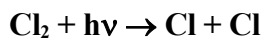


IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet PCI11

Website: <http://iupac.pole-ether.fr>. See website for latest evaluated data. Data sheets can be downloaded for personal use only and must not be retransmitted or disseminated either electronically or in hardcopy without explicit written permission.

This data sheet updated: 15th December 2000.



Primary photochemical processes

Reaction	$\Delta H^\circ/\text{kJ}\cdot\text{mol}^{-1}$	$\lambda_{\text{threshold}}/\text{nm}$
$\text{Cl}_2 + h\nu \rightarrow \text{Cl}(^2\text{P}_{3/2}) + \text{Cl}(^2\text{P}_{3/2})$	242	495

Preferred Values

Absorption cross-sections for Cl_2 at 298 K

λ/nm	$10^{20} \sigma/\text{cm}^2$	λ/nm	$10^{20} \sigma/\text{cm}^2$
260	0.20	370	8.4
270	0.82	380	5.0
280	2.6	390	2.9
290	6.2	400	1.8
300	11.9	410	1.3
310	18.5	420	0.96
320	23.7	430	0.73
330	25.5	440	0.54
340	23.5	450	0.38
350	18.8	460	0.26
360	13.2	370	0.16

Comments on Preferred Values

The preferred values of the absorption cross-sections at 298 K are the values reported by Maric *et al.*¹, which are in excellent agreement with those of Ganske *et al.*². There is good agreement with earlier studies which are cited in IUPAC, 1992.³ Maric *et al.*¹ fitted the data for the wavelength region 250-550 nm with the following semi-empirical expression:

$$10^{20}\sigma = \alpha^{0.5} \times 27.3 \exp \{-99.0 \alpha [\ln(329.5/\lambda)]^2\} \\ + \alpha^{0.5} \times 0.932 \exp \{-91.5 \alpha [\ln(406.5/\lambda)]^2\}$$

where $\alpha = \tanh(402.676/T)$

This expression combines the semi-empirical function originally proposed by Johnston *et al.*⁴ with the temperature dependence expressions proposed by Sulzer and Wieland.⁵ The photodissociation occurs with a quantum yield of unity.

References

- ¹ D. Maric, J. P. Burrows, R. Meller, and G. K. Moortgat, *J. Photochem. Photobiol. A: Chem.* **70**, 205 (1993).
- ² J. A. Ganske, H. N. Berko, and B. J. Finlayson-Pitts, *J. Geophys. Res.* **97**, 7651 (1992).
- ³ IUPAC, Supplement IV, 1992 (see references in Introduction).
- ⁴ H. S. Johnston, M. Paige, and F. Yao, *J. Geophys. Res.* **89**, 11661 (1984).
- ⁵ P. Sulzer and K. Wieland, *Helv. Phys. Acta.* **25**, 653 (1952).