Atmos. Chem. Phys. Discuss.,
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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Predictions of diffusion rates of organic molecules in secondary organic aerosols using the Stokes-Einstein and fractional Stokes-Einstein relations" *by* Erin Evoy et al.

**Anonymous Referee #1**

Received and published: 14 April 2019

Summary:

The authors present measured diffusivities of tracers in three proxies for secondary organic aerosols. They have compared their observations with predictions based on the Stokes-Einstein relation. From their measurement data, they have presented parameters for a fractional Stokes-Einstein relation. They have also compared their observations with observations in literature and predictions from Stokes-Einstein relation and their model for a fractional Stokes-Einstein relation. The experiments seem properly done and are simply and clearly explained. Their data are also simply and clearly presented.



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Discussion paper

There are however a few questions I would like answered:

Major comments:

1. There is a comparison between their developed fractional Stokes-Einstein relation and the Stokes-Einstein relation. Price et al. (2016) already presented a fractional S-E relation. A comparison of their outcome with this model was not made. Do we really need a new fractional S-E relation when that from Price et al. already exists? How does Price et al.'s compare to your model and your observations? What does C in the fractional relation represent?

2. What saturated salts were used in setting the relative humidity and what is the water activity over those salts used? This can be presented as part of the SI.

3. Crystallization in the droplets: was there a control sample without the tracers? How does the occurrence of crystallization at the low water activity in droplets without tracers compare to droplets with the tracers? A statement of how the tracers impact the behaviour of the test solution should be made.

Minor comments:

1. Please include a "," after following on line 8, page 3

2. Please include a "," before "we account. . ." on line 12, page 7

3.Please include a "," after "In Fig 3a on line 30, page 7

4. Please change "t" as the symbol for the fractional parameter in the fractional S-E relation; "t" has been used elsewhere in the paper to represent time.

Thank you.

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