CH P 509: PHYSICAL CHEMISTRY PRACTICALS – III

COURSE OUTCOME:

- This practical course give training to students on important electrochemical techniques namely,
- Conductometry, potentiometry, voltametry and polarography.
- In addition, they are introduced to nuclear and radiation chemistry experiments.
- This course enhances the skill of students in quantitative analysis

A. Electrochemistry:

a. Conductometry (At least three experiments to be carried out)

1. Titration of a mixture of acetic acid, monochloro and trichloacetic acids with NaOH.
2. Determination of concentrations/amounts of sulphuric acid, acetic acid and copper sulphate by conductometric titration with sodium hydroxide.
3. Measurements of the conductance of a weak acid, (a) HOAC and of the strong electrolytes NaOAc, HCl and NaCl and (b) HCOOH and of the strong electrolytes HCOONa, HCl and NaCl) and to calculate the ionization constant of the acid.
4. Titration of mixture of strong acid and weak acid with weak base (HCl + HAC against NH4OH).
5. Determination of pKa of a given weak acid by pH measurements at various dilutions.
6. Conductometric titration of the mixture of (a) HCl and NH4Cl and (b) HCl and acetic acid.
7. Determination of activity coefficient of Zinc ions in 0.002M ZnSO4.
8. Conductometric determination of Critical Micelle Concentration.

B. Potentiometry (At least three experiments are to be carried out)

1. Composition of Zinc Ferrocyanide Complex by potentiometric Titration.
2. Potentiometric titration of (a) Non aqueous system and (b) mixture of strong (HCl) and weak (HAC) acid with NaOH / NH4OH and find the strength of the acids in mixture.
3. Determination of decomposition potential of an aqueous electrolytic solution.
4. Determination of the potential of an electrochemical cell and mean ionic activity coefficient.
5. Determination of acidic and basic dissociation constants and isoelectric point an amino acid pH metrically..
6. pH titration of (a) HCl versus NaOH, (b) HOAC versus NaOH and (c) lead nitrate versus potassium chromate, and Titration of mixture of bases (Na2CO3& NaHCO3) with standard HCl..
7. Determination of pKa values of functional groups in amino acids using a pH meter.
8. Determination of Hammett constants of o-, m-, p- amino/nitro benzoic acid by pH measurements.
9. Verification of Tafel equation of hydrogen evolution reaction.
10. Study of rate of corrosion and inhibition efficiency of an inhibitor on mild steel/Al/Cu by weight loss method i) at different time intervals and ii) at different temperatures(to evaluate thermodynamic parameters)

C. Radiochemistry Experiments (At least Three experiments to be carried out)

1. Study of (a) Characteristic plateau, (b) Geometry effects and Statistics of G.M counter
2. Determination of (a) Dead time by single source & double source method. (b) Emax of □ - source (c) Back scattering of □ and (d) □ energy emitted by C-14.

3. Verification of the inverse square law.
4. Determination of half life of radionuclides.

4. Determination of Linear and mass attenuation coefficient.
5. Preparation of Fricke and Ceric sulphate dosimeters & calculation of G-value & dose rate.
6. Study of isotope dilution analysis; 8. Radiochemical Determination of I-131 in sea water.
7. Determination of β-particle range and, axmum energy (by half thickness method).

C. Voltammetry & Polarography (Any Three experiments are to be carried out)
1. Determination of the half-wave potential of Cd (II), Cu(II)& Zn(II) ions in 0.1M solutions.
2. Determination of metal ions individually and in mixtures,
3. Determination of the formula and the stability constant of a lead oxalate.
4. Study of the polarogram of supporting electrolyte with and without dissolved oxygen,
5. Determination of Huckel value of aromatic hydrocarbon reduction at dropping mercury electrode.
6. Amperometric titrations.
7. Coulometric titration
8. Percentage purity of copper sulphate by electrogravimetric method.

REFERENCES:
1. Findlay's Practical Physical Chemistry- B. P. Levitt (Longman, London).
2. Experiments in Physical Chemistry–James and Prichard.
3. Experimental Physical Chemistry - Daniels et al.
4. Experimental Physical Chemistry-Das & Behera (Tata McGraw Hill, New Delhi)1983.
5. Advanced Practical Physical Chemistry–Yadav (1989).
6. Experiments in Physical Chemistry–J. C. Ghosh (Bharathi Bhavan)1974.
7. Nucleonix systems Pvt. Ltd, Hyderabad.

4th SEMESTER

CH H 551 BIOINORGANIC CHEMISTRY

COURSE OUTCOME:

- In this course, students will learn metal and non metal ions in biological systems,
- Biological nitrogen fixation, Photocatalysis,
- Transport and storage of dioxygen, Metal storage and Transport, Metalloproteins as enzymes,
- Therapeutic uses of metals, Metal complexes as drugs, Treatment of toxicity due to inorganics.

UNIT -I: **[15 Hours]**

Metal and non metal ions in biological systems-essential and trace metals, ion transport across membranes, active transport of ions across biological membranes, ionophores.
Biological nitrogen fixation, Molybdenum nitrogenase Model compounds, in vitro fixation of nitrogen throgh dinitrogen complexex. Metal complexes in transmission of energy-chlorophylls. photosystems I ans II in cleavage of water, model systems.

UNIT-II: **[15Hours]**

Transport and storage of dioxygen- heme proteins, oxygen uptake, functions of haemoglobin, myoglobin, hemerythrin and hemocyanins, synthetic oxygen carriers.