

# Diatomite

## What is Diatomite?

*Diatomite is a powdery, non-metallic mineral composed of the fossilised skeletal remains of microscopic single-celled aquatic plants called diatoms. Over 10,000 species of these microscopic algae have been recognised, each with its own distinct shape, ranging in size from under 5 microns to over 100 microns. Diatomite deposits are usually categorised based upon their fresh water or salt water origin. Both the chemical composition and the physical structure of diatomite make it of great commercial value for a wide spectrum of uses, including filter aids, functional fillers, carriers for active ingredients and diluents, and aggregates.*

Diatoms have the unique ability to absorb water-soluble silica present in their natural environment to form a highly porous, yet rigid, skeletal framework of amorphous silica. To this day, living diatoms in bodies of water worldwide continue to serve as a source of food for marine animals and, by photosynthesis, as a major source of atmospheric oxygen. Over the eons, their remains settled and were joined by succeeding generations forming deep-bedded deposits on ocean and lake floors, some of which rose about fifteen million years ago to become part of our present land-mass. In a few regions the diatomite deposits formed in sufficient thickness and purity to be mined for many uses beneficial to mankind.

## Uniqueness

Before the end of the 19<sup>th</sup> century, the diatomite deposits attracted attention as a potential industrial material. At that time the chemical and physical properties of diatomite as an insulation material were already recognised. It was not, however, until sometime later, that the mining and processing of diatomite could be called an industry with a predictable future.



The *unique* properties of diatomite including:

- Light weight
- High porosity
- High absorptivity
- High purity
- Multi-shaped
- Rigidity
- Inertness

make it industrially useful in a variety of ways such as in liquid filtration; as a multi-functional mineral additive; as a carrier for active ingredients and diluents; as an aggregate; and, as a source of silica to name just a few.

## How is it manufactured?

During its early development period, diatomite was processed almost exclusively by hand. It was taken from the beds in blocks and dried, and subsequently shipped in this form. The first mill or plant for processing natural diatomite was constructed in the early 1900s.

Today, diatomite is typically mined by open-pit quarrying techniques using conventional, heavy duty earth moving equipment then transferred to a processing plant. At the plant, three different processes are used to manufacture the many different diatomite products depending on the desired characteristics.

#### Natural Grades:

The crude ore is milled, dried at relatively low temperatures and classified to remove extraneous matter and to produce a variety of different particle-size grades. These natural powders, consisting primarily of amorphous silica, are generally off-white in color.

#### Calcined Grades:

These products are produced from the natural material by calcination, or sintering, at higher temperatures usually in excess of 900° C in a rotary kiln. After calcination, the diatomite is further processed into products with selected particle size ranges that can include filter aids, multi-functional fillers and aggregates. During calcination any organics and volatiles are removed and the color typically changes from off-white to tan or pink.

#### Flux-calcined Grades:

These products are also produced from the natural material by calcining in a rotary kiln. Temperatures in excess of 900° C, are used in the presence of a flux such as soda ash (sodium carbonate). During flux-calcination the diatoms further increase in particle size though agglomeration, and in many instances become bright white in colour depending upon the conditions chosen. Further milling and air separation control the final particle size distribution to produce filter aids of relatively high permeability and fine white multi-functional fillers.

### Multiple properties - manifold uses

**Filter aids:** Liquid filtration is the process by which solid particles are separated from a fluid through a permeable material. Because of its high degree of porosity combined with its low density and inertness, diatomite makes an excellent filtration medium, providing the ability to economically remove microscopically small suspended solids from large volumes of liquid. Diatomite is ideally suited for a wide variety of applications including: antibiotics, beer, chemicals, edible oils and fats, fruit juices, glucose, pharmaceuticals, solvents, sugar, vitamins, water, wine, and many, many others.

Diatomite filter aids are used with outstanding success to remove suspended particles as small as 0.1 micron in size. A variety of grades are manufactured using the highest standards of quality to meet the exacting demands of almost every industrial filtration in an efficient and economical manner.

**Functional Mineral Additives:** The versatility of diatomite as a functional filler, in part as a result of its unique particle shape, has led to its widespread use in a number of applications such as: paint, plastics, paper, insulating bricks, and dental moldings.

Modern industrial processing technology demands more than single-purpose fillers that provide only traditional bulking characteristics. In diatomite, processors will find a multi-functional mineral additive that provides a variety of benefits that include: anti-blocking, brightness, cost control, density control, high surface area, reinforcement, controlled absorption, precise abrasive properties, and gloss and sheen control.

**Carriers for Active Ingredients and Diluents:** The high porosity of diatomite combined with its strong and irregularly shaped diatom structure makes it exceptional as a carrier for active ingredients and diluents. Complementing these desirable characteristics are its inert nature, large surface area and high purity. Typical applications include: pesticide carriers and catalyst carriers.

**Aggregates:** High absorptivity, lightweight and its free-flowing nature are characteristic of diatomite aggregates. They are used as absorbents in a number of applications including floor sweeping, the cleanup of hazardous wastes, oil and grease absorbents, and soil amendments.

#### Packaging and Distribution

Diatomite is shipped in multi-wall paper or plastic bags, in FIBC's, in cardboard containers, or in bulk utilising rail hopper cars, box cars or tank trucks. It is available worldwide.

For more information, please contact :

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