

## CONTENTS

	<b>Foreword</b>	<b>iii</b>
<b>Unit 1</b>	<b>Some Basic Concepts of Chemistry</b>	<b>1</b>
	1.1 Importance of Chemistry	1
	1.2 Nature of Matter	2
	1.3 Properties of Matter and their Measurement	4
	1.4 Uncertainty in Measurement	8
	1.5 Laws of Chemical Combinations	11
	1.6 Dalton's Atomic Theory	13
	1.7 Atomic and Molecular Masses	13
	1.8 Mole concept and Molar Masses	15
	1.9 Percentage Composition	15
	1.10 Stoichiometry and Stoichiometric Calculations	17
<b>Unit 2</b>	<b>Structure of Atom</b>	<b>26</b>
	2.1 Sub-atomic Particles	27
	2.2 Atomic Models	29
	2.3 Developments Leading to the Bohr's Model of Atom	34
	2.4 Bohr's Model for Hydrogen Atom	42
	2.5 Towards Quantum Mechanical Model of the Atom	46
	2.6 Quantum Mechanical Model of Atom	49
<b>Unit 3</b>	<b>Classification of Elements and Periodicity in Properties</b>	<b>70</b>
	3.1 Why do we need to Classify Elements ?	70
	3.2 Genesis of Periodic Classification	71
	3.3 Modern Periodic Law and the present form of the Periodic Table	75
	3.4 Nomenclature of Elements with Atomic Number > 100	75
	3.5 Electronic Configurations of Elements and the Periodic Table	78
	3.6 Electronic Configurations and Types of Elements: <i>s, p, d, f</i> -Blocks	79
	3.7 Periodic Trends in Properties of Elements	82

<b>Unit 4</b>	<b>Chemical Bonding and Molecular Structure</b>	<b>96</b>
4.1	Kössel-Lewis Approach to Chemical Bonding	97
4.2	Ionic or Electrovalent Bond	102
4.3	Bond Parameters	103
4.4	The Valence Shell Electron Pair Repulsion (VSEPR) Theory	108
4.5	Valence Bond Theory	113
4.6	Hybridisation	116
4.7	Molecular Orbital Theory	121
4.8	Bonding in Some Homonuclear Diatomic Molecules	125
4.9	Hydrogen Bonding	127
<b>Unit 5</b>	<b>States of Matter</b>	<b>132</b>
5.1	Intermolecular Forces	133
5.2	Thermal Energy	135
5.3	Intermolecular Forces vs Thermal Interactions	135
5.4	The Gaseous State	135
5.5	The Gas Laws	136
5.6	Ideal Gas Equation	141
5.7	Kinetic Molecular Theory of Gases	143
5.8	Behaviour of real gases: Deviation from Ideal Gas Behaviour	144
5.9	Liquifaction of Gases	147
5.10	Liquid State	149
<b>Unit 6</b>	<b>Thermodynamics</b>	<b>154</b>
6.1	Thermodynamic State	155
6.2	Applications	158
6.3	Measurement of $\Delta U$ and $\Delta H$ : Calorimetry	163
6.4	Enthalpy Change, $\Delta_r H$ of a Reaction	164
6.5	Enthalpies for Different Types of Reactions	170
6.6	Spontaneity	174
6.7	Gibbs Energy Change and Equilibrium	179
<b>Unit 7</b>	<b>Equilibrium</b>	<b>185</b>
7.1	Equilibrium in Physical Processes	186
7.2	Equilibrium in Chemical Processes – Dynamic Equilibrium	189

7.3	Law of Chemical Equilibrium and Equilibrium Constant	191
7.4	Homogeneous Equilibria	194
7.5	Heterogeneous equilibria	197
7.6	Applications of Equilibrium Constants	198
7.7	Relationship between Equilibrium Constant $K$ , Reaction Quotient $Q$ and Gibbs Energy $G$	201
7.8	Factors Affecting Equilibria	201
7.9	Ionic Equilibrium in Solution	205
7.10	Acids, Bases and Salts	206
7.11	Ionization of Acids and Bases	209
7.12	Buffer Solutions	219
7.13	Solubility Equilibria of Sparingly Soluble Salts	220
	<b>Appendices</b>	<b>231</b>
	<b>Answers</b>	<b>245</b>
	<b>Index</b>	<b>251</b>