

MICROWAVE SPECTRA AND GEOMETRIES OF $\text{H}_2\text{C}_2 \cdots \text{AgCl}$ AND $\text{H}_2\text{C}_2 \cdots \text{CuCl}$

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Pure rotational spectra of the vibrational ground states of $\text{H}_2\text{C}_2 \cdots \text{AgCl}$ and $\text{H}_2\text{C}_2 \cdots \text{CuCl}$ have been measured by chirped-pulse FTMW spectroscopy. Each complex is generated via laser ablation of the metal in the presence of small percentages of CCl_4 and C_2H_2 in argon. The complexes are stabilized and interrogated in the cold environment of a supersonic jet. Rotational constants (B_0 , C_0) and the centrifugal distortion constant, Δ_J , have been measured for six isotopologues of $\text{H}_2\text{C}_2 \cdots \text{AgCl}$ and three isotopologues of $\text{H}_2\text{C}_2 \cdots \text{CuCl}$ with substitutions at the metal, chlorine and carbon atoms in each case. The spectrum of each complex is consistent with a C_{2v} structure in which the metal atom is coordinated by the π -orbital of ethyne. The measured rotational constants allow determination of the length of the bond between the metal and chlorine atoms, $r(\text{M}-\text{Cl})$, and the distance between the metal atom and the centre of the ethyne double bond, $r(\text{M}-^*)$. Nuclear quadrupole coupling constants have been measured for the chlorine atom in each complex and also for copper in $\text{H}_2\text{C}_2 \cdots \text{CuCl}$.