

APPENDIX 7.2

A. LIST OF EQUIPMENT IN LABORATORY

No.	Laboratory	List of Equipment
TEACHING LABORATORY		
1	Gas Engineering	Schilling Effusiometer Gas Calorimeter Gas Flow Measurement Bench FM 120 Gas Meter Calibration Station Combustion Lab Unit Flame Propagation & Stability Unit Natural Gas Service Station Gas absorption Refrigeration Unit Boys Calorimeter Analytical Sieve Shaker Fire and Gas Detection Upper/lower Flammability Test Unit Gas Adsorption Unit
2	Reservoir	Resistivity Meter (Analog) Viscometer Liquid Permeameter Hydrometer Kit Foam Generator Pour and Cloud Point Apparatus
3	Geology and Drilling	Analytical Sieve Shaker Geology Microscopes Images Analyzer Microscope Planimeter Rock Cutting Machine Seismograph Thin Section Lapping Machine Core Drill Machine Ball Mill Compression machine Vulcan fusion machine X-Ray Diffractometer Resistivity Meter (Analog) Viscometer Cold Water Rheology Kit Oil and Water Retort Kit Analytical Balance Filtrate Analysis Test Kit Electrical Stability Tester Kit Sand Content pH Meter Marsh Funnel (Plastic) Mixer for Drilling Fluid Mud Balance Electronic Rheometer Constant Speed Mixer (From research grant) HPHT Filter Press API Filter press (From research grant)

4	Flow Assurance	3 Phase Gravity Separator System Multiphase Flowloop System
5	Pilot Plant/ Double Volume Laboratory	<p>Gas Absorption Column Liquid-liquid Mixing Equipment Continuous Stirred Tank Reactor Continuous Stirred Tank Reactors In Series Aquatron Cabinet Water Still Aquatron Deioniser Unit Water And Oil Bath, Stainless Steel Cover (Flat) Incubator Universal Electric Oven Swiss Electronic Balance Distillation Column Mass Transfer & Diffusion Coefficient Unit Liquid-Liquid Extraction Unit Tray Drier Training Unit Plate & Frame Filter Press Local Mild Steel Heavy Duty Trolley Protech Chemical Storage Cabinet Automatic Digital Refractometer Undercounter Ice Machine Analytical Sieve Shaker High Precision Thermoregulation Bath - Huber CP-McMillen Digital Flowmeter Adsorption Test Unit Shell & Tube Exchanger Process Simulator Gas Flow Process Control Training system Boiler Drum-Heat Exchanger Process Control Chemical-Analytical Process Control Training Gas Pressure Process Control Training System Liquid Flow Control Training System Process & Instrument Air Supply System Distributed Control System Protech-Bench Top Laboratory Dryers Water Cooling Tower Double Effect Evaporator Laboratory Glassware Dryer Thermal Conductivity Of Solid Liquid & Gas Radial Conductivity Unit Membrane Test Unit Plug Flow Reactor Ion Exchange Unit Rig Of Membrane Separation</p>

		Membrane Casting Machine Condenser Mixer Mill Vapour Liquid Equilibrium Eballiometer Film and Dropwise Condensation Unit Mechanical Heat Pump & Thermodynamic Refrigeration Unit Perfect Gas Expansion Apparatus Marcet Boiler Properties Of Gases & Liquids Measurement Fix & Fluidized Bed Apparatus Concentric Tube Heat Exchanger Osborne Reynolds Apparatus Osborne Reynolds Demonstration Apparatus Free & Force Vortex Apparatus Flowmeter Demonstration Apparatus Bernoulli's Theorem Demonstration Flow Over Notch Accessories Basic Hydraulic Bench Deep Bed Filter Electronic Digital Precision Top Pan Balance Fluid Friction Apparatus Multi Pump Test Rig Compact Digital Force Gauges
6	Environmental	Multi Probe System Universal Oven Laboratory Floor Model Dryer Jar Test Apparatus (Floc Tester) Chemical (COD) System Reactor Environmental Dust Monitor Basic Water Quality Laboratory Portable Air Speed & Direction Meter Thermo Personal Data Ram pH Controller & Dosing Pump Dissolved Oxygen Meter With Data Collection System Conductivity Probe Rechargeable Battery Water Purification pH Meter Lab 860 BNC Set Complete Water Quality Laboratory Jar Tester JT-M6 16mm Shaft
7	Kimia Am	Hach Portable Spectrophotometer Chemstore ducted Chemical Storage Cabinets ITV-Undercounter Ice Maker Floor Model Laboratory Glassware Dryer Universal Oven Bibby Aquatron Cabinet Water Still Analytical Balance Top Pan Balance Economy Ultrasonic Cleaner Rotary Evaporator Electronic Precision Balance Electronic Balance Waring 1L Blenders

