

PERLITE



# Indian Minerals Yearbook 2018

(Part- III : MINERAL REVIEWS)

57<sup>th</sup> Edition

**PERLITE**

**(FINAL RELEASE)**

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MINISTRY OF MINES  
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# 21 Perlite

Perlite is a type of amorphous volcanic glass with pearly lustre. It expands in the form of tiny spherules 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. It can expand up to 20 times of its original volume if heated above a point (800<sup>o</sup>-900<sup>o</sup>c). 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 1100kg/m<sup>3</sup> (1.1 g/cm<sup>3</sup>), while typical expanded perlite has a bulk density of about 30-150kg/m<sup>3</sup>.

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 <sub>2</sub>	72-76
Al <sub>2</sub> O <sub>3</sub>	11-17
K <sub>2</sub> O	4-5
Na <sub>2</sub> O	2.9-4.0
CaO	0.5-2.0
Fe <sub>2</sub> O <sub>3</sub>	0.5-1.5
MgO	0.1-0.5
TiO <sub>2</sub>	0.03-0.20
H <sub>2</sub> O	2-3

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

Figures rounded off.

## PRODUCTION AND STOCKS

There was no production of perlite reported since 2007-08 and also no stocks were reported during the year 2017-18.

## 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 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. The expansion is 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 all over the world 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 such as 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 and Zeolite are the alternatives in animal feed supplement.

## WORLD REVIEW

Insufficient information is available to make reliable estimates of resources in perlite-producing countries. However, the perlite resources in Greece are 120 million tonnes, Turkey 57 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 major perlite producing countries in the World are Greece 933 thousand tonnes, China 700 thousand tonnes, Turkey 606 thousand tonnes, etc. (Table-3). In 2017, 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 2014. Increased demand for perlite-based construction products, fillers, and filter aids in 2015 through 2017 was supplied by increased domestic production. As per the Ministry of Commerce, the total imports of Perlite during 2015-16, 2016-17 and 2017-18 was 43.57, 46.11 & 50.07 thousand tonnes respectively.

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

(In '000 tonnes)	
Country	Reserves
<b>World: Total (rounded)</b>	<b>NA</b>
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	2015	2016	2017
China <sup>e</sup>	700	700	700
Greece	891	921	933
Hungary	65	76	75 <sup>e</sup>
Iran	395	525	500 <sup>e</sup>
Italy <sup>e</sup>	60	60	60
Philippines	19	14	2
Russia <sup>e</sup>	45	45	45
Thailand	17	19	6
Turkey	846	1066	606
USA	488	513	520
Ukraine	16 <sup>e</sup>	16	16

*Source: World Mineral Production, 2013-2017. e: Estimated*

## **FUTURE OUTLOOK**

The government has planned about 100 smart cities which will invite investment of more than 2 trillion in the coming years which will help attain

significant gains to crude perlite market size. Positive growth indicators in the construction industry mainly in Asia Pacific is attributed to industrialisation and urbanisation which will propel product demand owing to its sandblasting application in the industry.

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