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*Supplement of*

## **Laboratory studies of the aqueous-phase oxidation of polyols: submicron particles vs. bulk aqueous solution**

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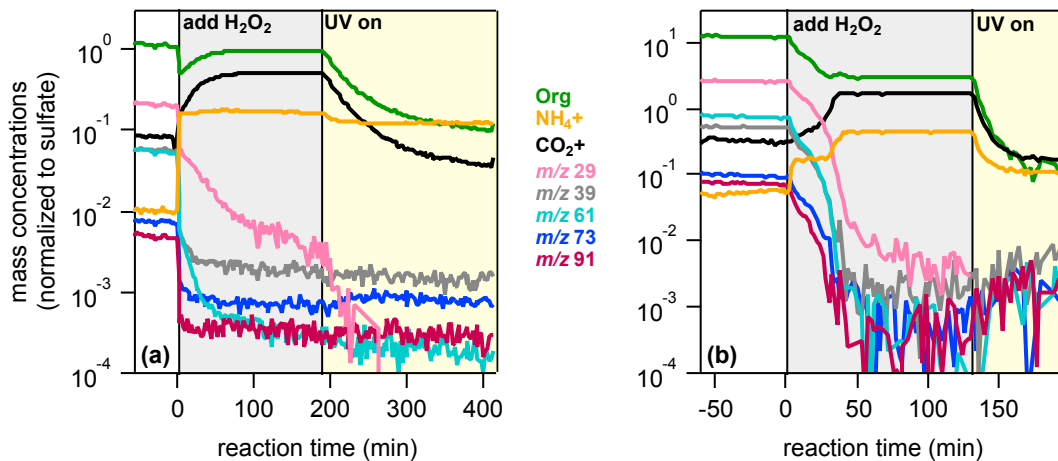


Figure S1. Results (including photolysis) for the oxidation of erythritol ( $C_4H_{10}O_4$ ), showing sulfate-normalized mass concentrations of total organic (Org), ammonium ( $NH_4^+$ ),  $CO_2^+$ , and key ions associated with erythritol ( $m/z$  29, 39, 61, 73, 91) as a function of reaction time for (a) bulk oxidation and (b) chamber oxidation. All data is shown in unit mass resolution, except for  $NH_4^+$  and  $CO_2^+$ , which are high-resolution traces. Dark Fenton chemistry is indicated by grey shading, and exposure to UV by yellow shading.

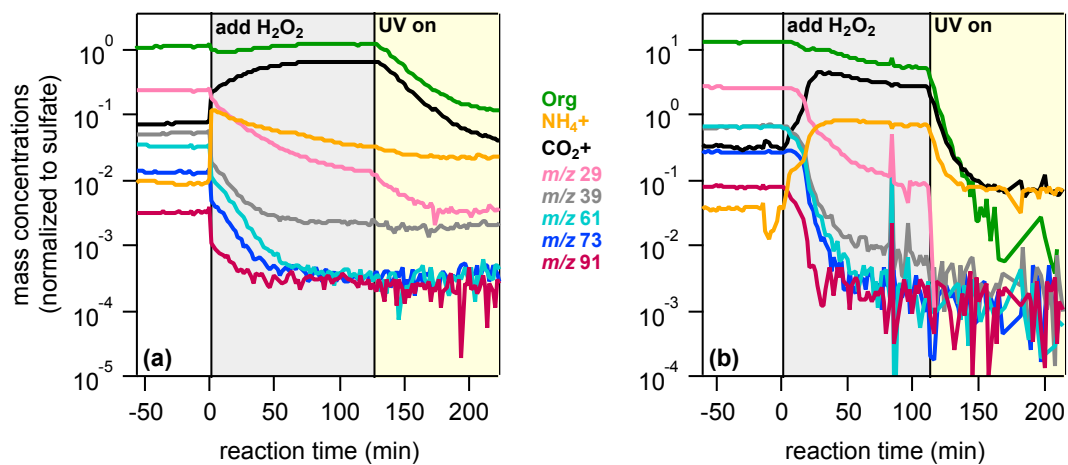


Figure S2. Same as Figure S1, but for the oxidation of adonitol (C<sub>5</sub>H<sub>12</sub>O<sub>5</sub>).

