PRODUCT PROFILE

EcoCatalyst is one of a line of patented bio-organic catalytic (BOC) formulations, produced by Bio-Organic Catalyst, Inc., formulated to break down organic waste contaminants, along natural biological pathways, on a highly accelerated basis These BOC biocatalysts have been shown to reduce the energy required for chemical and biological reactions to occur within a broad spectrum of water and wastewater processes.

Bio-Organic Catalyst formulations have been independently tested as non-toxic, non-caustic, non-corrosive, hypoallergenic, and safe to all human, animal, plant, and marine life. The Ecocatalyst product formulation meets both USDA and USEPA wastewater discharge requirements.

EcoCatalyst is designed to breakdown anaerobic slime layers and grease clogging within collection and drainage systems, eliminate grease layers in clarification channels, enhance biological processes, increase dissolved oxygen (DO) levels, eliminate hydrogen sulfide gas formation, and reduce expensive pump out and disposal expenditures within municipal, industrial, and commercial, wastewater treatment and collection systems.

EcoCatalyst is a bacteria-free, broad spectrum biocatalyst, that will cleave the ester bonds to catalyze fats, oils, and grease (FOG) wastes, causing a rapid breakdown of the FOG lipids into a carbon food source for the heterotrophic microorganisms within the collection system and wastewater treatment facility.

EcoCatalyst will provide benefits to enhancing the aerobic conditions within the collection system through improving the uptake and retention of dissolved oxygen (DO) within the collection system waste stream.

EcoCatalyst will provide superior odor reduction benefits within the collection and drainage system, grit chambers, residuals handling, as well as elimination of noxious odors in sludge dewatering, solid wastes receiving and transport facilities. Biofilms are broken down, and surfaces, such as flooring and containers, will clean down deeply into their substrates, eliminating a source of odors, corrosion, and pathogens, that exist at the microscopic level.

EcoCatalyst will insure the highest safety requirements for handling by personnel, and will not present any possible toxicity to the indigenous microbiology of collection system or wastewater treatment facility. EcoCatalyst will provide little limitation due to temperature variations, and will not require resident time. In addition to grease catalyzation, EcoCatalyst will breakdown the slime layers that buildup within sewage pipelines which are a major contributor to the production of anaerobic gases.

EcoCatalyst is a highly concentrated liquid additive which can be injected into a wastewater stream to very quickly reduce FOG components prior to entering the primary clarifiers and other channels, or applied through water/air foggers and spray systems, on a highly diluted basis, directly onto accumulated organic wastes and noxious odorous conditions.

EcoCatalyst's solubilization is part of a sequenced process in which lipid ester bonds are instantaneously cleaved, reducing their molecular structure to both glycerol and fatty acids. Glycerol is water soluble and readily degradable by wastewater micro organisms. Essential fatty acids, released from the lipids, can then be metabolized through biological processes as a high energy food and source of carbon for nitrification reduction processes.

Technical Background:

The fats and oils produced by plants and animals are described as lipids. The term lipids describes all substances that are:

- Relatively insoluble in water but soluble in organic solvents such as benzene, chloroform, acetone, and ether; and

- Related either actually or potentially to organic compounds such fatty acid esters, fatty alcohols, sterols and waxes; and

- Can be used as a source of energy and carbon to support the metabolism of a variety of different organisms.

The most common group of lipids encountered in nature are neutral fats (acylgycerols), which serve as the major components of energy storage in plants and animals, especially in vertebrate animals as a adipose (fat) tissue.

A neutral fat or lipid molecule consists of a glycerol ($CH_2OHCH_2OHCH_2OH$) molecule to which fatty acid (RCOOH) chains have been attached by esterification to form fatty esters (RCOOR').

The most abundant neutral fats in nature are the triglycerols (triacylglycerol) with a fatty acid attached to each of the three hydroxy (OH) group of glycerol. Triacylgylcerol is very insoluble in water and as a consequence cannot be degraded by wastewater treatment micro organisms until it is broken down into its components; glycerol and fatty acids. The ester bond linking glycerol to fatty acids is subject to cleavage by hydrolysis, which can be accomplished by very low pH, very high pH, or by the activity of BOCs which are also capable of cleaving ester bonds.

