

COURSE-2 ORGANIC CHEMISTRY-I

Block-1

Isomers, Types of isomerism, Geometrical isomerism due to C=C, C=N and N=N bond, E and Z conventions. Stereoisomerism, Projection formula, enantiomers, diastereomers, racemic mixture, methods of resolution of racemic mixtures, configurational notation of simple molecules, DL and RS notations. Chirality Center of chirality, axis of chirality, plane of chirality and helicity. Stereochemistry of allenes, spirans, biphenyls, cyclophanes and helicenes. Configurational nomenclature. Stereoselective reactions, diastereoselective reactions, stereospecific reactions, enantiomeric excess, Walden inversion. Conformation, conformational analysis of ethane and butane, conformations of cyclic systems up to six membered-conformational analysis of mono- and disubstituted cyclohexanes, Effect of conformation on the stability of decalins and perhydro phenanthrenes.

Block-2

Aromaticity in benzenoids, alternant and non-alternant hydrocarbon, Huckels rule, energy level of pi molecular orbital and concept of aromaticity, calculation of energies of orbitals in cyclic and acyclic systems. Determination energies and stabilities of different systems, calculation of charge densities, PMO theory and reactivity index. Non benzenoid aromatic compounds, aromaticity in non-benzenoids compounds, annulenes, hetroannulenes, fullerence-C60 , Tropone, tropolone. Dzulene, fulvene, tropylium salts, ferrocene. Three and five membered systems-Crown ether complexes, cyclodextrins, cryptands, catenanes and bonding in fullerenes.

Block-3

Reaction Intermediates: Formation, structure, stability of carbocations, carbanions, free radicals, nitrenes, arynes and nitrile oxide. Identification of reaction intermediates by trapping of intermediates, cross over experiments, isotopic labeling, stereochemical studies. Electrophilic aromatic substitution reactions. . Mechanism of nitration, halogenation, friedel-crafts alkylation, friedel-crafts acylation, diazo couplings, structure activity relations, reactivity of polycyclic and heteroaromatic compounds. Nucleophilic aromatic substitution, by addition-elimination, by elimination-addition mechanism. Mechanisms of Mannich reaction,

chloromethylation, Vilsmeier-Haack reaction. Addition reaction and mechanism; Addition to C-C multiple bonds involving electrophiles, nucleophiles and free radicals. Markownikoff's rule and anti-markownikoff's rule. Hydroboration and its applications.

Reference books

1. Bruice, P.Y. Organic Chemistry - *Pearson Education Pvt. Ltd., New Delhi, 2002.*
2. Pine, S. H. Organic Chemistry - *McGraw-Hill, London, 1987.*
3. Morrison, R.T. and Boyd, R.T. Organic Chemistry – *Prentice Hall, New Delhi, 1994.*
4. Solomons, T.W. G. Organic Chemistry - 4th Ed, John Wiley and Sons, 1988.
5. Carey, F.A. and Sundberg, S. J. Organic Chemistry –4th Ed, *McGraw Hill, 2000.*
6. March, J. Advanced Organic Chemistry, Reactions, Mechanism and Structure - 3rd Ed, *Wiley Eastern Ltd. 2004.*