IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet SOx10

This data sheet updated: 19th November 2001.

$Cl + OCS \rightarrow SCl + CO$
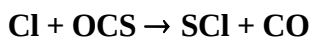
Rate coefficient data

k/cm^3 molecule^{-1} s^{-1}	Temp./K	Reference	Technique/Comments
Absolute Rate Coefficients			
$<1.1 \times 10^{-16}$	298	Eibling and Kaufman, 1983	(a)
$<4 \times 10^{-15}$	298	Clyne et al., 1984	(b)
$<1 \times 10^{-14}$	298	Nava et al., 1985	(c)

Comments

(a) Fast-flow discharge system with mass-spectrometric detection. [Cl] was monitored and from minimum observable change in [Cl] in presence of OCS upper limit to k obtained. SCl_2^+ was observed in small concentrations and if it is assumed to be due solely to the reaction of Cl with OCS, a lower limit of $k > 10^{-18}$ cm^3 molecule^{-1} s^{-1} can be derived.

(b) Discharge flow study of OCS removal in excess Cl. [OCS$^+$] was monitored by mass spectrometry. No consumption of OCS detectable, leading to upper limit to k.

(c) Flash photolysis of CCl_4 to produce Cl atoms in excess OCS. [Cl] monitored by resonance fluorescence. No consumption of Cl detected with OCS in range 100-300 Torr, leading to upper limit to k.

Preferred Values

$k < 1.0 \times 10^{-16}$ at 298 K.

Comments on Preferred Values

The reaction of Cl atoms with OCS is extremely slow and only upper limits to the rate coefficient have been obtained. The lowest of these, Eibling and Kaufman (1983), is preferred.

References

Clyne, M. A. A., MacRobert, A. J., Murrells, T. P. and Stief, L. J.: J. Chem. Soc., Faraday Trans. 2, 80, 877, 1984.

Eibling, R. E. and Kaufman, M.: Atmos. Environ., 17, 429, 1983.
Nava, D. F., Brobst, W. D. and Stief, L. J.: J. Phys. Chem., 89, 4703, 1985.