Mercury. Mercury cycle.

Worked by: Baigeldin Fakhridinov
Group: JEK – 511(F)

Plan:

1. Definition about mercury;
2. Etymology of mercury;
3. Properties;
4. Occurrence;
5. Applications;
6. Medicine;
7. Mercury cycle.


Hg
80
200.59

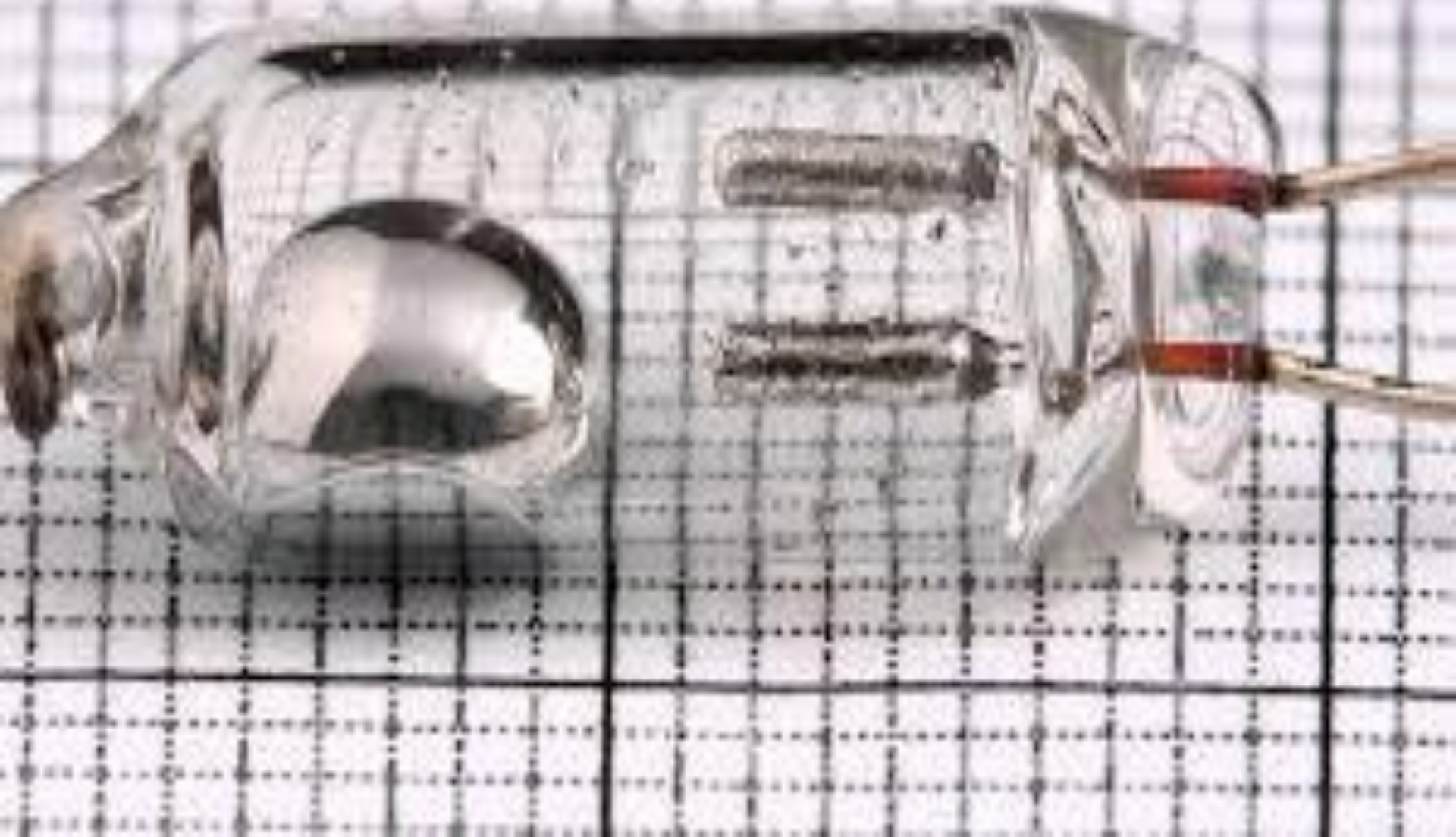
Mercury is a chemical element with symbol **Hg** and atomic number 80. It is commonly known as **quicksilver** and was formerly named **hydrargyrum**.

