

IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet PBr1

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: 20th July 2006.

HBr + hv → products

Primary photochemical processes

Reaction	$\Delta H^\circ/\text{kJ}\cdot\text{mol}^{-1}$	$\lambda_{\text{threshold}}/\text{nm}$
HBr + hv → H + Br	366	327

Preferred Values

Absorption cross-sections for HBr at 298 K

λ/nm	$10^{20} \sigma/\text{cm}^2$	λ/nm	λ/nm
170	254	215	39.0
175	270	220	23.5
180	265	225	14.2
185	242	230	8.08
190	204	235	4.43
195	164	240	2.35
200	122	250	0.661
205	87.2	260	0.141
210	59.1	270	0.020

Quantum yield for HBr photolysis

$$\phi = 1.0$$

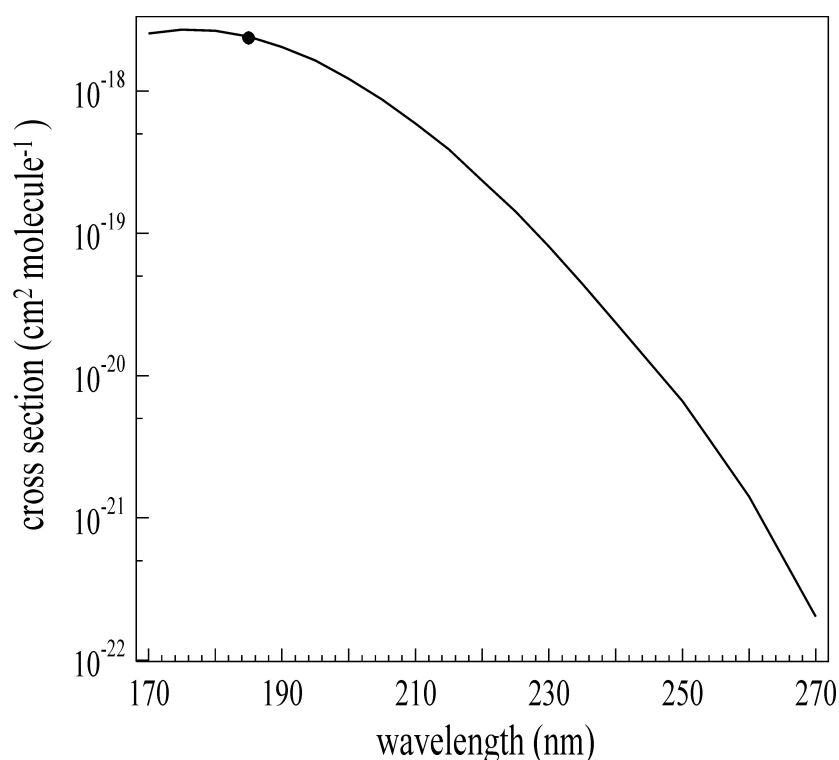
Comments on Preferred Values

The preferred cross-section values are those determined by Huebert and Martin (1968) between 170 and 220 nm, Goodeve and Taylor, (1935) between 220 and 240 nm, (scaled by 0.95) and Okabe, 1977 (240-270 nm). The resultant spectrum is in good agreement with the cross section at 184.9 nm from Ravishankara (1979) and Barone et al., 1994. Other determinations of Romand (1949), Roxlo et al. (1980) and Nee et al. (1986) show, in some wavelength regions, substantial differences.

A primary quantum yield of unity was obtained with an N₂O actinometer (Martin and Willard, 1964). The branching ratio for photolysis forming Br(²P_{1/2}) and Br(²P_{3/2}) was determined in Regan et al. (1999).

References

- Barone, S. B., Turnipseed, A. A., Gierczak, T., and Ravishankara, A. R.: *J. Phys. Chem.* 98, 11969, 1994.
- Goodeve, C. F. and Taylor, A. W. C.: *Proc. Roy. Soc. A*, 152, 221, 1935.
- Huebert, B. J. and Martin, R. M.: *J. Phys. Chem.*, 72, 3046, 1968.
- Martin, R. M. and Williard, J. E.: *J. Chem. Phys.*, 40, 2999, 1964.
- Nee, J. B., Suto, M., Lee, L. C., *J. Chem. Phys.* 85, 4919, 1986.
- Okabe, H.: *J. Chem. Phys.* 66, 2058, 1977.
- Ravishankara, A. R., Wine, P. H., and Langford, A. O.: *Chem. Phys. Lett.* 63, 479, 1979.
- Regan, P. M., Langford, S. R., Orr-Ewing, A. J. and Ashfold, M. N. R.: *J. Chem. Phys.*, 110, 281, 1999.
- Romand, J.: *Ann. Phys., Paris*, 4, 527, 1949.
- Roxlo, C., and Mandl, A.: *J. Appl. Phys.* 51, 2969, 1980.



HBr absorption cross sections: The 170-220 nm data are from Huebert and Martin, 1968; the 220-240 nm data are from Goodeve and Taylor, 1964 (scaled by 0.95); the 240-270 nm data are from Okabe, 1977. The single data point (solid circle) at 184.9 nm is from Ravishankara et al. (1979) and Barone et al. (1994).