CONTENTS

Publisher's Note vii
Editor's Introduction ix
Contributors xiv

Acid anhydrides 1
Acid chlorides 4
Acids and bases 6
Acids and bases: Brønsted-Lowry theory 9
Actinides 12
Activation energy 15
Active transport 20
Acyl cation 23
Algorithmic chemistry 26
Alkali metals 28
Alkali earth metals 31
Alkanes 33
Alkenes 37
Alkyl halides 41
Alkynes 45
Allotropes 49
Alloys and intermetallics 52
Allylic alcohols 56
Amines 58
Amino acids 62
Ammonium ion 66
Anions 68
Aromaticity 71
Atomic number 73
Atoms 75

Benzene and other rings 79
Biochemistry 83
Black holes 87
Buckyballs 89

Carboxylic acids 93
Cations 96
Cell communcation 99
Cellular respiration 102
Chalcogens 106
Chemical bonding 109
Chemical buffers 113
Chemical energy (non fossil fuels) 116
Chemisorption 119
Crystal growth 122

Debye-Hückel Theory 125
Decomposition reactions 127
Dehydration 130
Diffusion 134
Digestion 137
Diols 140
Displacement reactions 143
DNA computing 146
DNA/RNA synthesis 149
DNA/RNA transcription 153
Ductility 156

Electrons 159
Endocytosis and exocytosis 162
Endoergic and exoergic reactions 164
Epitaxy 167
Esters 170
Ethers 174
Exothermic and endothermic reactions 178

Functional groups 181

Half-life 186
Halogens 189
Hydrolysis 192
Hydrophilic and hydrophobic 194

Interstellar molecules 197
Ion implantation 200
Ions 203
Isotopes 205

Ketones 209

Lanthanides 213
Lewis structure and diagram 216
Litmus test 218

Malleability 222
Man-made elements 224
Melting point 227
Metalloids 229
Metals 232
Molarity and molality 235
Molecular formula 237
Molecular orbital theory 241

Monomers and polymers . . . 245
Multiple valences . . . 247

Naming organic molecules . . . 252
Neutrons . . . 255
Nitriles . . . 258
Noble gas compounds . . . 261
Nonmetals . . . 265
Nucleosynthesis . . . 268

Orbitals . . . 272
Osmosis . . . 275

Pericyclic reactions . . . 279
pH . . . 282
Phenols . . . 285
Phosphine . . . 288
Physiosorption . . . 292
Point defects and their equilibria . . . 295
Polymerase chain reaction . . . 297
Precipitation . . . 300
Properties of matter: Composition . . . 303
Protein synthesis . . . 306
Proteins/enzymes.carbohydrates/
lipids/nucleic acids . . . 309
Protons . . . 312

Radioactive decay . . . 315
Radioactive elements . . . 318
Reactants and products . . . 322
Reaction calculations: Avogadro's Law . . . 324
Reaction calculations: Balancing Equations . . . 328
Reaction calculations: Conservation of Mass . . . 331
Reaction calculations: Definite Proportions . . . 333
Reaction calculations: Molecular Formula . . . 336
Reaction calculations: Multiple Proportions . . . 339
Reaction calculations: Percentage
Composition . . . 342
Reaction calculations: Stiochiometry . . . 345
Reaction mechanisms . . . 349
Reaction rates . . . 352
Redox reactions . . . 355
RNA/protein translation . . . 358

Salts . . . 362
Spectroscopy . . . 365
Sublimation . . . 369
Substitution reaction . . . 372
Surface chemistry . . . 374
Synthesis . . . 378

Thiols . . . 381
Toxins, poisons, and venoms . . . 383
Transition metals . . . 387
Triple point . . . 389

Valence bond theory . . . 392
Valence shell . . . 395

Zone refining . . . 399

Appendices
Introducing the Periodic Table . . . 405
Periodic Table of the Elements . . . 409
Table of the Atomic Weights . . . 410
Nobel Notes . . . 417
Winners of the Nobel Prize in Chemistry . . . 419
Glossary . . . 427
Bibliography . . . 443
General Index . . . 450