SCANDIUM[1]

(Data in metric tons, scandium oxide equivalent, unless otherwise specified)

Domestic Production and Use: Domestically, scandium was neither mined nor recovered from process streams or mine tailings in 2023. Scandium was last produced domestically in 1969 primarily from the scandium-yttrium silicate mineral thortveitite and from byproduct leach solutions from uranium operations. Limited capacity to produce ingot and distilled scandium metal existed at facilities in Ames, IA; Tolleson, AZ; and Urbana, IL. The principal uses for scandium in 2023 were in aluminum-scandium alloys and solid oxide fuel cells (SOFCs). Other uses for scandium included ceramics, electronics, lasers, lighting, and radioactive isotopes.

Salient Statistics—United States:	2019	2020	2021	2022	2023[e]
Price, yearend:					
Compounds, dollars per gram:					
Acetate, 99.9% purity, 5-gram lot size[2]	45	45	43	46	70
Chloride, 99.9% purity, 5-gram lot size[2]	129	133	137	140	166
Fluoride, 99.9% purity (99.99% purity in 2022), 1- to 5-gram lot size[3]	209	214	216	250	1,080
Iodide, 99.999% purity, 5-gram lot size[2]	157	161	161	170	200
Oxide, 99.99% purity, 5-kilogram lot size[4]	3.9	3.8	2.2	2.1	NA
Metal:					
Scandium, dollars per gram:[2]					
Distilled dendritic, 2-gram lot size	233	233	238	260	269
Ingot, 5-gram lot size	134	134	137	150	153
Scandium-aluminum alloy, dollars per kilogram:[4]					
1-kilogram lot size	300	340	350	350	NA
1,000-kilogram lot size	NA	NA	NA	98	NA
Net import reliance[5] as a percentage of apparent consumption	100	100	100	100	100

Recycling: None.

Import Sources (2019–22): Although there are no trade codes for scandium materials exclusively, shipping records indicated imported material was mostly from Japan, China, Germany, and Philippines.

Tariff: Item	Number	Normal Trade Relations 12–31–23
Rare-earth metals:		
Unspecified, not alloys	2805.30.0050	5% ad valorem.
Unspecified, alloyed	2805.30.0090	5% ad valorem.
Compounds of rare-earth metals:		
Mixtures of oxides of yttrium or scandium as the predominant metal	2846.90.2015	Free.
Mixtures of chlorides of yttrium or scandium as the predominant metal	2846.90.2082	Free.
Mixtures of other rare-earth carbonates, including scandium	2846.90.8075	3.7% ad valorem.
Mixtures of other rare-earth compounds, including scandium	2846.90.8090	3.7% ad valorem.

Depletion Allowance: 14% (domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: The global supply and consumption of scandium oxide was estimated to be about 30 to 40 tons per year with a global capacity estimate of 80 tons per year. Scandium was recovered from cobalt, nickel, titanium, and zirconium process streams. China was the leading producer. Prices quoted for scandium oxide in the United States generally decreased over a 5-year period. Global consumption has increased considerably driven by its use in aluminum-scandium alloys and SOFCs.

In 2023, a metallurgical complex in southwestern Quebec extracted scandium from waste streams and was planning to increase capacity from the current 3 tons per year to 12 tons per year; the increase in capacity was expected to be completed by yearend 2024. An Australia-United Kingdom mining company entered into a binding agreement to purchase the Platina Scandium Project in New South Wales in first half of 2023; the project was expected to produce up to 40 tons per year of scandium oxide once operational.

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SCANDIUM

In Europe, a company started the ScaVanger project in France to produce scandium. Currently there is no production of scandium in the European Union and is 100% dependent on imports. The major European Union import sources for scandium are China (from the titanium dioxide industry and rare-earth-element production); the Philippines; Kazakhstan; and Ukraine (from nickel-laterite tailings and uranium production waste). Beginning in 2026, the ScaVanger project is projected to produce 21 tons per year of scandium oxide from titanium dioxide coproduction.

In the United States, there is no current mine production of scandium but, based on the 2022 Elk Creek Technical Report estimates, a scandium oxide resource of 11,000 tons is present in Nebraska. The company had successful pilot-scale production of 1 kilogram of aluminum-scandium ingot at its testing facility.

In Australia, several polymetallic projects were under development and seeking permitting, financing, and offtake agreements including the Nyngan, Owendale, Sconi, and Sunrise projects.

In the Philippines, the Taganito high-pressure acid-leach nickel commercial plant recovered 7 to 8 tons per year of scandium oxide.

In Tangshan, Hebei Province, China, a new production plant was being built and expected to produce 20 tons per year of high-purity scandium oxide from feedstock from Papua New Guinea. The pilot plant production started November 2023.

The global scandium market is small compared to most commodities, and according to industry estimates, global production totaled less than 40 tons in 2022. Global consumption has increased considerably driven by its use in SOFCs and aluminum alloys.

World Mine Production and Reserves:[6] No scandium was recovered from mining operations in the United States. As a result of its low concentration, scandium is produced exclusively as a byproduct during processing of various ores or recovered from previously processed tailings or residues. Historically, scandium was produced as byproduct material in China (iron ore, rare earths, titanium, and zirconium), Kazakhstan (uranium), the Philippines (nickel), Russia (apatite and uranium), and Ukraine (uranium). Foreign mine production data for 2022 and 2023 were not available.

World Resources:[6] Resources of scandium were abundant. Scandium's crustal abundance is greater than that of lead. Scandium lacks affinity for the common ore-forming anions; therefore, it is widely dispersed in the lithosphere and forms solid solutions with low concentrations in more than 100 minerals. Scandium resources have been identified in Australia, Canada, China, Finland, Guinea, Kazakhstan, Madagascar, Norway, the Philippines, Russia, South Africa, Ukraine, and the United States. Australia's reserves were about 37,000 tons of scandium as accessible Economic Demonstrated Resources (EDR) as of December 2022.[7]

Substitutes: Titanium and aluminum high-strength alloys as well as carbon-fiber materials may substitute in high-performance scandium-alloy applications. Under certain conditions, light-emitting diodes may displace mercury-vapor high-intensity lamps that contain scandium iodide. In some applications that rely on scandium's unique properties, substitution is not possible.

[e]Estimated. NA Not available.

[1]See also the Rare Earths chapter. Scandium is one of the 17 rare-earth elements.

[2]Source: Alfa Aesar, a part of Thermo Fisher Scientific Inc.

[3]Source: Sigma-Aldrich, a part of MilliporeSigma.

[4]Source: Stanford Materials Corp.

[5]Defined as imports – exports. Quantitative data were not available.

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

[7]For Australia, Joint Ore Reserves Committee-compliant or equivalent reserves were 12,000 tons.