

Interactive comment on “In-cloud processes of methacrolein under simulated conditions – Part 1: Aqueous phase photooxidation” by Y. Liu et al.

Anonymous Referee #1

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<General comments> Liu et al. studied the photochemical reactions of methacrolein, which can be derived from oxidation reaction of isoprene and direct anthropogenic emission in the atmosphere. In their manuscript, main result is that they determined bimolecular rate constant for methacrolein with OH radical and identified some of the reaction products under simulated cloud conditions. The objectives and study itself are quite interesting, however, the conditions of cloud (as shown in their title) need to be better simulated, especially pH often significantly affects the reaction rates. Thus, the reviewer recommends that this report needs a significant change, and hopes to see more experimental data, especially the effects of pH on bimolecular rate constants so that the information the authors provide will be a merit for the readers of Atmospheric Chemistry and Physics.

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<Specific comments> 1. One major concern for the study is the big change in pH of the studied solution, i.e. from 5.6 to 4.5. It would have been probably more interesting if the authors studied at least a few more pHs, e.g. pH = 3 and 2, since some of the aged cloud drops can reach pH of about 2. 2. Also, the bimolecular rate constant the author reported is in good agreement with the one reported by Buxter et al. Since the value is already reported, the originality of the study is not granted. 3. Authors state that the slight difference in rate constant between the one they report and Buxton et al. is due to temperature change. If so, the authors also should have studied rate constant at 20 °C to confirm it. If the rate constants were reported at several temperatures, the results would have been much more interesting one. 4. Page 6407, line 24, about hydroperoxide. The authors state that it was not detected. There did not seem to appear any experimental techniques or detection limit for the peroxides analysis. They should be included in “Table 1. Continued”, which I suggest to change to Table 2 since the “Table 1” and “Table 1. Continued” have very different information.

<Minor comments> 1. Page 6400, 14th line, MACR appears first time, so it should be defined as “methacrolein (MACR)” or somewhere beforehand. 2. Page 6400, 16th and 17th line, the rate constants (kMACR, kR) should appear above the arrows. Otherwise, though understandable, it looks like products times kMACR and products times kR. 3. Page 6401, 7th line, “. . . 4 mL samples were taken. . .” It would be more useful to state that the volume of samples taken out corresponds to ? % change in volume relative to the initial volume. Otherwise, the statement itself does not mean much. Or, the initial volume of the sample should be stated.

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