

PHOTODISSOCIATION SPECTROSCOPY OF COLD IONS PRODUCED IN A FREE JET EXPANSION

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We will present an instrument developed in house able to produce cold molecular ions and ionic van der Waals complexes. The aim of this instrument is to study such species by high-resolution photodissociation spectroscopy. Its main components are (i) a pulsed supersonic expansion plasma source, to produce the desired species at relatively low rotational temperature (50-70K), (ii) a time of flight mass spectrometer which includes a single unit able to perform acceleration, bunching and gating^a, and (iii) a photodissociation laser followed by a second mass selection of the fragmented ion. We will be presenting the first results obtained with this apparatus, (i) the first mass spectra of cationic and anionic species, formed from different gas mixtures and (ii) the first photodissociation spectra of the rovibronic overtones of N_2O^+ using a dye laser. Finally, future improvements, in terms of clusters production, spectral resolution and sensitivity will be discussed.

^aC. Dedman, Review of Scientific Instruments 72 (2001) 2915-2922