CONTENTS

 IMMEDUCTION PART I.—THE GENERAL BACKGROUND CHAPTER I.—General Introduction 9 II.—The First Theory of the Hydrogen Atom 24 III.—The Therory of Bohr. 26 IV.—The Uncertainty Principle of Heisenberg 30 V.—The Valve Equations and Their Interpretation 48 VII.—The Representation of the Individual Electron CHAPTER X.—The Electron Groups 	The and the second	PAGE
PART I.— THE GENERAL BACKGROUND CHAPTER I.—General Introduction 9 II.—The First Theory of Bohr 24 III.—The Theory of Bohr 26 IV.—The Uncertainty Principle of Heisenberg 30 V.—The Uncertainty Principle of Heisenberg 35 VI.—Wave Equations and Their Interpretation 48 VI.—The Meaning of Velocity 54 VI.—The Meaning of Velocity 54 VII.—The Structures of the Fare Arom 63 CHAPTER X.—The Electron Groups 63 XI.—Methods of Representation of the Electron- Cloud Density 79 XII.—The A, p, and d States 98 XIV.—The Elements 112 XV.—Assemblies of Unlike Atoms 121 XV.—Assemblies of Unlike Atoms 121 XVI.—The Elements 138 XVII.—The Interpretation of the Co-Valent Bond and the Nature of Exchange Forces 142 XVII.—The Interpretation of the Co-Valent Bond and the Nature of Exchange Forces 142 XVII.—The Interpretation of the Co-Valent Bond and the Nature of Exchange Forces 142 XVII.—The Interpretation of the Co-Valent Bond and the Nature of Exchange Forces 142 XVII.—The Interpretation of the Co-Valent Bond and the Nature of Excha		V11
CHAFTER IGeneral Introduction	PART I.—THE GENERAL BACKGROUND	
IIThe First Theory of the Hydrogen Atom . 24 IIIThe Theory of Bohr	CHAPTER I.—General Introduction	9
IIIThe Theory of Bohr	II.—The First Theory of the Hydrogen Atom .	24
IV.—The Uncertainty Principle of Heisenberg 30 V.—The Ideas of Wave Mechanics 35 VI.—Wave Equations and Their Interpretation 48 VII.—The Representation of the Individual Electron 54 VIII.—The Meaning of Velocity 59 IX.—Potential Boundaries in Wave Mechanics 60 PAET II.—The STRUCTURE OF THE FREE ATOM CHAFTER X—The Electron Groups 63 XI.—Methods of Representation of the Electron- Cloud Density 79 XII.—The s.p., and d States 85 PAET III.—Assemblies of ATOMS 112 XV.—The Elements 112 XV.—Assemblies of Unlike Atoms 121 XV.—Assemblies of Unlike Atoms 121 XV.—Assemblies of Valencies 138 XVII.—The Interpretation of the Nature of van der Waals Forces 142 XVI.—The Interpretation and the Nature of Exchange Forces 142 XVII.—The Interpretation of the Free-Electron Theory 138 XVII.—The Free-Electron Theory or METALS 144 CHAPTER XXII.—The Simple Theory of Brillouin Zones 174 XXI.—The Models of Wave Mechanics 174 XXI.—The Models of Wave Mechanics 188 XXI.—The Models of Wave Mechanics <td>III.—The Theory of Bohr.</td> <td>26</td>	III.—The Theory of Bohr.	26
VThe Ideas of Wave Mechanics	IV.—The Uncertainty Principle of Heisenberg .	30
VIWave Equations and Their Interpretation . 48 VIIThe Representation of the Individual Electron	V.—The Ideas of Wave Mechanics	35
VII.—The Representation of the Individual Electron	VI.—Wave Equations and Their Interpretation .	48
Electron	VII.—The Representation of the Individual	
 VIII.—The Meaning of Velocity	Electron	54:
IXPotential Boundaries in Wave Mechanics 60 PART IITHE STRUCTURE OF THE FREE ATOM CHAPTER XThe Electron Groups	VIII.—The Meaning of Velocity	59
PART II.—THE STRUCTURE OF THE FREE ATOM CHAPTEE X.—The Electron Groups	IX.—Potential Boundaries in Wave Mechanics .	60
CHAPTER X.—The Electron Groups	PART II.—THE STRUCTURE OF THE FREE ATOM	
 XIMethods of Representation of the Electron- Cloud Density	CHAPTER X -The Electron Groups	69
 AL. — The Status of Representation of the Direction Cloud Density	XI	03
XII.—The s, p, and d States 1 <td1< td=""><td>Cloud Density</td><td>70</td></td1<>	Cloud Density	70
PART III.—Assemblies of Aroms CHAFTEE XIII.—The Soft X-Ray Spectra of Solids . 98 XIV.—The Elements	XII — The s n and d States	95
PART III.—ASSEMBLIES OF ATOMS CHAPTER XIII.—The Soft X-Ray Spectra of Solids 98 XIV.—The Elements 112 XV.—Assemblies of Unlike Atoms 121 XVI.—Atomic Attraction and the Nature of van der Waals Forces 138 XVII.—The Interpretation of the Co-Valent Bond and the Nature of Exchange Forces 142 XVIII.—Directed Valencies 158 XIX.—Resonance Bonding and the Metallic Linkage 165 PART IV.—THE FREE-ELECTEON THEORY OF METALS 174 CHAPTEE XX.—The Fermi-Dirac Statistics and the Elec- tron Gas 174 XXI.—The Models of Wave Mechanics 188 XXII.—Applications of the Free-Electron Theory 193 PART V.—THE BRILLOUIN-ZONE THEORY OF METALS 205 CHAPTEE XXIII.—The Simple Theory of Brillouin Zones 205 XXIV.—Insulators, Semi-Conductors, and Metals 225 XXVI.—The Experimental Determination of the Electronic Structure of Metalls 265 PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS 310 XXXVII.—The Alkali Metals 3290 XXVIII.—Copper, Silver, and Gold 310 XXXI.—Some Metals of Higher Valency 341 XXXI.—Some Metals of Higher Valency 341	XII. Inco, p, and a blatters	- 00
CHAPTER XIII.—The Soft X-Ray Spectra of Solids	PART III.—Assemblies of Atoms	
XIV.—The Elements	CHAPTER XIII.—The Soft X-Ray Spectra of Solids	98
XV.—Assemblies of Unlike Atoms	XIV.—The Elements	112
XVI.—Atomic Attraction and the Nature of van der Waals Forces. 138 XVII.—The Interpretation of the Co-Valent Bond and the Nature of Exchange Forces 142 XVIII.—Directed Valencies 158 XIX.—Resonance Bonding and the Metallic Linkage 158 PART IV.—THE FREE-ELEOTEON THEOBY OF METALS 165 PART IV.—THE FREE-ELEOTEON THEOBY OF METALS 174 XXI.—The Models of Wave Mechanics. 188 XXII.—Applications of the Free-Electron Theory 193 PART V.—THE BRILLOUIN-ZONE THEORY OF METALS 205 CHAPTEE XXIII.—The Simple Theory of Brillouin Zones 205 XXIV.—Electron Theores of Metallic Crystals. 244 XXVI.—The Experimental Determination of the Electronic Structure of Metals 265 PART VI.—ELECTEONS, ATOMS, METALS, AND ALLOYS 310 XXVIII.—Copper, Silver, and Gold 310 XXXI.—Some Metals of Higher Valency 341 XXXI.—Some Magnetic Properties 397 Appendix: The CRYSTAL STRUCTURE OF THE METALLAC ELEMENTS 418 NAME INDEX 421	XVAssemblies of Unlike Atoms	121
der Waals Forces	XVI.—Atomic Attraction and the Nature of van	
