

Preface

The seventh edition of *General Chemistry: The Essential Concepts* continues the tradition of presenting the material that is essential to a one-year general chemistry course. It includes all the core topics that are necessary for a solid foundation in general chemistry without sacrificing depth, clarity, or rigor. The positive feedback from users over the years shows that there continues to be a strong need for a concise but thorough text containing all of the core concepts necessary for a solid foundation in general chemistry. *General Chemistry* covers the essential topics in the same depth and at the same level as much longer texts. The reduction in length in this text is achieved in large part by omitting chapters dedicated to descriptive chemistry and boxed essays describing specific applications of chemistry; however, many meaningful and relevant examples of descriptive and applied chemistry are included in the core chapters in the form of end-of-chapter problems.

What's New in This Edition?

Kenneth Goldsby, Florida State University, has joined Raymond Chang as an author on the seventh edition of *General Chemistry*. Ken's background in inorganic chemistry has added insight into content and problems, and his extensive work with undergraduate students, both in the classroom and in the laboratory, reinforces Raymond's long tradition of understanding and respecting the student's view of the material as well as that of the instructor's.

Many new **End-of-Chapter Problems** have been added to this edition of *General Chemistry*, with an emphasis on interpreting graphs and solving problems based on visual information. End-of-chapter problems are organized in various ways. Each section under a topic heading begins with Review Questions followed by Problems. The Additional Problems section provides more problems not organized by section.

Many of the examples and end-of-chapter problems present extra tidbits of knowledge and enable the student to solve a chemical problem that a chemist would solve. In particular, numerous problems are based on descriptive and applied chemistry that would be found in boxed essays and the later chapters of a longer text; see Problems 1.72, 4.115, 6.108, 8.108, 11.73, 13.105, and 19.127. These examples and problems show students the real world of chemistry and applications to everyday life situations.

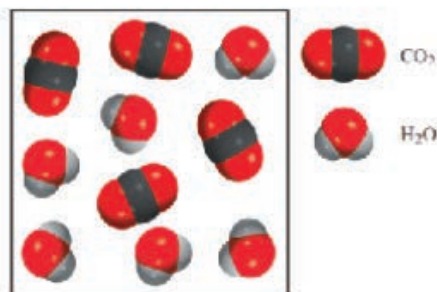
New is the creation and versatility of our **Connect Chemistry** system. McGraw-Hill has initiated a rigorous process to ensure high-quality electronic homework. Through careful observation of real students and active instructors, we have advanced online homework to an online learning and engagement environment. The goal of Connect is to usher in a new era of meaningful online learning that balances the conceptual and quantitative problem solving aspect of this most vital discipline.

McGraw-Hill is offering students and instructors an enhanced digital homework experience using **Connect**

Click in the answer box to activate the palette.

The diagram represents the products (CO_2 and H_2O) formed after the combustion of a hydrocarbon (a compound containing only C and H atoms).

Write an equation for the reaction.
(Hint: The molar mass of the hydrocarbon is about 30 g/mol.)



Question

NetCalculator

Assistance

View Hint

View Question

Show Me

Guided Solution

Print

Question Help

Report a Problem

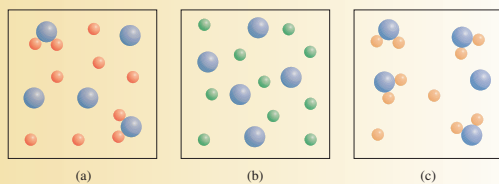
Chemistry. Each problem within Connect Chemistry carries the text problem-solving methodology and is tailored with specific hints, as well as answer-specific feedback for common incorrect answers. Each question has been accuracy checked by two or more chemistry professors. Several rounds of editorial and chemical accuracy checking, in addition to numerous instructor and student tests of all problems, ensure the accuracy of all content.

In addition to the specific hints and feedback provided for all questions, many questions allow students a chemical drawing experience that can be assessed directly within their online homework. Connect Chemistry utilizes ChemDraw, which is widely considered the “gold standard” of scientific drawing programs and the cornerstone application for scientists who draw and annotate molecules, reactions, and pathways. This collaboration of Connect and ChemDraw features an easy-to-use, intuitive, and comprehensive course management and homework system with professional-grade drawing capabilities.

New **Review of Concepts** have been added to many chapters. Review of Concepts are quick conceptual exercises spread throughout the chapters to enable the student to gauge his or her understanding of the concept just presented. The answers to the Review of Concepts are available in the Problem-Solving Workbook and on the companion website in Connect.

Review of Concepts

The diagrams show three compounds (a) AB_2 , (b) AC_2 , and (c) AD_2 dissolved in water. Which is the strongest electrolyte and which is the weakest? (For simplicity, water molecules are not shown.)



The entire text has been revised to improve clarity and readability, hallmark characteristics of *General Chemistry*. New and substantial revisions to **chapters and sections** include

- Chapter 3—summary of solving stoichiometry problems based on the mole method.
- Chapter 4—new Example 4.4 on writing molecular, ionic, and net-ionic equations addressing common misconceptions for diprotic and triprotic acids.
- Chapter 9—Example 9.11 provides insight into drawing Lewis structures for compounds containing elements in the third period and beyond, and addresses the controversies in drawing these structures.

