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Georgian National Investment Agency

Chemical Sector Research
Pigments and other coloring
matter

April 2015



Our findings, observations and/or recommendations are those that we could reasonably derive from the procedures or scope of services performed. The specific procedures performed were agreed with Georgian National Investment Agency (the Client) and were performed by us as set forth in the Report.

Our work was carried out solely based on the publicly available research data.

We have indicated within our Report the sources of the information presented and have satisfied ourselves, so far as possible, that the information presented in our Report is consistent with other information which was made available to us in the course of our work in accordance with the terms of the Contract. We have not, however, sought to establish the reliability of the sources by reference to other evidence.

All recommendations, provided to you with/in this Report that refer to the future have some limitations in the sense that they are based on the assumptions valid on the issuance date. These assumptions could change with time, after the date of this Report issuance, and so could lose their value.

References to 'KPMG Analysis' in this Report indicate only that we have (where specified) undertaken certain analytical activities on the underlying data to arrive at the information presented; we do not accept responsibility for the underlying data.

The key consumers of pigments and other coloring matters are paint and coatings industry and plastics production, accounting respectively for 56% and 24% of the global demand in 2013.

The end-user markets of pigments and other coloring matter can be segmented as follows:

- Paint and other coatings
- Printing Inks
- Plastics
- Construction Materials
- Consumer electronics (e.g., organic pigments LCD TVs)
- Other (e.g., rubber, paper, glass, ceramic)

The key consumers of pigments and other coloring matter are paint and coatings industry and plastics production, accounting respectively for 56% and 24% of the global demand in 2013.

Industry trends

Strong demand from end user industries has been driving the demand for pigments and other coloring matter in the past few years.

Moreover, there is an increasing demand in end-user preference for environmentally friendly products. Increasing demand for innovative high performance pigments and other coloring matter is expected to open new growth window for industry participants.

Inorganic pigments and other coloring matter are expected to be the largest revenue and volume segment in the dye and pigment market over the next few years.

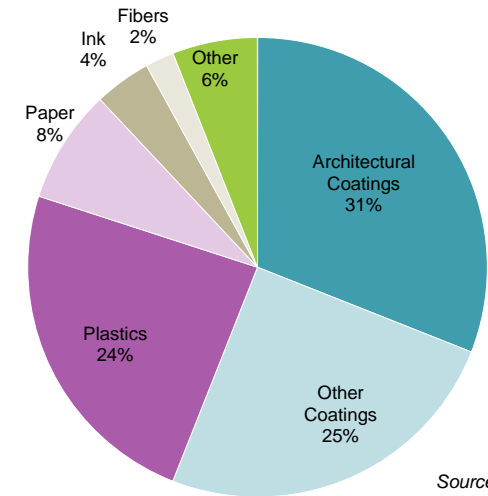
On the other hand, organic pigments and other coloring matter are anticipated to show the largest growth numbers in the future. Higher price of organic pigments could be one of the factors holding back the organic part of the dyes and pigments market.

Production technology

There are two widely used technologies for production of pigments - chloride and sulfate (detailed production processes are presented on slide 69).

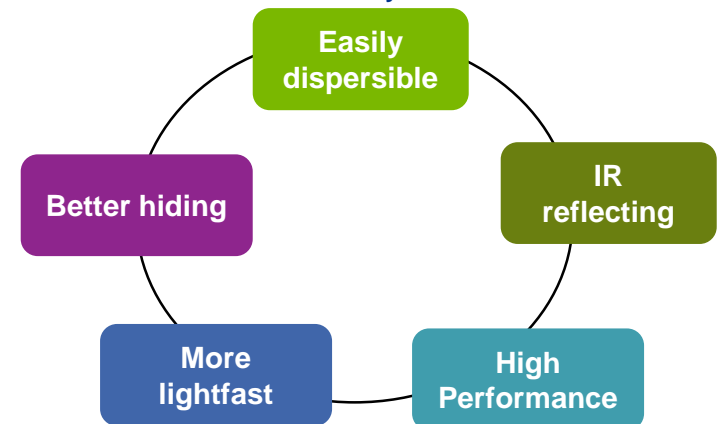
The sulfate process is more pollutive with environmental disposal costs approximately twice as of the chloride process.

Pigments and other coloring matter end-user markets, 2012



Source: Deutsche Bank

Global industry trends



Source: PCI Magazine

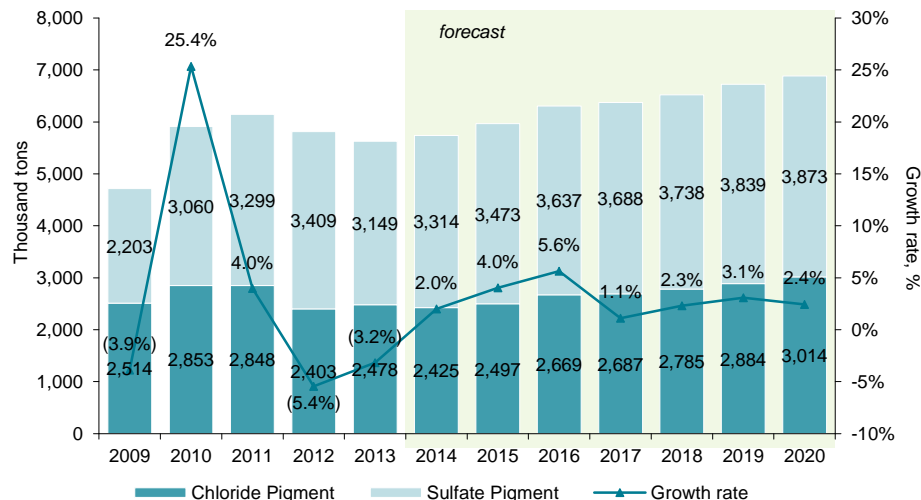
The world pigment production comprised 5,627 thousand tons in 2013

The world pigment production capacity comprised 7,817 thousand tons in 2013

Pigment production utilization rate comprised 72% in 2013.

China is the major pigment producer in the world, with 36.4% of the world production and 39.8% of the world production capacity in 2013. According to J.P. Morgan estimates China will increase its shares, reaching 41.3% and 43.4% respectively in 2020.

