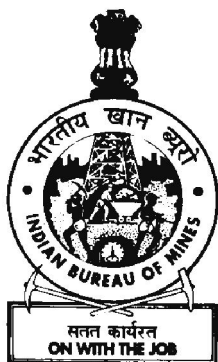


KYANITE, SILLIMANITE AND ANDALUSITE



Indian Minerals Yearbook 2019

(Part- III : MINERAL REVIEWS)

58th Edition

KYANITE, SILLIMANITE AND ANDALUSITE

(ADVANCE RELEASE)

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17 Kyanite, Sillimanite and Andalusite

Kyanite, sillimanite and andalusite are unhydrous aluminosilicate minerals that have the same chemical formula Al_2O_3 but differ in crystal structure and physical properties. When calcined at high temperature around 1,350 °C to 1,380 °C for kyanite and slightly higher for andalusite and sillimanite, these minerals are converted to mullite, ($3 Al_2O_3 \cdot 2SiO_2$) and silica (SiO_2) which are refractory minerals.

Synthetic mullite is made by heating mixtures of alumina and silica or bauxite and kaolin at around 1,550 °C to 2,000 °C. Refractories are heat resistant materials used in high temperature applications, such as, furnaces, ladles, kilns, in the metallurgical, glass, chemical, cement and other industries.

RESERVES/RESOURCES

Kyanite

The total reserves/resources of kyanite as per NMI database, based on UNFC system as on 1.4.2015 in the country has been placed at 104.98 million tonnes. Out of these resources, only 0.68 million tonnes are Reserves and 104.29 million tonnes are under Remaining Resources. Out of total resources, high and medium-grade resources together account for merely 1.74%, low grade 8%, mixed-grade 0.73%, quartz kyanite rock, kyanite gneiss rock and kyanite schist 87.1% and granular, others and not-known grades 2.41%. Statewise, share of Telangana is 46% of the total resources followed by Andhra Pradesh with 30.5%, Karnataka 12.67% and Jharkhand 7.23%.

The remaining 3.60% resources are in Kerala, Maharashtra, Rajasthan, Tamil Nadu and West Bengal collectively (Table-1).

Sillimanite

The total reserves/resources of sillimanite as per NMI database, based on UNFC system in the country as on 1.4.2015 has been placed at 70.20 million tonnes. Out of these resources, 6.50 million tonnes are under Reserves Category, while about 63.70 million tonnes are under the Remaining Resources. Out of total resources, more than 73.33% are granular high-grade, while quartz sillimanite rocks and sillimanite-bearing rocks are about 21.64%. Resources of massive sillimanite of all grades are about 4.83%. The resources are located mainly in Odisha (25.15%), Tamil Nadu (24.87%), Uttar Pradesh (16.30%), Andhra Pradesh (12.52%), Kerala (10.17%) and Assam (6.55%). The remaining 4.44% resources are in Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Rajasthan and West Bengal (Table-2).

Andalusite

The total reserves/resources of andalusite in the country as on 1.4.2015 as per NMI database, based on UNFC system has been placed at 28.20 million tonnes. Most of the resources are of reconnaissance category located in Uttar Pradesh (Table-3).

EXPLORATION & DEVELOPMENT

Details of exploration & development if any are covered in the review of "Exploration & Development" under "General Reviews".

