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Supplementary

Effect of Bulk Composition on the Heterogeneous Oxidation of Semi-Solid Atmospheric Aerosols

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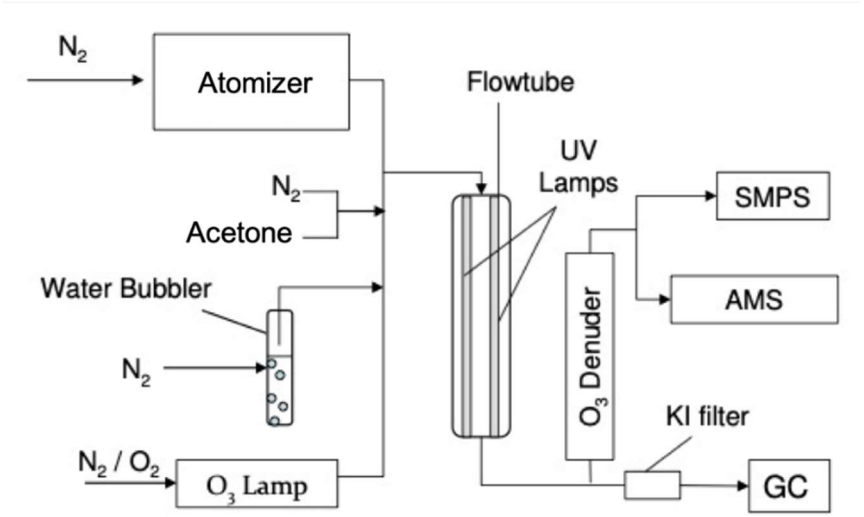

Figure S1. Schematic representation of the atmospheric pressure flow reactor at the Advanced Light Source Synchrotron. Saccharide particles are produced by a constant output atomizer. The aerosol stream is then mixed with acetone, humidified N_2, oxygen, and ozone. Upon exiting the flow tube, the aerosol stream is sampled and analyzed by a scanning mobility particle sizer (SMPS) and an aerosol mass spectrometer (AMS). Gas-phase concentrations of acetone are monitored during the reaction by a gas chromatograph (GC). Adapted from Smith et al. (2009) [49].

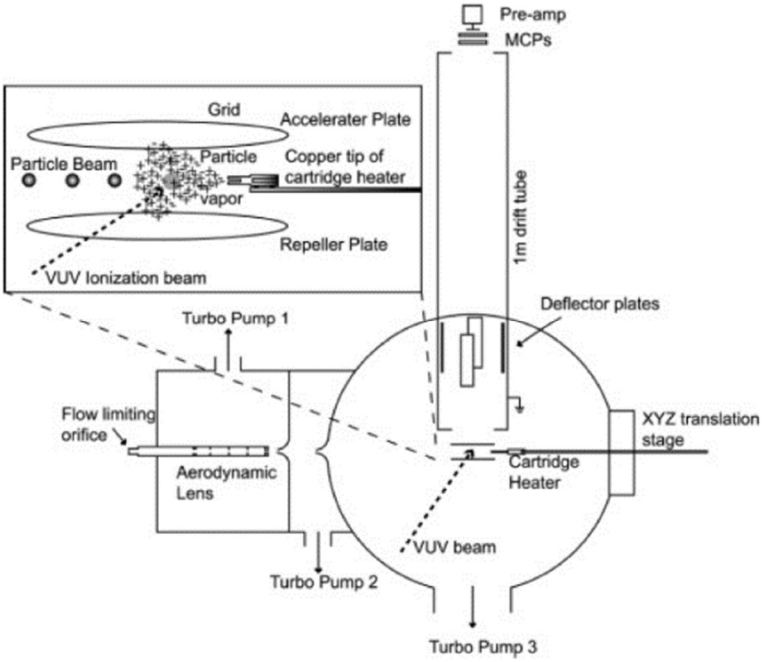

Figure S2. Schematic view of the aerosol TOF–MS at the Advanced Light Source synchrotron. The sampling of the particle flow is performed using an aerodynamic lens system generating a collimated particle beam under vacuum. The particles are vaporized by a cartridge heater in the ionization region (see insert) and the resulting plume is ionized by the VUV light. The ions are mass selected by a linear time-of-flight mass spectrometer. Reproduced from Mysak et al. (2005) [48].