World pigment production, 2009-2020



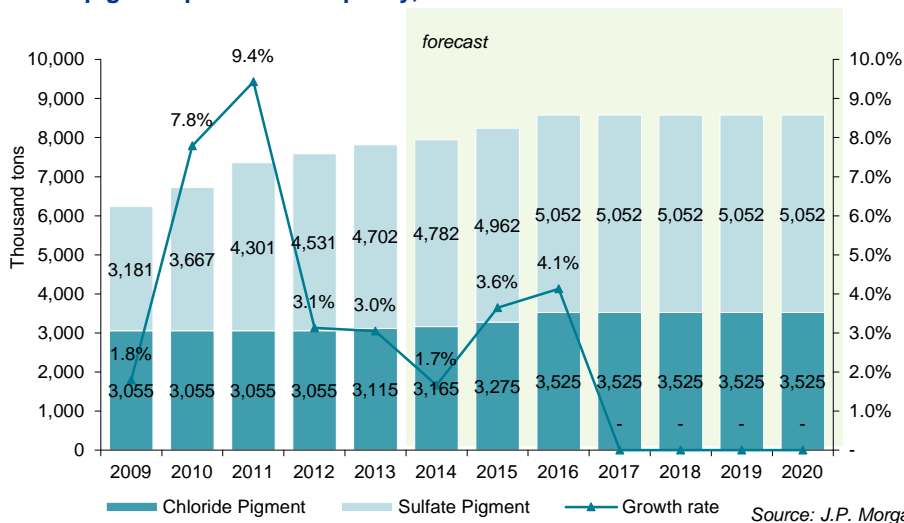
The world pigment production comprised 5,627 thousand tons in 2013, out of which 3,149 thousand tons (56%) of sulfate pigments. According to J.P. Morgan forecast the world total pigment production will reach to 6,887 thousand tons in 2020.

The world pigment production capacity comprised 7,817 thousand tons in 2013, out of which 4,782 thousand tons (60%) of sulfate pigments. According to J.P. Morgan forecast the world total pigment production capacity will reach to 8,577 thousand tons in 2020. The production technology split will change slightly in favor of chloride technology.

Highest utilization rate in pigments production was registered in 2010 – 88%, which gradually decreased reaching to 72% in 2013. This fall can be mainly explained by the increase of raw material prices. Chloride pigment production utilization rate is higher compared to sulfate pigment. It is forecasted that utilization rate will increase up to 80.3% in 2020.

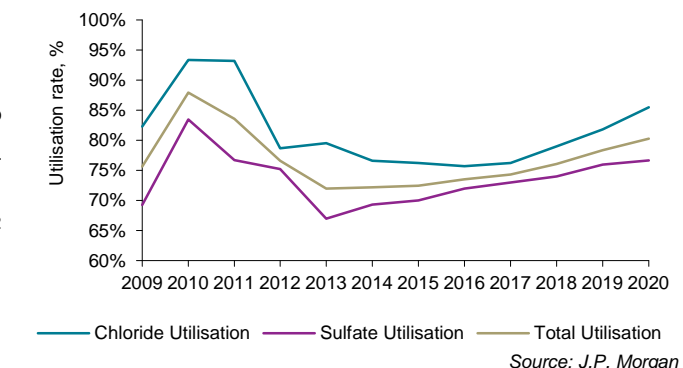
Source: J.P. Morgan

World pigment production capacity, 2009-2020



Source: J.P. Morgan

World pigment production utilisation, 2009-2020

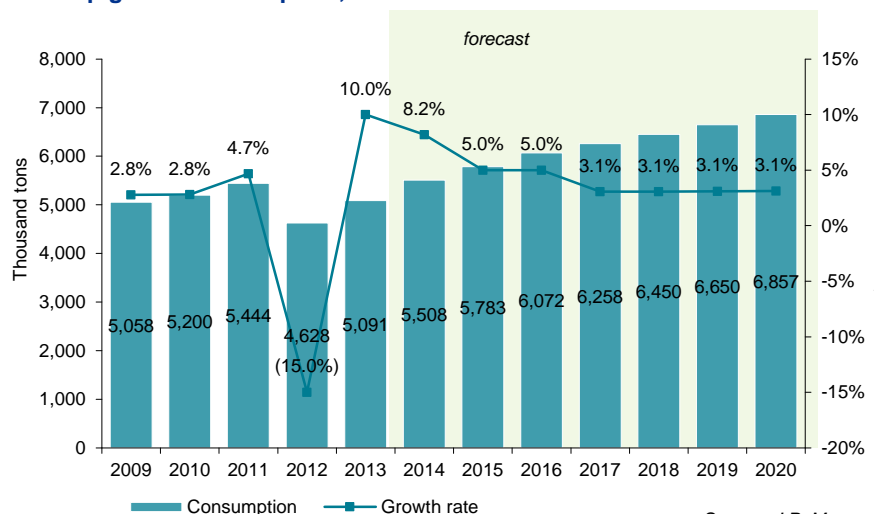


Source: J.P. Morgan

The world consumption of pigments comprised 5,091 thousand tons in 2013

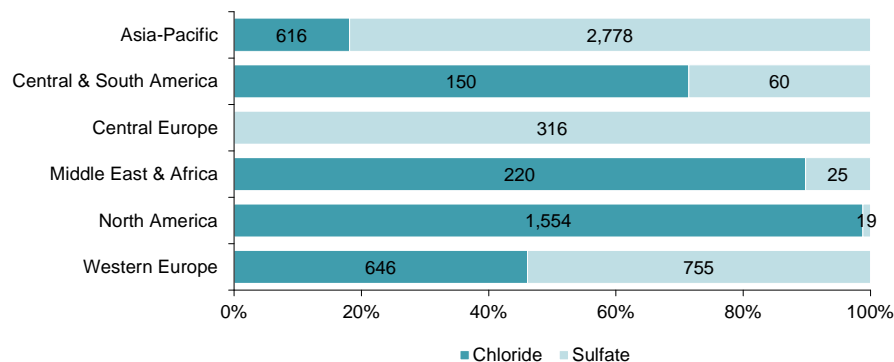
The Asia-Pacific region dominated in the pigments production with the share of 47.5% of the world production capacity in 2012

World pigment consumption, 2009-2020



Source: J.P. Morgan

World production capacity regional and technology split (thousand tons), 2012



Source: Deutsche Bank

The world consumption of pigments comprised 5,091 thousand tons in 2013, increasing by 10% compared to 2012. According to J.P. Morgan estimates the market consumption will reach to 6,857 thousand tons in 2020.

The highest supply-demand gap in the pigment market was registered in 2012, comprising 1,184 thousand tons. It is estimated that the gap will decrease during the upcoming years reaching to only 30 thousand tons in 2020.

