VIBRATIONAL OVERTONE SPECTRA OF C_2H_6 AND C_2H_4 IN CRYOGENIC LIQUIDS

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Vibrational overtone spectra of C_2H_6 and C_2H_4 in cryogenic solutions were recorded between 5000 and 14000 cm^{-1}. Spectral regions for the first four overtones were measured using a Fourier transform spectrophotometer. The fifth overtone $(\Delta\nu = 6)$ spectra between 15,000 and 16,000 cm^{-1} were recorded with a double beam (pump-probe) thermal lens technique using concentrations as low as 10^{-3} mole fraction. The peak frequency shift $(\Delta\omega)$ from gas phase to solution is explained by the change in harmonic frequency and anharmonicity in solution with respect to the gas phase values. The bandwidth $(\Delta\omega_{1/2})$ of the $(\Delta\nu = 6)$ C-H absorption bands in solution can be explained in terms of collisions with the solvent molecules.