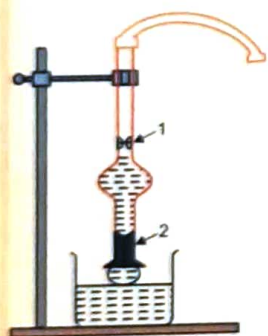


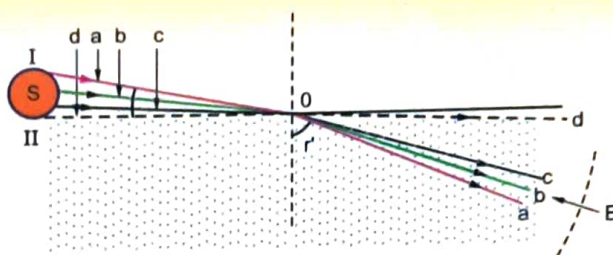
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PHYSICAL CHEMISTRY

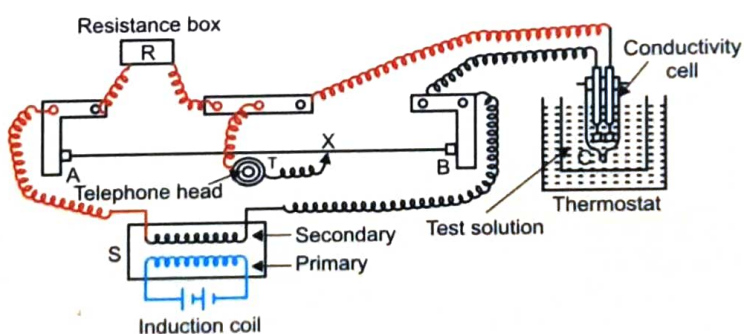
CHEMISTRY (DSC-3B) : PAPER-III



Determination of
surface tension by
Stalagmometer



Critical angle principle



Determination of conductivity by using Wheatstone bridge

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PREFACE

We have great pleasure in presenting this book to B.Sc. Part I Semester II Physical Chemistry students of Shivaji University Kolhapur. This book has been written according to the new prescribed syllabus of CBCS pattern (as per NEP 2022) of Shivaji University, Kolhapur.

The simple language and the lecture style used by the authors make the reader to understand the subject very easily. All the topics have been dealt at sufficient length and every attempt is made to prepare a text complete in itself. Theory topics are supplemented with sufficient number of figures and illustrations. Wherever possible solved and unsolved problems are given at the end of each chapter. The exercise at the end of each chapter includes multiple choice questions, long answer questions and short answer questions to test the understanding of the student.

Authors has no claim to the original research in preparing the book. Liberal use of the material available in the works of eminent authors has been made. The authors are thankful to these eminent authors for their valuable work.

We are thankful to Nirali Prakashan, Pune for making us a part of their team of Authors. We thank Mr. Dineshbhai Furia and Mr. Jignesh Furia for publishing this book.

We are grateful to Mr. Virdhaval Shinde (Marketing Executive, Kolhapur District) for his nice co-operation. We are very much thankful to Mr. Kiran Kamble (Proof Reading), Mrs. Anjali Muley (Graphic Design) and Mr. Malik Shaikh for a neat and error free D.T.P. of this book.

Errors might have crept in despite utmost care to avoid them and author shall be grateful if these are pointed out along with valuable suggestions for the improvement of the quality of the book.

We hope that this book will be useful for students and teachers.

Authors

SYLLABUS

Unit 1 : Basic Mathematical Concepts

(03 Hrs.)

- 1.1 Logarithm: Basic rules and calculations.
- 1.2 Graph - Quadrants, Drawing of linear graph, Slopes and Intercept.
- 1.3 Derivative and Integration: Basic rules.

Unit 2 : Thermodynamics

(05 Hrs.)

- 2.1 Introduction, Basic terms used in thermodynamics, Zeroth law of thermodynamics.
- 2.2 First law of thermodynamics: Mathematical equation, Sign conventions, Statements of first law and its limitations.
- 2.3 Spontaneous and Non-spontaneous processes, Second law of thermodynamics.
- 2.4 Heat engine, Carnot's cycle and efficiency of heat engine.
- 2.5 Numerical Problems.

Unit 3 : Chemical Kinetics

(08 Hrs.)

- 3.1 Introduction, Rate of reaction, Definition, and Units of rate constant.
- 3.2 Factors affecting rate of reaction.
- 3.3 Order and Molecularity of reaction.
- 3.4 First order reaction: Derivation of rate constant. Characteristics of the first order reaction.
- 3.5 Pseudo-Unimolecular reactions – (i) Hydrolysis of methyl acetate in the presence of acid, (ii) Inversion of cane sugar.
- 3.6 Second order reactions: Derivation of rate constant for equal and unequal concentration of reactants.
- 3.7 Examples of second order reaction: (i) Reaction between $K_2S_2O_8$ and KI and (ii) Saponification of ethyl acetate.
- 3.8 Characteristics of second order reactions.
- 3.9 Numerical Problems.

Unit 4 : Physical Properties of Liquids

(06 Hrs.)

