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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 are heaviness, high specific gravity, chemical & physical inertness, very low solubility and magnetic neutrality. Barium compounds are utilised as filler, extender and aggregate. Baryte 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.

RESERVES/RESOURCES

The total reserves/resources of barytes in India as on 1.4.2015 as per NMI data based on UNFC system, has 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 development details, if any, are covered in the Review on "Exploration & Development" under "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 producers report the production data directly to the respective States and not to IBM. However, efforts were made to collect this information through correspondence with the State Directorates of Mining and Geology of individual States or by visiting their websites. But data of only a few States could be collected. All possible information/data that could be gathered has been presented in this Review.

Statewise production of barytes during 2017-18 to 2019-20 is furnished in Table-2.

Table-2: Statewise Production of Barytes

(In tonnes)

State	Year		
	2017-18	2018-19	2019-20
Andhra Pradesh	2038915	2482736	2735439
Rajasthan	7600	5000	3000
Telangana	3700	1020	150
Karnataka	-	-	345

Source: *As received from State DGMs and their websites.*

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. The most desirable characteristic of barytes is its high specific gravity which makes it the only mineral used in substantial tonnages to increase

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 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 known for it's use 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 containing minimum 99.5% $BaSO_4$ is usually preferred. Since such pure form of barytes is not found in nature, barytes is normally bleached before use. The form of barytes called 'blanc fixe' is known best for its acid resistance properties. 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 radio diagnosis to highlight the abnormalities in internal body parts. Barytes also finds its 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.

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

Maximum quantity 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 to establish hydrocarbon discoveries which increasingly have become marginal and would get less productive with time. In the domestic front, however, the much needed exploration to locate new deposits of barytes especially in Rajasthan, Himachal Pradesh, etc. would continue.