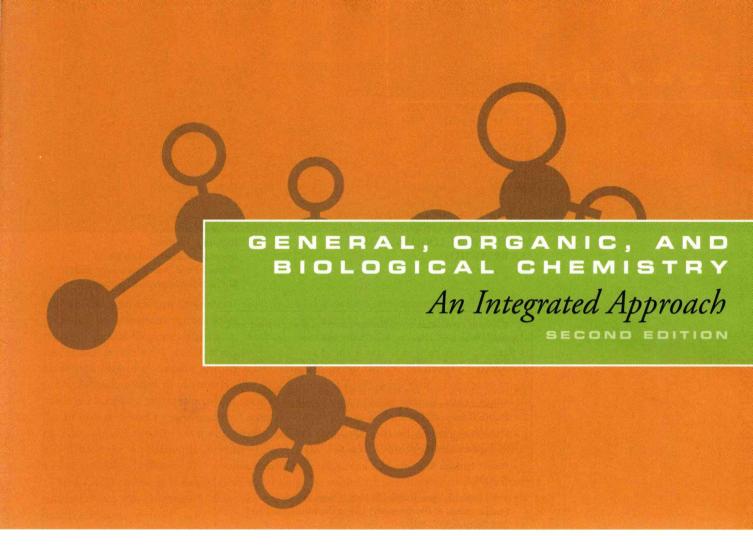


# CHEMISTRY

AN INTEGRATED APPROACH | 2nd Edition

KENNETH W. RAYMOND



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Eastern Washington University



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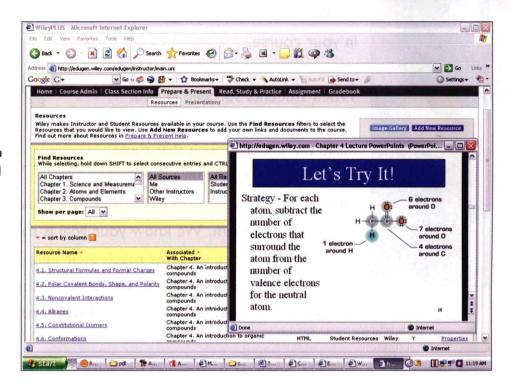


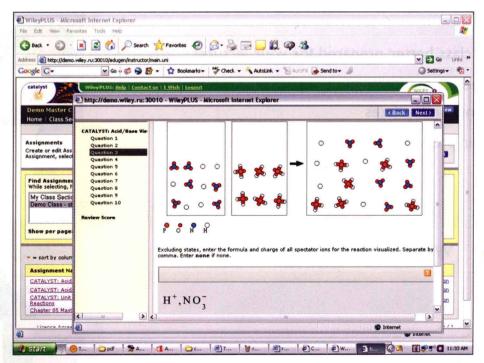
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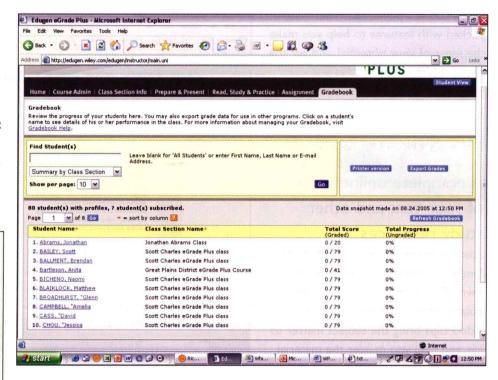
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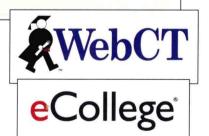
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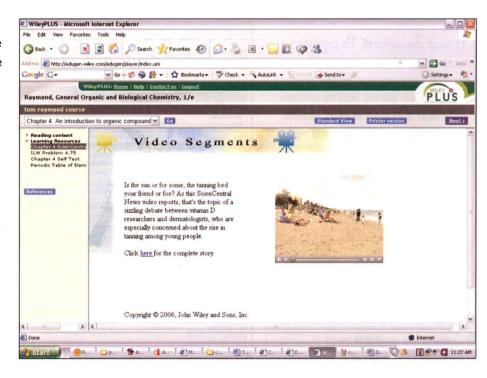
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# GENERAL, ORGANIC, AND BIOLOGICAL CHEMISTRY

An Integrated Approach

SECOND EDITION



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his second edition of General, Organic, and Biochemistry: an Integrated Approach has been written for students preparing for careers in health-related fields such as nursing, dental hygiene, nutrition, medical technology, and occupational therapy. The text is also suitable for students majoring in other fields where it is important to have an understanding of chemistry and its relationship to living things. Students need have no previous background in chemistry, but should possess basic math skills. For those whose math is a bit rusty, the text provides reviews of the important material. While designed for use in one-semester or two-quarter General, Organic, and Biochemistry (GOB) courses, instructors have found that it also works well for one-year courses, especially when combined with the supplement *Chemistry Case Studies For Allied Health Students* by Colleen Kelley and Wendy Weeks.

