IODINE

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

Domestic Production and Use: Iodine produced in 1997 from companies operating in Oklahoma accounted for 100% of the elemental iodine value estimated at $24 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, and reopened a world class plant that was closed in 1993 because of low market prices for iodine. A third company continued production at Vici, OK, for domestic use and export to Germany. Of the consumers that participate in the annual survey, 28 plants reported consumption of iodine in 1996. Major consumers were located in the East. Prices of crude iodine in drums, published for October, ranged between $16 and $17 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 in animal feed supplements, catalysts, inks and colorants, pharmaceuticals, photographic equipment, sanitary and industrial disinfectants, stabilizers, and other uses.

Salient Statistics—United States:	**1993**	**1994**	**1995**	**1996**	**1997[e]**
Production	1,940	1,630	1,220	1,270	1,330
Imports for consumption, crude content	3,620	4,360	3,950	4,810	5,000
Exports	1,220	1,200	1,220	2,380	2,400
Shipments from Government stockpile excesses	0.045	218	133	—	204
Consumption:					
Apparent	4,330	4,780	3,540	3,700	3,700
Reported	3,550	3,690	3,680	3,910	NA
Price, average c.i.f. value, dollars per kilogram, crude	7.98	8.02	10.32	12.90	14.60
Stocks, producer, yearend	NA	NA	NA	NA	NA
Employment, number	50	35	35	40	40
Net import reliance[1] as a percent of apparent consumption	56	66	90	66	65

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

Import Sources (1993-96): Japan, 53%; Chile, 46%; and other, 1%.

Tariff: Item	**Number**	**Most favored nation (MFN) 12/31/97**	**Non-MFN[2] 12/31/97**
Iodine, crude	2801.20.0000	Free	Free.
Iodide, calcium or of copper	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—9-30-97[3]

Material	**Uncommitted inventory**	**Committed inventory**	**Authorized for disposal**	**Disposal plan FY 1997**	**Disposals FY 1997**
Stockpile-grade	2,124	204	2,124	—	204

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Events, Trends, and Issues: Chile was the largest producer of iodine in the world. A company announced it would develop the Aguas Blancas project in Region II, northern Chile, for the production of iodine, sodium sulfate, and potassium nitrate in 1999. In September, the company received approval of an environmental impact statement (EIS). The EIS approval is necessary for the completion of other permitting. The proven and probable reserves are 29.5 million tons averaging 683 parts per million of iodine. The largest iodine company in Chile announced the construction of a 1,500-ton-per-year plant in Region I, the northern most region of the country. Production from all the company's plants was expected to reach 8,000 tons per year by 1997. A Canadian company announced the completion of a plant in July in Northern Chile. The company began to process solutions from solar ponds. The nitrate plant processed raw salts from the solar ponds.

Japan was the second largest producer of iodine in the world. Production was primarily from underground brines associated with natural gas production. Six companies operated 17 plants with a total capacity of 9,000 tons per year. Production capacity of the plants was dependent upon the availability of brines with high iodine concentrations.

A U.S. operation, which closed in 1992 because of low market prices for iodine, resumed production. Strong demand for crude iodine coupled with price increases made iodine production from this site profitable.

Methyl iodide was tested by the University of California at Riverside 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. Under the Montreal protocol, it will be phased out in the rest of the world 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.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves[4]	Reserve base[4]
	1996	1997[e]		
United States	1,270	1,330	550,000	550,000
Azerbaijan	300	300	171,000	NA
Chile	5,000	5,600	900,000	1,200,000
China	500	500	400,000	400,000
Indonesia	80	80	100,000	100,000
Japan	5,500	5,500	4,000,000	7,000,000
Russia	150	150	NA	NA
Turkmenistan	260	260	172,000	NA
World total (rounded)	13,100	13,700	[5]6,300,000	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.

[e]Estimated. NA Not available.

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

[2]See Appendix B.

[3]See Appendix C.

[4]See Appendix D for definitions.

[5]Sum excludes countries for which data are not available.