ROTATIONAL SPECTROSCOPIC INVESTIGATIONS OF $\text{CH}_4 - \text{H}_2\text{S}$ 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 $\text{CH}_4 - HX$. No experimental data is available for $\text{CH}_4 - \text{H}_2\text{S}$ complex to the best of our knowledge. Pulsed Nozzle Fourier Transform Microwave Spectrometer has been used to study the rotational spectrum of $\text{CH}_4 - \text{H}_2\text{S}$ complex. Two progressions were observed. Both could be fitted independently to a linear top. The ground state rotational constant is determined to be $B = 2683.100(1) \text{MHz}$ and the distortion constant to be $D_J = 0.09413(9) \text{MHz}$. Based on this rotational constant, the intermolecular separation is determined to be 4.136\AA. The other state has a rotational constant $B = 2593.05(1) \text{MHz}$ and a negative distortion constant, $D_J = -0.0089(7) \text{MHz}$. 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.