Indian Minerals Yearbook 2017

(Part- III : Mineral Reviews)

56th Edition

MINOR MINERALS

30.8 FELSPAR

(FINAL RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

Indira Bhavan, Civil Lines,
NAGPUR – 440 001

PHONE/FAX NO. (0712) 2565471
PBX : (0712) 2562649, 2560544, 2560648
E-MAIL : cme@ibm.gov.in
Website: www.ibm.gov.in

March, 2018

30-8 Felspar

Felspars are one of the most abundant rock-forming minerals in the earth's crust, comprising a complex series of aluminosilicates with varying amounts of potassium, sodium, calcium and though rarely barium. Common amongst these are the potash felspars called orthoclase and microcline ($K_2O.Al_2O_3.6SiO_2$), sodium felspar called albite ($Na_2O.Al_2O_3.6SiO_2$) and calcium felspar called anorthite ($CaO.Al_2O_3.2SiO_2$). The sodium and calcium felspars form a continuous series of solid solutions and are together termed plagioclase felspars. Though felspars occur in a variety of colours, pink, brown and grey felspars are known to be common.

The several varieties of felspar minerals are used as gemstones. Three of them, moonstone, sunstone and labradorite are known for their unique optical phenomena. The phenomenal properties of moonstone, sunstone and labradorite are almost always cut as dome-shaped cabochons. Their phenomenal properties are dependent upon light striking microscopic structures within a polished stone at just the right angle. To make that happen, skilled craftmen who understand the optical phenomena of these gems must study the rough and cut the stone so that the planes where the optical phenomena are produced are parallel to the bottom of the cut gemstone.

RESERVES/RESOURCES

As per NMI database, based on UNFC system, the total reserves/resources of felspar as on 1.4.2015 have been placed at 634 million tonnes of which 320 million tonnes (50.47%) constitute as "Reserves" and 314 million tonnes (49.53%) as "Remaining Resources". In terms of grades, Unclassified grade accounts for 57%, Pottery/Ceramic grade 18%, Glass grade 13% and Not-known & Others grades (6% each) of the total resources. By States, Rajasthan alone accounts for about 90% of the total reserves/ resources followed by Telangana (4%), Andhra Pradesh and Tamil Nadu (2% each) (Table - 1).

EXPLORATION & DEVELOPMENT

The exploration & development details, if any, are given in the review on "Exploration & Development" in "General Reviews".

PRODUCTION & STOCKS

As per Govt. of India Notification S.O. 423(E), dated 10th February 2015, 'felspar' has been declared as 'Minor Mineral', hence the production data is not available with IBM.

MINING & MARKETING

Felspar is won chiefly from pegmatites. Mining is carried out, generally, by opencast method. Significant output of felspar is obtained as an associated mineral during mining of quartz, mica and to some extent beryl. Ajmer, Bhilwara and Sikar districts in Rajasthan, Sri Potti Sriramulu Nellore district in Andhra Pradesh and Karur district of Tamil Nadu are the important mining areas in the country.

The pegmatite bodies are exposed after the removal of top soil and overburden. It is then broken either manually or by drilling and blasting.

The broken materials are then sorted out and sized. Crushed felspar is separated mechanically by suitable screens to meet market requirements. The general demand is for 30/80 mesh, 100 mesh, 150 mesh, 180 mesh, 200 mesh and 250 mesh material. Washing is sometimes done to upgrade the product by removing clay, etc. The processed felspar is bagged and despatched to different consignees.

The processing of felspar usually involves flotation or magnetic separation to remove accessory minerals like mica, garnet, ilmenite and quartz. Silica in the form of quartz in pegmatites and silica sand in felspathic sand deposits are obtained as co-products of mining. Though in

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

(In tonnes)

