

# Heavy Metals



## What are Heavy Metals, exactly?

The usual examples include: Mercury (Hg), Cadmium (Cd), Arsenic (As), Chromium (Cr) and Lead (Pb), apparently because the relatively high density that they have in common, causes them to be toxic or poisonous at even low concentrations. This high density translates scientifically into a high specific-gravity (usually meaning, greater than 4.0).



Sadly, it is this group of elements that have been used popularly for decades in coatings, paints, lacquers for packaging applications, furniture, other industrial uses, and most unfortunately, children's toys. The EPA and other environmental groups are constantly evaluating these metals <http://www.ampef.com/gloss.html> for potential toxic effects to humans.

In addition to high density (high specific gravity and high atomic mass), certain elements according to their metallic groupings (alternative terms are 'metal' or 'semi-metal') on the Periodic Table, together with malleability, and electrical and thermal conductivity, are therefore suspected, and are generally determined to be a part of this class. These may be found in the waste stream especially as part of discarded items such as batteries, lighting fixtures, colorants and inks. [www.kleanindustries.com/s/Glossary.asp](http://www.kleanindustries.com/s/Glossary.asp) To be sure, a heavy metal, classically, is any of a number of higher atomic weight elements, which has the properties of a metallic substance at room temperature.

Be aware that there are several different definitions concerning which elements fall into the above class designation. Accordingly, many definitions abound such as in astronomy wherein any element heavier than Helium is considered a metal, a heavy metal or heavy element, and this definition includes all elements that were not formed in the big bang; with the exception of Hydrogen [http://en.wikipedia.org/wiki/Heavy\\_metals](http://en.wikipedia.org/wiki/Heavy_metals) (and Deuterium), Helium, and Lithium.

Heavy metals may enter an organism's body via food, drinking water, and even air. Thus, Selenium (Se), Nickel (Ni), Silver (Ag), Zinc and Barium at the wrong levels cause toxic reactions. Even Iron (Fe), Copper (Cu), and Aluminum (Al) if ingested repeatedly in their elemental state from over-used cookware, may produce toxic side-effects.

It is all about dosage. Many of the aforesaid elements are not bad per se, but so-called heavy metals <http://education.melbournewater.com.au/content/glossary/glossary.asp#h> can become toxic when highly concentrated. In fact living organisms require trace amounts of some heavy metals [http://www.chelatedtraceminerals.com/trace\\_mineral\\_benefits.html](http://www.chelatedtraceminerals.com/trace_mineral_benefits.html) including Iron, Copper, Cobalt, Manganese, Molybdenum, Vanadium, Strontium, Arsenic, Selenium and Zinc, [http://en.wikipedia.org/wiki/Heavy\\_metals](http://en.wikipedia.org/wiki/Heavy_metals) but excessive levels can be detrimental to the organism. A number of these elements are antagonistic toward one another <http://www.montmorillonite.org/Mulders%20chart.htm>, so providing them in a balance, rather than in isolation, can provide a ready made antidote.

**Chelation.** <http://foliarfert.com/pages/chelates.htm>

Furthermore, the presentation of the elements to the organism for metabolic purposes is all important. When heavy metals become chelated to other elements found in amino acids and peptide chains forming proteins, it takes powerful body chemistry to break those bonds and selectively ingest the odd atom or two of these important catalysts. On the other hand, elements in simply an ionic state can cause an unwanted overdose because there is little to hold back or regulate their absorption.

### **More Definitions:**

According to one definition, heavy metals are a group of elements between [Copper](#) and [Bismuth](#) on the [Periodic Table](#) of the element. That number works out to 55 elements counting the two anchors, as follows:

Group between Copper and Bismuth = Copper, Zinc, Gallium, Germanium, Arsenic, Selenium, Bromine, Krypton, Rubidium, Strontium, Yttrium, Zirconium, Niobium, Molybdenum, Technetium, Ruthenium, Rhodium, Palladium, Silver, Cadmium, Indium, Tin, Antimony, Tellurium, Iodine, Xenon, Cesium, Barium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Hafnium, Tantalum, Tungsten, Rhenium, Osmium, Iridium, Platinum, Gold, Mercury, Thallium, Lead, Bismuth. However this does not seem to match everyone's complete list.

Another suggests that any [toxic metals](#) may be called "heavy metals", irrespective of their atomic mass.

### **Complete Heavy Metal List**

A more strict definition increases specificity to metals heavier than the [rare earth](#) metals, which are at the bottom of the periodic table. None of these are essential elements in biological systems and additionally, most of the better known elements are toxic in fairly low concentrations. [Thorium](#) and [Uranium](#) and Plutonium are occasionally included in this classification as well, but they are more often referred to as "[radioactive](#) metals". (See [actinides in the environment](#) for further details of these radioactive metals.)

In the context of [nuclear power plants](#), "tHM" means tons of heavy metal.

### **In Conclusion**

As seen in these definitions, "heavy metals" is an ambiguous term, not necessarily associated with any specific set of elements, and therefore not necessarily implying any common set of properties (such as high toxicity, high atomic weight, etc). This has led one author to call for the elimination of the term altogether from scientific discourse (Duffus 2002)... [http://en.wikipedia.org/wiki/Heavy\\_metals](http://en.wikipedia.org/wiki/Heavy_metals)

