

ZIRCON



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(Part- III : Mineral Reviews)

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ZIRCON

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GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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29 Zircon

Zirconium is the twentieth most abundant element in the Earth's crust and occurs in a variety of rock types and geological environment but most often in the form of zircon ($ZrSiO_4$) found usually as a constituent in heavy mineral sand assemblages, which include ilmenite, rutile, leucocoxene, monazite and garnet in varying proportions. Zircon sand and baddeleyite (an oxide- ZrO_2) are used via their salts to extract zirconium and hafnium. Normally, all zirconium compounds contain between 1.4% and 3% hafnium. Zircon is very stable at high temperature and has excellent thermal shock resistance, low thermal conductivity and chemical inertness. It finds use chiefly in industries like ceramic, refractory, abrasive, foundry, chemical and speciality alloys. Gem variety of zircon is used in jewellery. Ministry of Mines vide Notification No. S.O. 2356(E) dated 11.7.2016 inserted entry 12 beach sand minerals (which includes zircon) in Part B of the First Schedule to the MMDR Act, 1957.

RESERVES/RESOURCES

Table – 1: Resources of Zircon

(In million tonnes)

State	Resources [#]
Total	33.71
Andhra Pradesh	11.94
Bihar/Jharkhand	0.08
Gujarat	0.01
Kerala	7.83
Maharashtra	0.01
Odisha	3.25
Tamil Nadu	10.20
West Bengal	0.39

Source: Department of Atomic Energy, Mumbai

: Inclusive of indicated, inferred and speculative categories.

Zircon occurs in close association with other heavy minerals, such as, ilmenite, rutile and monazite in beach sands, along the coastal tracts of the country. Its concentration in the deposits is about 0.6-18.7% of the total heavy minerals. Indian zircons analyse 63-66% ZrO_2 . AMD has carried out reconnaissance investigation in parts of Gujarat, Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu, Kerala, Odisha and West Bengal during 2008-14. The resource estimation in these areas have been carried out up to 2016. The resources of zircon are placed at 33.71 million tonnes as per Department of Atomic Energy (DAE). The Statewise break-up of the resources is furnished in Table-1.

EXPLORATION & DEVELOPMENT

The exploration and development details, if any, are covered in the Review on Exploration & Development under "General Reviews".

PRODUCTION AND PRICES

Production of zircon increased to 11,906 tonnes in 2018-19 from 9,107 tonnes in the preceding year. The production of zircon is provided in Table-2. Prices of zircon as furnished by IREL, KMML and V. V. Mineral are detailed in Table- 3.

**Table – 2: Production of Zircon
2016-17 to 2018-19**

(In tonnes)	
Year	Production of Zircon*
2016-17	11709
2017-18	9107
2018-19	11906

**A reported by Indian Rare Earths Ltd.*

**Table – 3: Prices of Zircon,
2016-17 to 2018-19**

(₹ per tonne)			
Period	Grade	Price	Remarks
IREL			
2016-17	Q	64333	Ex-works, bagged
	MK	64333	Ex-works, bagged
	OR	59466	Ex-works, bagged
2017-18	Q	78766	Ex-works, bagged
	MK	78766	Ex-works, bagged
	OR	70266	Ex-works, bagged
2018-19	Q	120100	Ex-works, bagged
	MK	100100	Ex-works, bagged
	OR	89350	Ex-works, bagged
KMML			
2016-17	Zircon Gr.I	75583	-
	Zircon Gr.II	70250	-
	Zircon Gr.III	66250	-
2017-18	Zircon Gr.I	85166	-
	Zircon Gr.II	80160	-
	Zircon Gr.III	76166	-
2018-19	Zircon Gr.I	109750	-
	Zircon Gr.II	104750	-
	Zircon Gr.III	100750	-
	Zircon Gr.IV	820833	(From June to March)
V.V. Mineral			
2016-2017	NA	NA	NA
2017-2018	NA	NA	NA
2018-2019	NA	NA	-

Source: Department of Atomic Energy, Mumbai.

