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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric photochemistry of aromatic hydrocarbons: OH budgets during SAPHIR chamber experiments" *by* S. Nehr et al.

Anonymous Referee #2

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Atmospheric photochemistry of aromatic hydrocarbons: OH budgets during SAPHIR chamber experiments by Nehr et al.

This paper presents the results of an OH budget study of photochemical reaction experiments with multiple anthropogenic aromatic VOC's at the SAPHIR chamber located in Jülich. The authors present novel methods and experimental procedures in measuring variable parameters such as OH reactivity, HO2, O3, NO and HONO to study production and destruction OH radical in the chamber. The goal of this research was to find out if the recently proposed OH-production (via HO2 + RO2) would lead to better understanding of OH production in low NO conditions and to evaluate if the missing OH

production could be explained by the new approach and concentrated measurements. In this paper the authors used a steady-state approach to validate production and destruction rates of OH as equal (DOH/POH = 1). This approach was 'calibrated' using CO as a reference compound, giving a DOH/POH ratio result close to one. Both low and high NO conditions were applied during these experiments and results are compared with the Pearl River Delta campaign results. The ratios detected during high NO conditions were higher than the ones observed during low NO conditions. These results were contradictory with the field campaign observation and the authors concluded that aromatics are not driving the OH production in Pearl River Delta. Also the proposed new OH-production pathway proved to be ineffective to explain the missing OH production when NO levels are low. The strengths of this paper are fluent writing and extensive measurements of variable compounds during the photo-oxidation experiments. I recommend this paper to be accepted for publication in ACP after minor revisions.

Specific comments: 1. The use of CO as a reference compound is treated with very self-evident way by the authors. There are referenced within the paper explaining the reason why it is used but I would like to get a few sentences on why CO is used as a reference compound. Maybe the measurement results of CO could be shown in figure 2 with the aromatic compounds to better visualize the data quality if possible.

2. What is the temperature during these chamber studies? Do you have a strong temperature changes during measurements? How does it affect the experiments?

3. I would also like you to note comment (4) by Referee #1 and for the authors to consider explaining more about the systematically higher ratios for low NO experiments, what causes that? In figure 2 it also seems that the chemical structure may affect your measurements at least in the case of p-xylene. In Discussion there is a note that the degradation mechanism is similar to all aromatics but could you speculate if the chemical structure plays a role in the OH budget at all?

4. Figures need to be rearranged or modified, they are too small and I have hard time to recognize the colors (which one is which). Also you could put a marker in where the injection of the aromatic compound was executed in all of the subfigures.

5. Some measured parameters like O3 and NO2 are not presented in figure 1, is there a reason for that?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 5535, 2014.