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Reviewed in this issue...

8 software packages

21 books



Physical Sciences Educational Reviews



LTSN Physical Sciences

*...supporting learning and teaching in
chemistry, physics and astronomy*

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The journal of the LTSN Physical Sciences Subject Centre

Physical Sciences Educational Reviews



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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. Please contact the Centre.

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Editorial

Welcome to this the third issue of Physical Sciences Educational Reviews, the journal of the LTSN Physical Sciences Centre. This is indeed a 'bumper' edition, with no fewer than twenty-nine evaluations. Many thanks to those of you who support the Centre by taking part in this valuable work.

You may have noticed a change to the front cover of the journal. This change has been undertaken to try to make each issue somewhat more distinguishable!

As always there is a backlog of items waiting to be reviewed, particularly some web sites we are keen to evaluate. If you wish to join our team of independent reviewers, please let us know. In addition, we are pleased to learn about or receive materials to review.

Roger Gladwin
Editor

In this issue...

Book reviews...

- 2 Basic Concepts of Chemistry
- 4 Chemistry: Matter and its Changes
- 5 Classical Mechanics: A Modern Introduction
- 7 Color and Light in Nature
- 9 Communicating Chemistry
- 10 Electrochemical Methods
- 11 Elements of Modern X-ray Physics
- 13 Essentials of Biological Chemistry
- 15 Experiments and Exercises in Basic Chemistry
- 16 Further Mathematics for the Physical Sciences
- 18 Getting the Message Across: Key Skills for Scientists
- 19 Introduction to Soft Matter...
- 21 Introduction to the Relativity Principle
- 22 March's Advanced Organic Chemistry...
- 24 Medicinal Chemistry: An Introduction
- 25 Molecular Symmetry and Group Theory
- 26 Physical Biochemistry: Principles and Applications
- 28 Physics Student Study Guide
- 30 Physics: Volume 1
- 31 Principles of Physical Chemistry
- 33 Radiation Detection and Measurement

Software reviews...

- 34 Derive 5
- 36 Lewis Acid/Base Reaction Chemistry
- 38 LiveMath
- 40 MathType: The Mathematical Equation Editor for Windows
- 42 MCH Multimedia General Chemistry CDROM
- 44 nmrLAB
- 46 The Chemical Thesaurus 2
- 48 The Chemistry of Life

Basic Concepts of Chemistry



Subject area

General chemistry.

Description

General chemistry textbook.

Authors

Leo J. Malone.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000/6th Edition.

ISBN

0-471-32247-4.

Level

A-level, access, first-year undergraduate.

Price

£37.95 (www.amazon.co.uk).

Any member of academic staff who takes the time to peruse through any well-stocked university bookstore cannot but be impressed by the sheer volume and choice of general chemistry textbooks available on the market. Indeed the ultimate decision of choice of textbook by staff teaching on such courses is usually the result of considerable debate and due consideration. However, here lies an intriguing question! Why is it that publishers worldwide continue to bring out either new texts on general chemistry or launch another edition of a core text?

The current text, Basic Concepts of Chemistry, now in its sixth edition, has its roots back in 1981, as a book directed largely at students planning to advance to a mainstream chemistry course, but who have little or no background in chemistry. Not being familiar with previous editions of this book, this review instead focuses on the current edition in an attempt to see if the book fulfils its intended objectives. Here lies the second source of intrigue! In the preface, the author, Leo J. Malone (Saint Louis University, USA) states that this book has a broad mission. Not only is the text intended to be appropriate to preparatory chemistry courses, it also should satisfy the needs of those students intending to continue on in chemistry and other sciences. Interestingly, the author makes the bold assertion that the text "*does not cringe from or apologize for the quantitative nature of real chemistry*" ... an interesting goal that immediately attracted me to this book, coupled with the vision of a general chemistry textbook that not only was well produced but also had an all-important attribute – it appeared concise and short. The general chemistry market is rife with larger textbooks (often in excess of 1,000 pages) and any concise text coming on the market, maintaining an emphasis on the core chemistry has to be considered carefully.

The current edition consists of 16 chapters, culminating in a modest 504-page text, excluding 7 appendices (involving some basic mathematics, basic algebra, scientific notation, calculators *etc.*) and an index. In addition, the text comes complete with an interactive CDROM, written using Macromedia, containing sample questions on each chapter.

There are many virtues about this text, which must be stated. Not only is the production of a very-high quality, the chapters themselves in general are very short, on average 30 pages. What I particularly liked was the order chosen by the author in the introductory chapters. Chapters 1 and 2 concentrate on matter and measurements in chemistry. These are two well-written chapters, with some excellent groundwork on the importance of SI units, scientific notation, significant figures and decimal places. It was nice to see an introduction/comment on both precision (reproducibility) and accuracy at this early stage. Equally well covered was the factor-label method or dimensional analysis. In each case, the examples are well explained and nested in a coloured-frame for emphasis. The next four chapters cover atomic theory, building up to the Periodic Table of Elements and the all-important electron configuration. This then leads progressively onto chemical bonding, Lewis structures, resonance, VSEPR Theory and polarity. Finally, chapter 7 covers some basic chemical reactions (*e.g.* combustion, precipitation and neutralization), which may be somewhat detailed for the students. As a teaching text, I find this order from experience to be most useful to students *i.e.* the emphasis on the connectivity between valence shell electron configuration and the physical and chemical properties of the element. The effect of this sequence is that the mole and

Summary Review

range: * very poor to ***** excellent

Academic content	***
Usefulness to student	*****
Usefulness to teacher	***
Meets objectives	**
Accuracy	*****

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May 2001

Basic Concepts of Chemistry

stoichiometry is delayed until chapter 8. The next series of chapters, then moves from gases to solids and liquids, to aqueous solutions, acids and bases. Again a recommended structured learning order for students *i.e.* numerical problem-solving and the quantitative nature of chemistry comes slightly later on, after the students have come to grips with the Periodic Table of Elements and have developed a sense of the underlying bedrock of electron configuration.

In general, most of the material in these 12 chapters is well written. At the end of each series of chapters, usually 2-3, there is a review test, normally consisting of approximately 25-30 multiple-choice questions and some longer type problems. The number of questions is about correct at this level, as often some larger general chemistry texts with their associated huge banks of problems are too overwhelming for students.

However, despite the above, this textbook has a number of serious omissions for a general chemistry course.

In inorganic chemistry, the following topics either get sparse treatment or none at all:

- The trends in Pauling's electronegativity values across a period and down a group are not discussed
- No explanation is given as to why the first ionisation energy of boron is lower than beryllium and why the first ionisation energy of oxygen is lower than nitrogen, even though the characteristic dog-tooth graph of the variation of first ionisation energy across the second period from lithium to neon is given.
- Although the *d*-orbitals are mentioned, the shapes of the individual five orbitals are not presented.
- No mention is made of formal charge, which surely must be included if students are to ascertain which of two possible Lewis structures is favoured on formal charge considerations. The geometry of simple molecules is particularly weak, with no serious discussion or adequate treatment of examples. As lecturers, we have a duty to encourage from the first year level, the abilities of our students to think in three-dimensions. This book fails in this regard, and the author chooses very few appropriate examples. In addition, a rather meagre working method is suggested to determine molecular geometry using VSEPR Theory. Moreover, hybridisation is not mentioned at all!

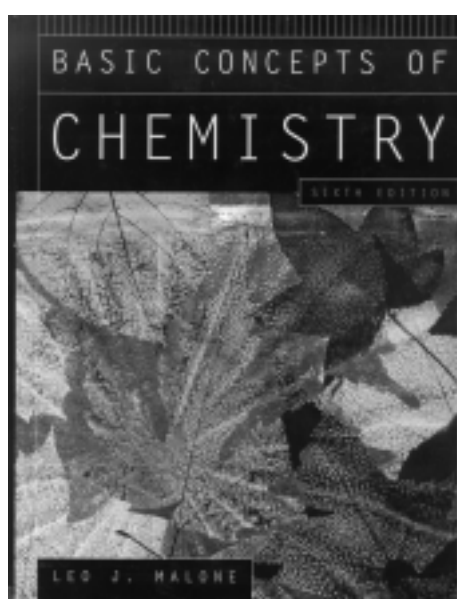
However, the most serious omission of this text has to be the totally inadequate treatment of physical chemistry. Core thermodynamics concepts, such as enthalpy, entropy and Gibbs free energy are not covered. Equally, chemical kinetics is only covered at a very introductory level. The order of a reaction is not mentioned, and hence no mathematical treatment is given to zero, first or second order reactions, nor is the Arrhenius equation given. With an appendix on graphs in the book, this would have been an appropriate and relevant area to introduce some numerical graphical solving, involving the $y = mx + c$ equation and indeed half-life (which incidentally does get mentioned in the chapter on nuclear chemistry).

Furthermore, the text only contains one chapter on organic chemistry, hardly the right balance for a general chemistry textbook. If this book is to be recommended, then future editions must address these omissions, if the author's goal is to jointly cater for both intending and non-intending chemists.

On a final note, the CDROM accompanying the book as supplementary material is currently Version 1. The CDROM only covers 9 of the 16 chapters, with no questions based on elements, the Periodic Table of elements, atomic theory, gases, acids and bases, nuclear chemistry and organic chemistry. Although the chosen questions are interactive, the number of questions is usually very

small, and often some rather bizarre examples are chosen for a general chemistry course. For example, in the section on VSEPR, the choice of examples is FCl^+ , SbH_3 and SeO_2 . Many of these geometries are not covered in the textbook, and hence seems a very odd choice for a student trying to come to grips with shape. However, some nice forms of interactions are seen, such as the drag and drop facility of electron pair placement in developing the resonance canonical forms of the carbonate oxoanion. Overall, the general instructional design of the CDROM is commendable *i.e.* the emphasis on interactions and not that of an electronic book, but like so many of the supplementary materials provided in general chemistry textbooks, the CDROM is incomplete and misses a golden opportunity of being a vital backup to the text.

In conclusion, as a collective package, in its current form, I would not recommend either this edition of the book or the CDROM in its current incomplete form.



Chemistry: Matter and its Changes



Subject area

General chemistry.

Description

General introduction to the subject of chemistry, aimed at foundation level chemistry and useful for the teaching of chemistry to non-chemists.

Authors

James Brady, Joel Russell and John Holum.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000/3rd Edition.

ISBN

0-471-18476-4.

Level

Access, first-year undergraduate.

Price

£31.95 (www.amazon.co.uk).

This is an excellent book for its intended audience. The material is applied well with many useful explanations and new concepts are explained in the kind of depth non-chemists need. The use of review problems and review questions is a particularly good feature, as are the learning summaries given at the end of each topic. There are also practice exercises in the text which help the student

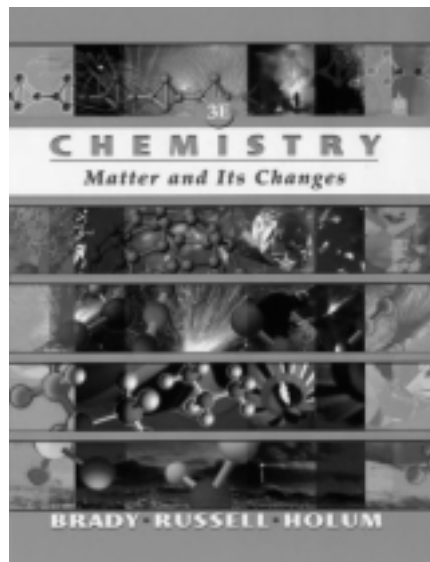
to become a more reflective learner, together with worked examples which go some way towards anticipating hurdles which may be encountered by a student getting to grips with the subject matter. Each chapter has a useful "what

Summary Review

range: * very poor to ***** excellent

Academic content	****
Usefulness to student	****
Usefulness to teacher	****
Meets objectives	*****
Accuracy	****

you have learned" summary before the problems and questions and these are excellent revision tools for students. There is also an accompanying CDROM as well as a WEB site which includes very good visualisations, video clips and other learning aids, including a WEB test engine with on-line feedback, enabling students to tackle problems from different angles and deepen their understanding. The material is logically organised, although bonding comes a little late in chapter 8! The emphasis of this book is on inorganic and physical chemistry, although organic examples are used quite often in the text. Whilst this matches many 'A' level syllabi reasonably well, there is insufficient basic organic chemistry for most university foundation courses. Organic chemistry is a third of most



chemistry degrees and deserves greater coverage. Having said that, the treatment of the other areas of chemistry is more than adequate and the *easy read* style coupled with a problem based approach to developing students' thinking is very pleasing.

The lack of organic chemistry would prevent me from making this my recommended text but it certainly ends up on my reading list for students.

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July 2001

Classical Mechanics: A Modern Introduction



Subject area

General physics.

Description

This book covers the elements of classical mechanics and special relativity at an introductory level.

Authors

Martin W. McCall.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000.

ISBN

0-471-49714-2.

Level

A-level, access, first-year undergraduate.

Price

£27.08 (www.amazon.co.uk).

£21.50 (www.wiley.co.uk).

