

ORGANIC AND BIOCHEMISTRY FOR TODAY

THIRD
EDITION

SPENCER L. SEAGER
MICHAEL R. SLABAUGH

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SPENCER L. SEAGER

Weber State University

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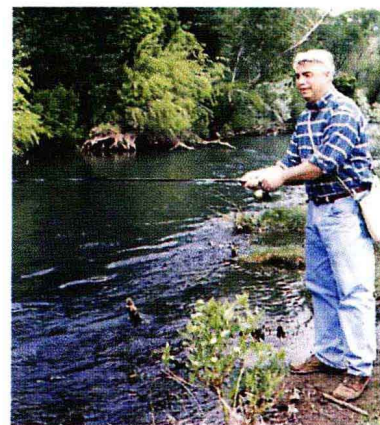
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PREFACE

THE IMAGE OF CHEMISTRY

When the first and second editions of this text were published in 1987 and 1994, respectively, we expressed concern about the negative images associated with the words *chemistry* and *chemicals* by our students. Our concern persists as we encounter increasing numbers of students who express genuine fear about working with chemicals in the laboratory portion of the courses we teach. This fear, which goes beyond a healthy respect for chemicals and appropriate cautions when using them, continues to be reinforced by the focus of the mass media on the negative aspects of chemical use in our society. Only rarely are benefits of chemicals and chemistry in our society depicted in news stories. Our hope continues with this edition that those who use this book will gain a more positive understanding and appreciation of the role of chemistry in our lives. We especially desire that this understanding and appreciation be gained by those entering the nursing and other health care professions. Persons served by these professionals expect them to possess knowledge of many topics related to the general health of the body, such as the effects of administered medications, general functions of the body, digestion, waste elimination, and nutrition. When a respected professional provides a description of such processes in terms of their chemical nature with the accompanying involvement of chemicals, some of the fear of chemistry and chemicals shared by the general public is dispelled.

THEME AND ORGANIZATION

In the second edition we used an emphasis on the positive and useful contributions of chemistry in our world as a theme. Keeping with that theme in this edition, we continue the chapter opening focus on health care professionals introduced in the second edition. This focus takes the same form it did in the second edition—a photo of a health care professional at work and a brief description of how chemistry is important in his or her work. An extension to each chapter opening discussion has been added in the form of a Web site where a wealth of career information can be obtained about the featured profession. Available information includes wages, work setting, required skills, and the current employment outlook.

This text is designed for use in a one-semester or two-quarter course of study that provides an introduction to organic chemistry and biochemistry. It is assumed that students who take the course have a background in general chemistry at least equivalent to that obtained by completing a one-term course of introductory general chemistry. Most of these students are majors in nursing, other health professions, or the life sciences. These students consider biochem-

istry to be the most important and relevant part of the course of study. However, biochemistry cannot be understood without a sound background in organic chemistry, and an understanding of organic chemistry depends on a sound foundation of general chemistry. We attempt to present organic chemistry in sufficient depth and breadth to make biochemistry understandable.

We used experience from our combined 55-plus years of teaching as well as input from numerous reviewers and adopters of the text to guide us in making the necessary decisions about what to include and what to omit. We used this same experience and input to decide what learning aids to include. We think of a textbook as a personal tutor that is available for student use at any time. In this role, it must be more than just a collection of facts, data, and exercises.

NEW TO THIS EDITION

The publication of a third edition of this text was motivated by the positive reception of the second edition by our own students and by the students of other adopters, and by our continuing desire to provide a student-oriented textbook for use in programs of study that incorporate all or part of the introductory chemistry sequence of organic chemistry, and biochemistry.

Our teaching experience with the second edition, together with input we received from our own students, from reviewers, and from other chemistry teachers who have used the text, prompted us to make some significant changes in this third edition while retaining many positive features of the second edition. More than 15 Chemistry Around Us boxes of the 2nd edition have been replaced with new boxes that emphasize health-related topics. Most of the drill-type exercises in chapters 1–6 were put into matching pairs, with one member of the pair answered in Appendix B and the other member left unanswered to give teachers more flexibility in assigning exercises.

