MOLYBDENUM

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

Domestic Production and Use: U.S. mine production of molybdenum in 2021 decreased by 6% to an estimated 48,000 tons compared with that in the previous year. Molybdenum ore was produced as a primary product at two mines—both in Colorado—whereas seven copper mines (four in Arizona and one each in Montana, Nevada, and Utah) recovered molybdenite concentrate 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. Metallurgical applications accounted for more than 88% of the total molybdenum consumed.

Salient Statistics—United States:	2017	2018	2019	2020	2021[e]
Production, mine	40,700	41,400	43,600	51,100	48,000
Imports for consumption	36,000	37,500	34,200	24,700	29,000
Exports	43,200	48,400	67,200	62,400	66,000
Consumption:					
Reported[1]	17,400	16,700	16,400	15,800	16,000
Apparent[2]	34,200	31,400	10,500	13,300	13,000
Price, average value, dollars per kilogram[3]	18.06	27.04	26.50	19.90	36
Stocks, consumer materials	2,010	1,940	1,980	1,980	1,700
Employment, mine and plant, number	940	940	950	950	950
Net import reliance[4] 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. Molybdenum is not recovered separately from recycled steel and superalloys, but the molybdenum content of the recycled alloys is significant, and the molybdenum content is reused. Recycling of molybdenum-bearing scrap will continue to be dependent on the markets for the principal alloy metals in which molybdenum is contained, such as iron, nickel, and chromium.

Import Sources (2017–20): Ferromolybdenum: Chile, 58%; the Republic of Korea, 35%; Canada, 3%; and other, 4%. Molybdenum ores and concentrates: Peru, 58%; Chile, 17%; Canada, 12%; Mexico, 12%; and other, 1%. Total: Peru, 42%; Chile, 26%; Canada, 10%; Mexico, 8%; and other, 14%.

Tariff: Item	Number	Normal Trade Relations 12–31–21
Molybdenum ore and concentrates, roasted	2613.10.0000	12.8¢/kg + 1.8% ad valorem.
Molybdenum ore and concentrates, other	2613.90.0000	17.8¢/kg.
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.
Ferroalloys, ferromolybdenum	7202.70.0000	4.5% ad valorem.
Molybdenum metals:		
Powders	8102.10.0000	9.1¢/kg + 1.2% ad valorem.
Unwrought	8102.94.0000	13.9¢/kg + 1.9% ad valorem.
Wrought bars and rods	8102.95.3000	6.6% ad valorem.
Wrought plates, sheets, strips, etc.	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.

Prepared by **Désirée E. Polyak [(703) 648–4909, dpolyak@usgs.gov]**

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

Government Stockpile: None.

Events, Trends, and Issues: In 2021, the estimated average molybdic oxide price increased by 81% compared with that in 2020, and U.S. estimated mine production of molybdenum decreased by 6% from that in 2020. The decrease in production was mainly the result of one byproduct mine in Utah decreasing its production by almost more than 70%. This decrease in production in Utah was offset by production increases at other molybdenum producers.

Estimated U.S. imports for consumption increased by 18% compared with those in 2020. U.S. exports increased by 5% from those in 2020. Apparent consumption in 2021 was essentially unchanged compared with that in 2020.

Global molybdenum production in 2021 increased slightly compared with that in 2020. In descending order of production, China, Chile, the United States, Peru, and Mexico provided 93% of total global production. Chinese molybdenum imports continued to be at historically high levels as China continued to focus on infrastructure growth to support its COVID-19 recovery. A major producer in China increased its molybdenum concentrate production in 2021 after having suspended its production for 6 months in 2020 following a tailings leakage accident. Many Chinese producers also continued to limit their molybdenum exports citing higher freight costs owing to container shortages and shipping delays. These factors all continued to contribute to decade-high molybdenum prices.

World Mine Production and Reserves: The reserves data for Mongolia, Peru, Russia, and Turkey were revised on the basis of new information from company and Government reports.

	Mine production		Reserves[5]
	2020	2021[e]	(thousand metric tons)
United States	51,100	48,000	2,700
Argentina	—	—	100
Armenia	[e]8,700	8,200	150
Canada	2,530	1,700	96
Chile	59,400	51,000	1,400
China	[e]120,000	130,000	8,300
Iran	[e]1,400	1,400	43
Korea, Republic of	411	400	NA
Mexico	16,600	18,000	130
Mongolia	2,890	2,900	NA
Peru	32,200	32,000	2,300
Russia	[e]2,700	2,800	430
Turkey	—	—	360
Uzbekistan	[e]200	200	60
World total (rounded)	298,000	300,000	16,000

World Resources:[5] 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.

[e]Estimated. E Net exporter. NA Not available. — Zero.

[1]Reported consumption of primary molybdenum products.

[2]Defined as production + imports – exports + adjustments for concentrate, consumer, and product producer stock changes.

[3]Time-weighted average price per kilogram of molybdenum contained in technical-grade molybdic oxide, as reported by CRU Group.

[4]Defined as imports – exports + adjustments for industry stock changes.

[5]See Appendix C for resource and reserve definitions and information concerning data sources.