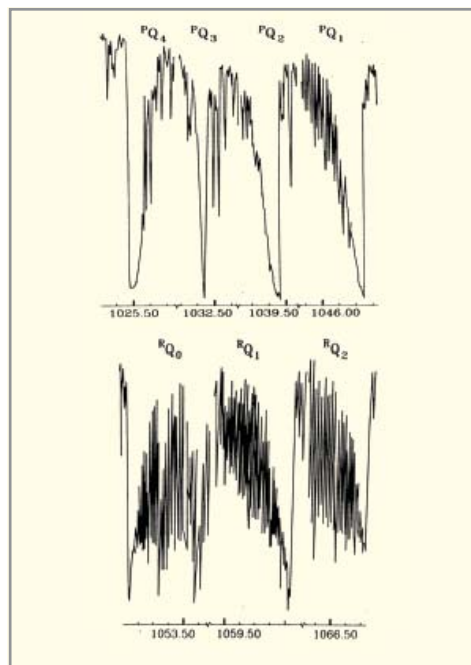


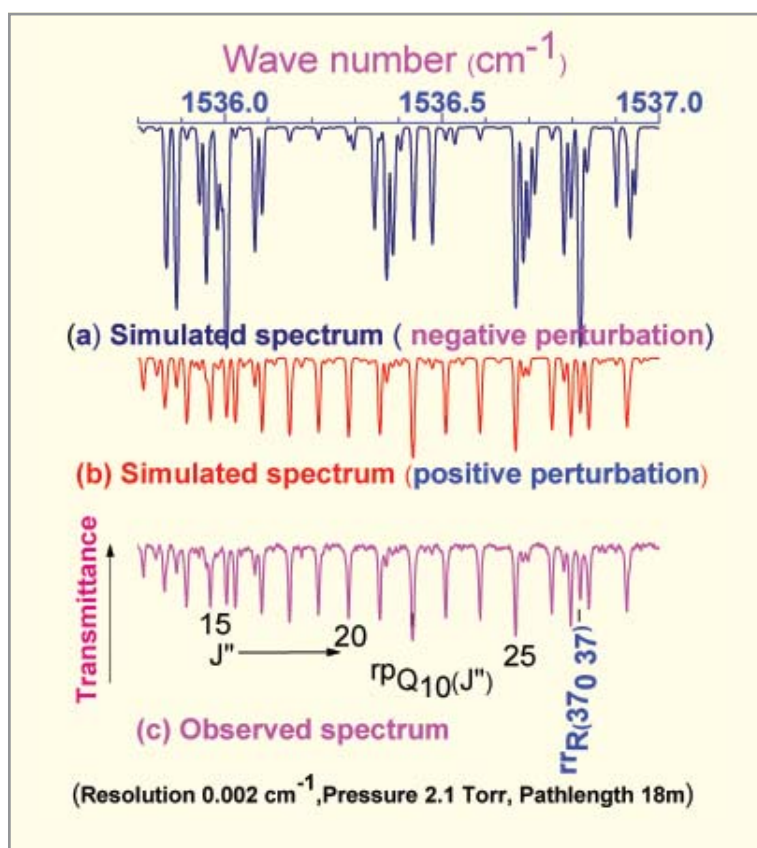
12.8 FOURIER TRANSFORM SPECTROSCOPIC STUDIES OF ATOMS, MOLECULES AND TRANSIENT SPECIES

The wide spectral coverage, high resolution capability and high sensitivity of modern Fourier transform instruments permit the studies of atoms, molecules and radicals either in absorption or emission mode. The results of these measurements are useful in applications in atmospheric studies, astrophysics, geophysics, laser development, nuclear properties etc.

We have carried out high resolution absorption studies of several molecules such as Methyl acetylene (Propyne; CH_3CCH), Phosphine (PH_3), PH_2D , Methylene fluoride (CH_2F_2) and its isotopomer CD_2F_2 , $^{13}\text{CF}_3\text{Br}$, etc. Spectra of these molecules have been recorded with Fourier transform spectrometer in the infrared region. Rotational-vibration



Typical spectrum observed in the ν_2 band CH_3CCH



ν_2 band in the region of Q_{10} branch of CH_2F_2 , showing the effect of Coriolis coupling.

spectra of these molecules are complicated due to the several perturbations (Coriolis interaction, Fermi resonance etc.) present in the vibrating-rotating molecules. Two such spectra are shown in Fig. (CH_2F_2) and Fig. (CH_3CCH). We have successfully analyzed the several spectra taking into account all the possible interactions. Similarly we have also studied the emission spectral of CO , N_2 , Ar , Ne and transient species (SiC , CH , CS , InCl , MgCl produced and excited by MW discharge, DC discharge or hollow cathode discharge etc. We have measured isotope shift of several atomic species such as Gd , Sm , Yb , et. Based on the experience in the field, it is proposed to set up an infrared beam line in the Indus-II synchrotron facility which will further enhance the capability of our Fourier transform spectroscopic studies.

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