

CHEMICAL ENGINEERING DEPARTMENT

Equipments and List of Experiments in each Laboratory

Name of Laboratory: Instrumentation and Process Control

(1) Equipments/instruments

Sr. No.	Name of Equipments
1	Pressure Control Trainer
2	Temperature Control Trainer
3	Level Control Trainer
4	Flow Control Trainer
5	First order liquid level
6	Linearization
7	Tank in Series [Non-Interacting]
8	Tank in Series [Interacting]
9	Simulation Software for Binary Distillation Column for benzene and toluene
10	Simulation Software for Catalytic reformer
11	Simulation Software for Heat Exchanger
12	Anemometer

List of Experiments:

1. Dynamics of First Order Liquid Level System.
2. Study of Linearization
3. Dynamics of Non Interacting Tanks.
4. Dynamics of Interacting Tanks
5. Response of Manometer system
6. Simulation of Heat Exchanger
7. Simulation of Catalytic Reformer
8. Simulation of Binary Distillation
9. Study of Temperature Control Trainer
10. Study of Pressure Control Trainer
11. Study of Flow Control Trainer
12. Study of Level Control Trainer
13. Dissolved Oxygen Meter
14. Thermocouple Calibration

Name of Laboratory: Mass Transfer Operations

List of Equipments/instruments

Sr. No.	Name of Equipments
1	Wetted wall column
2	Experimental cooling water tower
3	Fluid bed dryer
4	Liquid-liquid extraction unit
5	Gas absorption in sieve plate column
6	Packed bed distillation column
7	Gas Chromatograph
8	UV-Visible Spectrophotometer
9	Ultrasonic Probe

(2) List of Experiments

MTO-I Lab:

1. Diffusivity (Different constituents and Different temperatures)
2. Mass Transfer Coefficient (Different flow rates)
3. Latent Heat of Vaporization
4. Crystallization (Seeding and without seeding)
5. Humidification
6. Differential Distillation
7. Azeotropic Distillation
8. Steam Distillation
9. Hydro-distillation
10. Demo: Packed Bed Distillation

MTO-II Lab:

1. Ternary Diagram (Two solvents)
2. Liquid-liquid Extraction (Single/Multiple stages)
3. Freundlich Isotherm (Adsorption isotherm in case of liquid solution)
4. Adsorption in Packed Bed Column (Different amount of adsorbent/ different concentrations of adsorbate)
5. Leaching (Conventional method, Microwave-assisted extraction, Ultrasound-assisted extraction, Soxhlet extraction)
6. Fluidized Bed Drying
7. Cooling Tower
8. Gas Chromatograph/ UV-Vis Spectrophotometer
9. Demo: Pilot scale unit of Liquid-liquid Extraction
10. Demo: Pilot Scale unit of Gas Absorption
11. Demo: Pervaporation

Useful link for Virtual Lab: <http://iitg.vlab.co.in/?sub=58>

Name of Laboratory: Heat Transfer Operations

(1) List of Equipments/instruments

Sr. No.	Name of Equipments
1	Conduction through Composite Wall
2	Thermal Conductivity of Insulating Powder
3	Heat Transfer in Laminar Flow
4	Heat Transfer in Turbulent Flow
5	Forced Convection Setup
6	Natural Convection
7	Plate Heat Exchanger
8	Shell and Tube Heat Exchanger
9	Heat Transfer by Radiation: Stefan-Boltzmann Law
10	Heat Transfer in Agitated Vessel
11	Thermal Conductivity of Metal Rod

(2) List of Experiments

1. Experiment on “Heat transfer through composite wall at different temperature”
2. Experiment on “Thermal conductivity of insulating powder (Asbestos powder) ”
3. Experiment on “Heat transfer in double pipe heat exchanger in laminar flow”
4. Experiment on “Heat transfer in turbulent flow”
5. Experiment on “Heat transfer by forced convection”
6. Experiment on “Heat transfer coefficient in natural convection”
7. Experiment on “Heat transfer in Plate Heat Exchanger”
8. Experiment on “Shell and tube heat exchanger”
9. Experiment on “Heat transfer by radiation: Stefan-Boltzmann Law”
10. Experiment on “Heat Transfer in Agitated Vessel”
11. Experiment on “Thermal conductivity of metal rod ”

Name of the Laboratory: Chemical Reaction Engineering

(1) List of Equipments/instruments

Sr. No.	Name of the Equipment
1.	Gas Chromatograph (Thermo Scientific)
2.	UV-Vis Spectrophotometer (Thermo Scientific)
3.	UV-Vis Spectrophotometer (Hach)
4.	S.S. Continuous Plug Flow Reactor with Furnace
5.	Ultrasonic Processor
6.	Automatic Film Applicator
7.	Multi Vessel Dip Coating System
8.	Incubator
9.	Centrifuge
10.	Deep Freezer
11.	Microbial Fuel Cells (MFCs) Assembly
12.	Solar Distillation Unit

(2) List of Experiments

- 1) Integral method of analysis of kinetic data
- 2) Differential method of analysis of kinetic data
- 3) Determination of activation energy and frequency factor
- 4) Half life method of analysis of kinetic data
- 5) Kinetics of pseudo first order reaction
- 6) Reaction kinetic studies using conductivity meter
- 7) Reaction kinetic studies in a batch reactor (virtual lab)
- 8) Reaction kinetic studies in a mixed flow reactor (virtual lab)
- 9) Reaction kinetic studies in a plug flow reactor (virtual lab)

Name of Laboratory: General Chemical Technology

List of Experiments:

1. Preparation of Boric acid by acidified solution of borax ($\text{Na}_2\text{B}_4\text{O}_7$).
2. Preparation of Calcium chloride from HCl and lime stone (CaCO_3).
3. Preparation of detergent.
4. Preparation of nitro naphthalene from given chemicals.
5. Preparation of Potash alum from Aluminum Sulphate and Potassium sulphate.
6. Estimation of saponification value of coconut oil.
7. Determination of the kinematic viscosity of given oil sample using Redwood viscometer.
8. Determination of the aniline point of diesel.
9. Determination of the smoke point of kerosene and diesel.
10. Determination of the softening point of grease sample.
11. Determination of the penetration index using penetrometer.

Name of Laboratory: Fluid Flow Operations

(1) List of Equipments/instruments

Sr. No.	Name of Equipments
1	Friction in annulus and orifice meter
2	Friction in Circular Pipe apparatus
3	Stokes law apparatus
4	Equivalent length of pipe fittings
5	Flow through venturi meter
6	Helical Coil Apparatus
7	V Notch and Rectangular Notch set up
8	Characteristics of Centrifugal pump

(2) List of Experiments

Experiment on friction in annulus
Experiment on venturi meter
Experiment on equivalent length of pipe fittings
Experiment on viscosity by Stokes' law
Experiment on Reynolds number
Experiment on orifice meter
Experiment on characteristics of centrifugal pump
Experiment on friction in circular pipe
Experiment on flow through triangular weir
Experiment on flow through helical coil

Name of Laboratory: Computer Aided Design (CAD)

(1) List of Equipments/instruments

- 26 Nos. Dell Optiplex 990 computers with following specifications:
Core i5-2400 CPU @ 3.10 GHz, 4 GB RAM, 64 bit OS-Windows 7 Professional, 500 GB HDD.
- COMSOL Multiphysics software (for CFD)
- Statistica Data Miner software (for statistical analyses)
- Origin software (for data analysis and publication-quality graphing)