KYANITE, SILLIMANITE AND ANDALUSITE

**Table – 1 : Reserves/Resources of Kyanite as on 1.4.2015
(By Grades/States)**

Grade/State	Reserves				Remaining Resources						Total Resources (A+B)	
	Proved STD111	Probable STD121 STD122	Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334		Total (B)
					STD221	STD222						
All India : Total	639121	48958	688079	1505114	568205	2193427	579619	3577402	95869713	-	104293480	104981559
By Grades												
High grade	-	-	-	-	4317	21867	-	297827	114689	-	438700	438700
Medium grade	212881	48958	261839	430490	-	276651	-	34410	381532	-	1123083	1384922
Low grade	426240	-	426240	234210	15930	1178813	386247	2214900	3952872	-	7982972	8409212
High & medium mixed	-	-	-	-	100550	53103	-	93640	106928	-	354221	354221
Medium & low mixed	-	-	-	-	-	-	-	-	48000	-	48000	48000
High, medium & low mixed	-	-	-	13097	89650	10606	-	45000	210025	-	368378	368378
Granular	-	-	-	-	-	-	-	167000	81359	-	248359	248359
Quartz kyanite rock	-	-	-	-	-	-	-	-	81105358	-	81105358	81105358
Kyanite gneiss rock	-	-	-	-	-	-	-	-	5370800	-	5370800	5370800
Kyanite schist	-	-	-	-	-	-	-	724625	4250000	-	4974625	4974625
Others	-	-	-	593710	23491	303166	1012	-	12530	-	933909	933909
Not-known	-	-	-	233607	334267	349221	192360	-	235620	-	1345075	1345075
By States												
Andhra Pradesh	-	-	-	-	-	-	399	-	32003829	-	32004228	32004228
Jharkhand	426240	-	426240	824472	524467	881313	-	1754900	3182363	-	7167515	7593755
Karnataka	-	-	-	637460	15930	113630	386247	1610502	10531529	-	13295298	13295298
Kerala	-	-	-	-	-	-	192360	-	10000	-	202360	202360
Maharashtra	212881	48958	261839	30085	27808	1187479	1012	45000	1684113	-	2975497	3237336
Rajasthan	-	-	-	13097	-	10606	-	-	-	-	23703	23703
Tamil Nadu	-	-	-	-	-	-	-	167000	81359	-	248359	248359
Telangana	-	-	-	-	-	-	-	-	48350000	-	48350000	48350000
West Bengal	-	-	-	-	-	-	-	-	26520	-	26520	26520

Figures rounded off

KYANITE, SILLIMANITE AND ANDALUSITE

**Table – 2 : Reserves/Resources of Sillimanite as on 1.4.2015
(By Grades/States)**

Grade/States	Reserves				Remaining Resources						Total Resources (A+B)		
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333		Reconnaissance STD334	Total (B)
		STD121	STD122			STD221	STD222						
All India : Total	323231	5728868	450016	6502115	1020187	135278	20257525	4580083	17790664	16068690	3849600	63702027	70204142
By Grades													
Massive high grade	-	-	-	-	-	-	-	-	-	11903	-	11903	11903
Massive medium grade	-	-	-	-	-	4000	-	-	-	29705	-	33705	33705
Massive low grade	44021	-	15000	59021	300	-	519	-	850000	2273786	-	3124605	3183626
Massive high & medium	-	-	-	-	-	-	-	-	-	19800	-	19800	19800
Massive medium & low	136981	-	7274	144255	-	-	-	-	-	-	-	-	144255
Massive high, medium & low	-	-	-	-	-	-	-	-	-	38	-	38	38
Granular high	128789	5728868	427742	6285399	1019887	120208	20257006	2480083	7590600	13732942	-	45200726	51486125
Quartz sillimanite rock	-	-	-	-	-	-	-	-	-	-	-	3748000	3748000
Sillimanite- bearing rock	-	-	-	-	-	-	-	2100000	9350000	-	-	11450000	11450000
Others	-	-	-	13440	-	11070	-	-	-	-	-	11070	11070
Unclassified	13440	-	-	-	-	-	-	-	-	-	-	-	13440
Not-known	-	-	-	-	-	-	-	-	64	516	101600	102180	102180
By States													
Andhra Pradesh	2045	-	37	2082	15	11278	12	267	7430300	1346988	-	8788861	8790943
Assam	-	-	-	-	-	-	-	-	850000	6700	3748000	4604700	4604700
Jharkhand	-	-	-	-	-	-	-	-	-	83000	-	83000	83000
Karnataka	-	-	-	-	-	-	-	-	-	982725	-	982725	982725
Kerala	-	-	-	-	1015625	120000	-	2479816	160300	3369200	-	7144941	7144941
Madhya Pradesh	-	-	-	-	-	-	-	-	-	-	101600	101600	101600
Maharashtra	181002	-	22274	203276	-	-	-	-	64	15516	-	15580	218856
Meghalaya	-	-	-	-	-	-	-	-	-	55807	-	55807	55807
Odisha	-	5728868	427705	6156573	-	-	6557013	-	-	4943600	-	11500613	17657186
Rajasthan	-	-	-	-	300	-	519	-	-	-	-	819	819
Tamil Nadu	140184	-	-	140184	4246	4000	13699981	-	-	3612154	-	17320381	17460565
Uttar Pradesh	-	-	-	-	-	-	-	2100000	9350000	-	-	11450000	11450000
West Bengal	-	-	-	-	-	-	-	-	-	1653000	-	1653000	1653000

