



Environmental Remediation Catalog

Hydrocarbons



IBEX BIONOMICS
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WHO ARE WE?



IBEX Bionomics is a multinational company, leader in the development of organic and bionic products used in environmental remediation, agriculture, bio-industry and human health.

IBEX Bionomics is a pioneer in research and implementation of clean technologies that allow, among many other applications, the control and improvement of wastewater treatment procedures in **refineries and petrochemical plants** as well as **remediation of soils contaminated with hydrocarbons**.

Our products are 100% organic alternatives.

- More than 10 years of experience
- Guarantee compliance with current regulations for waste re-introduction and soil quality standards.

IBEX Bionomics is unique from its competition because:

- We develop and elaborate our own patented organic and bionic products.
- We specialize in wastewater treatment and soil remediation.
- We offer permanent technical and commercial assistance to our clients.
- We are certified organic by National and International regulating entities.



IBEX PRODUCTS

Our Selection Kit of organic products, formulated from microorganisms, enzymes and nutritional mineral complexes, treats the wastewater in refineries and petrochemical plants as well as remediates soils contaminated by hydrocarbons.

Through these products we are able to biologically degrade hydrocarbons such as: gasoline, diesel, BTEX,etc.



Biological

All the microorganisms used in our products are presented in sporulated form. As these break latency they adopt the fundamental characteristics of the native colonies of microorganisms present in the environment they are introduced into.

These microorganisms are obtained through an isolation, selection and reproduction process that guarantees chemo resistant and extremophile strains. These strains are able to withstand high concentrations of salts, metals and toxic elements as well as function in extreme pH (3-12) and temperature (1°-99°C) levels.

All of our microorganisms are classified as level 1 with regards to biosecurity according to the American Type Culture Collection (ATCC), and are harmless to humans, animals and plants.

Enzymatic

These products are obtained from the fermentation of plant metabolites.

Minerals

Selected and processed from quarries made up of mineralized organic material.



MODE OF ACTION



The microorganisms included in our formulations, act homogeneously with the microorganisms and molecular structures present in the environment to be treated. Together, these produce monooxygenated, dioxygenated, hydrolases, dehydrogenases, amydases, and transferases enzymes capable of bioconverting or biodegrading the contaminating materials into CO₂ and H₂O.

