RADIOISOTOPE BRIEF

Uranium

Uranium-235 (U-235)
Half-life: 700 million years

Uranium-238 (U-238)
Half-life: 4.47 billion years

Mode of decay: Alpha particles

Chemical properties: Weakly radioactive, extremely dense metal (65% denser than lead)

What is it used for?
Uranium "enriched" into U-235 concentrations can be used as fuel for nuclear power plants and the nuclear reactors that run naval ships and submarines. It also can be used in nuclear weapons.

Depleted uranium (uranium containing mostly U-238) can be used for radiation shielding or as projectiles in armor-piercing weapons.

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.

Where does it come from?
U-235 and U-238 occur naturally in nearly all rock, soil, and water. U-238 is the most abundant form in the environment. U-235 can be concentrated in a process called "enrichment," making it suitable for use in nuclear reactors or weapons.

What form is it in?
Uranium is an extremely heavy metal. Enriched uranium can be in the form of small pellets that are packaged in the long tubes used in nuclear reactors.

What does it look like?
When it has been refined and enriched, uranium is a silvery-white metal.

How can it hurt me?
Because uranium decays by alpha particles, external exposure to uranium is not as dangerous as exposure to other radioactive elements because the skin will block the alpha particles. Ingestion of high concentrations of uranium, however, can cause severe health effects, such as cancer of the bone or liver. Inhaling large concentrations of uranium can cause lung cancer from the exposure to alpha particles. Uranium is also a toxic chemical, meaning that ingestion of uranium can cause kidney damage from its chemical properties much sooner than its radioactive properties would cause cancers of the bone or liver.

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(continued from previous page)

For more information about U-235 and U-238, 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/uranium.htm.

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.

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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