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**Rubidium**

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| --- | --- |
| Rubidium,  37Rb | |
| [Rb5.JPG](https://en.wikipedia.org/wiki/File:Rb5.JPG) | |
| **General properties** | |
| **Pronunciation** | [/ruːˈbɪdiəm/](https://en.wikipedia.org/wiki/Help:IPA/English) ​([*roo-BID-ee-əm*](https://en.wikipedia.org/wiki/Help:Pronunciation_respelling_key)) |
| **Appearance** | grey white |
| [**Standard atomic weight**](https://en.wikipedia.org/wiki/Standard_atomic_weight) **(*A*r, standard)** | 85.4678(3)[[1]](https://en.wikipedia.org/wiki/Rubidium#cite_note-CIAAW2016-1) |
| **Rubidium in the** [**periodic table**](https://en.wikipedia.org/wiki/Periodic_table) | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 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[Neon](https://en.wikipedia.org/wiki/Neon) | | [Sodium](https://en.wikipedia.org/wiki/Sodium) | [Magnesium](https://en.wikipedia.org/wiki/Magnesium) |  | | | | | | | | | | | | | | | | | | | | | | | | [Aluminium](https://en.wikipedia.org/wiki/Aluminium) | [Silicon](https://en.wikipedia.org/wiki/Silicon) | [Phosphorus](https://en.wikipedia.org/wiki/Phosphorus) | [Sulfur](https://en.wikipedia.org/wiki/Sulfur) | [Chlorine](https://en.wikipedia.org/wiki/Chlorine) | [Argon](https://en.wikipedia.org/wiki/Argon) | | [Potassium](https://en.wikipedia.org/wiki/Potassium) | [Calcium](https://en.wikipedia.org/wiki/Calcium) | [Scandium](https://en.wikipedia.org/wiki/Scandium) |  | | | | | | | | | | | | | | [Titanium](https://en.wikipedia.org/wiki/Titanium) | [Vanadium](https://en.wikipedia.org/wiki/Vanadium) | [Chromium](https://en.wikipedia.org/wiki/Chromium) | [Manganese](https://en.wikipedia.org/wiki/Manganese) | [Iron](https://en.wikipedia.org/wiki/Iron) | [Cobalt](https://en.wikipedia.org/wiki/Cobalt) | [Nickel](https://en.wikipedia.org/wiki/Nickel) | [Copper](https://en.wikipedia.org/wiki/Copper) | [Zinc](https://en.wikipedia.org/wiki/Zinc) | [Gallium](https://en.wikipedia.org/wiki/Gallium) | [Germanium](https://en.wikipedia.org/wiki/Germanium) | [Arsenic](https://en.wikipedia.org/wiki/Arsenic) | [Selenium](https://en.wikipedia.org/wiki/Selenium) | [Bromine](https://en.wikipedia.org/wiki/Bromine) | [Krypton](https://en.wikipedia.org/wiki/Krypton) | | Rubidium | [Strontium](https://en.wikipedia.org/wiki/Strontium) | [Yttrium](https://en.wikipedia.org/wiki/Yttrium) |  |  | | | | | | | | | | | | | [Zirconium](https://en.wikipedia.org/wiki/Zirconium) | [Niobium](https://en.wikipedia.org/wiki/Niobium) | [Molybdenum](https://en.wikipedia.org/wiki/Molybdenum) | [Technetium](https://en.wikipedia.org/wiki/Technetium) | [Ruthenium](https://en.wikipedia.org/wiki/Ruthenium) | [Rhodium](https://en.wikipedia.org/wiki/Rhodium) | [Palladium](https://en.wikipedia.org/wiki/Palladium) | [Silver](https://en.wikipedia.org/wiki/Silver) | [Cadmium](https://en.wikipedia.org/wiki/Cadmium) | [Indium](https://en.wikipedia.org/wiki/Indium) | [Tin](https://en.wikipedia.org/wiki/Tin) | [Antimony](https://en.wikipedia.org/wiki/Antimony) | [Tellurium](https://en.wikipedia.org/wiki/Tellurium) | [Iodine](https://en.wikipedia.org/wiki/Iodine) | [Xenon](https://en.wikipedia.org/wiki/Xenon) | | [Caesium](https://en.wikipedia.org/wiki/Caesium) | [Barium](https://en.wikipedia.org/wiki/Barium) | [Lanthanum](https://en.wikipedia.org/wiki/Lanthanum) | [Cerium](https://en.wikipedia.org/wiki/Cerium) | [Praseodymium](https://en.wikipedia.org/wiki/Praseodymium) | [Neodymium](https://en.wikipedia.org/wiki/Neodymium) | [Promethium](https://en.wikipedia.org/wiki/Promethium) | [Samarium](https://en.wikipedia.org/wiki/Samarium) | [Europium](https://en.wikipedia.org/wiki/Europium) | [Gadolinium](https://en.wikipedia.org/wiki/Gadolinium) | [Terbium](https://en.wikipedia.org/wiki/Terbium) | [Dysprosium](https://en.wikipedia.org/wiki/Dysprosium) | [Holmium](https://en.wikipedia.org/wiki/Holmium) | [Erbium](https://en.wikipedia.org/wiki/Erbium) | [Thulium](https://en.wikipedia.org/wiki/Thulium) | [Ytterbium](https://en.wikipedia.org/wiki/Ytterbium) | [Lutetium](https://en.wikipedia.org/wiki/Lutetium) | [Hafnium](https://en.wikipedia.org/wiki/Hafnium) | [Tantalum](https://en.wikipedia.org/wiki/Tantalum) | [Tungsten](https://en.wikipedia.org/wiki/Tungsten) | [Rhenium](https://en.wikipedia.org/wiki/Rhenium) | [Osmium](https://en.wikipedia.org/wiki/Osmium) | [Iridium](https://en.wikipedia.org/wiki/Iridium) | [Platinum](https://en.wikipedia.org/wiki/Platinum) | [Gold](https://en.wikipedia.org/wiki/Gold) | [Mercury (element)](https://en.wikipedia.org/wiki/Mercury_(element)) | [Thallium](https://en.wikipedia.org/wiki/Thallium) | [Lead](https://en.wikipedia.org/wiki/Lead) | [Bismuth](https://en.wikipedia.org/wiki/Bismuth) | [Polonium](https://en.wikipedia.org/wiki/Polonium) | [Astatine](https://en.wikipedia.org/wiki/Astatine) | [Radon](https://en.wikipedia.org/wiki/Radon) | | [Francium](https://en.wikipedia.org/wiki/Francium) | [Radium](https://en.wikipedia.org/wiki/Radium) | [Actinium](https://en.wikipedia.org/wiki/Actinium) | [Thorium](https://en.wikipedia.org/wiki/Thorium) | [Protactinium](https://en.wikipedia.org/wiki/Protactinium) | [Uranium](https://en.wikipedia.org/wiki/Uranium) | [Neptunium](https://en.wikipedia.org/wiki/Neptunium) | [Plutonium](https://en.wikipedia.org/wiki/Plutonium) | [Americium](https://en.wikipedia.org/wiki/Americium) | [Curium](https://en.wikipedia.org/wiki/Curium) | [Berkelium](https://en.wikipedia.org/wiki/Berkelium) | [Californium](https://en.wikipedia.org/wiki/Californium) | [Einsteinium](https://en.wikipedia.org/wiki/Einsteinium) | [Fermium](https://en.wikipedia.org/wiki/Fermium) | [Mendelevium](https://en.wikipedia.org/wiki/Mendelevium) | [Nobelium](https://en.wikipedia.org/wiki/Nobelium) | [Lawrencium](https://en.wikipedia.org/wiki/Lawrencium) | [Rutherfordium](https://en.wikipedia.org/wiki/Rutherfordium) | [Dubnium](https://en.wikipedia.org/wiki/Dubnium) | [Seaborgium](https://en.wikipedia.org/wiki/Seaborgium) | [Bohrium](https://en.wikipedia.org/wiki/Bohrium) | [Hassium](https://en.wikipedia.org/wiki/Hassium) | [Meitnerium](https://en.wikipedia.org/wiki/Meitnerium) | [Darmstadtium](https://en.wikipedia.org/wiki/Darmstadtium) | [Roentgenium](https://en.wikipedia.org/wiki/Roentgenium) | [Copernicium](https://en.wikipedia.org/wiki/Copernicium) | [Nihonium](https://en.wikipedia.org/wiki/Nihonium) | [Flerovium](https://en.wikipedia.org/wiki/Flerovium) | [Moscovium](https://en.wikipedia.org/wiki/Moscovium) | [Livermorium](https://en.wikipedia.org/wiki/Livermorium) | [Tennessine](https://en.wikipedia.org/wiki/Tennessine) | [Oganesson](https://en.wikipedia.org/wiki/Oganesson) | | [K](https://en.wikipedia.org/wiki/Potassium) ↑ **Rb** ↓ [Cs](https://en.wikipedia.org/wiki/Caesium) | | [krypton](https://en.wikipedia.org/wiki/Krypton) ← **rubidium** → [strontium](https://en.wikipedia.org/wiki/Strontium) | | | | |
| [**Atomic number**](https://en.wikipedia.org/wiki/Atomic_number)(*Z*) | 37 |
| [**Group**](https://en.wikipedia.org/wiki/Group_(periodic_table)) | [group 1 (alkali metals)](https://en.wikipedia.org/wiki/Alkali_metal) |
| [**Period**](https://en.wikipedia.org/wiki/Period_(periodic_table)) | [period 5](https://en.wikipedia.org/wiki/Period_(periodic_table)#Period_5) |
| [**Block**](https://en.wikipedia.org/wiki/Block_(periodic_table)) | [s-block](https://en.wikipedia.org/wiki/S-block) |
| [**Element category**](https://en.wikipedia.org/wiki/Names_for_sets_of_chemical_elements#Category) | [alkali metal](https://en.wikipedia.org/wiki/Alkali_metal) |
| [**Electron configuration**](https://en.wikipedia.org/wiki/Electron_configuration) | [[Kr](https://en.wikipedia.org/wiki/Krypton)] 5s1 |
| Electrons per shell | 2, 8, 18, 8, 1 |
| **Physical properties** | |
| [**Phase**](https://en.wikipedia.org/wiki/Phase_(matter)) **at**[**STP**](https://en.wikipedia.org/wiki/Standard_conditions_for_temperature_and_pressure) | [solid](https://en.wikipedia.org/wiki/Solid) |
| [**Melting point**](https://en.wikipedia.org/wiki/Melting_point) | 312.45 [K](https://en.wikipedia.org/wiki/Kelvin) ​(39.30 °C, ​102.74 °F) |
| [**Boiling point**](https://en.wikipedia.org/wiki/Boiling_point) | 961 K ​(688 °C, ​1270 °F) |
| [**Density**](https://en.wikipedia.org/wiki/Density)(near r.t.) | 1.532 g/cm3 |
| when liquid (at m.p.) | 1.46 g/cm3 |
| [**Triple point**](https://en.wikipedia.org/wiki/Triple_point) | 312.41 K, ​? kPa[[2]](https://en.wikipedia.org/wiki/Rubidium#cite_note-b92-2) |
| [**Critical point**](https://en.wikipedia.org/wiki/Critical_point_(thermodynamics)) | 2093 K, 16 MPa *(extrapolated)*[[2]](https://en.wikipedia.org/wiki/Rubidium#cite_note-b92-2) |
| [**Heat of fusion**](https://en.wikipedia.org/wiki/Enthalpy_of_fusion) | 2.19 [kJ/mol](https://en.wikipedia.org/wiki/Kilojoule_per_mole) |
| [**Heat of vaporization**](https://en.wikipedia.org/wiki/Enthalpy_of_vaporization) | 69 kJ/mol |
| [**Molar heat capacity**](https://en.wikipedia.org/wiki/Molar_heat_capacity) | 31.060 J/(mol·K) |
| [**Vapor pressure**](https://en.wikipedia.org/wiki/Vapor_pressure)   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | ***P***(Pa) | **1** | **10** | **100** | **1 k** | **10 k** | **100 k** | | **at *T***(K) | 434 | 486 | 552 | 641 | 769 | 958 | | |
