

## ***Interactive comment on “Aqueous-phase photooxidation of levoglucosan – a mechanistic study using Aerosol Time of Flight Chemical Ionization Mass Spectrometry (Aerosol-ToF-CIMS)” by R. Zhao et al.***

**Anonymous Referee #1**

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General: This is a very good contribution on the aqueous phase degradation of levoglucosan which has been identified to possibly be degraded in the atmosphere including its aqueous phase. The study re-determines the rate constant for the OH reaction and confirms published kinetic data within a factor of about two.

Further to the kinetics study, the paper contains a wealth of very valuable mechanistic information, which, however, could be more comprehensively summarized (see below)

C2131

This contribution surely merits publication in ACP subject to a couple of issues listed below which should be addressed prior to publication.

Details:

Page 3, line 96ff: When competition kinetics are used, the reference rate constant should always be given.

Page 3, line 215: As it is nice to know that the LG concentration range might be similar to cloudwater concentrations, this is not a prerequisite for the determination of a correct rate constant. The concentration levels of both the oxidant (OH) and the substrate (LG), however, are of course important for the mechanistic studies. Maybe this could be remarked in that second paragraph, right column on page 3.

Page 4, line 264 ff: The mechanistic studies are described in sections 3.1.1., 3.1.2. and 3.1.3 discriminating between functionalisation, bond scission and information from the ToF-CIMS instrument which make sense in view of the methods applied. However, for summarising the information obtained as a whole it would be very good for the manuscript to have another, following section, maybe 3.1.4, where all mechanistic information should be integrated into an LG degradation scheme which does not need to be complete but should reflect at least the main findings leading to the identified products - 'a mechanism in line with the identified products'. Such summary is currently missing and would be a strong improvement of the manuscript.

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