

MOLYBDENUM

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

Domestic Production and Use: U.S. mine production of molybdenum in 2018 increased by 3% to 42,000 tons compared with 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 molybdenum 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 about 88% of the total molybdenum consumed.

Salient Statistics—United States:	2014	2015	2016	2017	2018^e
Production, mine	68,200	47,400	36,200	40,700	42,000
Imports for consumption	25,300	17,500	22,800	36,000	37,000
Exports	65,200	41,500	31,200	43,200	45,000
Consumption:					
Reported ¹	19,500	17,600	15,800	17,300	16,000
Apparent ²	28,000	23,800	27,400	33,300	34,000
Price, average value, dollars per kilogram ³	25.84	15.10	14.40	18.06	27
Stocks, consumer materials	2,010	1,880	1,910	2,010	2,050
Employment, mine and plant, number	1,000	950	920	940	940
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 comprises revert scrap, and 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 (2014–17): Ferromolybdenum: Chile, 58%; Republic of Korea, 25%; Canada, 10%; and other, 7%. Molybdenum ores and concentrates: Peru, 44%; Chile, 28%; Canada, 16%; Mexico, 10%; and other, 2%.

Tariff: Item	Number	Normal Trade Relations 12–31–18
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.

MOLYBDENUM

Events, Trends, and Issues: In 2018, the average molybdenic oxide price was 50% higher than that of 2017, and U.S. estimated mine output of molybdenum increased by 3% from that of 2017. The increase in production was seen at both primary and byproduct mines. Primary molybdenum production continued at the Climax Mine in Lake County and Summit County, CO, and at the Henderson Mine in Clear Creek County, CO. The Thompson Creek Mine in Custer County, ID, continued to be on care-and-maintenance status in 2018. Byproduct molybdenum production continued at the Bagdad, Morenci, Pinto Valley, and Sierrita Mines in Arizona; the Continental Pit Mine in Montana; the Robinson Mine in Nevada; and the Bingham Canyon Mine in Utah.

U.S. imports for consumption slightly increased from those of 2017. Ferromolybdenum imports increased by 57% in 2018, and imports of roasted molybdenum ores and concentrates decreased by 27% in 2018. Total U.S. exports increased by 4% from those of 2017. Apparent consumption increased slightly from that of 2017.

Global molybdenum production in 2018 increased slightly compared with 2017. In descending order of production, China, Chile, the United States, Peru, and Mexico provided approximately 93% of total global production.

World Mine Production and Reserves: The reserves estimate for Canada was revised based on new information from the Mining Association of Canada. The reserves estimate for Peru was revised based on new information from the Ministry of Energy and Mines of Peru. The reserves estimates for Chile, Mongolia, and Turkey were revised based on company and Government reports.

	Mine production		Reserves ⁵ (thousand metric tons)
	2017	2018 ^e	
United States	40,700	42,000	2,700
Argentina	450	450	100
Armenia	5,800	5,000	150
Canada	5,290	5,100	100
Chile	62,500	61,000	1,400
China ^e	130,000	130,000	8,300
Iran	3,500	3,500	43
Mexico	14,000	15,000	130
Mongolia	1,800	1,800	210
Peru	28,100	28,000	2,400
Russia ^e	3,100	3,100	1,000
Turkey	900	900	700
Uzbekistan ^e	450	450	60
World total (rounded)	297,000	300,000	17,000

World Resources: 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.

^eEstimated. E Net exporter.

¹Reported consumption of primary molybdenum products.

²Defined as production + imports – exports + adjustments for stock changes

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

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

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