

***Interactive comment on “Total sulphate vs. sulphuric acid monomer in nucleation studies: which represents the “true” concentration?” by K. Neitola et al.***

**Anonymous Referee #1**

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This paper examines the differences in sulfuric acid monomer concentrations measured with CIMS and CI-API-TOF and sulfate measured with MARGA and predicted from the Kulmala and Laaksonen (1990) equation. Sulfuric acid vapor is produced from a saturator from the liquid solution. A flow tube is also used to generate particles via nucleation and wall loss of sulfuric acid is estimated and taken into account for the sulfuric acid estimation. These flow tube results are used to assess the differences in sulfuric acid monomers and sulfate concentrations. I reject this paper for publication because the method used in the study cannot be validated and the conclusions drawn from these measurements and analysis are skewed.

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One usually assesses a theory or parameterization using observation data. In this manuscript the authors evaluate CIMS measurements, by assuming that the sulfate concentrations predicted from Kulmala and Laaksonen (1990) equation, together with mass flow measurements and wall losses, are the “correct” values of sulfate (although, they indicated that the equation predicts sulfuric acid vapor, but the language changes to sulfate in the manuscript later on). Wall loss is empirically estimated, although this does not follow the first order of loss process. The tube also has a considerable amount of impurities of base compounds, which are not determined at all, even though several unanswered questions are thrown at the end of the manuscript as the conclusion, which implies that base compounds are responsible for differences in sulfuric acid monomers and sulfate concentrations. With the high uncertainties in several key variables, I am skeptical that the predicted values of sulfuric acid (or sulfate) from these experiments are meaningful to properly assess CIMS measurements.

The title is also misleading. “Which represents the “true” concentration?” True concentration of what? Why would one expect concentrations of monomer should be the same as those of sulfate? They are different chemical substances.

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