

Mixed colloidal standards with trace elements for nanoparticle analysis using asymmetric flow field-flow fractionation coupled to inductively coupled plasma mass spectrometry

CLAIRE M CHURCHILL¹, SALANI U FERNANDO²,
ISABELLE A.M. WORMS³, MICHAELA MÜHLBAUER⁴
AND CHAD W CUSS²

¹Memorial University of Newfoundland, Grenfell Campus

²Memorial University of Newfoundland

³University of Geneva

⁴Postnova Analytics GmbH

Asymmetric flow field-flow fractionation (AF4) coupled to inductively coupled plasma mass spectrometry (ICP-MS) has a range of applications in environmental nanogeochemistry, particularly to analyze different size fractions that correspond to different forms in environmental samples, e.g. small molecules and simple complexes < 300 Da, DOM-associated forms, small inorganic and larger inorganic forms. The size of these colloids is directly related to their mobility, reactivity, and potential toxicity. However, stable colloidal standards suited to the verification of AF4-ICPMS to analyze complex environmental samples are still to be developed. Standards for AF4-ICPMS allow comparisons of methods and results which facilitates consistency across laboratories. Thus, this presentation will discuss the development of a reproducible standard composed of an organic and inorganic colloid mixture with associated trace elements for AF4-ICPMS. The viability of a mixed colloid-trace element standard based on its stability over time will be discussed, along with the reproducibility of its production as determined by analysis using AF4-ICPMS. Colloid mixtures were filtered to obtain the <0.22, 0.45 and 1.2 µm fractions. Temperature, pH, and conductivity were measured and controlled to maintain reproducibility. Results from interlaboratory comparisons between labs in Canada, Switzerland and Germany will also be discussed.