

St. Cloud Mining Company

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St. Cloud Natural Zeolite (Clinoptilolite)

Product Information Sheet

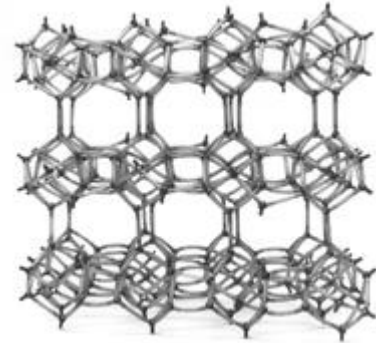
Natural zeolites are a unique type of microporous volcanic mineral with sieving and cation exchange properties for use in agriculture, environmental and industrial applications. St. Cloud Mining Company is the largest producer of natural zeolite in North America.

• Uses of St. Cloud Zeolite

St. Cloud Zeolite has hundreds of proven uses, and the list continues to grow. St. Cloud Zeolite is a natural mineral produced by all natural means, and is used as an animal feed supplement that has been shown to improve health and reduce the negative effects of animal waste; as an additive to animal stalls and pens to reduce ammonia and other emissions to air and water; as a soil amendment to retain water and plant nutrients in root zones, which conserves both; for a number of other horticultural and agricultural uses, including being the only zeolite endorsed for use in space by NASA; as a water filtration media that removes ammonia, some heavy metals and other constituents; and dozens of other uses.

• Physical Properties

Bulk Density (In Place, dried)	87 lbs/ft ³ (1,390 kg/m ³)
Bulk Density (Aggregate, dried. Common sizes)	
4 X 6 Mesh.....	44-48 lbs/ft ³
6 X 14 Mesh.....	45-47 lbs/ft ³
14 X 40 Mesh.....	46-49 lbs/ft ³
-40 Mesh	48-52 lbs/ft ³
-100 Mesh	49-53 lbs/ft ³
-325 Mesh	43-47 lbs/ft ³
Clinoptilolite content	75 to 85%
Cation Exchange Capacity (CEC)	0.8 – 1.2 meq/g
Surface Charge density	10.1E-23 meq/Å ²
Color	White (85 optical reflectance)
Crushing Strength	2,500 lbs/in ³ (176 kg/m ³)
Hardness	3.5-4.0 Mohs
LA Wear (Abrasion Index)	24
Molecular Ratio	5.1 (Si/Al)
pH (natural).....	7.5 to 8.0
pH Stability	0-13
Permeability	10 ⁻³ m/sec (1.4 – 0.4 mm particles)
Pore Size (diameter)	4 - 7 angstroms
Pore Volume	≤ 52%
Resistivity	~ 9,000 ohms/cm
Specific Gravity	2.2 - 2.4:1
External Surface Area.....	14 to 15 m ² /g
Total Surface Area.....	≤ 800 m ² /g
Swelling Index	nil
Thermal Stability	1,202 ⁰ F (650 ⁰ C)
Other	non-soluble, non-slaking, free flowing, readily mixable



- **Chemical Analysis**

(Ca, Na₂, K₂)(Al₆SiO) 24H₂O; Calcium-sodium-potassium aluminosilicate). In approximate weight percent for major oxides:

CaO	3.4%	MgO	1.5%	Na ₂ O	0.3%	Fe ₂ O ₃	1.6%
K ₂ O	3.0 %	P ₂ O ₅	0.05%	Al ₂ O ₃	12.1%	SiO ₂	70.0%

- **Chemical Composition** for selected elements by x-ray fluorescence (in weight % or ppm, as noted)

Ca	2.4 %	Mg	0.9 %	Na	0.1 %	Fe	0.6%	Cu	10 ppm
K	1.2 %	P	0.01%	Al	3.1 %	Si	32.9%	Zn	59 ppm

- **Cation Exchange Capacity**

Total exchange capacity of 0.8 – 1.2 meq/g total, and an external exchange capacity of about 0.1 meq/g.

- **Major Exchangeable Cations**

Rb, Li, K, Cs, NH₄, Na, Ca, Ag, Cd, Pb, Zn, Ba, Sr, Cu, Hg, Mg, Fe, Co, Al, Cr. (selectivity of above cations is a function of hydrated molecular size and relative concentrations).

- **Primary Adsorbing Gases:**

CO, CO₂, SO₂, H₂S, NH₃, HCHO, Ar, O₂, N₂, H₂O, He, H₂, Kr, Xe, CH₂OH, Freon, formaldehyde, and mercaptans.

- **Environmental Properties**

Zeolites are natural, inert, non-toxic substances which are federally classified as GRAS (Generally Regarded As Safe) in most applications and exempted from most regulations and reporting when used in accordance with good agricultural practice and when less than 2% in animal feed products (40 CFR, Part 180.1001 and elsewhere). St. Cloud Zeolite is USDA approved as an absorbent for spills in food processing facilities and complies with federal and state environmental requirements. No fibrous silicates have been detected and crystalline silica is present in quantities of less than 0.01%. Reference MSDS Sheet (product CAS No. 1318-02-1) for additional information.

- **Location** - St. Cloud's Zeolite operation is centrally located near Winston, New Mexico, approximately 35 miles west of Interstate 25 midway between Albuquerque, New Mexico and El Paso, Texas.

- **Reserves** - An 18.3 million ton zeolite reserve base mined from surface exposures 1.5 miles from plant site.

- **Delivery and Freight** - Motor carriers for packaged and bulk products for domestic and international destinations. Bulk rail facilities are available by special arrangement. UPS, LTL, and regional warehousing services also available. Warehouse customer pick-ups 8:00 am-3:00 PM, 5 days per week, or 24 hrs per day or by prior arrangement.

- **Trade Names**

Sold by St. Cloud as Stone House® Cat Litter, Floor Drying Material and Natural Zeolite Crystal, and Heaven Scent®. Marketed or included in products by brokers, manufacturers and distributors as Ammo® Chips, Litter and Rocks, Ammonia-X®, A-Stone®, Biolite®, Clinolite®, EcoFresh®, Ecolite®, E-Z Dry®, Hydrosil®, PDZ® Sweet Stall®, Stall Fresh® Zeofresh, ZeoPro and others.

- **Packaging**

Standard, private label and custom packaging and palletizing available including 10, 25, 50 lb. or other units in paper or plastic with stitch, taped, valve packed or heat sealed closures. Other off-site special packaging services available on request. Bulk packaging in approximately 1-ton and other supersacks or directly loaded in any bulk truck or rail car configuration including top loading or pneumatic carriers.

Information herein is accurate to the best of our knowledge, but may be subject to change without notice. Suggestions are made without warranty or guarantee of results. Before using, user should determine the suitability of the product for its intended use and user assumes the risk and liability in connection herewith.