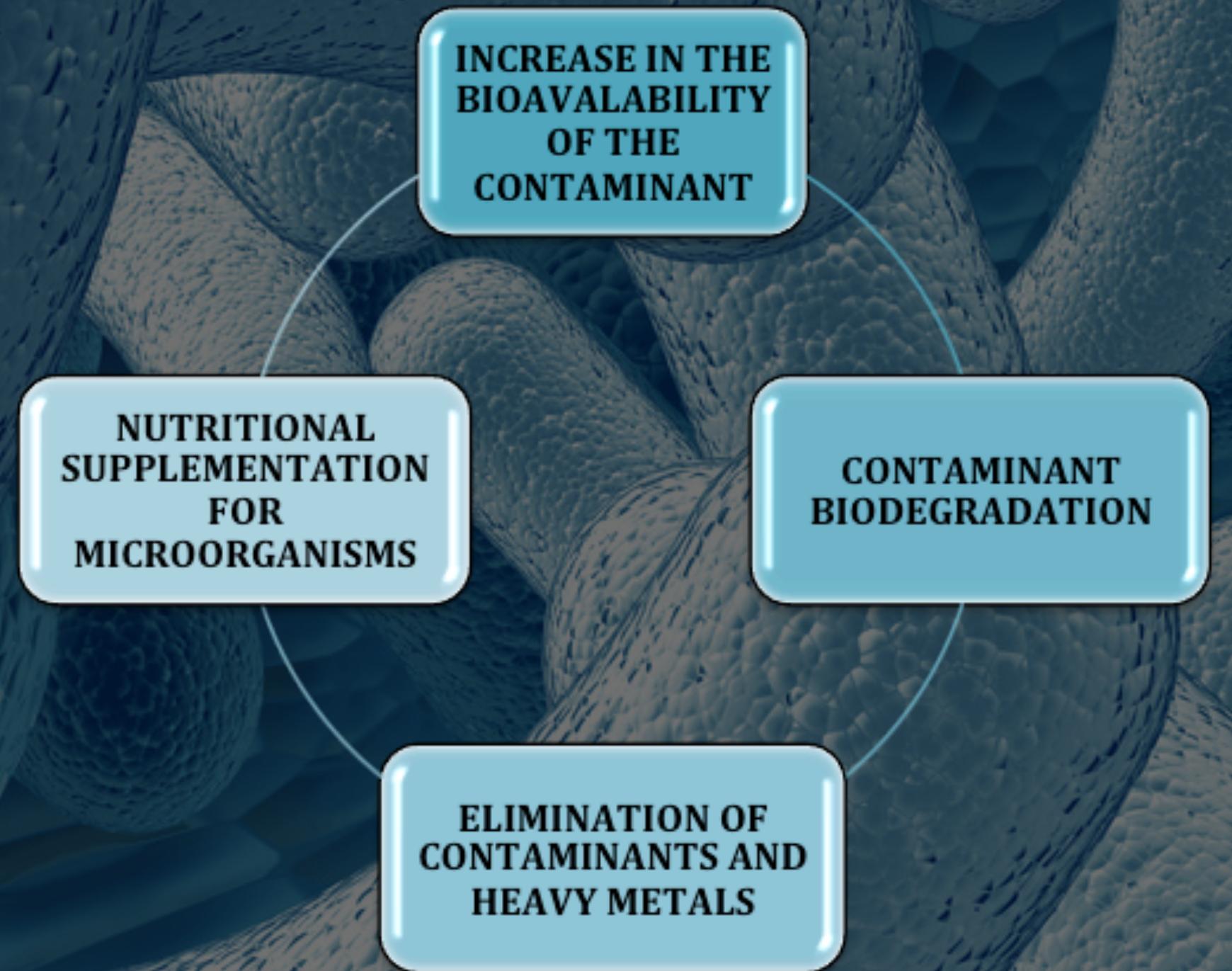
Our Selection Kit of organic products:

- Removes total hydrocarbons, oils and greases In Situ.
- Reduces the BOD and COD loads.
- Eliminates heavy metals.
- Eradicates foul odors produced by hydrocarbons and other contaminants.
- Improves the efficiency of overloaded systems.





TREATMENT CUSTOMIZED SELECTION KIT



The Customized Selection Kit:

• A customized Kit consisting of the appropriate selection of products is put together by IBEX personnel that responds to the conditions of the contamination:

- For contaminated wastewater, the treatment is applied directly, with specific times and dosages pre-established by IBEX technical personnel.
- For contaminated soils, the treatment is applied through a "Landfarming" approach, In Situ or Ex Situ. Soil and contaminant conditions, as well as other factors, are evaluated by IBEX personnel in establishing the optimal Selection Kit and mode of application

In both cases, when the Selection Kit's microorganisms come into contact with the contaminant, a four phase biological process occurs:

- 1. Increase in the bioavailability of the contaminant**
- 2. Contaminant biodegradation by microorganisms and enzymes**
- 3. Elimination of metals through bioconversion and degradation**
- 4. Nutritional supplementation of active microorganisms**





BIOAVAILABILITY TO CONTAMINANT

INCREASE IN THE BIOAVAILABILITY OF THE CONTAMINANT:

Hydrocarbons contain recalcitrant elements, that, in some cases, inhibit the contact between the contaminant and the enzymes or microorganisms responsible for their degradation. When the Selection Kit of products comes into contact with the medium to be treated, it micro-fractures the contaminating particles, facilitating the biodegradation process.





BIOLOGICAL TREATMENT PHASES

CONTAMINANT BIODEGRADATION BY MICROORGANISMS AND ENZYMES:

Hydrocarbons are degraded as a result of the symbiotic relations between the various bacteria used. Among the more important ones are *Bacillus* bacteria of the *Agglomerans*, *Lincheniformis*, *Cereus*, *Megaterium*, *Badis*, *Subillis* and *Azotobacter* species. In this population mix, the primary digesters commence the degradation process as the secondary ones use the metabolic products and enzymes produced by the previous ones or introduced in the Selection Kit to continue the process.



