

FLUORSPAR

(Data in thousand metric tons unless otherwise specified)

Domestic Production and Use: In 2024, minimal fluor spar (calcium fluoride, CaF₂) was produced in the United States. One company sold fluor spar from stockpiles produced as a byproduct of its limestone quarrying operation in Cave-In-Rock, IL. In February, a second company started the construction process for a fluor spar mine in Utah, including installation of a ramp that reached its targeted drilling depth in August. The mined fluor spar was expected to supply the company's lumps-processing plant that was under construction in Delta, UT. Completion of the processing plant was anticipated by yearend. U.S. fluor spar consumption was satisfied by imports. Domestically, CaF₂ was used in the production of anhydrous hydrogen fluoride (HF) in Louisiana and Texas and was by far the leading use for acid-grade fluor spar. Aqueous HF is the primary feedstock for the manufacture of virtually all fluorine-bearing chemicals, particularly refrigerants and fluoropolymers, and is a key ingredient in the processing of aluminum and uranium. Other uses of fluor spar were in cement production, in enamels, as a flux in steelmaking, in glass manufacture, in iron and steel casting, and in welding rod coatings.

The U.S. Department of Energy continued to produce aqueous HF as a byproduct of the conversion of depleted uranium hexafluoride to depleted uranium oxide at plants in Paducah, KY, and Portsmouth, OH; the aqueous HF was sold into the commercial market. An estimated 40,000 tons of fluorosilicic acid (FSA), equivalent to about 65,000 tons of fluor spar grading 100% CaF₂, was recovered from three phosphoric acid plants that processed phosphate rock. A company in Aurora, NC, started production of anhydrous HF from FSA in 2024.

Salient Statistics—United States:	2020	2021	2022	2023	2024^e
Production:					
Finished, metallurgical grade	NA	NA	NA	NA	NA
Fluorosilicic acid from phosphate rock	22	40	43	43	40
Imports for consumption:					
Acid grade	427	391	448	381	400
Metallurgical grade	<u>65</u>	<u>59</u>	<u>84</u>	<u>31</u>	<u>40</u>
Total fluor spar imports	492	451	532	412	440
Hydrofluoric acid	103	103	99	87	75
Aluminum fluoride	21	28	21	25	24
Cryolite	26	42	28	32	24
Exports, fluor spar, all grades ¹	9	15	24	20	15
Consumption, apparent ²	483	436	508	392	430
Price, average unit value of imports, cost, insurance, and freight, dollars per metric ton:					
Acid grade	309	322	387	429	470
Metallurgical grade	149	151	206	296	400
Employment, mine, number ^e	16	17	15	16	15
Net import reliance ² as a percentage of apparent consumption	100	100	100	100	100

Recycling: Synthetic fluor spar may be produced from neutralization of waste in the enrichment of uranium, petroleum alkylation, and stainless-steel pickling; however, undesirable impurities constrain use. Primary aluminum producers recycle HF and fluorides from smelting operations.

Import Sources (2020–23):³ Mexico, 62%; Vietnam, 14%; South Africa, 9%; China,⁴ 8%; and other, 7%.

Tariff:	Item	Number	Normal Trade Relations 12–31–24
	Metallurgical grade (97% or less CaF ₂)	2529.21.0000	Free.
	Acid grade (more than 97% CaF ₂)	2529.22.0000	Free.
	Natural cryolite	2530.90.1000	Free.
	Hydrogen fluoride (hydrofluoric acid)	2811.11.0000	Free.
	Aluminum fluoride	2826.12.0000	Free.
	Sodium hexafluoroaluminate (synthetic cryolite)	2826.30.0000	Free.

Depletion Allowance: 22% (domestic), 14% (foreign).

Government Stockpile: None.

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Events, Trends, and Issues: In 2024, world production of fluor spar was an estimated 9.5 million tons compared with 9.53 million tons in 2023. The supply of fluor spar in China was constrained by country-wide safety inspections and rectification of fluor spar mining issued by the Ministry of Natural Resources and conducted by the Mine Safety Administration from March through August. During this time, operations ceased while the mines were consolidated and upgraded to prevent accidents, which have become frequent in recent years. As a result, China's imports of fluor spar increased by 55% in the first half of 2024, mainly from Mongolia. This increase may also be attributed to the elimination of the 3% import tax on low-arsenic fluor spar by China's Ministry of Finance, which was used to produce HF and other downstream products used in lithium-ion batteries, such as binders, electrolyte salts, and separator coatings.

In February, the new owners of a fluor spar mine in Canada announced plans to restart operations in 2025 after the mine was idled in 2022. Several other fluor spar mines were in development or in the process of reopening in Australia, Germany, Kenya, and the United States.

To meet the goals of the American Innovation and Manufacturing Act (AIM Act) of 2020 and the planned phase down of hydrofluorocarbons (HFCs), the allowance quotas for HFC production and consumption were reduced to 40% below the historic baseline effective January 1, 2024. This limited the volume of legacy HFC refrigerants that could be imported or produced. In May, a U.S. chemical company decided to cease sales of certain HFCs used in commercial refrigeration equipment. For those not found in compliance with the regulatory requirements of the AIM Act, the U.S. Environmental Protection Agency (EPA) has outlined certain administrative consequences. As of September, the EPA has issued administrative consequences to 52 entities in accordance with the regulatory provisions, which include allowance adjustments. Under this authority, the EPA can retire, revoke, or withhold allowances and impose bans on receiving future allowances.

World Mine Production and Reserves: Reserves for China, Iran, and Vietnam were revised based on company and Government reports.

	Mine production ^e		Reserves ⁵
	2023	2024	
United States	NA	NA	NA
China	6,000	5,900	86,000
Germany	100	100	NA
Iran	121	120	7,600
Mexico	⁶ 1,160	1,200	68,000
Mongolia	1,210	1,200	34,000
Pakistan	55	52	NA
South Africa	345	380	41,000
Spain	165	160	15,000
Thailand	48	76	3,600
Vietnam	⁶ 146	110	16,000
Other countries	180	170	46,000
World total (rounded)	9,530	9,500	320,000

World Resources:^{5, 7} Large quantities of fluorine are present in phosphate rock. Current U.S. reserves of phosphate rock are estimated to be 1 billion tons, containing about 72 million tons of 100% fluor spar equivalent assuming an average fluorine content of 3.5% in the phosphate rock. World reserves of phosphate rock are estimated to be 74 billion tons, containing about 5 billion tons of 100% fluor spar equivalent.

Substitutes: FSA has been used as an alternative to fluor spar in the production of AlF₃ and HF. Because of differing physical properties, AlF₃ produced from FSA is not readily substituted for AlF₃ produced from fluor spar. Aluminum smelting dross, borax, calcium chloride, iron oxides, manganese ore, silica sand, and titanium dioxide have been used as substitutes for fluor spar fluxes.

^eEstimated. NA Not available.

¹Includes data for the following Schedule B numbers: 2529.21.0000 and 2529.22.0000.

²Defined as total fluor spar imports – exports.

³Includes data for the following Harmonized Tariff Schedule of the United States codes: 2529.21.0000 and 2529.22.0000.

⁴Includes Hong Kong.

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

⁶Reported.

⁷Measured as 100% CaF₂.