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This slim but delightfully self-contained text is based on forty or so lectures given to first year physics undergraduates in a British university. It covers the elements of classical mechanics and special relativity at an introductory level. The informal style of writing reflects the lively spirit of the lecture course and engages the reader as the story unfolds.

Summary Review

range: * very poor to ***** excellent

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	***
Meets objectives	*****
Accuracy	**

McCall has made some judicious choices as to content and level of presentation. The topics covered in its nine chapters are: Newton's Laws, One-Dimensional Motion, Oscillatory Motion, Two-Body Dynamics, Relativity 1: Space and Time, Relativity 2: Energy and Momentum, Gravitational Orbits, Rigid Body Dynamics, Rotating Frames. Each chapter ends with a summary of important results derived in that chapter.

Some might argue that the inclusion of oscillatory motion and relativity might be departing somewhat from the main theme but their inclusion here helps enrich and enliven the overall coverage. The scope and level of treatment are comparable to that covered in Chapters 3 to 9 of Mansfield and O'Sullivan¹.

McCall carefully introduces the basic concepts and his logical arguments are carefully developed and clearly explained using mainly algebraic methods incorporating simple vectors with the occasional use of fairly elementary calculus and trigonometry. More mathematically inclined readers might prefer the more sophisticated treatment and coverage of more ambitious texts such as those by Lunn² or Kibble and Berkshire³.

There is much that should maintain the students' interests and perhaps even motivate them to explore several of the topics even further. I would draw those students' attention to the impressive collection of memorable demonstrations by Ehrlich⁴. Inclusion of special relativity and other 20th century items such as rocketry and satellites presumably help justify the word 'Modern' in the subtitle of the book.

There are a sufficient number of interesting and thought provoking problems which add a considerable amount to the variety of content dealt with in the body of the text. Answers to all of the problems are given but no fully worked solutions are provided.

Readers from a non cricket playing background will probably be bemused by the cricketing analogies sprinkled throughout and perhaps even mystified by remarks such as "analysing the movement off the wicket induced by a bowler's leg break ...". It should be pointed out that this first printing is marred by far too many irritating misprints which seems a pity for an otherwise fine piece of work. The fact that the author produced camera-ready copy for publication is no excuse for such careless proof-reading.

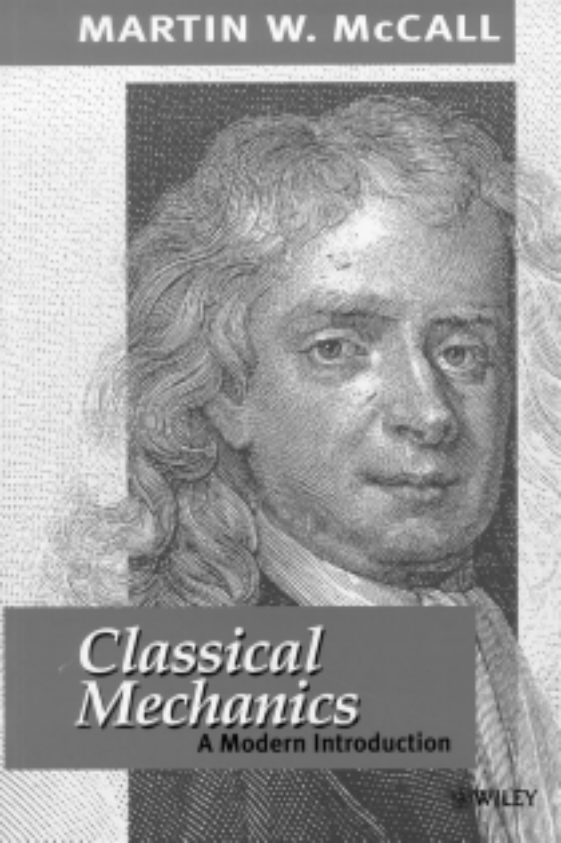
Having read this book, students will be well equipped to go on to study any of the more advanced and comprehensive texts such as those by Marion⁵, Goldstein⁶ or Jos and Saletan⁷.

In these days when efforts are constantly being directed towards making physics courses more attractive to students we may thank McCall for providing a crisp and lively introduction to the important topics treated in this quite enjoyable book.

Classical Mechanics: A Modern Introduction

References

1. Mansfield M. and O'Sullivan C., Understanding Physics, John Wiley, 1998.
2. Lunn M., A First Course in Mechanics, Oxford University Press, 1991.
3. Kibble T. W. B. and Berkshire F. H., Classical Mechanics 4th ed, Longmans, 1996.
4. Ehrlich R., Why Toast Lands Jelly-Side Down, Princeton University Press, 1997.
5. Marion J. B., Classical Dynamics, Academic Press, 1965.
6. Goldstein H., Classical Mechanics 2nd ed, Addison-Wesley 1980.
7. Jos J. V. and Saletan E., Classical Dynamics, Cambridge University Press 1998.



From the publisher...

**Classical Mechanics:
A Modern Introduction**

Martin W. McCall

Classical Mechanics is a clear introduction to the subject, combining a user-friendly style with an authoritative approach, whilst requiring minimal prerequisite mathematics - only elementary calculus and simple vectors are presumed. The text starts with a careful look at Newton's Laws, before applying them in one dimension to oscillations and collisions. More advanced applications - including gravitational orbits, rigid body dynamics and mechanics in rotating frames - are deferred until after the limitations of Newton's inertial frames have been highlighted through an exposition of Einstein's Special Relativity. The examples given throughout are often unusual for an elementary text, although they are made accessible through discussion and diagrams. Complete revision summaries are given at the end of each chapter, together with problems designed to be both illustrative and challenging.

0471497142 288pp 2000 £21.50

3. Kibble T. W. B. and Berkshire F. H., Classical Mechanics 4th ed, Longmans, 1996.
4. Ehrlich R., Why Toast Lands Jelly-Side Down, Princeton University Press, 1997.
5. Marion J. B., Classical Dynamics, Academic Press, 1965.

Color and Light in Nature



Subject area

General physics.

Description

This book is a guide to, rather than a textbook on, a wide range of naturally occurring optical phenomena, the vast majority being visible to the unaided eye. There are many excellent photographic illustrations, some derived from observations in remote situations and others the fruit of careful study of common phenomena to which most of us generally give only passing regard.

Authors

David K. Lynch and William Livingston.

Publishers/Suppliers

Cambridge University Press.
(www.uk.cambridge.org).

Date/Edition

2001/ 2nd Edition.

ISBN

0-521-77504-3.

Level

A-level, access, undergraduate.

Price

£15.96 (www.amazon.co.uk).
£19.95 (www.uk.cambridge.org).

Philip Bradfield
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WV1 1EQ
October 2001

This most welcome and enhanced second edition is to be greeted with delight, for it not only presents a great range of exciting and awe-inspiring phenomena, but, to a great extent, encourages the reader to give serious consideration to the physical basis of them, many of which are commonly visible if only we give appropriate attention.

This text should be available to every student not only of the mathematical and physical sciences, but also of photography and even computing. Perhaps we all, scientist or student or other, ought to carry a camera at all times, together with notebook - as with observational astronomy and other fields of interest, even the so-called amateur can make valuable contributions.

One might seriously quibble about the title: there is little if anything about the nature of colour within the living world, apart from a brief mention of snow algae and of iridescence (irisation). Also, though the book does not claim to be a textbook, it is somewhat frustrating, to say the least, to find a reference to Mie's theory as relating to the "glory" phenomena, without any attempt at all to give even a brief discussion. "In some way..." (p. 136) is not a helpful statement. There are several such places where we are denied an expected discussion/explanation.

The U.K. reader will find the language, not to mention the spelling, annoyingly "loose/unfamiliar", and whilst honest modesty in an author, where appropriate, is to be praised, nevertheless there are too many "perhaps/may be"s without the basis of the uncertainty being made clear. Often arguments are not clear enough - or the physics/logic not expressed explicitly.

Some details would perhaps have benefited from more careful feedback/editing:

Fig. 1.5C (c) [corner cube] (p. 7) is not clear.

Fig. 2.21 (b) and (c) [twinkling] (p. 53) : the supposed distinction will leave many readers puzzled.

Fig. 2.5B [mirages] (p. 60) would seem to need clarification of the significance of the two source-points each marked "S" - presumably the distinction is that the sight-line to the nearer does not allow detectable refractive deviation, whilst that to the farther leads to considerable refractive deviation, giving rise to an obvious mirage.

"A mirage is a refracted image of something that is normally not there" (2.23 Mirages - p. 55) does not seem adequate or helpful.

The section on water and light (3.6) appears suddenly to introduce some basic quantitative physics of refraction, but omits the chance to discuss the small-angle linear relationship between angles of incidence and deviation, which clearly shows in the graph of Fig. 3.6A, though the fact that the linearly-scaled r versus i graph, if used also to show D "on the i -axis", must necessarily result in a heavily non-linear D -axis scaling at large angles - i.e. it becomes a useful nomogram.

Summary Review

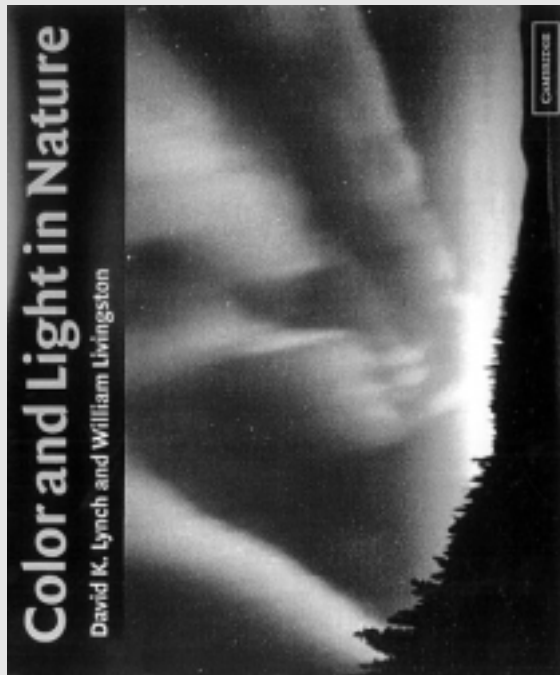
range: * very poor to ***** excellent

Academic content	****
Usefulness to student	****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	****

Color and Light in Nature

The discussion (3.7) of the air-water “optical manhole” fails to mention the spectrally dispersed fringe of the critical angle/total internal reflection light-dark boundary for the equivalent phenomenon of looking through the corner of a rectangular fish-tank: presumably, a coloured perimeter to

inspiration from the book, and then go out with open and curious eyes and minds. The book should be available in all school, college and public libraries, as well as in the backpacks of those who can get out - with a camera, too, of course.



From the publisher...

Color and Light in Nature

2nd Edition

David K. Lynch, William Livingston

We live in a world of optical marvels - from the commonplace but beautiful rainbow, to the rare and eerie superior mirage. But how many of us really understand how a rainbow is formed, why the setting sun is red and flattened, or even why the sky at night is not absolutely black? This beautiful and informative guide provides clear explanations to all naturally occurring optical phenomena seen with the naked eye, including shadows, halos, water optics, mirages and a host of other spectacles. Separating myth from reality, it outlines the basic principles involved, and supports them with many figures and references. A wealth of rare and spectacular photographs, many in full color, illustrate the phenomena throughout. In this new edition of the highly-acclaimed guide to seeing, photographing and understanding nature's optical delights, the authors have added over 50 new images and provided new material on experiments you can try yourself.

0521775043 292pp 2001 £19.95

the optical manhole should be detectable under appropriately controlled conditions. Perhaps here is a future experiment and illustration, as also for the contrasting critical angle/total internal reflection case for an air-glass cube corner, where there is NO through-the-corner optical passage, since

whereas $n(\text{air-glass}) \sim 1.5 > 1/\sin(45) \sim 1.4,$
 $n(\text{air-water}) \sim 1.3$

The angular “distance”/radii of features within photographs might usefully have been superimposed e.g. Fig. 5.7A [halos (sic)] (p.170)

Having made these niggling points about just a few of the many otherwise valuable features of the book, I am bound to report my great overall pleasure that such an excellent resource and stimulus has been re-issued, with so many extra “jewels”. Paraphrasing one of the reviews of the first (1995) edition, I would urge as many as possible to gain

Communicating Chemistry



Subject area

General chemistry.

Description

Resources for undergraduate chemistry courses.

Authors

Patrick D. Bailey and Sara E. Shinton.

Publishers/Suppliers

The Royal Society of Chemistry.
(www.rsc.org).

Date/Edition

1999.

ISBN

0-85404-904-5.

Level

Undergraduate.

Price

£9.95 (RSC members) or £14.95.

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September 2001

This publication consists of a set of resources for use in an undergraduate chemistry course, presented in the format of a book. The resources are designed to develop students' skills in communicating chemistry. The resources have been developed as an education resource by the RSC, and distributed by the Education Department, with financial support from a Marjorie Cutter Scholarship.

The resources follow the house style adopted by the RSC Education Department for their educational materials: i.e. A4 format masters for photocopying. They also follow the normal RSC policy of only publishing materials that have previously been successfully trialled. Although much of the development of these materials seems to have been based at Herriot-Watt and York universities, it has been informed by input from academics in a range of UK institutions. The materials are clear and well laid out, and have a professional appearance.