MINING AND PROCESSING

Indian Rare Earths Ltd (IREL), a Government of India Undertaking; KMML, a Kerala State Government Undertaking; and V.V. Mineral, a Private Sector company are engaged actively in mining and processing of beach sands in India. Zircon is recovered by these companies as a co-product of mining/dredging of heavy mineral sands which include ilmenite, rutile, leucosene, monazite, sillimanite and garnet. Beach sand deposits containing these minerals are obtained from coastal tracts of Manavalakurichi in Tamil Nadu, Chavara in Kerala and Gopalpur in Odisha. As such, no deposit is being worked exclusively for zircon alone. For details regarding mining and processing, etc., Review on 'Ilmenite and Rutile' may be referred. Plantwise capacity and production of zircon during 2015-16 to 2017-18 are given in Table- 4.

Table – 4: Plantwise Capacity and Production of Zircon Ore, 2016-17 to 2018-19

(In tonnes)

Company	Location	Specification	Installed capacity (tpy)	Production		
				2016-17	2017-18	2018-19
Total			57000	30351	13951	-
Indian Rare Earths Ltd	Manavalakurichi, Kanniyakumari distt., Tamil Nadu	65% ZrO ₂ +HfO ₂ (min)	10000	2606	*	2190
	Chavara, Kollam distt., Kerala	65% ZrO ₂ +HfO ₂ (min.)	17500	4502	2649	3072
	Orissa Sand Complex, Ganjam distt., Odisha	64.25% ZrO ₂ (min)	5000	5696	6458	6694
Kerala Minerals & Metals Ltd	Chavara, Kollam distt., Kerala	Zircon Gr.I 64.0% (min.)	6500	4784	4844	4762
		Zircon Gr.II 62% (min.)				
V.V. Mineral	Keeraikarantattu, Tirunelveli distt., Thisayanvilai, Tamil Nadu	66% min. (ZrO ₂ +HfO ₂)	18000 (654,000 - of heavy minerals)	12763	-	-

Source: Respective Producers and Department of Atomic Energy, Mumbai.

* During 2017-18 plant was not operating from Jan. 17 because of non-availability of environment clearance.

INDUSTRY

IREL has set up a dry grinding mill at Chavara, Kerala to produce Zirflour for its application in the Ceramic Industry. A wet grinding mill was also set up at Chavara to produce micro-zir for its specialised application as opacifier. Besides, IREL established a small chemical plant at Manavalakurichi, Tamil Nadu to produce zircon frit, zirconium chloride, etc., primarily for making supply of zircon frit to Department of Atomic Energy's Nuclear Fuel Complex (NFC), Hyderabad. A pilot plant (3.5 tpy capacity) was set up at Orissa Sand Complex (OSCOM) to produce a whole range of zirconia stabilised with CaO, MgO and rare earths.

The NFC manufactures and supplies fuel bundles for Pressurised Heavy Water Reactors (PHWRs) and Boiling Water Reactors (BWRs) of NPCIL. Highest ever production of PHWR fuel bundles, Zirconium Oxide, Zirconium sponge and Niobium metal was achieved during the period. The NFC, Hyderabad, has different types of production facilities which include the zirconium oxide plant for processing of zircon to pure zirconium oxide and zirconium sponge plant for conversion of zirconium oxide to pure sponge metal and Zirconium Complex (ZC) at Pazhayakayal, near Thoothukudi, Tamil Nadu. NFC Hyderabad produced 651 tonnes, 165 tonnes and 424 tonnes of zirconium oxide during 2016-17,

2017-18 and 2018-19, respectively. ZC, Pazhayakayal, produced 502 tonnes, 503 tonnes and 351 tonnes of ZrO_2 in 2015-16, 2016-17 and 2017-18, respectively. Besides, the Zircaloy Fabrication Plant produces various zirconium alloy tubings and sheet, rod and wire products. The plant also has facilities for reclamation of zircaloy mill-scrap. Zircon sand is processed through caustic fusion, dissolution, solvent extraction (to remove hafnium), precipitation and calcination to obtain zirconium oxide. The pure oxide is then subjected to high temperature chlorination, reactive metal reduction and vacuum distillation to obtain homogeneous zirconium sponge. The sponge is briquetted with alloying ingredients and melted in vacuum to produce zircaloy ingots. The alloy ingots are extruded to convert into seamless tubes, sheets and bars. The total installed capacity and production of zirconium oxide and zirconium sponge plants at NFC and ZC are furnished in Table-5.

