

IODINE

(Data in thousand kilograms, elemental iodine, unless otherwise noted)

Domestic Production and Use: Iodine produced in 1996 from companies operating in Oklahoma accounted for 100% of the elemental iodine value estimated at \$16 million. The operation at Woodward, OK, continued production of iodine from subterranean brines. A second company operated a miniplant in Kingfisher County, OK, using waste brine associated with oil production. A third company continued production at Vici, OK, and exported iodine to Germany. Of the consumers that participate in the annual survey, 25 plants reported consumption of iodine in 1995. Major consumers were located in the East. Prices of crude iodine in drums published in December ranged between \$15 and \$16 per kilogram. Imports of iodine through October averaged \$13.50 per kilogram.

Establishing an accurate end-use pattern for iodine was difficult because intermediate iodine compounds were marketed before reaching their final end uses. The downstream uses of iodine were as animal feed supplements, catalysts, inks and colorants, pharmaceutical, photographic equipment, sanitary and industrial disinfectants, stabilizers, and other uses.

Salient Statistics—United States:	1992	1993	1994	1995	1996^e
Production	2,000	1,940	1,630	1,220	1,200
Imports for consumption, crude content	3,750	3,620	4,360	3,950	4,000
Exports	1,810	1,220	1,200	1,220	2,000
Shipments from Government stockpile excesses	115	0.045	218	133	—
Consumption: Apparent	3,930	4,330	4,780	3,540	4,000
Reported	3,400	3,550	3,690	3,680	NA
Price, average c.i.f. value, dollars per kilogram, crude	9.03	7.98	8.02	10.32	13.50
Stocks, producer, yearend	NA	NA	NA	NA	NA
Employment, number	50	50	35	35	40
Net import reliance ¹ as a percent of apparent consumption	52	56	66	90	62

Recycling: Small amounts of iodine were recycled, but no data are reported.

Import Sources (1992-95): Japan, 53%; Chile, 46%; and other, 1%.

Tariff:	Item	Number	Most favored nation (MFN) <u>12/31/96</u>	Non-MFN ² <u>12/31/96</u>
	Iodine, crude	2801.20.0000	Free	Free.
	Iodide, calcium and cuprous	2827.60.1000	Free	25% ad val.
	Iodide, potassium	2827.60.2000	2.8% ad val.	7.5% ad val.
	Iodides and iodide oxides, other	2827.60.5000	4.2% ad val.	25% ad val.

Depletion Allowance: 5% on brine wells (Domestic and Foreign); 14% on solid minerals (Domestic), 14% (Foreign).

Government Stockpile:

Stockpile Status—9-30-96

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposals Jan.-Sept. 95
Stockpile-grade	2,362	—	2,362	—

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Events, Trends, and Issues: Japan continued to be the largest producer of iodine in the world. Production was primarily from underground brines associated with gas production. The deregulation of the refining/marketing operation of Japanese oil companies on April 1, 1996, may cut unprofitable marketing operations in order to compete in a more open market. The iodine market, which is tied to gas production, may be affected by the availability of alternative heating fuels.

Chile was the second largest producer with three companies producing iodine during the year.

One U.S. operation bought the plant of a consumer of iodine that manufactured iodine derivatives. Another U.S. operation, which closed in 1992 because of low market prices for iodine, was preparing to go back into production.

Methyl iodide was tested by the U.S. Department of Agriculture and was found to be an effective fumigant for controlling four species of fungi, one species of nematode, and seven species of weeds. Based on the results of 15 laboratory and field trials, methyl iodide was more effective than methyl bromide as a fumigant. Methyl bromide has an ozone depletion potential (ODP) of 0.65 and is scheduled to be phased out of production, importation, and use as an agricultural chemical in the United States by 2001 and under the Montreal protocol by 2010. Methyl iodide has an ODP of less than 0.016 and appears to be a replacement for methyl bromide in most uses. Methyl iodide is about five times more expensive, but could utilize the same equipment as methyl bromide.

Producers of medical contrast media, about 46% to 67% iodine, continued steady growth as newer technologies advanced. Imaging media consist largely of x-rays and use iodine, and to a lesser extent barium, for intestinal applications.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ³	Reserve base ³
	1995	1996 ^e		
United States	1,220	1,200	550,000	550,000
Azerbaijan	350	350	171,000	NA
Chile	5,000	5,000	900,000	1,200,000
China	500	500	400,000	400,000
Indonesia	80	80	100,000	100,000
Japan	6,200	6,200	4,000,000	7,000,000
Russia	160	160	NA	NA
Turkmenistan	250	250	172,000	NA
World total (rounded)	13,800	13,800	NA	NA

World Resources: In addition to the fields listed in the reserve base, seawater contains 0.05 parts per million iodine, or approximately 76 billion pounds. Seaweeds of the Laminaria family are able to extract and accumulate up to 0.45% iodine on a dry basis. Although not as economical as the production of iodine as a byproduct of gas, oil, and nitrate, the seaweed industry represented a major source of iodine prior to 1959 and is a large resource.

Substitutes: Bromine and chlorine could be substituted for most of the biocide, ink, and colorant uses of iodine, although they are usually considered less desirable than iodine. Antibiotics and mercurochrome also substitute for iodine as biocides. Salt crystals and finely divided carbon may be used for cloud seeding. There are no substitutes in some catalytic, nutritional, pharmaceutical, animal feed, and photographic uses.

^eEstimated. NA Not available.

¹Defined as imports - exports + adjustments for Government and industry stock changes.

²See Appendix B.

³See Appendix C for definitions.