



RADIOISOTOPE BRIEF

Americium-241 (Am-241)

Half-life: 432.2 years

Mode of decay: [Alpha particles](#) and weak [gamma radiation](#)

Chemical properties: Crystalline metal that is solid under normal conditions. Am-241 can be combined with beryllium to produce [neutrons](#).

What is it used for?

Am-241 is used in some medical diagnostic devices and in a variety of industrial and commercial devices that measure density and thickness. Tiny Am-241 sources are also present in smoke detectors.

Where does it come from?

Am-241 is a manmade metal that is produced from plutonium. Am-241 found in the environment is the result of past nuclear weapons testing.

What form is it in?

Am-241 found in the environment is in the form of microscopic dust. Am-241 used in industrial, medical, or commercial devices is in the form of coin-sized metal or plastic discs. The Am-241 source present in a smoke detector is inside a metal cylinder that is about the size of a pencil erasure.

What does it look like?

Am-241 is a silver-white metal that is solid under normal conditions.

How can it hurt me?

As a dust or fine powder, Am-241 can cause certain cancers. When Am-241 powder is swallowed, absorbed through a wound, or inhaled it can stay in the body for decades. Am-241 concentrates in the bones, liver, and muscles, exposing these organs to alpha particles.

Alpha particle: the nucleus of a helium atom, made up of two neutrons and two protons with a charge of +2. Certain radioactive nuclei emit alpha particles. Alpha particles generally carry more energy than gamma or beta particles, and deposit that energy very quickly while passing through tissue. Alpha particles can be stopped by a thin layer of light material, such as a sheet of paper, and cannot penetrate the outer, dead layer of skin. Therefore, they do not damage living tissue when outside the body. When alpha-emitting atoms are inhaled or swallowed, however, they are especially damaging because they transfer relatively large amounts of ionizing energy to living cells.

Gamma radiation: high-energy electromagnetic radiation emitted by certain radionuclides when their nuclei transition from a higher to a lower energy state. These rays have high energy and a short wave length. Gamma rays penetrate tissue farther than do beta or alpha particles, but leave a lower concentration of ions in their path to potentially cause cell damage. Gamma rays are very similar to x-rays.

For more information about Am-241, see the Public Health Statement by the Agency for Toxic Substances and Disease Registry at <http://www.atsdr.cdc.gov/toxprofiles>, or visit the Environmental Protection Agency at <http://www.epa.gov/radiation/radionuclides/ameridium.htm>.

To learn more about the use of radioactive materials in smoke detectors, visit the Environmental Protection Agency web site at http://www.epa.gov/radiation/sources/smoke_alarm.htm.

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For more information on protecting yourself before or during a radiologic emergency, see CDC's fact sheet titled "Frequently Asked Questions (FAQs) About a Radiation Emergency" at <http://www.bt.cdc.gov/radiation/emergencyfaq.asp>, and "Sheltering in Place During a Radiation Emergency," at <http://www.bt.cdc.gov/radiation/shelter.asp>.

For information about possible countermeasures for internal contamination with Am-241, please see CDC's fact sheet on [DTPA](#).

The Centers for Disease Control and Prevention (CDC) protects people's health and safety by preventing and controlling diseases and injuries; enhances health decisions by providing credible information on critical health issues; and promotes healthy living through strong partnerships with local, national, and international organizations.

For more information, visit www.bt.cdc.gov/radiation, or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

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