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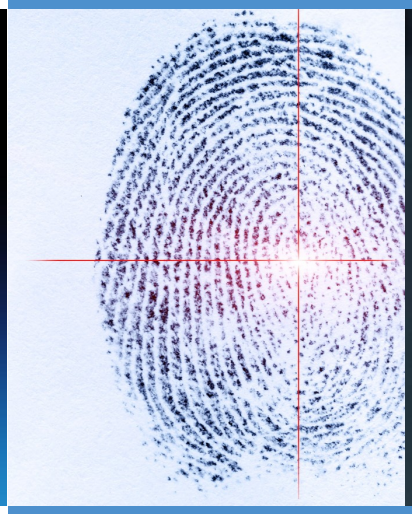


Reviews

A guide to publications in the Physical Sciences

CELEBRATING 10 YEARS ENHANCING LEARNING & TEACHING

Number 20
Volume 11 Issue 1

The Higher Education Academy
UK Physical Sciences Centre
...enhancing the student experience in chemistry, physics, astronomy and forensic science within the university sector

Reviews

'Reviews' is the journal of the UK Higher Education Academy Physical Sciences Centre. It is issued twice yearly in Spring and Autumn.

The journal is free of charge to academics in UK higher education institutions. The material is also published electronically on our web site. Subscriptions are available for those outside the UKHE sector who wish to receive the paper version. Contact the Centre for details.

Items for review and offers to contribute to the review process are welcomed. We also welcome any comments on this publication. Please contact the Centre.

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Editorial

This issue of *Reviews* has 33 reviews covering a wide range of topics in the physical sciences and more general ones including sustainability, research design and study skills. Don't forget, as well as the contents list below, there is a subject index on the back cover.

COMMENTS PLEASE!

The UK Physical Sciences Centre is constantly looking for ways to improve the quality of support it provides to the UK higher education sector and is actively considering ways to evaluate its performance. If you have any comments you would like to pass on to us regarding this publication (or any other publication or service we provide) then please contact us at psc@hull.ac.uk or telephone to 01482 465418.

Tracey Madden
Editor

In this issue...

Book reviews...

Action Research in Teaching and Learning: a practical guide to conducting pedagogic research...

Subject area
Pedagogic research

Description
A guide to action research for those involved in teaching and learning

Authors
Lin S Norton

Publishers/Suppliers
Routledge - Taylor & Francis Group <www.routledge.com>

Date/Edition
2008/1st edition

ISBN
978-0-425-43794-3

Level
Academic, research

Price
£21.59

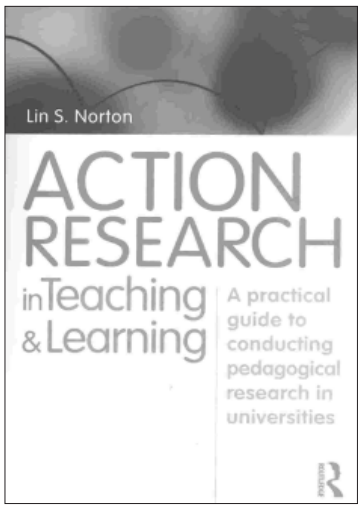
Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	***
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This is a well-written, comprehensive and much-needed book covering many aspects of pedagogic research in teaching and learning. It's probably most suitable for academic staff who are new or getting started in the field and who want a good grounding in the basics of pedagogic action research. It will also be useful for other support staff contributing to such research, and I can envisage certain chapters being particularly helpful to graduate or undergraduate students working in this area.

Although I read it from start to finish, I suspect it would be most relevant as a 'dip into' book. Chapters are mostly self-contained and don't have to be read in order. The first four chapters are quite heavy going, more about the theories of educational research and action research, rather than the practicalities. They are by no means impenetrable, though.

Subsequent chapters cover a broad range of topics including research methodologies, data analysis (both qualitative and quantitative), ethics, dissemination and seeking funding. Each chapter is characterised by specific and clear examples and illustrations of the relevant points, often from the author's own work.



These chapters are comprehensive without being too difficult to read; there are plenty of end of chapter references and links to other material. For the most part, these chapters manage to remain subject-neutral, but still leave the reader feeling that what is being discussed is applicable within the physical sciences (and, indeed, a wide variety of other disciplines as well).

I think that this book fills an important gap in the market: with more staff becoming interested in pedagogic research, this is a book that will be a valuable help to them along the way.

Simon Bates
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April 2010

An Introduction to Particle Physics...

Subject area
Particle physics

Description
An introduction for 4th year or senior undergraduates to the standard model of particle physics

Authors
Robert Mann

Publishers/Suppliers
CRC Press (Taylor & Francis Group) <www.crcpress.com>

Date/Edition
2009/1st edition

ISBN
978-1-4200-8298-2

Level
Undergraduate

Price
£44.99

Jack McArdle
Worcester College of Technology
Deansway
Worcester WR1 2JF
May 2010

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Nowadays some of these topics even appear in A-level Physics, and the clear, non-mathematical, descriptions in the introduction would be accessible, and of use, to an attentive A-level student. But swiftly the book goes on to topics that would leave most undergraduates behind. Realistically the book is aimed at final year undergraduates or postgraduates, though the author's hope is that it will be used by undergraduates and he has tried to construct it for that purpose.

The first chapter shows how clearly the author can write and even though the subject matter gets more complex through the book the clarity continues. All terms used are explained, comments are added so the text reads like a conversation, the limits of our present knowledge are discussed even as he tells us what we think we do know, which adds to the tutorial style of writing, giving the reader greater insights into how the maths and the reality match (or don't match!) and hopefully exciting them into further consideration of what may be 'hidden behind the curtain'.

The book begins with six chapters of background covering special relativity, group theory, particle classifications and symmetries. The student approaching this should already have met some special relativity, quantum mechanics and electromagnetism and would be building upon that knowledge.

The next three chapters cover experimental tools and methods, including accelerators detectors and the analysis of scattering experiments. These three chapters stand alone and would be accessible to any students approaching particle physics from an experimental, less mathematical, point of view.

The last two thirds of the book then goes on to cover quantum electrodynamics (QED), the quark model, quantum chromodynamics (QCD), weak interactions and electroweak unification. Again all these chapters are clearly written and the arguments can be followed even when the maths itself can prove a struggle.

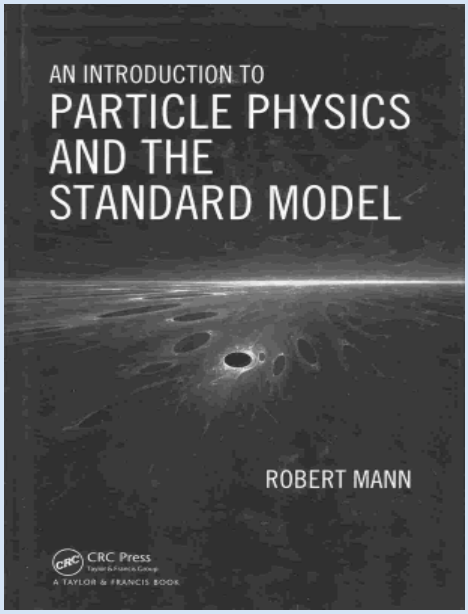
The last chapter looks beyond the Standard Model and briefly mentions many subjects like dark matter, dark energy, grand unification and string theory. But most of the chapter is devoted to neutrinos - the neutrino is seen by many now as showing us the new physics beyond the Standard Model[1]. A comprehensive review of the present state of knowledge on neutrino oscillations, neutrino experiments and neutrino masses is given, with the minimum of mathematical theory, so this chapter would be comprehensible to readers who might not understand the bulk of the book.

So while most of the book is limited to final year and postgraduate students, the first and last chapters of the book should be accessible to any interested reader wanting to understand the present knowledge and future directions of particle physics.

The author has intended the book to be used as a course of study, a single course over one term, essentially twelve weeks of lectures, and he has used the material himself in this way with success for two decades.

Continued on page 4

An Introduction to Particle Physics...



From the publisher...

An Introduction to Particle Physics and the Standard Model

By Robert Mann

The book does require a knowledge of special relativity, quantum mechanics, and electromagnetism, but most importantly it requires a hunger to understand at the most fundamental level: why things exist and how it is that anything happens. This book will prepare students and others for further study, but most importantly it will prepare them to open their minds to the mysteries that lie ahead.

978-1-4200-8298-2 614pp 2009 £44.99

Continued from page 3

Every chapter ends with a section of questions: seven to ten short questions, enough for the reader to check that they really do understand what has just been discussed. They are well thought out, relevant questions and most look like the sort of thoughts that might already occur to the interested reader, rather than just practice at maths manipulation. Maybe they have been gathered from students' questions over the years, or just again show the author's clear understanding of the thought processes of anyone attempting to understand this material.

References

1. Carlo Giunti and Chung Wook Kim, *Fundamentals of Physics and Astrophysics*, Oxford University Press 2007

Atkins' Physical Chemistry

Subject area
Physical chemistry

Description
A text book designed to provide a comprehensive grounding in physical chemistry

Authors
Peter Atkins and Julio de Paula

Publishers/Suppliers
Oxford University Press
<ukcatalogue.oup.com>

Date/Edition
2009/9th Edition

ISBN
978-0-19-954337-3

Level
Undergraduate, postgraduate, research

Price
£43.99

Dylan Powell Williams
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University Road
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April 2010

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Atkins' Physical Chemistry has been a staple of degree level chemistry reading lists since the late 1970s so I was keen to see how the book has evolved into its fourth decade. I have been familiar with Atkins' since the sixth edition appeared on my required texts list as an undergraduate. As an undergraduate I always found the book to be useful for revision and tutorials but it wasn't until I commenced my doctoral studies that I came to fully appreciate the clear, logical explanations provided by this book.

This ninth edition of the book retains the excellent presentation style of the eighth edition but there are a number of significant changes in terms of format and content. As in previous editions, the book is divided into three main parts ('Equilibrium', 'Structure' and 'Change'). The chapter structure has been slightly revised with some chapters combining material that appeared in separate chapters in previous editions.

The book is introduced by a new Fundamentals chapter which provides a concise, elegant and accessible introduction to physical chemistry, something which the eighth edition lacked. The Fundamentals chapter introduces some of the main themes which are revisited throughout the book (eg the relation between molecular and bulk properties).

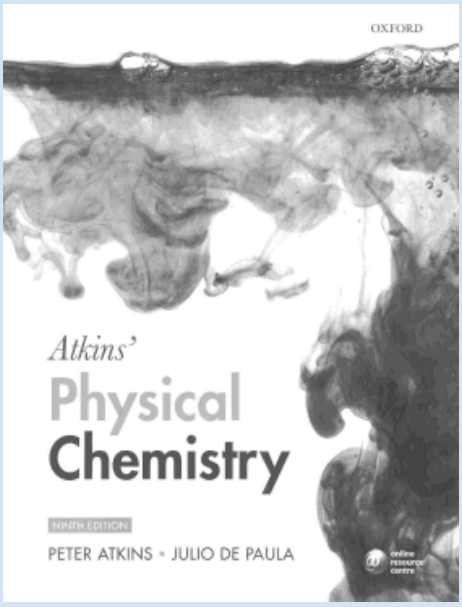
This latest edition of the book builds on the content of previous editions through greater contextualisation of physical chemistry concepts (in the excellent 'Impact on' sections) and by developing a number of new features designed to guide the student through some of the more difficult aspects of the subject. A particularly useful new feature of this edition is a series of end of chapter explanations of the underlying mathematical concepts used in the book, these sections provide a useful reference point for early level undergraduates who need a recap of some of the mathematical concepts used throughout the text. The 'Checklist of key ideas' from previous editions has been replaced by a 'Checklist of key equations'. The key points in each section are summarised in a box at the start of each sub-chapter making it easier to know what is being covered from the outset.

The main area of strength of this textbook is its ability to reach a wide audience. The book is presented in a very clear manner with plenty of support provided for undergraduate readers in the form of excellent illustrations, a series of worked examples and the mathematical background sections. The book is equally relevant to postgraduate students and researchers thanks to the breadth of comprehensive coverage provided.

My one reservation about the book is that the level of content may be too high for some level 1 undergraduates (those with a non mathematical background for example) who may prefer a less mathematical, more descriptive text until they have studied the maths which is taught as part of level 1 chemistry.

Continued on page 6

Atkins' Physical Chemistry



From the publisher...

Atkins' Physical Chemistry

By Peter Atkins and Julio de Paula

Atkins' Physical Chemistry epitomises the benchmark of achievement for a chemistry degree throughout the world. Its broad coverage, concise explanations, and robust mathematical support are clearly presented in an engaging style to furnish students with a solid foundation in the subject.

In this ninth edition the authors continue to refine their presentation of physical chemistry. The coverage of introductory topics is streamlined, and the addition of a new fundamentals chapter provides students with an overview of key principles on which the subject is based. The text includes increased coverage of computational chemistry and additional contextual examples of materials chemistry throughout, mirroring the current needs of today's students and lecturers.

978-0-19-954337-3 1008pp 2009 £43.99

Continued from page 5

In addition to the paper copy, **Atkin's Physical Chemistry** (ninth edition) is to be made available as an e-book through the Oxford Textbooks website. At the time of writing this resource was not available.

In summary this is another very impressive book. The **Atkin's Physical Chemistry** books continue to improve with each successive edition thanks to the commitment of the authors to make the book more accessible to its readers and more relevant to modern physical chemistry.

Basic Concepts of Chemistry: international students version

Subject area
Chemistry

Description
A chemistry text book designed to support engineering students, it is structured so as to emphasise key concepts, each with supporting problems and real world examples

Authors
Leo J Malone and Theodore O Dolter

Publishers/Suppliers
John Wiley & Sons, Inc
<eu.wiley.com/WileyCDA>

Date/Edition
2009/8th edition

ISBN
978-0-470-39890-6

Level
Undergraduate and postgraduate

Price
£47.99

Emma Clemson
The University of Wolverhampton
Wulfruna Street
Wolverhampton
West Midlands WV1 1LY
April 2010

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Basic Concepts of Chemistry is aimed at students who are new to chemistry but may need grounding in it to complete their degree or masters programme. It follows a predictable route through the subject, starting with manipulating numbers and units and measurement, progresses through atoms and bonding, states of matter, oxidation and reduction before finishing with the more intricate subjects of organic chemistry and biochemistry.

Each chapter takes a subject from its most basic to quite complex concepts with worked examples, self-test questions and a section called 'Making It Real' which gives the subject context. The students are given clearly defined objectives at the beginning of each section which are reinforced during the summation. Unit conversions are confusing for many students; Malone and Dolter break this down into manageable chunks which should help those students who have difficulty with the simplest mathematics.

Colourful imagery and many pictorial examples will appeal to the current generation of students who will immediately switch off when presented with a page full of text. Most students will find this book broken up into small enough chunks to keep them attentive.

The extensive electronic resources available with this book include, along with web based exercises, lectures and also lesson plans to accompany each chapter. The PowerPoint presentations provided are excellent for new lecturers who need guidance on lesson structure and appropriate lecture materials or for experienced lecturers who are looking to update their current presentations.

Basic Concepts of Chemistry will complement the modern student whose short attention span will be engaged by the mixture of teaching styles applied to each chapter. There is even a section in the appendices which introduces those students who, seduced into believing a mobile phone will suffice for a science degree, have not used a calculator before. The other appendices include scientific notation, linear relationships, graphing and also a glossary which will help the student become accustomed to the use of scientific language necessary to complete their assignments.

The only negative thing is the price! With the modern student having to pay out more and more in tuition fees and student loans they are relying heavily on the information they can gather from the free sites they can find on the internet, rather than £47.99 for a book. Most students would grudgingly pay £25 for a text book that they would use throughout their degree but not for one that is invariably going to be used to get them through one module.

That said, this book would be a great asset to any beginner chemistry student or a new lecturer who needs ideas for lectures. The step-by-step nature of the chapter make-up should help build even the weakest student's confidence in chemistry.

Chemistry^3: introducing inorganic, organic and physical chemistry

Subject area
Chemistry

Description
Written by a team of inorganic, organic and physical chemists, together with specialists in chemical education, all of whom bring to the book a wealth of experience of teaching chemistry in a way that students enjoy and understand; this is a uniformly authoritative yet engaging introduction to the fundamental principles of chemistry

Authors
A Burrows, J Holman, A Parsons, G Pilling and G Rice

Publishers/Suppliers
Oxford University Press
<ukcatalogue.oup.com>

Date/Edition
2009

ISBN
978-0-19-927789-6

Level
First year undergraduates and tutors in chemistry

Price
£49.99

This is a book that shines out amongst so many undergraduate texts in the field of chemistry. It does not try to encompass the whole of a degree course in a single text; rather it addresses the specific needs of the first year undergraduate. It does so in a refreshingly open and 'familiar' way.

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

The undergraduates of today have been raised on a diet of colour, digital media and a constant understanding of HOW science is directly relevant to them. Purely academic chemists may prefer the more traditional style of some of the more commonly used texts, but I would urge them to reconsider. If we wish to retain students on chemistry courses we need to look at what they want, and need, and not stick to what we know; this book would be a good place to start. They will get a text written in a style that is similar to many GCSE and A-level texts, and as such is not intimidating. It is not dry and full of unbroken text, it has a layout that includes a variety of boxes with 'tasters' of how the science is used or where it occurs; summary sections are not just at the end of a chapter but serve as regular review points throughout. There is a good use of colour and space that draws the eye naturally from one section to another. The maths is dealt with in a clear and easy to follow way. It is the text book equivalent of a friend, teacher and companion rather than a lecturer.

Perhaps the most significant difference is that for the first year it deals with physical, inorganic and organic branches of chemistry in one text. The common style is used throughout and this works well. It is familiar, this is how the texts they know from A-level are structured.

The electronic back up that is available online is another excellent resource. The calculations are broken down further and there is an additional maths toolkit to support those who experience difficulties. (I have used this extensively with students and they speak very highly of it.) There are regular multiple choice tests to review learning and enable students to identify their learning needs.

I have found myself recommending this book to higher level A2 students as well as trainee teachers, newly qualified teachers and undergraduates. Without exception they have all said how refreshing this book is. I think that the following comment from a post grad chemist sums up this book:
"It's made me remember what it is I love about chemistry, I can't wait to get out there and teach it now!"

If you work with first year undergraduate chemists and this book isn't on your bookshelf, I would strongly recommend that you consider adding it.

Claire E Platt
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May 2010

Concepts in Thermal Physics

Subject area
Thermal physics, Statistical physics

Description
An introduction to the main principles behind thermal physics, thermodynamics and statistical mechanics

Authors
S J Blundell and K M Blundell

Publishers/Suppliers
Oxford University Press
<ukcatalogue.oup.com>

Date/Edition
2009/2nd edition

ISBN
978-0-19-956210-7

Level
Undergraduate

Price
£27.50

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

One of the advantages of having a second edition to review is that it is always possible to look at the reviews of the first edition (Reviews vol 8, no2). James Collett, of the University of Hertfordshire, reviewed the first edition with an enthusiastic use of a gardening metaphor. Horticulture is not my forte, but if I understand the metaphor correctly I agree wholeheartedly with the sentiments. This is an excellent text that will serve an undergraduate throughout a degree.

Thermodynamics and statistical mechanics have been an interest of mine for several years now, and I was minded upon reading the book to compare it to two of my favourite texts; the 5th edition of Zemansky's *Heat and Thermodynamics* and the third edition of Sears and Salinger's *Thermodynamics, Kinetic Theory, and Statistical Thermodynamics*. I have found these books invaluable in recent years. The writing conveys the deep understanding that these authors had of the subject; an understanding borne of direct personal experience of working in the field. My friend and former colleague, Dr Jeremy Dunning-Davies, himself a noted thermodynamicist, recalls an occasion at a conference in Cardiff in 1970 when Zemansky vigorously assailed the axiomatic school for their mathematical approach to what he saw as very much a practical subject. It would seem to be a view shared by the Blundells, as the principal motivation for a second edition is to include chapters on practical matters such as diffusion, osmosis, Monte Carlo simulations, and radiation transfer in atmospheric physics.

This is a very different sort of book from the two mentioned above. In some respects it is also better. The chapters are short, typically ten pages or so and self-contained, though there is sense to the order in which the material is presented. Chapters on statistical mechanics are interwoven with chapters on thermodynamics in order to present a coherent account. At the end of many chapters, especially the earlier ones, there is also a short biographical vignette on some of the main historical characters associated with the subject of the chapter; Fourier on heat conduction, Lavoisier and Rumford on the First Law, for example. I was particularly pleased to see a biography of Joule, whose great achievement in measuring the mechanical equivalent of heat is almost unknown today. Compared with either Zemansky or Sears and Salinger's **Concepts in Thermal Physics** is much more accessible to an undergraduate. I have to confess that even though I bought these books when I was an undergraduate, I can't say that I read them very much. The chapters are too long and too detailed to have been of much use to me then, but I imagine that if I had owned this book all those years ago I would not have found it as daunting.