Besides, Bhalla Chemical Works Pvt. Ltd operates three plants—two of which are located in Gurgaon, Haryana to manufacture zirconium derivatives (ZrO_2), based on imported zircon ore (capacity 10,000 tpy) and zirconium silicate opacifiers (capacity 5,000 tpy). The third plant of the Company in Rajasthan manufactures zirconium oxychloride crystals and special zirconias (capacity 10,000 tpy).

**Table – 5 : Production at Zirconium Oxide and Sponge Plants of DAE at NFC and ZC
2016-17 to 2018-19**

(In tonnes)

Plant/Location	Installed capacity (tpy)	Production		
		2016-17	2017-18	2018-19
Zirconium Oxide Plant, NFC, Hyderabad	600/750	651	165	424
Zirconium Sponge Plant, NFC, Hyderabad	400	-	-	-
Zirconium Oxide Plant, ZC, Pazhayakayal	500	503	351	573
Zirconium Sponge Plant, ZC, Pazhayakayal	250	-	-	-

Source: Department of Atomic Energy, Mumbai.

USES & CONSUMPTION

Zircon's exceptional qualities of hardness and durability make it a must-use for the manufacture of ceramics and refractory tiles and also for a range of other high-tech applications, such as, armour plating on military aircraft, heat shield in space shuttles, potentially as solid oxide fuel cells in hydrogen-powered vehicles and in many industrial & chemical applications. Owing to its chemical inertness, very low heat conductivity, high specific gravity, low expansion, good resistance to abrasion, high melting point and no shrinkage on being heated up to 1,750 °C, zircon is found to be an outstanding refractory material. Zircon finds its application in ceramics, zirconia, chemicals, refractory and foundry & castings which accounts for zircon's total world estimated consumption. Zirconia and Zirconium chemicals can be used for a variety of uses. Yttria-stabilised zirconia (YSZ) is used in the manufacture of oxygen sensors that control combustion in automobile engines and furnaces. In Foundry Industry, zircon is used as facing for foundry moulds as it increases the resistance to metal penetration and accords a uniform finish to castings. Zircon sand is preferred to silica sand because of its uniform size, higher melting point, low thermal expansion and resistance to molten metal, acidic chemicals, slag, etc. Zircon containing 64% ZrO₂ is used generally for foundry applications. In Ceramic Industry, finely ground high-grade zircon and zirconium dioxide are used as opacifier in melts for vitreous enamelling and as pigment in ceramic glazes. Zirconium oxide is considered as a potential ceramic material for high temperature applications like engine components. Usually, zircon containing 65% ZrO₂ is preferred in ceramics. The toughened zirconia finds its use in ceramic coatings in jet aircraft engines and in other applications where strength and high temperature oxidation resistance are important. Zirconia ceramics are also used in automobile sensors for the microprocessor control of engines. In Chemical Industry, its property of high resistance to corrosion is used where dry chlorine, hydrochloric acid and caustic alkalis are involved. Abrasive and grinding wheels made from zircon sands are used for polishing optical glasses. Zircon powder is used as a medium in waterjet cutting machines.

Zirconium and zirconium powders are used in ammunition, primers, detonation caps, flashlight mixtures, radio tubes and in various heating elements. Hafnium-free zirconium metal is used as cladding material in atomic reactors due to its low absorbing cross section for thermal neutron. Green, blue, indigo, red, orange coloured zircon is used as a natural gemstone and also processed to produce cubic zirconia — a synthetic gemstone resembling diamond. Zircon compounds have a very low toxicity and are not perceived as a potential environmental hazard. They are even said to have some medicinal properties and are now increasingly preferred in the manufacture of food products and pharmaceuticals too. It is also widely used in television and computer screens, resistance to corrosion and erosion makes zircon products ideal for use in the Chemical Industry and in desalination plants. Zircon flour is manufactured by milling zircon sand. It is used in ceramic frits, foundry mould coatings, ceramic shells for investment casting, refractories, friction products, insulating fibres and glass. Zircon opacifier are used in refractories and friction products. Zirconium metal or sponge is used mainly in the Nuclear Industry with a requirement for minimum content of hafnium.

