

Sodium (Na)

Sodium is a soft, reactive Group 1 metal whose single 3s electron connects periodic position to Na⁺ chemistry. Its intense yellow-orange atomic emission doublet makes that electron structure visible as light.

11	Na	22.990
Atomic number	Sodium	Relative atomic mass

1. Quick facts

Property	Value	Meaning for a student
Atomic number	11	11 protons
Electrons	11	neutral Na atom
Electron configuration	[Ne] 3s ¹	one outer 3s electron
Relative atomic mass	22.990	natural sodium is essentially ²³ Na
Key isotope	²³ Na	11 protons / 12 neutrons
Group / period	1 / 3	s-block alkali metal

2. Atomic structure and electron configuration

Atomic feature	Value	How to read it
Protons	11	Atomic number fixes the proton count.
Electron configuration	[Ne] 3s ¹	Ground-state orbital bookkeeping.
Shell arrangement	2, 8, 1	Compact shell-count view.
Common oxidation states	+1	Formal oxidation-state bookkeeping, not permanent atom charges.

3. Signature idea

Why does sodium glow yellow?

Excited sodium atoms emit especially intense light in the yellow-orange region. NIST lists the familiar neutral-sodium D lines at about 588.995 and 589.592 nm.

Na I D doublet

Strong neutral-sodium lines occur near 588.995 nm and 589.592 nm. They are close together in the yellow-orange region; any teaching graphic that separates them widely is a visibility aid, not a to-scale spectrum.

4. Properties, phase behavior and evidence

Property	Value	Meaning for a student
Atomic radius	2.27 Å	RSC non-bonded radius.
Covalent radius	1.60 Å	RSC reference.
Electron affinity	52.867 kJ/mol	Gaseous neutral-atom value.
Electronegativity	0.93	Low Pauling electronegativity.

Evidence context

Atomic values and the D-line wavelengths are evaluated reference data. The Earth layer is occurrence context, not a mine-production ranking.

5. Where on Earth?

Sodium is globally distributed in salts and seawater

Because sodium is highly reactive, free sodium metal is not found naturally. Sodium occurs widely as Na⁺ in seawater, evaporite deposits and minerals, so broad reservoirs are more honest than arbitrary country dots.

Global occurrence view

Seawater Na⁺ / Evaporite salt beds / Crustal silicate minerals. Country dots are intentionally not used for this layer.

6. Representative compounds / forms

Sodium chloride / NaCl
Na⁺ and Cl⁻ form an ionic lattice; the sodium is not elemental sodium metal.

Sodium carbonate / Na₂CO₃
An important industrial alkali used in glass and chemical manufacture.

7. Isotope snapshot

Isotope	Nucleus	Natural abundance / status
²³ Na	11 p / 12 n	100% - Stable

8. Questions to ask next

Why does sodium emit yellow light? Strong neutral-sodium emission lines occur near 589 nm in the yellow-orange part of the visible spectrum.

Why does sodium usually form Na⁺? It has one 3s electron outside a closed [Ne] core.

Sources

Royal Society of Chemistry - Sodium element data
NIST - Sodium atomic data
NIST - Persistent lines of neutral sodium
PubChem - Sodium

Full interactive guide: <https://elementlookup.com/sodium/>