A heavy, silvery d-block element, **mercury** is the only metallic element that is liquid at standard conditions for temperature and pressure; the only other element that is liquid under these conditions is bromine, though metals such as calesium, gallium, and rubidium melt just above room temperature.

Mercury occurs in deposits throughout the world mostly as cinnabar (mercuric sulfide). The red pigment vermilion is obtained by grinding natural cinnabar or synthetic mercuric sulfide.

Mercury is used

in thermometers, barometers, manometers, sphygmomanometers, float valves, mercury switches, mercury relays, fluorescent lamps and other devices, though concerns about the element's toxicity have led to mercury thermometers and sphygmomanometers being largely phased out in clinical environments in favor of alternatives such as alcohol- or galinstan-filled glass thermometers and thermistor- or infrared-based electronic instruments.



Etymology

Hg is the modern chemical symbol for mercury. It comes from hydrargyrum, a Latinized form of the Greek word (hydrargyros), which is a compound word meaning "water-silver" (from - hydr-, the root , "water," and argyros "silver") – since it is liquid like water and shiny like silver.

Properties
Physical properties

Mercury is a heavy, silvery-white liquid metal. Compared to other metals, it is a poor conductor of heat, but a fair conductor of electricity

It has a freezing point of −38.83 °C and a boiling point of 356.73 °C, both the lowest of any metal. Upon freezing, the volume of mercury decreases by 3.59% and its density changes from 13.69 g/cm^3 when liquid to 14.184 g/cm^3 when solid. The coefficient of volume expansion is 181.59×10^{-6} at 0 °C, 181.71×10^{-6} at 20 °C and 182.50×10^{-6} at 100 °C (per °C). Solid mercury is malleable and ductile and can be cut with a knife.

The Discovery of Mercury

- The element Mercury was discovered at about 1500 B.C.
- The discoverer of Mercury is unknown
- Mercury is Named After the roman God Mercury, a.k.a. Greek God Hermes

Chemical properties

Mercury does not react with most acids, such as dilute sulfuric acid, although oxidizing acids such as concentrated sulfuric acid and nitric acid or aqua regia dissolve it to give sulfate, nitrate, and chloride.

Like silver, mercury reacts with atmospheric hydrogen sulfide. Mercury reacts with solid sulfur flakes, which are used in mercury spill kits to absorb mercury (spill kits also use activated carbon and powdered zinc).

Occurrence

Mercury is an extremely rare element in Earth's crust, having an average crustal abundance by mass of only 0.08 parts per million (ppm).

Because it does not blend geochemically with those elements that constitute the majority of the crustal mass, mercury ores can be extraordinarily concentrated considering the element's abundance in ordinary rock.

Applications

Mercury is used primarily for the manufacture of industrial chemicals or for electrical and electronic applications. It is used in some thermometers, especially ones which are used to measure high temperatures.

A still increasing amount is used as gaseous mercury in fluorescent lamps, while most of the other applications are slowly phased out due to health and safety regulations and is in some applications replaced with less toxic but considerably more expensive Galinstan alloy.

