BISMUTH

(Data in metric tons, gross weight, unless otherwise noted)

Domestic Production and Use: The United States ceased production of primary refined bismuth in 1997 and is highly import reliant. Bismuth is contained in some lead ores mined domestically. However, the last domestic primary lead smelter closed at yearend 2013; since then, all lead concentrates have been exported for smelting.

About 64% of domestic bismuth consumption was for chemicals used in cosmetic, industrial, laboratory, and pharmaceutical applications. Bismuth use in pharmaceuticals included bismuth subsalicylate (the active ingredient in over-the-counter stomach remedies) and other compounds used to treat burns, intestinal disorders, and stomach ulcers. Bismuth is also used in industrial applications for the manufacture of ceramic glazes, crystalware, and pearlescent pigments.

Bismuth has a wide variety of metallurgical applications, including use as an additive to improve metal integrity of malleable cast iron in the foundry industry and as a nontoxic replacement for lead in brass, free-machining steels, and solders. The use of bismuth in brass for pipe fittings, fixtures, and water meters increased after 2014 when the definition of “lead-free” under the Safe Drinking Water Act was modified to reduce the maximum lead content of “lead-free” pipes and plumbing fixtures to 0.25% from 8%. The melting point of bismuth is relatively low at 271 degrees Celsius, and it is an important component of various fusible alloys, some of which have melting points below that of boiling water. These bismuth-containing alloys can be used in holding devices for grinding optical lenses, as plugs for abandoned oil wells, as a temporary filler to prevent damage to tubes in bending operations, as a triggering mechanism for fire sprinklers, and in other applications in which a low melting point is ideal. Bismuth-tellurium-oxide alloy film paste is used in the manufacture of semiconductor devices.

Salient Statistics—United States:	**2018**	**2019**	**2020**	**2021**	**2022[e]**
Production:					
Refinery	—	—	—	—	—
Secondary (scrap)[e]	80	80	80	80	80
Imports for consumption, metal, alloys, and scrap[1]	2,470	2,340	1,650	1,980	2,800
Exports, metal, alloys, and scrap[2]	653	636	699	1,010	670
Consumption:					
Apparent[3]	2,040	1,690	1,210	1,030	2,000
Reported	570	548	513	597	600
Price, average,[4] dollars per pound	4.61	3.18	2.72	3.74	3.90
Stocks, yearend, consumer, bismuth metal	346	443	271	297	500
Net import reliance[5] as a percentage of apparent consumption	96	95	93	92	96

Recycling: Recycled bismuth-containing alloy scrap was thought to compose 4% to 8% of U.S. bismuth apparent consumption for the years 2018–22.

Import Sources (2018–21): China,[6] 65%; Republic of Korea, 19%; Mexico, 5%; Belgium, 3%; and other, 8%.

Tariff: Item	**Number**	**Normal Trade Relations 12–31–22**
Bismuth and articles thereof, including waste and scrap:		
Containing more than 99.99% of bismuth, by weight	8106.10.0000	Free.
Other	8106.90.0000	Free.

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

Government Stockpile: None.

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BISMUTH

Events, Trends, and Issues: The estimated annual average domestic dealer price for bismuth in 2022 was an estimated $3.90 per pound, a 4% increase from that in 2021 and the highest annual average price since 2018. Globally, excess stocks continued to keep prices low compared with those in 2007 through 2014, when the average annual dealer price was above $7.84 per pound. Global primary refined production was estimated to remain unchanged from that in 2021 and increased by 3% from that in 2019, before the coronavirus disease 2019 (COVID-19) pandemic. Exports from China through August 2022 remained flat compared with those during the same period in 2021 but increased by 76% from those in 2019. The increase was attributed to the stockpiling of supplies by foreign buyers avoiding shipping disruptions owing to concerns about COVID-19 pandemic-related production interruptions in China and global shipping issues.

U.S. trade data through July 2022 were mixed when compared with the same period in 2021—whereas bismuth imports for consumption increased, exports decreased. In the long term, bismuth demand from the alloying, chemical, and metallurgical industries was expected to remain stable.

World Refinery Production and Reserves:

	Refinery production[e]		Reserves[7]
	2021	2022	
United States	—	—	Quantitative estimates of reserves were not available.
Bolivia	60	60	
Bulgaria	50	50	
Canada	50	50	
China	16,000	16,000	
Japan	500	480	
Kazakhstan	230	220	
Korea, Republic of	1,000	950	
Laos	[8]2,070	2,000	
Mexico	10	10	
World total (rounded)	20,000	20,000	

World Resources:[7] World reserves of bismuth are usually estimated based on the bismuth content of lead resources because bismuth production is most often a byproduct of processing lead ores. In China and Vietnam, bismuth production is a byproduct or coproduct of tungsten and other metal ore processing. In Japan and the Republic of Korea, bismuth production is a byproduct or coproduct of zinc ore processing. Bismuth minerals rarely occur in sufficient quantities to be mined as principal products; the Tasna Mine in Bolivia and a mine in China are the only mines where bismuth has been the primary product. The Tasna Mine has been inactive since 1996.

Substitutes: Bismuth compounds can be replaced in pharmaceutical applications by alumina, antibiotics, calcium carbonate, and magnesia. Titanium dioxide-coated mica flakes and fish-scale extracts are substitutes in pigment uses. Cadmium, indium, lead, and tin can partially replace bismuth in low-temperature solders. Resins can replace bismuth alloys for holding metal shapes during machining, and glycerine-filled glass bulbs can replace bismuth alloys in triggering devices for fire sprinklers. Free-machining alloys can contain lead, selenium, or tellurium as a replacement for bismuth. Bismuth is an environmentally friendly substitute for lead in plumbing and many other applications, including fishing weights, hunting ammunition, lubricating greases, and soldering alloys.

[e]Estimated. — Zero.

[1]Includes data for the following Harmonized Tariff Schedule of the United States codes: 8106.00.0000 (for the years 2018–21), and 8106.10.0000 and 8106.90.0000 (for the year 2022).

[2]Includes data for the following Schedule B numbers: 8106.00.0000 (for the years 2018–21), and 8106.10.0000 and 8106.90.0000 (for the year 2022).

[3]Defined as secondary production + imports – exports ± adjustments for industry stock changes.

[4]Prices are based on 99.99%-purity metal at warehouse (Rotterdam) in minimum lots of 1 ton. Source: Fastmarkets AMM.

[5]Defined as imports – exports ± adjustments for industry stock changes.

[6]Includes Hong Kong.

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

[8]Reported.