BIOLOGICAL TREATMENT PHASES



ELIMINATION OF METALS THROUGH BIOCONVERSION AND DEGRADATION:

The presence of metals and salts reduce the speed at which the contaminants are degraded. Our Selection Kit is composed of extremophile microorganisms that, through cellular digestion, convert and fix metals onto their structure, which are then internally degraded in the process.



BIOLOGICAL TREATMENT PHASES



NUTRITIONAL SUPPLEMENTATION OF ACTIVE MICROORGANISMS:

Our Selection Kit contains products that provide the necessary nutrients to guarantee adequate microorganism growth within the treated medium. Iron, Copper, Zinc, Sulfur, Cobalt, Manganese, Magnesium, Calcium, Phosphorous, Nitrogen, Potassium, among others, are found in the list of nutrients provided. These elements facilitate the biodegradation process.



LANDFARMING CONTAMINATED SOILS



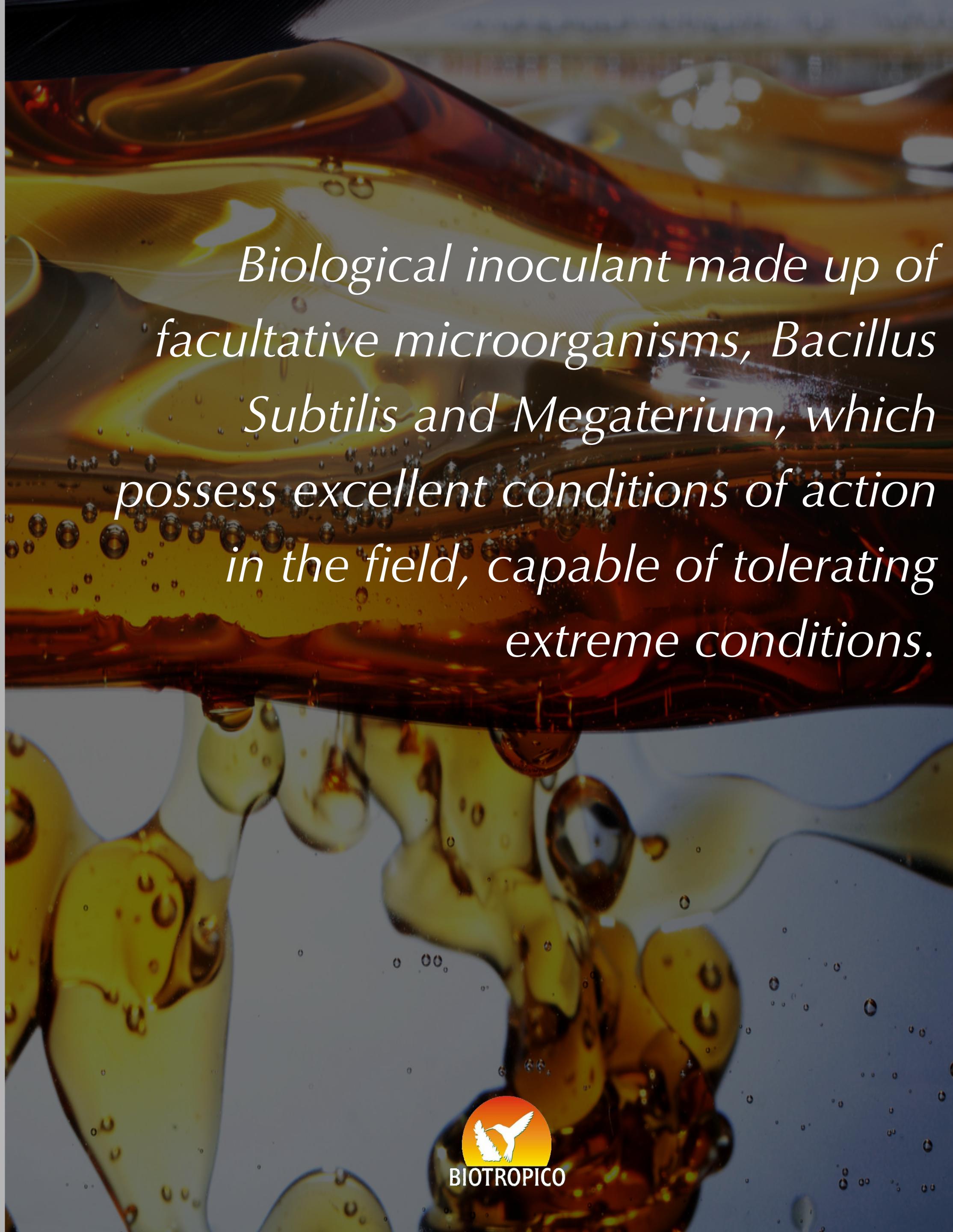
Soils contaminated with hydrocarbons are treated through a "Landfarming" process. This technique reduces the concentration of hydrocarbons in soils by degrading contaminants. Landfarming consists in stimulating microbiological activity through the use of our Selection Kit, while maintaining control over operative variables such as: humidity, nutrients, aeration, pH and temperature in order to guarantee optimum efficacy levels. This process can be carried out In Situ or Ex Situ, by stimulating microbial activity in soils. Effective depth of treatment depends on soil structure, contamination levels, contaminants, and other factors to be evaluated by IBEX technical personnel in the design of the optimum Selection Kit.



