

## ***Interactive comment on “The formation of SOA and chemical tracer compounds from the photooxidation of naphthalene and its methyl analogs in the presence and absence of nitrogen oxides” by T. E. Kleindienst et al.***

**Anonymous Referee #1**

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In this work, the authors study the photooxidation of naphthalene and methyl-naphthalenes and its resultant secondary organic aerosol formation in laboratory chambers. They then use phthalic acid as a unique tracer of naphthalene SOA product and estimate the contribution of naphthalene SOA to ambient aerosol at two urban sites in the Los Angeles Basin. This work is consistent with the tracer approach proposed by the same group, and thus adds to the capability of using such approach for SOA source attribution efforts. Publication of this manuscript is recommended after addressing the following comments.

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Major comments:

- The SOA yields presented here seem much lower than measured by Chan et al., but are closer to those measured by Shakya et al. (ES&T, 2010). These results should be included in the comparisons.
- The NO<sub>2</sub> concentration in the experiments are not shown here. The cyclohexadienyl radical that is formed upon OH addition to the ring can react with NO<sub>2</sub> or O<sub>2</sub>, depending on NO<sub>2</sub> concentrations. Nishino et al. (2009) showed that at concentrations above 100 ppb, the NO<sub>2</sub> addition dominates. It might therefore be difficult to use the yields measured under unrealistically high (>200 ppb) NO<sub>x</sub> concentrations. (Note: this is different from the HO<sub>2</sub>/NO competition. Here the competition is between NO<sub>2</sub> and O<sub>2</sub>, and since O<sub>2</sub> is constant, it is the absolute concentration of NO<sub>2</sub> that needs to be atmospherically relevant.)

Minor comments:

- pg. 12176 ln 5: "... conducted in the either the presence..." Remove the first "the".
- pg. 12177 ln 7: The base ion should be M+89, not M-89
- pg. 12177 ln 7: It is unclear to me why there would be a fragment resulting from a loss of methyl group [M-CH<sub>3</sub>]<sup>+</sup>. There are no methyl groups in phthalic acid.
- pg. 12178 ln 11: Instead of "worse-case scenario", I suggesting rewording it to "upper bound estimate of gas-phase artifact".
- pg. 12180 ln 15-29: Should include a reaction scheme that will describe the mechanisms more clearly.
- pg. 12180 ln 15-22: Is there any evidence for naphthoic acid formation? Abstraction of H atom is quite slow compared to OH addition to the ring. In toluene, for example, the abstraction route is only 10%. The increase in reaction rate by methyl substitution is likely due to stabilization of the radical by the methyl group after OH addition to the

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ring.

- pg. 12182 In 8-11: The sentence "Moreover, the SOA formation profiles..." is very vague. What does SOA formation profile mean? Is this referring to the time profile? If so, is there a figure that shows the claimed consistency? Or does the consistency lie in the chemical composition?

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 12163, 2012.

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