

ARSENIC

(Data in metric tons of arsenic unless otherwise noted)

Domestic Production and Use: Foreign sources have supplied arsenic trioxide and arsenic metal to arsenic-using industries in the United States since 1985, when the last domestic arsenic plant, a copper smelter, closed. During 2001-03, imports of arsenic compounds averaged over 20,000 tons and were used mainly in the production of chromated copper arsenate (CCA) wood preservatives. Arsenic compounds were also used in fertilizers, fireworks, herbicides, and insecticides. Arsenic metal was used as an antifriction additive for bearings, in lead shot, in clip-on wheel weights, and to strengthen the lead grids in lead-acid storage batteries. Addition of less than a percent of arsenic hardens small-arms ammunition used by the United States military. High-purity arsenic (99.9999%) was used by the electronics industry for gallium-arsenide semiconductors that are used for telecommunication, solar cells, and space research. Arsenic may be used for germanium-arsenide-selenide specialty optical materials. Indium-gallium-arsenide is used for short wave infrared technology. The value of arsenic compounds and metal consumed domestically in 2006 was estimated to be about \$7 million.

Salient Statistics—United States:	2002	2003	2004	2005	2006^e
Imports for consumption:					
Metal	880	990	870	810	850
Compounds	18,800	20,800	6,150	8,330	8,500
Exports, metal	100	173	220	320	400
Estimated consumption ¹	19,600	21,600	6,800	8,800	9,000
Value, cents per pound, average: ²					
Metal (China)	120	87	88	95	95
Trioxide (China)	44	45	49	18	35
Trioxide (Mexico)	33	34	32	67	NA
Net import reliance ³ as a percentage of estimated consumption	100	100	100	100	100

Recycling: Arsenic is one of several hazardous elements contained in electronic products. Circuit boards, relays, switches, and other electronic components that contain arsenic may be disposed of at hazardous waste sites. In celebration of "Earth Day" some organizations post drop-off sites for recycling or "e-cycling" of electronics which may contain arsenic. At wood treatment plants where CCA is used, arsenic in the process water was recycled and reused. Gallium-arsenide scrap from semiconductor manufacturing was processed for recovery of the arsenic. There was no recovery or recycling of arsenic from arsenic-containing residues and dusts at nonferrous smelters in the United States.

Import Sources (2002-05): Metal: China, 85%; Japan, 14%; and other, 1%. Trioxide: China, 65%; Morocco, 22%; Mexico, 4%; Chile, 3%; and other, 6%.

Tariff: Item	Number	Normal Trade Relations 12-31-06
Metal	2804.80.0000	Free.
Trioxide	2811.29.1000	Free.
Sulfide	2813.90.1000	Free.
Acid	2811.19.1000	2.3% ad val.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

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Events, Trends, and Issues: By yearend 2004, arsenic trioxide imports, mainly from China, had dropped to 6,150 tons for the year compared with 20,800 tons by yearend 2003. This 70% decline was because of a voluntary decision by the wood-preserving industry to stop using CCA as a wood preservative for deck materials and outdoor residential use by yearend 2003. Imports have increased since 2004, rising slightly from 2005 to 2006, but are still below 10,000 tons per year. Wood used for nonresidential applications may still be treated with CCA, which is preferred because of known performance and lower cost. The long-term demand for arsenic, mainly as arsenic trioxide, will be affected by human health concerns, increased regulation, use of alternative wood preservative treatments, and use of concrete or plasticized wood products. Global government and university research is expected to continue on the geologic sources and effects of high levels of arsenic in ground water. Arsenic may also be released from anthropogenic sources, such as buried World War I ammunition, Civil War-era cemeteries, and coal-burning powerplant emissions. In the aftermath of Hurricane Katrina, arsenic was one of several contaminants deposited in sludge across New Orleans. Exposure to arsenic may affect breathing and heart rhythm and may increase the risk for bladder cancer. Research indicates that arsenic trioxide may be used to treat leukemia.

World Production, Reserves, and Reserve Base:

	Production (arsenic trioxide)		Reserves and reserve base⁴ (arsenic content)
	2005	2006^e	
Belgium	1,000	1,000	World reserves and reserve base are thought to be about 20 and 30 times, respectively, annual world production. The reserve base for the United States is estimated to be 80,000 tons.
Chile	11,500	11,500	
China	30,000	30,000	
France	1,000	1,000	
Kazakhstan	1,500	1,500	
Mexico	1,650	1,300	
Morocco	6,900	6,900	
Peru	3,600	3,500	
Russia	1,500	1,500	
Other countries	790	1,000	
World total (rounded)	59,400	59,200	

World Resources: Arsenic may be obtained from a variety of sources. These include copper, gold, and lead smelter dust or from roasting arsenopyrite, perhaps the most abundant ore mineral of arsenic, or from realgar and orpiment. Arsenic resources are also contained in enargite, a copper ore, and associated alteration products; realgar and orpiment, in China, northern Peru, and the Philippines; copper-gold ores in Chile; and associated with gold occurrences in Canada. Orpiment and realgar from remote gold mines in Sichuan Province, China, are stockpiled for transport and later recovery of arsenic. Global resources of copper and lead contain approximately 11 million tons of arsenic.

Substitutes: Alkaline copper quaternary, ammoniacal copper quaternary, ammoniacal copper zinc arsenate, copper azole, and copper citrate may be substituted for CCA. In humid areas, silver-containing biocides are being considered as an alternative wood preservative. Concrete, steel, plasticized wood scrap, or plastic composites may also be substituted for CCA-treated wood.

^eEstimated. NA Not available.

¹Estimated to be the same as net imports.

²Calculated from U.S. Census Bureau import data.

³Defined as imports – exports + adjustments for Government and industry stock changes.

⁴[See Appendix C for definitions.](#)