



Polonium-210

July 2012

What is Polonium-210 (Po-210)?

Polonium-210 (Po-210) is a radioactive material that occurs naturally and at very low levels in the earth's crust, and can be found throughout our environment. It is a product of the radioactive decay of natural uranium (U-238).

Po-210 emits alpha radiation. It decays quickly, with a half-life of about 140 days, thus only 1% of its radiation remains after about two and a-half years, before turning into a stable lead isotope.

Where do you find Po-210?

Po-210 is naturally present in the environment at very low concentrations, which are not harmful to humans or animals.

How is it related to uranium mining?

Po-210 is a decay product of uranium, but its concentration is very low: less than 0.1 milligrams of Po-210 per ton of natural uranium. As such, it does not pose human health concerns during uranium mining or processing activities, and its short half-life means that it cannot accumulate in the natural environment near mining sites.

How are uranium mining workers protected from Po-210?

As Canada's nuclear regulator, the Canadian Nuclear Safety Commission (CNSC) regulates all nuclear substances (including Po-210) in Canada's nuclear facilities to protect the health of uranium workers and the public. Occupational radiation exposures in uranium mines and mills are strictly controlled. Controls include sophisticated detection and ventilation systems and dose limits that effectively protect Canadian uranium workers.

Quick Facts

- Polonium-210 (Po-210) is a product of the radioactive decay of natural uranium (U-238) found in the earth's crust.
- Its concentration is very low; there is less than 0.1 milligrams of Po-210 per ton of natural uranium.
- Po-210 is a known human carcinogen that presents a radiation hazard only if it is taken in large quantities into the body through inhalation, consumption, or through a wound.
- Getting a harmful dose through natural exposure is virtually impossible.
- There is no risk to the public living near uranium mining sites from Po-210.
- Po-210 is one of over 70 carcinogens found in tobacco.



How is Po-210 produced and used?

Outside the natural decay of uranium, Po-210 may be artificially produced (in milligram amounts) in nuclear reactors, by bombarding a stable bismuth target with neutrons. International estimates indicate that the total global production is less than 100 grams per year. Its main industrial use is in static elimination devices which ionize the air to remove static in many different environments, like labs.

Is Po-210 harmful to humans?

Po-210 is a known human carcinogen. Outside of the body, it does not pose any health hazards, because its alpha radiation cannot penetrate the skin, and its concentration in natural sources is so low that a large radiation dose would be virtually impossible. It only presents a radiation hazard if it is taken inside the body through breathing or eating, or if it enters through a wound.

If large quantities are inhaled or consumed in a fairly short period of time, and if they are absorbed into the body, Po-210 can be extremely toxic. This internal contamination can cause damage to organs and tissues, resulting in serious medical symptoms or death. Most Po-210 is passed through the feces; however remaining amounts can enter the bloodstream and can concentrate in organs such as the spleen, kidneys and liver.

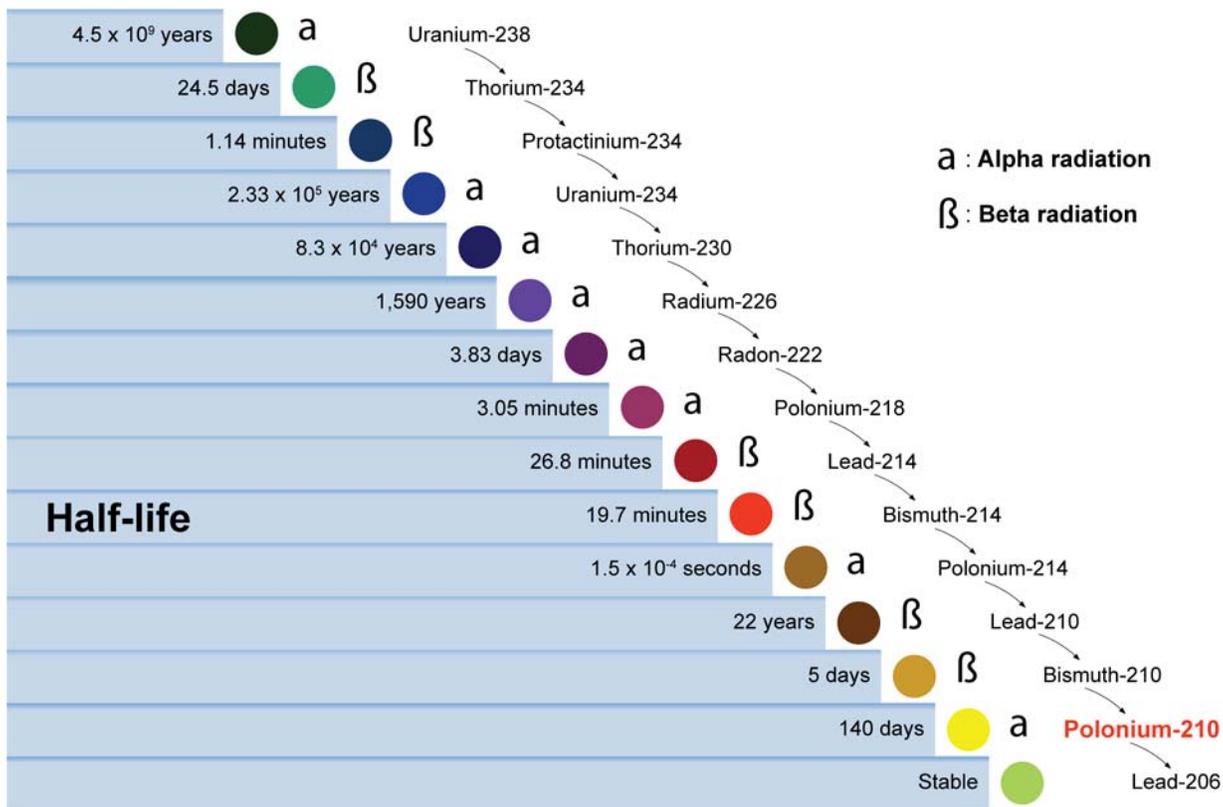
What is the link between Po-210 and tobacco?

Exposure through inhaling Po-210 (such as in cigarette smoking) can increase risk of lung cancer. Tobacco contains radioactive materials as a result of naturally occurring uranium in the soil and in the calcium phosphate fertilizer routinely applied to tobacco fields. Uranium eventually decays to radon, and airborne decay products attach to the leaves; polonium may also get absorbed through the roots from the same sources (uranium in the soil and phosphate fertilizers).

Is the Po-210 in tobacco the main cause of lung cancer?

According to the International Agency on Research on Cancer, an extension of the World Health Organization, cigarette smoke is an exceedingly complex mixture which contains over 5,300 compounds including multiple toxicants and carcinogens. Over 70 carcinogens have so far been identified in tobacco smoke as causing cancer in either laboratory animals or humans. Of these, polycyclic aromatic hydrocarbons (PAHs) and tobacco-specific N-nitrosamines are likely to play major roles in the development of lung cancer, rather than Po-210.

Figure 1 shows the decay chain of Uranium-238, the most common form of uranium.



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