

# Insights into arsenic-dissolved organic matter complexation

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Arsenic is one of the most common groundwater contaminants worldwide, and the mobility of arsenic is largely controlled through (bio)geochemical processes. Recently, arsenic mobility has been linked to the concentration and chemical characteristics of dissolved organic matter (DOM), which affect formation of arsenic-dissolved organic matter (As-DOM) complexes. The extent of As-DOM complexation has been difficult to measure. Commonly, As-DOM is inferred by co-occurrence of arsenic and DOM or extrapolated from lab-based experiments. Outputs from these experiments are then used in geochemical models to describe speciation in environmental systems. Specifically for As-DOM complexation, laboratory-derived conditional distribution coefficients span several orders of magnitude with sometimes conflicting results for similar DOM types. Here, we present an analytical technique to measure As-DOM complexes directly in environmental samples thereby reducing uncertainty in As-DOM quantification. The technique uses size-exclusion chromatography coupled to multiple detectors including an inductively coupled plasma mass spectrometer (ICPMS) for As in addition to fluorescence and variable wave detectors for organic matter. SEC separates “free” and “bound” arsenic so that both are quantified, and conditional distribution coefficients are calculated directly from environmental samples. We found that sample preservation plays an important role in quantifying As-DOM complexes and that interactions on-column, if not minimized, can greatly impede quantification of As-DOM complexes. SEC is a promising avenue to quantify As-DOM complexation and thereby gain deeper insights into As mobility in aquatic systems.

