



Uptake of N₂O₅ on Ice in the Temperature Range 140 K to 215 K

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The interaction of N₂O₅ with ice clouds (cirrus, PSC) provides an important sink for atmospheric nitrogen oxides. FTIR spectroscopic studies found that N₂O₅ hydrolyses on the ice surface only at temperatures above 160 K whereas at lower temperatures dissociative adsorption takes places. This reaction is fast; its temperature dependence is still not known.

In this presentation results of a study of the interaction of N₂O₅ with ice surfaces in the temperature range between 140 K and 215 K are reported. The uptake kinetics were determined using a Knudsen flow reactor coupled to a quadrupole mass spectrometer.

Between 165 K and 215 K an uptake coefficient of 0.015 has been found, nearly independent of temperature. At still lower temperatures, however, the uptake coefficient increases strongly with decreasing temperature. The change in the temperature dependence occurs at the same temperature as the onset of hydrolysis. From this coincidence it is concluded that below 165 K the uptake coefficients represents the adsorption/desorption kinetics, whereas above 165 K the uptake coefficient includes also the rate constant of hydrolysis. The analysis of the kinetic data over the whole temperature range provided activation energies for desorption and hydrolysis.