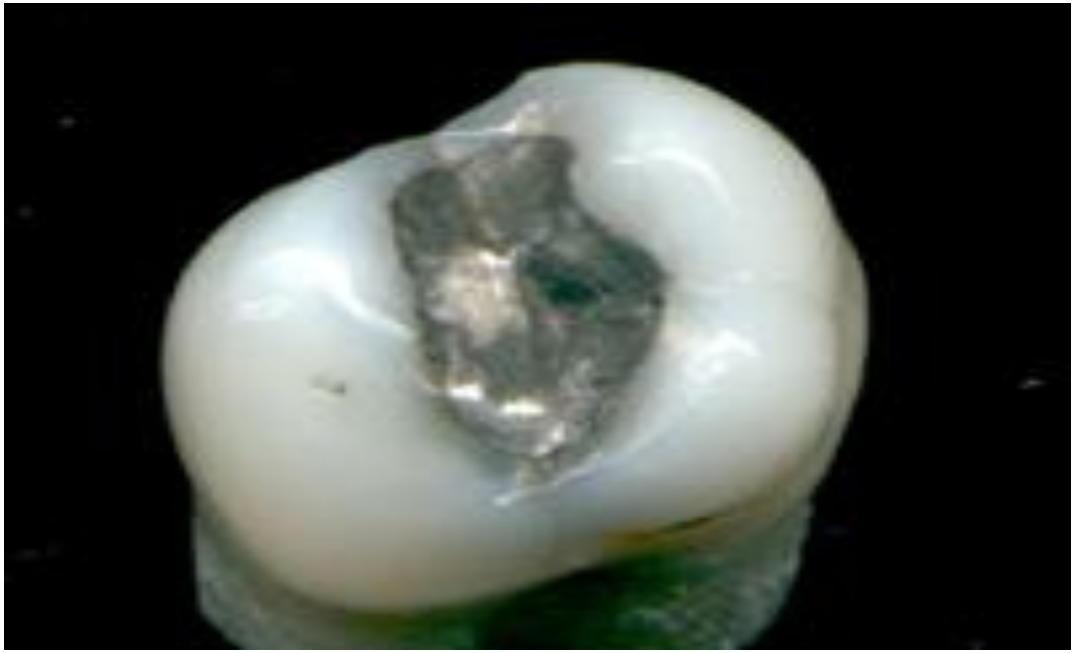
The bulb of a mercury-in-glass thermometer

Medicine

Mercury and its compounds have been used in medicine, although they are much less common today than they once were, now that the toxic effects of mercury and its compounds are more widely understood. The first edition of the Merck's Manual featured many mercuric compounds.

