THE IMPORTANCE OF A GOOD FIT: THE MICROWAVE SPECTRA AND MOLECULAR STRUCTURES OF *TRANS*-1,2-DIFLUOROETHYLENE-HYDROGEN CHLORIDE AND *CIS*-1,2-DIFLUOROETHYLENE-HYDROGEN CHLORIDE

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Previously studied complexes of hydrogen chloride with fluoroethylenes demonstrate that the secondary interaction between the chlorine atom of the HCl and a hydrogen of the ethylene occurs with the sterically accessible *cis* H-atom in vinyl fluoride rather than the electrostatically favorable geminal hydrogen. However, with 1,1,2-trifluoroethylene the opposite occurs and electrostatics is favored over sterics. The two hydrogen atoms in *trans*-1,2-difluoroethylene are electrostatically equivalent and each offer the possibility of interacting in a geminal or in a *cis* fashion. Thus, the observed structure of *trans*-1,2-difluoroethylene-HCl, with a secondary interaction to the *cis* H-atom, is consistent with the favorable steric interactions associated with this configuration. On the other hand, in *cis*-1,2-difluoroethylene only electrostatically-equivalent geminal H-atoms are present. We find that rather than adopting the sterically unfavorable arrangement found in 1,1,2-trifluoroethylene-HCl, the hydrogen chloride in this complex instead forms a bifurcated hydrogen bond with the two F-atoms, and there is no secondary interaction involving the chlorine atom.