

# VEER NARMAD SOUTH GUJARAT UNIVERSITY

## M.Sc. - CHEMISTRY

### M.Sc. Part -I

## INORGANIC PRACTICALS

### I. Inorganic Qualitative Analysis:

Minimum 5 Separations

Mixture having 6 radical 3 positive, 3 Negative including 2 less familiar from the following:

- |                |               |             |
|----------------|---------------|-------------|
| (1) Molybdenum | (2) Tungstun  | (3) Lithium |
| (4) Thorium    | (5) Zirconium | (6) Cerium  |
| (7) Vanadium   | (8) Berrylium |             |

### II. Volumetric Estimation:

1. Estimation of % Purity of Manganese Salt.
2. Estimation of Aluminium by back titration.
3. Estimation of  $\text{Ca}^{+2}$  and  $\text{Pb}^{+2}$  in the admixture.
4. Estimation of Carbonate-Bicarbonate in mixture using pH-meter.
5. Estimation of available chlorine ( $\text{ClO}^-$ ) in bleching powder.
6. Estimation of Iron in Iron Ore.
7. Estimation of  $\text{Fe}^{+2}$  and  $\text{Fe}^{+3}$  in the given admixture.

### III. Gravimetric Estimation:

1. Estimation of  $\text{Cu}^{+2}$  as  $\text{CuSCN}$ .
2. Estimation of  $\text{Ca}^{+2}$  as  $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$
3. Estimation of  $\text{Ba}^{+2}$  as  $\text{BaSO}_4$

### Reference books:

- 1) Quantitative Chemical Analysis, R.B. Fischer and D.G. Peters, 3rd Edition, D.B. Saunders Company, 1968 or latest edition.
- 2) Laboratory directions for analytical separation and determinations, C.T. Kenner, MacMillan Company, New York, 1971.
- 3) Inorganic Qualitative analysis, A.I. Vogel, 5th Edition, ELBS/ Longman, 1989.
- 4) Vogel's text books of Quantitative Chemical Analysis, Revised by G.H. Jeffery, J. Bassett, J. Mendham and R.C. Danney, Fifth Edition, ELBS/ Longman, 1989.
- 5) Spot tests in inorganic analysis, F. Feigel, 5th Edition, Elsevier (1958).
- 6) Colorimetric methods of analysis, Snell and Snell, D. Van Nostrand, latest edition. E.D.T.A. titrations, latest edition, Fleshka, Pergamon process.

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### M.Sc. Part -I

#### ORGANIC PRACTICALS

#### I. Organic Separation:

Separation and identification of components in mixtures containing three components. (Candidate will prepare at least 2 derivatives. Each student should carry out minimum 8 separations).

#### II. Organic Estimations:

1. To determine the amount of carboxylic acid and amide mixture of carboxylic acid and amide.
2. Determination of formaldehyde by Hydroxylamine hydrochloride method.
3. To determine the amount of ester and acid in a mixture of ester and acid.
4. Determine the amount of analgin in the given solution.

#### III. Preparation of the following Organic compounds involving not more than two steps:

1. Resacetophenone from resorcinol.
2. p-nitroaniline from acetanilide.
3. Beta-resorcylic acid from resorcinol.
4. p-bromoaniline from acetanilide.
5. Methyl orange from sulphanilic acid.
6. p-amino benzoic acid from p-nitrotoluene (via p-nitro benzoic acid)
7. Benzimidazole from o-phenylene diamine.
8. m-nitro aniline from nitrobenzene.

#### Books Recommended for Practicals :

1. Elementry Practical Organic Chemistry Part-I Small Scale Preparations by A. I. Vogel.
2. Elementry Practical Organic Chemistry Part-II Qualitative Organic Analysis by A. I. Vogel.

3. Elementary Practical Organic Chemistry Part-III Quantitative Organic Analysis by A. I. Vogel.
4. Practical Pharmaceutical Chemistry by A. H. Bakett, Volume I & II.
5. Indian Pharmacopia.
6. Comprehensive Practical Organic Chemistry Qualitative Analysis by Ahluwalia & Aggarwal.
7. Organic Quantitative Analysis by Vogel's (ELBS)
8. Comprehensive Practical Organic Chemistry Preparation and Quantitative Analysis by Ahluwalia & Aggarwal.
9. Practicals Biochemistry by Plummer
10. Practical Physical Chemistry by J. B. Yadav.

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**Part -I**  
**PHYSICAL PRACTICALS**

Minimum eight practical exercises (atleast **four** from instrumental and **four** from non instrumental) are to be performed

**INSTRUMENTAL**

1. Determine the dissociation constant of a given monobasic acid pH-metrically.
2. Determine the amount of ferrous sulphate / ferrous ammonium sulphate in given flask potentiometrically using ceric salt solution.
3. Verification of Onsager's equation and determination of equivalent conductance at infinite dilution of strong electrolytes
4. Determine the CMC of a surfactant by conductivity measurements.
5. Calculate the molar absorptivity of each of the given two solutions (A) and (B) and also find out concentration of supplied unknown solution colorimetrically.
6. Determine the dissociation constant of a given dibasic acid pH-metrically.
7. Determine the velocity constant of the hydrolysis of ethyl acetate with sodium hydroxide at room temperature by conductance measurements.
8. Determine the solubility of silver chloride in water potentiometrically.
9. Verification of Ostwald's dilution law and determination of dissociation constant of weak acids.
10. To determine the concentration of given components in a mixture colorimetrically.