A Study Skill feature introduced in the second edition proved to be very popular with students. In this feature we attempt to help improve the understanding and mastery of especially challenging ideas or concepts by providing study suggestions, analogies, or specific approaches that we have found to be effective with our students. One Study Skill that is designed to help students remember and master organic and biochemical reactions is the reaction-mapping technique. Two new reaction maps have been added to the third edition, one for alkenes and one for triglycerides.

The number of full-color photographs has been increased slightly in this edition. The practice, introduced in the second edition, of asking questions based on some photos has been continued. As in the second edition, some of these questions are expanded on in Points to Ponder and Pursue questions that follow the end-of-chapter exercises.

A new and significant feature of this edition is the periodic reference to Web sites where students can further explore specific topics. Each chapter contains about five of these topics.

FEATURES

Each chapter has features especially designed to help students organize, study effectively, understand, and enjoy the material in the course.

Chapter Opening Photos. Each chapter opens with a photo of one of the many health care professionals that provide us with needed services. These professions represent some of the numerous professions that require an understanding of chemistry.

Chapter Outlines/Learning Objectives. At the beginning of each chapter, a chapter outline provides students with a convenient overview of the topics and concepts they will be studying. At the end of the chapter, they encounter a list

of learning objectives that indicate skills and concepts they should have acquired or mastered from their study of the chapter. Thus, students begin each chapter with a topical preview and end with an indication of what they should have learned from the topics.

Key Terms. Identified within the text by the use of bold type, key terms are defined in the margin near the place where they are introduced. Students reviewing a chapter can quickly identify the important concepts on each page with this marginal glossary. A full glossary of key terms and concepts appears at the end of the text.

Chemistry Around Us. These boxed features present everyday applications of chemistry that emphasize in a real way the important role of chemistry in our lives. A significant number of these are new to this edition and emphasize health-related applications of chemistry.

Key Chemicals. Focusing on specific chemicals that have present or historical significance, these boxed discussions point out the prime role of the chemicals in important chemical developments and current applications.

Examples. To reinforce students in their problem-solving skill development, carefully worked out solutions in numerous examples are included in each chapter. The number of these examples that are based on health-related topics has been increased in this edition.

Learning Checks. Short self-check exercises follow examples and discussions of key or difficult concepts. A complete set of solutions is included in Appendix C. These allow students to immediately measure their understanding and progress. The number of these exercises that are based on health-related topics has also been increased in this edition.

Study Skills. Most chapters contain a Study Skills feature in which a challenging topic, skill, or concept of the chapter is addressed. Study suggestions, analogies, and approaches are provided to help students master these ideas.

How Reactions Occur. The mechanisms of representative organic reactions are presented in four boxed inserts to help students dispel the mystery of how these reactions take place.

Concept Summary. Located at the end of each chapter, this feature provides a concise review to reinforce the major ideas.

Key Terms and Concepts. These are listed at the end of the chapter for easy review.

Key Equations. This boxed feature provides a useful summary of general equations and reactions from the chapter. This feature is particularly helpful to students in the organic chemistry chapters.

Web Sites. This feature allows students to further explore specific topics on the Internet, where a wealth of information on chemical topics and health-related subjects can be found. Each chapter location of this feature is identified with an icon and a description of the information to be found at that site. Specific Internet addresses can be obtained at the home page, where an updated list of these addresses will be maintained: <http://www.weber.edu/today text/>.

Exercises. More than 900 end-of-chapter exercises are arranged by section. Color-coded for easy identification, approximately half of the exercises are answered in the back of the text. Completely worked out solutions to these answered exercises are included in the Student Study Guide. Solutions and answers to the remaining exercises are provided in the Instructor's Manual. We have included a significant number of clinical and other familiar applications of chemistry in the exercises.

Points to Ponder and Pursue. Included at the end of each chapter are special questions designed to encourage students to expand their reasoning skills. Some of these exercises are based on photographs found in the chapter, others emphasize clinical or other useful applications of chemistry, and a number are based on information found at various Internet sites given in each chapter.

