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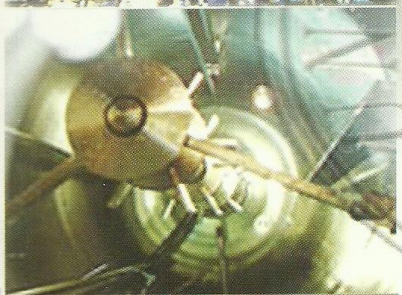

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UNIVERSITI MALAYSIA SABAH

CHEMICAL ENGINEERING PROGRAMME

SCHOOL OF ENGINEERING AND INFORMATION TECHNOLOGY

PROGRAMME AND ABSTRACTS BOOK

BPE-9

PRODUCTION OF CELLULASE ENZYME BY LIQUID STATE BIOCONVERSION OF DOMESTIC WASTEWATER SLUDGE

Md. Zahangir Alam **Suleyman A. Muyibi** **K. C. A. Jalal** **Rosmaziah Wahid**

Bioenvironmental Engineering Research Unit (BERU), Department of Biotechnology Engineering, Faculty of Engineering, International Islamic University Malaysia (IIUM), Jalan Gombak, 53100 Kuala Lumpur, Malaysia
Tel: +603-619664571, Fax: +603-61964442, Email: zahangir@iiu.edu.my,

A lab-scale cellulase enzyme production using domestic wastewater sludge was carried out by Trichoderma harzianum in liquid state bioconversion (LSB). The cellulase enzyme was produced with the optimum physicochemical conditions obtained from previous study. The conditions were: temperature of 30° C, initial pH of 6, agitation of 100 rpm, sludge and co-substrate concentration of 0.5% (w/v) and 3% (w/v), inoculum of 1% (w/v). In optimum conditions, the cellulase activity reached 7.2 FPU/ml at day 3 of fermentation. The study was also involved to the biodegradation of wastewater sludge and the product yields in order to evaluate the bioconversion process. The pH was measured in the entire formation process.

Keywords: Cellulase enzyme, wastewater sludge, liquid state bioconversion, *Trichoderma harzianum*

BPE-10

OPTIMIZATION OF PHYSICOCHEMICAL FACTORS FOR LIGNIN PEROXIDASE ENZYME PRODUCTION UTILIZING DOMESTIC WASTEWATER SLUDGE

Md. Zahangir Alam **Suleyman A. Muyibi** **P. Jamal** **Noornaemah A. Rahman.**

Bioenvironmental Engineering Research Unit (BERU), Department of Biotechnology Engineering, Faculty of Engineering, International Islamic University Malaysia (IIUM), Jalan Gombak, 53100 Kuala Lumpur, Malaysia, Tel: +603-619664571, Fax: +603-61964442, Email: zahangir@iiu.edu.my,

A lab-scale study was carried to identify the physicochemical factors of liquid state bioconversion for maximum lignin peroxidase (LiP) enzyme production. The white-rot fungus Phanerocheate chrysosporium collected from the lab stock at IIUM was used LiP production throughout the study. Statistical optimization was carried out to evaluate the physicochemical parameters (factors) through enzyme production by 2-level fractional factorial design with four central points. The polynomial regression model was developed using the experimental data including the effects of linear, quadratic and interaction of the factors. The factors involved were substrate (sludge) and co-substrate (wheat flour) concentrations, temperature, pH, inoculum and agitation. Statistical analysis showed that the optimum conditions were: substrate concentration of 1%, wheat flour concentration of 3%, pH of 4, inoculum of 3% and agitation of 100 rpm. Under these conditions, the model predicted the enzyme production to be 833.9 U/L. Analysis of variance (ANOVA) of the design showed a high coefficient of determination (R^2) value of 0.94, thus ensuring a satisfactory adjustment of the quadratic model with the experimental data.

Keywords: Lignin peroxidase, domestic wastatwre sludge, liquid state bioconversion, *Phanerocheate*