Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-501-RC2, 2016

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Quantification of environmentally persistent free radicals and reactive oxygen species in atmospheric aerosol particles" *by* Andrea M. Arangio et al.

Anonymous Referee #2

Received and published: 9 September 2016

This study reports concentrations of particle-bound environmentally persistent free radicals (EPFR) and radical forms of reactive oxygen species (ROS) using electron paramagnetic resonance (EPR) spectroscopy. ROS species quantified after release by extraction of submicron particle samples in water include OH, O2-, carbon- and oxygen-centered organic radicals; the authors further report concentrations as a function of particle size. The study proposes that the formation of ROS is due to the decomposition of organic hydroperoxides interacting with semiquinones in soot and/or HULIS particles, while EPFR are likely from semiquinone radicals. The study is well written and relevant to the atmosphere and human health concerns. I recommend publication in ACP after the following questions and comments are addressed.

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Comments:

-How do the concentrations of ROS (spins μg-1) compare to those previously reported? It may be useful to include a note in the Methods section about the context of these units in terms of their relationship to standard particle concentrations.

-A mention of g-factor before the Results section may be helpfulâĂŤas written it is difficult to understand the importance of the parameter and how unique a g-factor is to each measurable species.

-Figure 1 - what does the structure at 560 nm indicate?

-Lines 83-98. Can you expand a bit on any transmission effects of the impactor, especially for the coarse particles?

-Figure 2. What do the error bars indicate? Is there any significance that both ROS and EPFR have minima at the same size (560 nm)?

-Lines 99-113. What are the background concentrations of these species? Is there any signal when EPFR are not present?

-Figure 3. Can the authors expand on why rain events do not seem to dampen concentrations of EPFR in 100 nm particles as much as 180 nm particles?

-Figure 5. The authors may find it useful to note the total ROS concentrations to further illustrate the size dependence. For the largest particles (1.8 μm especially), OH seemingly dominates the total ROS concentrations - did OH significantly contribute to the total ROS concentration at 1.8 μm or is this due to the smaller ROS concentrations skewing the total contributions of each species?

-Lines 308-319. Is our lung capacity inhalation dependent on the total concentration (spins μg-1) of these ROS/EPFR species? Is there an amount of ROS/EPFR that our lungs can safely inhale without potential health harm?

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