

KYANITE, SILLIMANITE AND ANDALUSITE



Indian Minerals Yearbook 2020

(Part- III : MINERAL REVIEWS)

59th Edition

KYANITE, SILLIMANITE AND ANDALUSITE

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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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 & kyanite schist 87.1% and granular, others & 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)**

(In tonnes)

Grade/State	Reserves				Remaining Resources				Total Resources (A+B)			
	Proved STD111	Probable STD121	Total (A)	Feasibility STD211	Pre-feasibility STD221	Measured STD331	Indicated STD332	Inferred STD333		Reconnaissance STD334	Total (B)	
												STD122
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

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**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	-	-	-	-	11070	-	-	-	-	-	-	11070	11070			
Unclassified	13440	-	-	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

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**Table – 3 : Reserves/ Resources of Andalusite as on 1.4.2015
(By Grades/ States)**

(In '000 tonnes)

State	Total Reserves	Remaining Resources		Total Resources (A+B)
	Total (A)	Inferred STD333	Reconnaissance STD334	
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 3,497 tonnes in 2019-20, this decreased by 28% as compared to 4,889 tonnes in previous year. There were 5 reporting mines in 2019-20 against 4 reporting mines in the previous year. Three principal producers contributed the entire production of kyanite during the year.

In 2019-20, 2,248 tonnes, i.e., about 64% of the

total production of kyanite was of grade 40% Al₂O₃ & above and the remaining 36%, i.e., about 1,249 tonnes was of grade below 40% Al₂O₃. About 25% out of the total production was reported by the Public Sector and 75% by Private Sector (Tables - 4 to 6).

Mine-head closing stocks of kyanite for 2019-20 were at 9,621 tonnes as against 12,384 tonnes in 2018-19 (Table-7).

The average daily employment of labour was 62 in 2019-20 as against 64 in the preceding year.

Table – 4 : Principal Producers of Kyanite, 2019-20

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, Ajni Chowk, Wardha Road, Nagpur - 440 015, Maharashtra.	Maharashtra	Bhandara
Mohammad Akram Rasheed, 3 Marcha Halli, H.D.Kote Mysore-571 125. Karnataka	Karnataka	Mysore

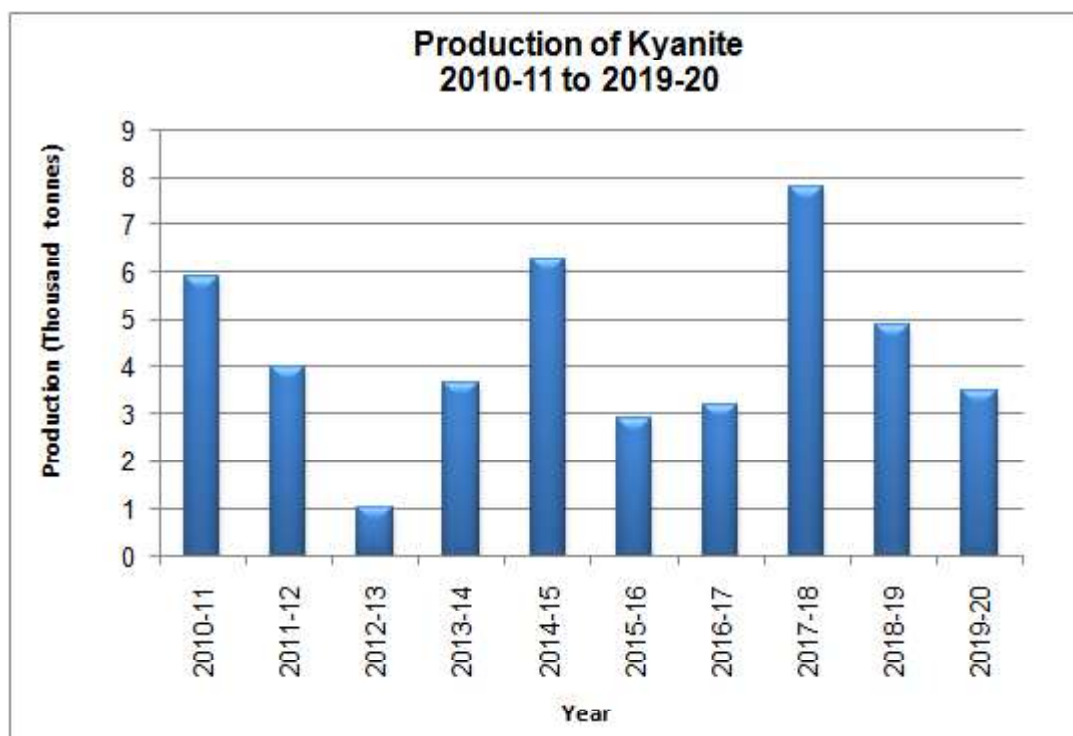


Table – 5 : Production of Kyanite, 2017-18 to 2019-20 (By States)

