

Dr. Mandeep
Chemistry Department
Govt. College Nagina (NUH)
Even Semesters (April-June)
2021-2022

B.Sc. – 1st Year (2nd Semester)

April:

(Inorganic Chemistry)

Hydrogen Bonding & Vander Waals Forces, Metallic Bond and Semiconductors: Types of Hydrogen Bonding, effects of hydrogen bonding on properties of substances, various types of Vander Waals Forces, Band theory of metallic bond, types and applications of Semiconductors,

(Physical Chemistry)

Kinetics Chemistry: Rate of reaction & factors influencing the rate of a reactions., Integrated rate expression for zero order, 1st order, second and third order reaction, Order of reaction. Arrhenius equation, collision theory for unimolecular and bimolecular collision, Transition state theory of Bimolecular reactions.

(Organic Chemistry)

Alkenes: Nomenclature, dehydration of alcohols and dehydrohalogenation of alkyl halides, Saytzeff rule, Hofmann elimination, relative stabilities of alkenes. Chemical reactions of alkenes mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration–oxidation, oxymercurationreduction, ozonolysis, hydration, hydroxylation and oxidation with KMnO₄. Arenes and Aromaticity,

Paper Chromatography **(Practical)**

May:

- ❖ s-Block Elements & Noble Gases
- ❖ Boron family, p-block elements
- ❖ Electrochemistry
- ❖ Preparation and purification through crystallization **(Practical)**

June:

(Inorganic Chemistry)

p-block elements: Carbon family, Nitrogen family, Oxygen family, Halogens

(Organic Chemistry)

Dienes and Alkynes:

Nomenclature and classification of dienes, Structure of butadiene & reactions 1,2 and 1,4 additions, Diels-Alder reaction, Methods of formation & Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation of alkynes.

Alkyl and Aryl Halides: Nomenclature, methods of formation, chemical reactions. SN2 and SN1 reactions, addition-elimination and the elimination-addition mechanisms.

The process of sublimation of camphor and phthalic acid (**Practical**)

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B.Sc. – 2nd Year (4th Semester)

April 2022:

Inorganic Chemistry:

f – block elements: Lanthanides & Actinides

Physical Chemistry:

Thermodynamics: Second law of thermodynamics, different statements of the law, Carnot's cycles and its efficiency, Concept of entropy – entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Third law of thermodynamics: Nernst heat theorem, residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.

Colorimetry: Beer - Lambert law (Practical)

May 2022:

- ❖ Theory of Qualitative and Quantitative Inorganic Analysis (**Inorganic**)
- ❖ Infrared absorption spectroscopy, Amine, Nitro compound, Diazonium Salts (**Organic**)
- ❖ To determine the CST of phenol – water system, To determine the solubility of benzoic acid at various temperatures and to determine the ΔH of the dissolution process (**Practical**)

June 2022:

- ❖ Aldehydes (**Organic Chemistry**)
- ❖ Ketones
- ❖ Electrochemistry (**Physical Chemistry**)
- ❖ To determine the enthalpy of neutralisation of a weak acid/weak base vs. strong base/strong acid and determine the enthalpy of ionisation of the weak acid/weak base. To determine the enthalpy of solution of solid calcium chloride (**Practical**)

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B.Sc. – 3rd Year (6th Semester)

April 2022:

Inorganic Chemistry:

Organometallic Chemistry Definition, nomenclature and classification of organometallic compounds. Preparation, properties, and bonding of alkyls of Li, Al, Hg, and Sn a brief account of metal-ethylenic complexes, mononuclear carbonyls and the nature of bonding in metal carbonyls.

Acids and Bases, HSAB Concept Arrhenius, Bronsted – Lowry, the Lux – Flood, Solvent system and Lewis concepts of acids & bases, relative strength of acids & bases, Concept of Hard and Soft Acids & Bases. Symbiosis, electronegativity and hardness and softness

Organic Chemistry:

Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck- Condon principle. Qualitative description of sigma and pie and n molecular orbital (MO) their energy level and respective transitions. Photochemistry: Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grotthus-Drapper law, Stark- Einstein law (law of photochemical equivalence) Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples).

Dilute Solutions and Colligative Properties: Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution, Colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination, Osmosis law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.

To determine the strength of the given acid solution conductometrically. **(Practical)**

May 2022:

Physical Chemistry:

Phase Equilibrium Statement and meaning of the terms – phase component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system –Example – water and Sulphur systems. Phase equilibria of two component systems solid-liquid equilibria, simple eutectic Example Pb-Ag system, desilverisation of lead

Inorganic Chemistry:

Bioinorganic Chemistry Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+} . Nitrogen fixation. Section—D Silicones and Phosphazenes Silicones and phosphazenes, their preparation, properties, structure and uses

To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically. To determine the strength of given acid solution (mono and dibasic acid) potentiometrically. **(Practical)**

June 2022:

(Organic Chemistry)

- ❖ Heterocyclic Compounds
- ❖ Organosulphur Compounds
- ❖ Organic Synthesis via Enolates, polymers
- ❖ Amino Acids, Peptides & Proteins
- ❖ To prepare o-chlorobenzoic acid, p-bromoaniline, m-nitroaniline **(Practical)**