

Interactive comment on “Effect of temperature on the formation of Highly-oxygenated Organic Molecules (HOM) from alpha-pinene ozonolysis” by Lauriane L. J. Quéléver et al.

Anonymous Referee #2

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The authors studied the formation of HOM (highly oxygenated organic molecules) by ozonolysis of α -pinene (and β -Pinene) and determined molecular HOM yields as a function of the temperature. Experiments were performed in the AURA chamber. HOM were measured by NO₃-CIMS. The findings are an interesting and important puzzle piece in finding out about the importance of HOM for SOA formation and atmospheric chemistry in general, as the temperature range was extended to -15° . Background for the study is that HOM formation should be hampered at low T, as the key formation step the rearrangement of peroxy radicals should be strongly dependent on temperature. The thorough study was a challenge and has some “weak points”, the main being the quantification of the HOM: even comparison of relative HOM pattern maybe difficult

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at different temperatures. As consequence the findings have some uncertainties. However, the authors addressed these issues and dealt with them quite clear and openly. Thus manuscript provides a new and original contribution for understanding HOM. The manuscript is highly interesting and very well written. I have only minor comments dealing with the quantification and some small remarks. I suggest to publish this very interesting manuscript in ACP. It could be even publish as it is, but the authors may want to consider the comments below.

Minor comments:

line 185: “. . .the calibration factor $C = 1.65E9$ molecules cm^{-3} ”, the reference to it is pretty vague. Do I understand correctly that you detect about 70 ppt HOM per normalized ct? Can you add your detection limit?

line 269: Did you try to verify your transmission function? Ehn et al. 2011 and Heinritzi et al. 2016 show quite different transmission behavior.

line 270: How did you specifically estimate the uncertainty of tens of percent? From the variation of the RI $5-7E4$ cps? (I guess you meant “several times 10%”?)

Remarks:

line 142: “In practice, the experimental plan focused on α -pinene oxidation. . .”, sounds a little skewed. Maybe better “The experiments focused on α -pinene oxidation. . .”

line 373 and line 378: I suggest to reformulate this sentence. Despite your large uncertainty you still “calculate” the yields. They maybe only estimates because of the uncertainty. . . . Accordingly you should replace “absolute estimates” by “molar yields” in line 378.

Figure 3, legend: I suggest to replace “HOM spectrum” by “selected HOM”. It is easier to grip.

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