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The Dissociative Photoionization of Ammonia.

The formation of NH_2^+,NH^+ and N^+.

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A detailed dissociative electroionization study of NH_3 has recently been completed /1/. The kinetic energy distributions and ionization efficiency curves of all fragment ions, including H^+, were investigated in ammonia and ammonia-d.

The photoabsorption and photoionization of NH in the wavelength region of 8-112 nm have recently been published by Samson et al. /2/. The cross sections and appearance energies of the fragment ions are measured. As shown in table 1, excepting the NH^+ ion, the onset energy values published by these authors disagree with those determined by electron impact.

The dissociative photoionization of NH_3 has been examined in the wavelength region of 50-112 nm and 20-45 nm by using synchrotron radiation dispersed by a 1m NIM- and a TGM-monochromator respectively. Only the preliminary results and the most salient features will be reported.

Table 1. *Appearance energies (eV) of NH_2^+, NH^+ and N^+ as measured by electron impact (E.I.) /1/, photoionization (P.I.) /2/ and in this work.*

Appearance Energies			
Ion	**E.I.**	**P.I.**	
		/2/	**This work**
NH_2^+	15.72 ± 0.04	15.71 ± 0.04	15.68± 0.01
NH^+	1 6.9 ± 0.1	—	17.05 ± 0.04
	1 8.0 ± 0. 2	18.23 ± 0.05	17.56 ± 0.04
	22.6 ± 0.3	22.75 ± 0.1	23.5
N^+	22.5 ± 0.2	—	22.30 ± 0.05
	24.1 ± 0.3	—	
	26.7± 0.3	26.05 ± 0.1	27.7 ± 0.1

The NH_2 ionization efficiency curve has been investiga-ted as a function of its initial kinetic energy by using the retarding potential technique. Fig.1 shows the dependence of the NH_2^+ ionization efficiency on the retarding potential V_R.

The retarding potential curve observed at 70 nm is inserted in the same figure. Up from 0.2 V retarding potential, the ionization efficiency exhibits remarkable modifications as already observed by electron impact /1/. The NH^+ and N^+ ionization efficiency curves were only recorded at fixed retarding potential. For NH^+ (see fig.2) the curve starts with a low intensity tail at 17.05±0.04 eV and shows a steep rise at 17.56±0.02 eV. For N two onsets are determined, at 22.3±0.05 eV and 27.7±0.1 eV respectively. The onset at 24.0 eV could be ascibed to N^+/N_2, present in the sample. This uncertainty will be removed in the near future.

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Fig.1. *Photoionization efficiency curve of NH_2^+/NH_3 at various V_R settings.*

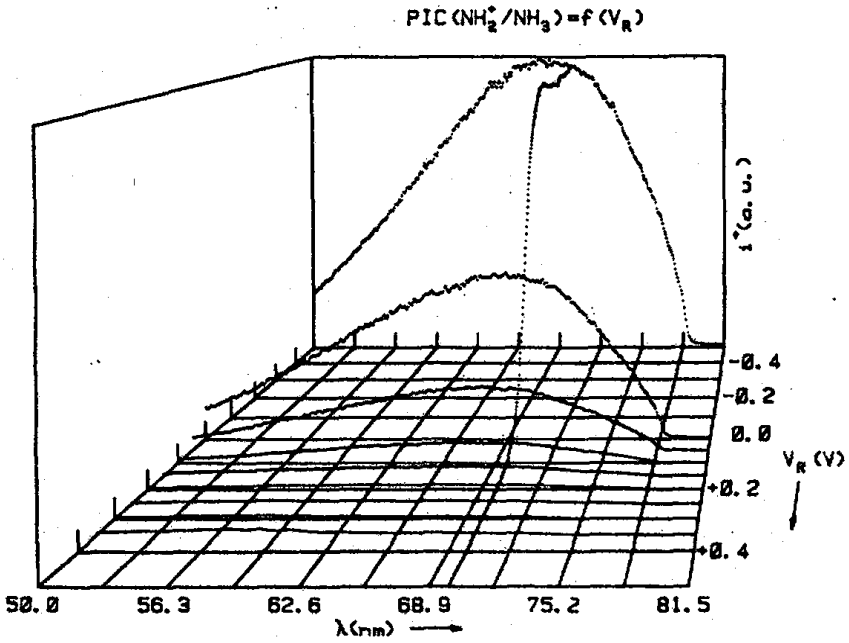
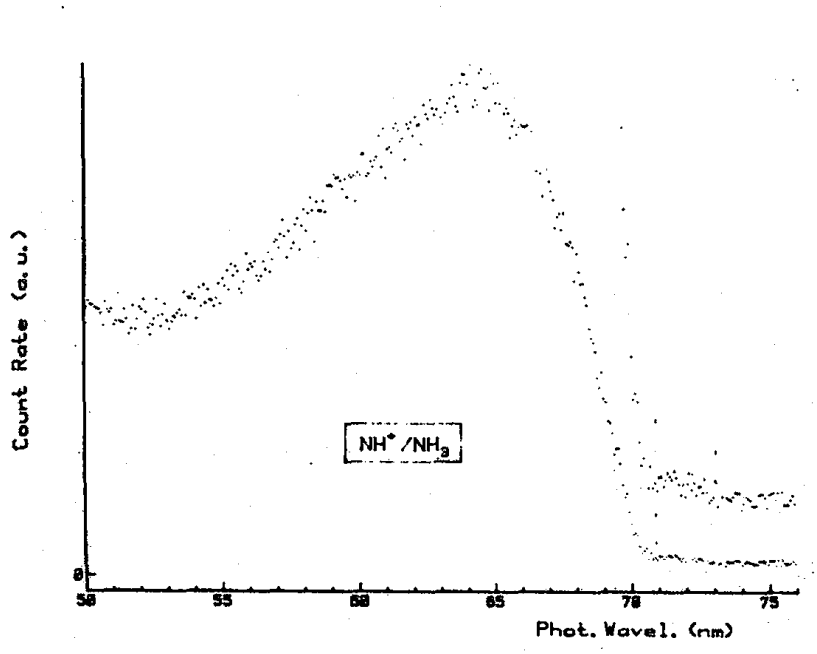


Fig.2. *Photoionization efficiency curve of NH^+/NH_3.*



References

/1/ R. Locht, M. Ligot, Ch. Servais, M. Davister, J. Momigny, Chem.Phys. 123, 443 (1988), 125, 425 (1988) and 127, 435 (1988).

/2/ J.A.R. Samson, G.N. Haddad, L.D. Kilcoyne, J.Chem.Phys. 87, 6416 (1987).