# Basic Information about Mercury

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## What is Mercury?

Mercury is a naturally-occurring chemical element found in rock in the earth's crust, including in deposits of coal. On the periodic table, it has the symbol "Hg" and its atomic number is 80. It exists in several forms:

- methylmercury and other organic compounds,
- elemental (metallic) mercury, and
- inorganic mercury compounds.

Methylmercury and other organic mercury compounds are formed when mercury combines with carbon. Microscopic organisms convert mercury into methylmercury, which is the most common organic mercury compound found in the environment.

Elemental or metallic mercury is a shiny, silver-white metal and is liquid at room temperature. It is used in older thermometers, fluorescent light bulbs and some electrical switches. When dropped, elemental mercury breaks into smaller droplets which can go through small cracks or become strongly attached to certain materials. At room temperature, exposed elemental mercury can evaporate to become an invisible, odorless toxic vapor. If heated, it is a colorless, odorless gas.

Elemental mercury is an element that has not reacted with another substance. When mercury reacts with another substance, it forms a compound.

Inorganic mercury compounds take the form of mercury salts and are generally white powder or crystals, with the exception of mercuric sulfide (cinnabar) which is red. Most uses of inorganic compounds have been discontinued.

## Emissions of Mercury into the Air

Mercury becomes a problem for the environment when it it is released from rock and ends up in the atmosphere and in water. These releases can happen naturally. Both volcanoes and forest fires send mercury

into the atmosphere.

Human activities, however, are responsible for much of the mercury that is released into the environment. The burning of coal, oil and wood as fuel can cause mercury to become airborne, as can burning wastes that contain mercury.

This airborne mercury can fall to the ground in raindrops, in dust, or simply due to gravity (known as "air deposition"). The amount of mercury deposited in a given area depends on how much mercury is released from local, regional, national, and international sources.

## Emissions from Power Plants

Since mercury occurs naturally in coal and other fossil fuels, when people burn these fuels for energy, the mercury becomes airborne and goes into the atmosphere. In the United States, power plants that burn coal to create electricity are the largest source of emissions; they account for about 42 percent of all manmade mercury emissions (*Source: 2014 National Emissions Inventory, version 1, Technical Support Document (December 2016)(PDF)* (discussion starts on page 2-25 of the PDF document).

- Learn more about mercury from power plants

## Other Causes of Mercury Air Emissions

- Burning oil that contains mercury
- Burning wood that contains mercury
- Burning mercury-containing wastes, including
    - wastes from the manufacture of Portland cement
    - consumer products that contain mercury, like electronic devices, batteries, light bulbs and thermometers, that are thrown into garbage that is incinerated
- Using certain technologies to produce chlorine
- Breaking products that contain mercury
- Burning iron ore, coke and limestone in electric arc furnaces used to produce steel
- Using coal-fired boilers in many industries to generate forms of thermal heat like steam

The burning of municipal and medical waste was once a major source of mercury emissions. A reduction in the use of mercury along with state and federal regulations, however, has led to a decrease in emissions from this source by over 95%.

## Trends in Air Emissions

Every year, industrial and commercial facilities are required to report their releases of chemicals through EPA's Toxics Release Inventory (TRI) Program. You can view a chart showing the annual amount of mercury emissions into the air from facilities throughout the United States from 2005 to 2015.

## Mercury Emissions around the Globe

What happens to mercury after it is emitted depends on several factors:

- the form of mercury emitted,
- the location of the emission source,
- how high above the landscape the mercury is released (for example, the height of a power-plant stack),
- the surrounding terrain, and
- the weather.

Depending on these factors, mercury in the atmosphere can be transported over a range of distances -- anywhere from a few feet from its source, to halfway around the globe -- before it is deposited in soil or water. Mercury that remains in the air for prolonged periods of time and travels across continents is said to be in the "global cycle."

One major source of mercury emissions outside of the U.S. is small-scale gold mining that occurs in many countries.

### Additional Resources

- EPA's Report on the Environment – Mercury Emissions
- Mercury Study Report to Congress, Volume II: An Inventory of Anthropogenic [Human-Caused] Mercury Emissions in the United States
- Mercury Emissions: The Global Context
- Global Mercury Assessment 2013 (PDF) (44 pp, 1.2 MB, About PDF) EXIT
    - Technical Background Report for the Assessment EXIT

- Report: Children's Exposure to Elemental Mercury (Agency for Toxic Substances & Disease Registry) (2009)

## Common Exposures to Mercury

The main way that people are exposed to mercury is by eating fish and shellfish that have high levels of methylmercury, a highly toxic form of mercury, in their tissues. A less common way people are exposed to mercury is breathing mercury vapor. This can happen when mercury is released from a container, or from a product or device that breaks. If the mercury is not immediately contained or cleaned up, it can evaporate, becoming an invisible, odorless, toxic vapor.

Learn more:

- How people are commonly exposed to mercury
- How to choose fish and shellfish wisely

## Health Effects Associated with Exposures to Mercury

- Mercury exposure at high levels can harm the brain, heart, kidneys, lungs, and immune system of people of all ages.
- High levels of methylmercury in the bloodstream of babies developing in the womb and young children may harm their developing nervous systems, affecting their ability to think and learn.

Learn more about health effects that can result from exposures to mercury.

## Ecological Effects of Mercury Exposure

Birds and mammals that eat fish are have more exposures to methylmercury than other animals in water ecosystems. Predators that eat these birds and mammals are also at risk. Methylmercury has been found in eagles, otters, and endangered Florida panthers. At high levels of exposure, methylmercury's harmful effects

on these animals include:

- death,
- reduced reproduction,
- slower growth and development, and
- abnormal behavior.

### Additional Resources

- National Park Service (NPS): Effects of Air Toxics/Mercury on Ecosystems
- U.S. Geological Survey (USGS): Mercury in the Environment
- Volume VI, Ecological Assessment, and Volume VII, Characterization of Human Health and Wildlife Risks, of the 1997 Mercury Study Report to Congress.

## Consumer Products that Traditionally Contain Mercury

- Some batteries
- Fluorescent light bulbs, including compact fluorescents (CFLs)
- Many types of thermometers
- Thermostats
- Amalgam in dental fillings
- Thimerosal in vaccines
- Automotive switches

Learn more about consumer products that contain mercury.

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