XVII.—The Interpretation of the Co-Valent Bond and the Nature of Exchange Forces 142 XVIII.—Directed Valencies 158 XIX.—Resonance Bonding and the Metallic Linkage 165 PART IV.—THE FREE-ELECOTEON THEORY OF METALS 165 PART IV.—THE FREE-ELECOTEON THEORY OF METALS 165 PART IV.—THE FREE-ELECOTEON THEORY OF METALS 174 XXI.—The Fermi-Dirac Statistics and the Elec- tron Gas 174 XXI.—The Models of Wave Mechanics 188 XXII.—Applications of the Free-Electron Theory 193 PART V.—THE BRILLOUIN-ZONE THEORY OF METALS 205 CHAPTEE XXIII.—The Simple Theory of Brillouin Zones 205 XXIV.—Ineulators, Semi-Conductors, and Metals 225 XXV.—Electron Theories of Metallic Crystals. 244 XXVI.—The Experimental Determination of the Electronic Structure of Metals 265 PART VI.—ELECTBONS, ATOMS, METALS, AND ALLOYS 310 XXVIII.—Copper, Silver, and Gold 310 XXXI.—Some Metals of Higher Valency 341 XXXI.—Some Magnetic Properties 397 APPENDIX: THE CRYSTAL STRUCTURE OF THE METALLOC ELEMENTS 418 NAME INDEX 421 SUBJECT INDEX 423 <td>der Waals Forces</td> <td>138</td>	der Waals Forces	138
and the Nature of Exchange Forces . 142 XVIII.—Directed Valencies	XVIIThe Interpretation of the Co-Valent Bond	
XVIII.—Directed Valencies 158 XIX.—Resonance Bonding and the Metallic Linkage 165 PART IV.—THE FREE-ELECTEON THEORY OF METALS 165 CHAPTEE XX.—The Fermi-Dirac Statistics and the Elec- tron Gas 174 XXI.—The Models of Wave Mechanics 188 XXII.—Applications of the Free-Electron Theory 193 PART V.—THE BRILLOUIN-ZONE THEORY OF METALS 205 CHAPTEE XXIII.—The Simple Theory of Brillouin Zones 205 XXIV.—Insulators, Semi-Conductors, and Metals 225 XXV.—Electron Theories of Metallic Crystals. 244 XXVI.—The Experimental Determination of the Electronic Structure of Metals 265 PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS 310 XXVIII.—Copper, Silver, and Gold 310 XXXI.—Some Metals of Higher Valency 341 XXXI.—Some Magnetic Properties 397 APPENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX 421 SUBJECT INDEX 423	and the Nature of Exchange Forces .	142
XIXResonance Bonding and the Metallic Linkage 165 PART IVTHE FREE-ELECTEON THEORY OF METALS CHAPTER XXThe Fermi-Dirac Statistics and the Elec- tron Gas 174 XXIThe Models of Wave Mechanics. 188 XXIIApplications of the Free-Electron Theory 193 PART VTHE BRILLOUIN-ZONE THEORY OF METALS CHAPTER XXIIIThe Simple Theory of Brillouin Zones 205 XXIVInsulators, Semi-Conductors, and Metals 225 XXVElectron Theories of Metallic Crystals. 244 XXVIThe Experimental Determination of the Electronic Structure of Metals 265 PART VIELECTRONS, ATOMS, METALS, AND ALLOYS 290 XXIXSome Metals of Higher Valency 341 XXXThe Transition Elements 358 XXXISome Magnetic Properties 397 AFFENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX 423	XVIII.—Directed Valencies	158
Linkage	XIXResonance Bonding and the Metallic	
PART IV.—THE FREE-ELECTEON THEORY OF METALS CHAFTEE XX.—The Fermi-Dirac Statistics and the Electron Gas tron Gas XXI.—The Models of Wave Mechanics. 188 XXI.—The Models of Wave Mechanics. 193 PART V.—THE BRILLOUIN-ZONE THEORY OF METALS CHAPTEE XXIII.—The Simple Theory of Brillouin Zones 205 XXIV.—Ineulators, Semi-Conductors, and Metals 225 XXV.—Electron Theories of Metallic Crystals. 244 XXVI.—The Experimental Determination of the Electronic Structure of Metals 265 PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS CHAPTER XXVII.—The Alkali Metals 290 XXVIII.—Copper, Silver, and Gold 310 XXXI.—Some Metals of Higher Valency 341 XXX.—The Transition Elements 358 XXXI.—Some Magnetic Properties 397 APPENDIX: THE CRYSTAL STRUCTURE OF THE METALLOC ELEMENTS 418 NAME INDEX 421 SUBJECT INDEX 423	Linkage	165
