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PRODUCT & TECHNICAL DATA

MBZ-L65-VB

TYPE – Food Approved Biocide, Bio-Dispersant, Surfactant and Wetting Agent for Effective Organics Dispersion, Microbial Control and Viscosity Modification. MBZ-L65-VB is a preventative for Dextran formation and will improve flow qualities should Dextran have already formed.

MBZ-L65-VB is a unique food approved process surfactant and biocide utilized as a viscosity modifier in viscous liquids to prevent Dextran formation or as an effective dispersant and viscosity modifier for organic residues such as dextran and unwanted hydrophobic compounds and biofilm.

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Dextran Problem

Sugar is an incredible food product found in almost everything we take in our daily lives. In addition to being so abundant in our lives, unfortunately, it does not grow on a tree. The life of sugar starts with sugar beet or sugar cane. To extract and purified this sugar, food technologists and food scientists use many complex steps together. One of these crucial steps is crystallization. This step directly relates to the quality of the sugar (Borji, Borji, & Jourani, 2019). However, high quality is not something that we can achieve so easily. We face problems at this point. For example, the presence of some particles in the sugar solution may affect sucrose crystallization adversely (Borji, Borji, & Jourani, 2019). Among these particles, this article was mainly focused on dextran.

Dextran is a high molecular weight polysaccharide formed by α-(1–6) linked glucose units, with α-(1–3) branch linkages and may contain other branches linkages such as α-(1–2) or α-(1–4) (Bashari et al., 2013). At least 50% to 60% of the linkage must be α-(1-6) to define the molecule as dextran (Coll, Clarke & Roberts, 1974). Their molecular weight ranges from 10^5-10^7 and upwards, and usually, there are soluble in water (high α-(1-6) linkage means higher solubility), but solubility also changes with changing molecular weight (Coll, Clarke & Roberts, 1974).

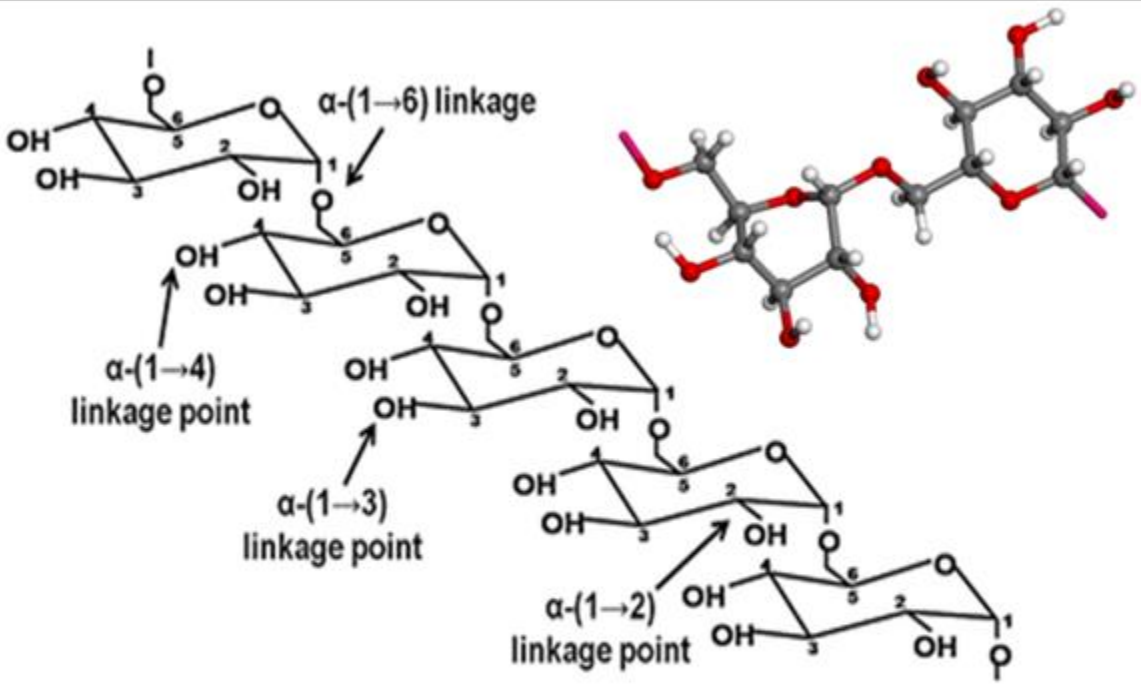

Fig. 1 : Structure of dextran showing α-(1 → 6) glycosidic bonds in main chain and possible branches of smaller chains with α-(1 → 2), α-(1 → 3), or α-(1 → 4) linkages (Kothari, Das, Patel, & Goyal, 2015)

Generally, a healthy sugarcane plant does not contain dextran in substantial amounts; however, it can increase rapidly in damaged cane (before and after harvest) by bacterial contamination (Coll, Clarke & Roberts, 1974). The appearance of dextran in sugar production can cause many problems such as slower filtration rate, increasing viscosity, a rise of sugar loss to molasses, or more separation cycles (Bashari et al., 2013).

