

Paper-VI CHN-405 Laboratory Course-I

270 Hours (18 Hours/week)

Inorganic Chemistry

I Preparations (Minimum 5)

Preparation of selected inorganic compounds and their studies by I.R., electronic spectra, Mossbaure, E.S.R. and magnetic susceptibility measurements. Handling of air and moisture sensitive compounds.

- (1) cis-K[Cr(C₂O₄)₂(H₂O)₂]
- (2) Na[Cr(NH₃)₂(SCN)₄]
- (3) Mn(acac)₃
- (4) K₃[Fe(C₂O₄)₃]
- (5) [Co(NH₃)₆][Co(NO₂)₆]
- (6) Hg[Co(SCN)₄]
- (7) [Ni(NH₃)₆]Cl₂

II Qualitative Analysis (A mixture containing total six radicals) (Minimum 4)

- (a) Less common metal ions – Tl, Mo, W, Ti, Zr, Th, V, U (one metal ion in cationic/anionic form)
- (b) Insoluble – oxides, sulphates and halides

III Chromatography (Separation of cations and anions)

Paper Chromatography

Organic Chemistry

I Qualitative Analysis (Minimum 4)

Mixture of 3 compounds – liquid mixture to be separated by distillation only
(only all solids or all liquids)

II Organic Synthesis (Minimum 3)

Acetylation : Acetylation of cholesterol and separation of cholesteryl acetate by column chromatography

Oxidation : Adipic acid by chromic acid oxidation of cyclohexanol

Grignard reaction : Synthesis of triphenylmethanol from benzoic acid

Aldol condensation : Dibenzal acetone from benzaldehyde

The products may be characterized by spectral techniques.

Semester -1

Physical Chemistry

Number of hours for each experiment : 3-4 Hours students are required to perform at least 08 experiments.

Section I

Error Analysis and Statistical Data Analysis

(Minimum 1)

- (i) Errors, types of errors, minimization of errors, error distribution curves, precision, accuracy and combination; statistical treatment for error analysis, student 't' test, null hypothesis, rejection criteria, F & Q test; linear regression analysis, curve fitting. Calibration of volumetric apparatus: burette, pipette and flask.

Phase Equilibrium

(Minimum 1)

- (ii) Determination of congruent composition and temperature of a binary system (e.g. diphenylamine-benzophenone system)
- (iii) Determination of glass transition temperature of a given salt (e.g. CaCl₂) conductometrically.

Chemical Kinetics

(Minimum 2)

- (i) Determination of the effect of Change of temperature on the velocity constant of hydrolysis of an ester/Ionic reactions.
- (ii) Determination of the effect of Change of concentration of reactants on the velocity constant of hydrolysis of an ester/Ionic reactions.
- (iii) Determination of the effect of Change of concentration of catalysts on the velocity constant of hydrolysis of an ester/Ionic reactions.
- (iv) Determination of the effect of Change of Ionic strength of the media on the velocity constant of hydrolysis of an ester/Ionic reactions.
- (v) Determination of the velocity constant of hydrolysis of an ester/Ionic reaction in micellar media.

Section II

Conductometry

(Minimum 2)

- (i) Determination of the velocity constant, order of the reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductometrically.
- (ii) Determination of solubility and solubility product of sparingly soluble salts (e.g., PbSO_4 , BaSO_4) conductometrically.
- (ii) Determination of the strength of strong and weak acids in a given mixture conductometrically.
- (iv) Determine the degree of hydrolysis of aniline hydrochloride and calculate the dissociation constant of free base conductometrically.

Potentiometry/pH metry

(Minimum 2)

- (i) Determination of strengths of halides in a mixture potentiometrically.
- (ii) Determination of the strength of strong and weak acids in a given mixture using a potentiometer/pH meter.
- (iii) Acid-base titration in a non-aqueous media using a pH meter
- (iv) Determination of the formation constant of silver-ammonia complex and stoichiometry of the complex potentiometrically.
- (v) Determine the foral redox potential of $\text{Fe}^{2+} / \text{Fe}^{3+}$ system.

Book Suggested

1. Vogel's Textbook of Quantitative Analysis, revised, J. Bassett, R.C.Denney, G.H. Jeffery and J. Mendham, ELBS
2. Synthesis and Characterization of Inorganic Compounds, W. L. Jolly, Prentice Hall
3. Experiments and TEchniques in Organic Chemistry, D.Pasto, C. Johnson and M. Miller, Prentice Hall
4. Macroscale and Microscale Organic Experiments, K. K. Williamson, D. C. Heath.
5. Systematic Qualitative Organic Analysis, H. Middleton, Adward Arnold.
6. Handbook of Organic Analysis – Qualitative and Quantitative, H. Clark, Adward Arnold.
7. Vogel's Textbook of Practical Organic Chemistry, A. R. Tatchell, John Wiley
8. Practival Physical Chemistry, A. M. James and F. E. Prichard, Longman
9. Findley's Practical Physical Chemistry, B. P. Levitt, Longman
10. Experimental Physical Chemistry, R.C. Das and B. Behera, Tata McGraw Hill.