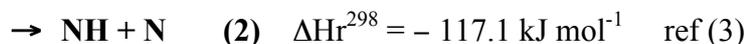


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Rate Coefficient Data  $k = k_1 + k_2$

$k / \text{cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$	$T / \text{K}$	Reference
<i>Rate Coefficient Measurements</i>		
$k(T) = 7.5 \times 10^{-7}$	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)
<i>Branching Ratios</i>		
$k_1 / (k_1 + k_2) = 0.36 ; k_2 / (k_1 + k_2) = 0.64$		(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  $\text{N}_2\text{H}^+$  was done by Mul and MacGowan (1) using a mearged-beam technique. They determined at 300 K a rate coefficient of  $7.5 \times 10^{-7} \text{ cm}^3 \text{ s}^{-1}$ . Smith and Adams(2) using a flowing afterglow technique found a lower rate of  $1.7 \times 10^{-7} \text{ cm}^3 \text{ s}^{-1}$ . Later on, Geppert *et al.* (3) at CRYRING obtained a close value of  $1 \times 10^{-7} \text{ cm}^3 \text{ s}^{-1}$  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  $2.4 \times 10^{-7} \text{ cm}^3 \text{ s}^{-1}$ . In the new experiment by Vigren *et al.* a similar reaction rate of  $2.98 \times 10^{-7} \text{ cm}^3 \text{ s}^{-1}$  was determined for  $T = 300\text{K}$ .

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  $\text{N}_2 + \text{H}$ , 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  $\text{N}_2\text{H}$  and  $\text{N}_2\text{H}^+$  that the likely outcomes from the dissociative recombination  $\text{N}_2\text{H}^+$  are the  $\text{N}_2$  and H fragments, with  $\text{N}_2$  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  $\text{N}_2\text{H}^+$  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  $5 \pm 2 \%$  for the NH + N and  $95 \pm 2 \%$  for the  $\text{N}_2 + \text{H}$  channel.

Preferred Values

Total rate coefficient (10 – 1000 K)  
 $k(T) = 2.6 \times 10^{-7} (T/300)^{-0.84}$

### *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*

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