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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Laboratory study on heterogeneous decomposition of methyl chloroform on various standard aluminosilica clay minerals as a potential tropospheric sink" *by* S. Kutsuna et al.

Anonymous Referee #2

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General Comments

This paper reports on the interaction of methyl chloroform with various standard aluminosilica clay minerals. Since the atmospheric chemistry of methyl chloroform is related to hemispheric and global OH concentrations, it was proposed to use the budget of methyl chloroform in order to infer the OH tropospheric budget. However, the OH concentrations deduced from the atmospheric behaviour of methyl chloroform were not supported by other observations nor by simulations. This brought increased attention to a better characterisation of the tropospheric methyl chloroform budget.

Accordingly, this paper, based on laboratory investigations, is focused on an additional tropospheric sink for methyl chloroform i.e., decomposition on clay minerals.

This approach is very interesting and the data are new. Without doubt, this paper warrants publication in Atmospheric Chemistry and Physics. However, in many aspects, the paper is difficult to read. A careful re-editing (according to the comment made below) will certainly improve the overall quality of this manuscript.

Specific Comments

Ţ Abstract: "n, a parameter of the general BET equation". This statement is insufficient without an indication of the physical meaning of n. Just finding a correlation with a parameter without giving the sense of the correlation is not appropriate.

Ţ What steps having taken to ensure that the results obtain in this study on gains smaller than 1 mm can be extrapolated to real atmospheric conditions?

Ţ Throughout the text, a certain number of symbols, notations are used. However, they are not all introduced correctly or defined when used for the first time. I would strongly encourage the authors to carefully define all parameters they are using in equations and figures.

Ţ What is the physical meaning of the first order rate constant k1? This constant has certainly a very complex meaning, including transport properties, adsorption and chemistry. What steps having taken to ensure a meaningful kinetic treatment? I couldn't find any indication about the real meaning of k1, this should be added.

Ţ Also the authors have found that k1 decreases with increasing relative humidity. However diffusion of gases in dry and wet gases is not the same i.e., diffusion being slower with increasing humidity. Could such a simple effect also explain part of the observations?

Ţ Two experimental set-ups are presented. But which one has been used and for what kind of results? More indications are needed.

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Ţ In the second set-up (i.e., column reactor), a Teflon tube was held in a water bath. What about water diffusion through Teflon? Was the humidity really controlled during the experiment? If large amount of water were diffusing into the minerals that would alter the results.

Ţ The number of figures is certainly too large.

Ţ In Table I, a negative rate constant is reported. What is its physical meaning? Also in this Table not all values have uncertainty limits. Please add to measured data their uncertainties with a clear indication of their level.

Ţ Equation (1): why was the C value negative? What is the physical meaning of this constant? Was this the reason of using instead equation (2)? If so, this should be clearly stated.

Ţ On page 1854, line 23: Why are the results between both studies (i.e., Kutsuna et al 2002 and this work) so different? Any hints?

Ţ On page 1858, line 22: "weighted-nonlinear regression". What was the weighting factor? What was fitted and how?

Ţ Equation 9: Does really gaseous methyl chloroform go directly into pores? Is not the gas first adsorb and then travelling from a surface state into the pores? Check also the type of double arrow for that equilibrium.

Technical Corrections

Ţ Most of the figures are too small and therefore difficult to read. Please increase the readiness of the figures. Especially for figure 2 where the spectra can hardly be seen.

Ţ Reference: WMO cannot be indicated as author. Please the reference.

Ţ Page 1846, line 13: "Some of us"Ě Please state clearly who.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 1843, 2003.