SJSU | DEPARTMENT OF CHEMISTRY

CHEMISTRY Departmental Seminar

Spring 2019
CHEM 285/191 Schedule
Tuesdays at 4:30-5:45PM
Room Duncan Hall 250

February 19th, 2019

Professor Annalise Van Wyngarden
San José State University

Organic Chemistry in Atmospheric Aerosol Particles: Implications for Climate

Atmospheric aerosol particles impact Earth's climate by absorbing and scattering radiation and by serving as cloud condensation nuclei. Currently the largest uncertainty in models of past and future climate change arises from the uncertainty in aerosol climate effects, whose magnitudes and even directions depend on chemical composition. Although organic molecules are ubiquitous in atmospheric particles, their effects are particularly poorly understood, largely because of our poor understanding of the chemical reactions that organic molecules undergo in atmospheric particles. Therefore, we examine how different atmospheric aging processes can drive chemical reactions of organics in aerosols and subsequently impact particle optical properties and cloud formation potential (hygroscopicity). Bulk aqueous phase experiments were performed simulating two of these aging processes: 1) cloud processing of organic aerosols and 2) the formation of colored organic species in or on sulfuric acid aerosols in the stratosphere.

In the case of cloud processing, experiments examined the reactions of glyoxal and methylglyoxal monomers and polymers (common aerosol organics) upon dilution (simulating cloud formation) from aerosol to cloud droplet concentrations via High Resolution Electrospray Ionization Tandem Mass Spectrometry. The kinetics of reactions driven by cloud formation were found to be slow enough that atmospheric models may need to include them.

In the case of colored organics in stratospheric aerosols, experiments identified the main chemical reactions responsible for formation of colored surface films on solutions of propanal, glyoxal, and/or methylglyoxal in sulfuric acid. The results demonstrate the presence of products of cross-reactions between the three species. Therefore, these reactions have the potential to produce significant organic aerosol mass, which could partition into surface films and impact optical, chemical, and/or cloud-forming properties of stratospheric aerosols.

For more information: Prof. Radlauer at madalyn.radlauer@sjsu.edu
or Prof. Wang at ningkun.wang@sjsu.edu

Revised 01/28/2019