Sources and Formation of Dextran

Besides occurring naturally in some foods, dextran is synthesized in sugar solutions by the action of the bacterial enzyme, dextransucrase, on sucrose (Kothari, Das Patel, &Goyal, 2015 and Coll, Clarke & Roberts, 1974).
Dextransucrase is produced by LAB (Lactic Acid Bacteria) of genera, viz., *Leuconostoc*, *Streptococcus*, *Lactobacillus*, *Pediococcus*, and *Weissella* (Kothari, Das Patel, &Goyal, 2015).

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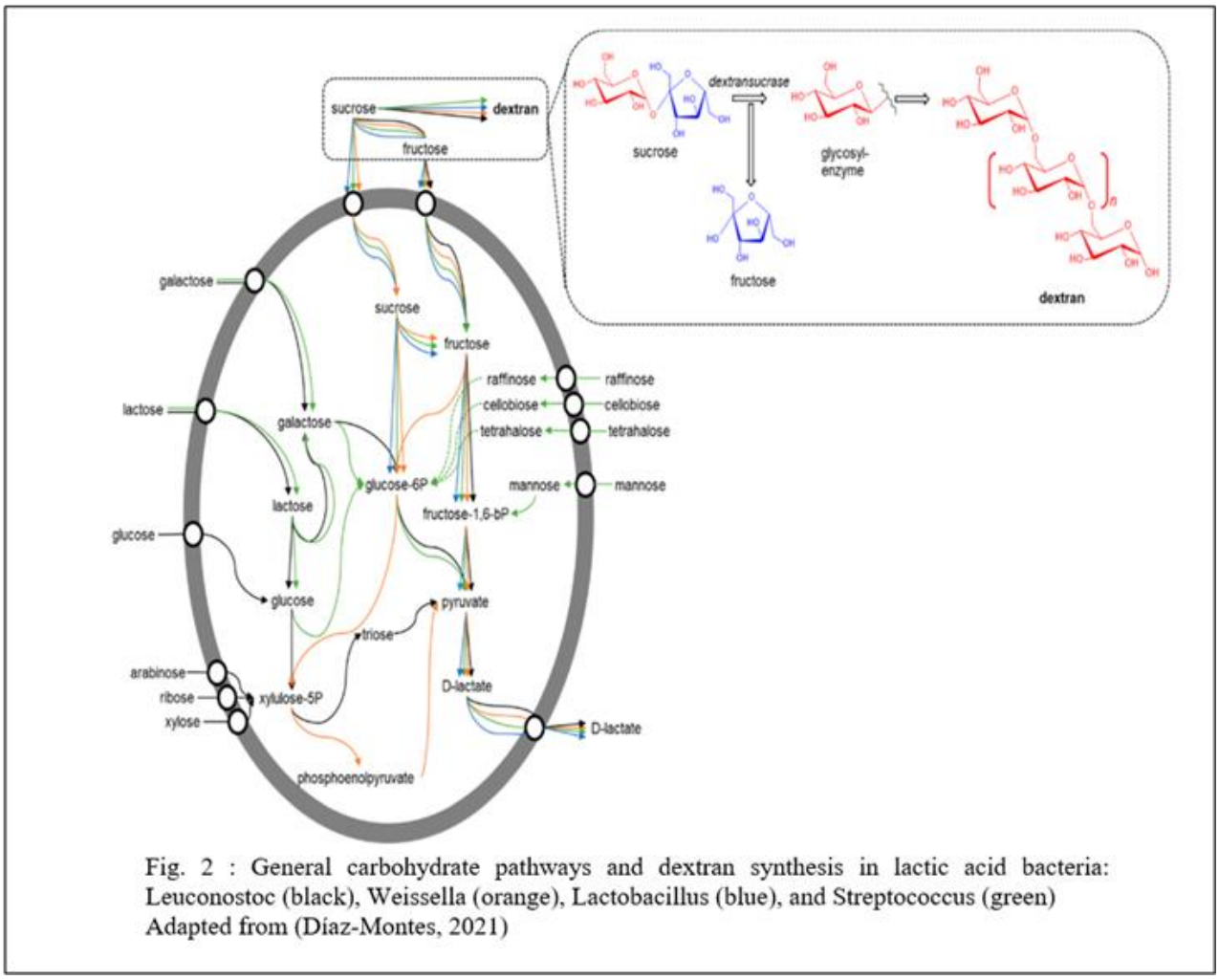

