

## Bill's Rocks and Minerals

### Mercury (Hg): It's Properties and Hazards.

Mercury is a mineral and native element which most of us recognise. Who hasn't seen a mercury thermometer or barometer or heard about mercury poisoning? More later.



Mercury is the only mineral that exists as a liquid at room temperature. It freezes and adopts a solid structure at a temperature of minus 38.83°C, and converts to a gas at its boiling point of 356.73°C. Both freezing and boiling point temperatures are the lowest of any mineral. When mercury is solid it is malleable, and can be cut with a knife. In its natural liquid state it is noticeable that it adopts pronounced globules, which are the result of a very high surface tension. This is because of intermetallic bonding in which the mercury molecules have a very strong attraction to each other. Many liquids form globules, but none as extreme as mercury, for instance water globules are flatter and not so pronounced because of the weaker bonding of hydrogen.

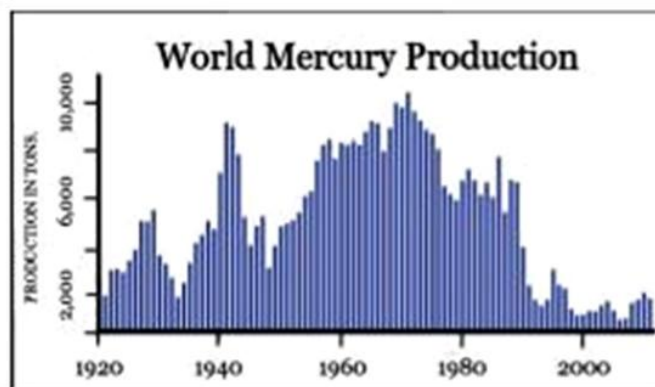
Mercury is not very common in its natural liquid state, only being found as small globules on the surface of mercury ores, and for this reason liquid mercury is not a major contributor to global production. There are very few ores of mercury, the major one being cinnabar (HgS). Less productive ores are montroydite (HgO), tiemannite (HgSe), and calomel (Hg<sub>2</sub>Cl<sub>2</sub>). Cinnabar is, or was the major ore of mercury, but since about 2010 most countries have ceased to mine cinnabar for the production of mercury, regarding mercury as being a health hazard. Most countries have also restricted details of what they have produced, and data is very difficult to obtain. China, however is an exception, and is producing about 150,000 tonnes per annum.

Cinnabar  
Mercury ore

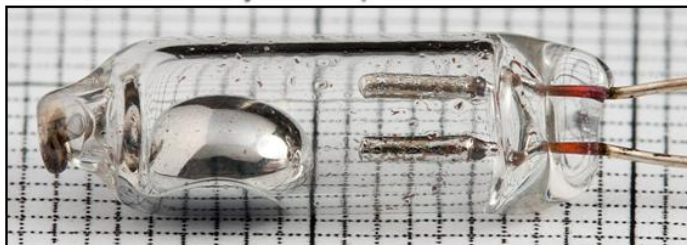


H Zel Creative commons

Most countries are supporting their greatly reduced need by recycling. The bulk of recycled mercury is recovered from the rapid decline, and shut down of chlorine-alkali facilities, which had been using the mercury process, but now have large unwanted stocks. Specialist companies also recover mercury



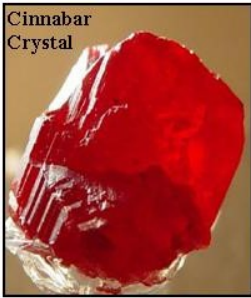
from the scrapping of float switches, thermometers, barometers, and particularly fluorescent light tubes and compact fluorescent lamps (C.F.L.s.) Historically mercury was also a key component of batteries, but the U.S.A. banned their sale in 1996, followed by a European ban in 1998.



Mercury switch C.C.

### Mercury Amalgams

Mercury readily forms amalgams with a number of minerals, including zinc, potassium, sodium, gold, silver, tin, and aluminium. In the process of forming an amalgam, mercury dissolves these minerals and incorporates them into an amalgam. Importantly it will not form an amalgam with iron, making iron flasks the preferred method of containment.

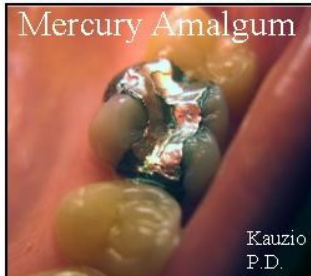


Cinnabar Crystal

Rob Lavinsky, iRocks.com

Dental amalgam is about 50% mercury, combined with mainly silver, and smaller amounts of tin and copper. There is a very lively ongoing argument about the use of dental amalgam. There are some who believe that the mercury in the amalgam can give rise to neurological

and mental problems, while others consider it to be perfectly safe. An internet search will find hundreds of articles on the controversy, mostly against its use.



