IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet SOx7

This data sheet updated: 19th November 2001.

$S + O_2 \rightarrow SO + O$

$\Delta H^\circ = -23.0$ kJ·mol^{-1}

Rate coefficient data

k/cm^3 molecule^{-1} s^{-1}	Temp./K	**Reference**	Technique/ Comments
Absolute Rate Coefficients			
$(2.0 \pm 0.5) \times 10^{-12}$	298	Fair and Thrush, 1969[1]	DF-CL
$(2.8 \pm 0.3) \times 10^{-12}$	298	Fair, Van Roodselaar and Strausz, 1971[2]	FP-A
$2.2 \times 10^{-12} \exp[(0 \pm 50)/T]$	252-423	Davis, Klemm and Pilling, 1972[3]	FP-RF
$(1.7 \pm 0.3) \times 10^{-12}$	298	Donovan and Little, 1972[4]	FP-RA
$(1.5 \pm 0.3) \times 10^{-12}$	298	Clyne and Townsend, 1975[5]	DF-RF
$1.7 \times 10^{-12} \exp[(153 \pm 108)/T]$	296-393	Clyne and Whitefield, 1979[6]	DF-RF
$(2.6 \pm 0.3) \times 10^{-12}$	298		

Preferred Values

$k = 2.1 \times 10^{-12}$ cm^3 molecule^{-1} s^{-1}, independent of temperature over the range 250-430 K.

Reliability

$\Delta \log k = \pm 0.2$ at 298 K.

$\Delta(E/R) = \pm 200$ K.

Comments on Preferred Values

All of the available measurements of k[1-6] are in good agreement. Clyne and Whitefield[6] observed a small decrease in k with increasing temperature, but until more definitive measurements of E/R are made a temperature independent k is recommended with error limits encompassing the existing measured values. The preferred value at 298 K is the mean of values from refs. 1-6.

References

[1] R. W. Fair and B. A. Thrush, Trans. Faraday Soc. **65**, 1557 (1969).
[2] R. W. Fair, A. Van Roodselaar, and O. P. Strausz, Can J. Chem. **49**, 1659 (1971).
[3] D. D. Davis, R. B. Klemm, and M. J. Pilling, Int. J. Chem. Kinet. **4**, 367 (1972).
[4] R. J. Donovan and D. J. Little, Chem. Phys. Lett. **13**, 488 (1972).
[5] M. A. A. Clyne and L. W. Townsend, Int. J. Chem. Kinet. **Symp**. **1**, 73 (1975).
[6] M. A. A. Clyne and P. D. Whitefield, J. Chem. Soc. Faraday Trans. 2, **75**, 1327 (1979).