



Key Properties

Atomic Mass	[244]
Category	actinide
State at 20°C	solid
Melting Point	640°C
Boiling Point	3228°C
Density	19.816
Electron Config	[Rn] 5f67s2
Electronegativity	1.28
Year Discovered	1940
Discovered By	Glenn Seaborg and colleagues

Did You Know?

- 1 It was named after the dwarf planet Pluto, continuing the planetary theme after uranium and neptunium.
- 2 The 'Fat Man' atomic bomb dropped on Nagasaki in 1945 used a core of plutonium-239.
- 3 The radioisotope thermoelectric generators (RTGs) that power deep space probes like the Voyager and Cassini spacecraft use the heat from the radioactive decay of plutonium-238.
- 4 It has the unusual property that its density increases as it is heated over a certain temperature range.
- 5 It is extremely toxic and radioactive, posing a significant health risk if inhaled or ingested.

APPEARANCE

Plutonium is a silvery-gray, radioactive metal.

SUPERHERO PERSONA

"The Planet-Hopper, the hero who powers deep-space missions to the outer planets."

EVERYDAY CONNECTION

Plutonium is found as the power source for deep-space probes like the Voyager spacecraft.

POP CULTURE

Plutonium powers the DeLorean's flux capacitor in Back to the Future at 1.21 gigawatts!

Plutonium: The Powerhouse Element

Plutonium is a silvery, radioactive metal and one of the most significant transuranium elements (elements heavier than uranium). It is famous—and feared—for its role as both a fuel in nuclear reactors and a key ingredient in nuclear weapons. The name follows the planetary naming trend: uranium (Uranus), neptunium (Neptune), and then plutonium (Pluto).

Why Is Plutonium Useful?

Plutonium is so valuable because it can undergo nuclear fission, releasing enormous amounts of energy.

Nuclear Weapons: The isotope plutonium-239 is the main material used in nuclear bombs. Just 1 kilogram of plutonium can release energy equal to 10,000 tonnes of TNT if fully detonated.

Nuclear Energy: Plutonium is used as fuel in some nuclear power plants, often in the form of mixed oxide (MOX) fuel, which recycles plutonium produced in reactors.

Spacecraft Power: The isotope plutonium-238 generates heat as it decays, which is converted into electricity by radioisotope thermoelectric generators (RTGs). These power spacecraft such as the Mars Curiosity Rover and New Horizons, especially where solar panels wouldn't work far from the Sun.

Natural Abundance & History

Plutonium does not occur naturally in significant amounts. It is mainly produced by bombarding uranium-238 in nuclear reactors, which creates plutonium-239.

1940: At the University of California, Berkeley, a team led by Glenn Seaborg created plutonium by bombarding uranium-238 with deuterium nuclei.

1942: Scientists succeeded in producing plutonium in measurable amounts.

1945: Plutonium was produced on a large scale for the Manhattan Project. Three atomic bombs were built using plutonium—one of which was detonated over Nagasaki, Japan.

Biological Role

Plutonium has no role in living organisms. It is extremely toxic because of its strong radioactivity. If inhaled, it can damage the lungs, bones, and liver and remains dangerous for thousands of years.