

CONTENTS

PREFACE	ix
CHAPTER 1 THE BEGINNINGS OF QUANTUM THEORY	
1-1 Introduction	
1-2 The Nature of Light	1
1-3 The Dual Nature of Matter	7
Exercises	8
References for Further Reading	o
CHAPTER 2 THE BOHR ATOM	10
2-1 Introduction	11
2-2 Occurrence of Line Spectra	12
2-3 Structure of the Hydrogen Atom	13
2-4 Other Atoms	16
Exercises	17
References for Further Reading	19
CHAPTER 3 WAVE MECHANICS AND ATOMS	20
3-1 Introduction	21

CHAPTER 4	MOLECULES AND THE COVALENT CHEMICAL BOND	44
4-1	Introduction: Molecular Orbital Formation	45
4-2	General Properties of Molecular Orbitals	48
4-3	Application to the Nitrogen Molecule	51
4-4	Some Simple Heteronuclear Molecules	52
4-5	Bond Polarity and Electric Dipole Moments	56
4-6	Need for the Concept of Hybridization	59
4-7	A Summary of Hybridization Rules	66
4-8	The Neon Molecular Isoelectronic Series	68
4-9	Other Simple Molecules	70
4-10	Delocalized π Molecular Orbitals	73
4-11	A More Detailed Treatment of Molecular Orbitals in Diatomic Molecules	77
4-12	Hybrids Involving d Orbitals	83
4-13	Noble-Gas and Interhalogen Compounds	84
	Exercises	89
	References for Further Reading	94
CHAPTER 5	BONDING IN IONIC, METALLIC, AND MOLECULAR SOLIDS	98
5-1	Ionic Bonding; Stabilization of Ions in Crystals	99
5-2	Size of Ions	104
5-3	Trends in Ionic Radii	105
5-4	Radius Ratio and Packing of Ions in Crystals	106
5-5	Ionic Potential and Partial Covalency	107
5-6	Metals	108
5-7	Semiconductors	117

CHAPTER 6	STRUCTURE OF TRANSITION-METAL COMPOUNDS	142
6-1	Introduction	143
6-2	Color	144
6-3	Magnetic Properties	145
6-4	Fundamentals of Crystal Field Theory	149
6-5	Explanation and Use of Absorption Spectra	152
6-6	Nonoctahedral Systems	155
6-7	Systems with More than One <i>d</i> Electron; Strong and Weak Crystal Fields	155
6-8	Factors Influencing Field Strength	158
6-9	Explanation of the Strange Double-humped Curves	159
6-10	Effects of Covalence	160
	Exercises	164
	References for Further Reading	165

APPENDIX A PERIODIC TABLE

**APPENDIX B ANSWERS OR HINTS TO
SOLUTION OF SELECTED EXERCISES**

INDEX