| **Atomic properties** | |
| [**Oxidation states**](https://en.wikipedia.org/wiki/Oxidation_state) | −1, **+1** (a strongly [basic](https://en.wikipedia.org/wiki/Base_(chemistry)) oxide) |
| [**Electronegativity**](https://en.wikipedia.org/wiki/Electronegativity) | Pauling scale: 0.82 |
| [**Ionization energies**](https://en.wikipedia.org/wiki/Ionization_energy) | * 1st: 403 kJ/mol * 2nd: 2632.1 kJ/mol * 3rd: 3859.4 kJ/mol |
| [**Atomic radius**](https://en.wikipedia.org/wiki/Atomic_radius) | empirical: 248 [pm](https://en.wikipedia.org/wiki/Picometre) |
| [**Covalent radius**](https://en.wikipedia.org/wiki/Covalent_radius) | 220±9 pm |
| [**Van der Waals radius**](https://en.wikipedia.org/wiki/Van_der_Waals_radius) | 303 pm |
| [Color lines in a spectral range](https://en.wikipedia.org/wiki/File:Rubidium_spectrum_visible.png)  [**Spectral lines**](https://en.wikipedia.org/wiki/Spectral_line) **of rubidium** | |
| **Other properties** | |
| [**Crystal structure**](https://en.wikipedia.org/wiki/Crystal_structure) | ​[body-centered cubic](https://en.wikipedia.org/wiki/Cubic_crystal_system) (bcc)  [Body-centered cubic crystal structure for rubidium](https://en.wikipedia.org/wiki/File:Cubic-body-centered.svg) |
| [**Speed of sound**](https://en.wikipedia.org/wiki/Speed_of_sound)thin rod | 1300 m/s (at 20 °C) |
| [**Thermal expansion**](https://en.wikipedia.org/wiki/Coefficient_of_thermal_expansion) | 90 µm/(m·K)[[3]](https://en.wikipedia.org/wiki/Rubidium#cite_note-3) (at r.t.) |
| [**Thermal conductivity**](https://en.wikipedia.org/wiki/Thermal_conductivity) | 58.2 W/(m·K) |
| [**Electrical resistivity**](https://en.wikipedia.org/wiki/Electrical_resistivity_and_conductivity) | 128 nΩ·m (at 20 °C) |
| [**Magnetic ordering**](https://en.wikipedia.org/wiki/Magnetism) | [paramagnetic](https://en.wikipedia.org/wiki/Paramagnetic)[[4]](https://en.wikipedia.org/wiki/Rubidium#cite_note-magnet-4) |
| [**Magnetic susceptibility**](https://en.wikipedia.org/wiki/Magnetic_susceptibility) | +17.0·10−6 cm3/mol (303 K)[[5]](https://en.wikipedia.org/wiki/Rubidium#cite_note-5) |
| [**Young's modulus**](https://en.wikipedia.org/wiki/Young%27s_modulus) | 2.4 GPa |
| [**Bulk modulus**](https://en.wikipedia.org/wiki/Bulk_modulus) | 2.5 GPa |
| [**Mohs hardness**](https://en.wikipedia.org/wiki/Mohs_scale_of_mineral_hardness) | 0.3 |
| [**Brinell hardness**](https://en.wikipedia.org/wiki/Brinell_hardness_test) | 0.216 MPa |
| [**CAS Number**](https://en.wikipedia.org/wiki/CAS_Registry_Number) | 7440-17-7 |
| **History** | |
| [**Discovery**](https://en.wikipedia.org/wiki/Timeline_of_chemical_element_discoveries) | [Robert Bunsen](https://en.wikipedia.org/wiki/Robert_Bunsen) and [Gustav Kirchhoff](https://en.wikipedia.org/wiki/Gustav_Kirchhoff) (1861) |
| **First isolation** | [George de Hevesy](https://en.wikipedia.org/wiki/George_de_Hevesy) |
| **Main** [**isotopes of rubidium**](https://en.wikipedia.org/wiki/Isotopes_of_rubidium) | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | [**Iso­tope**](https://en.wikipedia.org/wiki/Isotope) | [**Abun­dance**](https://en.wikipedia.org/wiki/Natural_abundance) | [**Half-life**](https://en.wikipedia.org/wiki/Half-life) **(*t*1/2)** | [**Decay mode**](https://en.wikipedia.org/wiki/Radioactive_decay) | [**Pro­duct**](https://en.wikipedia.org/wiki/Decay_product) | | **83Rb** | [syn](https://en.wikipedia.org/wiki/Synthetic_radioisotope) | 86.2 d | [ε](https://en.wikipedia.org/wiki/Electron_capture) | [83Kr](https://en.wikipedia.org/wiki/Krypton-83) | | [γ](https://en.wikipedia.org/wiki/Gamma_radiation) | – | | **84Rb** | syn | 32.9 d | ε | [84Kr](https://en.wikipedia.org/wiki/Krypton-84) | | [β+](https://en.wikipedia.org/wiki/Positron_emission) | 84Kr | | γ | – | | [β−](https://en.wikipedia.org/wiki/Beta_decay) | [84Sr](https://en.wikipedia.org/wiki/Strontium-84) | | **85Rb** | 72.17% | [stable](https://en.wikipedia.org/wiki/Stable_isotope) | | | | **86Rb** | syn | 18.7 d | β− | [86Sr](https://en.wikipedia.org/wiki/Strontium-86) | | γ | – | | **87Rb** | 27.83% | 4.9×1010 y | β− | [87Sr](https://en.wikipedia.org/wiki/Strontium-87) | | |
| * [view](https://en.wikipedia.org/wiki/Template:Infobox_rubidium) * [talk](https://en.wikipedia.org/wiki/Template_talk:Infobox_rubidium) * [edit](https://en.wikipedia.org/w/index.php?title=Template:Infobox_rubidium&action=edit)   | [references](https://en.wikipedia.org/wiki/List_of_data_references_for_chemical_elements) | |

