

OBSERVATION AND ANALYSIS OF THE SLIT JET/FTIR SPECTRA OF SOME SMALL DIMERS

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As a demonstration of our cw slit jet/FTIR spectrometer we have recorded and analyzed the jet ($T_{rot} = 10$ K) spectra of N_2O dimer, N_2O -Ar dimer, CO_2 dimer, and CO_2 -Ar dimer in the 2100 to 2400 cm^{-1} region. A Bruker IFS 120HR FTIR spectrometer is used to interrogate the molecular and cluster species in a cw jet formed by the expansion of argon and CO_2 or N_2O through a 12 cm \times 50 μ m slit. Preliminary analysis of the N_2O dimer spectrum gives the following constants: $A'' = 0.299421(5)$ cm^{-1} , $B'' = 0.059928(1)$ cm^{-1} , $C'' = 0.049841(1)$ cm^{-1} , $\Delta''_J = 0.192(3) \times 10^{-6}$ cm^{-1} , $\Delta''_{JK} = -0.93(3) \times 10^{-6}$ cm^{-1} , $\Delta''_K = 0.71(1) \times 10^{-5}$ cm^{-1} , $\delta''_J = 0.30(9) \times 10^{-7}$ cm^{-1} , $\delta''_K = 0.7(2) \times 10^{-6}$ cm^{-1} and for the upper state $A' = 0.299067(4)$ cm^{-1} , $B' = 0.059665(1)$ cm^{-1} , $C' = 0.049647(1)$ cm^{-1} , $\Delta'_J = 0.195(3) \times 10^{-6}$ cm^{-1} , $\Delta'_{JK} = -0.96(2) \times 10^{-6}$ cm^{-1} , $\Delta'_K = 0.712(8) \times 10^{-5}$ cm^{-1} , $\delta'_J = 0.33(9) \times 10^{-7}$ cm^{-1} , $\delta'_K = 0.9(1) \times 10^{-6}$ cm^{-1} , and $\nu_0 = 2229.48295(2)$ cm^{-1} . The CO_2 -Ar dimer spectrum gives the following constants: $A'' = 0.397145(3)$ cm^{-1} , $B'' = 0.06603456(8)$ cm^{-1} , $C'' = 0.05612272(7)$ cm^{-1} , $\Delta''_J = 0.6221(5) \times 10^{-6}$ cm^{-1} , $\Delta''_{JK} = 0.12018(3) \times 10^{-4}$ cm^{-1} , $\Delta''_K = -0.1055(5) \times 10^{-4}$ cm^{-1} , $\delta''_J = 0.907(5) \times 10^{-7}$ cm^{-1} , $\delta''_K = 0.863(2) \times 10^{-5}$ cm^{-1} , $H''_{JK} = -0.51(7) \times 10^{-9}$ cm^{-1} , and for the upper state $A' = 0.393988(3)$ cm^{-1} , $B' = 0.066007(2)$ cm^{-1} , $C' = 0.056027(1)$ cm^{-1} , $\Delta'_J = 0.640(4) \times 10^{-6}$ cm^{-1} , $\Delta'_{JK} = 0.1176(3) \times 10^{-4}$ cm^{-1} , $\Delta'_K = -0.1050(4) \times 10^{-4}$ cm^{-1} , $\delta'_J = 0.97(2) \times 10^{-7}$ cm^{-1} , $\delta'_K = 0.109(3) \times 10^{-4}$ cm^{-1} , $H'_{JK} = -0.65(9) \times 10^{-9}$ cm^{-1} , and $\nu_0 = 2348.67306(5)$ cm^{-1} . Spectroscopic constants for the other dimers will also be presented.