Ruthenium (Ru)

Element 44 — Complete Summary

44
Ru
Ruthenium
101.07

Key Properties

Atomic Mass	101.07
Category	Transition Metals
State at 20°C	solid
Melting Point	2333°C
Boiling Point	4147°C
Density	12.45
Electron Config	[Kr] 4d75s1
Electronegativity	2.2
Year Discovered	1844
Discovered By	Karl Ernst Claus

✨ Did You Know?

1. It is a member of the platinum group metals and is extremely rare, found in about 1 part per billion in the Earth's crust.
2. It is named after Ruthenia, the Latin word for Rus', a historical region that includes present-day Ukraine, Russia, and Belarus, in honor of its discoverer's birthplace.
3. A tiny amount of ruthenium added to platinum or palladium can dramatically increase their hardness and wear resistance.
4. It is an extremely versatile catalyst, used in a wide range of chemical reactions.
5. Some high-end fountain pen nibs are tipped with hard-wearing ruthenium alloys to prevent wear.

APPEARANCE
Ruthenium is a hard, white, rare metal.

SUPERHERO PERSONA
"The Everlasting Point, a hero who provides an incredibly hard and durable tip for the mightiest pens."

EVERYDAY CONNECTION
Ruthenium is found in the hard, wear-resistant tip on a high-quality fountain pen.

POP CULTURE
Ruthenium is one of the rare platinum-group metals, often depicted as a highly valuable resource.

Ruthenium: The Rare, Catalytic Metal

Ruthenium is a shiny, silvery metal and one of the rarest elements on Earth. Its name comes from Ruthenia, the Latin word for Russia, where it was first discovered. Ruthenium belongs to the platinum group metals and is valued for its durability and catalytic powers.

Why Is Ruthenium Useful?

Ruthenium's resistance to corrosion and ability to act as a catalyst make it useful in many industries:

Electronics: Most ruthenium is used for chip resistors and electrical contacts, where its durability and low resistance are vital.

Catalysts: Ruthenium oxide is used to coat anodes in electrochemical cells for chlorine production. Ruthenium catalysts are also important in making ammonia and acetic acid.

Solar Cells: Ruthenium compounds are being researched for solar panels, where they can help convert sunlight into electricity efficiently.

Alloys: Ruthenium strengthens platinum and palladium alloys, making them more resistant to wear. These tough alloys are used in electrical contacts and even in some jewelry.

Natural Abundance & History

Ruthenium is very rare in Earth's crust. It is sometimes found in pure form but more often occurs with other platinum-group metals in ores like pentlandite. Commercially, it is obtained as a by-product of nickel refining.

1808: Polish chemist Jedrzej Sniadecki announced a new element, vestium, in platinum ore—but later retracted the claim when no one could confirm it.

1825: German chemist Gottfried Osann reported finding three new elements in platinum from the Ural Mountains; only one was real, which he named ruthenium.

1840: Russian chemist Karl Karlovich Klaus successfully purified the new metal, confirming it as a genuine element and keeping Osann's name.

Biological Role

Ruthenium has no biological role. However, its oxide ruthenium(IV) oxide is highly toxic and must be handled carefully.