Figures rounded off

KYANITE, SILLIMANITE AND ANDALUSITE

Table – 3 : Reserves/ Resources of Andalusite as on 1.4.2015

(In '000 tonnes)

State	Total Reserves	Remaining Resources		Total Resources (A+B)
	Total (A)	Inferred STD333	Reconnaissance STD334	Total (B)
All India : Total	-	4000	24201	28201
By Grades				
Unclassified	-	-	24201	24201
Low	-	4000	-	4000
By States				
Jharkhand	-	4000	1	4001
Uttar Pradesh	-	-	24200	24200

Figures rounded off

PRODUCTION & STOCKS

Kyanite

The production of kyanite was 4,889 tonnes in 2018-19, this decreased by 37% as compared to that of the previous year. There were 4 reporting mines in 2018-19 against 5 reporting mines in the previous year. Two producers contributed the entire production of kyanite during the year.

In 2018-19, 4,681 tonnes, i.e., about 96% of the total production of kyanite was of grade 40% Al₂O₃ & above. About 38% of the total production was reported by the Public Sector and 62% by Private Sector (Tables - 4 to 6).

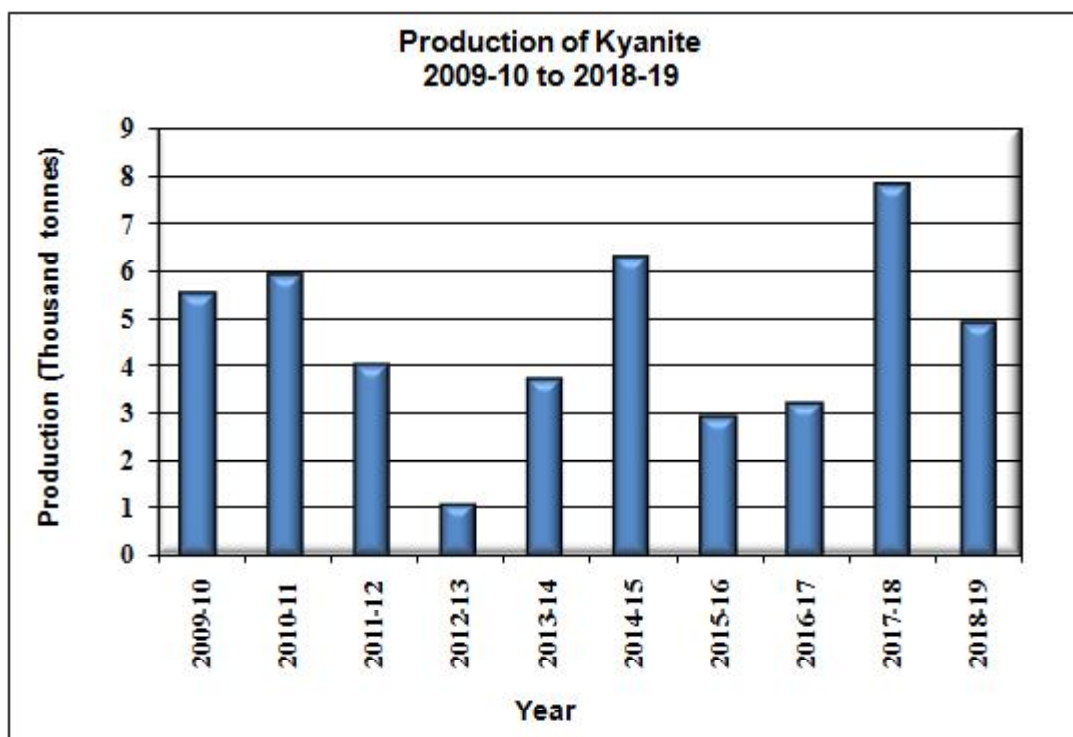
Mine-head closing stocks of kyanite for 2018-19 were 12,384 tonnes as against 12,340 tonnes in 2017-18 (Table-7).

