RUBIDIUM

(Data in metric tons, rubidium oxide, unless otherwise specified)

Domestic Production and Use: In 2024, no rubidium was mined in the United States; however, occurrences of rubidium-bearing minerals are known in Alaska, Arizona, Idaho, Maine, South Dakota, and Utah. Rubidium is also associated with some evaporate mineral occurrences in other States. Rubidium is not a major constituent of any mineral. Rubidium concentrate is produced as a byproduct of pollucite (cesium) and lepidolite (lithium) mining and is imported from other countries for processing in the United States.

Applications for rubidium and its compounds include biomedical research, electronics, pyrotechnics, and specialty glass. Specialty glasses are the leading market for rubidium; rubidium carbonate may be used to reduce electrical conductivity, which improves stability and durability in fiber-optic telecommunications networks. Biomedical applications may include rubidium salts used in antishock agents and the treatment of epilepsy and thyroid disorder; rubidium-82, a radioactive isotope, may be used as a blood-flow tracer in positron emission tomographic imaging; and rubidium chloride may be used as an antidepressant.

Rubidium's photoemissive properties make it useful for electrical-signal generators in motion-sensor devices, night-vision devices, photoelectric cells (solar panels), spectrometers, magnetometers, and photomultiplier tubes. For industrial uses, rubidium is widely used as a catalyst in ammonia synthesis, hydrogenation, oxidation and polymerization reactions, and sulfuric acid synthesis. Rubidium may be used as an atomic resonance-frequency-reference oscillator for telecommunications network synchronization, playing a vital role in global positioning systems. Rubidium-rich feldspars may be used in ceramic applications for spark plugs and electrical insulators because of their high dielectric constant. Rubidium hydroxide may be used in fireworks to oxidize mixtures of other elements and produce violet hues. The U.S. military frequency standard, the United States Naval Observatory (USNO) timescale, is based on a network of weighted atomic clocks, including 6 USNO rubidium fountain clocks.

Rubidium atoms are used in academic research, including the development of quantum-mechanics-based computing devices, a future application with potential for relatively high consumption of rubidium. Quantum computing, which uses ultracold rubidium atoms in a variety of applications in research, would perform more complex computational tasks than traditional computers by calculating in two quantum states simultaneously. Research suggests that rubidium may be used in chemical storage within hydrogen batteries, ion propulsion engines, magnetohydrodynamic power generation, and thermionic power conversion.

Salient Statistics—United States: Consumption, export, and import data were not available. Some concentrate was imported to the United States in prior years for further processing. Industry information during the past decade suggests a domestic consumption rate of less than 2,000 kilograms per year. The United States was 100% import reliant for rubidium minerals.

At the end of September 2024, one company offered 1-gram ampoules of 99.75% (metal basis) rubidium for $128.00, a 6% increase from $121.00 in 2023, and 100-gram ampoules of the same material for $2,290, a 6% increase from $2,160.00 in 2023. The price for 10-gram ampoules of 99.8% (metal basis) rubidium formate hydrate was $302.00, a 4% increase from $290.00 in 2023. One company cited the price for rubidium carbonate was $1,244.19 per kilogram, value-added tax included, at the end of September 2024.

In 2024, the prices for 10 grams of 99.8% (metal basis) rubidium acetate, rubidium bromide, rubidium carbonate, rubidium chloride, and rubidium nitrate were $68.70, $97.40, $66.30, $84.10, and $62.60, respectively, with increases ranging from 4% to 5% compared with prices in 2023.

The price for a rubidium-plasma standard solution (10,000 micrograms per milliliter) was $67.70 for 50 milliliters and $119.00 for 100 milliliters, an increase of 4% and 3%, respectively, from those in 2023.

Recycling: None.

Import Sources (2020–23): No reliable data have been available to determine the source of rubidium ore or compounds imported by the United States since 1988. The United States was 100% net import reliant for its rubidium needs and the primary global producers, including refined rubidium compounds, were estimated to include China, Germany, and Russia.

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RUBIDIUM

Tariff: Item	Number	Normal Trade Relations 12–31–24
Alkali metals, other	2805.19.9000	5.5% ad valorem.
Chlorides, other	2827.39.9000	3.7% ad valorem.
Bromides, other	2827.59.5100	3.6% ad valorem.
Iodides, other	2827.60.5100	4.2% ad valorem.
Sulfates, other	2833.29.5100	3.7% ad valorem.
Nitrates, other	2834.29.5100	3.5% ad valorem.
Carbonates, other	2836.99.5000	3.7% ad valorem.

Depletion Allowance: 14% (domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: Domestic rubidium occurrences will remain subeconomic unless market conditions change, such as the development of new end uses or increased consumption for existing end uses, which in turn could lead to increased prices. No known human health issues are associated with exposure to naturally occurring rubidium, and its use has minimal environmental impact.

During 2024, no rubidium production was reported globally but rubidium may have been produced in China. Known production of rubidium ore from all countries, excluding China, ceased within the past two decades. Mining of rubidium in Namibia ceased in the early 2000s. The Bikita Mine in Zimbabwe was depleted of pollucite ore reserves in 2018. The Sinclair Mine in Australia completed the mining and shipments of all economically recoverable pollucite ore in 2019. Recent reports indicate that with current processing rates, the world's commercial stockpiles of rubidium ore, excluding those in China, may be depleted in the near future.

Throughout 2024, multiple projects that could produce rubidium as a byproduct of lepidolite, pollucite, spodumene, or zinnwaldite mining, focused primarily on lithium or cesium extraction, were in the exploration and feasibility stages. One company continued developing a lepidolite concentration mine and processing facility in Namibia, with a targeted lithium hydroxide capacity of 5,700 tons per year expected to commence operations in 2026. Byproduct rubidium production was expected to be sent to a downstream chemical conversion facility in Abu Dhabi. In August 2024, another company announced that the Mount Edon Project in Western Australia had an initial Joint Ore Reserves Committee-compliant inferred mineral resource estimate totaling 3.6 million tons, which contained an estimated 7,900 tons of rubidium oxide, and planned to develop a mining proposal by yearend 2025.

World Mine Production and Reserves:[1] There were no official sources for rubidium production data in 2024. Lepidolite and pollucite, the principal rubidium-containing minerals in global rubidium reserves, can contain up to 3.5% and 1.5% rubidium oxide, respectively. Rubidium-bearing mineral resources are found in zoned pegmatites. Mineral resources exist globally, but extraction and concentration are mostly cost prohibitive. No reliable data were available to determine reserves for specific countries; however, Australia, Canada, China, and Namibia were estimated to have reserves totaling less than 200,000 tons of recoverable rubidium materials. Existing stockpiles at multiple former mine sites have continued feeding downstream refineries.

World Resources:[1] Significant rubidium-bearing pegmatite occurrences have been identified in Afghanistan, Australia, Canada, China, Denmark, Germany, Japan, Kazakhstan, Namibia, Peru, Russia, the United Kingdom, the United States, and Zambia. Minor quantities of rubidium are reported in brines in northern Chile and China and in evaporites in the United States (New Mexico and Utah), France, and Germany.

Substitutes: Rubidium and cesium can be used interchangeably in many applications because they have similar physical properties and atomic radii. Cesium, however, is more electropositive than rubidium, making it a preferred material for some applications.

[1]See Appendix C for resource and reserve definitions and information concerning data sources.