

MOLYBDENUM

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

Domestic Production and Use: In 1996, molybdenum, valued at about \$430 million (based on average oxide price), was produced by 12 mines. Molybdenum ore was produced at three mines in Colorado and Idaho, whereas nine mines in Arizona, Montana, New Mexico, and Utah recovered molybdenum as a byproduct. Three plants converted molybdenite (MoS_2) concentrate to molybdic oxide, from which intermediate products, such as ferromolybdenum, metal powder, and various chemicals, were produced. Iron and steel producers accounted for about 75% of the molybdenum consumed. Major end-use applications were as follows: machinery, 35%; electrical, 15%; transportation, 15%; chemicals, 10%; oil and gas industry, 10%; and others, 15%.

Salient Statistics—United States:	1992	1993	1994	1995	1996^e
Production, mine	49,700	36,800	46,800	60,900	57,000
Imports for consumption	3,831	3,400	2,280	5,570	5,000
Exports, all primary forms	36,000	30,000	37,000	51,300	47,500
Consumption: Reported	17,200	17,700	18,800	19,900	18,700
Apparent	21,000	16,000	20,400	16,100	14,500
Price, average value, dollars per kilogram ¹	4.85	5.13	4.60	17.50	7.50
Stocks, mine and plant concentrates, product, and end-use	21,900	19,900	11,500	12,400	12,400
Employment, mine and plant, number	750	680	700	700	700
Net import reliance ² as a percent 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. About 1,000 tons of molybdenum was reclaimed from spent catalysts. Although some molybdenum was recycled as a minor constituent of scrap alloy steels and iron, the use of such scrap did not generally depend on its molybdenum content.

Import Sources (1992-95): China, 17%; United Kingdom, 16%; Canada, 14%; Chile, 14%; and other, 39%.

Tariff: Item	Number	Most favored nation (MFN) 12/31/96	Non-MFN³ 12/31/96
Molybdenum ore and concentrates, roasted	2613.10.0000	13¢/kg + 1.9% ad val.	\$1.10/kg + 15% ad val.
Molybdenum ore and concentrates, other	2613.90.0000	19¢/kg	77.2¢/kg.
Molybdenum chemicals:			
Molybdenum oxides and hydroxides	2825.70.0000	3.2% ad val.	20.5% ad val.
Molybdates of ammonium	2841.70.1000	4.3% ad val.	29% ad val.
Molybdates, all others	2841.70.5000	3.7% ad val.	25% ad val.
Molybdenum pigments:			
Molybdenum orange	3206.20.0020	3.7% ad val.	25% ad val.
Miscellaneous chemical products:			
Mix of two or more inorganic compounds of molybdenum	3823.90.3400	2.8% ad val.	18% ad val.
Ferroalloys:			
Ferromolybdenum	7202.70.0000	4.5% ad val.	31.5% ad val.
Molybdenum metals:			
Powders	8102.10.0000	12¢/kg + 1.6% ad val.	\$1.10/kg + 15% ad val.
Unwrought	8102.91.1000	13.9¢/kg + 1.9% ad val.	\$1.10/kg + 15% ad val.
Waste and scrap	8102.91.5000	Free	Free.
Wrought	8102.92.0000	6.6% ad val.	60% ad val.
Wire	8102.93.0000	5.7% ad val.	60% ad val.
Other	8102.99.0000	4.8% ad val.	45% ad val.

MOLYBDENUM

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

Government Stockpile: None.

Events, Trends, and Issues: The Questa molybdenum mine, Questa, NM, was being prepared for operation. A new section has been developed for use of load haul dump vehicles, and production is expected to be about 460 metric tons of contained molybdenum per month. U.S. mine output of molybdenum in 1996 decreased 5% compared with that of 1995. Reported consumption of molybdenum also decreased about 6%; exports declined about 7%, and U.S. producer inventories were about the same as those of 1995.

The year 1996 was uneventful for the molybdenum industry, and prices of concentrates and molybdenum products moderated toward the year's end. The domestic price for technical-grade molybdic oxide averaged \$7.50 per kilogram of contained molybdenum during 1996. Mine capacity utilization was 50%.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁴ (thousand metric tons)	Reserve base ⁴ (thousand metric tons)
	1995	1996 ^e		
United States	60,900	57,000	2,700	5,400
Armenia	800	800	20	30
Bulgaria	—	—	(5)	10
Canada	9,536	10,000	450	910
Chile	17,889	18,000	1,100	2,500
China	17,500	18,000	500	1,000
Iran	1,200	1,000	50	140
Kazakstan	700	900	130	200
Mexico	3,810	4,000	90	230
Mongolia	1,830	2,000	30	50
Peru	3,630	4,000	140	230
Russia	7,300	8,000	240	360
Uzbekistan	500	700	60	150
Other countries	—	—	—	590
World total (rounded)	126,000	124,000	5,500	12,000

World Resources: Identified resources amount to about 5.4 million metric tons of molybdenum in the United States and more than 12 million metric tons in the world. Molybdenum occurs both as the principal metal sulfide in large low-grade porphyry molybdenum deposits and as a subsidiary 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, 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 B.

⁴See Appendix C for definitions.

⁵Less than ½ unit.