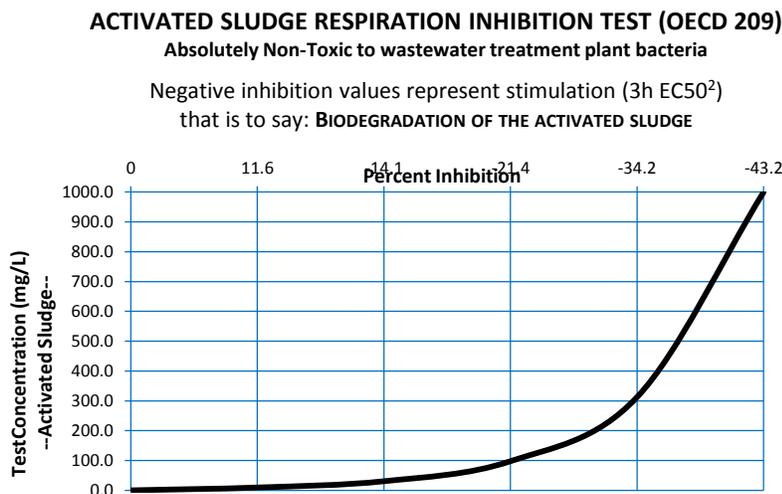


Lubritherm[®] All-Temp exhibits an exclusive biodegradation stimulation capability.

Extensive lab and field testing indicates that it acts like a synthetic enzyme catalyst, without the limitations of temperature and pH associated with biological enzymes¹. 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:

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



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

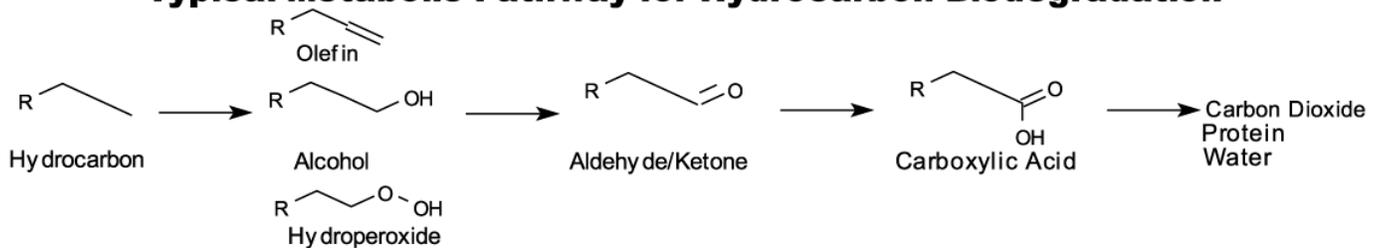
Lubritherm[®] All-Temp enables the conversion to carboxylic acids that biodegrade to a harmless reduction of carbon dioxide, water, and a tiny amount of cell biomass which is mostly innocuous protein.

Biodegradation of hydrocarbons and organic waste by bacteria and fungi⁴ involve the oxidation of the substrate by oxygenases² such as hydrocarbons, sewage, manure, cellulose wastes, etc.

Biodegradation of Hydrocarbons, Sewage, Manure, Agricultural and Food processing Waste.

The biological degradation processes including cellulose wastes in fats, oils, hydrocarbons, sewage, manure, agricultural waste and food processing waste, is accomplished by continuous enzymatic activities of bacterial & fungal⁴ cells involving the oxidation of the substrate by oxygenases². This will simultaneously eliminate the Sulphates, Phosphorus and Nitrates by the same biodegradation process.

Typical Metabolic Pathway for Hydrocarbon Biodegradation



Major Metabolic Pathways for Biodegradation of: Hydrocarbons, Sewage, Manure, Agricultural and Food Processing Waste.

The initial steps in the biodegradation of hydrocarbons and organic waste by bacteria and fungi⁴ involve the oxidation of the substrate by oxygenases², for which molecular oxygen O₂ is required. (O₂ is dissolved in air in the liquid solution. The substrate being hydrocarbons, sewage, manure, cellulose wastes, etc.)

Lubritherm[®] All-Temp enables the combination of oxygen O₂ at the molecular level with the substrate, triggering the subsequent conversion of hydrocarbons, sewage, manure, cellulose wastes, oils, fats, etc., to carboxylic acids that are further biodegraded via β-oxidation³ to a harmless reduction of carbon dioxide, water, and a tiny amount of cell biomass (protein) and can be safely assimilated into the food chain.

NOTES:

¹ Biological enzymes are catalysts which act in a narrow operating range of temperature and pH. When these enzymes catalyze a redox reaction they are classified as oxygenases².

² Oxygenases: Enzymes that oxidize a substrate by transferring the oxygen from molecular oxygen O₂ to the substrate, that catalyze reactions in which O₂ is introduced into an acceptor molecule.

³ β-oxidation is the central metabolic pathway for the utilization of fatty acids from lipids in which two-carbon units are sequentially removed from the molecule with each turn of the cycle, resulting in the formation of acetate which enters the tricarboxylic acid cycle by which alkanes, oils, fats, hydrocarbons, and other wastes are broken down and metabolized so that they can be used as a source of energy in aerobic respiration.

(Aromatic hydrocarbon rings generally are hydroxylated to form diols; the rings are then cleaved with the formation of catechols which are subsequently degraded to intermediates of the tricarboxylic acid cycle.)

⁴ Fungi and bacteria form intermediates with differing stereochemistries. Fungi, like mammalian enzyme systems, form *trans*-diols, whereas bacteria almost always form *cis*-diols (many *trans*-diols are potent carcinogens whereas *cis*-diols are not biologically active). Since bacteria are the dominant hydrocarbon degraders, the biodegradation of aromatic hydrocarbons results in detoxification and does not produce potential carcinogens.