Stability Studies of Immobilized Saccharomyces Cerevisiae in Calcium Alginate and Carrageenan Beads

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Abstract—Currently the resources for fossil fuels are depleting together with increase in fuel prices. This has urged the need for cheaper alternative fuels especially biofuels. The production of the most common liquid biofuel which is bioethanol using immobilized yeast cells is an approach taken to increase its demand in the world's market. There are various methods for the immobilization of yeast cells; however before they can be applied in the industry the stability of the immobilization technology must be investigated. This research aims to study the stabilities of immobilized S. cerevisiae in calcium alginate and carrageenan beads for bioethanol production. The S. cerevisiae was immobilized in calcium alginate and carrageenan beads using entrapment method. Next, screening for the optimal concentration of sodium alginate and semi refined carrageenan matrices were determined by employing fermentation and bioethanol quantification using GC-MS. Concentrations of 2% (w/v) calcium alginate and 2% (w/v) semi refined carrageenan beads were identified to produce the highest bioethanol yield which were 0.286 g/mL and 0.065 g/mL respectively. The two beads were then chosen to be tested in various stability studies with respect to bioethanol production such as storage stability, reusability, pH, thermaland permeability test. It was found out that a concentration of 2% (w/v) calcium alginate beads were more stable as immobilization matrix for S. cerevisiae as compared to 2% (w/v) semi refined carrageenan.

***Index Terms*—Immobilization, Stability, Saccharomyces, Alginate, Carrageenan**

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