Indian Minerals Yearbook 2017

(Part- III : Mineral Reviews)

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PERLITE

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GOVERNMENT OF INDIA
MINISTRY OF MINES
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21 Perlite

Perlite is a type of volcanic glass with pearly lustre. It expands and becomes porous when heated. Colour of crude perlite is light grey to glossy black, whereas the colour of expanded perlite ranges from snowy white to greyish white. Distinguishing feature apart from other volcanic glasses is that perlite when heated to about 850-900°C expands 4 to 20 times its original volume. This expansion is due to the presence of 2 to 5% combined water in crude perlite which when heated vaporises to form countless tiny bubbles. Expanded perlite is not only amazingly light weight, but also has exceptional physical properties. Unexpanded (raw) perlite has a bulk density around 1100 kg/m^3 (1.1 g/cm^3), while typical expanded perlite has a bulk density of about 30-150 kg/m^3.

Perlite is used in industry in both the forms- Crude Perlite and Expanded Perlite. Most perlite is expanded to produce ultra light perlite by heating. Crude perlite is prepared by crushing and screening to various size fractions.

Typical Analysis of Crude Perlite (in percentage)	
SiO_2	72-76
Al_2O_3	11-17
K_2O	4-5
Na_2O	2.9-4.0
CaO	0.5-2.0
Fe_2O_3	0.5-1.5
MgO	0.1-0.5
TiO_2	0.03-0.20
H_2O	2-3

RESOURCES

The only deposit of perlite is located in the Village Patanvav, Rajkot district, Gujarat. It is found to occur in Osam Hill in the form of discontinuous sill. The total resources of perlite as per NMI database, based on UNFC system as on 1.4.2015 have been estimated at 2.41 million tonnes, out of which 12% are high-grade, 12% medium-grade, 6% low-grade and the remaining 70% fall under unclassified category. The total resources fall under remaining resources category only (Table -1).

Table - 1: Reserves/Resources as on 1.4.2015 of Perlite (By Grades/State)

(In '000 tonnes)

Grade/State	Reserves	Remaining Resources					
	Total (A)	Feasibility	Pre-feasibility		Reconnaissance	Total (B)	Total Resources (A+B)
		STD211	STD221	STD222	STD334		
All India: Total	**-**	**140**	**683**	**595**	**988**	**2406**	**2406**
By Grades							
High	-	19	-	264	-	283	283
Medium	-	79	-	221	-	300	300
Low	-	42	-	110	-	152	152
Unclassified	-	-	683	-	988	1671	1671
By State							
Gujarat	-	140	683	595	988	2406	2406

Figures rounded off.

PRODUCTION AND STOCKS

There was no production of perlite since 2007-08 and no stocks were reported at the end of the year.

USES

There are different uses of perlite in both crude and expanded form. These uses can be grouped under three general categories– construction, horticultural and industrial applications.

Construction Applications

In the construction and manufacturing fields, expanded perlite, on account of its acoustic properties, light weight, fire resistant and an excellent insulator is used in light weight plasters and mortars, insulation, ceiling tiles and as filter aids.

In addition to providing thermal insulation, perlite enhances fire resistance, reduces noise transmission and is resistant to rot, vermin and termites. Perlite is also ideal for insulation against low temperature.When perlite is used as an aggregate in concrete, a light weight, fire resistant, insulating concrete is produced that is ideal for roof decks and other applications. Perlite is also used as an

an aggregate in portland cement and gypsum plasters (green plaster) for exterior applications and for fire protection of beams and columns. Other construction applications include: light weight curtain/ partition wall, noise reduction, under-floor insulation, chimney lining, paint texturing, ceiling tiles and roof insulation boards. Perlicon is expanded perlite based concrete due to presence of two to six percent combined water in the crude perlite rock. Demand for good quality expanded perlite in India has been showing an upward trend.