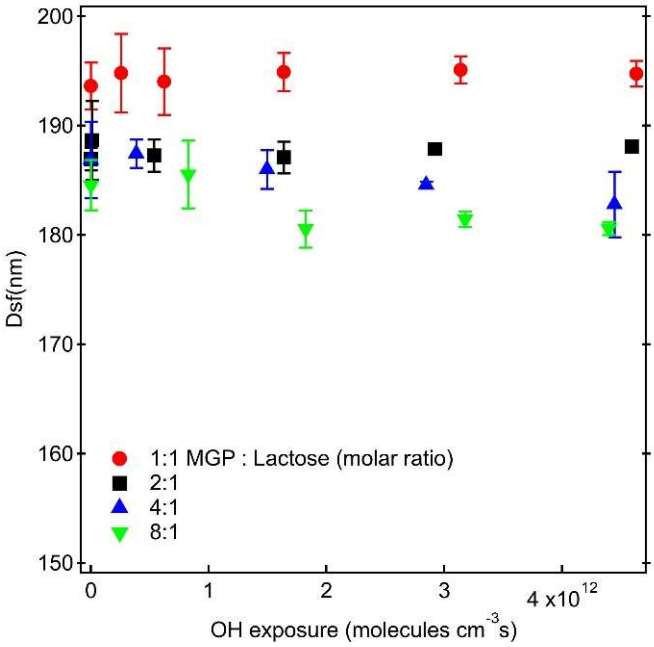

Figure S3. Absolute surface weighted diameter as a function of OH exposure for MGP:lactose molar ratios of 1:1 (red solid circles), 2:1 (black solid squares), 4:1 (blue solid up-triangles), and 8:1 (green solid down-triangles) used for the VUV-AMS experiments at the ALS. The error bar is 2σ of the mean values.

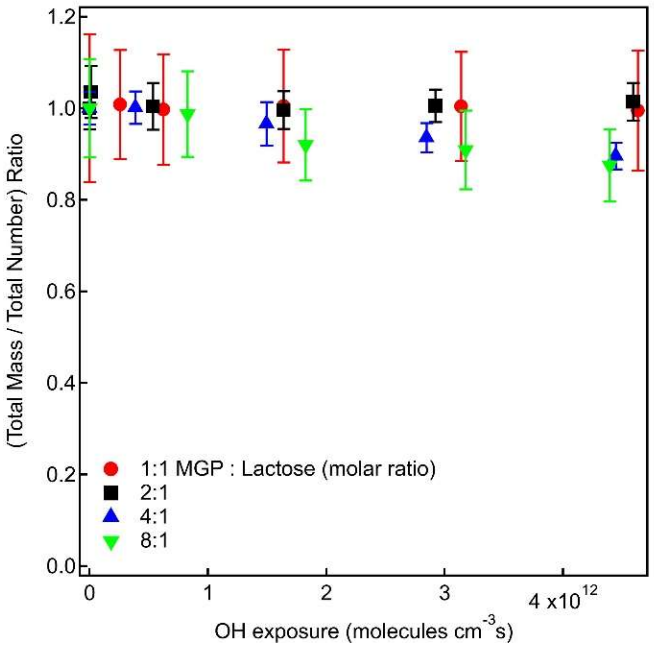

Figure S4. Ratio of the reacted over unreacted aerosol total mass as a function of OH for MGP:lactose molar ratios of 1:1 (red solid circles), 2:1 (black solid squares), 4:1 (blue solid up-triangles), and 8:1 (green solid down-triangles) used for the VUV-AMS experiments at the ALS. The error bar is 2σ of the mean values.

