IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet iFOx10

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$$FO + O_3 \rightarrow F + 2O_2 \quad (1)$$
$$\rightarrow FO_2 + O_2 \quad (2)$$

$\Delta H°(1) = -172$ kJ·mol^{-1}
$\Delta H°(2) = -226$ kJ·mol^{-1}

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

k/cm^3 molecule^{-1} s^{-1}	Temp./K	Reference	Technique/ Comments
Absolute Rate Coefficients			
<1.2 x 10^{-12}	298	Sehested et al., 1994	PR-UVA (a)
<1 x 10^{-14}	298	Li et al., 1995	DF-MS (b)

Comments

(a) Pulse radiolysis-UV absorption spectroscopy technique at 18 bar total pressure. FO_2 radicals and O_3 were monitored in absorption at 220 nm and 288 nm, respectively.

(b) Discharge flow-mass spectrometric technique at 1 mbar total pressure. FO radicals were produced in the reaction of F atoms with excess O_3. No appreciable decay of FO radicals was observed, only a small increase in FO_2 radical concentrations was detected, and the concentration of O_3 was unchanged, allowing the uppper limit to k tabulated above to be derived.

Preferred Values

Parameter	Value	T/K
k /cm^3 molecule^{-1} s^{-1}	<1 x 10^{-14}	298

Comments on Preferred Values

The recommended upper limit to the rate coefficient is based on the results of Li et al. (1995). A much higher upper limit was reported by Sehested et al. (1994). A much lower upper limit was derived by Colussi and Grela (1994) from a re-analysis of data that had been reported by Staricco et al. (1962) for ozone destruction quantum yields in the F_2-photosensitized decomposition of ozone. Results of the recent, more direct study of Li et al. (1995) are preferred over the much earlier results reported by Staricco et al. (1962).

References

Colussi, A. J. and Grela, M. A.: Chem. Phys. Lett. 229, 134, 1994.
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