The Asia-Pacific region dominates in the pigments production with share of 47.5% of the world production capacity in 2012. China is the leader in this region.

The second largest region is North America, with share of 22%, followed by Western Europe, with share of about 20%. 55.4% of the world production was based on the sulfate process.

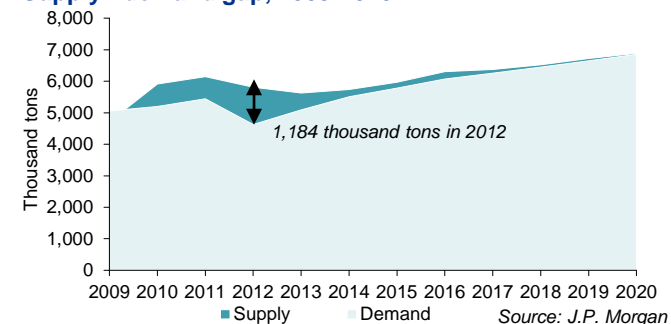
Asia-Pacific, Central Europe and Western Europe are mainly using sulfate production technology, whereas Americas are using Chloride production technologies.

The main factors stipulating production in the mentioned regions are: Asia-Pacific region, particularly China - availability of low cost workforce and raw materials.

North America and Western Europe – High level of R&D developments, innovative technologies, which bring to high quality products production and availability of raw materials.

Also the above mentioned regions are major pigments and other coloring matter consumers due to developed industries like paint and varnish production, textile, etc., which are the pigments and other coloring matter end-user sectors.

Supply - demand gap, 2009-2020



Source: J.P. Morgan

Pigments and other coloring matter

Market overview

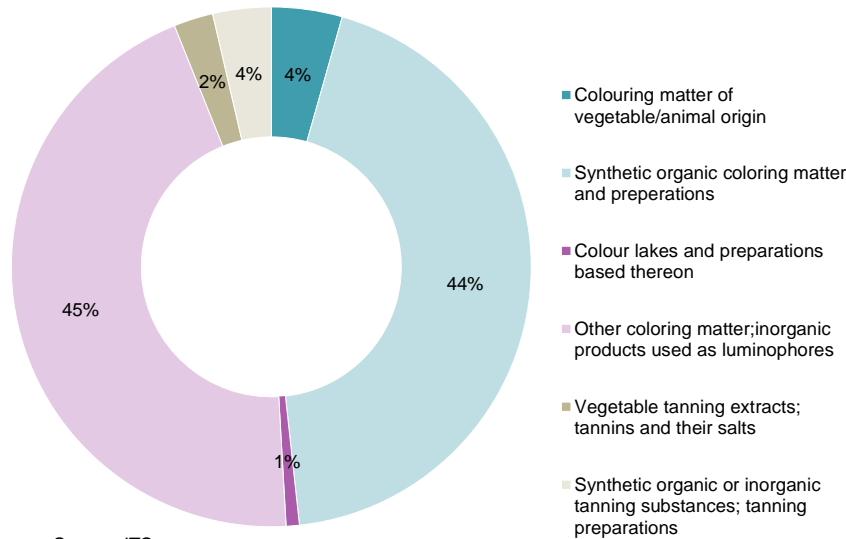
The international trade of pigments and other coloring matters increased in 2013 by 0.3% reaching USD29,402 million.

The international trade of pigments and other coloring matters increased in 2013 by 0.3% compared to 2012, reaching USD29,402 million. The major increase of raw material prices in 2011-2012 resulted in negative growth rate (-4.9%) of the international trade of pigments and other coloring matters in 2012.

The structure of the international trade of the main components of pigments and other coloring matters for 2013 is presented below. The main subgroups are synthetic organic coloring matter and preparations, comprising 44% of the total group and other coloring matters; inorganic products used as luminophores, comprising 45% of the group.

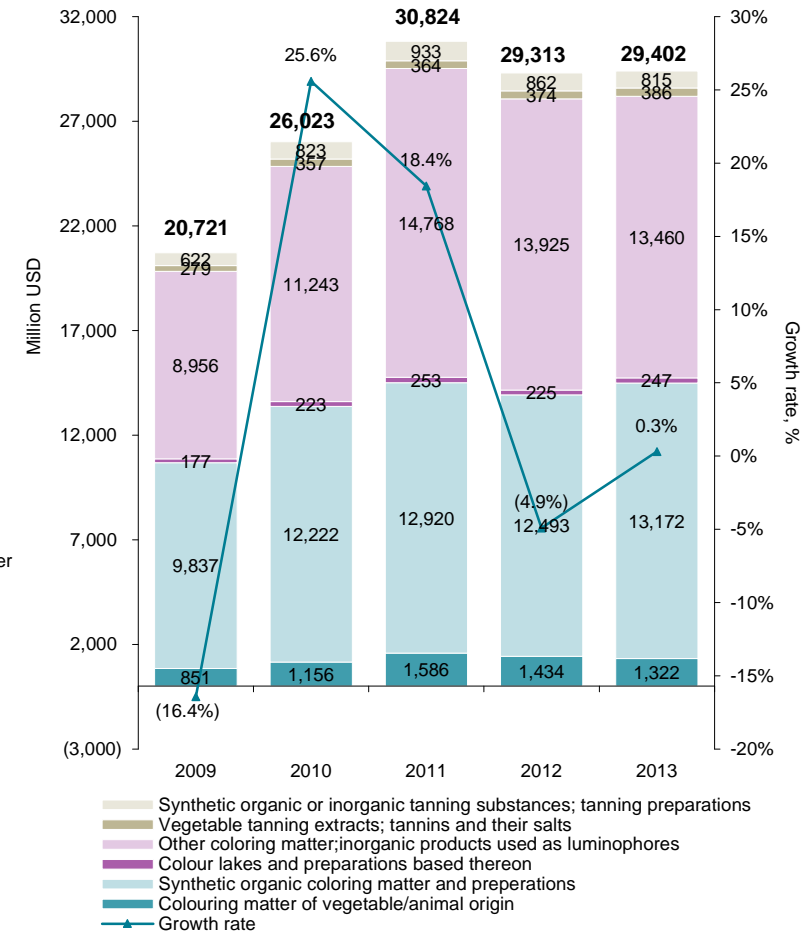
The detailed breakdown of the mentioned major subgroups are presented on the slide 7.

