

## IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet SO<sub>x</sub>25

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This data sheet updated: 19<sup>th</sup> November 2001.

### HO<sub>2</sub> + SO<sub>2</sub> → products

#### Rate coefficient data

$k/\text{cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$	Temp./K	Reference	Technique/ Comments
<i>Relative Rate Coefficients</i>			
$(1.0 \pm 0.2) \times 10^{-15}$	300	Payne, Stief and Davis, 1973 <sup>1</sup>	RR (a)
$\leq 1 \times 10^{-18}$	300	Graham <i>et al.</i> , 1979 <sup>2</sup>	RR (b)
$\leq 4.3 \times 10^{-17}$	~298	Burrows <i>et al.</i> , 1979 <sup>3</sup>	RR (c)

#### Comments

- (a) Photolysis of H<sub>2</sub>O-CO-<sup>18</sup>O<sub>2</sub>-N<sub>2</sub> mixtures at 184.9 and 253.7 nm, with formation of C<sup>16</sup>O<sub>2</sub> and C<sup>16,18</sup>O<sub>2</sub> being monitored by MS.  $k/k^{1/2}(\text{HO}_2 + \text{HO}_2)$  was determined. The value tabulated here was calculated using the effective value of  $k(\text{HO}_2 + \text{HO}_2)$  in this system of  $3.8 \times 10^{-12} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$  (this review).<sup>4</sup>
- (b) Thermal decomposition of HO<sub>2</sub>NO<sub>2</sub> monitored by IR absorption. Upper limit to  $k$  derived from the absence of a detectable effect of added SO<sub>2</sub> on the HO<sub>2</sub>NO<sub>2</sub> decay rate.
- (c) DF-LMR study.  $k/k(\text{HO} + \text{H}_2\text{O}_2)$  was determined. Value tabulated here was calculated using  $k(\text{HO} + \text{H}_2\text{O}_2) = 1.7 \times 10^{-12} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$  (this review).<sup>4</sup>

#### Preferred Values

$k < 1 \times 10^{-18} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$  at 298 K.

#### Comments on Preferred Values

The most recent determination<sup>3</sup> confirms that the reaction is slower than some earlier results<sup>1</sup> had suggested and supports the even lower upper limit set by Graham *et al.*,<sup>2</sup> which we take as the preferred value.

#### References

- <sup>1</sup> W. A. Payne, L. J. Stief, and D. D. Davis, *J. Am. Chem. Soc.* **95**, 7614 (1973).  
<sup>2</sup> R. A. Graham, A. M. Winer, R. Atkinson, and J. N. Pitts, Jr., *J. Phys. Chem.* **83**, 1563 (1979).  
<sup>3</sup> J. P. Burrows, D. I. Cliff, G. W. Harris, B. A. Thrush, and J. P. T. Wilkinson, *Proc. R. Soc. (London)* **A368**, 463 (1979).  
<sup>4</sup> IUPAC (2013). <http://iupac.pole-ether.fr>