



Legislative Committee Services

ISSUE BRIEF

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Elemental Mercury (Hg) & Methylmercury

Elemental Mercury (Hg) has historically been quite common in industrial societies. It can be found in thermometers, barometers, dental amalgams, batteries, fluorescent lights and electrical switches. It also was commonly found in household latex paint prior to the early 1990s. Mercury acts as a cumulative poison because the rate of elimination by body functions is low. It is processed by liver function and therefore, like lead, can build levels beyond the body's ability to metabolize.

Elemental Mercury, commonly known as "mercury" or "quicksilver", occurs in nature and is also a by-product of industrial production. It is unique, as it is the only metal that is liquid at room temperature. This silvery liquid metal is very dense, yet has a high surface tension that causes it to form tiny little perfect spheres in the pores of the rocks in which it is found. Mercury is not very volatile (volatility refers to rate of evaporation) in its natural state, but, as temperatures rise due to industrial processes or home use, it becomes increasingly volatile and therefore enters the biosphere.

PHYSICAL CHARACTERISTICS:

- Color is bright silvery metallic;
- Luster is metallic;
- Transparency is opaque;
- Crystal Habits: spherical droplets, or pools of mercury liquid;
- Specific Gravity is 13.5+ (very dense);
- Associated Minerals: cinnabar, calomel, and other secondary mercury minerals;
- Other Characteristics: Mercury is a liquid! It also expands at a constant rate with a rise in temperature;
- Notable Occurrences in the U.S. include: Oregon, California, Texas, and Arkansas.

The amount of mercury that cycles in the environment has increased since the industrial age. According to the U.S. EPA, the main source of mercury is air emissions from power generation and other industrial and waste disposal activities. During its movement among the atmosphere, land, and water, mercury undergoes a series of complex chemical transformations. One of the products of these transformations is an organic form called methylmercury. Methylmercury, as explained below, is highly toxic.

Methylmercury is easily absorbed into the living tissue of aquatic organisms and, as discussed earlier, is not easily eliminated. Therefore, it accumulates in predators. The degree to which mercury is transformed into methylmercury and transferred up the food chain through bioaccumulation depends on many site-specific factors (such as water chemistry and the complexity of the food web) through processes that are not completely understood. Methylmercury is highly toxic to mammals, including

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people, and causes a number of adverse effects. Health studies and information showing neurotoxicity, particularly in developing organisms, are most abundant. The brain is the most sensitive organ for which suitable data are available to quantify a dose-response relationship. A recent study by the National Academy of Science concluded that the population at highest risk is the children of women who consume large amounts of fish and seafood during pregnancy, and that the risk to that population is likely to be sufficient to result in an increase in the number of children who have to struggle to keep up in school and who might require remedial classes or special education.

In January 2001, the EPA published its "Water Quality Criterion for the Protection of Human Health: Methylmercury". Under this publication, water quality criterion describes the maximum advisable concentration of methylmercury in freshwater and estuarine fish and shellfish tissue to protect consumers of fish and shellfish among the general population. EPA expects the criterion recommendation to be used as guidance by States, authorized Tribes, and EPA in establishing or updating water quality standards for waters of the United States. Because consumption of contaminated fish and shellfish is the primary route of human exposure to methylmercury, EPA is expressing this water quality criterion as a fish and shellfish tissue value rather than as a water column value. EPA is providing suggested approaches for relating this criterion to water column concentrations, and also plans to develop more detailed guidance to help water quality managers implement the methylmercury criterion in water pollution control programs.