Structure of international trade of pigments and other coloring matters by main subgroups, 2013



Source: ITC

International trade of pigments and other coloring matters, 2009-2013

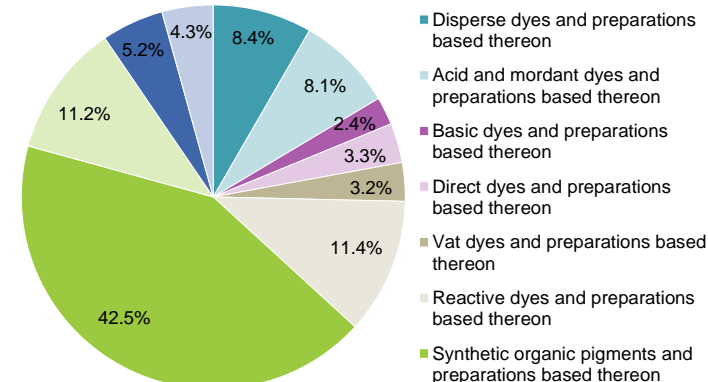


Source: ITC

Breakdown of the Synthetic organic coloring matter and preparations subgroup, 2009-2013

USD'000	2009	2010	2011	2012	2013
Disperse dyes and preparations based thereon	724,212	920,110	993,631	1,002,998	1,100,243
Acid and mordant dyes and preparations based thereon	768,621	1,031,637	1,020,128	926,890	1,065,655
Basic dyes and preparations based thereon	250,521	323,404	323,847	306,898	309,906
Direct dyes and preparations based thereon	360,752	439,849	459,165	452,101	438,971
Vat dyes and preparations based thereon	290,763	367,917	379,903	373,127	426,215
Reactive dyes and preparations based thereon	1,223,531	1,397,709	1,182,481	1,304,877	1,505,139
Synthetic organic pigments and preparations based thereon	4,244,514	5,413,026	5,995,286	5,557,816	5,596,826
Synthetic organic colouring matter nes and preparations based thereon	1,058,005	1,262,859	1,357,500	1,406,144	1,472,464
Synthetic organic products used as fluorescent brightening agents	602,899	694,929	734,614	677,319	688,316
Synthetic organic products used as luminophores	313,186	370,239	472,976	484,949	568,355
Total	9,837,004	12,221,679	12,919,531	12,493,119	13,172,090

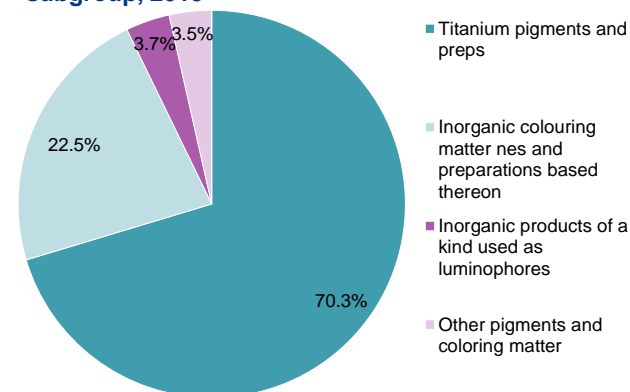
Breakdown of the Synthetic organic coloring matter and preparations subgroup, 2013



Breakdown of the Other coloring matters; inorganic products used as luminophores subgroup, 2009-2013

USD'000	2009	2010	2011	2012	2013
Titanium pigments and preps	6,092,619	7,640,201	10,663,832	10,032,940	9,467,362
Pigments and preparations based on chromium compounds	195,953	256,077	261,441	237,550	238,528
Pigments and preparations based on cadmium compounds	13,735	445	230	80	32
Ultramarine and preparations based thereon	103,635	130,500	141,395	136,227	160,753
Pigments and preparations based on zinc sulphide including lithophone	49,973	61,917	72,150	72,384	68,888
Pigments and preparations based on hexacyanoferrates	263	53	98	3,037	7,243
Inorganic colouring matter nes and preparations based thereon	2,147,466	2,729,692	3,018,983	2,879,935	3,023,854
Inorganic products of a kind used as luminophores	352,496	423,869	610,164	562,620	493,360
Total	8,956,140	11,242,754	14,768,293	13,924,773	13,460,020

Breakdown of the Other coloring matters; inorganic products used as luminophores subgroup, 2013



Paint, varnish and other coating industry production chain and profit distribution between market participants

Petrochemicals	
P/E	15.4x
Return on Assets %	6.3%
Gross Margin %	29.2%
SG&A Margin %	5.8%
EBIT Margin %	22.7%
Net Income Margin %	2.0%

Acids and Caustics	
P/E	1.1x
Return on Assets %	3.1%
Gross Margin %	13.8%
SG&A Margin %	8.7%
EBIT Margin %	3.2%
Net Income Margin %	(0.4%)

Alcohol	
P/E	10.2x
Return on Assets %	5.0%
Gross Margin %	9.8%
SG&A Margin %	2.7%
EBIT Margin %	7.1%
Net Income Margin %	5.9%

