RESONANT INFRARED PHOTODISSOCIATION STUDIES OF TRANSITION METAL CATION CARBONYL COMPLEXES IN THE GAS PHASE

J. VELASQUEZ III and M. A. DUNCAN, *Department of Chemistry, University of Georgia, Athens, GA, 30602*.

Gas-phase clusters of M^+-$(CO)_n$ are generated in a laser vaporization source and detected by time-of-flight mass spectrometry. Mass spectra give clues to gas-phase coordination for individual transition metal cations. Subsequently, infrared photodissociation spectra are obtained by scanning wavelengths from an infrared optical parametric oscillator/ optical parametric amplifier (IR OPO/OPA) and observing resonant fragmentation from mass-selected transition metal-carbonyl species. Some species exhibit vibrational frequencies which are red shifted from the free CO molecule (2143 cm^{-1}), illustrating so-called classical metal carbonyl behavior. Other complexes display blue shifts and are termed non-classical carbonyls. The direction and degree of shift are discussed in light of the transition metal-CO bonding.