CH P 558: PHYSICAL CHEMISTRY PRACTICALS-IV

COURSE OUTCOME:

Includes large number of kinetic experiments from which students are made to choose five experiments which illustrate different principles of chemical kinetics. They are also expected to learn concepts of thermodynamics by carrying out 5 experiments from the respective section. The paper also includes two experiments from polymer chemistry topics and two experiments from spectroscopy. In addition to the above knowledge, the students are trained to develop skill of using computers to draw chemical structures, to plot the data and tocarry out calculations

SPECIFIC COURSE OUTCOMES

- To Determine order of reaction order and activation parameters
- To study various tpes of reactions
- To determine the mechanism of reactions
- To study the catalytic constant, surface area of catalyst& temperature et.

A. Kinetics and Catalysis (Any Five Experiments are to be carried out)

Determination of reaction order and activation parameters, study of acidity/salt/solvent/catalytic effects on reaction rates of any FIVE of the reactions listed below.

1. Acid catalyzed hydrolysis of methyl acetate.
2. Saponification of ethyl acetate by conductivity method.
3. Decomposition of benzenediazonium chloride.
4. Reaction between potassium persulphate and potassium iodide (including the study of salt effect and catalysis by Ag^{+}, Fe^{2+} and Cu^{2+} ions).
5. Decomposition of diacetone alcohol by NaOH & Hydrolysis of t-butylchloride.
6. (i) Reaction between iodine and acetone, and (ii) iodination of aniline.
7. Reaction between hydrogen peroxide and HI.
8. Decomposition of H2O2 (including the study of catalytic effect).
9. Reaction between Chromic acid and oxalic acid.
10. Reduction of aqueous solution of ferric chloride by stannous chloride.
11. Determination of the mechanism of the oxidation of an organic compound from kinetic data.
12. Determination of catalytic constant of an acid.
13. Determination of effect of surface area of catalyst and temperature on the kinetics of Metal-acid reaction.
14. Determination of dissociation of trichloroacetic acid-Kinetic method.
15. Determination of equilibrium constant for homogeneous equilibria and determining the concentration of a given solution.
16. Determine the molecular formula of copper-ammonia complex by the partition coefficient method.
17. Alkaline hydrolysis of ethyl acetate volumetrically.
18. Effect of reaction surface area of catalyst and temperature, concentration on the kinetics of metal-acid

B. Polymer Chemistry (Any Two experiments are to be carried out)

1. Determination of molecular weight and size parameters of polymers by viscometry.
2. Determination of sequences in polyvinylalcohol by viscometry.
3. Determination of molecular weight of a polymer by turbidimetry.
4. Preparation of Polymethylmethacrylate by suspension polymerization / polystyrene by free radical polymerization / Nylon by interfacial polymerization / Polyacrylamide by solution

polymerisation method / polyvinylalcohol from polyvinylacetate / Phenol formaldehyde/ urea formaldehyde resins / thin films of polymers.

C. Thermodynamics Experiments (Any Five experiments to be carried out)

1. Determination of activities of an electrolyte and non-electrolyte by cryoscopy.
2. Determination of partial molar volumes of (a) Salts-water and (b) alcohol-water (methanol & ethanol) systems by density method.
3. Study of complex formation between mercury and potassium halides by cryoscopy.
4. Determination of specific heat of liquids and solutions by calorimetry.
5. Determination of stepwise neutralisation of acids.
6. Determination of heat of solution of KNO3 in water, integral heat of dilution of H2SO4 and heat of ionization of acetic acid and ammonium hydroxide calorimetrically.
7. Cryoscopic and ebullioscopic analysis of the given mixture of urea and glucose.
8. Determination of vant Hoff's factor for benzoic and acetic acid mixtures in benzene.
9. Viscosity of sound in liquid-ultrasonic interferometry

D. Spectroscopic Experiments (Any Two experiments to be carried out)

1.Kinetics of oxidation of alcohol by potassium dichromate – spectrophotometrically.
2.Simultaneous determination of Manganese and chromium in a solution of dichromate and permanganate mixture.
3.Determination of pKa of an indicator..
4.Spectroscopic investigation of partition coefficient of iodine between H_2O and $CHCl_3$.
5.Study of the effect of ionic strength on the pH of the given acid with the help of indicators using buffer solution by colorimetric method.

E. Computer related Practicals: Solution of some selected chemical engineering problems to
develop skill for computer applications, programme writing and numerical analysis.
Use of commercial software packages such as Mathcad, Matlab, Aspan Plus, Design II, Use of Chem draw and Chem sketch for construction of molecules. Use of Window excel for drawing graphs estimation of slope intercept.

CH P 559: PROJECT WORK AND DISSERTAION

COURSE OUTCOME:

Enable the students:

- To design the project by collecting required background material by referring the literature
- To understand the functioning and safety features in the industry.
- To improve the experimental and soft skills.
- To learn various analytical and instrumental techniques and interpretation of analytical data.