

## UPTAKE STUDY OF ACETONE ON ICE USING A VERTICAL COATED WALL FLOW TUBE. ATMOSPHERIC IMPLICATIONS.

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The upper troposphere defines a region of the atmosphere (between 8 and 12 km) characterised by its low temperatures (-45 to -85 °C) and where cirrus clouds cover a substantial portion (~25 %) of the earth's surface <sup>1</sup>. Some measurements in the upper troposphere showed the presence of high acetone concentrations (up to 3000 pptv) which lead to an enhanced abundance of HO<sub>x</sub> <sup>2</sup> and likely modify the ozone cycles in this region of the atmosphere. The goal of this work is then to measure uptake coefficients of acetone on ice and to determine its surface coverage.

The low pressure and low temperature flow tube (1-5 Torr) has been adapted to study the gas-ice interactions of atmospheric interest. By using this technique, it is possible to study kinetics of chemical reactions on ice which can be doped by adding chemical species <sup>3,4</sup>. This new set-up is coupled with a Mass Spectrometer which allows product identification and quantification.

The vertical flow tube has a movable injector which permits to change the reaction distance and then the reaction time. The ice surface is prepared by totally wetting the inner wall of the flow tube with pure water which is then rapidly cooled down to -20°C. The ice temperature is then regulated between -40°C and -80°C by circulating cool ethanol through a double jacket surrounding the flow tube.

Our results permit to estimate the ratio of acetone molecules adsorbed by ice surface to the number of acetone molecules in the gas phase. One can then estimate the influence of its adsorption on ice on its atmospheric lifetime in the upper troposphere.

<sup>1</sup> Salomon *et al.*, *J. Geophys. Res.* **102**, 21411, (1997).

<sup>2</sup> S.A. Mckeen *et al.* *Geophys. res. Lett.* **24**, 3177, (1997).

<sup>3</sup> J.P.D. Abbatt *et al.*, *J. Geophys. Res.* **97**, 15819, (1992).

<sup>4</sup> D.R. Hanson *et al.*, *J. Phys. Chem.* **96**, 2682, (1992).