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PART 1: THERMODYNAMICS PART 2: STRUCTURE PART 3: CHANGE Any literate person should be familiar with the central ideas of modern science. In his sparkling new book, Peter Atkins introduces his choice of the ten great ideas of science. With wit, charm, patience, and astonishing insights, he leads the reader through the emergence of the concepts, and then presents them in a strikingly effective manner. At the same time, he works into his engaging narrative an illustration of the scientific method and shows how simple ideas can have enormous consequences. His choice of the ten great ideas are: * Evolution occurs by natural selection, in which the early attempts at explaining the origin of species is followed by an account of the modern approach and some of its unsolved problems. * Inheritance is encoded in DNA, in which the story of the emergence of an understanding of inheritance is followed through to the mapping of the human genome. * Energy is conserved, in which we see how the central concept of energy gradually dawned on scientists as they mastered the motion of particles and the concept of heat. * All change is the consequence of the purposeless collapse of energy and matter into disorder, in which the extraordinarily simple concept of entropy is used to account for events in the world. * Matter is atomic, in which we see how the concept of atoms emerged and how the different personalities of the elements arise from the structures of their atoms. * Symmetry limits, guides, and drives, in which we see how concepts related to beauty can be extended to understand the nature of fundamental particles and the forces that act between them. * Waves behave like particles and particles behave like waves, in which we see how old familiar ideas gave way to the extraordinary insights of quantum theory and transformed our perception of matter. * The universe is expanding, in which we see how a combination of astronomy and a knowledge of elementary particles accounts for the origin of the universe and its long term future.

* Spacetime is curved by matter, in which we see the emergence of the theories of special and general relativity and come to understand the nature of space and time. * If arithmetic is consistent, then it is incomplete, in which we learn the origin of numbers and arithmetic, see how the philosophy of mathematics lets us understand the nature of this most cerebral of subjects, and are brought to the limits of its power. C. P. Snow once said 'not knowing the second law of thermodynamics is like never having read a work by Shakespeare'. This is an extraordinary, exciting book that not only will make you literate in science but give you deep enjoyment on the way. This text presents a rigorous mathematical account of the principles of quantum mechanics, in particular as applied to chemistry and chemical physics. Applications are used as illustrations of the basic theory. The first two chapters serve as an introduction to quantum theory, although it is assumed that the reader has been exposed to elementary quantum mechanics as part of an undergraduate physical chemistry or atomic physics course. Following a discussion of wave motion leading to Schrödinger's wave mechanics, the postulates of quantum mechanics are presented along with essential mathematical concepts and techniques. The postulates are rigorously applied to the harmonic oscillator, angular momentum, the hydrogen atom, the variation method, perturbation theory, and nuclear motion. Modern theoretical concepts such as hermitian operators, Hilbert space, Dirac notation, and ladder operators are introduced and used throughout. This text is appropriate for beginning graduate students in chemistry, chemical physics, molecular physics and materials science. This revision of the introductory textbook of physical chemistry has been designed to broaden its appeal, particularly to students with an interest in biological applications. aspects of the learning process are fully supported, including the understanding of terminology, notation, mathematical concepts, and the application of physical chemistry to other branches of science." "Building on the heritage of the world-renowned Atkins' Physical Chemistry , Quanta, Matter, and Change gives a refreshing new insight into the familiar by illuminating physical chemistry from a new direction." --Book Jacket. Table of contents Most people remember chemistry from their schooldays as largely incomprehensible, a subject that was fact-rich but understanding-poor, smelly, and so far removed from the real world of events and pleasures that there seemed little point, except for the most introverted, in coming to terms with its grubby concepts, spells, recipes, and rules. Peter Atkins wants to change all that. In this Very Short Introduction to Chemistry, he encourages us to look at chemistry anew, through a chemist's eyes, in order to understand its central concepts and to see how it contributes not only towards our material comfort, but also to human culture. Atkins shows how chemistry provides the infrastructure of our world, through the chemical industry, the fuels of heating, power generation, and transport, as well as the fabrics of our clothing and furnishings. By considering the remarkable achievements that chemistry has made, and examining its place between both physics and biology, Atkins presents a fascinating, clear, and rigorous exploration of the world of chemistry - its structure, core concepts, and exciting contributions to new cutting-edge technologies. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost

every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable. The laws of thermodynamics drive everything that happens in the universe. From the sudden expansion of a cloud of gas to the cooling of hot metal, and from the unfurling of a leaf to the course of life itself - everything is directed and constrained by four simple laws. They establish fundamental concepts such as temperature and heat, and reveal the arrow of time and even the nature of energy itself. Peter Atkins' powerful and compelling introduction explains what the laws are and how they work, using accessible language and virtually no mathematics. Guiding the reader from the Zeroth Law to the Third Law, he introduces the fascinating concept of entropy, and how it not only explains why your desk tends to get messier, but also how its unstoppable rise constitutes the engine of the universe. The marvellous complexity of the Universe emerges from several deep laws and a handful of fundamental constants that fix its shape, scale, and destiny. There is a deep structure to the world which at the same time is simple, elegant, and beautiful. Where did these laws and these constants come from? And why are the laws so fruitful when written in the language of mathematics? Peter Atkins considers the minimum effort needed to equip the Universe with its laws and its constants. He explores the origin of the conservation of energy, of electromagnetism, of classical and quantum mechanics, and of thermodynamics, showing how all these laws spring from deep symmetries. The revolutionary result is a short but immensely rich weaving together of the fundamental ideas of physics. With his characteristic wit, erudition, and economy, Atkins sketches out how the laws of Nature can spring from very little. Or arguably from nothing at all. This title takes an innovative molecular approach to the teaching of physical chemistry. The authors present the subject in a rigorous but accessible manner, allowing students to gain a thorough understanding of physical chemistry. This text unravels those fundamental physical principles which explain how all matter behaves. It takes us from the foundations of quantum mechanics, through quantum models of atomic, molecular, and electronic structure, and on to discussions of spectroscopy, and the electronic and magnetic properties of molecules. Peter Atkins and Julio de Paula offer a fully integrated approach to the study of physical chemistry and biology. The exceptional quality of previous editions has been built upon to make the twelfth edition of Atkins' Physical Chemistry even more closely suited to the needs of both lecturers and students. The writing style has been refreshed in collaboration with current students of physical chemistry in order to retain the clarity for which the book is recognised while mirroring the way you read and engage with information. The new edition is now available as an enhanced e-book, which offers you a richer, more dynamic learning experience. It does this by incorporating digital enhancements that are carefully curated and thoughtfully inserted at meaningful points to enhance the learning experience. In addition, it offers formative auto-graded assessment materials to provide you with regular opportunities to test their understanding. Digital enhancements introduced for the new edition include dynamic graphs, which you can interact with to explore how the manipulation of variables affects the results of the graphs; self-check

