ROTATIONAL SPECTRA OF $C_2D_4 - H_2S$, $C_2D_4 - D_2S$, $C_2D_4 - HDS$ and $^{13}CCH_4 - H_2S$ COMPLEXES

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The rotational spectra of $C_2D_4 - H_2S$, $C_2D_4 - HDS$, $C_2D_4 - D_2S$ and $^{13}CCH_4 - H_2S$ isotopomers have been measured. The spectra for $C_2D_4 - H_2S$, $C_2D_4 - D_2S$ and $^{13}CCH_4 - H_2S$ show four line pattern as was observed for the parent species [1]. $C_2D_4 - HDS$ shows doubling of transitions. These data combined with our earlier data of $C_2H_4 - H_2S$, $C_2H_4 - HDS$, $C_2H_4 - H_2^{34}S$ and $C_2H_4 - D_2S$ confirm that the smaller splitting (0.14 MHz in $(B + C)/2$ for the parent isotopomer) arises from the tunneling of ethylene hydrogens whereas the larger spilitting (1.67 MHz in $(B + C)/2$ for the parent isotopomer) arises from the interchange of equivalent hydrogens of H_2S. The splittings observed for various isotopic substitutions confirm that the dynamics of both these motions involve both ethylene and hydrogen-sulphide. Molecular symmetry group analysis has been performed where both ethylene and hydrogen motions have been considered. The experimental intensity patterns are consistent with the calculated statistical weights.

1. E. Arunan and co-workers, *Chem. Phys. Lett., 393, 2004,* ***22.***