



(20A51201P) Engineering Chemistry Lab

1

► **PREPARED BY**

TV Prathima, Assistant Professor
Department of H&S



COURSE OUTCOMES

- ▶ **CO1:** Determine the cell constant and conductance of solutions.
- ▶ **CO2:** Prepare advanced polymer materials.
- ▶ **CO3:** Determine the physical properties like surface tension, adsorption and viscosity.
- ▶ **CO4:** Estimate the Iron and Calcium in cement.
- ▶ **CO5:** Calculate the hardness of water.



Experiments List as per affiliated University

1. Determination of Hardness of a groundwater sample.
2. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of a polymer
7. Determination of percentage of Iron in Cement sample by colorimetry
8. Estimation of Calcium in port land Cement
9. Preparation of nanomaterials by precipitation.
10. Adsorption of acetic acid by charcoal
11. Determination of percentage Moisture content in a coal sample
12. Determination of Viscosity of lubricating oil by Redwood Viscometer 1 & 2
13. Determination of Calorific value of gases by Junker's gas Calorimeter



List of Additional Experiments

1. Determination of Alkalinity of Water
2. Estimation of Dissolved oxygen by Winkler's method



Major Equipments List

17

CHEMISTRY LABORATORY LIST OF MAJOR EQUIPMENTS					
S.No.	Name of The Equipment	Name of The Supplier	Quantity	Cost Per Unit	Amount Rs.
1.	Digital Conductometer	Systronics	4	12,900	51,600
2.	Electronic Balance	Essae	2	15,800	31,600
3.	Digital Colorimeter	Systronics	4	18,560	74,240
4.	Redwood Viscometer-I	Hindustan apparatus	1	8,800	8,800
5.	Redwood Viscometer-II	Deep vision Indian	1	8,800	8,800
6.	Physical Balance	Keroy	2	3,300	6,600
7.	Digital pH Meter	Systronics	1	10,900	21,800
8.	Hot Air Oven	Technico	1	29,325	29,325
9.	Water Bath	Technico	1	8,800	8,800
TOTAL					2,41,565/-

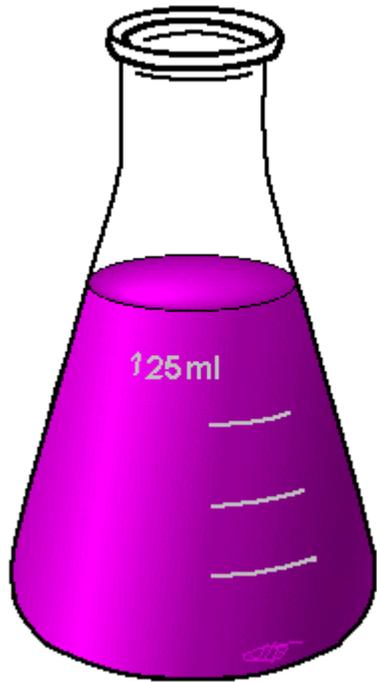
VEMU INSTITUTE OF TECHNOLOGY, P.KOTHAKOTA.
DEPARTMENT OF H & S



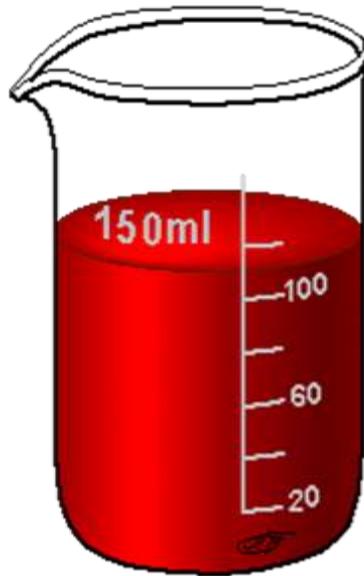
Common Laboratory Glassware and Volumetric Glassware



GLASSWARE



**Erlenmeyer
Flask**



Beaker



**Graduated
Cylinder**

Volumetric Glassware



Buret

Volumetric
Flask



Volumetric Transfer Pipette





lab equipment

1. Electronic weighing Balance
2. Digital conductometer
3. Digital Calorimeter
4. Redwood Viscometer-I
5. Redwood Viscometer-II
6. Physical Balance
7. Hotair oven
8. pH meter
9. Centrifuge machine



pH meter

- • A pH meter is a scientific instrument that measures the hydrogen ion activity in water based solutions, indicating its acidity or alkalinity expressed as $\text{pH} = -\log [\text{H}^+]$ •
- The pH meter measures the difference in electrical potential between a pH electrode (Glass electrode) and a reference electrode, and so the pH meter is sometimes referred to as a "potentiometric pH meter".
- The difference in electrical potential relates to the acidity or pH of the solution.



conductometry

Conductometry is defined as the determination or measurement of electrical conductance of an electrolyte solution by means of conductometer.

It is a laboratory method of quantitative analysis used to identify the **concentration** of a given analyte (**ionic species**) in a mixture to monitor a chemical reaction by studying the electrolytic conductivity of the reacting species or the resultant products.



Centrifuge machine

A centrifuge is a mechanical or electromechanical device used to separate various components of a liquid. It achieves that by simulating a very high gravity environment inside the tubes by producing centrifugal forces by spinning very fast.

