



## Mercury (Hg<sup>80</sup>)

### Properties

Mercury is a silvery-white metal with an atomic mass of 200.59 amu that is the only liquid metallic element at standard conditions for temperature and pressure. Hg has a density of 13.69 g/cm<sup>3</sup>, a freezing point of -38.83 °C and a resistivity of 96.1 μOhm cm. Upon freezing, the volume of mercury decreases by 3.59% and its density changes from 13.69 g/cm<sup>3</sup> when liquid to 14.184 g/cm<sup>3</sup> when solid. Solid mercury is soft, malleable, ductile and can be cut with a knife.

Unlike its lighter neighbors, cadmium and zinc, mercury usually forms simple stable compounds with metal-metal bonds. Mercury(II) is the most common oxidation state and is the main one in nature as well. It also exists in the +1 and -2 oxidation states. Mercury does not react with most acids, such as dilute sulfuric acid, although strong oxidizing acids such as concentrated sulfuric acid and nitric acid or aqua regia dissolve it. Like silver, mercury reacts with atmospheric hydrogen sulfide. Mercury dissolves many metals such as gold and silver to form amalgams. Its standard electrode potential in respect to Hg<sup>+2</sup> is +0.8V. 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).

### Plating Solutions

Mercury electroplating can be performed in aqueous (chloride, nitrate, acetate, perchlorate et al) <sup>[1-4]</sup> and non-aqueous electrolytes, for example, containing 8 x10<sup>-3</sup> M Hg(II) in 0.1 M HClO<sub>4</sub> or 0.1 M HNO<sub>3</sub> <sup>[5]</sup> and Aluminum Chloride-1-Methyl-3-Ethylimidazolium Chloride molten salt <sup>[6]</sup>.

### 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.

### References:

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