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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "Formation of hydroxyl radical from San Joaquin Valley particles extracted in a cell-free solution" *by* H. Shen and C. Anastasio

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The authors present an offline analysis of OH radical production rates in surrogate lung fluid from extracted ambient particulate matter collected at two California sampling locations in the San Joaquin valley. The authors demonstrate that the presence of ascorbate (a surrogate antioxidant) promotes the oxidation of transition metals found in ambient particles and the generation of reactive oxygen species (ROS, here OH). In samples that do not contain ascorbate, OH production rates are suppressed as are samples that are pretreated with a transition metal chelator. The author's findings support the growing amount of evidence in the literature that suggests transition metals



found in aerosol particles play an important role in the formation of ROS in lung lining fluid.

The paper is well written and structured. The scientific procedures are well described. I recommend that the manuscript be published in ACP, following the author's attention to the following comments:

General comments:

1.Title/Abstract: Given that the majority of the readers of this journal are from the atmospheric chemistry/physics community, I would suggest slightly rephrasing either the title or first few lines of the abstract to highlight that these are measurements of the generation of hydroxyl radicals by PM in surrogate lung fluid. The title currently is very technical and the linkage to surrogate lung tissue and the impacts of ROS in this medium are not adequately emphasized in the beginning of the abstract.

Reply: We've changed the title to "Formation of hydroxyl radical from San Joaquin Valley particles extracted in a cell-free surrogate lung fluid" and added "in cardiopulmonary tissues" to the end of the first sentence of the Abstract (line 18).

2.Given the strong sensitivity of OH production to the concentration of ascorbate, it would be interesting to see the dependence of OH production over a range of ascorbate levels. It seems possible that the net production of OH is much more a function reductant concentrations than transition metal concentrations, as the later is effectively cycled in the system. In this case, the initial production rate of OH would be a stronger function of Cu(II) loading. Were any analyses of these samples run at other ascorbate concentrations?

Reply: We agree that the rate of OH generation would be dependent on the concentration of ascorbate in the system and anticipate higher OH rates at higher ascorbate concentrations. However we used only one concentration of ascorbate for our ROS measurements (50 uM Asc) to mimic the endogenous level of this reductant. We did

not extract any PM sample at other ascorbate concentrations.

3.Were replicate samples run for each of the filters? Or were multiple filter samples taken for each location/sampling period? Specifically, does the sample number (n) in each figure refer to multiple analyses of the same filter or different samples at the same location and general time frame.

Reply: Either replicate or triplicate samples were run for each of the filters/foils. Since only one filter/foil sample was taken from each location during each sampling period, the sample size (n) in each figure refers to multiple measurements of different portions of the same filter/foil. This point is clarified in Section 2.3.

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/11/C8631/2011/acpd-11-C8631-2011-supplement.pdf

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 16861, 2011.