FOURIER TRANSFORM INFRARED BROADBAND SPECTROSCOPY OF THE GAS PHASE OF HF AND CO MIXTURES

A.S. Sizhuk

Physics Department, Texas A&M University
(*College Station, Texas 77843-4242, USA;*
e-mail: cannabiss@mail.univ.kiev.ua)

S u m m a r y

The gas phase spectra of hydrogen fluoride (HF) and carbon oxide (CO) mixtures are investigated using the Fourier transform infrared (FTIR) broadband spectroscopy technique for the region from 3838 to 3854 cm^{-1}. The OC–HF complex bands, that can correspond to the excited intermolecular (complex) stretching and bending, are observed for the partial mixture pressures of 20 Torr of HF and 30 Torr of CO and higher. The corresponding hot bands of the second harmonic for the bending mode are observed at the total pressure of 100 Torr at -15 degree Celsius (corresponding to 26 Torr of HF and about 90 Torr of CO at room temperature). The observed hot bands are assigned with the help of the fitted spectra for a slightly non-rigid linear molecule. The fitting for the model linear molecule with the experimental data produced the following parameters for the excited states v_1, $v_1 + v_5^1$ and $v_1 + v_3$: $v_1 = 3844.030345$ cm^{-1} with $B(v_1) = 0.104181$ cm^{-1} and $D(v_1) = 3.447151 \times 10^{-7}$ cm^{-1}; $v_1 + v_5^1 = 3931.406563$ cm^{-1} with $B(v_1 + v_5^1) = 0.105090$ cm^{-1} and $D(v_1 + v_5^1) = 3.31263 \times 10^{-7}$ cm^{-1}; $v_1 + v_3 = 3960.722190$ cm^{-1} with $B(v_1 + v_3) = 0.102764$ cm^{-1} and $D(v_1 + v_3) = 3.059578 \times 10^{-7}$ cm^{-1}, respectively.