

## NMCP - Wiki

**Activated Carbon** - 1. Activated carbon is the generic term used to describe a family of carbonaceous adsorbents with a highly crystalline form and extensively developed internal pore structure. Activation creates a fast internal pore network and imparts certain surface chemistries (functional groups) inside each particle. Thus activation gives carbon its unique filtering characteristics. 2. Activated carbon (also called activated charcoal) is the more general term which includes carbon material mostly derived from charcoal. It denotes a material which has an exceptionally high surface area, typically determined by nitrogen adsorption, and includes a large amount of microporosity. Sufficient activation for useful applications may come solely from the high surface area, though often further chemical treatment is used to enhance the adsorbing properties of the material.

**Adsorption** - 1. the attachment of one substance to the surface of another; the concentration of a gas or a substance in solution in a liquid on a surface in contact with the gas or liquid, resulting in a relatively high concentration of the gas or solution at the surface. 2. Adhesion of the molecules of gases, liquids, or dissolved substances to a solid surface, resulting in relatively high concentration of the molecules at the place of contact; eg the plating out of an anti-wear additive on metal surfaces.

**Amalgamation** - the process of separation of precious metals from ore. Mercury has been used in the [gold](#) and [silver](#) mining processes due to the ease with which mercury will amalgamate with them. Amalgamation was often used in placer mining. After all of the usable metal had been extracted from the ore, mercury was poured down a long copper trough which formed a thin coating of mercury on the surface. The waste ore was then poured down the trough, and any gold in the waste amalgamated with the mercury. This coating was occasionally scraped off and distilled to remove the mercury, leaving behind fairly high purity gold.

**Amenable ore** - When the process of cyanide leaching can extract 88% or more of the gold contained in a mill ore without further processing.

**Artisanal mining** - very small-scale or hobbyist mining. Typically utilizes amalgamation in lieu of more sophisticated thermal or chemical processes for gold extraction. Outside of hobbyists, it is still performed in economically depressed regions.

**Autoclave** - pumping a slurry of milled ore, water and sulfuric acid into a vessel which is highly pressurized with oxygen and heated to 350-430 °F. During this process, at least 95% sulfide minerals in the ore are oxidized to sulfates and mercury sulfide combines with oxygen to form mercury sulfates. Mercury present in the gaseous emissions is typically  $\text{Hg}_2^+$  (and can be effectively controlled using a venturi scrubber system). Three facilities in Nevada use autoclaves.

**Calomel** - Calomel is a byproduct of some mercury control technologies. Also known as mercurous chloride, this dense white or yellowish-white, odorless solid is the principal example of a [mercury\(I\)](#) compound. **Mercury(I) chloride** is the [chemical compound](#) with the formula  $\text{Hg}_2\text{Cl}_2$ .

**Cinnabar** - sometimes written **cinnabarite**, is a name applied to red [mercury\(II\) sulfide](#) ( $\text{HgS}$ ), or native [vermilion](#), the common [ore](#) of mercury.  $\text{HgS}$  adopts two structures, i.e. it is [dimorphous](#).<sup>[1]</sup> The more stable form is cinnabar, which has a structure akin to that for [HgO](#): each Hg center has two short Hg-S bonds (2.36 Å), and four longer Hg---S contacts (3.10, 3.10, 3.30, 3.30 Å). The black form of  $\text{HgS}$  has the [zinc blende](#) structure. Cinnabar is found in all localities that yield mercury and generally occurs as a vein-filling [mineral](#) associated with recent [volcanic activity](#) and alkaline [hot springs](#)

**Carbon adsorption** -

**Compound** - Two or more atoms joined together chemically, with covalent or ionic bonds.

**Coproduct** - multiple items that are produced simultaneously during a production run. Co-product as it relates to annual reporting under the NMCP is any quantity of mercury, in elemental form or contained in any other substrate (eg calomel), recovered from emission controls or processes.

