

Lesson Plan

Name of Assistant Professor: Abhishek Sharma

Class: B.Sc III N.M Physical Chemistry

Chemistry Lesson Plan: 16 Week (From February 2023 to May 2023)

Week 1: 31/01/2023 to 04/02/2023

Chapter 1: Introduction to statistical Mechanics

- 1.1 Need for Statistical Thermodynamics
- 1.2 Thermodynamics Probability
- 1.3 Maxwell Boltzmann Distribution Statistics
- 1.4 Born Oppenheimer Approximation

Week 2: 06/02/2023 to 11/02/2023

- 1.5 Partition Function
- 1.6 Significance of Partition Function
- 1.7 Factorization of Partition Function
- 1.8 Translational Partition Function

Week 3: 13/02/2023 to 18/02/2023

- 1.9 Vibrational Partition Function
- 1.10 Rotational Partition Function

Chapter 2: Photochemistry

- 2.1 Interaction of radiation with matter
- 2.2 Difference between Thermal and Photochemical Processes

Week 4: 20/02/2023 to 25/02/2023

- 2.3 Laws Governing Absorption of Light
- 2.4 Some other terms commonly used in Spectroscopy
- 2.5 Laws Governing Photochemical Reactions
- 2.6 Quantum Yield/Quantum Efficiency

Week 5: 27/02/2023 to 04/03/2023

- 2.7 Fluorescence and Phosphorescence in terms of Excitation of Electrons (Jabolonski Diagram)
- 2.8 Main Points of Difference Between Phosphorescence and Fluorescence

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- 2.9 Photosensitization

Week 6: 06/03/2023 to 11/03/2023

- 2.10 Quenching of Fluorescence: Stern Volmer Equation
- 2.11 Photoinhibitors
- 2.12 Photostationary State

Week 7: 13/03/2023 to 18/03/2023

- Test of Chapter 2 (Photochemistry)
- Assignment I

Chapter 3: Solutions

- 3.1 Mode of Expressing the Concentration of a Solution
- 3.2 Chemical Potential
- 3.3 Fugacity, Activity and Activity coefficient

Week 8: 20/03/2023 to 25/03/2023

- 3.4 Rault's Law
- 3.5 Ideal and Non Ideal Solutions
- 3.6 Thermodynamics Properties of Ideal Solution

Week 9: 27/03/2023 to 01/04/2023

- 3.7 Vapour Pressure of Ideal Solution
- 3.8 Deviation from Ideal Behaviour
- 3.9 Azeotropes

Week 10: 03/03/2023 to 08/04/2023

- 3.10 Colligative Properties
- 3.11 Lowering of Vapour Pressure
- 3.12 Thermodynamics Derivation of Relative Lowering of Vapour Pressure
- 3.13 Elevation in the Boiling Point

Week 12: 17/04/2023 to 22/04/2023

- 3.18 Thermodynamics Derivation of osmotic Pressure
- 3.19 Abnormal Molecular Mass
- 3.20 Van't Hoff Factor
- 3.21 Application in calculating molar masses of normal, dissociated and associated solutes in solution

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Week 13: 24/04/2023 to 29/04/2023

- Test of Chapter 3 (Solution)
- Assignment II

Chapter 4: Phase Equilibrium

- 4.1 Explanation of Terms involved in Phase Rule
- 4.2 Criteria for Phase Equilibrium for Multi-Component System
- 4.3 Derivation of Gibb's Phase Rule

Week 14: 01/05/2023 to 06/05/2023

- 4.4 Phase Diagrams
- 4.5 Application of Phase rule to one component system
- 4.6 Water System
- 4.7 Carbon Dioxide System

Week 15: 08/05/2023 to 13/05/2023

- 4.8 Phase rule Diagrams for Two Components Systems
- 4.9 Types of two Components involving Solid-Liquid Equilibria
- 4.10 General Discussion of the Phase Diagrams for Two Component system

Week 16: 15/05/2023 to 19/05/2023

- 4.11 Experimental Determination of the Phase Diagrams of Two Component System
- 4.12 Study of Two Component System (Pb-Ag System)
- 4.13 Pattinson's Process for Desilverisation of Lead

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Lesson Plan

Name of Assistant Professor: Abhishek Sharma

Class: B.Sc. III N.M Organic Chemistry

Chemistry Lesson Plan: 16 Week (Feb 2023 to May 2023)