**Rubidium** is a [chemical element](https://en.wikipedia.org/wiki/Chemical_element) with symbol **Rb** and [atomic number](https://en.wikipedia.org/wiki/Atomic_number) 37. Rubidium is a soft, silvery-white [metallic](https://en.wikipedia.org/wiki/Metal) element of the [alkali metal](https://en.wikipedia.org/wiki/Alkali_metal) group, with a [standard atomic weight](https://en.wikipedia.org/wiki/Standard_atomic_weight) of 85.4678. Elemental rubidium is highly reactive, with properties similar to those of other alkali metals, including rapid [oxidation](https://en.wikipedia.org/wiki/Oxidation) in [air](https://en.wikipedia.org/wiki/Earth%27s_atmosphere). On Earth, natural rubidium comprises two [isotopes](https://en.wikipedia.org/wiki/Isotope): 72% is the stable isotope, 85Rb; 28% is the slightly [radioactive](https://en.wikipedia.org/wiki/Radioactive) 87Rb, with a [half-life](https://en.wikipedia.org/wiki/Half-life) of 49 billion years—more than three times longer than the estimated [age of the universe](https://en.wikipedia.org/wiki/Age_of_the_universe).

German chemists [Robert Bunsen](https://en.wikipedia.org/wiki/Robert_Bunsen) and [Gustav Kirchhoff](https://en.wikipedia.org/wiki/Gustav_Kirchhoff) discovered rubidium in 1861 by the newly developed technique, [flame spectroscopy](https://en.wikipedia.org/wiki/Atomic_emission_spectroscopy#Flame_emission_spectroscopy).

Rubidium's compounds have various chemical and electronic applications. Rubidium metal is easily vaporized and has a convenient spectral absorption range, making it a frequent target for [laser](https://en.wikipedia.org/wiki/Laser) manipulation of [atoms](https://en.wikipedia.org/wiki/Atom).

Rubidium is not a known nutrient for any [living organisms](https://en.wikipedia.org/wiki/Organism). However, rubidium [ions](https://en.wikipedia.org/wiki/Ion) have the same charge as potassium ions, and are actively taken up and treated by [animal cells](https://en.wikipedia.org/wiki/Animal_cell) in similar ways.



**Contents**

* [1 Characteristics](https://en.wikipedia.org/wiki/Rubidium#Characteristics)
  + [1.1 Compounds](https://en.wikipedia.org/wiki/Rubidium#Compounds)
  + [1.2 Isotopes](https://en.wikipedia.org/wiki/Rubidium#Isotopes)
  + [1.3 Occurrence](https://en.wikipedia.org/wiki/Rubidium#Occurrence)
* [2 Production](https://en.wikipedia.org/wiki/Rubidium#Production)
* [3 History](https://en.wikipedia.org/wiki/Rubidium#History)
* [4 Applications](https://en.wikipedia.org/wiki/Rubidium#Applications)
* [5 Precautions and biological effects](https://en.wikipedia.org/wiki/Rubidium#Precautions_and_biological_effects)
* [6 See also](https://en.wikipedia.org/wiki/Rubidium#See_also)
* [7 References](https://en.wikipedia.org/wiki/Rubidium#References)
* [8 Further reading](https://en.wikipedia.org/wiki/Rubidium#Further_reading)
* [9 External links](https://en.wikipedia.org/wiki/Rubidium#External_links)

**Characteristics**

[](https://en.wikipedia.org/wiki/File:RbH.JPG)

Partially molten rubidium metal in an ampoule

Rubidium is a very soft, [ductile](https://en.wikipedia.org/wiki/Ductility), silvery-white metal.[[6]](https://en.wikipedia.org/wiki/Rubidium#cite_note-Ohly-6) It is the second most [electropositive](https://en.wikipedia.org/wiki/Electronegativity) of the stable alkali metals and melts at a temperature of 39.3 °C (102.7 °F). Like other alkali metals, rubidium metal reacts violently with water. As with potassium (which is slightly less reactive) and caesium (which is slightly more reactive), this reaction is usually vigorous enough to ignite the [hydrogen](https://en.wikipedia.org/wiki/Hydrogen) gas it produces. Rubidium has also been reported to ignite spontaneously in air.[[6]](https://en.wikipedia.org/wiki/Rubidium#cite_note-Ohly-6) It forms [amalgams](https://en.wikipedia.org/wiki/Amalgam_(chemistry)) with [mercury](https://en.wikipedia.org/wiki/Mercury_(element)) and [alloys](https://en.wikipedia.org/wiki/Alloy) with [gold](https://en.wikipedia.org/wiki/Gold), [iron](https://en.wikipedia.org/wiki/Iron), [caesium](https://en.wikipedia.org/wiki/Caesium), [sodium](https://en.wikipedia.org/wiki/Sodium), and [potassium](https://en.wikipedia.org/wiki/Potassium), but not [lithium](https://en.wikipedia.org/wiki/Lithium) (even though rubidium and lithium are in the same group).[[7]](https://en.wikipedia.org/wiki/Rubidium#cite_note-HollemanAF-7)

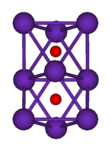
[](https://en.wikipedia.org/wiki/File:Rb%26Cs_crystals.jpg)

Rubidium crystals (silvery) compared to [caesium](https://en.wikipedia.org/wiki/Caesium) crystals (golden)

Rubidium has a very low [ionization energy](https://en.wikipedia.org/wiki/Ionization_energy) of only 406 kJ/mol.[[8]](https://en.wikipedia.org/wiki/Rubidium#cite_note-8) Rubidium and potassium show a very similar purple color in the [flame test](https://en.wikipedia.org/wiki/Flame_test), and distinguishing the two elements requires more sophisticated analysis, such as spectroscopy.

**Compounds**

See also: [Category:Rubidium compounds](https://en.wikipedia.org/wiki/Category:Rubidium_compounds).

[](https://en.wikipedia.org/wiki/File:Rb9O2_cluster.png)

Rb  
9O  
2 cluster

[Rubidium chloride](https://en.wikipedia.org/wiki/Rubidium_chloride) (RbCl) is probably the most used rubidium compound: among several other chlorides, it is used to induce living cells to take up [DNA](https://en.wikipedia.org/wiki/DNA); it is also used as a biomarker, because in nature, it is found only in small quantities in living organisms and when present, replaces potassium. Other common rubidium compounds are the corrosive [rubidium hydroxide](https://en.wikipedia.org/wiki/Rubidium_hydroxide) (RbOH), the starting material for most rubidium-based chemical processes; [rubidium carbonate](https://en.wikipedia.org/wiki/Rubidium_carbonate) (Rb2CO3), used in some optical glasses, and rubidium copper sulfate, Rb2SO4·CuSO4·6H2O. [Rubidium silver iodide](https://en.wikipedia.org/wiki/Rubidium_silver_iodide) (RbAg4I5) has the highest [room temperature](https://en.wikipedia.org/wiki/Room_temperature) [conductivity](https://en.wikipedia.org/wiki/Electrical_conductivity) of any known [ionic crystal](https://en.wikipedia.org/wiki/Ionic_crystal), a property exploited in thin film [batteries](https://en.wikipedia.org/wiki/Battery_(electricity)) and other applications.[[9]](https://en.wikipedia.org/wiki/Rubidium#cite_note-9)[[10]](https://en.wikipedia.org/wiki/Rubidium#cite_note-10)

Rubidium forms a number of [oxides](https://en.wikipedia.org/wiki/Rubidium_oxide) when exposed to air, including rubidium monoxide (Rb2O), Rb6O, and Rb9O2; rubidium in excess oxygen gives the [superoxide](https://en.wikipedia.org/wiki/Superoxide) RbO2. Rubidium forms salts with halides, producing [rubidium fluoride](https://en.wikipedia.org/wiki/Rubidium_fluoride), [rubidium chloride](https://en.wikipedia.org/wiki/Rubidium_chloride), [rubidium bromide](https://en.wikipedia.org/wiki/Rubidium_bromide), and [rubidium iodide](https://en.wikipedia.org/wiki/Rubidium_iodide).

