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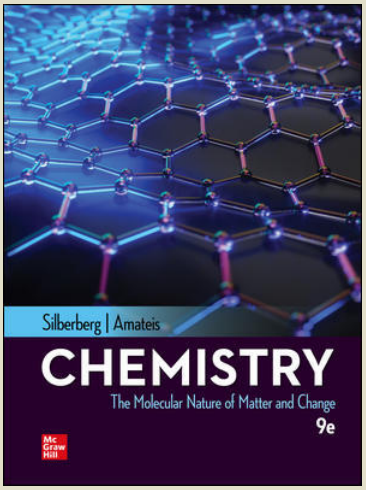
List of Changes



Chemistry: The Molecular Nature of Matter and Change
9th Edition

Silberberg and Amateis

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Chemistry: *The Molecular Nature of Matter and Change* by Martin Silberberg and Patricia Amateis has been recognized in the general chemistry market as an unparalleled classic. The revision for the ninth edition focused on continued optimization of the text. To aid in this process, we were able to use data from literally thousands of student responses to questions in LearnSmart, the adaptive learning system that assesses student knowledge of course content. The data, such as average time spent answering each question and the percentage of students who correctly answered the question on the first attempt, revealed the learning objectives that students found particularly difficult, which we addressed by revising surrounding text or adding additional learning resources such as videos and slideshows. The text still contains unprecedented macroscopic-to-microscopic molecular illustrations, consistent step-by-step worked exercises in every chapter, and an extensive range of end-of-chapter problems, which provide engaging applications covering a wide variety of interests, including engineering, medicine, materials, and environmental studies. Changes have been made to the text and applications throughout to make them more succinct, to the artwork to make it more teachable and modern, and to the design to make it more simplistic and open.

SEE LIST OF CHANGES ATTACHED.

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Changes to Silberberg: Chemistry, 9e

New Features:

- **Optimization of the text:** We were able to use data from literally thousands of student responses to questions in SmartBook probes. With the data, we were able to both hone our text content when needed and, for particularly challenging concepts, point students to the learning resources which can elucidate and reinforce those concepts.
- In almost every chapter, several **sample and follow-up problems** (and their brief solutions) were revised in this edition.
- **Annotated illustrations**: The innovative three-level figures and other art that raised the bar for molecular visualization in chemistry textbooks is still present. Several existing figures have been revised and several new ones added to create an even better teaching tool.

Chapter-by-Chapter Updates:

Chapter 1: Keys to Studying Chemistry: Definitions, Units, and Problem Solving

- Revised discussion of significant figures to make this important topic clearer.
- Two revised sample problems on significant figures and rounding in calculations.
- A new follow-up problem on using density in calculationsImproved overview of environmental health factors.

Chapter 2: The Components of Matter

- Includes an improved discussion on mass spectrometry, isotopic composition, and atomic mass.
- Five new figures to aid in nomenclature of compounds, including a summary nomenclature decision tree.
- Two new end-of-chapter problems on naming compounds.

Chapter 3: Stoichiometry of Formulas and Equations

- Now features two new problem-solving Student Hot Spot resources on mass/moles/molecules conversions and on determination of a molecular formula.
- Revisions to four sample problems on stoichiometry.

Chapter 4: Three Major Classes of Chemical Reactions

- Has been reorganized for better flow and clarity.
- There is a new table on the types of electrolytes.
- A revised sample problem on the stoichiometry of ions in solution.
- A revised sample problem on writing acid-base reactions.

Chapter 5: Gases and the Kinetic-Molecular Theory

- Has three improved sample problems.
- Two revised figures on gas laws.

Chapter 6: Thermochemistry: Energy Flow and Chemical Change

- Includes heavily revised sample problems on heat, temperature change, and specific heat capacity; Hess's Law; and calculations with heat of formation values.
- The Chemical Connections on energy has been updated.

Chapter 7: Quantum Theory and Atomic Structure

- Includes a new video to help students understand line spectra.
- Three revised figures.
- A revised sample problem on quantum numbers.

Chapter 8: Electron Configuration and Chemical Periodicity

- Incorporates a new figure to illustrate penetration and shielding of 4s vs. 3d orbitals.
- Four revised figures (on electron spin, orbital filling, element reactivity, and acid-base behavior of oxides).
- A heavily revised discussion on using the periodic table to write electron configurations.
- A new treatment of the concept of assigning quantum numbers to electrons.

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Chapter 9: Models of Chemical Bonding

- Has a revised treatment of the Born-Haber cycle.
- A clearer discussion of the three types of bonding.

