Iodine (I)

Element 53 — Complete Summary

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53

I

Iodine

126.904

Key Properties

Atomic Mass	126.904
Category	Halogens
State at 20°C	solid
Melting Point	113.7°C
Boiling Point	184.4°C
Density	4.933
Electron Config	[Kr] 4d105s25p5
Electronegativity	2.66
Year Discovered	1811
Discovered By	Bernard Courtois

✨ Did You Know?

1. It has the unusual property of subliming, which means when heated, it turns from a solid directly into a deep violet-colored gas, bypassing the liquid state.
2. Iodine is an essential nutrient for humans, required by the thyroid gland to produce hormones that regulate metabolism. A deficiency causes goiter.
3. Tincture of iodine, an iodine solution, was one of the first and most effective antiseptics for wounds.
4. The element was discovered by accident by Bernard Courtois in 1811 when he was processing seaweed ash to produce saltpeter for Napoleon's armies.
5. A common test for the presence of starch is to add an iodine solution, which turns an intense blue-black color in the presence of starch.

APPEARANCE

Iodine is a shiny, purplish-black, crystalline solid.

SUPERHERO PERSONA

"The Antiseptic, a hero who purifies wounds and keeps the body's metabolism in check."

EVERYDAY CONNECTION

Iodine is found in the antiseptic used to clean a cut or scrape.

POP CULTURE

Iodine is a key nutrient often added to salt hence iodized salt.

Overview of Iodine

Iodine is a black, shiny crystalline solid with atomic number 53. When heated, it undergoes sublimation, transforming directly into a striking purple vapor. As a member of the halogen group, iodine is both chemically reactive and biologically essential. It plays a vital role in human health, especially in thyroid function, while also being widely used in medicine, technology, and industry.

Why Is Iodine So Useful?

Iodine's importance comes from its antibacterial properties and its role in the human body:

Medicine and disinfectants: Iodide salts are used in antiseptics, such as tincture of iodine, to clean wounds. The radioactive isotope iodine-131 is a critical treatment for thyroid cancer and other thyroid-related conditions.

Health supplements: To prevent iodine deficiency, which can cause goiter (swelling of the thyroid gland), small amounts of iodide are added to table salt (iodized salt).

Photography: Historically, iodine compounds were vital in early photography, such as daguerreotypes, and they still play a role in modern photographic chemicals.

Technology and industry: Iodine is used in polarizing filters for LCD displays, in printing inks and dyes, and as a catalyst in chemical reactions.

Biological Role of Iodine

Iodine is an essential trace element for humans. The thyroid gland uses iodine to produce hormones that regulate growth, metabolism, and body temperature.

Daily requirement: The average human body contains about 20 milligrams of iodine, mostly concentrated in the thyroid.

Sources in diet: Seafood, seaweed, and iodized salt are the main dietary sources of iodine.

Natural Abundance and Production of Iodine

Iodine is not abundant in the Earth's crust, but it is widely distributed in trace amounts:

Seawater: Present as iodide ions, though in very low concentrations.

Seaweed: Historically, seaweed was a major source of iodine as it accumulates the element from seawater.

Modern production: Today, iodine is primarily obtained from iodate minerals and brine deposits left by evaporated ancient seas. Commercial production involves extracting iodine vapor from processed brine.

History of Iodine

1811 – Discovery: French chemist Bernard Courtois discovered iodine while producing saltpeter (potassium nitrate) from seaweed ash. Adding sulfuric acid released a vivid purple vapor that condensed into crystals of a new element.

Confirmation: Chemists Joseph Gay-Lussac and Sir Humphry Davy confirmed iodine as a new element shortly afterward, helping to establish it as part of the halogen family.