

Interactive comment on “Evidence of the water-cage effect on the photolysis of NO_3^- and FeOH^{2+} , and its implications for the photochemistry at the air-water interface of atmospheric droplets” by P. Nissenson et al.

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We are grateful to Dr. Arsene for her comments. The reviewer requests more details about certain aspects of the manuscript. First, the reviewer asks why the droplet radii $1\ \mu\text{m}$, $2\ \mu\text{m}$, and $3\ \mu\text{m}$ are chosen for the simulations. The authors calculate the fraction of benzene-OH reaction that could occur in the interfacial region (within 0.5 nm of the surface) of atmospherically relevant droplets. This fraction should be a function of the droplet size since the interfacial region makes up a smaller percentage of total droplet volume as the droplet radius increases. Therefore, three different radii are selected to

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examine how droplet size affects the importance of this reaction within the interfacial region. The droplet sizes selected for this study (radius = $1\ \mu\text{m}$, $2\ \mu\text{m}$, and $3\ \mu\text{m}$) are typical for droplets found in the troposphere. If different radii were chosen (e.g., $0.5\ \mu\text{m}$, $0.7\ \mu\text{m}$, and $0.9\ \mu\text{m}$), the authors expect that the same general trend would be observed – that is, the importance of reactions in the surface layer would be reduced in larger droplets and enhanced in smaller ones. The manuscript will be changed to make this point clearer.

Second, the reviewer asks why the authors selected benzene as a model aromatic substrate in order to assess its reaction rate with OH radicals. Benzene undergoes significant surface accumulation. There are different estimates for the possible extent of the surface accumulation of benzene compared to the bulk and in the study an accumulation factor of 75 is assumed, consistent with literature values (Vacha et al., 2006; Vione et al., 2007). Another reason for the choice of benzene is that this compound reacts very selectively with OH, and can be used as a probe of OH photoproduction in surface and atmospheric waters (Anastasio and McGregor, 2001; Takeda et al., 2004).

References

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