

GERMANIUM

(Data in kilograms of germanium content, unless otherwise noted)

Domestic Production and Use: The value of domestic refinery production of germanium, based upon the 2001 producer price, was \$22 million. Industry-generated scrap, imported concentrates, and processed residues from certain domestic base metal ores were the feed materials for the production of refined germanium in 2001. The domestic industry is based on two zinc mining operations, one in Tennessee and the other in Alaska. The mining companies at these operations supplied domestic and export markets with germanium-bearing materials generated from the processing of zinc ores. The germanium refineries in New York and Oklahoma remained in operation, but the one in Pennsylvania was sold to a new company, and its equipment was moved and set up in New York. The refinery in Oklahoma expanded, and a new secondary facility was built in North Carolina. The major end uses for germanium, worldwide, were estimated to be nearly the same as for 2000—fiber-optic systems, 50%; polymerization catalysts, 20%; infrared optics, 15%; electronics/solar electrical applications, 10%; and other (phosphors, metallurgy, and chemotherapy), 5%.

Salient Statistics—United States:	1997	1998	1999	2000	2001^e
Production, refinery ^e	20,000	22,000	20,000	23,000	20,000
Total imports ¹	23,700	14,600	12,400	8,210	10,000
Exports	NA	NA	NA	NA	NA
Consumption ^e	28,000	28,000	28,000	30,000	29,000
Price, producer, yearend, dollars per kilogram:					
Zone refined	1,475	1,700	1,400	1,250	1,100
Dioxide, electronic grade	950	1,100	900	800	700
Stocks, producer, yearend	NA	NA	NA	NA	NA
Employment, plant, ² number ^e	115	100	85	90	90
Net import reliance ³ as a percentage of apparent consumption	NA	NA	NA	NA	NA

Recycling: More than half of the germanium metal used during the manufacture of most electronic and optical devices is routinely recycled as new scrap. As a result of the low unit use of germanium in various devices, little germanium returns as old scrap. Worldwide, about 25% of the total germanium consumed is produced from recycled materials.

Import Sources (1997-2000):⁴ Belgium, 30%; China, 26%; Russia, 20%; Taiwan, 9%; and other, 15%.

Tariff: Item	Number	Normal Trade Relations 12/31/01
Germanium oxides	2825.60.0000	3.7% ad val.
Waste and scrap	8112.30.3000	Free.
Metal, unwrought	8112.30.6000	2.6% ad val.
Metal, wrought	8112.30.9000	4.4% ad val.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile:

Material	Stockpile Status—9-30-01⁵				
	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2001	Disposals FY 2001
Germanium	42,523	827	42,523	8,000	5,928

GERMANIUM

Events, Trends, and Issues: Domestic refinery production of germanium decreased in 2001; that of the rest of the world remained the same as last year. The recycling of new scrap continued to grow and remains a significant supply factor. The only releases from national Government stockpiles were those from the United States. Optical fiber manufacturing increased early in the year, but later demand fell owing to the downturn in the general economy and telecommunications in particular. Polyethylene terephthalate (PET) plastics demand weakened owing to economic conditions in Asia. The automobile night vision system that became popular in 2000 was extended to the bus/truck equipment aftermarket. New uses as catalysts, increases in demand for infrared applications in security, and the potential replacement of gallium arsenide devices by silicon-germanium in wireless telecommunications all portend a bright long-range future for germanium.

Germanium has little or no effect upon the environment because it usually occurs only as a trace element in ores and carbonaceous materials and is used in very small quantities in commercial applications.

World Refinery Production, Reserves, and Reserve Base:

	Refinery production ⁶		Reserves ⁶	Reserve base ⁶
	2000	2001		
United States	23,000	20,000	450,000	500,000
Other countries	48,000	48,000	NA	NA
World total	71,000	68,000	NA	NA

World Resources: The available resources of germanium are associated with certain zinc and lead-zinc-copper sulfide ores. Significant amounts of germanium are contained in ash and flue dust generated in the combustion of certain coals for power generation.

Substitutes: Less expensive silicon can be substituted for germanium in certain electronic applications. Some bimetallic compounds of gallium, indium, selenium, and tellurium can also be substituted for germanium. Germanium is more reliable than competing materials in some high-frequency and high-power electronics applications and is more economical as a substrate for some light-emitting diode applications. In infrared guidance systems, zinc selenide and germanium glass substitute for germanium metal but at the expense of performance.

⁶Estimated. NA Not available.

¹Gross weight of wrought and unwrought germanium and waste and scrap. Does not include imports of germanium dioxide and other germanium compounds for which data are not available.

²Employment related to primary germanium refining is indirectly related to zinc refining.

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

⁴Total imports from republics of the former Soviet Union (Estonia, Russia, and Ukraine) accounted for 26% of the imports from 1997 to 2000.

⁵See Appendix B for definitions.

⁶See Appendix C for definitions.