An inert desolvating nebulizer system and rapid washout accessory for tungsten isotope measurements with multicollector ICP-MS

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Multicollector ICP-MS instruments are specialized devices for high-precision isotope ratio measurements. Prepared liquid samples may be concentrated (100 to 1000 mg/L) in elements of interest; these higher concentrations can cause longer analyte washout times and signal spikes. This poster will describe an inert, low flow (50 to 200 μL/min) desolvating nebulizer system with a rapid washout accessory. This nebulizer system can also be equipped with a dedicated autosampler that features a dual-flowing rinse capability to minimize sample carryover. Wetted parts are composed of fluoropolymers such as PFA (perfluoroalkoxy) for lowest trace metal blanks and maximum chemical resistance. Optimum operating conditions for the nebulizer system with a contemporary multicollector ICP-MS for tungsten measurements will be detailed. Figures of merit will include signal enhancement, isotope ratio measurements and long-term (12 hour) ratio stability, and rinse out characteristics with and without the rapid washout accessory [1].

[1] Holst *et al*. (in review), "^{182}Hf-^{182}W age dating of a ^{26}Al-poor inclusion and implications for the origin of short-lived radionuclides in the early solar system." Proceedings of the National Academy of Sciences.

Biogenic new particle formation and its potential impacts on climate

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Observations show that growth rates of freshly nucleated atmospheric nanoparticles are about 5-10 times higher than can be accounted for by sulfuric acid condensation. This additional growth is primarily due to the uptake of organic compounds, often of biogenic orgin, by processes that are not yet understood and that might include condensation of low-volatility vapors or reactions that occur on or within particles. If the growth of freshly nucleated atmospheric aerosols is sufficiently fast, these particles can reach sizes required to serve as cloud condensation nuclei (CCN), and may thereby potentially affect the climate.

We have performed laboratory and field measurements focusing on understanding the role of biogenic organic compounds in the formation and growth of atmospheric aerosols. Measurements were made using the Thermal Desorption Chemical Ionization Mass Spectrometer (TDCIMS), an instrument capable of realtime measurements of the molecular composition of ambient aerosols as small as 10 nm in diameter. In recent laboratory experiments of new particle formation from a-pinene ozonolysis, high molecular weight (m/z 430-560) low volatility gases correlated with initial stages of particle formation [1]. Additional work has focused on identifying particle phase compounds present in nanoparticles of varying size during the earliest stages of growth: in those studies organic acids were observed in the smallest particles formed by nucleation [2].

Our laboratory results are also compared to field observations of nanoparticle composition and gas phase precursors at sites in which biogenic emissions dominate. These include an isoprene-dominated region (Columbia, MO), and several sites with a mixture of terpene emissions (Hyytiala, Finland, Manitou Forest, Colorado). These observations show that atmospheric nanoparticles are often enriched with organic acids and nitrogen-containing compounds. These particles are often quite hygroscopic, and thus may have a far greater effect on cloud formation than previously thought.

[1] Zhao *et al*. (2013) ACPD **13**, 9319-9354. [2] Winkler *et al*. (2012) GRL **29,** L20815.

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