Consumption of zircon/zirflour decreased marginally by 5% to 16,600 tonnes in 2018-19 from 17,500 tonnes in 2017-18. Consumption of zircon/zirflour during the year 2016-17 to 2018-19 is furnished in Table- 6. Refractory Industry was a major consumer of zircon/zirflour accounting for 57% consumption in 2018-19, followed by Ceramic Industry (38%) and Other Industries.

**Table – 6: Estimated Consumption * of Zircon
2016-17 to 2018-19
(By Industries)**

Industry	(In tonnes)		
	2016-17	2017-18 (R)	2018-19 (P)
All Industries	29000	17500	16600
Ceramic	19100	7200	6300
Refractory	8300	9700	9400
Others (Alloy steel, iron & steel, Chemical, foundry, paint and cement)	1600	600	900

Figures rounded off.

** Includes actual reported consumption and/or estimates made wherever required. Due to paucity of data, coverage may not be complete.*

RESEARCH & DEVELOPMENT

Approximately 3 kg of lanthanum zirconate was produced for testing of the product for its suitability towards application as thermal barrier material for Aero engine applications at HAL, Sunabeda/DMRL, Hyderabad. The material could withstand tests equivalent to 1,000 h of flying.

A process has been developed to produce >99.9% pure zirconyl nitrate from or zircon for fabrication of Diesel Oxidation Catalyst (DOC). About 25 kg of zirconyl nitrate could be produced for supply to National Chemical Laboratory (NCL), Pune.

POLICY

Zircon was earlier classified as a 'prescribed substance', as per notifications issued under Atomic Energy Act, 1962. From the revised list notified vide S. O. No. 61(E), dated 20.1.2006, zircon has been deleted, subject to the condition that the mineral shall remain a prescribed substance till the policy on exploration of beach sand minerals notified on 6.10.1998, is adopted/revised/modified by Ministry of Mines or till 1.1.2007, whichever occurs earlier and shall cease to be so thereafter. Recently, vide Notification No.S.O.2356(E) dated 11.07.2016, zircon covered under beach sand minerals was inserted after entry 11 of Part B of the First Schedule to the MMDR Act, 1957. As per the Foreign Trade Policy, 2015-20, the export and import of zirconium ores and concentrates under ITC (HS) Code 26151000 are freely allowed. The notification reads:

S.O. 1592(E)—In pursuance of Clauses (f) and (g) of Sub-section (1) of Section 2 and Section 3 of the Atomic Energy Act, 1962 (No. 33 of 1962) and in supersession of the notifications of the Government of India in the Department of Atomic Energy vide Number S.O. 61(E) dated 20th January 2006, the Central Government hereby notifies the substances, equipment and technology specified in the Schedule appended hereto as 'Prescribed Substances, Prescribed Equipment and Technology'.

Under category 0A303 and under heading Nuclear materials, nuclear-related other materials, equipment and technology—"Zirconium with hafnium content of less than 1 part to 500 parts of zirconium by weight (i.e. less than 2,000 ppm) in the form of metal, alloys containing more than 50% zirconium by weight, compounds, manufactures thereof, waste or scrap of any of the foregoing".

G.S.R. 134(E)—In exercise of the powers conferred under Section 11B of the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957) and Rule 36 of the Atomic Minerals Concession Rules, 2016, the Central Government hereby makes the following amendments further to amend the Atomic Minerals Concession Rules, 2016, namely—

2. (1) These rules may be called the Atomic Minerals Concession (Second Amendment) Rules, 2019.

(2) They shall come into force on the date of their publication in the Official Gazette.

3. In the Atomic Minerals Concession Rules, 2016, for Schedule A, the following Schedule shall be substituted, namely—

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[See Rule 2 (1)(m) and Rule 36]

10.	Uranium bearing tailings left over from ores after extraction of copper and gold, ilmenite and other titanium ores.	60 ppm U ₃ O ₈ and/or 250 ppm ThO ₂ .
11.	Zirconium bearing minerals and ores including zircon.	All cases of zirconium-bearing minerals occurring in Beach Sand Minerals and other placer deposits in association with monazite are notified as above threshold (i.e. the threshold is 0.00% monazite in Total Heavy Minerals), irrespective of monazite grade. In other cases, zircon containing less than 2000 ppm of Hafnium.
12.	Beach Sand Minerals, i.e., economic heavy minerals found in the teri or beach sand, which include ilmenite, rutile, leucoxene, garnet, monazite, zircon and sillimanite.	All cases of Beach Sand Minerals and other placer deposits in association with monazite are notified as above threshold (i.e., the threshold is 0.00% monazite in Total Heavy Minerals), irrespective of monazite grade.

