

ZEOLITE CLINOPTILOLITE

APPLICATION FOR



BIOENERGY

BIOENERGY - BIOFUEL - BIOMASS

CO₂ emissions from fossil fuel combustion is the key source of greenhouse gas (GHG) emissions and is one of the major reasons for global warming. Many countries are implementing emission regulations to decrease the usage of fossil fuels and to encourage the usage of sustainable alternatives. The depletion of fossil fuel resources and the increasing energy demand gives urgency and priority to the development of cost effective renewable energy technologies. Bioenergy - Biofuel is a renewable energy made available from materials derived from biological organic materials (Biomass) which has stored sunlight in the form of chemical energy. Biogas and Bio-oil are two promising biofuels produced by the breakdown of Biomass in the absence of oxygen.

UPGRADING OF BIO-OIL VIA ZEOLITE CRACKING

In order to use it as a Biofuel, Bio-oil has to be upgraded. The oxygen content is very important for the upgrading of bio-oil. High oxygen content causes poor heating value and instability. Zeolite is the most appropriate catalyst for the removal of oxygen. It greatly reduces the oxygen content of the bio-oil while enabling higher heating values and H/C atomic ratios for the catalyzed bio-oils. By using natural zeolite as a catalyst in pyrolysis maximum bio-oil yields can be achieved. Zeolite cracking decreases the oxygenated species and increases the quantities of alkyl and alkenyl substituted aromatic compounds and paraffinic alkanes in the catalyzed bio-oils. Zeolite produces higher quality oil with higher calorific values. Carbon & hydrogen contents are much higher when zeolite is used in the pyrolysis, while oxygen content is lower.

**SUSTAINABLE AND COST EFFECTIVE
CATALYST**

INCREASING THE BIOGAS PRODUCTION

Zeolite - clinoptilolite significantly enhances the biogas production rate and cumulative biogas production. It is widely used for the removal of ammonium in anaerobic digestion. It shows high performances where Biomass contains high concentrations of nitrogen. Zeolite enables a fast and stable biogas production. It removes toxic materials that can inhibit anaerobic digestions. It doesn't only inhibit the acidification of digestion liquid, but also enhances the organic acids destruction and microbial utilization. Clinoptilolite can well inhibit NH₃-N/NO₃-N and control C/N ratio.

Clinoptilolite possess unique adsorption properties for simultaneous biogas purification (H₂S removal) and upgrading of methane. Improves and expands habitats for process-relevant bacteria. It significantly increases the content of methane in the biogas and improves the biogas production.

Highly porous structure of the zeolite provides a host for the microorganisms involved in biogas processes to colonize. Within just a few days, these beneficial microorganisms colonize the surface of zeolite.

DIGESTATE MANAGEMENT

With the rising number of biogas plants, the disposal of digestate is becoming a serious problem. The most common practice is to apply it directly to agricultural fields. But ammonia emissions and nutrient run-off must be controlled otherwise they may contaminate the groundwater sources. Digestate must be within certain legal limits in order to be used as a soil additive. The addition of zeolite into digestate effectively removes ammonium and heavy metals, prevents leachate and increases digestate and effluent quality. Zeolite can successfully produce digestate that is compliant with the regulations.

Zeolite can also be applied to recover nutrients from the liquid fraction of digestate. Clinoptilolite presents higher removal efficiencies and a higher concentration of nutrients compared to other absorbents. After the recovery, Clinoptilolite itself can be effectively applied as a slow release fertiliser to the soil.

 **rota mining
corporation**
YOUR RELIABLE PRODUCER

**ENVIRONMENT FRIENDLY PRODUCT
SAFE & 100% NATURAL**

ZEOLITE CLINOPTILOLITE

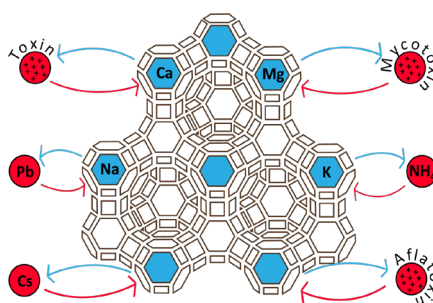


CONTENT

Zeolite is a crystalline, hydrated aluminosilicate that has an infinite three dimensional structure. Rota Mining's Zeolite contains extremely pure Clinoptilolite (92% by mass on average), which is one of the most effective Heulandite type of zeolite. Its highly porous structure (with a porosity reaching 50%) provides an extremely large surface area on which chemical reactions and cation exchanges can take place at a very high degree. It can absorb incredible amounts of water/liquid into its pores. Clinoptilolite has a natural negative ion charge which furnishes it with a tremendously high cation exchange capacity (CEC). Thanks to CEC, it adsorbs and binds ammonium, toxins, mycotoxins and heavy metals like Ni, Pb, Hg and Cd, very efficiently and effectively.

CATION EXCHANGE CAPACITY

Cation exchange capacity (CEC) is a measure of the amount of cations (positively-charged ions) that a clay can catch. As mycotoxins, toxins, heavy metals and ammonium are all positively charged, they are all easily trapped by cation exchangers. Clinoptilolite from Rota Mining's Gördes / Manisa reservoir possesses by far one of the highest CEC rates (as high as $170 \text{ cmol}^+ \text{ kg}^{-1}$) among all reservoirs in the world. Purity and CEC are the two vital parameters that define the quality of zeolite mineral.



THE PRODUCER, ROTA MINING

Rota Mining is the leading natural Zeolite - Clinoptilolite mineral producer and exporter in Eurasia. It was founded in 1995. Since 2003, it is only specialized in the production and the marketing of its own natural Zeolite mineral; and is committed to setting the standards for the natural zeolite industry in the world. It carries out its production under Fami-Qs quality control system since 2007. Thanks to the high purity of its ore and to the quality of its service, Rota Mining serves its products to more than 50 countries in the world.

 **rota mining**
corporation
YOUR RELIABLE PRODUCER

**MINIMUM
80% PURITY
GUARANTEE !**



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BIOENERGY

APPLICATION

Upgrading of Bio-oil: For maximum bio-oil yields, use zeolite as a catalyst at a ratio of 30 wt %.

Leachate, Waste Water, Air, Radioactive Waste Treatment: Generally zeolite in granule form is used as a barrier and filtering medium.

For detailed application instructions, please contact Rota Mining.

SUITABLE SIZES

- 0 - 0,4 mm
- 0 - 1,6 mm
- 0,7 - 1,6 mm
- 1,6 - 3 mm
- 3 - 5 mm

ENVIRONMENT-FRIENDLY

100% natural and safe product; produced under the strict quality control system and surveillance of FamiQs.

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.

FAMI[®]QS