Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-1355-SC1, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Photolytically-Generated Sulfuric Acid and Particle Formation: Dependence on Precursor Species" *by* David R. Hanson et al.

David R. Hanson

hansondr@augsburg.edu

Received and published: 9 March 2019

This reviewer's close reading and thoughtful comments are extremely helpful to us as we revise the manuscript. A few points here as the discussion time closes out:

> The title is lacking and we agree that it needs to be changed. We are considering a change to: "Sulfuric acid particle formation in a Photolytic Flow Reactor: experimental description, dependence of results on HONO, SO2, H2O and added base and model calculations"

With this new title including the model calculations, and the other referee's questions on the model, we will be adding a section in the Supplement that gives a more complete model description.

> The criticism that the results are not so much new knowledge but the work is mostly of a confirming nature is not incorrect. Yet, there are new aspects to this work: the experiment itself, the detailed photo-chemical and cluster model calculations, the measurements of dependency on RH when dimethylamine was added, the SO2 dependence, the demonstration that the ammonia-sulfuric acid system is not well-established.

Also, noting the spread in previous results (nearly four orders of magnitude in the x-axis in the figure below), experimental work of a confirming nature are very much needed in this field of study.

> The reviewer pointed out that our references in Fig. 11 were deficient. We also discovered we had left off the reference list two of the previous results that were plotted. We have also plotted the Sipila et al. results and added data from the Young et al. 2008 results. We decided not to include Benson et al. 2008, another photolytic result from the Kent State-type nucleation reactor, because they employed a wall loss factor that appears to not be measured and was subsequently over-ridden by the Young et al. 2008 and Benson et al. 2009 work. Note that Yu et al. 2017 also used a Kent State-type experiment: all these types of experiments are depicted with triangles in the figure. Likewise, the Leibniz and FMI type experiments are plotted with circles and the CLOUD experiments are plotted with diamonds.

Please see the revised figure below.

Overall, there is very little in this reviewer's comments that we will argue with and we will revise the manuscript accordingly. Details to follow.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-1355, 2019.

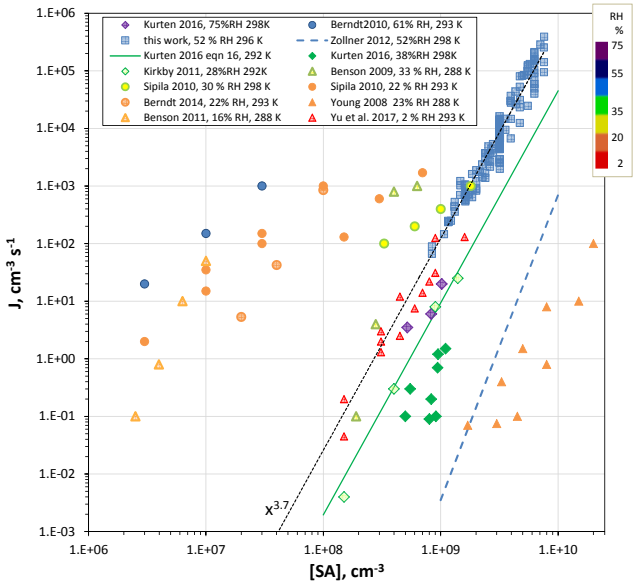

Fig. 1. Figure 11 comparing results with many previous results. Temperature and RH are now uniformly indicated in the legend.