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M.Sc. (PREV.) CHEMISTRY, 2007-2008

Duration 16 Hrs M.M. 200

(i) Inorganic Practicals	60 Marks
(ii) Organic Practicals	60 Marks
(iii) Physical Practicals	60 Marks
(iv) Seminar	20 Marks
Total	200 Marks

INORGANIC PRACTICALS

Duration 6 Hrs. (one day) M.M. : 60

Distribution of Marks:

1. Qualitative analysis (3 marks for each radicals)	18 Marks
2. Quantitative analysis Volumetric	12 marks
3. Preparation/ Chromatrography	10 Marks
4. Viva-Voce	10 Marks
5. Sessional/Record	10 Marks
Total	60 Marks

List of Experiments -

1. **Qualitative analysis** - Qualitative analysis of inorganic mixture containing SIX radicals from the following list: (at least two from Group B)

Ten mixtures are compulsory to be done during the session.

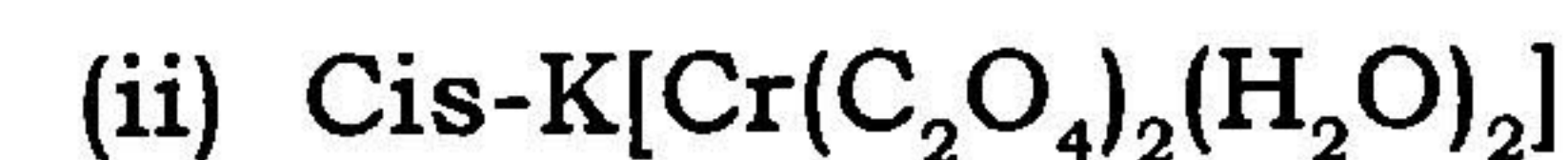
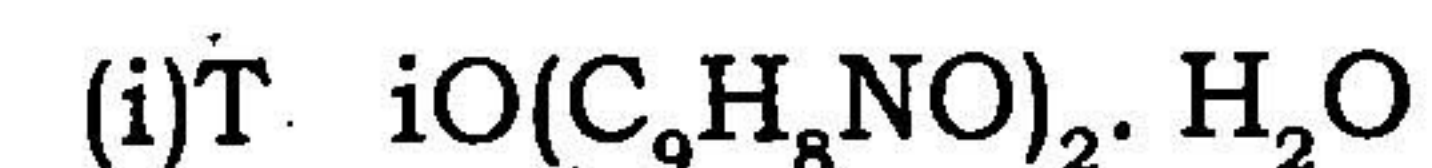
Group A - Carbonate, Sulphite, Sulphate, Sulphide, Nitrite, Acetate, Oxalate, Nitrate, Chloride, Iodide, Phosphate, Fluoride, Borate, Silver, Lead Mercury, Bismuth, Copper, Cadmium, Tin, Arsenic, Antimony, Aluminium, Chromium, Iron, Nickel, Cobalt, Zinc, Manganese, Calcium, Barium, Strontium, Magnesium, Ammonium.

Group B - Thiosulphate, Cyanate, Thiocyanate, Hypochlorite, Chlorate, Perchlorate, Iodate, Persulphate, Silicate, Chromate, Arsenate, Benzoate, Thallium, Tungsten, Molybdenum, Vanadium, Beryllium, Uranium, Thorium, Titanium, Zirconium, Cerium.

2. Quantitative analysis -

Volumetric determination of two components (binary) mixture containing any two of the following; Copper, Zinc, Silver, Nickel, Calcium, Magnesium, etc. (three exercises to be performed in practice).

3. Preparation of any ten complexes



(iv) Prussian Blue, Turnbull's Blue.

(v) $\text{Co}[(\text{NH}_3)_6][\text{NO}_2]_6$

(vi) Cis- $[\text{Co}(\text{trien})(\text{NO}_2)_2]\text{Cl}\cdot\text{H}_2\text{O}$

(vii) $\text{Hg}[\text{Co}(\text{SCN})_4]$

(viii) $[\text{Co}(\text{Py})_2\text{Cl}_2]$

(ix) $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$

(x) Ni (dmg)₂

(xi) $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4\cdot\text{H}_2\text{O}$

(xii) $\text{VO}(\text{acac})_2$

OR

Separation of cations and anions by paper chromatography/column chromatography/ ion exchange.

ORGANIC PRACTICALS

Duration 6 Hrs. (one day)

M.M. 60

Distribution of Marks

Exercises

1. Qualitative analysis	20 Marks
2. Quantitative analysis	10 Marks
3. Organic Synthesis	10 Marks
4. Viva-voce	10 Marks
5. Record	10 Marks
Total	60 Marks

List of Experiments

1. Qualitative Analysis - (Organic mixture)

Separation, purification and identification of compounds in a binary mixture (solid-solid or solid-liquid). One mixture to be given in the examination, suitable derivatives to be prepared, wherever possible.