- 4.1 Introduction to states of matter, Qualitative description of intermolecular forces in liquids, Structure of liquids, Classification of physical properties.
- 4.2 Surface tension and its determination using Stalagmometer and Differential rise method.
- 4.3 Viscosity and its determination using Ostwald's viscometer.
- 4.4 Refractive index (Snell's law), Specific and molecular refractivities and its determination using Abbe's refractometer.
- 4.5 Numerical Problems.

Unit 5 : Electrochemistry

(08 Hrs.)

- 5.1 Introduction, Types of cell, Phenomenon of electrolysis, Faraday's laws of electrolysis.
- 5.2 Types of conductors.
- 5.3 Explanations of conductance, specific conductance, equivalent and molecular conductance.
- 5.4 Variation of specific conductance, equivalent and molecular conductance with dilution, Equivalent conductance at infinite dilution.
- 5.5 Dipping type of conductivity cell, Modifications in the technique used before measurement of conductance w.r.to use of alternating current, use of conductivity water, conductivity cell and temperature control.
- 5.6 Measurement of conductance by using Wheatstone's bridge.
- 5.7 Cell constant and its determination.
- 5.8 Numerical problems.

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CONTENTS

1. Basic Mathematical Concepts	1.1 - 1.14
1.1 Logarithm: Basic rules and Calculations	1.1
1.2 Graphs : Quadrants, Drawing of Linear Graph, Slope and Calculation	1.4
1.3 Derivative and Integration : Basic Rules	1.10
• Exercise	1.13
 2. Thermodynamics	 2.1 - 2.14
2.1 Introduction	2.1
2.1.1 Basic Terms Used in Thermodynamics	2.1
2.1.2 Zeroth Law of Thermodynamics	2.4
2.2 First Law of Thermodynamics	2.4
2.2.1 Mathematical Formulation of First Law of Thermodynamics	2.5
2.2.2 Limitations of First Law of Thermodynamics	2.5
2.3 Spontaneous and Non-spontaneous Processes	2.5
2.3.1 Spontaneous Process	2.5
2.3.2 Non-Spontaneous Process	2.6
2.3.3 Statements of Second Law of Thermodynamics	2.6
2.4 Heat Engine, Carnot's Cycle and Efficiency of Heat Engine	2.7
2.4.1 Heat Engine	2.7
2.4.2 Carnot's Cycle	2.8
2.4.3 Efficiency of an Heat Engine	2.10
2.5 Numerical Problems	2.11
• Exercise	2.12

3. Chemical Kinetics

3.1 - 3.22

3.1	Introduction	
3.1.1	Rate of Reaction	3.1
3.1.2	Definition and Units of Rate Constant	3.2
3.2	Factors Affecting Rate of Reaction	3.2
3.3	Order and Molecularity of Reaction	3.3
3.4	First Order Reaction	3.3
3.4.1	Derivation of Rate Constant	3.5
3.4.2	Characteristics of the First Order Reaction	3.5
3.5	Pseudo-Unimolecular Reactions	3.6
3.6	Second Order Reactions	3.8
3.6.1	Derivation of Rate Constant for Equal and Unequal Concentration of Reactants	3.9
3.7	Examples of Second Order Reaction	3.10
3.8	Characteristics of Second Order Reaction	3.12
3.9	Numerical Problems	3.13
•	Exercise	3.16
		3.19

4. Physical Properties of Liquids

4.1 - 4.19

4.1	Introduction to States of Matter	4.1
4.1.1	Qualitative Description of Intermolecular Forces in Liquids	4.2
4.1.2	Structure of Liquids	4.4
4.1.3	Classification of Physical Properties	4.4
4.2	Surface Tension	4.5
4.2.1	Determination of Surface Tension by using Stalagmometer Method	4.6
4.2.2	Determination of Surface Tension by Differential Rise Method	4.7
4.3	Viscosity and its Determination using Ostwald's Viscometer	4.8

4.4	Refractive Index (Snell's Law)	4.10
4.4.1	Specific and Molecular Refraction	4.11
4.4.2	Measurement of Refractive Index by Abbe's Refractometer	4.11
4.5	Numerical Problems	4.14
•	Exercise	4.16

5. Electrochemistry

5.1 - 5.19

5.1	Introduction	5.1
5.1.1	Types of Cells	5.2
5.1.2	Phenomenon of Electrolysis	5.2
5.2	Types of Conductors	5.4
5.3	Explanation of Terms	5.6
5.4	Variation of Specific, Equivalent and Molecular Conductance with Dilution	5.8
5.4.1	Equivalent Conductance at Infinite Dilution	5.9
5.5	Dipping type of Conductivity Cell, Modifications in the Technique used before Measurement of Conductance w.r.t. use of Alternating Current, use of Conductivity Water, Conductivity Cell and Temperature Control	5.10
5.5.1	Use of Alternating Current	5.10
5.5.2	Use of Temperature Control	5.10
5.5.3	Use of Conductivity Water	5.10
5.5.4	Use of Dip Type Conductivity Cell	5.11
5.6	Measurement of Conductance by using Wheatstone Bridge	5.11
5.7	Cell Constant and its Determination	5.12
5.8	Numerical Problems	5.13
•	Exercise	5.15

• Model Question Papers

P.1 - P.5

• Nature of Question Paper Pattern

Q.1 - Q.1

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