The Infrared Absorption Spectrum of Carbon Dioxide Ice

by

Gary Bruce Hansen

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Doctoral Dissertation

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Abstract

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Chairman of the Supervisory Committee: Professor Stephen G. Warren
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The behavior of frozen carbon dioxide in the Martian polar caps is partly controlled by its optical properties. Modeling of polar deposits and clouds for the interpretation of remotely sensed measurements and for climatic energy balance calculations requires optical constants for CO_2 ice. Although thin film samples have been used to measure the real and imaginary indices of refraction in the strongly absorbing infrared wavelength bands and the real index in the visible wavelengths, very little accurate information has been available for the much weaker absorption between the strong bands. These weak absorption coefficients determine the emissivity of CO_2 frosts, such as in the Martian seasonal polar caps. A laboratory experiment was undertaken to improve on and extend the wavelength range of the previous data by measuring the transmission through thick samples of high quality, and determining the spectral absorption coefficient in wavelength regions of low absorption in the infrared spectral range 1.8–333 μm (30–5555 cm^{-1} in wavenumber). The optical path length between the two window surfaces in the sample chamber was adjustable from 1.6 to 107.5 mm in 5 geometrically spaced increments. The path length range allowed for accurate measurement of absorption coefficients from about 0.1 to 4000 m^{-1}. Three window materials (CaF_2, CsI, and crystal quartz) were used to span the measured wavelength range. A technique was developed to grow clear, thick CO_2 ice samples from the gas at a temperature of 150 K. The most important aspect of growing clear ice samples was strict control of the temperature. Techniques were developed to quantify the scattering of light by these samples; it typically contributed less than 20% of the total extinction. The spectral absorption was measured using a Fourier transform spectrometer. Four beamsplitters and three detectors were used to cover the wavelength range. The finest wavenumber resolution used was 0.14 cm^{-1}. Wavenumber calibration was accomplished by examining water vapor absorption lines in the spectra.

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Chapter 1.

Introduction

Carbon dioxide is a significant component of the atmospheres and near-surface regions of the terrestrial planets, and exists in smaller quantities in the atmospheres and surfaces of some of the icy solid bodies in the outer solar system. Solid CO_2 exists currently on numerous bodies in the outer solar system and in the polar regions of Mars. Carbon dioxide ice was a suspected component of the seasonal polar caps on Mars, but it was not until around 1970 that it was positively identified from astronomical spectra (Larson and Fink, 1972) and spacecraft spectra (Herr and Pimentel, 1969; Pimentel *et al.*, 1974). Since CO_2 is expected condense at 140–150 K at the atmospheric pressure of Mars, its presence was also inferred by finding infrared brightness temperatures in that range (Neugebauer *et al.*, 1969; Kieffer *et al.*, 1976). The Mariner 9 infrared spectrometer and the Viking infrared radiometer also provided evidence of the unexpected persistence of CO_2 frost in the residual south polar cap throughout the southern summer (Paige *et al.*,1990; Kieffer, 1979). Detailed analysis of the infrared radiometer measurements of the Viking orbiters indicated that the polar night radiance temperatures at 20 μm were, in fact, well below the expected equilibrium condensation temperature (Kieffer *et al.*, 1976; 1977) and this discovery inspired a contemporary experiment to measure the infrared absorption of thick samples of CO_2 ice (Ditteon and Kieffer, 1979), which is a precursor to the experiment described in this dissertation.

Solid CO_2 has also been detected or inferred to occur with an abundance of a few percent on the surface of comets (Delsemme, 1988) and the large satellite of Neptune, Triton (Cruikshank *et al.*, 1993), although it has not been detected on a similar primitive body, the planet Pluto (Owen *et al.*, 1993). The spectroscopic detection of CO_2 ice at these abundances is enhanced very little, if at all, by the new measurements comprising this dissertation, as discussed below.

Although CO_2 ice clouds may occur currently in the winter hemisphere of Mars (James *et al.*, 1992), they probably have no definitive thermal infrared signature (Forget, Hansen, and Pollack, 1995; reproduced in Appendix D). In earlier epochs, however, clouds of condensed CO_2 might have been very widespread and optically thick (with as

yet not fully understood radiative effects on climate) on both Mars (Kasting, 1991) and Earth (Caldiera and Kasting, 1992).

The optical constants of CO_2 ice are needed for radiative modeling of surface deposits or clouds that contain CO_2 ice. The optical constants are the real and imaginary parts of the complex index of refraction $\tilde{n} = n + ik$ which is a function of wavelength, λ, and, for birefringent materials, the angle between the plane wave polarization and the unique crystal axis. The imaginary part of the index of refraction is related to the linear absorption coefficient α (units of inverse length) as $\alpha = (4\pi k)/\lambda$. Unlike water ice, which has strong absorption throughout the thermal infrared, CO_2 ice absorbs strongly in only three narrow bands in the middle infrared and two lattice absorptions in the far infrared, and has very weak absorption in the spectral intervals between these bands. For small particles or small abundances, absorption coefficients in the highly-absorbing bands, which are measurable only by observing thin films of ice, are all that is necessary for radiative computations, since photons will never travel long distances through the ice material. However, if there are large particles or large optical depths of CO_2 ice, such as is found in the Martian seasonal polar caps, the emissivity (and reflectivity) of the cloud or deposit is strongly influenced by the absorption between the strong bands (Warren *et al.*, 1990).

Warren (1986) reviewed the previous measurements of the optical constants of CO_2 ice over all ranges of absorption and wavelength. More recent measurements of thin films of pure CO_2 ice have been made by Hudgins *et al.* (1993) from 2.5 to 20 μm and Johnson and Atreya (1993) from 20 to 200 μm. Although the agreement among the many measurements of the strong bands is not always good, the lack of quality measurements of the weakly-absorbing regions in the infrared is the greatest impediment to the accurate radiative modeling of the Martian polar regions and of clouds in the early greenhouse atmospheres of Earth and Mars. The only measurements in the moderate- and weakly-absorbing wavelengths of the solid CO_2 spectrum with samples more than a millimeter thick were made by Egan and Spagnolo (1969) (0.3–1.0 μm), Ditteon and Kieffer (1979) (2.5–28 μm), and Gaizauskas (1955) (6.6–8.6 μm). Egan and Spagnolo used a 10-mm-thick sample of commercial dry ice, clarified by the addition of water and oil, to measure

absorption and refractive index at visible wavelengths. The ice samples of Ditteon and Kieffer were cracked and rough and apparently scattered as much light as they absorbed in the transparent regions. The amount of scattering was estimated both by Ditteon and Kieffer and by Warren (1986), but very large uncertainties remain in the derived absorption coefficients. The samples of Gaizauskas (1955), on the other hand, were very clear and allowed for accurate measurements, but only in the narrow wavelength range he was studying (the ν_1 band near 7 μm). These are good measurements for comparing with new data, in spite of their coarse spectral resolution (3–5 cm^{-1}).

The measurements described in this dissertation were undertaken to obtain accurate absorption coefficients of CO_2 ice in weakly-absorbing wavelength regions by means of transmission spectroscopy on millimeter- to centimeter-thick samples of clear ice. This was done over the wavelength range from 0.170 to 333 μm using five sample thicknesses from 1.6 to 107.5 mm. The spectroscopy was accomplished using a grating monochromator for shorter wavelengths and a Fourier Transform Spectrometer (FTS) for the infrared wavelengths. An overview of the coverage of this wavelength range by both experiments, including information on sources, beamsplitters, filters, and detectors is given in Figure 1-1. This thesis reports the results of the FTS experiment, 1.8–333 μm. Measurements were also completed over the wavelength range 0.17–1.8 μm, using primarily the monochromator, and processing of these data to obtain estimates of the absorption and its uncertainty are underway. A progress report on that project is also included in this thesis (Chapter 5). All of the experimental work was carried out at the Jet Propulsion Laboratory (JPL) in Pasadena, California.

Chapter 2 addresses the mechanical and optical arrangements, the preparation of samples of CO_2 ice for measurement, and general techniques of spectroscopic measurement with the FTS. Complex and specialized analysis techniques used in the reduction of the raw data are described in Chapter 3, including the method of estimating absorption coefficient using transmission measurements from many thicknesses, and special Fourier transform processing required for spectra in both the longest and shortest wavelength ranges, and at the highest resolution. Chapter 4 presents the derived absorption coefficients and

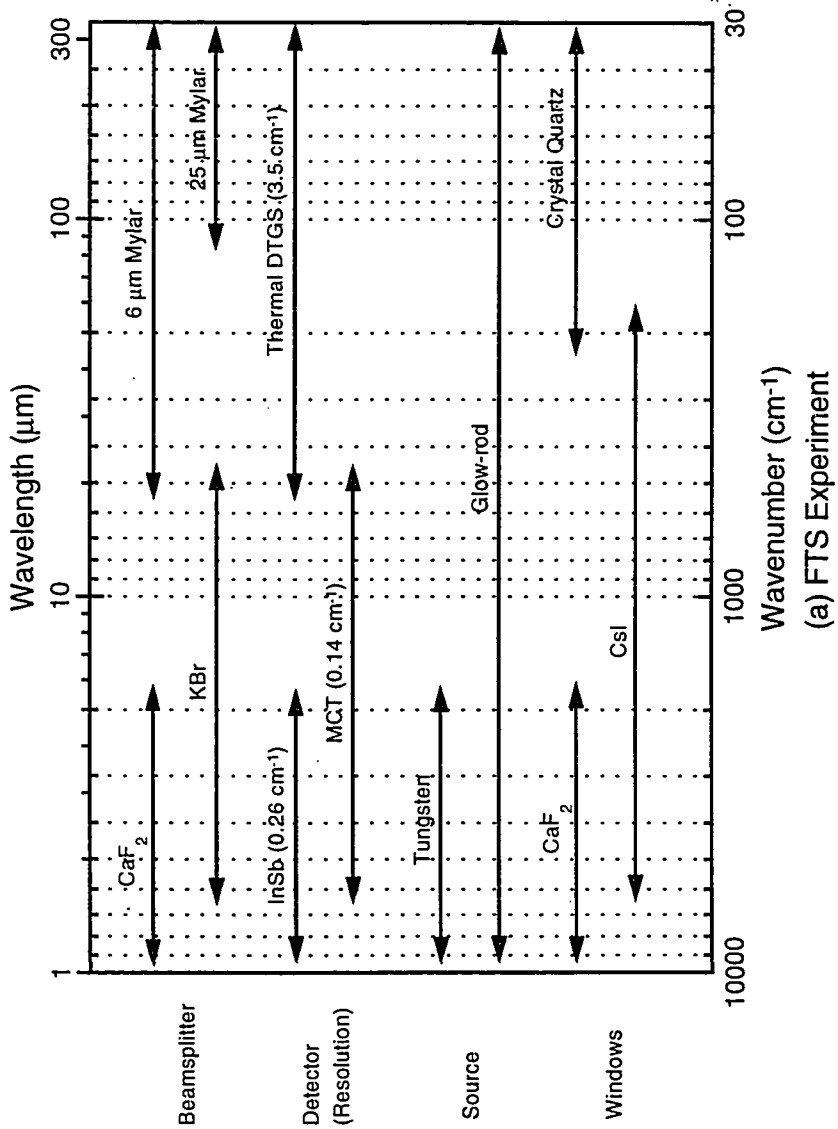
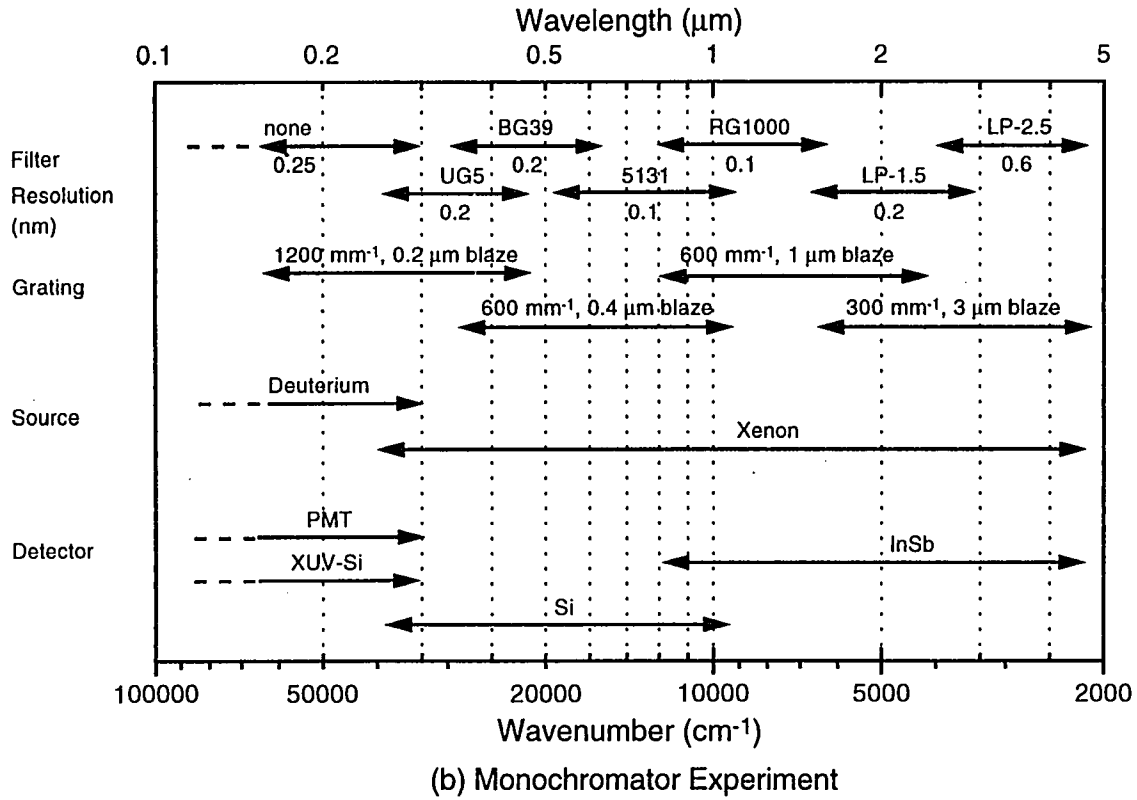


Figure 1-1. Wavelength ranges of each of the components in the measurement of the spectral absorption of CO_2 ice. (a) The FTS system.



(b) Monochromator Experiment

Figure 1-1. (continued)Wavelength ranges of each of the components in the measurement of the spectral absorption of CO_2 ice. (b) The monochromator system

their error estimates over the wavelength range 1.8–333 μm, limited to a maximum absorption of 4000–5000 m^{-1}. Comparisons which can be made between the new data and previous measurements also appear in Chapter 4. A complete description of the optical configuration and technique for monochromator measurements is given in Chapter 5, along with a brief description of the salient features of the spectra in the 0.17–1.8 μm region. Chapter 6 summarizes the future work that can be done using this new data.

Chapter 2.

Experimental Apparatus and Methods

2.1 INTRODUCTION

The main purpose of this investigation was to measure the absorption coefficient of CO_2 ice in wavelength regions where it is relatively small. To make an accurate measurement of the absorption, the amount of volume and surface scattering from an ice sample must be minimized, and this must be accomplished for samples exceeding one centimeter in path length. Many workers have succeeded at growing thin films ($< 100\,\mu m$) of CO_2 ice which are of good optical quality, and useful for measuring the strong absorption bands, but only a few reported measurements of samples greater than 1 mm thick, all of which are mentioned in Warren's (1986) review. These include a 10-mm sample, clarified by the addition of water and oil, used by Egan and Spagnolo (1969) for absorption measurements in the visible wavelengths, and 1.7- and 4.2-mm samples grown by Ditteon and Kieffer (1979) for measurement of absorption in the 2.5–25 μm wavelength region.

A number of researchers over many years at the University of Toronto were successful at growing clear samples of CO_2 ice up to 3 mm thick, using equipment designed by Gaizauskas (1955). Quantitative absorption measurements were made by Gaizauskas, and later qualitative studies of spectral structure with finer spectral resolution and wider temperature range were made by Blest-Castillo (1970) and Mannik and Allin (1972). Those experiments used a thermally insulating plastic cell surrounding a temperature-controlled cold surface, and the ice was grown from vapor at or near atmospheric pressure. All of these workers emphasized the sensitivity of ice samples to temperature changes, in part due to the high coefficient of expansion of solid CO_2 ($4.3 \times 10^{-4}\ K^{-1}$).

Partly because of the positive results of Gaizauskas, and partly in order to view the growing ice samples, I decided to make the main structure of the sample chamber out of fused quartz, a thermal insulator. To test this method, I made a small fused quartz chamber sealed to a copper top which was screwed to the cold finger, and discovered that good quality ice could be grown from a gas at ~160 K, and would stick to the copper as long as the low temperature was maintained. The layout of the chamber, largely dictated by the

geometry of an existing vacuum chamber available for this work, required the refrigerator cold finger to be at right angles to the optic axis. The samples were grown downward from a surface parallel to and in close thermal contact with the cold finger tip, which was set just above the optic axis. The source beam was directed through the sample towards a detector 180° away. The ice grew between two windows in the sample chamber whose path length was determined by mechanical means. In order to limit the heating load on the cold source and minimize the number of surfaces on which the CO_2 ice would grow, there were only a few small heat-conducting copper parts in the chamber, all concentrated in the center where the ice grows, including the cold top and frames around the windows. The sample chamber was built with interchangeable parts which allowed setting it up for many different sample thicknesses using the same fused quartz envelope and window attachments.

The ice samples were illuminated with the output from the monochromator or FTS, and the transmitted light collected and measured by the detector. A reference path that employed movable mirrors to direct the input beam around the sample chamber to the detector was designed to account for source instabilities in the monochromator experiment. This path was used in the FTS experiment for reference spectra, which are used to remove the instrument spectral response and to cancel residual gas absorption lines present in the purged FTS enclosure.

2.2 Description of Sample Chamber

The chamber for this experiment had a fused silica envelope made with a 1.5-inch vertical tube crossed at right angles with 1-inch tubing. The top and bottom were fitted with flanges for O-ring seals, and the horizontal tubes were sealed with Swagelok tube fittings. A schematic cross-section of the chamber is shown in Figure 2-1 and a photograph in Figure 2-2. The copper piece which was fitted to the cold finger was mounted inside the larger tube just above the optical path defined by the 1-inch tubes. It was placed in that position by a nylon offset tube to which it was screwed, the joint sealed by an O-ring. This assembly was clamped to the top using two O-rings. The bottom plate was

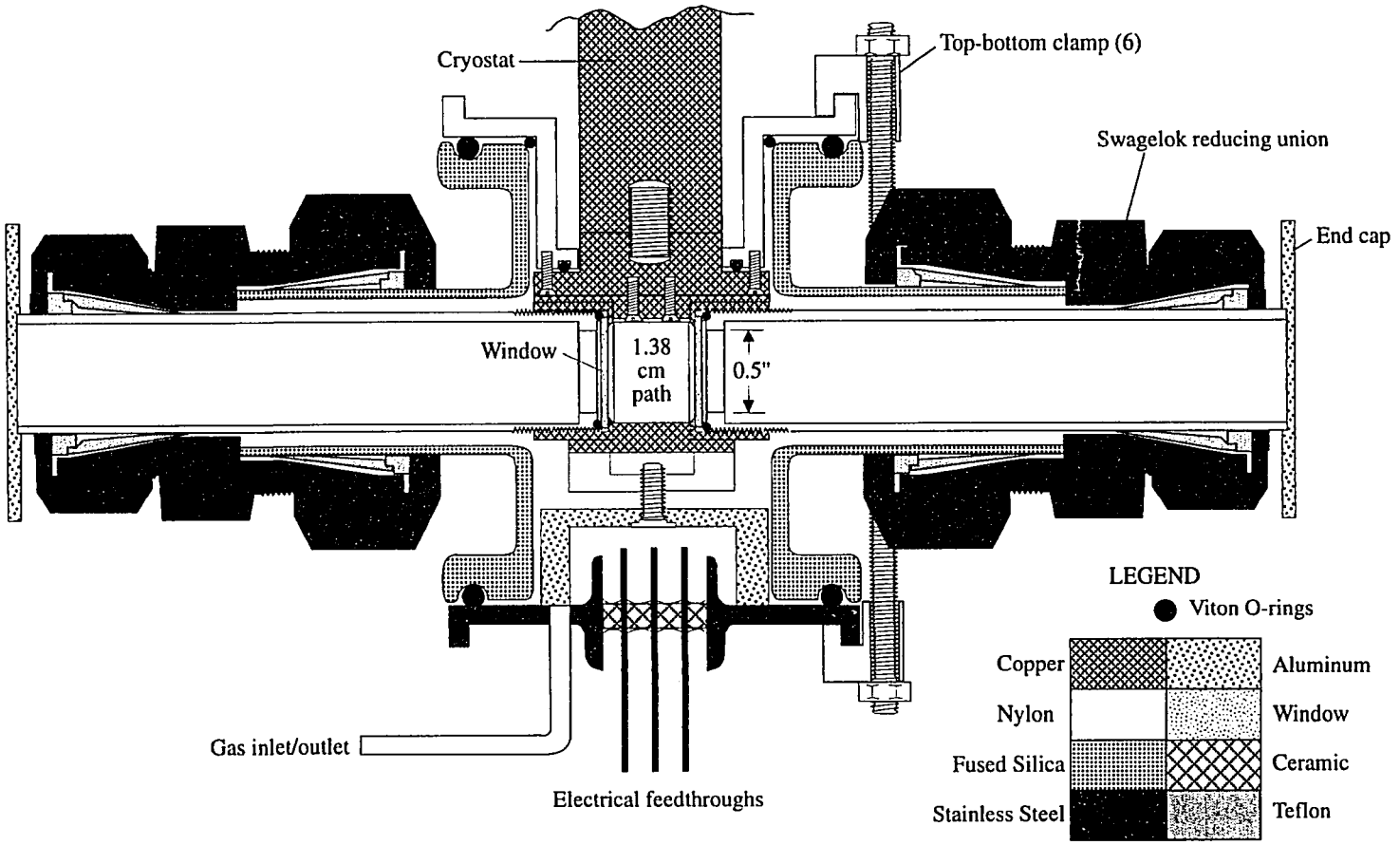


Figure 2-1. Schematic cross-section of sample chamber in which CO_2 ice was grown. Materials used are indicated in the legend. The path length shown is 13.8 mm. Other paths are achieved by moving the window tubes inward or outward and resting them against different central copper pieces. The ice grows from the copper pieces screwed to the cryostat across the space between the windows.

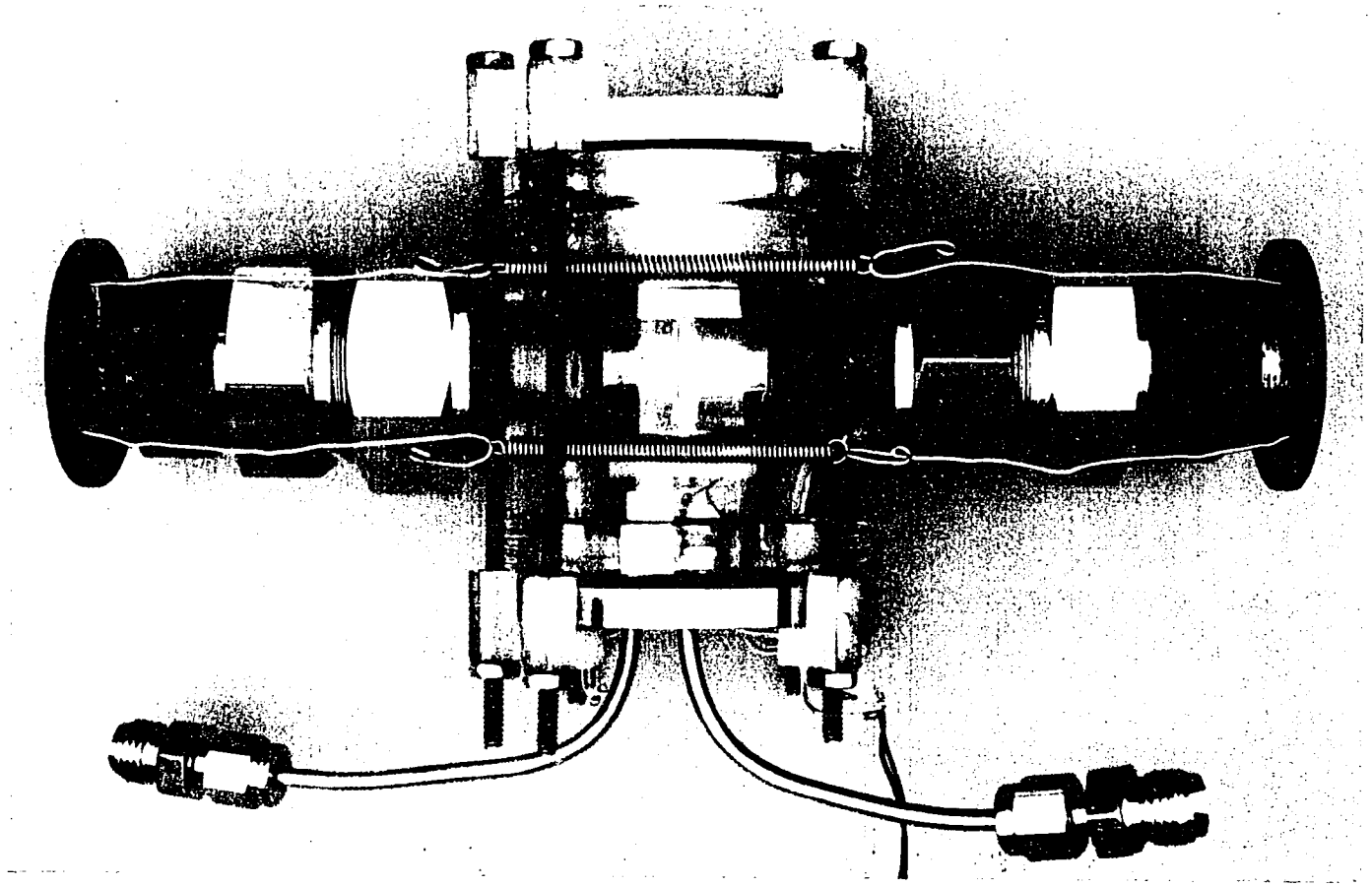


Figure 2-2. Photograph of the sample chamber. The path length is set to 4.6 mm in this image, and is made more visible by sliding one of the clamps out of the way. The end flanges wired together with springs, which are described in detail in the text, are clearly visible here.

made of stainless steel and had two gas tubes and an electrical feedthrough for temperature sensors attached. It was clamped to the bottom flange with a single O-ring. An aluminum and nylon screw jack to support and position the bottom cross-piece rested on the bottom plate.

The optical windows were mounted on ¾-inch tubing made of black-colored nylon which had an outside screw and O-ring grove on one end. The 0.7-inch diameter windows were clamped over the O-ring with a screwed-on copper cap. The web that held the window was chamfered at 45° to facilitate ice-window contact at the edges and had a thickness of $^1/_{32}$ inch, which prescribed the minimum path length ($2 \times {}^1/_{32}'' = {}^1/_{16}'' = 1.6$ mm). Small grooves were cut into the front surface of the window frames to allow gas flow into the space when the windows were clamped together. The front edge of the window frames and the back of the O-ring support at the tube end were both cut to a diameter of ½ inch, which was the smallest aperture in the optical path. The window tubes were sealed to the silica chamber via a ¾- to 1-inch Swagelok union which was bored out to allow passage of the window tubes. The sealing ferrules were made of Teflon, and all other O-rings were made of Viton.

The optical path length was set by parts attached to the copper top plate and corresponding bottom spacers attached to the bottom jack. The minimum path as stated above was 1.6 mm, and the maximum path was defined roughly by the distance between the windows when the window holders were pulled out all the way into the Swagelok fittings, 107.5 mm. The overall size of the chamber was constrained by the inside diameter of the surrounding vacuum chamber, ~16 inches. With the inclusion of the reference path mirrors at each end of the chamber, special short window tubes for the 107.5-mm path were needed. Three intermediate path lengths geometrically spaced between the extremes (4.6 mm, 13.8 mm and 41.3 mm) were specified. For the three shortest paths, a single copper adaptor that fit snugly to the window caps was made. For the longer paths, a separate semi-tubular copper part which extended part way down the optical path was screwed to the top block. In all cases, a copper rectangular or semi-tubular (for the longest path) bot-

tom spacer was rested on or screwed to the bottom jack to provide additional dimensional control and, for the shorter paths, compression of the window caps to the upper plate.

The actual path difference stated above was not that designed into the parts but rather the measurement from a special jig designed to support two nylon-tipped rods which slid into the end tubes of the assembled chamber, measuring the spacing at seven different locations on the ½-inch diameter aperture. The path length plus the thickness of the windows and the length of the rods was measured with a 6–12-inch micrometer. The measured thicknesses were very close to the designed ones, with the differences attributable to misalignments in the orientation of the various parts of the fused quartz envelope. The uncertainty in the path length was typically 30–50 μm. The impact of this uncertainty on transmission is less than instrumental noise except for the two shortest paths. Fractional uncertainties of up to 4% in the 1.6- and 4.6-mm thicknesses are compensated for in the process that estimates the scattering from each thickness, and are not considered to contribute to the error in the absorption coefficient. The large spectral overlap region between measurements with the KBr and CaF_2 beamsplitters measurements allowed for the approximate determination of the true path lengths for the 1.6- and 4.6-mm thicknesses for these measurements. This is possible because absorption coefficients in the middle range can be determined with little uncertainty due to error in path length for the thicker samples. When these were compared to the measurements of the thinner samples, it was determined that the thinnest sample in the KBr experiment was very close to 1.6 mm thick, while that in the CaF_2 experiment was about 2.1 mm thick. Similarly, the second thinnest sample in the KBr experiment was determined to be close to 4.6 mm thick while that in the CaF_2 experiment was about 4.8 mm thick.

There was provision for two platinum-resistor temperature sensors (Lake Shore model PT-100) near the ice sample: one in the side of the upper adaptor disk and one in the bottom cross piece. Both were wired through the bottom feedthrough. In practice, only the top one was used regularly. Often, the bottom one was omitted to simplify assembly of the sample chamber. The top one indicated the temperature difference between the ice at the top of the chamber and the temperature at the end of cold finger (usually about

0.2 K). Simple two-wire resistance measurement was used, and offsets due to wire resistance and other factors were corrected *a posteriori.*

One of the problems with this chamber was its moderately high leak rate, due to the many O-ring seals that had to function at low temperatures. The ice samples grew at temperatures above 150 K in equilibrium with vapor, which was at pressures of 1–50 torr, depending on temperature at the bottom of the ice sample. The chamber leakage, which was proportional to its internal pressure, reduced the amount of gas available for condensation and increased the vacuum pressure. The surrounding vacuum, necessary for the proper operation of the refrigerator, had to be kept at low pressures to avoid damaging the turbopump. Minimizing this leak rate allowed operation at higher chamber pressures and more constant sample growth rate (and thus latent heat generation) over long periods of measurement. The minimization of this leak rate required careful assembly with clean seals and substantial tightening of all joints. The original design at times leaked so much that the growth of the sample was effectively arrested once the pressure rose to a certain level. These problems were lessened after two design changes were made: a second O-ring was added to the top cover, and the separate top and bottom clamps were combined into single devices which clamped top to bottom via a threaded rod.

In the original implementation, the window tubes were snugged up against the central alignment surfaces and the end nuts were tightened to hold them in place. It was soon discovered that the expansion and contraction of the ice and the pressurization of the sample chamber led to displacement of the windows, sometimes by significant amounts. This led to uncertainty in the path length, separation of the ice from the windows, and poor thermal contact of the window frames to the cold surface. End flanges to the tubes were fashioned and these were wired together in an effort to solve this problem, but this eliminated only the large displacements. Small displacements (0.5 mm) still occurred. The end flanges were then connected by strong extension springs, resulting in an effectively fixed position for the tubes. But this, although it solved the problems of dimensional uncertainty and poor conductivity, still caused excessive separation of the ice from the window surfaces due to small temperature oscillations described below in section 2.4. The final solution

was to connect the end flanges with a moderate springs stretched so that the windows could move a fraction of a millimeter with the ice but still maintain good dimensional and thermal stability (see Figure 2-2).

Three window materials were used for the majority of the experiment: calcium fluoride (CaF_2), cesium iodide (CsI) and crystal quartz (SiO_2). The properties of these materials as used in this experiment are listed in Table 2-1. Two other window materials were

Table 2-1. Window materials used in the experiment

Window Material [Crystal Class]	Useful [Used] Transmission Range	Notes
Calcium Fluoride (CaF_2) [Cubic]	0.123–9.50 μm [0.140–5.90 μm]	Hard, somewhat brittle.
Cesium Iodide (CsI) [Cubic]	0.23–70.0 μm [1.80–58.0 μm]	Soft, very hygroscopic (loses polish at relative humidity >30%). Variable hydration absorption near 3 μm raises uncertainty of measurements near that wavelength.
Crystal Quartz (SiO_2) [Hexagonal]	0.19–4.50 μm 42–>500 μm [50–333 μm] Strong absorption of ordinary ray at 78 μm (128 cm^{-1})	Hard, durable. Birefringent: used windows were cut perpendicular to the c-axis (Z-cut) so normally incident rays of any polarization are ordinary

briefly tried, sapphire (Al_2O_3) and fused silica, but they were used for only a few samples each. All three materials formed adequate interfaces with CO_2 ice, with the crystal quartz having the most imperfect interface. All windows were plane-parallel, and channel fringes were observed with the CsI and CaF_2 windows. After ratioing samples to blanks, the fringes were less than 1–2 % of the signal for CsI windows, and were easily smoothed over. The fringes from the more highly polished CaF_2 windows were much more promi-

nent in the blank measurements than in the ice measurements, and needed to be removed from the ratio measurements. This process is described in section 3.5.

The CsI windows were extremely hygroscopic, so they required special handling procedures. In order to allow final assembly of the sample chamber with the CsI windows and to allow opening of the vacuum system or purged FTS (which were connected by a large CsI window) for alignment, a plastic-covered housing was made that surrounded the experiment as well as a small space for chamber assembly. A low-cost commercial dehumidifier was placed inside and run whenever assembly or alignment were undertaken. Thus, the relative humidity was maintained between 10% and 30%. A temperature-controlled heat gun was directed over specific work areas to further reduce the humidity. After the end of the measurements with the CsI, all of the windows retained a good polish except for the large window on the FTS (purged) side. The CsI is also relatively soft, and one window was gouged by a subliming ice sample and had to be replaced.

Since the fused silica envelope of the sample chamber absorbs like a blackbody in the thermal infrared, it was necessary to make a movable radiation shield to surround the chamber (all except the optical path and bottom) to limit the radiative heating of the ice near to or in contact with the envelope. This shield was made of aluminum and plated with gold and is visible in a photo later in the chapter (Figure 2-8). It was raised only when inspecting the quality of ice samples from the side. There are temperature gradients across the ice sample due to latent heat generated by condensation, but radiative heating of the sample can be comparable to or larger than the latent heating. Thus, use of the radiation shield minimizes the thermal gradients in the sample and increases the available capacity of the refrigerator for temperature control.

2.3 Mechanical Setup

The sample chamber was enclosed by a cylindrical vacuum chamber with inner dimensions of 400 mm diameter by 300 mm high. The cryostat was mounted in the center of the top cover, and there were 12 ports around the circumference of the bottom half of the cylinder. The cryostat was positioned so that the mounted sample chamber was in line

with two of these ports. The chamber was pumped through a 100-mm manual gate valve by a Balzers pumping system consisting of a 270 l/s turbo-molecular pump and a 12 m^3/hr rotary vane backing pump. The pumping system was able to attain pressures of ~10^{-6} torr at room temperature and high <10^{-6} torr with the cryostat on (due to additional "pumping" provided by its upper stages).

Two of the side ports were used for inlet and exit of the optical beam. The use of these ports is discussed in section 2.5. Two others were used for manually pivoted inspection mirrors by which light from a large window port 90° from the optical axis could be directed through the optical axis. When the reference mirrors were moved to the top, these mirrors could be pivoted into position, allowing viewing of the ice sample through the optical axis with room light or a flashlight. The mirror at the detector side of the sample chamber was also used for checking and adjusting the alignment of the sample chamber with the input beam. One of the mirrors was slightly concave so that the view of the sample chamber was magnified. The large side window was also used for viewing the ice from the side when the radiation shield was raised. There were two ports where ¼-inch tubing feedthroughs were mounted which were connected to the gas ports of the sample chamber through flexible metal tubing. A third port with a ¼-inch fitting was provided as a vacuum "drain" for the gas system. Finally, one port was used for electrical feedthroughs (temperature sensors). Photographs of the assembled system are shown in Figures 2-3 and 2-4.

A sliding rod at the top of the chamber was connected to the radiation shield and was used to raise the shield about 3 cm for sample inspection. Also at the top was a motor mount and two rotary feedthroughs used in the reference mirror system described in section 2.5. The cryostat was mounted with a double o-ring seal onto the top of the chamber. It could be raised up or down to adjust the level of the sample chamber. The upper shroud of the cryostat was fitted with electrical feedthroughs for the cryostat tip temperature sensors and heater, and a 25-mm tube fitted with the MKS ion gauge used for vacuum measurement.

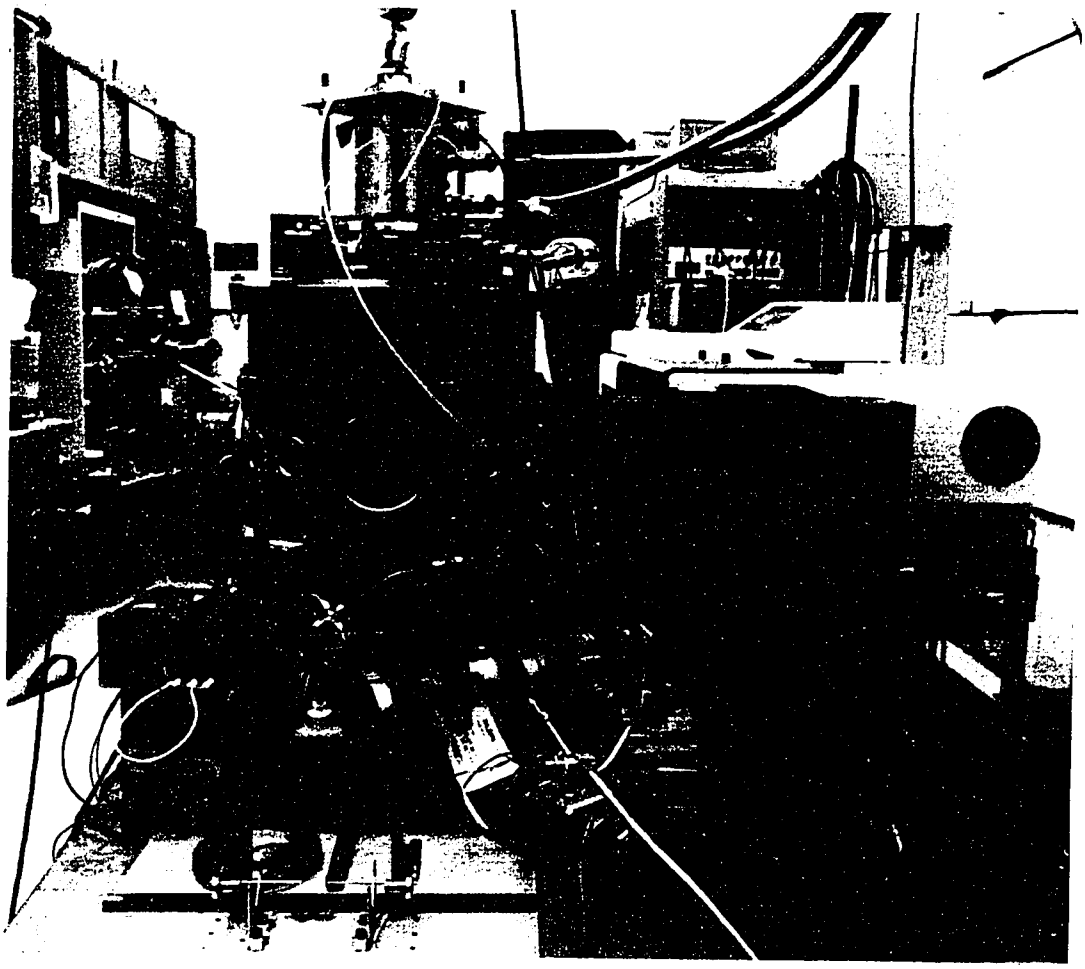


Figure 2-3. Photograph of FTS setup, front. The FTS is on the right, with the black rectangular box housing the input mirror facing the camera. The uncovered inspection window is visible on the front of the vacuum chamber on the left, and the detector mirror box and detector are visible at the left side of the chamber. At the extreme bottom of the image is the apparatus for measuring the path length of the sample chamber.

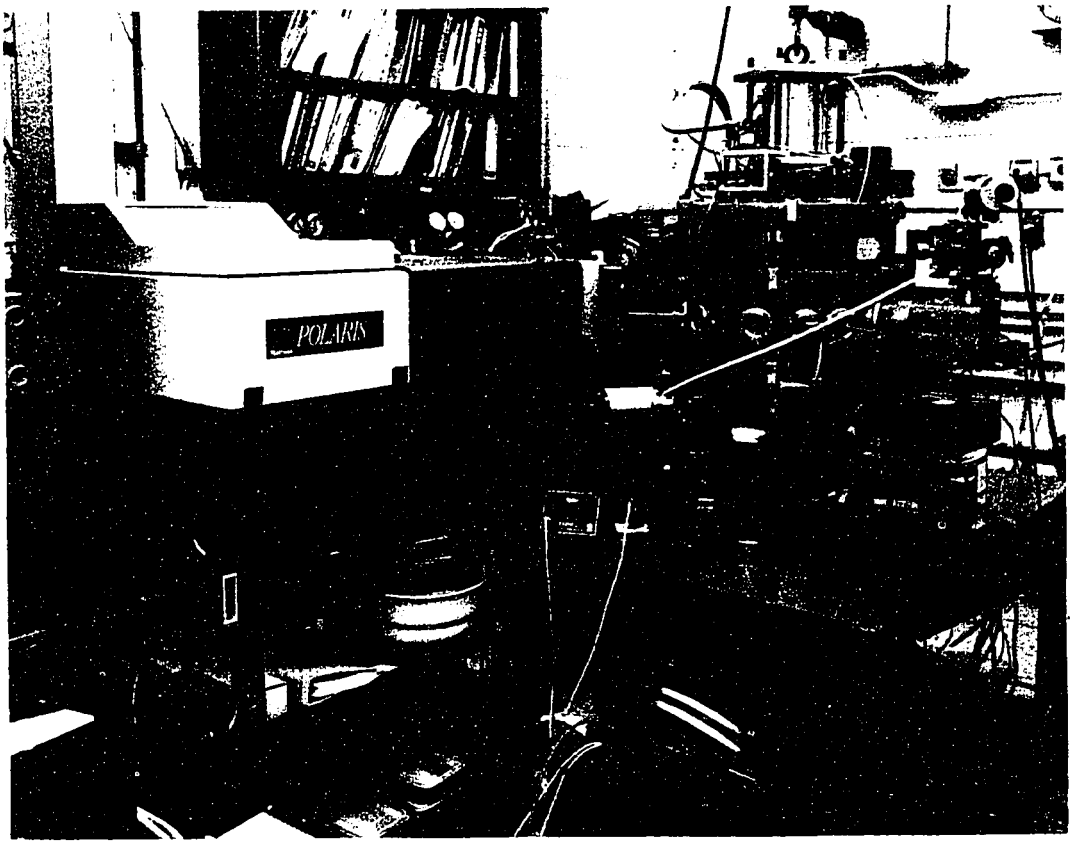


Figure 2-4. Photograph of the FTS setup, rear. The front panel of the FTS is visible on the upper left, while the vacuum chamber is to the right. When operating with the cesium iodide windows, the entire apparatus was enclosed by a plastic covered structure to control the humidity.

Strict control of the sample's temperature was critical for this experiment (discussed in section 2.4 below), and a number of different configurations were used to achieve this. The cooling system was an Air Products Displex CSW-202 closed cycle refrigeration system consisting of a water-cooled compressor and a two-stage expander module which, with a working fluid of 99.999% helium at 330 p.s.i. discharge pressure, was capable of reaching 10 K at the cold finger tip. When in top operating condition, there was 0.4–2.4 W of heater power (equivalent to excess cooling capacity) used to keep the tip temperature at 148 K with the full radiative and latent-heat load of various samples. The minimum temperature attainable with the sample chamber and ice was about 120–130 K.

Two temperature control systems were used, both of the Proportional-Integral-Derivative (PID) type. The first, used only for samples before January 1992 (when it failed), was an Air Products APD-E controller which used a Chromel-Gold thermocouple as its temperature sensor and 50-ohm Kapton film heater elements. This system could control temperature to about ±0.2 K. This was replaced with a Lake Shore model 320 temperature controller with automatic or manual, P, PI, or PID dynamic control. The temperature sensor for this controller was a 2-point calibrated silicon diode sensor (DT-471-LR-2S) accurate to within 0.2 K from 70 to 300 K. The heater was 35 Ohms of Manganin (13% Mn, 4% Ni, 83% Cu) wire wound around the tip of the cryostat (the Kapton film heaters burned out too readily). The automatic control mode turned out to be too unstable for this purpose, so a number of manual settings were tried to make the controller as "stiff" as possible. After considerable experimentation, I found that the best performance occurred when the Gain(P) was set to 150-300, the Reset(I) set to 60–80 (based on the heater time constant), and the Rate(D) set to 0.

The CO_2 gas supply and exhaust system is outlined in Figure 2-5. I used two different cylinders of liquid CO_2, one from Big Three Industries which had <10 ppm total impurities with <8 ppm of H_2O, and one from Alphagaz which had <20 ppm total impurities but only 0.5 ppm of H_2O. The remaining impurities in these supplies do not condense at 150 K. CO_2 gas was supplied from the cylinder through a standard regulator at 4–8 p.s.i. to the micrometer valve at the inlet to the vacuum chamber. The ¼-inch supply line for

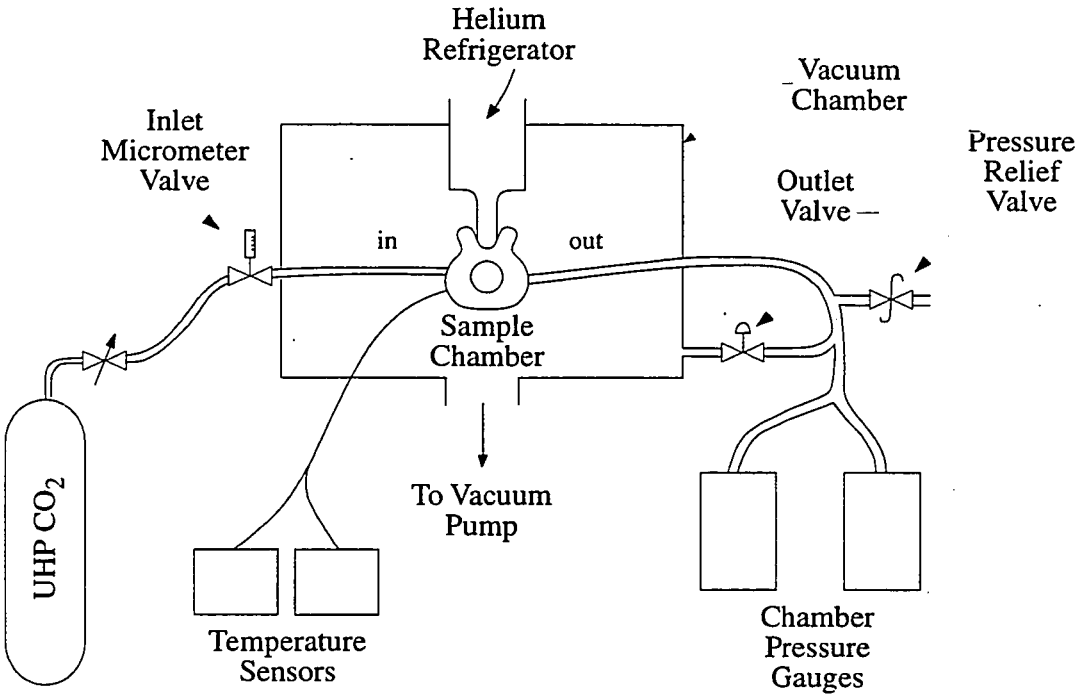


Figure 2-5. Schematic of gas flow and control system. The enclosed volume of the sample chamber includes the tubing from the inlet micrometer valve to the outlet valve, including the volume of the pressure gauges, and its pressure was measured by the gauges. The inlet valve was open and the outlet closed during growth and measurement and the inlet valve was closed and the outlet open during all other times.

much of the experimental work was made of Teflon, but this unfortunately allowed significant amounts of atmospheric water vapor to permeate through the tubing walls, enter the gas flow, and freeze onto the cold windows of the sample chamber. Before realizing that leakage through the supply line was the source of the unwanted water, I tried to remove it by a variety of cold traps placed before the inlet valve, including plain CO_2 snow, CO_2 snow mixed with isopropanol, and isopropyl acetate slush. None were successful. Since the CO_2 supply was under pressure, it froze out at a higher temperature than the CO_2 in the cold trap, which was at atmospheric pressure. If the cold trap line didn't clog with frozen

CO_2, it often warmed up to tens of degrees above the coldest optimum temperature (which would trap all but ~1 ppm of H_2O). These events caused reintroduction of water or uneven flow rate, both of which severely affect the sample quality (see section 2.4). Ultimately, the water contamination problem was solved by the replacement of the Teflon line with copper tubing, whose permeation coefficient for H_2O is four orders of magnitude lower than that of plastics.

The outlet tube from the sample chamber was connected to a $^1/_3$-p.s.i. pressure relief valve (for venting of sublimating CO_2 ice in the event of a power failure that might shut off the refrigerator and pump while unattended), a micrometer valve used for introduction of helium "carrier" gas for some low temperature experiments (see section 2.4), and two MKS diaphragm-type pressure sensor units, one for 0.0001 to 1 torr, and one for 0.1 to 1000 torr. This circuit was connected to a bellows valve through which CO_2 was "drained" into the vacuum chamber. This valve was fully open when the sample chamber was evacuated.

2.4 CO_2 Ice Samples

In the sample chamber I was able to consistently grow large samples of nearly clear CO_2 ice. This was accomplished by growing the ice relatively slowly in an environment where the gas is only slightly above the equilibrium vapor pressure of the ice at the temperature of the ice surface. The gas cools by molecular collisions in pressures greater than 1 torr before freezing on the ice expanding from the cold surface. These conditions are required for maintaining the quality of the sample. The growth rates were selected to minimize latent heat generation while still producing enough ice to fill the gap between the windows in a reasonable time. Samples were grown most quickly for the 13.8- and 4.6-mm paths due to the small amount of ice needed (~30 hr), but required longer times (>40 hr) for the larger samples and the 1.6-mm path. The 1.6-mm samples, due to the conduction in the cold "walls" of the space between the windows, grew in a concave manner, creating voids, unless the growth rate was sufficiently slow.

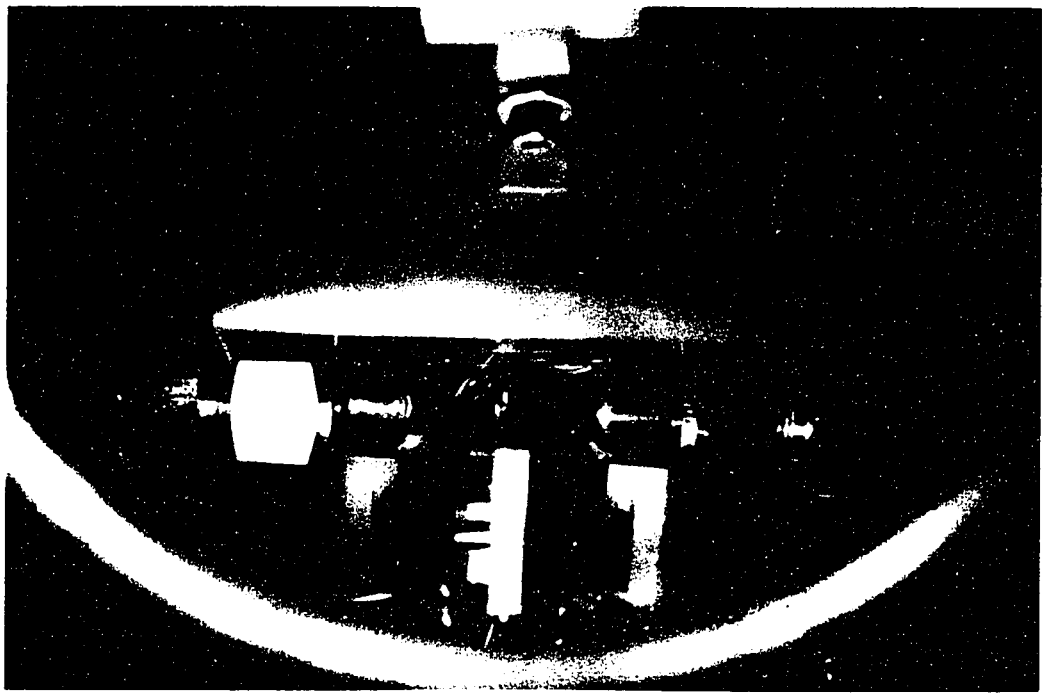


Figure 2-6. Photograph of 41.26-mm CO_2 ice sample in the sample chamber. The chamber is viewed from the side through the large inspection window, with the gold-plated radiation shield covering the upper parts of the sample chamber. The curved line visible below the window frames against the copper cross piece is the lower edge of the ice sample. The copper disk at the top is clearly visible through the ice.

The samples that showed high transmission always looked very clear when inspected from the side. The presence of ice was mainly visible by means of the excess refraction (Figure 2-6). The large samples, however, had small imperfections that were most visible when viewing through the optical path. These imperfections radiated from the screws securing the adaptor pieces to the top block. These scattering centers persisted even when contoured screw heads were used or when the screw holes and slots were filled with bits of tantalum foil. Most of the scattering, however, occurred at the ice-window interfaces. This scattering, which appeared as a set of interweaving thin lines across the interface, was evident with all of the window materials and was most visible when illuminated by a slightly off-axis bright beam. The 1.6-mm-path samples had the most scattering, espe-

cially with the CsI windows, where the bottom third of the sample did not fill smoothly, leaving dark arch-like structures. These samples had about 60% scattering extinction, but the scattering extinction of other samples was generally between 10% and 25%. Subsequent samples of the same path length had the same measured transmission to within a few percent (i.e., the scattering was repeatable).

Perhaps the most important factor in the production of high quality samples was the strict attention paid to temperature control of the sample. When there was a failure of the temperature controller which caused a temporary change of the top temperature by as little as 3–4 K, the sample became cracked and clouded and was not repairable by any simple method. In addition to holding the top temperature as steady as possible, it was also necessary to stabilize the temperature of the other parts of the sample by keeping latent heat generation and radiant heat absorption of the system as constant as possible. Therefore, the CO_2 flow rate was constant from the beginning of growth to the end of measurement (for a constant rate latent heat release), and the radiation shield was moved as little as possible (usually never) during the measurements. When I was using the cold trap in an attempt to eliminate the water contamination, there was often an interruption in the flow rate as the CO_2 condensed in the cold trap. This caused visible cloudy horizons in the sample wherever the flow was changed, demonstrating the sensitivity of the quality of samples to growth-rate changes.

Most of the samples used a cryostat temperature of 148 K, but some used 145 or 150 K. I also tried to grow ice at ~130 K, but the equilibrium pressure at that temperature is only ~0.25 torr, apparently too low to allow the gas entering the bottom of the sample chamber to cool collisionally before it reaches the ice surface. The samples grown this way were very cloudy. I tried to increase the conductivity of the gas in the chamber by adding ~10 torr of helium to the sample chamber through another valve. This pressure was hard to regulate since the input micrometer valve had to be just cracked open to balance the leakage of the sample chamber. Any small change in leak rate caused large changes in helium pressure. It was also impossible to determine the small partial pressure of CO_2 in this environment. The samples grown were of better quality compared to the

earlier 130 K samples, but maximum transmission was only 30–50% of warmer samples. The effort to measure samples of a significantly lower temperature was therefore abandoned. Samples could not be grown at a significantly higher temperature than 150 K because of the excessive leakage of the sample chamber at high pressures. This experiment was therefore limited to measurements of CO_2 ice at about 150 K.

The temperature structure of an ice sample grown at a constant rate in a constant radiative environment is a constant gradient of temperature from the warm condensing, radiating surface towards the actively cooled constant-temperature top. New layers of ice are deposited at increasingly warmer temperatures. The ice bottom temperature is approximately determined from the sample chamber pressure using the equilibrium vapor-solid condensation curve. The temperature gradient of samples is a function of the growth rate: small samples with slower growth rates had bottom-top differences of 2–6 K, while the larger samples had differences of 10–12 K. The average temperature of the central part of the samples sensed by the optical system was only 1–4 K warmer than the top temperature.

During growth, all of the sample sizes showed small deviations from a monotonic increase in sample chamber pressure due to temperature variations of a few tenths of a degree at the bottom of the sample. The 41.3-mm sample, however, exhibited a remarkable oscillation in this temperature, with peak-to-peak amplitude of 2 K and period of about 25 minutes. This oscillation was apparently the result of a resonant instability of the thermal time constant of a piece of CO_2 ice of that size and some physical forcing, such as the pressure regulator or temperature controller. It was probably not the temperature controller since I changed the dynamic parameters of the control over a large range with no effect. The optical result of this oscillation was a measurable change in transmission, so that at short wavelengths a $\pm 2.5\%$ variation occurs, with the highest transmission corresponding to the lowest pressure, while at wavelengths longer than 6 μm a similar variation occurs, with the highest transmission corresponding to the highest pressure. This amplitude of variation is consistent with the separation and reattachment of the ice-window interface at one end as the sample expands and contracts with the temperature oscillation.

If this separation was thin enough, interference of waves in the gap could explain the behavior with wavelength.

The best way to deal with this effect was to average over time and treat the average loss of transmission as a kind of scattering extinction. This was easy to do with the FTS data, which could be taken as "snapshots" at high and low pressure and averaged, or as long scans averaging over many pressure cycles.

Since the samples were grown continuously while being measured, there was a limit to how long samples could be maintained for the purpose of measurement. In most cases, measurements could be conducted for 36–48 hours after the windows became fully covered. This was long enough for the longest sequences of measurements needed, although the sample chamber pressure would often rise to 30–40 torr and a large CO_2 frost buildup from the leaking sample chamber would occur at the upper stage of the cryostat. The largest ice sample never extended more than several millimeters into the part of the sample chamber below the optical path.

2.5 Optical and Detection Setup

The output of the FTS was a large-diameter beam (4–5-cm diameter at the output port of the bench) whose f-number depended on the setting of the source iris inside the bench—the smaller the iris opening, the larger the effective f-number and the more collimated the beam. The smallest image that could be focused at the center of the chamber, if it was placed near the corner of the FTS and the output beam folded 90° past the side of the FTS into the chamber, was about 13 mm wide, even with the smallest iris opening. Therefore, it was necessary to interpose a field stop at the edge of the vacuum chamber to limit the beam size through the sample chamber. This stop usually cut out 60–80% of the flux from the FTS. Even with this stop, there was still some occultation by parts of the sample chamber, especially on the end towards the detector. The folding mirror was a 4-inch-diameter f/9 spherical gold reflector from Edmund Scientific. Since the FTS could not be evacuated, in order to seal the vacuum chamber, a window of the same material as the sample chamber windows was placed in the port of the vacuum chamber where the

input mirror box was attached. The FTS and mirror box were purged with nitrogen during measurements. A schematic layout of this system is shown in Figure 2-7.

I decided to add a reference optical path around the sample chamber to account for source instabilities. This path was also used as the "reference" measurement for the FTS spectra. Since the major optical layout was already made, the reference system was adapted to the existing constraints. This was accomplished by deflecting the beam to the back of the chamber opposite the inspection window, and thence back to the optical axis and towards the detector. This is illustrated in Figure 2-7. The mirrors on the optical axis were 2 inches in diameter, tilted at 22.5° from the optical axis. They were mounted on kinematic mounts attached to an optical rail assembly which allowed translation in all three axes for alignment. This assembly was bolted onto a vacuum-compatible translation stage which moved the mirrors into and out of the optical path. The two translation stages were driven over their 2-inch range by a ½-inch-lead ball screw. The optical mounts and translation stages were all from Newport Corp., except for a few specially machined adaptors. The ball screw assemblies were from Ball Screws and Actuators Co. The ball screws were driven through MDC FRM-125 rotary feedthroughs at the top of the chamber. These were driven in tandem by a pulley and timing belt system outside the top of the chamber and a Superior Electric M061 stepping motor. The motor was driven in half-step mode (400 steps / revolution) with a corresponding vertical resolution of ~10 μm per step. Figure 2-8 is a photograph of this apparatus.

The central mirror in the back of the chamber was designed for the monochromator experiment to maintain the focus of the system by refocusing the slit image that appears in the incoming beam (since the distance to the back of the chamber was longer than the distance to the center). The less-organized beam from the FTS did not focus properly this way. The best results for the FTS were obtained by using a flat mirror in the back which typically transferred about twice the flux through the reference path than through the direct path. The three mirrors of the reference system were purchased from Janos Technology and had chromium-gold surfaces.

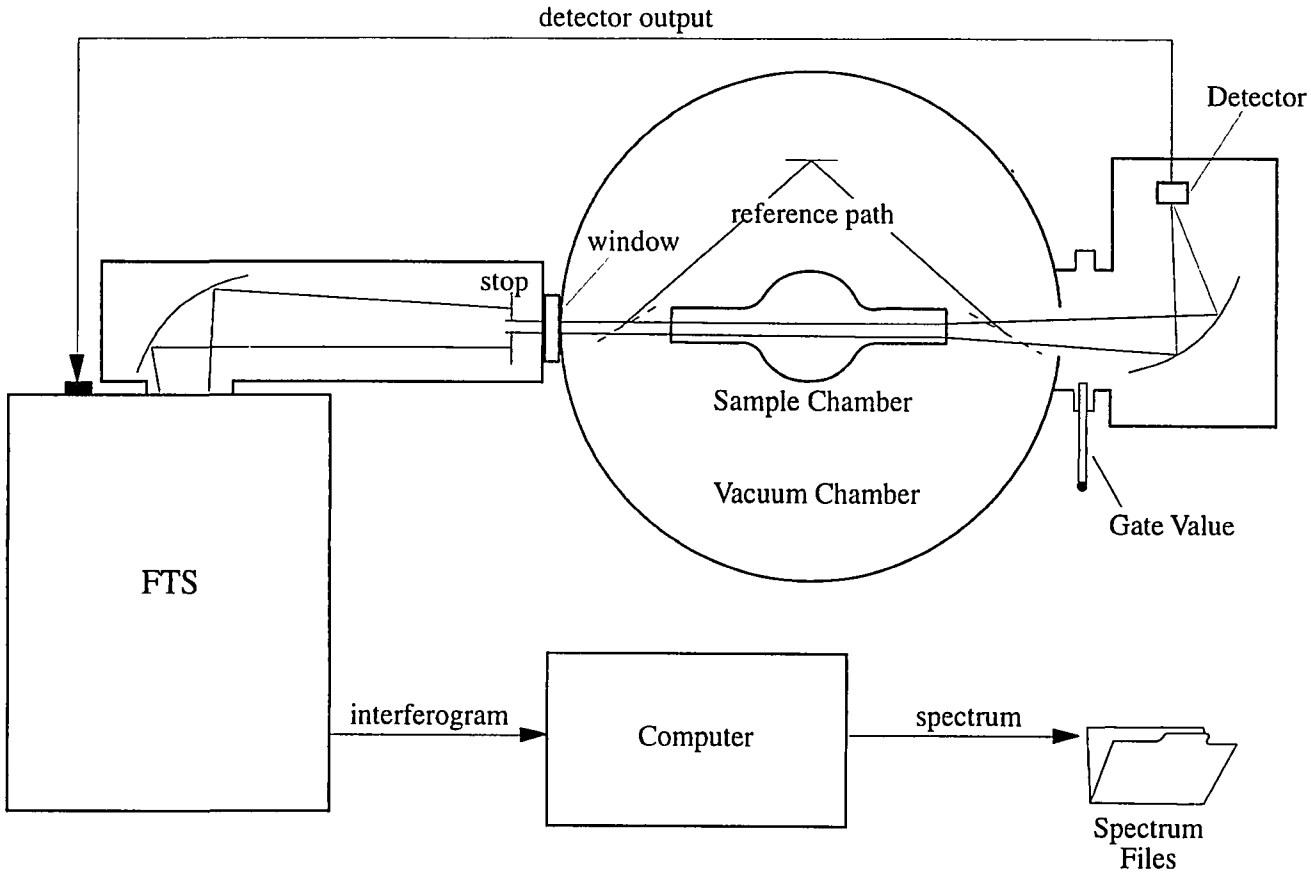


Figure 2-7. Optical layout schematic for FTS system. The beam from the FTS was focused towards the sample chamber, but much of it was restricted by an iris in front of the window into the vacuum chamber. The analog signal collected by the detector was passed to the FTS for sampling, and the discrete interferogram was sent to the computer by the FTS. The computer then performs all further processing.

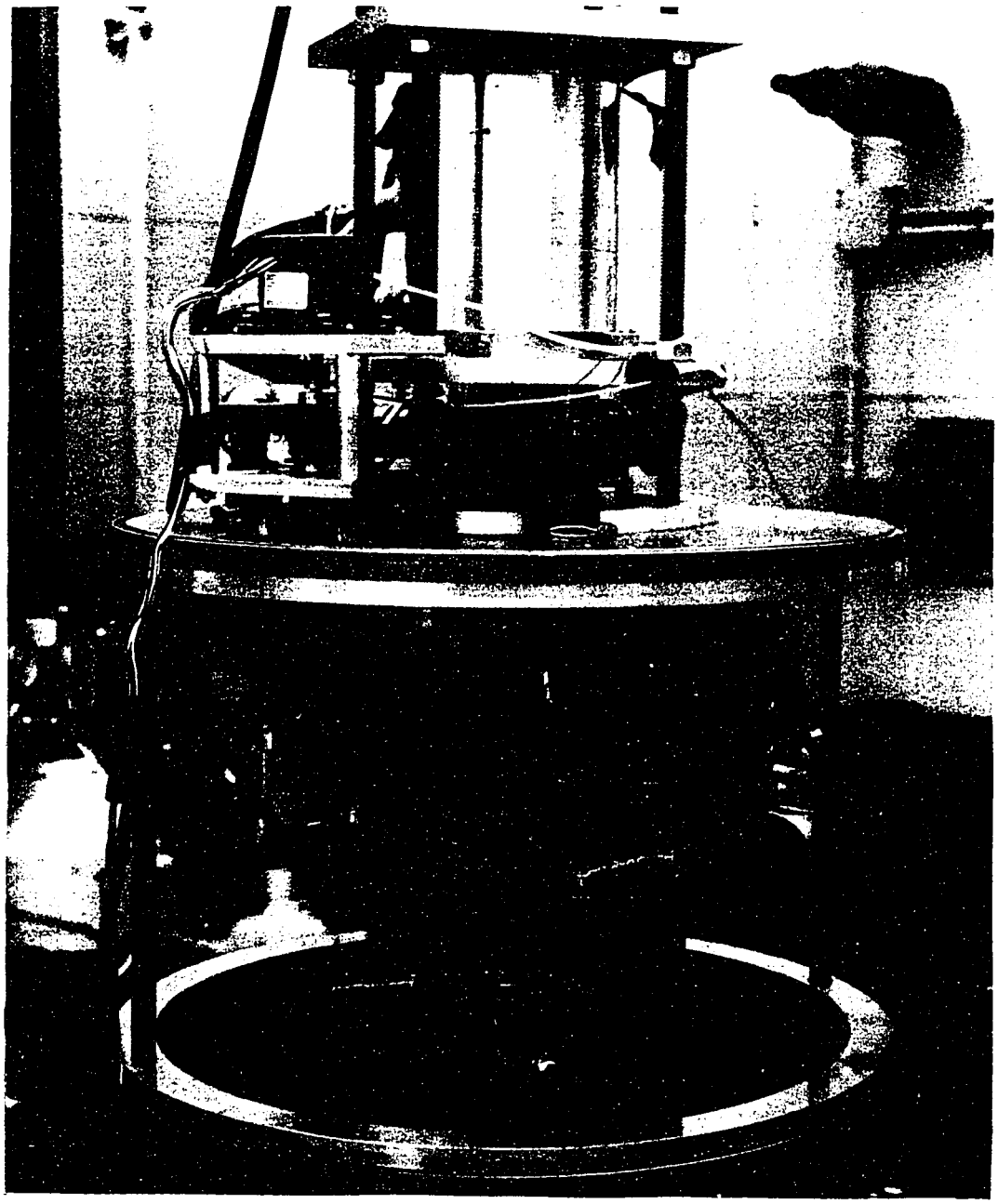


Figure 2-8. Photograph of the reference mirror system. The motor at the top drives the two ball screws through the pulley system and vacuum feedthroughs. The screws drive the translation stages to which are attached the two gold-plated circular mirrors which deflect the light beam around the sample chamber. The sample chamber and its raised radiation shield are visible in the lower center part of the image.

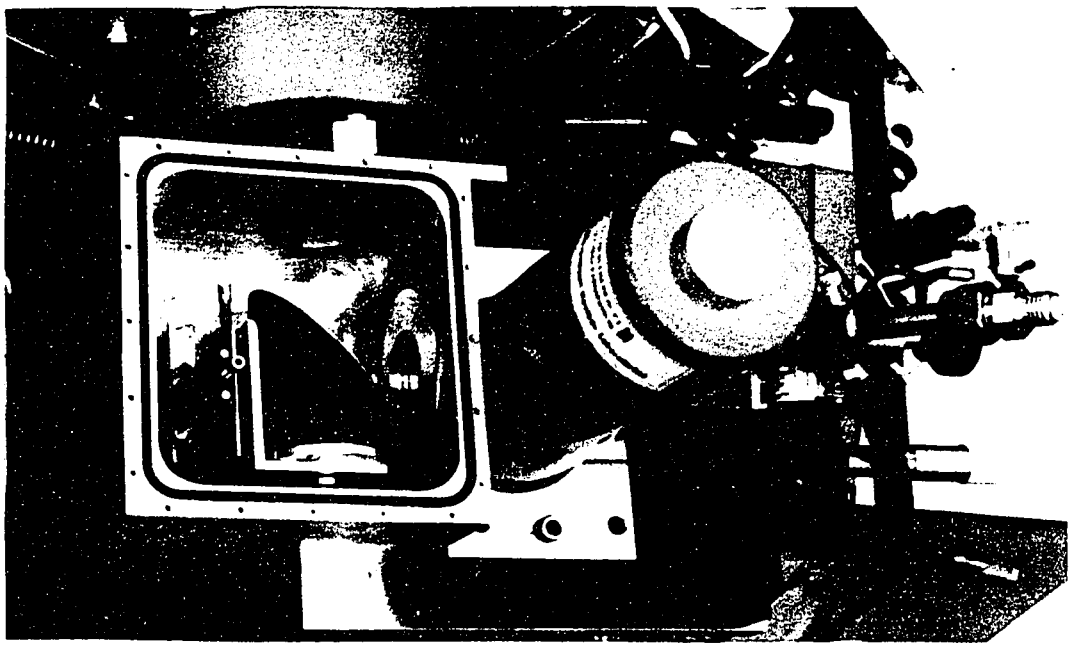


Figure 2-9. Photograph of detector box. The arrangement depicted here uses the InSb Dewar-detector, which is to the right. The light from the sample chamber enters through the gate valve and hole at the top and is focused by the right-angle mirror in the center onto the detector. The detector is mounted on a translation stage and could be moved in or out of the box for focusing, using a double O-ring cylinder for vacuum sealing.

The direct and reference beams entered the detector box through a 40-mm gate valve. The detector box was normally evacuated with the chamber and was milled out of solid aluminum with an O-ring-sealed stainless steel top plate. Figure 2-9 is a photograph of the interior of this box. It was cubical in shape, and had enough depth for a three-axis mount for the off-axis mirror made with miniature translation stages from Edmund Scientific. The detector was mounted in a detector-specific cylindrical adaptor which was attached to the box via a double o-ring seal. This design allows a limited travel in the focusing direction, even when the vacuum was present. Separate adaptors were made for the InSb detector, the mercury-cadmium-telluride (MCT) detector, and the pyroelectric deuterated triglycine sulfate (DTGS) detector. The focusing motion of the detector was controlled by a translation stage attached to the bottom of the box.

2.6 Fourier Transform Spectrometer System Design and Capabilities

2.6.1 Fourier Transform Spectrometer

The FTS used was a reconditioned Mattson Polaris model with a Revision-8 electronics board. The spectral range of the instrument is limited by the efficiency range of the beamsplitter, the sensitive range of the detector, and the transmission range of any windows in the system. In this experiment, four combinations of beamsplitter and windows were used to span the wavelength range of 1–300 μm (wavenumber range 33–10,000 cm^{-1}). The method of operation of the FTS is fully described in many texts, including Bell (1972) and Beer (1992).

The FTS works by accepting the source light into one arm of an interferometer, which splits it via the beamsplitter into a fixed mirror arm and a moving mirror arm. The waves returned by the mirrors superimpose at the beamsplitter and appear as an interference pattern (as the mirror moves) at the output of the interferometer. This output, when measured as a function of moving mirror position, is called an interferogram, and consists of a large peak, called a centerburst, when the mirrors are at the same distance from the beamsplitter (zero path difference), and oscillations which diminish as the path difference increases. Every part of this interferogram consists of light of all wavelengths, and it is further modulated by the sample chamber and its contents or the mirrors before being measured by the detector.

The measured interferogram is a representation of the Fourier transform of the spectrum of light measured by the detector. In order to make the transform to get the spectrum, the path difference between the discrete measurements of the interferogram must be measured very accurately. This is done by sending the monochromatic light of a He-Ne laser through a separate part of the interferometer, which produces a constant sine-wave interferogram. The zero crossings of this signal are used to accurately time the sampling of the infrared interferogram. As long as only positive-going or negative-going zero crossings are measured (or multiples of these), the sampling is very accurate. Since sampling interval is inversely related to spectral range, the maximum wavenumber measurable

using alternate zero crossings is half the laser frequency (7899 cm^{-1}, or 1.266 μm). Measurements using the CaF_2 beamsplitter were made using every zero crossing to extend the spectral range to the He-Ne wavelength (0.633 μm), but a small distortion or bias in the timing signal caused regular but unequal timing of the samples. This was manifested in the measured spectrum as an "alias" spectrum reflected about 7899 cm^{-1}. This aliasing was quite small, especially where there was a significant signal (<10,000 cm^{-1}), and was processed out of the data (section 3.4).

Accurate knowledge of the path difference from the laser signal translates into accurate knowledge of the wavenumber of the spectrum from the Fourier transform of the interferogram. Since the laser frequency is known to more than eight significant figures, the wavelength is accurate to the same level. This applies, however, only to infrared rays which travel the same path as the laser beam, i.e., the axial rays which have no angle with the interferometer axis. Since the source is not a point source, there are many off-axis rays, all of which travel *shorter* path differences in the interferometer than the axial rays. The result is a linear shift in the transformed wavenumber to shorter wavenumbers than the axial-ray wavenumber:

$$\nu_1 = \nu_0 \cos\theta \cong \nu_0\left(1 - \frac{\theta^2}{2}\right) \text{, or} \tag{2-1}$$

$$\delta\nu = \nu_0 - \nu_1 = \nu_0(1 - \cos\theta) \cong \nu_0\frac{\theta^2}{2} \text{,} \tag{2-2}$$

where ν_1 is the measured wavenumber of the off-axis ray, ν_0 is its true wavenumber and θ is the off-axis angle. The approximations apply for small θ. When the contributions of all the off-axis rays are added, the resulting spectrum is smeared out, especially at large wavenumbers. The difference between the measured wavenumber and the true wavenumber increases (and the instrument resolution degrades) linearly with wavenumber. If the angular field of view is uniformly filled, the instrument function retains the same form with an increased width. If it is not uniformly filled, however, the instrument function can become asymmetric. The measurements in this experiment show average wavenumber

shifts of less than 0.7 cm^{-1} at 5000 cm^{-1}, corresponding to an average off-axis angle of about 1°. The correction was negligible for the far-infrared measurements which were taken at 4-cm^{-1} resolution at wavenumbers less than 550 cm^{-1}. The effect of lowered resolution and distorted instrument function is insignificant where the spectral data are slowly varying with wavenumber. Here, a simple linear transformation of the measured wavenumber according to Equation 2-1, with the average off-axis angle term determined empirically (section 2.6.6), is applied. Considerable time was expended in an unsuccessful effort to devise a scheme for deconvoluting the smeared spectrum to retrieve the fine spectral detail in the middle infrared. This effort is summarized and an evaluation of the effect of field-of-view on the spectral resolution is given in Appendix A. The first order linear correction is all that is used with this data.

The resolution of a spectral scan is inversely proportional to the maximum path difference created by the moving mirror and is reduced slightly by the processing that yields a smooth instrument function. The true resolution is very close to the reciprocal of the maximum path difference. The maximum path difference of this FTS was about 6.2 cm, which corresponds to a spectral resolution of about 0.14 cm^{-1}. The FTS conventions for naming the resolutions differed slightly from the true calculated resolutions, but they will be used here for convenience and consistency, namely 0.125, 0.25, 0.5, 1, 2, and 4 cm^{-1}. The maximum path differences and true resolution for these FTS resolutions are given in Table 2-2.

2.6.2 Sources

The principal source was a water cooled glow-rod radiator, whose peak output is in the near-infrared. The glow-rod had measurable output over the whole wavelength range used, although the signal was small beyond 50 μm. For some of the sample thicknesses in the 1–5 μm measurements made with CaF_2 windows and beamsplitter, a tungsten-halogen lamp was used. It has a peak output near the visible, one-third the peak wavelength of the glow-rod, and a greatly reduced output beyond 4 μm, where the envelope absorbs the radiation from the hot filament. The lifetime of this source proved to be too short to measure

Table 2-2 Actual instrument resolutions corresponding to the names used in the FTS software.

Instrument resolution	Maximum path difference	True resolution (triangular apodization, FWHM)
0.125 cm^{-1}	6.18 cm	0.143 cm^{-1}
0.25 cm^{-1}	3.46 cm	0.256 cm^{-1}
0.5 cm^{-1}	1.27 cm	0.699 cm^{-1}
1.0 cm^{-1}	1.01 cm	0.873 cm^{-1}
2.0 cm^{-1}	0.508 cm	1.74 cm^{-1}
4.0 cm^{-1}	0.255 cm	3.47 cm^{-1}

more than one sequence of blanks and ice, and the output reaching the detector was only slightly greater at 1–4 μm than that from the glow-rod.

2.6.3 Beamsplitters

Four beamsplitters were used: two mylar sheets of different thicknesses for the far-infrared, a potassium bromide (KBr) substrate for the middle-infrared, and a calcium fluoride (CaF_2) substrate for the near-infrared. The mylar sheets were 6 μm and 25 μm in thickness and have their maximum efficiency at different wavenumbers. Films of high-index material exhibit cycles of beamsplitting efficiency with wavenumber (see Figures 9-4 to 9-10 in Bell, 1972). The efficiency is near zero at 0 cm^{-1} and has periodic maxima and minima as wavenumber increases. The number of minima in a given spectral range is greater for thicker films. The 6-μm beamsplitter had its first minimum around 550 cm^{-1} (18 μm) and provided good signal-to-noise from 65 to 500 cm^{-1} (20 to 150 μm). For $\lambda > 150$ μm this beamsplitter had poor efficiency and could not provide reliable data. For this reason, a 25-μm mylar beamsplitter was also used. It had efficiency minima near 145 and 290 cm^{-1} (69 and 35 μm), but had much better efficiency from 30 to 100 cm^{-1} (100 to 333 μm) than the 6-μm mylar.

The KBr beamsplitter had usable efficiency between 425 and 5550 cm^{-1} (1.8–23.5 μm) with the mercury-cadmium-telluride (MCT) detector. It had a variable hydration absorption from 2.9 to 3.3 μm which increased with time during a series of measurements. With the CsI windows, the measured signal in that region was even more unstable, due to the additional hydration of the CsI window. Therefore, measurements in this region with the KBr beamsplitter have much larger uncertainty than in surrounding regions. The CaF_2 beamsplitter was used from about 1700 to 10,000 cm^{-1} (1.0 to 5.9 μm) with the InSb detector, and had no unusual behavior near 3 μm.

2.6.4 Detectors

The detectors used included a pyroelectric thermal detector, a photoconductive MCT detector and a photovoltaic InSb detector. The pyroelectric detector was used for the far-infrared measurements and was made of deuterated triglycine sulfate (DTGS) with a polyethylene window. The detector responds only to oscillating thermal energy (no DC response) and was restricted to wavelengths longer than 15 μm because of its window. It was used from 30 to 555 cm^{-1} (18 to 333 μm) with both the CsI and crystal quartz windows.

The DTGS detector had a much lower signal than the semiconductor detectors and was subject to large amounts of coherent interference from 60 Hz and its harmonics and sub-harmonics (30 Hz, 120 Hz, 180 Hz, etc.). These interference frequencies appeared in wavenumber space at positions dependent on the mirror scan speed (given in the frequency of the fringes of the He-Ne laser). They appear as positive or negative spikes with a width corresponding to the selected spectral resolution. These spikes were generally small for measurements with the CsI window (<50 μm), so only one speed (10 kHz) was used and the residual spikes were averaged out or smoothed over. With the crystal quartz windows (>50 μm), however, the interference signals were always stronger than the infrared spectral signals. Since most of these spectra were taken at 4-cm^{-1} resolution, some 8-10 cm^{-1} of spectral data were obscured by each interference peak. Consequently, most measurements in the far-infrared were made using both the 5.7 and 3.6 kHz scan speeds

(with a few spectra at 10 or 2.6 kHz), with the prominent 60 Hz interference peak appearing at 160 cm^{-1} and 250 cm^{-1}, respectively. In this way, measurements at different speeds were used to interpolate across the interference peaks.

The MCT detector was used with the KBr beamsplitter and CsI windows, and provided fast, low-noise data from 425 to 5555 cm^{-1} (18 to 23.5 μm). It was operated with a mirror scan speed of 40 kHz. The InSb detector was a Cincinnati Electronics SDD-32E0-S1 indium antimonide (InSb) Dewar-detector, which had a 2-mm-diameter circular sensitive area, and was integrated to an AM300 transconductance amplifier with 7.5×10^3 V/A gain (2.2×10^4 V/A with the monochromator, described in section 5.4.5). The bandwidth of the AM300 amplifier was 0.5–1 MHz. The detector was operated at liquid-nitrogen temperature (77 K) and had a circular cold aperture with 60° field-of-view (FOV). The restricted FOV limits the background DC thermal signal and its associated noise. The InSb detector provided usable signals from 1700 to 14,000 cm^{-1} (0.7 to 5.9 μm) when used with the CaF_2 beamsplitter and CaF_2 windows. The beamsplitter provided adequate efficiency only <10,000 cm^{-1} ($\lambda>1$ μm). The signal-to-noise of the InSb was slightly better than that of the MCT. The factory-supplied gain of the InSb detector amplifier had to be lowered by a factor of 3 to handle the large unmodulated background level of the FTS signal, and the detector output was high-pass filtered to remove the large DC offset before returning to the FTS.

2.6.5 Throughput of Various Wavelength Ranges

The individual spectra from either the sample chamber or reference path are termed "single-beam" spectra. A plot of the normalized single-beam spectra for each of the wavelength ranges is given in Figure 2-10. The spectra are typical for the path through the empty sample chamber (chamber blank). The main features of the source, beamsplitter, and detector are visible at 4-cm^{-1} resolution, while fringes from the windows and deeper, narrow absorption lines from the gasses in the FTS become more apparent at higher resolutions. The data shown here are all at 4-cm^{-1} resolution to minimize the clutter from the higher resolution detail.

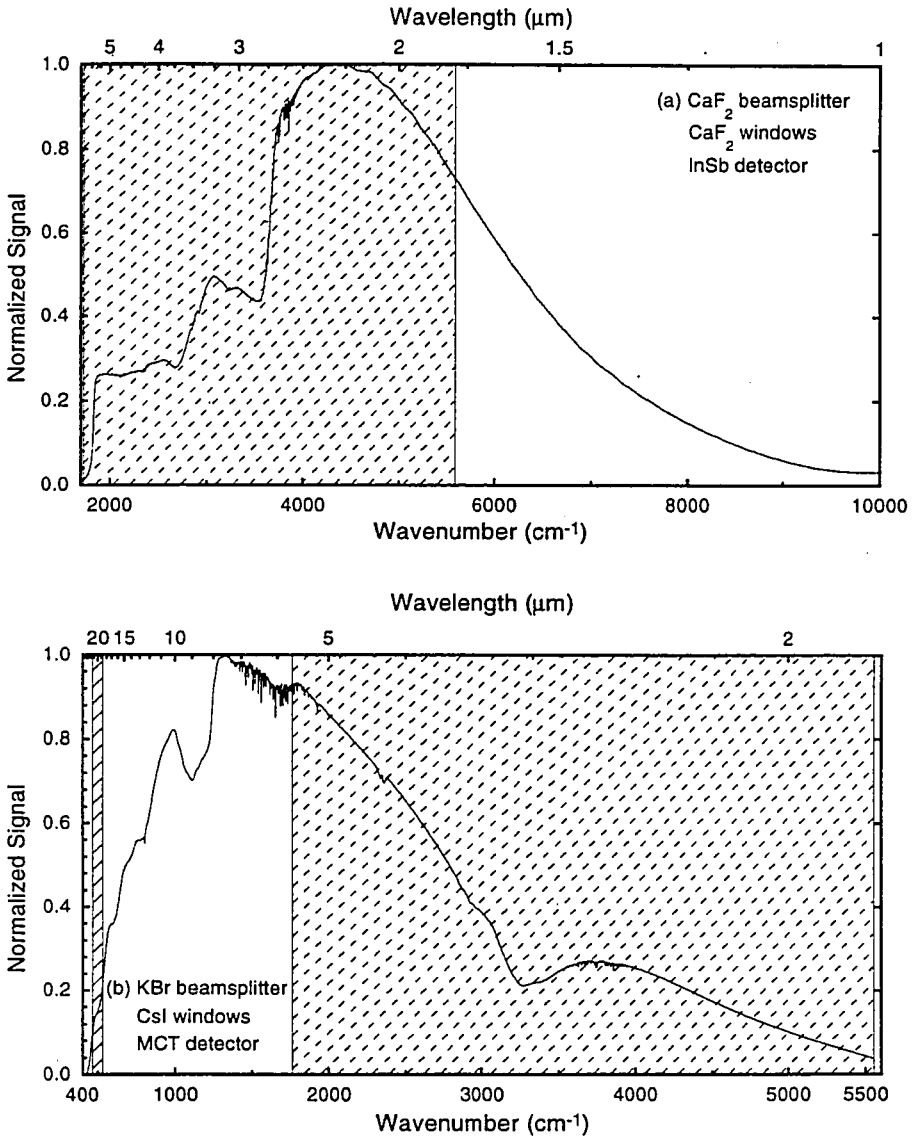


Figure 2-10. Throughput of the FTS experiment. There are four panels, each representing different combinations of beamsplitter, window, and detector. Single-beam spectra of the empty sample chamber at 4-cm^{-1} resolution, normalized to 1.0 at their maximum values, are shown. Some absorption by residual water vapor is visible. The wavenumber regions where overlapping data from adjacent beamsplitter-window combinations are merged is indicated by the hatched patterns. (a) The loss of beamsplitter efficiency causes the cutoff at large wavenumbers, and the sharp cutoff near 1800 cm^{-1} is from the detector. (b) The loss of beamsplitter efficiency causes the cutoff at large wavenumbers, and the cutoff near 400 cm^{-1} is from the detector.

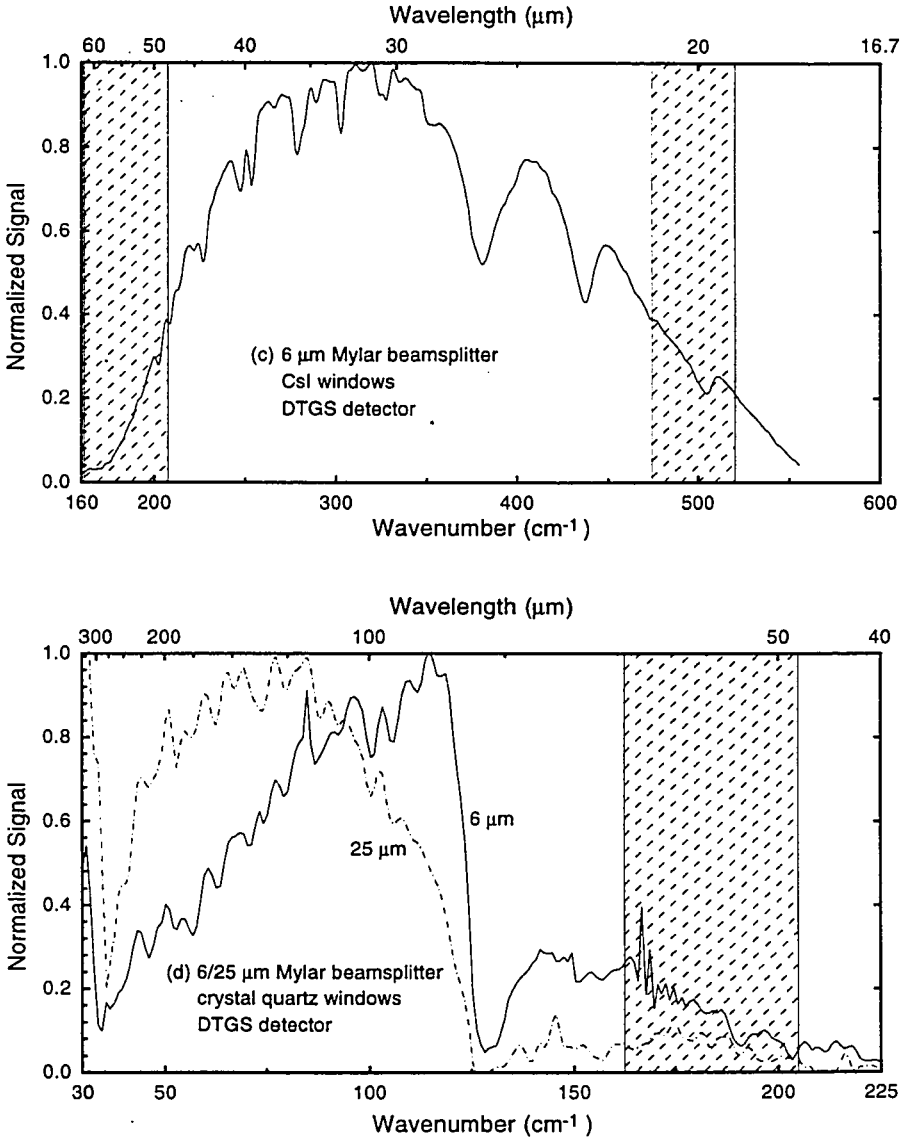


Figure 2-10. (continued) (c) The large-wavenumber cutoff is from the beamsplitter, and the cutoff near 200 cm^{-1} is from the cesium iodide windows. (d) There are two spectra in this plot, one for the 6-μm mylar beamsplitter and one for the 25-μm beamsplitter. The large-wavenumber cutoff and dip at 128 cm^{-1} are from the windows, while the small-wavenumber cutoff is from the beamsplitters. The region below 35 cm^{-1} is contaminated by interference in these examples.

2.6.6 Wavenumber precision and accuracy

The precision of wavenumber measurement based on repeatable location of spectral detail among several spectra (such as gaseous absorption lines in single-beam spectra) is typically better than 0.1 cm^{-1} in regions with high S/N. The accuracy can be brought close to that level as long as an accurate wavenumber-shift correction can be applied to compensate for the effects of finite field of view, detailed in section 2.6.1 above. The average wavenumber offset is measured by examination of single-beam spectra of the direct path (since its distribution of off-axis rays distribution was different from that of the less obstructed reference path). These exhibit numerous absorption lines from gases in the FTS enclosure, namely H_2O, CO_2 (only visible in blanks), and CO. The H_2O lines are the most visible and extend over broad regions of the mid-infrared spectrum. Comparing the estimated centers of selected isolated measured absorption lines with those in the HITRAN database (Rothman *et al.*, 1992) over a wide range of wavenumbers yields data that are used to determine the average wavenumber shift by linear regression.

2.6.7 Measurement Strategy and Rationale

The standard output of the FTS is a ratio spectrum: the spectrum of the sample chamber divided by the spectrum of the reference path. The total elapsed time required for a single reference or sample measurement was determined by the scan speed and the number of scans to be averaged together, which in turn were determined by the desired or available S/N. In general, higher resolution measurements required longer scans (same speed, longer path difference) and more scans (to achieve higher S/N for the low-level far wings of the interferogram). With the MCT and InSb detectors, satisfactory spectra of 0.25 and 0.125-cm^{-1} resolution could be obtained in 2–7 hours. The 4-cm^{-1} resolution measurements made with the DTGS detector were scanned at 4-8 times lower speed and averaged 8-25 times more scans than those made with the InSb or MCT. The DTGS measurements nevertheless had a S/N that was much worse than that of the other detectors. A summary of the typical resolutions, number of scans, scan speeds and elapsed time for all of the wavelength ranges is given in Table 2-3.

Table 2-3. Some typical values of number of scans, scan speeds and elapsed time for various wavenumber resolutions of the FTS.

Range	Detector	Resolution (cm^{-1})	Number of scans	Scan speed (kHz)	Elapsed time (hh:mm)
1.0–5.7 μm	InSb	4	250	40	00:06
1750-10,000 cm^{-1}		1	1250	40	00:27
		0.5	2500	40	01:06
		0.25	10,000	40	07:30
1.8–23.5 μm	MCT	4	80	40	00:01
425–5555 cm^{-1}		1	250	40	00:05
		0.5	320	40	00:09
		0.25	720	40	00:33
		0.125	1000	40	01:30
18–59 μm	DTGS	4	1000	10	00:16
170–555 cm^{-1}		1	1500	10	00:30
48–333 μm	DTGS	4	2000	10	00:32
30–210 cm^{-1}		4	25,000	5.7	12:00
		4	15,000	3.6	12:00

Wavenumber resolutions were selected based on scan time and S/N ratio. A few 1-cm^{-1} measurements in the 18–58 μm (175–555 cm^{-1}) spectral range using the DTGS detector showed that there were no unresolved features in the 4-cm^{-1} measurements, so these measurements were made at 4-cm^{-1} resolution. The measurements with the crystal quartz windows had such poor S/N that no attempt was made to examine resolutions finer than 4 cm^{-1}. At wavelengths less than 20 μm (ν>500 cm^{-1}), however, there are many narrow absorption features visible in CO_2 ice, and it was desirable to take at least one spectrum at 0.125-cm^{-1} resolution for each thickness in the mid-infrared region using the KBr beamsplitter. For the near-infrared CaF_2 data, 0.25-cm^{-1} resolution was judged sufficient

for the non-overlapping region from 1.0 to 1.8 μm (5555 to 10,000 cm^{-1}). Many fast lower resolution measurements, which are sufficient to resolve broad absorption features, were made in the near- and mid-infrared region to get better snapshots of the spectrum for characterizing time variations in transmission. Moderate-resolution measurements (0.5 and 1 cm^{-1}) were also very useful for verifying the presence of weak features which were hard to discern in the noisier high-resolution measurements.

2.6.8 General Technique of FTS Data Acquisition

The primary FTS data products are the interferograms of the sample and reference paths. These are converted to "spectral estimates" by way of a Fast Fourier Transform (FFT), which uses windowing (apodization) and phase correction methods that have effects on the recovered spectrum. The spectral estimate is the best estimate of the true spectrum based on knowledge of the instrument properties and performance. The apodization function is an envelope multiplied into the interferogram that attenuates signals far from the central peak, producing a spectrum with reduced resolution and minimal "ringing" in the near vicinity of narrow absorption or emission peaks. The functional form of the apodization function used has little consequence if the spectral detail is all coarser than the measurement resolution. The Mattson WinFirst software package, which was used for operating the FTS and acquiring the interferograms, also included a FFT function that was used to transform most of the FTS data. This function allowed for the selection of apodization function and phase correction parameters, which compensate for phase delays in the beamsplitter and other optical components that cause the position of zero path difference to be different at different frequencies. The instrument function of the FTS is defined as the FFT of the apodization function and usually decreases the unapodized resolution by a factor of 1.4 to 2. The measurements with the CsI windows used a triangular apodization ($1 - |x|/L$), while the CaF_2 measurements used the Norton-Beer Medium apodization ($\sum_{i=0}^{4} c_i[1 - (x/L)^2]^i$; where the coefficients c_i are given by Norton and Beer, 1976), and the crystal quartz long-wave measurements used cosine

apodization ($\cos(\pi x/2L)$), where $-L<x<L$ is the distance coordinate of the interferogram.

There were two cases where the FFT could not be performed in the WinFirst software: the 0.125-cm^{-1} KBr measurements which were not processed properly by the software, and the crystal quartz window measurements, whose signal was so weak that the interferograms were dominated by interference frequencies and the software could not find the centerburst. These interferograms were processed separately using a different FFT routine, described in section 3.2.

The single-beam spectra resulting from the FFT processing are then ratioed blank / reference or CO_2-ice / reference to get standard spectral products for further analysis. Ultimately, the individual products are combined into average blank / reference and CO_2 / reference spectra, which are then divided to get average CO_2-ice / blank spectra for each thickness and spectral resolution.

Chapter 3

Analytical Techniques Used in Producing Calibrated Measurements

3.1 Determining Absorption Coefficients with Data from Many Path Lengths

In principle, one can determine the absorption coefficient α from transmission measurements of a substance by taking the natural logarithm of the transmission T divided by the path length d:

$$\alpha = (-\log(T))/d \tag{3-1}$$

An experiment with finite precision limits the range of α which can be measured at a single path length, such that T differs from both 0 and 1 by more than the level of precision. A larger range of α can be measured using multiple path lengths, and if these lengths are not too different, α can be estimated by two or more measurements through different path lengths, usually by fitting to the linear relation:

$$d_i\alpha(\lambda) + \log T_i(\lambda) = 0 \tag{3-2}$$

where the slope of the fitted line is the desired absorption coefficient. In this experiment the samples exhibited some scattering so I measured not transmission reduced solely by absorption, but transmission reduced by absorption from a level less than unity where absorption is zero ($T_{\alpha=0}$), the remaining extinction being due to volume scattering in the sample or surface scattering at the window interfaces.

The quantity evaluated in this experiment is the measured transmission of an ice sample divided by the measured transmission of the empty cell (blank). In the absence of scattering, this value can exceed unity because of the reduced reflection of the ice-window interfaces compared to the vacuum-window interfaces of the blank. I will call this maximum CO_2 / blank value $T_{\alpha=0,max}$, and the transmission T in Equations (3-1) and (3-2) can be determined from a CO_2 / blank measurement by dividing by $T_{\alpha=0,max}$. It is a simple matter to estimate $T_{\alpha=0,max}$ for a given window type, treating the windows as absorbing

slabs (e.g., Bohren and Huffman, 1983, Section 2.8), and ignoring the absorption and multiple reflections within the ice sample:

$$T_{\alpha=0,\max} = \frac{T_{\mathrm{CO_2\ ice\ in\ chamber,\ no\ absorption}}}{T_{\mathrm{evacuated\ chamber\ (blank)}}}$$

$$= \left[\frac{(1-R')(1-R)\mathrm{e}^{-\alpha_w h}/(1-RR'\mathrm{e}^{-2\alpha_w h})}{(1-R)^2\mathrm{e}^{-\alpha_w h}/(1-R^2\mathrm{e}^{-2\alpha_w h})}\right]^2$$

$$= \left[\frac{(1-R')(1-R^2\mathrm{e}^{-2\alpha_w h})}{(1-R)(1-RR'\mathrm{e}^{-2\alpha_w h})}\right]^2 , \qquad (3\text{-}3)$$

where

$$R = \left|\frac{(1-\tilde{n}_w)}{(1+\tilde{n}_w)}\right|^2 \qquad (3\text{-}4)$$

is the window-vacuum reflection coefficient, and

$$R' = \left|\frac{(1-\tilde{n}_w/n_{\mathrm{CO_2}})}{(1+\tilde{n}_w/n_{\mathrm{CO_2}})}\right|^2 \qquad (3\text{-}5)$$

is the window-CO_2 ice reflection coefficient. The complex index of refraction of the window material is $\tilde{n}_w = n_w + ik_w$, where $k_w = \alpha_w\lambda/(4\pi)$, and $n_{\mathrm{CO_2}}$ is the refractive index of CO_2 ice (this is real since absorption is assumed to be zero). The α_w in the exponentials is the window absorption coefficient, and the thickness of the windows is h. The CO_2 / blank measurements at wavelengths where the ice was relatively weakly absorbing and the path length was small were a good indication of the $T_{\alpha=0}$ level, and these were typically 10–20% below $T_{\alpha=0,\max}$. If this level were nearly the same for each path length, the absorption coefficient could still be determined by linear regression, using the new model equation

$$d_i\alpha(\lambda) + \log T_i(\lambda) = \log T_{\alpha=0}(\lambda) \qquad (3\text{-}6)$$

where now the intercept of the fitted line is the estimate of log $[T_{\alpha=0}(\lambda)]$. This, however, was not the case with these measurements, as the amount of scattering varied by many percent from sample to sample, and was especially high for the smallest path lengths. This implies a different $T_{\alpha=0}$ for each d_i, and one more unknown quantity at each wavelength than there is known.

One might think that combining the data from many thicknesses and several nearby wavelengths, and assuming that the $T_{\alpha=0}$ levels were different for each thickness, but constant or nearly constant over the range of wavelengths, would result in reducing or eliminating the underdetermined nature of the single-wavelength system of equations. However, I have found that no matter how many new equations are added to the system, there will always be one excess degree of freedom: the $T_{\alpha=0}$ level for one of the thicknesses. So there exists a family of solutions for the absorption coefficient, limited by the constraint that all of the solution $T_{\alpha=0}$ levels must be between the maximum measured CO_2 / blank level (when $T_{\alpha=0}$ is near this, $\alpha \approx 0$) and $T_{\alpha=0,max}$ from Equation 3-3, which $T_{\alpha=0}$ cannot exceed. These solutions are not all equally likely, but many will be considered in the error analysis.

I have set up a generalized approach to solving the multiple-thickness problem simultaneously over a broad wavelength/wavenumber range by assuming that the $T_{\alpha=0}$ levels vary smoothly over the range as second order polynomial functions, $T_{\alpha=0,i} = a_i + b_i x(\nu) + c_i x^2(\nu)$, where $x(\nu)$ is a suitably scaled wavelength/wavenumber measure (e.g., $-1 < x(\nu) < 1$) and i varies over all the sample thicknesses. The set of values a_i, b_i, and c_i, plus the vector of absorption coefficients over the wavelength/wavenumber range $\alpha(\nu)$, are varied in such a way to minimize the quadratic cost function

$$f(a_i, b_i, c_i, \alpha(\nu)) = \sum_{\nu, i} [M_i(\nu) - m_i(a_i, b_i, c_i, \alpha(\nu), \nu)]^2 \quad , \qquad (3\text{-}7)$$

where m_i is the model spectrum, defined by

$$\begin{aligned} m_i(a_i, b_i, c_i, \alpha(\nu), \nu) &= T_{\alpha=0}(a_i, b_i, c_i, \nu)\exp{-\alpha(\nu)d_i} \\ &= (a_i + b_i x(\nu) + c_i x^2(\nu))\exp(-\alpha(\nu)d_i), \end{aligned} \qquad (3\text{-}8)$$

and $M_i(\nu)$ is the measured ratio of CO_2 ice transmission over blank transmission for thickness d_i. Some modifications to this cost function were used, including the weighted cost

$$f_w(a_i, b_i, c_i, \alpha(\nu)) = \sum_{\nu, i} \sigma_i^{-1}(\nu)[M_i(\nu) - m_i(a_i, b_i, c_i, \alpha(\nu), \nu)]^2, \quad (3\text{-}9)$$

where $\sigma_i(\nu)$ is an uncertainty corresponding to measurement $M_i(\nu)$, and an additional cost to penalize slope and curvature in $T_{\alpha=0}$

$$f_{sc}(a_i, b_i, c_i, \alpha(\nu)) = f(a_i, b_i, c_i, \alpha(\nu)) + \gamma_c \sum c_i + \gamma_s \sum b_i \quad , \quad (3\text{-}10)$$

where large γ_c and γ_s drive the minimization to flat, horizontal $T_{\alpha=0}$ functions. Normally, multidimensional minimization procedures which use the explicit gradient of the cost function are used, since the gradient can be calculated for all variations of this cost function.

Both unconstrained and constrained (e.g., $\alpha(\nu) > 0$, $0 < T_{\alpha=0} < T_{\alpha=0,max}$) minimization techniques were used, depending on the particular problem. The unconstrained approach used the conjugate gradient method described by Press *et al.* (1989). The constrained method used sequential quadratic programming which is described by Grace (1994). All of these minimization methods require a initial multidimensional point from where the down-gradient search is started. Because of the underdetermined nature of this problem, there is usually a family of valid solutions which have nearly equivalent minimal cost, and the solution that is found depends on the initial point.

Initial points were typically determined by selecting a constant $T_{\alpha=0}$ for the sample of longest path length, deriving the required absorption coefficient at wavenumbers where that sample has measurable transmission, and then finding the required $T_{\alpha=0}$ level for the next smaller sample at those wavenumbers. This is fitted with a second order polynomial which extrapolates it into wavenumber regions not measurable by the thickest sample. This process is continued until the thinnest sample has an estimated $T_{\alpha=0}$. The samples of smallest path length usually had broad regions of negligible absorption which effectively

defined the $T_{\alpha=0}$ level for those samples. In some cases, the functions derived in this process could not be fitted well with only a second-order function. These were corrected as detailed in the relevant parts of Chapter 4. An absorption coefficient could then be calculated for each of the path lengths using the initial $T_{\alpha=0}$ functions. The average of these derived absorption coefficients from all of the samples is the tentative ("initial") absorption coefficient, subject to correction by the methods of Chapter 4.

3.2 Special Fourier Transform Processing

3.2.1 Longwave Measurements with Crystal Quartz Windows

The measurements through crystal quartz windows were characterized by low signal levels and high coherent noise levels, mostly from 60-Hz electronic interference. As mentioned in the last chapter, the interference signals swamped the infrared signals I was interested in, and the FTS software package was unable to perform the FFT. A typical interferogram had a large amplitude oscillation with a small wiggle in the vicinity of the center, which was the centerburst of the infrared signal. After removal of first and second order trends in each individual interferogram, the entire length was multiplied with a cosine apodization function ($\cos(\pi x/2L)$, where $-L<x<L$ is the distance coordinate of the two-sided interferogram) without regard to centering over the infrared centerburst. The absolute value of the complex Fourier transform of the apodized interferogram, calculated using a "fast" Fourier transform (FFT) technique, was then produced as a spectral estimate. This is the simplest way to eliminate phase errors in the data, since they are contained in the argument of the complex FFT. The drawback of this method is that zero signals are always represented by a positive level that is related to the noise in the measurement. This offset was removed in a process described in section 3.3.

3.2.2 Spectrum Estimation for 0.125-cm^{-1} Resolution Data with KBr Beamsplitter

The long, one-sided interferograms from the 0.125-cm^{-1} measurements with the KBr beamsplitter were not properly processed by the FTS software, so the FFT was performed

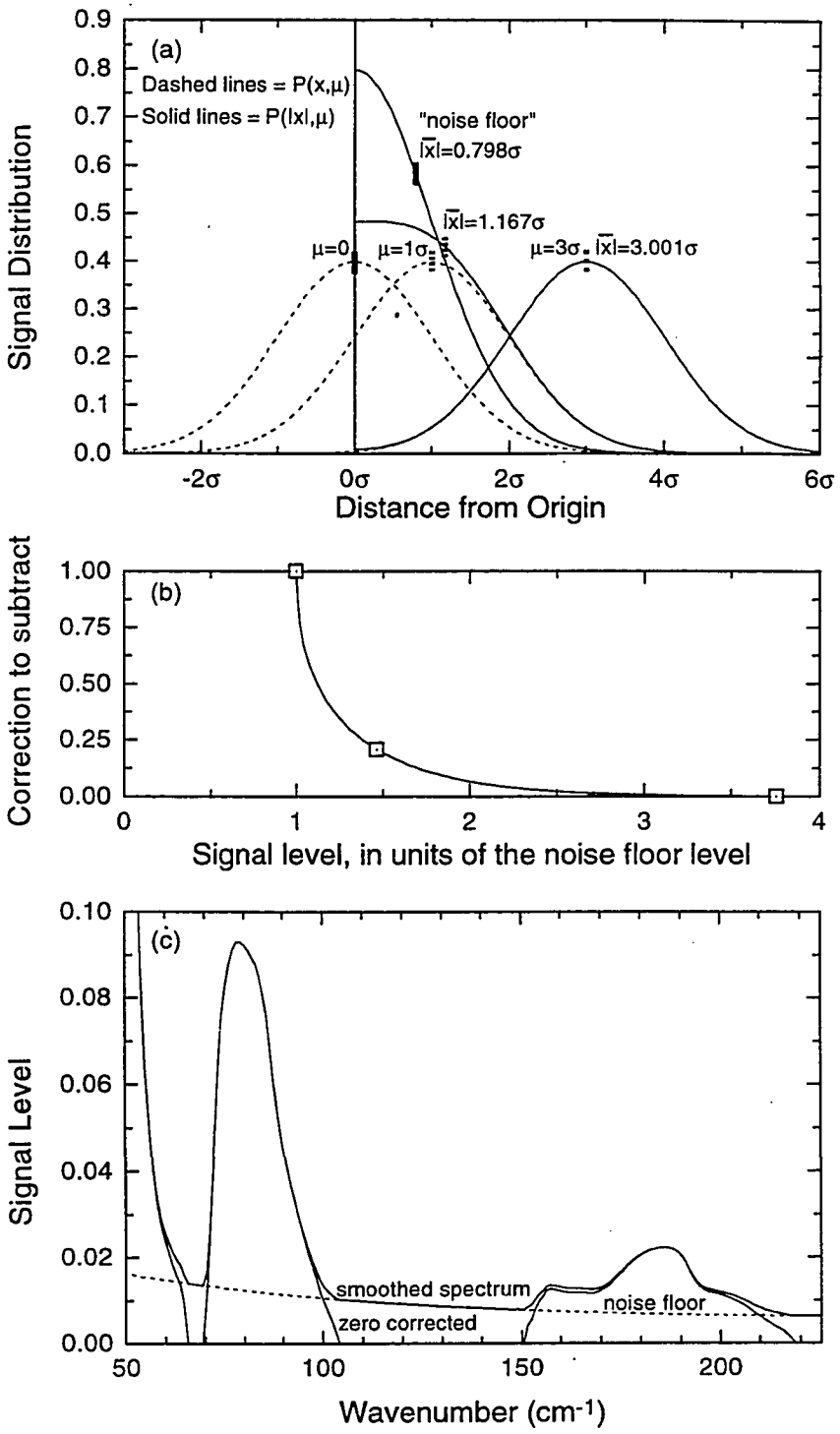
separately for these spectra. This was done according to the process outlined in Forman *et al.* (1966), in which the argument of the complex FFT of a shorter two-sided part of the interferogram is used to correct the phase errors in the original one-sided interferogram. In this case, the interferograms had about 28,500 points on the short side of the center-burst, and about 97,500 points on the long side. The two-sided part, which provides a spectrum of about 0.55-cm^{-1} resolution, was apodized with a triangle function and its complex FFT was calculated. The argument of this complex function (FFT/abs(FFT)) is then inverse Fourier transformed back into interferogram space. The resulting function has a large central peak surrounded by a small region of non-negligible values. The central few thousand points of this function are then convolved with the original interferogram to produce an interferogram which is nearly symmetric about the central peak. The long side of this phase-corrected interferogram is then Fourier transformed to get the 0.125-cm^{-1} spectrum. The value of these spectra lies mostly in the mid-infrared wavenumber regions, in which are found numerous very narrow absorption features.

3.3 Zero Correction for Longwave Measurements

The longwave measurements made with Mylar beamsplitters, the DTGS detector and crystal quartz windows were characterized by low signal levels and high coherent noise levels, mostly from 60-Hz electronic interference. The effects of the interference could be minimized by using different mirror scan speeds in the FTS, so that spectral regions obscured by interference peaks at one scan speed would be visible at another. As explained in section 4.2.1, it was desirable to use 12-hour "long-scan" averages for these measurements, although much quicker "short-scan" measurements were also used. As detailed in section 3.2.1, the absolute value of the FFT of these measurements was produced as a spectral estimate.

The disadvantage of this method is that there is a zero offset in the regions where there is no signal since the absolute value of the smallest signal must still be positive. A method was devised to correct for this zero offset based on the assumption of normally distributed noise in the original complex FFT. The average magnitude of the noisy complex value

Figure 3-1. The effect of noise on determining the magnitude of a complex number. The result of taking the absolute value of normally distributed noise as it approaches zero is shown in (a). The distribution of signal measurements with a mean (μ) of zero, 1σ away from zero and 3σ away from zero, where σ is the standard deviation of the distribution, are shown as dashed lines. The distribution of the absolute value of x for these three cases are shown as solid lines. The means of the original distributions and the corresponding expected value ($|x|$ from Equation 3-12) for the absolute value distributions are indicated by vertical line segments and numerical labels for each case. The expected value of the absolute value distribution corresponding to $\mu = 0$ is defined as the "noise floor". The resulting zero-correction curve is shown in (b), where the units of the graph are scaled to the level of the noise floor. The abscissa is the mean of the absolute value ($|x|$) and the ordinate is the difference $|x| - \mu$, which is subtracted from the measurement to correct for the zero-offset. The three cases illustrated in (a) are indicated by open-square symbols. This shows that signals at the noise floor are corrected to zero, and signals above the noise floor have rapidly diminishing amounts subtracted until above about 3 times the noise floor, no correction is applied. The effect of this correction on a typical (smoothed) spectral signal through CO_2 ice, in which most of the signal is within a few times the noise floor, is shown in (c). The estimated noise floor for this measurement is indicated by the broken line.


(a)
Dashed lines = P(x,μ)
Solid lines = P(|x|,μ)
"noise floor"
|x̄|=0.798σ
|x̄|=1.167σ
μ=0
μ=1σ
μ=3σ
|x̄|=3.001σ
Signal Distribution
Distance from Origin
(b)
Correction to subtract
Signal level, in units of the noise floor level
(c)
Signal Level
smoothed spectrum
noise floor
zero corrected
Wavenumber (cm-1)

does not accurately represent the mean distance from the complex origin if the noise radius encompasses the origin. This effect is illustrated in Figure 3-1 and in the one dimensional treatment

$$P(|x|, \mu, \sigma) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left[-\frac{1}{2}\left(\frac{|x| - \mu}{\sigma}\right)^2\right] \quad \text{, and} \tag{3-11}$$

$$\overline{|x|} = \frac{\int xP(|x|, \mu, \sigma)dx}{\int P(|x|, \mu, \sigma)dx} = \frac{\int_0^\infty x \exp\left[-\frac{1}{2}\left(\frac{x+\mu}{\sigma}\right)^2\right]dx + \int_0^\infty x \exp\left[-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right]dx}{\int_0^\infty \exp\left[-\frac{1}{2}\left(\frac{x+\mu}{\sigma}\right)^2\right]dx + \int_0^\infty \exp\left[-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right]dx} \quad , \tag{3-12}$$

where $P(|x|, \mu, \sigma)$ is the probability distribution for the absolute value of the normally distributed variable x, with the mean and standard deviation of x given by μ and σ, respectively, and $\overline{|x|}$ is the mean of the absolute value of x. The average magnitude of complex zero with noise is not zero, but rather the average of the positive half of a gaussian centered at zero (Equation 3-12 evaluated at $\mu = 0$, which is $\sigma\sqrt{2/\pi} \approx 0.798\sigma$). This level will be called the "noise floor" of the estimated spectrum because it varies with wavenumber in the same way as the magnitude of the noise. Spectral signals at or near this floor can then be corrected towards zero, but signals far from this floor are not corrected at all since their average level is an accurate measure of the complex magnitude. Since the magnitude of the noise (which is proportional to the height of the noise floor) varies as the reciprocal square root of the number of scans co-added into the interferogram, the lowest noise floors occurred on the measurements with the largest number of scans. However, even when a large number of short-scan measurements were averaged to reduce the noise, the noise floor remained high and affected a larger portion of the spectrum compared to a single long-scan measurement.

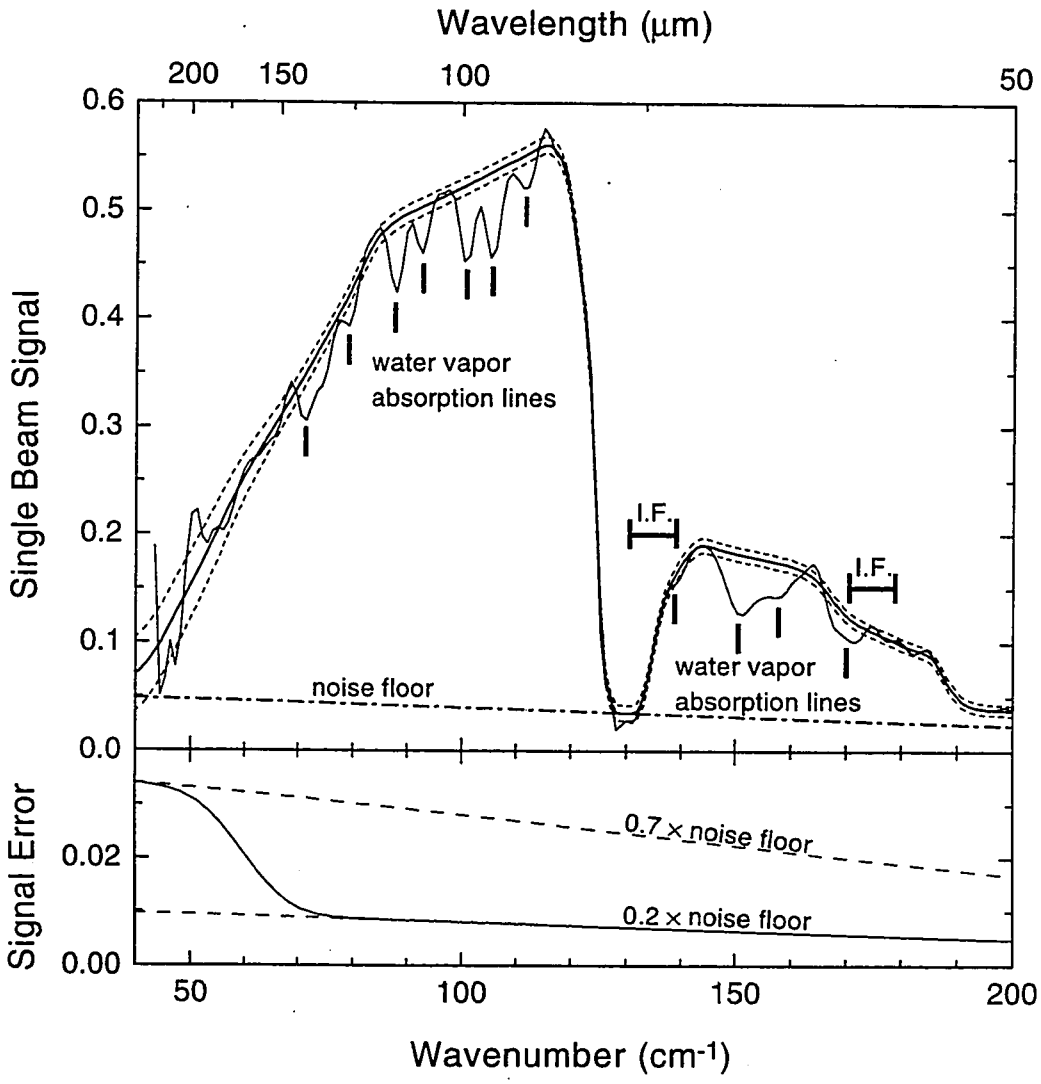
A single-beam average spectrum and a standard deviation spectrum are calculated from the absolute value FFTs for every combination of short-scan or long-scan, scan speed, reference or sample path, and CO_2 or blank. This was done over the full free spectral range, 0–1975 cm^{-1}. The standard deviation data were scaled and averaged for each

scan speed, interpolating over the interference peaks in each average. The mean of these two modified average spectra was fitted with a low order polynomial over part of the spectral range (e.g., 20–300 cm^{-1}), and this smooth function, called the "noise spectrum", was used for zero correction.

Each average spectrum was individually smoothed, and its uncertainty was estimated, as follows. First, the noise floor was estimated by multiplying the noise spectrum by an amount so that it matched those parts of the spectrum that had approximately zero transmission. This was easier for CO_2 ice sample spectra, since the ice has low transmission at many wavenumbers for all path lengths. For reference and blank measurements, the noise spectrum was usually fitted to the 128-cm^{-1} minimum and the region above 230 cm^{-1}, where the crystal quartz windows were opaque. A smooth line was then drawn by hand through the data such that a symmetric envelope around it would encompass most of the measured points. An effort was made to interpolate over interference peaks with the knowledge of the behavior of the spectrum from the other scan speeds. The smoothed spectrum was also interpolated across the prominent water vapor rotational absorption lines from the air path in the FTS for simplicity, and as they would normally be cancelled out when dividing the sample measurement by the reference measurement. The smoothed spectrum was also carefully merged into the noise floor where signal levels were low. An error estimate was then made by multiplying the noise spectrum by an appropriate constant so that the envelope of the smooth spectrum plus or minus the error included 80–90% of the measured points, not including interference peaks and absorption lines. Often, the noise spectrum was multiplied by a higher value for wavenumbers <100 cm^{-1}, to reflect the higher uncertainty that was often apparent in that region. An example of this process applied to the single-beam spectrum of the blank chamber is shown in Figure 3-2.

The zero correction was performed on the smoothed spectrum, which has no values below the noise floor, by inverting Equation 3-12 to get μ (the zero-corrected value) from $\overline{|x|}$ (the smoothed measurement) as illustrated in Figure 3-1. The zero-corrected average spectra are then ratiod and averaged in further processing described in section 4.2.

Figure 3-2. Example average spectrum, smooth fit, and error estimate. The thin solid line is a single-beam spectrum of the evacuated test chamber, the average of two 15,000-scan measurements made at a scan speed of 3.6 kHz. The measurement was made using the 6-μm Mylar beamsplitter. The heavy black line is the smoothed spectral estimate used for further analysis. The dotted lines above and below the smooth spectrum are the limits of the error estimate for this measurement. The smoothed spectrum is interpolated across known water vapor absorption lines, which are indicated, and across interference signal peaks. Interference peaks sometimes occur at the 3.6-kHz scan velocity at the places indicated by the capped bars labeled "I.F." In this particular measurement, no interference is evident at these locations. The minimum of the smooth spectrum is the noise floor, shown as a dot-dashed line, which is a noise spectrum scaled to match the out-of-band signal off the right end of the graph and the 128-cm^{-1} minimum where the crystal quartz windows become opaque. The zero offset of the smooth spectrum is corrected as described in the text before further processing. The error estimate, shown as a solid line in the bottom panel, is selected to encompass the variation of the measured spectrum except in absorption lines and interference peaks. In this case, it is set to 0.2 times the noise floor for most of the spectral range, with a smooth increase below 75 cm^{-1} to 0.7 times the noise floor. Some increase in the uncertainty of the spectrum at low wavenumbers is required for about half of the far-infrared spectra.


Wavelength (μm)
200
150
100
50
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Single Beam Signal
water vapor
absorption lines
I.F.
I.F.
water vapor
absorption lines
noise floor
Signal Error
0.02
0.00
0.7 × noise floor
0.2 × noise floor
50
100
150
200
Wavenumber (cm-1)

3.4 Removal of Alias Spectra from CaF_2 Beamsplitter Data

The single-beam spectra from the FTS measurements with the CaF_2 beamsplitter were taken with a free spectral range of 15,798 cm^{-1} (0.633 μm) by sampling the interferogram every 0.3165 μm in path length (every zero crossing, both positive-going and negative-going, of the He-Ne laser fringes). The laser signal circuitry, however, introduced a bias or distortion in the detected fringes, so that the positive-going sample points were not centered exactly between the negative-going sample points. This results in a small signal in the Fourier transform which has the free spectral range of one or the other set of points, half the range of the desired spectrum, and is visible as an "alias" spectrum at high wavenumbers where the true spectral energy is near zero (see Figure 3-3). Figure 3-4 shows that this spectrum at the wavenumber $\nu_0 - \nu$ is apparently proportional to the true spectrum at the wavenumber ν, where $\nu_0 = 1/(2\Delta) = 15{,}798\ cm^{-1}$ is the free spectral range at the ideal sampling interval Δ. In other words, the alias spectrum is similar to the true spectrum reflected about the wavenumber 7899 cm^{-1} (1.266 μm).

An explanation for this behavior is simple. The sampling theorem says that the discrete Fourier transform is identical to the continuous Fourier transform as long as all of the spectral energy is contained within the free spectral range ν_0 (Bracewell, 1986). Sampling causes the Fourier spectrum to be repeated alternately forwards and backwards to infinite frequency. If the spectral energy extends outside the free spectral range, the repeated spectra will overlap, causing the so-called alias spectra. In this case, there is clearly some sampling at half the ideal interval, causing spectra with a free spectral range of $\nu_0/2$.

If we assume that the error in the sampling of the interferogram is small, the sample measured at location $x + \delta$ can be expressed as a Taylor expansion around the desired sampling point x

$$f(x+\delta) = f(x) + \delta f'(x). \tag{3-13}$$

The Fourier transform of all of the samples then looks like

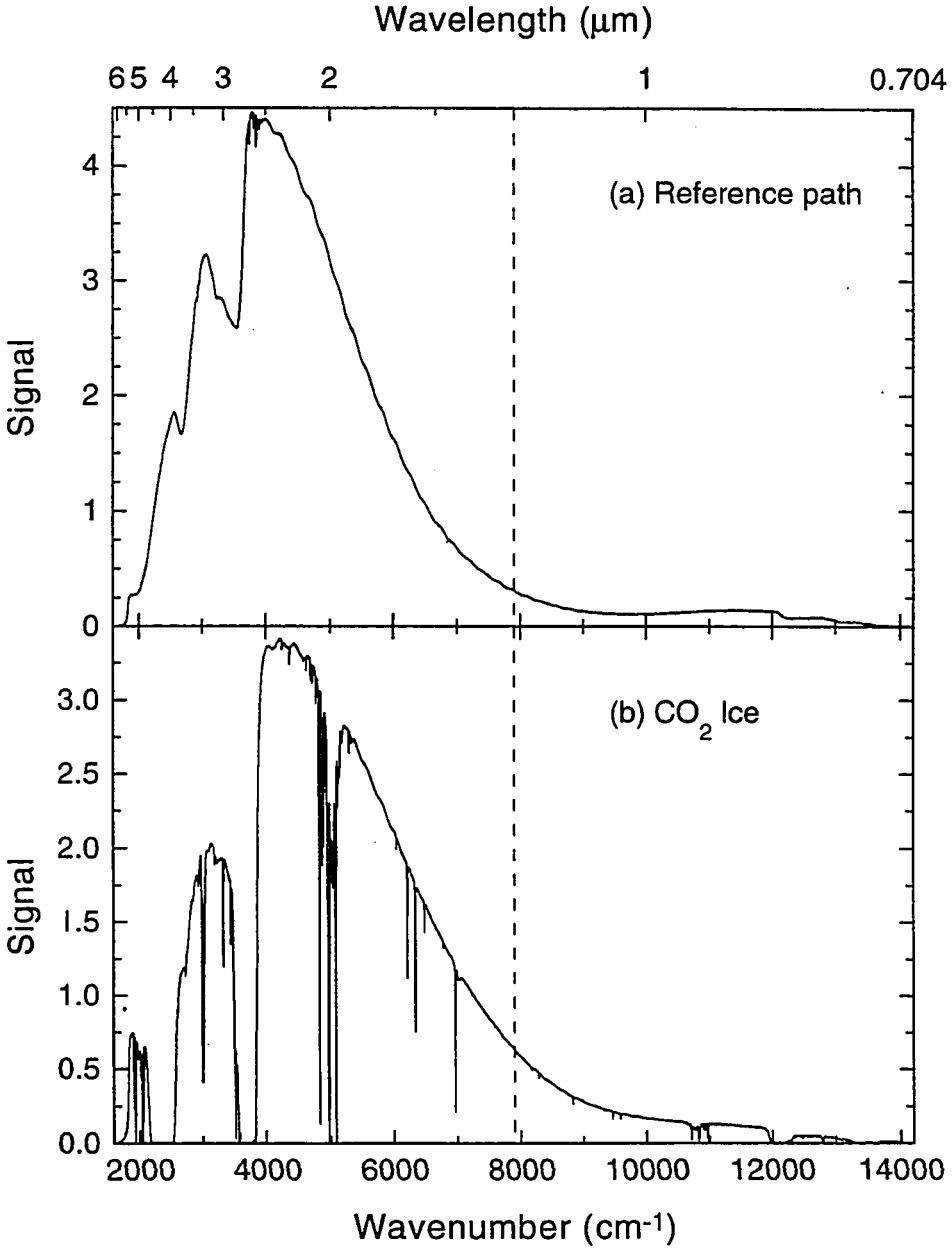


Figure 3-3 Example of alias spectra visible in CaF_2 beamsplitter data. (a) is a 4 cm^{-1} single-beam spectrum of the reference path, and (b) is a 4 cm^{-1} spectrum of the sample path with 4.6 mm of CO_2 ice. The vertical dashed line indicates the free spectral range of the alias spectrum (7899 cm^{-1}). In both cases, features of the spectrum on the left of the dashed line are reflected in the alias spectrum to the right.

$$\begin{aligned}\Im[f(x)] &= \Im[f(x_{even}) + f(x_{odd} + \delta)] \\ &= \Im[f(x_{even}) + f(x_{odd}) + \delta f'(x_{odd})] \\ &= \Im[f(x_{true})] + \delta\,\Im[f'(x_{odd})] \quad ,\end{aligned} \tag{3-14}$$

where the erroneously sampled data are arbitrarily assumed to be at "odd" x positions and the sum of the data at the even and corrected odd positions will produce the "true" spectrum over the full free spectral range. The Fourier transform of the derivative of a function is ν times the Fourier transform of the function, and the Fourier transform of the odd samples only gives a spectrum with half the free spectral range, so performing the Fourier transforms in Equation 3-14 gives

$$\Im[f(x)] = F(\nu) \text{ (measured)} = F_{true}(\nu) + \delta \cdot (\nu F_{true}(\nu) + (\nu_0 - \nu)F_{true}(\nu_0 - \nu)) . \tag{3-15}$$

From this, the ratio shown in Figure 3-4 can be expressed as

$$\frac{F(\nu_0 - \nu)}{F(\nu)} = \frac{F_{true}(\nu_0 - \nu) + \delta \cdot [\nu F_{true}(\nu) + (\nu_0 - \nu)F_{true}(\nu_0 - \nu)]}{F_{true}(\nu) + \delta \cdot [\nu F_{true}(\nu) + (\nu_0 - \nu)F_{true}(\nu_0 - \nu)]} . \tag{3-16}$$

If this is evaluated where $F_{true}(\nu_0 - \nu)$ is zero (which it is in the ν = 2500–4500 cm^{-1} range shown in Figure 3-4), this reduces to

$$\frac{F(\nu_0 - \nu)}{F(\nu)} = \frac{\delta \cdot \nu}{(1 + \delta \cdot \nu)} \approx \delta \cdot \nu \quad \text{for} \quad \delta \cdot \nu \ll 1 , \tag{3-17}$$

so the slope in Figure 3-4 is just the sampling error δ. The CaF_2 beamsplitter data are corrected using a pair of coupled equations which produces the points $F_{true}(\nu)$ and $F_{true}(\nu_0 - \nu)$ from the points $F(\nu)$ and $F(\nu_0 - \nu)$ for each ν according to Equation 3-15.

Unfortunately, almost half of the recorded spectra (which I term "anomalous"), when corrected by the above method, had significant negative signal near 10,000 cm^{-1}. This is because the measured spectrum falls well below the predicted level for the alias spectrum in this wavelength region, as shown in Figure 3-4. The origin of this behavior is unknown, and it is only predictable in an approximate sense. I devised a method with only a few adjustable parameters that allowed δ to a function of ν. $\delta(\nu)$ is a straight line

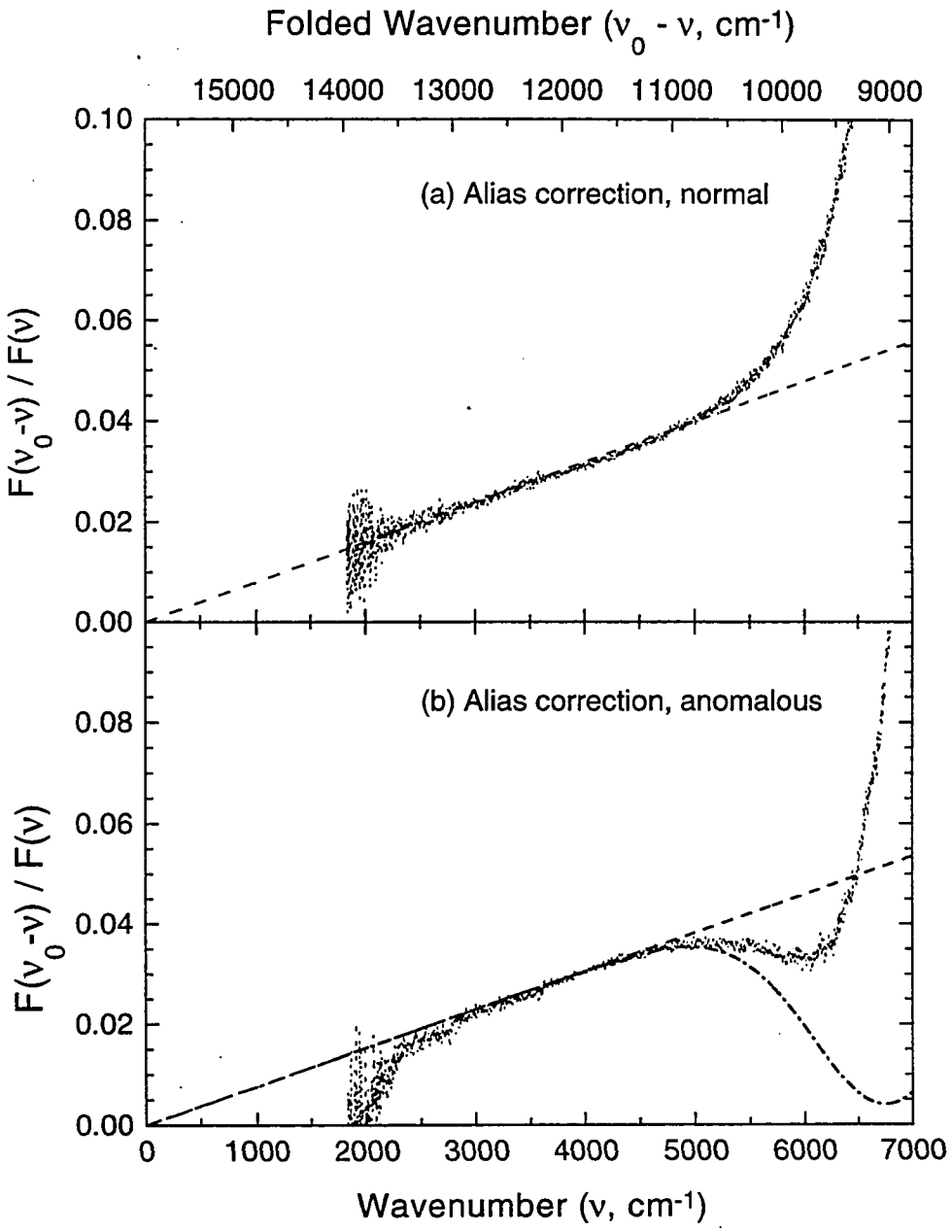


Figure 3-4 Determination of scaling factor for alias spectra. Plotted is the ratio of the alias spectrum at "folded" wavenumbers to the true spectrum. The linear fit, shown as a dashed line, is described in the text and is used to correct the spectrum. (a) Normal spectrum. (b) Anomalous spectrum, where linear fit results in negative values, so a line modified by a gaussian (dash-dot) is used instead. Both spectra are at a resolution of 4 cm^{-1}.

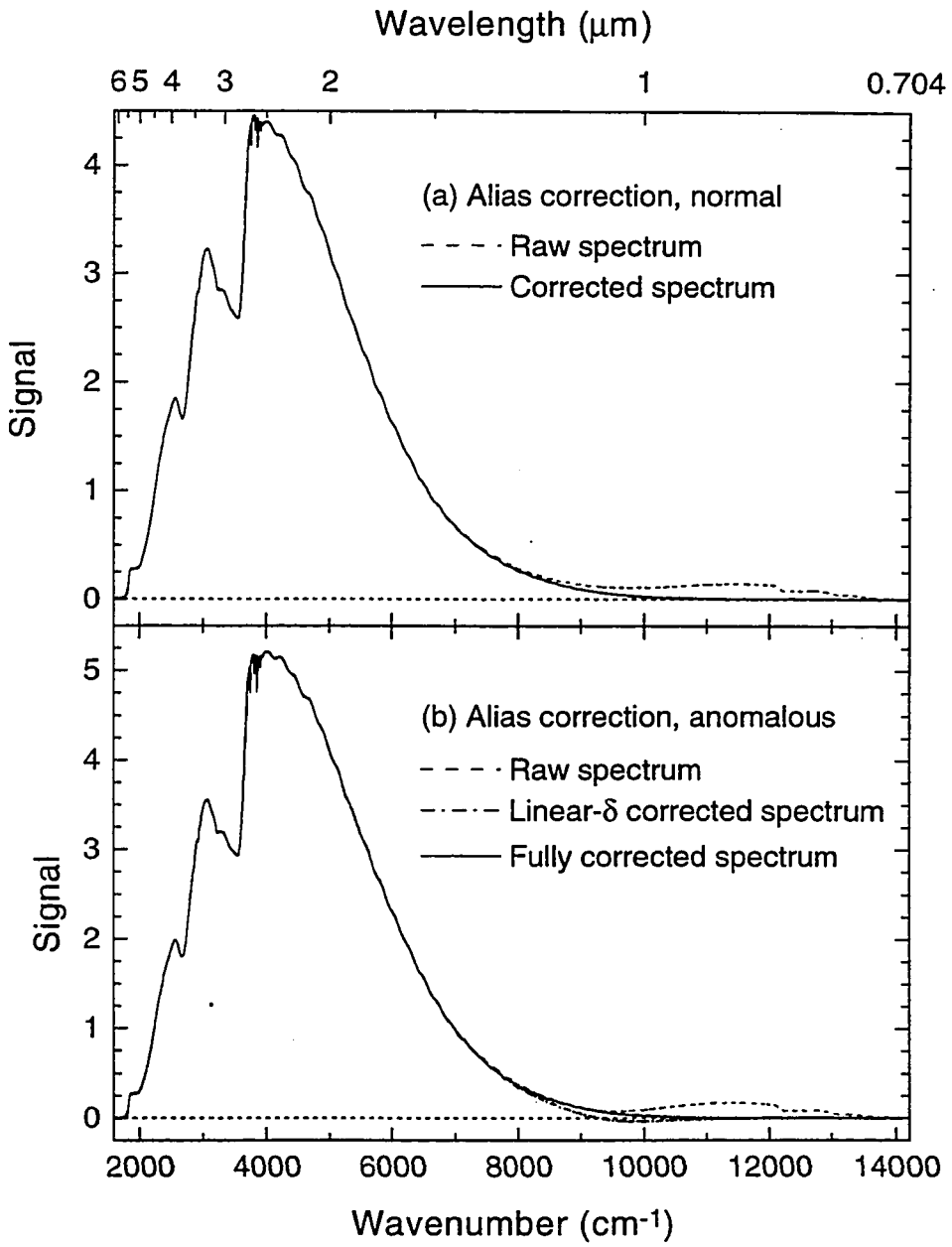


Figure 3-5 CaF_2 beamsplitter spectra with alias spectra removed. The solid lines depict the corrected spectra in both panels, while the dashed lines depict the original spectra. (a) shows a normal spectrum which is adequately corrected with a linear function, while (b) shows an anomalous spectrum, which if corrected by a linear function results in the dot-dashed line which goes below zero. The full correction for this is explained in the text.

modified by a negative-going gaussian of fixed wavenumber and width and adjustable amplitude. The amplitude was adjusted to get a fixed spectrum value at one wavenumber, producing tolerable results (Figure 3-5(b)), although some anomalous spectra still had values <0 at large wavenumbers after correction. This is of little consequence for the data presented in this dissertation, which end at 5555 cm^{-1} (1.8 μm), but it precludes the use of much the CaF_2 beamsplitter data beyond half of the free spectral range (7899 cm^{-1} or 1.266 μm).

3.5 Removal of Channel Fringes from CaF_2 Beamsplitter Data

The CaF_2 beamsplitter data exhibited very strong channel fringes from the highly polished CaF_2 windows. The fringes in the ice sample spectra were smaller and modified in phase compared to the blank spectra, so the CO_2 ice / blank ratios still had very large fringes. These needed to be removed for the spectra to be of any use, so I devised a relatively simple, though time-consuming, technique to do so. A 100 cm^{-1} segment of ratio spectrum is shown in Figure 3-6, where the strong 2.5-cm^{-1} fringe is clearly visible.

The method was to make a model fringe by which the measurement could be divided to get an improved spectrum. This was done by first dividing a high-resolution single-beam average spectrum by a 4 cm^{-1} single-beam average spectrum, which could not resolve the fringes. The result is mostly fringes, including modulation of the amplitude from the combination of fringes from the two chamber windows. This function was then Fourier transformed to find the dominant frequencies of the fringes. The strongest peak (near 2.5 cm^{-1}) was then separated and transformed back to frequency space to produce the model. It was not possible to remove other strong frequencies in this process, since the model phase and amplitude were adjusted to match the data, and this could only be done successfully for one fringe frequency at a time. Of course, the data could be processed serially with each frequency, but I decided that the other frequencies were sufficiently weak that further processing was unwarranted. Since the ratio spectrum is the ratio of two fringes, there is considerable energy in the second harmonic (1.25 cm^{-1}), which is not fully correctable using this model, and this is larger than the other remaining fringe

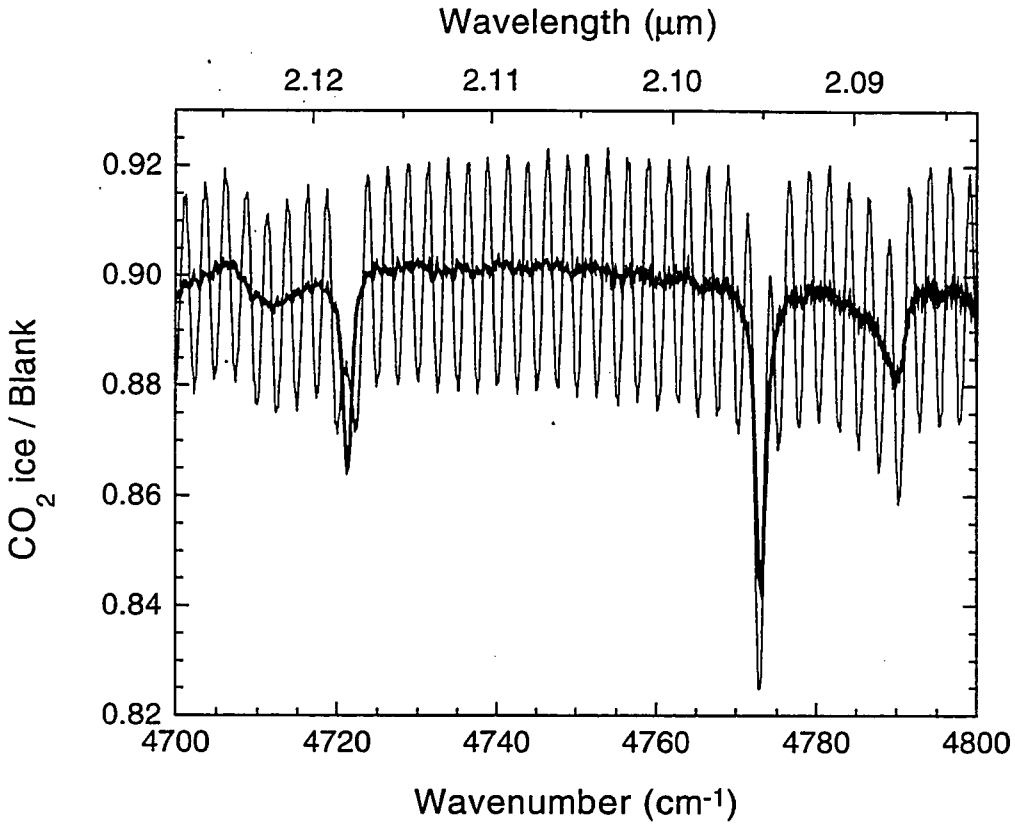


Figure 3-6 Sample spectrum showing fringe removal in CaF_2 beamsplitter data. The CO_2 ice / blank ratio shown is a 0.25-cm^{-1} resolution spectrum with 1.6-mm thick ice. The thin line is the uncorrected spectrum with strong 2.5-cm^{-1} fringes. The thick line is the corrected spectrum that results when it has been divided by a model fringe spectrum that has been adjusted in both amplitude and phase.

frequencies. In an attempt to get a more accurate model of the fringes in the ratio, the model from the single-beam measurement was transformed via

$$1 + \Phi' = \frac{1}{(1 + \Phi)}, \tag{3-18}$$

where Φ is the original model, and Φ' is the model used in removing fringes from the ratio spectrum.

The next step was to inspect the ratio spectrum about 25–50 cm^{-1} at a time, manually adjusting the amplitude and phase of the model to best match the fringes in the data, then

dividing the ratio by the adjusted fringes. An example of the result of such a process is displayed in Figure 3-6.

Chapter 4

Determination of Absorption Coefficients and Their Uncertainty

4.1 Anticipated Results Based on Previous Measurements

The anticipated absorption structure, based primarily on the measurements reviewed by Warren (1986) as well as some others, will be outlined here as background for understanding the structure seen in the new measurements. The far-infrared region, $\lambda>20$ μm ($\nu<500$ cm^{-1}), should be dominated by absorption in two lattice vibration lines studied by Kuan (1969), with minimal absorption at other wavelengths. Kuan tabulated the line positions, line widths, and integrated absorption for these features as functions of temperature from 4.2 to 100 K. Extrapolation of his data to 150 K implies broad lines centered at 93 μm (108 cm^{-1}) and 156 μm (64 cm^{-1}). The mid-infrared region is dominated by the 15-μm (667-cm^{-1}) ν_2 absorption band, which is highly absorbing over a broad wavelength range, about 12–18 μm (555–833 cm^{-1}). The wavelength regions on either side of this band are very transparent and were not accurately measured previously. The weakly absorbing ν_1 band centered at 7 μm should appear near to where Gaizauskas' (1955) accurate measurements place it.

The transparent region on the shortwave side of the 7 μm band was also not accurately measured previously. There is evidence from Fink and Sill (1980) for strong narrow absorption lines at 1914, 1934, and 2042 cm^{-1} (5.225, 5.171, and 4.897 μm), compared to the much weaker lines near (reanalyzed) wavelengths of 4.975 and 5.1 μm (2010 and 1960 cm^{-1}) in the Ditteon and Kieffer (1979) data. On the shortwave side of the 4.3 μm (ν_3) band, there is considerable evidence from frost measurements of far more detail than appears in the Ditteon and Kieffer measurements (Fink and Sill, 1980; Kieffer, 1970; Calvin, 1990). A much stronger line (than in Ditteon and Kieffer) near 3000 cm^{-1} (3.3 μm) is indicated, as well as weaker lines at 3330 and 3440 cm^{-1} (3.00 and 2.91 μm), and stronger lines on the wing of the 2.7 μm ($\nu_3 + \nu_1$; $\nu_3 + 2\nu_2$) band at 3514, 3563, and 3580 cm^{-1} (2.846, 2.807, and 2.793 μm). In the 2-μm region, the high resolution frost spectra of Fink and Sill (1980) show fine structure with at least ten narrow lines in the vicinity of the three strong lines near 2 μm. Their frost spectrum is probably characteristic of trans-

mission through a few mm solid ice. Also barely resolved in this data are two very weak absorption lines near 2.3 μm, also seen in a coarse-grained frost measured by Calvin (1990).

4.2 Far-infrared Measurements with Crystal Quartz Windows (50–333 μm)

4.2.1 Introduction

The measurements made with crystal quartz windows had very low signal-to-noise levels and high coherent interference. The effects of the interference were compensated for by using different mirror scan speeds in the FTS, since spectral regions affected by interference peaks are different at the different scan speeds. Two Mylar beamsplitters were employed, one 6 μm thick, used from 50 to 220 cm^{-1}, and another 25 μm thick, used from 30 to 100 cm^{-1}, which performed better than the other below about 70 cm^{-1}. The interferograms were specially processed because of the small signal/interference ratio (section 3.2.1).

All measurements were made at 4-cm^{-1} resolution, and only the three smallest thicknesses of ice were measured due to the large absorption coefficient in this region. The 13.8-mm sample showed measurable transmission only at the longwave end. The 1.6-mm path length was observed to be slightly misaligned during these measurements, so the value of 1.8 mm was used for the calculation of absorption coefficients. A separate sample was grown at each path length for each of the two beamsplitters, and an extra sample was measured at both 13.8-mm and 1.8-mm path lengths with the 25-μm beamsplitter.

It was necessary to average scans for 12 hours to get the S/N to levels where the small transmission of the ice samples was clearly visible above the noise floor (see section 3.2.1). These are called "long-scan" measurements. Several "short-scan" measurements in which scans were co-added for only 30 minutes were also taken for each sample. Because of the high noise floor of the short-scan measurements, they were made only to get some data safely recorded before starting the 12-hour scans, which were riskier (in terms of all of the equipment working properly for long periods). Because they contain 5–

10 times as much information as the short-scan data, the long-scan spectra dominate the weighted averages.

There are two sequences of measurements associated with each beamsplitter-path-length combination: a set of measurements of the evacuated, cold chamber, followed later by a set of measurements of a CO_2 ice sample. Each of these sequences typically consisted of 4–6 short-scan measurements and 1–3 long-scan measurements at each of two mirror scan speeds. An individual single-beam average spectrum and its standard deviation were calculated for both the sample-path and reference-path and for each scan speed and number of scans. These averages and standard deviations were converted to smoothed, zero-corrected single-beam spectra as described in section 3.2.1.

4.2.2 Ratioing and Averaging to Obtain CO_2-Ice / Blank Spectra

Sample-over-reference ratio spectra are calculated from the processed single-beam spectra, with the measurement error propagated according to

$$\frac{\sigma_T}{T} = \sqrt{\left(\frac{\sigma_S}{S}\right)^2 + \left(\frac{\sigma_R}{R}\right)^2} \tag{4-1}$$

(Bevington, 1969), where S is the sample spectrum (blank or CO_2), R is the reference spectrum, and T is the ratio S/R. The estimated measurement errors in S and R are σ_S and σ_R, respectively, while the propagated error in T is σ_T. The ratios (usually four) for each sequence are then combined in a weighted average, where the weighting factors are the reciprocals of the variances:

$$\bar{T} = \frac{\sum T_i \sigma_i^{-2}}{\sum \sigma_i^{-2}}. \tag{4-2}$$

The uncertainty I use for the average is given by

$$\sigma_{\bar{T}} = \sqrt{\frac{N}{\sum \sigma_i^{-2}}} \tag{4-3}$$

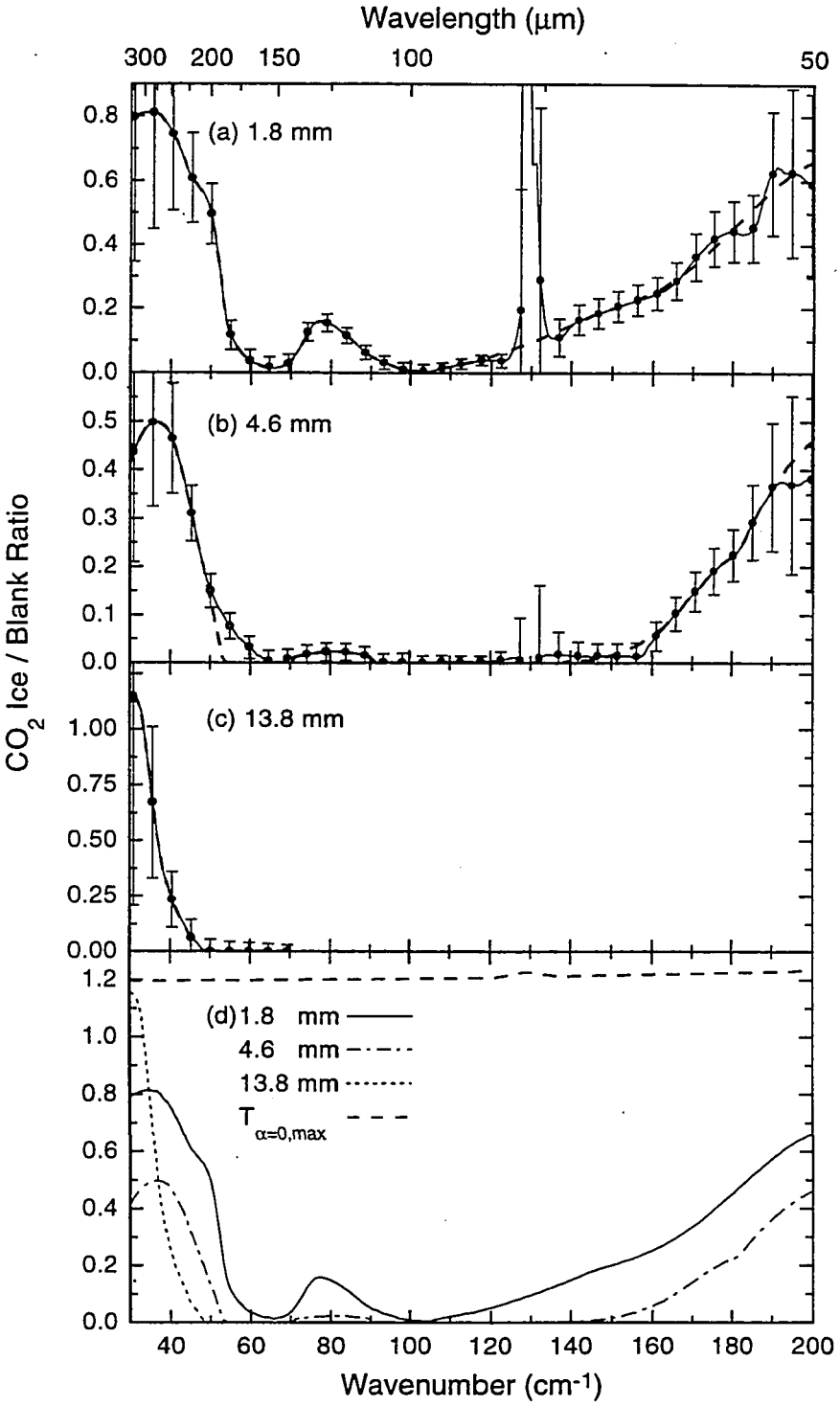
where N is the number of measurements averaged. This is $\sqrt{N}$ times the uncertainty in the *mean*, which is the same as the uncertainty in the *data* when individual measurement errors are identical. I decided that this was a more conservative estimate of the combined uncertainty, given that the individual measurement errors are only estimates. Usually, the weighted average of the blank measurements was divided into each individual CO_2 ice measurement, with the error estimated by Equation 4-1. The CO_2 / blank ratios were then combined into a weighted ratio representing the whole sequence. In the cases where two samples were measured with the same path length and beamsplitter combination, the sample averages were incorporated into a single estimate by performing another weighted average.

The next step is to combine the data for each path length from the two beamsplitters. For the 13.8-mm path, no transmission was measurable for $\nu>50$ cm^{-1}, so only the 25-μm beamsplitter data was used. The 4.6-mm-path measurements showed negligible transmission between 60 and 150 cm^{-1}, so 25-μm beamsplitter data was used below 100 cm^{-1} and 6-μm beamsplitter data above 100 cm^{-1}. The case of the 1.8-mm path was more complicated, since transmission was measurable at almost every wavenumber. A weighted average of the spectra from both beamsplitters was taken in the interval 76–104 cm^{-1}, where both gave useful data. The combined averages are shown in Figure 4-1.

4.2.3 Determining Absorption Coefficients and Error Bounds

Before applying the multi-thickness analysis to this data, it was necessary to make some adjustments to the combined averages. These are illustrated in Figure 4-1. The modified data were then broken into two halves at 104 cm^{-1}, with data from three thicknesses used for $\nu<104$ cm^{-1} and from two thicknesses for $\nu>104$cm^{-1}. The unconstrained minimization technique (see section 3.1) was tried initially, but this led to $T_{\alpha=0}$ solutions well outside of the limits for all initial conditions tried. So the constrained method was used limiting the derived absorption coefficient to $\alpha>0.1$ m^{-1} and the $T_{\alpha=0}$ levels to between zero and $T_{\alpha=0,max}$. The initial $T_{\alpha=0}$ estimates had no degrees of freedom in the small-wavenumber (hereafter, small-ν) segment, since the 13.8-mm measurement was

Figure 4-1. Weighted average spectra for three path lengths of CO_2 ice, using data from both the 25-μm and 6-μm Mylar beamsplitters. (a)-(c) show spectra from each thickness with associated error bars plotted about every 5 cm^{-1}. The heavy dashed lines indicate the smoothed and corrected spectra which were used for further processing. Except for the 50–60-cm^{-1} region in the 4.6-mm spectrum (b), the corrections are well within the error bounds. Both the 1.8- and 4.6-mm spectra ((a) and (b)) are smoothed at the 200-cm^{-1}end, where the smoothed single-beam spectra are both at very low levels so the ratio spectrum magnifies irregularities. The 1.8-mm spectrum is interpolated across the 128-cm^{-1} region where absorption by the windows obscures most of the signal, and the 4.6-mm spectrum is provided with a smooth cutoff from 160 down to 140 cm^{-1}. The increase of the absorption of the 4.6-mm spectrum from 50 to 60 cm^{-1} is to make the spectrum consistent with the 1.8-mm spectrum, which implies that the transmission at 4.6-mm should diminish greatly near where the 1.8-mm transmission is about 0.2. Two separate samples of 1.8-mm thickness were measured, and they agreed very well in their transmission in this region, so the single 4.6-mm measurement was considered less accurate, and was therefore modified. The maximum correction is less than 3σ. The final panel, (d), shows the corrected spectra for all three thicknesses plotted on the same scale, along with the maximum theoretical CO_2 / blank level for the crystal quartz, $T_{\alpha=0,max}$, calculated using Equation 3-3. The large uncertainty at 30 cm^{-1} is evident in the large spread in values where the CO_2 ice is apparently quite transparent, and should result in high values here for all three thicknesses. However, the data are taken at face value in this spectral region in the analysis for absorption coefficient, assuming that the adjustment of the $T_{\alpha=0}$ levels will be able to compensate for these differences.


Wavelength (μm)
300 200 150 100 50
(a) 1.8 mm
(b) 4.6 mm
(c) 13.8 mm
(d) 1.8 mm
4.6 mm
13.8 mm
$T_{\alpha=0,max}$
CO_2 Ice / Blank Ratio
Wavenumber (cm^{-1})

near the maximum possible at 30 cm^{-1} (albeit with large error bars). The initial $T_{\alpha=0}$ for 13.8 mm placed anywhere between the measurement and the maximum leads to about the same choice of $T_{\alpha=0}$ for the other two thicknesses. So instead of changing the initial condition for this segment, different cost functions were used with and without noise weighting and curvature and slope penalties.

The large-wavenumber (hereafter large-ν) segment had similar restrictions on the initial conditions, not because of $T_{\alpha=0}$ limits, but because of α determinations from the cesium iodide window with Mylar beamsplitter measurements described in section 4.3. At 200 cm^{-1} (50 μm), these measurements have much smaller error than the far-infrared measurements, and the implied α at this wavenumber requires that the $T_{\alpha=0}$ level for the 4.6-mm thickness must approach the maximum (with $T_{\alpha=0}\approx 0.8$ for 1.8 mm). Therefore, the minimizations for the large-ν segment all used the same initial point, with variations in the outcome dependent only on the selected cost function as in the case of the small-ν segment.

For both the small- and large-ν segments, using a weighted or unweighted cost function, or adding a large, small, or no penalty for curvature and slope of the $T_{\alpha=0}$ polynomials had very little effect on the resulting α for minimum error of fit. The misfit between the model measurements and the actual measurements was always well within the measurement uncertainty for all of the minimal solutions. When the unweighted cost function with no curvature penalty was used, the $T_{\alpha=0}$ functions often approached zero where the measured transmissions were small, but this had little effect on the best-fit absorption coefficients. The greatest variation in α among the minimization solutions occurred near 50 cm^{-1}, but the uncertainty at that wavenumber is still more than twice this variation. The minimal solutions were averaged, and the smallest of the errors in absorption, calculated from the measurement errors at every path length, was used to calculate the uncertainty in the derived α at each wavenumber. In the opaque center of the spectrum (162–200 cm^{-1}), this uncertainty is dominated by error in the 1.8-mm measurement. The minimizing routine always pinned α near 30 cm^{-1} to the minimum specified by the (arbitrary) constraint, 0.1 m^{-1}. In determining a smooth representation of the absorption spectrum, I

chose α=1 m^{-1}, which puts the upper error limit of α at 30 cm^{-1} near 100 m^{-1} (transmission >50% at 13.8 mm implies α<50 m^{-1}). The absorption coefficient estimate for the wavenumber region 30–200 cm^{-1} (50–333 μm) is shown with maximum and minimum bounds in Figure 4-2.

4.3 Cesium Iodide Window Measurements with Mylar Beamsplitter (18–60 μm)

4.3.1 Introduction

The longest wavelength measurements made with the cesium iodide (CsI) windows used the 6-μm Mylar beamsplitter, allowing measurements to the transmission cutoff of the windows, close to 170 cm^{-1} (59 μm). The shortwave cutoff was selected near the first efficiency minimum of the beamsplitter near 555 cm^{-1} (18 μm). The FFTs of the interferograms from these measurements were easily performed by the Mattson software. Although small peaks or dips from 60-Hz (and higher harmonics) were often evident, they were never large enough to create any difficulty in the processing. The measurements were all taken at a scan speed of 10 kHz, and most were made with 4-cm^{-1} resolution. One spectrum of CO_2 ice was taken at 1-cm^{-1} resolution for four of the five thicknesses, and none showed evidence of features unresolved at 4-cm^{-1} resolution.

In this wavelength range, there was significant transmission by CO_2 ice for all five thicknesses. The CsI measurements were made with the minimum possible handling of the chamber, so measurements with the KBr beamsplitter were also completed at each thickness before rebuilding the chamber. Four different samples were grown in the 4.6-mm chamber since there was some difficulty in making transparent samples. Data from the two samples with highest transmission are used, with about 15 separate spectra for each. Only one 1.6-mm sample was measured due to the long growth time needed to make a useful sample. It was also the first such sample grown, and experience was able to produce better results at other wavelengths. Twelve spectra were measured for this sample, which had about 50% scattering extinction. Two samples were grown at the 41.3-mm path length, and their transmittances were equal to within a few percent, with a total of

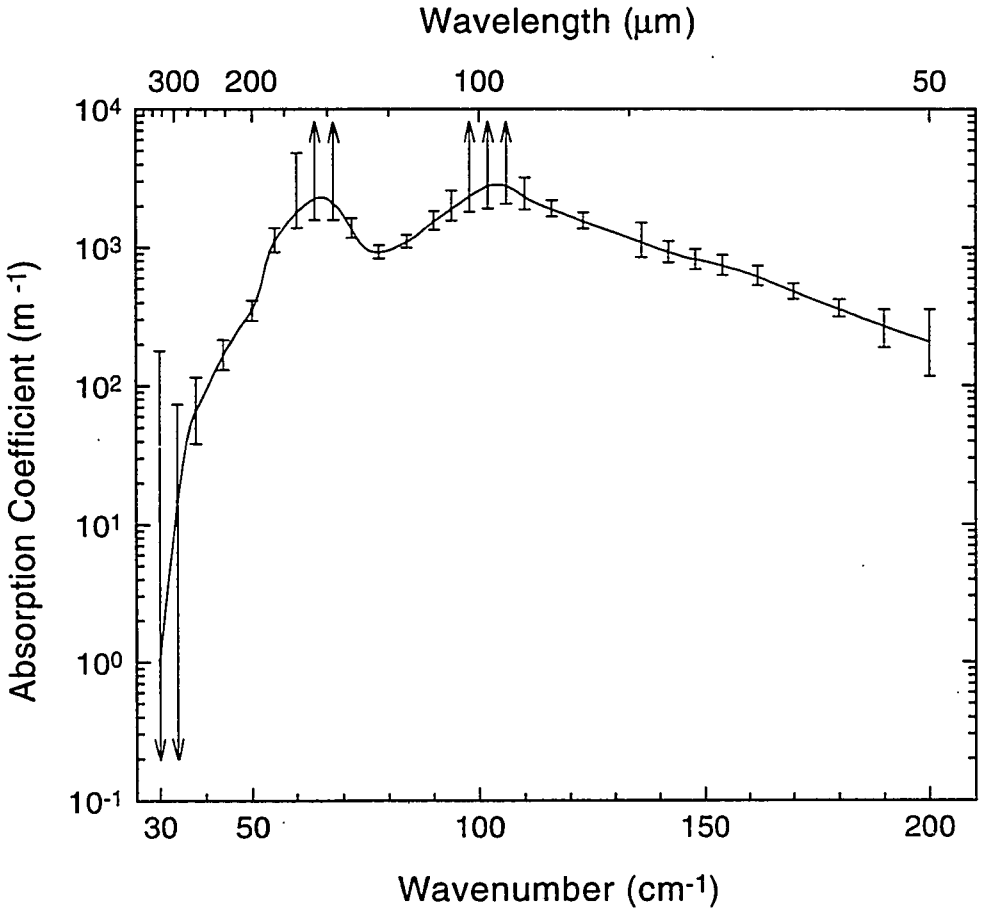


Figure 4-2. The best estimate of the absorption coefficient of CO_2 ice at a T=150 K in the wavenumber region 30–200 cm^{-1} (50–333 μm). The error bound estimates are plotted for occasional wavenumber values. The only source of error assumed to contribute here is measurement uncertainty due to noise and interference. Where the measurement error in transmission extends above $T_{\alpha=0,max}$ or below zero, the error bar for absorption is capped with an arrow pointing to 0 or infinity, respectively.

over 15 spectra taken. For the remaining thicknesses, 13.8 and 107.5 mm, 20 spectra were measured from only one sample each.

4.3.2 CO_2-Ice / Blank Averages and Error Estimates

The quality of these measurements was very good. Many measurements in each sequence were nearly identical, allowing for the accurate estimation of the noise spectrum (independent of drift or change in the sample) by examining the standard deviation of the data. In cases where two samples were measured the results were identical to a few percent.

The only problem was persistent interference peaks or dips at fixed wavenumbers, which usually did not average out. The solution was to examine the whole set of measurements in each region of the interference. Usually at least one measurement would be unaffected by the interference, and provide a guide for interpolating the other measurements across the interference region before averaging. Another problem was the large noise level at the ends of the wavenumber range. Figure 4-3 shows that the instrumental uncertainty at 170 cm^{-1} and 555 cm^{-1} is about 30 and 5 times greater, respectively, than at 250–500 cm^{-1}. The error in the central part of the spectrum, however, was <0.007 (in the units of the CO_2 ice / blank ratio), completely negligible compared to the uncertainty in determining the $T_{\alpha=0}$ levels there.

Before further processing, the CO_2 ice / blank ratios were rendered as smooth curves on a 5-cm^{-1} grid. There was some difficulty in accurately determining the shape of the spectrum where the transmission was low and the uncertainty was large (near the ends of the spectral range). The model spectra from the absorption coefficient determination process had the largest deviation from the smoothed measurements in these places. The smoothed spectra for all path lengths are shown in Figure 4-4.

4.3.3 Determining Absorption Coefficients and Error Bounds

The quality of these data allowed the use of constrained minimization to find the best estimate of α. Initially, unconstrained minimizations were run, starting with a fixed initial

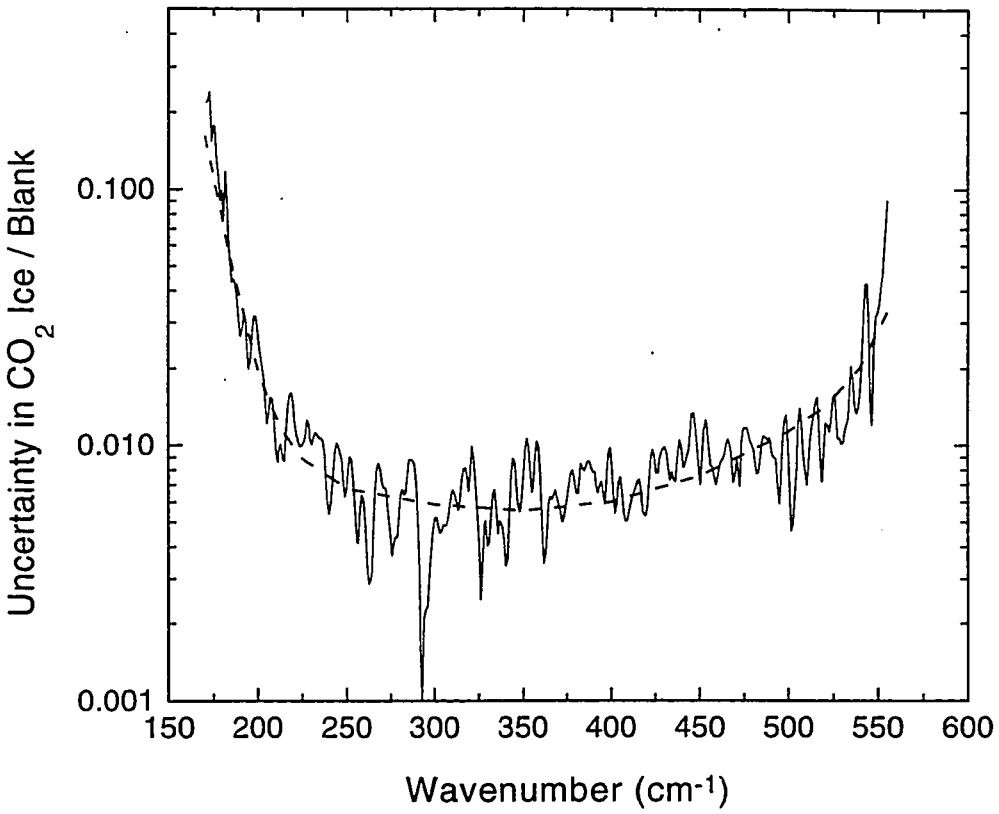


Figure 4-3. Error estimate for the measurements with cesium iodide windows and Mylar beamsplitter. The solid line is the average of several standard deviation calculations from sets of about seven individual spectra of blanks or CO_2 ice with the 41.3-mm path length, divided by an average blank spectrum to estimate the absolute error of the CO_2 ice / blank ratios. The dashed line is a smooth representation of this error which was used to determine the contribution of instrumental error to the uncertainty in derived absorption coefficients.

point consisting of constant $T_{\alpha=0}$ levels of 0.91, 1.025, 0.95, and 0.95 for thicknesses 4.6, 13.8, 41.3, and 107.5 mm, respectively; $T_{\alpha=0}$ for 1.6 mm sloping from 0.59 at 170 cm^{-1} to 0.51 at 555 cm^{-1}; and an absorption coefficient set to the average of the five determinations of α from Equation 3-1 with T replaced by $T_i/T_{\alpha=0,i}$. Using the cost function given by Equation 3-7, this yielded a minimal solution after 100–300 iterations such that the incremental reduction in the cost was very small. When the iterations were continued, the procedure drove α in the most transparent region (near 410 cm^{-1}) towards negative values

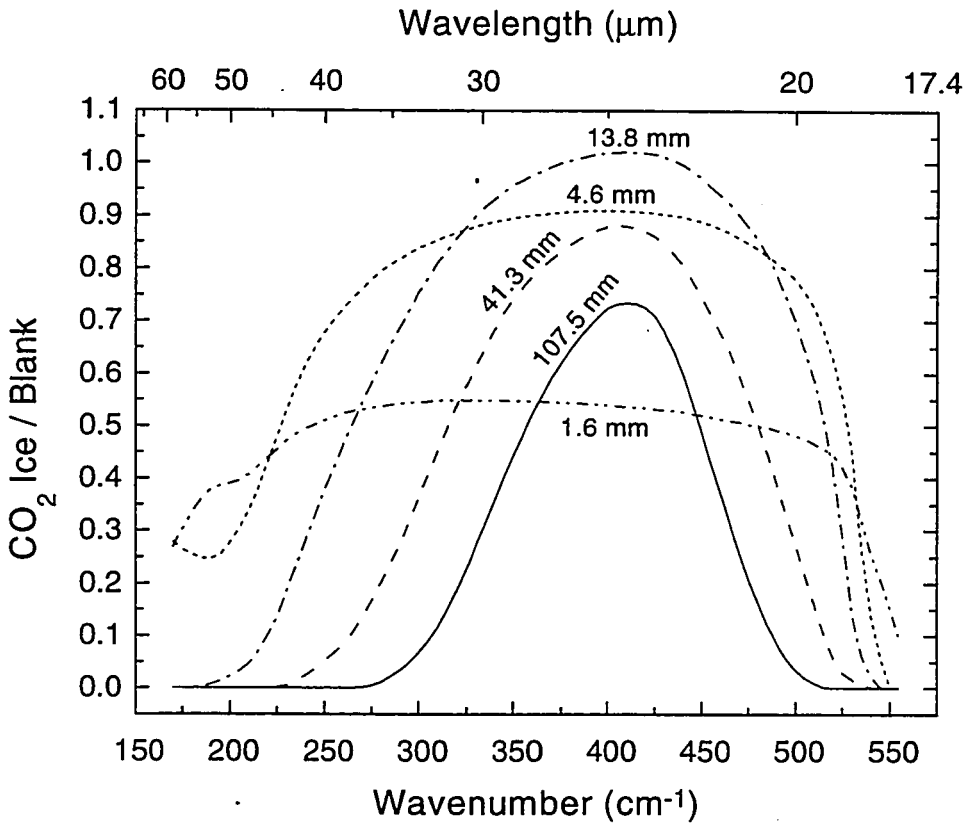


Figure 4-4. Smoothed CO_2 ice / blank spectra on a 5-cm^{-1} grid from 170 to 555 cm^{-1} for all five sample thicknesses as indicated. The 1.6-mm sample was imperfect over about half of the window area, and thus has a markedly lower transmission. The zero-absorption ($T_{\alpha=0}$) levels for the thinnest three samples should be very close to their maximum measured levels, since the 107.5-mm sample transmits at least 65%. This in turn implies that $T_{\alpha=0}$ levels for these path lengths must be significantly different, with $T_{\alpha=0}$(1.6 mm)<$T_{\alpha=0}$(4.6 mm)<$T_{\alpha=0}$(13.8 mm) and a sloped $T_{\alpha=0}$ for the 1.6-mm spectrum. This relationship is consistent with the visually observed character of the samples. The maximum theoretical transmission (no scattering) with CsI windows is about 1.14 (above the top of this plot), so even the best quality sample had about 10% scattering extinction.

and the $T_{\alpha=0}$ functions towards high curvature. When the weighted cost (Equation 3-9) was used, a similar solution could be arrived at in 30–50 steps (except at the ends, where the large errors caused any residual to be largely ignored, so the values there remained the same as the initial state).

Even though the solution from the one initial point seemed highly likely, based on observations of the samples and experience with other wavenumber ranges, equally good fits to the data could occur for a large range of initial conditions. The natural limits in this case are the possible $T_{\alpha=0}$ levels for the thickest sample. These could lie at any level from near the maximum of the 107.5-mm spectrum (0.74) to the theoretical $T_{\alpha=0,max}$ given by Equation 3-3 (1.10–1.15). Forty models were set up with the initial constant $T_{\alpha=0}$ (107.5 mm) placed at intervals of 0.01 between 0.74 and 1.13. The α at 410 cm^{-1} derived using this value was then used to set the constant $T_{\alpha=0}$ for the 41.3- and 13.8-mm spectra. The initial $T_{\alpha=0}$ for the two smallest path lengths were the same for all forty models and equal to their values in the fixed initial point described above, since the range of $T_{\alpha=0}$ levels for the 4.6- and 1.6-mm data over the forty models would vary only about 0.015 and 0.003, respectively. The models were minimized for 50 iterations using the weighted cost function, and the final costs of all models were very similar. None of the minimal solutions produced absorption coefficients less than 0, or $T_{\alpha=0}$ greater than $T_{\alpha=0,max}$ for any of the path lengths. Figure 4-5 shows some of the $T_{\alpha=0}$ solutions for the 107.5-mm spectrum. The average of the absorption coefficients from all 40 solutions is very close to the solution with the fixed initial point, since the $T_{\alpha=0}$ (107.5 mm) value for the fixed point (0.95) is halfway between the minimum and maximum values for the 40 models.

The final estimate for the α from 170 to 555 cm^{-1} is the 40-model average, with the uncertainty over most of the range given by the standard deviation of the set. There is very little difference in this estimated absorption coefficient where α>50 m^{-1}, so measurement errors are the main source of uncertainty in these regions. This estimate is shown in Figure 4-6.

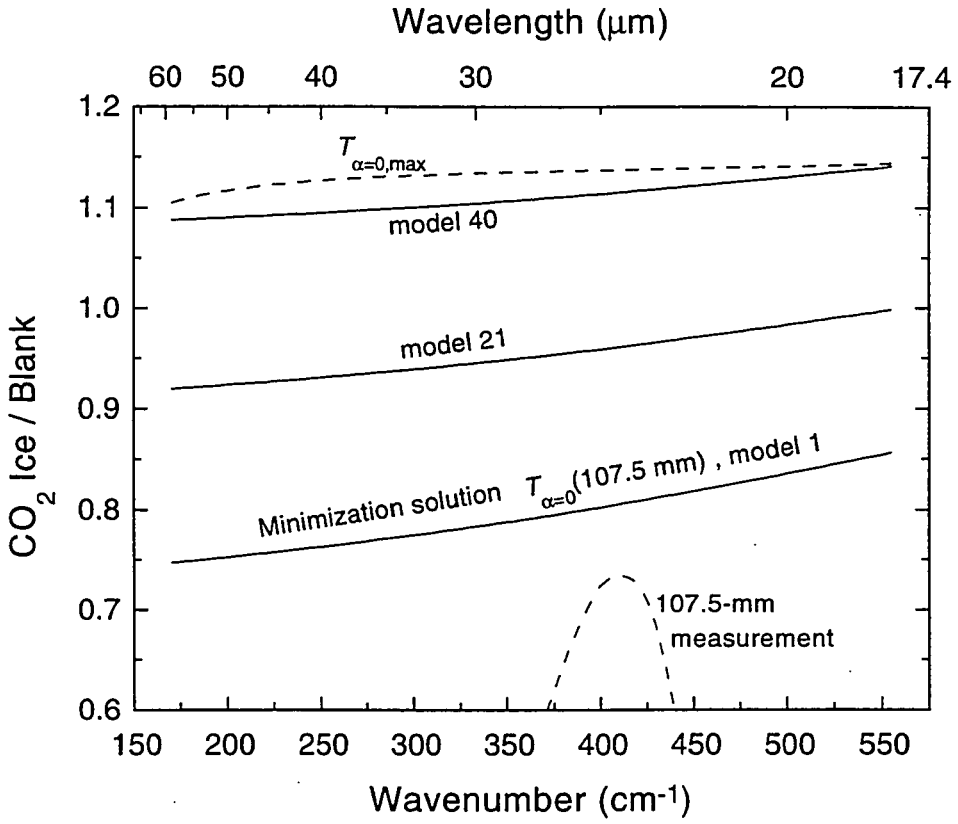


Figure 4-5. Examples of minimization solutions from a set of forty, each with a different initial estimate of the $T_{\alpha=0}$ levels and absorption coefficient. The $T_{\alpha=0}$ solution for the 107.5-mm sample spectrum is shown for the minimum initial $T_{\alpha=0}$ (model 1), an intermediate model (21), and the maximum initial $T_{\alpha=0}$ (40). The upper and lower limits on the $T_{\alpha=0}$ solutions are shown as dashed lines, namely the 107.5-mm CO_2 ice / blank spectrum and the maximum theoretical zero absorption level $T_{\alpha=0,max}$ (Equation 3-3).

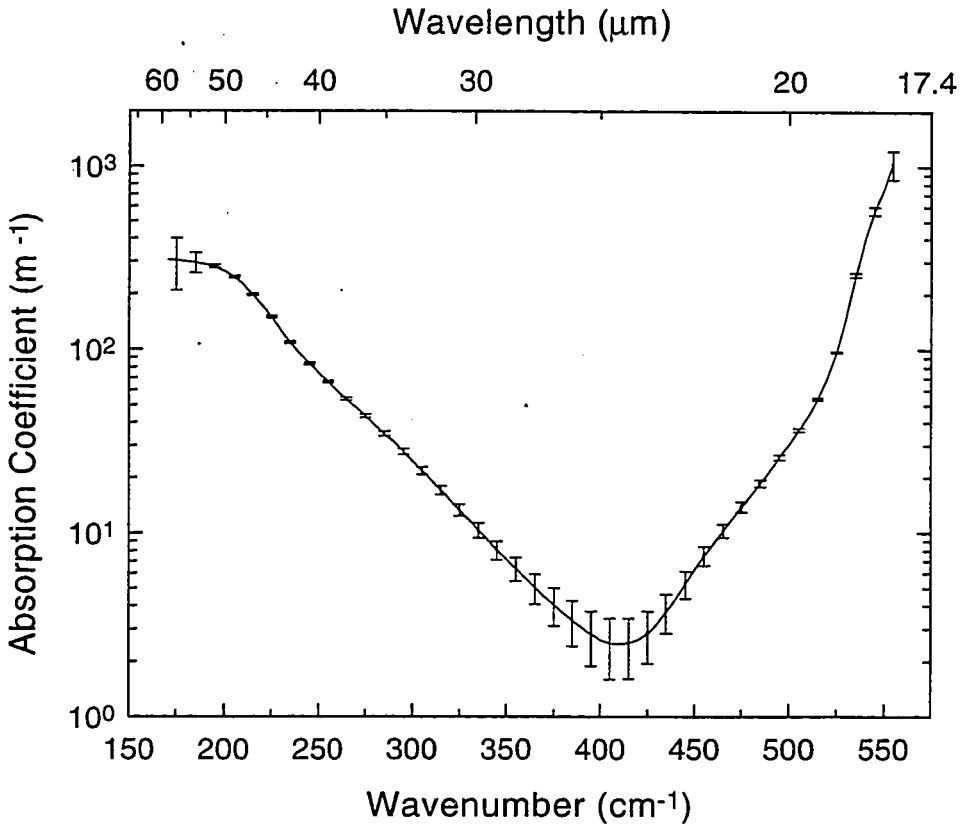


Figure 4-6. The best estimate of the absorption coefficient of CO_2 ice at 150K over the wavenumber range 170–555 cm^{-1} (18–58 μm). The uncertainty in the coefficient is plotted as error bars every 10 cm^{-1}. The source of the large relative error in the central part of the wavenumber range is from uncertainty in the amount of scattering extinction for the thickest sample. The larger errors at each end of the wavenumber range are due to instrumental uncertainty in measurement of the thinnest sample.

4.4 Mid-Infrared Measurements (1.8–22 μm)

Most of the information in this range comes from measurements with the CsI windows, KBr beamsplitter, and MCT detector. However, for reasons of better S/N and better spectral resolution, measurements made with CaF_2 windows and beamsplitter, and InSb

detector were used to improve the spectra obtained from the KBr in the region ~2000–5556 cm^{-1} (1.8–5.0 μm).

4.4.1 Cesium Iodide Window Measurements with KBr Beamsplitter

Measurements were made with the KBr beamsplitter in conjunction with the Mylar beamsplitter measurements, using the CsI windows and the MCT detector. The range of measurement was limited by the response of the detector at the longwave end (22.2 μm, or 450 cm^{-1}), and by the efficiency of the beamsplitter at the shortwave end (1.8 μm, or 5556 cm^{-1}).

The semiconductor detector provided, in contrast with the longer wavelength measurements made with the thermal detector, far superior S/N, so the variation in transmission due to other instabilities in the system was clearly evident compared to the intrinsic noise. Typically, the variation in transmission amounted to a few percent while the noise level was less than a tenth of a percent over most of the spectral range. Since the level where the absorption is zero is determined by separate processing, the spectrum-to-spectrum variation in transmission is inconsequential, and averages of all of the spectra made were suitable for continued processing. These instabilities, however, made it difficult to determine the intrinsic noise level from the standard deviation of sets of spectra.

The low noise level allowed acquisition of data at all spectral resolutions for each sample. The coarsest resolution spectra, made at 4 cm^{-1}, were quick, low-noise spectra that characterized the general shape and level of the transmission. They were useless, however, for characterizing the detailed shape of CO_2 ice absorption in the middle infrared. To measure this detail, much finer resolutions were used: 0.5, 0.25, and 0.125 cm^{-1}. Increasingly detailed spectra required geometrically longer scan times to get acceptable S/N, so there were many fewer spectra made at the highest resolutions. The middle resolution measurements (0.5 or 1 cm^{-1}), because of their higher S/N, were useful in verifying the existence of weak features in the highest resolution measurements, even if those features were not fully resolved.

The 1.6- and 41.3-mm samples were measured first, and had fewer high-resolution spectra, and fewer total spectra measured than later samples. These samples also were measured at 1-cm^{-1} resolution, but those measurements were later replaced by more useful 0.5-cm^{-1} measurements (which had a better trade-off between detail visible versus time to acquire). Each sample had ten to fifty 4-cm^{-1} spectra recorded, originally for studying the variation of transmission with time, but ultimately they were merely averaged together to minimize noise. These averages were found to be nearly equivalent to averages of the finer resolution, longer scan-time measurements. Normally, CO_2 ice spectra were divided by blank spectra with the same resolution, since each resolution showed a different expression of the channel fringes and absorption features of the windows, and these would be more effectively eliminated from the ratios. Only one blank spectrum at the finest (0.125 cm^{-1}) resolution was taken (of the 13.8-mm path length), because of the 6–7 hour scan time. The rest of the 0.125-cm^{-1} CO_2 ice measurements were divided by 0.25-cm^{-1} blanks, resulting in partially cancelled channel fringes of the highest frequencies.

Only one 1.6-mm sample was grown, and it contained an opaque, highly scattering region. This resulted in ice / blank spectra which were about half the level of the clear samples for the other thicknesses and which showed clear evidence of multiple reflections off CO_2 ice-gas interfaces, as will be seen in Figures 4-9(b), 4-13, and 4-17(a) below. The higher noise levels (due to the lower signal level) and the absence of large numbers of spectra to average limits the accuracy of the coefficients in the broad region from 550 to 785 cm^{-1}, which could be measured only from the 1.6-mm KBr sample. The number of samples grown and the number of spectra taken at each resolution for each sample thickness using the KBr beamsplitter are given in Table 4-1.

4.4.2 Averaging, Removing Zero Offsets, Scaling, and Smoothing of KBr Measurements

The general procedure for each thickness was to average most or all of the measurements of the same resolution together. There was substantial variation in the level of the spectra, which was greatest at large wavenumbers. The total variation over all spectra for

Table 4-1 Number of FTS measurements made at each resolution with the KBr beamsplitter.

Path length (mm)	Number of samples measured	Total number of spectra at each resolution CO_2 ice (blank)			
		4 cm^{-1}	0.5 cm^{-1}	0.25 cm^{-1}	0.125 cm^{-1}
1.6	1	0 (20)	6 (7)*	1 (3)	1 (0)
4.6	2	36 (48)	26 (16)†	6 (4)	1 (0)
13.8	1	10 (34)	8 (12)	4 (4)	2 (1)
41.3	2	47 (22)	11 (9)*	3 (3)	1 (0)
107.5	2	38 (34)	20 (12)	6 (4)	2 (0)

* All of these measurements were made at 1-cm^{-1} resolution instead of 0.5 cm^{-1}

† Four of the blank measurements were made at 1-cm^{-1} resolution

each sample was less than 2% at 450 cm^{-1}, 5% at 2000 cm^{-1}, and 10% at 5000 cm^{-1}. The averages from each resolution usually differed from each other by only a few percent over most of the wavenumber range. But, in order to construct a composite, smoothed spectrum using all of the available data, the averages from each resolution needed to be matched.

The first step in this process was to subtract the zero offset which was apparent in the strong absorptions of the CO_2 ice. This was similar for all resolutions, and amounted to less than 1% over most of the wavelength range. The location of zero transmission was easy to detect in the high resolution spectra, since the variation of the offset with wavenumber was small compared to the sharp transmission cutoffs. In the low resolution measurements, it was harder to locate because of the much smoother cutoff shape and the unresolved narrow absorption lines, where the measured spectrum may never approach the zero level. The zero offsets for the higher resolution measurements were used as a guide for estimating the zero offsets for the lower resolution data.

The zero-corrected spectra from all four resolutions were then scaled to one of the set, usually the 0.25-cm^{-1} average, which had less spectrum-to-spectrum variation than the lower resolution data due to the much longer integration time of each spectrum, and had much lower noise than the 0.125-cm^{-1} data. The scaling functions were smoothly varying curves which matched the levels only where the spectral variation was fully resolved by the spectrum being scaled, and were largely limited to the range of 0.95–1.05. After scaling, a smooth line with enough points to represent the curvature of the spectral features was generated, guided by the four scaled average spectra. Usually, the noise level allowed the location of this line to a precision of better than 0.1%. These zero-corrected, smoothed spectra are used to derive the α and are displayed in Figures 4-9(a), 4-13, 4-17(a), and 4-21(a) below.

4.4.3 Measurements with CaF_2 Windows and Beamsplitter

FTS measurements with the CaF_2 beamsplitter and windows, and InSb detector were made using only four of the five sample thicknesses, because they were originally intended only to supplement the monochromator measurements between 1 and 1.8 μm. This meant that only the three thinnest samples were really needed (see Chapter 5), but a 107.5-mm sample was also measured to take advantage of the greater ability of the FTS to resolve subtle spectral structure in this weakly absorbing region. Once the data was processed, however, I noticed that the measurements of the 1.6-mm sample, because of its relative clarity, showed far greater detail at high and low transmission levels than the same KBr sample, and also seemed to have higher spectral resolution (seen in the width and strength of the narrowest absorption features). So some of the CaF_2 spectra were used where possible to improve the KBr measurements.

Most of the spectra were recorded with a Tungsten-Halogen source, but the 107.5-mm data used the glow-rod, since, by then, all of the available Tungsten-Halogen bulbs had burnt out. The spectral characteristics of the two sources were similar, but the glow-rod had much greater output >3.6 μm (<2800 cm^{-1}), while the Tungsten-Halogen had slightly higher output <2 μm (>5000 cm^{-1}). The shortwave cutoff was very gradual and the signal

became negligible somewhere between 0.9 and 1.1 μm (9000–11,000 cm^{-1}). This was primarily caused by loss of beamsplitter efficiency. The glow-rod data were further limited by the source to >1.3 μm (<7700 cm^{-1}). The detector cut-off was around 5.9 μm (1700 cm^{-1}), although Tungsten-Halogen data were mainly useful below 4 μm (above 2500 cm^{-1}). The InSb detector had very good S/N, at least as good as the MCT.

The CaF_2 beamsplitter single-beam spectra were affected by a small alias spectrum at the largest wavenumbers. This has little bearing on the spectral range dealt with here, but in any case the alias spectrum was removed from each single-beam spectrum before further processing (section 3.4). One notable difference between the CaF_2 and KBr data was the much larger amplitude of the channel fringes from the CaF_2 windows. These had to be removed later in the processing. As noted in section 2.2, the actual sample thicknesses of the two thinnest samples were found to be different from those of the KBr (2.1 mm instead of 1.6 mm, and 4.8 mm instead of 4.6 mm).

Fewer spectra were recorded in this set than in the KBr data. Four resolutions were used: 4, 1, 0.5, and 0.25 cm^{-1}. The general procedures of data acquisition and processing were the same as for the KBr measurements. The number of spectra recorded at each resolution for each sample thickness is given in Table 4-2.

4.4.4 Averaging, Removing Zero Offsets, and Scaling of CaF_2 Measurements

Averages of single-beam CO_2 ice sample path and blank sample path were made along with averages of CO_2 / reference and blank / reference because the reference spectra were very low at varying points near 8500–9500 cm^{-1}. As with the KBr data, this was done separately for each resolution. In the center of the wavenumber range, the spectrum-to spectrum variation was typically only a few percent. Because of the variability of the reference spectra, ratios of the sample path single-beam averages were used, even though they had varying amounts of uncancelled water vapor lines in them. Before zeroing and scaling, the average ratio measurements had the channel fringes removed as described in section 3.5.

Table 4-2 Number of FTS measurements made at each resolution with the CaF_2 beamsplitter.

Path length (mm)	Total number of spectra at each resolution CO_2 ice (blank)			
	4 cm^{-1}	1 cm^{-1}	0.5 cm^{-1}	0.25 cm^{-1}
1.6	10 (22)	0 (0)	6 (10)	2 (2)
4.6	16 (14)	4 (2)*	3 (2)	1 (1)*
13.8	10 (10)	4 (2)*	3 (2)	1 (1)*
107.5	10 (10)	4 (4)	4 (4)	1 (1)

* The fringes were not removed from these data, and they were not compared with the KBr data

The measurements required much less zero-correction than the KBr measurements, but it was applied in the same way to the fringe-removed data. Next, the measurements were scaled to the 0.5-cm^{-1} average, after that average had been fitted to a straight line in the highly variable region >7000 cm^{-1}. The final step was to remove a small wave in the data with a period of about 225 cm^{-1} which appeared after the fringes were removed. This wave also appeared prominently in the single-beam spectra, and was apparently not fully cancelled in the ratioing. It was easy to fit this with an exponentially decaying sine wave, and divide it out of the data. This wave was largest at wavenumbers >5000 cm^{-1}, but the small amount that crossed into the shorter wavenumber regions which were compared with the KBr measurements was not completely removed.

4.4.5 Wavenumber Calibration

A discussion of the wavenumber precision and accuracy is given in section 2.6.6. As stated there, the finite field of view of the instrument causes both a shift in the wavenumber and a broadening of the instrument function which increase roughly linearly with increasing wavenumber. The issue of resolution degradation of the measurements was

considered at some length, including potential correction of both wavenumber shift and smearing by the same procedure, but has been abandoned for now. A full discussion of the efforts made and the implications towards the true resolution of uncorrected data is given in Appendix A. The first-order correction for the wavenumber in both the KBr and CaF_2 measurements is a simple linear shift, which is all that is done with this data.

The points for this calibration are provided by the absorption lines of residual gases in the nitrogen-purged FTS, namely H_2O, CO_2, and CO. These features are largely cancelled out when the sample-path spectrum is divided by the reference-path spectrum, so this analysis uses the single-beam spectra. Since the wavenumber shift is caused by off-axis rays from the extended source, there is reason to believe that the correction for the reference path could be different than that for the sample path through the test chamber. Also, and especially in the case of the partly opaque 1.6-mm sample, it is possible that the distribution of off-axis rays, and therefore the average wavenumber shift, could be different through the ice than through the blank chamber. Therefore it was best to analyze absorption lines (from H_2O only) which had passed through the ice sample to correct the wavenumbers of the ice spectrum. The empty chamber single-beam spectra were inspected as well, since only in these could one use the additional absorption lines of CO_2 and CO.

Lines could be detected from the rotational water vapor absorptions near 500 cm^{-1} to the overtone vibration-rotation lines near 5300 cm^{-1} for the KBr data, and from the wings of the fundamental ν_2 water vapor band near 1500 cm^{-1} to overtone lines near 7200 cm^{-1} for the CaF_2 data. Detection of the weaker lines required some removal of channel fringes in both data sets, but especially for the CaF_2 data. However, the most accurate line centers are determined for the strongest lines with the highest S/N. Thus, the ν_2 band of water vapor near 1500 cm^{-1} provided the primary data for the KBr calibration and the (ν_1, ν_3) band near 3700 cm^{-1} provided the primary data for the CaF_2 calibration. These are compared to catalogs of line center frequencies (Rothman *et al.*, 1992) to find the correction. The measured line centers were always located a few tenths of a wavenumber lower than the predicted value. The model for the correction is a linear function, sometimes constrained to be 0 at 0 cm^{-1} (see Equation 2-2). A sample of the raw data and its least-

squares linear fit for the wavenumber calibration of one of the KBr sample paths is shown in Figure 4-7.

4.4.6 Merging KBr and CaF_2 Measurements

After the wavenumbers of the measurements had been calibrated, the smoothed KBr data were compared with the CaF_2 data for the four thicknesses they had in common and in the range where the CaF_2 data were useful (i.e., >2500 cm^{-1} or <4 μm). First, the KBr measurements were adjusted for different pathlengths in the case of the 1.6- and 4.6-mm data; then they were scaled with slowly varying functions to match the CaF_2 measurement levels. Here, residual 225-cm^{-1} waves were also removed (see section 4.4.4). Then the smoothed data were modified to match the better CaF_2 measurements. Occasionally, new points needed to be added, but in most cases, the wavenumber grid from the KBr measurements was adequate. The modified spectra were then rescaled and readjusted to the KBr levels and used for further processing.

These comparisons were made for a number of purposes. First, the S/N of the 2.1-mm CaF_2 sample was far superior to the cracked KBr sample, so weak features throughout were resolved. Second, all but the 13.8-mm measurement showed better resolution of the narrow absorption lines in the CaF_2 data, especially towards larger wavenumbers. And finally, the CaF_2 measurements in the 3-μm region were used to verify the levels of the KBr data, which was made uncertain due to the hydration feature from the beamsplitter and windows in this region. Some of these results are depicted in Figure 4-8.