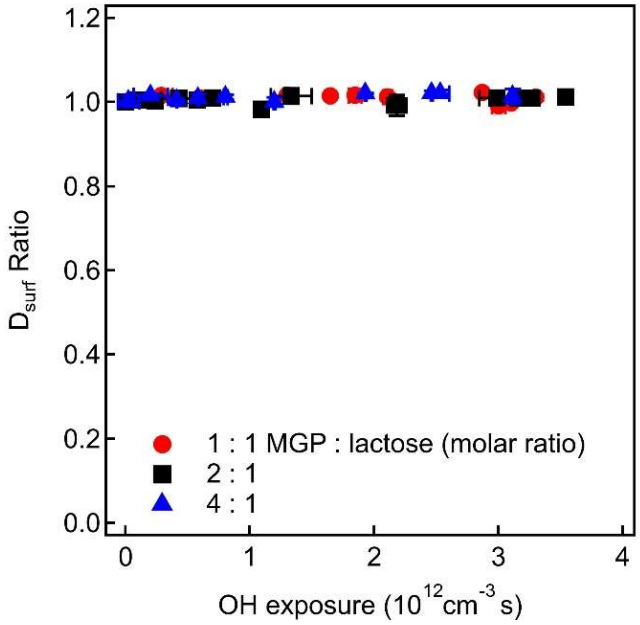

Figure S5. Relative surface weighted diameter as a function of OH exposure for MGP:lactose molar ratios of 1:1 (red solid circles), 2:1 (black solid squares), 4:1 (blue solid triangles) used for the GC-MS experiments at WVU. The error bar is 2σ of the mean values.

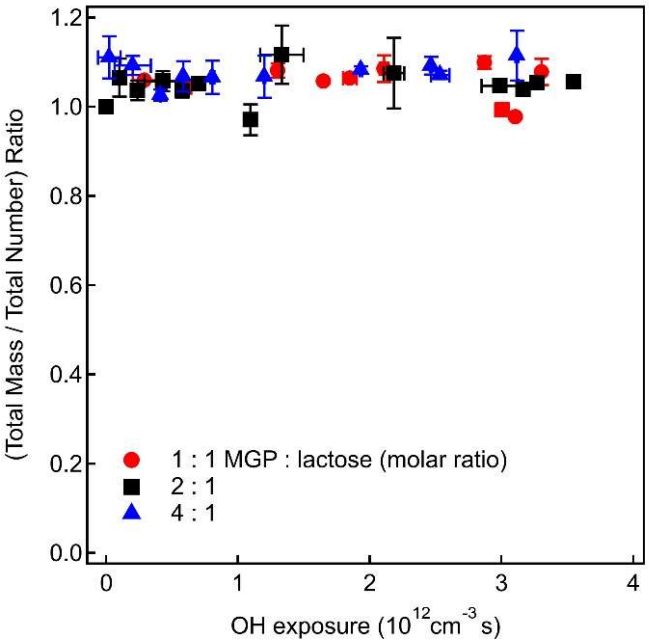

Figure S6. Ratio of the reacted over unreacted aerosol total mass as a function of OH for MGP:lactose molar ratios of 1:1 (red solid circles), 2:1 (black solid squares), 4:1 (blue solid up-triangles) used for the GC-MS experiments at WVU. The error bar is 2σ of the mean values.