The average daily employment of labour was 51 in 2018-19 as against 80 in the preceding year.

Table – 4 : Principal Producers of Kyanite, 2018-19

Name & address of producer	Location of mine	
	State	District
Pavri Kyanite Mines, A-1, Indra Sagar, Ravindranath Tagore Marg, Civil Lines, Nagpur- 440 001, Maharashtra.	Maharashtra	Bhandara
Maharashtra State Mining Corporation Ltd Plot No. 7, Ajani Chowk, Wardha Road, Nagpur - 440 015, Maharashtra.	Maharashtra	Bhandara

KYANITE, SILLIMANITE AND ANDALUSITE



**Table – 5 : Production of Kyanite, 2016-17 to 2018-19
(By States)**

(Qty in tonnes; Value in ` '000)

State	2016-17		2017-18		2018-19 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	3253	13458	7818	23277	4889	15228
Maharashtra	3253	13458	7818	23277	4889	15228

**Table – 6 : Production of Kyanite, 2017-18 and 2018-19
(By Sectors/States/Districts/Grades)**

(Qty in tonnes; Value in ` '000)

State/District	No. of mines	2017-18			Value	2018-19 (P)				
		Quantity				No. of mines	Quantity			Value
		40% & above Al ₂ O ₃	Below 40% Al ₂ O ₃	Total			40% & above Al ₂ O ₃	Below 40% Al ₂ O ₃	Total	
India	5	7818	-	7818	23277	4	4681	208	4889	15228
Public sector	1	2318	-	2318	4098	1	1640	208	1848	3138
Private sector	4	5500	-	5500	19179	3	3041	-	3041	12090
Karnataka	1*	-	-	-	-	-	-	-	-	-
Mysuru	1*	-	-	-	-	-	-	-	-	-
Maharashtra	4	7818	-	7818	23277	4	4681	208	4889	15228
Bhandara	4	7818	-	7818	23277	4	4681	208	4889	15228

*Only labour reported

**Table – 7 : Mine-head Closing Stocks of Kyanite, 2017-18 and 2018-19
(By States/Grades)**

(Qty in tonnes)

State	2017-18			2018-19 (P)		
	40% Al ₂ O ₃ & above	Below 40% Al ₂ O ₃	Total	40% Al ₂ O ₃ & above	Below 40% Al ₂ O ₃	Total
India	953	11387	12340	817	11567	12384
Jharkhand	-	1327	1327	-	1327	1327
Karnataka	-	10033	10033	-	10033	10033
Maharashtra	953	27	980	817	207	1024

