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MINOR MINERALS

30.1 BARYTES

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
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30-1 Barytes

Baryte or barite is a moderately soft crystalline mineral form of barium sulphate ($BaSO_4$). Approximately, 80% barytes produced worldwide is used for oil and gas drilling as a weighting agent in the drill mud, primarily to prevent the explosive release of gas and oil during drilling. Its unique physical and chemical properties like heavyness, high specific gravity, chemical and physical inertness, very low solubility and magnetic neutrality. Barium compounds are utilised as filler, extender and aggregate. Barytes after converting to barium carbonate, is used in the manufacture of ceramic and glass. The Mangampet deposit in Kadapa district of Andhra Pradesh is the single largest barytes deposit in the world. India is one of the leading producers and exporters of barytes in the world.

RESERVES/RESOURCES

The total reserves/resources of barytes in India as on 1.4.2015 as per NMI database, based on UNFC system have been placed at 86.67 million tonnes of which 59% constitute reserves and 41% remaining resources. By grades, 64% resources are of Oil-well drilling grade followed by 6% of Chemical grade (Chemical-A & Chemical-B), 1% of Paint grade and 27% constitute low grade. About 3% resources are of Other, Unclassified and Not-known categories. Among the states Andhra Pradesh alone accounts for 92% of the country's barytes resources. As per the information available, National Data Sharing and Accessibility Policy (NDSAP), the deposits of barytes are located at Relpataliya (Rajasthan), Chimalapenta, Mangampeta and at Vemula (Andhra Pradesh & Telangana), Ghatihosahalli (Karnataka) and at Sukwari (Madhya Pradesh) (Table - 1).

EXPLORATION & DEVELOPMENT

The exploration and developement details are given in the review on EXPLORATION & DEVELOPMENT in "GENERAL REVIEWS".

PRODUCTION

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

MINING, MARKETING AND TRANSPORT

Barytes mines in India are worked by opencast method. Andhra Pradesh Mineral Development Corp. Ltd, (APMDC), the largest producer, obtains barytes from the mechanised opencast mine in Mangampet area in Kadapa district, Andhra Pradesh. Drill machines, loaders, dozers and dumper-trucks are used for removing overburden. Barytes is won from benches using jackhammer drilling followed by blasting and then loading into trucks. The Corporation produces ore by engaging a raising contractor and supplies the ore to Exporters, Oil and Natural Gas Corporation Ltd, Oil India, Barium Chemical Industries and also to local Pulverising Industries. APMDC proposed to set-up beneficiation plant with private participation for beneficiation of low-grade barytes ore at Mangampet. This is due to the encouraging results of beneficiation study carried out by NML, Jamshedpur. It is expected to beneficiate 2 lakh tonnes of low-grade barytes ore per annum. APMDC has entered into an MoU with the ONGC Ltd to set up an industry for upgrading the quality of barytes mineral from Mangampeta.

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

(In tonnes)

Grade/State	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	**50449000**	**49358**	**848467**	**51346825**	**410466**	**323345**	**1258521**	**205834**	**1284390**	**31735548**	**105721**	**35323825**	**86670650**
By Grades													
Chemical-A	121417	13860	77696	212973	52409	53695	49790	-	140553	509819	-	806266	1019239
Chemical -B	1517785	23213	512919	2053917	231053	175630	180872	20167	508494	911750	12835	2040801	4094718
Oil-well Drilling	48615140	9185	174458	48798783	14154	57060	345584	48550	177407	5734783	-	6377538	55176321
Paint	1768	3100	1118	5986	83194	24348	149670	48904	21608	147135	-	474859	480845
Low	-	-	-	-	-	3068	388928	1210	361950	22876753	92886	23724795	23724795
Others	135331	-	73771	209102	28206	9544	122322	-	-	12599	-	172671	381773
Unclassified	57559	-	8505	66064	1450	-	20935	83195	69878	1494283	-	1669741	1735805
Not-known	-	-	-	-	-	-	420	3808	4500	48426	-	57154	57154
By States													
Andhra Pradesh	48990002	49358	372296	49411656	186544	94489	988514	104322	389630	28165637	105721	30034857	79446513
Haryana	-	-	-	-	-	-	-	-	-	440	-	440	440
Himachal Pradesh	-	-	-	-	27288	12846	12645	48904	12370	3000	-	117053	117053
Jharkhand	-	-	-	-	-	-	-	-	-	35900	-	35900	35900
Karnataka	-	-	-	-	78296	136220	14252	-	-	15175	-	243943	243943
Madhya Pradesh	-	-	-	-	-	18500	4472	-	35000	233940	-	291912	291912
Maharashtra	-	-	-	-	-	-	-	14800	89450	18610	-	122860	122860
Rajasthan	134416	-	72571	207167	6018	15890	108577	37808	311500	2304688	-	2784481	2991648
Tamil Nadu	-	-	-	-	-	-	-	-	500	221919	-	222419	222419
Telangana	1324582	-	403420	1728002	112320	45400	130061	-	12940	711239	-	1011960	2739962
Uttarakhand	-	-	-	-	-	-	-	-	-	25000	-	25000	25000
West Bengal	-	-	-	-	-	-	-	-	433000	-	-	433000	433000

Figures rounded off.

The MoU was to beneficiate about five lakh to seven lakh tonnes of inferior barytes per year. ONGC will use part of the beneficiated mineral and the rest will be exported to earn foreign exchange for the country. While marketing, barytes is graded into two varieties: off-colour and snow-white.The white and snow-white varieties are used generally as fillers in the manufacture of rubber goods and as an opacifying material in the manufacture of paints and paper. The off-colour barytes is used for manufacturing chemicals or as drilling muds. Both the well-known grades laid down by Oil Companies Material Association (OCMA) and American Petroleum Institute (API) were produced and marketed in the country. The country supplies drilling grade barytes to the countries in Middle East and South America. The other producer of barytes in the State of Telangana are IBC Ltd, Seripuram, district Khammam.