2. Quantitative Analysis (one experiment to be performed in the examination)

- Determination of equivalent weight of an acid by silver salt method
- Estimation of phenol/aniline using bromate-bromide solution or acetylation method.

(iii) Estimation of glucose by titration using Felhing's solution/Benedict solution

(iv) Estimation of carbonyl group by using 2,4-dinitrophenylhydrazine

(v) Determination of iodine and saponification value of an oil sample

3. Organic synthesis (One experiment to be performed from the following in the examination)

Acetylation - Acetylation of salicylic acid using acetyl chloride

Benzoylation - Benzoylation of phenol/aniline/glycine

Oxidation - Phenanthroquinone from phenanthrene

Sandmeyer reaction - p-Chlorotoluene from p-toluidine

Acetoacetic ester condensation - Synthesis of ethyl-n-butylacetoacetate

Cannizaro reaction - Any p-substituted benzaldehyde as substrate

Backmann rearrangement - Acetanilide from acetophenone

Claisen-Schmidt condensation - Benzalacetophenone/ benzalacetone/dibenzalacetone from benzaldehyde

Books Recommended :

1. Advanced Practical Organic Chemistry, N.K. Vishnoi
2. A Hand Book of Organic Analysis, H.T Clarke
3. Systematic Quantitative Organic Analysis, H. Middleton, Edward Arnold Ltd.
4. Text Book of Practical Organic Chemistry, Arthur I Vogel, ELBS.

M.Sc. (PREVIOUS) CHEMISTRY, 2007-2008

PHYSICAL PRACTICALS

Duration 6 Hrs. (one day)

M.M. 60

Distribution of Marks

Exercises

1. Experiment-I	20 Marks
2. Experiment-II	20 Marks
3. Viva-voce	10 Marks
5. Record/sessional	10 Marks
Total	60 Marks

Exercises -

1. Adsorption

To study surface tension-concentration relationship for solutions (Gibb's equation)

2. Phase equilibria

- Determination of congruent composition and temperature of a binary system (e.g. diphenylamine-benzophenone system).
- Determination of glass transition temperature of a given salt (e.g CaCl_2) conductometrically.

3. Chemical kinetics

- Determination of the effect of (a) change of temperature (b) change of concentration of reactants and catalysts and (c) ionic strength of media on the velocity constant of hydrolysis of an ester or ionic reactions.
- Determination of the velocity constant of hydrolysis of an ester or ionic reaction in micellar media.
- (xiii) Determination of the primary salt effect on the kinetics of ionic reactions and testing of the Bronsted relationship (iodide ion-persulphate ion)
- (xiv) Determination of the rate constant for the oxidation of iodide ions by hydrogen peroxide (the kinetics as an iodine clock reaction).
- (xv) Flowing clock reactions
- (xvi) Oscillatory reaction.

4.C Conductometry

- Determination of velocity constant and order of the reaction for saponification of ethyl acetate by sodium hydroxide conductometrically.
- To study the effect of solvent on the AgNO_3 /acetic acid and to determine the degree of dissociation and equilibrium constant in different solvents and in their mixture (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 zinc sulphate using Debye-Huckel's limiting law.
- (iv) Verify Ostwald dilution law and calculate dissociation constant of weak acid
- (v) Verify Kohlrausch's law
- (vi) Determine basicity of weak organic acid
- (vii) Determine the solubility of sparingly soluble salts and its solubility product.

5. Potentiometry/pH metry

- (i) Determination of strength of halides in a mixture potentiometrically
- (ii) Determination of the valency of mercurous ions potentiometrically
- (iii) Determine the strength of strong and weak acids in a given mixture using a potentiometer/pH meter
- (iv) Determination of the formation constant of copper - ammonia complex and stoichiometry of the complex potentiometrically
- (v) Determination of activity and activity coefficient of electrolytes
- (vi) Determination of the dissociation constant of acetic acid in DMSO, DMF, acetone and dioxane by titrating it with KOH.

- (vi) Determination of the dissociation constant of monobasic or dibasic acid.

6.P Polarimetry

- (i) Determination of rate constant for hydrolysis/inversion of sugar using a polarimeter
- (ii) Enzyme kinetics-inversion of sucrose

7.C Chromatography

Separation of inorganic ions or organic compounds by paper chromatography or thin layer chromatography

8. Distribution law

- (i) Complex formation between copper sulphate and ammonia
- (ii) Equilibrium constant of the reaction between iodine and potassium iodide.

9.P Photochemistry

- (i) Photochromism in Aberchrome 540 or malachite green or potassium ferrocyanide-phenolphthalein system
- (ii) Determination of quantum yield
- (iii) Photooxidation of leucomethyl crystal violet.

Books Recommended :

1. Practical Physical Chemistry, Alexander and Findlay.