Novo MAC

Multi-Purpose bioformulation with a new BioS™ *Multi-Action Microbial Consortium*

Introducing *Novo MAC* with a new BioS™ microbial consortium that demonstrates superior enzyme performance for use in multiple applications. The BioS™ consortium in *Novo MAC* exhibits a broad range of degradation capabilities needed for a multi-purpose product efficacious in maintenance of drain line and grease traps, improving septic and waste degradation and cleaning and odor control.

In their natural environment, bacteria produce hundreds of enzymes in response to the organics present in their environment. They produce extracellular enzymes that break down proteins, starches, fats, oils, greases and toilet tissue into smaller particles outside the bacterial cell. The bacteria then transport the smaller particles across their cell membrane for use as an energy source and for building of new cellular components. Since bacteria detect the organics present as potential food and produce specific enzymes to breakdown these organics, it is a very efficient system. Many different enzymes are required to completely breakdown a substrate.

Novo MAC BioS™ consortium produces key extracellular enzymes including amylase, cellulase, lipase and protease. Drain lines, grease traps, septic systems and surfaces are nutrient rich systems for bacteria. Although many bacteria can utilize these organics as food sources, it is the bacteria with the most rapid production of these key enzymes that provide the most dramatic effects. The new BioS™ microbial consortium is the next generation technology in microbial blends with degradation capability superior to the present market leading MSB blend.

Benefits

Novo MAC is designed to provide exceptional performance for the following applications:

- *Drain lines and grease traps* –degrades and eliminates organics found in drain lines and grease traps. Regular addition of *Novo MAC* maintains a cleaner and odor-free system.

- *Septic and waste treatment* –maintains effective activity in septic systems by eliminating the need for excessive pumping. Eliminates odors caused by incomplete digestion of malodorous volatile fatty acids.

- *Bathroom cleaner and odor controller* –penetrates into cracks, crevices and pores of surfaces where organics accumulate, actually removing the organics to leave a visually cleaner surface. Provides long-term odor control by removing the organics that cause odors and preventing the return of odor-causing compounds.

Features

The new BioS™ microbial blend offers:

- A stable consortium of safe *Bacillus* spores
- Production of multiple enzymes providing a wide range of degradation capabilities
- A synergistic blend that works in concert to provide superior performance across multiple applications
- Excretion of high levels of amylase, cellulase, lipase and protease enzymes
- Ability to work under aerobic and anaerobic conditions
- Single product simplicity for multi-application flexibility

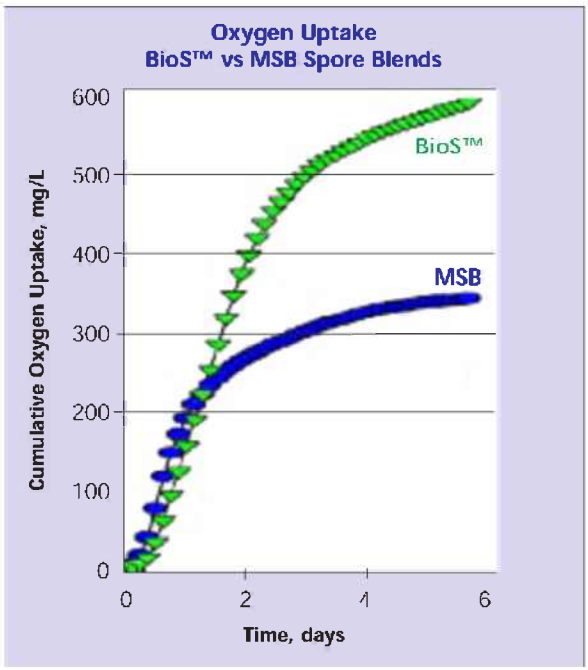

Figure 1. *Respirometry was used to monitor the effectiveness of synthetic sludge degradation by comparing the new BioS™ microbial blend and the MSB microbial blend as measured by oxygen consumption. The cumulative uptake is 74% higher for the BioS™ microbial blend, indicating that the BioS™ consortium has far better degradation activity.*

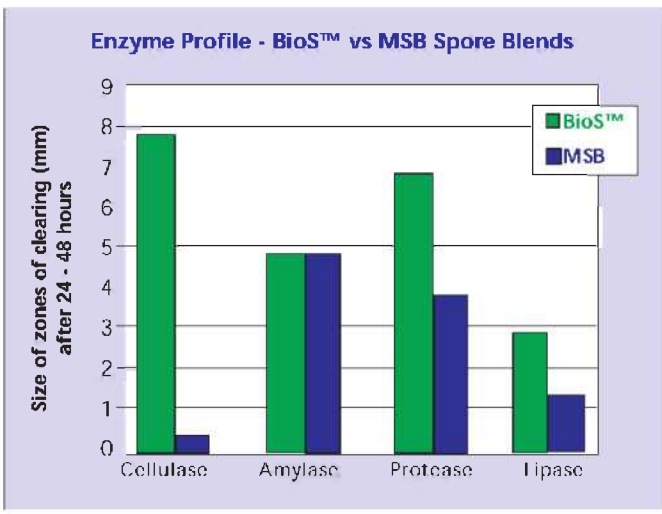

Figure 2. *Differential media on Petri plates visibly demonstrate breakdown of organic compounds by producing a "zone of clearing" (hydrolysis) around each colony. A given quantity of microbial culture is spotted onto a disk that is placed on a Petri plate containing a solid media (substrate) that allows visualization of an enzyme reaction. As the targeted enzyme is produced and diffuses throughout the agar, a zone of clearing is created. The BioS™ microbial blend demonstrates superior cellulase, lipase and protease enzyme production when compared to the MSB blend. Both blends produce high levels of amylase.*

