

EVALUATION OF FOUR SEMI-PERMEABLE
MEMBRANES IN THE OSMOTIC TECHNIQUE
FOR ESTABLISHING SOIL-WATER
RETENTION CURVE (SWRC) OF MANSULI
CLAY

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of degree of Master of Science.

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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 to any other degree at Universiti Malaysia Pahang or any other institutions.

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LIST OF SYMBOLS

MPa	Mega Pascal
Rb	Rubidium
Cs	Caesium
Sr	Strontium
K ⁺	Potassium ion
Na ⁺	Sodium ion
Mg ²⁺	Magnesium ion
Fe ²⁺	Ferrous ion
Al ⁺³	Aluminum ion
O ²⁻	Oxygen ion
OH ⁻	Hydroxyl ion
Ca ²⁺	Calcium ion
Si ⁴⁺	Silicon ion
S _m	Matric suction
μ _a	Air pressure
μ _w	Water pressure
S _o	Osmotic suction
S _T	Total suction
kPa	Kilo Pascal
g	Gram
L	Liter
S	Suction
c	PEG concentration
°C	Degree Celsius
n	Length of the chain
d _{PEG}	Diameter of PEG molecules
nm	Nanometer
%	Percentage
Da	Dalton
m/s	Meter per second
3-D	Three-Dimensional

Θ_s	Saturated water content
N	North
E	East
m	Meter
s	Second
hr	Hour
ml	Milliliter
mm	Millimeter
μm	Micrometer
m^2/g	Square meter per gram
m^2	Square meter
pH	Potential of Hydrogen
meq/100g	Milliequivalent per 100 grams
meq	Milliequivalent
Si	Silicon
Al	Aluminum
Fe	Iron
K	Potassium
Mg	Magnesium
Ti	Titanium
Na	Sodium
Ca	Calcium
Mn	Manganese
°	Degree
NaCl	Sodium chloride
Br	Brix index
J	Water flux
P_m	Permeability of semi-permeable membrane
mg	Milligram
PtCo	Platinum-Cobalt
CaCl_2	Calcium chloride
KNO_3	Potassium nitrate
KCl	Potassium chloride

K_2SO_4	Potassium sulphate
LiCl	Lithium chloride
K_2CO_3	Potassium carbonate
G_s	Specific gravity
w_i	Initial water content
w_h	Hygroscopic water content
LL	Liquid limit
PL	Plastic limit
SL	Shrinkage limit
SSA_T	Total specific surface area
Fe^{3+}	Ferric ion
Mn^{2+}	Manganese ion
<	Less than
w	Water content
S_r	Degree of saturation
e	Void ratio
P	Phosphorus
V	Vanadium
S	Sulfur
Ba	Barium
Zr	Zirconium
Zn	Zinc
Rb	Rubidium
Cr	Chromium
Ni	Nickel
Cu	Copper

LIST OF ABBREVIATIONS

AEV	Air Entry Value
AFM	Atomic Force Microscopy
ASTM	American Society for Testing and Materials
BET	Brunauer-Emmett-Teller
BS	British Standard
BSCS	British Soil Classification System
CA	Cellulose Acetate
CEC	Cation Exchange Capacity
CV	Clay with Very high plasticity
EGME	Ethylene Glycol Monoethyl Ether
ICP-OES	Inductively Coupled Plasma Optical Emission Spectrometry
LOI	Loss On Ignition
MW	Molecular Weight
MWCO	Molecular Weight Cut Off
NA	Nutrient Agar
NTU	Nephelometric Turbidity Units
PA	Polyamide
PDA	Potato Dextrose Agar
PEG	Polyethylene Glycol
PES	Polyethersulfone
Pf	Polysulfone
PIP	Piperazine
PPA	Polypiperazine-amide
SEM	Scanning Electron Microscopy
SSA	Specific Surface Area
SWRC	Soil-Water Retention Curve
TF	Thin Film
TMC	Trimesoylchloride
UMP	Universiti Malaysia Pahang
VET	Vapour Equilibrium Technique
WEV	Water Entry Value

XRD	X-Ray Diffraction
XRF	X-Ray Fluorescence