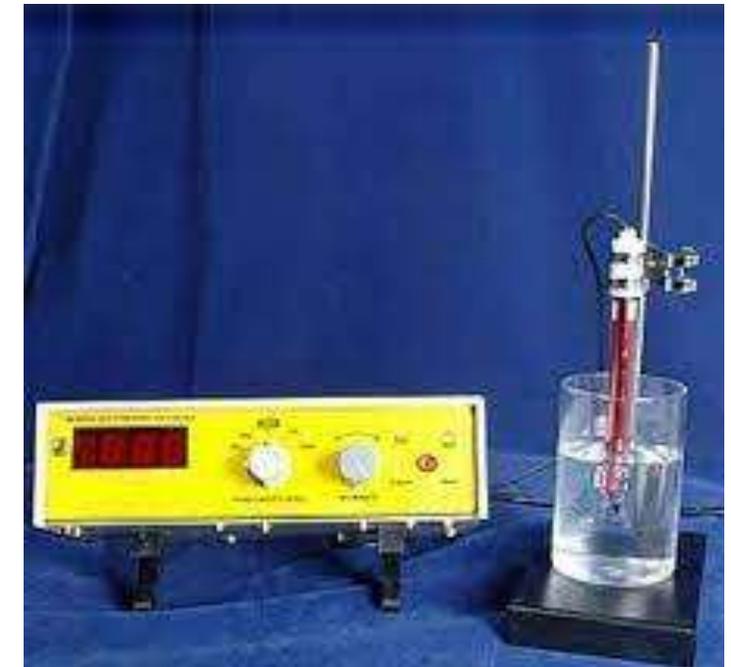
A centrifuge works with the principle of sedimentation due to gravitational force. When a tube is spun with the bottom side outward to the spin, the centrifugal force created by the spin acts like high gravity on the tube's sample. This pulls down the heavier components of a mixture faster than the lighter components – and they neatly lay down at the bottom of the tubes in layers.





Potentiometer

The potentiometer is an instrument used for measuring the unknown voltage by comparing it with the known voltage. It can be used to determine the emf and internal resistance of the given cell and also used to compare the emf of different cells. The comparative method is used by the potentiometer.



Digital Calorimeter

Colorimeter is a light-sensitive device that helps certain solutions absorb a particular wavelength of light in colorimetry. It is used to measure the absorbance and transmittance of light that passes through a liquid. **Principle of Colorimeter** is that coloured compounds can absorb a certain wavelength of light when monochromatic light is passed through them. The working of a colorimeter is based on the concept of Beer-Lambert's law.

Colorimeters are used to **detect colour and determine a solution's concentration**. When a wavelength is passed through a sample, some of the light gets absorbed and some passes through. The passing wavelengths of light get detected.



Redwood Viscometer

It is a measure of the resistance offered by one layer of fluid to the other layer of the same fluid during motion. It is expressed in Pa.s unit. The viscosity of the fuel or petroleum products is experimentally measured by a device called a viscometer.

A Redwood viscometer is used to determine the viscosity of petroleum products. The '[Redwood Viscometer](#)' determines the viscosity in terms of seconds (which are terms as Redwood seconds), it's the time taken by oil to pass through a standard orifice, and the collection of the same oil in a 50 cc flask. Originally Redwood Viscometer was developed for the measurement of viscosity of petroleum products.





Physical Balance

15

A physical balance is simply a **weight measuring instrument**. It is used to measure the weight of any unknown object with the help of the other object with known weight.



A hot air oven is an essential laboratory equipment that uses to dry heat (hot air) to sterilize laboratory objects and samples. This type of sterilization is also known as dry heat sterilization.

A hot air oven is used to sterilize equipment and materials used in the medical field. A hot air oven is a type of dry heat sterilization. Dry heat sterilization is used on equipment that cannot be wet, and on material that will not melt, catch fire, or change form when exposed to high temperatures. Moist heat sterilization uses water to boil items or steam them to sterilize and does not take as long as dry heat sterilization.





Do's and Don'ts

1. Students are expected to be punctual to the lab classes. If they are late, they will be considered absent for that particular session.
2. Students should strictly maintain the dress code.
3. Students must bring their observation note, record note (completed with previous experiment) and the calculator, scales, pencils to every lab class without fail.
4. Students are advised to come with full preparation for their lab sessions by
5. Reading the detailed procedure of the experiment from the laboratory manual.
6. Data entry in the observation note book must be by pen only.
7. Bring necessary graph papers for each of experiment. Learn to optimize on usage of graph papers. Graphs should be neatly drawn with pencil. Always label graphs and the axes and display units.
8. If you finish early, spend the remaining time to complete the calculations and drawing graphs.
9. Students should complete their calculations for their experiments and get it corrected on the same day of that experiment.



Do's and Don'ts

- 10. Students who miss observation, record note they have to do the experiment once again and get it corrected.
- 11. Internal marks for each experiment are based only on their performance in the laboratory.
- 12. Record note has to be completed then and there and get corrected when the students are coming for the next lab class.
- 13. Students must strictly maintain silence during lab classes.
- 14. If any of the students is absent for the lab class for genuine reasons, he/she will be permitted to do the experiment during the repetition class only.
- 15. If any student is found causing damage to the lab equipments, he/she shall replace the same with a new.



Safety Measures in the Laboratory

13

LAB SAFETY PROTOCOLS

Use Protective Gear

- Safety Goggles
- Lab Coat
- Gloves
- Long Pants
- Closed Shoes

Clean Up
After completing the lab, carefully clean your workspace and the equipment. Don't forget to wash your hands.

Proper Supervision
Don't perform lab experiments without instructor supervision.

ID Hazards
Always read labels before using any chemicals.

Safety First
Known location of safety equipment and emergency numbers.

No Food
Don't eat or drink in the lab and never taste chemicals.

Be Attentive
Be attentive while in the lab. Don't leave an experiment in progress.

Handle Glassware Carefully
Properly dispose of anything that breaks.

shutterstock
IMAGE ID: 2003081672
www.shutterstock.com



Safety Measures in the Laboratory

