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Interactive comment on “Sulfuric acid nucleation: power dependencies, variation with relative humidity, and effect of bases” by J. H. Zollner et al.

Anonymous Referee #1

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The authors describe findings from a flow-tube experiment investigating H₂SO₄/base/H₂O nucleation. This manuscript represents a continuation of a paper from 1999 using similar experimental setup completed with a high sensitivity mass spec for NH₃/amine detection.

Recently there is a lot of progress in the understanding of the elementary processes of interest for new particle formation. Nevertheless, the process of new particle formation is still a hot topic in atmospheric science. Therefore, the experimental results shown here could be interesting for the readership and the paper is suited to publish in this journal. Before publishing, some clarifications could improve this manuscript.

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- In Abstract the authors promise a CFD modelling study, but nothing is given in the manuscript! It would be very helpful to see explanations how they determined the nucleation zone and what the loss of H₂SO₄ and NH₃/amine was between nucleation zone and detector. What was the particle loss from nucleation zone to the counter depending on size? What processes are important for particle growth, i.e. the role of NH₃/amines for growth!

- It's not clear to me, measured the authors the particle numbers in each case with the commercial TSI counters in the "enhanced mode" allowing detection of particles in the 1.3 - 2.5 nm range? And were the particle in each case 2 nm in diameter or larger? Can the authors clearly distinct between the base-effect for nucleation rate and/or for growth?

- A comparison of slopes, log (nucleation rate) vs. log([H₂SO₄]), is presented. Have the authors any indication regarding the slope in the presence of amine as a result of their experiments? This topic should be discussed at least qualitatively.

- A comparison of author's findings with atmospheric observations for the "slope" and the nucleation rate and a discussion regarding this would be fine, for instance with the results by Kuang et al., J.Geophys.Res., 2008.

- Very recently (after submission of this manuscript) a paper by S.-H. Lee's group appeared in GRL with the same topic. The authors should refer to this paper and discuss the enhancement factors given here for much higher amine concentrations.

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