Atmos. Chem. Phys. Discuss., 2, S5–S7, 2002
www.atmos-chem-phys.org/acpd/2/S5/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Accommodation coefficient of HOBr on deliquescent sodium bromide aerosol particles" *by* M. Wachsmuth et al.

Anonymous Referee #1

Received and published: 23 January 2002

Review of Wachsmuth et al. "Accommodation coefficient of HOBr on deliquescent sodium bromide aerosol particles"

This paper presents experimental results that provide information on the magnitude of the mass accommodation coefficient for HOBr interacting with deliquescent NaBr particles. This chemistry is one step in the HOBr-mediated activation of sea-salt bromide that may occur in marine regions and so the topic is fully appropriate for publication in ACP. It is also of relevance as a measurement of a large mass accommodation coefficient to an aqueous surface. The experimental technique using short-lived radioactive isotopes of Br is novel and permits use of extremely low concentrations of gas phase HOBr, making measurement of the mass accommodation coefficient more tractable because reactant concentrations in the aerosol particle are not as readily depleted as with more more conventional approaches. I believe this paper is worthy of publication

in ACP when the major issues I raise below are addressed. In addition, I would like to make the comment that the technique could be used very nicely to measure the mass accommodation coefficients of species to water droplets which do not contain substantial dissolved components. Given the extremely small amount of HOBr (or other gases) that dissolves in the particles (at most one molecule per aerosol particle), it is not necessary to rely upon reaction to drive uptake, i.e. solubility will do it alone.

Major points:

1. Given the relatively vague manner of identification, I am not convinced that it is conclusively known that HOBr is the brominated species formed from the radioactive decay in the presence of oxygen, water and quartz (pages 6 and 7). In particular, while OBrO does, I do not believe that BrO will react to form HOBr unless HO2 is around. The paper states that HBr will deposit "at much higher temperature". Can the authors be more quantitative in this regard? What would be the behaviour of Br atoms or BrO radicals? I think it is necessary to put a caveat in the paper that there is some small but not insignificant chance that a species different from HOBr is undergoing uptake.

2. Would it be better to report the experimental results as consistent with an accommodation coefficient of up to unity. Given that the estimate error of 30% is consistent with a value of 0.8, a slightly larger error (which is not inconceivable) would lead to a mass accommodation coefficient of unity.

Minor points:

1. I am surprised by the pH value of 3 of a saturated NaBr solution. The authors may want to double-check this measurement (page 14).

2. Figure 3. Definition of quantities on axes

3. Figure 4. Why are there no squares to match the triangles for low and high reaction times?

4. Figure 5. Caption. Insert "mixing ratios of" in front of O3, Clx, etc.

ACPD

2, S5–S7, 2002

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 1, 2002.