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May 2010

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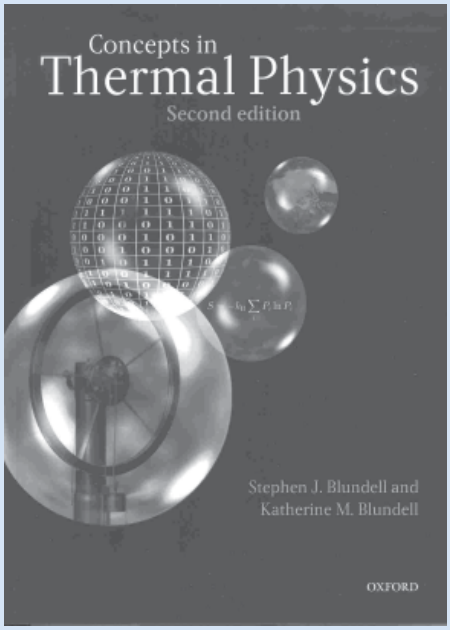
Concepts in Thermal Physics



From the publisher...

Concepts in Thermal Physics

By S J Blundell and K M Blundell

An understanding of thermal physics is crucial to much of modern physics, chemistry and engineering. This book provides a modern introduction to the main principles that are foundational to thermal physics, thermodynamics and statistical mechanics. The key concepts are carefully presented in a clear way, and new ideas are illustrated with copious worked examples as well as a description of the historical background to their discovery. Applications are presented to subjects as diverse as stellar astrophysics, information and communication theory, condensed matter physics and climate change. Each chapter concludes with detailed exercises.

978-0-19-956210-7 512pp 2009 £27.50

Continued from page 9

One of the great advantages of the book is its simplicity. In nearly 500 pages an impressive range of topics is covered, from basic ideas of heat and temperature up to more specialised concepts in statistical mechanics and irreversible thermodynamics that typically will not be covered until the final year. There are some useful mathematical ideas in the appendices. Each topic is dealt with simply and concisely with no sense of the doubt and confusion that surrounds this subject. I well remember the first time I came across Sommerfeld's pithy comments. The exact wording eludes me, but the gist of it was: "the first time you meet the subject you don't understand it; the second time you think you understand it apart from one or two small details; the third time you meet it you know you don't understand it but you are so familiar with the ideas that it doesn't matter". I was in a lecture theatre in Berlin and everyone in the audience found it highly amusing as Sommerfeld appeared to capture in these three sentences our own thoughts about the subject. Only later did it occur to me that he was actually saying that thermodynamics is impossible to understand. Coming from a famous theoretician who had himself written a volume on the subject, it is a remarkable thing to say.

The flaws in thermodynamics are deep and date to the origins of the subject in the middle of the19th century. Only a fundamental revision of some of those ideas will clear away the confusion, but this is not the book to do it. On the contrary, it is a standard text that presents the standard ideas, but it does it very well. **Concepts in Thermal Physics** is not, in my view, as insightful as Zemansky nor as detailed as Sears and Salinger, but it's at a level that students can cope with. It also presents a much broader range of material, enough in fact for it to be just as useful to finalists as it will undoubtedly be to first years. Whether it will last as well into the future as these other two remains to be seen, but it is definitely a book worth buying.

Constructivist Instruction: sucess or failure?

Subject area
Education

Description
This book provides a range of commentaries and evidence, for and against constructivism

Authors
Sigmund Tobias and Thomas M Duffy

Publishers/Suppliers
Routledge - Taylor & Francis Group <www.routledge.com>

Date/Edition
2009

ISBN
978-0-415-999424-8

Level
Academic, research

Price
£31.49

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	**
Usefulness to teacher	***
Meets objectives	*****
Accuracy	***

University teachers in the physical sciences are commonly being encouraged to move beyond teaching that is simply lecturing at large groups of students who tend to respond by making notes for later study and revision. Key concepts introduced into such arguments commonly relate to notions of 'active learning', and what are commonly described as 'constructivist' notions of teaching and learning. Given this background, colleagues may welcome a book which claims to tell us whether 'constructivist instruction' actually works. If constructivism is no more than a fad, then there is little reason to change teaching approaches. Indeed, if constructivist teaching is less effective than more 'traditional approaches' – as a number of contributions to this edited volume argue – then lecturers need to be aware that the educational emperor may be displaying naked ignorance rather than new clothes we should all aspire to.

The theme of this volume, then, could not be of more importance to teaching and learning. A wide range of contributors set out their arguments for whether 'constructivist instruction' is an improvement on more traditional forms of 'direct instruction', and in many cases set out the empirical basis for their views in terms of the outcomes of various studies. The debate is fundamental to the work of all teachers.

Despite this context, I would not recommend this book to a broad educational audience. I certainly enjoyed reading the volume, and found much that was thought-provoking, and I would strongly recommend it to certain readers. Yet I suspect that most readers of this review journal, for example, would not find it an informative or useful read. Indeed, I strongly suspect that such a volume might only heighten the sense of despair that some colleagues in the physical sciences already feel when meeting educational advice on how to teach their subject. This would be a great shame as educational research has much to offer of value to teachers of all subjects, at all levels, even if the Higher Education Academy's attempts to encourage university teachers to develop their teaching in line with the outcomes of such research have been claimed to alienate many university teachers in the physical sciences[1].

Constructivism in science education
Unfortunately 'constructivism' is a term that is understood and used in very differently ways, and even when applied to teaching can mean different things to different scholars (as becomes very clear in the present book). Within science education, constructivism is largely seen as a perspective on teaching and learning which is informed by research in psychology and the cognitive sciences on how people learn[2]. In this form, constructivist instruction involves applying principles that have strong empirical support, and indeed may often seem as little more than obvious good practice to experienced teachers. Constructivism here implies that learning is achieved through internal mental processes in learners: that an individual's perceptions, memories, thinking skills etc are all involved in understanding new ideas, and in building up mental representations of areas of knowledge; and that therefore the extent to which students can effectively learn what they have met in classes will depend upon whether teaching is well designed to fit those processes. Some of these ideas are quite basic: linking new information to what students already know;

Continued on page 12

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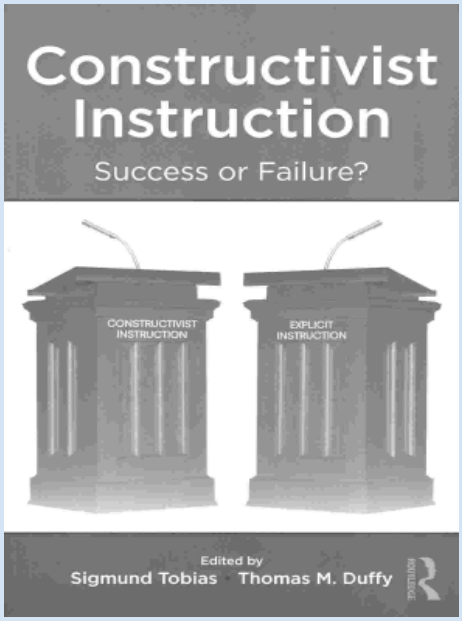
April 2010

Constructivist Instruction: sucess or failure?



From the publisher...

Constructivist Instruction: sucess or failure?

BySigmund Tobias and Thomas M Duffy

Constructivist Instruction: Success or Failure? brings together leading thinkers from both sides of the hotly debated controversy about constructivist approaches to instruction. Although constructivist theories and practice now dominate the fields of the learning sciences, instructional technology, curriculum and teaching, and educational psychology, they have also been the subject of sharp criticism regarding sparse research support and adverse research finding.

978-0-415-999424-8 392pp 2009 £31.49

Continued from page 11

proceeding at a pace that does not exceed their working memory limitations; making teaching (even lecturing) sufficiently interactive so that learners need to be actively processing information (not just copying things down to be considered later); emphasising key concepts and links, and so on.

Students' alternative conceptions

The reason constructivism in science education, as an approach to inform teachers, goes beyond common-sense and applied psychology, is that it draws upon an extensive research base exploring student learning difficulties in specific science topics[3]. In particular this work highlights that students often come to classes and lectures already holding personal idiosyncratic notions of scientific topics that are at odds which the canonical science they are expected to learn. These alternative conceptions act as frameworks for interpreting new teaching (so it may be distorted without the student being aware) and are sometimes quite tenacious, despite extensive instruction[4]. Much research in science education has attempted to characterise students' conceptions and explore different approaches to teaching the scientific models. Even in this limited context, where there is strong consensus on basic principles and educational goals, constructivism has been the source of much lively dispute[5-7], although this debate has tended to address issues other than how the perspective can offer guidance on what makes good and effective science teaching[4].

Constructivist Instruction

So even within science education, where the basic tenets of constructivism are widely accepted, there is nuanced and diverse writing about constructivist ideas, offering scholarly debate on how constructivism can and should be understood, and how its underlying philosophical stance relates to the epistemology of science. Tobias and Duffy offer an account of the debate which asks whether constructivist instruction works in teaching more widely.

The key difficulty in such a debate, which becomes very clear in reading the different contributions, is that there is very little agreement among the authors on what constructivist instruction (or for that matter, the supposed 'traditional' alternative) actually looks like. Indeed to a first approximation it could almost be said that the supporters of both approaches tend to agree on what good teaching is like more than they disagree. Both camps see teaching as involving the teacher making key inputs to support learning, but disagree on whether that is enough to count as 'direct instruction'. Neither camp thinks that totally open, unguided, discovery learning where learners are left to their own devices is a useful strategy, but for some of the authors this is how they understand constructivist

Constructivist Instruction: sucess or failure?

teaching. Yet such a notion (which is a common one in educational debate in the US, even if it seems unlikely to be a practice actually adopted by many teachers at any level) is certainly not how constructivist science teaching is understood in the UK. Indeed, the UK government, in its guidance to school science teachers, manages to recommend key constructivist techniques, within a teaching approach with more uniformity and structure[8] than most of the authors of the present volume would expect to see in 'direct instruction' in the States!

Overview

Taking these considerations together, I think that Tobias and Duffy have produced a volume of considerable interest to those who work in education departments and faculties, and especially for those with a strong interest in debates about instructional approaches. Indeed the accounts of empirical studies are very interesting, and worthy of finding a wide readership.

The book will also be of interest to those working in the physical sciences who are strongly interested in the scholarship of teaching and learning. To these readers, who are already aware of some of the nature of this area of debate, the volume is strongly recommended.

Yet for those who are not engaged in these areas of scholarship, the book is likely to be of limited interest. In particular, those who are looking to develop their own teaching, and have heard a little about constructivist approaches, should be wary of considering this book as a suitable guide. Without a close and careful reading of the diverse chapters here, the general reader is likely to feel more confused about constructivism, and its potential, after reading the book than before. For these readers there are certainly better starting points, and indeed the Physical Science Centre's own pedagogic publications are likely to prove of more immediate value in informing teaching.

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Deep Inelastic Scattering

Subject area
High energy physics

Description
Graduate level account of the physics of deep inelastic scattering

Authors
R Devenish and A Cooper-Sarkar

Publishers/Suppliers
Oxford University Press
<ukcatalogue.oup.com>

Date/Edition
2010

ISBN
978-0-19-850671-6

Level
Undergraduate, research

Price
£72.00

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	****
Usefulness to teacher	***
Meets objectives	*****
Accuracy	*****

This book is on the subject of deep inelastic scattering (DIS) in high energy physics. This text is very up-to-date, covering recent advances in the field, emphasising their importance and includes a comprehensive discussion of the background and basis of DIS. The book is ideal for PhD students, both experimental and theoretical, in particle physics and is also a very good desk reference for anyone involved in aspects of DIS such as analysis, detector physics or calculation. Overall the book is impressive, with the various aspects of the subject matter clearly explained and open questions well covered.

A particular highlight is a chapter on the extraction and formulation of parton densities, which is full of insights and explanations for anyone working with parton density functions. The coverage here will supplement and deepen the knowledge of many people used to working routinely with parton densities, as well as serve as a valuable introduction for new practitioners in the field. Also useful are chapters 3 and 4, giving an overview of quantum chromodynamics (QCD) and the QCD improved parton model (including DGLAP higher twist etc). All the key results are there, although the discussion is quite rapid in places.

Other chapters include determination of the strong coupling constant, DIS at large momentum transfer, hadron-induced DIS and aspects of polarisation. In places the pace is quick, and more suited to a reader already exposed to some of the material.

Appendices include the Dirac equation, Feynman rules and a discussion of Monte Carlo codes.

Overall a very useful and comprehensive book, suitable for any reader involved in DIS experiments or theory and can be strongly recommended to anybody with an interested in the subject.

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April 2010

Did Time Begin? Will Time End? Maybe the Big Bang Never Occured

Subject area
Cosmology

Description
This book is presented as an aid to think about the concept of time from a cosmological perspective. The author reviews astronomical observations and theories which attempt to describe the nature and evolution of our Universe, addressing the issue of if / when time began and will end

Authors
Paul H Frampton

Publishers/Suppliers
World Scientific
<www.worldscientific.com/index.html>

Date/Edition
2009/1st edition

ISBN
978-981-4280-58-7

Level
Professional non-scientists to A-level

Price
£21.00

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	****
Usefulness to teacher	****
Meets objectives	***
Accuracy	*****

At first sight the book is attractive as it is in a small format, and the text is not too dense. The author has the capability to write in a clear and accessible style. However, I have found that he has failed to meet its goal and intended target audience. The back cover suggests that this book "will better enable the public to discuss further the fascinating idea of time. It is ideally suited also for young people considering a career in scientific research." The book is clearly not for an expert in cosmology or particle physics, but it is fair to say that the reader is better off if equipped with some good physical understanding of current theories of the Universe, its content, and its history. Failing that, our reader might easily and quickly get lost in some of the arguments developed here. However, if these barriers are passed, it is certainly a book that can be enjoyed and which engenders, as the author hopes in his preface, further reflection about time.

The book is divided into eight chapters, starting with a discussion of why many scientists believe time began at a Big Bang, and why the author thinks this is not correct. Some basic concepts such as the Doppler effect, which is central in studying the expansion of the Universe, are explained in detail and in simple terms, even with the aid of a diagram. Most readers will be familiar with the Doppler effect. In contrast, terms like 'multiverse', 'eternal inflation', 'non-trivial topology', 'inflation potential', or 'cosmic variance', are used a few pages later with little or no introduction. These concepts would have benefited from a more gentle introduction, especially in the first chapter. The result is the reasoning is more difficult to follow.

The next four chapters discuss several key observations and the construction of the theoretical models that try to explain them: the observed smoothness of the Universe, its structure and content, why cosmologists think there is dark matter, and more importantly, that the main component of the Universe's energy is the mysterious dark energy. Then, the possible futures of the Universe are discussed, and the advantages (from the point of view of the author) of cyclic cosmological models are laid out. Finally, a brief final chapter summarises the answer to the two questions in the book title.

The author concludes that the most likely scenario for the evolution of the Universe is that the present expansion will end after a finite time, after which the Universe will contract, bounce, and start expanding again. From that point of view it is clear that time will have no end, and had no beginning. This raises the question of whether there was an initial cycle, or if the various cycles yield similar Universes with the same evolution.

To summarise, this is a very interesting book, but the reader needs a fair amount of understanding of physics and of cosmological concepts.

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May 2010

Fundamentals of Neutrino Physics and Astrophysics

Subject area
Particle Physics, Astrophysics

Description
A gathering together of all the current theoretical and experimental knowledge of neutrinos

Authors
Carlo Giunti and Chung Wook Kim

Publishers/Suppliers
Oxford University Press
<ukcatalogue.oup.com>

Date/Edition
2007/1st edition

ISBN
978-0-19-850871-7

Level
Postgraduate

Price
£54.00

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	***
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	****

"It doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong." So goes Richard Feynman's quote that heads Chapter 3 on the Standard Model. But it also sums up the whole book. Very beautiful theories are expounded, very smart people are mentioned, and then the experiments are discussed in order to bring everything back to reality. The big difference here, and what Feynman was getting at, is that in neutrino experiments the results are not always clear and often new theories have to be constructed as ways of analysing the experimental data, rather than using experimental data to destroy old theories. And that is the main reason most of the theory is mentioned in this book: to give the tools needed to understand the experiments.

In the historical introduction it is stated that: 'the neutrino is playing the role of a messenger of the new physics beyond the Standard Model'. And what is shown in the book is that neutrinos are messengers from many other places as well: from the heart of stars ('Only neutrinos… enable us to see into the interior of a star'); from supernovae; from the higher generations of the Standard Model, and even from the big bang ('[relic neutrinos,] the most abundant known, but not yet detected, relic particles in the universe, next to the Cosmic Microwave Background Radiation [CMBR]').

'Background' is an important theme in this book. In their introduction the authors give their intention to make the book 'as self-contained as possible'. And they have succeeded. The book includes the background to every area in which neutrinos are involved. Field theory and the Standard Model, the standard solar model, our present knowledge of supernovae, and current theories of cosmology, these are all covered, so the reader should not need to look beyond this text to understand the background necessary to discuss the neutrinos involvement. An example is the quote above as to how relic neutrinos are the next most abundant relic of the big bang next to CMBR: so to fully explain that statement there is a large section describing the CMBR.

One way of seeing this book is as a self-study guide on late 20th Century physics, in which neutrinos are used as the context to bridge the gap between abstract theory and experimental reality.

The authors' aim is to gather together all the knowledge and tools that are necessary to understand the true nature of neutrinos from the experimental data, using the theories that have currently been developed. So the book brings together all the current knowledge, whether experimental or theoretical, that exists on neutrinos.

The basic mathematical and physics background are presented in the first six chapters. This covers a short, well referenced, history of the neutrino (they were originally called 'neutrons', Pauli proposed them before the neutron had been discovered); the quantum field theory of spin ½ fermions; the Standard Model and the Higgs mechanism; the electroweak behaviour of quarks and leptons; three-generation mixing of particles; and neutrino interactions and neutrino masses.

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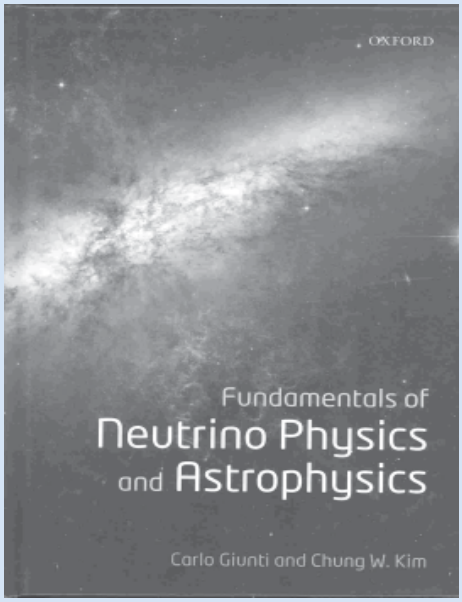
May 2010

Fundamentals of Neutrino Physics and Astrophysics



From the publisher...

Fundamentals of Neutrino Physics and Astrophysics

By Carlo Giunti and Chung Wook Kim

This book deals with neutrino physics and astrophysics - a field in which some of the most exciting recent developments in particle physics, astrophysics and cosmology took place. The book is the most up-to-date, comprehensive and self-contained treatment of key issues in neutrino physics. It discusses all the topics vital to the understanding of the nature of neutrinos such as what they are, how to describe them, how they behave in nature, and the roles that neutrinos play in shaping our Universe.

978-0-19-850871-7 728pp 2007 £54.00

Chapters 7, 8 and 9 build upon the background to discuss the more recent topics of neutrino oscillations and generation mixing, in vacuum and in matter. The aim is to show how the formulas generated by the theory are used to analyse experimental data.

Chapters 10 to 15 deal with neutrino experiments. These chapters are a good example of the book as a whole. They start off presenting background: whether thermonuclear energy production, cosmic ray interactions or supernova dynamics. All the important experiments are discussed in detail, explaining their set-ups and giving graphs of their results. Experiments to detect neutrinos from the solar interior, from cosmic rays, from nuclear reactors and accelerators as well as supernovae are all described and terrestrial neutrino experiments used to study neutrino oscillations and neutrino mass are also described and the results presented and analysed.

The book finishes in chapter 16 introducing the standard cosmological model so that in chapter 17 relic neutrinos can be discussed.

There are very extensive appendices (covering Special Relativity, Lagrangian theory, Gauge theories and Feynman rules) that are a very good resource and would be sufficient reason for a final year or postgraduate student taking this book off the shelf to remind themselves of those topics.

The whole book is very well referenced, the bibliography runs to over a 1000 items, so any point made can be followed up, or followed back.

The book is intended for postgraduates. The reader is expected to have encountered these concepts before, if not to know the details. Even though much background is explained, this is not a text to teach you these concepts but is a very concise reference that places all those concepts into a particular context. Note that the book is called ‘Fundamentals of…’ and not ‘Introduction to…’. The difference is crucial.

