

IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet PCI24

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

CF₂ClCF₂Cl (CFC-114) + hv → products

Primary photochemical processes

Reaction	$\Delta H^\circ/\text{kJ}\cdot\text{mol}^{-1}$	$\lambda_{\text{threshold}}/\text{nm}$
CF ₂ ClCF ₂ Cl + hv → CF ₂ ClCF ₂ + Cl	346 (est)	346

Preferred Values

Absorption cross-sections for CF₂ClCF₂Cl at 295 K and 210 K

λ/nm	$10^{20} \sigma/\text{cm}^2$		λ/nm	$10^{20} \sigma/\text{cm}^2$	
	295K	210 K		295 K	210 K
172	69	a	200	0.80	0.55
174	55	a	202	0.54	0.34
176	43	a	204	0.37	0.22
178	34	a	206	0.24	0.13
180	26	a	208	0.16	0.084
182	19.8	a	210	0.104	0.051
184	15.0	a	212	0.068	0.031
186	11.0	a	214	0.044	0.020
188	7.80	7.72	216	0.029	0.012
190	5.35	5.03	218	0.019	0.007
192	3.70	3.28	220	0.012	0.004
194	2.56	2.13			
196	1.75	1.39			
198	1.20	0.88			

(a) No temperature dependence observed.

Comments on Preferred Values

The preferred values of the absorption cross-sections are those reported by Simon et al. (1988). They are in good agreement with the room temperature results of Chou et al. (1978). Hubrich and Stuhl (1980) reported higher values and a smaller temperature dependence. Photolysis is expected to occur with unit quantum efficiency by breaking of the C-Cl bond to yield $\text{CF}_2\text{ClCF}_2 + \text{Cl}$.

References

- Chou, C. C., Milstein, R. J., Smith, W. S., Vera Ruiz, H., Molina, M. J. and Rowland, F. S.: *J. Phys. Chem.* 82, 1, 1978.
- Hubrich, C. and Stuhl, F.: *J. Photochem.* 12, 93, 1980.
- Simon, P. C., Gillotay, D., Vanlaethem-Meuree, N. and Wisenberg, J.: *Ann. Geophysicae* 6, 239, 1988.