Grade/State	Reserves				Remaining Resources								
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	Total Resources (A+B)
		STD121	STD122			STD221	STD222						
All India : Total	**173383004**	**103054634**	**43403974**	**319841612**	**45903221**	**42467787**	**40160373**	**13882441**	**17928113**	**150012330**	**3371567**	**313725831**	**633567443**
By Grades													
Glass	31101917	18964826	1116975	51183718	8069246	4155097	4088590	238133	181140	15735742	318842	32786790	83970507
Pottery/Ceramic	25598581	11659828	9048026	46306435	17946394	7997021	13703037	2462573	2417929	25265494	1238089	71030537	117336972
Others	9078676	888220	1552793	11519689	2480626	10933380	4250318	342147	100474	6621536	33048	24761530	36281219
Unclassified	106501350	71098791	31198970	208799110	16935671	19338463	17924472	634831	3195686	91436219	1762983	151228326	360027436
Not-known	1102480	442970	487210	2032660	471284	43825	193956	10204757	12032883	10953339	18605	33918649	35951309
By States													
Andhra Pradesh	2295253	150795	556263	3002311	4427537	50911	2379650	361444	1819937	1571271	442950	11053700	14056011
Bihar	-	-	-	-	-	-	35147	-	4195	4871499	-	4910841	4910841
Haryana	-	-	-	-	-	-	-	-	-	72164	-	72164	72164
Jharkhand	68789	15402	191913	276104	-	40766	348792	32510	120388	836061	-	1378517	1654621
Karnataka	-	-	-	-	103675	73613	107055	25000	135133	177300	3900	625676	625676
Madhya Pradesh	-	-	-	-	10330	-	6610	-	-	339851	-	356791	356791
Maharashtra	-	-	-	-	651835	-	323337	-	-	253731	-	1228903	1228903
Meghalaya	-	-	-	-	-	-	-	-	-	37449	-	37449	37449
Rajasthan	161965311	102283772	41417085	305666168	35514780	40938362	33919764	12410200	8488066	132329070	2866777	266467018	572133186
Tamil Nadu	738656	23386	7134	769176	1896213	620530	1101842	18870	69822	5465465	-	9172741	9941916
Telangana	8244089	526905	1231579	10002573	3163212	543605	1938177	134417	3890572	3657219	57940	13385142	23387715
Uttar Pradesh	-	-	-	-	-	-	-	-	-	200000	-	200000	200000
West Bengal	70906	54375	-	125281	135639	200000	-	900000	3400000	201250	-	4836889	4962170

Figures rounded off

some applications, presence of silica is advantageous, most users require extremely pure and finely-ground grades of felspar. Glass grade felspar is usually the most coarse material. The filler application demands finely-ground material. A modern processing plant located at Kodthal in Mahabubnagar district of Telangana and 12 processing plants in Rajasthan cater to Ceramics and Glass industries.

USES

Traditionally potassium felspar obtained from pegmatites is used as a source of alumina and alkali in ceramic and glass industries which account for more than 90% consumption. It also finds use as functional filler in paint, plastic, rubber and adhesive; as a binding agent in abrasives; and in the manufacture of artificial teeth, fertilizer and white cement. Certain varieties of felspar (like moonstone, sunstone and labradorite) are used as semi-precious stones.

In Ceramic Industry, felspar is used as fluxing agent which facilitates softening, melting and wetting of batch constituents. The flux controls the degree of vitrification of the ceramic body during firing. Potash felspar has technical advantages over sodium felspar. After clay, felspar is the biggest ingredient in the raw material batch for ceramic bodies. Typical felspar contents are < 25% in earthenware, 25-35% in sanitaryware, 15-30% in whiteware, 10-55% in floor and wall tiles and 30-55% in electrical porcelain. For Glass Industry, the alkali content in felspar acts as a flux, which not only facilitates lowering the glass batch melting temperature but also cuts production cost. The mineral is primarily added for alumina content which varies in its application from 0.05% for flat glass, 8% for container glass, 11% for some speciality glasses and up to 18% for insulation fibre glass.

In the abrasive industry, plagioclase felspar is used as a mild abrasive material in scouring powders because of its semi-conchoidal fracture and its hardness which is 6 on Mohs' scale. In Refractory Industry, felspar is used as one of the batch constituents in the manufacture of acid-proof refractories. In Welding Electrode Industry, felspar is used as a flux which acts as an arc stabiliser and helps to protect the molten metal from aerial oxidation.

Physical properties like good dispersability, chemical inertness, stable pH, low free silica content and brightness of 89-95% improve the filler properties of finely-ground felspar materials.

INDUSTRY

Ceramic Industry in India is about a century old and has formed a sizeable industrial base. The products generally comprises ceramic tiles, sanitaryware and crockery items. The Industry has its base both in large and small-scale sectors with wide variance in type, size, quality and standard. Manufacturing units are spread all-over India. The state-of-the-art ceramic goods are manufactured in the country. The domestic technology is at par with international standard. During the last two decades, there has been a phenomenal growth in the field of high end technical ceramics to meet specific demands of industries like high alumina ceramic, cutting tools and other structural ceramics.

CONSUMPTION

Felspar is used mainly in ceramic, glass and cement industries. Minor quantities of felspar are consumed by refractory, abrasive and electrode industries. The total consumption of felspar in 2015-16 was 6,01,600 tonnes in the organised sector. Of the total consumption, the ceramic industry accounted for 78%, glass Industry 13%, cement industry about 9% and the negligible quantity by refractory, abrasive, electrode, coal washery and cosmetics industries.

WORLD SCENARIO

World resources of felspar are large. The major producers of felspar are Turkey, Italy and China. Substantial production also comes from India, Thailand and Iran.