A good understanding of field theory and the Standard Model is needed to fully appreciate the discussions, but, even if you are not fully conversant, the text is detailed enough that one can follow the arguments presented as long as the reader has some familiarity. There are many particular terms and names used as shorthand to describe these concepts, for example ‘chirality’, ‘Majorana’, etc. none of these are explained here, for that is not the purpose of this book, the reader is expected to know these terms.

How Things Work: the physics of everyday life

Subject area
Physics

Description
A general text explaining the science behind everyday objects

Authors
Louis A Bloomfield

Publishers/Suppliers
John Wiley and Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2009/4th edition

ISBN
978-0-470-22399-4

Level
Undergraduate

Price
£42.99

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Louis Bloomfield has produced an excellent book aimed principally at the interested lay person but it is equally useful for scientists whose school physics is years behind them. The text focuses on aspects of everyday life from microwave ovens to desk lamps, from compasses to magnets, garden hoses, insulating clothing, hybrid cars and pendulum clocks. You name it, you'll find it, or something like it, in here. Bloomfield explains the science well, using everyday language, and takes a conceptual approach to the physics whilst bringing in some simple calculations to explore some of the quantitative consequences. He always takes the trouble to summarise the equations in words in order to spell things out, and there are frequent questions which help the reader to test their understanding, with answers helpfully and conveniently to hand. Each chapter ends with a series of exercises and questions to back these up and finally there are a few in-depth problems to help the reader really get to grips with the subject and embed the concepts firmly.

I had not seen earlier editions of this text and so come to it anew, but judging by the section on changes in the fouth edition given in the preface, much thought has been put into the presentation - and it shows. This is a fascinating, contemporary (LEDs, solar cells, wind turbines), as well as practical book (eg understanding water hammer) and would make an excellent text for any enquiring mind from secondary school age upwards. It is an ideal read for those who like to understand how devices work and for those who enjoy taking things apart and exploring the technology for themselves! There are a number of experiments to try out throughout the text which reinforce the concepts being discussed.

This is a very readable science book but it does the job of a text book too in many respects and so would be a good compliment to the reading list of a GCSE Science or Physics student. It would also be a useful way of stimulating scientific interest in younger readers.

The book has one disadvantage though in that it is unashamedly an American text. Whilst this is not a problem for most topics, in electricity, for example, the illustrations are based on the 120V AC generating system, which is slightly irritating, although easy enough to adapt to other voltages. The easy, chatty style though, is predominantly endearing and contributes much to the readability and accessibility of this book. At 580 pages it did not seem at all too long and there are good appendices as well as an excellent glossary of terms.

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March 2010

Introduction to General Organic & Biochemistry

Subject area
Organic chemistry, Biochemistry

Description
A general organic textbook designed for students at an undergraduate level

Authors
M Hein, S Pattison, S Arena and L R Best

Publishers/Suppliers
John Wiley & Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2008/9th edition

ISBN
978-0-470-12925-8

Level
Undergraduate

Price
£139.00

Summary Review

range: * poor to ***** good	
Academic content	****
Usefulness to student	****
Usefulness to teacher	***
Meets objectives	*****
Accuracy	*****

Introduction to General, Organic and Biochemistry (ninth edition) by Hein, Pattison, Arena and Best utilises *Wiley Plus* to deliver a better learning experience to the student. This is achieved by the use of an online version of the text which has further study resources. Instant feedback is given when the on-line quizzes are completed, and the online format allows the student to track their own progress. Tutors and instructors can also check their student's progress which enables further tutorial sessions and/or lectures to re-visit areas in which students are struggling or require additional explanation. Furthermore, *Wiley Plus* provides resources for tutors and lecturers to help prepare material for these sessions.

The text comprises 35 chapters which stretches from basic chemistry concepts to enzymes and their role in metabolism. Throughout the text key words are highlighted in bold and colour to alert the reader to new terms. 'Chemistry in Action' boxes are found throughout the text to highlight concepts being discussed in a real world context. As the title of the book suggests, this text encompasses a large area of chemistry which is spread over numerous facets therein. This means that each area is not presented as in depth as say a specialised text on the same subject, but this is not the desired objective of this text. However, the lack of a directed further reading section at the end of each chapter might deter some students from delving further into the chemistry discussed.

The text is aimed at students who do not have previous experience of chemistry at an advanced level and who have limited mathematical background. The text is instead directed at students who may well be studying for a degree in which chemistry is an active component but isn't central. As such, it can't really be described as a core textbook that might be used by a chemistry student throughout the entirety of their undergraduate degree; they would probably require a much more in depth and advanced organic textbook. This is clearly born out through the text, for example, aldehydes and ketones are only introduced in chapter 23, some 635 pages through the text. Simple chemical structures are used throughout the text in order to keep things to a level where the reader won't feel overawed by the structures.

The text is problem-solving orientated; one of the book's main aims is to develop problem solving skills within the student. A step-by-step process is used to show students how to tackle a problem and how to solve it. By no means are all the problems linear based; in fact where possible, alternative methods for solutions are also given. Units are frequently included in mathematical steps to show what happens to them during a calculation. Numerous worked examples are given within the chapters themselves, allowing the student to digest what has been discussed and then actively test whether or not they have understood it.

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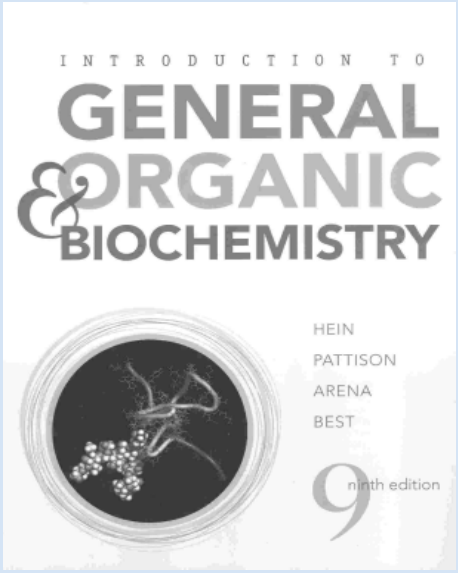
April 2010

Continued on page 20

Introduction to General Organic & Biochemistry



From the publisher...

Introduction to General Organic & Biochemistry

By M Hein, S Pattison, S Arena and L R Best

Intended for use in the two-term, freshman-level General, Organic, and Biochemistry course taken by Allied Health students, the Ninth Edition of this widely adopted text includes improved explanations, updated materials, cutting-edge developments, emerging technologies, and revisions to the popular Chemistry in Action sections. Hein, Pattison, Best, and Arena is a market-proven text that provides the most comprehensive coverage of general, organic, and biochemistry available at this level.

978-0-470-12925-8 1184pp 2008 £139.00

Continued from page 19

Each chapter has an extensive chapter review section, which draws on and builds upon the worked examples detailed within the chapter itself. This includes a key term revision section, review questions and paired exercises. Not all answers to the study questions are given at the end of the book, although roughly 50% are and those questions which have answers to them are clearly highlighted.

As a text for an undergraduate student the usefulness of the text really depends on the academic background of the student reader. If they have had previous experience of chemistry at an advanced level then this text would probably not be suitable, although if they struggle mathematically then it could certainly be a useful study aid. However, for those students studying a subject for which chemistry is not at its core but is a necessary component, then this text would be most useful. The clearly thought-out sections and focus on encouraging student problem solving would be a major boon for students coming from this type of background.

Introduction to Polymer Chemistry

Subject area
Materials sciences, Physics, Chemistry, Engineering (some medicine, pharmacy, biology) courses, with content emphasis on materials

Description
Overview and general text for a specialised branch of multidisciplinary science

Authors
Charles E Carraher

Publishers/Suppliers
CRC Press (Taylor & Francis Group) <www.crcpress.com>

Date/Edition
2010/2nd edition

ISBN
978-1-4398-0953-2

Level
Undergraduate

Price
£37.00

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April 2010

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

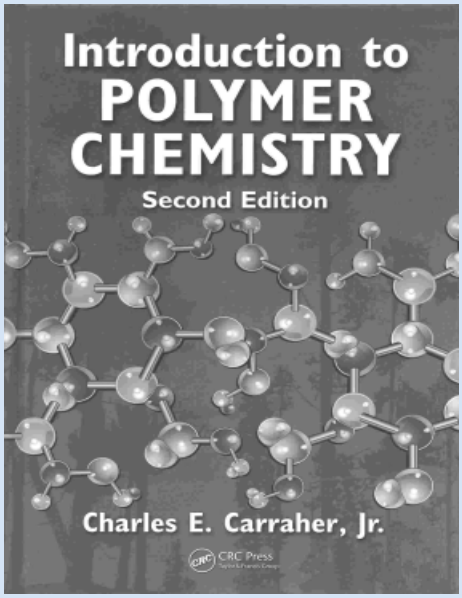
A first impression of the book is its wonderful ability to traverse a huge swathe of related topics. The style of the book is elemental and far-reaching at a glance, with a presentation which is pragmatic yet deals with sufficient in-depth coverage across the topics covered to be a voluminous read. The book places the central position of 'synthetic' and natural chemistry and biology neatly in the cadre that is polymer chemistry and technology. The ease of usage (for teaching) for the lecturer is pleasing and it is quite exciting to see a textbook that is written from on a topic more usually frequented by organic chemists, material scientists and physicists[1-4]. The text is certainly more chemistry-like than physics-based which should increase both its readability and lack of abstraction. The authors do an exemplary job at contextualising the field and reading is made ever more pleasant by the use of splendid black and white figures.

The societal impact and value of the current generation of polymers is discussed rather concisely and the author provides an excellent generational picture of the evolutionary history of polymer chemistry, covering the works of Wohler, Goodyear, Hyatt, Baekeland, Goodrich, Carothers and Ziegler et al, to name but a few. The section dealing with society and its perceptions of 'industrial' chemistry includes background material on ethics versus technical advances, markets, green chemistry and sustainability. There is an interesting contemporisation when the book makes reference to the Environmental Impact Assessment (p15) that has featured in G8 summits and governmental policies (Brundtland Commission). However, in addition to splendid delineatory schematics, the book deals with concerns of toxicology, carbon footprints, economic sustainability and the unease among the general public and environmentalists with 'polluting industrial' chemistry. This book doubles as supporting physics and material chemistry courses and in this case it is a good investment for the price of £37. The cost of the book is thus quite reasonable as a core text, particularly for courses where polymer chemistry features strongly.

There are a number of similar books on the university bookshelves[5-8] however, the book is particularly good at covering materials covered in part by many of these books and gathering them under one cover. This book is a particularly good read in view of its pleasing figures, explanatory text, diagrams and that the thermodynamic and kinetic maths is kept down to an 'elementary' level. All sixteen chapters are succinct, clear and subdivided in a manner that will be particularly useful for students. Themes cover the areas of the 'market place', morphology, molecular characteristics, syntheses (various key types), copolymerisation, organo-metallics, inorganics, reactions, testing[6, 8-10], rheology, additives and reactants, core polymer technologies and useful integrated appendices (A-G) and finally, natural materials and their role in the biosciences. Prerequisite reading and knowledge needed by the reader is a sound pre-university level base primarily in chemistry (and physics). The text is written in a consistent and usable manner for these students because the customary high level of mathematical description (in physics perspective texts) is kept to a bare minimum and concepts are allowed to be amplified in this way so the text is likely to be less daunting to many newcomers.

Continued on page 22

Introduction to Polymer Chemistry



From the publisher...

Introduction to Polymer Chemistry

By Charles E Carraher

Using simple fundamentals, the author shows how the basic principles of one polymer group can be applied to all of the other groups. He covers synthesis and polymerization reactions, reactivities, techniques for characterization and analysis, energy absorption and thermal conductivity, physical and optical properties, and practical applications. This edition also addresses environmental concerns and green polymeric materials, including biodegradable polymers and microorganisms for synthesizing materials. Brief case studies are woven within the text as historical accounts to illustrate various developments and the societal and scientific contexts in which these changes occurred.

978-1-4398-0953-2 534pp 2010 £37.00

Continued from page 21

The book scales the subject matter from the Q-e scheme (copolymerisation; p249) to protein chemistry (p104-117) and talks of the 'nano-sphere' and the 'meso-sphere' as both 'artificial' or synthetic and natural. Like many books thoughtfully penned by a subject expert, the book has a significant attention to detail paid to problem sections throughout the text (following each chapter although without model answers) and this always has and continues to prove very helpful to undergraduates. The problems posed by the authors are masterfully crafted to be both fundamental and applied (engineering, chemistry and polemical) and involve both calculation and essay-type questions. Despite the specialised title there is enough subject matter and conceptual common ground to make this book handy for referral purposes for core organic and inorganic chemistry course teaching if purchased. Lack of provision of worked answers is likely to be considered to be a small but obvious stumbling block of the text.

This title is specific to a single area of chemical sciences, consequently there is little possibility of routine uptake of the book, for example, by students as a standard chemistry guide textbook or a standard chemistry core text. However, the range of topics covered mean its use for particular courses (covering assorted themes) is the expected path[6,8]. The book successfully negotiates areas of specific, polymer-related analytical sciences[10-12], technology, fabrication, macroscopic and atomic-scale structure, thermodynamics, supramolecular-assemblies and 'natural' materials (organic and inorganic or hybrid-type).

The analytical sections appear at first sight to be limited in terms of spectroscopic, mechanical and microscopy-based analysis (that tend to be used ubiquitously) within this modern form of science and technology. On further reading it then becomes clear that Carraher's treatment of the subject matter means the material is present in its entirety but integrated within a tranche of sections and thus located at the point of context. In practice clear cut-segregation of themes is at times difficult for the novice to always appreciate but more realistic and thus, more valuable. This is certainly the case for a topic such as thermal analysis covering melting points and glass transitions (T_g) that can more appropriately be found presented in many sections across numerous chapters (pp 33, 44, 157, 253, etc).

Introduction to Polymer Chemistry

A particularly interesting chapter is the one covering ionic chain reaction and complex co-ordination chemistry (chapter 6), which is pivotal to current development in the field. There is an additional refined treatment of relevant energetics (Arrhenius, van't Hoff, Flory-Huggins and Kelvin, etc) and kinetics. At the same time it was interesting on a personal level to see the inclusion of liquid crystal, soft-matter assembly and solid-body mechanical and rheological theory from (Young, Maxwell, Hooke, Newton, etc.) subject initiators as a form of standard approach. It was also entirely pertinent to see with such predominance the areas of synthesis from dispersion media (suspension, emulsion, etc) running parallel to Carraher's free radical sectional methodologies (chapter 7).

The fabrication methodology sections (chapter 16) on melt spinning, moulding and thermoforming, composites and elastomers are superbly written and give clear details of a range of methods on difficult topics in light of continual novel discovery and patent disclosure and a rapidly evolving branch of scientific research. Themes such as top-down (films, sheets and calendering) and bottom-up (particle re-inforced composites), and supramolecular assemblies (p175, p329, p399) are mentioned with appropriate weighting. Supramolecular chemistry dealing with natural 'soft' and 'hard' colloids and graphenes is superbly written. The sections on structure and crystallinity (polymer structure, chapter 2) are dosed with sensible quantities of energetics, whilst the theory of mechanical behaviour[13], liquids and theory on solids (thermodynamics, p143, p175, p256) is precisely in line with expected content from a university lecturer. The book deals cogently and lucidly with concepts of the continuum within a media (chapters 2, 5, 8-10) and the nano-perspective and as might be expected discusses and explains the Shivers's techelic polymers concept (p251) and superconductor theory (p317) suitably for the novice.

The text deals additionally with the notion of 123-compound materials and perovskites (p317), mechanistic chemistry, electrophilic-nucleophilic and ligand theory and their outstanding landmark position within inorganic and carbon-based chemistry. Incorporation of Tables 10.1 and 10.3 is impressive as it attempts to elucidate the complexity of both nomenclature and composition of the sometimes disregarded 'inorganics' to suit and assist the multi-disciplinary reader. This is also exemplified in the discussion and comparison of the real-world extensions (eg Figs 11.11 and 16.9) of 'polymer' chemistry and in excellent pedagogy via parallel synthesis and 'the intermediates' approaches, persuasively alluded to in chemical flow diagrams (e.g. Fig 15.2-5) and other diagrams (throughout the text).

A textbook covering polymer science would be incomplete without a section on nanostructures and the obvious contemporaneous inclusion of work on fullerenes is fully expected in a textbook of such exemplary quality. The book also finds the way through the diverse challenging conceptual areas of electrically conducting polymers (p458-61), drug design and activity, that are essential for pharmacologists and pharmaceuticists (p462-63), additives (chapter 14) and synthetic medical polymers (p464-68). It is these topics nowadays which are critical to successful drug therapy, innovation (eg portable diagnostics, nanodevices, cancer therapy, etc) and medical intervention[14, 15] and that can be engineered to 'better' medical strategy and product stability. The book makes a great attempt to compare solution phase-matter with solid-matter (throughout the text) and discusses supramolecular systems that have current applications, such as block copolymers (p251) and dendrimers or ionomers (p259).

Basic treatment of functional polymers as a technological tool is good but further compounded and successfully steered in that the work also discusses strategies used as part of fabrication, such as those of Friedel-Crafts (vinyls), Grignard, Beckman and Canizzaro reactions and rearrangements. The chapters on polymer types and chemical synthesis (chapters 2, 5-10) are pre-requisite, de rigueur and indispensable[1, 2, 10, 16, 17] to polymer 'new materials' technology and are suitably elaborated on (p143-322) and expanded. The reviewer was exceptionally pleased to see reference to nanomedicines or the medical/dental applications of polymer technology in addition to building[9] and superconductors as these are current areas of fervent interest within economic and environmental sustainability and international regulatory control.

Chapter 10 deals with polymer materials such as minerals, clays and 'glasses' having followed on from discussing such ubiquitous natural products as asphaltics (chapter 4) and zeolites. Following an earlier section on both biopolymers (chapter 4) of natural and synthetic origin; this was really appreciated by the reader by way of presenting a balanced portrait of polymer chemistry using biological, petrochemical and petrological examples to prove that polymer chemistry is not something invented in our lifetimes. This treatment also serves to send a crucial message to imagine chemistry is a subject which touches no other[2,6, 9-12, 14-16, 18, 19]. Impressions of liquid crystals and space-filling structure (Fig 6.3) are two areas that have given rise to progeny within synthetic chemistry theory and stressing to the novice that some of the best ideas come from back-to-basics science.

Continued on page 24

Introduction to Polymer Chemistry

Continued from page 23

Mechanical testing (eg tensile strength) and moulding science for commercialisation of concept is reserved for the end of the book (chapters 13 and 16, respectively) and includes areas of cutting-edge product failure and rheological (in the broadest sense) research such as is relevant to interpenetrating networks and alloys. These thematic topics also refer indirectly to the earlier sections on thermoplastics and thermosetting materials, conventional polymeric solid materials (polyolefins, vinyls, neoprenes, etc), complex blends and composites, crystallinity, crystallites and defects, copolymers and self-assembly structures mentioned at various stages within the text.

The book as stated earlier is an excellent read and thoroughly engaging for student and tutor alike. Quite importantly, there are no observable errors in the book, in terms of accuracy of formulae, values and dates and the precision in citation and the content is first-rate. The chapters and sections on history and background (chapter 1), polymer structure (chapter 2), thermal analysis (p360-63), copolymerisation (chapter 8), rheology (chapter 13) and composites (part 16.7) were scrutinised heavily by the reviewer in light of teaching and research expertise and no faults were found. The final rating is a testiment to its flawless, impeccably succinct formatting and of a presentation of ideally varied content that reigns supreme for general teaching.

Carraher's book reflects the author's wide-ranging interests[1, 2, 5]. Those interests seem to range from green chemistry through engineering to natural science, and as the author quite justly states in the preface, "Polymers are all about us and are the basis of life itself." All the key areas of organic, inorganic, biological, physical, 'medicinal', chemical-engineering chemistries and related physics in addition to industrialised process testing and systems control and electronics are clearly alluded to in the book. This adds to the value of the text in view of the typical and rather 'abstract' customary positioning of this type of teaching material. The intended area of potential use for this text is for those undergraduates embarking on polymer chemistry or material science-only study or a course containing a significant element of this matter and even extends to undergraduate and MSc (or equivalent) research projects[3,14-17].

As a university lecturer traversing the disciplines of sustainable design and materials (engineering) and on through biomedical areas (pharmacy and medicine) on then to the analytics diagnostics (analytical chemistry) from bachelor's to master's and doctoral degree level, the book would be recommended to students as a indispensable read[14, 15, 17] and a noteworthy addition to the library.

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Laboratory Manual for Principles of General Chemistry

Subject area
Chemistry

Description
A collection of chemistry experiments to teach a range of techniques

Authors
J A Beran

Publishers/Suppliers
John Wiley & Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2008/8th edition

ISBN
978-0-470-12922-7

Level
A-level or 1st year undergraduate

Price
£99.50

Summary Review	
range: * poor to ***** good	
Academic content	****
Usefulness to student	***
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Laboratory manuals are rather different beasts from general chemistry text books. There is far more variability in the way that institutions choose to run their undergraduate practical courses than in the content of their chemistry courses and lectures.

