IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation
Data Sheet HI7; V.A1.7

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This data sheet last evaluated: June 2014; last change in preferred values: December 2007.

NO + ice → products

Experimental data

Parameter	Temp./K	Reference	Technique/ Comments
Uptake coefficients: γ_{ss}, γ_0			
$\gamma_{ss} \leq 1 \times 10^{-4}$	195	Leu, 1988a	CWFT-MS (a)
$\gamma_0 \leq 5.0 \times 10^{-6}$	193-243	Saastad et al. 1993	Kn-MS (b)

Comments

(a) water ice film formed by vapour-deposition at 200 K as described in Leu (1988b).

(b) Measurement of the total pressure drop in a static system over bulk ice and frozen 70% H_2SO_4-H_2O monitored by MS. NO partial pressures were 10^{-5}-10^{-2} mbar.

Preferred Values

Parameter	**Value**	**T/K**
γ	$\leq 5.0 \times 10^{-6}$	190-250
Reliability		
$\Delta \log (\gamma)$	±1.0	190-250

Comments on preferred values

There is no measurable uptake on ice surfaces or frozen sulfuric acid solutions at 195-243 K. Bartels-Rausch et al. (2002) used a chromatographic retention technique to measure the adsorption enthalpies of various NOx species onto ice spheres. Thermo-chromatography theory was used to extract the enthalpies of adsorption from the data. The adsorption enthalpy for NO was -20 kJ/mol. This small adsorption enthalpy is consistent with the experiments of Saastad et al. (1993) in which no measurable loss of NO to the ice surface was observed. Adsorption entropies were also estimated using two different standard states.

References

Bartels-Rausch, T., Eichler, B., Zimmermann, P., Gäggeler, H. W. and Ammann, M.: Atmos. Chem. Phys., 2, 235-247, 2002.

Leu, M.-T.: Geophys. Res. Lett. 15, 851-854, 1988a.

Leu, M.-T.: Geophys. Res. Lett. 15, 17-20, 1988b.

Saastad, O.W., Ellermann, Th. and Nielsen,C.J.: Geophys. Res. Lett. 20, 1191-1193, 1993.