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TREATMENT FOR WASTEWATER AND SOILS
CONTAMINATED BY HYDROCARBONS

TREATMENT FOR WASTEWATERS AND SOILS
CONTAMINATED BY HYDROCARBONS

*Biological inoculant made up of facultative microorganisms, *Bacillus Subtilis* and *Megaterium*, which possess excellent conditions of action in the field, capable of tolerating extreme conditions.*



Active Ingredients:
Bacillus Subtilis, Bacillus Megaterium.

X-BLAST

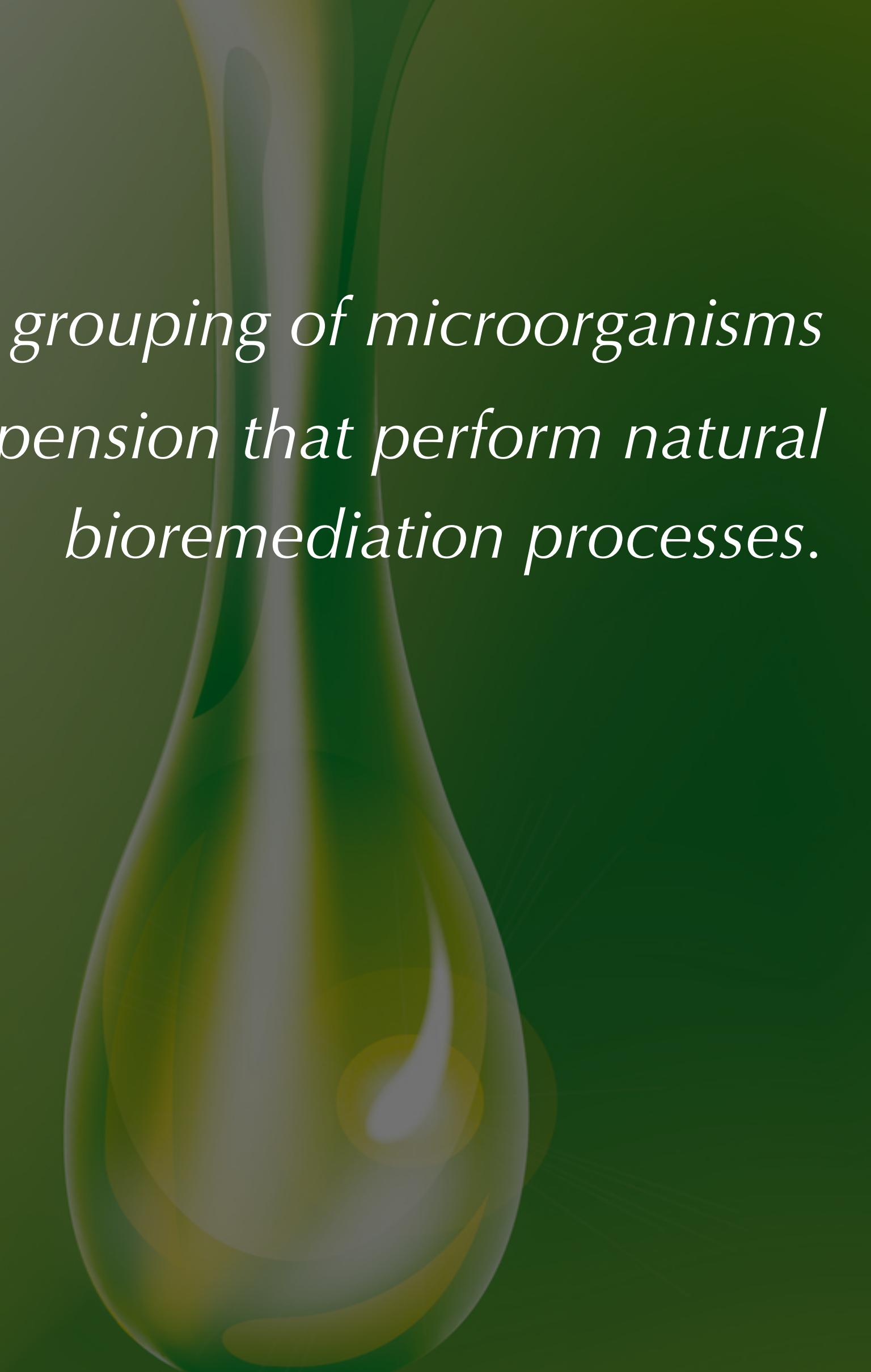
FRACTURES CONTAMINANTS AND DIGESTS FATS AND OILS

MODE OF ACTION

X-BLAST operates as a biodegradable treatment, which is harmless to the environment, highly concentrated, and formulated to break up and degrade long and short fat chains as well as vegetable, animal or mineral oils.

USES

- Endures extreme conditions of temperature, pH levels and pressure due to its protective endospores.
- Degrades decomposing organic matter.
- Micro-fractures long and short fat chains, hydrocarbons, and inorganic compounds.
- Oxidizes organic matter, converting the contaminants into biomass.
- Accelerates the degradation process for all types of hydrocarbons without the need of mechanical or chemical intervention.
- Mitigates the environmental impact generated by odors and vectors due to the decomposition of organic material.
- Degrades organic and inorganic fats, and leachates, without leaving traces of heavy metals or contaminating compounds in the effluents or in biosolids.
- Endures high concentrations of salts and heavy metals.
- Endures wide ranges of pH levels, between 3 and 10.5 pH.
- Endures wide ranges of temperature, between 2° and 98° C (36° – 208° F).



*Synergistic grouping of microorganisms