Fig. 2 : General carbohydrate pathways and dextran synthesis in lactic acid bacteria: Leuconostoc (black), Weissella (orange), Lactobacillus (blue), and Streptococcus (green) Adapted from (Díaz-Montes, 2021)

Commonly ***Leuconostoc mesenteroides*** **and, less commonly,** ***Leuconostac dextranicum*** (Coll, Clarke & Roberts, 1974) cause this formation. In addition, the nature and degree of the branching of dextran are affected by the bacterium that causes the production of dextran. And this nature directly affects its structure and molecular weight. This variety exists due to how dextran is formed (Coll, Clarke & Roberts, 1974) . Each bacterium, even each strain, produces dextran with its unique structure. However, structural differences seem to have little effect on the problems they cause in sugar production (Coll, Clarke & Roberts, 1974).

Leuconostoc mesenteroides is very abundant in nature, which means contamination with this bacterium is very easy. It can be found in most soils, so the sugar cane is basically in it (Coll, Clarke & Roberts, 1974). It is airborne and can also contaminate standing water (Coll, Clarke & Roberts, 1974). With contamination, this bacterium can grow and produce dextran from any source of

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sucrose, so a minor infection can create enough dextran in a few days to cause a factory to shut down (Coll, Clarke & Roberts, 1974).

