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 dependent for its supply. 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 three-fifths of domestic bismuth consumption was for chemicals used in cosmetic, industrial, laboratory, and pharmaceutical applications. Bismuth use in pharmaceuticals included bismuth salicylate (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 the manufacture of ceramic glazes, crystalware, and pearlescent pigments.

Bismuth has a wide variety of metallurgical applications, including use as an additive to enhance metallurgical quality 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 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:	**2016**	**2017**	**2018**	**2019**	**2020[e]**
Production:					
Refinery	—	—	—	—	—
Secondary (scrap)[e]	80	80	80	80	80
Imports for consumption, metal, alloys, and scrap	2,190	2,820	2,510	2,300	2,000
Exports, metal, alloys, and scrap	431	392	653	636	670
Consumption:					
Apparent[1]	1,780	2,530	2,080	1,650	1,400
Reported	651	694	570	548	500
Price, average,[2] dollars per pound	4.53	4.93	4.64	3.19	2.70
Stocks, yearend, consumer	513	489	346	443	500
Net import reliance[3] as a percentage of apparent consumption	96	97	96	95	94

Recycling: Bismuth-containing alloy scrap was recycled and thought to compose less than 5% of U.S. bismuth apparent consumption.

Import Sources (2016–19): China, 69%; the Republic of Korea, 10%; Mexico, 8%; Belgium, 5%; and other, 8%.

Tariff: **Item**	**Number**	**Normal Trade Relations 12–31–20**
Bismuth and articles thereof, including waste and scrap	8106.00.0000	Free.

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

Government Stockpile: None.

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BISMUTH

Events, Trends, and Issues: Bismuth prices continued a significant downward trend that began in 2014, when the annual average domestic dealer price was $11.14 per pound. Bismuth was one of the metals held in significant quantities by the defunct Fanya Nonferrous Metals Exchange in China, which closed in 2015. In December 2019, 19,200 tons of Fanya Metal Exchange bismuth stocks were sold, which was likely the cause for the price slump at the end of that year. In 2020, it was announced that the Fanya bismuth stocks would be used internally for manufacturing, which relieved downward pricing pressures seen through the first half of 2020, resulting in a slight increase in the third quarter.

The global COVID-19 pandemic affected the global economy and trade during the first of half of 2020; in particular, China during the first quarter and the United States in the second quarter. Economies in both countries have showed some rebound in subsequent quarters. Trade data through August 2020 were mixed when compared with the same period in 2019—while bismuth exports increased, imports for consumption decreased.

World Refinery Production and Reserves: Available information was inadequate to make reliable estimates for mine production and reserves data.

	Refinery production		Reserves[4]
	2019	2020[e]	
United States	—	—	Quantitative estimates of reserves are not available.
Bolivia	15	10	
Bulgaria	50	40	
Canada	25	20	
China	16,000	14,000	
Japan	540	480	
Kazakhstan	270	240	
Korea, Republic of	930	830	
Laos	3,000	1,000	
Mexico	300	270	
World total (rounded)	21,100	17,000	

World Resources:[4] 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. 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]Defined as secondary production + imports – exports + adjustments for industry stock changes.

[2]Price in 2015 is based on New York dealer price for 99.99%-purity metal in minimum lots of 1 ton; source: Platts Metals Week. Prices in 2016–19 are based on 99.99%-purity metal at warehouse (Rotterdam) in minimum lots of 1 ton; source: American Metal Market (Fastmarkets AMM).

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

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