

PERLITE



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(Part- III : Mineral Reviews)

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PERLITE

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GOVERNMENT OF INDIA
MINISTRY OF MINES
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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/m³ (1.1 g/cm³), while typical expanded perlite has a bulk density of about 30-150 kg/m³.

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 ₂ O ₃	11-17
K ₂ O	4-5
Na ₂ O	2.9-4.0
CaO	0.5-2.0
Fe ₂ O ₃	0.5-1.5
MgO	0.1-0.5
TiO ₂	0.03-0.20
H ₂ O	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 UNFC system as on 1.4.2010 are 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. Out of the total resources, about 18% fall under reserves and rest 82% are remaining resources (Table-1).

Table - 1: Reserves/Resources as on 1.4.2010 of Perlite (By Grades/State)

(In '000 tonnes)

Grade/State	Reserves				Remaining resources				Total resources (A+B)
	Proved STD111	Probable		Total (A)	Pre-feasibility		Reconnaissance STD334	Total (B)	
		STD121	STD122		STD221	STD222			
All India: Total	140	-	288	428	683	307	988	1978	2406
By Grades									
High	19	-	132	151	-	132	-	132	283
Medium	79	-	103	182	-	118	-	118	300
Low	42	-	53	95	-	57	-	57	152
Unclassified	-	-	-	-	683	-	988	1671	1671
By State									
Gujarat	140	-	288	428	683	307	988	1978	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 aggregate in portland cement and gypsum plasters for exterior applications and for fire protection of beams and columns. Other construction applications include: under-floor insulation, chimney lining, paint texturing, ceiling tiles and roof insulation boards.

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 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. Approximately 10% of annual perlite consumption world over is reported under horticultural applications.

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, water supply 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 such as vermiculite, diatomite, pumice, expanded clay, shale & slag etc. that can be used in place of perlite for many of its applications without losing any of the benefit that perlite provides.

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 and USA 50 million tonnes each (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 2014, in respect of principal countries was 4.87 million tonnes. Iran & Turkey (23% each), Greece (20%), China (14%), USA (9%) and Japan (4%) were the leading producers. Other important producers were Hungary, Italy, Mexico, Thailand, Russia and Ukraine (Table-3).

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

(In '000 tonnes)

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

Source: Mineral Commodity Summaries, 2016.
Note: Sufficient information is not available.

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

(In '000 tonnes)

Country	2012	2013	2014
World: Total	4239	4705	4872
Argentina	25	25 ^e	25 ^e
China ^e	700	700	700
Greece	870	890	985
Hungary	72	65	65 ^e
Iran	837	1121	1100 ^e
Italy ^e	60	60	60
Japan ^e	200	190	200
Mexico	30	27	27
Russia ^e	45	45	45
Slovakia	24	16	17
Thailand	41	14	54
Turkey	888	1076	1100 ^e
Ukraine ^e	36	36	36
USA	393	419	440 ^e
Other countries	18	21	18

Source: World Mineral Production, 2010-2014.