Strollo Group Research Projects Summer 2023

Oxidative potential of atmospheric particles

Exposure to particles in the atmosphere can cause adverse health outcomes such as asthma and cardiovascular disease. The mechanisms by which this occur are poorly understood, but oxidative stress has been proposed a potential mechanism of toxicity. The presence of reactive oxygen species can increase the oxidative potential of particles which can in turn cause more harm. This project will have students preparing a calibration curve of an antioxidant, then performing an oxidative assay on standards and atmospheric particles collected on campus or generated in an environmental chamber.

Ozonolysis of water-soluble alkenes

Ozonation is a common chemical water treatment technique because ozone is a powerful oxidant. The mechanism for the ozonolysis of alkenes is well known, but there is less information about the mechanism and products in aqueous atmospheric aerosols or clouds. In this project you will prepare solutions and bubble ozone through them and monitor reaction products with GC/MS and HPLC.

Deliquescence of atmospherically relevant mixtures

Deliquescence humidity is the humidity at which a substance takes up water. Atmospheric aerosols are often mixtures of inorganic and organic species and these mixtures can affect at what humidity it will deliquesce and therefore the chemistry that might take place. This project uses a quartz crystal microbalance to measure deliquescence humidity values for pure substances and mixtures.

Quantification of epoxides: environmental applications

This project focuses on the quantification of compounds that contain an epoxide functional group. Epoxides have been identified as an important photodegradation product of aromatic compounds in the atmosphere, but there are few reliable methods for identifying and quantifying these compounds. You will prepare calibrations for a variety of model epoxide compounds using UV/VIS and time permitting, learn to separate mixtures of these compounds using HPLC.