The set of resources is designed to offer students opportunities to develop and practice a range of skills, and some institutions may wish to adopt the full materials as a course component. However, it is also possible to consider the different activities as stand-alone units. Even if the course materials provided are not adopted directly, this is still a useful source of ideas. The range of activities is to be applauded, and the general rationale of developing undergraduate communication skills is a very worthwhile one. It is likely that many degree courses already include similar components: but this would be a valuable addition to the bookshelves of any colleague looking to introduce exercises on communication science, if looking to extend courses with more traditional teaching approaches.

One of the strengths of the publication is the variety of the resources (industrial roles plays, literature interpretation, computer based exercises, writing for various purposes/audiences). The different activities have been designed to cover a range of 'communication' skills, and provide a range of activity formats (that should appeal to students with different learning styles). Some of the activities have a higher degree of chemistry content than others. Indeed some are quite demanding, in requiring specific subject knowledge, whereas some allow the students greater flexibility in selecting a context to carry out a task. Students who complete the suite of activities will be required to work with peers in a variety of ways (and roles). Some of the activities give the students significant responsibilities in assessing the work of their colleagues. (To my mind some of the guidelines for mark schemes seem rather arbitrary - but the details of these could be altered.)

This publication should appeal to lecturers who are either looking for a ready made course in communicating chemistry, or for ideas for producing their own materials. The resources presented are well described, with the rationale for activities explained, and with suggestions for correct or acceptable answers where appropriate. Ideas for extending or modifying the exercises are also provided. Although the context is chemical, the ideas for most of the exercises could be used in other disciplines. The documentation provides guidelines for the time commitment for both students and teaching staff (and some of the activities can be carried out with a relatively minimal input from lecturers, which may be considered an added attraction where contact time is limited).

In conclusion, Communicating Chemistry is a very useful set of resources for the Chemistry Department.

Summary Review

range: * very poor to ***** excellent

Academic content	***
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	****
Accuracy	****

Electrochemical Methods



Subject area

Physical Chemistry.

Description

An advanced textbook at the post-graduate level for researchers in the field of non-equilibrium electrochemistry.

Authors

Allen J. Bard & Larry R. Faulkner.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2001/2nd Edition.

ISBN

0-471-04372-9.

Level

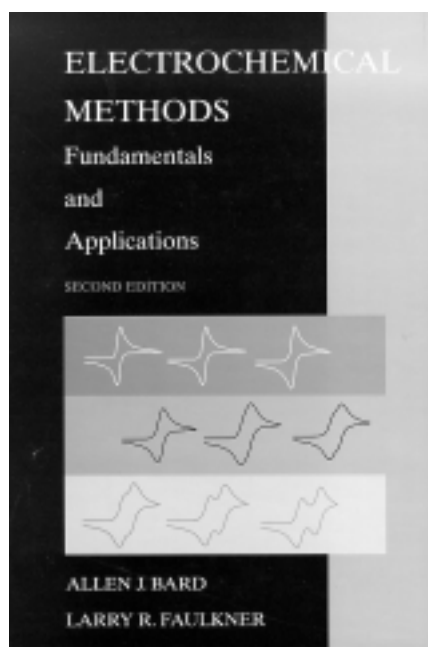
Research level.

Price

£87.87 (www.amazon.co.uk).

As a post-doctoral fellow in the 1980s, the first edition of this book was my constant companion. It was the best, if not the only, textbook describing in detail the electrochemical methods used to study the reactions occurring at electrode surfaces. I am delighted to see that the authors have now produced a second edition.

The new edition follows very closely the structure of the first, quite large sections in fact remaining largely unchanged. Other sections have been extended somewhat, for example that on variation of impedance with a.c. frequency, and some are completely new, such as the chapter on scanning probe techniques. Such sections illustrate the lengthy process of revising a text of this size, the references often not being as recent as, I'm sure, the authors would like.



Summary Review

range: * very poor to ***** excellent

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	***
Meets objectives	*****
Accuracy	*****

The book covers, as clearly as any, the essentials of electrode kinetics. The descriptions of the experimental methods are thorough, clear and, in most cases, well illustrated by reference to reactions to which the methods have been applied. The aim, as the authors point out, is to provide a teaching text rather than an up-to-date review of the applications of electrochemical methods. I feel that the authors have succeeded. Each chapter ends with numerous problems of varying levels of difficulty.

I hope if the book sells well that the publishers will consider a companion volume of example answers. I found one of the most valuable chapters in the first edition to be that on instrumentation, I was therefore disappointed that after

twenty years, this section was little changed - though I was pleased to see a discussion of the problems of measuring very small currents. The addition of a few pages on computer-controlled instrumentation is not very convincing. Nonetheless, these criticisms are minor. This remains the best text for any researcher entering the field of non-equilibrium electrochemistry, whether that researcher be a graduate student or an academic with twenty years experience of practical physical chemistry. It encourages me once again to dig out my box of operational amplifiers and get back into the lab.

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October 2001

Elements of Modern X-ray Physics



Subject area

General Physics.

Description

This is an introductory text at the advanced undergraduate/post-graduate level to the techniques and methods of X-ray scattering using advanced synchrotron X-ray sources.

Authors

Jens Als-Nielsen and Des McMorro.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2001/1st Edition.

ISBN

0-471-49858-0.

Level

Undergraduate, research level.

Price

£29.95 (www.amazon.co.uk).

£32.50 (www.wiley.co.uk).

Adrian Barnes
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September 2001

Since their discovery by Roentgen in 1895 X-rays have seen a continual growth in their use for the determination of the structure of condensed matter. Indeed the Nobel Prize for Physics had already been awarded in 1915 to Sir W.H. and W.L. Bragg for their work on the determination of crystal structures by X-ray diffraction. However, in the late twentieth century two developments have led to an explosion in the use of X-rays as a tool for use in the physical and biological sciences, namely, the development of powerful X-ray synchrotron sources and powerful computers. This has led to an ability to understand the microscopic structure of materials to an unprecedented detail and precision.

Until this time however, a good introductory text covering X-ray scattering methods based on synchrotron sources has not been available. "Elements of Modern X-ray Physics" by Jens Als-Nielsen and Des McMorro - two physicists with extensive experience of using synchrotron radiation - has been written to cover this need. The text is set at the advanced undergraduate or postgraduate level and requires the reader to have a good mathematical knowledge including vector analysis and calculus.

The book is divided into seven chapters and seven appendices. Chapter one introduces the basic interactions of X-rays with matter including scattering, absorption and emission processes, Compton scattering, coherence, refraction and reflection and magnetic scattering. Chapter two introduces the methods of generating X-rays. This chapter is unashamedly based on the generation of X-rays by synchrotron sources and carefully explains the emission of X-rays by synchrotron radiation from bending magnets and insertion devices. In the latter case the differences between wigglers and undulators are carefully described and the difficult concept of harmonic generation from undulators is considered with some care. The use of insertion devices at synchrotrons can be bewildering even to an experienced X-ray scatterer whose knowledge is confined to laboratory (tube based) sources and this chapter alone is invaluable as a reference for any student/researcher who wants to understand how to use these devices to their full potential. The subsequent chapters cover the use of specific X-ray techniques especially with regard to the advantages and advances gained through the use of synchrotrons. These chapters not only include the use of X-ray scattering to the study of the structure matter but also show how this knowledge can be used to understand and improve the X-ray optics of the instruments themselves. For example, after treating the reflection of X-rays from surfaces and discussing the measurement of surface layers and roughness, the authors show how this knowledge can be used for the production of X-ray mirrors for use in the X-ray beamlines themselves. Similarly the careful explanation of the dynamical theory of X-ray scattering leads to the understanding of the X-ray scattering from perfect crystals and the concept of the Darwin width - a property that is important for studying the limits of the energy and angular resolution of the monochromator systems used on the X-ray beamlines. The final two chapters cover experimental techniques that have only become achievable through the ability to tune the energy of the incident X-ray source while maintaining high incident intensities. These are the absorption methods including the Extended X-ray Absorption Fine Structure (EXAFS) method and magnetic dichroism and the Resonant X-ray scattering techniques that enable some of the limitations of the phase problem in crystallography to be overcome.

Summary Review

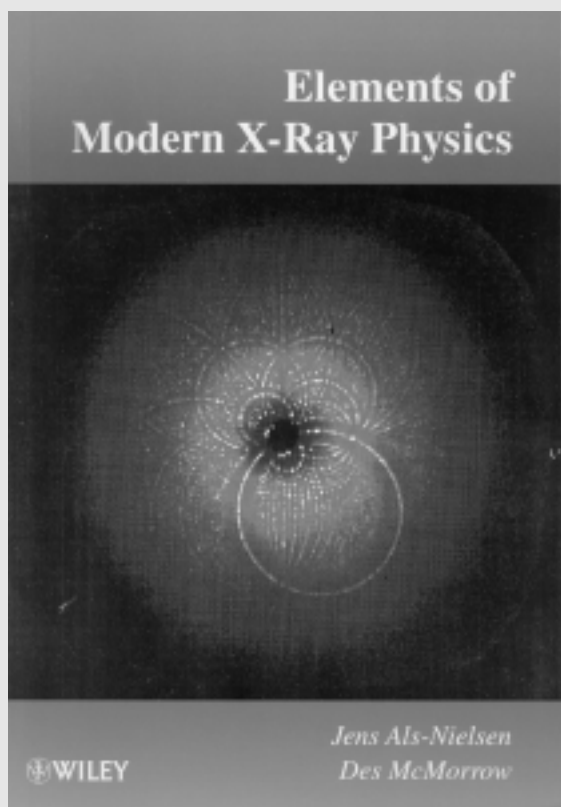
range: * very poor to ***** excellent

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	***
Accuracy	***

Elements of Modern X-ray Physics

The appendices cover in detail the mathematical proofs stated in the main text and also include a useful set of MATLAB programs that demonstrate many of the concepts outlined in the text.

I would certainly recommend that the book should be required reading for any student or researcher who is contemplating an X-ray experiment at a modern synchrotron.



From the publisher...

Elements of Modern X-ray Physics

Jens Als-Nielsen & Des McMorrow

The availability of intense X-ray beams from synchrotron storage rings has revolutionised the field of X-ray science. This is illustrated by the cover pictures: Von Laue's first observation of X-ray diffraction from a single crystal of ZnS used an exposure time of around 1000 seconds, whereas the diffraction from a single crystal of myoglobin using modern X-ray synchrotron radiation was obtained within the duration of a single pulse lasting only 0.0000000001 seconds.

In this book the basics of X-ray physics, as well as the completely new opportunities offered by synchrotron radiation, are viewed from a modern perspective. The style of the book is to develop the basic physical principles without obscuring them in too much mathematical rigour. This approach should make the book attractive to the wider community of material scientists, chemists, biologists and geologists, as well as to physicists who use synchrotron radiation in their research. The book should be useful both to students taking a course in X-rays, and to more experienced professionals who have the desire to extend their knowledge into new areas.

0471498580 336pp 2000 £32.50

It would be easy to criticise a book of this type for the depth in which some areas are covered and the omission of certain topics. For example, almost no mention is made of inelastic X-ray scattering methods and imaging – fields that have seen rapid development in recent years. However, one soon realises that a complete coverage of all the techniques being currently exploited at synchrotron sources is an impossible task to realise. In this respect the authors have produced an excellent introduction into modern aspects of X-ray scattering.

Essentials of Biological Chemistry



Subject area

Biochemistry.

Description

Essentials of Biological Chemistry is an introduction to the exciting and rapidly developing field of the chemistry of biologically active compounds.

Authors

Lorraine Buckberry and Paul Teesdale.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000.

ISBN

0-471-48904-2.

Level

Undergraduate.

Price

£60.97 (www.amazon.co.uk).

£65 (www.wiley.co.uk).

David Shuker
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October 2001

Some traditional scientific disciplines or their sub-branches are rebranding themselves in an effort to be seen to be thoroughly contemporary, and especially 'post-genomic', in order to appeal to students. It has therefore been refreshing to see recent commentaries by highly regarded scientists pointing out that the 'central' science of chemistry continues to contribute exciting new insights to the biological sciences with undiminished vigour¹. It is interesting to note that James Watson's classic textbook² contained an introductory chapter headed 'Cells Obey the Laws of Chemistry'.

Summary Review

range: * very poor to ***** excellent

Academic content	***
Usefulness to student	****
Usefulness to teacher	****
Meets objectives	****
Accuracy	***

The subject of biological chemistry, a term which predates biochemistry let alone molecular biology or biological sciences, is enjoying a richly deserved renaissance - sometimes masquerading under the slightly provocative and refreshingly minimalist label of 'chemical biology'. In order to attract new recruits from chemistry and from organic chemistry, in particular, into biological chemistry - often seen as an area tainted by the perceived *touchy-feeliness* of biology - it is going to be vital to have introductory texts which convincingly tempt the faint-hearted to study or work in a field which is so patently rich and relevant to our understanding of ourselves and the processes which underlie our very nature.

