

## MOLYBDENUM

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

**Domestic Production and Use:** In 2000, molybdenum, valued at about \$74 million (based on average oxide price), was produced by six mines. Molybdenum ore was produced at a mine in Idaho, whereas five mines in Arizona, Montana, New Mexico, and Utah recovered molybdenum as a byproduct. Three plants converted molybdenite (MoS<sub>2</sub>) 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%.

<b>Salient Statistics—United States:</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000<sup>e</sup></b>
Production, mine	54,900	60,900	53,300	43,000	32,100
Imports for consumption	13,400	13,200	14,400	13,800	13,600
Exports, all primary forms	49,600	62,100	41,700	27,900	27,400
Consumption: Reported	20,900	20,000	18,800	17,700	15,000
Apparent	21,200	23,000	24,500	33,100	21,500
Price, average value, dollars per kilogram <sup>1</sup>	8.30	9.46	5.90	5.90	5.90
Stocks, mine and plant concentrates, product, and consumer materials	9,900	11,400	16,200	12,000	8,700
Employment, mine and plant, number	800	700	600	475	300
Net import reliance <sup>2</sup> 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. While molybdenum is not recovered from scrap steel, recycling of steel alloys is significant, and molybdenum content is reused. Data on the quantities of molybdenum recycled in this manner are not available.

**Import Sources (1996-99):** United Kingdom, 28%; China, 26%; Chile, 23%; Canada, 14%; and other, 9%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12/31/00</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	8102.91.1000	13.9¢/kg + 1.9% ad val.
Waste and scrap	8102.91.5000	Free.
Wrought	8102.92.3000	6.6% ad val.
Wire	8102.93.0000	4.4% ad val.
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 2000 decreased 26% from that of 1999, to the lowest level since 1983. U.S. imports for consumption and exports were about the same as those of 1999. U.S. reported consumption and inventories were about 15% and 28%, respectively, below those of 1999.

Prices of concentrates and molybdenum products moderated toward the end of the year. The domestic price for technical-grade molybdic oxide averaged \$5.90 per kilogram of contained molybdenum during 2000; prices averaged the same as in 1999. Mine capacity utilization was 45%. Two mines, in Arizona and New Mexico, that had produced molybdenum in the past, recovered no molybdenum in 2000.

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

	Mine production		Reserves <sup>3</sup> (thousand metric tons)	Reserve base <sup>3</sup>
	1999	2000 <sup>e</sup>		
United States	43,000	32,100	2,700	5,400
Armenia	2,500	2,500	20	30
Canada	5,930	6,000	450	910
Chile	27,300	27,000	1,100	2,500
China	27,900	28,000	500	1,000
Iran	600	600	50	140
Kazakhstan	110	100	130	200
Mexico	6,000	6,000	90	230
Mongolia	1,750	1,800	30	50
Peru	4,400	4,500	140	230
Russia	2,400	2,500	240	360
Uzbekistan	500	500	60	150
Other countries	—	—	—	590
World total (rounded)	122,000	112,000	5,500	12,000

**World Resources:** Identified resources amount to about 5.5 million metric tons of molybdenum in the United States and more than 12 million metric tons in the world. Molybdenum occurs 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.

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

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

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

<sup>3</sup>See Appendix C for definitions.