

Semester: I
Department of Chemistry
Basirhat College

Lesson Plan for Course

Code: MA-1

Credit: 3

- Course coordinator: **Dr. Bidyut Debnath**
- Course Outcome
- CO1: To impart students a basic outline of the Atomic structures.
- CO2: The students will learn the Bonding of organic compounds
- CO3: They will also learn about Gas and its different types and their nature.
- CO4: Student will know about the acids and bases.
- CO5: Different type's reactions are discussed here.

Course planne

Sl	Course Topic	Teacher	Class-hrs	Remarks
				Class starts from 21.09.20 23
Sept + Oct	Atomic Structure Bohr's theory for hydrogen atom (simple mathematical treatment), atomic spectra of hydrogen and Bohr's model, Sommerfeld's model, quantum numbers and their significance, Pauli's exclusion principle, Hund's rule, electronic configuration of many-electron atoms, Aufbau principle and its limitations.	BD	15 hrs	
	Fundamentals of Organic Chemistry Concept of hybridisation, Structure and shape of organic molecules on the basis of VBT. Electronic displacements: inductive effect, resonance and hyperconjugation; nucleophiles electrophiles; reactive intermediates: carbocations, carbanion			
	Kinetic Theory of Gases and Real gases Concept of pressure and temperature; Collision of gas molecules; Collision diameter; Collision number and mean free path; Frequency of binary collisions (similar and different molecules); Rate of effusion ; Nature of distribution of velocities, Maxwell's distribution of speed and kinetic energy; Average velocity, root mean square velocity and most probable velocity; Principle of equipartition of energy and its application to calculate the classical limit of molar heat capacity of gases			
Nov	Chemical Periodicity Classification of elements on the basis of electronic configuration: general characteristics of s-, p-, d- and f-block elements. Positions of hydrogen and noble gases. Atomic and ionic radii, ionization potential, electron affinity, and electronegativity; periodic and group-wise variation of above properties in respect of s- and p- block elements.	BD	15 hrs	
	Aliphatic Hydrocarbons Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structures. Alkanes(up to 5 Carbons): Preparation: catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions: mechanism for free radical			

	substitution: halogenation. Alkenes(up to 5 Carbons): Preparation: elimination reactions: dehydration of alcohols and dehydrohalogenation of alkyl halides; cis alkenes (partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alkaline KMnO ₄) and trans-addition (bromine) with mechanism, addition of HX [Markownikoff's (with mechanism) and antiMarkownikoff's addition], hydration, ozonolysis, oxymercuration-demercuration and hydroboration-oxidation reaction			
	Deviation of gases from ideal behaviours; compressibility factor; Boyle temperature; Andrew's and Amagat's plots; van der Waals equation and its features; its derivation and application in explaining real gas behaviour; Existence of critical state, Critical constants in terms of van der Waals constants; Law of corresponding states Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only).			
Dec /Jan	Acids and bases Brönsted-Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents. Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept. Hard and soft acids and bases (HSAB concept), applications of HSAB process.	BD	15hrs	
	Alkynes(up to 5 Carbons): Preparation: acetylene from CaC ₂ and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal dihalides. Reactions: formation of metal acetylides, addition of bromine and alkaline KMnO ₄ , ozonolysis and oxidation with hot alkaline KMnO ₄ .			
	Liquids Definition of Surface tension, its dimension and principle of its determination using stalagmometer; Viscosity of a liquid and principle of determination of coefficient of viscosity using Ostwald viscometer; Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only)			
	Assessment: End-term Test		Total: 45Hrs	

Resources :

Books:

1. Poddar S. N. General and Inorganic Chemistry, Book Syndicate Pvt. Ltd. 2. Dutta R. L. & De G.S. Inorganic Chemistry (Vol I), The New Book Stall. 3. Lee, J. D. Concise Inorganic Chemistry, 5th Ed., Wiley India Pvt. Ltd., 2008. 4. Sen Gupta, S. Organic Chemistry, Oxford University Press. 5. Bahl, A. & Bahl, B.S. Advanced Organic Chemistry, S. Chand, 2010. 6. Sen Gupta, S. Basic Stereochemistry of Organic molecules, Oxford University Press. 7. Rakshit P. C. Physical Chemistry, Sarat Book House. 8. Palit S. R. Elementary Physical Chemistry, Science Book Agency. 9. Pahari, S., Physical Chemistry New

Central Book Agency. 10. Chugh, K.L., Agnish, S.L. A Text Book of Physical Chemistry, Kalyani Publishers.

Semester: I
Department of Chemistry
Basirhat College

Lesson Plan for

Lab Code: MA-1 (Laboratory)

Credit: 2

- Course coordinator: **Dr. Monojit Sarkar**
- Course Outcome
- CO1: students will get the knowledge about primary and secondary standard solution.
- CO2: Titration procedures are well plasticized.
- CO3: Determination of Viscosity and Surface tension re well practicized.

Course planner

Sl	Course Topic	Teacher	Class-hrs	Remarks
Jul Aug				Class starts from 21.09.2023
Sep Oct	1. Preparation of standard solution: (a) Primary standard: $K_2Cr_2O_7$ and Oxalic acid (b) Secondary standard: $KMnO_4$, $Na_2S_2O_3$ (c) Standardisation of secondary standard solution: $KMnO_4$, $Na_2S_2O_3$.	BD+SM	14 hrs	
Nov	2. (A) Determination of single solid and liquid compounds: (a) Oxalic acid, Resorcinol, Glucose, Salicylic acid, Benzoic acid. (b) Ethanol, Acetone, Aniline, Nitrobenzene, Benzaldehyde	MS+PD BD+SM	18 hrs 12 hrs	
	B) Preparation: (a) Green bromination of acetanilide (b) Dibenzalacetone.	MS+PD	8 hrs	
Dec	3. Determination of (a) Relative viscosity of a solution (b) Relative surface tension of a solution.	Ms+ PD	8 hrs	
	Assessment: End-term Test		Total: 60Hrs	

Resources :

Books:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6 th Ed., Pearson, 2009 2. Practical Workbook Chemistry (Honours), UGBS, Chemistry, University of Calcutta, 2015. 3. Nad A. K., Mahapatra B. and Ghosal A. An Advanced Course in Practical Chemistry, New Central Book Agency (P) Ltd. 4. Ghosh S., Das Sharma M., Majumder D and Manna S. Chemistry in Laboratory, Santra Publication Pvt Ltd 5. Vogel, A. I. Elementary Practical Organic Chemistry, Part 2: Qualitative Organic 6. Analysis, CBS Publishers and Distributors. 7. Viswanathan, B.,

Raghavan, P.S. Practical Physical Chemistry Viva Books (2009) 8. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson 9. Harris, D. C. Quantitative Chemical Analysis. 6th Ed., Freeman (2007) 10. Palit, S.R., De, S. K. Practical Physical Chemistry Science Book Agency 11. University Hand Book of Undergraduate Chemistry Experiments, edited by 12. Mukherjee, G. N., University of Calcutta 13. Levitt, B. P. edited Findlay's Practical Physical Chemistry Longman Group Ltd. 14. Gurtu, J. N., Kapoor, R., Advanced Experimental Chemistry S. Chand & Co. Ltd.