

Trapping of HCl and oxidized, organic trace-gases in growing ice at temperatures relevant for the tropopause.

Matthias Kippenberger¹, Gerhard Schuster¹, Jos Lelieveld¹ and John N. Crowley¹

¹Max-Planck-Institut für Chemie, Division of Atmospheric Chemistry, Mainz, 55128 Germany.

5 Correspondence to: John Crowley: (John.crowley@mpic.de)

Supplementary Information.

Tabulated datasets:

10 **Figure 3**

[HCl] (molecule cm ⁻³)	V _{IG} (m s ⁻¹)	σ (V _{IG}) (m s ⁻¹)	γ	σ (γ)	J _{HCl} (molecule s ⁻¹)	σ (J _{HCl}) (molecule s ⁻¹)
2.3E10	1.03E-08	5.17E-10	1.35E-02	1.62E-03	4.13E+13	4.95E+12
2.3E10	5.18E-09	2.59E-10	7.05E-03	8.46E-04	2.32E+13	2.79E+12
2.3E10	3.45E-09	1.73E-10	3.90E-03	4.68E-04	1.33E+13	1.60E+12
2.3E10	6.90E-09	3.45E-10	9.18E-03	1.10E-03	2.95E+13	3.54E+12
2.3E10	8.62E-09	4.31E-10	1.17E-02	1.41E-03	3.67E+13	4.40E+12
2.3E10	1.73E-09	8.65E-11	1.69E-03	2.03E-04	5.92E+12	7.11E+11
2.3E10	6.90E-09	3.45E-10	9.23E-03	1.11E-03	3.21E+13	3.85E+12
2.3E10	5.18E-09	2.59E-10	8.49E-03	1.02E-03	2.98E+13	3.58E+12
2.3E10	3.45E-09	1.73E-10	4.99E-03	5.98E-04	1.82E+13	2.19E+12
2.3E10	1.73E-09	8.65E-11	2.27E-03	2.72E-04	8.55E+12	1.03E+12
2.3E10	8.62E-09	4.31E-10	1.05E-02	1.26E-03	3.59E+13	4.31E+12
2.3E10	1.03E-08	5.17E-10	1.29E-02	1.54E-03	4.30E+13	5.16E+12
7.1E10	4.17E-09	2.09E-10	1.20E-03	1.44E-04	1.30E+13	1.57E+12
7.1E10	8.77E-09	4.38E-10	3.39E-03	4.06E-04	3.60E+13	4.32E+12
7.1E10	1.34E-08	6.68E-10	6.10E-03	7.32E-04	6.28E+13	7.54E+12
7.1E10	2.26E-08	1.13E-09	9.46E-03	1.14E-03	9.37E+13	1.12E+13