Week 1: 31/01/2023 to 04/02/2023 Organic synthesis via enolates <ul style="list-style-type: none">○ Acidity of hydrogen, alkylation of diethylmalonate & Ethyl acetoacetate
Week 2: 06/02/2023 to 11/02/2023 <ul style="list-style-type: none">○ Synthesis of Ethylacetoacetate, Claisen condensation Keto-enol tautomerism of ethyl acetoacetate
Week 3: 13/02/2023 to 18/02/2023 Heterocyclic compounds <ul style="list-style-type: none">○ M.O.P & Chemical Reaction with mechanism of electrophilic substitution
Week 4: 20/02/2023 to 25/02/2023 <ul style="list-style-type: none">○ Mech. Of Nucleophilic Substitution Reaction in Pyridine derivatives○ Comparison of basicity of pyridine piperidine & pyrrole
Week 5: 27/02/2023 to 04/03/2023 <ul style="list-style-type: none">○ Introduction of condensed 5-6 membered heterocycles○ Preparation & reaction of indole
Week 6: 06/03/2023 to 11/03/2023 <ul style="list-style-type: none">○ Reactions of quinolone & isoquinoline
Week 7: 13/03/2023 to 18/03/2023 <ul style="list-style-type: none">○ Fischer Indole synthesis & Skraup synthesis○ Bischler napieralski synthesis, Mech. of Electrophilic substitution of indole
Week 8: 20/03/2023 to 25/03/2023 <ul style="list-style-type: none">○ Assignment I○ Mech. Of electrophilic substitution Reaction. of Quinoline & Isoquinoline

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<p>Week 9: 27/03/2023 to 01/04/2023</p> <p>Amino acid Peptide and Protein</p> <ul style="list-style-type: none"> ○ Classification, structure & stereochemistry of amino acids, Acid-base behavior ○ Isoelectric point & electrophoresis, Preparation & reaction of Amino acids
<p>Week 10: 03/03/2023 to 08/04/2023</p> <ul style="list-style-type: none"> ○ Structure & Nomenclature of peptides & proteins, ○ Peptide structure determination, End group analysis, selective Hydrolysis of peptides
<p>Week 11: 10/04/2023 to 15/04/2023</p> <ul style="list-style-type: none"> ○ Classical peptide synthesis, Solid phase peptide synthesis ○ Structure of peptides & proteins, levels of proteins structure
<p>Week 12: 17/04/2023 to 22/04/2023</p> <ul style="list-style-type: none"> ○ Test of Amino Acid, Peptides and proteins ○ Assignment II <p>Synthetic Polymer</p> <ul style="list-style-type: none"> ○ Addition or Chain growth polymer ○ Free radical vinyl polymerization
<p>Week 13: 24/04/2023 to 29/04/2023</p> <ul style="list-style-type: none"> ○ Ionic vinyl polymerization ○ Ziegler-Natta Polymerization
<p>Week 14: 01/05/2023 to 06/05/2023</p> <ul style="list-style-type: none"> ○ Vinyl Polymers ○ Condensation and step growth polymerization
<p>Week 15: 08/05/2023 to 13/05/2023</p> <ul style="list-style-type: none"> ○ Polyesters, Polyamides, Phenol-formaldehyde resins ○ Natural and synthetic polymers
<p>Week 16: 15/05/2023 to 19/05/2023</p> <ul style="list-style-type: none"> ○ Revision

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Lesson Plan

Name of Assistant Professor: Abhishek Sharma

Class: B.Sc II N.M Physical Chemistry

Chemistry Lesson Plan: 16 Week (From February 2023 to May 2023)

Week 1: 31/01/2023 to 04/02/2023

Chapter 1: Thermodynamics II

- 1.1 Introduction –Need for second Law of thermodynamics and Statement
- 1.2 Carnot Cycle And its efficiency
- 1.3 Carnot Theorem

Week 2: 06/02/2023 to 11/02/2023

- 1.4 Thermodynamics scale of temperature
- 1.5 Entropy
- 1.6 Entropy Change in Reversible Processes
- 1.7 Entropy Change in irreversible Processes

Week 3: 13/02/2023 to 18/02/2023

- 1.8 Clausius inequality
- 1.9 Entropy change of universe
- 1.10 Entropy change for ideal gas with change in P,V & T and Entropy Change during Physical changes

Week 4: 20/02/2023 to 25/02/2023

- 1.11 Entropy Change on mixing of ideal gas
- 1.12 Physical Significance of Entropy
- 1.13 Measure of Disorder
- Assignment I

