

NEW
MILLENNIUM
EDITION

Vol. I

Pradeep's
Inorganic
Chemistry



Dr. K.K. Bhasin

PRADEEP PUBLICATIONS
JALANDHAR (INDIA)

Contents

1. ATOMIC STRUCTURE

1 - 59

-1.1.	De-Broglie Idea of Matter Waves	1
-1.2.	Heisenberg's Uncertainty Principle	6
-1.3.	Schrodinger Wave Equation	8
-1.4.	Significance of Wave Function (ψ)	12
-1.5.	Concept of Organic Orbitals	14
-1.6.	Quantum Numbers	15
-1.7.	Wave Functions of Hydrogen Atom	19
-1.8.	Probability Distribution Curves	25
-1.9.	Shapes of Orbitals	28
1.10.	Energy Level Diagrams	30
-1.11.	Aufbau Principle	32
-1.12.	Pauli's Exclusion Principle	34
-1.13.	Representation of Electronic Configuration	36
1.14.	The Shielding Effect and the Effective Nuclear Charge	44
	Summary for Review	49
	Typical Questions with Answers	50
	Questions (Long Answer, Short Answer & Very Short Answer)	53

2. PERIODIC PROPERTIES

60 - 97

2.1.	Long Form of the Periodic Table	60
2.2.	Effective Nuclear Charge and Slater's Rule	62
2.3.	Periodic Properties	63
2.4.	Atomic and Ionic Radii	63
2.5.	Ionization Energy	71
2.6.	Electron Affinity	76
2.7.	Electronegativity	79
2.8.	Chemical Properties and the Periodic Table	84
2.9.	Summary for Review	91
	Typical Questions	92
	Questions (Long Answer, Short Answer & Very Short Answer)	93

3. s - BLOCK ELEMENTS

98 - 133

3.1.	Electronic Configurations	98
3.2.	General Characteristics of Alkali Metals	98
3.3.	General Characteristics of Group 2 Elements	104
3.4.	Diagonal Relationship	108
3.5.	Diagonal Relationship of Lithium and Magnesium	108
3.6.	The Hydrides of s-block Elements	110
3.7.	Solvation and Complexing Tendencies	112
3.8.	Role of Alkali Metal and Alkaline Earth Metal Ions in Biological Systems	119
3.9.	Alkyls and Aryls of Alkali and Alkaline Earth Metals	120
	Summary for Review	128
	Typical Questions with Answers	129
	Questions (Long Answer, Short Answer & Very Short Answer)	130

4. CHEMISTRY OF NOBLE GASES*

134 - 151

4.1.	Position of Noble Gases in the Periodic Table	134
4.2.	Chemical Properties of Noble Gases	137
4.3.	Compounds of Xenon	138
4.4.	Compounds of Other Noble Gases	147
4.5.	Clathrate Compounds	147
	Summary for Review	148
	Typical Questions with Answers	148
	Questions (Long Answer, Short Answer & Very Short Answer)	149

* Not in GNDU Syllabus

5.

CHEMICAL BONDING — I (Covalent Bond)

- 5.1. Covalent Bond
- 5.2. Valence Bond Approach
- 5.3. Valence Bond Theory
- 5.4. Resonance
- 5.5. Directional Character of Covalent Bond
- 5.6. Hybridisation
- 5.7. Shapes of Inorganic Molecules and Ions
- 5.8. Limitation of Valence Bond Theory
- 5.9. Sigma (σ) and Pi (π) Bonds
- 5.10. Geometry of Some Oxoanions on the Basis of Hybridisation
- 5.11. Valence Shell Electron Pair Repulsion Theory
- 5.12. Molecular Orbital Theory
- 5.13. Linear Combination of Atomic Orbitals
- 5.14. Combination of 2s and 2p Atomic Orbitals
- 5.15. Conditions for the Combination of Atomic Orbitals
- 5.16. Energy level Diagram for Molecular Orbitals
- 5.17. Electronic Configuration and Molecular Behaviour
- 5.18. Bonding in Homonuclear Diatomic Molecules
- 5.19. Molecular Orbital Energy level Diagrams for Heteronuclear Diatomic Molecules
- 5.20. Comparison of Valence Bond and Molecular Orbital Theory
- 5.21. Electron Deficient Compounds
- 5.22. Bond Properties
- 5.23. Percentage Ionic Character
- 5.24. Effect of Electronegativity on the Shape of Molecules

Summary for Review**Typical Questions with Answers****Question (Long Answers, Short Answer & Very Short Answer)****6. CHEMICAL BONDING — II (Ionic Solids and Weak Interactions)**

- 6.1. Ionic Solids
- 6.2. Close Packing of Spheres
- 6.3. Ionic Structures
- 6.4. Radius Ratio Rule and Co-ordination Number
- 6.5. Limitations of Radius Ratio Rule
- 6.6. Lattice Energy
- 6.7. Born Haber Cycle for Lattice Energies
- 6.8. Applications of Born Haber Cycle
- 6.9. Solvation Energy and Solubilities of Ionic Compound
- 6.10. Polarising Power and Polarizability
- 6.11. Defects in Crystal Structure
- 6.12. Bonding in Metals (Metallic bonding)
- 6.13. Theories of Bonding in Metals
- 6.14. Conductors, Insulators and Semiconductors
- 6.15. Weak Interactions, vander Waals Interactions
- 6.16. Hydrogen Bonding

Summary for Review**Typical Questions with Answers****Questions (Long Answer, Short Answer & Very Short Answer)****p-Block Elements-I & II**

- 7.1. The Elements of Group 13
- 7.2. The Elements of Group 14
- 7.3. The Elements of Group 15
- 7.4. The Elements of Group 16
- 7.5. The Elements of Group 17
- 7.6. Chemistry of Important Compounds
- 7.7. Chemistry of S – N Compounds
- 7.8. Carbides
- 7.9. Silicates
- 7.10. Interhalogen Compounds
- 7.11. Basic properties of the Halogens
- 7.12. Fluorocarbons
- 7.13. Fullerenes
- 7.14. Silicones and Phosphazenes
- 7.15. Polyphosphazenes

Summary for Review**Typical Questions with Answer****Questions (Short Answer & Very Short Answer)**

152	210
	211
	216
	219
	221
	222
	223
	226
229–286	
	229
	232
	237
	243
	248
	249
	257
	258
	262
	262
	264
	268
	270
	274
	275
	278
	281
	282
	283
287–440	
	287
	300
	313
	353
	374
	387
	393
	395
	397
	400
	407
	409
	410
	412
	422
	430
	431
	434