POSSIBLE COURSE OUTLINES

This text may be used effectively in either a one-semester or two-quarter course of study:

One semester: Chapters 1–15 (organic chemistry and biochemistry)

First quarter: Chapters 1–8 (organic chemistry)

Second quarter: Chapters 9–15 (biochemistry)

ANCILLARIES

The following ancillaries have been prepared for use with this text.

Safety-Scale Laboratory Experiments for General, Organic, and Biochemistry, 2nd Edition. Prepared by Spencer L. Seager and Michael R. Slabaugh, this well-tested collection of experiments has been developed during more than 20 years of laboratory instruction with students at Weber State University. This manual provides a blend of training in laboratory skills and experiences illustrating concepts from the authors' textbook. The experiments are designed to use small quantities of chemicals, and emphasize safety and proper disposal of used materials.

Instructor's Guide for Safety-Scale Laboratory Experiments. Prepared by the authors of the laboratory manual, this useful resource gives complete directions for preparing the reagents and other materials used in each experiment. It also contains useful comments concerning the experiments, answers to questions included in the experiments, and suggestions for the proper disposal of used materials.

Study Guide and Solutions Manual. Prepared by Garth L. Welch of Weber State University, each chapter contains a chapter outline, learning objectives, a programmed review of important topics and concepts, detailed solutions to the even-numbered exercises answered in the text, and self-test questions.

Instructor's Manual and Testbank. Prepared by Garth L. Welch of Weber State University, each chapter contains a summary chapter outline, learning objectives, instructors resource materials, solutions to Points to Ponder and Pursue questions, answers and solutions to odd-numbered exercises not answered in the text, and more than 1300 sample exam questions.

Test File. This computerized test-generation system contains all the exam questions from the Instructor's Manual.

Acetate Package. The publisher provides nearly 100 full-color acetates illustrating key figures from the text for use in class.

Current Issues in General, Organic, and Biochemistry, 1997 Edition. This supplement of selected readings is a collection of articles gathered from recent health, general interest, and science magazines. Each article has been carefully chosen to help students gain a more balanced understanding of the important role of chemistry in the allied health fields and in our society. Each article begins with a brief overview and is followed by a few questions to help students focus on the main points discussed in the article.

Software. Software support is available for students and instructors for testing, and tutorial and lab support. Contact the West sales representative for details.

Powerpoint Presentation for General, Organic, and Biochemistry. Prepared by James Hardy, this electronic transparency package provides outlines, full-color graphics, and 33 animations to help students follow what are, in some cases, new or complex topics. Organized into chapters corresponding to the main text, the package contains between 20 and 80 slides per chapter. Examples from the health and medical care fields make this presentation especially relevant to students in nursing and allied health fields. Appropriate chapters contain math sidebars with examples for students' review. An instructor can edit, rearrange, and add slides to the package using Microsoft® Powerpoint version 4.0.

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Spencer L. Seager

Michael R. Slabaugh

BRIEF CONTENTS

Preface vii

Chapter 1	Organic Compounds: Alkanes	1
Chapter 2	Unsaturated Hydrocarbons	39
Chapter 3	Alcohols, Phenols, and Ethers	71
Chapter 4	Aldehydes and Ketones	101
Chapter 5	Carboxylic Acids and Esters	127
Chapter 6	Amines and Amides	153
Chapter 7	Carbohydrates	179
Chapter 8	Lipids	211
Chapter 9	Proteins	237
Chapter 10	Enzymes	265
Chapter 11	Nucleic Acids and Protein Synthesis	287
Chapter 12	Nutrition and Energy for Life	317
Chapter 13	Carbohydrate Metabolism	343
Chapter 14	Lipid and Amino Acid Metabolism	367
Chapter 15	Body Fluids	393
Appendix A	The International System of Measurements	A-1
Appendix B	Answers to Even-Numbered End-of-Chapter Exercises	B-1
Appendix C	Solutions to Learning Checks	C-1
	<i>Glossary</i>	G-1
	<i>Index</i>	I-1

