MICROWAVE SPECTRUM AND MOLECULAR STRUCTURE OF THE ARGON-(*E*)-1-CHLORO-1,2-DIFLUOROETHYLENE COMPLEX

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Previous studies of argon complexes with fluoroethylenes have revealed a preference for a geometry that maximizes the contact of the argon atom with heavy atoms on the fluoroethylene.[a] We have observed a continuation of this trend when one of the fluorine atoms is replaced by chlorine. The argon-(*E*)-1-chloro-1,2-difluoroethylene complex provides two competing heavy atom cavities, FCCF and FCCl, and the opportunity to examine whether the number of heavy atoms or the associated increase in polarizability is determinative of structure. The 5.6 – 18.1 GHz chirped-pulse Fourier transform microwave spectrum of this species provides initial assignments and predictions for spectra obtained in a more sensitive and higher precision Balle-Flygare instrument. Transitions for both the ^{35}Cl and ^{37}Cl isotopologues are observed and analyzed to provide geometric parameters for this non-planar complex. The spectrum is consistent with the argon atom located in the FCCl cavity, and the structure agrees well with *ab initio* predictions. Comparisons are made with Ar-1-chloro-1-fluoroethylene, (*Z*)-1-chloro-2-fluoroethylene, and Ar-vinyl chloride.

[a]Z. Kisiel, P.W. Fowler, and A.C. Legon, *J. Chem. Phys.* **95,** 2283 (1991).