Sillimanite

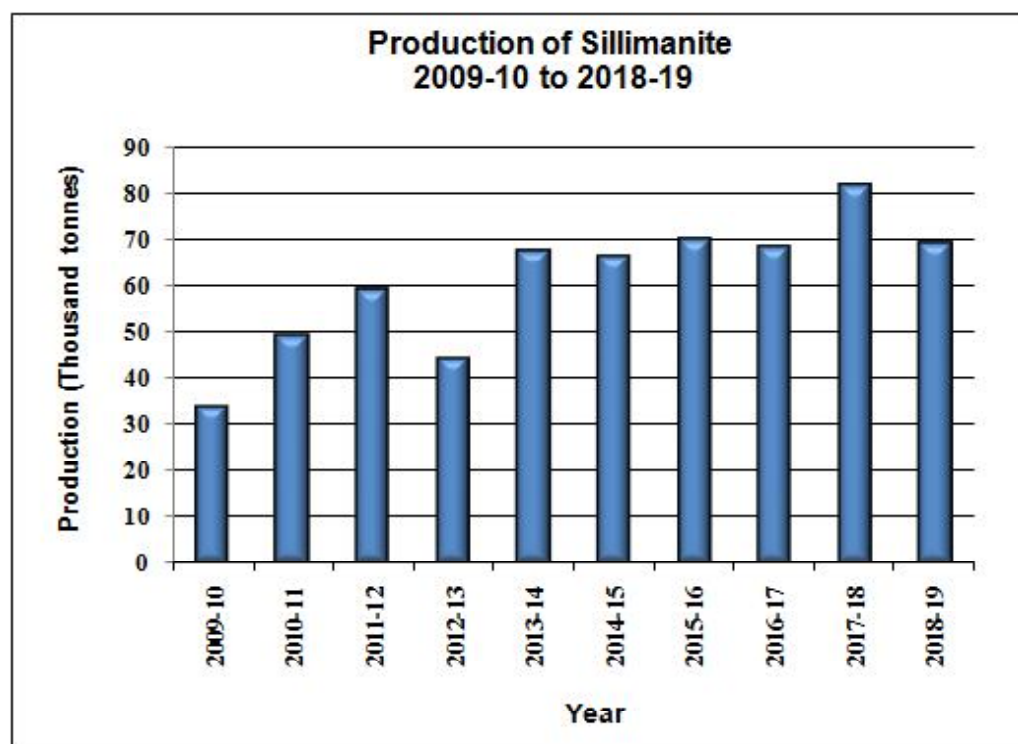
The production of sillimanite at 69,033 tonnes in 2018-19 decreased by 15% as compared to that in the previous year. There were 6 reporting mines in 2018-19. Besides, four mines reported production of sillimanite as an associated mineral with garnet and kyanite during the year.

Ninety-nine per cent of total production during the year was contributed by three producers. About 35% of total production of sillimanite was reported by the Public Sector mines, while the remaining 65% of production was

reported by the Private Sector mines. Andhra Pradesh, the main producing State, contributed 45% of the total output in 2018-19 followed by Odisha (25%), Maharashtra (19%), Kerala (11%), and remaining share was contributed by Meghalaya (Tables - 8 to 10).

Mine-head closing stocks for the year 2018-19 were 16,324 tonnes as against 21,635 tonnes in the previous year (Table - 11).

The average daily employment of labour during 2018-19 was 1,883 as against 1,678 in the previous year.



KYANITE, SILLIMANITE AND ANDALUSITE

Table – 8 : Principal Producers of Sillimanite, 2018-19

Name & address of producer	Location of mine	
	State	District
#Trimex Sands Private Limited, Trimex Towers, No.-1, Subbraya Avenue, C.P. Ramaswamy Road, Alwarpet, Chennai - 600 018. Tamil Nadu.	Andhra Pradesh	Srikakulam
Indian Rare Earths Ltd, Plot No. 1207, V. S Marg, Prabhadevi, Mumbai-400 028, Maharashtra.	Kerala Odisha	Kollam Ganjam
*Pavri Kyanite Mines, A/1, Indrasagar, Ravindranath Tagore Road, Civil Lines, Nagpur- 440 001 Maharashtra.	Maharashtra	Bhandara

Producing as an associated mineral with garnet

* Producing as an associated mineral with kyanite

**Table – 9 : Production of Sillimanite, 2016-17 to 2018-19
(By States)**

(Qty in tonnes; Value in `'000)

State	2016-17		2017-18		2018-19(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	68131	535949	81638	671690	69033	559792
Andhra Pradesh	37109	321945	53749	472024	31243	289278
Kerala	9254	87400	7538	74012	7327	82160
Maharashtra	6196	22739	3194	10904	13404	49907
Meghalaya	-	-	459	3374	24	168
Odisha	15572	103865	16698	111376	17035	138279

