



*University of zabol  
Faculty of Agriculture  
Department of Food Science*

*The Thesis Submitted for the Degree of Master of Science  
(In the field of Food Science and Technology)*

*Title:*

**Production, purification and physicochemical properties of  
Exopolysaccharide from *lactobacillus pentosus***

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## Abstract

Exopolysaccharides (EPSs) are high molecular weight biopolymers made up of sugar units that are released into the environment by microorganisms. In this study, first the exopolysaccharide obtained from *L.Pentosus* MT.ZH693 and *L.Fermentum* MT.ZH893 was produced, extracted and purified under optimal culture conditions. The obtained exopolysaccharides were then subjected to NMR, water holding capacity, water solubility index, anti-biofilm activity, rheological test and inhibition of DPPH radical activity. exopolysaccharide obtained from *L.Pentosus* MT.ZH693 under optimal culture medium conditions (glucose: 4.11% w/v, sucrose: 3.47% w/v, yeast extract: 3% w/v, peptone: 3% w/v, time: 30.92 h, temperature: 40°C, inoculation size: 3.16% v/v and pH: 7) and exopolysaccharide from strain *L. Fermentum* MT.-ZH893 under optimal conditions (glucose: 4.12% w/v, sucrose: 1.78% w/v, yeast extract: 2.64 % w/v, peptone: w/v 0.01% Time: 66.48 h, temperature: 39.55°C, inoculation size: 1.97 % v/v and pH: 5.83) were produced and then purification and drying steps were performed by freeze-drying system. The results showed that the amount of exopolysaccharide obtained from strain *L. Pentosus* MT.ZH693 0.225 mg/ml and its biomass amount 0.405 mg/ml and as well as the amount of exopolysaccharide produced by strain *L.Fermentum* MT.ZH893 mg/ml 0.181 and biomass value 0.337 mg/ml. The NMR spectrum of exopolysaccharides generally indicates the presence of anomeric protons, cyclic protons, and alkyls. Aqueous solubility index and water holding capacity EPS for *L. Pentosus* MT.ZH693 was 27.14% and 170% and for *L. Fermentum* MT.ZH893 This value is 16.84% and 130%. The results of anti-biofilm test indicate that the highest inhibition of EPSs was on *Pseudomonas aeruginosa* strain and the lowest inhibition was on *Salmonella typhimurium* strain. Examination of the EPS frequency change rheological test also showed that the EPSs produced by both strains behaved like a fluid. The results of DPPH indicate that with increasing the concentration of exopolysaccharide, the level of inhibitory activity also increases. The highest rate of EPS inhibition resulted from strain *L. Fermentum* MT.ZH893 was 64.36% and the highest rate of EPS inhibition by strain *L. Pentose* MT.ZH693 was 58.83%. In other words, the resulting physicochemical properties indicate that EPS can be well used in the food industry as an additive, natural stabilizer, viscose and water retaining agent.

**Keywords:** Exopolysaccharide, Biopolymer, Antioxidant activity, Rheology test