Semester: I
Department of Chemistry
Basirhat College

Lesson Plan for Course Code: DS-1 Credit: 3

- Course coordinator: **Dr. Suman Mandal**
- Course Outcome
- CO1: To impart students a broad outline of Bohr's model.
- CO2: The students will learn the nomenclatures of different organic acyclic compounds.
- CO3: They will also learn about HOMO/ LUMO and reactive intermediates like carbonations (carbenium and carbonium ions), carbanions, carbon radicals, carbenes to explain different types of reaction.
- CO4: Student will know different speed of gases and various laws on it.
- CO5: Some numerical of this course can boost up students concepts.

Course planne

| Sl | Course Topic | Teacher | Class-hrs | Remarks |
|---|---|---|---|---|
| | | | | Class starts from 21.09.2023 |
| Sept + Oct | Bohr's theory for hydrogen atom (simple mathematical treatment), its limitations and 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 manyelectron atoms, Aufbau principle and its limitations. | SM | 5hrs | |
| | Nomenclature for acyclic compounds only (trivial and IUPAC), DBE, hybridization(sp", n= 1,2,3) of C, N, O, halogens, bond distance, bond angles, VSEPR, shapes of molecules, inductive and field effects, bond energy, bond polarity and polarisability, dipole moment, resonance, resonance energy, steric inhibition of resonance, hyperconjugation | SK | 5hrs | |
| | Concept of pressure and temperature. Nature of the distribution of velocities in one dimension (with derivation), extension to two and three dimensions (without derivation, expression by induction). Maxwell's distribution of speeds in one, two and three dimensions. | MS | 5hrs | |
| Nov | Wave mechanics: de Broglie wave equation, Qualitative idea of Heisenberg's Uncertainty Principle. Radial and Angular distribution curves. Shapes of s, p and d orbitals. Exchange energy (qualitative idea). | SM | 5 hrs | |
| | $\pi$-M.O diagrams of ethylene, butadiene, 1,3,5- hexatriene, allyl cation, allyl anion, allyl radical, HOMO and LUMO in ground and excited states, orbital pictures of allene, carbene(singlet and triplet), vinyl cyanide, Huckel's rule for aromaticity and antiaromaticity (neutral systems 4,6,8,10 annulene, charged systems 3,4,5,7 rings. | SK | 5hrs | |
| | calculations of average, root mean square and most probable values in each case. Graphical comparison of velocity and energy distribution. | MS | 5 hrs | |
| Dec /Jan | 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. | SM | 5hrs | |

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|---|---|---|---|---|
| | Frost-diagram, melting point, boiling point, heat of hydrogenation, heat of combustion, hydrogen bonding (intra- and inter-molecular), crown-ether, concepts of acidity, basicity. Reaction intermediate, carbocation, carbanion, radicals, carbene & stability and generation. | SK | 5hrs | |
| | Collision of gas molecules; collision diameter; collision number and mean free path; frequency of binary collisions (similar and different molecules); wall collision and rate of effusion. Viscosity of gases from kinetic theory of gas. | MS | 5hrs | |
| | | | | |
| | Assessment: End-term Test | | Total: 45Hrs | |

Resources :

Books:

