A SYSTEMATIC INVESTIGATION OF CONCENTRATION VARIATIONS OF ATMOSPHERIC TRACE GASES PASSED THROUGH TUBINGS OF DIFFERENT MATERIALS USING A FOURIER TRANSFORM INFRARED (FT-IR) SPECTROMETER [a]

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Rovibronic spectra of the fundamental bands of $^{3}2S^{1}6O_2$, $^{1}4N^{1}6O$ and its isotopomers of HCl ($^{1}H^{3}5Cl$ and $^{1}H^{3}7Cl$) have been recorded using Nicolet Magna-IR 550 Fourier Transform Infrared spectrometer in the region $400-4000$ cm^{-1} spectral region, under quasi-static conditions, when the sample gas was passed in turn through tubings of aluminum, copper, stainless-steel and teflon. The absorbances were measured for the individual roational lines corresponding to the three modes of vibration (ν_1-symmetric stretch, ν_2-symmetric bend, ν_3-antisymmetric stretch) of the SO_2 molecule for the pressures in the range 50-250 Torr range. The absorbances were also measured for the rotational lines of the isotopomers HCl for pressures in the range 100-1000 Torr range; and for the NO molecule in the range 100-300 Torr. A plot of absorbance versus pressure for all the observed transitions showed a linear relationship, thereby validating Beer's law for the chosen pressure ranges. A measurable difference in the absorbance peaks was observed for HCl and NO confirming the interactions of these molecules with the corresponding tubing materials. Quantifiable changes in the absorbance peaks were not observed for the SO_2 moleucles flowing through the different tubing materials. A detailed and systematic analysis pertaining to the observed concentration changes of the trace gases studied will be presented.

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