



LUCAS
Lakehead University Center for
Analytical Services

Technical Bulletin



Mercury: an environmental toxin

By: Karen Maa & Susanne Walford

The element mercury can be found in many different forms in nature. At room temperature, pure mercury is a liquid which looks like little silver coloured balls. In nature, in its solid form, mercury appears most often as the inorganic mineral cinnabar or mercury sulfide. Although inorganic mercury is volatile and generally escapes to the atmosphere, if dissolved in water, ionic mercury can undergo many transformations.



Mercury at room temperature

Inorganic mercury in soils, sediments and water can be converted into two organic forms, generally by microbial activities. Methylmercury is one-hundred times more toxic than inorganic mercury forms. It is difficult for a body to remove methylmercury as it binds to proteins and has the ability to pass through the digestive tract wall. This means methylmercury bioaccumulates and bioconcentrates in food webs. Nearly all mercury in fish tissue is methylmercury, and this has resulted in fish consumption limits for many lakes in Ontario. Since methylmercury behaves as a neurotoxin, serious health effects are possible.

Mercury travels around the globe in a complicated cycle of air transport, deposition in snow, rain or dry dust, transformations in forests and wetland ecosystems, accumulation in fish, animals and people. Mercury is added to the cycle naturally by the erosion of land/rocks and volcanoes. However, since the industrial revolution, humans have dramatically increased the

mercury level through coal burning power plants, cement production, metal smelting and disposal of mercury containing items in landfills.

Since mercury is a serious environmental issue, it is invaluable to be able to quantify it. Lakehead University Environmental Laboratory (LUEL) is equipped with a Brooks Rand Atomic Fluorescence Spectrophotometer (AFS), a Methylmercury Distillation System (MDS) and an Amalgamation Control Module (ACM) to measure mercury and methylmercury in diverse sample types such as water, plant, fish, animal, invertebrate, hair, soil and sediment. The instruments are housed in a positive pressure clean room with filtered air and a laminar flow hood equipped with a HEPA filter. Picogram level of detection allows routine data reporting in units of nanograms per litre (ng/L) or nanograms per gram (ng/g).

Sample size, preservation techniques and detection limits will vary according to sample type and sample size. Please contact LUEL at 807-343-8368 or e-mail the Laboratory Manager, Johane Joncas at jjoncas@lakeheadu.ca for details about mercury testing or any of the other services available at LUEL.

References:

Mercury: Fishing for Answers, Water Policy and Coordination Directorate, Environment Canada, 2003.

Photo source: "Beautiful Poison" <http://www.sxc.hu/photo/8846>