A45P-2083 - Oxidative Aging of Isoprene Epoxydiol-Derived Secondary Organic Aerosol Under Varying Relative Humidity Conditions

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- *McCormick Place - Poster Hall, Hall A (South, Level 3)*

Abstract

Isoprene has a strong effect on the oxidative capacity of the troposphere due to its abundance. Under low-NO_x conditions, isoprene oxidizes to form isoprene-derived epoxydiols (IEPOX), contributing significantly to secondary organic aerosol (SOA) through heterogeneous reactions. In particular, organosulfates (OSs) can form from acid-driven reactive uptake of IEPOX onto preexisting particles followed by nucleophilic addition of inorganic sulfate, and they are an important component of SOA mass, primarily in submicron particles with long atmospheric lifetimes. Fundamental understanding of SOA and OS evolution in particles, including the formation of new compounds by oxidation as well as corresponding viscosity changes, is limited, particularly across relative humidity (RH) conditions above and below the deliquescence of typical sulfate aerosol particles. In a 2-m^3 indoor chamber held at various RH values (30 – 80%), SOA was generated from reactive uptake of gas-phase IEPOX onto acidic ammonium sulfate aerosols (pH = 0.5 – 2.5) and then aged in an oxidation flow reactor (OFR) for 0 – 24 days of equivalent atmospheric ·OH exposure. We investigated the extent of inorganic sulfate conversion to organosulfate, formation of oligomers, single-particle physicochemical properties, such as viscosity and phase state, and oxidation kinetics. Chemical composition of particle-phase species, as well as aerosol morphological changes, are analyzed as a function of RH, oxidant exposure times, and particle acidity to better understand SOA and OS formation and destruction mechanisms in the ambient atmosphere.

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Abstract