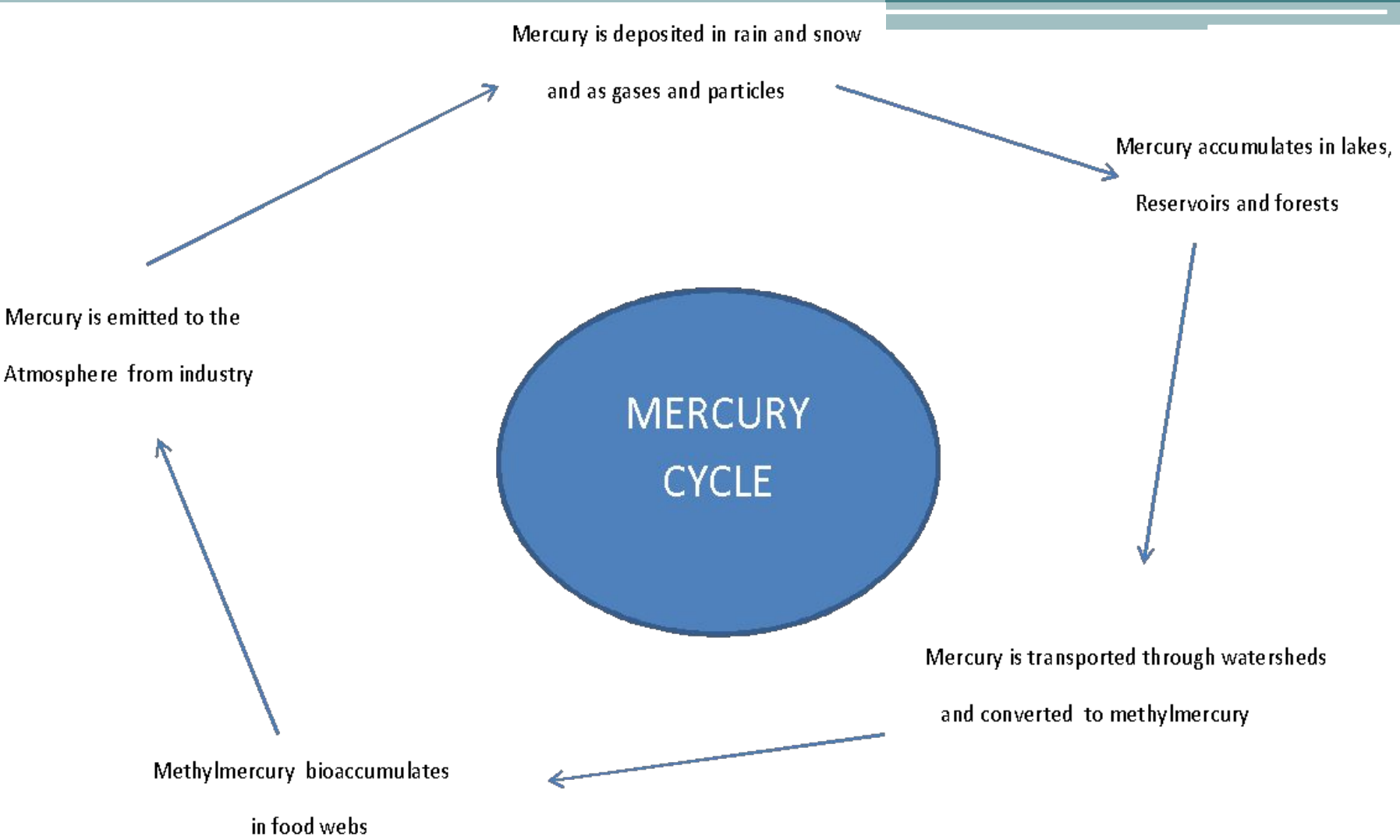
Mercury is an ingredient in dental amalgams. Thiomersal (called *Thimerosal* in the United States) is an organic compound used as a preservative in vaccines, though this use is in decline.

