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Preface

Welcome to Chemistry, an OpenStax resource. This textbook has been created with several goals in mind: accessibility, customization, and student engagement—all while encouraging students toward high levels of academic scholarship. Instructors and students alike will find that this textbook offers a strong foundation in chemistry in an accessible format.

About OpenStax

OpenStax is a non-profit organization committed to improving student access to quality learning materials. Our free textbooks go through a rigorous editorial publishing process. Our texts are developed and peer-reviewed by educators to ensure they are readable, accurate, and meet the scope and sequence requirements of today’s college courses. Unlike traditional textbooks, OpenStax resources live online and are owned by the community of educators using them. Through our partnerships with companies and foundations committed to reducing costs for students, OpenStax is working to improve access to higher education for all. OpenStax is an initiative of Rice University and is made possible through the generous support of several philanthropic foundations. Since our launch in 2012 our texts have been used by millions of learners online and over 1,091 institutions worldwide.

About OpenStax's Resources

OpenStax resources provide quality academic instruction. Three key features set our materials apart from others: they can be customized by instructors for each class, they are a "living" resource that grows online through contributions from educators, and they are available free or for minimal cost.

Customization

OpenStax learning resources are designed to be customized for each course. Our textbooks provide a solid foundation on which instructors can build, and our resources are conceived and written with flexibility in mind. Instructors can select the sections most relevant to their curricula and create a textbook that speaks directly to the needs of their classes and student body. Teachers are encouraged to expand on existing examples by adding unique context via geographically localized applications and topical connections. Chemistry can be easily customized using our online platform (http://cnx.org/content/col11760/latest). Simply select the content most relevant to your current semester and create a textbook that speaks directly to the needs of your class. Chemistry is organized as a collection of sections that can be rearranged, modified, and enhanced through localized examples or to incorporate a specific theme of your course. This customization feature will ensure that your textbook truly reflects the goals of your course.

Curation

To broaden access and encourage community curation, Chemistry is “open source” licensed under a Creative Commons Attribution (CC-BY) license. The academic science community is invited to submit examples, emerging research, and other feedback to enhance and strengthen the material and keep it current and relevant for today’s students.

Cost

Our textbooks are available for free online, and in low-cost print and e-book editions.

About Chemistry

Chemistry is designed for the two-semester general chemistry course. For many students, this course provides the foundation to a career in chemistry, while for others, this may be their only college-level science course. As such, this textbook provides an important opportunity for students to learn the core concepts of chemistry and understand how those concepts apply to their lives and the world around them. The text has been developed to meet the scope and sequence of most general chemistry courses. At the same time, the book includes a number of innovative features designed to enhance student learning. A strength of Chemistry is that instructors can customize the book, adapting it to the approach that works best in their classroom.
Coverage and Scope

Our Chemistry textbook adheres to the scope and sequence of most general chemistry courses nationwide. We strive to make chemistry, as a discipline, interesting and accessible to students. With this objective in mind, the content of this textbook has been developed and arranged to provide a logical progression from fundamental to more advanced concepts of chemical science. Topics are introduced within the context of familiar experiences whenever possible, treated with an appropriate rigor to satisfy the intellect of the learner, and reinforced in subsequent discussions of related content. The organization and pedagogical features were developed and vetted with feedback from chemistry educators dedicated to the project.

Chapter 1: Essential Ideas
Chapter 2: Atoms, Molecules, and Ions
Chapter 3: Composition of Substances and Solutions
Chapter 4: Stoichiometry of Chemical Reactions
Chapter 5: Thermochemistry
Chapter 6: Electronic Structures and Periodic Properties of Elements
Chapter 7: Chemical Bonding and Molecular Geometry
Chapter 8: Advanced Theories of Covalent Bonding
Chapter 9: Gases
Chapter 10: Liquids and Solids
Chapter 11: Solutions and Colloids
Chapter 12: Kinetics
Chapter 13: Fundamental Equilibrium Concepts
Chapter 14: Acid-Base Equilibria
Chapter 15: Equilibria of Other Reaction Classes
Chapter 16: Thermodynamics
Chapter 17: Electrochemistry
Chapter 18: Representative Metals, Metalloids, and Nonmetals
Chapter 19: Transition Metals and Coordination Chemistry
Chapter 20: Organic Chemistry
Chapter 21: Nuclear Chemistry

Pedagogical Foundation

Throughout Chemistry, you will find features that draw the students into scientific inquiry by taking selected topics a step further. Students and educators alike will appreciate discussions in these feature boxes.

Chemistry in Everyday Life ties chemistry concepts to everyday issues and real-world applications of science that students encounter in their lives. Topics include cell phones, solar thermal energy power plants, plastics recycling, and measuring blood pressure.

How Sciences Interconnect feature boxes discuss chemistry in context of its interconnectedness with other scientific disciplines. Topics include neurotransmitters, greenhouse gases and climate change, and proteins and enzymes.

Portrait of a Chemist features present a short bio and an introduction to the work of prominent figures from history and present day so that students can see the “face” of contributors in this field as well as science in action.
Comprehensive Art Program

Our art program is designed to enhance students’ understanding of concepts through clear, effective illustrations, diagrams, and photographs.
Interactives That Engage

Chemistry incorporates links to relevant interactive exercises and animations that help bring topics to life through our Link to Learning feature. Examples include:

PhET simulations
IUPAC data and interactives
TED talks

Assessments That Reinforce Key Concepts
In-chapter Examples walk students through problems by posing a question, stepping out a solution, and then asking students to practice the skill with a “Check Your Learning” component. The book also includes assessments at the end of each chapter so students can apply what they’ve learned through practice problems.

Atom-First Alternate Sequencing
Chemistry was conceived and written to fit a particular topical sequence, but it can be used flexibly to accommodate other course structures. Some instructors prefer to organize their course in a molecule-first or atom-first organization. For professors who use this approach, our OpenStax Chemistry textbook can be sequenced to fit this pedagogy. Please consider, however, that the chapters were not written to be completely independent, and that the proposed alternate sequence should be carefully considered for student preparation and textual consistency. We recommend these shifts in the table of contents structure if you plan to create a molecule/atom-first version of this text for your students:

Chapter 1: Essential Ideas
Chapter 2: Atoms, Molecules, and Ions
Chapter 6: Electronic Structure and Periodic Properties of Elements
Chapter 7: Chemical Bonding and Molecular Geometry
Chapter 8: Advanced Theories of Covalent Bonding
Chapter 3: Composition of Substances and Solutions
Chapter 4: Stoichiometry of Chemical Reactions
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Chapter 18: Representative Metals, Metalloids, and Nonmetals
Chapter 19: Transition Metals and Coordination Chemistry
Chapter 20: Organic Chemistry
Chapter 21: Nuclear Chemistry

Ancillaries
OpenStax projects offer an array of ancillaries for students and instructors. The following resources are available.

PowerPoint Slides
Instructor’s Solution Manual
Our resources are continually expanding, so please visit http://openstaxcollege.org to view an up-to-date list of the Learning Resources for this title and to find information on accessing these resources.

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