

MOLYBDENUM

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

Domestic Production and Use: U.S. mine production of molybdenum in 2017 increased by 25% to about 44,600 tons, and was valued at about \$800 million (based on an average oxide price). 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 molybdc oxide, from which intermediate products, such as ferromolybdenum, metal powder, and various chemicals, were produced. Metallurgical applications accounted for about 87% of the total molybdenum consumed.

Salient Statistics—United States:	2013	2014	2015	2016	2017^e
Production, mine	61,000	68,200	47,400	35,800	44,600
Imports for consumption	20,300	25,300	17,500	22,800	38,200
Exports	53,100	65,200	41,400	31,200	42,600
Consumption:					
Reported ¹	18,600	19,500	17,600	16,700	17,000
Apparent ²	29,800	28,000	23,800	27,300	40,200
Price, average value, dollars per kilogram ³	22.85	25.84	15.10	14.40	18.00
Stocks, consumer materials	1,820	2,010	1,880	1,940	1,950
Employment, mine and plant, number	960	1,000	950	920	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 (2013–16): Ferromolybdenum: Chile, 73%; Canada, 12%; Republic of Korea, 9%; and other, 6%. Molybdenum ores and concentrates: Peru, 35%; Chile, 27%; Canada, 23%; Mexico, 14%; and other, 1%.

Tariff: Item	Number	Normal Trade Relations 12–31–17
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.

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Events, Trends, and Issues: In 2017, the average molybdic oxide price was 25% higher than that of 2016 and U.S. estimated mine output of molybdenum increased by 25% from that of 2016. 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, but primary production at the Ashdown Mine in Humboldt County, NV, and at the Questa Mine in Taos County, NM, continued to be suspended. The Thompson Creek Mine in Custer County, ID, and the Mineral Park Mine in Mohave County, AZ, continued to be on care-and-maintenance status in 2017.

U.S. imports for consumption increased by 68% from those of 2016. The large increase in 2017 was attributed mainly to the 75% increase of imports of molybdenum ores and concentrates and as well as FeMo imports more than doubling compared with 2016. U.S. exports increased by 37% from those of 2016 mainly owing to an increase in exports of molybdenum ores and concentrates and molybdates. Apparent consumption increased by 26% from that of 2016.

Global molybdenum production in 2017 increased by 4% compared with 2016. In descending order of production, China, Chile, the United States, Peru, Mexico, and Armenia provided approximately 95% 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 Argentina and Russia was revised based on company reports.

	Mine production		Reserves ⁵ (thousand tons)
	2016	2017 ^e	
United States	35,800	44,600	2,700
Argentina	800	800	100
Armenia	6,300	6,300	150
Canada	2,710	3,000	150
Chile	55,600	58,000	1,800
China ^e	130,000	130,000	8,300
Iran	3,500	3,500	43
Mexico	11,900	12,000	130
Mongolia	2,440	2,400	160
Peru	25,800	26,000	2,200
Russia ^e	3,000	3,000	1,000
Turkey	900	900	100
Uzbekistan ^e	450	450	60
World total (rounded)	279,000	290,000	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 + net import reliance.

³Time-weighted average price per kilogram of molybdenum contained in technical-grade molybdic 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.