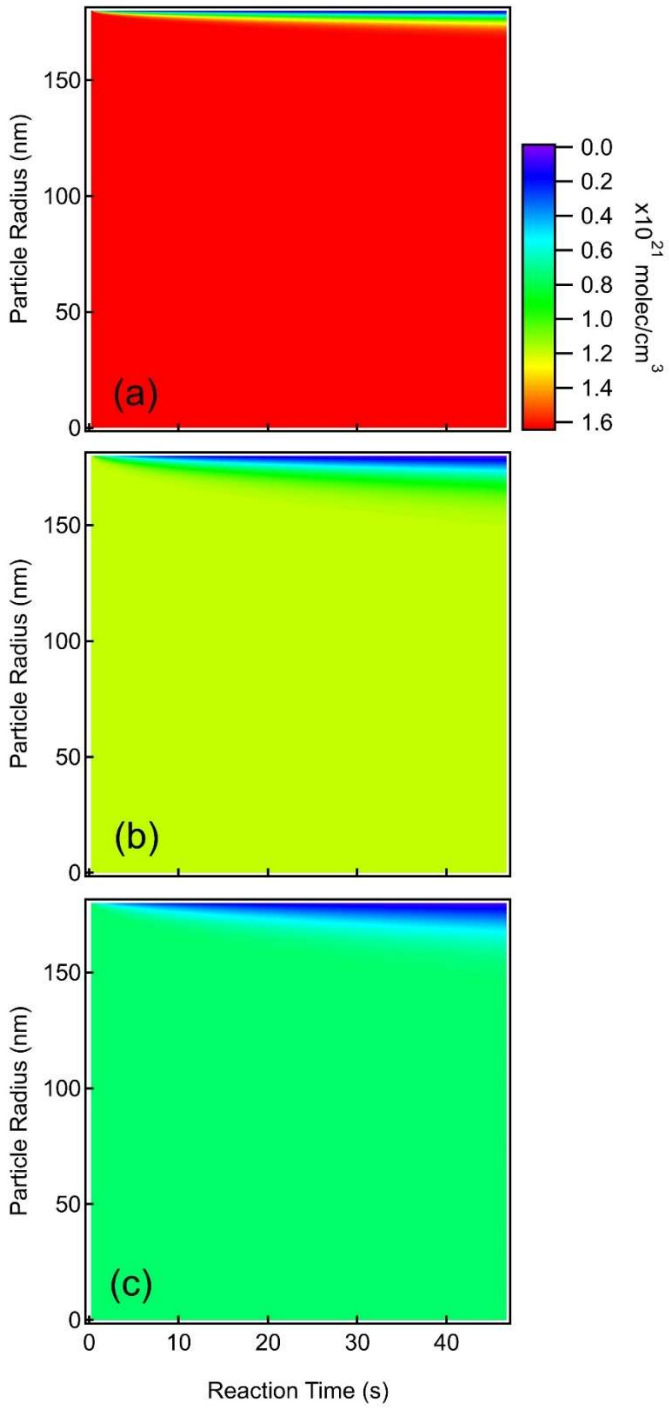

Figure S7. Modeled space-time plots of lactose concentration for MGP:lactose molar ratios of (**a**) 1:1 (**b**) 2:1 and (**c**) 4:1 with a constant OH gas number density of 1.08×10^{10} cm^{-3}. The particle radius is 180 nm and the reaction time is 46 s.

