

INFRARED PHOTODISSOCIATION SPECTROSCOPY OF PLATINUM-CATION ACETYLENE COMPLEXES

ANNA G BATCHELOR, *Department of Chemistry, University of Georgia, Athens, GA, USA*; JOSHUA H MARKS, *W. M. Keck Research Laboratory in Astrochemistry, University of Hawaii at Manoa, Honolulu, HI, USA*; TIMOTHY B WARD, MICHAEL A DUNCAN, *Department of Chemistry, University of Georgia, Athens, GA, USA*.

$\text{Pt}^+(\text{C}_2\text{H}_2)_n$ ($n = 1 - 9$) complexes are studied with tunable infrared laser photodissociation spectroscopy. These complexes are produced with laser vaporization of a platinum rod in a pulsed supersonic expansion of argon seeded with acetylene. Argon-tagged and tag-free complexes are then mass-selected in a specially made reflectron time-of-flight mass spectrometer, and their spectra are measured in the C – H stretching region ($2800 - 3400 \text{ cm}^{-1}$) with infrared laser photodissociation spectroscopy. A coordination number of three acetylenes is found for platinum-cation. The experimental spectra are assigned using B3LYP/DEF2TZVP with an effective core potential on platinum. Peaks for the asymmetric and normally forbidden symmetric stretch of acetylene are red shifted from free acetylene molecules. The presence of cation – pi complexes and reacted structures is investigated by comparing experiment to theory.