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long considered the standard for honors and high level mainstream general chemistry courses principles of modern chemistry continues to set the standard as the most modern rigorous and chemically and mathematically accurate text on the market this authoritative text features an atoms first approach and thoroughly revised chapters on quantum mechanics and molecular structure chapter 6 electrochemistry chapter 17 and molecular spectroscopy and photochemistry chapter 20 in addition the text utilizes mathematically accurate and artistic atomic and molecular orbital art and is student friendly without compromising its rigor end of chapter study aids focus on only the most important key objectives equations and concepts making it easier for students to locate chapter content while applications to a wide range of disciplines such as biology chemical engineering biochemistry and medicine deepen students understanding of the relevance of chemistry beyond the classroom

this book explores the evolving nature of objectivity in the history of science and its implications for science education it is generally considered that objectivity certainty truth universality the scientific method and the accumulation of experimental data characterize both science and science education such universal values associated with science may be challenged while studying controversies in their original historical context the scientific enterprise is not characterized by objectivity or the scientific method but rather controversies alternative interpretations of data ambiguity and uncertainty although objectivity is not synonymous with truth or certainty it has eclipsed other epistemic virtues and to be objective is often used as a synonym for scientific recent scholarship in history and philosophy of science has shown that it is not the experimental data baconian orgy of quantification but rather the diversity plurality in a scientific discipline that contributes toward understanding objectivity history of science shows that objectivity and subjectivity can be considered as the two poles of a continuum and this dualism leads to a conflict in understanding the evolving nature of objectivity the history of objectivity is nothing less than the history of science itself and the evolving and varying forms of objectivity does not mean that one replaced the other in a sequence but rather each form supplements the others this book is remarkable for its insistence that the philosophy of science and in particular that discipline s analysis of objectivity as the supposed hallmark of the scientific method is of direct value to teachers of science meticulously yet in a most readable way mansoor niaz looks at the way objectivity has been dealt with over the years in influential educational journals and in textbooks it s fascinating how certain perspectives fade while basic

questions show no sign of going away there are few books that take both philosophy and education seriously this one does roald hoffmann cornell university chemist writer and nobel laureate in chemistry

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 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 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 phenomena this talmudic approach of conceptual tension is a universal characteristic of any branch of evolving wisdom as such mansoor s book would be of great utility for chemistry teachers to examine how can they become more effective teachers by recognizing the importance of conceptual tension sason shaik saeree k and louis p fiedler chair in chemistry director the lise meitner minerva center for computational quantum chemistry the hebrew university of jerusalem israel

discover the essential aspects of chemistry in various industries with applied chemistry practical applications this comprehensive textbook provides an in depth understanding of fundamental chemical principles and their real world applications covering a wide range of topics from chemical reactions and materials science to environmental chemistry and sustainable practices it caters to students researchers and professionals written by experts our book blends theoretical concepts with practical examples offering a solid foundation in key concepts followed by discussions on their applications in industry technology and everyday life we emphasize sustainability green chemistry principles and environmentally friendly practices clear explanations of complex topics are supported by diagrams illustrations and tables our book integrates modern research findings and technological advancements in chemistry end of chapter

summaries review questions and exercises reinforce learning and facilitate self assessment supplementary materials including online resources and laboratory exercises enhance the learning experience whether you re a student seeking an introduction to applied chemistry or a professional looking to expand your knowledge applied chemistry practical applications is an invaluable resource for understanding the practical aspects of chemistry in industry technology and society

comprehensive inorganic chemistry exploring the elemental symphony is a comprehensive book on inorganic chemistry covering fundamental principles and applications it covers topics such as chemical bonding periodicity coordination chemistry main group chemistry transition metal chemistry descriptive inorganic chemistry solid state chemistry bioinorganic chemistry nuclear chemistry and industrial inorganic chemistry the book emphasizes the integration of theoretical concepts with real world examples and applications providing a holistic understanding of inorganic chemistry the book includes numerous illustrations diagrams and worked examples to aid comprehension it is a valuable resource for students researchers and professionals interested in inorganic chemistry aiming to inspire exploration of its boundless possibilities