in suspension that perform natural
bioremediation processes.*



D-TOXOL

BIODIGESTOR OF HYDROCARBONS AND TOXIC ELEMENTS

MODE OF ACTION

D-TOXOL uses Bacillus Megaterium and Licheniformis to restore a contaminated environment to its original condition. It contains microorganisms that are able to degrade petroleum based compounds, so that when they are introduced into hydrocarbons, aromatic compounds, phenolic compounds and/or solvents, they convert the toxic material into simpler components, to ultimately become carbon dioxide, water and cellular material.

USES

- Efficiently digests organochlorines, organophosphorus, trihalomethanes, chrome, toxic salts, heavy oils, tars, and other chemical residues derived from hydrocarbons.
- Degrades petrochemical derivatives in liquid residues achieving conditions allowing for proper disposal.
- The petrophilic bacteria in **D-TOXOL** allow for the degradation of hydrocarbons and toxic residues In Situ, without trace of heavy metals or contaminant compounds.
- Significantly reduces the use of materials such as co-substrates in bioremediation, decreasing the associated costs and mitigating the environmental impact of the process.
- It is an ideal product for the degradation of hydrocarbons discharged in containment ponds.
- Accelerates the degradation of toxic elements in landfills and allows for a rapid treatment of its leachates.
- This product can be used in the decontamination of waters and soils.

Synergistic grouping of microorganisms; composed principally of Pseudomonas and Bacillus Megaterium. When used in sewage or soil treatment it increases the natural bacterial population and improves their capacity for contaminant degradation.