. Lee J. D. Concise Inorganic Chemistry, 5th Ed., Wiley India Pvt. Ltd., 2008. 2. Douglas, B. E. and McDaniel, D. H. Concepts & Models of Inorganic Chemistry Oxford, 1970. 3. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS publications, 1962. 4. Atkins, P. Shriver & Atkins' Inorganic Chemistry, 5th Ed., Oxford University Press (2010). 5. Cotton, F.A., Wilkinson, G. and Gaus, P. L., Basic Inorganic Chemistry 3rd Ed., Wiley India. 6. Sharpe, A. G., Inorganic Chemistry, 4th Indian Reprint (Pearson Education) 2005. 7. Huheey, J. E.; Keiter, E. A. & Keiter, R.L., Inorganic Chemistry, Principles of Structure and Radioactivity 4th Ed., Harper Collins 1993, Pearson, 2006. 8. Atkins, P.W. & Paula, J. Physical Chemistry, Oxford Press 2006. 9. Mingos, D.M.P., Essential trends in Inorganic Chemistry, Oxford University Press (1998). 10. Winter, M. J., The Orbitron, http://winter.group.shef.ac.uk/orbitron/ (2002). An illustrated gallery of atomic and molecular orbitals. 11. Burgess, J., Ions in solution: basic principles of chemical interactions, Ellis Horwood (1999). 12. . Finar, I. L. Organic Chemistry (Vol- 1), 6th Edition, Pearson Education, 2002 13. 2. Sykes, P. A guidebook to Mechanism in Organic Chemistry, Pearson Education, 2003. 14. 3. Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education). 15. 4. Nasipuri, D. Stereochemistry of Organic Compounds, Wiley Eastern Limited. 16. 5. Graham Solomons, T.W. Fryhle, C. B. Organic Chemistry, John Wiley & Sons, Inc. 17. 6. Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994. 18. 7. Clayden, J., Greeves, N. & Warren, S. Organic Chemistry, Second edition, Oxford University Press, 2012. 19. 8. Carey, F. A., Guiliano, R. M. Organic Chemistry, Eighth edition, McGraw Hill Education, 2012. 20. Castellan, G. W. Physical Chemistry, Narosa 21. 3. McQuarrie, D. A. & Simons, J. D. Physical Chemistry: A Molecular Approach, Viva Press 22. 4. Engel, T. & Reid, P. Physical Chemistry, Pearson 23. 5. Levine, I. N. Physical Chemistry, Tata McGraw-Hill 24. 6. Maron, S. &Prutton Physical Chemistry 25. 7. Ball, D. W. Physical Chemistry, Thomson Press 26. 8. Mortimer, R. G. Physical Chemistry, Elsevier 27. 9. Laidler, K. J. Chemical Kinetics, Pearson 28. 10. Glasstone, S. & Lewis, G.N. Elements of Physical Chemistry 29. 11. Rakshit, P.C., Physical Chemistry Sarat Book House 30. 12. Zemansky, M. W. & Dittman, R.H. Heat and Thermodynamics, Tata-McGrawHill 31. 13. Rastogi, R. P. &Misra, R.R. An Introduction to Chemical Thermodynamics, Vikas 32. 14. Klotz, I. M. & Rosenberg, R. M. Chemical Thermodynamics, Wiley

Semester: I
Department of Chemistry
Basirhat College

Lesson Plan for Lab Code: DS-1 (Laboratory) Credit: 2

- Course coordinator: **Dr. Swastik Karmakar**
- Course Outcome
- CO1: Ideas about primary and secondary standard solution can be achieved.
- CO2: Students will be able to identify different organic compounds.
- CO3: Determination of boiling point of common organic liquid compounds is to be discussed.
- CO4: Student will learn how different solid and liquid organic compounds are identified.

Course planner

| Sl | Course Topic | Teacher | Class-hrs | Remarks |
|---|---|---|---|---|
| Jul<br><br>Aug | | | | Class starts from 21.09.2023 |
| Sep<br><br>Oct | 1.Preparation of Standard solutions a) Primary Standard: K2Cr2O7, Oxalic Acid b) Secondary Standard: KMnO4, Na2S2O3, Mohr's Salt<br>2.Standardization of Secondary Standard Solution: (KMnO4, Na2S2O3, Mohr's Salt) | SK+BD<br><br>MS+SM | 10 hrs<br><br>10 hrs | |
| Nov | 3. Identification of Pure Organic Compounds Liquid compounds: methanol, ethanol, acetone, aniline, dimethylaniline, benzaldehyde, chloroform, and nitrobenzene Solid compounds: oxalic acid, tartaric acid, succinic acid, resorcinol, urea, glucose, benzoic acid and salicylic acid. (Only unknown liquid and solid compounds as specified are to be written in laboratory notebook) | SK+BD | 14hrs | |
| | .4 Determinations of boiling points of different Organic Compounds Organic liquids with less than 1350C boiling point may be taken for experiments. Boiling points of two unknown organic compounds should be noted with literature survey (Reference may be incorporated therein) | MS+SM | 14 hrs | |
| Dec | 5. Determination of molecular properties of liquids a. Study of viscosity of unknown liquid (glycerol, sugar) with respect to water. b. Determination of relative surface tension of a liquid using Stalagmometer. | SK+BD<br><br>MS+SM | 6 hrs<br><br>6 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.

