Atmos. Chem. Phys. Discuss., 12, C5879–C5881, 2012
www.atmos-chem-phys-discuss.net/12/C5879/2012/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Accelerated dissolution of iron oxides in ice" *by* D. Jeong et al.

N. Takenaka

takenaka@chem.osakafu-ua.c.jp

Received and published: 18 August 2012

Freezing is ubiquitous phenomenon in the world and the effect of freezing aqueous solution on the environment is hardly understood. In this sense, this article is a very important study, and the results are very interesting. There are some comments described below.

Major comments;

The dissolution of iron is equilibrium phenomenon. What is the equilibrium concentration of Fe(3+)? In ice, the authors mentioned that the pH decreased. This means that the equilibrium is established at lower pH in ice. When the sample is thawed, the equilibrium moves to the original pH. If this is true, the results could depend on the

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

time from thawing the sample to the measurements. Please state the view point of equilibrium in the text.

Minor comments;

1. Unit: the SI unit is favorite to use. For example, l should be cmˆ3. In this case, oC can be used because freezing aqueous solution can be easily understood by using Celsius.

2. 2.2 Experimental procedure: the temperatures are wrong. "10 oC, -20 oC, and 30 oC " and "70 oC " and "196 oC" are "-10 oC, -20 oC, and -30 oC " and "-70 oC " and "-196 oC"

3. In Figure 2, the authors compare the reaction rate. However, the initial condition is g / L. It is difficult to compare. The reaction rates depend on M but not g/L. Furthermore, the authors discuss about the surface area. If the authors want to discuss the surface area, show the dependence of surface area by using all data or one material with different surface areas.

4. Figure 4 is difficult to understand. The order of the concentrations are very different. For acetic acid, the authors investigated at mM level but for DFOB, it was μM level. In the case of DFOB, the production of Fe(tot) may decrease in mM level. These are not good example to discuss. Furthermore, if we consider the reaction kinetics, the reaction rates must increase at higher concentration. Please discuss in the text.

5. At low pH(around 2), Fe(2+) becomes more stable than Fe(3+) and is dissolve in water. This does not relate to the results?

6. Page 20120, lines 7 - ; The thickness of the liquid-like layer in the ice decrease with decreasing temperature. Yes, this is true, but the amounts of substances are the same and the concentration increases. The reaction rate depends on the concentration and temperature. So, it is not enough to discuss with only the thickness of the liquid-like layer in the ice.

ACPD
12, C5879–C5881, 2012

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 20113, 2012.

ACPD

12, C5879–C5881, 2012

Interactive Comment