4.4.7 Determining Absorption Coefficients and Error Bounds

The approach to determining the absorption coefficient in this range was similar to that used for the Mylar beamsplitter data (section 4.3.3). The $T_{\alpha=0}$ level for each thickness was varied over a range constrained by the transmission of the thickest sample and the $T_{\alpha=0,max}$ level, and the shapes and levels of the $T_{\alpha=0}$ levels and the model α were adjusted by the minimization procedure described in section 3.1. In most cases for the KBr measurements, the maximum model $T_{\alpha=0}$ levels were limited to a somewhat lower level than

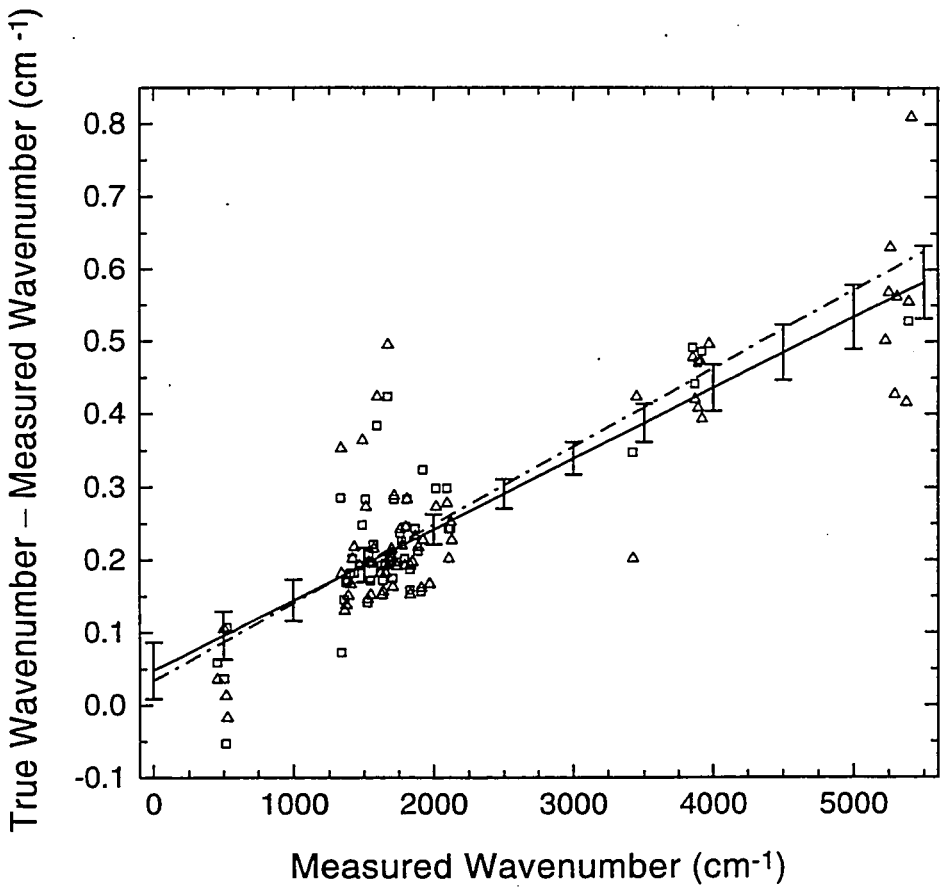
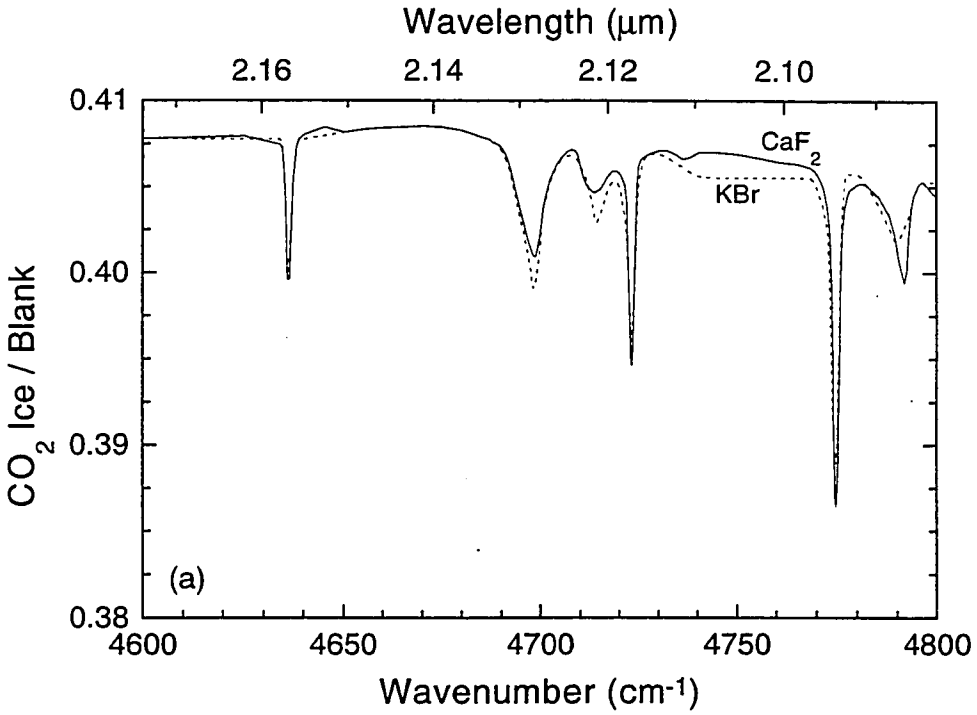
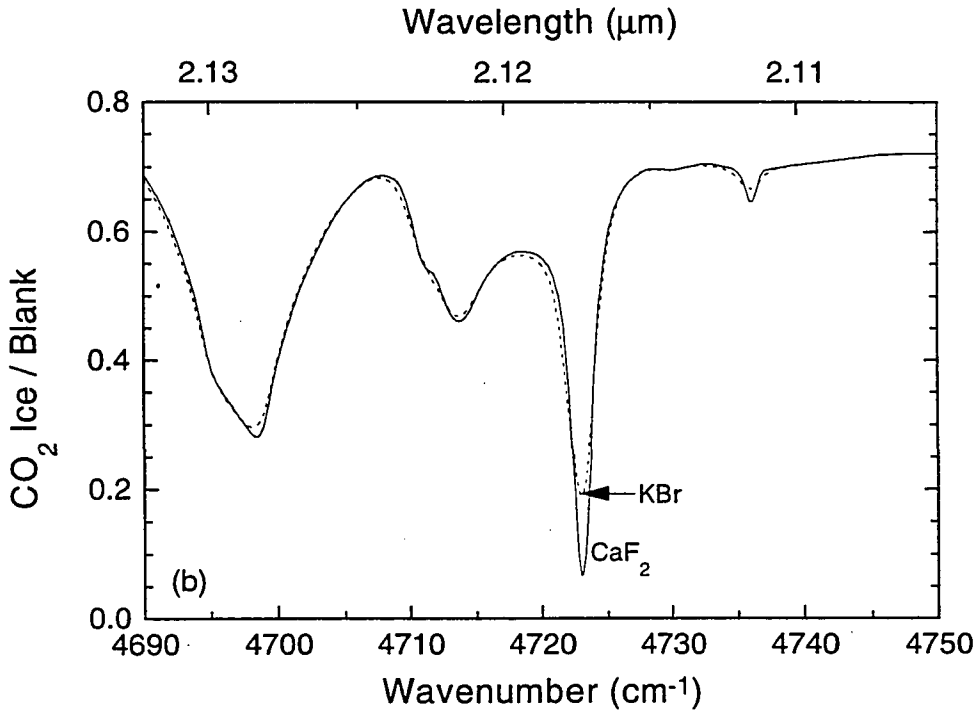


Figure 4-7. An example of wavenumber calibration for the KBr data. This is done by measuring the center of gaseous absorption lines (in this case, from water vapor), and comparing them to the center wavenumber value for the associated transition in published line catalogs (the "true" wavenumber). The precision of measuring the center of a well-isolated, strong absorption line is better than 0.1 cm^{-1}, while for weaker lines the precision can be many times worse, as indicated by the scatter on the plot. A set of well isolated lines separated by at least 10 cm^{-1} are selected from the line catalog for this purpose. These particular data are from two single-beam measurements of CO_2 ice with a path length of 13.8 mm. The squares are from an average of four 0.25-cm^{-1} resolution spectra and the triangles are from an average of two 0.125-cm^{-1} resolution spectra. A linear relationship between offset and wavenumber, with a near zero offset at 0 cm^{-1}, is predicted by the model for the finite field of view of an FTS. The least-squares linear fit to the 0.25 cm^{-1} data is shown by the solid line with error bars indicating the 95% confidence limit. The fit to the 0.125-cm^{-1} data is shown by the dot-dashed line.

Figure 4-8. Example of improvements to KBr-beamsplitter data made using CaF_2-beamsplitter measurements. Both panels show small spectral regions in the vicinity of 2 μm. The original smoothed KBr measurement is shown as dashed lines while the CaF_2-modified spectrum is shown as solid lines. (a) depicts both increased resolution and increased detection of weak features in the 1.6/2.1-mm sample. (b) shows the increased resolution of narrow lines in the 107.5-mm spectrum.


Wavelength (μm)
2.16
2.14
2.12
2.10
0.41
0.40
0.39
0.38
CO2 Ice / Blank
CaF2
KBr
(a)
4600
4650
4700
4750
4800
Wavenumber (cm-1)


Wavelength (μm)
2.13
2.12
2.11
0.8
0.6
0.4
0.2
0.0
CO2 Ice / Blank
KBr
CaF2
(b)
4690
4700
4710
4720
4730
4740
4750
Wavenumber (cm-1)

$T_{\alpha=0,max}$, because of the observation that even the clearest samples had >10% scattering extinction. The noise level for these data was small, and was not used as a weighting for this minimization.

The full wavenumber range was divided into four segments and six "windows", where a window is a region usually having high absorption at both ends. The first segment (450–1250 cm^{-1}; 8–22.2 μm) includes two windows on either side of the 667 cm^{-1} band. The second segment includes the large window between 1200 and 2250 cm^{-1} (4.4–8.3 μm). The third segment combines two windows on either side of the strong 3000 cm^{-1} (3.3 μm) line (including the gap between the two strong bands near 3700 cm^{-1}) and spans 2500–3700 cm^{-1}(2.7–4 μm). The last segment includes the large-wavenumber side of the 3700-cm^{-1} band to the end at 5556 cm^{-1} (1.8–2.7 μm). The region not covered by any of these segments is the very intense absorption feature at 4.0–4.4 μm, where all of the ice thicknesses used in this experiment are opaque, but which has measured by others using thin films of CO_2.

The number of points in these segments was usually so large that the minimization procedure would not change α significantly, and would only adjust the $T_{\alpha=0}$ levels slightly. It was important therefore to get a good first approximation to α before running the minimization. The minimizations were initialized as in the previous case with $T_{\alpha=0}$ levels which were invariant for the two thinnest path lengths, and for the other three thicknesses were set to self-consistent constant levels based on the value at one wavenumber. The initial $T_{\alpha=0}$ levels were set as described in the last paragraph of section 3.1. For each model, α could be calculated for each thickness in the regions where the samples were transparent. The unweighted average of these was used only for the first segment. The second segment showed that large distortions in the most transparent parts of the spectrum resulted if unweighted averages were used. Therefore, the absorption coefficients from each sample were weighted by a function of the transmission at each wavenumber for that sample before averaging, and this produced much better results. The function used was the derivative of transmission with respect to the logarithm of α

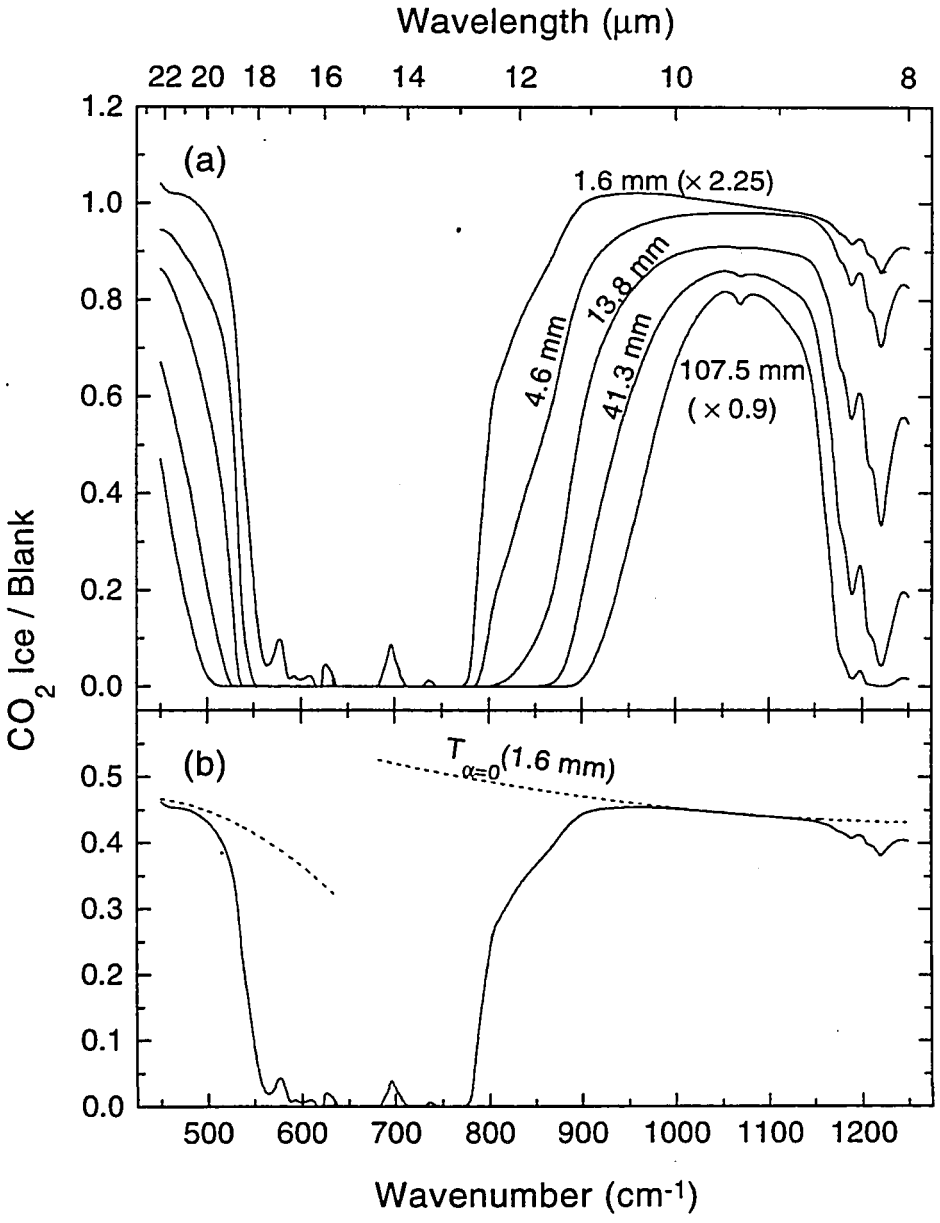
$$\frac{dT}{d\log\alpha} = \alpha\frac{d}{d\alpha}(e^{-\alpha d}) = -\alpha d e^{-\alpha d} = T\log T \ , \qquad (4\text{-}4)$$

where the transmission here is the model transmission, $T = M / T_{\alpha=0}$, and d is the thickness of the sample. This weighting function was then modified near the ends to smoothly drop to zero from T=0.95 to T=1.0 and from T=0.05 to T=0, except for the 107.5-mm sample at T=1.0 and the 1.6-mm sample at T=0. In this way, the thicknesses most sensitive to absorption coefficients in a particular range were preferentially used to determine that coefficient. This weighted average was used for all the segments but the first.

A small curvature penalty (Equation 3-10, with $\gamma_c = 0.1$ and $\gamma_s = 0.01$) was used for the first segment. The minimizations were continued for 30-40 steps to the point where little improvement in the cost was gained by further iteration. The other segments used unconstrained minimizations, and little improvement in fit was found beyond ~10 steps. Therefore, 14-step iterations were used for all other segments.

There are two sources of uncertainty for the KBr spectra: uncertainty in the $T_{\alpha=0}$ level, which affects primarily the lowest absorption levels, below 1–10 m^{-1}; and uncertainty due to variation in the measurements, represented by the misfit between the model spectra (m_i from Equation 3-8) and the measured spectra, which dominates at the highest absorption levels. The measurement uncertainty in the 1.6-mm sample is responsible for the large errors for α>1000 m^{-1}. This misfit is a measure of, among other things, measurement noise, inaccuracies in generating the smoothed spectra, and uncertainty in the path lengths. The error of the measured transmission is generally between 0.1 and 0.2%, for most measurements, but exceeds this level at the small wavenumber end and at isolated regions in the vicinity of steep slopes and narrow lines in the α. The first segment uses a smooth function for this uncertainty. The other segments calculate the average spectral misfit (measurement minus model) over all five thicknesses, smooth out the large variations with a window of 5–20 points, and then set the values lying below the spectral mean equal to the spectral mean. The large excursions above the spectral mean occur near strong lines because of variations in spectral resolution and wavelength calibration among the five thicknesses.

Figure 4-9. (a) The smoothed transmission spectra from the KBr beamsplitter data for 450–1250 cm^{-1} (8–22.2 μm) and five path lengths. The 1.6- and 107.5-mm measurements are multiplied by the indicated factors so that their spectra do not overlap. (b) The assumed zero-absorption level for the 1.6-mm sample. This is the initial estimate input to all of the minimization solutions and was calculated by assuming spectrally flat scattering for the 41.3-mm sample spectrum, deriving α where that spectrum has appreciable transmission, and then dividing the calculated transmission of a 1.6-mm sample, using that same α, into the measurement. A second-order polynomial is fitted to this result at wavenumbers that are transparent at 41.3 mm, and is extrapolated towards the center of the 667-cm^{-1} band. The spectral signature of this scattering indicates that there is considerable modification of the transmission from cracks in the CO_2 ice, identified by increased transmission on the large-ν side, and decreased transmission on the small-ν side, due to variation of the real index of refraction of the ice near the 667-cm^{-1} band.


Wavelength (μm)
22 20 18 16 14 12 10 8
(a)
1.6 mm (× 2.25)
4.6 mm
13.8 mm
41.3 mm
107.5 mm
(× 0.9)
(b)
$T_{\alpha=0}$(1.6 mm)
CO_2 Ice / Blank
Wavenumber (cm^{-1})
500 600 700 800 900 1000 1100 1200
0.0 0.2 0.4 0.6 0.8 1.0 1.2
0.0 0.1 0.2 0.3 0.4 0.5

The sample error is then converted to error in α at each wavenumber through the following relations:

$$\begin{aligned} \text{maximum } \alpha &= \min_d [-\log((m-e)/T_{\alpha=0})/d] \\ \text{minimum } \alpha &= \max_d [-\log((m+e)/T_{\alpha=0})/d], \end{aligned} \tag{4-5}$$

where m is the model transmission, $T_{\alpha=0}\exp(-\alpha d)$, and e is the uncertainty in the measurement. This error is combined in quadrature with the error in $T_{\alpha=0}$ to get the combined error in α. In almost every case, there is a distinct boundary between the two sources of error occurring around the level of 5 m^{-1}, with the error in $T_{\alpha=0}$ dominating below 5 m^{-1}, and the measurement error dominating above 5 m^{-1}. The large amount of detail in the mid-infrared spectrum and its error is such that there is no way to display it all in a few graphs. Therefore, only occasional error bars are plotted for the KBr data. Readers interested in details can refer to the data list in Appendix B. The details for each of the four segments follows.

Segment 1: 450–1200 cm^{-1} (8–22.2 μm). This problem was divided into two wavenumber parts short and long of the center of the 667-cm^{-1} band, mainly to allow for the large change in the $T_{\alpha=0}$ level across that band in the 1.6-mm spectrum (Figure 4-9(b)) to be representable by second order polynomials. The raw data are displayed in Figure 4-9(a). The initial $T_{\alpha=0}$ levels for the small-ν part are the curve shown in Figure 4-9(b) for 1.6 mm and 0.96 (constant) for 4.6 mm. The 107.5-mm $T_{\alpha=0}$ level was initialized at 48 different constant levels from 0.67 to 1.14 by increments of 0.01, and the 41.3- and 13.8-mm levels were initialized at constant values consistent with α calculated from the 107.5-mm measurement and $T_{\alpha=0}$ level at 450 cm^{-1}. The large-ν part was initialized by the curve shown in Figure 4-9(b) for 1.6 mm and by 0.982 (constant) for 4.6 mm. The 107.5-mm $T_{\alpha=0}$ level was initialized at 28 different levels from 0.91 to 1.18 by increments of 0.01, and the 41.3- and 13.8-mm levels were initialized at values consistent with the absorption coefficient calculated from the 107.5-mm measurement and $T_{\alpha=0}$ level at 1053 cm^{-1}.

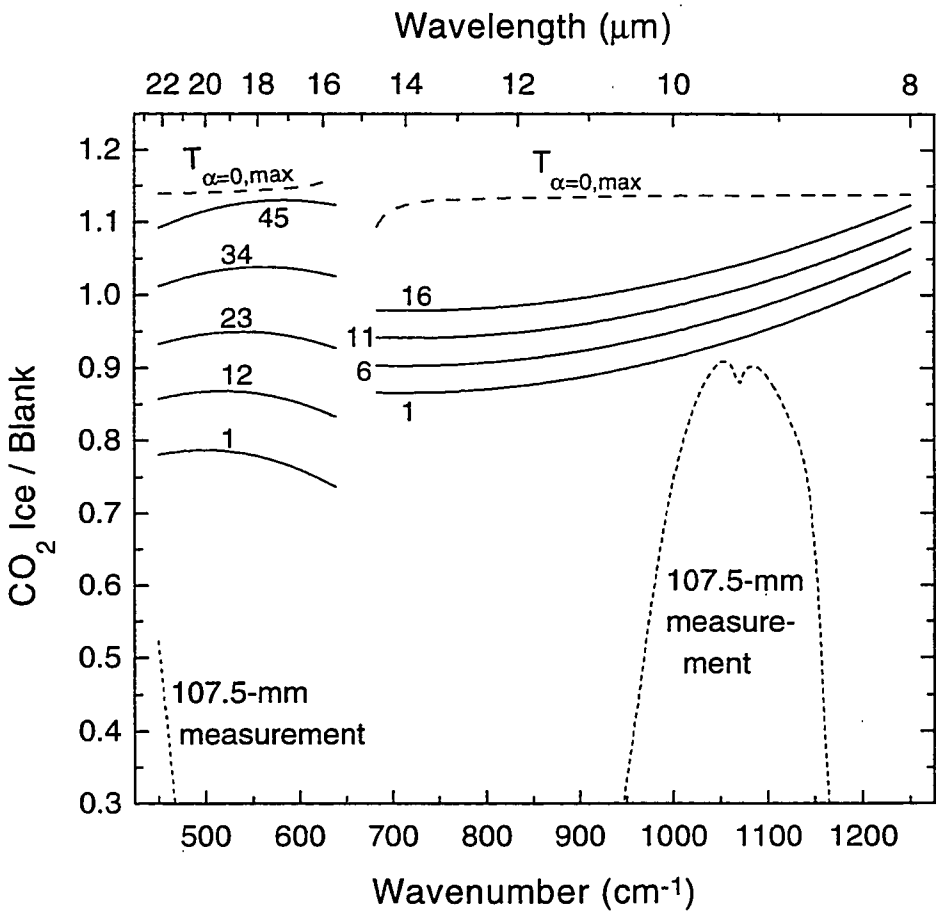


Figure 4-10. The zero-absorption levels for the 107.5-mm measurement from a set of minimizations performed on each of two parts of the 450–1250-cm^{-1} range. Each solution shown (samples from 48 models for the 450–640 cm^{-1} range and 28 models for the 680-1250 cm^{-1} range) has about the same error of fit to the spectral data, and lies in the valid range between the maximum of the measured spectrum and $T_{\alpha=0,max}$, which are indicated on the graph by dashed lines. The solutions for zero absorption level are numbered from minimum to maximum $T_{\alpha=0}$, and the numbers of the solutions shown are indicated. Some of the higher numbered solutions from each set did not remain below $T_{\alpha=0,max}$.

Figure 4-11. Determination of the uncertainty due to noise in the measurements with the KBr beamsplitter. (a) The standard deviation of a set of twenty 0.5-cm^{-1} resolution transmission spectra of CO_2 ice with a path length of 107.5 mm, divided by an average blank spectrum to scale it to the units of CO_2 ice / blank, is shown as a dotted line. This standard deviation approximates the intrinsic noise level in the regions of high absorption (see text). A heavy dashed line is plotted through these regions and identified as the noise spectrum. (b) The noise spectrum must be scaled up to be consistent with all of the measured data. The uncertainty in the spectral measurements is estimated by examining the residuals between the model spectra from the minimization and the measured spectra. The average absolute value of this residual from all of the valid minimization results was calculated at each wavenumber and is plotted as a solid line. Over this is plotted the noise spectrum from (a) as a thick dashed line, which is multiplied by a factor of 7.2 to approximate the uncertainty of the measurements.

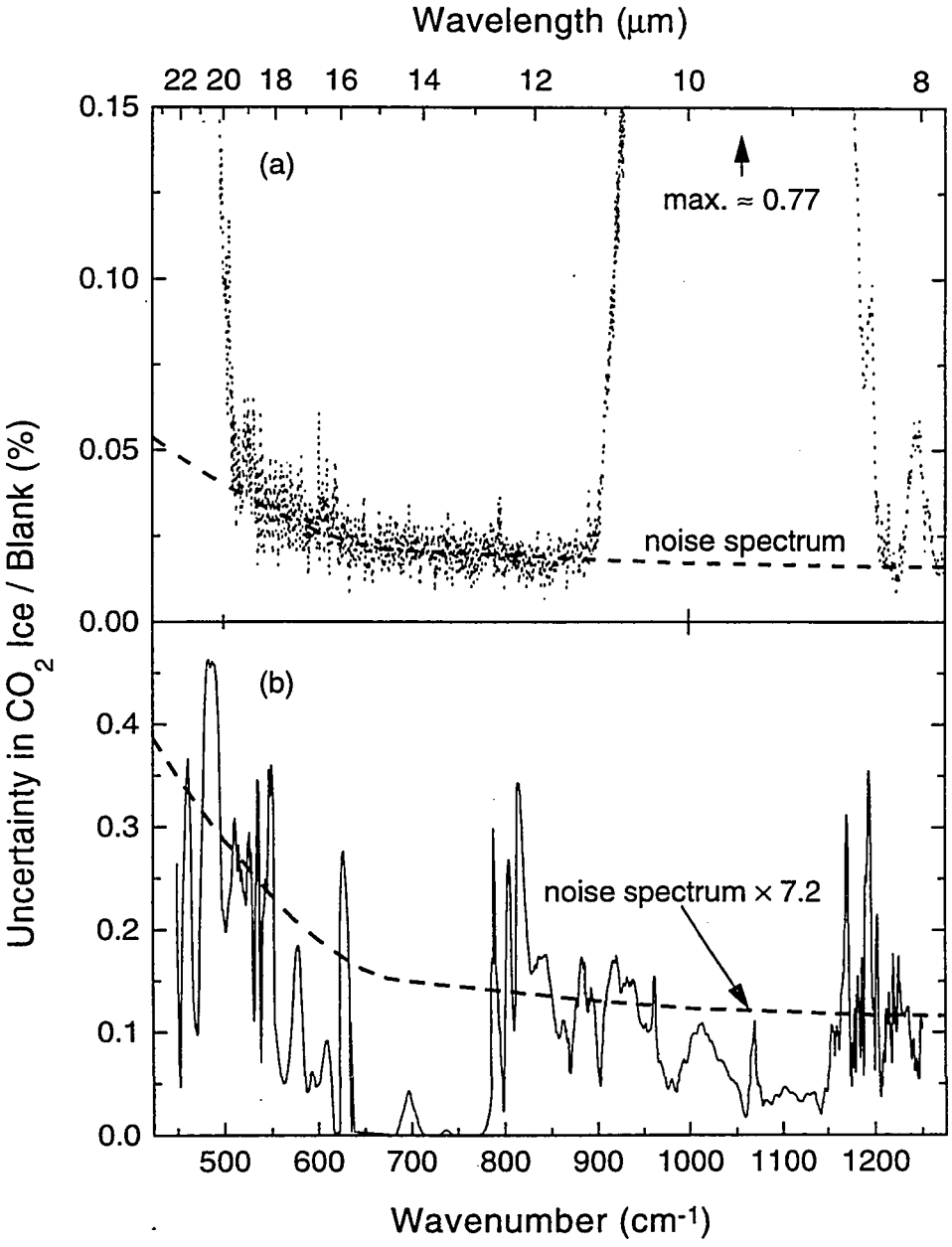
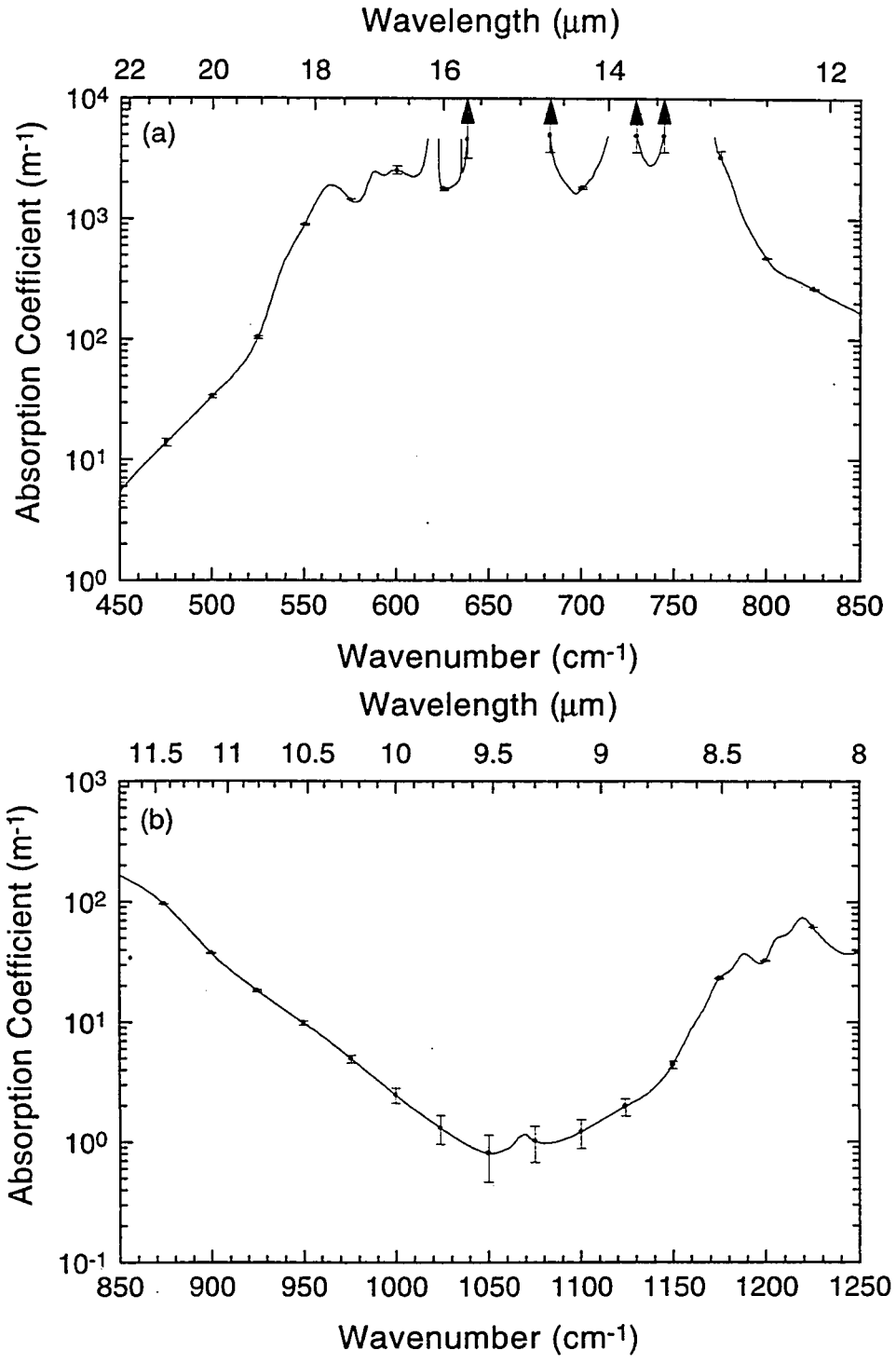

Wavelength (μm)
22 20 18 16 14 12 10 8
0.15
0.10
0.05
0.00
(a)
max. ≈ 0.77
noise spectrum
(b)
0.4
0.3
0.2
0.1
0.0
noise spectrum × 7.2
500 600 700 800 900 1000 1100 1200
Wavenumber (cm-1)
Uncertainty in CO2 Ice / Blank (%)

Figure 4-12. The best estimate of the absorption coefficient of CO_2 ice at 150 K over the wavenumber range 450–1250 cm^{-1} (8–22.2 μm). The uncertainty in the coefficient is plotted as error bars about every 25 cm^{-1}. The error in the transparent (small α) parts of the wavenumber range is due to uncertainty in the amount of scattering extinction for the thickest sample measurements. The error for large absorption (α>1000 m^{-1}) is due to instrumental uncertainty in the measurement of the thinnest sample. Error bars with upward-pointing arrows indicate that α has no upper limit.


Wavelength (μm)
22 20 18 16 14 12
(a)
Absorption Coefficient (m-1)
10^4 10^3 10^2 10^1 10^0
450 500 550 600 650 700 750 800 850
Wavenumber (cm-1)
Wavelength (μm)
11.5 11 10.5 10 9.5 9 8.5 8
(b)
Absorption Coefficient (m-1)
10^3 10^2 10^1 10^0 10-1
850 900 950 1000 1050 1100 1150 1200 1250
Wavenumber (cm-1)

The minimization process shifted the initial levels upwards, and two of the small-ν set and ten of the large-ν set had minimization results with part of the 107.5-mm $T_{\alpha=0}$ level above $T_{\alpha=0,max}$. Figure 4-10 illustrates some of the set of minimization solutions for $T_{\alpha=0}$ (107.5 mm) on both parts of the wavenumber range. The final value of the cost function for both wavenumber segments was a few percent larger for the minimizations with largest $T_{\alpha=0}$ levels.

The uncertainty in the measurements is much larger at the small-ν end because of low signal levels. To estimate this, the noise spectrum of the measurements needed to be estimated. Because of the variation between individual spectra, the standard deviation of an average is not an accurate measure of the intrinsic noise spectrum. However, where no transmission is measured, there is little variation between spectra, and the noise spectrum can be estimated. The standard deviation of a set of 107.5-mm measurements, chosen because they exhibit the broadest regions of zero transmission, is shown in Figure 4-11(a), along with the assumed noise spectrum derived from it. The magnitude of this spectrum is dependent on the number of spectra in the average and the resolution of the spectra. The magnitude of the noise in the 1.6-mm measurements near the center of the 667-cm^{-1} band appeared to be about 3 times the level represented by the noise spectrum displayed in Figure 4-11(a).

To provide an objective measure of the noise amplitude, I inspected the average over all minimization solutions and path lengths of the absolute misfit between the models and the measured spectra. This average is displayed in Figure 4-11(b), along with a scaled noise spectrum which lies above most of the points, and is about twice the estimate based on the apparent noise in the 1.6-mm measurement (7.2 times the value in Figure 4-11(a)). This error was used to generate the error in α, and is far less than the error due to uncertain $T_{\alpha=0}$ levels for $\alpha<50$ m^{-1} and is significant only for $\alpha>500$ m^{-1}.

The final estimate of the absorption coefficient (Figure 4-12) is the average of the 48 minimization results on the small-ν segment and the average of the 18 minimization results on the large-ν segment whose $T_{\alpha=0}$(107.5 mm) is less than $T_{\alpha=0,max}$. The error due to uncertainty in $T_{\alpha=0}$ is determined by the standard deviation of the averages.

Segment 2: 1200–2250 cm^{-1} (4.4–8.3 μm). This is a single window, the center of which is more transparent than encountered at longer wavelengths. The transmission spectrum of the 107.5-mm sample at 1755 cm^{-1} (5.7 μm) is quite flat, indicating that there is very little absorption in this region. The previous window (1050 cm^{-1}) indicates that the $T_{\alpha=0}$ here should not exceed ~0.95, and preliminary studies indicated that 0.92 looked like a more likely level, predicting a minimum absorption near 0.1 m^{-1}. The initial $T_{\alpha=0}$ levels were determined with a constant centered near 0.92 for the 107.5-mm spectrum and the best second-order curves based on the 107.5-mm level for the other four spectra. This resulted in similar $T_{\alpha=0}$ levels for 13.8 and 41.3 mm, which were sloping down towards higher wavenumbers, a lower, similarly sloping, and curved level for the 1.6-mm spectrum, and a flat level for the 4.6-mm spectrum. These are more or less consistent with the

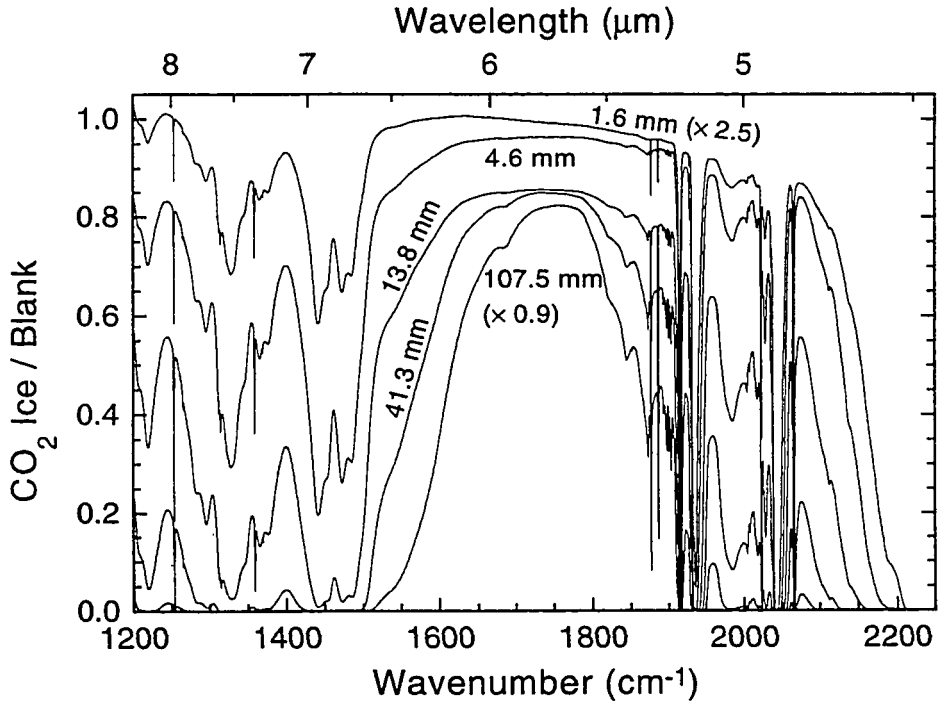


Figure 4-13. The smoothed transmission spectra from the KBr-beamsplitter data for 1200–2250 cm^{-1} (4.4–8.3 μm) and five path lengths. The 1.6- and 107.5-mm measurements are multiplied by the indicated factors for display. The 1.6-mm spectrum has considerable slope and curvature going into the 2300-cm^{-1} (4.3-μm) absorption line because of the large variation of the real index of refraction of CO_2 ice (see text).

levels of the spectra presented in Figure 4-13. Models with different $T_{\alpha=0}$ levels needed to be set up differently than before, because α changes greatly at 1755 cm^{-1} with very small changes in the 107.5-mm $T_{\alpha=0}$ level when it is below 0.92. So the 107.5-mm $T_{\alpha=0}$ level was set to 11 unequally spaced constant levels between 0.9165 and 1.05, with 6 levels below 0.935. The constant coefficients of the 41.3- and 13.8-mm $T_{\alpha=0}$ polynomials were adjusted slightly according to the absorption coefficient calculated by each 107.5-mm model at 1755 cm^{-1}.

The minimization caused the 107.5-mm $T_{\alpha=0}$ levels to curve upwards at the low-ν end (Figure 4-14). The fit of the model to the measurements was marginally better for the higher initial $T_{\alpha=0}$ levels. Instead of averaging and finding the standard deviation of the models, I just chose three of the models to represent a minimum, mean (best guess), and

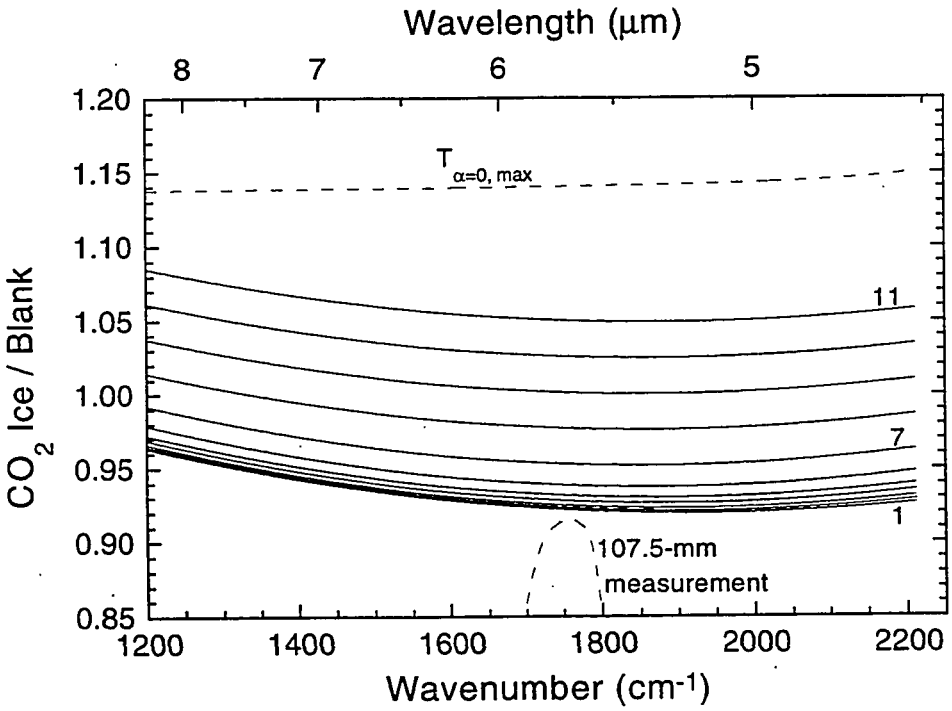


Figure 4-14. The zero-absorption levels for the 107.5-mm measurement in the range 1200–2250 cm^{-1} (4.4–8.3 μm). The 11 lines are the solutions to a minimization which fits a model spectrum to the measurements starting with 11 similar constant initial levels. They all lie in the valid range between the measured spectrum and the theoretical maximum (zero-scattering) level $T_{\alpha=0,max}$, indicated by the dashed lines. The solutions are numbered from 1 to 11 in order of increasing transmission.

maximum absorption coefficient. These were models 1, 4, and 7, with $T_{\alpha=0}$ (107.5 mm) levels of 0.922, 0.928, and 0.953 at 1757 cm^{-1}; and absorption coefficients of 0.015, 0.1, and 0.6 m^{-1}. This range represents the error due to uncertainty in the scattering.

The error from uncertainty in the measurements was estimated by calculating the spectral misfit of the mean model to the measurements. This misfit was then averaged over all five thicknesses, smoothed and set to the spectral average level (0.002) where it was below this. This estimate is shown in Figure 4-15, compared to a model absorption spectrum which shows that the location of the higher errors is in the vicinity of narrow absorption lines. The uncertainty in absorption calculated from this measurement error is combined with the error from scattering uncertainty to get the total error, plotted as error

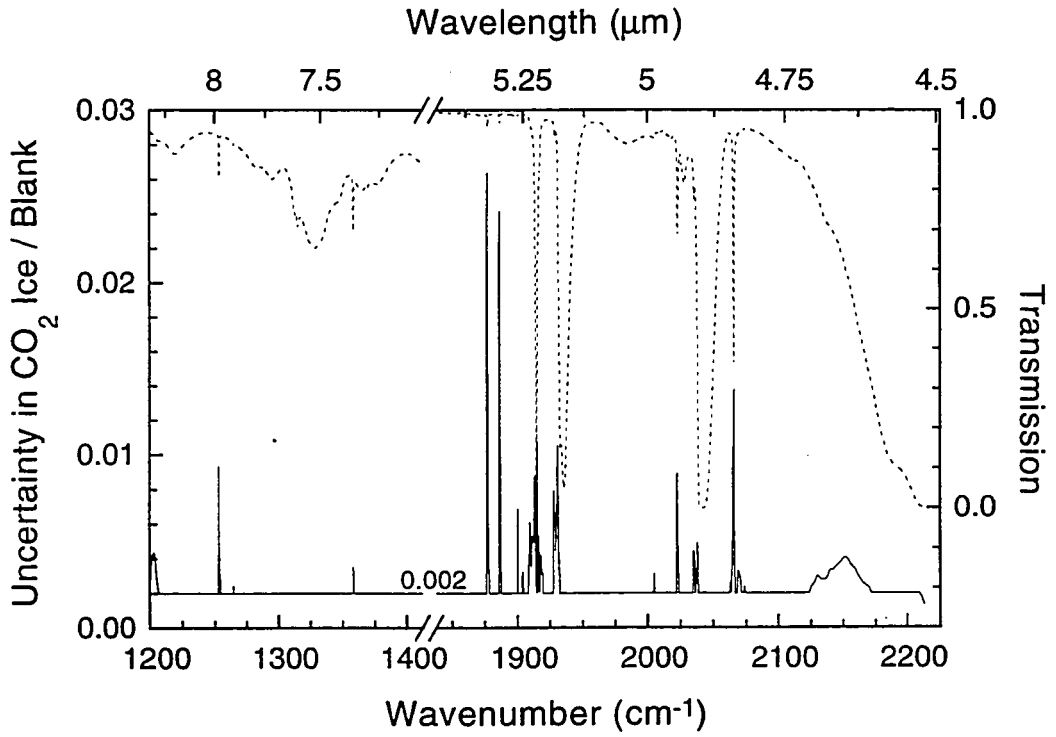
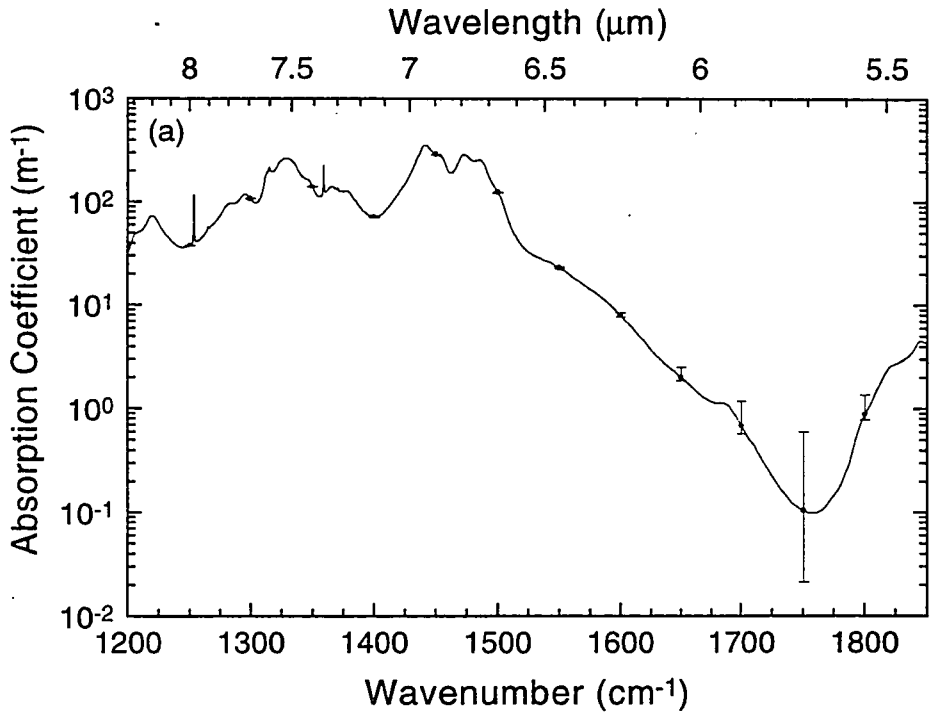
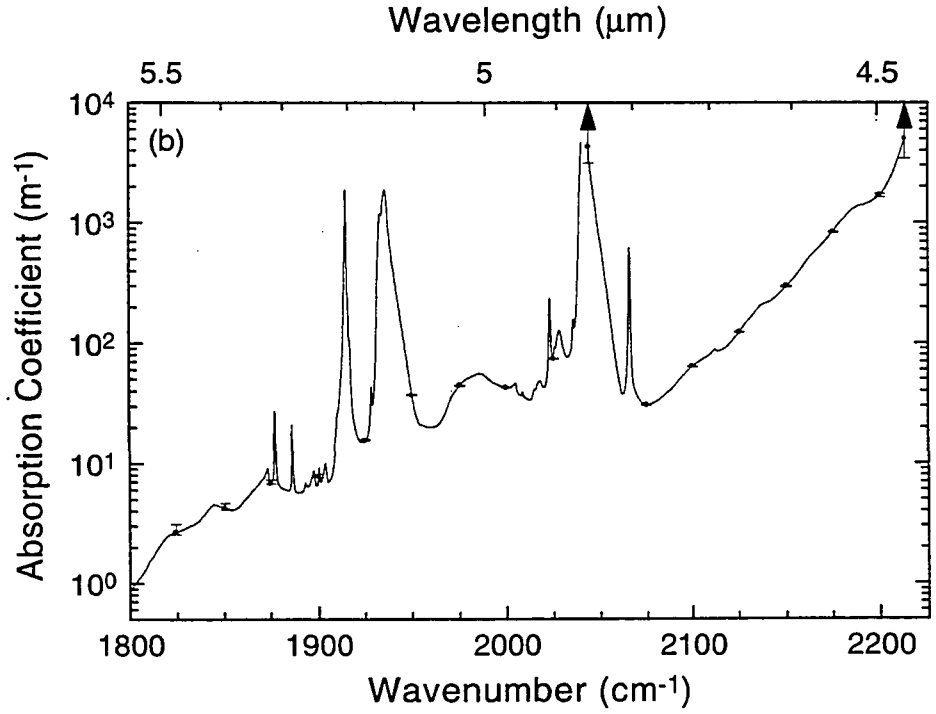


Figure 4-15. The estimate of uncertainty in the measurements in the range 1200–2250 cm^{-1} (4.4–8.3 μm). This is derived from the average residual between one model and the measurements, with the peaks smoothed and the low regions replaced by the spectral average (here 0.002). The axis is broken where there is no variation in the level. The dashed line is a model spectrum of 1.6 mm of CO_2 ice, with transmission as given on the right-hand axis, showing that large uncertainty correlates with narrow absorption features.

Figure 4-16. The best estimate of the absorption coefficient of CO_2 ice at 150 K over the wavenumber range 1200–2250 cm^{-1} (4.4–8.3 μm). The uncertainty in the coefficient is plotted as error bars about every 50 cm^{-1}. The error in the transparent regions (α<5 m^{-1}) is due to uncertainty in the amount of scattering in the thickest samples, and the error in more absorbing regions is due to uncertainty in the measurement of the thinner samples. Error bars with upward-pointing arrows indicate that α has no upper limit.


Wavelength (μm)
8
7.5
7
6.5
6
5.5
(a)
Absorption Coefficient (m-1)
10^3
10^2
10^1
10^0
10^-1
10^-2
1200
1300
1400
1500
1600
1700
1800
Wavenumber (cm-1)


Wavelength (μm)
5.5
5
4.5
(b)
Absorption Coefficient (m-1)
10^4
10^3
10^2
10^1
10^0
1800
1900
2000
2100
2200
Wavenumber (cm-1)

bars along with the mean spectrum in Figure 4-16. The error from scattering uncertainty is unbalanced (larger towards higher values than towards lower values) except in the center of the window, where α is uncertain by a factor of 10. Uncertainty due to other sources is negligible except at the highest levels of absorption.

Segment 3: 2500–3700 cm^{-1} (2.7–4 μm). This segment spans two windows, on either side of the 3000 cm^{-1} (3.3 μm) line, both of which are considerably less transparent than the neighboring windows. A $T_{\alpha=0}$ level near 0.92 for the 107.5-mm sample implies that $\alpha \geq 1$ m^{-1}. The minimum $T_{\alpha=0}$ for 107.5 mm is not constrained by the transmission of the measurement, but rather by the $T_{\alpha=0}$ levels in the neighboring windows. The initial $T_{\alpha=0}$ level for the 107.5-mm spectrum was a constant near 0.92 and the initial levels for the other spectra were the best second-order curves based on the 107.5-mm level. It was not possible to fit the 41.3-mm spectrum with a second-order polynomial in the large-ν window because of a strong hydration feature from the KBr beamsplitter. Inspection of the CaF_2 107.5-mm spectrum verified that this feature was part of the 41.3-mm and not the 107.5-mm spectrum. A smooth function was generated (Figure 4-17(b)) to remove this feature so that second-order curves could be generated by the minimization routine in this window. The $T_{\alpha=0}$ levels for 13.8 and 4.6 mm were roughly constant while the modified $T_{\alpha=0}$ level for 41.3 mm and the level for 1.6 mm were sloping down towards higher wavenumbers, with the 1.6-mm spectrum curved upwards towards the 2300 cm^{-1} (4.3 μm) band. The measured spectra of this wavenumber range are shown in Figure 4-17. Models with equally spaced $T_{\alpha=0}$ (107.5 mm) levels were used in both windows. The 107.5-mm $T_{\alpha=0}$ level was set to 10 constant levels between about 0.87 and 1.05 in both windows. The constant coefficients of the 41.3- and 13.8-mm $T_{\alpha=0}$ polynomials were adjusted slightly according to the absorption coefficient calculated by each 107.5-mm model at 2804 cm^{-1} in the small-ν window and at 3350 cm^{-1} in the large-ν window.

The minimization caused the 107.5-mm $T_{\alpha=0}$ levels to curve upwards slightly at the low-ν end of the small-ν segment (Figure 4-18). The fit of the model to the measurements was marginally better for the higher initial $T_{\alpha=0}$ levels. As in segment 2, I just chose three of the models to represent a minimum, mean (best guess), and maximum absorption

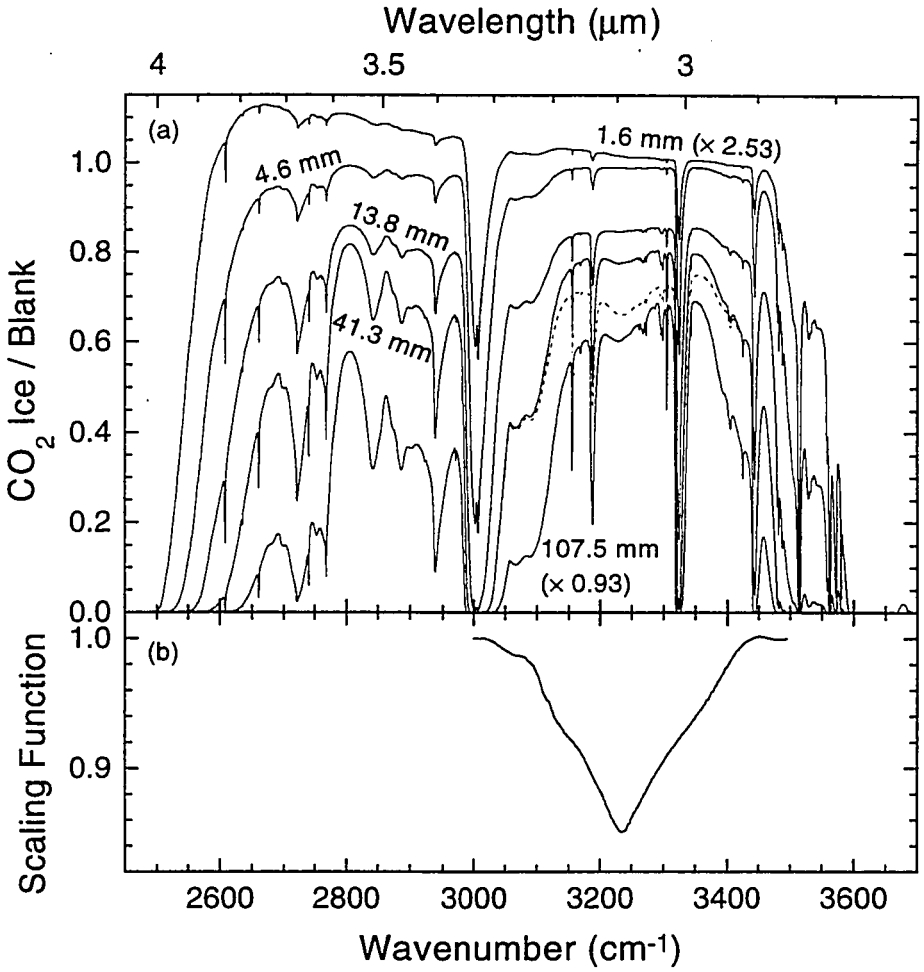


Figure 4-17. The smoothed transmission spectra from the KBr beamsplitter data for 2500–3700 cm^{-1} (2.7–4 μm) and five path lengths. (a) The 1.6- and 107.5-mm measurements are multiplied by the indicated factors for display. The 1.6-mm spectrum exhibits some curvature going into the 2300-cm^{-1} (4.3-μm) absorption line due to the variation of the real index of refraction of CO_2 ice (see text). The dashed line near the 41.3-mm spectrum is that spectrum before dividing by the function in (b). (b) The smooth function which was used to remove the hydration feature in the 41.3-mm spectrum so its $T_{\alpha=0}$ level could be represented by a second-order polynomial.

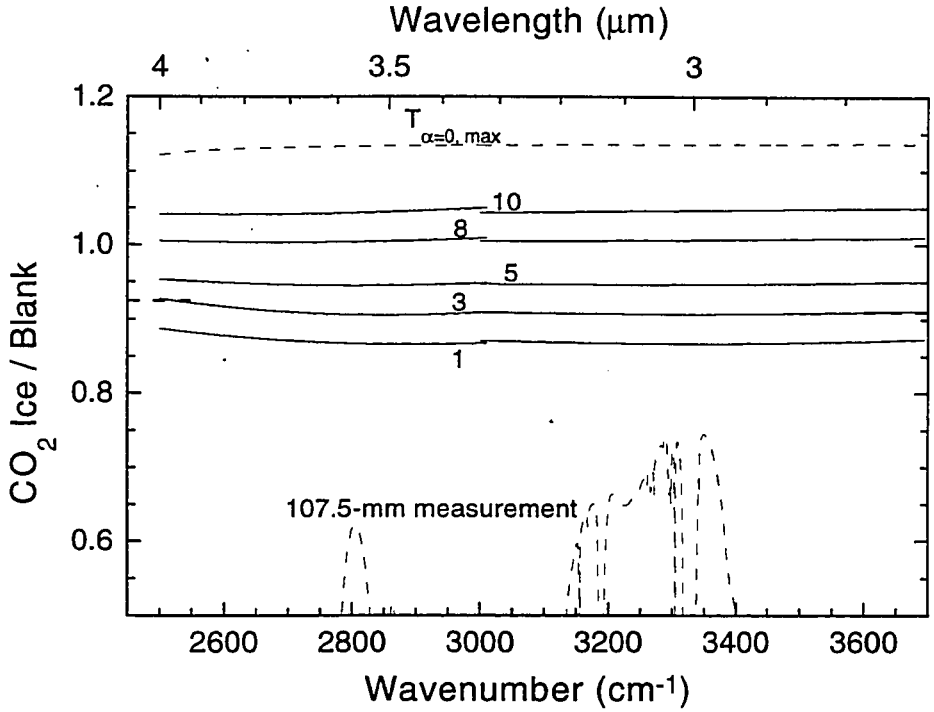


Figure 4-18. The zero-absorption levels for the 107.5-mm measurement in the range 2500–3700 cm^{-1} (2.7–4 μm). The solid lines show five of the ten solutions to a minimization which fits a model spectrum to the measurements starting with 10 similar constant initial levels. They all lie between the measured spectrum and the theoretical maximum (zero-scattering) level $T_{\alpha=0,max}$, indicated by the dashed lines. The lower limit of these curves is not actually the spectrum but rather the levels in the adjacent windows, the best guess for which is indicated by the dashed lines at each edge near 0.9. The solutions are numbered in order of increasing transmission, and numbers for the five displayed solutions are indicated.

coefficient. These were models 1, 3, and 8 for both windows, with $T_{\alpha=0}$ (107.5 mm) levels of 0.867, 0.907, and 1.005 at the peaks. This range represents the error due to uncertainty in the scattering.

The error from uncertainty in the measurements was estimated by calculating the spectral misfit of the mean model to the measurements averaged over all five thicknesses, smoothed and set to the spectral average level where it was below this. This estimate is shown in Figure 4-19, compared to a model absorption spectrum which shows that the location of the higher errors is again in the vicinity of narrow absorption lines. The uncer-

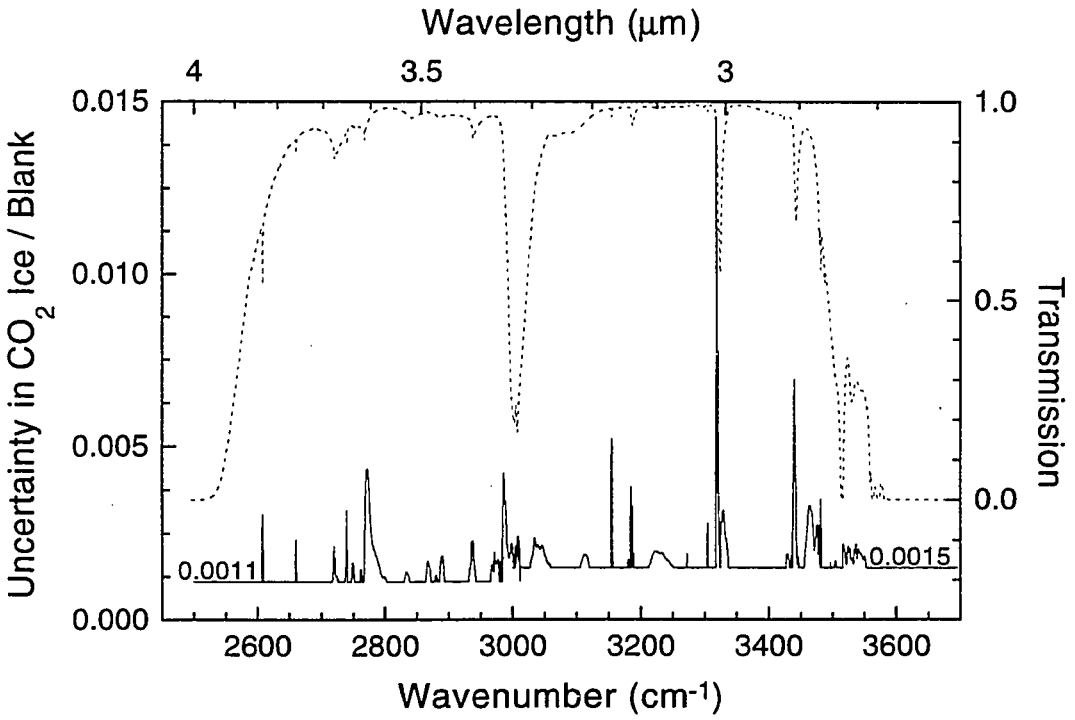
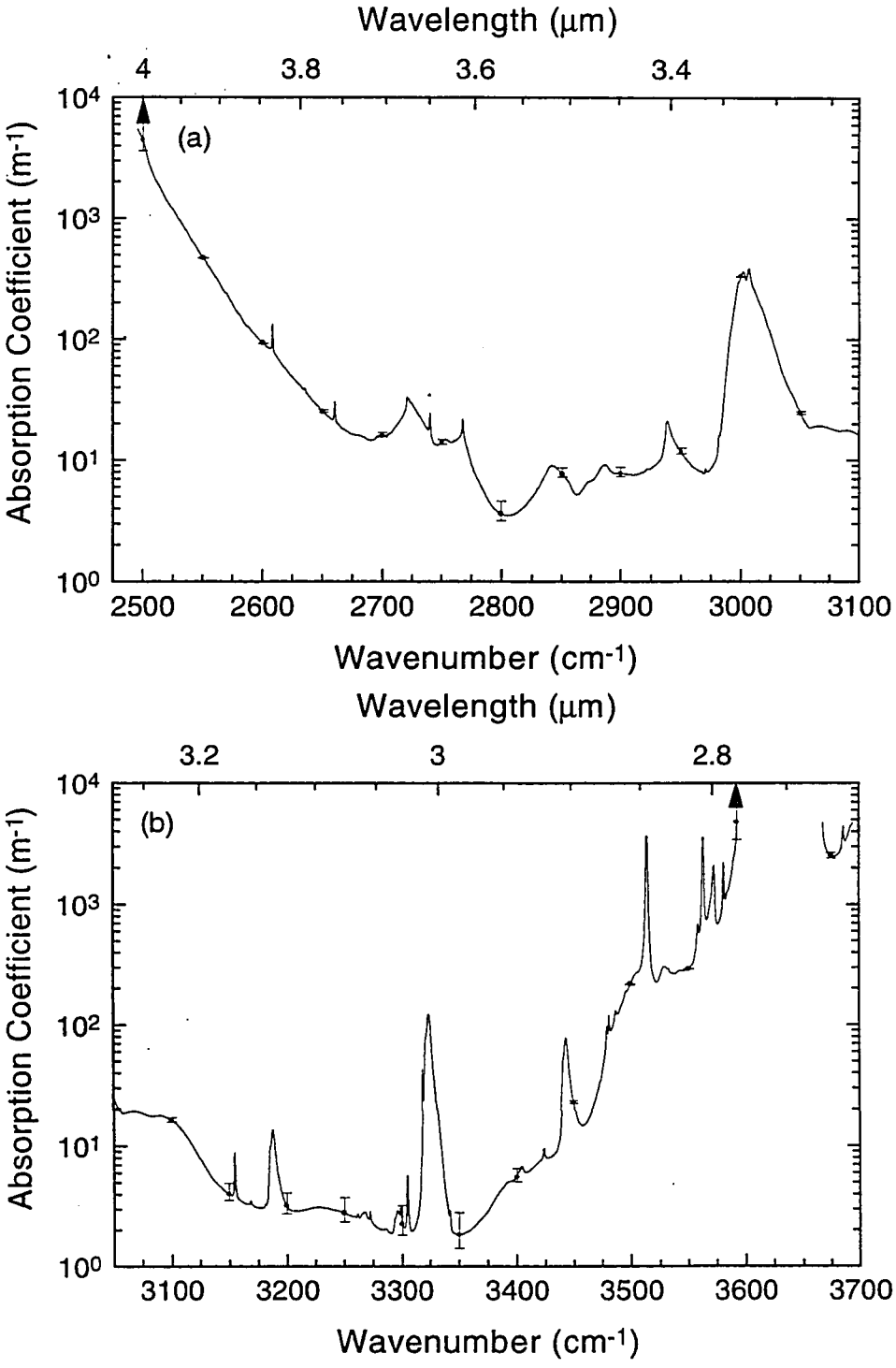


Figure 4-19. The model uncertainty in the measurements in the range 2500–3700 cm^{-1} (2.7–4 μm). This is derived from the average residual between one model and the measurements, with the peaks smoothed and the low regions replaced by the spectral average (0.0011 and 0.0015, as indicated). The dashed line is a model spectrum of 4.6 mm of CO_2 ice, with transmission as given on the right-hand axis, showing that the uncertainty correlates with narrow absorption features.

tainty in absorption calculated from this sample spectrum error is combined with the error from scattering uncertainty to get the total error, plotted as error bars along with the mean spectrum in Figure 4-20. The error from scattering uncertainty is unbalanced (larger towards higher values than towards lower values) because of the 107.5-mm $T_{\alpha=0}$ level is constrained by its behavior in neighboring spectral regions to be well above the peak transmittance of the sample. Uncertainty from other sources is negligible except at the highest levels of absorption.

Segment 4: 3750–5556 cm^{-1} (1.8–2.7 μm). This segment was treated as a single window, which is even more transparent than the 1750-cm^{-1} (5.7-μm) window of segment

Figure 4-20. The best estimate of the absorption coefficient of CO_2 ice at 150 K over the wavenumber range 2500–3700 cm^{-1} (2.7–4 μm). The uncertainty is indicated as error bars about every 50 cm^{-1}. The error in the transparent regions ($\alpha<5$ m^{-1}) is due to uncertainty in the amount of scattering in the thickest samples, and the error in more absorbing regions is due to uncertainty in the measurement of the thinner samples. Error bars with upward-pointing arrows indicate that α has no upper limit.


Wavelength (μm)
4
3.8
3.6
3.4
(a)
Absorption Coefficient (m-1)
10^4
10^3
10^2
10^1
10^0
2500
2600
2700
2800
2900
3000
3100
Wavenumber (cm-1)
Wavelength (μm)
3.2
3
2.8
(b)
Absorption Coefficient (m-1)
10^4
10^3
10^2
10^1
10^0
3100
3200
3300
3400
3500
3600
3700
Wavenumber (cm-1)

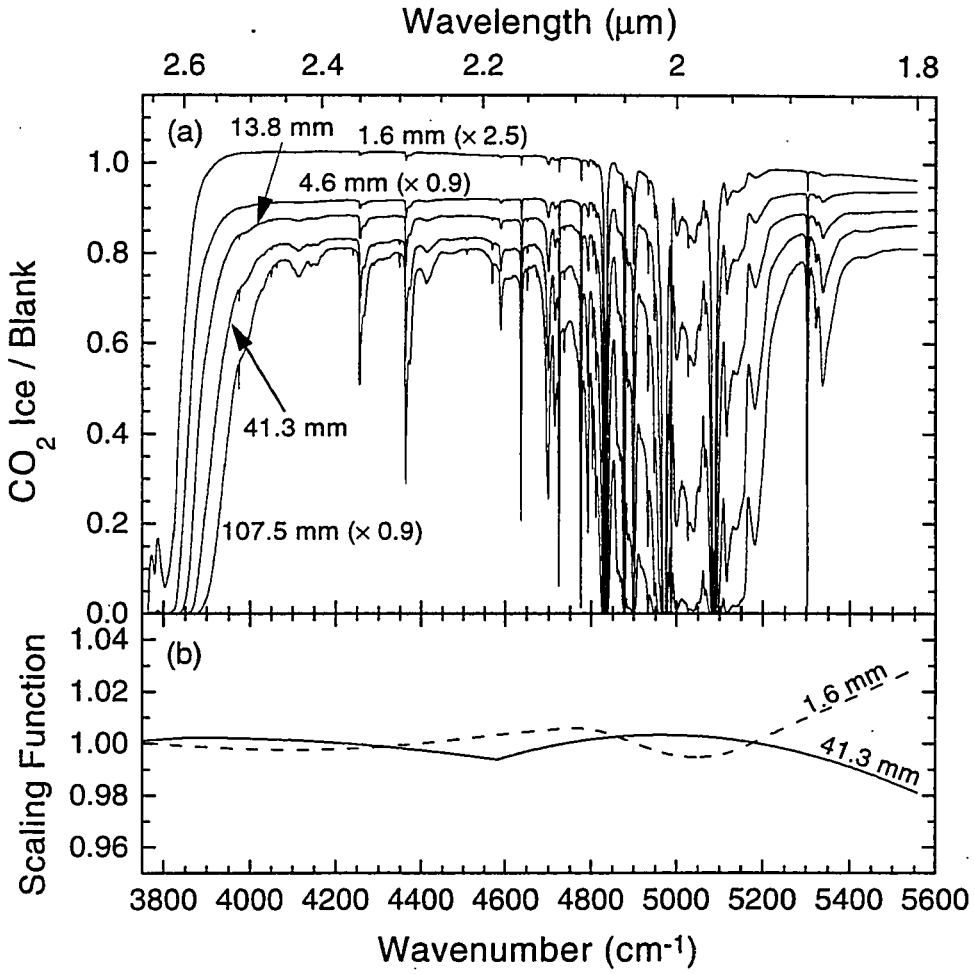


Figure 4-21. The smoothed transmission spectra from the KBr-beamsplitter data for 3750–5556 cm^{-1} (1.8–2.7 μm) and five path lengths. (a) The 1.6-, 4.6-, and 107.5-mm measurements are multiplied by the indicated factors for display. (b) The smooth functions which were used to adjust the 1.6- and 41.3-mm spectra so their $T_{\alpha=0}$ levels could be represented by second-order polynomials. The effect of these corrections would be too small to see if it were plotted in (a), except for ν>5300 cm^{-1}.

2. Three locations in this region have comparably high values of transmittance in the 107.5-mm spectra: 4235, 4527, and 5530–5556 cm^{-1} (2.361, 2.209, and 1.800–1.808 μm). Because of this, α will be highly uncertain near these wavenumbers, and unequally spaced model $T_{\alpha=0}$ (107.5-mm) levels will be required as in segment 2. The initial $T_{\alpha=0}$ levels were determined with a constant centered near 0.91 for the 107.5-mm spectrum and

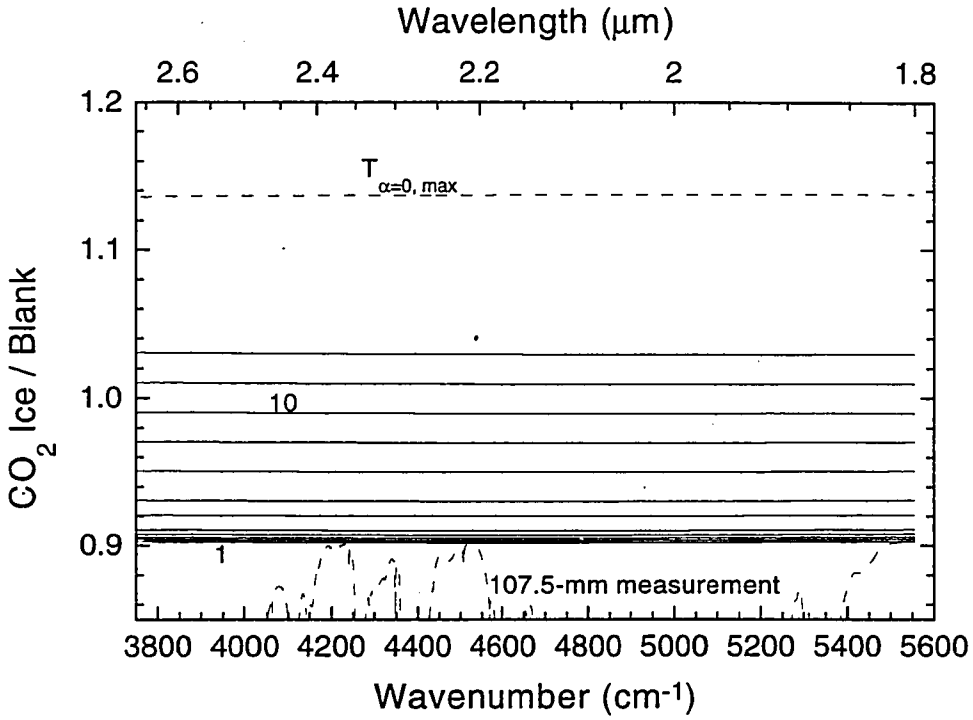


Figure 4-22. The zero-absorption levels for the 107.5-mm measurement in the range 3750–5556 cm^{-1} (1.8–2.7 μm). The solid lines indicate the 12 solutions to a minimization which fits a model spectrum to the measurements starting with 12 similar constant initial levels. All but number 1 lie between the measured spectrum and the theoretical maximum (zero scattering) level $T_{\alpha=0,max}$, indicated by the dashed lines. The solutions are numbered in order of increasing transmission; numbers 1 and 10 are indicated.

the best second-order curves based on the 107.5-mm level for the other four spectra. It was not possible to fit either the 41.3-mm or the 1.6-mm spectrum with a second-order polynomial over the whole range because of apparent discontinuous behavior across the 500-cm^{-1} (2-μm) region. The higher order components were removed from these two $T_{\alpha=0}$ functions (Figure 4-21(b)) before proceeding to the minimization. The resulting initial $T_{\alpha=0}$ levels were quite flat, although there were slight upward slopes (towards higher wavenumbers) for the three middle thicknesses and a slight downward slope for the 1.6-mm level. The measured spectra in this wavenumber range are shown in Figure 4-21. The 107.5-mm $T_{\alpha=0}$ level was set to 12 unequally spaced constant levels between 0.902

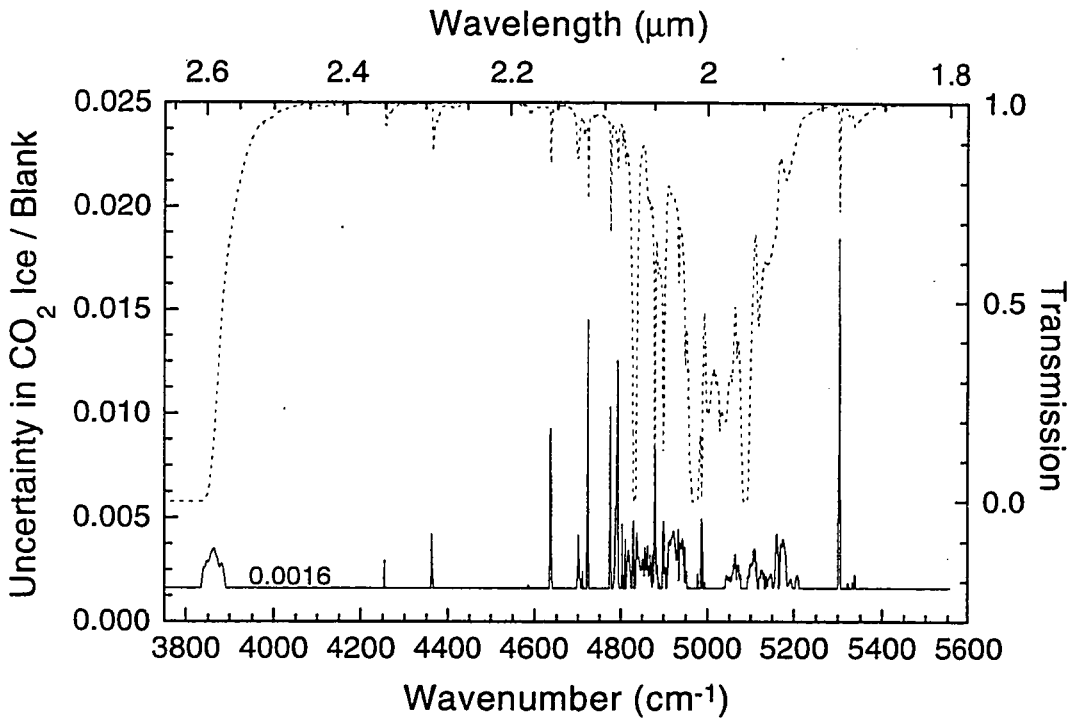


Figure 4-23. The model of the uncertainty in the measurements in the range 3750–5556 cm^{-1} (1.8–2.7 μm). This is derived from the average residual between one model and the measurements, with the peaks smoothed and the low regions replaced by the spectral average (0.0016, as indicated). The dashed line is a model spectrum of 13.8 mm of CO_2 ice, with transmission as given on the right-hand axis, showing that large uncertainty correlates with narrow absorption features.

and 1.03, with 6 levels below 0.92. The constant coefficients of the 41.3- and 13.8-mm $T_{\alpha=0}$ polynomials were adjusted slightly according to the absorption coefficient calculated by each 107.5-mm model at 4235 cm^{-1}.

The constant 107.5-mm $T_{\alpha=0}$ levels were not changed much by the minimization (Figure 4-22). Model 1 started and ended with $\alpha<0$ at the large wavenumber end. The fit of the model to the measurements was marginally better for the initial $T_{\alpha=0}$ levels in the middle of the set. As before, I just chose three of the models to represent a minimum, mean (best guess), and maximum absorption coefficient. These were models 1, 4, and 10, with $T_{\alpha=0}$ (107.5 mm) levels of 0.902, 0.907, and 0.990 at 4235 cm^{-1}. This represents the error due to uncertainty in the scattering.

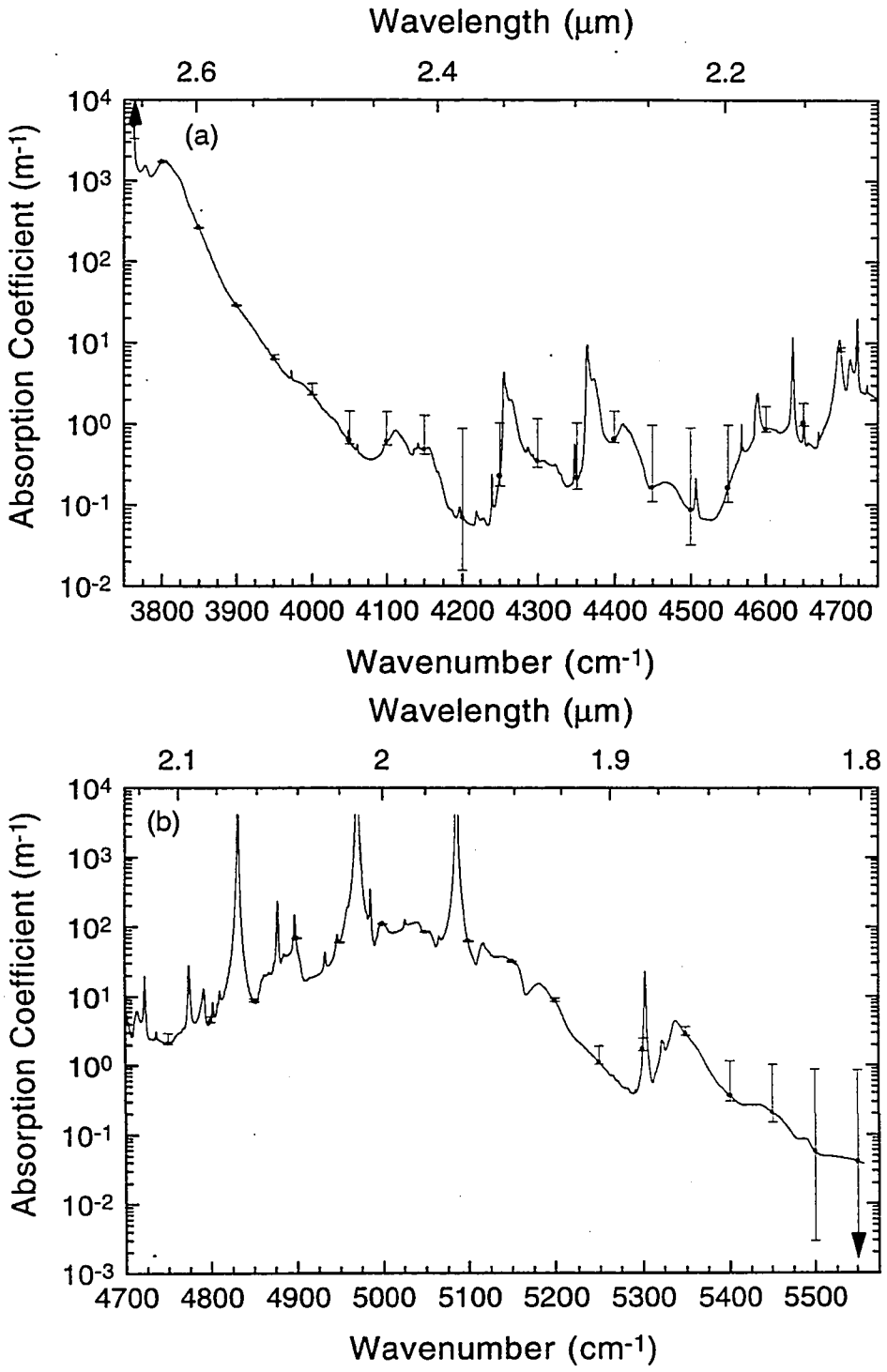
The error from uncertainty in the measurements was estimated by calculating, as before, the spectral misfit of the mean model to the measurements averaged over all five thicknesses, smoothed, and set to the spectral average level where it was below this. This estimate is shown in Figure 4-23, compared to a model absorption spectrum. The uncertainty in absorption calculated from this sample spectrum error is combined with the error from scattering uncertainty to get the total error, plotted as error bars along with the mean spectrum in Figure 4-24. The error from scattering uncertainty is unbalanced except in the three most transparent parts of the segment, where α is uncertain by a factor of 10. Uncertainty from other sources is negligible except at the highest levels of absorption.

4.5 Joining Three Segments of New Spectrum

There are two wavenumber regions where data from the three separate experiments overlap. The first region, 170–200 cm^{-1} (50.0–58.8 μm), between the Mylar beamsplitter measurements with CsI and crystal quartz windows, is illustrated in Figure 4-25. The mean spectra cross near 185 cm^{-1} (54 μm), but the upper limits of the data allow for a smoother connection. An interpolation that assumes log α varies linearly with log ν is illustrated in the figure. The uncertainty for these new points is assigned the minimum uncertainty from the two individual spectra at each point.

Figure 4-26 shows the crossover between the spectra through CsI windows using the Mylar and KBr beamsplitters located between 450 and 555 cm^{-1} (18.0 and 22.2 μm). The agreement between the two segments is quite good, but the average data intersect in only one location, near 475 cm^{-1} (21 μm). They approach each other again to about one standard deviation of the Mylar-beamsplitter data near 520 cm^{-1} (19.2 μm). The spectra are joined between these points by weighting the data according to their uncertainties, with a 50–50 average where the uncertainties of the two data sets are about equal, proceeding linearly in favor of the KBr data beyond 490 cm^{-1} until only the KBr data are used at the end point at 520 cm^{-1}.

Figure 4-24. The best estimate of the absorption coefficient of CO_2 ice at 150 K over the wavenumber range 3750–5556 cm^{-1} (1.8–2.7 μm). The uncertainty in the coefficient is plotted as error bars about every 50 cm^{-1}. The error in the transparent regions (α<5 m^{-1}) is due to uncertainty in the amount of scattering in the thickest samples, and the error in more absorbing regions is due to uncertainty in the measurement of the thinner samples. Error bars with upward-pointing arrows indicate that α has no upper limit and error bars with downward-pointing arrows indicate that α has no lower limit.


Wavelength (μm)
2.6
2.4
2.2
(a)
Absorption Coefficient (m-1)
10^4
10^3
10^2
10^1
10^0
10^-1
10^-2
3800 3900 4000 4100 4200 4300 4400 4500 4600 4700
Wavenumber (cm-1)
Wavelength (μm)
2.1
2
1.9
1.8
(b)
Absorption Coefficient (m-1)
10^4
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-3
4700 4800 4900 5000 5100 5200 5300 5400 5500
Wavenumber (cm-1)

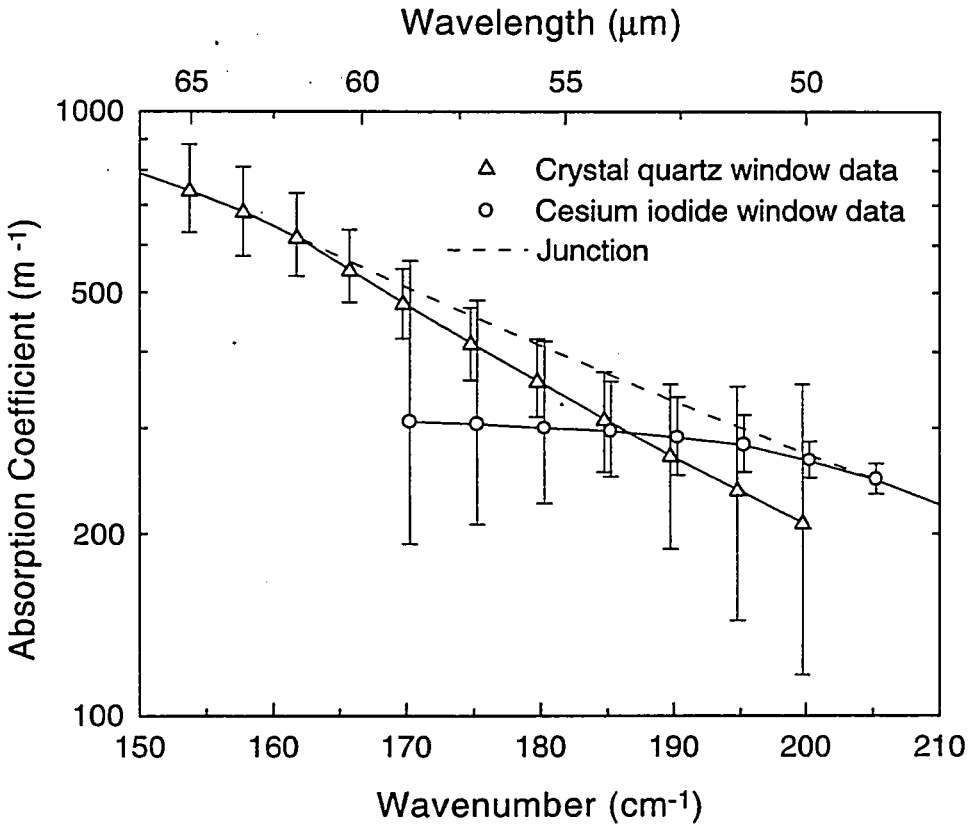


Figure 4-25. Overlap in spectral absorption coefficients between 170 and 200 cm^{-1}. The chosen junction is a straight line in logarithmic coordinates of wavenumber and absorption coefficient between 162 and 205 cm^{-1} (61.7 and 48.8 μm), depicted as a dashed line. It lies largely within the uncertainties of both sets of measurements.

4.6 Comparison of New Data With Previous Measurements

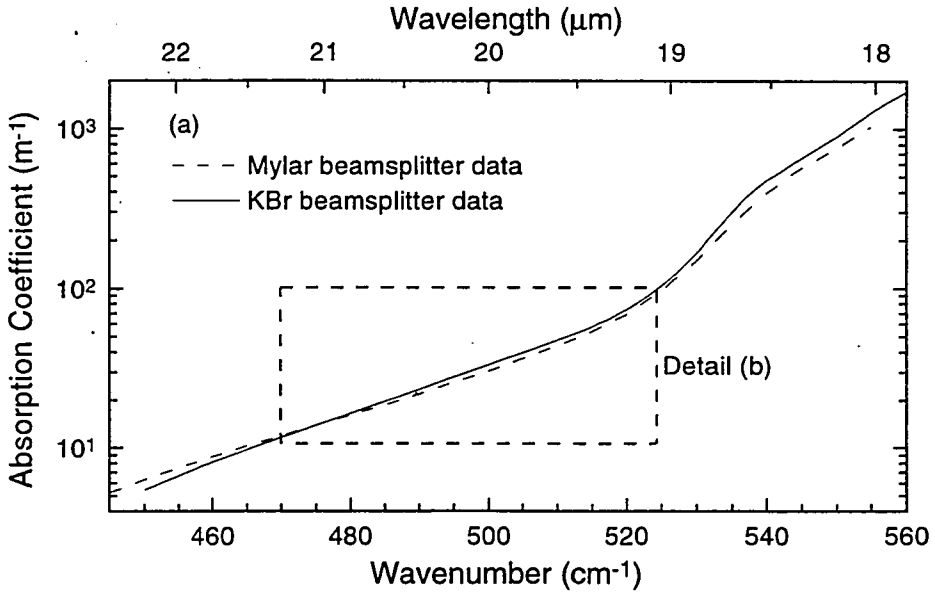
4.6.1 Comparison of Lattice Band Structure with Predictions

Kuan (1969) measured the far-infrared absorption (10–500 cm^{-1}) of CO_2 ice samples of 20-μm thickness at five temperatures between 4.2 and 100 K, with the intent of studying the two lattice vibration lines which appear in that region. He displayed the absorption spectrum only for the 4.2 K sample, but tabulated the location, width, and integrated intensity of each of the lines at the other temperatures. It is this information which I will compare with the new data at 150 K.

For the computation of integrated intensity, it is necessary to separate the two absorptions, which appear to overlap significantly at 150 K, in contrast to the colder temperatures, where the lines were apparently distinct. The calculation of the contribution of the individual lines to the integrated absorption is shown in Figure 4-27. The wing of the 104 cm^{-1} line underneath the 65 cm^{-1} line is estimated by a cubic spline segment. The estimated wing is subtracted from the total absorption to estimate the individual absorption of the 65 cm^{-1} line. Also shown in Figure 4-27 is the synthetic absorption spectrum at a thickness of 20 μm for the separated lines at 150 K. Since the maximum absorption is less than 6%, and significant wings extend below 40 cm^{-1} and above 200 cm^{-1}, it appears that a 1% inaccuracy in estimating the background intensity and/or the wavenumber range of necessary measurements could result in a considerable error in the integrated absorption.

The comparisons to Kuan's data are made in Figure 4-28. The top panel shows integrated absorption for both lines versus temperature, with linear fits illustrated for each line. The absorption of the 104 cm^{-1} line must be adjusted as mentioned above (changing I_0 from 1 to 0.99) to be made consistent with the Kuan data. The middle panels show the variation of center frequency of each line with temperature, and the low temperature frequencies can be accurately fitted to the 150 K frequencies if a quadratic variation with temperature is assumed in each case. The last panel shows the variation of line width with temperature. Here no simple correlation is obvious, even in the logarithm of the width.

Figure 4-26. Overlap in spectral absorption coefficients between 450 and 555 cm^{-1}. (a) The entire region of overlap, showing the good agreement between the measurements made with the Mylar beamsplitter and thermal detector and the KBr beamsplitter and MCT detector. (b) The central region, where the data intersect at one location near 475 cm^{-1} (21 μm). They approach each other again to within one standard deviation near 520 cm^{-1} (19.2 μm). The uncertainties nearly overlap throughout the region, so the junction is constructed by calculating an average α weighted approximately by the reciprocals of the uncertainties, which connects the Mylar measurement at 475 cm^{-1} to the KBr measurement at 520 cm^{-1}. (c) The ratio of uncertainties of the two data sets, shown as the solid line, is used as a guide for constructing the weighting for the junction, shown as a dashed line. The weights are equal until 490 cm^{-1}, then linearly varied in favor of the KBr data until the junction is equal to the KBr measurement at 520 cm^{-1}.


Wavelength (μm)
22
21
20
19
18
(a)
Mylar beamsplitter data
KBr beamsplitter data
Detail (b)
Absorption Coefficient (m-1)
10³
10²
10¹
460
480
500
520
540
560
Wavenumber (cm-1)

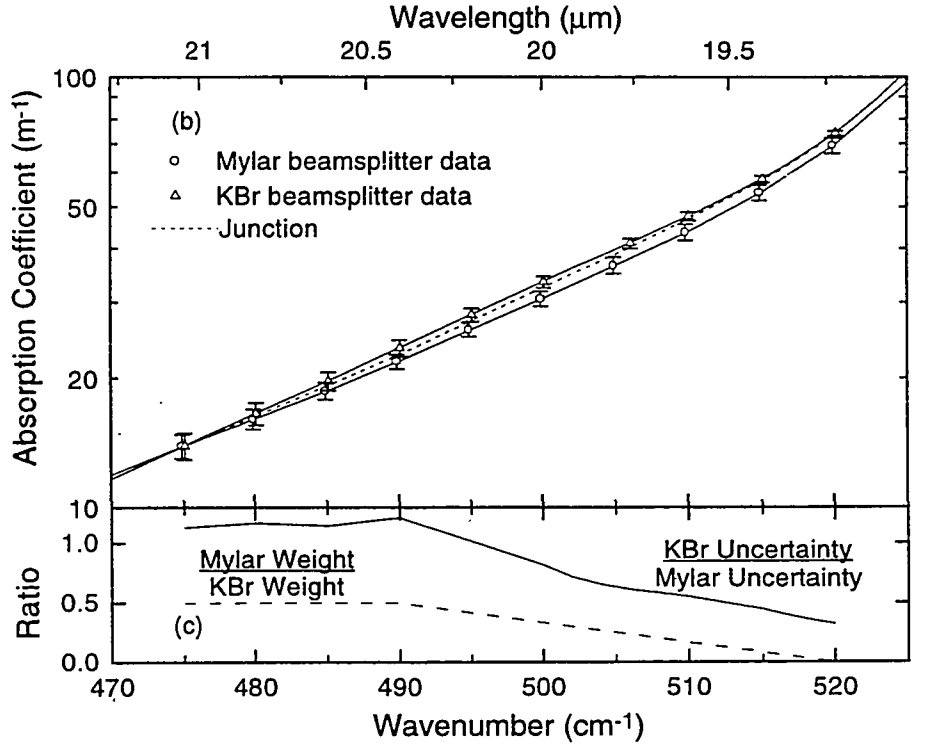

Wavelength (μm)
21
20.5
20
19.5
(b)
Mylar beamsplitter data
KBr beamsplitter data
Junction
Absorption Coefficient (m-1)
100
50
20
10
Mylar Weight
KBr Weight
KBr Uncertainty
Mylar Uncertainty
(c)
Ratio
1.0
0.5
0.0
470
480
490
500
510
520
Wavenumber (cm-1)

Figure 4-27. (a) Measured lattice-vibration lines of CO_2 ice at 150 K. The absorption coefficient is the same as in Figure 4-2 but shown here on a linear scale, illustrating the wide tails of the far-infrared absorption. To compare with the individual line measurements made by Kuan (1969), it was necessary to estimate separate integrated absorption values for each line, even though they appear to overlap. This was done by extending the apparent wing of the 104-cm^{-1} line below the 65-cm^{-1} line by using a cubic spline segment (dashed line) fitted between the data near 40 and 80 cm^{-1}. This is subtracted from the total absorption to estimate the independent absorption of the 65-cm^{-1} line. (b) To make a direct comparison to the Kuan numbers, the synthetic absorption was calculated for an ice thickness of 20 μm for the separated lines. The absorption is weaker at higher temperatures so a 20-μm sample would have transmission >0.90, where errors in determining the blank transmission (T_0) can have a large effect on the calculation of integrated intensity. To illustrate this, a line at T=0.99 is drawn which shows that the absorption of the unseparated 65-cm^{-1} line is largely unaffected by this error, since it sits on top of the 104-cm^{-1} line's tail there, while much of the tail of the 104-cm^{-1} line would not be included. This error will have negligible effect on the integrated absorption of these lines at lower temperatures, where they are much stronger and narrower. The effect of this potential error is shown in Figure 4-28 (a).

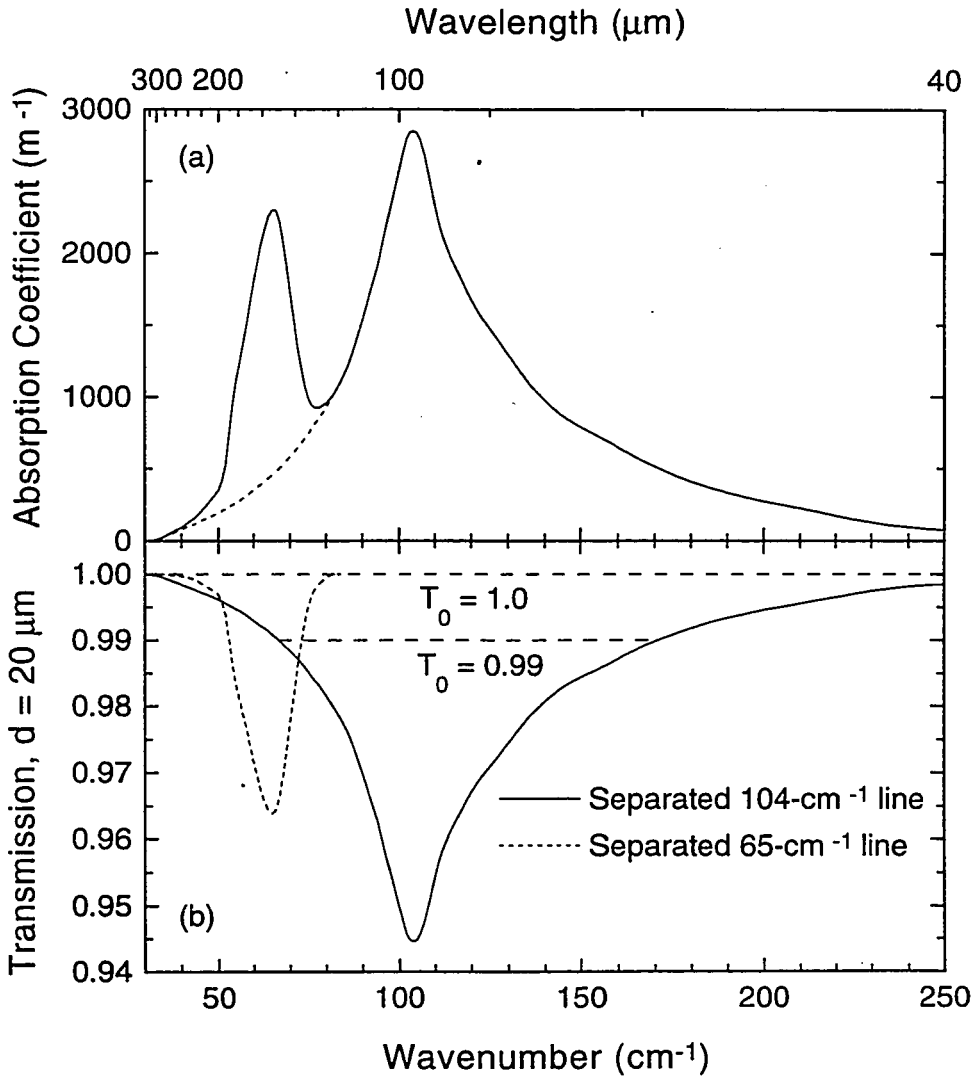
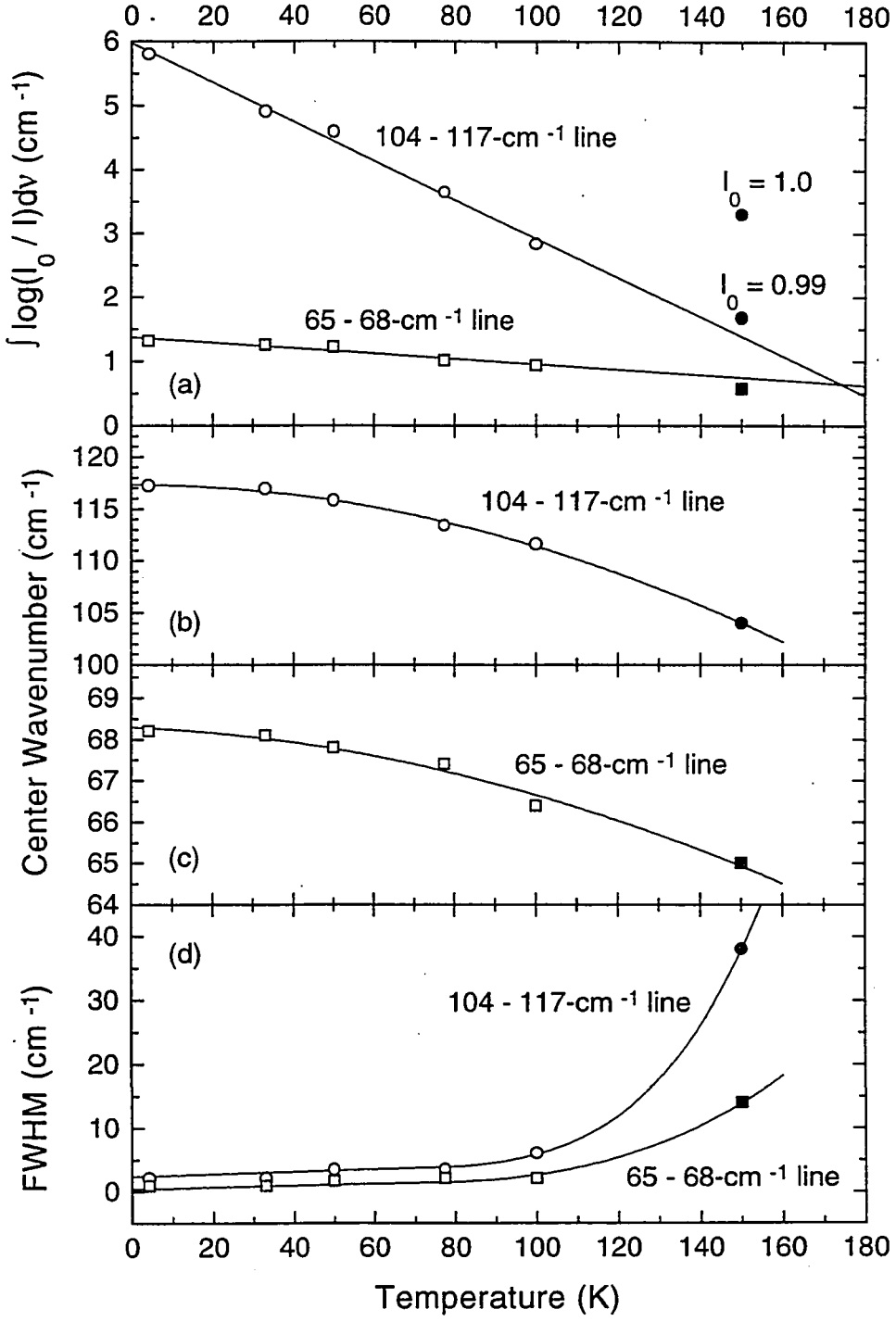

Wavelength (μm)
300 200
100
40
3000
2000
1000
0
Absorption Coefficient (m -1)
(a)
1.00
0.99
0.98
0.97
0.96
0.95
0.94
Transmission, d = 20 μm
T0 = 1.0
T0 = 0.99
Separated 104-cm -1 line
Separated 65-cm -1 line
(b)
50
100
150
200
250
Wavenumber (cm-1)

Figure 4-28. Correlation of integrated intensity, line position, and line width of the far-infrared lattice-vibration lines at 150 K with previous data at lower temperatures. The lower-temperature data at 4.2, 33, 50, 77.4, and 100 K are from Kuan (1969), and are shown as circles for the larger-wavenumber line (~110 cm^{-1}) and squares for the smaller-wavenumber line (~65 cm^{-1}). The new data are shown as filled circles for the larger-wavenumber line and filled squares for the smaller-wavenumber line. (a) The integral of the $\log(I_0/I)$ for both of the lines. A linear relationship is obvious, but the 104 cm^{-1} line at 150 K must use I_0=0.99 to be consistent with the Kuan data (this change would have little effect on the stronger, narrower Kuan measurements). The line is fit to the Kuan data only. (b) The variation of line-center wavenumber for the larger-wavenumber line and (c) the smaller-wavenumber line. These are fitted with quadratic polynomials which seem to accurately describe the variation. (d) The line width (full width at half maximum, FWHM) of both lines. This showed very little variation below 100 K and is clearly much larger at 150 K. The lines are not meant to be an accurate estimate of how this property varies, but are one way to connect the data.


∫ log(I0 / I)dν (cm -1)
104 - 117-cm -1 line
I0 = 1.0
I0 = 0.99
65 - 68-cm -1 line
(a)
Center Wavenumber (cm -1)
104 - 117-cm -1 line
(b)
65 - 68-cm -1 line
(c)
FWHM (cm -1)
(d)
104 - 117-cm -1 line
65 - 68-cm -1 line
Temperature (K)

Perhaps the processes that control width change significantly in some way between 80–100 K and 150 K.

4.6.2 Comparison of 7-μm band with Gaizauskas

As expected, the new measurements of the ν_1 band at 1400 cm^{-1} (7 μm) compare well with the accurate measurements of Gaizauskas (1955). This comparison is shown in Figure 4-29. The major difference is the much lower spectral resolution of the earlier measurement and a slight offset in wavenumber calibration.

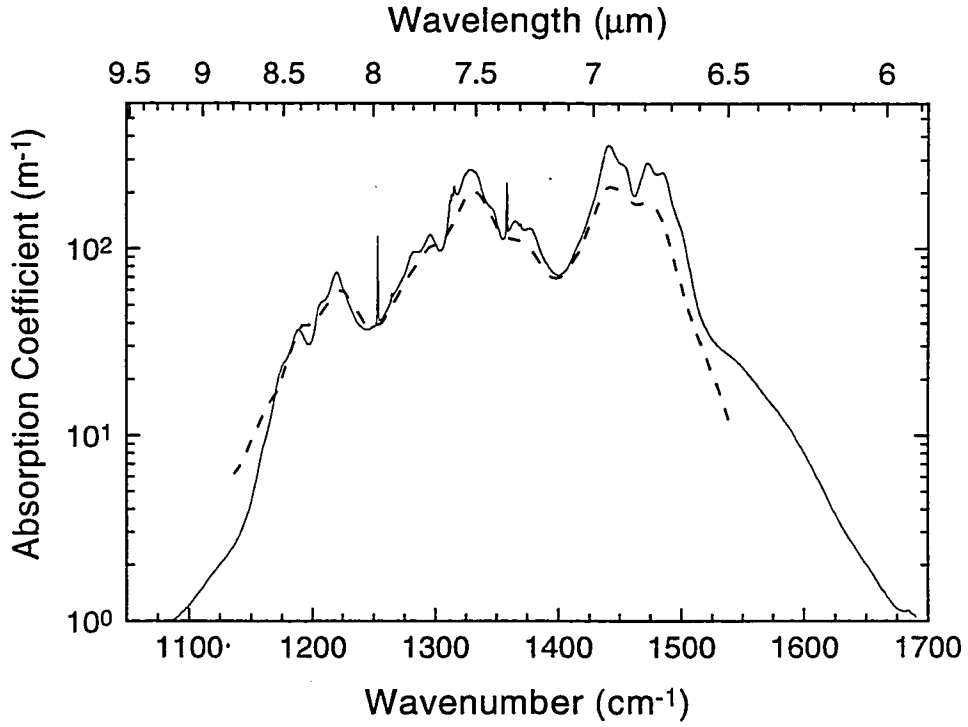


Figure 4-29. Comparison of new measurements of the ν_1 band at 1400 cm^{-1} (7 μm) with the measurements of Gaizauskas (1955). The new measurement is the solid line and the Gaizauskas measurement is the dashed line. The fit could be improved somewhat if the Gaizauskas measurement were shifted towards larger wavenumbers by a small amount.

Chapter 5

Progress on Measurements in the Ultraviolet, Visible, and Near-infrared

5.1 Introduction

Transmission measurements of CO_2 ice using the monochromator were made with some thicknesses over the range 0.17–4 μm (2500–58800 cm^{-1}). Although the data set is not as comprehensive as the FTS data, it can be used together with the shortwave part of FTS data with the CaF_2 beamsplitter to construct an absorption coefficient estimate over much of the 0.17–1.8 μm range. This chapter gives a description of the equipment and techniques of monochromator measurement, followed by a brief description of all of the data with $\lambda<1.8$ μm and expected results after analysis is completed.

The ice samples were illuminated with the output from the monochromator and the transmitted light collected and measured by the detector. Because the sources used with the monochromator had long-term drifts of many percent, a reference path was included to allow concurrent measurement of source intensity, as described earlier in section 2.5.

5.2 Mechanical Setup and Ice Sample Quality

When the monochromator was in use, it was evacuated through a 25-mm flexible bellows hose connected to the main chamber. The additional volume of the monochromator and input mirror box reduced the attainable vacuum slightly when they were attached. Photographs of the assembled system are shown in Figures 5-1 and 5-2.

Early samples were contaminated by a sub-micron layer of water ice which was deposited on one window from the beginning of gas flow until covered by the CO_2 ice. This left large regions of variable, but usually large (20–30%), scattering and significant absorption near 3 -μm wavelength. A few of these samples had a much smoother interface between the water and CO_2 ices and provided good results in the ultraviolet to near infrared, where absorption by the thin water-ice layer was negligible.

The long-period transmission oscillations measured on the 41.3-mm samples (see end of section 2.4) were particularly troublesome with the wavelength scanning of the monochromator. Fast scans inherently have coarse wavelength resolution, so the trans-

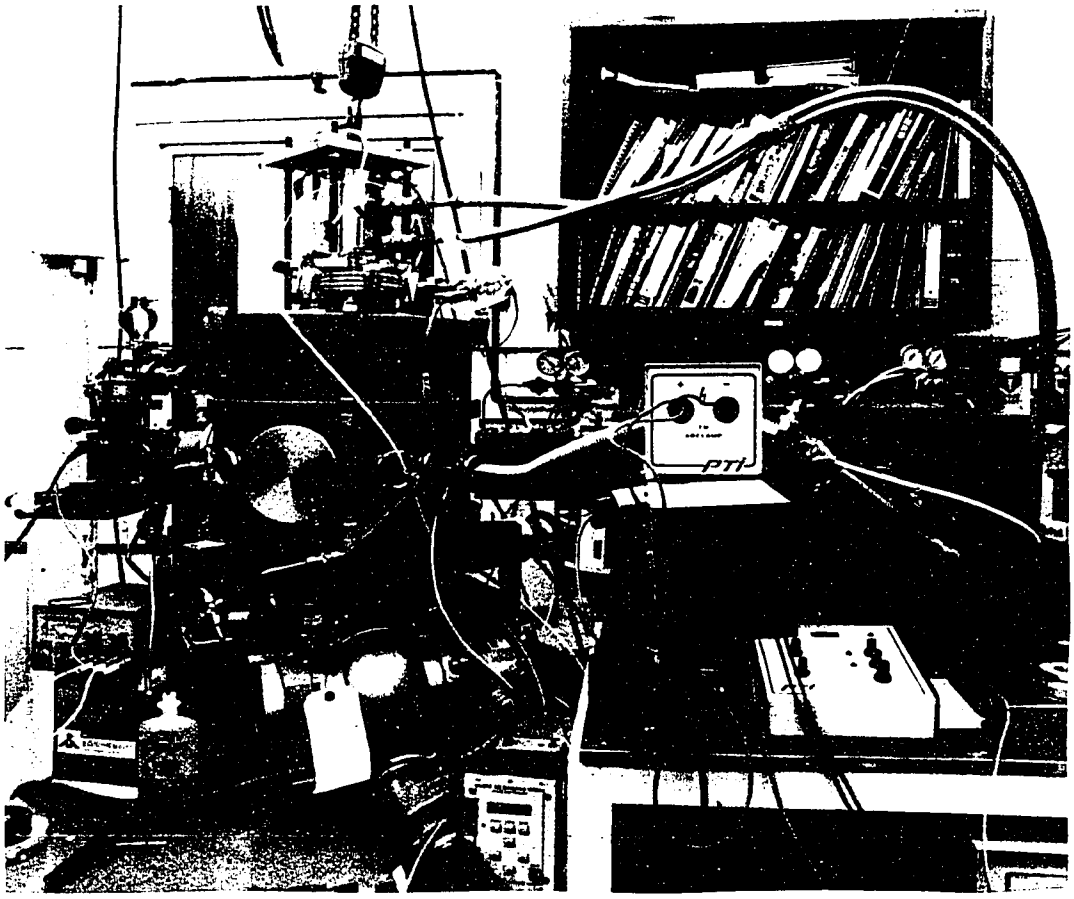


Figure 5-1. Photograph of monochromator setup, front. The source is mounted on the input slit of the monochromator and extends towards the viewer. The monochromator on the right is connected through the input mirror box in the center to the vacuum chamber on the left. The detector and its mirror box extend to the left of the vacuum chamber. The covered inspection window is on the front of the vacuum chamber in this view.

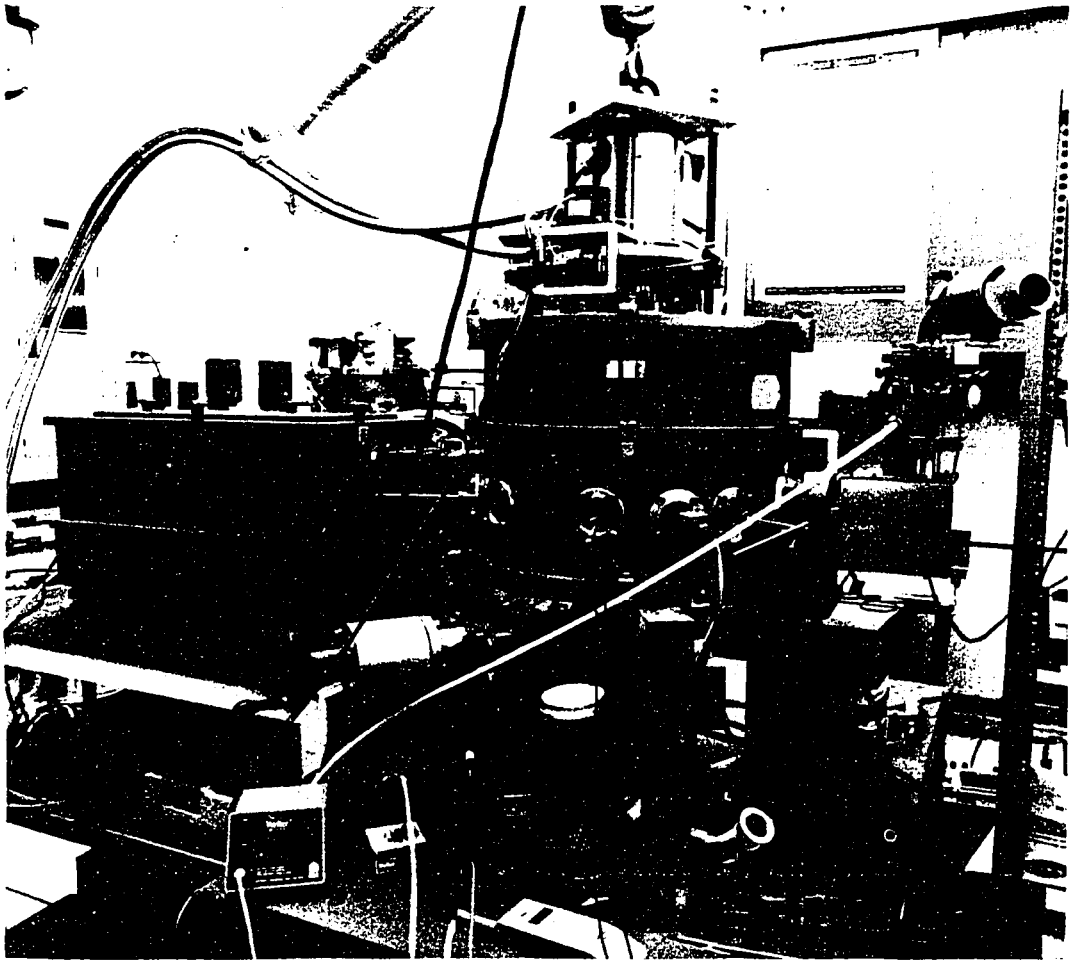


Figure 5-2. Photograph of monochromator setup, rear. The monochromator is on the left and the vacuum chamber on the right. The copper supply tube for the CO_2 gas and the levers for operating the inspection mirrors are visible on this side of the chamber.

mission variation appears as oscillations with wavelength on the slower, finer-resolution scans. Therefore, one must make many spectral scans starting at different phases of the pressure variation and average them to cancel out the oscillation. This procedure was impossible to do with the many-hour-long high-resolution scans in the infrared region, so other solutions were found (see section 5.4.10).

5.3 Optical and Detection Setup

The output of the monochromator was an f/8.7 beam emanating from a slit 3 mm high and 20 μm to 1 mm wide. The optical system is illustrated in schematic form in Figure 5-3. The monochromator output entered into an evacuated mirror box where it was reflected by a flat mirror onto a concave mirror which focused an image of the slit at the center of the vacuum chamber. The beam width was small enough that it was not occulted by any part of the sample chamber at any path length setting when properly aligned. The mirrors were mounted on custom-built supports which allowed for screw adjustment of tilt in two axes and translation in two directions. The mirrors were made from glass blanks from Rolyn Optics Co. that were coated at JPL with pure aluminum on one side and pure gold on the other. The aluminum was used primarily in the ultraviolet and visible, and the gold was used in the infrared. The mirrors were kept in a pure nitrogen atmosphere as much as possible to limit the oxidation of the aluminum surfaces that degrades their ultraviolet reflectance. The focusing mirror was made from a symmetric bi-concave lens with the appropriate radius of curvature. Figure 5-4 is a photograph of the interior of this box.

The reference mirror system (section 2.5) was commonly used at each measured wavelength in the monochromator system. This required very many cycles of the mirrors for every spectrum taken. One problem I had with the moving parts of the reference mirror system was this rapid up-down cycling (rapidity necessary to limit the transition time during the measurement, usually close to 1 s for the full movement, repeated every 10–25 s). This caused the failure of one of the rotary feedthroughs, so the range and speed of motion were minimized as much as possible after that failure.

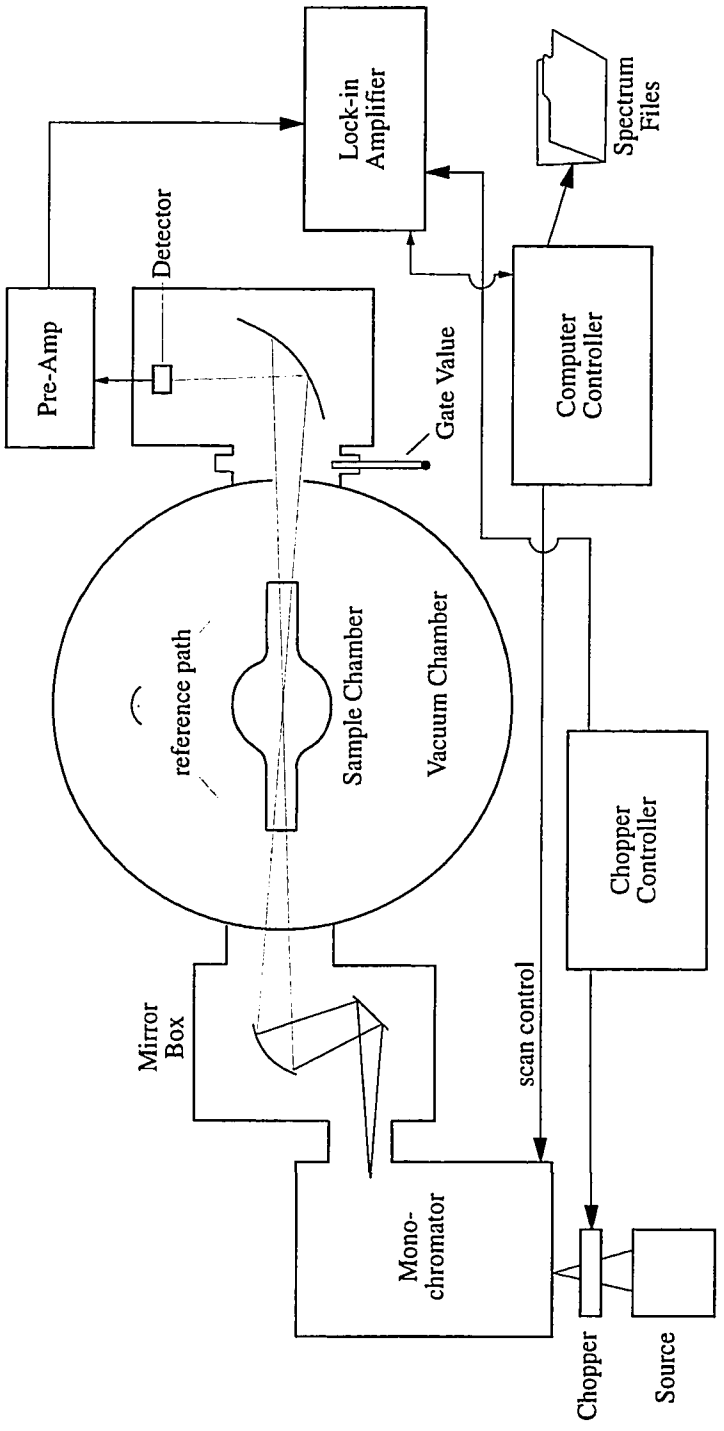


Figure 5-3. Optical layout schematic of monochromator system. The light from the f/8.7 slit was focused at the center of the sample chamber with a magnification of about 2.5 and then onto the detector. The reference path was designed to refocus the image of the slit at the same distance along the output path as it appears on the input path.

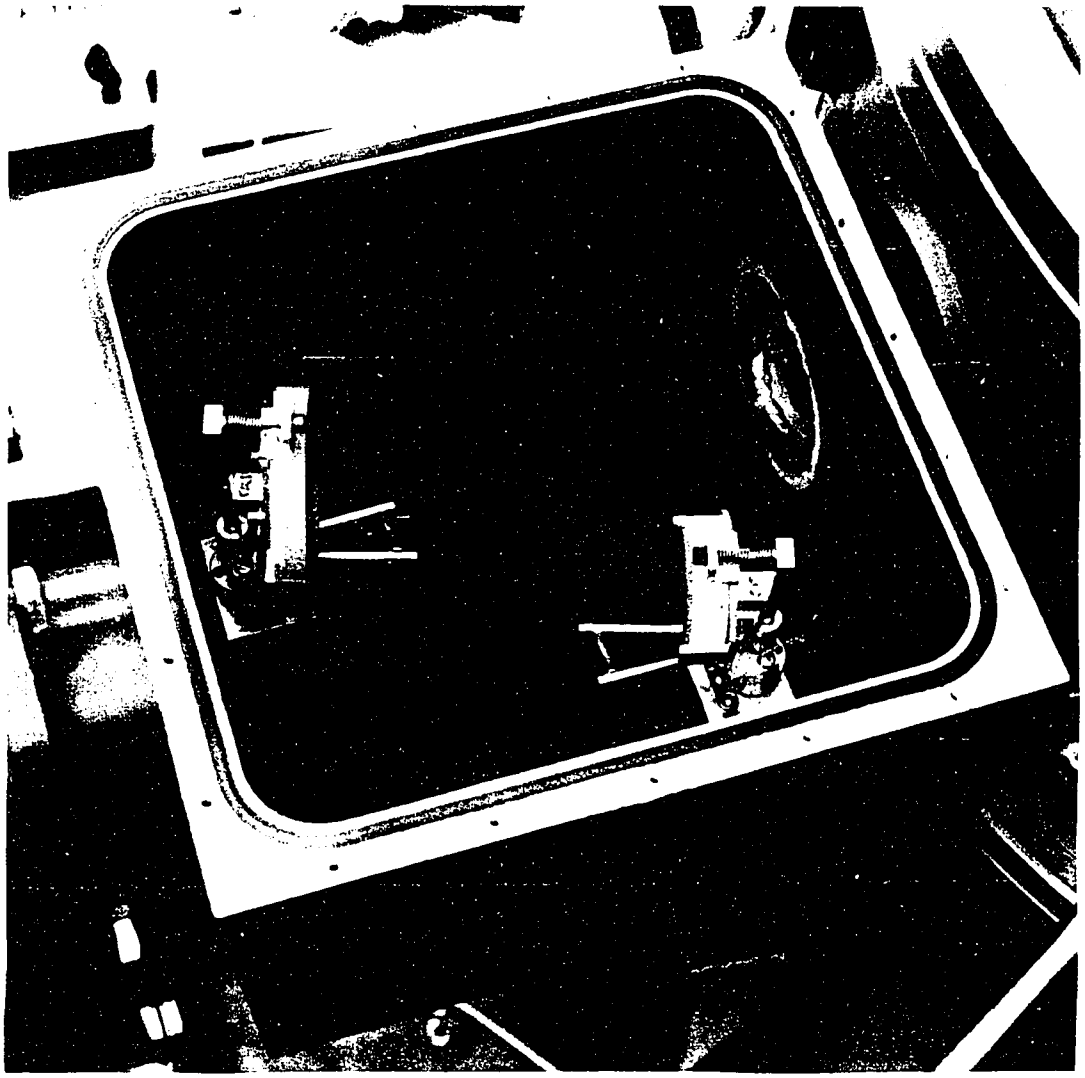


Figure 5-4. Photograph of the input mirror box and mirrors for the monochromator experiment. The flat mirror is on the lower right and the focusing mirror is in the upper left. The light from the monochromator enters from the lower left and exits into the vacuum chamber at the upper right.

The central mirror of the reference system in the back of the chamber was designed in the monochromator experiment to maintain the focus of the system by refocusing the slit image that appears in the incoming beam (since the distance to the back of the chamber was longer than the distance to the center). The focal length of this mirror was selected to form an image of the slit at the same distance along the outgoing beam as it appears in the incoming beam. This worked very well—the reference path beam entering the detector box was very similar in size and spread to the direct beam. The three mirrors of the reference system were originally purchased from Janos Technology, with both MgF_2-coated aluminum and chromium-gold surfaces. The aluminum mirrors, however, performed very poorly below 200 nm, so they were eventually replaced by glass blanks coated with pure aluminum at JPL.

The direct and reference beams entered the detector box through a 40-mm gate valve, which was used as a dark slide, or as a method for separately venting the box to change the order filter during measurement of a sample. It was normally evacuated with the chamber. After order filters were changed, the detector box was rough pumped with a Varian Associates sorption pump before reopening the gate valve. Two detector box designs were used during the experiment, both milled out of solid aluminum with O-ring-sealed stainless steel top plates. The first was shallow and rectangular, intended to entirely enclose the detector in the vacuum. It was used with silicon detectors and the photomultiplier tube (PMT). The input beam was focused by an aluminum- or gold-coated Melles Griot off-axis parabolic mirror with a 38-mm focal distance on a crude mount. The detector was on a similar mount, making focusing and alignment difficult. The signal was passed through feedthrough connectors welded to the top. The side-viewing PMT was mounted upside down with the socket and base pointing up into a special top with a cylindrical extension and high- voltage feedthroughs.

Since this early box was not appropriate for the indium antimonide (InSb) detector-Dewar, another design was made which was later adapted for use with all the detectors except the PMT. This box is described in detail near the end of section 2.5. For the mono-

chromator system, additional adaptors which fit in this box were made for the silicon detectors.

5.4 Monochromator System Design and Capabilities

5.4.1 Sources

The monochromator system used two sources, a Xenon arc-lamp and a deuterium arc-lamp. The Xenon source was a Photon Technology International short-arc lamp system including a 02-A1000 housing and an LPS 200X power supply with a f/4.5 focus and extension tube to optimize the filling of the monochromator aperture (f/8.7). It used an air-cooled 75 W Xenon lamp. An optical feedback system was included for improved long-term stability. The output of the lamp is characterized by many pressure-broadened emission lines on top of a smooth continuum running from 0.21 to ~4.5 μm, with maximum output between 0.6 to 1.0 μm. The lamp housing and extension tube were bolted to the slit assembly of the monochromator, with a vacuum-sealed CaF_2 window assembly between the source and slit. The extension tube was purged with dry nitrogen during measurements.

The deuterium source was an Acton Research DS-775 system, with a magnesium fluoride (MgF_2) window, which was bolted directly to the vacuum flange of the monochromator. It used a 30 W cold-cathode deuterium arc-lamp. Its spectral output has a detailed line structure from ~120 to 170 nm and a continuum beyond 170 nm. The monochromator had negligible transmission below 150 nm and no radiation below 140 nm was ever detected.

5.4.2 Monochromator

The vacuum monochromator was an Acton Research VM-505 f/8.7 with Czerny-Turner optics and 0.5-m focal length. The slits were adjustable from 5 to 3000 μm allowing for wavelength resolutions according to

$$\delta\lambda = \frac{w_{slit}}{nNf} \quad \Rightarrow \quad \delta\lambda(\text{nm}) = \frac{w_{slit}(\mu\text{m})}{a} \times 2.21\,, \tag{5-1}$$

where $\delta\lambda$ is the resolution, w_{slit} is the slit width, n is the spectral order (1), f is the f-number (8.7), a is the number of lines per millimeter of the grating (1200, 600, or 300), and N ($= a \times 52$ mm) is the number of grooves in the grating. This equation yields resolutions of 0.055, 0.111 and 0.221 nm, for w_{slit} = 30 μm and gratings of 1200, 600 and 300 mm^{-1}, respectively. The wavelength resolution is defined as the full width at half-height of the signal from a monochromatic source as the wavelength is scanned. The shape of this signal is called the "instrument function," and is roughly triangular, as expected for such an instrument operated far from the diffraction limit of resolution. Wavelength scanning was performed by a sine drive mechanism driven by a stepping motor, with gearing such that one step equals 0.025 nm with a 600-mm^{-1} grating.

5.4.3 Gratings

There were four gratings supplied with the monochromator, each a machine-ruled and blazed 52-mm square grating with aluminum coating made by Bausch and Lomb. The peak reflectance of each grating in the first order is near the blaze wavelength, with declining reflectance on either side (usually steeper on the short wavelength side). The characteristics of the four gratings are displayed in Table 5-1.

Table 5-1. Gratings used with the monochromator

		Non-polarized Light Reflectance (R):		
Lines/mm	.Blaze wavelength	10% R short λ	Peak R @ λ	10% R long λ
1200	200 nm	N.A.	73% @222 nm	730 nm
600	400 nm	180 nm	82% @400 nm	1550 nm
600	1000 nm	550 nm	82% @950 nm	>3000 nm
300	3000 nm	1600 nm	81% @ 2500 nm	6500 nm

5.4.4 Filters

There were five long-pass order filters used to isolate one spectral order from the filter cut-on wavelength to about two times the filter cut-on wavelength. In the visible, broad band-pass filters, rather than long-pass filters, were used to attenuate the scattered light from the peak output of the Xenon source in the near-infrared. The scattered light, undispersed light which escapes the monochromator exit slit, was usually less than one-thousandth of the peak dispersed light. Only scattered light at wavelengths which pass through the order filter is measured by the detector. The characteristics of the order filters used are shown in Table 5-2.

5.4.5 Detectors and Preamplifiers

There were four detectors used in the monochromator experiment, two for the vacuum ultraviolet, one for the visible and near-infrared, and one for near- and mid-infrared. A Hamamatsu R955 side-on 9-stage photomultiplier tube (PMT) was used in the vacuum ultraviolet because of its superior sensitivity to the weak deuterium lamp signal. It was sensitive from 155 to 900 nm and was operated with a Hamamatsu E717-21 voltage divider socket at −1000 V, giving a typical electron gain of 10^7. There was short-wave cutoff from the fused quartz envelope of the tube. The tube was surrounded with a magnetic shield held at high potential. The typical dark current was 20–30 nA, and the typical transconductance gain used for the output was 10^6 V/A.

A silicon X-ray/UV detector was also used, which was windowless and had no short-wave cutoff. However, since there was no output from the monochromator below 140 nm, this detector gave no more than 10 nm of additional spectral range compared to the PMT, and this at 10 times lower spectral resolution and lower signal-to-noise (S/N). It was a United Detector Technology (UDT) X-UV5, sensitive from <0.1 nm to 1000 nm with a 0.1-inch-diameter element. Its quantum efficiency was >1 for $\lambda < 200$ nm due to electron avalanche multiplication. The typical transconductance gain used with this detector was $10^7 \times 10$ or $10^7 \times 100$ V/A (first stage × second stage; see below). The X-UV silicon and PMT detectors were only used in only one spectral order, ~150–300 nm.

Table 5-2. Order filters used with the monochromator

Filter Name	Manufacturer	Type	Diameter	Thickness	Cuton λ, 50% Transmittance (T)	Blocking
UG-5 (bandpass)	Schott/CVI	ionically colored glass	1 inch	2 mm	295 nm (short) 395 nm(long,70% T)	<.001% <250 nm; 60% 700-1100 nm
BG-39 (bandpass)	Schott/CVI	ionically colored glass	1 inch	2 mm	350 nm (short) 593 nm (long)	<.001% <320 nm; <10%720-1100 nm
5131	Oriel	ionically colored glass	1 inch	3 mm	575 nm	<0.001%
RG-1000	Schott/CVI	ionically colored glass	1 cm	1 mm	838 nm @ 77 K	<0.001%
LP-1.5	μCoatings	interference	1 cm	<1 mm	1.49 μm @ 77 K (5% T)	<0.1%
LP-2.5	μCoatings	interference	1 cm	<1 mm	2.49 μm @ 77 K (5% T)	<0.1%

The visible wavelengths were measured by an ultraviolet-enhanced silicon detector, the UDT UV005, which had a sensitive area of 0.1 inch in diameter. With a fused quartz window, its sensitivity extended from 158 to 1150 nm, with a peak near 900 nm. Used with the UV5, BG39 and 5131 filters, measurements from 250 to 1100 nm were made. The typical transconductance gain used with this detector was 10^8 V/A.

In the infrared, the InSb detector described in section 2.6.4 was used. The transconductance amplifier gain was different than that used in the FTS experiment (2.2×10^4 instead of 7.5×10^3 V/A). The RG1000, LP-1.5 and LP-2.5 filters were mounted in the 60° field-of-view cold aperture. The filters had limited thermal signal in their cutoff wavelength regions due to their low temperature. Using these three filters, the wavelength region from 0.78 to 4.7 μm were measured.

The transconductance amplifier used with the silicon and UV detectors was built around the Burr-Brown OPA111AM low-noise FET input op-amp. It had selectable gains from 10^3 to 10^9 V/A, but the highest setting had stray capacitance which limited the bandwidth to about 25 Hz, well below the chopper frequency of 280 Hz. Therefore, a switchable second stage using a Burr-Brown OPA637AM op-amp was added to provide an additional gain of 10 or 100. This gave a total gain of 10^9 V/A with a bandwidth >800 Hz using 10^7 V/A first stage and 100 × second stage.

5.4.6 Light Choppers

Light choppers are used to modulate the source intensity so that the component of the detected signal from the source can be separated from the other components. When measured by a lock-in amplifier, AC components in a narrow range around the chopper frequency are selected, removing any DC components (energy not from the source), and avoiding most of the 1/f noise at low frequencies which arises from semiconductor amplifiers. (The dominant noise source from op-amp circuits below about 500 Hz is this 1/f noise, whose amplitude increases with decreasing frequency like the reciprocal of frequency). The choppers output a synchronous signal for the lock-in amplifier reference input. The advantages of synchronous detection are outlined by Wolfe (1988).

Two choppers were used in this experiment, one a variable-speed rotary chopper and the other a fixed-speed tuning fork chopper. The rotary chopper was a Monolight Instruments model 7500 with a chopping frequency adjustable between 35 and 820 Hz, a stability of 0.05%/°C, and a phase jitter of 0.7°. The tuning fork chopper was a 242-90D280 from Electro Optical Products which operated at 280 Hz and had large enough vanes moving at high enough amplitude to fully modulate the source signal if mounted close enough to the input slit. Its stability was <0.1% and it could operate in a vacuum, but not when illuminated by the Xenon source, which heated it up enough in the absence of cooling by convection to stop it. The chopper was mounted at the exit slit to avoid this problem, but this was unsatisfactory for infrared measurements because of the appearance of a large negative thermal offset, which depended on the chopper temperature and inhibited the detection of small signals. The heating problem with the Xenon source was solved by the fabrication of an inset flange and window holder which placed the chopper close enough to the slit for proper light modulation while leaving the chopper outside the vacuum. The vacuum-mounted chopper worked fine with the weaker deuterium source.

5.4.7 Lock-in Amplifiers

The amplitude of the chopped AC signal at the detector was measured synchronously by a lock-in amplifier. This amplifier pre-amplifies the input signal and mixes it in a phase-sensitive detector with a sinusoidal reference signal derived from the synchronization signal from the chopper. The output of the phase detector can be maximized by shifting the phase of the reference signal to match that of the input signal. The output of the phase detector is then filtered with low-pass filters to select only those components of the input signal which are very near the frequency of the reference. The user-controllable inputs include the input sensitivity, low-pass time constant, and phase. The input signal is often pre-filtered to eliminate line-frequency components, and harmonics or other interfering frequencies before entering the phase-sensitive detector. The gain of the phase detector circuit is sometimes adjustable to trade off output stability with dynamic reserve (the ability to find a small-amplitude coherent signal in large amplitude noise). For this exper-

iment, the output of the lock-in amplifier was digitized (inside or outside the amplifier) for computer storage.

The main trade-off in using a synchronous detection system is to use the low-pass filter with the shortest time constant that provides an acceptable noise level. Any changes in the signal due to wavelength change or reference mirror movement must be accompanied by a suitable delay time for settling before taking another measurement (usually about 10 times the time constant τ). Therefore, measurements using the maximum time constant (τ = 3 s) were very rare due to the extraordinarily long time required for spectral scanning. The most common time constant used for large signals was 0.1 s.

Two lock-in amplifiers were used, both made by EG&G Princeton Applied Research Corporation (PARC). The first was a model 5101 whose ±1 V full-scale analog output was wired to the analog-to-digital (A-to-D) card of an Elexor Associates XL-1200 data acquisition system. The Elexor ran a program internally which manipulated the monochromator and reference mirror stepper motors through a serial port to the motor drivers, and acquired digital data from the lock-in via the A-to-D card. The program printed out the data to a PC serial connection which was then captured to disk by a communication program in the PC. The A-to-D card had 16-bit resolution and was set to ±1.25 V full scale, yielding 52 μV per digital number (DN). The 5101 had full-scale input sensitivities from 1 μV to 0.25 V, only line-frequency filtering for the input, 6 dB/octave for time constants (τ) from 1 μs to 30 s, and an additional 6 dB/octave "post-filter" at 0.1 s or 1 s. The post-filter was always used; 0.1 s for $\tau \leq 0.3$ s, and 1 s for $\tau \geq 1$ s.

The second lock-in used was a model 5209, which was directly controllable from a PC via a serial interface, and which had an internal 16-bit A-to-D which converted the output to numbers sent to the PC through that interface. The acquisition program in the PC controlled the motor drivers by a second serial interface, and changed the time constant and input sensitivity dynamically while the measurements were being taken. The full-scale input sensitivities available were 100 nV to 3 V (with 100 μV being the highest sensitivity typically used). Input was filtered by a fourth-order bandpass filter tuned to the chopper frequency. This shortened the long settling times associated with the InSb detector whose

DC output reflected the average temperature, which changed significantly when the reference mirrors were moved and caused a low frequency signal that, without filtering, severely affected the phase detector output. Line frequency notch filters at 60 and 120 Hz were also used.

The dynamic reserve of the 5209 is switchable, and the "high stability" mode was used for these experiments, where the useful signals were much larger than the noise. Output time constants were used with 12 dB/octave filters at all settings, with an available range of 1 ms to 3000 s and a used range of 30 ms to 3 s. The sensitivity was adjusted during acquisition to keep the output signal between 0.3 and 1 times full scale. The sensitivity was not increased above a specified maximum where the noise was a significant part of the full scale. Output was in the form of a decimal integer in the range ±15000, with 10000 representing full scale.

5.4.8 Throughput of Optical Combinations

The scaled throughput of the eight grating-filter-detector combinations are displayed in Figure 5-5 a–h. The instrumental and sampling resolutions of the runs in these figures are typical of the highest used in each region. The vertical scale of these graphs is the square root of the scaled signal, which gives a better indication of the useful measurement levels, which run over 3 or 4 orders of magnitude, than linear (too much emphasis on high level signals) or logarithmic (too much emphasis on low level signals). Even though the average levels in the wavelength ranges which exhibit strong Xenon source peaks are less than one tenth the peak level, filter time constants were selected for good performance at the continuum level and quality data was usually obtained for all signals above a few thousandths of the peak level.

5.4.9 Wavelength Calibration

Most wavelength calibration of the monochromator data was done using a mercury-argon pencil lamp placed behind the chopper near the input slit. This low-pressure arc lamp was treated as a monochromatic line source for this application. It was best to obtain

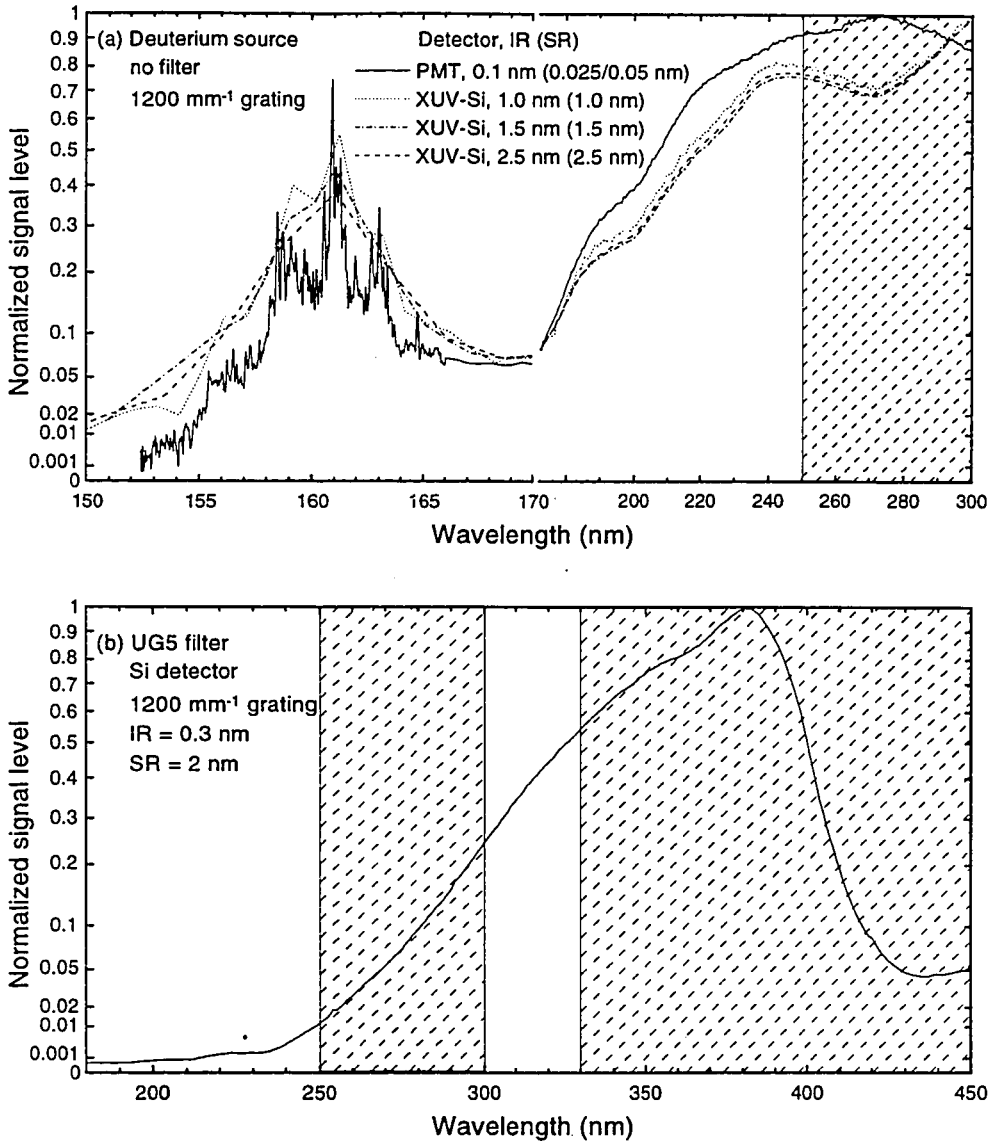
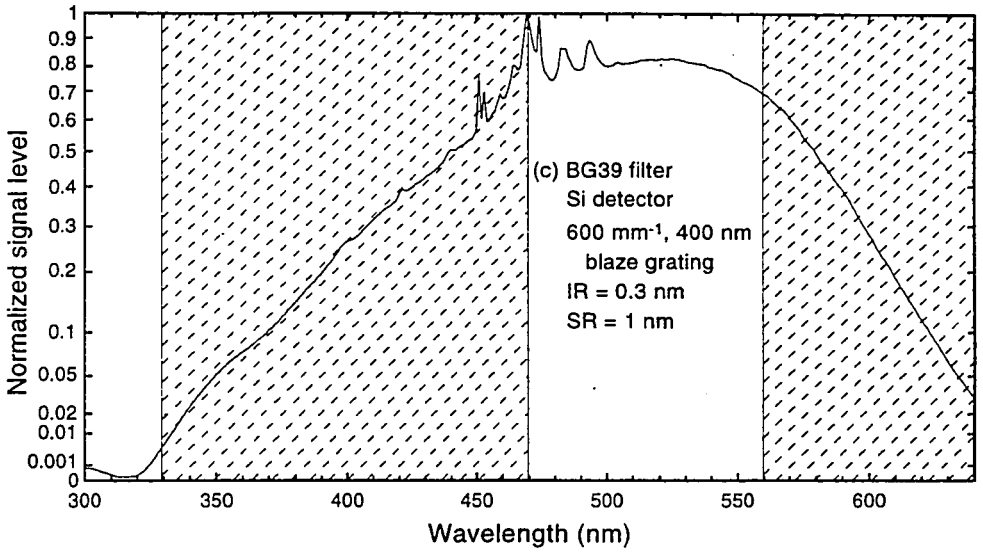


Figure 5-5. Throughput for the monochromator experiment. Each panel shows a single spectral order determined by blocking filter, grating and detector, and is normalized to 1.0 at the maximum signal. There are eight of these combinations (a–h). The instrumental resolution (IR) and sampling resolution (SR) of each spectra are noted. In each panel, the wavelength regions where overlapping data from adjacent filter/detector combinations are merged are indicated by hatched patterns. In the UV to near-infrared (a–d), the spectra of the empty sample chamber are displayed. All but (a) are made using the Xenon lamp. (a) Throughput for the deuterium source with no blocking filter, plotted on a split scale to better display the fine line structure of the source between 150 and 165 nm.



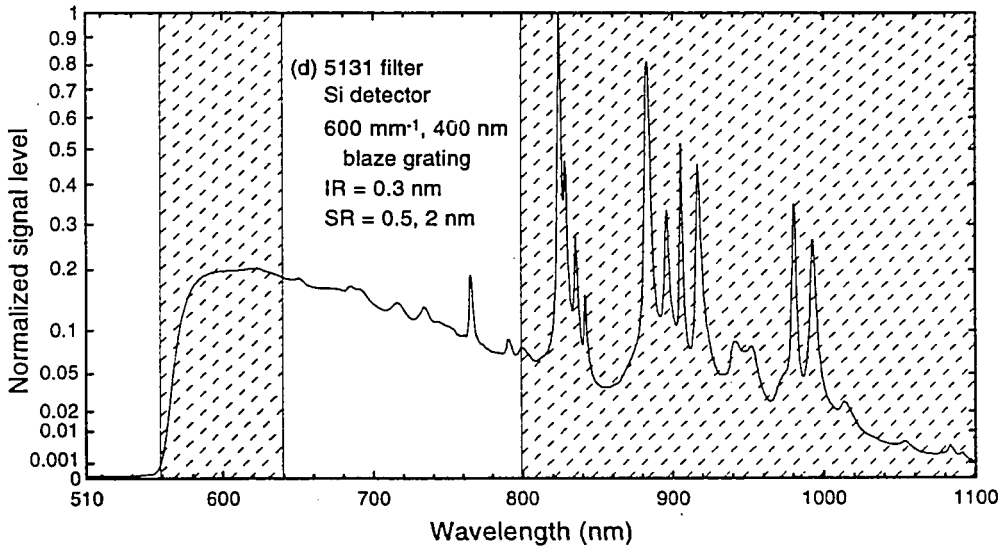


Figure 5-5. (continued) Throughput for the monochromator experiment.

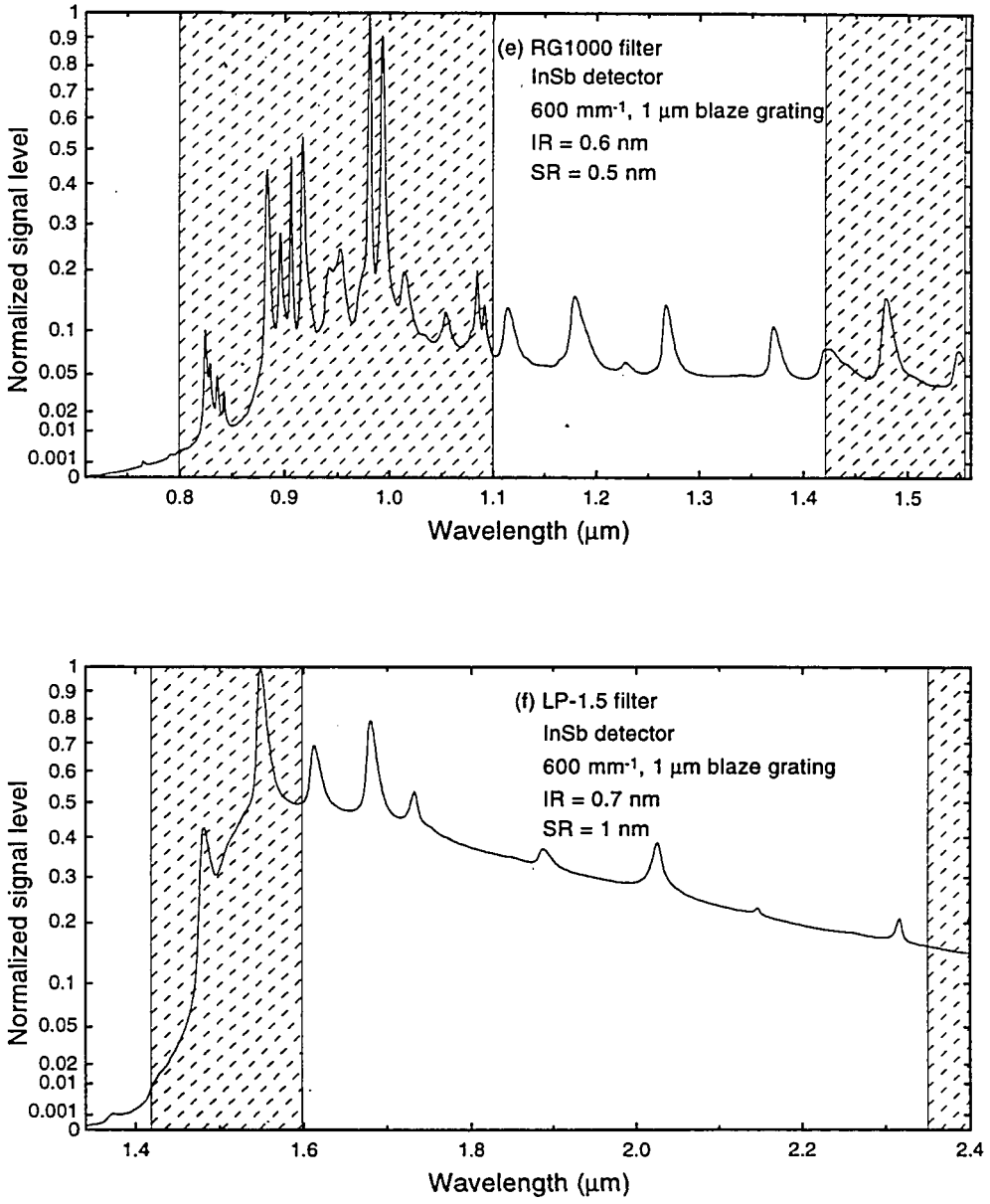


Figure 5-5. (continued) Scaled throughput for the monochromator experiment. At wavelengths longer than 1 µm (e–h), spectra are of the reference path to avoid plotting channel fringes.

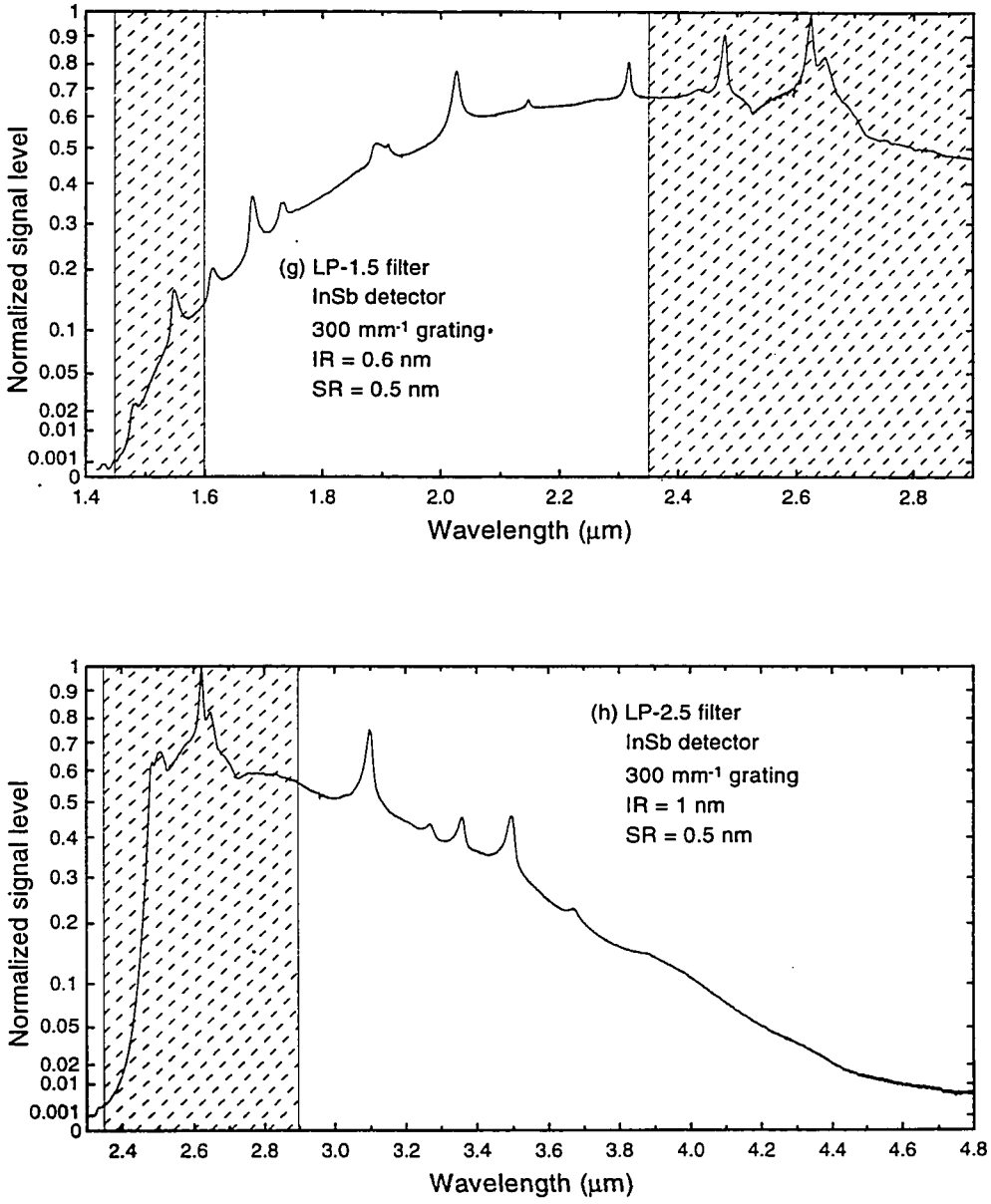


Figure 5-5. (continued) Scaled throughput for the monochromator experiment.

data in the absence of an order filter so that lines from higher order grating reflections would appear. These lines increase the density of calibration points, especially in the infrared beyond 1 μm, where first order emission lines from the lamp are few and weak. Even with this advantage, suitable calibration lines at wavelengths greater than 2 μm are very rare. When the 300-mm^{-1}, 3-μm blaze grating was used, the absorption lines of gaseous CO_2 at 2.7 and 4.3 μm were used for calibration. The close spacing of these lines gave very accurate (and laboriously obtained) calibration data, but only in wavelength regions where the CO_2 ice samples are opaque.

The width of the monochromatic emission lines of the Hg-Ar lamp as measured were controlled by the slit opening. The wavelength calibration measurements were done at the finest resolution needed to get an acceptable line profile, whose center was determined via a triangular fit. These measurements verify that the instrument function was very symmetric and triangular (section 5.4.2; Figure 5-6). Visible and near-infrared lines with $\lambda<1$ μm were usually measured with a resolution of a few tenths of a nanometer, but weak mid-infrared lines often needed slit openings corresponding to many nanometers resolution for adequate S/N. The centers of the lines were determined by the intersection of two straight lines fit in the least-squares sense to the triangular slopes of the measured lines. A representative set of lines with different strengths, wavelengths, and resolutions is shown in Figure 5-6.

The general shape of the wavelength calibration curves are characteristic of the sine drive of the monochromator; The calibration curves of the four gratings differ mainly in offset and scale. When a grating was remounted (or the wavelength drive motor reset), the calibration for it was the same as previous calibrations of that grating plus a (usually small) offset. Therefore, the calibration curve had to be measured accurately across the full range only once; thereafter, only a few strong, well-spaced lines were measured to determine the offset. The calibration curves are plotted as true wavelength minus measured wavelength (a correction) versus measured wavelength. These curves are concave-downward with a maximum near the center of the wavelength travel, consistent with a

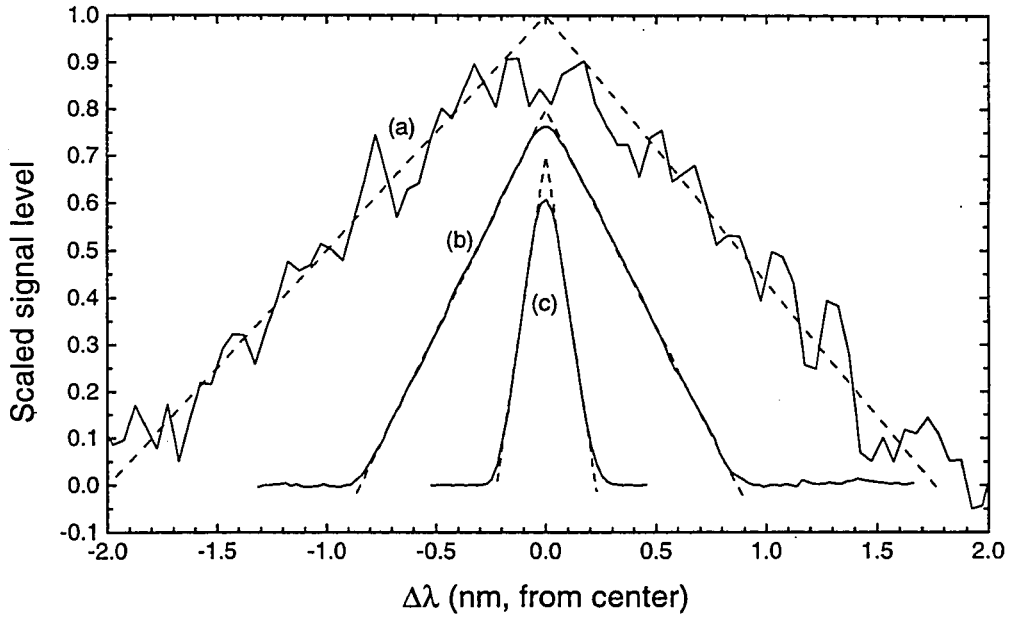


Figure 5-6. Finding the center of measured lines from the Hg-Ar calibration lamp for monochromator wavelength calibration. The measured signal for three lines of different strengths is shown on an arbitrary vertical scale. The noise of the measurement is directly related to the resolution of the measurement—weak lines with low S/N are usually at coarser resolution. Each measurement, represented by the solid line, is accompanied by the three-point triangular best fit, shown as a dashed line. The wavelength scale is aligned in each case with the wavelength of the center of the triangular fit. (a) The weakest line is the second order reflection of a mercury line at 1.12905 μm, which appears at a calibrated wavelength of 2.25810 μm using the 600 line mm^{-1}, 1-μm blaze grating. The resolution of this measurement is about 1.9 nm. The coarse resolution and noise of this measurement inhibit determination of the central wavelength to the accuracy possible for stronger lines. (b) This medium-strength line is the 1.01425-μm Hg line in the first order of the 600 line mm^{-1}, 1 μm blaze grating, measured at a resolution of 0.88 nm. (c) The strongest line is the 253.728-nm Hg line measured with the 600 line mm^{-1}, 400-nm blaze grating at a resolution of 0.23 nm.

small misadjustment of the wavelength drive (Ando, 1964). A typical calibration curve fit with its related measured points is shown in Figure 5-7.

The ultimate accuracy of calibration is not limited by the repeatability of measurements at a single wavelength (usually ±0.01 nm for strong lines), but rather by the amplitude of the high frequency periodic error, probably caused by the drive screw (Fisher, 1959). The amplitude and frequency of this error were measured when the closely spaced lines in the CO_2 gas infrared absorption bands were used for calibration (Figure 5-8). The phase of this oscillation is impossible to determine with the typically widely spaced lines from the calibration lamp, although occasional resolved doublets confirmed large local slopes in the calibration function. An attempt is made to trace the calibration curves through the measured points with this variation in mind. The amplitude of the periodic error is $\sim \pm 0.06$ nm for 600-mm^{-1} gratings, six times the individual measurement error.

Another effect on the accuracy of wavelength determination is the backlash in the grating drive, seen as a 0.4–0.45 nm (for 600-mm^{-1} gratings) difference between the forward and backward calibration data. To avoid the need to make calibration measurements in both directions, spectral scans were usually made in a single direction. Errors in the measurements of lines near the limits of the scanning range are larger because of the difficulty of completely eliminating the backlash at those locations.

5.4.10 General Technique of Data Acquisition

In most cases, multiple measurements were taken at each wavelength step and reference mirror position and averaged together. Adjacent measurements at one position were separated by a delay of about three times the time constant, τ, of the lock-in amplifier. A delay of about 10τ was used when the reference mirrors were moved or the wavelength stepped. Spectral data consist of direct signal average and reference path signal average at each wavelength following a sequence like:

> move reference mirror — sample measurement — change wavelength — sample measurement — move reference mirror — reference measurement — change wavelength — reference measurement — move reference mirror — sample measurement — ...

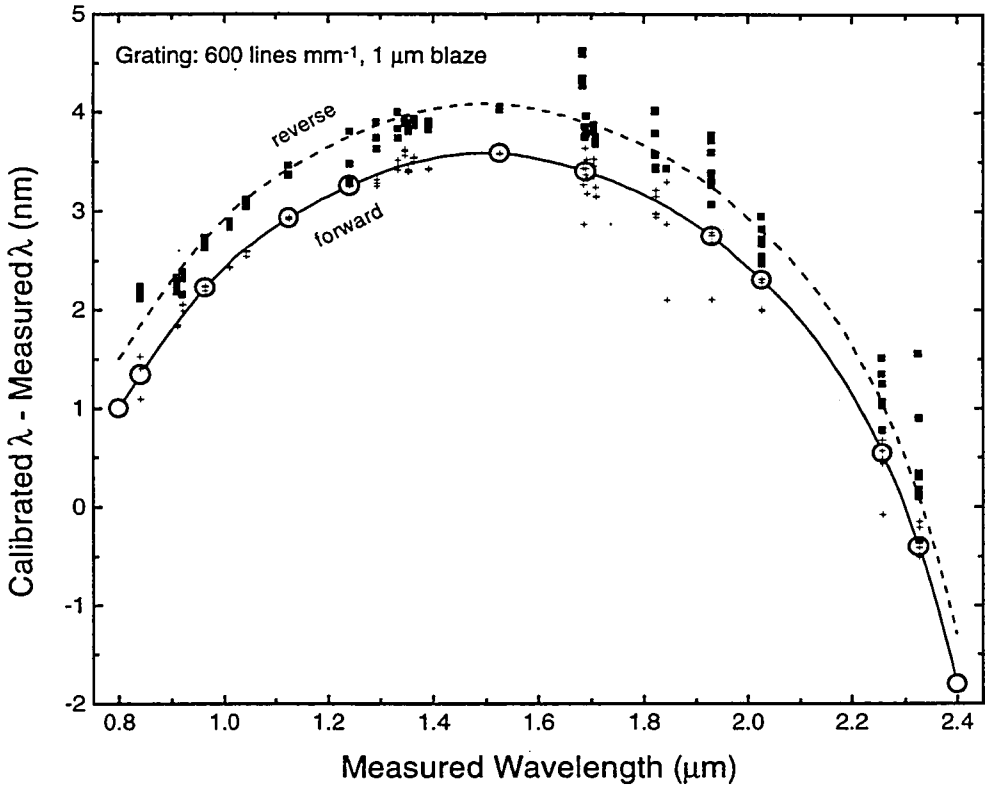


Figure 5-7. Example of a wavelength calibration curve. This curve is for the 600 line mm^{-1}, 1-μm blaze grating, which was used in the wavelength range 0.8–2.4 μm, and was calibrated using 26 first and second order lines from the Hg-Ar lamp. Separate measurements were made in both scanning directions: Forward (increasing wavelengths) and reverse (decreasing wavelengths). The data is plotted as an additive correction (calibrated wavelength minus measured wavelength) versus measured wavelength. The plus symbols represent the forward scanning data, and the solid square symbols represent the reverse scanning data. Large circles located at the average value of some accurately measured strong lines (forward) and two end points are used as tie points for a spline fit to the data, shown as a solid line. The dashed line is a uniform upward shift of this fit (originating from backlash in the grating drive) of about 0.5 nm, estimating the reverse scan calibration.

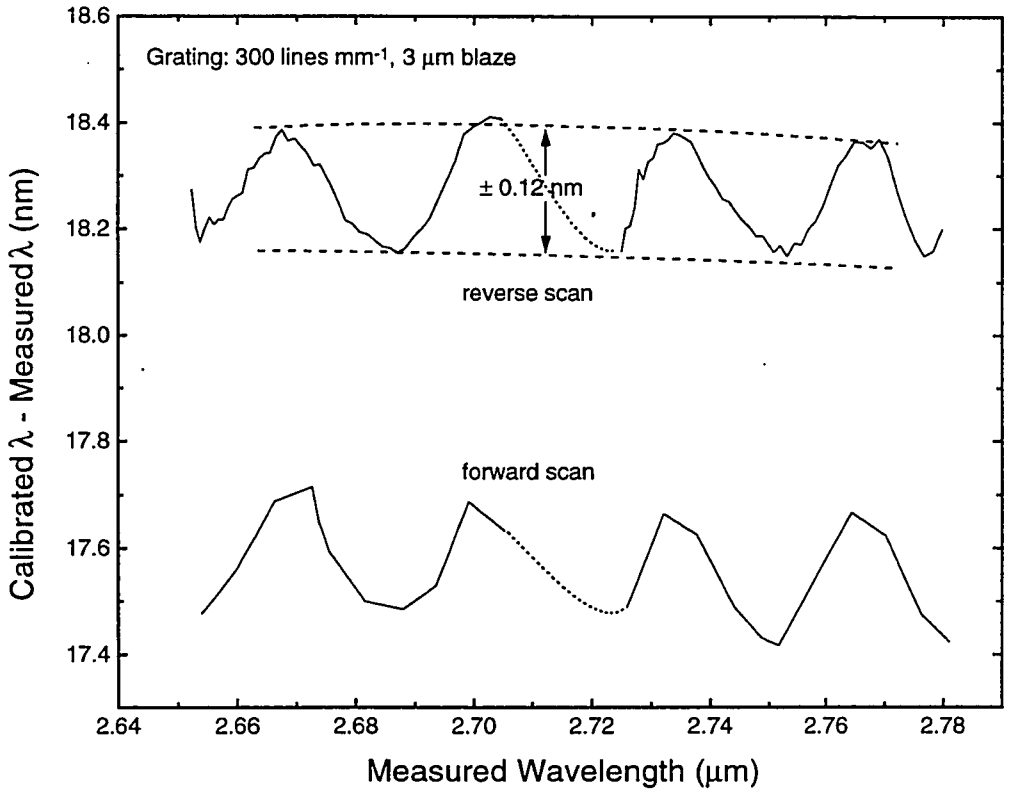


Figure 5-8. Periodic error visible in high resolution calibration of the monochromator sine drive. The data shown here were obtained by measuring the line positions of selected absorption lines in the 23-1 and 25-1 vibration-rotation bands (near 2.7 μm) through a 41.3-mm path of CO_2 gas at 293 K and 95 torr. The close spacing of these lines and the ability to measure their centers to a precision of a few hundredths of a nanometer resulted in the upper curve, taken in the reverse scanning direction. The axes are the same as in Figure 5-7, a correction value versus wavelength, but for the 300 line mm^{-1}, 3-μm blaze grating. The oscillation of the grating drive has a period of 34 nm and an amplitude of ±0.12 nm. These values are halved for the 600 line mm^{-1} gratings (17 nm and ±0.06 nm, respectively). A forward scan with fewer points is also shown.

This method corrects any long-term drift in the source signal. The scattered (undispersed) light level was found by scanning the monochromator below the wavelength of the order filter cut-on. This signal was measured at each sensitivity setting and later subtracted from the measured spectral signals. The final spectral data product is the ratio of the direct signal to the reference signal:

$$\frac{\text{direct signal} - \text{direct scattered light}}{\text{reference signal} - \text{reference scattered light}} \qquad (5\text{-}2)$$

The variance of the data is estimated by the calculated standard deviation of the 4–8 measurements at each position.

At some wavelength near the order filter cut-on, the signal becomes large enough that the second-order signal at two times that wavelength may interfere with the first-order signal there, defining the "free spectral range" of the experiment. The order filters are selected so there is some overlap between adjacent ranges.

The measurement method described above is a relatively slow process, taking 15–20 seconds or more for each wavelength step. Scans were designed to take as few steps as possible by using a variable step size (sampling resolution) based on the assumed amount of spectral detail in each wavelength region. It was not possible to achieve sampling resolution near the instrumental resolution across the full wavelength range in the infrared. Even with carefully selected regions of high resolution and moderate resolution, infrared scans using this method took 4–7 hours to complete. Any temporal change in the optical quality of the ice sample being measured shows up as spectral variation on these scans. This problem was solved in one of two ways, each of which abandons the simultaneous measurement of the direct and reference paths. Instead, full wavelength range scans were made with the reference mirrors in one position, followed by another scan with the mirrors in the other position.

The first method is a "free running" method in which the monochromator is scanned continuously, while the computer makes periodic measurements of the lock-in output. This method is the fastest, but suffers from difficult wavelength calibration, since the loop

time of the computer is slightly dependent on detailed internal timing and is not exactly constant in time or consistent between subsequent scans. The location of features in these spectra must be associated with their locations in stepped spectra for wavelength calibration. The advantage of this method is that a high resolution infrared spectrum could be obtained in 15–60 minutes, minimizing the possible effects of sample variation.

The second method is called "single-step", because it moves the monochromator constant small steps, taking 1–4 measurements at each wavelength, allowing for the proper settling time. Using this method, it was possible to acquire a full resolution infrared spectrum in about the same time as the basic method, which would have much coarser sampling resolution in many wavelength regions. The wavelength accuracy for this method is as good as the basic method. It was necessary to use the single-step or free running method to discover where the details in a spectrum were located so that the variable-step spectrum could be designed. The single-step method was particularly useful in scanning over the full range of the Hg-Ar lamp to find lines strong enough to use for calibration.

5.5 Status of Ultraviolet to Near-Infrared Measurements

The coverage of the 0.17–1.8 μm range with both monochromator and FTS measurements is detailed in Figure 5-9. In the visible to 1 μm, no evidence of absorption was found at 41.3 mm, so there was no need to examine thinner samples. All of the range (except for a short segment near 0.5 μm) was measured by one or the other method with the 107.5-mm pathlength. Large absorption in the ultraviolet and in narrow, near-infrared lines required the use of all thicknesses in these regions where possible (the 13.8-mm thickness was not measured in the ultraviolet).

The monochromator measurements with 41.3-mm samples extended from the ultraviolet to 4 μm, although only one sample was measured beyond 2.4 μm, and it showed extensive 3-μm absorption by the water ice layer. Most of the measurements at this pathlength were made during the time when there was water ice in the chamber, but only this longest wavelength spectrum was affected by it. The infrared measurements by the monochromator were, however, sensitive to subtle (and sometimes not so subtle) continuum

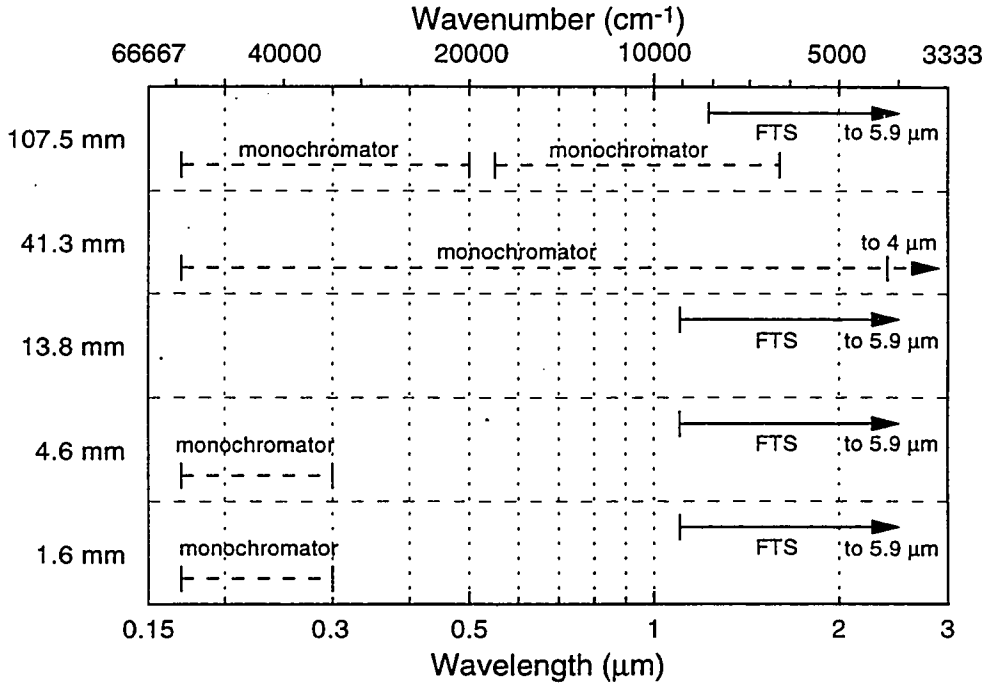
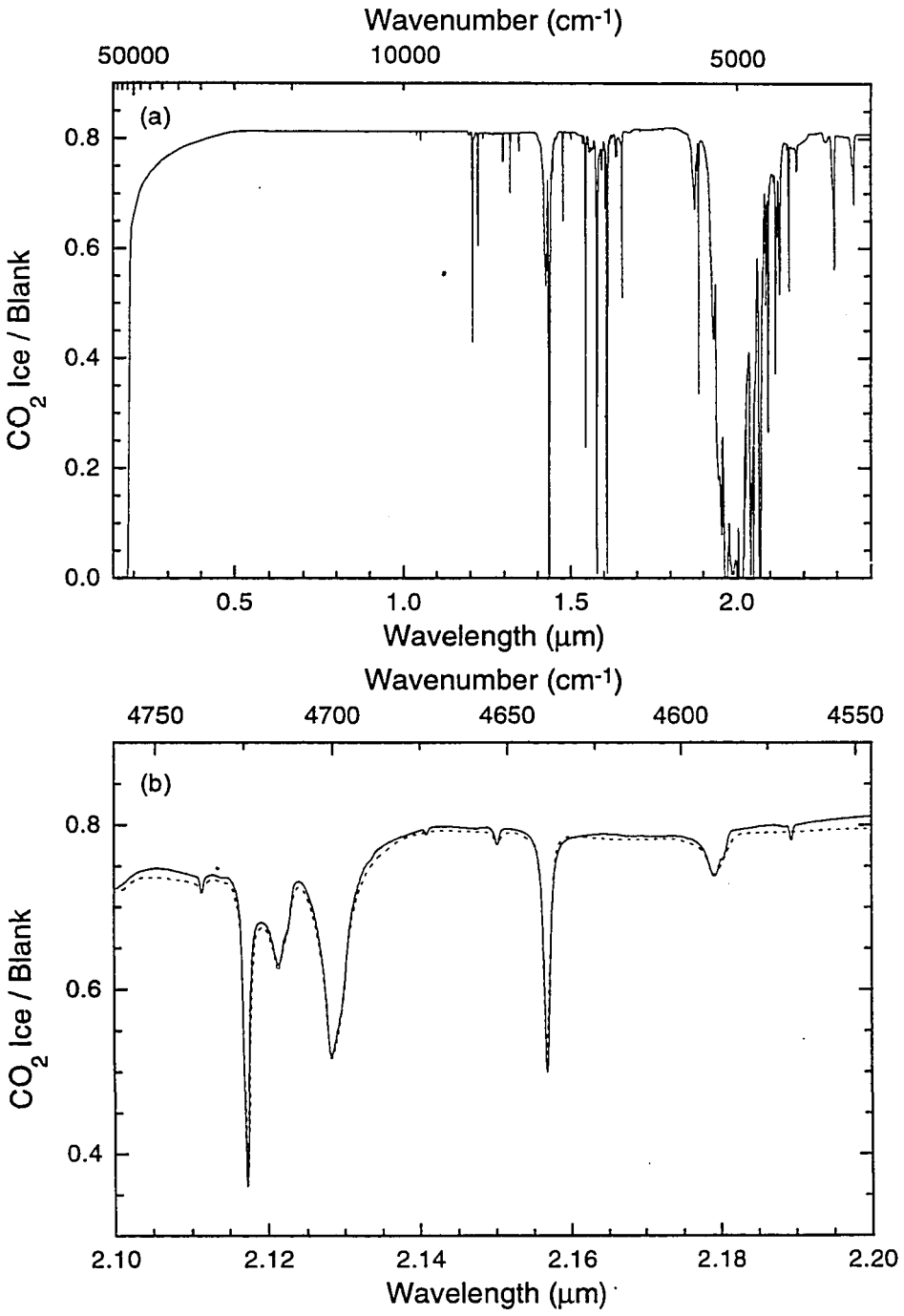


Figure 5-9. Measurements available for the ultraviolet to near-infrared wavelength range 0.17–1.8 µm. The graph is organized by sample thickness, on the left axis, and by both wavelength (bottom) and wavenumber (top). Monochromator measurements are indicated by broken lines while FTS measurements with the CaF_2 beamsplitter are indicated by solid lines. The two thickest sample sizes cover most of the wavelength range, while the thinner sample sizes are available only below 300 nm and beyond 1 µm.

changes due to changes in the sample as the wavelength scan was performed. The FTS measurements are superior to the monochromator measurements where both are available because of better continuum stability, better wavelength calibration beyond 2 µm (see Figure 5-7), and improved S/N. Therefore, monochromator measurements at 41.3 mm are used only below 1.8 µm. The overall comparison of the stronger features between the two datasets is nonetheless quite good, as seen in Figure 5-10(b), verifying the accuracy of the measurements from both methods.

The continuum absorption throughout this range is extremely small. This is shown by the combined 41.3-mm spectrum shown in Figure 5-10(a). This smoothed spectrum is based on the measurements of samples with the highest transmission over many spectral

Figure 5-10. Monochromator measurements of 41.3 mm of CO_2 ice. (a) Smoothed measurement combined from seven spectral ranges from 0.17–2.4 μm. The zero-absorption level for this data is about 0.81. (b) Comparison of monochromator data (dashed line) and FTS data (solid line). The FTS data is synthesized from the absorption coefficient in this range using $T_{\alpha=0} = 0.815$, and the monochromator data are shifted in wavelength by –0.2 nm. The monochromator did not detect the weak features at 2.14 and 2.19 μm, and its continuum baseline does not match the FTS data very accurately.


Wavenumber (cm-1)
50000
10000
5000
(a)
0.8
0.6
0.4
0.2
0.0
CO2 Ice / Blank
0.5
1.0
1.5
2.0
Wavelength (μm)
Wavenumber (cm-1)
4750
4700
4650
4600
4550
(b)
0.8
0.6
0.4
CO2 Ice / Blank
2.10
2.12
2.14
2.16
2.18
2.20
Wavelength (μm)

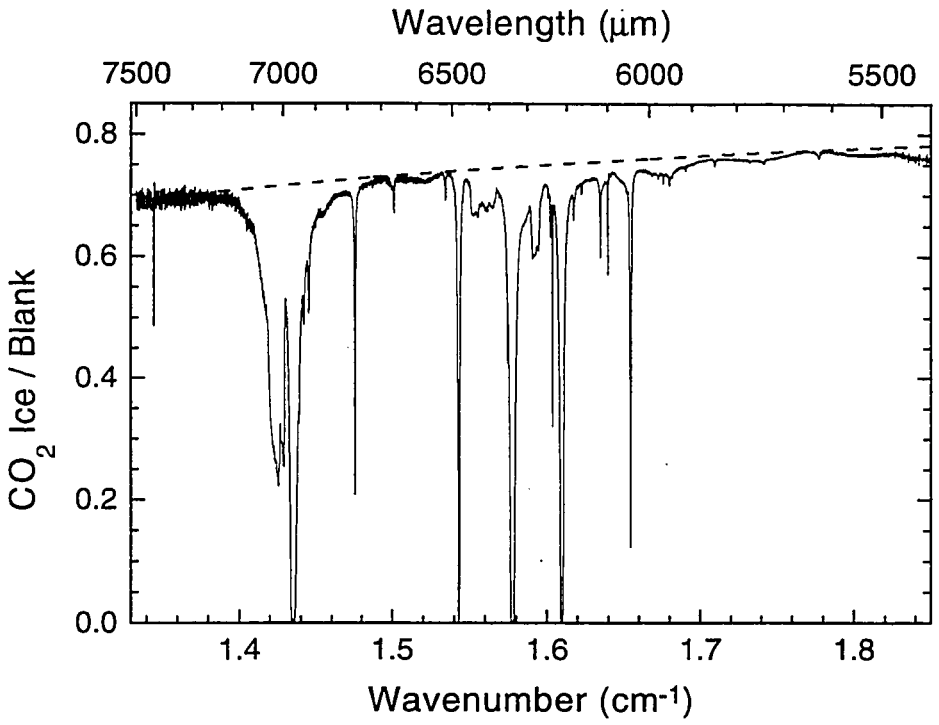


Figure 5-11. Measurement of a 107.5-mm CO_2 ice sample between 1.4 and 1.8 μm using the FTS, showing weak absorption features throughout this region. The heavy dashed line is a provisional $T_{\alpha=0}$ level for this measurement, which is close to the measurement below 1.38 μm, and at 1.54 and 1.78 μm. It should be possible to determine a minimum absorption coefficient at all other wavelengths from this data.

orders. The $T_{\alpha=0}$ level for this spectrum is about 0.81 (verified by the number needed to match the FTS and monochromator spectra between 1.8 and 2.4 μm), and the spectrum is flat and featureless from 0.5 to 1 μm, and, except for a few weak and narrow absorption lines, continues in this way to at least ~1.4 μm. The presumption here is that no lower limit to absorption will be determinable in these featureless regions.

In the longer wavelength region 1.4–1.8 μm, the 107.5-mm sample shows weak, but measurable absorption across the whole range. The provisional $T_{\alpha=0}$ level shown in Figure 5-11 indicates that the absorption has lower limits everywhere except at perhaps two or three points between 1.38 and 1.8 μm. The weakly absorbing region between 1.65 and 1.85 μm also shows numerous weak lines, most of which are visible only at this thickness.

Chapter 6

Future Work

6.1 Ultraviolet and Near-Infrared Absorption Coefficients

The first task which must be completed is to finish the analysis of the 0.17–1.8 μm data described in Chapter 5 and to estimate absorption coefficients in this region. Only the 41.3-mm monochromator data has been analyzed in any depth, and proper analysis of the other monochromator data requires consideration of wavelength calibration, instrument resolution, and the combination of data taken using all of the measurement methods. The determination of absorption coefficients will be complicated by the fact that most of the region has absorption less than or equal to the most transparent regions at longer wavelengths. Only two thicknesses will be available for part of the region. Also, most of the absorption in this wavelength region is in the form of narrow lines, which have proven difficult to resolve properly at longer wavelengths. Hopefully, these difficulties will not prove insurmountable.

6.2 Optical Constants

The most important form of optical data for use in models are the optical constants, which include both the real and imaginary indices of refraction. New optical constants can be constructed using these data, if some appropriate thin-film absorption coefficients for all wavelength regions where $\alpha>4000$ m^{-1} are adopted, and the combined absorption spectra is used in a dispersion, or Kramers-Kronig, analysis (e.g., Jackson, 1975, pp. 306–312), which provides the real index of refraction for all wavelengths given a value at one wavelength and the values of the imaginary index at all wavelengths. The real index has little dependence on the value of k where it is $<<1$, so only the adopted thin film absorption coefficients have much effect on the calculated real index.

The problem here is that much of the available thin-film data is contradictory (Warren, 1986; also Hudgins *et al.*, 1993), and one must invoke some other rationale to pick the data of one worker over that of another. In addition, very few of the thin-film measurements extend reliably down to a level where they comfortably overlap with the data pre-

sented in Chapter 4. An additional significant problem with many of these earlier experiments is that the spectral resolution used was unable to resolve the extremely fine structure present in CO_2 ice (e.g., see the 2.7-μm band in Warren, 1986).

6.3 Optical Properties of CO_2 Snow and Clouds on Mars

Using the new absorption coefficients, improved models of the spectral reflection, albedo, and emissivity of various kinds of CO_2 snow or ice deposits can be constructed. The new data are particularly useful for occurrences where large abundances of CO_2 ice are present, leading to large optical paths through the ice, and this is currently present only in the polar regions of Mars. An approach similar to that of Warren *et al.* (1990) is warranted, except that the current paradigm argues against large deposits of very fine-grained snow (Calvin and Martin, 1994; Hansen, 1994; Forget, Hansen, and Pollack, 1995, see Appendix D; Paige *et al.*, 1995), which was a significant consideration of the earlier study. Instead, models including mm to cm size spheres, as well as cracked and/or cloudy solid ice need to be formulated. These models can be of considerable use in the planning and analysis of observations of the Martian polar regions by numerous instruments on imminent spacecraft missions to Mars, including Mars 96 and Mars Global Surveyor. The new absorption coefficients I have measured are currently in demand for these purposes.

Recent interest in the formation of possibly thick clouds of condensed CO_2 in the early history of both Mars (Kasting, 1991) and Earth (Caldiera and Kasting, 1993) can also benefit from the new absorption coefficients, although they are for ice at 150 K, while these models have condensed CO_2 occurring both as solid and liquid, and over a very wide range of temperatures. Infrared scattering was not included in these models, although it should be important in many regions of the infrared based on the new results. I have provided preliminary absorption coefficients for use in a simple CO_2 cloud model which has shown that the infrared scattering properties of the ice can possibly create a greenhouse effect under some conditions (Stansberry *et al.*, 1995).

6.4 Remote Sensing of Mars

In addition to general-use models of the Martian polar regions and of early terrestrial planet climates, there are a few spectral measurements of the polar regions of Mars from previous spacecraft whose interpretation can benefit from the new absorption numbers. Among these are the Viking Orbiter InfraRed Thermal Mapper measurements which were obtained over large spatial and temporal ranges, but included only a few broad channels from 7 to 20 μm. The InfraRed Interferometer Spectrometer on Mariner 9 had very few of its 21,000 measurements aimed at the polar regions, and the field of view typically covered many tens of kilometers, but it does offer medium resolution (2.7 cm^{-1}) spectra from 5 to 50 μm (20–2000 cm^{-1}). Finally, the InfraRed Spectrometer on Mariner 7 measured a large region of the sunlit seasonal south polar cap over a range of 1.9–14.4 μm in one pass during a flyby. In spite of problems with radiometric and wavelength calibration of the data, these represent a rich dataset which has not been fully analyzed, although qualitative (Calvin and Martin, 1994) and preliminary quantitative (Hansen and Martin, 1993, see Appendix C) studies over part of the available wavelength range have been accomplished recently.

There are at least two Mars orbiters to be launched in the next two opportunities (1996 and 1998) which can measure the polar regions with spectrometers. The analysis of the measurements from these instruments can benefit greatly from the new optical constants for CO_2 ice. Although the instrument compliment is not firm, the projected payload of the Russian Mars 96 mission includes a visible to near-infrared imaging spectrometer with high spatial resolution (OMEGA, 0.35–5.2 μm, 0.4–4 km surface spatial resolution) and a Fourier transform spectrometer with high spectral resolution (Planetary Fourier Spectrometer, 1.3–45 μm, 2 cm^{-1} spectral resolution). The US Mars Surveyor mission includes the Thermal Emission Spectrometer, a Fourier spectrometer with 6 spatial elements and 5 cm^{-1} spectral resolution. Other spectral measurements are sure to follow (e.g., the Pressure Modulated InfraRed Radiometer).

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Appendix A

Analysis of the Effect of FTS Field-of-view on the Resolving Power of the Measurements

A.1 Background

The conventional descriptions of the operation of an FTS (i.e., the measured interferogram is the Fourier transform of the spectrum) are true only for point sources which provide perfectly parallel rays in the interferometer. Real instruments, however, view extended sources, which provide rays with an angle, θ, to the axis of the interferometer (off-axis rays). These rays, as shown in Bell (1972, Chapter 11), all travel *shorter* paths in the interferometer, and since they are sampled using the axial He-Ne laser, the interferogram produced is stretched out relative to the axial interferogram. This causes the Fourier transform spectrum to be shifted and smeared out in wavenumber, especially at large wavenumbers. Here I formulate a procedure which operates on a model spectrum and produces a spectrum similar to an instrumental spectrum. By performing the inverse of this operation, an instrumental spectrum could be converted to a spectrum representing axial rays only, with the full instrumental resolution available at all wavenumbers. The treatment here ignores apodization, which is treated in some detail by Walden (1995) and references therein.

Based on the treatment found in Bell (1972), an expression which describes the interferogram $F(x)$ (within a constant) of an arbitrary, azimuthally symmetric distribution $W(\mu)$ of off-axis rays with angle cosines μ ($\mu=\cos\theta$), is

$$F(x) = \int_0^{\infty} B(\nu) \int_1^{\mu_{min}} W(\mu)\, \cos(2\pi\nu x\mu)\, d\mu\, d\nu\,, \qquad \text{(A-1)}$$

where $W(\mu)$ is normalized such that its integral over μ equals 1, and $B(\nu)$ is the axial spectrum. If the order of integration is changed, and a change of variable, $\nu' = \nu\mu$, is used, we get

$$F(x) = \int_1^{\mu_{min}} W(\mu) \int_0^{\infty} B(\nu'/\mu)\, \cos(2\pi\nu' x)\, d(\nu'/\mu)\, d\mu\,. \qquad \text{(A-2)}$$

We can now perform the Fourier transform of this instrumental interferogram with respect to the new variable ν' to get the measured spectrum $B_m(\nu')$, assuming infinite path difference and no apodization,

$$B_m(\nu') = \int_1^{\mu_{min}} \frac{W(\mu)}{\mu} B(\nu'/\mu)\, d\mu$$

$$= \int_0^{u_{max}} K(u)\, B(\nu'/(1-u))\, du, \qquad \text{(A-3)}$$

where $u = 1 - \mu$ and the integrating kernel, $K(u)$, is equal to $W(1-u)/(1-u)$. It can thus be seen that the measured spectrum at each wavenumber ν' is equal to a weighted average of the axial spectrum in a small interval of wavenumbers $\nu' \le \nu \le \nu'/(1-u_{max})$. Since this interval is all on one side of the measured wavenumber, one may derive the axial spectrum through a sequential process working from large wavenumbers to zero if the weighting kernel is known or previously determined. The following section describes how $K(u)$ was determined by looking at water vapor absorption lines of in the single-beam spectra from the KBr-beamsplitter experiment (see section 4.4).

A.2 Determining the Weighting Kernel

The first step in this process is the calculation of an axial spectrum model for comparison to the measurements. This was done using a line-by-line model, LBLRTM (Clough *et al.*, 1991; Clough, 1994), which was configured to calculate the transmission of a 1.5-m path with variable humidity, and which produced output comparable to the axial beam of an FTS with selected maximum path difference and apodization functions. The most useful band for this task was the (ν_1, ν_3) band near 3700 cm^{-1}, because it had significant spectral smearing and adequate S/N. The fundamental ν_2 band near 1500 cm^{-1} was used for determining water vapor quantity because of its breadth, visibility in all conditions, and even better S/N.

The water vapor lines in the measurement had to be extracted from the single-beam blank or CO_2 ice spectra. This was done by carefully removing all trends from instrument features and CO_2 ice by division, so the fractional absorption was preserved. These spectra were then compared to the model by way of integrated absorption over some large interval. The model humidity was varied to match the integrated absorptions to within three decimal places. When the fit to the water lines was good, the water-vapor continuum of the measurement was adjusted to match that of the model, since this was often lost or distorted in the trend removal process.

The axial model was then smeared by using a calculation based on Equation A-3. The weighting kernel could then be determined by a minimization process which minimized the squared residual between the measurement and the smeared model by varying the integrating kernel. For this application, the relationship between the kernel shape and the spectrum was very complex. Therefore, the downhill simplex method (Nelder and Mead, 1965; Grace, 1994) was used for the minimization, since it robust and does not need to calculate gradients of the function being minimized. After considerable experimentation, I estimated of the kernel for two of the sample thicknesses, which are displayed in Figure A-1. The fit achieved by the minimization is illustrated in Figure A-2.

A.3 Attempts to Correct Field-of-View Error in Measured Spectra

With the kernel determined, the estimated axial spectrum derived from a measured spectrum can be made. This is done by discretizing the integral in Equation A-3, usually on a grid determined by the spectral data. This turns it into a matrix equation for the measurement, where the matrix multiplying the axial measurement is upper-triangular (the integral extends only one side of the wavenumber of calculation) and banded (the kernel has a limited size). If the axial spectrum can be assumed or estimated for a small interval towards higher wavenumbers from ν', the axial spectrum at ν' can be determined by back substitution: The points of the kernel for $u > 0$ are multiplied by the previously determined axial spectrum for $\nu > \nu'$, and the sum is subtracted from the measured spectrum

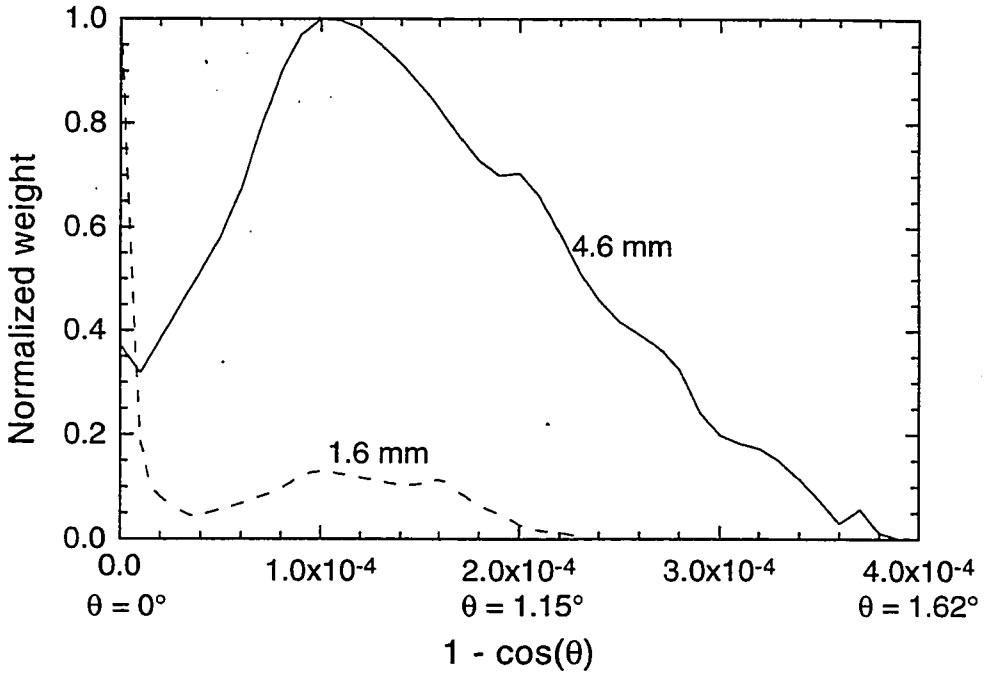


Figure A-1 Estimated weighting kernels for spectrum smearing determined by fitting a smeared model spectrum to measurements. The kernels for two of the sample thicknesses in the KBr experiment, 1.6 mm and 4.6 mm, are shown. The abscissa is also labeled in three places with the corresponding off-axis angle. The 1.6-mm kernel is different primarily because the measurement was through a cracked CO_2 ice sample.

$B_m(\nu')$ and divided by $K(u=0)$. The back substitution is started at large wavenumbers in a region of nearly constant value, where $B_m(\nu') \approx B(\nu > \nu')$.

