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The Dissociative Photoionization of O_2 and N_2O

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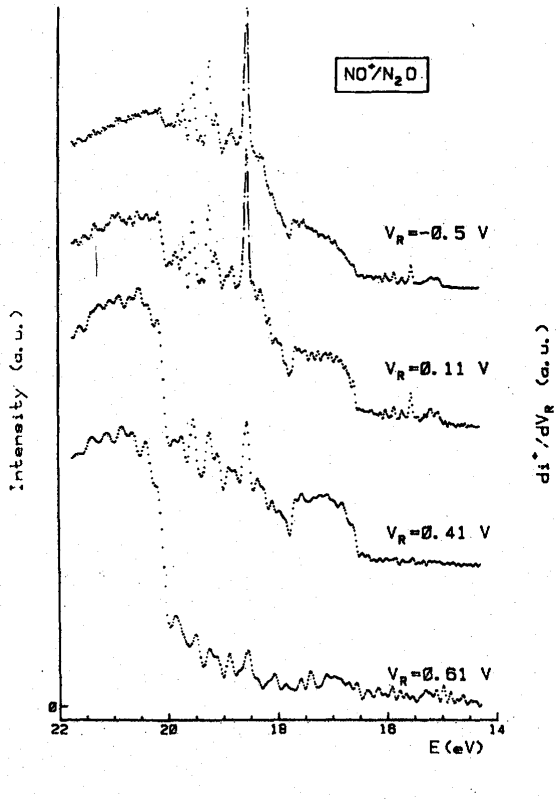
As dissociative electroionization coupled with ion translational energy analysis gives satisfactory results /1/, the same technique applied to photoionization mass spectrometry has to bring more details (resolution of vibrational energy, autoionization,...).

The method has first been tested on the dissociative photoionization of CH_3F /2/. Good agreement is found between the electroionization and photoionization results. To test the technique on more complex systems, the photoionization of O_2 and N_2O has been chosen. In both systems, beside direct dissociative ionization, an abundant autoionization structure is present. Though abundantly investigated /3/, the O^+/O_2 and N_2O and NO^+/N_2O has been reexamined by photoionization mass spectrometry together with ion energy analysis (retarding potential method). Mainly three aspects are studied. (i)The ion translational energy distributions are examined as a function of the excitation energy. (ii) The photoionization

Fig.1. *PIE curves of NO^+/N_2O at V_R (a)-0.5 V,(b)0.1 V, and (c)0.4 V*



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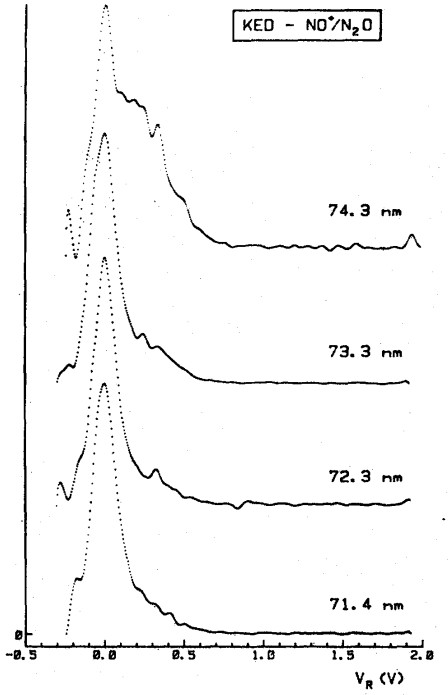
efficiency curves are recorded as a function of the applied retarding field; a KE-vs-AE plot could be obtained, (iii) Important modifications of the photoelectron. spectra of the corresponding molecules, as a function of the excitation energy, are expected. These modifications and those observed in the ion energy distribution spectra could be correlated /4/.

Fig.1 shows a sample of NO^+/N_2O photoionization efficiency curves at different retarding potential settings. Drastic changes are observed. Fig.2 displays NO^+/N_2O ion translational energy spectra at different wavelength, i.e. 74.3 nm, 73.3 nm and 72.3 nm corresponding to autoionization processes. The same kind of results are obtained for the O^+ formation from O_2 and N_2O.

Fig.2. *KE spectra of NO^+/N_2O at (a)74.3 nm,(b)73.3 nm and at (c)72.3 nm.*



References

/1/ J.L. 01ivier, R. Locht, J. Momigny, Chem.Phys. 68 (1982) 201, id. 84 (1984) 295.

/2/ R. Locht, J. Momigny, E. Rühl, H. Baumgärtel, Chem.Phys. 117 (1987) 305.

/3/ J. Berkowitz, J.H.D. Eland, J.Chem.Phys. 67 (1977) 2740.

/4/ R. Locht, G. Caprace, J. Momigny, Chem.Phys.Letters 111 (1984) 560.