

TITANIUM

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The titanium markets were buoyant for much of 2000. However, by the fourth quarter reduced demand was affecting both pigment and feedstock markets. In early 2001 there are further signs of slowdown in pigment markets and oversupply of some feedstocks.

TiO² Pigment

Titanium dioxide pigment accounts for more than 90% of the consumption of titanium minerals. TiO² is the brightest of the white pigments and its main applications are in the manufacture of paints, paper and plastics. Consumption is concentrated in North America and Europe which together account for more than half of world demand. However, demand growth is strongest in Asia, outside Japan.

Global TiO² market growth accelerated about 4.1% in 2000, after about 2% growth in 1999, according to estimates prepared by TZMI. In the US consumption is estimated by the US Geological Survey to have increased by 6%. In the second and third quarters demand rose by around 12% year on year, but by the fourth quarter consumption was declining, and producer inventory was increasing, as off-take in the major end uses slowed.

Pigment prices increased in response to rising demand, although producers experienced some problems in implementing the full extent of posted price increases. In Europe, prices increased by around €140-160/t from mid year, although the extent of the increase varied between markets, depending on the extent to which earlier price increases had been successfully implemented. Pigment producers are striving to normalize pigment pricing in Europe, and a further round of increases, again of €140-160/t was posted in early 2001. In Asia,

	1998	1999	2000
Australia	250	240	240
Sierra Leone	0	0	0
South Africa	120	120	120
US	40	50	50
Others*	10	10	10
World Total	420	420	420

* Does not include C.I.S.

Ishihara increased prices by US\$100/t in February, for markets outside Japan.

Consolidation among pigment producers which had been under way for more than two years continued in 2000. Between 1998 and 2000 an estimated 25% of world TiO² pigment plant capacity has changed hands. In 2000, Kerr-McGee acquired from Bayer the outstanding 20% ownership of the plants at Uerdingen, Germany, and Antwerp, Belgium. Kerr-McGee had acquired 80% of these businesses in 1998. Kerr-McGee also sold its 25% holding in Crystal Pigment, Saudi Arabia, to the other partners in the project.

	1998	1999	2000
Australia*	2000	2000	2300
India	420	400	400
Malaysia	30	30	30
Sri Lanka	80	80	80
Brazil	100	100	100
US	390	430	460
Norway **	0	0	100
World Total	3000	3000	3400

Includes ilmenite used in synthetic rutile.

** Slag production using Tellenes ilmenite ceased mid-97, resuming in 2000.

NB Canadian and South African ilmenite production used in slag production omitted

These moves consolidated Kerr-McGee as the third largest pigment producer behind DuPont and Millennium and ahead of Huntsman. Huntsman Corp. acquired the remaining 30% interest of ICI in the old Tioxide operations.

Construction of additional pigment production capacity continues at a slow pace - a consequence of the increased merger and acquisition activity. In 2000, capacity expansions were limited to debottlenecking at several plants belonging to Huntsman Corp. and Kronos. Huntsman is also looking at the potential for a new plant in Asia, possibly China.

Synthetic Rutile Production Capacity ('000t/y)			
	1998	1999	2000
Australia	530	670	670
India	90	90	90
US	100	100	100
Other	30	30	30
<i>World Total</i>	<i>750</i>	<i>900</i>	<i>900</i>

Titanium Metal

The titanium metal industry staged an unexpected recovery in 2000 after collapsing in 1999. Aircraft manufacturers brought their inventories under control more rapidly than in previous downturns, allowing sponge prices to recover and sponge producers to increase shipments. Prices in 2000 recovered around 8% from the first quarter low. By year-end prices of TG100 had recovered to US\$6.30-6.70 and rose further in early 2001. Shipments from Japanese sponge producers rose 10%. Towards year-end further support came from a tightening scrap supply. Despite these improving conditions however, Allegheny Technologies idled its high cost Oremet plant in the US.

Titanium Feedstocks

Titanium feedstocks comprise several mineral and beneficiated products which vary in their titanium content and suitability for use in the different pigment production processes. In

general terms, minerals with a higher TiO₂ content, rutile, synthetic rutile (a beneficiated product of ilmenite) and some slags, comprise the chlorinatable feedstocks. They are used in pigment plants employing a chloride process, and sponge production. Only DuPont directly uses certain ilmenites as feed to chloride plants. Other grades of ilmenite and certain slags are soluble in sulphuric acid and are suitable for use as feeds to sulphate pigment plants. Most growth has been in chloride feedstock production in recent years, resulting in a shortage of sulphatable feedstocks.

