

INFRARED PREDISSOCIATION SPECTROSCOPY OF CATIONIC ACETYLENE CLUSTERS,  $(C_2H_2)_n^+$ ,  $n = 1 - 4$

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Infrared predissociation spectroscopic studies of systematically solvated acetylene clusters,  $(C_2H_2)_n^+$ ,  $n = 1 - 4$ , reveal the structural evolution of these cations with increasing cluster size. The argon predissociation spectrum of the acetylene dimer coupled with harmonic frequency calculations suggests the dominate species adopts a cyclobutadiene-like geometry. The argon solvated trimer,  $(C_6H_6)^+ \cdot Ar$ , predominantly loses  $(C_2H_2)^+ \cdot Ar$ , suggesting that the trimer is composed of a covalently bonded "dimer core" which exhibits a spectrum different than cyclobutadiene, and is solvated by a weakly bound acetylene. The same spectral features are retained in the tetramer suggesting that the dimer core survives the solvation of additional acetylene molecules. The minor loss channel of  $(C_6H_6)^+ \cdot Ar$ , loss of a single Ar, shows multiple features believed to be from a number of covalently bonded  $(C_6H_6)^+$  species.