D-VOROL

BIODIGESTOR OF ORGANIC MATERIAL

MODE OF ACTION

The microorganisms in D-VOROL, for their subsistence, produce enzymes suitable for degrading organic matter accumulated in pipes, pumping stations, septic tanks, oxidation ponds, and landfills.

USES

- Endures wide ranges of pH levels, between 4.5 and 10.5 pH.
- Endures wide ranges of temperature, levels between 5° and 100° C (41° - 212° F).
- Accelerates the biodegradation of the most recalcitrant compounds from hydrocarbons.
- Removes fat layers and degrade organic solids in suspension, improving water characteristics in terms of color and odor.
- Reduces the presence of H₂S.
- Generates 80% less sludge and silts in contention and treatment systems.
- Removes unpleasant odors and contamination vectors.
- In landfills, decreases the quantity and contamination capacity of leachates.
- Improves the quality of biosolids generated in wastewater treatment systems.

Active Ingredients:

Bacillus Megaterium y
Pseudomonas.

TREATMENT FOR WASTEWATERS AND SOILS
CONTAMINATED BY HYDROCARBONS

Synergistic collection of microorganisms made up principally of Azotobacter that, when introduced into wastewaters or soils, increase the capabilities for the degradation of nitrogen contaminants by the natural bacterial population.



Active Ingredient:
Azotobacter.

D-NITROL

BIO-TRANSFORMER OF
AMMONIUM COMPOUNDS

MODE OF ACTION

The microorganisms in D-NITROL, for their subsistence, produce enzymes that effectively degrade accumulated organic matter, as well as ammonium compounds.

USES

- Endures wide ranges of pH levels, between 3 and 10.5 pH.
- Endures wide ranges of temperature, between 2° and 98° C (36° – 208° F).
- Accelerates the degradation process for all types of organic and inorganic nitrogen compounds present in hydrocarbons and agrochemicals.
- Degrades organic solids in suspension, improving the color and odor of waters.
- Reduces the presence of nitrites, nitrates and volatile nitrogen compounds.
- Eliminates unpleasant odors and contaminating vectors.
- Decreases the quantity and contaminating capacity of leachates in landfills.
- Improves the quality of biosolids generated in wastewater treatment systems

TREATMENT FOR WASTEWATERS AND SOILS
CONTAMINATED BY HYDROCARBONS

Formulation rich in silicon, calcium, meso and macro elements, that nutritionally stimulate the medium where it is applied increasing the number of beneficial microorganisms, as well as their metabolic capacity.



Active Ingredients:
Finely ground calcium and silicic earth elements with high nutritional bio-availability

