THE MICROWAVE SPECTRUM AND UNEXPECTED STRUCTURE OF THE BIMOLECULAR COMPLEX FORMED BETWEEN ACETYLENE AND (Z)-1-CHLORO-2-FLUOROETHYLENE

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In all previously studied complexes between protic acids and chlorofluoroethylenes in our laboratory, the acidic hydrogen atom forms the primary intermolecular interaction with a fluorine atom on the ethylene subunit. This has been rationalized by the greater electronegativity of the fluorine atom leading to a stronger, hydrogen-bond like interaction, than would be formed with the chlorine atom. With (Z)-1-chloro-2-fluoroethylene, however, *ab initio* calculations for its complex with acetylene indicate that participation of the chlorine atom in the intermolecular interaction leads to lower energy configurations. This is confirmed by observation of the rotational spectrum of the complex by chirped-pulse and Balle-Flygare Fourier transform microwave spectroscopy. The complex is determined to be planar with one interaction between an acetylenic hydrogen and the chlorine atom and a second between the triple bond and the hydrogen atom geminal to chlorine.