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Effective Henry's Law constant measurements for glyoxal in model aerosols containing sulfate

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Traditional models represent secondary organic aerosol (SOA) formation based on the gas-phase oxidation of a limited set of precursor molecules. However, these models tend to under-estimate the amounts and degree of oxygenation of actual SOA, indicating missing processes. One such source that has become increasingly important in recent years is glyoxal (CHOCHO, the smallest alpha-dicarbonyl). Unlike traditional SOA precursors, glyoxal forms SOA by partitioning to the aqueous phase according to Henry's Law. This work presents an analysis of Henry's Law constants for glyoxal uptake to laboratory-generated aerosols in a dynamically coupled gas-aerosol system. We combine CU LED-CE-DOAS measurements of gas-phase glyoxal with online HR-Tof-AMS and time-resolved HPLC ESI MS/MS particle-phase measurements to characterize the time resolved evolution of glyoxal partitioning, and relate molecular-specific measurements to AMS mass spectra. The experiments were performed in the simulation chamber facility at PSI, Switzerland, and investigate ammonium sulfate (AS), and mixed AS / fulvic acid seed aerosols under relative humidity conditions ranging from 50 to 85% RH. The Henry's Law and effective Henry's Law constants are compared with other values reported in the literature.