

DISSOCIATIVE IONIZATION BY LOW ENERGY ELECTRON IMPACT. ION ENERGY DISTRIBUTION OF N^{2+} FROM N_2 AND O^{2+} FROM O_2 .

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The formation of N^{2+} ions by electron and ion impact has been investigated by several groups (1-1). The lowest threshold for the appearance energy is measured at around 61 eV (1, 2) and 54 eV (3). The N^{2+} ion energy distribution has been examined as a function of the electron energy and the angle between ion and electron beam (1-3). No thermal peak has been observed. The present contribution will report preliminary results on N^{2+} from N_2 and O^{2+} from O_2 .

The experimental set-up is described elsewhere (5). Ion energy distributions are measured by recording the first differentiated retarding potential curve. Fig. 1 shows the N^{2+}/N_2 kinetic energy distributions obtained for electron energies from 60-100 eV. Peak maxima are measured at (1.2 ± 0.1) eV, (3.0 ± 0.1) eV, (5.1 ± 0.1) eV and a shoulder around 7 eV, in agreement with CROWE (2). Furthermore, in the present work, a thermal peak of low intensity is present at all electron energies down to 65 eV.

A second feature in this experiment is that no N^{2+} ion current is detected at 60 eV (see fig. 1). The signals at 60 eV and 65 eV are obtained both in the same experimental conditions. This result un-ambiguously shows that the appearance energy of the N^{2+} ions lies below 65 eV and higher than 60 eV electron energy. These measurements agree with those of VAN BRUNT (1) and CROWE (2) and disagree drastically with the value of 54 eV determined by DELEANU (3).

FIG. 1 - N^{2+}/N_2 ion energy distribution at electron energies 60-100 eV.

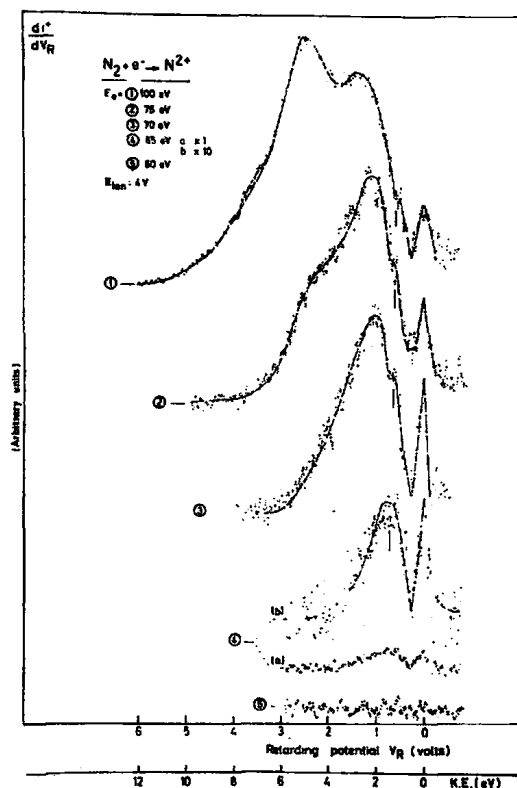
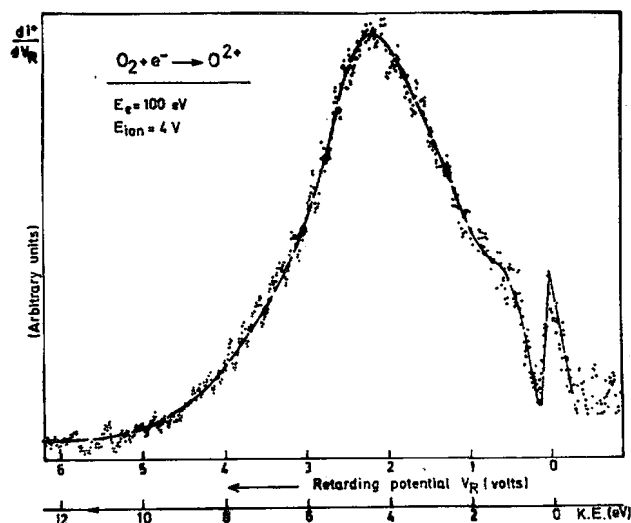


FIG. 2 - Ion energy distribution of O^{2+}/O_2 for 100 eV electrons.



For the first time the O^{2+} from O_2 ion energy distribution is examined. A distribution obtained for 100 eV electrons is shown in Fig. 2. Beneath the peak maxima at 4.4 eV and 1.6 eV ion energy a thermal peak is observed. Further experiments on both N^{2+}/N_2 and O^{2+}/O_2 are in progress for the determination of the appearance energy of each observed process.

References

- (1) L.J. KIEFFER, R.J. VAN BRUNT, J. Chem. Phys. 46 (1967) 2728.
- (2) A. CROWE, J.W. McCONKEY, J. Phys. B.8 (1975) 1765.
- (3) L. DELEANU, J.A.D. STOCKDALE, J. Chem. Phys. 63 (1975) 3898.
- (4) A.K. EDWARDS, R.M. WOOD, M.F. STEUER, Phys. Rev. A.15 (1977) 48.
- (5) R. LOCHT, J. SCHOPMAN, Int. J. Mass. Spectr. Ion Phys. 15 (1974) 361.