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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Investigation of particle and vapor wall-loss effects on controlled wood-smoke smog-chamber experiments" *by* Q. Bian et al.

Anonymous Referee #3

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The manuscript "Investigation of particle and vapor wall-loss effects on controlled wood-smoke smog-chamber experiments" by Bian et al. studies how different loss processes and assumptions in describing these processes affect estimates of secondary organic aerosol formation in smog-chamber experiments. They combine experiments with model simulations, which describe evolution of an aerosol populationin a teflon smog-chamber. The manuscript is well written and fits in the scope of Atmospheric Chemistry and Physics.

I recommend the paper for publication provided the authors address the following issues:

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- My main concern is the determination of particle wall losses. Parameter k_e in Equation (1) is a function of turbulent kinetic energy yet the difference in its values for different fuel types range over more than two orders of magnitude (also $k_{w,p0}$ varies more than two orders of magnitude). What can explain this? It does not seem intuitive that chemical or physical properties of different compounds can affect this parameter so much.

Is there a possibility that the APE model inadvertedly e.g. includes wall losses of evaporating compounds in particle wall losses? This would have implications in determining the relative contribution of gas-wall losses.

- The model is initialized assuming equilibrium between the gas and particle phase. Are the walls assumed to be initially "empty" from SOA? If so, would this assumption cause overestimation of gas-wall losses? In addition, instant 25:1 dilution seems like an unreasonable assumption.

Minor comments:

- Page 15245, Line 22: What cooling effects?

- Page 15251, Lines 15-17: Why wouldn't the lower "effective" accomodation coefficients be appropriate for the POA partitioning?

- Page 15260, Line 21: Fig 8. should be Fig. 9

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 15243, 2015.