**Isotopes**

Main article: [Isotopes of rubidium](https://en.wikipedia.org/wiki/Isotopes_of_rubidium)

Although rubidium is [monoisotopic](https://en.wikipedia.org/wiki/Monoisotopic_element), rubidium in the Earth's crust is composed of two isotopes: the stable 85Rb (72.2%) and the [radioactive](https://en.wikipedia.org/wiki/Radioactive) 87Rb (27.8%).[[11]](https://en.wikipedia.org/wiki/Rubidium#cite_note-Audi-11) Natural rubidium is radioactive, with specific activity of about 670 [Bq](https://en.wikipedia.org/wiki/Becquerel)/g, enough to significantly expose a [photographic film](https://en.wikipedia.org/wiki/Photographic_film) in 110 days.[[12]](https://en.wikipedia.org/wiki/Rubidium#cite_note-12)[[13]](https://en.wikipedia.org/wiki/Rubidium#cite_note-13)

Twenty four additional rubidium isotopes have been synthesized with half-lives of less than 3 months; most are highly radioactive and have few uses.

Rubidium-87 has a [half-life](https://en.wikipedia.org/wiki/Half-life) of 48.8×109 years, which is more than three times the [age of the universe](https://en.wikipedia.org/wiki/Age_of_the_universe) of (13.799±0.021)×109 years,[[14]](https://en.wikipedia.org/wiki/Rubidium#cite_note-Planck_2015-14) making it a [primordial nuclide](https://en.wikipedia.org/wiki/Primordial_nuclide). It readily substitutes for [potassium](https://en.wikipedia.org/wiki/Potassium) in [minerals](https://en.wikipedia.org/wiki/Mineral), and is therefore fairly widespread. Rb has been used extensively in [dating rocks](https://en.wikipedia.org/wiki/Rock_dating); 87Rb [beta decays](https://en.wikipedia.org/wiki/Beta_decay) to stable 87Sr. During [fractional crystallization](https://en.wikipedia.org/wiki/Fractional_crystallization_(geology)), Sr tends to concentrate in [plagioclase](https://en.wikipedia.org/wiki/Plagioclase), leaving Rb in the liquid phase. Hence, the Rb/Sr ratio in residual [magma](https://en.wikipedia.org/wiki/Magma) may increase over time, and the progressing [differentiation](https://en.wikipedia.org/wiki/Igneous_differentiation) results in rocks with elevated Rb/Sr ratios. The highest ratios (10 or more) occur in [pegmatites](https://en.wikipedia.org/wiki/Pegmatite). If the initial amount of Sr is known or can be extrapolated, then the age can be determined by measurement of the Rb and Sr concentrations and of the 87Sr/86Sr ratio. The dates indicate the true age of the minerals only if the rocks have not been subsequently altered (see [rubidium–strontium dating](https://en.wikipedia.org/wiki/Rubidium%E2%80%93strontium_dating)).[[15]](https://en.wikipedia.org/wiki/Rubidium#cite_note-15)[[16]](https://en.wikipedia.org/wiki/Rubidium#cite_note-16)

[Rubidium-82](https://en.wikipedia.org/wiki/Rubidium-82), one of the element's non-natural isotopes, is produced by [electron-capture](https://en.wikipedia.org/wiki/Electron_capture) decay of [strontium-82](https://en.wikipedia.org/wiki/Strontium-82) with a half-life of 25.36 days. With a half-life of 76 seconds, rubidium-82 decays by positron emission to stable [krypton-82](https://en.wikipedia.org/wiki/Krypton-82).[[11]](https://en.wikipedia.org/wiki/Rubidium#cite_note-Audi-11)

**Occurrence**

Rubidium is the twenty-third [most abundant element in the Earth's crust](https://en.wikipedia.org/wiki/Abundance_of_elements_in_Earth%27s_crust), roughly as abundant as [zinc](https://en.wikipedia.org/wiki/Zinc) and rather more common than [copper](https://en.wikipedia.org/wiki/Copper).[[17]](https://en.wikipedia.org/wiki/Rubidium#cite_note-USGS-17) It occurs naturally in the minerals [leucite](https://en.wikipedia.org/wiki/Leucite), [pollucite](https://en.wikipedia.org/wiki/Pollucite), [carnallite](https://en.wikipedia.org/wiki/Carnallite), and [zinnwaldite](https://en.wikipedia.org/wiki/Zinnwaldite), which contain as much as 1% rubidium [oxide](https://en.wikipedia.org/wiki/Oxide). [Lepidolite](https://en.wikipedia.org/wiki/Lepidolite) contains between 0.3% and 3.5% rubidium, and is the commercial source of the element.[[18]](https://en.wikipedia.org/wiki/Rubidium#cite_note-18) Some [potassium](https://en.wikipedia.org/wiki/Potassium) minerals and [potassium chlorides](https://en.wikipedia.org/wiki/Potassium_chloride) also contain the element in commercially significant quantities.[[19]](https://en.wikipedia.org/wiki/Rubidium#cite_note-19)

[Seawater](https://en.wikipedia.org/wiki/Seawater) contains an average of 125 µg/L of rubidium compared to the much higher value for potassium of 408 mg/L and the much lower value of 0.3 µg/L for caesium.[[20]](https://en.wikipedia.org/wiki/Rubidium#cite_note-20)

Because of its large [ionic radius](https://en.wikipedia.org/wiki/Ionic_radius), rubidium is one of the "[incompatible elements](https://en.wikipedia.org/wiki/Incompatible_element)."[[21]](https://en.wikipedia.org/wiki/Rubidium#cite_note-21) During [magma crystallization](https://en.wikipedia.org/wiki/Fractional_crystallization_(geology)), rubidium is concentrated together with its heavier analogue caesium in the liquid phase and crystallizes last. Therefore, the largest deposits of rubidium and caesium are zone [pegmatite](https://en.wikipedia.org/wiki/Pegmatite) ore bodies formed by this enrichment process. Because rubidium substitutes for [potassium](https://en.wikipedia.org/wiki/Potassium) in the crystallization of magma, the enrichment is far less effective than that of caesium. Zone pegmatite ore bodies containing mineable quantities of caesium as [pollucite](https://en.wikipedia.org/wiki/Pollucite) or the lithium minerals [lepidolite](https://en.wikipedia.org/wiki/Lepidolite) are also a source for rubidium as a by-product.[[17]](https://en.wikipedia.org/wiki/Rubidium#cite_note-USGS-17)

