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understanding the triplet relationship in chemical education.

The tenth edition of this market-leading text has been substantially revised to meet the rapidly changing instructional demands of GENERAL CHEMISTRY professors. Known for its carefully developed, thoroughly integrated, step-by-step approach to problem solving, GENERAL CHEMISTRY helps students master quantitative skills and build a lasting conceptual understanding of key chemical concepts. The tenth edition retains this hallmark approach and builds upon the conceptual focus through key new features and revisions. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

The eleventh edition was carefully reviewed with an eye toward strengthening the content available in OWLv2, end-of-chapter questions, and updating the presentation. Nomenclature changes and the adoption of IUPAC periodic table conventions are highlights of the narrative revisions, along with changes to the discussion of d orbitals. In-text examples have been reformatted to facilitate learning, and the accompanying Interactive Examples in OWLv2 have been redesigned to better parallel the problem-solving approach in the narrative. New Capstone Problems have been added to a number of chapters. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

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This book explores the relationship between the content of chemistry education and the history and philosophy of science (HPS) framework that underlies such education. It discusses the

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need to present an image that reflects how chemistry developed and progresses. It proposes that chemistry should be taught the way it is practiced by chemists: as a human enterprise, at the interface of scientific practice and HPS. Finally, it sets out to convince teachers to go beyond the traditional classroom practice and explore new teaching strategies. The importance of HPS has been recognized for the science curriculum since the middle of the 20th century. The need for teaching chemistry within a historical context is not difficult to understand as HPS is not far below the surface in any science classroom. A review of the literature shows that the traditional chemistry classroom, curricula, and textbooks while dealing with concepts such as law, theory, model, explanation, hypothesis, observation, evidence and idealization, generally ignore elements of the history and philosophy of science. This book proposes that the conceptual understanding of chemistry requires knowledge and understanding of the history and philosophy of science. "Professor Niaz's book is most welcome, coming at a time when there is an urgently felt need to upgrade the teaching of science. The book is a huge aid for adding to the usual way - presenting science as a series of mere facts - also the necessary mandate: to show how science is done, and how science, through its history and philosophy, is part of the cultural development of humanity." Gerald Holton, Mallinckrodt Professor of Physics & Professor of History of Science, Harvard University "In this stimulating and sophisticated blend of history of chemistry, philosophy of science, and science pedagogy, Professor Mansoor Niaz has succeeded in offering a promising new approach to the teaching of fundamental ideas in chemistry. Historians and philosophers of chemistry --- and above all, chemistry teachers --- will find this book full of valuable and highly usable new ideas" Alan Rocke, Case Western Reserve University "This book artfully connects chemistry and

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chemistry education to the human context in which chemical science is practiced and the historical and philosophical background that illuminates that practice. Mansoor Niaz deftly weaves together historical episodes in the quest for scientific knowledge with the psychology of learning and philosophical reflections on the nature of scientific knowledge and method. The result is a compelling case for historically and philosophically informed science education. Highly recommended!” Harvey Siegel, University of Miami “Books that analyze the philosophy and history of science in Chemistry are quite rare. ‘Chemistry Education and Contributions from History and Philosophy of Science’ by Mansoor Niaz is one of the rare books on the history and philosophy of chemistry and their importance in teaching this science. The book goes through all the main concepts of chemistry, and analyzes the historical and philosophical developments as well as their reflections in textbooks. Closest to my heart is Chapter 6, which is devoted to the chemical bond, the glue that holds together all matter in our earth. The chapter emphasizes the revolutionary impact of the concept of the ‘covalent bond’ on the chemical community and the great novelty of the idea that was conceived 11 years before quantum mechanics was able to offer the mechanism of electron pairing and covalent bonding. The author goes then to describe the emergence of two rival theories that explained the nature of the chemical bond in terms of quantum mechanics; these are valence bond (VB) and molecular orbital (MO) theories. He emphasizes the importance of having rival theories and interpretations in science and its advancement. He further argues that this VB-MO rivalry is still alive and together the two conceptual frames serve as the tool kit for thinking and doing chemistry in creative manners. The author surveys chemistry textbooks in the light of the how the books preserve or not the balance between the two theories in describing various chemical



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value for students and instructors, this new hybrid version features the instructional presentation found in the printed text while delivering all the end-of-chapter exercises online in OWLv2, the leading online learning system for chemistry. The result--a briefer printed text that engages learners online! Improve your grades and understanding of concepts with this value-packed Hybrid Edition of GENERAL CHEMISTRY, 10th edition. An access code to OWLv2 with MindTap Reader is included with the text, providing you with powerful online resources that include tutorials, simulations, randomized homework questions, videos, a complete interactive electronic version of the textbook, and more! The 10th edition continues to offer the signature clear explanations, macro to micro orientation, and enhanced problem-solving strategies that have made the book a best-seller. Featuring a new design and a significantly enhanced art program that convey the excitement of chemistry, this Hybrid Edition provides you with even more learning support through a new "Gaining Mastery Toolbox" feature in all examples, more micro-macro presentations, new two-tier questions, and a new end-of-chapter "Checklist for Review."

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this hallmark approach and builds on the conceptual focus through key new features and revisions. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Known for its carefully developed, thoroughly integrated approach to problem solving, this market-leading text emphasizes the conceptual understanding and visualization skills essential for first-year chemistry and science majors. The new technology program reinforces the approach of the text and provides a complete solution for teaching and learning. The Eighth Edition retains the hallmark pedagogical features of the text and builds upon the conceptual focus and art program. Students also benefit from online homework in the technology program, which features an extensive database of questions drawn from the text.

It goes without saying that atomic structure, including its dual wave-particle nature, cannot be demonstrated in the classroom. Thus, for most science teachers, especially those in physics and chemistry, the textbook is their key resource and their students' core source of information. Science education historiography recognizes the role played by the history and philosophy of science in developing the content of our textbooks, and with this in mind, the authors analyze more than 120 general chemistry textbooks published in the USA, based on criteria derived from a historical reconstruction of wave-particle duality. They come to some revealing conclusions, including the fact that very few textbooks discussed issues such as the suggestion, by both Einstein and de

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Broglie, and before conclusive experimental evidence was available, that wave-particle duality existed. Other large-scale omissions included de Broglie's prescription for observing this duality, and the importance of the Davisson-Germer experiments, as well as the struggle to interpret the experimental data they were collecting. Also untouched was the background to the role played by Schrödinger in developing de Broglie's ideas. The authors argue that rectifying these deficiencies will arouse students' curiosity by giving them the opportunity to engage creatively with the content of science curricula. They also assert that it isn't just the experimental data in science that matters, but the theoretical insights and unwonted inspirations, too. In addition, the controversies and discrepancies in the theoretical and experimental record are key drivers in understanding the development of science as we know it today.

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