MINER-Q

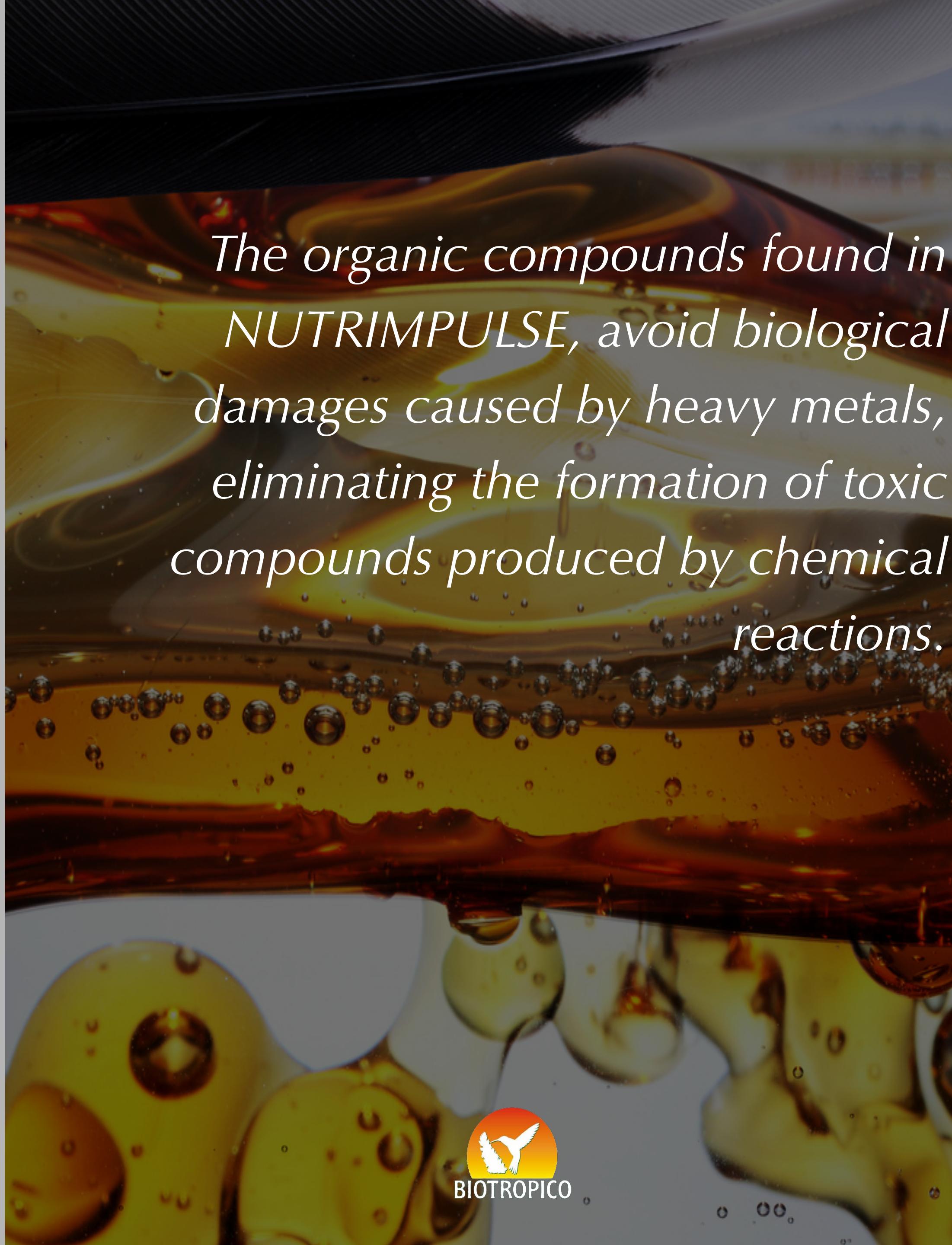
**MINERAL BIOLOGIC ENHANCER
FOR ENVIRONMENTAL USES**

MODE OF ACTION

MINER-Q insures an increased rate of biodegradation of chemical traces, hydrocarbons, and organic matter in drainage waters, as well as septic tanks, and domestic and industrial wastewater treatment systems.

USES

- Elevates the levels of dissolved oxygen in water.
- Optimizes water quality parameters such as: color, pH, and the removal of colloids, floating and dissolved material, fats, oils and heavy elements.
- Reduces the quantity and improves the quality of sludge generated.
- Limits the generation of gases, mitigating the environmental impact from odors and contaminating vectors.
- Maintains nutritional equilibrium, avoiding excessive import of substrates and co-substrates, decreasing process costs and making In Situ treatments viable.



The organic compounds found in NUTRIMPULSE, avoid biological damages caused by heavy metals, eliminating the formation of toxic compounds produced by chemical reactions.

NUTRIMPULSE

MICRO AND MACRO NUTRIENTS
FOR BENEFICIAL MICROORGANISM

MODE OF ACTION

NUTRIMPULSE is composed of organic product providing micro and macro elements of high bioavailability that nutritionally stimulate the microorganisms in a body of water or in a wastewater treatment system, increasing the number of beneficial microorganisms present, and their metabolic capacity.

USES

- Does not allow for the development of toxic compounds.
- Stimulates the activation of beneficial microorganisms present in wastewaters that contribute to the degradation of organic matter.
- Provides nutritional supplements without causing stress to the available biological charge.
- Cannot be utilized by pathogenic microorganisms.

Active Ingredients:
Nutrients such as Nitrogen,
Phosphorous, Potassium
and minor elements.



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BIOTROPICO