

WHAT'S NEW IN THE FIFTH EDITION?

Enhancements in Pedagogy

A new edition always brings an opportunity to enhance the text's pedagogy. As in earlier editions, writing has been clarified wherever readers felt ideas could flow more smoothly. Updates made to rapidly changing areas of chemistry always tie the application to fundamental principles. Each chapter ends with a Chapter Review Guide, which offers ways to review the chapter content through Learning Objectives, Key Terms, Key Equations and Relationships, Highlighted Figures and Tables, and, most importantly, Brief Solutions to Follow-Up Problems, which effectively doubles the number of worked problems. But, by far the greatest pedagogical change is the addition of many new worked sample problems and end-of-chapter problems that use simple molecular scenes to teach quantitative concepts.

Molecular-Scene Sample Problems

Many texts include molecular-scene problems in their end-of-chapter sets, but none makes the attempt to explain how to reason toward a solution. It seemed most productive to help students solve these end-of-chapter problems by working out similar ones within the chapter, just as the text does with other types of worked problems. In the previous (4th) edition, in addition to the inclusion of more molecular-scene problems in the end-of-chapter sets, 5 worked-out, molecular-scene sample problems were introduced, and they used the same multistep problem-solving approach as in other sample problems. Responses from students and teachers alike were very positive, so 17 new molecular-scene sample problems and an equal number of follow-up problems have been included in this edition. Together with the original 5, they make a total of 44 such problems, providing a rich source for learning how to understand quantitative concepts via simple chemical scenes.

End-of-Chapter Problems

In each edition, a special effort is made to create new problems that address pedagogical needs and real applications. In the 5th edition, in addition to the quantitative revision of hundreds of end-of-chapter problems, over 135 completely new ones have been added. Of these, 88 are molecular-scene problems, which, together with the 52 already present from the 4th edition, offer abundant practice for the skills learned in the molecular-scene sample and follow-up problems. The remaining new problems incorporate realistic, up-to-date scenarios in biological, organic, environmental, or engineering/industrial applications and are at the challenging level.

Content Changes to Individual Chapters

After four successful editions, *Chemistry: The Molecular Nature of Matter and Change* has reached a level of matu-

urity in that much of the mainstream content works well for teacher and student. But everyone's course is unique, so the content is presented with many section and subsection breaks so that it can, in most cases, be rearranged with minimal loss of continuity. Thus, for example, redox balancing can be covered in Chapter 4, in Chapter 21, or, as done in the text, both in Chapter 4 (oxidation-number method) and Chapter 21 (half-reaction method, in preparation for electrochemistry). Likewise, several chapters can be taught in a different order. For instance, gases (Chapter 5) can be covered in sequence to explore the mathematical modeling of physical behavior or, with no loss of continuity, just before liquids and solids (Chapter 12) to show the effects of intermolecular forces on the three states of matter. In fact, based on user feedback, many of you already move chapters and sections around, for example, covering descriptive chemistry (Chapter 14) and organic chemistry (Chapter 15) in the more traditional placement at the end of the course. The topic sequence is flexible, and you should feel comfortable making these, or any of numerous other changes, to suit your course.

In the 5th edition, small content changes have been made to many chapters, but a few sections, and even one whole chapter, have been revised considerably. Among the most important changes to this edition are the following:

- Chapter 3 now introduces reaction tables in the discussion of limiting reactants to show the changes in amounts in a stoichiometry problem, just as similar tables are used later to show changes in amounts in an equilibrium problem.
- Chapter 5 includes an updated discussion of how gas behavior relates to Earth's atmosphere.
- Chapter 6 provides updated coverage of how thermochemical ideas relate to the future of energy sources, with expanded coverage of climate change.
- Chapter 12 contains an updated discussion of the relation between the solid state and nanotechnology.
- Chapter 15 includes new material on the role of H-bonding in DNA profiling for forensic chemistry.
- Chapter 16 offers an updated discussion of the catalytic basis of ozone depletion in the stratosphere.
- Chapter 19 covers quantitative analysis by selective precipitation in an earlier section and eliminates the outdated discussion of ion-group qualitative analysis.
- Chapter 20 has been revised further to clarify the discussion of entropy, with several new pieces of art to illustrate key ideas.
- Chapter 24 has been thoroughly revised to more accurately reflect modern ideas in nuclear chemistry.
- Appendices of equilibrium constants for weak acids and bases now include structures of the species.