

Rubidium (Rb) - Student Datasheet

Element 37 · Alkali metal · source-reviewed learning reference

Rubidium is element 37, a soft Group 1 metal with one 5s valence electron. Beyond its high reactivity, rubidium connects atomic spectroscopy, Rb-Sr geochronology and laser-cooled atomic physics.

Quick reference

Atomic number	37
Relative atomic mass	85.468
Electron configuration	[Kr] 5s ¹
Period / group / block	5 / 1 / s
State context	Soft silvery alkali metal · solid at 20 °C
Density	1.53 g/cm ³
Melting / transition	312.45 K
Boiling / gas reference	961 K
Oxidation states	+1
Electronegativity	0.82

Structure & orbitals

Rubidium metal is represented with a body-centred-cubic conventional teaching cell near room temperature. Boundary atoms are shared between neighbouring cells.

The 5s cloud is an isolated-atom probability model. It is not an electron orbit and does not depict conduction electrons in metallic rubidium.

Phase behavior

At approximately standard pressure, rubidium is BCC solid below 312.45 K, liquid to about 961 K, and gaseous above that boiling reference.

Five things to remember

- Atomic number 37 means 37 protons.
- Neutral rubidium ends in 5s¹ and commonly forms Rb⁺.
- Rubidium metal is BCC near room temperature.
- ⁸⁷Rb is naturally radioactive and is used in Rb-Sr geochronology.
- Rubidium also has important roles in atomic-physics and frequency-standard research.

Rubidium: Real World & Signature Science

Element-specific science, uses and history

Big idea

Rubidium metal, Rb^+ salts and radioactive ^{87}Rb are related by element identity but are not the same chemical or nuclear object. The page keeps ion chemistry and isotope clocks separate.

Why this element is scientifically distinctive

Toggle Rb to Rb^+ , rotate a ^{85}Rb teaching nucleus and BCC cell, inspect the spherical 5s probability cloud, then connect the atom to spectroscopy and the $^{87}\text{Rb} \rightarrow ^{87}\text{Sr}$ geological clock.

Spectroscopy	Rubidium has strong optical transitions used in laser spectroscopy and atomic-physics experiments.
Atomic timing	Rubidium frequency standards are widely used in timing systems, though the SI second itself is defined using ^{133}Cs .
Rb-Sr dating	The decay of ^{87}Rb to ^{87}Sr provides a geological isotope clock for suitable rocks and minerals.
Mineral occurrence	Rubidium occurs dispersed in potassium-rich and lithium-rich minerals rather than as native metal deposits.
Chemical distinction	Reactive Rb metal and Rb^+ in compounds behave very differently; the element name alone is not a complete materials description.

From mineral association to specialized rubidium products

1. Rubidium occurs as a minor constituent in minerals and brines associated with alkali metals.
2. Industrial recovery separates rubidium compounds from larger alkali-metal process streams.
3. High-purity compounds or metal are produced for specialized technical uses; this guide does not provide reactive-metal preparation procedures.
4. Atomic-physics applications use controlled laboratory systems, not bulk consumer rubidium.

History checkpoints

1861	Robert Bunsen and Gustav Kirchhoff discovered rubidium by spectroscopy, identifying characteristic red spectral lines.
20th century	Rubidium spectroscopy and isotope science became important research tools.
Geochronology	The $^{87}\text{Rb} \rightarrow ^{87}\text{Sr}$ decay system became a major method for dating geological materials.
Today	Rubidium is used mainly in specialized research, timing and electronic/atomic applications rather than bulk structural materials.

Rubidium: Isotopes, Questions & Evidence

Evidence status and learner self-check

Isotope context

⁸⁵ Rb	Stable natural isotope	Reference teaching nucleus with 37 protons and 48 neutrons.
⁸⁷ Rb	Very long-lived radioactive natural isotope	Decays to ⁸⁷ Sr and underpins Rb–Sr geochronology.
Rubidium isotope context	Two major natural isotopes	Natural rubidium includes both ⁸⁵ Rb and ⁸⁷ Rb.

Common questions

What is rubidium?

Rubidium is element 37, a soft reactive alkali metal.

How many valence electrons does rubidium have?

One, in the 5s¹ outer configuration.

Is rubidium a metal?

Yes. It is a Group 1 alkali metal.

What is rubidium used for?

Specialized uses include frequency standards, atomic-physics research and Rb–Sr geochronology.

Quick self-check

Q: What is rubidium's atomic number? | Answer: 37. Atomic number equals proton count.

Q: What is the common ion? | Answer: Rb⁺. Rubidium commonly loses its single 5s electron.

Q: What is the outer configuration? | Answer: 5s¹. Rubidium is a Group 1 alkali metal.

Evidence & safety

Atomic, isotope and ordinary bulk references are evaluated. The BCC view is a conventional teaching cell. Mineral-occurrence geography is conceptual because a few pins would falsely imply a dedicated native-rubidium mining map.

Rubidium metal is highly reactive. This page is educational and provides no handling, storage or preparation instructions.

Core sources

Royal Society of Chemistry - Rubidium

<https://periodic-table.rsc.org/element/37/rubidium>

NIST - Atomic Data for Rubidium

<https://physics.nist.gov/PhysRefData/Handbook/Tables/rubidiumtable1.htm>