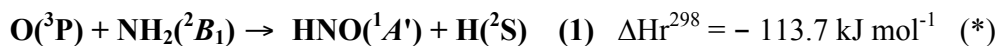


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Rate Coefficient Data $k = k_1 + k_2 + k_3$

$k / \text{cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$	T / K	Reference	Comments
<i>Rate Coefficient Measurements</i>			
$k = 7.6 \times 10^{-11}$	296	(a) Dransfield <i>et al.</i>	all studies use variants of the flow-discharge method and should be quite reliable – in respect of the overall rate coefficient
$k = 6.5 \times 10^{-11}$	295	(b) Adamson <i>et al.</i>	
$k = (1.2 \pm 0.3) \times 10^{-11}$	242 - 473	(c) Inomata and Washida	
<i>Reviews and Evaluations</i>			
$4.56 \times 10^{-11} \exp(10/T)$ 8×10^{-11}	200 – 3000 no T -dependence	UMIST database OSU website	

Comments

This radical-radical reaction is strongly exothermic and spin-allowed to all channels – though the reactants correlate with quartet, as well as doublet, surfaces.

The values of the overall rate coefficient at ‘room temperature’ obtained in (a) and (b) are in good agreement; that in (c) is slightly higher but probably within combined errors. Consequently, k can be assumed to be quite well-determined. Reaction probably proceeds through an ONH_2^* complex whose formation does not require passage over a barrier.

Refs (a) and (b) also agree that (1) is the major channel with k_3 being about 10% of k . There is no experimental indication that channel (2) proceeds at a measurable rate.

Preferred Values

Total rate coefficient (10 – 300 K)

$$k(300 \text{ K}) = 7.0 \cdot 10^{-11} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$$

$$k(10 \text{ K}) = 1.0 \cdot 10^{-10} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$$

$$k(T) = 7 \times 10^{-11} (T/300)^{-0.1} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$$

Branching Ratios

$$k_1 / (k_1 + k_2 + k_3) = 0.9$$

$$k_2 / (k_1 + k_2 + k_3) = 0.0$$

$$k_3 / (k_1 + k_2 + k_3) = 0.1$$

Reliability

$$\Delta \log k (300 \text{ K}) = \pm 0.3$$

$$\Delta \log k (10 \text{ K}) = \pm 0.5$$

$$F_0 = 2 ; g = 4$$

Comments on Preferred Values

I recommend values for the overall rate coefficient similar to those in the UMIST and Ohio compilations. For $k(298 \text{ K})$, I take an average of the room temperature measurements in (a) and (b). I assume a mild negative T -dependence.

If all three channels proceed via formation of an energised ONH_2 complex, then the branching ratios are unlikely to have a strong temperature-dependence.

References

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(a) P. Dransfield, W. Hack, H. Kurzke, F. Temps and H. Gg. Wagner, *Sympos. Int. Combust. Proc.* **20**, 655 (1985).

(b) J. D. Adamson, S. K. Farhat, C. L. Morter, G. P. Glass, R. F. Curl and L. F. Phillips, *J. Phys. Chem.* **98**, 5665 (1994).

(c) S. Inomata and N. Washida, *J. Phys. Chem. A* **103**, 5023 (1999).