

BROMINE

(Data in thousand metric tons of bromine content unless otherwise noted)

Domestic Production and Use: The quantity of bromine sold or used in the United States from three companies operating in Arkansas and Michigan accounted for 100% of elemental bromine production. Arkansas, with six plants, led the Nation in bromine production, and bromine was the leading mineral commodity in terms of value produced in the State. In Michigan, bromine was produced as a byproduct of magnesium compounds production. Three bromine companies in the United States accounted for more than one-third of world production.

A major domestic company reported that bromine is used in the manufacture of, dyes, fire retardants, insect repellents, oilfield completion fluids, pharmaceuticals, perfumes, photographic chemicals, water-treatment chemicals, and other chemicals. Other products included intermediate chemicals for the manufacture of products and bromide solutions used alone or in combination with other chemicals.

Salient Statistics—United States:	2001	2002	2003	2004	2005^e
Production ¹	212	222	216	222	212
Imports for consumption, elemental bromine and compounds ²	16	7	7	10	10
Exports, elemental bromine and compounds	11	13	13	8	9
Consumption, apparent ³	214	216	210	220	224
Price, cents per kilogram, bulk, purified bromine	67.0	99.2	72.0	75.5	81.0
Employment, number	1,700	1,700	1,700	1,500	1,200
Net import reliance ⁴ as a percentage of apparent consumption	—	—	E	E	(5)

Recycling: Some bromide solutions were recycled to obtain elemental bromine and prevent the solutions from being disposed of as hazardous waste. This recycled bromine is not included in the virgin bromine production reported by the companies, but is included in data collected by the U.S. Census Bureau.

Import Sources (2001-04): Israel, 93%; China, 2%; Indonesia, 2%; and other, 3%.

Tariff: Item	Number	Normal Trade Relations 12-31-05
Bromine	2801.30.2000	5.5% ad val.
Bromides and bromide oxides	2827.59.5000	3.6% ad val.
Bromochloromethane	2903.49.1000	Free.
Ammonium, calcium, or zinc bromide	2827.59.2500	Free.
Decabromodiphenyl and octabromodiphenyl oxide	2909.30.0700	5.5% ad val.
Ethylene dibromide	2903.30.0500	5.5% ad val.
Hydrobromic acid	2811.19.3000	Free.
Potassium bromate	2829.90.0500	Free.
Potassium or sodium bromide	2827.51.0000	Free.
Sodium bromate	2829.90.2500	Free.
Tetrabromobisphenol A	2908.10.2500	5.5% ad val.
Vinyl bromide, methylene dibromide	2903.30.1520	Free.

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

Government Stockpile: None.

Events, Trends, and Issues: Israel and the United States were the largest producers of bromine in the world. Approximately 90% of Israel's production was for export, accounting for about 80% of international trade in bromine and bromine compounds to more than 100 countries. Exports from Israel were used to produce bromine compounds at a plant in the Netherlands for export to other countries.

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Great Lakes Chemical Corporation, a major domestic producer of bromine and bromine compounds, experienced a fatality at the El Dorado, AR, plant after the worker was exposed to methyl bromide. The accident occurred after a valve used in venting was modified during replacement of adjacent valves venting the gas to an emergency exhaust stack rather than to a recovery unit.⁶

Great Lakes merged with Crompton Corporation to become Chemtura Corporation, the third-largest publicly traded U.S. specialty chemical firm by revenues on July 1. Cumulative savings were expected to total \$10 million in 2005, \$100 million in 2006, and \$150 million in 2007. The 7,300 workforce will be reduced by 8%, resulting in 600 fewer jobs worldwide during the next 3 years.⁷

Price increases for many bromine compounds were announced reflecting the rising market value of the bromine and to cover major increases in the costs of energy, raw materials, regulatory compliance, and transportation.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁸	Reserve base ⁸
	2004	2005 ^e		
United States ¹	222	212	11,000	11,000
Azerbaijan	2	2	300	300
China	42	43	130	3,500
France	2	2	1,600	1,600
Germany	0.5	0.5	(⁹)	(⁹)
India	1.5	1.5	(¹⁰)	(¹⁰)
Israel	206	210	(¹¹)	(¹¹)
Italy	0.3	0.3	(¹⁰)	(¹⁰)
Japan	20	20	(¹²)	(¹²)
Jordan	20	50	(¹¹)	(¹¹)
Spain	0.1	0.1	1,400	1,400
Turkmenistan	0.15	0.15	700	700
Ukraine	3	3	400	400
United Kingdom	35	35	(¹²)	(¹²)
World total (rounded)	560	580	Large	Large

World Resources: Resources of bromine are virtually unlimited. The Dead Sea, in the Middle East, is estimated to contain 1 billion tons of bromine. Seawater contains about 65 parts per million of 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 that do not harm the permeability of the production zone and that control well "blowouts." Because plastics have a low ignition temperature, alumina, magnesium hydroxide, organic chlorine compounds, and phosphorous compounds can be substituted for bromine as fire retardants in some uses. Bromine compounds and bromine acting as a synergist with other materials are used as fire retardants in plastics such as those found in electronics.

^eEstimated. E Net exporter. — Zero.

¹Sold or used by U.S. producers.

²Imports calculated from items shown in Tariff section.

³Includes recycled product.

⁴Defined as imports – exports + adjustments for Government and industry stock changes.

⁵Less than ½ unit.

⁶El Dorado News-Times, 2005, Great Lakes finds likely cause of methyl bromide release: El Dorado News-Times, May 25, p. A1, A3.

⁷Chemtura Corporation, 2005, Crompton Corporation and Great Lakes Chemical finalize merger, become "Chemtura" Corporation: Middlebury, CT, Chemtura Corporation, press release, July 1, 2 p.

⁸See Appendix C for definitions.

⁹From waste bitters associated with potash production.

¹⁰From waste bitters associated with solar salt.

¹¹From the Dead Sea.

¹²From seawater.