CONTENTS

Preface vii

Chapter 1

Organic Compounds: Alkanes 1

- 1.1 Carbon: The Element of Organic Compounds 2
- 1.2 Organic and Inorganic Compounds Compared 3

Study Skills 1.1

Change Gears for Organic Chemistry 4

- 1.3 Bonding Characteristics and Isomerism 5

- 1.4 Functional Groups: The Organization of Organic Chemistry 7

- 1.5 Alkane Structures 10

Key Chemicals 1.1

Methane: Natural Gas 11

- 1.6 Conformations of Alkanes 13

- 1.7 Alkane Nomenclature 15

- 1.8 Cycloalkanes 21

Chemistry Around Us 1.1

Buckminsterfullerene 22

- 1.9 The Shape of Cycloalkanes 24

- 1.10 Physical Properties of Alkanes 26

- 1.11 Alkane Reactions 28

Chemistry Around Us 1.2

Carbon Monoxide: Silent but Deadly 29

Chemistry Around Us 1.3

Petroleum 30

Concept Summary 31

Learning Objectives 31

Key Terms and Concepts 32

Key Reactions 32

Exercises 32

Points to Ponder and Pursue 38

Chapter 2

Unsaturated Hydrocarbons 39

- 2.1 Nomenclature of Alkenes 40

Chemistry Around Us 2.1

Beta-Carotene and Good Health 42

Key Chemicals 2.1

Ethylene: Number One in Organics 44

- 2.2 Geometry of Alkenes 44

Chemistry Around Us 2.2

Seeing the Light 47

- 2.3 Properties of Alkenes 48

Study Skills 2.1

Keep a Reaction Card File 50

- 2.4 Addition Polymers 53

How Reactions Occur 2.1

Hydration of Alkenes: An Addition Reaction 53

Study Skills 2.2

Reaction Map for Alkenes 54

- 2.5 Alkynes 57

- 2.6 Aromatic Compounds and the Benzene Structure 58

- 2.7 Nomenclature of Benzene Derivatives 60

Chemistry Around Us 2.3

Too Much Sun—Not a Bright Idea 61

- 2.8 Properties and Uses of Aromatic Compounds 62

Chemistry Around Us 2.4

Cigarette Smoke and Cancer 63

Concept Summary 64

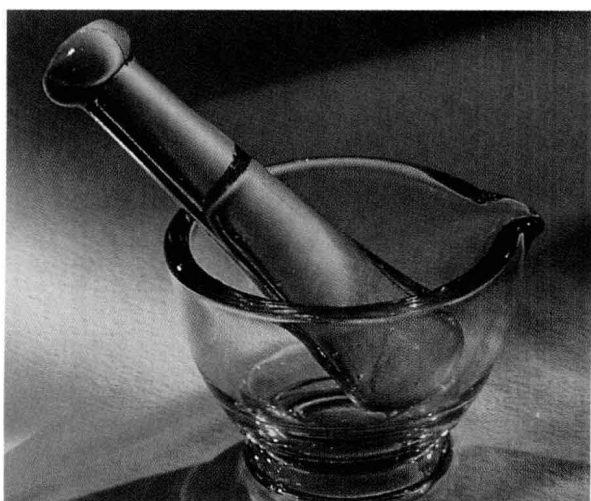


Learning Objectives	65
Key Terms and Concepts	65
Key Reactions	65
Exercises	66
Points to Ponder and Pursue	70