This variability is evident is several ways: the time allocated to experiments in the undergraduate laboratory depends upon the balance between lectures and practicals; experiments may be intended primarily to reinforce the lectures, or may instead have the goal of illustrating experimental method; organic, inorganic and physical chemistry may be blended into integrated experiments, or kept distinct; and the level of student expertise and available instrumentation inevitably varies from one institution to another.

Further differences exist between institutions in the format and style of laboratory reports they require. Consequently, it is never likely that a single manual will be able to satisfy the needs of every institution and few manuals can expect to be big sellers unless they can piggy-back on a widely adopted chemistry text.

Beran's **Laboratory Manual for Principles of General Chemistry** claims to be 'the most well-received laboratory manual that Wiley has ever produced for general chemistry'. This sounds promising, although it is a pity that the author does not let us in on how many manuals Wiley has produced. Whether 'well-received' equates to 'financially successful' is hard to judge, but this text has now reached its 8th edition, a feat that few general chemistry texts manage, let alone laboratory manuals. Beran must be doing something right; what is it?

The text contains 39 experiments in general chemistry, on topics that range from atomic structure, acids and bases, and oxidation and reduction to kinetics, qualitative analysis and thermodynamics; in other words, most of the major topics encountered in a first chemistry course are represented, apart from organic chemistry. The experiments are at the level of a UK 1st year university chemistry course, or below, with many being suitable for A-level investigations, both in terms of complexity and subject matter. Indeed, there's a distinctly A-level feel to the whole text, with a tone that verges on the overly-simple. For example, a picture of a pen bears the legend 'Marking pens help to organise samples', while one of an Erlenmeyer is labelled 'Erlenmeyer flasks are convenient for containing solutions'; below a picture of a test tube we learn that 'Test tubes are a chemist's companion'.

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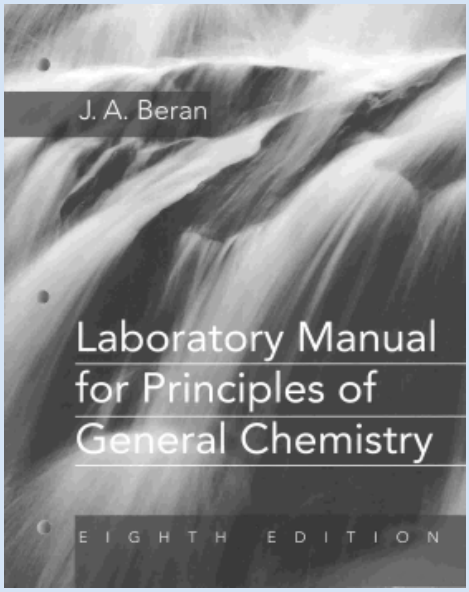
March 2010

Continued on page 26

Laboratory Manual for Principles of General Chemistry



From the publisher...

Laboratory Manual for Principles of General Chemistry

By J A Beran

This collection of challenging experiments will help get readers up to speed on laboratory techniques, safety and experimental procedures. Each experiment is presented with concise objectives, a comprehensive list of techniques, and detailed lab intros and step-by-step procedures. Beran also integrates numerous Dry Labs, experiments that do not involve chemicals but reinforce the reader's knowledge of general chemistry topics such as nomenclature, oxidation numbers, and atomic and molecular structure.

978-0-470-12922-7 464pp 2008 £99.50

Continued from page 25

However, though I found the slightly patronising approach of the author to be irritating at times, students will probably be more accepting of it, and it is better to include groundwork which can be skipped over if not required than to miss out essential information. While none of the experiments is original, all are potentially useful in illustrating the sort of topics an A-level student, or beginning university student, should know. The text is clear, with a clean and effective layout and the experiments are presented in a uniform and straightforward format. The very explicit and straightforward approach would suit an A-level course, and should be of particular value to an A-level teacher whose degree subject was not chemistry, for whom a step-by-step approach to practical work would be most suitable.

Less attractive is the style of the instructions: the experiments are written throughout in a recipe format. Here is a section drawn from the instructions for an experiment to determine relative reactivity of metals:

'Obtain 1-cm strips of Cu, Zn, Fe and Ni. Place about 1ml of 0.1M $NiSO_4$ in each of three test tubes. Place a short strip of freshly polished Cu, Zn and Fe in successive test tubes (Figure 27.5). Observation of a tarnishing or dulling of the metal or color change of the solution indicates that a reaction has occurred.'

At no stage is the experimenter expected to make, or indeed given any chance to make decisions, from the size of the metal strip, to the concentration of reagent, or the determination of what might indicate whether a reaction has taken place. (The text also makes no mention of what to do with the strip of nickel, which seems to have been forgotten about.) This lack of opportunity to decide how an experiment should be performed is a recurring theme in the book. Although the text is clearly intended for students with only a limited background in chemistry, this approach does restrict its usefulness for students who have moved beyond an elementary level. Students are not encouraged to think much about how an experiment is done, or to look out for limitations or uncertainties; they are expected to just follow the recipes.

As another example, in an experiment on molar mass, a sample of a volatile liquid is placed in an Erlenmeyer flask, clamped in a bath of boiling water. The Erlenmeyer is capped with aluminium foil, pricked to allow vapour from the sample to escape as the flask is heated. Heating is to be continued until the 'liquid in the flask and/or the [escaping vapours] ... are no longer visible', but what does '...and/or...' really mean? This seems to imply that only one condition need be met, while in reality all liquid must evaporate and no more vapour must escape, otherwise the results will be meaningless.

Laboratory Manual for Principles of General Chemistry

It is also suggested that wrapping a little aluminium foil around the top of the flask may help to maintain the temperature of the flask close to that of the liquid in which it is submerged, though this action seems likely to be of negligible value. Once the flask has cooled it is weighed to determine the quantity of vapour within. As the flask cools, air will seep back in and, by the time the flask is weighed, around 20% of the contents of the flask will be air. Will this affect the results? If so, how should the data be treated? If the results are unaffected by the air, why is this? Trying to work this out is a useful exercise for the students, and to omit it seems like an opportunity lost.

The volume is subsequently measured by filling the flask with water and then tipping the water into a 50 or 100 ml graduated cylinder. Students are expected to record the volume to 0.1 ml, though there is little chance that this precision will be achievable with a graduated cylinder, and of course water will remain on the inner walls of the flask. Yet no mention is made of this, even though this quantity could readily be determined by weighing the wet flask and comparing with its weight when dry.

In some ways therefore this text is a disappointment. The instructions to students are very prescriptive, with little opportunity for them to think about the answers to questions such as ‘how much?’, ‘how long?’ or ‘which reagent?’ They are not encouraged to think more deeply about the meaning of what they are doing - could the experiment be done differently? Are there some assumptions that might affect the accuracy of their data? Could they do anything to improve the experiment?

These are significant limitations for anyone contemplating using the text in a University context, but of far less importance at a lower level. If the text is used for A-level or IB chemistry, where a degree of hand-holding is essential, the recipe-like structure of the experiments is far more appropriate. A-level teachers should find this text to be a useful resource and will appreciate the clarity of the writing and layout.

Learning with Digital Games: a practical guide to engaging students in higher education

Subject area
Education

Description
An introduction to games-based learning

Authors
N Whitton

Publishers/Suppliers
Routledge - Taylor & Francis Group <www.routledge.com>

Date/Edition
2009

ISBN
978-0-415-99775-1

Level
Undergraduate

Price
£20.69

Anita Pincas
Department of Continuing and Professional Education
Institute of Education
20 Bedford Way
University of London
London WC1H 0AL
March 2010

Summary Review

range: * poor to ***** good	
Academic content	****
Usefulness to student	***
Usefulness to teacher	****
Meets objectives	**
Accuracy	****

This is a thoughtful and reflective work that will interest those who come to it with some experience of games. Based on doctoral studies, it offers careful analyses of some major issues around games such as attempts to define them, what typologies can be constructed to explain them, how various of their characteristics interact, what justifications there could be for using them in higher education, what possible relationship games could have to learning, and what the demands of technology are. A final chapter offers very brief but more specific insights into six educational uses of games.

However, it is not truly a practical guide to using or designing games. One would expect a guide to start from where the teacher stands, ie confronting traditional models of higher education [lecture/demonstration – seminar/laboratory/clinic etc – tutorial – examination] and wondering to what purpose a game might be included. Many questions arise about how and where gaming as a learning activity can sit within a typical course, for instance in relation to student motivation, ages and preferences, what outcomes a game can be relied upon to bring about, specific subject needs and whether games teach content or distract from it, or whether games are limited to problem solving and, crucially, where to find usable existing games or else templates to make one's own.

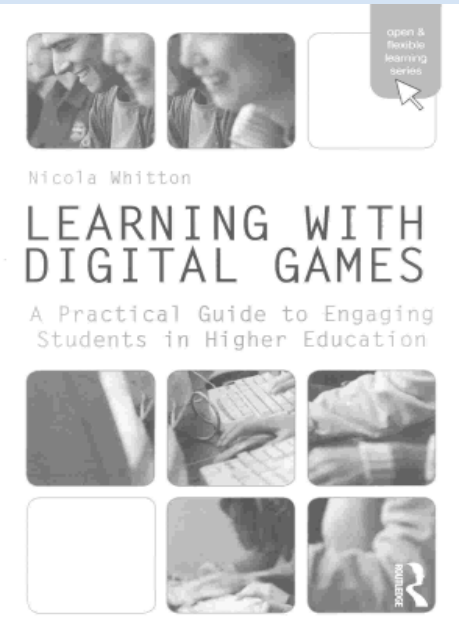
The two most important chapters offer good thinking and advice. 'Designing a Digital Game for Learning' briefly charts learning objectives against learning activities and game activities, comments on how to support collaboration, and maps out some features that are most effective. The chapter on 'Developing New Digital Games for Learning' has much useful material about the skills required, functionalities, ensuring balance, and a checklist of factors that enhance engagement. It is the pedagogic chapter that lets the book down. It reiterates theories of constructivism, active, collaborative and experiential learning and problem solving, and points out how games use these, but does not place games within the scenarios of higher education.

Nonetheless, Whitton's book is eminently suitable as a background text for a lecturer who wishes to teach about games perhaps in media studies, or for a discussion of the wider potentials of e-learning. It maps out in a logical fashion the factors that should be taken into consideration, with clear charts and further references, plus the occasional example. The instructor can add applications that challenge learners to analyse existing games and create their own.

These themes are taken further by other literature on the relation between games and education. Pelletier[1] offers a sensitive critique of common approaches that range across seeing a game as:

- a remedy for the shortcomings of perceived failing educational practice, or
- a way of facilitating learning outcomes, or
- a form behind which lies valuable content, or
- a prompt for active and critical learning.

Learning with Digital Games: a practical guide to engaging students in higher education



From the publisher...

Learning with Digital Games: a practical guide to engaging students in higher education

By N Whitton

Written for Higher Education teaching and learning professionals, *Learning with Digital Games* provides an accessible, straightforward introduction to the field of computer game-based learning. Up to date with current trends and the changing learning needs of today's students, this text offers friendly guidance, and is unique in its focus on post-school education and its pragmatic view of the use of computer games with adults.

978-0-415-99775-1 216pp 2009 £20.69

And her experiment with 11-14 year old children making their own games (usefully illustrating the use of ready-made items such as three-dimensional rooms or corridors, chairs, tables, machines, sound, and images) leads into her illuminating theoretical focus on the 'situated signification' of a 'game' rather than of 'games as causing learning'.

A Spanish team[2] uses existing software e-Adventure to create educational adventure games by manipulating templates that facilitate a story-board with problem solving, simulation, and scoring.

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Torrente, J. et al (2008) "Educational Game Design for Online Education". *Computers in Human Behavior* 24(6),..

Fernndez-Manjn: B. et al "<e-Adventure>: Introducing Educational Games in the Learning Process" . Accepted for publication in the *Proceedings of the IEEE EDUCON 2010 Conference* (Special issue e-Madrid). Madrid, April 2010.

Molecular Orbitals and Organic Chemical Reactions: student edition

Subject area
Organic chemistry

Description
Molecular orbital theory explained in a non-mathematical way for organic chemists

Authors
Ian Fleming

Publishers/Suppliers
Wiley-Blackwell (John Wiley and Sons) <eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2009

ISBN
978-0-470-74659-2

Level
Undergraduate and research

Price
£34.95

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

I inherited a 1976 copy of *Frontier Orbitals and Organic Chemical Reactions* by Fleming[1] from my predecessor and it has been much valued. It acted as an intellectual channel for the more electronic molecular level aspects of organic chemistry and formed the way in which I lecture on the subject. This book, like Stryer's book[2] was for my undergraduate biochemistry, adorned with crystal clear diagrams essential to fire up the imagination and clarify some of the more abstract concepts often delivered in the primary literature mathematically.

Chapter 1 takes one tidily through any required molecular orbital (mo) theory and one hopes that a modern undergraduate will cope well with this 'quantum' jump from their A-level syllabus. The chapter culminates in a brief but relevant nod toward spectroscopic techniques linking the m.o. theory to observable outcomes.

Chapter 2 takes careful reading as the author leads you into the modifications of the basic ethane allyl and butadiene systems to introduce ionic and radical characteristics and subsequent substituent effects. There then is an excellent section on stereo-electronic effects and conformational properties reminiscent of Deslongchamps book[3]. Other non-covalent interactions such as hydrogen bonding and pi-pi stacking are also addressed.

Chapter 3 gets straight the point in 'Chemical reactions - how far, how fast', definition of hard and soft nucleophiles and electrophiles and moving smoothly into thermodynamic *vs.* kinetic control very similar to Fleming's *Frontier Orbital* book.

Chapters 4 and 5 take the reader through ionic reactions with ambident nucleophiles through to stereochemistry of S_N reactions. Nucelophilic attack on carbonyl groups led me to the Felkin-Anh rule on diastereotopic selection.

Chapter 6 is more 'familiar ground' for those expecting frontier orbital theory in the thermal pericyclic reactions and explanation of Woodman-Hoffmann rules.

Chapters 7 and 8 have the whole gambit of photochemical and radical like reactions to peruse.

The end of chapter exercises challenge students in application of the 'rules' learnt within each subject and many of these will tax their minds more than sufficiently. The book culminates in essential references that will, for those taken by the subject and who could fail to be, propel them on.

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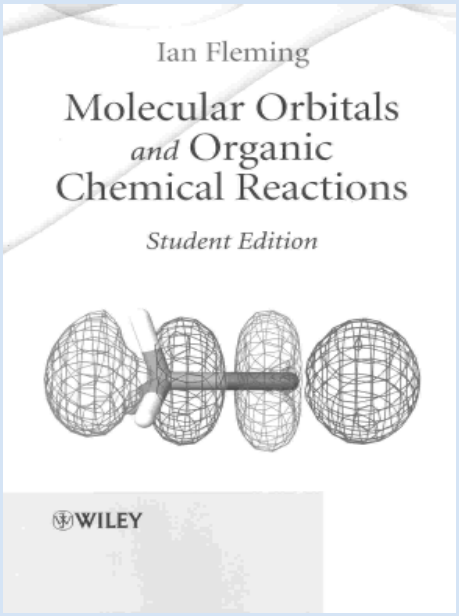
May 2010

Molecular Orbitals and Organic Chemical Reactions: student edition



From the publisher...

Molecular Orbitals and Organic Chemical Reactions: student edition

By Ian Fleming

Molecular Orbitals and Organic Chemical Reactions is both a simplified account of molecular orbital theory and a review of its applications in organic chemistry; it provides a basic introduction to the subject and a wealth of illustrative examples. In this book molecular orbital theory is presented in a much simplified, and entirely non-mathematical language, accessible to every organic chemist, whether student or research worker, whether mathematically competent or not.

978-0-470-74659-2 376pp 2009 £34.95

I love this book, but then it does pander to my weakness for molecular level phenomena in organic chemistry. I can thoroughly recommend this to any student who requires a good grounding in orbital theory and its practical application particularly those intending to employ modern computer aided techniques in solving organic problems.

References

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2. *Biochemistry*, Lubert Stryer, W.H. Freeman, San Francisco (1975)
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Nuclear and Particle Physics: an introduction

Subject area
Nuclear physics

Description
An introduction to particle and nuclear physics, at undergraduate level

Authors
B R Martin

Publishers/Suppliers
John Wiley and Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2009/2nd edition

ISBN
978-0-470-74275-4

Level
Undergraduate

Price
£34.95

Summary Review

range: * poor to ***** good	
Academic content	****
Usefulness to student	*****
Usefulness to teacher	****
Meets objectives	*****
Accuracy	*****

The area of particle and nuclear physics is rapidly evolving, and this very up-to-date textbook covers both of these areas in an introductory way. The book is very useful for beginning students (undergraduate) and even advanced A-level, and is very current in terms of content, particularly for the frontiers of particle physics. The style is engaging and approachable and, while very clearly written, may not be quite enough for a graduate student but would be a good place to start. The book is ideal for a new undergraduate, and will cover all the material in most combined particle and nuclear physics undergraduate courses.

The highlights of the book are, among others, a superb chapter on future prospects in the field. For example, a very topical discussion on the Higgs boson is presented, along with discussions on neutrino physics and particle astrophysics. The book also stands out with discussion of topics like power production and waste, which are relevant to our society at the present time. The future prospects chapter gives a real flavour of outstanding questions. The chapter on the weak interaction and electroweak unification is good, with a nice presentation of CP violation and its context within the Standard Model. The material is very clearly written and easy to read.

The book is split almost evenly between particle and nuclear physics. After the introductory chapter there are two chapters on phenomenology, one on nuclear and one on particle physics. These two chapters nicely set the scene and give a good overview. Then there is a chapter on experimental methods, including accelerators (not much, and perhaps could be more), particle interactions with matter (very pedagogic and useful to understand sometimes not obvious parts like the units employed) and a brief section on detector subsystems. There are then two chapters on quantum chromodynamics (QCD) and weak/electoweak and chapters and then two chapters on models/theories of nuclear physics, including a discussion on the limitations of fermi gas/shell models. These chapters include a section on applications of nuclear physics, including nuclear weapons, and biomedical applications. Finally the book concludes with future prospects and outstanding questions.

There are many appendices on quantum mechanics, kinematics, gauge theories, plus lots of particle data making it a useful reference. The book also includes a full set of solutions to the problems, making it ideal for an undergraduate course.

Overall the chatty style explains things clearly, and this book is an excellent starter text.

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April 2010

Organic Structure Analysis

Subject area
Organic chemistry, Analytical chemistry

Description
An advanced text on organic structure analysis with emphasis on real life examples

Authors
Philip Crews, Jaime Rodreguez and Marcel Jaspars

Publishers/Suppliers
Oxford University Press
<ukcatalogue.oup.com>

Date/Edition
2009/2nd edition

ISBN
978-0-19-533604-7

Level
Undergraduate and postgraduate

Price
£85.00

Zia Khan
CA/151, 9/A
Muhammad Hussain Road
Modeltown A
Bahawalpur
Pakistan
April 2010

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This is the second and latest edition of an already well established title, appearing after a long interval of 12 years. The matter of fact approach of the authors, reflected in the entire text, is commensurate with the complexity involved in organic structural analysis. Indeed, it is a highly demanding read both in terms of specificity of the organic structures and their symbolic formulations. Although the authors list advanced undergraduate students among the intended beneficiaries of their endeavour, any such endeavour on the part of an undergraduate will risk the better judgment, unless they are inherently as well as exceptionally gifted. The other two categories of beneficiaries, graduate students and practitioners, will certainly find abundant opportunities for adding sizeable deposits to their analyses bank of organic structures. That said, the book scarcely offers a free lunch even to accomplished scholars on the subject, as most of the ingredients of recipes remain ambivalent, largely because of the conspicuous absence of the support of mathematical formulae.

The book is structured around three sections including spectroscopic methods for problem solving, worked-out solutions and unsolved problems. The presentation scheme, specifically in terms of space allocated to the topics, appears to be arbitrary rather than following a systemically consistent approach.

The entire ethos of this title can be summarised in the attempt to highlight the usefulness of analytical equipment for establishing molecular structural parameters. Although the text includes four instruments-based techniques including nuclear magnetic resonance (NMR), mass spectrometry (MS), infrared (IR) and ultraviolet-visible (UV-VIS), the authors' advocacy for NMR and MS clearly stands out.

