

See discussions, stats, and author profiles for this publication at:
<https://www.researchgate.net/publication/244245844>

High-resolution FTIR spectroscopy of OBrO

ARTICLE *in* JOURNAL OF AEROSOL SCIENCE · SEPTEMBER 1997

Impact Factor: 2.24 · DOI: 10.1016/S0021-8502(97)88130-X

READS

3

2 AUTHORS, INCLUDING:



Matthew S Johnson

University of Copenhagen

138 PUBLICATIONS 1,683 CITATIONS

SEE PROFILE

DISTRIBUTION OF AMMONIUM ON SULPHATE AND NITRATE CONTAINING AEROSOLS QUALITATIVE ESTIMATES BASED ON MEASUREMENTS AND MODEL CALCULATIONS

O. Hertel,* E. Vignati,*† H. Skov* and M. F. Hovmand*

* National Environmental Research Institute, P.O. Box 358, Frederiksborgvej 399, 4000 Roskilde, Denmark

† Risø National Laboratory, P.O. Box 49, Frederiksborgvej 399, 4000 Roskilde, Denmark

‡ Joint Research Centre, Environmental Institute, TP 460, 21020 Ispra, Italy

The deposition of ammonium is an important source of nitrogen to marine waters. Ammonium is to a great extent associated with sulphate containing aerosols, but this may change due to the reductions in sulphur emissions. A reduction in sulphate in the atmosphere may increase the relative importance of ammonium nitrate, which has a shorter lifetime than ammonium sulphate and ammonium bisulphate. Such a change will have considerable impact on the transport of ammonia, ammonium, nitric acid and nitrate in the atmosphere. In the present paper, a qualitative analysis of the distribution of ammonium on sulphate and nitrate containing aerosols is performed based on filter pack measurements from the Danish Nation-wide Monitoring Programme. Two scenarios are examined assuming that, respectively, 1.5 and 2 ammonium molecules are associated with each sulphate molecule. This analysis shows no clear trend in the distribution of ammonium between the two types of aerosols. The results of this analysis are compared with calculations with the variable scale transport-chemistry model—ACDEP. The model reproduced the observed ammonium levels well. However, the comparison indicates that the model overestimates the fraction of ammonium associated with sulphate.

HIGH-RESOLUTION FTIR SPECTROSCOPY OF OBrO

M. S. Johnson* and B. Nelander†

* MAX-Lab Beamline for Infrared Spectroscopy, Lund University, S-221 00 Lund, Sweden

† Center for Chemistry, Thermochemistry, Lund University, Box 124, S-221 00 Lund, Sweden

The gas-phase infrared spectrum of OBrO has been measured for the first time. The ν_1 and ν_3 symmetric and asymmetric stretching vibrations of bromine dioxide have been measured at high resolution using the White cell at the beamline for infrared spectroscopy at MAX-Lab. In addition, the $\nu_1 + \nu_2$ transition is observed. Interest in halogen oxides has been stimulated by their role as catalysts in stratospheric ozone depletion. A great deal of effort has gone into understanding the mechanisms of ozone depletion processes which involve chlorine. There is evidence from direct observation of earth's atmosphere that bromine species are also involved. Unfortunately, due to the difficulty of their synthesis and the limitations of instrumentation there are few laboratory studies concerning the structure and reactivity of the members of the BrO_x family.

A THREE-DIMENSIONAL GLOBAL MODEL STUDY OF CARBONYL SULFIDE IN THE TROPOSPHERE AND THE LOWER STRATOSPHERE

E. Kjellström

Department of Meteorology, Stockholm University, S-10691 Stockholm, Sweden

Global distributions of carbonyl sulfide and carbon disulfide have been calculated with a three-dimensional global model of the general circulation (ECHAM). Running the model with emissions estimates from the literature gives a global sink strength of 0.3 Tg S yr^{-1} , with vegetation uptake being the largest sink. The calculated mixing ratios are higher in the southern hemisphere than in the northern hemisphere. This interhemispheric gradient, which is the opposite of what is observed, shows that the present knowledge of the distribution of sinks and sources is not fully adequate. Our model calculations support the idea that the open oceans could act as a sink of carbonyl sulfide. The calculated stratospheric photolysis of carbonyl sulfide constitutes about 5% of the total sink of carbonyl sulfide. We obtain a stratospheric production of sulfate from carbonyl sulfide of $0.014 \text{ Tg S yr}^{-1}$, i.e. 3 to 12 times less than what is needed to maintain the stratospheric sulfate aerosol layer. On the other hand, sulfate formed from DMS and SO₂, transported from the troposphere, is more than enough to account for the stratospheric sulfate aerosol layer.