

***Interactive comment on “Ternary homogeneous nucleation of H<sub>2</sub>SO<sub>4</sub>, NH<sub>3</sub>, and H<sub>2</sub>O under conditions relevant to the lower troposphere” by D. Benson et al.***

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What was the cut-off size of the used CPC? Introducing large quantities of ammonia will cause the particles to grow and if the size range of the freshly nucleated particles is close to the cut-off size, adding ammonia causes the particles to grow, increasing the apparent nucleation rate due to the detection efficiency of the particle counter. Also finding that the unit nucleation rate was accomplished with the same concentration of H<sub>2</sub>SO<sub>4</sub> implies that ammonia is taking part on the growth, not in the forming of critical cluster.

Response: The cut-off size for the CPC 3786 is 2.5 nm. It is possible that ammonia is

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contributing to growth and not so much producing new particles. However, one study (Zhang et al., 2009) does show that ammonia contributed negligibly to growth.

Other question is that was the sulfuric acid measured again from the side of the tube as previously? This might cause some error if the wall loss factor (WLF) is being minimized. This might explain the very low H<sub>2</sub>SO<sub>4</sub> concentration for nucleation compared to other studies.

Response: [H<sub>2</sub>SO<sub>4</sub>] are measured from the side of the tube as previously, but there should not be any error in this measurement since we have complete mixing in our flow tube. Also, since the measurements were taken from the end of the mixing region (which has the same I.D. as our last experiments) this would not explain the low H<sub>2</sub>SO<sub>4</sub> concentration (last time it was 108 cm<sup>-3</sup>)

Zhang, R., Wang, L., Khalizov, A. F., Zhao, J., Zheng, J., McGraw, R. L., and Molina, L. T.: Formation of nanoparticles of blue haze enhanced by anthropogenic pollution, *Proceedings of the National Academy of Sciences*, 106(42), 17650-17654, 2009.

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