Lipases are a specific group of enzymes, which initiate the first step in the breakdown of lipids by cleaving the ester linkage between glycerol and fatty acids. There are also non-specific esterase's that can attach the ester bonds present in a variety of organic molecules, including some lipids.

A few substances with an esterase activity are not enzyme in the conventional sense, but still have the ability to reduce the energy required to cleave an ester bond by hydrolysis. These substances are called bio-organic catalysts (BOCs), and are thought of to function by several distinct mechanisms.

After lipids have been broken down into glycerol and fatty acids, microbial degradation of these two lipids components can take place even though they have markedly different characteristics. Once glycerol is released from a lipid it becomes very miscible in water and will not be detected by the analytical methods used for the quantitative analysis of fats, oils and greases (FOG, TOG). Due to its high solubility in water, glycerol is rapidly metabolized by wastewater micro organisms.

Concentrations of FOG contributed by the remaining fatty acids will be reduced, as the fatty acids are metabolized by micro organisms. It's currently believed that the primary mechanism for the breakdown of fatty acids is the "Beta Oxidation Sequence" (beta oxidation) or the Leloir Reaction. In beta oxidation, the beta methylene group (second from the end) is oxidized to a ketone group, followed by the removal of the two carbon fragments from the fatty acid chain.

The enzyme system involved in the splitting of these two carbon fragments is Coenzyme A (CoA). The removal of the two carbon units is achieved by the formation for acetyl-CoA and an acid-CoA complex. The acetyl-CoA enters into microbial metabolism through the Krebs Tricarboxylic Acid Cycle, which eventually releases the CoA for additional reactions.

EcoCatalyst will stimulate beta oxidation by:

- Beta oxidation is an aerobic process and BOCs have been shown to increase the mass transfer of oxygen into fluids;

- BOCs contain some of biochemical precursors required by micro organisms to synthesize factors

used in beta oxidation; and

- BOCs contain small, but detectible, concentrations of CoA.

In conclusion, the treatment of fats, oils, and greases (FOG) components, the lipids, and other non-solubilized organic wastes in wastewater with EcoCatalyst can have a number of beneficial effects. First, lipids are solubilized, preventing their accumulation on surfaces. This solubilization is part of a sequenced process in which lipid ester bonds are instantaneously cleaved, reducing the molecular structure to glycerol and fatty acids. Glycerol is water soluble and readily degradable by wastewater micro organisms. Essential fatty acids, released from the lipids, can then be metabolized through the biological processes as a high energy food and source of carbon for nitrification reduction processes. The Bio-Organic Catalyst biocatalysts also act by creating an increase in dissolved oxygen (DO) levels which improves the ability of aerobic conditions to predominate within wastewater collection and drainage pipelines.

Partial List of Clients:

Wynn Hotel, Las Vegas
Belliago Hotel & Casino, Las Vegas
Four Seasons New York City
Mandaley Bay Hotel , Casino, Las Vegas
Paramount Studios, Holly Wood, CA
Caesars Palace, Las Vegas, NV
Marriott, Seattle WA
Fairmont Hotel, San Francisco, CA
Marriott, San Francisco, CA
Luxor Hotel & Casino, Las Vegas
Hotel del Coronado, Coronado, CA
Hotel San Ramo, Las Vegas
Blue Beacon Truck Wash, Kansas
Omni Royal Orleans, New Orleans, LA
June Mt. Ski Resort, CA
Thunder Valley Casino, Sacramento, CA
W Hotel, San Diego
Four Seasons Hotel, New Port Beach, CA
Embassy Suits, San Diego
Pala Casino, San Diego, CA
Hilton Hotel, Burbark, CA
Concordia University, CA
Chrysler Pacifica, Carlsbad, CA
Marriott Suites, Costa Mesa, CA
Ressaince Hotel, Hollywood, CA
City of Fountain Hills, AZ
Monte Carlo Hotel & Casino, Las Vegas
Cal Expo Fair Grounds, Sacramento, CA
Courtyard, San Ramon, CA
Hilton Grand Vacation Club Hotel, Las Vegas
Residence Inn, La Jolla, CA
Four Seasons, Santa Barbara, CA
Royal Palms Hotel, Phoenix, AZ
Marriott Laguna Cliffs Hotel, Laguna CA
Sheraton Hotel, San Diego
La' Auberge Hotel, Del Mar, CA
Prunyard Inn, Campbell, CA