

SYLLABUS

CHEMISTRY

As per NEP-2020

B.Sc. I YEAR II SEMESTER EXAMINATION, 2025-26



JAI NARAIN VYAS UNIVERSITY

JODHPUR

SYLLABUS OF B.Sc. I year (Chemistry) II semester CBCS as per NEP-2020

Syllabus for II semester DCC

CHE5002T: Fundamentals of Chemistry-II

UNIT-I: s-Block elements

Periodicity in properties of alkali and alkaline earth metals. Complexation tendency, Solvation tendency, stability and solubilities of carbonates, bicarbonates and sulphates of Magnesium and Calcium, Synthesis and applications of important hydrides: NaH, NaBH₄, LiH, LiBH₄, LiAlH₄ and CaH₂.

p-Block elements

Periodicity in properties of III A, IV A, V A, VI A and VII A group elements.

Silicates, oxides of nitrogen, phosphorous and sulphur- their structure and preparations.

UNIT-II: Dienes and Alkynes

Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions – 1, 2-and 1, 4-additions, Diels-Alder reaction.

Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidic nature of 1-alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, oxidation and polymerization.

UNIT III: Aromaticity:

Aromaticity: Huckel's rule, aromatic ions.

Aromatic electrophilic substitution – general pattern of the mechanism, role of σ - and π - complexes. Mechanism of nitration, halogenation, sulphonation, mercuriation and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction.

Arenes:

Nomenclature of benzene derivatives. Aryl group. Aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture.

Methods of formation and chemical reactions of alkylbenzenes, Structure, preparation and properties of naphthalene.

UNIT IV: Solutions

Types of liquid mixtures, Raoult's law, Ideal and Non-Ideal mixtures, Vapour pressure of liquid mixtures, vapour pressure-Composition and Boiling point-composition curves of completely miscible binary solutions, Fractional distillation of binary liquid solutions, Azeotropic mixtures and Distillation of Immiscible liquid mixtures.

Partially miscible liquids mixtures-phenol-water, triethylamine-water, nicotine-water-systems, consolute temperature-lower and upper, Effect of impurity on consolute temperature-Phenol-water system, immiscible liquids, Principle and Methodology of steam distillation. Numericals

UNIT V: Chemical Energetics & Chemical Equilibrium

Laws of thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature - Kirchhoff's equation.

Statement of third law of thermodynamics and calculation of absolute entropies of substances.

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG and ΔG° , Le Chatelier's principle. Relationships between K_P , K_C and K_X for reactions involving ideal gases.

Books Suggested

1. Inorganic Chemistry by B.R. Puri and L.R. Sharma

2. Inorganic Chemistry by G.C. Shivhare and V.P. Lavania
3. Inorganic Chemistry by Satya Prakash
4. A Text Book of Organic Chemistry by M.K. Jain
5. Organic Chemistry, R.T. Morrison and R.N.Boyd, Prentice-Hall
6. Advanced Organic Chemistry by Mukherji & Kapoor Vol I & II
7. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma and M.S. Pathania, Shobhan Lal Naginchand & Co.
8. Physical Chemistry by Bahl & Tuli (S. Chand & Co.)
9. Bhotic Rasayan, K.R. Genwa, RBD Jaipur
10. Chemistry-Semester-II by R.L. Madan (S. Chand & Co.)

Practical Chemistry-II-CHE5002P:

Excercise1:

Redox Titrations:

- (i) To determine the strength of given unknown copper sulphate solution iodometrically using starch as indicator.
- (ii) To determine the strength of given unknown potassium dichromate solution iodometrically using starch as indicator.
- (iii) To determine the strength of given oxalic acid solution by titrating it against approx N/30 KMnO_4 solution

Excercise2:

Acidimetry-Alkalimetry titration:

- (a) Standardization of alkali NaOH by oxalic acid.
- (b) Standardization of acedic acid by NaOH

Excercise3.

(a) Viscosity:

- (I) To determine the viscosity of the given organic liquid by Ostwald Viscometer
- (II) To determine the % composition of a binary solution by Viscosity measurement.

(b) Surface Tension:

- (I) To determine the surface tension of a given organic liquid by Stalagmometer.
- (II) To determine the % composition of a binary solution by surface tension measurement.

Skill Based Course

B.Sc. II Semester:

SEC-CH(B) POLYMER TECHNOLOGY

Unit-I Polymer: Classification, introduction to concept of Average Molecular Mass, polydispersity, amorphous and crystalline state.

Unit-II Polymer Processing:

Mixing: Introduction, dispersion, distribution and plasticization.

Extrusion: Basic principles of extrusion.

Calendering: Types of calender rolls.

Unit-III Applications of Polymers: Common polymers and their applications as rubber, plastic, fiber, paints & adhesives

Books Recommended:

1. Polymer Science- V R Gowarikar, N V Vishwanathan and J Sridhar
2. Polymer Science & Technology: J R Fried
3. Science & Technology of Polymers-Plastics and Rubber: P Ghosh
4. Rubber Technology: M Morton