Chapter 3

Alcohols, Phenols, and Ethers 71

3.1 Nomenclature of Alcohols and Phenols	72
3.2 Classification of Alcohols	75
3.3 Physical Properties of Alcohols	76
3.4 Reactions of Alcohols	77
<i>How Reactions Occur 3.1</i>	
<i>Dehydration of an Alcohol</i>	79
3.5 Important Alcohols	82
<i>Study Skills 3.1</i>	
<i>Reaction Map for Alcohols</i>	83
<i>Chemistry Around Us 3.1</i>	
<i>Muscle Fatigue</i>	84
3.6 Characteristics and Uses of Phenols	85
<i>Key Chemicals 3.1</i>	
<i>Ethanol and Alcoholic Beverages</i>	86
<i>Chemistry Around Us 3.2</i>	
<i>Vitamin E As an Antioxidant</i>	88
3.7 Ethers	89
<i>Chemistry Around Us 3.3</i>	
<i>General Anesthetics</i>	90
3.8 Properties of Ethers	90
3.9 Thiols	91
3.10 Polyfunctional Compounds	93
Concept Summary	94
Learning Objectives	95
Key Terms and Concepts	95
Key Reactions	95
Exercises	96
Points to Ponder and Pursue	100



Chapter 4

Aldehydes and Ketones 101

4.1 Naming Aldehydes and Ketones	102
<i>Chemistry Around Us 4.1</i>	
<i>Faking a Tan</i>	103
4.2 Physical Properties	105
4.3 Chemical Properties	107
<i>Chemistry Around Us 4.2</i>	
<i>Acetaldehyde Formation in the Body</i>	111
<i>How Reactions Occur</i>	
<i>Hemiacetal Formation</i>	112
<i>Study Skills 4.1</i>	
<i>Reaction Map for Aldehydes and Ketones</i>	114
<i>Chemistry Around Us 4.3</i>	
<i>Vitamin A and Birth Defects</i>	116
4.4 Important Aldehydes and Ketones	117
<i>Key Chemicals 4.1</i>	
<i>Birth Control: Progesterone Substitutes</i>	118
Concept Summary	119
Learning Objectives	120
Key Terms and Concepts	120
Key Reactions	120
Exercises	121
Points to Ponder and Pursue	126

Chapter 5

Carboxylic Acids and Esters 127

5.1 Nomenclature of Carboxylic Acids	129
5.2 Physical Properties of Carboxylic Acids	130
5.3 The Acidity of Carboxylic Acids	131
5.4 Salts of Carboxylic Acids	133
5.5 Carboxylic Esters	135
<i>Key Chemicals 5.1</i>	
<i>Polyester</i>	135
<i>Chemistry Around Us 5.1</i>	
<i>Aspirin: Looking Even Better</i>	139
5.6 Nomenclature of Esters	139
5.7 Reactions of Esters	141
<i>Study Skills 5.1</i>	
<i>Reaction Map for Carboxylic Acids</i>	142
5.8 Esters of Inorganic Acids	143
<i>How Reactions Occur</i>	
<i>Ester Saponification</i>	144
<i>Chemistry Around Us 5.2</i>	
<i>Nitroglycerin in Dynamite and in Medicine</i>	145
Concept Summary	146
Learning Objectives	146
Key Terms and Concepts	146
Key Reactions	147
Exercises	147
Points to Ponder and Pursue	152

