

Hemchandracharya North Gujarat University. Patan.

F.Y.B.Sc.

Chemistry.(CC CH 101)

Semester: 1

UNIT: 1 : (A) : CHEMICAL BONDING

- Valence bond theory & its application, Ex. H₂
- Directional characteristics of covalent bond
- Various types of hybridization and shape of simple inorganic molecules
Ex. sp – BeCl₂ , sp² – BF₃ , sp³ – CH₄ , dsp³ – PCl₅ , d²sp³ – SF₆
- V.S.E.P.R. theory for NH₃, H₂O
- M.O. Theory-Energy level diagram for homo nucleus diatomic molecules (N₂ and O₂) and hetero diatomic molecule (CO and NO)

(B) : F – BLOCK ELEMENTS

- Lanthanide electronic configuration, Oxidation state
- Lanthanide contraction, Effect of lanthanide contraction
- Separation method
 - (1) Solvent extraction methods
 - (2) Ion Exchange Method

UNIT: 2 : (A) : STRUCTURE AND PROPERTIES

Factors affecting to the properties of organic molecule

- Intramolecular forces (dipol-dipol interaction, vander waals forces)
- Electromeric effect
- Inductive effect
- Resonance effect(draw resonating structures of Nitro benzene, Chlorobenzen, Phenoxide ion, Anillinium ion, Acetate ion)
- Hyper conjugation (o,p-directing effect of Alkyl group, Stability of Carbonium ion and Free radicals)

(B) : REACTION MECHANISM

- Fission of Co-Valent bond (With at least one example of each intermediates)
- Types of reagents.
- Types of organic reaction with mechanism.
- Substitution reactions (Nucleophilic & Electrophilic)
- Addition reactions (Nucleophilic & Electrophilic)
- Elimination reactions (E₁ & E₂)

UNIT : 3 : THERMODYNAMICS

- Thermodynamics (only introduction)
- System and surrounding- work & heat, state function, thermodynamic process, internal energy, enthalpy, free energy, maximum work function.
- First law of thermodynamics
heat capacity, specific and molar heat capacity, heat capacity at constant volume and pressure and their relationship
- Work done in adiabatic and isothermal reversible expansion of an ideal gas.
- Second law of thermodynamics
- Carnot cycle and its efficiency
- Concept of entropy ; entropy change for an ideal gas under different conditions, entropy change for mixture of ideal gases
- Gibbs-Helmholtz equation
- Numerical

UNIT : 4 : INTRODUCTION TO VOLUMETRIC ANALYSIS

- **Principle, Mechanism and Applications of,**
- Acid-Base Titrations (Only strong acid Vs strong Base).
- Redox Titrations (Only Fe(II) Vs KMnO_4)
- Complexometric Titrations (Only $\text{Ca}^{+2}/\text{Mg}^{+2}$ Vs EDTA)
- Precipitation Titrations (Only Cl^- Vs AgNO_3).
- Related Numericals.

: REFERENCE BOOKS :

INORGANIC CHEMISTRY

1. 'Source Book on Atomic Energy' by glastone, 1969.
2. 'Modern Inorganic Chemistry' by G.F.Liporni, ELBS, 4th edn. coiling Educational. 1983.
3. 'Inorganic Chemistry' D.F.Shriver. P.W.Atkinss and C.H.Longford, 3rd edn, ELPS Oxford University Press, 1999.
4. 'Nuclear and Redio Cnemistrv' by G fried lander, J.W.Kcnned. E.S.macias and J.M.MiIIer, 3rd edn, John wiley, 1981.
5. 'Essentials of Nuclear Chemistry' H.J.Arnical, 4th edn, New Age International. 1995.
6. 'Concise Inorganic Chemistry' J.D.Lee. 5th edn.
7. 'Inorganic Chemistry', D.F.Slirjver, P.W.Atkinss, 3rd edn, Oxferd. 1999.
8. 'Concise Inorganic Chemistry' J.D.Lee, 4th edn, Champman and hall ELBS, 1991.
9. 'Inorganic Chemistry' by A.G.Sharp, 3rd edn, ELBS, Longman, 1990.

