

ARSENIC

(Data in metric tons, unless otherwise noted)

Domestic Production and Use: All arsenic metal and compounds consumed in the United States were imported, principally from China. More than 95% of the arsenic consumed was in compound form, principally as arsenic trioxide. Three principal manufacturers of wood preservatives consumed most of the arsenic trioxide for the production of arsenic acid for formulation of chromated copper arsenate (CCA) wood preservatives. Arsenic acid was also consumed by one manufacturer of arsenical herbicides. Metallic arsenic was consumed in the manufacture of nonferrous alloys, principally in lead alloys used in lead-acid batteries. About 15 tons of high-purity arsenic was consumed in the manufacture of semiconductor materials. About 90% of all arsenic was consumed in the production of wood preservatives; the balance was consumed in glass manufacturing, agricultural chemicals, nonferrous alloys, and miscellaneous uses. The value of arsenic metal and compounds consumed was estimated at \$20 million.

Salient Statistics—United States:	1992	1993	1994	1995	1996^e
Imports for consumption:					
Metal	740	767	1,330	557	250
Trioxide ¹	30,700	27,500	26,800	29,000	29,000
Arsenic acid	40	—	5	(2)	1
Exports, metal	94	364	79	430	20
Consumption, apparent, arsenic content	23,900	21,300	21,500	22,300	22,000
Price, cents per pound, average: ³					
Trioxide, Mexican	29	33	32	33	33
Metal, Chinese	56	44	40	66	53
Net import reliance ⁴ as a percent of apparent consumption	100	100	100	100	100

Recycling: Process water and contaminated runoff collected at wood treatment plants are reused in pressure treatment. Gallium arsenide scrap from the manufacture of semiconductor devices is reprocessed for gallium and arsenic recovery. Domestically, no arsenic is recovered from arsenical residues and dusts at nonferrous smelters, although some of these materials are processed for recovery of other metals.

Import Sources (1992-95): China, 50%; Chile, 16%; Mexico, 12%; and other, 22%.

Tariff: Item	Number	Most favored nation (MFN) 12/31/96	Non-MFN⁵ 12/31/96
Metal	2804.80.0000	Free	13.2¢/kg.
Trioxide	2811.29.1000	Free	Free.
Sulfide	2813.90.1000	Free	Free.
Acid ⁶	2811.19.1000	2.3% ad val.	4.9% ad val.

Depletion Allowance: 14% (Domestic), 14% (Foreign).

Government Stockpile: None.

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Events, Trends, and Issues: Domestic demand for arsenic in the wood preservative industry was relatively unchanged in 1996, despite projected growth in the domestic housing industry. Demand in 1995 had been boosted by in-process construction and restocking by distributors of pressure-treated lumber following the 1994 surge in housing construction. The apparent demand for arsenic metal for nonferrous alloys, especially battery-lead alloys, remained low for the second consecutive year. Consumers, fearing disruptions from Chinese suppliers, may have overbought in 1994, reducing their need for additional material in the subsequent 2 years. Also, continued growth in market share for maintenance-free automotive batteries, which require little or no arsenic, may be further lowering demand for arsenic metal.

Because of the toxicity of arsenic and its compounds, numerous environmental and workplace regulations proposed or amended during 1996 specify limitations for arsenic releases or exposure levels. In May, the Environmental Protection Agency issued revised rules for reportable quantities, under the Community Right-to-Know Act of 1986, for its list of extremely hazardous substances, which includes numerous arsenic compounds. The reportable quantity for arsenic compounds remained at 1 pound. In July, the Occupational Safety and Health Administration, as part of a review process to modify out-of-date regulations, proposed revision of medical surveillance requirements for certain workers exposed to inorganic arsenic, including elimination of the semiannual sputum cytology examinations and reduction, from semiannual to annual, of the frequency of required chest x-rays

World Production, Reserves, and Reserve Base:

	Production (Arsenic trioxide)		Reserves and reserve base ⁷ (Arsenic content)
	1995	1996 ^e	
United States	—	—	
Belgium	2,000	2,000	
Chile	6,400	6,500	
China	13,000	13,000	
France	5,000	4,000	
Kazakstan	1,500	1,500	
Mexico	4,500	4,500	
Namibia	2,300	2,300	
Philippines	2,000	2,000	
Russia	1,500	1,500	
Other countries	<u>2,600</u>	<u>3,000</u>	
World total	41,000	41,000	World reserves and reserve base are thought to be about 20 and 30 times, respectively, annual world production.

World Resources: World resources of copper and lead contain about 11 million tons of arsenic. Substantial resources of arsenic occur in copper ores in northern Peru and the Philippines and in copper-gold ores in Chile. In addition, world gold resources, particularly in Canada, contain substantial resources of arsenic.

Substitutes: Substitutes for arsenic compounds exist in most of its major uses, although arsenic compounds may be preferred because of lower cost and superior performance. The wood preservatives pentachlorophenol and creosote may be substituted for CCA when odor and paintability are not problems and where permitted by local regulations. A recently developed alternative, ammoniacal copper quaternary, which avoids using chrome and arsenic, has yet to gain widespread usage. Nonwood alternatives, such as concrete, steel, or plastic lumber, may be substituted in some applications for treated wood. A South American hardwood, ipe, which requires no chemical treatment, has been used in some localities in oceanfront boardwalks.

^eEstimated.

¹Arsenic trioxide (As₂O₃) contains 75.7% arsenic by weight.

²Less than ½ unit.

³Calculated from Bureau of the Census import data.

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

⁵See Appendix B.

⁶Tariff is free for Canada, Israel, Caribbean Basin countries, and designated Beneficiary Andean and developing countries.

⁷See Appendix C for definitions. The reserve base for the United States was estimated at 80,000 tons.