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Optimization of Fermentation Parameters for Bioethanol Production from Waste Glycerol by Microwave Induced Mutant Escherichia coli EC-MW (ATCC 11105)

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Abstract : Glycerol is a valuable raw material for the production of industrially useful metabolites. Among many promising applications for the use of glycerol is its bioconversion to high value-added compounds, such as bioethanol through microbial fermentation. Bioethanol is an important industrial chemical with emerging potential as a biofuel to replace vanishing fossil fuels. The yield of liquid fuel in this process was greatly influenced by various parameters viz, temperature, pH, glycerol concentration, organic concentration, and agitation speed were considered. The present study was undertaken to investigate optimum parameters for bioethanol production from raw glycerol by immobilized mutant Escherichia coli (E.coli) (ATCC11505) strain on chitosan cross linked glutaraldehyde optimized by Taguchi statistical method in shake flasks. The initial parameters were set each at four levels and the orthogonal array layout of L16 (45) conducted. The important controlling parameters for optimized the operational fermentation was temperature 38 °C, medium pH 6.5, initial glycerol concentration (250 g/l), and organic source concentration (5 g/l). Fermentation with optimized parameters was carried out in a custom fabricated shake flask. The predicted value of bioethanol production under optimized conditions was (118.13 g/l). Immobilized cells are mainly used for economic benefits of continuous production or repeated use in continuous as well as in batch mode.

Keywords : bioethanol, Escherichia coli, immobilization, optimization
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