Cellulase: Cellulose is the most abundant biological compound on earth and is present in stains, grime and organic deposits. The BioS™ consortium produces cellulase enzymes that break down this large chain insoluble molecule into much smaller water soluble, biodegradable fragments.

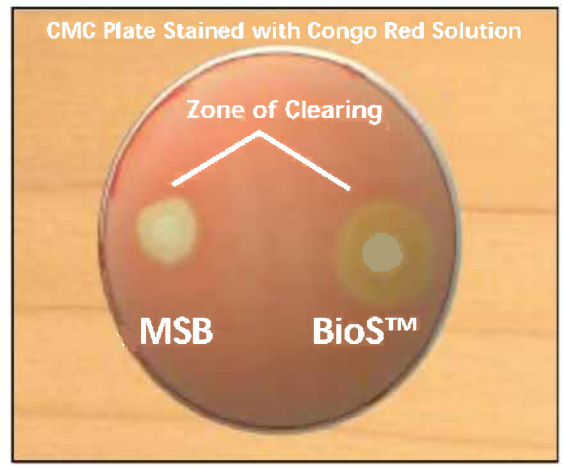

Figure 3*. BioS™ and MSB consortiums are each spotted onto separate disks placed on a Petri plate containing a carboxy-methylcellulose medium. As cellulase is produced and excreted, the carboxy-methylcellulose is broken down. After the plate is stained with a congo red solution, the zone of clearing becomes visible around the colony. The BioS™ consortium produces a significantly higher level of cellulase when compared to the MSB consortium.*

Protease: Proteins are long chains of amino acids that are tightly coiled into a particular structure suitable for the function of specific proteins. Proteases are enzymes that hydrolyze peptide bonds in proteins to break down the large structure into smaller groups of amino acids. Due to the high degree of charged amino acids in proteins they are usually very sticky, and the proteases produced by the BioS™ microbial blend help to reduce this stickiness by breaking down the protein into more readily biodegradable parts.

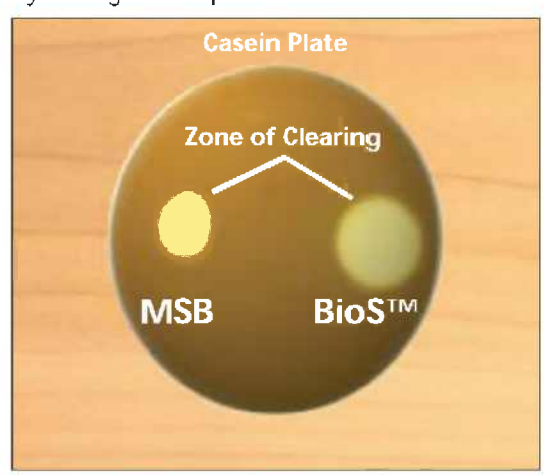

Figure 4. *BioS™ and MSB consortiums are each spotted onto separate disks placed on a Petri plate containing a casein skim milk medium. As protease is produced and excreted, a zone of clearing becomes visible where the skim milk has been broken down. The BioS™ consortium produces a significantly higher level of protease when compared to the MSB consortium.*

Lipase: Fats, oils and greases are primarily composed of triglycerides, and are major portions of soils and organic deposits. The BioS™ consortium in *Novo MAC* produces a lipase enzyme that breaks down this triglyceride molecule into its more basic biodegradable components.

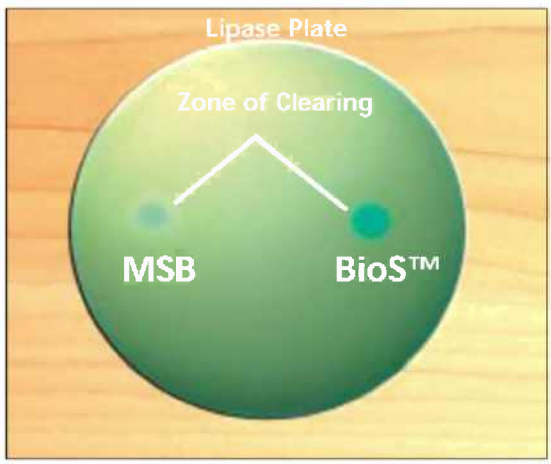

Figure 5. *BioS™ and MSB consortiums are each spotted onto separate disks placed on a Petri plate containing a lipase medium. As lipase is excreted, the triglycerides are hydrolyzed and the pH drops in the area where the break down has occurred. The BioS™ consortium shows a deeper green color revealing that more triglycerides were broken down, i.e. the BioS™ consortium produced more lipase enzyme, when compared to the MSB consortium.*

Amylase: Starch is a sugar storage molecule composed of repeating units of glucose present in most food substances. Starch contributes to soiling by causing particles to stick more readily to surfaces. The amylase produced by the BioS™ microbial blend breaks down the starch into a more readily biodegradable form, reducing the stickiness of particles and making them easier to remove.

