
VERMICULITE



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Gilan Mica was founded in 1987 and is the first manufacturer of Vermiculite and Vermiculite products in Iran.

Gilan Mica is the owner of Vermiculite mine and the processing factory.

Gilan Mica has specialized in the supply of high quality exfoliated vermiculite since 1995.

Gilan Mica is specialist to use of Vermiculite in fireproofing and insulating products and horticulture.

Gilan Mica Vermiculite Mine is Located in amlash, Gilan Province, Iran



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Vermiculite

VERMICULITE is the name used in commerce for a group of micaceous minerals that expand or exfoliate many times (commercial varieties exfoliate 8 to 20 times or more) the original thickness when heated. They show the characteristic micaceous structure of basal cleavage and occur as soft, pliable inelastic laminae. Their basal cleavages are not so perfect as those of mica. Vermiculite exists in a wide range of colours from black through various shades of brown to yellow. Its chemical composition varies widely consisting of a complex hydrated aluminium, magnesium silicate and hence the analysis of the mineral is of little use in determining the vermiculite for commercial utility; a technical trial of the material provides the only satisfactory test. Vermiculite owes its commercial utility to its property of exfoliation when heated. It exfoliates into a yellow to bronze coloured mass giving an appearance of a cluster of worms - vermiculus, an Italian word for worm from which it has derived its name as vermiculite. Some authorities quote the Latin word vermiculari from which the name vermiculite might have been derived.

General Vermiculite Information

Chemical Formula: $(\text{Mg}, \text{Fe}^{++}, \text{Al})_3(\text{Al}, \text{Si})_4\text{O}_{10}(\text{OH})_2 \cdot 4(\text{H}_2\text{O})$

Composition: Molecular Weight = 504.19 gm

Empirical Formula: $\text{Mg}_{1.8}\text{Fe}^{2+}_{0.9}\text{Al}_{4.3}\text{SiO}_{10}(\text{OH})_2 \cdot 4(\text{H}_2\text{O})$

Name Origin: From the Latin vermiculus, "little worm."

Images:



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Vermiculite Crystallography

Axial Ratios:

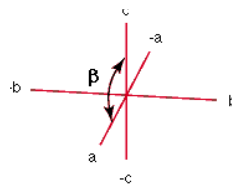
a:b:c = 0.5698:1:1.6218

Cell Dimensions:

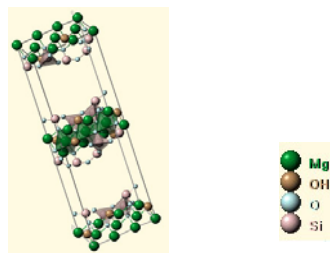
a = 5.26, b = 9.23, c = 14.97, Z = 2; beta = 96.82° V = 721.65 Den(Calc) = 2.32

Crystal System:

Monoclinic- Prismatic H-M Symbol (2/m) Space Group: C 2/m



Crystal Structure:



Physical Properties of Vermiculite

Cleavage:

[001] Perfect

Color:

Light Brown to Golden

Thermal Conductivity:

0.06 W/mk

Ph:

7.2

Diaphaniety:

Translucent

Fracture:

Uneven - Flat surfaces (not cleavage) fractured in an uneven pattern.

Habit:

Lamellar - Thin laminae producing a lamellar structure.

Hardness:

1.5-2 - Talc-Gypsum

Luster:

Vitreous – Dull



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Optical Properties of Vermiculite

Gladstone-Dale:

CI meas= 0.026 (Excellent) - where the CI = $(1-K_{PDmeas}/K_C)$

CI calc= -0.05 (Good) - where the CI = $(1-K_{PDcalc}/K_C)$

$K_{PDcalc}= 0.2398, K_{PDmeas}= 0.2225, K_C= 0.2284$

Optical Data:

Biaxial (-), $a=1.525-1.561$, $b=1.545-1.581$, $g=1.545-1.581$, bire=0.0200,
 $2V(\text{Calc})=0$, $2V(\text{Meas})=0-8$. Dispersion weak, $r > v$.

Pleochroism (x):

colorless or pale green.

Pleochroism (y):

pale brown, yellowish green, or brownish green.

Maximum Birefringence:

$\delta = 0.020$



Chart shows birefringence interference colour range (at 30 μ m thickness) and does not take into account mineral colouration.

Surface Relief: Low

Dispersion: weak



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Calculated Properties of Vermiculite

Electron Density:

$\rho_{\text{electron}} = 2.51 \text{ gm/cc}$

note: $\rho_{\text{Vermiculite}} = 2.50 \text{ gm/cc.}$

Fermion Index

Fermion Index = 0.01363

Boson Index = 0.98637

Photoelectric:

$PE_{\text{Vermiculite}} = 4.01 \text{ barns/electron}$

$U = PE_{\text{Vermiculite}} \times \rho_{\text{electron}} = 10.06 \text{ barns/cc.}$

Radioactivity:

GRapi = 0 (Gamma Ray American Petroleum Institute Units)

Vermiculite is **Not Radioactive**



Vermiculite Uses

CONSTRUCTION

Vermiculite is an extremely versatile material which can serve in a wide variety of applications. There is a rather crude classification system for uses of vermiculite in order to make order in a database of over 10,000 vermiculite referenced patents and technical papers. The list below will give some idea of the ways in which commercial vermiculite is used.

:: Agriculture

Fertilizer Carrier; Seed Encapsulation and Soil Amendments.

:: Biology and Biotechnology

Bacterial Growth Support; Biological Carrier; Animal Feed Additive;

Animal litter;

Incubation media; Aquaculture and Fillers in Food and Cosmetics.

:: Catalysts

Untreated and Exfoliated; Ion Exchanged and pillared Clays and as Coated Supports.

Acoustic finishes Construction Products

Acoustic Finishes; Light-weight Aggregates; Attic and Block Fill; Boards and Panels;

Cementations Coatings; Light Weight Concrete; Cements; Mortars and Plasters;

Products Molded and Shaped; Roofing Products and Systems; Water Repellant Products

:: Fillers and Carriers

Carrier, chemical (fertilizer, pesticides, etc); Filler, inorganic formulations; Filler,

Organic formulations; Explosives; and Tobacco Products.

:: Horticulture

Germination and Growth Media; Hydroponics; Propagation Media; and Soil Cover.

:: Industrial Products and Applications



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Fillers and Filtration Aids; Fire-breaks, extinguishing compounds, Flame and smoke retardant, etc.; Insulation, Acoustic; Insulation, Thermal (Cryogenic); Formed Articles; Loose Fill, coated; Insulation, (High Temperature); and Manufacture Products.

:: Packing and Absorbents
Loose Fill and Packaged.

:: Refractory and High Temperature Insulation
Blocks and Molded Pieces; Coating and Mold Fill; Hot Topping; Refractory Mixes; Slag Modifier; and Thermally Prepared Ceramic and Glass Compositions.

:: Waste Treatment
Flue Gas (e.g. MagSorbents); Industrial and municipal Waste Treatment; Radioactive Waste; Water Purification; Oil Removal and Reclamation; Soil Detoxification; General Cleanup and Disposal.

:: Ground Vermiculite
Fillers in friction Media, Ink, Paint and Plastics; Refractory Articles; Seals and Sheets; Lubricants; Mold Release Compounds; and Refractory Coatings.

:: Chemically Exfoliated and Wet Ground Vermiculite Dispersions; Gaskets and Fiber Coatings; Sheets, Paper, and Films; And Inorganic Foams.

:: Chemically Modified Vermiculite
In tumescent Gaskets and Seals.