**NON INSTRUMENTAL**

1. Investigation the reaction between  $K_2S_2O_8$  and  $KI$  at two different temperatures and calculate the energy of activation for the reaction.
2. To study the solubility of naphthalene in toluene.
3. To study the phase diagram of a three component system. water – acetic acid – chloroform.

4. Determination of CMC and area per molecule of a surfactant by surface tension measurement.
5. Determine the equilibrium constant of the reaction  $I^- + I_2 = I_3^-$  by distribution method.
6. Investigation the reaction between  $H_2O_2$  and HI at two different temperatures and calculate the energy of activation for the reaction
7. Determine the formula of a complex between  $Cu^{2+}$  and  $NH_3$  by distribution method.  $Cu^{2+} + nNH_3 = [Cu(NH_3)_n]^{2+}$
8. Adsorption of acetic acid on activated charcoal. The Freundlich Adsorption Isotherm.
9. Determine the molecular weight of a given polymer from viscosity measurement.
10. Critical solution temperature of partially miscible liquid system.

**Books Suggested for Practicals:**

1. Findley's Practical Physical Chemistry, B.P. Levitt, Longman.
2. Practical Physical Chemistry, A.M. James and F.E. Prichard, Longman.
3. Experimental Physical Chemistry, R.C. Das and B. Behra, Tata McGraw Hill.
4. Advanced Physical Chemistry Experiments, Gurtu-Gurtu, Pragati Prakashan.
5. Experimental Physical Chemistry, V. D. Athawale and Parul Mathur, New Age International.
6. Advanced Practical Physical Chemistry, J. B. Yadav, Goel Pub.House.
7. Experiments in Physical Chemistry, Dr. D. V. Jahagirdar.
8. Practical Physical chemistry, B. Viswanathan and P. S. Raghavan, Viva Books Pvt Ltd.

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**M.Sc. Part-I**

TO COME IN FORCE FROM JUNE-2008

**Organic Chemistry**

**I. Organic Separation**

**48 Marks**

- |   |        |          |
|---|--------|----------|
| (i) Correct type and method of separation |        | 07 Marks |
| (ii) Correct identification, m.p. & C.T.  | 3 x 11 | 33 Marks |
| (iii) Derivative and Crystallization      | 2 x 4  | 08 Marks |

**II. Organic Preparation**

**26 Marks**

(Marks should be divided equally in different stages-criteria (Yield, Purity and crystallization)).

**III. Estimations (Two)**

**22 Marks**

- |                                  |          |
|----------------------------------|----------|
| (i) For each estimation accuracy | 18 Marks |
| (ii) Calculation                 | 04 Marks |

<b>Error in reading:</b>	<b>Marks</b>	<b>Marks (Ester/ Amide)</b>	<b>Marks (Aniline)</b>
± 0.1 ml	07	11	18
± 0.2 ml	06	10	16
± 0.3 ml	05	09	14
± 0.4 ml	04	07	11
± 0.5 ml	03	05	08
± 0.6 ml	01	03	04
± 0.7 ml	00	00	00

**Physical Chemistry****44 Marks****I. Instrumental Experiment****22 Marks**

- (i) Operation – Calibration 05 Marks  
(ii) Reading with accuracy 10 Marks  
(iii) Calculation – Graph 07 Marks

**II. Non-Instrumental Experiment****22 Marks**

- (i) Reading with accuracy 14 Marks  
(ii) Calculation – Graph 08 Marks

**Inorganic Chemistry****48 Marks****I. Inorganic Qualitative Analysis:****24 Marks**

- (i) Dry tests 06 Marks  
(ii) Wet tests each radicals (2.5 x 6) 15 Marks  
(iii) Systematic work 03 Marks

**II. Volumetric or Gravimetric****24 Marks**

- (i) Reading accuracy 20 Marks  
(ii) Calculation 04 Marks

<b>Error (ml)</b>		<b>Marks (single)</b>	<b>Marks</b>	<b>Marks</b>
Gravimetric	Volumetric			
± 7 mg	± 0.1 ml	20	10	10
± 8 mg	± 0.2 ml	18	09	09
± 9 mg	± 0.3 ml	16	08	08
± 10 mg	± 0.4 ml	14	07	07
± 11 mg	± 0.5 ml	10	05	05
± 12 mg	± 0.6 ml	06	03	03
± 13 mg	± 0.7 ml	02	01	01
± 14 mg	± 0.8 ml	00	00	00

Marks should be entered in the marks sheet in the following order:

Inorganic	Organic	Physical	Total
48	48	44	140