

**Determination of Mercury(II) Complexation with Dissolved Organic Matter in a  
Contaminated Aquatic Environment**

American Chemical Society Fall 2009 National Meeting & Exposition – August 12-20, 2009,  
Washington, DC

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The aqueous speciation of Hg(II) in the contaminated East Fork Poplar Creek (EFPC) at Oak Ridge, Tennessee, is not well understood despite the recognition of important roles played by dissolved organic matter (DOM) in controlling the transport, transformation and bioavailability of mercury in the system. In this study, subfractions of DOM (i.e., hydrophobic and hydrophilic acids) were isolated from EFPC surface water, and their chemical structure and specific functional groups (e.g., thiols, carboxyls and phenols) were characterized by chemical and spectroscopic techniques. The conditional stability constants of Hg(II) complexes with DOM-isolates were determined using a modified ion exchange method and an equilibrium dialysis ligand exchange (EDLE) technique. Results indicate that Hg(II) forms the strong complexes with DOM through thiol-like functional groups (-SH). Model calculations suggest that Hg(II)-DOM complexes are the dominant species in EFPC surface waters and may control the reactivity and transformation of mercury under site-specific conditions.