The most successful general chemistry textbook published in 30 years is specifically written for Canadian students.

This innovative, pedagogically driven text explains difficult concepts in a student-oriented manner. The book offers a rigorous and accessible treatment of general chemistry in the context of relevance. Chemistry is presented visually through multi-level images—macroscopic, molecular and symbolic representations—helping students see the connections among the formulas (symbolic), the world around them (macroscopic), and the atoms and molecules that make up the world (molecular).

Personalize Learning with MasteringChemistry™

MasteringChemistry is an online homework, tutorial, and assessment program designed to work with this text to engage students and improve results. Interactive, self-paced tutorials provide individualized coaching to help students stay on track. With a wide range of activities available, students can actively learn, understand, and retain even the most difficult concepts.
Approach

Chemistry: A Molecular Approach is first and foremost a student-oriented book. The main goal of the book is to motivate students and get them to achieve at the highest possible level. As we all know, many students take general chemistry because it is a requirement; they do not see the connection between chemistry and their lives or their intended careers. Chemistry: A Molecular Approach strives to make those connections consistently and effectively.

Chemistry: A Molecular Approach is a pedagogically driven book. In seeking to develop problem-solving skills, a consistent approach is applied (Sort, Strategize, Solve, and Check), usually in a two- or three-column format. In the twocolumn format, the left column shows the student how to analyze the problem and devise a solution strategy. It also lists the steps of the solution and explains the rationale for each one, while the right column shows the implementation of each step. In the three-column format, the left column outlines the general procedure for solving an important category of problems that is then applied to two side-by-side examples. This strategy allows students to see both the general pattern and the slightly different ways in which the procedure may be applied in differing contexts.

Chemistry: A Molecular Approach is a visual book. Wherever possible, images are used to deepen the student’s insight into chemistry. In developing chemical principles, multipart images help to show the connection between everyday processes visible to the unaided eye and what atoms and molecules are actually doing. Many of these images have three parts: macroscopic, molecular, and symbolic. This combination helps students to see the relationships between the formulas they write down on paper (symbolic), the world they see around them (macroscopic), and the atoms and molecules that compose that world (molecular).

Chemistry: A Molecular Approach is a “big picture” book. At the beginning of each chapter, a short paragraph helps students to see the key relationships between the different topics they are learning. A focused and concise narrative helps make the basic ideas of every chapter clear to the student. Interim summaries are provided at selected spots in the narrative, making it easier to grasp (and review) the main points of important discussions. And to make sure that students never lose sight of the forest for the trees, each chapter includes several Conceptual Connections, which ask them to think about concepts and solve problems without doing any math.

Chemistry: A Molecular Approach is a book that delivers the depth of coverage faculty want. We do not have to cut corners and water down the material in order to get our students interested. We simply have to meet them where they are, challenge them to the highest level of achievement, and then support them with enough pedagogy to allow them to succeed.
Features

- **IUPAC** International Conventions on Units, Symbols, and Nomenclature. The field of chemistry is communicated according to conventions that are determined by the broader international chemistry community, through the International Union of Pure and Applied Chemistry (IUPAC). The Canadian edition of Chemistry: A Molecular Approach scrupulously follows IUPAC recommendations for chemical names and symbols, nomenclature, and conventions for symbols and units in measurements.

- **Thermodynamics.** In thermodynamics, we have adopted the recommended notation for enthalpy, entropy, and Gibbs energy changes, placing subscripts for changes after the delta sign rather than after H, S, or G. For example, the standard reaction enthalpy is expressed as $\Delta H_{\text{r}}$ rather than $\Delta H_{\text{rxn}}$.

- **S.I.** S.I. units of measurement are used exclusively. Imperial units such as the gallon, pound, and the Fahrenheit scale of temperature have not been used in modern science for over a generation. IUPAC recommended defining standard pressure as 1 bar (or 100 kPa) back in 1982. This is the standard that has been adopted by chemists worldwide and is almost exclusive in second-year physical chemistry texts. Only in first-year textbooks does the atmosphere still linger as standard pressure. In this text, standard pressure is the IUPAC-recommended bar. Students will see pressure in various units, but we make little use of the atmosphere. When dealing with ideal gases, the most common value of $R$ is 0.08314 L bar mol$^{-1}$ K$^{-1}$.

- **Current Theories.** We have updated the text so that the most current, consensus scientific view is described. This is most notable in the case of bonding theory and the so-called expanded octet. In this case, recent evidence shows that the d orbitals have a negligible contribution to bonding, which means that full sp$^3$ d and sp$^3$ d$^2$ hybridizations should no longer be included in bonding theories, even though this idea continues to appear in general chemistry textbooks. This Canadian edition reflects the most current understanding of chemical phenomenon, at the first-year level.

- **Organic Chemistry.** The coverage of organic chemistry has been expanded to two chapters, reflecting the curricula in many Canadian universities, which provide additional organic chemistry coverage in first-year chemistry. The first organic chemistry chapter covers structure and bonding, stereochemistry, and structure determination. The second chapter covers organic reactivity, and it is organized according to reaction mechanisms.

- **Canadian Context.** Naturally, a Canadian edition will include Canadian examples. In some places, the Canadian content is fun, like the hockey goalie’s “Quantum mechanical five hole” in Chapter 7. In other places, Canadian chemistry examples are serious and important, like the chemistry of the oil sands. Wherever Canadian content appears in this edition, it is there to promote student engagement. This book is meant for the Canadian student.

- **End-of-Chapter Problems.** One of the first things that professors consider when choosing a chemistry textbook is the quality of end-of-chapter problems. This is because, to learn chemistry, students need to work through meaningful exercises and problems. Tro’s Chemistry: A Molecular Approach has extensive, high-quality problems.
Table of Contents

1 Units of Measurement for Physical and Chemical Change
2 Atoms and Elements
3 Molecules, Compounds, and Nomenclature
4 Chemical Reactions and Stoichiometry
5 Gases
6 Thermochemistry
7 The Quantum-Mechanical Model of the Atom
8 Periodic Properties of the Elements
9 Chemical Bonding I: Lewis Theory
10 Chemical Bonding II: Molecular Shapes, Valence Bond Theory, and Molecular Orbital Theory
11 Liquids, Solids, and Intermolecular Forces
12 Solutions
13 Chemical Kinetics
14 Chemical Equilibrium
15 Acids and Bases
16 Aqueous Ionic Equilibrium
17 Gibbs Energy and Thermodynamics
18 Electro Chemistry
19 Radioactivity and Nuclear Chemistry
20 Organic Chemistry I: Structures
21 Organic Chemistry II: Reactions
22 Bio Chemistry
23 Chemistry of the Nonmetals
24 Metals and Metallurgy
25 Transition Metals and Coordination Compounds

Appendix I: Common Mathematical Operations
Appendix II: Useful Data
Appendix III: Answers to Selected Exercises
Appendix IV: Answers to In-Chapter Practice Problems
The taste of a food depends on the interaction between the food molecules and taste cells on your tongue. Sugar molecules fit into the active site of taste cell receptors called Tlr3 receptor proteins. Taking a receptor-based, target-centered approach, it presents the concepts central to the study of drug action in a logical, mechanistic way grounded on molecular and biochemical principles. Students of pharmacy, chemistry and pharmacology, as well as researchers interested in a better understanding of drug design, will find this book an invaluable resource. Starting with an overview of basic principles, Medicinal Chemistry examines the properties of drug molecules, the characteristics of drug receptors, and the nature of drug-receptor interactions. Then it systematically examines the various