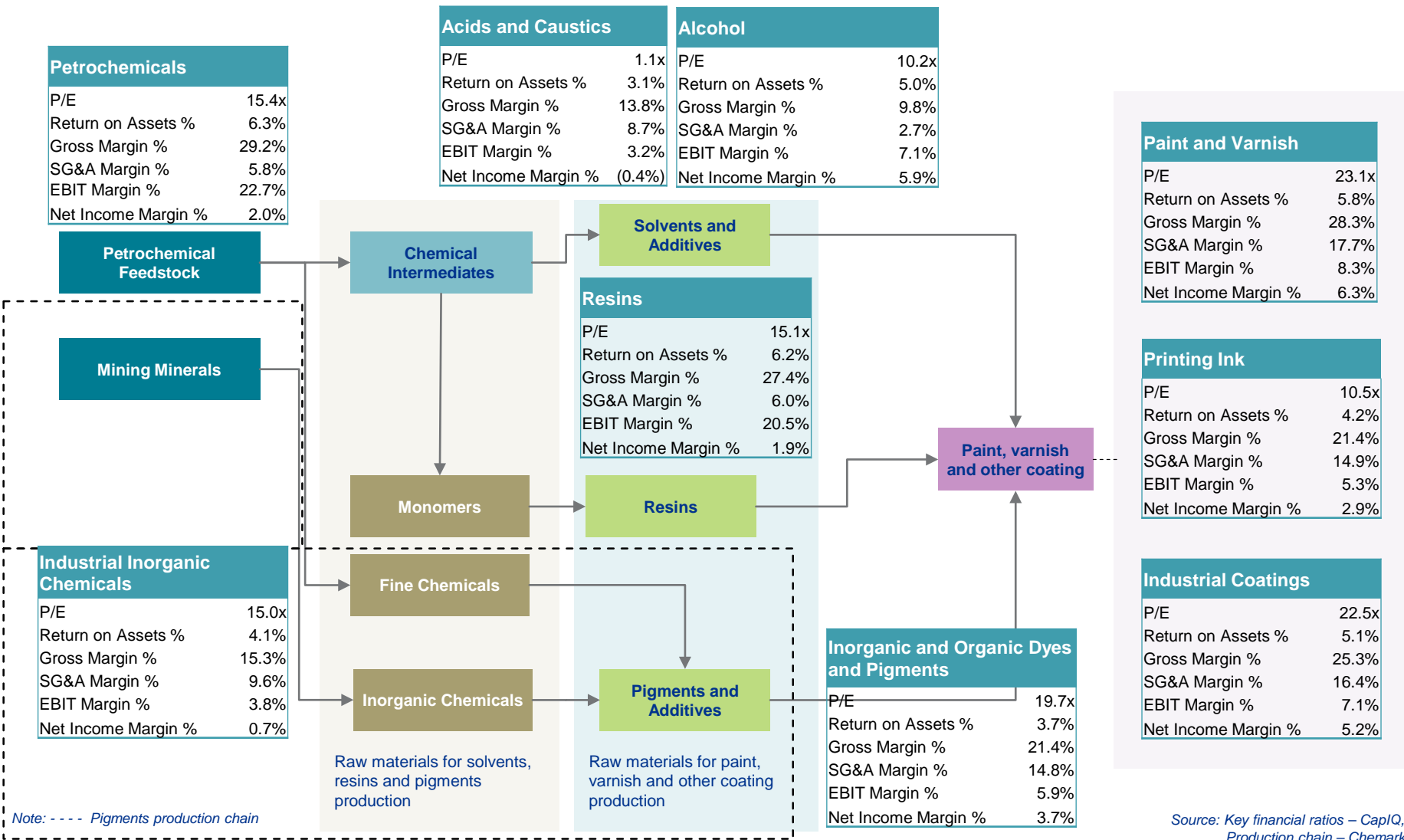
Paint and Varnish	
P/E	23.1x
Return on Assets %	5.8%
Gross Margin %	28.3%
SG&A Margin %	17.7%
EBIT Margin %	8.3%
Net Income Margin %	6.3%

Printing Ink	
P/E	10.5x
Return on Assets %	4.2%
Gross Margin %	21.4%
SG&A Margin %	14.9%
EBIT Margin %	5.3%
Net Income Margin %	2.9%

Industrial Coatings	
P/E	22.5x
Return on Assets %	5.1%
Gross Margin %	25.3%
SG&A Margin %	16.4%
EBIT Margin %	7.1%
Net Income Margin %	5.2%

Inorganic and Organic Dyes and Pigments	
P/E	19.7x
Return on Assets %	3.7%
Gross Margin %	21.4%
SG&A Margin %	14.8%
EBIT Margin %	5.9%
Net Income Margin %	3.7%

Resins	
P/E	15.1x
Return on Assets %	6.2%
Gross Margin %	27.4%
SG&A Margin %	6.0%
EBIT Margin %	20.5%
Net Income Margin %	1.9%



Note: - - - - Pigments production chain

Source: Key financial ratios – CapIQ, Data for 2013
Production chain – Chemark consulting

The main price drivers in pigments industry are: **Cost of raw materials; Type of production technology used and Transportation costs (both for raw materials and finished products).**

The highest prices were registered in EU28 countries, followed by the CIS region

Volume and price of consumption can be affected by many factors. The fundamental price drivers are supply, demand and price of raw materials. The price of the products is also dependent on the production technology and the types of raw materials used.

The main price drivers in pigments and other coloring matter production industry are:

- Cost of raw materials
- Labor cost
- Type of production technology used
- Transportation costs (both for raw materials and finished products)

The highest prices for the subject products were registered in EU28 countries, followed by the CIS region, which can be mainly explained by the quality of products imported.

Average import price of main types of pigments in the CIS region 2009-2013 (USD/Tons)					
	2009	2010	2011	2012	2013
Titanium pigments and preps, >80% titanium oxide	1,888	2,095	2,853	3,078	2,600
Titanium pigments and preps, <80% titanium oxide	3,217	3,222	3,679	3,744	3,612
Pigments and preparations based on zinc sulphide including lithophone	1,865	1,649	1,874	2,051	1,813
Synthetic organic pigments and preparations based thereon	7,630	7,989	9,495	9,551	8,596

Source: ITC

Average import price of main types of pigments in EU28 countries, 2009-2013 (USD/Tons)					
	2009	2010	2011	2012	2013
Titanium pigments and preps, >80% titanium oxide	2,190	2,285	3,257	3,487	2,851
Titanium pigments and preps, <80% titanium oxide	3,429	3,565	4,272	4,128	3,859
Pigments and preparations based on zinc sulphide including lithophone	2,152	2,149	2,901	3,093	2,908
Synthetic organic pigments and preparations based thereon	8,560	8,508	9,614	9,019	10,017

Source: ITC

Average import price of main types of pigments in the Central Asian Republics, 2009-2013 (USD/Tons)					
	2009	2010	2011	2012	2013
Titanium pigments and preps, >80% titanium oxide	1,939	2,169	3,074	3,199	2,731
Titanium pigments and preps, <80% titanium oxide	2,916	3,325	2,618	3,001	3,109
Pigments and preparations based on zinc sulphide including lithophone	2,286	1,138	1,019	1,043	983
Synthetic organic pigments and preparations based thereon	6,736	8,722	8,548	9,354	7,113

Source: ITC

Average import price of main types of pigments in Georgia, 2010-2014 (USD/Tons)					
	2010	2011	2012	2013	2014
Titanium pigments and preps, >80% titanium oxide	2,331	2,555	3,648	3,522	3,103
Titanium pigments and preps, <80% titanium oxide	10,600	10,167	9,143	5,143	4,372
Pigments and preparations based on zinc sulphide including lithophone	-	2,000	-	1,857	1,900
Synthetic organic pigments and preparations based thereon	10,222	6,594	20,754	5,621	8,323