- Chapter 19—discussion of the increasingly important lithium-ion battery has been updated, including a new figure highlighting the role of graphene in these systems.
- Chapter 21—up-to-date information on the nuclear power plant accident in Fukushima, Japan, and its implications for the nuclear power industry.

Visualization

Graphs and Flow Charts are important in science. In *General Chemistry*, flow charts illustrate a conceptual thought process or an approach to solving a problem. A significant number of Problems and Review of Concepts, many new to this edition, include graphical data; for example, see the Review of Concepts on page 215 and Problems 4.118, 5.120, 13.113, 17.73, and 21.77.

Study Aids

Setting the Stage

Each chapter starts with the chapter outline and a list of the essential concepts in the chapter.

Chapter Outline enables the student to see at a glance the big picture and focus on the main ideas of the chapter.

Essential Concepts summarizes the main topics to be presented in the chapter.

Tools to Use for Studying

Study aids are abundant in *General Chemistry*, enabling students to reinforce the comprehension of chemical concepts and learn problem-solving skills.

Worked Examples, along with the accompanying Practice Exercise, is a very important tool for learning and mastering chemistry. The problem-solving steps guide the student through the critical thinking necessary for succeeding in chemistry. Using sketches helps the student understand the inner workings of a problem. A margin note lists similar problems in the end-of-chapter problems section, enabling the student to apply new skill to other problems of the same type. Answers to the Practice Exercises are listed at the end of the chapter problems.

Review of Concepts enables the student to evaluate if they understand the concept presented in the section. Answers to the Review of Concepts can be found in the Problem-Solving Workbook and online in the accompanying Connect Chemistry companion website.

Key equations are highlighted within the chapter, drawing the student’s eye to material that needs to be understood and retained. The key equations are also

presented in the chapter summary materials for easy access in review and study.

Summary of Facts and Concepts provides a quick review of concepts presented and discussed in detail within the chapter.

Testing Your Knowledge

End-of-Chapter problems enable the student to practice critical thinking and problem-solving skills. The problems are broken into various types:

- By chapter section. Starting with Review Questions to test basic conceptual understanding, followed by Problems to test the student's skill in solving problems for that particular section of the chapter.
- Additional Problems uses knowledge gained from the various sections and/or previous chapters to solve the problem.

Real-Life Relevance

Interesting examples of how chemistry applies to life, both around the home and “on the job,” are used throughout the text. Analogies based on common experiences such as banking (Chapter 6) and driving (Chapter 14) are used to help foster understanding of abstract chemical concepts. End-of-chapter problems ask students to apply the concepts presented in the text to answer questions drawn from common experiences, including: Why do swimming coaches sometimes place a drop of alcohol in a swimmer's ear? How does one determine if it is “safe” to open a carbonated soft drink bottle before removing the cap?

Enhanced Support for Faculty and Students

To the Instructor:



www.mcgrawhillconnect.com/chemistry

McGraw-Hill Connect[®] is a Web-based, interactive assignment and assessment platform that incorporates cognitive science principles to customize the learning process. The chemical drawing tool found within Connect Chemistry is PerkinElmer ChemDraw, which is

widely considered the “gold standard” of scientific drawing programs and the cornerstone application for scientists who draw and annotate molecules, reactions, and pathways. This combination of Connect and ChemDraw features an easy-to-use, intuitive and comprehensive course management and homework system with professional-grade drawing capabilities.

End-of-chapter problems from this textbook are available in Connect Chemistry for instructors to build assignments that are automatically graded and tracked through reports that export easily to Excel. Instructors can edit existing problems and write entirely new problems; track individual student performance—by problem, assignment, concepts, or in relation to the class overall—with automatic grading; provide instant feedback to students; and store detailed grade reports securely online. Grade reports can be easily integrated with learning management systems such as WebCT and Blackboard. Single sign-on integration is available with Blackboard course management systems. Within Connect, instructors can also create and share materials with colleagues. Ask your McGraw-Hill representative for more information, and then check it out at www.mcgrawhillconnect.com/chemistry.

With ConnectPlus, if you or your students are ready for an alternative version of the traditional textbook, McGraw-Hill has your solution. E-books from McGraw-Hill are smart, interactive, searchable, and portable. Included is a powerful suite of built-in tools that allow detailed searching, highlighting, note taking, and instructor-to-student note sharing. In addition, the media-rich E-book for *Chemistry* integrates relevant animations and videos into the textbook content for a true multimedia learning experience.



McGraw-Hill LearnSmart[™] This adaptive diagnostic learning system, based on artificial intelligence, constantly assesses the student's knowledge of the course material. As the student works within the system, LearnSmart develops a personal learning path adapted to what the student has actively learned and retained. This innovative study tool also has features to allow the instructor to see exactly what the student has accomplished, with a built-in assessment tool for graded assignments. LearnSmart for general chemistry can be accessed by going to www.mcgrawhillconnect.com/chemistry.