

IRON OXIDE PIGMENTS

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Iron oxide pigments (IOPs) were mined by three companies in three States in the United States. Production, which was withheld to avoid disclosing company proprietary data, increased in 2016 from that of 2015. Six companies, including the three producers of natural IOPs, processed and sold about 55,000 tons of finished natural and synthetic IOPs with an estimated value of \$78 million, significantly below the sales peak of 88,100 tons in 2007. About 36% of natural and synthetic finished IOPs were used in concrete and other construction materials, 29% in coatings and paints, 14% in foundry uses, 5% in animal food, 4% in industrial chemicals, 2% in glass and ceramics, 1% in fertilizer, and 9% in other uses.

Salient Statistics—United States:	2012	2013	2014	2015	2016^e
Mine production, crude	W	W	W	W	W
Sold or used, finished natural and synthetic IOP	48,400	47,200	45,300	53,500	55,000
Imports for consumption	151,000	165,000	175,000	176,000	175,000
Exports, pigment grade	8,950	8,170	8,790	8,930	12,000
Consumption, apparent ¹	190,000	204,000	212,000	221,000	218,000
Price, average value, dollars per kilogram ²	1.61	1.60	1.58	1.46	1.46
Employment, mine and mill	55	50	40	40	50
Net import reliance ³ as a percentage of apparent consumption	>50	>50	>70	>70	>70

Recycling: None.

Import Sources (2012–15): Natural: Cyprus, 63%; France, 16%; Austria, 11%; Spain 6%; and other, 4%. Synthetic: China, 52%; Germany, 26%; Canada, 7%; Brazil, 7%; and other, 8%.

Tariff: Item	Number	Normal Trade Relations 12–31–16
Natural:		
Micaceous iron oxides	2530.90.2000	2.9% ad val.
Earth colors	2530.90.8015	Free.
Iron oxides and hydroxides containing 70% or more by weight Fe ₂ O ₃ :		
Synthetic:		
Black	2821.10.0010	3.7% ad val.
Red	2821.10.0020	3.7% ad val.
Yellow	2821.10.0030	3.7% ad val.
Other	2821.10.0040	3.7% ad val.
Earth colors	2821.20.0000	5.5% ad val.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: In 2016, domestic production of crude natural IOPs increased significantly and production and sales of finished natural and synthetic IOPs rose by 3%. In Europe, consumption of IOPs likely declined, mostly owing to continued sluggishness in the region's construction industry. In Asia, growth continued and consumption of IOPs increased. In the United States, residential construction, in which IOPs are commonly used to color concrete block and brick, ready-mixed concrete, and roofing tiles, increased in the first half of 2016. Housing starts and completions rose by about 13% and 14%, respectively, compared with those of the same period in 2015.

Spending on residential construction increased by more than 6% during the first 8 months of 2016 compared with the same period in 2015. Spending on nonresidential construction, which accounted for about 60% of construction expenditures, increased by about 4% in the first 8 months of 2016 compared with the same period in 2015. Increased residential and nonresidential construction could lead to an increase in IOP consumption in this sector.

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Exports of pigment-grade IOPs increased by about 90% during the first 8 months of 2016 compared with the same period in 2015, mostly owing to a significant increase in exports to Belgium; more than 80% of pigment-grade IOPs went to Belgium, Mexico, China, and the United Kingdom, in descending order of quantity. Exports of other grades of iron oxides and hydroxides, more than three times those of pigment grade, were virtually unchanged during the first 8 months of 2016 compared with the same period in 2015. About 90% of exports of other grades of iron oxides and hydroxides went to China, Spain, Canada, and Mexico, in descending order of quantity. Total imports of natural and synthetic IOPs were virtually unchanged during 2016 compared with those in 2015.

A company in Utah produced a high-purity “advanced natural” iron oxide, mostly composed of goethite and hematite, and promoted its transparent iron oxide products to the wood stain market and other natural IOP products to the paints and coatings industries. The company also marketed iron oxide products to the energy and biogas industries as desulfurization catalysts to compete with costly synthetic iron oxide catalysts commonly used in scavenging the highly corrosive hydrogen sulfide gas produced in the anaerobic conversion of biomass.

In May, a leading Texas-based specialty chemical company began production at its new synthetic IOP production plant in Augusta, GA. The plant has the capacity to produce 30,000 tons per year of yellow, red, and black IOPs and is the first new IOP plant built in the United States in about 35 years.

Globally, two other leading producers of finished natural and synthetic IOPs completed construction of synthetic IOP production plants in Tongling, Anhui Province, and Ningbo, Zhejiang Province, China. One began production in the latter half of 2015 with an additional 20,000 tons per year of high-performance IOPs capacity added in 2016. Both plants employ advanced processing techniques that use enhanced water and waste gas treatment.

World Mine Production and Reserves:

	Mine production		Reserves ⁴
	<u>2015</u>	<u>2016^e</u>	
United States	W	W	Moderate
Austria (micaceous IOP)	3,500	3,500	NA
Cyprus (umber)	4,000	3,500	Moderate
France	1,000	1,000	NA
Germany ⁵	200,000	200,000	Moderate
India (ochre)	2,200,000	2,200,000	55,000,000
Pakistan (ocher)	30,000	35,000	Moderate
Spain (ocher and red iron oxide)	<u>16,000</u>	<u>16,000</u>	<u>Large</u>
World total	<u>⁶NA</u>	<u>⁶NA</u>	<u>Large</u>

World Resources: Domestic and world resources for production of IOPs are adequate. Adequate resources are available worldwide for the manufacture of synthetic IOPs.

Substitutes: Milled IOPs are probably the most commonly used natural minerals for pigments. Because IOPs are color stable, low cost, and nontoxic, they can be economically used for imparting black, brown, red, and yellow coloring in large and relatively low-value applications. Other minerals may be used as colorants, but they generally cannot compete with IOPs because of their higher costs and more limited availability. Synthetic IOPs are widely used as colorants and compete with natural IOPs in many color applications. Organic colorants are used for some colorant applications, but many of the organic compounds fade over time from exposure to sunlight.

^eEstimated. NA Not available. W Withheld to avoid disclosing company proprietary data.

¹Defined as sold or used finished natural and synthetic IOPs + imports – exports.

²Unit value for finished iron oxide pigments sold or used by U.S. producers.

³Defined as imports – exports.

⁴See [Appendix C](#) for resource and reserve definitions and information concerning data sources.

⁵Includes natural and synthetic iron oxide pigment.

⁶A significant number of other countries, including Azerbaijan, China, Honduras, Italy, Kazakhstan, Russia, South Africa, Turkey, and Ukraine, are thought to produce IOPs, but output is not reported and no basis is available to make reliable estimates of production.