

Introductory Chemistry Cracolice Peters

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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 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

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

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 two volume work discusses environmental health the branch of public health concerned with all aspects of the natural and built environment affecting human health and addresses key issues at the global and local scales the work offers an overview of the methodologies and paradigms that define this burgeoning field ranging from ecology to epidemiology and from pollution to environmental psychology and addresses a wide variety of global concerns including air quality water and sanitation food security chemical physical hazards occupational health disease control and injuries the authors intend to provide up to date

information for environmental health professionals and to provide a reference for students and consultants working at the interface between health and environmental sectors volume 1 focuses on discussing the fundamentals of physical chemical and biological sciences in an environmental health context and introduces the key concepts that bridge environmental health and medical sciences to accurately inform both environmental and medical professionals the book addresses different specializations in medical science that account for environmental health issues and aims to reduce the knowledge gap among professionals on public health topics such as pollution impacts occupational hazards radiation exposure natural disasters and climate change

learn chemistry actively while studying assignments with introductory chemistry the authors question and answer format is reflected in three words of advice and encouragement that are repeated throughout the book learn it now each chapter includes an everyday chemistry section that illustrates how chemistry is applied in daily life this edition integrates new features such as technological resources coached problems and enhanced art and photography all of which dovetail with the authors active learning approach

potassium chloride is a logical alternative to sodium chloride in water softening water softening with potassium chloride provides a thorough overview of the process the equipment and the techniques used then it compiles diverse trade and technical data on water softening with potassium chloride so readers can make informed decisions it documents the health and environmental consequences and benefits of using potassium chloride and includes a chapter with summaries of recent research projects and faqs this is a key reference for professional water treatment specialists environmental science researchers and others

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

this best selling textbook takes an active learning approach through a question and answer presentation in which students actively learn the material while reading through the text rather than reading with the intent to learn later for example the authors turn the passive statement read the author s solution into the active work the problem with guided methodology from the authors as with previous editions this text allows professors to tailor the order of chapters to accommodate their particular needs through two flexible formats a standard paperbound edition and loose leaf edition this modularity is achieved not only by carefully writing each topic so it never assumes prior knowledge but also by including any and all necessary preview or review information needed to learn that topic the new third edition integrates new features such as helpful technological resources coached problems and enhanced art and photography all of which dovetail with the text s active learning approach

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introductory chemistry an active learning approach gives you the tools you need to teach the course your way the authors provide a question and answer presentation that allows students to actively learn chemistry while studying an assignment this approach is reflected in three words of advice and encouragement that are repeated throughout the book learn it now as with previous editions this text allows you to tailor the order of chapters to accommodate your particular needs through two flexible formats a standard paperbound edition and loose leaf edition this flexibility is achieved not only by carefully writing each topic so it never assumes prior knowledge but also by including any and all necessary preview or review information needed to learn that topic the fourth edition integrates new features such as technological resources coached problems and enhanced

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