Source: ITC

Top 20 pigments and other coloring matter producing companies	
	Company
1	DIC Corporation
2	Clariant AG
3	RPM International Inc.
4	Toyo Ink SC Holdings Co., Ltd.
5	Zhejiang Longsheng Group Co., Ltd.
6	Valhi, Inc.
7	Ferro Corporation
8	Rockwood Holdings, Inc.
9	Archroma Management LLC
10	Eckart Pigment GmbH
11	KRONOS TITAN GmbH
12	Zhejiang Runtu Co., Ltd.
13	Sumitomo Chemical Belgium
14	Clariant (Brazil) S.A.
15	INEOS Americas, LLC
16	Tioxide Europe Ltd.
17	Sun Chemical Ltd
18	Hexcel Composites S.A.
19	CAPAROL Farben Lacke Bautenschutz GmbH
20	Nippon Pigment Co., Ltd. (TSE:4119)

World major pigment producing companies by production capacity as at 2013 are:

- Dupont – 18% (world production capacity)
- Cristal – 11%
- Kronos – 9%
- Huntsman – 9%
- Tronox – 7%
- Sachtleben – 5%

Source: Kronos annual report, 2013

Source: Capital IQ

- 1) Industry Classifications: Inorganic Dyes and Pigments (Primary) OR Organic Dyes And Pigments (Primary)
- 2) The ranking is based on the annual revenue figures based on the latest financial year information available

For Top 20 importing and exporting companies please refer to the Group24.3 Paint, varnish and other coating

Pigments and other coloring matter

Georgia: Import value

In 2013 Georgia imported pigments and other coloring matter in the amount of USD3 million.

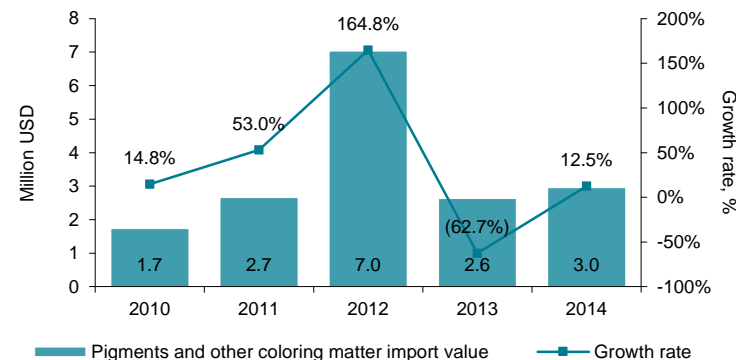
The major shares in the structure of product types belong to subgroups Other coloring matter; inorganic products used as luminophores and Synthetics organic coloring matter and preparations.

Pigments and other coloring matter import value of Georgia increased by 12.5% in 2014, comprising USD3 million. The highest level of import growth rate and import value was recorded in 2012, comprising 164.8% and USD7 million respectively.

In 2013 Turkey accounted for 32% of the Georgian import of pigments and other coloring matter. The second largest country in the import structure is Slovenia, with 13% share, followed by Germany and Italy.

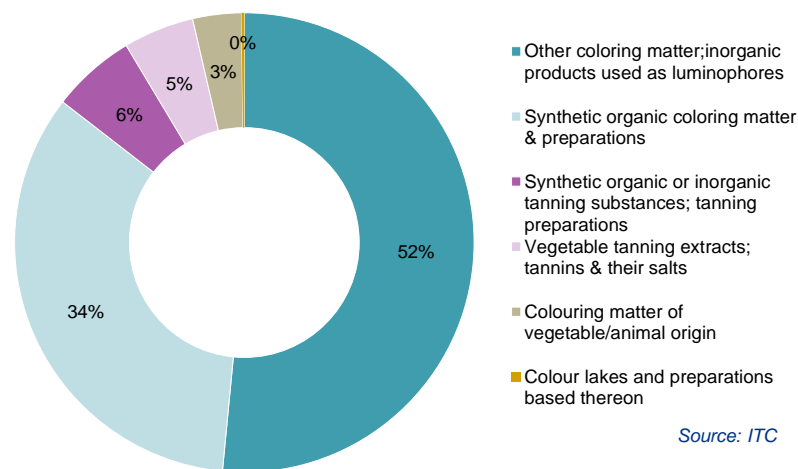
Other coloring matter; inorganic products used as luminophores subgroup comprised 52% of the import structure of Georgia (the breakdown of this subgroup is presented on the slide 7). The second largest share – 34%, belongs to Synthetics organic coloring matter and preparations subgroup.

Pigments and other coloring matter import value, 2010-2014



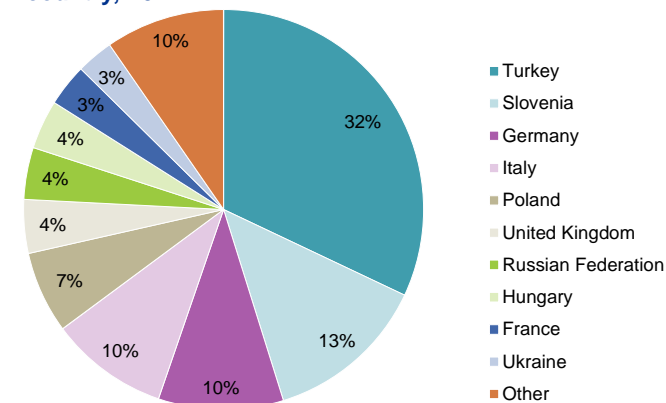
Source: ITC

Pigments and other coloring matter import structure by product type, 2014



Source: ITC

Pigments and other coloring matter import structure by country, 2014



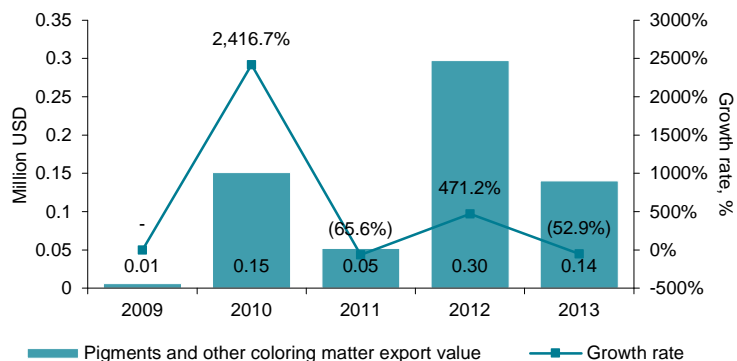
Source: ITC

In 2013 Georgia exported pigments and other coloring matter in the amount of USD0.14 million.