'Essentials of Biological Chemistry' is just such a venture and, with its feet firmly planted in chemistry, attempts to convey the important message that apparently complex biological systems and processes are constituted of very basic organic chemistry.

The chemistry of life takes place in water at neutral pH and at 37.4°C - something which can be hard to keep in mind for bench organic chemists who are used to torturing molecules into submission by heating them at reflux in exotic solvents in the presence of distant, and slightly dodgy, relatives from the darkest corners of the periodic table.

Buckberry and Teesdale's book is by and large successful in its objective of teaching biological chemistry from the point of view of a living cell being a reaction vessel. Almost every page has structures and sufficient arrow-pushing to satisfy the average organic chemist. However, the balance of detail and coverage may require some attention in future editions. For example, the detailed mechanistic discussion of the Maxam-Gilbert DNA sequencing method, somewhat awkwardly spread over two recto-verso pages, contrasts somewhat with the rather simplistic cartoon of the cell on p.33. Consideration of a cell as a reaction vessel has been the classical way of thinking about biological chemistry but the very small size of cells leads, through some simple arithmetic, to some surprising conclusions about concentrations and dimensions of biomolecules and properties of water when each H₂O molecule has a specific role in solvation³.

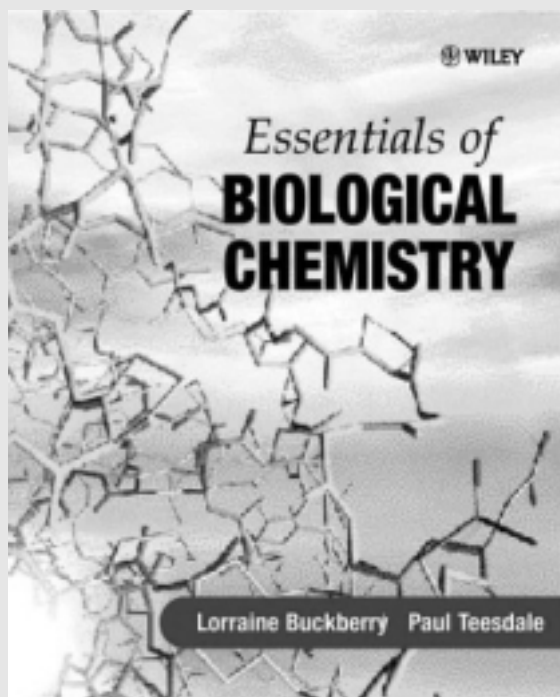
The sight of crosswords as a teaching aid struck an odd note but this may reflect a successful teaching method developed by the authors.

Essentials of Biological Chemistry

The website containing supplementary information worked well although there were a few disjointed oddities. For example, in the organic chemistry link we are directed to a slide showing the Mitsunobu reaction without any explanation. There was also a link to peptide synthesis from

References

1. Adam, D., *What's in a name?* Nature, **411**, 408-409, 2001
2. Watson, J. D. et. al., *Molecular Biology of the Gene*, 4th Ed., Ch. 2, 1987



From the publisher...

Essentials of Biological Chemistry

Lorraine D. Buckberry & Paul H. Teesdale

Essentials of Biological Chemistry is an introduction to this exciting and rapidly developing field of the chemistry of biologically active compounds. Assuming little in the way of biological knowledge, this text aims to develop students' understanding of how biological processes are controlled by underlying chemical principles. Taking a mechanistic approach, the book starts with the basics and carefully leads the reader through the essentials of the field. It begins by looking at biological systems and the physical chemistry of the cell, and then moves on to cover protein structure and function and catalytic proteins, and concludes with a number of case studies. Each chapter is carefully structured, and includes examples, summaries, self-test questions and problems.

0471489042 238pp 2000 £65.00

Chapter 3 which is all about DNA. From Chapter 4 one of the links was to an unlabelled scheme of amide hydrolysis (which is also in the text on p.152). As both the authors have recently moved from DeMontfort University some of this unevenness may be due to the inevitable disruption which ensues - but the editors of a reputable publisher like Wiley should have addressed these issues prior to publication. Overall this text is priced so as to be accessible as an undergraduate text with the added bonus of web-linked supplementary material which can be readily updated and improved.

3. Müller-Hill B., *Some number and concepts in The lac Operon*, Walter de Gruyter, Berlin pp. 134-136, 1996

Experiments and Exercises in Basic Chemistry



Subject area

General chemistry.

Description

A laboratory text book containing a wide range of introductory practical experiments and exercises.

Authors

Steven Murov and Brian Stedjee.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000/5th Edition.

ISBN

0-471-35862-2.

Level

A-level, access, first-year undergraduate.

Price

£33.95 (www.amazon.co.uk).

General comments

The stated aim of the authors in preparing this book is to provide a safe, interesting and challenging educational experience for students. The book contains an extensive range of introductory experiments and exercises, designed to be used in conjunction with Malone's Basic Concepts of Chemistry¹ and is clearly oriented towards an American college audience. Thus early experiments introduce the use of the Bunsen burner in glassworking, measurement accuracy and precision, purification techniques, but later experiments are concerned with the use of spectroscopy in analysis, redox reactions, equilibrium studies and the rates of chemical reactions.

Structure

There are two major parts to the book. The first of these consists of 26 separate experimental topic chapters. Each chapter starts by listing the learning objectives and the topics covered, with a reference to the appropriate chapter in Malone. A discussion section sets out the relevance of the experiments about to be described, details of the experimental procedures follow. A series of prepared forms for *Prelaboratory exercises* and *Experimental results and calculations* are provided in the book, printed on separate pages to be handed in for student assessment. The answers for some of these exercises are provided in an Appendix, (most of the remaining answers are in an Instructor's Manual, not seen by this reviewer). The assessments are often quite lengthy and would require considerable time and commitment for the students to complete everything. The second major part of the book consists of 26 Exercises covering such topics as unit conversions, formulas of compounds, stoichiometry, nuclear reactions. These exercises are intended to fill in gaps where experiments are not easily performed and do not necessarily parallel the topics in the Experiment chapters. Again, space is given for students to fill in answers directly in the book and form part of their assessment. A very nice feature of the Exercises section is the inclusion of internet exercises, called *Webercises* by the authors, in six of the Exercise chapters (Measurements, Accuracy and Precision; Properties of Elements; Nomenclature, Properties and Uses of Compounds; Periodic Properties of the Elements; Gases and Gas Laws; and Chemists, Chemistry and Society). A Website has been set up which provides the necessary URL's. The site is an extremely valuable resource in its own right reproducing many of the key scientific papers in the history of Chemistry and providing useful links to other educational sites.

Safety

The importance of safety in the laboratory is emphasised by providing a list of dos and don'ts, and by carefully selecting experiments that avoid use of known carcinogenic and toxic materials.

Additional remarks

Much effort has been spent by the authors on explaining the relevance of chemistry in society, both in the form of some of the problems set and also in so-called *Chemical Capsules*. The experiments and exercises are well chosen and show the evident enthusiasm of the authors for the teaching of chemistry.

Recommendation

The text would be a valuable aid to teachers designing introductory laboratory courses. It is probably too closely tied in to the American education system for use by students in the UK, particularly in view of its cost, but it is certainly a very valuable source of ideas for teachers.

Reference

1. Malone, L.J., Basic Concepts of Chemistry, 6th Edition, J. Wiley, 2000.

Summary Review

range: * very poor to ***** excellent

Academic content	****
Usefulness to student	***
Usefulness to teacher	****
Meets objectives	****
Accuracy	****

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August 2001

Further Mathematics for the Physical Sciences



Subject area
Mathematics.

Description

This book offers material from teaching resources designed to enable a wider intake of students to enter and benefit from Higher Education in physical science, specifically by providing basically “self-help” support for individual students from within a wide spectrum of prior learning. This text is concerned with the mathematical equipment these students will need, at around 1st year undergraduate level, though A-level students might also find it of some use.

Authors

Michael Tinker and Robert Lambourne (editors).

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000/1st Edition.

ISBN

0-471-86723-3.

Level

A-level, undergraduate.

Price

£22.50 (www.amazon.co.uk).

£24.50 (www.wiley.co.uk).

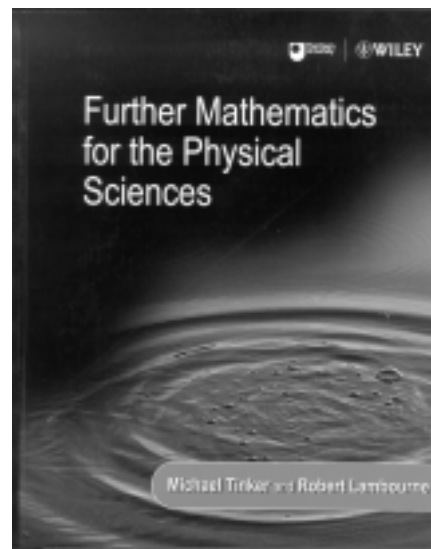
This book is one of a pair published under the “FLAP” (Flexible Learning Approach to Physics) project (see *Basic mathematics for the physical sciences review*¹).

With so many current and “classical” texts at approximately this level, and of similar coverage, one looks for some justification for any new contribution.

The book is particularly targeted at those students who are not “typical” A-level (or equivalent) students taking applicable maths (for science) courses in school or further education. Presumably this will give the book some immunity against the recent changes to (new-style) AS and A2 programmes. Thus, mature students - with perhaps a somewhat patchy or rusty background - and those with similar needs for fuller support (e.g. distance-learners) are specifically catered for. This has resulted in more explanatory textual material - in good Open University-style - than was seen in many of the older “classics” dealing with the same material - though over the decades there has been a general improvement in the proportion of discussion found in such texts. Of course, the possibly rather austere older texts were intended to go along with many hours of individual work with expert, if rather less indulgent, teaching: no amount of

textual discussion can ever, of course, replace the extent and flexibility of face-to-face support/teaching. We should not exclude those older texts designed for Technical College courses in engineering and the like.

We all must have added (or been tempted to do so) marginalia and footnotes to favourite textbooks and monographs which represent mature understanding of and reflections on, rather tersely-expressed “gems” from text or teachers. No doubt inter-pupil discussions will remain valuable occasions for deeper learning. Though distance-learners in the past may have missed out on this, the advent of the Internet is surely making effective mutual support possible for all.



The “federal” nature of this edited compendium appears in the rather widely different styles, and levels, of detail to be found in the several sections. The “disclaimer” in the Preface, “... exclude all the physics-based material...” (see also below) seems both unnecessary and inapplicable: many of the book’s discussions involve - nay, even require - an appreciation and understanding of the physical scenario/model giving rise to the mathematics. This perspective has the potential to give the volume extra value not found in some other treatments of these mathematical topics, but the treatment is not sufficiently or uniformly careful to be relied on through the book.

Summary Review

range: * very poor to ***** excellent

Academic content	***
Usefulness to student	***
Usefulness to teacher	***
Meets objectives	***
Accuracy	***

Philip Bradfield
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October 2001

Further Mathematics for the Physical Sciences

With a wide range of topics covered, up to and including 1st year undergraduate work, it seems impossible in this review space to give this reader's response to more than just a few typical points. It is surprising to see relatively elementary topics (basics of complex numbers, vector algebra) included along with others such as vector calculus, though I suspect this last topic is determined by the needs of courses on electromagnetic theory.

The discussion of the wave equation, using transverse waves on a stretched string as a tangible example, has a somewhat unhelpful discussion of the calculation of the energy flow (for a progressive wave) in terms of the work done on a small section of string. The treatment seems highly artificial, though raises interesting, but possibly unintended, questions about the implied direction of the energy flow, which might well challenge the more astute reader but are more likely to confuse the target readership seeking effective mathematical enlightenment.

There seems little to support aspiring chemists as against physicists and engineers - perhaps that was a deliberate but unspoken policy, but I would have included the first under "physical scientists". Here Kynch² remains invaluable, especially in his introduction of the Maxwell (thermodynamic) Relations. Perhaps the clue to this policy is found in the Preface, where, as mentioned above, there is a reference to "exclude all the physics-based material" (sic), and also in the "P" of "FLAP". See also the reviewer's comments¹.

There are seemingly some errors and misjudgements:

Fig. 16.13 [p. 449] seems to have a distractingly extreme perspective view of a wave $F(x,t)$.

In the discussion of the Newton-Raphson method, the choice of a negative local slope for the plotted function $f(x)$ [fig. 9.5, p. 230] whose root is sought makes unnecessarily difficult the reader's appreciation of the significance of the negative sign in the usual solution.

The use [p. 234] of (crystalline) argon as an implicitly typical "molecular solid" is surely confusing, even to those readers who have some appreciation of crystal chemistry. In fact, the term itself is somewhat misleading - diamond would seem to fit a more literal interpretation of the term, despite time-honoured use differently. Diamond is a very special case of an entirely covalently bonded crystal, which might here be regarded as a "single giant molecule", but of course the wider chemical significance of "molecule" is then lost.

