INFRARED PHOTODISSOCIATION SPECTROSCOPY OF M^+-$(C_2H_2)_n$) CLUSTERS[a]

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Metal ion-acetylene complexes of the general form M^+-$(C_2H_2)_n$ are synthesized in the gas phase by a pulsed nozzle laser ablation cluster source. These ions are then mass selected in a reflectron time-of-flight mass spectrometer where they are excited and undergo multiphoton absorption from a tunable infrared OPO/OPA laser system. Efficient fragmentation occurs by the loss of whole C_2H_2 units and this process is enhanced on vibrational resonances near the symmetric and asymmetric C-H stretch frequencies of acetylene. Infrared photofragmentation spectra are obtained by monitoring the fragment yield versus energy of the tunable infrared laser in the 3000 cm^{-1} to 3400 cm^{-1} region. the observed infrared band positions are red-shifted from those of free acetylene consistent with the weakening of the carbon-carbon bond energy by π electron withdrawal. Interpretation of the spectra for M^+ = Ni^+ and Co^+ will be discussed.

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