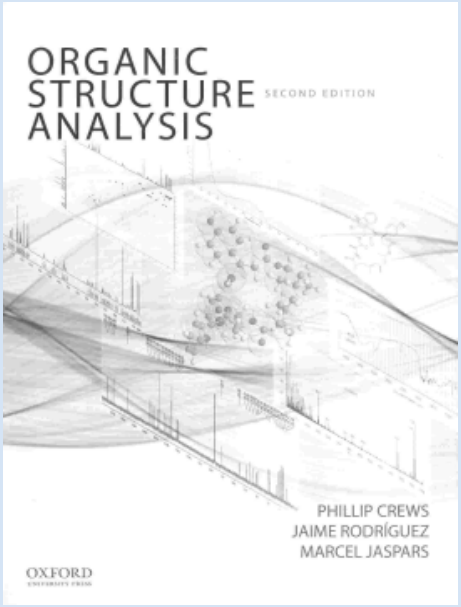
This book devotes the first ten of its twelve chapters to identifying the methods for organic structure analysis. Each of the ten chapters ends with a useful list of suggested further reading, followed by problems for the average and more advanced user.

Chapter 1 begins with the description of two-dimensional molecular structure, popularly known as regiochemistry and stereochemistry, and ends with Organic Structure Analyses Gone Bad. Characteristics, advantages and disadvantages of spectroscopic methods remain the major focus of the opening chapter which is followed by the introduction to NMR in Chapter 2. The major emphases of the latter include basic principles, general instrumentation, magnetic shielding, relaxation effects and identification of inherent differences of various nuclei affecting the acquisition and appearance of the output of analysis.

In Chapter 3, tables listing ^{1}H, ^{13}C, ^{15}N and ^{31}P NMR spectra of commonly used organic compounds provide important background information to help correlate functionality with chemical shift ranges. This is followed by the evaluation of coupling constants and nuclear Overhauser effects (NOE) in Chapter 4. Both these methods are considered to be helpful for identifying the nuclei actually engaged in coupling. Such identification is necessary to help establish the

Continued on page 34

Organic Structure Analysis



From the publisher...

Organic Structure Analysis

By B R Martin

The most up-to-date integrated spectroscopy text available, Organic Structure Analysis, Second Edition, is the only text that teaches students how to solve structures as they are solved in actual practice. Ideal for advanced undergraduate and graduate courses in organic structure analysis, organic structure identification, and organic spectroscopy, it emphasizes real applications—integrating theory as needed—and introduces students to the latest spectroscopic methods.

978-0-19-533604-7 654pp 2009 £85.00

Continued from page 33

relationship between unconnected nuclei. Two, three, four and higher spin systems are, however, dealt with in a vacuum which should have been filled with related mathematical formulae. Similarly, most of the compounds analysed by the authors lack the warranted rigour, for which compensation is made in Chapter 5 by focusing on multidimensional NMR. Chapter 5 introduces the mechanics of nuclear Overhauser enhancement spectroscopy (NOESY) and rotating-frame Overhauser enhancement spectroscopy (ROESY), after having discussed in detail both one-dimensional and two-dimensional NMR techniques. The use of NOESY and ROESY is specifically explained for determining relative stereochemistry and configurational analysis based on coupling constants. More importantly, Chapter 5 underscores instrumental advances, new pulse sequences, and improved data processing techniques; namely, computer assisted structure elucidation (CASE).

These developments are significantly valuable supplements to the previous edition of the book. Indeed, a lot has changed since the turn of the millennium and it is, perhaps, that which motivated the authors to revisit their earlier endeavour. For example, in Chapter 6, the coverage of ion analysers introduces orbitrap, an innovative type of mass analyser introduced in 2000. Similarly, Chapter 6 also describes tandem mass spectrometry (MS-MS) as an amazingly advanced tool in biochemical research. Chapter 6, in its entirety, encompasses a vast spectrum of MS techniques for examining a broad array of organic molecules.

The two techniques favoured by the author, NMR and MS, also dominate chapters 7 and 8, and it is only in chapters 9 and 10 that the reader finds IR and UV methods finally getting acknowledged as alternative techniques to establish structural features of organic compounds. The focus of Chapter 7 is the analysis of large and small molecules by applying the MS technique. In the section on small molecules, dereplication is added in the new edition to introduce the role of chemoinformatics. Since an important tool in the dereplication process happens to be the use of a database consisting of mass spectra of known compounds, the authors emphasise that the combination of MS analysis and database searching leads to a probability of identity rather than to an absolute identification. Therefore, electrospray ionization (ESI) and matrix-assisted laser desorption ionization (MALDI) are identified as the most efficient methods to study peptides and proteins through mass spectrometry. Nonetheless, some of the algorithms are recommended by the authors including MASCOT and SEQUEST, the most common databases to search the fragmentation spectra and peptide sequences contained in a database.

Organic Structure Analysis

Fragmentation processes are addressed in Chapter 8. The major emphases of the chapter include the classical methods of electron ionization mass spectrometry (EIMS). The identified fragmentation processes include one-bond cleavages, two-bond cleavages or cyclic pathway rearrangements, and complex rearrangements involving successive bond cleavages. Some practical examples are used in this chapter to illustrate the three categories of fragmentations. The section on identification of functionality from fragmentation processes also provides useful illustrations and explanations of the behaviour of many functional groups; alkanes, alkenes and alkynes, benzenoid aromatics, halogenated compounds, alcohols and phenols, carbonyls, ethers, and nitrogen groups.

The other two methods, IR and UV, are discussed in much less detail: only 65 of the 465 pages to the end of Chapter 10 are allocated to Chapter 9 and 10, thus rendering the title more of a treatise on NMR and MS rather than a guide to organic structure analysis. Chapter 9 focuses on the optical techniques underscoring IR spectroscopy. The empirical approach adopted in this chapter helps correlate experimental IR frequencies to functional groups. Numerous illustrations are used to underscore the use of correlation charts and tables for deciding the presence or absence of a particular functional group as confirmed by the IR peaks. Finally, spectral features possessed by organic functional groups are also illustrated and explained with the help of examples including all the common functional groups found in organic molecules.

Chapter 10, last of the authors' classification of the first section of book, provides the guidance to help infer the presence or absence of unsaturated functional groups by interpreting UV spectra values. The latter, obtained with both unpolarized and polarised light, are variously listed, illustrated and interpreted throughout the chapter. It is, however, emphasised that in most situations, UV data are used to reaffirm a conclusion previously identified by NMR or IR. The chapter end underscores improvements in theoretical chemistry which now offer the possibility to calculate circular dichroism (CD) spectra of medium-sized molecules, allowing the determination of the absolute configuration of the studied compound by comparing the calculated spectra against the UV spectra.

Chapter 11, the second section of the book according to the authors' classification, after briefly reviewing the previously discussed methods, moves swiftly on to worked examples, which provide precise interpretations and rich illustrations. The worked examples are both motivational and useful as various illustrations show that the four types of spectral analytical techniques can be used in combination for identifying molecular structures. The dereplication process is revisited to help recognise and follow different routes for avoiding the investigation of an already known compound.

The rewards promised by unsolved problems in Chapter 12, the third section according to authors, can't be claimed without having thoroughly read the previous chapters of the book.

Organometallic Chemistry

Subject area
Chemistry

Description
A textbook dedicated to organometallic chemistry designed for undergraduate level and beyond

Authors
G O Spessard and G L Miessler

Publishers/Suppliers
Oxford University Press
<ukcatalogue.oup.com>

Date/Edition
2009/2nd edition

ISBN
978-0-19-533099

Level
Undergraduate, research

Price
£57.00

Ryan Mewis
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University of York
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April 2010

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Organometallic Chemistry contains thirteen chapters beginning with an overview to organometallic chemistry and finishes with a section on isolobal groups and cluster components. The preface states that this edition has been written with both undergraduate and postgraduate students in mind. Each chapter has been designed around the student; each chapter has a number of worked examples throughout the text, with additional in-chapter questions to test the student's understating of the concepts being discussed. There are also end of chapter problems with which a student can test themselves, some of which come directly from recent chemical literature; this would aptly demonstrate to the student that the fundamentals being learnt are applicable to research being conducted at an international level. Answers to the end of chapter questions are given at the end of the book. There is also a directed reading section at the end of each chapter, so that those students who have a genuine interest can delve further into the subject. Students are directed to research papers as well as other textbooks.

The book has been updated in several ways since the first edition; there is now an updated and expanded coverage of the latest developments from the field, one particular facet is that this edition includes over 80% more end-of-chapter problems and 50% more in-chapter worked examples. There is also special emphasis on green chemistry, industrial applications and computational approaches to molecular orbital calculations. Furthermore there are more molecular model illustrations, a 25% increase from the previous edition (the second edition now contains over 600).

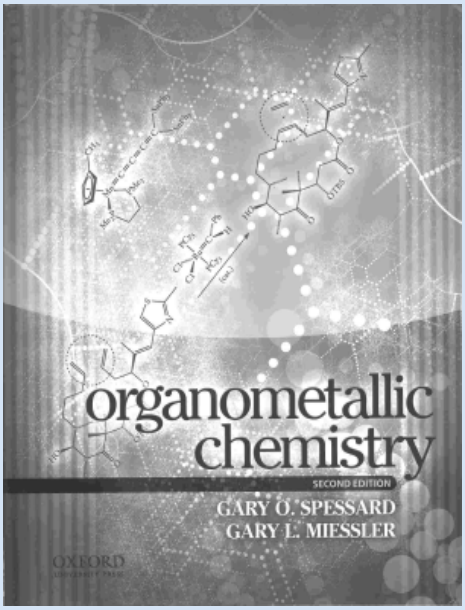
Chapter 1 provides a brief overview to organometallic chemistry. It is broken down into two sections. The first section illustrates how organometallic molecules differ from organic and inorganic molecules. Examples of sandwich and cluster compounds are given. The second section gives a brief historical overview of the subject.

Chapter 2, 'Fundamentals of structure and bonding', has a clear focus on molecular orbital theory. The chapter begins by introducing molecular orbitals and their interaction to form bonds. The same pictorial representations of orbital combinations are then used when molecular orbital diagrams are discussed. A large range of molecular orbital diagrams are provided and many problem based exercises are based upon them. Computational chemistry with respect to molecular orbital modelling is also introduced which is a new thrust in this edition of this text.

Chapter 3, 'The 18 electron rule', guides the student through the process of electron counting, this is achieved through use of examples in which a metal complex is broken down in to its component parts and the number of electrons donated to a metal centre calculated. Two methods are presented, the donor pair method and the neutral ligand method. The chapter then expands upon the concepts outlined in Chapter 2.

Chapters 4-6 discuss the types of ligands regularly encountered in organometallic chemistry. The carbonyl ligand is given its own chapter, as are π ligands, with a further chapter dedicated to other important ligands.

Organometallic Chemistry



From the publisher...

Organometallic Chemistry

By G O Spessard and G L Miessler

Designed with the needs of both undergraduate and graduate students in mind, Organometallic Chemistry, Second Edition, covers the fundamentals of organometallic chemistry by presenting seminal experiments, analyzing real data, and offering the most comprehensive problem sets available. The text opens with careful and patient explanations of the structure and bonding of organometallic compounds, providing a uniquely accessible introduction to the subject for undergraduate students. Later chapters build on this foundation with in-depth coverage of organometallic reaction mechanisms, more advanced topics of catalysis, carbene complexes, metathesis, applications of organometallic chemistry to organic synthesis, and cluster compounds.

978-0-19-533099 572pp 2009 £57.00

Vast numbers of examples are given in each chapter to highlight each ligand type, which are presented in conjunction with molecular orbital diagrams to show bonding characteristics. At the end of Chapter 6 there is also a section on nuclear magnetic resonance spectroscopy and its application to organometallic chemistry in terms of structure elucidation.

Chapters 7 and 8 introduce organometallic reactions and are broken down into those that occur at the metal centre and those that involve the modification of ligands. These two chapters are extensive, covering over 120 pages combined; however, this is a measure of the sheer number of examples that are covered within the two chapters (over 130).

Chapter 9 details Homogeneous Catalysis. Special emphasis has been placed on green chemistry, an emerging and very important area in which organometallic chemistry is involved.

Chapter 10 details transition-metal carbene and carbyne complexes. Structure, preparation and chemistry of transition metal complexes are presented. Both Shrock and Fisher carbenes/ carbynes are also discussed, molecular orbital diagrams again being used to highlight their binding modes to a metal centre.

The use of metal-carbene complexes in methathesis and polymerization reactions is detailed in Chapter 11. The section on π-bond methathesis has been re-written and expanded for this edition. This chapter includes a very good discussion of both methathesis and Ziegler-Natta polymerization reactions.

Chapter 12 looks at the application of organometallic chemistry to organic synthesis. Hydrogenation and asymmetric oxidation are covered in depth, as are the various ways in which C-C bonds are created using cross-coupling reactions.

Finally, Chapter 13 discusses isolobal groups and cluster compounds. Whereas the first edition included a variety of topics relating to applications of organometallic chemistry to other areas of science, this material has now been all but removed.

To summarise, this text would be an excellent resource for both the undergraduate and postgraduate chemist alike. The layout of the book, examples and problems, clearly meet the desired aim of producing a text which is suitable for students from undergraduate level to beyond. The availability of an instructor's resource CD-ROM, which includes all the examples from the text and solution manual files to the exercises and problems, results in a text that is highly recommended as a companion text book for an undergraduate course.

Physics of the Sun: a first course

Subject area
Solar physics (but see review)

Description
A very comprehensive introduction to solar physics aimed principally at a second and third year undergraduate audience. A major feature of the book is the set of recipes provided for readers to construct their own simple models of parts of the Sun or waves that pass through it

Authors
Dermott J Mullan

Publishers/Suppliers
CRC Press (Taylor & Francis Group) <www.crcpress.com>

Date/Edition
2009/1st Edition

ISBN
978-1-4200-8307-1

Level
Undergraduate

Price
£49.99

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

I finished this review during the final phase of the World Snooker Championship. It was a period of slow attritional strategic defence; pots were rare. Then suddenly a small opening, one ball falls, and the rest of the frame follows. And so it is inside the Sun's energy-generating core; a proton has, on average, to make ten to the power thirty three collisions before forming a deuteron nucleus, a period of play of the order of tens of billions of years; now that's what you call safety! This first step in the pp-chain controls the nuclear reactor inside the Sun and, if you read chapter 11 of this interesting book on solar physics, you will learn that it is the weak interaction (manifested as the 'indecision' of a proton in transforming into a neutron) that is largely responsible for this extraordinary slowness. The Coulomb repulsion of the two protons already means we are relying on quantum mechanical tunnelling to spirit them into a small chamber where the strong force can be felt. But the low probability of arranging the date is nothing compared with the unlikely makeover that the weak interaction must achieve, In fact the probabilities differ by seventeen orders of magnitude. In a few sentences, we see one of the great merits of a book on the physics of the Sun. You'll need particle, nuclear and quantum physics for starters, just to turn the Sun on. In other stars, things can get even more involved, but as Dermott Mullan shows, here at least degeneracy pressures are dwarfed by normal gas pressure. Nevertheless, the scope of core physics that can be taught with the Sun as an illuminating vehicle is impressive: hydrostatic support under gravity; heat transfer (all forms are relevant at some point in the Sun); ionisation states of plasma; kinetic theory; magnetic stresses and particle acceleration; sound waves; radiative transfer - and this is a far from exhaustive list. For colleagues interested enough to think a bit more about this possibility or immediately keen to try, Mullan's book is an excellent starting place.

Things start well. An interesting first chapter establishes what we can deduce from the Sun by direct observation, of its disc, the motion of the planets and (indirectly) the motion of Earth satellites. I did not previously know that a transit of Mercury, whose orbit was known to an observational accuracy of a fortieth of an arcsecond, was used to calibrate the pixels in the SOHO/MDI detector. The Sun may appear like a squashed mango when setting but its true oblateness is rather small (roughly one part in one hundred thousand) and due to rotation. Mullan describes the curious latitudinal variations in the Sun's superficial angular velocity and, a little later but without detail, the triumph of helioseismology in establishing the non-uniform angular velocity within the Sun. It is quite interesting however that both the fastest and slowest rotation speeds anywhere in the Sun are both to be found on its surface, at the equator and poles respectively.

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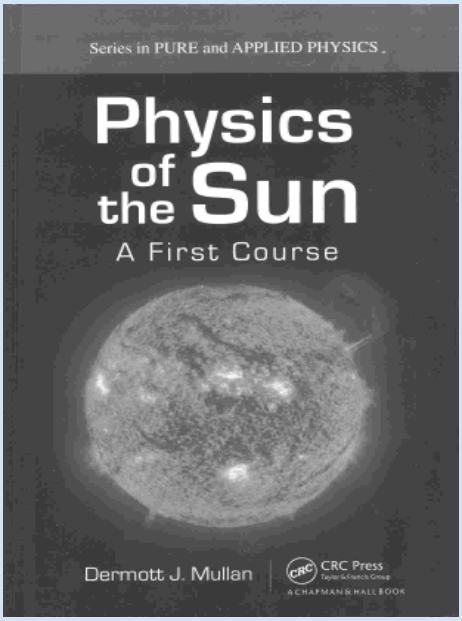
May 2010

Physics of the Sun: a first course



From the publisher...

Physics of the Sun: a first course

By Dermott J Mullan

The text covers a wide range of topics on the Sun and stellar astrophysics, including the structure of the Sun, solar radiation, the solar atmosphere, and Sun-space interactions. It explores how the physical conditions in the visible surface of the Sun are determined by the opacity of the material in the atmosphere. It also presents the empirical properties of convection in the Sun and discusses how the physical parameters increase with depth through the convection zone. The author shows how certain types of "real stars" are actually polytropes and offers a simplified version of oscillation equations to highlight the properties of p- and g-modes in the Sun.

978-1-4200-8307-1 390pp 2009 £49.99

Radiative transfer is nicely dealt with and accompanied by an explanation of the limb darkening that occurs in pictures of the Sun's visible surface, with a nice caution about the wavelength dependence of this effect and how limb brightening may also occur. There are however no problems in this chapter and this is a small general criticism of this book. Several chapters have no problem sets and those that do are of the unchallenging kind, useful for students to get a feel for the numbers but not challenging their understanding. Some work on this for a future edition is strongly recommended; Question 9.5 on the interesting problem of how to model gravity as a function of radius through the Sun is an honourable exception.

Next, a wonderful treatment of opacity and ionisation, topics that can be presented as passed-down Masonic secrets in some texts, and here manipulation of relevant numbers (which Mullan practices at every opportunity) really comes into its own. Every physicist should know that the opacity in the solar photosphere is provided largely by the negative hydrogen ion with a relative abundance of just one part in a hundred million (the Sun truly is a long-odds gambler's paradise). And something about The Crucible? Ah yes, it's mainly metals with low ionisation potentials that dominate the supply of the extra electrons needed to make these ions.

Why, if the Sun is a big ball of luminous gas, is the visible edge so sharp, is the question posed next and this introduces one of the central themes of this book. Readers are encouraged to construct models for various parts of the Sun, in this case the photosphere, using just simple finite difference schemes and a few simplifying assumptions. The recipes are given in a way that students should be able to make their own versions eg on a spreadsheet. Typical answers are given too. However, laudable as this is, I do wonder how many students seeing 'the answer' will be encouraged to make their own models. Again, for a future edition, some thought might be given to finding stronger incentives for these valuable exercises.

The discussion of convection below the Sun's surface is interesting, showing how these fluid currents are forming and dissolving on their turnover times, like the frenetic eddies at the base of a waterfall. One more for the editor: 'through' seems to become 'though' and even 'thru' at several points in the text. The march of the text continues inward and we are passed by neutrinos, which travel business class outward from the Sun's interior and, very occasionally, end up in a large tank of cleaning fluid in an underground mine in South Dakota. This and the similar experiments which uncovered neutrino oscillations, are nicely summarised, paying due respect to the extraordinary care required to ensnare and detect these ghostly chameleon particles.

Continued on page 40

Physics of the Sun: a first course

Continued from page 39

The most technical discussion in the book is reserved for helioseismology and is better suited for starting graduate students. Nevertheless, the discussion of the evanescence of sound waves in a stratified atmosphere could be easily followed by an undergraduate and the models that can be constructed in chapter 14 are perhaps the most interesting in a general physics class, used to organ pipes and violin strings.

Having completed our journey inward, we return to regions above the photosphere and now move outward into layers that, far from getting cooler, are heated intensely by processes that are incompletely understood. As a result, these are the most descriptive sections of the book and the most heavily dependent on current literature. Again, a small point for the editor, some of the references throughout the text were not to the most up-to-date editions of reference texts.

In summary, this is a very useful book with lots of nice details supported by accessible calculations. I'm not sure all the model making quite comes off in this first edition but the intention is good. The idea of teaching general physics through the Sun, in both senses of the word, is surely a promising one.

