ID de Contribution: **72** Type: **Contribution orale**

Role of water in the aging processes of secondary organic aerosols: Atmospheric implication

mardi 4 juillet 2023 08:30 (30 minutes)

Secondary Organic Aerosol (SOA) particles are formed in the atmosphere by gas-to-particle conversion processes involving volatile organic compounds of natural and anthropogenic origin. SOA, which constitutes 30 to 50 % of the global organic aerosol budget are recognized to affect both climate change and human health. To date, the formation and evolution (i.e. the atmospheric aging during air mass transport) of SOAs have been investigated by performing both field measurements and laboratory experiments, highlighting the complexity of related physico-chemical processes, due to the large diversity of their chemical makeup. Actually, interactions between atmospheric water vapor and SOA play key roles in air quality and climate change, requiring an accurate scrutinization. As aerosol particles may be considered as micro-reactors, a key bridge between individual process studies and the complexity of in situ atmospheric chemistry can be provided by lab-single particle investigations. Interactions between gases and particles may be confined to the surface region for particles in solid and semi-solid phases but may also occur in the bulk for particles in the liquid phase. In addition, the condensed water may serve as a reaction medium for multiphasic reactions. Finally, the condensed-phase water may be regarded as a plasticizer whose presence results in changes in the particle phase state, which may directly affect the molecular diffusion both at the particle surface and in the bulk. So far, most studies on hygroscopicity, phase states and viscosity that have been performed with a focus on laboratory experiments, demonstrated that atmospheric particles can adopt not only a liquid phase state, but also semi-solid and even solid states, depending on their chemical composition (including inorganic/organic mixing) and on the atmospheric relative humidity. It is critical to understand the interactions between SOAs and water particles by determining the key physical and/or chemical factors that drive and/or influence water-particle interactions during atmospheric aging processes at the particle scale.
We will present some laboratory studies on model SOA particles using a panel of original and complementary experimental setups for on-line and in situ studies of individual particles. In addition, molecular scale SOA-water processes are investigated using low temperature matrix isolation experiments. This multi-scale approach may help in identifying key physico-chemical markers related to aerosol-water interaction processes, and provides insight for understanding the effect of aerosols on climate change and air quality.

Affiliation de l'auteur principal

Instiut des Sciences Moléculaires - UMR CNRS 5255

Auteur principal: SOBANSKA, Sophie (Institut des Sciences Moléculaires - UMR 5255)

Orateur: SOBANSKA, Sophie (Institut des Sciences Moléculaires - UMR 5255)

Classification de Session: Mini-colloques: MC13 Effets d'environnement et de solvatation sur les processus moléculaires

Classification de thématique: MC13 Effets d'environnement et de solvatation sur les processus moléculaires