**Table – 10 : Production of Sillimanite, 2017-18 and 2018-19
(By Sectors/States/Districts)**

(Qty in tonnes; Value in `'000)

State/District	2017-18			2018-19 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	5(4)	81638	671690	6(4)	69033	559792
Public sector	4	24326	185596	5	24419	220642
Private sector	1(4)	57312	486094	1(4)	44614	339150
Andhra Pradesh	(1)	53749	472024	(1)	31243	289278
Srikakulam	(1)	53749	472024	(1)	31243	289278
Kerala	2	7538	74012	3	7327	82160
Kollam	2	7538	74012	3	7327	82160
Maharashtra	1(3)	3194	10904	1(3)	13404	49907
Bhandara	1(3)	3194	10904	1(3)	13404	49907
Meghalaya	1	459	3374	1	24	168
Khasi Hills West	1	459	3374	1	24	168
Odisha	1	16698	111376	1	17035	138279
Ganjam	1	16698	111376	1	17035	138279

Figures in parentheses indicate the number of associated mines with garnet and kyanite

Table – 11: Mine-head Closing Stocks of Sillimanite, 2017-18 and 2018-19 (By States)

(In tonnes)

State	2017-18	2018-19 (P)
India	21635	16324
Andhra Pradesh	2428	865
Kerala	1470	1918
Meghalaya	244	188
Maharashtra	16830	11965
Odisha	663	1388

Andalusite

There was no production of andalusite reported since 1988.

MINING & MARKETING

Kyanite

Kyanite mines are worked by opencast manual as well as semi-mechanised methods. Generally, the mineral is marketed under three grades: 60% Al₂O₃ and above, 50-60% Al₂O₃ and less than 50% Al₂O₃. These three grades are used in the manufacture of refractories.

Sillimanite

Sillimanite mines are also worked by opencast method. Pohra mine of Maharashtra State Mining Corporation Ltd is semi-mechanised.

Granular sillimanite is obtained from beach sands in Kerala, Odisha and Tamil Nadu as a by-product along with ilmenite, rutile, zircon, garnet, etc. while recovering monazite. The Odisha Sands Complex of IREL in the coastal region of Chatrapur in Ganjam district, Odisha has the capacity to recover 10,000 tpy granular sillimanite at present. At Chatrapur, mining is carried out by suction dredging with gravel pump. Presently IREL's Chavara plant in Kollam district, Kerala, has an installed capacity of 10,000 tpy granular sillimanite.

At Chavara in Kerala, beach sand mining operations are carried out by IREL in two stages: (i) by means of bulldozers and wheel loaders, and

subsequently loading by front-end loaders, wheel loaders and belt conveyors; and (ii) upgrading it to around 93% heavy minerals at Dredge & Wet Concentration Plant and concentrate upgrading unit. The Mineral Recovery Plant (MRP) essentially consists of a dredging system to mine the deposit and a pre-concentration system to separate the valuable minerals and dispose of the waste at the same place from where it was mined. The two systems are mounted on a combined floating platform which keeps moving with the progress of mining. For details regarding mining and processing, etc. of beach sand minerals, Review on 'Ilmenite and Rutile' may be referred.

USES

Kyanite, sillimanite and andalusite are mainly used in refractories and ceramic products because of their ability to form mullite phase at high temperature. Mullite is an essential component of high-alumina refractories forming the inner lining of furnaces and high temperature vessels widely used in the production of metals, ceramics, glass and cement. These are used to manufacture refractory products like dense bricks, insulating bricks, monolithic & castables. Sillimanite refractory bricks are extensively used in steel and glass industries and also in ceramics, cement kilns, heat treatment furnaces and petrochemical industries.