Amalgam filling

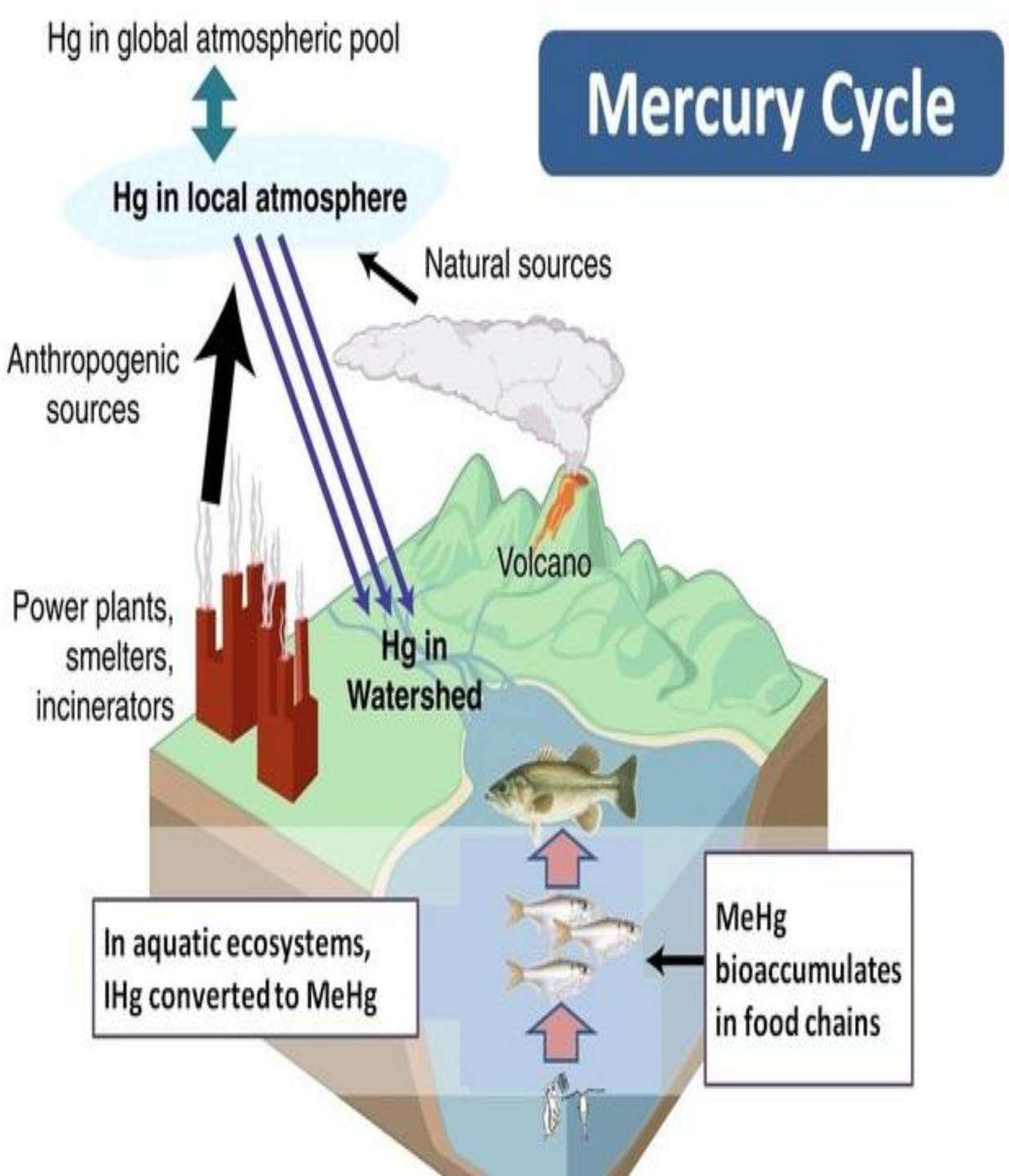


Mercury cycle

The **mercury cycle** is a biogeochemical cycle involving mercury. Mercury is notable for being the only metal which is liquid at room temperature. It is a volatile metal and evaporates, though it takes quite a while to do so.


Mercury is deposited in rain and snow
and as gases and particles
Mercury accumulates in lakes,
Reservoirs and forests
Mercury is transported through watersheds
and converted to methylmercury
Methylmercury bioaccumulates
in food webs
Mercury is emitted to the
Atmosphere from industry
MERCURY
CYCLE

Mercury Cycle



Processes

Most natural mercury occurs as cinnabar, HgS. Here mercury (Hg^{2+}) is bound very tightly to sulfur, but weathering slowly releases the mercury to the environment. There are also trace amounts of mercury in coal. Mining mercury or burning coal results in releasing mercury. Volcanoes and forest fires are also sources of mercury.

Chlorine factories, among other sources, release mercury into the atmosphere. This mercury is deposited back onto land and water. Inorganic mercury can be converted by bacteria into the organometallic cation known as methylmercury, CH_3Hg^+,which bioaccumulates in fish such as tuna and swordfish.

Over long periods of time, some mercury recombines with sulfur and is buried in sediments. Then, the cycle repeats itself

Anthropogenic emissions of mercury

The human-generated half can be divided into the following estimated percentages:

*65% from stationary combustion, of which coal-fired power plants are the largest aggregate source (40% of U.S. mercury emissions in 1999). This includes power plants fueled with gas where the mercury has not been removed. Emissions from coal combustion are between one and two orders of magnitude higher than emissions from oil combustion, depending on the country.

*11% from gold production. The three largest point sources for mercury emissions in the U.S. are the three largest gold mines.
Hydrogeochemical release of mercury from gold-mine tailings has been accounted as a significant source of atmospheric mercury in eastern Canada.

The end