

**Key Properties**

Atomic Mass	54.938
Category	Transition Metals
State at 20°C	solid
Melting Point	1246°C
Boiling Point	2060°C
Density	7.21
Electron Config	[Ar] 3d54s2
Electronegativity	1.55
Year Discovered	1774
Discovered By	Johan Gottlieb Gahn

Did You Know?

- 1 It is essential for making steel and is so important that it's nearly impossible to make steel without it; it removes oxygen and sulfur and adds strength.
- 2 Early cave paintings dating back 30,000 years were made using black pigments from manganese oxides.
- 3 The human body needs manganese as an essential trace nutrient to help activate enzymes and support bone health.
- 4 Some bacteria get their energy by metabolizing manganese, leaving behind deposits that can clog water pipes.
- 5 The beautiful purple color of amethyst crystals comes from iron impurities, but it's manganese that is responsible for the color in the gemstone sugilite.

APPEARANCE

Manganese is a hard, brittle, silvery metal.

SUPERHERO PERSONA

"The Steel Stabilizer, the unsung hero of steel production, essential for making it strong and workable."

EVERYDAY CONNECTION

Manganese is found in the steel rails of a train track.

POP CULTURE

Manganese is a common resource needed for crafting in survival video games.

Manganese: The Steelmaker's Metal

Manganese is a hard, brittle, silvery metal. On its own it's too fragile for most uses, but when combined with other elements, it becomes one of the most important metals in industry—especially in the making of steel.

Why Is Manganese So Valuable?

Manganese's main role is as an alloying agent, enhancing the strength, durability, and performance of other metals.

Steel Production: Ordinary steel usually contains about 1% manganese. This small addition increases strength, improves workability, and boosts resistance to wear.

Manganese Steel: An alloy with around 13% manganese is exceptionally tough. It's used for railway tracks, rifle barrels, prison bars, and safes—applications where durability is critical.

Aluminum Alloys: Adding just 1.5% manganese to aluminum significantly improves its resistance to corrosion, which is why it's used in beverage cans.

Other Uses of Manganese:

Manganese dioxide (MnO₂) serves as a catalyst, a rubber additive, and a decolorizer for glass stained green by iron impurities.

Manganese sulfate is widely used in fertilizers, fungicides, and ceramics.

Essential for Life

Manganese is vital for all living things. It's a building block in many enzymes, including the one responsible for splitting water molecules during photosynthesis—a process that releases oxygen into the atmosphere. Without manganese, photosynthesis (and life itself) could not occur.

In humans, the body contains about 12 milligrams of manganese, mostly obtained from foods like nuts, whole grains, and tea. It supports healthy bones and helps the body process Vitamin B1.

Natural Abundance & History

Manganese is the fifth most abundant metal in Earth's crust. It occurs most commonly in the minerals pyrolusite (MnO₂) and rhodochrosite (MnCO₃). Today, manganese is produced mainly by reducing its oxide with other metals or by electrolyzing manganese sulfate. Vast reserves also exist in manganese nodules scattered across the ocean floor.

Early Uses: Prehistoric cave painters used pyrolusite as a black pigment. Centuries later, glassmakers relied on it to remove the greenish tint from glass.

Discovery (1774): Swedish chemist Johan Gottlieb Gahn successfully isolated manganese metal from pyrolusite, proving it was a distinct element—a suspicion long held by earlier scientists.

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