SPECIFICATIONS

BIS has prescribed IS:14301-1995 (reaffirmed in 2011) for kyanite used in Refractory Industry. There are two grades i.e. Grade-1 and Grade-2. Composition of kyanite under this specification is Al₂O₃ 58% min. Grade-1 and 54% min. for Grade-2; Fe₂O₃ 1.50% max., K₂O + Na₂O 1% max.; other constituents would be for as agreed between the supplier and purchaser. Pyrometric Cone Equivalent (PCE) specified would have to be not less than 36 for Grade-1 and 35 for Grade-2. Size of the material is 50 to 150 mm or 10 to 50 mm.

BIS has laid down IS:14302-1995 (reaffirmed in 2011) in respect of beach sand sillimanite for use in Refractory Industry, while IS:2045-1962 in respect of natural sillimanite blocks for glass melting tanks furnaces has been withdrawn.

CONSUMPTION

Kyanite

The consumption of kyanite in various industries was 5,100 tonnes in 2018-19 which is about 23% less than previous year. Almost all consumption of kyanite was accounted for by the Refractory Industry and negligible amount of consumption is reported by other industries (Table-12).

Sillimanite

The consumption of sillimanite was 56,100 tonnes in 2018-19, which is about 26% less than that of the previous year. Refractory Industry alone accounted for about 78% of consumption, Ceramic Industry (4%), Foundry Industry (10%) and rest by Other Industries (Table-12).

Table – 12 : Consumption* of Kyanite and Sillimanite 2016-17 to 2018-19 (By Industries)

(In tonnes)			
Industry	2016-17	2017-18(R)	2018-19(P)
Kyanite			
All Industries	3400	6600[#]	5100[#]
Refractory	3100	6600	5100
Others	300	++	++
Sillimanite			
All Industries	24200	75900[#]	56100[#]
Ceramic	2400	8700	2500
Foundry	1300	4000	5400
Refractory	19300	59000	43800
Others (abrasives, cement, chemicals, etc.)	1200	4200	4400

Figures rounded off.

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

[#]Consumption estimated from the despatches, as reported in Form-H under Rule-45 of MCDR, 2017.

WORLD REVIEW

World reserve of kyanite and related minerals is large in the USA. Andalusite is limited to only a few countries. The main producer and exporter of andalusite is South Africa and France while USA and India are the main producers of kyanite. India is the leading producer of sillimanite. World production of kyanite and related minerals is indicated in Table-13.

Table – 13 : World Production of Sillimanite Minerals (By Principal Countries) (In tonnes)

Country	2016	2017	2018
Brazil			
Kyanite ^c	200	200	200
France			
Andalusite ^e	6500	58000	68000
India*			
Kyanite ^e	5100	3253	7818
Sillimanite ^e	73000	68131	81638
Madagascar			
Andalusite	1800	1800	4200
Nepal			
Kyanite ^e	1	2	-
South Africa			
Andalusite ^c	190000	190000	190000
USA			
Kyanite ^b	79700	91300	95000 ^e

Source: BGS World Mineral Production, 2014-2018, BGS.

(a) May Include other sillimanite minerals.

(b) Including related minerals.

(c) Including beneficiated and directly shipped material.

(d) Years ended 31st March following the stated.

(e) Years ending 15th July of the stated.

*India's production during 2016-17, 2017-18 and 2018-19 in respect of Kyanite is 3,253 tonnes, 7,818 tonnes & 4,889 tonnes respectively and in respect of Sillimanite is 68,131 tonnes, 81,638 tonnes & 69,033 tonnes respectively.

The availability of inexpensive refractory-grade bauxite from China served to increase demand for refractories from

alternative raw material such as andalusite. Demand for refractories in iron and steel production is expected to have larger increases in countries with higher growth rates in steel production. Increased demand also is anticipated for refractories used to produce other metals and in the industrial mineral market because of increasing production of cement, ceramics, glass, and other mineral products.