In a GOB course it is essential to show how the subject matter relates to the students' future careers. For this reason, this text makes extensive use of real-life examples from the health sciences.

# ORGANIZATION

In most GOB texts, a group of chapters on general chemistry is followed by a series of organic chemistry chapters, which is followed by chapters devoted to biochemistry. Years of experience in teaching health science courses have shown the author that there is a drawback to this approach: in many cases there is a long time interval between when a topic is first presented and when it is used again—enough of a break that students' familiarity with the subject matter has often lapsed.

In introducing GOB material, this text uses an integrated approach in which related general chemistry, organic chemistry, and biochemistry topics are presented in adjacent chapters. This approach helps students see the strong connections that exist between these three branches of chemistry and allows instructors to discuss these interrelationships while the material is still fresh in students' minds. This integration involves the following sets of chapters:

- Chapter 3 (Compounds) and Chapter 4 (An Introduction to Organic Compounds). An introduction to bonding and compounds is followed by a look at the members of a few key organic families.
- Chapters 3 and 4 and Chapter 6 (Reactions). A study of inorganic and organic compounds is followed (after a look at gases, liquids, and solids in Chapter 5) by an introduction to their reactions.
- Chapter 7 (Solutions) and Chapter 8 (Lipids and Membranes). A discussion of solubility is followed by a look at the importance of solubility in biochemistry. Some reactions from Chapter 6 are reintroduced.
- Chapter 9 (Acids and Bases) and Chapter 10 (Carboxylic Acids, Phenols, and Amines). Principles of acid/base chemistry from an inorganic perspective are followed by a chapter on the organic and biochemical aspects of this topic.

EDITION

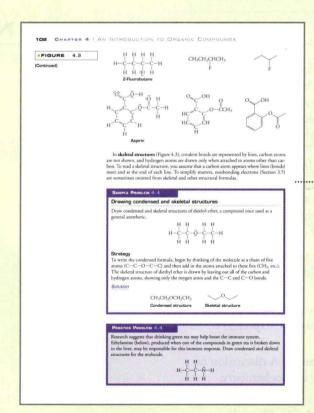
Chapter 11 (Alcohols, Aldehydes, and Ketones) and Chapter 12 (Carbohydrates).
 An introduction to the chemistry of alcohols, aldehydes and ketones is followed by a presentation of related biochemical applications.

The many reviewers of this text have made helpful suggestions. The major changes to the second edition are:

- Newly introduced material: Molar mass (Chapter 2), step-by-step instructions for drawing molecules and polyatomic ions (Chapter 4), ionic equations and net ionic equations (Chapter 7), and naming esters and amides (Chapter 10).
- Revised material: Changed group naming from IA, IIA format to 1A, 2A format (Chapter 2), added details on naming binary molecules and introduced a table of prefixes used for naming them (Chapter 2), modified treatment of the combined gas law and the ideal gas law (Chapter 5), and updated discussion of waxes, fatty acids, phospholipids, and eicosanoids (Chapter 8).
- New Appendicies: Important families of organic compounds (Appendix B) and Naming ions, ionic compounds, binary molecules, and organic compounds (Appendix C).
- Addition of new chapter sections: Reaction types (Section 6.2), Maintaining the pH of blood serum (Section 9.10), and Oxidation of phenols (Section 10.5).

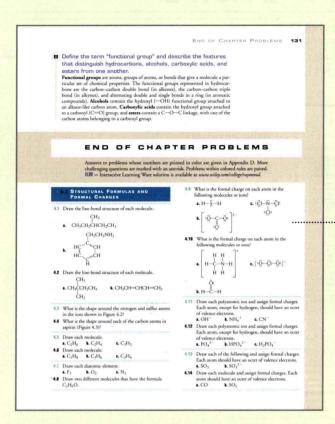
### PROBLEM SOLVING

Learning to do anything requires practice, and in chemistry this practice involves solving problems. This text offers students ample opportunities to do so.