This seems very straightforward. However, the assumed or calculated $B(\nu > \nu')$ are each multiplied by $K(u>0)/K(u=0)$ in the calculation of $B(\nu')$, and this leads to numerical instability from the multiplication of error, unless $K(u=0)$ is considerably larger than $K(u>0)$. The estimated kernel for the 1.6-mm spectrum (Figure A-1) satisfied this condition well enough that the water vapor spectrum was capable of being inverted to show much of the detail in the model. When applied to a smoothed CO_2 spectrum, however, the process produced damped oscillations in the vicinity of narrow lines, the correction of which was the primary purpose of this exercise. The small $u = 0$ value of the kernel for the 4.6-mm spectrum produced exponentially growing, oscillatory errors

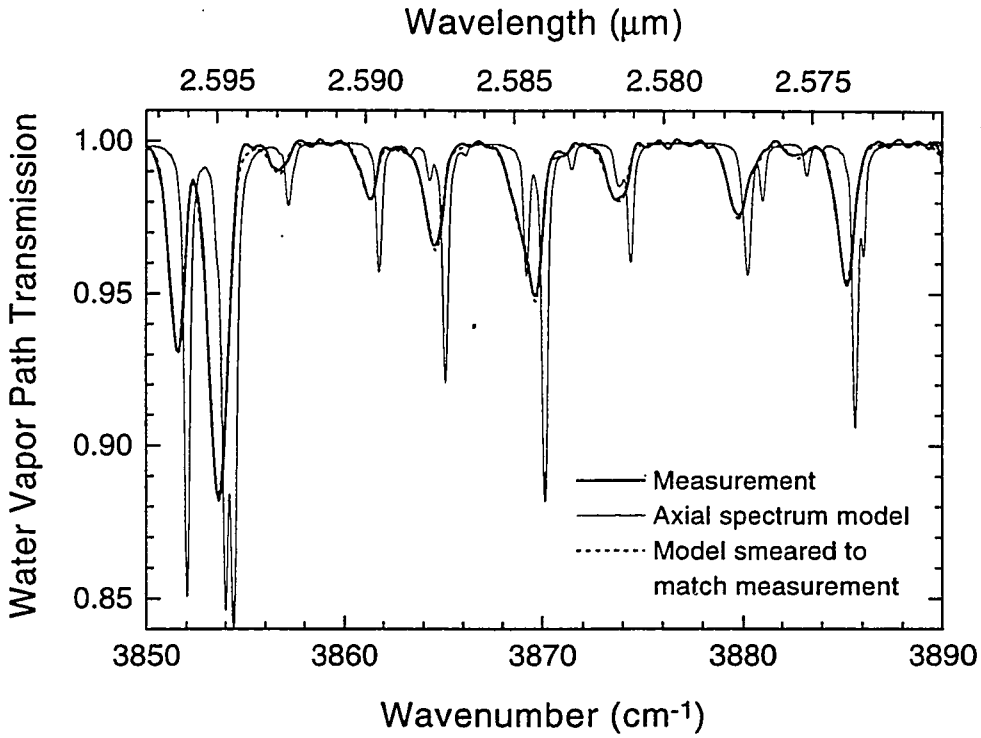


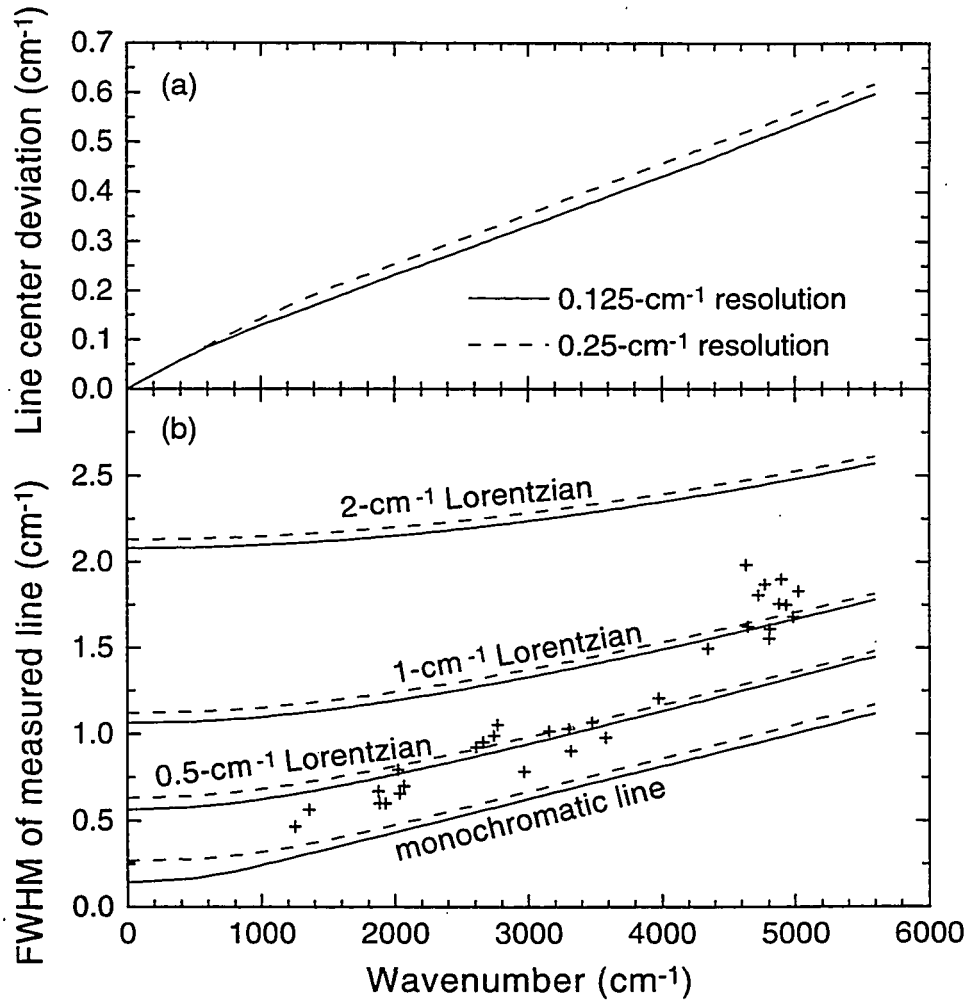
Figure A-2 Results of the minimization to find the integrating kernel for the 4.6-mm spectrum. The absorption lines are from the 3700 cm^{-1} band of water vapor. The axial model is a line-by-line model with carefully adjusted water vapor amount, which is scanned to simulate an ideal FTS at a resolution of 0.26 cm^{-1}. The axial model is smeared by the estimated kernel shown in Figure A-1 to match the measurement.

when the inversion was done with those data. I therefore decided that this was not a promising approach to improving the spectral resolution of the measurements at large wavenumbers.

A.4 Insights From Calculated Smearing of Theoretical Data

To assess the impact of the estimated kernels on the measurement of CO_2 ice absorption features, I performed the forward smearing (Equation A-3) on theoretical isolated Lorentzian-shaped lines, as well as a monochromatic line, which were rendered as if measured by an instrument with the maximum path difference and apodization as used in the

Figure A-3 Theoretical shift of wavenumber and increase of width of monochromatic and Lorentzian lines using field-of-view smearing kernel estimated for 4.6-mm sample. (a) shows the shift of the center frequency of a monochromatic line with frequency for the two finest resolutions in the FTS experiment. This is directly comparable to the trend seen in the FTS wavenumber calibration (Figure 4-7). The shift of Lorentzian lines is indistinguishable from that of monochromatic lines. (b) illustrates the increase of the width of monochromatic lines, and Lorentzian lines of three natural widths, with increasing frequency due to the field-of-view smearing of the 4.6-mm sample. The data for both 0.125 and 0.25 cm^{-1} resolutions are shown, using the same legend as in (a). The degradation is negligible below ~600 cm^{-1}, although the instrument adds a little width to all lines. The measured widths of 33 of the narrowest lines in the 4.6-mm KBr-beamsplitter spectrum are also plotted (+). The fact that their widths are larger than that of a smeared monochromatic line indicates that most of the lines have been resolved, although their measured width is greater than their natural width, especially at large wavenumbers.


Line center deviation (cm-1)
(a)
0.125-cm-1 resolution
0.25-cm-1 resolution
FWHM of measured line (cm-1)
(b)
2-cm-1 Lorentzian
1-cm-1 Lorentzian
0.5-cm-1 Lorentzian
monochromatic line
Wavenumber (cm-1)

KBr experiment for both the 0.125- and 0.25-cm^{-1} resolutions. (The behavior of the monochromatic line might be empirically determined by examining the width of the water vapor lines used for wavenumber calibration.) The results of this are shown in Figure A-3. This figure shows that lines of all widths are affected by this process, and that the difference between the two resolutions is significant only at very small wavenumbers. Also plotted here are the measured widths of some of the finest absorption lines in the 4.6-mm KBr measurement (before any correction by the CaF_2 measurements), indicating that, even though they are distinguishable from monochromatic lines, their measured widths are significantly larger than the widths of the equivalent axial spectrum lines, indicated by the values at 0 cm^{-1}. It should be noted here that this kernel also produced considerable asymmetry in all of the lines, which grew in the same way as the width. It may be possible to individually correct symmetric measured lines by using a plot like this, but it can offer little to correct features which are not shaped like Lorentzian lines. Correction along these lines is outside the scope of this dissertation, but Figure A-3 is offered to suggest the true width of the lines measured in the FTS experiment, especially as compared to the stated resolutions of 0.25 and 0.125 cm^{-1}.

Appendix B

List of Infrared Absorption Coefficients of CO_2 Ice

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
30.00	333.33333	1.0315E+0	1.8003E+2	0	94.00	106.38298	1.9046E+3	2.5948E+3	1.5656E+3
32.00	312.50000	4.1723E+0	9.1496E+1	0	98.00	102.04082	2.3480E+3	∞	1.8065E+3
33.00	303.03030	7.8942E+0	7.5901E+1	0	100.00	100.00000	2.5860E+3	∞	1.8839E+3
34.00	294.11765	1.4735E+1	7.3869E+1	0	101.00	99.00990	2.6965E+3	∞	1.9014E+3
35.00	285.71429	2.5418E+1	7.9070E+1	1.3005E+0	102.00	98.03922	2.7890E+3	∞	1.9236E+3
36.00	277.77778	3.9137E+1	8.9449E+1	9.2808E+0	103.00	97.08738	2.8348E+3	∞	1.9448E+3
37.00	270.27027	5.3471E+1	1.0204E+2	2.4623E+1	104.00	96.15385	2.8480E+3	∞	2.0403E+3
38.00	263.15789	6.6434E+1	1.1539E+2	3.8200E+1	105.00	95.23810	2.8348E+3	∞	2.1482E+3
40.00	250.00000	9.2004E+1	1.4538E+2	6.1789E+1	106.00	94.33962	2.7826E+3	∞	2.0713E+3
44.00	227.27273	1.6713E+2	2.1454E+2	1.3135E+2	107.00	93.45794	2.6872E+3	∞	2.0035E+3
46.00	217.39130	2.2180E+2	2.6771E+2	1.8563E+2	108.00	92.59259	2.5740E+3	∞	1.9533E+3
48.00	208.33333	2.8151E+2	3.2691E+2	2.3715E+2	109.00	91.74312	2.4513E+3	3.9402E+3	1.9172E+3
49.00	204.08163	3.1439E+2	3.6213E+2	2.6249E+2	110.00	90.90909	2.3290E+3	3.1946E+3	1.8824E+3
50.00	200.00000	3.5317E+2	4.1385E+2	2.9448E+2	111.00	90.09009	2.2206E+3	2.8106E+3	1.8379E+3
51.00	196.07843	4.1803E+2	5.1866E+2	3.5459E+2	112.00	89.28571	2.1328E+3	2.5984E+3	1.7995E+3
52.00	192.30769	5.3367E+2	6.7674E+2	4.3383E+2	114.00	87.71930	1.9938E+3	2.3561E+3	1.7362E+3
53.00	188.67925	7.4772E+2	9.3451E+2	6.2652E+2	116.00	86.20690	1.8782E+3	2.1862E+3	1.6798E+3
54.00	185.18519	9.4901E+2	1.1726E+3	7.9099E+2	120.00	83.33333	1.6765E+3	1.8937E+3	1.5203E+3
55.00	181.81818	1.1168E+3	1.3901E+3	9.2770E+2	123.00	81.30081	1.5444E+3	1.7958E+3	1.3733E+3
56.00	178.57143	1.2574E+3	1.5960E+3	1.0410E+3	136.00	73.52941	1.0830E+3	1.5069E+3	8.4413E+2
58.00	172.41379	1.5199E+3	2.1149E+3	1.2301E+3	140.00	71.42857	9.7323E+2	1.1938E+3	8.1326E+2
60.00	166.66667	1.7991E+3	4.8209E+3	1.3872E+3	142.00	70.42254	9.2389E+2	1.1148E+3	7.8248E+2
62.00	161.29032	2.0565E+3	∞	1.5044E+3	144.00	69.44444	8.8129E+2	1.0509E+3	7.4961E+2
63.00	158.73016	2.1670E+3	∞	1.5587E+3	146.00	68.49315	8.4482E+2	1.0089E+3	7.2146E+2
64.00	156.25000	2.2543E+3	∞	1.5776E+3	148.00	67.56757	8.1554E+2	9.7398E+2	6.9669E+2
65.00	153.84615	2.2967E+3	∞	1.6134E+3	150.00	66.66667	7.8882E+2	9.4021E+2	6.7193E+2
66.00	151.51515	2.2967E+3	∞	1.6421E+3	154.00	64.93506	7.3395E+2	8.8017E+2	6.2776E+2
67.00	149.25373	2.2153E+3	∞	1.6173E+3	158.00	63.29114	6.7554E+2	8.0672E+2	5.7228E+2
68.00	147.05882	2.0806E+3	∞	1.5787E+3	162.00	61.72840	6.1591E+2	7.3447E+2	5.3411E+2
69.00	144.92754	1.9179E+3	∞	1.5210E+3	166.00	60.24096	5.6029E+2	6.5352E+2	4.9952E+2
70.00	142.85714	1.7280E+3	5.3637E+3	1.4141E+3	170.00	58.82353	5.1085E+2	5.8082E+2	4.5372E+2
72.00	138.88889	1.3457E+3	1.6238E+3	1.1717E+3	175.00	57.14286	4.5650E+2	5.1798E+2	4.0523E+2
74.00	135.13514	1.0743E+3	1.2331E+3	9.6279E+2	180.00	55.55556	4.0923E+2	4.7257E+2	3.6604E+2
75.00	133.33333	9.9036E+2	1.1271E+3	8.9492E+2	185.00	54.05405	3.6796E+2	4.3056E+2	3.2023E+2
76.00	131.57895	9.4315E+2	1.0594E+3	8.4963E+2	190.00	52.63158	3.3179E+2	3.7895E+2	2.9301E+2
77.00	129.87013	9.2289E+2	1.0398E+3	8.3321E+2	195.00	51.28205	2.9998E+2	3.3298E+2	2.7131E+2
78.00	128.20513	9.2502E+2	1.0387E+3	8.3572E+2	200.00	50.00000	2.7191E+2	2.9109E+2	2.5428E+2
79.00	126.58228	9.3804E+2	1.0462E+3	8.4461E+2	205.00	48.78049	2.4707E+2	2.6166E+2	2.3338E+2
80.00	125.00000	9.5603E+2	1.0656E+3	8.6288E+2	210.00	47.61905	2.2260E+2	2.3313E+2	2.1254E+2
81.00	123.45679	9.8233E+2	1.0963E+3	8.8943E+2	215.00	46.51163	1.9815E+2	2.0602E+2	1.9056E+2
82.00	121.95122	1.0148E+3	1.1358E+3	9.2206E+2	220.00	45.45455	1.7337E+2	1.7959E+2	1.6731E+2
84.00	119.04762	1.1060E+3	1.2371E+3	1.0020E+3	225.00	44.44444	1.4933E+2	1.5424E+2	1.4453E+2
86.00	116.27907	1.2219E+3	1.3816E+3	1.1029E+3	230.00	43.47826	1.2723E+2	1.3131E+2	1.2337E+2
88.00	113.63636	1.3652E+3	1.5849E+3	1.2208E+3	235.00	42.55319	1.0907E+2	1.1210E+2	1.0616E+2
90.00	111.11111	1.5307E+3	1.8351E+3	1.3463E+3	240.00	41.66667	9.4414E+1	9.6769E+1	9.2134E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
245.00	40.81633	8.3263E+1	8.5168E+1	8.1407E+1	495.00	20.20202	2.7140E+1	2.8102E+1	2.6178E+1
250.00	40.00000	7.4003E+1	7.5571E+1	7.2467E+1	500.00	20.00000	3.2444E+1	3.3457E+1	3.1432E+1
255.00	39.21569	6.6420E+1	6.7810E+1	6.5056E+1	502.00	19.92032	3.4847E+1	3.5850E+1	3.3845E+1
260.00	38.46154	5.9731E+1	6.0976E+1	5.8508E+1	504.00	19.84127	3.7438E+1	3.8467E+1	3.6410E+1
265.00	37.73585	5.3760E+1	5.4889E+1	5.2648E+1	506.00	19.76285	4.0248E+1	4.1291E+1	3.9206E+1
270.00	37.03704	4.8325E+1	4.9356E+1	4.7308E+1	508.00	19.68504	4.3323E+1	4.4377E+1	4.2270E+1
275.00	36.36364	4.3387E+1	4.4359E+1	4.2414E+1	510.00	19.60784	4.6730E+1	4.7794E+1	4.5666E+1
280.00	35.71429	3.8889E+1	3.9842E+1	3.7936E+1	512.00	19.53125	5.0565E+1	5.1623E+1	4.9507E+1
285.00	35.08772	3.4789E+1	3.5777E+1	3.3801E+1	514.00	19.45525	5.4963E+1	5.6005E+1	5.3921E+1
290.00	34.48276	3.1055E+1	3.2018E+1	3.0092E+1	515.00	19.41748	5.7431E+1	5.8465E+1	5.6398E+1
295.00	33.89831	2.7660E+1	2.8611E+1	2.6709E+1	516.00	19.37984	6.0119E+1	6.1140E+1	5.9097E+1
300.00	33.33333	2.4582E+1	2.5573E+1	2.3591E+1	517.00	19.34236	6.3061E+1	6.4071E+1	6.2052E+1
305.00	32.78689	2.1802E+1	2.2774E+1	2.0830E+1	518.00	19.30502	6.6304E+1	6.7302E+1	6.5306E+1
310.00	32.25806	1.9299E+1	2.0247E+1	1.8352E+1	519.00	19.26782	6.9900E+1	7.0885E+1	6.8915E+1
315.00	31.74603	1.7057E+1	1.8002E+1	1.6111E+1	520.00	19.23077	7.3913E+1	7.4885E+1	7.2941E+1
320.00	31.25000	1.5056E+1	1.6004E+1	1.4108E+1	521.00	19.19386	7.8420E+1	7.9377E+1	7.7462E+1
325.00	30.76923	1.3279E+1	1.4228E+1	1.2330E+1	522.00	19.15709	8.3515E+1	8.4457E+1	8.2572E+1
330.00	30.30303	1.1707E+1	1.2652E+1	1.0761E+1	523.00	19.12046	8.9313E+1	9.0260E+1	8.8367E+1
335.00	29.85075	1.0322E+1	1.1268E+1	9.3757E+0	524.00	19.08397	9.6001E+1	9.6912E+1	9.5090E+1
340.00	29.41176	9.1070E+0	1.0059E+1	8.1553E+0	525.00	19.04762	1.0362E+2	1.0449E+2	1.0275E+2
345.00	28.98551	8.0445E+0	8.9889E+0	7.1002E+0	526.00	19.01141	1.1248E+2	1.1344E+2	1.1154E+2
350.00	28.57143	7.1186E+0	8.0567E+0	6.1805E+0	527.00	18.97533	1.2289E+2	1.2393E+2	1.2185E+2
355.00	28.16901	6.3140E+0	7.2544E+0	5.3736E+0	528.00	18.93939	1.3519E+2	1.3628E+2	1.3410E+2
360.00	27.77778	5.6167E+0	6.5562E+0	4.6772E+0	529.00	18.90359	1.4977E+2	1.5092E+2	1.4861E+2
365.00	27.39726	5.0121E+0	5.9471E+0	4.0771E+0	530.00	18.86792	1.6699E+2	1.6823E+2	1.6575E+2
370.00	27.02703	4.4942E+0	5.4262E+0	3.5622E+0	531.00	18.83239	1.8720E+2	1.8856E+2	1.8585E+2
375.00	26.66667	4.0474E+0	4.9765E+0	3.1184E+0	532.00	18.79699	2.1064E+2	2.1215E+2	2.0913E+2
380.00	26.31579	3.6612E+0	4.5873E+0	2.7351E+0	533.00	18.76173	2.3738E+2	2.3908E+2	2.3569E+2
385.00	25.97403	3.3283E+0	4.2510E+0	2.4055E+0	534.00	18.72659	2.6727E+2	2.6919E+2	2.6537E+2
390.00	25.64103	3.0449E+0	3.9628E+0	2.1270E+0	535.00	18.69159	2.9987E+2	3.0207E+2	2.9770E+2
395.00	25.31646	2.8114E+0	3.7257E+0	1.8972E+0	536.00	18.65672	3.3446E+2	3.3702E+2	3.3193E+2
400.00	25.00000	2.6306E+0	3.5403E+0	1.7208E+0	537.00	18.62197	3.7010E+2	3.7310E+2	3.6715E+2
405.00	24.69136	2.5138E+0	3.4230E+0	1.6046E+0	538.00	18.58736	4.0590E+2	4.0946E+2	4.0240E+2
410.00	24.39024	2.4673E+0	3.3728E+0	1.5619E+0	539.00	18.55288	4.4133E+2	4.4553E+2	4.3720E+2
415.00	24.09639	2.5005E+0	3.4012E+0	1.5997E+0	540.00	18.51852	4.7540E+2	4.8038E+2	4.7053E+2
420.00	23.80952	2.6250E+0	3.5215E+0	1.7285E+0	542.00	18.45018	5.4334E+2	5.5018E+2	5.3670E+2
425.00	23.52941	2.8561E+0	3.7506E+0	1.9617E+0	544.00	18.38235	6.1577E+2	6.2526E+2	6.0657E+2
430.00	23.25581	3.2129E+0	4.1026E+0	2.3232E+0	546.00	18.31502	6.9872E+2	7.0953E+2	6.8809E+2
435.00	22.98851	3.7169E+0	4.6064E+0	2.8275E+0	548.00	18.24818	7.9111E+2	8.0360E+2	7.7886E+2
440.00	22.72727	4.3887E+0	5.2777E+0	3.4997E+0	550.00	18.18182	8.9789E+2	9.1272E+2	8.8340E+2
445.00	22.47191	5.2422E+0	6.1217E+0	4.3627E+0	552.00	18.11594	1.0287E+3	1.0471E+3	1.0109E+3
450.00	22.22222	6.2782E+0	7.1503E+0	5.4062E+0	554.00	18.05054	1.1884E+3	1.2122E+3	1.1655E+3
455.00	21.97802	7.4827E+0	8.3573E+0	6.6080E+0	555.03	18.01693	1.2733E+3	1.3006E+3	1.2471E+3
460.00	21.73913	8.8326E+0	9.6962E+0	7.9690E+0	556.03	17.98453	1.3562E+3	1.3876E+3	1.3264E+3
465.00	21.50538	1.0315E+1	1.1168E+1	9.4626E+0	557.03	17.95224	1.4431E+3	1.4790E+3	1.4091E+3
470.00	21.27660	1.1956E+1	1.2804E+1	1.1107E+1	558.03	17.92007	1.5345E+3	1.5762E+3	1.4954E+3
475.00	21.05263	1.3903E+1	1.4780E+1	1.3025E+1	559.03	17.88801	1.6256E+3	1.6732E+3	1.5813E+3
480.00	20.83333	1.6262E+1	1.7117E+1	1.5408E+1	560.03	17.85607	1.7155E+3	1.7700E+3	1.6654E+3
485.00	20.61856	1.9135E+1	1.9991E+1	1.8279E+1	561.03	17.82424	1.7923E+3	1.8560E+3	1.7345E+3
490.00	20.40816	2.2726E+1	2.3572E+1	2.1879E+1	562.03	17.79252	1.8525E+3	1.9228E+3	1.7892E+3

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
563.03	17.76092	1.8863E+3	1.9606E+3	1.8198E+3	606.04	16.50066	2.3082E+3	2.4549E+3	2.1894E+3
564.03	17.72943	1.9012E+3	1.9773E+3	1.8333E+3	607.04	16.47347	2.2757E+3	2.4141E+3	2.1625E+3
565.03	17.69805	1.8956E+3	1.9709E+3	1.8285E+3	607.54	16.45991	2.2621E+3	2.3972E+3	2.1511E+3
566.03	17.66678	1.8780E+3	1.9508E+3	1.8127E+3	608.04	16.44638	2.2528E+3	2.3856E+3	2.1434E+3
567.03	17.63562	1.8530E+3	1.9227E+3	1.7903E+3	608.54	16.43286	2.2518E+3	2.3843E+3	2.1425E+3
568.03	17.60457	1.8199E+3	1.8854E+3	1.7606E+3	609.04	16.41937	2.2548E+3	2.3881E+3	2.1451E+3
569.03	17.57363	1.7753E+3	1.8364E+3	1.7197E+3	610.04	16.39245	2.2694E+3	2.4051E+3	2.1580E+3
570.03	17.54280	1.7233E+3	1.7790E+3	1.6722E+3	610.54	16.37903	2.2829E+3	2.4236E+3	2.1682E+3
571.03	17.51208	1.6598E+3	1.7095E+3	1.6138E+3	611.04	16.36563	2.3069E+3	2.4543E+3	2.1878E+3
572.03	17.48146	1.5932E+3	1.6379E+3	1.5514E+3	611.54	16.35224	2.3422E+3	2.4995E+3	2.2166E+3
573.03	17.45096	1.5321E+3	1.5728E+3	1.4938E+3	612.54	16.32555	2.4446E+3	2.6326E+3	2.3002E+3
574.03	17.42055	1.4746E+3	1.5112E+3	1.4401E+3	613.04	16.31223	2.5346E+3	2.7577E+3	2.3706E+3
575.03	17.39026	1.4257E+3	1.4594E+3	1.3938E+3	614.04	16.28566	2.8204E+3	3.2105E+3	2.5821E+3
576.03	17.36006	1.3932E+3	1.4251E+3	1.3629E+3	615.04	16.25918	3.2931E+3	5.2931E+3	2.8374E+3
577.03	17.32998	1.3786E+3	1.4096E+3	1.3490E+3	615.54	16.24597	3.6093E+3	5.6093E+3	2.9840E+3
578.03	17.30000	1.3769E+3	1.4079E+3	1.3475E+3	616.04	16.23279	4.0389E+3	6.0389E+3	3.1231E+3
579.03	17.27012	1.3884E+3	1.4199E+3	1.3584E+3	616.54	16.21962	4.6594E+3	∞	3.2213E+3
580.03	17.24034	1.4177E+3	1.4507E+3	1.3863E+3	622.04	16.07620	4.6468E+3	∞	3.2204E+3
581.04	17.21067	1.4726E+3	1.5097E+3	1.4375E+3	622.54	16.06329	2.5117E+3	2.7248E+3	2.3531E+3
582.04	17.18110	1.5795E+3	1.6231E+3	1.5388E+3	623.04	16.05040	2.0712E+3	2.1675E+3	1.9878E+3
583.04	17.15163	1.7291E+3	1.7838E+3	1.6787E+3	623.29	16.04396	1.9666E+3	2.0470E+3	1.8953E+3
584.04	17.12226	1.9172E+3	1.9928E+3	1.8498E+3	623.54	16.03753	1.9031E+3	1.9753E+3	1.8384E+3
585.04	17.09299	2.1228E+3	2.2285E+3	2.0323E+3	623.79	16.03110	1.8623E+3	1.9297E+3	1.8015E+3
586.04	17.06382	2.3304E+3	2.4830E+3	2.2079E+3	624.04	16.02468	1.8344E+3	1.8987E+3	1.7761E+3
586.54	17.04927	2.4051E+3	2.5851E+3	2.2654E+3	624.54	16.01185	1.7978E+3	1.8587E+3	1.7424E+3
587.04	17.03475	2.4453E+3	2.6373E+3	2.2987E+3	625.04	15.99904	1.7763E+3	1.8345E+3	1.7232E+3
587.54	17.02025	2.4603E+3	2.6577E+3	2.3106E+3	625.54	15.98625	1.7634E+3	1.8205E+3	1.7111E+3
588.04	17.00578	2.4648E+3	2.6637E+3	2.3142E+3	626.04	15.97348	1.7570E+3	1.8137E+3	1.7050E+3
588.54	16.99133	2.4614E+3	2.6578E+3	2.3122E+3	626.54	15.96073	1.7558E+3	1.8124E+3	1.7039E+3
589.04	16.97691	2.4470E+3	2.6392E+3	2.3003E+3	627.04	15.94800	1.7598E+3	1.8166E+3	1.7077E+3
590.04	16.94813	2.3946E+3	2.5687E+3	2.2586E+3	627.54	15.93529	1.7714E+3	1.8294E+3	1.7184E+3
591.04	16.91945	2.3388E+3	2.4966E+3	2.2130E+3	628.04	15.92261	1.7867E+3	1.8462E+3	1.7324E+3
591.54	16.90515	2.3143E+3	2.4644E+3	2.1934E+3	629.04	15.89729	1.8279E+3	1.8922E+3	1.7695E+3
592.04	16.89087	2.2980E+3	2.4443E+3	2.1795E+3	630.04	15.87206	1.8741E+3	1.9437E+3	1.8114E+3
592.54	16.87662	2.2914E+3	2.4352E+3	2.1745E+3	631.04	15.84691	1.9255E+3	2.0009E+3	1.8582E+3
593.04	16.86239	2.2946E+3	2.4392E+3	2.1772E+3	631.54	15.83436	1.9546E+3	2.0338E+3	1.8842E+3
593.54	16.84818	2.3037E+3	2.4513E+3	2.1844E+3	632.04	15.82183	1.9898E+3	2.0741E+3	1.9156E+3
594.04	16.83400	2.3227E+3	2.4747E+3	2.2006E+3	632.54	15.80932	2.0375E+3	2.1289E+3	1.9577E+3
595.04	16.80571	2.3855E+3	2.5558E+3	2.2518E+3	633.04	15.79684	2.0980E+3	2.2001E+3	2.0103E+3
596.04	16.77751	2.4723E+3	2.6722E+3	2.3211E+3	633.54	15.78437	2.1692E+3	2.2844E+3	2.0720E+3
596.54	16.76345	2.5059E+3	2.7189E+3	2.3474E+3	633.84	15.77690	2.2176E+3	2.3431E+3	2.1132E+3
597.04	16.74941	2.5169E+3	2.7343E+3	2.3560E+3	633.94	15.77441	2.2391E+3	2.3694E+3	2.1313E+3
598.04	16.72140	2.5240E+3	2.7428E+3	2.3622E+3	634.04	15.77192	2.2799E+3	2.4201E+3	2.1654E+3
599.04	16.69348	2.5253E+3	2.7457E+3	2.3627E+3	634.14	15.76943	2.3494E+3	2.5084E+3	2.2228E+3
600.04	16.66566	2.5234E+3	2.7427E+3	2.3613E+3	634.24	15.76695	2.5176E+3	2.7352E+3	2.3565E+3
601.04	16.63793	2.5147E+3	2.7306E+3	2.3546E+3	634.34	15.76446	3.0847E+3	3.8998E+3	2.7426E+3
601.54	16.62410	2.5022E+3	2.7127E+3	2.3450E+3	634.39	15.76322	4.6161E+3	∞	3.2126E+3
602.04	16.61029	2.4835E+3	2.6867E+3	2.3305E+3	634.64	15.75701	4.6154E+3	∞	3.2124E+3
602.54	16.59651	2.4597E+3	2.6539E+3	2.3118E+3	634.74	15.75453	2.9886E+3	3.6015E+3	2.6852E+3
605.04	16.52793	2.3469E+3	2.5043E+3	2.2212E+3	634.84	15.75204	2.6293E+3	2.9002E+3	2.4409E+3

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
634.94	15.74956	2.5021E+3	2.7135E+3	2.3444E+3	711.04	14.06385	3.4557E+3	4.3006E+3	3.1091E+3
635.04	15.74708	2.4438E+3	2.6333E+3	2.2986E+3	711.54	14.05397	3.6504E+3	5.1504E+3	3.2129E+3
635.14	15.74460	2.4222E+3	2.6032E+3	2.2820E+3	712.04	14.04410	3.8648E+3	5.3648E+3	3.3123E+3
635.24	15.74212	2.4344E+3	2.6215E+3	2.2905E+3	712.54	14.03424	4.1035E+3	5.6035E+3	3.3435E+3
635.54	15.73469	2.5142E+3	2.7307E+3	2.3537E+3	713.04	14.02440	4.3774E+3	5.8774E+3	3.5021E+3
636.04	15.72232	2.7066E+3	3.0163E+3	2.5005E+3	713.54	14.01457	4.6462E+3	6.1462E+3	3.3160E+3
636.54	15.70997	2.9907E+3	3.5977E+3	2.6886E+3	714.04	14.00476	4.9171E+3	∞	3.6004E+3
636.79	15.70380	3.2031E+3	4.8278E+3	2.7936E+3	729.54	13.70719	4.9043E+3	∞	3.5796E+3
637.04	15.69764	3.4722E+3	5.4722E+3	2.8980E+3	730.04	13.69780	4.5001E+3	6.0001E+3	3.5149E+3
637.29	15.69148	3.7807E+3	5.7807E+3	3.0367E+3	730.54	13.68843	4.1688E+3	5.6688E+3	3.4305E+3
637.54	15.68533	4.1534E+3	6.1534E+3	3.1424E+3	731.04	13.67907	3.9033E+3	5.4033E+3	3.3365E+3
637.79	15.67918	4.6071E+3	∞	3.2097E+3	732.04	13.66038	3.5021E+3	4.3397E+3	3.1566E+3
682.29	14.65650	4.9211E+3	∞	3.5775E+3	733.04	13.64174	3.2318E+3	3.6629E+3	2.9791E+3
682.54	14.65113	4.3683E+3	5.8683E+3	3.4817E+3	734.04	13.62316	3.0422E+3	3.3333E+3	2.8444E+3
683.04	14.64041	3.8352E+3	5.3352E+3	3.2744E+3	735.04	13.60462	2.8964E+3	3.1147E+3	2.7349E+3
683.54	14.62970	3.4750E+3	4.3404E+3	3.1254E+3	735.54	13.59537	2.8367E+3	3.0316E+3	2.6883E+3
684.04	14.61900	3.2282E+3	3.6676E+3	2.9727E+3	736.04	13.58614	2.8025E+3	2.9853E+3	2.6612E+3
685.04	14.59766	2.8580E+3	3.0646E+3	2.7030E+3	736.54	13.57691	2.7860E+3	2.9633E+3	2.6480E+3
686.04	14.57638	2.6000E+3	2.7304E+3	2.4922E+3	737.04	13.56770	2.7818E+3	2.9577E+3	2.6447E+3
687.04	14.55516	2.4250E+3	2.5189E+3	2.3434E+3	737.54	13.55851	2.7979E+3	2.9791E+3	2.6575E+3
688.04	14.53401	2.2811E+3	2.3545E+3	2.2154E+3	738.04	13.54932	2.8239E+3	3.0153E+3	2.6776E+3
690.04	14.49188	2.0560E+3	2.1070E+3	2.0088E+3	739.04	13.53098	2.9197E+3	3.1435E+3	2.7552E+3
691.04	14.47091	1.9672E+3	2.0112E+3	1.9261E+3	740.04	13.51270	3.0537E+3	3.3330E+3	2.8614E+3
692.04	14.45000	1.8859E+3	1.9244E+3	1.8497E+3	741.04	13.49446	3.2524E+3	3.6670E+3	3.0053E+3
693.04	14.42914	1.8109E+3	1.8449E+3	1.7788E+3	742.04	13.47628	3.5524E+3	4.4942E+3	3.1926E+3
694.04	14.40835	1.7385E+3	1.7686E+3	1.7098E+3	742.54	13.46720	3.7697E+3	5.2697E+3	3.2794E+3
695.04	14.38762	1.6766E+3	1.7033E+3	1.6510E+3	743.04	13.45814	4.0630E+3	5.5630E+3	3.3966E+3
695.54	14.37728	1.6498E+3	1.6755E+3	1.6251E+3	743.54	13.44909	4.4360E+3	5.9360E+3	3.5016E+3
696.04	14.36695	1.6353E+3	1.6603E+3	1.6113E+3	744.04	13.44005	4.7368E+3	6.2368E+3	3.4917E+3
696.54	14.35664	1.6310E+3	1.6559E+3	1.6070E+3	744.54	13.43102	4.8991E+3	∞	3.5797E+3
697.04	14.34634	1.6372E+3	1.6623E+3	1.6131E+3	771.55	12.96098	4.8901E+3	∞	3.5802E+3
697.54	14.33605	1.6538E+3	1.6796E+3	1.6290E+3	772.05	12.95259	4.3299E+3	5.8299E+3	3.5495E+3
698.04	14.32578	1.6802E+3	1.7071E+3	1.6543E+3	772.55	12.94420	4.0040E+3	5.5040E+3	3.4330E+3
699.04	14.30529	1.7423E+3	1.7723E+3	1.7137E+3	773.05	12.93583	3.7990E+3	5.2990E+3	3.2937E+3
700.04	14.28485	1.8074E+3	1.8411E+3	1.7754E+3	774.05	12.91912	3.4799E+3	4.3381E+3	3.1313E+3
701.04	14.26448	1.8762E+3	1.9136E+3	1.8408E+3	775.05	12.90245	3.2265E+3	3.7026E+3	2.9594E+3
702.04	14.24416	1.9487E+3	1.9909E+3	1.9092E+3	775.55	12.89413	3.1096E+3	3.5022E+3	2.8704E+3
703.04	14.22389	2.0252E+3	2.0731E+3	1.9807E+3	776.05	12.88582	2.9968E+3	3.2886E+3	2.7986E+3
704.04	14.20369	2.1071E+3	2.1617E+3	2.0569E+3	776.55	12.87752	2.8832E+3	3.1047E+3	2.7200E+3
705.04	14.18354	2.1911E+3	2.2539E+3	2.1341E+3	777.05	12.86924	2.7779E+3	2.9499E+3	2.6432E+3
705.54	14.17349	2.2375E+3	2.3054E+3	2.1762E+3	778.05	12.85270	2.5628E+3	2.6818E+3	2.4629E+3
706.04	14.16345	2.3143E+3	2.3917E+3	2.2455E+3	778.55	12.84444	2.4557E+3	2.5544E+3	2.3704E+3
706.54	14.15343	2.4861E+3	2.5900E+3	2.3970E+3	779.05	12.83620	2.3488E+3	2.4303E+3	2.2768E+3
706.79	14.14842	2.5507E+3	2.6671E+3	2.4527E+3	779.55	12.82796	2.2425E+3	2.3107E+3	2.1809E+3
707.04	14.14342	2.5861E+3	2.7093E+3	2.4832E+3	780.05	12.81974	2.1369E+3	2.1935E+3	2.0850E+3
707.54	14.13342	2.6348E+3	2.7705E+3	2.5233E+3	780.55	12.81153	2.0325E+3	2.0803E+3	1.9881E+3
708.04	14.12344	2.6978E+3	2.8490E+3	2.5761E+3	781.05	12.80333	1.9299E+3	1.9702E+3	1.8920E+3
709.04	14.10352	2.8880E+3	3.1033E+3	2.7282E+3	781.55	12.79513	1.8308E+3	1.8650E+3	1.7985E+3
710.04	14.08366	3.1371E+3	3.4928E+3	2.9118E+3	782.05	12.78695	1.7322E+3	1.7612E+3	1.7045E+3
710.54	14.07375	3.2836E+3	3.7762E+3	3.0115E+3	783.05	12.77062	1.5483E+3	1.5701E+3	1.5271E+3

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
784.05	12.75433	1.3905E+3	1.4074E+3	1.3741E+3	834.00	11.99041	2.2084E+2	2.2166E+2	2.2002E+2
785.00	12.73885	1.2644E+3	1.2780E+3	1.2510E+3	836.00	11.96172	2.1277E+2	2.1356E+2	2.1198E+2
786.00	12.72265	1.1550E+3	1.1664E+3	1.1438E+3	838.00	11.93317	2.0512E+2	2.0589E+2	2.0436E+2
787.00	12.70648	1.0617E+3	1.0715E+3	1.0521E+3	840.00	11.90476	1.9786E+2	1.9860E+2	1.9713E+2
788.00	12.69036	9.8318E+2	9.9178E+2	9.7469E+2	842.00	11.87648	1.9095E+2	1.9167E+2	1.9024E+2
789.00	12.67427	9.1365E+2	9.2129E+2	9.0609E+2	844.00	11.84834	1.8435E+2	1.8505E+2	1.8366E+2
790.00	12.65823	8.5313E+2	8.6004E+2	8.4630E+2	846.00	11.82033	1.7802E+2	1.7870E+2	1.7735E+2
791.00	12.64223	7.9902E+2	8.0539E+2	7.9272E+2	848.00	11.79245	1.7192E+2	1.7257E+2	1.7126E+2
792.00	12.62626	7.4792E+2	7.5378E+2	7.4211E+2	850.00	11.76471	1.6599E+2	1.6662E+2	1.6535E+2
793.00	12.61034	7.0176E+2	7.0722E+2	6.9635E+2	852.00	11.73709	1.6019E+2	1.6081E+2	1.5957E+2
794.00	12.59446	6.6079E+2	6.6591E+2	6.5571E+2	854.00	11.70960	1.5448E+2	1.5508E+2	1.5388E+2
795.00	12.57862	6.2175E+2	6.2658E+2	6.1695E+2	856.00	11.68224	1.4881E+2	1.4939E+2	1.4822E+2
796.00	12.56281	5.8740E+2	5.9198E+2	5.8287E+2	858.00	11.65501	1.4313E+2	1.4370E+2	1.4256E+2
797.00	12.54705	5.5546E+2	5.5945E+2	5.5153E+2	860.00	11.62791	1.3751E+2	1.3806E+2	1.3695E+2
798.00	12.53133	5.2703E+2	5.3050E+2	5.2361E+2	862.00	11.60093	1.3167E+2	1.3221E+2	1.3113E+2
799.00	12.51564	5.0009E+2	5.0317E+2	4.9706E+2	864.00	11.57407	1.2592E+2	1.2645E+2	1.2539E+2
800.00	12.50000	4.7519E+2	4.7793E+2	4.7249E+2	866.00	11.54734	1.2018E+2	1.2069E+2	1.1967E+2
801.00	12.48439	4.5146E+2	4.5392E+2	4.4903E+2	868.00	11.52074	1.1431E+2	1.1480E+2	1.1381E+2
802.00	12.46883	4.2980E+2	4.3204E+2	4.2759E+2	870.00	11.49425	1.0825E+2	1.0871E+2	1.0779E+2
802.50	12.46106	4.1997E+2	4.2212E+2	4.1785E+2	872.00	11.46789	1.0215E+2	1.0257E+2	1.0173E+2
803.00	12.45330	4.1119E+2	4.1325E+2	4.0916E+2	874.00	11.44165	9.5948E+1	9.6338E+1	9.5560E+1
803.50	12.44555	4.0303E+2	4.0501E+2	4.0106E+2	876.00	11.41553	8.9921E+1	9.0279E+1	8.9563E+1
804.00	12.43781	3.9508E+2	3.9700E+2	3.9318E+2	878.00	11.38952	8.4070E+1	8.4401E+1	8.3741E+1
804.50	12.43008	3.8820E+2	3.9006E+2	3.8636E+2	880.00	11.36364	7.8416E+1	7.8721E+1	7.8111E+1
805.00	12.42236	3.8194E+2	3.8374E+2	3.8014E+2	882.00	11.33787	7.2984E+1	7.3268E+1	7.2702E+1
805.50	12.41465	3.7662E+2	3.7838E+2	3.7488E+2	884.00	11.31222	6.7806E+1	6.8081E+1	6.7530E+1
806.00	12.40695	3.7136E+2	3.7307E+2	3.6966E+2	886.00	11.28668	6.2907E+1	6.3187E+1	6.2626E+1
807.00	12.39157	3.6203E+2	3.6366E+2	3.6042E+2	888.00	11.26126	5.8310E+1	5.8596E+1	5.8023E+1
808.00	12.37624	3.5404E+2	3.5560E+2	3.5249E+2	890.00	11.23596	5.4028E+1	5.4322E+1	5.3735E+1
809.00	12.36094	3.4706E+2	3.4857E+2	3.4556E+2	892.00	11.21076	5.0070E+1	5.0372E+1	4.9769E+1
810.00	12.34568	3.4113E+2	3.4259E+2	3.3968E+2	894.00	11.18568	4.6433E+1	4.6743E+1	4.6123E+1
811.00	12.33046	3.3590E+2	3.3731E+2	3.3449E+2	896.00	11.16071	4.3109E+1	4.3429E+1	4.2790E+1
812.00	12.31527	3.3116E+2	3.3254E+2	3.2980E+2	898.00	11.13586	4.0083E+1	4.0415E+1	3.9752E+1
813.00	12.30012	3.2646E+2	3.2780E+2	3.2514E+2	900.00	11.11111	3.7335E+1	3.7672E+1	3.6998E+1
814.00	12.28501	3.2181E+2	3.2312E+2	3.2052E+2	902.00	11.08647	3.4839E+1	3.5182E+1	3.4496E+1
815.00	12.26994	3.1697E+2	3.1824E+2	3.1571E+2	904.00	11.06195	3.2598E+1	3.2946E+1	3.2250E+1
816.00	12.25490	3.1185E+2	3.1309E+2	3.1062E+2	906.00	11.03753	3.0626E+1	3.0979E+1	3.0274E+1
817.00	12.23990	3.0663E+2	3.0784E+2	3.0543E+2	908.00	11.01322	2.8854E+1	2.9211E+1	2.8498E+1
818.00	12.22494	3.0129E+2	3.0247E+2	3.0011E+2	910.00	10.98901	2.7240E+1	2.7599E+1	2.6880E+1
819.00	12.21001	2.9576E+2	2.9692E+2	2.9462E+2	912.00	10.96491	2.5757E+1	2.6118E+1	2.5395E+1
820.00	12.19512	2.9012E+2	2.9125E+2	2.8900E+2	914.00	10.94092	2.4401E+1	2.4764E+1	2.4039E+1
821.00	12.18027	2.8456E+2	2.8566E+2	2.8347E+2	916.00	10.91703	2.3133E+1	2.3495E+1	2.2770E+1
822.00	12.16545	2.7906E+2	2.8013E+2	2.7799E+2	920.00	10.86957	2.0813E+1	2.1174E+1	2.0453E+1
823.00	12.15067	2.7365E+2	2.7470E+2	2.7261E+2	925.00	10.81081	1.8283E+1	1.8639E+1	1.7927E+1
824.00	12.13592	2.6833E+2	2.6935E+2	2.6731E+2	930.00	10.75269	1.6108E+1	1.6462E+1	1.5754E+1
825.00	12.12121	2.6308E+2	2.6408E+2	2.6208E+2	935.00	10.69519	1.4224E+1	1.4582E+1	1.3866E+1
826.00	12.10654	2.5792E+2	2.5889E+2	2.5694E+2	940.00	10.63830	1.2573E+1	1.2938E+1	1.2208E+1
828.00	12.07729	2.4788E+2	2.4882E+2	2.4695E+2	945.00	10.58201	1.1128E+1	1.1496E+1	1.0760E+1
830.00	12.04819	2.3833E+2	2.3922E+2	2.3744E+2	950.00	10.52632	9.8602E+0	1.0225E+1	9.4952E+0
832.00	12.01923	2.2935E+2	2.3021E+2	2.2850E+2	954.00	10.48218	8.9565E+0	9.3175E+0	8.5956E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
956.00	10.46025	8.5348E+0	8.8946E+0	8.1751E+0	1061.00	9.42507	8.9717E−1	1.2360E+0	5.5829E−1
958.00	10.43841	8.1250E+0	8.4844E+0	7.7656E+0	1062.00	9.41620	9.2002E−1	1.2588E+0	5.8126E−1
960.00	10.41667	7.7279E+0	8.0878E+0	7.3680E+0	1063.00	9.40734	9.4969E−1	1.2884E+0	6.1097E−1
962.00	10.39501	7.3411E+0	7.7022E+0	6.9799E+0	1063.50	9.40291	9.6672E−1	1.3055E+0	6.2796E−1
964.00	10.37344	6.9611E+0	7.3247E+0	6.5974E+0	1064.00	9.39850	9.8559E−1	1.3244E+0	6.4677E−1
966.00	10.35197	6.5920E+0	6.9580E+0	6.2259E+0	1064.50	9.39408	1.0081E+0	1.3470E+0	6.6924E−1
968.00	10.33058	6.2340E+0	6.6016E+0	5.8663E+0	1065.00	9.38967	1.0316E+0	1.3706E+0	6.9259E−1
970.00	10.30928	5.8898E+0	6.2580E+0	5.5217E+0	1065.50	9.38527	1.0593E+0	1.3984E+0	7.2014E−1
972.00	10.28807	5.5567E+0	5.9241E+0	5.1894E+0	1066.00	9.38086	1.0833E+0	1.4225E+0	7.4407E−1
976.00	10.24590	4.9430E+0	5.3062E+0	4.5798E+0	1066.50	9.37647	1.1004E+0	1.4397E+0	7.6120E−1
980.00	10.20408	4.3991E+0	4.7580E+0	4.0403E+0	1067.00	9.37207	1.1128E+0	1.4519E+0	7.7360E−1
984.00	10.16260	3.9147E+0	4.2721E+0	3.5573E+0	1067.50	9.36768	1.1231E+0	1.4622E+0	7.8407E−1
988.00	10.12146	3.4849E+0	3.8436E+0	3.1263E+0	1068.00	9.36330	1.1330E+0	1.4720E+0	7.9403E−1
992.00	10.08065	3.1030E+0	3.4631E+0	2.7429E+0	1068.50	9.35891	1.1418E+0	1.4807E+0	8.0295E−1
996.00	10.04016	2.7631E+0	3.1229E+0	2.4034E+0	1069.00	9.35454	1.1489E+0	1.4876E+0	8.1012E−1
1000.00	10.00000	2.4621E+0	2.8192E+0	2.1050E+0	1069.50	9.35016	1.1546E+0	1.4932E+0	8.1596E−1
1004.00	9.96016	2.2005E+0	2.5544E+0	1.8465E+0	1070.00	9.34579	1.1579E+0	1.4964E+0	8.1944E−1
1008.00	9.92063	1.9743E+0	2.3264E+0	1.6221E+0	1070.10	9.34492	1.1581E+0	1.4965E+0	8.1964E−1
1012.00	9.88142	1.7772E+0	2.1289E+0	1.4255E+0	1070.20	9.34405	1.1570E+0	1.4954E+0	8.1861E−1
1016.00	9.84252	1.6026E+0	1.9542E+0	1.2509E+0	1070.30	9.34317	1.1547E+0	1.4930E+0	8.1633E−1
1020.00	9.80392	1.4451E+0	1.7967E+0	1.0934E+0	1070.40	9.34230	1.1513E+0	1.4896E+0	8.1303E−1
1024.00	9.76562	1.3072E+0	1.6584E+0	9.5592E−1	1070.50	9.34143	1.1475E+0	1.4857E+0	8.0933E−1
1028.00	9.72763	1.1860E+0	1.5360E+0	8.3597E−1	1070.60	9.34056	1.1432E+0	1.4814E+0	8.0511E−1
1030.00	9.70874	1.1313E+0	1.4804E+0	7.8213E−1	1070.70	9.33968	1.1385E+0	1.4766E+0	8.0047E−1
1032.00	9.68992	1.0808E+0	1.4291E+0	7.3254E−1	1070.80	9.33881	1.1336E+0	1.4716E+0	7.9564E−1
1034.00	9.67118	1.0346E+0	1.3820E+0	6.8722E−1	1070.90	9.33794	1.1290E+0	1.4668E+0	7.9109E−1
1036.00	9.65251	9.9326E−1	1.3398E+0	6.4673E−1	1071.00	9.33707	1.1245E+0	1.4623E+0	7.8674E−1
1038.00	9.63391	9.5442E−1	1.3001E+0	6.0872E−1	1071.25	9.33489	1.1151E+0	1.4527E+0	7.7747E−1
1040.00	9.61538	9.1824E−1	1.2631E+0	5.7335E−1	1071.50	9.33271	1.1064E+0	1.4439E+0	7.6895E−1
1042.00	9.59693	8.8584E−1	1.2300E+0	5.4167E−1	1071.75	9.33053	1.0979E+0	1.4352E+0	7.6057E−1
1044.00	9.57854	8.5772E−1	1.2013E+0	5.1418E−1	1072.00	9.32836	1.0897E+0	1.4269E+0	7.5250E−1
1046.00	9.56023	8.3542E−1	1.1784E+0	4.9243E−1	1072.50	9.32401	1.0737E+0	1.4106E+0	7.3671E−1
1047.00	9.55110	8.2546E−1	1.1682E+0	4.8275E−1	1073.00	9.31966	1.0579E+0	1.3946E+0	7.2118E−1
1048.00	9.54198	8.1723E−1	1.1597E+0	4.7478E−1	1073.50	9.31532	1.0448E+0	1.3813E+0	7.0828E−1
1049.00	9.53289	8.1104E−1	1.1532E+0	4.6886E−1	1074.00	9.31099	1.0336E+0	1.3699E+0	6.9726E−1
1050.00	9.52381	8.0583E−1	1.1477E+0	4.6392E−1	1074.50	9.30665	1.0245E+0	1.3607E+0	6.8836E−1
1050.50	9.51928	8.0403E−1	1.1458E+0	4.6225E−1	1075.00	9.30233	1.0168E+0	1.3528E+0	6.8080E−1
1051.00	9.51475	8.0274E−1	1.1444E+0	4.6108E−1	1075.50	9.29800	1.0101E+0	1.3459E+0	6.7419E−1
1051.50	9.51022	8.0217E−1	1.1437E+0	4.6065E−1	1076.00	9.29368	1.0042E+0	1.3399E+0	6.6840E−1
1052.00	9.50570	8.0249E−1	1.1439E+0	4.6112E−1	1076.50	9.28936	9.9838E−1	1.3341E+0	6.6270E−1
1052.50	9.50119	8.0360E−1	1.1448E+0	4.6239E−1	1077.00	9.28505	9.9330E−1	1.3289E+0	6.5768E−1
1053.00	9.49668	8.0536E−1	1.1464E+0	4.6431E−1	1077.50	9.28074	9.8856E−1	1.3241E+0	6.5300E−1
1053.50	9.49217	8.0811E−1	1.1490E+0	4.6723E−1	1078.00	9.27644	9.8474E−1	1.3203E+0	6.4922E−1
1054.00	9.48767	8.1147E−1	1.1522E+0	4.7078E−1	1078.50	9.27214	9.8184E−1	1.3173E+0	6.4636E−1
1055.00	9.47867	8.2040E−1	1.1607E+0	4.8007E−1	1079.00	9.26784	9.8006E−1	1.3155E+0	6.4463E−1
1056.00	9.46970	8.3010E−1	1.1701E+0	4.9010E−1	1079.50	9.26355	9.7882E−1	1.3142E+0	6.4344E−1
1057.00	9.46074	8.4098E−1	1.1807E+0	5.0129E−1	1080.00	9.25926	9.7806E−1	1.3134E+0	6.4272E−1
1058.00	9.45180	8.5238E−1	1.1918E+0	5.1294E−1	1080.50	9.25497	9.7794E−1	1.3132E+0	6.4267E−1
1059.00	9.44287	8.6510E−1	1.2043E+0	5.2589E−1	1081.00	9.25069	9.7827E−1	1.3135E+0	6.4308E−1
1060.00	9.43396	8.7899E−1	1.2180E+0	5.3996E−1	1081.50	9.24642	9.7912E−1	1.3142E+0	6.4402E−1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1082.00	9.24214	9.8035E-1	1.3154E+0	6.4536E-1	1157.00	8.64304	7.1445E+0	7.4550E+0	6.8341E+0
1083.00	9.23361	9.8376E-1	1.3186E+0	6.4897E-1	1158.00	8.63558	7.6973E+0	8.0074E+0	7.3873E+0
1084.00	9.22509	9.8833E-1	1.3229E+0	6.5378E-1	1159.00	8.62813	8.2516E+0	8.5596E+0	7.9437E+0
1085.00	9.21659	9.9411E-1	1.3284E+0	6.5981E-1	1160.00	8.62069	8.8045E+0	9.1098E+0	8.4992E+0
1086.00	9.20810	1.0010E+0	1.3350E+0	6.6699E-1	1161.00	8.61326	9.3496E+0	9.6529E+0	9.0463E+0
1087.00	9.19963	1.0090E+0	1.3427E+0	6.7530E-1	1162.00	8.60585	9.9129E+0	1.0216E+1	9.6101E+0
1088.00	9.19118	1.0182E+0	1.3516E+0	6.8486E-1	1163.00	8.59845	1.0490E+1	1.0794E+1	1.0186E+1
1089.00	9.18274	1.0289E+0	1.3619E+0	6.9593E-1	1164.00	8.59107	1.1108E+1	1.1415E+1	1.0801E+1
1090.00	9.17431	1.0407E+0	1.3733E+0	7.0817E-1	1165.00	8.58369	1.1768E+1	1.2078E+1	1.1457E+1
1092.00	9.15751	1.0688E+0	1.4005E+0	7.3722E-1	1166.00	8.57633	1.2479E+1	1.2793E+1	1.2165E+1
1094.00	9.14077	1.1011E+0	1.4317E+0	7.7045E-1	1167.00	8.56898	1.3333E+1	1.3649E+1	1.3017E+1
1096.00	9.12409	1.1355E+0	1.4651E+0	8.0590E-1	1168.00	8.56164	1.4344E+1	1.4661E+1	1.4027E+1
1098.00	9.10747	1.1735E+0	1.5021E+0	8.4489E-1	1169.00	8.55432	1.5490E+1	1.5804E+1	1.5177E+1
1100.00	9.09091	1.2152E+0	1.5428E+0	8.8765E-1	1170.00	8.54701	1.6760E+1	1.7069E+1	1.6451E+1
1102.00	9.07441	1.2611E+0	1.5877E+0	9.3458E-1	1171.00	8.53971	1.8113E+1	1.8417E+1	1.7809E+1
1104.00	9.05797	1.3123E+0	1.6379E+0	9.8675E-1	1172.00	8.53242	1.9523E+1	1.9824E+1	1.9223E+1
1106.00	9.04159	1.3668E+0	1.6915E+0	1.0421E+0	1173.00	8.52515	2.0916E+1	2.1215E+1	2.0617E+1
1108.00	9.02527	1.4256E+0	1.7495E+0	1.1017E+0	1173.50	8.52152	2.1593E+1	2.1892E+1	2.1294E+1
1110.00	9.00901	1.4886E+0	1.8120E+0	1.1653E+0	1174.00	8.51789	2.2211E+1	2.2510E+1	2.1913E+1
1112.00	8.99281	1.5549E+0	1.8778E+0	1.2321E+0	1174.50	8.51426	2.2763E+1	2.3062E+1	2.2464E+1
1114.00	8.97666	1.6229E+0	1.9454E+0	1.3004E+0	1175.00	8.51064	2.3262E+1	2.3560E+1	2.2963E+1
1116.00	8.96057	1.6917E+0	2.0140E+0	1.3695E+0	1175.50	8.50702	2.3693E+1	2.3992E+1	2.3395E+1
1118.00	8.94454	1.7614E+0	2.0835E+0	1.4393E+0	1176.00	8.50340	2.4044E+1	2.4343E+1	2.3746E+1
1120.00	8.92857	1.8324E+0	2.1544E+0	1.5104E+0	1176.50	8.49979	2.4355E+1	2.4653E+1	2.4056E+1
1122.00	8.91266	1.9038E+0	2.2257E+0	1.5819E+0	1177.00	8.49618	2.4614E+1	2.4912E+1	2.4315E+1
1124.00	8.89680	1.9757E+0	2.2974E+0	1.6540E+0	1178.00	8.48896	2.5079E+1	2.5376E+1	2.4781E+1
1126.00	8.88099	2.0480E+0	2.3694E+0	1.7265E+0	1179.00	8.48176	2.5560E+1	2.5858E+1	2.5263E+1
1128.00	8.86525	2.1230E+0	2.4442E+0	1.8019E+0	1179.50	8.47817	2.5859E+1	2.6156E+1	2.5561E+1
1130.00	8.84956	2.2061E+0	2.5268E+0	1.8854E+0	1180.00	8.47458	2.6209E+1	2.6506E+1	2.5911E+1
1132.00	8.83392	2.2989E+0	2.6191E+0	1.9788E+0	1180.50	8.47099	2.6617E+1	2.6914E+1	2.6319E+1
1134.00	8.81834	2.4045E+0	2.7238E+0	2.0851E+0	1181.00	8.46740	2.7073E+1	2.7370E+1	2.6776E+1
1136.00	8.80282	2.5230E+0	2.8411E+0	2.2049E+0	1181.50	8.46382	2.7592E+1	2.7889E+1	2.7294E+1
1138.00	8.78735	2.6664E+0	2.9828E+0	2.3499E+0	1182.00	8.46024	2.8195E+1	2.8493E+1	2.7898E+1
1140.00	8.77193	2.8389E+0	3.1534E+0	2.5245E+0	1183.00	8.45309	2.9546E+1	2.9843E+1	2.9248E+1
1141.00	8.76424	2.9352E+0	3.2487E+0	2.6217E+0	1184.00	8.44595	3.1118E+1	3.1416E+1	3.0820E+1
1142.00	8.75657	3.0384E+0	3.3511E+0	2.7258E+0	1185.00	8.43882	3.2886E+1	3.3184E+1	3.2588E+1
1143.00	8.74891	3.1493E+0	3.4613E+0	2.8373E+0	1186.00	8.43170	3.4677E+1	3.4975E+1	3.4379E+1
1144.00	8.74126	3.2723E+0	3.5840E+0	2.9606E+0	1186.50	8.42815	3.5475E+1	3.5774E+1	3.5177E+1
1145.00	8.73362	3.4100E+0	3.7218E+0	3.0981E+0	1187.00	8.42460	3.6122E+1	3.6420E+1	3.5824E+1
1146.00	8.72600	3.5685E+0	3.8809E+0	3.2561E+0	1187.50	8.42105	3.6593E+1	3.6891E+1	3.6295E+1
1147.00	8.71840	3.7468E+0	4.0601E+0	3.4335E+0	1188.00	8.41751	3.6919E+1	3.7217E+1	3.6622E+1
1148.00	8.71080	3.9503E+0	4.2646E+0	3.6361E+0	1188.50	8.41397	3.7027E+1	3.7325E+1	3.6730E+1
1149.00	8.70322	4.1768E+0	4.4915E+0	3.8622E+0	1189.00	8.41043	3.6966E+1	3.7263E+1	3.6668E+1
1150.00	8.69565	4.4287E+0	4.7429E+0	4.1145E+0	1189.50	8.40689	3.6787E+1	3.7084E+1	3.6490E+1
1151.00	8.68810	4.7162E+0	5.0289E+0	4.4036E+0	1190.00	8.40336	3.6493E+1	3.6790E+1	3.6197E+1
1152.00	8.68056	5.0355E+0	5.3456E+0	4.7254E+0	1190.50	8.39983	3.6159E+1	3.6455E+1	3.5863E+1
1153.00	8.67303	5.3809E+0	5.6885E+0	5.0733E+0	1191.00	8.39631	3.5738E+1	3.6033E+1	3.5442E+1
1154.00	8.66551	5.7587E+0	6.0651E+0	5.4522E+0	1191.50	8.39278	3.5238E+1	3.5533E+1	3.4943E+1
1155.00	8.65801	6.1751E+0	6.4821E+0	5.8681E+0	1192.00	8.38926	3.4721E+1	3.5015E+1	3.4426E+1
1156.00	8.65052	6.6323E+0	6.9412E+0	6.3234E+0	1193.00	8.38223	3.3606E+1	3.3900E+1	3.3313E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1194.00	8.37521	3.2553E+1	3.2845E+1	3.2261E+1	1225.00	8.16327	6.0782E+1	6.1161E+1	6.0433E+1
1195.00	8.36820	3.1635E+1	3.1927E+1	3.1344E+1	1226.00	8.15661	5.8188E+1	5.8552E+1	5.7849E+1
1195.50	8.36470	3.1309E+1	3.1600E+1	3.1018E+1	1227.00	8.14996	5.5793E+1	5.6136E+1	5.5456E+1
1196.00	8.36120	3.1056E+1	3.1346E+1	3.0766E+1	1228.00	8.14332	5.3540E+1	5.3882E+1	5.3222E+1
1196.50	8.35771	3.0868E+1	3.1158E+1	3.0578E+1	1229.00	8.13670	5.1454E+1	5.1787E+1	5.1146E+1
1197.00	8.35422	3.0778E+1	3.1068E+1	3.0489E+1	1230.00	8.13008	4.9549E+1	4.9871E+1	4.9247E+1
1197.50	8.35073	3.0784E+1	3.1074E+1	3.0495E+1	1231.00	8.12348	4.7795E+1	4.8108E+1	4.7498E+1
1198.00	8.34725	3.0859E+1	3.1148E+1	3.0570E+1	1232.00	8.11688	4.6162E+1	4.6468E+1	4.5872E+1
1198.50	8.34376	3.1045E+1	3.1334E+1	3.0756E+1	1233.00	8.11030	4.4650E+1	4.4949E+1	4.4366E+1
1199.00	8.34028	3.1370E+1	3.1659E+1	3.1081E+1	1234.00	8.10373	4.3241E+1	4.3534E+1	4.2962E+1
1199.50	8.33681	3.1855E+1	3.2144E+1	3.1567E+1	1235.00	8.09717	4.1926E+1	4.2214E+1	4.1652E+1
1200.00	8.33333	3.2564E+1	3.2853E+1	3.2275E+1	1236.00	8.09061	4.0709E+1	4.0994E+1	4.0441E+1
1201.00	8.32639	3.4567E+1	3.4856E+1	3.4278E+1	1237.00	8.08407	3.9621E+1	3.9891E+1	3.9351E+1
1202.00	8.31947	3.7339E+1	3.7629E+1	3.7049E+1	1238.00	8.07754	3.8693E+1	3.8964E+1	3.8423E+1
1203.00	8.31255	4.0548E+1	4.1141E+1	3.9958E+1	1239.00	8.07103	3.7934E+1	3.8194E+1	3.7663E+1
1204.00	8.30565	4.4119E+1	4.4686E+1	4.3531E+1	1240.00	8.06452	3.7321E+1	3.7572E+1	3.7049E+1
1204.50	8.30220	4.5756E+1	4.6276E+1	4.5226E+1	1241.00	8.05802	3.6802E+1	3.7053E+1	3.6530E+1
1205.00	8.29876	4.7110E+1	4.7556E+1	4.6631E+1	1242.00	8.05153	3.6442E+1	3.6687E+1	3.6170E+1
1205.50	8.29531	4.8255E+1	4.8637E+1	4.7823E+1	1243.00	8.04505	3.6267E+1	3.6506E+1	3.5992E+1
1206.00	8.29187	4.9106E+1	4.9456E+1	4.8734E+1	1244.00	8.03859	3.6168E+1	3.6405E+1	3.5935E+1
1206.50	8.28844	4.9737E+1	5.0055E+1	4.9396E+1	1245.00	8.03213	3.6120E+1	3.6355E+1	3.5889E+1
1207.00	8.28500	5.0188E+1	5.0493E+1	4.9863E+1	1246.00	8.02568	3.6181E+1	3.6425E+1	3.5950E+1
1207.50	8.28157	5.0534E+1	5.0844E+1	5.0214E+1	1247.00	8.01925	3.6391E+1	3.6636E+1	3.6125E+1
1208.00	8.27815	5.0804E+1	5.1114E+1	5.0481E+1	1248.00	8.01282	3.6765E+1	3.7008E+1	3.6500E+1
1208.50	8.27472	5.1036E+1	5.1354E+1	5.0719E+1	1249.00	8.00641	3.7188E+1	3.7436E+1	3.6926E+1
1209.00	8.27130	5.1270E+1	5.1590E+1	5.0953E+1	1250.14	7.99909	3.7735E+1	3.7986E+1	3.7475E+1
1209.50	8.26788	5.1514E+1	5.1835E+1	5.1196E+1	1250.64	7.99589	3.8017E+1	3.8272E+1	3.7758E+1
1210.00	8.26446	5.1770E+1	5.2099E+1	5.1458E+1	1250.89	7.99429	3.8187E+1	3.8442E+1	3.7929E+1
1210.50	8.26105	5.2108E+1	5.2439E+1	5.1794E+1	1251.14	7.99270	3.8369E+1	3.8626E+1	3.8112E+1
1211.00	8.25764	5.2539E+1	5.2878E+1	5.2230E+1	1251.39	7.99110	3.8561E+1	3.8820E+1	3.8304E+1
1211.50	8.25423	5.3138E+1	5.3480E+1	5.2827E+1	1251.64	7.98950	3.8791E+1	3.9053E+1	3.8533E+1
1212.00	8.25083	5.3908E+1	5.4259E+1	5.3598E+1	1252.14	7.98631	3.9329E+1	3.9599E+1	3.9067E+1
1213.00	8.24402	5.5908E+1	5.6253E+1	5.5573E+1	1252.24	7.98567	3.9504E+1	3.9775E+1	3.9240E+1
1214.00	8.23723	5.8322E+1	5.8702E+1	5.8000E+1	1252.34	7.98504	3.9738E+1	4.0016E+1	3.9475E+1
1215.00	8.23045	6.1201E+1	6.1600E+1	6.0869E+1	1252.44	7.98440	4.0043E+1	4.0325E+1	3.9777E+1
1216.00	8.22368	6.4667E+1	6.5053E+1	6.4286E+1	1252.54	7.98376	4.0407E+1	4.0687E+1	4.0134E+1
1217.00	8.21693	6.8187E+1	6.8565E+1	6.7760E+1	1252.64	7.98312	4.0825E+1	4.1108E+1	4.0552E+1
1217.50	8.21355	6.9649E+1	7.0043E+1	6.9221E+1	1252.74	7.98249	4.1333E+1	4.1615E+1	4.1055E+1
1218.00	8.21018	7.0897E+1	7.1293E+1	7.0457E+1	1252.84	7.98185	4.1953E+1	4.2274E+1	4.1705E+1
1218.50	8.20681	7.1876E+1	7.2275E+1	7.1428E+1	1252.94	7.98121	4.2811E+1	4.3150E+1	4.2565E+1
1219.00	8.20345	7.2559E+1	7.2964E+1	7.2108E+1	1252.99	7.98089	4.3425E+1	4.3806E+1	4.3149E+1
1219.50	8.20008	7.2968E+1	7.3398E+1	7.2537E+1	1253.04	7.98058	4.4245E+1	4.4720E+1	4.3896E+1
1220.00	8.19672	7.2995E+1	7.3390E+1	7.2530E+1	1253.09	7.98026	4.5314E+1	4.5932E+1	4.4842E+1
1220.50	8.19336	7.2605E+1	7.2999E+1	7.2143E+1	1253.14	7.97994	4.6669E+1	4.7477E+1	4.5987E+1
1221.00	8.19001	7.1809E+1	7.2229E+1	7.1382E+1	1253.17	7.97978	4.7439E+1	4.8346E+1	4.6603E+1
1221.50	8.18666	7.0777E+1	7.1171E+1	7.0336E+1	1253.19	7.97962	4.8573E+1	4.9619E+1	4.7609E+1
1222.00	8.18331	6.9540E+1	6.9938E+1	6.9117E+1	1253.22	7.97946	4.9737E+1	5.0926E+1	4.8648E+1
1222.50	8.17996	6.8154E+1	6.8555E+1	6.7749E+1	1253.24	7.97930	5.1445E+1	5.2784E+1	5.0237E+1
1223.00	8.17661	6.6688E+1	6.7080E+1	6.6290E+1	1253.27	7.97914	5.3198E+1	5.4686E+1	5.1872E+1
1224.00	8.16993	6.3688E+1	6.4069E+1	6.3312E+1	1253.29	7.97898	5.5851E+1	5.7598E+1	5.4549E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1253.34	7.97867	6.1987E+1	6.4182E+1	6.0724E+1	1256.44	7.95898	4.1695E+1	4.1977E+1	4.1415E+1
1253.39	7.97835	6.9915E+1	7.2348E+1	6.8587E+1	1256.54	7.95834	4.1754E+1	4.2036E+1	4.1473E+1
1253.44	7.97803	7.9966E+1	8.2329E+1	7.8392E+1	1256.64	7.95771	4.1817E+1	4.2100E+1	4.1536E+1
1253.49	7.97771	9.1497E+1	9.3655E+1	8.9704E+1	1256.89	7.95613	4.1989E+1	4.2272E+1	4.1707E+1
1253.54	7.97739	1.0365E+2	1.0547E+2	1.0180E+2	1257.14	7.95455	4.2163E+1	4.2448E+1	4.1881E+1
1253.57	7.97723	1.0986E+2	1.1137E+2	1.0795E+2	1257.39	7.95296	4.2364E+1	4.2649E+1	4.2081E+1
1253.59	7.97707	1.1305E+2	1.1435E+2	1.1122E+2	1257.64	7.95138	4.2585E+1	4.2871E+1	4.2301E+1
1253.62	7.97692	1.1599E+2	1.1708E+2	1.1425E+2	1258.14	7.94822	4.3078E+1	4.3366E+1	4.2792E+1
1253.64	7.97676	1.1623E+2	1.1719E+2	1.1447E+2	1258.64	7.94506	4.3615E+1	4.3905E+1	4.3327E+1
1253.67	7.97660	1.1608E+2	1.1691E+2	1.1429E+2	1259.14	7.94191	4.4184E+1	4.4477E+1	4.3894E+1
1253.69	7.97644	1.1330E+2	1.1416E+2	1.1165E+2	1260.14	7.93561	4.5444E+1	4.5742E+1	4.5149E+1
1253.72	7.97628	1.0990E+2	1.1082E+2	1.0842E+2	1260.64	7.93246	4.6098E+1	4.6398E+1	4.5800E+1
1253.74	7.97612	1.0509E+2	1.0582E+2	1.0366E+2	1261.14	7.92931	4.6778E+1	4.7081E+1	4.6476E+1
1253.79	7.97580	9.4035E+1	9.4586E+1	9.2957E+1	1261.39	7.92774	4.7140E+1	4.7445E+1	4.6837E+1
1253.84	7.97548	8.1779E+1	8.2701E+1	8.1495E+1	1261.64	7.92617	4.7516E+1	4.7822E+1	4.7211E+1
1253.89	7.97517	7.0937E+1	7.1924E+1	6.9951E+1	1261.89	7.92460	4.7904E+1	4.8212E+1	4.7598E+1
1253.94	7.97485	6.2439E+1	6.3259E+1	6.1618E+1	1262.14	7.92303	4.8303E+1	4.8612E+1	4.7995E+1
1253.97	7.97469	5.8993E+1	5.9632E+1	5.8790E+1	1262.64	7.91989	4.9147E+1	4.9463E+1	4.8838E+1
1253.99	7.97453	5.6234E+1	5.6808E+1	5.6025E+1	1263.14	7.91676	5.0098E+1	5.0415E+1	4.9782E+1
1254.02	7.97437	5.3803E+1	5.4367E+1	5.3587E+1	1263.64	7.91362	5.1052E+1	5.1374E+1	5.0733E+1
1254.04	7.97421	5.1898E+1	5.2467E+1	5.1649E+1	1264.14	7.91049	5.2096E+1	5.2423E+1	5.1773E+1
1254.07	7.97405	5.0244E+1	5.0824E+1	4.9949E+1	1264.24	7.90987	5.2336E+1	5.2667E+1	5.2014E+1
1254.09	7.97389	4.9010E+1	4.9568E+1	4.8690E+1	1264.29	7.90955	5.2464E+1	5.2793E+1	5.2139E+1
1254.12	7.97373	4.7977E+1	4.8497E+1	4.7640E+1	1264.34	7.90924	5.2604E+1	5.2934E+1	5.2278E+1
1254.14	7.97358	4.7196E+1	4.7689E+1	4.6879E+1	1264.39	7.90893	5.2760E+1	5.3091E+1	5.2434E+1
1254.19	7.97326	4.6022E+1	4.6455E+1	4.5751E+1	1264.44	7.90862	5.2930E+1	5.3261E+1	5.2603E+1
1254.24	7.97294	4.5141E+1	4.5479E+1	4.4854E+1	1264.49	7.90830	5.3119E+1	5.3453E+1	5.2790E+1
1254.29	7.97262	4.4468E+1	4.4775E+1	4.4188E+1	1264.54	7.90799	5.3330E+1	5.3681E+1	5.2988E+1
1254.34	7.97230	4.3946E+1	4.4246E+1	4.3665E+1	1264.64	7.90737	5.3836E+1	5.4231E+1	5.3466E+1
1254.39	7.97199	4.3529E+1	4.3826E+1	4.3248E+1	1264.69	7.90705	5.4136E+1	5.4550E+1	5.3753E+1
1254.44	7.97167	4.3197E+1	4.3490E+1	4.2916E+1	1264.74	7.90674	5.4467E+1	5.4890E+1	5.4076E+1
1254.49	7.97135	4.2931E+1	4.3220E+1	4.2648E+1	1264.84	7.90612	5.5433E+1	5.5846E+1	5.5072E+1
1254.54	7.97103	4.2695E+1	4.2984E+1	4.2414E+1	1264.89	7.90580	5.6077E+1	5.6437E+1	5.5711E+1
1254.64	7.97040	4.2316E+1	4.2611E+1	4.2043E+1	1264.94	7.90549	5.6697E+1	5.7025E+1	5.6327E+1
1254.74	7.96976	4.2012E+1	4.2298E+1	4.1733E+1	1264.97	7.90533	5.6936E+1	5.7261E+1	5.6565E+1
1254.84	7.96913	4.1774E+1	4.2061E+1	4.1498E+1	1264.99	7.90518	5.7134E+1	5.7461E+1	5.6764E+1
1254.94	7.96849	4.1567E+1	4.1853E+1	4.1291E+1	1265.02	7.90502	5.7276E+1	5.7602E+1	5.6903E+1
1254.99	7.96817	4.1479E+1	4.1762E+1	4.1201E+1	1265.04	7.90487	5.7384E+1	5.7705E+1	5.7006E+1
1255.04	7.96786	4.1416E+1	4.1698E+1	4.1138E+1	1265.07	7.90471	5.7410E+1	5.7730E+1	5.7030E+1
1255.09	7.96754	4.1368E+1	4.1650E+1	4.1089E+1	1265.09	7.90455	5.7384E+1	5.7704E+1	5.7005E+1
1255.14	7.96722	4.1332E+1	4.1614E+1	4.1054E+1	1265.12	7.90440	5.7281E+1	5.7603E+1	5.6904E+1
1255.24	7.96659	4.1297E+1	4.1578E+1	4.1019E+1	1265.14	7.90424	5.7130E+1	5.7454E+1	5.6756E+1
1255.34	7.96595	4.1295E+1	4.1581E+1	4.1021E+1	1265.19	7.90393	5.6698E+1	5.7050E+1	5.6356E+1
1255.54	7.96468	4.1342E+1	4.1623E+1	4.1063E+1	1265.24	7.90362	5.6292E+1	5.6656E+1	5.5966E+1
1255.74	7.96341	4.1398E+1	4.1679E+1	4.1119E+1	1265.29	7.90330	5.6002E+1	5.6361E+1	5.5674E+1
1255.94	7.96215	4.1460E+1	4.1741E+1	4.1180E+1	1265.34	7.90299	5.5737E+1	5.6089E+1	5.5405E+1
1256.04	7.96151	4.1493E+1	4.1775E+1	4.1214E+1	1265.39	7.90268	5.5568E+1	5.5914E+1	5.5231E+1
1256.14	7.96088	4.1532E+1	4.1814E+1	4.1253E+1	1265.44	7.90237	5.5448E+1	5.5793E+1	5.5112E+1
1256.24	7.96025	4.1582E+1	4.1864E+1	4.1302E+1	1265.49	7.90205	5.5369E+1	5.5713E+1	5.5032E+1
1256.34	7.95961	4.1638E+1	4.1919E+1	4.1357E+1	1265.54	7.90174	5.5314E+1	5.5657E+1	5.4977E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1265.64	7.90112	5.5260E+1	5.5606E+1	5.4926E+1	1282.90	7.79487	9.6078E+1	9.6679E+1	9.5481E+1
1265.74	7.90049	5.5272E+1	5.5617E+1	5.4937E+1	1283.15	7.79335	9.6134E+1	9.6735E+1	9.5536E+1
1265.84	7.89987	5.5344E+1	5.5690E+1	5.5010E+1	1283.40	7.79183	9.6158E+1	9.6759E+1	9.5560E+1
1265.94	7.89924	5.5452E+1	5.5796E+1	5.5114E+1	1283.65	7.79031	9.6175E+1	9.6776E+1	9.5577E+1
1266.14	7.89800	5.5794E+1	5.6139E+1	5.5454E+1	1283.90	7.78879	9.6165E+1	9.6767E+1	9.5568E+1
1266.34	7.89675	5.6170E+1	5.6515E+1	5.5826E+1	1284.15	7.78728	9.6150E+1	9.6751E+1	9.5552E+1
1266.54	7.89550	5.6538E+1	5.6884E+1	5.6192E+1	1284.40	7.78576	9.6108E+1	9.6709E+1	9.5511E+1
1266.84	7.89363	5.7063E+1	5.7412E+1	5.6715E+1	1284.65	7.78425	9.6060E+1	9.6662E+1	9.5464E+1
1267.14	7.89176	5.7581E+1	5.7933E+1	5.7231E+1	1284.90	7.78273	9.6008E+1	9.6609E+1	9.5413E+1
1267.64	7.88865	5.8439E+1	5.8795E+1	5.8085E+1	1285.15	7.78122	9.5957E+1	9.6558E+1	9.5362E+1
1268.14	7.88554	5.9293E+1	5.9653E+1	5.8934E+1	1285.40	7.77970	9.5919E+1	9.6519E+1	9.5323E+1
1268.64	7.88243	6.0129E+1	6.0493E+1	5.9766E+1	1285.65	7.77819	9.5882E+1	9.6483E+1	9.5288E+1
1269.14	7.87933	6.0951E+1	6.1320E+1	6.0585E+1	1285.90	7.77668	9.5865E+1	9.6465E+1	9.5270E+1
1269.64	7.87622	6.1803E+1	6.2177E+1	6.1432E+1	1286.02	7.77592	9.5863E+1	9.6464E+1	9.5269E+1
1270.14	7.87312	6.2658E+1	6.3036E+1	6.2282E+1	1286.15	7.77517	9.5869E+1	9.6470E+1	9.5275E+1
1270.64	7.87002	6.3515E+1	6.3898E+1	6.3135E+1	1286.27	7.77441	9.5902E+1	9.6502E+1	9.5307E+1
1271.14	7.86693	6.4366E+1	6.4754E+1	6.3982E+1	1286.40	7.77365	9.5944E+1	9.6545E+1	9.5349E+1
1271.64	7.86383	6.5279E+1	6.5672E+1	6.4890E+1	1286.65	7.77214	9.6039E+1	9.6641E+1	9.5443E+1
1272.14	7.86074	6.6227E+1	6.6624E+1	6.5832E+1	1286.90	7.77063	9.6158E+1	9.6760E+1	9.5561E+1
1272.39	7.85920	6.6725E+1	6.7125E+1	6.6327E+1	1287.15	7.76912	9.6299E+1	9.6905E+1	9.5702E+1
1272.64	7.85765	6.7235E+1	6.7638E+1	6.6835E+1	1287.40	7.76762	9.6531E+1	9.7137E+1	9.5931E+1
1272.89	7.85611	6.7762E+1	6.8168E+1	6.7359E+1	1287.65	7.76611	9.6796E+1	9.7405E+1	9.6195E+1
1273.14	7.85457	6.8308E+1	6.8718E+1	6.7903E+1	1287.90	7.76460	9.7151E+1	9.7763E+1	9.6547E+1
1273.64	7.85148	6.9534E+1	6.9951E+1	6.9122E+1	1288.15	7.76309	9.7553E+1	9.8169E+1	9.6945E+1
1274.14	7.84840	7.0825E+1	7.1249E+1	7.0405E+1	1288.40	7.76159	9.8016E+1	9.8634E+1	9.7403E+1
1274.64	7.84532	7.2241E+1	7.2673E+1	7.1813E+1	1288.65	7.76008	9.8500E+1	9.9123E+1	9.7883E+1
1275.14	7.84225	7.3741E+1	7.4182E+1	7.3303E+1	1288.90	7.75857	9.9029E+1	9.9656E+1	9.8408E+1
1275.64	7.83917	7.5335E+1	7.5786E+1	7.4888E+1	1289.15	7.75707	9.9583E+1	1.0022E+2	9.8957E+1
1276.14	7.83610	7.6991E+1	7.7453E+1	7.6533E+1	1289.40	7.75557	1.0020E+2	1.0084E+2	9.9568E+1
1276.65	7.83303	7.8760E+1	7.9234E+1	7.8291E+1	1289.65	7.75406	1.0084E+2	1.0149E+2	1.0021E+2
1277.15	7.82996	8.0629E+1	8.1115E+1	8.0148E+1	1289.90	7.75256	1.0151E+2	1.0216E+2	1.0086E+2
1277.65	7.82690	8.2644E+1	8.3142E+1	8.2148E+1	1290.15	7.75106	1.0220E+2	1.0286E+2	1.0155E+2
1278.15	7.82384	8.4667E+1	8.5179E+1	8.4157E+1	1290.65	7.74805	1.0375E+2	1.0442E+2	1.0309E+2
1278.65	7.82078	8.6685E+1	8.7212E+1	8.6161E+1	1291.15	7.74505	1.0536E+2	1.0604E+2	1.0468E+2
1278.90	7.81925	8.7663E+1	8.8197E+1	8.7132E+1	1291.65	7.74205	1.0708E+2	1.0778E+2	1.0638E+2
1279.15	7.81772	8.8617E+1	8.9157E+1	8.8078E+1	1292.15	7.73906	1.0883E+2	1.0955E+2	1.0812E+2
1279.40	7.81619	8.9497E+1	9.0046E+1	8.8953E+1	1292.65	7.73606	1.1059E+2	1.1132E+2	1.0986E+2
1279.65	7.81466	9.0365E+1	9.0919E+1	8.9813E+1	1293.15	7.73307	1.1237E+2	1.1312E+2	1.1163E+2
1279.90	7.81314	9.1170E+1	9.1730E+1	9.0612E+1	1293.65	7.73008	1.1433E+2	1.1508E+2	1.1357E+2
1280.15	7.81161	9.1931E+1	9.2497E+1	9.1366E+1	1294.15	7.72710	1.1637E+2	1.1713E+2	1.1560E+2
1280.40	7.81009	9.2574E+1	9.3147E+1	9.2006E+1	1294.40	7.72560	1.1722E+2	1.1799E+2	1.1646E+2
1280.65	7.80856	9.3171E+1	9.3747E+1	9.2597E+1	1294.52	7.72486	1.1759E+2	1.1836E+2	1.1683E+2
1280.90	7.80704	9.3696E+1	9.4277E+1	9.3118E+1	1294.65	7.72411	1.1790E+2	1.1866E+2	1.1713E+2
1281.15	7.80551	9.4187E+1	9.4772E+1	9.3605E+1	1294.77	7.72337	1.1813E+2	1.1890E+2	1.1736E+2
1281.40	7.80399	9.4605E+1	9.5192E+1	9.4019E+1	1294.90	7.72262	1.1830E+2	1.1907E+2	1.1753E+2
1281.65	7.80247	9.4982E+1	9.5573E+1	9.4394E+1	1295.02	7.72188	1.1845E+2	1.1922E+2	1.1768E+2
1281.90	7.80095	9.5302E+1	9.5896E+1	9.4712E+1	1295.15	7.72113	1.1854E+2	1.1931E+2	1.1777E+2
1282.15	7.79943	9.5581E+1	9.6177E+1	9.4988E+1	1295.27	7.72038	1.1857E+2	1.1934E+2	1.1780E+2
1282.40	7.79791	9.5774E+1	9.6375E+1	9.5183E+1	1295.40	7.71964	1.1858E+2	1.1934E+2	1.1781E+2
1282.65	7.79639	9.5997E+1	9.6595E+1	9.5399E+1	1295.52	7.71890	1.1856E+2	1.1933E+2	1.1779E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1295.65	7.71815	1.1851E+2	1.1928E+2	1.1774E+2	1307.65	7.64731	1.0756E+2	1.0827E+2	1.0686E+2
1295.77	7.71741	1.1841E+2	1.1918E+2	1.1764E+2	1307.90	7.64585	1.0923E+2	1.0995E+2	1.0851E+2
1295.90	7.71666	1.1828E+2	1.1905E+2	1.1751E+2	1308.15	7.64439	1.1105E+2	1.1180E+2	1.1032E+2
1296.02	7.71592	1.1813E+2	1.1890E+2	1.1736E+2	1308.40	7.64293	1.1315E+2	1.1390E+2	1.1240E+2
1296.15	7.71517	1.1796E+2	1.1872E+2	1.1719E+2	1308.65	7.64147	1.1537E+2	1.1614E+2	1.1462E+2
1296.40	7.71368	1.1752E+2	1.1828E+2	1.1675E+2	1308.90	7.64001	1.1785E+2	1.1863E+2	1.1709E+2
1296.65	7.71220	1.1699E+2	1.1775E+2	1.1622E+2	1309.15	7.63855	1.2048E+2	1.2127E+2	1.1971E+2
1296.90	7.71071	1.1633E+2	1.1710E+2	1.1557E+2	1309.40	7.63709	1.2348E+2	1.2427E+2	1.2270E+2
1297.15	7.70922	1.1566E+2	1.1642E+2	1.1490E+2	1309.65	7.63563	1.2679E+2	1.2760E+2	1.2600E+2
1297.40	7.70774	1.1499E+2	1.1574E+2	1.1423E+2	1309.90	7.63418	1.3054E+2	1.3137E+2	1.2974E+2
1297.65	7.70625	1.1431E+2	1.1507E+2	1.1356E+2	1310.15	7.63272	1.3476E+2	1.3560E+2	1.3395E+2
1297.90	7.70477	1.1362E+2	1.1437E+2	1.1287E+2	1310.40	7.63126	1.3943E+2	1.4028E+2	1.3859E+2
1298.15	7.70328	1.1291E+2	1.1366E+2	1.1216E+2	1310.65	7.62981	1.4439E+2	1.4527E+2	1.4354E+2
1298.40	7.70180	1.1209E+2	1.1284E+2	1.1135E+2	1310.90	7.62835	1.5017E+2	1.5107E+2	1.4929E+2
1298.65	7.70032	1.1127E+2	1.1201E+2	1.1053E+2	1311.02	7.62763	1.5331E+2	1.5423E+2	1.5242E+2
1298.90	7.69884	1.1043E+2	1.1117E+2	1.0971E+2	1311.15	7.62690	1.5675E+2	1.5769E+2	1.5586E+2
1299.15	7.69735	1.0959E+2	1.1032E+2	1.0887E+2	1311.27	7.62617	1.6078E+2	1.6172E+2	1.5986E+2
1299.40	7.69587	1.0872E+2	1.0944E+2	1.0801E+2	1311.40	7.62544	1.6502E+2	1.6597E+2	1.6406E+2
1299.65	7.69439	1.0785E+2	1.0855E+2	1.0714E+2	1311.52	7.62472	1.6918E+2	1.7011E+2	1.6817E+2
1299.90	7.69291	1.0696E+2	1.0766E+2	1.0627E+2	1311.65	7.62399	1.7311E+2	1.7406E+2	1.7209E+2
1300.15	7.69143	1.0607E+2	1.0677E+2	1.0539E+2	1311.70	7.62370	1.7457E+2	1.7555E+2	1.7356E+2
1300.40	7.68995	1.0517E+2	1.0586E+2	1.0450E+2	1311.75	7.62341	1.7588E+2	1.7686E+2	1.7486E+2
1300.65	7.68848	1.0428E+2	1.0496E+2	1.0362E+2	1311.80	7.62312	1.7698E+2	1.7798E+2	1.7597E+2
1300.90	7.68700	1.0342E+2	1.0409E+2	1.0276E+2	1311.85	7.62283	1.7791E+2	1.7890E+2	1.7689E+2
1301.15	7.68552	1.0259E+2	1.0325E+2	1.0194E+2	1311.90	7.62254	1.7868E+2	1.7968E+2	1.7765E+2
1301.40	7.68404	1.0181E+2	1.0246E+2	1.0116E+2	1311.95	7.62225	1.7931E+2	1.8031E+2	1.7828E+2
1301.65	7.68257	1.0105E+2	1.0169E+2	1.0041E+2	1312.00	7.62196	1.7981E+2	1.8081E+2	1.7878E+2
1301.90	7.68109	1.0031E+2	1.0095E+2	9.9675E+1	1312.05	7.62167	1.8018E+2	1.8119E+2	1.7915E+2
1302.15	7.67962	9.9600E+1	1.0024E+2	9.8974E+1	1312.10	7.62138	1.8043E+2	1.8144E+2	1.7940E+2
1302.40	7.67814	9.9048E+1	9.9677E+1	9.8425E+1	1312.15	7.62109	1.8054E+2	1.8156E+2	1.7951E+2
1302.65	7.67667	9.8537E+1	9.9163E+1	9.7919E+1	1312.20	7.62079	1.8052E+2	1.8153E+2	1.7949E+2
1302.90	7.67520	9.8111E+1	9.8733E+1	9.7497E+1	1312.25	7.62050	1.8036E+2	1.8138E+2	1.7934E+2
1303.15	7.67372	9.7766E+1	9.8385E+1	9.7155E+1	1312.30	7.62021	1.8014E+2	1.8116E+2	1.7912E+2
1303.40	7.67225	9.7515E+1	9.8136E+1	9.6910E+1	1312.35	7.61992	1.7990E+2	1.8093E+2	1.7889E+2
1303.65	7.67078	9.7340E+1	9.7957E+1	9.6733E+1	1312.40	7.61963	1.7976E+2	1.8079E+2	1.7875E+2
1303.90	7.66931	9.7284E+1	9.7903E+1	9.6680E+1	1312.45	7.61934	1.7974E+2	1.8077E+2	1.7874E+2
1304.15	7.66784	9.7316E+1	9.7932E+1	9.6709E+1	1312.50	7.61905	1.7987E+2	1.8091E+2	1.7887E+2
1304.40	7.66637	9.7439E+1	9.8056E+1	9.6831E+1	1312.55	7.61876	1.8015E+2	1.8120E+2	1.7916E+2
1304.65	7.66490	9.7599E+1	9.8217E+1	9.6989E+1	1312.60	7.61847	1.8066E+2	1.8171E+2	1.7966E+2
1304.90	7.66343	9.7816E+1	9.8436E+1	9.7204E+1	1312.65	7.61818	1.8141E+2	1.8246E+2	1.8041E+2
1305.15	7.66196	9.8088E+1	9.8711E+1	9.7475E+1	1312.70	7.61789	1.8238E+2	1.8343E+2	1.8137E+2
1305.40	7.66050	9.8452E+1	9.9078E+1	9.7835E+1	1312.75	7.61760	1.8352E+2	1.8457E+2	1.8250E+2
1305.65	7.65903	9.8926E+1	9.9557E+1	9.8307E+1	1312.80	7.61731	1.8480E+2	1.8585E+2	1.8377E+2
1305.90	7.65756	9.9582E+1	1.0022E+2	9.8955E+1	1312.85	7.61702	1.8619E+2	1.8724E+2	1.8514E+2
1306.15	7.65610	1.0030E+2	1.0094E+2	9.9666E+1	1312.90	7.61673	1.8761E+2	1.8867E+2	1.8656E+2
1306.40	7.65463	1.0119E+2	1.0184E+2	1.0055E+2	1312.95	7.61644	1.8903E+2	1.9009E+2	1.8797E+2
1306.65	7.65317	1.0216E+2	1.0282E+2	1.0152E+2	1313.00	7.61615	1.9039E+2	1.9145E+2	1.8931E+2
1306.90	7.65170	1.0336E+2	1.0403E+2	1.0270E+2	1313.05	7.61586	1.9167E+2	1.9274E+2	1.9058E+2
1307.15	7.65024	1.0463E+2	1.0532E+2	1.0396E+2	1313.10	7.61557	1.9278E+2	1.9384E+2	1.9168E+2
1307.40	7.64878	1.0607E+2	1.0677E+2	1.0539E+2	1313.15	7.61528	1.9369E+2	1.9475E+2	1.9258E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1313.20	7.61499	1.9429E+2	1.9535E+2	1.9318E+2	1316.75	7.59446	1.9599E+2	1.9709E+2	1.9490E+2
1313.25	7.61470	1.9460E+2	1.9567E+2	1.9349E+2	1316.85	7.59388	1.9568E+2	1.9678E+2	1.9459E+2
1313.30	7.61441	1.9469E+2	1.9576E+2	1.9358E+2	1316.95	7.59331	1.9542E+2	1.9653E+2	1.9434E+2
1313.35	7.61412	1.9455E+2	1.9562E+2	1.9344E+2	1317.05	7.59273	1.9520E+2	1.9629E+2	1.9411E+2
1313.40	7.61383	1.9421E+2	1.9529E+2	1.9311E+2	1317.15	7.59215	1.9500E+2	1.9610E+2	1.9391E+2
1313.45	7.61354	1.9372E+2	1.9480E+2	1.9263E+2	1317.25	7.59158	1.9485E+2	1.9595E+2	1.9377E+2
1313.55	7.61296	1.9255E+2	1.9363E+2	1.9147E+2	1317.35	7.59100	1.9474E+2	1.9584E+2	1.9366E+2
1313.65	7.61238	1.9142E+2	1.9252E+2	1.9037E+2	1317.45	7.59042	1.9467E+2	1.9577E+2	1.9359E+2
1313.75	7.61180	1.9072E+2	1.9181E+2	1.8967E+2	1317.55	7.58985	1.9464E+2	1.9573E+2	1.9355E+2
1313.80	7.61151	1.9053E+2	1.9161E+2	1.8947E+2	1317.65	7.58927	1.9465E+2	1.9574E+2	1.9356E+2
1313.85	7.61122	1.9045E+2	1.9153E+2	1.8939E+2	1317.75	7.58869	1.9471E+2	1.9580E+2	1.9362E+2
1313.90	7.61093	1.9046E+2	1.9154E+2	1.8940E+2	1317.85	7.58812	1.9480E+2	1.9590E+2	1.9372E+2
1313.95	7.61064	1.9056E+2	1.9164E+2	1.8950E+2	1317.95	7.58754	1.9496E+2	1.9606E+2	1.9388E+2
1314.00	7.61035	1.9076E+2	1.9185E+2	1.8970E+2	1318.05	7.58697	1.9519E+2	1.9629E+2	1.9410E+2
1314.05	7.61006	1.9108E+2	1.9216E+2	1.9002E+2	1318.15	7.58639	1.9547E+2	1.9658E+2	1.9439E+2
1314.10	7.60977	1.9154E+2	1.9263E+2	1.9048E+2	1318.35	7.58524	1.9626E+2	1.9736E+2	1.9516E+2
1314.15	7.60949	1.9216E+2	1.9325E+2	1.9110E+2	1318.55	7.58409	1.9708E+2	1.9819E+2	1.9598E+2
1314.20	7.60920	1.9292E+2	1.9401E+2	1.9185E+2	1318.75	7.58294	1.9802E+2	1.9914E+2	1.9692E+2
1314.25	7.60891	1.9380E+2	1.9490E+2	1.9273E+2	1318.85	7.58236	1.9856E+2	1.9969E+2	1.9747E+2
1314.35	7.60833	1.9579E+2	1.9689E+2	1.9470E+2	1318.95	7.58179	1.9917E+2	2.0030E+2	1.9807E+2
1314.45	7.60775	1.9787E+2	1.9898E+2	1.9677E+2	1319.05	7.58121	1.9985E+2	2.0097E+2	1.9874E+2
1314.55	7.60717	2.0008E+2	2.0121E+2	1.9898E+2	1319.15	7.58064	2.0057E+2	2.0169E+2	1.9945E+2
1314.65	7.60659	2.0254E+2	2.0368E+2	2.0142E+2	1319.35	7.57949	2.0212E+2	2.0325E+2	2.0099E+2
1314.75	7.60601	2.0521E+2	2.0637E+2	2.0408E+2	1319.65	7.57777	2.0453E+2	2.0568E+2	2.0340E+2
1314.85	7.60543	2.0808E+2	2.0924E+2	2.0692E+2	1320.15	7.57490	2.0896E+2	2.1013E+2	2.0781E+2
1314.95	7.60486	2.1089E+2	2.1205E+2	2.0970E+2	1321.15	7.56916	2.1873E+2	2.1996E+2	2.1752E+2
1315.00	7.60457	2.1215E+2	2.1332E+2	2.1095E+2	1322.15	7.56344	2.2974E+2	2.3103E+2	2.2846E+2
1315.05	7.60428	2.1325E+2	2.1443E+2	2.1205E+2	1322.65	7.56058	2.3531E+2	2.3663E+2	2.3400E+2
1315.10	7.60399	2.1417E+2	2.1535E+2	2.1297E+2	1322.85	7.55943	2.3754E+2	2.3887E+2	2.3622E+2
1315.15	7.60370	2.1490E+2	2.1608E+2	2.1368E+2	1322.95	7.55886	2.3863E+2	2.3996E+2	2.3729E+2
1315.20	7.60341	2.1538E+2	2.1656E+2	2.1416E+2	1323.05	7.55829	2.3966E+2	2.4100E+2	2.3832E+2
1315.25	7.60312	2.1561E+2	2.1679E+2	2.1439E+2	1323.15	7.55772	2.4059E+2	2.4193E+2	2.3924E+2
1315.30	7.60283	2.1555E+2	2.1673E+2	2.1433E+2	1323.25	7.55715	2.4134E+2	2.4269E+2	2.3999E+2
1315.35	7.60254	2.1518E+2	2.1636E+2	2.1396E+2	1323.35	7.55658	2.4203E+2	2.4338E+2	2.4067E+2
1315.40	7.60225	2.1451E+2	2.1568E+2	2.1329E+2	1323.55	7.55544	2.4330E+2	2.4466E+2	2.4194E+2
1315.45	7.60196	2.1357E+2	2.1474E+2	2.1236E+2	1323.75	7.55429	2.4454E+2	2.4592E+2	2.4318E+2
1315.50	7.60168	2.1243E+2	2.1360E+2	2.1123E+2	1323.95	7.55315	2.4582E+2	2.4721E+2	2.4445E+2
1315.55	7.60139	2.1110E+2	2.1227E+2	2.0992E+2	1324.15	7.55201	2.4706E+2	2.4845E+2	2.4568E+2
1315.60	7.60110	2.0972E+2	2.1089E+2	2.0855E+2	1324.35	7.55087	2.4817E+2	2.4957E+2	2.4678E+2
1315.65	7.60081	2.0830E+2	2.0948E+2	2.0715E+2	1324.55	7.54973	2.4929E+2	2.5070E+2	2.4790E+2
1315.75	7.60023	2.0579E+2	2.0696E+2	2.0467E+2	1324.75	7.54859	2.5043E+2	2.5185E+2	2.4903E+2
1315.85	7.59965	2.0380E+2	2.0496E+2	2.0269E+2	1324.95	7.54745	2.5158E+2	2.5300E+2	2.5017E+2
1315.95	7.59908	2.0229E+2	2.0344E+2	2.0118E+2	1325.15	7.54631	2.5272E+2	2.5414E+2	2.5130E+2
1316.05	7.59850	2.0111E+2	2.0225E+2	2.0000E+2	1325.65	7.54347	2.5563E+2	2.5708E+2	2.5419E+2
1316.15	7.59792	2.0010E+2	2.0122E+2	1.9899E+2	1326.15	7.54062	2.5852E+2	2.5998E+2	2.5706E+2
1316.25	7.59734	1.9920E+2	2.0032E+2	1.9809E+2	1326.40	7.53920	2.5975E+2	2.6122E+2	2.5829E+2
1316.35	7.59677	1.9840E+2	1.9951E+2	1.9729E+2	1326.65	7.53778	2.6096E+2	2.6244E+2	2.5949E+2
1316.45	7.59619	1.9769E+2	1.9880E+2	1.9659E+2	1326.90	7.53636	2.6193E+2	2.6342E+2	2.6045E+2
1316.55	7.59561	1.9703E+2	1.9814E+2	1.9593E+2	1327.15	7.53494	2.6280E+2	2.6429E+2	2.6131E+2
1316.65	7.59504	1.9643E+2	1.9754E+2	1.9534E+2	1327.40	7.53352	2.6341E+2	2.6491E+2	2.6192E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1327.65	7.53210	2.6398E+2	2.6548E+2	2.6248E+2	1339.20	7.46713	1.9390E+2	1.9498E+2	1.9281E+2
1327.90	7.53068	2.6439E+2	2.6590E+2	2.6289E+2	1339.25	7.46685	1.9335E+2	1.9444E+2	1.9227E+2
1328.15	7.52926	2.6472E+2	2.6622E+2	2.6321E+2	1339.30	7.46657	1.9279E+2	1.9387E+2	1.9171E+2
1328.40	7.52785	2.6476E+2	2.6627E+2	2.6326E+2	1339.35	7.46630	1.9222E+2	1.9331E+2	1.9115E+2
1328.65	7.52643	2.6472E+2	2.6622E+2	2.6321E+2	1339.40	7.46602	1.9167E+2	1.9275E+2	1.9059E+2
1328.90	7.52502	2.6438E+2	2.6588E+2	2.6288E+2	1339.45	7.46574	1.9112E+2	1.9220E+2	1.9005E+2
1329.15	7.52360	2.6398E+2	2.6548E+2	2.6248E+2	1339.55	7.46518	1.9008E+2	1.9115E+2	1.8902E+2
1329.65	7.52077	2.6304E+2	2.6454E+2	2.6155E+2	1339.65	7.46462	1.8912E+2	1.9019E+2	1.8806E+2
1330.15	7.51794	2.6210E+2	2.6359E+2	2.6062E+2	1339.75	7.46407	1.8822E+2	1.8928E+2	1.8716E+2
1330.65	7.51512	2.6111E+2	2.6260E+2	2.5964E+2	1339.85	7.46351	1.8735E+2	1.8841E+2	1.8630E+2
1331.15	7.51229	2.6009E+2	2.6156E+2	2.5862E+2	1339.95	7.46295	1.8653E+2	1.8758E+2	1.8548E+2
1331.65	7.50947	2.5875E+2	2.6022E+2	2.5729E+2	1340.15	7.46184	1.8499E+2	1.8604E+2	1.8396E+2
1332.15	7.50665	2.5716E+2	2.5861E+2	2.5570E+2	1340.40	7.46045	1.8330E+2	1.8434E+2	1.8227E+2
1332.40	7.50525	2.5609E+2	2.5754E+2	2.5465E+2	1340.65	7.45906	1.8168E+2	1.8271E+2	1.8066E+2
1332.65	7.50384	2.5498E+2	2.5642E+2	2.5355E+2	1340.90	7.45766	1.8016E+2	1.8118E+2	1.7914E+2
1332.90	7.50243	2.5370E+2	2.5514E+2	2.5228E+2	1341.15	7.45627	1.7876E+2	1.7978E+2	1.7775E+2
1333.15	7.50102	2.5235E+2	2.5378E+2	2.5094E+2	1341.40	7.45488	1.7751E+2	1.7852E+2	1.7650E+2
1333.40	7.49962	2.5086E+2	2.5227E+2	2.4945E+2	1341.65	7.45350	1.7628E+2	1.7729E+2	1.7528E+2
1333.65	7.49821	2.4933E+2	2.5073E+2	2.4793E+2	1341.90	7.45211	1.7510E+2	1.7610E+2	1.7410E+2
1333.90	7.49680	2.4761E+2	2.4901E+2	2.4623E+2	1342.15	7.45072	1.7399E+2	1.7499E+2	1.7300E+2
1334.15	7.49540	2.4582E+2	2.4720E+2	2.4444E+2	1342.65	7.44794	1.7224E+2	1.7323E+2	1.7125E+2
1334.40	7.49400	2.4375E+2	2.4512E+2	2.4239E+2	1343.15	7.44517	1.7057E+2	1.7155E+2	1.6960E+2
1334.65	7.49259	2.4167E+2	2.4303E+2	2.4032E+2	1343.40	7.44378	1.6987E+2	1.7085E+2	1.6890E+2
1334.90	7.49119	2.3958E+2	2.4092E+2	2.3824E+2	1343.65	7.44240	1.6919E+2	1.7017E+2	1.6822E+2
1335.15	7.48979	2.3741E+2	2.3873E+2	2.3608E+2	1344.15	7.43963	1.6788E+2	1.6885E+2	1.6692E+2
1335.40	7.48838	2.3483E+2	2.3615E+2	2.3353E+2	1344.65	7.43686	1.6669E+2	1.6766E+2	1.6573E+2
1335.65	7.48698	2.3223E+2	2.3353E+2	2.3094E+2	1345.15	7.43410	1.6554E+2	1.6650E+2	1.6458E+2
1335.90	7.48558	2.2963E+2	2.3092E+2	2.2835E+2	1345.65	7.43134	1.6443E+2	1.6538E+2	1.6348E+2
1336.15	7.48418	2.2699E+2	2.2826E+2	2.2573E+2	1345.90	7.42996	1.6389E+2	1.6484E+2	1.6294E+2
1336.40	7.48278	2.2406E+2	2.2531E+2	2.2281E+2	1346.15	7.42858	1.6333E+2	1.6427E+2	1.6238E+2
1336.65	7.48138	2.2080E+2	2.2203E+2	2.1957E+2	1346.40	7.42720	1.6272E+2	1.6366E+2	1.6178E+2
1336.90	7.47998	2.1715E+2	2.1837E+2	2.1595E+2	1346.65	7.42582	1.6208E+2	1.6302E+2	1.6114E+2
1337.15	7.47858	2.1350E+2	2.1470E+2	2.1232E+2	1346.90	7.42444	1.6135E+2	1.6229E+2	1.6042E+2
1337.40	7.47718	2.1018E+2	2.1138E+2	2.0903E+2	1347.15	7.42306	1.6055E+2	1.6148E+2	1.5961E+2
1337.65	7.47579	2.0716E+2	2.0832E+2	2.0601E+2	1347.40	7.42168	1.5946E+2	1.6039E+2	1.5853E+2
1337.90	7.47439	2.0439E+2	2.0555E+2	2.0327E+2	1347.65	7.42031	1.5828E+2	1.5920E+2	1.5735E+2
1338.15	7.47299	2.0183E+2	2.0297E+2	2.0071E+2	1347.90	7.41893	1.5680E+2	1.5772E+2	1.5588E+2
1338.35	7.47188	1.9995E+2	2.0108E+2	1.9884E+2	1348.15	7.41755	1.5524E+2	1.5615E+2	1.5432E+2
1338.45	7.47132	1.9904E+2	2.0016E+2	1.9793E+2	1348.40	7.41618	1.5335E+2	1.5425E+2	1.5244E+2
1338.55	7.47076	1.9815E+2	1.9927E+2	1.9705E+2	1348.65	7.41480	1.5134E+2	1.5223E+2	1.5044E+2
1338.65	7.47020	1.9737E+2	1.9849E+2	1.9628E+2	1348.90	7.41343	1.4917E+2	1.5006E+2	1.4828E+2
1338.75	7.46964	1.9669E+2	1.9780E+2	1.9560E+2	1349.15	7.41206	1.4697E+2	1.4785E+2	1.4609E+2
1338.80	7.46936	1.9638E+2	1.9749E+2	1.9529E+2	1349.40	7.41068	1.4469E+2	1.4556E+2	1.4382E+2
1338.85	7.46908	1.9610E+2	1.9720E+2	1.9501E+2	1349.65	7.40931	1.4241E+2	1.4327E+2	1.4155E+2
1338.90	7.46881	1.9585E+2	1.9696E+2	1.9476E+2	1349.90	7.40794	1.4013E+2	1.4099E+2	1.3928E+2
1338.95	7.46853	1.9563E+2	1.9673E+2	1.9453E+2	1350.15	7.40657	1.3788E+2	1.3873E+2	1.3704E+2
1339.00	7.46825	1.9539E+2	1.9648E+2	1.9429E+2	1350.65	7.40382	1.3347E+2	1.3430E+2	1.3265E+2
1339.05	7.46797	1.9512E+2	1.9621E+2	1.9403E+2	1351.15	7.40108	1.2915E+2	1.2997E+2	1.2835E+2
1339.10	7.46769	1.9480E+2	1.9588E+2	1.9370E+2	1351.40	7.39971	1.2715E+2	1.2796E+2	1.2635E+2
1339.15	7.46741	1.9438E+2	1.9547E+2	1.9329E+2	1351.65	7.39835	1.2526E+2	1.2606E+2	1.2447E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1351.90	7.39698	1.2350E+2	1.2429E+2	1.2272E+2	1358.70	7.35995	2.2541E+2	2.2677E+2	2.2266E+2
1352.15	7.39561	1.2184E+2	1.2263E+2	1.2106E+2	1358.75	7.35968	2.2240E+2	2.2392E+2	2.1999E+2
1352.65	7.39288	1.1906E+2	1.1984E+2	1.1829E+2	1358.80	7.35941	2.1443E+2	2.1586E+2	2.1245E+2
1352.90	7.39151	1.1783E+2	1.1860E+2	1.1706E+2	1358.85	7.35914	2.0335E+2	2.0460E+2	2.0181E+2
1353.15	7.39014	1.1665E+2	1.1742E+2	1.1589E+2	1358.90	7.35887	1.9063E+2	1.9173E+2	1.8942E+2
1353.40	7.38878	1.1563E+2	1.1640E+2	1.1487E+2	1358.95	7.35860	1.7729E+2	1.7844E+2	1.7641E+2
1353.65	7.38741	1.1469E+2	1.1545E+2	1.1393E+2	1359.00	7.35833	1.6541E+2	1.6660E+2	1.6468E+2
1353.90	7.38605	1.1390E+2	1.1466E+2	1.1314E+2	1359.05	7.35806	1.5604E+2	1.5718E+2	1.5534E+2
1354.15	7.38469	1.1318E+2	1.1394E+2	1.1243E+2	1359.10	7.35779	1.4903E+2	1.5008E+2	1.4830E+2
1354.40	7.38332	1.1265E+2	1.1340E+2	1.1190E+2	1359.15	7.35752	1.4376E+2	1.4474E+2	1.4300E+2
1354.65	7.38196	1.1220E+2	1.1295E+2	1.1145E+2	1359.20	7.35725	1.3969E+2	1.4062E+2	1.3892E+2
1354.90	7.38060	1.1194E+2	1.1269E+2	1.1119E+2	1359.25	7.35697	1.3654E+2	1.3743E+2	1.3576E+2
1355.15	7.37924	1.1175E+2	1.1250E+2	1.1101E+2	1359.30	7.35670	1.3396E+2	1.3484E+2	1.3318E+2
1355.40	7.37787	1.1174E+2	1.1250E+2	1.1100E+2	1359.35	7.35643	1.3186E+2	1.3272E+2	1.3108E+2
1355.65	7.37651	1.1178E+2	1.1253E+2	1.1103E+2	1359.40	7.35616	1.3018E+2	1.3104E+2	1.2941E+2
1355.78	7.37583	1.1186E+2	1.1261E+2	1.1112E+2	1359.45	7.35589	1.2892E+2	1.2976E+2	1.2814E+2
1355.90	7.37515	1.1198E+2	1.1273E+2	1.1123E+2	1359.50	7.35562	1.2794E+2	1.2877E+2	1.2715E+2
1356.03	7.37447	1.1211E+2	1.1286E+2	1.1136E+2	1359.55	7.35535	1.2714E+2	1.2797E+2	1.2636E+2
1356.15	7.37379	1.1225E+2	1.1301E+2	1.1151E+2	1359.65	7.35481	1.2593E+2	1.2674E+2	1.2515E+2
1356.28	7.37311	1.1245E+2	1.1321E+2	1.1171E+2	1359.75	7.35427	1.2501E+2	1.2582E+2	1.2423E+2
1356.40	7.37243	1.1268E+2	1.1343E+2	1.1193E+2	1359.85	7.35373	1.2441E+2	1.2522E+2	1.2363E+2
1356.53	7.37175	1.1292E+2	1.1368E+2	1.1217E+2	1359.95	7.35319	1.2410E+2	1.2492E+2	1.2333E+2
1356.65	7.37108	1.1319E+2	1.1395E+2	1.1244E+2	1360.05	7.35265	1.2396E+2	1.2476E+2	1.2318E+2
1356.78	7.37040	1.1351E+2	1.1427E+2	1.1276E+2	1360.15	7.35211	1.2398E+2	1.2478E+2	1.2320E+2
1356.90	7.36972	1.1388E+2	1.1464E+2	1.1313E+2	1360.25	7.35156	1.2414E+2	1.2493E+2	1.2335E+2
1357.03	7.36904	1.1433E+2	1.1509E+2	1.1357E+2	1360.35	7.35102	1.2435E+2	1.2515E+2	1.2357E+2
1357.15	7.36836	1.1481E+2	1.1558E+2	1.1406E+2	1360.45	7.35048	1.2461E+2	1.2541E+2	1.2382E+2
1357.28	7.36768	1.1540E+2	1.1617E+2	1.1465E+2	1360.55	7.34994	1.2490E+2	1.2570E+2	1.2411E+2
1357.40	7.36700	1.1614E+2	1.1693E+2	1.1541E+2	1360.75	7.34886	1.2552E+2	1.2632E+2	1.2473E+2
1357.53	7.36632	1.1704E+2	1.1782E+2	1.1628E+2	1360.95	7.34778	1.2623E+2	1.2703E+2	1.2543E+2
1357.65	7.36565	1.1816E+2	1.1896E+2	1.1741E+2	1361.15	7.34670	1.2693E+2	1.2774E+2	1.2613E+2
1357.75	7.36510	1.1944E+2	1.2023E+2	1.1868E+2	1361.40	7.34535	1.2789E+2	1.2869E+2	1.2708E+2
1357.80	7.36483	1.2030E+2	1.2109E+2	1.1954E+2	1361.65	7.34401	1.2887E+2	1.2968E+2	1.2806E+2
1357.85	7.36456	1.2132E+2	1.2212E+2	1.2056E+2	1361.90	7.34266	1.2989E+2	1.3071E+2	1.2908E+2
1357.90	7.36429	1.2254E+2	1.2334E+2	1.2177E+2	1362.15	7.34131	1.3091E+2	1.3173E+2	1.3009E+2
1357.95	7.36402	1.2393E+2	1.2475E+2	1.2317E+2	1362.40	7.33996	1.3191E+2	1.3273E+2	1.3109E+2
1358.00	7.36375	1.2560E+2	1.2643E+2	1.2483E+2	1362.65	7.33862	1.3290E+2	1.3372E+2	1.3207E+2
1358.05	7.36348	1.2756E+2	1.2840E+2	1.2679E+2	1362.90	7.33727	1.3383E+2	1.3466E+2	1.3300E+2
1358.10	7.36320	1.2993E+2	1.3085E+2	1.2913E+2	1363.15	7.33592	1.3474E+2	1.3557E+2	1.3391E+2
1358.15	7.36293	1.3295E+2	1.3403E+2	1.3208E+2	1363.40	7.33458	1.3564E+2	1.3647E+2	1.3480E+2
1358.20	7.36266	1.3707E+2	1.3833E+2	1.3601E+2	1363.65	7.33323	1.3653E+2	1.3736E+2	1.3569E+2
1358.25	7.36239	1.4221E+2	1.4369E+2	1.4097E+2	1363.90	7.33189	1.3733E+2	1.3816E+2	1.3648E+2
1358.30	7.36212	1.4862E+2	1.5028E+2	1.4724E+2	1364.16	7.33055	1.3808E+2	1.3892E+2	1.3723E+2
1358.35	7.36185	1.5645E+2	1.5821E+2	1.5500E+2	1364.40	7.32920	1.3869E+2	1.3954E+2	1.3784E+2
1358.40	7.36158	1.6588E+2	1.6765E+2	1.6442E+2	1364.66	7.32786	1.3922E+2	1.4007E+2	1.3837E+2
1358.45	7.36131	1.7696E+2	1.7859E+2	1.7551E+2	1364.91	7.32652	1.3956E+2	1.4041E+2	1.3871E+2
1358.50	7.36104	1.8897E+2	1.9050E+2	1.8756E+2	1365.16	7.32517	1.3983E+2	1.4068E+2	1.3897E+2
1358.55	7.36077	2.0154E+2	2.0290E+2	1.9990E+2	1365.41	7.32383	1.3997E+2	1.4083E+2	1.3912E+2
1358.60	7.36049	2.1253E+2	2.1395E+2	2.1062E+2	1365.66	7.32249	1.4006E+2	1.4091E+2	1.3920E+2
1358.65	7.36022	2.2079E+2	2.2235E+2	2.1857E+2	1365.91	7.32115	1.3995E+2	1.4080E+2	1.3909E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1366.16	7.31981	1.3976E+2	1.4061E+2	1.3891E+2	1371.66	7.29046	1.2673E+2	1.2754E+2	1.2594E+2
1366.41	7.31847	1.3942E+2	1.4027E+2	1.3857E+2	1371.91	7.28913	1.2636E+2	1.2716E+2	1.2556E+2
1366.66	7.31713	1.3901E+2	1.3986E+2	1.3816E+2	1372.16	7.28780	1.2603E+2	1.2684E+2	1.2524E+2
1366.91	7.31580	1.3846E+2	1.3931E+2	1.3761E+2	1372.28	7.28714	1.2592E+2	1.2672E+2	1.2512E+2
1367.16	7.31446	1.3787E+2	1.3872E+2	1.3703E+2	1372.41	7.28647	1.2582E+2	1.2662E+2	1.2502E+2
1367.41	7.31312	1.3721E+2	1.3805E+2	1.3637E+2	1372.66	7.28515	1.2564E+2	1.2644E+2	1.2485E+2
1367.66	7.31178	1.3652E+2	1.3735E+2	1.3568E+2	1372.91	7.28382	1.2554E+2	1.2634E+2	1.2474E+2
1367.91	7.31045	1.3574E+2	1.3658E+2	1.3491E+2	1373.16	7.28249	1.2547E+2	1.2627E+2	1.2467E+2
1368.16	7.30911	1.3496E+2	1.3580E+2	1.3413E+2	1373.41	7.28117	1.2550E+2	1.2630E+2	1.2470E+2
1368.41	7.30778	1.3423E+2	1.3507E+2	1.3341E+2	1373.66	7.27984	1.2555E+2	1.2635E+2	1.2476E+2
1368.66	7.30644	1.3352E+2	1.3435E+2	1.3270E+2	1373.91	7.27852	1.2566E+2	1.2646E+2	1.2486E+2
1368.86	7.30537	1.3302E+2	1.3385E+2	1.3220E+2	1374.16	7.27719	1.2579E+2	1.2659E+2	1.2499E+2
1368.96	7.30484	1.3278E+2	1.3360E+2	1.3196E+2	1374.41	7.27587	1.2597E+2	1.2678E+2	1.2518E+2
1369.06	7.30431	1.3255E+2	1.3337E+2	1.3173E+2	1374.66	7.27455	1.2618E+2	1.2698E+2	1.2538E+2
1369.16	7.30377	1.3232E+2	1.3315E+2	1.3150E+2	1375.16	7.27190	1.2665E+2	1.2745E+2	1.2585E+2
1369.26	7.30324	1.3211E+2	1.3294E+2	1.3130E+2	1375.66	7.26926	1.2715E+2	1.2795E+2	1.2634E+2
1369.36	7.30271	1.3195E+2	1.3278E+2	1.3114E+2	1375.91	7.26794	1.2736E+2	1.2817E+2	1.2656E+2
1369.41	7.30244	1.3190E+2	1.3273E+2	1.3109E+2	1376.16	7.26662	1.2757E+2	1.2837E+2	1.2676E+2
1369.46	7.30217	1.3187E+2	1.3270E+2	1.3106E+2	1376.41	7.26530	1.2773E+2	1.2854E+2	1.2692E+2
1369.51	7.30191	1.3188E+2	1.3271E+2	1.3107E+2	1376.66	7.26398	1.2787E+2	1.2867E+2	1.2706E+2
1369.56	7.30164	1.3192E+2	1.3275E+2	1.3110E+2	1376.91	7.26266	1.2795E+2	1.2875E+2	1.2714E+2
1369.61	7.30137	1.3198E+2	1.3281E+2	1.3117E+2	1377.16	7.26134	1.2799E+2	1.2880E+2	1.2719E+2
1369.66	7.30111	1.3208E+2	1.3291E+2	1.3127E+2	1377.41	7.26002	1.2793E+2	1.2874E+2	1.2712E+2
1369.71	7.30084	1.3225E+2	1.3308E+2	1.3143E+2	1377.66	7.25870	1.2783E+2	1.2864E+2	1.2703E+2
1369.76	7.30057	1.3250E+2	1.3334E+2	1.3169E+2	1377.91	7.25739	1.2764E+2	1.2845E+2	1.2684E+2
1369.81	7.30031	1.3287E+2	1.3371E+2	1.3206E+2	1378.16	7.25607	1.2742E+2	1.2823E+2	1.2662E+2
1369.86	7.30004	1.3332E+2	1.3415E+2	1.3250E+2	1378.28	7.25541	1.2727E+2	1.2807E+2	1.2646E+2
1369.91	7.29977	1.3380E+2	1.3463E+2	1.3298E+2	1378.41	7.25475	1.2708E+2	1.2789E+2	1.2628E+2
1369.96	7.29951	1.3432E+2	1.3515E+2	1.3348E+2	1378.53	7.25410	1.2689E+2	1.2769E+2	1.2609E+2
1370.01	7.29924	1.3479E+2	1.3561E+2	1.3395E+2	1378.66	7.25344	1.2666E+2	1.2746E+2	1.2585E+2
1370.06	7.29897	1.3515E+2	1.3598E+2	1.3431E+2	1378.91	7.25212	1.2607E+2	1.2687E+2	1.2527E+2
1370.11	7.29871	1.3542E+2	1.3625E+2	1.3458E+2	1379.16	7.25081	1.2543E+2	1.2623E+2	1.2464E+2
1370.16	7.29844	1.3555E+2	1.3636E+2	1.3469E+2	1379.41	7.24949	1.2471E+2	1.2551E+2	1.2392E+2
1370.21	7.29817	1.3546E+2	1.3627E+2	1.3460E+2	1379.66	7.24818	1.2397E+2	1.2476E+2	1.2318E+2
1370.26	7.29791	1.3516E+2	1.3597E+2	1.3430E+2	1379.91	7.24687	1.2317E+2	1.2396E+2	1.2238E+2
1370.31	7.29764	1.3462E+2	1.3543E+2	1.3377E+2	1380.16	7.24555	1.2231E+2	1.2310E+2	1.2152E+2
1370.36	7.29738	1.3384E+2	1.3465E+2	1.3300E+2	1380.41	7.24424	1.2134E+2	1.2212E+2	1.2056E+2
1370.41	7.29711	1.3290E+2	1.3373E+2	1.3208E+2	1380.66	7.24293	1.2034E+2	1.2112E+2	1.1956E+2
1370.46	7.29684	1.3199E+2	1.3282E+2	1.3118E+2	1380.91	7.24162	1.1932E+2	1.2010E+2	1.1855E+2
1370.51	7.29658	1.3115E+2	1.3198E+2	1.3034E+2	1381.16	7.24031	1.1827E+2	1.1904E+2	1.1750E+2
1370.56	7.29631	1.3040E+2	1.3124E+2	1.2961E+2	1381.41	7.23900	1.1715E+2	1.1792E+2	1.1638E+2
1370.61	7.29604	1.2984E+2	1.3068E+2	1.2905E+2	1381.66	7.23769	1.1601E+2	1.1677E+2	1.1524E+2
1370.66	7.29578	1.2946E+2	1.3029E+2	1.2867E+2	1382.16	7.23507	1.1370E+2	1.1446E+2	1.1295E+2
1370.76	7.29525	1.2896E+2	1.2979E+2	1.2817E+2	1382.66	7.23245	1.1135E+2	1.1210E+2	1.1061E+2
1370.86	7.29471	1.2858E+2	1.2939E+2	1.2778E+2	1383.16	7.22984	1.0900E+2	1.0973E+2	1.0828E+2
1370.96	7.29418	1.2824E+2	1.2906E+2	1.2744E+2	1383.66	7.22722	1.0659E+2	1.0730E+2	1.0589E+2
1371.06	7.29365	1.2795E+2	1.2876E+2	1.2715E+2	1384.16	7.22461	1.0421E+2	1.0490E+2	1.0354E+2
1371.16	7.29312	1.2771E+2	1.2851E+2	1.2690E+2	1384.66	7.22200	1.0196E+2	1.0263E+2	1.0131E+2
1371.28	7.29245	1.2744E+2	1.2824E+2	1.2663E+2	1385.16	7.21940	9.9779E+1	1.0042E+2	9.9142E+1
1371.41	7.29179	1.2719E+2	1.2799E+2	1.2639E+2	1385.66	7.21679	9.7718E+1	9.8345E+1	9.7098E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1386.16	7.21419	9.5744E+1	9.6355E+1	9.5142E+1	1403.16	7.12677	7.3023E+1	7.3469E+1	7.2580E+1
1386.66	7.21159	9.3956E+1	9.4552E+1	9.3368E+1	1403.66	7.12423	7.3467E+1	7.3917E+1	7.3022E+1
1387.16	7.20899	9.2271E+1	9.2853E+1	9.1696E+1	1404.16	7.12170	7.3963E+1	7.4416E+1	7.3514E+1
1387.66	7.20639	9.0730E+1	9.1299E+1	9.0166E+1	1404.41	7.12043	7.4249E+1	7.4703E+1	7.3798E+1
1388.16	7.20379	8.9237E+1	8.9795E+1	8.8685E+1	1404.66	7.11916	7.4545E+1	7.5001E+1	7.4092E+1
1388.66	7.20120	8.7832E+1	8.8379E+1	8.7291E+1	1405.16	7.11663	7.5173E+1	7.5634E+1	7.4717E+1
1389.16	7.19861	8.6465E+1	8.7002E+1	8.5934E+1	1405.66	7.11410	7.5901E+1	7.6366E+1	7.5440E+1
1389.66	7.19602	8.5196E+1	8.5724E+1	8.4674E+1	1405.91	7.11283	7.6281E+1	7.6749E+1	7.5818E+1
1390.16	7.19343	8.3975E+1	8.4494E+1	8.3461E+1	1406.16	7.11157	7.6675E+1	7.7145E+1	7.6209E+1
1390.66	7.19084	8.2872E+1	8.3383E+1	8.2366E+1	1406.41	7.11030	7.7109E+1	7.7582E+1	7.6640E+1
1391.16	7.18826	8.1820E+1	8.2323E+1	8.1321E+1	1406.66	7.10904	7.7563E+1	7.8038E+1	7.7091E+1
1391.66	7.18567	8.0836E+1	8.1332E+1	8.0344E+1	1407.16	7.10651	7.8503E+1	7.8986E+1	7.8026E+1
1392.16	7.18309	7.9887E+1	8.0377E+1	7.9401E+1	1407.66	7.10399	7.9525E+1	8.0014E+1	7.9040E+1
1392.66	7.18051	7.9002E+1	7.9486E+1	7.8522E+1	1408.16	7.10147	8.0583E+1	8.1080E+1	8.0092E+1
1393.16	7.17794	7.8153E+1	7.8632E+1	7.7679E+1	1408.66	7.09894	8.1723E+1	8.2227E+1	8.1223E+1
1393.66	7.17536	7.7360E+1	7.7833E+1	7.6890E+1	1409.16	7.09643	8.2909E+1	8.3421E+1	8.2401E+1
1394.16	7.17279	7.6584E+1	7.7052E+1	7.6119E+1	1410.16	7.09139	8.5455E+1	8.5987E+1	8.4929E+1
1394.66	7.17021	7.5842E+1	7.6306E+1	7.5382E+1	1411.16	7.08637	8.8208E+1	8.8760E+1	8.7662E+1
1395.16	7.16764	7.5119E+1	7.5578E+1	7.4664E+1	1412.16	7.08135	9.1244E+1	9.1820E+1	9.0675E+1
1395.41	7.16636	7.4776E+1	7.5233E+1	7.4323E+1	1414.16	7.07133	9.7806E+1	9.8438E+1	9.7183E+1
1395.66	7.16508	7.4446E+1	7.4900E+1	7.3994E+1	1416.16	7.06134	1.0531E+2	1.0601E+2	1.0462E+2
1395.91	7.16379	7.4125E+1	7.4578E+1	7.3676E+1	1418.16	7.05139	1.1370E+2	1.1446E+2	1.1295E+2
1396.16	7.16251	7.3821E+1	7.4273E+1	7.3374E+1	1419.16	7.04642	1.1827E+2	1.1905E+2	1.1750E+2
1396.41	7.16123	7.3563E+1	7.4013E+1	7.3117E+1	1420.16	7.04145	1.2323E+2	1.2402E+2	1.2244E+2
1396.66	7.15995	7.3320E+1	7.3768E+1	7.2876E+1	1421.16	7.03650	1.2834E+2	1.2916E+2	1.2754E+2
1396.91	7.15866	7.3092E+1	7.3539E+1	7.2649E+1	1422.16	7.03155	1.3391E+2	1.3474E+2	1.3308E+2
1397.16	7.15738	7.2876E+1	7.3321E+1	7.2434E+1	1422.66	7.02908	1.3698E+2	1.3782E+2	1.3614E+2
1397.41	7.15610	7.2696E+1	7.3140E+1	7.2255E+1	1423.16	7.02661	1.4011E+2	1.4097E+2	1.3926E+2
1397.66	7.15482	7.2533E+1	7.2976E+1	7.2093E+1	1423.66	7.02414	1.4335E+2	1.4422E+2	1.4248E+2
1397.91	7.15354	7.2376E+1	7.2818E+1	7.1937E+1	1424.16	7.02167	1.4663E+2	1.4751E+2	1.4575E+2
1398.16	7.15226	7.2228E+1	7.2670E+1	7.1790E+1	1425.16	7.01675	1.5335E+2	1.5427E+2	1.5245E+2
1398.41	7.15098	7.2102E+1	7.2542E+1	7.1665E+1	1426.16	7.01183	1.6057E+2	1.6152E+2	1.5964E+2
1398.66	7.14971	7.1985E+1	7.2425E+1	7.1548E+1	1427.19	7.00676	1.6860E+2	1.6959E+2	1.6764E+2
1398.91	7.14843	7.1878E+1	7.2317E+1	7.1442E+1	1428.19	7.00186	1.7724E+2	1.7829E+2	1.7626E+2
1399.16	7.14715	7.1792E+1	7.2231E+1	7.1357E+1	1429.19	6.99696	1.8660E+2	1.8767E+2	1.8556E+2
1399.41	7.14587	7.1732E+1	7.2170E+1	7.1296E+1	1430.19	6.99206	1.9668E+2	1.9781E+2	1.9560E+2
1399.66	7.14460	7.1681E+1	7.2119E+1	7.1246E+1	1431.19	6.98718	2.0750E+2	2.0871E+2	2.0638E+2
1399.91	7.14332	7.1644E+1	7.2082E+1	7.1210E+1	1432.19	6.98230	2.1982E+2	2.2108E+2	2.1862E+2
1400.16	7.14205	7.1627E+1	7.2066E+1	7.1194E+1	1433.19	6.97742	2.3410E+2	2.3544E+2	2.3281E+2
1400.41	7.14077	7.1657E+1	7.2095E+1	7.1222E+1	1434.19	6.97256	2.4965E+2	2.5110E+2	2.4828E+2
1400.66	7.13950	7.1701E+1	7.2139E+1	7.1266E+1	1435.19	6.96770	2.6679E+2	2.6837E+2	2.6532E+2
1400.91	7.13822	7.1756E+1	7.2194E+1	7.1321E+1	1436.19	6.96285	2.8605E+2	2.8779E+2	2.8445E+2
1401.16	7.13695	7.1821E+1	7.2260E+1	7.1386E+1	1437.19	6.95800	3.0797E+2	3.0975E+2	3.0607E+2
1401.41	7.13567	7.1916E+1	7.2355E+1	7.1480E+1	1438.19	6.95316	3.2688E+2	3.2886E+2	3.2485E+2
1401.66	7.13440	7.2023E+1	7.2463E+1	7.1586E+1	1438.69	6.95075	3.3564E+2	3.3767E+2	3.3349E+2
1401.91	7.13313	7.2138E+1	7.2579E+1	7.1701E+1	1439.19	6.94833	3.4282E+2	3.4495E+2	3.4063E+2
1402.16	7.13186	7.2266E+1	7.2708E+1	7.1828E+1	1439.69	6.94592	3.4897E+2	3.5111E+2	3.4667E+2
1402.41	7.13059	7.2433E+1	7.2875E+1	7.1993E+1	1440.19	6.94351	3.5315E+2	3.5533E+2	3.5080E+2
1402.66	7.12931	7.2609E+1	7.3053E+1	7.2169E+1	1440.69	6.94110	3.5524E+2	3.5748E+2	3.5290E+2
1402.91	7.12804	7.2808E+1	7.3253E+1	7.2366E+1	1441.19	6.93869	3.5597E+2	3.5821E+2	3.5362E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1442.19	6.93388	3.5429E+2	3.5652E+2	3.5196E+2	1472.20	6.79256	2.8804E+2	2.8967E+2	2.8630E+2
1442.69	6.93147	3.5215E+2	3.5434E+2	3.4983E+2	1472.70	6.79025	2.8891E+2	2.9056E+2	2.8718E+2
1443.20	6.92907	3.4845E+2	3.5062E+2	3.4619E+2	1473.20	6.78795	2.8864E+2	2.9029E+2	2.8691E+2
1444.20	6.92427	3.3889E+2	3.4098E+2	3.3674E+2	1473.70	6.78565	2.8719E+2	2.8883E+2	2.8547E+2
1445.20	6.91948	3.2792E+2	3.2994E+2	3.2590E+2	1474.20	6.78334	2.8471E+2	2.8632E+2	2.8301E+2
1446.20	6.91469	3.1672E+2	3.1868E+2	3.1484E+2	1475.20	6.77875	2.7765E+2	2.7924E+2	2.7603E+2
1447.20	6.90992	3.0679E+2	3.0867E+2	3.0500E+2	1476.20	6.77415	2.6981E+2	2.7137E+2	2.6827E+2
1448.20	6.90514	2.9825E+2	3.0006E+2	2.9653E+2	1477.20	6.76957	2.6209E+2	2.6363E+2	2.6063E+2
1448.70	6.90276	2.9476E+2	2.9650E+2	2.9303E+2	1478.20	6.76499	2.5572E+2	2.5723E+2	2.5433E+2
1449.20	6.90038	2.9123E+2	2.9302E+2	2.8961E+2	1478.70	6.76270	2.5365E+2	2.5512E+2	2.5224E+2
1450.20	6.89562	2.8769E+2	2.8940E+2	2.8604E+2	1479.20	6.76041	2.5209E+2	2.5355E+2	2.5069E+2
1451.20	6.89087	2.8518E+2	2.8687E+2	2.8355E+2	1479.70	6.75813	2.5109E+2	2.5253E+2	2.4969E+2
1452.20	6.88612	2.8350E+2	2.8515E+2	2.8185E+2	1480.20	6.75584	2.5040E+2	2.5185E+2	2.4901E+2
1453.20	6.88138	2.8180E+2	2.8342E+2	2.8015E+2	1480.70	6.75356	2.5021E+2	2.5164E+2	2.4881E+2
1453.70	6.87902	2.8053E+2	2.8214E+2	2.7888E+2	1481.20	6.75128	2.5034E+2	2.5178E+2	2.4895E+2
1454.20	6.87665	2.7863E+2	2.8021E+2	2.7698E+2	1481.70	6.74900	2.5085E+2	2.5229E+2	2.4944E+2
1454.70	6.87429	2.7563E+2	2.7716E+2	2.7398E+2	1482.20	6.74673	2.5162E+2	2.5306E+2	2.5021E+2
1455.20	6.87192	2.7114E+2	2.7263E+2	2.6952E+2	1483.20	6.74218	2.5374E+2	2.5518E+2	2.5230E+2
1455.70	6.86956	2.6496E+2	2.6643E+2	2.6340E+2	1484.20	6.73763	2.5574E+2	2.5718E+2	2.5427E+2
1456.20	6.86720	2.5759E+2	2.5901E+2	2.5608E+2	1484.70	6.73536	2.5634E+2	2.5776E+2	2.5484E+2
1456.70	6.86485	2.4897E+2	2.5037E+2	2.4755E+2	1485.20	6.73310	2.5606E+2	2.5748E+2	2.5457E+2
1457.20	6.86249	2.3986E+2	2.4124E+2	2.3854E+2	1485.70	6.73083	2.5482E+2	2.5624E+2	2.5335E+2
1458.20	6.85778	2.2297E+2	2.2427E+2	2.2177E+2	1486.20	6.72857	2.5291E+2	2.5429E+2	2.5142E+2
1459.20	6.85308	2.0815E+2	2.0942E+2	2.0708E+2	1486.70	6.72630	2.4962E+2	2.5099E+2	2.4817E+2
1459.70	6.85074	2.0285E+2	2.0403E+2	2.0174E+2	1487.20	6.72404	2.4538E+2	2.4673E+2	2.4396E+2
1460.20	6.84839	1.9839E+2	1.9956E+2	1.9732E+2	1488.20	6.71952	2.3512E+2	2.3639E+2	2.3374E+2
1460.70	6.84605	1.9521E+2	1.9635E+2	1.9415E+2	1489.20	6.71501	2.2265E+2	2.2387E+2	2.2137E+2
1461.20	6.84370	1.9286E+2	1.9398E+2	1.9180E+2	1490.20	6.71050	2.0873E+2	2.0993E+2	2.0758E+2
1461.45	6.84253	1.9199E+2	1.9310E+2	1.9093E+2	1491.20	6.70600	1.9540E+2	1.9652E+2	1.9432E+2
1461.70	6.84136	1.9138E+2	1.9249E+2	1.9033E+2	1492.20	6.70151	1.8268E+2	1.8378E+2	1.8169E+2
1461.95	6.84019	1.9103E+2	1.9212E+2	1.8996E+2	1493.20	6.69702	1.7203E+2	1.7306E+2	1.7108E+2
1462.20	6.83902	1.9091E+2	1.9201E+2	1.8985E+2	1494.20	6.69254	1.6292E+2	1.6390E+2	1.6199E+2
1462.45	6.83785	1.9107E+2	1.9219E+2	1.9002E+2	1495.20	6.68806	1.5495E+2	1.5590E+2	1.5407E+2
1462.70	6.83668	1.9146E+2	1.9257E+2	1.9040E+2	1496.20	6.68359	1.4823E+2	1.4913E+2	1.4735E+2
1462.95	6.83551	1.9211E+2	1.9322E+2	1.9105E+2	1497.20	6.67912	1.4190E+2	1.4277E+2	1.4104E+2
1463.20	6.83435	1.9296E+2	1.9408E+2	1.9190E+2	1498.20	6.67467	1.3583E+2	1.3667E+2	1.3499E+2
1463.45	6.83318	1.9412E+2	1.9524E+2	1.9304E+2	1499.20	6.67021	1.2971E+2	1.3053E+2	1.2889E+2
1463.70	6.83201	1.9546E+2	1.9659E+2	1.9439E+2	1500.17	6.66591	1.2359E+2	1.2439E+2	1.2280E+2
1464.20	6.82968	1.9877E+2	1.9993E+2	1.9769E+2	1500.67	6.66369	1.2023E+2	1.2101E+2	1.1945E+2
1464.70	6.82735	2.0284E+2	2.0401E+2	2.0173E+2	1501.17	6.66147	1.1689E+2	1.1767E+2	1.1612E+2
1465.20	6.82502	2.0772E+2	2.0891E+2	2.0658E+2	1501.42	6.66036	1.1519E+2	1.1595E+2	1.1442E+2
1466.20	6.82036	2.1876E+2	2.2003E+2	2.1758E+2	1501.67	6.65925	1.1345E+2	1.1422E+2	1.1270E+2
1467.20	6.81571	2.3170E+2	2.3302E+2	2.3042E+2	1501.92	6.65814	1.1171E+2	1.1247E+2	1.1096E+2
1468.20	6.81107	2.4514E+2	2.4654E+2	2.4377E+2	1502.17	6.65703	1.0994E+2	1.1069E+2	1.0920E+2
1469.20	6.80643	2.5883E+2	2.6031E+2	2.5736E+2	1502.67	6.65482	1.0629E+2	1.0701E+2	1.0558E+2
1469.70	6.80412	2.6563E+2	2.6713E+2	2.6409E+2	1503.17	6.65260	1.0269E+2	1.0337E+2	1.0201E+2
1470.20	6.80180	2.7179E+2	2.7334E+2	2.7021E+2	1503.42	6.65150	1.0081E+2	1.0147E+2	1.0014E+2
1470.70	6.79949	2.7747E+2	2.7903E+2	2.7583E+2	1503.67	6.65039	9.8414E+1	9.9068E+1	9.7786E+1
1471.20	6.79718	2.8206E+2	2.8366E+2	2.8038E+2	1503.92	6.64929	9.6489E+1	9.7116E+1	9.5868E+1
1471.70	6.79487	2.8571E+2	2.8733E+2	2.8400E+2	1504.17	6.64818	9.4584E+1	9.5195E+1	9.3979E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1504.67	6.64597	9.0820E+1	9.1406E+1	9.0251E+1	1530.67	6.53307	2.9888E+1	3.0308E+1	2.9700E+1
1505.17	6.64376	8.7197E+1	8.7751E+1	8.6653E+1	1531.17	6.53094	2.9682E+1	3.0103E+1	2.9496E+1
1506.17	6.63935	8.0618E+1	8.1124E+1	8.0121E+1	1531.67	6.52880	2.9482E+1	2.9904E+1	2.9298E+1
1507.17	6.63495	7.4532E+1	7.4997E+1	7.4075E+1	1532.17	6.52667	2.9287E+1	2.9709E+1	2.9104E+1
1507.67	6.63275	7.1732E+1	7.2178E+1	7.1290E+1	1532.67	6.52454	2.9103E+1	2.9526E+1	2.8921E+1
1508.17	6.63055	6.9035E+1	6.9466E+1	6.8610E+1	1533.17	6.52242	2.8921E+1	2.9345E+1	2.8741E+1
1508.67	6.62835	6.6545E+1	6.6960E+1	6.6134E+1	1533.67	6.52029	2.8742E+1	2.9165E+1	2.8563E+1
1509.17	6.62615	6.4146E+1	6.4549E+1	6.3749E+1	1534.17	6.51816	2.8570E+1	2.8995E+1	2.8393E+1
1509.67	6.62396	6.1960E+1	6.2356E+1	6.1580E+1	1534.67	6.51604	2.8405E+1	2.8830E+1	2.8229E+1
1510.17	6.62176	5.9902E+1	6.0282E+1	5.9528E+1	1535.17	6.51392	2.8242E+1	2.8668E+1	2.8067E+1
1510.67	6.61957	5.8005E+1	5.8380E+1	5.7640E+1	1536.17	6.50968	2.7923E+1	2.8349E+1	2.7750E+1
1511.17	6.61738	5.6232E+1	5.6607E+1	5.5876E+1	1537.17	6.50544	2.7606E+1	2.8035E+1	2.7436E+1
1511.67	6.61519	5.4579E+1	5.4955E+1	5.4230E+1	1538.17	6.50121	2.7295E+1	2.7725E+1	2.7126E+1
1512.17	6.61301	5.2981E+1	5.3357E+1	5.2640E+1	1540.18	6.49277	2.6669E+1	2.7102E+1	2.6504E+1
1512.67	6.61082	5.1512E+1	5.1890E+1	5.1178E+1	1542.18	6.48435	2.6015E+1	2.6452E+1	2.5855E+1
1513.17	6.60863	5.0122E+1	5.0500E+1	4.9793E+1	1543.18	6.48015	2.5677E+1	2.6115E+1	2.5496E+1
1513.67	6.60645	4.8803E+1	4.9182E+1	4.8481E+1	1544.18	6.47595	2.5325E+1	2.5765E+1	2.5115E+1
1514.17	6.60427	4.7548E+1	4.7927E+1	4.7231E+1	1544.68	6.47385	2.5142E+1	2.5583E+1	2.4918E+1
1514.67	6.60209	4.6391E+1	4.6771E+1	4.6079E+1	1545.18	6.47176	2.4958E+1	2.5399E+1	2.4724E+1
1515.17	6.59991	4.5286E+1	4.5667E+1	4.4979E+1	1545.68	6.46966	2.4769E+1	2.5211E+1	2.4525E+1
1515.67	6.59773	4.4300E+1	4.4681E+1	4.3997E+1	1546.18	6.46757	2.4576E+1	2.5019E+1	2.4330E+1
1516.17	6.59556	4.3355E+1	4.3737E+1	4.3056E+1	1547.18	6.46339	2.4185E+1	2.4629E+1	2.3926E+1
1516.67	6.59338	4.2465E+1	4.2848E+1	4.2169E+1	1548.18	6.45921	2.3799E+1	2.4245E+1	2.3538E+1
1517.17	6.59121	4.1607E+1	4.1990E+1	4.1315E+1	1550.18	6.45088	2.3019E+1	2.3468E+1	2.2747E+1
1517.67	6.58904	4.0809E+1	4.1194E+1	4.0520E+1	1552.18	6.44257	2.2221E+1	2.2672E+1	2.1970E+1
1518.17	6.58687	4.0057E+1	4.0442E+1	3.9773E+1	1554.18	6.43428	2.1414E+1	2.1868E+1	2.1170E+1
1518.67	6.58470	3.9343E+1	3.9729E+1	3.9068E+1	1555.18	6.43014	2.1014E+1	2.1469E+1	2.0781E+1
1519.17	6.58253	3.8669E+1	3.9055E+1	3.8401E+1	1556.18	6.42601	2.0616E+1	2.1072E+1	2.0385E+1
1519.67	6.58036	3.8019E+1	3.8406E+1	3.7758E+1	1557.18	6.42188	2.0226E+1	2.0684E+1	2.0005E+1
1520.17	6.57820	3.7405E+1	3.7793E+1	3.7150E+1	1558.18	6.41776	1.9831E+1	2.0290E+1	1.9601E+1
1520.67	6.57604	3.6786E+1	3.7213E+1	3.6538E+1	1559.18	6.41364	1.9443E+1	1.9903E+1	1.9213E+1
1521.17	6.57388	3.6248E+1	3.6675E+1	3.6006E+1	1560.18	6.40953	1.9059E+1	1.9521E+1	1.8828E+1
1521.67	6.57171	3.5738E+1	3.6146E+1	3.5501E+1	1561.18	6.40542	1.8686E+1	1.9149E+1	1.8449E+1
1522.17	6.56956	3.5261E+1	3.5669E+1	3.5028E+1	1562.18	6.40132	1.8318E+1	1.8782E+1	1.8077E+1
1522.67	6.56740	3.4815E+1	3.5224E+1	3.4586E+1	1563.18	6.39723	1.7957E+1	1.8423E+1	1.7716E+1
1523.17	6.56524	3.4387E+1	3.4797E+1	3.4162E+1	1564.18	6.39314	1.7606E+1	1.8072E+1	1.7368E+1
1523.67	6.56309	3.3979E+1	3.4390E+1	3.3758E+1	1565.18	6.38905	1.7263E+1	1.7731E+1	1.7033E+1
1524.17	6.56093	3.3585E+1	3.3997E+1	3.3368E+1	1566.18	6.38497	1.6929E+1	1.7398E+1	1.6704E+1
1524.67	6.55878	3.3216E+1	3.3628E+1	3.3001E+1	1567.18	6.38090	1.6606E+1	1.7075E+1	1.6387E+1
1525.17	6.55663	3.2859E+1	3.3272E+1	3.2647E+1	1568.18	6.37683	1.6294E+1	1.6764E+1	1.6079E+1
1525.67	6.55448	3.2521E+1	3.2935E+1	3.2313E+1	1569.18	6.37276	1.5989E+1	1.6460E+1	1.5776E+1
1526.17	6.55234	3.2195E+1	3.2610E+1	3.1989E+1	1570.18	6.36870	1.5691E+1	1.6163E+1	1.5481E+1
1526.67	6.55019	3.1885E+1	3.2300E+1	3.1682E+1	1571.18	6.36465	1.5400E+1	1.5874E+1	1.5196E+1
1527.17	6.54804	3.1600E+1	3.2016E+1	3.1399E+1	1572.18	6.36060	1.5112E+1	1.5587E+1	1.4910E+1
1527.67	6.54590	3.1329E+1	3.1746E+1	3.1131E+1	1573.18	6.35656	1.4832E+1	1.5307E+1	1.4632E+1
1528.17	6.54376	3.1065E+1	3.1482E+1	3.0868E+1	1574.18	6.35252	1.4552E+1	1.5029E+1	1.4351E+1
1528.67	6.54162	3.0810E+1	3.1228E+1	3.0615E+1	1575.18	6.34848	1.4278E+1	1.4755E+1	1.4078E+1
1529.17	6.53948	3.0561E+1	3.0979E+1	3.0368E+1	1576.18	6.34446	1.4004E+1	1.4483E+1	1.3803E+1
1529.67	6.53734	3.0324E+1	3.0743E+1	3.0133E+1	1577.18	6.34043	1.3735E+1	1.4215E+1	1.3536E+1
1530.17	6.53520	3.0098E+1	3.0518E+1	2.9909E+1	1580.18	6.32839	1.2941E+1	1.3423E+1	1.2745E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1585.18	6.30843	1.1648E+1	1.2134E+1	1.1448E+1	1668.19	5.99452	1.3153E+0	1.8221E+0	1.2022E+0
1590.18	6.28859	1.0384E+1	1.0875E+1	1.0182E+1	1669.19	5.99093	1.2896E+0	1.7966E+0	1.1780E+0
1595.18	6.26888	9.1473E+0	9.6414E+0	8.9276E+0	1670.20	5.98730	1.2652E+0	1.7722E+0	1.1536E+0
1600.18	6.24929	7.9793E+0	8.4764E+0	7.7572E+0	1672.20	5.98014	1.2225E+0	1.7296E+0	1.1115E+0
1602.18	6.24149	7.5351E+0	8.0332E+0	7.3181E+0	1673.20	5.97656	1.2032E+0	1.7103E+0	1.0928E+0
1604.18	6.23371	7.1110E+0	7.6100E+0	6.8965E+0	1674.20	5.97299	1.1852E+0	1.6922E+0	1.0758E+0
1606.18	6.22594	6.7021E+0	7.2019E+0	6.4912E+0	1675.20	5.96943	1.1693E+0	1.6762E+0	1.0611E+0
1608.18	6.21820	6.3094E+0	6.8100E+0	6.1039E+0	1676.20	5.96586	1.1558E+0	1.6625E+0	1.0494E+0
1609.18	6.21433	6.1209E+0	6.6219E+0	5.9168E+0	1677.20	5.96231	1.1451E+0	1.6517E+0	1.0412E+0
1610.18	6.21047	5.9355E+0	6.4369E+0	5.7333E+0	1677.70	5.96053	1.1410E+0	1.6476E+0	1.0385E+0
1611.18	6.20662	5.7560E+0	6.2577E+0	5.5553E+0	1678.20	5.95875	1.1376E+0	1.6441E+0	1.0366E+0
1612.18	6.20277	5.5795E+0	6.0815E+0	5.3808E+0	1679.20	5.95520	1.1337E+0	1.6401E+0	1.0355E+0
1614.18	6.19508	5.2397E+0	5.7424E+0	5.0439E+0	1680.20	5.95166	1.1322E+0	1.6384E+0	1.0354E+0
1616.18	6.18742	4.9197E+0	5.4229E+0	4.7265E+0	1681.20	5.94812	1.1319E+0	1.6381E+0	1.0364E+0
1618.18	6.17977	4.6154E+0	5.1191E+0	4.4321E+0	1682.70	5.94282	1.1339E+0	1.6396E+0	1.0398E+0
1620.18	6.17214	4.3297E+0	4.8339E+0	4.1587E+0	1683.70	5.93929	1.1355E+0	1.6407E+0	1.0428E+0
1621.18	6.16833	4.1928E+0	4.6972E+0	4.0273E+0	1684.20	5.93752	1.1355E+0	1.6409E+0	1.0442E+0
1622.18	6.16453	4.0634E+0	4.5680E+0	3.9047E+0	1684.70	5.93576	1.1359E+0	1.6400E+0	1.0446E+0
1623.18	6.16073	3.9411E+0	4.4458E+0	3.7837E+0	1685.20	5.93400	1.1330E+0	1.6367E+0	1.0416E+0
1624.18	6.15694	3.8222E+0	4.3271E+0	3.6713E+0	1685.70	5.93224	1.1236E+0	1.6291E+0	1.0321E+0
1625.18	6.15315	3.7085E+0	4.2135E+0	3.5602E+0	1686.20	5.93048	1.1114E+0	1.6198E+0	1.0197E+0
1626.18	6.14936	3.6017E+0	4.1068E+0	3.4566E+0	1686.70	5.92872	1.1020E+0	1.6115E+0	1.0101E+0
1627.18	6.14558	3.4972E+0	4.0024E+0	3.3542E+0	1687.20	5.92696	1.0954E+0	1.6042E+0	1.0034E+0
1628.18	6.14181	3.3991E+0	3.9044E+0	3.2591E+0	1687.70	5.92521	1.0921E+0	1.5973E+0	1.0001E+0
1628.69	6.13992	3.3513E+0	3.8566E+0	3.2120E+0	1688.20	5.92345	1.0906E+0	1.5903E+0	9.9851E-1
1629.19	6.13804	3.3047E+0	3.8101E+0	3.1651E+0	1688.70	5.92170	1.0850E+0	1.5803E+0	9.9282E-1
1629.69	6.13615	3.2605E+0	3.7660E+0	3.1218E+0	1689.20	5.91994	1.0724E+0	1.5657E+0	9.8002E-1
1630.19	6.13427	3.2168E+0	3.7223E+0	3.0788E+0	1689.70	5.91819	1.0542E+0	1.5475E+0	9.6144E-1
1631.19	6.13051	3.1309E+0	3.6365E+0	2.9935E+0	1690.20	5.91644	1.0339E+0	1.5281E+0	9.4078E-1
1632.19	6.12675	3.0515E+0	3.5572E+0	2.9158E+0	1691.21	5.91294	9.9189E-1	1.4882E+0	8.9809E-1
1635.19	6.11551	2.8283E+0	3.3341E+0	2.6951E+0	1692.21	5.90945	9.5141E-1	1.4494E+0	8.5691E-1
1640.19	6.09687	2.5121E+0	3.0182E+0	2.3793E+0	1693.21	5.90596	9.1301E-1	1.4124E+0	8.1784E-1
1641.19	6.09315	2.4552E+0	2.9613E+0	2.3211E+0	1694.21	5.90247	8.7703E-1	1.3769E+0	7.8124E-1
1642.19	6.08944	2.4002E+0	2.9063E+0	2.2658E+0	1695.21	5.89899	8.4195E-1	1.3423E+0	7.4556E-1
1643.19	6.08574	2.3460E+0	2.8521E+0	2.2108E+0	1696.21	5.89551	8.0739E-1	1.3089E+0	7.1040E-1
1644.19	6.08203	2.2935E+0	2.7997E+0	2.1583E+0	1697.21	5.89204	7.7355E-1	1.2760E+0	6.7598E-1
1646.19	6.07464	2.1932E+0	2.6995E+0	2.0568E+0	1698.21	5.88857	7.4070E-1	1.2438E+0	6.4255E-1
1648.19	6.06727	2.0981E+0	2.6043E+0	1.9609E+0	1700.21	5.88164	6.7917E-1	1.1828E+0	5.7996E-1
1650.19	6.05992	2.0071E+0	2.5134E+0	1.8690E+0	1702.21	5.87473	6.2327E-1	1.1268E+0	5.2284E-1
1652.19	6.05258	1.9193E+0	2.4255E+0	1.7805E+0	1703.21	5.87128	5.9699E-1	1.1005E+0	4.9636E-1
1654.19	6.04526	1.8337E+0	2.3399E+0	1.6952E+0	1704.21	5.86783	5.7205E-1	1.0754E+0	4.7187E-1
1656.19	6.03796	1.7490E+0	2.2552E+0	1.6129E+0	1705.21	5.86439	5.4816E-1	1.0515E+0	4.4882E-1
1658.19	6.03068	1.6655E+0	2.1717E+0	1.5334E+0	1707.21	5.85752	5.0325E-1	1.0066E+0	4.0580E-1
1660.19	6.02341	1.5845E+0	2.0907E+0	1.4577E+0	1709.21	5.85067	4.6137E-1	9.6467E-1	3.6512E-1
1662.19	6.01616	1.5078E+0	2.0141E+0	1.3866E+0	1711.21	5.84383	4.2237E-1	9.2564E-1	3.2675E-1
1663.19	6.01255	1.4705E+0	1.9769E+0	1.3522E+0	1713.21	5.83700	3.8466E-1	8.8783E-1	2.9012E-1
1664.19	6.00893	1.4352E+0	1.9417E+0	1.3197E+0	1715.21	5.83020	3.4950E-1	8.5252E-1	2.5706E-1
1665.19	6.00532	1.4021E+0	1.9087E+0	1.2872E+0	1717.21	5.82341	3.1781E-1	8.2039E-1	2.2651E-1
1666.19	6.00172	1.3719E+0	1.8785E+0	1.2572E+0	1719.21	5.81663	2.8958E-1	7.9178E-1	1.9832E-1
1667.19	5.99812	1.3431E+0	1.8498E+0	1.2289E+0	1721.21	5.80987	2.6434E-1	7.6602E-1	1.7248E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1723.21	5.80313	2.4141E-1	7.4235E-1	1.4901E-1	1787.22	5.59529	2.9392E-1	7.7611E-1	2.0500E-1
1724.21	5.79976	2.3087E-1	7.3143E-1	1.3869E-1	1788.22	5.59216	3.2294E-1	8.0440E-1	2.3258E-1
1725.21	5.79640	2.2109E-1	7.2123E-1	1.2947E-1	1789.22	5.58904	3.5872E-1	8.4004E-1	2.6489E-1
1726.21	5.79304	2.1204E-1	7.1174E-1	1.2138E-1	1790.22	5.58591	3.9804E-1	8.7922E-1	3.0081E-1
1727.21	5.78969	2.0365E-1	7.0285E-1	1.1410E-1	1791.22	5.58280	4.4066E-1	9.2150E-1	3.4108E-1
1729.21	5.78299	1.8812E-1	6.8604E-1	1.0079E-1	1792.22	5.57968	4.8667E-1	9.6713E-1	3.8663E-1
1731.21	5.77631	1.7377E-1	6.7133E-1	8.8691E-2	1794.22	5.57346	5.8254E-1	1.0622E+0	4.8400E-1
1732.21	5.77297	1.6708E-1	6.6504E-1	8.3029E-2	1796.22	5.56725	6.8182E-1	1.1607E+0	5.8633E-1
1734.21	5.76631	1.5488E-1	6.5369E-1	7.2438E-2	1798.22	5.56106	7.7977E-1	1.2577E+0	6.8598E-1
1736.21	5.75967	1.4355E-1	6.4309E-1	6.2845E-2	1800.22	5.55488	8.7632E-1	1.3535E+0	7.8201E-1
1738.21	5.75304	1.3346E-1	6.3336E-1	5.4234E-2	1802.22	5.54872	9.7306E-1	1.4495E+0	8.7676E-1
1739.21	5.74973	1.2896E-1	6.2881E-1	5.0253E-2	1803.22	5.54564	1.0216E+0	1.4977E+0	9.2314E-1
1740.21	5.74643	1.2502E-1	6.2454E-1	4.6684E-2	1804.22	5.54257	1.0718E+0	1.5478E+0	9.7189E-1
1742.21	5.73983	1.1917E-1	6.1626E-1	4.0334E-2	1805.22	5.53949	1.1244E+0	1.6001E+0	1.0233E+0
1744.21	5.73325	1.1451E-1	6.0964E-1	3.4643E-2	1806.22	5.53643	1.1829E+0	1.6582E+0	1.0805E+0
1746.21	5.72668	1.1039E-1	6.0408E-1	2.9571E-2	1807.22	5.53336	1.2479E+0	1.7227E+0	1.1469E+0
1748.21	5.72013	1.0674E-1	5.9984E-1	2.5049E-2	1808.22	5.53030	1.3215E+0	1.7958E+0	1.2219E+0
1750.21	5.71359	1.0359E-1	5.9657E-1	2.1396E-2	1810.22	5.52419	1.4949E+0	1.9688E+0	1.3872E+0
1751.21	5.71033	1.0223E-1	5.9523E-1	1.9836E-2	1812.22	5.51809	1.6833E+0	2.1563E+0	1.5753E+0
1752.21	5.70707	1.0105E-1	5.9415E-1	1.8503E-2	1813.22	5.51505	1.7804E+0	2.2529E+0	1.6779E+0
1753.21	5.70381	1.0005E-1	5.9335E-1	1.7406E-2	1814.22	5.51201	1.8866E+0	2.3588E+0	1.7855E+0
1754.21	5.70056	9.9231E-2	5.9220E-1	1.6539E-2	1815.22	5.50897	1.9976E+0	2.4696E+0	1.8966E+0
1755.21	5.69731	9.8807E-2	5.9152E-1	1.5925E-2	1816.22	5.50594	2.1142E+0	2.5862E+0	2.0091E+0
1756.21	5.69407	9.8561E-2	5.9101E-1	1.5506E-2	1817.22	5.50291	2.2232E+0	2.6949E+0	2.1197E+0
1757.21	5.69083	9.8524E-2	5.9083E-1	1.5313E-2	1818.22	5.49988	2.3286E+0	2.8000E+0	2.2272E+0
1758.21	5.68759	9.8593E-2	5.9074E-1	1.5257E-2	1819.22	5.49686	2.4292E+0	2.9004E+0	2.3302E+0
1759.21	5.68436	9.8799E-2	5.9087E-1	1.5335E-2	1819.72	5.49535	2.4742E+0	2.9455E+0	2.3749E+0
1760.21	5.68113	9.9223E-2	5.9117E-1	1.5683E-2	1820.22	5.49384	2.5136E+0	2.9849E+0	2.4138E+0
1761.21	5.67790	9.9878E-2	5.9175E-1	1.6226E-2	1820.72	5.49233	2.5421E+0	3.0133E+0	2.4432E+0
1762.21	5.67468	1.0083E-1	5.9258E-1	1.7103E-2	1821.22	5.49082	2.5644E+0	3.0353E+0	2.4673E+0
1763.21	5.67146	1.0204E-1	5.9365E-1	1.8285E-2	1822.22	5.48781	2.5972E+0	3.0678E+0	2.5019E+0
1764.21	5.66825	1.0360E-1	5.9499E-1	1.9883E-2	1824.22	5.48179	2.6616E+0	3.1312E+0	2.5724E+0
1765.21	5.66504	1.0551E-1	5.9665E-1	2.1889E-2	1826.22	5.47579	2.7415E+0	3.2106E+0	2.6498E+0
1766.21	5.66183	1.0778E-1	5.9839E-1	2.4320E-2	1827.22	5.47279	2.7851E+0	3.2542E+0	2.6914E+0
1767.21	5.65862	1.1077E-1	6.0078E-1	2.7359E-2	1828.22	5.46980	2.8313E+0	3.3002E+0	2.7362E+0
1768.21	5.65542	1.1437E-1	6.0397E-1	3.0715E-2	1830.22	5.46382	2.9285E+0	3.3956E+0	2.8395E+0
1769.21	5.65223	1.1869E-1	6.0806E-1	3.4478E-2	1832.22	5.45785	3.0313E+0	3.4963E+0	2.9404E+0
1770.21	5.64903	1.2298E-1	6.1210E-1	3.8151E-2	1833.22	5.45488	3.0867E+0	3.5508E+0	2.9950E+0
1772.21	5.64266	1.3264E-1	6.2111E-1	4.6836E-2	1834.22	5.45190	3.1458E+0	3.6087E+0	3.0532E+0
1774.22	5.63629	1.4236E-1	6.3044E-1	5.6259E-2	1835.22	5.44893	3.2132E+0	3.6753E+0	3.1200E+0
1776.22	5.62995	1.5269E-1	6.4044E-1	6.6733E-2	1835.72	5.44745	3.2530E+0	3.7147E+0	3.1595E+0
1778.22	5.62361	1.6567E-1	6.5303E-1	7.9293E-2	1836.22	5.44596	3.2999E+0	3.7613E+0	3.2060E+0
1779.22	5.62045	1.7385E-1	6.6095E-1	8.7126E-2	1836.72	5.44448	3.3497E+0	3.8108E+0	3.2555E+0
1780.22	5.61730	1.8336E-1	6.7029E-1	9.5811E-2	1837.22	5.44300	3.4057E+0	3.8665E+0	3.3112E+0
1781.22	5.61414	1.9447E-1	6.8106E-1	1.0634E-1	1838.22	5.44004	3.5345E+0	3.9942E+0	3.4394E+0
1782.22	5.61099	2.0676E-1	6.9289E-1	1.1848E-1	1839.22	5.43708	3.6871E+0	4.1455E+0	3.5913E+0
1783.22	5.60784	2.2040E-1	7.0599E-1	1.3208E-1	1840.22	5.43412	3.8637E+0	4.3214E+0	3.7673E+0
1784.22	5.60470	2.3533E-1	7.2029E-1	1.4704E-1	1841.22	5.43117	4.0485E+0	4.5057E+0	3.9514E+0
1785.22	5.60156	2.5167E-1	7.3596E-1	1.6370E-1	1842.22	5.42822	4.2300E+0	4.6866E+0	4.1324E+0
1786.22	5.59843	2.7055E-1	7.5375E-1	1.8229E-1	1842.72	5.42675	4.3155E+0	4.7719E+0	4.2178E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1843.22	5.42528	4.3966E+0	4.8528E+0	4.2989E+0	1853.72	5.39454	4.1033E+0	4.5569E+0	4.0029E+0
1843.52	5.42439	4.4404E+0	4.8964E+0	4.3425E+0	1853.92	5.39396	4.1008E+0	4.5544E+0	4.0004E+0
1843.72	5.42381	4.4685E+0	4.9244E+0	4.3706E+0	1854.12	5.39338	4.1000E+0	4.5537E+0	3.9997E+0
1844.02	5.42292	4.5100E+0	4.9657E+0	4.4120E+0	1854.22	5.39309	4.0999E+0	4.5537E+0	3.9996E+0
1844.12	5.42263	4.5234E+0	4.9790E+0	4.4254E+0	1854.32	5.39280	4.1010E+0	4.5548E+0	4.0007E+0
1844.22	5.42234	4.5358E+0	4.9912E+0	4.4377E+0	1854.52	5.39222	4.1046E+0	4.5585E+0	4.0044E+0
1844.32	5.42204	4.5456E+0	5.0009E+0	4.4474E+0	1854.72	5.39164	4.1099E+0	4.5638E+0	4.0097E+0
1844.37	5.42189	4.5485E+0	5.0038E+0	4.4504E+0	1855.22	5.39018	4.1270E+0	4.5813E+0	4.0270E+0
1844.42	5.42175	4.5498E+0	5.0051E+0	4.4517E+0	1855.73	5.38873	4.1496E+0	4.6042E+0	4.0498E+0
1844.47	5.42160	4.5500E+0	5.0053E+0	4.4519E+0	1856.23	5.38728	4.1789E+0	4.6338E+0	4.0793E+0
1844.52	5.42145	4.5491E+0	5.0043E+0	4.4510E+0	1856.73	5.38583	4.2144E+0	4.6695E+0	4.1150E+0
1844.72	5.42087	4.5407E+0	4.9959E+0	4.4426E+0	1856.98	5.38510	4.2351E+0	4.6902E+0	4.1357E+0
1845.02	5.41998	4.5286E+0	4.9839E+0	4.4306E+0	1857.23	5.38438	4.2589E+0	4.7140E+0	4.1595E+0
1845.22	5.41940	4.5212E+0	4.9764E+0	4.4232E+0	1857.48	5.38365	4.2855E+0	4.7404E+0	4.1860E+0
1845.47	5.41866	4.5117E+0	4.9669E+0	4.4137E+0	1857.73	5.38293	4.3155E+0	4.7701E+0	4.2159E+0
1845.72	5.41793	4.5019E+0	4.9571E+0	4.4039E+0	1857.98	5.38220	4.3488E+0	4.8031E+0	4.2491E+0
1845.97	5.41719	4.4919E+0	4.9471E+0	4.3939E+0	1858.23	5.38148	4.3861E+0	4.8400E+0	4.2862E+0
1846.22	5.41646	4.4803E+0	4.9355E+0	4.3822E+0	1858.73	5.38003	4.4679E+0	4.9207E+0	4.3673E+0
1846.47	5.41573	4.4671E+0	4.9224E+0	4.3690E+0	1859.23	5.37858	4.5559E+0	5.0077E+0	4.4546E+0
1846.72	5.41499	4.4529E+0	4.9083E+0	4.3548E+0	1859.73	5.37714	4.6488E+0	5.1008E+0	4.5480E+0
1847.22	5.41353	4.4235E+0	4.8789E+0	4.3254E+0	1860.23	5.37569	4.7473E+0	5.1995E+0	4.6471E+0
1847.72	5.41206	4.3929E+0	4.8483E+0	4.2948E+0	1862.23	5.36992	5.1749E+0	5.6283E+0	5.0767E+0
1848.22	5.41060	4.3607E+0	4.8161E+0	4.2626E+0	1864.23	5.36416	5.6351E+0	6.0892E+0	5.5385E+0
1849.22	5.40767	4.2970E+0	4.7520E+0	4.1985E+0	1865.23	5.36128	5.8785E+0	6.3327E+0	5.7824E+0
1850.22	5.40475	4.2360E+0	4.6905E+0	4.1370E+0	1865.73	5.35984	5.9942E+0	6.4486E+0	5.8985E+0
1850.72	5.40329	4.2079E+0	4.6622E+0	4.1086E+0	1866.23	5.35841	6.0972E+0	6.5518E+0	6.0019E+0
1850.97	5.40256	4.1956E+0	4.6499E+0	4.0963E+0	1866.73	5.35697	6.2016E+0	6.6564E+0	6.1067E+0
1851.22	5.40183	4.1880E+0	4.6423E+0	4.0885E+0	1867.23	5.35554	6.3176E+0	6.7726E+0	6.2232E+0
1851.32	5.40154	4.1870E+0	4.6413E+0	4.0874E+0	1867.73	5.35410	6.4552E+0	6.9104E+0	6.3611E+0
1851.42	5.40125	4.1883E+0	4.6427E+0	4.0887E+0	1868.23	5.35267	6.6144E+0	7.0696E+0	6.5206E+0
1851.52	5.40095	4.1918E+0	4.6462E+0	4.0920E+0	1869.23	5.34981	6.9509E+0	7.4058E+0	6.8576E+0
1851.62	5.40066	4.1988E+0	4.6533E+0	4.0990E+0	1870.23	5.34695	7.2581E+0	7.7122E+0	7.1654E+0
1851.72	5.40037	4.2077E+0	4.6621E+0	4.1077E+0	1870.43	5.34637	7.3131E+0	7.7670E+0	7.2205E+0
1851.82	5.40008	4.2170E+0	4.6715E+0	4.1170E+0	1870.73	5.34552	7.3895E+0	7.8432E+0	7.2970E+0
1851.92	5.39979	4.2250E+0	4.6795E+0	4.1249E+0	1870.93	5.34494	7.4451E+0	7.8986E+0	7.3526E+0
1852.02	5.39950	4.2313E+0	4.6857E+0	4.1310E+0	1871.13	5.34437	7.5109E+0	7.9642E+0	7.4184E+0
1852.07	5.39935	4.2335E+0	4.6879E+0	4.1332E+0	1871.23	5.34409	7.5532E+0	8.0063E+0	7.4606E+0
1852.12	5.39920	4.2340E+0	4.6884E+0	4.1336E+0	1871.43	5.34352	7.6549E+0	8.1078E+0	7.5622E+0
1852.17	5.39906	4.2321E+0	4.6865E+0	4.1317E+0	1871.63	5.34294	7.7829E+0	8.2357E+0	7.6899E+0
1852.22	5.39891	4.2271E+0	4.6814E+0	4.1266E+0	1871.83	5.34237	7.9241E+0	8.3768E+0	7.8310E+0
1852.32	5.39862	4.2107E+0	4.6651E+0	4.1102E+0	1871.93	5.34209	7.9997E+0	8.4522E+0	7.9065E+0
1852.42	5.39833	4.1930E+0	4.6473E+0	4.0925E+0	1872.03	5.34180	8.0742E+0	8.5266E+0	7.9809E+0
1852.52	5.39804	4.1759E+0	4.6301E+0	4.0754E+0	1872.13	5.34152	8.1454E+0	8.5977E+0	8.0520E+0
1852.62	5.39775	4.1606E+0	4.6147E+0	4.0601E+0	1872.23	5.34123	8.2144E+0	8.6666E+0	8.1210E+0
1852.72	5.39746	4.1474E+0	4.6014E+0	4.0469E+0	1872.43	5.34066	8.3499E+0	8.8021E+0	8.2563E+0
1852.82	5.39716	4.1360E+0	4.5898E+0	4.0355E+0	1872.63	5.34009	8.4865E+0	8.9387E+0	8.3927E+0
1852.92	5.39687	4.1285E+0	4.5822E+0	4.0279E+0	1872.83	5.33952	8.6248E+0	9.0769E+0	8.5307E+0
1853.02	5.39658	4.1230E+0	4.5767E+0	4.0224E+0	1872.93	5.33924	8.7054E+0	9.1574E+0	8.6112E+0
1853.22	5.39600	4.1143E+0	4.5679E+0	4.0138E+0	1873.03	5.33895	8.7993E+0	9.2511E+0	8.7049E+0
1853.52	5.39513	4.1067E+0	4.5603E+0	4.0063E+0	1873.13	5.33867	8.9074E+0	9.3590E+0	8.8127E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1873.23	5.33838	9.0183E+0	9.4696E+0	8.9232E+0	1877.07	5.32746	2.3740E+1	2.5764E+1	2.1849E+1
1873.29	5.33821	9.0726E+0	9.5241E+0	8.9773E+0	1877.10	5.32736	2.5232E+1	2.7281E+1	2.3337E+1
1873.35	5.33804	9.1151E+0	9.5667E+0	9.0196E+0	1877.14	5.32726	2.6342E+1	2.8212E+1	2.4413E+1
1873.39	5.33792	9.1299E+0	9.5817E+0	9.0343E+0	1877.17	5.32716	2.7099E+1	2.8847E+1	2.5242E+1
1873.43	5.33781	9.1234E+0	9.5753E+0	9.0277E+0	1877.21	5.32706	2.7503E+1	2.9154E+1	2.5785E+1
1873.48	5.33767	9.0714E+0	9.5235E+0	8.9757E+0	1877.24	5.32696	2.7389E+1	2.8866E+1	2.5771E+1
1873.53	5.33753	8.9912E+0	9.4435E+0	8.8957E+0	1877.28	5.32686	2.6768E+1	2.8114E+1	2.5295E+1
1873.58	5.33738	8.8902E+0	9.3426E+0	8.7949E+0	1877.32	5.32676	2.5851E+1	2.7088E+1	2.4540E+1
1873.63	5.33724	8.7748E+0	9.2276E+0	8.6797E+0	1877.35	5.32666	2.4679E+1	2.5823E+1	2.3530E+1
1873.73	5.33696	8.4973E+0	8.9504E+0	8.4024E+0	1877.39	5.32656	2.3212E+1	2.4246E+1	2.2195E+1
1873.83	5.33667	8.2018E+0	8.6548E+0	8.1070E+0	1877.42	5.32646	2.1717E+1	2.2639E+1	2.0828E+1
1873.93	5.33639	7.9278E+0	8.3805E+0	7.8330E+0	1877.46	5.32636	2.0171E+1	2.0989E+1	1.9422E+1
1874.03	5.33610	7.6962E+0	8.1491E+0	7.6014E+0	1877.49	5.32626	1.8701E+1	1.9434E+1	1.8078E+1
1874.13	5.33582	7.5216E+0	7.9746E+0	7.4268E+0	1877.56	5.32606	1.6025E+1	1.6605E+1	1.5576E+1
1874.23	5.33553	7.3830E+0	7.8361E+0	7.2883E+0	1877.63	5.32586	1.3889E+1	1.4330E+1	1.3602E+1
1874.33	5.33525	7.2642E+0	7.7177E+0	7.1697E+0	1877.70	5.32566	1.2280E+1	1.2720E+1	1.2082E+1
1874.43	5.33496	7.1618E+0	7.6157E+0	7.0674E+0	1877.77	5.32546	1.1065E+1	1.1506E+1	1.0879E+1
1874.53	5.33468	7.0753E+0	7.5296E+0	6.9810E+0	1877.84	5.32526	1.0182E+1	1.0626E+1	1.0055E+1
1874.63	5.33439	7.0047E+0	7.4595E+0	6.9105E+0	1877.91	5.32506	9.4817E+0	9.9272E+0	9.3659E+0
1874.73	5.33411	6.9543E+0	7.4093E+0	6.8601E+0	1877.95	5.32496	9.2021E+0	9.6481E+0	9.0918E+0
1874.83	5.33382	6.9204E+0	7.3756E+0	6.8263E+0	1877.99	5.32486	8.9596E+0	9.4061E+0	8.8554E+0
1874.93	5.33354	6.9000E+0	7.3551E+0	6.8059E+0	1878.02	5.32476	8.7562E+0	9.2032E+0	8.6600E+0
1875.03	5.33326	6.8921E+0	7.3470E+0	6.7979E+0	1878.09	5.32456	8.4289E+0	8.8767E+0	8.3320E+0
1875.13	5.33297	6.8978E+0	7.3526E+0	6.8036E+0	1878.16	5.32436	8.1728E+0	8.6210E+0	8.0755E+0
1875.23	5.33269	6.9106E+0	7.3652E+0	6.8163E+0	1878.27	5.32406	7.8633E+0	8.3120E+0	7.7656E+0
1875.33	5.33240	6.9328E+0	7.3870E+0	6.8384E+0	1878.36	5.32381	7.6564E+0	8.1055E+0	7.5584E+0
1875.43	5.33212	6.9633E+0	7.4172E+0	6.8690E+0	1878.44	5.32356	7.4814E+0	7.9310E+0	7.3832E+0
1875.53	5.33183	7.0016E+0	7.4550E+0	6.9073E+0	1878.53	5.32332	7.3289E+0	7.7788E+0	7.2304E+0
1875.63	5.33155	7.0500E+0	7.5031E+0	6.9559E+0	1878.63	5.32303	7.1728E+0	7.6230E+0	7.0741E+0
1875.73	5.33126	7.1148E+0	7.5679E+0	7.0212E+0	1878.73	5.32275	7.0309E+0	7.4817E+0	6.9321E+0
1875.80	5.33106	7.1727E+0	7.6258E+0	7.0794E+0	1878.83	5.32247	6.9269E+0	7.3779E+0	6.8280E+0
1875.87	5.33086	7.2408E+0	7.6939E+0	7.1479E+0	1878.93	5.32218	6.8488E+0	7.2998E+0	6.7496E+0
1875.94	5.33066	7.3253E+0	7.7785E+0	7.2328E+0	1879.03	5.32190	6.7861E+0	7.2370E+0	6.6867E+0
1876.01	5.33046	7.4279E+0	7.8812E+0	7.3358E+0	1879.13	5.32162	6.7342E+0	7.1851E+0	6.6346E+0
1876.08	5.33026	7.5604E+0	8.0138E+0	7.4687E+0	1879.23	5.32133	6.6867E+0	7.1376E+0	6.5869E+0
1876.15	5.33006	7.7156E+0	8.1692E+0	7.6245E+0	1879.43	5.32077	6.6064E+0	7.0572E+0	6.5062E+0
1876.22	5.32986	7.8955E+0	8.3491E+0	7.8053E+0	1879.63	5.32020	6.5356E+0	6.9863E+0	6.4351E+0
1876.29	5.32966	8.1016E+0	8.5552E+0	8.0128E+0	1879.83	5.31964	6.4758E+0	6.9264E+0	6.3750E+0
1876.36	5.32946	8.3637E+0	8.8175E+0	8.2770E+0	1880.03	5.31907	6.4239E+0	6.8743E+0	6.3227E+0
1876.43	5.32926	8.6969E+0	9.1501E+0	8.6101E+0	1880.23	5.31850	6.3795E+0	6.8299E+0	6.2781E+0
1876.50	5.32906	9.1022E+0	9.5543E+0	8.9726E+0	1880.53	5.31766	6.3230E+0	6.7733E+0	6.2212E+0
1876.58	5.32886	9.6504E+0	1.0103E+1	9.4760E+0	1880.73	5.31709	6.2888E+0	6.7389E+0	6.1867E+0
1876.65	5.32866	1.0431E+1	1.0885E+1	1.0182E+1	1881.23	5.31568	6.2140E+0	6.6639E+0	6.1113E+0
1876.72	5.32846	1.1458E+1	1.1946E+1	1.1049E+1	1881.73	5.31426	6.1499E+0	6.5997E+0	6.0466E+0
1876.79	5.32826	1.3030E+1	1.3826E+1	1.2400E+1	1882.23	5.31285	6.0934E+0	6.5431E+0	5.9896E+0
1876.82	5.32816	1.3989E+1	1.4958E+1	1.3131E+1	1882.73	5.31144	6.0428E+0	6.4925E+0	5.9388E+0
1876.86	5.32806	1.5160E+1	1.6418E+1	1.4103E+1	1883.23	5.31003	5.9989E+0	6.4485E+0	5.8947E+0
1876.93	5.32786	1.7696E+1	1.9270E+1	1.6218E+1	1883.73	5.30862	5.9625E+0	6.4121E+0	5.8585E+0
1877.00	5.32766	2.0640E+1	2.2508E+1	1.8906E+1	1884.03	5.30778	5.9455E+0	6.3952E+0	5.8418E+0
1877.03	5.32756	2.2205E+1	2.4165E+1	2.0372E+1	1884.23	5.30721	5.9391E+0	6.3891E+0	5.8358E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1884.43	5.30665	5.9369E+0	6.3872E+0	5.8342E+0	1887.31	5.29856	6.6974E+0	7.1419E+0	6.5906E+0
1884.63	5.30609	5.9386E+0	6.3893E+0	5.8367E+0	1887.38	5.29836	6.5349E+0	6.9800E+0	6.4279E+0
1884.83	5.30552	5.9514E+0	6.4026E+0	5.8505E+0	1887.48	5.29806	6.3286E+0	6.7743E+0	6.2215E+0
1885.03	5.30496	5.9856E+0	6.4375E+0	5.8859E+0	1887.56	5.29786	6.2165E+0	6.6624E+0	6.1093E+0
1885.23	5.30440	6.0659E+0	6.5184E+0	5.9675E+0	1887.63	5.29766	6.1263E+0	6.5724E+0	6.0191E+0
1885.33	5.30411	6.1340E+0	6.5868E+0	6.0364E+0	1887.70	5.29746	6.0537E+0	6.4999E+0	5.9464E+0
1885.43	5.30383	6.2171E+0	6.6701E+0	6.1202E+0	1887.77	5.29726	6.0007E+0	6.4470E+0	5.8932E+0
1885.53	5.30355	6.3183E+0	6.7713E+0	6.2225E+0	1887.84	5.29706	5.9605E+0	6.4067E+0	5.8528E+0
1885.63	5.30327	6.4495E+0	6.9024E+0	6.3548E+0	1887.91	5.29686	5.9263E+0	6.3725E+0	5.8185E+0
1885.73	5.30299	6.6349E+0	7.0870E+0	6.5413E+0	1888.03	5.29653	5.8845E+0	6.3308E+0	5.7765E+0
1885.78	5.30285	6.7565E+0	7.2081E+0	6.6635E+0	1888.13	5.29625	5.8581E+0	6.3045E+0	5.7499E+0
1885.83	5.30271	6.9180E+0	7.3690E+0	6.8256E+0	1888.23	5.29597	5.8349E+0	6.2812E+0	5.7265E+0
1885.88	5.30256	7.1590E+0	7.6092E+0	7.0673E+0	1888.53	5.29513	5.7714E+0	6.2178E+0	5.6627E+0
1885.92	5.30246	7.3544E+0	7.8041E+0	7.2634E+0	1888.73	5.29457	5.7333E+0	6.1799E+0	5.6247E+0
1885.95	5.30236	7.6244E+0	8.0733E+0	7.5327E+0	1888.83	5.29429	5.7173E+0	6.1641E+0	5.6088E+0
1885.99	5.30226	7.9519E+0	8.4000E+0	7.8328E+0	1888.93	5.29400	5.7046E+0	6.1515E+0	5.5962E+0
1886.03	5.30216	8.3394E+0	8.7868E+0	8.1763E+0	1889.03	5.29372	5.6947E+0	6.1417E+0	5.5865E+0
1886.06	5.30206	8.8235E+0	9.2712E+0	8.6152E+0	1889.13	5.29344	5.6893E+0	6.1364E+0	5.5812E+0
1886.10	5.30196	9.3706E+0	9.8194E+0	9.1089E+0	1889.23	5.29316	5.6873E+0	6.1344E+0	5.5793E+0
1886.13	5.30186	9.9970E+0	1.0448E+1	9.6630E+0	1889.43	5.29260	5.6889E+0	6.1361E+0	5.5811E+0
1886.17	5.30176	1.0747E+1	1.1252E+1	1.0305E+1	1889.73	5.29176	5.6959E+0	6.1432E+0	5.5883E+0
1886.20	5.30166	1.1669E+1	1.2330E+1	1.1121E+1	1889.83	5.29148	5.7024E+0	6.1498E+0	5.5950E+0
1886.24	5.30156	1.2703E+1	1.3523E+1	1.2008E+1	1889.93	5.29120	5.7125E+0	6.1598E+0	5.6051E+0
1886.27	5.30146	1.3830E+1	1.4804E+1	1.2949E+1	1890.03	5.29092	5.7237E+0	6.1710E+0	5.6164E+0
1886.31	5.30136	1.5107E+1	1.6305E+1	1.4042E+1	1890.13	5.29064	5.7338E+0	6.1810E+0	5.6265E+0
1886.35	5.30126	1.6398E+1	1.7768E+1	1.5157E+1	1890.23	5.29036	5.7407E+0	6.1880E+0	5.6336E+0
1886.38	5.30116	1.7700E+1	1.9177E+1	1.6292E+1	1890.33	5.29008	5.7446E+0	6.1919E+0	5.6375E+0
1886.42	5.30106	1.8923E+1	2.0447E+1	1.7390E+1	1890.43	5.28980	5.7421E+0	6.1895E+0	5.6352E+0
1886.45	5.30096	1.9945E+1	2.1492E+1	1.8315E+1	1890.53	5.28952	5.7363E+0	6.1838E+0	5.6294E+0
1886.49	5.30086	2.0701E+1	2.2260E+1	1.9024E+1	1890.63	5.28924	5.7307E+0	6.1784E+0	5.6240E+0
1886.52	5.30076	2.0986E+1	2.2558E+1	1.9358E+1	1890.73	5.28896	5.7261E+0	6.1738E+0	5.6195E+0
1886.56	5.30066	2.0754E+1	2.2204E+1	1.9177E+1	1890.83	5.28868	5.7221E+0	6.1698E+0	5.6156E+0
1886.59	5.30056	2.0191E+1	2.1527E+1	1.8741E+1	1890.93	5.28841	5.7200E+0	6.1678E+0	5.6137E+0
1886.63	5.30046	1.9309E+1	2.0562E+1	1.8079E+1	1891.03	5.28813	5.7191E+0	6.1669E+0	5.6129E+0
1886.67	5.30036	1.7965E+1	1.9010E+1	1.6907E+1	1891.23	5.28757	5.7237E+0	6.1716E+0	5.6177E+0
1886.70	5.30026	1.6530E+1	1.7403E+1	1.5692E+1	1891.43	5.28701	5.7370E+0	6.1851E+0	5.6313E+0
1886.74	5.30016	1.5079E+1	1.5791E+1	1.4468E+1	1891.53	5.28673	5.7495E+0	6.1976E+0	5.6438E+0
1886.77	5.30006	1.3740E+1	1.4264E+1	1.3296E+1	1891.63	5.28645	5.7655E+0	6.2137E+0	5.6599E+0
1886.81	5.29996	1.2561E+1	1.3009E+1	1.2242E+1	1891.73	5.28617	5.7854E+0	6.2336E+0	5.6799E+0
1886.84	5.29986	1.1502E+1	1.1944E+1	1.1261E+1	1891.93	5.28561	5.8350E+0	6.2834E+0	5.7297E+0
1886.88	5.29976	1.0562E+1	1.1001E+1	1.0345E+1	1892.03	5.28533	5.8678E+0	6.3162E+0	5.7625E+0
1886.92	5.29966	9.8606E+0	1.0299E+1	9.6712E+0	1892.13	5.28505	5.9060E+0	6.3543E+0	5.8007E+0
1886.95	5.29956	9.1594E+0	9.5965E+0	8.9969E+0	1892.23	5.28477	5.9474E+0	6.3956E+0	5.8422E+0
1886.99	5.29946	8.6358E+0	9.0727E+0	8.5127E+0	1892.33	5.28449	5.9942E+0	6.4423E+0	5.8891E+0
1887.02	5.29936	8.1863E+0	8.6233E+0	8.0785E+0	1892.43	5.28421	6.0486E+0	6.4964E+0	5.9436E+0
1887.06	5.29926	7.8257E+0	8.2633E+0	7.7090E+0	1892.63	5.28365	6.1907E+0	6.6381E+0	6.0859E+0
1887.09	5.29916	7.5663E+0	8.0049E+0	7.4603E+0	1892.73	5.28337	6.2893E+0	6.7370E+0	6.1845E+0
1887.13	5.29906	7.3386E+0	7.7784E+0	7.2326E+0	1892.83	5.28310	6.4114E+0	6.8597E+0	6.3065E+0
1887.16	5.29896	7.1540E+0	7.5952E+0	7.0479E+0	1892.93	5.28282	6.5663E+0	7.0155E+0	6.4612E+0
1887.20	5.29886	7.0192E+0	7.4615E+0	6.9128E+0	1893.03	5.28254	6.7200E+0	7.1692E+0	6.6145E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1893.08	5.28240	6.7878E+0	7.2369E+0	6.6820E+0	1897.43	5.27029	8.5666E+0	9.0104E+0	8.4624E+0
1893.13	5.28226	6.8399E+0	7.2889E+0	6.7340E+0	1897.48	5.27015	8.6381E+0	9.0821E+0	8.5337E+0
1893.18	5.28212	6.8754E+0	7.3243E+0	6.7693E+0	1897.53	5.27001	8.7022E+0	9.1466E+0	8.5977E+0
1893.23	5.28198	6.8980E+0	7.3468E+0	6.7919E+0	1897.58	5.26987	8.7440E+0	9.1888E+0	8.6393E+0
1893.28	5.28184	6.9032E+0	7.3519E+0	6.7971E+0	1897.63	5.26973	8.7635E+0	9.2087E+0	8.6586E+0
1893.33	5.28170	6.8913E+0	7.3398E+0	6.7853E+0	1897.68	5.26959	8.7402E+0	9.1856E+0	8.6352E+0
1893.38	5.28156	6.8682E+0	7.3165E+0	6.7622E+0	1897.73	5.26945	8.6908E+0	9.1365E+0	8.5858E+0
1893.43	5.28142	6.8351E+0	7.2833E+0	6.7292E+0	1897.78	5.26931	8.6141E+0	9.0600E+0	8.5092E+0
1893.48	5.28128	6.7907E+0	7.2386E+0	6.6848E+0	1897.83	5.26918	8.5084E+0	8.9547E+0	8.4037E+0
1893.53	5.28114	6.7362E+0	7.1840E+0	6.6305E+0	1897.93	5.26890	8.2512E+0	8.6979E+0	8.1465E+0
1893.58	5.28100	6.6736E+0	7.1213E+0	6.5681E+0	1898.03	5.26862	7.9632E+0	8.4099E+0	7.8586E+0
1893.63	5.28086	6.6069E+0	7.0545E+0	6.5016E+0	1898.13	5.26834	7.6789E+0	8.1253E+0	7.5746E+0
1893.68	5.28072	6.5503E+0	6.9980E+0	6.4452E+0	1898.23	5.26806	7.4243E+0	7.8709E+0	7.3203E+0
1893.73	5.28058	6.5083E+0	6.9561E+0	6.4033E+0	1898.33	5.26779	7.2039E+0	7.6513E+0	7.1002E+0
1893.78	5.28045	6.4798E+0	6.9279E+0	6.3748E+0	1898.43	5.26751	7.0123E+0	7.4605E+0	6.9090E+0
1893.83	5.28031	6.4597E+0	6.9080E+0	6.3547E+0	1898.53	5.26723	6.8524E+0	7.3015E+0	6.7493E+0
1893.88	5.28017	6.4488E+0	6.8972E+0	6.3437E+0	1898.63	5.26695	6.7214E+0	7.1711E+0	6.6186E+0
1893.93	5.28003	6.4419E+0	6.8904E+0	6.3367E+0	1898.68	5.26682	6.6654E+0	7.1154E+0	6.5627E+0
1893.98	5.27989	6.4373E+0	6.8859E+0	6.3322E+0	1898.73	5.26668	6.6153E+0	7.0655E+0	6.5128E+0
1894.03	5.27975	6.4338E+0	6.8825E+0	6.3286E+0	1898.78	5.26654	6.5754E+0	7.0257E+0	6.4730E+0
1894.23	5.27919	6.4340E+0	6.8829E+0	6.3287E+0	1898.83	5.26640	6.5444E+0	6.9947E+0	6.4420E+0
1894.43	5.27863	6.4406E+0	6.8896E+0	6.3354E+0	1898.88	5.26626	6.5221E+0	6.9724E+0	6.4198E+0
1894.63	5.27808	6.4490E+0	6.8980E+0	6.3440E+0	1898.93	5.26612	6.5098E+0	6.9601E+0	6.4074E+0
1894.83	5.27752	6.4586E+0	6.9075E+0	6.3537E+0	1899.03	5.26585	6.4989E+0	6.9490E+0	6.3964E+0
1894.93	5.27724	6.4638E+0	6.9127E+0	6.3591E+0	1899.13	5.26557	6.5029E+0	6.9529E+0	6.4003E+0
1895.03	5.27696	6.4737E+0	6.9225E+0	6.3691E+0	1899.23	5.26529	6.5138E+0	6.9637E+0	6.4112E+0
1895.13	5.27668	6.4881E+0	6.9367E+0	6.3836E+0	1899.33	5.26501	6.5338E+0	6.9836E+0	6.4313E+0
1895.23	5.27640	6.5110E+0	6.9593E+0	6.4067E+0	1899.43	5.26474	6.5637E+0	7.0135E+0	6.4613E+0
1895.33	5.27613	6.5520E+0	7.0002E+0	6.4477E+0	1899.48	5.26460	6.5827E+0	7.0324E+0	6.4804E+0
1895.43	5.27585	6.6055E+0	7.0536E+0	6.5013E+0	1899.53	5.26446	6.6070E+0	7.0566E+0	6.5049E+0
1895.53	5.27557	6.6689E+0	7.1168E+0	6.5647E+0	1899.58	5.26432	6.6368E+0	7.0861E+0	6.5348E+0
1895.63	5.27529	6.7458E+0	7.1935E+0	6.6416E+0	1899.63	5.26418	6.6725E+0	7.1217E+0	6.5707E+0
1895.73	5.27501	6.8315E+0	7.2790E+0	6.7273E+0	1899.68	5.26404	6.7166E+0	7.1655E+0	6.6148E+0
1895.83	5.27473	6.9277E+0	7.3750E+0	6.8236E+0	1899.73	5.26390	6.7694E+0	7.2180E+0	6.6678E+0
1895.93	5.27446	7.0292E+0	7.4761E+0	6.9251E+0	1899.78	5.26377	6.8452E+0	7.2934E+0	6.7436E+0
1896.03	5.27418	7.1340E+0	7.5805E+0	7.0299E+0	1899.83	5.26363	6.9533E+0	7.4011E+0	6.8518E+0
1896.13	5.27390	7.2369E+0	7.6830E+0	7.1328E+0	1899.88	5.26349	7.1001E+0	7.5476E+0	6.9986E+0
1896.23	5.27362	7.3356E+0	7.7815E+0	7.2316E+0	1899.93	5.26335	7.2849E+0	7.7328E+0	7.1834E+0
1896.33	5.27334	7.4298E+0	7.8754E+0	7.3258E+0	1899.98	5.26321	7.5066E+0	7.9553E+0	7.4051E+0
1896.43	5.27307	7.5187E+0	7.9641E+0	7.4146E+0	1900.03	5.26307	7.7616E+0	8.2111E+0	7.6600E+0
1896.53	5.27279	7.6012E+0	8.0465E+0	7.4972E+0	1900.08	5.26294	8.0527E+0	8.5033E+0	7.9509E+0
1896.63	5.27251	7.6786E+0	8.1240E+0	7.5746E+0	1900.13	5.26280	8.3599E+0	8.8116E+0	8.2394E+0
1896.73	5.27223	7.7574E+0	8.2027E+0	7.6534E+0	1900.18	5.26266	8.6575E+0	9.1098E+0	8.5170E+0
1896.83	5.27195	7.8400E+0	8.2852E+0	7.7360E+0	1900.23	5.26252	8.9139E+0	9.3665E+0	8.7551E+0
1896.93	5.27168	7.9210E+0	8.3659E+0	7.8170E+0	1900.28	5.26238	9.1234E+0	9.5757E+0	8.9500E+0
1897.03	5.27140	8.0126E+0	8.4570E+0	7.9086E+0	1900.31	5.26231	9.1874E+0	9.6394E+0	9.0089E+0
1897.13	5.27112	8.1244E+0	8.5682E+0	8.0205E+0	1900.33	5.26224	9.2513E+0	9.7030E+0	9.0678E+0
1897.23	5.27084	8.2603E+0	8.7038E+0	8.1565E+0	1900.36	5.26217	9.2585E+0	9.7098E+0	9.0786E+0
1897.33	5.27056	8.4159E+0	8.8594E+0	8.3120E+0	1900.38	5.26210	9.2658E+0	9.7165E+0	9.0893E+0
1897.38	5.27043	8.4929E+0	8.9366E+0	8.3890E+0	1900.41	5.26203	9.2118E+0	9.6620E+0	9.0453E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1900.43	5.26197	9.1579E+0	9.6074E+0	9.0013E+0	1903.68	5.25298	1.0082E+1	1.0525E+1	9.9760E+0
1900.46	5.26190	9.0538E+0	9.5027E+0	8.9137E+0	1903.73	5.25284	1.0048E+1	1.0492E+1	9.9423E+0
1900.48	5.26183	8.9498E+0	9.3979E+0	8.8262E+0	1903.78	5.25271	9.9796E+0	1.0424E+1	9.8737E+0
1900.53	5.26169	8.6778E+0	9.1247E+0	8.5729E+0	1903.83	5.25257	9.8754E+0	1.0320E+1	9.7694E+0
1900.58	5.26155	8.3768E+0	8.8229E+0	8.2721E+0	1903.88	5.25243	9.7433E+0	1.0188E+1	9.6371E+0
1900.63	5.26141	8.0717E+0	8.5170E+0	7.9674E+0	1903.93	5.25229	9.5904E+0	1.0035E+1	9.4841E+0
1900.68	5.26127	7.7881E+0	8.2330E+0	7.6841E+0	1903.98	5.25215	9.4289E+0	9.8738E+0	9.3226E+0
1900.73	5.26114	7.5470E+0	7.9923E+0	7.4435E+0	1904.03	5.25202	9.2671E+0	9.7118E+0	9.1608E+0
1900.78	5.26100	7.3671E+0	7.8131E+0	7.2638E+0	1904.13	5.25174	8.9387E+0	9.3829E+0	8.8328E+0
1900.83	5.26086	7.2372E+0	7.6838E+0	7.1341E+0	1904.23	5.25146	8.6114E+0	9.0556E+0	8.5059E+0
1900.88	5.26072	7.1459E+0	7.5933E+0	7.0429E+0	1904.33	5.25119	8.3065E+0	8.7511E+0	8.2014E+0
1900.93	5.26058	7.0826E+0	7.5304E+0	6.9796E+0	1904.43	5.25091	8.0424E+0	8.4877E+0	7.9375E+0
1900.98	5.26044	7.0409E+0	7.4891E+0	6.9379E+0	1904.53	5.25064	7.8097E+0	8.2560E+0	7.7052E+0
1901.03	5.26030	7.0136E+0	7.4619E+0	6.9106E+0	1904.63	5.25036	7.5990E+0	8.0459E+0	7.4948E+0
1901.08	5.26017	6.9977E+0	7.4462E+0	6.8947E+0	1904.68	5.25022	7.5025E+0	7.9497E+0	7.3984E+0
1901.13	5.26003	6.9897E+0	7.4382E+0	6.8867E+0	1904.73	5.25009	7.4123E+0	7.8599E+0	7.3085E+0
1901.23	5.25975	6.9902E+0	7.4386E+0	6.8871E+0	1904.78	5.24995	7.3306E+0	7.7784E+0	7.2268E+0
1901.33	5.25947	7.0076E+0	7.4559E+0	6.9045E+0	1904.83	5.24981	7.2590E+0	7.7070E+0	7.1554E+0
1901.43	5.25920	7.0417E+0	7.4901E+0	6.9386E+0	1904.88	5.24967	7.1976E+0	7.6457E+0	7.0940E+0
1901.53	5.25892	7.1000E+0	7.5487E+0	6.9969E+0	1904.93	5.24953	7.1484E+0	7.5966E+0	7.0449E+0
1901.58	5.25878	7.1349E+0	7.5837E+0	7.0317E+0	1904.98	5.24940	7.1119E+0	7.5602E+0	7.0084E+0
1901.63	5.25864	7.1742E+0	7.6231E+0	7.0711E+0	1905.03	5.24926	7.0836E+0	7.5320E+0	6.9801E+0
1901.68	5.25851	7.2191E+0	7.6681E+0	7.1159E+0	1905.13	5.24898	7.0491E+0	7.4977E+0	6.9457E+0
1901.73	5.25837	7.2719E+0	7.7208E+0	7.1686E+0	1905.23	5.24871	7.0365E+0	7.4853E+0	6.9331E+0
1901.78	5.25823	7.3296E+0	7.7785E+0	7.2263E+0	1905.33	5.24843	7.0395E+0	7.4885E+0	6.9363E+0
1901.83	5.25809	7.3935E+0	7.8422E+0	7.2902E+0	1905.43	5.24816	7.0526E+0	7.5019E+0	6.9496E+0
1901.88	5.25795	7.4620E+0	7.9104E+0	7.3586E+0	1905.53	5.24788	7.0756E+0	7.5249E+0	6.9727E+0
1901.93	5.25782	7.5329E+0	7.9810E+0	7.4294E+0	1905.63	5.24761	7.1064E+0	7.5556E+0	7.0036E+0
1902.03	5.25754	7.6743E+0	8.1220E+0	7.5708E+0	1905.73	5.24733	7.1469E+0	7.5960E+0	7.0442E+0
1902.08	5.25740	7.7462E+0	8.1936E+0	7.6425E+0	1905.83	5.24705	7.1917E+0	7.6405E+0	7.0891E+0
1902.13	5.25726	7.8171E+0	8.2643E+0	7.7134E+0	1905.93	5.24678	7.2332E+0	7.6817E+0	7.1307E+0
1902.18	5.25712	7.8867E+0	8.3336E+0	7.7829E+0	1906.03	5.24650	7.2710E+0	7.7193E+0	7.1686E+0
1902.23	5.25699	7.9549E+0	8.4017E+0	7.8511E+0	1906.13	5.24623	7.3022E+0	7.7505E+0	7.2000E+0
1902.33	5.25671	8.0887E+0	8.5351E+0	7.9847E+0	1906.23	5.24595	7.3285E+0	7.7771E+0	7.2266E+0
1902.43	5.25643	8.2165E+0	8.6627E+0	8.1125E+0	1906.33	5.24568	7.3528E+0	7.8017E+0	7.2513E+0
1902.53	5.25616	8.3392E+0	8.7850E+0	8.2352E+0	1906.43	5.24540	7.3833E+0	7.8326E+0	7.2821E+0
1902.63	5.25588	8.4558E+0	8.9013E+0	8.3517E+0	1906.53	5.24513	7.4219E+0	7.8715E+0	7.3211E+0
1902.73	5.25560	8.5722E+0	9.0174E+0	8.4680E+0	1906.63	5.24485	7.4687E+0	7.9185E+0	7.3682E+0
1902.83	5.25533	8.6943E+0	9.1391E+0	8.5901E+0	1906.73	5.24458	7.5245E+0	7.9745E+0	7.4243E+0
1902.93	5.25505	8.8317E+0	9.2761E+0	8.7276E+0	1906.78	5.24444	7.5559E+0	8.0059E+0	7.4559E+0
1903.03	5.25478	8.9845E+0	9.4282E+0	8.8804E+0	1906.83	5.24430	7.5897E+0	8.0397E+0	7.4898E+0
1903.13	5.25450	9.1537E+0	9.5967E+0	9.0496E+0	1906.93	5.24403	7.6652E+0	8.1152E+0	7.5656E+0
1903.23	5.25422	9.3573E+0	9.7999E+0	9.2530E+0	1907.03	5.24375	7.7479E+0	8.1979E+0	7.6485E+0
1903.33	5.25395	9.5974E+0	1.0040E+1	9.4928E+0	1907.13	5.24348	7.8374E+0	8.2876E+0	7.7384E+0
1903.38	5.25381	9.7150E+0	1.0158E+1	9.6103E+0	1907.23	5.24320	7.9350E+0	8.3853E+0	7.8364E+0
1903.43	5.25367	9.8225E+0	1.0265E+1	9.7178E+0	1907.33	5.24293	8.0396E+0	8.4900E+0	7.9416E+0
1903.48	5.25353	9.9184E+0	1.0361E+1	9.8136E+0	1907.43	5.24265	8.1513E+0	8.6015E+0	8.0539E+0
1903.53	5.25340	9.9956E+0	1.0439E+1	9.8906E+0	1907.53	5.24238	8.2697E+0	8.7199E+0	8.1729E+0
1903.58	5.25326	1.0051E+1	1.0494E+1	9.9457E+0	1907.63	5.24210	8.3941E+0	8.8443E+0	8.2980E+0
1903.63	5.25312	1.0082E+1	1.0526E+1	9.9767E+0	1907.68	5.24197	8.4603E+0	8.9106E+0	8.3647E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1907.73	5.24183	8.5345E+0	8.9848E+0	8.4393E+0	1913.22	5.22680	1.0439E+2	1.0807E+2	1.0217E+2
1907.78	5.24169	8.6173E+0	9.0676E+0	8.5226E+0	1913.32	5.22652	1.2081E+2	1.2429E+2	1.1748E+2
1907.83	5.24155	8.7052E+0	9.1553E+0	8.6108E+0	1913.42	5.22625	1.3964E+2	1.4359E+2	1.3604E+2
1907.93	5.24128	8.9070E+0	9.3572E+0	8.8135E+0	1913.52	5.22598	1.6529E+2	1.7030E+2	1.6224E+2
1908.03	5.24100	9.1250E+0	9.5752E+0	9.0322E+0	1913.62	5.22570	1.9658E+2	2.0099E+2	1.9266E+2
1908.13	5.24073	9.3720E+0	9.8224E+0	9.2801E+0	1913.72	5.22543	2.3798E+2	2.4268E+2	2.3442E+2
1908.23	5.24045	9.6569E+0	1.0108E+1	9.5661E+0	1913.77	5.22530	2.6296E+2	2.6681E+2	2.5934E+2
1908.33	5.24018	9.9831E+0	1.0434E+1	9.8933E+0	1913.82	5.22516	2.8858E+2	2.9257E+2	2.8584E+2
1908.43	5.23991	1.0361E+1	1.0812E+1	1.0272E+1	1913.87	5.22502	3.1902E+2	3.2190E+2	3.1560E+2
1908.52	5.23967	1.0749E+1	1.1201E+1	1.0661E+1	1913.92	5.22489	3.4705E+2	3.5049E+2	3.4442E+2
1908.62	5.23940	1.1281E+1	1.1733E+1	1.1168E+1	1914.02	5.22462	4.0803E+2	4.1233E+2	4.0515E+2
1908.82	5.23885	1.2535E+1	1.2989E+1	1.2400E+1	1914.12	5.22435	4.7926E+2	4.8517E+2	4.7485E+2
1909.02	5.23830	1.3954E+1	1.4407E+1	1.3781E+1	1914.17	5.22421	5.1941E+2	5.2786E+2	5.1351E+2
1909.22	5.23775	1.5432E+1	1.5886E+1	1.5215E+1	1914.22	5.22407	5.6715E+2	5.8068E+2	5.5883E+2
1909.32	5.23748	1.6230E+1	1.6684E+1	1.5979E+1	1914.27	5.22394	6.3010E+2	6.4986E+2	6.1518E+2
1909.42	5.23720	1.7090E+1	1.7544E+1	1.6796E+1	1914.32	5.22380	7.0428E+2	7.3176E+2	6.8395E+2
1909.52	5.23693	1.8056E+1	1.8512E+1	1.7723E+1	1914.37	5.22366	7.9820E+2	8.2981E+2	7.7027E+2
1909.62	5.23665	1.9147E+1	1.9604E+1	1.8770E+1	1914.42	5.22353	8.9947E+2	9.3845E+2	8.6811E+2
1909.72	5.23638	2.0338E+1	2.0796E+1	1.9935E+1	1914.47	5.22339	1.0192E+3	1.0613E+3	9.8322E+2
1909.82	5.23610	2.1611E+1	2.2070E+1	2.1185E+1	1914.52	5.22325	1.1430E+3	1.1870E+3	1.1019E+3
1909.92	5.23583	2.2824E+1	2.3283E+1	2.2404E+1	1914.57	5.22312	1.3842E+3	1.4370E+3	1.3356E+3
1910.02	5.23556	2.3959E+1	2.4417E+1	2.3553E+1	1914.62	5.22298	1.5432E+3	1.5966E+3	1.4939E+3
1910.12	5.23528	2.4843E+1	2.5300E+1	2.4479E+1	1914.67	5.22284	1.7108E+3	1.7684E+3	1.6580E+3
1910.22	5.23501	2.5496E+1	2.5951E+1	2.5148E+1	1914.72	5.22271	1.8419E+3	1.9076E+3	1.7825E+3
1910.32	5.23473	2.6037E+1	2.6493E+1	2.5714E+1	1914.77	5.22257	1.8992E+3	1.9772E+3	1.8298E+3
1910.42	5.23446	2.6508E+1	2.6963E+1	2.6189E+1	1914.82	5.22244	1.8419E+3	1.9282E+3	1.7661E+3
1910.52	5.23419	2.6952E+1	2.7406E+1	2.6640E+1	1914.87	5.22230	1.6961E+3	1.7873E+3	1.6166E+3
1910.62	5.23391	2.7419E+1	2.7874E+1	2.7099E+1	1914.92	5.22216	1.5431E+3	1.6409E+3	1.4586E+3
1910.72	5.23364	2.7921E+1	2.8376E+1	2.7587E+1	1914.97	5.22203	1.2379E+3	1.3161E+3	1.1685E+3
1910.82	5.23336	2.8479E+1	2.8935E+1	2.8119E+1	1915.02	5.22189	1.0888E+3	1.1653E+3	1.0206E+3
1910.92	5.23309	2.9111E+1	2.9566E+1	2.8718E+1	1915.07	5.22175	9.6650E+2	1.0403E+3	9.0049E+2
1911.02	5.23282	2.9906E+1	3.0391E+1	2.9481E+1	1915.12	5.22162	8.3623E+2	9.0234E+2	7.7646E+2
1911.12	5.23254	3.0949E+1	3.1467E+1	3.0452E+1	1915.17	5.22148	7.3068E+2	7.8927E+2	6.7712E+2
1911.22	5.23227	3.2247E+1	3.2822E+1	3.1699E+1	1915.22	5.22134	6.3315E+2	6.8220E+2	5.9311E+2
1911.32	5.23199	3.3697E+1	3.4332E+1	3.3108E+1	1915.27	5.22121	5.5558E+2	5.8802E+2	5.2734E+2
1911.42	5.23172	3.5224E+1	3.5902E+1	3.4580E+1	1915.32	5.22107	4.9058E+2	5.1303E+2	4.7023E+2
1911.52	5.23145	3.6847E+1	3.7584E+1	3.6169E+1	1915.37	5.22094	4.3782E+2	4.5402E+2	4.2273E+2
1911.62	5.23117	3.8649E+1	3.9416E+1	3.7906E+1	1915.42	5.22080	3.9396E+2	4.0593E+2	3.8262E+2
1911.82	5.23063	4.2265E+1	4.3067E+1	4.1489E+1	1915.47	5.22066	3.5662E+2	3.6547E+2	3.4812E+2
1912.02	5.23008	4.6132E+1	4.6968E+1	4.5337E+1	1915.52	5.22053	3.2519E+2	3.3164E+2	3.1893E+2
1912.22	5.22953	5.0489E+1	5.1372E+1	4.9670E+1	1915.57	5.22039	2.9590E+2	3.0045E+2	2.9145E+2
1912.32	5.22926	5.3019E+1	5.3907E+1	5.2155E+1	1915.62	5.22025	2.7715E+2	2.8065E+2	2.7423E+2
1912.42	5.22898	5.5920E+1	5.6899E+1	5.5035E+1	1915.67	5.22011	2.6514E+2	2.6786E+2	2.6314E+2
1912.52	5.22871	5.9082E+1	6.0112E+1	5.8085E+1	1915.72	5.21998	2.5565E+2	2.5783E+2	2.5422E+2
1912.62	5.22844	6.2711E+1	6.3886E+1	6.1617E+1	1915.77	5.21984	2.4914E+2	2.5089E+2	2.4785E+2
1912.72	5.22816	6.6856E+1	6.8163E+1	6.5596E+1	1915.82	5.21970	2.4450E+2	2.4623E+2	2.4329E+2
1912.82	5.22789	7.1599E+1	7.3092E+1	7.0171E+1	1915.87	5.21957	2.4195E+2	2.4369E+2	2.4046E+2
1912.92	5.22762	7.7256E+1	7.8979E+1	7.5625E+1	1915.92	5.21943	2.4033E+2	2.4221E+2	2.3841E+2
1913.02	5.22734	8.4245E+1	8.6275E+1	8.2339E+1	1915.97	5.21929	2.3848E+2	2.4062E+2	2.3606E+2
1913.12	5.22707	9.2932E+1	9.5406E+1	9.0650E+1	1916.02	5.21916	2.3542E+2	2.3784E+2	2.3251E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1916.07	5.21902	2.3025E+2	2.3293E+2	2.2701E+2	1920.02	5.20828	1.9378E+1	1.9821E+1	1.9250E+1
1916.12	5.21889	2.2265E+2	2.2548E+2	2.1925E+2	1920.12	5.20801	1.9034E+1	1.9477E+1	1.8910E+1
1916.17	5.21875	2.1252E+2	2.1545E+2	2.0921E+2	1920.22	5.20774	1.8719E+1	1.9163E+1	1.8594E+1
1916.22	5.21861	2.0062E+2	2.0345E+2	1.9746E+2	1920.32	5.20747	1.8424E+1	1.8868E+1	1.8302E+1
1916.27	5.21848	1.8722E+2	1.8999E+2	1.8444E+2	1920.42	5.20720	1.8146E+1	1.8590E+1	1.8024E+1
1916.32	5.21834	1.7365E+2	1.7621E+2	1.7120E+2	1920.52	5.20693	1.7893E+1	1.8338E+1	1.7772E+1
1916.37	5.21821	1.6037E+2	1.6265E+2	1.5820E+2	1920.62	5.20666	1.7659E+1	1.8104E+1	1.7539E+1
1916.42	5.21807	1.4745E+2	1.4970E+2	1.4578E+2	1920.72	5.20639	1.7450E+1	1.7896E+1	1.7331E+1
1916.52	5.21780	1.2612E+2	1.2835E+2	1.2508E+2	1920.82	5.20611	1.7253E+1	1.7699E+1	1.7135E+1
1916.57	5.21766	1.1756E+2	1.1939E+2	1.1641E+2	1920.92	5.20584	1.7077E+1	1.7524E+1	1.6960E+1
1916.62	5.21752	1.1122E+2	1.1269E+2	1.0995E+2	1921.02	5.20557	1.6912E+1	1.7358E+1	1.6795E+1
1916.67	5.21739	1.0686E+2	1.0835E+2	1.0582E+2	1921.22	5.20503	1.6610E+1	1.7057E+1	1.6495E+1
1916.72	5.21725	1.0420E+2	1.0551E+2	1.0327E+2	1921.42	5.20449	1.6335E+1	1.6782E+1	1.6222E+1
1916.77	5.21712	1.0301E+2	1.0412E+2	1.0219E+2	1921.62	5.20395	1.6074E+1	1.6522E+1	1.5963E+1
1916.82	5.21698	1.0298E+2	1.0392E+2	1.0224E+2	1921.82	5.20341	1.5828E+1	1.6276E+1	1.5719E+1
1916.92	5.21671	1.0451E+2	1.0532E+2	1.0378E+2	1922.02	5.20286	1.5601E+1	1.6049E+1	1.5496E+1
1916.97	5.21657	1.0543E+2	1.0616E+2	1.0459E+2	1922.22	5.20232	1.5410E+1	1.5859E+1	1.5306E+1
1917.02	5.21644	1.0595E+2	1.0673E+2	1.0498E+2	1922.32	5.20205	1.5324E+1	1.5772E+1	1.5221E+1
1917.07	5.21630	1.0585E+2	1.0669E+2	1.0467E+2	1922.42	5.20178	1.5258E+1	1.5707E+1	1.5157E+1
1917.12	5.21616	1.0445E+2	1.0540E+2	1.0313E+2	1922.52	5.20151	1.5207E+1	1.5655E+1	1.5107E+1
1917.17	5.21603	1.0148E+2	1.0249E+2	1.0010E+2	1922.62	5.20124	1.5168E+1	1.5617E+1	1.5069E+1
1917.22	5.21589	9.6918E+1	9.8007E+1	9.5640E+1	1922.72	5.20097	1.5143E+1	1.5591E+1	1.5042E+1
1917.27	5.21576	9.1521E+1	9.2570E+1	9.0295E+1	1922.82	5.20070	1.5130E+1	1.5578E+1	1.5029E+1
1917.32	5.21562	8.5340E+1	8.6437E+1	8.4287E+1	1922.92	5.20043	1.5124E+1	1.5572E+1	1.5024E+1
1917.42	5.21535	7.3206E+1	7.4365E+1	7.2484E+1	1923.02	5.20016	1.5127E+1	1.5575E+1	1.5026E+1
1917.52	5.21508	6.3062E+1	6.4268E+1	6.2584E+1	1923.22	5.19962	1.5146E+1	1.5595E+1	1.5045E+1
1917.62	5.21480	5.5025E+1	5.5843E+1	5.4308E+1	1923.42	5.19908	1.5177E+1	1.5625E+1	1.5075E+1
1917.72	5.21453	4.9032E+1	4.9819E+1	4.8402E+1	1923.62	5.19854	1.5214E+1	1.5663E+1	1.5112E+1
1917.82	5.21426	4.4236E+1	4.4910E+1	4.3609E+1	1923.82	5.19800	1.5255E+1	1.5704E+1	1.5153E+1
1917.92	5.21399	4.0368E+1	4.1075E+1	3.9893E+1	1924.02	5.19745	1.5300E+1	1.5749E+1	1.5197E+1
1918.02	5.21372	3.7235E+1	3.7771E+1	3.6746E+1	1924.22	5.19691	1.5346E+1	1.5795E+1	1.5243E+1
1918.12	5.21344	3.4897E+1	3.5428E+1	3.4535E+1	1924.42	5.19637	1.5394E+1	1.5842E+1	1.5290E+1
1918.22	5.21317	3.3002E+1	3.3443E+1	3.2618E+1	1924.62	5.19583	1.5441E+1	1.5889E+1	1.5336E+1
1918.32	5.21290	3.1517E+1	3.1958E+1	3.1162E+1	1924.82	5.19529	1.5488E+1	1.5936E+1	1.5383E+1
1918.42	5.21263	3.0211E+1	3.0652E+1	2.9884E+1	1925.02	5.19475	1.5536E+1	1.5985E+1	1.5431E+1
1918.52	5.21236	2.9050E+1	2.9492E+1	2.8748E+1	1925.22	5.19421	1.5587E+1	1.6034E+1	1.5481E+1
1918.62	5.21208	2.7990E+1	2.8433E+1	2.7714E+1	1925.32	5.19395	1.5615E+1	1.6063E+1	1.5509E+1
1918.72	5.21181	2.7059E+1	2.7501E+1	2.6788E+1	1925.42	5.19368	1.5649E+1	1.6096E+1	1.5542E+1
1918.82	5.21154	2.6192E+1	2.6634E+1	2.5930E+1	1925.52	5.19341	1.5691E+1	1.6138E+1	1.5584E+1
1918.92	5.21127	2.5364E+1	2.5805E+1	2.5105E+1	1925.62	5.19314	1.5741E+1	1.6188E+1	1.5634E+1
1919.02	5.21100	2.4594E+1	2.5035E+1	2.4347E+1	1925.72	5.19287	1.5804E+1	1.6251E+1	1.5696E+1
1919.12	5.21073	2.3888E+1	2.4329E+1	2.3640E+1	1925.82	5.19260	1.5879E+1	1.6326E+1	1.5771E+1
1919.22	5.21046	2.3230E+1	2.3671E+1	2.2995E+1	1926.02	5.19206	1.6069E+1	1.6516E+1	1.5958E+1
1919.32	5.21018	2.2609E+1	2.3049E+1	2.2395E+1	1926.22	5.19152	1.6319E+1	1.6766E+1	1.6206E+1
1919.42	5.20991	2.2044E+1	2.2485E+1	2.1856E+1	1926.42	5.19098	1.6604E+1	1.7050E+1	1.6490E+1
1919.52	5.20964	2.1522E+1	2.1963E+1	2.1359E+1	1926.52	5.19071	1.6759E+1	1.7204E+1	1.6642E+1
1919.62	5.20937	2.1038E+1	2.1479E+1	2.0892E+1	1926.62	5.19044	1.6924E+1	1.7369E+1	1.6809E+1
1919.72	5.20910	2.0587E+1	2.1029E+1	2.0451E+1	1926.72	5.19017	1.7112E+1	1.7557E+1	1.6997E+1
1919.82	5.20883	2.0155E+1	2.0597E+1	2.0022E+1	1926.82	5.18990	1.7321E+1	1.7766E+1	1.7204E+1
1919.92	5.20856	1.9746E+1	2.0188E+1	1.9614E+1	1926.92	5.18963	1.7572E+1	1.8017E+1	1.7452E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1927.02	5.18936	1.7858E+1	1.8303E+1	1.7737E+1	1930.32	5.18049	4.5947E+1	4.7126E+1	4.4901E+1
1927.12	5.18909	1.8168E+1	1.8613E+1	1.8045E+1	1930.42	5.18022	4.9325E+1	5.0558E+1	4.8145E+1
1927.22	5.18882	1.8519E+1	1.8964E+1	1.8391E+1	1930.52	5.17995	5.3256E+1	5.4652E+1	5.2025E+1
1927.32	5.18855	1.8919E+1	1.9365E+1	1.8767E+1	1930.62	5.17968	5.7849E+1	5.9325E+1	5.6447E+1
1927.42	5.18829	1.9398E+1	1.9845E+1	1.9215E+1	1930.67	5.17955	6.0540E+1	6.2107E+1	5.9031E+1
1927.52	5.18802	1.9969E+1	2.0419E+1	1.9718E+1	1930.72	5.17942	6.3754E+1	6.5528E+1	6.2162E+1
1927.57	5.18788	2.0312E+1	2.0763E+1	2.0004E+1	1930.77	5.17928	6.7514E+1	6.9513E+1	6.5735E+1
1927.62	5.18775	2.0702E+1	2.1154E+1	2.0334E+1	1930.82	5.17915	7.1957E+1	7.4287E+1	6.9964E+1
1927.67	5.18761	2.1126E+1	2.1580E+1	2.0708E+1	1930.92	5.17889	8.2685E+1	8.5685E+1	8.0260E+1
1927.72	5.18748	2.1610E+1	2.2099E+1	2.1143E+1	1931.02	5.17862	9.6624E+1	1.0061E+2	9.3746E+1
1927.77	5.18734	2.2150E+1	2.2680E+1	2.1641E+1	1931.12	5.17835	1.1468E+2	1.1953E+2	1.1158E+2
1927.82	5.18721	2.2735E+1	2.3302E+1	2.2195E+1	1931.22	5.17808	1.4007E+2	1.4457E+2	1.3633E+2
1927.87	5.18707	2.3377E+1	2.3974E+1	2.2808E+1	1931.32	5.17782	1.6843E+2	1.7322E+2	1.6502E+2
1927.92	5.18694	2.4073E+1	2.4699E+1	2.3478E+1	1931.42	5.17755	2.0281E+2	2.0698E+2	1.9898E+2
1927.97	5.18681	2.4831E+1	2.5486E+1	2.4210E+1	1931.52	5.17728	2.4295E+2	2.4740E+2	2.3944E+2
1928.02	5.18667	2.5657E+1	2.6339E+1	2.5005E+1	1931.62	5.17701	2.8832E+2	2.9293E+2	2.8462E+2
1928.07	5.18654	2.6532E+1	2.7244E+1	2.5854E+1	1931.72	5.17674	3.3874E+2	3.4334E+2	3.3400E+2
1928.12	5.18640	2.7466E+1	2.8209E+1	2.6765E+1	1931.82	5.17648	3.8773E+2	3.9338E+2	3.8247E+2
1928.17	5.18627	2.8482E+1	2.9264E+1	2.7763E+1	1931.92	5.17621	4.3831E+2	4.4501E+2	4.3201E+2
1928.22	5.18613	2.9657E+1	3.0475E+1	2.8906E+1	1932.02	5.17594	4.9019E+2	4.9852E+2	4.8287E+2
1928.27	5.18600	3.1002E+1	3.1860E+1	3.0210E+1	1932.12	5.17567	5.4652E+2	5.5657E+2	5.3734E+2
1928.32	5.18586	3.2498E+1	3.3408E+1	3.1666E+1	1932.22	5.17540	6.0556E+2	6.1857E+2	5.9470E+2
1928.37	5.18573	3.4181E+1	3.5137E+1	3.3304E+1	1932.32	5.17514	6.7368E+2	6.8937E+2	6.6051E+2
1928.42	5.18559	3.6040E+1	3.7035E+1	3.5123E+1	1932.42	5.17487	7.5440E+2	7.7012E+2	7.4069E+2
1928.47	5.18546	3.8057E+1	3.9072E+1	3.7096E+1	1932.52	5.17460	8.4515E+2	8.6093E+2	8.3125E+2
1928.52	5.18533	4.0127E+1	4.1124E+1	3.9164E+1	1932.62	5.17433	9.5185E+2	9.6681E+2	9.3528E+2
1928.57	5.18519	4.2266E+1	4.3110E+1	4.1198E+1	1932.67	5.17420	9.9475E+2	1.0109E+3	9.7842E+2
1928.62	5.18506	4.3456E+1	4.4292E+1	4.2415E+1	1932.72	5.17406	1.0345E+3	1.0519E+3	1.0175E+3
1928.67	5.18492	4.3774E+1	4.4604E+1	4.2740E+1	1932.77	5.17393	1.0640E+3	1.0823E+3	1.0462E+3
1928.72	5.18479	4.3225E+1	4.4087E+1	4.2217E+1	1932.82	5.17380	1.0970E+3	1.1163E+3	1.0783E+3
1928.77	5.18465	4.2042E+1	4.2938E+1	4.1055E+1	1932.87	5.17366	1.1267E+3	1.1470E+3	1.1071E+3
1928.82	5.18452	4.0448E+1	4.1372E+1	3.9477E+1	1932.92	5.17353	1.1500E+3	1.1711E+3	1.1296E+3
1928.87	5.18438	3.8615E+1	3.9568E+1	3.7698E+1	1932.97	5.17340	1.1687E+3	1.1904E+3	1.1477E+3
1928.92	5.18425	3.6800E+1	3.7721E+1	3.5950E+1	1933.02	5.17326	1.1837E+3	1.2059E+3	1.1622E+3
1928.97	5.18412	3.5139E+1	3.6001E+1	3.4361E+1	1933.07	5.17313	1.1936E+3	1.2162E+3	1.1718E+3
1929.02	5.18398	3.3701E+1	3.4522E+1	3.3034E+1	1933.12	5.17299	1.1993E+3	1.2221E+3	1.1773E+3
1929.07	5.18385	3.2788E+1	3.3469E+1	3.2139E+1	1933.17	5.17286	1.2021E+3	1.2251E+3	1.1800E+3
1929.12	5.18371	3.1931E+1	3.2554E+1	3.1385E+1	1933.22	5.17273	1.1993E+3	1.2221E+3	1.1772E+3
1929.17	5.18358	3.1326E+1	3.1881E+1	3.0844E+1	1933.27	5.17259	1.1964E+3	1.2191E+3	1.1745E+3
1929.22	5.18344	3.0965E+1	3.1480E+1	3.0520E+1	1933.32	5.17246	1.1935E+3	1.2162E+3	1.1717E+3
1929.32	5.18318	3.0720E+1	3.1247E+1	3.0306E+1	1933.42	5.17219	1.1847E+3	1.2070E+3	1.1632E+3
1929.42	5.18291	3.0974E+1	3.1507E+1	3.0522E+1	1933.47	5.17206	1.1796E+3	1.2017E+3	1.1582E+3
1929.52	5.18264	3.1572E+1	3.2139E+1	3.1073E+1	1933.52	5.17192	1.1736E+3	1.1955E+3	1.1524E+3
1929.62	5.18237	3.2439E+1	3.3060E+1	3.1896E+1	1933.57	5.17179	1.1668E+3	1.1885E+3	1.1459E+3
1929.72	5.18210	3.3484E+1	3.4132E+1	3.2864E+1	1933.62	5.17166	1.1605E+3	1.1819E+3	1.1398E+3
1929.82	5.18183	3.4744E+1	3.5470E+1	3.4077E+1	1933.67	5.17152	1.1552E+3	1.1764E+3	1.1346E+3
1929.92	5.18156	3.6308E+1	3.7148E+1	3.5597E+1	1933.72	5.17139	1.1525E+3	1.1737E+3	1.1320E+3
1930.02	5.18130	3.8155E+1	3.9066E+1	3.7330E+1	1933.77	5.17126	1.1525E+3	1.1737E+3	1.1320E+3
1930.12	5.18103	4.0372E+1	4.1362E+1	3.9453E+1	1933.82	5.17112	1.1567E+3	1.1781E+3	1.1361E+3
1930.22	5.18076	4.2951E+1	4.3998E+1	4.1943E+1	1933.87	5.17099	1.1659E+3	1.1875E+3	1.1450E+3