Semester: I
Department of Chemistry
Basirhat College

Lesson Plan for Course:BASIC ANALYTICAL CHEMISTRY Code: SE-1 Credit: 3

- Course coordinator**: Dr. Suman Mandal**
- Course Outcome
- CO1: Particular this part is very important for the impact of chemistry in real life applications..
- CO2: Soil, water and food etc analysis are well plasticized,
- CO3: This part having very importance on employment related issuses.

Course planner

| Sl | Course Topic | Teacher | Class-hrs | Remarks |
|---|---|---|---|---|
| Jul<br><br>Aug | | | | Class starts from 21.09.2023 |
| Sep<br><br>Oct | **Introduction**: Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurements. Presentation of experimental data and results from the point of view of significant figures. | SK | 5hrs | |
| | **Analysis of soil:** Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators 1. Determination of pH of soil samples. 2. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration.<br><br>**Analysis of water**: Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods. 1. Determination of pH, acidity and alkalinity of a water sample. 2. Determination of dissolved oxygen (DO) of a water sample. | PD | 10hrs | |
| | **Analysis of food products** Nutritional value of foods, idea about food processing and food preservations and adulteration. 1. Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc. 2. | SK | 5 hrs | |

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| | Analysis of preservatives and colouring matter | | | |
| Nov | **Chromatography** Definition, general introduction on principles of chromatography, paper chromatography, TLC etc. 1. Paper chromatographic separation of mixture of metal ion (Fe3+ and Al3+). 2. To compare paint samples by TLC method.<br><br>**Ion-exchange** Column, ion-exchange chromatography etc. Determination of ion exchange capacity of anion / cation exchange resin (using batch procedure if use of column is not feasible). | PD | 5 hrs | |
| Dec | **Analysis of cosmetics Major and minor constituents and their function** 1. Analysis of deodorants and antiperspirants, Al, Zn, boric acid, chloride, sulphate. 2. Determination of constituents of talcum powder: Magnesium oxide, Calcium oxide, Zinc oxide and Calcium carbonate by complexometric titration | BD | 10 hrs | |
| | **Suggested Applications (Any one)** 1. To study the use of phenolphthalein in trap cases. 2. To analyse arson accelerants. 3. To carry out analysis of gasoline | PD | 5 hrs | |
| | **Suggested Instrumental demonstrations** 1. Estimation of macro nutrients: Potassium, Calcium, Magnesium in soil samples by flame photometry. 2. Spectrophotometric determination of Iron in Vitamin / Dietary Tablets. 3. Spectrophotometric Identification and Determination of Caffeine and Benzoic Acid in Soft Drinks. | SK | 5 hrs | |
| Feb | Assessment: End-term Test | | Total: 45Hrs | |

Resources :

Books:


1. Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. Instrumental Methods of Analysis, 7th Ed. Wadsworth Publishing Company Ltd., Belmont, California, USA, 1988. 2. Skoog, D.A., Holler, F.J. & Crouch, S. Principles of Instrumental Analysis, Cengage Learning India Edition, 2007. 3. Skoog, D.A.; West, D.M. & Holler, F.J. Analytical Chemistry: An Introduction 6th 4. Ed., Saunders College Publishing, Fort Worth, Philadelphia (1994). 5. Harris, D. C. Quantitative Chemical Analysis, 9th ed. Macmillan Education, 2016. 6. Dean, J. A. Analytical Chemistry Handbook, McGraw Hill, 2004. 7. Day, R. A. & Underwood, A. L. Quantitative Analysis, Prentice Hall of India, 1992. 8. Freifelder, D.M. Physical Biochemistry 2nd Ed., W.H. Freeman & Co., N.Y. USA (1982). 9. Cooper, T.G. The Tools of Biochemistry, John Wiley & Sons, N.Y. USA. 16 (1977). 10. Vogel, A. I. Vogel‟s Qualitative Inorganic Analysis 7th Ed., Prentice Hall, 1996. 11. Mendham, J., A. I. Vogel‟s Quantitative Chemical Analysis 6th Ed., Pearson, 2009. 12. Robinson, J.W. Undergraduate Instrumental Analysis 5th Ed., Marcel Dekker, Inc., New York (1995). 13. Christian, G.D. Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.