Polonium

Atomic Number: 84

Atomic Weight: 209

Melting Point: 527 K (254°C or 489°F)

Boiling Point: 1235 K (962°C or 1764°F)

Density: 9.32 grams per cubic centimeter

Phase at Room Temperature: Solid

Element Classification: Metal

Radioactive

Period Number: 6 **Group Number:** 16 **Group Name:** Chalcogen

What's in a name? Named for the country of Poland.

Say what? Polonium is pronounced as **peh-LOW-ni-em**.

History and Uses:

Polonium was discovered by Marie Sklodowska Curie, a Polish chemist, in 1898. She obtained polonium from pitchblende, a material that contains uranium, after noticing that unrefined pitchblende was more radioactive than the uranium that was separated from it. She reasoned that pitchblende must contain at least one other radioactive element. Curie needed to refine several tons of pitchblende in order to obtain tiny amounts of polonium and radium, another radioactive element discovered by Curie. One ton of uranium ore contains only about 100 micrograms (0.0001 grams) of polonium.

Due to its scarcity, polonium is usually produced by bombarding bismuth-209 with neutrons in a nuclear reactor. This forms bismuth-210, which has a half-life of 5 days. Bismuth-210 decays into polonium-210 through beta decay. Milligram amounts of polonium-210 have been produced by this method.

Polonium-210 is a very strong emitter of alpha particles. A single gram of polonium-210 creates 140 Watts of heat energy and is being considered as a lightweight heat source for thermoelectric power for spacecraft. Polonium-210 has a half-life of 138.39 days.

Polonium's most stable isotope, polonium-209, has a half-life of 102 years. It decays into lead-205 through alpha decay. Polonium-209 is available from Oak Ridge National Laboratory at the cost of about $3200 per microcurie.

Polonium can be used to eliminate static electricity in machinery that is caused by processes such as the rolling of paper, wire or sheet metal, although other materials which emit beta particles are more commonly used for this purpose. Polonium is also used in brushes for removing dust from photographic films, although the polonium must be carefully sealed to protect the user from contamination. Polonium is also combined with beryllium to form neutron sources.

Estimated Crustal Abundance: 2×10^{-10} milligrams per kilogram

Estimated Oceanic Abundance: 1.5×10^{-14} milligrams per liter

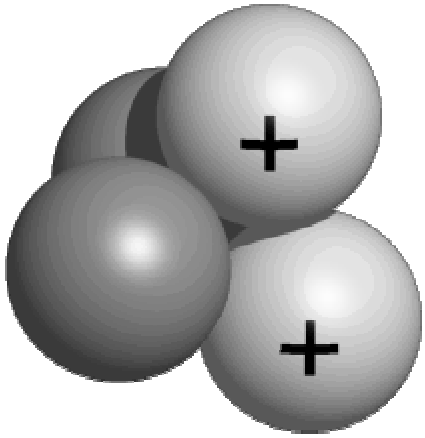
Number of Stable Isotopes: 0 (View all isotope data)

Ionization Energy: 8.417 eV

Oxidation States: +4, +2

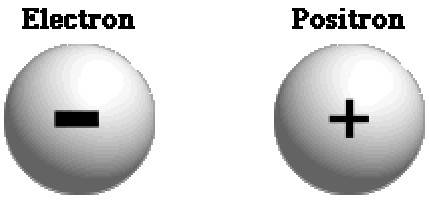
Electron Shell Configuration: $1s^2$
$2s^2$ $2p^6$
$3s^2$ $3p^6$ $3d^{10}$
$4s^2$ $4p^6$ $4d^{10}$ $4f^{14}$
$5s^2$ $5p^6$ $5d^{10}$
$6s^2$ $6p^4$

Alpha Particle



Produced during alpha decay, an alpha particle is a fast moving helium nucleus. Alpha particles carry a charge of +2 and strongly interact with matter. They travel only a few inches through air and can easily be stopped with a sheet of paper.

Beta Particle



Ejected from the nucleus during beta decay, a beta particle is a fast moving electron or positron, depending on the type on beta decay involved. Beta particles can travel a few feet through air and can be stopped with a few sheets of aluminum foil.

http://education.jlab.org/itselemental/ele084.html