IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet iFOx15

This data sheet updated: 22th July 2003.

$FO_2 + NO_2 \rightarrow$ products

Rate coefficient data

k/cm^3 molecule^{-1} s^{-1}	Temp./K	Reference	Technique/ Comments
Absolute Rate Coefficients			
$(1.05 \pm 0.15) \times 10^{-13}$	298	Sehested *et al*., 1994[1]	PR-UVA (a)
$3.8 \times 10^{-11} \exp[-(2042 \pm 456)/T]$	260-315	Li, Friedl, and Sander, 1995[2]	DF-MS (b)
$(4.2 \pm 0.8) \times 10^{-14}$	298		

Comments

(a) Pulse radiolysis of NO_2-O_2-SF_6 mixtures. The decay of NO_2 was monitored in absorption at 400 nm, and that of FO_2 radicals at 220 nm. The rate coefficient showed no dependence on pressure over the pressure range 1-18 bar of SF_6.

(b) First-order decay rate of FO_2 radicals in the presence of excess NO_2 was monitored by mass spectrometry at a total presssure of 1.3 mbar He.

Preferred Values

$k = 4.0 \times 10^{-14}$ cm^3 molecule^{-1} s^{-1} at 298 K.

$k = 3.8 \times 10^{-11} \exp(-2040/T)$ cm^3 molecule^{-1} s^{-1} over the temperature range 260 K to 320 K.

Reliability

$\Delta \log k = \pm 0.3$ at 298 K.

$\Delta(E/R) = \pm 500$ K.

Comments on Preferred Values

The preferred values are based on results of the temperature-dependent study of Li *et al*.[2] The higher room temperature result of Sehested *et al*.[1] might be attributable to a small NO impurity in the NO_2 sample used. The observed positive temperature dependence suggests that reaction occurs primarily by a simple bimolecular mechanism yielding $FNO_2 + O_2$.

References

[1] J. Sehested, K. Sehested, O. J. Nielsen, and T. J. Wallington, J. Phys. Chem. **98**, 6731 (1994).

[2] Z. Li, R. R. Friedl, and S. P. Sander, J. Phys. Chem. **99**, 13445 (1995).