ARSD College, University of Delhi

Model Course Handout/Lesson Plan

Course Name : B.Sc. (Hons) Chemistry						
Semester	**Course Code**	**Course Title**	**Lecture (L)**	**Tutorial (T)**	**Practical (P)**	**Credit (C)**
IV	CC – C4: CORE COURSE CHEMISTRY- 4	Chemistry of s- and p-Block Elements, States of Matter and Chemical Kinetics	0	0	4	2
Teacher/Instructor(s)		Dr. Meenakshi Gupta, Dr. Anil Kumar				
Session		Jan-June 2022				

Course Description:

Objectives: The objective of this paper is to provide basic understanding of the fundamental principles of metallurgy through study of the methods of extraction of metals, recovery of the by-products during extraction, applications of metals, alloy behaviour and their manufacturing processes. The course illustrates the diversity and fascination of inorganic chemistry through the study of properties and utilities of s- and pblock elements and their compounds. The students will learn about the properties of ideal and real gases and deviation from ideal behaviour, properties of liquid, types of solids with details about crystal structure. The student will also learn about the reaction rate, order, activation energy and theories of reaction rates.

Learning Outcomes: By the end of the course, the students will be able to:
• Understand the chemistry and applications of s- and p-block elements.
• Derive ideal gas law from kinetic theory of gases and explain why the real gases deviate from ideal behaviour.
• Explain Maxwell-Boltzmann distribution, critical constants and viscosity of gases.
• Explain the properties of liquids especially surface tension and viscosity.
• Explain symmetry elements, crystal structure specially NaCl, KCl and CsCl
• Define rate of reactions and the factors that affect the rates of reaction.
• Understand the concept of rate laws e.g., order, molecularity, half-life and their determination
• Learn about various theories of reaction rates and how these account for experimental observation.

List of Experiments:

Section A: Inorganic Chemistry
Semi-micro qualitative analysis of mixtures using H_2S or any other scheme- not more than four ionic species (two anions and two cations and excluding insoluble salts) out of the following:
Cations: NH_4^+ , Pb^{2+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, K^+
Anions: CO_3^{2-}, S^{2-} , SO^{3-} , NO^{2-} , CH_3COO^- , Cl^- , Br^- , I^- , NO_3^- ,SO_4^{2-} , PO_4^{3-} , BO_3^{3-} ,

$C_2O_4^{2-}$, F^- . (Spot tests should be carried out wherever feasible)

Section B: Physical Chemistry

1**. Surface tension measurement** (use of organic solvents excluded): Determination of the surface tension of a liquid or a dilute solution using a stalagmometer.

2. **Viscosity measurement** (use of organic solvents excluded):

a) Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald viscometer.

b) Study of the variation of viscosity of an aqueous solution with concentration of solute.

3. **Chemical Kinetics** Study the kinetics of the following reactions by integrated rate method:

a) Acid hydrolysis of methyl acetate with hydrochloric acid.

b) Compare the strength of HCl and H_2SO_4 by studying the kinetics of hydrolysis methyl acetate.

Details of the Lab Course		
Session	**Name of Experiment**	**Contact Hours**
1	Issue of Apparatus	4
2	**Surface Tension**: Determination of the surface tension of a liquid or a dilute solution using a stalagmometer.	4
3	**Viscosity:** Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald viscometer.	4
4	**Viscosity:** Study of the variation of viscosity of an aqueous solution with concentration of solute.	4
5	**Chemical Kinetics:**Study the kinetics of the following reactions by integrated rate method: a) Acid hydrolysis of methyl acetate with hydrochloric acid.	4
6	**Chemical Kinetics:** Comparison of the strengths of HCl and H_2SO_4 by studying the kinetics of hydrolysis of methyl acetate.	4
7	Analysis of anions: CO_3^{2-}, S^{2-} , SO^{3-} , NO^{2-} , CH_3COO^- , Cl^- , Br^- , I^- ,	4
8	Analysis of anions: NO_3^- , SO_4^{2-} , PO_4^{3-} , BO_3^{3-} , $C_2O_4^{2-}$, F^- .	4
9	Analysis of Zero group, I^{st} Group cation, II^{nd} group cation,	4
10	Analysis of III^{rd} group, IV^{th} Group cation	4
11	Analysis of V^{th} group, VI^{th} Group and VII^{th} cation	4
12.	Semi-micro qualitative analysis of mixtures using H_2S or any other scheme-not more than four ionic species (two anions and two cations)	4
13	Semi-micro qualitative analysis of mixtures using H_2S or any other scheme-not more than four ionic species (two anions and two cations)	4
14.	Semi-micro qualitative analysis of mixtures using H_2S or any other scheme-not more than four ionic species (two anions and two cations)	4
15	Mock test	4

	Total	**60**

Suggested Books:

Sl. No.	Name of Authors/Books/Publishers	Year of Publication/Reprint
1.	Svehla, G. (1996), Vogel's Qualitative Inorganic Analysis, Prentice Hall.	1996
2.	Khosla, B.D.; Garg, V.C.;Gulati, A.(2015),Senior Practical Physical Chemistry, R. Chand & Co.	2015

Evaluation Scheme:

No.	Component	Duration	Marks
1.	Internal Assessment • Quiz/Viva • Observation & Record • Attendance • Model Exam		20
2.	End Semester Examination	5 hrs	30

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