THALLIUM

(Data in kilograms unless otherwise noted)

Domestic Production and Use: The value of consumption of thallium metal and thallium compounds was estimated to be about $300,000. The primary end uses included the following: radioactive thallium-201 used for medical purposes in cardiovascular imaging; thallium as an activator (sodium iodide crystal doped with thallium) in gamma radiation detection equipment (scintillometer); thallium-barium-calcium-copper-oxide high-temperature superconductor used in filters for wireless communications; thallium in lenses, prisms, and windows for infrared detection and transmission equipment; thallium-arsenic-selenium crystal filters for light diffraction in acousto-optical measuring devices; and thallium in mercury alloys for low-temperature measurements. Other uses include: as an additive in glass to increase its refractive index and density, a catalyst for organic compound synthesis, and a component in high-density liquids for gravity separation of minerals.

Salient Statistics—United States:	2015	2016	2017	2018	2019[e]
Production, refinery	—	—	—	—	—
Imports for consumption:					
Unwrought metal and metal powders	—	—	—	—	—
Waste and scrap	—	—	—	23	30
Other articles	334	193	—	41	40
Exports:					
Unwrought metal and powders	104	56	34	100	230
Waste and scrap	1,450	286	364	853	110
Other articles	1,070	973	1,560	[1]31,400	[1]79,000
Consumption, estimated[2]	334	193	—	64	70
Price, metal, dollars per kilogram[e, 3]	7,400	7,400	NA	NA	7,600
Net import reliance[4] as a percentage of estimated consumption	NA	NA	NA	NA	NA

Recycling: None.

Import Sources (2015–18): Russia, 53%; Germany, 33%; China, 8%; and the United Kingdom, 6%.

Tariff: Item	Number	Normal Trade Relations 12–31–19
Unwrought and powders	8112.51.0000	4.0% ad val.
Waste and scrap	8112.52.0000	Free.
Other	8112.59.0000	4.0% ad val.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

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THALLIUM

Events, Trends, and Issues: In 2019, imports of thallium waste and scrap increased by 30% and imports of other thallium articles were essentially unchanged compared with 2018. Most imports of other thallium articles from 2015 to 2018 came into the Cleveland, OH, customs district. In 2019, imports came into the Dallas-Fort Worth, TX, customs district. Exports of unwrought thallium and powders more than doubled in 2019 compared with 2018. All exports of unwrought thallium and powders left the New Orleans, LA, customs district and 58% went to Taiwan and 42% went to Germany. All exports of thallium waste and scrap went to Mexico in 2019. In 2018 and 2019, there was a significant increase in the export quantity of other thallium articles (Schedule B number 8112.59.0000) as reported by the U.S. Census Bureau. In 2018, most of the exports of other thallium articles left from the Charleston, SC, customs district and were shipped to Colombia. In 2019, most of the exports of other thallium articles left from the customs districts of New York, NY, and Norfolk, VA. The exports from both ports were shipped to Egypt and the average unit value was extremely low. It is possible items may have been misclassified.

Demand for thallium for use in cardiovascular-imaging applications has declined owing to superior performance and availability of alternatives, such as the medical isotope technetium-99. A global shortage of technetium-99 from 2009 to 2011 had contributed to an increase in thallium consumption during that time period. Since 2011, consumption of thallium has declined significantly. Small quantities of thallium are used for research.

The leading global uses for thallium were photoelectric cells, infrared optical materials, and low melting glasses. Many producers of these products were in China, Japan, and the Republic of Korea.

Thallium metal and its compounds are highly toxic materials and are strictly controlled to prevent harm to humans and the environment. Thallium and its compounds can be absorbed into the human body by skin contact, ingestion, or inhalation of dust or fumes. Under its national primary drinking water regulations for public water supplies, the U.S. Environmental Protection Agency has set an enforceable Maximum Contaminant Level of 2 parts per billion thallium in drinking water.

World Refinery Production and Reserves:[5] Thallium is produced commercially in only a few countries as a byproduct in the roasting of copper, lead, and zinc ores and is recovered from flue dust. Because most producers withhold thallium production data, global production data are limited. In 2019, global production of thallium was estimated to be less than 8,000 kilograms. China, Kazakhstan, and Russia were thought to be leading producers of primary thallium. Since 2005, substantial thallium-rich deposits have been identified in Brazil, China, North Macedonia, and Russia.

World Resources: Although thallium is reasonably abundant in the Earth's crust, estimated at about 0.7 part per million, it exists mostly in association with potassium minerals in clays, granites, and soils, and it is not generally considered to be commercially recoverable from those materials. The major source of recoverable thallium is the trace amounts found in copper, lead, zinc, and other sulfide ores. Quantitative estimates of reserves are not available, owing to the difficulty in identifying deposits where thallium can be extracted economically. Previous estimates of reserves were based on the thallium content of zinc ores. World resources of thallium contained in zinc resources could be as much as 17 million kilograms; most are in Canada, Europe, and the United States. Global resources of coal contain an estimated 630 million kilograms of thallium.

Substitutes: Although other materials and formulations can substitute for thallium in gamma radiation detection equipment and optics used for infrared detection and transmission, thallium materials are presently superior and more cost effective for these very specialized uses. The medical isotope technetium-99 can be used in cardiovascular-imaging applications instead of thallium.

Nonpoisonous substitutes, such as tungsten compounds, are being marketed as substitutes for thallium in high-density liquids for gravity separation of minerals.

[e]Estimated. NA Not available. — Zero.

[1]Includes material that may have been misclassified.

[2]Estimated to be equal to imports.

[3]Estimated price of 99.99%-pure granules in 100 gram lots.

[4]Defined as imports – exports. Consumption and exports of unwrought thallium were from imported material or from a drawdown in unreported inventories.

[5]See Appendix C for resource and reserve definitions and information concerning data sources.