Two notable sources of rubidium are the rich deposits of [pollucite](https://en.wikipedia.org/wiki/Pollucite) at [Bernic Lake](https://en.wikipedia.org/wiki/Bernic_Lake), [Manitoba](https://en.wikipedia.org/wiki/Manitoba), Canada, and the [rubicline](https://en.wikipedia.org/wiki/Rubicline) ((Rb,K)AlSi3O8) found as impurities in pollucite on the Italian island of [Elba](https://en.wikipedia.org/wiki/Elba), with a rubidium content of 17.5%.[[22]](https://en.wikipedia.org/wiki/Rubidium#cite_note-22) Both of those deposits are also sources of caesium.

**Production**

Although rubidium is more abundant in Earth's crust than caesium, the limited applications and the lack of a mineral rich in rubidium limits the production of rubidium compounds to 2 to 4 [tonnes](https://en.wikipedia.org/wiki/Tonne) per year.[[17]](https://en.wikipedia.org/wiki/Rubidium#cite_note-USGS-17) Several methods are available for separating potassium, rubidium, and caesium. The [fractional crystallization](https://en.wikipedia.org/wiki/Fractional_crystallization_(chemistry)) of a rubidium and caesium alum (Cs,Rb)Al(SO4)2·12H2O yields after 30 subsequent steps pure rubidium alum. Two other methods are reported, the chlorostannate process and the ferrocyanide process.[[17]](https://en.wikipedia.org/wiki/Rubidium#cite_note-USGS-17)[[23]](https://en.wikipedia.org/wiki/Rubidium#cite_note-23)

For several years in the 1950s and 1960s, a by-product of potassium production called Alkarb was a main source for rubidium. Alkarb contained 21% rubidium, with the rest being potassium and a small amount of caesium.[[24]](https://en.wikipedia.org/wiki/Rubidium#cite_note-24) Today the largest producers of caesium, such as the [Tanco Mine](https://en.wikipedia.org/wiki/Tanco_Mine), Manitoba, Canada, produce rubidium as a by-product from pollucite.[[17]](https://en.wikipedia.org/wiki/Rubidium#cite_note-USGS-17)

[](https://en.wikipedia.org/wiki/File:Die_Flammenf%C3%A4rbung_des_Rubidium.jpg)

Flame test for rubidium

**History**

[](https://en.wikipedia.org/wiki/File:Kirchhoff_Bunsen_Roscoe.jpg)

[Gustav Kirchhoff](https://en.wikipedia.org/wiki/Gustav_Kirchhoff) (left) and [Robert Bunsen](https://en.wikipedia.org/wiki/Robert_Bunsen) (center) discovered rubidium by spectroscopy. *(*[*Henry Enfield Roscoe*](https://en.wikipedia.org/wiki/Henry_Enfield_Roscoe) *is on the right side.)*

Rubidium was discovered in 1861 by [Robert Bunsen](https://en.wikipedia.org/wiki/Robert_Bunsen) and [Gustav Kirchhoff](https://en.wikipedia.org/wiki/Gustav_Kirchhoff), in Heidelberg, Germany, in the mineral [lepidolite](https://en.wikipedia.org/wiki/Lepidolite) through [spectroscopy](https://en.wikipedia.org/wiki/Spectroscope). Because of the bright red lines in its [emission spectrum](https://en.wikipedia.org/wiki/Emission_spectrum), they chose a name derived from the [Latin](https://en.wikipedia.org/wiki/Latin) word *rubidus*, meaning "deep red".[[25]](https://en.wikipedia.org/wiki/Rubidium#cite_note-BuKi1861-25)[[26]](https://en.wikipedia.org/wiki/Rubidium#cite_note-Weeks-26)

Rubidium is a minor component in lepidolite. Kirchhoff and Bunsen processed 150 kg of a lepidolite containing only 0.24% rubidium oxide (Rb2O). Both potassium and rubidium form insoluble salts with [chloroplatinic acid](https://en.wikipedia.org/wiki/Chloroplatinic_acid), but those salts show a slight difference in solubility in hot water. Therefore, the less-soluble rubidium [hexachloroplatinate](https://en.wikipedia.org/wiki/Hexachloroplatinate) (Rb2PtCl6) could be obtained by [fractional crystallization](https://en.wikipedia.org/wiki/Fractional_crystallization_(chemistry)). After reduction of the hexachloroplatinate with [hydrogen](https://en.wikipedia.org/wiki/Hydrogen), the process yielded 0.51 grams of [rubidium chloride](https://en.wikipedia.org/wiki/Rubidium_chloride) for further studies.[[*clarification needed*](https://en.wikipedia.org/wiki/Wikipedia:Please_clarify)] Bunsen and Kirchhoff began their first large-scale isolation of caesium and rubidium compounds with 44,000 litres (12,000 US gal) of mineral water, which yielded 7.3 grams of [caesium chloride](https://en.wikipedia.org/wiki/Caesium_chloride) and 9.2 grams of [rubidium chloride](https://en.wikipedia.org/wiki/Rubidium_chloride).[[25]](https://en.wikipedia.org/wiki/Rubidium#cite_note-BuKi1861-25)[[26]](https://en.wikipedia.org/wiki/Rubidium#cite_note-Weeks-26) Rubidium was the second element, shortly after caesium, to be discovered by spectroscopy, just one year after the invention of the [spectroscope](https://en.wikipedia.org/wiki/Spectroscope) by Bunsen and Kirchhoff.[[27]](https://en.wikipedia.org/wiki/Rubidium#cite_note-autogenerated1-27)

