

MOLYBDENUM

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

Domestic Production and Use: In 2002, molybdenum, valued at about \$270 million (based on average oxide price), was produced by six mines. Molybdenum ore was produced at three mines, one each in Colorado, Idaho, and New Mexico, whereas three mines in Arizona and Utah recovered molybdenum as a byproduct. Three plants converted molybdenite (MoS₂) concentrate to molybdic oxide, from which intermediate products, such as ferromolybdenum, metal powder, and various chemicals, were produced. Iron and steel, cast and wrought alloy, and superalloy producers accounted for about 70% of the molybdenum consumed.

Salient Statistics—United States:	1998	1999	2000	2001	2002^e
Production, mine	53,300	42,400	40,900	37,600	32,600
Imports for consumption	14,300	14,000	15,000	13,400	9,800
Exports	46,600	32,700	27,900	31,500	23,100
Consumption:					
Reported	18,800	18,700	18,300	16,200	13,400
Apparent	16,200	32,500	34,200	22,300	19,900
Price, average value, dollars per kilogram ¹	5.90	5.90	5.64	5.20	8.30
Stocks, mine and plant concentrates, product, and consumer materials	16,200	12,000	11,400	10,700	9,600
Employment, mine and plant, number	740	610	470	380	360
Net import reliance ² as a percentage of apparent consumption	E	E	E	E	E

Recycling: Secondary 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 molybdenum content is reutilized. Quantities of molybdenum recycled from new and old scrap are estimated to be 30% of apparent supply of molybdenum.

Import Sources (1998-2001): China, 30%; Mexico, 29%; Canada, 19%; United Kingdom, 11%; Chile, 8%; and other, 3%.

Tariff: Item	Number	Normal Trade Relations 12/31/02
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. mine output of molybdenum in 2002 decreased an estimated 13% from that of 2001. U.S. imports for consumption decreased an estimated 26% from those of 2001, while the U.S. exports decreased 27% from those of 2001. U.S. reported consumption decreased 17% from that of 2001. Mine capacity utilization was about 40%.

World Mine Production, Reserves, and Reserve Base: Reserves and reserve base estimates for Armenia and China have been revised upward based on new information from official country sources.

	Mine production		Reserves ³ (thousand metric tons)	Reserve base ³
	2001	2002 ^e		
United States	37,600	32,600	2,700	5,400
Armenia	3,300	3,000	200	400
Canada	7,000	8,200	450	910
Chile	33,000	34,000	1,100	2,500
China	28,200	28,000	3,300	8,300
Iran	1,600	2,000	50	140
Kazakhstan	230	200	130	200
Kyrgyzstan	250	200	100	180
Mexico	7,000	5,500	90	230
Mongolia	1,500	1,500	30	50
Peru	7,500	9,500	140	230
Russia ^e	2,600	2,600	240	360
Uzbekistan ^e	500	500	60	150
World total (rounded)	130,000	128,000	8,600	19,000

World Resources: Identified resources amount to about 5.4 million metric tons of molybdenum in the United States and about 13 million metric tons in the world. 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 the metal, industry has sought to develop new materials that benefit from the alloying properties of molybdenum. Potential substitutes for molybdenum include chromium, vanadium, columbium (niobium), 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.

^eEstimated. E Net exporter.

¹Major producer price per kilogram of molybdenum contained in technical-grade molybdic oxide.

²Defined as imports - exports + adjustments for Government and industry stock changes.

³See Appendix C for definitions.