

## LITHIUM

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

**Domestic Production and Use:** Chile was the leading lithium chemical producer in the world; Argentina, China, Russia, and the United States also were major producers. Australia, Canada, and Zimbabwe were major producers of lithium ore concentrates. The United States remained the leading consumer of lithium minerals and compounds and the leading producer of value-added lithium materials. Because only one company produced lithium compounds from domestic resources, reported production and value of production data cannot be published. Estimation of value for the lithium mineral compounds produced in the United States is extremely difficult because of the large number of compounds used in a wide variety of end uses and the great variability of the prices for the different compounds.

Although lithium markets vary by location, one major international lithium company identified its end-use markets as ceramics and glass, 21%; batteries, 19%; lubricating greases, 16%; pharmaceuticals and polymers, 9%; air conditioning, 8%; primary aluminum production, 6%; and other uses, 21%. Lithium use in batteries expanded significantly in recent years because rechargeable lithium batteries were being used increasingly in portable electronic devices and electrical tools.

<b><u>Salient Statistics—United States:</u></b>	<b><u>2002</u></b>	<b><u>2003</u></b>	<b><u>2004</u></b>	<b><u>2005</u></b>	<b><u>2006<sup>e</sup></u></b>
Production	W	W	W	W	W
Imports for consumption	1,920	2,200	2,910	3,580	3,450
Exports	1,620	1,520	1,690	1,720	1,500
Consumption:					
Apparent	W	W	W	W	W
Estimated	1,100	1,400	1,900	2,500	2,600
Employment, mine and mill, number <sup>e</sup>	100	100	100	100	100
Net import reliance <sup>1</sup> as a percentage of apparent consumption	≤50%	≤50%	>50%	>50%	>50%

**Recycling:** Insignificant, but increasing through the recycling of lithium batteries.

**Import Sources (2002-05):** Chile, 74%; Argentina, 24%; and other, 2%.

<b><u>Tariff: Item</u></b>	<b><u>Number</u></b>	<b><u>Normal Trade Relations</u></b> <b><u>12-31-06</u></b>
Other alkali metals	2805.19.9000	5.5% ad val.
Lithium oxide and hydroxide	2825.20.0000	3.7% ad val.
Lithium carbonate:		
U.S.P. grade	2836.91.0010	3.7% ad val.
Other	2836.91.0050	3.7% ad val.

**Depletion Allowance:** 22% (Domestic), 14% (Foreign).

**Government Stockpile:** None.

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**Events, Trends, and Issues:** The only active lithium carbonate plant in the United States was at a brine operation in Nevada. Subsurface brines have become the dominant raw material for lithium carbonate production worldwide because of lower production costs as compared with the mining and processing costs for hard-rock ores. Two brine operations in Chile dominate the world market; a facility at a brine deposit in Argentina produced lithium carbonate and lithium chloride. Most of the lithium minerals mined in the world were used directly as ore concentrates in ceramics and glass applications rather than feedstock for lithium carbonate and other lithium compounds.

Two companies produced a large array of downstream lithium compounds in the United States from domestic or South American lithium carbonate. A U.S. recycling company produced a small quantity of lithium carbonate from solutions recovered during the recycling of lithium batteries.

The market for lithium compounds with the largest potential for growth is batteries, especially rechargeable batteries. Demand for rechargeable lithium batteries continued to grow for use in video cameras, portable computers and telephones, and cordless tools. Several laptop computer companies issued recall notices for a particular type of lithium ion battery contained in their devices that was prone to dangerous overheating. Interest continued in lithium batteries for hybrid electric vehicles, vehicles with an internal combustion engine and a battery-powered electric motor. Most commercially available hybrid vehicles use other types of batteries, although future models may use lithium. Nonrechargeable lithium batteries were used in calculators, cameras, computers, electronic games, watches, and other devices.

### **World Mine Production, Reserves, and Reserve Base:**

	Mine production		Reserves <sup>2</sup>	Reserve base <sup>2</sup>
	2005	2006 <sup>e</sup>		
United States	W	W	38,000	410,000
Argentina <sup>e</sup>	1,980	2,000	NA	NA
Australia <sup>e</sup>	3,770	3,800	160,000	260,000
Bolivia	—	—	—	5,400,000
Brazil	242	475	190,000	910,000
Canada	707	710	180,000	360,000
Chile	8,270	8,300	3,000,000	3,000,000
China	2,820	3,000	540,000	1,100,000
Portugal	320	325	NA	NA
Russia	2,200	2,200	NA	NA
Zimbabwe	260	250	23,000	27,000
World total (rounded)	<sup>3</sup> 20,600	<sup>3</sup> 21,100	4,100,000	11,000,000

**World Resources:** The identified lithium resources total 760,000 tons in the United States and more than 13 million tons in other countries.

**Substitutes:** Substitutes for lithium compounds are possible in manufactured glass, ceramics, greases, and batteries. Examples are sodic and potassic fluxes in ceramics and glass manufacture; calcium and aluminum soaps as substitutes for stearates in greases; and calcium, magnesium, mercury, and zinc as anode material in primary batteries. Lithium carbonate is not considered to be an essential ingredient in aluminum potlines. Substitutes for aluminum-lithium alloys as structural materials are composite materials consisting of boron, glass, or polymer fibers in engineering resins.

<sup>e</sup>Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.

<sup>1</sup>Defined as imports – exports + adjustments for Government and industry stock changes.

<sup>2</sup>See Appendix C for definitions.

<sup>3</sup>Excludes U.S. production.