

INFRARED RESONANCE ENHANCED PHOTODISSOCIATION SPECTROSCOPY OF  $\text{Ni}^+(\text{CO}_2)_n$ ,  $\text{Ni}^+(\text{CO}_2)_n\text{Ar}$ , AND  $\text{Ni}^+(\text{O}_2)(\text{CO}_2)_n$  CLUSTERS

N.R. WALKER, G.A. GRIEVES, R.S. WALTERS and M. A. DUNCAN, *University of Georgia, Department of Chemistry, Athens, GA, 30602-2556.*

$\text{Ni}^+(\text{CO}_2)_n$  and  $\text{Ni}^+(\text{CO}_2)_n\text{Ar}$  ion-molecule complexes are produced by laser vaporization in a pulsed nozzle source and studied with mass-selected infrared resonance-enhanced photodissociation spectroscopy (IR-REPD). Photofragment yield is measured as a function of energy in the region of the asymmetric stretch vibration of  $\text{CO}_2$  ( $2349\text{ cm}^{-1}$ ). Fragmentation of  $\text{Ni}^+(\text{CO}_2)_n$  complexes proceeds by the loss of intact  $\text{CO}_2$  units. The mixed clusters fragment by loss of Ar, permitting higher photofragment yields and sharper spectra than those provided by the corresponding pure  $\text{Ni}^+(\text{CO}_2)_n$  complexes. Spectra for the  $n \leq 4$  complexes depict asymmetric stretches to the blue of free  $\text{CO}_2$  while solvation effects are observed in the larger complexes. An additional blue-shifted band is observed in complexes with  $n \geq 6$ , indicating that the  $\text{Ni}^+$  ion participates in a cluster-assisted chemical reaction producing a nickel oxide. This inference is supported by the results of experiments on  $\text{Ni}^+(\text{O}_2)(\text{CO}_2)_n$  complexes, where a blue-shifted band is also observed.