# MANGALORE UNIVERSITY

## Department of Industrial Chemistry

### ICP 508: PHYSICAL CHEMISTRY PRACTICALS-III

## Course Outcomes:

- Analysis of polymers, study on phase diagram.
- Thermochemical experiment with spectrophotometer.

**Any twelve experiments are to be carried out**

**Thermodynamic Experiments (Any 6 Experiments to be carried out)**

1. Determination of molecular weight and size parameters of polymers by viscometry.
2. Determination of sequences in polyvinyl alcohol by viscometry.
3. Study of association of benzoic acid in benzene.
4. Determination of partial molar volumes of a) Salts – water and b) alcohol – water (methanol & ethanol) systems by density method.
5. Determination of specific heat of liquids and solutions by calorimetry.
6. Study of phase diagram of a ternary aqueous system of potassium chloride and water.
7. Study of phase diagram of a ternary system of benzene – acetic acid – water or DMSO-water – benzene or ethanol – benzene – water etc.
8. Determination of heat of solution of $KNO_3$ in water, integral heat of dilution of $H_2SO_4$ and heat of ionization of acetic acid and ammonium hydroxide calorimetrically.
9. Determination of heat of neutralisation of two acids and hence their relative strength.
10. Determination of conc. of $KMnO_4$ and $K_2Cr_2O_7$ by spectrophotometer.
11. Determination of pKa values of indicators.

**Voltammetry & Polarography Experiments (Any 6 Experiments 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 β value of aromatic hydrocarbon reduction at dropping mercury electrode.
6. Verification of Ilkovic equation.
7. Determination of i) stability constant of a metal complex (lead oxalate or copper glycinate) and ii) concentration of metal ions polarographically.
8. Amperometric titrations.
9. Study of potential-pH diagrams.

10. Determination of thermodynamic parameters of a cell reaction by EMF method.
11. Electroplating of i) Nickel, ii) Chromium, iii) Aluminium and iv) copper on a copper plate.
12. a) Verification of Tafel equation of hydrogen evolution reaction. b) Determination of rate of corrosion by weight loss method.
13. a) Identification of deposits by chemical spot tests. b) Determination of electrochemical equivalent of copper.
14. Coulometric Experiments
15. Any other experiment of interest.

**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.
6. Experimental Physical Chemistry, Das & Behera, Tata McGraw Hill, New Delhi, 1983.
7. Advanced Practical Physical Chemistry, Yadav, 1989.
8. Experiments in Physical Chemistry, J.C.