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Theory of Atoms in

Molecules

Prentice Hall

Chemistry PRENTICE

HALL

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Quantum Chemistry:
Student Edition

*emphasizes the
ground state*

molecular orbital

theory of molecules.

This book contains 14

chapters that also

cover some aspects

of quantum

mechanics theory.

The opening chapters

deal with some

simple, but

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important, particle systems, allowing the introduction of many basic concepts and definitions of classical physics. The subsequent chapters consider the simple harmonic oscillator, the hydrogenlike ion, and many-electron atoms. Considerable chapters are devoted to the development

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of methods for performing linear variational calculations. These methods require solving a determinantal equation for its roots, and then solving a set of simultaneous homogeneous equations for coefficients. The closing chapters

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explore the concept and application of group theory and the qualitative molecular orbital theory. This book is of great value to organic, inorganic, and physical chemists, as well as to undergraduate or graduate chemistry students.

Chemical principles are fundamental to

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the Earth sciences, and geoscience students increasingly require a firm grasp of basic chemistry to succeed in their studies. The enlarged third edition of this highly regarded textbook introduces the student to such 'geo-relevant' chemistry, presented in the same lucid and

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*accessible style as
earlier editions, but
the new edition has
been strengthened in
its coverage of
environmental
geoscience and
incorporates a new
chapter introducing
isotope*

*geochemistry. The
book comprises three
broad sections. The
first (Chapters 1-4)*

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deals with the basic physical chemistry of geological processes.

The second (Chapters 5-8) introduces the

wave-mechanical view of the atom and

explains the various types of chemical

bonding that give Earth materials their

diverse and distinctive properties.

The final chapters

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(9-11) survey the geologically relevant elements and isotopes, and explain their formation and their abundances in the cosmos and the Earth. The book concludes with an extensive glossary of terms; appendices cover basic maths, explain basic solution chemistry, and list

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the chemical elements and the symbols, units and constants used in the book.

Cutnell and Johnson has been the #1 text in the algebra-based physics market for almost 20 years. The 10th edition brings on new co-authors: David Young and Shane Stadler (both

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out of LSU). The Cutnell offering now includes enhanced features and functionality. The authors have been extensively involved in the creation and adaptation of valuable resources for the text. This edition includes chapters 18-32.

How Quantum Theory

Page 126/195

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*Explains Our
Everyday World
for Scientists and
Engineers
Atomic Physics
Quantum Chemistry
Variational Methods
in Electron-Atom
Scattering Theory*
The content of this
book describes in
detail the results of
the present
measurements of the

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partial and total doubly differential cross sections for the multiple-ionization of rare gas atoms by electron impact.

These measurements show, beside other trends, the role of Auger transitions in the production of multiply ionized atoms in the region where the incident electron

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energy is sufficient to produce inner shell ionization. Other processes like Coster-Kronig transitions and shake off also contribute towards increasing the charge of the ions. The incident electron having energy of 6 keV, for example, in a collision with xenon atom can remove up

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to nine electrons! (*) X-ray-ion coincidence spectroscopy of the electron xenon atom collisions is also described. The present measurements of doubly differential cross sections for the dissociative and non-dissociative ionization of hydrogen, sulfur dioxide and sulfur

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hexa fluoride
molecular gases by
electron impact are
also described in the
text of this book. The
results of the
measurements for
sulfur dioxide
molecule show how
this major
atmospheric pollutant
can be removed from
the atmosphere by
electron impact

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dissociation of this molecule. The present results of the measurements for sulfur hexa fluoride give an insight into the dissociation properties of this molecular gas, which is being so widely used as a gaseous insulator in the electrical circuits. The book also describes

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the present measurements of the polarization parameters of the fluorescence radiation emitted by the electron-impact-excited atoms of sodium and potassium. In these investigations the target atoms are polarized, therefore, the measurements of the polarization

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parameters give
information about the
electron atom

interaction in terms of
the interference,
direct and exchange
interaction channels.

