Cadmium (Cd)

Element 48 — Complete Summary

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48
Cd
Cadmium
112.414

Key Properties

Atomic Mass	112.414
Category	Transition Metals
State at 20°C	solid
Melting Point	321.069°C
Boiling Point	767°C
Density	8.65
Electron Config	[Kr] 4d105s2
Electronegativity	1.69
Year Discovered	1817
Discovered By	Friedrich Stromeyer

✨ Did You Know?

1. Cadmium gets its name from \
2. Cadmium compounds are legendary for creating some of the most incredibly vibrant and stable red, orange, and yellow pigments, seen in everything from artist paints to plastics and even traffic lights!
3. It was once a superstar in nickel-cadmium (NiCd) rechargeable batteries, powering portable electronics worldwide before newer, greener battery tech arrived.
4. Heads up! Despite its dazzling uses, cadmium is highly toxic. It slowly builds up in the body over time, potentially causing serious health issues like kidney damage and brittle bones.
5. In nuclear reactors, cadmium plays a critical role as a neutron absorber, acting like a sponge to soak up excess neutrons and control the nuclear chain reaction, keeping things safe.
6. Cadmium telluride (CdTe) is a key ingredient in advanced thin-film solar cells, making them super efficient at turning sunlight into electricity for renewable energy.
7. You won't find pure cadmium just lying around! It's a relatively rare element, usually found as a byproduct when mining for much more common metals like zinc.
8. This isn't your average hard metal! Cadmium is so soft you can literally cut it with a knife, and it's incredibly malleable, easily hammered into thin shapes.
9. Its melting point is surprisingly low (321°C or 610°F), making it useful for specialized alloys and solders that need to join things at lower temperatures.
10. Cadmium plating was historically used to protect steel from rust, especially in harsh saltwater conditions, though environmental concerns have drastically reduced this use today.

👁 APPEARANCE
A soft, silvery-white metal with a subtle blue tinge, gleaming brightly when polished.

🦸 SUPERHERO PERSONA
"Cadmium, the Vibrant Vindicator! This element brings dazzling colors to life and powers our devices, but wields a hidden toxic punch if mishandled."

🔗 EVERYDAY CONNECTION
Powers some rechargeable batteries and creates those electrifying reds and yellows in modern screens.

🎬 POP CULTURE
Think of its vibrant, beautiful colors that hide a dark secret, like a classic movie villain's tempting trap, or a glowing, crucial element in a sci-fi thriller.

Overview of Cadmium

Cadmium is a soft, silvery-blue metal that is highly toxic to humans and the environment. Because of its health risks, the use of cadmium has been restricted in many industries. However, its unique chemical and physical properties still make it valuable in specialized applications, from batteries to nuclear technology.

Uses of Cadmium

Despite safety concerns, cadmium has been widely used in industry:

Batteries: Around 80% of cadmium production goes into nickel–cadmium (NiCd) rechargeable batteries, though these are increasingly being replaced by safer alternatives.

Corrosion protection: Cadmium coatings protect steel and other metals from rust, particularly in critical components such as aircraft parts and offshore structures.

Nuclear reactors: Cadmium is an excellent neutron absorber and is used in control rods to regulate nuclear fission.

Pigments: Cadmium compounds once produced vivid yellow, orange, and red pigments used in paints, plastics, and ceramics. Their use has declined due to toxicity.

History of Cadmium

1817 – Discovery: German chemist Friedrich Stromeyer discovered cadmium while investigating the discoloration of zinc carbonate. He identified the impurity as a new element, which he named after cadmia, an old term for zinc ores.

1818 – Independent discoveries: German chemists Karl Meissner and Karl Karsten also independently discovered cadmium shortly after Stromeyer.

Natural Occurrence and Production of Cadmium

Cadmium is a relatively rare element and is not found in pure form in nature. Instead, it occurs as a minor component in zinc ores, particularly in the mineral greenockite (CdS). Nearly all cadmium used commercially is obtained as a by-product of zinc refining.

Biological Role of Cadmium

Cadmium has no known biological role and is considered highly toxic. It accumulates in living organisms, including humans, where it can damage the kidneys, bones, and respiratory system. Cadmium is a suspected carcinogen and can also cause birth defects with prolonged exposure.

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