

61 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/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 1.4.2005 are estimated at 1.89 million tonnes, out of which 15% are high-grade, 18% medium-grade, 11% low-grade and the remaining 56% fall under unclassified category. Out of the total resources, about 27% fall under reserves and rest are resources (Table-1).

**Table – 1 : Reserves/Resources of Perlite as on 1.4.2005
(By Grades/State)**

Grade/State	Reserves		Total (A)	Remaining resources			Total resources (A+B)
	Proved			Pre-feasibility STD222	Reconnaissance STD334	Total (B)	
	STD 111	STD122					
All India : Total	188	316	504	334	1051	1385	1889
By Grades							
High	19	132	151	132	–	132	283
Medium	90	116	206	130	–	130	336
Low	79	68	147	72	–	72	219
Unclassified	–	–	–	–	1051	1051	1051
By State							
Gujarat	188	316	504	334	1051	1385	1889

PRODUCTION AND STOCKS

There was no production of perlite during 2007-08, 2008-09 and 2009-10 and there was no stock at the beginning or 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 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 use to grow 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. In greenhouse plantations, landscaping applications 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 for 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 that can be used in place of perlite for many of its applications. These materials (such as vermiculite, diatomite, pumice, expanded clay, shale, etc.) may be used in place of perlite without losing any of the benefit that perlite provides.

WORLD REVIEW

The world reserve of perlite are placed at 700 million tonnes of which Greece and USA accounted for 50 million tonnes each. (Table - 2).

The available world production of perlite in 2009 in respect of principal countries was estimated at 2.62 million tonnes. Greece (33%) China (27%), USA (14%) Japan (9%) and Turkey(6%) were the leading producers. Other important producers were Hungary, Italy, Mexico, Armenia and Russia (Table-3). The USA was believed to be the largest consumer of processed, crude and expanded perlite in 2009.

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

(In '000 tonnes crude ore)

Country	Reserves
World: Total (rounded)	700,000
Greece	50,000
Hungary	3,000
USA	50,000
Other countries*	600,000

Source: Mineral Commodity Summaries, 2010.

* Figures for Japan, Turkey & Mexico included with other countries.

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

(In '000 tonnes)

Country	2007	2008	2009
Armenia ^(e)	50	50	50
China ^(e)	700	700	700
Greece	1100 ^(e)	1000	863
Hungary	68	132	82
Italy ^(e)	60	60	60
Japan ^(e)	230	230	230
Mexico	54	43	51
Russia ^(e)	45	45	45
Turkey ^(e)	160	160	160
USA	409	434	380 ^(e)

Source: World Mineral Production, 2005-2009.