



STRONTIUM-90

What is STRONTIUM-90?

Strontium is a soft, silvery metallic element found in rocks, soil, dust, coal and oil. Strontium found in nature is not radioactive and is sometimes called stable strontium.

Strontium-90 is a radioactive form of strontium. Strontium-90 is formed in nuclear reactors or during the explosion of nuclear weapons. The half-life of strontium-90 (the time it takes for half of the strontium to give off its radiation and change into another substance) is 29 years.

Where can strontium-90 be found and how is it used?

Strontium-90 is found in spent fuel rods in nuclear reactors and is considered a waste product. It is found almost everywhere in small amounts, due to past nuclear accidents and fallout from nuclear explosions. Strontium-90 is a part of polluted soils at sites where nuclear fission was used, including research reactors and nuclear power plants.

Strontium-90 is used as a radioactive tracer in medical studies and in studies of agricultural crops. It is also used in beacons for navigating, remote weather stations and space vehicles. Strontium-90 is used in electron tubes to treat eye diseases and as a radiation source in industrial thickness gauges.

How can people be exposed to strontium-90?

It is unlikely that people will be exposed through breathing, drinking, or touching strontium-90. Food and drinking water are the largest sources of exposure to strontium-90. Some strontium-90 gets into fish, vegetables and livestock. It can also be found in grain, leafy vegetables and dairy products. However, the amount of radioactive strontium taken in by most people is small, unless they eat food that was grown on a waste site polluted with radioactive strontium.

How does strontium-90 work and how can it affect my health?

It is possible to breathe in particles or dust containing a chemical compound of strontium-90. If this compound dissolves in water, the chemical will dissolve in the moist surface inside the lungs. Strontium will then enter the blood quickly. If the chemical form of strontium does not dissolve in water easily, a small amount may remain in the lungs.

When you eat food or drink water containing strontium, only a small amount leaves the intestines and enters the blood. Strontium can also pass through the skin.

Once strontium enters the blood, it flows to other parts of the body. It enters and leaves cells easily. In the body, strontium acts very much like calcium. A large portion of the strontium will build up in bones. In adults, strontium mostly attaches to the surfaces of bones. In children, strontium may create the hard bone mineral itself, thus being stored in the bones for many years. Eventually, strontium will dissolve from the bones and return to the blood to be used again to grow bone, or to be expelled through urine, waste matter or sweat. The harmful effects of strontium-90 are caused by the high energy effects of radiation.

Since radioactive strontium is taken up into bone, the bone itself and nearby soft tissues may be damaged by radiation released over time. Bone marrow is the most important source of red blood cells, which are depleted if the strontium-90 level is too high. Some cancer patients are given injections of radioactive strontium (^{90}Sr) to destroy cancer tissue in the bone marrow.

Problems from lowered red blood cell counts include anemia, which causes excessive tiredness, blood that does not clot properly, and a decreased resistance to fight disease.



Frequently Asked Questions

Radioactive strontium probes are used to destroy unwanted tissue on the surface of the eye or skin. If used for eye surgery, this results in eye tissues becoming red and sore, or very thin after a long time. Thinning of the lower layer of the skin has also been reported in animal studies.

In animal studies, exposure to strontium-90 caused harmful reproductive effects. These effects happened when animals were exposed to doses more than a million times higher than typical exposure levels for humans. Animals that breathed or swallowed radioactive strontium had lowered blood cell counts. It is not known if exposure to strontium-90 affects human reproduction.

Strontium-90 is considered a cancer-causing substance because it damages the genetic material (DNA) in cells. In one geographical location near a nuclear weapons plant, an increase in leukemia (a form of cancer) was reported in people who swallowed a large amount of strontium-90 in water. In animal studies, researchers reported cancers of the bone, nose and lung, as well as leukemia. Animals receiving high doses of radiation to the skin developed skin and bone cancer.

How is strontium-90 poisoning treated?

Strontium-90 poisoning is treated in the same way as other radiation exposures. There are no direct treatments for strontium-90 exposure.

What should I do if exposed to strontium-90?

Decontamination should begin immediately. Emergency workers should wear protective safety gear. The patient's clothing should be removed. Then, the entire skin surface must be scrubbed with soap and water. All materials in contact with the strontium-90 must be placed in containers labeled as radioactive waste. Investigators should determine the exact type of exposure to assist caregivers in providing the best treatment. It will also help protect the emergency workers and hospital staff.

What factors limit use or exposure to strontium-90?

Strontium-90 exposure is usually only of concern for people working in nuclear facilities. This could be in the nuclear power industry, at a nuclear weapons plant or in nuclear plants that taken out of service. Laws ensure that such employees are safe and limit their exposure.

Is there a medical test to show whether I've been exposed to strontium-90?

All people have small amounts of stable strontium in their bodies. Tests can measure the level of strontium in blood, hair, waste matter and urine. These tests are most useful for people exposed to high levels. These tests cannot determine the exact levels of strontium during exposure, or how the exposure will affect your health.

Technical information for strontium-90:

CAS Number: 10098-97-2

Chemical Formula: Sr⁹⁰

Carcinogenicity (EPA): Classified as a human carcinogen.

MCL (Drinking Water): 4 millirems per year for beta and alpha emitters.

OSHA Standards: There is no standard for Sr.⁹⁰

NIOSH Standards: There is no standard for Sr.⁹⁰

References and Sources

<http://www.radonseal.com/radon-level.htm>

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. *Toxicological profile for Strontium*. Atlanta, GA: U.S. Department of Health and Human Services.