In question T4 (a) [p. 383] we are given $y(t)$ to describe the scenario [water flowing from a reservoir], yet the differential equation modelling the behaviour is stated as

$$dy/dx = -k \sqrt{y}$$

Similarly, in T4 (b) the "small angle" limitation of the modelling for the simple pendulum is not mentioned - this omission may make the underived relationship between the scenario and the equation of motion obscure for some intended readers, and will annoy many others.

In question T3 [p. 407], the 2nd order linear differential equation determining the temporal behaviour of a simple LC circuit is given in terms of I , rather than Q - this importantly misses the physical basis of the model, i.e. in terms of the potential difference arising from the stored (ie separated) charge(s) (Q) in the capacitor, and the inductive back-e.m.f., and its solution adds nothing to the understanding of either the maths or the physics. A discussion in terms of Q would have covered the same maths, if in fact it were the integral relationship between I and Q that was to be avoided at this point in the text. The same error occurs on p. 414. [eqn. 28], where the LCR circuit is discussed in terms of I rather than Q , thus again rather perversely ignoring the physical basis of the model.

In brief, the book would seem to have limited value as a "self-help" resource at the intended level, and I have yet to be convinced that its addition can be justified - perhaps teachers who have been convinced of its worth can be persuaded to share their experiences - that would be of great interest.

References

1. Burns, Duncan Thorburn, - Physical Sciences Educational Reviews 2(1), p. 4. A review of *Basic mathematics for the physical sciences*, June 2001
2. Kynch, George J., *Mathematics for the Chemist*, Butterworths, 1955 (revised reprint 1966)

Getting the Message Across: Key Skills for Scientists



Subject area

Physical sciences.

Description

Reference for undergraduates and beyond, giving advice on aspects of communication skills.

Authors

Patrick D. Bailey and Sara E. Shinton. Second edition edited by Denise Rafferty, RSC.

Publishers/Suppliers

The Royal Society of Chemistry (www.rsc.org) Education Dept and GlaxoWellcome (www.glaxowellcome.co.uk).

Date/Edition

1999/2nd Edition.

ISBN

None.

Level

Undergraduate.

Price

First copy free to academics - subsequent copies subject to minimum order of 10 for £25.

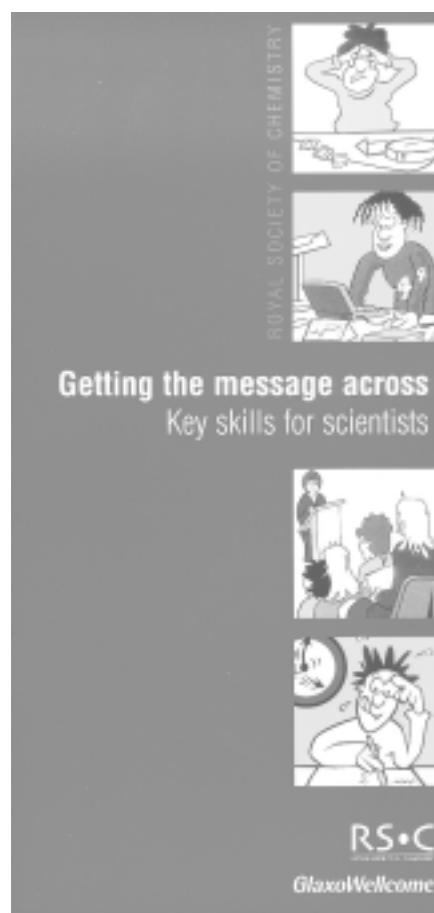
Getting the Message Across: Key Skills for Scientists, is a real breath of fresh air. The compact volume is well protected for laboratory use and fits easily into the pocket.

Most of the nine sections provide an excellent starting point for developing relevant skills and are entertaining as well as very useful. The range of skills addressed is impressive, although I am not convinced that chairing a meeting should be in the same section as time management. Although it is good to see the latter in there, a separate section on "meeting skills" might have been better and the time management section would certainly benefit from expansion.

Summary Review

range: * very poor to ***** excellent

Academic content	***
Usefulness to student	****
Usefulness to teacher	****
Meets objectives	****
Accuracy	*****



Although it is good to see the latter in there, a separate section on "meeting skills" might have been better and the time management section would certainly benefit from expansion.

I wondered about the target audience too: section one is "Giving an Oral Presentation". There's nothing like getting in at the deep end for undergraduates but perhaps this was aimed at the post-graduate market? Section two on "Preparing a Poster" reinforced my conviction. Perhaps if undergraduates are the main target area; note taking in lectures and laboratory notebook keeping, perhaps followed by report writing might better reflect their needs early on.

Having said that, the sections are clearly labelled and marked so that one can turn instantly to the desired subject and read on.

There is a fine section on networking, a much neglected and vital element in career progression which is very pleasing to see.

This little book is excellent and leaves you wanting more - a few references and some further reading

in each section might be a useful addition in the future but the book will be a useful companion for any student scientist.

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September 2001

Introduction to Soft Matter: Polymers, Colloids, Amphiphiles and Liquid Crystals



Subject area

Physical Chemistry.

Description

A unique text describing the role of soft matter within colloid chemistry.

Authors

Ian W. Hamley.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000.

ISBN

0-471-89952-6.

Level

Undergraduate.

Price

£24.75 (www.wiley.co.uk and www.amazon.co.uk).

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August 2001

Materials included under the general heading of soft matter include those formed by the self organisation of organic molecules. Such materials take the form of polymers (plastics, rubber); colloids (clays, foams, emulsions); amphiphiles (detergents) and liquid crystals. This book attempts to take the area of 'soft matter' and form a unified subject area within the boundaries of colloid science.

Covering all types of soft matter, this book has been primarily written for final year undergraduates taking physical chemistry courses, although it would not be out of place as an introductory text on a postgraduate bookshelf.

In general, textbooks on colloid science may be categorised into two distinct types. We either have the weighty, in depth, tomes of Fennel Evans¹ or Robert Hunter² as compared to the much lighter read provided by Duncan Shaw³. These books are all excellent works, the Shaw book by its very nature and size providing a less in-depth study and yet it is the book that most undergraduates will prefer to use to help with their studies. Ian Hamley has clearly aimed to complement Shaw's book and as a result, "The Introduction to Soft Matter", clearly falls into the second category. It is physically the same size as Shaw's book and should be easily read by most final year undergraduates.

The chapters of the book take the reader first through an introduction to the subject area and then onto the more specific areas of polymers, colloids, amphiphiles and finally liquid crystals. The introduction actually deserves special mention in that it provides the reader with a brief insight to the soft matter area of colloid science, from intermolecular interactions, via phase transitions to a discussion of the experimental techniques available for investigating soft matter. The discussion of experimental techniques is excellent and although only some 20 pages in length includes, microscopy, scattering (light, x-ray and neutron), rheology and spectroscopic methods.

The chapters on polymers, colloids, amphiphiles and liquid crystals are also well written with a direct style that is very appealing. Colloid science by its very nature is a somewhat mathematical subject, however maths element has been kept to a minimum and only used where absolutely necessary. Sub-topics are addressed directly and are explained immediately they are used. This makes the book useful as a reference text and may be "dipped into" from the index as needed.

Following the introduction, the polymer chapter covers synthesis, characterization, solution properties and also discusses the many varied polymer types from plastics to biopolymers and also block copolymers. Normal colloidal systems (e.g. clays, mists, smoke, emulsions, foams etc.) are next discussed in terms of their characterisation, stabilisation and kinetic properties. This is then followed by a discussion of amphiphile chemistry in terms of their surface activity, adsorption at the solid interface, the formation of micelles in bulk solution and the formation of liquid crystalline phases at high concentration. The liquid crystalline phase is then discussed in detail in the final chapter. Both the thermotropic and lyotropic types are considered along with the identification of the phases present in these systems and their application.

Summary Review

range: * very poor to ***** excellent

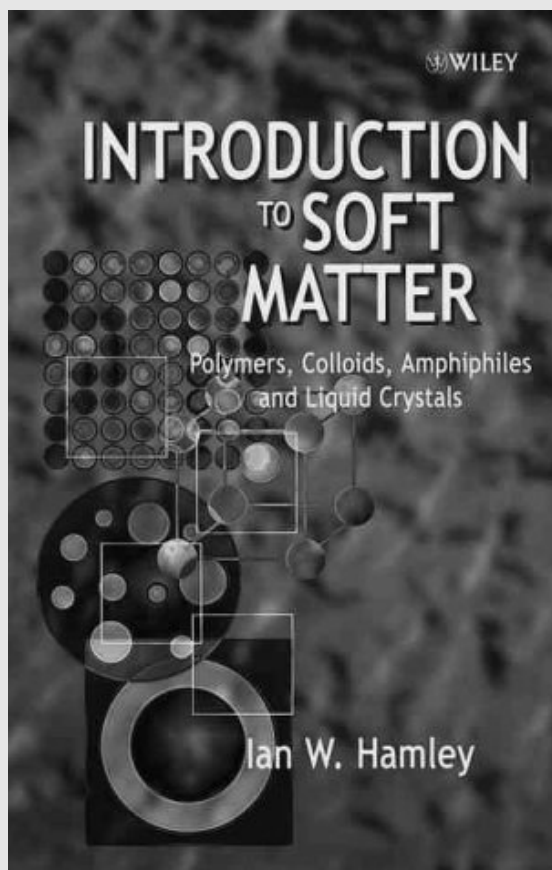
Academic content	***
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	****
Accuracy	****

Introduction to Soft Matter: Polymers, Colloids, Amphiphiles and Liquid Crystals

Each chapter is accompanied by a very useful bibliography directing the reader to further perhaps more in depth discussions^{1,2}. Questions are provided at the end of each chapter with numerical answers at the end of the book.

References

1. Evans, F., *The Colloidal Domain*, H. Wennerstrom, Wiley-VCH, 1999
2. Hunter, R.J., *Foundations of Colloid Science*, Oxford, 2001



From the publisher...

Introduction to Soft Matter: Polymers, Colloids, Amphiphiles and Liquid Crystals

Ian W. Hamley

Provides an introduction to this exciting subject with chapters covering natural and synthetic polymers, colloids, surfactants, and liquid crystals, highlighting the many and varied applications of these materials.

- The only introductory book on this subject
- Cutting-edge introduction to a new and emerging subject area
- An interdisciplinary approach suitable for chemistry, materials science, physics, and biochemistry courses
- Copious end-of-chapter problems

0471899526 350pp 2000 £24.75

This is a very useful text, occupying some 342 pages, it is about the correct size to be useful to the student and yet not strike fear into their hearts. It fills a unique gap in the market and is one I feel able to most strongly recommend.

3. Shaw, D.J., *Colloid and Surface Chemistry*, Butterworth Heinemann, 1994

Introduction to the Relativity Principle



Subject area

Relativity.

Description

Undergraduate text book covering Einstein's Relativity Principle.

Authors

G. Barton.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

1999/1st Edition.

ISBN

0-471-99896-6.

Level

Undergraduate.

Price

£19.99 (www.wiley.co.uk and www.amazon.co.uk).

'Introduction to the Relativity Principle' is a very valuable addition to the available text books on Einstein's Relativity. The author claims that only elementary mathematics is required and indeed this is so. But this should not be interpreted as implying that the treatment is not intellectually demanding. This is a well-argued and fairly rigorous treatment of the subject matter. Clear and logical thinking are vital in following the arguments. Worked examples are interspersed in the text and these are really useful in ascertaining that the reader really has understood the sometimes deceptively easy text.

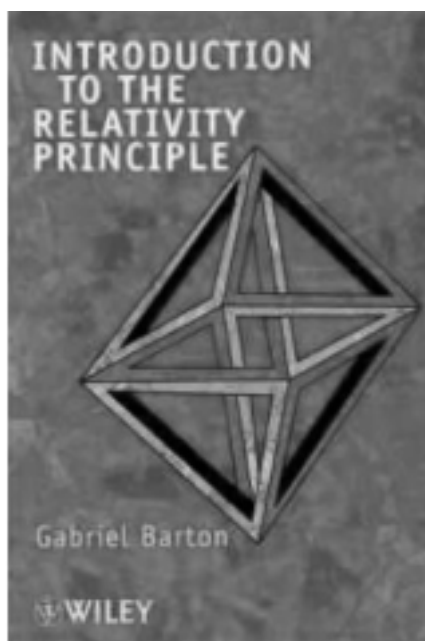
Summary Review

range: * very poor to ***** excellent

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Although the treatment is fairly formal, developing the theory in steps from fundamental postulates through to its myriad consequences, a particular feature of the book is the wealth of supporting experimental evidence quoted at all stages. There are also explanatory notes at the end of many chapters,

amplifying or clarifying points of the text and giving references for further reading. At the end of the book there is an extensive collection of problems for the reader to attempt.



I liked the introductory discussion of Galilean relativity which precedes the invariance of the speed of light and the development of Einstein's relativity. Relativity, in this general sense, is an important principle often overlooked in undergraduate physics curricula. This leads to concepts such as invariants that have application very generally in numerous areas of science.

Following the introductory part of the book, latter parts cover Kinematics, Momentum and Energy, plus Waves and there is a valuable collection of Appendices.