Chapter 6

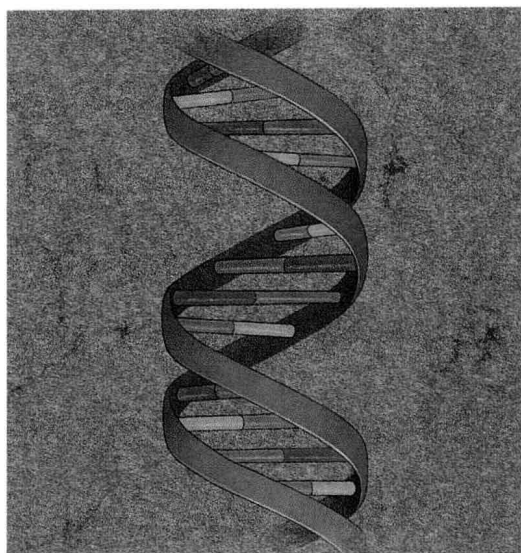
Amines and Amides 153

- 6.1 Classification of Amines 154
- 6.2 Nomenclature of Amines 154
- Chemistry Around Us 6.1*
- Antihistamines* 156
- 6.3 Physical Properties of Amines 157
- 6.4 Chemical Properties of Amines 158
- Study Skills 6.1*
- Reaction Map for Amines* 163
- Key Chemicals 6.1*
- Nylon: A Polyamide* 164
- 6.5 Biologically Important Amines 164
- Chemistry Around Us 6.2*
- Nicotine Patches, Gum, and Nasal Spray* 167
- Chemistry Around Us 6.3*
- Aspirin Substitutes* 168
- 6.6 Nomenclature of Amides 169
- 6.7 Physical Properties of Amides 170
- 6.8 Chemical Properties of Amides 171
- Concept Summary 173
- Learning Objectives 174
- Key Terms and Concepts 174
- Key Reactions 174
- Exercises 175
- Points to Ponder and Pursue 178

Chapter 7

Carbohydrates 179

- 7.1 Classes of Carbohydrates 180
- 7.2 Stereochemistry of Carbohydrates 181
- 7.3 Fischer Projections 185
- 7.4 Monosaccharides 188
- 7.5 Properties of Monosaccharides 189
- Chemistry Around Us 7.1*
- Sugar-Free Foods and Diabetes* 192
- 7.6 Important Monosaccharides 196
- 7.7 Disaccharides 197
- Study Skills 7.1*
- Biomolecules: A New Focus* 197
- Chemistry Around Us 7.2*
- Health Effects of Sucrose* 199
- 7.8 Polysaccharides 200
- Chemistry Around Us 7.3*
- Fiber and Good Health* 203
- Key Chemicals 7.1*
- The Versatility of Cellulose* 204
- Concept Summary 205
- Learning Objectives 206
- Key Terms and Concepts 206
- Key Reactions 206



- Exercises 206
- Points to Ponder and Pursue 210

Chapter 8

Lipids 211

- 8.1 Classification of Lipids 212
- 8.2 Fatty Acids 213
- 8.3 The Structure of Fats and Oils 214
- Key Chemicals 8.1*
- Omega-3 and Omega-6 Fatty Acids* 216
- 8.4 Chemical Properties of Fats and Oils 217
- Study Skills 8.1*
- Reaction Map for Triglycerides* 221
- 8.5 Waxes 221
- 8.6 Phosphoglycerides 221
- Chemistry Around Us 8.1*
- Simplex and Olestra: Fake Fats* 222
- Chemistry Around Us 8.2*
- Respiratory Distress Syndrome* 224
- 8.7 Sphingolipids 224
- 8.8 Biological Membranes 226
- 8.9 Steroids 227
- Chemistry Around Us 8.3*
- Low Cholesterol and Healthy Hearts* 228
- 8.10 Steroid Hormones 229
- 8.11 Prostaglandins 231
- Concept Summary 232
- Learning Objectives 233
- Key Terms and Concepts 233
- Key Reactions 233
- Exercises 234
- Points to Ponder and Pursue 236

Chapter 9

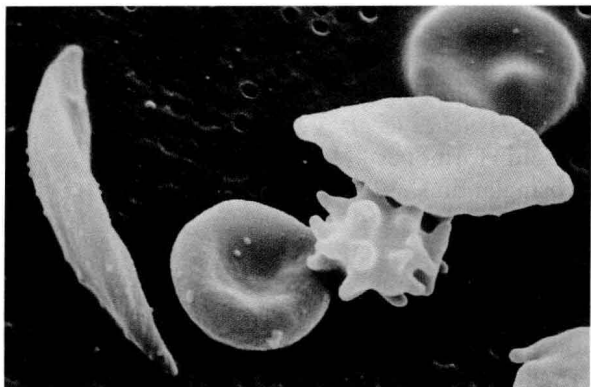
Proteins 237

- 9.1 The Amino Acids 238
- 9.2 Zwitterions 240
- 9.3 Reactions of Amino Acids 242
- Chemistry Around Us 9.1*
- Enkephalins: The Brain's Own Painkillers* 244
- 9.4 Important Peptides 245
- 9.5 Characteristics of Proteins 246
- Chemistry Around Us 9.2*
- Leptin: The "Obese" Protein* 249
- 9.6 The Primary Structure of Proteins 250
- Key Chemicals 9.1*
- Immunoglobulins* 251
- 9.7 The Secondary Structure of Proteins 251
- Chemistry Around Us 9.3*
- Sickle Cell Anemia* 253
- 9.8 The Tertiary Structure of Proteins 254
- Study Skills 9.1*
- Visualizing Protein Structure* 255
- 9.9 The Quaternary Structure of Proteins 257
- 9.10 Protein Hydrolysis and Denaturation 258
- Concept Summary 259
- Learning Objectives 260
- Key Terms and Concepts 260
- Key Reactions 261
- Exercises 261
- Points to Ponder and Pursue 263

