

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 by the U.S. Geological Survey to avoid disclosing company proprietary data, increased slightly in 2015 from that of 2014. Six companies, including the three producers of natural IOPs, processed and sold about 45,000 tons of finished natural and synthetic IOPs at an estimated value of \$72 million, significantly below the sales peak of 88,100 tons in 2007. About 50% of natural and synthetic finished IOPs were used in concrete and other construction materials, 35% in coatings and paints, 3% each in animal food and foundry uses, 2% each in industrial chemicals and fertilizer, and 5% in other uses.

Salient Statistics—United States:	2011	2012	2013	2014	2015^e
Production, mine	W	W	W	W	W
Production, finished natural and synthetic IOP	48,000	48,400	47,200	45,300	45,000
Imports for consumption	158,000	151,000	165,000	175,000	180,000
Exports, pigment grade	8,660	8,950	8,170	8,790	8,200
Consumption, apparent ¹	197,000	190,000	204,000	212,000	217,000
Price, average value, dollars per kilogram ²	1.54	1.61	1.60	1.60	1.65
Employment, mine and mill	58	55	60	65	70
Net import reliance ³ as a percentage of apparent consumption	>50%	>50%	>50%	>70%	>70%

Recycling: None.

Import Sources (2011–14): Natural: Cyprus, 63%; France, 15%; Austria, 9%; and other, 13%. Synthetic: China, 50%; Germany, 25%; Canada, 8%; Brazil, 6%; and other, 11%.

Tariff: Item	Number	Normal Trade Relations 12–31–15
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 2015, domestic production and sales of crude natural IOPs increased slightly. In Europe, consumption of IOPs declined, mostly owing to continued sluggishness in the region's construction industry. In Asia, moderate to strong 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 2015. Housing starts and completions rose by about 11% and 10%, respectively, compared with those of the same period in 2014.

Spending on residential construction increased by more than 12% during the first 9 months of 2015 compared with the same period in 2014. Spending on nonresidential construction, which accounted for about 63% of construction expenditures, increased by about 10% in the first 9 months of 2015 compared with the same period in 2014. Increases were expected to continue through 2016. 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 decreased by about 7% during 2015 compared with those of 2014; about 80% went to Mexico, China, and Belgium, in descending order of quantity. Exports of other grades of iron oxides and hydroxides, about seven times that of pigment-grade, decreased by about 6% during 2015 compared with those in 2014, mostly owing to a significant decrease in exports to Spain. About 85% of exports of other grades of iron oxides and hydroxides went to China, Spain, and Canada, in descending order. Total imports of natural and synthetic IOPs increased slightly during 2015 compared with those in 2014.

A company in Utah that began production of a high-purity “advanced natural” iron oxide in 2014, mostly composed of goethite and hematite, promoted its transparent iron oxide products to the woodstain 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 a desulfurization catalyst, 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.

A leading Texas-based specialty chemical company neared completion of its synthetic IOP production plant in Augusta, GA—the first new IOP production plant built in the United States in about 35 years. Operations were expected to begin in early 2016.

Globally, two other leading producers of finished natural and synthetic IOPs continued construction of synthetic IOP production plants in China. The plants—one in Tongling, Anhui Province, owned by a Hong Kong-based company, and the other in Ningbo, Zhejiang Province, owned by a German chemical company—are expected to begin production 2016. Both plants will employ an advanced process that uses enhanced water and waste gas treatment. In India, one company began production of yellow IOPs at its Sahapuram, Tamil Nadu, facility, by separating out IOPs from leach liquor, a waste from ilmenite production.

World Mine Production and Reserves:

	Mine production		Reserves ⁴
	<u>2014</u>	<u>2015^e</u>	
United States	W	W	Moderate
Austria (micaceous IOP)	3,500	4,000	NA
Cyprus (umber)	4,000	4,000	Moderate
France	1,000	1,000	NA
Germany ⁵	200,000	200,000	Moderate
India (ochre)	1,600,000	1,600,000	55,000,000
Pakistan (ocher)	33,000	35,000	Moderate
Spain (ocher and red iron oxide)	<u>16,000</u>	<u>16,000</u>	<u>Large</u>
World total	⁶ NA	⁶ NA	<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 cost 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 several 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 production of 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/reserve definitions and information concerning data sources.

⁵Includes natural and synthetic iron oxide pigment.

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