

Paper-XII (CHN505) Laboratory Course

270 Hours (18 Hours/week)

INORGANIC CHEMISTRY

I Qualitative (A mixture containing total Eight radicals) (Minimum 4)

(a) Less common metal ions – TI, Mo, W, Ti, Zr, Th, V, U (two metal ions in cationic/ anionic form)

(b) Insoluble – oxides, sulphates and halides

II Separation and determination of two metal ions Cu-Ni, Ni-Zn, Cu-Fe etc. involving volumetric and gravimetric methods (Minimum 2)

III Chromatography

Column chromatography – ion exchange

ORGANIC CHEMISTRY

Qualitative Analysis

Separation, purification and identification of compounds of three component mixture (solid mixed with liquid) use of TLC and column chromatography, chemical tests. IR spectra to be used for functional group identification etc. preferred.

Organic Preparation (Minimum 3)

- (i) Sandmeyer reaction: p-Chlorotoluene from p-toluidine
- (ii) Acetoacetic ester Condensation: Synthesis of ethyl-n-butylaceto -acetate by A.E.E. condensation.
- (iii) Cannizzaro reaction : 4-Chlorobenzaldehyde as substrate
- (iv) Friedel Crafts Reaction : -Benzoyl propionic acid from succinic anhydride and benzene
- (v) Aromatic electrophilic substitutions: Synthesis of p-nitroaniline and p-bromoaniline

Quantitative Analysis (Minimum 3)

- (i) Determination of the percentage or number of hydroxyl groups in an organic compound by acetylation method
- (ii) Estimation of amines/phenols using bromate bromide solution/or acetylation method
- (iii) Determination of Iodine and Specification values of an oil sample.
- (iv) Determination of DO, COD of water sample

Physical Chemistry

Semester II

Physical Chemistry

Students are required to perform at least 08 experiments

Section I

Adsorption and phase equilibria (Minimum one)

- (i) To study surface tension- concentration relationship for solutions (Gibbs equation).
- (ii) To construct the phase diagram for three component system (e.g. chloroform-acetic acid-water)

Partition coefficient (Minimum one)

- (1) To determine equilibrium constant of the reaction $KI + I_2 \rightleftharpoons KI_3$ by distribution method.
- (2) To determine the formula of the complex formed between the cupric ion and ammonia by distribution method.

Chemical Kinetics**(Minimum Two)**

- (i) Determine the temperature coefficient and energy of activation of the reaction between HBrO_3 and HI.
- (ii) Flowing clock reactions (Ref: Experiments in Physical Chemistry by Show maker)
- (iii) Determination of the primary salt effect on the kinetics of ionic reactions and testing of the Bronsted relationship (iodide ion is oxidized by persulphate ion)
- (iv) Determination of the rate constant for the oxidation of iodide ions by hydrogen peroxide studying the kinetics as an iodine clock reaction.

Section II**Conductometry****(Minimum two)**

- (i) Determination of the velocity constant, order of the reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductometrically.
- (i) To determine the amount of acetic acid and hydrochloric acid in given mixture of HAC + HCl conductometrically.
- (ii) To study the effect of solvent on the conductance of AgNO_3 /acetic acid and to determine the degree of dissociation and equilibrium constant in different solvents and in their mixtures (DMSO, DMF, dioxane, acetone, water) and to test the validity of Debye-Huckel- Onsager theory.
- (iii) Determination of the activity coefficient of zinc ions in the solution of 0.002 M zinc sulphate using Debye Huckel's limiting law.

Potentiometry/pH metry**(Minimum Two)**

- (i) Determination of the concentration of NaOH and NH_4OH in the given mixture using 0.1N HCl / conductometrically.
- (ii) Determination of the dissociation constant of monobasic/ dibasic acid by Albert-Serjeant method.
- (iii) Determination of the valency of mercurous ions potentiometrically.
- (iv) Determination of activity and activity coefficient of electrolytes.
- (v) Determination of the dissociation constant of acetic acid in DMSO /DMF /acetone or dioxane by titrating it with KOH
- (vi) Determine of thermodynamic constants, G , S and H for the reaction by e.m.f. method.

**Polarimetry****(Minimum one)**

- (i) Determination of rate constant for hydrolysis / inversion of sugar using a Polari meter.
- (ii) Enzyme kinetics – inversion of sucrose.

Semester –I
Practical Examination Schedule
[Total 150 marks 3 days]

- [A] Inorganic Chemistry Practicals (40 marks, 5Hrs)
- (i) Preparation of complexes and their analysis and chromatography.
OR
- (ii) Qualitative Analysis
- [B] Organic Chemistry Practicals (40 marks, 5 Hrs)
- (i) Organic Preparations
OR
- (ii) Qualitative Analysis
- [C] Experiments of Physical Chemistry (40 marks, 5 Hrs)
- (i) Any one statistical 05 marks
- (ii) Instrument / Kinetics / Adsorption 35 marks
- [D] Viva voce 30 marks

Semester –II

Practical Examination Schedule
[Total 150 marks 3 days]

- [A] Inorganic Chemistry Practicals (40 Marks, 5Hours)
- (i) Qualitative Analysis 25 Marks
- (ii) Admixture (Gravimetry, Volumetry)
OR Chromatographic Analysis 15 Marks
- [B] Organic Chemistry Practicals (40 marks, 5 Hrs)
- (i) Organic Qualitative Analysis including derivatives and
crystallization 40 Marks
- OR
- (i) Organic Preparation, Characterization 20 Marks
And
- (ii) Organic Estimation 20 Marks
- [C] Experiments of Physical Chemistry (40 marks, 5 Hrs)
Any one experiment
- [D] Viva voce 30 marks