Notwithstanding the valuable experimental details and discussions, the book will probably have greatest appeal to students in theoretical and mathematical streams to whom the formalism should be second nature; there it could be the text around which a Relativity course was based. To other students studying Relativity the book would be very useful as supplementary reading, filling in gaps and providing explanation.

I found the book a good read. Many treatments of Relativity are muddled and confusing. Einstein's own writings are a model of clarity and I usually recommend students to go to the sources following an initial exposure. This book is a model of clarity and it stands out from the run-of-the-mill undergraduate texts on this topic.

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September 2001

March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure

Subject area

Organic chemistry.

Description

A text predominantly aimed at research level organic chemists.

Authors

Michael B. Smith and Jerry March.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2001/5th Edition.

ISBN

0-471-58589-0.

Level

Research level.

Price

£50.50 (www.amazon.co.uk).

£55.95 (www.wiley.co.uk).

The 5th edition of the universally popular "March" has been eagerly awaited for some time, the previous edition being close to ten years old. With the death of Jerry March, the publishers brought in Michael Smith to complete the new edition, but the well known style and layout of the book have been retained almost unchanged. Thus the first nine chapters offer a brief advanced introduction,

suitable for the new post-graduates who form the target audience, to organic chemistry in general, covering topics such as bonding, stereochemistry, reactive intermediates, and the determination of reaction mechanisms. This section of the book has been updated unobtrusively to take account of advances in theory and understanding. The second and much larger part of the book, divided as before into ten chapters, describes a huge number of individual transformations with fairly detailed coverage from a synthetic, and sometimes mechanistic, viewpoint, and contains the multitude of references to the original literature which make the book such a valuable resource. The last ten chapters have clearly been extensively updated. There are now many references from the 1990s; the claim (which I have not attempted to verify but find very credible) is that 25% of the 20000 citations are new in this edition. The increase from under 1500 pages to nearly 2100 pages demonstrates the breadth of increased coverage. In view of this expansion it is a relief to find that the overall size of the book is, if anything, slightly smaller, despite the hard covers. The thin paper seems to stand up well enough to repeated handling, and to be sufficiently opaque. A minor organisational change is the removal of the references from the foot of each page to the end of each chapter. The index has been considerably improved, although gaps are still sometimes apparent (see below).

The updating process has concentrated on the citations and transformations to the near exclusion of all else. A number of old-fashioned practices have thus been retained, including the use of rectilinear structure drawings with dashed (not hashed) bonds to show stereochemistry. Despite editorial claims of "updated illustrations of molecular structures" they look very old-fashioned to my eyes. Such drawings will disappoint those of us who labour to inculcate modern practice and realistic molecular shape representations into our students. Various minor errors from previous editions are still not corrected (see for instance schemes on pp 459, 777, etc.). The section on computerised searching has apparently not been updated at all. At ten years old this section now looks antediluvian, and might have been better removed altogether. The most serious problem of all, however, is new to this edition and widespread throughout the book. While retaining the Germanic (and practical) use of the line to represent an electron lone pair, Michael Smith has changed from charge-signs-in-circles (used in virtually all cases of potential ambiguity in the 4th edition) to straightforward unringed signs for all charged atoms. The simple dash – is therefore serving two purposes, frequently on the same atom. A carbon atom with two identical bars, one representing a lone pair and the other a negative charge, is a frequently used piece of symbolism unnecessarily confusing for the inexperienced new post-graduate students at whom the book is aimed.

In reviewing a book of this size and generality I make no apology for using my areas of specialist knowledge and interest to explore the breadth, depth, and accuracy of coverage. A number of new and greatly expanded sections illustrate, for example, the increase in transition metal mediated transformations in

Summary Review

range: * very poor to ***** excellent

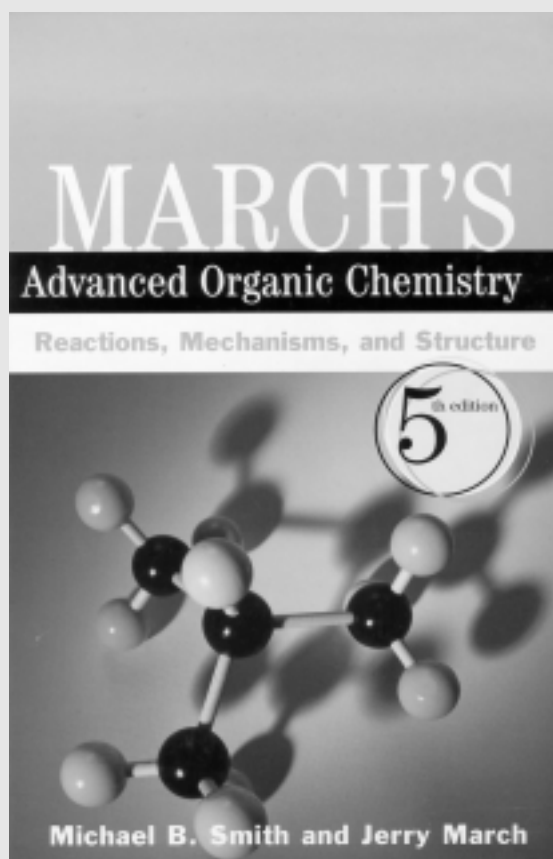
Academic content	*****
Usefulness to student	****
Usefulness to teacher	****
Meets objectives	*****
Accuracy	***

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September 2001

March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure

everyday organic synthesis. Reactions which have received most welcome new or expanded coverage include alkene metathesis (pp 1457-9), the Pauson-Khand synthesis of cyclopentenones, Tebbe and Petasis alkylidenation, and Hartwig-Buchwald arylation of amines.

the field is now simply too large for adequate coverage by a single volume and a small team, but "March" will still provide a useful introduction, and an immensely valuable source of primary references, provided its limitations are recognised by users.



From the publisher...

March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure 5th Edition

Michael B. Smith & Jerry March

New to this Fifth Edition:

- Michael Smith from the University of Connecticut joins as co-author for the Fifth Edition
- Contains 20,000 valuable, selected references to the primary literature-5,000 new to this edition
- 40 entirely new sections covering the most important developments in organic chemistry since the previous edition
- Updated illustrations of molecular structures

0471585890 2112pp 2001 £55.95

Unfortunately the first of these (at least) also illustrates a disappointing increase in the number of errors and omissions. No post-1995 review of alkene metathesis is cited, although citations elsewhere reach 1999. Although homogeneous ruthenium complexes are stated to be "the most common" catalysts, no formula or structure of any such complex is given, and the references listed for the catalysts are inappropriate. The insertion of the new text into unmodified sections of the old leads to the erroneous impression that ring opening metathesis of functionalised alkenes is impossible with "most of the common catalysts", which is certainly no longer the case; and at least one sulfonamide is referred to as an "amide". The coverage of samarium iodide as a reagent also appears rather patchy, with no indexed mention of SmI_2 in connection with pinacol coupling or the Barbier reaction, for example, but closer inspection reveals this to be a failing in the index rather than in the text. These few areas on which I have commented are not necessarily representative of the whole, but have left me simultaneously impressed by the breadth, and disappointed with the standard, of coverage. Perhaps

A book of this size will inevitably include numerous minor errors (although perhaps more could have been eliminated) and idiosyncrasies. Apart from the duplicate symbols already referred to, however, the latter are in fact admirably few and unobtrusive (especially if one does not work on 1,3-dipoles). Much excellent work has been done to leave "March" at the head of its field for post-graduates requiring a compact and relatively affordable paper source of references to the original literature, well organised and fairly comprehensively indexed. In summary, then: go out and buy the new edition, but caveat emptor.

Medicinal Chemistry: An Introduction



Subject area

Biochemistry.

Description

This is a student-friendly overview of medicinal chemistry aimed at second year and higher undergraduates.

Authors

Gareth Thomas.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000.

ISBN

0-471-48935-2.

Level

Undergraduate.

Price

£27.50 (www.wiley.co.uk and www.amazon.co.uk).

Alison Rodger
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August 2001

Medicinal Chemistry: An Introduction by Gareth Thomas is precisely what the title says; it is a student-friendly overview of medicinal chemistry. It is aimed at second year and higher undergraduates and in general it hits this level well. The content of the book aims to be a fairly comprehensive coverage of medicinal chemistry in 539 pages including indexes etc. This aim is achieved to a greater or lesser extent, though experts in e.g. computer aided drug design would be distressed to find their area covered in two pages including pictures.

Summary Review

range: * very poor to ***** excellent

Academic content	***
Usefulness to student	*****
Usefulness to teacher	****
Meets objectives	****
Accuracy	****

The structure of the book is good and in general logical, though in places the ordering of material is unfortunate. For example, the definition of partition coefficient is well after an extensive discussion of Hansch analysis. The text is well written and easy to read, the summaries at the end of each chapter are helpful. The end of chapter problems are just what the lecturer for courses needs. Some more numerical problems would be an advantage in a subject where ultimately a lot of the work is quantitative.

The declared prerequisite level of learning for the book is chemistry at level one of a life sciences degree at university. Much of the book would in fact be accessible with a school level of chemistry. However, the author does slip into using jargon that is not explained anywhere in the book and may or may not be comprehensible to a dictionary-less reader, for example hypotonic and hypertonic are not indexed and I could not find them defined in the text anywhere, though they may have been buried somewhere. In general the indexing and cross referencing within the book leaves a lot to be desired and it is unrealistic in my experience to expect students to read a book from cover to cover, they tend to read only what they think they need to survive until tomorrow.

The proof reading standard is high, but some aspects of the book need reworking to reach a higher level of accuracy. For example, equation 2.3 uses logP whereas the extended form in equation 2.17 used P and both are attributed to Hansch. The latter is almost certainly not intended since the table of examples used pi which is a logarithmic function of P.

Medicinal Chemistry is certainly a text I would choose to teach from for undergraduates. It fills a unique niche in the market place. Unfortunately the subtitle 'An Introduction' is all too accurate and it is probably limited to the undergraduate audience though is very close to being a superb starting MSc or PhD text. The phrases that came to mind repeatedly when I read it were 'over-simplistic', 'I wonder what the references for that were?', 'where in the book can I find complementary material to this?', 'is that term defined anywhere?' A particular example of this is that ultracentrifugation is not in the index though there is an appendix defining S in terms of s, which is not defined anywhere that I could find. The AIDS appendix refers to retroviruses without a cross reference and the one index reference to that topic goes to page 141 which has no mention of the subject, perhaps p 415 would have been more appropriate. Sadly there are only a few of the most general references given at the end of the text, so the intriguing facts and the general information in the text cannot be used as a springboard into the area of medicinal chemistry at a post graduate level.

So in general I would recommend the book for students and as a teaching aid, but do not expect to use it seriously beyond the undergraduate level. Before walking out of a shop with your copy also check that all the pages are present. One of my two copies has pages 293-324 missing and some repeated ones to make up the difference.

Molecular Symmetry and Group Theory



Subject area

General chemistry.

Description

This book presents a programmed introduction of group theory to chemical applications.

Authors

A. Vincent.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

1998/2nd Edition.

ISBN

0-471-48939-5.

Level

Undergraduate.

Price

£16.99 (www.amazon.co.uk).

£18.99 (www.wiley.co.uk).

Understanding the symmetry of molecules denotes an important instrument to tackle fundamental problems in chemistry, biology, and astrophysics. Alan Vincent's book 'Molecular Symmetry and Group Theory' has selected an amiable recipe to introduce this intrinsically complex topic to undergraduate students of chemistry. Rather than accentuating the mathematical foundations of group theory, the author takes the reader through a systematic series of carefully designed problem sets emphasizing on truly chemical problems

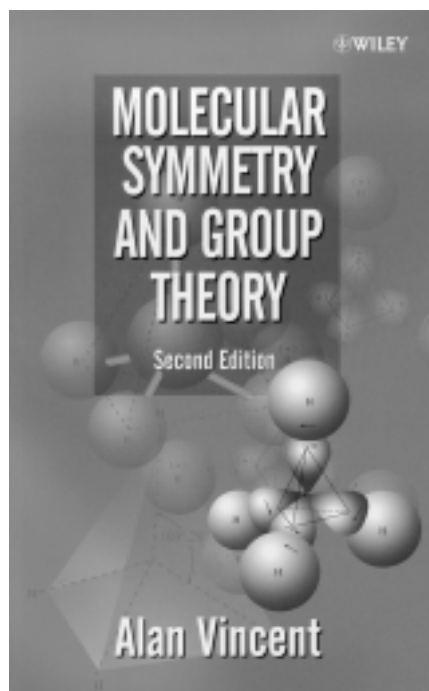
Summary Review

range: * very poor to ***** excellent

Academic content	****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

The textbook presents a programmed introduction of group theory to chemical applications and is divided into eight carefully selected chapters, which can be

grouped into two main divisions. Each chapter commences with a list of learning objectives, compiles the prerequisites necessary to get started, and plunges then into the programme section. The first sections expose the basic tools, which are essential to apply group theory to chemical topic. Symmetry elements and symmetry operations are lectured comprehensively assuming only basic knowledge of the shapes of simple molecules. Hereafter, a systematic classification of molecules into point groups is addressed, and degenerate and non-degenerate representations together with simple matrix algebra are taught. This sets the stage to apply molecular symmetry in connection with group theory to chemical bondings (hybrid orbitals and linear combinations of atomic orbitals to construct molecular orbital correlation diagrams). The final chapters are devoted to molecular vibrations, outline the infrared and



Raman activity of normal modes, and 'visualize' combinations of bond vibrations and stretching modes of a molecule.