(Qty in tonnes; Value in ₹'000)

State	2017-18		2018-19		2019-20 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	7818	23277	4889	15757	3497	11743
Maharashtra	7818	23277	4889	15757	3097	10863
Karnataka	-	-	-	-	400	880

Table – 6 : Production of Kyanite, 2018-19 and 2019-20 (By Sectors/States/Districts/Grades)

(Qty in tonnes; Value in ₹ '000)

State/District	No. of mines	2018-19				2019-20 (P)				
		Quantity			Value	No. of mines	Quantity			Value
		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	4	4681	208	4889	15757	5	2248	1249	3497	11743
Public sector	1	1640	208	1848	3019	1	13	849	862	1440
Private sector	3	3041	-	3041	12738	4	2235	400	2635	10303
Karnataka	-	-	-	-	-	1	-	400	400	880
Mysuru	-	-	-	-	-	1	-	400	400	880
Maharashtra	4	4681	208	4889	15757	4	2248	849	3097	10863
Bhandara	4	4681	208	4889	15757	4	2248	849	3097	10863

**Table – 7 : Mine-head Closing Stocks of Kyanite, 2018-19 & 2019-20
(By States/Grades)**

(Qty in tonnes)

State	2018-19			2019-20 (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	817	11567	12384	249	9372	9621
Jharkhand	-	1327	1327	-	1326	1326
Karnataka	-	10033	10033	-	7915	7915
Maharashtra	817	207	1024	249	131	380

Sillimanite

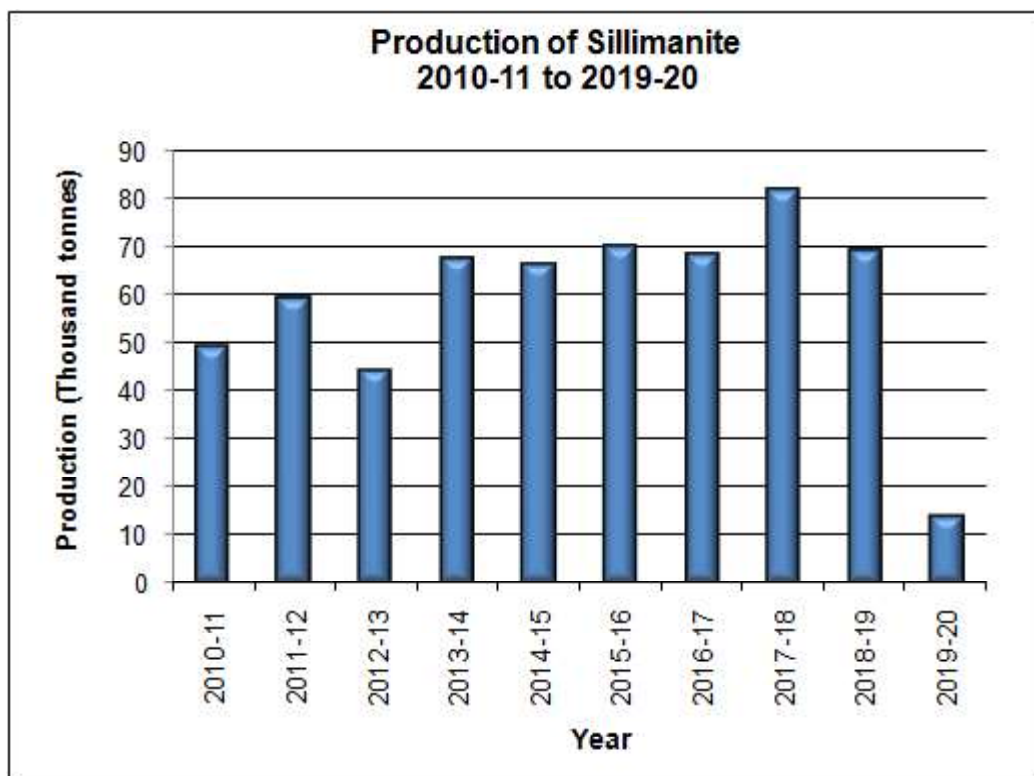
The production of sillimanite at 13,236 tonnes in 2019-20 decreased by 81% as compared to 69,919 tonnes in the previous year. There were 2 reporting mines in 2019-20 as against 6 mines reported in the year 2018-19. The main reason for decrease in number of mines is on account of classification of some sillimanite producing mines, as Beach Sand Minerals (BSM) mines in Andhra Pradesh, Odisha and Kerala. Earlier these mines were considered under sillimanite as a part of MCDR mineral prior to separate classification as BSM and Non-BSM. This has also resulted in shrinking of production. Besides, three mines reported production of

sillimanite as an associated mineral with kyanite during the year. (Table-8, 9 & 10)

The whole production of sillimanite was reported by Private Sector during the year 2019-20. Maharashtra is the only State which contributed cent per cent production of sillimanite during the year 2019-20.

