UNIVERSITI TEKNOLOGI MARA

ENZYMATIC HYDROLYSIS AND MODELLING OF FERMENTABLE SUGAR PRODUCTION FROM KITCHEN WASTE

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Thesis submitted in fulfilment
of the requirements for the degree of
Masters of Science

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

This study focused on maximizing the amount of reducing sugar produced from enzymatic hydrolysis of kitchen waste catalyzed by cellulase from *Trichoderma viride* and *Trichoderma reesei*, which was used separately to compare the results obtained from each enzyme. Effects of enzyme dosage (X_1), substrate concentration (X_2), hydrolysis time (X_3) and temperature (X_4) were evaluated by Full Factorial Design (FFD) to determine the significant parameters affecting the production of reducing sugar. Optimization of process conditions were also performed using Central Composite Design (CCD) within the range employed for each independent variable. All the variables evaluated using FFD was found to have a significant effect towards the production of reducing sugar. The study has shown that enzymatic hydrolysis catalyzed by cellulase from *T.viride* is efficient in producing high amount of reducing sugar. A modelling study on enzymatic hydrolysis of kitchen waste was also performed to predict the reducing sugar yield using the datasets obtained from Response Surface Methodology (RSM) studies. A multi-layer feed-forward back-propagation artificial neural network (ANN) models were developed for enzymatic hydrolysis with input variables chosen from RSM studies. A comparative observation between ANN model and RSM model was also performed. Based on the R^2 (correlation coefficient) and MSE (mean square error) values, it was concluded that ANN model is more accurate in predicting the reducing sugar yield than RSM model.

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