EM Treatments of Odor, Waste Water, and Environment Problems
by
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1. Reduction of Odor

EM contains various organic acids due to the existence of microorganisms such as lactic acid bacteria that secrete organic acids, enzymes, antioxidants, and metallic chelates.

First, odor substances are of weak alkaline represented by ammonia and will be neutralized with organic acids in EM solution. Secondly, the enzyme and antioxidants reduce odor in a synergistic way, a sort of buffer effect. Thirdly, the metallic chelates react with odor substance instantly, change them into non-door substances and reduce them quickly.

Organic matter produce odor when they are putrefied with putrefactive type of microorganisms. When EM is applied to a local environment and starts to dominate it with its fermentation type of microorganisms, they will stop the process of putrefaction and move towards a fermentation process. Thus if EM is applied to the treatment of waste water, the treatment takes place in this fermentation system with odor fairly well suppressed.

2. Treatment of Waste Water

A mechanism in the EM treatment system is depicted in Figure 1. EM simply enhances the natural cleaning process. Figure 2 shows the conceptual differences between the natural oxidation process and the EM treatment process. The EM treatment process compared with the conventional method is characterized with the existence of antioxidants secreted by EM microorganisms and the resulting antioxidation environment, both of which enhance solid-liquid separation (separation through depositing), the basis for cleaning the water.

It has been eight years since EM was introduced to the waste water treatment at the Gushikawa City Public Library in Okinwawa, Japan. The system has been very stable and is able to maintain the quality of treated water at a high level passing all requirements for discharge, even though the water is recycled at the premises.
3. Does EM affect the environment negatively?

Microorganisms in EM are not genetically engineered, but are gathered mainly from those used in the food processing industry. They are carefully chosen passing very strict criteria in terms of no harm to plants, animals, humans and especially the environment either directly or indirectly.

EM was introduced first in the field of agriculture about fifteen years ago and has been extended to many other fields. This has been done in Japan and in many other countries. Though it has been used in an extensive range of environments throughout the world, no single case of the use of EM reported any problem over the entire period of time.

We conclude that EM, a multi-culture of beneficial microorganisms, does no harm on the environment and that its safety on the environment is supported by no single case of any harmful effect.

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Microorganisms producing organic acids

Assimilation and decomposition of organic matters by yeast, actinomycetes and filamentous fungi

Hydrolysis
Fermentation process producing organic acids

Microorganisms producing organic acids producing organic acids

Saccharides

Fatty acids and Glycerin
Amino acids

Organic acids

Photosynthetic bacteria (rhodospirillaceae)

Sulfuric acid
Sulphate reducing bacteria

Recycling

CO₂

CO₂

BOD (organic matters)

NH₃
Nitrification

NO₂⁻
Denitrification

NO₃⁻
Denitrification

Phytoplankton
Zooplankton

Note: Processes of respiration and assimilation must be also taken into consideration for each step.
Multiple number of coexisting microorganisms complement each other by providing foods to each other through secretion, multiple effects of energy utilization

- Fermentative microorganism secreting excellent foods to photosynthetic bacteria, the continuation of propagation processes
- ATP secreted by photosynthetic bacteria to be used by other microorganisms for propagation

Enhanced propagation of microorganisms

Catching of free-electron by photosynthetic bacteria, antioxidation field

Antioxidation field suppressing the process of ionization

Enhanced flocking and depositing

Cleaning the waste water

Secretion of antioxidants

Antioxidation field suppressing the propagation of pathogenic microorganisms
Separate flows of energy associated with single microorganism, methane oxidation process, sulphate reducing process, etc.

- Simpler microbial flora
- Increased free-electron in the system, oxidation field

Propagation of pathogenic microorganisms

- Increased toxic substances in the system

Secondary and tertiary pollution