Chapter 10

Enzymes 265

- 10.1 The General Characteristics of Enzymes 266
- 10.2 Enzyme Nomenclature and Classification 267
- Chemistry Around Us 10.1*
- Enzymes and Disease* 268
- 10.3 Enzyme Cofactors 269
- 10.4 Mechanism of Enzyme Action 270
- 10.5 Enzyme Activity 271
- 10.6 Factors Affecting Enzyme Activity 272

*Chemistry Around Us 10.2**Extremozymes* 273

10.7 Enzyme Inhibition 274

*Chemistry Around Us 10.3**Antifreeze Poisoning and Competitive Inhibition* 278

10.8 Regulation of Enzyme Activity 279

*Study Skills 10.1**Summary Chart of Enzyme Inhibitors* 280

10.9 Medical Applications of Enzymes 282

*Key Chemicals 10.1**Enzymes to Dissolve Blood Clots* 282

Concept Summary 284

Learning Objectives 284

Key Terms and Concepts 284

Key Reactions 285

Exercises 285

Points to Ponder and Pursue 286

Chapter 11

Nucleic Acids and Protein Synthesis 287

11.1 Components of Nucleic Acids 288

11.2 Structure of DNA 290

11.3 Replication of DNA 293

*Chemistry Around Us 11.1**The Polymerase Chain Reaction* 296

11.4 Ribonucleic Acid (RNA) 298

11.5 The Flow of Genetic Information 300

11.6 Transcription: RNA Synthesis 301

*Chemistry Around Us 11.2**Fighting the AIDS Virus* 303

11.7 The Genetic Code 303

*Study Skills 11.1**Remembering Key Words* 305

11.8 Translation and Protein Synthesis 306

11.9 Mutations 308

11.10 Recombinant DNA 309

*Key Chemicals 11.1**DNA: A Key in Modern Forensics* 310*Chemistry Around Us 11.3**The Human Genome Project* 313

Concept Summary 313

Learning Objectives 314

Key Terms and Concepts 314

Exercises 315

Points to Ponder and Pursue 316

Chapter 12

Nutrition and Energy for Life 317

12.1 Nutritional Requirements 318

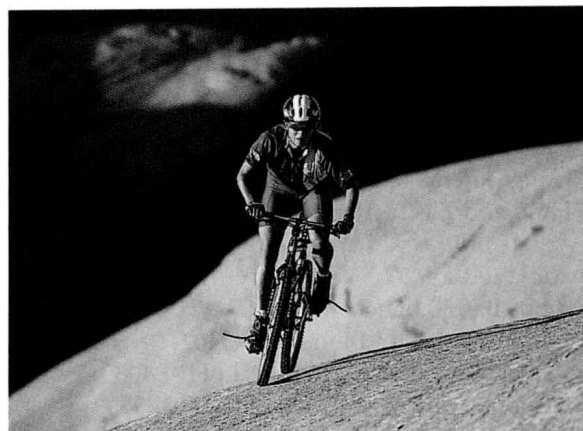
12.2 The Macronutrients 319

<i>Chemistry Around Us 12.1</i>	
<i>New Dietary Guidelines from the USDA</i>	322
<i>Chemistry Around Us 12.2</i>	
<i>Protein and Amino Acid Supplements</i>	323
12.3 Micronutrients I: Vitamins	323
12.4 Micronutrients II: Minerals	324
12.5 The Flow of Energy in the Biosphere	326
12.6 Metabolism and an Overview of Energy Production	328
12.7 ATP: The Primary Energy Carrier	329
<i>Study Skills 12.1</i>	
<i>Bioprocesses</i>	330
<i>Key Chemicals 12.1</i>	
<i>ATP</i>	332
12.8 Important Coenzymes in the Common Catabolic Pathway	333
Concept Summary	338
Learning Objectives	338
Key Terms and Concepts	339
Key Reactions	339
Exercises	339
Points to Ponder and Pursue	341

