



## ION-MIN<sup>®</sup> Product Spec Sheet

### Product Class

Montmorillonite is a clay mineral compound that is a member of the Smectite family. It typically forms microscopic, very thin crystal platelets. It is a 2:1 clay, meaning that it has 2 tetrahedral sheets sandwiching a central octahedral sheet, often with trace mineral anions ionically bound to the surface areas.

Chemically it is hydrated sodium calcium aluminum magnesium silicate hydroxide. Potassium, iron, and other cations are common substitutes. It is the main constituent of the volcanic ash weathering product, Bentonite.

#### Attributes:

- Color can be beige neutral, cream, brown, gray
- Luster is dull.
- Transparency crystals are translucent and masses are opaque.
- Crystal System is monoclinic; 2/m.
- Cleavage is perfect in one direction, basal; not seen in massive specimens.
- Fracture is uneven to lamellar.
- Hardness is 1- 2
- Specific Gravity is variable from 2.3 – 3. In powdered form its weight is close to that of water

There tend to be two distinct types of Bentonite on the market. Sodium Bentonite (SB) and Calcium Bentonite (CB). SB is used more in industrial applications, with some derivatives repurposed for consumer markets, such as health and cosmetics. SB is a hyper-swelling clay that should not be ingested. It clumps and forms a seal when wet. Calcium Bentonite is ideal for skin applications and is popular as a dietary supplement.

Calcium Bentonite and Calcium Montmorillonite (CM) are considered the same thing in commercial markets. The names are synonyms. CM is better suited to consumer applications and is not used as much for industrial applications. It is used in food and feeds as an additive, cosmetics, health and supplements, spa products, and soil enrichment products.

Montmorillonite has a number of unique properties.

1. The right deposits are among of the most powerful detoxifying natural substances on earth. It can have a zeta potential or drawing power at high pH.
2. The compound can act as a delivery vehicle for minerals to the skin and body when ingested.
3. Hydrated to a paste, it can draw oils and toxins from the skin
4. It is a powerful adsorbant that can attract heavy metal and toxic cations into and onto the particles, neutralizing pathogens and toxins.
5. It tends to have a relatively high pH.
6. Its particle size includes very small colloids and electrolytes
7. The right deposits contain a portfolio of macro, micro and trace minerals like calcium, magnesium, iron, potassium, silica, copper, chromium, and zinc...all in bio-available form.



## ION-MIN<sup>®</sup> Description

Our clay compound is called ION-MIN<sup>®</sup>. It comes from a single dry, desert subsurface mine in the Colorado River basin in southern California. It is an ultra-fine, very pure Calcium Montmorillonite in a high, active, open ionic state. This product is a free flowing powder containing low swelling properties, high thermo stability, high plasticity and tensile strength.

ION-MIN<sup>®</sup> is sold under various consumer brands through distributors, in bulk for international resale, in bulk for agricultural uses, and in bulk for OEM partners.

## No Additives

ION-MIN<sup>®</sup> in its final, consumer-ready form contains no additives, colors, fragrances. It contains no pathogens, no toxins, no allergens. It is not chemically or thermally treated in any way. It is 100% natural.

## Technical Data

The molecular formula for Calcium Montmorillonite is usually given as  $(M+x \cdot nH_2O)(Al_2yMg_x)Si_4O_{10}(OH)_2$ , where  $M^+ = Ca^{2+}$  (Brindley & Brown, 1980). Ideally,  $x = 0.33$ .

- The **CAS registry number** for Montmorillonite is **1318-93-0**.
- The **EINECS number** for Montmorillonite is **215-288-5**

The following table represents a summary of the chemical and particle size data for ION-MIN<sup>®</sup> powder. The information is based on historical data, more data can be provided upon request.

<b><u>Property</u></b>	<b><u>Unit</u></b>	<b><u>Typical value</u></b>
Moisture content	%	3 - 8
Montmorillonite content	%	100
Alkalinity	pH	8.1 - 8.7
SiO <sub>2</sub> -	%	55.3
Al <sub>2</sub> O <sub>3</sub> -	%	18.3
K <sub>2</sub> O -	%	2.80
Fe <sub>2</sub> O <sub>3</sub> -	%	4.35
CaO -	%	4.69
Na <sub>2</sub> O -	%	1.13
MgO -	%	2.88

## Color

ION-MIN<sup>®</sup> is a neutral, light beige with red tones, darker when wet.



