

Use of Mist Chambers in Collection of Atmospheric Gases

Devonne Friday

Key Words/Phrases:

VOCs

Organic Aerosols

Mist Chamber

Atmospheric Sampling

Air sampling is a process used to characterize the airborne contaminants that are present in the atmosphere. Volatile organic compounds (VOCs) are gases emitted into the atmosphere from both anthropogenic and natural sources. Once emitted into the atmosphere, VOCs undergo oxidation reactions to form highly-oxygenated products that may partition into the particle phase. These particles can ultimately contribute to secondary organic aerosol (SOA) which has several detrimental effects on humans as well as the environment. Thus, it is necessary to quantify these oxygenated organic gases. Mist chambers (MC) have been used to sample atmospheric water-soluble organic gases (WSOC_g) for decades. The general principle of the MC is to dissolve organic gases within a high volume of air into a substantially lower volume of water inside the chamber. The resulting sample is an aqueous solution containing WSOC_g. The aqueous sample is then sent for analysis to a total organic carbon (TOC) analyzer, where the total amount of organic carbon is measured within the sample. The aim of this study is to utilize the MC, as a vital component to a much larger experimental set-up, for the collection of WSOC_g. Previous studies have investigated the MC efficiency in collecting atmospherically relevant WSOC_g, suggesting that the MC collects the majority of VOC oxidation products in the atmosphere and can achieve collection efficiencies of more than 90% for compounds with effective Henry's law constant more than 10³ M. Our study takes place at ERAU campus in Daytona Beach, FL, where the MC is placed in a temperature-controlled environmental enclosure. Sampling is conducted seasonally to identify the impact of emission sources in the Daytona Beach area in order to devise mitigation strategies.