ROTATIONAL SPECTRA AND STRUCTURE OF H$_2$S COMPLEXES: Ar(H$_2$S)$_2$ AND C$_2$H$_4$-H$_2$S

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Recently, we determined hydrogen bond radii for HF, HCl, HBr, HI, HCN, H$_2$O and HCCH, using the accurate structural data available from microwave spectroscopic studies on several B:HX complexes, where B is a hydrogen bond acceptor\(^a\). For H$_2$S, the available data is limited compared to other hydrogen bond donors listed above. Hence, a systematic investigation has been started on several H$_2$S complexes. Several transitions have been observed for Ar-(H$_2$S)$_2$ and C$_2$H$_4$-H$_2$S complexes. The rotational spectrum of C$_2$H$_4$-H$_2$S complex appears to be a composite of rotational spectra of the hydrogen bonded C$_2$H$_4$-H$_2$O and the van der Waals complex C$_2$H$_4$-Ar. Each transition is split into four with a smaller splitting of about 0.14 MHz and a larger splitting of 1.67 MHz in (B+C)/2. The rotational constants for the strongest progression are $A = 26.1(1)$ GHz; $B = 1972.88(1)$ MHz and $c = 1866.68(1)$ MHz. Assignment of Ar-(H$_2$S)$_2$ spectra is in progress. It was realized that the rotational spectrum for (H$_2$S)$_2$ complex has not been completely solved yet\(^b\) and hence a 'revisit' started. Several more progressions have been assigned for this dimer now. The search for deuterated isotopomers was carried out by bubbling H$_2$S through D$_2$O and some new H$_2$O-H$_2$S transitions have been observed. During this talk, rotational spectra of all these complexes will be discussed.

\(^b\)F. J. Lovas private communication