Since the book is designed in a modular way, students can learn at their own pace and check their progress gradually. In particular, the mathematical background necessary to solve the problem sets is presented exceptionally clearly; this goes well beyond any conventional treatment of group theory, which ordinarily relies heavily on mathematics. Once the programs have been completed successfully, the more interested reader is referred to increasingly advanced literature in the appendix. This skilful presentation makes this textbook a 'must' for every undergraduate student coming in first contact with symmetry, spectroscopy, or group theory.

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August 2001

Physical Biochemistry: Principles and Applications



Subject area

Biochemistry.

Description

The purpose of this book is to bridge the gap between general biochemistry textbooks and more specialist monographs.

Authors

D. Sheehan.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000.

ISBN

0-471-98663-1.

Level

Undergraduate.

Price

£35 (www.wiley.co.uk and www.amazon.co.uk).

This is not a bog-standard textbook on physical biochemistry. The cover notes make it clear that its purpose is to bridge the gap between general biochemistry textbooks and more specialist monographs covering particular techniques. As such, it clearly runs the risk of falling between two stools, a problem exacerbated by its being targeted at both undergraduates and postgraduates.

While the book could be used with advantage as an undergraduate text on a physical biochemistry course, it lacks some of the 'hooks' commonly associated with mass-market student texts. There is, for example, no use of colour, no end-of-chapter quiz and relatively few worked mathematical examples (not to mention the absence of the almost obligatory CDROM or website!). Indeed, the author espouses a positive desire to keep mathematical content to an absolute minimum rather than, say, showing how practising biochemists might apply such methods to advantage. Some teachers (and students) will regard this attitude as a boon, allowing a better flow of ideas than might otherwise be the case. Others will have misgivings. Teachers considering adopting the book as a course text would do well to compare it with its more conventional brethren and perhaps to note that additional titles in this area are due for publication soon. The reviewer is tempted to note that the book is relatively inexpensive compared to others but suspects that it will still exceed the pocket of many students and thus more likely be a library purchase. In this guise it has considerable merit.

As far as postgraduates are concerned, the book provides a good overview of the basic principles and applications of physical biochemistry but does not pretend to provide the depth needed to master any one technique at a research level though references to more specialist texts and websites are provided. It is, however, sometimes a problem with research students that their focus becomes too narrow and this book provides a useful opportunity to broaden horizons, not least for those coming to a project without a strong background in this area. Ultimately, if it were possible to identify the optimal niche market for the book, it would probably be at the level of a taught Masters course. While this might seem fanciful, the author makes it clear that he has the needs of 'in-vogue' post-genomics areas such as proteomics very much in mind: students wishing to gain enlightenment as regards acronyms such as MALDI and TOF will find concise explanations here.

The book does not claim to be exhaustive in terms of its coverage but it does a good job in synthesising a wide range of topics into its eight chapters. The Introduction provides an overview of the book as well as covering fundamental issues such as pH and temperature effects, buffers and SI units. Thereafter the book devotes individual chapters to:

- Chromatography (includes diverse modes, open-column, HPLC, FPLC, perfusion and membrane-based chromatography systems, and a sample protocol),
- Spectroscopy (includes UV/visible, fluorescence, CD, LD, IR, NMR, ESR, use of lasers),
- Mass Spectrometry (includes applications to proteins/peptides and DNA, interfacing to other methods such as LC/MS, GC/MS),
- Electrophoresis (includes denaturing/non-denaturing PAGE, DNA sequencing gels, IEF, 2-D, use with antibody, PFGE, capillary, blotting and electroporation),
- Protein Structure Determination (includes NMR, X-ray diffraction, electron density maps, neutron and electron diffraction, comparison of NMR and X-ray, structural databases),

Summary Review

range: * very poor to ***** excellent

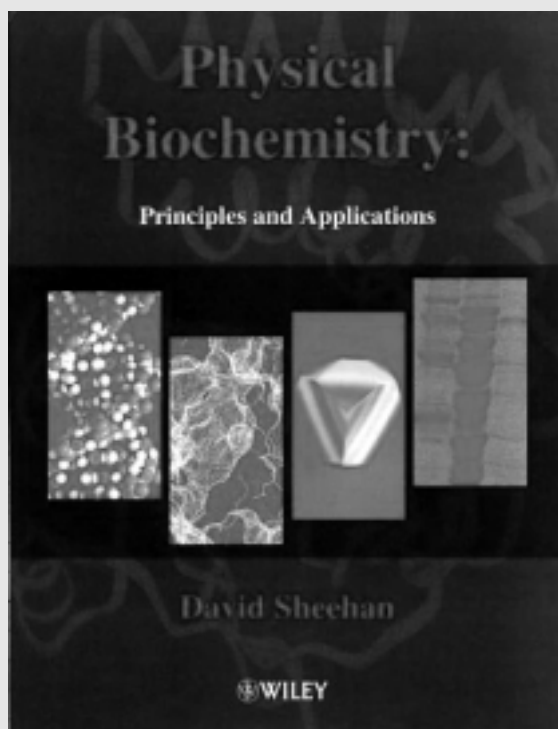
Academic content	****
Usefulness to student	****
Usefulness to teacher	****
Meets objectives	****
Accuracy	****

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August 2001

Physical Biochemistry: Principles and Applications

- Hydrodynamic Methods (includes centrifugation, ultra-filtration, flow cytometry)
- Biocalorimetry (includes Isothermal Titration Calorimetry, Differential Scanning Calorimetry and determination of thermodynamic parameters by non-calorimetric means).

from reference to the (suitably emboldened) term 'purification table' in the Chromatography chapter without an example or indication as to how one is constructed. I examined a few of the websites listed and all I tried were still current though it would probably be useful for the publisher or author to track these over time via a central repository.



From the publisher...

Physical Biochemistry: Principles and Applications

David Sheehan

An accessible and easy-to-read text for students requiring a broad overview of the key techniques used to characterise the structure and function of complex biomacromolecules such as proteins and DNA. It bridges the gap between general biochemistry textbooks and the more specialist texts covering individual techniques. Topics covered include chromatography, spectroscopy, mass spectrometry, electrophoresis, X-ray diffraction, centrifugation and biocalorimetry. New developments are placed in context by describing the physical principles on which they depend, examining the range of biophysical applications most widely used and, emphasising the overall similarities of experimental approach. Written by a biochemist with extensive teaching experience, the book:

- describes the advantages and disadvantages of each technique and compares one technique to another;
- introduces experimental approaches in a non-mathematical way, using practical examples; and
- provides a bibliography, including useful web sites, at the end of each chapter.

0471986631 368pp 2000 £35.00

Each chapter starts with a summary of objectives followed by the theoretical principles before going on to particular techniques. Where alternatives exist, there is generally some discussion of relative merits. Key terms are emboldened and a particularly useful feature are many 'boxed' examples showing how techniques have been applied in actual published research. There are a large number of useful illustrations though relatively few plates. The book concludes with brief appendices on SI Units and Fourier Transforms, followed by a good index.

Generally speaking, the book is well-written apart from the occasional overlong sentence and minor typographical error. It is necessarily condensed and I sometimes wondered whether students would gain much, for example,

To summarise, the book is a useful compendium of physical biochemistry principles, techniques and applications. Notwithstanding my reservations about its target audience, it achieves its objectives in providing a channel for those interested in a broader and better understanding of physical biochemistry in the context of current and emerging application areas. It should do well.

Physics Student Study Guide



Subject area

General Physics.

Description

This is an A4 style study guide to accompany the text of the same name, written by two of the authors, and including a disk giving access to further, animated, examples via the Web.

Authors

Mark J. Comella, John D. Cutnell and Kenneth W. Johnson.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2001/5th Edition.

ISBN

0-471-35582-8.

Level

A-level, access.

Price

£27.92 (www.amazon.co.uk).

£29.95 (www.wiley.co.uk).

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September 2001

This text and accompanying disk are intended to provide support to US college students following a first course in general physics. The authors themselves stress that it is to be used as a resource after reading the text by the same name, written by two of the three co-authors of the guide.

Not having access to the text¹ I can only comment on the content of the support guide which appears to work well towards helping students understand concepts and develop their ability to solve problems. Given that the intended audience is US college students the content is more closely in line with the UK Advanced level physics syllabi, however this would also make it accessible to access or foundation students who are following a general physics course.

The text is made up of 32 chapters each of which follows the same format of Preview which gives a brief synopsis of the chapter, Quick reference which gives a glossary of terms and states the equations used, Discussion of selected sections which gives further notes and examples on the main chapter topic(s) and Practice problems which obviously provides opportunities for students to 'have a go' but also provides detailed solutions rather than simply answers.

The disk supplied with the text allows quick and easy access to a variety of Web based materials including additional tutorial problems and simulation exercises.

The text is calculus free and a student following this text should only need some basic algebra and trigonometry in order to follow the examples given. The level of physics required to proceed with this text is kept to a minimum and the concepts developed through the chapter - a good GCSE student in the UK could follow much of the material. The A4 format with a fair amount of white space and sensible use of language makes it easy to read, especially if used alongside lecture notes and the main text.

In terms of the content covered by the text however, I found it rather traditional, indeed I was taken by the similarity, with the exception of relativity and the quark model, of this text and my own A-level course book² of the mid-seventies.

I also have a problem with the use of units in this text. Why make a student take on SI, cgs and BE units in both the examples and practice problems? I certainly think UK students and tutors would be thrown by measuring mass in slug and force in pound or dyne.

On occasions I felt that the 'definitions' (in the glossary of the Quick reference section of a chapter) might lead to some confusion amongst students, e.g. , moment of inertia of an object is defined as "A rotational quantity which plays the same role as mass in linear motion". Whilst the equations for rotational and linear Kinetic Energy have similar form, $KE_{rot} = \frac{1}{2} I\omega^2$ and $KE_{lin} = \frac{1}{2}mv^2$, and I can be considered to be a constant of proportionality between Torque and angular acceleration in the way that mass can be considered a constant of proportionality between Force and linear acceleration, I feel that this is different from 'playing the same role'.

Summary Review

range: * very poor to ***** excellent

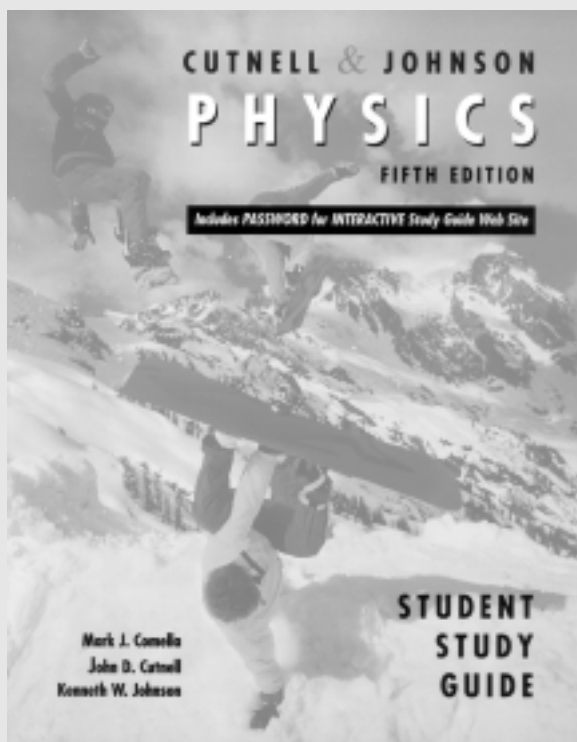
Academic content	***
Usefulness to student	***
Usefulness to teacher	***
Meets objectives	****
Accuracy	*****

Physics Student Study Guide

The random selection of problems that I attempted gave the text book answers and I would therefore argue that in this respect the text had been well proof read.

References

1. Cutnell, J. D. and Johnson, K. W., Physics Fifth Edition, John Wiley and Son, 2001
2. Nelkon, N. and Parker, P., Advanced Level Physics Third Edition, Heinemann Educational Books, 1970



From the publisher...

Physics Student Study Guide

5th Edition

John D. Cutnell & Kenneth W. Johnson

Clear concepts, sound reasoning skills, and real-world applications! Cutnell and Johnson offer numerous learning tools, problems, and real-life applications that will involve readers and make difficult concepts easier to understand.

0471355828 432pp 2001 £29.95

Given the problems of units and the need for a core text or lecture notes I am not sure how this text would work with a UK audience. Since the content is covered, in a less traditional way, to the same depth in GCE A-level texts, e.g. Duncan³, then with the exception of the detailed solutions a student may be better directed to such a text.

The Web based material is a very useful addition but I was able to reach all the resources by following the links from; <http://www.wiley.com/college/cutnell> without the need for a password, which is supplied with the text. These are worth a look for instructional and self-study purposes especially the simulation exercises.