ORGANIC CHEMISTRY

1. 'Organic reaction and mechanism, P.S.Kalsi, New Age international Publishers.
2. Text book of organic Chemistry. P.S.Kalsi, New Age international Publishers.
3. Organic Chemistry Vol. I & II. S.M.Muklierji, S.P.Singh. R.P.Kapoor.
4. Reaction mechanism in Organic Chemistry, S.M.Mukhergi. S.P.Singh. 3rd edn. Macmillan.
5. Reaction Mechanism and Reagents in Organic Chemistry, Gurdeep R. Chatwal 4th edn, Himalaya Publication House.
6. Text book of Organic Chemistry, Arun Bahal, S.Chand.
7. Organic Chemistry, R.Morrison and R.Boyd, 6th edn, Pearson Education 2003.
8. Organic Chemistry. T.W.Graham Solomons, 4th edn. John Wilay. 1998.

PHYSICAL CHEMISTRY

1. Advance Physical Chemistry by Gurdeepraj.
2. Physical Chemistry (Question and Answer) by R.N.Madan, G.D.Tuli. . S.Chand.
3. Principal of Physical Chemistry by Puri Sharma, Pathania.
4. Chemical Thermodynamics by R.P.Rastogi and R.R.Misra.
5. Nuclear Chemistry by C.V.Shekhar, Dominent-Publisher. New Delhi.
6. Essentials of physical Chemistr by B.S.Bahal, Arun Bahal. G. D.Tuli.
7. Physical Chemistry by P.W.Atkins. 5th edn. Oxferd 1994 7th edn-2002.
8. Physical Chemistry b R.A.Albert and RJ.Silby, John Wiley 1995.
9. Physical Chemistry by G.H.Barrow. 5th edn, Mac Graw Hill . 1988. 6th edn. 1996.
10. Physical Chemistry by W.J.Moore. 4th edn. Orient Longmans 1969.

ANALYTICAL CHEMISTRY

1. Fundamentals of Analytical Chemistry by Skoos & West.
2. Analytical Chemistry, Garry D.Christain.
3. Analytical Chemistry, Day & Underwood.
4. Analytical Chemistry by Lerry & Hergins.
5. Qualitative Analysis by A.I.Vogel, 5th edn.

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Chemistry Practical

Laboratory Course (LC CH 101)

Semester : I

This syllabus is to be completed by assigning two laboratory sessions per week, each of two hours. Total laboratory work is 60 hrs /semester (4 hrs/week) or 15 weeks.

The number of students in the laboratory batch should not exceed fifteen (15). The medium of instruction should be English in laboratory course.

1. Organic Chemistry

- 1) Identification of an organic compound through the functional group analysis, Determination of melting point and boiling point. Preparation of suitable derivative.
- 2) Candidate should perform the analysis of at least 10 compounds.

List of compounds

- **Acids:**
Benzoic acid. Cinnamic acid, Phthalic acid. Oxalic acid. Succinic acid.
- **Phenols:**
 α - Naphthol. β -Naphthol.
- **Bases:**
p-Toludine, Diphenylamine. Aniline. Methyl aniline.
- **Neutrals:**
Naphthalene, Anthracene, Acetamide, Benzamide, Acetanilide, m-Dinitrobenzene, Urea, Thiourea, Toluene. Acetone, Benzaldehyde, Methyl acetate, Ethyl acetate. Ethanol, 1-Propanol, Glycerol, Chloroform. Carbon tetrachloride, Chlorobenzene, Nitrobenzene.

2. Standardization

- 1) Preparation of standard solution of succinic acid and standardization of NaOH / KOH solution.
- 2) Preparation of standard solution of $\text{Na}_2\text{S}_2\text{O}_3$ and standardization of I_2 solution.
- 3) Preparation of standard solution of EDTA and estimation of Ca^{+2} / Mg^{2+} in CaCl_2 / MgCl_2 solution.
- 4) Preparation of standard solution of Oxalic acid and standardization of KMnO_4 solution.
- 5) Preparation of standard solution of $\text{K}_2\text{Cr}_2\text{O}_7$ and standardization of FeSO_4 solution.

3. Demonstrations

- Preparation of standard stock solution by w / v method and their different dilutions.
- Preparation of standard stock solution of HCl by v/v method and their different dilutions.