8	Kimia Instrumentasi	Differential Scanning Calorimetry (DSC) Thermogravimetri Analyzer (TGA) Fourier Transform Infra-Red (FT-IR) Mercury Analyzer Bomb Calorimeter Elemental Analyzer Mercury Porosimeter Inductive Coupled Plasma (ICP-OES) Atomic Absorption Spectrophotometer (AAS) Gas Chromatography Mass Spectrometer (GC-MS) UV-Visible/NIR Spectrometer Gas Chromatography (GC) High Performance Liquid Chromatography (HPLC) Compact Refrigerated Dehumidifier Ultrasonic Cleaner
9	Kimia Organic	Mettler-Toledo Analytical Balance pH meter Safetypette pro pipette filter Porcelain mortar and pestle Pasteur pipette dropper Jet pipette Controller Diaphragm vacuum and pressure pump Portable digital thermometer
RESEARCH LABORATORY		
1	Kakisan	Front Loading Furnace Electrochemical Laboratory Radiometer Precision Analytical Balance Refrigerator Glass Dip Coater Bibby Aquatron Water Still Ultrasonic Cleaner Ducting System for Chemical Engineering Lab Seven Multi Bench Top Meter Stirring Hot Plate Protech Floor Model Laboratory Dryer with Double Doors Furnace Protech Chemical Storage Cabinet Potentiostat / Galvanostat with Impedance 2 Wheel Grinding / Polishing Machine Heating Circulation Thermostats Digital Reading Viscometer Venticell Oven

2	Hasil Buangan	Chiller Electric Drying Cabinet with 3 Shelves 'EG' Perchloric Fume Cupboard Membrane Cell System Fitting and Tubings Electric Mixers Extraction Heater, 240VAC,60HZ Friedrich Glass Condensor 300ML.55/50 Analytical Balance with Sliding Cover Digital Stop Watch Autoclave Compact Cloud & Pour Point Cryostate Elga Water Deionizer Determines Cloud & Pour Point
3	Novel Materials	Ultrasonic Cleaning Unit Thermostatically Controlled incubators Benchtop Incubator Shaker COD Photometer Diaphragm Vacuum Pump COD Reactor for 230v 50 Hz. 1PH Video Contact Angle Goniometer Micromeritic Chemisorb 2750
4	Crystallization	Laboratory Drying Oven Analytical Balance Refrigerated / Heating Bath Programmable Refrigerated Bath Various Water Jacketed Reactor Vessel Sizes With Borosilicate Conductivity Probe Programmable Controller For Refrigerated
5	Supercritical fluid	Rotary Evaporator Oxidation Stability SFT-100 Supercritical Fluid Extractor High Pressure Reactor Automatic Titrator


6	ROTU	<p> Acid Reactor Aerobic Digester Anaerobic Digester Benchtop Meter for BOD Cooled Incubator in low temperature condition for BOD test Flocculation Test Unit Multiparameter HandHeld Orbital Shaker Portable Gas Analyzer Portable Semi Continuous Emission Monitoring System Sampling Probe for Vaio Plus Screw Press (Solid Liquid Separator) Microprocessor Controlled R.O.C Ball Mill Roalox Alumina Grinding Jar Universal Oven Bibby Rotary Evaporator Benchtop Furnace Determines Flash Points 5 Star Bench Top PH/ORP ISE/COND/DO Meter 3 Star pH Portable Meter Ice Maker Ultra Low Temperature Ref Circulator Analytical Balance Reflectometer Microwave Drying System Apparatus Microwave Pyrolizer System Balance Data Collection / Acquisition System Pressure Boiling System Laboratory Glassware Dryer Class 1 Real Time Analyzer Measurement Meter pH/COND/DO/Temp with Case Grider Herb Pulveriser Powder Grinder - Fruit Juicer </p>
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B. EXAMPLE OF MAINTENANCE AND CALIBRATION DOCUMENTS

**FAKULTI KEJURUTERAAN KIMIA UITM
REKOD UJILARI PERALATAN**

EQUIPMENT : **VISCOMETER**
MODEL : 35SA 6-SPEED, FANN
S/N : 12499
DELIVERY DATE : **12/03/ 2010**
DATE PERFORMED : **1 APRIL 2014**
DUE DATE : **30 JULY 2014**

NO.	CRITERIA / TASK / TEST	CONDITION	ACTIONS TAKEN / TO BE TAKEN
1	POWER SUPPLY	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	
2	DIAL READING	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	
3	GEAR SHIFT KNOB	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	
4	BOB SHAFT	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	* TEST THE BOB SHAFT BEARING
5	STAGE SAMPLE CUP	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	
6	SPEED MOTOR	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	
9	OPERATION STATUS	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	

PERFORMED BY : 
NAME : MOHD RIZUAN B. MOHD RAZLAN
DATE : 24/4/14

Cert No : 0001/2014
Rahmat Dagangan Sdn Bhd
No 8B, Jln BRP 1/2,
Taman Bukit Rahman Putra,
47000 Sungai Buloh,
Selangor.

CERTIFICATE OF CALIBRATION

Viscometer 355A

Model No : Viscometer 355A

Serial No : 12499

This instrument has been calibrated using the procedure of API Recommended Practice 13B-2, Appendix J, and meets or exceeds the standard therein. This certification is valid for one year.

Calibration Fluid : 100 cp

Batch No : E100 - 0613

Exp. Date : 16/10/2016

RPM	TEMP °C	STANDARD cP	MEASURED cP Before Calibration (as found)	MEASURED cP After Calibration (as left)	DEVIATION cP
300	<u>25.3</u>	<u>95.51</u>	<u>100</u>	<u>96</u>	<u>0.49</u>
600/1.98	<u>26.1</u>	<u>93.97</u>	<u>198</u>	<u>189/1.98 = 95.4</u>	<u>1.43</u>

* Record the deviation as + or -. The measured cP must not exceed $\pm 1.5cP$ of the standard cP



Calibration Technician

16/10/2014

Date


RIZUAN RAZLAN
Fakulti Kejuruteraan Kimia
UiTM Shah Alam.