LUBRITHERM® ALL-TEMP
BIODEGRADABLE HYDRAULIC FLUID

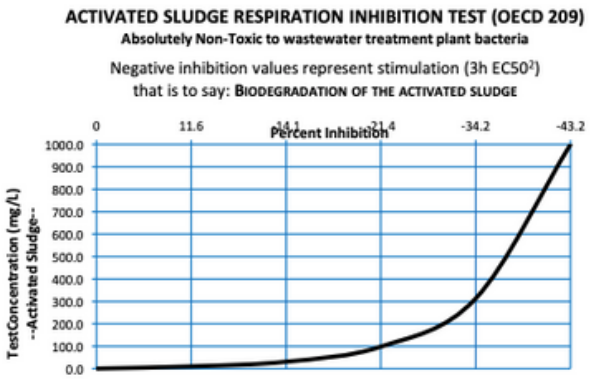
BIOREMEDIATION PROCESS

Lubritherm® All-Temp exhibits an exclusive biodegradation stimulation capability. Extensive lab and field testing indicates that it acts like a synthetic enzyme catalyst, without the limitations of temperature and pH associated with biological enzymes. Lubritherm quickly catalyzes the degradation of sewage, manure, cellulose wastes, hydrocarbons, etc. without itself being depleted and is under Canadian Government approval as environmentally safe.

Lubritherm® All-Temp Benefits:

- In situ bioremediation of contaminated water and soils.
- Rapid biodegradation of organic liquid wastes such as sewage, manure, and cellulose wastes from agricultural and food processing.
- Eliminates Phosphorus and Nitrates from the wastes by utilizing them as a source of energy in stimulating bacteria to increase aerobic respiration (P went from 306 ppm to 2 ppm in Lab. test).
- Sulfates and organic compounds are also fully biodegradable by utilizing Lubritherm All-Temp.
- Eliminates Struvite in sewage by dispersion of the calcium, magnesium, and uric acid deposits.
- Promotes aerobic biodegradation of wastes and eliminates waste stench.

Lubritherm® All-Temp enables the conversion to carboxylic acids that biodegrade to a harmless reduction of carbon dioxide, water, and a tiny amount of cell biomass which is mostly innocuous protein. Biodegradation of hydrocarbons and organic waste by bacteria and fungi involve the oxidation of the substrate by oxygenases2 such as hydrocarbons, sewage, manure, cellulose wastes, etc.



BIODEGRADABILITY

Acute Aquatic
(US Fish and Wildlife, 1984)
Ecotoxicity Classification

Rainbow Trout OECD 203
LC50 = 148.3 mg/L
"Practically Non-Toxic"

Daphnia Toxicity OECD 202
EC50 = 36.8 mg/L
48 hr immobility

Selenastrum Toxicity OECD 201
EC50 = 31.5 mg/L
72 hr Cell number

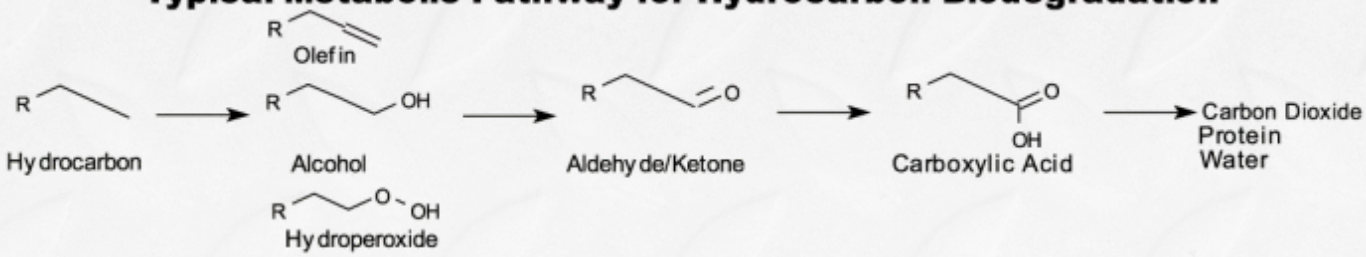
UNDERSTANDING THE BIOREMEDIATION PROCESS

The decomposition of substances, including cellulose, fats, oils, hydrocarbons, sewage, manure, agricultural waste, and residues from food processing, is facilitated by the persistent enzymatic activity of bacterial and fungal cells. These enzymes, specifically oxygenases, play a crucial role in oxidizing these substrates. This enzymatic action also aids in the concurrent removal of Sulphates, Phosphorus, and Nitrates through the biodegradation process.

When considering the primary pathways for the breakdown of hydrocarbons and organic waste, bacteria and fungi initiate the process by oxidizing the substrates with the help of oxygenases. This reaction mandates the presence of molecular oxygen (O2), often found in dissolved form within liquid solutions. The substrates in question range from hydrocarbons and sewage to manure and cellulose waste.

Lubritherm® All-Temp facilitates this process by allowing oxygen to bond at the molecular level with the substrate. This promotes the conversion of hydrocarbons, sewage, manure, cellulose wastes, oils, and fats into carboxylic acids. These acids are then further decomposed through the ß-oxidation process, resulting in the safe and harmless byproducts of carbon dioxide, water, and a minuscule cellular biomass, primarily protein. This proteinaceous matter can be seamlessly integrated into the natural food cycle.

Typical Metabolic Pathway for Hydrocarbon Biodegradation



Additional Information:

1. Biological enzymes have a specific range of operational temperature and pH. Oxygenases are classified among these enzymes when they initiate a redox reaction.
2. Oxygenases: These enzymes oxidize a substrate by transferring oxygen from the air (O2) to the substrate, introducing O2 into a receiving molecule.
3. ß-oxidation stands as the primary pathway for metabolizing fatty acids from lipids, gradually removing two-carbon units in each cycle, eventually leading to acetate formation. This acetate then integrates into the tricarboxylic acid cycle, a pathway breaking down various wastes for energy in aerobic respiration.
4. Fungi and bacteria, the main agents in hydrocarbon breakdown, produce distinct intermediate compounds. Fungi create trans-diols similar to mammalian systems, while bacteria predominantly generate cis-diols. Given that cis-diols are biologically inactive, and many trans-diols can be potential carcinogens, bacteria-driven biodegradation ensures detoxification without producing potential carcinogenic substances.