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1933.92	5.17085	1.1795E+3	1.2016E+3	1.1582E+3	1942.02	5.14928	2.6283E+2	2.6436E+2	2.6135E+2
1933.97	5.17072	1.1991E+3	1.2220E+3	1.1771E+3	1942.22	5.14875	2.4955E+2	2.5100E+2	2.4817E+2
1934.02	5.17059	1.2224E+3	1.2461E+3	1.1995E+3	1942.42	5.14822	2.3704E+2	2.3841E+2	2.3573E+2
1934.12	5.17032	1.2849E+3	1.3118E+3	1.2603E+3	1942.62	5.14769	2.2534E+2	2.2663E+2	2.2409E+2
1934.22	5.17005	1.3606E+3	1.3904E+3	1.3323E+3	1942.82	5.14716	2.1433E+2	2.1556E+2	2.1315E+2
1934.27	5.16992	1.3986E+3	1.4301E+3	1.3683E+3	1943.02	5.14663	2.0376E+2	2.0493E+2	2.0264E+2
1934.32	5.16978	1.4346E+3	1.4675E+3	1.4021E+3	1943.22	5.14610	1.9372E+2	1.9484E+2	1.9264E+2
1934.37	5.16965	1.4643E+3	1.4989E+3	1.4303E+3	1943.42	5.14557	1.8431E+2	1.8537E+2	1.8327E+2
1934.42	5.16952	1.4873E+3	1.5239E+3	1.4528E+3	1943.62	5.14504	1.7525E+2	1.7627E+2	1.7426E+2
1934.52	5.16925	1.5340E+3	1.5735E+3	1.4967E+3	1943.82	5.14451	1.6676E+2	1.6775E+2	1.6581E+2
1934.62	5.16898	1.5794E+3	1.6219E+3	1.5394E+3	1944.02	5.14398	1.5856E+2	1.5952E+2	1.5765E+2
1934.72	5.16872	1.6230E+3	1.6688E+3	1.5803E+3	1944.22	5.14345	1.5066E+2	1.5163E+2	1.4982E+2
1934.82	5.16845	1.6636E+3	1.7126E+3	1.6182E+3	1944.42	5.14292	1.4337E+2	1.4425E+2	1.4251E+2
1934.97	5.16805	1.7135E+3	1.7667E+3	1.6644E+3	1944.62	5.14239	1.3642E+2	1.3728E+2	1.3559E+2
1935.12	5.16765	1.7677E+3	1.8260E+3	1.7143E+3	1944.82	5.14186	1.2973E+2	1.3056E+2	1.2892E+2
1935.22	5.16738	1.7967E+3	1.8579E+3	1.7409E+3	1945.02	5.14133	1.2336E+2	1.2417E+2	1.2258E+2
1935.32	5.16711	1.8270E+3	1.8915E+3	1.7686E+3	1945.22	5.14080	1.1732E+2	1.1812E+2	1.1657E+2
1935.42	5.16685	1.8590E+3	1.9270E+3	1.7976E+3	1945.47	5.14014	1.1024E+2	1.1102E+2	1.0952E+2
1935.52	5.16658	1.8756E+3	1.9455E+3	1.8126E+3	1945.72	5.13948	1.0347E+2	1.0421E+2	1.0278E+2
1935.57	5.16645	1.8756E+3	1.9455E+3	1.8126E+3	1945.97	5.13882	9.7088E+1	9.7755E+1	9.6446E+1
1935.62	5.16631	1.8672E+3	1.9362E+3	1.8051E+3	1946.22	5.13816	9.1041E+1	9.1665E+1	9.0461E+1
1935.72	5.16605	1.8506E+3	1.9176E+3	1.7900E+3	1946.72	5.13684	8.0365E+1	8.0904E+1	7.9865E+1
1935.82	5.16578	1.8330E+3	1.8981E+3	1.7740E+3	1947.22	5.13552	7.0975E+1	7.1453E+1	7.0540E+1
1935.92	5.16551	1.8076E+3	1.8699E+3	1.7508E+3	1947.72	5.13420	6.2716E+1	6.3146E+1	6.2325E+1
1936.02	5.16524	1.7793E+3	1.8388E+3	1.7249E+3	1948.22	5.13289	5.5522E+1	5.5953E+1	5.5163E+1
1936.12	5.16498	1.7443E+3	1.8003E+3	1.6927E+3	1948.47	5.13223	5.2239E+1	5.2670E+1	5.1904E+1
1936.22	5.16471	1.7076E+3	1.7602E+3	1.6588E+3	1948.72	5.13157	4.9178E+1	4.9610E+1	4.8848E+1
1936.32	5.16444	1.6668E+3	1.7161E+3	1.6211E+3	1948.97	5.13091	4.6427E+1	4.6860E+1	4.6107E+1
1936.42	5.16418	1.6159E+3	1.6612E+3	1.5736E+3	1949.22	5.13025	4.3850E+1	4.4283E+1	4.3541E+1
1936.52	5.16391	1.5520E+3	1.5928E+3	1.5137E+3	1949.47	5.12960	4.1428E+1	4.1862E+1	4.1137E+1
1936.62	5.16364	1.4841E+3	1.5205E+3	1.4496E+3	1949.72	5.12894	3.9160E+1	3.9594E+1	3.8872E+1
1936.72	5.16338	1.4273E+3	1.4605E+3	1.3958E+3	1949.97	5.12828	3.7123E+1	3.7558E+1	3.6856E+1
1936.82	5.16311	1.3669E+3	1.3970E+3	1.3383E+3	1950.22	5.12762	3.5241E+1	3.5678E+1	3.4995E+1
1936.92	5.16284	1.3079E+3	1.3352E+3	1.2818E+3	1950.47	5.12697	3.3562E+1	3.3999E+1	3.3337E+1
1937.12	5.16231	1.1895E+3	1.2120E+3	1.1678E+3	1950.72	5.12631	3.1999E+1	3.2436E+1	3.1784E+1
1937.32	5.16178	1.0871E+3	1.1061E+3	1.0686E+3	1950.97	5.12565	3.0589E+1	3.1026E+1	3.0385E+1
1937.37	5.16165	1.0639E+3	1.0822E+3	1.0461E+3	1951.22	5.12499	2.9299E+1	2.9737E+1	2.9110E+1
1937.52	5.16125	1.0037E+3	1.0203E+3	9.8746E+2	1951.47	5.12434	2.8138E+1	2.8576E+1	2.7959E+1
1937.72	5.16071	9.3008E+2	9.4484E+2	9.1566E+2	1951.72	5.12368	2.7085E+1	2.7522E+1	2.6908E+1
1937.92	5.16018	8.5386E+2	8.6691E+2	8.4108E+2	1951.97	5.12302	2.6125E+1	2.6562E+1	2.5955E+1
1938.12	5.15965	7.9805E+2	8.0998E+2	7.8635E+2	1952.10	5.12270	2.5681E+1	2.6118E+1	2.5514E+1
1938.62	5.15832	6.7461E+2	6.8439E+2	6.6499E+2	1952.22	5.12237	2.5269E+1	2.5706E+1	2.5104E+1
1939.12	5.15699	5.7852E+2	5.8498E+2	5.7224E+2	1952.35	5.12204	2.4891E+1	2.5328E+1	2.4728E+1
1939.62	5.15566	4.9793E+2	5.0239E+2	4.9357E+2	1952.47	5.12171	2.4533E+1	2.4969E+1	2.4375E+1
1940.12	5.15433	4.3359E+2	4.3690E+2	4.3033E+2	1952.72	5.12106	2.3873E+1	2.4309E+1	2.3716E+1
1940.62	5.15300	3.7924E+2	3.8182E+2	3.7670E+2	1952.97	5.12040	2.3298E+1	2.3735E+1	2.3146E+1
1941.12	5.15167	3.3288E+2	3.3496E+2	3.3082E+2	1953.22	5.11975	2.2767E+1	2.3204E+1	2.2618E+1
1941.37	5.15101	3.1194E+2	3.1383E+2	3.1006E+2	1953.35	5.11942	2.2519E+1	2.2956E+1	2.2371E+1
1941.62	5.15034	2.9177E+2	2.9351E+2	2.9007E+2	1953.47	5.11909	2.2280E+1	2.2716E+1	2.2135E+1
1941.82	5.14981	2.7672E+2	2.7837E+2	2.7516E+2	1953.60	5.11876	2.2054E+1	2.2490E+1	2.1909E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1953.72	5.11844	2.1848E+1	2.2284E+1	2.1704E+1	1965.97	5.08654	2.3034E+1	2.3462E+1	2.2882E+1
1953.85	5.11811	2.1668E+1	2.2104E+1	2.1526E+1	1966.22	5.08589	2.3474E+1	2.3902E+1	2.3320E+1
1953.97	5.11778	2.1520E+1	2.1955E+1	2.1381E+1	1966.72	5.08460	2.4460E+1	2.4889E+1	2.4299E+1
1954.10	5.11745	2.1397E+1	2.1831E+1	2.1254E+1	1967.22	5.08331	2.5508E+1	2.5937E+1	2.5340E+1
1954.22	5.11713	2.1298E+1	2.1733E+1	2.1158E+1	1967.72	5.08201	2.6610E+1	2.7039E+1	2.6435E+1
1954.35	5.11680	2.1224E+1	2.1658E+1	2.1083E+1	1967.97	5.08137	2.7195E+1	2.7624E+1	2.7016E+1
1954.47	5.11647	2.1163E+1	2.1597E+1	2.1024E+1	1968.22	5.08072	2.7820E+1	2.8248E+1	2.7635E+1
1954.72	5.11582	2.1067E+1	2.1501E+1	2.0927E+1	1968.47	5.08008	2.8482E+1	2.8911E+1	2.8292E+1
1954.97	5.11516	2.0988E+1	2.1422E+1	2.0848E+1	1968.72	5.07943	2.9180E+1	2.9608E+1	2.8984E+1
1955.22	5.11451	2.0915E+1	2.1349E+1	2.0776E+1	1968.97	5.07879	2.9908E+1	3.0336E+1	2.9706E+1
1955.72	5.11320	2.0779E+1	2.1212E+1	2.0640E+1	1969.22	5.07814	3.0654E+1	3.1081E+1	3.0445E+1
1956.22	5.11189	2.0649E+1	2.1082E+1	2.0511E+1	1969.47	5.07750	3.1410E+1	3.1837E+1	3.1193E+1
1956.72	5.11059	2.0525E+1	2.0957E+1	2.0388E+1	1969.72	5.07685	3.2154E+1	3.2581E+1	3.1932E+1
1957.22	5.10928	2.0410E+1	2.0842E+1	2.0274E+1	1969.97	5.07621	3.2900E+1	3.3326E+1	3.2671E+1
1957.47	5.10863	2.0358E+1	2.0790E+1	2.0221E+1	1970.22	5.07557	3.3630E+1	3.4056E+1	3.3394E+1
1957.72	5.10798	2.0308E+1	2.0740E+1	2.0172E+1	1970.47	5.07492	3.4333E+1	3.4759E+1	3.4090E+1
1957.97	5.10732	2.0264E+1	2.0696E+1	2.0128E+1	1970.72	5.07428	3.5003E+1	3.5428E+1	3.4752E+1
1958.22	5.10667	2.0224E+1	2.0656E+1	2.0089E+1	1970.97	5.07363	3.5633E+1	3.6058E+1	3.5377E+1
1958.47	5.10602	2.0188E+1	2.0619E+1	2.0052E+1	1971.22	5.07299	3.6240E+1	3.6658E+1	3.5977E+1
1958.72	5.10537	2.0156E+1	2.0588E+1	2.0021E+1	1971.47	5.07235	3.6832E+1	3.7254E+1	3.6562E+1
1958.97	5.10472	2.0129E+1	2.0561E+1	1.9994E+1	1971.72	5.07170	3.7375E+1	3.7797E+1	3.7100E+1
1959.22	5.10407	2.0105E+1	2.0537E+1	1.9970E+1	1971.97	5.07106	3.7912E+1	3.8334E+1	3.7630E+1
1959.47	5.10341	2.0088E+1	2.0520E+1	1.9953E+1	1972.22	5.07042	3.8414E+1	3.8836E+1	3.8127E+1
1959.72	5.10276	2.0076E+1	2.0508E+1	1.9941E+1	1972.47	5.06978	3.8916E+1	3.9338E+1	3.8624E+1
1959.97	5.10211	2.0071E+1	2.0502E+1	1.9936E+1	1972.72	5.06913	3.9421E+1	3.9843E+1	3.9126E+1
1960.22	5.10146	2.0071E+1	2.0502E+1	1.9936E+1	1972.97	5.06849	3.9919E+1	4.0341E+1	3.9622E+1
1960.47	5.10081	2.0076E+1	2.0508E+1	1.9942E+1	1973.22	5.06785	4.0419E+1	4.0841E+1	4.0120E+1
1960.72	5.10016	2.0087E+1	2.0518E+1	1.9952E+1	1973.72	5.06656	4.1397E+1	4.1819E+1	4.1095E+1
1960.97	5.09951	2.0102E+1	2.0533E+1	1.9967E+1	1974.22	5.06528	4.2405E+1	4.2826E+1	4.2098E+1
1961.22	5.09886	2.0123E+1	2.0554E+1	1.9988E+1	1974.72	5.06400	4.3403E+1	4.3823E+1	4.3092E+1
1961.47	5.09821	2.0151E+1	2.0582E+1	2.0016E+1	1975.22	5.06272	4.4424E+1	4.4843E+1	4.4107E+1
1961.72	5.09756	2.0183E+1	2.0614E+1	2.0048E+1	1975.47	5.06207	4.4918E+1	4.5337E+1	4.4599E+1
1961.97	5.09691	2.0232E+1	2.0662E+1	2.0096E+1	1975.72	5.06143	4.5395E+1	4.5814E+1	4.5074E+1
1962.22	5.09626	2.0286E+1	2.0716E+1	2.0151E+1	1975.97	5.06079	4.5862E+1	4.6281E+1	4.5540E+1
1962.47	5.09561	2.0351E+1	2.0781E+1	2.0215E+1	1976.22	5.06015	4.6323E+1	4.6742E+1	4.5998E+1
1962.72	5.09496	2.0422E+1	2.0851E+1	2.0285E+1	1976.47	5.05951	4.6768E+1	4.7187E+1	4.6442E+1
1962.97	5.09431	2.0499E+1	2.0928E+1	2.0362E+1	1976.72	5.05887	4.7204E+1	4.7622E+1	4.6875E+1
1963.22	5.09366	2.0585E+1	2.1015E+1	2.0448E+1	1976.97	5.05823	4.7617E+1	4.8036E+1	4.7287E+1
1963.47	5.09302	2.0681E+1	2.1110E+1	2.0544E+1	1977.22	5.05759	4.8021E+1	4.8439E+1	4.7688E+1
1963.72	5.09237	2.0793E+1	2.1222E+1	2.0655E+1	1977.47	5.05695	4.8408E+1	4.8826E+1	4.8071E+1
1963.97	5.09172	2.0918E+1	2.1346E+1	2.0778E+1	1977.72	5.05632	4.8770E+1	4.9188E+1	4.8434E+1
1964.22	5.09107	2.1056E+1	2.1485E+1	2.0917E+1	1977.97	5.05568	4.9116E+1	4.9534E+1	4.8779E+1
1964.47	5.09042	2.1227E+1	2.1655E+1	2.1086E+1	1978.22	5.05504	4.9447E+1	4.9865E+1	4.9108E+1
1964.72	5.08978	2.1422E+1	2.1851E+1	2.1281E+1	1978.47	5.05440	4.9744E+1	5.0161E+1	4.9403E+1
1964.85	5.08945	2.1536E+1	2.1964E+1	2.1393E+1	1978.72	5.05376	5.0028E+1	5.0446E+1	4.9687E+1
1964.97	5.08913	2.1655E+1	2.2083E+1	2.1512E+1	1978.97	5.05312	5.0305E+1	5.0722E+1	4.9962E+1
1965.10	5.08880	2.1792E+1	2.2220E+1	2.1647E+1	1979.22	5.05248	5.0578E+1	5.0995E+1	5.0233E+1
1965.22	5.08848	2.1938E+1	2.2366E+1	2.1794E+1	1979.72	5.05121	5.1095E+1	5.1512E+1	5.0748E+1
1965.47	5.08783	2.2264E+1	2.2693E+1	2.2118E+1	1980.22	5.04993	5.1601E+1	5.2018E+1	5.1252E+1
1965.72	5.08719	2.2627E+1	2.3055E+1	2.2478E+1	1980.73	5.04866	5.2079E+1	5.2496E+1	5.1728E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1981.23	5.04738	5.2550E+1	5.2966E+1	5.2196E+1	1995.98	5.01008	4.4586E+1	4.4995E+1	4.4269E+1
1981.73	5.04611	5.3021E+1	5.3437E+1	5.2666E+1	1996.23	5.00945	4.4376E+1	4.4785E+1	4.4060E+1
1982.23	5.04484	5.3492E+1	5.3907E+1	5.3134E+1	1996.33	5.00920	4.4296E+1	4.4705E+1	4.3981E+1
1982.73	5.04356	5.3961E+1	5.4375E+1	5.3600E+1	1996.43	5.00895	4.4219E+1	4.4628E+1	4.3904E+1
1983.23	5.04229	5.4406E+1	5.4820E+1	5.4043E+1	1996.53	5.00870	4.4142E+1	4.4551E+1	4.3827E+1
1983.48	5.04166	5.4618E+1	5.5032E+1	5.4254E+1	1996.63	5.00845	4.4066E+1	4.4474E+1	4.3751E+1
1983.73	5.04102	5.4827E+1	5.5241E+1	5.4462E+1	1996.68	5.00832	4.4028E+1	4.4437E+1	4.3714E+1
1983.98	5.04039	5.502iE+1	5.5434E+1	5.4655E+1	1996.73	5.00820	4.3991E+1	4.4399E+1	4.3677E+1
1984.23	5.03975	5.5208E+1	5.5621E+1	5.4841E+1	1996.78	5.00807	4.3954E+1	4.4363E+1	4.3640E+1
1984.48	5.03911	5.5383E+1	5.5796E+1	5.5015E+1	1996.83	5.00795	4.3918E+1	4.4327E+1	4.3604E+1
1984.73	5.03848	5.5529E+1	5.5942E+1	5.5160E+1	1996.88	5.00782	4.3883E+1	4.4291E+1	4.3569E+1
1984.98	5.03785	5.5653E+1	5.6066E+1	5.5284E+1	1996.93	5.00769	4.3848E+1	4.4257E+1	4.3535E+1
1985.23	5.03721	5.5755E+1	5.6167E+1	5.5385E+1	1996.98	5.00757	4.3814E+1	4.4222E+1	4.3500E+1
1985.35	5.03689	5.5795E+1	5.6207E+1	5.5425E+1	1997.03	5.00744	4.3780E+1	4.4188E+1	4.3467E+1
1985.48	5.03658	5.5830E+1	5.6241E+1	5.5459E+1	1997.08	5.00732	4.3747E+1	4.4155E+1	4.3434E+1
1985.60	5.03626	5.5841E+1	5.6252E+1	5.5470E+1	1997.13	5.00719	4.3714E+1	4.4123E+1	4.3401E+1
1985.73	5.03594	5.5835E+1	5.6247E+1	5.5464E+1	1997.18	5.00707	4.3683E+1	4.4091E+1	4.3370E+1
1985.85	5.03563	5.5811E+1	5.6222E+1	5.5441E+1	1997.23	5.00694	4.3652E+1	4.4060E+1	4.3340E+1
1985.98	5.03531	5.5779E+1	5.6190E+1	5.5409E+1	1997.28	5.00682	4.3622E+1	4.4031E+1	4.3310E+1
1986.10	5.03499	5.5739E+1	5.6150E+1	5.5368E+1	1997.33	5.00669	4.3594E+1	4.4002E+1	4.3281E+1
1986.23	5.03467	5.5688E+1	5.6099E+1	5.5318E+1	1997.38	5.00657	4.3566E+1	4.3974E+1	4.3254E+1
1986.48	5.03404	5.5564E+1	5.5976E+1	5.5196E+1	1997.43	5.00644	4.3542E+1	4.3949E+1	4.3230E+1
1986.73	5.03341	5.5419E+1	5.5830E+1	5.5050E+1	1997.48	5.00632	4.3521E+1	4.3928E+1	4.3209E+1
1986.98	5.03277	5.5250E+1	5.5661E+1	5.4882E+1	1997.53	5.00619	4.3506E+1	4.3914E+1	4.3195E+1
1987.23	5.03214	5.5050E+1	5.5461E+1	5.4683E+1	1997.58	5.00606	4.3501E+1	4.3909E+1	4.3191E+1
1987.48	5.03151	5.4810E+1	5.5221E+1	5.4444E+1	1997.63	5.00594	4.3510E+1	4.3917E+1	4.3199E+1
1987.73	5.03087	5.4533E+1	5.4944E+1	5.4169E+1	1997.68	5.00581	4.3532E+1	4.3939E+1	4.3221E+1
1987.98	5.03024	5.4225E+1	5.4636E+1	5.3863E+1	1997.73	5.00569	4.3564E+1	4.3971E+1	4.3253E+1
1988.23	5.02961	5.3892E+1	5.4303E+1	5.3531E+1	1997.78	5.00556	4.3603E+1	4.4010E+1	4.3290E+1
1988.73	5.02834	5.3156E+1	5.3568E+1	5.2799E+1	1997.83	5.00544	4.3637E+1	4.4044E+1	4.3324E+1
1989.23	5.02708	5.2399E+1	5.2810E+1	5.2045E+1	1997.88	5.00531	4.3665E+1	4.4072E+1	4.3351E+1
1989.73	5.02582	5.1599E+1	5.2011E+1	5.1250E+1	1997.93	5.00519	4.3687E+1	4.4094E+1	4.3373E+1
1990.23	5.02455	5.0811E+1	5.1223E+1	5.0466E+1	1997.98	5.00506	4.3704E+1	4.4110E+1	4.3390E+1
1990.73	5.02329	5.0043E+1	5.0455E+1	4.9702E+1	1998.03	5.00494	4.3712E+1	4.4119E+1	4.3398E+1
1991.23	5.02203	4.9290E+1	4.9701E+1	4.8952E+1	1998.08	5.00481	4.3713E+1	4.4119E+1	4.3398E+1
1991.73	5.02077	4.8568E+1	4.8979E+1	4.8234E+1	1998.13	5.00469	4.3702E+1	4.4108E+1	4.3387E+1
1992.23	5.01951	4.7882E+1	4.8293E+1	4.7551E+1	1998.18	5.00456	4.3680E+1	4.4086E+1	4.3366E+1
1992.48	5.01888	4.7572E+1	4.7983E+1	4.7242E+1	1998.23	5.00444	4.3648E+1	4.4054E+1	4.3333E+1
1992.73	5.01825	4.7283E+1	4.7694E+1	4.6955E+1	1998.28	5.00431	4.3600E+1	4.4006E+1	4.3285E+1
1992.98	5.01762	4.7018E+1	4.7429E+1	4.6691E+1	1998.33	5.00419	4.3539E+1	4.3946E+1	4.3226E+1
1993.23	5.01699	4.6775E+1	4.7186E+1	4.6450E+1	1998.38	5.00406	4.3470E+1	4.3876E+1	4.3157E+1
1993.48	5.01636	4.6557E+1	4.6967E+1	4.6232E+1	1998.43	5.00394	4.3396E+1	4.3803E+1	4.3085E+1
1993.73	5.01573	4.6358E+1	4.6769E+1	4.6034E+1	1998.53	5.00368	4.3257E+1	4.3664E+1	4.2948E+1
1993.98	5.01510	4.6172E+1	4.6582E+1	4.5848E+1	1998.63	5.00343	4.3139E+1	4.3547E+1	4.2830E+1
1994.23	5.01448	4.5988E+1	4.6398E+1	4.5665E+1	1998.73	5.00318	4.3045E+1	4.3452E+1	4.2737E+1
1994.73	5.01322	4.5628E+1	4.6038E+1	4.5306E+1	1998.78	5.00306	4.3007E+1	4.3414E+1	4.2698E+1
1994.98	5.01259	4.5441E+1	4.5851E+1	4.5120E+1	1998.83	5.00293	4.2976E+1	4.3383E+1	4.2667E+1
1995.23	5.01196	4.5244E+1	4.5654E+1	4.4924E+1	1998.88	5.00281	4.2951E+1	4.3358E+1	4.2642E+1
1995.48	5.01133	4.5032E+1	4.5441E+1	4.4713E+1	1998.93	5.00268	4.2931E+1	4.3338E+1	4.2622E+1
1995.73	5.01071	4.4810E+1	4.5219E+1	4.4492E+1	1999.03	5.00243	4.2901E+1	4.3308E+1	4.2592E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
1999.23	5.00193	4.2853E+1	4.3260E+1	4.2544E+1	2004.88	4.98784	4.6273E+1	4.6725E+1	4.5814E+1
1999.43	5.00143	4.2816E+1	4.3222E+1	4.2507E+1	2004.93	4.98771	4.6354E+1	4.6833E+1	4.5861E+1
1999.53	5.00118	4.2802E+1	4.3209E+1	4.2493E+1	2004.98	4.98759	4.6366E+1	4.6861E+1	4.5856E+1
1999.63	5.00093	4.2792E+1	4.3198E+1	4.2483E+1	2005.03	4.98746	4.6303E+1	4.6806E+1	4.5786E+1
1999.73	5.00068	4.2785E+1	4.3191E+1	4.2476E+1	2005.08	4.98734	4.6168E+1	4.6669E+1	4.5652E+1
1999.83	5.00043	4.2781E+1	4.3187E+1	4.2472E+1	2005.13	4.98721	4.5950E+1	4.6439E+1	4.5448E+1
1999.93	5.00018	4.2781E+1	4.3187E+1	4.2472E+1	2005.18	4.98709	4.5661E+1	4.6121E+1	4.5192E+1
2000.03	4.99993	4.2784E+1	4.3190E+1	4.2475E+1	2005.23	4.98696	4.5321E+1	4.5737E+1	4.4894E+1
2000.13	4.99968	4.2790E+1	4.3196E+1	4.2481E+1	2005.33	4.98672	4.4526E+1	4.4930E+1	4.4153E+1
2000.23	4.99943	4.2803E+1	4.3209E+1	4.2494E+1	2005.43	4.98647	4.3637E+1	4.4042E+1	4.3307E+1
2000.43	4.99893	4.2835E+1	4.3241E+1	4.2526E+1	2005.53	4.98622	4.2740E+1	4.3145E+1	4.2430E+1
2000.63	4.99843	4.2873E+1	4.3278E+1	4.2563E+1	2005.63	4.98597	4.1847E+1	4.2252E+1	4.1548E+1
2000.83	4.99793	4.2914E+1	4.3319E+1	4.2604E+1	2005.68	4.98585	4.1454E+1	4.1859E+1	4.1154E+1
2001.03	4.99743	4.2953E+1	4.3358E+1	4.2643E+1	2005.73	4.98572	4.1089E+1	4.1493E+1	4.0791E+1
2001.23	4.99693	4.2990E+1	4.3395E+1	4.2680E+1	2005.78	4.98560	4.0760E+1	4.1164E+1	4.0464E+1
2001.43	4.99643	4.3019E+1	4.3423E+1	4.2708E+1	2005.83	4.98547	4.0467E+1	4.0871E+1	4.0173E+1
2001.63	4.99593	4.3034E+1	4.3439E+1	4.2724E+1	2005.93	4.98522	3.9959E+1	4.0363E+1	3.9669E+1
2001.83	4.99544	4.3037E+1	4.3442E+1	4.2727E+1	2006.03	4.98498	3.9533E+1	3.9936E+1	3.9241E+1
2001.93	4.99519	4.3036E+1	4.3441E+1	4.2726E+1	2006.13	4.98473	3.9169E+1	3.9573E+1	3.8877E+1
2002.03	4.99494	4.3033E+1	4.3437E+1	4.2722E+1	2006.23	4.98448	3.8846E+1	3.9249E+1	3.8556E+1
2002.13	4.99469	4.3026E+1	4.3431E+1	4.2716E+1	2006.43	4.98398	3.8285E+1	3.8689E+1	3.8002E+1
2002.23	4.99444	4.3018E+1	4.3423E+1	4.2708E+1	2006.53	4.98373	3.8059E+1	3.8463E+1	3.7776E+1
2002.33	4.99419	4.3005E+1	4.3410E+1	4.2695E+1	2006.63	4.98348	3.7861E+1	3.8264E+1	3.7583E+1
2002.43	4.99394	4.2988E+1	4.3393E+1	4.2678E+1	2006.73	4.98324	3.7684E+1	3.8088E+1	3.7405E+1
2002.53	4.99369	4.2966E+1	4.3371E+1	4.2658E+1	2006.83	4.98299	3.7535E+1	3.7939E+1	3.7263E+1
2002.63	4.99344	4.2962E+1	4.3367E+1	4.2654E+1	2007.03	4.98249	3.7319E+1	3.7723E+1	3.7045E+1
2002.73	4.99319	4.2985E+1	4.3389E+1	4.2679E+1	2007.23	4.98199	3.7163E+1	3.7567E+1	3.6891E+1
2002.83	4.99294	4.3037E+1	4.3442E+1	4.2729E+1	2007.43	4.98150	3.7044E+1	3.7449E+1	3.6773E+1
2002.93	4.99269	4.3122E+1	4.3527E+1	4.2817E+1	2007.63	4.98100	3.6951E+1	3.7355E+1	3.6681E+1
2003.03	4.99244	4.3240E+1	4.3645E+1	4.2931E+1	2007.73	4.98075	3.6919E+1	3.7323E+1	3.6648E+1
2003.13	4.99219	4.3392E+1	4.3797E+1	4.3085E+1	2007.83	4.98051	3.6903E+1	3.7307E+1	3.6634E+1
2003.23	4.99194	4.3578E+1	4.3983E+1	4.3267E+1	2007.93	4.98026	3.6909E+1	3.7314E+1	3.6640E+1
2003.33	4.99169	4.3783E+1	4.4188E+1	4.3470E+1	2008.03	4.98001	3.6947E+1	3.7351E+1	3.6679E+1
2003.43	4.99145	4.4001E+1	4.4406E+1	4.3688E+1	2008.13	4.97976	3.7017E+1	3.7421E+1	3.6747E+1
2003.53	4.99120	4.4228E+1	4.4633E+1	4.3910E+1	2008.18	4.97964	3.7084E+1	3.7488E+1	3.6814E+1
2003.63	4.99095	4.4434E+1	4.4838E+1	4.4115E+1	2008.23	4.97951	3.7176E+1	3.7580E+1	3.6905E+1
2003.73	4.99070	4.4596E+1	4.5001E+1	4.4277E+1	2008.28	4.97939	3.7297E+1	3.7701E+1	3.7026E+1
2003.83	4.99045	4.4733E+1	4.5137E+1	4.4415E+1	2008.33	4.97927	3.7452E+1	3.7856E+1	3.7180E+1
2003.93	4.99020	4.4832E+1	4.5237E+1	4.4512E+1	2008.38	4.97914	3.7650E+1	3.8054E+1	3.7375E+1
2004.03	4.98995	4.4916E+1	4.5320E+1	4.4596E+1	2008.43	4.97902	3.7888E+1	3.8291E+1	3.7611E+1
2004.13	4.98970	4.4983E+1	4.5388E+1	4.4664E+1	2008.48	4.97889	3.8170E+1	3.8574E+1	3.7890E+1
2004.23	4.98945	4.5037E+1	4.5442E+1	4.4718E+1	2008.53	4.97877	3.8500E+1	3.8903E+1	3.8210E+1
2004.33	4.98920	4.5098E+1	4.5503E+1	4.4782E+1	2008.58	4.97865	3.8830E+1	3.9234E+1	3.8533E+1
2004.43	4.98895	4.5182E+1	4.5587E+1	4.4865E+1	2008.63	4.97852	3.9127E+1	3.9530E+1	3.8827E+1
2004.48	4.98883	4.5240E+1	4.5645E+1	4.4922E+1	2008.68	4.97840	3.9379E+1	3.9781E+1	3.9076E+1
2004.53	4.98871	4.5311E+1	4.5715E+1	4.4993E+1	2008.73	4.97827	3.9569E+1	3.9970E+1	3.9261E+1
2004.58	4.98858	4.5404E+1	4.5808E+1	4.5086E+1	2008.78	4.97815	3.9663E+1	4.0064E+1	3.9349E+1
2004.63	4.98846	4.5536E+1	4.5940E+1	4.5203E+1	2008.83	4.97803	3.9617E+1	4.0019E+1	3.9307E+1
2004.73	4.98821	4.5848E+1	4.6251E+1	4.5478E+1	2008.88	4.97790	3.9461E+1	3.9863E+1	3.9153E+1
2004.83	4.98796	4.6154E+1	4.6567E+1	4.5735E+1	2008.93	4.97778	3.9204E+1	3.9606E+1	3.8899E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2008.98	4.97765	3.8863E+1	3.9265E+1	3.8561E+1	2015.63	4.96123	4.1150E+1	4.1551E+1	4.0849E+1
2009.03	4.97753	3.8453E+1	3.8856E+1	3.8161E+1	2015.73	4.96098	4.1202E+1	4.1603E+1	4.0905E+1
2009.08	4.97741	3.8025E+1	3.8428E+1	3.7746E+1	2015.83	4.96074	4.1288E+1	4.1689E+1	4.0989E+1
2009.13	4.97728	3.7643E+1	3.8046E+1	3.7368E+1	2015.93	4.96049	4.1428E+1	4.1829E+1	4.1128E+1
2009.18	4.97716	3.7305E+1	3.7709E+1	3.7035E+1	2016.03	4.96025	4.1623E+1	4.2024E+1	4.1320E+1
2009.23	4.97704	3.7017E+1	3.7422E+1	3.6752E+1	2016.13	4.96000	4.1906E+1	4.2307E+1	4.1610E+1
2009.28	4.97691	3.6787E+1	3.7192E+1	3.6522E+1	2016.23	4.95975	4.2257E+1	4.2658E+1	4.1951E+1
2009.33	4.97679	3.6602E+1	3.7007E+1	3.6339E+1	2016.33	4.95951	4.2695E+1	4.3097E+1	4.2395E+1
2009.43	4.97654	3.6308E+1	3.6731E+1	3.6053E+1	2016.43	4.95926	4.3196E+1	4.3597E+1	4.2887E+1
2009.53	4.97629	3.6107E+1	3.6520E+1	3.5848E+1	2016.53	4.95902	4.3714E+1	4.4116E+1	4.3399E+1
2009.63	4.97604	3.5943E+1	3.6351E+1	3.5683E+1	2016.63	4.95877	4.4217E+1	4.4619E+1	4.3900E+1
2009.73	4.97580	3.5799E+1	3.6207E+1	3.5541E+1	2016.73	4.95852	4.4712E+1	4.5113E+1	4.4391E+1
2009.85	4.97549	3.5642E+1	3.6049E+1	3.5387E+1	2016.83	4.95828	4.5157E+1	4.5558E+1	4.4831E+1
2009.98	4.97518	3.5507E+1	3.5915E+1	3.5251E+1	2016.93	4.95803	4.5565E+1	4.5966E+1	4.5241E+1
2010.23	4.97456	3.5251E+1	3.5658E+1	3.4998E+1	2017.03	4.95779	4.5923E+1	4.6324E+1	4.5595E+1
2010.73	4.97332	3.4809E+1	3.5215E+1	3.4560E+1	2017.13	4.95754	4.6248E+1	4.6648E+1	4.5922E+1
2011.23	4.97209	3.4407E+1	3.4813E+1	3.4162E+1	2017.23	4.95729	4.6540E+1	4.6940E+1	4.6212E+1
2011.48	4.97147	3.4216E+1	3.4622E+1	3.3973E+1	2017.33	4.95705	4.6818E+1	4.7218E+1	4.6491E+1
2011.73	4.97085	3.4037E+1	3.4443E+1	3.3796E+1	2017.43	4.95680	4.7075E+1	4.7474E+1	4.6746E+1
2011.85	4.97054	3.3959E+1	3.4365E+1	3.3719E+1	2017.53	4.95656	4.7323E+1	4.7723E+1	4.6993E+1
2011.98	4.97023	3.3888E+1	3.4294E+1	3.3649E+1	2017.63	4.95631	4.7550E+1	4.7949E+1	4.7219E+1
2012.10	4.96992	3.3828E+1	3.4234E+1	3.3588E+1	2017.73	4.95607	4.7766E+1	4.8165E+1	4.7433E+1
2012.23	4.96961	3.3772E+1	3.4178E+1	3.3534E+1	2017.83	4.95582	4.7957E+1	4.8356E+1	4.7624E+1
2012.35	4.96931	3.3722E+1	3.4128E+1	3.3484E+1	2017.93	4.95558	4.8132E+1	4.8531E+1	4.7797E+1
2012.48	4.96900	3.3677E+1	3.4083E+1	3.3440E+1	2018.03	4.95533	4.8277E+1	4.8676E+1	4.7941E+1
2012.60	4.96869	3.3646E+1	3.4052E+1	3.3409E+1	2018.13	4.95508	4.8388E+1	4.8786E+1	4.8050E+1
2012.73	4.96838	3.3627E+1	3.4033E+1	3.3390E+1	2018.18	4.95496	4.8416E+1	4.8815E+1	4.8077E+1
2012.85	4.96807	3.3623E+1	3.4029E+1	3.3389E+1	2018.23	4.95484	4.8404E+1	4.8803E+1	4.8066E+1
2012.98	4.96776	3.3651E+1	3.4056E+1	3.3418E+1	2018.28	4.95472	4.8359E+1	4.8758E+1	4.8020E+1
2013.10	4.96745	3.3707E+1	3.4112E+1	3.3469E+1	2018.33	4.95459	4.8275E+1	4.8674E+1	4.7938E+1
2013.23	4.96715	3.3803E+1	3.4209E+1	3.3566E+1	2018.38	4.95447	4.8167E+1	4.8566E+1	4.7831E+1
2013.35	4.96684	3.3939E+1	3.4344E+1	3.3705E+1	2018.43	4.95435	4.8033E+1	4.8433E+1	4.7697E+1
2013.48	4.96653	3.4114E+1	3.4519E+1	3.3876E+1	2018.48	4.95422	4.7870E+1	4.8270E+1	4.7535E+1
2013.60	4.96622	3.4365E+1	3.4771E+1	3.4124E+1	2018.53	4.95410	4.7676E+1	4.8076E+1	4.7341E+1
2013.73	4.96591	3.4690E+1	3.5095E+1	3.4445E+1	2018.63	4.95386	4.7219E+1	4.7619E+1	4.6890E+1
2013.98	4.96530	3.5454E+1	3.5859E+1	3.5200E+1	2018.73	4.95361	4.6763E+1	4.7163E+1	4.6437E+1
2014.23	4.96468	3.6307E+1	3.6718E+1	3.6044E+1	2018.83	4.95337	4.6323E+1	4.6724E+1	4.6000E+1
2014.33	4.96443	3.6685E+1	3.7086E+1	3.6416E+1	2018.93	4.95312	4.5904E+1	4.6305E+1	4.5583E+1
2014.43	4.96419	3.7082E+1	3.7484E+1	3.6811E+1	2019.03	4.95287	4.5507E+1	4.5909E+1	4.5188E+1
2014.53	4.96394	3.7524E+1	3.7926E+1	3.7249E+1	2019.13	4.95263	4.5136E+1	4.5537E+1	4.4818E+1
2014.63	4.96369	3.8036E+1	3.8438E+1	3.7756E+1	2019.23	4.95238	4.4785E+1	4.5187E+1	4.4469E+1
2014.73	4.96345	3.8625E+1	3.9026E+1	3.8340E+1	2019.33	4.95214	4.4457E+1	4.4859E+1	4.4144E+1
2014.83	4.96320	3.9242E+1	3.9643E+1	3.8945E+1	2019.53	4.95165	4.3906E+1	4.4308E+1	4.3596E+1
2014.93	4.96295	3.9829E+1	4.0229E+1	3.9523E+1	2019.73	4.95116	4.3465E+1	4.3867E+1	4.3155E+1
2015.03	4.96271	4.0335E+1	4.0735E+1	4.0026E+1	2019.83	4.95091	4.3286E+1	4.3688E+1	4.2976E+1
2015.13	4.96246	4.0704E+1	4.1105E+1	4.0394E+1	2019.88	4.95079	4.3210E+1	4.3611E+1	4.2900E+1
2015.23	4.96222	4.0930E+1	4.1331E+1	4.0621E+1	2019.93	4.95067	4.3149E+1	4.3551E+1	4.2840E+1
2015.33	4.96197	4.1045E+1	4.1446E+1	4.0733E+1	2019.98	4.95055	4.3100E+1	4.3502E+1	4.2791E+1
2015.43	4.96172	4.1107E+1	4.1509E+1	4.0802E+1	2020.03	4.95042	4.3062E+1	4.3464E+1	4.2753E+1
2015.53	4.96148	4.1128E+1	4.1529E+1	4.0826E+1	2020.08	4.95030	4.3035E+1	4.3437E+1	4.2726E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2020.13	4.95018	4.3015E+1	4.3417E+1	4.2706E+1	2023.38	4.94223	2.2039E+2	2.2289E+2	2.1715E+2
2020.23	4.94993	4.2988E+1	4.3390E+1	4.2680E+1	2023.43	4.94210	2.0855E+2	2.1092E+2	2.0576E+2
2020.33	4.94969	4.2990E+1	4.3392E+1	4.2682E+1	2023.48	4.94198	1.9499E+2	1.9708E+2	1.9275E+2
2020.43	4.94944	4.3027E+1	4.3428E+1	4.2718E+1	2023.53	4.94186	1.8080E+2	1.8260E+2	1.7915E+2
2020.53	4.94920	4.3108E+1	4.3509E+1	4.2802E+1	2023.63	4.94162	1.5345E+2	1.5491E+2	1.5249E+2
2020.63	4.94895	4.3222E+1	4.3623E+1	4.2914E+1	2023.73	4.94137	1.2977E+2	1.3161E+2	1.2977E+2
2020.73	4.94871	4.3378E+1	4.3779E+1	4.3069E+1	2023.83	4.94113	1.1108E+2	1.1219E+2	1.1068E+2
2020.78	4.94859	4.3477E+1	4.3878E+1	4.3167E+1	2023.93	4.94088	9.7700E+1	9.8585E+1	9.7258E+1
2020.83	4.94846	4.3596E+1	4.3997E+1	4.3287E+1	2023.98	4.94076	9.2636E+1	9.3412E+1	9.2176E+1
2020.88	4.94834	4.3745E+1	4.4145E+1	4.3434E+1	2024.03	4.94064	8.8728E+1	8.9434E+1	8.8264E+1
2020.93	4.94822	4.3916E+1	4.4316E+1	4.3605E+1	2024.08	4.94052	8.5696E+1	8.6322E+1	8.5201E+1
2020.98	4.94810	4.4112E+1	4.4512E+1	4.3802E+1	2024.13	4.94039	8.3222E+1	8.3840E+1	8.2756E+1
2021.03	4.94797	4.4343E+1	4.4743E+1	4.4031E+1	2024.18	4.94027	8.1396E+1	8.1989E+1	8.0932E+1
2021.08	4.94785	4.4600E+1	4.5000E+1	4.4288E+1	2024.23	4.94015	8.0123E+1	8.0685E+1	7.9647E+1
2021.13	4.94773	4.4898E+1	4.5298E+1	4.4583E+1	2024.28	4.94003	7.9209E+1	7.9753E+1	7.8728E+1
2021.18	4.94761	4.5226E+1	4.5626E+1	4.4906E+1	2024.33	4.93991	7.8553E+1	7.9087E+1	7.8071E+1
2021.23	4.94748	4.5555E+1	4.5956E+1	4.5233E+1	2024.38	4.93978	7.8111E+1	7.8631E+1	7.7621E+1
2021.28	4.94736	4.5879E+1	4.6279E+1	4.5554E+1	2024.43	4.93966	7.7777E+1	7.8286E+1	7.7281E+1
2021.33	4.94724	4.6190E+1	4.6590E+1	4.5864E+1	2024.48	4.93954	7.7465E+1	7.7966E+1	7.6966E+1
2021.38	4.94712	4.6492E+1	4.6892E+1	4.6169E+1	2024.53	4.93942	7.7144E+1	7.7637E+1	7.6641E+1
2021.43	4.94699	4.6814E+1	4.7214E+1	4.6489E+1	2024.58	4.93930	7.6773E+1	7.7258E+1	7.6268E+1
2021.48	4.94687	4.7155E+1	4.7555E+1	4.6830E+1	2024.63	4.93917	7.6314E+1	7.6794E+1	7.5809E+1
2021.53	4.94675	4.7523E+1	4.7922E+1	4.7197E+1	2024.68	4.93905	7.5745E+1	7.6223E+1	7.5246E+1
2021.58	4.94663	4.7925E+1	4.8324E+1	4.7603E+1	2024.73	4.93893	7.5085E+1	7.5579E+1	7.4611E+1
2021.63	4.94650	4.8407E+1	4.8806E+1	4.8082E+1	2024.78	4.93881	7.4492E+1	7.4992E+1	7.4032E+1
2021.68	4.94638	4.8959E+1	4.9358E+1	4.8632E+1	2024.83	4.93869	7.4041E+1	7.4554E+1	7.3600E+1
2021.73	4.94626	4.9584E+1	4.9982E+1	4.9260E+1	2024.88	4.93856	7.3855E+1	7.4364E+1	7.3412E+1
2021.78	4.94614	5.0327E+1	5.0725E+1	5.0002E+1	2024.93	4.93844	7.3914E+1	7.4417E+1	7.3464E+1
2021.83	4.94601	5.1209E+1	5.1607E+1	5.0882E+1	2024.98	4.93832	7.4165E+1	7.4670E+1	7.3714E+1
2021.88	4.94589	5.2250E+1	5.2647E+1	5.1918E+1	2025.03	4.93820	7.4615E+1	7.5126E+1	7.4164E+1
2021.93	4.94577	5.3449E+1	5.3845E+1	5.3118E+1	2025.08	4.93808	7.5279E+1	7.5797E+1	7.4826E+1
2022.03	4.94553	5.6308E+1	5.6761E+1	5.5924E+1	2025.13	4.93795	7.6180E+1	7.6717E+1	7.5734E+1
2022.13	4.94528	5.9666E+1	6.0266E+1	5.9160E+1	2025.18	4.93783	7.7413E+1	7.7964E+1	7.6964E+1
2022.23	4.94504	6.3692E+1	6.4511E+1	6.2954E+1	2025.23	4.93771	7.9022E+1	7.9556E+1	7.8533E+1
2022.33	4.94479	6.8390E+1	6.9603E+1	6.7375E+1	2025.33	4.93747	8.2562E+1	8.3080E+1	8.2007E+1
2022.38	4.94467	7.1032E+1	7.2473E+1	6.9759E+1	2025.43	4.93722	8.5803E+1	8.6329E+1	8.5208E+1
2022.43	4.94455	7.4204E+1	7.5936E+1	7.2677E+1	2025.53	4.93698	8.8543E+1	8.9082E+1	8.7917E+1
2022.48	4.94443	7.7941E+1	7.9981E+1	7.6157E+1	2025.58	4.93686	8.9782E+1	9.0341E+1	8.9156E+1
2022.53	4.94430	8.2471E+1	8.4893E+1	8.0469E+1	2025.63	4.93674	9.0703E+1	9.1281E+1	9.0081E+1
2022.63	4.94406	9.4243E+1	9.7386E+1	9.1821E+1	2025.68	4.93661	9.1410E+1	9.2000E+1	9.0788E+1
2022.73	4.94381	1.1061E+2	1.1438E+2	1.0773E+2	2025.73	4.93649	9.1948E+1	9.2535E+1	9.1315E+1
2022.83	4.94357	1.3331E+2	1.3701E+2	1.3014E+2	2025.78	4.93637	9.2260E+1	9.2861E+1	9.1635E+1
2022.93	4.94333	1.5950E+2	1.6308E+2	1.5642E+2	2025.83	4.93625	9.2444E+1	9.3045E+1	9.1815E+1
2023.03	4.94308	1.8897E+2	1.9202E+2	1.8606E+2	2025.88	4.93613	9.2479E+1	9.3087E+1	9.1857E+1
2023.08	4.94296	2.0384E+2	2.0621E+2	2.0082E+2	2025.93	4.93600	9.2445E+1	9.3049E+1	9.1820E+1
2023.13	4.94284	2.1617E+2	2.1841E+2	2.1331E+2	2026.03	4.93576	9.2206E+1	9.2799E+1	9.1574E+1
2023.18	4.94271	2.2608E+2	2.2823E+2	2.2291E+2	2026.13	4.93552	9.1858E+1	9.2467E+1	9.1247E+1
2023.23	4.94259	2.3204E+2	2.3434E+2	2.2861E+2	2026.23	4.93527	9.1451E+1	9.2057E+1	9.0844E+1
2023.28	4.94247	2.3363E+2	2.3589E+2	2.2983E+2	2026.33	4.93503	9.1005E+1	9.1620E+1	9.0415E+1
2023.33	4.94235	2.2930E+2	2.3174E+2	2.2568E+2	2026.43	4.93479	9.0710E+1	9.1340E+1	9.0139E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2026.48	4.93466	9.0645E+1	9.1265E+1	9.0066E+1	2029.83	4.92652	1.0212E+2	1.0284E+2	1.0144E+2
2026.53	4.93454	9.0740E+1	9.1356E+1	9.0155E+1	2029.93	4.92628	9.9842E+1	1.0054E+2	9.9179E+1
2026.58	4.93442	9.1008E+1	9.1647E+1	9.0441E+1	2030.03	4.92603	9.7786E+1	9.8452E+1	9.7128E+1
2026.63	4.93430	9.1513E+1	9.2154E+1	9.0940E+1	2030.13	4.92579	9.5759E+1	9.6423E+1	9.5135E+1
2026.68	4.93418	9.2259E+1	9.2901E+1	9.1674E+1	2030.23	4.92555	9.3987E+1	9.4628E+1	9.3372E+1
2026.73	4.93406	9.3205E+1	9.3856E+1	9.2613E+1	2030.43	4.92506	9.0726E+1	9.1341E+1	9.0140E+1
2026.78	4.93393	9.4357E+1	9.5019E+1	9.3756E+1	2030.63	4.92458	8.7945E+1	8.8539E+1	8.7383E+1
2026.83	4.93381	9.5725E+1	9.6409E+1	9.5122E+1	2030.83	4.92409	8.5570E+1	8.6143E+1	8.5024E+1
2026.93	4.93357	9.9032E+1	9.9702E+1	9.8356E+1	2031.03	4.92361	8.3523E+1	8.4080E+1	8.2992E+1
2027.03	4.93333	1.0230E+2	1.0301E+2	1.0160E+2	2031.23	4.92312	8.1804E+1	8.2346E+1	8.1284E+1
2027.13	4.93308	1.0558E+2	1.0631E+2	1.0484E+2	2031.43	4.92264	8.0349E+1	8.0881E+1	7.9840E+1
2027.18	4.93296	1.0717E+2	1.0790E+2	1.0642E+2	2031.63	4.92215	7.9195E+1	7.9717E+1	7.8693E+1
2027.23	4.93284	1.0865E+2	1.0939E+2	1.0790E+2	2031.83	4.92167	7.8272E+1	7.8786E+1	7.7775E+1
2027.28	4.93272	1.1006E+2	1.1079E+2	1.0930E+2	2032.03	4.92119	7.7526E+1	7.8034E+1	7.7033E+1
2027.33	4.93260	1.1136E+2	1.1210E+2	1.1060E+2	2032.23	4.92070	7.6938E+1	7.7442E+1	7.6449E+1
2027.38	4.93247	1.1258E+2	1.1332E+2	1.1181E+2	2032.43	4.92022	7.6503E+1	7.7010E+1	7.6022E+1
2027.43	4.93235	1.1367E+2	1.1441E+2	1.1289E+2	2032.63	4.91973	7.6283E+1	7.6782E+1	7.5798E+1
2027.53	4.93211	1.1552E+2	1.1628E+2	1.1475E+2	2032.73	4.91949	7.6260E+1	7.6765E+1	7.5781E+1
2027.63	4.93187	1.1720E+2	1.1796E+2	1.1642E+2	2032.83	4.91925	7.6311E+1	7.6806E+1	7.5821E+1
2027.73	4.93162	1.1872E+2	1.1949E+2	1.1794E+2	2033.03	4.91876	7.6596E+1	7.7094E+1	7.6105E+1
2027.83	4.93138	1.2011E+2	1.2089E+2	1.1933E+2	2033.23	4.91828	7.6948E+1	7.7451E+1	7.6458E+1
2027.88	4.93126	1.2080E+2	1.2158E+2	1.2001E+2	2033.43	4.91780	7.7446E+1	7.7956E+1	7.6956E+1
2027.93	4.93114	1.2149E+2	1.2227E+2	1.2070E+2	2033.53	4.91755	7.7752E+1	7.8257E+1	7.7253E+1
2027.98	4.93101	1.2216E+2	1.2295E+2	1.2137E+2	2033.63	4.91731	7.8124E+1	7.8634E+1	7.7625E+1
2028.03	4.93089	1.2283E+2	1.2362E+2	1.2204E+2	2033.68	4.91719	7.8321E+1	7.8832E+1	7.7820E+1
2028.08	4.93077	1.2350E+2	1.2430E+2	1.2271E+2	2033.73	4.91707	7.8540E+1	7.9054E+1	7.8039E+1
2028.13	4.93065	1.2415E+2	1.2494E+2	1.2335E+2	2033.78	4.91695	7.8794E+1	7.9309E+1	7.8290E+1
2028.18	4.93053	1.2476E+2	1.2555E+2	1.2395E+2	2033.83	4.91683	7.9079E+1	7.9595E+1	7.8572E+1
2028.23	4.93041	1.2528E+2	1.2607E+2	1.2447E+2	2033.93	4.91659	7.9693E+1	8.0217E+1	7.9186E+1
2028.28	4.93028	1.2571E+2	1.2650E+2	1.2490E+2	2034.03	4.91635	8.0400E+1	8.0929E+1	7.9888E+1
2028.33	4.93016	1.2604E+2	1.2683E+2	1.2522E+2	2034.13	4.91610	8.1204E+1	8.1740E+1	8.0687E+1
2028.38	4.93004	1.2622E+2	1.2700E+2	1.2540E+2	2034.23	4.91586	8.2105E+1	8.2646E+1	8.1579E+1
2028.43	4.92992	1.2621E+2	1.2700E+2	1.2540E+2	2034.33	4.91562	8.3085E+1	8.3634E+1	8.2553E+1
2028.48	4.92980	1.2608E+2	1.2688E+2	1.2527E+2	2034.43	4.91538	8.4147E+1	8.4708E+1	8.3611E+1
2028.53	4.92968	1.2588E+2	1.2667E+2	1.2507E+2	2034.53	4.91514	8.5354E+1	8.5922E+1	8.4807E+1
2028.58	4.92956	1.2559E+2	1.2638E+2	1.2477E+2	2034.63	4.91490	8.6687E+1	8.7285E+1	8.6141E+1
2028.63	4.92943	1.2518E+2	1.2597E+2	1.2437E+2	2034.73	4.91465	8.8183E+1	8.8821E+1	8.7599E+1
2028.68	4.92931	1.2468E+2	1.2547E+2	1.2387E+2	2034.83	4.91441	9.0046E+1	9.0772E+1	8.9381E+1
2028.73	4.92919	1.2412E+2	1.2491E+2	1.2332E+2	2034.93	4.91417	9.2291E+1	9.3161E+1	9.1499E+1
2028.83	4.92895	1.2291E+2	1.2369E+2	1.2211E+2	2035.03	4.91393	9.5036E+1	9.6105E+1	9.4100E+1
2028.93	4.92871	1.2164E+2	1.2243E+2	1.2085E+2	2035.13	4.91369	9.8613E+1	9.9925E+1	9.7521E+1
2029.03	4.92846	1.2029E+2	1.2106E+2	1.1949E+2	2035.18	4.91357	1.0114E+2	1.0250E+2	9.9798E+1
2029.13	4.92822	1.1885E+2	1.1961E+2	1.1806E+2	2035.23	4.91345	1.0363E+2	1.0516E+2	1.0218E+2
2029.18	4.92810	1.1800E+2	1.1876E+2	1.1721E+2	2035.28	4.91333	1.0632E+2	1.0798E+2	1.0480E+2
2029.23	4.92798	1.1702E+2	1.1778E+2	1.1624E+2	2035.33	4.91321	1.0949E+2	1.1121E+2	1.0790E+2
2029.33	4.92773	1.1483E+2	1.1558E+2	1.1405E+2	2035.38	4.91308	1.1308E+2	1.1483E+2	1.1147E+2
2029.43	4.92749	1.1237E+2	1.1312E+2	1.1161E+2	2035.43	4.91296	1.1715E+2	1.1889E+2	1.1554E+2
2029.53	4.92725	1.0978E+2	1.1053E+2	1.0903E+2	2035.48	4.91284	1.2165E+2	1.2337E+2	1.2006E+2
2029.63	4.92700	1.0716E+2	1.0791E+2	1.0643E+2	2035.53	4.91272	1.2657E+2	1.2828E+2	1.2502E+2
2029.73	4.92676	1.0460E+2	1.0533E+2	1.0388E+2	2035.63	4.91248	1.3751E+2	1.3930E+2	1.3593E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2035.68	4.91236	1.4327E+2	1.4493E+2	1.4146E+2	2039.02	4.90431	1.1145E+3	1.1350E+3	1.0946E+3
2035.73	4.91224	1.4847E+2	1.5019E+2	1.4653E+2	2039.12	4.90407	1.2558E+3	1.2820E+3	1.2313E+3
2035.78	4.91212	1.5283E+2	1.5461E+2	1.5076E+2	2039.20	4.90388	1.3774E+3	1.4154E+3	1.3531E+3
2035.83	4.91200	1.5614E+2	1.5791E+2	1.5393E+2	2039.40	4.90340	1.7893E+3	1.8545E+3	1.7345E+3
2035.88	4.91188	1.5786E+2	1.5958E+2	1.5558E+2	2039.60	4.90292	2.2379E+3	2.3842E+3	2.1328E+3
2035.93	4.91176	1.5756E+2	1.5936E+2	1.5546E+2	2039.70	4.90268	2.5254E+3	2.7781E+3	2.3629E+3
2035.98	4.91164	1.5616E+2	1.5792E+2	1.5415E+2	2039.80	4.90244	2.8712E+3	3.3804E+3	2.6045E+3
2036.03	4.91152	1.5382E+2	1.5559E+2	1.5195E+2	2039.90	4.90220	3.2588E+3	7.3934E+3	2.8257E+3
2036.08	4.91139	1.5107E+2	1.5283E+2	1.4927E+2	2040.00	4.90196	3.6706E+3	∞	3.0096E+3
2036.13	4.91127	1.4808E+2	1.4983E+2	1.4632E+2	2040.10	4.90172	4.4245E+3	∞	3.1597E+3
2036.18	4.91115	1.4502E+2	1.4677E+2	1.4332E+2	2040.20	4.90148	4.6984E+3	∞	3.1782E+3
2036.23	4.91103	1.4208E+2	1.4379E+2	1.4043E+2	2043.80	4.89285	4.6977E+3	∞	3.1948E+3
2036.28	4.91091	1.3932E+2	1.4100E+2	1.3778E+2	2044.00	4.89237	4.2705E+3	∞	3.1432E+3
2036.33	4.91079	1.3704E+2	1.3864E+2	1.3560E+2	2044.20	4.89189	3.7092E+3	∞	3.0156E+3
2036.38	4.91067	1.3535E+2	1.3684E+2	1.3403E+2	2044.40	4.89141	3.3639E+3	∞	2.8780E+3
2036.43	4.91055	1.3425E+2	1.3560E+2	1.3307E+2	2044.60	4.89093	3.0893E+3	4.0673E+3	2.7381E+3
2036.48	4.91043	1.3377E+2	1.3496E+2	1.3273E+2	2044.80	4.89045	2.8832E+3	3.4366E+3	2.6135E+3
2036.53	4.91031	1.3383E+2	1.3487E+2	1.3292E+2	2045.00	4.88998	2.7115E+3	3.0709E+3	2.4974E+3
2036.58	4.91019	1.3435E+2	1.3529E+2	1.3353E+2	2045.20	4.88950	2.5631E+3	2.8136E+3	2.3851E+3
2036.63	4.91007	1.3531E+2	1.3620E+2	1.3451E+2	2045.40	4.88902	2.4142E+3	2.6012E+3	2.2698E+3
2036.73	4.90983	1.3790E+2	1.3881E+2	1.3711E+2	2045.47	4.88884	2.3579E+3	2.5265E+3	2.2252E+3
2036.78	4.90971	1.3958E+2	1.4047E+2	1.3875E+2	2045.52	4.88872	2.3196E+3	2.4768E+3	2.1940E+3
2036.83	4.90959	1.4149E+2	1.4243E+2	1.4062E+2	2045.62	4.88849	2.2384E+3	2.3743E+3	2.1269E+3
2036.88	4.90947	1.4364E+2	1.4469E+2	1.4269E+2	2045.87	4.88789	2.0641E+3	2.1640E+3	1.9779E+3
2036.93	4.90935	1.4617E+2	1.4736E+2	1.4510E+2	2046.12	4.88729	1.9246E+3	2.0032E+3	1.8547E+3
2037.03	4.90910	1.5214E+2	1.5354E+2	1.5091E+2	2046.37	4.88669	1.7997E+3	1.8634E+3	1.7419E+3
2037.13	4.90886	1.5922E+2	1.6076E+2	1.5778E+2	2046.52	4.88634	1.7309E+3	1.7876E+3	1.6789E+3
2037.23	4.90862	1.6718E+2	1.6891E+2	1.6569E+2	2046.62	4.88610	1.6866E+3	1.7393E+3	1.6380E+3
2037.33	4.90838	1.7633E+2	1.7811E+2	1.7472E+2	2046.72	4.88586	1.6421E+3	1.6910E+3	1.5967E+3
2037.43	4.90814	1.8659E+2	1.8839E+2	1.8493E+2	2046.82	4.88562	1.5999E+3	1.6457E+3	1.5576E+3
2037.52	4.90792	1.9679E+2	1.9870E+2	1.9526E+2	2047.02	4.88514	1.5168E+3	1.5564E+3	1.4793E+3
2037.62	4.90768	2.0948E+2	2.1116E+2	2.0781E+2	2047.12	4.88490	1.4745E+3	1.5129E+3	1.4406E+3
2037.72	4.90744	2.2436E+2	2.2631E+2	2.2296E+2	2047.42	4.88419	1.3624E+3	1.3940E+3	1.3337E+3
2037.82	4.90720	2.4143E+2	2.4317E+2	2.3971E+2	2047.62	4.88371	1.2931E+3	1.3211E+3	1.2671E+3
2037.87	4.90708	2.5095E+2	2.5282E+2	2.4910E+2	2047.82	4.88323	1.2269E+3	1.2522E+3	1.2037E+3
2037.92	4.90696	2.6185E+2	2.6397E+2	2.5975E+2	2048.12	4.88252	1.1346E+3	1.1566E+3	1.1147E+3
2037.97	4.90684	2.7443E+2	2.7692E+2	2.7196E+2	2048.32	4.88204	1.0786E+3	1.0978E+3	1.0596E+3
2038.02	4.90672	2.8856E+2	2.9151E+2	2.8566E+2	2048.52	4.88156	1.0212E+3	1.0394E+3	1.0044E+3
2038.07	4.90660	3.0401E+2	3.0755E+2	3.0052E+2	2048.72	4.88109	9.6763E+2	9.8376E+2	9.5174E+2
2038.12	4.90648	3.2539E+2	3.2974E+2	3.2113E+2	2048.92	4.88061	9.1344E+2	9.2849E+2	8.9912E+2
2038.22	4.90623	3.6600E+2	3.7264E+2	3.6139E+2	2049.12	4.88014	8.6080E+2	8.7613E+2	8.4906E+2
2038.32	4.90599	4.1425E+2	4.2263E+2	4.0798E+2	2049.32	4.87966	8.1736E+2	8.3057E+2	8.0537E+2
2038.42	4.90575	4.7093E+2	4.8212E+2	4.6294E+2	2049.42	4.87942	7.9759E+2	8.0998E+2	7.8559E+2
2038.52	4.90551	5.4021E+2	5.5486E+2	5.2940E+2	2049.82	4.87847	7.1970E+2	7.3056E+2	7.0902E+2
2038.62	4.90527	6.2345E+2	6.4311E+2	6.0858E+2	2050.12	4.87775	6.6743E+2	6.7718E+2	6.5810E+2
2038.72	4.90503	7.2212E+2	7.4468E+2	7.0288E+2	2051.12	4.87538	5.1757E+2	5.2243E+2	5.1282E+2
2038.82	4.90479	8.3269E+2	8.5416E+2	8.1193E+2	2052.12	4.87300	3.9764E+2	4.0044E+2	3.9488E+2
2038.87	4.90467	8.9407E+2	9.1370E+2	8.7503E+2	2052.62	4.87181	3.5034E+2	3.5259E+2	3.4812E+2
2038.92	4.90455	9.5783E+2	9.7628E+2	9.3990E+2	2053.12	4.87063	3.0769E+2	3.0954E+2	3.0585E+2
2038.97	4.90443	1.0481E+3	1.0673E+3	1.0295E+3	2053.62	4.86944	2.6878E+2	2.7032E+2	2.6724E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2054.13	4.86823	2.3468E+2	2.3603E+2	2.3339E+2	2062.63	4.84817	3.8115E+1	3.8483E+1	3.7793E+1
2054.23	4.86800	2.2830E+2	2.2959E+2	2.2703E+2	2062.73	4.84793	3.8324E+1	3.8691E+1	3.7969E+1
2054.33	4.86776	2.2199E+2	2.2326E+2	2.2077E+2	2062.83	4.84770	3.8588E+1	3.8978E+1	3.8207E+1
2054.43	4.86752	2.1590E+2	2.1713E+2	2.1471E+2	2062.93	4.84746	3.8905E+1	3.9296E+1	3.8523E+1
2054.63	4.86705	2.0429E+2	2.0548E+2	2.0319E+2	2063.03	4.84723	3.9261E+1	3.9631E+1	3.8901E+1
2054.83	4.86657	1.9365E+2	1.9477E+2	1.9258E+2	2063.13	4.84699	3.9672E+1	4.0040E+1	3.9342E+1
2054.93	4.86634	1.8855E+2	1.8963E+2	1.8750E+2	2063.23	4.84676	4.0148E+1	4.0517E+1	3.9848E+1
2055.03	4.86610	1.8357E+2	1.8462E+2	1.8253E+2	2063.43	4.84629	4.1340E+1	4.1708E+1	4.1027E+1
2055.13	4.86586	1.7863E+2	1.7967E+2	1.7763E+2	2063.53	4.84605	4.2077E+1	4.2446E+1	4.1723E+1
2055.23	4.86563	1.7387E+2	1.7488E+2	1.7289E+2	2063.63	4.84582	4.2893E+1	4.3320E+1	4.2487E+1
2055.43	4.86515	1.6461E+2	1.6561E+2	1.6370E+2	2063.73	4.84558	4.3836E+1	4.4338E+1	4.3397E+1
2055.63	4.86468	1.5576E+2	1.5670E+2	1.5486E+2	2063.83	4.84535	4.4952E+1	4.5489E+1	4.4459E+1
2055.83	4.86421	1.4745E+2	1.4836E+2	1.4659E+2	2063.93	4.84511	4.6354E+1	4.6918E+1	4.5835E+1
2056.03	4.86373	1.3955E+2	1.4041E+2	1.3871E+2	2064.03	4.84488	4.7997E+1	4.8589E+1	4.7458E+1
2056.23	4.86326	1.3198E+2	1.3282E+2	1.3117E+2	2064.13	4.84465	4.9988E+1	5.0620E+1	4.9434E+1
2056.43	4.86279	1.2498E+2	1.2579E+2	1.2419E+2	2064.23	4.84441	5.2429E+1	5.3106E+1	5.1843E+1
2056.63	4.86231	1.1832E+2	1.1911E+2	1.1757E+2	2064.33	4.84418	5.5497E+1	5.6306E+1	5.4905E+1
2056.83	4.86184	1.1208E+2	1.1283E+2	1.1133E+2	2064.43	4.84394	5.9140E+1	6.0015E+1	5.8408E+1
2057.03	4.86137	1.0609E+2	1.0684E+2	1.0537E+2	2064.53	4.84371	6.3767E+1	6.4923E+1	6.2949E+1
2057.23	4.86090	1.0043E+2	1.0112E+2	9.9751E+1	2064.63	4.84347	6.9898E+1	7.1358E+1	6.8796E+1
2057.43	4.86042	9.4970E+1	9.5628E+1	9.4354E+1	2064.73	4.84324	7.8053E+1	7.9996E+1	7.6499E+1
2057.63	4.85995	8.9939E+1	9.0591E+1	8.9401E+1	2064.83	4.84300	8.9659E+1	9.2500E+1	8.7518E+1
2057.83	4.85948	8.5243E+1	8.5815E+1	8.4701E+1	2064.93	4.84277	1.0738E+2	1.1129E+2	1.0413E+2
2058.03	4.85901	8.0946E+1	8.1493E+1	8.0443E+1	2065.03	4.84253	1.3123E+2	1.3611E+2	1.2747E+2
2058.23	4.85853	7.6962E+1	7.7467E+1	7.6474E+1	2065.13	4.84230	1.6543E+2	1.7165E+2	1.6149E+2
2058.43	4.85806	7.3207E+1	7.3688E+1	7.2744E+1	2065.23	4.84206	2.1532E+2	2.2367E+2	2.1170E+2
2058.63	4.85759	6.9749E+1	7.0223E+1	6.9323E+1	2065.28	4.84195	2.4600E+2	2.5319E+2	2.4028E+2
2058.83	4.85712	6.6549E+1	6.6989E+1	6.6128E+1	2065.33	4.84183	2.8307E+2	2.9112E+2	2.7662E+2
2059.03	4.85665	6.3542E+1	6.3963E+1	6.3137E+1	2065.38	4.84171	3.2696E+2	3.3668E+2	3.1914E+2
2059.23	4.85617	6.0741E+1	6.1147E+1	6.0353E+1	2065.43	4.84160	3.7851E+2	3.9174E+2	3.6889E+2
2059.43	4.85570	5.8144E+1	5.8535E+1	5.7769E+1	2065.48	4.84148	4.4505E+2	4.6082E+2	4.2899E+2
2059.63	4.85523	5.5741E+1	5.6119E+1	5.5377E+1	2065.53	4.84136	5.0433E+2	5.2674E+2	4.8354E+2
2059.83	4.85476	5.3475E+1	5.3852E+1	5.3119E+1	2065.58	4.84124	5.6096E+2	5.9050E+2	5.3336E+2
2060.03	4.85429	5.1265E+1	5.1642E+1	5.0921E+1	2065.63	4.84113	6.0855E+2	6.4525E+2	5.7290E+2
2060.23	4.85382	4.9149E+1	4.9525E+1	4.8815E+1	2065.68	4.84101	6.3158E+2	6.7537E+2	5.9139E+2
2060.43	4.85335	4.7132E+1	4.7508E+1	4.6807E+1	2065.73	4.84089	6.3260E+2	6.7981E+2	5.8989E+2
2060.63	4.85288	4.5198E+1	4.5573E+1	4.4881E+1	2065.78	4.84078	6.1029E+2	6.5703E+2	5.6900E+2
2060.83	4.85240	4.3330E+1	4.3705E+1	4.3023E+1	2065.83	4.84066	5.7119E+2	6.1285E+2	5.3354E+2
2061.03	4.85193	4.1529E+1	4.1904E+1	4.1230E+1	2065.88	4.84054	5.1632E+2	5.5051E+2	4.8536E+2
2061.23	4.85146	3.9870E+1	4.0245E+1	3.9579E+1	2065.93	4.84042	4.5335E+2	4.7995E+2	4.3033E+2
2061.33	4.85123	3.9168E+1	3.9543E+1	3.8886E+1	2065.98	4.84031	3.9417E+2	4.1328E+2	3.7693E+2
2061.43	4.85099	3.8618E+1	3.8992E+1	3.8336E+1	2066.03	4.84019	3.3675E+2	3.5086E+2	3.2536E+2
2061.53	4.85076	3.8210E+1	3.8583E+1	3.7932E+1	2066.08	4.84007	2.8910E+2	2.9880E+2	2.8113E+2
2061.63	4.85052	3.7908E+1	3.8280E+1	3.7632E+1	2066.13	4.83996	2.4829E+2	2.5536E+2	2.4325E+2
2061.73	4.85029	3.7724E+1	3.8096E+1	3.7447E+1	2066.18	4.83984	2.1679E+2	2.2152E+2	2.1313E+2
2061.83	4.85005	3.7641E+1	3.8011E+1	3.7358E+1	2066.23	4.83972	1.9027E+2	1.9366E+2	1.8777E+2
2061.93	4.84982	3.7604E+1	3.7973E+1	3.7324E+1	2066.28	4.83960	1.6805E+2	1.7054E+2	1.6639E+2
2062.03	4.84958	3.7593E+1	3.7962E+1	3.7313E+1	2066.33	4.83949	1.4988E+2	1.5183E+2	1.4883E+2
2062.23	4.84911	3.7646E+1	3.8014E+1	3.7367E+1	2066.43	4.83925	1.2233E+2	1.2376E+2	1.2171E+2
2062.43	4.84864	3.7804E+1	3.8172E+1	3.7513E+1	2066.53	4.83902	1.0295E+2	1.0394E+2	1.0239E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2066.58	4.83890	9.5349E+1	9.6138E+1	9.4844E+1	2075.24	4.81873	3.0795E+1	3.1165E+1	3.0581E+1
2066.63	4.83878	8.9141E+1	8.9829E+1	8.8652E+1	2075.49	4.81815	3.0807E+1	3.1178E+1	3.0594E+1
2066.68	4.83867	8.3904E+1	8.4525E+1	8.3431E+1	2075.74	4.81757	3.0833E+1	3.1204E+1	3.0619E+1
2066.73	4.83855	7.9392E+1	7.9989E+1	7.8960E+1	2075.99	4.81699	3.0870E+1	3.1240E+1	3.0656E+1
2066.83	4.83832	7.1999E+1	7.2556E+1	7.1627E+1	2076.24	4.81641	3.0914E+1	3.1284E+1	3.0699E+1
2066.93	4.83808	6.6425E+1	6.6920E+1	6.6060E+1	2076.49	4.81583	3.0969E+1	3.1339E+1	3.0753E+1
2067.03	4.83785	6.2116E+1	6.2566E+1	6.1755E+1	2076.74	4.81525	3.1035E+1	3.1404E+1	3.0819E+1
2067.13	4.83761	5.8684E+1	5.9109E+1	5.8336E+1	2076.99	4.81467	3.1112E+1	3.1482E+1	3.0896E+1
2067.23	4.83738	5.5803E+1	5.6254E+1	5.5511E+1	2077.24	4.81409	3.1201E+1	3.1570E+1	3.0983E+1
2067.33	4.83715	5.3361E+1	5.3747E+1	5.3029E+1	2077.49	4.81351	3.1300E+1	3.1669E+1	3.1082E+1
2067.43	4.83691	5.1305E+1	5.1679E+1	5.0982E+1	2077.74	4.81293	3.1404E+1	3.1773E+1	3.1185E+1
2067.53	4.83668	4.9541E+1	4.9913E+1	4.9220E+1	2077.99	4.81235	3.1518E+1	3.1886E+1	3.1297E+1
2067.63	4.83644	4.8049E+1	4.8419E+1	4.7737E+1	2078.24	4.81177	3.1637E+1	3.2005E+1	3.1415E+1
2067.73	4.83621	4.6801E+1	4.7171E+1	4.6490E+1	2078.49	4.81119	3.1765E+1	3.2134E+1	3.1542E+1
2067.84	4.83598	4.5778E+1	4.6148E+1	4.5476E+1	2078.74	4.81062	3.1902E+1	3.2270E+1	3.1678E+1
2067.94	4.83574	4.4868E+1	4.5237E+1	4.4558E+1	2079.24	4.80946	3.2194E+1	3.2562E+1	3.1967E+1
2068.04	4.83551	4.4098E+1	4.4467E+1	4.3777E+1	2079.74	4.80830	3.2508E+1	3.2876E+1	3.2279E+1
2068.24	4.83504	4.2749E+1	4.3117E+1	4.2397E+1	2080.24	4.80715	3.2844E+1	3.3211E+1	3.2611E+1
2068.36	4.83475	4.2003E+1	4.2402E+1	4.1614E+1	2080.74	4.80599	3.3197E+1	3.3564E+1	3.2961E+1
2068.48	4.83446	4.1335E+1	4.1780E+1	4.0914E+1	2081.24	4.80484	3.3567E+1	3.3934E+1	3.3327E+1
2068.61	4.83416	4.0737E+1	4.1207E+1	4.0280E+1	2081.74	4.80368	3.3961E+1	3.4326E+1	3.3717E+1
2068.74	4.83387	4.0219E+1	4.0704E+1	3.9745E+1	2081.99	4.80310	3.4168E+1	3.4534E+1	3.3922E+1
2068.86	4.83358	3.9763E+1	4.0255E+1	3.9278E+1	2082.24	4.80253	3.4384E+1	3.4749E+1	3.4136E+1
2068.99	4.83329	3.9336E+1	3.9827E+1	3.8851E+1	2082.49	4.80195	3.4611E+1	3.4976E+1	3.4360E+1
2069.24	4.83270	3.8551E+1	3.9029E+1	3.8079E+1	2082.74	4.80138	3.4848E+1	3.5213E+1	3.4595E+1
2069.49	4.83212	3.7814E+1	3.8271E+1	3.7368E+1	2083.24	4.80022	3.5338E+1	3.5703E+1	3.5080E+1
2069.74	4.83154	3.7101E+1	3.7527E+1	3.6684E+1	2083.74	4.79907	3.5839E+1	3.6203E+1	3.5576E+1
2069.99	4.83095	3.6417E+1	3.6817E+1	3.6027E+1	2084.24	4.79792	3.6355E+1	3.6724E+1	3.6087E+1
2070.24	4.83037	3.5777E+1	3.6152E+1	3.5407E+1	2084.74	4.79677	3.6910E+1	3.7267E+1	3.6635E+1
2070.49	4.82979	3.5146E+1	3.5514E+1	3.4805E+1	2085.24	4.79562	3.7466E+1	3.7822E+1	3.7184E+1
2070.74	4.82920	3.4551E+1	3.4920E+1	3.4243E+1	2085.74	4.79447	3.8035E+1	3.8391E+1	3.7746E+1
2070.99	4.82862	3.3985E+1	3.4354E+1	3.3712E+1	2086.24	4.79332	3.8621E+1	3.8978E+1	3.8329E+1
2071.24	4.82804	3.3478E+1	3.3848E+1	3.3231E+1	2086.74	4.79217	3.9231E+1	3.9588E+1	3.8937E+1
2071.36	4.82775	3.3253E+1	3.3623E+1	3.3016E+1	2087.24	4.79102	3.9862E+1	4.0219E+1	3.9566E+1
2071.49	4.82745	3.3037E+1	3.3407E+1	3.2804E+1	2087.74	4.78987	4.0530E+1	4.0887E+1	4.0230E+1
2071.61	4.82716	3.2837E+1	3.3207E+1	3.2605E+1	2088.24	4.78873	4.1237E+1	4.1595E+1	4.0935E+1
2071.74	4.82687	3.2648E+1	3.3018E+1	3.2418E+1	2088.74	4.78758	4.1980E+1	4.2337E+1	4.1674E+1
2071.99	4.82629	3.2307E+1	3.2677E+1	3.2081E+1	2089.24	4.78644	4.2750E+1	4.3107E+1	4.2441E+1
2072.24	4.82571	3.2021E+1	3.2392E+1	3.1797E+1	2090.24	4.78415	4.4393E+1	4.4750E+1	4.4077E+1
2072.49	4.82512	3.1784E+1	3.2155E+1	3.1562E+1	2091.13	4.78211	4.5959E+1	4.6316E+1	4.5636E+1
2072.74	4.82454	3.1587E+1	3.1958E+1	3.1366E+1	2092.13	4.77983	4.7856E+1	4.8214E+1	4.7524E+1
2072.99	4.82396	3.1415E+1	3.1785E+1	3.1187E+1	2093.13	4.77754	4.9894E+1	5.0252E+1	4.9553E+1
2073.24	4.82338	3.1264E+1	3.1635E+1	3.1020E+1	2094.13	4.77526	5.1983E+1	5.2341E+1	5.1632E+1
2073.49	4.82280	3.1134E+1	3.1505E+1	3.0878E+1	2096.13	4.77070	5.5954E+1	5.6327E+1	5.5583E+1
2073.74	4.82222	3.1029E+1	3.1400E+1	3.0774E+1	2097.13	4.76843	5.7878E+1	5.8261E+1	5.7497E+1
2073.99	4.82163	3.0950E+1	3.1321E+1	3.0709E+1	2098.13	4.76616	5.9818E+1	6.0212E+1	5.9427E+1
2074.24	4.82105	3.0887E+1	3.1258E+1	3.0663E+1	2099.13	4.76389	6.1796E+1	6.2201E+1	6.1394E+1
2074.49	4.82047	3.0844E+1	3.1214E+1	3.0629E+1	2100.13	4.76162	6.3787E+1	6.4203E+1	6.3374E+1
2074.74	4.81989	3.0812E+1	3.1182E+1	3.0598E+1	2102.13	4.75709	6.7531E+1	6.7968E+1	6.7096E+1
2074.99	4.81931	3.0796E+1	3.1167E+1	3.0583E+1	2104.13	4.75257	7.0630E+1	7.1087E+1	7.0176E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2106.13	4.74805	7.3743E+1	7.4220E+1	7.3270E+1	2141.13	4.67043	2.1844E+2	2.2049E+2	2.1641E+2
2108.13	4.74355	7.7526E+1	7.8029E+1	7.7027E+1	2141.63	4.66934	2.2052E+2	2.2258E+2	2.1847E+2
2110.13	4.73905	8.1881E+1	8.2415E+1	8.1351E+1	2142.13	4.66825	2.2291E+2	2.2500E+2	2.2084E+2
2110.33	4.73860	8.2412E+1	8.2949E+1	8.1878E+1	2142.63	4.66716	2.2578E+2	2.2792E+2	2.2366E+2
2110.53	4.73815	8.2982E+1	8.3524E+1	8.2444E+1	2143.13	4.66607	2.2894E+2	2.3115E+2	2.2676E+2
2111.13	4.73681	8.4855E+1	8.5411E+1	8.4303E+1	2144.13	4.66390	2.3587E+2	2.3819E+2	2.3356E+2
2111.53	4.73591	8.6043E+1	8.6612E+1	8.5486E+1	2145.13	4.66172	2.4367E+2	2.4614E+2	2.4123E+2
2111.73	4.73546	8.6696E+1	8.7267E+1	8.6130E+1	2146.13	4.65955	2.5181E+2	2.5442E+2	2.4923E+2
2111.93	4.73501	8.7422E+1	8.7998E+1	8.6850E+1	2147.13	4.65738	2.6109E+2	2.6386E+2	2.5835E+2
2112.13	4.73456	8.8139E+1	8.8721E+1	8.7562E+1	2148.13	4.65521	2.7097E+2	2.7394E+2	2.6804E+2
2112.23	4.73434	8.8283E+1	8.8838E+1	8.7677E+1	2149.13	4.65305	2.8177E+2	2.8498E+2	2.7861E+2
2112.33	4.73411	8.8234E+1	8.8814E+1	8.7653E+1	2150.13	4.65088	2.9408E+2	2.9756E+2	2.9065E+2
2112.53	4.73367	8.7773E+1	8.8352E+1	8.7198E+1	2151.13	4.64872	3.0627E+2	3.1002E+2	3.0259E+2
2112.73	4.73322	8.7041E+1	8.7626E+1	8.6484E+1	2152.13	4.64656	3.1872E+2	3.2268E+2	3.1483E+2
2113.13	4.73232	8.5997E+1	8.6577E+1	8.5451E+1	2153.13	4.64440	3.3221E+2	3.3634E+2	3.2815E+2
2113.33	4.73187	8.5692E+1	8.6255E+1	8.5134E+1	2154.13	4.64225	3.4608E+2	3.5034E+2	3.4191E+2
2113.73	4.73098	8.5375E+1	8.5936E+1	8.4820E+1	2155.13	4.64009	3.6137E+2	3.6575E+2	3.5708E+2
2114.13	4.73008	8.5476E+1	8.6043E+1	8.4925E+1	2157.13	4.63579	3.9556E+2	4.0046E+2	3.9077E+2
2114.53	4.72919	8.5791E+1	8.6355E+1	8.5232E+1	2159.13	4.63149	4.3591E+2	4.4153E+2	4.3043E+2
2114.93	4.72829	8.6202E+1	8.6769E+1	8.5640E+1	2160.13	4.62935	4.5887E+2	4.6478E+2	4.5312E+2
2115.13	4.72785	8.6448E+1	8.7016E+1	8.5884E+1	2161.13	4.62721	4.7947E+2	4.8563E+2	4.7347E+2
2115.33	4.72740	8.6724E+1	8.7295E+1	8.6158E+1	2162.13	4.62507	5.0148E+2	5.0806E+2	4.9509E+2
2115.73	4.72651	8.7361E+1	8.7937E+1	8.6790E+1	2163.13	4.62293	5.2242E+2	5.2929E+2	5.1575E+2
2116.13	4.72561	8.8042E+1	8.8623E+1	8.7465E+1	2165.13	4.61866	5.6597E+2	5.7375E+2	5.5845E+2
2116.63	4.72450	8.9029E+1	8.9618E+1	8.8445E+1	2170.13	4.60802	6.8280E+2	6.9487E+2	6.7136E+2
2118.13	4.72115	9.2552E+1	9.3171E+1	9.1939E+1	2171.13	4.60589	7.0933E+2	7.2104E+2	6.9783E+2
2119.13	4.71892	9.5442E+1	9.6086E+1	9.4804E+1	2172.13	4.60377	7.3750E+2	7.4915E+2	7.2607E+2
2120.13	4.71670	9.8995E+1	9.9671E+1	9.8325E+1	2173.13	4.60166	7.6941E+2	7.8168E+2	7.5738E+2
2121.13	4.71447	1.0311E+2	1.0383E+2	1.0240E+2	2174.13	4.59954	8.0363E+2	8.1660E+2	7.9092E+2
2122.13	4.71225	1.0766E+2	1.0840E+2	1.0693E+2	2175.13	4.59742	8.4024E+2	8.5401E+2	8.2677E+2
2123.13	4.71003	1.1254E+2	1.1329E+2	1.1179E+2	2176.13	4.59531	8.7858E+2	8.9324E+2	8.6426E+2
2124.13	4.70781	1.1769E+2	1.1850E+2	1.1688E+2	2177.13	4.59320	9.3218E+2	9.4818E+2	9.1659E+2
2125.13	4.70560	1.2309E+2	1.2402E+2	1.2217E+2	2178.13	4.59109	9.7276E+2	9.8984E+2	9.5613E+2
2127.63	4.70007	1.3720E+2	1.3832E+2	1.3609E+2	2179.13	4.58898	1.0132E+3	1.0315E+3	9.9551E+2
2129.13	4.69676	1.4610E+2	1.4737E+2	1.4484E+2	2180.13	4.58688	1.0527E+3	1.0721E+3	1.0338E+3
2130.13	4.69455	1.5211E+2	1.5346E+2	1.5077E+2	2181.13	4.58478	1.0947E+3	1.1156E+3	1.0745E+3
2131.13	4.69235	1.5862E+2	1.5999E+2	1.5727E+2	2182.13	4.58268	1.1391E+3	1.1616E+3	1.1175E+3
2131.63	4.69125	1.6220E+2	1.6355E+2	1.6085E+2	2183.13	4.58058	1.1863E+3	1.2105E+3	1.1629E+3
2132.13	4.69015	1.6584E+2	1.6720E+2	1.6449E+2	2184.13	4.57848	1.2337E+3	1.2599E+3	1.2086E+3
2132.63	4.68905	1.6994E+2	1.7132E+2	1.6857E+2	2185.13	4.57638	1.2739E+3	1.3018E+3	1.2471E+3
2134.13	4.68575	1.8267E+2	1.8413E+2	1.8122E+2	2186.13	4.57429	1.3109E+3	1.3406E+3	1.2825E+3
2135.13	4.68356	1.9112E+2	1.9264E+2	1.8961E+2	2187.13	4.57220	1.3409E+3	1.3722E+3	1.3111E+3
2136.13	4.68137	1.9911E+2	2.0068E+2	1.9754E+2	2188.13	4.57011	1.3596E+3	1.3918E+3	1.3289E+3
2136.63	4.68027	2.0264E+2	2.0426E+2	2.0104E+2	2189.13	4.56802	1.3755E+3	1.4086E+3	1.3441E+3
2137.13	4.67918	2.0571E+2	2.0740E+2	2.0404E+2	2190.13	4.56593	1.3885E+3	1.4223E+3	1.3564E+3
2138.13	4.67699	2.1000E+2	2.1179E+2	2.0823E+2	2191.13	4.56385	1.4018E+3	1.4364E+3	1.3691E+3
2138.63	4.67589	2.1159E+2	2.1347E+2	2.0973E+2	2192.13	4.56177	1.4189E+3	1.4545E+3	1.3853E+3
2139.13	4.67480	2.1280E+2	2.1475E+2	2.1086E+2	2193.13	4.55969	1.4365E+3	1.4732E+3	1.4019E+3
2140.13	4.67262	2.1537E+2	2.1738E+2	2.1338E+2	2194.13	4.55761	1.4560E+3	1.4939E+3	1.4203E+3
2140.63	4.67152	2.1682E+2	2.1886E+2	2.1480E+2	2195.13	4.55553	1.4811E+3	1.5206E+3	1.4440E+3

