Silicon (Si)

Element 14 — Complete Summary

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14
Si
Silicon
28.085

Key Properties

Atomic Mass	28.085
Category	Metalloids
State at 20°C	solid
Melting Point	1414°C
Boiling Point	3265°C
Density	2.329
Electron Config	[Ne] 3s23p2
Electronegativity	1.9
Year Discovered	1824
Discovered By	Jöns Jacob Berzelius

✨ Did You Know?

1. It is the second most abundant element in the Earth's crust (after oxygen), making up over 28% of its mass.
2. Silicon is the essential component of most semiconductors, forming the basis of modern electronics and computer chips, leading to the name \
3. Quartz, one of the most common minerals on Earth, is a compound of silicon and oxygen (silicon dioxide).
4. Diatoms, a type of algae, build their intricate, glassy cell walls out of silica.
5. Pure silicon is used to make the wafers that integrated circuits are printed on.

APPEARANCE
A hard, brittle crystalline solid with a blue-grey metallic luster.

SUPERHERO PERSONA
"The Digital Dynamo, the hero at the heart of all modern technology, processing information at lightning speed."

EVERYDAY CONNECTION
The computer chip in your phone, laptop, or gaming console.

POP CULTURE
The namesake of 'Silicon Valley', the hub of the global tech industry.

Silicon: The Foundation of the Digital Age

Silicon is a blue-gray semi-metal with a shiny, metallic appearance when purified. It’s the second most abundant element in Earth’s crust (after oxygen) and plays a huge role in modern life—from the sand under our feet to the microchips in our computers.

Why Is Silicon Useful?

Silicon’s usefulness comes from its role as both a construction material and a semiconductor in electronics.

Electronics: Ultrapure silicon is the backbone of the computer and microelectronics industry. It’s used in microchips, transistors, and solar cells. A process called doping (adding tiny amounts of other elements) allows scientists to control its electrical properties with precision.

Alloys: Mixed with aluminum or iron, silicon makes alloys like aluminum–silicon (for car engine parts) and ferro-silicon (to strengthen steel).

Building & Construction: Silicon compounds dominate everyday materials. Silica (sand, quartz) and silicates (clay, granite) are the building blocks of concrete, cement, and glass.

Silicones: Long chains of silicon and oxygen form silicones, used in sealants, lubricants, waterproofing, cosmetics, and even hair conditioners.

Abrasives: Silicon carbide is a very tough material used for cutting, grinding, and polishing.

Biological Role & Natural Abundance

Silicon is essential for plants, helping strengthen their cell walls. In animals, its role is less clear, but it’s thought to help with bone and connective tissue. While elemental silicon is non-toxic, some silicon compounds (like asbestos) are carcinogenic, and inhaling silicate dust can cause silicosis, a serious lung disease.

Silicon makes up about 27.7% of Earth’s crust. It is never found as a pure element, but instead as silica (sand, quartz) or silicates (minerals like granite and clay). Pure silicon is made by heating sand with carbon in an electric furnace.

History of Discovery

Prehistoric Uses: Early humans made sharp tools from flint (silica). Ancient civilizations learned to make glass from sand, without realizing silicon was the key ingredient.

1824 – Discovery: Swedish chemist Jöns Jacob Berzelius isolated relatively pure silicon powder by heating potassium fluorosilicate with potassium, finally proving silicon was a distinct element.