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## GREEN COMPOST

### KMI ZEOLITE: A KEY INGREDIENT IN GREEN WASTE COMPOST

**General statement:** KMI Zeolites are 97+% pure crystalline, hydrated aluminosilicates of alkali and alkaline earth cations which possess three-dimensional crystal structures. They have the ability to lose and gain water reversibly, to adsorb molecules of appropriate cross-sectional diameter and to exchange their constituent cations ( $\text{NH}_4^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ) without major change in their structure.

**Benefits of the inclusion of zeolite in the processing of the green compost:** Zeolite helps improve the composting of green waste by converting the naturally bound nitrogen into usable, bioavailable, assimilable plant nutrients. Zeolite can help you get usable compost quicker, with higher nitrogen retention and less odor.

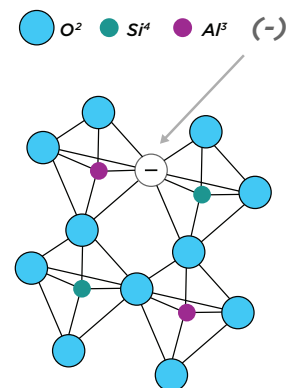
According to Bautista et al., 2011, the addition of zeolite to composted swine manure sequestered 44% of the retained  $\text{NH}_4^+\text{-N}$  at zeolite exchange sites. The authors concluded their study by confirming that zeolite further reduces ammonia emissions, and improves fertilizer quality, by serving as a slow-release N source.

Zhang and Sun, 2015 examined more closely the synergistic effects of a clinoptilolite zeolite & earthworm castings mixture on the composting of green waste. The results indicate that this mixture improved the quality of the compost products, with “greater nitrification and greater nutrient retention than the other treatments during the composting process.” (...)

**Significant time reduction of the composting process by adding zeolite:** The compost matured in only 21 days with the optimized two-stage composting method rather than in the 90–270 days required for traditional composting. The optimal two stage composting and the best quality compost were obtained with 0.30% EWC1s and 25% CL2. (Zhang and Sun, 2015).

**Zeolite a natural source of bioavailable potassium ( $\text{K}^+$ ) for plants:** Litaor et al., 2017 conclude that soil amendment with an inclusion of 2% of zeolite might be beneficial to improve soil retention for cationic nutrients such as  $\text{K}^+$ .

**Interaction between Zeolite and heavy metals:** According to Singh et al., 2014, zeolite (clinoptilolite) can also contribute to the reduction of bioavailability of heavy metals ( $\text{Zn}$ ,  $\text{Cu}$ ,  $\text{Mn}$ ,  $\text{Fe}$ ,  $\text{Pb}$ ,  $\text{Ni}$ ,  $\text{Cd}$  and  $\text{Cr}$ ) in compost. “The addition of an optimum quantity of natural zeolite significantly reduced the bioavailability fractions of heavy metals during rotary drum composting.” (...)



Ill. 1 clinoptilolite zeolite structure.



KMI Zeolite has a maximum moisture content level of 5 - 7%. The zeolites are naturally activated with a negative charge which causes them to draw in and absorb moisture, then release it slowly, balancing the moisture levels surrounding it.



Calcium ions play a vital role in the physiology and biochemistry of organisms and the cell.

They play an important role in signal transduction pathways, where they act as a second messenger, in neurotransmitter release from neurons, in contraction of all muscle cell types, and in fertilization.



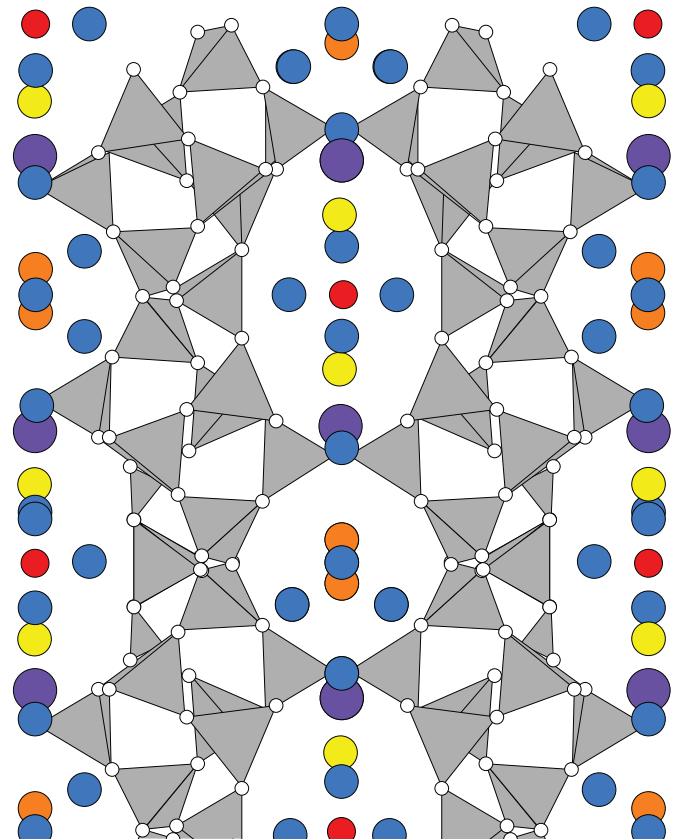
Magnesium is an essential plant nutrient. It has a wide range of key roles in many plant functions. One of magnesium's well-known roles is in the photosynthesis process, as it is a building block of the Chlorophyll, which makes leaves appear green.



In Photosynthesis, potassium regulates the opening and closing of stomata, and therefore regulates CO<sub>2</sub> uptake. Potassium triggers activation of enzymes and is essential for production of Adenosine Triphosphate (ATP). ATP is an important energy source for many chemical processes taking place in plant issues.



Nitrogen is the building block of amino acids, proteins and chlorophyll. Plants can absorb nitrogen either as Nitrate (NO<sub>3</sub><sup>-</sup>) or Ammonium (NH<sub>4</sub><sup>+</sup>), and therefore, the total uptake of nitrogen usually consists of a combination of these two forms.



III. 2 clinoptilolite zeolite molecular sieve absorption.

#### References:

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