Chapter 13

Carbohydrate Metabolism 343

13.1 Digestion of Carbohydrates	344
13.2 Blood Glucose	344
13.3 Glycolysis	344
<i>Chemistry Around Us 13.1</i>	
<i>Lactose Intolerance</i>	346
13.4 Fates of Pyruvate	347
<i>Key Chemicals 13.1</i>	
<i>Glucose</i>	348
<i>Chemistry Around Us 13.2</i>	
<i>Lactate Accumulation</i>	350
13.5 The Citric Acid Cycle	351
13.6 The Electron Transport Chain	353
13.7 Oxidative Phosphorylation	354
13.8 Complete Oxidation of Glucose	356
13.9 Glycogen Metabolism	357
<i>Study Skills 13.1</i>	
<i>Key Numbers for ATP Calculations</i>	358
13.10 Gluconeogenesis	359
13.11 Hormonal Control of Carbohydrate Metabolism	359
<i>Chemistry Around Us 13.3</i>	
<i>Diabetes Mellitus</i>	361
Concept Summary	362
Learning Objectives	363
Key Terms and Concepts	363
Key Reactions	363
Exercises	364
Points to Ponder and Pursue	366



Chapter 14

Lipid and Amino Acid Metabolism 367

14.1 Blood Lipids	368
14.2 Fat Mobilization	369
14.3 Glycerol Metabolism	370
<i>Key Chemicals 14.1</i>	
<i>High-Density Lipoprotein (HDL)</i>	371
14.4 Oxidation of Fatty Acids	371
<i>Chemistry Around Us 14.1</i>	
<i>Burning Off More Fat</i>	374
14.5 The Energy from Fatty Acids	375
<i>Study Skills 14.1</i>	
<i>Key Numbers for ATP Calculations</i>	376
14.6 Ketone Bodies	376
14.7 Fatty Acid Synthesis	377
14.8 Amino Acid Metabolism	378
14.9 Catabolism of Amino Acids: Fate of the Nitrogen Atoms	380
<i>Chemistry Around Us 14.2</i>	
<i>Ammonia Toxicity</i>	383
14.10 Catabolism of the Carbon Skeleton of Amino Acids	384
14.11 Amino Acid Biosynthesis	385
<i>Chemistry Around Us 14.3</i>	
<i>Phenylketonuria (PKU)</i>	385
Concept Summary	387
Learning Objectives	387
Key Terms and Concepts	388
Key Reactions	388
Exercises	389
Points to Ponder and Pursue	391

Chapter 15

Body Fluids 393

15.1 Comparison of Body Fluids	394
15.2 Oxygen and Carbon Dioxide Transport	394

Key Chemicals 15.1

Calcium and Osteoporosis 396

Chemistry Around Us 15.1

Exercise and Altitude 398

15.3 Chemical Transport to the Cells 399

15.4 Constituents of Urine 400

15.5 Fluid and Electrolyte Balance 400

Chemistry Around Us 15.2

Heat Stroke 401

15.6 Acid–Base Balance 402

15.7 Buffer Control of Blood pH 402

15.8 Respiratory Control of Blood pH 403

15.9 Urinary Control of Blood pH 404

15.10 Acidosis and Alkalosis 405

Concept Summary 407

Learning Objectives 408

Key Terms and Concepts 408

Key Reactions 408

Exercises 408

Points to Ponder and Pursue 410

Appendix A

The International System of Measurements A-1

Appendix B

Answers to Even-Numbered End-of-Chapter Exercises B-1

Appendix C

Solutions to Learning Checks C-1

Glossary G-1

Index I-1