IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet PCl27

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This datasheet last evaluated: June 2015; last change in preferred values: December 2005.

CF_2ClCF_2CHFCl (HCFC-225cb) + hυ → products

Primary photochemical processes

Reaction	$\Delta H°$/kJ·mol^{-1}	$\lambda_{threshold}$/nm
$CF_2ClCF_2CHFCl + h\upsilon \rightarrow CF_2ClCF_2CHF + Cl$	335 (est)	360
$\rightarrow CHFClCF_2CF_2 + Cl$	335 (est)	360

Preferred Values

Absorption cross-sections for CF_2ClCF_2CHFCl at 298 K

λ/nm	10^{20} σ/cm^2	λ/nm	10^{20} σ/cm^2
160	188	185	9.1
165	145	190	3.5
170	91	195	1.5
175	47	200	0.63
180	21	205	0.33
		210	0.25

Comments on Preferred Values

The preferred values of the absorption cross-sections at 298 K are the values reported by Braun et al.(1991) In the same study, absorption cross-section measurements in the liquid phase were made over the wavelength range 205-250 nm. Correction factors were used to convert these liquid-phase values into gas-phase values. The combined set of gas-phase values for the wavelength range 170-250 nm were fitted with the expression:

$$\log_{10}\sigma = -17.714 - 2.175 \times 10^{-2} X - 1.484 \times 10^{-3} X^2 + 1.147 \times 10^{-5} X^3 \text{ where } X = (\lambda - 160 \text{ nm})$$

Photolysis is expected to occur with unit quantum efficiency by breaking of the C-Cl bond to yield $CF_2ClCF_2CHF + Cl$ or $CHFClCF_2CF_2 + Cl$.

Reference

Braun,W., Fahr, A., Klein, R., Kurylo, M. J. and Huie, R. E.: J. Geophys. Res. 96, 13009, 1991.