CHAFTEE XX.—The Fermi-Dirac Statistics and the Elec- tron Gas 174 XXI.—The Models of Wave Mechanics 188 XXII.—Applications of the Free-Electron Theory 193 PART V.—THE BRILLOUIN-ZONE THEORY OF METALS CHAFTEE XXIII.—The Simple Theory of Brillouin Zones 205 XXIV.—Ineulators, Semi-Conductors, and Metals 225 XXV.—Electron Theories of Metallic Crystals 244 XXVI.—The Experimental Determination of the Electronic Structure of Metals 265 PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS CHAFTEE XXVII.—The Alkali Metals . 290 XXVIII.—Copper, Silver, and Gold . 310 XXIII.—Copper, Silver, and Gold . 310 XXIII.—Come Metals of Higher Valency 341 XXX.—The Transition Elements . 358 XXXI.—Some Magnetic Properties . 397 AFFENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX . 423	PART IV THE FREE-ELECTRON THEORY OF METALS	
tron Gas	CHAPTER XX.—The Fermi-Dirac Statistics and the Elec-	
XXI.—The Models of Wave Mechanics	tron Gas	174
XXII.—Applications of the Free-Electron Theory 193 PART V.—THE BRILLOUIN-ZONE THEORY OF METALS CHAPTER XXIII.—The Simple Theory of Brillouin Zones 205 XXIV.—Insulators, Semi-Conductors, and Metals 225 XXV.—Electron Theories of Metallic Crystals. 244 XXVI.—The Experimental Determination of the Electronic Structure of Metals 265 PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS CHAPTER XXVII.—The Alkali Metals	XXI.—The Models of Wave Mechanics .	188
PART V.—THE BRILLOUIN-ZONE THEORY OF METALS 205 CHAPTEE XXIII.—The Simple Theory of Brillouin Zones 205 XXIV.—Insulators, Semi-Conductors, and Metals 225 XXV.—Electron Theories of Metallic Crystals. 244 XXVI.—The Experimental Determination of the 265 PART VI.—Electrons, Atoms, Metals, and Alloys 265 CHAPTER XXVII.—The Alkali Metals 290 XXV—Some Metals of Higher Valency 341 XXX.—Some Metals of Higher Valency 341 XXX.—The Transition Elements 358 XXXI.—Some Magnetic Properties 397 AFFPENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX 421 SUBJECT INDEX 423	XXII.—Applications of the Free-Electron Theory	193
TART V.—The Diminion of Theory of Brillouin Zones 205 XXIV.—The Simple Theory of Brillouin Zones 205 XXV.—Electron Theories of Metallic Crystals. 244 XXV.—Electron Theories of Metallic Crystals. 244 XXV.—The Experimental Determination of the Electronic Structure of Metalls 265 PART VI.—ELECTEONS, ATOMS, METALS, AND ALLOYS 265 CHAPTER XXVII.—The Alkali Metals 290 XXXVCopper, Silver, and Gold 310 XXXX.—Some Metals of Higher Valency 341 XXX.—The Transition Elements 358 XXXI.—Some Magnetic Properties 397 AFFENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX 423	PART VTHE BELLIONIN.ZONE THEORY OF METALS	
