SPECTROCSOPY AND STRUCTURE OF CATIONIC METAL CARBONYL SYSTEMS $M(CO)_N^+$ M=V, CO N=1-10

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Metal carbonyl complexes are well known throughout inorganic chemistry and the carbonyl stretching vibration has historically served as a sensitive indicator of the electronic structure and bonding in these systems. Stable, fully coordinated metal carbonyl complexes have been extensively studied in the gas phase and are generally closed shell. Non-fully coordinated metal carbonyls are generally not closed shell and have been difficult to characterize in the gas phase due to their reactive nature. We present here the first systematic infrared spectroscopic studies of cationic metal carbonyl systems in the gas phase. The infrared spectra of $Co(CO)_n^+$ and $V(CO)_n^+$ for n=1-10 have been obtained using mass-selected infrared photodissociation spectroscopy. These measurements provide the coordination numbers, structures and spin states for these systems. Density Functional Theory calculations will also be presented in support of this work.