The two scientists used the rubidium chloride to estimate that the [atomic weight](https://en.wikipedia.org/wiki/Atomic_weight) of the new element was 85.36 (the currently accepted value is 85.47).[[25]](https://en.wikipedia.org/wiki/Rubidium#cite_note-BuKi1861-25) They tried to generate elemental rubidium by electrolysis of molten rubidium chloride, but instead of a metal, they obtained a blue homogeneous substance which "neither under the naked eye nor under the microscope showed the slightest trace of metallic substance." They presumed it was a [subchloride](https://en.wikipedia.org/wiki/Non-stoichiometric_compound) (Rb  
2Cl); however, the product was probably a [colloidal](https://en.wikipedia.org/wiki/Colloid) mixture of the metal and rubidium chloride.[[28]](https://en.wikipedia.org/wiki/Rubidium#cite_note-28) In a second attempt to produce metallic rubidium, Bunsen was able to reduce rubidium by heating charred rubidium tartrate. Although the distilled rubidium was [pyrophoric](https://en.wikipedia.org/wiki/Pyrophoric), they were able to determine the density and the melting point. The quality of this research in the 1860s can be appraised by the fact that their determined density differs less than 0.1 g/cm3 and the melting point by less than 1 °C from the presently accepted values.[[29]](https://en.wikipedia.org/wiki/Rubidium#cite_note-29)

The slight radioactivity of rubidium was discovered in 1908, but that was before the theory of isotopes was established in 1910, and the low level of activity (half-life greater than 1010 years) made interpretation complicated. The now proven decay of 87Rb to stable 87Sr through [beta decay](https://en.wikipedia.org/wiki/Beta_decay) was still under discussion in the late 1940s.[[30]](https://en.wikipedia.org/wiki/Rubidium#cite_note-30)[[31]](https://en.wikipedia.org/wiki/Rubidium#cite_note-31)

Rubidium had minimal industrial value before the 1920s.[[32]](https://en.wikipedia.org/wiki/Rubidium#cite_note-32) Since then, the most important use of rubidium is research and development, primarily in chemical and electronic applications. In 1995, rubidium-87 was used to produce a [Bose–Einstein condensate](https://en.wikipedia.org/wiki/Bose%E2%80%93Einstein_condensate),[[33]](https://en.wikipedia.org/wiki/Rubidium#cite_note-33) for which the discoverers, [Eric Allin Cornell](https://en.wikipedia.org/wiki/Eric_Allin_Cornell), [Carl Edwin Wieman](https://en.wikipedia.org/wiki/Carl_Edwin_Wieman) and [Wolfgang Ketterle](https://en.wikipedia.org/wiki/Wolfgang_Ketterle), won the 2001 [Nobel Prize in Physics](https://en.wikipedia.org/wiki/Nobel_Prize_in_Physics).[[34]](https://en.wikipedia.org/wiki/Rubidium#cite_note-34)

**Applications**

[](https://en.wikipedia.org/wiki/File:USNO_rubidium_fountain.jpg)

A rubidium fountain [atomic clock](https://en.wikipedia.org/wiki/Atomic_clock) at the [United States Naval Observatory](https://en.wikipedia.org/wiki/United_States_Naval_Observatory)

Rubidium compounds are sometimes used in [fireworks](https://en.wikipedia.org/wiki/Fireworks) to give them a purple color.[[35]](https://en.wikipedia.org/wiki/Rubidium#cite_note-35) Rubidium has also been considered for use in a [thermoelectric generator](https://en.wikipedia.org/wiki/Thermoelectric_generator) using the [magnetohydrodynamic](https://en.wikipedia.org/wiki/Magnetohydrodynamics) principle, where hot rubidium ions are passed through a [magnetic field](https://en.wikipedia.org/wiki/Magnetic_field).[[36]](https://en.wikipedia.org/wiki/Rubidium#cite_note-36) These conduct electricity and act like an [armature](https://en.wikipedia.org/wiki/Armature_(electrical_engineering)) of a generator thereby generating an [electric current](https://en.wikipedia.org/wiki/Electric_current). Rubidium, particularly vaporized 87Rb, is one of the most commonly used atomic species employed for [laser cooling](https://en.wikipedia.org/wiki/Laser_cooling) and [Bose–Einstein condensation](https://en.wikipedia.org/wiki/Bose%E2%80%93Einstein_condensation). Its desirable features for this application include the ready availability of inexpensive [diode laser](https://en.wikipedia.org/wiki/Diode_laser) light at the relevant [wavelength](https://en.wikipedia.org/wiki/Wavelength), and the moderate temperatures required to obtain substantial vapor pressures.[[37]](https://en.wikipedia.org/wiki/Rubidium#cite_note-37)[[38]](https://en.wikipedia.org/wiki/Rubidium#cite_note-38) For cold atom applications requiring tunable interactions, 85Rb is preferable due to its rich [Feshbach spectrum](https://en.wikipedia.org/wiki/Feshbach_resonance).[[39]](https://en.wikipedia.org/wiki/Rubidium#cite_note-39)

Rubidium has been used for polarizing [3He](https://en.wikipedia.org/wiki/Helium-3), producing volumes of magnetized 3He gas, with the nuclear spins aligned rather than random. Rubidium vapor is optically pumped by a laser and the polarized Rb polarizes 3He through the [hyperfine](https://en.wikipedia.org/wiki/Hyperfine_structure) interaction.[[40]](https://en.wikipedia.org/wiki/Rubidium#cite_note-40) Such [spin-polarized](https://en.wikipedia.org/wiki/Spin_polarization) 3He cells are useful for neutron polarization measurements and for producing polarized neutron beams for other purposes.[[41]](https://en.wikipedia.org/wiki/Rubidium#cite_note-41)

The resonant element in [atomic clocks](https://en.wikipedia.org/wiki/Atomic_clock) utilizes the [hyperfine structure](https://en.wikipedia.org/wiki/Hyperfine_structure) of rubidium's energy levels, and rubidium is useful for high-precision timing. It is used as the main component of secondary frequency references (rubidium oscillators) in cell site transmitters and other electronic transmitting, networking, and test equipment. These [rubidium standards](https://en.wikipedia.org/wiki/Rubidium_standard) are often used with [GPS](https://en.wikipedia.org/wiki/Global_Positioning_System) to produce a "primary frequency standard" that has greater accuracy and is less expensive than caesium standards.[[42]](https://en.wikipedia.org/wiki/Rubidium#cite_note-42)[[43]](https://en.wikipedia.org/wiki/Rubidium#cite_note-Clock-43) Such rubidium standards are often mass-produced for the [telecommunication](https://en.wikipedia.org/wiki/Telecommunication) industry.[[44]](https://en.wikipedia.org/wiki/Rubidium#cite_note-44)

