

BROMINE

(Data in metric tons of contained bromine unless otherwise noted)

Domestic Production and Use: Bromine was recovered from underground brines by two companies in Arkansas. Bromine is one of the leading mineral commodities, in terms of value, produced in Arkansas. The two bromine companies in the United States account for a large percentage of world production capacity.

The leading global applications of bromine are for the production of brominated flame retardants (BFRs) and clear brine drilling fluids. Bromine compounds are also used in a variety of other applications, including industrial uses, as intermediates, and for water treatment. U.S. apparent consumption of bromine in 2021 was estimated to be greater than that in 2020.

Salient Statistics—United States:

	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021^e</u>
Production	W	W	W	W	W
Imports for consumption, elemental bromine and compounds ¹	52,700	56,200	56,300	28,700	32,000
Exports, elemental bromine and compounds ²	32,600	21,900	29,300	36,800	25,000
Consumption, apparent ³	W	W	W	W	W
Price, average unit value of imports (cost, insurance, and freight), dollars per kilogram	2.30	2.21	2.31	2.73	2.66
Employment, number ^e	1,050	1,050	1,050	1,050	1,050
Net import reliance ⁴ as a percentage of apparent consumption	<25	<25	<25	E	<25

Recycling: Some bromide solutions were recycled to obtain elemental bromine and to prevent the solutions from being disposed of as hazardous waste. For example, hydrogen bromide is emitted as a byproduct in many organic reactions. This byproduct waste can be recycled with virgin bromine brines and used as a source of bromine production. Bromine contained in plastics can be incinerated as solid organic waste and the bromine can be recovered.

Import Sources (2017–20):⁵ Israel, 78%; Jordan, 13%; China, 6%; and other, 3%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u> <u>12–31–21</u>
	Bromine	2801.30.2000	5.5% ad valorem.
	Hydrobromic acid	2811.19.3000	Free.
	Potassium or sodium bromide	2827.51.0000	Free.
	Ammonium, calcium, or zinc bromide	2827.59.2500	Free.
	Potassium bromate	2829.90.0500	Free.
	Sodium bromate	2829.90.2500	Free.
	Ethylene dibromide	2903.31.0000	5.4% ad valorem.
	Methyl bromide	2903.39.1520	Free.
	Dibromoneopentylglycol	2905.59.3000	Free.
	Tetrabromobisphenol A	2908.19.2500	5.5% ad valorem.
	Decabromodiphenyl and octabromodiphenyl oxide	2909.30.0700	5.5% ad valorem.

Depletion Allowance: Brine wells, 5% (domestic and foreign).

Government Stockpile: None.

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Events, Trends, and Issues: The United States maintained its position as one of the leading bromine producers in the world along with China, Israel, and Jordan. In 2021, the leading source of imports of bromine and bromide compounds (gross weight) was Israel. The average import value of bromine and bromine compounds decreased by about 3% in 2021 compared with that in 2020. Together, the leading imported bromine products in terms of both gross weight and bromine content were bromides and bromide oxides of ammonium, calcium, or zinc and bromides of sodium or potassium (over 90%). Total imports of bromine and bromine compounds (bromine content) increased by about 10% whereas total exports decreased by about 30% compared with that in 2020.

Global sales of bromine and bromine compounds increased in 2021 compared with those in 2020. Sales volumes increased for BFRs and clear brine fluids, the leading applications of bromine, compared with the previous year. Sales were driven, in particular, by strong demand in electronic, automotive, and construction industries, the leading consumers of BFRs. Although sales of clear brine drilling fluids increased compared with the previous year, demand had yet to return to pre-pandemic levels. In February 2021, Texas suffered a major power crisis, which resulted from three severe winter storms sweeping across the United States on February 10–11, 13–17, and 15–20. The storms caused a massive electricity generation failure in Texas, leading to shortages of water, food, and heat. Additionally, the winter storms adversely affected drilling production, drew down inventory stocks, and disrupted supply-chain logistics.

World Production and Reserves:

	Production		Reserves ⁶
	<u>2020</u>	<u>2021^e</u>	
United States	W	W	11,000,000
Azerbaijan	—	—	300,000
China	70,000	75,000	NA
India	3,300	3,000	NA
Israel	170,000	180,000	Large
Japan	20,000	20,000	NA
Jordan	84,000	110,000	Large
Ukraine	<u>4,500</u>	<u>4,500</u>	<u>NA</u>
World total (rounded)	<u>7352,000</u>	<u>7390,000</u>	Large

World Resources:⁶ Bromine is found principally in seawater, evaporitic (salt) lakes, and underground brines associated with petroleum deposits. The Dead Sea, in the Middle East, is estimated to contain 1 billion tons of bromine. Seawater contains about 65 parts per million bromine, or an estimated 100 trillion tons. Bromine is also recovered from seawater as a coproduct during evaporation to produce salt.

Substitutes: Chlorine and iodine may be substituted for bromine in a few chemical reactions and for sanitation purposes. There are no comparable substitutes for bromine in various oil- and gas-well-completion and packer applications. Because plastics have a low ignition temperature, aluminum hydroxide, magnesium hydroxide, organic chlorine compounds, and phosphorus compounds can be substituted for bromine as fire retardants in some uses.

^eEstimated. E Net exporter. NA Not available. W Withheld to avoid disclosing company proprietary data. — Zero.

¹Includes data for the Harmonized Tariff Schedule of the United States codes shown in the “Tariff” section.

²Includes data for the following Schedule B numbers: 2801.30.2000, 2827.51.0000, 2827.59.0000, 2903.31.0000, and 2903.39.1520.

³Defined as production (sold or used) + imports – exports.

⁴Defined as imports – exports.

⁵Calculated using the gross weight of imports.

⁶See Appendix C for resource and reserve definitions and information concerning data sources.

⁷Excludes U.S. production.