

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE COURSE IN CHEMISTRY**  
**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCY-DSC02**

**CORE-II: GENERAL CHEMISTRY – II**

**Units Learning outcomes**

1. To equip the learners with concepts of s block elements through comparative study.
2. To equip the learners with concepts of p block elements through comparative study.
3. To understand the aspects of gaseous state.
4. To understand the aspects of liquid state, colloids and carbon nanotubes, fullerenes
5. To understand the chemistry of organic compounds like alkanes, cycloalkanes, alkenes, alkynes and the conformational analysis.

| Semester | Subject                | Hours | Credits |
|----------|------------------------|-------|---------|
| II       | General Chemistry - II | 75    | 4       |

**UNIT-I Chemistry of s- Block Elements [Group IA and IIA] (10 hrs)**

Hydrogen: Position of hydrogen in the periodic table.

Alkali metals: Comparative study of the elements with respect to oxides, hydroxides, halides, carbonates and bicarbonates. Diagonal relationship of Li with Mg. Extraction of Li from its silicate- ores. Preparation, properties and uses of NaOH, Na<sub>2</sub>CO<sub>3</sub>, KBr, KClO<sub>3</sub>  
alkaline earth metals: Comparative study of the elements with respect to oxides, hydroxides, sulphates, halides and carbonates. Extraction and anomalous behaviour of Be.

**UNIT-II Chemistry of p- Block Elements (10 hrs)**

2.1 Boron Family[Group-IIIA]: preparation and structure of diborane and borazine. Chemistry of borax. Extraction of Al and its uses. Alloys of Al. 2.2 Carbon Family (Group -IV A) : comparison of carbon with silicon. Carbon-di-sulphide – Preparation , properties , structure and uses. Percarbonates , per monocarbonates and per dicarbonates. Tin- Allotropic forms of Tin, alloys of tin, tinning, tin plating. Lead-lead accumulator (discharging and recharging), leadpigments.

**UNIT-III Gaseous State (15 hrs)**

Postulates of kinetic theory of gases, derivation of gas laws from the kinetic gas equation. Kinetic energy and temperature-average translational kinetic energy and its calculation. Maxwell's distribution of molecular velocities(no derivation)-mean, root mean square and most probable velocity. Collision diameter, collision number, collision frequency, mean free path. Principle of equipartition of energy. Real gases- van der Waals equation of state-derivation. Boyle temperature. Significance of critical constants.

**UNIT-IV**

**4.1 Liquid State (20 hrs)**

Some Properties of Liquids(molecular basis)-Equilibrium vapour pressure of a liquid, boiling point, heat of evaporation, heat of condensation, freezing point. Surface tension- definition, measurement of surface tension, effect of temperature on surface

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tension. Parachor-definition, calculation and applications.

Viscosity or fluidity-definition, measurement and calculation, factors affecting viscosity.

4.2 Nanoparticles of Au, Ag and TiO<sub>2</sub> –preparation, properties and uses. Carbon nanotubes-Types- preparation, properties and uses-Fullerene – Introduction only

**UNIT-V**

(20 hrs)

5.1 Chemistry of Alkanes and Cycloalkanes : General methods of preparation and properties of alkanes and cycloalkanes ,Conformational analysis of ethane and n-butane. Baeyer's strain theory.

5.2 Alkenes, Alkynes and Dienes: Preparation of alkenes (dehydrogenation, dehydrohalogenation and dehydration), preparation of alkynes(dehydrohalogenation, dehalogenation).Addition (with mechanisms) of H<sub>2</sub>, X<sub>2</sub>, HX, HOX, B<sub>2</sub>H<sub>6</sub> and O<sub>3</sub> to alkenes and alkynes. Addition of HBr (peroxide effect; free radical reaction mechanism) to alkenes and alkynes. . Allylic substitution of alkenes by NBS. Dienes types, stability; preparation of- 1,3-butadiene, isoprene, and chloroprene. Reactivity: 1,2- and 1,4-additions to butadiene. Diels-Alder reaction.

**Textbooks :**

1. Puri B.R., Sharma L.R. and Pathania M.S., Principles of Physical Chemistry, 47th ed., New Delhi, Vishal Publishing Co.,2016.
2. Puri B.R., Sharma L.R. and Kalia K.C., Principles of Inorganic Chemistry, 33th ed., New Delhi, Milestone Publishers and Distributors,2016.
3. Soni P.L., and Chawla H.M., Textbook of Organic Chemistry, 29th ed., New Delhi, Sultan Chand & Sons, 2007.
4. Understanding Chemistry, C N R Rao, Universities Press Private Limited, Chennai,1999
5. The Chemistry of the p-Block Elements: Syntheses, Reactions and Applications, Anil J Elias, Universities Press Private Limited, Chennai,2019
6. T. Pradeep, Nano: The Essentials, New Delhi, McGraw Hill,2007

**Reference Books**

1. Lee J.D. Concise Inorganic Chemistry, 5th ed., Blackwell Science,2005.
2. Jain M.K, Sharma S.C. Modern Organic Chemistry, Vishal Publishing Co.,2017
3. Soni, P.L. and Mohan Katyal. Textbook of Inorganic Chemistry, 20th ed., Sultan Chand & Sons, 2006.
4. Glasstone Samuel. Textbook of Physical Chemistry, 2<sup>nd</sup> ed., Macmillan India Ltd.,1990.
5. Soni P.L., Dharmarha O.P. and Dash U.N Textbook of Physical Chemistry, 23<sup>rd</sup> ed., New Delhi, Sultan Chand & Sons,2011.
6. Graham Solomons T.W. Organic Chemistry, 3<sup>rd</sup> ed., John Wiley&Sons.
7. Morrison R T and Boyd R N, Organic Chemistry, 6<sup>th</sup> ed., Pearson Education, Asia,2002.
8. C. N. R. Rao, Chemistry of Nanomaterials: Synthesis, Properties and Applications, Wiley-VCH Verlag GmbH & Co. KgaA,2004
9. Charles P. Poole Jr., Frank J. Owens, Introduction to Nanotechnology, New Jersey, John Wiley & Sons, 2003