Atmos. Chem. Phys. Discuss., 7, S7391–S7392, 2007
www.atmos-chem-phys-discuss.net/7/S7391/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global modeling of secondary organic aerosol formation from aromatic hydrocarbons: high- vs low-yield pathways" *by* D. K. Henze et al.

Anonymous Referee #4

Received and published: 30 November 2007

Using a simple mechanism, based on recent laboratory studies describing the NOx dependence of SOA-yields for aromatic hydrocarbons, the authors try to estimate on a global scale the amount of SOA formed from the aromatic hydrocarbon photooxidation. The paper is well written and presents the results in a clear form. With regard to the content, the comments are as follows: Up to now the understanding of the mechanism leading to the formation of the organic fraction of aerosols is, despite the large number of experimental studies, rather limited. The recent studies as used by the authors clearly indicate, that that the NOx-dependence of aerosol formation has an important influence on the overall yield. The simple mechanism used here in this study describes the competition of two pathways either ROHO2 + HO2 or RO2HO2 + NO, resulting in

different secondary semivolatile products. Using this approach, the experimental results from chamber studies may be transfered to even a global model. Nevertheless one should keep in mind, that the conditions within the atmosphere are quite different from those used in simulation chambers. The authors used the results from the study of Ng et al (2007) where, under low NOx conditions, due to the findings that the yield is constatnt with respect to changes in available substrate and the semivolatile products are essential non-volatile under these conditions. It is worthwhile to mention that in the study of Martin-Reviejo and Wirtz, 2005, the same behaviour was described even under moderate NOx conditions, but using constant NOx levels. The use of the stoichiometric coefficients and equilibrium constants from the study of Ng et. al (2007) may only reflect the experimental conditions used and an interpretation in a global model, with a huge number of different conditions with respect to the free radical levels, NOx-concentration, temperature and pressure regions, can be seen as an first approach. More experimental data is needed to improve our understanding. On the global scale the aromatic SOA-fraction is small, but regionally it can be quite substantial. No clear estimate of the error on the results is given.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 14569, 2007.

ACPD

7, S7391–S7392, 2007