# BioTherm Eliminator®
## Bioremediation Process



1010 72 Avenue NE, Calgary, Alberta, Canada T2E 8V9 • Tel: 403-250-8448 / 800-661-6100 • Fax: 403-444-0033 • Email: info@lubecorp.com

BioTherm Eliminator® 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[1]. BioTherm quickly catalyzes the degradation of sewage, manure, cellulose wastes, hydrocarbons, etc. without itself being depleted and is under Canadian Government approval as environmentally safe.

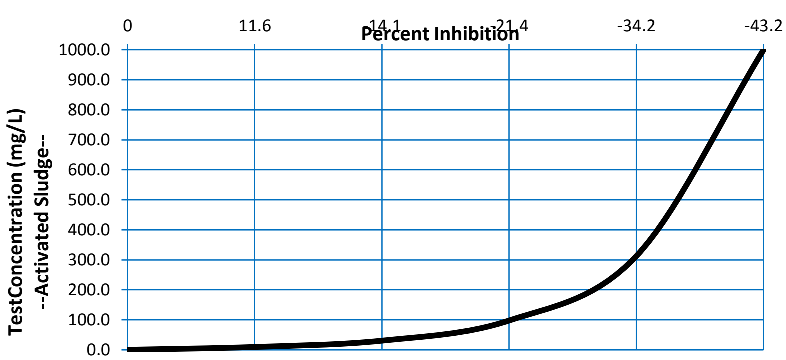
**BioTherm Eliminator® Benefits:**

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 BioTherm Eliminator.
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.

**ACTIVATED SLUDGE RESPIRATION INHIBITION TEST (OECD 209)**

**Absolutely Non-Toxic to wastewater treatment plant bacteria**

Negative inhibition values represent stimulation (3h EC50[2])
that is to say: **BIODEGRADATION OF THE ACTIVATED SLUDGE**




**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

**BioTherm Eliminator** 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.

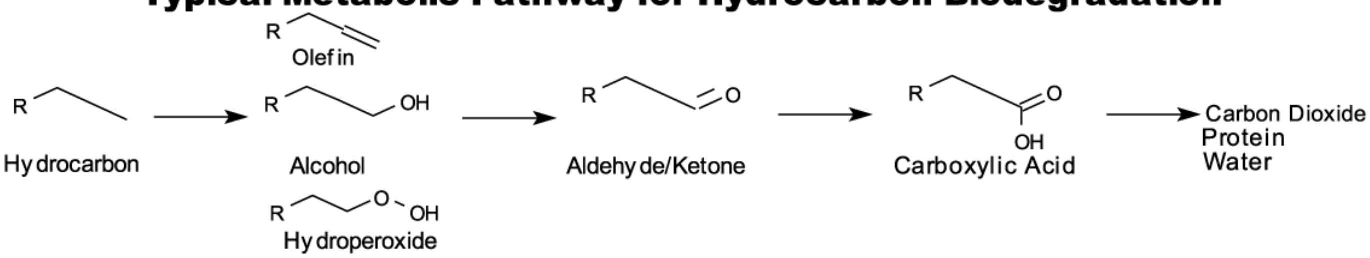
Biodegradation of hydrocarbons and organic waste by bacteria and fungi[4] involve the oxidation of the substrate by oxygenases[2] such as hydrocarbons, sewage, manure, cellulose wastes, etc.

1010 72 Avenue NE, Calgary, Alberta, Canada T2E 8V9 • Tel: 403-250-8448 / 800-661-6100 • Fax: 403-444-0033 • Email: info@lubecorp.com

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

The biological degradation processes including cellulose wastes in sewage, manure, agricultural waste, food processing waste, fats, oils, and hydrocarbons is accomplished by continuous enzymatic activities of bacterial & fungal[4] cells involving the oxidation of the substrate by oxygenases[2]. This will simultaneously eliminate the Sulphates, Phosphorus and Nitrates by the same biodegradation process.

**Typical Metabolic Pathway for Hydrocarbon Biodegradation**




**Major Metabolic Pathways for Sewage, Manure, Agricultural and Food Waste Biodegradation.**

The initial steps in the biodegradation of organic waste and hydrocarbons by bacteria and fungi[4] involve the oxidation of the substrate by oxygenases[2], for which molecular oxygen $O_2$ is required. ($O_2$ is dissolved air in the liquid solution. The substrate being hydrocarbons, sewage, manure, cellulose wastes, etc.)

BioTherm Eliminator enables the combination of oxygen $O_2$ 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 ß-oxidation[3] 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 oxygenases[2].

[2]Oxygenases: Enzymes that oxidize a substrate by transferring the oxygen from molecular oxygen $O_2$ to the substrate, that catalyze reactions in which $O_2$ is introduced into an acceptor molecule.

[3]ß-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.

Benjamin Vroon,
Chief Chemical Engineer