Practical Research Planning and Design

Subject area
Thermodynamics, Statistical physics

Description
A guide to conducting research from problem selection to report preparation

Authors
Paul Leedy and Jeanne Ormrod

Publishers/Suppliers
Pearson Education
<www.pearsoned.co.uk>

Date/Edition
2009/9th edition

ISBN
978-0-13136566-7

Level
Undergraduate, research

Price
£35.99

Simon Bates
School of Physics and Astronomy
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Edinburgh EH9 3JZ
May 2010

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	***
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

It is always a little daunting to try and review a book that has reached its ninth edition, after nearly twenty years on the shelves in one form or another. To have got to the ninth edition, it must be a classic by now, surely?

My opinion of this text is that it probably is, but I am still left feeling a little unsure of its primary intended readership. In terms of what it covers, the simple answer is almost everything, from defining the fundamentals of the research process, the tools to undertake it, qualitative and quantitative methodologies and reporting and presenting it. It is broad-spectrum and deliberately cross-disciplinary in its approach.

Notwithstanding my uncertainty about the primary market for this text within the physical sciences, perhaps its greatest strength is that it can be useful in a variety of different contexts. There are almost certainly others, but I can identify several potential uses for the text:

1. Academic staff involved in teaching 'research skills' or project preparation courses within their discipline will find it an extremely useful reference to inform their course design. There is plenty within here that can have a discipline context overlayed for presentation to an undergraduate audience.

2. Supervisors of postgraduates will find this a useful text to give to their students at the start of their research. As the authors state, time spent early in the research process thinking about research in its broadest sense is time well-invested. A careful research study (in any discipline) is not, to quote from the book's introduction, 'a large number of facts ... incorporated into a lengthy footnoted paper'.

3. Finally, academic staff engaged in research will find that this is an invaluable look-up for techniques and methodologies, particularly if they venture into the somewhat unfamiliar territory of discipline-based educational research. I found the chapter on experimental design particularly useful.

For all its strengths, the book has certain flaws which I found irritating in places. The most abundant one was the highlighting of aspects that were 'using technology' in various areas of research. I can understand how such sections might have been invaluable a decade ago, but the fast pace of change in all things technological has rendered them somewhat archaic now in the text, and feeling out of place. I'd argue that these methods (eg 'using spreadsheets to organise and analyse data') should simply be incorporated into the text, rather than flagged up as 'different'. It's just part of the way we go about doing research now.

Overall, this is a very useful book to have on your shelf, for a whole variety of reasons. Whilst I know that some of my colleagues may well scoff at the thought of consulting a text on the process and practicalities of doing research, there is food for thought in here for staff at all stages, and the students they teach and supervise.

Principles of Chemistry: a molecular approach

Subject area
Chemistry

Description
Undergraduate text on the principles of chemistry

Authors
Nivaldo J Tro

Publishers/Suppliers
Pearson Education
<www.pearsoned.co.uk>

Date/Edition
2009

ISBN
978-0-32165771-8

Level
Undergraduate

Price
£39.99

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Writing an educational book on the principles of a subject is the most daunting challenge of conventional scholarly pursuits. All the more so when the book deals with a discipline encompassing the entire spectrum of natural philosophy; a presumption which is neither unjustified nor misplaced while evaluating a title on general chemistry. Indeed, a book on general chemistry ought to address the most essential needs of students, including efficient learning and effective internalisation of the natural phenomena. The former offers economical solutions to time management for students, while the latter is translated into an integrated process of holistic and lifelong learning.

The title under review incorporates all of the above considerations. The author artfully integrates the universality of the relevant phenomena and the dynamics of the formal learning process which is increasingly becoming analytical in terms of mathematical formulation and graphic representation of the problems. The book is therefore highly recommended for undergraduate students and teachers of general chemistry in reputable schools of higher learning all over the world.

The book is divided into twenty neatly written and consistently organised chapters. Very early in the book (page 5 of Chapter 1) the reader is invited to a time travel: a miniature reprint of an inspirational and vintage painting of 18th century French Chemist Antoine Lavoisier who was executed during the French Revolution. The imprint, also portraying the elegant picture of his aristocratically clad wife, Marie, appears to be the antithesis of the homely picture of Marie Curie, on Page 52 of Chapter 2, emanating a zeal which was rightfully honoured as Curium. Indeed, the author lives up to his convictions expressed in the Preface; namely, understanding chemistry makes us deeper and richer people.

Although student-oriented in its fundamental approach and apparent outlook, the scientific rigour of the book stands out both in descriptions of natural phenomena and exercises given at the end of every chapter. More importantly, the students are not driven to monotonously examine their cognitive learning and/or test their abilities in a vacuum. The former aspect is addressed by formulating the problems in a chain successively graduating from simple to cumulative problems and smoothly elevating the young learner to the challenge problems which, in turn, help a smooth landing into the conceptual problems. Similarly, the book amply supplements students' abilities with solved rigorous examples preceding the exercises.

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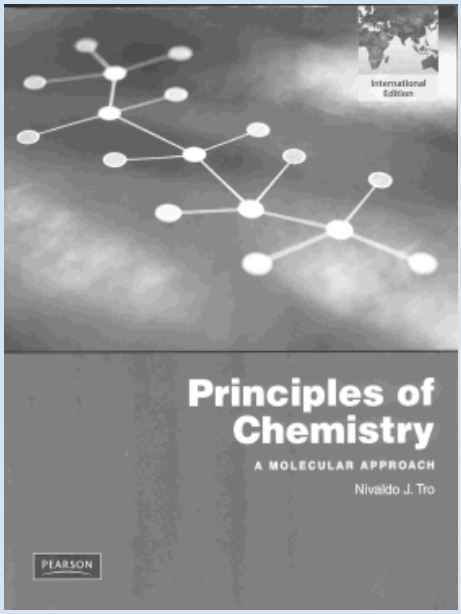
April 2010

Principles of Chemistry: a molecular approach



From the publisher...

Principles of Chemistry: a molecular approach

By Nivaldo J Tro

This innovative, pedagogically driven text explains difficult concepts in a student-oriented manner. The book offers a rigorous and accessible treatment of general chemistry in the context of relevance. Chemistry is presented visually through multi-level images—macroscopic, molecular and symbolic representations—helping students see the connections among the formulas (symbolic), the world around them (macroscopic), and the atoms and molecules that make up the world (molecular).

978-0-32165771-8 888pp 2009 £39.99

The initial five chapters are devoted to help students befriend what the author rightly classifies as the macroscopic, molecular and symbolic phenomena. Numerous fundamental concepts ranging from tangible to intangible natural objects, matter to gases, are introduced to the learner in literary quality text, richly adorned with sumptuous colours, alternating between experimental models, real life pictures and other illustrations. The symbolic phenomena throughout remains a faithful friend, clad in easy to follow analytical formulations. Indeed, the author should be applauded for his ingenious and yet simple and spontaneous method of motivating students to adopt a mathematical approach in scientific inquiry, an approach which is both desirable and warranted considering the twin targets of efficiency and precision. Molecules, compounds and chemical equations go hand in hand, engaging the attention span of even average students through basic experiments: Cathode rays, Millikan's oil drop experiments and Rutherford experiments, for example. Kinetic molecular theory, root mean square velocity, main free path, diffusion, effusion of gasses, real gasses and Van der Wall's equation, etc, are all described within an integrated scheme applying simultaneous as well as sequential approaches, hence offering a treat to eager learners.

The next three chapters are understandably a lot more demanding, as the students are expected to have developed commensurate receptive ability through exposure to the natural parameters and parametric relationships discovered in nature, as discussed in the earlier part of book. Discussions of thermochemistry and quantum mechanics are followed by the periodic properties of the elements. The topics in thermochemistry range from the nature of energy to enthalpies of reaction. The complicated scientific formulations are seasoned with the simple message on conservation, underscored by the universal truth that there is no free lunch. The chapter on quantum mechanics is extremely rich in presentation as well as substance. Even a layperson will be tempted to study the subject when introduced to Einstein's dictum that God does not play dice with the universe. This is a very interesting and crafty method of working upon students' inquisitive potentialities. In order to orient them to the theory and application of quantum mechanics, the author has skilfully dealt with the phenomena suitable to the corresponding level of students. The major topics, for example, include atomic spectroscopy and the Bohr model, the wave nature of matter, and many other relevant concepts which are prerequisites for understanding periodic properties of elements in Chapter 8. The latter helps

Continued on page 44

Principles of Chemistry: a molecular approach

Continued from page 43

students uncover the marvels of nature by having systematic access to the understanding of the arrangement of elements in the periodic table which is widely considered the single most important tool for the chemist. One of the major highlights of Chapter 8 is the order of filling quantum-mechanical orbitals which, in turn, is underscored by emphasis on the explanatory power of quantum-mechanical models of both organic and inorganic matter.

The two chapters devoted to chemical bonding, Chapter 9 and 10, provide easy to follow description of Lewis theory, valence bond theory and molecular orbital theory. These topics together are the artificial sweeteners followed by the taste of real sugar in Chapter 11 and 12, ranging from various palatable and exotic liquids and solids to the thirsty solutions of the seawater. The major focus of Chapter 11 is the description of molecular comparison of solids, liquids and gases, along with the discussion of forces that hold condensed phases together; namely, the intermolecular forces. Chapter 12 on the other hand is entirely devoted to the types, formation, equilibrium, concentration and colligative properties of solutions.

The topics discussed in the next four chapters, 13 to 16, reflect the applied momentum of the book. Chapters 13 and 14 help students recognise chemical kinetics and chemical equilibrium, succeeded by acids & bases and aqueous ionic equilibrium in Chapter 15 and16 respectively. In these four chapters, a comprehensive discussion of chemical reaction tails out of homogenous and heterogeneous catalysis including enzymes, leading the students to the concept of dynamic equilibrium followed by systematic mathematical formulations, including the equilibrium constant and the reaction quotient. The mathematical formulations also underscore most of the phenomena related to acids and bases in Chapter 15, while students are increasingly required to engage their inherent analytical abilities and cognitive skills for understanding aqueous ionic equilibrium in Chapter 16. That said, ably guided learning is a must from Chapter 13 to 19. Therefore, the sympathies and empathies of the teachers must vote in favour of extending extra help to the students, specifically where the highly sophisticated formulations threaten to compromise the conceptual clarity and logical approach to the real life scientific phenomena. Although the free energy and thermodynamics discussed in Chapter 17 do captivate even the attention of a layperson, quantification of entropy and Gibbs free energy are the topics not zealously welcomed by those without sound mathematical grounding.

As a matter of fact, Chapter 18 lacks the benefit of offering stimuli even to the enthused learner not particularly interested in the respective phenomena. Indeed, the sophistication involved in electrochemistry essentially demands inclination which is both inherent and acquired. Therefore, the mundane descriptions of positives laws of technology do not inspire at least this reader as much as the lively and vibrant subjects reviewed in the foregoing. The compensation is, however, made in Chapter 19 which addresses the mixed blessings of nuclear chemistry; radioactivity in medicine and discovery of fission which subsequently led to nuclear bombs. That said, a fairer representation of the nuclear phenomena was expected from the author in the sociological realm: highly educational pictures of Dead Sea Scrolls, the detonation of the world's first atomic bomb in the New Mexico desert, and the Chernobyl disaster must not make humanity overlook the most unfortunate legacy of Hiroshima and Nagasaki, especially so for the international edition of an exceptionally promising title.

Just befitting a showstopper, Chapter 20 begins the lessons in organic chemistry with fragrances and odours. The major carbon containing compounds are discussed with the help of illustrations and easy to follow symbolic formulations. Finally, while sifting through this book, this reviewer is reminded of the recommendation by Hawking in the preface of the History of Time; that he'd written his book for the layperson who after having understood it ought to be awarded a Master's degree in physics. The title under review, supposedly a textbook for undergraduates, appears to have close affinity with this recommendation. Nonetheless, the book offers a splendid blend of the artefacts of civilization with the scientific phenomena which is charmingly tantalizing and gracefully philosophical, may it be the artistic invitation to a drink or clever manipulation of the billiard game.

Principles of Physical Optics

Subject area
Physics

Description
A contemporary introduction to geometrical and physical optics with numerous examples and problems

Authors
C A Bennett

Publishers/Suppliers
John Wiley and Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2008

ISBN
978-0-470-12212-9

Level
Undergraduate

Price
£112.00

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November 2009

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This is an introductory book for undergraduate and postgraduate students of science, technology, engineering and mathematics (STEM) who need to understand the physical optics of the diverse range of optical devices used in a wide range of contemporary applications. **Principles of Physical Optics** makes it clear in the preface that the mathematics prerequisite is a standard introductory calculus course as is usual with optics texts. However, it is a stated expectation that by the end of a course using this text the students will have experience in matrix methods, Fourier analysis and complex algebra. Readers can readily learn about these mathematical topics as they are explained at appropriate places in the book.

There are nine chapters. The first seven chapters cover the topics that are commonly taught in a one semester introductory optics course. There are starred sections throughout the book which may be omitted as they are not essential to understanding for the following chapters. Some chapters have appendices for the more difficult material.

Chapter 1 is about the physics of waves and starts with the one-dimensional wave on a string. After the general solution of the 1-D wave equation the particular case of harmonic travelling waves is introduced. The principal of superposition is briefly stated but the treatment of interference and diffraction is reserved to chapters 5 and 6. The use of complex numbers and the complex representation of harmonic waves are considered before a final section in this chapter on three dimensional waves for both spherical and plane wave solutions is given. There is an extensive set of problems scattered through the text and at the end of this chapter. The text is compact and the problems are used to illustrate the applications of the basic mathematical analysis. In the next chapter the dual nature of light as electromagnetic waves and as photons is discussed. The electromagnetic spectrum is illustrated with the aid of a logarithmic chart. Again there are many examples and problems for the reader to solve.

The treatment of reflection and refraction in chapter 3 is thorough and includes the theory of electromagnetic waves at an interface and a derivation of the Fresnel equations. Total internal reflection and Brewster's law are obtained from the Fresnel equations, but a discussion of optical fibres is delayed until an optional section of chapter 4. Chapter 3 ends with an optional section on dispersion and after this a section on scattering that briefly mentions Rayleigh scattering and an explanation of the formation of the rainbow and the scattering by ice crystals. The main topic in chapter 4 is geometric optics. This chapter opens with a discussion of refraction at aspheric surfaces and then the more important case of refraction at spherical surfaces is considered. Reflecting surfaces are also considered. Rays of light and ray diagrams are introduced and used to show the passage of light through lenses and to draw ray diagrams to relate object and image positions. The equations to relate image and object position to the radii of curvature and refractive index of a thin meniscus lens are developed. These equations are used to describe a variety of common lens combinations and to explain the use of magnifying glasses, the compound microscope, the telescope and the eye. There is an optional section on radiometry, the Rayleigh-Jeans theory

Continued on page 46

Principles of Physical Optics

Continued from page 45

of black body radiation, optical fibres and finally thick lenses and the matrix treatment of refraction at spherical surfaces. There are again many problems in this chapter.

Chapters 5 and 6 describe the core physical optics of the title of the book. In chapter 5 superposition and interference in the classic experiments of Young's slits and Newton's rings are discussed. Coherent Doppler Lidar is used as an example of the superposition of waves of different frequencies. Fourier analysis and Fourier transforms are introduced to discuss wavepackets and group and phase velocity. The Michelson interferometer and Fourier transform spectroscopy are used as another example of an application of interference. Multiple beam interference is treated by using the complex notation and then the scanning Fabry-Perot interferometer is discussed and the limit of spectral resolution is considered. Multilayer interference filters, antireflection and high reflectance films are considered and the matrix method is used to simplify the notation. The final section of this chapter is on coherence with explanations of both spatial and temporal coherence and the Michelson stellar interferometer as an example of these ideas. The appendix to this chapter is on Fourier analysis and Fourier Transforms.

'Diffraction' is the title for chapter 6, it begins with Huygens' principle which is the initial intuitive idea that led to the explanation of diffraction phenomena. There is then a summary of the Fresnel-Kirchoff results that provides the mathematical justification for the use of the ideas of Huygens' principle. Fraunhofer diffraction at various standard apertures is explained and is used to derive an expression for the angular resolution of a telescope. The properties of reflection and transmission diffraction gratings are also discussed in terms of Fraunhofer diffraction. It is shown that the Fraunhofer diffraction integral may be approximated as a Fourier transform integral. Fresnel diffraction at edges and circular apertures is described. The Cornu spiral is derived and is used to explain the Fresnel diffraction at straight edges and slit apertures. A brief introduction to quantum electrodynamics concludes this chapter. There are some good monochrome photographs of diffraction effects in this chapter.

Lasers are the topic for study in Chapter 7. A revision treatment of atomic energy levels follows the introductory section of this chapter. Next electron energy levels in molecules and solids are described and the band structure of conductors and semiconductors is introduced. Stimulated emission and light amplification are discussed and the equations relating the transition rates to the Einstein coefficients are presented. The operating modes of the various types of laser are then given. This is followed by sections on frequency stability and techniques for better stability. Beam profiles are also discussed and how they may be controlled.

These last two chapters allow for some more advanced ideas to be discussed if there is time. The title of chapter eight is 'Optical Imaging' and includes topics such as the Abbe theory of image formation, spatial filtering and adaptive optics. In chapter 9 there is a discussion of linear polarisers, elliptical polarisation, birefringence and wave plates which are omitted from the earlier work on polarisation in chapter 3. Other effects that depend upon the polarisation of light such as optical activity, Faraday rotation and the electro-optic effect are included in this chapter. The final sections in chapter 9 are on non-linear optics, harmonic generation and frequency mixing.

The order of presentations of topic areas in optics is not fixed and whilst some topics are clearly taught at a particular stage others may be taught at different times at a lecturer's choice. This book does not always follow the order used in other books, but the order chosen is perfectly valid and consistent on the whole. There is an extensive collection of examples and problem for each chapter of the book. A valuable resource to lecturers adopting this book is that solutions to the problems are available online. There are good diagrams throughout the text. Photographs are used sparingly with most in the chapter on diffraction. The book is generally well written and illustrated. It provides a good alternative to the other many well respected books that are available with some new content.

Reaction Mechanisms in Organic Synthesis

Subject area
Organic chemistry

Description
This text covers reaction mechanisms in organic synthesis at a postgraduate level

Authors
Rakesh Kumar Parashar

Publishers/Suppliers
John Wiley and Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2009/1st edition

ISBN
978-1-4051-9089-3

Level
Postgraduate

Price
£95.00

Summary Review

range: * poor to ***** good	
Academic content	****
Usefulness to student	***
Usefulness to teacher	****
Meets objectives	****
Accuracy	****

As the title of this book suggests, it encompasses a very broad area of organic chemistry: reaction mechanisms. In the 372 pages of this text, the author has made a careful selection of synthetically useful modern (and not so modern) transformations which are organised by type along six chapters: reactions of carbanions, C-C double bond formation, transition metal mediated C-C bond formation, reductions, oxidations and pericyclic reactions. This is complemented by two introductory chapters on basic synthetic concepts and a description of reactive intermediates.

In general, the level of detail and the selection of material are very well pitched to give an overview of the most common transformations and their 'most popular' proposed mechanisms. Asymmetric reactions are also included when appropriate, with examples of the use of chiral auxiliaries, chiral reagents and asymmetric catalysis. The author also includes references to primary literature for most topics, which are very useful to look for specific reaction conditions, mechanistic studies or as a starting point for further reading.

The style is easy to read and it generally flows quite well, although due to the nature of some topics (such as Wittig reactions), these have ended up distributed over two different chapters with a certain degree of repetition.

This book is intended for postgraduate students and early stage researchers, and as such it does not deal with the most basic reaction mechanisms. For these, the reader is directed to more basic organic textbooks. On the other hand, the chemical drawings can sometimes look a bit funny, and several mistakes can be found such as substituents disappearing, OH connected to carbon through the H instead of the O, or curved arrows in mechanisms starting from atoms instead of bonds. For this reason, I would only recommend this text to the more advanced students, who are able to recognise and ignore these mistakes.

Overall, this is a good addition to the chemical literature, as it collects together a series of topics in a manageable size book, and provides a good introduction to a variety of synthetic topics although perhaps a bit pricey at £95.

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Sciences: an integrated approach

Subject area
Science

Description
This text covers a broad range of scientific topics, aiming to act as a textbook for general, Earth sciences and biology

Authors
James Trefil and Robert M Hazen

Publishers/Suppliers
John Wiley and Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2010/6th edition

ISBN
978-0-470-50581-6

Level
Undergraduate

Price
£46.99

Summary Review	
range: * poor to ***** good	
Academic content	****
Usefulness to student	****
Usefulness to teacher	***
Meets objectives	*****
Accuracy	*****

The two authors state that this book is 'a response to recognised science education issues in the US.' The book is aimed at undergraduate students who are enrolled on general science courses and as such covers a wide range of scientific fields and topics.

The recognition is that, with the continual increase in scientific findings and technologies becoming common place, there are huge benefits to having a scientifically literate population irrespective of a student's background/course or future career.