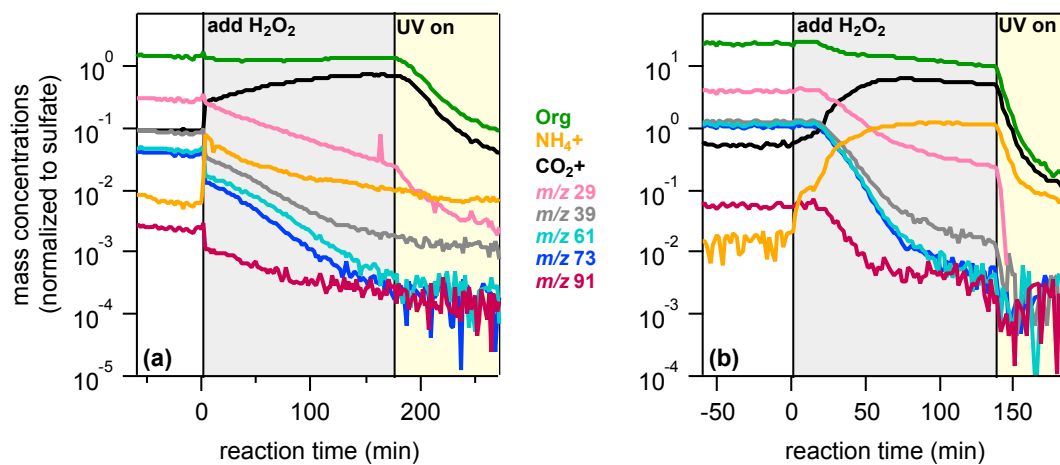


Figure S3. Same as Figure S1, but for the oxidation of mannitol (C<sub>6</sub>H<sub>14</sub>O<sub>6</sub>).

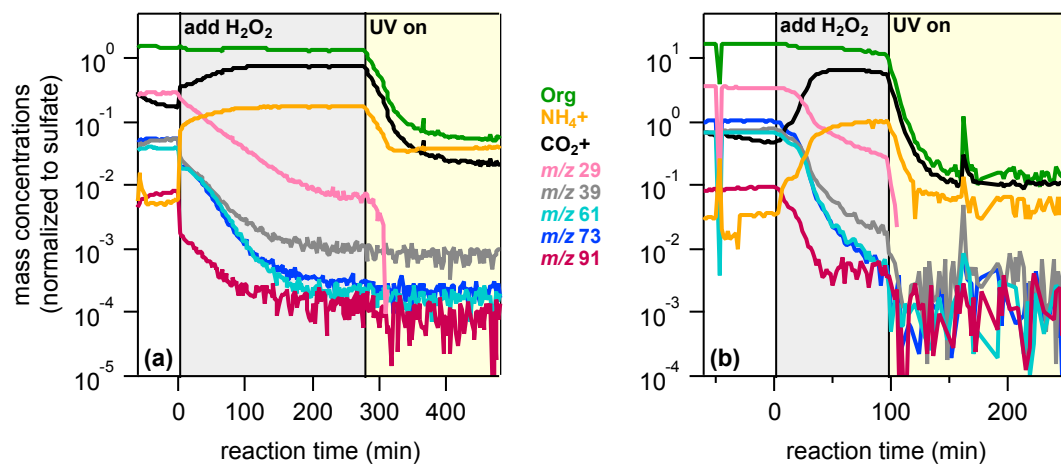


Figure S4. Same as Figure S1, but for the oxidation of volemitol ( $C_7H_{16}O_7$ ).