Week 5: 27/02/2023 to 04/03/2023

Chapter 2: Electrochemistry

- 2.1 What is Electrochemical cell or Galvanic cell
- 2.2 What is Electrolytic Cell
- 2.3 Representation of Electrochemical Cell
- 2.4 Electrode Potential

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Week 6: 06/03/2023 to 11/03/2023

- 2.5 EMF of the Cell And its Measurement
- 2.6 Standard cell
- 2.7 Reversible and Irreversible Cell
- 2.8 Reversible electrodes

Week 7: 13/03/2023 to 18/03/2023

- 2.9 Relationship between Chemical and Electrical Energy
- 2.10 Calculation of Thermodynamics Quantity of the Cell reaction

Week 8: 20/03/2023 to 25/03/2023

- 2.11 Standard Hydrogen Electrode and Measurement of Electrode Potential
- 2.12 Other Reference Electrode and Measurement of Electrode Potential

Week 9: 27/03/2023 to 01/04/2023

- 2.13 Electrochemical Series
- 2.14 Application of Electrochemical Series
- 2.15 Activity and Activity coefficient of the electrolyte
- 2.16 Standard State

Week 10: 03/03/2023 to 08/04/2023

- 2.17 Nernst Equation for EMF of Cell
- 2.18 Nernst Equation for Electrode Potential
- 2.19 Calculation of Equilibrium Constant of Cell reaction
- 2.20 Polarization

Week 11: 10/04/2023 to 15/04/2023

- 2.21 Decomposition Voltage/Potential Deposition
- 2.22 Discharge of Potential
- 2.23 Overvoltage or Over Potential

Week 12: 17/04/2023 to 22/04/2023

- 2.24 Hydrogen Overvoltage
- 2.25 Anodic Overvoltage and Oxygen Overvoltage
- 2.26 Application of Overvoltage

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Week 13: 24/04/2023 to 29/04/2023

- 2.27 Concentration Cell
- 2.28 Types of Concentration Cell

Week 14: 01/05/2023 to 06/05/2023

- 2.29 EMF of Concentration Cell
- 2.30 Review of Various Types of Electrochemical Cells

Week 15: 08/05/2023 to 13/05/2023

- 2.32 Determination of Activities and Activity Coefficient from EMF Measurements
- 2.33 Application of EMF Measurement

Week 16: 15/05/2023 to 19/05/2023

- Revision

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Lesson Plan

Name of Assistant Professor: Abhishek Sharma

Class: B.Sc I N.M Inorganic Chemistry

Chemistry Lesson Plan: 16 Week (From February 2023 to May 2023)

Week 1: 31/01/2023 to 04/02/2023

Chapter 1 Hydrogen – Bonding & Vander Waal's Forces

- Hydrogen Bonding – Definition
- Types of Hydrogen Bonding
- Effect of Hydrogen Bonding on Properties of Substance
- Applications of Hydrogen Bonding

Week 2: 06/02/2023 to 11/02/2023

- Brief discussion of various types of Vander Waal's forces
- Introduction of metallic bond
- Qualitative Idea of Valence Bond theory
- Band theory of metallic bond

Week 3: 13/02/2023 to 18/02/2023

- Semiconductors-Introduction
 - Types & Applications
- Chapter 2: S-Block Elements
- Comparative study of the element including diagonal Relationship

Week 4: 20/02/2023 to 25/02/2023

- Anomalous Behaviour of Li & Bi compared to other Elements in Same Group
- Salient feature of hydrides, Oxides
- Salient Feature of Halide And Hydroxide
- Behaviour of Solution in liquid NH_3

Week 5: 27/02/2023 to 04/03/2023

- Solvation
 - Complexation tendencies including their function in Bio system
- Chapter 4: Chemistry of Noble Gases
- Chemical properties of the noble gases
 - Emphasis on their low chemical properties