Mine-head closing stocks for the year 2019-20 were 10,129 tonnes as against 15,804 tonnes in the previous year (Table - 11).

The average daily employment of labour during 2019-20 was 29 as against 2,042 in the previous year.



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Table – 8 : Principal Producers of Sillimanite, 2019-20

Name & address of producer	Location of mine	
	State	District
*Dighori Kyanite Mine, Apna Nagar, Tkiya Ward, Nagpur Road Bhandara, Bhandara-441 904, Maharashtra.	Maharashtra	Bhandara
*Pavri Kyanite Mines, A/1, Indrasagar, Ravindranath Tagore Road, Civil Lines, Nagpur- 440 001 Maharashtra.	Maharashtra	Bhandara

* Producing as an associated mineral with kyanite

**Table – 9 : Production of Sillimanite, 2017-18 to 2019-20
(By States)**

(Qty in tonnes; Value in ₹'000)

State	2017-18		2018-19		2019-20(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	81638	671690	69919	564498	13236	36322
Andhra Pradesh	53749	472024	31243	288810	-	-
Kerala	7538	74012	7318	82173	-	-
Maharashtra	3194	10904	13404	49477	13236	36322
Meghalaya	459	3374	24	168	-	-
Odisha	16698	111376	17930	143870	-	-

Note: The main reason for decrease in number of mines is classification of some sillimanite producing mines, as BSM mines in Andhra Pradesh, Kerala and Tamil Nadu. Earlier, these mines were considered under sillimanite mineral as a part of MCDR mineral as there was no separate classification of Beach Sand minerals (BSM) and Non-Beach Sand Minerals (Non-BSM).

**Table – 10 : Production of Sillimanite, 2018-19 & 2019-20
(By Sectors/States/Districts)**

(Qty in tonnes; Value in ₹'000)

State/District	2018-19			2019-20 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	6(4)	69919	564498	2(3)	13236	36322
Public sector	5	25305	226169	2	-	-
Private sector	1(4)	44614	338329	(3)	13236	36322
Andhra Pradesh	(1)	31243	288810	-	-	-
Srikakulam	(1)	31243	288810	-	-	-
Kerala	3	7318	82173	-	-	-
Kollam	3	7318	82173	-	-	-
Maharashtra	1(3)	13404	49477	2(3)	13236	36322
Bhandara	1(3)	13404	49477	2(3)	13236	36322
Meghalaya	1	24	168	-	-	-
Khasi Hills West	1	24	168	-	-	-
Odisha	1	17930	143870	-	-	-
Ganjam	1	17930	143870	-	-	-

Figures in parentheses indicate the number of associated mines with kyanite

Note: The main reason for decrease in number of mines is classification of some sillimanite producing mines as BSM mines in Andhra Pradesh, Kerala and Tamil Nadu. Earlier, these mines were considered under sillimanite mineral as a part of MCDR mineral as there was no separate classification of Beach Sand minerals (BSM) and Non-Beach Sand Minerals (Non-BSM).

Table – 11: Mine-head Closing Stocks of Sillimanite, 2018-19 & 2019-20 (By States)

(In tonnes)		
State	2018-19	2019-20 (P)
India	15804	10129
Andhra Pradesh	865	-
Kerala	1918	-
Meghalaya	188	188
Maharashtra	11964	9941
Odisha	869	-

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 in manufacturing 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 7,700 tonnes in 2019-20 which is about 51% more than previous year. Nearly 88% consumption of kyanite was accounted for by the Refractory Industry and the remaining 12% by other industries (Table-12).

Sillimanite

The consumption of sillimanite was 23,400 tonnes in 2019-20, which is about 58% less than that of the previous year. Refractory Industry alone accounted for about 89% of consumption. Ceramic Industry (2%), Foundry Industry (5%) and Other Industries accounted for the rest. (Table-12).

Table – 12 : Consumption* of Kyanite and Sillimanite 2017-18 to 2019-20 (By Industries)

(In tonnes)			
Industry	2017-18	2018-19 (R)	2019-20 (P)
Kyanite			
All Industries	6600	5100	7700
Refractory	6600	5100	6800
Others	++	++	900
Sillimanite			
All Industries	75900	56100	23400
Ceramic	8700	2500	500
Foundry	4000	5400	1100
Refractory	59000	43800	20800
Others (abrasives, cement, chemicals, etc.)	4200	4400	1000

Figures rounded off

* Includes actual reported consumption and/or estimates made from dispatches (as reported in Form FH under Rule-45 & MCDR, 2017/1988) wherever required and coverage may not be complete due to paucity of data.

