Conditional complexation constants for Hg2+ and CH3Hg+ in natural organic matter. (S02-bloom123738-Oral)

Authors:

- P.R.Bloom - *University of Minnesota*
- A.R.Khawja - *University of Minnesota*
- C.M.Lin - *University of Minnesota*
- P.L.Brezonik - *University of Minnesota*
- E.A.Nater - *University of Minnesota*

Abstract:

Mercury 2+ and methyl-Hg bind strongly with natural organic matter (NOM) in soils and waters. Our previous x-ray spectroscopy studies showed that in NOM reduced sulfur is involved in very strong binding of Hg2+ and methyl-Hg when these ions are added at low Hg to reduced S ratios. Because of the strong binding it is necessary to use competitive ligands, Br-, EGTA, or DTPA, for the determination equilibrium binding strength. Bromide works well for methyl-Hg yielding apparent complexation constants in the range of 10e16 for soil organic matter (SOM). For Hg2+ the apparent Kd for adsorption in SOM is in the range of 10e22 to 23 but we found evidence of for adsorption of Hg-bromide complexes. EGTA and DTPA do not complex as strongly as Br- but these ligands do increase the Hg in solution and there is little possibility of multi-ligand complex formation with NOM. The apparent Kd values were lower that for Br-. However, the two ligands gave quite different Kd results for soil HA; 10e20 for EGTA and 10e15 for EGTA. Part

of the problem may be non equilibrium conditions for the added Hg2+. After heating the HA-Hg2+ complex to 70C for a minimum of 3 days the binding strength increased such that EGTA and DTPA were not strong enough complexing agents to determine Kd.

Corresponding Author Information:

Paul Bloom
University of Minnesota
1991 Upper Buford Cr.
St. Paul, MN 55108

phone: 612-625-4711
fax: 612-625-2208
e-mail: pbloom@soils.umn.edu

Presentation Information:

Presentation Date: Wednesday, November 13, 2002
Presentation Time: 2:30 pm

Keywords:

mercury, Humic acid, Metal complexes, Natural Organic Matter