The book encompasses topics from the world of physics, chemistry, astronomy, Earth science and biology. Throughout the text there are continual links to previous/subsequent chapters, other disciplines and up-to-date references to real world examples of the topics. The changes between this edition and the previous one appear to be expanding and updating the theories and content, and introducing more illustrations and applications. There are several new additions concerning relatively new fields, for example string theory and quantum entanglement.

There are several 'tools' used throughout the book to encourage student engagement with the text. Each chapter has a 'Great Idea' and the topics within each chapter are shown to expand from and link back to such central ideas. There are also coloured buttons throughout the text telling the reader what applications from this central 'Idea' are discussed in the chapter or will have further discussion in later chapters. This system is quite simple and straightforward and quickly tells the reader if the topic under study will be expanded upon later. There is also a companion online learning environment (*WileyPLUS*) that claims to increase the educational value of the book. I did not have the opportunity to sample this resource.

There is an agreed approach, clearly stated by the authors at the start of the book, that this textbook is not designed to tackle issues of decreased mathematical ability in the general student population. As such any mathematics is kept to a bare minimum within the text and only used when essential to the understanding of the content (something which, I feel, can be very subjective). Where any equations are used there tends to be worked examples to assist the reader.

Each chapter finishes with several, nicely defined, sections designed to reinforce the content. This starts with a summary of the information and a list of the key terms. This is followed by a Discovery Lab detailing a simple experiment focused on the chapter topic that the reader should be able to conduct. Review questions are followed by discussion questions, problem questions, and Investigations that take the form of short answer questions. Some of the investigations may be slightly optimistic, eg 'Read a biography of Albert Einstein…' such attempts to stretch the reader are spread throughout the text and hopefully such pushes will inspire students to continue their studies beyond this book.

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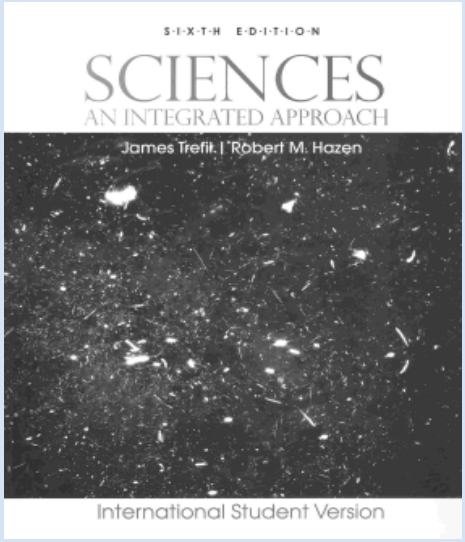
April 2010

Sciences: an integrated approach



From the publisher...

Sciences: an integrated approach

By James Trefil and Robert M Hazen

The book focuses on the great ideas in each field while showing readers how core scientific principles connect to their daily lives. The sixth edition emphasizes important themes and relationships, along with new real world connections. *Scientific American* has been added to the book along with completely updated examples. The presentation also employs a more visual approach that includes new illustrations and visuals. In addition, new problems help readers answer the big questions in science.

978-0-470-50581-6 640pp 2010 £46.99

As a summary I feel that this book is well structured, engaging and employs some nice educational tools in order to focus the reader on the important, core points. I believe it could be read, followed, and largely understood by anyone with school level science. Someone with no scientific knowledge but an interest in learning would be able to work through the text and finish with a quite a broad foundation in current science. I do feel slightly disappointed in the level of mathematics used however I do recognise that it is not the intention of this book to address the issue of decreased competency in mathematics.

From an undergraduate student's point of view, if the student is enrolled on a general science course that will cover all/majority of the fields contained within the book then the structure and content is presented in such a way as to capture the reader's interest and hopefully engage them with the subject. The authors are very clear that the level of the book is probably not in-depth enough for anyone studying a specific science course. I can however see some advantages to a school pupil undertaking several science A-levels or Advanced Highers using the book, particularly the Problems and Investigations sections at the end of each chapter.

Statistical Mechanics: an elementary outline

Subject area
Theoretical physics, theoretical chemistry

Description
A guide to statistical mechanics at a postgraduate level

Authors
Avijit Lahiri

Publishers/Suppliers
CRC Press (Taylor & Francis Group) <www.crcpress.com>

Date/Edition
2009/2nd edition

ISBN
978-0-415-80261-1

Level
Postgraduate

Price
£19.95

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May 2010

This book by Avijit Lahiri provides a different and insightful explanation of the main elementary material of Statistical Mechanics. This does not necessarily imply that it is a good introduction for beginners. Rather than starting from the simplest concepts, it develops from first principles in a thorough and mathematical fashion. In 280 pages, it focuses less on application and more on concepts.

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	***
Usefulness to teacher	****
Meets objectives	****
Accuracy	*****

The content is fairly standard. The first chapter introduces probability distributions and entropy in terms of probability before switching to concepts from quantum mechanics such as wave functions and the Schrödinger equation. Using these, the energy levels are derived for the particle in a box and the switch is made back to classical mechanics. Now come the concepts of states, ensembles and the equal a priori postulate and Boltzmann's equation linking entropy and the number of states. In Chapter 2, equations for the number of states and entropy are derived for a system of non-interacting spins, fermions and bosons, and the ideal gas in the microcanonical ensemble. Chapter 3 canonical and grand canonical ensembles with the associated quantities of free energies and fluctuations. The final chapter develops the ideas for a number of systems including the harmonic oscillator, coupled oscillators, black body radiation, electrons in a magnetic field, ideal Fermi and Bose gases in the grand canonical ensemble, the electron gas, Bose condensates, ferromagnets, and non-ideal gases.

Despite its formal development, the book is often informal in style. The author often makes it clear when he writes in first person that he is expressing his own opinion about how to view some concept rather than the set-in-stone factual style of many other textbooks. Numerous problems are set as exercises throughout the book, often with hints, or suggested steps but usually not with full working. At some points, the text assumes a little too much. For example, the derivation of the equation for energy levels by solving the Schrödinger equation for the particle-in-the-box is set as a problem for the reader to derive rather than being a fully worked derivation. Some explanations are given very clearly and simply, such as doing the statistics of Bose-Einstein versus Fermi-Dirac which may otherwise appear intimidating. The book is factually correct with only a few very minor typos. And while a relatively minor issue, the author knows the difference between 'finite' and 'non-zero' unlike many others in this field.

Overall, I would recommend this book to those who wish to pursue a deeper understanding of statistical mechanics. This makes it best suited for postgraduate courses and beyond. It requires a reasonable competency in mathematics, as demonstrated by the casual use of Lambda and Bessel mechanics. For a course at any level, there is plenty of useful material and the book's less commonly encountered perspectives justify its consideration.

Students' Experiences of e-learning in Higher Education...

Subject area
Education

Description
This book provides an in depth look at a variety of e-learning experiences from both student and teaching staff perspectives and is well supported by a range of international research-based evidence. E-learning is discussed within the overall context of the Higher Education ecosystem and the ideas, results and practices outlined provide a strong theoretical and practical base upon which educational managers, lecturers, learning space designers and policy makers can draw

Authors
Robert A Ellis and Peter Goodyear

Publishers/Suppliers
Routledge - Taylor & Francis Group <www.routledge.com>

Date/Edition
2009

ISBN
978-0-415-98936-7

Level
Undergraduate

Price
£24.99

Donna Carroll
The Library
The University of Warwick
Coventry CV4 7AL
March 2010

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	***
Usefulness to teacher	*****
Meets objectives	****
Accuracy	*****

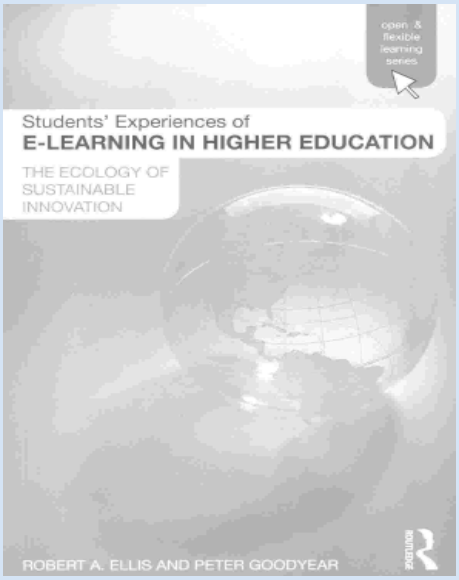
This book provides those working within teaching and management in the higher education sector with a thoroughly researched and interesting study of e-learning practices, perceptions and applications within the more general learning environment. The work portrays a great balance between the theoretical and practical aspects of teaching and learning within the university setting which is continually having to adapt to the diversifying and evolving needs and learning expectations of students. The book discusses general strategy and theory pitched at university managers and policy makers, and includes practical insights and experiences both from students and teachers in higher education. This offers a great opportunity for university lecturers to learn from the practices and findings outlined throughout. Lastly the authors go on to discuss the broader topic of designing and planning good learning environments in order to strike a balance between virtual and physical spaces (from learning spaces at classroom level, through to entire buildings, campuses and library provisions).

Robert A Ellis and Peter Goodyear have invested well in researching and analysing the theoretical background to the work and ideas discussed and presented here. To begin with their work is clearly compared with a wealth of previous research from which an understandable theoretical framework is described and upon which the rest of the book is built. Once they move away from the theoretical basis, the early chapters outline students' viewpoints from their experiences of different learning situations which are complemented by information and communication technologies, demonstrating that students themselves differ in their uses and opinions of IT in learning. This highlights the difficulties that teachers, lecturers and educational managers sometimes have in deciding upon the 'right' approach to e-learning within their courses.

The book shows us that although students may be digital natives, demanding greater flexibility in the way they work and learn, and often appearing more confident with new technologies than their teachers, students still look to their teachers for guidance in understanding how best to apply their technologies to educational purposes. It is important to strike the right balance between physical and virtual learning and so e-learning should be used as a way to complement traditional learning methods rather than replacing them, as it is not the process of learning that is changing but the attitudes, practices and expectations brought about by technological practices outside the learning environment. The authors found that students' approaches, engagement, attitudes and consequently their success with e-learning was dependent upon their general approach to learning and as such e-learning should be considered within the broader context of general pedagogy. To accomplish this the authors looked at the 'ecology of learning', concentrating on how students interact and build relationships with their learning environments (which include the teachers, the tools and the spaces) both in a face to face and online learning capacity. Students' perspectives were investigated to study how they see themselves developing relationships between these aspects and how the environment impacts upon their quality of learning. The meaning of 'good learning' was also further elucidated. Previous research is discussed within these contexts and is further developed through the authors' own research findings.

Continued on page 52

Students' Experiences of e-learning in Higher Education...



From the publisher...

Students' Experiences of e-learning in Higher Education

By Robert A Ellis and Peter Goodyear

Students' Experiences of e-learning in Higher Education helps higher education instructors and university managers understand how e-learning relates to, and can be integrated with, other student experiences of learning. Grounded in relevant international research, the book is distinctive in that it foregrounds students' experiences of learning, emphasizing the importance of how students interpret the challenges set before them, along with their conceptions of learning and their approaches to learning.

978-0-415-98936-7 212pp 2009 £24.99

Continued from page 51

To complement the students' opinions outlined in the first half of the book, interviews with teachers were conducted to understand their experiences, conceptions and approaches to implementing and trialling e-learning opportunities. The teachers' experiences with e-learning are described in a reflective way that should provide other teachers reading this with an excellent opportunity to learn from these shared experiences. One criticism would perhaps be that this book concentrates heavily on the teacher/student e-learning experiences rather than discussing specific examples of the e-learning technologies available that one might expect from a book like this. However, as the applications and available technologies are changing so rapidly with software and service providers adapting swiftly to user needs, the techniques described here are more generic and will perhaps be more transferable over time.

The final chapters of the book concentrate on course design and space development. The former section discusses the importance of collecting good feedback and considers the needs of all those involved in the learning process (teachers, students as well as those supporting learning, for example library or IT services staff), showing that course design must again consider the whole learning environment in terms of space, resources and tools. This then leads onto the chapters regarding space design which is an area that could appeal to teachers, managers, university estates staff and architects working in the development of effective academic learning spaces. These chapters outline a variety of factors that must be taken into consideration during such a process, again considering learning quality from the ecological perspective and emphasising the importance of a balance between virtual and physical spaces.

Students' Experiences of e-learning in Higher Education...

The breadth of topics covered in this book should appeal to many professionals working in teaching, course management, educational support or campus design within the higher education sector, and the new research included provides excellent examples of practices conducted elsewhere which can be learnt from. However, the wide range of material also means that some chapters will be more relevant for some than others, with the book split nearly in half between the practical, hands-on teaching aspects (from students' and teachers' perspectives) and the course and space development chapters. As such I found some chapters far more appealing, interesting and practical for me, while the theoretical framework would be of more relevance to those working within educational development or research. Because of its wide scope, I would expect the different aspects of this book to be useful to any of those working in the areas listed above when considering adopting e-learning, especially when trying to understand more about the various approaches to it.

Study Guide and Solution Manual to accompany Basic Concepts of Chemistry

Subject area
Chemistry

Description
Accompanying work to the Basic Concepts of Chemistry textbook

Authors
Leo J Malone and Theodore Dolter

Publishers/Suppliers
John Wiley and Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2009/8th edition

ISBN
978-0-470-08769-5

Level
Undergraduate

Price
£47.50

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This book is a self-help manual to get over a universal phobia which is a concomitant part of formal learning; namely, examination. The latter is a recurrent phenomenon during the entire length of studentship and, yet, it is scarcely welcomed at the taking end. The only consolation which this reviewer, a teacher and examiner for over 30 years, can extend to the students is that it is not very palatable also on the giver's part. The authors of this Study Guide (SG) have none the less gone many steps ahead by writing the manual which offers invaluable help for all practical purposes, for taking as well as for making the examination in basic concepts of chemistry. However, there is one fundamental difference in that the manual under review which is a guide for the taker must not be a free ride for the maker. The moral and legal underpinning of the latter case underscores professional integrity and intellectual property rights respectively. That said, a fairly large size of the existing stock of knowledge owes to cognitive emulation; hence the facilitation for the maker to do the things right while simultaneously doing the right thing.

The SG accompanies *Basic Concepts of Chemistry*, a valuable textbook by the same author, for college students taking general chemistry as a required course for their major. It is divided into sixteen almost equal parts, each dovetailing with the respective chapter in the textbook. In the table of contents, the units under each chapter are perfect clones but for Chapter 9 and Chapter 13 which, in addition to Part A and Part B, also happen to have Part C. The students using the SG are strongly advised to read through the foreword, a four and a half page rich narrative conveying authors' friendly advice is both educational and motivational in letter as well as in spirit. That said, emphasis on 'Acing' the exam ought to be revisited because it is tantamount to nurturing narcissism and megalomania, the two universally inherent human traits which, in the absence of self-regulation, not only threaten to cause a personality disorder, but are, in the present context, also feared to sacrifice the glorious tradition of learning to the demigods of empowering recognition.

The SG begins each of the 16 parts by reviewing the respective chapter of the text. Each part ends with the answers and solutions to the problems given at the end of each chapter in the textbook. Students are advised against the temptation of having recourse to these answers and solution without first having made warranted effort to ensure the accuracy of their own attempt. Chapter 1, Measurements in Chemistry, though supposedly capitalising on presumed background of the students, is a hard bite for anyone more inclined to creative internalisation of natural laws rather than the mundane memory exercises. That said, the latter in the present case essentially helps economise and speed up the former. In all fairness, the author deserves a lot of credit for designing a consistent and easy to climb up self-test ladder to help students apply the contrived science of measurements to the efficient understanding and systematic presentation of natural phenomena. Chapter 2, Elements and Compounds, maintains the tempo set in Chapter 1 of the SG. However, the difficulty level increases as reflected in both the chapter summary assessment and answers and solutions to the green text problems.

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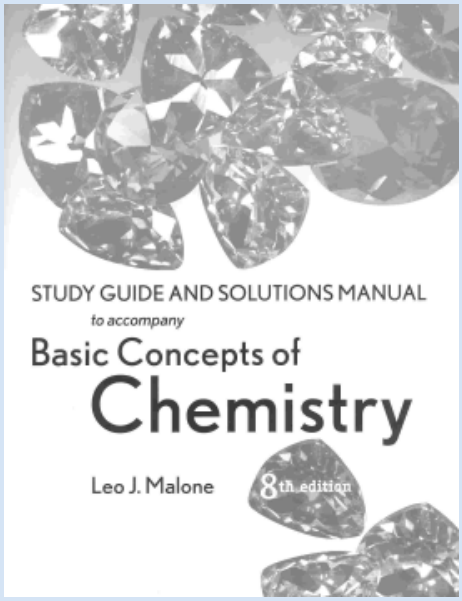
April 2010

Study Guide and Solution Manual to accompany Basic Concepts of Chemistry



From the publisher...

Study Guide and Solution Manual to accompany Basic Concepts of Chemistry

By Leo J Malone and Theodore Dolter

Each section focuses on the development and assessment of one or two specific objectives. Within each section, a specific objective is included, an anticipatory set to orient the reader, content discussion from established authors, and guided practice problems for relevant objectives. These features are followed by a set of independent practice problems. The expanded Making it Real feature showcases topics of current interest relating to the subject at hand such as chemical forensics and more medical related topics. Numerous worked examples in the text now include Analysis and Synthesis sections, which allow engineers to explore concepts in greater depth, and discuss outside relevance.

978-0-470-08769-5 336pp 2009 £47.50

The discussion of properties of matter and energy in Chapter 3 offers friendly possibilities to the students to apply their analytical abilities, as the SG presents artful formulations of various assessment types allowing the self-evaluation of both depth and breadth of respective phenomena. Chapter 4, The Periodic Table and Chemical Nomenclature, deals with a challenging topic which has been skilfully facilitated by the self-assessment exercises in the SG, useful for both the formal examination and internalisation of the highly technical concepts covered under this topic.

Chemical reaction is the next topic in Chapter 5. The difficulty level for self-assessment increases with the assessment type becoming more demanding in mathematical formulations and conceptual clarity owing to the successive complexity of topics. Multiple choice questions not included in the SG of Chapter 5 reappear in Chapter 6 which is on quantities in chemistry and essentially demands some memory test along with working out the problems based on specific measures.

Quantitative relationships in chemistry are the subject of Chapter 7, followed by the self-assessment exercises for mastering modern atomic theory and the chemical bond in Chapter 8 and Chapter 9 respectively. The Chapter summaries for these three highly technical and complex topics are both concise and precise, serving as an efficient reference source for comprehensive and varied self-assessment exercises. Similarly, gaseous state discussed in Chapter 10, is simplified by the SG to help students understand and retain various laws, Charles's, Gay-Lussac's and Avogadro's Laws, for example. Moreover, the summary of Part B provided by the SG specifically focuses on Ideal Gas Law, Dalton's Law.

Continued on page 56

Study Guide and Solution Manual to accompany Basic Concepts of Chemistry

Continued from page 55

The SG for the next two chapters provides summaries on various diverse topics included in the discussion of solid and liquid states, Chapter 11, and aqueous states, Chapter 12. Where required, the solutions to the green text problems are given with elaborate procedures; not even the minutest mathematical step involved in the procedure has been skipped in Problem 12-24 and Problem 12-82, for example. The self-assessment and summary assessment in the SG for these chapters reflect the difficulty level which the students are both expected and required to meet for moving forward to understand acids, bases and salts, addressed in Chapter 13, and oxidation-reduction reactions discussed in Chapter 14. Finally, the last two chapters, Chapter 15 & 16, provide the SG and solutions to the problems related to reaction rates and equilibrium and nuclear chemistry respectively. The summaries of Part A & B in each of the two chapters vividly reflect the crux of these relatively advanced but highly important topics which lie at the core of modern technological capabilities.

All in all the SG is a highly laborious and equally intelligent effort by the author. The worked exercises are included in each chapter to help students understand and determine the procedures involved in the solutions of summary assessment problems. Moreover, important terms and concepts needed for successive interconnectivity have been highlighted in all chapter summaries. Finally, the students are strongly advised by the reviewer to take this SG as a means to discover and build up abilities for innovative problem formulation on their own to self-examine cognitive development and analytical skills, the two phenomena universally considered fundamental to knowledge accumulation and multiplication.