## Grades

We believe ION-MIN<sup>®</sup> is much finer than many other clay mineral compounds we're aware of on the market. But averages can be misleading. Our ION-MIN<sup>®</sup> grades contain a very high percentage of extremely small, nano-sized particulate and even sub-nanometric molecules. With over 60% of any amount of our mid-grade product being under 2 microns, the average particle size of the most functional portion of our products cannot be traditionally measured. Such particles are nanometric, some of which must be measured in angstroms (the smallest unit of measure).

### Average particulate in food grade ION-MIN<sup>®</sup>:

"Standard Test Method for Particle Size Analysis". This standard method is issued under designation D22-63, (reapproved 1990), of the ASTM (American Society for Testing and Materials). The determinations of average tested clays were as follows:

- 60% 2 microns or less
- 10% 5 – 15 microns
- 5% 15 – 20 microns
- 20% 20 – 250 microns
- 5% over 250 microns

We produce five grades of ION-MIN<sup>®</sup>.

1. **Grade A<sub>1</sub>**: Ultra-Fine, all powder below 450 mesh; 75% of the compound consists of sub-micronic sized (< 2 microns) particles. From lowest—most protected layers of the mine; used for facial and skin applications.
2. **Grade A<sub>2</sub>**: Extremely Fine, all powder below 350 mesh; 70% of the compound consists of sub-micronic-sized particles (< 2 microns). From lowest—most protected layers of the mine. Used for edible supplements.
3. **Grade A<sub>3</sub>**: Very Fine; slight amount of small silica particles. All powder below 200 mesh; 60% of the compound consists of sub-micronic-sized particles (< 2 microns). Used for water clarification, pain relief packs, and hydrotherapy products.
4. **Grade B<sub>1</sub>**: Fine; some silica particulate. All powder below 180 mesh; 50% of the compound consists of sub-micronic-sized particles (< 2 microns). Used for animal feed and animal health supplements.
5. **Grade B<sub>2</sub>**: Fine, blended silica particles. All powder is mixed and some particulate is slightly over 200 mesh size, mixed with extremely fine powder; 40% of the total volume is sub-micronic-sized particles. Used for soil supplements.

## Applications

- Nutritional supplements
- Desiccants
- Cosmetics and cosmeceuticals
- Adsorbents
- Nanocomposites
- Environmental remediation
- Soil enrichment
- Water purifier and clarifier

## Process

Our clay compound is carefully extracted from a single, subsurface mine and re-particulated using standard industry crushing equipment. The particulate is milled and separated into fine powders of several grades and packaged in vapor-resistant, tamper-proof bags. Bags are transported to final packaging operations as powder or tablet form. Tablets are excipient-free. All mining operations are eco-friendly and overburden is replaced to leave the land in original pre-extraction condition.

## Packaging type

- 50-lb vapor-resistant sacks per grade

## Recognized as safe

- All ION-MIN<sup>®</sup> produced for resale is additive free, and contains no toxins or pathogens. Calcium Bentonite/ Montmorillonite is considered GRAS by the FDA and is classified by the USDA as one of only a few non-agricultural ingredients allowed for certified organic foods.
- OSPAR offshore treaty considers this material to pose little or no risk to the environment when released into the ocean.
- Made in USA. No animal testing. All-natural final product with no additives, preservatives, colorants or organic substances. Product is not irradiated.

## Company

California Earth Minerals<sup>®</sup> develops and distributes ION-MIN<sup>®</sup> premium mineral products for people, animal, and environmental health. Our products are made from a pure, clean “rare-earth” source of Calcium Montmorillonite. ION-MIN<sup>®</sup> is an exquisite, naturally-fine-powdered clay-based, inorganic compound. All of our products are used to detoxify and remineralize internal and external health environments.

