

## BISMUTH

(Data in metric tons unless otherwise specified)

**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.

Most 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 compounds such as bismuth nitrate, bismuth oxychloride, and bismuth vanadate are also used in industrial applications for the manufacture of ceramic glazes, crystalware, high-performance pigments, 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 aluminum alloys and 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. Bismuth is an important component of various fusible alloys that 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.

<b>Salient Statistics—United States:</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024<sup>e</sup></b>
Production:					
Refinery	—	—	—	—	—
Secondary (scrap) <sup>e</sup>	80	80	80	80	80
Imports for consumption, metal, alloys, and scrap:					
Containing more than 99.99% bismuth, by weight	NA	NA	740	731	650
Other	NA	NA	2,340	1,110	1,200
Total <sup>1</sup>	1,650	1,980	3,080	1,840	1,800
Exports, metal, alloys, and scrap:					
Containing more than 99.99% bismuth, by weight	NA	NA	144	131	560
Other	NA	NA	360	329	600
Total <sup>2</sup>	699	1,010	503	460	1,200
Consumption:					
Apparent <sup>3</sup>	1,210	1,030	2,600	1,450	760
Reported	513	597	724	691	700
Price, average, <sup>4</sup> dollars per pound	2.73	3.74	3.90	4.08	5.30
Stocks, yearend, consumer, bismuth metal	271	297	356	365	365
Net import reliance <sup>5</sup> as a percentage of apparent consumption	93	92	97	94	89

**Recycling:** Recycled bismuth-containing alloy scrap was thought to compose up to 3% to 10% of U.S. bismuth apparent consumption for the years 2020–24.

**Import Sources (2020–23):** China,<sup>6</sup> 67%; Republic of Korea, 23%; and other, 10%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–24</b>
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.

## BISMUTH

**Events, Trends, and Issues:** In 2024, average monthly prices for bismuth (in-warehouse, Rotterdam) increased from \$3.89 per pound in January to \$6.29 per pound in October. The estimated annual average price in 2024 was \$5.30 per pound, a 30% increase from that in 2023, and the highest annual average price since 2018. Bismuth metal prices have been increasing worldwide and particularly in China since 2023. China, the leading producer and exporter of bismuth, reportedly experienced high feedstock prices as competition for bismuth ore increased among domestic smelters. United States bismuth metal imports (under Harmonized System code 8106) from China decreased by 40% to 580 tons in 2024 from 964 tons in 2023.

Estimated world production of bismuth was 16,000 tons in 2024 compared with 16,200 tons in 2023. Reported bismuth production capacities were unavailable.

### World Refinery Production and Capacity:

	Refinery production <sup>a</sup>		Production capacity
	2023	2024 <sup>b</sup>	
United States	—	—	NA
Bolivia	68	70	NA
Bulgaria	46	50	NA
China	13,300	13,000	NA
Japan	500	500	NA
Kazakhstan	180	180	NA
Korea, Republic of	1,000	1,000	NA
Laos	81,150	1,100	NA
World total (rounded)	16,200	16,000	NA

**World Resources:**<sup>7</sup> Bismuth reserves and resources data were generally not reported at a mine or country level and thus difficult to quantify. Bismuth minerals rarely occur in sufficient quantities to be mined as principal products; bismuth is produced most often as a byproduct during the processing of lead ores. In China and Vietnam, bismuth is also produced as a byproduct or coproduct of tungsten and other metal ore processing. In Japan and the Republic of Korea, bismuth is produced as a byproduct or coproduct of zinc ore processing. The Tasna Mine in Bolivia, which has been inactive since 1996, and a mine in China are the only mines where bismuth has been the primary product.

**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 certain 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 glycerin-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.

<sup>a</sup>Estimated. NA Not available. — Zero.

<sup>1</sup>Includes data for the following Harmonized Tariff Schedule of the United States codes: 8106.00.0000 (for the years 2020–21), and 8106.10.0000 and 8106.90.0000 (for the years 2022–24).

<sup>2</sup>Includes data for the following Schedule B numbers: 8106.00.0000 (for the years 2020–21), and 8106.10.0000 and 8106.90.0000 (for the years 2022–24).

<sup>3</sup>Defined as secondary production + imports – exports ± adjustments for industry stock changes.

<sup>4</sup>Prices are based on 99.99%-purity metal at warehouse (Rotterdam) in minimum lots of 1 ton. Source: Fastmarkets.

<sup>5</sup>Defined as imports – exports ± adjustments for industry stock changes.

<sup>6</sup>Includes Hong Kong.

<sup>7</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>8</sup>Reported.