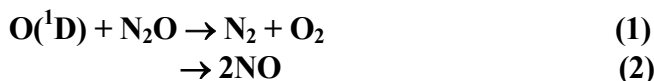


IUPAC Subcommittee on Gas Kinetic Data Evaluation – Data Sheet NO_x7

Website: <http://www.iupac-kinetic.ch.cam.ac.uk/>. See website for latest evaluated data. Datasheets can be downloaded for personal use only and must not be retransmitted or disseminated either electronically or in hardcopy without explicit written permission.

This datasheet updated: 9th March 2002.



$$\Delta H^\circ(1) = -521.0 \text{ kJ}\cdot\text{mol}^{-1}$$

$$\Delta H^\circ(2) = -340.4 \text{ kJ}\cdot\text{mol}^{-1}$$

Rate coefficient data ($k = k_1 + k_2$)

$k/\text{cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$	Temp./K	Reference	Technique/ Comments
<i>Absolute Rate Coefficients</i>			
$(1.1 \pm 0.2) \times 10^{-10}$	204-359	Davidson <i>et al.</i> , 1977 ¹	PLP (a)
$(1.20 \pm 0.1) \times 10^{-10}$	295	Amimoto <i>et al.</i> , 1979 ²	PLP-RA (b)
$(1.17 \pm 0.12) \times 10^{-10}$	298	Wine and Ravishankara, 1981 ³	PLP-RF (b)
<i>Branching Ratios</i>			
$k_2/k = 0.62 \pm 0.02$	298	Marx, Bahe and Schurath, 1979 ⁴	P-GC/CL
$k_2/k = 0.62 \pm 0.09$	177-296	Lam <i>et al.</i> , 1981 ⁵	P-CL
$k_2/k = 0.61 \pm 0.08$	296	Cantrell, Shetter and Calvert, 1994 ⁶	(c)

Comments

- O(¹D) atoms were monitored by time-resolved detection of O(¹D) → O(³P) emission.
- O(³P) atom product monitored.
- Static photolysis of N₂O-O₃ mixtures at λ>240 nm with product analysis by FTIR spectroscopy. The amount of NO formed in reaction (2) was determined from the yield of HNO₃ formed by total oxidation and hydration of NO_x products, corrected for losses to the wall. The value of k_2/k obtained from the experimental data was 0.57 ± 0.08 ; the value given in the table was obtained by averaging the experimental value with selected literature data.

Preferred Values

$k_1 = 4.4 \times 10^{-11} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$, independent of temperature over the range 200-350 K.

$k_2 = 7.2 \times 10^{-11} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$, independent of temperature over the range 200-350 K.

Reliability

$\Delta \log k_1 = \Delta \log k_2 = \pm 0.1$ at 298 K.

$\Delta(E_1/R) = (E_2/R) = \pm 100 \text{ K}$.

Comments on Preferred Values

The data and recommendation for the branching ratio at room temperature of $k_2/k_1 = 0.61 \pm 0.08$ given by Cantrell *et al.*⁶ are in accord with the earlier results of Marx *et al.*⁴ and Lam *et al.*⁵ The overall rate coefficient values at room temperature are the average of the results of Davidson *et al.*,¹ Amimoto *et al.*² and Wine and Ravishankara,³ all of which are in close agreement (see also data by Volltrauer *et al.*⁸). The temperature independence reported by Davidson *et al.*^{1,7} is accepted.

References

- ¹ J. A. Davidson, H. I. Schiff, G. E. Streit, J. R. McAfee, A. L. Schmeltekopf, and C. J. Howard, *J. Chem. Phys.* **67**, 5021 (1977).
- ² S. T. Amimoto, A. P. Force, R. G. Gulotty, Jr., and J. R. Weisenfeld, *J. Chem. Phys.* **71**, 3640 (1979).
- ³ P. H. Wine and A. R. Ravishankara, *Chem. Phys. Lett.* **77**, 103 (1981).
- ⁴ W. Marx, F. Bahe, and U. Schurath, *Ber. Bunsenges. Phys. Chem.* **83**, 225 (1979).
- ⁵ L. Lam, D. R. Hastie, B. A. Ridley, and H. I. Schiff, *J. Photochem.* **15**, 119 (1981).
- ⁶ C. A. Cantrell, R. E. Shetter, and J. G. Calvert, *J. Geophys. Res.* **99**, 3739 (1994).
- ⁷ J. A. Davidson, C. J. Howard, H. I. Schiff and F. C. Fehsenfeld, *J. Chem. Phys.* **70**, 1697 (1979).
- ⁸ H. N. Volltrauer, W. Felder, R. J. Pirkle, and A. Fontijn, *J. Photochem.* **11**, 173 (1979).