Chapter 10: The Shapes of Molecules

- Includes two new videos: one video demonstrates the process of drawing Lewis structures and one explains the process of determining molecular geometry.
- There are also improvements in the text explanation about drawing Lewis structures, on assigning and using formal charges, and on determining molecular polarity.

Chapter 11: Theories of Covalent Bonding

- Has a revised sample problem and a new follow-up problem on types of orbitals.
- A revised follow-up problem on hybrid orbitals.
- An improved discussion on hybridization and bond angles in molecules.

Chapter 12: Intermolecular Forces: Liquids, Solids, and Phase Changes

- Includes a rewritten section on phase changes.
- A new discussion on intermolecular forces and boiling points.
- A revision to a figure that helps students determine the type of intermolecular forces in a sample.
- Updated discussions in the advanced material section on LEDs, plastic recycling, 3-D printing, and nanomedicine.

Chapter 13: The Properties of Mixtures: Solutions and Colloids

- Incorporates a new video on freezing point depression calculations.
- A new graphical figure that depicts Henry's law for several gases and connects gas solubility with molar mass and the strength of dispersion forces.
- A revised figure on the types of intermolecular forces in solution.
- A revised sample and follow-up problems on predicting charge density.

Chapter 14: Periodic Patterns in the Main-Group Elements

- Has two revised figures, one showing silicates and the other showing crystals of a noble gas compound.
- An updated discussion, with new figures, on carbon allotropes.

Chapter 15: Organic Compounds and the Atomic Properties of Carbon

- Includes a new example and new art to aid in naming organic compounds.
- New videos on naming alkanes, understanding optical isomers, and recognizing functional groups.

Chapter 16: Kinetics: Rates and Mechanisms of Chemical Reactions

- Has a newly organized section on rate laws and half-lives for first-, second-, and zero-order reactions.
- An addition to a sample problem that requires the calculation of rate from rate constant and concentration data.
- A new follow-up problem on first-order integrated rate law calculations.
- Several new or revised end-of-chapter problems.
- The section on collision theory, activation energy, and transition state theory was heavily revised for better flow and clarity.
- There is a new Student Hot Spot resource on solving first-order integrated rate law problems.

Chapter 17: Equilibrium: The Extent of Chemical Reactions

- Has several revised and new sample problems and follow-up problems, including a new sample problem on the van't Hoff equation for calculating the change in equilibrium constant with a change in temperature.
- Several new end-of-chapter problems.
- Three new Student Hot Spot resources explaining equilibrium and Le Chatelier's principle.
- There are two revised figures on equilibrium position.

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Chapter 18: Acid-Base Equilibria

- Has a significant rearrangement of topics, introducing conjugate acid-base pairs and the pH scale before the introduction of Ka.
- Two new figures, one describing the relationship between [H+] and [OH–] and the other summarizing Ka and Kb calculations.
- Three revised sample and follow-up problems.
- Two new videos to help students understand acidic metal cations and how to predict the pH of salts with amphiprotic anions.

Chapter 19: Ionic Equilibria in Aqueous Systems

- Includes three new tables, one summarizing buffer pH relative to buffer concentration ratio and the other two summarizing pH calculations for titrations of weak acids and weak bases.
- There are new Student Hot Spot resources on the calculation of buffer pH, the preparation of a buffer of a specific pH, and the calculation of pH during acid-base titrations.

Chapter 20: Thermodynamics: Entropy, Free Energy, and Reaction Direction

- Includes new tables with values of entropy and Gibbs free energy for selected substances.
- A revised sample problem on the calculation of the standard entropy of reaction.
- A new video on spontaneity and temperature.

Chapter 21: Electrochemistry: Chemical Change and Electrical Work

- Incorporates a more useful example of balancing a redox reaction in acidic solution.
- Incorporates a new Student Hot Spot resource that illustrates the balancing method.
- A new follow-problem on the relationship between cell potential and equilibrium constant.
- An updated discussion on batteries.

Chapter 23: Transition Elements and Their Coordination Compounds

- Has a revised section on nomenclature of coordination compounds, including a revised sample problem on nomenclature.
- New art on the color of complex ions.
- New videos on coordination number, optical isomers, and low-spin vs. high-spin complex ions.

Chapter 24: Nuclear Reactions and Their Applications

- Includes a new table on stability of isotopes.
- A new sample problem on writing transmutation reactions.
- An updated table on radiation exposure.
- Updated discussions on PET scans and on fusion.

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