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WEERANUCH PLUEMSAB : STUDIES ON THE PRODUCTION OF OLIGOSACCHARIDES. THESIS ADVISORS: PAIROJ LUANGPITAKSA, Ph.D., SAROTE SIRISANSANEEYAKUL, Dr.rer.nat., SOMCHAI CHAUVATCHARIN, Ph.D., SITTIWAT LERTSIRI, Ph.D. 129 P. ISBN 974-664-402-5

Microorganisms producing β-galactosidase were isolated from soil samples by growing them on minimal medium containing 20 g/l of lactose. Among 28 strains, one yeast and three bacterial isolates were screened by visualizing the lactose hydrolysate by Thin Layer Chromatography. Strain identification revealed that the yeast and the bacterial isolates were *Trichosporon beigelii* and *Bacillus megaterium*, respectively. Four isolates were cultured under aerobic conditions in a fermentor using lactose (20 g/l) as a carbon source to study fermentation kinetics in order to select the most suitable isolate for the production of β-galactosidase. *T. beigelii* showed maximum β-galactosidase productivity (Q_P = 90 U/l/h). Its β-galactosidase localization was found at the cell debris portion. Under testing an ability in oligosaccharide production, trisaccharides and tetrasaccharides were detected and clarified by High Performance Liquid Chromatography. The optimum conditions for hydrolyzing and galactosyltransferring activities were found in 0.05 M potassium phosphate buffer (pH 7.0) and 300 g/l lactose at 45^0C. Under studies on substrate specificity, the enzyme could produce oligosaccharides from maltose and cellobiose, but not from soluble corn starch, xylose, sucrose, and sago starch. The maximum production of galacto-oligosaccharides (Gal-OS) was 55.1 g/l ($Y_{P/S}$ = 0.48 g Gal-OS/g lactose) from 300 g/l lactose and 30.40 U enzyme/g lactose at 45^0C. The best model corresponding to the experimental results was a Michaelis-Menten model with competitive inhibition by glucose on irreversible lactose hydrolysis corporated with reversible reactions of oligosaccharide formation.