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THE DISSOCIATIVE IONIZATION OF N_2O BY LOW-ENERGY ELECTRON IMPACT THE N^+ AND N^+_2 DISSOCIATION CHANNELS

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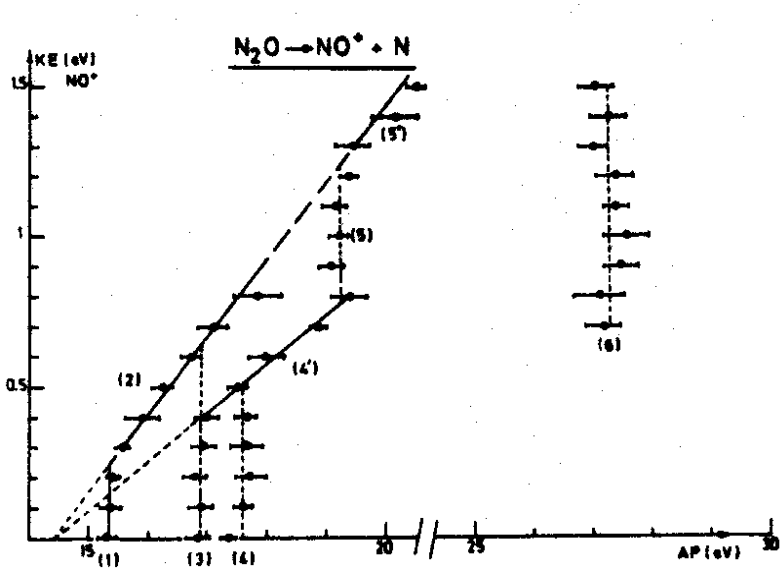
The N_2O molecule has been the subject of many investigations during the last few years. BERKOWITZ[1] made a detailled photoionization study of the four dissociation channels. BEAR[2] and NENNER [3] performed the threshold photoelectron-photoion coincidence study of N_2O. Few are the dissociative electroionization studies of this molecule.

In the present abstract a part of the dissociative electroionization work on N_2O, together with ion kinetic energy analysis, is reported.

The details of the instrumentation and the measuring techniques have been described elsewhere [4]. The result of the kinetic energy measurements and the threshold energy determinations for NO^+ are summarized in fig. 1. Over the electron energy range investigated (15-40 eV) six different channels for NO^+ formation have been evidenced.

Below 21 eV electron energy only one dissociation limit, i.e. $N_2O + e^- \rightarrow N(^4S) + NO^+(X^1\Sigma^+)$ is involved and calculated at 14.2 eV [1] in agreement with earlier measurements [1-3]. Experimentally this dissociation limit is measured at 14.1 eV and 14.4 eV by extrapolation of the least square fits (2) and (4') in fig. 1.

FIG. 1. Kinetic Energy-versus-electron energy plot for NO^+ ions from NO.



Several threshold energies have been measured in the electro-ionization efficiency curve of NO^+, i.e. at (15.3 ± 0.1) eV, (16.8 ± 0.1) eV, (17.6 ± 0.1) eV, (19.3 ± 0.2) eV and (27.3 ± 0.2) eV. They are mainly interpreted in terms of dissociative autoionization and/or predissociation of ionized N_2O^+ states through the $^4\Sigma^-$ ionic state. The NO^+ fragment is mainly produced in vibrationally excited levels of its ground $X\,^1\Sigma^+$ state.

In a similar way, the N^+_2 dissociation channel has been investigated in detail and will also be reported at the meeting.

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