Study Skills for Science, Engineering and Technology Students

Subject area
Education

Description
Guide for students and tutors on study skill aquisition and development

Authors
Pat Maier, Anna Barney and Geraldine Price

Publishers/Suppliers
Pearson Education
<www.pearsoned.co.uk>

Date/Edition
2009/1st edition

ISBN
978-0-27372073-7

Level
Undergraduate

Price
£17.99

Summary Review

range: * poor to ***** good	
Academic content	****
Usefulness to student	**
Usefulness to teacher	***
Meets objectives	***
Accuracy	****

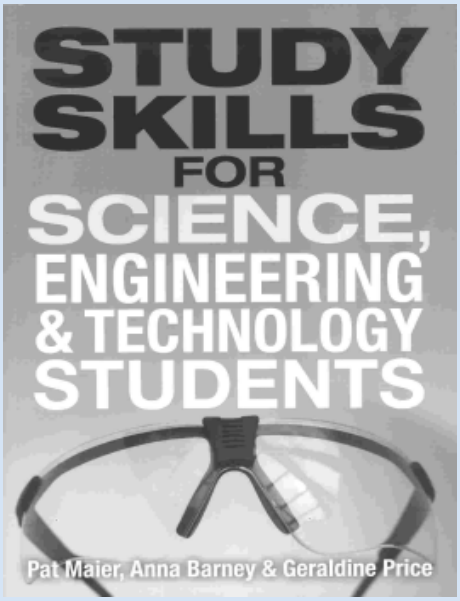
This book presents the topic of study skills to both students and tutors in science and engineering topics. Students are encouraged to interact with the material by considering their own personal development, which is a nice approach. There are lots of start and end of chapter activities encouraging students to think about their current approach, but future editions might benefit from a format encouraging periodic review of these questions and activities, which would stimulate reflection during and after the learning process, consistent with good practice of personal development plans. In addition, the personal development is very piecemeal, and one doesn't get the sense of developing a portfolio or compilation of skills, which students could subsequently use in their search for employment. The companion website, whose content is poor, could easily contain compiled templates for the areas students are asked to consider their skills, along with prompts for periodic review. The book is very text heavy, diagram light. It is crammed full of materials and suggestions but it is visually not engaging. It would benefit from incorporation of more activities where students can consider their own experience, and replacing a lot of text with diagrams. Some text is just unnecessary. For example, the section on solving by design is dominated with a discussion on programming, whereas a much more beneficial process would be the scaffolding of a design process, which is afforded only a few pages. It would be difficult for a student to filter out particular strategies and techniques that would be immediately useful and applicable. For example, in a section on extracting useful text and keywords from a lecture, it would be a more useful activity to provide structure for students to extract information from one of their actual lectures, rather than a hypothetical one.

There is a lot of material for tutors to incorporate into professional development aspects of modules. As well as generic information on managing time and learning in a lecture-based environment, the book devotes three sections to applying skills (eg working in the laboratory), developing technical writing and solving mathematical problems. There are useful sections on poster presentations and oral presentations, although incorporation of a peer/mentor feedback form would be useful for students to elicit feedback in their real scenario. The chapter on the writing process, one of the most difficult areas for science and engineering students could benefit from much more interactive, structured activities from the outset, although the chapter does provide a good overview of the writing process, if students are willing to read it. The section on technical writing is again very text heavy - the sub-section on diagrams would have benefited enormously from examples of different types of diagrams! For the purposes of this book, it isn't clear why the writing and technical writing sections are in different chapters. The final section on mathematical skills is useful, although I am not sure of its direct relevance in this book - students will probably prefer to use a dedicated book on that topic.

Michael Seery
School of Chemical and Pharmaceutical Sciences
Dublin Institute of Technology
Kevin Street
Dublin 8
April 2010

Continued on page 58

Study Skills for Science, Engineering and Technology Students



From the publisher...

Study Skills for Science, Engineering and Technology Students

By Pat Maier, Anna Barney and Geraldine Price

Study Skills for Science, Engineering & Technology Students has been developed specifically to provide tried & tested guidance on the most important academic and study skills that students require throughout their time at university and beyond. Presented in a practical and easy-to-use style it demonstrates the immediate benefits to be gained by developing and improving these skills during each stage of their course.

978-0-27372073-7 440pp 2009 £17.99

Continued from page 57

The companion website is advertised throughout the book and on the first page. On viewing this (April 2010), I found very little of the content directly related to the book, with nothing on technical writing, laboratory skills, and so on. The personal development logs are very basic, and again do not relate to the content in the book. As mentioned above, this would have been the ideal space to host personal development plan templates to encourage students who wished to reflect on their development of the various skills as they progressed through their college programme.

In summary, this book has a lot of useful content, but this is lost in a sea of unnecessary, text heavy material. The extent and amount of diagrams in the text is poor with little visual engagement compared to, for example, The *Study Skills Handbook*, by Stella Cottrell, from the same publisher which uses extensive diagrams to represent the material in a way that is more useful and accessible for both student and tutor. The concept of incorporating a personal development process is useful, but could be very much improved upon by allowing students to pull together the various elements of their development records and allow for a periodic review of these skills throughout their learning. The companion website is very poor, providing no added benefit.

Supramolecular Chemistry

Subject area
Chemistry

Description
Comprehensive guide to supramolecular chemistry

Authors
Jonathan W Steed and Jerry L Atwood

Publishers/Suppliers
John Wiley and Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2009/2nd edition

ISBN
978-0-470-51234-0

Level
Undergraduate, postgraduate

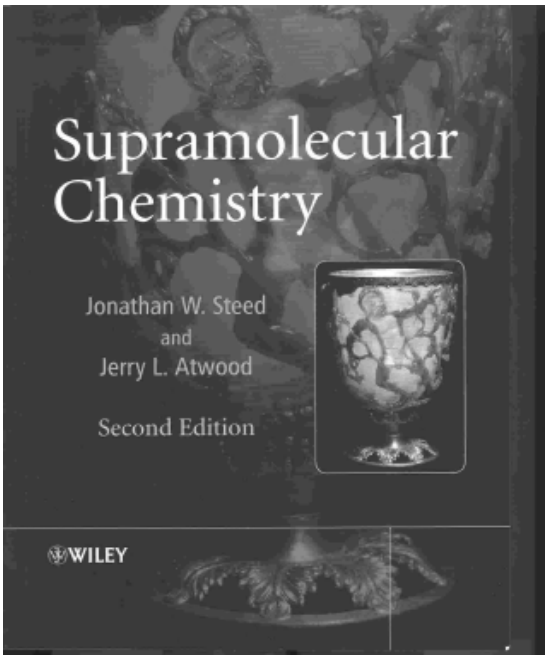
Price
£45.00

A comprehensive text book on supramolecular chemistry, which covers all areas of this exciting and diverse area of chemistry. It is just under a 1000 pages and covers all the major areas in this field. It has been primarily designed for use in graduate or senior undergraduate courses in supramolecular chemistry.

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	***
Usefulness to teacher	****
Meets objectives	*****
Accuracy	*****

Although the book is somewhat text heavy, it is very clearly written and can be used by undergraduate students for specialist modules in this area. Numerous examples and problems are given throughout the book. A comprehensive list of references is given in each chapter both to secondary and primary literature.



This book is definitely recommended as a good quality textbook which offers detailed and coherent information in this area of chemistry. Very few textbooks exist in this area of chemistry which gives such a comprehensive guide to supramolecular chemistry. The book has some excellent illustrations with excellent coverage of up to date information.

This book serves as a useful role in teaching suparmolecular chemistry to both undergraduate and postgraduate students.

Tasnim Munshi
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Richmond Road
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April 2010

The Handbook of Sustainability Literacy: skills for a changing world

Subject area
General

Description
A multidisciplinary work conprising a collection of chapters written by a range of experts in education and sustainability

Authors
Edited by Arran Stibbe

Publishers/Suppliers
Green Books
<www.greenbooks.co.uk>

Date/Edition
2009/1st edition

ISBN
978-1-900322-60-7

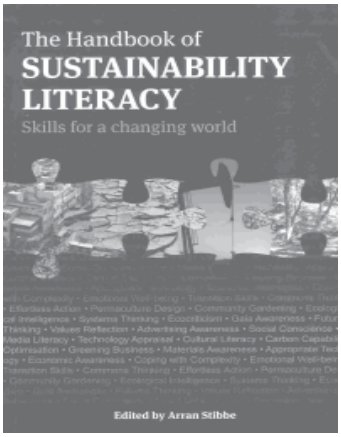
Level
General

Price
£14.95

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This is an excellent and readable contribution to the sustainability debate: how to overcome the challenges of the twenty-first century in developing a sustainable society and way of life on a planet with finite resources. It attempts to address the threat, to humankind at least, of climate change and population growth and the challenges of peak oil and finite energy resources. Necessary changes to the world economic system, which is facing its greatest challenges yet, are also explored.

Some 35 authors, singly for the most part but also in collaboration, contribute 32 short chapters on aspects of managing change towards greater sustainability of life and the planetary ecosystems on which we all depend. Most of these are in the form of extended essays. Great thinkers such as Satish Kumar and Stephan Harding of Schumacher College, Ecologists, Educationalists, Business Academics, Engineers and Scientists, combine and communicate their thoughts and ideas in a very readable and accessible style which nonetheless remains sufficiently deep and intellectually robust to engage the reader and stimulate discussion and debate. Each chapter is well referenced and further reading is indicated.



The result is very much an interdisciplinary whole and would make an excellent addition to undergraduate reading lists across the sciences and indeed throughout the wider curriculum. It would also be appropriate for a less academic but thoughtful and concerned audience.

The authors come not only from a wide range of academic disciplines but also from varying backgrounds. Most are practicing educationalists from Universities and Colleges of Higher Education. A number are active in the Transition Movement and Environmental groups, and almost all have considerable practical experience of interacting with students and other adults in sustainability education. How to teach sustainability across the curriculum is an emergent theme.

It has been a great pleasure to review this unique book for the UK Physical Sciences Centre and it is already a well thumbed volume!

David J Harwood
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April 2010

The Organic Chem Lab Survival Manual: a student's guide to techniques

Subject area
Organic chemistry

Description
An introduction to organic chemistry laboratory techniques for undergraduates

Authors
James W Zubrick

Publishers/Suppliers
John Wiley and Sons
<eu.wiley.com/WileyCDA/Section/index.html>

Date/Edition
2010/8th edition

ISBN
978-0-470-49437-0

Level
Undergraduate

Price
£54.50

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This is the eighth edition of **The Organic Chem Lab Survival Manual (A Student's Guide to Techniques)** by James W Zubrick, and it left me wondering how I missed out on the first seven editions! It comprises 34 chapters over some 350 pages and is small enough to fit in a large laboratory coat pocket. It certainly won't weigh down your book shelves but it carries more weight in terms of practical tips than many other larger tomes.

The book is designed to inform junior undergraduate students of Organic Chemistry about techniques and protocols in the laboratory. Each short chapter has a number of sections, and some have exercises to focus the students on what they have read. While a book cannot replace the practical demonstration by a tutor in the laboratory, it certainly can emphasise the importance of and the reasons behind the methods. I found myself agreeing with the author, and confirming that I was of like mind with him about the 'proper' way to carry out the techniques.

The Survival Manual starts with a chapter on safety, and naturally safety is a theme echoed throughout the book, as Zubrick says 'Safety first, last and always'. This moves from a set of laboratory rules, to MSDS sheets, and has a new section (not in previous editions) on green chemistry and planning syntheses.

Chapter 2 looks at keeping a notebook, and gives illustrated examples of the particular notebook styles the author encourages. This may not match the style that you use, but it certainly gives food for thought, and includes information on stoichiometric calculations and estimations. The final section on Notebook Mortal Sin is indicative of the author's sense of humour (which permeates the book and for me makes it even more readable):
'Bless me Father, for I have sinned. I let someone else borrow my notebook, and he seems to have dropped off the face of the earth. He doesn't come to lab or lecture anymore and friends can't seem to find him either. My notebook is gone!'
'Well for your penance ? I'd say losing your lab notebook is punishment enough.'

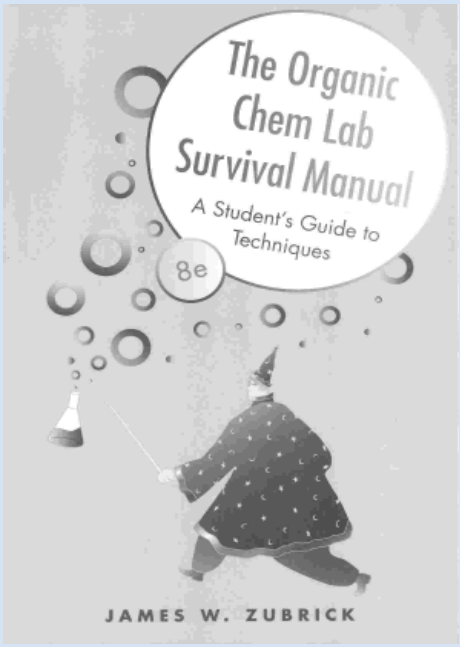
After a chapter on handbooks and interpretation of their codes, Zubrick goes on to cover glassware and other equipment, with chapters on joints, heating sources, clamps and clamping, syringes and septa, vials and labelling, pipettes, and maintenance - including cleaning and drying. He also has a number of sections looking at microscale apparatus, which is now favoured by some labs.

Many of the chapters deal with standard techniques that our undergraduates must become acquainted with, including melting point determination, recrystallisation, extraction and washing, distillation, rotary evaporation, reflux and addition. Exercises are included at the end of some chapters with the aim of reinforcing the safety and precision of the techniques. Some guidance on finding solutions to the end-of-chapter exercises is given at <www.wiley.com//college/zubrick>.

Marie Walsh
Limerick Institute of Technology
Moylish
Limerick
March 2010

Continued on page 62

The Organic Chem Lab Survival Manual: a student's guide to techniques



From the publisher...

The Organic Chem Lab Survival Manual: a student's guide to techniques

By James W Zubrick

This valuable guide takes organic chemists through the basic techniques of the organic chemistry lab such as interpretation of infrared spectroscopy. The eighth edition has been revised to include updated coverage of NMR Spectroscopy and UV spectroscopy. New questions at the end of chapters reinforce the skills and techniques learned. Emphasis is placed on green chemistry in the lab, focusing on the more environmentally friendly materials that can be used. In addition, updated discussions are included on safety, distillation, gas chromatography, and liquid chromatography. This gives organic chemists the most up-to-date information to enhance their lab skills.

978-0-470-49437-0 376pp 2010 £54.50

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The remaining chapters deal with methods of characterisation of products. Some sections have been updated from previous editions, mainly to reflect data capture and analysis by computer packages, rather than by chart recorder. These start with a general introduction to Chromatography, including the eluatropic series and some troubleshooting ideas around choice of solvents and solvent mixtures. Zubrick goes on to describe Thin Layer Chromatography, Wet Column Chromatography, Refractometry, Gas Chromatography, High Pressure Liquid Chromatography, Infra-Red Spectroscopy and FTIR (with a short section on UV-vis), and Nuclear Magnetic Resonance. Each of these chapters includes information on the background theory, sample preparation and interpretation of results/data. As the author points out, systems differ but the information he imparts may help understand basic principles.

I thoroughly recommend this book, if not as prescribed text, at least to be on library shelves (and not just one copy, as I suspect anyone 'borrowing' the book might decide to keep it on long-term loan!) It should be essential reading for laboratory demonstrators whose role in helping train undergraduates in good laboratory practice is so important. Last but not least, I found it a refreshing affirmation of all the tips passed on to me by my instructors at University all those years ago in Glasgow, that I have been trying to pass on to our students for more years than I care to number.

Zubrick's engaging and witty style made me smile and sometimes laugh out loud, and want to read every last page!

Understanding Solid State Physics

Subject area
Physics

Description
Keeping the mathematics to a minimum yet losing none of the required rigour, Understanding Solid State Physics clearly explains basic physics principles to provide a firm grounding in the subject. The author underscores the technological applications of the physics discussed and emphasises the multidisciplinary nature of scientific research

Authors
Sharon Ann Holgate

Publishers/Suppliers
CRC Press (Taylor & Francis Group) <www.crcpress.com>

Date/Edition
2009/1st edition

ISBN
978-0-750-30972-1

Level
Undergraduate and postgraduate students

Price
£48.99

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

I was very curious about what to expect from this book when I knew that the author Dr Holgate (PhD in physics, University of Sussex) has worked for over a decade as a science writer and broadcaster, and was awarded the IOP Young Professional Physicist of the Year for 2006 for her 'passionate and talented promotion of physics and the public perception of physics through her books, articles, talks and broadcast work'.

First impression: I was indeed amused and inspired by the wonderful images throughout the book, carefully selected by the author. These images and corresponding contexts, together with the thoughtful considerations of the difficulties of the freshmen to solid state physics like me, who may find it hard to follow the maths in the classics like Kittel's or Mermin's, fulfils very well the goal of the author: 'I wanted to write a truly accessible solid state physics textbook for introductory courses that concentrated on explaining the basics, and gave students a firm grounding in the subject. It was also very important to me to relate the theories and concepts to the real world, so that anyone reading it could see the point of learning the physics and how it was likely to be used once they had left university.'

Here are some significant examples from the book I have returned to for a couple of times over the past two weeks:

The first example demonstrates impressively the time dependence (70 years!) of fluidity of a solid of high viscosity. Figure 2.1 shows the apparatus set up in 1927 to demonstrate the fluidity of pitch at room temperature. Pitch appears solid and is so brittle that it can be smashed into pieces with a hammer. However, eight drops of pitch gradually dripped out of the funnel during the first 70 years of the experiment.

The second example demonstrates beautifully the structure-function relationship for the extraordinary ability of a gecko to climb walls and run across ceilings, and the story behind a major scientific discovery made by Prof Kellar Autumn. As in the Box 2.1 entitled 'Sticky Fingers', one photograph shows a gecko walking upside down on polished glass demonstrating the role of van der Waals force between tiny hairs (the diameter in nanoscale) on the toe and the surface. The other photograph shows it is van der Waals force instead of capillary force that renders geckos magic.

The third example demonstrates what will occur if thermal expansion is not taken seriously. Figure 5.12 shows an image of continuous welded rails, on exceptionally hot days, buckled (a real case happened in Manchester in 2006).

The fourth example demonstrate that superconductors can be used to enable super high speed train as having been realised in The Shanghai Maglev Train in China which travels at a maximum speed of 430 km/h.

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Harbin Institute of Technology
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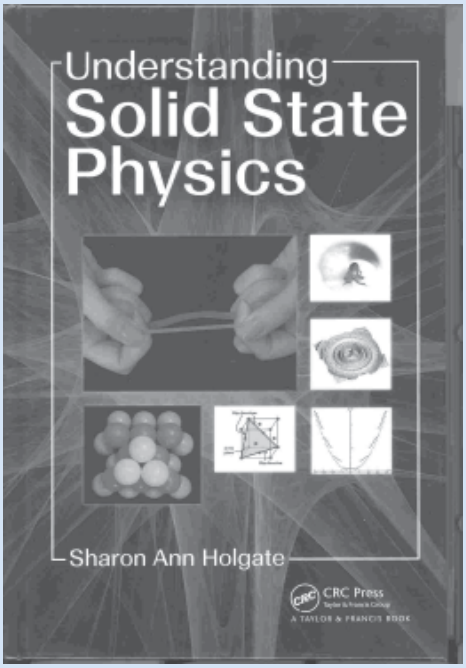
Heilongjiang 150001
P. R. China
May 2010

Continued on page 64

Understanding Solid State Physics



From the publisher...

Understanding Solid State Physics

By Sharon Ann Holgate

Presents an accessible treatment of solid state physics for undergraduate physics students as well as materials science and electrical engineering students. This title covers topics, such as bonding in solids, amorphous materials, polymers, diffraction, lattice vibrations and phonons, free electron models of electrical conduction, and magnetism.

978-0-750-30972-1 367pp 2009 £48.99

Continued from page 63

The fifth example demonstrates what happened when the mystery about magnetism was uncovered by Prof Andrey Geim of University of Manchester who is also the pioneer of graphene studies from 2004. A stunning picture shows that the frog, hazelnut, milk drop, and water droplet are levitated inside the bore of a strong magnet.

Well, this book is fun, at least for me! Why not have a copy together with Kittel's and Mermin's for the visiting undergraduate or even postgraduate students who are becoming frustrated with classics.

The contents of the book:
Chapter 1 Introduction (4 pages)
Chapter 2 Crystal Clear: Bonding and Crystal Structures (55 pages)
Chapter 3 The Rejection of Perfection: Defects, Amorphous Materials, and Polymers (34 pages)
Chapter 4 Stressed Out: The Mechanical Properties of Solids (30 pages)
Chapter 5 In, Out, Shake It All About: Diffraction, Phonons, and Thermal Properties of Solids (32 pages)
Chapter 6 Unable to Resist: Metals, Semiconductors, and Superconductors (58 pages)
Chapter 7 Chips with Everything: Semiconductor Devices and Dielectrics (52 pages)
Chapter 8 Living in a Magnetic World: Magnetism and Its Applications (28 pages)
Appendix: A-Some Useful Maths; B-Vibrational and Waves; C-Revision of Atomic Physics; D-Revision of Quantum Mechanics; E-Revision of Statistical Mechanics; F-Glossary of Terms. (50 pages)

Each chapter has a further reading list and selected questions from questions and answers manual.

The UK Physical Sciences Centre is one of the 24 Subject Centres in the Subject Network of the Higher Education Academy, a UK-wide initiative supported by the four Higher Education Funding Councils

www.heacademy.ac.uk/physsci

Reviewed in this issue...

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