UNEXPECTED GENERATION AND OBSERVATION OF A T-SHAPED COMPLEX OF $H_2C_2\cdots AgCCH$

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An experiment to probe species generated within a supersonically-expanding jet consisting of SF_6, Ag, C_2H_2 and argon by broadband rotational spectroscopy revealed the existence of a T-shaped complex of hitherto unknown origin. Empirical tests revealed that this complex requires the presence of C_2H_2 and Ag within the gas sample. While the intensity of the associated transitions are enhanced by the presence of SF_6, theoretical calculations and empirical tests implied that the identified complex is $H_2C_2\cdots AgCCH$ rather than the original target of the experiment, $H_2C_2\cdots AgF$. This deduction is now supported by evidence acquired through experiments exploiting ^{13}C-enriched isotopic samples. Transitions have been assigned for the $H_2{}^{13}C_2\cdots Ag^{13}C^{13}CH$ isotopologue. Data acquired from each isotopologue allows determination of the rotational constants (B_0, C_0) and centrifugal distortion constant, Δ_J. The data are consistent with a T-shaped complex in which the Ag atom of AgCCH binds to electrons within the π-orbitals of ethyne. Preliminary determinations of bond lengths will be presented. Experiments are in progress to measure the spectra of deuterated isotopologues.