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2196.13	4.55346	1.5093E+3	1.5506E+3	1.4705E+3	2551.84	3.91873	4.4611E+2	4.4793E+2	4.4430E+2
2197.13	4.55139	1.5419E+3	1.5856E+3	1.5011E+3	2552.04	3.91843	4.4370E+2	4.4550E+2	4.4192E+2
2198.13	4.54932	1.5832E+3	1.6300E+3	1.5396E+3	2552.14	3.91827	4.4263E+2	4.4442E+2	4.4085E+2
2199.13	4.54725	1.6288E+3	1.6793E+3	1.5820E+3	2552.24	3.91812	4.4170E+2	4.4348E+2	4.3993E+2
2200.13	4.54518	1.6815E+3	1.7367E+3	1.6308E+3	2552.34	3.91797	4.4099E+2	4.4277E+2	4.3923E+2
2201.00	4.54339	1.7392E+3	1.8033E+3	1.6865E+3	2552.44	3.91781	4.4024E+2	4.4201E+2	4.3848E+2
2203.00	4.53926	1.9248E+3	2.0126E+3	1.8546E+3	2552.54	3.91766	4.3955E+2	4.4132E+2	4.3780E+2
2205.00	4.53515	2.2056E+3	2.3507E+3	2.0992E+3	2552.64	3.91751	4.3883E+2	4.4059E+2	4.3709E+2
2207.00	4.53104	2.6029E+3	2.9065E+3	2.4117E+3	2552.74	3.91735	4.3781E+2	4.3956E+2	4.3607E+2
2209.00	4.52694	3.1685E+3	8.4021E+3	2.7719E+3	2552.84	3.91720	4.3648E+2	4.3822E+2	4.3475E+2
2211.00	4.52284	4.0830E+3	∞	3.1460E+3	2552.94	3.91704	4.3444E+2	4.3616E+2	4.3273E+2
2213.00	4.51875	4.9782E+3	∞	3.4433E+3	2553.04	3.91689	4.3197E+2	4.3368E+2	4.3028E+2
2495.00	4.00802	5.5211E+3	∞	3.8156E+3	2553.14	3.91674	4.2915E+2	4.3083E+2	4.2748E+2
2500.00	4.00000	4.4410E+3	∞	3.6160E+3	2553.24	3.91658	4.2653E+2	4.2819E+2	4.2488E+2
2505.00	3.99202	2.8339E+3	2.9818E+3	2.7148E+3	2553.34	3.91643	4.2380E+2	4.2544E+2	4.2217E+2
2510.00	3.98406	2.1155E+3	2.1584E+3	2.0753E+3	2553.45	3.91628	4.2164E+2	4.2326E+2	4.2003E+2
2520.00	3.96825	1.3906E+3	1.4038E+3	1.3777E+3	2553.54	3.91612	4.1973E+2	4.2134E+2	4.1813E+2
2522.34	3.96457	1.2763E+3	1.2872E+3	1.2655E+3	2553.64	3.91597	4.1787E+2	4.1947E+2	4.1628E+2
2523.34	3.96300	1.2315E+3	1.2417E+3	1.2215E+3	2553.74	3.91582	4.1625E+2	4.1783E+2	4.1467E+2
2524.34	3.96143	1.1895E+3	1.1990E+3	1.1801E+3	2553.84	3.91566	4.1469E+2	4.1627E+2	4.1313E+2
2525.34	3.95986	1.1493E+3	1.1582E+3	1.1404E+3	2554.35	3.91490	4.0701E+2	4.0853E+2	4.0550E+2
2526.34	3.95829	1.1111E+3	1.1195E+3	1.1028E+3	2554.85	3.91413	3.9958E+2	4.0105E+2	3.9812E+2
2527.34	3.95673	1.0735E+3	1.0814E+3	1.0656E+3	2555.35	3.91337	3.9259E+2	3.9401E+2	3.9118E+2
2527.84	3.95594	1.0553E+3	1.0630E+3	1.0477E+3	2556.35	3.91183	3.7890E+2	3.8023E+2	3.7757E+2
2528.34	3.95516	1.0372E+3	1.0447E+3	1.0298E+3	2557.35	3.91030	3.6565E+2	3.6691E+2	3.6440E+2
2528.84	3.95438	1.0190E+3	1.0263E+3	1.0118E+3	2558.35	3.90878	3.5288E+2	3.5406E+2	3.5170E+2
2529.34	3.95360	1.0011E+3	1.0081E+3	9.9408E+2	2559.35	3.90725	3.4057E+2	3.4170E+2	3.3946E+2
2530.34	3.95204	9.6621E+2	9.7289E+2	9.5960E+2	2560.35	3.90572	3.2882E+2	3.2988E+2	3.2776E+2
2531.34	3.95047	9.3365E+2	9.3999E+2	9.2737E+2	2561.35	3.90420	3.1754E+2	3.1855E+2	3.1654E+2
2532.34	3.94891	8.9995E+2	9.0596E+2	8.9400E+2	2562.35	3.90267	3.0631E+2	3.0727E+2	3.0536E+2
2532.84	3.94813	8.8405E+2	8.8991E+2	8.7825E+2	2563.35	3.90115	2.9531E+2	2.9622E+2	2.9440E+2
2533.34	3.94735	8.6854E+2	8.7426E+2	8.6288E+2	2564.35	3.89963	2.8477E+2	2.8564E+2	2.8390E+2
2534.34	3.94580	8.3861E+2	8.4406E+2	8.3320E+2	2565.35	3.89811	2.7447E+2	2.7530E+2	2.7364E+2
2535.34	3.94424	8.0981E+2	8.1502E+2	8.0465E+2	2566.35	3.89659	2.6441E+2	2.6520E+2	2.6362E+2
2536.34	3.94268	7.8154E+2	7.8652E+2	7.7660E+2	2567.35	3.89507	2.5462E+2	2.5538E+2	2.5387E+2
2537.34	3.94113	7.5424E+2	7.5900E+2	7.4951E+2	2567.85	3.89431	2.4978E+2	2.5052E+2	2.4905E+2
2538.34	3.93958	7.2728E+2	7.3184E+2	7.2274E+2	2568.15	3.89386	2.4700E+2	2.4773E+2	2.4627E+2
2539.34	3.93803	7.0123E+2	7.0561E+2	6.9688E+2	2568.35	3.89355	2.4524E+2	2.4597E+2	2.4452E+2
2540.34	3.93648	6.7607E+2	6.8028E+2	6.7189E+2	2568.55	3.89325	2.4366E+2	2.4438E+2	2.4294E+2
2541.34	3.93493	6.5166E+2	6.5571E+2	6.4763E+2	2568.75	3.89295	2.4222E+2	2.4293E+2	2.4150E+2
2542.34	3.93338	6.2806E+2	6.3196E+2	6.2419E+2	2568.85	3.89280	2.4165E+2	2.4236E+2	2.4094E+2
2543.34	3.93183	6.0554E+2	6.0929E+2	6.0182E+2	2568.95	3.89265	2.4112E+2	2.4183E+2	2.4041E+2
2544.34	3.93029	5.8372E+2	5.8714E+2	5.8035E+2	2569.05	3.89249	2.4072E+2	2.4143E+2	2.4001E+2
2545.34	3.92874	5.6279E+2	5.6590E+2	5.5973E+2	2569.15	3.89234	2.4033E+2	2.4104E+2	2.3962E+2
2546.34	3.92720	5.4276E+2	5.4559E+2	5.3996E+2	2569.25	3.89219	2.4004E+2	2.4075E+2	2.3933E+2
2547.34	3.92566	5.2344E+2	5.2604E+2	5.2088E+2	2569.35	3.89204	2.3995E+2	2.4066E+2	2.3924E+2
2548.34	3.92412	5.0479E+2	5.0717E+2	5.0244E+2	2569.45	3.89189	2.4000E+2	2.4071E+2	2.3930E+2
2549.34	3.92258	4.8694E+2	4.8913E+2	4.8477E+2	2569.55	3.89174	2.4022E+2	2.4093E+2	2.3951E+2
2550.34	3.92104	4.6967E+2	4.7169E+2	4.6766E+2	2569.65	3.89158	2.4053E+2	2.4124E+2	2.3982E+2
2551.34	3.91950	4.5325E+2	4.5513E+2	4.5138E+2	2569.75	3.89143	2.4080E+2	2.4151E+2	2.4009E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2569.85	3.89128	2.4077E+2	2.4148E+2	2.4006E+2	2600.35	3.84563	9.2812E+1	9.3358E+1	9.2446E+1
2569.95	3.89113	2.4030E+2	2.4101E+2	2.3959E+2	2601.35	3.84416	9.0942E+1	9.1487E+1	9.0581E+1
2570.05	3.89098	2.3928E+2	2.3999E+2	2.3858E+2	2602.35	3.84268	8.9179E+1	8.9725E+1	8.8822E+1
2570.15	3.89083	2.3781E+2	2.3852E+2	2.3712E+2	2603.35	3.84120	8.7504E+1	8.8051E+1	8.7152E+1
2570.25	3.89068	2.3622E+2	2.3692E+2	2.3553E+2	2603.85	3.84046	8.6720E+1	8.7268E+1	8.6370E+1
2570.35	3.89052	2.3460E+2	2.3530E+2	2.3392E+2	2604.35	3.83973	8.5970E+1	8.6519E+1	8.5621E+1
2570.45	3.89037	2.3325E+2	2.3394E+2	2.3257E+2	2604.85	3.83899	8.5251E+1	8.5801E+1	8.4904E+1
2570.55	3.89022	2.3209E+2	2.3278E+2	2.3141E+2	2605.05	3.83870	8.4960E+1	8.5510E+1	8.4614E+1
2570.75	3.88992	2.2998E+2	2.3066E+2	2.2931E+2	2605.25	3.83840	8.4666E+1	8.5216E+1	8.4320E+1
2570.95	3.88962	2.2806E+2	2.2873E+2	2.2739E+2	2605.35	3.83825	8.4524E+1	8.5074E+1	8.4178E+1
2571.15	3.88931	2.2603E+2	2.2670E+2	2.2537E+2	2605.45	3.83811	8.4383E+1	8.4934E+1	8.4038E+1
2571.35	3.88901	2.2408E+2	2.2475E+2	2.2343E+2	2605.55	3.83796	8.4248E+1	8.4798E+1	8.3902E+1
2571.55	3.88871	2.2209E+2	2.2275E+2	2.2144E+2	2605.65	3.83781	8.4121E+1	8.4672E+1	8.3776E+1
2571.75	3.88841	2.2003E+2	2.2068E+2	2.1938E+2	2605.75	3.83766	8.4014E+1	8.4565E+1	8.3669E+1
2571.95	3.88810	2.1803E+2	2.1868E+2	2.1739E+2	2605.85	3.83752	8.3914E+1	8.4465E+1	8.3570E+1
2572.15	3.88780	2.1604E+2	2.1668E+2	2.1540E+2	2605.95	3.83737	8.3824E+1	8.4375E+1	8.3480E+1
2572.35	3.88750	2.1424E+2	2.1488E+2	2.1361E+2	2606.05	3.83722	8.3744E+1	8.4295E+1	8.3400E+1
2572.45	3.88735	2.1334E+2	2.1398E+2	2.1271E+2	2606.15	3.83707	8.3668E+1	8.4219E+1	8.3324E+1
2572.65	3.88705	2.1168E+2	2.1232E+2	2.1106E+2	2606.25	3.83693	8.3595E+1	8.4146E+1	8.3251E+1
2572.85	3.88674	2.1007E+2	2.1070E+2	2.0945E+2	2606.35	3.83678	8.3527E+1	8.4078E+1	8.3183E+1
2573.35	3.88599	2.0596E+2	2.0658E+2	2.0535E+2	2606.45	3.83663	8.3494E+1	8.4045E+1	8.3150E+1
2573.85	3.88523	2.0184E+2	2.0246E+2	2.0124E+2	2606.55	3.83649	8.3490E+1	8.4041E+1	8.3146E+1
2574.35	3.88448	1.9787E+2	1.9849E+2	1.9728E+2	2606.65	3.83634	8.3533E+1	8.4084E+1	8.3190E+1
2575.35	3.88297	1.9028E+2	1.9088E+2	1.8970E+2	2606.75	3.83619	8.3616E+1	8.4167E+1	8.3273E+1
2576.35	3.88146	1.8315E+2	1.8374E+2	1.8259E+2	2606.85	3.83604	8.3800E+1	8.4350E+1	8.3456E+1
2577.35	3.87996	1.7639E+2	1.7698E+2	1.7585E+2	2606.95	3.83590	8.4127E+1	8.4676E+1	8.3782E+1
2578.35	3.87845	1.7004E+2	1.7062E+2	1.6952E+2	2607.05	3.83575	8.4622E+1	8.5170E+1	8.4276E+1
2579.35	3.87695	1.6397E+2	1.6454E+2	1.6346E+2	2607.15	3.83560	8.5252E+1	8.5799E+1	8.4906E+1
2580.35	3.87545	1.5809E+2	1.5866E+2	1.5759E+2	2607.25	3.83546	8.6072E+1	8.6618E+1	8.5724E+1
2581.35	3.87394	1.5245E+2	1.5301E+2	1.5196E+2	2607.30	3.83538	8.6570E+1	8.7115E+1	8.6220E+1
2582.35	3.87244	1.4722E+2	1.4778E+2	1.4674E+2	2607.35	3.83531	8.7222E+1	8.7766E+1	8.6871E+1
2583.35	3.87094	1.4225E+2	1.4281E+2	1.4178E+2	2607.40	3.83523	8.8025E+1	8.8578E+1	8.7660E+1
2584.35	3.86945	1.3766E+2	1.3822E+2	1.3720E+2	2607.45	3.83516	8.9027E+1	8.9614E+1	8.8610E+1
2585.35	3.86795	1.3343E+2	1.3399E+2	1.3297E+2	2607.55	3.83501	9.2071E+1	9.2729E+1	9.1554E+1
2585.85	3.86720	1.3145E+2	1.3201E+2	1.3100E+2	2607.65	3.83487	9.6105E+1	9.6854E+1	9.5474E+1
2586.35	3.86645	1.2966E+2	1.3021E+2	1.2920E+2	2607.75	3.83472	1.0292E+2	1.0379E+2	1.0215E+2
2587.35	3.86496	1.2645E+2	1.2701E+2	1.2600E+2	2607.85	3.83457	1.1185E+2	1.1287E+2	1.1090E+2
2588.35	3.86347	1.2336E+2	1.2392E+2	1.2291E+2	2607.95	3.83443	1.2102E+2	1.2213E+2	1.1996E+2
2589.35	3.86197	1.2041E+2	1.2097E+2	1.1997E+2	2608.00	3.83435	1.2523E+2	1.2641E+2	1.2412E+2
2590.35	3.86048	1.1761E+2	1.1817E+2	1.1717E+2	2608.05	3.83428	1.2897E+2	1.3019E+2	1.2780E+2
2591.35	3.85899	1.1480E+2	1.1536E+2	1.1437E+2	2608.10	3.83421	1.3161E+2	1.3286E+2	1.3041E+2
2592.35	3.85750	1.1201E+2	1.1257E+2	1.1158E+2	2608.15	3.83413	1.3305E+2	1.3431E+2	1.3185E+2
2593.35	3.85602	1.0928E+2	1.0984E+2	1.0886E+2	2608.20	3.83406	1.3348E+2	1.3471E+2	1.3229E+2
2594.35	3.85453	1.0659E+2	1.0715E+2	1.0618E+2	2608.25	3.83398	1.3238E+2	1.3356E+2	1.3124E+2
2595.35	3.85304	1.0390E+2	1.0446E+2	1.0350E+2	2608.30	3.83391	1.2999E+2	1.3111E+2	1.2892E+2
2596.35	3.85156	1.0138E+2	1.0193E+2	1.0098E+2	2608.35	3.83384	1.2607E+2	1.2712E+2	1.2507E+2
2597.35	3.85008	9.9025E+1	9.9574E+1	9.8638E+1	2608.40	3.83376	1.2156E+2	1.2254E+2	1.2064E+2
2598.35	3.84859	9.6838E+1	9.7385E+1	9.6458E+1	2608.45	3.83369	1.1642E+2	1.1734E+2	1.1557E+2
2598.85	3.84785	9.5780E+1	9.6326E+1	9.5404E+1	2608.55	3.83354	1.0645E+2	1.0729E+2	1.0571E+2
2599.35	3.84711	9.4767E+1	9.5313E+1	9.4394E+1	2608.65	3.83340	9.8474E+1	9.9249E+1	9.7811E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2608.75	3.83325	9.2234E+1	9.2970E+1	9.1624E+1	2634.26	3.79614	3.8358E+1	3.9102E+1	3.8016E+1
2608.80	3.83318	8.9892E+1	9.0617E+1	8.9298E+1	2634.36	3.79599	3.8288E+1	3.9032E+1	3.7946E+1
2608.85	3.83310	8.7818E+1	8.8536E+1	8.7238E+1	2634.46	3.79585	3.8228E+1	3.8972E+1	3.7887E+1
2608.90	3.83303	8.6037E+1	8.6749E+1	8.5467E+1	2634.56	3.79571	3.8180E+1	3.8923E+1	3.7839E+1
2608.95	3.83296	8.4662E+1	8.5369E+1	8.4100E+1	2634.66	3.79556	3.8143E+1	3.8886E+1	3.7802E+1
2609.00	3.83288	8.3566E+1	8.4269E+1	8.3012E+1	2634.76	3.79542	3.8124E+1	3.8866E+1	3.7783E+1
2609.05	3.83281	8.2690E+1	8.3390E+1	8.2141E+1	2634.86	3.79527	3.8142E+1	3.8884E+1	3.7802E+1
2609.10	3.83274	8.1965E+1	8.2662E+1	8.1422E+1	2634.96	3.79513	3.8233E+1	3.8974E+1	3.7892E+1
2609.15	3.83266	8.1383E+1	8.2075E+1	8.0847E+1	2635.06	3.79499	3.8399E+1	3.9140E+1	3.8058E+1
2609.20	3.83259	8.0894E+1	8.1578E+1	8.0370E+1	2635.16	3.79484	3.8634E+1	3.9375E+1	3.8293E+1
2609.25	3.83252	8.0505E+1	8.1175E+1	7.9999E+1	2635.26	3.79470	3.8935E+1	3.9674E+1	3.8594E+1
2609.35	3.83237	7.9828E+1	8.0462E+1	7.9374E+1	2635.36	3.79455	3.9222E+1	3.9961E+1	3.8881E+1
2609.45	3.83222	7.9240E+1	7.9852E+1	7.8820E+1	2635.46	3.79441	3.9363E+1	4.0101E+1	3.9021E+1
2609.60	3.83200	7.8475E+1	7.9048E+1	7.8121E+1	2635.56	3.79427	3.9249E+1	3.9989E+1	3.8907E+1
2609.70	3.83185	7.7991E+1	7.8555E+1	7.7653E+1	2635.66	3.79412	3.8902E+1	3.9643E+1	3.8560E+1
2609.80	3.83171	7.7550E+1	7.8117E+1	7.7214E+1	2635.76	3.79398	3.8424E+1	3.9168E+1	3.8082E+1
2609.85	3.83163	7.7332E+1	7.7901E+1	7.6997E+1	2635.86	3.79383	3.7828E+1	3.8574E+1	3.7486E+1
2610.10	3.83127	7.6356E+1	7.6932E+1	7.6020E+1	2635.96	3.79369	3.7271E+1	3.8018E+1	3.6929E+1
2610.35	3.83090	7.5488E+1	7.6068E+1	7.5152E+1	2636.06	3.79355	3.6925E+1	3.7675E+1	3.6583E+1
2610.60	3.83053	7.4690E+1	7.5273E+1	7.4354E+1	2636.16	3.79340	3.6694E+1	3.7446E+1	3.6352E+1
2610.85	3.83017	7.3942E+1	7.4529E+1	7.3606E+1	2636.26	3.79326	3.6491E+1	3.7244E+1	3.6148E+1
2611.10	3.82980	7.3227E+1	7.3818E+1	7.2892E+1	2636.36	3.79311	3.6320E+1	3.7074E+1	3.5977E+1
2611.35	3.82943	7.2530E+1	7.3125E+1	7.2195E+1	2636.46	3.79297	3.6153E+1	3.6908E+1	3.5810E+1
2611.85	3.82870	7.1224E+1	7.1828E+1	7.0888E+1	2636.56	3.79283	3.5992E+1	3.6748E+1	3.5648E+1
2612.35	3.82797	6.9996E+1	7.0607E+1	6.9659E+1	2636.76	3.79254	3.5714E+1	3.6472E+1	3.5371E+1
2613.35	3.82650	6.7721E+1	6.8349E+1	6.7384E+1	2636.96	3.79225	3.5474E+1	3.6233E+1	3.5131E+1
2614.35	3.82504	6.5625E+1	6.6264E+1	6.5287E+1	2637.36	3.79168	3.5023E+1	3.5783E+1	3.4679E+1
2615.35	3.82358	6.3670E+1	6.4316E+1	6.3332E+1	2638.36	3.79024	3.3960E+1	3.4726E+1	3.3616E+1
2616.35	3.82211	6.1798E+1	6.2451E+1	6.1461E+1	2638.86	3.78952	3.3472E+1	3.4239E+1	3.3127E+1
2617.35	3.82065	6.0008E+1	6.0667E+1	5.9672E+1	2639.36	3.78880	3.3019E+1	3.3788E+1	3.2673E+1
2618.35	3.81919	5.8255E+1	5.8920E+1	5.7919E+1	2640.36	3.78737	3.2169E+1	3.2943E+1	3.1822E+1
2619.35	3.81774	5.6577E+1	5.7247E+1	5.6241E+1	2641.36	3.78593	3.1360E+1	3.2138E+1	3.1012E+1
2620.35	3.81628	5.4965E+1	5.5640E+1	5.4628E+1	2642.36	3.78450	3.0581E+1	3.1364E+1	3.0232E+1
2621.35	3.81482	5.3419E+1	5.4101E+1	5.3083E+1	2643.36	3.78307	2.9824E+1	3.0611E+1	2.9473E+1
2622.35	3.81337	5.1940E+1	5.2626E+1	5.1603E+1	2644.36	3.78164	2.9090E+1	2.9881E+1	2.8738E+1
2623.35	3.81191	5.0553E+1	5.1245E+1	5.0215E+1	2645.36	3.78021	2.8397E+1	2.9193E+1	2.8043E+1
2624.35	3.81046	4.9236E+1	4.9933E+1	4.8898E+1	2646.36	3.77878	2.7729E+1	2.8531E+1	2.7373E+1
2625.35	3.80901	4.7996E+1	4.8698E+1	4.7657E+1	2648.36	3.77592	2.6441E+1	2.7258E+1	2.6079E+1
2626.35	3.80756	4.6810E+1	4.7516E+1	4.6470E+1	2650.36	3.77308	2.5246E+1	2.6077E+1	2.4879E+1
2627.36	3.80611	4.5669E+1	4.6381E+1	4.5329E+1	2652.36	3.77023	2.4151E+1	2.4993E+1	2.3780E+1
2628.36	3.80466	4.4584E+1	4.5300E+1	4.4242E+1	2653.36	3.76881	2.3632E+1	2.4479E+1	2.3261E+1
2629.36	3.80321	4.3531E+1	4.4253E+1	4.3188E+1	2654.36	3.76739	2.3132E+1	2.3982E+1	2.2759E+1
2630.36	3.80177	4.2470E+1	4.3197E+1	4.2126E+1	2654.86	3.76668	2.2896E+1	2.3747E+1	2.2522E+1
2631.36	3.80032	4.1403E+1	4.2135E+1	4.1060E+1	2655.36	3.76597	2.2667E+1	2.3520E+1	2.2293E+1
2631.86	3.79960	4.0861E+1	4.1596E+1	4.0518E+1	2655.86	3.76526	2.2452E+1	2.3307E+1	2.2077E+1
2632.36	3.79888	4.0314E+1	4.1050E+1	3.9971E+1	2656.36	3.76455	2.2246E+1	2.3102E+1	2.1871E+1
2632.86	3.79816	3.9761E+1	4.0500E+1	3.9418E+1	2656.56	3.76427	2.2167E+1	2.3024E+1	2.1792E+1
2633.36	3.79744	3.9231E+1	3.9972E+1	3.8888E+1	2656.72	3.76404	2.2103E+1	2.2960E+1	2.1728E+1
2633.86	3.79672	3.8712E+1	3.9456E+1	3.8370E+1	2656.93	3.76374	2.2026E+1	2.2884E+1	2.1651E+1
2634.06	3.79643	3.8523E+1	3.9267E+1	3.8181E+1	2657.08	3.76354	2.1975E+1	2.2833E+1	2.1600E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2657.43	3.76304	2.1856E+1	2.2714E+1	2.1481E+1	2661.39	3.75744	2.1213E+1	2.2078E+1	2.0835E+1
2657.64	3.76274	2.1793E+1	2.2652E+1	2.1417E+1	2661.46	3.75734	2.1066E+1	2.1931E+1	2.0688E+1
2657.78	3.76254	2.1757E+1	2.2616E+1	2.1381E+1	2661.53	3.75724	2.0936E+1	2.1802E+1	2.0557E+1
2657.85	3.76244	2.1741E+1	2.2601E+1	2.1366E+1	2661.60	3.75714	2.0819E+1	2.1685E+1	2.0440E+1
2657.99	3.76224	2.1716E+1	2.2576E+1	2.1340E+1	2661.74	3.75694	2.0627E+1	2.1494E+1	2.0248E+1
2658.14	3.76204	2.1696E+1	2.2556E+1	2.1320E+1	2661.89	3.75674	2.0468E+1	2.1336E+1	2.0089E+1
2658.28	3.76184	2.1681E+1	2.2541E+1	2.1305E+1	2661.96	3.75664	2.0401E+1	2.1269E+1	2.0022E+1
2658.35	3.76174	2.1676E+1	2.2536E+1	2.1300E+1	2662.03	3.75654	2.0342E+1	2.1210E+1	1.9963E+1
2658.49	3.76154	2.1673E+1	2.2533E+1	2.1297E+1	2662.17	3.75634	2.0235E+1	2.1104E+1	1.9856E+1
2658.63	3.76134	2.1679E+1	2.2538E+1	2.1303E+1	2662.38	3.75604	2.0102E+1	2.0972E+1	1.9723E+1
2658.77	3.76114	2.1702E+1	2.2561E+1	2.1326E+1	2662.56	3.75579	2.0004E+1	2.0874E+1	1.9624E+1
2658.84	3.76104	2.1720E+1	2.2579E+1	2.1344E+1	2662.74	3.75554	1.9923E+1	2.0794E+1	1.9543E+1
2658.91	3.76094	2.1746E+1	2.2605E+1	2.1370E+1	2662.91	3.75529	1.9843E+1	2.0715E+1	1.9463E+1
2658.98	3.76084	2.1787E+1	2.2646E+1	2.1412E+1	2663.09	3.75504	1.9773E+1	2.0645E+1	1.9392E+1
2659.05	3.76074	2.1848E+1	2.2707E+1	2.1473E+1	2663.44	3.75454	1.9634E+1	2.0507E+1	1.9254E+1
2659.12	3.76064	2.1931E+1	2.2790E+1	2.1555E+1	2663.80	3.75404	1.9502E+1	2.0375E+1	1.9121E+1
2659.20	3.76054	2.2045E+1	2.2904E+1	2.1669E+1	2664.36	3.75325	1.9286E+1	2.0161E+1	1.8905E+1
2659.34	3.76034	2.2367E+1	2.3228E+1	2.1987E+1	2666.36	3.75043	1.8550E+1	1.9428E+1	1.8167E+1
2659.48	3.76014	2.2803E+1	2.3664E+1	2.2420E+1	2667.36	3.74902	1.8238E+1	1.9118E+1	1.7855E+1
2659.55	3.76004	2.3102E+1	2.3963E+1	2.2717E+1	2668.36	3.74762	1.7941E+1	1.8824E+1	1.7557E+1
2659.62	3.75994	2.3476E+1	2.4336E+1	2.3088E+1	2669.36	3.74622	1.7662E+1	1.8547E+1	1.7277E+1
2659.69	3.75984	2.3946E+1	2.4804E+1	2.3555E+1	2669.61	3.74586	1.7595E+1	1.8480E+1	1.7210E+1
2659.76	3.75974	2.4550E+1	2.5407E+1	2.4157E+1	2670.36	3.74481	1.7400E+1	1.8286E+1	1.7015E+1
2659.83	3.75964	2.5321E+1	2.6179E+1	2.4924E+1	2671.36	3.74341	1.7153E+1	1.8041E+1	1.6767E+1
2659.90	3.75954	2.6248E+1	2.7106E+1	2.5847E+1	2672.36	3.74201	1.6920E+1	1.7809E+1	1.6534E+1
2659.97	3.75944	2.7316E+1	2.8170E+1	2.6912E+1	2673.36	3.74061	1.6714E+1	1.7604E+1	1.6327E+1
2660.04	3.75934	2.8386E+1	2.9228E+1	2.7984E+1	2674.36	3.73921	1.6544E+1	1.7436E+1	1.6156E+1
2660.11	3.75924	2.9356E+1	3.0183E+1	2.8958E+1	2675.36	3.73781	1.6398E+1	1.7291E+1	1.6010E+1
2660.15	3.75919	2.9765E+1	3.0586E+1	2.9370E+1	2676.36	3.73642	1.6289E+1	1.7182E+1	1.5900E+1
2660.19	3.75914	3.0088E+1	3.0903E+1	2.9696E+1	2676.99	3.73554	1.6235E+1	1.7129E+1	1.5846E+1
2660.22	3.75909	3.0340E+1	3.1149E+1	2.9951E+1	2677.35	3.73504	1.6209E+1	1.7103E+1	1.5820E+1
2660.26	3.75904	3.0505E+1	3.1312E+1	3.0119E+1	2677.71	3.73454	1.6187E+1	1.7081E+1	1.5798E+1
2660.29	3.75899	3.0490E+1	3.1294E+1	3.0107E+1	2678.07	3.73404	1.6166E+1	1.7061E+1	1.5778E+1
2660.33	3.75894	3.0385E+1	3.1186E+1	3.0005E+1	2678.78	3.73304	1.6135E+1	1.7029E+1	1.5746E+1
2660.36	3.75889	3.0195E+1	3.0995E+1	2.9817E+1	2679.50	3.73204	1.6105E+1	1.6999E+1	1.5716E+1
2660.40	3.75884	2.9875E+1	3.0675E+1	2.9500E+1	2679.86	3.73154	1.6088E+1	1.6982E+1	1.5699E+1
2660.43	3.75879	2.9465E+1	3.0265E+1	2.9093E+1	2680.22	3.73104	1.6069E+1	1.6964E+1	1.5680E+1
2660.47	3.75874	2.8993E+1	2.9793E+1	2.8623E+1	2680.58	3.73054	1.6048E+1	1.6943E+1	1.5659E+1
2660.54	3.75864	2.7899E+1	2.8704E+1	2.7531E+1	2680.76	3.73029	1.6036E+1	1.6931E+1	1.5647E+1
2660.61	3.75854	2.6735E+1	2.7551E+1	2.6366E+1	2680.94	3.73004	1.6022E+1	1.6917E+1	1.5633E+1
2660.68	3.75844	2.5598E+1	2.6424E+1	2.5229E+1	2681.30	3.72954	1.5988E+1	1.6883E+1	1.5599E+1
2660.75	3.75834	2.4655E+1	2.5488E+1	2.4285E+1	2681.66	3.72904	1.5948E+1	1.6843E+1	1.5559E+1
2660.82	3.75824	2.3883E+1	2.4723E+1	2.3513E+1	2682.38	3.72804	1.5855E+1	1.6751E+1	1.5465E+1
2660.89	3.75814	2.3257E+1	2.4103E+1	2.2885E+1	2683.10	3.72704	1.5741E+1	1.6638E+1	1.5352E+1
2660.96	3.75804	2.2754E+1	2.3606E+1	2.2380E+1	2683.82	3.72604	1.5617E+1	1.6515E+1	1.5227E+1
2661.04	3.75794	2.2371E+1	2.3228E+1	2.1996E+1	2685.26	3.72404	1.5346E+1	1.6245E+1	1.4956E+1
2661.11	3.75784	2.2047E+1	2.2907E+1	2.1671E+1	2686.70	3.72204	1.5081E+1	1.5982E+1	1.4690E+1
2661.18	3.75774	2.1785E+1	2.2646E+1	2.1408E+1	2687.35	3.72114	1.4966E+1	1.5868E+1	1.4574E+1
2661.25	3.75764	2.1576E+1	2.2440E+1	2.1199E+1	2687.79	3.72054	1.4892E+1	1.5795E+1	1.4500E+1
2661.32	3.75754	2.1384E+1	2.2248E+1	2.1006E+1	2687.93	3.72034	1.4869E+1	1.5771E+1	1.4477E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2688.15	3.72004	1.4837E+1	1.5740E+1	1.4445E+1	2696.48	3.70854	1.5929E+1	1.6824E+1	1.5541E+1
2688.51	3.71954	1.4789E+1	1.5692E+1	1.4397E+1	2696.66	3.70829	1.5953E+1	1.6848E+1	1.5565E+1
2688.87	3.71904	1.4744E+1	1.5648E+1	1.4352E+1	2696.85	3.70804	1.5975E+1	1.6869E+1	1.5586E+1
2689.23	3.71854	1.4703E+1	1.5607E+1	1.4311E+1	2697.21	3.70754	1.6015E+1	1.6909E+1	1.5626E+1
2689.59	3.71804	1.4668E+1	1.5571E+1	1.4275E+1	2697.57	3.70704	1.6050E+1	1.6943E+1	1.5661E+1
2689.95	3.71754	1.4636E+1	1.5540E+1	1.4243E+1	2697.94	3.70654	1.6081E+1	1.6975E+1	1.5693E+1
2690.32	3.71704	1.4612E+1	1.5517E+1	1.4220E+1	2698.30	3.70604	1.6108E+1	1.7002E+1	1.5720E+1
2690.46	3.71684	1.4607E+1	1.5511E+1	1.4215E+1	2698.67	3.70554	1.6129E+1	1.7022E+1	1.5740E+1
2690.61	3.71664	1.4604E+1	1.5509E+1	1.4212E+1	2698.85	3.70529	1.6135E+1	1.7028E+1	1.5747E+1
2690.68	3.71654	1.4604E+1	1.5508E+1	1.4211E+1	2699.03	3.70504	1.6139E+1	1.7032E+1	1.5751E+1
2690.75	3.71644	1.4605E+1	1.5509E+1	1.4212E+1	2699.21	3.70479	1.6138E+1	1.7032E+1	1.5750E+1
2690.82	3.71634	1.4608E+1	1.5512E+1	1.4215E+1	2699.39	3.70454	1.6133E+1	1.7026E+1	1.5745E+1
2690.90	3.71624	1.4614E+1	1.5518E+1	1.4221E+1	2699.58	3.70429	1.6124E+1	1.7017E+1	1.5736E+1
2690.97	3.71614	1.4623E+1	1.5528E+1	1.4231E+1	2699.76	3.70404	1.6114E+1	1.7007E+1	1.5726E+1
2691.04	3.71604	1.4634E+1	1.5538E+1	1.4242E+1	2700.12	3.70354	1.6091E+1	1.6983E+1	1.5703E+1
2691.11	3.71594	1.4647E+1	1.5551E+1	1.4254E+1	2700.49	3.70304	1.6065E+1	1.6957E+1	1.5677E+1
2691.18	3.71584	1.4662E+1	1.5566E+1	1.4270E+1	2700.85	3.70254	1.6042E+1	1.6935E+1	1.5654E+1
2691.33	3.71564	1.4694E+1	1.5597E+1	1.4301E+1	2701.22	3.70204	1.6025E+1	1.6918E+1	1.5637E+1
2691.47	3.71544	1.4722E+1	1.5625E+1	1.4330E+1	2701.58	3.70154	1.6016E+1	1.6909E+1	1.5627E+1
2691.55	3.71534	1.4733E+1	1.5636E+1	1.4341E+1	2701.76	3.70129	1.6015E+1	1.6908E+1	1.5626E+1
2691.62	3.71524	1.4740E+1	1.5643E+1	1.4348E+1	2701.95	3.70104	1.6016E+1	1.6909E+1	1.5627E+1
2691.69	3.71514	1.4743E+1	1.5646E+1	1.4352E+1	2702.31	3.70054	1.6022E+1	1.6916E+1	1.5634E+1
2691.76	3.71504	1.4745E+1	1.5647E+1	1.4353E+1	2702.68	3.70004	1.6037E+1	1.6930E+1	1.5648E+1
2691.91	3.71484	1.4740E+1	1.5643E+1	1.4348E+1	2702.86	3.69979	1.6047E+1	1.6940E+1	1.5658E+1
2692.13	3.71454	1.4722E+1	1.5625E+1	1.4330E+1	2703.04	3.69954	1.6059E+1	1.6952E+1	1.5671E+1
2692.34	3.71424	1.4703E+1	1.5607E+1	1.4311E+1	2703.41	3.69904	1.6090E+1	1.6983E+1	1.5702E+1
2692.49	3.71404	1.4694E+1	1.5597E+1	1.4302E+1	2703.77	3.69854	1.6132E+1	1.7025E+1	1.5744E+1
2692.63	3.71384	1.4687E+1	1.5590E+1	1.4295E+1	2703.99	3.69824	1.6164E+1	1.7057E+1	1.5776E+1
2692.71	3.71374	1.4686E+1	1.5589E+1	1.4294E+1	2704.14	3.69804	1.6190E+1	1.7082E+1	1.5802E+1
2692.78	3.71364	1.4687E+1	1.5590E+1	1.4295E+1	2704.36	3.69774	1.6236E+1	1.7128E+1	1.5848E+1
2692.85	3.71354	1.4693E+1	1.5595E+1	1.4301E+1	2704.50	3.69754	1.6273E+1	1.7165E+1	1.5886E+1
2692.92	3.71344	1.4703E+1	1.5605E+1	1.4311E+1	2704.72	3.69724	1.6351E+1	1.7242E+1	1.5964E+1
2693.07	3.71324	1.4729E+1	1.5632E+1	1.4337E+1	2704.87	3.69704	1.6415E+1	1.7305E+1	1.6028E+1
2693.21	3.71304	1.4768E+1	1.5670E+1	1.4376E+1	2705.02	3.69684	1.6484E+1	1.7374E+1	1.6097E+1
2693.29	3.71294	1.4789E+1	1.5692E+1	1.4398E+1	2705.16	3.69664	1.6545E+1	1.7434E+1	1.6158E+1
2693.43	3.71274	1.4842E+1	1.5745E+1	1.4451E+1	2705.24	3.69654	1.6569E+1	1.7459E+1	1.6183E+1
2693.58	3.71254	1.4904E+1	1.5807E+1	1.4513E+1	2705.31	3.69644	1.6590E+1	1.7480E+1	1.6204E+1
2693.94	3.71204	1.5076E+1	1.5977E+1	1.4684E+1	2705.38	3.69634	1.6599E+1	1.7489E+1	1.6213E+1
2694.30	3.71154	1.5252E+1	1.6151E+1	1.4862E+1	2705.46	3.69624	1.6604E+1	1.7493E+1	1.6217E+1
2694.67	3.71104	1.5417E+1	1.6315E+1	1.5027E+1	2705.53	3.69614	1.6606E+1	1.7496E+1	1.6219E+1
2694.96	3.71064	1.5537E+1	1.6434E+1	1.5148E+1	2705.60	3.69604	1.6604E+1	1.7494E+1	1.6217E+1
2695.10	3.71044	1.5595E+1	1.6492E+1	1.5206E+1	2705.75	3.69584	1.6593E+1	1.7483E+1	1.6206E+1
2695.25	3.71024	1.5652E+1	1.6548E+1	1.5262E+1	2705.82	3.69574	1.6592E+1	1.7482E+1	1.6205E+1
2695.39	3.71004	1.5705E+1	1.6601E+1	1.5315E+1	2705.89	3.69564	1.6600E+1	1.7490E+1	1.6213E+1
2695.46	3.70994	1.5729E+1	1.6625E+1	1.5340E+1	2706.04	3.69544	1.6630E+1	1.7519E+1	1.6243E+1
2695.54	3.70984	1.5751E+1	1.6647E+1	1.5362E+1	2706.19	3.69524	1.6667E+1	1.7556E+1	1.6281E+1
2695.61	3.70974	1.5771E+1	1.6667E+1	1.5382E+1	2706.33	3.69504	1.6711E+1	1.7599E+1	1.6325E+1
2695.68	3.70964	1.5789E+1	1.6685E+1	1.5400E+1	2707.07	3.69404	1.6975E+1	1.7862E+1	1.6590E+1
2695.76	3.70954	1.5806E+1	1.6702E+1	1.5417E+1	2707.80	3.69304	1.7286E+1	1.8171E+1	1.6902E+1
2696.12	3.70904	1.5874E+1	1.6769E+1	1.5485E+1	2708.17	3.69254	1.7453E+1	1.8337E+1	1.7069E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2708.53	3.69204	1.7628E+1	1.8511E+1	1.7244E+1	2721.58	3.67434	3.2066E+1	3.2857E+1	3.1695E+1
2708.90	3.69154	1.7810E+1	1.8691E+1	1.7426E+1	2721.65	3.67424	3.2104E+1	3.2897E+1	3.1730E+1
2709.27	3.69104	1.8003E+1	1.8884E+1	1.7620E+1	2721.73	3.67414	3.2178E+1	3.2973E+1	3.1803E+1
2709.63	3.69054	1.8204E+1	1.9084E+1	1.7821E+1	2721.80	3.67404	3.2267E+1	3.3062E+1	3.1891E+1
2710.00	3.69004	1.8414E+1	1.9292E+1	1.8031E+1	2721.95	3.67384	3.2346E+1	3.3140E+1	3.1971E+1
2713.68	3.68504	2.0748E+1	2.1614E+1	2.0370E+1	2722.10	3.67364	3.2316E+1	3.3108E+1	3.1947E+1
2715.89	3.68204	2.2311E+1	2.3168E+1	2.1936E+1	2722.17	3.67354	3.2277E+1	3.3068E+1	3.1910E+1
2716.63	3.68104	2.2887E+1	2.3740E+1	2.2513E+1	2722.25	3.67344	3.2214E+1	3.3004E+1	3.1848E+1
2717.00	3.68054	2.3208E+1	2.4058E+1	2.2834E+1	2722.32	3.67334	3.2120E+1	3.2911E+1	3.1756E+1
2717.37	3.68004	2.3557E+1	2.4404E+1	2.3184E+1	2722.40	3.67324	3.1963E+1	3.2754E+1	3.1601E+1
2718.10	3.67904	2.4311E+1	2.5149E+1	2.3939E+1	2722.47	3.67314	3.1785E+1	3.2576E+1	3.1424E+1
2718.47	3.67854	2.4710E+1	2.5544E+1	2.4339E+1	2722.54	3.67304	3.1590E+1	3.2380E+1	3.1230E+1
2718.70	3.67824	2.4962E+1	2.5794E+1	2.4592E+1	2722.69	3.67284	3.1214E+1	3.2005E+1	3.0856E+1
2718.84	3.67804	2.5142E+1	2.5972E+1	2.4771E+1	2722.91	3.67254	3.0728E+1	3.1523E+1	3.0369E+1
2718.99	3.67784	2.5327E+1	2.6156E+1	2.4955E+1	2723.14	3.67224	3.0317E+1	3.1116E+1	2.9956E+1
2719.14	3.67764	2.5516E+1	2.6343E+1	2.5144E+1	2723.29	3.67203	3.0102E+1	3.0903E+1	2.9740E+1
2719.29	3.67744	2.5717E+1	2.6541E+1	2.5344E+1	2723.43	3.67184	2.9985E+1	3.0787E+1	2.9623E+1
2719.43	3.67724	2.5959E+1	2.6783E+1	2.5585E+1	2723.58	3.67164	2.9919E+1	3.0722E+1	2.9558E+1
2719.58	3.67704	2.6234E+1	2.7055E+1	2.5858E+1	2723.73	3.67144	2.9902E+1	3.0705E+1	2.9541E+1
2719.73	3.67684	2.6590E+1	2.7409E+1	2.6212E+1	2723.88	3.67124	2.9913E+1	3.0716E+1	2.9552E+1
2719.88	3.67664	2.7020E+1	2.7840E+1	2.6640E+1	2723.95	3.67114	2.9916E+1	3.0720E+1	2.9555E+1
2719.95	3.67654	2.7278E+1	2.8098E+1	2.6895E+1	2724.03	3.67104	2.9910E+1	3.0715E+1	2.9548E+1
2720.03	3.67644	2.7553E+1	2.8372E+1	2.7169E+1	2724.10	3.67094	2.9882E+1	3.0687E+1	2.9520E+1
2720.10	3.67634	2.7893E+1	2.8711E+1	2.7508E+1	2724.18	3.67084	2.9829E+1	3.0634E+1	2.9466E+1
2720.17	3.67624	2.8270E+1	2.9088E+1	2.7885E+1	2724.32	3.67064	2.9701E+1	3.0507E+1	2.9339E+1
2720.32	3.67604	2.9142E+1	2.9956E+1	2.8755E+1	2724.47	3.67044	2.9553E+1	3.0359E+1	2.9191E+1
2720.47	3.67584	3.0252E+1	3.1063E+1	2.9864E+1	2724.62	3.67023	2.9404E+1	3.0211E+1	2.9041E+1
2720.54	3.67574	3.0827E+1	3.1636E+1	3.0440E+1	2724.77	3.67004	2.9253E+1	3.0061E+1	2.8890E+1
2720.62	3.67564	3.1422E+1	3.2229E+1	3.1035E+1	2725.51	3.66903	2.8515E+1	2.9328E+1	2.8150E+1
2720.69	3.67554	3.1994E+1	3.2798E+1	3.1610E+1	2725.88	3.66853	2.8162E+1	2.8978E+1	2.7797E+1
2720.77	3.67544	3.2512E+1	3.3313E+1	3.2130E+1	2726.26	3.66804	2.7826E+1	2.8645E+1	2.7460E+1
2720.80	3.67539	3.2751E+1	3.3549E+1	3.2371E+1	2727.00	3.66703	2.7193E+1	2.8019E+1	2.6825E+1
2720.84	3.67534	3.2945E+1	3.3740E+1	3.2568E+1	2727.37	3.66653	2.6894E+1	2.7724E+1	2.6526E+1
2720.88	3.67529	3.3096E+1	3.3889E+1	3.2723E+1	2727.59	3.66623	2.6715E+1	2.7546E+1	2.6346E+1
2720.91	3.67524	3.3207E+1	3.3997E+1	3.2836E+1	2727.74	3.66603	2.6594E+1	2.7427E+1	2.6224E+1
2720.95	3.67519	3.3269E+1	3.4057E+1	3.2900E+1	2727.89	3.66583	2.6482E+1	2.7317E+1	2.6112E+1
2720.99	3.67514	3.3301E+1	3.4087E+1	3.2935E+1	2728.11	3.66554	2.6302E+1	2.7139E+1	2.5932E+1
2721.03	3.67509	3.3302E+1	3.4088E+1	3.2938E+1	2728.49	3.66504	2.5991E+1	2.6831E+1	2.5620E+1
2721.06	3.67504	3.3264E+1	3.4049E+1	3.2902E+1	2728.64	3.66484	2.5860E+1	2.6701E+1	2.5488E+1
2721.10	3.67499	3.3198E+1	3.3982E+1	3.2838E+1	2728.86	3.66453	2.5657E+1	2.6501E+1	2.5285E+1
2721.14	3.67494	3.3112E+1	3.3895E+1	3.2753E+1	2729.23	3.66403	2.5311E+1	2.6158E+1	2.4938E+1
2721.17	3.67489	3.3011E+1	3.3793E+1	3.2652E+1	2730.72	3.66203	2.3885E+1	2.4740E+1	2.3509E+1
2721.21	3.67484	3.2895E+1	3.3678E+1	3.2537E+1	2731.47	3.66103	2.3222E+1	2.4081E+1	2.2845E+1
2721.25	3.67479	3.2774E+1	3.3556E+1	3.2416E+1	2732.21	3.66003	2.2610E+1	2.3472E+1	2.2232E+1
2721.28	3.67474	3.2646E+1	3.3428E+1	3.2288E+1	2735.20	3.65603	2.0387E+1	2.1262E+1	2.0004E+1
2721.32	3.67469	3.2521E+1	3.3304E+1	3.2162E+1	2735.95	3.65503	1.9856E+1	2.0734E+1	1.9473E+1
2721.36	3.67464	3.2396E+1	3.3179E+1	3.2036E+1	2736.70	3.65403	1.9315E+1	2.0197E+1	1.8931E+1
2721.40	3.67459	3.2290E+1	3.3074E+1	3.1929E+1	2737.08	3.65353	1.9038E+1	1.9922E+1	1.8652E+1
2721.43	3.67454	3.2203E+1	3.2988E+1	3.1841E+1	2737.45	3.65303	1.8748E+1	1.9634E+1	1.8360E+1
2721.51	3.67444	3.2094E+1	3.2882E+1	3.1728E+1	2737.82	3.65253	1.8470E+1	1.9359E+1	1.8080E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2738.20	3.65203	1.8215E+1	1.9106E+1	1.7824E+1	2742.40	3.64643	1.4703E+1	1.5612E+1	1.4309E+1
2738.42	3.65173	1.8078E+1	1.8969E+1	1.7687E+1	2742.56	3.64623	1.4564E+1	1.5473E+1	1.4169E+1
2738.57	3.65153	1.7996E+1	1.8887E+1	1.7604E+1	2742.71	3.64603	1.4438E+1	1.5348E+1	1.4043E+1
2738.65	3.65143	1.7960E+1	1.8851E+1	1.7568E+1	2742.86	3.64583	1.4318E+1	1.5229E+1	1.3923E+1
2738.72	3.65133	1.7930E+1	1.8822E+1	1.7538E+1	2743.01	3.64563	1.4209E+1	1.5121E+1	1.3813E+1
2738.80	3.65123	1.7911E+1	1.8803E+1	1.7519E+1	2743.16	3.64543	1.4112E+1	1.5025E+1	1.3716E+1
2738.87	3.65113	1.7902E+1	1.8795E+1	1.7509E+1	2743.31	3.64523	1.4024E+1	1.4938E+1	1.3628E+1
2738.95	3.65103	1.7903E+1	1.8795E+1	1.7509E+1	2743.46	3.64503	1.3945E+1	1.4859E+1	1.3548E+1
2739.10	3.65083	1.7928E+1	1.8822E+1	1.7532E+1	2743.61	3.64483	1.3874E+1	1.4789E+1	1.3477E+1
2739.17	3.65073	1.7958E+1	1.8853E+1	1.7559E+1	2743.76	3.64463	1.3810E+1	1.4726E+1	1.3413E+1
2739.25	3.65063	1.8011E+1	1.8907E+1	1.7610E+1	2743.91	3.64443	1.3754E+1	1.4670E+1	1.3356E+1
2739.32	3.65053	1.8087E+1	1.8984E+1	1.7683E+1	2744.06	3.64423	1.3699E+1	1.4616E+1	1.3302E+1
2739.40	3.65043	1.8202E+1	1.9100E+1	1.7795E+1	2744.21	3.64403	1.3651E+1	1.4568E+1	1.3254E+1
2739.47	3.65033	1.8365E+1	1.9264E+1	1.7954E+1	2744.36	3.64383	1.3607E+1	1.4525E+1	1.3210E+1
2739.55	3.65023	1.8601E+1	1.9502E+1	1.8187E+1	2744.59	3.64353	1.3549E+1	1.4466E+1	1.3151E+1
2739.62	3.65013	1.8895E+1	1.9795E+1	1.8478E+1	2744.74	3.64333	1.3515E+1	1.4433E+1	1.3117E+1
2739.70	3.65003	1.9296E+1	2.0196E+1	1.8878E+1	2744.96	3.64303	1.3469E+1	1.4387E+1	1.3072E+1
2739.78	3.64993	1.9799E+1	2.0697E+1	1.9378E+1	2745.34	3.64253	1.3414E+1	1.4332E+1	1.3016E+1
2739.85	3.64983	2.0413E+1	2.1309E+1	1.9992E+1	2745.72	3.64203	1.3373E+1	1.4291E+1	1.2975E+1
2739.93	3.64973	2.1131E+1	2.2024E+1	2.0710E+1	2745.91	3.64178	1.3356E+1	1.4274E+1	1.2958E+1
2740.00	3.64963	2.1914E+1	2.2805E+1	2.1495E+1	2746.09	3.64153	1.3345E+1	1.4263E+1	1.2947E+1
2740.08	3.64953	2.2714E+1	2.3600E+1	2.2298E+1	2746.28	3.64128	1.3335E+1	1.4253E+1	1.2937E+1
2740.15	3.64943	2.3495E+1	2.4375E+1	2.3085E+1	2746.47	3.64103	1.3332E+1	1.4250E+1	1.2934E+1
2740.19	3.64938	2.3828E+1	2.4703E+1	2.3422E+1	2746.66	3.64078	1.3333E+1	1.4250E+1	1.2935E+1
2740.23	3.64933	2.4109E+1	2.4977E+1	2.3707E+1	2746.85	3.64053	1.3339E+1	1.4257E+1	1.2941E+1
2740.26	3.64928	2.4327E+1	2.5189E+1	2.3931E+1	2747.04	3.64028	1.3351E+1	1.4269E+1	1.2953E+1
2740.30	3.64923	2.4463E+1	2.5319E+1	2.4071E+1	2747.23	3.64003	1.3367E+1	1.4285E+1	1.2968E+1
2740.34	3.64918	2.4503E+1	2.5355E+1	2.4115E+1	2747.42	3.63978	1.3389E+1	1.4306E+1	1.2989E+1
2740.38	3.64913	2.4447E+1	2.5296E+1	2.4064E+1	2747.60	3.63953	1.3414E+1	1.4332E+1	1.3014E+1
2740.41	3.64908	2.4293E+1	2.5140E+1	2.3912E+1	2747.79	3.63928	1.3442E+1	1.4360E+1	1.3042E+1
2740.45	3.64903	2.4031E+1	2.4880E+1	2.3652E+1	2747.98	3.63903	1.3478E+1	1.4395E+1	1.3078E+1
2740.49	3.64898	2.3698E+1	2.4550E+1	2.3320E+1	2748.74	3.63803	1.3643E+1	1.4559E+1	1.3243E+1
2740.53	3.64893	2.3296E+1	2.4151E+1	2.2918E+1	2749.49	3.63703	1.3837E+1	1.4751E+1	1.3438E+1
2740.60	3.64883	2.2328E+1	2.3188E+1	2.1950E+1	2750.25	3.63603	1.4047E+1	1.4959E+1	1.3650E+1
2740.68	3.64873	2.1298E+1	2.2166E+1	2.0919E+1	2751.01	3.63503	1.4257E+1	1.5167E+1	1.3862E+1
2740.75	3.64863	2.0332E+1	2.1205E+1	1.9951E+1	2751.76	3.63403	1.4470E+1	1.5378E+1	1.4076E+1
2740.83	3.64853	1.9456E+1	2.0333E+1	1.9074E+1	2752.52	3.63303	1.4690E+1	1.5597E+1	1.4297E+1
2740.90	3.64843	1.8774E+1	1.9655E+1	1.8390E+1	2752.82	3.63263	1.4777E+1	1.5683E+1	1.4383E+1
2741.05	3.64823	1.7710E+1	1.8599E+1	1.7323E+1	2752.97	3.63243	1.4814E+1	1.5721E+1	1.4421E+1
2741.20	3.64803	1.6902E+1	1.7796E+1	1.6513E+1	2753.05	3.63233	1.4829E+1	1.5736E+1	1.4436E+1
2741.28	3.64793	1.6583E+1	1.7479E+1	1.6194E+1	2753.13	3.63223	1.4840E+1	1.5747E+1	1.4446E+1
2741.35	3.64783	1.6331E+1	1.7228E+1	1.5941E+1	2753.20	3.63213	1.4845E+1	1.5752E+1	1.4451E+1
2741.43	3.64773	1.6115E+1	1.7013E+1	1.5724E+1	2753.28	3.63203	1.4843E+1	1.5750E+1	1.4449E+1
2741.50	3.64763	1.5938E+1	1.6837E+1	1.5547E+1	2753.35	3.63193	1.4836E+1	1.5744E+1	1.4442E+1
2741.58	3.64753	1.5779E+1	1.6680E+1	1.5388E+1	2753.43	3.63183	1.4825E+1	1.5732E+1	1.4431E+1
2741.65	3.64743	1.5643E+1	1.6545E+1	1.5251E+1	2753.58	3.63163	1.4802E+1	1.5709E+1	1.4408E+1
2741.80	3.64723	1.5399E+1	1.6302E+1	1.5007E+1	2753.73	3.63143	1.4781E+1	1.5689E+1	1.4387E+1
2741.95	3.64703	1.5199E+1	1.6104E+1	1.4807E+1	2753.88	3.63123	1.4763E+1	1.5671E+1	1.4368E+1
2742.10	3.64683	1.5020E+1	1.5926E+1	1.4627E+1	2754.04	3.63103	1.4744E+1	1.5653E+1	1.4350E+1
2742.25	3.64663	1.4854E+1	1.5761E+1	1.4461E+1	2754.19	3.63083	1.4724E+1	1.5633E+1	1.4330E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2754.42	3.63053	1.4690E+1	1.5599E+1	1.4295E+1	2765.46	3.61603	1.5855E+1	1.6755E+1	1.5464E+1
2754.57	3.63033	1.4663E+1	1.5573E+1	1.4269E+1	2765.61	3.61583	1.5926E+1	1.6827E+1	1.5535E+1
2754.79	3.63003	1.4621E+1	1.5531E+1	1.4227E+1	2765.77	3.61563	1.6004E+1	1.6904E+1	1.5613E+1
2755.17	3.62953	1.4541E+1	1.5452E+1	1.4146E+1	2765.92	3.61543	1.6087E+1	1.6987E+1	1.5696E+1
2755.55	3.62903	1.4455E+1	1.5367E+1	1.4060E+1	2766.00	3.61533	1.6130E+1	1.7030E+1	1.5739E+1
2756.31	3.62803	1.4278E+1	1.5190E+1	1.3882E+1	2766.07	3.61523	1.6179E+1	1.7079E+1	1.5788E+1
2757.07	3.62703	1.4118E+1	1.5031E+1	1.3721E+1	2766.15	3.61513	1.6234E+1	1.7135E+1	1.5842E+1
2757.23	3.62683	1.4089E+1	1.5002E+1	1.3692E+1	2766.23	3.61503	1.6292E+1	1.7193E+1	1.5899E+1
2757.45	3.62653	1.4053E+1	1.4967E+1	1.3657E+1	2766.42	3.61478	1.6491E+1	1.7394E+1	1.6095E+1
2757.61	3.62633	1.4032E+1	1.4946E+1	1.3636E+1	2766.61	3.61453	1.6797E+1	1.7700E+1	1.6396E+1
2757.83	3.62603	1.4008E+1	1.4921E+1	1.3612E+1	2766.68	3.61443	1.6981E+1	1.7885E+1	1.6579E+1
2757.99	3.62583	1.3995E+1	1.4909E+1	1.3599E+1	2766.76	3.61433	1.7222E+1	1.8125E+1	1.6819E+1
2758.21	3.62553	1.3984E+1	1.4898E+1	1.3588E+1	2766.84	3.61423	1.7503E+1	1.8405E+1	1.7100E+1
2758.37	3.62533	1.3982E+1	1.4895E+1	1.3586E+1	2766.91	3.61413	1.7848E+1	1.8748E+1	1.7446E+1
2758.59	3.62503	1.3982E+1	1.4895E+1	1.3585E+1	2766.99	3.61403	1.8295E+1	1.9193E+1	1.7894E+1
2758.75	3.62483	1.3985E+1	1.4898E+1	1.3589E+1	2767.07	3.61393	1.8811E+1	1.9706E+1	1.8411E+1
2758.90	3.62463	1.3992E+1	1.4905E+1	1.3596E+1	2767.14	3.61383	1.9393E+1	2.0285E+1	1.8994E+1
2759.05	3.62443	1.4007E+1	1.4920E+1	1.3611E+1	2767.22	3.61373	2.0064E+1	2.0953E+1	1.9667E+1
2759.20	3.62423	1.4029E+1	1.4941E+1	1.3633E+1	2767.30	3.61363	2.0778E+1	2.1662E+1	2.0383E+1
2759.36	3.62403	1.4058E+1	1.4970E+1	1.3662E+1	2767.37	3.61353	2.1439E+1	2.2320E+1	2.1046E+1
2759.51	3.62383	1.4094E+1	1.5005E+1	1.3698E+1	2767.41	3.61348	2.1688E+1	2.2566E+1	2.1295E+1
2759.66	3.62363	1.4142E+1	1.5053E+1	1.3746E+1	2767.45	3.61343	2.1880E+1	2.2758E+1	2.1488E+1
2759.74	3.62353	1.4173E+1	1.5084E+1	1.3778E+1	2767.49	3.61338	2.2022E+1	2.2900E+1	2.1630E+1
2759.81	3.62343	1.4212E+1	1.5122E+1	1.3817E+1	2767.53	3.61333	2.2117E+1	2.2994E+1	2.1724E+1
2759.89	3.62333	1.4263E+1	1.5173E+1	1.3868E+1	2767.57	3.61328	2.2115E+1	2.2994E+1	2.1721E+1
2759.96	3.62323	1.4326E+1	1.5237E+1	1.3931E+1	2767.60	3.61323	2.2040E+1	2.2920E+1	2.1645E+1
2760.12	3.62303	1.4472E+1	1.5382E+1	1.4077E+1	2767.64	3.61318	2.1906E+1	2.2788E+1	2.1509E+1
2760.19	3.62293	1.4540E+1	1.5450E+1	1.4145E+1	2767.68	3.61313	2.1714E+1	2.2598E+1	2.1315E+1
2760.27	3.62283	1.4592E+1	1.5501E+1	1.4197E+1	2767.76	3.61303	2.1071E+1	2.1961E+1	2.0669E+1
2760.35	3.62273	1.4626E+1	1.5536E+1	1.4232E+1	2767.83	3.61293	2.0336E+1	2.1231E+1	1.9930E+1
2760.42	3.62263	1.4636E+1	1.5545E+1	1.4241E+1	2767.95	3.61278	1.9164E+1	2.0065E+1	1.8755E+1
2760.50	3.62253	1.4622E+1	1.5531E+1	1.4228E+1	2768.06	3.61263	1.8181E+1	1.9088E+1	1.7770E+1
2760.57	3.62243	1.4598E+1	1.5507E+1	1.4203E+1	2768.14	3.61253	1.7632E+1	1.8542E+1	1.7219E+1
2760.65	3.62233	1.4570E+1	1.5479E+1	1.4176E+1	2768.22	3.61243	1.7179E+1	1.8092E+1	1.6764E+1
2760.73	3.62223	1.4541E+1	1.5450E+1	1.4147E+1	2768.29	3.61233	1.6820E+1	1.7737E+1	1.6402E+1
2760.80	3.62213	1.4514E+1	1.5423E+1	1.4119E+1	2768.37	3.61223	1.6521E+1	1.7440E+1	1.6101E+1
2760.88	3.62203	1.4487E+1	1.5396E+1	1.4093E+1	2768.45	3.61213	1.6269E+1	1.7189E+1	1.5848E+1
2761.03	3.62183	1.4447E+1	1.5356E+1	1.4051E+1	2768.52	3.61203	1.6046E+1	1.6967E+1	1.5624E+1
2761.18	3.62163	1.4425E+1	1.5335E+1	1.4029E+1	2768.60	3.61193	1.5860E+1	1.6782E+1	1.5438E+1
2761.34	3.62143	1.4427E+1	1.5337E+1	1.4030E+1	2768.68	3.61183	1.5698E+1	1.6621E+1	1.5275E+1
2761.49	3.62123	1.4446E+1	1.5356E+1	1.4049E+1	2768.75	3.61173	1.5562E+1	1.6486E+1	1.5138E+1
2761.64	3.62103	1.4474E+1	1.5384E+1	1.4077E+1	2768.83	3.61163	1.5441E+1	1.6366E+1	1.5015E+1
2761.79	3.62083	1.4510E+1	1.5420E+1	1.4114E+1	2768.91	3.61153	1.5330E+1	1.6257E+1	1.4904E+1
2762.02	3.62053	1.4574E+1	1.5483E+1	1.4177E+1	2768.98	3.61143	1.5223E+1	1.6151E+1	1.4795E+1
2762.25	3.62023	1.4641E+1	1.5550E+1	1.4245E+1	2769.14	3.61123	1.5024E+1	1.5955E+1	1.4593E+1
2762.40	3.62003	1.4690E+1	1.5598E+1	1.4293E+1	2769.29	3.61103	1.4831E+1	1.5764E+1	1.4398E+1
2763.93	3.61803	1.5246E+1	1.6149E+1	1.4854E+1	2770.06	3.61003	1.3935E+1	1.4875E+1	1.3498E+1
2764.70	3.61703	1.5543E+1	1.6444E+1	1.5152E+1	2770.82	3.60903	1.3076E+1	1.4022E+1	1.2638E+1
2765.08	3.61653	1.5692E+1	1.6593E+1	1.5301E+1	2771.59	3.60803	1.2235E+1	1.3186E+1	1.1800E+1
2765.31	3.61623	1.5788E+1	1.6688E+1	1.5396E+1	2772.36	3.60703	1.1435E+1	1.2389E+1	1.1003E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2773.13	3.60603	1.0696E+1	1.1654E+1	1.0266E+1	2828.03	3.53603	5.4870E+0	6.4574E+0	5.0685E+0
2773.90	3.60503	1.0032E+1	1.0994E+1	9.6046E+0	2828.83	3.53503	5.6423E+0	6.6125E+0	5.2239E+0
2774.67	3.60403	9.4428E+0	1.0408E+1	9.0165E+0	2829.34	3.53439	5.7464E+0	6.7164E+0	5.3281E+0
2775.44	3.60303	8.9283E+0	9.8950E+0	8.5038E+0	2830.34	3.53314	5.9624E+0	6.9321E+0	5.5441E+0
2775.82	3.60253	8.6927E+0	9.6600E+0	8.2691E+0	2831.34	3.53189	6.1930E+0	7.1624E+0	5.7747E+0
2776.21	3.60203	8.4797E+0	9.4478E+0	8.0565E+0	2832.34	3.53065	6.4383E+0	7.4072E+0	6.0200E+0
2776.98	3.60103	8.0843E+0	9.0531E+0	7.6620E+0	2833.34	3.52940	6.6987E+0	7.6672E+0	6.2805E+0
2777.75	3.60003	7.7333E+0	8.7027E+0	7.3118E+0	2834.34	3.52815	6.9817E+0	7.9496E+0	6.5636E+0
2779.30	3.59803	7.1511E+0	8.1216E+0	6.7303E+0	2835.34	3.52691	7.2923E+0	8.2594E+0	6.8745E+0
2780.84	3.59603	6.6463E+0	7.6179E+0	6.2255E+0	2835.84	3.52629	7.4582E+0	8.4251E+0	7.0406E+0
2782.39	3.59403	6.1834E+0	7.1560E+0	5.7624E+0	2836.34	3.52567	7.6304E+0	8.5967E+0	7.2130E+0
2783.94	3.59203	5.7553E+0	6.7287E+0	5.3340E+0	2837.34	3.52442	7.9922E+0	8.9572E+0	7.5753E+0
2785.49	3.59003	5.3563E+0	6.3304E+0	4.9346E+0	2837.84	3.52380	8.1743E+0	9.1386E+0	7.7578E+0
2787.04	3.58803	4.9917E+0	5.9666E+0	4.5696E+0	2838.34	3.52318	8.3503E+0	9.3139E+0	7.9341E+0
2787.82	3.58703	4.8280E+0	5.8032E+0	4.4058E+0	2838.84	3.52256	8.5189E+0	9.4819E+0	8.1032E+0
2788.60	3.58603	4.6762E+0	5.6517E+0	4.2540E+0	2839.09	3.52225	8.5973E+0	9.5599E+0	8.1817E+0
2790.15	3.58403	4.4141E+0	5.3893E+0	3.9924E+0	2839.34	3.52194	8.6703E+0	9.6328E+0	8.2547E+0
2791.71	3.58203	4.1993E+0	5.1737E+0	3.7783E+0	2839.59	3.52163	8.7334E+0	9.6957E+0	8.3179E+0
2792.49	3.58103	4.1066E+0	5.0808E+0	3.6858E+0	2839.84	3.52132	8.7873E+0	9.7493E+0	8.3720E+0
2793.27	3.58003	4.0244E+0	4.9985E+0	3.6038E+0	2840.09	3.52101	8.8354E+0	9.7971E+0	8.4201E+0
2794.05	3.57903	3.9495E+0	4.9236E+0	3.5289E+0	2840.34	3.52070	8.8780E+0	9.8395E+0	8.4629E+0
2794.83	3.57803	3.8821E+0	4.8563E+0	3.4615E+0	2840.59	3.52039	8.9149E+0	9.8761E+0	8.4998E+0
2795.61	3.57703	3.8237E+0	4.7980E+0	3.4031E+0	2840.84	3.52008	8.9456E+0	9.9068E+0	8.5306E+0
2796.39	3.57603	3.7687E+0	4.7431E+0	3.3481E+0	2841.09	3.51977	8.9685E+0	9.9296E+0	8.5535E+0
2797.18	3.57503	3.7200E+0	4.6944E+0	3.2993E+0	2841.34	3.51946	8.9869E+0	9.9480E+0	8.5719E+0
2797.96	3.57403	3.6725E+0	4.6469E+0	3.2519E+0	2841.59	3.51915	8.9997E+0	9.9609E+0	8.5847E+0
2799.53	3.57203	3.6053E+0	4.5788E+0	3.1852E+0	2841.84	3.51884	9.0094E+0	9.9708E+0	8.5943E+0
2801.09	3.57003	3.5573E+0	4.5298E+0	3.1377E+0	2842.09	3.51853	9.0155E+0	9.9770E+0	8.6003E+0
2801.88	3.56903	3.5367E+0	4.5090E+0	3.1171E+0	2842.34	3.51822	9.0144E+0	9.9760E+0	8.5992E+0
2802.66	3.56803	3.5178E+0	4.4901E+0	3.0983E+0	2842.59	3.51791	9.0080E+0	9.9698E+0	8.5928E+0
2803.45	3.56703	3.5038E+0	4.4763E+0	3.0842E+0	2842.84	3.51760	8.9965E+0	9.9583E+0	8.5813E+0
2804.24	3.56603	3.4975E+0	4.4701E+0	3.0779E+0	2843.09	3.51729	8.9817E+0	9.9437E+0	8.5664E+0
2805.02	3.56503	3.4971E+0	4.4696E+0	3.0775E+0	2843.34	3.51698	8.9632E+0	9.9253E+0	8.5478E+0
2805.81	3.56403	3.5014E+0	4.4738E+0	3.0819E+0	2843.59	3.51668	8.9393E+0	9.9015E+0	8.5239E+0
2806.60	3.56303	3.5073E+0	4.4796E+0	3.0878E+0	2843.84	3.51637	8.9115E+0	9.8738E+0	8.4960E+0
2807.38	3.56203	3.5163E+0	4.4887E+0	3.0968E+0	2844.09	3.51606	8.8800E+0	9.8425E+0	8.4645E+0
2808.17	3.56103	3.5300E+0	4.5024E+0	3.1104E+0	2844.34	3.51575	8.8441E+0	9.8067E+0	8.4285E+0
2808.96	3.56003	3.5482E+0	4.5206E+0	3.1286E+0	2844.60	3.51544	8.8060E+0	9.7688E+0	8.3904E+0
2809.75	3.55903	3.5730E+0	4.5453E+0	3.1534E+0	2844.84	3.51513	8.7673E+0	9.7304E+0	8.3516E+0
2811.33	3.55703	3.6369E+0	4.6089E+0	3.2176E+0	2845.10	3.51482	8.7292E+0	9.6925E+0	8.3133E+0
2812.91	3.55503	3.7137E+0	4.6852E+0	3.2946E+0	2845.35	3.51451	8.6903E+0	9.6539E+0	8.2743E+0
2814.50	3.55303	3.8111E+0	4.7820E+0	3.3923E+0	2845.85	3.51389	8.6097E+0	9.5741E+0	8.1934E+0
2816.08	3.55103	3.9257E+0	4.8967E+0	3.5068E+0	2846.35	3.51328	8.5290E+0	9.4942E+0	8.1123E+0
2817.67	3.54903	4.0581E+0	5.0295E+0	3.6390E+0	2846.85	3.51266	8.4415E+0	9.4076E+0	8.0244E+0
2819.26	3.54703	4.2074E+0	5.1786E+0	3.7885E+0	2847.35	3.51204	8.3422E+0	9.3090E+0	7.9249E+0
2820.85	3.54503	4.3837E+0	5.3546E+0	3.9650E+0	2847.85	3.51143	8.2372E+0	9.2045E+0	7.8196E+0
2821.64	3.54403	4.4788E+0	5.4497E+0	4.0602E+0	2848.35	3.51081	8.1264E+0	9.0942E+0	7.7087E+0
2823.24	3.54203	4.6888E+0	5.6598E+0	4.2700E+0	2848.85	3.51019	8.0076E+0	8.9758E+0	7.5897E+0
2824.83	3.54003	4.9276E+0	5.8986E+0	4.5088E+0	2849.35	3.50958	7.8921E+0	8.8605E+0	7.4741E+0
2826.43	3.53803	5.1935E+0	6.1643E+0	4.7748E+0	2850.35	3.50835	7.6734E+0	8.6424E+0	7.2552E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2851.35	3.50712	7.4776E+0	8.4473E+0	7.0590E+0	2870.60	3.48359	6.2911E+0	7.2632E+0	5.8713E+0
2852.35	3.50589	7.2901E+0	8.2606E+0	6.8712E+0	2870.85	3.48329	6.3372E+0	7.3093E+0	5.9174E+0
2853.35	3.50466	7.1096E+0	8.0810E+0	6.6904E+0	2871.10	3.48299	6.3814E+0	7.3535E+0	5.9615E+0
2854.35	3.50343	6.9243E+0	7.8964E+0	6.5047E+0	2871.35	3.48268	6.4230E+0	7.3951E+0	6.0032E+0
2854.85	3.50282	6.8227E+0	7.7950E+0	6.4031E+0	2871.60	3.48238	6.4623E+0	7.4344E+0	6.0426E+0
2855.10	3.50251	6.7691E+0	7.7415E+0	6.3494E+0	2871.85	3.48208	6.4991E+0	7.4714E+0	6.0794E+0
2855.35	3.50220	6.7134E+0	7.6861E+0	6.2936E+0	2872.10	3.48177	6.5328E+0	7.5051E+0	6.1131E+0
2855.60	3.50190	6.6550E+0	7.6279E+0	6.2351E+0	2872.35	3.48147	6.5641E+0	7.5365E+0	6.1444E+0
2855.85	3.50159	6.5941E+0	7.5672E+0	6.1741E+0	2872.60	3.48117	6.5928E+0	7.5654E+0	6.1730E+0
2856.35	3.50098	6.4676E+0	7.4414E+0	6.0474E+0	2872.85	3.48087	6.6196E+0	7.5924E+0	6.1997E+0
2856.85	3.50036	6.3305E+0	7.3046E+0	5.9101E+0	2873.35	3.48026	6.6644E+0	7.6376E+0	6.2444E+0
2857.35	3.49975	6.1891E+0	7.1634E+0	5.7684E+0	2873.85	3.47965	6.6959E+0	7.6692E+0	6.2758E+0
2857.85	3.49914	6.0418E+0	7.0164E+0	5.6211E+0	2874.35	3.47905	6.7219E+0	7.6955E+0	6.3018E+0
2858.35	3.49853	5.8957E+0	6.8705E+0	5.4748E+0	2874.85	3.47844	6.7435E+0	7.7171E+0	6.3233E+0
2858.85	3.49791	5.7563E+0	6.7314E+0	5.3353E+0	2875.35	3.47784	6.7665E+0	7.7400E+0	6.3463E+0
2859.35	3.49730	5.6303E+0	6.6056E+0	5.2091E+0	2875.60	3.47754	6.7796E+0	7.7531E+0	6.3595E+0
2859.85	3.49669	5.5147E+0	6.4902E+0	5.0934E+0	2875.85	3.47723	6.7954E+0	7.7687E+0	6.3754E+0
2860.10	3.49639	5.4626E+0	6.4381E+0	5.0413E+0	2876.10	3.47693	6.8147E+0	7.7878E+0	6.3947E+0
2860.35	3.49608	5.4151E+0	6.3904E+0	4.9939E+0	2876.35	3.47663	6.8392E+0	7.8122E+0	6.4193E+0
2860.60	3.49577	5.3731E+0	6.3484E+0	4.9519E+0	2876.60	3.47633	6.8692E+0	7.8421E+0	6.4494E+0
2860.85	3.49547	5.3346E+0	6.3096E+0	4.9135E+0	2876.85	3.47603	6.9015E+0	7.8743E+0	6.4817E+0
2861.10	3.49516	5.2985E+0	6.2734E+0	4.8775E+0	2877.10	3.47572	6.9369E+0	7.9095E+0	6.5171E+0
2861.35	3.49486	5.2669E+0	6.2416E+0	4.8460E+0	2877.35	3.47542	6.9754E+0	7.9478E+0	6.5557E+0
2861.60	3.49455	5.2400E+0	6.2146E+0	4.8193E+0	2877.85	3.47482	7.0598E+0	8.0319E+0	6.6402E+0
2861.85	3.49425	5.2187E+0	6.1932E+0	4.7981E+0	2878.10	3.47452	7.1048E+0	8.0767E+0	6.6854E+0
2862.10	3.49394	5.2021E+0	6.1765E+0	4.7816E+0	2878.35	3.47421	7.1527E+0	8.1244E+0	6.7333E+0
2862.35	3.49364	5.1909E+0	6.1651E+0	4.7706E+0	2878.60	3.47391	7.2052E+0	8.1767E+0	6.7859E+0
2862.60	3.49333	5.1823E+0	6.1562E+0	4.7620E+0	2878.85	3.47361	7.2626E+0	8.2339E+0	6.8434E+0
2862.85	3.49303	5.1762E+0	6.1500E+0	4.7560E+0	2879.35	3.47301	7.3871E+0	8.3581E+0	6.9680E+0
2863.10	3.49272	5.1738E+0	6.1475E+0	4.7537E+0	2879.85	3.47240	7.5219E+0	8.4924E+0	7.1029E+0
2863.35	3.49242	5.1756E+0	6.1493E+0	4.7555E+0	2880.35	3.47180	7.6653E+0	8.6353E+0	7.2465E+0
2863.60	3.49211	5.1816E+0	6.1553E+0	4.7615E+0	2880.85	3.47120	7.8176E+0	8.7869E+0	7.3990E+0
2863.85	3.49181	5.1898E+0	6.1636E+0	4.7697E+0	2881.35	3.47060	7.9833E+0	8.9518E+0	7.5650E+0
2864.10	3.49150	5.2013E+0	6.1750E+0	4.7811E+0	2881.85	3.46999	8.1486E+0	9.1166E+0	7.7307E+0
2864.35	3.49120	5.2154E+0	6.1891E+0	4.7951E+0	2882.35	3.46939	8.3129E+0	9.2802E+0	7.8952E+0
2864.60	3.49089	5.2328E+0	6.2065E+0	4.8125E+0	2882.85	3.46879	8.4731E+0	9.4400E+0	8.0557E+0
2864.85	3.49059	5.2531E+0	6.2267E+0	4.8328E+0	2883.35	3.46819	8.6232E+0	9.5897E+0	8.2060E+0
2865.10	3.49028	5.2765E+0	6.2501E+0	4.8563E+0	2883.85	3.46759	8.7597E+0	9.7257E+0	8.3426E+0
2865.35	3.48998	5.3028E+0	6.2763E+0	4.8826E+0	2884.10	3.46729	8.8213E+0	9.7873E+0	8.4043E+0
2865.60	3.48967	5.3330E+0	6.3063E+0	4.9129E+0	2884.35	3.46699	8.8791E+0	9.8451E+0	8.4620E+0
2865.85	3.48937	5.3656E+0	6.3387E+0	4.9456E+0	2884.60	3.46669	8.9321E+0	9.8982E+0	8.5150E+0
2866.35	3.48876	5.4378E+0	6.4104E+0	5.0180E+0	2884.85	3.46638	8.9786E+0	9.9449E+0	8.5615E+0
2866.85	3.48815	5.5203E+0	6.4927E+0	5.1004E+0	2885.10	3.46608	9.0185E+0	9.9847E+0	8.6013E+0
2867.35	3.48754	5.6150E+0	6.5874E+0	5.1950E+0	2885.35	3.46578	9.0531E+0	1.0019E+1	8.6359E+0
2867.85	3.48694	5.7174E+0	6.6898E+0	5.2975E+0	2885.60	3.46548	9.0823E+0	1.0049E+1	8.6651E+0
2868.35	3.48633	5.8245E+0	6.7969E+0	5.4045E+0	2885.85	3.46518	9.1043E+0	1.0071E+1	8.6871E+0
2868.85	3.48572	5.9317E+0	6.9041E+0	5.5117E+0	2886.10	3.46488	9.1186E+0	1.0085E+1	8.7012E+0
2869.35	3.48511	6.0367E+0	7.0091E+0	5.6168E+0	2886.35	3.46458	9.1255E+0	1.0092E+1	8.7078E+0
2869.85	3.48450	6.1418E+0	7.1141E+0	5.7218E+0	2886.60	3.46428	9.1246E+0	1.0092E+1	8.7067E+0
2870.35	3.48390	6.2423E+0	7.2144E+0	5.8224E+0	2886.85	3.46398	9.1167E+0	1.0084E+1	8.6986E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2887.10	3.46368	9.1036E+0	1.0071E+1	8.6853E+0	2903.10	3.44459	7.7380E+0	8.7115E+0	7.3178E+0
2887.35	3.46338	9.0851E+0	1.0053E+1	8.6665E+0	2903.35	3.44429	7.7285E+0	8.7020E+0	7.3084E+0
2887.60	3.46308	9.0620E+0	1.0030E+1	8.6433E+0	2903.60	3.44400	7.7188E+0	8.6923E+0	7.2986E+0
2887.85	3.46278	9.0312E+0	9.9993E+0	8.6123E+0	2903.85	3.44370	7.7085E+0	8.6820E+0	7.2884E+0
2888.10	3.46248	8.9949E+0	9.9634E+0	8.5758E+0	2904.35	3.44311	7.6888E+0	8.6623E+0	7.2686E+0
2888.35	3.46218	8.9516E+0	9.9206E+0	8.5322E+0	2904.60	3.44281	7.6779E+0	8.6514E+0	7.2577E+0
2888.85	3.46158	8.8499E+0	9.8196E+0	8.4301E+0	2904.85	3.44252	7.6657E+0	8.6393E+0	7.2454E+0
2889.35	3.46099	8.7404E+0	9.7109E+0	8.3202E+0	2905.10	3.44222	7.6540E+0	8.6278E+0	7.2337E+0
2889.85	3.46039	8.6194E+0	9.5906E+0	8.1988E+0	2905.35	3.44192	7.6423E+0	8.6162E+0	7.2220E+0
2890.35	3.45979	8.4987E+0	9.4706E+0	8.0780E+0	2905.60	3.44163	7.6310E+0	8.6050E+0	7.2107E+0
2890.85	3.45919	8.3796E+0	9.3520E+0	7.9588E+0	2905.85	3.44133	7.6202E+0	8.5942E+0	7.1997E+0
2891.35	3.45859	8.2660E+0	9.2388E+0	7.8453E+0	2906.35	3.44074	7.6004E+0	8.5746E+0	7.1799E+0
2891.85	3.45799	8.1619E+0	9.1350E+0	7.7414E+0	2906.85	3.44015	7.5811E+0	8.5555E+0	7.1606E+0
2892.35	3.45740	8.0653E+0	9.0385E+0	7.6449E+0	2907.35	3.43956	7.5683E+0	8.5430E+0	7.1476E+0
2892.60	3.45710	8.0223E+0	8.9956E+0	7.6020E+0	2907.85	3.43896	7.5576E+0	8.5326E+0	7.1368E+0
2892.85	3.45680	7.9822E+0	8.9555E+0	7.5620E+0	2908.10	3.43867	7.5538E+0	8.5289E+0	7.1329E+0
2893.10	3.45650	7.9460E+0	8.9193E+0	7.5259E+0	2908.35	3.43837	7.5513E+0	8.5264E+0	7.1304E+0
2893.35	3.45620	7.9140E+0	8.8874E+0	7.4940E+0	2908.60	3.43808	7.5496E+0	8.5248E+0	7.1288E+0
2893.60	3.45590	7.8851E+0	8.8585E+0	7.4650E+0	2908.85	3.43778	7.5486E+0	8.5238E+0	7.1278E+0
2893.85	3.45560	7.8592E+0	8.8327E+0	7.4390E+0	2909.35	3.43719	7.5471E+0	8.5222E+0	7.1263E+0
2894.10	3.45530	7.8357E+0	8.8093E+0	7.4156E+0	2909.85	3.43660	7.5459E+0	8.5210E+0	7.1251E+0
2894.35	3.45501	7.8142E+0	8.7878E+0	7.3940E+0	2910.35	3.43601	7.5451E+0	8.5202E+0	7.1243E+0
2894.60	3.45471	7.7963E+0	8.7701E+0	7.3761E+0	2910.60	3.43571	7.5454E+0	8.5204E+0	7.1245E+0
2894.85	3.45441	7.7795E+0	8.7534E+0	7.3592E+0	2910.85	3.43542	7.5461E+0	8.5211E+0	7.1252E+0
2895.10	3.45411	7.7645E+0	8.7386E+0	7.3442E+0	2911.10	3.43512	7.5484E+0	8.5234E+0	7.1275E+0
2895.35	3.45381	7.7520E+0	8.7261E+0	7.3316E+0	2911.35	3.43483	7.5528E+0	8.5278E+0	7.1319E+0
2895.60	3.45351	7.7413E+0	8.7155E+0	7.3209E+0	2911.60	3.43453	7.5586E+0	8.5337E+0	7.1378E+0
2895.85	3.45322	7.7319E+0	8.7061E+0	7.3115E+0	2911.85	3.43424	7.5650E+0	8.5401E+0	7.1442E+0
2896.10	3.45292	7.7242E+0	8.6983E+0	7.3038E+0	2912.10	3.43394	7.5724E+0	8.5474E+0	7.1516E+0
2896.35	3.45262	7.7183E+0	8.6923E+0	7.2979E+0	2912.35	3.43365	7.5808E+0	8.5558E+0	7.1600E+0
2896.60	3.45232	7.7135E+0	8.6875E+0	7.2931E+0	2912.60	3.43335	7.5898E+0	8.5647E+0	7.1690E+0
2896.85	3.45202	7.7101E+0	8.6841E+0	7.2898E+0	2912.85	3.43306	7.5994E+0	8.5743E+0	7.1786E+0
2897.10	3.45173	7.7086E+0	8.6824E+0	7.2883E+0	2913.10	3.43277	7.6100E+0	8.5849E+0	7.1892E+0
2897.35	3.45143	7.7081E+0	8.6818E+0	7.2879E+0	2913.35	3.43247	7.6214E+0	8.5963E+0	7.2007E+0
2897.85	3.45083	7.7112E+0	8.6848E+0	7.2910E+0	2913.60	3.43218	7.6331E+0	8.6079E+0	7.2124E+0
2898.35	3.45024	7.7221E+0	8.6957E+0	7.3019E+0	2913.85	3.43188	7.6454E+0	8.6201E+0	7.2247E+0
2898.85	3.44964	7.7420E+0	8.7159E+0	7.3216E+0	2914.35	3.43129	7.6711E+0	8.6457E+0	7.2504E+0
2899.35	3.44905	7.7638E+0	8.7379E+0	7.3433E+0	2914.85	3.43070	7.6980E+0	8.6725E+0	7.2774E+0
2899.60	3.44875	7.7698E+0	8.7438E+0	7.3494E+0	2915.35	3.43012	7.7262E+0	8.7007E+0	7.3056E+0
2899.85	3.44845	7.7725E+0	8.7464E+0	7.3522E+0	2915.85	3.42953	7.7562E+0	8.7307E+0	7.3356E+0
2900.10	3.44815	7.7737E+0	8.7474E+0	7.3535E+0	2916.35	3.42894	7.7868E+0	8.7612E+0	7.3661E+0
2900.35	3.44786	7.7739E+0	8.7475E+0	7.3537E+0	2916.85	3.42835	7.8182E+0	8.7927E+0	7.3976E+0
2900.60	3.44756	7.7730E+0	8.7466E+0	7.3529E+0	2917.35	3.42776	7.8527E+0	8.8272E+0	7.4321E+0
2900.85	3.44726	7.7719E+0	8.7454E+0	7.3517E+0	2917.85	3.42718	7.8904E+0	8.8647E+0	7.4698E+0
2901.35	3.44667	7.7686E+0	8.7422E+0	7.3484E+0	2918.10	3.42688	7.9108E+0	8.8851E+0	7.4903E+0
2901.85	3.44608	7.7647E+0	8.7383E+0	7.3445E+0	2918.35	3.42659	7.9329E+0	8.9071E+0	7.5124E+0
2902.10	3.44578	7.7621E+0	8.7357E+0	7.3419E+0	2918.60	3.42630	7.9564E+0	8.9305E+0	7.5359E+0
2902.35	3.44548	7.7587E+0	8.7323E+0	7.3385E+0	2918.85	3.42600	7.9814E+0	8.9554E+0	7.5610E+0
2902.60	3.44518	7.7538E+0	8.7274E+0	7.3336E+0	2919.10	3.42571	8.0087E+0	8.9825E+0	7.5884E+0
2902.85	3.44489	7.7469E+0	8.7205E+0	7.3266E+0	2919.35	3.42542	8.0374E+0	9.0109E+0	7.6172E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2919.60	3.42512	8.0687E+0	9.0420E+0	7.6486E+0	2931.61	3.41110	9.7128E+0	1.0679E+1	9.2954E+0
2919.85	3.42483	8.1003E+0	9.0734E+0	7.6802E+0	2931.86	3.41081	9.7793E+0	1.0745E+1	9.3621E+0
2920.10	3.42454	8.1328E+0	9.1057E+0	7.7129E+0	2932.11	3.41052	9.8496E+0	1.0815E+1	9.4325E+0
2920.35	3.42424	8.1661E+0	9.1388E+0	7.7463E+0	2932.36	3.41023	9.9256E+0	1.0890E+1	9.5086E+0
2920.55	3.42401	8.1944E+0	9.1669E+0	7.7746E+0	2932.61	3.40994	1.0011E+1	1.0975E+1	9.5944E+0
2920.75	3.42377	8.2245E+0	9.1969E+0	7.8048E+0	2932.86	3.40965	1.0108E+1	1.1072E+1	9.6913E+0
2920.95	3.42354	8.2600E+0	9.2323E+0	7.8403E+0	2933.11	3.40936	1.0222E+1	1.1185E+1	9.8055E+0
2921.05	3.42342	8.2828E+0	9.2551E+0	7.8631E+0	2933.36	3.40906	1.0353E+1	1.1315E+1	9.9364E+0
2921.15	3.42330	8.3088E+0	9.2811E+0	7.8891E+0	2933.61	3.40877	1.0498E+1	1.1459E+1	1.0082E+1
2921.25	3.42319	8.3371E+0	9.3093E+0	7.9174E+0	2933.86	3.40848	1.0667E+1	1.1627E+1	1.0251E+1
2921.35	3.42307	8.3664E+0	9.3385E+0	7.9467E+0	2934.11	3.40819	1.0873E+1	1.1832E+1	1.0458E+1
2921.45	3.42295	8.3947E+0	9.3666E+0	7.9752E+0	2934.36	3.40790	1.1109E+1	1.2066E+1	1.0694E+1
2921.55	3.42284	8.4232E+0	9.3948E+0	8.0038E+0	2934.61	3.40761	1.1386E+1	1.2341E+1	1.0972E+1
2921.65	3.42272	8.4463E+0	9.4176E+0	8.0270E+0	2934.86	3.40732	1.1695E+1	1.2647E+1	1.1281E+1
2921.75	3.42260	8.4650E+0	9.4360E+0	8.0459E+0	2935.11	3.40703	1.2046E+1	1.2995E+1	1.1633E+1
2921.85	3.42248	8.4793E+0	9.4500E+0	8.0602E+0	2935.36	3.40674	1.2470E+1	1.3414E+1	1.2058E+1
2921.95	3.42237	8.4892E+0	9.4598E+0	8.0702E+0	2935.61	3.40645	1.2996E+1	1.3933E+1	1.2584E+1
2922.05	3.42225	8.4935E+0	9.4641E+0	8.0746E+0	2935.86	3.40616	1.3712E+1	1.4642E+1	1.3301E+1
2922.15	3.42213	8.4937E+0	9.4643E+0	8.0746E+0	2936.11	3.40587	1.4633E+1	1.5558E+1	1.4224E+1
2922.25	3.42202	8.4907E+0	9.4617E+0	8.0716E+0	2936.36	3.40558	1.5769E+1	1.6683E+1	1.5364E+1
2922.35	3.42190	8.4834E+0	9.4547E+0	8.0642E+0	2936.61	3.40529	1.7042E+1	1.7953E+1	1.6639E+1
2922.45	3.42178	8.4726E+0	9.4442E+0	8.0532E+0	2936.86	3.40500	1.8365E+1	1.9275E+1	1.7961E+1
2922.55	3.42166	8.4604E+0	9.4323E+0	8.0409E+0	2937.06	3.40477	1.9261E+1	2.0170E+1	1.8856E+1
2922.65	3.42155	8.4490E+0	9.4212E+0	8.0294E+0	2937.16	3.40465	1.9629E+1	2.0536E+1	1.9224E+1
2922.75	3.42143	8.4399E+0	9.4122E+0	8.0202E+0	2937.26	3.40454	1.9938E+1	2.0844E+1	1.9532E+1
2922.85	3.42131	8.4339E+0	9.4062E+0	8.0142E+0	2937.36	3.40442	2.0193E+1	2.1098E+1	1.9786E+1
2922.95	3.42120	8.4291E+0	9.4014E+0	8.0094E+0	2937.46	3.40431	2.0399E+1	2.1304E+1	1.9991E+1
2923.15	3.42096	8.4244E+0	9.3965E+0	8.0048E+0	2937.56	3.40419	2.0583E+1	2.1488E+1	2.0173E+1
2923.35	3.42073	8.4236E+0	9.3955E+0	8.0041E+0	2937.66	3.40407	2.0735E+1	2.1640E+1	2.0324E+1
2923.55	3.42049	8.4287E+0	9.4006E+0	8.0092E+0	2937.76	3.40396	2.0860E+1	2.1765E+1	2.0449E+1
2923.75	3.42026	8.4395E+0	9.4115E+0	8.0199E+0	2937.86	3.40384	2.0971E+1	2.1877E+1	2.0561E+1
2923.85	3.42014	8.4465E+0	9.4185E+0	8.0269E+0	2937.96	3.40373	2.1058E+1	2.1963E+1	2.0647E+1
2924.10	3.41985	8.4687E+0	9.4408E+0	8.0491E+0	2938.06	3.40361	2.1126E+1	2.2032E+1	2.0716E+1
2924.35	3.41956	8.4944E+0	9.4665E+0	8.0748E+0	2938.16	3.40349	2.1161E+1	2.2066E+1	2.0751E+1
2924.60	3.41927	8.5217E+0	9.4938E+0	8.1021E+0	2938.26	3.40338	2.1163E+1	2.2068E+1	2.0753E+1
2924.85	3.41897	8.5516E+0	9.5235E+0	8.1321E+0	2938.36	3.40326	2.1131E+1	2.2036E+1	2.0721E+1
2925.35	3.41839	8.6181E+0	9.5897E+0	8.1987E+0	2938.46	3.40315	2.1048E+1	2.1953E+1	2.0639E+1
2925.85	3.41780	8.6870E+0	9.6582E+0	8.2678E+0	2938.56	3.40303	2.0934E+1	2.1839E+1	2.0525E+1
2926.35	3.41722	8.7590E+0	9.7298E+0	8.3399E+0	2938.76	3.40280	2.0622E+1	2.1528E+1	2.0215E+1
2926.86	3.41664	8.8327E+0	9.8031E+0	8.4138E+0	2938.96	3.40257	2.0277E+1	2.1182E+1	1.9872E+1
2927.36	3.41605	8.9077E+0	9.8776E+0	8.4890E+0	2939.16	3.40234	1.9927E+1	2.0832E+1	1.9525E+1
2927.86	3.41547	8.9857E+0	9.9552E+0	8.5671E+0	2939.36	3.40211	1.9606E+1	2.0512E+1	1.9205E+1
2928.36	3.41489	9.0659E+0	1.0035E+1	8.6475E+0	2939.56	3.40187	1.9312E+1	2.0219E+1	1.8912E+1
2928.86	3.41430	9.1502E+0	1.0119E+1	8.7319E+0	2939.76	3.40164	1.9045E+1	1.9951E+1	1.8646E+1
2929.36	3.41372	9.2389E+0	1.0207E+1	8.8208E+0	2939.96	3.40141	1.8798E+1	1.9705E+1	1.8400E+1
2929.86	3.41314	9.3324E+0	1.0300E+1	8.9144E+0	2940.16	3.40118	1.8570E+1	1.9477E+1	1.8171E+1
2930.36	3.41256	9.4317E+0	1.0399E+1	9.0139E+0	2940.36	3.40095	1.8342E+1	1.9251E+1	1.7943E+1
2930.86	3.41197	9.5370E+0	1.0504E+1	9.1194E+0	2940.46	3.40083	1.8222E+1	1.9131E+1	1.7822E+1
2931.11	3.41168	9.5930E+0	1.0560E+1	9.1756E+0	2940.56	3.40072	1.8097E+1	1.9007E+1	1.7697E+1
2931.36	3.41139	9.6503E+0	1.0617E+1	9.2330E+0	2940.76	3.40049	1.7826E+1	1.8737E+1	1.7426E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2940.96	3.40025	1.7543E+1	1.8455E+1	1.7143E+1	2967.16	3.37023	8.0116E+0	8.9954E+0	7.5862E+0
2941.36	3.39979	1.6970E+1	1.7885E+1	1.6570E+1	2967.24	3.37013	7.9893E+0	8.9734E+0	7.5637E+0
2941.86	3.39921	1.6310E+1	1.7228E+1	1.5910E+1	2967.33	3.37003	7.9640E+0	8.9483E+0	7.5384E+0
2942.11	3.39892	1.6011E+1	1.6931E+1	1.5611E+1	2967.42	3.36993	7.9369E+0	8.9212E+0	7.5113E+0
2942.36	3.39864	1.5736E+1	1.6657E+1	1.5335E+1	2967.51	3.36983	7.9113E+0	8.8954E+0	7.4858E+0
2942.61	3.39835	1.5485E+1	1.6408E+1	1.5084E+1	2967.60	3.36973	7.8879E+0	8.8718E+0	7.4626E+0
2942.86	3.39806	1.5251E+1	1.6176E+1	1.4850E+1	2967.68	3.36963	7.8667E+0	8.8503E+0	7.4414E+0
2943.36	3.39748	1.4845E+1	1.5773E+1	1.4442E+1	2967.77	3.36953	7.8493E+0	8.8328E+0	7.4242E+0
2943.86	3.39690	1.4494E+1	1.5424E+1	1.4090E+1	2967.86	3.36943	7.8347E+0	8.8180E+0	7.4097E+0
2944.36	3.39633	1.4184E+1	1.5117E+1	1.3779E+1	2967.95	3.36933	7.8235E+0	8.8067E+0	7.3986E+0
2944.86	3.39575	1.3898E+1	1.4833E+1	1.3493E+1	2968.04	3.36923	7.8148E+0	8.7979E+0	7.3899E+0
2945.36	3.39517	1.3635E+1	1.4573E+1	1.3229E+1	2968.12	3.36913	7.8080E+0	8.7911E+0	7.3831E+0
2946.36	3.39402	1.3154E+1	1.4096E+1	1.2746E+1	2968.21	3.36903	7.8011E+0	8.7843E+0	7.3763E+0
2947.36	3.39287	1.2699E+1	1.3645E+1	1.2289E+1	2968.39	3.36883	7.7915E+0	8.7749E+0	7.3666E+0
2948.36	3.39172	1.2265E+1	1.3215E+1	1.1854E+1	2968.56	3.36863	7.7840E+0	8.7676E+0	7.3589E+0
2949.36	3.39057	1.1852E+1	1.2806E+1	1.1439E+1	2968.65	3.36853	7.7811E+0	8.7649E+0	7.3560E+0
2949.82	3.39003	1.1664E+1	1.2620E+1	1.1251E+1	2968.74	3.36843	7.7803E+0	8.7642E+0	7.3551E+0
2950.70	3.38903	1.1322E+1	1.2281E+1	1.0907E+1	2968.83	3.36833	7.7809E+0	8.7650E+0	7.3557E+0
2951.57	3.38803	1.0994E+1	1.1957E+1	1.0578E+1	2968.92	3.36823	7.7846E+0	8.7689E+0	7.3593E+0
2952.44	3.38703	1.0673E+1	1.1638E+1	1.0256E+1	2969.09	3.36803	7.7981E+0	8.7826E+0	7.3726E+0
2953.31	3.38603	1.0370E+1	1.1338E+1	9.9517E+0	2969.18	3.36793	7.8081E+0	8.7926E+0	7.3826E+0
2954.18	3.38503	1.0092E+1	1.1063E+1	9.6732E+0	2969.27	3.36783	7.8200E+0	8.8046E+0	7.3944E+0
2955.06	3.38403	9.8313E+0	1.0804E+1	9.4113E+0	2969.36	3.36773	7.8340E+0	8.8187E+0	7.4084E+0
2955.93	3.38303	9.5886E+0	1.0563E+1	9.1679E+0	2969.45	3.36763	7.8521E+0	8.8368E+0	7.4265E+0
2956.80	3.38203	9.3597E+0	1.0335E+1	8.9385E+0	2969.53	3.36753	7.8756E+0	8.8603E+0	7.4500E+0
2957.68	3.38103	9.1536E+0	1.0130E+1	8.7319E+0	2969.62	3.36743	7.9100E+0	8.8946E+0	7.4844E+0
2958.11	3.38053	9.0611E+0	1.0038E+1	8.6393E+0	2969.71	3.36733	7.9525E+0	8.9368E+0	7.5271E+0
2958.55	3.38003	8.9764E+0	9.9535E+0	8.5544E+0	2969.80	3.36723	8.0127E+0	8.9967E+0	7.5875E+0
2958.99	3.37953	8.8998E+0	9.8773E+0	8.4777E+0	2969.89	3.36713	8.0932E+0	9.0768E+0	7.6681E+0
2959.43	3.37903	8.8306E+0	9.8085E+0	8.4083E+0	2969.98	3.36703	8.1894E+0	9.1730E+0	7.7643E+0
2960.30	3.37803	8.7066E+0	9.6852E+0	8.2841E+0	2970.06	3.36693	8.2951E+0	9.2790E+0	7.8700E+0
2961.18	3.37703	8.5952E+0	9.5747E+0	8.1723E+0	2970.11	3.36688	8.3424E+0	9.3261E+0	7.9172E+0
2962.06	3.37603	8.4877E+0	9.4681E+0	8.0644E+0	2970.15	3.36683	8.3852E+0	9.3687E+0	7.9602E+0
2962.94	3.37503	8.3730E+0	9.3538E+0	7.9495E+0	2970.20	3.36678	8.4229E+0	9.4060E+0	7.9980E+0
2963.81	3.37403	8.2601E+0	9.2414E+0	7.8365E+0	2970.24	3.36673	8.4541E+0	9.4368E+0	8.0294E+0
2964.25	3.37353	8.2064E+0	9.1879E+0	7.7827E+0	2970.28	3.36668	8.4761E+0	9.4584E+0	8.0516E+0
2964.69	3.37303	8.1544E+0	9.1362E+0	7.7306E+0	2970.33	3.36663	8.4886E+0	9.4705E+0	8.0642E+0
2965.13	3.37253	8.1071E+0	9.0892E+0	7.6829E+0	2970.37	3.36658	8.4924E+0	9.4741E+0	8.0680E+0
2965.57	3.37203	8.0639E+0	9.0466E+0	7.6394E+0	2970.42	3.36653	8.4869E+0	9.4685E+0	8.0626E+0
2965.75	3.37183	8.0495E+0	9.0324E+0	7.6248E+0	2970.46	3.36648	8.4707E+0	9.4525E+0	8.0462E+0
2965.92	3.37163	8.0392E+0	9.0224E+0	7.6143E+0	2970.50	3.36643	8.4443E+0	9.4264E+0	8.0197E+0
2966.10	3.37143	8.0321E+0	9.0157E+0	7.6071E+0	2970.59	3.36633	8.3722E+0	9.3552E+0	7.9471E+0
2966.28	3.37123	8.0313E+0	9.0150E+0	7.6062E+0	2970.68	3.36623	8.2927E+0	9.2766E+0	7.8671E+0
2966.45	3.37103	8.0344E+0	9.0182E+0	7.6092E+0	2970.77	3.36613	8.2126E+0	9.1975E+0	7.7864E+0
2966.63	3.37083	8.0392E+0	9.0228E+0	7.6140E+0	2970.86	3.36603	8.1439E+0	9.1294E+0	7.7173E+0
2966.72	3.37073	8.0413E+0	9.0248E+0	7.6161E+0	2970.95	3.36593	8.0883E+0	9.0743E+0	7.6615E+0
2966.80	3.37063	8.0420E+0	9.0255E+0	7.6168E+0	2971.03	3.36583	8.0493E+0	9.0355E+0	7.6223E+0
2966.89	3.37053	8.0409E+0	9.0243E+0	7.6157E+0	2971.12	3.36573	8.0233E+0	9.0095E+0	7.5961E+0
2966.98	3.37043	8.0369E+0	9.0203E+0	7.6117E+0	2971.21	3.36563	8.0062E+0	8.9924E+0	7.5791E+0
2967.07	3.37033	8.0281E+0	9.0117E+0	7.6028E+0	2971.30	3.36553	7.9970E+0	8.9830E+0	7.5699E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
2971.39	3.36543	7.9936E+0	8.9796E+0	7.5666E+0	2983.09	3.35223	1.6988E+1	1.7906E+1	1.6587E+1
2971.56	3.36523	7.9953E+0	8.9810E+0	7.5685E+0	2983.27	3.35203	1.7418E+1	1.8335E+1	1.7015E+1
2971.74	3.36503	8.0034E+0	8.9889E+0	7.5769E+0	2983.35	3.35193	1.7651E+1	1.8567E+1	1.7247E+1
2971.83	3.36493	8.0103E+0	8.9957E+0	7.5839E+0	2983.40	3.35188	1.7788E+1	1.8704E+1	1.7384E+1
2971.96	3.36478	8.0222E+0	9.0074E+0	7.5959E+0	2983.60	3.35165	1.8456E+1	1.9371E+1	1.8047E+1
2972.18	3.36453	8.0466E+0	9.0316E+0	7.6205E+0	2983.80	3.35143	1.9281E+1	2.0196E+1	1.8867E+1
2972.40	3.36428	8.0754E+0	9.0603E+0	7.6494E+0	2984.00	3.35120	2.0210E+1	2.1125E+1	1.9791E+1
2972.62	3.36403	8.1073E+0	9.0920E+0	7.6813E+0	2984.20	3.35098	2.1220E+1	2.2134E+1	2.0795E+1
2973.07	3.36353	8.1809E+0	9.1657E+0	7.7550E+0	2984.40	3.35075	2.2304E+1	2.3217E+1	2.1872E+1
2973.51	3.36303	8.2605E+0	9.2452E+0	7.8345E+0	2984.60	3.35053	2.3483E+1	2.4398E+1	2.3042E+1
2973.95	3.36253	8.3453E+0	9.3300E+0	7.9193E+0	2984.80	3.35030	2.4749E+1	2.5666E+1	2.4294E+1
2974.39	3.36203	8.4353E+0	9.4200E+0	8.0094E+0	2985.00	3.35008	2.6119E+1	2.7038E+1	2.5649E+1
2974.83	3.36153	8.5355E+0	9.5201E+0	8.1095E+0	2985.20	3.34986	2.7496E+1	2.8418E+1	2.7009E+1
2975.28	3.36103	8.6414E+0	9.6257E+0	8.2155E+0	2985.40	3.34963	2.8942E+1	2.9864E+1	2.8435E+1
2975.72	3.36053	8.7594E+0	9.7434E+0	8.3334E+0	2985.60	3.34941	3.0482E+1	3.1404E+1	2.9955E+1
2976.16	3.36003	8.8901E+0	9.8740E+0	8.4642E+0	2985.80	3.34918	3.2089E+1	3.3011E+1	3.1542E+1
2976.61	3.35953	9.0317E+0	1.0015E+1	8.6058E+0	2986.00	3.34896	3.3720E+1	3.4645E+1	3.3152E+1
2977.05	3.35903	9.1777E+0	1.0161E+1	8.7519E+0	2986.20	3.34873	3.5485E+1	3.6416E+1	3.4895E+1
2977.49	3.35853	9.3430E+0	1.0325E+1	8.9176E+0	2986.40	3.34851	3.7308E+1	3.8245E+1	3.6697E+1
2977.94	3.35803	9.5197E+0	1.0501E+1	9.0949E+0	2986.60	3.34829	3.9226E+1	4.0171E+1	3.8593E+1
2978.38	3.35753	9.7135E+0	1.0693E+1	9.2896E+0	2986.80	3.34806	4.1248E+1	4.2191E+1	4.0602E+1
2978.82	3.35703	9.9237E+0	1.0901E+1	9.5008E+0	2987.00	3.34784	4.3323E+1	4.4254E+1	4.2681E+1
2979.00	3.35683	1.0022E+1	1.0999E+1	9.5999E+0	2987.20	3.34761	4.5495E+1	4.6420E+1	4.4851E+1
2979.27	3.35653	1.0173E+1	1.1148E+1	9.7514E+0	2987.40	3.34739	4.7754E+1	4.8669E+1	4.7116E+1
2979.53	3.35623	1.0347E+1	1.1321E+1	9.9260E+0	2987.60	3.34716	5.0136E+1	5.1037E+1	4.9504E+1
2979.71	3.35603	1.0479E+1	1.1452E+1	1.0058E+1	2987.80	3.34694	5.2568E+1	5.3469E+1	5.1930E+1
2979.89	3.35583	1.0619E+1	1.1591E+1	1.0199E+1	2988.00	3.34672	5.5062E+1	5.5969E+1	5.4406E+1
2980.07	3.35563	1.0777E+1	1.1748E+1	1.0358E+1	2988.20	3.34649	5.7684E+1	5.8601E+1	5.7007E+1
2980.24	3.35543	1.0951E+1	1.1921E+1	1.0532E+1	2988.40	3.34627	6.0427E+1	6.1353E+1	5.9728E+1
2980.42	3.35523	1.1160E+1	1.2129E+1	1.0741E+1	2989.40	3.34515	7.6032E+1	7.6982E+1	7.5266E+1
2980.60	3.35503	1.1406E+1	1.2373E+1	1.0988E+1	2990.40	3.34403	9.3571E+1	9.4473E+1	9.2781E+1
2980.78	3.35483	1.1728E+1	1.2691E+1	1.1311E+1	2990.90	3.34347	1.0297E+2	1.0385E+2	1.0218E+2
2980.95	3.35463	1.2200E+1	1.3157E+1	1.1784E+1	2991.40	3.34291	1.1293E+2	1.1379E+2	1.1216E+2
2981.13	3.35443	1.2904E+1	1.3856E+1	1.2490E+1	2992.40	3.34179	1.3513E+2	1.3600E+2	1.3432E+2
2981.31	3.35423	1.3800E+1	1.4746E+1	1.3388E+1	2993.40	3.34068	1.6055E+2	1.6144E+2	1.5970E+2
2981.49	3.35403	1.4748E+1	1.5685E+1	1.4339E+1	2993.90	3.34012	1.7399E+2	1.7489E+2	1.7313E+2
2981.58	3.35393	1.5197E+1	1.6132E+1	1.4790E+1	2994.40	3.33956	1.8836E+2	1.8930E+2	1.8745E+2
2981.66	3.35383	1.5564E+1	1.6496E+1	1.5159E+1	2994.90	3.33900	2.0356E+2	2.0456E+2	2.0257E+2
2981.75	3.35373	1.5830E+1	1.6759E+1	1.5426E+1	2995.40	3.33845	2.1953E+2	2.2063E+2	2.1844E+2
2981.84	3.35363	1.6008E+1	1.6934E+1	1.5606E+1	2995.90	3.33789	2.3568E+2	2.3689E+2	2.3448E+2
2981.93	3.35353	1.6100E+1	1.7024E+1	1.5699E+1	2996.40	3.33733	2.5224E+2	2.5356E+2	2.5094E+2
2982.02	3.35343	1.6121E+1	1.7044E+1	1.5719E+1	2996.90	3.33678	2.6898E+2	2.7043E+2	2.6754E+2
2982.20	3.35323	1.6045E+1	1.6969E+1	1.5644E+1	2997.15	3.33650	2.7649E+2	2.7802E+2	2.7496E+2
2982.29	3.35313	1.5993E+1	1.6917E+1	1.5592E+1	2997.40	3.33622	2.8312E+2	2.8474E+2	2.8151E+2
2982.38	3.35303	1.5968E+1	1.6892E+1	1.5566E+1	2997.66	3.33594	2.8927E+2	2.9099E+2	2.8757E+2
2982.46	3.35293	1.5981E+1	1.6906E+1	1.5580E+1	2997.90	3.33566	2.9476E+2	2.9656E+2	2.9296E+2
2982.55	3.35283	1.6043E+1	1.6967E+1	1.5642E+1	2998.41	3.33511	3.0553E+2	3.0747E+2	3.0360E+2
2982.64	3.35273	1.6145E+1	1.7068E+1	1.5744E+1	2998.91	3.33455	3.1587E+2	3.1789E+2	3.1386E+2
2982.73	3.35263	1.6280E+1	1.7202E+1	1.5879E+1	2999.41	3.33399	3.2503E+2	3.2708E+2	3.2299E+2
2982.91	3.35243	1.6613E+1	1.7534E+1	1.6213E+1	2999.91	3.33344	3.3398E+2	3.3602E+2	3.3195E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3000.11	3.33322	3.3749E+2	3.3953E+2	3.3546E+2	3006.11	3.32656	3.6219E+2	3.6430E+2	3.6009E+2
3000.31	3.33299	3.4075E+2	3.4275E+2	3.3876E+2	3006.31	3.32634	3.7108E+2	3.7334E+2	3.6885E+2
3000.41	3.33288	3.4233E+2	3.4432E+2	3.4037E+2	3006.41	3.32623	3.7538E+2	3.7770E+2	3.7308E+2
3000.51	3.33277	3.4392E+2	3.4589E+2	3.4197E+2	3006.51	3.32612	3.7932E+2	3.8172E+2	3.7696E+2
3000.61	3.33266	3.4545E+2	3.4739E+2	3.4352E+2	3006.61	3.32601	3.8275E+2	3.8520E+2	3.8033E+2
3000.71	3.33255	3.4691E+2	3.4883E+2	3.4502E+2	3006.66	3.32595	3.8429E+2	3.8676E+2	3.8185E+2
3000.81	3.33244	3.4833E+2	3.5023E+2	3.4644E+2	3006.71	3.32590	3.8554E+2	3.8804E+2	3.8308E+2
3000.91	3.33233	3.4971E+2	3.5159E+2	3.4785E+2	3006.76	3.32584	3.8644E+2	3.8895E+2	3.8396E+2
3001.11	3.33211	3.5244E+2	3.5430E+2	3.5059E+2	3006.81	3.32579	3.8719E+2	3.8971E+2	3.8470E+2
3001.31	3.33188	3.5489E+2	3.5671E+2	3.5308E+2	3006.86	3.32573	3.8764E+2	3.9017E+2	3.8513E+2
3001.41	3.33177	3.5603E+2	3.5784E+2	3.5424E+2	3006.91	3.32568	3.8768E+2	3.9022E+2	3.8517E+2
3001.51	3.33166	3.5713E+2	3.5892E+2	3.5536E+2	3006.96	3.32562	3.8731E+2	3.8986E+2	3.8479E+2
3001.61	3.33155	3.5816E+2	3.5993E+2	3.5640E+2	3007.01	3.32557	3.8661E+2	3.8917E+2	3.8407E+2
3001.71	3.33144	3.5908E+2	3.6083E+2	3.5734E+2	3007.06	3.32551	3.8557E+2	3.8815E+2	3.8302E+2
3001.81	3.33133	3.5983E+2	3.6157E+2	3.5810E+2	3007.11	3.32546	3.8425E+2	3.8684E+2	3.8169E+2
3001.91	3.33122	3.6043E+2	3.6217E+2	3.5871E+2	3007.21	3.32535	3.8088E+2	3.8347E+2	3.7832E+2
3002.01	3.33111	3.6083E+2	3.6256E+2	3.5912E+2	3007.31	3.32523	3.7681E+2	3.7939E+2	3.7426E+2
3002.11	3.33100	3.6109E+2	3.6281E+2	3.5938E+2	3007.41	3.32512	3.7205E+2	3.7461E+2	3.6952E+2
3002.31	3.33077	3.6131E+2	3.6303E+2	3.5960E+2	3007.51	3.32501	3.6621E+2	3.6872E+2	3.6374E+2
3002.41	3.33066	3.6115E+2	3.6287E+2	3.5945E+2	3007.61	3.32490	3.6008E+2	3.6251E+2	3.5767E+2
3002.51	3.33055	3.6059E+2	3.6230E+2	3.5889E+2	3007.81	3.32468	3.4820E+2	3.5049E+2	3.4594E+2
3002.61	3.33044	3.5969E+2	3.6140E+2	3.5800E+2	3008.01	3.32446	3.3764E+2	3.3977E+2	3.3553E+2
3002.71	3.33033	3.5860E+2	3.6030E+2	3.5692E+2	3008.21	3.32424	3.2799E+2	3.2999E+2	3.2600E+2
3002.81	3.33022	3.5701E+2	3.5869E+2	3.5534E+2	3008.31	3.32413	3.2364E+2	3.2558E+2	3.2172E+2
3002.91	3.33011	3.5523E+2	3.5689E+2	3.5357E+2	3008.41	3.32402	3.1965E+2	3.2152E+2	3.1780E+2
3003.01	3.33000	3.5279E+2	3.5443E+2	3.5115E+2	3008.66	3.32374	3.1033E+2	3.1209E+2	3.0859E+2
3003.11	3.32989	3.4986E+2	3.5148E+2	3.4825E+2	3008.91	3.32347	3.0309E+2	3.0472E+2	3.0148E+2
3003.21	3.32978	3.4671E+2	3.4830E+2	3.4512E+2	3009.16	3.32319	2.9665E+2	2.9820E+2	2.9512E+2
3003.31	3.32966	3.4289E+2	3.4446E+2	3.4134E+2	3009.41	3.32291	2.9106E+2	2.9250E+2	2.8963E+2
3003.41	3.32955	3.3863E+2	3.4016E+2	3.3710E+2	3009.66	3.32264	2.8578E+2	2.8716E+2	2.8441E+2
3003.61	3.32933	3.2988E+2	3.3140E+2	3.2837E+2	3009.91	3.32236	2.8085E+2	2.8215E+2	2.7955E+2
3003.81	3.32911	3.2270E+2	3.2421E+2	3.2120E+2	3010.41	3.32181	2.7176E+2	2.7295E+2	2.7057E+2
3003.91	3.32900	3.1980E+2	3.2131E+2	3.1830E+2	3010.91	3.32126	2.6395E+2	2.6507E+2	2.6283E+2
3004.01	3.32889	3.1759E+2	3.1910E+2	3.1609E+2	3011.41	3.32071	2.5610E+2	2.5716E+2	2.5505E+2
3004.11	3.32878	3.1570E+2	3.1721E+2	3.1421E+2	3012.41	3.31960	2.4165E+2	2.4264E+2	2.4066E+2
3004.21	3.32867	3.1419E+2	3.1569E+2	3.1270E+2	3014.41	3.31740	2.1602E+2	2.1690E+2	2.1514E+2
3004.31	3.32856	3.1310E+2	3.1459E+2	3.1162E+2	3016.41	3.31520	1.9311E+2	1.9393E+2	1.9233E+2
3004.41	3.32845	3.1241E+2	3.1389E+2	3.1093E+2	3017.41	3.31410	1.8241E+2	1.8321E+2	1.8166E+2
3004.51	3.32833	3.1219E+2	3.1366E+2	3.1073E+2	3018.41	3.31300	1.7167E+2	1.7244E+2	1.7095E+2
3004.61	3.32822	3.1242E+2	3.1389E+2	3.1096E+2	3019.41	3.31191	1.6099E+2	1.6174E+2	1.6031E+2
3004.71	3.32811	3.1320E+2	3.1467E+2	3.1174E+2	3020.41	3.31081	1.5015E+2	1.5088E+2	1.4949E+2
3004.81	3.32800	3.1440E+2	3.1587E+2	3.1294E+2	3020.91	3.31026	1.4480E+2	1.4552E+2	1.4415E+2
3004.91	3.32789	3.1602E+2	3.1750E+2	3.1455E+2	3021.41	3.30971	1.3971E+2	1.4042E+2	1.3908E+2
3005.01	3.32778	3.1816E+2	3.1966E+2	3.1667E+2	3021.91	3.30917	1.3483E+2	1.3554E+2	1.3422E+2
3005.11	3.32767	3.2080E+2	3.2234E+2	3.1928E+2	3022.41	3.30862	1.3032E+2	1.3103E+2	1.2972E+2
3005.21	3.32756	3.2394E+2	3.2551E+2	3.2238E+2	3022.91	3.30807	1.2598E+2	1.2668E+2	1.2538E+2
3005.31	3.32745	3.2749E+2	3.2910E+2	3.2589E+2	3023.41	3.30753	1.2185E+2	1.2254E+2	1.2126E+2
3005.51	3.32723	3.3539E+2	3.3712E+2	3.3368E+2	3024.41	3.30643	1.1388E+2	1.1457E+2	1.1331E+2
3005.71	3.32701	3.4394E+2	3.4580E+2	3.4209E+2	3025.41	3.30534	1.0647E+2	1.0716E+2	1.0592E+2
3005.91	3.32678	3.5292E+2	3.5491E+2	3.5094E+2	3026.41	3.30425	9.9515E+1	1.0018E+2	9.9003E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3027.41	3.30315	9.2853E+1	9.3516E+1	9.2365E+1	3057.14	3.27103	1.8654E+1	1.9538E+1	1.8275E+1
3028.41	3.30206	8.6414E+1	8.7098E+1	8.5918E+1	3057.33	3.27083	1.8627E+1	1.9510E+1	1.8247E+1
3029.41	3.30097	8.0187E+1	8.0885E+1	7.9702E+1	3057.42	3.27073	1.8619E+1	1.9502E+1	1.8240E+1
3030.41	3.29988	7.4208E+1	7.4926E+1	7.3738E+1	3057.51	3.27063	1.8614E+1	1.9497E+1	1.8235E+1
3030.91	3.29934	7.1312E+1	7.2040E+1	7.0845E+1	3057.70	3.27043	1.8610E+1	1.9493E+1	1.8231E+1
3031.41	3.29880	6.8552E+1	6.9291E+1	6.8085E+1	3057.89	3.27023	1.8611E+1	1.9493E+1	1.8232E+1
3031.91	3.29825	6.5895E+1	6.6642E+1	6.5428E+1	3058.08	3.27003	1.8620E+1	1.9503E+1	1.8241E+1
3032.41	3.29771	6.3363E+1	6.4123E+1	6.2885E+1	3058.54	3.26953	1.8660E+1	1.9542E+1	1.8281E+1
3032.91	3.29716	6.0928E+1	6.1696E+1	6.0446E+1	3059.01	3.26903	1.8718E+1	1.9599E+1	1.8340E+1
3033.41	3.29662	5.8579E+1	5.9362E+1	5.8082E+1	3059.48	3.26853	1.8789E+1	1.9669E+1	1.8412E+1
3033.91	3.29608	5.6353E+1	5.7142E+1	5.5857E+1	3059.95	3.26803	1.8854E+1	1.9734E+1	1.8477E+1
3034.41	3.29553	5.4306E+1	5.5096E+1	5.3818E+1	3060.88	3.26703	1.8971E+1	1.9851E+1	1.8594E+1
3034.91	3.29499	5.2406E+1	5.3193E+1	5.1930E+1	3061.82	3.26603	1.9069E+1	1.9948E+1	1.8693E+1
3035.41	3.29445	5.0653E+1	5.1434E+1	5.0196E+1	3062.76	3.26503	1.9152E+1	2.0031E+1	1.8776E+1
3035.91	3.29391	4.9058E+1	4.9836E+1	4.8615E+1	3063.23	3.26453	1.9188E+1	2.0066E+1	1.8811E+1
3036.41	3.29336	4.7619E+1	4.8397E+1	4.7186E+1	3063.70	3.26403	1.9216E+1	2.0094E+1	1.8840E+1
3036.91	3.29282	4.6287E+1	4.7067E+1	4.5858E+1	3064.17	3.26353	1.9241E+1	2.0119E+1	1.8865E+1
3037.41	3.29228	4.5040E+1	4.5824E+1	4.4612E+1	3064.64	3.26303	1.9260E+1	2.0138E+1	1.8884E+1
3037.91	3.29174	4.3887E+1	4.4676E+1	4.3458E+1	3065.11	3.26253	1.9275E+1	2.0153E+1	1.8899E+1
3038.41	3.29119	4.2798E+1	4.3593E+1	4.2368E+1	3065.58	3.26203	1.9283E+1	2.0161E+1	1.8907E+1
3039.41	3.29011	4.0721E+1	4.1521E+1	4.0297E+1	3066.05	3.26153	1.9287E+1	2.0165E+1	1.8910E+1
3040.41	3.28903	3.8872E+1	3.9670E+1	3.8466E+1	3066.52	3.26103	1.9285E+1	2.0164E+1	1.8909E+1
3041.41	3.28795	3.7123E+1	3.7923E+1	3.6729E+1	3067.46	3.26003	1.9274E+1	2.0152E+1	1.8897E+1
3042.41	3.28687	3.5483E+1	3.6287E+1	3.5095E+1	3068.40	3.25903	1.9248E+1	2.0126E+1	1.8871E+1
3043.41	3.28579	3.3886E+1	3.4697E+1	3.3500E+1	3069.34	3.25803	1.9205E+1	2.0084E+1	1.8828E+1
3044.41	3.28471	3.2304E+1	3.3127E+1	3.1918E+1	3069.81	3.25753	1.9176E+1	2.0055E+1	1.8799E+1
3045.41	3.28363	3.0797E+1	3.1633E+1	3.0408E+1	3070.28	3.25703	1.9136E+1	2.0016E+1	1.8759E+1
3046.41	3.28255	2.9337E+1	3.0187E+1	2.8946E+1	3071.22	3.25603	1.9040E+1	1.9921E+1	1.8663E+1
3047.41	3.28147	2.7903E+1	2.8767E+1	2.7512E+1	3072.17	3.25503	1.8931E+1	1.9812E+1	1.8554E+1
3048.41	3.28040	2.6535E+1	2.7407E+1	2.6146E+1	3072.64	3.25453	1.8871E+1	1.9752E+1	1.8494E+1
3049.41	3.27932	2.5232E+1	2.6105E+1	2.4848E+1	3073.11	3.25403	1.8806E+1	1.9688E+1	1.8428E+1
3049.91	3.27878	2.4606E+1	2.5477E+1	2.4223E+1	3073.58	3.25353	1.8736E+1	1.9617E+1	1.8358E+1
3050.41	3.27825	2.3993E+1	2.4864E+1	2.3612E+1	3074.06	3.25303	1.8662E+1	1.9544E+1	1.8284E+1
3051.41	3.27717	2.2869E+1	2.3741E+1	2.2489E+1	3075.00	3.25203	1.8507E+1	1.9390E+1	1.8129E+1
3052.41	3.27610	2.1843E+1	2.2718E+1	2.1464E+1	3075.95	3.25103	1.8349E+1	1.9232E+1	1.7971E+1
3052.91	3.27556	2.1356E+1	2.2232E+1	2.0978E+1	3076.42	3.25053	1.8272E+1	1.9156E+1	1.7893E+1
3053.41	3.27502	2.0900E+1	2.1778E+1	2.0521E+1	3076.89	3.25003	1.8198E+1	1.9082E+1	1.7819E+1
3053.91	3.27449	2.0474E+1	2.1353E+1	2.0095E+1	3077.84	3.24903	1.8066E+1	1.8951E+1	1.7687E+1
3054.41	3.27395	2.0087E+1	2.0968E+1	1.9708E+1	3078.32	3.24853	1.8005E+1	1.8891E+1	1.7626E+1
3055.09	3.27323	1.9614E+1	2.0497E+1	1.9234E+1	3078.79	3.24803	1.7948E+1	1.8834E+1	1.7569E+1
3055.27	3.27303	1.9492E+1	2.0374E+1	1.9112E+1	3079.26	3.24753	1.7894E+1	1.8781E+1	1.7515E+1
3055.46	3.27283	1.9378E+1	2.0261E+1	1.8998E+1	3079.74	3.24703	1.7842E+1	1.8728E+1	1.7462E+1
3055.65	3.27263	1.9272E+1	2.0156E+1	1.8892E+1	3080.21	3.24653	1.7795E+1	1.8681E+1	1.7415E+1
3055.83	3.27243	1.9168E+1	2.0051E+1	1.8788E+1	3080.69	3.24603	1.7751E+1	1.8638E+1	1.7371E+1
3056.02	3.27223	1.9072E+1	1.9955E+1	1.8693E+1	3081.16	3.24553	1.7713E+1	1.8600E+1	1.7333E+1
3056.21	3.27203	1.8981E+1	1.9864E+1	1.8602E+1	3081.64	3.24503	1.7680E+1	1.8566E+1	1.7300E+1
3056.39	3.27183	1.8893E+1	1.9776E+1	1.8514E+1	3082.11	3.24453	1.7653E+1	1.8539E+1	1.7273E+1
3056.58	3.27163	1.8816E+1	1.9699E+1	1.8437E+1	3082.59	3.24403	1.7634E+1	1.8521E+1	1.7254E+1
3056.77	3.27143	1.8749E+1	1.9632E+1	1.8370E+1	3083.06	3.24353	1.7626E+1	1.8513E+1	1.7246E+1
3056.95	3.27123	1.8695E+1	1.9578E+1	1.8316E+1	3083.54	3.24303	1.7627E+1	1.8514E+1	1.7247E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3084.01	3.24253	1.7633E+1	1.8521E+1	1.7254E+1	3130.38	3.19450	6.3945E+0	7.3571E+0	5.9834E+0
3084.49	3.24203	1.7644E+1	1.8532E+1	1.7264E+1	3131.38	3.19348	6.1693E+0	7.1322E+0	5.7579E+0
3085.44	3.24103	1.7675E+1	1.8563E+1	1.7295E+1	3132.38	3.19246	5.9570E+0	6.9201E+0	5.5453E+0
3086.39	3.24003	1.7717E+1	1.8604E+1	1.7337E+1	3133.38	3.19144	5.7563E+0	6.7195E+0	5.3443E+0
3087.34	3.23903	1.7768E+1	1.8655E+1	1.7388E+1	3134.38	3.19042	5.5725E+0	6.5358E+0	5.1602E+0
3088.30	3.23803	1.7814E+1	1.8701E+1	1.7434E+1	3135.38	3.18941	5.4031E+0	6.3665E+0	4.9905E+0
3088.77	3.23753	1.7828E+1	1.8715E+1	1.7448E+1	3136.38	3.18839	5.2471E+0	6.2110E+0	4.8341E+0
3089.25	3.23703	1.7835E+1	1.8722E+1	1.7455E+1	3137.38	3.18737	5.1019E+0	6.0663E+0	4.6885E+0
3089.73	3.23653	1.7836E+1	1.8724E+1	1.7456E+1	3138.38	3.18636	4.9628E+0	5.9276E+0	4.5489E+0
3090.21	3.23603	1.7831E+1	1.8719E+1	1.7451E+1	3138.88	3.18585	4.8979E+0	5.8630E+0	4.4839E+0
3090.68	3.23553	1.7818E+1	1.8706E+1	1.7438E+1	3139.38	3.18534	4.8410E+0	5.8062E+0	4.4268E+0
3091.16	3.23503	1.7797E+1	1.8685E+1	1.7417E+1	3139.88	3.18483	4.7899E+0	5.7552E+0	4.3755E+0
3091.64	3.23453	1.7767E+1	1.8655E+1	1.7386E+1	3140.38	3.18433	4.7438E+0	5.7090E+0	4.3293E+0
3092.12	3.23403	1.7724E+1	1.8613E+1	1.7344E+1	3140.88	3.18382	4.7012E+0	5.6664E+0	4.2867E+0
3092.60	3.23353	1.7673E+1	1.8562E+1	1.7293E+1	3141.38	3.18331	4.6607E+0	5.6257E+0	4.2461E+0
3093.07	3.23303	1.7616E+1	1.8505E+1	1.7235E+1	3142.38	3.18230	4.5823E+0	5.5469E+0	4.1676E+0
3093.55	3.23253	1.7550E+1	1.8440E+1	1.7169E+1	3143.38	3.18129	4.4985E+0	5.4628E+0	4.0838E+0
3094.03	3.23203	1.7478E+1	1.8369E+1	1.7096E+1	3144.38	3.18028	4.4125E+0	5.3766E+0	3.9978E+0
3094.51	3.23153	1.7398E+1	1.8289E+1	1.7016E+1	3145.38	3.17926	4.3243E+0	5.2882E+0	3.9094E+0
3094.99	3.23103	1.7312E+1	1.8204E+1	1.6930E+1	3145.88	3.17876	4.2786E+0	5.2426E+0	3.8636E+0
3095.47	3.23053	1.7220E+1	1.8112E+1	1.6838E+1	3146.38	3.17825	4.2285E+0	5.1927E+0	3.8132E+0
3095.95	3.23003	1.7120E+1	1.8013E+1	1.6738E+1	3146.88	3.17775	4.1849E+0	5.1491E+0	3.7695E+0
3097.86	3.22803	1.6711E+1	1.7606E+1	1.6328E+1	3147.38	3.17724	4.1443E+0	5.1083E+0	3.7288E+0
3099.79	3.22603	1.6267E+1	1.7165E+1	1.5883E+1	3147.88	3.17674	4.1054E+0	5.0693E+0	3.6898E+0
3101.71	3.22403	1.5804E+1	1.6705E+1	1.5419E+1	3148.38	3.17623	4.0685E+0	5.0321E+0	3.6530E+0
3102.67	3.22303	1.5560E+1	1.6463E+1	1.5174E+1	3148.88	3.17573	4.0351E+0	4.9983E+0	3.6196E+0
3103.63	3.22203	1.5309E+1	1.6214E+1	1.4923E+1	3149.38	3.17523	4.0049E+0	4.9678E+0	3.5894E+0
3104.60	3.22103	1.5041E+1	1.5948E+1	1.4654E+1	3149.88	3.17472	3.9759E+0	4.9386E+0	3.5604E+0
3105.56	3.22003	1.4747E+1	1.5656E+1	1.4358E+1	3150.38	3.17422	3.9482E+0	4.9113E+0	3.5325E+0
3106.53	3.21903	1.4424E+1	1.5336E+1	1.4034E+1	3150.88	3.17371	3.9226E+0	4.8863E+0	3.5066E+0
3107.49	3.21803	1.4098E+1	1.5012E+1	1.3706E+1	3151.13	3.17346	3.9106E+0	4.8748E+0	3.4945E+0
3108.46	3.21703	1.3758E+1	1.4675E+1	1.3365E+1	3151.38	3.17321	3.9001E+0	4.8646E+0	3.4838E+0
3109.42	3.21603	1.3397E+1	1.4317E+1	1.3003E+1	3151.63	3.17296	3.8915E+0	4.8564E+0	3.4751E+0
3111.36	3.21403	1.2683E+1	1.3609E+1	1.2286E+1	3151.78	3.17281	3.8873E+0	4.8524E+0	3.4708E+0
3113.30	3.21203	1.1954E+1	1.2886E+1	1.1555E+1	3151.98	3.17261	3.8822E+0	4.8475E+0	3.4657E+0
3115.38	3.20988	1.1179E+1	1.2118E+1	1.0777E+1	3152.18	3.17241	3.8798E+0	4.8453E+0	3.4632E+0
3116.38	3.20885	1.0806E+1	1.1748E+1	1.0404E+1	3152.38	3.17220	3.8811E+0	4.8466E+0	3.4645E+0
3117.38	3.20782	1.0435E+1	1.1380E+1	1.0032E+1	3152.58	3.17200	3.8880E+0	4.8535E+0	3.4715E+0
3118.38	3.20680	1.0071E+1	1.1019E+1	9.6667E+0	3152.68	3.17190	3.8954E+0	4.8607E+0	3.4788E+0
3119.38	3.20577	9.7111E+0	1.0661E+1	9.3063E+0	3152.78	3.17180	3.9063E+0	4.8714E+0	3.4899E+0
3120.38	3.20474	9.3562E+0	1.0308E+1	8.9507E+0	3152.88	3.17170	3.9209E+0	4.8856E+0	3.5045E+0
3121.38	3.20371	9.0153E+0	9.9694E+0	8.6088E+0	3152.98	3.17160	3.9391E+0	4.9035E+0	3.5229E+0
3122.38	3.20269	8.6788E+0	9.6346E+0	8.2716E+0	3153.08	3.17150	3.9584E+0	4.9225E+0	3.5423E+0
3123.38	3.20166	8.3431E+0	9.3002E+0	7.9353E+0	3153.18	3.17140	3.9799E+0	4.9438E+0	3.5638E+0
3124.38	3.20064	8.0247E+0	8.9832E+0	7.6162E+0	3153.28	3.17130	4.0044E+0	4.9681E+0	3.5885E+0
3125.38	3.19961	7.7163E+0	8.6760E+0	7.3072E+0	3153.38	3.17120	4.0330E+0	4.9967E+0	3.6170E+0
3126.38	3.19859	7.4239E+0	8.3845E+0	7.0144E+0	3153.48	3.17110	4.0642E+0	5.0281E+0	3.6480E+0
3127.38	3.19757	7.1449E+0	8.1061E+0	6.7349E+0	3153.58	3.17100	4.1040E+0	5.0685E+0	3.6875E+0
3128.38	3.19654	6.8810E+0	7.8427E+0	6.4706E+0	3153.68	3.17090	4.1509E+0	5.1164E+0	3.7338E+0
3129.38	3.19552	6.6310E+0	7.5933E+0	6.2203E+0	3153.78	3.17080	4.2190E+0	5.1867E+0	3.8007E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3153.88	3.17070	4.3071E+0	5.2776E+0	3.8870E+0	3162.13	3.16242	3.4038E+0	4.3633E+0	2.9874E+0
3153.98	3.17059	4.4504E+0	5.4242E+0	4.0282E+0	3162.38	3.16217	3.3951E+0	4.3545E+0	2.9786E+0
3154.08	3.17049	4.6466E+0	5.6229E+0	4.2227E+0	3162.88	3.16167	3.3789E+0	4.3381E+0	2.9624E+0
3154.18	3.17039	4.9564E+0	5.9331E+0	4.5324E+0	3163.38	3.16117	3.3641E+0	4.3231E+0	2.9477E+0
3154.28	3.17029	5.3681E+0	6.3445E+0	4.9450E+0	3163.88	3.16067	3.3503E+0	4.3091E+0	2.9339E+0
3154.38	3.17019	5.9523E+0	6.9280E+0	5.5299E+0	3164.38	3.16017	3.3372E+0	4.2958E+0	2.9208E+0
3154.48	3.17009	6.6835E+0	7.6575E+0	6.2606E+0	3164.88	3.15967	3.3258E+0	4.2840E+0	2.9095E+0
3154.58	3.16999	7.5013E+0	8.4737E+0	7.0768E+0	3165.38	3.15917	3.3183E+0	4.2760E+0	2.9019E+0
3154.68	3.16989	8.2315E+0	9.1993E+0	7.8064E+0	3165.63	3.15892	3.3161E+0	4.2737E+0	2.8998E+0
3154.73	3.16984	8.5109E+0	9.4753E+0	8.0861E+0	3165.88	3.15868	3.3151E+0	4.2724E+0	2.8988E+0
3154.78	3.16979	8.7251E+0	9.6856E+0	8.3010E+0	3166.13	3.15843	3.3149E+0	4.2719E+0	2.8987E+0
3154.83	3.16974	8.8576E+0	9.8145E+0	8.4343E+0	3166.38	3.15818	3.3154E+0	4.2721E+0	2.8992E+0
3154.88	3.16969	8.8697E+0	9.8234E+0	8.4472E+0	3166.48	3.15808	3.3159E+0	4.2725E+0	2.8997E+0
3154.93	3.16964	8.7417E+0	9.6938E+0	8.3195E+0	3166.58	3.15798	3.3170E+0	4.2735E+0	2.9009E+0
3154.98	3.16959	8.5285E+0	9.4802E+0	8.1066E+0	3166.68	3.15788	3.3187E+0	4.2751E+0	2.9026E+0
3155.03	3.16954	8.2389E+0	9.1896E+0	7.8176E+0	3166.78	3.15778	3.3209E+0	4.2773E+0	2.9048E+0
3155.08	3.16949	7.9045E+0	8.8543E+0	7.4841E+0	3166.88	3.15768	3.3242E+0	4.2805E+0	2.9082E+0
3155.18	3.16939	7.1276E+0	8.0784E+0	6.7092E+0	3166.98	3.15758	3.3290E+0	4.2852E+0	2.9130E+0
3155.28	3.16929	6.3399E+0	7.2933E+0	5.9231E+0	3167.08	3.15748	3.3358E+0	4.2918E+0	2.9198E+0
3155.38	3.16919	5.6598E+0	6.6139E+0	5.2451E+0	3167.28	3.15728	3.3540E+0	4.3102E+0	2.9381E+0
3155.48	3.16909	5.1598E+0	6.1159E+0	4.7460E+0	3167.38	3.15718	3.3653E+0	4.3219E+0	2.9495E+0
3155.58	3.16899	4.8107E+0	5.7695E+0	4.3961E+0	3167.58	3.15698	3.3986E+0	4.3565E+0	2.9827E+0
3155.68	3.16889	4.5704E+0	5.5308E+0	4.1556E+0	3167.68	3.15688	3.4235E+0	4.3823E+0	3.0075E+0
3155.78	3.16879	4.3972E+0	5.3586E+0	3.9822E+0	3167.78	3.15678	3.4544E+0	4.4142E+0	3.0383E+0
3155.88	3.16869	4.2713E+0	5.2330E+0	3.8563E+0	3167.88	3.15668	3.4882E+0	4.4484E+0	3.0720E+0
3155.98	3.16859	4.1774E+0	5.1388E+0	3.7625E+0	3167.98	3.15658	3.5174E+0	4.4778E+0	3.1012E+0
3156.08	3.16848	4.1076E+0	5.0684E+0	3.6929E+0	3168.08	3.15648	3.5303E+0	4.4908E+0	3.1140E+0
3156.18	3.16838	4.0437E+0	5.0042E+0	3.6290E+0	3168.18	3.15638	3.5344E+0	4.4949E+0	3.1181E+0
3156.28	3.16828	3.9874E+0	4.9479E+0	3.5727E+0	3168.28	3.15628	3.5178E+0	4.4780E+0	3.1015E+0
3156.38	3.16818	3.9406E+0	4.9015E+0	3.5257E+0	3168.38	3.15618	3.4948E+0	4.4545E+0	3.0785E+0
3156.48	3.16808	3.9002E+0	4.8616E+0	3.4851E+0	3168.58	3.15598	3.4202E+0	4.3787E+0	3.0040E+0
3156.58	3.16798	3.8668E+0	4.8284E+0	3.4514E+0	3168.78	3.15578	3.3571E+0	4.3145E+0	2.9411E+0
3156.78	3.16778	3.8123E+0	4.7744E+0	3.3966E+0	3168.98	3.15559	3.3195E+0	4.2774E+0	2.9032E+0
3156.98	3.16758	3.7668E+0	4.7291E+0	3.3508E+0	3169.08	3.15549	3.3061E+0	4.2643E+0	2.8896E+0
3157.18	3.16738	3.7287E+0	4.6910E+0	3.3127E+0	3169.18	3.15539	3.2960E+0	4.2546E+0	2.8795E+0
3157.38	3.16718	3.6943E+0	4.6563E+0	3.2781E+0	3169.28	3.15529	3.2875E+0	4.2463E+0	2.8708E+0
3157.58	3.16698	3.6647E+0	4.6262E+0	3.2486E+0	3169.38	3.15519	3.2804E+0	4.2394E+0	2.8637E+0
3157.78	3.16678	3.6396E+0	4.6007E+0	3.2236E+0	3169.48	3.15509	3.2738E+0	4.2330E+0	2.8570E+0
3157.98	3.16658	3.6178E+0	4.5782E+0	3.2018E+0	3169.58	3.15499	3.2676E+0	4.2270E+0	2.8508E+0
3158.18	3.16638	3.5989E+0	4.5588E+0	3.1830E+0	3169.68	3.15489	3.2614E+0	4.2211E+0	2.8445E+0
3158.38	3.16618	3.5829E+0	4.5423E+0	3.1671E+0	3169.88	3.15469	3.2495E+0	4.2096E+0	2.8325E+0
3158.58	3.16598	3.5690E+0	4.5280E+0	3.1532E+0	3170.38	3.15419	3.2215E+0	4.1825E+0	2.8042E+0
3158.88	3.16568	3.5506E+0	4.5093E+0	3.1348E+0	3170.63	3.15394	3.2084E+0	4.1699E+0	2.7910E+0
3159.13	3.16543	3.5363E+0	4.4952E+0	3.1204E+0	3170.88	3.15369	3.1965E+0	4.1584E+0	2.7790E+0
3159.38	3.16517	3.5233E+0	4.4823E+0	3.1074E+0	3171.13	3.15345	3.1851E+0	4.1474E+0	2.7675E+0
3159.88	3.16467	3.4990E+0	4.4581E+0	3.0829E+0	3171.38	3.15320	3.1742E+0	4.1368E+0	2.7565E+0
3160.38	3.16417	3.4760E+0	4.4353E+0	3.0599E+0	3171.63	3.15295	3.1637E+0	4.1265E+0	2.7460E+0
3160.88	3.16367	3.4541E+0	4.4135E+0	3.0379E+0	3171.88	3.15270	3.1546E+0	4.1176E+0	2.7368E+0
3161.38	3.16317	3.4331E+0	4.3926E+0	3.0167E+0	3172.13	3.15245	3.1463E+0	4.1094E+0	2.7284E+0
3161.88	3.16267	3.4131E+0	4.3726E+0	2.9967E+0	3172.38	3.15220	3.1394E+0	4.1026E+0	2.7215E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3172.88	3.15171	3.1288E+0	4.0921E+0	2.7109E+0	3182.69	3.14200	3.4301E+0	4.3990E+0	3.0114E+0
3173.38	3.15121	3.1205E+0	4.0838E+0	2.7025E+0	3182.79	3.14190	3.4627E+0	4.4331E+0	3.0436E+0
3173.88	3.15071	3.1141E+0	4.0775E+0	2.6962E+0	3182.89	3.14180	3.5011E+0	4.4734E+0	3.0816E+0
3174.38	3.15022	3.1087E+0	4.0720E+0	2.6906E+0	3182.99	3.14170	3.5530E+0	4.5271E+0	3.1330E+0
3174.89	3.14972	3.1033E+0	4.0667E+0	2.6853E+0	3183.19	3.14151	3.7230E+0	4.7002E+0	3.3018E+0
3175.39	3.14922	3.0965E+0	4.0598E+0	2.6784E+0	3183.29	3.14141	3.8444E+0	4.8225E+0	3.4228E+0
3175.89	3.14873	3.0894E+0	4.0529E+0	2.6713E+0	3183.39	3.14131	3.9926E+0	4.9707E+0	3.5708E+0
3176.39	3.14823	3.0825E+0	4.0461E+0	2.6644E+0	3183.49	3.14121	4.1881E+0	5.1653E+0	3.7667E+0
3176.64	3.14798	3.0795E+0	4.0432E+0	2.6615E+0	3183.59	3.14111	4.3985E+0	5.3747E+0	3.9776E+0
3176.89	3.14774	3.0767E+0	4.0405E+0	2.6587E+0	3183.79	3.14091	4.9261E+0	5.9009E+0	4.5062E+0
3177.14	3.14749	3.0744E+0	4.0381E+0	2.6563E+0	3183.99	3.14072	5.5436E+0	6.5169E+0	5.1248E+0
3177.39	3.14724	3.0725E+0	4.0363E+0	2.6545E+0	3184.19	3.14052	6.2415E+0	7.2136E+0	5.8232E+0
3177.64	3.14699	3.0716E+0	4.0353E+0	2.6536E+0	3184.39	3.14032	6.9863E+0	7.9566E+0	6.5683E+0
3177.89	3.14675	3.0712E+0	4.0349E+0	2.6532E+0	3184.49	3.14022	7.3669E+0	8.3357E+0	6.9494E+0
3178.14	3.14650	3.0716E+0	4.0352E+0	2.6536E+0	3184.59	3.14013	7.7484E+0	8.7154E+0	7.3319E+0
3178.39	3.14625	3.0732E+0	4.0368E+0	2.6554E+0	3184.69	3.14003	8.1389E+0	9.1042E+0	7.7234E+0
3178.64	3.14600	3.0761E+0	4.0395E+0	2.6583E+0	3184.79	3.13993	8.5382E+0	9.5014E+0	8.1242E+0
3178.89	3.14576	3.0793E+0	4.0429E+0	2.6616E+0	3184.89	3.13983	8.9222E+0	9.8834E+0	8.5096E+0
3179.14	3.14551	3.0829E+0	4.0465E+0	2.6651E+0	3184.99	3.13973	9.2692E+0	1.0227E+1	8.8591E+0
3179.39	3.14526	3.0879E+0	4.0517E+0	2.6701E+0	3185.09	3.13963	9.5413E+0	1.0496E+1	9.1334E+0
3179.59	3.14506	3.0920E+0	4.0561E+0	2.6742E+0	3185.19	3.13953	9.7285E+0	1.0680E+1	9.3228E+0
3179.69	3.14497	3.0946E+0	4.0587E+0	2.6767E+0	3185.29	3.13944	9.8266E+0	1.0776E+1	9.4220E+0
3179.79	3.14487	3.0977E+0	4.0620E+0	2.6798E+0	3185.39	3.13934	9.8743E+0	1.0823E+1	9.4699E+0
3179.89	3.14477	3.1018E+0	4.0661E+0	2.6839E+0	3185.49	3.13924	9.8870E+0	1.0835E+1	9.4828E+0
3179.99	3.14467	3.1071E+0	4.0714E+0	2.6891E+0	3185.59	3.13914	9.8832E+0	1.0831E+1	9.4792E+0
3180.19	3.14447	3.1234E+0	4.0876E+0	2.7056E+0	3185.69	3.13904	9.8906E+0	1.0838E+1	9.4865E+0
3180.39	3.14427	3.1487E+0	4.1126E+0	2.7310E+0	3185.79	3.13894	9.9282E+0	1.0877E+1	9.5233E+0
3180.59	3.14407	3.1848E+0	4.1486E+0	2.7673E+0	3185.89	3.13884	9.9990E+0	1.0949E+1	9.5926E+0
3180.69	3.14398	3.2069E+0	4.1703E+0	2.7895E+0	3185.99	3.13875	1.0118E+1	1.1069E+1	9.7100E+0
3180.79	3.14388	3.2288E+0	4.1920E+0	2.8115E+0	3186.09	3.13865	1.0290E+1	1.1242E+1	9.8796E+0
3180.89	3.14378	3.2476E+0	4.2106E+0	2.8303E+0	3186.19	3.13855	1.0519E+1	1.1473E+1	1.0107E+1
3180.94	3.14373	3.2548E+0	4.2178E+0	2.8375E+0	3186.29	3.13845	1.0837E+1	1.1789E+1	1.0424E+1
3180.99	3.14368	3.2597E+0	4.2228E+0	2.8423E+0	3186.39	3.13835	1.1190E+1	1.2141E+1	1.0776E+1
3181.04	3.14363	3.2630E+0	4.2262E+0	2.8455E+0	3186.49	3.13825	1.1552E+1	1.2500E+1	1.1139E+1
3181.09	3.14358	3.2631E+0	4.2266E+0	2.8456E+0	3186.59	3.13815	1.1892E+1	1.2836E+1	1.1480E+1
3181.19	3.14348	3.2575E+0	4.2217E+0	2.8398E+0	3186.69	3.13806	1.2210E+1	1.3150E+1	1.1799E+1
3181.29	3.14338	3.2503E+0	4.2150E+0	2.8325E+0	3186.79	3.13796	1.2480E+1	1.3416E+1	1.2071E+1
3181.39	3.14328	3.2477E+0	4.2128E+0	2.8298E+0	3186.89	3.13786	1.2721E+1	1.3653E+1	1.2314E+1
3181.49	3.14319	3.2480E+0	4.2134E+0	2.8300E+0	3186.99	3.13776	1.2901E+1	1.3831E+1	1.2496E+1
3181.59	3.14309	3.2521E+0	4.2176E+0	2.8341E+0	3187.09	3.13766	1.3059E+1	1.3987E+1	1.2657E+1
3181.69	3.14299	3.2586E+0	4.2242E+0	2.8405E+0	3187.19	3.13756	1.3188E+1	1.4114E+1	1.2787E+1
3181.79	3.14289	3.2684E+0	4.2341E+0	2.8503E+0	3187.29	3.13746	1.3302E+1	1.4227E+1	1.2904E+1
3181.89	3.14279	3.2803E+0	4.2461E+0	2.8622E+0	3187.39	3.13737	1.3391E+1	1.4315E+1	1.2994E+1
3181.99	3.14269	3.2947E+0	4.2605E+0	2.8766E+0	3187.49	3.13727	1.3461E+1	1.4384E+1	1.3066E+1
3182.09	3.14259	3.3098E+0	4.2758E+0	2.8917E+0	3187.59	3.13717	1.3517E+1	1.4440E+1	1.3122E+1
3182.19	3.14249	3.3260E+0	4.2921E+0	2.9079E+0	3187.62	3.13714	1.3529E+1	1.4452E+1	1.3135E+1
3182.29	3.14240	3.3432E+0	4.3095E+0	2.9250E+0	3187.69	3.13707	1.3539E+1	1.4462E+1	1.3144E+1
3182.39	3.14230	3.3614E+0	4.3281E+0	2.9432E+0	3187.79	3.13697	1.3501E+1	1.4424E+1	1.3106E+1
3182.49	3.14220	3.3811E+0	4.3482E+0	2.9627E+0	3187.89	3.13687	1.3396E+1	1.4319E+1	1.3002E+1
3182.59	3.14210	3.4034E+0	4.3713E+0	2.9850E+0	3187.99	3.13678	1.3242E+1	1.4166E+1	1.2847E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3188.09	3.13668	1.3060E+1	1.3985E+1	1.2664E+1	3199.89	3.12511	3.1649E+0	4.1255E+0	2.7473E+0
3188.19	3.13658	1.2853E+1	1.3782E+1	1.2455E+1	3200.39	3.12462	3.1170E+0	4.0776E+0	2.6992E+0
3188.39	3.13638	1.2350E+1	1.3284E+1	1.1950E+1	3200.89	3.12413	3.0743E+0	4.0348E+0	2.6564E+0
3188.49	3.13628	1.2074E+1	1.3010E+1	1.1673E+1	3201.39	3.12364	3.0353E+0	3.9957E+0	2.6174E+0
3188.59	3.13619	1.1777E+1	1.2715E+1	1.1374E+1	3201.89	3.12316	3.0017E+0	3.9618E+0	2.5837E+0
3188.79	3.13599	1.1163E+1	1.2105E+1	1.0760E+1	3202.39	3.12267	2.9732E+0	3.9331E+0	2.5553E+0
3188.99	3.13579	1.0570E+1	1.1515E+1	1.0165E+1	3202.64	3.12243	2.9611E+0	3.9209E+0	2.5431E+0
3189.19	3.13560	9.9993E+0	1.0950E+1	9.5933E+0	3202.89	3.12218	2.9504E+0	3.9100E+0	2.5325E+0
3189.29	3.13550	9.7394E+0	1.0692E+1	9.3325E+0	3203.14	3.12194	2.9408E+0	3.9004E+0	2.5229E+0
3189.39	3.13540	9.5057E+0	1.0460E+1	9.0980E+0	3203.39	3.12169	2.9323E+0	3.8917E+0	2.5143E+0
3189.49	3.13530	9.2869E+0	1.0243E+1	8.8786E+0	3203.64	3.12145	2.9245E+0	3.8839E+0	2.5065E+0
3189.59	3.13520	9.0990E+0	1.0056E+1	8.6904E+0	3203.89	3.12121	2.9178E+0	3.8771E+0	2.4998E+0
3189.79	3.13501	8.7552E+0	9.7133E+0	8.3461E+0	3204.14	3.12096	2.9124E+0	3.8716E+0	2.4944E+0
3189.99	3.13481	8.4347E+0	9.3937E+0	8.0253E+0	3204.39	3.12072	2.9091E+0	3.8680E+0	2.4910E+0
3190.39	3.13442	7.8324E+0	8.7924E+0	7.4225E+0	3204.64	3.12048	2.9071E+0	3.8659E+0	2.4892E+0
3190.79	3.13402	7.2955E+0	8.2567E+0	6.8848E+0	3204.89	3.12023	2.9061E+0	3.8645E+0	2.4882E+0
3190.99	3.13383	7.0511E+0	8.0131E+0	6.6400E+0	3205.39	3.11975	2.9045E+0	3.8624E+0	2.4866E+0
3191.19	3.13363	6.8175E+0	7.7803E+0	6.4061E+0	3205.89	3.11926	2.9031E+0	3.8605E+0	2.4853E+0
3191.39	3.13343	6.5976E+0	7.5609E+0	6.1859E+0	3206.39	3.11877	2.9012E+0	3.8582E+0	2.4835E+0
3191.79	3.13304	6.1921E+0	7.1564E+0	5.7798E+0	3206.64	3.11853	2.8996E+0	3.8564E+0	2.4818E+0
3192.19	3.13265	5.8373E+0	6.8032E+0	5.4241E+0	3206.89	3.11829	2.8971E+0	3.8539E+0	2.4794E+0
3192.39	3.13245	5.6734E+0	6.6400E+0	5.2597E+0	3207.14	3.11804	2.8934E+0	3.8502E+0	2.4756E+0
3192.49	3.13235	5.6001E+0	6.5668E+0	5.1862E+0	3207.39	3.11780	2.8905E+0	3.8472E+0	2.4726E+0
3192.59	3.13226	5.5305E+0	6.4973E+0	5.1166E+0	3207.64	3.11756	2.8879E+0	3.8446E+0	2.4701E+0
3192.79	3.13206	5.4033E+0	6.3699E+0	4.9892E+0	3207.89	3.11731	2.8863E+0	3.8429E+0	2.4684E+0
3192.99	3.13186	5.2860E+0	6.2525E+0	4.8719E+0	3208.14	3.11707	2.8856E+0	3.8421E+0	2.4678E+0
3193.19	3.13167	5.1758E+0	6.1420E+0	4.7616E+0	3208.39	3.11683	2.8864E+0	3.8427E+0	2.4686E+0
3193.39	3.13147	5.0678E+0	6.0337E+0	4.6536E+0	3208.64	3.11659	2.8881E+0	3.8442E+0	2.4703E+0
3193.59	3.13127	4.9590E+0	5.9248E+0	4.5446E+0	3208.89	3.11634	2.8906E+0	3.8464E+0	2.4728E+0
3193.79	3.13108	4.8492E+0	5.8149E+0	4.4346E+0	3209.39	3.11586	2.8960E+0	3.8513E+0	2.4783E+0
3193.99	3.13088	4.7365E+0	5.7025E+0	4.3216E+0	3210.39	3.11489	2.9077E+0	3.8621E+0	2.4901E+0
3194.19	3.13069	4.6240E+0	5.5903E+0	4.2087E+0	3215.39	3.11004	2.9728E+0	3.9244E+0	2.5556E+0
3194.39	3.13049	4.5154E+0	5.4819E+0	4.0997E+0	3220.39	3.10521	3.0483E+0	3.9986E+0	2.6310E+0
3194.59	3.13029	4.4171E+0	5.3835E+0	4.0013E+0	3221.39	3.10425	3.0621E+0	4.0122E+0	2.6448E+0
3194.79	3.13010	4.3280E+0	5.2940E+0	3.9120E+0	3221.89	3.10377	3.0689E+0	4.0191E+0	2.6516E+0
3194.99	3.12990	4.2440E+0	5.2096E+0	3.8280E+0	3222.39	3.10329	3.0754E+0	4.0255E+0	2.6581E+0
3195.19	3.12971	4.1638E+0	5.1289E+0	3.7478E+0	3222.89	3.10280	3.0812E+0	4.0314E+0	2.6640E+0
3195.39	3.12951	4.0929E+0	5.0570E+0	3.6769E+0	3223.39	3.10232	3.0867E+0	4.0369E+0	2.6695E+0
3195.89	3.12902	3.9272E+0	4.8897E+0	3.5114E+0	3223.89	3.10184	3.0919E+0	4.0422E+0	2.6747E+0
3196.14	3.12878	3.8566E+0	4.8184E+0	3.4407E+0	3224.39	3.10136	3.0961E+0	4.0465E+0	2.6789E+0
3196.39	3.12853	3.7887E+0	4.7500E+0	3.3727E+0	3225.39	3.10040	3.1025E+0	4.0532E+0	2.6853E+0
3196.64	3.12829	3.7241E+0	4.6849E+0	3.3080E+0	3226.39	3.09944	3.1074E+0	4.0583E+0	2.6902E+0
3196.89	3.12804	3.6617E+0	4.6222E+0	3.2456E+0	3226.89	3.09896	3.1091E+0	4.0600E+0	2.6918E+0
3197.14	3.12780	3.6039E+0	4.5641E+0	3.1876E+0	3227.39	3.09848	3.1096E+0	4.0606E+0	2.6923E+0
3197.39	3.12755	3.5487E+0	4.5088E+0	3.1323E+0	3227.89	3.09800	3.1096E+0	4.0605E+0	2.6923E+0
3197.89	3.12706	3.4472E+0	4.4072E+0	3.0306E+0	3228.39	3.09752	3.1082E+0	4.0592E+0	2.6909E+0
3198.39	3.12658	3.3551E+0	4.3153E+0	2.9382E+0	3229.39	3.09656	3.1032E+0	4.0542E+0	2.6858E+0
3198.64	3.12633	3.3162E+0	4.2765E+0	2.8991E+0	3230.39	3.09560	3.0940E+0	4.0451E+0	2.6766E+0
3198.89	3.12609	3.2818E+0	4.2421E+0	2.8646E+0	3231.39	3.09464	3.0822E+0	4.0334E+0	2.6649E+0
3199.39	3.12560	3.2200E+0	4.1804E+0	2.8025E+0	3232.39	3.09368	3.0691E+0	4.0202E+0	2.6517E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3232.89	3.09321	3.0617E+0	4.0128E+0	2.6443E+0	3261.10	3.06645	2.7289E+0	3.6860E+0	2.3098E+0
3233.39	3.09273	3.0536E+0	4.0048E+0	2.6362E+0	3261.20	3.06636	2.7318E+0	3.6894E+0	2.3127E+0
3233.89	3.09225	3.0452E+0	3.9965E+0	2.6278E+0	3261.30	3.06627	2.7257E+0	3.6837E+0	2.3066E+0
3234.39	3.09177	3.0370E+0	3.9883E+0	2.6195E+0	3261.40	3.06617	2.7116E+0	3.6699E+0	2.2924E+0
3236.39	3.08986	3.0060E+0	3.9576E+0	2.5884E+0	3261.50	3.06608	2.6877E+0	3.6464E+0	2.2683E+0
3238.39	3.08795	2.9787E+0	3.9305E+0	2.5608E+0	3261.60	3.06598	2.6653E+0	3.6238E+0	2.2457E+0
3240.39	3.08605	2.9499E+0	3.9018E+0	2.5318E+0	3261.70	3.06589	2.6434E+0	3.6014E+0	2.2238E+0
3242.39	3.08414	2.9158E+0	3.8679E+0	2.4977E+0	3261.80	3.06580	2.6232E+0	3.5806E+0	2.2035E+0
3243.89	3.08272	2.8924E+0	3.8448E+0	2.4741E+0	3261.90	3.06570	2.6044E+0	3.5614E+0	2.1846E+0
3244.39	3.08224	2.8851E+0	3.8376E+0	2.4668E+0	3262.00	3.06561	2.5873E+0	3.5443E+0	2.1674E+0
3244.89	3.08177	2.8797E+0	3.8322E+0	2.4613E+0	3262.10	3.06551	2.5724E+0	3.5295E+0	2.1524E+0
3245.39	3.08129	2.8762E+0	3.8287E+0	2.4578E+0	3262.20	3.06542	2.5614E+0	3.5187E+0	2.1414E+0
3245.89	3.08082	2.8726E+0	3.8251E+0	2.4543E+0	3262.30	3.06533	2.5554E+0	3.5127E+0	2.1353E+0
3246.39	3.08034	2.8686E+0	3.8211E+0	2.4502E+0	3262.40	3.06523	2.5517E+0	3.5091E+0	2.1316E+0
3246.89	3.07987	2.8640E+0	3.8166E+0	2.4457E+0	3262.50	3.06514	2.5496E+0	3.5070E+0	2.1296E+0
3247.39	3.07939	2.8590E+0	3.8115E+0	2.4405E+0	3262.60	3.06504	2.5490E+0	3.5064E+0	2.1290E+0
3247.64	3.07916	2.8558E+0	3.8084E+0	2.4374E+0	3262.70	3.06495	2.5502E+0	3.5075E+0	2.1302E+0
3247.89	3.07892	2.8510E+0	3.8038E+0	2.4326E+0	3262.80	3.06486	2.5524E+0	3.5095E+0	2.1324E+0
3248.39	3.07844	2.8389E+0	3.7920E+0	2.4203E+0	3263.00	3.06467	2.5590E+0	3.5159E+0	2.1392E+0
3249.39	3.07750	2.8047E+0	3.7588E+0	2.3858E+0	3263.10	3.06457	2.5635E+0	3.5203E+0	2.1437E+0
3249.89	3.07702	2.7873E+0	3.7418E+0	2.3684E+0	3263.20	3.06448	2.5689E+0	3.5256E+0	2.1492E+0
3250.39	3.07655	2.7704E+0	3.7253E+0	2.3514E+0	3263.30	3.06439	2.5752E+0	3.5318E+0	2.1555E+0
3251.39	3.07560	2.7370E+0	3.6926E+0	2.3178E+0	3263.40	3.06429	2.5822E+0	3.5387E+0	2.1625E+0
3251.89	3.07513	2.7205E+0	3.6764E+0	2.3012E+0	3263.50	3.06420	2.5898E+0	3.5462E+0	2.1701E+0
3252.39	3.07466	2.7051E+0	3.6613E+0	2.2857E+0	3263.60	3.06410	2.5991E+0	3.5553E+0	2.1794E+0
3252.89	3.07419	2.6913E+0	3.6476E+0	2.2718E+0	3263.80	3.06392	2.6220E+0	3.5780E+0	2.2024E+0
3253.39	3.07371	2.6782E+0	3.6347E+0	2.2587E+0	3264.00	3.06373	2.6468E+0	3.6027E+0	2.2273E+0
3253.89	3.07324	2.6660E+0	3.6225E+0	2.2465E+0	3264.20	3.06354	2.6737E+0	3.6294E+0	2.2543E+0
3254.39	3.07277	2.6545E+0	3.6111E+0	2.2350E+0	3264.40	3.06335	2.7028E+0	3.6585E+0	2.2835E+0
3254.89	3.07230	2.6441E+0	3.6006E+0	2.2245E+0	3264.50	3.06326	2.7144E+0	3.6704E+0	2.2951E+0
3255.39	3.07182	2.6343E+0	3.5908E+0	2.2148E+0	3264.60	3.06317	2.7214E+0	3.6780E+0	2.3020E+0
3256.39	3.07088	2.6159E+0	3.5722E+0	2.1964E+0	3264.70	3.06307	2.7264E+0	3.6837E+0	2.3069E+0
3257.40	3.06994	2.6001E+0	3.5563E+0	2.1806E+0	3264.80	3.06298	2.7288E+0	3.6870E+0	2.3092E+0
3257.90	3.06947	2.5942E+0	3.5504E+0	2.1746E+0	3264.90	3.06288	2.7284E+0	3.6876E+0	2.3087E+0
3258.15	3.06923	2.5909E+0	3.5471E+0	2.1713E+0	3265.00	3.06279	2.7253E+0	3.6855E+0	2.3055E+0
3258.40	3.06900	2.5874E+0	3.5436E+0	2.1677E+0	3265.10	3.06270	2.7233E+0	3.6844E+0	2.3033E+0
3258.65	3.06876	2.5844E+0	3.5406E+0	2.1647E+0	3265.20	3.06260	2.7253E+0	3.6870E+0	2.3052E+0
3258.90	3.06852	2.5816E+0	3.5378E+0	2.1619E+0	3265.30	3.06251	2.7309E+0	3.6929E+0	2.3107E+0
3259.15	3.06829	2.5790E+0	3.5352E+0	2.1592E+0	3265.40	3.06242	2.7377E+0	3.7000E+0	2.3175E+0
3259.40	3.06805	2.5767E+0	3.5329E+0	2.1569E+0	3265.60	3.06223	2.7531E+0	3.7155E+0	2.3330E+0
3259.65	3.06782	2.5746E+0	3.5308E+0	2.1548E+0	3265.80	3.06204	2.7692E+0	3.7313E+0	2.3492E+0
3259.90	3.06758	2.5753E+0	3.5314E+0	2.1554E+0	3266.00	3.06185	2.7859E+0	3.7477E+0	2.3660E+0
3260.00	3.06749	2.5766E+0	3.5326E+0	2.1567E+0	3266.20	3.06167	2.8031E+0	3.7642E+0	2.3834E+0
3260.10	3.06739	2.5815E+0	3.5374E+0	2.1616E+0	3266.40	3.06148	2.8194E+0	3.7799E+0	2.3999E+0
3260.20	3.06730	2.5883E+0	3.5441E+0	2.1685E+0	3266.50	3.06138	2.8272E+0	3.7873E+0	2.4078E+0
3260.40	3.06711	2.6091E+0	3.5646E+0	2.1895E+0	3266.60	3.06129	2.8348E+0	3.7945E+0	2.4154E+0
3260.60	3.06692	2.6409E+0	3.5965E+0	2.2213E+0	3266.70	3.06120	2.8416E+0	3.8009E+0	2.4223E+0
3260.80	3.06674	2.6818E+0	3.6378E+0	2.2625E+0	3266.80	3.06110	2.8466E+0	3.8057E+0	2.4274E+0
3260.90	3.06664	2.7022E+0	3.6586E+0	2.2830E+0	3266.90	3.06101	2.8498E+0	3.8087E+0	2.4306E+0
3261.00	3.06655	2.7184E+0	3.6752E+0	2.2993E+0	3267.00	3.06092	2.8522E+0	3.8109E+0	2.4330E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3267.10	3.06082	2.8532E+0	3.8118E+0	2.4340E+0	3273.00	3.05530	2.3909E+0	3.3520E+0	1.9700E+0
3267.20	3.06073	2.8521E+0	3.8106E+0	2.4329E+0	3273.10	3.05521	2.3795E+0	3.3406E+0	1.9586E+0
3267.30	3.06063	2.8495E+0	3.8080E+0	2.4303E+0	3273.20	3.05512	2.3697E+0	3.3309E+0	1.9488E+0
3267.40	3.06054	2.8452E+0	3.8038E+0	2.4259E+0	3273.40	3.05493	2.3538E+0	3.3150E+0	1.9329E+0
3267.60	3.06035	2.8339E+0	3.7926E+0	2.4145E+0	3274.40	3.05400	2.2876E+0	3.2491E+0	1.8666E+0
3267.80	3.06017	2.8186E+0	3.7776E+0	2.3992E+0	3274.90	3.05353	2.2554E+0	3.2171E+0	1.8344E+0
3267.90	3.06007	2.8095E+0	3.7686E+0	2.3900E+0	3275.40	3.05306	2.2258E+0	3.1877E+0	1.8047E+0
3268.00	3.05998	2.7993E+0	3.7585E+0	2.3798E+0	3275.70	3.05279	2.2098E+0	3.1719E+0	1.7887E+0
3268.20	3.05979	2.7729E+0	3.7324E+0	2.3533E+0	3275.90	3.05260	2.1998E+0	3.1621E+0	1.7787E+0
3268.40	3.05960	2.7421E+0	3.7022E+0	2.3224E+0	3276.10	3.05241	2.1906E+0	3.1529E+0	1.7696E+0
3268.60	3.05942	2.7073E+0	3.6677E+0	2.2875E+0	3276.40	3.05213	2.1778E+0	3.1401E+0	1.7567E+0
3268.80	3.05923	2.6686E+0	3.6289E+0	2.2486E+0	3277.40	3.05120	2.1378E+0	3.1003E+0	1.7170E+0
3269.00	3.05904	2.6329E+0	3.5928E+0	2.2129E+0	3277.90	3.05074	2.1186E+0	3.0813E+0	1.6979E+0
3269.20	3.05886	2.6027E+0	3.5622E+0	2.1826E+0	3278.40	3.05027	2.1013E+0	3.0640E+0	1.6807E+0
3269.30	3.05876	2.5889E+0	3.5483E+0	2.1687E+0	3278.90	3.04981	2.0854E+0	3.0482E+0	1.6650E+0
3269.40	3.05867	2.5764E+0	3.5358E+0	2.1563E+0	3279.40	3.04934	2.0710E+0	3.0339E+0	1.6507E+0
3269.60	3.05848	2.5531E+0	3.5127E+0	2.1329E+0	3279.90	3.04888	2.0582E+0	3.0211E+0	1.6379E+0
3269.80	3.05829	2.5320E+0	3.4920E+0	2.1119E+0	3280.40	3.04841	2.0467E+0	3.0096E+0	1.6264E+0
3270.00	3.05811	2.5131E+0	3.4735E+0	2.0931E+0	3280.90	3.04795	2.0378E+0	3.0008E+0	1.6175E+0
3270.20	3.05792	2.4986E+0	3.4592E+0	2.0786E+0	3281.15	3.04771	2.0344E+0	2.9975E+0	1.6141E+0
3270.40	3.05773	2.4866E+0	3.4475E+0	2.0667E+0	3281.40	3.04748	2.0318E+0	2.9948E+0	1.6114E+0
3270.50	3.05764	2.4813E+0	3.4422E+0	2.0613E+0	3281.65	3.04725	2.0294E+0	2.9924E+0	1.6090E+0
3270.60	3.05755	2.4780E+0	3.4390E+0	2.0581E+0	3282.40	3.04655	2.0232E+0	2.9863E+0	1.6027E+0
3270.70	3.05745	2.4756E+0	3.4368E+0	2.0558E+0	3282.90	3.04609	2.0193E+0	2.9826E+0	1.5988E+0
3270.80	3.05736	2.4747E+0	3.4358E+0	2.0549E+0	3283.40	3.04563	2.0167E+0	2.9802E+0	1.5959E+0
3270.90	3.05727	2.4746E+0	3.4357E+0	2.0549E+0	3283.65	3.04539	2.0166E+0	2.9802E+0	1.5956E+0
3271.00	3.05717	2.4765E+0	3.4376E+0	2.0568E+0	3283.90	3.04516	2.0179E+0	2.9816E+0	1.5967E+0
3271.10	3.05708	2.4807E+0	3.4417E+0	2.0611E+0	3284.15	3.04493	2.0209E+0	2.9847E+0	1.5995E+0
3271.20	3.05699	2.4907E+0	3.4517E+0	2.0712E+0	3284.40	3.04470	2.0254E+0	2.9893E+0	1.6038E+0
3271.30	3.05689	2.5086E+0	3.4695E+0	2.0891E+0	3284.65	3.04447	2.0303E+0	2.9943E+0	1.6085E+0
3271.40	3.05680	2.5487E+0	3.5096E+0	2.1290E+0	3284.90	3.04423	2.0351E+0	2.9992E+0	1.6134E+0
3271.50	3.05670	2.6059E+0	3.5664E+0	2.1861E+0	3285.15	3.04400	2.0402E+0	3.0043E+0	1.6185E+0
3271.60	3.05661	2.6857E+0	3.6453E+0	2.2662E+0	3285.40	3.04377	2.0447E+0	3.0089E+0	1.6232E+0
3271.70	3.05652	2.7657E+0	3.7241E+0	2.3466E+0	3285.90	3.04331	2.0537E+0	3.0179E+0	1.6327E+0
3271.75	3.05647	2.8018E+0	3.7595E+0	2.3829E+0	3286.10	3.04312	2.0567E+0	3.0207E+0	1.6360E+0
3271.80	3.05642	2.8327E+0	3.7899E+0	2.4140E+0	3286.20	3.04303	2.0573E+0	3.0213E+0	1.6368E+0
3271.85	3.05638	2.8549E+0	3.8117E+0	2.4363E+0	3286.30	3.04294	2.0561E+0	3.0200E+0	1.6356E+0
3271.90	3.05633	2.8705E+0	3.8269E+0	2.4521E+0	3286.40	3.04284	2.0528E+0	3.0168E+0	1.6324E+0
3271.95	3.05628	2.8771E+0	3.8326E+0	2.4587E+0	3286.50	3.04275	2.0486E+0	3.0126E+0	1.6281E+0
3272.00	3.05624	2.8741E+0	3.8291E+0	2.4558E+0	3286.60	3.04266	2.0432E+0	3.0073E+0	1.6226E+0
3272.05	3.05619	2.8614E+0	3.8159E+0	2.4431E+0	3286.70	3.04257	2.0365E+0	3.0007E+0	1.6157E+0
3272.10	3.05614	2.8386E+0	3.7932E+0	2.4202E+0	3286.80	3.04247	2.0285E+0	2.9927E+0	1.6075E+0
3272.20	3.05605	2.7617E+0	3.7172E+0	2.3425E+0	3286.90	3.04238	2.0191E+0	2.9834E+0	1.5977E+0
3272.30	3.05596	2.6692E+0	3.6261E+0	2.2492E+0	3287.00	3.04229	2.0088E+0	2.9732E+0	1.5871E+0
3272.40	3.05586	2.5863E+0	3.5447E+0	2.1657E+0	3287.20	3.04210	1.9896E+0	2.9541E+0	1.5672E+0
3272.50	3.05577	2.5238E+0	3.4832E+0	2.1029E+0	3287.40	3.04192	1.9723E+0	2.9368E+0	1.5493E+0
3272.60	3.05568	2.4830E+0	3.4430E+0	2.0620E+0	3287.60	3.04173	1.9564E+0	2.9211E+0	1.5330E+0
3272.70	3.05558	2.4520E+0	3.4124E+0	2.0310E+0	3287.80	3.04155	1.9414E+0	2.9062E+0	1.5175E+0
3272.80	3.05549	2.4263E+0	3.3870E+0	2.0054E+0	3287.90	3.04146	1.9358E+0	2.9006E+0	1.5118E+0
3272.90	3.05540	2.4068E+0	3.3677E+0	1.9859E+0	3288.00	3.04136	1.9318E+0	2.8966E+0	1.5078E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3288.10	3.04127	1.9298E+0	2.8946E+0	1.5060E+0	3294.80	3.03509	2.6352E+0	3.6025E+0	2.2137E+0
3288.20	3.04118	1.9293E+0	2.8939E+0	1.5057E+0	3295.00	3.03490	2.6955E+0	3.6622E+0	2.2741E+0
3288.30	3.04109	1.9293E+0	2.8938E+0	1.5060E+0	3295.20	3.03472	2.7637E+0	3.7292E+0	2.3427E+0
3288.40	3.04099	1.9297E+0	2.8940E+0	1.5067E+0	3295.40	3.03453	2.8217E+0	3.7862E+0	2.4010E+0
3288.50	3.04090	1.9300E+0	2.8943E+0	1.5073E+0	3295.50	3.03444	2.8479E+0	3.8119E+0	2.4273E+0
3288.60	3.04081	1.9294E+0	2.8936E+0	1.5069E+0	3295.60	3.03435	2.8688E+0	3.8326E+0	2.4484E+0
3288.70	3.04072	1.9279E+0	2.8921E+0	1.5056E+0	3295.70	3.03426	2.8860E+0	3.8496E+0	2.4657E+0
3288.80	3.04062	1.9257E+0	2.8898E+0	1.5035E+0	3295.80	3.03416	2.8986E+0	3.8622E+0	2.4783E+0
3289.00	3.04044	1.9202E+0	2.8844E+0	1.4981E+0	3295.90	3.03407	2.9054E+0	3.8691E+0	2.4851E+0
3289.20	3.04025	1.9142E+0	2.8784E+0	1.4920E+0	3296.00	3.03398	2.9078E+0	3.8717E+0	2.4875E+0
3289.40	3.04007	1.9077E+0	2.8720E+0	1.4855E+0	3296.10	3.03389	2.9064E+0	3.8706E+0	2.4861E+0
3289.60	3.03988	1.9012E+0	2.8657E+0	1.4789E+0	3296.20	3.03380	2.9028E+0	3.8675E+0	2.4825E+0
3289.80	3.03970	1.8952E+0	2.8599E+0	1.4729E+0	3296.30	3.03370	2.8985E+0	3.8634E+0	2.4780E+0
3290.00	3.03951	1.8901E+0	2.8549E+0	1.4677E+0	3296.40	3.03361	2.8928E+0	3.8580E+0	2.4723E+0
3290.10	3.03942	1.8881E+0	2.8530E+0	1.4657E+0	3296.50	3.03352	2.8858E+0	3.8513E+0	2.4653E+0
3290.20	3.03933	1.8873E+0	2.8523E+0	1.4650E+0	3296.60	3.03343	2.8781E+0	3.8437E+0	2.4575E+0
3290.30	3.03924	1.8873E+0	2.8523E+0	1.4650E+0	3296.70	3.03334	2.8682E+0	3.8340E+0	2.4476E+0
3290.40	3.03915	1.8879E+0	2.8529E+0	1.4658E+0	3296.80	3.03324	2.8571E+0	3.8231E+0	2.4364E+0
3290.60	3.03896	1.8897E+0	2.8548E+0	1.4679E+0	3296.90	3.03315	2.8429E+0	3.8093E+0	2.4222E+0
3290.80	3.03878	1.8922E+0	2.8574E+0	1.4706E+0	3297.00	3.03306	2.8266E+0	3.7933E+0	2.4058E+0
3291.00	3.03859	1.8951E+0	2.8605E+0	1.4739E+0	3297.20	3.03288	2.7896E+0	3.7570E+0	2.3685E+0
3291.10	3.03850	1.8983E+0	2.8637E+0	1.4771E+0	3297.40	3.03269	2.7509E+0	3.7189E+0	2.3295E+0
3291.20	3.03841	1.9034E+0	2.8689E+0	1.4825E+0	3297.50	3.03260	2.7337E+0	3.7017E+0	2.3122E+0
3291.30	3.03831	1.9103E+0	2.8758E+0	1.4895E+0	3297.60	3.03251	2.7194E+0	3.6871E+0	2.2979E+0
3291.40	3.03822	1.9181E+0	2.8837E+0	1.4976E+0	3297.70	3.03242	2.7082E+0	3.6757E+0	2.2867E+0
3291.50	3.03813	1.9271E+0	2.8927E+0	1.5067E+0	3297.80	3.03232	2.7062E+0	3.6733E+0	2.2847E+0
3291.60	3.03804	1.9374E+0	2.9031E+0	1.5170E+0	3297.90	3.03223	2.7085E+0	3.6755E+0	2.2871E+0
3291.80	3.03785	1.9620E+0	2.9280E+0	1.5414E+0	3298.00	3.03214	2.7314E+0	3.6987E+0	2.3101E+0
3291.90	3.03776	1.9773E+0	2.9434E+0	1.5565E+0	3298.10	3.03205	2.7686E+0	3.7369E+0	2.3472E+0
3292.00	3.03767	1.9939E+0	2.9602E+0	1.5730E+0	3298.15	3.03200	2.7971E+0	3.7663E+0	2.3758E+0
3292.10	3.03758	2.0118E+0	2.9783E+0	1.5908E+0	3298.20	3.03196	2.8362E+0	3.8059E+0	2.4150E+0
3292.20	3.03748	2.0310E+0	2.9976E+0	1.6098E+0	3298.25	3.03191	2.8797E+0	3.8495E+0	2.4585E+0
3292.40	3.03730	2.0729E+0	3.0396E+0	1.6515E+0	3298.30	3.03186	2.9233E+0	3.8933E+0	2.5020E+0
3292.60	3.03711	2.1216E+0	3.0884E+0	1.7000E+0	3298.35	3.03182	2.9653E+0	3.9349E+0	2.5440E+0
3292.80	3.03693	2.1796E+0	3.1462E+0	1.7580E+0	3298.40	3.03177	3.0087E+0	3.9774E+0	2.5874E+0
3292.90	3.03684	2.2150E+0	3.1812E+0	1.7935E+0	3298.45	3.03173	3.0502E+0	4.0166E+0	2.6293E+0
3293.00	3.03675	2.2558E+0	3.2217E+0	1.8344E+0	3298.50	3.03168	3.0778E+0	4.0421E+0	2.6573E+0
3293.10	3.03665	2.3019E+0	3.2672E+0	1.8806E+0	3298.55	3.03164	3.0969E+0	4.0589E+0	2.6768E+0
3293.20	3.03656	2.3537E+0	3.3181E+0	1.9325E+0	3298.60	3.03159	3.1068E+0	4.0668E+0	2.6870E+0
3293.30	3.03647	2.4066E+0	3.3701E+0	1.9856E+0	3298.65	3.03154	3.1056E+0	4.0639E+0	2.6860E+0
3293.40	3.03638	2.4478E+0	3.4108E+0	2.0269E+0	3298.70	3.03150	3.0914E+0	4.0486E+0	2.6718E+0
3293.50	3.03628	2.4791E+0	3.4419E+0	2.0582E+0	3298.80	3.03141	3.0124E+0	3.9689E+0	2.5925E+0
3293.60	3.03619	2.4992E+0	3.4620E+0	2.0783E+0	3298.90	3.03131	2.8922E+0	3.8499E+0	2.4722E+0
3293.70	3.03610	2.5129E+0	3.4759E+0	2.0920E+0	3299.00	3.03122	2.7595E+0	3.7192E+0	2.3393E+0
3293.80	3.03601	2.5208E+0	3.4843E+0	2.0999E+0	3299.10	3.03113	2.6402E+0	3.6022E+0	2.2197E+0
3294.00	3.03582	2.5295E+0	3.4942E+0	2.1084E+0	3299.20	3.03104	2.5571E+0	3.5209E+0	2.1360E+0
3294.20	3.03564	2.5390E+0	3.5049E+0	2.1178E+0	3299.30	3.03095	2.4935E+0	3.4585E+0	2.0720E+0
3294.40	3.03545	2.5568E+0	3.5237E+0	2.1353E+0	3299.40	3.03085	2.4414E+0	3.4070E+0	2.0196E+0
3294.50	3.03536	2.5701E+0	3.5374E+0	2.1486E+0	3299.50	3.03076	2.3968E+0	3.3627E+0	1.9746E+0
3294.60	3.03527	2.5883E+0	3.5557E+0	2.1668E+0	3299.60	3.03067	2.3607E+0	3.3266E+0	1.9385E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3299.70	3.03058	2.3258E+0	3.2917E+0	1.9034E+0	3305.50	3.02526	3.3943E+0	4.3666E+0	2.9734E+0
3299.80	3.03049	2.2985E+0	3.2643E+0	1.8761E+0	3305.60	3.02517	3.1223E+0	4.0955E+0	2.7006E+0
3299.90	3.03039	2.2738E+0	3.2394E+0	1.8513E+0	3305.70	3.02508	2.9250E+0	3.8958E+0	2.5036E+0
3300.00	3.03030	2.2527E+0	3.2181E+0	1.8304E+0	3305.75	3.02503	2.8415E+0	3.8111E+0	2.4202E+0
3300.20	3.03012	2.2173E+0	3.1824E+0	1.7951E+0	3305.80	3.02499	2.7738E+0	3.7418E+0	2.3526E+0
3300.40	3.02994	2.1884E+0	3.1536E+0	1.7663E+0	3305.85	3.02494	2.7132E+0	3.6803E+0	2.2921E+0
3300.60	3.02975	2.1630E+0	3.1284E+0	1.7409E+0	3305.90	3.02489	2.6589E+0	3.6251E+0	2.2379E+0
3300.80	3.02957	2.1418E+0	3.1073E+0	1.7196E+0	3306.00	3.02480	2.5651E+0	3.5306E+0	2.1444E+0
3301.00	3.02938	2.1247E+0	3.0904E+0	1.7024E+0	3306.10	3.02471	2.4823E+0	3.4478E+0	2.0617E+0
3301.20	3.02920	2.1101E+0	3.0759E+0	1.6879E+0	3306.20	3.02462	2.4112E+0	3.3769E+0	1.9906E+0
3301.40	3.02902	2.0983E+0	3.0641E+0	1.6762E+0	3306.30	3.02453	2.3433E+0	3.3094E+0	1.9230E+0
3301.60	3.02883	2.0891E+0	3.0548E+0	1.6673E+0	3306.40	3.02444	2.2873E+0	3.2538E+0	1.8668E+0
3301.80	3.02865	2.0824E+0	3.0478E+0	1.6610E+0	3306.50	3.02435	2.2365E+0	3.2037E+0	1.8159E+0
3302.00	3.02847	2.0804E+0	3.0455E+0	1.6596E+0	3306.60	3.02425	2.1905E+0	3.1580E+0	1.7699E+0
3302.20	3.02828	2.0857E+0	3.0503E+0	1.6654E+0	3306.70	3.02416	2.1526E+0	3.1203E+0	1.7320E+0
3302.40	3.02810	2.0978E+0	3.0621E+0	1.6776E+0	3306.80	3.02407	2.1203E+0	3.0880E+0	1.6998E+0
3302.60	3.02792	2.1171E+0	3.0812E+0	1.6964E+0	3306.90	3.02398	2.0933E+0	3.0608E+0	1.6733E+0
3302.70	3.02783	2.1297E+0	3.0940E+0	1.7087E+0	3307.00	3.02389	2.0710E+0	3.0384E+0	1.6514E+0
3302.80	3.02773	2.1464E+0	3.1110E+0	1.7249E+0	3307.20	3.02370	2.0393E+0	3.0067E+0	1.6193E+0
3302.90	3.02764	2.1672E+0	3.1322E+0	1.7454E+0	3307.40	3.02352	2.0161E+0	2.9836E+0	1.5954E+0
3303.00	3.02755	2.1944E+0	3.1600E+0	1.7724E+0	3307.60	3.02334	1.9972E+0	2.9649E+0	1.5759E+0
3303.10	3.02746	2.2249E+0	3.1910E+0	1.8027E+0	3307.80	3.02316	1.9838E+0	2.9517E+0	1.5620E+0
3303.20	3.02737	2.2592E+0	3.2260E+0	1.8369E+0	3308.00	3.02297	1.9743E+0	2.9423E+0	1.5520E+0
3303.30	3.02728	2.2960E+0	3.2635E+0	1.8737E+0	3308.20	3.02279	1.9687E+0	2.9370E+0	1.5460E+0
3303.40	3.02718	2.3384E+0	3.3065E+0	1.9160E+0	3308.40	3.02261	1.9674E+0	2.9357E+0	1.5445E+0
3303.50	3.02709	2.3851E+0	3.3540E+0	1.9625E+0	3308.65	3.02238	1.9710E+0	2.9393E+0	1.5482E+0
3303.60	3.02700	2.4347E+0	3.4049E+0	2.0120E+0	3308.90	3.02215	1.9766E+0	2.9449E+0	1.5540E+0
3303.70	3.02691	2.4880E+0	3.4600E+0	2.0649E+0	3309.15	3.02192	1.9840E+0	2.9521E+0	1.5615E+0
3303.80	3.02682	2.5645E+0	3.5394E+0	2.1410E+0	3309.40	3.02169	1.9926E+0	2.9607E+0	1.5705E+0
3303.90	3.02673	2.6612E+0	3.6406E+0	2.2367E+0	3309.65	3.02147	2.0022E+0	2.9701E+0	1.5803E+0
3304.00	3.02663	2.8067E+0	3.7909E+0	2.3811E+0	3309.90	3.02124	2.0126E+0	2.9803E+0	1.5912E+0
3304.10	3.02654	3.0340E+0	4.0207E+0	2.6075E+0	3310.15	3.02101	2.0245E+0	2.9920E+0	1.6036E+0
3304.20	3.02645	3.3375E+0	4.3239E+0	2.9111E+0	3310.40	3.02078	2.0385E+0	3.0057E+0	1.6179E+0
3304.30	3.02636	3.7130E+0	4.6964E+0	3.2879E+0	3310.65	3.02055	2.0525E+0	3.0195E+0	1.6324E+0
3304.40	3.02627	4.1289E+0	5.1085E+0	3.7059E+0	3310.90	3.02033	2.0676E+0	3.0343E+0	1.6478E+0
3304.50	3.02618	4.5945E+0	5.5701E+0	4.1741E+0	3311.15	3.02010	2.0846E+0	3.0513E+0	1.6651E+0
3304.60	3.02608	5.0424E+0	6.0144E+0	4.6243E+0	3311.40	3.01987	2.1056E+0	3.0721E+0	1.6859E+0
3304.65	3.02604	5.2387E+0	6.2092E+0	4.8215E+0	3311.60	3.01969	2.1244E+0	3.0909E+0	1.7046E+0
3304.70	3.02599	5.4055E+0	6.3751E+0	4.9889E+0	3311.80	3.01950	2.1451E+0	3.1115E+0	1.7253E+0
3304.75	3.02595	5.5366E+0	6.5052E+0	5.1205E+0	3312.00	3.01932	2.1678E+0	3.1341E+0	1.7478E+0
3304.80	3.02590	5.6392E+0	6.6069E+0	5.2233E+0	3312.20	3.01914	2.1940E+0	3.1601E+0	1.7738E+0
3304.85	3.02586	5.6994E+0	6.6668E+0	5.2835E+0	3312.40	3.01896	2.2225E+0	3.1885E+0	1.8022E+0
3304.90	3.02581	5.7013E+0	6.6682E+0	5.2856E+0	3312.60	3.01878	2.2539E+0	3.2198E+0	1.8333E+0
3304.95	3.02576	5.6191E+0	6.5853E+0	5.2037E+0	3312.80	3.01859	2.2867E+0	3.2527E+0	1.8660E+0
3305.00	3.02572	5.4772E+0	6.4422E+0	5.0622E+0	3313.00	3.01841	2.3223E+0	3.2884E+0	1.9014E+0
3305.05	3.02567	5.2916E+0	6.2542E+0	4.8777E+0	3313.20	3.01823	2.3602E+0	3.3264E+0	1.9391E+0
3305.10	3.02563	5.0656E+0	6.0261E+0	4.6524E+0	3313.40	3.01805	2.3999E+0	3.3662E+0	1.9786E+0
3305.20	3.02553	4.5426E+0	5.5050E+0	4.1277E+0	3313.60	3.01786	2.4440E+0	3.4106E+0	2.0226E+0
3305.30	3.02544	4.0935E+0	5.0591E+0	3.6763E+0	3313.80	3.01768	2.4908E+0	3.4577E+0	2.0693E+0
3305.40	3.02535	3.7120E+0	4.6818E+0	3.2924E+0	3314.00	3.01750	2.5404E+0	3.5075E+0	2.1188E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3314.20	3.01732	2.5959E+0	3.5633E+0	2.1742E+0	3319.70	3.01232	2.5811E+1	2.6693E+1	2.5356E+1
3314.40	3.01714	2.6570E+0	3.6249E+0	2.2353E+0	3319.75	3.01228	2.5076E+1	2.5971E+1	2.4621E+1
3314.60	3.01695	2.7256E+0	3.6937E+0	2.3039E+0	3319.80	3.01223	2.4439E+1	2.5348E+1	2.3984E+1
3314.80	3.01677	2.8074E+0	3.7755E+0	2.3858E+0	3319.85	3.01219	2.4007E+1	2.4925E+1	2.3550E+1
3315.00	3.01659	2.9015E+0	3.8693E+0	2.4802E+0	3319.90	3.01214	2.3696E+1	2.4619E+1	2.3238E+1
3315.20	3.01641	3.0115E+0	3.9783E+0	2.5906E+0	3319.95	3.01209	2.3580E+1	2.4509E+1	2.3118E+1
3315.40	3.01623	3.1353E+0	4.1005E+0	2.7151E+0	3320.00	3.01205	2.3566E+1	2.4499E+1	2.3097E+1
3315.60	3.01604	3.2660E+0	4.2302E+0	2.8464E+0	3320.05	3.01200	2.3697E+1	2.4635E+1	2.3219E+1
3315.80	3.01586	3.4019E+0	4.3658E+0	2.9830E+0	3320.10	3.01196	2.3943E+1	2.4888E+1	2.3451E+1
3315.90	3.01577	3.4748E+0	4.4390E+0	3.0560E+0	3320.15	3.01191	2.4337E+1	2.5293E+1	2.3827E+1
3316.00	3.01568	3.5542E+0	4.5188E+0	3.1357E+0	3320.20	3.01187	2.4844E+1	2.5814E+1	2.4312E+1
3316.10	3.01559	3.6448E+0	4.6102E+0	3.2263E+0	3320.25	3.01182	2.5505E+1	2.6491E+1	2.4944E+1
3316.20	3.01550	3.7466E+0	4.7128E+0	3.3282E+0	3320.35	3.01173	2.7147E+1	2.8178E+1	2.6514E+1
3316.30	3.01541	3.8667E+0	4.8348E+0	3.4480E+0	3320.45	3.01164	2.9261E+1	3.0340E+1	2.8543E+1
3316.40	3.01532	4.0079E+0	4.9789E+0	3.5886E+0	3320.55	3.01155	3.1789E+1	3.2908E+1	3.0985E+1
3316.50	3.01522	4.1691E+0	5.1427E+0	3.7494E+0	3320.65	3.01146	3.4608E+1	3.5803E+1	3.3690E+1
3316.60	3.01513	4.3534E+0	5.3284E+0	3.9338E+0	3320.75	3.01137	3.7629E+1	3.8924E+1	3.6586E+1
3316.80	3.01495	4.8002E+0	5.7752E+0	4.3816E+0	3320.85	3.01128	4.0997E+1	4.2361E+1	3.9847E+1
3316.95	3.01482	5.2076E+0	6.1809E+0	4.7906E+0	3321.05	3.01110	4.8379E+1	4.9809E+1	4.7133E+1
3317.15	3.01464	5.8017E+0	6.7725E+0	5.3866E+0	3321.25	3.01092	5.6878E+1	5.8361E+1	5.5562E+1
3317.35	3.01446	6.3946E+0	7.3649E+0	5.9797E+0	3321.35	3.01083	6.1466E+1	6.2962E+1	6.0129E+1
3317.45	3.01437	6.6863E+0	7.6573E+0	6.2705E+0	3321.45	3.01073	6.5863E+1	6.7362E+1	6.4519E+1
3317.55	3.01427	6.9701E+0	7.9426E+0	6.5529E+0	3321.55	3.01064	6.9682E+1	7.1179E+1	6.8344E+1
3317.65	3.01418	7.2871E+0	8.2610E+0	6.8678E+0	3321.65	3.01055	7.3038E+1	7.4538E+1	7.1700E+1
3317.75	3.01409	7.6457E+0	8.6209E+0	7.2242E+0	3321.70	3.01051	7.4495E+1	7.5971E+1	7.3183E+1
3317.85	3.01400	8.0664E+0	9.0436E+0	7.6401E+0	3321.75	3.01046	7.5632E+1	7.7074E+1	7.4356E+1
3317.95	3.01391	8.6163E+0	9.5969E+0	8.1803E+0	3321.80	3.01042	7.6657E+1	7.8057E+1	7.5425E+1
3318.05	3.01382	9.3201E+0	1.0307E+1	8.8659E+0	3321.85	3.01037	7.7377E+1	7.8726E+1	7.6198E+1
3318.15	3.01373	1.0299E+1	1.1297E+1	9.8130E+0	3321.90	3.01033	7.8033E+1	7.9326E+1	7.6914E+1
3318.25	3.01364	1.1559E+1	1.2580E+1	1.1020E+1	3321.95	3.01028	7.8545E+1	7.9776E+1	7.7493E+1
3318.35	3.01355	1.3340E+1	1.4424E+1	1.2694E+1	3322.05	3.01019	7.9287E+1	8.0413E+1	7.8344E+1
3318.45	3.01346	1.5745E+1	1.6922E+1	1.4941E+1	3322.15	3.01010	7.9743E+1	8.0766E+1	7.8906E+1
3318.55	3.01337	1.9103E+1	2.0385E+1	1.8160E+1	3322.25	3.01001	8.0030E+1	8.0955E+1	7.9296E+1
3318.65	3.01328	2.3218E+1	2.4634E+1	2.2113E+1	3322.35	3.00992	8.0339E+1	8.1189E+1	7.9684E+1
3318.75	3.01318	2.8524E+1	3.0164E+1	2.7195E+1	3322.45	3.00983	8.0932E+1	8.1733E+1	8.0326E+1
3318.85	3.01309	3.4575E+1	3.6430E+1	3.2993E+1	3322.55	3.00974	8.1937E+1	8.2714E+1	8.1351E+1
3318.90	3.01305	3.7291E+1	3.9200E+1	3.5635E+1	3322.65	3.00965	8.3559E+1	8.4340E+1	8.2960E+1
3318.95	3.01300	3.9514E+1	4.1400E+1	3.7833E+1	3322.75	3.00956	8.5668E+1	8.6470E+1	8.5035E+1
3319.00	3.01296	4.1342E+1	4.3120E+1	3.9737E+1	3322.85	3.00947	8.8491E+1	8.9339E+1	8.7795E+1
3319.05	3.01291	4.2529E+1	4.4174E+1	4.1060E+1	3322.95	3.00938	9.1807E+1	9.2715E+1	9.1034E+1
3319.10	3.01287	4.3186E+1	4.4687E+1	4.1869E+1	3323.05	3.00928	9.5316E+1	9.6296E+1	9.4457E+1
3319.15	3.01282	4.3027E+1	4.4385E+1	4.1867E+1	3323.25	3.00910	1.0244E+2	1.0354E+2	1.0144E+2
3319.20	3.01278	4.2157E+1	4.3387E+1	4.1146E+1	3323.35	3.00901	1.0578E+2	1.0692E+2	1.0474E+2
3319.25	3.01273	4.0820E+1	4.1949E+1	3.9936E+1	3323.45	3.00892	1.0892E+2	1.1004E+2	1.0788E+2
3319.30	3.01268	3.9151E+1	4.0206E+1	3.8380E+1	3323.55	3.00883	1.1172E+2	1.1278E+2	1.1074E+2
3319.35	3.01264	3.7144E+1	3.8127E+1	3.6478E+1	3323.65	3.00874	1.1408E+2	1.1509E+2	1.1315E+2
3319.45	3.01255	3.3072E+1	3.3986E+1	3.2523E+1	3323.75	3.00865	1.1606E+2	1.1699E+2	1.1521E+2
3319.55	3.01246	2.9423E+1	3.0307E+1	2.8937E+1	3323.85	3.00856	1.1783E+2	1.1869E+2	1.1706E+2
3319.60	3.01241	2.7958E+1	2.8832E+1	2.7490E+1	3323.95	3.00847	1.1941E+2	1.2021E+2	1.1871E+2
3319.65	3.01237	2.6763E+1	2.7636E+1	2.6305E+1	3324.05	3.00838	1.2081E+2	1.2155E+2	1.2017E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3324.15	3.00829	1.2182E+2	1.2253E+2	1.2122E+2	3333.95	2.99944	1.1176E+1	1.2130E+1	1.0766E+1
3324.25	3.00820	1.2248E+2	1.2318E+2	1.2188E+2	3334.20	2.99922	1.0588E+1	1.1545E+1	1.0176E+1
3324.30	3.00815	1.2264E+2	1.2334E+2	1.2205E+2	3334.45	2.99899	1.0025E+1	1.0986E+1	9.6129E+0
3324.35	3.00811	1.2262E+2	1.2332E+2	1.2203E+2	3334.95	2.99855	8.9946E+0	9.9609E+0	8.5809E+0
3324.45	3.00802	1.2230E+2	1.2300E+2	1.2171E+2	3335.45	2.99810	8.0722E+0	9.0426E+0	7.6571E+0
3324.55	3.00793	1.2171E+2	1.2241E+2	1.2112E+2	3335.95	2.99765	7.2509E+0	8.2239E+0	6.8348E+0
3324.65	3.00784	1.2062E+2	1.2134E+2	1.2001E+2	3336.45	2.99720	6.5265E+0	7.5013E+0	6.1094E+0
3324.75	3.00775	1.1910E+2	1.1984E+2	1.1847E+2	3336.95	2.99675	5.8634E+0	6.8391E+0	5.4456E+0
3324.85	3.00766	1.1708E+2	1.1785E+2	1.1641E+2	3337.20	2.99652	5.5631E+0	6.5393E+0	5.1449E+0
3324.95	3.00756	1.1476E+2	1.1557E+2	1.1406E+2	3337.45	2.99630	5.2694E+0	6.2458E+0	4.8508E+0
3325.05	3.00747	1.1220E+2	1.1305E+2	1.1146E+2	3337.95	2.99585	4.7384E+0	5.7153E+0	4.3187E+0
3325.15	3.00738	1.0952E+2	1.1041E+2	1.0874E+2	3338.45	2.99540	4.2720E+0	5.2494E+0	3.8510E+0
3325.25	3.00729	1.0678E+2	1.0770E+2	1.0596E+2	3338.95	2.99495	3.8724E+0	4.8504E+0	3.4504E+0
3325.35	3.00720	1.0396E+2	1.0490E+2	1.0313E+2	3339.20	2.99473	3.7026E+0	4.6798E+0	3.2804E+0
3325.45	3.00711	1.0092E+2	1.0186E+2	1.0009E+2	3339.40	2.99455	3.5690E+0	4.5452E+0	3.1467E+0
3325.65	3.00693	9.4560E+1	9.5493E+1	9.3747E+1	3339.66	2.99432	3.4144E+0	4.3894E+0	2.9920E+0
3325.85	3.00675	8.7660E+1	8.8560E+1	8.6894E+1	3339.91	2.99410	3.2662E+0	4.2409E+0	2.8435E+0
3326.05	3.00657	8.1232E+1	8.2109E+1	8.0508E+1	3340.16	2.99387	3.1322E+0	4.1074E+0	2.7091E+0
3326.25	3.00639	7.5558E+1	7.6423E+1	7.4871E+1	3340.41	2.99365	3.0091E+0	3.9849E+0	2.5857E+0
3326.45	3.00621	7.0406E+1	7.1274E+1	6.9750E+1	3340.66	2.99342	2.8924E+0	3.8691E+0	2.4686E+0
3326.65	3.00603	6.5704E+1	6.6572E+1	6.5075E+1	3340.81	2.99329	2.8246E+0	3.8018E+0	2.4006E+0
3326.85	3.00585	6.1373E+1	6.2235E+1	6.0769E+1	3340.91	2.99320	2.7823E+0	3.7597E+0	2.3583E+0
3327.05	3.00567	5.7601E+1	5.8457E+1	5.7019E+1	3341.01	2.99311	2.7406E+0	3.7181E+0	2.3165E+0
3327.25	3.00549	5.4264E+1	5.5115E+1	5.3700E+1	3341.11	2.99302	2.7016E+0	3.6792E+0	2.2776E+0
3327.45	3.00530	5.1243E+1	5.2095E+1	5.0690E+1	3341.21	2.99293	2.6704E+0	3.6480E+0	2.2464E+0
3327.65	3.00512	4.8524E+1	4.9381E+1	4.7975E+1	3341.31	2.99284	2.6494E+0	3.6266E+0	2.2253E+0
3327.85	3.00494	4.6001E+1	4.6866E+1	4.5451E+1	3341.36	2.99280	2.6426E+0	3.6195E+0	2.2186E+0
3328.05	3.00476	4.3655E+1	4.4525E+1	4.3109E+1	3341.41	2.99275	2.6377E+0	3.6143E+0	2.2137E+0
3328.25	3.00458	4.1449E+1	4.2326E+1	4.0904E+1	3341.46	2.99271	2.6362E+0	3.6126E+0	2.2122E+0
3328.45	3.00440	3.9375E+1	4.0259E+1	3.8835E+1	3341.51	2.99266	2.6385E+0	3.6148E+0	2.2146E+0
3328.65	3.00422	3.7449E+1	3.8328E+1	3.6932E+1	3341.61	2.99257	2.6549E+0	3.6311E+0	2.2309E+0
3328.85	3.00404	3.5618E+1	3.6494E+1	3.5120E+1	3341.71	2.99248	2.6831E+0	3.6607E+0	2.2589E+0
3329.05	3.00386	3.3920E+1	3.4800E+1	3.3436E+1	3341.81	2.99239	2.7279E+0	3.7071E+0	2.3035E+0
3329.25	3.00368	3.2291E+1	3.3179E+1	3.1817E+1	3341.91	2.99231	2.7805E+0	3.7600E+0	2.3562E+0
3329.45	3.00350	3.0723E+1	3.1623E+1	3.0255E+1	3341.96	2.99226	2.8111E+0	3.7894E+0	2.3872E+0
3329.65	3.00332	2.9236E+1	3.0151E+1	2.8773E+1	3342.01	2.99222	2.8473E+0	3.8237E+0	2.4238E+0
3329.85	3.00314	2.7819E+1	2.8741E+1	2.7363E+1	3342.06	2.99217	2.8827E+0	3.8566E+0	2.4599E+0
3330.05	3.00296	2.6531E+1	2.7454E+1	2.6085E+1	3342.11	2.99213	2.9110E+0	3.8826E+0	2.4886E+0
3330.45	3.00260	2.4216E+1	2.5130E+1	2.3785E+1	3342.16	2.99208	2.9248E+0	3.8942E+0	2.5029E+0
3330.85	3.00224	2.2120E+1	2.3032E+1	2.1699E+1	3342.21	2.99204	2.9286E+0	3.8962E+0	2.5068E+0
3331.45	3.00170	1.9326E+1	2.0242E+1	1.8915E+1	3342.26	2.99199	2.9144E+0	3.8808E+0	2.4928E+0
3331.70	3.00147	1.8282E+1	1.9200E+1	1.7873E+1	3342.31	2.99195	2.8908E+0	3.8565E+0	2.4691E+0
3331.95	3.00125	1.7298E+1	1.8218E+1	1.6891E+1	3342.36	2.99190	2.8524E+0	3.8181E+0	2.4305E+0
3332.20	3.00102	1.6384E+1	1.7306E+1	1.5978E+1	3342.41	2.99186	2.8043E+0	3.7704E+0	2.3822E+0
3332.45	3.00080	1.5520E+1	1.6445E+1	1.5114E+1	3342.51	2.99177	2.6905E+0	3.6582E+0	2.2679E+0
3332.70	3.00057	1.4698E+1	1.5627E+1	1.4292E+1	3342.61	2.99168	2.5552E+0	3.5250E+0	2.1323E+0
3332.95	3.00034	1.3919E+1	1.4853E+1	1.3513E+1	3342.71	2.99159	2.4221E+0	3.3938E+0	1.9990E+0
3333.20	3.00012	1.3180E+1	1.4120E+1	1.2773E+1	3342.81	2.99150	2.3111E+0	3.2839E+0	1.8880E+0
3333.45	2.99989	1.2477E+1	1.3421E+1	1.2069E+1	3342.91	2.99141	2.2152E+0	3.1889E+0	1.7923E+0
3333.70	2.99967	1.1807E+1	1.2757E+1	1.1398E+1	3343.01	2.99132	2.1471E+0	3.1211E+0	1.7243E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3343.11	2.99123	2.0968E+0	3.0710E+0	1.6743E+0	3363.41	2.97317	2.1568E+0	3.1264E+0	1.7346E+0
3343.21	2.99114	2.0644E+0	3.0382E+0	1.6424E+0	3364.41	2.97229	2.2049E+0	3.1748E+0	1.7824E+0
3343.31	2.99105	2.0403E+0	3.0138E+0	1.6184E+0	3365.41	2.97141	2.2547E+0	3.2251E+0	1.8320E+0
3343.41	2.99096	2.0239E+0	2.9969E+0	1.6018E+0	3366.41	2.97052	2.3067E+0	3.2775E+0	1.8837E+0
3343.51	2.99087	2.0098E+0	2.9825E+0	1.5876E+0	3367.41	2.96964	2.3605E+0	3.3318E+0	1.9372E+0
3343.61	2.99078	1.9975E+0	2.9699E+0	1.5752E+0	3368.41	2.96876	2.4165E+0	3.3883E+0	1.9931E+0
3343.71	2.99069	1.9864E+0	2.9586E+0	1.5639E+0	3369.41	2.96788	2.4768E+0	3.4491E+0	2.0534E+0
3343.81	2.99060	1.9759E+0	2.9479E+0	1.5533E+0	3370.41	2.96700	2.5427E+0	3.5155E+0	2.1192E+0
3344.01	2.99043	1.9578E+0	2.9295E+0	1.5350E+0	3371.41	2.96612	2.6127E+0	3.5862E+0	2.1892E+0
3344.21	2.99025	1.9429E+0	2.9143E+0	1.5198E+0	3372.41	2.96524	2.6858E+0	3.6601E+0	2.2622E+0
3344.41	2.99007	1.9309E+0	2.9021E+0	1.5077E+0	3373.41	2.96436	2.7623E+0	3.7375E+0	2.3387E+0
3344.61	2.98989	1.9208E+0	2.8918E+0	1.4974E+0	3374.41	2.96348	2.8489E+0	3.8248E+0	2.4252E+0
3344.81	2.98971	1.9122E+0	2.8831E+0	1.4888E+0	3375.41	2.96260	2.9399E+0	3.9168E+0	2.5160E+0
3345.01	2.98953	1.9045E+0	2.8753E+0	1.4812E+0	3375.91	2.96216	2.9873E+0	3.9645E+0	2.5633E+0
3345.21	2.98935	1.8979E+0	2.8687E+0	1.4747E+0	3376.41	2.96173	3.0362E+0	4.0136E+0	2.6123E+0
3345.41	2.98917	1.8917E+0	2.8623E+0	1.4685E+0	3376.91	2.96129	3.0867E+0	4.0644E+0	2.6628E+0
3345.91	2.98873	1.8779E+0	2.8483E+0	1.4549E+0	3377.41	2.96085	3.1393E+0	4.1172E+0	2.7155E+0
3346.41	2.98828	1.8661E+0	2.8364E+0	1.4433E+0	3377.91	2.96041	3.1952E+0	4.1731E+0	2.7714E+0
3346.91	2.98783	1.8559E+0	2.8260E+0	1.4331E+0	3378.41	2.95997	3.2559E+0	4.2336E+0	2.8323E+0
3347.41	2.98739	1.8473E+0	2.8173E+0	1.4245E+0	3379.41	2.95910	3.3826E+0	4.3600E+0	2.9594E+0
3347.91	2.98694	1.8401E+0	2.8099E+0	1.4171E+0	3380.41	2.95822	3.5148E+0	4.4918E+0	3.0919E+0
3348.16	2.98672	1.8367E+0	2.8065E+0	1.4137E+0	3381.41	2.95735	3.6500E+0	4.6267E+0	3.2275E+0
3348.41	2.98650	1.8347E+0	2.8045E+0	1.4118E+0	3381.91	2.95691	3.7185E+0	4.6951E+0	3.2962E+0
3348.66	2.98627	1.8339E+0	2.8036E+0	1.4108E+0	3382.41	2.95647	3.7875E+0	4.7639E+0	3.3654E+0
3348.91	2.98605	1.8336E+0	2.8032E+0	1.4105E+0	3382.91	2.95603	3.8571E+0	4.8335E+0	3.4352E+0
3349.16	2.98583	1.8336E+0	2.8032E+0	1.4105E+0	3383.41	2.95560	3.9257E+0	4.9020E+0	3.5041E+0
3349.41	2.98560	1.8339E+0	2.8034E+0	1.4108E+0	3383.91	2.95516	3.9953E+0	4.9714E+0	3.5739E+0
3349.66	2.98538	1.8347E+0	2.8042E+0	1.4116E+0	3384.41	2.95472	4.0637E+0	5.0398E+0	3.6426E+0
3349.91	2.98516	1.8359E+0	2.8054E+0	1.4129E+0	3384.66	2.95451	4.0966E+0	5.0727E+0	3.6755E+0
3350.41	2.98471	1.8377E+0	2.8070E+0	1.4150E+0	3384.91	2.95429	4.1268E+0	5.1031E+0	3.7057E+0
3351.41	2.98382	1.8438E+0	2.8128E+0	1.4218E+0	3385.16	2.95407	4.1502E+0	5.1272E+0	3.7290E+0
3352.41	2.98293	1.8527E+0	2.8215E+0	1.4310E+0	3385.41	2.95385	4.1765E+0	5.1539E+0	3.7551E+0
3352.66	2.98271	1.8554E+0	2.8242E+0	1.4338E+0	3385.66	2.95363	4.2054E+0	5.1831E+0	3.7839E+0
3352.91	2.98249	1.8585E+0	2.8272E+0	1.4369E+0	3385.91	2.95342	4.2370E+0	5.2149E+0	3.8156E+0
3353.16	2.98226	1.8618E+0	2.8305E+0	1.4404E+0	3386.41	2.95298	4.3017E+0	5.2798E+0	3.8803E+0
3353.41	2.98204	1.8654E+0	2.8340E+0	1.4441E+0	3387.41	2.95211	4.4329E+0	5.4114E+0	4.0118E+0
3354.41	2.98115	1.8813E+0	2.8496E+0	1.4603E+0	3388.41	2.95124	4.5649E+0	5.5434E+0	4.1441E+0
3355.41	2.98026	1.8985E+0	2.8667E+0	1.4775E+0	3389.41	2.95037	4.6962E+0	5.6748E+0	4.2757E+0
3356.41	2.97938	1.9177E+0	2.8858E+0	1.4966E+0	3389.91	2.94993	4.7596E+0	5.7383E+0	4.3392E+0
3356.91	2.97893	1.9277E+0	2.8960E+0	1.5066E+0	3390.41	2.94949	4.8169E+0	5.7959E+0	4.3965E+0
3357.41	2.97849	1.9387E+0	2.9071E+0	1.5174E+0	3390.91	2.94906	4.8707E+0	5.8500E+0	4.4504E+0
3357.91	2.97805	1.9503E+0	2.9189E+0	1.5290E+0	3391.41	2.94862	4.9243E+0	5.9039E+0	4.5039E+0
3358.41	2.97760	1.9637E+0	2.9324E+0	1.5421E+0	3392.41	2.94776	5.0201E+0	5.9999E+0	4.5997E+0
3358.91	2.97716	1.9781E+0	2.9470E+0	1.5564E+0	3392.91	2.94732	5.0640E+0	6.0438E+0	4.6438E+0
3359.41	2.97672	1.9936E+0	2.9626E+0	1.5718E+0	3393.16	2.94710	5.0820E+0	6.0618E+0	4.6619E+0
3359.91	2.97627	2.0105E+0	2.9797E+0	1.5885E+0	3393.41	2.94689	5.0965E+0	6.0762E+0	4.6763E+0
3360.41	2.97583	2.0287E+0	2.9980E+0	1.6066E+0	3393.66	2.94667	5.1044E+0	6.0839E+0	4.6844E+0
3360.91	2.97539	2.0476E+0	3.0170E+0	1.6254E+0	3393.91	2.94645	5.1063E+0	6.0857E+0	4.6863E+0
3361.41	2.97494	2.0679E+0	3.0374E+0	1.6457E+0	3394.16	2.94624	5.1032E+0	6.0827E+0	4.6832E+0
3362.41	2.97406	2.1114E+0	3.0809E+0	1.6893E+0	3394.41	2.94602	5.1014E+0	6.0810E+0	4.6814E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3394.66	2.94580	5.1040E+0	6.0837E+0	4.6839E+0	3402.51	2.93900	6.2921E+0	7.2697E+0	5.8743E+0
3394.91	2.94558	5.1110E+0	6.0908E+0	4.6909E+0	3402.61	2.93892	6.3321E+0	7.3092E+0	5.9144E+0
3395.16	2.94537	5.1175E+0	6.0975E+0	4.6974E+0	3402.81	2.93875	6.4296E+0	7.4060E+0	6.0123E+0
3395.29	2.94526	5.1221E+0	6.1020E+0	4.7019E+0	3403.01	2.93857	6.5275E+0	7.5038E+0	6.1103E+0
3395.41	2.94515	5.1281E+0	6.1080E+0	4.7079E+0	3403.21	2.93840	6.5994E+0	7.5764E+0	6.1820E+0
3395.66	2.94493	5.1423E+0	6.1222E+0	4.7222E+0	3403.31	2.93831	6.6299E+0	7.6072E+0	6.2125E+0
3395.91	2.94472	5.1584E+0	6.1381E+0	4.7383E+0	3403.41	2.93823	6.6575E+0	7.6352E+0	6.2400E+0
3396.16	2.94450	5.1756E+0	6.1552E+0	4.7556E+0	3403.51	2.93814	6.6803E+0	7.6582E+0	6.2627E+0
3396.41	2.94428	5.1949E+0	6.1742E+0	4.7751E+0	3403.61	2.93805	6.6998E+0	7.6778E+0	6.2821E+0
3396.66	2.94407	5.2158E+0	6.1948E+0	4.7961E+0	3403.71	2.93797	6.7157E+0	7.6938E+0	6.2980E+0
3396.79	2.94396	5.2258E+0	6.2047E+0	4.8062E+0	3403.81	2.93788	6.7279E+0	7.7060E+0	6.3103E+0
3396.91	2.94385	5.2352E+0	6.2140E+0	4.8156E+0	3403.91	2.93780	6.7377E+0	7.7157E+0	6.3201E+0
3397.04	2.94374	5.2439E+0	6.2227E+0	4.8244E+0	3404.01	2.93771	6.7452E+0	7.7231E+0	6.3277E+0
3397.16	2.94363	5.2519E+0	6.2306E+0	4.8324E+0	3404.11	2.93762	6.7485E+0	7.7262E+0	6.3310E+0
3397.41	2.94342	5.2670E+0	6.2457E+0	4.8475E+0	3404.21	2.93754	6.7497E+0	7.7272E+0	6.3322E+0
3397.54	2.94331	5.2750E+0	6.2537E+0	4.8556E+0	3404.31	2.93745	6.7448E+0	7.7221E+0	6.3274E+0
3397.66	2.94320	5.2837E+0	6.2623E+0	4.8643E+0	3404.41	2.93736	6.7360E+0	7.7131E+0	6.3186E+0
3397.79	2.94309	5.2929E+0	6.2714E+0	4.8735E+0	3404.51	2.93728	6.7229E+0	7.6997E+0	6.3055E+0
3397.91	2.94298	5.3025E+0	6.2809E+0	4.8831E+0	3404.61	2.93719	6.7043E+0	7.6810E+0	6.2869E+0
3398.16	2.94277	5.3222E+0	6.3004E+0	4.9030E+0	3404.81	2.93702	6.6590E+0	7.6356E+0	6.2416E+0
3398.41	2.94255	5.3423E+0	6.3203E+0	4.9232E+0	3405.01	2.93685	6.6011E+0	7.5774E+0	6.1837E+0
3398.66	2.94233	5.3634E+0	6.3411E+0	4.9445E+0	3405.21	2.93667	6.5395E+0	7.5157E+0	6.1221E+0
3398.91	2.94212	5.3857E+0	6.3631E+0	4.9670E+0	3405.41	2.93650	6.4747E+0	7.4509E+0	6.0573E+0
3399.16	2.94190	5.4102E+0	6.3872E+0	4.9916E+0	3405.51	2.93642	6.4415E+0	7.4178E+0	6.0241E+0
3399.29	2.94179	5.4236E+0	6.4004E+0	5.0051E+0	3405.61	2.93633	6.4070E+0	7.3835E+0	5.9895E+0
3399.41	2.94168	5.4379E+0	6.4146E+0	5.0195E+0	3405.71	2.93624	6.3684E+0	7.3452E+0	5.9508E+0
3399.54	2.94158	5.4541E+0	6.4308E+0	5.0358E+0	3405.81	2.93616	6.3271E+0	7.3045E+0	5.9093E+0
3399.66	2.94147	5.4721E+0	6.4487E+0	5.0538E+0	3405.91	2.93607	6.2868E+0	7.2647E+0	5.8688E+0
3399.79	2.94136	5.4932E+0	6.4699E+0	5.0749E+0	3406.01	2.93598	6.2495E+0	7.2278E+0	5.8312E+0
3399.91	2.94125	5.5239E+0	6.5007E+0	5.1057E+0	3406.11	2.93590	6.2170E+0	7.1957E+0	5.7986E+0
3400.16	2.94104	5.6146E+0	6.5916E+0	5.1963E+0	3406.21	2.93581	6.1918E+0	7.1706E+0	5.7734E+0
3400.41	2.94082	5.7281E+0	6.7055E+0	5.3099E+0	3406.31	2.93573	6.1718E+0	7.1507E+0	5.7533E+0
3400.51	2.94073	5.7750E+0	6.7524E+0	5.3568E+0	3406.41	2.93564	6.1573E+0	7.1362E+0	5.7388E+0
3400.61	2.94065	5.8231E+0	6.8005E+0	5.4049E+0	3406.51	2.93555	6.1447E+0	7.1237E+0	5.7262E+0
3400.71	2.94056	5.8710E+0	6.8483E+0	5.4529E+0	3406.61	2.93547	6.1335E+0	7.1125E+0	5.7150E+0
3400.81	2.94047	5.9173E+0	6.8946E+0	5.4993E+0	3406.81	2.93529	6.1129E+0	7.0918E+0	5.6944E+0
3400.91	2.94039	5.9585E+0	6.9358E+0	5.5405E+0	3407.01	2.93512	6.0951E+0	7.0738E+0	5.6765E+0
3401.01	2.94030	5.9964E+0	6.9738E+0	5.5784E+0	3407.21	2.93495	6.0798E+0	7.0585E+0	5.6613E+0
3401.11	2.94021	6.0297E+0	7.0073E+0	5.6118E+0	3407.31	2.93486	6.0730E+0	7.0516E+0	5.6544E+0
3401.21	2.94013	6.0594E+0	7.0371E+0	5.6414E+0	3407.41	2.93478	6.0674E+0	7.0459E+0	5.6489E+0
3401.31	2.94004	6.0848E+0	7.0626E+0	5.6668E+0	3407.51	2.93469	6.0632E+0	7.0417E+0	5.6447E+0
3401.41	2.93996	6.1053E+0	7.0833E+0	5.6873E+0	3407.61	2.93461	6.0599E+0	7.0383E+0	5.6414E+0
3401.61	2.93978	6.1377E+0	7.1158E+0	5.7197E+0	3407.81	2.93443	6.0555E+0	7.0339E+0	5.6371E+0
3401.81	2.93961	6.1619E+0	7.1399E+0	5.7439E+0	3408.01	2.93426	6.0545E+0	7.0328E+0	5.6361E+0
3401.91	2.93952	6.1734E+0	7.1515E+0	5.7554E+0	3408.21	2.93409	6.0556E+0	7.0339E+0	5.6372E+0
3402.01	2.93944	6.1831E+0	7.1612E+0	5.7651E+0	3408.41	2.93392	6.0587E+0	7.0370E+0	5.6403E+0
3402.11	2.93935	6.1937E+0	7.1720E+0	5.7757E+0	3408.61	2.93374	6.0651E+0	7.0433E+0	5.6467E+0
3402.21	2.93926	6.2083E+0	7.1866E+0	5.7902E+0	3408.81	2.93357	6.0740E+0	7.0522E+0	5.6556E+0
3402.31	2.93918	6.2291E+0	7.2073E+0	5.8111E+0	3409.01	2.93340	6.0846E+0	7.0628E+0	5.6662E+0
3402.41	2.93909	6.2583E+0	7.2361E+0	5.8403E+0	3409.21	2.93323	6.0969E+0	7.0750E+0	5.6785E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3409.41	2.93306	6.1099E+0	7.0878E+0	5.6915E+0	3423.32	2.92114	9.3681E+0	1.0338E+1	8.9542E+0
3409.61	2.93288	6.1245E+0	7.1024E+0	5.7061E+0	3423.42	2.92106	9.5294E+0	1.0499E+1	9.1153E+0
3409.81	2.93271	6.1395E+0	7.1174E+0	5.7212E+0	3423.47	2.92102	9.5864E+0	1.0556E+1	9.1723E+0
3410.01	2.93254	6.1558E+0	7.1336E+0	5.7375E+0	3423.52	2.92097	9.6204E+0	1.0590E+1	9.2063E+0
3410.21	2.93237	6.1734E+0	7.1512E+0	5.7552E+0	3423.57	2.92093	9.6312E+0	1.0601E+1	9.2172E+0
3410.41	2.93220	6.1918E+0	7.1695E+0	5.7735E+0	3423.62	2.92089	9.6200E+0	1.0590E+1	9.2060E+0
3410.66	2.93198	6.2161E+0	7.1938E+0	5.7979E+0	3423.67	2.92085	9.5976E+0	1.0568E+1	9.1835E+0
3410.91	2.93177	6.2429E+0	7.2205E+0	5.8247E+0	3423.72	2.92080	9.5645E+0	1.0535E+1	9.1503E+0
3411.41	2.93134	6.3055E+0	7.2832E+0	5.8873E+0	3423.77	2.92076	9.5156E+0	1.0487E+1	9.1012E+0
3411.91	2.93091	6.3698E+0	7.3476E+0	5.9516E+0	3423.82	2.92072	9.4566E+0	1.0428E+1	9.0420E+0
3412.41	2.93048	6.4339E+0	7.4117E+0	6.0156E+0	3423.92	2.92063	9.3230E+0	1.0296E+1	8.9081E+0
3412.91	2.93005	6.4992E+0	7.4771E+0	6.0810E+0	3424.02	2.92055	9.1720E+0	1.0145E+1	8.7568E+0
3413.41	2.92962	6.5644E+0	7.5422E+0	6.1461E+0	3424.12	2.92046	9.0034E+0	9.9771E+0	8.5879E+0
3413.91	2.92919	6.6306E+0	7.6084E+0	6.2123E+0	3424.22	2.92038	8.8430E+0	9.8171E+0	8.4273E+0
3414.41	2.92876	6.6971E+0	7.6750E+0	6.2789E+0	3424.32	2.92029	8.7033E+0	9.6776E+0	8.2873E+0
3414.91	2.92833	6.7664E+0	7.7443E+0	6.3482E+0	3424.42	2.92021	8.5745E+0	9.5489E+0	8.1584E+0
3415.41	2.92790	6.8380E+0	7.8157E+0	6.4199E+0	3424.52	2.92012	8.4684E+0	9.4428E+0	8.0523E+0
3415.91	2.92747	6.9116E+0	7.8892E+0	6.4936E+0	3424.62	2.92004	8.3784E+0	9.3529E+0	7.9623E+0
3416.41	2.92705	6.9890E+0	7.9665E+0	6.5709E+0	3424.72	2.91995	8.3185E+0	9.2931E+0	7.9022E+0
3416.91	2.92662	7.0677E+0	8.0451E+0	6.6498E+0	3424.82	2.91987	8.2698E+0	9.2449E+0	7.8533E+0
3417.41	2.92619	7.1458E+0	8.1230E+0	6.7279E+0	3424.92	2.91978	8.2275E+0	9.2030E+0	7.8108E+0
3417.91	2.92576	7.2212E+0	8.1982E+0	6.8035E+0	3425.02	2.91969	8.1894E+0	9.1653E+0	7.7725E+0
3418.41	2.92533	7.2940E+0	8.2707E+0	6.8763E+0	3425.12	2.91961	8.1537E+0	9.1300E+0	7.7366E+0
3418.91	2.92490	7.3647E+0	8.3413E+0	6.9471E+0	3425.22	2.91952	8.1255E+0	9.1021E+0	7.7083E+0
3419.41	2.92448	7.4297E+0	8.4062E+0	7.0123E+0	3425.32	2.91944	8.1009E+0	9.0776E+0	7.6836E+0
3419.91	2.92405	7.4923E+0	8.4686E+0	7.0750E+0	3425.42	2.91935	8.0793E+0	9.0562E+0	7.6620E+0
3420.41	2.92362	7.5546E+0	8.5308E+0	7.1375E+0	3425.52	2.91927	8.0602E+0	9.0371E+0	7.6429E+0
3420.91	2.92319	7.6193E+0	8.5952E+0	7.2023E+0	3425.62	2.91918	8.0446E+0	9.0217E+0	7.6273E+0
3421.11	2.92302	7.6466E+0	8.6224E+0	7.2296E+0	3425.82	2.91901	8.0241E+0	9.0015E+0	7.6067E+0
3421.21	2.92294	7.6624E+0	8.6383E+0	7.2455E+0	3426.02	2.91884	8.0124E+0	8.9901E+0	7.5948E+0
3421.31	2.92285	7.6787E+0	8.6545E+0	7.2618E+0	3426.12	2.91876	8.0082E+0	8.9860E+0	7.5905E+0
3421.42	2.92277	7.6971E+0	8.6729E+0	7.2803E+0	3426.22	2.91867	8.0052E+0	8.9832E+0	7.5875E+0
3421.52	2.92268	7.7169E+0	8.6926E+0	7.3000E+0	3426.42	2.91850	8.0017E+0	8.9797E+0	7.5839E+0
3421.62	2.92260	7.7388E+0	8.7144E+0	7.3220E+0	3426.62	2.91833	7.9996E+0	8.9778E+0	7.5817E+0
3421.72	2.92251	7.7636E+0	8.7391E+0	7.3468E+0	3426.82	2.91816	7.9992E+0	8.9774E+0	7.5811E+0
3421.82	2.92243	7.7895E+0	8.7649E+0	7.3727E+0	3427.02	2.91799	8.0000E+0	8.9784E+0	7.5816E+0
3421.92	2.92234	7.8181E+0	8.7933E+0	7.4013E+0	3427.22	2.91782	8.0024E+0	8.9808E+0	7.5840E+0
3422.02	2.92225	7.8483E+0	8.8233E+0	7.4316E+0	3427.42	2.91765	8.0053E+0	8.9837E+0	7.5868E+0
3422.12	2.92217	7.8816E+0	8.8563E+0	7.4651E+0	3427.67	2.91744	8.0100E+0	8.9884E+0	7.5913E+0
3422.22	2.92208	7.9188E+0	8.8931E+0	7.5024E+0	3427.92	2.91722	8.0154E+0	8.9938E+0	7.5966E+0
3422.32	2.92200	7.9629E+0	8.9368E+0	7.5467E+0	3428.17	2.91701	8.0213E+0	8.9998E+0	7.6025E+0
3422.42	2.92191	8.0204E+0	8.9937E+0	7.6046E+0	3428.42	2.91680	8.0275E+0	9.0060E+0	7.6087E+0
3422.52	2.92183	8.0895E+0	9.0622E+0	7.6739E+0	3428.67	2.91659	8.0350E+0	9.0136E+0	7.6161E+0
3422.62	2.92174	8.1792E+0	9.1511E+0	7.7640E+0	3428.92	2.91637	8.0442E+0	9.0227E+0	7.6253E+0
3422.72	2.92166	8.2825E+0	9.2535E+0	7.8677E+0	3429.17	2.91616	8.0571E+0	9.0356E+0	7.6382E+0
3422.82	2.92157	8.4157E+0	9.3862E+0	8.0013E+0	3429.42	2.91595	8.0731E+0	9.0516E+0	7.6543E+0
3422.92	2.92149	8.5834E+0	9.5538E+0	8.1693E+0	3429.67	2.91574	8.0932E+0	9.0716E+0	7.6744E+0
3423.02	2.92140	8.7865E+0	9.7568E+0	8.3724E+0	3429.92	2.91552	8.1148E+0	9.0932E+0	7.6961E+0
3423.12	2.92132	8.9927E+0	9.9628E+0	8.5788E+0	3430.17	2.91531	8.1393E+0	9.1177E+0	7.7206E+0
3423.22	2.92123	9.1841E+0	1.0154E+1	8.7703E+0	3430.42	2.91510	8.1643E+0	9.1427E+0	7.7457E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3430.67	2.91489	8.1925E+0	9.1708E+0	7.7740E+0	3440.26	2.90675	4.3792E+1	4.4943E+1	4.2879E+1
3430.92	2.91467	8.2237E+0	9.2018E+0	7.8053E+0	3440.46	2.90658	4.7383E+1	4.8481E+1	4.6526E+1
3431.17	2.91446	8.2579E+0	9.2357E+0	7.8399E+0	3440.56	2.90650	4.8860E+1	4.9934E+1	4.8027E+1
3431.42	2.91425	8.2958E+0	9.2732E+0	7.8781E+0	3440.66	2.90642	5.0161E+1	5.1221E+1	4.9344E+1
3431.67	2.91404	8.3356E+0	9.3126E+0	7.9182E+0	3440.76	2.90633	5.1198E+1	5.2247E+1	5.0391E+1
3431.92	2.91382	8.3778E+0	9.3544E+0	7.9606E+0	3440.86	2.90625	5.2050E+1	5.3099E+1	5.1240E+1
3432.17	2.91361	8.4189E+0	9.3953E+0	8.0019E+0	3440.96	2.90616	5.2799E+1	5.3852E+1	5.1981E+1
3432.42	2.91340	8.4583E+0	9.4346E+0	8.0414E+0	3441.06	2.90608	5.3483E+1	5.4543E+1	5.2654E+1
3432.67	2.91319	8.4976E+0	9.4739E+0	8.0808E+0	3441.26	2.90591	5.5080E+1	5.6162E+1	5.4222E+1
3432.92	2.91298	8.5386E+0	9.5148E+0	8.1218E+0	3441.46	2.90574	5.7218E+1	5.8322E+1	5.6329E+1
3433.17	2.91276	8.5852E+0	9.5614E+0	8.1684E+0	3441.56	2.90565	5.8598E+1	5.9711E+1	5.7694E+1
3433.42	2.91255	8.6356E+0	9.6118E+0	8.2189E+0	3441.76	2.90549	6.1728E+1	6.2847E+1	6.0811E+1
3433.62	2.91238	8.6814E+0	9.6575E+0	8.2646E+0	3441.86	2.90540	6.3553E+1	6.4665E+1	6.2641E+1
3433.82	2.91221	8.7311E+0	9.7069E+0	8.3141E+0	3441.96	2.90532	6.5415E+1	6.6517E+1	6.4513E+1
3434.02	2.91204	8.7841E+0	9.7599E+0	8.3671E+0	3442.06	2.90523	6.7198E+1	6.8274E+1	6.6327E+1
3434.22	2.91187	8.8440E+0	9.8195E+0	8.4269E+0	3442.26	2.90506	7.0285E+1	7.1332E+1	6.9449E+1
3434.46	2.91166	8.9317E+0	9.9068E+0	8.5147E+0	3442.37	2.90498	7.1711E+1	7.2739E+1	7.0897E+1
3434.71	2.91145	9.0407E+0	1.0015E+1	8.6241E+0	3442.47	2.90490	7.2966E+1	7.3970E+1	7.2178E+1
3434.96	2.91124	9.1692E+0	1.0143E+1	8.7532E+0	3442.67	2.90473	7.5026E+1	7.5942E+1	7.4336E+1
3435.21	2.91103	9.3150E+0	1.0287E+1	8.9000E+0	3442.77	2.90464	7.5900E+1	7.6785E+1	7.5238E+1
3435.46	2.91081	9.4913E+0	1.0462E+1	9.0771E+0	3442.87	2.90456	7.6593E+1	7.7451E+1	7.5956E+1
3435.71	2.91060	9.7047E+0	1.0674E+1	9.2913E+0	3442.97	2.90447	7.7156E+1	7.7990E+1	7.6542E+1
3435.96	2.91039	9.9390E+0	1.0906E+1	9.5266E+0	3443.07	2.90439	7.7495E+1	7.8300E+1	7.6909E+1
3436.21	2.91018	1.0168E+1	1.1133E+1	9.7568E+0	3443.17	2.90430	7.7572E+1	7.8360E+1	7.7008E+1
3436.46	2.90997	1.0372E+1	1.1336E+1	9.9612E+0	3443.27	2.90422	7.7340E+1	7.8124E+1	7.6787E+1
3436.66	2.90980	1.0534E+1	1.1498E+1	1.0122E+1	3443.37	2.90414	7.6891E+1	7.7677E+1	7.6346E+1
3436.86	2.90963	1.0686E+1	1.1651E+1	1.0272E+1	3443.47	2.90405	7.6276E+1	7.7061E+1	7.5739E+1
3437.06	2.90946	1.0869E+1	1.1835E+1	1.0455E+1	3443.57	2.90397	7.5504E+1	7.6287E+1	7.4977E+1
3437.26	2.90929	1.1112E+1	1.2078E+1	1.0696E+1	3443.67	2.90388	7.4598E+1	7.5377E+1	7.4080E+1
3437.46	2.90912	1.1409E+1	1.2373E+1	1.0992E+1	3443.87	2.90371	7.2310E+1	7.3072E+1	7.1824E+1
3437.56	2.90904	1.1587E+1	1.2550E+1	1.1171E+1	3444.07	2.90355	6.9449E+1	7.0186E+1	6.9001E+1
3437.66	2.90895	1.1811E+1	1.2772E+1	1.1396E+1	3444.27	2.90338	6.6276E+1	6.7004E+1	6.5854E+1
3437.76	2.90887	1.2046E+1	1.3005E+1	1.1631E+1	3444.47	2.90321	6.2822E+1	6.3554E+1	6.2414E+1
3437.86	2.90878	1.2313E+1	1.3268E+1	1.1898E+1	3444.67	2.90304	5.9173E+1	5.9917E+1	5.8770E+1
3437.96	2.90870	1.2613E+1	1.3566E+1	1.2198E+1	3444.87	2.90287	5.5774E+1	5.6530E+1	5.5369E+1
3438.06	2.90861	1.2938E+1	1.3888E+1	1.2522E+1	3444.97	2.90279	5.4187E+1	5.4952E+1	5.3777E+1
3438.16	2.90853	1.3316E+1	1.4263E+1	1.2898E+1	3445.07	2.90270	5.2711E+1	5.3482E+1	5.2295E+1
3438.26	2.90844	1.3766E+1	1.4711E+1	1.3343E+1	3445.27	2.90253	4.9944E+1	5.0725E+1	4.9527E+1
3438.36	2.90836	1.4274E+1	1.5218E+1	1.3844E+1	3445.47	2.90237	4.7445E+1	4.8230E+1	4.7035E+1
3438.46	2.90827	1.4863E+1	1.5809E+1	1.4423E+1	3445.67	2.90220	4.5179E+1	4.5967E+1	4.4782E+1
3438.66	2.90811	1.6299E+1	1.7253E+1	1.5834E+1	3445.87	2.90203	4.3108E+1	4.3900E+1	4.2721E+1
3438.86	2.90794	1.8218E+1	1.9187E+1	1.7717E+1	3446.46	2.90153	3.8069E+1	3.8876E+1	3.7692E+1
3439.06	2.90777	2.0662E+1	2.1650E+1	2.0116E+1	3447.06	2.90103	3.3934E+1	3.4761E+1	3.3562E+1
3439.26	2.90760	2.3704E+1	2.4722E+1	2.3098E+1	3447.29	2.90083	3.2514E+1	3.3351E+1	3.2140E+1
3439.46	2.90743	2.7202E+1	2.8280E+1	2.6506E+1	3447.53	2.90063	3.1238E+1	3.2084E+1	3.0861E+1
3439.66	2.90726	3.1203E+1	3.2320E+1	3.0411E+1	3447.77	2.90043	3.0003E+1	3.0858E+1	2.9625E+1
3439.76	2.90718	3.3345E+1	3.4486E+1	3.2505E+1	3448.01	2.90023	2.8919E+1	2.9784E+1	2.8539E+1
3439.86	2.90709	3.5448E+1	3.6617E+1	3.4561E+1	3448.24	2.90003	2.7924E+1	2.8798E+1	2.7541E+1
3439.96	2.90701	3.7594E+1	3.8790E+1	3.6665E+1	3448.48	2.89983	2.7054E+1	2.7936E+1	2.6669E+1
3440.06	2.90692	3.9777E+1	4.0972E+1	3.8823E+1	3448.84	2.89953	2.5838E+1	2.6727E+1	2.5452E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3449.20	2.89923	2.4771E+1	2.5662E+1	2.4385E+1	3461.07	2.88928	1.5488E+1	1.6425E+1	1.5067E+1
3449.43	2.89903	2.4078E+1	2.4970E+1	2.3691E+1	3461.37	2.88903	1.5618E+1	1.6554E+1	1.5196E+1
3449.67	2.89883	2.3403E+1	2.4296E+1	2.3016E+1	3461.67	2.88878	1.5763E+1	1.6698E+1	1.5340E+1
3449.91	2.89863	2.2741E+1	2.3637E+1	2.2354E+1	3461.97	2.88853	1.5924E+1	1.6858E+1	1.5499E+1
3450.15	2.89843	2.2069E+1	2.2968E+1	2.1681E+1	3462.27	2.88828	1.6105E+1	1.7039E+1	1.5679E+1
3450.39	2.89823	2.1451E+1	2.2352E+1	2.1062E+1	3462.57	2.88803	1.6299E+1	1.7232E+1	1.5872E+1
3450.62	2.89803	2.0874E+1	2.1777E+1	2.0485E+1	3463.17	2.88753	1.6739E+1	1.7671E+1	1.6311E+1
3450.86	2.89783	2.0383E+1	2.1287E+1	1.9993E+1	3463.77	2.88703	1.7220E+1	1.8148E+1	1.6792E+1
3451.10	2.89763	1.9910E+1	2.0817E+1	1.9520E+1	3464.37	2.88653	1.7727E+1	1.8653E+1	1.7299E+1
3451.34	2.89743	1.9483E+1	2.0391E+1	1.9091E+1	3464.97	2.88603	1.8287E+1	1.9210E+1	1.7860E+1
3451.58	2.89723	1.9071E+1	1.9982E+1	1.8680E+1	3465.27	2.88578	1.8578E+1	1.9499E+1	1.8151E+1
3451.82	2.89703	1.8685E+1	1.9598E+1	1.8292E+1	3465.57	2.88553	1.8886E+1	1.9805E+1	1.8460E+1
3452.05	2.89683	1.8299E+1	1.9214E+1	1.7906E+1	3465.87	2.88528	1.9207E+1	2.0125E+1	1.8781E+1
3452.29	2.89663	1.7947E+1	1.8863E+1	1.7553E+1	3466.17	2.88503	1.9539E+1	2.0455E+1	1.9112E+1
3452.53	2.89643	1.7606E+1	1.8524E+1	1.7211E+1	3466.77	2.88453	2.0212E+1	2.1125E+1	1.9786E+1
3452.77	2.89623	1.7276E+1	1.8196E+1	1.6881E+1	3467.37	2.88403	2.0943E+1	2.1852E+1	2.0518E+1
3453.01	2.89603	1.6973E+1	1.7895E+1	1.6577E+1	3467.98	2.88353	2.1754E+1	2.2656E+1	2.1330E+1
3453.25	2.89583	1.6707E+1	1.7630E+1	1.6310E+1	3468.58	2.88303	2.2656E+1	2.3546E+1	2.2239E+1
3453.48	2.89563	1.6479E+1	1.7404E+1	1.6082E+1	3469.78	2.88203	2.4588E+1	2.5444E+1	2.4189E+1
3453.72	2.89543	1.6274E+1	1.7200E+1	1.5876E+1	3470.38	2.88153	2.5628E+1	2.6470E+1	2.5241E+1
3453.96	2.89523	1.6083E+1	1.7010E+1	1.5684E+1	3470.99	2.88103	2.6794E+1	2.7630E+1	2.6413E+1
3454.20	2.89503	1.5902E+1	1.6830E+1	1.5503E+1	3472.19	2.88003	2.9515E+1	3.0358E+1	2.9127E+1
3454.56	2.89473	1.5660E+1	1.6590E+1	1.5261E+1	3473.40	2.87903	3.2969E+1	3.3819E+1	3.2555E+1
3454.80	2.89453	1.5523E+1	1.6453E+1	1.5123E+1	3473.97	2.87855	3.4916E+1	3.5768E+1	3.4481E+1
3455.15	2.89423	1.5332E+1	1.6264E+1	1.4932E+1	3474.47	2.87814	3.6796E+1	3.7651E+1	3.6341E+1
3455.39	2.89403	1.5216E+1	1.6149E+1	1.4815E+1	3475.21	2.87752	3.9968E+1	4.0831E+1	3.9473E+1
3455.63	2.89383	1.5114E+1	1.6047E+1	1.4712E+1	3475.71	2.87711	4.2387E+1	4.3249E+1	4.1879E+1
3455.99	2.89353	1.4983E+1	1.5918E+1	1.4579E+1	3476.21	2.87670	4.5067E+1	4.5924E+1	4.4550E+1
3456.35	2.89323	1.4882E+1	1.5818E+1	1.4478E+1	3476.71	2.87628	4.8090E+1	4.8938E+1	4.7571E+1
3456.47	2.89313	1.4855E+1	1.5792E+1	1.4450E+1	3476.96	2.87608	4.9740E+1	5.0581E+1	4.9224E+1
3456.59	2.89303	1.4832E+1	1.5769E+1	1.4427E+1	3477.21	2.87587	5.1535E+1	5.2363E+1	5.1032E+1
3456.83	2.89283	1.4797E+1	1.5735E+1	1.4391E+1	3477.46	2.87566	5.3523E+1	5.4334E+1	5.3037E+1
3457.07	2.89263	1.4771E+1	1.5709E+1	1.4364E+1	3477.71	2.87546	5.5780E+1	5.6572E+1	5.5313E+1
3457.19	2.89253	1.4761E+1	1.5699E+1	1.4354E+1	3477.96	2.87525	5.8473E+1	5.9242E+1	5.8026E+1
3457.30	2.89243	1.4753E+1	1.5692E+1	1.4346E+1	3478.21	2.87504	6.1673E+1	6.2439E+1	6.1217E+1
3457.42	2.89233	1.4748E+1	1.5686E+1	1.4340E+1	3478.46	2.87484	6.5829E+1	6.6614E+1	6.5319E+1
3457.66	2.89213	1.4746E+1	1.5684E+1	1.4338E+1	3478.71	2.87463	7.1784E+1	7.2607E+1	7.1198E+1
3457.78	2.89203	1.4750E+1	1.5688E+1	1.4341E+1	3478.96	2.87442	8.0243E+1	8.1118E+1	7.9550E+1
3457.90	2.89193	1.4754E+1	1.5692E+1	1.4345E+1	3479.21	2.87422	8.9995E+1	9.0930E+1	8.9195E+1
3458.14	2.89173	1.4770E+1	1.5709E+1	1.4361E+1	3479.31	2.87413	9.3255E+1	9.4201E+1	9.2433E+1
3458.26	2.89163	1.4780E+1	1.5719E+1	1.4371E+1	3479.41	2.87405	9.5514E+1	9.6449E+1	9.4700E+1
3458.38	2.89153	1.4793E+1	1.5732E+1	1.4383E+1	3479.46	2.87401	9.6282E+1	9.7204E+1	9.5482E+1
3458.50	2.89143	1.4809E+1	1.5748E+1	1.4399E+1	3479.51	2.87397	9.6740E+1	9.7642E+1	9.5961E+1
3458.74	2.89123	1.4845E+1	1.5784E+1	1.4435E+1	3479.56	2.87393	9.6839E+1	9.7716E+1	9.6088E+1
3458.98	2.89103	1.4889E+1	1.5827E+1	1.4478E+1	3479.61	2.87389	9.6656E+1	9.7501E+1	9.5941E+1
3459.58	2.89053	1.5020E+1	1.5958E+1	1.4607E+1	3479.66	2.87384	9.6178E+1	9.6991E+1	9.5501E+1
3459.94	2.89023	1.5112E+1	1.6051E+1	1.4698E+1	3479.76	2.87376	9.4569E+1	9.5340E+1	9.3945E+1
3460.18	2.89003	1.5179E+1	1.6118E+1	1.4764E+1	3479.86	2.87368	9.2424E+1	9.3150E+1	9.1859E+1
3460.48	2.88978	1.5269E+1	1.6207E+1	1.4853E+1	3479.96	2.87360	9.0073E+1	9.0771E+1	8.9553E+1
3460.77	2.88953	1.5374E+1	1.6311E+1	1.4955E+1	3480.06	2.87351	8.7908E+1	8.8588E+1	8.7426E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3480.11	2.87347	8.6948E+1	8.7622E+1	8.6481E+1	3485.81	2.86877	1.0553E+2	1.0623E+2	1.0498E+2
3480.21	2.87339	8.5479E+1	8.6146E+1	8.5029E+1	3486.01	2.86861	1.0765E+2	1.0834E+2	1.0709E+2
3480.36	2.87327	8.4091E+1	8.4756E+1	8.3648E+1	3486.21	2.86844	1.1002E+2	1.1071E+2	1.0945E+2
3480.51	2.87314	8.3880E+1	8.4542E+1	8.3438E+1	3486.41	2.86828	1.1278E+2	1.1347E+2	1.1221E+2
3480.61	2.87306	8.4390E+1	8.5051E+1	8.3947E+1	3486.61	2.86812	1.1638E+2	1.1708E+2	1.1581E+2
3480.71	2.87298	8.5397E+1	8.6069E+1	8.4931E+1	3486.81	2.86795	1.2095E+2	1.2165E+2	1.2037E+2
3480.76	2.87294	8.6206E+1	8.6907E+1	8.5699E+1	3487.01	2.86779	1.2572E+2	1.2643E+2	1.2512E+2
3480.81	2.87289	8.7157E+1	8.7895E+1	8.6596E+1	3487.11	2.86770	1.2771E+2	1.2841E+2	1.2711E+2
3480.91	2.87281	8.9808E+1	9.0623E+1	8.9146E+1	3487.21	2.86762	1.2931E+2	1.3001E+2	1.2870E+2
3481.01	2.87273	9.3192E+1	9.4084E+1	9.2432E+1	3487.31	2.86754	1.3057E+2	1.3128E+2	1.2996E+2
3481.06	2.87269	9.5145E+1	9.6083E+1	9.4329E+1	3487.41	2.86746	1.3133E+2	1.3204E+2	1.3072E+2
3481.11	2.87265	9.7475E+1	9.8494E+1	9.6567E+1	3487.51	2.86738	1.3141E+2	1.3212E+2	1.3080E+2
3481.16	2.87261	1.0005E+2	1.0115E+2	9.9046E+1	3487.61	2.86729	1.3098E+2	1.3169E+2	1.3037E+2
3481.21	2.87256	1.0285E+2	1.0404E+2	1.0175E+2	3487.71	2.86721	1.3014E+2	1.3084E+2	1.2953E+2
3481.26	2.87252	1.0581E+2	1.0707E+2	1.0463E+2	3487.81	2.86713	1.2902E+2	1.2973E+2	1.2842E+2
3481.31	2.87248	1.0863E+2	1.0994E+2	1.0740E+2	3488.01	2.86696	1.2658E+2	1.2728E+2	1.2598E+2
3481.36	2.87244	1.1137E+2	1.1271E+2	1.1010E+2	3488.21	2.86680	1.2457E+2	1.2527E+2	1.2398E+2
3481.41	2.87240	1.1390E+2	1.1526E+2	1.1261E+2	3488.41	2.86664	1.2322E+2	1.2392E+2	1.2263E+2
3481.46	2.87236	1.1621E+2	1.1758E+2	1.1491E+2	3488.61	2.86647	1.2243E+2	1.2313E+2	1.2184E+2
3481.56	2.87228	1.1916E+2	1.2052E+2	1.1786E+2	3488.81	2.86631	1.2215E+2	1.2285E+2	1.2156E+2
3481.61	2.87223	1.1971E+2	1.2104E+2	1.1844E+2	3488.91	2.86622	1.2217E+2	1.2287E+2	1.2158E+2
3481.71	2.87215	1.1916E+2	1.2041E+2	1.1798E+2	3489.01	2.86614	1.2229E+2	1.2299E+2	1.2170E+2
3481.76	2.87211	1.1797E+2	1.1917E+2	1.1684E+2	3489.11	2.86606	1.2249E+2	1.2319E+2	1.2190E+2
3481.86	2.87203	1.1402E+2	1.1513E+2	1.1299E+2	3489.21	2.86598	1.2277E+2	1.2347E+2	1.2218E+2
3481.96	2.87195	1.0872E+2	1.0974E+2	1.0778E+2	3489.41	2.86581	1.2351E+2	1.2421E+2	1.2292E+2
3482.01	2.87190	1.0611E+2	1.0710E+2	1.0521E+2	3489.71	2.86557	1.2489E+2	1.2559E+2	1.2430E+2
3482.11	2.87182	1.0116E+2	1.0209E+2	1.0035E+2	3489.81	2.86549	1.2540E+2	1.2610E+2	1.2480E+2
3482.21	2.87174	9.7082E+1	9.7949E+1	9.6339E+1	3490.01	2.86532	1.2649E+2	1.2719E+2	1.2589E+2
3482.31	2.87166	9.3876E+1	9.4694E+1	9.3195E+1	3490.21	2.86516	1.2765E+2	1.2836E+2	1.2705E+2
3482.41	2.87157	9.1582E+1	9.2349E+1	9.0966E+1	3490.71	2.86475	1.3087E+2	1.3158E+2	1.3026E+2
3482.46	2.87153	9.0830E+1	9.1570E+1	9.0250E+1	3491.21	2.86434	1.3442E+2	1.3513E+2	1.3380E+2
3482.56	2.87145	8.9820E+1	9.0532E+1	8.9277E+1	3491.46	2.86413	1.3630E+2	1.3701E+2	1.3568E+2
3482.71	2.87133	8.9141E+1	8.9821E+1	8.8645E+1	3491.71	2.86393	1.3831E+2	1.3902E+2	1.3768E+2
3482.86	2.87120	8.8955E+1	8.9609E+1	8.8494E+1	3492.21	2.86352	1.4255E+2	1.4327E+2	1.4191E+2
3483.06	2.87104	8.9126E+1	8.9782E+1	8.8664E+1	3493.21	2.86270	1.5182E+2	1.5256E+2	1.5115E+2
3483.21	2.87092	8.9470E+1	9.0127E+1	8.9006E+1	3494.21	2.86188	1.6187E+2	1.6263E+2	1.6118E+2
3483.31	2.87083	8.9764E+1	9.0421E+1	8.9299E+1	3495.21	2.86106	1.7269E+2	1.7347E+2	1.7197E+2
3483.41	2.87075	9.0090E+1	9.0748E+1	8.9624E+1	3495.71	2.86065	1.7883E+2	1.7962E+2	1.7808E+2
3483.61	2.87059	9.0852E+1	9.1510E+1	9.0381E+1	3495.96	2.86044	1.8239E+2	1.8323E+2	1.8160E+2
3483.81	2.87042	9.1732E+1	9.2391E+1	9.1258E+1	3496.21	2.86024	1.8489E+2	1.8576E+2	1.8406E+2
3484.01	2.87026	9.2685E+1	9.3345E+1	9.2206E+1	3496.46	2.86004	1.8625E+2	1.8714E+2	1.8540E+2
3484.21	2.87009	9.3738E+1	9.4400E+1	9.3253E+1	3496.71	2.85983	1.8709E+2	1.8797E+2	1.8625E+2
3484.41	2.86993	9.4893E+1	9.5557E+1	9.4402E+1	3497.21	2.85942	1.8972E+2	1.9054E+2	1.8894E+2
3484.51	2.86984	9.5498E+1	9.6164E+1	9.5003E+1	3497.71	2.85901	1.9321E+2	1.9403E+2	1.9242E+2
3484.61	2.86976	9.6116E+1	9.6783E+1	9.5618E+1	3498.21	2.85860	1.9730E+2	1.9814E+2	1.9650E+2
3484.81	2.86960	9.7417E+1	9.8089E+1	9.6912E+1	3498.71	2.85820	2.0189E+2	2.0273E+2	2.0106E+2
3485.01	2.86943	9.8809E+1	9.9485E+1	9.8296E+1	3499.21	2.85779	2.0676E+2	2.0762E+2	2.0591E+2
3485.21	2.86927	1.0028E+2	1.0096E+2	9.9761E+1	3500.21	2.85697	2.1714E+2	2.1803E+2	2.1626E+2
3485.41	2.86910	1.0185E+2	1.0254E+2	1.0132E+2	3501.21	2.85615	2.2859E+2	2.2952E+2	2.2766E+2
3485.61	2.86894	1.0360E+2	1.0429E+2	1.0305E+2	3502.21	2.85534	2.4105E+2	2.4203E+2	2.4007E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3502.71	2.85493	2.4744E+2	2.4847E+2	2.4641E+2	3515.51	2.84454	1.2391E+3	1.2570E+3	1.2217E+3
3503.21	2.85452	2.5305E+2	2.5417E+2	2.5194E+2	3515.61	2.84446	1.1093E+3	1.1247E+3	1.0943E+3
3503.71	2.85412	2.5766E+2	2.5885E+2	2.5648E+2	3515.71	2.84437	9.9746E+2	1.0113E+3	9.8393E+2
3504.21	2.85371	2.6178E+2	2.6301E+2	2.6056E+2	3515.81	2.84429	8.9804E+2	9.1041E+2	8.8591E+2
3505.21	2.85290	2.6829E+2	2.6952E+2	2.6708E+2	3516.01	2.84413	7.5507E+2	7.6595E+2	7.4438E+2
3505.71	2.85249	2.7065E+2	2.7185E+2	2.6947E+2	3516.21	2.84397	6.5288E+2	6.6225E+2	6.4373E+2
3506.21	2.85208	2.7303E+2	2.7420E+2	2.7187E+2	3516.46	2.84377	5.5820E+2	5.6442E+2	5.5215E+2
3506.71	2.85167	2.7582E+2	2.7698E+2	2.7467E+2	3516.71	2.84357	4.9278E+2	4.9737E+2	4.8828E+2
3507.21	2.85127	2.7911E+2	2.8029E+2	2.7795E+2	3516.96	2.84336	4.3996E+2	4.4350E+2	4.3648E+2
3507.71	2.85086	2.8328E+2	2.8447E+2	2.8209E+2	3517.21	2.84316	4.0126E+2	4.0417E+2	3.9838E+2
3508.21	2.85046	2.8903E+2	2.9025E+2	2.8781E+2	3517.46	2.84296	3.7019E+2	3.7267E+2	3.6773E+2
3508.71	2.85005	2.9667E+2	2.9795E+2	2.9541E+2	3517.71	2.84276	3.4593E+2	3.4813E+2	3.4374E+2
3508.96	2.84985	3.0151E+2	3.0281E+2	3.0022E+2	3517.96	2.84255	3.2521E+2	3.2719E+2	3.2325E+2
3509.21	2.84964	3.0763E+2	3.0897E+2	3.0630E+2	3518.21	2.84235	3.0900E+2	3.1081E+2	3.0721E+2
3509.71	2.84924	3.2368E+2	3.2512E+2	3.2226E+2	3518.46	2.84215	2.9491E+2	2.9658E+2	2.9326E+2
3510.21	2.84883	3.4572E+2	3.4731E+2	3.4414E+2	3518.71	2.84195	2.8303E+2	2.8461E+2	2.8147E+2
3510.41	2.84867	3.5690E+2	3.5858E+2	3.5524E+2	3518.96	2.84175	2.7307E+2	2.7456E+2	2.7159E+2
3510.61	2.84851	3.7023E+2	3.7201E+2	3.6846E+2	3519.21	2.84155	2.6491E+2	2.6633E+2	2.6349E+2
3510.81	2.84834	3.8589E+2	3.8780E+2	3.8399E+2	3519.46	2.84134	2.5823E+2	2.5956E+2	2.5690E+2
3511.01	2.84818	4.0410E+2	4.0618E+2	4.0204E+2	3519.71	2.84114	2.5289E+2	2.5413E+2	2.5166E+2
3511.21	2.84802	4.2709E+2	4.2940E+2	4.2480E+2	3519.96	2.84094	2.4846E+2	2.4964E+2	2.4730E+2
3511.41	2.84786	4.5393E+2	4.5655E+2	4.5135E+2	3520.21	2.84074	2.4480E+2	2.4593E+2	2.4368E+2
3511.61	2.84770	4.8657E+2	4.8961E+2	4.8358E+2	3520.46	2.84054	2.4135E+2	2.4242E+2	2.4028E+2
3511.81	2.84753	5.2608E+2	5.2972E+2	5.2249E+2	3520.71	2.84033	2.3819E+2	2.3924E+2	2.3715E+2
3512.01	2.84737	5.7666E+2	5.8127E+2	5.7214E+2	3520.96	2.84013	2.3520E+2	2.3622E+2	2.3419E+2
3512.21	2.84721	6.4024E+2	6.4642E+2	6.3424E+2	3521.21	2.83993	2.3244E+2	2.3345E+2	2.3144E+2
3512.31	2.84713	6.8016E+2	6.8725E+2	6.7325E+2	3521.46	2.83973	2.2984E+2	2.3085E+2	2.2884E+2
3512.41	2.84705	7.2256E+2	7.3014E+2	7.1507E+2	3521.71	2.83953	2.2748E+2	2.2850E+2	2.2647E+2
3512.51	2.84697	7.7535E+2	7.8361E+2	7.6719E+2	3521.96	2.83933	2.2582E+2	2.2687E+2	2.2478E+2
3512.61	2.84688	8.3492E+2	8.4402E+2	8.2595E+2	3522.21	2.83912	2.2499E+2	2.2609E+2	2.2390E+2
3512.71	2.84680	9.0448E+2	9.1467E+2	8.9446E+2	3522.71	2.83872	2.2479E+2	2.2597E+2	2.2361E+2
3512.81	2.84672	9.8760E+2	9.9925E+2	9.7615E+2	3523.21	2.83832	2.2631E+2	2.2757E+2	2.2506E+2
3512.91	2.84664	1.0890E+3	1.1028E+3	1.0756E+3	3523.71	2.83792	2.2971E+2	2.3104E+2	2.2840E+2
3513.01	2.84656	1.2108E+3	1.2276E+3	1.1945E+3	3524.21	2.83751	2.3452E+2	2.3588E+2	2.3317E+2
3513.11	2.84648	1.3532E+3	1.3743E+3	1.3327E+3	3524.71	2.83711	2.4039E+2	2.4172E+2	2.3907E+2
3513.21	2.84640	1.5204E+3	1.5484E+3	1.4937E+3	3525.21	2.83671	2.4737E+2	2.4870E+2	2.4606E+2
3513.31	2.84632	1.7230E+3	1.7622E+3	1.6862E+3	3525.46	2.83651	2.5131E+2	2.5265E+2	2.4998E+2
3513.41	2.84624	1.9664E+3	2.0256E+3	1.9125E+3	3525.71	2.83631	2.5588E+2	2.5726E+2	2.5451E+2
3513.51	2.84616	2.2635E+3	2.3638E+3	2.1781E+3	3525.96	2.83611	2.6119E+2	2.6262E+2	2.5977E+2
3513.61	2.84607	2.6969E+3	3.0157E+3	2.5216E+3	3526.21	2.83590	2.6685E+2	2.6834E+2	2.6537E+2
3513.71	2.84599	3.2805E+3	4.0813E+3	2.9407E+3	3526.46	2.83570	2.7222E+2	2.7376E+2	2.7068E+2
3513.81	2.84591	3.6557E+3	∞	3.1306E+3	3526.71	2.83550	2.7713E+2	2.7873E+2	2.7554E+2
3514.71	2.84518	3.6557E+3	∞	3.1306E+3	3526.96	2.83530	2.8187E+2	2.8350E+2	2.8024E+2
3514.81	2.84510	3.2309E+3	3.9185E+3	2.9114E+3	3527.21	2.83510	2.8623E+2	2.8787E+2	2.8461E+2
3514.91	2.84502	2.8503E+3	3.1321E+3	2.6568E+3	3527.46	2.83490	2.9048E+2	2.9208E+2	2.8889E+2
3515.01	2.84494	2.4782E+3	2.6244E+3	2.3613E+3	3527.71	2.83470	2.9433E+2	2.9591E+2	2.9277E+2
3515.11	2.84486	2.1407E+3	2.2211E+3	2.0700E+3	3527.96	2.83450	2.9755E+2	2.9909E+2	2.9603E+2
3515.21	2.84478	1.8339E+3	1.8813E+3	1.7899E+3	3528.21	2.83430	3.0024E+2	3.0175E+2	2.9873E+2
3515.31	2.84470	1.5834E+3	1.6145E+3	1.5539E+3	3528.71	2.83389	3.0463E+2	3.0617E+2	3.0309E+2
3515.41	2.84462	1.3916E+3	1.4142E+3	1.3699E+3	3528.96	2.83369	3.0608E+2	3.0765E+2	3.0453E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3529.21	2.83349	3.0636E+2	3.0793E+2	3.0480E+2	3543.71	2.82190	2.8130E+2	2.8281E+2	2.7981E+2
3529.46	2.83329	3.0563E+2	3.0719E+2	3.0409E+2	3544.21	2.82150	2.8157E+2	2.8307E+2	2.8008E+2
3529.71	2.83309	3.0418E+2	3.0570E+2	3.0267E+2	3544.71	2.82110	2.8176E+2	2.8325E+2	2.8028E+2
3529.96	2.83289	3.0244E+2	3.0394E+2	3.0096E+2	3545.21	2.82070	2.8189E+2	2.8338E+2	2.8042E+2
3530.21	2.83269	3.0046E+2	3.0195E+2	2.9899E+2	3545.71	2.82031	2.8208E+2	2.8355E+2	2.8061E+2
3530.71	2.83229	2.9610E+2	2.9758E+2	2.9462E+2	3545.96	2.82011	2.8221E+2	2.8368E+2	2.8075E+2
3530.96	2.83209	2.9379E+2	2.9526E+2	2.9232E+2	3546.21	2.81991	2.8239E+2	2.8385E+2	2.8094E+2
3531.21	2.83189	2.9215E+2	2.9363E+2	2.9069E+2	3546.46	2.81971	2.8258E+2	2.8403E+2	2.8115E+2
3531.46	2.83169	2.9130E+2	2.9276E+2	2.8985E+2	3546.71	2.81951	2.8278E+2	2.8421E+2	2.8136E+2
3531.71	2.83149	2.9107E+2	2.9252E+2	2.8964E+2	3547.21	2.81911	2.8317E+2	2.8460E+2	2.8176E+2
3531.96	2.83129	2.9121E+2	2.9262E+2	2.8982E+2	3547.46	2.81892	2.8337E+2	2.8479E+2	2.8197E+2
3532.21	2.83109	2.9217E+2	2.9354E+2	2.9081E+2	3547.71	2.81872	2.8359E+2	2.8499E+2	2.8220E+2
3532.46	2.83089	2.9352E+2	2.9487E+2	2.9217E+2	3547.96	2.81852	2.8382E+2	2.8521E+2	2.8244E+2
3532.71	2.83069	2.9292E+2	2.9427E+2	2.9159E+2	3548.21	2.81832	2.8411E+2	2.8550E+2	2.8274E+2
3532.96	2.83049	2.8885E+2	2.9020E+2	2.8751E+2	3548.46	2.81812	2.8451E+2	2.8590E+2	2.8314E+2
3533.21	2.83029	2.8276E+2	2.8412E+2	2.8141E+2	3548.71	2.81792	2.8513E+2	2.8653E+2	2.8374E+2
3533.46	2.83008	2.7818E+2	2.7957E+2	2.7678E+2	3549.21	2.81753	2.8661E+2	2.8804E+2	2.8518E+2
3533.71	2.82988	2.7476E+2	2.7619E+2	2.7334E+2	3549.71	2.81713	2.8841E+2	2.8989E+2	2.8694E+2
3533.96	2.82968	2.7251E+2	2.7400E+2	2.7104E+2	3550.21	2.81673	2.9083E+2	2.9233E+2	2.8933E+2
3534.21	2.82948	2.7122E+2	2.7274E+2	2.6971E+2	3551.21	2.81594	2.9774E+2	2.9923E+2	2.9626E+2
3534.46	2.82928	2.7058E+2	2.7211E+2	2.6906E+2	3552.21	2.81515	3.0621E+2	3.0765E+2	3.0478E+2
3534.71	2.82908	2.7049E+2	2.7199E+2	2.6899E+2	3552.71	2.81475	3.1039E+2	3.1180E+2	3.0899E+2
3535.21	2.82868	2.7079E+2	2.7226E+2	2.6934E+2	3552.96	2.81455	3.1276E+2	3.1414E+2	3.1138E+2
3535.71	2.82828	2.7047E+2	2.7194E+2	2.6901E+2	3553.21	2.81435	3.1543E+2	3.1681E+2	3.1406E+2
3535.96	2.82808	2.6982E+2	2.7134E+2	2.6830E+2	3553.46	2.81416	3.1841E+2	3.1981E+2	3.1702E+2
3536.21	2.82788	2.6889E+2	2.7047E+2	2.6732E+2	3553.71	2.81396	3.2180E+2	3.2322E+2	3.2039E+2
3536.46	2.82768	2.6755E+2	2.6916E+2	2.6595E+2	3553.96	2.81376	3.2572E+2	3.2717E+2	3.2428E+2
3536.71	2.82748	2.6620E+2	2.6781E+2	2.6460E+2	3554.21	2.81356	3.3021E+2	3.3168E+2	3.2874E+2
3536.96	2.82728	2.6517E+2	2.6675E+2	2.6360E+2	3554.46	2.81336	3.3551E+2	3.3702E+2	3.3400E+2
3537.21	2.82708	2.6448E+2	2.6600E+2	2.6298E+2	3554.71	2.81317	3.4195E+2	3.4351E+2	3.4040E+2
3537.46	2.82688	2.6410E+2	2.6552E+2	2.6268E+2	3554.96	2.81297	3.4952E+2	3.5113E+2	3.4791E+2
3537.71	2.82668	2.6407E+2	2.6542E+2	2.6274E+2	3555.21	2.81277	3.5852E+2	3.6020E+2	3.5684E+2
3537.96	2.82649	2.6433E+2	2.6562E+2	2.6304E+2	3555.46	2.81257	3.6812E+2	3.6988E+2	3.6637E+2
3538.21	2.82629	2.6481E+2	2.6609E+2	2.6353E+2	3555.71	2.81237	3.7832E+2	3.8017E+2	3.7649E+2
3538.46	2.82609	2.6548E+2	2.6678E+2	2.6419E+2	3555.96	2.81218	3.8897E+2	3.9091E+2	3.8705E+2
3538.71	2.82589	2.6632E+2	2.6765E+2	2.6501E+2	3556.21	2.81198	4.0022E+2	4.0226E+2	3.9820E+2
3538.96	2.82569	2.6727E+2	2.6863E+2	2.6591E+2	3556.41	2.81182	4.0973E+2	4.1186E+2	4.0762E+2
3539.21	2.82549	2.6835E+2	2.6978E+2	2.6694E+2	3556.61	2.81166	4.2044E+2	4.2267E+2	4.1822E+2
3539.46	2.82529	2.6959E+2	2.7106E+2	2.6812E+2	3556.81	2.81150	4.3379E+2	4.3617E+2	4.3144E+2
3539.71	2.82509	2.7100E+2	2.7250E+2	2.6950E+2	3556.91	2.81143	4.4187E+2	4.4433E+2	4.3942E+2
3539.96	2.82489	2.7243E+2	2.7397E+2	2.7091E+2	3557.01	2.81135	4.5097E+2	4.5354E+2	4.4843E+2
3540.21	2.82469	2.7385E+2	2.7540E+2	2.7231E+2	3557.21	2.81119	4.7455E+2	4.7742E+2	4.7172E+2
3540.71	2.82429	2.7653E+2	2.7808E+2	2.7500E+2	3557.41	2.81103	5.0620E+2	5.0952E+2	5.0293E+2
3541.21	2.82389	2.7882E+2	2.8036E+2	2.7729E+2	3557.61	2.81087	5.4658E+2	5.5058E+2	5.4266E+2
3541.71	2.82349	2.7994E+2	2.8147E+2	2.7842E+2	3557.81	2.81071	5.9418E+2	5.9917E+2	5.8931E+2
3542.21	2.82309	2.8040E+2	2.8193E+2	2.7888E+2	3558.01	2.81056	6.4154E+2	6.4774E+2	6.3550E+2
3542.46	2.82289	2.8057E+2	2.8209E+2	2.7906E+2	3558.11	2.81048	6.6193E+2	6.6870E+2	6.5532E+2
3542.71	2.82270	2.8073E+2	2.8225E+2	2.7922E+2	3558.21	2.81040	6.7652E+2	6.8357E+2	6.6957E+2
3542.96	2.82250	2.8088E+2	2.8239E+2	2.7937E+2	3558.31	2.81032	6.8618E+2	6.9334E+2	6.7910E+2
3543.21	2.82230	2.8102E+2	2.8253E+2	2.7952E+2	3558.41	2.81024	6.8950E+2	6.9670E+2	6.8238E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3558.51	2.81016	6.8678E+2	6.9395E+2	6.7970E+2	3564.41	2.80551	1.3189E+3	1.3388E+3	1.2995E+3
3558.61	2.81008	6.7929E+2	6.8637E+2	6.7229E+2	3564.51	2.80543	1.2109E+3	1.2277E+3	1.1946E+3
3558.71	2.81000	6.6851E+2	6.7543E+2	6.6170E+2	3564.61	2.80535	1.1256E+3	1.1402E+3	1.1114E+3
3558.81	2.80992	6.5566E+2	6.6228E+2	6.4923E+2	3564.71	2.80527	1.0589E+3	1.0719E+3	1.0461E+3
3558.91	2.80985	6.4137E+2	6.4757E+2	6.3534E+2	3564.81	2.80519	1.0012E+3	1.0131E+3	9.8952E+2
3559.01	2.80977	6.2736E+2	6.3317E+2	6.2171E+2	3564.91	2.80512	9.4957E+2	9.6051E+2	9.3881E+2
3559.11	2.80969	6.1478E+2	6.2025E+2	6.0943E+2	3565.01	2.80504	9.1067E+2	9.2096E+2	9.0055E+2
3559.21	2.80961	6.0444E+2	6.0966E+2	5.9934E+2	3565.11	2.80496	8.7550E+2	8.8521E+2	8.6594E+2
3559.31	2.80953	5.9576E+2	6.0078E+2	5.9086E+2	3565.21	2.80488	8.4760E+2	8.5689E+2	8.3845E+2
3559.41	2.80945	5.8923E+2	5.9410E+2	5.8447E+2	3565.31	2.80480	8.2489E+2	8.3384E+2	8.1606E+2
3559.51	2.80937	5.8481E+2	5.8958E+2	5.8015E+2	3565.41	2.80472	8.0598E+2	8.1466E+2	7.9741E+2
3559.61	2.80929	5.8213E+2	5.8684E+2	5.7752E+2	3565.51	2.80464	7.9132E+2	7.9980E+2	7.8295E+2
3559.71	2.80921	5.8142E+2	5.8611E+2	5.7682E+2	3565.61	2.80457	7.7907E+2	7.8738E+2	7.7086E+2
3559.81	2.80914	5.8255E+2	5.8727E+2	5.7793E+2	3565.71	2.80449	7.6916E+2	7.7734E+2	7.6108E+2
3559.91	2.80906	5.8542E+2	5.9020E+2	5.8074E+2	3565.81	2.80441	7.6097E+2	7.6904E+2	7.5300E+2
3560.01	2.80898	5.8997E+2	5.9485E+2	5.8519E+2	3565.91	2.80433	7.5441E+2	7.6240E+2	7.4652E+2
3560.11	2.80890	5.9660E+2	6.0163E+2	5.9167E+2	3566.01	2.80425	7.4942E+2	7.5735E+2	7.4160E+2
3560.21	2.80882	6.0487E+2	6.1010E+2	5.9976E+2	3566.11	2.80417	7.4567E+2	7.5355E+2	7.3789E+2
3560.31	2.80874	6.1612E+2	6.2163E+2	6.1074E+2	3566.21	2.80409	7.4281E+2	7.5065E+2	7.3506E+2
3560.41	2.80866	6.2876E+2	6.3460E+2	6.2307E+2	3566.31	2.80401	7.4087E+2	7.4868E+2	7.3314E+2
3560.51	2.80858	6.4398E+2	6.5026E+2	6.3789E+2	3566.41	2.80394	7.4008E+2	7.4789E+2	7.3237E+2
3560.61	2.80850	6.6152E+2	6.6826E+2	6.5493E+2	3566.51	2.80386	7.4048E+2	7.4830E+2	7.3276E+2
3560.71	2.80843	6.8160E+2	6.8870E+2	6.7457E+2	3566.61	2.80378	7.4199E+2	7.4983E+2	7.3426E+2
3560.81	2.80835	7.0330E+2	7.1066E+2	6.9603E+2	3566.71	2.80370	7.4461E+2	7.5247E+2	7.3684E+2
3560.91	2.80827	7.2518E+2	7.3280E+2	7.1765E+2	3566.81	2.80362	7.4847E+2	7.5639E+2	7.4066E+2
3561.01	2.80819	7.4924E+2	7.5717E+2	7.4141E+2	3567.01	2.80346	7.5936E+2	7.6741E+2	7.5141E+2
3561.11	2.80811	7.7829E+2	7.8659E+2	7.7009E+2	3567.22	2.80331	7.7264E+2	7.8086E+2	7.6451E+2
3561.21	2.80803	8.1289E+2	8.2168E+2	8.0423E+2	3567.42	2.80315	7.8951E+2	7.9797E+2	7.8117E+2
3561.31	2.80795	8.5318E+2	8.6255E+2	8.4394E+2	3567.62	2.80299	8.0762E+2	8.1633E+2	7.9904E+2
3561.41	2.80787	9.0029E+2	9.1041E+2	8.9034E+2	3567.82	2.80284	8.2866E+2	8.3767E+2	8.1978E+2
3561.51	2.80779	9.5630E+2	9.6738E+2	9.4541E+2	3568.02	2.80268	8.5272E+2	8.6208E+2	8.4350E+2
3561.61	2.80772	1.0249E+3	1.0373E+3	1.0128E+3	3568.22	2.80252	8.7929E+2	8.8907E+2	8.6967E+2
3561.71	2.80764	1.1084E+3	1.1226E+3	1.0945E+3	3568.42	2.80236	9.0572E+2	9.1592E+2	8.9569E+2
3561.81	2.80756	1.2055E+3	1.2221E+3	1.1893E+3	3568.62	2.80221	9.3165E+2	9.4228E+2	9.2119E+2
3561.91	2.80748	1.3198E+3	1.3398E+3	1.3003E+3	3568.82	2.80205	9.5665E+2	9.6772E+2	9.4577E+2
3562.01	2.80740	1.4610E+3	1.4863E+3	1.4367E+3	3569.02	2.80189	9.8101E+2	9.9253E+2	9.6971E+2
3562.11	2.80732	1.6407E+3	1.6749E+3	1.6084E+3	3569.22	2.80174	1.0051E+3	1.0171E+3	9.9334E+2
3562.21	2.80724	1.8648E+3	1.9138E+3	1.8194E+3	3569.42	2.80158	1.0285E+3	1.0410E+3	1.0164E+3
3562.31	2.80716	2.1478E+3	2.2263E+3	2.0780E+3	3569.62	2.80142	1.0513E+3	1.0642E+3	1.0387E+3
3562.41	2.80708	2.4524E+3	2.5858E+3	2.3425E+3	3569.82	2.80127	1.0717E+3	1.0850E+3	1.0587E+3
3562.51	2.80701	2.7659E+3	3.0046E+3	2.5936E+3	3570.02	2.80111	1.0878E+3	1.1015E+3	1.0745E+3
3562.61	2.80693	3.1279E+3	3.6503E+3	2.8474E+3	3570.22	2.80095	1.1068E+3	1.1209E+3	1.0930E+3
3562.71	2.80685	3.5495E+3	∞	3.0822E+3	3570.42	2.80079	1.1321E+3	1.1468E+3	1.1178E+3
3563.71	2.80606	3.5495E+3	∞	3.0822E+3	3570.62	2.80064	1.1718E+3	1.1874E+3	1.1565E+3
3563.81	2.80598	3.0086E+3	3.4032E+3	2.7687E+3	3570.82	2.80048	1.2312E+3	1.2485E+3	1.2144E+3
3563.91	2.80590	2.4864E+3	2.6282E+3	2.3709E+3	3571.02	2.80032	1.3170E+3	1.3369E+3	1.2978E+3
3564.01	2.80582	2.0831E+3	2.1535E+3	2.0199E+3	3571.12	2.80025	1.3728E+3	1.3945E+3	1.3517E+3
3564.11	2.80575	1.8218E+3	1.8675E+3	1.7794E+3	3571.22	2.80017	1.4277E+3	1.4515E+3	1.4048E+3
3564.21	2.80567	1.6211E+3	1.6538E+3	1.5900E+3	3571.32	2.80009	1.4761E+3	1.5018E+3	1.4514E+3
3564.31	2.80559	1.4571E+3	1.4822E+3	1.4330E+3	3571.42	2.80001	1.5211E+3	1.5488E+3	1.4946E+3

