IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet SOx62

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$CH_3SO + NO_2 \rightarrow$ products

Rate coefficient data

k/cm^3 molecule^{-1} s^{-1}	Temp./K	Reference	Technique/ Comments
Absolute Rate Coefficients			
$(3 \pm 2) \times 10^{-11}$	298	Mellouki et al., 1988	DF-MS
$(8 \pm 5) \times 10^{-12}$	298	Tyndall and Ravishankara, 1989	PLP-LIF
$(1.2 \pm 0.25) \times 10^{-11}$	298	Dominé et al., 1990	DF-MS
$(1.5 \pm 0.4) \times 10^{-11}$	300	Kukui et al, 2000	(a) PLP-LIF, DF-LIF

Comment

(a) PLP of $CH_3S_2CH_3/NO_2$ mixtures at 351 and 248 nm relative to CH_3I/NO_2 at 351 nm in the range 16-814 mbar He at 300 K with LIF detection of CH_3O. The temporal profile of CH_3O was monitored in order to obtain k by fitting which was found to be independent of pressure. Supporting measurements on pressure-dependent CH_3 yields in the range 243-333 K and 16-814 mbar He have been performed. Ancillary measurements of absolute SO_2 yields at 1.3 mbar He result in 1.0 ± 0.1 using $Cl + CH_3SH$ in DF-LIF measurements.

Preferred Values

$k = 1.2 \times 10^{-11}$ cm^3 molecule^{-1} s^{-1} at 298 K.

Reliability

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

Comments on Preferred Values

The measured values (Mellouki et al., 1988; Tyndall and Ravishankara, 1989; Dominé et al., 1990, Kukui et al., 2000) of k at 298 K agree within their error limits, some of which are substantial. The rate coefficient for this reaction is difficult to measure because of the lack of a clean primary source of CH_3SO radicals and the complexity of the secondary chemistry. The two most recent determinations (Dominé et al., 1990; Kukui et al., 2000) agree well with each other, the latter of which being a relative rate study extended to 814 mbar (He) using $CH_3 + NO_2$ as a reference reaction. The preferred value is that of Dominé et al. (1990) as it agrees with all studies within the given uncertainty limits.

References

Dominé, F., Murrells, T. P. and Howard, C. J.: J. Phys. Chem. 94, 5839, 1990.
Kukui, A., Bossoutrot, V., Laverdet, G. and Le Bras, G.: J. Phys. Chem. A 104, 935, 2000.
Mellouki, A., Jourdain, J. L. and Le Bras, G.: Chem. Phys. Lett. 148, 231, 1988.
Tyndall, G. S. and Ravishankara, A. R.: J. Phys. Chem. 93, 2426, 1989.