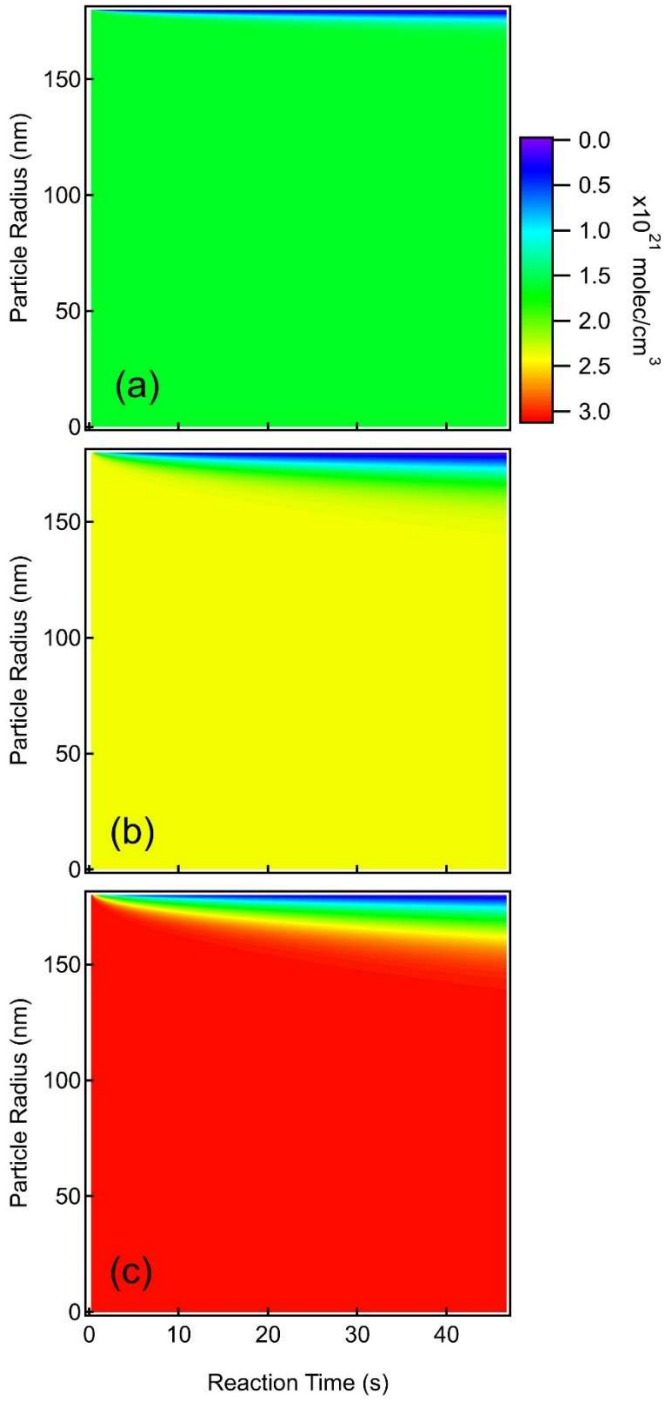

Figure S8. Modeled space-time plots of MGP concentration for MGP:lactose molar ratios of (a) 1:1 (b) 2:1 and (c) 4:1 with a constant OH gas number density of 1.08×10^{10} cm^{-3}. The particle radius is 180 nm and the reaction time is 46 s.

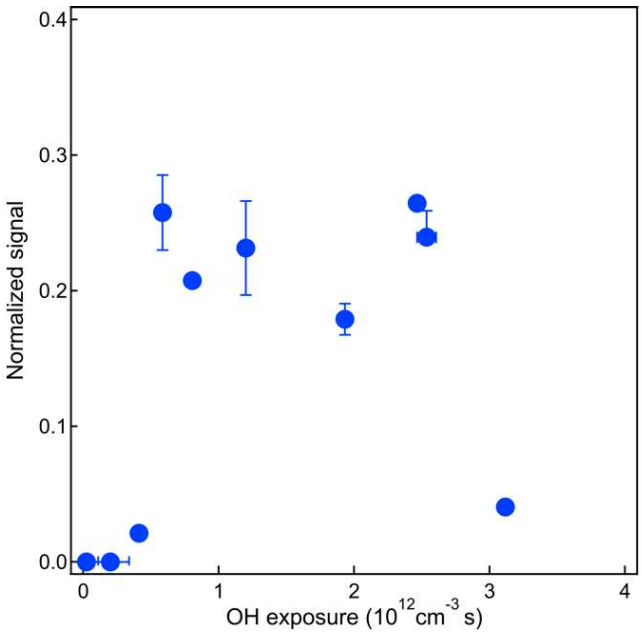

Figure S9. Normalized glucose signal as a function of OH exposure identified in semi-solid MGP–lactose particles with a molar ratio of 4:1.