**Desorption** - a phenomenon and process opposite of adsorption, absorption or more general sorption. Desorption process occurs in a system being in the state of adsorption equilibrium between bulk phase (fluid, i.e. gas or liquid solution) and adsorbing surface (solid, or boundary separating 2 fluids) and when the concentration (or pressure) of adsorbed/absorbed/sorbed substance in the bulk phase is lowered. The result is the decrease of the amount of adsorbed/absorbed/sorbed substance.

**Dissolution** - 1. Process of dissolving minerals, rocks, fossils etc. 2. Mixing in which a solid or gas forms a chemical solution in a liquid. 3. A form of chemical weathering in which water molecules, sometimes in combination with acid or another compound in the environment, attract and remove oppositely charged ions or ion groups from a mineral or rock.

**Electro winning** - separation of gold from solution by using the electric potential to plate the gold in solution to a cathode.

**Element** - Substance consisting of only one type of atom.

**Kiln** (aka carbon kiln, regeneration kiln, carbon regeneration kiln, rotary kiln) - Regenerates carbon with heat.

**Leaching** - Ore is stacked on a large impervious pad that drains to a collection pond. An alkaline cyanide solution is dispersed over the ore and percolates through the heap. As

the cyanide comes into contact with the gold contained in the ore, a gold-cyanide solution is formed which seeps down the liner to the collection pond. During this process mercury may be leached into the gold-cyanide solution. This solution containing the precious metals is the “pregnant solution.” After leaching, the gold complexes in the pregnant cyanide solution are concentrated through adsorption onto activated carbon.

**Merrill Crowe** - a separation technique for removing [gold](#) from a [cyanide solution](#) (pregnant solution). The solution is separated from the ore by methods such as [filtration](#) and [counter current decantation](#) (CCD), and then the gold is [cemented](#) by adding [zinc](#) dust, which [precipitates](#) the gold: zinc has a higher [affinity](#) for the cyanide [ion](#) than gold.

**Ore Roaster** - an industrial furnace in which milled ore \*\*\*\*\*. During roasting, mercury sulfide is converted to elemental mercury and sulfur dioxide.

**Oxidation** - the addition of oxygen, removal of hydrogen, or the removal of electrons from an element or compound. In the environment, organic matter is oxidized to more stable substances. The opposite of reduction.

**Placer Mining** - small particles of gold are washed from sand or gravel deposits. mercury was often used to separate the gold from other heavy minerals. After all of the usable metal had been extracted from the ore, mercury was poured down a long copper trough which formed a thin coating of mercury on the surface. The waste ore was then poured down the trough, and any gold in the waste amalgamated with the mercury. This coating was occasionally scraped off and distilled to remove the mercury, leaving behind fairly high purity gold.

**Pregnant solution** - gold-cyanide solution containing precious metals.

**Reactive** - A chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shock, pressure, or temperature.

**Reactive Mercury Gas (RMG)** - Reactive mercury in the troposphere is affected by a complex mix of local emissions, global-scale transport, and gas and aqueous-phase chemistry.

**Refractory ore** - When the process of cyanide leaching can NOT extract 88% or more of the gold contained in a mill ore without further processing. Factors such as the presence of organic carbon and sulfide. Mineral grains in refractory ores inhibit the efficiency of gold recovery during cyanide leaching.

**Retort** - After the separation of gold from solution by electro winning or precipitation, gold must be extracted from other remaining metals. This is accomplished by retorting

and then smelting. A retort heats the gold and other metals under vacuum for 12-24 hours at 600-700 °C

**Smelting** - last step in gold production before the gold is sent to a refinery. The gold, along with a material with reducing potential known as flux, is heated to around 1,500 °C.

**Speciation** - Refers to the chemical form or compound in which an element occurs in both non-living and living systems. It may also refer to the quantitative distribution of an element. Mercury speciation includes elemental, oxidized/reactive and particulate-bound.

**zinc precipitation** - separation of gold from solution. Zinc has a higher affinity for cyanide ions than does gold or other metals. Therefore when zinc powder is added to the cyanide solution, the zinc dissolves and the other metals precipitate out and are extracted by filtration. Typically takes place within an enclosed cell.