The major share in the structure of product types belongs to the subgroup Other coloring matter; inorganic products used as luminophores.

Export value to Armenia was more than the half of the total export in 2013.

Pigments and other coloring matter export value, 2010-2014



Source: ITC

Pigments and other coloring matter export value of Georgia decreased by 52.9% in 2013, comprising USD0.14 million. The highest level of export value recorded in 2012, comprising USD0.3 million.

In 2013 Armenia accounted for 54% of the Georgian export of pigments and other coloring matter. The second largest country in the export structure is Iran, with 29% share, followed by Azerbaijan.

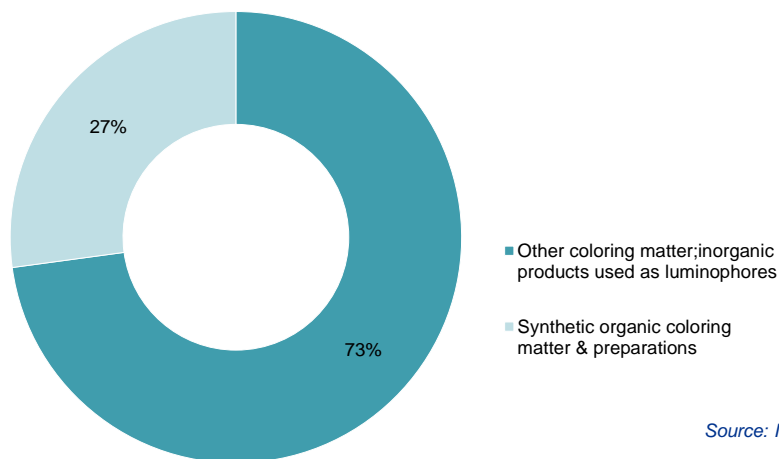
Other coloring matter; inorganic products used as luminophores subgroup comprised 73% of the export structure of Georgia (the breakdown of this subgroup is presented on the slide 7). Major share in this subgroup belongs to the Titanium pigments and preparations (>80% titanium oxide), which comprised USD0.059 million and Pigments and preparations based on zinc sulphide including lithophone, comprising USD0.034 million in 2013.

Due to minor levels of pigments production in Georgia, the National statistical office of Georgia does not provide information regarding the pigments production volume separately in chemical production group.

According to KPMG estimates the consumption level of pigments and other coloring matter was nearly USD2.8 million in 2013*.

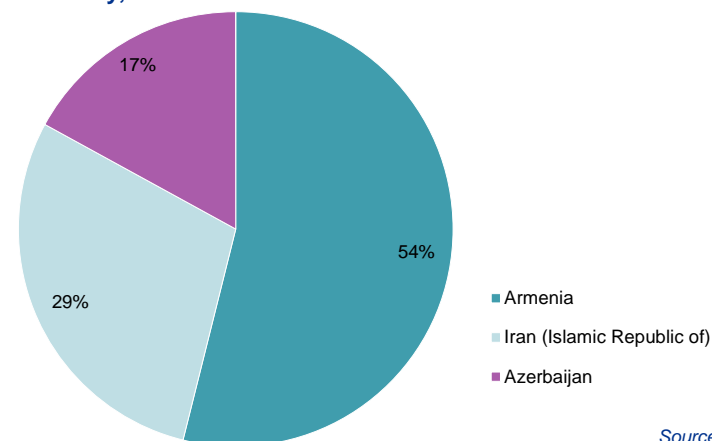
Note: Calculations are based on the production, import and export data

Pigments and other coloring matter export structure by product type, 2014



Source: ITC

Pigments and other coloring matter export structure by country, 2014



Source: ITC

No major projects in Central Asia, South Caucasus, Turkey and Ukraine are identified.

The pigments and other coloring matter production industry is characterized by high barriers to entry consisting of high capital costs, proprietary technology and significant lead times (typically three to five years) required to construct new facilities or to expand existing capacity. In addition, the suppliers of raw materials need time to increase the supply of the raw materials.

So, according to major pigment producers, it is unlikely that any new major pigment plants will be constructed in Europe in the foreseeable future.

There is also tendencies of reconstructing of existing plants from USA and Europe in China and other Asian countries with low cost workforce and availability of raw materials.

Raw materials in the selected Region/Countries – Titanium

Titanium oxides export and import, export and import unit value

Among the selected countries the largest exporter of titanium oxides were EU countries

Georgia was the largest exporter among the South Caucasus countries

	Value exported in 2013 (USD thousand)	Trade balance in 2013 (USD thousand)	Quantity exported in 2013	Quantity Unit	Unit value (USD/unit)
World	950,480	-87,158	313,724	Tons	3,030
Germany	186,630	96,208	50,626	Tons	3,686
France	146,037	98,961	31,486	Tons	4,638
Belgium	96,819	613	26,750	Tons	3,619
Finland	59,213	55,048	16,452	Tons	3,599
Italy	45,897	25,754	20,112	Tons	2,282
Other EU	22,977	-63,640	8,572	Tons	n/a
Georgia	1,589	281	321	Tons	4,950
Turkey	354	-12,624	89	Tons	3,978

	Value imported in 2013 (USD thousand)	Trade balance in 2013 (USD thousand)	Quantity imported in 2013	Quantity Unit	Unit value (USD/unit)
World	1,037,638	-87,158	323,970	Tons	3,203
Belgium	96,206	613	31,673	Tons	3,037
Germany	90,422	96,208	22,214	Tons	4,070
France	47,076	98,961	9,177	Tons	5,130
Spain	23,886	-20,737	10,433	Tons	2,289
Italy	20,143	25,754	7,056	Tons	2,855
Other EU	68,632	10,409	19,715	Tons	n/a
Turkey	12,978	-12,624	4,413	Tons	2,941
Turkmenistan	7,539	-7,539	732	Tons	10,299
Georgia	1,308	281	322	Tons	4,062
Kazakhstan	790	-790	140	Tons	5,643
Ukraine	526	-524	150	Tons	3,507
Uzbekistan	521	-521	177	Tons	2,944
Kyrgyzstan	291	-291	234	Tons	1,244
Armenia	271	-271	91	Tons	2,978
Azerbaijan	11	-11	28	Tons	393

