



Optimizing Growth Conditions for Lactic Acid Bacteria

Master Thesis in Chemical Engineering | Lorenzo García Tejada



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Abstract

High production titers are paramount in lactic fermentation processes aimed towards poly lactic acid (PLA) manufacturing. Optimization of the fermentation stage is therefore essential for the viability of the process. L-lactic acid producing *Pediococcus acidilactici* strain TY112 was grown in shake flasks and 2L bioreactors with glucose and mannose as carbon sources under different aeration conditions and with an increased concentration of yeast extract. The presence of oxygen in the medium was found to activate undesired oxidative metabolic pathways in the strain through the apparent activation of NADH and pyruvate oxidases. This metabolic shift diverted precursors from lactate synthesis onto acetate synthesis, so the presence of oxygen should therefore be avoided during high-yield fermentation processes. Yeast extract was found to be stimulatory to cell growth, inducing higher sugar consumption and acid production rates without compromising the production rates. Therefore, the presence of yeast extract in the medium leads to an enhanced productivity in the system which is beneficial to large scale processes. However, further research should be conducted to fully identify the specific components in yeast extract responsible for this stimulatory growth.