

## ***Interactive comment on “COMPASS – COMparative Particle formation in the Atmosphere using Simulation chamber Study techniques” by B. Bonn et al.***

**Anonymous Referee #2**

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General Comments:

In this manuscript the authors describe a new instrument for probing the effects of chemical and physical parameters on atmospheric gas and aerosol properties. This instrument is essentially a pair of flow tube reactors into which atmospheric air is sampled and then the air in one reactor is subjected to various perturbations, such as changes in light, temperature, humidity, oxidants, VOCs, or other chemicals while the other reactor is unperturbed and thus acts as a reference. The instrument has been thoroughly characterized to show that both reactors act similarly when subjected to the same conditions, as is necessary to guarantee that differences between measurements made on

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the two reactors can be interpreted as being due solely to the effect of the perturbation. The system has been used in preliminary studies to explore the effects of a variety of the parameters mentioned above for air sampled in urban and rural atmospheres, and the results indicate that the instrument should provide a useful tool for understanding the atmospheric chemistry of gases and aerosols. The described work is well done, the experiments are relatively straightforward, and the interpretation of the results is reasonable. The paper is well written and the presentation of data clear. I recommend the paper be published after the minor comments below have been addressed.

Specific Comments:

1. A number of other studies have been conducted in which atmospheric air was sampled into a flow tube, such as the PAM reactor, and subjected to perturbations such as the addition of O<sub>3</sub>, UV light, etc. The major difference between those approaches and this one appears to be that here a separate reactor is used for reference measurements whereas in those studies the reference is air sampled into the same reactor without the perturbation or air sampled directly into the measurement instruments. Some discussion of the need for a separate reference reactor is warranted. Were any studies conducted to determine if it was necessary?
2. Some discussion would be useful regarding the value of information obtained when a single variable is changed, while in the atmosphere it is more common that many would change at once. They are not typically independent. Also, without highly detailed chemical analyses how does one interpret these results when the atmospheric system is so complex?

Technical Comments:

None.

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