

PRODUCTION OF RENEWABLE GLUCOSE
FROM OIL PALM FROND BAGASSE BY
USING SACCHARISEB C6 THROUGH
ENZYMATIC HYDROLYSIS

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Master of Science

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SUPERVISOR'S DECLARATION

We hereby declare that we have checked this thesis and in our opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Master of Science in Chemical Engineering.

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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LIST OF SYMBOLS

A_1	Weight of crucibles
A_2	Initial weight of OPF bagasse
A_3	Final weight of crucibles and ash
E_1	Weight of fiberglass filter
E_2	Weight of wet biomass added to extraction cell
E_3	Weight of oven-dry extracted biomass and filter
E_4	Volume of water extract
$E_{5, \text{Glu}}$	Glucose content in HPLC standard
E_6	Concentration of monomer sugar after acid hydrolysis
E_7	Concentration of monomer sugar before acid hydrolysis
E_8	Water extract samples solutions using HPLC
EE	Ethanol extractives
ET	Total extractives
H_2	Mass of monomer sugar after acid hydrolysis
H_5	Concentration of monomer sugars after acid hydrolysis
I_{am}	Peak intensity of the amorphous phase
I_{002}	Peak intensity of the 002 crystal plane
L_1	Weight of filter paper prior to filtration
L_2	Final weight of the residue and filter paper
M	Mass
MC_{TWB}	Moisture content
MW_{EXT}	Moisture content of oven-dry extracted biomass and filter
SC	Structural carbohydrate
SS_{Glu}	Glucose soluble sugar
V	Volume
W	Weight

LIST OF ABBREVIATIONS

AFEX	Ammonia fiber explosion
ANOVA	Analysis of variance
CCD	Central composite design
DOE	Design of experiments
DP	Degree of polymerization
EFB	Empty fruit bunch
FTIR	Fourier transform infrared
HMF	5-hydroxymethyl-furfural
HPLC	High performance liquid chromatography
LCB	Lignocellulosic biomass
LHW	Liquid hot water
MPOB	Malaysian palm oil board
NREL	National renewable energy laboratory
OFAT	One-factor-at-a-time
OPF	Oil palm frond
OPT	Oil palm tree
PPS	Palm pressed fiber
RSM	Response surface methodology
SEM	Scanning electron microscopy
XRD	X-ray diffraction