The titanium feedstock producers experienced differing trends in demand for their products in 2000. Rio Tinto, the world's largest feedstock producer, reduced output at RBM in South Africa and QIT in Canada by 4%. Iluka Resources, the number two producer, increased output sharply in 2000 after the restructuring in 1999. Ilmenite production increased by 10%, rutile 20% and synthetic rutile 6%. Inventories of most products also declined. Buoyant production and sales continued through the early months of 2001. Tiwest also reported sharp production increases in 2000. In Norway, Tinfos reverted to production of sulphatable slag, using ilmenite from the Titania mine, after the failure of the Beenup project in Australia.

Feedstock prices were heavily influenced by currency factors in 2000. For example, the average Australian export price of ilmenite

Titanium Dioxide Pigment Production Capacity ('000t/y)			
	1998	1999	2000
Americas	1710	1790	1800
W.Europe	1360	1400	1450
E.Bloc	190	190	190
Japan	330	330	330
Australia	160	160	170
Others	500	500	520
<i>World Total</i>	<i>4250</i>	<i>4350</i>	<i>4460</i>

Sources: USBM, Industry Sources

rose about 8% in Australian dollar terms, to A\$138/t, but fell 4% in US dollars. Rutile prices were stable around US\$470. Slag prices rose modestly

There are plans to increase output at several existing producers. In Canada, QIT has the ability to further expand production of its chloriatable product UGS from 250,000 to 350,000 t/y. In the US Iluka could increase output by 70% through incremental expansions. In Australia, Tiwest is considering increasing synthetic rutile capacity by 50,000 t to 250,000 t/y. On the west coast of Africa, Anglo American's Namakwa Sands operation is slowly increasing production from the second furnace commissioned in early 1999. Despite this slow progress, Namakwa Sands is investigating building a third furnace which would be scheduled for commissioning in late 2003.

Titaniferous Slag Production Capacity ('000t/y)			
	1998	1999	2000
Canada	1100	1250	1250
South Africa	1100	1200	1200
Norway	200	200	200
<i>Total</i>	<i>2400</i>	<i>2650</i>	<i>2650</i>

There were significant developments in three emerging mineral provinces in 2000; the west coast of Africa, the Murray Basin in Australia and in India.

In South Africa Iscor announced that it will proceed with the IHM (Iskor Heavy Mineral) project. Initial work, which began in 2000, is establishing a mining operation on the Hillendale deposit and a separation plant at Empangeni. Prior to 2003 annual production will be 500,000 t/y of ilmenite, 50,000 t/y of rutile and 50,000 t/y of zircon. In subsequent years production will be doubled through development of the Fairbreeze and Gravotte deposits. The project also entails a 250,000 t/y smelter to be built at Empangeni in two

phases, the first to be commissioned by mid 2002.

Iskor, is divesting 40% of the project and most other mineral sands interests to Tigor. Tigor will also take an option to acquire a further 40% of the project on successful commissioning of the smelter.

In Mozambique, the giant Corridor Sands project, held by Southern Mining Corp., moved further ahead. The project is envisaged as a slagging operation, initially producing 375,000 t/y, rising to 800,000 t/y. First production could commence in 2004. The project received a boost when WMC and IDC exercised exclusive options to participate in the project.

Also in Mozambique, the Muma-Congolone mineral sands project of Kenmare Resources advanced through the purchase of second-hand equipment from BHP's abandoned Beenup project and agreement with the government on a mining lease and favorable tax treatments.

In the Murray Basin, in Australia, small companies most active in project development have begun to consolidate. The Wemen deposit is being developed by MBT, a joint venture between RZM and Sons of Gwalia. Production began in early 2001.

BeMaX Resources, which holds the Ginkgo deposit rejected a take over bid by Iluka but subsequently accepted an offer by Sons of Gwalia which now holds 20%. Meanwhile, the

Titanium Sponge Production Capacity (000t/y)			
Region	1998	1999	2000
US	21500	21500	21500
Japan	24700	24700	24700
China	3000	3000	3000
FSU	42000	42000	42000
<i>Total</i>	<i>91200</i>	<i>91200</i>	<i>91200</i>

Sources:USBM,TZMI Industry Sources

Douglas Mineral Sands Project has advanced to feasibility study stage.

In India, interest among international companies in developing the extensive mineral sand reserves has increased following a relaxation in government policy in 1998. Greatest interest centres on the deposits in Tamil Nadu. MDL and Iscor are investigating two projects, one for a 135,000 t/y synthetic rutile plant, the other an integrated synthetic rutile and pigment operation. Local company Tata Iron and Steel is also investigating possibilities for the development of the Tamil Nadu deposits.

Meanwhile, in Orissa, Tigor, Austpac and India Rare Earths are in joint venture to investigate the application of Austpac's ERMS beneficiation technology to IRE's OSCOM ilmenite.

Outlook

In early 2001 slower economic growth, most notably in the US, is affecting TiO₂ markets, and there are signs of oversupply of certain feedstocks. The longer-term supply-demand balance is threatened by the increased number of new projects under evaluation.