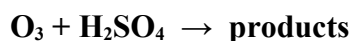


IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet V.A4.0 HET_SL_0

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This data sheet last evaluated: January 2009; last change in preferred values: January 2009



Experimental data

Parameter	Temp./K	Reference	Technique/ Comments
<i>Uptake coefficients: γ</i>			
$< 1 \times 10^{-6}$	300 – 270	Baldwin and Golden, 1979	Knudsen-MS (a)
$(4.79 \pm 1.38) \times 10^{-11}$ (75 wt.% H ₂ SO ₄)	223	Olszyna et al., 1979	(b)
$< 1 \times 10^{-6}$	195	Dlugokencky and Ravishankara, 1992	CWFT-CLD (c)
$(1.2 \pm 0.08) \times 10^{-6}$ (98 wt.% H ₂ SO ₄)	239	Il'in et al, 1992	UV (d)
$(1.6 \pm 0.08) \times 10^{-6}$ (98 wt.% H ₂ SO ₄)	258		
$(1.75 \pm 0.07) \times 10^{-6}$ (98 wt.% H ₂ SO ₄)	273		

Comments

- (a) No evidence for uptake of O₃ to H₂SO₄ surface which contained less than 5 % water.
- (b) Static experiment with H₂SO₄ coated on glass beads in a round bottom flask. O₃ analysed ex-situ. Slow loss of O₃ was observed over several hours to derive the values of γ listed.
- (c) \approx 2 mm thick (frozen) H₂SO₄ films were prepared from a bulk solution of 50 or 97 wt%. [O₃] was either 5×10^8 or 2×10^9 molecule cm⁻³. The geometric surface area was used to calculate γ .
- (d) Static reactor with O₃ measured using optical absorption at 254 nm. Initial [O₃] was $1\text{-}6 \times 10^{15}$ molecule cm⁻³.

Preferred Values

Parameter	Value	T/K
γ	$< 10^{-6}$	200 – 220 K

Comments on Preferred Value

The studies of the uptake of O₃ to various H₂SO₄ surfaces confirm that the interaction is very weak with uptake coefficients lower than 10^{-6} . Olszyna et al. (1979) measured comparable uptake coefficients on pure H₂SO₄ and H₂SO₄ doped with various cations (Ni²⁺, Cu²⁺, Cr³⁺, Al³⁺, Fe³⁺, NH₄⁺ and Mn²⁺). Doping with Fe²⁺ resulted in γ values close to 10^{-9} . Uptake coefficients of the order of 10^{-8} to 10^{-9} were obtained on frozen H₂SO₄ surfaces at 217 – 263 (Harker and Ho, 1979). The preferred value is based on the uptake coefficients obtained in the flow tube experiments of Dlugokencky and Ravishankara (1992) which were carried out at stratospheric temperatures and using low [O₃].

References

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Il'in, S. D., Selikhanovich, V. V., Gershenson, Y. M. and Rozenshtein, V. B.: Sov. J. Chem. Phys. 8, 1858-1880, 1991.

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