Osmium (Os)

Element 76 — Complete Summary

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76
Os
Osmium
190.23

Key Properties

Atomic Mass	190.23
Category	Transition Metals
State at 20°C	solid
Melting Point	3033°C
Boiling Point	5008°C
Density	22.59
Electron Config	[Xe] 4f145d66s2
Electronegativity	2.2
Year Discovered	1803
Discovered By	Smithson Tennant

✨ Did You Know?

1. It is the densest naturally occurring element on Earth, approximately twice as dense as lead.
2. Its name comes from the Greek word 'osme', meaning 'smell', because its volatile oxide, osmium tetroxide, has a very sharp, unpleasant, chlorine-like odor.
3. Because it is extremely hard and wear-resistant, alloys of osmium are used to make the tips of high-end fountain pens, instrument pivots, and electrical contacts.
4. Osmium tetroxide is a powerful oxidizing agent and is used in chemical synthesis and as a stain for microscopy.
5. It is one of the rarest of the precious metals.

APPEARANCE
Osmium is a hard, brittle, bluish-white metal the densest element.

SUPERHERO PERSONA
"The Densest, the heaviest and most compact hero on the planet."

EVERYDAY CONNECTION
Osmium is found in the durable, non-wearing tip of a high-end fountain pen.

POP CULTURE
Osmium is twice as dense as lead a brick of it would be too heavy for most people to lift.

Osmium: The Densely-Packed, Smelly Element

Osmium is a shiny, silvery metal that is the densest naturally occurring element—about twice as dense as lead! It's also extremely hard and resistant to corrosion. Its name comes from the Greek word osme, meaning "smell," because one of its compounds, osmium tetroxide, gives off a sharp, unpleasant odor.

Why Is Osmium Useful?

Pure osmium is so hard and brittle that it's difficult to work with, but in alloys and compounds it has unique applications.

Hard Alloys: Osmium is combined with iridium to make ultra-hard alloys. These are used in fountain pen tips, record player needles, instrument pivots, and electrical contacts—places where extreme durability is needed.

Catalyst: Osmium is a powerful catalyst in the chemical industry, especially in organic synthesis.

Microscopy & Forensics: Osmium tetroxide (OsO_4) is used as a stain to make biological tissues visible under microscopes and to detect fingerprints in forensic science.

Biological Role & Natural Abundance

Osmium has no known role in living things. The metal itself is not harmful, but osmium tetroxide is highly toxic, damaging the lungs, skin, and eyes. Because it's volatile, powdered osmium must be handled with extreme care.

Osmium is one of the rarest elements in Earth's crust. It is sometimes found in nature in its pure state or mixed with iridium in an alloy called osmiridium. Today, most osmium is obtained as a by-product of nickel refining.

History of Discovery

1803: English chemist Smithson Tennant discovered osmium in London. While studying the black residue left after dissolving crude platinum in acid, he realized it wasn't graphite. Careful experiments revealed two new elements: iridium (named for its colorful salts) and osmium (named for its strong smell).