Figure 6. *BioS™ and MSB consortiums are each spotted onto separate disks placed on a Petri plate containing a starch medium. As amylase is produced and excreted, the starch is broken down. After the Petri plate is stained with an iodine solution, the zone of clearing becomes visible. As demonstrated, both the BioS™ and MSB consortiums produce considerable levels of amylase.*

Safety of BioS™ Consortium

Novo MAC contains a blend of safe *Bacillus* microorganisms. Toxicity studies done by an independent laboratory revealed that the BioS™ consortium has no acute oral toxicity, no acute dermal toxicity, and no acute inhalation toxicity at maximal test dose. Acute dermal irritation and acute eye irritation studies classify the BioS™ consortium as non-irritating. The BioS™ consortium also does not elicit a skin sensitization reaction.

Product Characteristics

Bacteria Counts	5.4×10^7 cfu/ml (200 Billion/gal)
Bacteria Type	Blend of *Bacillus* Spores
Salmonella	Not detected
Appearance	Creamy white
Fragrance	Pleasantly perfumed
Shelf-life	Two years; maximum loss of 1.0 log at recommended storage conditions

Performance Characteristics

Characterized Enzyme Production	Lipase,Protease, Amylase,Cellulase
Bacterial Pathways	Aerobic & Facultative Anaerobic
pH Range	5.0 - 9.8
Temperature range	38° - 145°F (3° - 63°C)

Storage and Handling

Store in closed containers at 50° - 100°F (10° - 40°C). Wash hands thoroughly with warm, soapy water after contact. Avoid eye contact.

Standard Packaging

- 4 x 1 gallon case
- 5 gallon pail
- 55 gallon drum

Product Code: 7002027

This product not approved for use in Canada

Recommended Application Feed Rates

GREASE TRAPS	
TRAP SIZE	**DOSING***
200 gal trap (27 ft^3 or 0.8m^3)	10 oz (300 mL) per day
500 – 1,500 gal trap (67-200 ft^3 or 1.9 - 5.7m^3)	18 – 20 oz (530 - 590 mL) per day
1,500 gal or larger (>200 ft^3 or >5.7 m^3)	32 – 40 oz (950 - 1180 mL) per day

DRAINLINES			
SIZE	**FREQUENCY**	**NOTES**	**DOSING***
RESIDENTIAL and HOTEL Slow Running Drains	3-day start-up treatment	Run hot water for 30 seconds before dosing product directly into drain. For best results, dose at bedtime or when drain will not be used for several hours.	2 - 4 oz/day (60 - 120 mL/day)
RESIDENTIAL and HOTEL Maintenance	Ongoing	For best results, dose at bedtime or when drain will not be used for several hours.	2 - 4 oz/week (60 - 120-mL/week)
COMMERCIAL Slow Running Drains	7-day start-up treatment	For best results, dose at closing or during quiet hours.	6 - 8 oz/day (180 - 240 mL/day)
COMMERCIAL Maintenance	Ongoing	For best results, dose at closing or during quiet hours.	4 - 8 oz/week (120 - 240 mL/week)
FLOOR DRAINS	Ongoing	Start-up: Treat drains daily for 3-7 days to acheive better flow rates. Maintenance: dose weekly. For best results, dose at closing or during quiet hours.	Mix 32 oz in 2 gallons water (125 mL/L) to treat 6 - 8 drains

SEPTIC TANKS		
APPLICATION	**FREQUENCY**	**DOSING**
RESIDENTIAL SEPTIC TANK	≤ 1000 gal tank	**Liquid:** 10 oz (300ml) per month **Dry:** 2- 4 oz (60-120 ml) per month
COMMERCIAL SEPTIC TANK	≥ 1000 gal tank	**Liquid:** 16 oz (475ml) per week **Dry:** 8 oz (240 ml) per month

ODOR CONTROL		
APPLICATION	**FREQUENCY**	**DOSING**
Bath tile, floors, diaper pails, garbage pails, animal areas	Use as needed; rinse as necessary	2 - 4 oz (60 - 120 ml) per gallon of water
Trash/garbage collection areas, dog pens, concrete, floor surfaces	Spray, let sit on tough areas, scrub as necessary, rinse as needed. Air dry.	5 - 8 oz (150 - 240 ml) per gallon of water
Subways, public restrooms, kennel runs, loading docks	Spray and wipe surfaces; rinse or hose down as necessary.	5 - 8 oz (150 - 240 ml) per gallon of water
Dumpsters, trash chutes, containment areas	Spray as necessary; allow to air dry.	Use full strength

** Dosing guidelines are recommendations only. Higher dosing rates may be required based on grease loading, types of food cooked and number of meals served. Contact your Novozymes Biologicals' Sales Representative for technical assistance.*

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