RUBIDIUM

(Data in metric tons of rubidium oxide unless otherwise noted)

Domestic Production and Use: In 2018, no rubidium was mined in the United States; however, occurrences 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; it is produced in small quantities as a byproduct of cesium, lithium, and strontium mining. 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. The United States sourced the majority of its pollucite from the largest known deposit in North America at Bernic Lake, Manitoba, Canada; however, that operation ceased mining at the end of 2015.

Applications for rubidium and its compounds include biomedical research, electronics, specialty glass, and pyrotechnics. Specialty glasses are the leading market for rubidium; rubidium carbonate is used to reduce electrical conductivity, which improves stability and durability in fiber optic telecommunications networks. Biomedical applications include rubidium salts used in antishock agents and the treatment of epilepsy and thyroid disorder; rubidium-82, a radioactive isotope used as a blood-flow tracer in positron emission tomographic imaging; and rubidium chloride, used as an antidepressant. 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 research uses ultracold rubidium atoms in a variety of applications. Quantum computers, which have the ability to perform more complex computational tasks than traditional computers by calculating in two quantum states simultaneously, were expected to be in prototype phase by 2025.

Rubidium's photoemissive properties make it ideal for electrical-signal generators in motion-sensor devices, night-vision devices, photoelectric cells (solar panels), and photomultiplier tubes. Rubidium is used as an atomic resonance-frequency-reference oscillator for telecommunications network synchronization, playing a vital role in global positioning systems. Rubidium-rich feldspars are used in ceramic applications for spark plugs and electrical insulators because of their high dielectric constant. Rubidium hydroxide is 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 48 weighted atomic clocks, including 4 USNO rubidium fountain clocks.

Salient Statistics—United States: U.S. salient statistics, such as consumption, exports, and imports, are not available. Some concentrate was imported to the United States for further processing. Industry information during the past decade suggests a domestic consumption rate of approximately 2,000 kilograms per year. The United States was 100% import reliant for rubidium minerals.

In 2018, one company offered 1-gram ampoules of 99.75%-grade rubidium (metals basis) for $84.40, a slight increase from $82.70 in 2017, and 100-gram ampoules of the same material for $1,546.00, a slight increase from $1,516.00 in 2017. The price for 10-gram ampoules of 99.8% rubidium formate hydrate (metals basis) was $48.40, a 12% decrease from $55.10 in 2017.

In 2018, the prices for 10 grams of 99.8% (metals basis) rubidium acetate, rubidium bromide, rubidium carbonate, rubidium chloride, and rubidium nitrate were $48.40, $63.80, $55.20, $58.10, and $45.00, respectively. The price for a rubidium-plasma standard solution (10,000 micrograms per milliliter) was $54.30 for 50 milliliters and $80.80 for 100 milliliters, a slight decrease from that of 2017.

Recycling: None.

Import Sources (2014–17): No reliable data has been available to determine the source of rubidium ore imported by the United States since 1988. Previously, Canada was thought to be the primary supplier of rubidium ore.

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RUBIDIUM

Tariff: Item	Number	Normal Trade Relations 12–31–18
Alkali metals, other	2805.19.9000	5.5% ad val.
Chlorides, other	2827.39.9000	3.7% ad val.
Bromides, other	2827.59.5100	3.6% ad val.
Nitrates, other	2834.29.5100	3.5% ad val.
Carbonates, other	2836.99.5000	3.7% ad val.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: Domestic rubidium occurrences will remain uneconomic 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.

In May 2018, the U.S. Department of the Interior, in coordination with other executive branch agencies, published a list of 35 critical minerals (83 FR 23295), including rubidium. This list was developed to serve as an initial focus, pursuant to Executive Order 13817, ‘‘A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals” (82 FR 60835).

During 2018, projects that were primarily aimed at developing lithium resources were at various stages of development, including eight subprojects at the King Col project in Australia, the Jubilee Lake lithium prospect in Canada, the Soris lithium project in Namibia, and the Winnipeg River pegmatite field in Canada. The status of these projects ranged from early feasibility studies to active exploration and drilling. No production has been reported at any sites. The projects focused on pegmatites containing pollucite and spodumene, which primarily contain lithium, tantalum, or both, but may also contain minor quantities of cesium and rubidium.

World Mine Production and Reserves: There were no official sources for rubidium production data. Production is known to take place periodically in Namibia and Zimbabwe, but production data are not available. Production of pollucite ceased at the Bernic Lake operation in Manitoba, Canada, at the end of 2015; however, it was expected that rubidium concentrate would continue to be produced as a byproduct of processing from pollucite stocks. Rubidium is thought to be mined in China, but information regarding reserves and production is unavailable. 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 cost prohibitive. Rubidium at the Manitoba, Canada, operation no longer was considered economically recoverable following a mine collapse in 2015.

	Reserves[1]
Namibia	50,000
Zimbabwe	30,000
Other countries	10,000
World total	90,000

World Resources: Significant rubidium-bearing pegmatite occurrences have been identified in the United States, Afghanistan, Australia, Canada, China, Denmark, Germany, Japan, Kazakhstan, Namibia, Peru, Russia, the United Kingdom, 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.