WORLD REVIEW

World reserves of zirconium are placed at 62 million tonnes in terms of ZrO₂. The world's largest reserves are with Australia (68%), South Africa (10%). The world production of zirconium minerals was estimated at 1.26 million tonnes in 2018 which decreased by 15% as against 1.47 million tonnes in the previous year. Australia, South Africa, USA and Mozambique are the principal producers of zirconium minerals (Tables- 7 & 8).

**Table – 7: World Reserves of Zirconium
(By Principal Countries)**

(In '000 tonnes of ZrO₂)

Country	Reserves
World: Total(rounded)	62,000
Australia	42,000 ¹⁰
China	500
Kenya	120
Mozambique	1,800
Senegal	NA
South Africa	6,500
USA	500
Other countries	11,000

Source: USGS, *Mineral Commodity Summaries*, 2020.

¹⁰For Australia, Joint Ore Reserves Committee-compliant reserves were 13 million tonnes.

**Table – 8 : World Production of
Zirconium Minerals
(By Principal Countries)**

(In tonnes)

Country	2016	2017	2018
World: Total	1401000	1475000	1256000
Australia ⁽ⁱ⁾	620136	583339	404310
South Africa ^e	400000 ^e	460000 ^e	370000 ^e
USA	50000 ^e	50000	100000 ^e
Mozambique	68200	74000	76600
Senegal	52627	61562	64278
Indonesia ^(d)	35000 ^e	29000 ^e	54000 ^e
Kenya	27671	65324	36604
China	33500 ^e	33500 ^e	33500 ^e
Sri Lanka	7749	24486	24500
Madagascar	15582	21000	22757
Ukraine	22000 ^e	25000 ^e	21614
Brazil ^(a)	21302	20000 ^e	20000 ^e
Other countries	47095	28232	28199

Source: World Mineral Production, BGS.

Note: *) Estimate

(a) Including caldasite rock containing zircon & baddeleyite.

(b) Conservative BGS estimates, based on exports.

(i) Years ended 30 June of that stated.

Although zircon inventories and production were sufficient for global demand at the beginning of 2017, Iluka's suspension of operations at the Jacinth-Ambrosia Mine, which began in April 2016 and continued until December 2017, contributed to a tightening of zircon supply, which was evident at year-end. Owing to depleted supplies, shortages of zircon resulted in the increased prices of downstream products.

To provide a generalised view of the development in various countries, country-wise description as sourced from latest available publication of Minerals Yearbook 'USGS' -2017 is furnished below :

Australia

Iluka produced 3,12,000 t of zircon from its operations in Australia, a decrease of 10% from that of 2016. In December, Iluka announced the resumption of mining activity at the Jacinth-Ambrosia Mine in the Eucla basin of South Australia. Iluka had suspended mining activities at the mine in April 2016 to draw down the heavy-mineral-concentrate inventory held there. Jacinth-Ambrosia was the primary source of zircon for Iluka. Also in December, the Cataby project in Western Australia was approved. With a projected mine life of 8.5 years, zircon production was anticipated to average about 50,000 tonnes per year and was expected to begin in the second quarter of 2019. MZI Resources Ltd produced 18,341 t of zircon concentrate at its Keysbrook project in Western Australia, an increase of 15% from that of 2016. Tronox Ltd produced 34,000 t of zircon from its Cooljarloo Mine in Western Australia, an increase of 6% from production in 2016. The total heavy-mineral reserves at year-end 2017 for Tronox's operations in Western Australia was 481 Mt of ore containing 11.1 Mt of heavy minerals and 1.2 Mt of zircon, a 4% decrease from reported reserves at year-end 2016. Sheffield Resources Ltd obtained multiple offtake agreements to account for almost all its zircon and zircon concentrate production during the first 4-year phase of its Thunderbird project. Production of zircon in the first year was expected to be about 80,000 t, which would gradually be scaled up to

1,10,000 t in the fourth year of production. Contingent on financing, Sheffield was expecting to commence production at Thunderbird in 2020.