Source: ITC

Raw materials in the selected Region/Countries – Iron oxides and hydroxides

Iron oxides and hydroxides export and import, export and import unit value

Among the selected countries the largest exporter of iron oxides and hydroxides were EU countries

	Value exported in 2013 (USD thousand)	Trade balance in 2013 (USD thousand)	Quantity exported in 2013	Quantity Unit	Unit value (USD/unit)
World	1,109,574	-22,269	869,678	Tons	1,276
Netherlands	166,861	51,662	93,133	Tons	1,792
Belgium	144,153	95,267	178,299	Tons	808
Germany	68,609	4,087	33,955	Tons	2,021
Italy	41,222	16,737	19,264	Tons	2,140
Poland	30,482	-146	16,001	Tons	1,905
Spain	20,740	-64,234	21,918	Tons	946
Other EU	27,323	-178,133	10,369	Tons	n/a
Ukraine	3,597	549	3558	Tons	1011
Turkey	1,012	-18,875	1,093	Tons	926
Uzbekistan	344	-1,702	319	Tons	1,078
Armenia	4	-54	6	Tons	667

	Value imported in 2013 (USD thousand)	Trade balance in 2013 (USD thousand)	Quantity imported in 2013	Quantity Unit	Unit value (USD/unit)
World	1,072,226	-237,568	1,042,693	Tons	1,028
Germany	44,809	-44,809	51,293	Tons	874
United Kingdom	34,660	-22,349	28,546	Tons	1,214
Netherlands	29,117	-20,814	25,994	Tons	1,120
France	28,179	-9,700	18,585	Tons	1,516
Italy	26,929	31,651	32,914	Tons	818
Other EU	112,912	-42,905	98,309	Tons	n/a
Turkey	19,887	-18,875	14,944	Tons	1,331
Kazakhstan	3,581	-3,581	2,592	Tons	1,382
Ukraine	3,048	549	2,474	Tons	1,232
Uzbekistan	2,046	-1,702	2,382	Tons	859
Turkmenistan	559	-559	366	Tons	1,527
Azerbaijan	253	-253	253	Tons	1,000
Kyrgyzstan	151	-151	177	Tons	853
Georgia	71	-71	72	Tons	986
Armenia	58	-54	34	Tons	1,706
Tajikistan	22	-22	22	Tons	1,000

Source: ITC

Raw materials in the selected Region/Countries – Zinc oxide; zinc peroxide

Zinc oxide; zinc peroxide export and import, export and import unit value

Among the selected countries the largest exporter of zinc oxide; zinc peroxide were EU countries

	Value exported in 2013 (USD thousand)	Trade balance in 2013 (USD thousand)	Quantity exported in 2013	Quantity Unit	Unit value (USD/unit)
World	1,109,574	-22,269	869,678	Tons	1,276
Netherlands	166,861	51,662	93,133	Tons	1,792
Belgium	144,153	95,267	178,299	Tons	808
Germany	68,609	4,087	33,955	Tons	2,021
Italy	41,222	16,737	19,264	Tons	2,140
Poland	30,482	-146	16,001	Tons	1,905
Spain	20,740	-64,234	21,918	Tons	946
Other EU	27,323	-178,133	10,369	Tons	n/a
Turkey	27,180	15,757	27,554	Tons	986
Ukraine	38	-6,071	109	Tons	349

	Value imported in 2013 (USD thousand)	Trade balance in 2013 (USD thousand)	Quantity imported in 2013	Quantity Unit	Unit value (USD/unit)
World	1,131,843	-22,269	0	n/a	n/a
Netherlands	115,199	51,662	143,482	Tons	803
France	90,558	-87,276	85,142	Tons	1,064
Spain	84,974	-64,234	47,729	Tons	1,780
Other EU	288,194	20,313	193,417	Tons	n/a
Turkey	11,423	15,757	4,712	Tons	2,424
Ukraine	6,109	-6,071	2,958	Tons	2,065
Kazakhstan	959	-959	171	Tons	5,608
Uzbekistan	260	-260	101	Tons	2,574
Armenia	26	-26	9	Tons	2,889
Georgia	12	-12	3	Tons	4,000
Azerbaijan	5	-5	18	Tons	278
Kyrgyzstan	3	-3	1	Tons	3,000
Turkmenistan	1	-1	0	Tons	n/a

Source: ITC

Raw materials in the selected Region/Countries – Titanium oxides, Iron oxide and Zinc oxide; zinc peroxide

Iron oxide world mine production and reserves (m.t.)			
	Mine production		Reserves
	2013	2014 (e)	
France	18,000	18,000	NA
Germany*	205,000	210,000	Moderate
Spain	16,400	17,000	Large
World total	NA**	NA**	Large

Source: USGS

Note: * Includes natural and synthetic iron oxide pigment

** A significant number of other countries are thought to produce Iron oxide, but output is not reported and no basis is available to formulate estimates of output levels, which likely is substantial. Such countries include Azerbaijan, China, Honduras, Kazakhstan, Russia, Turkey, and Ukraine

(e) - Estimated

Titanium and Titanium dioxide world sponge metal production and sponge and pigment capacity (m.t)				
	Sponge production		Capacity 2014*	
	2013	2014 (e)	Sponge	Pigment
Belgium				74,000
Finland				130,000
France				125,000
Germany				440,000
Italy				80,000
Kazakhstan(e)	12,000	9,000	27,000	1,000
Spain				80,000
Ukraine(e)	6,300	6,000	10,000	120,000
United Kingdom				300,000
World total (rounded)***	5,209,000	5,192,000	279,000	6,560,000

Source: USGS

Note: * Year end operating capacity

** Withheld to avoid disclosing company proprietary data

*** Excluding USA

(e) - Estimated

For measuring the availability and possibility of supply of zinc oxide and zinc peroxide we used the information regarding the zinc ore reserves.

According to the USGS Mineral Commodity Summaries 2015 among selected countries Kazakhstan has significant reserves and mine production of zinc.

Zinc world mine production and reserves (thousands m.t)			
	Mine production		Reserves
	2013	2014 (e)	
USA	784	820	10,000
Australia	1,520	1,500	962,000
Bolivia	407	410	4,500
Canada	426	350	5,900
China	5,000	5,000	43,000
India	793	700	11,000
Ireland	327	300	1,100
Kazakhstan	362	330	10,000
Mexico	643	700	16,000
Peru	1,350	1,300	29,000
Other countries	1,800	1,900	42,000
World total	13,400	13,300	230,000

Source: USGS



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