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<p>Week 6: 06/03/2023 to 11/03/2023</p> <ul style="list-style-type: none"> ○ Chemistry of xenon ○ Structure & bonding of fluoride, oxides & oxyfluorides of xenon <p>Chapter 5: p-Block Elements</p> <ul style="list-style-type: none"> ○ Electronic Configuration ○ Atomic size & Ionic size ○ Metallic Character ○ Melting Point
<p>Week 7: 13/03/2023 to 18/03/2023</p> <ul style="list-style-type: none"> ○ Ionization Energy ○ Electron Affinity ○ Electronegativity ○ Inert Pair Effect ○ Diagonal Relationship
<p>Week 8: 20/03/2023 to 25/03/2023</p> <ul style="list-style-type: none"> ○ Test of Chapter 1 And 2 ○ Assignment I ○ Diborane ○ Properties & Structure of Diborane
<p>Week 9: 27/03/2023 to 01/04/2023</p> <ul style="list-style-type: none"> ○ Borazine & its structure ○ Chemical properties of Borazine ○ Trihalides of Boron ○ Relative Strength of Trihalides of Boron as Lewis Acid
<p>Week 10: 03/03/2023 to 08/04/2023</p> <ul style="list-style-type: none"> ○ Structure of Aluminium (III) Chloride ○ Catenation ○ Carbides
<p>Week 11: 10/04/2023 to 15/04/2023</p> <ul style="list-style-type: none"> ○ Silicates ○ Types and Structure of Silicates ○ Silicones –General methods of preparations ○ Properties & its uses
<p>Week 12: 17/04/2023 to 22/04/2023</p> <ul style="list-style-type: none"> ○ Oxides-structure of oxides of N & P ○ Oxoacids –Structure & relative acid Strength of Oxoacids of N & P

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Week 13: 24/04/2023 to 29/04/2023

- Structure of white ,yellow & Red phosphorous
- Oxoacids of Sulphur
- Structure & Acid strength

Week 14: 01/05/2023 to 06/05/2023

- H_2O_2
- Properties and Uses
- Basic Properties of Halogens

Week 15: 08/05/2023 to 13/05/2023

- Interhalogen Compound
- Their Types and Structure
- Hydra and Oxy Acids of Chlorine
- Structure and Acidic Strength

Week 16: 15/05/2023 to 19/05/2023

- Cationic Nature of Iodine
- Revision

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Lesson Plan

Name of Assistant Professor: Abhishek Sharma

Class: B.Sc I N.M Physical Chemistry

Chemistry Lesson Plan: 16 Week (From February 2023 to May 2023)

Week 1: 31/01/2023 to 04/02/2023

Chapter 1 KINETICS 1

- Rate of reaction, rate equation
- Factor effecting the rate of reaction, order of reaction

Week 2: 06/02/2023 to 11/02/2023

- Integrated rate equation of zero and first order reaction
- Integrated rate equation of second and third order reaction

Week 3: 13/02/2023 to 18/02/2023

- Method of determination of order of reaction

Week 4: 20/02/2023 to 25/02/2023

- Arrhenius equation and effect of temperature
- Simple collision theory of reaction rate

Week 5: 27/02/2023 to 04/03/2023

- Bimolecular collision theory of reaction rate
- Transition state theory of bimolecular reaction

Week 6: 06/03/2023 to 11/03/2023

- Test of Chemical Kinetics
- Assignment I

Chapter 3 Electrochemistry

- Electrolytic conduction and factor effecting

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<p>Week 7: 13/03/2023 to 18/03/2023</p> <ul style="list-style-type: none"> ○ Specific conductance, equivalent conductance, molar conductance
<p>Week 8: 20/03/2023 to 25/03/2023</p> <ul style="list-style-type: none"> ○ Relation between different conductance ○ Effect of concentration on various conductance
<p>Week 9: 27/03/2023 to 01/04/2023</p> <ul style="list-style-type: none"> ○ Arrhenius theory of ionization, Ostwald dilution law
<p>Week 10: 03/03/2023 to 08/04/2023</p> <ul style="list-style-type: none"> ○ Debye-Huckel-Onsager equation, transport number
<p>Week 11: 10/04/2023 to 15/04/2023</p> <ul style="list-style-type: none"> ○ Definition and determination of transport number by Hittorf method
<p>Week 12: 17/04/2023 to 22/04/2023</p> <ul style="list-style-type: none"> ○ Kohlrausch law and its numerical
<p>Week 13: 24/04/2023 to 29/04/2023</p> <ul style="list-style-type: none"> ○ Calculation of molar ionic conductance and effect of viscosity, temperature and pressure on it ○ Application of conductivity measurement
<p>Week 14: 01/05/2023 to 06/05/2023</p> <ul style="list-style-type: none"> ○ Determination of degree of dissociation ○ Determination of pH, K_a and pK_a
<p>Week 15: 08/05/2023 to 13/05/2023</p> <ul style="list-style-type: none"> ○ Determination of solubility product and numerical based on it ○ Conductometric titration ○ Henderson-Hasselbalch equation
<p>Week 16: 15/05/2023 to 19/05/2023</p> <ul style="list-style-type: none"> ○ Buffer solution and buffer action ○ Mechanism of buffer action ○ Revision

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