

## MOLYBDENUM

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

**Domestic Production and Use:** In 2011, molybdenum, valued at about \$2.2 billion (based on an average oxide price), was produced by 10 mines. Molybdenum ore was produced as a primary product at four mines—one each in Colorado, Idaho, Nevada, and New Mexico—whereas six copper mines (three in Arizona, one each in Montana, Nevada, 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 81% of the molybdenum consumed.

<b>Salient Statistics—United States:</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011<sup>e</sup></b>
Production, mine	57,000	55,900	47,800	59,400	64,000
Imports for consumption	18,300	14,500	11,400	19,700	18,000
Exports	33,700	34,700	27,900	31,600	33,000
Consumption:					
Reported	21,000	21,100	17,700	19,200	19,000
Apparent	40,900	36,400	30,500	46,400	50,000
Price, average value, dollars per kilogram <sup>1</sup>	66.79	62.99	25.84	34.83	34.90
Stocks, mine and plant concentrates, product, and consumer materials	7,600	7,000	7,700	8,800	7,500
Employment, mine and plant, number	940	940	920	940	940
Net import reliance <sup>2</sup> as a percentage of apparent consumption	E	E	E	E	E

**Recycling:** Molybdenum in the form of molybdenum metal or superalloys was recovered, but the amount was small. Although molybdenum is not recovered from scrap steel, recycling of steel alloys is significant, and some molybdenum content is reutilized. 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.

**Import Sources (2007–10):** Ferromolybdenum: Chile, 61%; China, 19%; Canada, 10%; and other, 10%. Molybdenum ores and concentrates: Mexico, 32%; Chile, 30%; Peru, 20%; Canada, 17%; and other, 1%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12-31-11</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.

## MOLYBDENUM

**Events, Trends, and Issues:** U.S. mine output of molybdenum in concentrate in 2011 increased by 8% from that of 2010. U.S. imports for consumption decreased by 9% from those of 2010, while U.S. exports increased by 5% from those of 2010. Domestic roasters operated at between 80% and 90% of full production capacity in 2009, but in 2010 and 2011 operated close to full production levels. U.S. reported consumption decreased slightly from that of 2010 while apparent consumption increased by 8%. Mine capacity utilization in 2010 was about 72%.

Molybdenum prices slowly increased in the first 2 months of 2011 but decreased for the remainder of the year; average price for the year was slightly higher than that of 2010. However, molybdenum demand remained strong. Both byproduct and primary molybdenum production levels in the United States remained strong in 2011 compared with their relatively low levels in 2009. Byproduct molybdenum production continued to be suspended at the Chino Mine in Grant County, NM, the Morenci Mine in Greenlee County, AZ, and the Mission Mine in Pima County, AZ. The Questa Mine, in Taos County, NM, commenced primary molybdenum mine production in the second quarter of 2011.

**World Mine Production and Reserves:** Reserves for Chile and Canada were revised based on new information.

	Mine production		Reserves <sup>3</sup>
	2010	2011 <sup>e</sup>	(thousand metric tons)
United States	59,400	64,000	2,700
Armenia	4,150	4,200	200
Canada	8,260	8,300	220
Chile	37,200	38,000	1,200
China	93,600	94,000	4,300
Iran	3,700	3,700	50
Kazakhstan	360	360	130
Kyrgyzstan	250	250	100
Mexico	10,900	12,000	130
Mongolia	2,500	2,000	160
Peru	17,000	18,000	450
Russia <sup>e</sup>	3,800	3,800	250
Uzbekistan <sup>e</sup>	550	550	60
World total (rounded)	<u>242,000</u>	<u>250,000</u>	<u>10,000</u>

**World Resources:** Identified resources of molybdenum in the United States amount to 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 chromium, vanadium, niobium (columbium), and boron in alloy steels; tungsten in tool steels; graphite, tungsten, and tantalum for refractory materials in high-temperature electric furnaces; and chrome-orange, cadmium-red, and organic-orange pigments for molybdenum orange.

<sup>e</sup>Estimated. E Net exporter.

<sup>1</sup>Time-weighted average price per kilogram of molybdenum contained in technical-grade molybdic oxide, as reported by Platts Metals Week.

<sup>2</sup>Defined as imports – exports + adjustments for Government and industry stock changes.

<sup>3</sup>See Appendix C for resource/reserve definitions and information concerning data sources.