IUPAC Task Group on Atmospheric Chemical Kinetic Data Evaluation – Data Sheet V.A1.34 HI34

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This data sheet last evaluated: March 2008; last change in preferred values: March 2008.

ICl + ice

Experimental data

Parameter	Temp./K	Reference	Technique/ Comments
Experimental uptake coefficients: γ			
γ_0 = 0.09±0.023	200	Allanic et al., 2000	Knud-MS (a)
$\gamma_0 = 2.2 \times 10^{-6} \exp(2175/T)$	180-205		
γ_0 = 0.30±0.05 (HCl doped ice)	200		
γ_0 = 0.30±0.02 (HBr doped ice)	200		
γ_0 = 0.32±0.02 (HI doped ice)	200		

Comments

(a) Vapour deposited ice film, approx. 75 mm thick. Uptake on pure ice saturated and was reversible. Expression for γ_0 obtained from data taken from figure in Allanic et al. over range given. Uptake was observed on ice doped with ~ 3 x 10^{15} cm^{-2} HCl, HBr and HI: with HBr, HCl production was observed, and with HI, HCl and I_2 observed.

Preferred Values

Parameter	Value	T/K
γ_0	$2.2 \times 10^{-6} \exp(2175/T)$	180 - 205
Reliability		
$\Delta \log (\gamma_0)$	± 0.3	180 - 205

Comments on Preferred Values

The results of the only reported study are accepted for the recommendation. They suggest a physical adsorption of ICl on the ice surface, driven by dipole-dipole interaction. There is insufficient information to establish the partition coefficient. In the same study conducted with HCl, HBr and HI doped ice, fast uptake was observed with reaction to form HCl. Proposed uptake mechanism involves initial formation X-BrCl intermediate(X = Cl^- Br^- or I^-).

References

Allanic, A., Oppliger, R., Van den Bergh, H., and Rossi, M. J., *Z.Phys.Chemie*, **214**(11) 1479-1500. 2000.

Fig 1 Recommended temperature dependence of initial uptake coefficients of ICl on ice taken from figure 5 in Allanic et al.(2000) over range 180-205 K.