questions at the end of every Topic; video content from physical chemists; and video tutorials to accompany each Focus, which dig deeper into the key equations introduced. There is also a new foundational prologue entitled 'Energy: A First Look', which summarizes key concepts that are best kept in mindright from the beginning of your physical chemistry studies. The coupling of the broad coverage of the subject with a structure and use of pedagogy that is even more innovative will ensure Atkins' Physical Chemistry remains the textbook of choice for studying physical chemistry. This book is designed to provide chemistry undergraduates with a basic understanding of the principles of quantum mechanics. Explains how scientists first observed the second law of thermodynamics, discusses its connection with living things, and looks at the nature of structure and chaos Through an innovative, closely integrated design of images and text, and his characteristically clear, precise, and economical exposition, Peter Atkins explains the processes involved in chemical reactions. He begins by introducing a 'tool kit' of basic reactions, such as precipitation, corrosion, and catalysis, and concludes by showing how these building blocks are brought together in more complex processes such as photosynthesis. In this scientific 'Credo', Peter Atkins considers the universal questions of origins, endings, birth, and death to which religions have claimed answers. With his usual economy, wit, and elegance, unswerving before awkward realities, Atkins presents what science has to say. While acknowledging the comfort some find in belief, he declares his own faith in science's capacity to reveal the deepest truths. This bestselling graduate quantum mechanics textbook is now available in a re-issued and affordable edition. The text first teaches how to do quantum mechanics, and then provides a more insightful discussion of what it means. The authors avoids the temptation to include every possible relevant topic, instead presenting readers with material that they can easily focus on in a complete treatment with few distractions and diversions. Fundamental principles are covered, quantum theory is presented, and special techniques are developed for attacking realistic problems. The innovative two-part coverage is entertaining and informative, organizing topics under basic theory and assembling an arsenal of approximation schemes with illustrative applications linked closely to the text. This revision of the introductory textbook of physical chemistry has been designed to broaden its appeal, particularly to students with an interest in biological applications. With its modern emphasis on the molecular view of physical chemistry, its wealth of contemporary applications, vivid full-color presentation, and dynamic new media tools, the thoroughly revised new edition is again the most modern, most effective full-length textbook available for the physical chemistry classroom. Volume 1 of Physical Chemistry, Ninth Edition, contains the new edition's new Fundamentals chapters (Chapter 0), plus coverage of thermodynamics (Chapters 1-6) and kinetics (Chapters 20-23) From the sudden expansion of a cloud of gas or the cooling of a hot metal, to the unfolding of a thought in our minds and even the course of life itself, everything is governed by the four Laws of Thermodynamics. These laws specify the nature of 'energy' and 'temperature', and are soon revealed to reach out and define the arrow of time itself: why things change and why death must come. In this Very Short Introduction Peter Atkins explains the basis and deeper implications of each

law, highlighting their relevance in everyday examples. Using the minimum of mathematics, he introduces concepts such as entropy, free energy, and to the brink and beyond of the absolute zero temperature. These are not merely abstract ideas: they govern our lives. In this concise and compelling introduction Atkins paints a lucid picture of the four elegant laws that, between them, drive the Universe. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable. Presents the problems of quantum theory from the perspective of mathematical formalism. -- Back cover. Atkins' Physical Chemistry: Molecular Thermodynamics and Kinetics is designed for use on the second semester of a quantum-first physical chemistry course. Based on the hugely popular Atkins' Physical Chemistry, this volume approaches molecular thermodynamics with the assumption that students will have studied quantum mechanics in their first semester. The exceptional quality of previous editions has been built upon to make this new edition of Atkins' Physical Chemistry even more closely suited to the needs of both lecturers and students. Re-organised into discrete 'topics', the text is more flexible to teach from and more readable for students. Now in its eleventh edition, the text has been enhanced with additional learning features and maths support to demonstrate the absolute centrality of mathematics to physical chemistry. Increasing the digestibility of the text in this new approach, the reader is brought to a question, then the math is used to show how it can be answered and progress made. The expanded and redistributed maths support also includes new 'Chemist's toolkits' which provide students with succinct reminders of mathematical concepts and techniques right where they need them. Checklists of key concepts at the end of each topic add to the extensive learning support provided throughout the book, to reinforce the main take-home messages in each section. The coupling of the broad coverage of the subject with a structure and use of pedagogy that is even more innovative will ensure Atkins' Physical Chemistry remains the textbook of choice for studying physical chemistry. Explores the world of chemistry, including its structure, core concepts, and contributions to human culture and material comforts.

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