Mercury Amalgum

Kauzio P.D.

Airlines have banned the carriage of mercury, because of the ease with which it amalgamates with aluminium. Aircraft bodies are mainly aluminium, and any contact with mercury could be disastrous:

Today, we often hear about the use of mercury in gold recovery by impoverished miners in third world countries. This is achieved by the amalgam process in which small particles of gold are absorbed by the mercury, to be later recovered by boiling off the mercury.



Natural Mercury Amalgam

Rob Lavinsky, iRocks.com

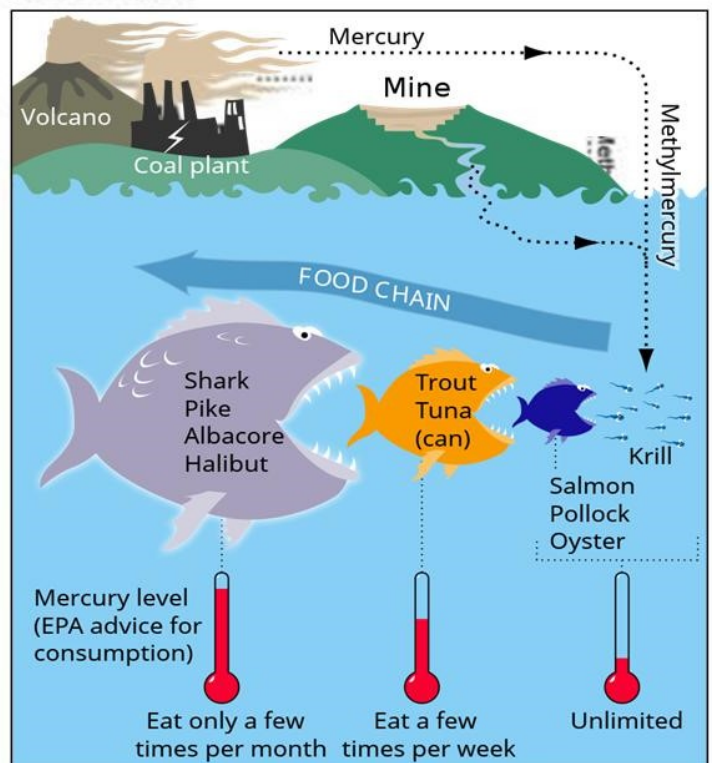
The boiling releases atmospheric mercury, which is very toxic and dangerous for the tens of thousand small scale miners who are using this method. Major gold mining companies have been pressured into using alternative methods, other than mercury for gold recovery, and now hardly use it at all.



Mercury Thermometer

Mercury is finding its way into the ocean and eventually the food chain from three major sources: volcanic activity, mining sites, even those that are now closed, but mostly from coal fired power station emissions. The latter emit about 50% of the mercury which finds its way into the ocean. In the U.S.A. there are about six hundred coal fired power stations. Once in the ocean, mercury is assimilated in the bodies of fish and shellfish. Mercury in smaller fish is concentrated even more as they are eaten by larger fish, until the very largest fish such as

tuna, and sharks have considerable levels of mercury. They eventually end up in fish markets, and the human food supply. It is estimated that in the U.S.A. one in six women of child bearing age have blood mercury levels that are above the safe recommended limits. The worst occurrence of mercury poisoning from food occurred in 1956 in Japan. Minamata disease, was one of Japan's worst environmental disasters and was the result of mercury poisoning from eating fish and shellfish. Thousands of people were sickened or crippled by neurological disorders from the mercury leaks into Minamata Bay and nearby waters by chemical company Chisso Corp., which continued for more than a decade. Affected babies were born with severe deformities.



Bretwood Higman, Ground Truth Trekking.

In conclusion, mercury is a very interesting and useful mineral, but because of the knowledge gained over the years about its harmful effects, it is now being used less and less in all its applications. There is concern about the amount that has found its way into the food chain, particularly into large fish. Mercury levels in tissue are cumulative and can not be removed. Symptoms of mercury poisoning include vision, hearing, and speech problems, lack of co-ordination, muscle weakness, and neurological problems.

Mercury is definitely both beauty and the beast.

Bill Bagley