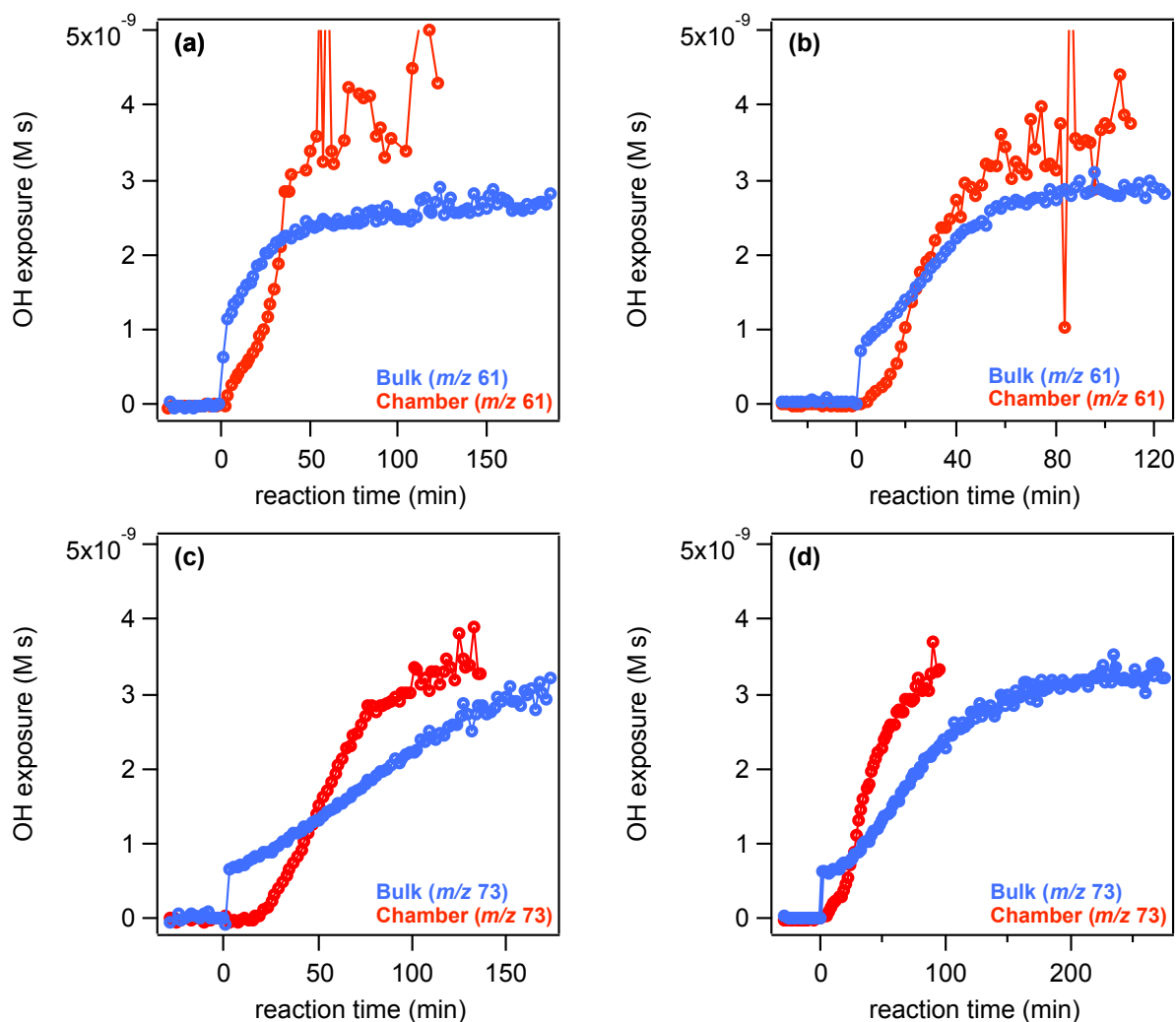


Figure S5. Estimated OH exposures for all experiments. These are determined from  $\text{OH exposure} = \ln([\text{polyol}]_0/[\text{polyol}]_t)/k_{\text{OH}}$ , where  $[\text{polyol}]_0$  and  $[\text{polyol}]_t$  are the sulfate-normalized mass concentrations of the fastest decaying tracer ion at times 0 and  $t$ , respectively, and  $k_{\text{OH}}$  is the rate constant for aqueous reaction with OH (Herrmann et al., 2010). OH exposures for both bulk and chamber oxidation are shown as a function of time from 30 min prior to adding  $\text{H}_2\text{O}_2$  until exposure to UV lights for (a) erythritol using  $m/z$  61 as a tracer and  $k_{\text{OH}} = 1.9 \times 10^9 \text{ M}^{-1}\text{s}^{-1}$ , (b) adonitol using  $m/z$  61 as a tracer and  $k_{\text{OH}} = 1.6 \times 10^9 \text{ M}^{-1}\text{s}^{-1}$ , (c) mannitol using  $m/z$  73 as a tracer and  $k_{\text{OH}} = 1.6 \times 10^9 \text{ M}^{-1}\text{s}^{-1}$ , and (d) volemitol using  $m/z$  73 as a tracer and  $k_{\text{OH}} = 1.6 \times 10^9 \text{ M}^{-1}\text{s}^{-1}$ . (Because no  $k_{\text{OH}}$  has been reported for volemitol, it was assumed to be equal to the  $k_{\text{OH}}$  for mannitol.)