Figure 4

T (K)	V_{IG} ($m s^{-1}$)	$\sigma(V_{IG})$ ($m s^{-1}$)	γ	$\sigma(\gamma)$	J_{HCl} ($molecule s^{-1}$)	$\sigma(J_{HCl})$ ($molecule s^{-1}$)
195	3.89E-09	1.94E-10	8.23E-03	9.88E-04	2.39E+13	2.87E+12
195	4.82E-09	2.41E-10	1.08E-02	1.30E-03	3.05E+13	3.65E+12
195	5.75E-09	2.87E-10	1.41E-02	1.70E-03	3.77E+13	4.53E+12
195	6.68E-09	3.34E-10	1.57E-02	1.89E-03	4.17E+13	5.00E+12
195	4.54E-09	2.27E-10	1.25E-02	1.50E-03	3.31E+13	3.97E+12
195	5.28E-09	2.64E-10	1.38E-02	1.66E-03	3.64E+13	4.37E+12
195	6.40E-09	3.20E-10	1.78E-02	2.13E-03	4.37E+13	5.25E+12
211	1.03E-08	5.17E-10	1.35E-02	1.62E-03	4.13E+13	4.95E+12
211	5.18E-09	2.59E-10	7.05E-03	8.46E-04	2.32E+13	2.79E+12
211	3.45E-09	1.73E-10	3.90E-03	4.68E-04	1.33E+13	1.60E+12
211	6.90E-09	3.45E-10	9.18E-03	1.10E-03	2.95E+13	3.54E+12
211	8.62E-09	4.31E-10	1.17E-02	1.41E-03	3.67E+13	4.40E+12
211	1.73E-09	8.65E-11	1.69E-03	2.03E-04	5.92E+12	7.11E+11
211	6.90E-09	3.45E-10	9.23E-03	1.11E-03	3.21E+13	3.85E+12
211	5.18E-09	2.59E-10	8.49E-03	1.02E-03	2.98E+13	3.58E+12
211	3.45E-09	1.73E-10	4.99E-03	5.98E-04	1.82E+13	2.19E+12
211	1.73E-09	8.65E-11	2.27E-03	2.72E-04	8.55E+12	1.03E+12
211	8.62E-09	4.31E-10	1.05E-02	1.26E-03	3.59E+13	4.31E+12
211	1.03E-08	5.17E-10	1.29E-02	1.54E-03	4.30E+13	5.16E+12
227	8.59E-09	4.29E-10	3.31E-03	3.97E-04	1.77E+13	2.12E+12
227	1.76E-08	8.78E-10	7.18E-03	8.61E-04	3.66E+13	4.40E+12
227	2.65E-08	1.33E-09	1.07E-02	1.29E-03	5.28E+13	6.34E+12
227	4.10E-09	2.05E-10	2.01E-03	2.41E-04	1.10E+13	1.32E+12
227	1.31E-08	6.54E-10	4.86E-03	5.83E-04	2.54E+13	3.04E+12
227	1.31E-08	6.54E-10	4.08E-03	4.89E-04	2.15E+13	2.58E+12
227	2.20E-08	1.10E-09	8.26E-03	9.92E-04	4.09E+13	4.91E+12
227	3.10E-08	1.55E-09	8.90E-03	1.07E-03	4.37E+13	5.25E+12

Figure 5

T (K)	(1-θ)	γ / V_{IG} ($m^{-1} s$)	$\sigma (\gamma / V_{IG})$ ($m^{-1} s$)
195	0.40984	3.36E+06	8.04E+05
195	0.32134	2.89E+06	5.31E+05
195	0.57182	4.63E+06	1.55E+06
195	0.39432	3.44E+06	3.05E+05
200	0.44484	1.58E+06	2.78E+05
200	0.36657	1.54E+06	9.81E+04
200	0.37994	1.32E+06	7.58E+04
200	0.39432	1.83E+06	9.75E+04
200	0.20661	6.95E+05	1.57E+05
210	0.31172	1.12E+06	8.54E+04
210	0.18464	1.08E+06	3.13E+04
210	0.16426	7.16E+05	5.94E+04
210	0.13631	6.54E+05	1.00E+00
210	0.15684	4.74E+05	7.84E+04
210	0.12794	4.52E+05	3.33E+04
210	0.27115	1.02E+06	1.00E+00
222	0.11521	2.98E+05	4.21E+04
222	0.36657	7.29E+05	9.13E+04
227	0.32134	3.76E+05	1.25E+05
227	0.1552	2.21E+05	1.43E+04
227	0.06453	1.48E+05	1.02E+04
227	0.23992	2.89E+05	3.47E+04

Figure 6

T (K)	1/T (K⁻¹)	$(\gamma / V_{IG})(1-\theta)^{-1}$ (m⁻¹ s)	$\sigma \{(\gamma / V_{IG})(1-\theta)^{-1}\}$ (m⁻¹ s)
195	0.00513	8.67E+06	2.68E+05
200	0.005	3.96E+06	2.57E+05
210	0.00476	3.98E+06	1.83E+05
222	0.0045	2.18E+06	2.76E+05
227	0.00441	1.53E+06	2.15E+05

5

Figure 7

T (K)	1/T (K⁻¹)	n^* (molecule cm⁻³)	$\sigma (n^*)$ (molecule cm⁻³)
195	0.00513	7.20E+18	1.70E+18
200	0.005	3.60E+18	2.00E+18
210	0.00476	2.70E+18	9.00E+17
222	0.0045	1.10E+18	6.00E+17
227	0.00441	1.80E+18	1.00E+18