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3571.62	2.79985	1.6078E+3	1.6397E+3	1.5774E+3	3579.32	2.79383	8.3775E+2	8.4690E+2	8.2874E+2
3571.82	2.79970	1.6758E+3	1.7115E+3	1.6420E+3	3579.42	2.79375	8.4939E+2	8.5870E+2	8.4021E+2
3572.02	2.79954	1.7218E+3	1.7603E+3	1.6855E+3	3579.52	2.79367	8.6203E+2	8.7154E+2	8.5267E+2
3572.22	2.79938	1.8000E+3	1.8438E+3	1.7590E+3	3579.62	2.79360	8.7509E+2	8.8479E+2	8.6553E+2
3572.42	2.79923	1.9141E+3	1.9672E+3	1.8653E+3	3579.72	2.79352	8.8915E+2	8.9908E+2	8.7938E+2
3572.52	2.79915	1.9754E+3	2.0342E+3	1.9217E+3	3579.82	2.79344	9.0368E+2	9.1384E+2	8.9367E+2
3572.62	2.79907	2.0356E+3	2.1005E+3	1.9767E+3	3580.02	2.79328	9.4917E+2	9.6011E+2	9.3841E+2
3572.72	2.79899	2.0830E+3	2.1534E+3	2.0197E+3	3580.22	2.79313	1.0151E+3	1.0272E+3	1.0031E+3
3572.82	2.79891	2.1024E+3	2.1752E+3	2.0373E+3	3580.32	2.79305	1.0595E+3	1.0726E+3	1.0467E+3
3572.92	2.79883	2.0615E+3	2.1296E+3	2.0002E+3	3580.42	2.79297	1.1154E+3	1.1297E+3	1.1014E+3
3573.02	2.79876	1.9802E+3	2.0393E+3	1.9261E+3	3580.52	2.79289	1.2078E+3	1.2245E+3	1.1916E+3
3573.12	2.79868	1.8529E+3	1.9010E+3	1.8083E+3	3580.62	2.79282	1.3283E+3	1.3487E+3	1.3087E+3
3573.22	2.79860	1.7222E+3	1.7609E+3	1.6857E+3	3580.72	2.79274	1.4706E+3	1.4963E+3	1.4460E+3
3573.32	2.79852	1.5799E+3	1.6106E+3	1.5507E+3	3580.82	2.79266	1.6339E+3	1.6675E+3	1.6019E+3
3573.42	2.79844	1.4376E+3	1.4619E+3	1.4143E+3	3580.92	2.79258	1.8246E+3	1.8709E+3	1.7816E+3
3573.62	2.79829	1.2117E+3	1.2284E+3	1.1953E+3	3581.02	2.79250	2.0249E+3	2.0894E+3	1.9665E+3
3573.82	2.79813	1.0448E+3	1.0575E+3	1.0322E+3	3581.12	2.79243	2.1650E+3	2.2460E+3	2.0934E+3
3573.92	2.79805	9.7502E+2	9.8644E+2	9.6381E+2	3581.22	2.79235	2.2092E+3	2.2965E+3	2.1327E+3
3574.02	2.79797	9.1888E+2	9.2930E+2	9.0862E+2	3581.32	2.79227	2.0326E+3	2.0978E+3	1.9735E+3
3574.12	2.79790	8.7277E+2	8.8244E+2	8.6325E+2	3581.42	2.79219	1.8489E+3	1.8969E+3	1.8044E+3
3574.22	2.79782	8.3992E+2	8.4910E+2	8.3088E+2	3581.52	2.79211	1.6711E+3	1.7068E+3	1.6374E+3
3574.42	2.79766	7.8436E+2	7.9275E+2	7.7608E+2	3581.62	2.79204	1.5198E+3	1.5475E+3	1.4932E+3
3574.52	2.79758	7.6273E+2	7.7083E+2	7.5474E+2	3581.82	2.79188	1.3008E+3	1.3201E+3	1.2820E+3
3574.62	2.79750	7.4586E+2	7.5375E+2	7.3808E+2	3581.92	2.79180	1.2346E+3	1.2520E+3	1.2177E+3
3574.72	2.79743	7.3213E+2	7.3984E+2	7.2452E+2	3582.02	2.79172	1.1848E+3	1.2009E+3	1.1692E+3
3574.82	2.79735	7.2232E+2	7.2991E+2	7.1482E+2	3582.12	2.79165	1.1505E+3	1.1657E+3	1.1357E+3
3574.92	2.79727	7.1391E+2	7.2140E+2	7.0651E+2	3582.22	2.79157	1.1279E+3	1.1425E+3	1.1136E+3
3575.02	2.79719	7.0705E+2	7.1445E+2	6.9973E+2	3582.32	2.79149	1.1124E+3	1.1267E+3	1.0985E+3
3575.22	2.79703	6.9697E+2	7.0425E+2	6.8977E+2	3582.42	2.79141	1.1024E+3	1.1165E+3	1.0887E+3
3575.42	2.79688	6.9119E+2	6.9841E+2	6.8405E+2	3582.52	2.79133	1.0970E+3	1.1109E+3	1.0834E+3
3575.62	2.79672	6.8795E+2	6.9513E+2	6.8085E+2	3582.62	2.79126	1.0951E+3	1.1090E+3	1.0816E+3
3575.82	2.79656	6.8659E+2	6.9376E+2	6.7951E+2	3582.72	2.79118	1.0956E+3	1.1095E+3	1.0820E+3
3576.02	2.79641	6.8669E+2	6.9386E+2	6.7961E+2	3582.82	2.79110	1.0977E+3	1.1116E+3	1.0841E+3
3576.22	2.79625	6.8784E+2	6.9502E+2	6.8075E+2	3582.92	2.79102	1.1012E+3	1.1152E+3	1.0875E+3
3576.42	2.79610	6.9005E+2	6.9726E+2	6.8293E+2	3583.02	2.79094	1.1067E+3	1.1208E+3	1.0929E+3
3576.62	2.79594	6.9309E+2	7.0033E+2	6.8593E+2	3583.12	2.79087	1.1149E+3	1.1292E+3	1.1009E+3
3576.82	2.79578	6.9700E+2	7.0429E+2	6.8980E+2	3583.22	2.79079	1.1252E+3	1.1397E+3	1.1110E+3
3577.02	2.79563	7.0194E+2	7.0928E+2	6.9468E+2	3583.42	2.79063	1.1511E+3	1.1663E+3	1.1363E+3
3577.22	2.79547	7.0771E+2	7.1513E+2	7.0039E+2	3583.62	2.79048	1.1811E+3	1.1970E+3	1.1656E+3
3577.42	2.79531	7.1444E+2	7.2194E+2	7.0704E+2	3583.82	2.79032	1.2185E+3	1.2355E+3	1.2021E+3
3577.62	2.79516	7.2215E+2	7.2974E+2	7.1466E+2	3584.02	2.79017	1.2529E+3	1.2707E+3	1.2355E+3
3577.82	2.79500	7.3073E+2	7.3842E+2	7.2313E+2	3584.22	2.79001	1.2723E+3	1.2908E+3	1.2544E+3
3578.02	2.79485	7.4027E+2	7.4808E+2	7.3255E+2	3584.42	2.78985	1.2795E+3	1.2982E+3	1.2614E+3
3578.22	2.79469	7.5065E+2	7.5859E+2	7.4281E+2	3584.62	2.78970	1.2783E+3	1.2969E+3	1.2602E+3
3578.42	2.79453	7.6216E+2	7.7026E+2	7.5418E+2	3584.82	2.78954	1.2796E+3	1.2983E+3	1.2615E+3
3578.62	2.79438	7.7486E+2	7.8312E+2	7.6671E+2	3585.02	2.78939	1.2855E+3	1.3043E+3	1.2672E+3
3578.82	2.79422	7.8925E+2	7.9771E+2	7.8091E+2	3585.22	2.78923	1.3007E+3	1.3201E+3	1.2820E+3
3579.02	2.79406	8.0663E+2	8.1533E+2	7.9806E+2	3586.22	2.78845	1.4288E+3	1.4526E+3	1.4059E+3
3579.12	2.79399	8.1638E+2	8.2521E+2	8.0767E+2	3587.22	2.78768	1.5872E+3	1.6180E+3	1.5578E+3
3579.22	2.79391	8.2652E+2	8.3550E+2	8.1767E+2	3588.22	2.78690	1.7976E+3	1.8413E+3	1.7568E+3

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3589.22	2.78612	2.0848E+3	2.1554E+3	2.0214E+3	3686.60	2.71253	3.7594E+3	∞	3.1733E+3
3589.47	2.78593	2.1704E+3	2.2521E+3	2.0982E+3	3686.90	2.71231	3.4863E+3	∞	3.0518E+3
3589.72	2.78574	2.2696E+3	2.3664E+3	2.1858E+3	3687.10	2.71216	3.3898E+3	4.6208E+3	3.0018E+3
3589.97	2.78554	2.3531E+3	2.4651E+3	2.2582E+3	3687.30	2.71201	3.3324E+3	4.2931E+3	2.9703E+3
3590.22	2.78535	2.4495E+3	2.5822E+3	2.3400E+3	3687.40	2.71194	3.3138E+3	4.2110E+3	2.9598E+3
3590.47	2.78515	2.5481E+3	2.7066E+3	2.4217E+3	3687.60	2.71179	3.3067E+3	4.1814E+3	2.9557E+3
3590.72	2.78496	2.6470E+3	2.8373E+3	2.5013E+3	3687.80	2.71164	3.3157E+3	4.2189E+3	2.9609E+3
3590.97	2.78477	2.7434E+3	2.9720E+3	2.5764E+3	3688.00	2.71150	3.3325E+3	4.2935E+3	2.9703E+3
3591.22	2.78457	2.8534E+3	3.1375E+3	2.6588E+3	3689.00	2.71076	3.4509E+3	5.3082E+3	3.0339E+3
3591.72	2.78418	3.1456E+3	3.6922E+3	2.8586E+3	3690.00	2.71003	3.6002E+3	∞	3.1061E+3
3591.97	2.78399	3.3416E+3	4.3402E+3	2.9750E+3	3691.00	2.70929	3.7982E+3	∞	3.1882E+3
3592.22	2.78380	3.6133E+3	∞	3.1115E+3	3691.50	2.70893	3.9235E+3	∞	3.2326E+3
3592.47	2.78360	4.0059E+3	∞	3.2580E+3	3692.00	2.70856	4.0632E+3	∞	3.2754E+3
3592.72	2.78341	4.7469E+3	∞	3.4052E+3	3692.50	2.70819	4.2046E+3	∞	3.3124E+3
3668.22	2.72612	4.7502E+3	∞	3.4060E+3	3693.00	2.70783	4.3499E+3	∞	3.3443E+3
3668.72	2.72575	3.9583E+3	∞	3.2436E+3	3693.50	2.70746	4.4700E+3	∞	3.3666E+3
3669.22	2.72537	3.5461E+3	∞	3.0807E+3	3694.00	2.70709	4.5759E+3	∞	3.3835E+3
3669.72	2.72500	3.3191E+3	4.2347E+3	2.9627E+3	3694.50	2.70673	4.6592E+3	∞	3.3951E+3
3670.22	2.72463	3.1576E+3	3.7206E+3	2.8663E+3	3695.10	2.70629	4.7480E+3	∞	3.4062E+3
3670.72	2.72426	3.0342E+3	3.4519E+3	2.7861E+3	3762.60	2.65774	4.7648E+3	∞	3.3861E+3
3671.22	2.72389	2.9338E+3	3.2690E+3	2.7169E+3	3763.00	2.65745	4.7048E+3	∞	3.3756E+3
3671.72	2.72352	2.8476E+3	3.1281E+3	2.6547E+3	3763.20	2.65731	4.1892E+3	∞	3.2849E+3
3672.22	2.72315	2.7725E+3	3.0141E+3	2.5987E+3	3763.50	2.65710	3.6411E+3	∞	3.1063E+3
3672.72	2.72278	2.7106E+3	2.9250E+3	2.5513E+3	3763.73	2.65694	3.2013E+3	3.8794E+3	2.8838E+3
3673.72	2.72204	2.6169E+3	2.7967E+3	2.4775E+3	3763.98	2.65676	2.7878E+3	3.0490E+3	2.6041E+3
3674.72	2.72129	2.5509E+3	2.7102E+3	2.4242E+3	3764.23	2.65659	2.4511E+3	2.5901E+3	2.3375E+3
3675.22	2.72092	2.5258E+3	2.6779E+3	2.4035E+3	3764.48	2.65641	2.1823E+3	2.2691E+3	2.1061E+3
3675.72	2.72055	2.5080E+3	2.6553E+3	2.3889E+3	3764.73	2.65624	1.9855E+3	2.0477E+3	1.9290E+3
3676.22	2.72018	2.4946E+3	2.6383E+3	2.3777E+3	3764.98	2.65606	1.8475E+3	1.8968E+3	1.8018E+3
3676.72	2.71981	2.4886E+3	2.6308E+3	2.3728E+3	3765.23	2.65588	1.7540E+3	1.7962E+3	1.7144E+3
3677.22	2.71944	2.4874E+3	2.6294E+3	2.3718E+3	3765.48	2.65571	1.6876E+3	1.7254E+3	1.6519E+3
3678.22	2.71871	2.4935E+3	2.6370E+3	2.3769E+3	3765.73	2.65553	1.6374E+3	1.6723E+3	1.6044E+3
3679.22	2.71797	2.5096E+3	2.6573E+3	2.3902E+3	3765.98	2.65535	1.5974E+3	1.6300E+3	1.5664E+3
3680.22	2.71723	2.5391E+3	2.6949E+3	2.4145E+3	3766.23	2.65518	1.5632E+3	1.5941E+3	1.5338E+3
3681.22	2.71649	2.5869E+3	2.7569E+3	2.4534E+3	3766.73	2.65482	1.5035E+3	1.5314E+3	1.4767E+3
3682.22	2.71575	2.6519E+3	2.8437E+3	2.5053E+3	3767.23	2.65447	1.4540E+3	1.4798E+3	1.4293E+3
3682.72	2.71538	2.6940E+3	2.9016E+3	2.5384E+3	3767.73	2.65412	1.4138E+3	1.4380E+3	1.3906E+3
3683.22	2.71501	2.7465E+3	2.9761E+3	2.5789E+3	3768.23	2.65377	1.3812E+3	1.4041E+3	1.3591E+3
3683.72	2.71465	2.8170E+3	3.0807E+3	2.6322E+3	3768.73	2.65342	1.3548E+3	1.3768E+3	1.3336E+3
3684.22	2.71428	2.9048E+3	3.2200E+3	2.6963E+3	3768.98	2.65324	1.3437E+3	1.3653E+3	1.3229E+3
3684.72	2.71391	3.0908E+3	3.5671E+3	2.8236E+3	3769.23	2.65306	1.3339E+3	1.3551E+3	1.3134E+3
3685.22	2.71354	3.5321E+3	∞	3.0742E+3	3769.48	2.65289	1.3252E+3	1.3461E+3	1.3050E+3
3685.72	2.71317	4.0955E+3	∞	3.2843E+3	3769.73	2.65271	1.3175E+3	1.3382E+3	1.2975E+3
3685.80	2.71312	4.2199E+3	∞	3.3159E+3	3770.23	2.65236	1.3049E+3	1.3251E+3	1.2853E+3
3685.90	2.71304	4.3698E+3	∞	3.3481E+3	3770.73	2.65201	1.2963E+3	1.3163E+3	1.2770E+3
3686.00	2.71297	4.4693E+3	∞	3.3663E+3	3771.23	2.65166	1.2920E+3	1.3118E+3	1.2728E+3
3686.10	2.71289	4.4693E+3	∞	3.3663E+3	3771.73	2.65131	1.2920E+3	1.3118E+3	1.2728E+3
3686.20	2.71282	4.3937E+3	∞	3.3527E+3	3771.98	2.65113	1.2938E+3	1.3136E+3	1.2745E+3
3686.30	2.71275	4.2364E+3	∞	3.3198E+3	3772.23	2.65095	1.2966E+3	1.3166E+3	1.2773E+3
3686.40	2.71267	4.0688E+3	∞	3.2769E+3	3772.48	2.65078	1.3005E+3	1.3206E+3	1.2811E+3