this book argues that the traditional image of feyerabend is erroneous and that contrary to common belief he was a great admirer of science it shows how feyerabend presented a vision of science that represented how science really works besides giving a theoretical framework based on feyerabend s philosophy of science the book offers criteria that can help readers to evaluate and understand research reported in important international science education journals with respect to feyerabend s epistemological anarchism the book includes an evaluation of general chemistry and physics textbooks most science curricula and textbooks provide the following advice to students do not allow theories in contradiction with observations and all scientific theories must be formulated inductively based on experimental facts feyerabend questioned this widely prevalent premise of science education in most parts of the world and in contrast gave the following advice scientists can accept a hypothesis despite experimental evidence to the contrary and scientific theories are not always consistent with all the experimental data no wonder feyerabend became a controversial philosopher and was considered to be against rationalism and anti science recent research in philosophy of science however has shown that most of feyerabend s philosophical ideas are in agreement with recent trends in the 21st century of the 120 articles

from science education journals evaluated in this book only 9 recognized that feyerabend was presenting a plurality of perspectives based on how science really works furthermore it has been shown that feyerabend could even be considered as a perspectival realist among other aspects feyerabend emphasized that in order to look for breakthroughs in science one does not have to be complacent about the truth of the theories but rather has to look for opportunities to break rules or violate categories mansoor niaz carefully analyses references to feyerabend in the literature and displays the importance of feyerabend s philosophy in analyzing historical episodes niaz shows through this remarkable book a deep understanding to the essence of science calvin kalman concordia university canada in this book mansoor niaz explores the antecedents context and features of feyerabend s work and offers a more nuanced understanding then reviews and considers its reception in the science education and philosophy of science literature this is a valuable contribution to scholarship about feyerabend with the potential to inform further research as well as science education practice david geelan griffith university australia

don t be mixed up about chemistry simplify the complex chemical reactions that take place everywhere in our lives with this engaging easy to follow question and answer guide where would we be without atoms and compounds gas liquids solids and plasma acids and bases bonds and reactions matter and energy the handy chemistry answer book covers the building blocks of life and the universe the secret life of atoms how polar bears aren t actually white why oil and water don t mix and much much more are revealed and explained this informative guide covers the basics of chemistry history atomic structures chemical bonds and reactions organic and inorganic chemistry to more advanced material nuclear chemistry biochemistry physical and theoretical chemistry by answering nearly 1 000 common chemistry questions including what causes lightning how does photosynthesis work what are hard and soft lewis acids and bases what makes a fabric waterproof what are the twelve principles of green chemistry when did alchemists finally abandon trying to make gold what is le chatelier s principle what do the different octane ratings mean at the gas pump what is genetic engineering why is calcium important for strong bones what is the 18 electron rule why does chocolate turn white as it ages chemical reactions that rule the world their properties structure composition behavior and history are tackled and explained in plain english in the handy chemistry answer book with many photos illustrations a few formulas molecular diagrams and other graphics this fun fact filled tome is richly illustrated a history of chemistry timeline appendices on nobel prize in chemistry winners a bibliography further

reading section glossary of terms a table of physical constants a table of conversion factors and extensive index add to its usefulness

research in science education has recognized the importance of history and philosophy of science hps nature of science nos is considered to be an essential part of hps with important implications for teaching science the role played by textbooks in developing students informed conceptions of nos has been a source of considerable interest for science educators in some parts of the world textbooks become the curriculum and determine to a great extent what is taught and learned in the classroom given this background and interest this monograph has evaluated nos in university level general chemistry textbooks published in u s a most textbooks in this study provided little insight with respect to the nine criteria used for evaluating nos some of the textbooks however inevitably refer to hps and thus provide guidelines for future textbooks a few of the textbooks go into considerable detail to present the atomic models of dalton thomson rutherford bohr and wave mechanical to illustrate the tentative nature of scientific theories an important nos aspect these results lead to the question are we teaching science as practiced by scientists an answer to this question can help us to understand the importance of nos by providing students an hps based environment so that they too just like the scientists feel the thrill and excitement of discovering new things this monograph provides students and teachers guidelines for introducing various aspects of nos based on historical episodes

the advances in chemical physics series provides the chemical physics and physical chemistry fields with a forum for critical authoritative evaluations of advances in every area of the discipline filled with cutting edge research reported in a cohesive manner not found elsewhere in the literature each volume of the advances in chemical physics series serves as the perfect supplement to any advanced graduate class devoted to the study of chemical physics

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provides abstracts and review articles on topics in physical chemistry

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