THERMAL LENS IN CRYOGENIC SOLUTIONS: VIBRATIONAL OVERTONE SPECTRA OF BENZENE IN LIQUID ETHANE

M. H. DIEZ-Y-RIEGA, A. LOPEZ-CALVO and CARLOS E. MANZANARES, *Department of Chemistry and Biochemistry, Baylor University, Waco, Texas, 76798*.

The atmosphere and surface of Titan (a satellite of Saturn) will be discussed with emphasis on the lakes and large seas of methane and ethane that have been found on the surface. Experimental techniques (currently used in our laboratory) to study the spectroscopy and chemical reactions of unsaturated hydrocarbons dissolved in liquid methane and ethane will be presented. Liquefied methane and ethane exhibit high transparency and their C-H absorption bands around $\Delta v = 6$ do not interfere with the C-H absorption bands of olefinic or aromatic hydrocarbons. The main limitation with these solvents is the low solubility of the majority of molecular compounds. High vibrational overtone transitions ($\Delta v = 6$) only observed in high concentrations of the solute cannot be measured with absorption spectroscopy. Recently, our laboratory has reported the application of the thermal lens technique to the field of cryo-spectroscopy. The fifth overtone of methane in liquid argon and nitrogen solutions has been obtained at concentrations as low as 120 ppm. In this seminar, two variations of the thermal lens technique will be presented to obtain overtone transitions of unsaturated hydrocarbons in ethane solutions.