Horticultural Applications

In horticultural application, expanded perlite is used throughout the world as a component of soil-less growing mixes, where it provides aeration and optimum moisture retention for superior plant growth. Studies have shown that outstanding yields are achieved with perlite hydroponic systems. Other benefits of perlite in horticulture are its neutral pH value and the fact that it is sterile and weed-free. In addition, its light weight makes it ideal for growing plants in small containers. Besides, perlite is a good carrier for fertilizer, herbicides & pesticides and for pelletising seed. Horticultural perlite is used both by home gardeners as well as commercial growers. Green roofing, where perlite is used as the sole growing medium for plants on roofs, has become a popular trend, and offers a unique sustainable way to insulate a roof while adding foliage to the surface. In greenhouse plantations, landscaping and for in-house plants, use of perlite has shown encouraging results with clean & safe handling. Approximately 10% of annual perlite consumption world over is reported under horticultural applications. Perlite can be used by mixing with sand in 1:1 ratio for the better results.

Industrial Applications

Industrial applications of perlite are the most diverse, ranging from high performance fillers for plastics to cements, for petroleum, water and geothermal wells. Other applications include its use as a filter media for pharmaceuticals, food products, chemicals and water for municipal systems and swimming pools.

Perlite finds application additionally as an abrasive in soaps, cleaners and polishes. Its high resistance to heat is taken advantage of in manufacturing refractory bricks, mortars and pipe insulation. Crude perlite is used in retention of heat in Foundry and Ferro-alloys Industry. Small quantities of perlite are also used in cryogenic insulation and in ceramics as clay.

SUBSTITUTES

There are a number of materials for construction applications diatomite, expanded clay, shale, pumice & slag and for horticultural use, vermiculite, coco coir, wood pulp & pumice are alternative soil additives and are sometimes used in conjunction with perlite. These materials can be used in place of perlite without losing any of the benefit that perlite provides. Bentonite, Zeolite are the alternatives in animal feed suppliment.

WORLD REVIEW

Insufficient information is available to make reliable estimates of resources in perlite-producing countries. However, the perlite resources in Turkey are 57 million tonnes, Greece 120 million tonnes, USA contributed 50 million tonnes and Hungary 28 million tonnes (Table- 2). Asia Pacific is expected to be the fastest growing market for expanded perlite in the next few years. The major reason for this is the growing demand for expanded perlite in developing Asian countries such as India, China, Malaysia, Indonesia & Thailand. The world production of perlite in 2015, in respect of principal countries was 3.61 million tonnes. Greece (23.8%),Turkey (23.4%), China (19.4%), USA (13.4%) and Iran (11.1%) were the leading producers. Other important producers were Hungary, Italy, Ukraine, Russia, Mexico, Argentina, Slovakia and Thailand (Table-3). In 2016, the quantity of processed crude perlite sold or used by U.S. mines increased to the highest level since 2005, and estimated apparent consumption increased to its highest level since 2011. Increased demand for perlite-based construction products, fillers, and filter aids in 2014 through 2016 was supplied by increased domestic production. As per the Ministry of Commerce, the total imports of Perlite during 2014-15, 2015-16 and 2016-17 was 41.53 , 43.57 & 46.11 thousand tonnes respectively.

Table – 2 : World Reserves of Perlite (By Principal Countries)

(In '000 tonnes)

Country	Reserves
World: Total (rounded)	**NA**
Greece	120,000
Hungary	28,000
Turkey	57,000
USA	50,000
Other countries	NA

***Source**: Mineral Commodity Summaries, 2018.*
***Note**: Sufficient information is not available to make reliable estimates of resources in perlite-producing countries.*

Table – 3 : World Production of Perlite (By Principal Countries)

(In '000 tonnes)

Country	2013	2014	2015
World: Total	**4515**	**3716**	**3609**
Argentina[e]	25	25	25
China[e]	700	700	700
Greece	890	985	860
Hungary	65	69	65
Iran	1121	351	400[e]
Italy[e]	60[e]	60[e]	60[e]
Mexico	27	26	26[e]
Russia[e]	45	45	45
Slovakia	16	17	25
Thailand	14	54	17
Turkey	1076	879	846
Ukraine[e]	36	36	36
USA	419	451	483[e]
Other countries	21	18	21

***Source:** World Mineral Production, 2011-2015.*