Potassium (K)

Element 19 — Complete Summary

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19
K
Potassium
39.098

Key Properties

Atomic Mass	39.098
Category	Alkali Metals
State at 20°C	solid
Melting Point	63.5°C
Boiling Point	759°C
Density	0.862
Electron Config	[Ar] 4s1
Electronegativity	0.82
Year Discovered	1807
Discovered By	Humphry Davy

✨ Did You Know?

1. Its chemical symbol 'K' comes from its Neo-Latin name, 'kalium', which is derived from the word 'alkali'.
2. Potassium metal reacts so violently with water that the hydrogen gas produced immediately ignites, burning with a lilac-colored flame.
3. It is an essential electrolyte for human life, crucial for nerve signals and muscle contractions, including the heartbeat.
4. Bananas are a well-known source of potassium, but potatoes and spinach actually contain more per serving.
5. Potassium is a key ingredient in most fertilizers, along with nitrogen and phosphorus (NPK).

APPEARANCE
A soft, silvery-white metal that tarnishes instantly in air.

SUPERHERO PERSONA
"The Banana-Powered Blaster, an essential hero for a healthy body, but with an explosive reaction to water."

EVERYDAY CONNECTION
The banana you eat for a healthy snack.

POP CULTURE
A key ingredient in fertilizers needed to grow food on colonized planets in sci-fi.

Overview of Potassium

Potassium is a soft, silvery alkali metal with atomic number 19. It tarnishes rapidly in air and reacts violently with water, releasing hydrogen gas that ignites with a lavender-colored flame. Although pure potassium metal is rarely seen outside of laboratories, its compounds are essential for both life and industry.

Why Is Potassium So Useful?

The greatest demand for potassium compounds comes from agriculture and industry:

Fertilizers: Potassium is a vital macronutrient for plants, helping them regulate fluid balance, improve photosynthesis, and grow strong. Potassium salts like potassium chloride and potassium sulfate are widely used in fertilizers to boost crop yields.

Glassmaking: Potassium carbonate is used to manufacture glass, giving it improved strength and clarity.

Cleaning products: Potassium hydroxide is a key ingredient in liquid soap, detergents, and bleaches.

Medicine: Potassium chloride is used in saline drips, supplements, and pharmaceuticals to treat deficiencies and support normal bodily functions.

Biological Role of Potassium

Potassium is essential for all living things, especially for nerve signaling and muscle contraction.

In humans: Potassium ions regulate fluid and electrolyte balance in the body. An average adult consumes up to 7 grams per day and stores about 140 grams inside their cells.

Dietary sources: Potassium-rich foods include bananas, potatoes, nuts, leafy greens, and sardines.

Radioactivity: The isotope potassium-40 is mildly radioactive. While harmless in normal amounts, its slow decay may contribute to natural genetic mutations over time.

Natural Abundance and Production of Potassium

Potassium makes up about 2.4% of Earth's crust, making it the seventh most abundant metal. However, it is never found in its pure metallic form due to its reactivity.

Common minerals: Potassium is found in salts such as sylvite (KCl) and carnallite ($KMgCl_3 \cdot 6H_2O$), often left behind by evaporated ancient seas.

Commercial production: Potassium compounds are mined from these minerals, particularly from underground deposits in Canada, Russia, and Belarus.

History of Potassium

Early uses: Potassium salts have been known since antiquity and were used in gunpowder, soap-making, and glass. The name "potash" comes from "pot ash," describing the method of leaching potassium salts from wood ash.

1807 – Isolation: Potassium was the first metal isolated by electrolysis. Sir Humphry Davy passed an electric current through moist potash (potassium carbonate), successfully producing pure potassium metal. He noted its violent reaction with water and the lavender flame it produced.