Ideas of Quantum
Chemistry shows how
quantum mechanics
is applied to chemistry
to give it a theoretical
foundation. The
structure of the book

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(a TREE-form)
emphasizes the
logical relationships
between various
topics, facts and
methods. It shows the
reader which parts of
the text are needed
for understanding
specific aspects of the
subject matter.

Interspersed
throughout the text
are short biographies

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of key scientists and their contributions to the development of the field. Ideas of Quantum Chemistry has both textbook and reference work aspects. Like a textbook, the material is organized into digestable sections with each chapter following the same structure. It answers

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frequently asked questions and highlights the most important conclusions and the essential mathematical formulae in the text. In its reference aspects, it has a broader range than traditional quantum chemistry books and reviews virtually all of the pertinent literature. It

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is useful both for beginners as well as specialists in advanced topics of quantum chemistry. The book is supplemented by an appendix on the Internet. * Presents the widest range of quantum chemical problems covered in one book * Unique structure allows

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material to be tailored
to the specific needs
of the reader *

Informal language

facilitates the

understanding of

difficult topics

The rapid growth of

the subject since the

first edition ten years

ago has made it

necessary to rewrite

the greater part of the

book. Except for the

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introductory portion and the section on Mott scattering, the book has been completely revised. In Chap. 3, sections on polarization violating reflection symmetry, on resonance scattering, and on inelastic processes have been added. Chapter 4 has been rewritten, taking

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account of the numerous novel results obtained in exchange scattering. Chapter 5 includes the recent discoveries on photoelectron polarization produced by unpolarized radiation with unpolarized targets and on Auger-electron polarization. In Chap. 6, a further discussion

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of relativistic polarization phenomena has been added to the book.

The immense growth of polarization studies with solids and surfaces required an extension and new presentation of Chap. 7. All but one section of Chap. 8 has been rewritten and a detailed treatment of

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polarization analysis
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has been included.

Again, a nearly comprehensive treatment has been attempted. Even so, substantial selectivity among the wide range of available material has been essential in order to accomplish a compact presentation. The reference list, selected along the

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same lines as in the first edition, is meant to lead the reader through the literature giving a guide for finding further references. I want to express my indebtedness to a number of people whose help has been invaluable.

Physics is a complex and daunting topic,

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but it is also deeply satisfying--even thrilling. And it is absolutely one you can understand. Absolutely Small develops your intuition for the very nature of things at their most basic and intriguing levels by demystifying the world of quantum science. Just as we can

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understand the concept of gravity without solving a single equation, author Michael D. Fayer, professor of chemistry at Stanford University, uses examples from the everyday world to help you understand quantum science like never before.

Exploring a range of

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scientific
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concepts--from particles of light, to probability, to states of matter, to what makes greenhouse gases bad--in considerable depth, he provides readers the answers to questions like: What makes blueberries blue and strawberries red? Does sound

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really travels in waves? and Why does light behave so differently from any other phenomenon in the universe?

Challenging without being intimidating and accessible but not condescending, Absolutely Small liberates physics from its mathematical underpinnings so

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anyone with curiosity
and imagination can
explore its beauty.

Collisions of Electrons
with Atoms and
Molecules

From Solid State to
DNA and Drug Design
Absolutely Small

Holt McDougal

Modern Chemistry

Interatomic Bonding
in Solids

The investigation of

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scattering phenomena

is a major theme of
modern physics. A

scattered particle

provides a dynamical

probe of the target

system. The practical

problem of interest

here is the scattering

of a low energy

electron by an N-

electron atom. It has

been difficult in this

area of study to

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achieve theoretical results that are even qualitatively correct, yet quantitative accuracy is often needed as an adjunct to experiment. The present book describes a quantitative theoretical method, or class of methods, that has been applied effectively to this

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problem. Quantum mechanical theory relevant to the scattering of an electron by an N-electron atom, which may gain or lose energy in the process, is summarized in Chapter 1. The variational theory itself is presented in Chapter 2, both as currently used and in

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forms that may facilitate future applications. The theory of multichannel resonance and threshold effects, which provide a rich structure to observed electron-atom scattering data, is presented in Chapter 3. Practical details of the computational implementation of the

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variational theory are given in Chapter 4.

