

## INFRARED PHOTODISSOCIATION SPECTROSCOPY OF CATIONIC TRANSITION METAL-NITROGEN COMPLEXES

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Transition metal-nitrogen complexes of the form  $\text{TM}^+(\text{N}_2)_n$  (TM=V, Fe, Nb) are produced in a laser vaporization pulsed nozzle cluster source, size selected with a time-of-flight mass spectrometer and excited in the infrared with an infrared OPO/OPA. Infrared photodissociation occurs by elimination of whole  $\text{N}_2$  molecules and the photofragment yield versus wavelength produces IR resonance-enhanced photodissociation (REPD) spectra for the clusters. Vibrational bands seen in the  $2100 - 2400 \text{ cm}^{-1}$  region correspond to the N-N stretch but are shifted from those of free  $\text{N}_2$ . Density functional theory calculations on the bond energies, geometries and frequency shifts for the  $\text{TM}^+(\text{N}_2)_n$  are also discussed in regard to periodic trends.