Other potential or current uses of rubidium include a working fluid in vapor turbines, as a [getter](https://en.wikipedia.org/wiki/Getter) in [vacuum tubes](https://en.wikipedia.org/wiki/Vacuum_tube), and as a [photocell](https://en.wikipedia.org/wiki/Photocell) component.[[45]](https://en.wikipedia.org/wiki/Rubidium#cite_note-45) Rubidium is also used as an ingredient in special types of glass, in the production of [superoxide](https://en.wikipedia.org/wiki/Superoxide) by burning in [oxygen](https://en.wikipedia.org/wiki/Oxygen), in the study of [potassium](https://en.wikipedia.org/wiki/Potassium) [ion channels](https://en.wikipedia.org/wiki/Ion_channel) in biology, and as the vapor in atomic [magnetometers](https://en.wikipedia.org/wiki/Magnetometer).[[46]](https://en.wikipedia.org/wiki/Rubidium#cite_note-MAG-46) In particular, 87Rb is used with other alkali metals in the development of spin-exchange relaxation-free [(SERF) magnetometers](https://en.wikipedia.org/wiki/SERF).[[46]](https://en.wikipedia.org/wiki/Rubidium#cite_note-MAG-46)

[Rubidium-82](https://en.wikipedia.org/wiki/Rubidium-82) is used for [positron emission tomography](https://en.wikipedia.org/wiki/Positron_emission_tomography). Rubidium is very similar to potassium and tissue with high potassium content will also accumulate the radioactive rubidium. One of the main uses is [myocardial perfusion imaging](https://en.wikipedia.org/wiki/Myocardial_perfusion_imaging). As a result of changes in the [blood–brain barrier](https://en.wikipedia.org/wiki/Blood%E2%80%93brain_barrier) in brain tumors, rubidium collects more in brain tumors than normal brain tissue, allowing the use of radioisotope rubidium-82 in [nuclear medicine](https://en.wikipedia.org/wiki/Nuclear_medicine) to locate and image brain tumors.[[47]](https://en.wikipedia.org/wiki/Rubidium#cite_note-47) Rubidium-82 has a very short half-life of 76 seconds, and the production from decay of [strontium-82](https://en.wikipedia.org/wiki/Strontium-82) must be done close to the patient.[[48]](https://en.wikipedia.org/wiki/Rubidium#cite_note-48)

Rubidium was tested for the influence on manic depression and depression.[[49]](https://en.wikipedia.org/wiki/Rubidium#cite_note-manic-49)[[50]](https://en.wikipedia.org/wiki/Rubidium#cite_note-50) Dialysis patients suffering from depression show a depletion in rubidium and therefore a supplementation may help during depression.[[51]](https://en.wikipedia.org/wiki/Rubidium#cite_note-51) In some tests the rubidium was administered as rubidium chloride with up to 720 mg per day for 60 days.[[52]](https://en.wikipedia.org/wiki/Rubidium#cite_note-isbn1-58890-299-4-52)[[53]](https://en.wikipedia.org/wiki/Rubidium#cite_note-53)

**Precautions and biological effects**

|  |  |
| --- | --- |
| Rubidium | |
| **Hazards** | |
| [GHS pictograms](https://en.wikipedia.org/wiki/GHS_hazard_pictograms) | [The flame pictogram in the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)](https://en.wikipedia.org/wiki/File:GHS-pictogram-flamme.svg)[The corrosion pictogram in the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)](https://en.wikipedia.org/wiki/File:GHS-pictogram-acid.svg) |
| [GHS signal word](https://en.wikipedia.org/wiki/Globally_Harmonized_System_of_Classification_and_Labelling_of_Chemicals) | Danger |
| [GHS hazard statements](https://en.wikipedia.org/wiki/GHS_hazard_statement) | H260, H314 |
| [GHS precautionary statements](https://en.wikipedia.org/wiki/GHS_precautionary_statements) | P223, P231+232, P280, P305+351+338, P370+378, P422[[54]](https://en.wikipedia.org/wiki/Rubidium#cite_note-54) |
| [NFPA 704](https://en.wikipedia.org/wiki/NFPA_704) | NFPA 704 four-colored diamond  [4](https://en.wikipedia.org/wiki/NFPA_704#Red)  [3](https://en.wikipedia.org/wiki/NFPA_704#Blue)  [2](https://en.wikipedia.org/wiki/NFPA_704#Yellow)  [~~W~~](https://en.wikipedia.org/wiki/NFPA_704#White) |

Rubidium reacts violently with water and can cause fires. To ensure safety and purity, this metal is usually kept under a dry [mineral oil](https://en.wikipedia.org/wiki/Mineral_oil) or sealed in glass ampoules in an inert atmosphere. Rubidium forms [peroxides](https://en.wikipedia.org/wiki/Peroxide) on exposure even to small amount of air diffused into the oil, and storage is subject to similar precautions as the storage of metallic [potassium](https://en.wikipedia.org/wiki/Potassium).[[55]](https://en.wikipedia.org/wiki/Rubidium#cite_note-55)

Rubidium, like sodium and potassium, almost always has +1 [oxidation state](https://en.wikipedia.org/wiki/Oxidation_state) when dissolved in water, even in biological contexts. The human body tends to treat Rb+ ions as if they were potassium ions, and therefore concentrates rubidium in the body's [intracellular fluid](https://en.wikipedia.org/wiki/Intracellular_fluid) (i.e., inside cells).[[56]](https://en.wikipedia.org/wiki/Rubidium#cite_note-56) The ions are not particularly toxic; a 70 kg person contains on average 0.36 g of rubidium, and an increase in this value by 50 to 100 times did not show negative effects in test persons.[[57]](https://en.wikipedia.org/wiki/Rubidium#cite_note-57) The [biological half-life](https://en.wikipedia.org/wiki/Biological_half-life) of rubidium in humans measures 31–46 days.[[49]](https://en.wikipedia.org/wiki/Rubidium#cite_note-manic-49) Although a partial substitution of potassium by rubidium is possible, when more than 50% of the potassium in the muscle tissue of rats was replaced with rubidium, the rats died.[[58]](https://en.wikipedia.org/wiki/Rubidium#cite_note-58)[[59]](https://en.wikipedia.org/wiki/Rubidium#cite_note-59)

**See also**

* [Electron configuration](https://en.wikipedia.org/wiki/Electron_configuration)
* [Electron configurations of the elements (data page)](https://en.wikipedia.org/wiki/Electron_configurations_of_the_elements_(data_page))
* [Periodic table (electron configurations)](https://en.wikipedia.org/wiki/Periodic_table_(electron_configurations))

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