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3772.73	2.65060	1.3054E+3	1.3257E+3	1.2858E+3	3790.23	2.63836	1.2397E+3	1.2579E+3	1.2221E+3
3772.98	2.65043	1.3113E+3	1.3317E+3	1.2915E+3	3791.23	2.63767	1.2853E+3	1.3049E+3	1.2664E+3
3773.23	2.65025	1.3181E+3	1.3387E+3	1.2981E+3	3792.23	2.63697	1.3334E+3	1.3546E+3	1.3129E+3
3773.73	2.64990	1.3342E+3	1.3554E+3	1.3137E+3	3794.23	2.63558	1.4386E+3	1.4637E+3	1.4144E+3
3774.23	2.64955	1.3535E+3	1.3754E+3	1.3324E+3	3794.48	2.63541	1.4520E+3	1.4776E+3	1.4273E+3
3774.73	2.64920	1.3756E+3	1.3983E+3	1.3537E+3	3794.73	2.63523	1.4646E+3	1.4908E+3	1.4394E+3
3775.23	2.64885	1.4010E+3	1.4247E+3	1.3783E+3	3795.23	2.63489	1.4886E+3	1.5159E+3	1.4625E+3
3775.73	2.64850	1.4294E+3	1.4541E+3	1.4055E+3	3796.23	2.63419	1.5340E+3	1.5634E+3	1.5060E+3
3776.23	2.64815	1.4596E+3	1.4856E+3	1.4346E+3	3798.23	2.63281	1.6232E+3	1.6572E+3	1.5909E+3
3776.48	2.64797	1.4749E+3	1.5016E+3	1.4493E+3	3799.23	2.63211	1.6705E+3	1.7073E+3	1.6358E+3
3776.73	2.64779	1.4898E+3	1.5172E+3	1.4636E+3	3799.73	2.63177	1.6965E+3	1.7349E+3	1.6604E+3
3776.98	2.64762	1.5036E+3	1.5315E+3	1.4768E+3	3800.23	2.63142	1.7215E+3	1.7615E+3	1.6839E+3
3777.23	2.64744	1.5153E+3	1.5438E+3	1.4881E+3	3800.73	2.63107	1.7445E+3	1.7861E+3	1.7056E+3
3777.48	2.64727	1.5243E+3	1.5532E+3	1.4966E+3	3801.23	2.63073	1.7645E+3	1.8074E+3	1.7243E+3
3777.73	2.64709	1.5300E+3	1.5592E+3	1.5021E+3	3801.73	2.63038	1.7802E+3	1.8243E+3	1.7390E+3
3777.98	2.64692	1.5331E+3	1.5624E+3	1.5050E+3	3802.23	2.63004	1.7906E+3	1.8354E+3	1.7487E+3
3778.23	2.64674	1.5341E+3	1.5635E+3	1.5060E+3	3802.73	2.62969	1.7953E+3	1.8405E+3	1.7531E+3
3778.48	2.64657	1.5337E+3	1.5631E+3	1.5056E+3	3803.23	2.62934	1.7942E+3	1.8393E+3	1.7521E+3
3778.73	2.64639	1.5313E+3	1.5606E+3	1.5033E+3	3803.48	2.62917	1.7916E+3	1.8365E+3	1.7497E+3
3778.98	2.64622	1.5263E+3	1.5554E+3	1.4986E+3	3803.73	2.62900	1.7876E+3	1.8322E+3	1.7459E+3
3779.23	2.64604	1.5182E+3	1.5468E+3	1.4908E+3	3804.23	2.62865	1.7761E+3	1.8198E+3	1.7352E+3
3779.73	2.64569	1.4916E+3	1.5190E+3	1.4653E+3	3804.98	2.62814	1.7539E+3	1.7960E+3	1.7143E+3
3780.23	2.64534	1.4530E+3	1.4788E+3	1.4283E+3	3805.73	2.62762	1.7293E+3	1.7698E+3	1.6912E+3
3780.48	2.64517	1.4302E+3	1.4550E+3	1:4063E+3	3806.23	2.62727	1.7124E+3	1.7518E+3	1.6754E+3
3780.73	2.64499	1.4063E+3	1.4302E+3	1.3834E+3	3806.73	2.62693	1.6953E+3	1.7336E+3	1.6592E+3
3780.98	2.64482	1.3820E+3	1.4049E+3	1.3598E+3	3807.23	2.62658	1.6776E+3	1.7148E+3	1.6425E+3
3781.23	2.64464	1.3575E+3	1.3796E+3	1.3362E+3	3807.73	2.62624	1.6596E+3	1.6957E+3	1.6255E+3
3781.73	2.64429	1.3101E+3	1.3305E+3	1.2903E+3	3808.23	2.62589	1.6413E+3	1.6764E+3	1.6082E+3
3782.23	2.64394	1.2663E+3	1.2853E+3	1.2478E+3	3809.23	2.62520	1.6055E+3	1.6385E+3	1.5741E+3
3782.73	2.64359	1.2277E+3	1.2455E+3	1.2103E+3	3810.23	2.62451	1.5687E+3	1.5998E+3	1.5391E+3
3783.23	2.64325	1.1955E+3	1.2124E+3	1.1790E+3	3811.23	2.62383	1.5327E+3	1.5620E+3	1.5047E+3
3783.48	2.64307	1.1822E+3	1.1987E+3	1.1660E+3	3812.23	2.62314	1.4948E+3	1.5223E+3	1.4684E+3
3783.73	2.64290	1.1708E+3	1.1871E+3	1.1550E+3	3812.73	2.62279	1.4736E+3	1.5002E+3	1.4480E+3
3783.98	2.64272	1.1616E+3	1.1776E+3	1.1460E+3	3813.23	2.62245	1.4519E+3	1.4776E+3	1.4272E+3
3784.23	2.64255	1.1540E+3	1.1698E+3	1.1386E+3	3813.73	2.62211	1.4321E+3	1.4569E+3	1.4081E+3
3784.73	2.64220	1.1431E+3	1.1586E+3	1.1279E+3	3814.23	2.62176	1.4097E+3	1.4337E+3	1.3866E+3
3785.23	2.64185	1.1367E+3	1.1521E+3	1.1217E+3	3816.23	2.62039	1.3204E+3	1.3412E+3	1.3004E+3
3785.48	2.64167	1.1349E+3	1.1502E+3	1.1199E+3	3818.23	2.61901	1.2423E+3	1.2606E+3	1.2246E+3
3785.73	2.64150	1.1338E+3	1.1491E+3	1.1188E+3	3822.77	2.61591	1.0958E+3	1.1102E+3	1.0817E+3
3786.23	2.64115	1.1339E+3	1.1492E+3	1.1189E+3	3823.02	2.61574	1.0880E+3	1.1022E+3	1.0741E+3
3786.73	2.64080	1.1371E+3	1.1525E+3	1.1221E+3	3823.52	2.61539	1.0703E+3	1.0841E+3	1.0568E+3
3786.98	2.64063	1.1399E+3	1.1554E+3	1.1248E+3	3824.02	2.61505	1.0501E+3	1.0635E+3	1.0370E+3
3787.23	2.64045	1.1436E+3	1.1592E+3	1.1284E+3	3824.52	2.61471	1.0297E+3	1.0426E+3	1.0170E+3
3787.48	2.64028	1.1482E+3	1.1639E+3	1.1329E+3	3824.77	2.61454	1.0194E+3	1.0322E+3	1.0070E+3
3787.73	2.64010	1.1536E+3	1.1694E+3	1.1381E+3	3825.02	2.61437	1.0077E+3	1.0202E+3	9.9544E+2
3788.23	2.63976	1.1663E+3	1.1825E+3	1.1506E+3	3825.52	2.61403	9.8375E+2	9.9576E+2	9.7197E+2
3788.73	2.63941	1.1816E+3	1.1982E+3	1.1655E+3	3826.02	2.61368	9.5993E+2	9.7149E+2	9.4859E+2
3789.23	2.63906	1.1991E+3	1.2162E+3	1.1825E+3	3826.52	2.61334	9.3599E+2	9.4711E+2	9.2507E+2
3789.73	2.63871	1.2186E+3	1.2361E+3	1.2015E+3	3826.77	2.61317	9.2399E+2	9.3490E+2	9.1328E+2
3789.98	2.63854	1.2289E+3	1.2468E+3	1.2116E+3	3827.02	2.61300	9.1221E+2	9.2291E+2	9.0170E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3827.27	2.61283	9.0047E+2	9.1097E+2	8.9015E+2	3866.52	2.58630	1.1114E+2	1.1238E+2	1.0996E+2
3827.52	2.61266	8.8784E+2	8.9812E+2	8.7772E+2	3868.52	2.58497	1.0028E+2	1.0138E+2	9.9244E+1
3827.77	2.61249	8.7545E+2	8.8553E+2	8.6553E+2	3870.52	2.58363	9.0710E+1	9.1682E+1	8.9829E+1
3828.02	2.61232	8.6329E+2	8.7317E+2	8.5355E+2	3871.52	2.58296	8.6308E+1	8.7230E+1	8.5487E+1
3828.27	2.61215	8.5106E+2	8.6076E+2	8.4152E+2	3872.52	2.58230	8.2165E+1	8.3029E+1	8.1420E+1
3828.52	2.61198	8.3751E+2	8.4700E+2	8.2817E+2	3874.52	2.58096	7.4428E+1	7.5221E+1	7.3806E+1
3829.02	2.61164	8.1122E+2	8.2031E+2	8.0226E+2	3876.52	2.57963	6.7490E+1	6.8247E+1	6.6946E+1
3829.27	2.61147	7.9825E+2	8.0715E+2	7.8947E+2	3877.52	2.57897	6.4328E+1	6.5078E+1	6.3800E+1
3829.52	2.61130	7.8454E+2	7.9325E+2	7.7595E+2	3878.52	2.57830	6.1355E+1	6.2100E+1	6.0841E+1
3830.02	2.61095	7.5771E+2	7.6605E+2	7.4948E+2	3879.52	2.57764	5.8563E+1	5.9311E+1	5.8054E+1
3830.52	2.61061	7.3128E+2	7.3927E+2	7.2339E+2	3880.52	2.57697	5.5967E+1	5.6715E+1	5.5467E+1
3831.02	2.61027	7.0542E+2	7.1308E+2	6.9784E+2	3881.52	2.57631	5.3557E+1	5.4301E+1	5.3073E+1
3831.52	2.60993	6.8078E+2	6.8815E+2	6.7350E+2	3882.52	2.57564	5.1310E+1	5.2046E+1	5.0847E+1
3832.02	2.60959	6.5736E+2	6.6446E+2	6.5045E+2	3883.52	2.57498	4.9219E+1	4.9947E+1	4.8778E+1
3832.52	2.60925	6.3547E+2	6.4192E+2	6.2920E+2	3884.52	2.57432	4.7288E+1	4.8007E+1	4.6871E+1
3833.02	2.60891	6.1495E+2	6.2082E+2	6.0924E+2	3885.47	2.57369	4.5562E+1	4.6272E+1	4.5170E+1
3833.52	2.60857	5.9544E+2	6.0101E+2	5.9002E+2	3885.97	2.57336	4.4706E+1	4.5411E+1	4.4327E+1
3834.02	2.60823	5.7689E+2	5.8214E+2	5.7176E+2	3886.47	2.57303	4.3866E+1	4.4568E+1	4.3498E+1
3834.52	2.60789	5.5937E+2	5.6449E+2	5.5438E+2	3886.97	2.57270	4.3064E+1	4.3761E+1	4.2709E+1
3835.52	2.60721	5.2704E+2	5.3189E+2	5.2231E+2	3887.47	2.57237	4.2277E+1	4.2969E+1	4.1940E+1
3836.52	2.60653	4.9788E+2	5.0253E+2	4.9333E+2	3887.97	2.57204	4.1529E+1	4.2216E+1	4.1206E+1
3837.02	2.60619	4.8434E+2	4.8887E+2	4.7990E+2	3888.47	2.57170	4.0801E+1	4.1485E+1	4.0490E+1
3837.52	2.60585	4.7136E+2	4.7586E+2	4.6695E+2	3889.47	2.57104	3.9413E+1	4.0091E+1	3.9129E+1
3838.02	2.60551	4.5888E+2	4.6320E+2	4.5464E+2	3890.47	2.57038	3.8107E+1	3.8780E+1	3.7850E+1
3838.52	2.60517	4.4670E+2	4.5095E+2	4.4252E+2	3891.47	2.56972	3.6885E+1	3.7553E+1	3.6660E+1
3839.02	2.60483	4.3513E+2	4.3921E+2	4.3112E+2	3891.97	2.56939	3.6309E+1	3.6975E+1	3.6097E+1
3839.52	2.60449	4.2393E+2	4.2788E+2	4.2006E+2	3892.47	2.56906	3.5746E+1	3.6414E+1	3.5539E+1
3840.52	2.60381	4.0310E+2	4.0669E+2	3.9957E+2	3893.47	2.56840	3.4667E+1	3.5337E+1	3.4468E+1
3841.52	2.60314	3.8368E+2	3.8693E+2	3.8047E+2	3893.97	2.56807	3.4144E+1	3.4816E+1	3.3949E+1
3842.52	2.60246	3.6601E+2	3.6902E+2	3.6304E+2	3894.47	2.56774	3.3634E+1	3.4307E+1	3.3443E+1
3843.52	2.60178	3.4921E+2	3.5206E+2	3.4641E+2	3895.47	2.56708	3.2656E+1	3.3332E+1	3.2471E+1
3844.52	2.60111	3.3292E+2	3.3565E+2	3.3021E+2	3896.47	2.56642	3.1716E+1	3.2395E+1	3.1538E+1
3845.02	2.60077	3.2528E+2	3.2797E+2	3.2261E+2	3897.47	2.56577	3.0812E+1	3.1495E+1	3.0641E+1
3845.52	2.60043	3.1759E+2	3.2024E+2	3.1498E+2	3898.47	2.56511	2.9941E+1	3.0627E+1	2.9775E+1
3846.52	2.59975	3.0298E+2	3.0550E+2	3.0049E+2	3898.97	2.56478	2.9504E+1	3.0191E+1	2.9341E+1
3847.52	2.59908	2.8869E+2	2.9105E+2	2.8635E+2	3899.47	2.56445	2.9069E+1	2.9758E+1	2.8908E+1
3848.52	2.59840	2.7488E+2	2.7707E+2	2.7270E+2	3899.97	2.56412	2.8646E+1	2.9337E+1	2.8488E+1
3849.52	2.59773	2.6149E+2	2.6354E+2	2.5946E+2	3900.47	2.56379	2.8232E+1	2.8924E+1	2.8076E+1
3850.52	2.59705	2.4869E+2	2.5064E+2	2.4677E+2	3901.47	2.56313	2.7424E+1	2.8121E+1	2.7273E+1
3851.52	2.59638	2.3696E+2	2.3882E+2	2.3512E+2	3901.97	2.56281	2.7033E+1	2.7732E+1	2.6884E+1
3852.52	2.59570	2.2561E+2	2.2743E+2	2.2382E+2	3902.47	2.56248	2.6646E+1	2.7347E+1	2.6499E+1
3853.52	2.59503	2.1458E+2	2.1635E+2	2.1283E+2	3903.47	2.56182	2.5897E+1	2.6603E+1	2.5754E+1
3854.52	2.59436	2.0400E+2	2.0572E+2	2.0230E+2	3904.47	2.56116	2.5174E+1	2.5886E+1	2.5035E+1
3855.52	2.59368	1.9409E+2	1.9579E+2	1.9241E+2	3905.47	2.56051	2.4474E+1	2.5192E+1	2.4338E+1
3856.52	2.59301	1.8459E+2	1.8625E+2	1.8296E+2	3906.47	2.55985	2.3794E+1	2.4517E+1	2.3661E+1
3857.52	2.59234	1.7524E+2	1.7686E+2	1.7366E+2	3907.47	2.55920	2.3140E+1	2.3868E+1	2.3010E+1
3858.52	2.59167	1.6658E+2	1.6815E+2	1.6503E+2	3908.47	2.55854	2.2498E+1	2.3230E+1	2.2372E+1
3860.52	2.59032	1.5047E+2	1.5199E+2	1.4899E+2	3909.47	2.55789	2.1878E+1	2.2613E+1	2.1754E+1
3862.52	2.58898	1.3622E+2	1.3768E+2	1.3481E+2	3910.47	2.55723	2.1271E+1	2.2009E+1	2.1149E+1
3864.52	2.58764	1.2307E+2	1.2444E+2	1.2175E+2	3911.47	2.55658	2.0682E+1	2.1422E+1	2.0563E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3911.97	2.55625	2.0393E+1	2.1135E+1	2.0275E+1	3942.68	2.53635	7.9936E+0	8.8036E+0	7.9293E+0
3912.47	2.55593	2.0106E+1	2.0849E+1	1.9989E+1	3942.88	2.53622	7.9153E+0	8.7255E+0	7.8512E+0
3912.97	2.55560	1.9820E+1	2.0563E+1	1.9704E+1	3943.08	2.53609	7.8507E+0	8.6613E+0	7.7868E+0
3913.47	2.55527	1.9533E+1	2.0278E+1	1.9418E+1	3943.28	2.53596	7.7887E+0	8.5996E+0	7.7249E+0
3914.47	2.55462	1.8960E+1	1.9707E+1	1.8847E+1	3943.48	2.53583	7.7297E+0	8.5410E+0	7.6661E+0
3915.47	2.55397	1.8399E+1	1.9149E+1	1.8289E+1	3943.73	2.53567	7.6604E+0	8.4722E+0	7.5969E+0
3915.97	2.55364	1.8125E+1	1.8876E+1	1.8016E+1	3943.98	2.53551	7.5975E+0	8.4098E+0	7.5341E+0
3916.48	2.55332	1.7853E+1	1.8605E+1	1.7745E+1	3944.23	2.53535	7.5390E+0	8.3515E+0	7.4757E+0
3917.48	2.55266	1.7321E+1	1.8076E+1	1.7214E+1	3944.48	2.53519	7.4825E+0	8.2953E+0	7.4193E+0
3918.48	2.55201	1.6800E+1	1.7557E+1	1.6695E+1	3945.48	2.53455	7.2713E+0	8.0848E+0	7.2086E+0
3919.48	2.55136	1.6302E+1	1.7061E+1	1.6198E+1	3946.48	2.53390	7.0710E+0	7.8849E+0	7.0087E+0
3919.98	2.55104	1.6057E+1	1.6818E+1	1.5954E+1	3947.48	2.53326	6.8777E+0	7.6919E+0	6.8158E+0
3920.48	2.55071	1.5813E+1	1.6576E+1	1.5712E+1	3948.48	2.53262	6.6910E+0	7.5054E+0	6.6294E+0
3920.98	2.55039	1.5575E+1	1.6339E+1	1.5475E+1	3950.48	2.53134	6.3286E+0	7.1434E+0	6.2678E+0
3921.48	2.55006	1.5337E+1	1.6103E+1	1.5239E+1	3952.48	2.53006	5.9786E+0	6.7935E+0	5.9184E+0
3922.48	2.54941	1.4874E+1	1.5642E+1	1.4779E+1	3954.48	2.52878	5.6448E+0	6.4600E+0	5.5850E+0
3923.48	2.54876	1.4424E+1	1.5195E+1	1.4333E+1	3956.48	2.52750	5.3250E+0	6.1407E+0	5.2658E+0
3924.48	2.54811	1.3982E+1	1.4756E+1	1.3893E+1	3957.48	2.52686	5.1732E+0	5.9892E+0	5.1142E+0
3925.48	2.54746	1.3546E+1	1.4324E+1	1.3460E+1	3958.48	2.52622	5.0249E+0	5.8413E+0	4.9660E+0
3926.48	2.54681	1.3119E+1	1.3900E+1	1.3036E+1	3959.48	2.52558	4.8828E+0	5.6997E+0	4.8242E+0
3928.48	2.54552	1.2310E+1	1.3097E+1	1.2231E+1	3960.48	2.52495	4.7458E+0	5.5631E+0	4.6873E+0
3930.48	2.54422	1.1558E+1	1.2350E+1	1.1482E+1	3961.48	2.52431	4.6181E+0	5.4358E+0	4.5598E+0
3931.48	2.54357	1.1201E+1	1.1995E+1	1.1126E+1	3962.48	2.52367	4.4971E+0	5.3153E+0	4.4389E+0
3932.48	2.54293	1.0852E+1	1.1648E+1	1.0779E+1	3963.48	2.52303	4.3898E+0	5.2085E+0	4.3316E+0
3933.48	2.54228	1.0512E+1	1.1311E+1	1.0440E+1	3965.48	2.52176	4.1925E+0	5.0123E+0	4.1345E+0
3934.48	2.54163	1.0184E+1	1.0985E+1	1.0113E+1	3967.48	2.52049	3.9832E+0	4.8028E+0	3.9256E+0
3935.48	2.54099	9.8693E+0	1.0672E+1	9.7998E+0	3968.48	2.51986	3.8855E+0	4.7046E+0	3.8280E+0
3936.48	2.54034	9.5642E+0	1.0369E+1	9.4957E+0	3968.98	2.51954	3.8398E+0	4.6587E+0	3.7823E+0
3937.48	2.53970	9.2669E+0	1.0073E+1	9.1992E+0	3969.48	2.51922	3.7949E+0	4.6136E+0	3.7375E+0
3938.48	2.53905	8.9778E+0	9.7850E+0	8.9110E+0	3969.73	2.51906	3.7728E+0	4.5915E+0	3.7155E+0
3939.48	2.53841	8.7121E+0	9.5203E+0	8.6461E+0	3969.98	2.51890	3.7515E+0	4.5702E+0	3.6942E+0
3939.98	2.53809	8.5821E+0	9.3906E+0	8.5164E+0	3970.23	2.51874	3.7309E+0	4.5497E+0	3.6736E+0
3940.23	2.53792	8.5204E+0	9.3291E+0	8.4549E+0	3970.48	2.51859	3.7110E+0	4.5298E+0	3.6537E+0
3940.48	2.53776	8.4659E+0	9.2749E+0	8.4005E+0	3970.73	2.51843	3.6930E+0	4.5120E+0	3.6357E+0
3940.73	2.53760	8.4266E+0	9.2360E+0	8.3613E+0	3970.98	2.51827	3.6759E+0	4.4952E+0	3.6187E+0
3940.98	2.53744	8.4013E+0	9.2110E+0	8.3361E+0	3971.23	2.51811	3.6631E+0	4.4825E+0	3.6058E+0
3941.18	2.53731	8.3906E+0	9.2002E+0	8.3253E+0	3971.48	2.51795	3.6576E+0	4.4771E+0	3.6004E+0
3941.38	2.53718	8.4038E+0	9.2127E+0	8.3386E+0	3971.58	2.51789	3.6577E+0	4.4772E+0	3.6005E+0
3941.48	2.53712	8.4144E+0	9.2228E+0	8.3492E+0	3971.68	2.51783	3.6597E+0	4.4792E+0	3.6025E+0
3941.58	2.53705	8.4210E+0	9.2291E+0	8.3558E+0	3971.78	2.51776	3.6644E+0	4.4838E+0	3.6072E+0
3941.68	2.53699	8.4223E+0	9.2303E+0	8.3571E+0	3971.83	2.51773	3.6674E+0	4.4867E+0	3.6101E+0
3941.78	2.53693	8.4171E+0	9.2251E+0	8.3519E+0	3971.88	2.51770	3.6713E+0	4.4907E+0	3.6140E+0
3941.88	2.53686	8.3972E+0	9.2055E+0	8.3320E+0	3971.98	2.51763	3.6807E+0	4.5001E+0	3.6234E+0
3941.98	2.53680	8.3667E+0	9.1756E+0	8.3016E+0	3972.08	2.51757	3.6920E+0	4.5115E+0	3.6348E+0
3942.08	2.53673	8.3189E+0	9.1283E+0	8.2539E+0	3972.18	2.51751	3.7048E+0	4.5243E+0	3.6475E+0
3942.18	2.53667	8.2617E+0	9.0713E+0	8.1968E+0	3972.28	2.51744	3.7206E+0	4.5403E+0	3.6633E+0
3942.28	2.53660	8.1939E+0	9.0035E+0	8.1291E+0	3972.38	2.51738	3.7379E+0	4.5577E+0	3.6806E+0
3942.38	2.53654	8.1328E+0	8.9425E+0	8.0682E+0	3972.48	2.51732	3.7613E+0	4.5812E+0	3.7040E+0
3942.48	2.53648	8.0837E+0	8.8935E+0	8.0192E+0	3972.53	2.51729	3.7740E+0	4.5939E+0	3.7166E+0
3942.58	2.53641	8.0377E+0	8.8476E+0	7.9733E+0	3972.58	2.51725	3.7902E+0	4.6102E+0	3.7328E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
3972.63	2.51722	3.8092E+0	4.6291E+0	3.7517E+0	3979.98	2.51257	3.3650E+0	4.1851E+0	3.3081E+0
3972.68	2.51719	3.8313E+0	4.6510E+0	3.7738E+0	3980.48	2.51226	3.3508E+0	4.1707E+0	3.2939E+0
3972.78	2.51713	3.8905E+0	4.7099E+0	3.8330E+0	3980.98	2.51194	3.3375E+0	4.1573E+0	3.2806E+0
3972.88	2.51706	3.9735E+0	4.7922E+0	3.9159E+0	3981.48	2.51163	3.3235E+0	4.1431E+0	3.2666E+0
3972.98	2.51700	4.0860E+0	4.9042E+0	4.0283E+0	3981.98	2.51131	3.3085E+0	4.1282E+0	3.2517E+0
3973.08	2.51694	4.2070E+0	5.0250E+0	4.1492E+0	3982.48	2.51100	3.2925E+0	4.1122E+0	3.2357E+0
3973.18	2.51687	4.3209E+0	5.1386E+0	4.2629E+0	3982.98	2.51068	3.2760E+0	4.0959E+0	3.2192E+0
3973.28	2.51681	4.4222E+0	5.2391E+0	4.3641E+0	3983.48	2.51037	3.2592E+0	4.0793E+0	3.2023E+0
3973.33	2.51678	4.4685E+0	5.2850E+0	4.4104E+0	3983.98	2.51005	3.2414E+0	4.0620E+0	3.1846E+0
3973.38	2.51675	4.5062E+0	5.3223E+0	4.4481E+0	3984.48	2.50974	3.2226E+0	4.0438E+0	3.1658E+0
3973.43	2.51672	4.5340E+0	5.3497E+0	4.4759E+0	3985.48	2.50911	3.1840E+0	4.0067E+0	3.1271E+0
3973.48	2.51668	4.5490E+0	5.3646E+0	4.4909E+0	3986.48	2.50848	3.1415E+0	3.9655E+0	3.0846E+0
3973.53	2.51665	4.5511E+0	5.3667E+0	4.4930E+0	3987.48	2.50785	3.0965E+0	3.9210E+0	3.0396E+0
3973.58	2.51662	4.5382E+0	5.3540E+0	4.4800E+0	3988.48	2.50722	3.0506E+0	3.8752E+0	2.9937E+0
3973.63	2.51659	4.5119E+0	5.3280E+0	4.4538E+0	3988.98	2.50690	3.0274E+0	3.8520E+0	2.9706E+0
3973.68	2.51656	4.4771E+0	5.2935E+0	4.4190E+0	3989.48	2.50659	3.0036E+0	3.8283E+0	2.9469E+0
3973.78	2.51649	4.3812E+0	5.1985E+0	4.3232E+0	3990.48	2.50596	2.9569E+0	3.7815E+0	2.9002E+0
3973.88	2.51643	4.2762E+0	5.0943E+0	4.2183E+0	3991.48	2.50533	2.9106E+0	3.7351E+0	2.8540E+0
3973.98	2.51637	4.1587E+0	4.9777E+0	4.1008E+0	3992.48	2.50471	2.8593E+0	3.6837E+0	2.8027E+0
3974.08	2.51630	4.0397E+0	4.8598E+0	3.9820E+0	3992.98	2.50439	2.8319E+0	3.6562E+0	2.7753E+0
3974.18	2.51624	3.9290E+0	4.7502E+0	3.8713E+0	3993.48	2.50408	2.8054E+0	3.6297E+0	2.7489E+0
3974.28	2.51618	3.8458E+0	4.6679E+0	3.7882E+0	3994.48	2.50345	2.7484E+0	3.5727E+0	2.6920E+0
3974.38	2.51611	3.7872E+0	4.6099E+0	3.7296E+0	3995.48	2.50283	2.6895E+0	3.5137E+0	2.6331E+0
3974.48	2.51605	3.7406E+0	4.5636E+0	3.6830E+0	3996.48	2.50220	2.6280E+0	3.4519E+0	2.5717E+0
3974.58	2.51599	3.7027E+0	4.5259E+0	3.6452E+0	3996.98	2.50189	2.5964E+0	3.4197E+0	2.5402E+0
3974.68	2.51592	3.6738E+0	4.4970E+0	3.6163E+0	3997.48	2.50157	2.5643E+0	3.3870E+0	2.5081E+0
3974.78	2.51586	3.6476E+0	4.4709E+0	3.5901E+0	3997.98	2.50126	2.5313E+0	3.3534E+0	2.4752E+0
3974.88	2.51580	3.6247E+0	4.4481E+0	3.5672E+0	3998.48	2.50095	2.4975E+0	3.3192E+0	2.4415E+0
3974.98	2.51573	3.6044E+0	4.4280E+0	3.5470E+0	3998.98	2.50063	2.4632E+0	3.2846E+0	2.4072E+0
3975.08	2.51567	3.5882E+0	4.4118E+0	3.5308E+0	3999.49	2.50032	2.4279E+0	3.2491E+0	2.3719E+0
3975.18	2.51561	3.5747E+0	4.3985E+0	3.5173E+0	4000.49	2.49970	2.3548E+0	3.1759E+0	2.2989E+0
3975.28	2.51554	3.5634E+0	4.3872E+0	3.5060E+0	4001.49	2.49907	2.2795E+0	3.1009E+0	2.2237E+0
3975.38	2.51548	3.5543E+0	4.3781E+0	3.4969E+0	4002.49	2.49845	2.2069E+0	3.0286E+0	2.1512E+0
3975.48	2.51542	3.5468E+0	4.3705E+0	3.4894E+0	4002.99	2.49814	2.1712E+0	2.9929E+0	2.1155E+0
3975.58	2.51535	3.5398E+0	4.3635E+0	3.4824E+0	4003.49	2.49782	2.1365E+0	2.9583E+0	2.0809E+0
3975.68	2.51529	3.5331E+0	4.3568E+0	3.4757E+0	4003.99	2.49751	2.1031E+0	2.9249E+0	2.0475E+0
3975.88	2.51517	3.5207E+0	4.3442E+0	3.4633E+0	4004.49	2.49720	2.0714E+0	2.8931E+0	2.0158E+0
3976.08	2.51504	3.5089E+0	4.3323E+0	3.4516E+0	4004.99	2.49689	2.0412E+0	2.8628E+0	1.9857E+0
3976.28	2.51491	3.4981E+0	4.3214E+0	3.4408E+0	4005.49	2.49658	2.0122E+0	2.8335E+0	1.9567E+0
3976.48	2.51479	3.4880E+0	4.3112E+0	3.4307E+0	4006.49	2.49595	1.9564E+0	2.7771E+0	1.9009E+0
3976.58	2.51472	3.4834E+0	4.3065E+0	3.4261E+0	4007.49	2.49533	1.9023E+0	2.7225E+0	1.8470E+0
3976.68	2.51466	3.4788E+0	4.3018E+0	3.4215E+0	4008.49	2.49471	1.8486E+0	2.6681E+0	1.7934E+0
3976.88	2.51453	3.4698E+0	4.2927E+0	3.4126E+0	4009.49	2.49409	1.7954E+0	2.6141E+0	1.7403E+0
3977.08	2.51441	3.4622E+0	4.2849E+0	3.4050E+0	4009.74	2.49393	1.7825E+0	2.6010E+0	1.7275E+0
3977.28	2.51428	3.4549E+0	4.2773E+0	3.3977E+0	4009.99	2.49377	1.7706E+0	2.5887E+0	1.7156E+0
3977.48	2.51415	3.4477E+0	4.2700E+0	3.3905E+0	4010.24	2.49362	1.7596E+0	2.5774E+0	1.7047E+0
3977.98	2.51384	3.4303E+0	4.2520E+0	3.3732E+0	4010.49	2.49346	1.7505E+0	2.5677E+0	1.6957E+0
3978.48	2.51352	3.4131E+0	4.2343E+0	3.3560E+0	4010.74	2.49331	1.7420E+0	2.5586E+0	1.6873E+0
3978.98	2.51321	3.3962E+0	4.2169E+0	3.3392E+0	4010.99	2.49315	1.7338E+0	2.5497E+0	1.6792E+0
3979.48	2.51289	3.3801E+0	4.2005E+0	3.3231E+0	4011.09	2.49309	1.7303E+0	2.5460E+0	1.6757E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4011.19	2.49303	1.7263E+0	2.5418E+0	1.6718E+0	4033.99	2.47894	1.0160E+0	1.8231E+0	9.6192E-1
4011.29	2.49297	1.7218E+0	2.5371E+0	1.6673E+0	4034.49	2.47863	9.9687E-1	1.8038E+0	9.4283E-1
4011.39	2.49290	1.7163E+0	2.5314E+0	1.6618E+0	4035.49	2.47801	9.5711E-1	1.7640E+0	9.0303E-1
4011.49	2.49284	1.7101E+0	2.5251E+0	1.6557E+0	4036.49	2.47740	9.1788E-1	1.7250E+0	8.6375E-1
4011.59	2.49278	1.7034E+0	2.5184E+0	1.6490E+0	4037.49	2.47679	8.8092E-1	1.6883E+0	8.2675E-1
4011.74	2.49269	1.6919E+0	2.5069E+0	1.6375E+0	4038.49	2.47617	8.4602E-1	1.6537E+0	7.9182E-1
4011.99	2.49253	1.6709E+0	2.4861E+0	1.6165E+0	4038.99	2.47587	8.2964E-1	1.6375E+0	7.7542E-1
4012.24	2.49238	1.6527E+0	2.4680E+0	1.5983E+0	4039.49	2.47556	8.1450E-1	1.6226E+0	7.6028E-1
4012.49	2.49222	1.6361E+0	2.4514E+0	1.5817E+0	4039.99	2.47525	8.0016E-1	1.6081E+0	7.4593E-1
4012.74	2.49206	1.6201E+0	2.4353E+0	1.5658E+0	4040.49	2.47495	7.8658E-1	1.5944E+0	7.3235E-1
4012.99	2.49191	1.6060E+0	2.4214E+0	1.5517E+0	4040.99	2.47464	7.7375E-1	1.5817E+0	7.1951E-1
4013.24	2.49175	1.5934E+0	2.4090E+0	1.5390E+0	4041.49	2.47433	7.6202E-1	1.5701E+0	7.0777E-1
4013.49	2.49160	1.5814E+0	2.3972E+0	1.5270E+0	4042.49	2.47372	7.3998E-1	1.5488E+0	6.8571E-1
4013.74	2.49144	1.5697E+0	2.3854E+0	1.5152E+0	4043.49	2.47311	7.1928E-1	1.5289E+0	6.6499E-1
4013.99	2.49129	1.5585E+0	2.3739E+0	1.5041E+0	4044.49	2.47250	6.9861E-1	1.5093E+0	6.4430E-1
4014.49	2.49098	1.5392E+0	2.3538E+0	1.4849E+0	4045.49	2.47189	6.7827E-1	1.4901E+0	6.2394E-1
4014.99	2.49067	1.5225E+0	2.3369E+0	1.4683E+0	4045.69	2.47177	6.7428E-1	1.4864E+0	6.1994E-1
4015.49	2.49036	1.5075E+0	2.3216E+0	1.4532E+0	4045.89	2.47164	6.7033E-1	1.4828E+0	6.1599E-1
4015.99	2.49005	1.4928E+0	2.3068E+0	1.4385E+0	4046.09	2.47152	6.6645E-1	1.4792E+0	6.1211E-1
4016.49	2.48974	1.4775E+0	2.2911E+0	1.4234E+0	4046.29	2.47140	6.6265E-1	1.4756E+0	6.0831E-1
4016.99	2.48943	1.4623E+0	2.2754E+0	1.4082E+0	4046.49	2.47128	6.5898E-1	1.4721E+0	6.0463E-1
4017.49	2.48912	1.4462E+0	2.2589E+0	1.3921E+0	4046.79	2.47109	6.5396E-1	1.4673E+0	5.9961E-1
4017.99	2.48881	1.4293E+0	2.2417E+0	1.3752E+0	4046.99	2.47097	6.5188E-1	1.4652E+0	5.9754E-1
4018.49	2.48850	1.4116E+0	2.2238E+0	1.3575E+0	4047.19	2.47085	6.5117E-1	1.4644E+0	5.9683E-1
4018.99	2.48819	1.3941E+0	2.2062E+0	1.3400E+0	4047.39	2.47073	6.5274E-1	1.4653E+0	5.9840E-1
4019.49	2.48788	1.3775E+0	2.1893E+0	1.3234E+0	4047.49	2.47067	6.5461E-1	1.4666E+0	6.0029E-1
4020.49	2.48726	1.3453E+0	2.1566E+0	1.2913E+0	4047.59	2.47061	6.5717E-1	1.4685E+0	6.0286E-1
4021.49	2.48664	1.3135E+0	2.1241E+0	1.2596E+0	4047.69	2.47054	6.6024E-1	1.4709E+0	6.0594E-1
4022.49	2.48602	1.2821E+0	2.0919E+0	1.2281E+0	4047.79	2.47048	6.6397E-1	1.4740E+0	6.0968E-1
4022.99	2.48571	1.2669E+0	2.0765E+0	1.2129E+0	4047.89	2.47042	6.6868E-1	1.4781E+0	6.1440E-1
4023.49	2.48541	1.2525E+0	2.0618E+0	1.1986E+0	4047.99	2.47036	6.7407E-1	1.4830E+0	6.1980E-1
4023.99	2.48510	1.2395E+0	2.0481E+0	1.1857E+0	4048.09	2.47030	6.8138E-1	1.4896E+0	6.2712E-1
4024.49	2.48479	1.2284E+0	2.0360E+0	1.1746E+0	4048.19	2.47024	6.9037E-1	1.4981E+0	6.3612E-1
4024.99	2.48448	1.2181E+0	2.0246E+0	1.1644E+0	4048.29	2.47018	7.0325E-1	1.5104E+0	6.4901E-1
4025.49	2.48417	1.2090E+0	2.0145E+0	1.1554E+0	4048.39	2.47012	7.2039E-1	1.5266E+0	6.6618E-1
4025.99	2.48386	1.2012E+0	2.0062E+0	1.1476E+0	4048.49	2.47006	7.4107E-1	1.5462E+0	6.8688E-1
4026.49	2.48355	1.1936E+0	1.9989E+0	1.1399E+0	4048.59	2.47000	7.6443E-1	1.5678E+0	7.1030E-1
4027.49	2.48294	1.1783E+0	1.9848E+0	1.1245E+0	4048.69	2.46993	7.8784E-1	1.5889E+0	7.3377E-1
4027.99	2.48263	1.1705E+0	1.9779E+0	1.1167E+0	4048.79	2.46987	8.0859E-1	1.6070E+0	7.5459E-1
4028.49	2.48232	1.1626E+0	1.9708E+0	1.1086E+0	4048.89	2.46981	8.2383E-1	1.6203E+0	7.6989E-1
4028.99	2.48201	1.1544E+0	1.9637E+0	1.1003E+0	4048.99	2.46975	8.3062E-1	1.6264E+0	7.7670E-1
4029.49	2.48170	1.1458E+0	1.9563E+0	1.0916E+0	4049.09	2.46969	8.2523E-1	1.6221E+0	7.7128E-1
4029.99	2.48140	1.1366E+0	1.9481E+0	1.0823E+0	4049.19	2.46963	8.0520E-1	1.6054E+0	7.5116E-1
4030.49	2.48109	1.1261E+0	1.9381E+0	1.0718E+0	4049.29	2.46957	7.7779E-1	1.5824E+0	7.2363E-1
4030.99	2.48078	1.1140E+0	1.9252E+0	1.0597E+0	4049.39	2.46951	7.4794E-1	1.5569E+0	6.9367E-1
4031.49	2.48047	1.1007E+0	1.9113E+0	1.0466E+0	4049.49	2.46945	7.1860E-1	1.5311E+0	6.6425E-1
4031.99	2.48017	1.0859E+0	1.8954E+0	1.0318E+0	4049.59	2.46939	6.9037E-1	1.5050E+0	6.3598E-1
4032.49	2.47986	1.0699E+0	1.8786E+0	1.0158E+0	4049.69	2.46932	6.6571E-1	1.4811E+0	6.1131E-1
4032.99	2.47955	1.0527E+0	1.8608E+0	9.9869E-1	4049.79	2.46926	6.4429E-1	1.4604E+0	5.8988E-1
4033.49	2.47924	1.0346E+0	1.8422E+0	9.8057E-1	4049.89	2.46920	6.2925E-1	1.4456E+0	5.7486E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4049.99	2.46914	6.1858E-1	1.4354E+0	5.6419E-1	4060.69	2.46263	5.5822E-1	1.3655E+0	5.0398E-1
4050.09	2.46908	6.1245E-1	1.4290E+0	5.5806E-1	4060.79	2.46257	5.4916E-1	1.3578E+0	4.9492E-1
4050.19	2.46902	6.0777E-1	1.4240E+0	5.5339E-1	4060.89	2.46251	5.3679E-1	1.3473E+0	4.8253E-1
4050.29	2.46896	6.0373E-1	1.4196E+0	5.4936E-1	4060.99	2.46245	5.2357E-1	1.3361E+0	4.6930E-1
4050.39	2.46890	6.0005E-1	1.4156E+0	5.4569E-1	4061.09	2.46239	5.1046E-1	1.3247E+0	4.5617E-1
4050.49	2.46884	5.9671E-1	1.4121E+0	5.4236E-1	4061.19	2.46233	4.9760E-1	1.3135E+0	4.4330E-1
4050.59	2.46878	5.9380E-1	1.4089E+0	5.3945E-1	4061.29	2.46227	4.8687E-1	1.3039E+0	4.3257E-1
4050.69	2.46871	5.9110E-1	1.4059E+0	5.3675E-1	4061.39	2.46221	4.7807E-1	1.2959E+0	4.2377E-1
4050.89	2.46859	5.8638E-1	1.4004E+0	5.3205E-1	4061.49	2.46215	4.7048E-1	1.2888E+0	4.1618E-1
4051.09	2.46847	5.8218E-1	1.3955E+0	5.2787E-1	4061.59	2.46209	4.6412E-1	1.2827E+0	4.0982E-1
4051.19	2.46841	5.8017E-1	1.3931E+0	5.2586E-1	4061.69	2.46203	4.5912E-1	1.2778E+0	4.0482E-1
4051.29	2.46835	5.7820E-1	1.3908E+0	5.2390E-1	4061.79	2.46197	4.5513E-1	1.2734E+0	4.0084E-1
4051.39	2.46829	5.7626E-1	1.3885E+0	5.2196E-1	4061.89	2.46191	4.5200E-1	1.2698E+0	3.9772E-1
4051.49	2.46823	5.7436E-1	1.3862E+0	5.2007E-1	4062.09	2.46179	4.4763E-1	1.2641E+0	3.9337E-1
4051.74	2.46807	5.6971E-1	1.3806E+0	5.1543E-1	4062.29	2.46166	4.4472E-1	1.2600E+0	3.9047E-1
4051.99	2.46792	5.6526E-1	1.3756E+0	5.1099E-1	4062.49	2.46154	4.4217E-1	1.2564E+0	3.8793E-1
4052.24	2.46777	5.6095E-1	1.3709E+0	5.0668E-1	4062.74	2.46139	4.3914E-1	1.2527E+0	3.8490E-1
4052.49	2.46762	5.5680E-1	1.3667E+0	5.0254E-1	4062.99	2.46124	4.3630E-1	1.2495E+0	3.8207E-1
4053.49	2.46701	5.4122E-1	1.3513E+0	4.8697E-1	4063.24	2.46109	4.3361E-1	1.2465E+0	3.7938E-1
4054.49	2.46640	5.2672E-1	1.3376E+0	4.7246E-1	4063.49	2.46094	4.3109E-1	1.2438E+0	3.7686E-1
4055.49	2.46579	5.1307E-1	1.3247E+0	4.5881E-1	4063.99	2.46063	4.2644E-1	1.2390E+0	3.7221E-1
4055.99	2.46549	5.0660E-1	1.3186E+0	4.5234E-1	4064.49	2.46033	4.2229E-1	1.2349E+0	3.6807E-1
4056.49	2.46518	5.0051E-1	1.3127E+0	4.4625E-1	4065.49	2.45973	4.1471E-1	1.2273E+0	3.6049E-1
4056.99	2.46488	4.9469E-1	1.3071E+0	4.4043E-1	4066.49	2.45912	4.0744E-1	1.2202E+0	3.5323E-1
4057.24	2.46473	4.9184E-1	1.3043E+0	4.3759E-1	4067.49	2.45852	4.0035E-1	1.2130E+0	3.4614E-1
4057.49	2.46458	4.8904E-1	1.3016E+0	4.3478E-1	4068.49	2.45791	3.9346E-1	1.2061E+0	3.3925E-1
4057.74	2.46442	4.8625E-1	1.2989E+0	4.3199E-1	4069.49	2.45731	3.8686E-1	1.1997E+0	3.3265E-1
4057.99	2.46427	4.8365E-1	1.2964E+0	4.2939E-1	4069.99	2.45701	3.8374E-1	1.1967E+0	3.2954E-1
4058.24	2.46412	4.8205E-1	1.2948E+0	4.2780E-1	4070.49	2.45670	3.8085E-1	1.1939E+0	3.2665E-1
4058.49	2.46397	4.8178E-1	1.2942E+0	4.2752E-1	4070.74	2.45655	3.7953E-1	1.1927E+0	3.2533E-1
4058.69	2.46385	4.8226E-1	1.2944E+0	4.2801E-1	4070.99	2.45640	3.7831E-1	1.1915E+0	3.2411E-1
4058.79	2.46379	4.8268E-1	1.2947E+0	4.2843E-1	4071.24	2.45625	3.7724E-1	1.1905E+0	3.2304E-1
4058.89	2.46373	4.8319E-1	1.2950E+0	4.2894E-1	4071.49	2.45610	3.7624E-1	1.1895E+0	3.2204E-1
4058.99	2.46367	4.8384E-1	1.2956E+0	4.2959E-1	4072.49	2.45550	3.7263E-1	1.1863E+0	3.1843E-1
4059.09	2.46360	4.8459E-1	1.2963E+0	4.3034E-1	4073.49	2.45489	3.6924E-1	1.1832E+0	3.1504E-1
4059.19	2.46354	4.8554E-1	1.2972E+0	4.3129E-1	4073.99	2.45459	3.6786E-1	1.1820E+0	3.1366E-1
4059.29	2.46348	4.8670E-1	1.2983E+0	4.3245E-1	4074.49	2.45429	3.6673E-1	1.1809E+0	3.1254E-1
4059.39	2.46342	4.8814E-1	1.2998E+0	4.3389E-1	4074.99	2.45399	3.6585E-1	1.1801E+0	3.1166E-1
4059.49	2.46336	4.9019E-1	1.3021E+0	4.3593E-1	4075.49	2.45369	3.6512E-1	1.1794E+0	3.1093E-1
4059.59	2.46330	4.9292E-1	1.3051E+0	4.3866E-1	4076.49	2.45309	3.6430E-1	1.1785E+0	3.1011E-1
4059.69	2.46324	4.9613E-1	1.3087E+0	4.4187E-1	4077.49	2.45249	3.6383E-1	1.1779E+0	3.0963E-1
4059.79	2.46318	5.0047E-1	1.3133E+0	4.4620E-1	4078.49	2.45189	3.6364E-1	1.1776E+0	3.0945E-1
4059.89	2.46312	5.0600E-1	1.3189E+0	4.5173E-1	4079.49	2.45128	3.6391E-1	1.1777E+0	3.0972E-1
4059.99	2.46306	5.1496E-1	1.3274E+0	4.6069E-1	4079.99	2.45098	3.6428E-1	1.1780E+0	3.1009E-1
4060.09	2.46300	5.2566E-1	1.3371E+0	4.7139E-1	4080.49	2.45068	3.6487E-1	1.1784E+0	3.1068E-1
4060.19	2.46294	5.3664E-1	1.3469E+0	4.8238E-1	4081.00	2.45038	3.6558E-1	1.1790E+0	3.1139E-1
4060.29	2.46288	5.4636E-1	1.3553E+0	4.9211E-1	4081.50	2.45008	3.6652E-1	1.1797E+0	3.1233E-1
4060.39	2.46282	5.5525E-1	1.3630E+0	5.0101E-1	4082.00	2.44978	3.6762E-1	1.1807E+0	3.1344E-1
4060.49	2.46276	5.6058E-1	1.3675E+0	5.0634E-1	4082.50	2.44948	3.6888E-1	1.1818E+0	3.1469E-1
4060.59	2.46269	5.6066E-1	1.3676E+0	5.0642E-1	4083.00	2.44918	3.7037E-1	1.1833E+0	3.1618E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4083.50	2.44888	3.7213E−1	1.1851E+0	3.1794E−1	4106.00	2.43546	7.1080E−1	1.5240E+0	6.5643E−1
4084.50	2.44828	3.7608E−1	1.1892E+0	3.2189E−1	4106.50	2.43516	7.2397E−1	1.5373E+0	6.6960E−1
4085.00	2.44798	3.7833E−1	1.1915E+0	3.2414E−1	4107.00	2.43487	7.3761E−1	1.5510E+0	6.8323E−1
4085.50	2.44768	3.8070E−1	1.1940E+0	3.2650E−1	4107.50	2.43457	7.5164E−1	1.5651E+0	6.9725E−1
4086.50	2.44708	3.8611E−1	1.1997E+0	3.3191E−1	4108.50	2.43398	7.7989E−1	1.5933E+0	7.2549E−1
4087.50	2.44649	3.9200E−1	1.2061E+0	3.3779E−1	4108.75	2.43383	7.8631E−1	1.5999E+0	7.3190E−1
4089.50	2.44529	4.0444E−1	1.2199E+0	3.5022E−1	4109.00	2.43368	7.9205E−1	1.6059E+0	7.3764E−1
4090.00	2.44499	4.0815E−1	1.2239E+0	3.5393E−1	4109.50	2.43339	8.0234E−1	1.6171E+0	7.4789E−1
4090.50	2.44469	4.1234E−1	1.2282E+0	3.5811E−1	4110.00	2.43309	8.1132E−1	1.6272E+0	7.5681E−1
4091.00	2.44439	4.1703E−1	1.2328E+0	3.6280E−1	4110.25	2.43294	8.1523E−1	1.6317E+0	7.6070E−1
4091.50	2.44409	4.2221E−1	1.2376E+0	3.6797E−1	4110.50	2.43279	8.1835E−1	1.6354E+0	7.6379E−1
4091.75	2.44394	4.2508E−1	1.2404E+0	3.7084E−1	4111.00	2.43250	8.2385E−1	1.6420E+0	7.6924E−1
4092.00	2.44379	4.2835E−1	1.2436E+0	3.7412E−1	4111.50	2.43220	8.2845E−1	1.6467E+0	7.7382E−1
4092.50	2.44350	4.3560E−1	1.2505E+0	3.8136E−1	4111.75	2.43206	8.3026E−1	1.6481E+0	7.7566E−1
4092.75	2.44335	4.3958E−1	1.2545E+0	3.8534E−1	4112.00	2.43191	8.3121E−1	1.6487E+0	7.7662E−1
4093.00	2.44320	4.4392E−1	1.2588E+0	3.8968E−1	4112.25	2.43176	8.3105E−1	1.6482E+0	7.7647E−1
4093.25	2.44305	4.4874E−1	1.2635E+0	3.9450E−1	4112.50	2.43161	8.3019E−1	1.6470E+0	7.7563E−1
4093.50	2.44290	4.5443E−1	1.2691E+0	4.0018E−1	4112.75	2.43146	8.2882E−1	1.6453E+0	7.7428E−1
4093.75	2.44275	4.6079E−1	1.2753E+0	4.0654E−1	4113.00	2.43132	8.2681E−1	1.6429E+0	7.7229E−1
4094.00	2.44260	4.6769E−1	1.2821E+0	4.1343E−1	4113.50	2.43102	8.2177E−1	1.6373E+0	7.6728E−1
4094.25	2.44245	4.7487E−1	1.2892E+0	4.2061E−1	4114.00	2.43072	8.1607E−1	1.6311E+0	7.6160E−1
4094.50	2.44230	4.8237E−1	1.2965E+0	4.2811E−1	4114.50	2.43043	8.0980E−1	1.6243E+0	7.5535E−1
4094.75	2.44215	4.9019E−1	1.3041E+0	4.3592E−1	4114.75	2.43028	8.0628E−1	1.6205E+0	7.5184E−1
4095.00	2.44200	4.9798E−1	1.3118E+0	4.4371E−1	4115.00	2.43013	8.0231E−1	1.6163E+0	7.4788E−1
4095.25	2.44186	5.0564E−1	1.3194E+0	4.5137E−1	4115.25	2.42999	7.9769E−1	1.6117E+0	7.4327E−1
4095.50	2.44171	5.1279E−1	1.3267E+0	4.5851E−1	4115.50	2.42984	7.9259E−1	1.6068E+0	7.3817E−1
4095.75	2.44156	5.1944E−1	1.3335E+0	4.6515E−1	4116.00	2.42954	7.8179E−1	1.5964E+0	7.2735E−1
4096.00	2.44141	5.2534E−1	1.3397E+0	4.7105E−1	4116.50	2.42925	7.7034E−1	1.5854E+0	7.1589E−1
4096.50	2.44111	5.3635E−1	1.3513E+0	4.8205E−1	4117.00	2.42895	7.5832E−1	1.5739E+0	7.0387E−1
4097.00	2.44081	5.4684E−1	1.3622E+0	4.9252E−1	4117.50	2.42866	7.4618E−1	1.5617E+0	6.9173E−1
4097.50	2.44051	5.5688E−1	1.3722E+0	5.0256E−1	4118.00	2.42836	7.3392E−1	1.5486E+0	6.7951E−1
4098.50	2.43992	5.7625E−1	1.3904E+0	5.2193E−1	4118.50	2.42807	7.2164E−1	1.5350E+0	6.6727E−1
4098.75	2.43977	5.8070E−1	1.3946E+0	5.2638E−1	4119.50	2.42748	6.9724E−1	1.5088E+0	6.4292E−1
4099.00	2.43962	5.8492E−1	1.3986E+0	5.3061E−1	4120.50	2.42689	6.7297E−1	1.4829E+0	6.1868E−1
4099.50	2.43932	5.9271E−1	1.4060E+0	5.3839E−1	4121.50	2.42630	6.4881E−1	1.4571E+0	5.9455E−1
4099.75	2.43917	5.9641E−1	1.4096E+0	5.4210E−1	4122.00	2.42601	6.3708E−1	1.4446E+0	5.8283E−1
4100.00	2.43903	5.9979E−1	1.4129E+0	5.4548E−1	4122.50	2.42571	6.2600E−1	1.4334E+0	5.7176E−1
4100.25	2.43888	6.0296E−1	1.4161E+0	5.4864E−1	4123.00	2.42542	6.1559E−1	1.4233E+0	5.6134E−1
4100.50	2.43873	6.0573E−1	1.4189E+0	5.5141E−1	4123.50	2.42512	6.0552E−1	1.4138E+0	5.5126E−1
4101.00	2.43843	6.1171E−1	1.4250E+0	5.5739E−1	4124.50	2.42454	5.8674E−1	1.3970E+0	5.3246E−1
4101.50	2.43813	6.1840E−1	1.4316E+0	5.6407E−1	4125.50	2.42395	5.6714E−1	1.3798E+0	5.1284E−1
4101.75	2.43799	6.2206E−1	1.4352E+0	5.6773E−1	4126.50	2.42336	5.4659E−1	1.3612E+0	4.9228E−1
4102.00	2.43784	6.2599E−1	1.4391E+0	5.7166E−1	4127.00	2.42307	5.3556E−1	1.3509E+0	4.8125E−1
4102.25	2.43769	6.3017E−1	1.4433E+0	5.7584E−1	4127.50	2.42277	5.2384E−1	1.3395E+0	4.6953E−1
4102.50	2.43754	6.3460E−1	1.4476E+0	5.8027E−1	4128.00	2.42248	5.1080E−1	1.3270E+0	4.5649E−1
4103.50	2.43695	6.5364E−1	1.4667E+0	5.9930E−1	4128.50	2.42219	4.9701E−1	1.3135E+0	4.4271E−1
4104.00	2.43665	6.6381E−1	1.4770E+0	6.0947E−1	4129.00	2.42189	4.8251E−1	1.2994E+0	4.2822E−1
4104.50	2.43635	6.7459E−1	1.4878E+0	6.2024E−1	4129.50	2.42160	4.6903E−1	1.2859E+0	4.1474E−1
4105.00	2.43605	6.8616E−1	1.4994E+0	6.3181E−1	4130.00	2.42131	4.5656E−1	1.2733E+0	4.0229E−1
4105.50	2.43576	6.9817E−1	1.5114E+0	6.4381E−1	4130.25	2.42116	4.5098E−1	1.2675E+0	3.9672E−1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4130.50	2.42101	4.4592E-1	1.2622E+0	3.9166E-1	4140.40	2.41522	4.9917E-1	1.3088E+0	4.4493E-1
4130.75	2.42087	4.4174E-1	1.2576E+0	3.8748E-1	4140.50	2.41517	5.0071E-1	1.3107E+0	4.4647E-1
4131.00	2.42072	4.3800E-1	1.2535E+0	3.8375E-1	4140.70	2.41505	5.0481E-1	1.3152E+0	4.5056E-1
4131.50	2.42043	4.3151E-1	1.2461E+0	3.7727E-1	4140.90	2.41493	5.1284E-1	1.3231E+0	4.5859E-1
4131.75	2.42028	4.2872E-1	1.2428E+0	3.7449E-1	4141.10	2.41482	5.2769E-1	1.3365E+0	4.7345E-1
4132.00	2.42013	4.2628E-1	1.2398E+0	3.7205E-1	4141.30	2.41470	5.4825E-1	1.3547E+0	4.9402E-1
4132.25	2.41999	4.2408E-1	1.2370E+0	3.6986E-1	4141.50	2.41458	5.6691E-1	1.3708E+0	5.1270E-1
4132.50	2.41984	4.2217E-1	1.2347E+0	3.6795E-1	4141.60	2.41452	5.7132E-1	1.3747E+0	5.1711E-1
4133.00	2.41955	4.1904E-1	1.2311E+0	3.6483E-1	4141.70	2.41447	5.7223E-1	1.3755E+0	5.1802E-1
4133.25	2.41940	4.1778E-1	1.2300E+0	3.6356E-1	4141.80	2.41441	5.7011E-1	1.3739E+0	5.1590E-1
4133.50	2.41926	4.1674E-1	1.2291E+0	3.6252E-1	4141.90	2.41435	5.6578E-1	1.3705E+0	5.1156E-1
4134.00	2.41896	4.1547E-1	1.2280E+0	3.6125E-1	4142.00	2.41429	5.6014E-1	1.3659E+0	5.0592E-1
4134.50	2.41867	4.1486E-1	1.2279E+0	3.6064E-1	4142.10	2.41423	5.5420E-1	1.3611E+0	4.9997E-1
4134.70	2.41855	4.1472E-1	1.2280E+0	3.6050E-1	4142.30	2.41412	5.4233E-1	1.3512E+0	4.8808E-1
4134.90	2.41844	4.1478E-1	1.2284E+0	3.6055E-1	4142.50	2.41400	5.3108E-1	1.3415E+0	4.7683E-1
4135.00	2.41838	4.1489E-1	1.2288E+0	3.6067E-1	4142.70	2.41388	5.2079E-1	1.3322E+0	4.6653E-1
4135.10	2.41832	4.1506E-1	1.2292E+0	3.6083E-1	4142.90	2.41377	5.1251E-1	1.3243E+0	4.5825E-1
4135.20	2.41826	4.1529E-1	1.2297E+0	3.6106E-1	4143.00	2.41371	5.0926E-1	1.3208E+0	4.5500E-1
4135.30	2.41820	4.1560E-1	1.2303E+0	3.6137E-1	4143.10	2.41365	5.0656E-1	1.3179E+0	4.5231E-1
4135.50	2.41809	4.1648E-1	1.2317E+0	3.6224E-1	4143.20	2.41359	5.0433E-1	1.3153E+0	4.5008E-1
4135.60	2.41803	4.1713E-1	1.2326E+0	3.6289E-1	4143.30	2.41353	5.0248E-1	1.3131E+0	4.4824E-1
4135.80	2.41791	4.1980E-1	1.2358E+0	3.6556E-1	4143.40	2.41348	5.0093E-1	1.3110E+0	4.4668E-1
4136.00	2.41779	4.2726E-1	1.2430E+0	3.7301E-1	4143.50	2.41342	4.9957E-1	1.3092E+0	4.4533E-1
4136.10	2.41774	4.3242E-1	1.2479E+0	3.7818E-1	4143.75	2.41327	4.9671E-1	1.3051E+0	4.4248E-1
4136.20	2.41768	4.4083E-1	1.2555E+0	3.8659E-1	4144.00	2.41313	4.9443E-1	1.3017E+0	4.4021E-1
4136.40	2.41756	4.6133E-1	1.2739E+0	4.0709E-1	4144.50	2.41283	4.9108E-1	1.2967E+0	4.3686E-1
4136.60	2.41744	4.7905E-1	1.2902E+0	4.2481E-1	4144.75	2.41269	4.8967E-1	1.2948E+0	4.3546E-1
4136.70	2.41738	4.8567E-1	1.2965E+0	4.3143E-1	4145.00	2.41254	4.8831E-1	1.2930E+0	4.3410E-1
4136.80	2.41733	4.8956E-1	1.3006E+0	4.3531E-1	4145.50	2.41225	4.8554E-1	1.2899E+0	4.3133E-1
4136.90	2.41727	4.9191E-1	1.3035E+0	4.3766E-1	4146.00	2.41196	4.8265E-1	1.2872E+0	4.2844E-1
4137.00	2.41721	4.9322E-1	1.3054E+0	4.3896E-1	4146.50	2.41167	4.7956E-1	1.2843E+0	4.2535E-1
4137.10	2.41715	4.9421E-1	1.3069E+0	4.3995E-1	4146.75	2.41153	4.7821E-1	1.2831E+0	4.2400E-1
4137.30	2.41703	4.9538E-1	1.3091E+0	4.4111E-1	4147.00	2.41138	4.7729E-1	1.2821E+0	4.2308E-1
4137.50	2.41692	4.9585E-1	1.3106E+0	4.4157E-1	4147.25	2.41123	4.7674E-1	1.2815E+0	4.2253E-1
4137.70	2.41680	4.9578E-1	1.3113E+0	4.4150E-1	4147.50	2.41109	4.7632E-1	1.2811E+0	4.2212E-1
4137.90	2.41668	4.9532E-1	1.3109E+0	4.4104E-1	4148.00	2.41080	4.7570E-1	1.2803E+0	4.2150E-1
4138.10	2.41657	4.9444E-1	1.3093E+0	4.4016E-1	4148.50	2.41051	4.7526E-1	1.2802E+0	4.2105E-1
4138.30	2.41645	4.9331E-1	1.3070E+0	4.3904E-1	4149.00	2.41022	4.7493E-1	1.2802E+0	4.2072E-1
4138.50	2.41633	4.9206E-1	1.3044E+0	4.3780E-1	4149.25	2.41007	4.7493E-1	1.2806E+0	4.2072E-1
4138.70	2.41622	4.9081E-1	1.3019E+0	4.3657E-1	4149.50	2.40993	4.7530E-1	1.2812E+0	4.2109E-1
4138.90	2.41610	4.8972E-1	1.3000E+0	4.3548E-1	4149.75	2.40978	4.7621E-1	1.2824E+0	4.2199E-1
4139.10	2.41598	4.8895E-1	1.2988E+0	4.3471E-1	4150.00	2.40964	4.7784E-1	1.2841E+0	4.2363E-1
4139.30	2.41587	4.8877E-1	1.2982E+0	4.3453E-1	4150.50	2.40935	4.8199E-1	1.2883E+0	4.2777E-1
4139.50	2.41575	4.8926E-1	1.2983E+0	4.3503E-1	4151.50	2.40877	4.9078E-1	1.2972E+0	4.3656E-1
4139.60	2.41569	4.8973E-1	1.2987E+0	4.3550E-1	4152.50	2.40819	4.9955E-1	1.3060E+0	4.4533E-1
4139.70	2.41563	4.9042E-1	1.2994E+0	4.3619E-1	4152.75	2.40804	5.0163E-1	1.3081E+0	4.4741E-1
4139.90	2.41552	4.9241E-1	1.3013E+0	4.3818E-1	4153.00	2.40790	5.0345E-1	1.3100E+0	4.4923E-1
4140.10	2.41540	4.9495E-1	1.3040E+0	4.4072E-1	4153.25	2.40775	5.0489E-1	1.3115E+0	4.5067E-1
4140.20	2.41534	4.9631E-1	1.3056E+0	4.4207E-1	4153.50	2.40761	5.0564E-1	1.3124E+0	4.5141E-1
4140.30	2.41528	4.9773E-1	1.3072E+0	4.4350E-1	4154.00	2.40732	5.0692E-1	1.3142E+0	4.5269E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4154.50	2.40703	5.0801E-1	1.3157E+0	4.5378E-1	4168.71	2.39883	2.4320E-1	1.0554E+0	1.8907E-1
4155.00	2.40674	5.0894E-1	1.3171E+0	4.5471E-1	4168.91	2.39871	2.3948E-1	1.0518E+0	1.8536E-1
4155.25	2.40659	5.0913E-1	1.3176E+0	4.5489E-1	4169.11	2.39860	2.3612E-1	1.0486E+0	1.8200E-1
4155.50	2.40645	5.0858E-1	1.3173E+0	4.5435E-1	4169.31	2.39848	2.3311E-1	1.0457E+0	1.7899E-1
4155.75	2.40630	5.0651E-1	1.3156E+0	4.5228E-1	4169.51	2.39837	2.3047E-1	1.0431E+0	1.7635E-1
4156.00	2.40616	5.0386E-1	1.3129E+0	4.4962E-1	4170.01	2.39808	2.2426E-1	1.0369E+0	1.7015E-1
4156.50	2.40587	4.9644E-1	1.3050E+0	4.4221E-1	4170.51	2.39779	2.1825E-1	1.0308E+0	1.6414E-1
4156.75	2.40572	4.9192E-1	1.3004E+0	4.3769E-1	4171.01	2.39750	2.1165E-1	1.0241E+0	1.5754E-1
4157.00	2.40558	4.8645E-1	1.2949E+0	4.3222E-1	4171.51	2.39722	2.0426E-1	1.0167E+0	1.5016E-1
4157.50	2.40529	4.7465E-1	1.2835E+0	4.2043E-1	4172.01	2.39693	1.9624E-1	1.0087E+0	1.4215E-1
4158.00	2.40500	4.6207E-1	1.2713E+0	4.0784E-1	4172.51	2.39664	1.8763E-1	1.0002E+0	1.3354E-1
4158.50	2.40471	4.4905E-1	1.2587E+0	3.9482E-1	4173.01	2.39635	1.7918E-1	9.9180E-1	1.2509E-1
4159.00	2.40442	4.3547E-1	1.2455E+0	3.8125E-1	4173.51	2.39607	1.7101E-1	9.8373E-1	1.1693E-1
4159.50	2.40413	4.2085E-1	1.2315E+0	3.6664E-1	4174.01	2.39578	1.6335E-1	9.7626E-1	1.0928E-1
4160.00	2.40384	4.0536E-1	1.2165E+0	3.5115E-1	4174.51	2.39549	1.5628E-1	9.6937E-1	1.0221E-1
4160.50	2.40355	3.8866E-1	1.2005E+0	3.3446E-1	4175.01	2.39521	1.4959E-1	9.6290E-1	9.5521E-2
4161.00	2.40327	3.7200E-1	1.1844E+0	3.1780E-1	4175.51	2.39492	1.4324E-1	9.5673E-1	8.9182E-2
4161.50	2.40298	3.5636E-1	1.1691E+0	3.0217E-1	4176.01	2.39463	1.3720E-1	9.5081E-1	8.3145E-2
4162.00	2.40269	3.4129E-1	1.1544E+0	2.8710E-1	4176.51	2.39435	1.3142E-1	9.4513E-1	7.7373E-2
4162.50	2.40240	3.2650E-1	1.1398E+0	2.7232E-1	4177.01	2.39406	1.2583E-1	9.3962E-1	7.1788E-2
4162.75	2.40226	3.1950E-1	1.1329E+0	2.6532E-1	4177.51	2.39377	1.2045E-1	9.3429E-1	6.6411E-2
4163.00	2.40211	3.1321E-1	1.1266E+0	2.5905E-1	4178.01	2.39349	1.1525E-1	9.2911E-1	6.1219E-2
4163.50	2.40182	3.0195E-1	1.1152E+0	2.4779E-1	4178.51	2.39320	1.1046E-1	9.2422E-1	5.6431E-2
4164.00	2.40153	2.9125E-1	1.1044E+0	2.3710E-1	4179.01	2.39291	1.0601E-1	9.1963E-1	5.1992E-2
4164.51	2.40125	2.8094E-1	1.0940E+0	2.2679E-1	4179.51	2.39263	1.0219E-1	9.1556E-1	4.8168E-2
4164.71	2.40113	2.7697E-1	1.0899E+0	2.2283E-1	4180.01	2.39234	9.8749E-2	9.1185E-1	4.4737E-2
4164.91	2.40102	2.7318E-1	1.0861E+0	2.1903E-1	4180.51	2.39205	9.5683E-2	9.0851E-1	4.1677E-2
4165.11	2.40090	2.6955E-1	1.0824E+0	2.1541E-1	4181.01	2.39177	9.3362E-2	9.0594E-1	3.9359E-2
4165.31	2.40078	2.6615E-1	1.0790E+0	2.1201E-1	4181.51	2.39148	9.1576E-2	9.0429E-1	3.7578E-2
4165.51	2.40067	2.6292E-1	1.0759E+0	2.0878E-1	4182.01	2.39120	9.0242E-2	9.0351E-1	3.6247E-2
4165.71	2.40055	2.5988E-1	1.0729E+0	2.0575E-1	4182.51	2.39091	8.9155E-2	9.0309E-1	3.5162E-2
4165.91	2.40044	2.5715E-1	1.0702E+0	2.0301E-1	4183.01	2.39062	8.8381E-2	9.0284E-1	3.4390E-2
4166.11	2.40032	2.5484E-1	1.0680E+0	2.0071E-1	4183.51	2.39034	8.7807E-2	9.0252E-1	3.3817E-2
4166.31	2.40021	2.5314E-1	1.0662E+0	1.9901E-1	4184.51	2.38977	8.6847E-2	9.0144E-1	3.2859E-2
4166.51	2.40009	2.5212E-1	1.0651E+0	1.9799E-1	4185.51	2.38920	8.5888E-2	9.0018E-1	3.1902E-2
4166.61	2.40004	2.5190E-1	1.0648E+0	1.9777E-1	4186.01	2.38891	8.5278E-2	8.9941E-1	3.1293E-2
4166.71	2.39998	2.5190E-1	1.0647E+0	1.9777E-1	4186.51	2.38863	8.4450E-2	8.9840E-1	3.0468E-2
4166.81	2.39992	2.5225E-1	1.0650E+0	1.9812E-1	4186.76	2.38848	8.3914E-2	8.9777E-1	2.9934E-2
4166.91	2.39986	2.5278E-1	1.0654E+0	1.9865E-1	4187.01	2.38834	8.3218E-2	8.9697E-1	2.9240E-2
4167.11	2.39975	2.5437E-1	1.0667E+0	2.0024E-1	4187.26	2.38820	8.2389E-2	8.9605E-1	2.8414E-2
4167.31	2.39963	2.5597E-1	1.0680E+0	2.0183E-1	4187.51	2.38806	8.1394E-2	8.9497E-1	2.7422E-2
4167.41	2.39957	2.5650E-1	1.0684E+0	2.0236E-1	4188.01	2.38777	7.9009E-2	8.9245E-1	2.5048E-2
4167.51	2.39952	2.5662E-1	1.0684E+0	2.0249E-1	4188.51	2.38748	7.6660E-2	8.8999E-1	2.2711E-2
4167.61	2.39946	2.5650E-1	1.0682E+0	2.0236E-1	4188.76	2.38734	7.5530E-2	8.8883E-1	2.1587E-2
4167.71	2.39940	2.5614E-1	1.0678E+0	2.0201E-1	4189.01	2.38720	7.4501E-2	8.8778E-1	2.0565E-2
4167.81	2.39934	2.5551E-1	1.0672E+0	2.0138E-1	4189.26	2.38706	7.3673E-2	8.8691E-1	1.9743E-2
4167.91	2.39929	2.5472E-1	1.0664E+0	2.0059E-1	4189.51	2.38692	7.3009E-2	8.8621E-1	1.9083E-2
4168.11	2.39917	2.5259E-1	1.0643E+0	1.9846E-1	4190.01	2.38663	7.1945E-2	8.8510E-1	1.8028E-2
4168.31	2.39906	2.4993E-1	1.0618E+0	1.9580E-1	4190.51	2.38635	7.1027E-2	8.8418E-1	1.7119E-2
4168.51	2.39894	2.4672E-1	1.0587E+0	1.9259E-1	4191.01	2.38606	7.0228E-2	8.8343E-1	1.6327E-2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4191.51	2.38578	6.9533E-2	8.8288E-1	1.5640E-2	4212.51	2.37388	5.6649E-2	8.7077E-1	3.2142E-3
4192.01	2.38549	6.8925E-2	8.8251E-1	1.5039E-2	4213.51	2.37332	5.6197E-2	8.7057E-1	2.8228E-3
4192.26	2.38535	6.8752E-2	8.8248E-1	1.4868E-2	4214.51	2.37275	5.5852E-2	8.7062E-1	2.5372E-3
4192.51	2.38521	6.8942E-2	8.8280E-1	1.5056E-2	4215.51	2.37219	5.5607E-2	8.7095E-1	2.3512E-3
4192.76	2.38506	6.9361E-2	8.8334E-1	1.5471E-2	4215.81	2.37202	5.5753E-2	8.7129E-1	2.4731E-3
4193.01	2.38492	6.9885E-2	8.8398E-1	1.5989E-2	4216.01	2.37191	5.6149E-2	8.7178E-1	2.8035E-3
4193.26	2.38478	7.0545E-2	8.8476E-1	1.6643E-2	4216.11	2.37185	5.6482E-2	8.7215E-1	3.0882E-3
4193.51	2.38464	7.1321E-2	8.8564E-1	1.7412E-2	4216.31	2.37174	5.7316E-2	8.7306E-1	3.8244E-3
4193.76	2.38450	7.2172E-2	8.8660E-1	1.8256E-2	4216.51	2.37163	5.8371E-2	8.7418E-1	4.7897E-3
4194.01	2.38435	7.3084E-2	8.8758E-1	1.9161E-2	4216.71	2.37152	5.9576E-2	8.7543E-1	5.9194E-3
4194.26	2.38421	7.4070E-2	8.8862E-1	2.0140E-2	4216.91	2.37140	6.0910E-2	8.7681E-1	7.1918E-3
4194.51	2.38407	7.5199E-2	8.8978E-1	2.1262E-2	4217.11	2.37129	6.2400E-2	8.7833E-1	8.6313E-3
4194.76	2.38393	7.6522E-2	8.9109E-1	2.2577E-2	4217.31	2.37118	6.3983E-2	8.7994E-1	1.0174E-2
4195.01	2.38379	7.8287E-2	8.9280E-1	2.4332E-2	4217.51	2.37107	6.5773E-2	8.8174E-1	1.1929E-2
4195.26	2.38364	8.0353E-2	8.9476E-1	2.6389E-2	4217.61	2.37101	6.6794E-2	8.8276E-1	1.2934E-2
4195.51	2.38350	8.2826E-2	8.9710E-1	2.8852E-2	4217.71	2.37095	6.7912E-2	8.8386E-1	1.4036E-2
4195.76	2.38336	8.5730E-2	8.9977E-1	3.1746E-2	4217.81	2.37090	6.9238E-2	8.8516E-1	1.5345E-2
4196.01	2.38322	8.8866E-2	9.0267E-1	3.4873E-2	4217.91	2.37084	7.0914E-2	8.8678E-1	1.7004E-2
4196.26	2.38308	9.1530E-2	9.0512E-1	3.7530E-2	4218.01	2.37079	7.2844E-2	8.8863E-1	1.8918E-2
4196.51	2.38293	9.3650E-2	9.0707E-1	3.9645E-2	4218.11	2.37073	7.4930E-2	8.9061E-1	2.0989E-2
4196.76	2.38279	9.4667E-2	9.0798E-1	4.0660E-2	4218.21	2.37067	7.6734E-2	8.9234E-1	2.2783E-2
4197.01	2.38265	9.4040E-2	9.0734E-1	4.0035E-2	4218.31	2.37062	7.8299E-2	8.9383E-1	2.4339E-2
4197.26	2.38251	9.2254E-2	9.0561E-1	3.8253E-2	4218.41	2.37056	7.9729E-2	8.9521E-1	2.5763E-2
4197.51	2.38237	8.9361E-2	9.0282E-1	3.5367E-2	4218.51	2.37050	8.0868E-2	8.9629E-1	2.6897E-2
4197.76	2.38222	8.5576E-2	8.9919E-1	3.1594E-2	4218.61	2.37045	8.1909E-2	8.9727E-1	2.7934E-2
4198.01	2.38208	8.2235E-2	8.9597E-1	2.8265E-2	4218.71	2.37039	8.2772E-2	8.9805E-1	2.8793E-2
4198.26	2.38194	7.9417E-2	8.9325E-1	2.5461E-2	4218.81	2.37034	8.3487E-2	8.9869E-1	2.9506E-2
4198.51	2.38180	7.7048E-2	8.9094E-1	2.3105E-2	4218.91	2.37028	8.4009E-2	8.9915E-1	3.0026E-2
4198.76	2.38166	7.5138E-2	8.8907E-1	2.1207E-2	4219.01	2.37022	8.4322E-2	8.9941E-1	3.0338E-2
4199.01	2.38151	7.3595E-2	8.8755E-1	1.9675E-2	4219.11	2.37017	8.3799E-2	8.9884E-1	2.9817E-2
4199.26	2.38137	7.2312E-2	8.8627E-1	1.8404E-2	4219.21	2.37011	8.3068E-2	8.9807E-1	2.9088E-2
4199.51	2.38123	7.1216E-2	8.8516E-1	1.7319E-2	4219.31	2.37005	8.2201E-2	8.9717E-1	2.8224E-2
4199.76	2.38109	7.0256E-2	8.8418E-1	1.6368E-2	4219.41	2.37000	8.1269E-2	8.9621E-1	2.7295E-2
4200.01	2.38095	6.9485E-2	8.8339E-1	1.5606E-2	4219.51	2.36994	8.0363E-2	8.9527E-1	2.6393E-2
4200.26	2.38081	6.8990E-2	8.8287E-1	1.5117E-2	4219.71	2.36983	7.8680E-2	8.9350E-1	2.4717E-2
4200.51	2.38066	6.8676E-2	8.8251E-1	1.4807E-2	4219.91	2.36972	7.7352E-2	8.9204E-1	2.3395E-2
4201.51	2.38010	6.7730E-2	8.8139E-1	1.3872E-2	4220.11	2.36961	7.6281E-2	8.9083E-1	2.2329E-2
4202.01	2.37981	6.7176E-2	8.8079E-1	1.3325E-2	4220.31	2.36949	7.5327E-2	8.8975E-1	2.1381E-2
4202.51	2.37953	6.6473E-2	8.8006E-1	1.2633E-2	4220.51	2.36938	7.4523E-2	8.8884E-1	2.0582E-2
4203.51	2.37896	6.4675E-2	8.7822E-1	1.0864E-2	4221.01	2.36910	7.2801E-2	8.8694E-1	1.8870E-2
4204.51	2.37840	6.3074E-2	8.7663E-1	9.2974E-3	4221.51	2.36882	7.1099E-2	8.8513E-1	1.7180E-2
4205.51	2.37783	6.1599E-2	8.7517E-1	7.8633E-3	4222.01	2.36854	6.9375E-2	8.8336E-1	1.5470E-2
4206.01	2.37755	6.0945E-2	8.7452E-1	7.2308E-3	4222.51	2.36826	6.7733E-2	8.8166E-1	1.3846E-2
4206.51	2.37727	6.0405E-2	8.7402E-1	6.7120E-3	4223.01	2.36798	6.6258E-2	8.8013E-1	1.2389E-2
4207.01	2.37698	5.9947E-2	8.7360E-1	6.2724E-3	4223.51	2.36770	6.5088E-2	8.7892E-1	1.1235E-2
4207.51	2.37670	5.9574E-2	8.7326E-1	5.9171E-3	4224.51	2.36714	6.3953E-2	8.7764E-1	1.0118E-2
4208.51	2.37614	5.8904E-2	8.7265E-1	5.2810E-3	4225.51	2.36658	6.4762E-2	8.7826E-1	1.0911E-2
4209.51	2.37557	5.8275E-2	8.7209E-1	4.6918E-3	4226.51	2.36602	6.6610E-2	8.8006E-1	1.2731E-2
4210.51	2.37501	5.7692E-2	8.7157E-1	4.1528E-3	4227.51	2.36546	6.8217E-2	8.8174E-1	1.4318E-2
4211.51	2.37444	5.7147E-2	8.7113E-1	3.6572E-3	4228.51	2.36490	6.8300E-2	8.8190E-1	1.4401E-2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4229.51	2.36434	6.6069E-2	8.7983E-1	1.2199E-2	4241.01	2.35793	1.0298E-1	9.1684E-1	4.8955E-2
4230.51	2.36378	6.2490E-2	8.7647E-1	8.6876E-3	4241.11	2.35787	1.0029E-1	9.1405E-1	4.6269E-2
4231.51	2.36322	5.8993E-2	8.7318E-1	5.3229E-3	4241.31	2.35776	9.7306E-2	9.1087E-1	4.3290E-2
4232.51	2.36266	5.6695E-2	8.7102E-1	3.2086E-3	4241.51	2.35765	9.6004E-2	9.0942E-1	4.1990E-2
4233.51	2.36210	5.5491E-2	8.6990E-1	2.1846E-3	4241.71	2.35754	9.5113E-2	9.0847E-1	4.1101E-2
4234.51	2.36155	5.4962E-2	8.6944E-1	1.7754E-3	4242.01	2.35737	9.4257E-2	9.0760E-1	4.0247E-2
4234.76	2.36141	5.4906E-2	8.6940E-1	1.7351E-3	4242.26	2.35723	9.3877E-2	9.0720E-1	3.9867E-2
4235.01	2.36127	5.5027E-2	8.6953E-1	1.8266E-3	4242.51	2.35709	9.3801E-2	9.0708E-1	3.9792E-2
4235.26	2.36113	5.5427E-2	8.6992E-1	2.1375E-3	4243.01	2.35681	9.4442E-2	9.0758E-1	4.0432E-2
4235.51	2.36099	5.6468E-2	8.7091E-1	3.0135E-3	4243.51	2.35654	9.5974E-2	9.0892E-1	4.1961E-2
4235.76	2.36085	5.7741E-2	8.7214E-1	4.1596E-3	4244.01	2.35626	9.8242E-2	9.1095E-1	4.4225E-2
4236.01	2.36071	5.9209E-2	8.7355E-1	5.5332E-3	4244.26	2.35612	9.9790E-2	9.1236E-1	4.5770E-2
4236.51	2.36043	6.2495E-2	8.7671E-1	8.6996E-3	4244.51	2.35598	1.0290E-1	9.1539E-1	4.8875E-2
4236.76	2.36029	6.4269E-2	8.7843E-1	1.0434E-2	4245.01	2.35570	1.1185E-1	9.2457E-1	5.7811E-2
4237.01	2.36015	6.6246E-2	8.8034E-1	1.2379E-2	4245.51	2.35543	1.2120E-1	9.3458E-1	6.7158E-2
4237.26	2.36001	6.8475E-2	8.8249E-1	1.4580E-2	4246.02	2.35515	1.3093E-1	9.4414E-1	7.6877E-2
4237.51	2.35987	7.0991E-2	8.8493E-1	1.7072E-2	4246.52	2.35487	1.4102E-1	9.5375E-1	8.6959E-2
4237.61	2.35982	7.2097E-2	8.8599E-1	1.8169E-2	4247.02	2.35459	1.5148E-1	9.6371E-1	9.7405E-2
4237.71	2.35976	7.3299E-2	8.8715E-1	1.9362E-2	4247.52	2.35432	1.6220E-1	9.7402E-1	1.0812E-1
4237.81	2.35971	7.4592E-2	8.8839E-1	2.0648E-2	4248.02	2.35404	1.7310E-1	9.8451E-1	1.1902E-1
4237.91	2.35965	7.5988E-2	8.8973E-1	2.2035E-2	4248.27	2.35390	1.7858E-1	9.8978E-1	1.2449E-1
4238.01	2.35960	7.7496E-2	8.9118E-1	2.3536E-2	4248.52	2.35376	1.8407E-1	9.9506E-1	1.2998E-1
4238.21	2.35948	8.0889E-2	8.9442E-1	2.6915E-2	4248.77	2.35362	1.8955E-1	1.0003E+0	1.3545E-1
4238.31	2.35943	8.2796E-2	8.9624E-1	2.8815E-2	4249.02	2.35349	1.9511E-1	1.0057E+0	1.4101E-1
4238.41	2.35937	8.4857E-2	8.9821E-1	3.0869E-2	4249.27	2.35335	2.0107E-1	1.0114E+0	1.4697E-1
4238.51	2.35932	8.7243E-2	9.0048E-1	3.3248E-2	4249.52	2.35321	2.0806E-1	1.0182E+0	1.5396E-1
4238.61	2.35926	9.0431E-2	9.0355E-1	3.6428E-2	4249.77	2.35307	2.1628E-1	1.0262E+0	1.6217E-1
4238.71	2.35921	9.5209E-2	9.0820E-1	4.1195E-2	4250.02	2.35293	2.2656E-1	1.0363E+0	1.7244E-1
4238.81	2.35915	1.0214E-1	9.1503E-1	4.8115E-2	4250.27	2.35279	2.3874E-1	1.0482E+0	1.8462E-1
4238.91	2.35909	1.1214E-1	9.2505E-1	5.8106E-2	4250.52	2.35266	2.5228E-1	1.0618E+0	1.9815E-1
4239.01	2.35904	1.2530E-1	9.3841E-1	7.1244E-2	4250.72	2.35255	2.6422E-1	1.0739E+0	2.1009E-1
4239.11	2.35898	1.4501E-1	9.5829E-1	9.0943E-2	4250.92	2.35243	2.7706E-1	1.0872E+0	2.2291E-1
4239.21	2.35893	1.6807E-1	9.8139E-1	1.1398E-1	4251.12	2.35232	2.9093E-1	1.1015E+0	2.3678E-1
4239.31	2.35887	1.9144E-1	1.0045E+0	1.3734E-1	4251.32	2.35221	3.0574E-1	1.1169E+0	2.5158E-1
4239.41	2.35882	2.1109E-1	1.0231E+0	1.5698E-1	4251.52	2.35210	3.2298E-1	1.1344E+0	2.6881E-1
4239.51	2.35876	2.2797E-1	1.0389E+0	1.7385E-1	4251.72	2.35199	3.4259E-1	1.1541E+0	2.8841E-1
4239.61	2.35871	2.3811E-1	1.0480E+0	1.8399E-1	4251.92	2.35188	3.6575E-1	1.1771E+0	3.1156E-1
4239.71	2.35865	2.4172E-1	1.0510E+0	1.8759E-1	4252.12	2.35177	3.9376E-1	1.2048E+0	3.3956E-1
4239.81	2.35859	2.3921E-1	1.0483E+0	1.8508E-1	4252.32	2.35166	4.2543E-1	1.2360E+0	3.7121E-1
4239.91	2.35854	2.2842E-1	1.0378E+0	1.7430E-1	4252.52	2.35155	4.6424E-1	1.2740E+0	4.1002E-1
4240.01	2.35848	2.1229E-1	1.0224E+0	1.5817E-1	4252.62	2.35149	4.8636E-1	1.2960E+0	4.3213E-1
4240.11	2.35843	1.9425E-1	1.0052E+0	1.4015E-1	4252.72	2.35144	5.0981E-1	1.3196E+0	4.5557E-1
4240.21	2.35837	1.7560E-1	9.8736E-1	1.2151E-1	4252.82	2.35138	5.3518E-1	1.3459E+0	4.8092E-1
4240.31	2.35832	1.5921E-1	9.7165E-1	1.0513E-1	4252.92	2.35133	5.6092E-1	1.3738E+0	5.0662E-1
4240.41	2.35826	1.4572E-1	9.5872E-1	9.1648E-2	4253.02	2.35127	5.8581E-1	1.4022E+0	5.3145E-1
4240.51	2.35820	1.3412E-1	9.4755E-1	8.0062E-2	4253.12	2.35122	6.0698E-1	1.4291E+0	5.5244E-1
4240.61	2.35815	1.2436E-1	9.3813E-1	7.0315E-2	4253.22	2.35116	6.2710E-1	1.4564E+0	5.7227E-1
4240.71	2.35809	1.1692E-1	9.3084E-1	6.2878E-2	4253.32	2.35111	6.5006E-1	1.4877E+0	5.9378E-1
4240.81	2.35804	1.1098E-1	9.2496E-1	5.6949E-2	4253.42	2.35105	6.8243E-1	1.5284E+0	6.2453E-1
4240.91	2.35798	1.0666E-1	9.2059E-1	5.2632E-2	4253.52	2.35100	7.3012E-1	1.5821E+0	6.7050E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4253.62	2.35094	7.9764E−1	1.6525E+0	7.3614E−1	4259.12	2.34790	2.5222E+0	3.3394E+0	2.4663E+0
4253.72	2.35089	8.9145E−1	1.7462E+0	8.2770E−1	4259.32	2.34779	2.4519E+0	3.2689E+0	2.3961E+0
4253.82	2.35083	1.0259E+0	1.8728E+0	9.6109E−1	4259.52	2.34768	2.3926E+0	3.2093E+0	2.3368E+0
4253.92	2.35078	1.2010E+0	2.0385E+0	1.1361E+0	4259.72	2.34757	2.3405E+0	3.1571E+0	2.2848E+0
4254.02	2.35072	1.4148E+0	2.2433E+0	1.3509E+0	4259.92	2.34746	2.2950E+0	3.1114E+0	2.2394E+0
4254.12	2.35066	1.6622E+0	2.4857E+0	1.5992E+0	4260.12	2.34735	2.2551E+0	3.0715E+0	2.1995E+0
4254.22	2.35061	1.9471E+0	2.7700E+0	1.8847E+0	4260.32	2.34724	2.2178E+0	3.0343E+0	2.1623E+0
4254.32	2.35055	2.2750E+0	3.0988E+0	2.2131E+0	4260.52	2.34713	2.1830E+0	2.9995E+0	2.1275E+0
4254.42	2.35050	2.6345E+0	3.4574E+0	2.5730E+0	4260.72	2.34702	2.1496E+0	2.9662E+0	2.0941E+0
4254.52	2.35044	2.9855E+0	3.8060E+0	2.9243E+0	4260.92	2.34691	2.1199E+0	2.9366E+0	2.0644E+0
4254.62	2.35039	3.3137E+0	4.1308E+0	3.2532E+0	4261.12	2.34680	2.0918E+0	2.9086E+0	2.0363E+0
4254.72	2.35033	3.6039E+0	4.4175E+0	3.5444E+0	4261.32	2.34669	2.0648E+0	2.8817E+0	2.0093E+0
4254.82	2.35028	3.8536E+0	4.6647E+0	3.7949E+0	4261.52	2.34658	2.0398E+0	2.8568E+0	1.9843E+0
4254.92	2.35022	4.0447E+0	4.8557E+0	3.9864E+0	4261.72	2.34647	2.0169E+0	2.8340E+0	1.9614E+0
4255.02	2.35017	4.1746E+0	4.9868E+0	4.1165E+0	4261.92	2.34636	1.9967E+0	2.8139E+0	1.9413E+0
4255.12	2.35011	4.2451E+0	5.0593E+0	4.1871E+0	4262.12	2.34625	1.9798E+0	2.7970E+0	1.9244E+0
4255.22	2.35006	4.2756E+0	5.0919E+0	4.2177E+0	4262.32	2.34614	1.9662E+0	2.7834E+0	1.9108E+0
4255.32	2.35000	4.2848E+0	5.1029E+0	4.2269E+0	4262.42	2.34609	1.9617E+0	2.7788E+0	1.9063E+0
4255.42	2.34995	4.2703E+0	5.0896E+0	4.2123E+0	4262.52	2.34603	1.9590E+0	2.7760E+0	1.9036E+0
4255.52	2.34989	4.2605E+0	5.0804E+0	4.2025E+0	4262.62	2.34598	1.9580E+0	2.7749E+0	1.9027E+0
4255.62	2.34984	4.2630E+0	5.0825E+0	4.2050E+0	4262.72	2.34592	1.9579E+0	2.7747E+0	1.9026E+0
4255.72	2.34978	4.2772E+0	5.0961E+0	4.2192E+0	4262.82	2.34587	1.9595E+0	2.7761E+0	1.9042E+0
4255.82	2.34973	4.3061E+0	5.1237E+0	4.2482E+0	4262.92	2.34581	1.9616E+0	2.7781E+0	1.9063E+0
4255.92	2.34967	4.3429E+0	5.1589E+0	4.2850E+0	4263.02	2.34576	1.9644E+0	2.7806E+0	1.9091E+0
4256.02	2.34962	4.3674E+0	5.1822E+0	4.3096E+0	4263.12	2.34570	1.9671E+0	2.7833E+0	1.9118E+0
4256.12	2.34956	4.3705E+0	5.1845E+0	4.3127E+0	4263.22	2.34565	1.9700E+0	2.7860E+0	1.9147E+0
4256.22	2.34950	4.3420E+0	5.1559E+0	4.2843E+0	4263.32	2.34559	1.9726E+0	2.7885E+0	1.9173E+0
4256.32	2.34945	4.2764E+0	5.0907E+0	4.2187E+0	4263.52	2.34548	1.9773E+0	2.7931E+0	1.9220E+0
4256.42	2.34939	4.1640E+0	4.9791E+0	4.1064E+0	4263.72	2.34537	1.9817E+0	2.7974E+0	1.9263E+0
4256.52	2.34934	4.0275E+0	4.8432E+0	3.9701E+0	4263.92	2.34526	1.9858E+0	2.8015E+0	1.9305E+0
4256.62	2.34928	3.8646E+0	4.6804E+0	3.8074E+0	4264.12	2.34515	1.9900E+0	2.8057E+0	1.9346E+0
4256.72	2.34923	3.6952E+0	4.5113E+0	3.6382E+0	4264.32	2.34504	1.9935E+0	2.8092E+0	1.9381E+0
4256.82	2.34917	3.5219E+0	4.3392E+0	3.4650E+0	4264.52	2.34493	1.9965E+0	2.8123E+0	1.9411E+0
4256.92	2.34912	3.3640E+0	4.1820E+0	3.3072E+0	4264.62	2.34488	1.9971E+0	2.8129E+0	1.9417E+0
4257.02	2.34906	3.2194E+0	4.0380E+0	3.1627E+0	4264.72	2.34482	1.9972E+0	2.8130E+0	1.9418E+0
4257.12	2.34901	3.0870E+0	3.9060E+0	3.0304E+0	4264.82	2.34477	1.9957E+0	2.8116E+0	1.9403E+0
4257.22	2.34895	2.9810E+0	3.8003E+0	2.9246E+0	4264.92	2.34471	1.9938E+0	2.8098E+0	1.9384E+0
4257.32	2.34890	2.9012E+0	3.7205E+0	2.8448E+0	4265.02	2.34466	1.9905E+0	2.8066E+0	1.9351E+0
4257.42	2.34884	2.8489E+0	3.6682E+0	2.7926E+0	4265.12	2.34460	1.9865E+0	2.8026E+0	1.9311E+0
4257.52	2.34879	2.8218E+0	3.6410E+0	2.7655E+0	4265.32	2.34449	1.9775E+0	2.7938E+0	1.9221E+0
4257.62	2.34873	2.8144E+0	3.6335E+0	2.7581E+0	4265.52	2.34438	1.9679E+0	2.7844E+0	1.9125E+0
4257.72	2.34868	2.8192E+0	3.6380E+0	2.7629E+0	4265.72	2.34427	1.9577E+0	2.7744E+0	1.9023E+0
4257.82	2.34862	2.8334E+0	3.6515E+0	2.7771E+0	4265.92	2.34416	1.9464E+0	2.7633E+0	1.8911E+0
4257.92	2.34857	2.8481E+0	3.6655E+0	2.7919E+0	4266.12	2.34405	1.9340E+0	2.7510E+0	1.8786E+0
4258.02	2.34851	2.8593E+0	3.6762E+0	2.8031E+0	4266.32	2.34394	1.9207E+0	2.7378E+0	1.8654E+0
4258.12	2.34846	2.8594E+0	3.6761E+0	2.8032E+0	4266.52	2.34383	1.9063E+0	2.7235E+0	1.8510E+0
4258.32	2.34835	2.8343E+0	3.6517E+0	2.7781E+0	4266.77	2.34369	1.8862E+0	2.7032E+0	1.8309E+0
4258.52	2.34824	2.7710E+0	3.5891E+0	2.7148E+0	4267.02	2.34356	1.8616E+0	2.6784E+0	1.8063E+0
4258.72	2.34813	2.6850E+0	3.5029E+0	2.6290E+0	4267.27	2.34342	1.8327E+0	2.6494E+0	1.7774E+0
4258.92	2.34802	2.5986E+0	3.4162E+0	2.5427E+0	4267.52	2.34328	1.7985E+0	2.6150E+0	1.7433E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4267.77	2.34315	1.7614E+0	2.5777E+0	1.7062E+0	4284.52	2.33398	4.4982E−1	1.2599E+0	3.9559E−1
4268.02	2.34301	1.7207E+0	2.5371E+0	1.6655E+0	4284.72	2.33387	4.4774E−1	1.2591E+0	3.9351E−1
4268.27	2.34287	1.6755E+0	2.4921E+0	1.6203E+0	4284.92	2.33377	4.4611E−1	1.2587E+0	3.9187E−1
4268.52	2.34273	1.6316E+0	2.4482E+0	1.5764E+0	4285.12	2.33366	4.4524E−1	1.2590E+0	3.9099E−1
4269.02	2.34246	1.5470E+0	2.3638E+0	1.4918E+0	4285.22	2.33360	4.4551E−1	1.2598E+0	3.9126E−1
4269.52	2.34218	1.4652E+0	2.2820E+0	1.4100E+0	4285.32	2.33355	4.4613E−1	1.2609E+0	3.9187E−1
4270.02	2.34191	1.3854E+0	2.2021E+0	1.3303E+0	4285.42	2.33349	4.4743E−1	1.2626E+0	3.9317E−1
4270.52	2.34164	1.3077E+0	2.1241E+0	1.2528E+0	4285.52	2.33344	4.4955E−1	1.2649E+0	3.9529E−1
4270.77	2.34150	1.2702E+0	2.0863E+0	1.2153E+0	4285.72	2.33333	4.5575E−1	1.2711E+0	4.0149E−1
4271.02	2.34136	1.2342E+0	2.0500E+0	1.1793E+0	4285.92	2.33322	4.6503E−1	1.2798E+0	4.1076E−1
4271.27	2.34123	1.1992E+0	2.0146E+0	1.1444E+0	4286.12	2.33311	4.7576E−1	1.2894E+0	4.2150E−1
4271.52	2.34109	1.1651E+0	1.9800E+0	1.1104E+0	4286.32	2.33300	4.8637E−1	1.2990E+0	4.3212E−1
4272.02	2.34081	1.0988E+0	1.9124E+0	1.0443E+0	4286.52	2.33289	4.9598E−1	1.3073E+0	4.4173E−1
4272.52	2.34054	1.0355E+0	1.8473E+0	9.8110E−1	4286.72	2.33279	5.0433E−1	1.3145E+0	4.5008E−1
4273.02	2.34027	9.7655E−1	1.7870E+0	9.2224E−1	4286.82	2.33273	5.0772E−1	1.3175E+0	4.5348E−1
4273.52	2.33999	9.2169E−1	1.7319E+0	8.6738E−1	4286.92	2.33268	5.1054E−1	1.3200E+0	4.5630E−1
4274.02	2.33972	8.7036E−1	1.6813E+0	8.1601E−1	4287.02	2.33262	5.1262E−1	1.3219E+0	4.5837E−1
4274.52	2.33944	8.2297E−1	1.6346E+0	7.6860E−1	4287.12	2.33257	5.1420E−1	1.3234E+0	4.5995E−1
4274.77	2.33931	8.0061E−1	1.6123E+0	7.4624E−1	4287.22	2.33251	5.1500E−1	1.3243E+0	4.6076E−1
4275.02	2.33917	7.7924E−1	1.5907E+0	7.2489E−1	4287.32	2.33246	5.1540E−1	1.3250E+0	4.6116E−1
4275.27	2.33903	7.5893E−1	1.5700E+0	7.0459E−1	4287.42	2.33241	5.1526E−1	1.3254E+0	4.6101E−1
4275.52	2.33890	7.3917E−1	1.5507E+0	6.8482E−1	4287.52	2.33235	5.1489E−1	1.3259E+0	4.6063E−1
4275.77	2.33876	7.1998E−1	1.5320E+0	6.6563E−1	4287.62	2.33230	5.1431E−1	1.3268E+0	4.6004E−1
4276.02	2.33862	7.0162E−1	1.5139E+0	6.4727E−1	4287.72	2.33224	5.1361E−1	1.3277E+0	4.5932E−1
4276.27	2.33849	6.8451E−1	1.4968E+0	6.3017E−1	4287.82	2.33219	5.1247E−1	1.3264E+0	4.5819E−1
4276.52	2.33835	6.6895E−1	1.4810E+0	6.1462E−1	4287.92	2.33213	5.1076E−1	1.3225E+0	4.5649E−1
4276.77	2.33821	6.5441E−1	1.4665E+0	6.0008E−1	4288.02	2.33208	5.0825E−1	1.3184E+0	4.5400E−1
4277.02	2.33808	6.4083E−1	1.4529E+0	5.8651E−1	4288.12	2.33202	5.0512E−1	1.3142E+0	4.5088E−1
4277.27	2.33794	6.2862E−1	1.4407E+0	5.7431E−1	4288.32	2.33192	4.9503E−1	1.3041E+0	4.4080E−1
4277.52	2.33780	6.1793E−1	1.4298E+0	5.6362E−1	4288.52	2.33181	4.8103E−1	1.2908E+0	4.2680E−1
4277.77	2.33767	6.0794E−1	1.4194E+0	5.5364E−1	4288.72	2.33170	4.6899E−1	1.2794E+0	4.1476E−1
4278.02	2.33753	5.9842E−1	1.4095E+0	5.4413E−1	4288.92	2.33159	4.6107E−1	1.2714E+0	4.0684E−1
4278.27	2.33739	5.8950E−1	1.4005E+0	5.3521E−1	4289.12	2.33148	4.5574E−1	1.2655E+0	4.0152E−1
4278.52	2.33726	5.8126E−1	1.3922E+0	5.2697E−1	4289.32	2.33137	4.5180E−1	1.2609E+0	3.9758E−1
4278.77	2.33712	5.7345E−1	1.3842E+0	5.1917E−1	4289.52	2.33126	4.4824E−1	1.2570E+0	3.9403E−1
4279.02	2.33698	5.6608E−1	1.3766E+0	5.1181E−1	4290.52	2.33072	4.3175E−1	1.2416E+0	3.7753E−1
4279.52	2.33671	5.5236E−1	1.3628E+0	4.9810E−1	4291.02	2.33045	4.2358E−1	1.2337E+0	3.6937E−1
4280.02	2.33644	5.3929E−1	1.3495E+0	4.8503E−1	4291.32	2.33029	4.1870E−1	1.2289E+0	3.6449E−1
4280.52	2.33617	5.2676E−1	1.3366E+0	4.7251E−1	4291.52	2.33018	4.1550E−1	1.2257E+0	3.6129E−1
4281.02	2.33589	5.1460E−1	1.3243E+0	4.6035E−1	4291.72	2.33007	4.1236E−1	1.2227E+0	3.5815E−1
4281.52	2.33562	5.0296E−1	1.3125E+0	4.4872E−1	4292.02	2.32990	4.0811E−1	1.2185E+0	3.5390E−1
4282.02	2.33535	4.9187E−1	1.3012E+0	4.3763E−1	4292.12	2.32985	4.0684E−1	1.2172E+0	3.5263E−1
4282.52	2.33507	4.8145E−1	1.2905E+0	4.2722E−1	4292.22	2.32980	4.0571E−1	1.2161E+0	3.5151E−1
4283.02	2.33480	4.7160E−1	1.2804E+0	4.1737E−1	4292.32	2.32974	4.0472E−1	1.2150E+0	3.5052E−1
4283.32	2.33464	4.6632E−1	1.2750E+0	4.1210E−1	4292.42	2.32969	4.0426E−1	1.2145E+0	3.5005E−1
4283.52	2.33453	4.6320E−1	1.2716E+0	4.0898E−1	4292.52	2.32963	4.0434E−1	1.2143E+0	3.5013E−1
4283.72	2.33442	4.6036E−1	1.2687E+0	4.0614E−1	4292.72	2.32953	4.0522E−1	1.2147E+0	3.5102E−1
4283.92	2.33431	4.5757E−1	1.2658E+0	4.0335E−1	4292.92	2.32942	4.0671E−1	1.2157E+0	3.5250E−1
4284.12	2.33420	4.5483E−1	1.2633E+0	4.0061E−1	4293.12	2.32931	4.0889E−1	1.2172E+0	3.5469E−1
4284.32	2.33409	4.5219E−1	1.2614E+0	3.9797E−1	4293.22	2.32925	4.1038E−1	1.2183E+0	3.5618E−1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4293.32	2.32920	4.1215E-1	1.2197E+0	3.5795E-1	4310.02	2.32017	3.4624E-1	1.1557E+0	2.9207E-1
4293.42	2.32915	4.1404E-1	1.2211E+0	3.5984E-1	4310.52	2.31990	3.4332E-1	1.1529E+0	2.8914E-1
4293.52	2.32909	4.1577E-1	1.2225E+0	3.6157E-1	4311.52	2.31937	3.3688E-1	1.1467E+0	2.8271E-1
4293.62	2.32904	4.1727E-1	1.2236E+0	3.6307E-1	4312.52	2.31883	3.3045E-1	1.1403E+0	2.7628E-1
4293.72	2.32898	4.1817E-1	1.2242E+0	3.6397E-1	4313.02	2.31856	3.2745E-1	1.1374E+0	2.7328E-1
4293.92	2.32887	4.1773E-1	1.2235E+0	3.6353E-1	4313.52	2.31829	3.2483E-1	1.1349E+0	2.7067E-1
4294.12	2.32877	4.1420E-1	1.2202E+0	3.6000E-1	4314.02	2.31802	3.2256E-1	1.1327E+0	2.6839E-1
4294.32	2.32866	4.0757E-1	1.2142E+0	3.5338E-1	4314.27	2.31789	3.2152E-1	1.1318E+0	2.6735E-1
4294.52	2.32855	3.9766E-1	1.2053E+0	3.4347E-1	4314.52	2.31775	3.2053E-1	1.1308E+0	2.6637E-1
4294.72	2.32844	3.8507E-1	1.1941E+0	3.3088E-1	4315.02	2.31748	3.1866E-1	1.1291E+0	2.6450E-1
4294.92	2.32833	3.7699E-1	1.1868E+0	3.2280E-1	4315.52	2.31722	3.1692E-1	1.1275E+0	2.6276E-1
4295.12	2.32822	3.7242E-1	1.1826E+0	3.1823E-1	4316.02	2.31695	3.1528E-1	1.1260E+0	2.6111E-1
4295.32	2.32811	3.6917E-1	1.1794E+0	3.1498E-1	4316.52	2.31668	3.1371E-1	1.1246E+0	2.5954E-1
4295.42	2.32806	3.6786E-1	1.1781E+0	3.1367E-1	4317.52	2.31614	3.1066E-1	1.1218E+0	2.5650E-1
4295.52	2.32801	3.6676E-1	1.1770E+0	3.1257E-1	4318.52	2.31561	3.0765E-1	1.1192E+0	2.5349E-1
4295.62	2.32795	3.6574E-1	1.1760E+0	3.1156E-1	4319.02	2.31534	3.0621E-1	1.1179E+0	2.5205E-1
4295.72	2.32790	3.6489E-1	1.1751E+0	3.1070E-1	4319.52	2.31507	3.0486E-1	1.1167E+0	2.5070E-1
4295.82	2.32784	3.6413E-1	1.1743E+0	3.0995E-1	4320.02	2.31480	3.0367E-1	1.1157E+0	2.4951E-1
4295.92	2.32779	3.6346E-1	1.1736E+0	3.0927E-1	4320.27	2.31467	3.0320E-1	1.1152E+0	2.4904E-1
4296.12	2.32768	3.6224E-1	1.1723E+0	3.0805E-1	4320.52	2.31453	3.0287E-1	1.1149E+0	2.4871E-1
4296.52	2.32746	3.5992E-1	1.1697E+0	3.0573E-1	4320.77	2.31440	3.0268E-1	1.1148E+0	2.4852E-1
4297.02	2.32719	3.5715E-1	1.1667E+0	3.0297E-1	4321.02	2.31427	3.0270E-1	1.1148E+0	2.4853E-1
4297.52	2.32692	3.5464E-1	1.1640E+0	3.0046E-1	4321.52	2.31400	3.0370E-1	1.1157E+0	2.4954E-1
4298.02	2.32665	3.5246E-1	1.1618E+0	2.9828E-1	4321.77	2.31386	3.0588E-1	1.1176E+0	2.5172E-1
4298.32	2.32649	3.5133E-1	1.1606E+0	2.9715E-1	4322.02	2.31373	3.1072E-1	1.1218E+0	2.5656E-1
4298.52	2.32638	3.5066E-1	1.1600E+0	2.9648E-1	4322.27	2.31360	3.1577E-1	1.1263E+0	2.6160E-1
4298.72	2.32627	3.5004E-1	1.1594E+0	2.9586E-1	4322.52	2.31346	3.1718E-1	1.1275E+0	2.6302E-1
4298.92	2.32616	3.4947E-1	1.1589E+0	2.9529E-1	4322.77	2.31333	3.1764E-1	1.1279E+0	2.6347E-1
4299.52	2.32584	3.4799E-1	1.1577E+0	2.9381E-1	4323.02	2.31320	3.1684E-1	1.1272E+0	2.6267E-1
4300.52	2.32530	3.4595E-1	1.1560E+0	2.9177E-1	4323.52	2.31293	3.1430E-1	1.1249E+0	2.6013E-1
4300.77	2.32516	3.4552E-1	1.1557E+0	2.9134E-1	4324.02	2.31266	3.1043E-1	1.1214E+0	2.5626E-1
4301.02	2.32503	3.4520E-1	1.1554E+0	2.9102E-1	4324.27	2.31253	3.0821E-1	1.1193E+0	2.5404E-1
4301.27	2.32489	3.4498E-1	1.1552E+0	2.9080E-1	4324.52	2.31239	3.0563E-1	1.1168E+0	2.5147E-1
4301.52	2.32476	3.4498E-1	1.1552E+0	2.9080E-1	4324.77	2.31226	3.0283E-1	1.1141E+0	2.4867E-1
4302.02	2.32449	3.4519E-1	1.1554E+0	2.9102E-1	4325.02	2.31213	2.9973E-1	1.1111E+0	2.4557E-1
4302.52	2.32422	3.4558E-1	1.1558E+0	2.9140E-1	4325.27	2.31199	2.9642E-1	1.1079E+0	2.4226E-1
4302.77	2.32408	3.4589E-1	1.1561E+0	2.9171E-1	4325.52	2.31186	2.9278E-1	1.1043E+0	2.3863E-1
4303.02	2.32395	3.4641E-1	1.1565E+0	2.9223E-1	4325.77	2.31172	2.8891E-1	1.1005E+0	2.3475E-1
4303.52	2.32368	3.4767E-1	1.1576E+0	2.9349E-1	4326.02	2.31159	2.8459E-1	1.0963E+0	2.3044E-1
4304.52	2.32314	3.5067E-1	1.1603E+0	2.9649E-1	4326.27	2.31146	2.8000E-1	1.0919E+0	2.2585E-1
4305.52	2.32260	3.5367E-1	1.1629E+0	2.9949E-1	4326.52	2.31132	2.7519E-1	1.0872E+0	2.2104E-1
4305.77	2.32246	3.5424E-1	1.1634E+0	3.0006E-1	4327.02	2.31106	2.6559E-1	1.0779E+0	2.1145E-1
4306.02	2.32233	3.5454E-1	1.1637E+0	3.0036E-1	4327.27	2.31092	2.6115E-1	1.0736E+0	2.0701E-1
4306.52	2.32206	3.5464E-1	1.1637E+0	3.0046E-1	4327.52	2.31079	2.5708E-1	1.0696E+0	2.0294E-1
4307.02	2.32179	3.5454E-1	1.1636E+0	3.0036E-1	4327.77	2.31066	2.5317E-1	1.0658E+0	1.9903E-1
4307.52	2.32152	3.5421E-1	1.1634E+0	3.0003E-1	4328.02	2.31052	2.4960E-1	1.0622E+0	1.9547E-1
4308.02	2.32125	3.5371E-1	1.1629E+0	2.9953E-1	4328.27	2.31039	2.4643E-1	1.0590E+0	1.9230E-1
4308.52	2.32098	3.5262E-1	1.1618E+0	2.9844E-1	4328.52	2.31026	2.4389E-1	1.0564E+0	1.8975E-1
4309.02	2.32071	3.5102E-1	1.1603E+0	2.9685E-1	4328.77	2.31012	2.4193E-1	1.0543E+0	1.8780E-1
4309.52	2.32044	3.4888E-1	1.1583E+0	2.9470E-1	4329.02	2.30999	2.4040E-1	1.0526E+0	1.8628E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4329.28	2.30986	2.3934E-1	1.0513E+0	1.8521E-1	4345.53	2.30122	2.0451E-1	1.0160E+0	1.5040E-1
4329.53	2.30972	2.3876E-1	1.0505E+0	1.8464E-1	4345.63	2.30116	2.0926E-1	1.0208E+0	1.5515E-1
4329.78	2.30959	2.3849E-1	1.0500E+0	1.8437E-1	4345.73	2.30111	2.1470E-1	1.0262E+0	1.6059E-1
4330.03	2.30946	2.3845E-1	1.0497E+0	1.8433E-1	4345.83	2.30106	2.2111E-1	1.0326E+0	1.6700E-1
4330.28	2.30932	2.3844E-1	1.0494E+0	1.8431E-1	4345.93	2.30101	2.2917E-1	1.0407E+0	1.7505E-1
4330.53	2.30919	2.3819E-1	1.0489E+0	1.8406E-1	4346.03	2.30095	2.3841E-1	1.0503E+0	1.8428E-1
4330.78	2.30906	2.3749E-1	1.0480E+0	1.8336E-1	4346.13	2.30090	2.4927E-1	1.0619E+0	1.9514E-1
4331.03	2.30892	2.3599E-1	1.0464E+0	1.8186E-1	4346.23	2.30085	2.6181E-1	1.0756E+0	2.0766E-1
4331.28	2.30879	2.3322E-1	1.0436E+0	1.7910E-1	4346.33	2.30079	2.7800E-1	1.0927E+0	2.2385E-1
4331.53	2.30866	2.2779E-1	1.0384E+0	1.7367E-1	4346.43	2.30074	3.0246E-1	1.1171E+0	2.4829E-1
4332.53	2.30812	2.0219E-1	1.0141E+0	1.4809E-1	4346.53	2.30069	3.3200E-1	1.1457E+0	2.7782E-1
4333.53	2.30759	1.9091E-1	1.0029E+0	1.3681E-1	4346.63	2.30063	3.6824E-1	1.1798E+0	3.1405E-1
4333.78	2.30746	1.8864E-1	1.0007E+0	1.3454E-1	4346.73	2.30058	4.0763E-1	1.2164E+0	3.5343E-1
4334.03	2.30732	1.8668E-1	9.9875E-1	1.3259E-1	4346.83	2.30053	4.4924E-1	1.2547E+0	3.9503E-1
4334.53	2.30706	1.8305E-1	9.9514E-1	1.2895E-1	4346.93	2.30048	4.8956E-1	1.2918E+0	4.3536E-1
4335.03	2.30679	1.7963E-1	9.9189E-1	1.2554E-1	4347.03	2.30042	5.2463E-1	1.3242E+0	4.7043E-1
4335.53	2.30653	1.7644E-1	9.8886E-1	1.2235E-1	4347.13	2.30037	5.4842E-1	1.3467E+0	4.9422E-1
4336.03	2.30626	1.7355E-1	9.8616E-1	1.1946E-1	4347.23	2.30032	5.6296E-1	1.3615E+0	5.0877E-1
4336.53	2.30599	1.7095E-1	9.8375E-1	1.1687E-1	4347.33	2.30026	5.6187E-1	1.3627E+0	5.0768E-1
4336.78	2.30586	1.6986E-1	9.8276E-1	1.1577E-1	4347.43	2.30021	5.4744E-1	1.3510E+0	4.9323E-1
4337.03	2.30573	1.6898E-1	9.8197E-1	1.1489E-1	4347.53	2.30016	5.2256E-1	1.3290E+0	4.6833E-1
4337.28	2.30559	1.6828E-1	9.8134E-1	1.1419E-1	4347.63	2.30011	4.9135E-1	1.2994E+0	4.3713E-1
4337.53	2.30546	1.6777E-1	9.8089E-1	1.1368E-1	4347.73	2.30005	4.5816E-1	1.2667E+0	4.0394E-1
4338.03	2.30520	1.6723E-1	9.8043E-1	1.1314E-1	4347.83	2.30000	4.2579E-1	1.2346E+0	3.7158E-1
4338.53	2.30493	1.6706E-1	9.8031E-1	1.1297E-1	4348.03	2.29989	3.6608E-1	1.1781E+0	3.1189E-1
4339.03	2.30466	1.6705E-1	9.8031E-1	1.1296E-1	4348.23	2.29979	3.1907E-1	1.1340E+0	2.6489E-1
4339.53	2.30440	1.6741E-1	9.8066E-1	1.1332E-1	4348.33	2.29973	3.0153E-1	1.1174E+0	2.4736E-1
4339.78	2.30427	1.6772E-1	9.8094E-1	1.1363E-1	4348.43	2.29968	2.8652E-1	1.1030E+0	2.3236E-1
4340.03	2.30413	1.6817E-1	9.8136E-1	1.1408E-1	4348.53	2.29963	2.7410E-1	1.0910E+0	2.1994E-1
4340.28	2.30400	1.6875E-1	9.8190E-1	1.1466E-1	4348.63	2.29958	2.6423E-1	1.0813E+0	2.1007E-1
4340.53	2.30387	1.6945E-1	9.8254E-1	1.1536E-1	4348.73	2.29952	2.5546E-1	1.0726E+0	2.0131E-1
4341.03	2.30360	1.7110E-1	9.8406E-1	1.1701E-1	4348.83	2.29947	2.4891E-1	1.0661E+0	1.9477E-1
4341.53	2.30334	1.7292E-1	9.8574E-1	1.1883E-1	4348.93	2.29942	2.4323E-1	1.0603E+0	1.8910E-1
4342.03	2.30307	1.7484E-1	9.8750E-1	1.2075E-1	4349.03	2.29936	2.3852E-1	1.0553E+0	1.8439E-1
4342.53	2.30281	1.7696E-1	9.8945E-1	1.2287E-1	4349.13	2.29931	2.3428E-1	1.0508E+0	1.8015E-1
4342.78	2.30267	1.7762E-1	9.9007E-1	1.2353E-1	4349.33	2.29921	2.2631E-1	1.0423E+0	1.7219E-1
4343.03	2.30254	1.7809E-1	9.9049E-1	1.2400E-1	4349.53	2.29910	2.1936E-1	1.0348E+0	1.6524E-1
4343.28	2.30241	1.7846E-1	9.9083E-1	1.2437E-1	4349.73	2.29899	2.1441E-1	1.0293E+0	1.6029E-1
4343.53	2.30228	1.7883E-1	9.9117E-1	1.2474E-1	4349.93	2.29889	2.1084E-1	1.0250E+0	1.5673E-1
4344.03	2.30201	1.7985E-1	9.9212E-1	1.2576E-1	4350.13	2.29878	2.0926E-1	1.0227E+0	1.5515E-1
4344.13	2.30196	1.8014E-1	9.9237E-1	1.2605E-1	4350.33	2.29868	2.0850E-1	1.0213E+0	1.5439E-1
4344.23	2.30191	1.8049E-1	9.9268E-1	1.2639E-1	4350.53	2.29857	2.0797E-1	1.0205E+0	1.5386E-1
4344.33	2.30185	1.8092E-1	9.9306E-1	1.2682E-1	4350.78	2.29844	2.0748E-1	1.0199E+0	1.5337E-1
4344.43	2.30180	1.8151E-1	9.9360E-1	1.2741E-1	4351.03	2.29831	2.0738E-1	1.0199E+0	1.5327E-1
4344.53	2.30175	1.8220E-1	9.9425E-1	1.2810E-1	4351.28	2.29818	2.0753E-1	1.0201E+0	1.5342E-1
4344.63	2.30169	1.8314E-1	9.9513E-1	1.2904E-1	4351.53	2.29804	2.0814E-1	1.0208E+0	1.5403E-1
4344.73	2.30164	1.8421E-1	9.9613E-1	1.3011E-1	4351.78	2.29791	2.0925E-1	1.0220E+0	1.5514E-1
4344.93	2.30153	1.8725E-1	9.9903E-1	1.3316E-1	4352.03	2.29778	2.1113E-1	1.0240E+0	1.5702E-1
4345.13	2.30143	1.9149E-1	1.0031E+0	1.3739E-1	4352.28	2.29765	2.1374E-1	1.0266E+0	1.5963E-1
4345.33	2.30132	1.9708E-1	1.0086E+0	1.4297E-1	4352.53	2.29752	2.1745E-1	1.0301E+0	1.6334E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4352.78	2.29738	2.2215E-1	1.0347E+0	1.6803E-1	4360.73	2.29319	1.2147E+0	2.0448E+0	1.1530E+0
4353.03	2.29725	2.2806E-1	1.0403E+0	1.7394E-1	4360.83	2.29314	1.2946E+0	2.1237E+0	1.2305E+0
4353.28	2.29712	2.3440E-1	1.0463E+0	1.8028E-1	4360.93	2.29309	1.3936E+0	2.2201E+0	1.3272E+0
4353.53	2.29699	2.4049E-1	1.0520E+0	1.8637E-1	4361.03	2.29304	1.5181E+0	2.3415E+0	1.4488E+0
4353.78	2.29686	2.4552E-1	1.0569E+0	1.9139E-1	4361.13	2.29298	1.6867E+0	2.5069E+0	1.6155E+0
4354.03	2.29672	2.4884E-1	1.0601E+0	1.9471E-1	4361.23	2.29293	1.8881E+0	2.7078E+0	1.8148E+0
4354.28	2.29659	2.5105E-1	1.0624E+0	1.9692E-1	4361.33	2.29288	2.1462E+0	2.9679E+0	2.0713E+0
4354.53	2.29646	2.5246E-1	1.0640E+0	1.9833E-1	4361.43	2.29283	2.4647E+0	3.2915E+0	2.3887E+0
4354.78	2.29633	2.5376E-1	1.0655E+0	1.9963E-1	4361.53	2.29277	2.8740E+0	3.7043E+0	2.7974E+0
4355.03	2.29620	2.5555E-1	1.0674E+0	2.0141E-1	4361.63	2.29272	3.3692E+0	4.1984E+0	3.2918E+0
4355.23	2.29609	2.5758E-1	1.0695E+0	2.0344E-1	4361.73	2.29267	3.9129E+0	4.7383E+0	3.8348E+0
4355.43	2.29599	2.6056E-1	1.0725E+0	2.0642E-1	4361.83	2.29262	4.5094E+0	5.3296E+0	4.4319E+0
4355.53	2.29593	2.6243E-1	1.0743E+0	2.0829E-1	4361.93	2.29256	5.1312E+0	5.9470E+0	5.0532E+0
4355.63	2.29588	2.6453E-1	1.0764E+0	2.1039E-1	4362.03	2.29251	5.7768E+0	6.5894E+0	5.6981E+0
4355.73	2.29583	2.6677E-1	1.0785E+0	2.1263E-1	4362.13	2.29246	6.4300E+0	7.2403E+0	6.3499E+0
4355.83	2.29577	2.6930E-1	1.0810E+0	2.1515E-1	4362.23	2.29241	7.0462E+0	7.8539E+0	6.9652E+0
4355.93	2.29572	2.7205E-1	1.0836E+0	2.1791E-1	4362.33	2.29235	7.6284E+0	8.4335E+0	7.5468E+0
4356.13	2.29562	2.7838E-1	1.0896E+0	2.2424E-1	4362.43	2.29230	8.0931E+0	8.8963E+0	8.0109E+0
4356.33	2.29551	2.8539E-1	1.0963E+0	2.3124E-1	4362.53	2.29225	8.4708E+0	9.2727E+0	8.3876E+0
4356.53	2.29541	2.9337E-1	1.1040E+0	2.3921E-1	4362.63	2.29220	8.7442E+0	9.5460E+0	8.6605E+0
4356.73	2.29530	3.0224E-1	1.1126E+0	2.4808E-1	4362.73	2.29214	8.9358E+0	9.7378E+0	8.8521E+0
4356.93	2.29519	3.1182E-1	1.1219E+0	2.5765E-1	4362.83	2.29209	9.0485E+0	9.8511E+0	8.9657E+0
4357.13	2.29509	3.2236E-1	1.1322E+0	2.6820E-1	4362.93	2.29204	9.1297E+0	9.9321E+0	9.0482E+0
4357.33	2.29498	3.3376E-1	1.1435E+0	2.7959E-1	4363.03	2.29199	9.1904E+0	9.9924E+0	9.1101E+0
4357.53	2.29488	3.4645E-1	1.1561E+0	2.9227E-1	4363.13	2.29193	9.2439E+0	1.0045E+1	9.1637E+0
4357.73	2.29477	3.6050E-1	1.1699E+0	3.0631E-1	4363.23	2.29188	9.3106E+0	1.0111E+1	9.2293E+0
4357.93	2.29467	3.7660E-1	1.1859E+0	3.2241E-1	4363.33	2.29183	9.3996E+0	1.0200E+1	9.3163E+0
4358.13	2.29456	3.9540E-1	1.2045E+0	3.4121E-1	4363.43	2.29178	9.4800E+0	1.0281E+1	9.3952E+0
4358.33	2.29446	4.1622E-1	1.2252E+0	3.6201E-1	4363.53	2.29172	9.5307E+0	1.0331E+1	9.4447E+0
4358.53	2.29435	4.4075E-1	1.2493E+0	3.8654E-1	4363.63	2.29167	9.5280E+0	1.0328E+1	9.4414E+0
4358.73	2.29425	4.6851E-1	1.2766E+0	4.1429E-1	4363.73	2.29162	9.4662E+0	1.0266E+1	9.3795E+0
4358.83	2.29419	4.8440E-1	1.2924E+0	4.3017E-1	4363.83	2.29157	9.3421E+0	1.0143E+1	9.2562E+0
4358.93	2.29414	5.0145E-1	1.3096E+0	4.4723E-1	4363.93	2.29151	9.1446E+0	9.9463E+0	9.0607E+0
4359.03	2.29409	5.2046E-1	1.3292E+0	4.6622E-1	4364.03	2.29146	8.8803E+0	9.6836E+0	8.7992E+0
4359.13	2.29404	5.4111E-1	1.3508E+0	4.8686E-1	4364.13	2.29141	8.5822E+0	9.3876E+0	8.5039E+0
4359.23	2.29398	5.6329E-1	1.3745E+0	5.0901E-1	4364.23	2.29136	8.2542E+0	9.0619E+0	8.1788E+0
4359.33	2.29393	5.8769E-1	1.4005E+0	5.3338E-1	4364.33	2.29130	7.9002E+0	8.7104E+0	7.8279E+0
4359.43	2.29388	6.1419E-1	1.4288E+0	5.5983E-1	4364.43	2.29125	7.5123E+0	8.3242E+0	7.4426E+0
4359.53	2.29383	6.4220E-1	1.4586E+0	5.8779E-1	4364.53	2.29120	7.1248E+0	7.9375E+0	7.0571E+0
4359.63	2.29377	6.7236E-1	1.4905E+0	6.1787E-1	4364.63	2.29115	6.7800E+0	7.5934E+0	6.7139E+0
4359.73	2.29372	7.0396E-1	1.5240E+0	6.4937E-1	4364.73	2.29109	6.4850E+0	7.2988E+0	6.4201E+0
4359.83	2.29367	7.3823E-1	1.5614E+0	6.8347E-1	4364.83	2.29104	6.2527E+0	7.0671E+0	6.1886E+0
4359.93	2.29362	7.7592E-1	1.6016E+0	7.2096E-1	4364.93	2.29099	6.0579E+0	6.8733E+0	5.9946E+0
4360.03	2.29356	8.1675E-1	1.6442E+0	7.6160E-1	4365.03	2.29094	5.9265E+0	6.7421E+0	5.8640E+0
4360.13	2.29351	8.6025E-1	1.6891E+0	8.0487E-1	4365.13	2.29088	5.8415E+0	6.6571E+0	5.7798E+0
4360.23	2.29346	9.0869E-1	1.7394E+0	8.5300E-1	4365.23	2.29083	5.7961E+0	6.6118E+0	5.7351E+0
4360.33	2.29341	9.6032E-1	1.7920E+0	9.0413E-1	4365.33	2.29078	5.7770E+0	6.5928E+0	5.7169E+0
4360.43	2.29335	1.0173E+0	1.8491E+0	9.5988E-1	4365.53	2.29067	5.7050E+0	6.5202E+0	5.6452E+0
4360.53	2.29330	1.0777E+0	1.9092E+0	1.0192E+0	4365.73	2.29057	5.5768E+0	6.3908E+0	5.5173E+0
4360.63	2.29325	1.1426E+0	1.9735E+0	1.0827E+0	4365.93	2.29046	5.4058E+0	6.2194E+0	5.3466E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4366.13	2.29036	5.1998E+0	6.0143E+0	5.1408E+0	4380.53	2.28283	1.4699E+0	2.2869E+0	1.4147E+0
4366.33	2.29025	4.9926E+0	5.8083E+0	4.9339E+0	4381.03	2.28257	1.3642E+0	2.1815E+0	1.3090E+0
4366.53	2.29015	4.8016E+0	5.6182E+0	4.7431E+0	4381.53	2.28231	1.2619E+0	2.0797E+0	1.2068E+0
4366.78	2.29002	4.5836E+0	5.4008E+0	4.5253E+0	4382.03	2.28205	1.1638E+0	1.9816E+0	1.1087E+0
4367.03	2.28989	4.3891E+0	5.2066E+0	4.3310E+0	4382.28	2.28192	1.1165E+0	1.9346E+0	1.0615E+0
4367.28	2.28975	4.2150E+0	5.0325E+0	4.1571E+0	4382.53	2.28179	1.0718E+0	1.8897E+0	1.0168E+0
4367.53	2.28962	4.0592E+0	4.8769E+0	4.0016E+0	4382.78	2.28166	1.0315E+0	1.8487E+0	9.7667E-1
4367.78	2.28949	3.9207E+0	4.7388E+0	3.8632E+0	4383.03	2.28153	9.9369E-1	1.8092E+0	9.3903E-1
4368.03	2.28936	3.8054E+0	4.6241E+0	3.7480E+0	4383.28	2.28140	9.5858E-1	1.7726E+0	9.0403E-1
4368.28	2.28923	3.7115E+0	4.5307E+0	3.6542E+0	4383.53	2.28127	9.2642E-1	1.7385E+0	8.7200E-1
4368.53	2.28910	3.6387E+0	4.4584E+0	3.5814E+0	4383.78	2.28114	8.9694E-1	1.7070E+0	8.4262E-1
4368.78	2.28897	3.5798E+0	4.3998E+0	3.5226E+0	4384.03	2.28101	8.7058E-1	1.6793E+0	8.1632E-1
4369.03	2.28884	3.5362E+0	4.3562E+0	3.4791E+0	4384.28	2.28088	8.4668E-1	1.6546E+0	7.9244E-1
4369.28	2.28871	3.5084E+0	4.3281E+0	3.4514E+0	4384.53	2.28075	8.2514E-1	1.6326E+0	7.7091E-1
4369.53	2.28858	3.4906E+0	4.3098E+0	3.4336E+0	4384.78	2.28062	8.0556E-1	1.6132E+0	7.5132E-1
4369.78	2.28844	3.4838E+0	4.3025E+0	3.4268E+0	4385.03	2.28049	7.8820E-1	1.5962E+0	7.3395E-1
4370.03	2.28831	3.4861E+0	4.3045E+0	3.4292E+0	4385.28	2.28036	7.7370E-1	1.5822E+0	7.1944E-1
4370.28	2.28818	3.4955E+0	4.3138E+0	3.4386E+0	4385.53	2.28023	7.6235E-1	1.5707E+0	7.0808E-1
4370.53	2.28805	3.5100E+0	4.3283E+0	3.4530E+0	4386.03	2.27997	7.4175E-1	1.5495E+0	6.8750E-1
4370.78	2.28792	3.5267E+0	4.3453E+0	3.4697E+0	4386.53	2.27971	7.2391E-1	1.5310E+0	6.6967E-1
4371.03	2.28779	3.5446E+0	4.3634E+0	3.4875E+0	4387.03	2.27945	7.0843E-1	1.5149E+0	6.5420E-1
4371.28	2.28766	3.5625E+0	4.3819E+0	3.5054E+0	4387.53	2.27919	6.9541E-1	1.5013E+0	6.4119E-1
4371.53	2.28753	3.5785E+0	4.3981E+0	3.5214E+0	4388.03	2.27893	6.8390E-1	1.4894E+0	6.2969E-1
4371.78	2.28740	3.5920E+0	4.4116E+0	3.5349E+0	4388.53	2.27867	6.7347E-1	1.4788E+0	6.1925E-1
4372.03	2.28727	3.6033E+0	4.4227E+0	3.5461E+0	4389.53	2.27815	6.5352E-1	1.4591E+0	5.9930E-1
4372.28	2.28714	3.6125E+0	4.4316E+0	3.5553E+0	4390.53	2.27763	6.3431E-1	1.4406E+0	5.8008E-1
4372.53	2.28701	3.6162E+0	4.4348E+0	3.5590E+0	4391.53	2.27711	6.1632E-1	1.4231E+0	5.6208E-1
4372.78	2.28687	3.6118E+0	4.4299E+0	3.5547E+0	4391.78	2.27698	6.1227E-1	1.4191E+0	5.5803E-1
4373.03	2.28674	3.6018E+0	4.4196E+0	3.5447E+0	4392.03	2.27685	6.0884E-1	1.4156E+0	5.5460E-1
4373.28	2.28661	3.5855E+0	4.4030E+0	3.5285E+0	4392.28	2.27672	6.0603E-1	1.4126E+0	5.5179E-1
4373.53	2.28648	3.5592E+0	4.3765E+0	3.5022E+0	4392.53	2.27659	6.0394E-1	1.4103E+0	5.4970E-1
4373.78	2.28635	3.5222E+0	4.3397E+0	3.4653E+0	4393.03	2.27633	6.0039E-1	1.4061E+0	5.4617E-1
4374.03	2.28622	3.4741E+0	4.2917E+0	3.4172E+0	4393.53	2.27607	5.9739E-1	1.4023E+0	5.4317E-1
4374.28	2.28609	3.4149E+0	4.2327E+0	3.3580E+0	4394.03	2.27581	5.9484E-1	1.3993E+0	5.4062E-1
4374.53	2.28596	3.3409E+0	4.1588E+0	3.2841E+0	4394.53	2.27555	5.9274E-1	1.3970E+0	5.3853E-1
4374.78	2.28583	3.2590E+0	4.0769E+0	3.2023E+0	4395.03	2.27530	5.9108E-1	1.3953E+0	5.3686E-1
4375.03	2.28570	3.1690E+0	3.9866E+0	3.1124E+0	4395.53	2.27504	5.9056E-1	1.3946E+0	5.3635E-1
4375.28	2.28557	3.0734E+0	3.8904E+0	3.0170E+0	4395.78	2.27491	5.9106E-1	1.3949E+0	5.3685E-1
4375.53	2.28544	2.9737E+0	3.7901E+0	2.9174E+0	4396.03	2.27478	5.9287E-1	1.3963E+0	5.3866E-1
4376.03	2.28518	2.7729E+0	3.5890E+0	2.7169E+0	4396.28	2.27465	5.9534E-1	1.3983E+0	5.4114E-1
4376.53	2.28491	2.5811E+0	3.3976E+0	2.5252E+0	4396.53	2.27452	5.9832E-1	1.4008E+0	5.4412E-1
4377.03	2.28465	2.4013E+0	3.2180E+0	2.3455E+0	4397.03	2.27426	6.0480E-1	1.4064E+0	5.5061E-1
4377.53	2.28439	2.2347E+0	3.0514E+0	2.1791E+0	4397.53	2.27400	6.1194E-1	1.4129E+0	5.5776E-1
4378.03	2.28413	2.0812E+0	2.8979E+0	2.0257E+0	4398.03	2.27374	6.1944E-1	1.4202E+0	5.6525E-1
4378.53	2.28387	1.9399E+0	2.7566E+0	1.8845E+0	4398.53	2.27349	6.2716E-1	1.4279E+0	5.7298E-1
4378.78	2.28374	1.8749E+0	2.6918E+0	1.8196E+0	4399.53	2.27297	6.4340E-1	1.4444E+0	5.8923E-1
4379.03	2.28361	1.8133E+0	2.6301E+0	1.7580E+0	4400.53	2.27245	6.6036E-1	1.4619E+0	6.0619E-1
4379.28	2.28348	1.7527E+0	2.5695E+0	1.6974E+0	4400.78	2.27232	6.6499E-1	1.4666E+0	6.1082E-1
4379.53	2.28335	1.6938E+0	2.5106E+0	1.6385E+0	4401.03	2.27219	6.6998E-1	1.4716E+0	6.1581E-1
4380.03	2.28309	1.5800E+0	2.3969E+0	1.5247E+0	4401.28	2.27206	6.7552E-1	1.4770E+0	6.2135E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4401.53	2.27194	6.8161E-1	1.4830E+0	6.2745E-1	4415.29	2.26486	9.2145E-1	1.7297E+0	8.6722E-1
4402.53	2.27142	7.0824E-1	1.5087E+0	6.5411E-1	4415.54	2.26473	9.1469E-1	1.7231E+0	8.6045E-1
4403.53	2.27090	7.3653E-1	1.5359E+0	6.8243E-1	4415.79	2.26460	9.0593E-1	1.7150E+0	8.5167E-1
4404.03	2.27065	7.5153E-1	1.5503E+0	6.9746E-1	4416.04	2.26447	8.9564E-1	1.7057E+0	8.4132E-1
4404.53	2.27039	7.6737E-1	1.5657E+0	7.1332E-1	4416.54	2.26422	8.7490E-1	1.6870E+0	8.2049E-1
4405.03	2.27013	7.8441E-1	1.5827E+0	7.3038E-1	4417.04	2.26396	8.5882E-1	1.6719E+0	8.0438E-1
4405.53	2.26987	8.0256E-1	1.6014E+0	7.4854E-1	4417.29	2.26383	8.5281E-1	1.6659E+0	7.9836E-1
4406.03	2.26961	8.2149E-1	1.6209E+0	7.6748E-1	4417.54	2.26371	8.4788E-1	1.6607E+0	7.9345E-1
4406.53	2.26936	8.4108E-1	1.6414E+0	7.8708E-1	4417.79	2.26358	8.4370E-1	1.6561E+0	7.8929E-1
4407.53	2.26884	8.8225E-1	1.6847E+0	8.2823E-1	4418.04	2.26345	8.4020E-1	1.6520E+0	7.8582E-1
4408.53	2.26833	9.2560E-1	1.7305E+0	8.7153E-1	4418.29	2.26332	8.3697E-1	1.6481E+0	7.8261E-1
4408.78	2.26820	9.3630E-1	1.7417E+0	8.8221E-1	4418.54	2.26319	8.3283E-1	1.6435E+0	7.7849E-1
4409.03	2.26807	9.4664E-1	1.7521E+0	8.9256E-1	4418.79	2.26307	8.2788E-1	1.6383E+0	7.7354E-1
4409.28	2.26794	9.5638E-1	1.7619E+0	9.0231E-1	4419.04	2.26294	8.2106E-1	1.6316E+0	7.6673E-1
4409.53	2.26781	9.6563E-1	1.7712E+0	9.1156E-1	4419.29	2.26281	8.1283E-1	1.6236E+0	7.5849E-1
4409.78	2.26768	9.7431E-1	1.7801E+0	9.2024E-1	4419.54	2.26268	8.0593E-1	1.6165E+0	7.5160E-1
4410.03	2.26756	9.8248E-1	1.7886E+0	9.2840E-1	4419.79	2.26255	8.0014E-1	1.6102E+0	7.4583E-1
4410.16	2.26749	9.8639E-1	1.7928E+0	9.3230E-1	4420.04	2.26242	7.9575E-1	1.6048E+0	7.4147E-1
4410.28	2.26743	9.8983E-1	1.7965E+0	9.3572E-1	4420.54	2.26217	7.8749E-1	1.5945E+0	7.3326E-1
4410.41	2.26736	9.9304E-1	1.8001E+0	9.3892E-1	4420.79	2.26204	7.8308E-1	1.5891E+0	7.2888E-1
4410.53	2.26730	9.9570E-1	1.8032E+0	9.4155E-1	4421.04	2.26191	7.7801E-1	1.5833E+0	7.2382E-1
4410.78	2.26717	1.0004E+0	1.8088E+0	9.4618E-1	4421.29	2.26179	7.7180E-1	1.5766E+0	7.1763E-1
4411.04	2.26704	1.0041E+0	1.8134E+0	9.4982E-1	4421.54	2.26166	7.6422E-1	1.5688E+0	7.1004E-1
4411.16	2.26698	1.0052E+0	1.8148E+0	9.5097E-1	4422.04	2.26140	7.4708E-1	1.5517E+0	6.9290E-1
4411.28	2.26691	1.0056E+0	1.8154E+0	9.5136E-1	4422.54	2.26115	7.2817E-1	1.5333E+0	6.7397E-1
4411.41	2.26685	1.0055E+0	1.8154E+0	9.5120E-1	4422.79	2.26102	7.1787E-1	1.5234E+0	6.6366E-1
4411.54	2.26678	1.0044E+0	1.8145E+0	9.5012E-1	4423.04	2.26089	7.0620E-1	1.5126E+0	6.5197E-1
4411.66	2.26672	1.0027E+0	1.8128E+0	9.4841E-1	4423.29	2.26076	6.9288E-1	1.5005E+0	6.3862E-1
4411.79	2.26666	1.0001E+0	1.8101E+0	9.4576E-1	4423.54	2.26063	6.8078E-1	1.4894E+0	6.2651E-1
4411.91	2.26659	9.9663E-1	1.8068E+0	9.4232E-1	4424.04	2.26038	6.5889E-1	1.4689E+0	6.0459E-1
4412.04	2.26653	9.9228E-1	1.8027E+0	9.3795E-1	4424.54	2.26012	6.3881E-1	1.4499E+0	5.8450E-1
4412.16	2.26646	9.8731E-1	1.7982E+0	9.3296E-1	4425.04	2.25987	6.1996E-1	1.4319E+0	5.6564E-1
4412.29	2.26640	9.8144E-1	1.7930E+0	9.2704E-1	4425.54	2.25961	6.0239E-1	1.4151E+0	5.4807E-1
4412.54	2.26627	9.6722E-1	1.7806E+0	9.1271E-1	4426.04	2.25936	5.8551E-1	1.3989E+0	5.3118E-1
4412.79	2.26614	9.5098E-1	1.7667E+0	8.9633E-1	4426.54	2.25910	5.6975E-1	1.3835E+0	5.1543E-1
4413.04	2.26601	9.3656E-1	1.7542E+0	8.8181E-1	4427.54	2.25859	5.3963E-1	1.3538E+0	4.8532E-1
4413.16	2.26595	9.3112E-1	1.7493E+0	8.7633E-1	4428.54	2.25808	5.1131E-1	1.3255E+0	4.5702E-1
4413.29	2.26589	9.2721E-1	1.7456E+0	8.7241E-1	4429.04	2.25783	4.9776E-1	1.3120E+0	4.4347E-1
4413.41	2.26582	9.2437E-1	1.7427E+0	8.6959E-1	4429.54	2.25757	4.8508E-1	1.2993E+0	4.3080E-1
4413.54	2.26576	9.2240E-1	1.7404E+0	8.6763E-1	4430.54	2.25706	4.6092E-1	1.2748E+0	4.0666E-1
4413.66	2.26569	9.2084E-1	1.7385E+0	8.6610E-1	4431.54	2.25655	4.3732E-1	1.2508E+0	3.8308E-1
4413.79	2.26563	9.1986E-1	1.7371E+0	8.6515E-1	4432.54	2.25604	4.1422E-1	1.2273E+0	3.6000E-1
4414.04	2.26550	9.1940E-1	1.7353E+0	8.6477E-1	4433.54	2.25554	3.9068E-1	1.2039E+0	3.3647E-1
4414.29	2.26537	9.2097E-1	1.7350E+0	8.6644E-1	4434.54	2.25503	3.6677E-1	1.1802E+0	3.1257E-1
4414.54	2.26524	9.2399E-1	1.7359E+0	8.6958E-1	4435.04	2.25477	3.5469E-1	1.1679E+0	3.0050E-1
4414.66	2.26518	9.2535E-1	1.7363E+0	8.7100E-1	4435.54	2.25452	3.4230E-1	1.1555E+0	2.8811E-1
4414.79	2.26512	9.2630E-1	1.7363E+0	8.7199E-1	4436.54	2.25401	3.1727E-1	1.1299E+0	2.6310E-1
4414.91	2.26505	9.2640E-1	1.7356E+0	8.7213E-1	4438.54	2.25299	2.6812E-1	1.0789E+0	2.1398E-1
4415.04	2.26499	9.2560E-1	1.7343E+0	8.7136E-1	4440.54	2.25198	2.1997E-1	1.0312E+0	1.6586E-1
4415.16	2.26492	9.2398E-1	1.7324E+0	8.6975E-1	4440.79	2.25185	2.1477E-1	1.0262E+0	1.6066E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4441.04	2.25173	2.1039E-1	1.0220E+0	1.5628E-1	4478.04	2.23312	1.6801E-1	9.8011E-1	1.1394E-1
4441.29	2.25160	2.0686E-1	1.0185E+0	1.5275E-1	4478.54	2.23287	1.6623E-1	9.7830E-1	1.1216E-1
4441.54	2.25147	2.0369E-1	1.0154E+0	1.4958E-1	4479.04	2.23262	1.6437E-1	9.7641E-1	1.1030E-1
4442.04	2.25122	1.9754E-1	1.0093E+0	1.4344E-1	4479.54	2.23237	1.6245E-1	9.7448E-1	1.0838E-1
4442.54	2.25097	1.9153E-1	1.0034E+0	1.3743E-1	4479.79	2.23225	1.6140E-1	9.7342E-1	1.0733E-1
4443.54	2.25046	1.7986E-1	9.9192E-1	1.2577E-1	4480.04	2.23212	1.6020E-1	9.7223E-1	1.0614E-1
4444.54	2.24995	1.6848E-1	9.8071E-1	1.1440E-1	4480.54	2.23187	1.5765E-1	9.6972E-1	1.0359E-1
4444.79	2.24983	1.6600E-1	9.7824E-1	1.1192E-1	4481.54	2.23137	1.5220E-1	9.6436E-1	9.8141E-2
4445.04	2.24970	1.6386E-1	9.7610E-1	1.0977E-1	4482.54	2.23088	1.4638E-1	9.5867E-1	9.2337E-2
4445.29	2.24957	1.6211E-1	9.7432E-1	1.0802E-1	4483.54	2.23038	1.4032E-1	9.5274E-1	8.6280E-2
4445.54	2.24945	1.6065E-1	9.7284E-1	1.0657E-1	4484.54	2.22988	1.3402E-1	9.4660E-1	7.9996E-2
4445.79	2.24932	1.5943E-1	9.7159E-1	1.0535E-1	4485.54	2.22938	1.2789E-1	9.4062E-1	7.3870E-2
4446.04	2.24919	1.5848E-1	9.7062E-1	1.0440E-1	4486.04	2.22914	1.2500E-1	9.3780E-1	7.0985E-2
4446.29	2.24907	1.5774E-1	9.6987E-1	1.0366E-1	4486.54	2.22889	1.2228E-1	9.3513E-1	6.8272E-2
4446.54	2.24894	1.5731E-1	9.6943E-1	1.0323E-1	4487.54	2.22839	1.1714E-1	9.3009E-1	6.3148E-2
4446.79	2.24881	1.5706E-1	9.6917E-1	1.0298E-1	4488.54	2.22789	1.1243E-1	9.2544E-1	5.8450E-2
4447.04	2.24869	1.5708E-1	9.6917E-1	1.0300E-1	4489.04	2.22765	1.1023E-1	9.2326E-1	5.6261E-2
4447.29	2.24856	1.5737E-1	9.6943E-1	1.0329E-1	4489.54	2.22740	1.0828E-1	9.2132E-1	5.4316E-2
4447.54	2.24843	1.5790E-1	9.6991E-1	1.0382E-1	4490.04	2.22715	1.0646E-1	9.1951E-1	5.2509E-2
4448.04	2.24818	1.5911E-1	9.7103E-1	1.0503E-1	4490.54	2.22690	1.0480E-1	9.1783E-1	5.0847E-2
4448.54	2.24793	1.6038E-1	9.7221E-1	1.0629E-1	4491.54	2.22641	1.0166E-1	9.1467E-1	4.7725E-2
4449.54	2.24742	1.6290E-1	9.7457E-1	1.0882E-1	4492.04	2.22616	1.0020E-1	9.1319E-1	4.6275E-2
4450.54	2.24692	1.6522E-1	9.7675E-1	1.1113E-1	4492.54	2.22591	9.8839E-2	9.1182E-1	4.4923E-2
4451.54	2.24641	1.6739E-1	9.7882E-1	1.1331E-1	4493.04	2.22566	9.7609E-2	9.1057E-1	4.3701E-2
4452.54	2.24591	1.6931E-1	9.8066E-1	1.1522E-1	4493.54	2.22541	9.6422E-2	9.0937E-1	4.2523E-2
4453.54	2.24540	1.7100E-1	9.8232E-1	1.1691E-1	4494.05	2.22517	9.5271E-2	9.0821E-1	4.1382E-2
4454.04	2.24515	1.7186E-1	9.8316E-1	1.1777E-1	4494.55	2.22492	9.4181E-2	9.0710E-1	4.0301E-2
4454.54	2.24490	1.7274E-1	9.8403E-1	1.1865E-1	4495.55	2.22442	9.2061E-2	9.0496E-1	3.8201E-2
4456.54	2.24389	1.7634E-1	9.8764E-1	1.2224E-1	4496.55	2.22393	9.0000E-2	9.0294E-1	3.6163E-2
4458.54	2.24289	1.7983E-1	9.9127E-1	1.2573E-1	4497.05	2.22368	8.9028E-2	9.0201E-1	3.5203E-2
4460.54	2.24188	1.8321E-1	9.9495E-1	1.2911E-1	4497.55	2.22343	8.8126E-2	9.0115E-1	3.4314E-2
4461.54	2.24138	1.8485E-1	9.9682E-1	1.3075E-1	4498.05	2.22319	8.7413E-2	9.0046E-1	3.3612E-2
4462.54	2.24088	1.8638E-1	9.9862E-1	1.3228E-1	4498.55	2.22294	8.6843E-2	8.9992E-1	3.3052E-2
4463.54	2.24037	1.8765E-1	1.0003E+0	1.3355E-1	4499.05	2.22269	8.6377E-2	8.9949E-1	3.2595E-2
4464.54	2.23987	1.8853E-1	1.0016E+0	1.3444E-1	4499.55	2.22245	8.6035E-2	8.9917E-1	3.2261E-2
4465.54	2.23937	1.8920E-1	1.0028E+0	1.3510E-1	4500.55	2.22195	8.5485E-2	8.9867E-1	3.1727E-2
4466.04	2.23912	1.8938E-1	1.0033E+0	1.3529E-1	4501.30	2.22158	8.5142E-2	8.9838E-1	3.1393E-2
4466.54	2.23887	1.8926E-1	1.0035E+0	1.3517E-1	4501.55	2.22146	8.5079E-2	8.9834E-1	3.1333E-2
4468.54	2.23787	1.8813E-1	1.0031E+0	1.3403E-1	4501.80	2.22134	8.5076E-2	8.9839E-1	3.1332E-2
4469.54	2.23737	1.8730E-1	1.0024E+0	1.3320E-1	4502.05	2.22121	8.5356E-2	8.9870E-1	3.1611E-2
4470.54	2.23687	1.8631E-1	1.0011E+0	1.3222E-1	4502.35	2.22106	8.5981E-2	8.9934E-1	3.2230E-2
4471.79	2.23624	1.8474E-1	9.9869E-1	1.3064E-1	4502.55	2.22097	8.6574E-2	8.9993E-1	3.2817E-2
4472.54	2.23586	1.8351E-1	9.9693E-1	1.2942E-1	4502.75	2.22087	8.7246E-2	9.0062E-1	3.3483E-2
4473.54	2.23536	1.8142E-1	9.9428E-1	1.2733E-1	4502.95	2.22077	8.8000E-2	9.0142E-1	3.4229E-2
4474.54	2.23487	1.7897E-1	9.9152E-1	1.2489E-1	4503.15	2.22067	8.8867E-2	9.0235E-1	3.5088E-2
4475.04	2.23462	1.7762E-1	9.9009E-1	1.2354E-1	4503.35	2.22057	8.9879E-2	9.0343E-1	3.6090E-2
4475.54	2.23437	1.7616E-1	9.8855E-1	1.2208E-1	4503.55	2.22047	9.1134E-2	9.0476E-1	3.7334E-2
4476.04	2.23412	1.7461E-1	9.8693E-1	1.2053E-1	4503.75	2.22037	9.2656E-2	9.0638E-1	3.8843E-2
4476.54	2.23387	1.7303E-1	9.8529E-1	1.1895E-1	4503.85	2.22032	9.3561E-2	9.0734E-1	3.9740E-2
4477.54	2.23337	1.6972E-1	9.8188E-1	1.1565E-1	4503.95	2.22028	9.4560E-2	9.0839E-1	4.0732E-2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4504.05	2.22023	9.5670E-2	9.0955E-1	4.1833E-2	4512.05	2.21629	7.1015E-2	8.8476E-1	1.7649E-2
4504.15	2.22018	9.6850E-2	9.1080E-1	4.3004E-2	4512.30	2.21617	7.0245E-2	8.8394E-1	1.6917E-2
4504.35	2.22008	9.9556E-2	9.1367E-1	4.5692E-2	4512.55	2.21604	6.9632E-2	8.8328E-1	1.6337E-2
4504.45	2.22003	1.0107E-1	9.1530E-1	4.7201E-2	4512.80	2.21592	6.9196E-2	8.8281E-1	1.5925E-2
4504.55	2.21998	1.0272E-1	9.1713E-1	4.8842E-2	4513.05	2.21580	6.8936E-2	8.8252E-1	1.5680E-2
4504.65	2.21993	1.0446E-1	9.1905E-1	5.0567E-2	4513.55	2.21555	6.8573E-2	8.8209E-1	1.5341E-2
4504.75	2.21988	1.0634E-1	9.2111E-1	5.2434E-2	4514.05	2.21531	6.8357E-2	8.8180E-1	1.5140E-2
4504.95	2.21978	1.1047E-1	9.2561E-1	5.6546E-2	4514.55	2.21506	6.8185E-2	8.8155E-1	1.4981E-2
4505.15	2.21968	1.1540E-1	9.3089E-1	6.1462E-2	4516.55	2.21408	6.7585E-2	8.8080E-1	1.4441E-2
4505.35	2.21959	1.2253E-1	9.3820E-1	6.8563E-2	4518.55	2.21310	6.7032E-2	8.8015E-1	1.3961E-2
4505.55	2.21949	1.3350E-1	9.4905E-1	7.9510E-2	4520.55	2.21212	6.6506E-2	8.7954E-1	1.3513E-2
4505.75	2.21939	1.5072E-1	9.6574E-1	9.6698E-2	4522.55	2.21114	6.6001E-2	8.7899E-1	1.3092E-2
4505.95	2.21929	1.7186E-1	9.8598E-1	1.1781E-1	4524.55	2.21017	6.5526E-2	8.7857E-1	1.2708E-2
4506.05	2.21924	1.8264E-1	9.9626E-1	1.2857E-1	4525.55	2.20968	6.5301E-2	8.7837E-1	1.2525E-2
4506.15	2.21919	1.9284E-1	1.0060E+0	1.3876E-1	4526.55	2.20919	6.5089E-2	8.7819E-1	1.2344E-2
4506.25	2.21914	2.0130E-1	1.0140E+0	1.4721E-1	4527.05	2.20894	6.5045E-2	8.7815E-1	1.2308E-2
4506.35	2.21909	2.0736E-1	1.0198E+0	1.5327E-1	4527.55	2.20870	6.5089E-2	8.7820E-1	1.2351E-2
4506.45	2.21904	2.1082E-1	1.0232E+0	1.5673E-1	4528.05	2.20846	6.5263E-2	8.7838E-1	1.2507E-2
4506.55	2.21899	2.1120E-1	1.0237E+0	1.5711E-1	4528.55	2.20821	6.5570E-2	8.7868E-1	1.2782E-2
4506.65	2.21894	2.0972E-1	1.0224E+0	1.5563E-1	4529.55	2.20773	6.6360E-2	8.7948E-1	1.3494E-2
4506.75	2.21890	2.0496E-1	1.0181E+0	1.5088E-1	4530.55	2.20724	6.7302E-2	8.8044E-1	1.4354E-2
4506.85	2.21885	1.9958E-1	1.0131E+0	1.4550E-1	4532.55	2.20626	6.9339E-2	8.8257E-1	1.6242E-2
4506.95	2.21880	1.9201E-1	1.0059E+0	1.3793E-1	4533.55	2.20578	7.0422E-2	8.8373E-1	1.7260E-2
4507.05	2.21875	1.8402E-1	9.9827E-1	1.2995E-1	4534.05	2.20553	7.1193E-2	8.8455E-1	1.7988E-2
4507.15	2.21870	1.7542E-1	9.8985E-1	1.2136E-1	4534.55	2.20529	7.2346E-2	8.8574E-1	1.9082E-2
4507.25	2.21865	1.6670E-1	9.8107E-1	1.1265E-1	4535.05	2.20505	7.3771E-2	8.8718E-1	2.0442E-2
4507.35	2.21860	1.5835E-1	9.7270E-1	1.0431E-1	4535.55	2.20480	7.5512E-2	8.8892E-1	2.2115E-2
4507.55	2.21850	1.4283E-1	9.5722E-1	8.8821E-2	4536.55	2.20432	7.9411E-2	8.9280E-1	2.5894E-2
4507.65	2.21845	1.3601E-1	9.5037E-1	8.2006E-2	4537.55	2.20383	8.3576E-2	8.9693E-1	2.9965E-2
4507.75	2.21840	1.3096E-1	9.4525E-1	7.6971E-2	4538.55	2.20335	8.7598E-2	9.0092E-1	3.3919E-2
4507.95	2.21830	1.2270E-1	9.3706E-1	6.8735E-2	4539.55	2.20286	9.1447E-2	9.0475E-1	3.7716E-2
4508.15	2.21821	1.1680E-1	9.3118E-1	6.2857E-2	4540.55	2.20238	9.5205E-2	9.0848E-1	4.1433E-2
4508.25	2.21816	1.1432E-1	9.2873E-1	6.0382E-2	4541.05	2.20213	9.7135E-2	9.1040E-1	4.3345E-2
4508.35	2.21811	1.1206E-1	9.2649E-1	5.8130E-2	4541.55	2.20189	9.9149E-2	9.1243E-1	4.5342E-2
4508.45	2.21806	1.0989E-1	9.2433E-1	5.5968E-2	4542.05	2.20165	1.0128E-1	9.1460E-1	4.7458E-2
4508.55	2.21801	1.0782E-1	9.2227E-1	5.3904E-2	4542.55	2.20141	1.0356E-1	9.1691E-1	4.9720E-2
4508.65	2.21796	1.0580E-1	9.2026E-1	5.1895E-2	4543.05	2.20116	1.0602E-1	9.1939E-1	5.2162E-2
4508.75	2.21791	1.0387E-1	9.1834E-1	4.9976E-2	4543.55	2.20092	1.0853E-1	9.2193E-1	5.4657E-2
4508.95	2.21781	1.0022E-1	9.1469E-1	4.6345E-2	4543.80	2.20080	1.0992E-1	9.2334E-1	5.6045E-2
4509.15	2.21771	9.6814E-2	9.1127E-1	4.2967E-2	4544.05	2.20068	1.1154E-1	9.2497E-1	5.7657E-2
4509.35	2.21762	9.3631E-2	9.0806E-1	3.9810E-2	4544.30	2.20056	1.1334E-1	9.2675E-1	5.9444E-2
4509.55	2.21752	9.0689E-2	9.0508E-1	3.6895E-2	4544.55	2.20044	1.1526E-1	9.2866E-1	6.1357E-2
4509.80	2.21739	8.7285E-2	9.0164E-1	3.3529E-2	4545.05	2.20020	1.1919E-1	9.3254E-1	6.5266E-2
4510.05	2.21727	8.4277E-2	8.9857E-1	3.0562E-2	4545.55	2.19995	1.2319E-1	9.3652E-1	6.9255E-2
4510.55	2.21703	7.9484E-2	8.9359E-1	2.5854E-2	4546.55	2.19947	1.3132E-1	9.4469E-1	7.7355E-2
4510.80	2.21690	7.7651E-2	8.9169E-1	2.4063E-2	4547.55	2.19899	1.3961E-1	9.5304E-1	8.5627E-2
4511.05	2.21678	7.6007E-2	8.8998E-1	2.2461E-2	4547.80	2.19886	1.4176E-1	9.5524E-1	8.7769E-2
4511.30	2.21666	7.4498E-2	8.8840E-1	2.0998E-2	4548.05	2.19874	1.4414E-1	9.5767E-1	9.0151E-2
4511.55	2.21653	7.3179E-2	8.8700E-1	1.9724E-2	4548.30	2.19862	1.4668E-1	9.6023E-1	9.2681E-2
4511.80	2.21641	7.2023E-2	8.8581E-1	1.8613E-2	4548.55	2.19850	1.4950E-1	9.6306E-1	9.5495E-2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4549.05	2.19826	1.5551E-1	9.6907E-1	1.0150E-1	4567.85	2.18921	6.5322E-1	1.4702E+0	5.9878E-1
4549.55	2.19802	1.6201E-1	9.7552E-1	1.0799E-1	4567.95	2.18916	5.8460E-1	1.4090E+0	5.3005E-1
4550.55	2.19754	1.7540E-1	9.8877E-1	1.2136E-1	4568.05	2.18912	5.3224E-1	1.3606E+0	4.7767E-1
4551.55	2.19705	1.8848E-1	1.0017E+0	1.3442E-1	4568.15	2.18907	5.0213E-1	1.3311E+0	4.4760E-1
4552.55	2.19657	2.0106E-1	1.0144E+0	1.4698E-1	4568.25	2.18902	4.8945E-1	1.3169E+0	4.3497E-1
4553.55	2.19609	2.1332E-1	1.0267E+0	1.5923E-1	4568.35	2.18897	4.8202E-1	1.3074E+0	4.2760E-1
4554.55	2.19561	2.2618E-1	1.0396E+0	1.7209E-1	4568.45	2.18892	4.8413E-1	1.3075E+0	4.2974E-1
4555.55	2.19512	2.3967E-1	1.0531E+0	1.8556E-1	4568.55	2.18888	4.8759E-1	1.3089E+0	4.3322E-1
4556.55	2.19464	2.5350E-1	1.0669E+0	1.9938E-1	4568.65	2.18883	4.9253E-1	1.3119E+0	4.3819E-1
4557.55	2.19416	2.6812E-1	1.0813E+0	2.1399E-1	4568.75	2.18878	4.9856E-1	1.3161E+0	4.4423E-1
4558.55	2.19368	2.8397E-1	1.0969E+0	2.2983E-1	4568.85	2.18873	5.0496E-1	1.3204E+0	4.5066E-1
4559.55	2.19320	3.0098E-1	1.1134E+0	2.4683E-1	4568.95	2.18868	5.1153E-1	1.3251E+0	4.5724E-1
4560.55	2.19272	3.1907E-1	1.1311E+0	2.6491E-1	4569.05	2.18864	5.1697E-1	1.3290E+0	4.6270E-1
4561.05	2.19248	3.2860E-1	1.1403E+0	2.7443E-1	4569.55	2.18840	5.1264E-1	1.3226E+0	4.5839E-1
4561.55	2.19224	3.3858E-1	1.1499E+0	2.8440E-1	4570.05	2.18816	4.8239E-1	1.2954E+0	4.2813E-1
4562.05	2.19200	3.4884E-1	1.1598E+0	2.9466E-1	4570.30	2.18804	4.7394E-1	1.2876E+0	4.1968E-1
4562.55	2.19176	3.5963E-1	1.1703E+0	3.0545E-1	4570.55	2.18792	4.6869E-1	1.2825E+0	4.1443E-1
4563.05	2.19152	3.7101E-1	1.1812E+0	3.1682E-1	4570.80	2.18780	4.6473E-1	1.2785E+0	4.1047E-1
4563.55	2.19127	3.8297E-1	1.1927E+0	3.2878E-1	4571.05	2.18768	4.6157E-1	1.2752E+0	4.0732E-1
4563.80	2.19115	3.8915E-1	1.1986E+0	3.3496E-1	4571.30	2.18756	4.5914E-1	1.2724E+0	4.0489E-1
4564.05	2.19103	3.9549E-1	1.2047E+0	3.4129E-1	4571.55	2.18744	4.5743E-1	1.2704E+0	4.0319E-1
4564.30	2.19091	4.0197E-1	1.2108E+0	3.4777E-1	4571.80	2.18732	4.5633E-1	1.2688E+0	4.0208E-1
4564.55	2.19079	4.0861E-1	1.2171E+0	3.5441E-1	4572.05	2.18720	4.5590E-1	1.2679E+0	4.0166E-1
4564.80	2.19067	4.1542E-1	1.2238E+0	3.6122E-1	4572.55	2.18696	4.5696E-1	1.2678E+0	4.0273E-1
4565.05	2.19055	4.2241E-1	1.2310E+0	3.6821E-1	4573.55	2.18648	4.6472E-1	1.2737E+0	4.1049E-1
4565.25	2.19046	4.2815E-1	1.2372E+0	3.7394E-1	4574.55	2.18601	4.7528E-1	1.2835E+0	4.2106E-1
4565.45	2.19036	4.3402E-1	1.2439E+0	3.7981E-1	4575.05	2.18577	4.8147E-1	1.2896E+0	4.2724E-1
4565.55	2.19031	4.3705E-1	1.2474E+0	3.8283E-1	4575.55	2.18553	4.8835E-1	1.2963E+0	4.3412E-1
4565.65	2.19027	4.4023E-1	1.2514E+0	3.8601E-1	4576.06	2.18529	4.9616E-1	1.3040E+0	4.4193E-1
4565.75	2.19022	4.4355E-1	1.2555E+0	3.8932E-1	4576.56	2.18505	5.0503E-1	1.3126E+0	4.5080E-1
4565.85	2.19017	4.4725E-1	1.2602E+0	3.9301E-1	4578.56	2.18410	5.4350E-1	1.3503E+0	4.8926E-1
4565.95	2.19012	4.5138E-1	1.2652E+0	3.9713E-1	4580.56	2.18314	5.8326E-1	1.3897E+0	5.2902E-1
4566.05	2.19007	4.5617E-1	1.2708E+0	4.0191E-1	4581.56	2.18266	6.0347E-1	1.4097E+0	5.4924E-1
4566.15	2.19003	4.6199E-1	1.2774E+0	4.0772E-1	4582.06	2.18243	6.1423E-1	1.4203E+0	5.5999E-1
4566.25	2.18998	4.7095E-1	1.2869E+0	4.1667E-1	4582.56	2.18219	6.2589E-1	1.4319E+0	5.7165E-1
4566.35	2.18993	4.8384E-1	1.2996E+0	4.2955E-1	4582.76	2.18209	6.3083E-1	1.4369E+0	5.7659E-1
4566.45	2.18988	5.0633E-1	1.3209E+0	4.5205E-1	4582.96	2.18200	6.3600E-1	1.4423E+0	5.8176E-1
4566.55	2.18984	5.3715E-1	1.3498E+0	4.8286E-1	4583.16	2.18190	6.4146E-1	1.4482E+0	5.8722E-1
4566.65	2.18979	5.7886E-1	1.3904E+0	5.2457E-1	4583.36	2.18181	6.4720E-1	1.4545E+0	5.9294E-1
4566.75	2.18974	6.4576E-1	1.4554E+0	5.9148E-1	4583.56	2.18171	6.5354E-1	1.4627E+0	5.9926E-1
4566.85	2.18969	7.2498E-1	1.5332E+0	6.7071E-1	4583.66	2.18166	6.5707E-1	1.4671E+0	6.0277E-1
4566.95	2.18964	8.1167E-1	1.6171E+0	7.5750E-1	4583.76	2.18162	6.6085E-1	1.4718E+0	6.0653E-1
4567.05	2.18960	8.9450E-1	1.6950E+0	8.4054E-1	4583.86	2.18157	6.6504E-1	1.4770E+0	6.1070E-1
4567.15	2.18955	9.5854E-1	1.7531E+0	9.0490E-1	4583.96	2.18152	6.7096E-1	1.4837E+0	6.1660E-1
4567.25	2.18950	9.9636E-1	1.7835E+0	9.4303E-1	4584.06	2.18147	6.7878E-1	1.4934E+0	6.2437E-1
4567.35	2.18945	9.9812E-1	1.7801E+0	9.4491E-1	4584.16	2.18143	6.9039E-1	1.5063E+0	6.3594E-1
4567.45	2.18940	9.6919E-1	1.7504E+0	9.1589E-1	4584.36	2.18133	7.2113E-1	1.5410E+0	6.6653E-1
4567.55	2.18936	9.0690E-1	1.6932E+0	8.5332E-1	4584.56	2.18124	7.7242E-1	1.5959E+0	7.1748E-1
4567.65	2.18931	8.2294E-1	1.6189E+0	7.6900E-1	4584.76	2.18114	8.5130E-1	1.6784E+0	7.9566E-1
4567.75	2.18926	7.3384E-1	1.5410E+0	6.7959E-1	4584.96	2.18105	9.4773E-1	1.7751E+0	8.9166E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4585.16	2.18095	1.0618E+0	1.8883E+0	1.0054E+0	4592.56	2.17744	1.2259E+0	2.0374E+0	1.1714E+0
4585.36	2.18086	1.1870E+0	2.0115E+0	1.1306E+0	4592.76	2.17734	1.1968E+0	2.0085E+0	1.1424E+0
4585.56	2.18076	1.3251E+0	2.1472E+0	1.2691E+0	4592.96	2.17725	1.1710E+0	1.9830E+0	1.1165E+0
4585.66	2.18071	1.3966E+0	2.2175E+0	1.3409E+0	4593.16	2.17715	1.1474E+0	1.9599E+0	1.0929E+0
4585.76	2.18067	1.4659E+0	2.2854E+0	1.4105E+0	4593.36	2.17706	1.1253E+0	1.9382E+0	1.0708E+0
4585.86	2.18062	1.5296E+0	2.3480E+0	1.4743E+0	4593.56	2.17696	1.1048E+0	1.9183E+0	1.0501E+0
4585.96	2.18057	1.5847E+0	2.4020E+0	1.5296E+0	4593.76	2.17687	1.0860E+0	1.9002E+0	1.0313E+0
4586.16	2.18048	1.6693E+0	2.4855E+0	1.6144E+0	4593.96	2.17677	1.0687E+0	1.8834E+0	1.0140E+0
4586.36	2.18038	1.7236E+0	2.5401E+0	1.6686E+0	4594.16	2.17668	1.0535E+0	1.8682E+0	9.9880E-1
4586.46	2.18033	1.7393E+0	2.5564E+0	1.6842E+0	4594.36	2.17658	1.0391E+0	1.8539E+0	9.8446E-1
4586.56	2.18029	1.7461E+0	2.5641E+0	1.6909E+0	4594.56	2.17649	1.0262E+0	1.8409E+0	9.7148E-1
4586.66	2.18024	1.7508E+0	2.5695E+0	1.6954E+0	4594.81	2.17637	1.0107E+0	1.8254E+0	9.5609E-1
4586.76	2.18019	1.7559E+0	2.5755E+0	1.7003E+0	4595.06	2.17625	9.9658E-1	1.8109E+0	9.4196E-1
4586.86	2.18014	1.7668E+0	2.5868E+0	1.7109E+0	4595.31	2.17613	9.8379E-1	1.7983E+0	9.2918E-1
4586.96	2.18009	1.7826E+0	2.6029E+0	1.7266E+0	4595.56	2.17601	9.7207E-1	1.7868E+0	9.1744E-1
4587.06	2.18005	1.8095E+0	2.6298E+0	1.7535E+0	4596.06	2.17578	9.5054E-1	1.7657E+0	8.9591E-1
4587.16	2.18000	1.8458E+0	2.6656E+0	1.7899E+0	4596.56	2.17554	9.3092E-1	1.7470E+0	8.7624E-1
4587.36	2.17990	1.9349E+0	2.7542E+0	1.8794E+0	4596.81	2.17542	9.2213E-1	1.7385E+0	8.6744E-1
4587.56	2.17981	2.0450E+0	2.8643E+0	1.9894E+0	4597.06	2.17530	9.1424E-1	1.7310E+0	8.5954E-1
4587.76	2.17971	2.1596E+0	2.9798E+0	2.1039E+0	4597.31	2.17519	9.0691E-1	1.7237E+0	8.5221E-1
4587.96	2.17962	2.2514E+0	3.0716E+0	2.1957E+0	4597.56	2.17507	8.9988E-1	1.7161E+0	8.4523E-1
4588.06	2.17957	2.2877E+0	3.1076E+0	2.2319E+0	4598.06	2.17483	8.8788E-1	1.7024E+0	8.3333E-1
4588.16	2.17952	2.3158E+0	3.1357E+0	2.2601E+0	4598.31	2.17471	8.8262E-1	1.6961E+0	8.2813E-1
4588.26	2.17948	2.3397E+0	3.1593E+0	2.2839E+0	4598.56	2.17459	8.7788E-1	1.6902E+0	8.2345E-1
4588.36	2.17943	2.3587E+0	3.1779E+0	2.3029E+0	4598.81	2.17448	8.7395E-1	1.6851E+0	8.1957E-1
4588.46	2.17938	2.3745E+0	3.1933E+0	2.3187E+0	4599.06	2.17436	8.7060E-1	1.6804E+0	8.1628E-1
4588.56	2.17933	2.3884E+0	3.2068E+0	2.3327E+0	4599.56	2.17412	8.6479E-1	1.6736E+0	8.1051E-1
4588.66	2.17929	2.3983E+0	3.2163E+0	2.3426E+0	4600.06	2.17389	8.6058E-1	1.6710E+0	8.0623E-1
4588.76	2.17924	2.4027E+0	3.2205E+0	2.3470E+0	4600.31	2.17377	8.5945E-1	1.6708E+0	8.0507E-1
4588.86	2.17919	2.4030E+0	3.2206E+0	2.3473E+0	4600.56	2.17365	8.5891E-1	1.6712E+0	8.0449E-1
4588.96	2.17914	2.3956E+0	3.2131E+0	2.3399E+0	4600.81	2.17353	8.5906E-1	1.6721E+0	8.0460E-1
4589.06	2.17910	2.3841E+0	3.2015E+0	2.3284E+0	4601.06	2.17341	8.6005E-1	1.6737E+0	8.0556E-1
4589.16	2.17905	2.3640E+0	3.1814E+0	2.3083E+0	4601.56	2.17318	8.6334E-1	1.6778E+0	8.0881E-1
4589.26	2.17900	2.3397E+0	3.1570E+0	2.2841E+0	4602.06	2.17294	8.6715E-1	1.6823E+0	8.1258E-1
4589.36	2.17895	2.3098E+0	3.1270E+0	2.2542E+0	4602.56	2.17270	8.7113E-1	1.6868E+0	8.1653E-1
4589.56	2.17886	2.2375E+0	3.0544E+0	2.1820E+0	4603.06	2.17247	8.7528E-1	1.6914E+0	8.2065E-1
4589.76	2.17876	2.1478E+0	2.9645E+0	2.0924E+0	4603.56	2.17223	8.7922E-1	1.6957E+0	8.2457E-1
4589.96	2.17867	2.0398E+0	2.8563E+0	1.9844E+0	4603.81	2.17211	8.8109E-1	1.6977E+0	8.2643E-1
4590.16	2.17857	1.9257E+0	2.7422E+0	1.8704E+0	4604.06	2.17200	8.8254E-1	1.6994E+0	8.2786E-1
4590.36	2.17848	1.8260E+0	2.6422E+0	1.7708E+0	4604.31	2.17188	8.8362E-1	1.7004E+0	8.2895E-1
4590.56	2.17838	1.7406E+0	2.5565E+0	1.6855E+0	4604.56	2.17176	8.8406E-1	1.7005E+0	8.2940E-1
4590.76	2.17829	1.6623E+0	2.4779E+0	1.6072E+0	4604.81	2.17164	8.8413E-1	1.7001E+0	8.2950E-1
4590.96	2.17820	1.5913E+0	2.4063E+0	1.5363E+0	4605.06	2.17153	8.8399E-1	1.6995E+0	8.2938E-1
4591.16	2.17810	1.5273E+0	2.3413E+0	1.4725E+0	4605.31	2.17141	8.8363E-1	1.6987E+0	8.2905E-1
4591.36	2.17801	1.4698E+0	2.2829E+0	1.4152E+0	4605.56	2.17129	8.8299E-1	1.6978E+0	8.2842E-1
4591.56	2.17791	1.4195E+0	2.2326E+0	1.3649E+0	4606.06	2.17105	8.8108E-1	1.6958E+0	8.2652E-1
4591.76	2.17782	1.3734E+0	2.1863E+0	1.3189E+0	4606.56	2.17082	8.7883E-1	1.6937E+0	8.2426E-1
4591.96	2.17772	1.3314E+0	2.1441E+0	1.2769E+0	4607.56	2.17035	8.7373E-1	1.6892E+0	8.1914E-1
4592.16	2.17763	1.2925E+0	2.1045E+0	1.2380E+0	4608.06	2.17011	8.7078E-1	1.6866E+0	8.1617E-1
4592.36	2.17753	1.2576E+0	2.0693E+0	1.2032E+0	4608.56	2.16988	8.6766E-1	1.6839E+0	8.1303E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4609.56	2.16940	8.6125E-1	1.6783E+0	8.0659E-1	4623.06	2.16307	8.0279E-1	1.6192E+0	7.4821E-1
4610.56	2.16893	8.5488E-1	1.6729E+0	8.0018E-1	4623.56	2.16284	8.0832E-1	1.6262E+0	7.5367E-1
4610.81	2.16882	8.5352E-1	1.6717E+0	7.9881E-1	4623.69	2.16278	8.0977E-1	1.6281E+0	7.5510E-1
4611.06	2.16870	8.5250E-1	1.6708E+0	7.9778E-1	4623.81	2.16272	8.1126E-1	1.6299E+0	7.5657E-1
4611.31	2.16858	8.5176E-1	1.6702E+0	7.9704E-1	4624.06	2.16260	8.1439E-1	1.6337E+0	7.5966E-1
4611.56	2.16846	8.5120E-1	1.6696E+0	7.9648E-1	4624.31	2.16248	8.1774E-1	1.6377E+0	7.6298E-1
4612.06	2.16823	8.5039E-1	1.6687E+0	7.9568E-1	4624.56	2.16237	8.2138E-1	1.6419E+0	7.6658E-1
4612.56	2.16799	8.4976E-1	1.6678E+0	7.9506E-1	4624.81	2.16225	8.2524E-1	1.6463E+0	7.7040E-1
4612.81	2.16788	8.4968E-1	1.6675E+0	7.9499E-1	4625.06	2.16213	8.2936E-1	1.6509E+0	7.7449E-1
4613.06	2.16776	8.4983E-1	1.6673E+0	7.9516E-1	4625.31	2.16202	8.3372E-1	1.6556E+0	7.7883E-1
4613.31	2.16764	8.5028E-1	1.6671E+0	7.9564E-1	4625.56	2.16190	8.3828E-1	1.6606E+0	7.8335E-1
4613.56	2.16752	8.5070E-1	1.6668E+0	7.9610E-1	4625.81	2.16178	8.4303E-1	1.6657E+0	7.8807E-1
4613.81	2.16741	8.5081E-1	1.6662E+0	7.9624E-1	4626.06	2.16167	8.4799E-1	1.6710E+0	7.9299E-1
4613.93	2.16735	8.5055E-1	1.6656E+0	7.9599E-1	4626.56	2.16143	8.5833E-1	1.6819E+0	8.0328E-1
4614.06	2.16729	8.4993E-1	1.6648E+0	7.9538E-1	4627.06	2.16120	8.6922E-1	1.6932E+0	8.1411E-1
4614.18	2.16723	8.4882E-1	1.6636E+0	7.9428E-1	4627.56	2.16097	8.8055E-1	1.7048E+0	8.2540E-1
4614.31	2.16717	8.4693E-1	1.6618E+0	7.9239E-1	4628.06	2.16073	8.9214E-1	1.7162E+0	8.3698E-1
4614.43	2.16711	8.4455E-1	1.6596E+0	7.9000E-1	4628.31	2.16062	8.9806E-1	1.7220E+0	8.4290E-1
4614.56	2.16705	8.4190E-1	1.6572E+0	7.8734E-1	4628.56	2.16050	9.0407E-1	1.7278E+0	8.4890E-1
4614.81	2.16694	8.3628E-1	1.6522E+0	7.8170E-1	4628.81	2.16038	9.1011E-1	1.7337E+0	8.5494E-1
4615.06	2.16682	8.3015E-1	1.6467E+0	7.7554E-1	4629.06	2.16027	9.1777E-1	1.7408E+0	8.6263E-1
4615.31	2.16670	8.2341E-1	1.6407E+0	7.6878E-1	4629.31	2.16015	9.2716E-1	1.7498E+0	8.7203E-1
4615.56	2.16658	8.1605E-1	1.6343E+0	7.6138E-1	4629.56	2.16003	9.3817E-1	1.7604E+0	8.8305E-1
4615.81	2.16647	8.0877E-1	1.6279E+0	7.5407E-1	4629.76	2.15994	9.4786E-1	1.7702E+0	8.9271E-1
4615.93	2.16641	8.0553E-1	1.6249E+0	7.5082E-1	4629.96	2.15985	9.5812E-1	1.7804E+0	9.0295E-1
4616.06	2.16635	8.0260E-1	1.6221E+0	7.4789E-1	4630.16	2.15975	9.6904E-1	1.7918E+0	9.1381E-1
4616.18	2.16629	8.0011E-1	1.6198E+0	7.4540E-1	4630.36	2.15966	9.8028E-1	1.8036E+0	9.2498E-1
4616.31	2.16623	7.9814E-1	1.6178E+0	7.4343E-1	4630.56	2.15957	9.9225E-1	1.8161E+0	9.3688E-1
4616.56	2.16612	7.9472E-1	1.6142E+0	7.4002E-1	4630.76	2.15947	1.0052E+0	1.8292E+0	9.4975E-1
4616.81	2.16600	7.9201E-1	1.6111E+0	7.3733E-1	4630.96	2.15938	1.0200E+0	1.8443E+0	9.6449E-1
4616.94	2.16594	7.9085E-1	1.6098E+0	7.3618E-1	4631.16	2.15929	1.0371E+0	1.8617E+0	9.8158E-1
4617.06	2.16588	7.9009E-1	1.6088E+0	7.3543E-1	4631.36	2.15919	1.0572E+0	1.8820E+0	1.0016E+0
4617.31	2.16576	7.8892E-1	1.6071E+0	7.3429E-1	4631.56	2.15910	1.0823E+0	1.9074E+0	1.0266E+0
4617.56	2.16565	7.8804E-1	1.6057E+0	7.3342E-1	4631.66	2.15905	1.0966E+0	1.9215E+0	1.0408E+0
4618.06	2.16541	7.8670E-1	1.6037E+0	7.3211E-1	4631.76	2.15901	1.1123E+0	1.9368E+0	1.0566E+0
4618.56	2.16518	7.8575E-1	1.6026E+0	7.3117E-1	4631.96	2.15891	1.1485E+0	1.9721E+0	1.0928E+0
4619.06	2.16494	7.8509E-1	1.6023E+0	7.3050E-1	4632.16	2.15882	1.1912E+0	2.0130E+0	1.1357E+0
4619.56	2.16471	7.8454E-1	1.6020E+0	7.2994E-1	4632.36	2.15873	1.2397E+0	2.0593E+0	1.1843E+0
4620.06	2.16447	7.8410E-1	1.6019E+0	7.2949E-1	4632.56	2.15863	1.2956E+0	2.1136E+0	1.2404E+0
4620.31	2.16436	7.8405E-1	1.6019E+0	7.2943E-1	4632.76	2.15854	1.3582E+0	2.1749E+0	1.3031E+0
4620.56	2.16424	7.8429E-1	1.6022E+0	7.2966E-1	4632.96	2.15845	1.4291E+0	2.2458E+0	1.3739E+0
4620.81	2.16412	7.8478E-1	1.6027E+0	7.3016E-1	4633.16	2.15835	1.5102E+0	2.3277E+0	1.4550E+0
4621.06	2.16401	7.8591E-1	1.6036E+0	7.3130E-1	4633.36	2.15826	1.6045E+0	2.4227E+0	1.5491E+0
4621.31	2.16389	7.8730E-1	1.6048E+0	7.3269E-1	4633.56	2.15817	1.7215E+0	2.5399E+0	1.6660E+0
4621.56	2.16377	7.8911E-1	1.6063E+0	7.3451E-1	4633.66	2.15812	1.7890E+0	2.6073E+0	1.7334E+0
4621.81	2.16365	7.9105E-1	1.6078E+0	7.3647E-1	4633.76	2.15807	1.8619E+0	2.6802E+0	1.8063E+0
4622.06	2.16354	7.9314E-1	1.6095E+0	7.3857E-1	4633.86	2.15803	1.9411E+0	2.7595E+0	1.8853E+0
4622.31	2.16342	7.9538E-1	1.6115E+0	7.4082E-1	4633.96	2.15798	2.0284E+0	2.8470E+0	1.9719E+0
4622.56	2.16330	7.9772E-1	1.6137E+0	7.4317E-1	4634.06	2.15793	2.1269E+0	2.9457E+0	2.0697E+0
4622.81	2.16319	8.0018E-1	1.6162E+0	7.4563E-1	4634.16	2.15789	2.2368E+0	3.0557E+0	2.1786E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4634.26	2.15784	2.3583E+0	3.1771E+0	2.2988E+0	4639.36	2.15547	1.4046E+0	2.2292E+0	1.3453E+0
4634.36	2.15779	2.5013E+0	3.3196E+0	2.4405E+0	4639.46	2.15542	1.3554E+0	2.1805E+0	1.2964E+0
4634.46	2.15775	2.6711E+0	3.4883E+0	2.6093E+0	4639.56	2.15538	1.3090E+0	2.1348E+0	1.2503E+0
4634.56	2.15770	2.8645E+0	3.6801E+0	2.8018E+0	4639.66	2.15533	1.2659E+0	2.0922E+0	1.2076E+0
4634.66	2.15765	3.0893E+0	3.9027E+0	3.0256E+0	4639.76	2.15528	1.2272E+0	2.0540E+0	1.1692E+0
4634.76	2.15761	3.3406E+0	4.1519E+0	3.2757E+0	4639.96	2.15519	1.1581E+0	1.9861E+0	1.1005E+0
4634.86	2.15756	3.6372E+0	4.4463E+0	3.5703E+0	4640.16	2.15510	1.0979E+0	1.9278E+0	1.0404E+0
4634.96	2.15751	3.9823E+0	4.7900E+0	3.9127E+0	4640.36	2.15500	1.0441E+0	1.8767E+0	9.8672E-1
4635.06	2.15747	4.3876E+0	5.1947E+0	4.3144E+0	4640.56	2.15491	9.9730E-1	1.8321E+0	9.3995E-1
4635.16	2.15742	4.8558E+0	5.6636E+0	4.7773E+0	4640.76	2.15482	9.5841E-1	1.7944E+0	9.0132E-1
4635.26	2.15738	5.3894E+0	6.1990E+0	5.3018E+0	4640.96	2.15473	9.2455E-1	1.7610E+0	8.6783E-1
4635.36	2.15733	6.0004E+0	6.8116E+0	5.8972E+0	4641.16	2.15463	8.9387E-1	1.7303E+0	8.3745E-1
4635.46	2.15728	6.6902E+0	7.5019E+0	6.5693E+0	4641.36	2.15454	8.6547E-1	1.7012E+0	8.0940E-1
4635.56	2.15724	7.4356E+0	8.2466E+0	7.2922E+0	4641.56	2.15445	8.3929E-1	1.6736E+0	7.8355E-1
4635.66	2.15719	8.2249E+0	9.0354E+0	8.0486E+0	4641.76	2.15435	8.1559E-1	1.6484E+0	7.6005E-1
4635.76	2.15714	9.0300E+0	9.8412E+0	8.8137E+0	4641.96	2.15426	7.9400E-1	1.6260E+0	7.3861E-1
4635.86	2.15710	9.8261E+0	1.0637E+1	9.5738E+0	4642.16	2.15417	7.7516E-1	1.6065E+0	7.1987E-1
4635.96	2.15705	1.0542E+1	1.1355E+1	1.0257E+1	4642.36	2.15408	7.5821E-1	1.5892E+0	7.0300E-1
4636.06	2.15700	1.1171E+1	1.1987E+1	1.0860E+1	4642.56	2.15398	7.4342E-1	1.5742E+0	6.8826E-1
4636.16	2.15696	1.1640E+1	1.2460E+1	1.1309E+1	4642.81	2.15387	7.2698E-1	1.5577E+0	6.7187E-1
4636.26	2.15691	1.1867E+1	1.2690E+1	1.1531E+1	4643.06	2.15375	7.1263E-1	1.5434E+0	6.5756E-1
4636.36	2.15686	1.1824E+1	1.2650E+1	1.1497E+1	4643.31	2.15363	6.9948E-1	1.5302E+0	6.4446E-1
4636.46	2.15682	1.1565E+1	1.2391E+1	1.1253E+1	4643.56	2.15352	6.8759E-1	1.5179E+0	6.3261E-1
4636.56	2.15677	1.1081E+1	1.1907E+1	1.0792E+1	4643.81	2.15340	6.7695E-1	1.5072E+0	6.2200E-1
4636.66	2.15672	1.0414E+1	1.1240E+1	1.0153E+1	4644.06	2.15329	6.6751E-1	1.4974E+0	6.1260E-1
4636.76	2.15668	9.6584E+0	1.0483E+1	9.4257E+0	4644.31	2.15317	6.5884E-1	1.4882E+0	6.0397E-1
4636.86	2.15663	8.8448E+0	9.6706E+0	8.6385E+0	4644.56	2.15305	6.5071E-1	1.4794E+0	5.9589E-1
4636.96	2.15658	8.0449E+0	8.8730E+0	7.8583E+0	4644.81	2.15294	6.4303E-1	1.4715E+0	5.8824E-1
4637.06	2.15654	7.2822E+0	8.1125E+0	7.1115E+0	4645.06	2.15282	6.3572E-1	1.4641E+0	5.8094E-1
4637.16	2.15649	6.5775E+0	7.4089E+0	6.4203E+0	4645.31	2.15271	6.2891E-1	1.4577E+0	5.7414E-1
4637.26	2.15644	5.9525E+0	6.7837E+0	5.8060E+0	4645.56	2.15259	6.2256E-1	1.4522E+0	5.6776E-1
4637.36	2.15640	5.3868E+0	6.2174E+0	5.2495E+0	4645.81	2.15248	6.1689E-1	1.4481E+0	5.6206E-1
4637.46	2.15635	4.8819E+0	5.7127E+0	4.7528E+0	4646.06	2.15236	6.1179E-1	1.4446E+0	5.5690E-1
4637.56	2.15631	4.4181E+0	5.2509E+0	4.2969E+0	4646.31	2.15224	6.0730E-1	1.4417E+0	5.5237E-1
4637.66	2.15626	4.0007E+0	4.8372E+0	3.8869E+0	4646.56	2.15213	6.0345E-1	1.4393E+0	5.4847E-1
4637.76	2.15621	3.6318E+0	4.4725E+0	3.5263E+0	4646.81	2.15201	6.0031E-1	1.4374E+0	5.4529E-1
4637.86	2.15617	3.3079E+0	4.1513E+0	3.2108E+0	4647.06	2.15190	5.9795E-1	1.4361E+0	5.4289E-1
4637.96	2.15612	3.0370E+0	3.8813E+0	2.9461E+0	4647.31	2.15178	5.9692E-1	1.4358E+0	5.4183E-1
4638.06	2.15607	2.8035E+0	3.6470E+0	2.7177E+0	4647.56	2.15166	5.9698E-1	1.4364E+0	5.4187E-1
4638.16	2.15603	2.6023E+0	3.4437E+0	2.5220E+0	4647.76	2.15157	5.9765E-1	1.4373E+0	5.4253E-1
4638.26	2.15598	2.4300E+0	3.2681E+0	2.3548E+0	4647.96	2.15148	5.9883E-1	1.4387E+0	5.4369E-1
4638.36	2.15593	2.2728E+0	3.1077E+0	2.2008E+0	4648.16	2.15139	6.0054E-1	1.4407E+0	5.4539E-1
4638.46	2.15589	2.1364E+0	2.9680E+0	2.0671E+0	4648.36	2.15129	6.0365E-1	1.4436E+0	5.4850E-1
4638.56	2.15584	2.0142E+0	2.8425E+0	1.9470E+0	4648.46	2.15125	6.0607E-1	1.4458E+0	5.5092E-1
4638.66	2.15579	1.9006E+0	2.7266E+0	1.8358E+0	4648.56	2.15120	6.0946E-1	1.4486E+0	5.5432E-1
4638.76	2.15575	1.8004E+0	2.6248E+0	1.7374E+0	4648.66	2.15116	6.1355E-1	1.4521E+0	5.5843E-1
4638.86	2.15570	1.7130E+0	2.5364E+0	1.6511E+0	4648.76	2.15111	6.1869E-1	1.4563E+0	5.6359E-1
4638.96	2.15565	1.6372E+0	2.4602E+0	1.5760E+0	4648.86	2.15106	6.2503E-1	1.4614E+0	5.6997E-1
4639.06	2.15561	1.5700E+0	2.3931E+0	1.5094E+0	4648.96	2.15102	6.3232E-1	1.4672E+0	5.7730E-1
4639.16	2.15556	1.5107E+0	2.3342E+0	1.4506E+0	4649.06	2.15097	6.4189E-1	1.4755E+0	5.8689E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4649.16	2.15092	6.5224E-1	1.4845E+0	5.9727E-1	4654.76	2.14834	5.5043E-1	1.3686E+0	4.9604E-1
4649.26	2.15088	6.6516E-1	1.4963E+0	6.1021E-1	4654.96	2.14824	5.5250E-1	1.3735E+0	4.9805E-1
4649.36	2.15083	6.8049E-1	1.5105E+0	6.2554E-1	4655.06	2.14820	5.5367E-1	1.3762E+0	4.9920E-1
4649.46	2.15079	7.0217E-1	1.5302E+0	6.4725E-1	4655.16	2.14815	5.5512E-1	1.3790E+0	5.0062E-1
4649.56	2.15074	7.3034E-1	1.5574E+0	6.7540E-1	4655.26	2.14811	5.5737E-1	1.3826E+0	5.0283E-1
4649.66	2.15069	7.7141E-1	1.5973E+0	7.1642E-1	4655.36	2.14806	5.6008E-1	1.3865E+0	5.0550E-1
4649.76	2.15065	8.1862E-1	1.6432E+0	7.6359E-1	4655.46	2.14801	5.6420E-1	1.3914E+0	5.0960E-1
4649.86	2.15060	8.7739E-1	1.6991E+0	8.2240E-1	4655.56	2.14797	5.6973E-1	1.3965E+0	5.1512E-1
4649.96	2.15055	9.4247E-1	1.7619E+0	8.8750E-1	4655.66	2.14792	5.7636E-1	1.4025E+0	5.2177E-1
4650.06	2.15051	1.0109E+0	1.8264E+0	9.5618E-1	4655.76	2.14787	5.8340E-1	1.4081E+0	5.2883E-1
4650.16	2.15046	1.0760E+0	1.8862E+0	1.0216E+0	4655.86	2.14783	5.8856E-1	1.4123E+0	5.3400E-1
4650.26	2.15042	1.1313E+0	1.9362E+0	1.0774E+0	4655.96	2.14778	5.9096E-1	1.4139E+0	5.3642E-1
4650.36	2.15037	1.1714E+0	1.9739E+0	1.1177E+0	4656.06	2.14774	5.9183E-1	1.4141E+0	5.3730E-1
4650.46	2.15032	1.1914E+0	1.9933E+0	1.1377E+0	4656.16	2.14769	5.9166E-1	1.4133E+0	5.3715E-1
4650.56	2.15028	1.1956E+0	1.9985E+0	1.1420E+0	4656.36	2.14760	5.9010E-1	1.4106E+0	5.3562E-1
4650.66	2.15023	1.1777E+0	1.9836E+0	1.1238E+0	4656.56	2.14751	5.8837E-1	1.4079E+0	5.3391E-1
4650.76	2.15018	1.1419E+0	1.9530E+0	1.0875E+0	4657.06	2.14728	5.8388E-1	1.4021E+0	5.2946E-1
4650.86	2.15014	1.0941E+0	1.9112E+0	1.0392E+0	4657.56	2.14704	5.7923E-1	1.3988E+0	5.2479E-1
4650.96	2.15009	1.0358E+0	1.8603E+0	9.8031E-1	4658.06	2.14681	5.7454E-1	1.3976E+0	5.2002E-1
4651.06	2.15005	9.7576E-1	1.8070E+0	9.1973E-1	4658.56	2.14658	5.6983E-1	1.3974E+0	5.1520E-1
4651.16	2.15000	9.1559E-1	1.7521E+0	8.5927E-1	4659.07	2.14635	5.6487E-1	1.3952E+0	5.1018E-1
4651.26	2.14995	8.5916E-1	1.6993E+0	8.0280E-1	4659.57	2.14612	5.5959E-1	1.3902E+0	5.0490E-1
4651.36	2.14991	8.0962E-1	1.6513E+0	7.5338E-1	4660.57	2.14566	5.4914E-1	1.3775E+0	4.9453E-1
4651.46	2.14986	7.6790E-1	1.6082E+0	7.1200E-1	4661.57	2.14520	5.3901E-1	1.3649E+0	4.8448E-1
4651.56	2.14981	7.3517E-1	1.5724E+0	6.7965E-1	4662.57	2.14474	5.2934E-1	1.3529E+0	4.7487E-1
4651.66	2.14977	7.0847E-1	1.5427E+0	6.5322E-1	4663.57	2.14428	5.2010E-1	1.3415E+0	4.6568E-1
4651.76	2.14972	6.8641E-1	1.5173E+0	6.3140E-1	4664.57	2.14382	5.1146E-1	1.3315E+0	4.5708E-1
4651.86	2.14968	6.6778E-1	1.4953E+0	6.1296E-1	4665.07	2.14359	5.0768E-1	1.3277E+0	4.5330E-1
4651.96	2.14963	6.5144E-1	1.4756E+0	5.9678E-1	4665.32	2.14348	5.0616E-1	1.3262E+0	4.5178E-1
4652.06	2.14958	6.3690E-1	1.4590E+0	5.8232E-1	4665.57	2.14336	5.0491E-1	1.3251E+0	4.5053E-1
4652.16	2.14954	6.2348E-1	1.4449E+0	5.6894E-1	4665.82	2.14325	5.0432E-1	1.3245E+0	4.4994E-1
4652.26	2.14949	6.1061E-1	1.4322E+0	5.5608E-1	4666.07	2.14313	5.0462E-1	1.3246E+0	4.5024E-1
4652.36	2.14944	5.9861E-1	1.4205E+0	5.4410E-1	4666.57	2.14290	5.0622E-1	1.3258E+0	4.5185E-1
4652.46	2.14940	5.8750E-1	1.4098E+0	5.3298E-1	4667.07	2.14267	5.0848E-1	1.3281E+0	4.5411E-1
4652.56	2.14935	5.7705E-1	1.3999E+0	5.2254E-1	4667.57	2.14244	5.1166E-1	1.3321E+0	4.5727E-1
4652.66	2.14931	5.6789E-1	1.3911E+0	5.1338E-1	4667.82	2.14233	5.1376E-1	1.3349E+0	4.5936E-1
4652.76	2.14926	5.5941E-1	1.3828E+0	5.0491E-1	4668.07	2.14221	5.1655E-1	1.3384E+0	4.6213E-1
4652.86	2.14921	5.5282E-1	1.3760E+0	4.9833E-1	4668.27	2.14212	5.1935E-1	1.3415E+0	4.6492E-1
4652.96	2.14917	5.4688E-1	1.3700E+0	4.9240E-1	4668.37	2.14208	5.2089E-1	1.3432E+0	4.6646E-1
4653.06	2.14912	5.4300E-1	1.3656E+0	4.8854E-1	4668.47	2.14203	5.2250E-1	1.3450E+0	4.6806E-1
4653.16	2.14908	5.4066E-1	1.3624E+0	4.8622E-1	4668.57	2.14199	5.2418E-1	1.3470E+0	4.6973E-1
4653.26	2.14903	5.3920E-1	1.3599E+0	4.8477E-1	4668.67	2.14194	5.2591E-1	1.3492E+0	4.7145E-1
4653.36	2.14898	5.3903E-1	1.3585E+0	4.8463E-1	4668.77	2.14189	5.2765E-1	1.3514E+0	4.7318E-1
4653.46	2.14894	5.3939E-1	1.3577E+0	4.8501E-1	4668.97	2.14180	5.3153E-1	1.3562E+0	4.7703E-1
4653.56	2.14889	5.3993E-1	1.3570E+0	4.8557E-1	4669.17	2.14171	5.3658E-1	1.3630E+0	4.8204E-1
4653.76	2.14880	5.4127E-1	1.3561E+0	4.8695E-1	4669.37	2.14162	5.4332E-1	1.3720E+0	4.8871E-1
4653.96	2.14871	5.4285E-1	1.3561E+0	4.8854E-1	4669.57	2.14153	5.5425E-1	1.3873E+0	4.9949E-1
4654.16	2.14861	5.4462E-1	1.3576E+0	4.9031E-1	4669.77	2.14143	5.7171E-1	1.4093E+0	5.1675E-1
4654.36	2.14852	5.4647E-1	1.3600E+0	4.9216E-1	4669.87	2.14139	5.8537E-1	1.4245E+0	5.3030E-1
4654.56	2.14843	5.4843E-1	1.3641E+0	4.9408E-1	4669.97	2.14134	6.0328E-1	1.4430E+0	5.4813E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4670.07	2.14130	6.2779E-1	1.4660E+0	5.7262E-1	4685.07	2.13444	1.4299E+0	2.2431E+0	1.3751E+0
4670.17	2.14125	6.5654E-1	1.4919E+0	6.0140E-1	4685.32	2.13433	1.4674E+0	2.2809E+0	1.4126E+0
4670.27	2.14121	6.9068E-1	1.5214E+0	6.3565E-1	4685.57	2.13421	1.5082E+0	2.3217E+0	1.4534E+0
4670.37	2.14116	7.2694E-1	1.5513E+0	6.7212E-1	4685.82	2.13410	1.5595E+0	2.3736E+0	1.5045E+0
4670.47	2.14111	7.6156E-1	1.5799E+0	7.0693E-1	4686.07	2.13399	1.6202E+0	2.4343E+0	1.5652E+0
4670.57	2.14107	7.9032E-1	1.6026E+0	7.3589E-1	4686.32	2.13387	1.6937E+0	2.5073E+0	1.6387E+0
4670.67	2.14102	8.0547E-1	1.6145E+0	7.5116E-1	4686.57	2.13376	1.7587E+0	2.5718E+0	1.7036E+0
4670.77	2.14098	8.1044E-1	1.6179E+0	7.5618E-1	4686.82	2.13364	1.8002E+0	2.6137E+0	1.7451E+0
4670.87	2.14093	7.9595E-1	1.6059E+0	7.4161E-1	4687.07	2.13353	1.8243E+0	2.6385E+0	1.7690E+0
4670.97	2.14088	7.7173E-1	1.5856E+0	7.1726E-1	4687.17	2.13348	1.8313E+0	2.6458E+0	1.7759E+0
4671.07	2.14084	7.4239E-1	1.5613E+0	6.8777E-1	4687.37	2.13339	1.8493E+0	2.6644E+0	1.7940E+0
4671.17	2.14079	7.1185E-1	1.5358E+0	6.5707E-1	4687.57	2.13330	1.8763E+0	2.6917E+0	1.8209E+0
4671.27	2.14075	6.8233E-1	1.5111E+0	6.2741E-1	4687.77	2.13321	1.9104E+0	2.7259E+0	1.8551E+0
4671.37	2.14070	6.5948E-1	1.4917E+0	6.0448E-1	4687.97	2.13312	1.9518E+0	2.7671E+0	1.8964E+0
4671.47	2.14066	6.4093E-1	1.4760E+0	5.8586E-1	4688.17	2.13303	1.9934E+0	2.8087E+0	1.9380E+0
4671.57	2.14061	6.3362E-1	1.4689E+0	5.7856E-1	4688.37	2.13294	2.0388E+0	2.8542E+0	1.9834E+0
4671.67	2.14056	6.3110E-1	1.4660E+0	5.7607E-1	4688.57	2.13285	2.0877E+0	2.9031E+0	2.0323E+0
4671.77	2.14052	6.3092E-1	1.4649E+0	5.7593E-1	4688.77	2.13276	2.1423E+0	2.9576E+0	2.0869E+0
4671.97	2.14043	6.3493E-1	1.4673E+0	5.8000E-1	4688.97	2.13267	2.2022E+0	3.0172E+0	2.1467E+0
4672.17	2.14033	6.4104E-1	1.4725E+0	5.8613E-1	4689.17	2.13257	2.2673E+0	3.0821E+0	2.2117E+0
4672.27	2.14029	6.4436E-1	1.4754E+0	5.8945E-1	4689.37	2.13248	2.3375E+0	3.1520E+0	2.2819E+0
4672.37	2.14024	6.4793E-1	1.4785E+0	5.9304E-1	4689.57	2.13239	2.4122E+0	3.2264E+0	2.3565E+0
4672.47	2.14020	6.5163E-1	1.4818E+0	5.9674E-1	4689.77	2.13230	2.4929E+0	3.3070E+0	2.4372E+0
4672.57	2.14015	6.5541E-1	1.4854E+0	6.0052E-1	4689.97	2.13221	2.5768E+0	3.3909E+0	2.5210E+0
4673.07	2.13992	6.7513E-1	1.5041E+0	6.2023E-1	4690.17	2.13212	2.6653E+0	3.4800E+0	2.6094E+0
4673.57	2.13969	6.9594E-1	1.5240E+0	6.4102E-1	4690.37	2.13203	2.7564E+0	3.5721E+0	2.7004E+0
4674.07	2.13946	7.1746E-1	1.5444E+0	6.6254E-1	4690.57	2.13194	2.8533E+0	3.6702E+0	2.7971E+0
4674.57	2.13924	7.3936E-1	1.5651E+0	6.8445E-1	4690.77	2.13185	2.9535E+0	3.7716E+0	2.8971E+0
4675.57	2.13878	7.8500E-1	1.6080E+0	7.3011E-1	4690.97	2.13176	3.0590E+0	3.8782E+0	3.0025E+0
4676.57	2.13832	8.3161E-1	1.6519E+0	7.7679E-1	4691.17	2.13166	3.1694E+0	3.9894E+0	3.1127E+0
4677.57	2.13786	8.7873E-1	1.6963E+0	8.2399E-1	4691.37	2.13157	3.2839E+0	4.1046E+0	3.2270E+0
4678.57	2.13741	9.2628E-1	1.7416E+0	8.7163E-1	4691.57	2.13148	3.4059E+0	4.2269E+0	3.3488E+0
4679.07	2.13718	9.5052E-1	1.7653E+0	8.9589E-1	4691.77	2.13139	3.5375E+0	4.3585E+0	3.4803E+0
4679.57	2.13695	9.7713E-1	1.7913E+0	9.2251E-1	4691.97	2.13130	3.6774E+0	4.4979E+0	3.6200E+0
4680.07	2.13672	1.0066E+0	1.8214E+0	9.5198E-1	4692.17	2.13121	3.8244E+0	4.6440E+0	3.7669E+0
4680.57	2.13649	1.0384E+0	1.8540E+0	9.8369E-1	4692.37	2.13112	3.9816E+0	4.8002E+0	3.9240E+0
4680.82	2.13638	1.0551E+0	1.8708E+0	1.0003E+0	4692.57	2.13103	4.1584E+0	4.9759E+0	4.1006E+0
4681.07	2.13626	1.0721E+0	1.8880E+0	1.0173E+0	4692.77	2.13094	4.3464E+0	5.1630E+0	4.2884E+0
4681.57	2.13604	1.1069E+0	1.9223E+0	1.0521E+0	4692.97	2.13085	4.5535E+0	5.3695E+0	4.4953E+0
4682.07	2.13581	1.1421E+0	1.9566E+0	1.0873E+0	4693.17	2.13076	4.7735E+0	5.5889E+0	4.7150E+0
4682.57	2.13558	1.1784E+0	1.9917E+0	1.1237E+0	4693.37	2.13067	5.0161E+0	5.8311E+0	4.9574E+0
4682.82	2.13547	1.1974E+0	2.0106E+0	1.1427E+0	4693.57	2.13057	5.2834E+0	6.0980E+0	5.2243E+0
4683.07	2.13535	1.2174E+0	2.0307E+0	1.1628E+0	4693.77	2.13048	5.5712E+0	6.3854E+0	5.5116E+0
4683.32	2.13524	1.2382E+0	2.0515E+0	1.1835E+0	4693.97	2.13039	5.8937E+0	6.7075E+0	5.8337E+0
4683.57	2.13512	1.2596E+0	2.0729E+0	1.2049E+0	4694.17	2.13030	6.2471E+0	7.0598E+0	6.1865E+0
4683.82	2.13501	1.2818E+0	2.0950E+0	1.2271E+0	4694.37	2.13021	6.6245E+0	7.4357E+0	6.5632E+0
4684.07	2.13490	1.3063E+0	2.1194E+0	1.2516E+0	4694.57	2.13012	7.0205E+0	7.8298E+0	6.9586E+0
4684.32	2.13478	1.3330E+0	2.1460E+0	1.2783E+0	4694.77	2.13003	7.4334E+0	8.2409E+0	7.3706E+0
4684.57	2.13467	1.3631E+0	2.1762E+0	1.3084E+0	4694.87	2.12998	7.6168E+0	8.4234E+0	7.5537E+0
4684.82	2.13455	1.3953E+0	2.2085E+0	1.3405E+0	4694.97	2.12994	7.7921E+0	8.5978E+0	7.7286E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4695.07	2.12989	7.9501E+0	8.7551E+0	7.8862E+0	4703.32	2.12616	4.1423E+0	4.9628E+0	4.0807E+0
4695.17	2.12985	8.1003E+0	8.9048E+0	8.0361E+0	4703.57	2.12604	3.9806E+0	4.8017E+0	3.9194E+0
4695.27	2.12980	8.2396E+0	9.0437E+0	8.1750E+0	4703.82	2.12593	3.8336E+0	4.6553E+0	3.7728E+0
4695.37	2.12976	8.3711E+0	9.1748E+0	8.3062E+0	4704.07	2.12582	3.6955E+0	4.5176E+0	3.6350E+0
4695.57	2.12967	8.6010E+0	9.4041E+0	8.5355E+0	4704.32	2.12571	3.5616E+0	4.3839E+0	3.5014E+0
4695.77	2.12958	8.8096E+0	9.6123E+0	8.7435E+0	4704.57	2.12559	3.4351E+0	4.2576E+0	3.3752E+0
4695.97	2.12949	8.9987E+0	9.8010E+0	8.9320E+0	4704.82	2.12548	3.3239E+0	4.1464E+0	3.2646E+0
4696.17	2.12939	9.1837E+0	9.9857E+0	9.1156E+0	4705.07	2.12537	3.2230E+0	4.0453E+0	3.1643E+0
4696.37	2.12930	9.3634E+0	1.0165E+1	9.2922E+0	4705.32	2.12525	3.1272E+0	3.9492E+0	3.0692E+0
4696.57	2.12921	9.5434E+0	1.0344E+1	9.4702E+0	4705.57	2.12514	3.0400E+0	3.8614E+0	2.9824E+0
4696.77	2.12912	9.7209E+0	1.0521E+1	9.6454E+0	4705.82	2.12503	2.9586E+0	3.7795E+0	2.9016E+0
4696.97	2.12903	9.8992E+0	1.0698E+1	9.8222E+0	4706.07	2.12491	2.8857E+0	3.7060E+0	2.8290E+0
4697.17	2.12894	1.0073E+1	1.0871E+1	9.9944E+0	4706.32	2.12480	2.8200E+0	3.6398E+0	2.7637E+0
4697.37	2.12885	1.0247E+1	1.1044E+1	1.0167E+1	4706.57	2.12469	2.7639E+0	3.5830E+0	2.7077E+0
4697.47	2.12881	1.0332E+1	1.1129E+1	1.0252E+1	4706.77	2.12460	2.7252E+0	3.5439E+0	2.6691E+0
4697.57	2.12876	1.0416E+1	1.1211E+1	1.0335E+1	4706.97	2.12451	2.6951E+0	3.5135E+0	2.6390E+0
4697.67	2.12872	1.0497E+1	1.1292E+1	1.0417E+1	4707.17	2.12442	2.6724E+0	3.4906E+0	2.6163E+0
4697.77	2.12867	1.0580E+1	1.1374E+1	1.0499E+1	4707.37	2.12433	2.6544E+0	3.4727E+0	2.5982E+0
4697.87	2.12862	1.0659E+1	1.1452E+1	1.0578E+1	4707.57	2.12424	2.6412E+0	3.4597E+0	2.5848E+0
4697.97	2.12858	1.0735E+1	1.1528E+1	1.0654E+1	4707.77	2.12415	2.6355E+0	3.4543E+0	2.5787E+0
4698.07	2.12853	1.0808E+1	1.1601E+1	1.0726E+1	4707.97	2.12406	2.6358E+0	3.4550E+0	2.5786E+0
4698.17	2.12849	1.0867E+1	1.1660E+1	1.0785E+1	4708.17	2.12397	2.6422E+0	3.4618E+0	2.5845E+0
4698.27	2.12844	1.0907E+1	1.1699E+1	1.0824E+1	4708.37	2.12388	2.6539E+0	3.4739E+0	2.5958E+0
4698.37	2.12840	1.0929E+1	1.1720E+1	1.0845E+1	4708.57	2.12379	2.6741E+0	3.4947E+0	2.6154E+0
4698.47	2.12835	1.0921E+1	1.1713E+1	1.0835E+1	4708.67	2.12374	2.6869E+0	3.5078E+0	2.6278E+0
4698.57	2.12831	1.0892E+1	1.1685E+1	1.0805E+1	4708.77	2.12370	2.7026E+0	3.5239E+0	2.6431E+0
4698.67	2.12826	1.0826E+1	1.1621E+1	1.0737E+1	4708.87	2.12365	2.7217E+0	3.5434E+0	2.6618E+0
4698.77	2.12822	1.0734E+1	1.1530E+1	1.0644E+1	4708.97	2.12361	2.7467E+0	3.5686E+0	2.6863E+0
4698.87	2.12817	1.0587E+1	1.1386E+1	1.0494E+1	4709.07	2.12356	2.7795E+0	3.6014E+0	2.7187E+0
4698.97	2.12813	1.0417E+1	1.1217E+1	1.0320E+1	4709.17	2.12352	2.8211E+0	3.6432E+0	2.7600E+0
4699.07	2.12808	1.0203E+1	1.1006E+1	1.0102E+1	4709.37	2.12343	2.9207E+0	3.7435E+0	2.8589E+0
4699.17	2.12804	9.9726E+0	1.0777E+1	9.8690E+0	4709.57	2.12334	3.0586E+0	3.8819E+0	2.9962E+0
4699.37	2.12794	9.4594E+0	1.0269E+1	9.3466E+0	4709.77	2.12325	3.2277E+0	4.0512E+0	3.1651E+0
4699.57	2.12785	8.9478E+0	9.7610E+0	8.8312E+0	4709.97	2.12316	3.4280E+0	4.2509E+0	3.3667E+0
4699.77	2.12776	8.4744E+0	9.2902E+0	8.3584E+0	4710.17	2.12307	3.6654E+0	4.4866E+0	3.6057E+0
4699.97	2.12767	8.0449E+0	8.8624E+0	7.9310E+0	4710.37	2.12297	3.9242E+0	4.7432E+0	3.8660E+0
4700.17	2.12758	7.6494E+0	8.4675E+0	7.5400E+0	4710.47	2.12293	4.0573E+0	4.8749E+0	3.9997E+0
4700.37	2.12749	7.2772E+0	8.0953E+0	7.1732E+0	4710.57	2.12288	4.1818E+0	4.9983E+0	4.1241E+0
4700.57	2.12740	6.9392E+0	7.7574E+0	6.8403E+0	4710.67	2.12284	4.2997E+0	5.1151E+0	4.2420E+0
4700.77	2.12731	6.6347E+0	7.4529E+0	6.5412E+0	4710.77	2.12279	4.4104E+0	5.2249E+0	4.3525E+0
4700.97	2.12722	6.3520E+0	7.1701E+0	6.2633E+0	4710.87	2.12275	4.5086E+0	5.3225E+0	4.4507E+0
4701.17	2.12713	6.0933E+0	6.9116E+0	6.0087E+0	4710.97	2.12270	4.5929E+0	5.4065E+0	4.5349E+0
4701.37	2.12704	5.8464E+0	6.6646E+0	5.7658E+0	4711.17	2.12261	4.7283E+0	5.5418E+0	4.6700E+0
4701.57	2.12695	5.6209E+0	6.4394E+0	5.5433E+0	4711.37	2.12252	4.8275E+0	5.6419E+0	4.7690E+0
4701.82	2.12684	5.3601E+0	6.1788E+0	5.2856E+0	4711.57	2.12243	4.9013E+0	5.7171E+0	4.8426E+0
4702.07	2.12672	5.1255E+0	5.9444E+0	5.0539E+0	4711.77	2.12234	4.9841E+0	5.8005E+0	4.9251E+0
4702.32	2.12661	4.9050E+0	5.7241E+0	4.8362E+0	4711.97	2.12225	5.1068E+0	5.9228E+0	5.0469E+0
4702.57	2.12650	4.6980E+0	5.5171E+0	4.6317E+0	4712.17	2.12216	5.2592E+0	6.0741E+0	5.1994E+0
4702.82	2.12638	4.4985E+0	5.3179E+0	4.4348E+0	4712.37	2.12207	5.4364E+0	6.2501E+0	5.3771E+0
4703.07	2.12627	4.3119E+0	5.1318E+0	4.2495E+0	4712.57	2.12198	5.6261E+0	6.4386E+0	5.5666E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4712.77	2.12189	5.8093E+0	6.6208E+0	5.7495E+0	4720.37	2.11848	4.6905E+0	5.5071E+0	4.6300E+0
4712.87	2.12185	5.8918E+0	6.7029E+0	5.8319E+0	4720.47	2.11843	4.7561E+0	5.5731E+0	4.6927E+0
4712.97	2.12180	5.9645E+0	6.7753E+0	5.9045E+0	4720.57	2.11839	4.8306E+0	5.6481E+0	4.7635E+0
4713.07	2.12176	6.0307E+0	6.8412E+0	5.9706E+0	4720.67	2.11834	4.9156E+0	5.7335E+0	4.8452E+0
4713.17	2.12171	6.0877E+0	6.8979E+0	6.0275E+0	4720.77	2.11830	5.0110E+0	5.8293E+0	4.9363E+0
4713.27	2.12167	6.1403E+0	6.9503E+0	6.0800E+0	4720.87	2.11825	5.1206E+0	5.9395E+0	5.0405E+0
4713.37	2.12162	6.1850E+0	6.9948E+0	6.1247E+0	4720.97	2.11821	5.2408E+0	6.0601E+0	5.1567E+0
4713.47	2.12158	6.2177E+0	7.0274E+0	6.1573E+0	4721.07	2.11816	5.3746E+0	6.1945E+0	5.2864E+0
4713.57	2.12153	6.2450E+0	7.0546E+0	6.1846E+0	4721.17	2.11812	5.5256E+0	6.3460E+0	5.4327E+0
4713.67	2.12149	6.2625E+0	7.0721E+0	6.2020E+0	4721.27	2.11807	5.6986E+0	6.5198E+0	5.6002E+0
4713.77	2.12144	6.2662E+0	7.0758E+0	6.2058E+0	4721.37	2.11803	5.8927E+0	6.7148E+0	5.7873E+0
4713.87	2.12140	6.2557E+0	7.0652E+0	6.1953E+0	4721.47	2.11798	6.1329E+0	6.9558E+0	6.0209E+0
4713.97	2.12135	6.2334E+0	7.0429E+0	6.1730E+0	4721.67	2.11789	6.7731E+0	7.5974E+0	6.6517E+0
4714.07	2.12131	6.2015E+0	7.0111E+0	6.1412E+0	4721.87	2.11780	7.7936E+0	8.6194E+0	7.6530E+0
4714.17	2.12126	6.1569E+0	6.9665E+0	6.0966E+0	4722.07	2.11771	9.1963E+0	1.0021E+1	9.0191E+0
4714.37	2.12117	6.0483E+0	6.8581E+0	5.9882E+0	4722.29	2.11762	1.1291E+1	1.2114E+1	1.1033E+1
4714.57	2.12108	5.9147E+0	6.7252E+0	5.8548E+0	4722.51	2.11752	1.4271E+1	1.5137E+1	1.3834E+1
4714.77	2.12099	5.7672E+0	6.5784E+0	5.7076E+0	4722.62	2.11747	1.5992E+1	1.6935E+1	1.5395E+1
4714.97	2.12090	5.6162E+0	6.4283E+0	5.5567E+0	4722.73	2.11742	1.7603E+1	1.8606E+1	1.6895E+1
4715.17	2.12081	5.4629E+0	6.2757E+0	5.4037E+0	4722.84	2.11737	1.8947E+1	2.0045E+1	1.8101E+1
4715.37	2.12072	5.3138E+0	6.1269E+0	5.2547E+0	4722.96	2.11732	1.9676E+1	2.0814E+1	1.8750E+1
4715.57	2.12063	5.1785E+0	5.9915E+0	5.1196E+0	4723.01	2.11729	1.9803E+1	2.0941E+1	1.8869E+1
4715.77	2.12054	5.0536E+0	5.8664E+0	4.9950E+0	4723.07	2.11727	1.9716E+1	2.0840E+1	1.8802E+1
4715.97	2.12045	4.9350E+0	5.7474E+0	4.8765E+0	4723.18	2.11722	1.8958E+1	2.0024E+1	1.8146E+1
4716.17	2.12036	4.8274E+0	5.6395E+0	4.7691E+0	4723.29	2.11717	1.7679E+1	1.8665E+1	1.6996E+1
4716.37	2.12027	4.7351E+0	5.5474E+0	4.6769E+0	4723.40	2.11712	1.6047E+1	1.6967E+1	1.5494E+1
4716.57	2.12018	4.6652E+0	5.4780E+0	4.6071E+0	4723.51	2.11707	1.4358E+1	1.5222E+1	1.3946E+1
4716.77	2.12009	4.6048E+0	5.4182E+0	4.5467E+0	4723.62	2.11702	1.2681E+1	1.3508E+1	1.2399E+1
4716.97	2.12000	4.5530E+0	5.3668E+0	4.4950E+0	4723.85	2.11692	9.8799E+0	1.0706E+1	9.7056E+0
4717.17	2.11991	4.5058E+0	5.3201E+0	4.4478E+0	4724.07	2.11682	7.7638E+0	8.5892E+0	7.6404E+0
4717.37	2.11982	4.4631E+0	5.2776E+0	4.4051E+0	4724.18	2.11677	6.9524E+0	7.7762E+0	6.8422E+0
4717.57	2.11973	4.4285E+0	5.2431E+0	4.3706E+0	4724.29	2.11672	6.2583E+0	7.0801E+0	6.1575E+0
4717.77	2.11964	4.3992E+0	5.2138E+0	4.3414E+0	4724.41	2.11667	5.7393E+0	6.5604E+0	5.6439E+0
4717.97	2.11955	4.3775E+0	5.1919E+0	4.3197E+0	4724.52	2.11662	5.3316E+0	6.1529E+0	5.2406E+0
4718.17	2.11946	4.3627E+0	5.1767E+0	4.3049E+0	4724.63	2.11657	4.9727E+0	5.7943E+0	4.8864E+0
4718.37	2.11937	4.3532E+0	5.1669E+0	4.2955E+0	4724.74	2.11652	4.6820E+0	5.5040E+0	4.6027E+0
4718.57	2.11929	4.3506E+0	5.1642E+0	4.2928E+0	4724.97	2.11641	4.1768E+0	4.9991E+0	4.1086E+0
4718.77	2.11920	4.3521E+0	5.1659E+0	4.2943E+0	4725.07	2.11637	3.9932E+0	4.8152E+0	3.9279E+0
4718.97	2.11911	4.3572E+0	5.1715E+0	4.2994E+0	4725.17	2.11632	3.8281E+0	4.6493E+0	3.7652E+0
4719.17	2.11902	4.3665E+0	5.1812E+0	4.3087E+0	4725.27	2.11628	3.6755E+0	4.4957E+0	3.6146E+0
4719.37	2.11893	4.3821E+0	5.1973E+0	4.3242E+0	4725.37	2.11624	3.5403E+0	4.3591E+0	3.4814E+0
4719.47	2.11888	4.3946E+0	5.2100E+0	4.3367E+0	4725.57	2.11615	3.3325E+0	4.1478E+0	3.2759E+0
4719.57	2.11884	4.4086E+0	5.2241E+0	4.3506E+0	4725.77	2.11606	3.1732E+0	3.9853E+0	3.1169E+0
4719.67	2.11879	4.4267E+0	5.2424E+0	4.3687E+0	4725.97	2.11597	3.0517E+0	3.8615E+0	2.9956E+0
4719.77	2.11875	4.4483E+0	5.2641E+0	4.3903E+0	4726.07	2.11592	2.9997E+0	3.8091E+0	2.9437E+0
4719.87	2.11870	4.4750E+0	5.2909E+0	4.4169E+0	4726.17	2.11588	2.9504E+0	3.7597E+0	2.8945E+0
4719.97	2.11866	4.5075E+0	5.3234E+0	4.4494E+0	4726.27	2.11583	2.9050E+0	3.7141E+0	2.8491E+0
4720.07	2.11861	4.5442E+0	5.3602E+0	4.4860E+0	4726.37	2.11579	2.8628E+0	3.6720E+0	2.8069E+0
4720.17	2.11857	4.5856E+0	5.4017E+0	4.5273E+0	4726.57	2.11570	2.7898E+0	3.5991E+0	2.7340E+0
4720.27	2.11852	4.6337E+0	5.4500E+0	4.5750E+0	4726.77	2.11561	2.7244E+0	3.5342E+0	2.6687E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4726.97	2.11552	2.6690E+0	3.4792E+0	2.6132E+0	4735.47	2.11172	2.7691E+0	3.5796E+0	2.7133E+0
4727.17	2.11543	2.6182E+0	3.4288E+0	2.5625E+0	4735.57	2.11168	2.8455E+0	3.6546E+0	2.7897E+0
4727.37	2.11534	2.5737E+0	3.3848E+0	2.5181E+0	4735.67	2.11163	2.9264E+0	3.7338E+0	2.8705E+0
4727.57	2.11525	2.5370E+0	3.3482E+0	2.4813E+0	4735.77	2.11159	3.0018E+0	3.8075E+0	2.9460E+0
4727.77	2.11516	2.5066E+0	3.3180E+0	2.4510E+0	4735.87	2.11154	3.0537E+0	3.8582E+0	2.9979E+0
4727.97	2.11507	2.4838E+0	3.2953E+0	2.4282E+0	4735.97	2.11150	3.0837E+0	3.8874E+0	3.0280E+0
4728.17	2.11498	2.4728E+0	3.2840E+0	2.4172E+0	4736.07	2.11145	3.0895E+0	3.8928E+0	3.0337E+0
4728.37	2.11489	2.4683E+0	3.2793E+0	2.4128E+0	4736.17	2.11141	3.0657E+0	3.8695E+0	3.0100E+0
4728.57	2.11480	2.4690E+0	3.2798E+0	2.4134E+0	4736.27	2.11136	3.0165E+0	3.8217E+0	2.9608E+0
4728.77	2.11471	2.4694E+0	3.2800E+0	2.4138E+0	4736.37	2.11132	2.9488E+0	3.7560E+0	2.8930E+0
4728.97	2.11462	2.4706E+0	3.2812E+0	2.4150E+0	4736.47	2.11127	2.8636E+0	3.6734E+0	2.8077E+0
4729.17	2.11453	2.4720E+0	3.2825E+0	2.4164E+0	4736.57	2.11123	2.7759E+0	3.5880E+0	2.7201E+0
4729.37	2.11444	2.4745E+0	3.2852E+0	2.4190E+0	4736.67	2.11119	2.6891E+0	3.5028E+0	2.6332E+0
4729.57	2.11436	2.4783E+0	3.2891E+0	2.4227E+0	4736.77	2.11114	2.6182E+0	3.4328E+0	2.5623E+0
4729.77	2.11427	2.4804E+0	3.2914E+0	2.4248E+0	4736.87	2.11110	2.5599E+0	3.3746E+0	2.5041E+0
4729.97	2.11418	2.4786E+0	3.2899E+0	2.4231E+0	4736.97	2.11105	2.5211E+0	3.3351E+0	2.4653E+0
4730.17	2.11409	2.4736E+0	3.2850E+0	2.4180E+0	4737.07	2.11101	2.4901E+0	3.3032E+0	2.4344E+0
4730.37	2.11400	2.4666E+0	3.2783E+0	2.4110E+0	4737.17	2.11096	2.4712E+0	3.2834E+0	2.4156E+0
4730.57	2.11391	2.4574E+0	3.2695E+0	2.4018E+0	4737.27	2.11092	2.4591E+0	3.2704E+0	2.4035E+0
4730.77	2.11382	2.4475E+0	3.2597E+0	2.3919E+0	4737.37	2.11087	2.4511E+0	3.2616E+0	2.3956E+0
4730.97	2.11373	2.4367E+0	3.2490E+0	2.3811E+0	4737.47	2.11083	2.4450E+0	3.2547E+0	2.3895E+0
4731.17	2.11364	2.4254E+0	3.2376E+0	2.3699E+0	4737.57	2.11078	2.4400E+0	3.2491E+0	2.3845E+0
4731.37	2.11355	2.4138E+0	3.2257E+0	2.3582E+0	4737.67	2.11074	2.4355E+0	3.2443E+0	2.3801E+0
4731.57	2.11346	2.4018E+0	3.2132E+0	2.3463E+0	4737.77	2.11070	2.4311E+0	3.2396E+0	2.3757E+0
4731.77	2.11337	2.3904E+0	3.2012E+0	2.3349E+0	4737.87	2.11065	2.4268E+0	3.2351E+0	2.3714E+0
4731.97	2.11328	2.3804E+0	3.1908E+0	2.3249E+0	4737.97	2.11061	2.4226E+0	3.2308E+0	2.3672E+0
4732.17	2.11319	2.3718E+0	3.1819E+0	2.3163E+0	4738.07	2.11056	2.4184E+0	3.2265E+0	2.3630E+0
4732.37	2.11310	2.3654E+0	3.1754E+0	2.3100E+0	4738.17	2.11052	2.4142E+0	3.2224E+0	2.3588E+0
4732.57	2.11302	2.3621E+0	3.1721E+0	2.3067E+0	4738.27	2.11047	2.4101E+0	3.2183E+0	2.3547E+0
4732.77	2.11293	2.3618E+0	3.1718E+0	2.3064E+0	4738.37	2.11043	2.4060E+0	3.2142E+0	2.3506E+0
4732.97	2.11284	2.3642E+0	3.1741E+0	2.3087E+0	4738.57	2.11034	2.3979E+0	3.2062E+0	2.3425E+0
4733.17	2.11275	2.3703E+0	3.1802E+0	2.3148E+0	4738.77	2.11025	2.3899E+0	3.1982E+0	2.3345E+0
4733.37	2.11266	2.3783E+0	3.1882E+0	2.3228E+0	4739.07	2.11012	2.3782E+0	3.1866E+0	2.3228E+0
4733.57	2.11257	2.3892E+0	3.1992E+0	2.3337E+0	4739.32	2.11001	2.3687E+0	3.1773E+0	2.3133E+0
4733.77	2.11248	2.4014E+0	3.2117E+0	2.3459E+0	4739.57	2.10989	2.3593E+0	3.1680E+0	2.3040E+0
4733.97	2.11239	2.4136E+0	3.2241E+0	2.3581E+0	4739.82	2.10978	2.3505E+0	3.1591E+0	2.2951E+0
4734.07	2.11235	2.4193E+0	3.2300E+0	2.3638E+0	4740.07	2.10967	2.3420E+0	3.1507E+0	2.2866E+0
4734.17	2.11230	2.4252E+0	3.2361E+0	2.3697E+0	4740.58	2.10945	2.3257E+0	3.1345E+0	2.2704E+0
4734.27	2.11226	2.4312E+0	3.2423E+0	2.3756E+0	4741.58	2.10900	2.2931E+0	3.1021E+0	2.2377E+0
4734.37	2.11221	2.4379E+0	3.2493E+0	2.3823E+0	4742.08	2.10878	2.2763E+0	3.0855E+0	2.2210E+0
4734.47	2.11217	2.4476E+0	3.2593E+0	2.3920E+0	4742.58	2.10856	2.2591E+0	3.0684E+0	2.2037E+0
4734.57	2.11212	2.4588E+0	3.2708E+0	2.4032E+0	4743.08	2.10834	2.2414E+0	3.0509E+0	2.1861E+0
4734.67	2.11208	2.4722E+0	3.2845E+0	2.4166E+0	4743.58	2.10811	2.2233E+0	3.0330E+0	2.1680E+0
4734.77	2.11203	2.4877E+0	3.3002E+0	2.4321E+0	4744.08	2.10789	2.2052E+0	3.0151E+0	2.1499E+0
4734.87	2.11199	2.5084E+0	3.3211E+0	2.4527E+0	4744.58	2.10767	2.1867E+0	2.9969E+0	2.1314E+0
4734.97	2.11194	2.5349E+0	3.3477E+0	2.4792E+0	4744.83	2.10756	2.1776E+0	2.9879E+0	2.1223E+0
4735.07	2.11190	2.5660E+0	3.3787E+0	2.5102E+0	4745.08	2.10745	2.1693E+0	2.9797E+0	2.1140E+0
4735.17	2.11185	2.6025E+0	3.4152E+0	2.5468E+0	4745.33	2.10734	2.1622E+0	2.9726E+0	2.1069E+0
4735.27	2.11181	2.6456E+0	3.4579E+0	2.5898E+0	4745.58	2.10723	2.1558E+0	2.9663E+0	2.1005E+0
4735.37	2.11177	2.6997E+0	3.5114E+0	2.6439E+0	4745.83	2.10711	2.1503E+0	2.9608E+0	2.0951E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4746.08	2.10700	2.1454E+0	2.9559E+0	2.0902E+0	4761.58	2.10014	2.9420E+0	3.7514E+0	2.8861E+0
4746.58	2.10678	2.1364E+0	2.9467E+0	2.0812E+0	4761.83	2.10003	2.9582E+0	3.7676E+0	2.9022E+0
4747.08	2.10656	2.1277E+0	2.9379E+0	2.0725E+0	4762.08	2.09992	2.9694E+0	3.7788E+0	2.9134E+0
4747.58	2.10634	2.1199E+0	2.9300E+0	2.0647E+0	4762.33	2.09981	2.9788E+0	3.7884E+0	2.9228E+0
4747.83	2.10623	2.1162E+0	2.9263E+0	2.0611E+0	4762.58	2.09970	2.9849E+0	3.7948E+0	2.9290E+0
4748.08	2.10612	2.1129E+0	2.9230E+0	2.0578E+0	4762.83	2.09959	2.9898E+0	3.8000E+0	2.9338E+0
4748.33	2.10601	2.1102E+0	2.9202E+0	2.0551E+0	4763.08	2.09948	2.9939E+0	3.8043E+0	2.9378E+0
4748.58	2.10589	2.1088E+0	2.9188E+0	2.0537E+0	4763.33	2.09937	2.9975E+0	3.8083E+0	2.9415E+0
4748.83	2.10578	2.1078E+0	2.9177E+0	2.0527E+0	4763.58	2.09926	3.0012E+0	3.8122E+0	2.9451E+0
4749.08	2.10567	2.1073E+0	2.9171E+0	2.0522E+0	4763.83	2.09915	3.0059E+0	3.8171E+0	2.9498E+0
4749.33	2.10556	2.1072E+0	2.9170E+0	2.0521E+0	4764.08	2.09904	3.0126E+0	3.8241E+0	2.9565E+0
4749.58	2.10545	2.1083E+0	2.9181E+0	2.0532E+0	4764.33	2.09893	3.0224E+0	3.8342E+0	2.9663E+0
4749.83	2.10534	2.1105E+0	2.9202E+0	2.0554E+0	4764.58	2.09882	3.0332E+0	3.8452E+0	2.9771E+0
4750.08	2.10523	2.1135E+0	2.9231E+0	2.0584E+0	4764.83	2.09871	3.0470E+0	3.8593E+0	2.9909E+0
4750.58	2.10501	2.1226E+0	2.9323E+0	2.0675E+0	4765.08	2.09860	3.0620E+0	3.8744E+0	3.0058E+0
4751.08	2.10479	2.1327E+0	2.9424E+0	2.0775E+0	4765.33	2.09849	3.0798E+0	3.8925E+0	3.0236E+0
4751.58	2.10456	2.1433E+0	2.9533E+0	2.0881E+0	4765.58	2.09838	3.1002E+0	3.9128E+0	3.0439E+0
4751.83	2.10445	2.1493E+0	2.9594E+0	2.0941E+0	4765.83	2.09827	3.1295E+0	3.9418E+0	3.0733E+0
4752.08	2.10434	2.1560E+0	2.9661E+0	2.1007E+0	4766.08	2.09816	3.1718E+0	3.9832E+0	3.1156E+0
4752.33	2.10423	2.1632E+0	2.9734E+0	2.1079E+0	4766.33	2.09805	3.2263E+0	4.0363E+0	3.1701E+0
4752.58	2.10412	2.1709E+0	2.9813E+0	2.1156E+0	4766.58	2.09794	3.2867E+0	4.0950E+0	3.2305E+0
4752.83	2.10401	2.1793E+0	2.9898E+0	2.1241E+0	4766.83	2.09783	3.3492E+0	4.1556E+0	3.2931E+0
4753.08	2.10390	2.1883E+0	2.9988E+0	2.1330E+0	4767.08	2.09772	3.4057E+0	4.2106E+0	3.3496E+0
4753.58	2.10368	2.2073E+0	3.0179E+0	2.1520E+0	4767.20	2.09767	3.4284E+0	4.2328E+0	3.3722E+0
4754.08	2.10346	2.2278E+0	3.0386E+0	2.1725E+0	4767.33	2.09761	3.4439E+0	4.2483E+0	3.3878E+0
4754.33	2.10335	2.2393E+0	3.0502E+0	2.1840E+0	4767.45	2.09756	3.4546E+0	4.2593E+0	3.3985E+0
4754.58	2.10324	2.2517E+0	3.0627E+0	2.1964E+0	4767.58	2.09750	3.4579E+0	4.2633E+0	3.4017E+0
4754.83	2.10313	2.2648E+0	3.0759E+0	2.2094E+0	4767.83	2.09739	3.4572E+0	4.2643E+0	3.4010E+0
4755.08	2.10302	2.2790E+0	3.0902E+0	2.2236E+0	4768.08	2.09728	3.4536E+0	4.2624E+0	3.3972E+0
4755.33	2.10290	2.2952E+0	3.1065E+0	2.2398E+0	4768.33	2.09717	3.4585E+0	4.2677E+0	3.4020E+0
4755.58	2.10279	2.3132E+0	3.1244E+0	2.2578E+0	4768.58	2.09706	3.4678E+0	4.2765E+0	3.4114E+0
4756.08	2.10257	2.3522E+0	3.1635E+0	2.2967E+0	4768.70	2.09701	3.4739E+0	4.2817E+0	3.4175E+0
4756.58	2.10235	2.4006E+0	3.2122E+0	2.3451E+0	4768.83	2.09695	3.4819E+0	4.2888E+0	3.4256E+0
4756.83	2.10224	2.4298E+0	3.2417E+0	2.3743E+0	4769.08	2.09684	3.5046E+0	4.3102E+0	3.4483E+0
4757.08	2.10213	2.4578E+0	3.2700E+0	2.4022E+0	4769.20	2.09679	3.5189E+0	4.3238E+0	3.4626E+0
4757.33	2.10202	2.4864E+0	3.2991E+0	2.4308E+0	4769.33	2.09673	3.5351E+0	4.3395E+0	3.4789E+0
4757.58	2.10191	2.5161E+0	3.3295E+0	2.4604E+0	4769.45	2.09668	3.5546E+0	4.3584E+0	3.4984E+0
4757.83	2.10180	2.5468E+0	3.3608E+0	2.4911E+0	4769.58	2.09662	3.5768E+0	4.3803E+0	3.5205E+0
4758.08	2.10169	2.5787E+0	3.3929E+0	2.5229E+0	4769.70	2.09657	3.6011E+0	4.4050E+0	3.5448E+0
4758.58	2.10147	2.6414E+0	3.4555E+0	2.5856E+0	4769.83	2.09651	3.6291E+0	4.4337E+0	3.5728E+0
4759.08	2.10125	2.6997E+0	3.5129E+0	2.6438E+0	4769.95	2.09646	3.6602E+0	4.4657E+0	3.6037E+0
4759.33	2.10114	2.7279E+0	3.5407E+0	2.6721E+0	4770.08	2.09640	3.6949E+0	4.5014E+0	3.6383E+0
4759.58	2.10103	2.7554E+0	3.5676E+0	2.6996E+0	4770.33	2.09629	3.7730E+0	4.5816E+0	3.7163E+0
4759.83	2.10092	2.7823E+0	3.5940E+0	2.7265E+0	4770.58	2.09618	3.8695E+0	4.6799E+0	3.8126E+0
4760.08	2.10081	2.8084E+0	3.6195E+0	2.7525E+0	4770.78	2.09609	3.9570E+0	4.7688E+0	3.8999E+0
4760.33	2.10070	2.8336E+0	3.6443E+0	2.7778E+0	4770.98	2.09601	4.0615E+0	4.8743E+0	4.0042E+0
4760.58	2.10059	2.8582E+0	3.6685E+0	2.8023E+0	4771.18	2.09592	4.1905E+0	5.0040E+0	4.1330E+0
4760.83	2.10048	2.8820E+0	3.6919E+0	2.8261E+0	4771.38	2.09583	4.3365E+0	5.1505E+0	4.2787E+0
4761.08	2.10036	2.9038E+0	3.7135E+0	2.8479E+0	4771.58	2.09574	4.5137E+0	5.3279E+0	4.4557E+0
4761.33	2.10025	2.9241E+0	3.7336E+0	2.8682E+0	4771.68	2.09570	4.6147E+0	5.4290E+0	4.5566E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4771.78	2.09565	4.7232E+0	5.5376E+0	4.6649E+0	4780.53	2.09182	4.2174E+0	5.0224E+0	4.1604E+0
4771.88	2.09561	4.8431E+0	5.6575E+0	4.7846E+0	4780.99	2.09162	4.1970E+0	5.0010E+0	4.1401E+0
4771.98	2.09557	4.9750E+0	5.7895E+0	4.9161E+0	4781.44	2.09142	4.2029E+0	5.0059E+0	4.1460E+0
4772.08	2.09552	5.1170E+0	5.9316E+0	5.0567E+0	4781.90	2.09122	4.2235E+0	5.0259E+0	4.1662E+0
4772.18	2.09548	5.2728E+0	6.0876E+0	5.2098E+0	4782.36	2.09102	4.2552E+0	5.0576E+0	4.1974E+0
4772.28	2.09543	5.4398E+0	6.2547E+0	5.3728E+0	4782.82	2.09082	4.3130E+0	5.1158E+0	4.2549E+0
4772.38	2.09539	5.6209E+0	6.4362E+0	5.5480E+0	4783.27	2.09062	4.3909E+0	5.1939E+0	4.3320E+0
4772.48	2.09535	5.8198E+0	6.6354E+0	5.7405E+0	4783.73	2.09042	4.4897E+0	5.2928E+0	4.4296E+0
4772.58	2.09530	6.0364E+0	6.8520E+0	5.9517E+0	4784.19	2.09022	4.6108E+0	5.4137E+0	4.5491E+0
4772.68	2.09526	6.2838E+0	7.0993E+0	6.1932E+0	4784.65	2.09002	4.7505E+0	5.5536E+0	4.6869E+0
4772.78	2.09522	6.5644E+0	7.3799E+0	6.4677E+0	4785.11	2.08982	4.9173E+0	5.7206E+0	4.8510E+0
4772.88	2.09517	6.8942E+0	7.7095E+0	6.7910E+0	4785.33	2.08972	5.0163E+0	5.8195E+0	4.9478E+0
4772.98	2.09513	7.2680E+0	8.0829E+0	7.1575E+0	4785.56	2.08962	5.1318E+0	5.9348E+0	5.0606E+0
4773.08	2.09508	7.7429E+0	8.5575E+0	7.6247E+0	4785.79	2.08952	5.2585E+0	6.0612E+0	5.1846E+0
4773.18	2.09504	8.2903E+0	9.1036E+0	8.1657E+0	4786.02	2.08942	5.4038E+0	6.2060E+0	5.3261E+0
4773.38	2.09495	9.6067E+0	1.0414E+1	9.4664E+0	4786.48	2.08922	5.7421E+0	6.5441E+0	5.6532E+0
4773.58	2.09486	1.1411E+1	1.2210E+1	1.1239E+1	4786.94	2.08902	6.1432E+0	6.9460E+0	6.0421E+0
4773.78	2.09478	1.3875E+1	1.4672E+1	1.3635E+1	4787.40	2.08882	6.5918E+0	7.3962E+0	6.4782E+0
4773.91	2.09472	1.5842E+1	1.6652E+1	1.5519E+1	4787.85	2.08862	7.0526E+0	7.8587E+0	6.9239E+0
4774.14	2.09462	2.0034E+1	2.0891E+1	1.9558E+1	4788.31	2.08842	7.4919E+0	8.2989E+0	7.3529E+0
4774.25	2.09457	2.2337E+1	2.3212E+1	2.1772E+1	4788.77	2.08822	7.9306E+0	8.7384E+0	7.7843E+0
4774.37	2.09452	2.4253E+1	2.5153E+1	2.3594E+1	4789.23	2.08802	8.3706E+0	9.1788E+0	8.2197E+0
4774.48	2.09447	2.5862E+1	2.6865E+1	2.5110E+1	4789.46	2.08792	8.6300E+0	9.4388E+0	8.4758E+0
4774.60	2.09442	2.7250E+1	2.8356E+1	2.6390E+1	4789.69	2.08782	8.9388E+0	9.7479E+0	8.7777E+0
4774.71	2.09437	2.7980E+1	2.9141E+1	2.7058E+1	4789.92	2.08772	9.3164E+0	1.0126E+1	9.1430E+0
4774.82	2.09432	2.8036E+1	2.9206E+1	2.7104E+1	4790.15	2.08762	9.7979E+0	1.0609E+1	9.6027E+0
4774.94	2.09427	2.7354E+1	2.8474E+1	2.6481E+1	4790.38	2.08752	1.0331E+1	1.1144E+1	1.0113E+1
4775.05	2.09422	2.6141E+1	2.7161E+1	2.5378E+1	4790.61	2.08742	1.0871E+1	1.1688E+1	1.0620E+1
4775.17	2.09417	2.4742E+1	2.5669E+1	2.4066E+1	4790.84	2.08732	1.1398E+1	1.2224E+1	1.1108E+1
4775.28	2.09412	2.3201E+1	2.4071E+1	2.2611E+1	4791.07	2.08722	1.1906E+1	1.2744E+1	1.1573E+1
4775.39	2.09407	2.1384E+1	2.2247E+1	2.0877E+1	4791.30	2.08712	1.2352E+1	1.3208E+1	1.1972E+1
4775.51	2.09402	1.9456E+1	2.0301E+1	1.9028E+1	4791.41	2.08707	1.2550E+1	1.3419E+1	1.2140E+1
4775.74	2.09392	1.5835E+1	1.6650E+1	1.5540E+1	4791.53	2.08702	1.2719E+1	1.3606E+1	1.2272E+1
4775.96	2.09382	1.2997E+1	1.3799E+1	1.2830E+1	4791.64	2.08697	1.2843E+1	1.3746E+1	1.2365E+1
4776.19	2.09372	1.0765E+1	1.1573E+1	1.0646E+1	4791.75	2.08692	1.2909E+1	1.3824E+1	1.2409E+1
4776.42	2.09362	9.1300E+0	9.9424E+0	9.0337E+0	4791.87	2.08687	1.2880E+1	1.3796E+1	1.2377E+1
4776.65	2.09352	7.9861E+0	8.8015E+0	7.9008E+0	4791.98	2.08682	1.2747E+1	1.3661E+1	1.2251E+1
4776.88	2.09342	7.1559E+0	7.9721E+0	7.0779E+0	4792.10	2.08677	1.2539E+1	1.3445E+1	1.2060E+1
4777.10	2.09332	6.5237E+0	7.3392E+0	6.4533E+0	4792.21	2.08672	1.2196E+1	1.3086E+1	1.1754E+1
4777.33	2.09322	6.0001E+0	6.8134E+0	5.9382E+0	4792.33	2.08667	1.1750E+1	1.2623E+1	1.1351E+1
4777.56	2.09312	5.6035E+0	6.4152E+0	5.5441E+0	4792.44	2.08662	1.1192E+1	1.2048E+1	1.0839E+1
4777.79	2.09302	5.3022E+0	6.1130E+0	5.2433E+0	4792.67	2.08652	9.8810E+0	1.0713E+1	9.6116E+0
4778.02	2.09292	5.0882E+0	5.8983E+0	5.0297E+0	4792.90	2.08642	8.6480E+0	9.4637E+0	8.4559E+0
4778.25	2.09282	4.9156E+0	5.7249E+0	4.8574E+0	4793.13	2.08632	7.6235E+0	8.4335E+0	7.4885E+0
4778.47	2.09272	4.7726E+0	5.5812E+0	4.7147E+0	4793.36	2.08622	6.7398E+0	7.5478E+0	6.6337E+0
4778.70	2.09262	4.6505E+0	5.4584E+0	4.5928E+0	4793.59	2.08612	6.1126E+0	6.9202E+0	6.0258E+0
4778.93	2.09252	4.5456E+0	5.3530E+0	4.4881E+0	4793.82	2.08602	5.6424E+0	6.4496E+0	5.5686E+0
4779.16	2.09242	4.4609E+0	5.2679E+0	4.4034E+0	4794.05	2.08592	5.2621E+0	6.0690E+0	5.1957E+0
4779.62	2.09222	4.3377E+0	5.1445E+0	4.2805E+0	4794.28	2.08582	4.9640E+0	5.7714E+0	4.9011E+0
4780.07	2.09202	4.2646E+0	5.0706E+0	4.2075E+0	4794.51	2.08572	4.7278E+0	5.5351E+0	4.6673E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4794.74	2.08562	4.5442E+0	5.3510E+0	4.4848E+0	4805.80	2.08082	5.3663E+0	6.1741E+0	5.3060E+0
4794.97	2.08552	4.3998E+0	5.2064E+0	4.3409E+0	4806.03	2.08072	5.4436E+0	6.2514E+0	5.3846E+0
4795.20	2.08542	4.2836E+0	5.0907E+0	4.2248E+0	4806.26	2.08062	5.5385E+0	6.3468E+0	5.4794E+0
4795.43	2.08532	4.1896E+0	4.9973E+0	4.1309E+0	4806.50	2.08052	5.6533E+0	6.4625E+0	5.5940E+0
4795.66	2.08522	4.1188E+0	4.9267E+0	4.0602E+0	4806.73	2.08042	5.8154E+0	6.6255E+0	5.7557E+0
4795.89	2.08512	4.0669E+0	4.8750E+0	4.0086E+0	4806.84	2.08037	5.9263E+0	6.7366E+0	5.8665E+0
4796.35	2.08492	3.9906E+0	4.7989E+0	3.9336E+0	4806.96	2.08032	6.0720E+0	6.8823E+0	6.0118E+0
4796.81	2.08472	3.9385E+0	4.7469E+0	3.8816E+0	4807.19	2.08022	6.4723E+0	7.2813E+0	6.4103E+0
4797.04	2.08462	3.9270E+0	4.7352E+0	3.8701E+0	4807.42	2.08012	6.9695E+0	7.7745E+0	6.9021E+0
4797.27	2.08452	3.9240E+0	4.7321E+0	3.8672E+0	4807.65	2.08002	7.4415E+0	8.2420E+0	7.3699E+0
4797.50	2.08442	3.9286E+0	4.7367E+0	3.8717E+0	4807.88	2.07992	7.7422E+0	8.5429E+0	7.6693E+0
4797.73	2.08432	3.9397E+0	4.7479E+0	3.8828E+0	4808.00	2.07987	7.8231E+0	8.6259E+0	7.7510E+0
4797.96	2.08422	3.9587E+0	4.7672E+0	3.9018E+0	4808.11	2.07982	7.8118E+0	8.6169E+0	7.7424E+0
4798.42	2.08402	4.0133E+0	4.8224E+0	3.9563E+0	4808.23	2.07977	7.7523E+0	8.5594E+0	7.6857E+0
4798.88	2.08382	4.0820E+0	4.8920E+0	4.0248E+0	4808.46	2.07967	7.6437E+0	8.4540E+0	7.5803E+0
4799.34	2.08362	4.1694E+0	4.9801E+0	4.1121E+0	4808.58	2.07962	7.6229E+0	8.4338E+0	7.5595E+0
4799.57	2.08352	4.2244E+0	5.0352E+0	4.1670E+0	4808.69	2.07957	7.6499E+0	8.4611E+0	7.5863E+0
4799.80	2.08342	4.2893E+0	5.1000E+0	4.2318E+0	4808.81	2.07952	7.7264E+0	8.5373E+0	7.6622E+0
4800.04	2.08332	4.3587E+0	5.1692E+0	4.3011E+0	4808.92	2.07947	7.8785E+0	8.6889E+0	7.8133E+0
4800.27	2.08322	4.4357E+0	5.2460E+0	4.3780E+0	4809.04	2.07942	8.0705E+0	8.8794E+0	8.0043E+0
4800.50	2.08312	4.5336E+0	5.3446E+0	4.4759E+0	4809.27	2.07932	8.6428E+0	9.4477E+0	8.5741E+0
4800.73	2.08302	4.6574E+0	5.4702E+0	4.5994E+0	4809.50	2.07922	9.3602E+0	1.0159E+1	9.2844E+0
4800.96	2.08292	4.8269E+0	5.6410E+0	4.7685E+0	4809.73	2.07912	1.0206E+1	1.0998E+1	1.0114E+1
4801.19	2.08282	5.0652E+0	5.8797E+0	5.0057E+0	4809.96	2.07902	1.1094E+1	1.1881E+1	1.0977E+1
4801.42	2.08272	5.4114E+0	6.2250E+0	5.3496E+0	4810.08	2.07897	1.1474E+1	1.2260E+1	1.1345E+1
4801.65	2.08262	5.9124E+0	6.7231E+0	5.8466E+0	4810.19	2.07892	1.1779E+1	1.2565E+1	1.1639E+1
4801.76	2.08257	6.2273E+0	7.0368E+0	6.1580E+0	4810.31	2.07887	1.1990E+1	1.2776E+1	1.1839E+1
4801.88	2.08252	6.6252E+0	7.4345E+0	6.5496E+0	4810.43	2.07882	1.2059E+1	1.2846E+1	1.1903E+1
4801.99	2.08247	7.0647E+0	7.8739E+0	6.9816E+0	4810.54	2.07877	1.1992E+1	1.2779E+1	1.1841E+1
4802.11	2.08242	7.4864E+0	8.2943E+0	7.3918E+0	4810.66	2.07872	1.1815E+1	1.2602E+1	1.1670E+1
4802.23	2.08237	7.8464E+0	8.6525E+0	7.7372E+0	4810.89	2.07862	1.1330E+1	1.2122E+1	1.1204E+1
4802.34	2.08232	8.1092E+0	8.9130E+0	7.9881E+0	4811.12	2.07852	1.0781E+1	1.1578E+1	1.0677E+1
4802.46	2.08227	8.2605E+0	9.0619E+0	8.1349E+0	4811.24	2.07847	1.0504E+1	1.1302E+1	1.0414E+1
4802.57	2.08222	8.2769E+0	9.0773E+0	8.1505E+0	4811.35	2.07842	1.0243E+1	1.1041E+1	1.0164E+1
4802.69	2.08217	8.1819E+0	8.9831E+0	8.0584E+0	4811.47	2.07837	9.9902E+0	1.0789E+1	9.9175E+0
4802.80	2.08212	7.9854E+0	8.7886E+0	7.8700E+0	4811.58	2.07832	9.7728E+0	1.0572E+1	9.7035E+0
4802.92	2.08207	7.6928E+0	8.4980E+0	7.5916E+0	4811.70	2.07827	9.5894E+0	1.0390E+1	9.5209E+0
4803.03	2.08202	7.3387E+0	8.1451E+0	7.2522E+0	4811.81	2.07822	9.4319E+0	1.0233E+1	9.3639E+0
4803.26	2.08192	6.6615E+0	7.4713E+0	6.5904E+0	4812.05	2.07812	9.2140E+0	1.0015E+1	9.1467E+0
4803.49	2.08182	6.1271E+0	6.9395E+0	6.0651E+0	4812.28	2.07802	9.0992E+0	9.8998E+0	9.0323E+0
4803.61	2.08177	5.9227E+0	6.7355E+0	5.8626E+0	4812.51	2.07792	9.0503E+0	9.8505E+0	8.9836E+0
4803.72	2.08172	5.7687E+0	6.5817E+0	5.7089E+0	4812.74	2.07782	9.0379E+0	9.8379E+0	8.9713E+0
4803.96	2.08162	5.5479E+0	6.3609E+0	5.4884E+0	4812.97	2.07772	9.0467E+0	9.8464E+0	8.9801E+0
4804.19	2.08152	5.4040E+0	6.2163E+0	5.3448E+0	4813.20	2.07762	9.0703E+0	9.8697E+0	9.0017E+0
4804.42	2.08142	5.3016E+0	6.1126E+0	5.2427E+0	4813.44	2.07752	9.1066E+0	9.9058E+0	9.0352E+0
4804.65	2.08132	5.2427E+0	6.0521E+0	5.1834E+0	4813.67	2.07742	9.1616E+0	9.9605E+0	9.0879E+0
4804.88	2.08122	5.2205E+0	6.0288E+0	5.1601E+0	4813.90	2.07732	9.2432E+0	1.0042E+1	9.1669E+0
4805.11	2.08112	5.2307E+0	6.0388E+0	5.1692E+0	4814.13	2.07722	9.3546E+0	1.0152E+1	9.2749E+0
4805.34	2.08102	5.2575E+0	6.0655E+0	5.1959E+0	4814.36	2.07712	9.4836E+0	1.0280E+1	9.3989E+0
4805.57	2.08092	5.3042E+0	6.1122E+0	5.2431E+0	4814.59	2.07702	9.6333E+0	1.0429E+1	9.5445E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4815.06	2.07682	1.0004E+1	1.0797E+1	9.9085E+0	4830.69	2.07010	9.3821E+2	9.5621E+2	9.2073E+2
4815.52	2.07662	1.0435E+1	1.1225E+1	1.0329E+1	4830.79	2.07005	1.0925E+3	1.1123E+3	1.0734E+3
4815.99	2.07642	1.0923E+1	1.1710E+1	1.0810E+1	4830.89	2.07001	1.2781E+3	1.3004E+3	1.2566E+3
4816.45	2.07622	1.1468E+1	1.2252E+1	1.1347E+1	4830.99	2.06997	1.4800E+3	1.5077E+3	1.4536E+3
4816.91	2.07602	1.2051E+1	1.2832E+1	1.1922E+1	4831.09	2.06993	1.6937E+3	1.7330E+3	1.6568E+3
4817.38	2.07582	1.2694E+1	1.3471E+1	1.2554E+1	4831.19	2.06988	1.9670E+3	2.0307E+3	1.9097E+3
4817.84	2.07562	1.3390E+1	1.4164E+1	1.3236E+1	4831.29	2.06984	2.7363E+3	4.4149E+3	2.4321E+3
4818.31	2.07542	1.4155E+1	1.4925E+1	1.3988E+1	4831.39	2.06980	4.1778E+3	∞	3.2821E+3
4818.77	2.07522	1.5016E+1	1.5783E+1	1.4836E+1	4832.49	2.06933	4.1782E+3	∞	3.2823E+3
4819.24	2.07502	1.5981E+1	1.6743E+1	1.5792E+1	4832.59	2.06928	3.7763E+3	7.5841E+3	3.1117E+3
4819.70	2.07482	1.7029E+1	1.7786E+1	1.6839E+1	4832.69	2.06924	2.8523E+3	3.2518E+3	2.6309E+3
4820.16	2.07462	1.8195E+1	1.8946E+1	1.8005E+1	4832.79	2.06920	2.2356E+3	2.3387E+3	2.1483E+3
4820.63	2.07442	1.9475E+1	2.0220E+1	1.9285E+1	4832.89	2.06915	1.8372E+3	1.8879E+3	1.7905E+3
4821.15	2.07419	2.1176E+1	2.1914E+1	2.0985E+1	4833.09	2.06907	1.3342E+3	1.3559E+3	1.3133E+3
4821.65	2.07398	2.3073E+1	2.3796E+1	2.2877E+1	4833.29	2.06898	1.0099E+3	1.0227E+3	9.9743E+2
4822.15	2.07376	2.5158E+1	2.5855E+1	2.4955E+1	4833.49	2.06890	7.8382E+2	7.9264E+2	7.7512E+2
4822.65	2.07355	2.7465E+1	2.8153E+1	2.7248E+1	4833.69	2.06881	6.1975E+2	6.2571E+2	6.1395E+2
4822.85	2.07346	2.8480E+1	2.9171E+1	2.8256E+1	4833.79	2.06877	5.5599E+2	5.6041E+2	5.5166E+2
4823.05	2.07338	2.9579E+1	3.0272E+1	2.9349E+1	4833.89	2.06873	5.0231E+2	5.0575E+2	4.9892E+2
4823.25	2.07329	3.0784E+1	3.1477E+1	3.0548E+1	4834.09	2.06864	4.1442E+2	4.1672E+2	4.1215E+2
4823.45	2.07320	3.2098E+1	3.2788E+1	3.1862E+1	4834.29	2.06856	3.4516E+2	3.4682E+2	3.4350E+2
4823.65	2.07312	3.3559E+1	3.4245E+1	3.3318E+1	4834.49	2.06847	2.9306E+2	2.9444E+2	2.9168E+2
4823.95	2.07299	3.5963E+1	3.6641E+1	3.5710E+1	4834.69	2.06838	2.5268E+2	2.5393E+2	2.5144E+2
4824.15	2.07290	3.7701E+1	3.8375E+1	3.7436E+1	4834.89	2.06830	2.2075E+2	2.2192E+2	2.1958E+2
4824.45	2.07277	4.0535E+1	4.1198E+1	4.0267E+1	4835.09	2.06821	1.9506E+2	1.9623E+2	1.9392E+2
4824.65	2.07269	4.2606E+1	4.3260E+1	4.2338E+1	4835.29	2.06813	1.7330E+2	1.7446E+2	1.7216E+2
4824.85	2.07260	4.4835E+1	4.5480E+1	4.4569E+1	4835.49	2.06804	1.5459E+2	1.5576E+2	1.5345E+2
4825.15	2.07247	4.8538E+1	4.9168E+1	4.8275E+1	4835.69	2.06796	1.3871E+2	1.3987E+2	1.3759E+2
4825.45	2.07234	5.2729E+1	5.3351E+1	5.2454E+1	4835.89	2.06787	1.2472E+2	1.2586E+2	1.2363E+2
4825.65	2.07226	5.5867E+1	5.6484E+1	5.5581E+1	4836.09	2.06779	1.1283E+2	1.1395E+2	1.1176E+2
4825.85	2.07217	5.9326E+1	5.9944E+1	5.9017E+1	4836.29	2.06770	1.0265E+2	1.0376E+2	1.0161E+2
4826.05	2.07209	6.3104E+1	6.3731E+1	6.2753E+1	4836.49	2.06761	9.3650E+1	9.4691E+1	9.2691E+1
4826.25	2.07200	6.7326E+1	6.7971E+1	6.6916E+1	4836.69	2.06753	8.5707E+1	8.6706E+1	8.4800E+1
4826.45	2.07192	7.2002E+1	7.2695E+1	7.1496E+1	4836.89	2.06744	7.8759E+1	7.9734E+1	7.7882E+1
4826.65	2.07183	7.7221E+1	7.7954E+1	7.6637E+1	4837.09	2.06736	7.2788E+1	7.3746E+1	7.1938E+1
4826.90	2.07172	8.4562E+1	8.5360E+1	8.3880E+1	4837.29	2.06727	6.7491E+1	6.8434E+1	6.6671E+1
4827.15	2.07161	9.2944E+1	9.3834E+1	9.2148E+1	4837.49	2.06719	6.2705E+1	6.3647E+1	6.1910E+1
4827.40	2.07151	1.0259E+2	1.0360E+2	1.0166E+2	4837.65	2.06712	5.9087E+1	6.0029E+1	5.8312E+1
4827.65	2.07140	1.1369E+2	1.1480E+2	1.1264E+2	4837.89	2.06702	5.4447E+1	5.5373E+1	5.3709E+1
4827.90	2.07129	1.2677E+2	1.2805E+2	1.2554E+2	4838.12	2.06692	5.0412E+1	5.1314E+1	4.9715E+1
4828.15	2.07119	1.4236E+2	1.4381E+2	1.4095E+2	4838.36	2.06682	4.6750E+1	4.7620E+1	4.6110E+1
4828.40	2.07108	1.6120E+2	1.6287E+2	1.5955E+2	4838.82	2.06662	4.0355E+1	4.1174E+1	3.9819E+1
4828.65	2.07097	1.8454E+2	1.8652E+2	1.8259E+2	4839.29	2.06642	3.5263E+1	3.6031E+1	3.4850E+1
4828.90	2.07086	2.1416E+2	2.1657E+2	2.1177E+2	4839.76	2.06622	3.1199E+1	3.1939E+1	3.0871E+1
4829.15	2.07076	2.5093E+2	2.5397E+2	2.4794E+2	4840.23	2.06602	2.7813E+1	2.8545E+1	2.7535E+1
4829.69	2.07053	3.6922E+2	3.7489E+2	3.6369E+2	4840.70	2.06582	2.5101E+1	2.5843E+1	2.4845E+1
4829.89	2.07044	4.3202E+2	4.3948E+2	4.2480E+2	4841.17	2.06562	2.2784E+1	2.3542E+1	2.2549E+1
4830.09	2.07035	5.0906E+2	5.1906E+2	4.9951E+2	4841.64	2.06542	2.0791E+1	2.1554E+1	2.0577E+1
4830.29	2.07027	5.9486E+2	6.0801E+2	5.8245E+2	4842.10	2.06522	1.8986E+1	1.9751E+1	1.8791E+1
4830.49	2.07018	7.2186E+2	7.3822E+2	7.0592E+2	4842.57	2.06502	1.7459E+1	1.8228E+1	1.7277E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4843.04	2.06482	1.6149E+1	1.6926E+1	1.5976E+1	4857.86	2.05852	1.3443E+1	1.4233E+1	1.3301E+1
4843.51	2.06462	1.5007E+1	1.5790E+1	1.4848E+1	4858.10	2.05842	1.4002E+1	1.4788E+1	1.3858E+1
4843.98	2.06442	1.4019E+1	1.4807E+1	1.3875E+1	4858.57	2.05822	1.5004E+1	1.5784E+1	1.4847E+1
4844.45	2.06422	1.3159E+1	1.3951E+1	1.3029E+1	4858.81	2.05812	1.5450E+1	1.6228E+1	1.5286E+1
4844.92	2.06402	1.2424E+1	1.3220E+1	1.2305E+1	4859.04	2.05802	1.5887E+1	1.6664E+1	1.5717E+1
4845.39	2.06382	1.1773E+1	1.2572E+1	1.1664E+1	4859.28	2.05792	1.6269E+1	1.7044E+1	1.6095E+1
4845.86	2.06362	1.1216E+1	1.2018E+1	1.1114E+1	4859.52	2.05782	1.6628E+1	1.7403E+1	1.6452E+1
4846.33	2.06342	1.0731E+1	1.1535E+1	1.0635E+1	4859.75	2.05772	1.6954E+1	1.7727E+1	1.6778E+1
4846.80	2.06322	1.0325E+1	1.1130E+1	1.0232E+1	4860.23	2.05752	1.7508E+1	1.8277E+1	1.7342E+1
4847.27	2.06302	9.9900E+0	1.0797E+1	9.9002E+0	4860.70	2.05732	1.8021E+1	1.8785E+1	1.7863E+1
4847.74	2.06282	9.6908E+0	1.0499E+1	9.6029E+0	4861.17	2.05712	1.8620E+1	1.9382E+1	1.8452E+1
4848.21	2.06262	9.4213E+0	1.0230E+1	9.3348E+0	4861.41	2.05702	1.9032E+1	1.9797E+1	1.8849E+1
4848.68	2.06242	9.1719E+0	9.9814E+0	9.0862E+0	4861.64	2.05692	1.9512E+1	2.0281E+1	1.9304E+1
4849.15	2.06222	8.9403E+0	9.7501E+0	8.8550E+0	4861.88	2.05682	1.9902E+1	2.0674E+1	1.9668E+1
4849.62	2.06202	8.7102E+0	9.5201E+0	8.6246E+0	4862.00	2.05677	2.0047E+1	2.0820E+1	1.9804E+1
4850.09	2.06182	8.5036E+0	9.3136E+0	8.4171E+0	4862.12	2.05672	2.0152E+1	2.0922E+1	1.9908E+1
4850.56	2.06162	8.3252E+0	9.1356E+0	8.2381E+0	4862.35	2.05662	2.0226E+1	2.0994E+1	1.9989E+1
4851.03	2.06142	8.1929E+0	9.0034E+0	8.1042E+0	4862.47	2.05657	2.0213E+1	2.0980E+1	1.9987E+1
4851.50	2.06122	8.1145E+0	8.9250E+0	8.0248E+0	4862.59	2.05652	2.0167E+1	2.0933E+1	1.9948E+1
4851.97	2.06102	8.0732E+0	8.8835E+0	7.9838E+0	4862.71	2.05647	2.0093E+1	2.0859E+1	1.9881E+1
4852.21	2.06092	8.0682E+0	8.8783E+0	7.9805E+0	4862.83	2.05642	2.0004E+1	2.0770E+1	1.9798E+1
4852.44	2.06082	8.0773E+0	8.8874E+0	7.9912E+0	4863.06	2.05632	1.9840E+1	2.0604E+1	1.9648E+1
4852.68	2.06072	8.0862E+0	8.8961E+0	8.0019E+0	4863.18	2.05627	1.9799E+1	2.0562E+1	1.9610E+1
4852.91	2.06062	8.1037E+0	8.9136E+0	8.0208E+0	4863.30	2.05622	1.9780E+1	2.0542E+1	1.9594E+1
4853.15	2.06052	8.1335E+0	8.9434E+0	8.0516E+0	4863.53	2.05612	1.9790E+1	2.0551E+1	1.9610E+1
4853.50	2.06037	8.2026E+0	9.0124E+0	8.1210E+0	4863.77	2.05602	1.9836E+1	2.0594E+1	1.9664E+1
4853.86	2.06022	8.2906E+0	9.0999E+0	8.2091E+0	4864.01	2.05592	1.9888E+1	2.0643E+1	1.9723E+1
4854.09	2.06012	8.3542E+0	9.1633E+0	8.2733E+0	4864.24	2.05582	1.9939E+1	2.0691E+1	1.9784E+1
4854.21	2.06007	8.3925E+0	9.2015E+0	8.3125E+0	4864.72	2.05562	2.0051E+1	2.0801E+1	1.9901E+1
4854.33	2.06002	8.4395E+0	9.2487E+0	8.3607E+0	4864.95	2.05552	2.0113E+1	2.0862E+1	1.9960E+1
4854.56	2.05992	8.5649E+0	9.3745E+0	8.4882E+0	4865.19	2.05542	2.0182E+1	2.0932E+1	2.0026E+1
4854.80	2.05982	8.7754E+0	9.5846E+0	8.6984E+0	4865.43	2.05532	2.0258E+1	2.1008E+1	2.0098E+1
4854.92	2.05977	8.9183E+0	9.7268E+0	8.8400E+0	4865.66	2.05522	2.0339E+1	2.1090E+1	2.0175E+1
4855.03	2.05972	9.0848E+0	9.8927E+0	9.0034E+0	4865.90	2.05512	2.0429E+1	2.1181E+1	2.0262E+1
4855.27	2.05962	9.5283E+0	1.0335E+1	9.4389E+0	4866.14	2.05502	2.0524E+1	2.1277E+1	2.0355E+1
4855.51	2.05952	1.0123E+1	1.0930E+1	1.0020E+1	4866.37	2.05492	2.0637E+1	2.1390E+1	2.0469E+1
4855.74	2.05942	1.0722E+1	1.1526E+1	1.0603E+1	4866.49	2.05487	2.0694E+1	2.1447E+1	2.0527E+1
4855.98	2.05932	1.1166E+1	1.1965E+1	1.1035E+1	4866.73	2.05477	2.0829E+1	2.1581E+1	2.0666E+1
4856.21	2.05922	1.1401E+1	1.2196E+1	1.1270E+1	4866.85	2.05472	2.0914E+1	2.1665E+1	2.0752E+1
4856.33	2.05917	1.1446E+1	1.2242E+1	1.1321E+1	4867.09	2.05462	2.1127E+1	2.1877E+1	2.0963E+1
4856.45	2.05912	1.1438E+1	1.2234E+1	1.1316E+1	4867.32	2.05452	2.1399E+1	2.2148E+1	2.1228E+1
4856.57	2.05907	1.1394E+1	1.2193E+1	1.1274E+1	4867.44	2.05447	2.1556E+1	2.2305E+1	2.1375E+1
4856.68	2.05902	1.1349E+1	1.2151E+1	1.1231E+1	4867.56	2.05442	2.1730E+1	2.2479E+1	2.1541E+1
4856.80	2.05897	1.1332E+1	1.2136E+1	1.1214E+1	4867.68	2.05437	2.1929E+1	2.2680E+1	2.1732E+1
4856.92	2.05892	1.1364E+1	1.2170E+1	1.1246E+1	4867.80	2.05432	2.2146E+1	2.2898E+1	2.1941E+1
4857.04	2.05887	1.1472E+1	1.2278E+1	1.1351E+1	4867.91	2.05427	2.2312E+1	2.3066E+1	2.2092E+1
4857.16	2.05882	1.1631E+1	1.2437E+1	1.1507E+1	4868.03	2.05422	2.2412E+1	2.3166E+1	2.2181E+1
4857.27	2.05877	1.1852E+1	1.2656E+1	1.1725E+1	4868.15	2.05417	2.2461E+1	2.3217E+1	2.2224E+1
4857.39	2.05872	1.2139E+1	1.2940E+1	1.2007E+1	4868.27	2.05412	2.2439E+1	2.3196E+1	2.2200E+1
4857.63	2.05862	1.2796E+1	1.3593E+1	1.2657E+1	4868.39	2.05407	2.2362E+1	2.3119E+1	2.2124E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4868.51	2.05402	2.2221E+1	2.2978E+1	2.1989E+1	4876.56	2.05063	5.1097E+1	5.1785E+1	5.0704E+1
4868.63	2.05397	2.2047E+1	2.2803E+1	2.1826E+1	4876.66	2.05058	5.3913E+1	5.4614E+1	5.3484E+1
4868.74	2.05392	2.1858E+1	2.2613E+1	2.1648E+1	4876.76	2.05054	5.7072E+1	5.7788E+1	5.6601E+1
4868.86	2.05387	2.1669E+1	2.2422E+1	2.1466E+1	4876.86	2.05050	6.0665E+1	6.1414E+1	6.0121E+1
4869.10	2.05377	2.1333E+1	2.2086E+1	2.1141E+1	4876.96	2.05046	6.4755E+1	6.5537E+1	6.4138E+1
4869.22	2.05372	2.1199E+1	2.1951E+1	2.1011E+1	4877.06	2.05042	6.9729E+1	7.0562E+1	6.9027E+1
4869.34	2.05367	2.1114E+1	2.1865E+1	2.0931E+1	4877.16	2.05037	7.5666E+1	7.6582E+1	7.4858E+1
4869.46	2.05362	2.1064E+1	2.1816E+1	2.0884E+1	4877.26	2.05033	8.2843E+1	8.3886E+1	8.1893E+1
4869.69	2.05352	2.1029E+1	2.1781E+1	2.0850E+1	4877.36	2.05029	9.1397E+1	9.2611E+1	9.0263E+1
4869.93	2.05342	2.1028E+1	2.1779E+1	2.0852E+1	4877.46	2.05025	1.0160E+2	1.0310E+2	1.0018E+2
4870.17	2.05332	2.1041E+1	2.1790E+1	2.0872E+1	4877.56	2.05021	1.1360E+2	1.1529E+2	1.1196E+2
4870.40	2.05322	2.1066E+1	2.1813E+1	2.0902E+1	4877.66	2.05016	1.2774E+2	1.2961E+2	1.2590E+2
4870.64	2.05312	2.1106E+1	2.1851E+1	2.0950E+1	4877.76	2.05012	1.4408E+2	1.4614E+2	1.4206E+2
4870.88	2.05302	2.1165E+1	2.1908E+1	2.1015E+1	4877.86	2.05008	1.6275E+2	1.6504E+2	1.6050E+2
4871.12	2.05292	2.1254E+1	2.1996E+1	2.1110E+1	4877.96	2.05004	1.8294E+2	1.8550E+2	1.8042E+2
4871.35	2.05282	2.1397E+1	2.2137E+1	2.1255E+1	4878.06	2.05000	2.0321E+2	2.0608E+2	2.0039E+2
4871.59	2.05272	2.1594E+1	2.2334E+1	2.1451E+1	4878.16	2.04995	2.2105E+2	2.2426E+2	2.1789E+2
4871.83	2.05262	2.1852E+1	2.2591E+1	2.1706E+1	4878.26	2.04991	2.3477E+2	2.3825E+2	2.3134E+2
4872.07	2.05252	2.2165E+1	2.2903E+1	2.2015E+1	4878.36	2.04987	2.3967E+2	2.4327E+2	2.3613E+2
4872.30	2.05242	2.2532E+1	2.3269E+1	2.2379E+1	4878.46	2.04983	2.3584E+2	2.3941E+2	2.3233E+2
4872.42	2.05237	2.2752E+1	2.3488E+1	2.2597E+1	4878.56	2.04979	2.2429E+2	2.2773E+2	2.2091E+2
4872.78	2.05222	2.3433E+1	2.4165E+1	2.3281E+1	4878.66	2.04974	2.0742E+2	2.1066E+2	2.0423E+2
4873.01	2.05212	2.3974E+1	2.4700E+1	2.3831E+1	4878.76	2.04970	1.8823E+2	1.9136E+2	1.8515E+2
4873.25	2.05202	2.4650E+1	2.5368E+1	2.4510E+1	4878.86	2.04966	1.6866E+2	1.7171E+2	1.6567E+2
4873.37	2.05197	2.5116E+1	2.5831E+1	2.4971E+1	4878.96	2.04962	1.4999E+2	1.5297E+2	1.4706E+2
4873.49	2.05192	2.5723E+1	2.6437E+1	2.5564E+1	4879.06	2.04958	1.3290E+2	1.3577E+2	1.3009E+2
4873.73	2.05182	2.7302E+1	2.8020E+1	2.7102E+1	4879.16	2.04953	1.1788E+2	1.2065E+2	1.1516E+2
4873.96	2.05172	2.9077E+1	2.9807E+1	2.8811E+1	4879.26	2.04949	1.0494E+2	1.0763E+2	1.0230E+2
4874.08	2.05167	2.9791E+1	3.0526E+1	2.9502E+1	4879.36	2.04945	9.4124E+1	9.6612E+1	9.1749E+1
4874.20	2.05162	3.0305E+1	3.1044E+1	2.9997E+1	4879.46	2.04941	8.5130E+1	8.7401E+1	8.2971E+1
4874.32	2.05157	3.0557E+1	3.1303E+1	3.0232E+1	4879.56	2.04937	7.7556E+1	7.9649E+1	7.5579E+1
4874.44	2.05152	3.0630E+1	3.1378E+1	3.0303E+1	4879.66	2.04932	7.1197E+1	7.3135E+1	6.9381E+1
4874.56	2.05147	3.0627E+1	3.1372E+1	3.0305E+1	4879.76	2.04928	6.5802E+1	6.7605E+1	6.4123E+1
4874.68	2.05142	3.0618E+1	3.1359E+1	3.0306E+1	4879.86	2.04924	6.1336E+1	6.3024E+1	5.9776E+1
4874.92	2.05132	3.0693E+1	3.1418E+1	3.0415E+1	4879.96	2.04920	5.7421E+1	5.8969E+1	5.6009E+1
4875.03	2.05127	3.0879E+1	3.1596E+1	3.0621E+1	4880.06	2.04916	5.4022E+1	5.5457E+1	5.2733E+1
4875.15	2.05122	3.1249E+1	3.1959E+1	3.1005E+1	4880.16	2.04911	5.1025E+1	5.2362E+1	4.9845E+1
4875.27	2.05117	3.1835E+1	3.2540E+1	3.1598E+1	4880.26	2.04907	4.8446E+1	4.9704E+1	4.7357E+1
4875.36	2.05113	3.2417E+1	3.3118E+1	3.2182E+1	4880.46	2.04899	4.4209E+1	4.5326E+1	4.3289E+1
4875.46	2.05109	3.3250E+1	3.3947E+1	3.3016E+1	4880.56	2.04895	4.2463E+1	4.3513E+1	4.1628E+1
4875.56	2.05105	3.4198E+1	3.4891E+1	3.3960E+1	4880.66	2.04890	4.0964E+1	4.1962E+1	4.0198E+1
4875.66	2.05100	3.5249E+1	3.5937E+1	3.5007E+1	4880.86	2.04882	3.8346E+1	3.9266E+1	3.7690E+1
4875.76	2.05096	3.6406E+1	3.7091E+1	3.6158E+1	4880.96	2.04878	3.7253E+1	3.8129E+1	3.6668E+1
4875.86	2.05092	3.7687E+1	3.8370E+1	3.7428E+1	4881.06	2.04874	3.6247E+1	3.7083E+1	3.5726E+1
4875.96	2.05088	3.9139E+1	3.9818E+1	3.8872E+1	4881.16	2.04869	3.5340E+1	3.6134E+1	3.4888E+1
4876.06	2.05084	4.0692E+1	4.1366E+1	4.0417E+1	4881.26	2.04865	3.4522E+1	3.5297E+1	3.4109E+1
4876.16	2.05079	4.2393E+1	4.3062E+1	4.2107E+1	4881.36	2.04861	3.3784E+1	3.4540E+1	3.3412E+1
4876.26	2.05075	4.4261E+1	4.4928E+1	4.3961E+1	4881.46	2.04857	3.3133E+1	3.3875E+1	3.2795E+1
4876.36	2.05071	4.6319E+1	4.6989E+1	4.5995E+1	4881.66	2.04848	3.2059E+1	3.2791E+1	3.1754E+1
4876.46	2.05067	4.8576E+1	4.9256E+1	4.8215E+1	4881.86	2.04840	3.1255E+1	3.1981E+1	3.0974E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4882.06	2.04832	3.0674E+1	3.1397E+1	3.0412E+1	4891.66	2.04430	3.9918E+1	4.0578E+1	3.9687E+1
4882.16	2.04827	3.0461E+1	3.1183E+1	3.0206E+1	4892.16	2.04409	4.0397E+1	4.1054E+1	4.0164E+1
4882.26	2.04823	3.0304E+1	3.1025E+1	3.0054E+1	4892.66	2.04388	4.0990E+1	4.1645E+1	4.0755E+1
4882.46	2.04815	3.0185E+1	3.0902E+1	2.9947E+1	4893.06	2.04371	4.1545E+1	4.2199E+1	4.1309E+1
4882.66	2.04806	3.0289E+1	3.1006E+1	3.0053E+1	4893.46	2.04354	4.2186E+1	4.2838E+1	4.1948E+1
4882.86	2.04798	3.0559E+1	3.1276E+1	3.0318E+1	4893.66	2.04346	4.2549E+1	4.3200E+1	4.2310E+1
4883.06	2.04790	3.1028E+1	3.1747E+1	3.0772E+1	4893.86	2.04338	4.2959E+1	4.3609E+1	4.2718E+1
4883.16	2.04785	3.1361E+1	3.2081E+1	3.1094E+1	4894.06	2.04329	4.3424E+1	4.4072E+1	4.3182E+1
4883.26	2.04781	3.1749E+1	3.2471E+1	3.1470E+1	4894.26	2.04321	4.3923E+1	4.4569E+1	4.3679E+1
4883.46	2.04773	3.2725E+1	3.3449E+1	3.2422E+1	4894.46	2.04313	4.4477E+1	4.5122E+1	4.4232E+1
4883.66	2.04764	3.3784E+1	3.4507E+1	3.3469E+1	4894.66	2.04304	4.5073E+1	4.5716E+1	4.4826E+1
4883.86	2.04756	3.4580E+1	3.5297E+1	3.4269E+1	4894.86	2.04296	4.5726E+1	4.6367E+1	4.5476E+1
4884.06	2.04748	3.5054E+1	3.5769E+1	3.4746E+1	4895.06	2.04288	4.6494E+1	4.7133E+1	4.6242E+1
4884.16	2.04744	3.5227E+1	3.5941E+1	3.4919E+1	4895.26	2.04279	4.7388E+1	4.8024E+1	4.7132E+1
4884.66	2.04723	3.5971E+1	3.6688E+1	3.5653E+1	4895.46	2.04271	4.8452E+1	4.9085E+1	4.8193E+1
4885.16	2.04702	3.7652E+1	3.8382E+1	3.7296E+1	4895.66	2.04262	4.9751E+1	5.0381E+1	4.9487E+1
4885.26	2.04697	3.8171E+1	3.8903E+1	3.7805E+1	4895.86	2.04254	5.1310E+1	5.1938E+1	5.1041E+1
4885.36	2.04693	3.8710E+1	3.9441E+1	3.8336E+1	4896.06	2.04246	5.3165E+1	5.3789E+1	5.2889E+1
4885.46	2.04689	3.9226E+1	3.9957E+1	3.8847E+1	4896.26	2.04237	5.5414E+1	5.6031E+1	5.5129E+1
4885.56	2.04685	3.9672E+1	4.0400E+1	3.9293E+1	4896.46	2.04229	5.8202E+1	5.8814E+1	5.7907E+1
4885.66	2.04681	4.0002E+1	4.0727E+1	3.9626E+1	4896.66	2.04221	6.1624E+1	6.2228E+1	6.1315E+1
4885.76	2.04676	4.0266E+1	4.0989E+1	3.9895E+1	4896.76	2.04217	6.3629E+1	6.4225E+1	6.3312E+1
4885.86	2.04672	4.0454E+1	4.1175E+1	4.0087E+1	4896.86	2.04212	6.5845E+1	6.6429E+1	6.5518E+1
4885.96	2.04668	4.0599E+1	4.1319E+1	4.0235E+1	4896.96	2.04208	6.8320E+1	6.8892E+1	6.7982E+1
4886.06	2.04664	4.0678E+1	4.1396E+1	4.0318E+1	4897.06	2.04204	7.1068E+1	7.1629E+1	7.0716E+1
4886.16	2.04660	4.0674E+1	4.1386E+1	4.0323E+1	4897.16	2.04200	7.4239E+1	7.4799E+1	7.3872E+1
4886.26	2.04655	4.0628E+1	4.1335E+1	4.0288E+1	4897.36	2.04192	8.2169E+1	8.2790E+1	8.1701E+1
4886.36	2.04651	4.0550E+1	4.1250E+1	4.0222E+1	4897.56	2.04183	9.3104E+1	9.3849E+1	9.2469E+1
4886.46	2.04647	4.0440E+1	4.1135E+1	4.0125E+1	4897.76	2.04175	1.0685E+2	1.0779E+2	1.0598E+2
4886.66	2.04639	4.0156E+1	4.0845E+1	3.9856E+1	4897.86	2.04171	1.1444E+2	1.1549E+2	1.1344E+2
4886.86	2.04630	3.9855E+1	4.0539E+1	3.9567E+1	4897.96	2.04167	1.2248E+2	1.2368E+2	1.2132E+2
4887.16	2.04618	3.9448E+1	4.0128E+1	3.9174E+1	4898.06	2.04162	1.3070E+2	1.3201E+2	1.2943E+2
4887.46	2.04605	3.9092E+1	3.9766E+1	3.8833E+1	4898.16	2.04158	1.3836E+2	1.3979E+2	1.3697E+2
4887.66	2.04597	3.8878E+1	3.9548E+1	3.8631E+1	4898.26	2.04154	1.4466E+2	1.4620E+2	1.4316E+2
4888.46	2.04563	3.8248E+1	3.8913E+1	3.8022E+1	4898.36	2.04150	1.4872E+2	1.5039E+2	1.4708E+2
4888.66	2.04555	3.8210E+1	3.8875E+1	3.7984E+1	4898.41	2.04148	1.4970E+2	1.5142E+2	1.4802E+2
4888.86	2.04547	3.8238E+1	3.8904E+1	3.8012E+1	4898.46	2.04146	1.5007E+2	1.5182E+2	1.4836E+2
4888.96	2.04542	3.8277E+1	3.8943E+1	3.8049E+1	4898.56	2.04142	1.4898E+2	1.5075E+2	1.4726E+2
4889.06	2.04538	3.8326E+1	3.8994E+1	3.8095E+1	4898.66	2.04137	1.4554E+2	1.4728E+2	1.4383E+2
4889.16	2.04534	3.8379E+1	3.9048E+1	3.8145E+1	4898.76	2.04133	1.3992E+2	1.4162E+2	1.3825E+2
4889.36	2.04526	3.8496E+1	3.9167E+1	3.8253E+1	4898.86	2.04129	1.3320E+2	1.3487E+2	1.3158E+2
4889.66	2.04513	3.8666E+1	3.9339E+1	3.8416E+1	4898.96	2.04125	1.2578E+2	1.2743E+2	1.2418E+2
4889.96	2.04501	3.8817E+1	3.9492E+1	3.8561E+1	4899.16	2.04117	1.1091E+2	1.1253E+2	1.0933E+2
4890.16	2.04492	3.8914E+1	3.9591E+1	3.8653E+1	4899.36	2.04108	9.7383E+1	9.8891E+1	9.5950E+1
4890.46	2.04480	3.9071E+1	3.9748E+1	3.8809E+1	4899.56	2.04100	8.5885E+1	8.7230E+1	8.4630E+1
4890.66	2.04471	3.9189E+1	3.9864E+1	3.8929E+1	4899.66	2.04096	8.0729E+1	8.2017E+1	7.9547E+1
4890.86	2.04463	3.9311E+1	3.9982E+1	3.9058E+1	4899.86	2.04087	7.2166E+1	7.3362E+1	7.1104E+1
4891.06	2.04455	3.9447E+1	4.0117E+1	3.9199E+1	4899.96	2.04083	6.8827E+1	6.9981E+1	6.7813E+1
4891.26	2.04446	3.9593E+1	4.0258E+1	3.9357E+1	4900.06	2.04079	6.5822E+1	6.6935E+1	6.4857E+1
4891.46	2.04438	3.9751E+1	4.0412E+1	3.9520E+1	4900.24	2.04072	6.1575E+1	6.2615E+1	6.0698E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4900.48	2.04062	5.7243E+1	5.8177E+1	5.6499E+1	4914.93	2.03462	1.8412E+1	1.9183E+1	1.8179E+1
4900.72	2.04052	5.3725E+1	5.4583E+1	5.3087E+1	4915.05	2.03457	1.8504E+1	1.9274E+1	1.8271E+1
4900.96	2.04042	5.0826E+1	5.1625E+1	5.0276E+1	4915.17	2.03452	1.8596E+1	1.9366E+1	1.8363E+1
4901.20	2.04032	4.8395E+1	4.9158E+1	4.7907E+1	4915.29	2.03447	1.8664E+1	1.9432E+1	1.8430E+1
4901.44	2.04022	4.6436E+1	4.7168E+1	4.6006E+1	4915.41	2.03442	1.8691E+1	1.9459E+1	1.8458E+1
4901.68	2.04012	4.4764E+1	4.5482E+1	4.4369E+1	4915.65	2.03432	1.8696E+1	1.9464E+1	1.8462E+1
4901.92	2.04002	4.3320E+1	4.4028E+1	4.2952E+1	4915.90	2.03422	1.8658E+1	1.9426E+1	1.8424E+1
4902.16	2.03992	4.1977E+1	4.2682E+1	4.1625E+1	4916.14	2.03412	1.8611E+1	1.9379E+1	1.8377E+1
4902.40	2.03982	4.0720E+1	4.1425E+1	4.0380E+1	4916.38	2.03402	1.8576E+1	1.9344E+1	1.8339E+1
4903.12	2.03952	3.7274E+1	3.7978E+1	3.6965E+1	4916.62	2.03392	1.8563E+1	1.9331E+1	1.8324E+1
4903.84	2.03922	3.3767E+1	3.4481E+1	3.3480E+1	4916.86	2.03382	1.8564E+1	1.9333E+1	1.8323E+1
4904.08	2.03912	3.2533E+1	3.3253E+1	3.2250E+1	4917.10	2.03372	1.8575E+1	1.9344E+1	1.8331E+1
4904.32	2.03902	3.1245E+1	3.1974E+1	3.0970E+1	4917.35	2.03362	1.8592E+1	1.9362E+1	1.8346E+1
4904.56	2.03892	2.9829E+1	3.0566E+1	2.9572E+1	4917.59	2.03352	1.8616E+1	1.9386E+1	1.8368E+1
4904.80	2.03882	2.8373E+1	2.9117E+1	2.8138E+1	4917.83	2.03342	1.8647E+1	1.9418E+1	1.8397E+1
4905.04	2.03872	2.6839E+1	2.7584E+1	2.6634E+1	4918.31	2.03322	1.8716E+1	1.9487E+1	1.8463E+1
4905.28	2.03862	2.5316E+1	2.6056E+1	2.5142E+1	4918.80	2.03302	1.8792E+1	1.9565E+1	1.8537E+1
4905.53	2.03852	2.3955E+1	2.4690E+1	2.3817E+1	4920.01	2.03252	1.9003E+1	1.9776E+1	1.8742E+1
4905.77	2.03842	2.2638E+1	2.3374E+1	2.2512E+1	4920.49	2.03232	1.9096E+1	1.9870E+1	1.8833E+1
4906.01	2.03832	2.1634E+1	2.2371E+1	2.1512E+1	4920.98	2.03212	1.9188E+1	1.9962E+1	1.8922E+1
4906.49	2.03812	2.0244E+1	2.0984E+1	2.0128E+1	4921.22	2.03202	1.9237E+1	2.0012E+1	1.8969E+1
4906.97	2.03792	1.9317E+1	2.0061E+1	1.9205E+1	4921.46	2.03192	1.9287E+1	2.0062E+1	1.9016E+1
4907.45	2.03772	1.8606E+1	1.9356E+1	1.8471E+1	4921.94	2.03172	1.9393E+1	2.0169E+1	1.9118E+1
4907.93	2.03752	1.8012E+1	1.8766E+1	1.7870E+1	4922.43	2.03152	1.9508E+1	2.0286E+1	1.9229E+1
4908.17	2.03742	1.7756E+1	1.8512E+1	1.7612E+1	4923.64	2.03102	1.9842E+1	2.0619E+1	1.9557E+1
4908.41	2.03732	1.7522E+1	1.8280E+1	1.7377E+1	4924.85	2.03052	2.0254E+1	2.1024E+1	1.9982E+1
4908.66	2.03722	1.7305E+1	1.8065E+1	1.7159E+1	4925.58	2.03022	2.0534E+1	2.1301E+1	2.0271E+1
4908.90	2.03712	1.7119E+1	1.7880E+1	1.6971E+1	4926.07	2.03002	2.0731E+1	2.1495E+1	2.0473E+1
4909.14	2.03702	1.6961E+1	1.7723E+1	1.6808E+1	4926.55	2.02982	2.0930E+1	2.1691E+1	2.0680E+1
4909.38	2.03692	1.6854E+1	1.7618E+1	1.6692E+1	4927.04	2.02962	2.1144E+1	2.1902E+1	2.0899E+1
4909.62	2.03682	1.6769E+1	1.7535E+1	1.6601E+1	4927.52	2.02942	2.1384E+1	2.2138E+1	2.1146E+1
4909.86	2.03672	1.6715E+1	1.7483E+1	1.6534E+1	4928.01	2.02922	2.1660E+1	2.2412E+1	2.1426E+1
4910.10	2.03662	1.6693E+1	1.7465E+1	1.6496E+1	4928.49	2.02902	2.1975E+1	2.2723E+1	2.1748E+1
4910.34	2.03652	1.6694E+1	1.7467E+1	1.6488E+1	4928.98	2.02882	2.2334E+1	2.3078E+1	2.2113E+1
4910.58	2.03642	1.6710E+1	1.7484E+1	1.6498E+1	4929.22	2.02872	2.2541E+1	2.3283E+1	2.2320E+1
4910.83	2.03632	1.6747E+1	1.7522E+1	1.6530E+1	4929.47	2.02862	2.2780E+1	2.3520E+1	2.2557E+1
4911.07	2.03622	1.6796E+1	1.7572E+1	1.6575E+1	4929.71	2.02852	2.3048E+1	2.3787E+1	2.2821E+1
4911.31	2.03612	1.6856E+1	1.7633E+1	1.6633E+1	4929.95	2.02842	2.3356E+1	2.4094E+1	2.3123E+1
4911.55	2.03602	1.6924E+1	1.7701E+1	1.6700E+1	4930.19	2.02832	2.3732E+1	2.4468E+1	2.3492E+1
4911.79	2.03592	1.6990E+1	1.7766E+1	1.6766E+1	4930.44	2.02822	2.4186E+1	2.4921E+1	2.3938E+1
4912.15	2.03577	1.7091E+1	1.7867E+1	1.6867E+1	4930.68	2.02812	2.4739E+1	2.5473E+1	2.4480E+1
4912.76	2.03552	1.7258E+1	1.8033E+1	1.7031E+1	4930.92	2.02802	2.5430E+1	2.6164E+1	2.5158E+1
4913.00	2.03542	1.7328E+1	1.8103E+1	1.7098E+1	4931.17	2.02792	2.6371E+1	2.7103E+1	2.6081E+1
4913.24	2.03532	1.7409E+1	1.8184E+1	1.7176E+1	4931.41	2.02782	2.7693E+1	2.8425E+1	2.7384E+1
4913.48	2.03522	1.7498E+1	1.8274E+1	1.7263E+1	4931.53	2.02777	2.8489E+1	2.9222E+1	2.8169E+1
4913.72	2.03512	1.7600E+1	1.8376E+1	1.7364E+1	4931.65	2.02772	2.9388E+1	3.0122E+1	2.9060E+1
4913.96	2.03502	1.7726E+1	1.8501E+1	1.7490E+1	4931.78	2.02767	3.0404E+1	3.1141E+1	3.0062E+1
4914.20	2.03492	1.7875E+1	1.8650E+1	1.7640E+1	4931.90	2.02762	3.1643E+1	3.2387E+1	3.1279E+1
4914.45	2.03482	1.8040E+1	1.8815E+1	1.7807E+1	4932.02	2.02757	3.3109E+1	3.3863E+1	3.2716E+1
4914.69	2.03472	1.8215E+1	1.8989E+1	1.7982E+1	4932.14	2.02752	3.4816E+1	3.5588E+1	3.4379E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4932.26	2.02747	3.6709E+1	3.7515E+1	3.6207E+1	4946.53	2.02162	6.6546E+1	6.7364E+1	6.5882E+1
4932.38	2.02742	3.8558E+1	3.9388E+1	3.8002E+1	4946.66	2.02157	6.9410E+1	7.0263E+1	6.8698E+1
4932.50	2.02737	4.0273E+1	4.1119E+1	3.9685E+1	4946.78	2.02152	7.2173E+1	7.3068E+1	7.1413E+1
4932.63	2.02732	4.1786E+1	4.2646E+1	4.1171E+1	4946.90	2.02147	7.4542E+1	7.5475E+1	7.3739E+1
4932.75	2.02727	4.2944E+1	4.3819E+1	4.2304E+1	4947.02	2.02142	7.6401E+1	7.7360E+1	7.5567E+1
4932.87	2.02722	4.3440E+1	4.4327E+1	4.2784E+1	4947.15	2.02137	7.7620E+1	7.8575E+1	7.6788E+1
4932.99	2.02717	4.3157E+1	4.4044E+1	4.2503E+1	4947.27	2.02132	7.8099E+1	7.9015E+1	7.7309E+1
4933.11	2.02712	4.2287E+1	4.3167E+1	4.1649E+1	4947.39	2.02127	7.7856E+1	7.8735E+1	7.7111E+1
4933.23	2.02707	4.1073E+1	4.1933E+1	4.0468E+1	4947.51	2.02122	7.6638E+1	7.7469E+1	7.5951E+1
4933.36	2.02702	3.9588E+1	4.0409E+1	3.9049E+1	4947.64	2.02117	7.4917E+1	7.5685E+1	7.4307E+1
4933.48	2.02697	3.7890E+1	3.8688E+1	3.7404E+1	4947.76	2.02112	7.2998E+1	7.3725E+1	7.2444E+1
4933.60	2.02692	3.6226E+1	3.6994E+1	3.5804E+1	4947.88	2.02107	7.1062E+1	7.1756E+1	7.0557E+1
4933.72	2.02687	3.4651E+1	3.5386E+1	3.4300E+1	4948.00	2.02102	6.9111E+1	6.9781E+1	6.8651E+1
4933.84	2.02682	3.3264E+1	3.3976E+1	3.2972E+1	4948.13	2.02097	6.7256E+1	6.7903E+1	6.6845E+1
4933.97	2.02677	3.2201E+1	3.2906E+1	3.1938E+1	4948.25	2.02092	6.5661E+1	6.6291E+1	6.5278E+1
4934.09	2.02672	3.1265E+1	3.1964E+1	3.1026E+1	4948.49	2.02082	6.3233E+1	6.3867E+1	6.2856E+1
4934.21	2.02667	3.0473E+1	3.1170E+1	3.0255E+1	4948.74	2.02072	6.1686E+1	6.2329E+1	6.1302E+1
4934.33	2.02662	2.9784E+1	3.0479E+1	2.9585E+1	4948.98	2.02062	6.0748E+1	6.1396E+1	6.0358E+1
4934.45	2.02657	2.9230E+1	2.9924E+1	2.9036E+1	4949.23	2.02052	6.0362E+1	6.1012E+1	5.9970E+1
4934.57	2.02652	2.8741E+1	2.9436E+1	2.8546E+1	4949.47	2.02042	6.0296E+1	6.0950E+1	5.9900E+1
4934.82	2.02642	2.7972E+1	2.8672E+1	2.7756E+1	4949.72	2.02032	6.0341E+1	6.1000E+1	5.9937E+1
4935.06	2.02632	2.7454E+1	2.8161E+1	2.7206E+1	4949.96	2.02022	6.0474E+1	6.1139E+1	6.0058E+1
4935.30	2.02622	2.7146E+1	2.7861E+1	2.6873E+1	4950.21	2.02012	6.0746E+1	6.1418E+1	6.0315E+1
4935.55	2.02612	2.6979E+1	2.7704E+1	2.6677E+1	4950.45	2.02002	6.1174E+1	6.1854E+1	6.0726E+1
4935.79	2.02602	2.6911E+1	2.7642E+1	2.6594E+1	4950.70	2.01992	6.1756E+1	6.2442E+1	6.1295E+1
4936.04	2.02592	2.6925E+1	2.7660E+1	2.6600E+1	4950.94	2.01982	6.2515E+1	6.3203E+1	6.2044E+1
4936.28	2.02582	2.6993E+1	2.7731E+1	2.6665E+1	4951.19	2.01972	6.3461E+1	6.4146E+1	6.2985E+1
4936.77	2.02562	2.7232E+1	2.7971E+1	2.6903E+1	4951.43	2.01962	6.4591E+1	6.5269E+1	6.4113E+1
4937.25	2.02542	2.7521E+1	2.8256E+1	2.7197E+1	4951.92	2.01942	6.7167E+1	6.7819E+1	6.6705E+1
4937.74	2.02522	2.7871E+1	2.8604E+1	2.7550E+1	4952.41	2.01922	7.0431E+1	7.1038E+1	7.0010E+1
4938.23	2.02502	2.8309E+1	2.9041E+1	2.7986E+1	4952.90	2.01902	7.4301E+1	7.4862E+1	7.3932E+1
4938.72	2.02482	2.8771E+1	2.9506E+1	2.8441E+1	4953.40	2.01882	7.8804E+1	7.9369E+1	7.8414E+1
4939.20	2.02462	2.9282E+1	3.0021E+1	2.8942E+1	4953.89	2.01862	8.3995E+1	8.4572E+1	8.3576E+1
4939.69	2.02442	2.9819E+1	3.0563E+1	2.9466E+1	4954.38	2.01842	8.9798E+1	9.0394E+1	8.9345E+1
4940.18	2.02422	3.0427E+1	3.1177E+1	3.0058E+1	4954.87	2.01822	9.6137E+1	9.6762E+1	9.5637E+1
4940.67	2.02402	3.1080E+1	3.1836E+1	3.0693E+1	4955.11	2.01812	9.9587E+1	1.0024E+2	9.9053E+1
4941.16	2.02382	3.1803E+1	3.2568E+1	3.1396E+1	4955.36	2.01802	1.0319E+2	1.0386E+2	1.0262E+2
4941.65	2.02362	3.2641E+1	3.3416E+1	3.2210E+1	4955.60	2.01792	1.0702E+2	1.0769E+2	1.0644E+2
4942.13	2.02342	3.3613E+1	3.4400E+1	3.3158E+1	4955.85	2.01782	1.1110E+2	1.1177E+2	1.1052E+2
4942.62	2.02322	3.4790E+1	3.5580E+1	3.4321E+1	4956.04	2.01774	1.1436E+2	1.1503E+2	1.1378E+2
4943.11	2.02302	3.6196E+1	3.6986E+1	3.5720E+1	4956.22	2.01766	1.1773E+2	1.1841E+2	1.1715E+2
4943.60	2.02282	3.7933E+1	3.8719E+1	3.7451E+1	4956.41	2.01759	1.2137E+2	1.2205E+2	1.2078E+2
4944.09	2.02262	4.0123E+1	4.0889E+1	3.9651E+1	4956.60	2.01751	1.2510E+2	1.2578E+2	1.2449E+2
4944.58	2.02242	4.2740E+1	4.3490E+1	4.2280E+1	4956.79	2.01744	1.2912E+2	1.2981E+2	1.2851E+2
4945.07	2.02222	4.6040E+1	4.6767E+1	4.5597E+1	4956.97	2.01736	1.3356E+2	1.3425E+2	1.3293E+2
4945.56	2.02202	5.0189E+1	5.0904E+1	4.9744E+1	4957.16	2.01728	1.3815E+2	1.3886E+2	1.3751E+2
4945.80	2.02192	5.2916E+1	5.3632E+1	5.2457E+1	4957.35	2.01721	1.4312E+2	1.4384E+2	1.4247E+2
4946.04	2.02182	5.6474E+1	5.7199E+1	5.5983E+1	4957.54	2.01713	1.4839E+2	1.4911E+2	1.4772E+2
4946.29	2.02172	6.1043E+1	6.1804E+1	6.0481E+1	4957.72	2.01705	1.5368E+2	1.5442E+2	1.5300E+2
4946.41	2.02167	6.3714E+1	6.4497E+1	6.3109E+1	4957.91	2.01698	1.5903E+2	1.5979E+2	1.5833E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4958.10	2.01690	1.6450E+2	1.6526E+2	1.6377E+2	4973.10	2.01082	3.2157E+3	4.1014E+3	2.8819E+3
4958.29	2.01683	1.6989E+2	1.7067E+2	1.6915E+2	4973.20	2.01078	2.8535E+3	3.1702E+3	2.6468E+3
4958.47	2.01675	1.7492E+2	1.7571E+2	1.7416E+2	4973.30	2.01074	2.6037E+3	2.7909E+3	2.4599E+3
4958.66	2.01667	1.7971E+2	1.8052E+2	1.7894E+2	4973.40	2.01070	2.3823E+3	2.5075E+3	2.2780E+3
4958.85	2.01660	1.8407E+2	1.8490E+2	1.8326E+2	4973.50	2.01066	2.1815E+3	2.2715E+3	2.1032E+3
4959.04	2.01652	1.8733E+2	1.8819E+2	1.8651E+2	4973.70	2.01058	1.8505E+3	1.9015E+3	1.8034E+3
4959.22	2.01644	1.8897E+2	1.8983E+2	1.8813E+2	4973.90	2.01049	1.6024E+3	1.6360E+3	1.5706E+3
4959.41	2.01637	1.8961E+2	1.9045E+2	1.8879E+2	4974.10	2.01041	1.4125E+3	1.4372E+3	1.3889E+3
4959.60	2.01629	1.8927E+2	1.9010E+2	1.8846E+2	4974.30	2.01033	1.2565E+3	1.2755E+3	1.2380E+3
4959.80	2.01621	1.8873E+2	1.8956E+2	1.8792E+2	4974.50	2.01025	1.1269E+3	1.1424E+3	1.1119E+3
4959.90	2.01617	1.8875E+2	1.8958E+2	1.8794E+2	4974.70	2.01017	1.0165E+3	1.0294E+3	1.0039E+3
4960.10	2.01609	1.8963E+2	1.9047E+2	1.8882E+2	4974.90	2.01009	9.2138E+2	9.3245E+2	9.1051E+2
4960.20	2.01605	1.9051E+2	1.9135E+2	1.8970E+2	4975.10	2.01001	8.3866E+2	8.4834E+2	8.2913E+2
4960.30	2.01601	1.9169E+2	1.9254E+2	1.9087E+2	4975.30	2.00993	7.6595E+2	7.7456E+2	7.5746E+2
4960.40	2.01597	1.9319E+2	1.9404E+2	1.9237E+2	4975.80	2.00973	6.1808E+2	6.2391E+2	6.1240E+2
4960.50	2.01593	1.9501E+2	1.9587E+2	1.9418E+2	4976.30	2.00953	5.1282E+2	5.1644E+2	5.0926E+2
4960.60	2.01589	1.9706E+2	1.9792E+2	1.9622E+2	4976.60	2.00940	4.6260E+2	4.6586E+2	4.5940E+2
4960.80	2.01580	2.0202E+2	2.0290E+2	2.0116E+2	4976.80	2.00932	4.3333E+2	4.3639E+2	4.3031E+2
4961.10	2.01568	2.1140E+2	2.1231E+2	2.1051E+2	4977.00	2.00924	4.0692E+2	4.0980E+2	4.0407E+2
4961.30	2.01560	2.1863E+2	2.1957E+2	2.1771E+2	4977.30	2.00912	3.7159E+2	3.7419E+2	3.6901E+2
4961.50	2.01552	2.2659E+2	2.2756E+2	2.2564E+2	4977.50	2.00904	3.5046E+2	3.5288E+2	3.4806E+2
4961.80	2.01540	2.3970E+2	2.4072E+2	2.3868E+2	4977.80	2.00892	3.2199E+2	3.2413E+2	3.1988E+2
4962.10	2.01528	2.5437E+2	2.5547E+2	2.5328E+2	4978.10	2.00880	2.9689E+2	2.9875E+2	2.9506E+2
4962.30	2.01519	2.6500E+2	2.6615E+2	2.6386E+2	4978.30	2.00872	2.8198E+2	2.8366E+2	2.8031E+2
4962.50	2.01511	2.7671E+2	2.7792E+2	2.7551E+2	4978.50	2.00864	2.6828E+2	2.6979E+2	2.6678E+2
4962.80	2.01499	2.9548E+2	2.9680E+2	2.9417E+2	4978.80	2.00852	2.4962E+2	2.5090E+2	2.4835E+2
4963.10	2.01487	3.1717E+2	3.1863E+2	3.1572E+2	4979.10	2.00840	2.3293E+2	2.3405E+2	2.3182E+2
4963.30	2.01479	3.3311E+2	3.3468E+2	3.3155E+2	4979.30	2.00831	2.2286E+2	2.2388E+2	2.2184E+2
4963.50	2.01471	3.5015E+2	3.5184E+2	3.4846E+2	4979.50	2.00823	2.1363E+2	2.1456E+2	2.1270E+2
4963.80	2.01459	3.7825E+2	3.8018E+2	3.7634E+2	4979.70	2.00815	2.0514E+2	2.0603E+2	2.0427E+2
4964.10	2.01446	4.1016E+2	4.1240E+2	4.0795E+2	4979.90	2.00807	1.9721E+2	1.9807E+2	1.9638E+2
4964.30	2.01438	4.3381E+2	4.3630E+2	4.3134E+2	4980.10	2.00799	1.8990E+2	1.9073E+2	1.8908E+2
4964.80	2.01418	5.0420E+2	5.0765E+2	5.0080E+2	4980.30	2.00791	1.8322E+2	1.8403E+2	1.8243E+2
4965.30	2.01398	5.9449E+2	5.9972E+2	5.8938E+2	4980.50	2.00783	1.7721E+2	1.7801E+2	1.7645E+2
4965.80	2.01377	7.1027E+2	7.1813E+2	7.0250E+2	4980.70	2.00775	1.7205E+2	1.7283E+2	1.7130E+2
4966.30	2.01357	8.7158E+2	8.8178E+2	8.6154E+2	4980.90	2.00767	1.6772E+2	1.6849E+2	1.6699E+2
4966.50	2.01349	9.5194E+2	9.6356E+2	9.4054E+2	4981.10	2.00759	1.6502E+2	1.6579E+2	1.6430E+2
4966.80	2.01337	1.0964E+3	1.1111E+3	1.0821E+3	4981.30	2.00751	1.6384E+2	1.6460E+2	1.6312E+2
4967.10	2.01325	1.2833E+3	1.3033E+3	1.2640E+3	4981.67	2.00736	1.6349E+2	1.6425E+2	1.6277E+2
4967.30	2.01317	1.4333E+3	1.4587E+3	1.4089E+3	4981.87	2.00728	1.6083E+2	1.6158E+2	1.6011E+2
4967.50	2.01309	1.6108E+3	1.6447E+3	1.5786E+3	4982.07	2.00720	1.5440E+2	1.5514E+2	1.5371E+2
4967.70	2.01300	1.8366E+3	1.8858E+3	1.7909E+3	4982.27	2.00712	1.4635E+2	1.4706E+2	1.4568E+2
4967.90	2.01292	2.1371E+3	2.2189E+3	2.0648E+3	4982.47	2.00704	1.3943E+2	1.4013E+2	1.3878E+2
4968.00	2.01288	2.3189E+3	2.4309E+3	2.2239E+3	4982.67	2.00695	1.3422E+2	1.3492E+2	1.3359E+2
4968.10	2.01284	2.5515E+3	2.7214E+3	2.4181E+3	4982.87	2.00687	1.3119E+2	1.3188E+2	1.3057E+2
4968.20	2.01280	2.8440E+3	3.1430E+3	2.6427E+3	4982.97	2.00683	1.3030E+2	1.3099E+2	1.2968E+2
4968.30	2.01276	3.2694E+3	4.1383E+3	2.9194E+3	4983.07	2.00679	1.2983E+2	1.3051E+2	1.2921E+2
4968.40	2.01272	3.7280E+3	∞	3.1396E+3	4983.17	2.00675	1.2964E+2	1.3033E+2	1.2903E+2
4968.50	2.01268	4.1830E+3	∞	3.2805E+3	4983.27	2.00671	1.2964E+2	1.3033E+2	1.2903E+2
4973.00	2.01086	4.1825E+3	∞	3.2802E+3	4983.37	2.00667	1.2976E+2	1.3045E+2	1.2914E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
4983.47	2.00663	1.2994E+2	1.3063E+2	1.2933E+2	4991.17	2.00354	5.4104E+1	5.4722E+1	5.3825E+1
4983.67	2.00655	1.3055E+2	1.3124E+2	1.2993E+2	4991.27	2.00350	5.4202E+1	5.4820E+1	5.3923E+1
4983.87	2.00647	1.3147E+2	1.3216E+2	1.3085E+2	4991.37	2.00346	5.4431E+1	5.5047E+1	5.4151E+1
4983.97	2.00643	1.3212E+2	1.3281E+2	1.3149E+2	4991.47	2.00342	5.4736E+1	5.5352E+1	5.4455E+1
4984.07	2.00639	1.3290E+2	1.3360E+2	1.3228E+2	4991.57	2.00338	5.5233E+1	5.5847E+1	5.4950E+1
4984.27	2.00631	1.3522E+2	1.3592E+2	1.3459E+2	4991.67	2.00334	5.5893E+1	5.6508E+1	5.5607E+1
4984.47	2.00623	1.3893E+2	1.3970E+2	1.3822E+2	4991.87	2.00326	5.7644E+1	5.8257E+1	5.7351E+1
4984.67	2.00615	1.4535E+2	1.4621E+2	1.4453E+2	4991.97	2.00322	5.8672E+1	5.9285E+1	5.8375E+1
4984.87	2.00607	1.5571E+2	1.5664E+2	1.5481E+2	4992.07	2.00318	5.9823E+1	6.0437E+1	5.9518E+1
4985.07	2.00599	1.7214E+2	1.7317E+2	1.7113E+2	4992.27	2.00310	6.2748E+1	6.3363E+1	6.2404E+1
4985.27	2.00591	1.9721E+2	1.9846E+2	1.9598E+2	4992.47	2.00301	6.5809E+1	6.6417E+1	6.5433E+1
4985.47	2.00583	2.3306E+2	2.3475E+2	2.3138E+2	4992.67	2.00293	6.8249E+1	6.8868E+1	6.7856E+1
4985.57	2.00579	2.5478E+2	2.5682E+2	2.5275E+2	4992.77	2.00289	6.9178E+1	6.9801E+1	6.8783E+1
4985.67	2.00575	2.7799E+2	2.8048E+2	2.7552E+2	4992.87	2.00285	6.9645E+1	7.0267E+1	6.9258E+1
4985.77	2.00571	3.0122E+2	3.0426E+2	2.9822E+2	4993.07	2.00277	6.9862E+1	7.0475E+1	6.9496E+1
4985.87	2.00567	3.2200E+2	3.2563E+2	3.1842E+2	4993.27	2.00269	6.9160E+1	6.9762E+1	6.8818E+1
4985.97	2.00563	3.3738E+2	3.4157E+2	3.3327E+2	4993.47	2.00261	6.8342E+1	6.8936E+1	6.8004E+1
4986.07	2.00559	3.4426E+2	3.4884E+2	3.3977E+2	4993.67	2.00253	6.8313E+1	6.8889E+1	6.7975E+1
4986.17	2.00555	3.4043E+2	3.4515E+2	3.3582E+2	4993.77	2.00249	6.8872E+1	6.9442E+1	6.8532E+1
4986.27	2.00551	3.2695E+2	3.3154E+2	3.2245E+2	4993.87	2.00245	6.9902E+1	7.0469E+1	6.9556E+1
4986.37	2.00547	3.0660E+2	3.1087E+2	3.0240E+2	4993.97	2.00241	7.1204E+1	7.1772E+1	7.0853E+1
4986.47	2.00543	2.8216E+2	2.8602E+2	2.7837E+2	4994.07	2.00237	7.2649E+1	7.3220E+1	7.2291E+1
4986.67	2.00534	2.3030E+2	2.3327E+2	2.2738E+2	4994.27	2.00229	7.5869E+1	7.6445E+1	7.5494E+1
4986.87	2.00526	1.8807E+2	1.9032E+2	1.8585E+2	4994.47	2.00221	7.9134E+1	7.9714E+1	7.8743E+1
4987.07	2.00518	1.5679E+2	1.5856E+2	1.5506E+2	4994.67	2.00213	8.2251E+1	8.2834E+1	8.1843E+1
4987.27	2.00510	1.3372E+2	1.3514E+2	1.3233E+2	4994.87	2.00205	8.5165E+1	8.5753E+1	8.4740E+1
4987.47	2.00502	1.1664E+2	1.1791E+2	1.1542E+2	4995.07	2.00197	8.7890E+1	8.8483E+1	8.7449E+1
4987.57	2.00498	1.1028E+2	1.1152E+2	1.0909E+2	4995.27	2.00189	9.0405E+1	9.1005E+1	8.9948E+1
4987.67	2.00494	1.0485E+2	1.0607E+2	1.0368E+2	4995.47	2.00181	9.2669E+1	9.3277E+1	9.2198E+1
4987.77	2.00490	1.0017E+2	1.0136E+2	9.9048E+1	4995.67	2.00173	9.4767E+1	9.5382E+1	9.4282E+1
4987.87	2.00486	9.6006E+1	9.7148E+1	9.4942E+1	4995.87	2.00165	9.6578E+1	9.7200E+1	9.6081E+1
4988.07	2.00478	8.8867E+1	8.9907E+1	8.7916E+1	4995.92	2.00163	9.7014E+1	9.7639E+1	9.6514E+1
4988.27	2.00470	8.3071E+1	8.4027E+1	8.2220E+1	4996.18	2.00153	9.9032E+1	9.9666E+1	9.8518E+1
4988.47	2.00462	7.8105E+1	7.8964E+1	7.7371E+1	4996.42	2.00143	1.0090E+2	1.0154E+2	1.0037E+2
4988.67	2.00454	7.3899E+1	7.4679E+1	7.3271E+1	4996.68	2.00133	1.0248E+2	1.0313E+2	1.0194E+2
4988.87	2.00446	7.0337E+1	7.1031E+1	6.9833E+1	4996.93	2.00123	1.0378E+2	1.0443E+2	1.0323E+2
4989.07	2.00438	6.7323E+1	6.7956E+1	6.6928E+1	4997.18	2.00113	1.0488E+2	1.0553E+2	1.0433E+2
4989.27	2.00430	6.4777E+1	6.5385E+1	6.4445E+1	4997.43	2.00103	1.0586E+2	1.0652E+2	1.0531E+2
4989.47	2.00422	6.2497E+1	6.3105E+1	6.2184E+1	4997.68	2.00093	1.0677E+2	1.0743E+2	1.0622E+2
4989.67	2.00414	6.0516E+1	6.1127E+1	6.0212E+1	4997.93	2.00083	1.0756E+2	1.0822E+2	1.0701E+2
4989.87	2.00406	5.8828E+1	5.9440E+1	5.8530E+1	4998.18	2.00073	1.0826E+2	1.0892E+2	1.0770E+2
4990.07	2.00398	5.7450E+1	5.8063E+1	5.7158E+1	4998.43	2.00063	1.0885E+2	1.0951E+2	1.0829E+2
4990.27	2.00390	5.6345E+1	5.6959E+1	5.6058E+1	4998.68	2.00053	1.0934E+2	1.1000E+2	1.0878E+2
4990.37	2.00386	5.5879E+1	5.6494E+1	5.5593E+1	4998.93	2.00043	1.0970E+2	1.1036E+2	1.0914E+2
4990.47	2.00382	5.5456E+1	5.6071E+1	5.5172E+1	4999.18	2.00033	1.0995E+2	1.1061E+2	1.0939E+2
4990.57	2.00378	5.5068E+1	5.5685E+1	5.4785E+1	4999.43	2.00023	1.1009E+2	1.1075E+2	1.0952E+2
4990.67	2.00374	5.4729E+1	5.5347E+1	5.4448E+1	4999.68	2.00013	1.1013E+2	1.1079E+2	1.0957E+2
4990.87	2.00366	5.4239E+1	5.4859E+1	5.3959E+1	4999.93	2.00003	1.1008E+2	1.1074E+2	1.0952E+2
4990.97	2.00362	5.4103E+1	5.4723E+1	5.3824E+1	5000.18	1.99993	1.0997E+2	1.1063E+2	1.0941E+2
4991.07	2.00358	5.4079E+1	5.4699E+1	5.3800E+1	5000.43	1.99983	1.0978E+2	1.1044E+2	1.0922E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5000.68	1.99973	1.0953E+2	1.1019E+2	1.0897E+2	5014.28	1.99431	8.3974E+1	8.4561E+1	8.3556E+1
5000.93	1.99963	1.0924E+2	1.0990E+2	1.0868E+2	5014.38	1.99427	8.3834E+1	8.4420E+1	8.3416E+1
5001.18	1.99953	1.0890E+2	1.0956E+2	1.0834E+2	5014.48	1.99423	8.3675E+1	8.4261E+1	8.3258E+1
5001.68	1.99933	1.0810E+2	1.0876E+2	1.0755E+2	5014.58	1.99419	8.3474E+1	8.4060E+1	8.3059E+1
5002.18	1.99913	1.0716E+2	1.0781E+2	1.0660E+2	5014.68	1.99415	8.3263E+1	8.3847E+1	8.2848E+1
5002.43	1.99903	1.0661E+2	1.0727E+2	1.0606E+2	5014.88	1.99407	8.2888E+1	8.3471E+1	8.2476E+1
5002.68	1.99893	1.0602E+2	1.0668E+2	1.0547E+2	5014.98	1.99403	8.2767E+1	8.3350E+1	8.2356E+1
5003.18	1.99873	1.0476E+2	1.0542E+2	1.0421E+2	5015.08	1.99399	8.2678E+1	8.3260E+1	8.2267E+1
5003.68	1.99853	1.0334E+2	1.0399E+2	1.0280E+2	5015.28	1.99391	8.2568E+1	8.3149E+1	8.2158E+1
5004.18	1.99833	1.0182E+2	1.0246E+2	1.0128E+2	5015.43	1.99385	8.2553E+1	8.3134E+1	8.2143E+1
5004.68	1.99813	1.0010E+2	1.0074E+2	9.9576E+1	5015.68	1.99375	8.2578E+1	8.3159E+1	8.2168E+1
5004.93	1.99803	9.9163E+1	9.9797E+1	9.8648E+1	5015.93	1.99365	8.2651E+1	8.3231E+1	8.2240E+1
5005.18	1.99793	9.8196E+1	9.8826E+1	9.7688E+1	5016.18	1.99355	8.2766E+1	8.3346E+1	8.2355E+1
5005.43	1.99783	9.7149E+1	9.7774E+1	9.6648E+1	5016.43	1.99345	8.2919E+1	8.3499E+1	8.2507E+1
5005.68	1.99773	9.6036E+1	9.6656E+1	9.5542E+1	5016.68	1.99335	8.3098E+1	8.3679E+1	8.2685E+1
5006.18	1.99753	9.3720E+1	9.4332E+1	9.3242E+1	5017.18	1.99315	8.3505E+1	8.4086E+1	8.3090E+1
5006.43	1.99743	9.2536E+1	9.3143E+1	9.2066E+1	5017.68	1.99295	8.3977E+1	8.4558E+1	8.3559E+1
5006.68	1.99733	9.1354E+1	9.1957E+1	9.0892E+1	5018.68	1.99256	8.5131E+1	8.5714E+1	8.4706E+1
5007.18	1.99713	8.9032E+1	8.9627E+1	8.8583E+1	5019.68	1.99216	8.6395E+1	8.6982E+1	8.5963E+1
5007.68	1.99693	8.6877E+1	8.7468E+1	8.6442E+1	5020.18	1.99196	8.7036E+1	8.7625E+1	8.6600E+1
5007.93	1.99683	8.5959E+1	8.6547E+1	8.5529E+1	5020.68	1.99176	8.7682E+1	8.8273E+1	8.7243E+1
5008.18	1.99673	8.5225E+1	8.5811E+1	8.4799E+1	5021.18	1.99156	8.8358E+1	8.8950E+1	8.7914E+1
5008.43	1.99664	8.4704E+1	8.5288E+1	8.4281E+1	5021.68	1.99137	8.9062E+1	8.9657E+1	8.8613E+1
5008.68	1.99654	8.4474E+1	8.5057E+1	8.4053E+1	5022.18	1.99117	8.9791E+1	9.0388E+1	8.9338E+1
5009.18	1.99634	8.4550E+1	8.5135E+1	8.4129E+1	5022.48	1.99105	9.0249E+1	9.0848E+1	8.9794E+1
5009.43	1.99624	8.4630E+1	8.5215E+1	8.4208E+1	5022.68	1.99097	9.0563E+1	9.1163E+1	9.0105E+1
5009.68	1.99614	8.4656E+1	8.5242E+1	8.4234E+1	5022.88	1.99089	9.0877E+1	9.1478E+1	9.0418E+1
5009.93	1.99604	8.4596E+1	8.5182E+1	8.4174E+1	5023.18	1.99077	9.1373E+1	9.1976E+1	9.0911E+1
5010.18	1.99594	8.4445E+1	8.5032E+1	8.4024E+1	5023.48	1.99065	9.1977E+1	9.2581E+1	9.1510E+1
5010.43	1.99584	8.4189E+1	8.4777E+1	8.3770E+1	5023.68	1.99057	9.2474E+1	9.3080E+1	9.2004E+1
5010.68	1.99574	8.3815E+1	8.4403E+1	8.3398E+1	5023.88	1.99049	9.3068E+1	9.3677E+1	9.2595E+1
5011.18	1.99554	8.2556E+1	8.3143E+1	8.2146E+1	5024.08	1.99041	9.3778E+1	9.4389E+1	9.3300E+1
5011.43	1.99544	8.1775E+1	8.2361E+1	8.1370E+1	5024.28	1.99034	9.4574E+1	9.5188E+1	9.4091E+1
5011.68	1.99534	8.0968E+1	8.1551E+1	8.0567E+1	5024.48	1.99026	9.5468E+1	9.6085E+1	9.4979E+1
5011.88	1.99526	8.0349E+1	8.0930E+1	7.9951E+1	5024.68	1.99018	9.6441E+1	9.7062E+1	9.5945E+1
5012.08	1.99518	7.9820E+1	8.0399E+1	7.9425E+1	5024.88	1.99010	9.7512E+1	9.8138E+1	9.7008E+1
5012.28	1.99510	7.9481E+1	8.0058E+1	7.9088E+1	5025.08	1.99002	9.8716E+1	9.9347E+1	9.8204E+1
5012.38	1.99506	7.9487E+1	8.0064E+1	7.9094E+1	5025.28	1.98994	1.0019E+2	1.0083E+2	9.9671E+1
5012.48	1.99502	7.9571E+1	8.0147E+1	7.9177E+1	5025.48	1.98986	1.0214E+2	1.0279E+2	1.0161E+2
5012.58	1.99498	7.9738E+1	8.0314E+1	7.9343E+1	5025.68	1.98978	1.0469E+2	1.0535E+2	1.0414E+2
5012.68	1.99494	8.0017E+1	8.0594E+1	7.9621E+1	5025.88	1.98970	1.0804E+2	1.0869E+2	1.0748E+2
5012.88	1.99486	8.0920E+1	8.1499E+1	8.0519E+1	5026.08	1.98962	1.1221E+2	1.1287E+2	1.1164E+2
5013.08	1.99478	8.2265E+1	8.2847E+1	8.1856E+1	5026.28	1.98954	1.1693E+2	1.1760E+2	1.1635E+2
5013.18	1.99474	8.2911E+1	8.3495E+1	8.2499E+1	5026.48	1.98946	1.2161E+2	1.2229E+2	1.2102E+2
5013.28	1.99470	8.3456E+1	8.4042E+1	8.3041E+1	5026.58	1.98942	1.2355E+2	1.2423E+2	1.2295E+2
5013.38	1.99466	8.3844E+1	8.4430E+1	8.3426E+1	5026.68	1.98938	1.2499E+2	1.2567E+2	1.2438E+2
5013.48	1.99462	8.4066E+1	8.4652E+1	8.3647E+1	5026.78	1.98935	1.2581E+2	1.2650E+2	1.2521E+2
5013.68	1.99454	8.4288E+1	8.4876E+1	8.3868E+1	5026.88	1.98931	1.2602E+2	1.2670E+2	1.2541E+2
5013.88	1.99446	8.4303E+1	8.4890E+1	8.3882E+1	5026.98	1.98927	1.2570E+2	1.2638E+2	1.2510E+2
5014.08	1.99438	8.4143E+1	8.4730E+1	8.3724E+1	5027.08	1.98923	1.2492E+2	1.2560E+2	1.2432E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5027.28	1.98915	1.2200E+2	1.2268E+2	1.2141E+2	5042.93	1.98297	1.1190E+2	1.1275E+2	1.1113E+2
5027.48	1.98907	1.1845E+2	1.1912E+2	1.1787E+2	5043.18	1.98288	1.1090E+2	1.1175E+2	1.1012E+2
5027.68	1.98899	1.1543E+2	1.1610E+2	1.1485E+2	5043.43	1.98278	1.0970E+2	1.1055E+2	1.0893E+2
5027.88	1.98891	1.1307E+2	1.1373E+2	1.1250E+2	5043.68	1.98268	1.0836E+2	1.0921E+2	1.0760E+2
5027.98	1.98887	1.1205E+2	1.1271E+2	1.1148E+2	5044.18	1.98248	1.0546E+2	1.0629E+2	1.0471E+2
5028.08	1.98883	1.1116E+2	1.1182E+2	1.1060E+2	5044.43	1.98238	1.0385E+2	1.0467E+2	1.0312E+2
5028.28	1.98875	1.0971E+2	1.1037E+2	1.0914E+2	5044.68	1.98229	1.0215E+2	1.0295E+2	1.0145E+2
5028.48	1.98867	1.0866E+2	1.0932E+2	1.0810E+2	5045.18	1.98209	9.8585E+1	9.9347E+1	9.7921E+1
5028.68	1.98859	1.0798E+2	1.0864E+2	1.0742E+2	5045.68	1.98189	9.4946E+1	9.5671E+1	9.4329E+1
5028.88	1.98851	1.0756E+2	1.0822E+2	1.0700E+2	5045.93	1.98179	9.3287E+1	9.3997E+1	9.2691E+1
5029.08	1.98844	1.0731E+2	1.0797E+2	1.0675E+2	5046.18	1.98170	9.1797E+1	9.2494E+1	9.1217E+1
5029.18	1.98840	1.0722E+2	1.0788E+2	1.0667E+2	5046.43	1.98160	9.0656E+1	9.1343E+1	9.0088E+1
5029.28	1.98836	1.0716E+2	1.0781E+2	1.0660E+2	5046.68	1.98150	8.9770E+1	9.0451E+1	8.9211E+1
5029.38	1.98832	1.0711E+2	1.0777E+2	1.0655E+2	5046.93	1.98140	8.9035E+1	8.9713E+1	8.8482E+1
5029.48	1.98828	1.0708E+2	1.0773E+2	1.0652E+2	5047.18	1.98130	8.8399E+1	8.9075E+1	8.7848E+1
5029.58	1.98824	1.0705E+2	1.0771E+2	1.0650E+2	5047.43	1.98121	8.7860E+1	8.8538E+1	8.7309E+1
5029.68	1.98820	1.0705E+2	1.0771E+2	1.0650E+2	5047.68	1.98111	8.7428E+1	8.8108E+1	8.6873E+1
5029.88	1.98812	1.0707E+2	1.0773E+2	1.0652E+2	5048.68	1.98071	8.6093E+1	8.6785E+1	8.5526E+1
5030.08	1.98804	1.0714E+2	1.0780E+2	1.0659E+2	5049.68	1.98032	8.4992E+1	8.5682E+1	8.4429E+1
5030.28	1.98796	1.0725E+2	1.0791E+2	1.0669E+2	5050.18	1.98013	8.4467E+1	8.5152E+1	8.3911E+1
5030.48	1.98788	1.0738E+2	1.0803E+2	1.0682E+2	5050.48	1.98001	8.4186E+1	8.4864E+1	8.3637E+1
5030.68	1.98780	1.0753E+2	1.0818E+2	1.0697E+2	5050.68	1.97993	8.4007E+1	8.4680E+1	8.3466E+1
5031.68	1.98741	1.0846E+2	1.0912E+2	1.0790E+2	5050.88	1.97985	8.3843E+1	8.4512E+1	8.3307E+1
5032.68	1.98701	1.0946E+2	1.1012E+2	1.0890E+2	5051.08	1.97977	8.3684E+1	8.4344E+1	8.3158E+1
5033.68	1.98662	1.1045E+2	1.1111E+2	1.0989E+2	5051.28	1.97970	8.3555E+1	8.4211E+1	8.3035E+1
5033.93	1.98652	1.1068E+2	1.1134E+2	1.1012E+2	5051.48	1.97962	8.3447E+1	8.4095E+1	8.2937E+1
5034.18	1.98642	1.1090E+2	1.1156E+2	1.1033E+2	5051.68	1.97954	8.3357E+1	8.3999E+1	8.2856E+1
5034.43	1.98632	1.1110E+2	1.1176E+2	1.1053E+2	5051.88	1.97946	8.3289E+1	8.3927E+1	8.2793E+1
5034.68	1.98622	1.1130E+2	1.1196E+2	1.1073E+2	5052.08	1.97938	8.3267E+1	8.3902E+1	8.2775E+1
5035.18	1.98603	1.1170E+2	1.1236E+2	1.1113E+2	5052.28	1.97930	8.3299E+1	8.3934E+1	8.2807E+1
5035.43	1.98593	1.1191E+2	1.1257E+2	1.1134E+2	5052.48	1.97923	8.3388E+1	8.4026E+1	8.2892E+1
5035.68	1.98583	1.1214E+2	1.1280E+2	1.1157E+2	5052.58	1.97919	8.3443E+1	8.4084E+1	8.2944E+1
5036.68	1.98543	1.1312E+2	1.1380E+2	1.1253E+2	5052.68	1.97915	8.3516E+1	8.4160E+1	8.3013E+1
5037.68	1.98504	1.1418E+2	1.1486E+2	1.1358E+2	5052.88	1.97907	8.3687E+1	8.4339E+1	8.3173E+1
5038.18	1.98484	1.1471E+2	1.1539E+2	1.1412E+2	5053.08	1.97899	8.3903E+1	8.4564E+1	8.3376E+1
5038.43	1.98474	1.1495E+2	1.1562E+2	1.1436E+2	5053.28	1.97891	8.4230E+1	8.4902E+1	8.3689E+1
5038.68	1.98465	1.1518E+2	1.1585E+2	1.1459E+2	5053.48	1.97883	8.4689E+1	8.5372E+1	8.4135E+1
5039.18	1.98445	1.1557E+2	1.1624E+2	1.1499E+2	5053.68	1.97876	8.5272E+1	8.5964E+1	8.4707E+1
5039.43	1.98435	1.1574E+2	1.1641E+2	1.1515E+2	5053.78	1.97872	8.5684E+1	8.6380E+1	8.5113E+1
5039.68	1.98425	1.1588E+2	1.1656E+2	1.1529E+2	5053.88	1.97868	8.6150E+1	8.6850E+1	8.5575E+1
5039.93	1.98415	1.1599E+2	1.1667E+2	1.1539E+2	5053.98	1.97864	8.6592E+1	8.7293E+1	8.6014E+1
5040.18	1.98406	1.1605E+2	1.1675E+2	1.1544E+2	5054.18	1.97856	8.7233E+1	8.7930E+1	8.6659E+1
5040.68	1.98386	1.1610E+2	1.1682E+2	1.1546E+2	5054.38	1.97848	8.7466E+1	8.8155E+1	8.6901E+1
5040.93	1.98376	1.1607E+2	1.1682E+2	1.1539E+2	5054.48	1.97844	8.7398E+1	8.8081E+1	8.6841E+1
5041.18	1.98366	1.1595E+2	1.1672E+2	1.1525E+2	5054.58	1.97840	8.7191E+1	8.7868E+1	8.6641E+1
5041.43	1.98356	1.1571E+2	1.1651E+2	1.1499E+2	5054.68	1.97836	8.6886E+1	8.7559E+1	8.6343E+1
5041.68	1.98347	1.1532E+2	1.1614E+2	1.1458E+2	5054.88	1.97829	8.6035E+1	8.6701E+1	8.5500E+1
5041.93	1.98337	1.1480E+2	1.1563E+2	1.1405E+2	5055.18	1.97817	8.4451E+1	8.5113E+1	8.3925E+1
5042.18	1.98327	1.1422E+2	1.1506E+2	1.1345E+2	5055.68	1.97797	8.1747E+1	8.2411E+1	8.1222E+1
5042.68	1.98307	1.1278E+2	1.1363E+2	1.1200E+2	5056.68	1.97758	7.7900E+1	7.8582E+1	7.7361E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5057.48	1.97727	7.4783E+1	7.5468E+1	7.4247E+1	5067.58	1.97333	6.6622E+1	6.7299E+1	6.6126E+1
5057.68	1.97719	7.3916E+1	7.4599E+1	7.3386E+1	5067.68	1.97329	6.6353E+1	6.7039E+1	6.5846E+1
5057.88	1.97711	7.3013E+1	7.3695E+1	7.2491E+1	5067.78	1.97325	6.6140E+1	6.6832E+1	6.5628E+1
5058.18	1.97699	7.1592E+1	7.2269E+1	7.1084E+1	5067.88	1.97321	6.5984E+1	6.6678E+1	6.5470E+1
5058.68	1.97680	6.9056E+1	6.9731E+1	6.8568E+1	5068.08	1.97313	6.5799E+1	6.6496E+1	6.5284E+1
5058.88	1.97672	6.7958E+1	6.8635E+1	6.7476E+1	5068.28	1.97305	6.5751E+1	6.6448E+1	6.5237E+1
5059.18	1.97660	6.6223E+1	6.6908E+1	6.5741E+1	5068.48	1.97298	6.5774E+1	6.6466E+1	6.5270E+1
5059.68	1.97641	6.3235E+1	6.3939E+1	6.2743E+1	5068.68	1.97290	6.5851E+1	6.6539E+1	6.5352E+1
5060.18	1.97621	6.0167E+1	6.0888E+1	5.9668E+1	5068.98	1.97278	6.6065E+1	6.6750E+1	6.5568E+1
5060.68	1.97602	5.7287E+1	5.8016E+1	5.6790E+1	5069.18	1.97270	6.6283E+1	6.6973E+1	6.5776E+1
5060.88	1.97594	5.6191E+1	5.6918E+1	5.5701E+1	5069.38	1.97263	6.6560E+1	6.7254E+1	6.6041E+1
5061.08	1.97586	5.5160E+1	5.5885E+1	5.4680E+1	5069.58	1.97255	6.6894E+1	6.7594E+1	6.6365E+1
5061.28	1.97578	5.4202E+1	5.4924E+1	5.3730E+1	5069.68	1.97251	6.7084E+1	6.7789E+1	6.6546E+1
5061.48	1.97571	5.3383E+1	5.4101E+1	5.2920E+1	5069.88	1.97243	6.7502E+1	6.8219E+1	6.6946E+1
5061.68	1.97563	5.2711E+1	5.3425E+1	5.2256E+1	5070.08	1.97235	6.8003E+1	6.8726E+1	6.7434E+1
5061.88	1.97555	5.2211E+1	5.2921E+1	5.1763E+1	5070.28	1.97228	6.8582E+1	6.9310E+1	6.8006E+1
5061.98	1.97551	5.2032E+1	5.2740E+1	5.1588E+1	5070.48	1.97220	6.9228E+1	6.9959E+1	6.8646E+1
5062.08	1.97547	5.1912E+1	5.2619E+1	5.1470E+1	5070.69	1.97212	6.9933E+1	7.0663E+1	6.9348E+1
5062.18	1.97543	5.1823E+1	5.2529E+1	5.1383E+1	5070.89	1.97204	7.0681E+1	7.1408E+1	7.0097E+1
5062.28	1.97539	5.1771E+1	5.2477E+1	5.1331E+1	5071.19	1.97193	7.1822E+1	7.2541E+1	7.1246E+1
5062.48	1.97531	5.1820E+1	5.2528E+1	5.1379E+1	5071.49	1.97181	7.3069E+1	7.3786E+1	7.2491E+1
5062.68	1.97524	5.1985E+1	5.2698E+1	5.1535E+1	5071.69	1.97173	7.3992E+1	7.4706E+1	7.3415E+1
5062.88	1.97516	5.2303E+1	5.3030E+1	5.1828E+1	5071.89	1.97165	7.4994E+1	7.5704E+1	7.4420E+1
5063.08	1.97508	5.2808E+1	5.3550E+1	5.2307E+1	5072.19	1.97154	7.6627E+1	7.7330E+1	7.6060E+1
5063.28	1.97500	5.3391E+1	5.4154E+1	5.2856E+1	5072.69	1.97134	7.9639E+1	8.0328E+1	7.9085E+1
5063.48	1.97492	5.4064E+1	5.4839E+1	5.3509E+1	5073.19	1.97115	8.3009E+1	8.3682E+1	8.2470E+1
5063.68	1.97485	5.4924E+1	5.5702E+1	5.4363E+1	5073.69	1.97095	8.6694E+1	8.7369E+1	8.6145E+1
5063.88	1.97477	5.6004E+1	5.6778E+1	5.5442E+1	5074.19	1.97076	9.0836E+1	9.1548E+1	9.0238E+1
5064.08	1.97469	5.7292E+1	5.8057E+1	5.6736E+1	5074.69	1.97057	9.5461E+1	9.6230E+1	9.4794E+1
5064.28	1.97461	5.8757E+1	5.9512E+1	5.8207E+1	5075.19	1.97037	1.0067E+2	1.0150E+2	9.9929E+1
5064.48	1.97453	6.0422E+1	6.1168E+1	5.9878E+1	5075.69	1.97018	1.0670E+2	1.0755E+2	1.0592E+2
5064.68	1.97446	6.2221E+1	6.2957E+1	6.1680E+1	5075.94	1.97008	1.1013E+2	1.1097E+2	1.0937E+2
5065.18	1.97426	6.7354E+1	6.8080E+1	6.6796E+1	5076.19	1.96998	1.1383E+2	1.1464E+2	1.1310E+2
5065.38	1.97418	6.9631E+1	7.0353E+1	6.9063E+1	5076.44	1.96989	1.1780E+2	1.1857E+2	1.1710E+2
5065.48	1.97414	7.0731E+1	7.1450E+1	7.0161E+1	5076.69	1.96979	1.2203E+2	1.2275E+2	1.2138E+2
5065.68	1.97407	7.2700E+1	7.3417E+1	7.2129E+1	5077.19	1.96960	1.3144E+2	1.3213E+2	1.3082E+2
5065.78	1.97403	7.3428E+1	7.4142E+1	7.2860E+1	5077.69	1.96940	1.4250E+2	1.4321E+2	1.4185E+2
5065.88	1.97399	7.3868E+1	7.4573E+1	7.3314E+1	5077.94	1.96930	1.4872E+2	1.4945E+2	1.4805E+2
5065.98	1.97395	7.4110E+1	7.4809E+1	7.3568E+1	5078.19	1.96921	1.5550E+2	1.5624E+2	1.5480E+2
5066.08	1.97391	7.4173E+1	7.4864E+1	7.3646E+1	5078.44	1.96911	1.6286E+2	1.6362E+2	1.6215E+2
5066.18	1.97387	7.3988E+1	7.4661E+1	7.3486E+1	5078.69	1.96901	1.7091E+2	1.7169E+2	1.7016E+2
5066.28	1.97383	7.3668E+1	7.4330E+1	7.3182E+1	5079.19	1.96882	1.8957E+2	1.9040E+2	1.8876E+2
5066.38	1.97379	7.3232E+1	7.3882E+1	7.2765E+1	5079.44	1.96872	2.0032E+2	2.0119E+2	1.9947E+2
5066.48	1.97376	7.2720E+1	7.3364E+1	7.2264E+1	5079.69	1.96863	2.1221E+2	2.1312E+2	2.1132E+2
5066.58	1.97372	7.2139E+1	7.2777E+1	7.1691E+1	5080.19	1.96843	2.4044E+2	2.4147E+2	2.3942E+2
5066.68	1.97368	7.1509E+1	7.2144E+1	7.1067E+1	5080.69	1.96824	2.7581E+2	2.7701E+2	2.7461E+2
5066.88	1.97360	7.0155E+1	7.0789E+1	6.9713E+1	5081.19	1.96804	3.2102E+2	3.2250E+2	3.1954E+2
5067.08	1.97352	6.8882E+1	6.9525E+1	6.8428E+1	5081.69	1.96785	3.7934E+2	3.8127E+2	3.7742E+2
5067.28	1.97344	6.7814E+1	6.8465E+1	6.7351E+1	5081.89	1.96777	4.0692E+2	4.0911E+2	4.0474E+2
5067.48	1.97337	6.6970E+1	6.7639E+1	6.6484E+1	5082.09	1.96770	4.3765E+2	4.4018E+2	4.3514E+2

