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$N_2H^+ + e^- \rightarrow N_2 + H$	**(1)**	$\Delta Hr^{298} = -\ 815.3$ kJ mol^{-1}	ref (3)
$\rightarrow NH + N$	**(2)**	$\Delta Hr^{298} = -\ 117.1$ kJ mol^{-1}	ref (3)

Rate Coefficient Data $k = k_1 + k_2$

k / cm^3 molecule^{-1} s^{-1}	T / K	Reference
Rate Coefficient Measurements		
$k(T) = 7.5 \times 10^{-7}$	300	(1)
$k(T) = 1.7 \times 10^{-7}\ (T/300)^{-0.9}$	95 – 300	(2)
$k(T) = (1.0 \pm 0.1) \times 10^{-7}\ (T/300)^{-0.5 \pm 0.02}$	10 – 300	(3)
$k(T) = 2.4 \times 10^{-7}$	300	(4)
$k(T) = 2.98 \times 10^{-7}(T/300)^{-0.74}$	10 – 150	(6)
$k(T) = 2.74 \times 10^{-7}(T/300)^{-0.84}$	150 – 1000	(6)
Branching Ratios		
$k_1 / (k_1 + k_2) = 0.36$; $k_2 / (k_1 + k_2) = 0.64$		(3)
$k_1 / (k_1 + k_2) \approx 0.95 \pm 0.02$; $k_2 / (k_1 + k_2) \approx 0.05 \pm 0.02$		(5)
$k_2 / (k_1 + k_2) = 0.08$		(6)
Reviews and Evaluations		

Comments

The first measurement of recombination rate coefficient for N_2H^+ was done by Mul and MacGowan (1) using a mearged-beam technique. They determined at 300 K a rate coefficient of 7.5 x10^{-7} cm^{3}s^{-1}. Smith and Adams(2) using a flowing afterglow technique found a lower rate of 1.7 x 10^{-7} cm^{3}s^{-1}. Later on, Geppert *et al*. (3) at CRYRING obtained a close value of 1 x 10^{-7} cm^{3}s^{-1} for the same temperature. More recently Poteyra et al. (4) with a revisited flowing afterglow technique measured for 300 K a slightly higher rate of 2.4 x 10^{-7} cm^{3}s^{-1}. In the new experiment by Vigren et al. a similar reaction rate of 2.98 x 10^{-7} cm^{3}s^{-1} was determined fror T = 300K.

Geppert et al. (3) also determined a branching ratio with the CRYRING experiment and found that the NH + H channel was much larger than previously believed i.e 64% for NH + N and 36% for N_2 + H, but a later experiment (6) showed that this unexpected branching ratio was due to a contamination of the ion beam and a new branching ration was proposed (6) with for the NH + H channel a value of 7 %. This is in good agreement with the branching ratio measured by Molek *et al.* (5) of less than 5% for the NH + N channel and the theoretical investigations of D. Talbi (7,8,9) showing from potential energy surface calculations for linear N_2H and N_2H^+ that the likely outcomes from the dissociative recombination N_2H^+ are the N_2 and H fragments, with N_2 in its first electronically excited state, while the NH + N channel should be minor because of inefficient curves crossing.

Since the rate constants of the dissociative recombination of N_2H^+ measured by the last flowing afterglow and storage ring experiments do not differ very much we recommend an intermediate value of $k(T) = (2.6 \pm 0.6) \times 10^{-7}(T/300)^{-0.84}$. For the branching ratio we also choose a value in agreement with both studies, namely 5 ± 2 % for the NH + N and 95 ± 2 % for the N_2 + H channel.

Preferred Values

Total rate coefficient (10 – 1000 K)

$\boldsymbol{k}$**(T) = 2.6 × 10^{-7}(T/300)$^{-0.84}$**

Branching ratios

k_1 / (k_1 + k_2) = 0.95
k_2 / (k_1 + k_2) = 0.05

Reliability

F_0 = 1.6, g = 0

Comments on Preferred Values

References

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