China

As the leading consumer of zirconium mineral concentrates, China imported 1.01 Mt in 2017, a decrease of 4% from 1.05 Mt imported in the previous year. During the year, many zircon consumers shut down operations to perform plant modifications to ensure compliance with environmental policies.

Kenya

Base Resources Ltd produced 42,200 t of zircon from its Kwale operation in 2017, a decrease of 3% from that of 2016. The Kwale Phase 2 mine project was approved in May and was designed to increase the input of heavy-mineral concentrate into the mineral separation plant to maintain output of finished products despite declining ore grades for the remaining life of the mine.

Madagascar

Base Resources announced an agreement with World Titane Holdings, Ltd to acquire an initial 85% interest in the Toliara Mineral Sands project. If the project proceeds to mine development, Base Resources planned to acquire the remaining interest in the project. Measured and indicated resources were 612 Mt containing 6.7% heavy minerals. A decision to begin construction was expected in the second half of 2019.

Mozambique

Kenmare Resources plc produced 74,000 t of zircon in 2017, an increase of 9% from that of 2016. Increased production of heavy-mineral concentrates (HMC) was attributed to improved dredge and dry mining techniques.

Senegal

Mineral Deposits Ltd produced 81,750 t of zircon, an increase of 55% from that of 2016, owing to the introduction of medium-grade zircon sand to the company's product line, which added an additional 20,200 t of zircon production in 2017.

South Africa

Tronox produced 1,21,000 t of zircon from its Namakwa Sands operation and 46,000 t of zircon

from its KZN Sands operation in South Africa, adding to a total of 1,67,000 t, an increase of 2% from that in 2016. The total reported reserves at year-end 2017 for Tronox's operations in South Africa was 864 Mt of ore containing 54.7 Mt of heavy minerals, a 6% decrease from those at year-end 2016.

In 2017, Mineral Commodities Ltd produced 22,111 t of zircon-rutile concentrate, containing 71% zircon and 18% rutile, at its Tormin Mine in Western Cape Province, a 38% decrease in production from that in 2016. Although the amount of ore processed was greater than that in 2018, the zircon and rutile ore grades decreased from those of 2017. The Company's production guidance for 2018 was projected to range from 20,000 to 25,000 t of zircon-rutile concentrate.

Tanzania

In October, Strandline Resources Ltd announced the maiden ore reserves for its Fungoni heavy-mineral-sands project. Using a cut-off grade of 1.5% heavy minerals, reserves were estimated to contain 3.9% heavy minerals and were estimated to support a mine life of 6.2 years.

FOREIGN TRADE

Exports

Exports of zirconium ores and concentrates decreased drastically by 71% to 89 tonnes in 2018-19 from 308 tonnes in the previous year. Exports were mostly to Italy (81%) and Bangladesh (11%). Exports of zirconium and scrap also sharply decreased by 50% to 4 tonnes in 2018-19 as against 8 tonnes in 2017-18. Exports were mostly to Canada (75%). Exports of zirconium waste & scraps were at 3 tonnes in 2018-19 as compared to 7 tonnes in the preceding year (Tables-9 to 12).

Imports

Imports of zirconium ores and concentrates decreased marginally by 9% to 76,077 tonnes in 2018-19 from 83,781 tonnes in the previous year. Main suppliers were Australia (40%) and Malaysia (25%). Imports of zirconium and scrap more than doubled to 61 tonnes in 2018-19 as against 22 tonnes in 2017-18. Imports were mainly from China

(70%), Germany (15%) and USA (8%). Imports of zirconium waste & scraps were at 60 tonnes in 2018-19 as compared to 22 tonnes in the preceding year (Tables-13 to 16).