Chapters 5 and 6 summarize recent applications of the variational theory to problems of experimental interest, with many examples of the successful interpretation of complex structural features observed in scattering

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experiments, and of
the quantitative
prediction of details of
electron-atom
scattering
phenomena.

Fundamentals of
Quantum Mechanics,
Third Edition is a clear
and detailed
introduction to
quantum mechanics
and its applications in
chemistry and

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physics. All required math is clearly explained, including intermediate steps in derivations, and concise review of the math is included in the text at appropriate points. Most of the elementary quantum mechanical models—including particles in boxes, rigid rotor, harmonic

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oscillator, barrier penetration, hydrogen atom—are clearly and completely presented. Applications of these models to selected “real world topics are also included. This new edition includes many new topics such as band theory and heat capacity of solids, spectroscopy of molecules and

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complexes (including applications to ligand field theory), and small molecules of astrophysical interest.

Accessible style and colorful illustrations make the content appropriate for professional researchers and students alike

Presents results of quantum mechanical

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calculations that can be performed with readily available software Provides exceptionally clear discussions of spin-orbit coupling and group theory, and comprehensive coverage of barrier penetration (quantum mechanical tunneling) that touches upon hot topics, such as

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superconductivity and

scanning tunneling
microscopy Problems

given at the end of

each chapter help

students to master

concepts

This book introduces

the fundamental

quantum physics of

atoms and molecules.

Divided into three

parts, the first

provides a historical

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perspective, which leads to the contemporary view of atomic and molecular physics, outlining the principles of non-relativistic quantum mechanics. The second part covers the physical description of atoms and their interaction with radiation, whilst the third part deals

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with molecular physics. This is the first volume of a series of three, focusing on a selected set of topics whilst also providing substantial, in-depth coverage of atomic, molecular, solid-state and statistical physics. Emphasis is given to the underlying physical

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basis or principle for each topic, and pedagogical features include conceptual layout sections that define the goals of each chapter, a simplified but rigorous mathematical apparatus and a thorough discussion of approximations are used to develop the adopted physical

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models.

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University Physics is designed for the two- or three-semester calculus-based physics course. The text has been developed to meet the scope and sequence of most university physics courses and provides a foundation for a career in mathematics, science,

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or engineering. The book provides an important opportunity for students to learn the core concepts of physics and understand how those concepts apply to their lives and to the world around them. Due to the comprehensive nature of the material, we are offering the book in

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three volumes for flexibility and efficiency. Coverage and Scope Our University Physics textbook adheres to the scope and sequence of most two- and three-semester physics courses nationwide. We have worked to make physics interesting and

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accessible to students while maintaining the mathematical rigor inherent in the subject. With this objective in mind, the content of this textbook has been developed and arranged to provide a logical progression from fundamental to more advanced concepts, building

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upon what students have already learned and emphasizing connections between topics and between theory and applications. The goal of each section is to enable students not just to recognize concepts, but to work with them in ways that will be useful in later courses and future

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careers. The organization and pedagogical features were developed and vetted with feedback from science educators dedicated to the project.

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Nature of Light
Chapter 2: Geometric
Optics and Image
Formation Chapter 3:

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Interference Chapter

4: Diffraction Unit 2:

Modern Physics

Chapter 5: Relativity

Chapter 6: Photons

and Matter Waves

Chapter 7: Quantum

Mechanics Chapter 8:

Atomic Structure

Chapter 9:

Condensed Matter

Physics Chapter 10:

Nuclear Physics

Chapter 11: Particle

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Physics and
Cosmology
Quantum Mechanics
of One- and Two-
Electron Atoms
Elementary Quantum
Chemistry, Second
Edition
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Chemistry
Chemistry: An Atoms
First Approach
University Physics

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science or brain surgery, quantum mechanics is pigeonholed as a daunting and inaccessible topic, which is best left to an elite or peculiar few.

