

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 four companies operating in Arkansas and Michigan accounted for 100% of elemental bromine production valued at an estimated \$207 million. Arkansas, with six plants, continued to be the Nation's leading bromine producer, and bromine was the leading mineral commodity in terms of value produced in the State. A new elemental bromine plant that opened in 1999 was closed during 2000.

One domestic producer of bromine and a major producer of borates signed an agreement to market zinc borate flame retardants and smoke suppressants in Asia. The two companies, with leading positions in global flame and smoke suppressant markets, planned to jointly produce new products in halogen and halogen-free flame retardant systems.

Bromine was used in fire retardants, 27%; agriculture, 15%; petroleum additives, 15%; well drilling fluids, 10%; sanitary preparations, 5%; and other applications, 28%. Other applications included intermediate chemicals for the manufacture of other products and bromide solutions used alone or in combination with other chemicals.

Salient Statistics—United States:	1996	1997	1998	1999	2000^e
Production ¹	227	247	230	239	229
Imports for consumption, elemental bromine and compounds ²	14	11	10	10	9
Exports, elemental bromine and compounds	17	14	12	10	10
Consumption, apparent ³	225	244	235	238	228
Price, cents per kilogram, bulk, purified bromine	66.0	80.2	70.0	87.0	90.0
Employment, number	1,700	1,700	1,700	1,700	1,700
Net import reliance ⁴ as a percent of apparent consumption	E	E	—	E	E

Recycling: Approximately 35% of U.S. bromine production was converted to byproduct sodium bromide solutions, which were recycled to obtain elemental bromine. This recycled bromine is not included in the virgin bromine production reported by the companies.

Import Sources (1996-99): Israel, 83%; Belgium, 5%; United Kingdom, 4%; and other, 8%.

Tariff: Item	Number	Normal Trade Relations 12/31/00
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	11.3% 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	0.6¢/kg + 11.1% ad val.
Vinyl bromide, methyl	2903.30.1520	Free.

Depletion Allowance: 5% on brine wells (Domestic and foreign).

Government Stockpile: None.

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Events, Trends, and Issues: Three bromine companies accounted for 64% of world production. Two of these companies are located in the United States and accounted for about 94% of U.S. production. A U.S. company signed a joint-venture agreement with a company in Jordan to build a bromine complex at Safi, Jordan. Construction, which was planned to begin in 2000 and be completed by 2002, includes a 50,000-ton-per-year bromine plant.

Israel was the second largest producer of bromine in the world and the largest producer of elemental bromine. Approximately 90% of production was for export, accounting for about 80% of international trade in bromine and bromine compounds to more than 100 countries. A company produced bromine from Dead Sea bromine-rich brines after production of potash by another company. Exports of elemental bromine by the bromine producer are used to produce bromine compounds at its plant in the Netherlands.

Under the Montreal Protocol, the global phaseout of methyl bromide as a crop pesticide will occur during 2001-2005 in the United States. Imports of crops treated with methyl bromide in Mexico are expected to continue, however, because Mexico does not have to phaseout methyl bromide until 2015.

China announced that construction has commenced on the first phase of a bromide manufacturing facility that is a joint venture between a Chinese company and the Israeli bromine producer.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁵	Reserve base ⁵
	1999	2000 ^e		
United States ¹	239	229	11,000	11,000
Azerbaijan	2.0	2.0	300	300
China	45.0	45.0	NA	NA
France	2.0	2.0	1,600	1,600
India	1.5	1.5	(⁶)	(⁶)
Israel	185	185	(⁷)	(⁷)
Italy	0.3	0.3	(⁶)	(⁶)
Japan	20.0	20.0	(⁸)	(⁸)
Spain	0.1	0.1	1,400	1,400
Turkmenistan	0.2	0.2	700	700
Ukraine	3.0	3.0	400	400
United Kingdom	<u>30.0</u>	<u>30.0</u>	(⁶)	(⁶)
World total (rounded)	530	520	NA	NA

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. The bromine content of underground water in Poland has been estimated at 36 million tons.

Substitutes: Chlorine and iodine may be substituted for bromine in a few chemical reactions and for sanitation purposes. Aniline and some of its derivatives, methanol, ethanol, and gasoline-grade tertiary butyl alcohol, are effective nonlead substitutes for ethylene dibromide and lead in gasoline in some cars. There are no comparable substitutes for bromine in various oil and gas well completion and packer applications. Alumina, magnesium hydroxide, organic chlorine compounds, and phosphorous compounds can be substituted for bromine as fire retardants in some uses.

^eEstimated. E Net exporter. NA Not available.

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.

⁵See Appendix C for definitions.

⁶From waste bitterns associated with solar salt.

⁷From the Dead Sea. See World Resources section.

⁸From seawater. See World Resources section.