

## RUBIDIUM

(Data in kilograms of rubidium content unless otherwise noted)

**Domestic Production and Use:** Rubidium is not mined in the United States; however, occurrences are known in Maine and South Dakota, and rubidium is associated with some evaporite mineral occurrences in other States. Rubidium concentrate is imported from Canada for processing in the United States. Applications for rubidium and its compounds include biomedical research, electronics, specialty glass, and pyrotechnics. Biomedical applications include rubidium salts used in the treatment of epilepsy and rubidium-82 used as a blood-flow tracer. Rubidium is used to generate electricity in some photoelectric cells, commonly referred to as solar panels, or as an electrical signal generator in motion sensor devices. Rubidium is used in gas cell oscillators, which are required as an atomic resonance frequency standard in some atomic clocks, playing a vital role in global positioning systems (GPS). Rubidium-rich feldspars are used in ceramic applications for spark plugs and electrical insulators because of their high dielectric capacity.

**Salient Statistics—United States:** U.S. salient statistics, such as consumption, exports, and imports, are not available. U.S. rubidium consumption was small and may amount to only a few thousand kilograms per year. One mine in Canada produced rubidium ore as a byproduct, which was processed as concentrate; however, production data for that mine are not available. Part of that concentrate was exported to the United States for further processing. No market price for rubidium is published because the metal is not traded in commercial quantities. In 2012, one company offered 1-gram ampoules of 99.75%-grade rubidium (metal basis) for \$74.60 each, a 3.5% increase from that of 2011. The price for 100 grams of the same material was \$1,367.00, also a 3.5% increase from that of 2011.

**Recycling:** None.

**Import Sources (2008–11):** The United States is 100% import reliant on byproduct rubidium concentrate imported from Canada.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations</b>
			<u>12–31–12</u>
	Alkali metals, other	2805.19.9000	5.5% ad val.

**Depletion Allowance:** 14% (Domestic and foreign).

**Government Stockpile:** None.

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**Events, Trends, and Issues:** Rubidium has been commercially available as a byproduct of lithium chemicals production for 40 years. The use of rubidium was primarily in chemical, medical and electronics research. The use of rubidium in atomic clocks continued to increase, with emphasis on new ultra-accuracy atomic clocks. Rubidium-82 was being used to create quantum gates that transfer information within atomic circuit technology for quantum computing. Research into the use of rubidium in superconductors was increasing.

The use of rubidium-82 positron emission tomography (PET) combined with computed tomography angiography (CTA) in the evaluation and care of patients with suspected coronary artery disease continues to increase. Recent improvements in PET/CT scanning machines have led to licensing, which could allow for the replacement of technetium-99 with rubidium-82 as a safer, efficient, and stable component.

Cold atom traps, which will utilize supercooled rubidium atoms to detect gravitational changes with great sensitivity, were under development and were expected to be marketable within 5 years. Applications could include the subsurface detection of oil wells, tracking geologic faults and continental plate movement, climate change research, and higher gravitational sensitivity for satellites and space research vessels.

**World Mine Production and Reserves:**<sup>1</sup> No minerals exist in which rubidium is the predominant metallic element; however, rubidium may be taken up in trace amounts in the lattices of potassium feldspars and micas during the crystallization of pegmatites. The rubidium-bearing minerals lepidolite and pollucite may be found in zoned pegmatites, which are exceptionally coarse-grained plutonic rocks that formed late in the crystallization of a silicic magma. Lepidolite, the principal source of rubidium, can contain up to 3.5% rubidium oxide, and pollucite contains up to 1.5% rubidium oxide. Mines reported to produce rubidium as a by-product are in Canada, China, and Zimbabwe. Canadian reserves were estimated from data collected by Natural Resources Canada.

	<b>Reserves<sup>1</sup></b>
Canada	113,000,000
Other countries	NA
World total	NA

**World Resources:** World resources of rubidium are unknown. In addition to several significant rubidium-bearing zoned pegmatites in Canada, pegmatite occurrences have been identified in Afghanistan, Namibia, Peru, Russia, and Zambia. Minor amounts of rubidium are reported in brines in northern Chile and China and in evaporites in France, Germany, and the United States (New Mexico and Utah).

**Substitutes:** Rubidium and cesium have similar physical properties and may be used interchangeably in many applications; however, cesium is a preferred material in many applications because it is more electropositive than rubidium.

NA Not available.

<sup>1</sup>[See Appendix C for resource/reserve definitions and information concerning data sources.](#)