



Fact Sheet

United States Nuclear Regulatory Commission
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Polonium-210

The investigation in the United Kingdom into the Nov. 23, 2006, death of Alexander Litvinenko has prompted considerable interest in the radioisotope polonium-210, its uses in industry, and its potential hazards.

Polonium was discovered by Marie Curie in 1898; she later named it for her homeland of Poland. It exists in nature in small quantities and is found in tobacco. For industrial purposes, it is produced in milligram amounts in nuclear reactors. Only about 100 grams (a little more than 3 ounces) is believed to be produced worldwide each year, making polonium quite rare. Commercially licensed distributors import a very small amount of polonium-210 into the US each year.

Potential Hazards

Polonium-210 emits alpha radiation, which cannot penetrate paper or skin. Therefore, external exposure does not pose a health hazard. It also decays quickly, with a half-life (the time it takes to lose half its radioactivity) of 138 days. That means polonium-210 effectively loses its radioactivity in about two-and-a-half years.

However, if swallowed or inhaled in sufficient quantities *and absorbed into the bodily system*, polonium-210 can be extremely toxic – many times more toxic than cyanide. If polonium-210 is ingested in its most common form, most of it will likely pass through the system without being absorbed. Once absorbed, however, the alpha radiation can rapidly destroy major organs, DNA and the immune system. Because of this hazard, pure polonium-210 must be handled very carefully. The Health Physics Society estimates that as little as 3 millicuries of polonium-210, equivalent in size to less than a grain of salt, could be fatal to a person weighing 70 kilograms (154 pounds).

Industrial Uses



Static Eliminators

These devices are designed according to tough NRC standards and pose no threat to public health or safety.

Polonium-210 is typically used in static elimination devices employed in various industries. To be used in these devices, the isotope is combined with silver or other metals in a foil mounted inside a protective cage, using designs approved by the NRC or a state agency. The construction and design of the radiation source makes ingestion during normal operation highly unlikely. Similarly, any attempt to destroy or disassemble the source to extract the polonium would be extremely difficult and would require sophisticated laboratory work.

Most static elimination devices used in industry are regulated by the NRC as “generally licensed devices.” This means that manufacturers and distributors are licensed by the NRC or state regulatory agencies. Customers who purchase the devices become “general licensees” and must comply with NRC or state regulations regarding their safe storage, operation and disposal.

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Availability

Much media attention has focused on the availability over the Internet of small polonium-210 sources containing 0.1 microcurie of radioactivity. This is an extremely small amount of radioactivity and is considered an “exempt quantity.” These sources are typically used to check or calibrate instrumentation. Possessors of exempt quantities are not required to obtain a license. However, they are expected to handle the source using appropriate radiation safety precautions as explained in the brochure provided with the source and not attempt to remove the radioactive material. They are typically in a form that, if ingested, would pose no health problem, and the radiation is so small that they do not pose a hazard even if the polonium were to be absorbed. It would take 30,000 of these exempt quantities to represent the 3-millicurie fatal dose estimate.

Other media stories have suggested that someone could disassemble one or more static elimination devices and procure a lethal dose of polonium-210 for as little as \$22.50. Such calculations discount the difficulty, expense and hazards of extracting the polonium-210 from the sealed sources and rendering it in a form that could be used to harm someone.

At this time, the NRC has seen nothing to suggest that increased controls or security measures are required for polonium-210. The NRC constantly re-evaluates security needs for radioactive materials; should new information become available that suggests enhanced controls are needed, the agency will take appropriate action.

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