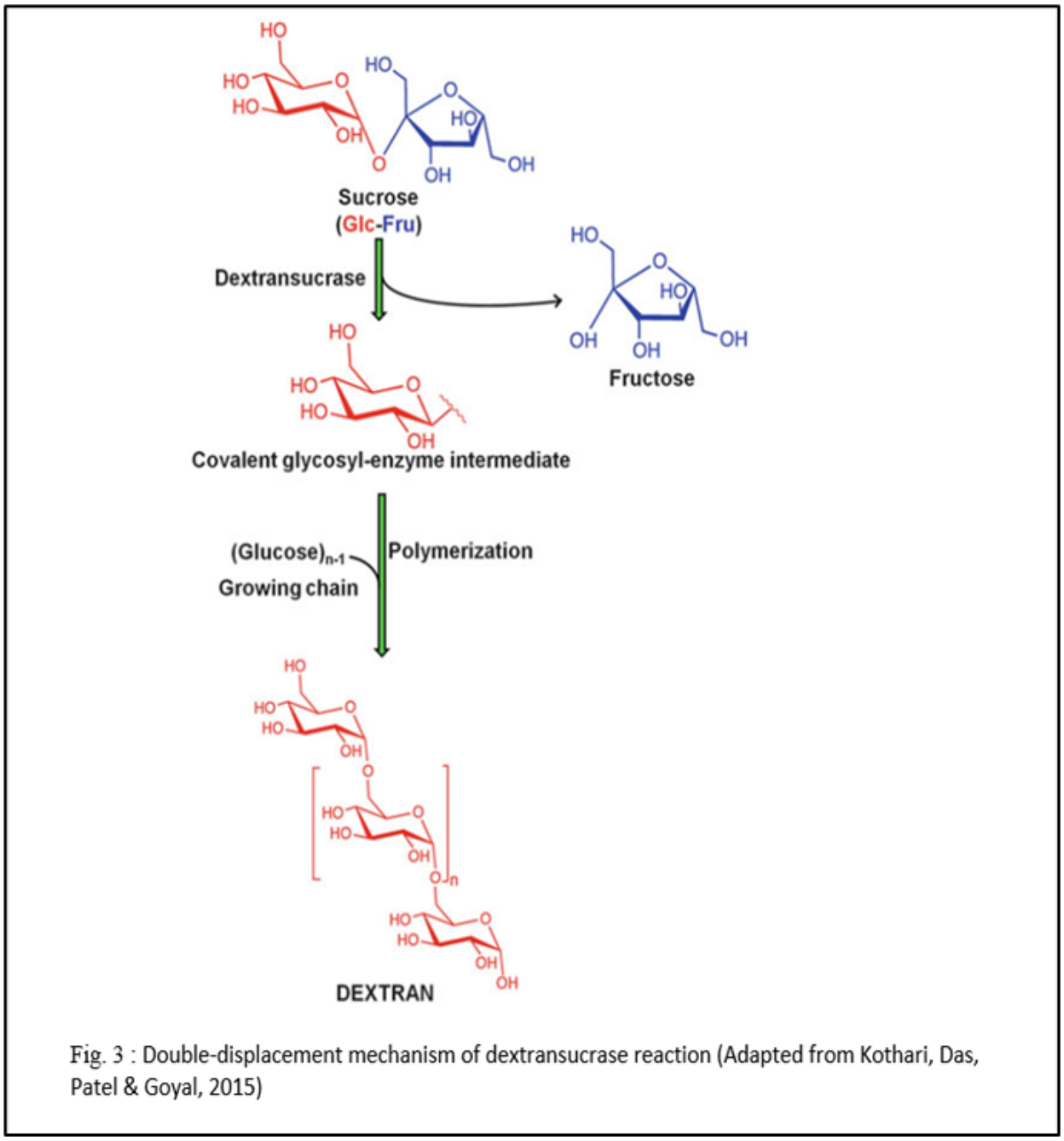

Fig. 3 : Double-displacement mechanism of dextransucrase reaction (Adapted from Kothari, Das, Patel & Goyal, 2015)

Therefore, it can be understood that increasing dextran amount means reducing the recovery of sucrose during production. Because for dextran production, we need sucrose (Bukhari et al., 2015). From an industrial point of view, dextran also creates processing line problems such as blockage in the filter and pump (Bukhari et al., 2015).

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TYPICAL PROPERTIES

Appearance	:	Clear/Opaque Yellowish Liquid
Flash Point	:	>55°C Not Combustible
pH neat soln. at 25°C	:	5.0 – 8.0
Specific Gravity at 25°C	:	1.03 - 1.08
Solubility in Water	:	Dispersible Emulsion

APPLICATION & CONTROL

BIOFILM & DEXTRAN CONTROL

MBZ-L65-VB should be dosed on a continuous basis to sugar process recirculation water that is prone to microbiological contamination. This dosage is undertaken via a proportional dosing pump at a rate of 5 to 25mg/l based on water make-up rates, cycles of concentration or slug dosed at similar rates as necessary, based on system volume. Dosages are dependent upon the specific fouling problems being experienced and may be altered as necessary. High surfactant levels will promote foaming which is necessary for lowering surface tension to create cleaner surfaces.
(GPD-L155 General Process Defoamer will have to be applied as necessary for adequate foam control if necessary.)

VISCOSITY MODIFICATION (should dextran have formed)

MBZ-L65-VB is effectively utilized as a combination viscosity modifier/biocide and may be dosed as necessary directly to food and industrial products as an effective wetting agent and biocide. Dosages may vary dependent upon applicable viscosities, but usually dosages at less than 30mg/l prove effective. Dosages should average at between at around 25mg/l in highly contaminated systems.

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The specific active surfactant/viscosity modifier type of which MBZ-L65-VB is comprised is FDA Approved as 21 CFR 172-810 which stipulates "As a processing aid in sugar factories in the production of unrefined cane sugar, in an amount not in excess of 0.5 part per million of the additive per percentage point of sucrose in the juice, syrup, or massecuite being processed, and so used that the final molasses will contain no more than 25 parts per million of the additive expressed as 100% activity."

STORAGE AND HANDLING

MBZ-L65-VB can be stored for up to 24 months from the date of manufacture, in its original, sealed packaging, at room temperature in a dry area. Containers must be kept undercover and out of direct sunlight. This product can be safely stored in plastic type holding tanks designed to manage the specific gravity listed. **MBZ-L65-VB** must be protected from high heat areas. Protective clothing such as gloves and goggles should be worn when handling

HEALTH AND SAFETY

MBZ-L65-VB is of low toxicity and any residue monomers present have low toxicity. The product is generally regarded as safe but eye contact or prolonged skin contact may cause irritation. Should contact occur, hands should be washed with soap and water and eyes well irrigated for fifteen minutes. Ingestion will induce vomiting and should be treated symptomatically. Spillages must be contained to allow for safe disposal. Avoid direct flushing to storm water drain. Please refer to product SAFETY DATA and PRODUCT APPROVALS DECLARATION.

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