

# STRONTIUM

(Data in metric tons of strontium content unless otherwise noted)

**Domestic Production and Use:** Although deposits of strontium minerals occur widely throughout the United States, none have been mined in the United States since 1959. Domestic production of strontium carbonate, the principal strontium compound, ceased in 2006. Virtually all the strontium mineral celestite consumed in the United States since 2006 is thought to have been used as an additive in drilling fluids for oil and natural gas wells. A few domestic companies produced small quantities of downstream strontium chemicals from imported strontium carbonate.

Based on import data, the estimated end-use distribution in the United States for strontium, including celestite and strontium compounds, was, in descending order, ceramic ferrite magnets and pyrotechnics and signals, 27% each; drilling fluids, 26%; and electrolytic production of zinc, master alloys, pigments and fillers, and other applications, including glass, 5% each.

<b>Salient Statistics—United States:</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020<sup>e</sup></b>
Production	—	—	—	—	—
Imports for consumption:					
Celestite <sup>1</sup>	4,420	11,300	16,900	7,960	1,300
Strontium compounds <sup>2</sup>	6,420	6,660	6,350	5,560	3,800
Exports, strontium compounds	91	36	32	20	30
Consumption, apparent: <sup>3</sup>					
Celestite	4,420	11,300	16,900	7,960	1,300
Strontium compounds	<u>6,330</u>	<u>6,620</u>	<u>6,320</u>	<u>5,540</u>	<u>3,800</u>
Total	10,700	17,900	23,200	13,500	5,100
Price, average value of celestite imports at port of exportation, dollars per ton	78	74	78	82	66
Net import reliance <sup>3</sup> as a percentage of apparent consumption	100	100	100	100	100

**Recycling:** None.

**Import Sources (2016–19):** Celestite: Mexico, 100%. Strontium compounds: Mexico, 50%; Germany, 40%; China, 6%; and other, 4%. Total imports: Mexico, 81%; Germany, 15%; China, 2%; and other, 2%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–20</b>
	Celestite	2530.90.8010	Free.
	Strontium compounds:		
	Strontium metal	2805.19.1000	3.7% ad val.
	Strontium oxide, hydroxide, peroxide	2816.40.1000	4.2% ad val.
	Strontium nitrate	2834.29.2000	4.2% ad val.
	Strontium carbonate	2836.92.0000	4.2% ad val.

**Depletion Allowance:** 22% (domestic), 14% (foreign).

**Government Stockpile:** None.

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**Events, Trends, and Issues:** Apparent consumption of strontium declined by 63% in 2020 compared with that in 2019 because of the economic downturn caused by restrictions imposed worldwide as the result of the global COVID-19 pandemic. Many countries experienced significant industrial declines, and celestite production was estimated to have declined from most sources.

Imports of celestite, the most commonly used strontium mineral, decreased by 84%, likely the result of decreased natural-gas- and oil-drilling activity, which was at least partly caused by the pandemic restrictions. Nearly all celestite imports were from Mexico and were thought to be used as additives in drilling fluids for oil and natural gas exploration and production, which experienced declined activity. For these applications, celestite is ground but undergoes no chemical processing. A small quantity of high-value celestite imports were reported; these were most likely mineral specimens. Although no strontium carbonate was produced in the United States, celestite is the raw material from which strontium carbonate and other strontium compounds are produced.

Strontium carbonate is the most commonly traded strontium compound and is used as the raw material from which other strontium compounds are derived. Strontium carbonate is sintered with iron oxide to produce permanent ceramic ferrite magnets, and strontium nitrate contributes a brilliant red color to fireworks and signal flares. Smaller quantities of these and other strontium compounds were consumed in several other applications, including electrolytic production of zinc, glass production, master alloys, and pigments and fillers. Imports of strontium compounds decreased by 32% in 2020.

### **World Mine Production and Reserves:**<sup>4</sup>

	Mine production <sup>e</sup>		Reserves <sup>5</sup>
	2019	2020	
United States	—	—	Quantitative estimates of reserves for most countries were not available.
Argentina	700	670	
China	50,000	50,000	
Iran	37,000	35,000	
Mexico	40,000	38,000	
Spain	90,000	86,000	
World total (rounded)	220,000	210,000	

**World Resources:**<sup>5</sup> World resources of strontium are thought to exceed 1 billion tons.

**Substitutes:** Barium can be substituted for strontium in ferrite ceramic magnets; however, the resulting barium composite will have reduced maximum operating temperature when compared with that of strontium composites. Substituting for strontium in pyrotechnics is hindered by difficulty in obtaining the desired brilliance and visibility imparted by strontium and its compounds. In drilling mud, barite is the preferred material, but celestite may substitute for some barite, especially when barite prices are high.

<sup>e</sup>Estimated. — Zero.

<sup>1</sup>The strontium content of celestite is 43.88%, assuming an ore grade of 92%, which was used to convert units of celestite to strontium content.

<sup>2</sup>Strontium compounds, with their respective strontium contents, in descending order, include metal (100.00%); oxide, hydroxide, and peroxide (70.00%); carbonate (59.35%); and nitrate (41.40%). These factors were used to convert gross weight of strontium compounds to strontium content.

<sup>3</sup>Defined as imports – exports.

<sup>4</sup>Gross weight of celestite in tons.

<sup>5</sup>See Appendix C for resource and reserve definitions and information concerning data sources.