SOA formation from aqueous-phase reactions of glyoxal with OH radicals

Yong Bin Lim, Yi Tan, Mark J. Perri, Katye E. Altieri and Barbara J. Turpin
Department of Environmental Sciences, Rutgers University
email: ylim@envsci.rutgers.edu, turpin@envsci.rutgers.edu

SOA formation through aqueous-phase reactions

Aqueous-phase reaction mechanism

FTICR-MS Interpretation

Reaction Vessel Kinetic Modeling

Non radical versus radical reactions in the aqueous phase

Conclusions


Funding: EPA-STAR, NOAA, NSF

A new kinetic model has been developed based on the explicit reaction mechanism
- The model includes radical-radical reactions: combination of two organic radicals (R1, R2)
- Peroxy-radical channel: formation of glyoxylic acid and oxalic acid
- Radical-radical reaction channel: formation of high-molecular-weight organic compounds (carbon number > 2)

Atmospheric implications
- Aqueous photooxidation competes with gas-phase photooxidation
- Aqueous photooxidation is an irreversible process: potentially faster and more SOA formation