CHAPTER XXIII.—Ine Simple Theory of Brillouin Zones 205 XXV.—Insulators, Semi-Conductors, and Metals 225 XXV.—Electron Theories of Metallic Crystals. 244 XXVI.—The Experimental Determination of the Electronic Structure of Metals 265 PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS 290 XXVIII.—The Alkali Metals 290 XXVIII.—Copper, Silver, and Gold 310 XXXIII.—Some Metals of Higher Valency 341 XXX.—The Transition Elements 358 XXXI.—Some Magnetic Properties 397 APPENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX 423	TARI VTHE DELLOUIN-ZONE THEORY OF METALS	
XXIV.—Insulators, Semi-Conductors, and Metals 225 XXV.—Electron Theories of Metallic Crystals. 244 XXVI.—The Experimental Determination of the Electronic Structure of Metals 265 PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS 246 CHAPTER XXVII.—The Alkali Metals 290 XXVIII.—Copper, Silver, and Gold 310 XXXX.—Some Metals of Higher Valency 341 XXX.—The Transition Elements 358 XXXI.—Some Magnetic Properties 397 APPENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX 421	CHAPTER XXIII.— The Simple Theory of Brillouin Zones	205
XXV.—Electron Theories of Metallic Crystals. 244 XXVI.—The Experimental Determination of the Electronic Structure of Metals 265 PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS 290 CHAPTER XXVII.—The Alkali Metals . XXVII.—The Alkali Metals . XXVII.—The Alkali Metals . XXXIX.—Some Metals of Higher Valency . XXXI.—Some Magnetic Properties . XXXI.—Some Magnetic Properties . APPENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX . . SUBJECT INDEX . .	XXIV.—Insulators, Semi-Conductors, and Metals	225
AXVIIne Experimental Determination of the Electronic Structure of Metals 265 PART VIELECTEONS, ATOMS, METALS, AND ALLOYS CHAPTER XXVIIThe Alkali Metals 290 XXVIICopper, Silver, and Gold 310 XXIXSome Metals of Higher Valency 341 XXXThe Transition Elements 358 XXXISome Magnetic Properties 397 APPENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX 421 SUBJECT INDEX 423	XXV.—Electron 1 neories of Metallic Urystals.	244
PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS 290 CHAPTER XXVII.—The Alkali Metals 290 XXVIII.—Copper, Silver, and Gold 310 XXVIII.—Copper, Silver, and Gold 310 XXX	AAVI.	0.05
PART VI.—ELECTRONS, ATOMS, METALS, AND ALLOYS CHAPTER XXVII.—The Alkali Metals	Electronic Structure of Metals	209
CHAPTER XXVII.—The Alkali Metals	PART VIELECTRONS, ATOMS, METALS, AND ALLOYS	
XXVIII.—Copper, Silver, and Gold 310 XXIX.—Some Metals of Higher Valency 341 XXX.—The Transition Elements 358 XXXI.—Some Magnetic Properties 397 Appendix: The Crystal Structure of the Metallic Elements 418 NAME INDEX 421 SUBJECT INDEX 423	CHAPTER XXVII	200
XXIX.—Some Metals of Higher Valency	XXVIII Copper Silver and Gold	310
XXX.—The Transition Elements	XXIX — Some Metals of Higher Valency	341
XXXI.—Some Magnetic Properties	XXX.—The Transition Elements	358
APPENDIX: THE CRYSTAL STRUCTURE OF THE METALLIC ELEMENTS 418 NAME INDEX	XXXI.—Some Magnetic Properties	397
NAME INDEX	APPENDIX : THE CRUSTAL STRUCTURE OF THE METALLIC FLEMENTS	418
SUBJECT INDEX . 423	NAME INDEV	401
SUBJECT INDEX	Converse Trenew	421 400
a the stand of the	OUBJECT INDEX	423