

ROTATIONAL SPECTROSCOPIC INVESTIGATIONS OF $CH_4 - H_2S$ COMPLEX

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Recently, Raghavendra and Arunan [1] have shown that methane can form a hydrogen bonded complex with HX ($X = F, Cl, OH, SH$), in which $H - X$ points towards the carbon of methane. Microwave spectroscopy has confirmed the structure of $CH_4 - HF/HCl/H_2O$ complexes. No experimental data is available for $CH_4 - H_2S$ complex to the best of our knowledge. Pulsed Nozzle Fourier Transform Microwave Spectrometer has been used to study the rotational spectrum of $CH_4 - H_2S$ complex. Two progressions were observed. Both could be fitted independently to a linear top. The ground state rotational constant is determined to be $B = 2683.100(1) MHz$ and the distortion constant to be $D_J = 0.09413(9) MHz$. Based on this rotational constant, the intermolecular separation is determined to be 4.136 \AA . The other state has a rotational constant $B = 2593.05(1) MHz$ and a negative distortion constant, $D_J = -0.0089(7) MHz$. The negative distortion constant implies rotational - vibrational coupling and the progression arises from some excited internal rotor/torsional state. Experiments are in progress to look for more states and isotopologues of this complex. Details will be presented in the talk.

1. Raghavendra et al. *Chem. Phys. Lett.* 467(2008)37.