

Factorial design analysis of a tapioca slurry saccharification process using encapsulated enzymes

ABSTRACT

A three-factor two-level (2³) full factorial design analysis was conducted to identify the significant factors that influence glucose production from tapioca slurry with an encapsulated enzymatic saccharification process using a stirred bioreactor. The factors investigated were pH (5 to 7), temperature (40 to 60°C), and agitation speed (80 to 160 rpm). From the statistical analysis, a mathematical model for tapioca slurry saccharification was derived, and the variance analysis resulted in a high determination coefficient ($R^2=0.9993$). The main effects and their interactions were also investigated. The results showed that all the main factors and the two-way interaction factors were statistically significant. The most significant factor in the tapioca slurry saccharification was found to be pH, while the interaction between pH and agitation speed was the most influential two-way interaction.

Keyword: Saccharification; Tapioca slurry; Encapsulated enzymes; Stirred bioreactor; Factorial design