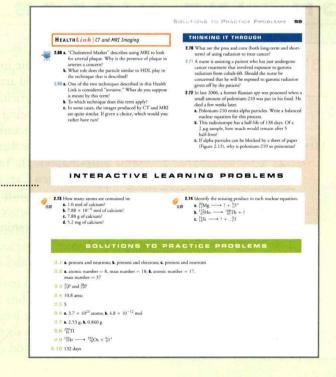
Sample Problems and Practice Problems.

Each major topic is followed by a sample problem and a related practice problem. The solution to each sample problem is accompanied by a strategy to use when solving the problem. The answers to practice problems are given at the end of the chapter.

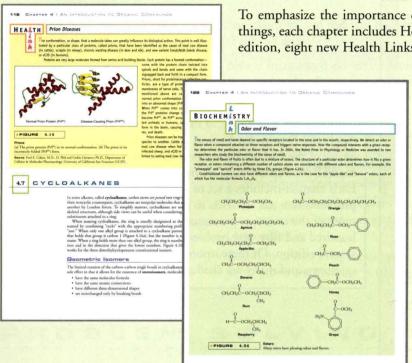


• End of Chapter Problems. A large number of problems can be found and the end of each chapter, and Appendix D provides answers for the odd-numbered ones. Many of the end of chapter problems are paired and some, marked with an asterisk, are more challenging than others. Each chapter includes a set of *Thinking It Through* problems that ask students to go a bit further with one or more of the concepts presented in the chapter. Over two hundred and fifty new problems have been added to the second edition. Of these, more than half are multi-part questions and many are challenging.

• Interactive Learning Ware Problems. The text's website (http://www.wiley.com/college/raymond) features Interactive Learning Ware (ILW), a step-by-step problem solving tutorial program that guides students through selected problems from the book. The ILW problems are representative of those that students frequently find most difficult and they reinforce students' critical thinking and problem solving skills. An ILW icon identifies each ILW problem in the end-of-chapter question section.



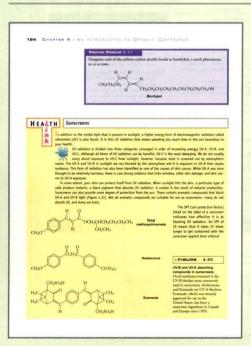
# HEALTH LINKS AND BIOCHEMISTRY LINKS



To emphasize the importance of chemistry to the health sciences and to living things, each chapter includes Health Links and Biochemistry Links. In the second edition, eight new Health Links have been added: Body Mass Index (Chapter 1),

Dental Fillings (Chapter 3), Making Weight (Chapter 5), Saliva (Chapter 7), Omega-3 fatty acids (Chapter 8), Biofilms (Chapter 10), Drugs in the environment (Chapter 11), and RNA Interference (Chapter 14). In addition, six Health Links from the first edition have been updated: Body Temperature (Chapter 1), Dietary Reference Intakes (formerly Recommended Daily Allowances) (Chapter 2), CT and MRI (formerly CT and PET) (Chapter 2), Sunscreens (Chapter 4), *Trans* fats (Chapter 8), and Proteins in Medicine (formerly Enzymes in Medicine) (Chapter 13).

# ON-LINE VIDEOS

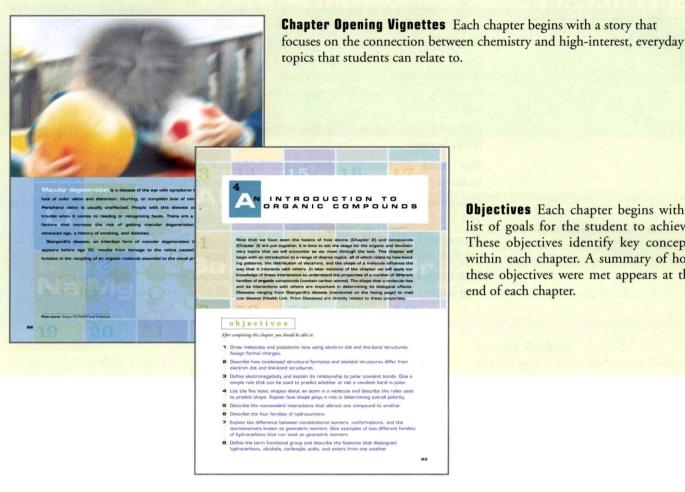


For one topic in each chapter, a special icon is used to indicate that an on-line ScienCentral article and video clip are available for viewing.

