

Interactive comment on “Evaluation of Anthropogenic Secondary Organic Aerosol Tracers” by Ibrahim M. Al-Naiema and Elizabeth A. Stone

Anonymous Referee #1

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General comments: The authors selected 2,3-dihydroxy-4-oxopentanoic acid (DHOPA), phthalic acid derivatives, nitroaromatic compounds, and frandiones as the candidates of anthropogenic secondary organic aerosol (ASOA) tracer to test them based on a field observation campaign. Secondary organic aerosol is believed to affect climate, visibility, and human health. A tracer-based approach is hopeful technique to identify aerosol sources. Currently DHOPA is an only established tracer of ASOA, therefore additional ASOA tracers would be helpful for better understanding. The authors collected gas and particle offline samples in November, 2015 at a site in Iowa City, United States. The authors analyzed sample extracts employing TMS-derivatization gas chromatography-mass spectrometry. The authors studied source specificity, con-

C1

sistent detectability, atmospheric stability, and partitioning to the aerosol phase for each candidate to conclude that DHOPA, phthalic acid, and 4-hydroxy-3-nitrobenzyl alcohol will be used as ASOA tracers. The manuscript is well written and will provide new physical insight into the atmospheric chemistry, but the following comments should be addressed before publication:

Comments:

- (1) Page 3, line 22. Is November the suitable season to study the validity of ASOA markers? Discussion on observation period would be necessary.
- (2) Page 4, line 14. Ketopinic acid would have lower polarity than DHOPA. ^{13}C -Labeled adipic acid or deuterated tartaric acid might be better internal standards for DHOPA. Discussion on the internal standard of DHOPA would be necessary.
- (3) Page 4, lines 17-18. The power of sonication is missing.
- (4) Page 8, lines 31. Is 4M-PhA the product of naphthalene photooxidation? It would be produced by the reaction of an isomer of methylnaphthalene.
- (5) Page 9, lines 8-10. The definition of M is missing. If M indicates the molecular mass of derivative, $[\text{M}-\text{NO}_2-\text{CH}_3]^+$ and $[\text{M}-\text{NO}_2-\text{CH}_3-\text{Si}(\text{CH}_3)_3]^+$ would be measured at m/z of M-61 and M-134, respectively.
- (6) Page 9, line 10. $[\text{M}-\text{NO}_2]^+$ fragment would be measured at m/z of M-46 if M is the molecular mass of derivative. According to Table S2, $[\text{M}-\text{NO}_2]^+$ fragment would be observed for methylnitrophenol isomers rather than nitroguaiacol isomers.
- (7) Page 24, Figure 4. The chromatographic peaks of 4NP and 4M-2NP are overlapped. These fragment signals might be interfered each other. Discussion on these interferences would be necessary in text.

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C2