FOREIGN TRADE

Exports

Exports of kyanite during 2018-19 at 284 tonnes increased drastically by 70% from 166 tonnes in the previous year. Exports were mainly to Greece (59%), China (20%), Saudi Arabia (7%), Nepal & Niger (5%), Philippines & Yemen (2% each). On the other hand exports of sillimanite decreased by 38% to 9,986 tonnes in 2018-19 from 16,193 tonnes in the previous year. Sillimanite was exported mainly to China (83%) &

remaining other was contributed by Japan & Germany (5% each) and Nepal (3%). Exports of andalusite during 2018-19 increased manifolds 100 tonnes from 6 tonnes in the previous year. Andalusite was exported mainly to Saudi Arabia (75%) and UAE (25%) (Tables - 14 to 16).

Imports

In 2018-19, imports of kyanite were at 997 tonnes as against 620 tonnes in the previous year registering an increase of 61%. Imports of sillimanite were at 99 tonnes which increased manifolds during 2018-19 as compared to the previous year. Imports of andalusite at 14,263 tonnes decreased slightly by 1 % during 2018-19 from that of the previous year. The imports of kyanite were from USA (74%) and China (22%). Ukraine (53%), Hong Kong (28%), Japan (7%), China (6%) and USA (5%) were the main suppliers of sillimanite, while South Africa (82%), France (11%) and Peru (6%) were the main suppliers of andalusite in 2018-19 (Tables - 17 to 19).

**Table – 14: Exports of Kyanite
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	166	3404	284	4873
Greece	140	2598	167	3514
China	-	-	56	591
Saudi Arab	-	-	20	241
Nepal	6	144	13	162
Nigeria	-	-	13	96
Phillippines	-	-	5	86
Yemen	-	-	5	83
Bangladesh	1	30	1	53
UAE	16	498	3	41
Malawi	-	-	++	5
Other countries	3	134	++	++

Figures rounded off

**Table – 15: Exports of Sillimanite
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	16193	171835	9986	111874
China	12616	127570	8294	86553
Japan	452	7886	457	10834
Germany	1062	12336	505	5887
Nepal	1189	8519	333	1950
Thailand	235	3927	90	1752
Iran	238	5498	50	1146
Malaysia	87	1405	50	923
Saudi Arabia	50	842	50	822
Taiwan	-	-	48	622
Vietnam	50	901	30	616
Other countries	214	2950	79	770

Figures rounded off

**Table – 16: Exports of Andalusite
(By Countries)**

Country	2017-18 (R)		2018-19(P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	6	327	100	2660
UAE	6	327	25	1425
Saudi Arabia	-	-	75	1234

Figures rounded off

KYANITE, SILLIMANITE AND ANDALUSITE

**Table – 17: Imports of Kyanite
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	620	17807	997	27590
USA	538	17104	739	24700
China	82	703	218	1675
Virgin Is Us	-	-	40	1197
Japan	-	-	++	18

Figures rounded off

**Table – 18 : Imports of Sillimanite
(By Countries)**

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	18	1028	99	2404
Ukraine	-	-	52	755
Hong Kong	-	-	28	424
Japan	9	729	7	530
China	-	-	6	386
USA	5	231	5	276
Taiwan	4	46	1	22
Kuwait	-	-	++	8
UK	-	-	++	3
Italy	++	12	-	-
Belgium	++	10	-	-

Figures rounded off

**Table – 19 : Imports of Andalusite
(By Countries)**

Country	2017-18		2018-19	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	14375	318253	14263	355232
South Africa	13495	287655	11751	277035
France	879	30566	1608	52576
Peru	-	-	876	24625
USA	++	8	20	551
Germany	-	-	8	445
China	1	24	-	-

Figures rounded off

FUTURE OUTLOOK

The demand for high quality raw and calcined sillimanite minerals is closely linked to the need for high performance refractories with increased operational lifespans. As the predominant consumer of refractory products, the Steel Manufacturing Industry provides a reliable market indicator of the demand for sillimanite minerals.

The Asia-Pacific region remains the largest market for refractories. The production of sillimanite is likely to increase in the coming years to meet the demand. China will remain the leading market on global front. Demand for refractory minerals in India is likely to scale up in commensurate with steel production which also is likely to show an increasing trend.