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 Peru while USA and India are the main producers of kyanite. India is the leading producer of sillimanite. Total reserve of kyanite and sillimanite in India is near about 72,00,000 tonnes. World production of kyanite and related minerals is indicated in Table-13.

Table – 13 : World Production of Minerals (Kyanite, Sillimanite & Andalusite) (By Principal Countries)

(In tonnes)			
Country	2017	2018	2019
France^(a)			
Andalusite ^(e)	68000	65000	68000
India*			
Kyanite ^(e)	7818	4889	2889
Sillimanite ^(e)	81638	69033	12931
Madagascar			
Andalusite	4200	-	-
Nepal			
Kyanite ^(d)	2	-	-
South Africa			
Andalusite ^(e)	200000	200000	190000
USA			
Kyanite ^(b)	91300	89200 ^e	90000 ^(e)

Source: BGS World Mineral Production, 2015-2019, BGS.

(a) May Include other sillimanite minerals.

(b) Including related minerals.

(c) Years ended 31st March following the at stated.

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

(e) Estimated.

*India's production during 2016-17, 2017-18 and 2018-19 in respect of kyanite is 7,818 tonnes, 4,889 tonnes & 3,497 tonnes respectively and in respect of sillimanite is 81,638 tonnes, 69,919 tonnes & 13,236 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 for producing 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 2019-20 at 143 tonnes decreased drastically by 50% from 284 tonnes in the previous year. Exports were mainly to Greece (50%), Saudi Arabia (35%), UAE (9%), Nigeria (5%) and China (1%). Similarly, exports of sillimanite decreased by manifold to 1,026 tonnes in 2019-20 from 9,986 tonnes in the previous year. Sillimanite was exported mainly to Nepal (47%), Japan (23%), China (21%) and Sri Lanka (5%). Exports of about 4% were to

USA, Vietnam, Thailand and other countries. Exports of andalusite during 2019-20 also decreased manifolds to 19 tonnes from 100 tonnes in the previous year. Andalusite was exported solely to UAE (100%) (Tables - 14 to 16).

Imports

In 2019-20, imports of kyanite were at 1,112 tonnes as against 997 tonnes in the previous year registering an increase of 12%. Imports of sillimanite were at 609 tonnes which increased manifolds during 2019-20 as compared to 98 tonnes in the previous year. Imports of andalusite at 17,617 tonnes increased by 24 % during 2019-20 from that of the previous year. The imports of kyanite were mainly from USA (71%) and China (23%) & Ukraine (5%), Hong Kong (18%), South africa (9%) were the main suppliers of sillimanite, while South Africa (83%), France (16%) were the main suppliers of andalusite in 2019-20 (Tables - 17 to 19).

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	284	4873	143	2626
Greece	167	3514	72	1575
Saudi Arabia	20	241	50	541
UAE	3	41	13	421
China	56	591	1	59
Nigeria	13	96	7	16
Nepal	13	162	++	15
Philippines	5	86	-	-
Yemen	5	83	-	-
Bangladesh	1	53	-	-
Malawi	++	5	-	-
Other countries	++	++	-	-

Figures rounded off

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	9986	111874	1026	14963
Japan	457	10834	231	7431
China	8294	86553	216	3570
Nepal	333	1950	487	2809
Thailand	90	1752	25	374
Sri Lanka	3	31	52	366
Vietnam	30	616	10	351
USA	++	28	1	23
Italy	-	-	++	13
Gambia	-	-	4	10
Maldives	-	-	++	8
Other countries	779	10110	++	6

Figures rounded off

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

Country	2018-19 (R)		2019-20(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	100	2660	19	1240
UAE	25	1425	19	1240
Saudi Arabia	75	1234	-	-

Figures rounded off

KYANITE, SILLIMANITE AND ANDALUSITE

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	997	27590	1112	33476
USA	739	24700	790	28596
China	218	1675	260	3721
Ukraine	-	-	56	825
Malaysia	-	-	6	314
Japan	++	18	++	20
Virgin Isl US	40	1197	-	-

Figures rounded off

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	98	2403	609	10780
Ukraine	52	755	416	6321
Hong Kong	28	424	112	1696
South Africa	-	-	54	1398
USA	5	276	17	849
Japan	7	530	3	241
Taiwan	1	22	1	132
China	6	386	6	131
Vietnam	-	-	++	7
UK	++	3	++	3
Belgium	-	-	++	2
Other countries	++	8	-	-

Figures rounded off

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	14263	355231	17617	425962
South Africa	11751	277035	14661	343391
France	1608	52576	2871	80220
USA	20	551	60	1877
Netherlands	-	-	26	474
Peru	876	24625	-	-
Germany	8	445	-	-

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 is also likely to show an increasing trend.