Table – 9: Exports of Zirconium Ores & Conc. (By Countries)

Country	2017-18(R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	308	31131	89	4470
Italy	-	-	72	2378
Bangladesh	120	11838	10	1243
UAE	181	18448	6	676
Israel	1	95	1	158
Korea, Rep. of	-	-	++	7
UK	-	-	++	7
USA	-	-	++	++
Kenya	1	136	-	-
Oman	5	613	-	-

Figures rounded off

Table – 10: Exports of Zirconium & Scrap (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	8	33359	4	18427
USA	++	2746	++	4476
Canada	4	2378	3	3398
Hong Kong	-	-	++	3355
Iraq	-	-	++	2967
Serbia	-	-	++	1154
Australia	++	298	++	985
Turkey	++	111	++	682
UAE	-	-	++	441
Saudi Arabia	-	-	++	271
Vietnam	-	-	++	239
Other countries	4	27826	++	458

Figures rounded off

Table – 11: Exports of Zirconium Waste & Scrap (By Countries)

Country	2017-18(R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	7	30264	3	10386
Canada	3	2102	3	3398
Hong Kong	-	-	++	3355
USA	++	511	++	1161
Serbia	-	-	++	1154
Australia	++	298	++	985
UAE	-	-	++	299
Nepal	+	83	++	25
Germany	2	26302	++	9
Eithiopia	++	311	-	-
Tanzania	++	259	-	-
Other Countries	1	398	++	++

Figures rounded off

Table – 12: Exports of Zirconium Unwrought Powder (By Countries)

Country	2017-18		2018-19	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2	3095	1	8040
USA	++	2235	++	3315
Iraq	-	-	++	2967
Turkey	++	111	++	682
Saudi Arabia	-	-	++	271
Vietnam	-	-	++	239
Ukrain	-	-	++	179
UAE	-	-	++	141
France	-	-	++	98
Macedonia	-	-	++	52
Israel	++	391	++	40
Other countries	1	358	++	54

Figures rounded off

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**Table- 13: Imports of Zirconium Ores & Conc.
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	83781	6202746	76077	8084381
Australia	53791	4031215	30712	3275809
Malaysia	364	26935	19335	2106280
South Africa	19615	1380560	12237	1244162
Indonesia	3025	251511	5681	613308
USA	294	53552	3038	328270
Senegal	4191	289247	2916	292670
China	2	117	601	66734
Sri Lanka	525	45530	400	45981
Ukraine	1590	95906	476	39541
Sierra Leone	-	-	201	17387
Other countries	384	28173	480	54239

Figures rounded off

**Table – 14: Imports of Zirconium & Scrap
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	22	65330	61	108310
China	9	17764	43	36145
Germany	5	21343	9	28919
USA	++	2190	5	19585
Austria	1	3911	2	8044
Italy	2	7104	++	7670
Malaysia	2	3994	2	5468
Japan	++	432	++	1113
UK	++	469	++	827
Vietnam	-	-	++	266
Netherlands	-	-	++	238
Other countries	3	8123	++	35

Figures rounded off

**Table – 15: Imports of Unwrought Powders
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	++	1326	1	6949
Germany	++	125	1	6683
Vietnam	-	-	++	266
Singapore	++	983	-	-
France	++	115	-	-
USA	++	41	-	-
U K	++	34	-	-
China	++	28	-	-

Figures rounded off

ZIRCON

**Table – 16: Imports of Zirconium Waste & Scrap of Zirconium
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	22	64005	60	101637
China	9	17736	43	36145
Germany	5	21219	8	22236
USA	++	2149	5	19585
Austria	1	3911	2	8044
Italy	2	7104	++	7670
Malaysia	2	3994	2	5468
Japan	++	432	++	1113
UK	++	435	++	827
Netherlands	-	-	++	238
Switzerland	++	11	++	24
Other countries	3	7014	++	11

Figures rounded off

FUTURE OUTLOOK

The development of digital printing of ceramic tile pattern has the potential to increase demand since higher zircon content of the base tile is required to impart aesthetically appealing product and optimize the cost of the digital printing process.

TZ Minerals International Pty Ltd, a major industry analyst of the zircon and Titanium Mineral Sands Industry, expected global zircon demand to increase by 3% to 4% per year from 2015 to 2020.

Zircon and Zirflor are the key ingredients in ceramics, foundry and refraction and are likely to see growth path on account of Government of India's thrust for 'Housing for all'.