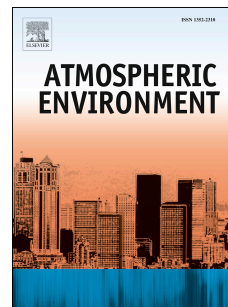


Accepted Manuscript

Secondary organic aerosol formation from propylene irradiations in a chamber study

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PII: S1352-2310(17)30145-0

DOI: [10.1016/j.atmosenv.2017.03.019](https://doi.org/10.1016/j.atmosenv.2017.03.019)

Reference: AEA 15230

To appear in: *Atmospheric Environment*

Received Date: 13 January 2017

Revised Date: 3 March 2017

Accepted Date: 11 March 2017

Please cite this article as: Ge, S., Xu, Y., Jia, L., Secondary organic aerosol formation from propylene irradiations in a chamber study, *Atmospheric Environment* (2017), doi: 10.1016/j.atmosenv.2017.03.019.

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1 Secondary organic aerosol formation from propylene irradiations in 2 a chamber study

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12 13 Abstract

14 Some studies have shown that low-molecular-weight VOCs such as ethylene and
15 acetylene can form SOA. However, so far propylene (C₃H₆) has not been studied. The
16 current work systematically investigates irradiations of propylene in the presence of
17 NO_x (x=1, 2) in a self-made indoor chamber. Only a small amount of secondary
18 organic aerosols (SOA) was formed under 5% and 80% RH conditions without
19 sodium chloride (NaCl) seed particles or in the presence of solid NaCl. When NaCl
20 was in the form of droplets, liquid water content (LWC) increased from 34.5 to 169.8
21 μg m⁻³ under different initial NaCl concentrations, and correspondingly the amount of
22 SOA linearly increased from 5.9 to 29.8 μg m⁻³ (SOA=0.0164×LWC+1.137, R²=0.97)
23 at the C₃H₆/NO_x ratio of 32.2-44.9. The initial C₃H₆/NO_x concentration ratio
24 (ppbC/ppb) considerably impacted the formation of SOA, in which the amount of
25 SOA increased from 12.1 to 47.9 μg m⁻³ exponentially as the ratio decreased from
26 46.5 to 6.3 with an important point of the ratio value of 11. At the ratio of less than 11
27 in the regime under the control of C₃H₆, SOA concentrations decreased considerably

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