FOURIER TRANSFORM INFRARED (FT-IR) SPECTROSCOPY OF ATMOSPHERICALLY SIGNIFICANT MOLECULES[a]

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Vibrational and rotational spectra of atmospherically significant molecules, like NO_2, SO_2, and HCl, in gas phase, have been recorded when the gases are passed through tubes made of different materials (e.g. stainless steel, aluminum, copper and teflon) under quasi-static and flow conditions, using a Nicolet Magna-IR 500 Fourier Transform Infrared spectrometer. Fundamental modes of vibrations of the triatomic molecules, NO_2 and SO_2, in the spectral region 400 - 4000 cm^{-1} have been identified for absorption monitoring. The infrared spectra of some molecules, e.g. NO_2 and HCl, show measurable difference in absorbance peaks, when the gases are passed through copper tubing for instance, confirming that these molecules react strongly with metallic materials, whereas teflon and stainless steel are fairly inert. Our objective is to identify and characterize the various tubing materials with respect to their absorption features, so that specific tubing-gas combinations may be determined for designing suitable platforms for airborne atmospheric measurements.

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