

IODINE

(Data in metric tons elemental iodine unless otherwise noted)

Domestic Production and Use: Iodine was produced in 2008 by three companies operating in Oklahoma. Production increased slightly in 2008 compared with that of 2007. 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. A third company continued production at Vici, OK. Prices for iodine have increased in recent years owing to high demand, which has led to high-capacity utilization. The average c.i.f. value of iodine imports in 2008 was estimated to be \$22.20 per kilogram.

Establishing an accurate end-use pattern for iodine was difficult because intermediate iodine compounds were marketed before reaching their final end uses. Of the consumers that participate in an annual U.S. Geological Survey canvass, 17 plants reported consumption of iodine in 2007. Iodine compounds reported used were unspecified organic compounds, including ethyl and methyl iodide, 45%; crude iodine, 13%; potassium iodide, 10%; sodium iodide, 9%; povidine-iodine (iodophors), 7%; ethylenediamine dihydroiodide, 4%; and other, 12%.

Salient Statistics—United States:	2004	2005	2006	2007	2008^e
Production	1,130	1,570	W	W	W
Imports for consumption, crude content	5,700	6,250	5,640	6,060	6,660
Exports ¹	1,060	2,430	1,580	1,060	1,200
Shipments from Government stockpile excesses	245	444	467	93	—
Consumption:					
Apparent	5,810	5,600	W	W	W
Reported	4,070	4,680	4,570	4,730	4,900
Price, average c.i.f. value, dollars per kilogram, crude	13.38	16.75	19.34	21.12	22.20
Employment, number	30	30	30	30	30
Net import reliance ² as a percentage of apparent consumption	81	72	W	W	W

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

Import Sources (2004-07): Chile, 76%; Japan, 23%; and other, 1%.

Tariff:	Item	Number	Normal Trade Relations
			12-31-08
	Iodine, crude	2801.20.0000	Free.
	Iodide, calcium or copper	2827.60.1000	Free.
	Iodide, potassium	2827.60.2000	2.8% ad val.
	Iodides and iodide oxides, other	2827.60.5100	4.2% ad val.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: The National Defense Stockpile Center announced that all iodine (94,100 kilograms) in the stockpile had been sold.

Events, Trends, and Issues: Chile was the largest iodine producing country, with Chilean producers accounting for more than 50% of world production. Two of the leading iodine companies in the world were located in Chile. Iodine was a coproduct of surface mineral deposits used to produce nitrate fertilizer. Japan was the second leading producer; its production was associated with gas brines. The Turkmenistan Government continues to invest significantly in repairing and upgrading its production facilities to achieve its anticipated goal of 1,800 tons of iodine per year by 2010. A company in Azerbaijan announced its intent to build a \$70 million iodine production facility in Azerbaijan during the next 3 years that will have the capacity to produce 10,000 tons of iodine per year. The output of the plant would be exported to Russian and European markets.

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During the second quarter of 2008, a leading producer of iodine in Chile finished construction of a new mechanically agitated leach plant. The commissioning process, which consists of testing and optimizing plant components, was experiencing some unanticipated challenges in the crushing and grinding section, which may delay full startup until late in the fourth quarter of 2008 or early in the first quarter of 2009. The company anticipated these improvements would result in an extended mine life, lower production costs, and reduced working-capital requirements. Another leading Chilean producer announced plans to increase production capacity of iodine from its northern Chile deposits by approximately 25% by 2012.

U.S. consumption growth is strongest in the pharmaceuticals and sanitation end-use market. Use of x-ray contrast media in medical diagnostics is increasing. This has offset iodine's waning consumption in photographic film, an end-use application that has declined recently owing to the increasing popularity of digital-imaging systems.

Global iodine consumption patterns continue to increase owing to the growing levels of awareness among health-conscious consumers about the importance of iodine as a dietary ingredient in a well-balanced diet. Use of iodine in food products is gaining in momentum as governments resort to iodine fortification as a means to eradicate diseases caused by iodine deficiency. In the Middle East, consumption of iodine in the animal feed sector is projected to increase. The water-treatment market is also expected to increase, with more growth anticipated in Asian areas such as China, India, and Pakistan.

Application breakthroughs are expected to give rise to new end uses and result in increases in demand for crude iodine. Replacement of chlorofluorocarbons (CFCs) with fluoriodocarbons offers an opportunity for iodine as a potential substitute for chlorine in CFCs. With bromine-based herbicides increasingly coming under environmental pressure, opportunities exist for increased use of iodine in herbicides.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves³	Reserve base³
	<u>2007</u>	<u>2008^e</u>		
United States	W	W	250,000	550,000
Azerbaijan	300	300	170,000	340,000
Chile	15,500	16,000	9,000,000	18,000,000
China	570	580	4,000	120,000
Indonesia	75	75	100,000	200,000
Japan	8,700	8,800	4,900,000	7,000,000
Russia	300	300	120,000	240,000
Turkmenistan	270	500	170,000	350,000
Uzbekistan	<u>2</u>	<u>2</u>	NA	NA
World total (rounded)	⁴ 25,700	⁴ 27,000	15,000,000	27,000,000

World Resources: In addition to the reserve base shown above, seawater contains 0.05 parts per million iodine, or approximately 34 million tons. 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, nitrate, and oil, the seaweed industry represented a major source of iodine prior to 1959 and remains a large resource.

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

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

¹Export data for the years 2004-2006 revised by the U.S. Census Bureau.

²Defined as imports – exports + adjustments for Government and industry stock changes.

³See Appendix C for definitions.

⁴Excludes U.S. production.