This classification was not earned without some

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degree of merit.

Answer Key
Depending on

perspective;

quantum

mechanics is a

discipline or

philosophy, a

convention or

conundrum, an

answer or

question.

Authors have run

the gamut from

hand waving to

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heavy handed in hopes to dispel the common beliefs about quantum mechanics, but perhaps they continue to promulgate the stigma. The focus of this particular effort is to give the reader

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*an introduction,
if not at least
an appreciation,
of the role that
linear algebra
techniques play
in the practical
application of
quantum
mechanical
methods. It
interlaces
aspects of the
classical and*

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quantum picture,
Answer Key
including a

number of both

worked and

parallel

applications.

Students with no

prior experience

in quantum

mechanics,

motivated

graduate

students, or

researchers in

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*other areas
attempting to
gain some
introduction to
quantum theory
will find
particular
interest in this
book.*

*Nearly all of
this book is
taken from an
article prepared
for a volume of*

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the Encyclopedia of Physics. This article, in turn, is partly based on Dr.

Norbert

Rosenzweig's

translation of an older article on the same subject, written by one of us

(H.A.B.) about

25 years ago for

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the Geiger-
Scheel Handbuch

*der Physik. To
the article
written last
year we have
added some
Addenda and
Errata. These
Addenda and
Errata refer
back to some of
the 79 sections
of the main text*

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and contain some
misprint

corrections,

additional

references and

some notes. The

aim of this book

is two-fold.

First, to act as

a reference work

on calculations

pertaining to

hydrogen-like

and helium-like

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*atoms and their
comparison with
experiments.*

*However, these
calculations
involve a vast
array of
approximation
methods,
mathematical
tricks and
physical
pictures, which
are also useful*

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in the
Answer Key

application of
quantum
mechanics to
other fields. In
many sections we
have given more
general
discussions of
the methods and
physical ideas
than is
necessary for
the study of the

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*H- and He-atom
alone. We hope
that this book
will thus at
least partly
fulfill its
second aim,
namely to be of
some use to
graduate
students who
wish to learn
"applied quantum
mechanics". A*

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basic knowledge of the principles of quantum mechanics, such as given in the early chapters of Schiff's or Bohm's book, is presupposed.

As part of the Physics 2010 decadal survey project, the

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Department of
Energy and the
National Science
Foundation
requested that
the National
Research Council
assess the
opportunities,
over roughly the
next decade, in
atomic,
molecular, and
optical (AMO)

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*science and
technology. In
particular, the
National
Research Council
was asked to
cover the state
of AMO science,
emphasizing
recent
accomplishments
and identifying
new and
compelling*

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scientific
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questions.

Controlling the Quantum World, discusses both the roles and challenges for AMO science in instrumentation; scientific research near absolute zero; development of extremely

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*intense x-ray
and laser
sources;
exploration and
control of
molecular
processes;
photonics at the
nanoscale level;
and development
of quantum
information
technology. This
book also offers*

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an assessment of
Answer Key
and

*recommendations
about critical
issues
concerning
maintaining U.S.
leadership in
AMO science and
technology.*

*Authored by Paul
Hewitt, the
pioneer of the
enormously*

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successful

"concepts before

computation"

approach,

Conceptual

Physics boosts

student success

by first

building a solid

conceptual

understanding of

physics. The

Three Step

Learning

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*Approach makes
physics*

*accessible to
today's
students.*

*Exploration -
Ignite interest
with meaningful
examples and
hands-on
activities.*

*Concept
Development -
Expand*

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*understanding
with engaging
narrative and
visuals,
multimedia
presentations,
and a wide range
of concept-
development
questions and
exercises.*

*Application -
Reinforce and
apply key*

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*concepts with
hands-on
laboratory work,
critical
thinking, and
problem solving.*

*Atomic Physics
for the Laser
Era*

*A Worked
Examples
Approach*

*An Introduction
to Techniques*

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May Be Explained

by Considering

the Behavior of

Small Particles

When Grouped

Into Systems

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