USES AND SPECIFICATIONS

Oil and Gas Drilling

The properties like non-corrosive, non-abrasive, insolubility in water, inertness and high specific gravity enable barytes application as a weighting agent in drilling operations to remove the cutting from the bits, transport cutting to the surface to reduce the friction in the drilling string, control pressure, prevent blow-out and at the same time to provide lubrication. Barytes most desirable characteristics is its high specific gravity which makes it the only mineral used in substantial tonnages to increase the density of water based drilling. Barytes powder containing minimum 90% barium sulphate with 4.15 specific gravity is recommended for drilling. For offshore drilling, the specific gravity should be 4.2. At least 97% ground barytes should pass through 75- micron IS sieve and 95% through 53- micron IS sieve. BIS has prescribed IS:2881:1984 (Reaffirmed 2010) as specification of barytes for use in Chemical Industry and Oil-well drilling Industry.

Chemical

Major barium chemicals obtained from barytes are carbonate, chloride, oxide, hydroxide, nitrate, peroxide and sulphate. Barium carbonate is used in Glass Industry as a flux to add brilliance & clarity in electro-ceramics and for removing inconvenient impurities in phosphoric acid. Barium hydroxide is used in the preparation of barium salts of organic acids which are utilised as additives for lubricating oils and as stabilisers for PVC. Barium sulphate is used as pigment, extender and filler in Rubber and Paper Industries.

Lithopone, a mixture of $BaSO_4$ and ZnS, is used in Paint and Lacquer Industries as white pigment, extenders and fillers. Barium nitrate is used in green signal flares, tracer bullets, primers and detonators. Barium oxide is used in electric furnace. Barium titanate finds its use in miniature electronic and communication equipment. Barytes is also used in explosive manufacture.

For Chemical Industry, purity is the prime criterion, with ferric oxide and strontium sulphate limited to a maximum 1% and fluorine to traces. The mesh size is also important in manufacturing chemicals. Barytes used in explosive manufacture may be bleached or unbleached. It should be in dry powder form free from extraneous matter.

Paint

Barytes is used as filler and extender in Paint Industry. White pigment is manufactured from barytes. Barytes should be free from mud, clay or siliceous minerals. Presence of iron oxide is undesirable. The material should be in the form of dry powder.

Glass

In glass manufacturing, barytes is added to the glass melt for making the glass more workable and enhancing its brilliance. Iron is the most undesirable impurity in barytes.

Rubber

Barytes is used as a filler and extender in rubber products. It is added to rubber compounds to impart resiliency and durability. Barytes containingminimum 99.5% $BaSO_4$ is usually preferred. Since such purity material is not found in nature, before use, barytes is normally bleached called 'blanc fixe' used as a best acid resistance. The

sieve residue through 75-micron and 150- micron should be 4% and 0.01% max., respectively. BIS has prescribed IS:1683-1994 (Reaffirmed 2008) as specification of barytes for use in Rubber Industry.

Other Uses

Barytes is used in the manufacture of asbestos products required for autobrake lining and other frictional materials. It is used as a filler in Paper Industry, oil cloth, X-Ray proof plaster and rope finishes. Finely ground barytes and clay are used as suspension in Barvois system of coal washing. Barytes is also used in concrete aggregate as an absorber of gamma and X-Ray radiation required for reactor shielding. In medicine, it is used in radiodiagnosis to highlight the abnormalities in internal body parts. Barytes also finds use in explosives and pyrotechnics composition for which BIS has laid down specifications vide IS 7588-1992 (Reaffirmed 2011).

SUBSTITUTES AND TECHNICAL POSSIBILITIES

Drilling mud substitutes include celestite, witherite calcium carbonate, synthetic haematite and ilmenite but the low cost and technical advantages of barytes deter substitution. Iron ore fines and ilmenite are substitutes used for deep drilling. Apart from calcium carbonate, none of the mineral substitutes has had a major impact on the Barytes Drilling Mud Industry. Reclamation and recycling of drilling muds have been increasingly hampering the requirement for new supplies. Further new oil exploration techniques and drilling methods have reduced the need for new boreholes and wells, which have led to curtailment in the requirement for drilling muds. As a filler, barytes can be substituted by diatomite, felspar, kaolin, mica, talc and silica flour.

WORLD SCENARIO

The world resources of barytes are 290 million tonnes with a maximum share from Kazakhstan, USA and Turkey. The world resources of Barytes are fast depleting, which compelled the American Petroleum Institute to reduce specification of the barytes from specific gravity of 4.2 to 4.1. This may lead to increased exploration for new deposits and updation of the global resources. The leading producers were China and Morocco.

TRADE POLICY

As per Foreign Trade Policy (FTP) 2015-20, in force, import and export of barytes (both lumps and powder) as also witherite (natural barium carbonate) are allowed without restrictions under HS Code 2511.

FUTURE OUTLOOK

India ranks second in the production of barytes in the world after China and is one of the important exporters in the world market. About 80% of the world's barytes is used in the Petroleum Industry. The worldwide demand for barytes would continue till petroleum products are preferred as chief source of energy given their importance in the transportation and industrial end-use sectors. The future growth in petroleum usage suggests that petroleum exploration will continue to grow and along with it barytes consumption, especially as more drilling has to be done per unit of oil as hydrocarbon discoveries become marginal and less productive with time. In the domestic front, however, exploration is necessary to locate new deposits of barytes especially in Rajasthan, Himachal Pradesh, etc. The apparent domestic demand of barytes is estimated to be 2.09 million tonnes by 2016-17 and is expected to grow at 9% growth rate.