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5082.29	1.96762	4.7241E+2	4.7538E+2	4.6948E+2	5094.71	1.96282	1.6245E+2	1.6346E+2	1.6148E+2
5082.51	1.96753	5.1717E+2	5.2083E+2	5.1358E+2	5094.91	1.96274	1.5313E+2	1.5409E+2	1.5220E+2
5082.81	1.96742	5.9011E+2	5.9523E+2	5.8512E+2	5095.11	1.96267	1.4535E+2	1.4628E+2	1.4446E+2
5083.11	1.96730	6.7907E+2	6.8660E+2	6.7173E+2	5095.31	1.96259	1.3835E+2	1.3925E+2	1.3749E+2
5083.31	1.96722	7.5024E+2	7.5869E+2	7.4191E+2	5095.51	1.96251	1.3198E+2	1.3287E+2	1.3115E+2
5083.51	1.96715	8.3546E+2	8.4515E+2	8.2592E+2	5095.71	1.96244	1.2611E+2	1.2697E+2	1.2531E+2
5083.71	1.96707	9.3834E+2	9.4979E+2	9.2711E+2	5095.91	1.96236	1.2074E+2	1.2158E+2	1.1996E+2
5083.91	1.96699	1.0651E+3	1.0791E+3	1.0513E+3	5096.31	1.96221	1.1105E+2	1.1189E+2	1.1028E+2
5084.11	1.96691	1.2238E+3	1.2420E+3	1.2061E+3	5096.51	1.96213	1.0670E+2	1.0755E+2	1.0593E+2
5084.31	1.96684	1.4272E+3	1.4526E+3	1.4028E+3	5096.71	1.96205	1.0267E+2	1.0353E+2	1.0189E+2
5084.41	1.96680	1.5515E+3	1.5827E+3	1.5219E+3	5097.01	1.96194	9.7109E+1	9.7953E+1	9.6357E+1
5084.51	1.96676	1.6930E+3	1.7322E+3	1.6562E+3	5097.58	1.96172	8.8082E+1	8.8887E+1	8.7382E+1
5084.61	1.96672	1.8588E+3	1.9103E+3	1.8113E+3	5097.84	1.96162	8.4374E+1	8.5163E+1	8.3696E+1
5084.71	1.96668	2.0614E+3	2.1338E+3	1.9966E+3	5098.10	1.96152	8.0931E+1	8.1705E+1	8.0275E+1
5084.81	1.96664	2.3046E+3	2.4146E+3	2.2111E+3	5098.36	1.96142	7.7749E+1	7.8507E+1	7.7113E+1
5084.91	1.96660	2.5861E+3	2.7686E+3	2.4451E+3	5098.62	1.96132	7.4753E+1	7.5498E+1	7.4137E+1
5085.01	1.96657	3.0569E+3	3.5391E+3	2.7880E+3	5098.88	1.96122	7.1983E+1	7.2721E+1	7.1385E+1
5085.11	1.96653	3.9309E+3	∞	3.2084E+3	5099.40	1.96102	6.6905E+1	6.7637E+1	6.6339E+1
5085.21	1.96649	4.1754E+3	∞	3.2756E+3	5099.92	1.96082	6.2438E+1	6.3175E+1	6.1902E+1
5088.41	1.96525	4.1756E+3	∞	3.2756E+3	5100.44	1.96062	5.8516E+1	5.9247E+1	5.8012E+1
5088.51	1.96521	3.9875E+3	8.8290E+3	3.1986E+3	5100.96	1.96042	5.4972E+1	5.5691E+1	5.4504E+1
5088.61	1.96517	3.0937E+3	3.6942E+3	2.8042E+3	5101.48	1.96022	5.1768E+1	5.2484E+1	5.1319E+1
5088.71	1.96514	2.6064E+3	2.8016E+3	2.4591E+3	5102.00	1.96002	4.8879E+1	4.9596E+1	4.8443E+1
5088.81	1.96510	2.2874E+3	2.3957E+3	2.1954E+3	5103.30	1.95952	4.2544E+1	4.3269E+1	4.2139E+1
5089.01	1.96502	1.8625E+3	1.9147E+3	1.8145E+3	5104.60	1.95902	3.7600E+1	3.8340E+1	3.7210E+1
5089.21	1.96494	1.5677E+3	1.5996E+3	1.5373E+3	5105.12	1.95882	3.5943E+1	3.6690E+1	3.5554E+1
5089.41	1.96487	1.3379E+3	1.3598E+3	1.3167E+3	5105.64	1.95862	3.4434E+1	3.5188E+1	3.4044E+1
5089.61	1.96479	1.1507E+3	1.1669E+3	1.1350E+3	5106.17	1.95842	3.3075E+1	3.3829E+1	3.2692E+1
5089.81	1.96471	9.9920E+2	1.0118E+3	9.8682E+2	5106.69	1.95822	3.1909E+1	3.2659E+1	3.1545E+1
5090.11	1.96460	8.2973E+2	8.3933E+2	8.2027E+2	5107.21	1.95802	3.0884E+1	3.1629E+1	3.0536E+1
5090.31	1.96452	7.4246E+2	7.5080E+2	7.3423E+2	5107.73	1.95782	3.0023E+1	3.0765E+1	2.9680E+1
5090.81	1.96433	5.7799E+2	5.8283E+2	5.7327E+2	5107.99	1.95772	2.9651E+1	3.0393E+1	2.9309E+1
5091.11	1.96421	5.0668E+2	5.1016E+2	5.0326E+2	5108.51	1.95752	2.9026E+1	2.9758E+1	2.8708E+1
5091.31	1.96413	4.6557E+2	4.6850E+2	4.6269E+2	5108.77	1.95742	2.8769E+1	2.9493E+1	2.8470E+1
5091.51	1.96406	4.2912E+2	4.3168E+2	4.2659E+2	5109.03	1.95732	2.8654E+1	2.9372E+1	2.8371E+1
5091.71	1.96398	3.9570E+2	3.9800E+2	3.9342E+2	5109.30	1.95722	2.8656E+1	2.9372E+1	2.8382E+1
5091.91	1.96390	3.6502E+2	3.6708E+2	3.6297E+2	5109.56	1.95712	2.8770E+1	2.9487E+1	2.8492E+1
5092.11	1.96382	3.3705E+2	3.3892E+2	3.3520E+2	5109.82	1.95702	2.8998E+1	2.9720E+1	2.8703E+1
5092.31	1.96375	3.1186E+2	3.1354E+2	3.1018E+2	5110.08	1.95692	2.9455E+1	3.0186E+1	2.9136E+1
5092.51	1.96367	2.8978E+2	2.9131E+2	2.8826E+2	5110.60	1.95672	3.1220E+1	3.1959E+1	3.0873E+1
5092.71	1.96359	2.7135E+2	2.7277E+2	2.6995E+2	5111.12	1.95652	3.3733E+1	3.4453E+1	3.3409E+1
5092.91	1.96352	2.5617E+2	2.5751E+2	2.5484E+2	5112.43	1.95602	3.8054E+1	3.8779E+1	3.7684E+1
5093.11	1.96344	2.4456E+2	2.4585E+2	2.4328E+2	5113.74	1.95552	4.6140E+1	4.6812E+1	4.5805E+1
5093.31	1.96336	2.3525E+2	2.3652E+2	2.3398E+2	5114.00	1.95542	4.7719E+1	4.8376E+1	4.7399E+1
5093.51	1.96328	2.2717E+2	2.2844E+2	2.2590E+2	5114.52	1.95522	5.0295E+1	5.0941E+1	4.9976E+1
5093.71	1.96321	2.1902E+2	2.2028E+2	2.1777E+2	5115.05	1.95502	5.2533E+1	5.3182E+1	5.2194E+1
5093.91	1.96313	2.0959E+2	2.1082E+2	2.0838E+2	5115.57	1.95482	5.4704E+1	5.5353E+1	5.4352E+1
5094.11	1.96305	1.9823E+2	1.9941E+2	1.9706E+2	5116.09	1.95462	5.6656E+1	5.7293E+1	5.6313E+1
5094.31	1.96298	1.8584E+2	1.8697E+2	1.8474E+2	5116.62	1.95442	5.8376E+1	5.8985E+1	5.8073E+1
5094.51	1.96290	1.7355E+2	1.7461E+2	1.7251E+2	5116.88	1.95432	5.9003E+1	5.9608E+1	5.8705E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5117.14	1.95422	5.9308E+1	5.9914E+1	5.9009E+1	5142.93	1.94442	3.6703E+1	3.7390E+1	3.6426E+1
5117.40	1.95412	5.9072E+1	5.9679E+1	5.8775E+1	5143.46	1.94422	3.6451E+1	3.7137E+1	3.6178E+1
5117.66	1.95402	5.8380E+1	5.8988E+1	5.8085E+1	5143.99	1.94402	3.6206E+1	3.6892E+1	3.5937E+1
5117.93	1.95392	5.7266E+1	5.7880E+1	5.6975E+1	5145.31	1.94352	3.5420E+1	3.6108E+1	3.5154E+1
5118.45	1.95372	5.4822E+1	5.5442E+1	5.4540E+1	5146.64	1.94302	3.4516E+1	3.5210E+1	3.4245E+1
5118.97	1.95352	5.2217E+1	5.2867E+1	5.1890E+1	5149.29	1.94202	3.2619E+1	3.3311E+1	3.2379E+1
5119.24	1.95342	5.1329E+1	5.1988E+1	5.0991E+1	5150.61	1.94152	3.1698E+1	3.2383E+1	3.1493E+1
5119.50	1.95332	5.0590E+1	5.1256E+1	5.0244E+1	5151.94	1.94102	3.0955E+1	3.1634E+1	3.0781E+1
5119.76	1.95322	4.9949E+1	5.0621E+1	4.9597E+1	5154.59	1.94002	2.9708E+1	3.0397E+1	2.9532E+1
5120.28	1.95302	4.9012E+1	4.9685E+1	4.8664E+1	5155.66	1.93962	2.9174E+1	2.9876E+1	2.8981E+1
5120.81	1.95282	4.8248E+1	4.8921E+1	4.7906E+1	5156.19	1.93942	2.8822E+1	2.9531E+1	2.8616E+1
5121.59	1.95252	4.7252E+1	4.7922E+1	4.6919E+1	5156.72	1.93922	2.8415E+1	2.9141E+1	2.8180E+1
5122.38	1.95222	4.6257E+1	4.6928E+1	4.5931E+1	5157.25	1.93902	2.7890E+1	2.8634E+1	2.7628E+1
5122.91	1.95202	4.5523E+1	4.6202E+1	4.5186E+1	5157.79	1.93882	2.7233E+1	2.7994E+1	2.6947E+1
5124.22	1.95152	4.3474E+1	4.4181E+1	4.3102E+1	5158.32	1.93862	2.6402E+1	2.7178E+1	2.6101E+1
5125.53	1.95102	4.0962E+1	4.1665E+1	4.0613E+1	5158.85	1.93842	2.5366E+1	2.6152E+1	2.5055E+1
5126.06	1.95082	4.0028E+1	4.0733E+1	3.9684E+1	5159.38	1.93822	2.4322E+1	2.5115E+1	2.4001E+1
5126.32	1.95072	3.9558E+1	4.0266E+1	3.9212E+1	5159.91	1.93802	2.3171E+1	2.3963E+1	2.2857E+1
5126.58	1.95062	3.9152E+1	3.9862E+1	3.8805E+1	5160.45	1.93782	2.1975E+1	2.2766E+1	2.1675E+1
5126.85	1.95052	3.8866E+1	3.9576E+1	3.8522E+1	5160.98	1.93762	2.0780E+1	2.1568E+1	2.0498E+1
5127.11	1.95042	3.8684E+1	3.9392E+1	3.8344E+1	5161.25	1.93752	2.0187E+1	2.0974E+1	1.9915E+1
5127.64	1.95022	3.8590E+1	3.9292E+1	3.8262E+1	5161.78	1.93732	1.8973E+1	1.9755E+1	1.8728E+1
5128.16	1.95002	3.8531E+1	3.9228E+1	3.8213E+1	5162.31	1.93712	1.7729E+1	1.8509E+1	1.7503E+1
5128.69	1.94982	3.8255E+1	3.8945E+1	3.7956E+1	5162.84	1.93692	1.6420E+1	1.7199E+1	1.6214E+1
5129.21	1.94962	3.7890E+1	3.8576E+1	3.7604E+1	5163.38	1.93672	1.5067E+1	1.5844E+1	1.4892E+1
5129.48	1.94952	3.7659E+1	3.8348E+1	3.7369E+1	5163.91	1.93652	1.3681E+1	1.4458E+1	1.3547E+1
5130.00	1.94932	3.7086E+1	3.7783E+1	3.6786E+1	5164.44	1.93632	1.2487E+1	1.3266E+1	1.2395E+1
5130.27	1.94922	3.6772E+1	3.7473E+1	3.6467E+1	5164.71	1.93622	1.2007E+1	1.2787E+1	1.1926E+1
5130.53	1.94912	3.6513E+1	3.7211E+1	3.6217E+1	5164.98	1.93612	1.1595E+1	1.2376E+1	1.1520E+1
5130.79	1.94902	3.6320E+1	3.7010E+1	3.6044E+1	5165.24	1.93602	1.1273E+1	1.2055E+1	1.1199E+1
5131.06	1.94892	3.6256E+1	3.6930E+1	3.6021E+1	5165.78	1.93582	1.0849E+1	1.1634E+1	1.0777E+1
5131.32	1.94882	3.6333E+1	3.6998E+1	3.6125E+1	5166.31	1.93562	1.0617E+1	1.1403E+1	1.0542E+1
5131.85	1.94862	3.6790E+1	3.7452E+1	3.6578E+1	5166.58	1.93552	1.0551E+1	1.1336E+1	1.0469E+1
5132.11	1.94852	3.7061E+1	3.7723E+1	3.6846E+1	5166.85	1.93542	1.0513E+1	1.1298E+1	1.0426E+1
5132.37	1.94842	3.7277E+1	3.7944E+1	3.7041E+1	5167.11	1.93532	1.0494E+1	1.1278E+1	1.0404E+1
5132.64	1.94832	3.7330E+1	3.8005E+1	3.7074E+1	5167.38	1.93522	1.0493E+1	1.1278E+1	1.0393E+1
5132.90	1.94822	3.7228E+1	3.7907E+1	3.6962E+1	5167.91	1.93502	1.0546E+1	1.1331E+1	1.0437E+1
5133.43	1.94802	3.6880E+1	3.7558E+1	3.6622E+1	5168.45	1.93482	1.0653E+1	1.1437E+1	1.0533E+1
5133.95	1.94782	3.6590E+1	3.7258E+1	3.6365E+1	5168.98	1.93462	1.0798E+1	1.1583E+1	1.0670E+1
5134.48	1.94762	3.6443E+1	3.7106E+1	3.6233E+1	5169.52	1.93442	1.0981E+1	1.1765E+1	1.0848E+1
5135.01	1.94742	3.6564E+1	3.7236E+1	3.6324E+1	5170.05	1.93422	1.1169E+1	1.1952E+1	1.1034E+1
5135.54	1.94722	3.6752E+1	3.7439E+1	3.6476E+1	5170.59	1.93402	1.1379E+1	1.2162E+1	1.1245E+1
5136.06	1.94702	3.6902E+1	3.7593E+1	3.6618E+1	5173.26	1.93302	1.2520E+1	1.3297E+1	1.2362E+1
5137.12	1.94662	3.7130E+1	3.7804E+1	3.6881E+1	5175.94	1.93202	1.3614E+1	1.4386E+1	1.3439E+1
5137.65	1.94642	3.7214E+1	3.7880E+1	3.6982E+1	5178.62	1.93102	1.4700E+1	1.5465E+1	1.4520E+1
5138.17	1.94622	3.7266E+1	3.7931E+1	3.7037E+1	5179.69	1.93062	1.5073E+1	1.5835E+1	1.4895E+1
5138.70	1.94602	3.7284E+1	3.7949E+1	3.7055E+1	5180.23	1.93042	1.5212E+1	1.5973E+1	1.5037E+1
5140.02	1.94552	3.7243E+1	3.7915E+1	3.6998E+1	5180.77	1.93022	1.5321E+1	1.6080E+1	1.5154E+1
5141.34	1.94502	3.7097E+1	3.7779E+1	3.6827E+1	5181.30	1.93002	1.5381E+1	1.6138E+1	1.5223E+1
5142.40	1.94462	3.6894E+1	3.7581E+1	3.6616E+1	5181.84	1.92982	1.5380E+1	1.6136E+1	1.5232E+1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5182.65	1.92952	1.5282E+1	1.6036E+1	1.5150E+1	5224.13	1.91419	2.2991E+0	3.1085E+0	2.2438E+0
5183.99	1.92902	1.4940E+1	1.5694E+1	1.4834E+1	5224.63	1.91401	2.2666E+0	3.0759E+0	2.2114E+0
5185.33	1.92852	1.4464E+1	1.5221E+1	1.4369E+1	5225.13	1.91383	2.2363E+0	3.0456E+0	2.1811E+0
5186.68	1.92802	1.3964E+1	1.4723E+1	1.3871E+1	5225.63	1.91364	2.2068E+0	3.0161E+0	2.1516E+0
5188.02	1.92752	1.3475E+1	1.4237E+1	1.3383E+1	5226.13	1.91346	2.1777E+0	2.9870E+0	2.1225E+0
5189.37	1.92702	1.2942E+1	1.3708E+1	1.2851E+1	5226.63	1.91328	2.1489E+0	2.9582E+0	2.0938E+0
5192.06	1.92602	1.1738E+1	1.2515E+1	1.1650E+1	5227.63	1.91291	2.0917E+0	2.9008E+0	2.0366E+0
5194.76	1.92502	1.0574E+1	1.1359E+1	1.0497E+1	5228.63	1.91255	2.0348E+0	2.8439E+0	1.9798E+0
5197.46	1.92402	9.5071E+0	1.0299E+1	9.4393E+0	5229.63	1.91218	1.9783E+0	2.7873E+0	1.9232E+0
5200.16	1.92302	8.5731E+0	9.3700E+0	8.5079E+0	5230.63	1.91181	1.9221E+0	2.7311E+0	1.8671E+0
5202.87	1.92202	7.6250E+0	8.4284E+0	7.5595E+0	5231.63	1.91145	1.8664E+0	2.6754E+0	1.8115E+0
5203.13	1.92192	7.5267E+0	8.3307E+0	7.4607E+0	5232.63	1.91108	1.8120E+0	2.6209E+0	1.7571E+0
5203.63	1.92173	7.3343E+0	8.1391E+0	7.2680E+0	5233.63	1.91072	1.7589E+0	2.5677E+0	1.7040E+0
5204.13	1.92155	7.1372E+0	7.9430E+0	7.0704E+0	5234.63	1.91035	1.7072E+0	2.5158E+0	1.6524E+0
5204.63	1.92137	6.9395E+0	7.7462E+0	6.8727E+0	5235.64	1.90999	1.6571E+0	2.4654E+0	1.6023E+0
5205.13	1.92118	6.7369E+0	7.5444E+0	6.6699E+0	5236.64	1.90962	1.6118E+0	2.4202E+0	1.5571E+0
5205.63	1.92100	6.5293E+0	7.3377E+0	6.4618E+0	5237.64	1.90926	1.5673E+0	2.3756E+0	1.5126E+0
5206.13	1.92081	6.3023E+0	7.1111E+0	6.2350E+0	5238.64	1.90889	1.5240E+0	2.3323E+0	1.4693E+0
5206.63	1.92063	6.0697E+0	6.8791E+0	6.0028E+0	5239.64	1.90853	1.4822E+0	2.2904E+0	1.4276E+0
5207.13	1.92044	5.8359E+0	6.6458E+0	5.7693E+0	5240.64	1.90817	1.4422E+0	2.2501E+0	1.3876E+0
5207.63	1.92026	5.6110E+0	6.4214E+0	5.5449E+0	5242.64	1.90744	1.3646E+0	2.1718E+0	1.3102E+0
5208.13	1.92007	5.3927E+0	6.2036E+0	5.3271E+0	5244.64	1.90671	1.2884E+0	2.0946E+0	1.2341E+0
5208.63	1.91989	5.1904E+0	6.0019E+0	5.1257E+0	5246.64	1.90598	1.2136E+0	2.0182E+0	1.1594E+0
5209.13	1.91971	4.9971E+0	5.8093E+0	4.9334E+0	5247.64	1.90562	1.1768E+0	1.9805E+0	1.1227E+0
5209.63	1.91952	4.8085E+0	5.6214E+0	4.7455E+0	5248.64	1.90526	1.1405E+0	1.9432E+0	1.0865E+0
5210.13	1.91934	4.6256E+0	5.4392E+0	4.5634E+0	5249.64	1.90489	1.1049E+0	1.9064E+0	1.0510E+0
5210.63	1.91915	4.4492E+0	5.2631E+0	4.3884E+0	5250.64	1.90453	1.0700E+0	1.8704E+0	1.0161E+0
5211.13	1.91897	4.2814E+0	5.0955E+0	4.2223E+0	5251.64	1.90417	1.0355E+0	1.8348E+0	9.8166E-1
5211.63	1.91878	4.1257E+0	4.9400E+0	4.0675E+0	5252.64	1.90381	1.0023E+0	1.8007E+0	9.4839E-1
5212.13	1.91860	3.9765E+0	4.7910E+0	3.9191E+0	5253.14	1.90362	9.8617E-1	1.7843E+0	9.3229E-1
5212.63	1.91842	3.8352E+0	4.6496E+0	3.7780E+0	5253.64	1.90344	9.7057E-1	1.7683E+0	9.1669E-1
5213.13	1.91823	3.7003E+0	4.5143E+0	3.6433E+0	5254.64	1.90308	9.3986E-1	1.7367E+0	8.8597E-1
5213.63	1.91805	3.5725E+0	4.3857E+0	3.5157E+0	5255.64	1.90272	9.0942E-1	1.7054E+0	8.5552E-1
5214.13	1.91786	3.4595E+0	4.2721E+0	3.4029E+0	5256.64	1.90236	8.7929E-1	1.6744E+0	8.2538E-1
5214.63	1.91768	3.3539E+0	4.1653E+0	3.2975E+0	5257.64	1.90199	8.4938E-1	1.6437E+0	7.9544E-1
5215.13	1.91750	3.2546E+0	4.0651E+0	3.1984E+0	5258.64	1.90163	8.1985E-1	1.6145E+0	7.6586E-1
5215.63	1.91731	3.1680E+0	3.9777E+0	3.1119E+0	5259.64	1.90127	7.9054E-1	1.5856E+0	7.3651E-1
5216.13	1.91713	3.0865E+0	3.8956E+0	3.0305E+0	5260.64	1.90091	7.6166E-1	1.5575E+0	7.0759E-1
5216.63	1.91695	3.0119E+0	3.8205E+0	2.9560E+0	5261.14	1.90073	7.4754E-1	1.5442E+0	6.9345E-1
5217.13	1.91676	2.9436E+0	3.7520E+0	2.8878E+0	5261.39	1.90064	7.4071E-1	1.5377E+0	6.8661E-1
5217.63	1.91658	2.8778E+0	3.6859E+0	2.8221E+0	5261.64	1.90055	7.3441E-1	1.5316E+0	6.8029E-1
5218.13	1.91639	2.8172E+0	3.6251E+0	2.7616E+0	5261.89	1.90046	7.2840E-1	1.5259E+0	6.7428E-1
5218.63	1.91621	2.7601E+0	3.5679E+0	2.7045E+0	5262.14	1.90037	7.2290E-1	1.5207E+0	6.6877E-1
5219.13	1.91603	2.7058E+0	3.5138E+0	2.6502E+0	5262.39	1.90028	7.1788E-1	1.5159E+0	6.6374E-1
5219.63	1.91584	2.6562E+0	3.4645E+0	2.6007E+0	5262.64	1.90019	7.1427E-1	1.5124E+0	6.6013E-1
5220.13	1.91566	2.6089E+0	3.4175E+0	2.5534E+0	5262.89	1.90010	7.1186E-1	1.5100E+0	6.5772E-1
5220.63	1.91548	2.5644E+0	3.3731E+0	2.5089E+0	5263.14	1.90001	7.1047E-1	1.5085E+0	6.5633E-1
5221.63	1.91511	2.4818E+0	3.2909E+0	2.4264E+0	5263.64	1.89983	7.0892E-1	1.5074E+0	6.5477E-1
5222.63	1.91474	2.4045E+0	3.2138E+0	2.3492E+0	5264.14	1.89965	7.0826E-1	1.5082E+0	6.5409E-1
5223.63	1.91438	2.3333E+0	3.1427E+0	2.2780E+0	5264.64	1.89947	7.0862E-1	1.5096E+0	6.5443E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5265.14	1.89929	7.0979E-1	1.5108E+0	6.5560E-1	5279.64	1.89407	4.6792E-1	1.2718E+0	4.1371E-1
5265.39	1.89920	7.1108E-1	1.5115E+0	6.5690E-1	5280.14	1.89389	4.6591E-1	1.2699E+0	4.1170E-1
5265.64	1.89910	7.1288E-1	1.5119E+0	6.5872E-1	5280.64	1.89371	4.6427E-1	1.2687E+0	4.1006E-1
5265.74	1.89907	7.1372E-1	1.5122E+0	6.5957E-1	5281.14	1.89353	4.6305E-1	1.2680E+0	4.0884E-1
5265.84	1.89903	7.1468E-1	1.5125E+0	6.6055E-1	5281.64	1.89335	4.6225E-1	1.2678E+0	4.0804E-1
5265.94	1.89900	7.1561E-1	1.5125E+0	6.6149E-1	5282.14	1.89317	4.6195E-1	1.2680E+0	4.0773E-1
5266.04	1.89896	7.1647E-1	1.5125E+0	6.6237E-1	5282.64	1.89299	4.6192E-1	1.2681E+0	4.0771E-1
5266.14	1.89892	7.1667E-1	1.5120E+0	6.6257E-1	5282.89	1.89290	4.6171E-1	1.2677E+0	4.0749E-1
5266.24	1.89889	7.1553E-1	1.5104E+0	6.6144E-1	5283.14	1.89281	4.6123E-1	1.2667E+0	4.0701E-1
5266.34	1.89885	7.1186E-1	1.5067E+0	6.5776E-1	5283.39	1.89272	4.6030E-1	1.2652E+0	4.0609E-1
5266.44	1.89882	7.0726E-1	1.5021E+0	6.5315E-1	5283.64	1.89263	4.5856E-1	1.2628E+0	4.0435E-1
5266.54	1.89878	7.0061E-1	1.4959E+0	6.4650E-1	5283.89	1.89254	4.5580E-1	1.2595E+0	4.0159E-1
5266.64	1.89874	6.9387E-1	1.4896E+0	6.3974E-1	5284.14	1.89246	4.5170E-1	1.2551E+0	3.9749E-1
5266.74	1.89871	6.8802E-1	1.4840E+0	6.3389E-1	5284.39	1.89237	4.4639E-1	1.2497E+0	3.9219E-1
5266.84	1.89867	6.8312E-1	1.4793E+0	6.2899E-1	5284.64	1.89228	4.3976E-1	1.2431E+0	3.8556E-1
5267.04	1.89860	6.7437E-1	1.4708E+0	6.2023E-1	5284.89	1.89219	4.3253E-1	1.2359E+0	3.7833E-1
5267.24	1.89853	6.6695E-1	1.4635E+0	6.1281E-1	5285.14	1.89210	4.2527E-1	1.2288E+0	3.7107E-1
5267.44	1.89846	6.6020E-1	1.4570E+0	6.0605E-1	5285.39	1.89201	4.1811E-1	1.2217E+0	3.6392E-1
5267.64	1.89838	6.5387E-1	1.4510E+0	5.9971E-1	5285.64	1.89192	4.1186E-1	1.2155E+0	3.5767E-1
5268.14	1.89820	6.3843E-1	1.4368E+0	5.8426E-1	5285.89	1.89183	4.0647E-1	1.2101E+0	3.5228E-1
5268.64	1.89802	6.2363E-1	1.4234E+0	5.6944E-1	5286.14	1.89174	4.0261E-1	1.2062E+0	3.4842E-1
5268.89	1.89793	6.1722E-1	1.4175E+0	5.6302E-1	5286.39	1.89165	3.9983E-1	1.2034E+0	3.4564E-1
5269.14	1.89784	6.1199E-1	1.4127E+0	5.5779E-1	5286.64	1.89156	3.9782E-1	1.2013E+0	3.4363E-1
5269.39	1.89775	6.0819E-1	1.4089E+0	5.5399E-1	5287.14	1.89138	3.9421E-1	1.1978E+0	3.4002E-1
5269.64	1.89766	6.0600E-1	1.4066E+0	5.5180E-1	5287.64	1.89120	3.9094E-1	1.1946E+0	3.3676E-1
5270.14	1.89748	6.0342E-1	1.4033E+0	5.4922E-1	5288.14	1.89102	3.8790E-1	1.1917E+0	3.3372E-1
5270.39	1.89739	6.0149E-1	1.4011E+0	5.4729E-1	5288.39	1.89093	3.8654E-1	1.1905E+0	3.3236E-1
5270.64	1.89730	5.9895E-1	1.3984E+0	5.4476E-1	5288.64	1.89084	3.8570E-1	1.1897E+0	3.3151E-1
5270.89	1.89721	5.9570E-1	1.3952E+0	5.4150E-1	5288.89	1.89076	3.8541E-1	1.1895E+0	3.3123E-1
5271.14	1.89712	5.9212E-1	1.3917E+0	5.3793E-1	5289.14	1.89067	3.8591E-1	1.1900E+0	3.3173E-1
5271.39	1.89703	5.8828E-1	1.3879E+0	5.3408E-1	5289.64	1.89049	3.8821E-1	1.1921E+0	3.3402E-1
5271.64	1.89694	5.8388E-1	1.3838E+0	5.2968E-1	5290.14	1.89031	3.9111E-1	1.1952E+0	3.3693E-1
5271.89	1.89685	5.7867E-1	1.3789E+0	5.2446E-1	5290.39	1.89022	3.9284E-1	1.1969E+0	3.3865E-1
5272.14	1.89676	5.7263E-1	1.3734E+0	5.1843E-1	5290.64	1.89013	3.9473E-1	1.1988E+0	3.4054E-1
5272.39	1.89667	5.6496E-1	1.3665E+0	5.1075E-1	5290.89	1.89004	3.9681E-1	1.2009E+0	3.4263E-1
5272.64	1.89658	5.5823E-1	1.3604E+0	5.0401E-1	5291.14	1.88995	3.9914E-1	1.2034E+0	3.4495E-1
5272.89	1.89649	5.5210E-1	1.3547E+0	4.9788E-1	5291.39	1.88986	4.0184E-1	1.2063E+0	3.4765E-1
5273.14	1.89640	5.4662E-1	1.3496E+0	4.9240E-1	5291.64	1.88977	4.0500E-1	1.2095E+0	3.5081E-1
5273.64	1.89622	5.3705E-1	1.3406E+0	4.8282E-1	5291.89	1.88968	4.0860E-1	1.2132E+0	3.5441E-1
5274.64	1.89586	5.1984E-1	1.3242E+0	4.6561E-1	5292.14	1.88959	4.1217E-1	1.2169E+0	3.5797E-1
5275.64	1.89550	5.0318E-1	1.3083E+0	4.4895E-1	5292.39	1.88950	4.1581E-1	1.2206E+0	3.6162E-1
5276.14	1.89533	4.9545E-1	1.3009E+0	4.4122E-1	5292.64	1.88942	4.1959E-1	1.2248E+0	3.6539E-1
5276.64	1.89515	4.8876E-1	1.2943E+0	4.3454E-1	5292.89	1.88933	4.2359E-1	1.2291E+0	3.6939E-1
5276.89	1.89506	4.8589E-1	1.2914E+0	4.3167E-1	5293.14	1.88924	4.2794E-1	1.2338E+0	3.7374E-1
5277.14	1.89497	4.8340E-1	1.2888E+0	4.2918E-1	5293.64	1.88906	4.3802E-1	1.2444E+0	3.8381E-1
5277.39	1.89488	4.8134E-1	1.2867E+0	4.2712E-1	5294.04	1.88892	4.4783E-1	1.2548E+0	3.9361E-1
5277.64	1.89479	4.7956E-1	1.2847E+0	4.2534E-1	5294.24	1.88884	4.5344E-1	1.2607E+0	3.9922E-1
5278.14	1.89461	4.7630E-1	1.2810E+0	4.2208E-1	5294.44	1.88877	4.5961E-1	1.2671E+0	4.0539E-1
5278.64	1.89443	4.7323E-1	1.2775E+0	4.1902E-1	5294.64	1.88870	4.6664E-1	1.2742E+0	4.1241E-1
5279.14	1.89425	4.7041E-1	1.2744E+0	4.1620E-1	5294.84	1.88863	4.7445E-1	1.2820E+0	4.2022E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5295.04	1.88856	4.8355E-1	1.2909E+0	4.2932E-1	5306.04	1.88464	1.8076E+0	2.6178E+0	1.7524E+0
5295.24	1.88849	4.9407E-1	1.3012E+0	4.3983E-1	5306.14	1.88461	1.7319E+0	2.5424E+0	1.6767E+0
5295.44	1.88842	5.0624E-1	1.3133E+0	4.5200E-1	5306.24	1.88457	1.6617E+0	2.4727E+0	1.6065E+0
5295.64	1.88835	5.1964E-1	1.3264E+0	4.6539E-1	5306.34	1.88454	1.5946E+0	2.4059E+0	1.5393E+0
5295.74	1.88831	5.2664E-1	1.3332E+0	4.7239E-1	5306.44	1.88450	1.5299E+0	2.3415E+0	1.4746E+0
5295.84	1.88827	5.3380E-1	1.3401E+0	4.7955E-1	5306.64	1.88443	1.4088E+0	2.2198E+0	1.3537E+0
5296.56	1.88802	5.8935E-1	1.3932E+0	5.3511E-1	5306.84	1.88436	1.3069E+0	2.1177E+0	1.2520E+0
5297.13	1.88782	6.3952E-1	1.4430E+0	5.8528E-1	5307.04	1.88429	1.2155E+0	2.0251E+0	1.1608E+0
5297.69	1.88762	7.0187E-1	1.5086E+0	6.4755E-1	5307.24	1.88422	1.1352E+0	1.9416E+0	1.0809E+0
5297.97	1.88752	7.4349E-1	1.5522E+0	6.8910E-1	5307.44	1.88415	1.0644E+0	1.8686E+0	1.0102E+0
5298.25	1.88742	7.9837E-1	1.6102E+0	7.4383E-1	5307.64	1.88408	1.0039E+0	1.8077E+0	9.4967E-1
5298.53	1.88732	8.6763E-1	1.6849E+0	8.1271E-1	5307.84	1.88400	9.4981E-1	1.7550E+0	8.9554E-1
5298.81	1.88722	9.5765E-1	1.7845E+0	9.0163E-1	5308.04	1.88393	9.0095E-1	1.7071E+0	8.4662E-1
5299.37	1.88702	1.2188E+0	2.0432E+0	1.1596E+0	5308.24	1.88386	8.5752E-1	1.6635E+0	8.0320E-1
5299.79	1.88687	1.4841E+0	2.2985E+0	1.4212E+0	5308.44	1.88379	8.1743E-1	1.6232E+0	7.6312E-1
5300.07	1.88677	1.7094E+0	2.5195E+0	1.6425E+0	5308.64	1.88372	7.8104E-1	1.5868E+0	7.2673E-1
5300.50	1.88662	2.1907E+0	3.0010E+0	2.1104E+0	5308.84	1.88365	7.4608E-1	1.5517E+0	6.9178E-1
5300.78	1.88652	2.6953E+0	3.5080E+0	2.6031E+0	5309.04	1.88358	7.1305E-1	1.5181E+0	6.5878E-1
5301.06	1.88642	3.4514E+0	4.2650E+0	3.3456E+0	5309.24	1.88351	6.8377E-1	1.4876E+0	6.2953E-1
5301.34	1.88632	4.6536E+0	5.4656E+0	4.5361E+0	5309.44	1.88344	6.5707E-1	1.4593E+0	6.0285E-1
5301.62	1.88622	6.5443E+0	7.3594E+0	6.4008E+0	5309.64	1.88337	6.3392E-1	1.4350E+0	5.7971E-1
5301.90	1.88612	9.4881E+0	1.0304E+1	9.2663E+0	5309.84	1.88329	6.1293E-1	1.4135E+0	5.5873E-1
5302.18	1.88602	1.3877E+1	1.4772E+1	1.3387E+1	5310.04	1.88322	5.9426E-1	1.3953E+0	5.4005E-1
5302.32	1.88597	1.6555E+1	1.7580E+1	1.5822E+1	5310.14	1.88319	5.8577E-1	1.3875E+0	5.3155E-1
5302.46	1.88592	1.9185E+1	2.0306E+1	1.8273E+1	5310.24	1.88315	5.7798E-1	1.3805E+0	5.2375E-1
5302.60	1.88587	2.0767E+1	2.2039E+1	1.9658E+1	5310.34	1.88312	5.7125E-1	1.3745E+0	5.1701E-1
5302.74	1.88582	2.2082E+1	2.3542E+1	2.0841E+1	5310.44	1.88308	5.6552E-1	1.3697E+0	5.1128E-1
5302.88	1.88577	2.3068E+1	2.4614E+1	2.1747E+1	5310.54	1.88305	5.6126E-1	1.3662E+0	5.0701E-1
5303.03	1.88572	2.2860E+1	2.4342E+1	2.1589E+1	5310.64	1.88301	5.5837E-1	1.3639E+0	5.0412E-1
5303.17	1.88567	2.1930E+1	2.3210E+1	2.0824E+1	5310.84	1.88294	5.5475E-1	1.3619E+0	5.0049E-1
5303.31	1.88562	1.9926E+1	2.1112E+1	1.8988E+1	5311.04	1.88287	5.5390E-1	1.3621E+0	4.9962E-1
5303.59	1.88552	1.4788E+1	1.5745E+1	1.4226E+1	5311.24	1.88280	5.5443E-1	1.3637E+0	5.0014E-1
5303.87	1.88542	1.0490E+1	1.1334E+1	1.0218E+1	5311.44	1.88273	5.5632E-1	1.3670E+0	5.0200E-1
5304.15	1.88532	7.4927E+0	8.3228E+0	7.3214E+0	5311.64	1.88266	5.5990E-1	1.3717E+0	5.0556E-1
5304.43	1.88522	5.4657E+0	6.2895E+0	5.3329E+0	5311.84	1.88259	5.6493E-1	1.3776E+0	5.1058E-1
5304.54	1.88518	4.9014E+0	5.7249E+0	4.7800E+0	5312.04	1.88251	5.7192E-1	1.3851E+0	5.1755E-1
5304.64	1.88514	4.4565E+0	5.2807E+0	4.3467E+0	5312.24	1.88244	5.8061E-1	1.3944E+0	5.2622E-1
5304.74	1.88511	4.0701E+0	4.8961E+0	3.9683E+0	5312.44	1.88237	5.9108E-1	1.4051E+0	5.3668E-1
5304.84	1.88507	3.7384E+0	4.5650E+0	3.6434E+0	5312.64	1.88230	6.0348E-1	1.4173E+0	5.4907E-1
5304.94	1.88503	3.4369E+0	4.2623E+0	3.3488E+0	5313.14	1.88212	6.4087E-1	1.4529E+0	5.8647E-1
5305.04	1.88500	3.1839E+0	4.0051E+0	3.1017E+0	5313.64	1.88195	6.8676E-1	1.4954E+0	6.3241E-1
5305.14	1.88496	2.9690E+0	3.7853E+0	2.8914E+0	5314.64	1.88159	7.7678E-1	1.5798E+0	7.2255E-1
5305.24	1.88493	2.7771E+0	3.5902E+0	2.7046E+0	5315.64	1.88124	7.9984E-1	1.6136E+0	7.4522E-1
5305.34	1.88489	2.6091E+0	3.4199E+0	2.5418E+0	5316.14	1.88106	8.4287E-1	1.6552E+0	7.8827E-1
5305.44	1.88486	2.4598E+0	3.2696E+0	2.3961E+0	5316.39	1.88097	8.6682E-1	1.6782E+0	8.1224E-1
5305.54	1.88482	2.3197E+0	3.1292E+0	2.2583E+0	5316.64	1.88089	8.9121E-1	1.7018E+0	8.3665E-1
5305.64	1.88479	2.1931E+0	3.0024E+0	2.1336E+0	5316.89	1.88080	9.1569E-1	1.7255E+0	8.6116E-1
5305.74	1.88475	2.0795E+0	2.8892E+0	2.0216E+0	5317.14	1.88071	9.4018E-1	1.7493E+0	8.8568E-1
5305.84	1.88471	1.9762E+0	2.7861E+0	1.9196E+0	5317.64	1.88053	9.9003E-1	1.7977E+0	9.3561E-1
5305.94	1.88468	1.8890E+0	2.6990E+0	1.8333E+0	5318.14	1.88035	1.0436E+0	1.8506E+0	9.8923E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5318.44	1.88025	1.0781E+0	1.8844E+0	1.0238E+0	5325.95	1.87760	1.7248E+0	2.5366E+0	1.6698E+0
5318.65	1.88018	1.1032E+0	1.9097E+0	1.0489E+0	5326.05	1.87757	1.7122E+0	2.5241E+0	1.6572E+0
5318.85	1.88011	1.1301E+0	1.9374E+0	1.0757E+0	5326.15	1.87753	1.7021E+0	2.5139E+0	1.6471E+0
5319.05	1.88004	1.1589E+0	1.9667E+0	1.1045E+0	5326.25	1.87749	1.6929E+0	2.5048E+0	1.6380E+0
5319.25	1.87997	1.1924E+0	2.0021E+0	1.1378E+0	5326.35	1.87746	1.6856E+0	2.4974E+0	1.6306E+0
5319.45	1.87990	1.2292E+0	2.0410E+0	1.1744E+0	5326.45	1.87742	1.6792E+0	2.4909E+0	1.6242E+0
5319.65	1.87982	1.2684E+0	2.0818E+0	1.2134E+0	5326.55	1.87739	1.6757E+0	2.4874E+0	1.6207E+0
5319.85	1.87975	1.3109E+0	2.1264E+0	1.2555E+0	5326.65	1.87735	1.6738E+0	2.4856E+0	1.6189E+0
5320.05	1.87968	1.3545E+0	2.1716E+0	1.2988E+0	5326.85	1.87728	1.6721E+0	2.4838E+0	1.6172E+0
5320.25	1.87961	1.4053E+0	2.2229E+0	1.3492E+0	5327.05	1.87721	1.6733E+0	2.4849E+0	1.6184E+0
5320.35	1.87958	1.4366E+0	2.2543E+0	1.3802E+0	5327.25	1.87714	1.6808E+0	2.4927E+0	1.6259E+0
5320.45	1.87954	1.4714E+0	2.2888E+0	1.4147E+0	5327.45	1.87707	1.6903E+0	2.5024E+0	1.6353E+0
5320.55	1.87951	1.5104E+0	2.3272E+0	1.4536E+0	5327.65	1.87700	1.7036E+0	2.5158E+0	1.6486E+0
5320.65	1.87947	1.5535E+0	2.3696E+0	1.4967E+0	5327.85	1.87693	1.7207E+0	2.5329E+0	1.6657E+0
5320.85	1.87940	1.6470E+0	2.4619E+0	1.5908E+0	5328.05	1.87686	1.7427E+0	2.5550E+0	1.6878E+0
5321.05	1.87933	1.7482E+0	2.5624E+0	1.6925E+0	5328.25	1.87679	1.7710E+0	2.5833E+0	1.7160E+0
5321.25	1.87926	1.8567E+0	2.6705E+0	1.8015E+0	5328.45	1.87672	1.8038E+0	2.6162E+0	1.7488E+0
5321.45	1.87919	1.9680E+0	2.7816E+0	1.9128E+0	5328.65	1.87665	1.8375E+0	2.6500E+0	1.7825E+0
5321.55	1.87915	2.0229E+0	2.8364E+0	1.9677E+0	5328.85	1.87658	1.8735E+0	2.6863E+0	1.8185E+0
5321.65	1.87912	2.0744E+0	2.8878E+0	2.0192E+0	5329.05	1.87651	1.9118E+0	2.7251E+0	1.8568E+0
5321.75	1.87908	2.1209E+0	2.9340E+0	2.0657E+0	5329.25	1.87644	1.9520E+0	2.7658E+0	1.8969E+0
5321.85	1.87905	2.1643E+0	2.9772E+0	2.1091E+0	5329.45	1.87637	1.9925E+0	2.8068E+0	1.9373E+0
5321.95	1.87901	2.2028E+0	3.0156E+0	2.1476E+0	5329.65	1.87630	2.0332E+0	2.8480E+0	1.9780E+0
5322.05	1.87898	2.2338E+0	3.0463E+0	2.1785E+0	5329.85	1.87623	2.0742E+0	2.8896E+0	2.0189E+0
5322.15	1.87894	2.2579E+0	3.0705E+0	2.2026E+0	5330.05	1.87616	2.1155E+0	2.9314E+0	2.0602E+0
5322.25	1.87891	2.2762E+0	3.0886E+0	2.2209E+0	5330.25	1.87609	2.1571E+0	2.9736E+0	2.1017E+0
5322.35	1.87887	2.2874E+0	3.0998E+0	2.2321E+0	5330.45	1.87602	2.1990E+0	3.0160E+0	2.1435E+0
5322.45	1.87884	2.2929E+0	3.1054E+0	2.2376E+0	5330.65	1.87595	2.2433E+0	3.0609E+0	2.1878E+0
5322.55	1.87880	2.2877E+0	3.1005E+0	2.2323E+0	5330.85	1.87587	2.2881E+0	3.1063E+0	2.2324E+0
5322.65	1.87876	2.2774E+0	3.0908E+0	2.2220E+0	5331.05	1.87580	2.3338E+0	3.1526E+0	2.2776E+0
5322.75	1.87873	2.2606E+0	3.0747E+0	2.2052E+0	5331.25	1.87573	2.3822E+0	3.2015E+0	2.3254E+0
5322.85	1.87869	2.2412E+0	3.0561E+0	2.1855E+0	5331.45	1.87566	2.4357E+0	3.2553E+0	2.3784E+0
5323.05	1.87862	2.1994E+0	3.0156E+0	2.1430E+0	5331.65	1.87559	2.4955E+0	3.3152E+0	2.4380E+0
5323.25	1.87855	2.1602E+0	2.9772E+0	2.1036E+0	5331.85	1.87552	2.5594E+0	3.3789E+0	2.5016E+0
5323.45	1.87848	2.1328E+0	2.9500E+0	2.0764E+0	5332.05	1.87545	2.6309E+0	3.4502E+0	2.5732E+0
5323.65	1.87841	2.1292E+0	2.9459E+0	2.0731E+0	5332.25	1.87538	2.7059E+0	3.5246E+0	2.6483E+0
5323.85	1.87834	2.1340E+0	2.9494E+0	2.0785E+0	5332.45	1.87531	2.7827E+0	3.6007E+0	2.7254E+0
5324.05	1.87827	2.1447E+0	2.9586E+0	2.0894E+0	5332.65	1.87524	2.8609E+0	3.6782E+0	2.8039E+0
5324.25	1.87820	2.1440E+0	2.9564E+0	2.0888E+0	5333.05	1.87510	3.0198E+0	3.8360E+0	2.9634E+0
5324.45	1.87813	2.1310E+0	2.9422E+0	2.0759E+0	5333.45	1.87496	3.1851E+0	4.0006E+0	3.1286E+0
5324.55	1.87809	2.1156E+0	2.9265E+0	2.0605E+0	5333.85	1.87482	3.3600E+0	4.1748E+0	3.3033E+0
5324.65	1.87806	2.0940E+0	2.9047E+0	2.0390E+0	5334.05	1.87475	3.4509E+0	4.2653E+0	3.3942E+0
5324.75	1.87802	2.0683E+0	2.8789E+0	2.0133E+0	5334.25	1.87468	3.5443E+0	4.3583E+0	3.4875E+0
5324.85	1.87799	2.0386E+0	2.8492E+0	1.9837E+0	5334.45	1.87461	3.6379E+0	4.4516E+0	3.5810E+0
5325.05	1.87792	1.9675E+0	2.7782E+0	1.9126E+0	5334.65	1.87454	3.7281E+0	4.5416E+0	3.6711E+0
5325.25	1.87785	1.8981E+0	2.7094E+0	1.8432E+0	5334.85	1.87447	3.8124E+0	4.6261E+0	3.7553E+0
5325.45	1.87778	1.8324E+0	2.6441E+0	1.7775E+0	5335.05	1.87440	3.8899E+0	4.7039E+0	3.8326E+0
5325.65	1.87771	1.7791E+0	2.5908E+0	1.7241E+0	5335.25	1.87433	3.9674E+0	4.7818E+0	3.9100E+0
5325.75	1.87767	1.7577E+0	2.5696E+0	1.7028E+0	5335.45	1.87426	4.0447E+0	4.8593E+0	3.9872E+0
5325.85	1.87764	1.7390E+0	2.5507E+0	1.6840E+0	5335.65	1.87419	4.1178E+0	4.9326E+0	4.0602E+0

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α	ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5335.85	1.87412	4.1847E+0	4.9995E+0	4.1270E+0	5362.65	1.86475	1.7499E+0	2.5583E+0	1.6953E+0
5336.05	1.87405	4.2474E+0	5.0621E+0	4.1891E+0	5363.65	1.86440	1.6719E+0	2.4800E+0	1.6174E+0
5336.25	1.87398	4.3026E+0	5.1172E+0	4.2432E+0	5364.65	1.86405	1.5942E+0	2.4019E+0	1.5398E+0
5336.45	1.87391	4.3520E+0	5.1663E+0	4.2917E+0	5365.65	1.86371	1.5181E+0	2.3256E+0	1.4637E+0
5336.65	1.87384	4.3950E+0	5.2093E+0	4.3341E+0	5366.65	1.86336	1.4426E+0	2.2501E+0	1.3882E+0
5336.85	1.87377	4.4280E+0	5.2422E+0	4.3665E+0	5367.65	1.86301	1.3680E+0	2.1755E+0	1.3136E+0
5337.05	1.87370	4.4524E+0	5.2665E+0	4.3901E+0	5368.65	1.86267	1.2945E+0	2.1020E+0	1.2401E+0
5337.25	1.87363	4.4696E+0	5.2839E+0	4.4066E+0	5369.65	1.86232	1.2223E+0	2.0299E+0	1.1679E+0
5337.45	1.87355	4.4757E+0	5.2901E+0	4.4123E+0	5370.65	1.86197	1.1533E+0	1.9604E+0	1.0988E+0
5337.65	1.87348	4.4749E+0	5.2895E+0	4.4113E+0	5371.65	1.86162	1.0892E+0	1.8948E+0	1.0349E+0
5337.85	1.87341	4.4701E+0	5.2849E+0	4.4064E+0	5372.65	1.86128	1.0296E+0	1.8327E+0	9.7541E-1
5338.05	1.87334	4.4596E+0	5.2746E+0	4.3958E+0	5373.65	1.86093	9.7388E-1	1.7739E+0	9.1986E-1
5338.25	1.87327	4.4469E+0	5.2620E+0	4.3833E+0	5374.65	1.86059	9.2132E-1	1.7184E+0	8.6738E-1
5338.45	1.87320	4.4324E+0	5.2476E+0	4.3689E+0	5375.65	1.86024	8.7251E-1	1.6700E+0	8.1850E-1
5338.65	1.87313	4.4149E+0	5.2303E+0	4.3517E+0	5376.65	1.85989	8.2724E-1	1.6269E+0	7.7312E-1
5338.90	1.87305	4.3906E+0	5.2060E+0	4.3278E+0	5377.15	1.85972	8.0680E-1	1.6084E+0	7.5261E-1
5339.15	1.87296	4.3621E+0	5.1775E+0	4.3000E+0	5377.65	1.85955	7.8780E-1	1.5910E+0	7.3356E-1
5339.40	1.87287	4.3299E+0	5.1453E+0	4.2688E+0	5378.15	1.85937	7.7018E-1	1.5747E+0	7.1591E-1
5339.65	1.87278	4.2953E+0	5.1106E+0	4.2354E+0	5378.65	1.85920	7.5415E-1	1.5596E+0	6.9985E-1
5339.90	1.87270	4.2568E+0	5.0718E+0	4.1980E+0	5380.65	1.85851	6.9167E-1	1.5006E+0	6.3730E-1
5340.15	1.87261	4.2173E+0	5.0320E+0	4.1592E+0	5381.65	1.85817	6.6149E-1	1.4719E+0	6.0710E-1
5340.65	1.87243	4.1331E+0	4.9472E+0	4.0755E+0	5382.65	1.85782	6.3257E-1	1.4444E+0	5.7817E-1
5341.15	1.87226	4.0471E+0	4.8608E+0	3.9897E+0	5383.65	1.85747	6.0607E-1	1.4189E+0	5.5167E-1
5341.65	1.87208	3.9610E+0	4.7747E+0	3.9037E+0	5384.65	1.85713	5.8162E-1	1.3950E+0	5.2724E-1
5342.15	1.87191	3.8754E+0	4.6895E+0	3.8181E+0	5385.65	1.85678	5.5896E-1	1.3724E+0	5.0459E-1
5342.65	1.87173	3.7893E+0	4.6040E+0	3.7322E+0	5386.15	1.85661	5.4859E-1	1.3620E+0	4.9423E-1
5343.15	1.87156	3.7004E+0	4.5159E+0	3.6433E+0	5386.65	1.85644	5.3931E-1	1.3524E+0	4.8496E-1
5343.65	1.87138	3.6130E+0	4.4293E+0	3.5560E+0	5387.15	1.85627	5.3061E-1	1.3435E+0	4.7628E-1
5344.15	1.87121	3.5276E+0	4.3445E+0	3.4706E+0	5387.65	1.85610	5.2230E-1	1.3349E+0	4.6798E-1
5344.65	1.87103	3.4444E+0	4.2619E+0	3.3875E+0	5388.65	1.85575	5.0647E-1	1.3192E+0	4.5216E-1
5345.15	1.87086	3.3667E+0	4.1846E+0	3.3099E+0	5389.65	1.85541	4.9139E-1	1.3044E+0	4.3709E-1
5345.65	1.87068	3.2920E+0	4.1102E+0	3.2352E+0	5390.65	1.85506	4.7719E-1	1.2903E+0	4.2290E-1
5346.15	1.87051	3.2201E+0	4.0384E+0	3.1634E+0	5391.65	1.85472	4.6359E-1	1.2767E+0	4.0931E-1
5346.65	1.87033	3.1540E+0	3.9723E+0	3.0974E+0	5392.65	1.85437	4.5028E-1	1.2633E+0	3.9601E-1
5347.15	1.87016	3.0909E+0	3.9089E+0	3.0344E+0	5393.65	1.85403	4.3719E-1	1.2501E+0	3.8294E-1
5347.65	1.86998	3.0313E+0	3.8488E+0	2.9749E+0	5394.65	1.85369	4.2455E-1	1.2374E+0	3.7031E-1
5348.15	1.86981	2.9758E+0	3.7927E+0	2.9195E+0	5395.65	1.85334	4.1246E-1	1.2252E+0	3.5822E-1
5348.65	1.86963	2.9222E+0	3.7385E+0	2.8660E+0	5396.65	1.85300	4.0092E-1	1.2134E+0	3.4669E-1
5349.65	1.86928	2.8203E+0	3.6350E+0	2.7642E+0	5397.65	1.85266	3.8987E-1	1.2020E+0	3.3565E-1
5350.65	1.86893	2.7243E+0	3.5372E+0	2.6684E+0	5398.65	1.85231	3.7949E-1	1.1913E+0	3.2528E-1
5351.65	1.86858	2.6333E+0	3.4448E+0	2.5776E+0	5400.66	1.85163	3.5938E-1	1.1703E+0	3.0519E-1
5352.15	1.86841	2.5890E+0	3.4001E+0	2.5334E+0	5401.66	1.85128	3.4986E-1	1.1603E+0	2.9568E-1
5352.65	1.86823	2.5455E+0	3.3561E+0	2.4900E+0	5402.66	1.85094	3.4077E-1	1.1508E+0	2.8660E-1
5353.15	1.86806	2.5026E+0	3.3129E+0	2.4471E+0	5403.66	1.85060	3.3217E-1	1.1417E+0	2.7800E-1
5353.65	1.86788	2.4610E+0	3.2709E+0	2.4056E+0	5404.66	1.85026	3.2401E-1	1.1330E+0	2.6985E-1
5354.15	1.86771	2.4201E+0	3.2299E+0	2.3647E+0	5405.66	1.84991	3.1629E-1	1.1248E+0	2.6214E-1
5354.65	1.86754	2.3796E+0	3.1892E+0	2.3243E+0	5406.66	1.84957	3.0889E-1	1.1170E+0	2.5474E-1
5356.65	1.86684	2.2201E+0	3.0294E+0	2.1650E+0	5407.66	1.84923	3.0178E-1	1.1094E+0	2.4763E-1
5358.65	1.86614	2.0617E+0	2.8707E+0	2.0068E+0	5408.66	1.84889	2.9493E-1	1.1023E+0	2.4079E-1
5360.65	1.86545	1.9059E+0	2.7148E+0	1.8512E+0	5409.66	1.84855	2.8852E-1	1.0958E+0	2.3438E-1

ν (cm^{-1})	λ (μm)	α (m^{-1})	max α	min α
5410.66	1.84820	2.8271E-1	1.0902E+0	2.2858E-1
5411.66	1.84786	2.7737E-1	1.0852E+0	2.2324E-1
5412.66	1.84752	2.7316E-1	1.0814E+0	2.1902E-1
5413.66	1.84718	2.7012E-1	1.0786E+0	2.1598E-1
5414.66	1.84684	2.6799E-1	1.0768E+0	2.1385E-1
5415.66	1.84650	2.6673E-1	1.0761E+0	2.1260E-1
5416.66	1.84616	2.6624E-1	1.0761E+0	2.1211E-1
5417.66	1.84582	2.6610E-1	1.0768E+0	2.1197E-1
5420.66	1.84479	2.6600E-1	1.0801E+0	2.1186E-1
5425.66	1.84309	2.6596E-1	1.0817E+0	2.1180E-1
5430.66	1.84140	2.6593E-1	1.0820E+0	2.1178E-1
5435.66	1.83970	2.6593E-1	1.0822E+0	2.1177E-1
5436.66	1.83936	2.6553E-1	1.0819E+0	2.1137E-1
5437.66	1.83903	2.6411E-1	1.0807E+0	2.0996E-1
5438.66	1.83869	2.6163E-1	1.0785E+0	2.0748E-1
5439.66	1.83835	2.5844E-1	1.0757E+0	2.0429E-1
5440.66	1.83801	2.5419E-1	1.0720E+0	2.0004E-1
5441.66	1.83767	2.4904E-1	1.0675E+0	1.9489E-1
5443.66	1.83700	2.3794E-1	1.0577E+0	1.8379E-1
5445.66	1.83632	2.2756E-1	1.0486E+0	1.7341E-1
5447.66	1.83565	2.1831E-1	1.0399E+0	1.6417E-1
5450.66	1.83464	2.0523E-1	1.0266E+0	1.5110E-1
5453.66	1.83363	1.9284E-1	1.0126E+0	1.3873E-1
5455.66	1.83296	1.8431E-1	1.0026E+0	1.3021E-1
5457.66	1.83229	1.7553E-1	9.9251E-1	1.2145E-1
5458.66	1.83195	1.7104E-1	9.8748E-1	1.1696E-1
5459.66	1.83162	1.6628E-1	9.8239E-1	1.1220E-1
5460.66	1.83128	1.6142E-1	9.7723E-1	1.0735E-1
5465.66	1.82960	1.3661E-1	9.5137E-1	8.2560E-2
5468.66	1.82860	1.2217E-1	9.3671E-1	6.8143E-2
5470.66	1.82793	1.1295E-1	9.2737E-1	5.8931E-2
5472.66	1.82726	1.0436E-1	9.1891E-1	5.0351E-2
5474.66	1.82660	9.6334E-2	9.1098E-1	4.2345E-2
5475.66	1.82626	9.2738E-2	9.0740E-1	3.8759E-2
5476.66	1.82593	8.9785E-2	9.0446E-1	3.5814E-2
5477.66	1.82560	8.7623E-2	9.0237E-1	3.3660E-2
5478.66	1.82526	8.6578E-2	9.0132E-1	3.2619E-2
5479.66	1.82493	8.6229E-2	9.0092E-1	3.2272E-2
5480.66	1.82460	8.6057E-2	9.0069E-1	3.2101E-2
5485.67	1.82293	8.6050E-2	9.0034E-1	3.2093E-2
5488.67	1.82194	8.5843E-2	8.9995E-1	3.1886E-2
5489.67	1.82160	8.4798E-2	8.9890E-1	3.0846E-2
5490.67	1.82127	8.2686E-2	8.9685E-1	2.8743E-2
5491.67	1.82094	7.9438E-2	8.9374E-1	2.5513E-2
5492.67	1.82061	7.5439E-2	8.8992E-1	2.1542E-2
5493.67	1.82028	7.0922E-2	8.8561E-1	1.7070E-2
5494.67	1.81995	6.7102E-2	8.8196E-1	1.3310E-2
5495.67	1.81962	6.3989E-2	8.7896E-1	1.0274E-2
5496.67	1.81928	6.1413E-2	8.7647E-1	7.7974E-3
5497.67	1.81895	5.9229E-2	8.7435E-1	5.7512E-3
5498.67	1.81862	5.7476E-2	8.7264E-1	4.1828E-3
5499.67	1.81829	5.5948E-2	8.7113E-1	2.9352E-3
5500.67	1.81796	5.4616E-2	8.6981E-1	2.0730E-3
5502.67	1.81730	5.2308E-2	8.6750E-1	4.2485E-3
5504.67	1.81664	5.0556E-2	8.6572E-1	0
5506.67	1.81598	4.9375E-2	8.6447E-1	0
5508.67	1.81532	4.8750E-2	8.6375E-1	0
5510.67	1.81466	4.8544E-2	8.6343E-1	0
5515.67	1.81302	4.8484E-2	8.6306E-1	0
5520.67	1.81137	4.7993E-2	8.6231E-1	0
5525.67	1.80974	4.7142E-2	8.6125E-1	0
5530.67	1.80810	4.6100E-2	8.6009E-1	0
5535.67	1.80647	4.4886E-2	8.5877E-1	0
5540.67	1.80484	4.3499E-2	8.5730E-1	0
5545.67	1.80321	4.1887E-2	8.5562E-1	0
5550.67	1.80158	3.9963E-2	8.5365E-1	0
5555.67	1.79996	3.7663E-2	8.5132E-1	0
5556.67	1.79964	3.7096E-2	8.5075E-1	0

Appendix C

Poster Presented at 1993 Lunar and Planetary Science Conference

(Houston, TX, March 1993)

A NEW ANALYSIS OF THE MARINER 7 INFRARED MEASUREMENTS OF THE MARTIAN SOUTH POLAR DEPOSITS

Gary B. Hansen, Univ. of Washington (Seattle) / Jet Propulsion Laboratory
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1. INTRODUCTION

In 1969, the Mariner 7 spacecraft encountered Mars, passing over southern latitudes at its nearest approach, allowing for many observations of the south polar seasonal deposits in early spring (L_s = 200). Among these measurements are spectra from the InfraRed Spectrometer (IRS) instrument with ~1.5% spectral resolution and covering the spectral range 1.9 - 14.4 micrometers. In the shorter wave region of these measurements, numerous spectral features characteristic of CO_2 ice are apparent (Herr and Pimentel, 1969; Pimentel et al., 1974).

Recent measurements of the absorption coefficient of solid CO_2 (Hansen, 1992) have motivated a reanalysis of the IRS spectra with the goal of determining probable grain size of CO_2 frost and mixing ratios of minor constituents (water ice, dust). Figure 1 displays these new measurements in the form of imaginary index of refraction (= absorption coefficient × wavelength / (4 π)). The new measurements do not extend above about 3×10^{-5} in imaginary index, so the data shown here have been augmented with information from Warren (1986), and in the case of the strong line at 3.32 μm, the data have been extrapolated in a way consistent with laboratory frost measurements.

Two representative IRS spectra will be discussed here, as supplied by Martin (1993). The measured spectral intensity has been divided by the solar spectral flux to provide spectra in units of bidirectional reflectance. The wavelength scale has been adjusted by shifts of < 0.02 μm, to align observed bands with the numerous CO_2 ice features. We restrict our attention to wavelengths less than 3.9 μm, because the new CO_2 data end there. The radiometric calibration of the IRS spectra below 3 μm is based on laboratory Nernst glower measurements that may contain significant low spectral frequency behavior, so the attempt to fit the measured and modeled spectra at

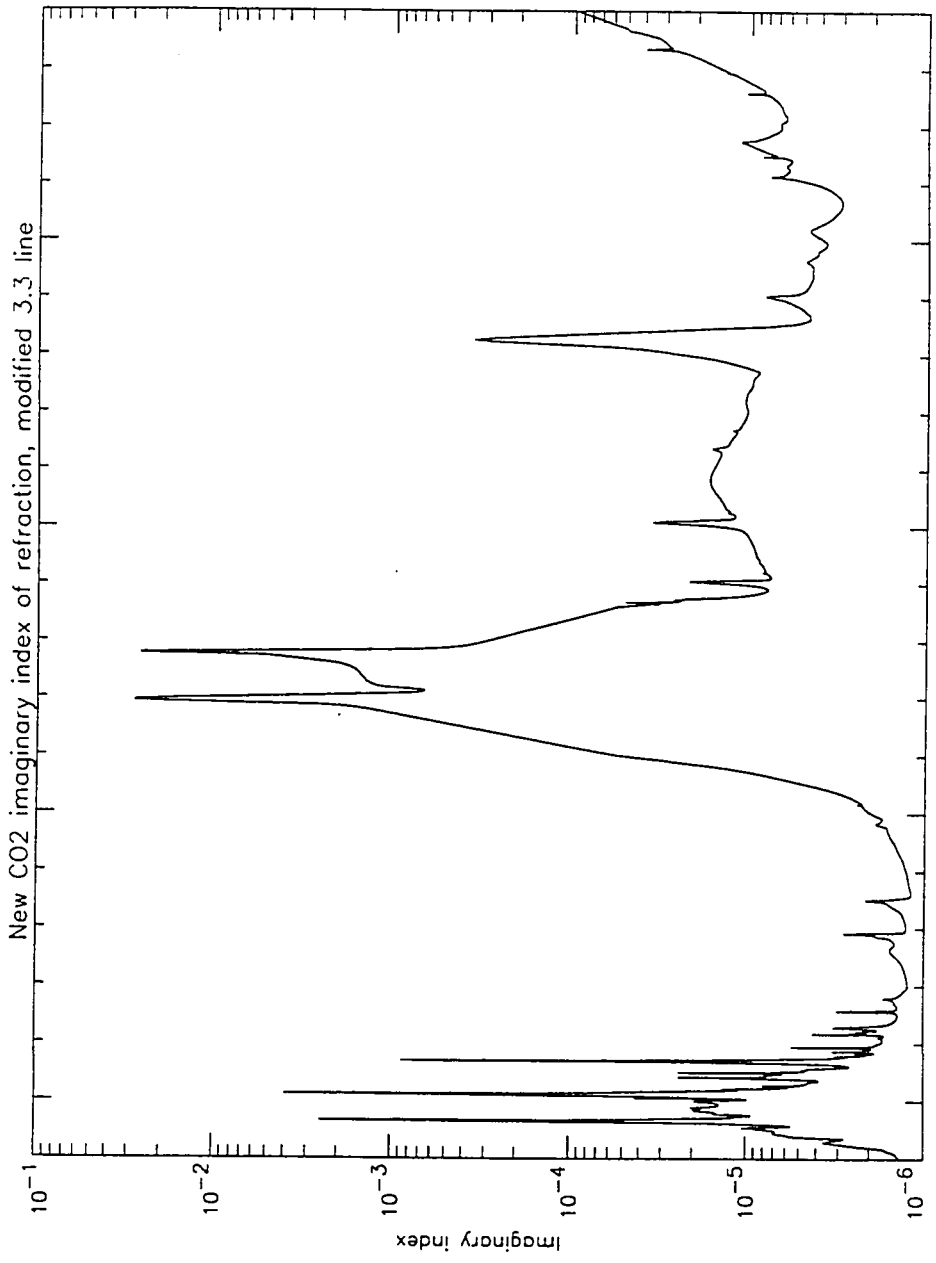

New CO2 imaginary index of refraction, modified 3.3 line
imaginary index
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
2.0
2.5
3.0
3.5
Wavelength, microns

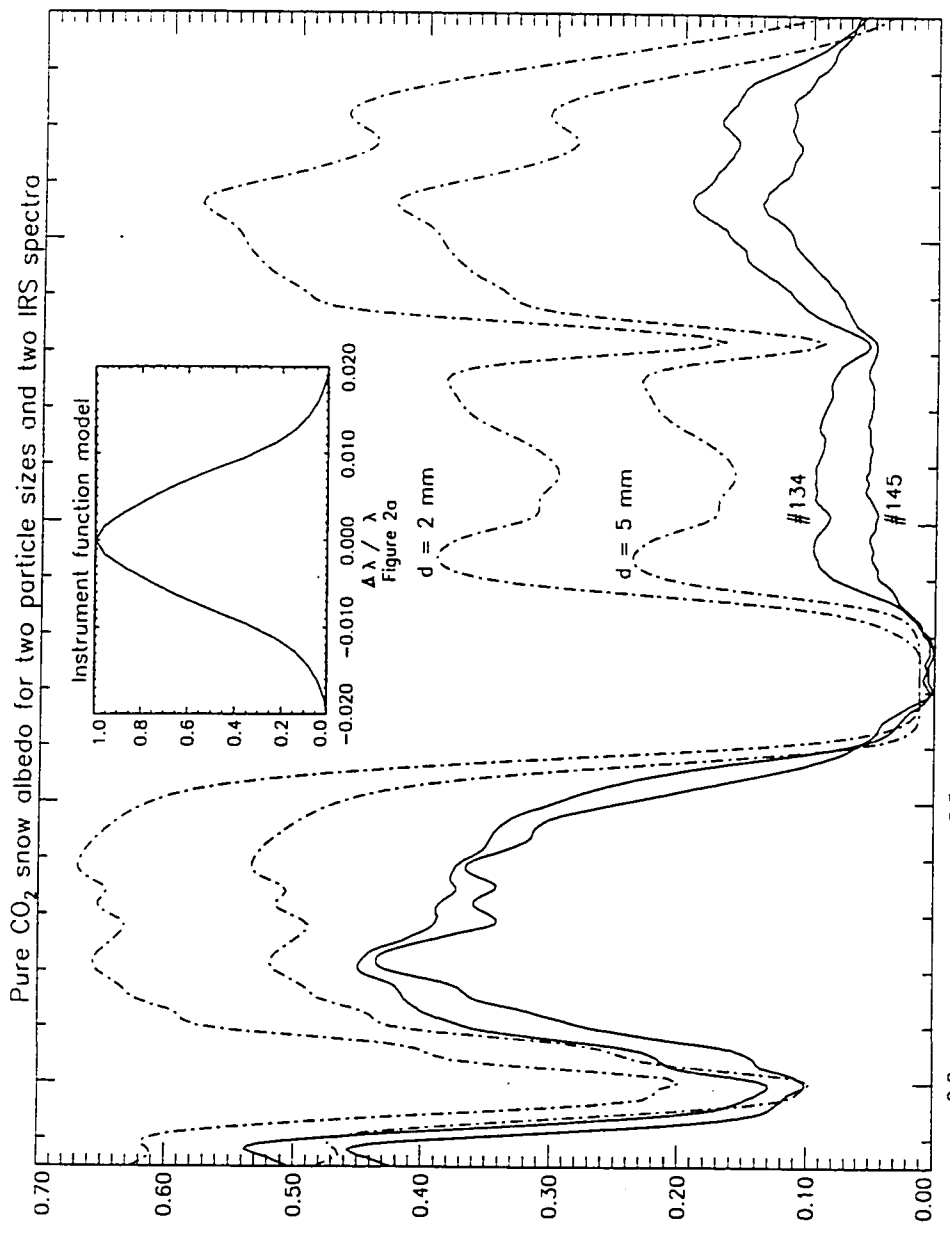
Figure 1.

2. DETAILS OF THE MEASUREMENTS

Figure 2 shows representative spectra of model CO_2 frost and the IRS spectra. The IRS spectra have been converted to hemispheric albedo by assuming that the reflectance at the Mariner 7 phase angle of 37° is representative of the average at all angles as justified below; therefore, albedo = $\pi \times$ reflectance. The CO_2 frost model is discussed later. The frost model spectra are for mean particle diameters of 2 and 5 mm, convoluted to the resolution of the IRS spectra using the instrument function shown in the inset and a FWHM of 1.6 %. The IRS spectra are identified by numbers 134 and 145, and are from the set of south polar deposit measurements. The first (#134) is from about 68° South latitude; it was selected because it has the strongest and most distinct CO_2 ice features. The second (#145), from 75° South, was selected to show the typical variation in brightness beyond 2.7 μm, and an atypical absorption strength in the two lines near 2.3 μm.

The notable features in these spectra are:

1) a triplet structure centered around 2.0 μm; the IRS spectra include additional absorption from atmospheric CO_2 here.
2) two weak bands at 2.28 and 2.32 μm.
3) a weak shoulder at ~ 2.43 μm visible only in the IRS data (atmospheric?).
4) a shoulder at 2.63 μm which is visible in the IRS spectra and is in a region where the atmosphere is still transparent; this is the CO_2 *ice* absorption edge. (Atmospheric CO_2 absorbs between 2.66 and 2.90 μm).
5) a weak line at 3.0 μm, more evident in the IRS spectra.
6) A broad triangular absorption centered at 3.1 μm which appears in the modeled CO_2; This may be the signature of small (10^{-5}) amounts of water in the CO_2 ice of the recent measurements, and is not visible in laboratory CO_2 frost measurements (Calvin (1990)). (Water ice at this wavelength has such a large absorption coefficient that snow crystals are actually reflective, as shown in figure 5 below, so H_2O particles mixed into Martian frost could *raise* the albedo whereas a molecular mixture in the laboratory could cause the broad absorption at 3.1 μm.)
7) the relatively strong absorption centered at 3.32 μm.
8) the distinctive segmented shape longward of the 3.3-μm line, with maxima at 3.57 and 3.73 μm and a minimum at 3.67 μm.


Pure CO_2 snow albedo for two particle sizes and two IRS spectra
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm
Figure 2
d = 2 mm
d = 5 mm
#134
#145
Instrument function model
1.0
0.8
0.6
0.4
0.2
0.0
−0.020
−0.010
0.000
0.010
0.020
Δλ / λ
Figure 2a

The distinctive behavior of the IRS polar spectra set is that the reflectance at 2.2 - 2.4 μm is nearly invariant, while the reflectance beyond 2.7 μm changes level by as much as a factor of two. This behavior is used to constrain the models.

3. ALBEDO MODEL

Since the IRS data are reflectance measurements into a particular viewing angle, it is necessary to investigate the validity of using an albedo model for comparison. A short segment of the new CO_2 data was analyzed for this purpose. The single scattering cross sections and phase function moments were calculated in both models by the Mie algorithm and the approximate Mie algorithms provided by Warren Wiscombe (1980). The effect on the Mie scattering by closely packed particles is ignored in this model following Warren (1982) and Warren et al. (1990). The discrete-ordinates-method multiple-scattering model of Stamnes et al. (1988) was used in this investigation. Figure 3 shows the difference between the hemispheric albedo and $\pi \times$ reflectance at 43° nadir angle and 45° relative azimuth, typical of the Mariner 7 observations, both calculated by the bidirectional reflectance package. Over a large range of particle opacity, the approximation is good to ± 2 % in albedo.

The results from the delta-Eddington albedo program (Wiscombe and Warren (1980), Warren et al. (1990)) used in this work are compared to the 16-stream discrete-ordinate albedo in Figure 4. The largest differences occur in regions of moderate albedo and do not exceed 1% in albedo. Therefore, the delta-Eddington program was deemed adequate for preliminary modeling if compared to $\pi \times$ the IRS reflectance spectra. All of the models use a solar incidence angle of 60°, intermediate between the values for the two IRS spectra, 58° and 67°.

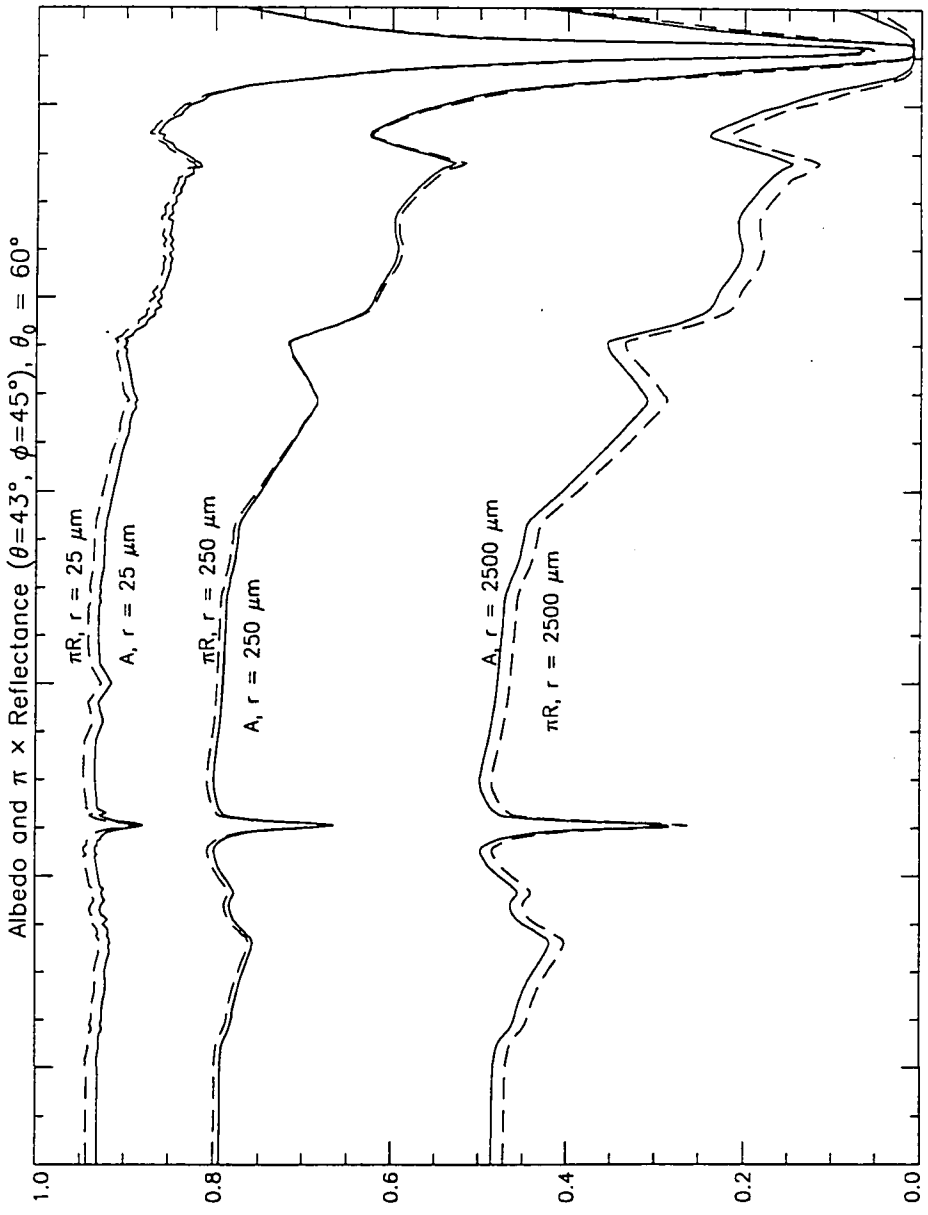

Albedo and π × Reflectance (θ=43°, φ=45°), θ0 = 60°
πR, r = 25 μm
A, r = 25 μm
πR, r = 250 μm
A, r = 250 μm
A, r = 2500 μm
πR, r = 2500 μm
1.0
0.8
0.6
0.4
0.2
0.0
1.86
1.88
1.90
1.92
1.94
1.96
Wavelength, μm

Figure 3

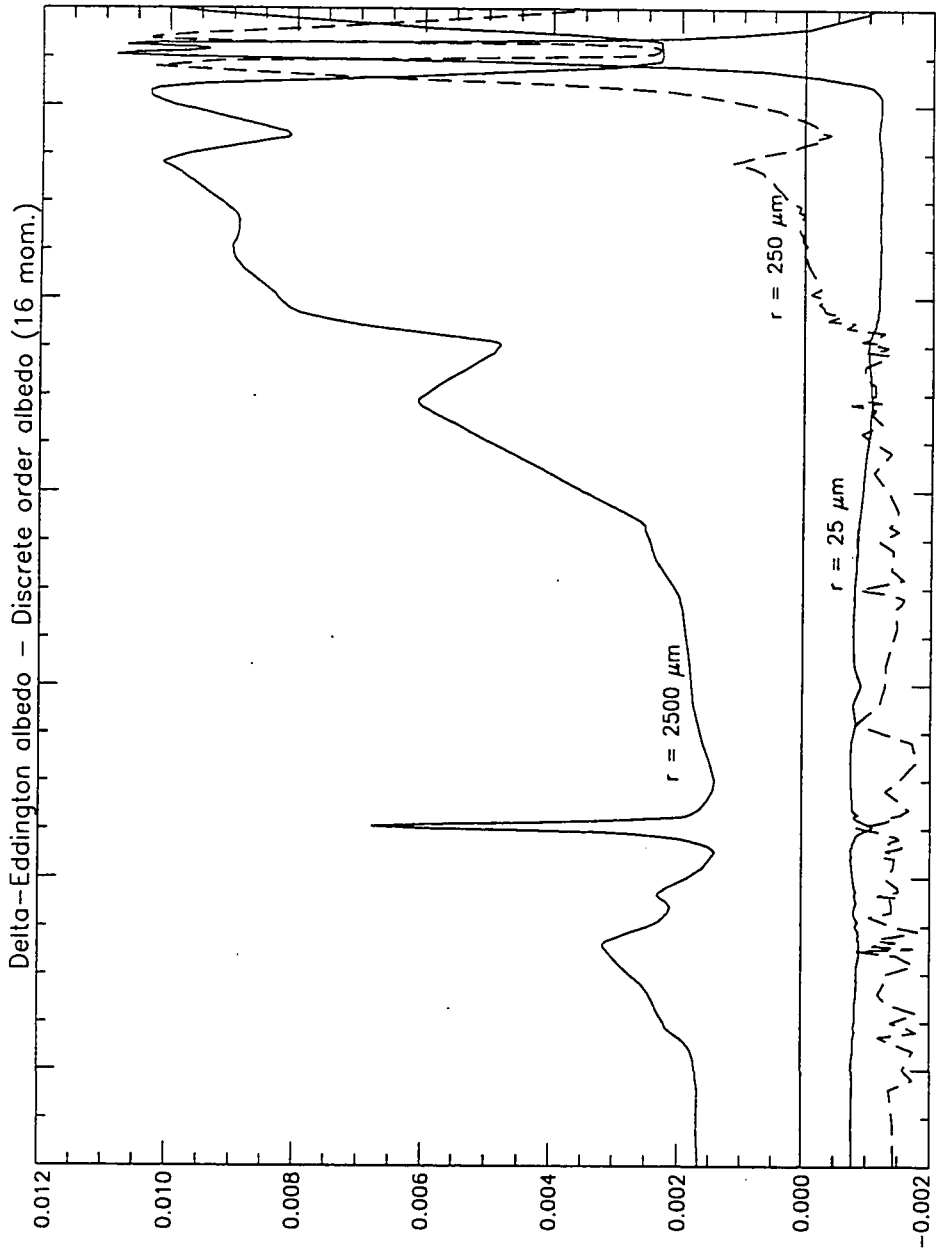

Delta-Eddington albedo – Discrete order albedo (16 mom.)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
-0.002
1.86
1.88
1.90
1.92
1.94
1.96
Wavelength, μm
r = 2500 μm
r = 250 μm
r = 25 μm

Figure 4

4. THE MATERIALS

In addition to CO_2, the Martian polar deposits are presumed to contain some water ice and some dust. The optical constants for H_2O come from Warren (1984), and when entered into the albedo model for a semi-infinite layer of various particle sizes, result in the spectra displayed in Figure 5. The dust optical constants used were for the hydrated silicate "palagonite", and were kindly supplied by Ted Roush. Both water ice and dust are very absorptive in the wavelength region longer than 2.7 μm, and thus are very effective in changing the albedo of mixtures in this region. The effect of mixing dust with water snow results primarily in changes of the shorter wavelength albedo (Figure 6). Figure 7 shows the full wavelength resolution albedo of pure CO_2 frost of many average particle sizes. Only the largest particle sizes exhibit large band depth in the 2.3-μm features and moderate albedo at 2.2 μm. Figure 8 (degraded resolution) shows the much different effect that the addition of dust to CO_2 snow has as compared to its effect on water snow, lowering the albedo where it is high, and raising it where it is low, and having a significant subduing effect on the CO_2 absorption features.

The near invariance of reflectance at 2.2 - 2.4 μm among the set of south pole IRS spectra suggests a selection strategy for materials to include in the models of the polar deposits, namely, to select the particle sizes of the constituent dust, water snow, and CO_2 snow such that their semi-infinite layer albedo is about 0.40 at 2.2 - 2.4 μm. Using this strategy, any mixture or layering of these constituents will have little or no effect on the 2.2 - 2.4 μm albedo, while varying effects at other wavelengths will be observed. Figure 9 displays a representative selection of these choices.

CO_2 particle diameters typical of terrestrial water snow (0.1 - 0.5 mm) give albedos too high in the 2.2 μm region, so to match the Mariner measurements, huge particles of about 1 cm diameter were needed. Such large particles would give visible albedos of about 0.4 - 0.5, which are rather lower than those estimated by Paige and Ingersoll (1985). So the Mariner measurements at 2.2 μm may be inconsistent with Viking measurements at visible wavelengths.

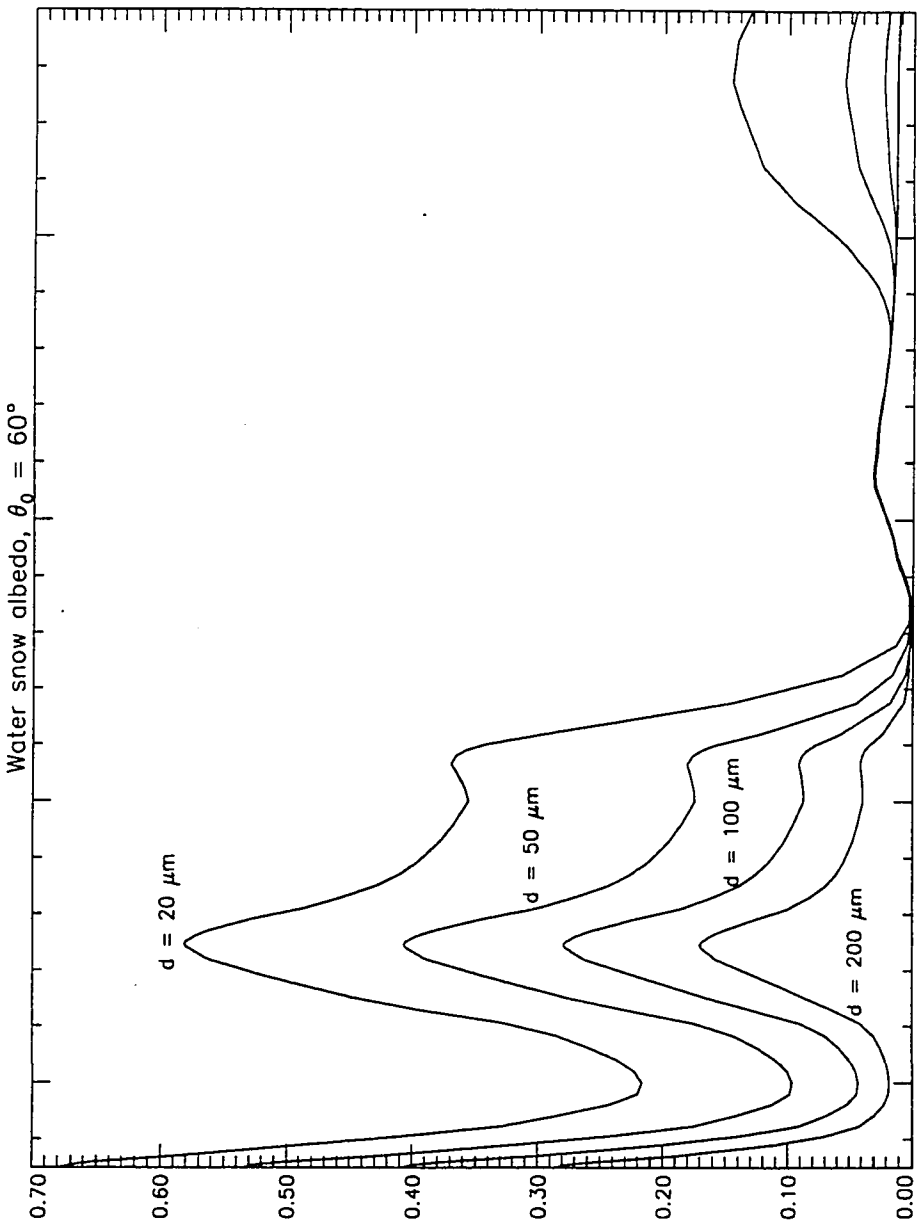

Water snow albedo, θ_0 = 60°
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm
d = 20 μm
d = 50 μm
d = 100 μm
d = 200 μm

Figure 5

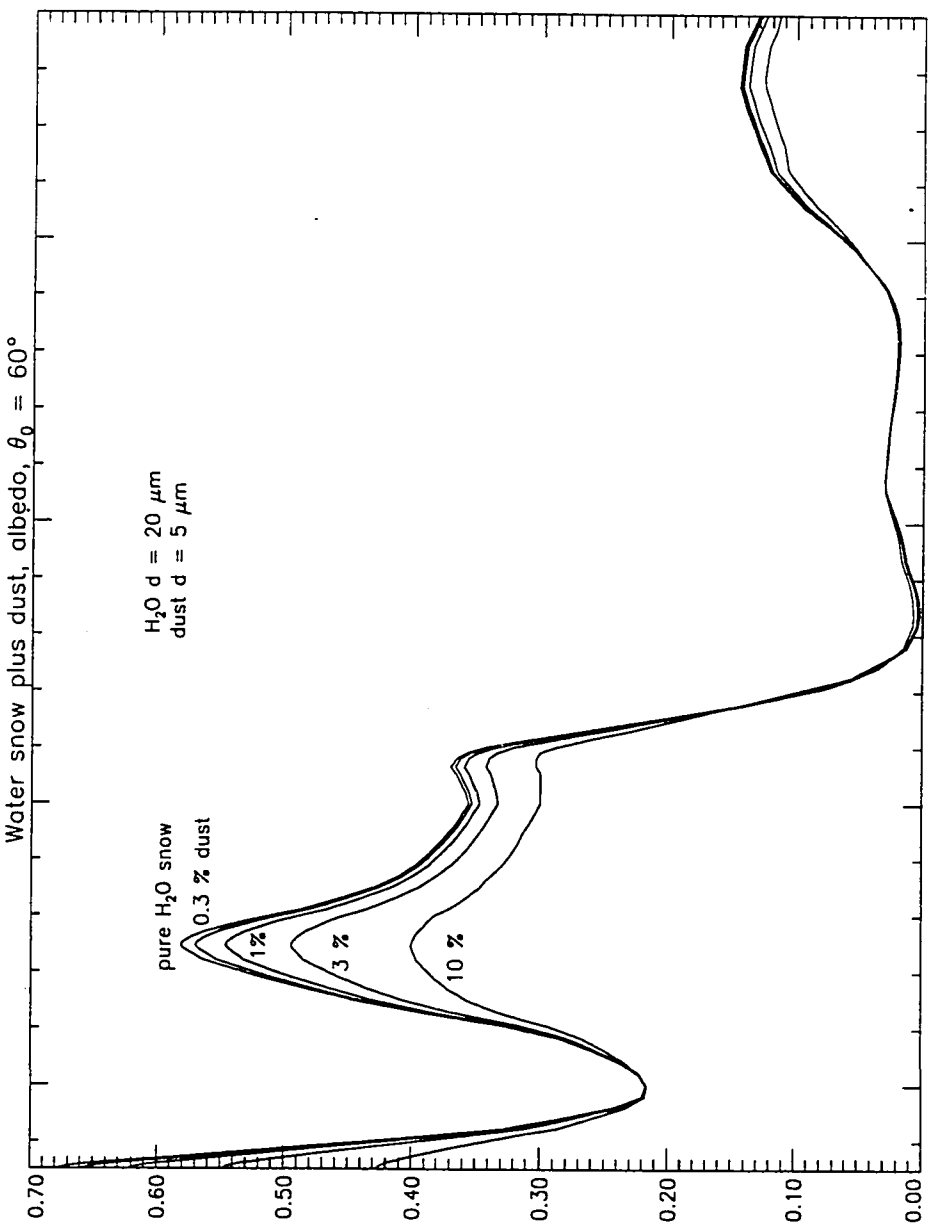

Water snow plus dust, albedo, θ_0 = 60°
H_2O d = 20 μm
dust d = 5 μm
pure H_2O snow
0.3 % dust
1%
3 %
10 %
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 6

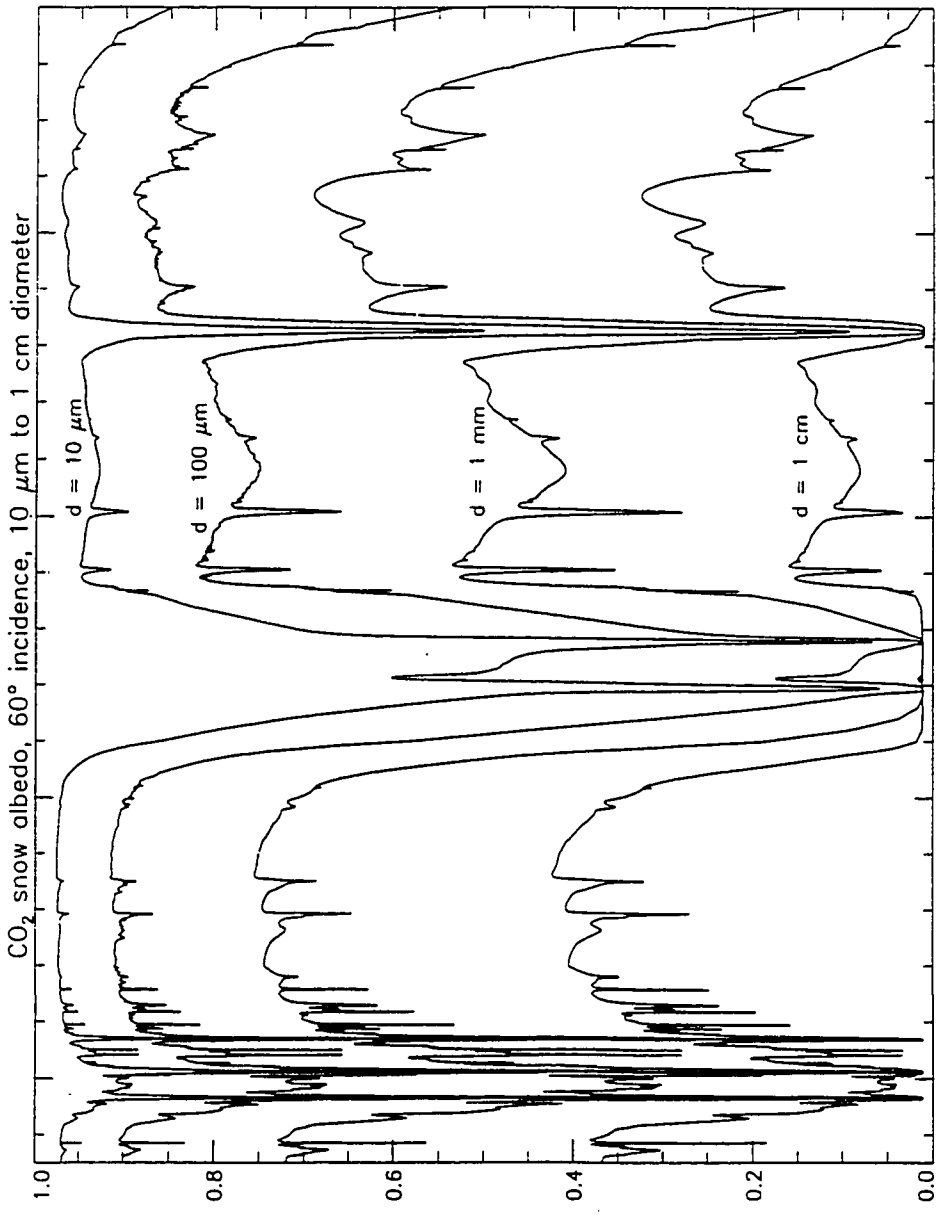

CO_2 snow albedo, 60° incidence, 10 μm to 1 cm diameter
d = 10 μm
d = 100 μm
d = 1 mm
d = 1 cm
1.0
0.8
0.6
0.4
0.2
0.0
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 7

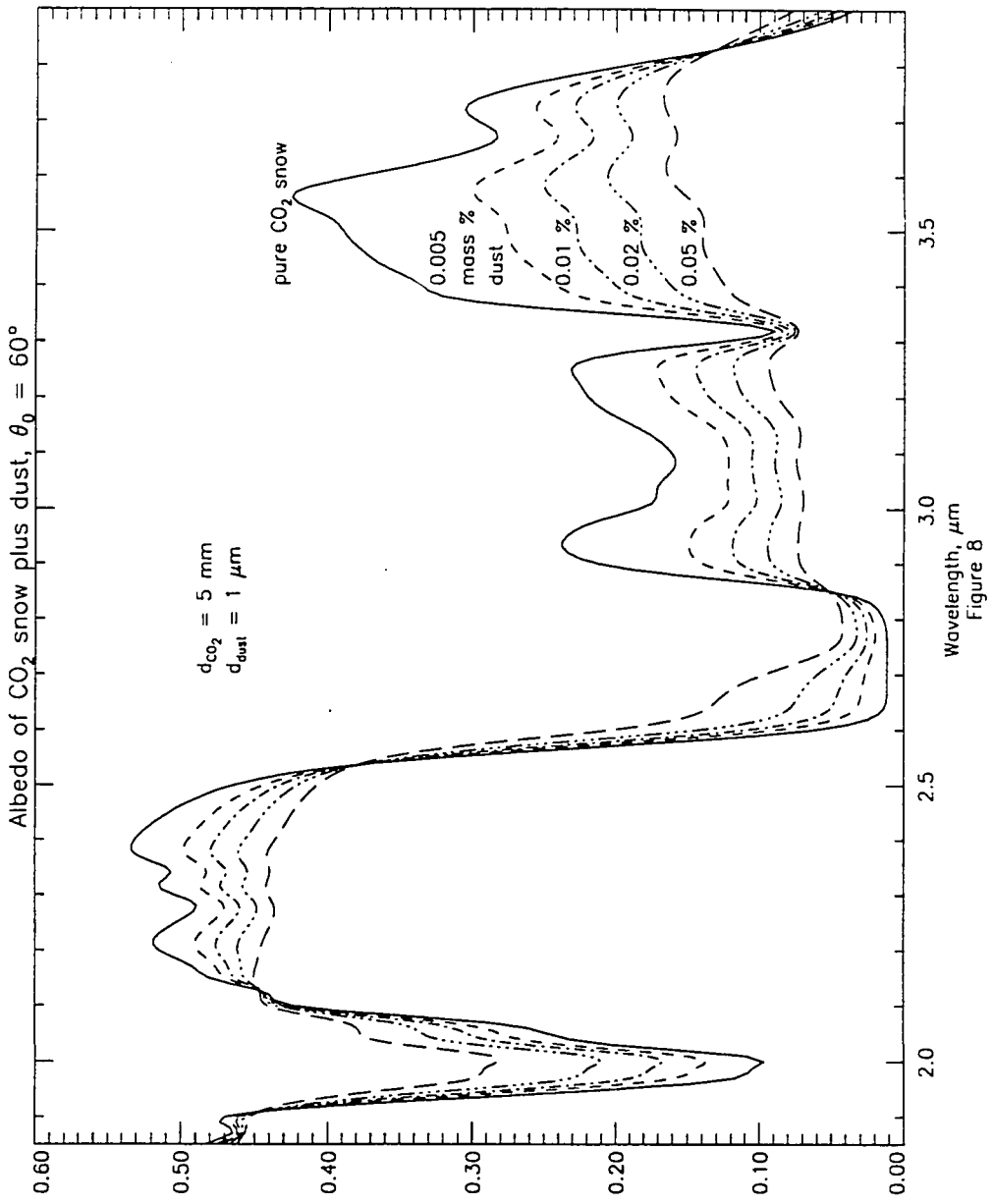

Albedo of CO_2 snow plus dust, θ_0 = 60°
d_{CO_2} = 5 mm
d_{dust} = 1 μm
pure CO_2 snow
0.005 mass % dust
0.01 %
0.02 %
0.05 %
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 8

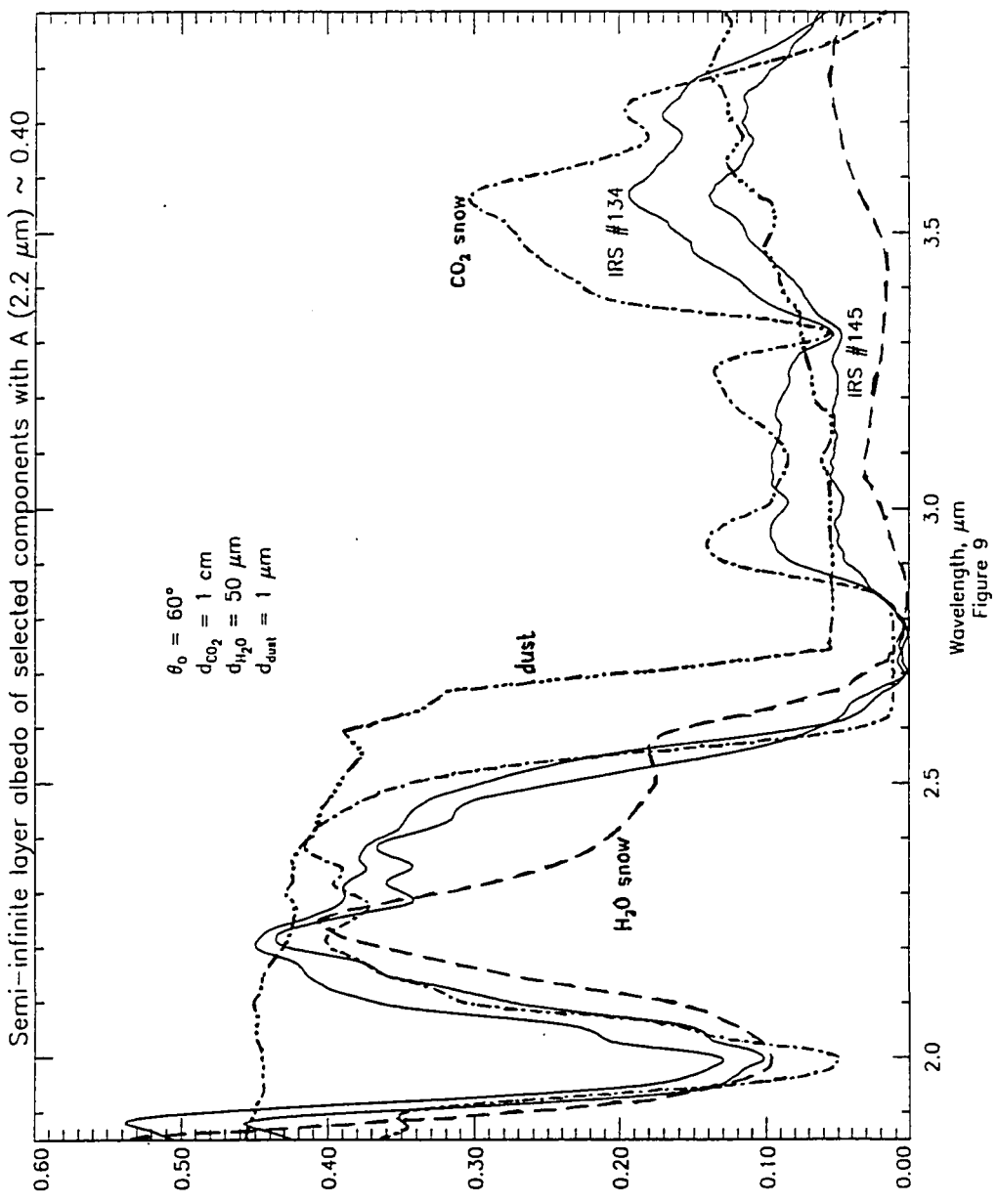

Semi-infinite layer albedo of selected components with A (2.2 μm) ~ 0.40
θ₀ = 60°
d_CO2 = 1 cm
d_H2O = 50 μm
d_dust = 1 μm
dust
H₂O snow
CO₂ snow
IRS #134
IRS #145
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 9

5.a. LAYERED MODELS

Preliminary experiments suggested that layered models, with a semi-infinite underlying layer covered by a small to moderate optical depth layer of another material, would provide the best fit to the observed spectra.

Figure 10 shows the results of a layer of 1-cm-diameter pure CO_2 ice particles over a dusty water snow. Here, the band depths at 2.3 μm are adequate for the larger layer depths, but only with inappropriately small layer depths are the albedos at > 3.3 μm low enough to fit the brightest of the IRS spectra. The layer depth of 1 g / cm^2 suggests a monolayer of 1-cm-diameter, closely packed particles, while 0.5 g / cm^2 suggests a dispersed monolayer, i.e., not a multiple scattering problem at all, as the program treats it. The masking of the 3.0-μm feature by the nearby 3.1-μm bulge in the model spectra as compared to its well defined appearance in the IRS spectrum #134 in this and subsequent models points to a suspected water contamination of the laboratory sample used to generate the model.

Figure 11 shows the model of a dusty CO_2 layer of 5-mm particles over dusty water snow. Here, the weakness of the 2.3-μm bands is apparent, and the layer depths must be thinned to inappropriate levels to keep the albedo > 2.7 μm low enough. The 3.3-μm line is also too prominent and the spectral slopes > 3.3 μm do not match the observations.

Figure 12 shows the albedo of dusty water frost over pure 1-cm CO_2 particles. Here, opposite to the problem of CO_2 over water, the water layer is too effective in lowering the albedo > 2.7 μm, leading to sub-monolayer depths of 20-μm water snow just to match the low albedo of the spectrum #145. The brighter spectrum #134 is barely approached. The 3.3-μm band is quite subdued and the 2.3-μm bands are appropriately deep.

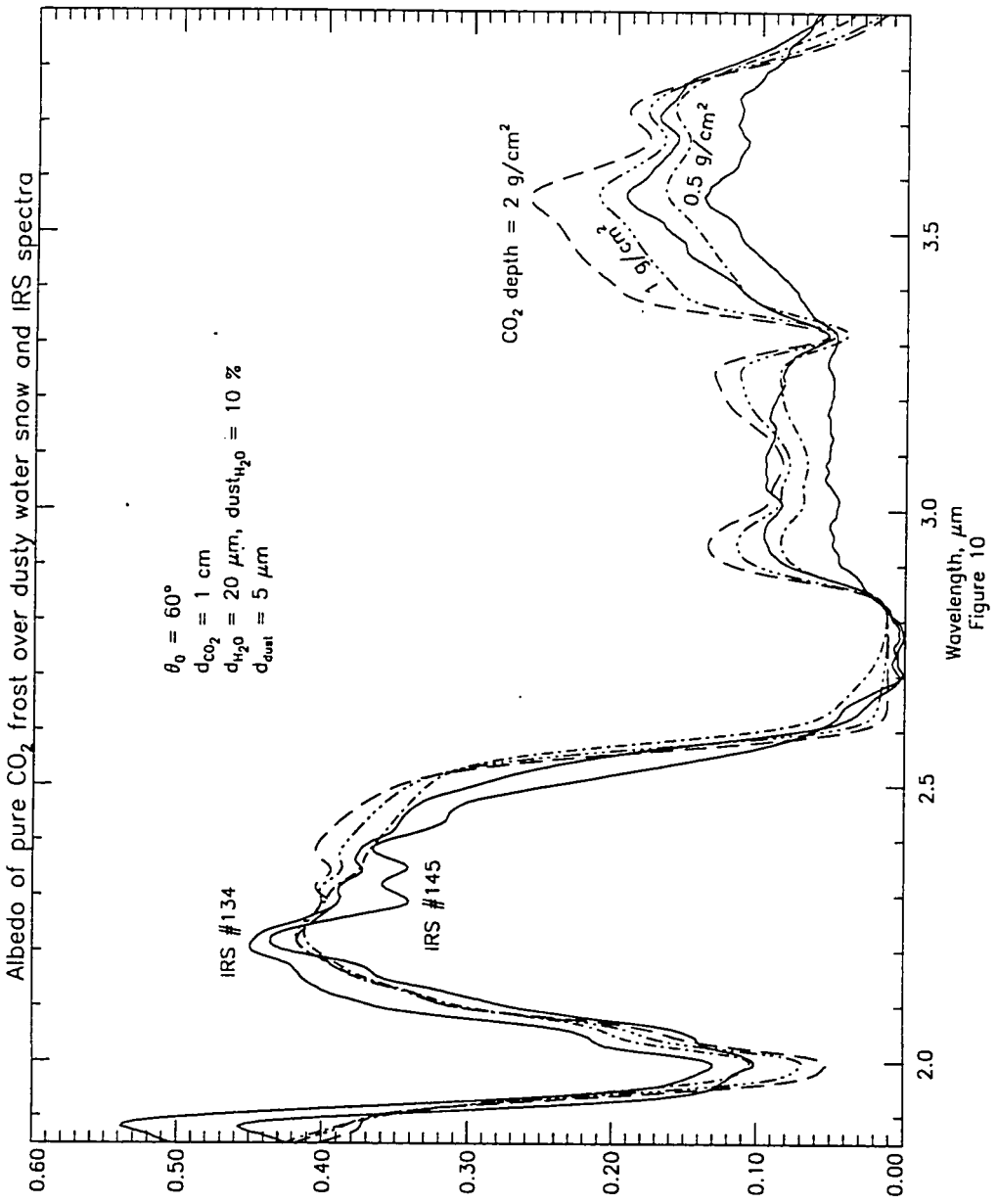

Albedo of pure CO_2 frost over dusty water snow and IRS spectra
θ_0 = 60°
d_{CO_2} = 1 cm
d_{H_2O} = 20 μm, $dust_{H_2O}$ = 10 %
d_{dust} = 5 μm
IRS #134
IRS #145
CO_2 depth = 2 g/cm²
1 g/cm²
0.5 g/cm²
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 10

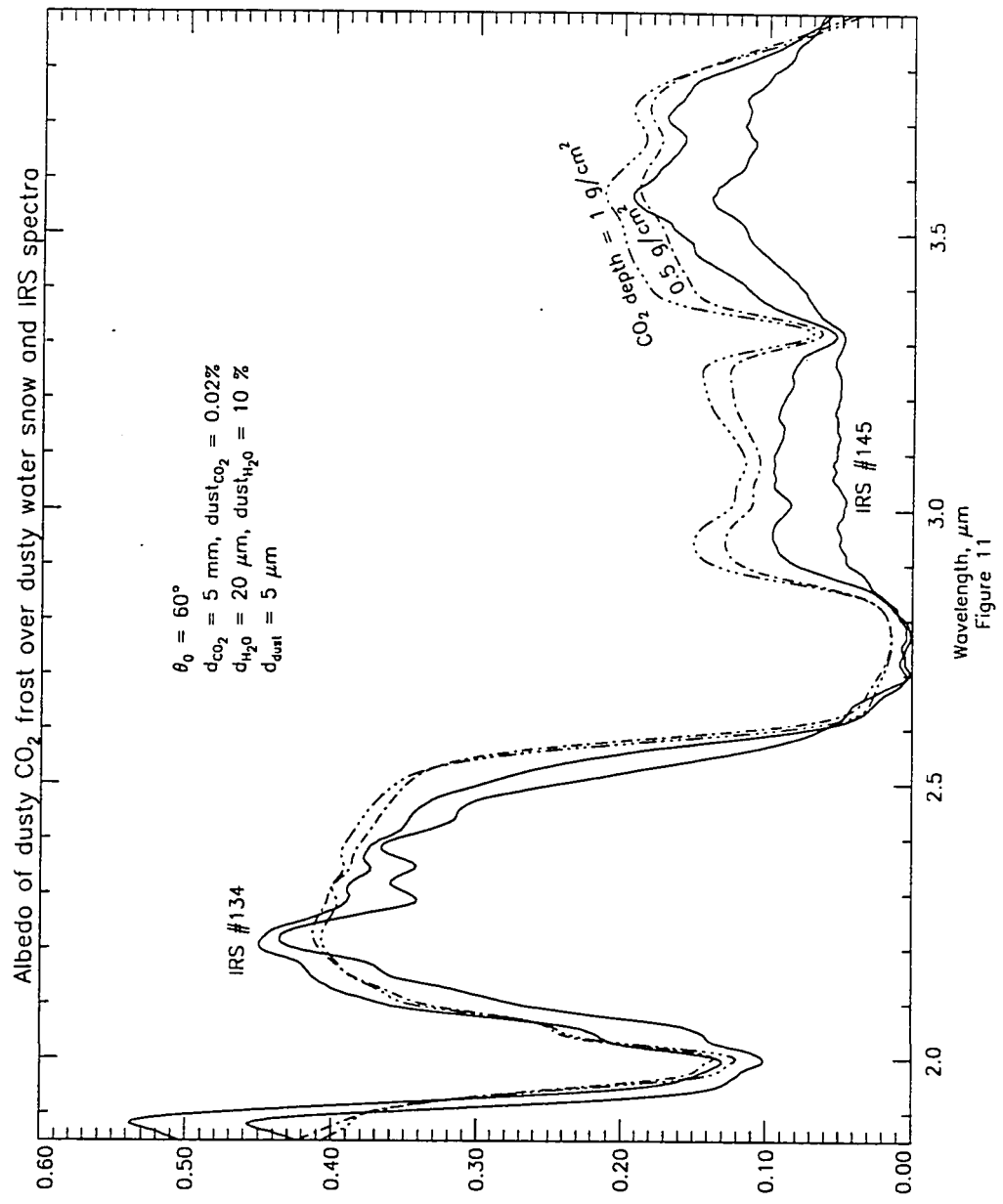

Albedo of dusty CO_2 frost over dusty water snow and IRS spectra
θ_0 = 60°
d_{CO_2} = 5 mm, $dust_{CO_2}$ = 0.02%
d_{H_2O} = 20 μm, $dust_{H_2O}$ = 10 %
d_{dust} = 5 μm
IRS #134
IRS #145
CO_2 depth = 1 g/cm²
0.5 g/cm²
0.00
0.10
0.20
0.30
0.40
0.50
0.60
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 11

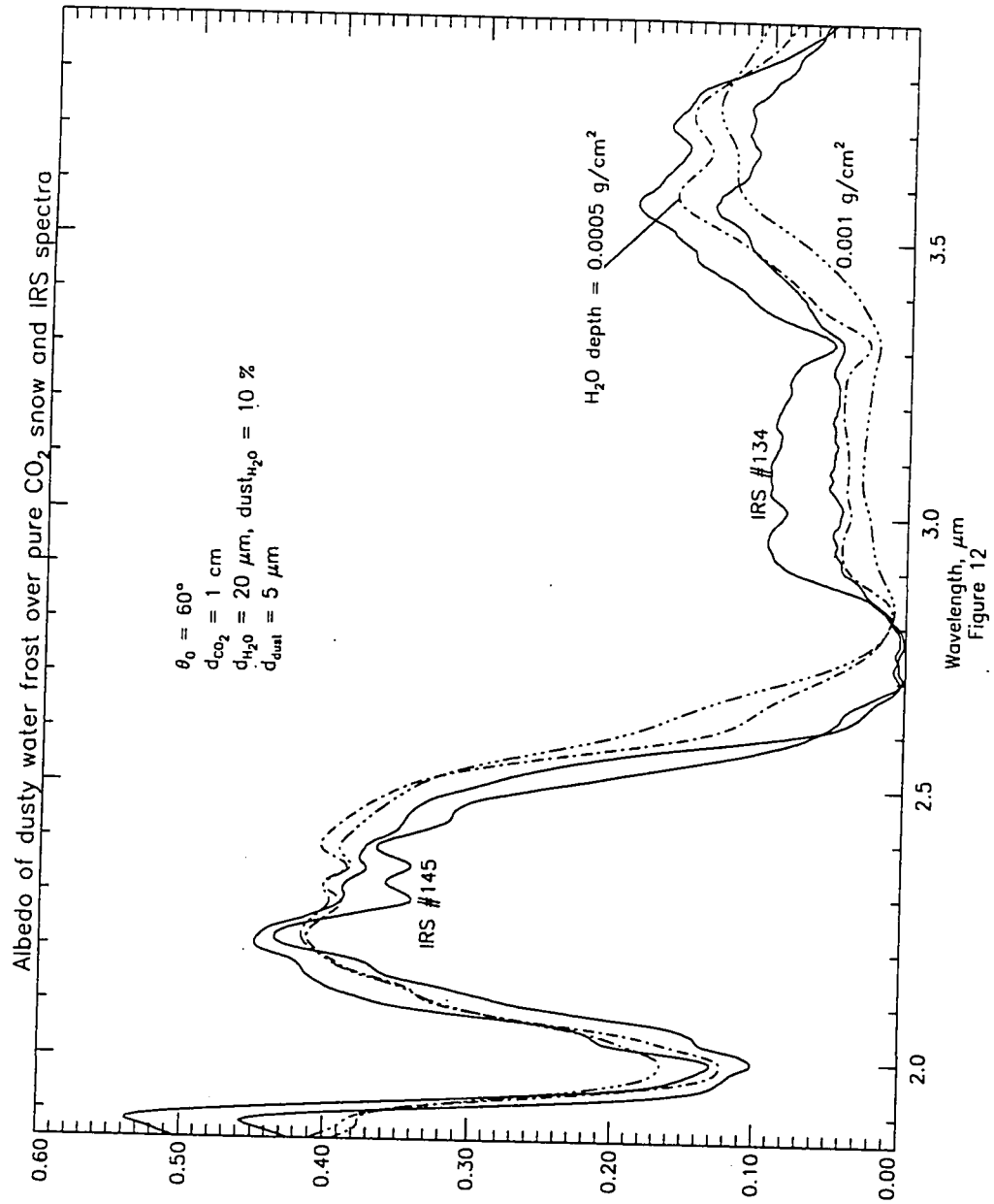

Albedo of dusty water frost over pure CO_2 snow and IRS spectra
θ_0 = 60°
d_{CO_2} = 1 cm
d_{H_2O} = 20 μm, $dust_{H_2O}$ = 10 %
d_{dust} = 5 μm
H_2O depth = 0.0005 g/cm²
0.001 g/cm²
IRS #134
IRS #145
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 12

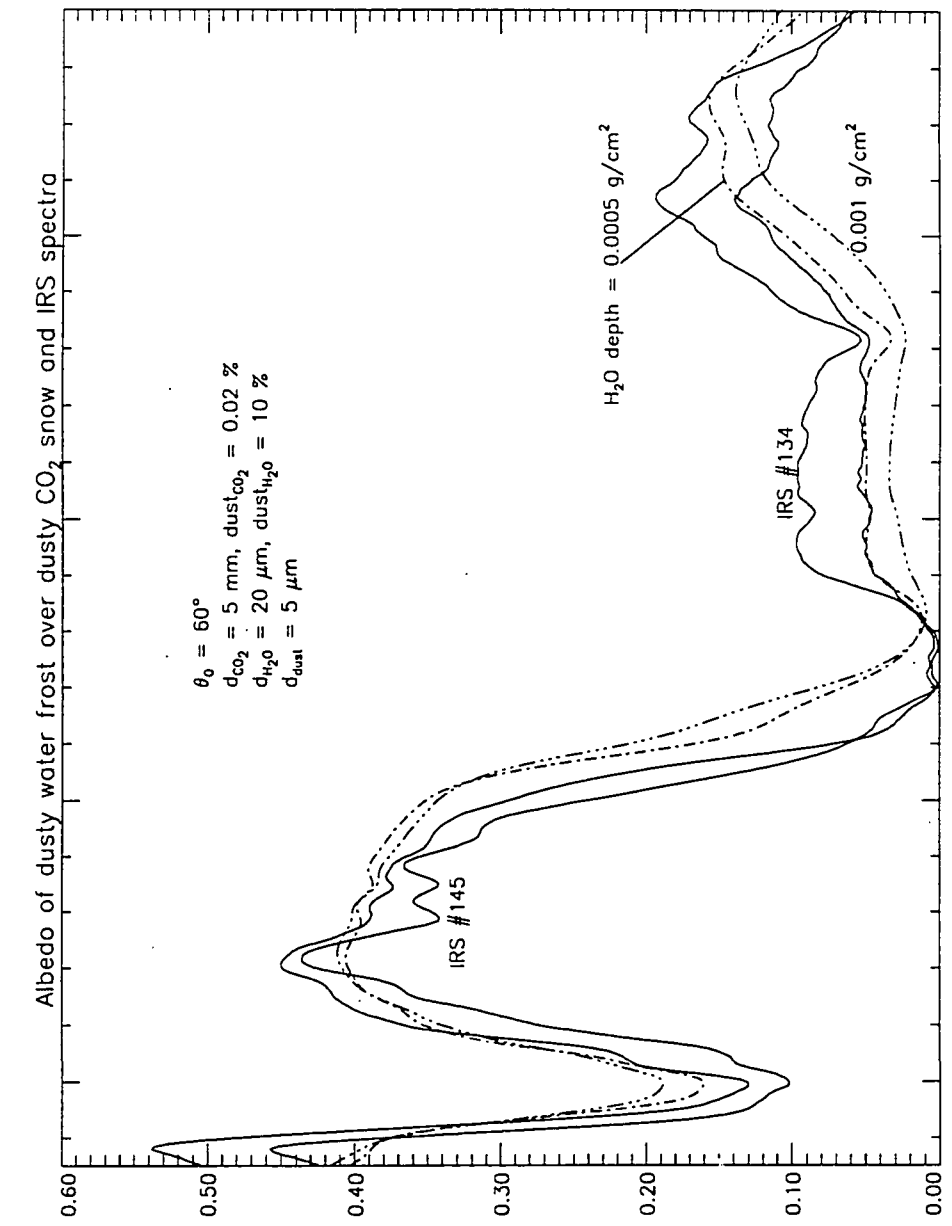

Albedo of dusty water frost over dusty CO_2 snow and IRS spectra
θ_0 = 60°
d_{CO_2} = 5 mm, $dust_{CO_2}$ = 0.02 %
d_{H_2O} = 20 μm, $dust_{H_2O}$ = 10 %
d_{dust} = 5 μm
H_2O depth = 0.0005 g/cm²
0.001 g/cm²
IRS #134
IRS #145
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 13

Figure 13 shows the albedo of a dusty water snow layer over dusty 5-mm-diameter CO_2. Now the 2.3-μm features are too subdued, and the spectrum > 2.7 μm is little different than the previous model which was overlying pure CO_2.

In conclusion, the layered models consistently approach sparse monolayers in order to fit the observed spectra. This suggests, perhaps, a glaze ice layer which is more effective at absorption than scattering. This will be considered later. Also, the depth of the 2.3-μm bands in the IRS spectra indicates that the CO_2 component must have a large equivalent diameter--1 cm or so.

5.b. MIXED MODELS

Models of intimately mixed constituents will now be considered; these will include both binary and tertiary mixtures.

Figure 14 displays the albedo of various amounts of 50-μm water snow mixed into 1-cm CO_2 particles. Here, the 2.3-μm bands are strong enough for the dilute mixtures, but the 2.2 - 2.5 μm slope changes with mixing ratio. The overall shape longward of 2.7 μm is adequate, but the 3.3-μm line is too strong, and the slopes > 3.3 μm do not match the IRS observations.

Figure 15 shows the albedo of 1-cm CO_2 mixed with 20-μm (instead of 50-μm) water snow. The result is considerably more satisfactory than seen in Figure 14, especially in fitting the spectrum #134. The 2.3-μm lines are adequately deep for all mixtures, the variation of albedo with mixture across the 2.9 - 3.3μm region is quite good, if one ignores the 3.1-μm bump, and the fit to the IRS spectrum #134 at wavelengths > 3.3 μm is quite good.

Figure 16 displays a binary model of CO_2 and dust. Here, the spectral shape > 3.3 μm is different than the observed spectra, and the variation of albedo < 3.3 μm is much less than that > 3.3 μm as the mixing ratio changes. The dust is much more effective than water at suppressing the 3.3-μm line and the 2.3-μm lines.

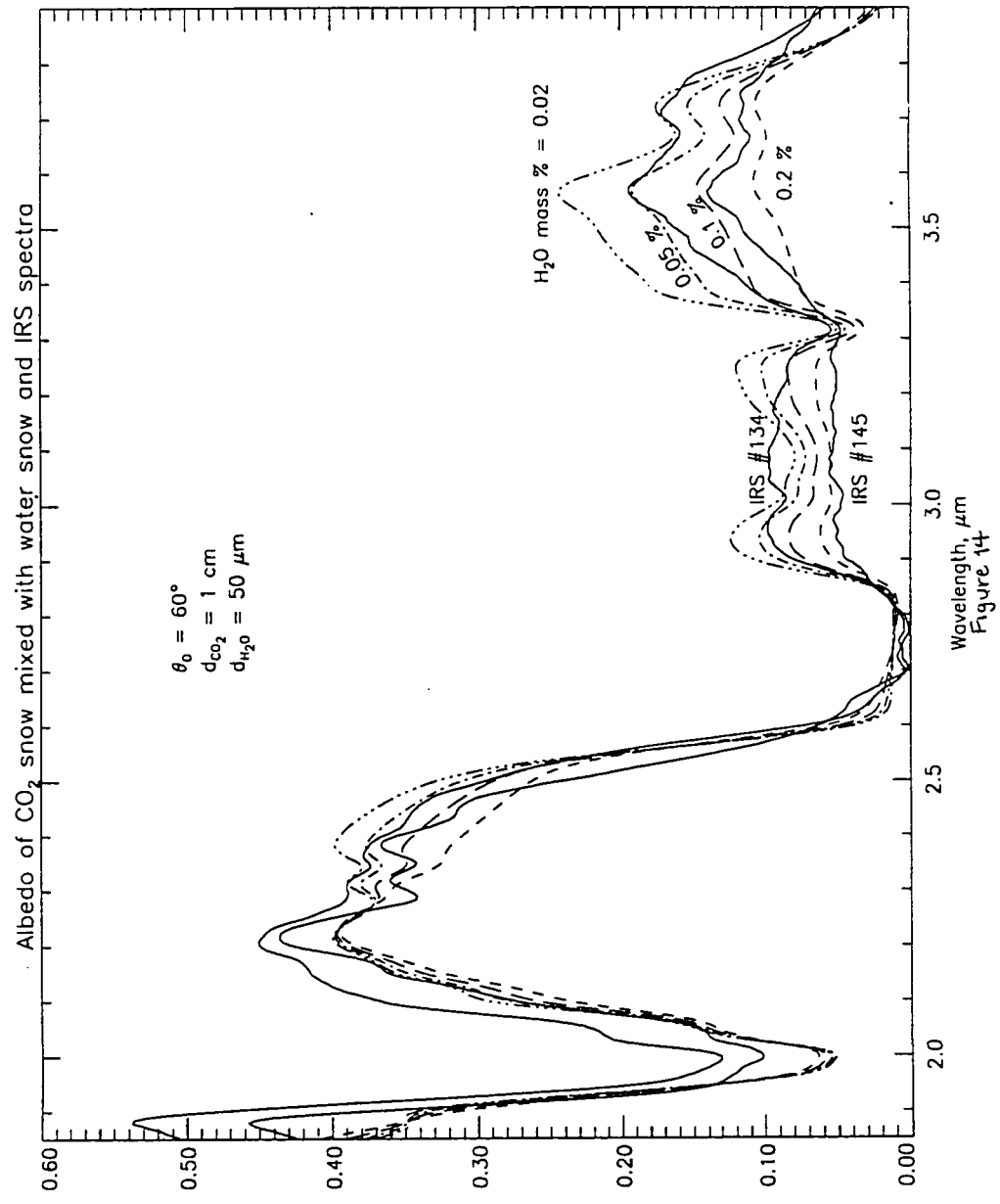

Albedo of CO_2 snow mixed with water snow and IRS spectra
θ_0 = 60°
d_{CO_2} = 1 cm
d_{H_2O} = 50 μm
H_2O mass % = 0.02
0.05 %
0.1 %
0.2 %
IRS #134
IRS #145
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 14

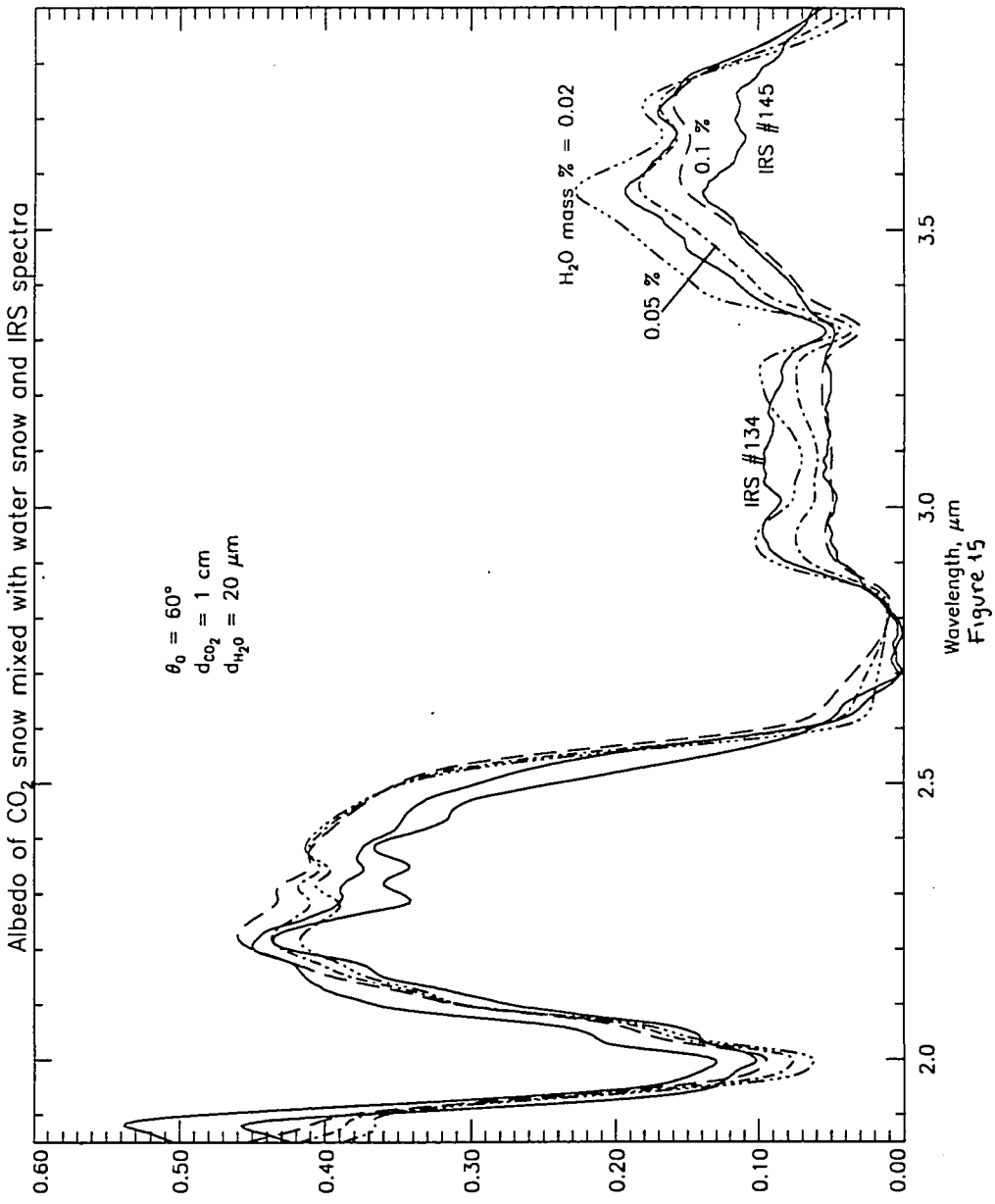

Albedo of CO_2 snow mixed with water snow and IRS spectra
θ_0 = 60°
d_{CO_2} = 1 cm
d_{H_2O} = 20 μm
H_2O mass % = 0.02
0.1 %
0.05 %
IRS #145
IRS #134
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 15

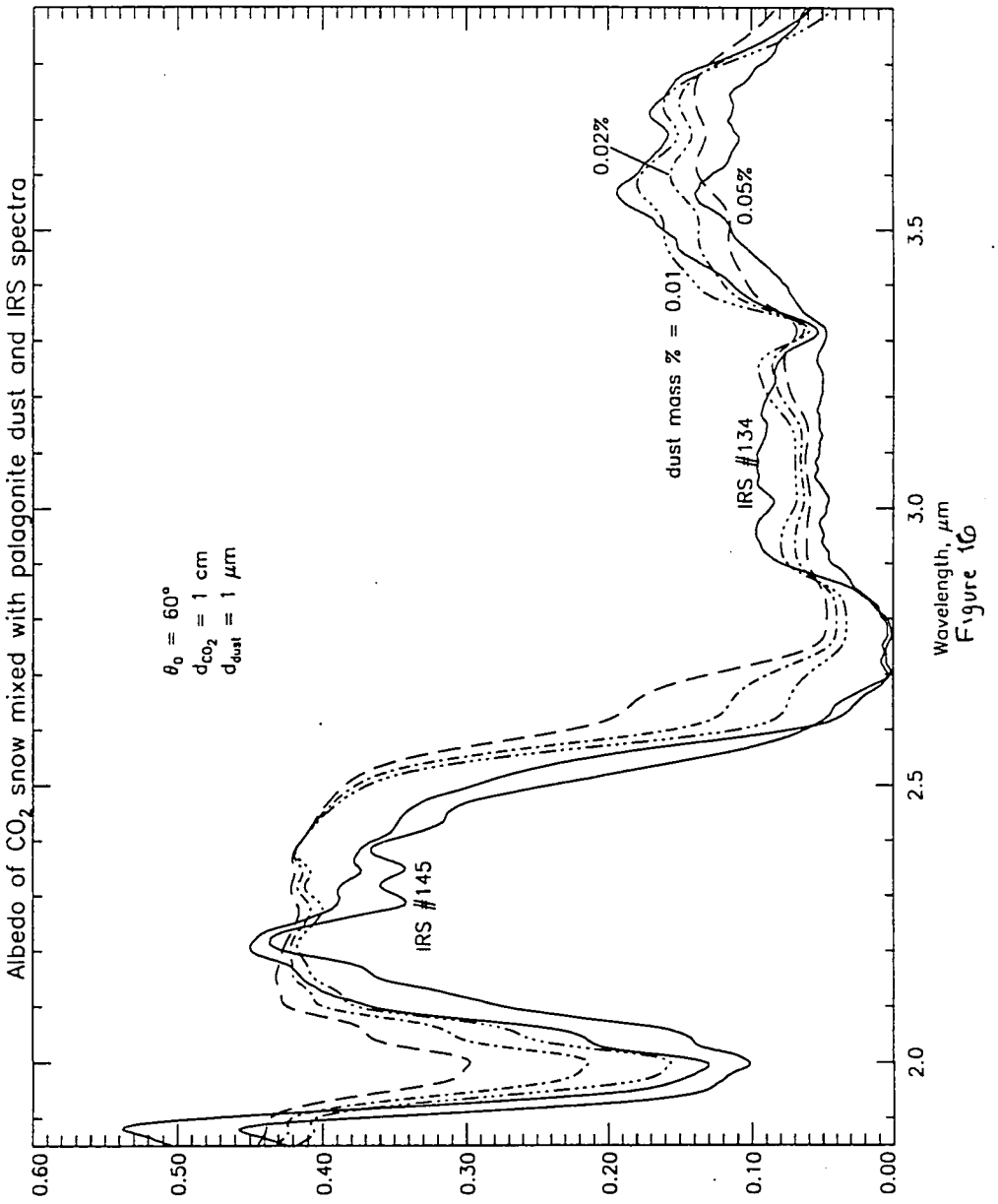

Albedo of CO_2 snow mixed with palagonite dust and IRS spectra
θ_0 = 60°
d_{CO_2} = 1 cm
d_{dust} = 1 μm
dust mass % = 0.01
0.02%
0.05%
IRS #134
IRS #145
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 16

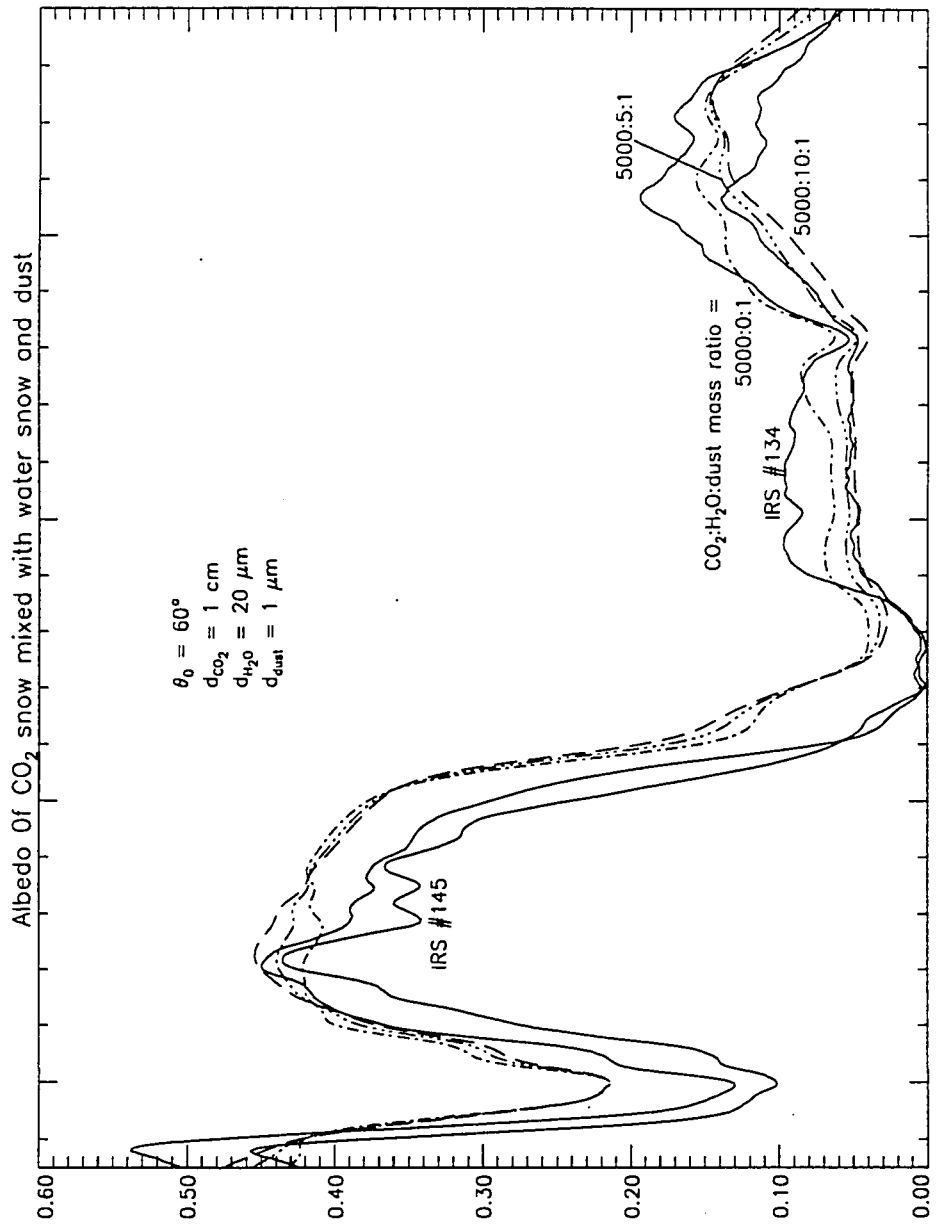

Albedo Of CO_2 snow mixed with water snow and dust
θ_0 = 60°
d_{CO_2} = 1 cm
d_{H_2O} = 20 μm
d_{dust} = 1 μm
CO_2:H_2O:dust mass ratio =
5000:0:1
5000:5:1
5000:10:1
IRS #134
IRS #145
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 17

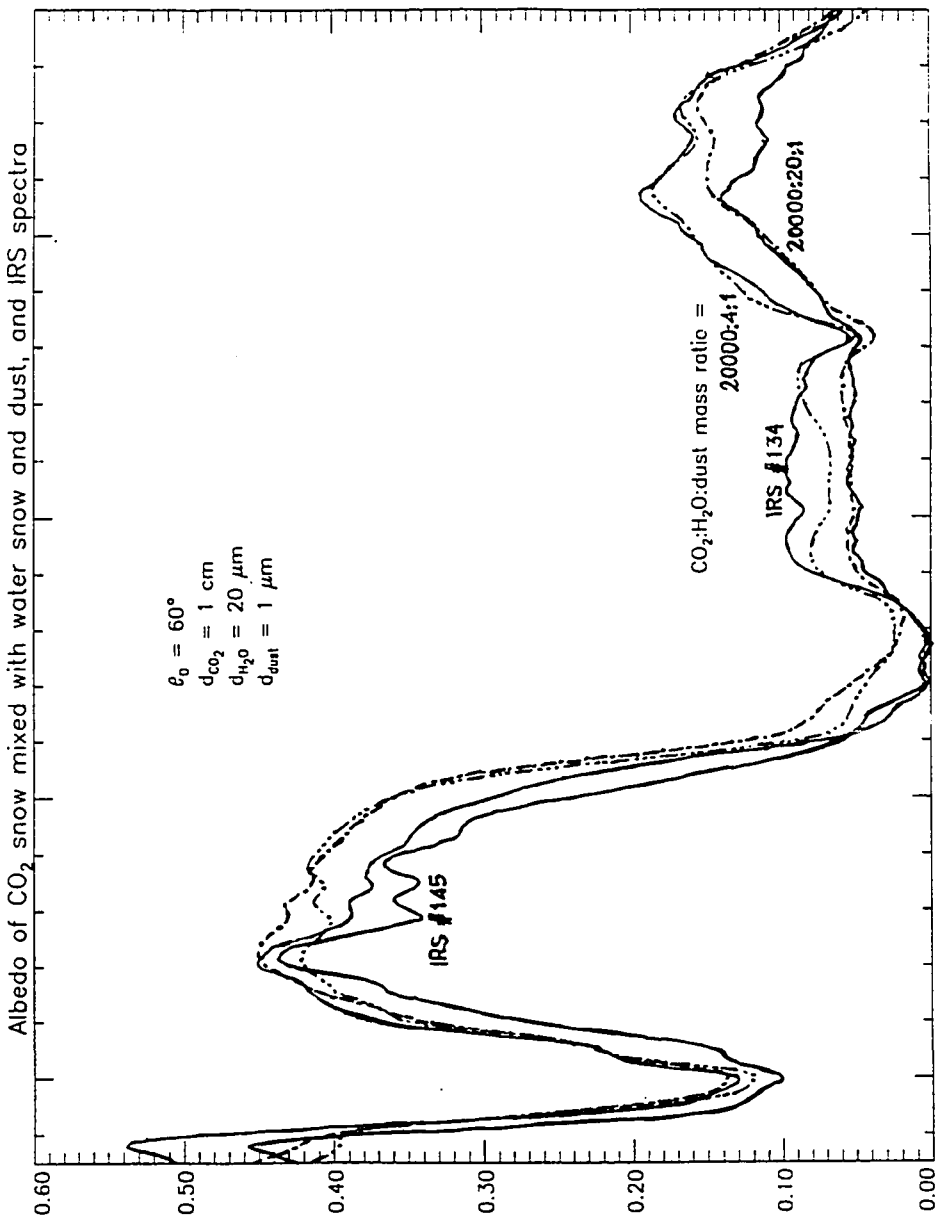

Albedo of CO_2 snow mixed with water snow and dust, and IRS spectra
θ_0 = 60°
d_{CO_2} = 1 cm
d_{H_2O} = 20 μm
d_{dust} = 1 μm
CO_2:H_2O:dust mass ratio =
20000:4:1
20000:20:1
IRS #134
IRS #145
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 18

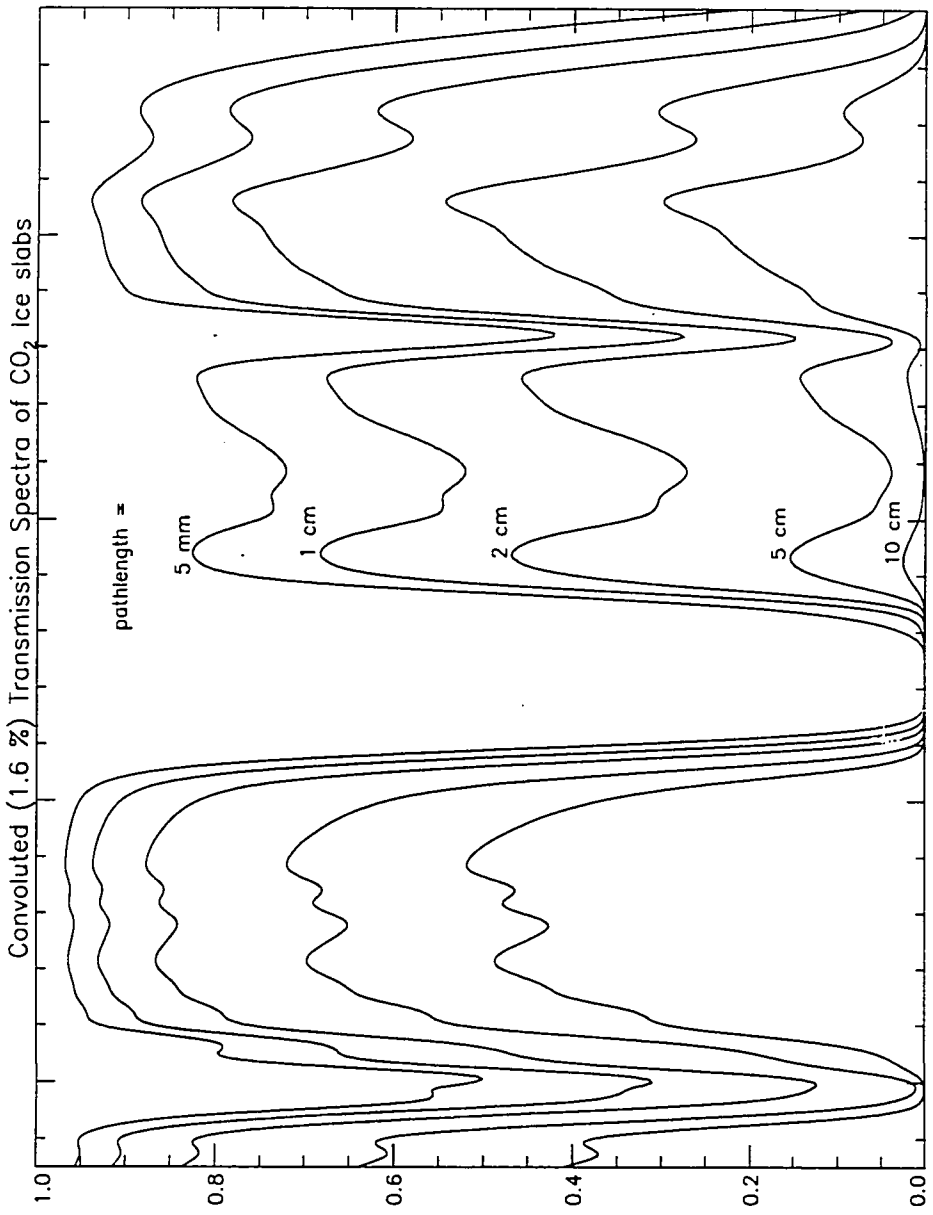

Convoluted (1.6 %) Transmission Spectra of CO_2 Ice slabs
pathlength =
5 mm
1 cm
2 cm
5 cm
10 cm
1.0
0.8
0.6
0.4
0.2
0.0
2.0
2.5
3.0
3.5
Wavelength, μm

Figure 19

Figure 17 shows tertiary mixtures of CO_2 ice, water ice, and dust. Starting with the 5000:1 CO_2:dust mass ratio of the central curve of Figure 16, small amounts of water are added in. This serves only to lower the albedo 2.7 - 3.7 μm and further suppress the CO_2 features.

Figure 18 shows the albedo of tertiary mixtures with less dust than in the models of Figure 17. These offer the best fits found for the two IRS spectra. They both have 20,000:1 CO_2:dust mass ratios and varying amounts of water snow. The upper curve with less water is a very good fit for the spectrum #134 except in the 3.1 μm region. The lower curve fits the spectrum #145 from 2.7 - 3.55 μm quite well, but diverges to a higher albedo longward of 3.55 μm. It also shows a weakening of the 2.3-μm features as the 3 μm albedo decreases, rather than the increased depth of the 2.3-μm features in the spectrum #145.

6. REMAINING PROBLEMS

The group of models investigated here is in no way exhaustive, but it is consistent with the constant shortwave but varying longwave behavior of the IRS spectra. The possible contamination of the input data to the model at 3.1 μm should be resolved soon, since laboratory measurements are continuing. The inability to properly fit the spectrum #145 longward of 3.3 μm remains an open question, as is the unusual depth of the 2.3-μm features in the spectrum #145. If these are caused by a glazed layer of CO_2 ice over a bright substrate, the degraded resolution transmission of various thicknesses of solid CO_2 ice shown in Figure 19 indicates that a 5 - 10 cm pathlength through ice is necessary to produce the observed depth of the 2.3-μm features. This layer would have about 60% transmission at 2.2 μm, 10% at 2.9 μm, 40% at 3.55 μm and 20% at 3.72 μm. An underlying albedo of about 60%, 50%, 30% and 60% at the same wavelengths, respectively, would be required to match the spectrum #145. Such behavior is unlike any of the materials considered here, but the glazed layer needs to be properly included in the model in order to decide on whether or not to reject it.

One thing to note here is that the field of view of the IRS spectrometer slit was moving over the surface as each spectrum was acquired. This leads to the possibility that geographical variations appear as spectral variations. Only for similar deposits extending over many tens of kilometers will each spectrum be an accurate representation of a single spectrum taken at any point in the field.

7. CONCLUSIONS

It is possible to use radiative-transfer algorithms to create models of frost deposits which compare very well to at least some of the infrared spectra of the south polar seasonal deposits returned by Mariner 7. These results indicate that the best model for the frost deposits in the observed regions in 1969 is a tertiary mixture of CO_2-ice : H_2O-ice : dust in the mass ratio 20,000 : 4 - 20 : 1. The implied equivalent particle diameters are 1 cm for CO_2, 20 μm for water, and 1 μm for dust. The large equivalent diameter for CO_2 is consistent with the conclusions made by Calvin (1990), and implies that there is a metamorphic process by which small grains can grow to cm scales on a seasonal time scale (Eluszkiewicz (1993)).

Acknowledgements:

Many thanks to Steve Warren and Warren Wiscombe for the Mie scattering, discrete-ordinate, and delta-Eddington programs. The programs for generating single-scattering parameters for mixtures and generating optical depth were inherited from John Firestone. Thanks to Steve Warren for many helpful discussions regarding this work. Thanks also to Ted Roush for the palagonite optical constants as a Martian dust analog. Invaluable service has been provided by free use of the JPL supercomputing project CRAY, and the SCN computer system and its staff at JPL, the account on which is provided by the Mars Observer project. Work on this project was partially funded by a grant from the Caltech President's Fund.

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Appendix D

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Low brightness temperatures of Martian polar caps: CO_2 clouds or low surface emissivity?

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Abstract. One of the major surprises from the spacecraft missions to Mars of the 1970s was the finding of anomalously low brightness temperatures in the winter polar regions, far below the expected CO_2 frost point. Since then, many explanations have been advanced for this puzzling behavior, including the low emissivities of carbon dioxide frost and the presence of carbon dioxide clouds, but no conclusion has been reached. We have carefully analyzed the measurements obtained by the Mariner 9 infrared interferometer spectrometer (IRIS) and the Viking infrared thermal mapper (IRTM). Besides their low brightness temperatures, the anomalous areas are characterized by their high variability and their complex spectral signature. Also, there is evidence suggesting that their occurrence is related to the condensation of CO_2 in the atmosphere. We have used a combination of data analysis and modeling to compare these observations with simulated spectra obtained with radiative models of CO_2 ice clouds and CO_2 ice deposits. We show that precipitating CO_2 cloud with particle radius larger than 10 μm and CO_2 snow deposits with millimeter-sized grains are able to produce the observed features. In both cases, matching the IRIS spectra requires the CO_2 ice particles to be mixed with small amounts of water or dust, as expected for the northern winter cap observed by the Mariner 9 mission. Nonprecipitating CO_2 clouds, if they exist, should be transparent in the infrared. On the other hand, CO_2 ice deposits composed of large grains or monolithic ice which have directly condensed on the ground could have an emissivity close to unity and in any case much higher than that of small CO_2 ice particles originating from atmospheric condensation. We conclude that the low brightness temperatures are likely to be created by CO_2 snow falls and that both falling snow particles and fresh snow deposits could contribute to create the observed features.

1. Introduction

A unique and very important aspect of the current climate of Mars is the seasonal CO_2 cycle. During the fall and winter seasons, the local surface and atmospheric temperatures fall to the frost point of CO_2 gas, CO_2 condenses, and polar ice caps are formed. The surface temperature of the polar CO_2 ice deposits is thus controlled by vapor-pressure equilibrium. At the expected atmospheric pressure on the polar caps, about 6 millibars, this temperature should be about 148 K.

A major surprise from the spacecraft missions of the 1970s was the finding of areas in the winter polar regions with anomalously low brightness temperatures at 20-μm wavelength, some below 135 K [*Kieffer et al.*, 1976b].

The location and brightness temperatures of these areas (hereafter also called "cold spots") sometimes varied on timescales of days [*Kieffer et al.*, 1977], suggesting complex physical processes. By altering the infrared emission toward space, these cold spots are likely to have a strong impact on the polar energy balance. In particular, the amount of CO_2 that condenses in the caps is controlled by the energy balance of the polar regions. To first approximation, during the polar night,

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the latent heat released by the condensation of CO_2 balances the net infrared radiation toward space. Therefore the cold spots could strongly decrease our estimates of the total amount of CO_2 that condenses during the winter and may themselves affect the global climate on Mars [*Kieffer et al.*, 1976b].

Hypotheses for explaining these anomalously low brightness temperatures include a strong enrichment in lighter, noncondensible gases in the winter polar atmosphere allowing the partial pressure of CO_2 to be less than that at low latitude [*Kieffer et al.*, 1977], low emissivities for carbon dioxide frost [*Ditteon and Kieffer*, 1979], and the presence of carbon dioxide clouds [*Hunt*, 1980]. *Hess* [1979] cast doubt on the feasibility of the noncondensible gas enrichment by showing that vertical and horizontal gradients in the average molecular weight of the Martian polar atmosphere could be stable only under very special circumstances. The last two hypotheses have been supported or studied by various authors. See *Ditteon and Kieffer* [1979], *Warren et al.* [1990], and *Hansen* [1994] for the low surface emissivity hypothesis, and *Hunt* [1980], *Paige* [1985], *Paige et al.* [1990], *Pollack et al.* [1990], and *Forget and Pollack* [1993] for the CO_2 clouds scenario. Until now, it has not been possible to conclusively solve the puzzle because of the complexity of the problem and the lack of data. Besides, the two hypotheses may not be contradictory since the spectral properties of thick CO_2 clouds and surface frost of similar effective grain size should be close.

What causes the anomalously low brightness temperatures? To address this important issue, we have tried to use all the thermal infrared data available to study the spectral, spatial, and temporal properties of the cold spots in order to learn more about the possible mechanisms involved and to assess the hypotheses.

Two complementary data sets are currently available: Mariner 9 infrared interferometer spectrometer (IRIS) spectra and Viking infrared thermal mapper (IRTM) brightness temperatures. The IRIS spectra provide a good definition of the spectral properties of the winter polar atmosphere and surface but only for a limited range of seasonal dates and locations and with poor spatial resolution. Conversely, the IRTM data provide good coverage of both polar regions over the relevant seasons but in only three spectral channels.

In sections 2 and 3, we present in more detail the characteristics of these data and the typical features observed in the cold spots. In sections 4 and 5, we analyze the CO_2 clouds and the low-emissivity scenarios and compare them to the observations. In section 6, we conclude by suggesting a new realistic scenario consistent with the observations, and discuss its implications.

2. Mariner 9 IRIS Spectra

2.1 Data Set

The Mariner 9 IRIS was a Michelson interferometer with a spectral resolution of 2.4 cm^{-1} [*Hanel et al.*, 1972; *Conrath et al.*, 1973]. At low temperatures (T <150 K), data are reliable only in the range 11-45 μm. More than 20,000 spectra were obtained during the Mariner 9 mission of which 1800 were taken above the seasonal polar caps poleward of 50° latitude. Unfortunately, almost all these spectra were obtained only in the northern hemisphere at the end of winter, between the areocentric longitude of the Sun (L_s, defined to be 0° at the northern vernal equinox) of 322° and 351°. The field of view of the instrument was circular with a diameter of 4.5°. As most polar IRIS spectra were obtained from an altitude of about 4000 km, this corresponds to a 315-km-diameter footprint for nadir viewing and to a 370-km by 580-km elliptical footprint for emission angles near 50°, a typical value in the dataset.

The Mariner 9 spacecraft arrived at Mars during a major global dust storm, and the atmosphere was extremely dust-laden during much of the primary mission. However, *Hanel et al.* [1972] reported that the dust was dissipating by L_s=319°, and clearing was well advanced by L_s=341°.

2.2 Characteristic features

Most IRIS spectra obtained during the northern winter above the polar caps exhibit the same complex spectral signature. Many of them unambiguously present anomalously low brightness temperatures (Figure 1).

The prominent feature extending from about 600 to 800 cm^{-1} is due to absorption and emission by gaseous CO_2. Centered at 667 cm^{-1} (15 μm) is the strongest absorption band, the vibrational bending fundamental of CO_2 (ν_2 of $^{12}C^{16}O_2$). On both sides of this 15-μm feature are a number of weaker combination, isotopic, and hot bands. The observed signature in Figure 1 (the 667 cm^{-1} feature in emission and the weak bands in absorption) is representative of the IRIS spectra display-

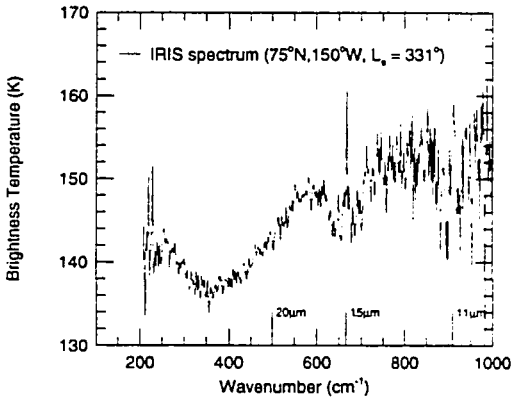

Figure 1. Typical northern winter polar Mariner 9 IRIS spectrum. This particular spectrum was obtained at 75°N,150°W and L_s = 331° (data acquisition system time: 6320999; orbit 132; emission angle: 59.5°). Data below 225 cm^{-1} and above 750 cm^{-1} are very noisy and thus not reliable. Center wavenumbers of three of the IRTM channels are also indicated.

ing low brightness temperatures. It suggests a strong inversion, high in the atmosphere, and below that, a much colder atmosphere within which temperature decreases with increasing altitude. This temperature structure is consistent with the Mariner 9 radio occultation profiles [*Kliore et al.*, 1972]. In some other polar IRIS spectra (not shown here), the temperature inversion seems to start at a lower altitude. The 15-μm band then corresponds to a single warm feature. However, these spectra do not usually display anomalously low brightness temperatures.

Outside the CO_2 band, minimum brightness temperatures generally occur around 350 cm^{-1}, and local maxima exist over a broad region around 850 cm^{-1} and a region near 250 cm^{-1}. Interpreting such a large emission and absorption feature is not straightforward. This signature does not point clearly to a surface or an atmospheric component. We shall test different scenarios through their ability to reproduce these features, as well as the 15-μm profile.

3. Viking Infrared Thermal Maps

3.1 Dataset

The two Viking orbiters observed the entire planet during almost two Martian years [see *Kieffer et al.*, 1977]. The infrared thermal mappers (IRTM) operated in five broad infrared channels, but only the 11-, 15-, and 20-μm channels are reliable for studying very cold areas like the Martian polar caps (the 7- and 9-μm channels are too noisy). The 11- and 20-μm channels are unaffected by gaseous absorption. They measure the surface brightness temperature when aerosol (dust, H_2O ice, or CO_2 ice) opacity is low at these wavelengths.

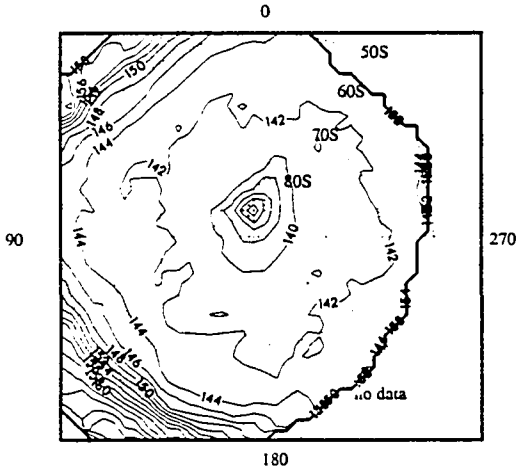

Figure 2. IRTM T_{20} measured by the Viking Orbiter 2, orbit 79, in the south polar region in winter (L_s = 145.8°). The contour interval is 2 K. The minimum temperature in the cold spot near the pole is 129 K.

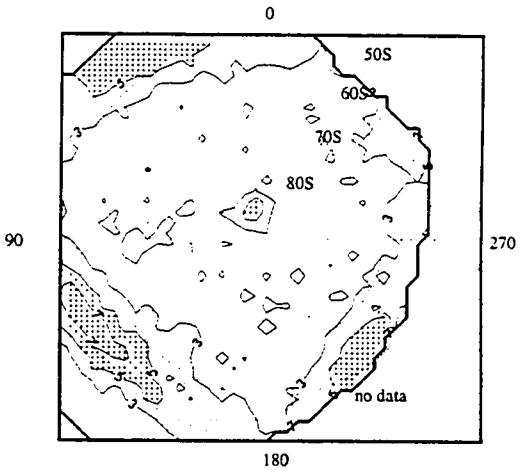

Figure 3. South polar region. Map of $T_{11} - T_{20}$ corresponding to Figure 2 (L_s = 145.8°). The contour interval is 2 K.

When the aerosol opacity is large enough, the 11- and 20-μm brightness temperatures are influenced by the presence of the aerosols which can absorb, reemit, and scatter the ground emission. The 15-μm channel, with a spectral response centered on the strong gaseous CO_2 absorption feature, measures atmospheric temperatures over a broad altitude range with maximum sensitivity near the 0.6-mbar pressure level [*Kieffer et al.*, 1976a].

The field of view of each channel was defined by focal plane stops 5.2 mrad in diameter. The corresponding footprint diameter generally ranged from 5 to 30 km in the north polar region, and from 10 to 200 km in the south polar region.

3.2 Characteristic Features

Spatial characteristics. We have plotted and analyzed more than 100 maps from the IRTM data, and performed numerous diagnostics and data analyses. A complete description of the climatology of the winter polar caps during the Viking years is beyond the scope of the present paper and will be the subject of a future publication. We shall focus here on the characteristic features likely to be of interest for our investigation.

The difference $T_{11} - T_{20}$ (also called "spectral contrast") is a useful tool for characterizing the radiative properties of the atmosphere and the surface. (The spectral contrast of a blackbody would be zero.) Figure 2 and 3 show typical thermal maps of the fall or winter southern cap. Generally, and for these maps in particular, characteristic features are observed: Around the cap, there are large areas of positive values of $T_{11} - T_{20}$ (typically 3 to 5 K, up to 7 to 10 K on the dayside). Inside the cap, $T_{11} - T_{20}$ values are positive but remain close to 0 K. Near the pole, high values of $T_{11} - T_{20}$ (up to 12 K) are observed where cold spots (low values of T_{20}) are present.

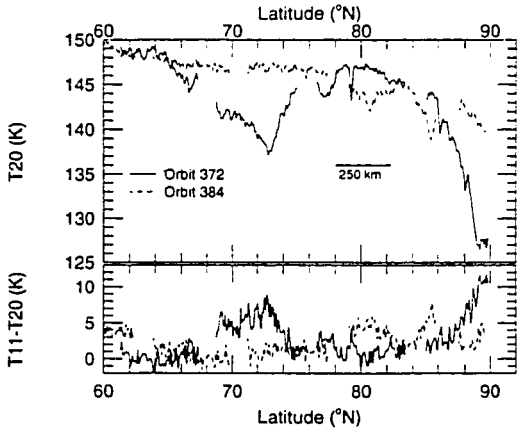

Figure 4. The brightness temperature T_{20} and the $T_{11} - T_{20}$ spectral difference observed in two similar south-north scans taken by Viking Orbiter 2 (IRTM detector 7) on orbits 372 (L_s = 322.9°) and orbit 384 (L_s = 329.2°) along meridian 183°W.

In the northern hemisphere, the same type of features are observed except that cold spots were more common at lower latitudes down to 60°N. Most of the time, the observed $T_{11} - T_{20}$ background values inside the cap were higher than in the south, reaching values up to 4 K as compared to 0 to 1 K in the south.

Figure 4 shows the brightness temperatures measured during two similar low altitude scans by the Viking Orbiter 2 during orbits 372 and 384 in the middle of the northern winter. Both orbits scanned the same meridian at 183°W from the midlatitudes to the pole. Despite the fact that these observations were only 12 Martian days apart and that they correspond to exactly the same areas, they exhibit very different brightness temperature structures. This illustrates the high variability of the anomalously low brightness temperatures. However, we have found in other observations that many characteristic small structures similar to the dip observed during orbit 372 at 79°N fluctuate but in most cases do not move. In many cases these fluctuating cold spots appear to be well correlated with the locations of surface features such as the permanent polar cap boundaries or isolated craters, suggesting that topography could play a role in the origin of the cold spots. Both scans were taken one measurement every 6 km (except for a few large gaps), with a spatial resolution ranging from 5 km at 60°N up to 11 km near the pole. This good spatial sampling reveals fine structures with spatial scales as low as a few tens of kilometers. The variations of $T_{11} - T_{20}$ are also shown in Figure 4. Here again, despite the fact that T_{11} is noisy, these variations are clearly related to the variations of T_{20}.

Seasonal evolution. The temporal evolution of T_{11} and T_{20} on both polar caps is illustrated in Figure 5 where we have plotted averaged values of T_{11} and T_{20} for different latitude belts, binned every 5 solar longitude deg. (See also the frames published by *Martin* [1981].) The variation of these averaged values reflects the variation of the frequency and intensity of the cold spots, except in the northern hemisphere where T_{11} and T_{20} were also affected by atmospheric dust during the second Viking global dust storm just after the winter solstice.

No particular features appear on the southern hemisphere plots, where the cold spot distribution seemed to be rather constant, except at the pole where the mean T_{20} reached a minimum in early winter (L_s=110°-120°). In the northern hemisphere, the second dust storm of the first "Viking year" started at L_s=273°. As mentioned above, the presence of dust above the polar caps is detected by a strong warming of T_{20} and T_{11} between L_s=275° and L_s=290°, especially at lower latitudes. Poleward of 70° north, the dust storm was followed by a period of minimum mean brightness temperatures. A careful study of the data shows that an exceptionally high frequency of occurrence of extremely low brightness temperatures was reached near the pole around L_s=300°, right after the first phase of the storm. This apparent correlation between airborne dust and cold spots is a very important and striking characteristic of the IRTM data.

Correlation between T_{11} and T_{20}. As suggested by the $T_{11} - T_{20}$ and T_{20} maps and scans, the cold spots are characterized by large values of $T_{11} - T_{20}$ [*Paige*, 1985]. Figure 6 shows the correlation of T_{20} and $T_{11} - T_{20}$ for the northern and southern hemispheres. The observed linear correlation is almost always observed during the winter and fall seasons. Such behavior is also a key characteristic of the cold spots. The difference between the two hemispheres is likely to be due to a difference in surface temperature, the south pole being colder than the north pole [*Paige and Ingersoll*, 1985].

Interpreting differences between T_{11} and T_{20} is not straightforward. Several different processes can produce such a signature.

First, one must keep in mind that the noise level of the 11-μm channel has to be considered (it can be neglected for the 20-μm channel). The temperature equivalent noise of T_{11} is about 1.6 K at 150 K , 2.6 K at 140 K, 3.4 K at 135 K and 4.6 K at 130 K. As this noise is random, it cannot explain the systematic bias observed at the cold spots.

Physically, $T_{11} - T_{20}$ differences can be produced by (1) nonunit thermal emissivity of the ground (either because it is a non gray emmissivity or a gray emissivity which is less than unity), (2) the presence of atmospheric aerosols (dust or ice clouds), or (3) nonuniform temperature across the field of view of the instrument. For example, the high values of $T_{11} - T_{20}$ observed at the polar cap boundary in Figure 3 must be due to a combination of water ice clouds (known to be present especially near the polar cap edge) and non uniform temperatures (viewing a scene whose area includes both relatively warm bare ground and cold patches of ice produces substantial spectral differences) [*Christensen and*

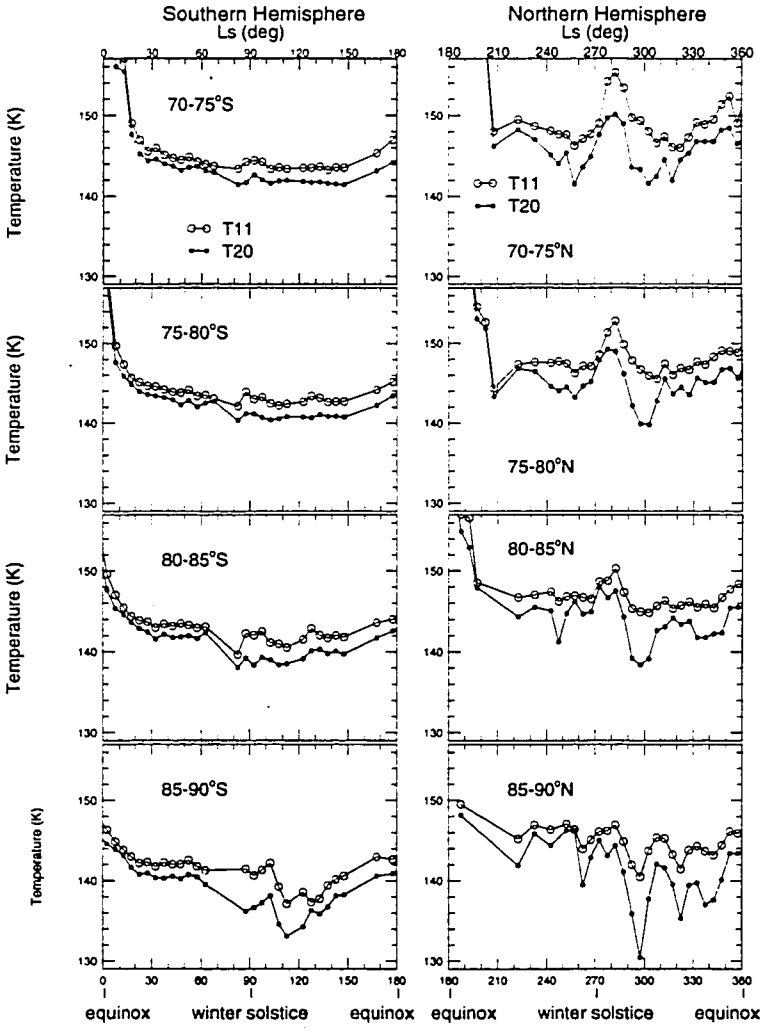

Figure 5. Seasonal evolution of IRTM brightness temperatures, averaged in 5° latitude by 5° L_s bins.

Zurek, 1984]. In the cold spots, dust could theoretically play a role in the infrared emission. In fact, the dust extinction coefficients in the 11- and 20-μm bands are not very different. Thus the dust is not expected to have a strong impact on $T_{11} - T_{20}$ above the polar cap, at least during the "clear" period, outside the dust storms. Non uniform temperatures could theoretically be observed when CO_2 ice on the ground (at 150 K) shares the IRTM field of view with a colder object such as a CO_2 or H_2O cloud higher in the atmosphere. However, the maximum value of $T_{11} - T_{20}$ obtained in such a case (with 60% at 130 K, and 40% at 150 K) would only reach 1.4 K, whereas actual spectral differences are about 8 to 10 K. To summarize, let's repeat that not only are the low brightness temperature areas characterized by low values of T_{20} but also by large and systematic differences between T_{11} and T_{20}, and that such a spectral contrast can similarly be attributed to the presence of CO_2 or H_2O clouds, or nonunit thermal emissivity of the ground.

Correlation between T_{15} and T_{20}. Figure 7a. shows the observed correlation between T_{20} and the atmospheric brightness temperatures T_{15} in the southern hemisphere. We included all the IRTM observations obtained poleward of 70°S during the fall and winter

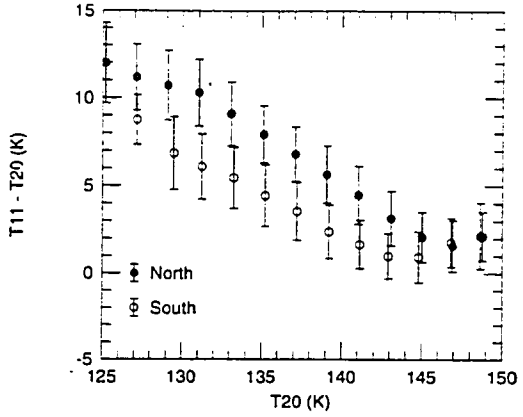

Figure 6. Correlation between T_{20} and $T_{11} - T_{20}$ in both hemispheres, polarward of 70°, with emission angles below 60°. Data are averaged in 2 K bins. The variability in the data is illustrated by the error bars showing the standard deviation ($\pm\sigma$).

seasons, with an emission angle lower than 45° (about 25,000 data points). T_{15} is never below 129.5 K, which corresponds to the emission of an atmosphere following the coldest possible temperature profile at every altitude: the CO_2 frost point temperature profile. A very interesting feature is the tendency for T_{15} to decrease toward this minimum value with decreasing values of T_{20}. This means that cold spots could be related in some way to cold atmospheric temperatures. The same type of plot for the northern hemisphere data obtained during the fall and winter seasons outside the period of the second Viking dust storm is shown in Figure 7b. A similar kind of correlation is observed, especially for the low T_{20} values. The unusual cluster of points with $T_{15} > 160$ K and $T_{20} < 140$ K corresponds to a single set of observations obtained around 71°N-0°W during VO2 orbit 242 at L_s=247.9°N.

During the second Viking dust storm, the Martian polar atmosphere experienced a rapid and intense warming event observed by the IRTM instrument, caused by complex atmospheric dynamical processes [*Martin and Kieffer*, 1979; *Jakosky and Martin*, 1987]. Figure 7c shows that these high values of T_{15} were also observed in the anomalously cold temperature areas, which were, as mentioned above, particularly common then.

4. CO_2 Clouds Hypothesis

4.1 Existence of CO_2 Clouds

As first suggested by *Gierasch and Goody* [1968], further studied by *Paige* [1985] using a one-dimensional polar radiative model, and more recently modeled and analyzed with a general circulation model [*Pollack et al.*, 1990], atmospheric CO_2 condensation could occur at most altitudes of high latitudes during the fall and winter seasons. CO_2 ice particles are likely to form clouds in the polar night atmosphere (see review in work by *James et al.* [1992]).

Definitive observational evidence does not exist. Clouds in the polar regions of Mars during the fall and winter seasons have been known to astronomers for decades, especially in the northern hemisphere and are referred to as "polar hoods" [see *Briggs and Leovy*, 1974; *Briggs et al.*, 1977] However, Mariner 9 IRIS showed that the northern winter hood was composed of water ice, at least south of 65°N. *Briggs and Leovy* [1974] observed at higher latitudes some cloud lines formed at the CO_2 ice temperature, with very distinct small structure. They showed that water ice clouds could not have

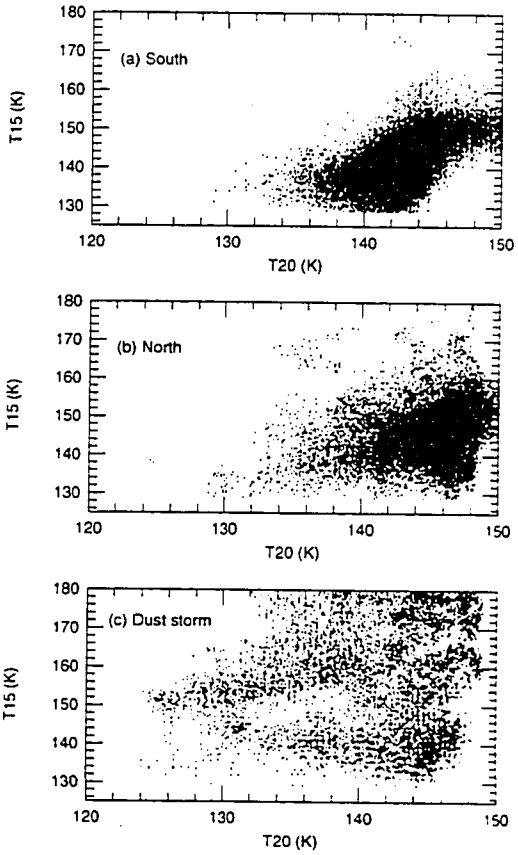

Figure 7. Correlation between T_{15} and T_{20} (included are the observations poleward of 70° lat. with an emission angle below 45°): (a) in the southern hemisphere ($0° > L_s > 180°$), (b) in the northern hemisphere outside dust storm b ($180° > L_s > 270°$ and $320° > L_s > 360°$), (c) in the northern hemisphere during dust storm b and the polar warming event ($270° > L_s > 320°$).

exhibited such a structure because of the slow condensation and sublimation rates of water ice at low temperature and that these clouds were likely to be composed of CO_2 ice. Also, three of the Mariner 6 and 7 infrared spectrometers limb spectra have been interpreted as a reflection on thin CO_2 clouds because of characteristic spikes at 4.26 μm [*Herr and Pimentel*, 1970].

4.2 Link Between Low Brightness Temperatures and Atmospheric CO_2 Condensation

Kieffer et al. [1976b] first suggested that CO_2 clouds could create the anomalously low IRTM brightness temperatures, among other possibilities. *Pollack et al.* [1990] showed that the spatial and temporal variabilities of the modeled atmospheric condensation rate were consistent with those exhibited by the low 20-μm brightness temperatures mapped by the Viking IRTM [*Kieffer et al.*, 1977]. We have seen above that the IRTM measurements in the 15-μm gaseous CO_2 band shown in Figure 7 also suggested a link between the cold spots and low atmospheric temperatures, at least outside the dust storm periods and the related polar warming events. Above all, the fact that the second Viking dust storm was followed by a period of maximum frequency and intensity of low brightness temperature events strongly supports the notion that the low brightness temperatures are due to the condensation of CO_2 ice in the atmosphere. Several studies have shown the link between dust and CO_2 atmospheric condensation [*Paige*, 1985; *Pollack et al.*, 1990]. The dusty atmosphere experiences much greater cooling than a clear atmosphere because of the significant infrared emissivity of the dust particles. This results in an enhanced atmospheric condensation rate. Model calculations indicate that increasing the dust optical depth from 0 to 5 in the winter polar atmosphere produces a transition from a situation in which almost all the carbon dioxide condenses on the ground to one in which it nearly all condenses in the atmosphere. It also seems likely that the dust particles can serve as condensation nuclei.

4.3 Radiative Properties of CO_2 Clouds

How can CO_2 clouds lower the brightness temperature emitted to space? In fact, the radiative properties of CO_2 clouds are poorly known. *Ditteon and Kieffer* [1979] first measured that the interband absorption coefficients of CO_2 ice in the thermal infrared were very small. Recent laboratory measurements by G. B. Hansen (Spectral coefficient of CO_2 ice, 2. Thermal Infrared, manuscript in preparation for *JGR-Planets*, 1995) indicate that in the spectral regions on either side of the strong 15-μm absorption, the CO_2 ice is actually a factor of 10 more transparent than reported by Ditteon and Kieffer.

Therefore pure CO_2 ice clouds should not absorb and emit much radiation themselves. On the basis of the laboratory data of Ditteon and Kieffer, *Hunt* [1980] showed that CO_2 clouds could lower the brightness temperatures emitted to space by scattering the radiation emitted by the surface back to the surface which would ultimately absorb the redirected photons. *Hunt* [1980] computed that a cloud of only modest optical thickness composed of particles of 10-μm radius over a ground with effective temperature of 150 K could produce brightness temperatures of about 130 K.

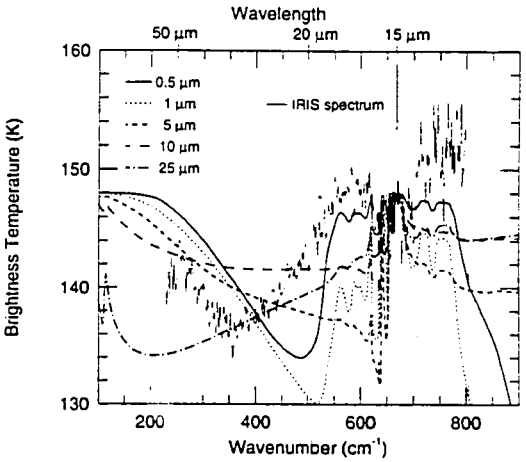

Figure 8. Same spectrum as in Figure 1, compared to simulated spectra of pure CO_2 clouds with various particle radii and a similar emission angle (60°). The clouds all have a vertical optical thickness of of $\tau = 1$ at 500 cm^{-1} (20 μm). The temperatures of cloud and ground are 148 K.

On the basis of the more reliable data from G. B. Hansen, we have simulated the signature of pure CO_2 ice clouds with a radiative transfer program that allows for absorption, scattering, and emission by atmospheric aerosols [*Toon et al.*, 1989; *Pollack et al.*, 1993]. This algorithm is based on the two-stream, hemispheric mean, source function solution to the equation of radiative transfer and allows for the emission angle of the observations. The single-scattering calculation follows Mie theory, and we assume that we can mimic the signature of a Martian CO_2 clouds by a model cloud of "equivalent spheres". We used a Hansen-Hovenier gamma particle size distribution with an effective variance of 0.05, equivalent to a lognormal distribution with $\sigma_g = 0.221$ [*Hansen and Travis*, 1974].

Figure 8 shows the signature of CO_2 clouds with a vertical optical thickness at 20 μm of one and a viewing angle of 60° for various particle sizes. We show in Table 1 the amount of CO_2 ice required to reach such an optical thickness.

4.4 Small-Particle CO_2 Clouds

Particles with a cross-section-weighted average radius smaller than 0.5 μm are too small to effectively scatter the infrared radiation below 1000 cm^{-1}. Since CO_2 ice cannot absorb outside the 15-μm band, huge quantities are required to obtain the observed optical depth

Table 1. Extinction Parameter Q_{ext} at 20-μm, the Corresponding Mass of Airborne CO_2 Ice per Square Meter Required to Make a Cloud With an Optical Thickness Equal to One and the Sedimention Speed for Various CO_2 Ice Cloud Particle sizes

Particle Radius, μm	Q_{ext} (at 20μm)	Mass for $\tau_{20\mu m} = 1$, kg m^{-2}	Sedimentation Speed[a] m s^{-1}
0.1	1.1x10^{-5}	19.6	8.3x10^{-5}
0.5	1.7x10^{-4}	6.35	4.4x10^{-4}
1	2.5x10^{-3}	0.86	9.6x10^{-4}
5	0.763	1.4x10^{-2}	7.5x10^{-3}
10	2.95	7.3x10^{-3}	2.2x10^{-2}
25	2.50	2.2x10^{-2}	1.0x10^{-1}
50	2.35	4.6x10^{-2}	3.8x10^{-1}
100	2.19	9.9x10^{-2}	1.42

[a] The sedimentation speed is estimated at the 5-mb pressure level using the Stokes formulae, modified for low pressure (Knudsen number below unity), following *Rossow* [1978].

around 300-500 cm^{-1} (Table 1). In fact, pure CO_2 ice clouds composed of small particles with a mode radius smaller than 1 μm are likely to be transparent in the thermal infrared.

Particles with a radius larger than 1 μm can more readily scatter the infrared radiation. Outside the 15-μm band and below 200 cm^{-1} they are almost conservative scatterers with a single-scattering albedo close to one for the studied spectral regions. Their signature is not dependent upon the cloud temperature. However, for particle radius between 1 and 5 μm , the ability to reduce the infrared fluxes toward space increase with wavenumber on the relevant spectral interval (below 1000 cm^{-1}). Such a signature is very different than what is observed in the IRIS spectra. Moreover, simulation of IRTM brightness temperatures then gives T_{11} lower than T_{20}, which is never observed in the IRTM data (Figure 9).

CO_2 clouds could be composed of CO_2 ice contaminated by "impurities" such as water or dust. The presence of water ice clouds in the observed polar hood implies that water ice could also be present in the polar night areas and it seems likely that some dust is present in the winter polar regions as a result of transport from lower latitudes. Such contaminents could decrease the single scattering albedo of the cloud particles. CO_2 clouds composed of "contaminated" particles able to absorb and reemit the radiation could lower the brightness temperatures emitted to space not only because of their ability to backscatter the radiation, but because of their colder effective temperatures. (the frost point of CO_2 is 140 K at 1.8 mbar, 135 K at 0.8 mbar, 130 K at 0.4 mbar). Could the signature of such contaminated CO_2 clouds match the observations? In fact the CO_2 ice absorption coefficients measured in the weak bands show that pure CO_2 ice presents a "window" in absorption between 20 μm (500 cm^{-1}) and 40 μm (250 cm^{-1}). If the CO_2 cloud is not transparent, but not really opaque, its expected signature would be a region of higher temperature in this window compared to the band on each side (at least if the cloud extinction is dominated by absorption). This is exactly the opposite of what is observed in the IRIS spectra. Water ice contamination cannot change this behavior since water ice presents a similar window in absorption between two water ice absorption bands centered at 12.2 (820 cm^{-1}) and 45 μm (222 cm^{-1}).

4.5 Precipitating CO_2 Clouds

Particles with radius larger than 10 μm are not expected to stay airborne over long periods (Table 1). Above 25 μm they are likely to fall out the atmosphere rapidly. Unless unexpected vertical winds occur in the winter polar regions, CO_2 clouds composed of such particles should not last very long. However, *Pollack et al.* [1990] computed that the atmospheric CO_2 condensation rate could reach 5.10^{-5} kg m^{-2} s^{-1} in a dusty atmosphere in the polar night. Despite the fact that most of this condensation is expected to occur at low altitudes, such a rate should be sufficient to maintain relatively large amount of CO_2 ice airborne. For in-

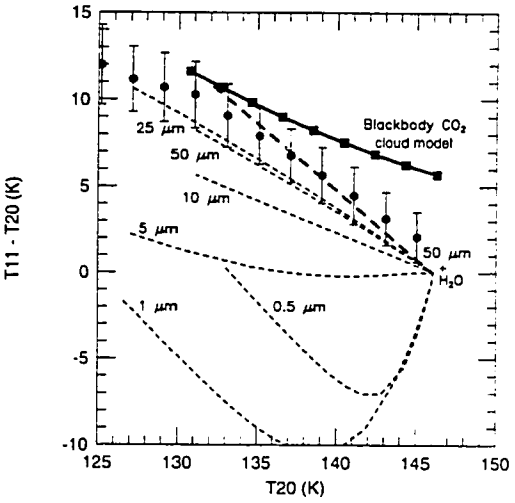

Figure 9. Dashed lines: Correlation between T_{20} and T_{11} simulated with pure CO_2 clouds for various cloud particle radii compared to the observed brightness temperatures. The line of long thick dashes is the simulated correlation for CO_2 cloud (particle radius $r = 50\mu$m) contaminated by 2 precipitable μm of H_2O ice ($r = 1\mu$m) . Correlations were computed by varying the cloud optical depth at 20 μm from 0 to 4. The temperatures of cloud and ground are 146 K. The line with square symbols corresponds to the expected correlation for blackbody clouds at various temperatures lying below a "constant" H_2O cloud at 165 K. The northern hemisphere IRTM data shown for comparison are the same as in Figure 6.

stance, if we assume that the cloud particles are formed at only half the atmospheric scale height (3.5 km) and then fell, this rate would correspond to a rather thick cloud even for particles as big as 50 μm for which we then find $\tau_{20\mu m} = 10$. In reality, the problem is more complex because CO_2 ice particles will continue to grow while falling down in a condensing atmosphere.

Precipitating clouds of pure CO_2 ice give more realistic spectra corresponding to T_{11} larger than T_{20} as observed in the IRTM data (Figure 9). For particle radii larger than 20 μm, the scattering parameter Q_{scat} remains between 2 and 3.5 for wavenumbers greater than 200 cm^{-1}. Thus clouds composed of such particles exhibit a signature similar to the 25-μm curve on Figure 8 characterized by a decrease of the brightness temperature with wavelength until the absorption bands near 100 cm^{-1}. This signature cannot match the observed IRIS spectra. However, we have found that small amounts of water ice (or dust) intimately mixed with the CO_2 ice particles would raise the emissivity of the cloud especially in their absorption bands. The presence of a water-ice absorption band centered at 220 cm^{-1} may therefore explain the shape of the IRIS spectra below 350 cm^{-1}. Figure 10 shows the signature of such a precipitating cloud composed of CO_2 ice mixed with 10 precipitable microns (pr-μm) of water ice. Its signature is very similar to that of the IRIS spectrum. However, in the region from 600 to 1000 cm^{-1}, the contaminated CO_2 cloud model is flat or slightly decreasing while the IRIS spectrum shows an increase in brightness temperature peaking near 800 cm^{-1} at about 4 K above

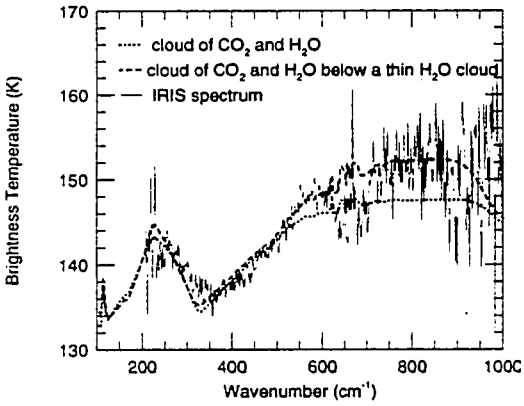

Figure 10. Same spectrum as in Figure 1, compared to the simulated spectra of contaminated precipating CO_2 clouds. Dotted line shows the signature of a CO_2 ice cloud composed of 50-μm particles with a vertical optical thickness of 1.3 (0.06 $kg.m^{-2}$) mixed with 10 pr-μm of 1-μm water ice particles. The temperatures of cloud and ground are 148 K. Dashed line correspond to the same CO_2 ice cloud contaminated by only 5 pr-μm of 1-μm water ice particles lying below a thin water ice cloud of 0.5 pr-μm of 1-μm particles at 155 K.

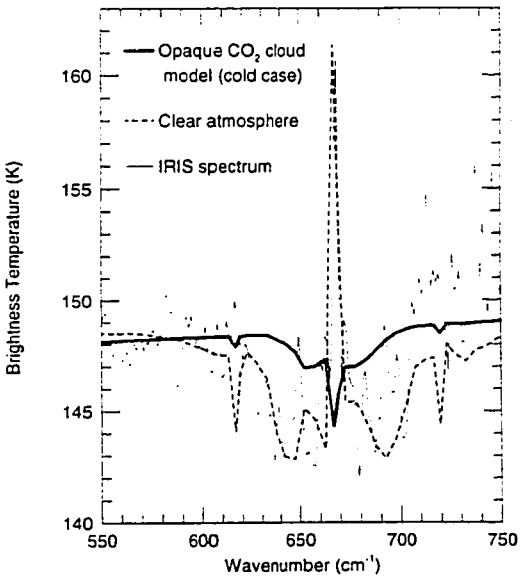

Figure 11. Comparison of the gaseous CO_2 band of the IRIS spectrum shown in Figure 1 with model results. Dashed line is a best fit in a clear atmosphere case. Solid line is the atmospheric emission in the blackbody CO_2 cloud scenario. Despite the use of a temperature profile with minimum temperatures (the CO_2 frost point temperature profile), simulated brightness temperatures are too high in the band wings.

the 550-cm^{-1} temperature. Since the IRIS spectra all measure the North polar region in late winter, a thin water-ice polar hood cloud might be expected, based on historical observations. A cloud of 1-2-μm water-ice particles emits strongly at 800 cm^{-1}, much more weakly at 225 cm^{-1} (due to the Rayleigh limit), and is very transparent at other wavenumbers. A warmer water-ice cloud (consistent with the atmospheric temperature structure implied by the 15-μm gaseous CO_2 band) over the contaminated CO_2 snow raises the brightness temperature around 800-cm^{-1} and has little effect otherwise. The amount of cloud required is quite modest, less than one pr-μm or a visible optical depth below unity. For the IRIS spectrum shown in Figure 10, the added cloud is at 155 K and has 0.5 pr-μm of 1-μm particles, and only 5 pr-μm are required to "contaminate" the CO_2 cloud and match the observed spectrum. We used optical constants for water ice at a temperature of 140 K [*Hudgins et al.*, 1993] rather than ones measured near 0°C.

In Figure 10, we have not tried to match the gaseous CO_2 band near 667 cm^{-1}. Figure 11 gives us a closer look at this spectral region. In fact, the precipitating CO_2 clouds which appear to match the IRIS spectra are thought to have a temperature close to the ground

temperature. Therefore they should lay at relatively low altitudes and their presence should not alter the atmospheric emission compare to that of an atmosphere free of CO_2 clouds. We have simulated the emission of the CO_2 atmosphere with a narrow-band model of the CO_2 15-μm band developed by *Hourdin* [1992] for Mars. The model is a classical random band model [*Goody*, 1964] with some improvements concerning the representation of Doppler effects. It is in very good agreement with a line-by-line model [*Hourdin*, 1992] and is very consistent with the results published by *Santee and Crisp* [1993] for the IRIS spectra.

A clear atmosphere scenario (and thus a low-altitude clouds scenario) can readily match the observed spectra. The dashed line on Figure 11 was obtained with a simple atmospheric profile corresponding to a 6.6 mbar atmosphere following the CO_2 frost point temperature profile up to 0.4 mbar, and with a thermal inversion at 150-170 K above this level. Given the noise level in the IRIS data, the solution is far from being unique. Also, we found that the spectrum was not strongly affected by the thin, high-altitude water ice cloud suggested above to improve the match outside the 15-μm band.

4.6 Blackbody CO_2 Clouds

It has been suggested that CO_2 clouds could be optically very thick and efficient blackbody emitters like water clouds on Earth [*Paige et al.*, 1990]. Such a property would be puzzling. According to *Warren et al.* [1990], even for CO_2 ice deposits, large and even unrealistic amount of impurities would be required to reach a near unit emissivity. Nevertheless, we must admit that these criticisms are not conclusive. Viking observations showed that the CO_2 frost emissivity was near unity at least during late winter and spring [*Paige*, 1985]. The emissivity depends on many other aspects such as the grain shape. For instance, it seems reasonable that, if the growth can proceed in alternative ways, the form which maximizes the emissivity will be favored since such particles will cool, and grow at the maximum rate [*James et al.*, 1992].

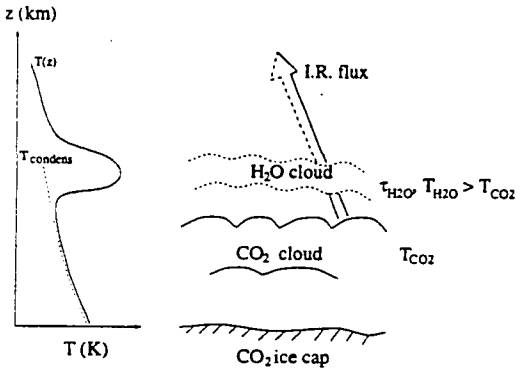

Figure 12. Schematic drawing of blackbody CO_2 cloud scenario and the corresponding model.

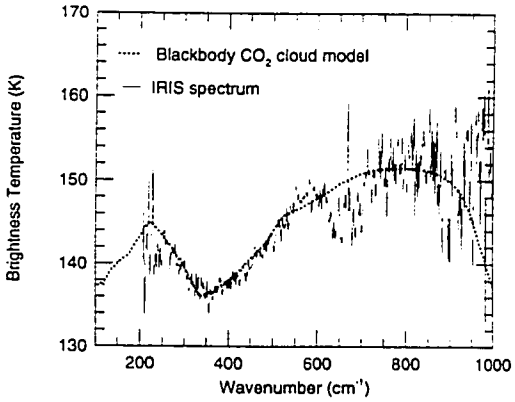

Figure 13. Same spectra than in Figure 1, fitted by the blackbody CO_2 cloud model.

To match the IRIS spectra within this context, *Paige et al.* [1990] proposed the following conceptual model based on an analysis of the IRIS spectra both inside and outside the CO_2 band. Near the ground and at low altitudes, the temperature profile stays close to the CO_2 frost point temperature and CO_2 clouds are present (Figure 12). Above that, where the observed inversion occurs, the warmer upper atmosphere is relatively clear, but contains optically thin clouds of water ice. As the water ice cloud is warmer than the CO_2 clouds, it creates the feature seen in Figure 1, the area around 350 cm^{-1} being a window between the two water ice absorption bands centered at 220 and 820 cm^{-1}. In this scenario, the anomalously cold brightness temperatures observed by Viking and Mariner 9 are explained directly by thermally opaque CO_2 clouds lying at one to several scale heights above the surface, at the CO_2 frost point temperature.

Comparison with the IRIS spectra outside the 15-μm band. To further study and verify the scenario suggested above, we have developed a simple model where the CO_2 / H_2O cloud system is defined by three parameters (Figure 12) : T_{CO_2}, the temperature of the top of the blackbody CO_2 cloud, T_{H_2O}, the temperature of a warmer H_2O cloud lying above; τ_{H_2O}, the H_2O cloud vertical optical depth at 20 μm.

To compute how the CO_2 cloud emission is absorbed and scattered by the H_2O cloud, we have used the same radiative transfer program that we used for the previous CO_2 cloud calculations. Comparisons between an IRIS spectrum of the winter polar region and best fit simulations are shown in Figure 13. The model can accurately reproduce the data. We needed to consider spherical water ice particles that were large enough (>2 μm) so that they scattered as well as absorbed and emitted thermal radiation. Here again, we used a Hansen-Hovenier gamma particle size distribution.

We have found CO_2 cloud temperatures ranging from 130 K to 140 K. T_{H_2O} and τ_{H_2O} are more difficult to

infer separately because both tend to increase the H_2O cloud signature, although their effects are not identical. For example, the spectrum shown in Figure 13 can be fitted with the couple (T_{H_2O}=160 K; τ_{H_2O}=0.4), or with (T_{H_2O}=180 K; τ_{H_2O}=0.1). Nevertheless, we can estimate that our modeled H_2O clouds have typical optical depths up to few tenths (1-2 pr-μm) and temperatures between 155 and 180 K. All these parameters seem realistic for northern winter.

Problem raised by the 15-μm gaseous CO_2 band. The blackbody CO_2 cloud / H_2O cloud simple model agree very well with the IRIS observations outside the 15-μm band. Is this scenario also consistent with the atmospheric emission in the 15-μm band? When the Martian atmosphere is clear, the high atmosphere produces most of the emitted radiance in the center of the band, and, in the more transparent band wings, the emitted radiation comes principally from the surface and near-surface layers. In the opaque CO_2 cloud scenario, things are quite different since the radiance is due to a combination of the emissions of the CO_2 cloud, the H_2O cloud and the atmospheric gaseous CO_2 atmosphere above the CO_2 cloud. The atmosphere and the ground below the CO_2 cloud level are hidden by the opaque CO_2 cloud.

We found that the atmosphere above the CO_2 cloud would not be able to create the cold brightness temperatures observed on each side of the core of the 15-μm band on most "cold" IRIS spectra. (143 K in Figure 11, 5 K below the background continuum). This is illustrated by the thick line in Figure 11, which shows the emission from an atmosphere following the coldest possible temperature profile (the CO_2 frost point temperature profile) above a CO_2 cloud at 135 K and below a theoretical H_2O cloud lying above the entire atmosphere. This temperature (135 K) is the highest temperature T_{CO_2} compatible with the IRIS spectrum used here. This should make it easier to match the cool wings, since the H_2O cloud properties are chosen in order to match the observed brightness temperature in the continuum outside the 15-μm band, i.e., below 600 cm^{-1}. Within this context, the warmer the CO_2 cloud is, the thinner and colder the H_2O cloud can be (and the thicker the atmosphere above the CO_2 cloud is). Despite the use of such parameters and despite the fact that we tend to underestimate the brightness temperatures by not taking the observed atmospheric inversion into account, the simulated spectrum (solid line) is well above the observed brightness temperatures.

In reality, things might be more complex than in the model, and, for example, the IRIS instrument could have observed more than just one CO_2 cloud / H_2O cloud system because of its large field of view. Nevertheless, no obvious reason can explain the cold brightness temperatures observed on the wings of the 15-μm band even if the IRIS instrument was observing a combination of various clouds and bare ground.

Comparison of the blackbody CO_2 cloud scenario with the IRTM data. T_{11} and T_{20} can be simulated from the spectra produced by the blackbody CO_2 cloud / H_2O cloud model. As the IRTM 20-μm band is near the minimum of absorption of water ice, in the 17-μm - 33-μm window, T_{20} is not strongly affected by the warmer H_2O clouds. Thus T_{20} measured by IRTM stays close to the effective CO_2 cloud temperature, although it is usually few Kelvins higher, especially for the coldest spots. On the other hand, the IRTM 11-μm band includes the strong water ice absorption band centered at 12.2-μm (820 cm^{-1}). T_{11} is much more affected by the water ice cloud than is T_{20}. On this basis, following our conclusion of section 2.2, the difference between T_{11} and T_{20} in this model is uniquely attributed to the presence of warmer H_2O clouds (at least, outside the dust storm periods).

Within this context the linear correlation between T_{20} and T_{11} shown in Figure 6 would indicate that the $T_{11} - T_{20}$ signature of the water ice clouds is strongly correlated with the presence of CO_2 ice clouds (low T_{20}). The colder the CO_2 clouds are, the higher the temperature contrast between CO_2 and H_2O clouds is, and the stronger the H_2O cloud signature is. But this is not quantitatively sufficient. With a "constant" layer of H_2O clouds (constant temperature and opacity) lying above CO_2 clouds at various temperatures, our model cannot fully simulate the observed linear relation of $T_{11} - T_{20}$ to T_{20} (solid line with solid square symbols in Figure 9). The properties of the H_2O clouds would have to be adjusted so that the signature of H_2O clouds disappears when CO_2 clouds are not present (T_{11} is close to T_{20} for higher values of T_{20}). This would suggest that the presence of CO_2 clouds is linked with the condensation of water ice, or with an increase of the temperature of the middle polar atmosphere inversion. No simple physical processes can be suggested to explain these observations. This raises another major problem for the CO_2 clouds hypothesis. More generally, it is difficult to understand why the IRTM instrument did not observe strong spectral contrast $T_{11} - T_{20}$ with a high value of T_{20}; in other words, why do thick H_2O clouds never occur above the ground without CO_2 clouds? Conversely the IRTM instrument did not measure T_{11} below 135 K, whereas T_{20} often reached temperatures below 130 or 125 K. This fact, which would mean that CO_2 clouds never occur without thick H_2O clouds above, would be also difficult to understand.

The blackbody CO_2 cloud hypothesis can also be compared with the IRTM observation in the 15-μm band. If the CO_2 cloud layer is an efficient blackbody emitter, T_{20} measured by IRTM should be close to the actual "thermodynamic" temperature of the observed CO_2 clouds, when CO_2 clouds are present. Therefore T_{20} should be approximately equal to the CO_2 frost point temperature of the top of the cloud, which depends on the pressure level of the cloud top. At 0.5 mbar, the CO_2 frost temperature is about 133 K. For a typical daytime temperature profile, and low emission angle, T_{15} also measures temperature at the 0.5 mbar level [*Kieffer et al.*, 1976a] Thus, when T_{20} is comparable to or below 133 K, we should have T_{15} close to T_{20}.

In Figure 7a and 7b , we see indeed that when the IRTM is supposed to observe cold CO_2 clouds ($T_{20} <$ 135 K), T_{15} remains between T_{20} and $T_{20} + 10$ K. As the temperature equivalent noise level for T_{15} is about 5 K at 133 K, we can consider that there is a good coincidence between T_{15} and T_{20}. These observations would support the blackbody CO_2 cloud scenario.

In Figure 7c., which corresponds to the observations obtained during the polar warming event related to second Viking dust storm, there is no such correlation between T_{15} and T_{20}. Such observations, which could call into question the blackbody CO_2 cloud hypothesis since they suggest that very low brightness temperatures were observed where sufficiently cold CO_2 clouds could not exist, are puzzling, but not conclusive. Indeed, these unexpected values could be explained without contradicting this hypothesis. As explained by *Kieffer et al.* [1976a], T_{15} is supposed to sample the level about 0.6 mbar for vertical viewing for a typical daytime temperature profile. However, during a polar warming event, temperature profiles are far from typical. In our case, one can imagine a warm atmospheric layer above very cold CO_2 clouds at about 130 K. The thermal emission of the warm atmospheric layer would dominate the total emission of the atmosphere toward space in the 15-μm channel, even if the warm layer is above the 0.6 mbar-level. For instance, a system composed of an opaque CO_2 cloud at 130 K lying below a thermal inversion at 200 K would led to T_{15}=175 K. (Results obtained with the CO_2 gas narrow-band model of *Hourdin* [1992] presented in section 4.5 and an IRTM 15-μm band model, with an emission angle of 30°, typical of the Viking Orbiter polar observations during the polar warming event.)

Conclusions for the blackbody CO_2 cloud scenario. Despite the fact that it can match the IRIS spectra oustside the 15-μm band, we have shown that the blackbody CO_2 cloud scenario is not consistent with some other key characteristics of the data in the 15-μm band and in the IRTM data. Besides, because modeling of the CO_2 clouds characteristics points strongly to semiopaque, scattering CO_2 clouds rather than absorbing clouds, and since these scattering clouds are more compatible with the observations, we believe that the blackbody CO_2 cloud hypothesis can be ruled out.

5. Low Surface Emissivity Hypothesis

5.1 CO_2 Frost Emissivity

Low emissivities are uncommon on known natural surfaces. As explained by *Warren et al.* [1990], most planetary surfaces have emissivities above 90% in the thermal infrared and in particular snow and sea-ice on Earth always have emissivities near 99%. Using spacecraft observations, *Paige* [1985] also estimated that the Martian polar cap emissivity was likely to be high. He studied the Viking IRTM data on restricted areas at both poles and found nearly coincident brightness temperatures at 11 μm and 20 μm during the early fall and late winter seasons. He showed that this could only be explained with a CO_2 ice emissivity close to one. In fact, this argument can be applied wherever T_{20} stayed close to T_{11}, which means outside the cold spots. Nevertheless Paige argued that the spatial and temporal variation of the low brightness temperatures would be very difficult to explain by spatial variations in surface emissivity.

However, CO_2 ice has the property that its interband absorption in the infrared is much smaller than, for example, that of H_2O ice, apparently because of the lack of hydrogen-bonding in CO_2 ice [*Warren*, 1986]. *Ditteon and Kieffer* [1979] measured that the transmissivity of CO_2 ice samples grown in the laboratory was quite high and estimated that the emissivity in the Viking IRTM 20-μm of pure CO_2 deposits was low enough to explain the cold spots. Since then, more sophisticated CO_2 snow models [*Warren et al.*, 1990] and more accurate laboratory measurements by G.B. Hansen (manuscript in preparation for *JGR-Planets*, 1995) have confirmed that Martian CO_2 frost could theoretically have an emissivity much lower than one in the thermal infrared.

The problem is complicated by other parameters. *Warren et al.* [1990] showed that water and dust contamination and large grain size could raise the modeled emissivity of CO_2 ice snow substantially, although they also showed that unrealistic amount of impurities (or large grain sizes to the order of one millimeter) would be required to get near unity. The emissivity may also depend on other properties, such as the the grain form, which is difficult to model. As explained for the CO_2 cloud particles, the form that maximizes the emissivity should be favored, since such deposits will cool, and grow at the maximum rate [*James et al.*, 1992].

5.2 Comparison With IRIS Spectra

Figure 14 shows the spectral emissivity corresponding to the IRIS spectrum shown in Figure 1, assuming that the thermodynamic temperature of the ground was the observed brightness temperature around 580-600 cm^{-1} (148 K in Figure 1). The emissivity goes down to about 0.7 around 350-400 cm^{-1}. This value (0.7) is also typically observed on most other "cold" IRIS spectra.

In Figure 14, the IRIS emissivity curve is compared to the emissivity of pure CO_2 ice deposits with various grain sizes. This is calculated using the same model as *Warren et al.* [1990] , but with the recent CO_2 ice optical constants of G. B. Hansen.

The model is of a semi-infinite layer of spherical particles using a delta-Eddington method [*Joseph et al.*, 1976]. No grain size of pure CO_2 will match the IRIS spectrum, but small amounts of water ice and dust particles intimately mixed with the CO_2 frost will have the effect of raising regions of low emissivity to higher levels, due to the infrared-opaque nature of these materials compared to CO_2 ice.

The approach is to start with the largest grain size possible so that only small amounts of dust and water need to be added to approximate the observed spec-

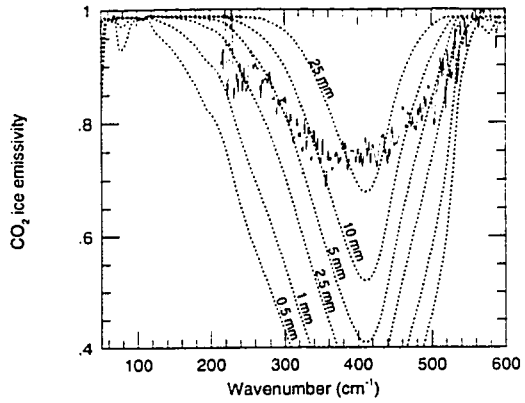

Figure 14. Spectral emissivity corresponding to the IRIS spectrum shown in figure 1 (solid line) compared to the spectral emissivity of CO_2 snow (dashed lines) calculated for various grain radii and a similar emission angle (60^0). The emissivity for the IRIS spectrum was estimated assuming that the thermodynamic temperature of the ground was 148K.

trum. The largest sizes are not appropriate, since their model emissivities are already higher than the IRIS spectrum at most wavenumbers. The pure CO_2 model spectra with grain radii from 1 to 2.5 mm are low enough at 250 and 500 cm^{-1} to be consistent with the IRIS spectrum. Adding about 0.1 % by weight of both water ice and dust (using the data for Montmorillonite 219b from *Toon et al.* [1977]) with effective

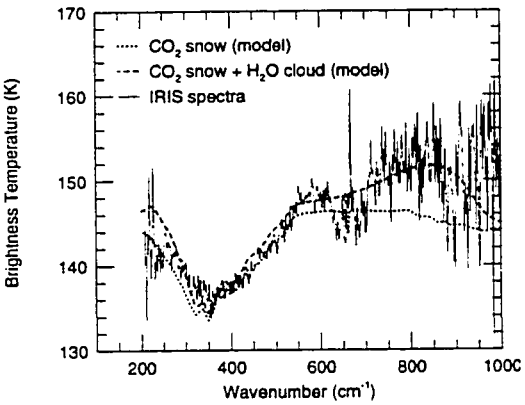

Figure 15. Same spectrum as in Figure 1, compared to simulated spectra of contaminated CO_2 snow. Dotted line shows the signature of a mixture composed of CO_2 grains (r = 2.5 mm) mixed with 0.05 % of dust (r = 2.5μm) and 0.05 % of water ice (r = 10μm) at an emission angle of 60°. Dashed line correspond to the same CO_2 ice snow lying below a thin cloud with 0.6 pr-μm of water ice particles (r = 1μm) at 155 K.

grain radii of 10 and 2.5 μm, respectively, yields a model spectrum which approximates the IRIS data quite well (Figure 15).

The model described above assumes that all particles are independent scatterers, and does not take close packing effects into account. This is mentioned by *Wiscombe and Warren* [1980], and a more rigorous treatment is presented by *Mishchenko* [1994], where it is shown that independent scattering calculations are valid for weakly absorbing particles much larger than the wavelength. Mishchenko also demonstrates that the scattering of packed nonspherical particles can be approximated by spheres of some equivalent size. If the scattering instead arises from imperfections and voids in a more monolithic deposit (perhaps more likely than large spherical particles when the inferred CO_2 grain size gets very large), the results may be different than those presented here. *Bohren* [1993] argues that transmission and reflection from bubbly water ice, at least, can be successfully modeled by independently scattering large spheres of some appropriate effective radius.

As for the contaminated precipitating CO_2 cloud, the contaminated CO_2 frost model also differs from the IRIS spectrum in the region from 600 to 1000-cm^{-1} (Figure 15), where it is too flat. As in section 4.5, adding a thin warmer water ice cloud as expected in north polar region in late winter improves the fit.

Last, the low surface emissivity scenario corresponds to a clear atmosphere scenario and thus is consistent with the IRIS observations in the 15-μm band (Figure 11).

5.3 Comparison With IRTM Data

As mentioned above the radiative properties of the ground should mainly be controlled by the frost grain size or shape. Figure 16 illustrate the correlation of T_{11}

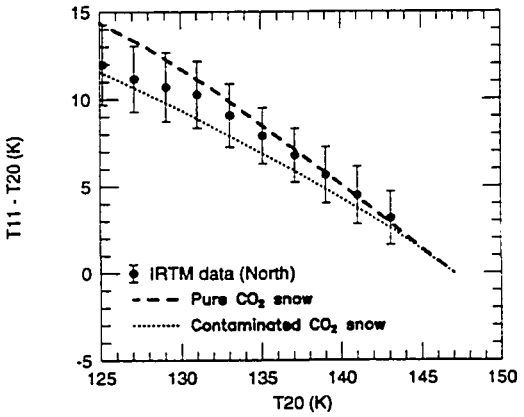

Figure 16. Correlation between T_{20} and T_{11} simulated with the pure and contaminated CO_2 frost model. Correlations were computed by varrying the grain size. The northern hemisphere IRTM data shown for comparison are the same as in Fig.6.

and T_{20} simulated from both the pure and the contaminated CO_2 frost model for various grain sizes. The modeled correlation for pure CO_2 ice closely matches the observed systematic correlation between T_{11} and T_{20}. The contaminated CO_2 snow model has similar behavior to pure CO_2 when IRTM brightness temperatures are calculated, except that smaller CO_2 grain sizes can be used to achieve the same T_{11} and T_{20}. Centimeter-sized grains are still necessary to obtain near-blackbody values. The addition of thin water ice clouds mainly increases T_{11}, which shifts the model points upward on this graph.

6. Summary and Discussion: CO_2 Snow

In this paper, we have reviewed and modeled the possible scenarios related to the presence of CO_2 clouds or low surface emissivities. We have compared their spectral behavior to the observed spectral properties of the cold spots, characterized by the typical shape of the IRIS spectra and the systematic correlation between IRTM T_{11} and T_{20} (Table 2).

First, we have shown that nonprecipitating CO_2 clouds (whatever their ability to backscatter or absorb the infrared radiation) cannot match these observations. CO_2 clouds composed of small particles may exist but in most cases should be transparent because they cannot really scatter or absorb the infrared radiation outside the 15-μm band. The blackbody CO_2 cloud scenario proposed by *Paige et al.* [1990] (cold blackbody CO_2 clouds lying below thin warmer H_2O clouds) can match some of the observations, but several pieces of evidence presented in this paper allow us to rule out this scenario as well.

Nevertheless, we have found that precipitating CO_2 clouds with particle radii larger than 10 μm could produce the observed features, especially if they are contaminated by dust or water ice. Similarly, our simple modeling of the signature of CO_2 ice deposits in the infrared suggest that contaminated deposits could also match the observations. These two results are rather similar in that they both rely on the fact that large enough CO_2 ice grains can be efficient scatterers at infrared wavelengths, whether they are airborne or on the ground.

Aside from their spectral signatures, the cold spots are characterized by their high spatial and temporal variability, and by their apparent link to atmospheric CO_2 condensation (correlation with the presence of dust and with the low atmospheric temperature T_{15} ; variability consistent with CO_2 atmospheric condensation modeling). Each of these points is consistent with the CO_2 clouds scenario and would tend to dismiss the low surface emissivity hypothesis.

However, we propose here a new realistic scenario consistent with both hypotheses. We have shown that the radiative properties of the CO_2 ice deposits are mainly controlled by the frost grain size or shape : the bigger the grains are, the higher the frost emissivity is. The CO_2 ice grain characteristics are likely to vary depending on wether the CO_2 ice condenses directly on the ground or in the atmosphere. On the ground, CO_2 condenses on CO_2 ice grains already existing and is likely to form dense, solid deposits composed of big CO_2 ice grains or even monolithic deposits. In the atmosphere, condensing CO_2 should form small particles which will fall down (See Table 1) while growing and continue to grow once on the ground, resulting in a layer of "fresh CO_2 snow." In fact, the average size of the CO_2 ice grain at the surface should mainly depend on the ratio between the atmospheric condensation rate and the total condensation rate. Since this fresh snow layer is expected to have low spectral emissivities compared to other areas where no atmospheric condensation (or no condensation at all) occurs, they are likely to create the observed cold brightness temperatures along with the CO_2 ice particles falling down from the atmosphere. Differentiating snow on the ground and snow in the atmosphere on the basis of spacecraft data may be very difficult. In particular, moderately low brightness temperatures can either be created by thinner precipitating CO_2 clouds or larger snow grains on the ground. When a snowfall ends, for instance, because the airborne dust has been washed out by the CO_2 ice pre-

Table 2. Ability of the Various Scenarios Described in This Paper to Duplicate the Spectral Signatures of the Cold Spots

	IRIS Spectra		IRTM Data
	Shape Outside the 15-μm Band	Shape of the 15-μm Band	Correlation Between T_{11} and T_{20}
Small particle CO_2 clouds ($r < 10\mu$m)	no	yes	no
Precipitating CO_2 clouds ($r > 10\mu$m)	if contaminated by water	yes	yes (T_{20} varies with cloud thickness)
High altitude blackbody CO_2 cloud	yes (H_2O cloud above)	no (cold wings)	requires correlation between CO_2 and H_2O clouds
Low emissivity CO_2 surface frost	if contaminated by water and dust	yes	yes (T_{20} varies with grain size)

cipitation (unlike on Earth where snowfall ends when there is no more water vapor in the atmosphere, there is always enough CO_2 in the Martian atmosphere), the CO_2 snow will age. The grain size will increase because of the continuing surface condensation which will tend to occur between the grains and aggregate them or because of a "destructive metamorphism" similar to what is observed for terrestrial water snow [*LaChapelle*, 1969] which do not require any condensation. More precisely, *Eluszkiewicz* [1993] showed that, because under martian conditions an inert gas is nearly absent and the frost temperature is nearly constant and thus no "air bubbles" and no thermal cracking are expected, the martian CO_2 snow seasonal metamorphism could form "nonporous, polycrystalline" layers, provided freshly condensed grains were sufficiently small. The spectral emissivities of the aging snow is thus likely to increase up to values close to unity until the next snowfall or until the spring. Within this context, the high variability of the cold spots cannot only be attributed to the variability of the atmospheric condensation but also to the ability of the CO_2 snow to age rapidly.

An interesting aspect of our study is the fact that the correlation between T_{20} and $T_{11} - T_{20}$ is rather similar for pure or contaminated CO_2 ice. This means that the cold spot signature seen by the IRTM instrument is independent of the CO_2 ice contamination by water or dust, unlike the shape of our simulated IRIS spectra. This could explain why the IRTM instrument always observed the same kind of correlation in both hemispheres and in all seasons in spite of the fact that the amount of airborne dust or water is highly variable. A spectrum obtained above the condensing south polar cap when less dust and water is expected than during the late northern winter observed by Mariner 9 may be very different than the IRIS data and closer to the pure CO_2 ice spectra shown in this paper.

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VITA

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After graduating from Caltech, Gary worked three years at CBS Television in Los Angeles, California (mechanical and electronic design) and four years at the Jet Propulsion Laboratory (JPL) in Pasadena, California (programming the command and data computer on the Galileo spacecraft). He returned to school, inspired by associations with numerous Ph.D.'s at JPL, in September 1983, at the University of Washington in Seattle, Washington, in the department of Aeronautics and Astronautics (A&A). He attended only part-time until September 1985, while working full time for a year at a small software firm in Seattle. After one full-time year (1985–1986), he received a Masters of Science degree in A&A in June 1986.

Gary stayed an additional year in A&A, while looking for doctoral research project opportunities, eventually moving to the Geophysics Department in the summer of 1987, when he worked with Marcia Baker during a cloud research project off the coast of southern California. In September 1987, he started course work in Geophysics working under Conway Leovy. He served for three academic quarters (1987–1988) as a teaching assistant in undergraduate Astronomy courses for non-science majors (planetary science and cosmology). He spent the summer of 1988 working for Professor Leovy doing inversions of infrared spectra of Mars from the Mariner 9 mission to determine atmospheric temperature structure. Continued work on the Martian atmosphere with Professor Leovy was not possible, so after working briefly with Gonzalo Hernandez on atmospheric airglow studies, he started work on his doctoral research under Stephen Warren in March 1989. This was facilitated by his agreement to do the laboratory work for the thesis at JPL, with

which he was already very familiar. The laboratory work was started in the last half of 1989 and course work was finished at the University of Washington in early 1990. Then four years were spent at JPL (July 1990–July 1994) to finish the experimental work.