These articles and video clips are of interest because they show how the chemistry being presented pertains to current events. Each set of end of chapter problems includes some related to the video content. The video titles include: Pork on the Run (Chapter 1), Cholesterol Marker (Chapter 2), Glowing Fish (Chapter 3), Tanning & Health (Chapter 4), Breath Of Life (Chapter 5), Hydrogen Cars (Chapter 6), Kidney Bones (Chapter 7), Teen Steroids (Chapter 8), Cystic Fibrosis Mucus (Chapter 9), Meth and the Brain (Chapter 10), Toxin Eaters (Chapter 11), Sweet Spot (Chapter 12), Young Hearts (Chapter 13), Cancer Screening (Chapter 14), Exercise Gene (Chapter 15).



### OTHER TEXT FEATURES



Objectives Each chapter begins with a list of goals for the student to achieve. These objectives identify key concepts within each chapter. A summary of how these objectives were met appears at the end of each chapter.

Student Web Site Within each chapter you will find an icon \* a indicating that there is a ScienCentral sciencentral ne. news video at the website with a news story related to chapter content. The web site also features practice quizzes and Interactive Learningware problems.

Student Solutions Manual and Study Guide Written by Byron Howell, Tyler Junior College and Adeliza Flores, of Las Positas College, this supplement contains worked out solutions to the odd-numbered text problems; chapter summaries; sample problems, and practice problems.

Laboratory Manual Written by David Macaulay, Joseph Bauer, and Molly Bloomfield. This lab manual is written for the one or two-term chemistry lab course for students in the allied health sciences and related fields. These experiments are presented in an integrated table of contents and contain chapter references from General, Organic, and Biological Chemistry: An Integrated Approach, Second Edition.

Chemistry Case Studies For Allied Health Students Written by Colleen Kelley and Wendy Weeks. This manual was designed to bring relevance and critical thinking skills to the allied health chemistry course. Students are encouraged to become "diagnosticians" and apply their newly-acquired chemistry knowledge to solving real life health and environmental cases. The case manual also encourages a holistic approach by asking students to synthesize information across topics.

SUPPORT PACKAGE FOR STUDENTS

### SUPPORT PACKAGE FOR INSTRUCTORS

**PowerPoint Lecture Slides** Created by Colleen Kelley, Pima Community College, these slides contain lecture outlines and key topics from each chapter of the text, along with supporting artwork and figures from the text. The slides also contain assessment questions and questions for in-class discussion.

WileyPlus Homework Management System WileyPlus is a powerful on-line tool that provides a completely integrated suite of teaching and learning resources in one easy-to-use web site. WileyPlus integrates Wiley's world-renowned content with media, including a multimedia version of the text, PowerPoint slides, on-line assessment, and more.

*Digital Image Archive* The text web site includes downloadable files of text images in JPEG format.

*Test Bank* Written by John Singer, Jackson Community College, the test bank includes multiple choice, true/false, and short answer questions.

**Computerized Test Bank** The IBM and Macintosh compatible version of the entire Test Bank has full editing features to help the instructor customize tests.

*Instructor's Manual* Written by Colleen Kelley, Pima Community College, this supplement provides Chapter Summaries and lecture outlines.

*Instructor's Solutions Manual* Written by Adeliza Flores, of Las Positas College, this supplement contains worked-out solutions to all of the end-of-chapter problems.

# ACKNOWLEDGMENTS

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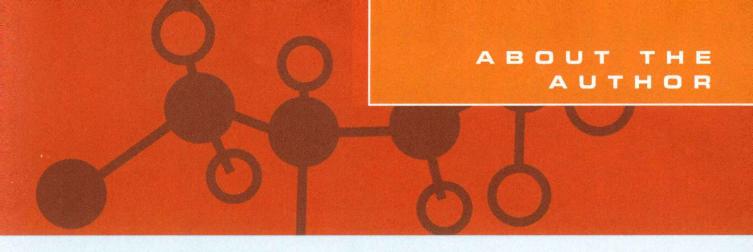
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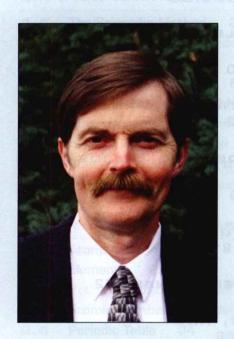
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**Todd Wimpfheimer** 

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