

## MOLYBDENUM

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

**Domestic Production and Use:** In 2014, molybdenum, valued at about \$1.8 billion (based on an average oxide price), was produced at 13 mines. Molybdenum ore was produced as a primary product at three mines—two in Colorado, and one in Idaho—whereas ten copper mines (six in Arizona, one each in Montana, Nevada, New Mexico, and Utah) recovered molybdenum as a byproduct. Three roasting plants converted molybdenite concentrate to molybdic oxide, from which intermediate products, such as ferromolybdenum, metal powder, and various chemicals, were produced. Iron and steel and superalloy producers accounted for about 74% of the molybdenum consumed.

<b>Salient Statistics—United States:</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014<sup>e</sup></b>
Production, mine	59,400	63,700	61,500	60,700	65,500
Imports for consumption	19,700	21,100	19,800	20,200	23,600
Exports	49,900	56,700	48,900	53,100	55,300
Consumption:					
Reported <sup>1</sup>	19,200	19,100	19,400	18,600	19,000
Apparent <sup>2</sup>	28,200	26,100	33,100	29,500	33,900
Price, average value, dollars per kilogram <sup>3</sup>	34.83	34.34	28.09	22.85	26.90
Stocks, consumer materials	1,630	1,810	1,770	1,820	1,830
Employment, mine and plant, number	940	940	940	960	1,000
Net import reliance <sup>4</sup> as a percentage of apparent consumption	E	E	E	E	E

**Recycling:** Molybdenum is recycled as a component of catalysts, ferrous scrap, and superalloy scrap. Ferrous scrap is comprised of revert scrap, and new and old scrap. Revert scrap refers to remnants manufactured in the steelmaking process. New scrap is generated by steel mill customers and recycled by scrap collectors and processors. Old scrap is largely molybdenum-bearing alloys recycled after serving their useful life. The amount of molybdenum recycled as part of new and old steel and other scrap may be as much as 30% of the apparent supply of molybdenum. There are no processes for the separate recovery and refining of secondary molybdenum from its alloys. Molybdenum is not recovered separately from recycled steel and superalloys, but the molybdenum content of the recycled alloys is significant, and the molybdenum content is reutilized. Recycling of molybdenum-bearing scrap will continue to be dependent on the markets for the principal alloy metals of the alloys in which molybdenum is found, such as iron, nickel, and chromium.

**Import Sources (2010–13):** Ferromolybdenum: Chile, 79%; Canada, 9%; United Kingdom, 6%; and other, 6%. Molybdenum ores and concentrates: Canada, 44%; Mexico, 28%; Peru, 22%; Chile, 5%; and other, 1%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–14</b>
Molybdenum ore and concentrates, roasted	2613.10.0000	12.8¢/kg + 1.8% ad val.
Molybdenum ore and concentrates, other	2613.90.0000	17.8¢/kg.
Molybdenum chemicals:		
Molybdenum oxides and hydroxides	2825.70.0000	3.2% ad val.
Molybdates of ammonium	2841.70.1000	4.3% ad val.
Molybdates, all others	2841.70.5000	3.7% ad val.
Molybdenum pigments, molybdenum orange	3206.20.0020	3.7% ad val.
Ferroalloys, ferromolybdenum	7202.70.0000	4.5% ad val.
Molybdenum metals:		
Powders	8102.10.0000	9.1¢/kg + 1.2% ad val.
Unwrought	8102.94.0000	13.9¢/kg + 1.9% ad val.
Wrought bars and rods	8102.95.3000	6.6% ad val.
Wrought plates, sheets, strips, etc.	8102.95.6000	6.6% ad val.
Wire	8102.96.0000	4.4% ad val.
Waste and scrap	8102.97.0000	Free.
Other	8102.99.0000	3.7% ad val.

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

**Government Stockpile:** None.

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**Events, Trends, and Issues:** U.S. estimated mine output of molybdenum in concentrate in 2014 increased 8% from that of 2013. U.S. imports for consumption increased by 17% from those of 2013, and U.S. exports increased by 4% from those of 2013. Reported U.S. consumption of primary molybdenum products slightly increased from that of 2013. Apparent consumption of roasted molybdenum concentrates increased by 4% from that of 2013.

The average molybdenum price for 2014 was higher than that of 2013. Most byproduct and primary molybdenum mines maintained high production levels in 2014. Primary molybdenum production continued at the Climax Mine in Lake County and Summit County, CO, but primary production at the Ashdown Mine in Humboldt County, NV, and at the Questa Mine in Taos County, NM, continued to be suspended. The Thompson Creek Mine in Custer County, ID, was expected to be put on care and maintenance at yearend 2014. Both the Mission Mine in Pima County, AZ, and the Pinto Valley Mine in Gila County, AZ, restarted their molybdenum circuits in 2014.

In November, China cancelled export quotas (25,000 t) for molybdenum for 2015. This comes after a World Trade Organization panel concluded in March that China violated the organization's membership obligation by restricting exports of molybdenum.

**World Mine Production and Reserves:** Reserves for Australia were updated with data from Geoscience Australia.

	Mine production		Reserves <sup>5</sup> (thousand metric tons)
	2013	2014 <sup>e</sup>	
United States	60,700	65,500	2,700
Armenia	6,700	6,700	150
Australia	—	—	200
Canada	7,620	9,500	260
Chile	38,700	39,000	1,800
China	101,000	100,000	4,300
Iran	4,000	6,300	50
Kazakhstan	—	—	130
Kyrgyzstan	NA	NA	100
Mexico	12,100	11,000	130
Mongolia	1,900	2,000	160
Peru	18,100	18,100	450
Russia <sup>e</sup>	4,800	4,800	250
Turkey	1,500	2,800	100
Uzbekistan <sup>e</sup>	530	550	60
World total (rounded)	258,000	266,000	11,000

**World Resources:** Identified resources of molybdenum in the United States are about 5.4 million tons, and in the rest of the world, about 14 million tons. Molybdenum occurs as the principal metal sulfide in large low-grade porphyry molybdenum deposits and as an associated metal sulfide in low-grade porphyry copper deposits. Resources of molybdenum are adequate to supply world needs for the foreseeable future.

**Substitutes:** There is little substitution for molybdenum in its major application as an alloying element in steels and cast irons. In fact, because of the availability and versatility of molybdenum, industry has sought to develop new materials that benefit from the alloying properties of the metal. Potential substitutes for molybdenum include boron, chromium, niobium (columbium), and vanadium in alloy steels; tungsten in tool steels; graphite, tantalum, and tungsten for refractory materials in high-temperature electric furnaces; and cadmium-red, chrome-orange, and organic-orange pigments for molybdenum orange.

<sup>e</sup>Estimated. E Net exporter. NA Not available. — Zero.

<sup>1</sup>Reported consumption of primary molybdenum products.

<sup>2</sup>Apparent consumption of molybdenum concentrates roasted to make molybdenum oxide.

<sup>3</sup>Time-weighted average price per kilogram of molybdenum contained in technical-grade molybdic oxide, as reported by Ryan's Notes.

<sup>4</sup>Defined as imports – exports + adjustments for Government and industry stock changes.

<sup>5</sup>See [Appendix C](#) for resource/reserve definitions and information concerning data sources.