

# Contents

To the Student    xv

## Part One Chemical Reactions

- |   |  |     |
|---|--|-----|
| 1 | The Chemical Elements                    | 3   |
| 2 | Stoichiometry                            | 20  |
| 3 | Energy Relations in Chemical Reactions   | 46  |
| 4 | Oxidation and Reduction                  | 75  |
| 5 | Electrochemistry                         | 90  |
| 6 | Kinetics and Equilibrium                 | 122 |
| 7 | Acid-Base Equilibria in Aqueous Solution | 144 |
| 8 | Further Concepts of Equilibrium          | 169 |

## Part Two Atomic and Molecular Structure

- |    |  |     |
|----|--|-----|
| 9  | Experimental Basis for the Atomic Theory | 195 |
| 10 | Electronic Structure of the Atom         | 220 |
| 11 | Chemical Bonding I                       | 244 |
| 12 | Chemical Bonding II                      | 265 |
| 13 | Experimental Determination of Structure  | 286 |
| 14 | Coordination Compounds                   | 317 |
| 15 | Metal-Ligand Bonding                     | 334 |
| 16 | Nuclear Chemistry and Radiochemistry     | 356 |

## **Part Three Properties of Matter in Bulk**

- 17 The Kinetic Molecular Theory 383
- 18 Liquids and Solutions 414
- 19 Crystalline Solids and Ionic Solutions 450
- 20 Metals and Metallurgy 474

## **Part Four Representative Descriptive Chemistry**

- 21 Chemistry of the Nonmetals I 499
- 22 Chemistry of the Nonmetals II 522
- 23 Compounds of the Metals 553
- 24 Organic Chemistry and Biochemistry 586

Appendix 617

Answers to Selected Exercises 625

Index 629