Things to know about radium

Today we often hear about deadly radioactive substances or victims of cancer because of radioactive substances from nuclear weapons tests. However, the same radioactive material as Radium - Radium, can be used to treat metastatic bone cancer, prostate cancer.

Radium (*Radium*) is a highly **radioactive** and extremely **dangerous** chemical element that can be fatal. However, it is still used to produce many everyday items, such as wrist watches, toothbrushes and is believed to have therapeutic properties until the intense radioactivity in it is found. It is the cause of adverse health effects.

Radium radioactivity is used as a watch face, numbers and needles glow in the dark in the 1900s. Photo source: EPA

According to **Chemicool** , radium is about **one-trillionth** of the earth's crust. A small amount of radioactive material is found in the ore containing uranium, by the chemical element Radium formed from the decay of uranium atoms, then into some other unstable chemical elements before end at lead chemical element. There are some known isotopes of radium, but due to the rapid decay rate of many isotopes, it is uncertain about the natural abundance of Ra isotopes.

General nature:

1. Atomic number (number of protons in the nucleus): 88
2. Sign (in the periodic table of elements): Ra

3. Standard atomic mass (average mass of atoms): 226
4. Density: 5.5 g / cm3 (3.2 ounces / inch3)
5. Material state: solid
6. Melting temperature: 700 degrees C (1,292 degrees F)
7. Boiling temperature: 1140 degrees C (2084 degrees F)
8. Number of isotopes (atoms in the same element have different number of neutrons): 33
9. The most common isotope: Ra-226 (unknown percentage of abundance in nature), Ra-223 (percent unknown to abundance in nature), Ra-224 (percent Ra-228 is not known for its abundance in nature) (the unknown percentage of abundance in nature).

Radium radioactive material.Photo source: Andrei Marincas Shutterstock

History

Marie and Pierre Curie, Polish and French chemists, discovered radium in 1898, according to **New World Encyclopedia.** This discovery comes from the study of **mineral uranite** (black ore or pebblene ore) found in Bohemia (present-day Czech Republic). Uranium or uranium is removed from the ore and the rest is found to remain radioactive. Later, the remainder of this radioactivity was separated and when studying the spectrum, the material was found primarily Barium with an unknown element.

According to **Peter van der Krogt** - a Dutch historian, the Radium chemical element is named in the Latin " *radius* " or " *ray* " because the radiation emitted by the new elements is large. about 3 million times more than radiation from uranium. The Curies temperature can extract about 1 milligram of radium from 10 tons of perblite ore, according to the **Royal Society of Chemistry** .

Pure radium was isolated in 1902 by electrical insulation by Marie Curie and Andre Debierne, a French chemist, according to New World Encyclopedia. Radium E, known as **bismuth-210** , is **the** first **artificial radioactive element** created by synthesis by scientists at the University of California, according to **Time magazine** .

Who know?

1. According to **Chemicool** , radium is abundant in the earth's crust by about 1 part per trillion by weight. This makes it the 84th most abundant element in the earth's crust, according to **Periodic Table** .
2. Radium is the heaviest alkaline earth metal, according to Encyclopedia.Other alkali soils include beryllium, magnesium (magnesium), calcium (calcium), strontium (strontium) and barium (barium).
3. When exposed to air, radium converts from silvery white to black due to oxidation, according to Lenntech.
4. According to Chemicool, radioisotopes with the longest half-life are radium-226 with a half-life of 1602 years.
5. According to **the** Agency for Toxic Substances and Disease Registry (ATSDR), **radium** usually enters the body when **inhaled** or **swallowed,** causing health effects due to radiation exposure including **cancer. letters** , anemia, cataracts and **death** .
6. Radium emits **alpha particles** (two protons and two neutrons linked together), **beta particles** (high energy or positron) and **gamma rays** (the largest wavelengths of light energy), according to New Encyclopedia World.
7. According to the Royal Society of Chemistry, radium is in the same group as calcium and is sometimes used to treat bone cancer.Alpha particles emitted from radium kill cancer cells.
8. Radium is mainly separated as a byproduct in uranium mining, according to the Royal Society of Chemistry.Most radium comes from uranium ore mines in the Democratic Republic of Congo and Canada.
9. According to Chemistry Explained, radium is now extracted from uranium ore in the same way that Marie and Pierre Curie did in the late 1890s and early 1900s.
10. According to **Periodic Table** , radium is used in the manufacture of watches, drawing numbers and needles showing glowing hours that can be seen in the dark.However, this production had to be stopped because so many factory workers died when exposed to it.
11. According to Encyclopedia, radium can be combined with almost all nonmetals, including oxygen, fluorine, chlorine, and nitrogen.
12. Curie (Ci) is the unit named after the amount of radiation emitted, the amount of radionuclide equivalent to one gram of radium, or at the rate of decay at 37 billion decomposes per second, according **to the Grain Energy Commission.** US Nuclear Regulatory Commission said.
13. According to Lenntech, because radium occurs naturally in small quantities in the environment, we are continuously exposed to a small amount of radiation.However, there is no evidence of harmful radium levels.
14. The lab notes of Marie and Pierre Curie still have too much radioactive material, because their research with radium has not been processed until today, according to **Jefferson Lab** .
15. Research with radium, Marie Curie was the first woman to win a Nobel Prize in Physics (1903) and was also the first scientist to win two Nobel prizes (second prize in 1911), according to Biography.
16. According to **Los Alamos** National **Laboratory** , radium is used to produce radon gas, which is often used to treat certain diseases such as cancer.
17. Radium is an unstable chemical element and undergoes many new stages **of radioactive decay** reaching the final product, lead, according to New World Encyclopedia.

Current research

Radium is often used to treat different types of cancer diseases. In a study published in the **Journal of Nuclear Medicine** , Isis Gayed and researchers from Texas discussed how to treat metastatic bone cancer caused by prostate cancer. The patients were treated with isotope Ra-223 and followed closely through treatments. Several factors are considered, carefully compared before and after treatment, including pain level, PSA (prostate-specific antigen), creatinine and hematological values. Patients with **PSA** , higher **creatinine** levels and higher **hemoglobin** levels often respond better to radium treatments.

A 2014 article by Ashley Lehman, an American researcher published in J **ournal of Nuclear Medicine** , discusses how to use the drug in the above study, radium-223 dichlorua (Xofigo). When radium is exposed to bone, it acts like calcium and the gravitational pull towards new bone formation takes place. Radium in drugs in metastatic bone cancer areas is damaged by alpha particles emitted by radium decay, primarily limited to surrounding cancer cells like alpha particles that only reach the distance short. The study concluded that the use of radium-223 is a promising treatment for people with prostate cancer and similar treatment has recently been studied with patients with breast cancer developing into cancer. metastatic bone.

Ongoing studies conducted using radium-223 for the treatment of breast cancer, including a "double blind", "placebo-control" (a counterfeit drug) randomized controlled experiment The American team of researchers, along with a summary published in the **American Association for Cancer Research** in 2015. This study included all 227 participants, effects and safety levels when used. Use of radium to treat metastatic bone cancer is caused by breast cancer.