

## MOLYBDENUM

(Data in metric tons, molybdenum content, unless otherwise specified)

**Domestic Production and Use:** Total estimated U.S. mine production of molybdenum concentrate decreased slightly to 34,000 tons of molybdenum content in 2023 compared with 34,600 tons in 2022. Molybdenum concentrate production at primary molybdenum mines continued at two U.S. operations in Colorado, and molybdenum concentrate production from mines where molybdenum was a byproduct continued at six U.S. operations (four in Arizona and one each in Montana and Utah). Three roasting plants converted molybdenum concentrate to molybdic oxide, from which intermediate products, such as ferromolybdenum, metal powder, and various chemicals, were produced. Molybdenum is a refractory metallic element used principally as an alloying agent in cast iron, steel, and superalloys and is also used in numerous chemical applications, including catalysts, lubricants, and pigments.

### **Salient Statistics—United States:**

	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023<sup>e</sup></u>
Production, mine	43,600	51,100	41,100	34,600	34,000
Imports for consumption	34,200	24,700	30,200	28,800	31,000
Exports	67,200	62,600	59,900	51,100	51,000
Consumption:					
Reported <sup>1</sup>	16,400	16,000	16,100	15,900	16,000
Apparent <sup>2</sup>	10,400	13,100	11,200	12,400	14,000
Price, average value, dollars per kilogram <sup>3</sup>	26.50	19.90	35.30	41.35	55.60
Stocks, consumer materials	1,980	2,010	2,040	2,050	1,900
Employment, mine and plant, number	950	950	940	940	950
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 consists of revert, 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, but the molybdenum content of the recycled alloys is significant and is reused.

**Import Sources (2019–22):** Ferromolybdenum: Chile, 72%; Republic of Korea, 24%; and other, 4%.  
Molybdenum ores and concentrates: Peru, 60%; Mexico, 18%; Chile, 13%; Canada, 8%; and other, 1%.  
Total: Peru, 34%; Chile, 32%; Mexico, 11%; Republic of Korea, 7%; and other, 16%.

<b><u>Tariff:</u></b>	<b><u>Item</u></b>	<b><u>Number</u></b>	<b><u>Normal Trade Relations</u></b> <b><u>12–31–23</u></b>
	Molybdenum ore and concentrates, roasted	2613.10.0000	12.8¢/kg on molybdenum content + 1.8% ad valorem.
	Molybdenum ore and concentrates, other	2613.90.0000	17.8¢/kg on molybdenum content.
	Molybdenum chemicals:		
	Molybdenum oxides and hydroxides	2825.70.0000	3.2% ad valorem.
	Molybdates of ammonium	2841.70.1000	4.3% ad valorem.
	Molybdates, all others	2841.70.5000	3.7% ad valorem.
	Molybdenum pigments, molybdenum orange	3206.20.0020	3.7% ad valorem.
	Ferrolloys, ferromolybdenum	7202.70.0000	4.5% ad valorem.
	Molybdenum metals:		
	Powders	8102.10.0000	9.1¢/kg on molybdenum content + 1.2% ad valorem.
	Unwrought	8102.94.0000	13.9¢/kg on molybdenum content + 1.9% ad valorem.
	Wrought bars and rods	8102.95.3000	6.6% ad valorem.
	Wrought plates, sheets, strips, and so forth	8102.95.6000	6.6% ad valorem.
	Wire	8102.96.0000	4.4% ad valorem.
	Waste and scrap	8102.97.0000	Free.
	Other	8102.99.0000	3.7% ad valorem.

**Depletion Allowance:** 22% (domestic), 14% (foreign).

**Government Stockpile:** None.

## MOLYBDENUM

**Events, Trends, and Issues:** In 2023, the estimated average U.S. molybdic oxide price increased by 34% compared with that in 2022. Estimated U.S. imports for consumption increased by 8% compared with those in 2022. Estimated U.S. exports were unchanged from those in 2022. Estimated apparent consumption in 2023 increased by 14% compared with that in 2022. The decrease in North American molybdenum production owing to declining ore grades at copper-molybdenum mines as well as record-high molybdenum prices has caused some idled molybdenum mining companies to consider reopening. In 2023, a Canadian company completed a prefeasibility study to consider reopening its idled molybdenum mine in Idaho.

Estimated global molybdenum production in 2023 increased by 3% compared with that in 2022. In descending order of production, China, Chile, Peru, the United States, and Mexico provided 93% of total global production. Molybdenum producers in China continued to face difficulties because of the tightening of environmental regulations making mining permits more difficult to obtain. High molybdenum prices caused some consumers, especially in China, to purchase less material to avoid higher costs. However, molybdenum was expected to continue to have strong demand in global power generation and infrastructure projects as countries continue to prioritize clean energy to address climate change.

**World Mine Production and Reserves:** Reserves data for China, Peru, Russia, Turkey, and the United States were revised based on Government and industry reports.

	Mine production		Reserves <sup>5</sup> (thousand metric tons)
	2022	2023 <sup>e</sup>	
United States	34,600	34,000	3,500
Argentina	—	—	100
Armenia	<sup>e</sup> 7,800	7,800	150
Australia	277	500	<sup>6</sup> 690
Canada	952	1,000	72
Chile	45,600	46,000	1,400
China	<sup>e</sup> 106,000	110,000	5,800
Iran	<sup>e</sup> 3,700	3,700	43
Korea, North	<sup>e</sup> 700	700	NA
Korea, Republic of	367	400	8
Mexico	15,500	15,000	130
Mongolia	<sup>e</sup> 3,000	3,100	NA
Peru	31,600	37,000	1,500
Russia	<sup>e</sup> 1,700	1,700	1,100
Turkey	—	—	52
Uzbekistan	<u><sup>e</sup>1,700</u>	<u>1,700</u>	<u>21</u>
World total (rounded)	253,000	260,000	15,000

**World Resources:**<sup>5</sup> Identified resources of molybdenum in the United States are about 5.4 million tons, and in the rest of the world, about 20 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 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 its alloying properties. Potential substitutes 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>Defined as production + imports – exports ± adjustments for industry stock changes.

<sup>3</sup>Time-weighted average price per kilogram of molybdenum contained in technical-grade molybdic oxide. Source: CRU Group.

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

<sup>5</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>6</sup>For Australia, Joint Ore Reserves Committee-compliant or equivalent reserves were 250,000 tons.