# ARSENIC

(Data in metric tons, unless 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 80% 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 $24 million.

| **Salient Statistics—United States:** | **1991** | **1992** | **1993** | **1994** | **1995[e]** |
|---|---|---|---|---|---|
| Imports for consumption: | | | | | |
| Metal | 1,010 | 740 | 767 | 1,330 | 800 |
| Trioxide[1] | 27,100 | 30,700 | 27,500 | 27,500 | 31,000 |
| Compounds[2] | 374 | 40 | — | 5 | 350 |
| Exports, metal | 233 | 94 | 364 | 79 | 100 |
| Consumption, apparent, arsenic content | 21,600 | 23,900 | 21,300 | 21,500 | 24,000 |
| Price, cents per pound, average:[3] | | | | | |
| Trioxide, Mexican | 25 | 29 | 33 | 32 | 33 |
| Metal, Chinese | 68 | 56 | 44 | 40 | 72 |
| Net import reliance[4] as a percent of apparent consumption | 100 | 100 | 100 | 100 | 100 |

**Recycling**: Process water and contaminated run-off 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, though some of these materials are processed for recovery of other metals.

**Import Sources (1991-94):** China, 44%; Chile, 19%; Mexico, 12%; and other, 25%.

| **Tariff: Item** | **Number** | **Most favored nation (MFN) 12/31/95** | **Non-MFN[5] 12/31/95** |
|---|---|---|---|
| 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% | 4.9%. |

**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 increased for the second consecutive year. In 1994 the growth corresponded to strong growth in housing industry indicators— both housing starts and building permits issued rose by about 13%, and new home sales rose by about 6%. While these indicators are expected to decline in 1995 from the previous year's levels, consumption for in-process construction, as well as restocking by distributors of pressure treated lumber, accounted for continued growth in 1995.

In August, the Environmental Protection Agency (EPA) proposed treatment standards for the land disposal of wastes from wood preserving operations. Wastes from the wood preserving industry had been listed as hazardous in 1990. In the proposed standards, EPA recommended the application of Universal Treatment Standards to these wastes. At the same time EPA was proposing these standards, it invited comments on wood preserving industry concerns that wastewaters, including drippage reclamation, were part of the production process, and therefore should receive a variance from proposed regulation.

Tightness in the arsenic metal market, caused by supply disruptions reported in China, resulted in the average December 1994 customs price for arsenic metal surging to 92 cents per pound. During the first half of 1995, the tightness eased and prices declined—the customs price averaged 72 cents per pound during the first 6 months of 1995.

**World Production, Reserves, and Reserve Base:**

| | Production (Arsenic trioxide) | | Reserves and reserve base[7] (Arsenic content) |
|---|---|---|---|
| | 1994 | 1995[e] | |
| United States | — | — | |
| Belgium | 2,000 | 2,000 | |
| Chile | 6,300 | 6,300 | World reserves and reserve base are believed to be about 20 and 30 times, respectively, annual world production. |
| China | 13,000 | 13,000 | |
| France | 6,000 | 6,000 | |
| Ghana[8] | 500 | 500 | |
| Kazakstan | 1,500 | 1,500 | |
| Mexico | 4,400 | 4,400 | |
| Namibia | 2,300 | 2,300 | |
| Philippines | 2,000 | 2,000 | |
| Russia | 1,500 | 1,500 | |
| Other countries | 3,500 | 3,500 | |
| World total | 43,000 | 43,000 | |

**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, though 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 use of chrome and arsenic, has yet to gain widespread usage. Nonwood alternatives, such as concrete, steel, and vinyl 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.

[e]Estimated.

[1]Arsenic trioxide ($As_2O_3$) contains 75.7% arsenic by weight.

[2]Almost entirely arsenic acid.

[3]Calculated from Bureau of the Census import data.

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

[5]See Appendix B.

[6]Tariff is free for Israel, Caribbean Basin Countries, and designated Beneficiary Developing Countries. For Canada, the tariff is 1.8¢/kg.

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

[8]Byproduct of gold ore roasting. Excludes production of noncommercial grade material estimated at 9,000 tons per year.