3. Duncan, T., Advanced Physics Fifth Edition, John Murray, 2000

Physics: Volume 1



Subject area

General physics.

Description

Volume 1 of a 2 volume set.

Authors

Robert Resnick, David Halliday and Kenneth S. Krane.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000/5th Edition.

ISBN

0-471-32057-9.

Level

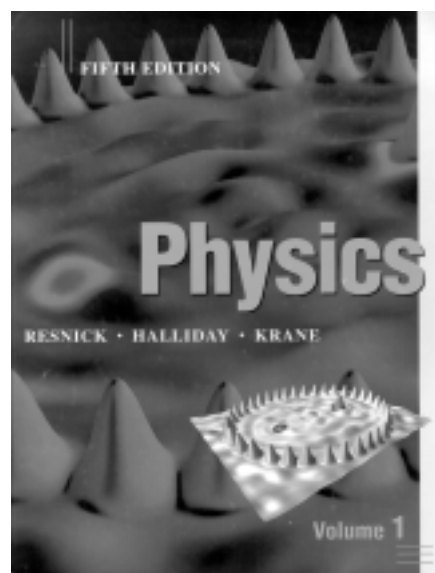
Undergraduate.

Price

£29.95 (www.amazon.co.uk).

This is the latest edition of a series that began in 1960 as “Physics for Students of Science and Engineering”. This volume, the first of two, covers kinematics, mechanics and thermodynamics.

The book covers all the “standard” topics you would expect, but presents energy and energy conservation only after a full study of vector mechanics and momentum conservation. Other notable changes from the previous edition are that vectors are presented when needed, rather than in their own chapter and the modern physics topics that were sprinkled throughout the early chapters and labelled “optional” have been consolidated into separate chapters (most of which are in Volume 2).



Krane is somewhat denser than its counterpart; it is also two colour throughout in contrast to the technicolour splash of HRW. This book covers the same number of topics in approximately the same number of pages as in HRW (570) but the larger page size and denser format mean a greater depth of material is presented.

There is no doubt that this is a detailed and complete text. Its usefulness and applicability are called into question on purely economic grounds; the cost of this single volume is comparable to “complete” physics texts, such as HRW and Cutnell and Johnson².

References

1. Halliday, D., Resnick, R. and Walker, J., Fundamentals of Physics, 6th Ed, Wiley, 2001.
2. Cutnell, J.D. and Johnson, K. W., Physics, 5th Ed, Wiley, 2000.

Summary Review

range: * very poor to ***** excellent

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	****
Accuracy	*****

There is a section of problems at the end of each chapter that is devoted to multiple choice questions. This increased profile is welcome; it is a method of assessment used widely in teaching introductory Physics. The multiple choice questions often test broad concepts, but a serious omission is that the solutions are only available in the accompanying Instructor’s manual. Many of the end of chapter exercises are very similar (even identical) to those found in the “Fundamentals of Physics” book by Halliday, Resnick and Walker¹ (HRW).

In fact, it is difficult to review this book entirely objectively without the shadow of HRW looming. The style of Halliday, Resnick and

Principles of Physical Chemistry



Subject area

Physical Chemistry.

Description

This book is an introduction to physical chemistry. It covers the main aspects of quantum mechanics, thermodynamics, statistical mechanics, kinetics and chemical equilibrium.

Authors

Hans Kuhn and Horst-Dieter Forsterling.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000/1st Edition.

ISBN

0-471-96541-3.

Level

Undergraduate.

Price

£29.95 (www.wiley.co.uk and www.amazon.co.uk).

P. Mark Rodger
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August 2001

When I first read the foreword to this book, I was very encouraged to read the attitude from which the book had been written. There is a need for a book on Physical Chemistry that starts from the fundamental principles and shows how all of Physical Chemistry follows, rather than adopting the more historical and traditional developments that often fail to inspire the current crop of students. Unfortunately, having read further I fear that this book will fail to fill this niche - at least as far as students are concerned.

Summary Review

range: * very poor to ***** excellent

Academic content	*****
Usefulness to student	**
Usefulness to teacher	*****
Meets objectives	**
Accuracy	*****

The book covers most of the traditional areas of physical chemistry. There are 10 chapters covering quantum mechanics. These are particularly comprehensive on electronic structure, but rather brief on quantum oscillators and vibrators. This is followed by 6 chapters on statistical mechanics and thermodynamics, four chapters on equilibria (including pH and equilibria) and a final four chapters on kinetics and applications to increasingly complex systems (including crystals, interfaces, membranes, enzymes). The book claims to provide alternative paths through the 24 chapters, and not to require the reader to commence at chapter 1, but I found that to start anywhere else will feel like being thrown in at the deep end.

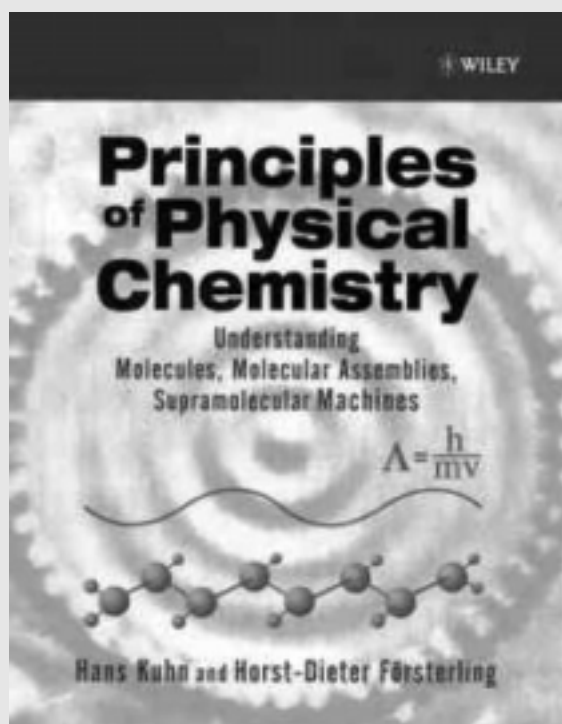
The approach of the book is unashamedly to start with the theory and derive the applications. For the quantum mechanics the result is non-traditional and reasonably enlightening, with a rather extensive use of the particle-in-a-box to explain many of the applications (even down to the orbitals of O₂) and none of the traditional historical chronology to explain and justify the need for quantum mechanics. The result is least successful for the thermodynamics where the authors' have made a point of developing the ideas of statistical mechanics before addressing thermodynamics and using statistical mechanical ideas continually to explain the thermodynamics; I fear that the resulting explanations will tend to obscure rather than clarify the thermodynamics for many readers. Sections on equilibria and kinetics are reasonably traditional in the method and material covered, although the authors have produced a number of interesting applications to add interest.

The main problem with this book is that it is aimed at a very specialist market: those who already have a firm grasp of physics, but are very new to chemistry. One example that serves to illustrate this point is that the precepts of general relativity and concepts such as rest mass are treated as assumed knowledge in chapter 1, but it is deemed necessary to re-explain in chapter 7 the meaning of dashes for bonds in structural formulae. In keeping with this, the book has a very strong emphasis on rigorous application of mathematics that some students will find helpful, but that will alienate most current undergraduate chemistry students. In many cases, this mathematical emphasis is on numerical accuracy of the theory rather than on the general principles that might flow from the theory. For example, one focus of the repeated use of the particle-in-a-box model is to show that simple models can give good predictions of energies and other properties associated with molecular states. However the authors have implemented the model variationally - sometime deriving, sometimes simply quoting the values for the variational parameters - and this tends to obscure the principles being developed. The stress on numerical accuracy is accompanied by a lack of discussion of more generic and transferable features of the problems, such as inherent degeneracy of the states, whether the energy levels are divergent or convergent, or the existence of a continuum.

Principles of Physical Chemistry

While this book will not capture the undergraduate market for introductory Physical Chemistry, it is a worthwhile book with a lot to teach those who are teaching the introductory Physical Chemistry. The book has a novel, bottom-up approach to developing its topics that will give potential

understand a wide range of chemical and biochemical phenomena. While I do not see this book making it onto the undergraduate reading lists, I can recommend it as good reading for anyone engaged in teaching physical chemistry to undergraduates.



From the publisher...

Principles of Physical Chemistry: Understanding Molecules, Molecular Assemblies, Supramolecular Machines

Hans Kuhn & Horst-Dieter Försterling

“This admirable text provides a solid foundation in the fundamentals of physical chemistry including quantum mechanics and statistical mechanics/thermodynamics. The presentation assists the students in developing an intuitive understanding of the subjects as well as skill in quantitative manipulations. Particularly exciting is the treatment of larger molecular systems. With a firm but gentle hand, the student is led to several organized molecular assemblies including supramolecular systems and models of the origin of life. By learning of some of the most productive areas of current chemical research, the student may see the discipline as an active, young science in addition to its many accomplishments of earlier years. This text makes physical chemistry fun and demonstrates why so many find it a stimulating and rewarding profession.”

Professor Edel Wassermann, President (1999) of the American Chemical Society

0471965413 998pp 1999 £29.95

lecturers pause for thought about the way they present their material. The book also has a number of excellent and unusual applications that can be used to spice up lectures. This is particularly true of the later chapters, that deal with biomolecules, macromolecular chemistry, ordered structures and self-assembly. Indeed, I think the best aspect of this book is the breadth of interesting and unusual applications to which it puts the physical chemistry and the way it shows how rigorous physical chemistry can be used to

Radiation Detection and Measurement



Subject area

Physical Science.

Description

A text covering radiation/nuclear science (e.g. radiochemistry, nuclear physics).

Authors

Glenn F. Knoll.

Publishers/Suppliers

John Wiley & Sons, Inc. John Wiley and Sons, Ltd. (www.wiley.co.uk).

Date/Edition

2000/3rd Edition.

ISBN

0-471-07338-5.

Level

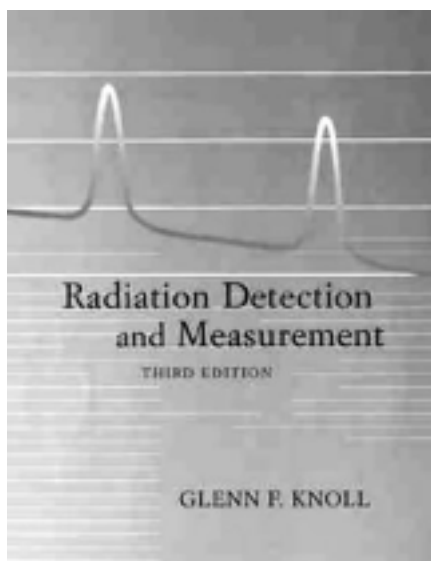
Undergraduate, research level.

Price

£39.95 (www.amazon.co.uk).

The purpose of the book is two fold: as a text book for undergraduate students studying their first and subsequent courses in nuclear instrumentation and ionizing radiation detection; and also as a comprehensive reference tool for any scientist or engineer actively involved in radiation measurements. In my opinion, it easily meets both of these objectives. The material covered gives a complete description of all the well-established detection and spectroscopic methods used for the measurement of radiation, including many recent developments and applications. The presence of a good index allows the book to be easily used as a reference source.

The book is written in a very clear, easily readable, style, with good explanations and simple examples to illustrate the concepts being discussed. It is well illustrated and referenced, giving the reader ample opportunity to further explore specific areas of interest.



Summary Review

range: * very poor to ***** excellent

Academic content	*****
Usefulness to student	****
Usefulness to teacher	****
Meets objectives	****
Accuracy	*****

Since this book provides an in-depth coverage of the basic principles of radiation detection, little previous knowledge in this field is required, and consequently, the book can be readily utilised as a 'stand-alone' text. However, although I believe this book to be an excellent teaching tool, I think it is perhaps a little too comprehensive for the average student to digest: a selected reading approach would be highly recommended!

Although each chapter contains a good selection of problems for students to get their teeth into, I found the lack of answers a little disappointing. This is a shame, as I think it will deter many keen students from working through the problems on their own initiative.

On balance, I think this is a truly excellent teaching and reference tool, and I strongly recommend it to anyone needing to detect or measure ionizing radiation. Granted, this area is rather specialised, and not surprisingly there has always been a paucity in relevant texts. However, there is a need for such material, and this is one of the most comprehensive books in the field I have come across for a long while.

Belinda Colston
Department of Chemistry
De Montfort University
The Gateway
Leicester
LE1 9BH
October 2001

Derive 5



Subject area
Mathematics.

Description
A mathematical assistant for the PC.

Authors
Bernhard Kutzler, Albert D. Rich,
Theresa M. Shelby and David R.
Stoutemyer.

Suppliers/Distributors
Texas Instruments Incorporated.
In UK from Chartwell-Yorke,
114 High Street, Belmont, Bolton,
Lancashire, BL7 8AL.
(www.chartwellyorke.com).

Date/Version
2001/Version 5.04.

Level
A-level, access, first-year
undergraduate.

Type of package
Utility.

Price
£49.

Hardware required
A PC capable of running Windows.

Software required
Windows.

Derive 5 is one of many programs available for doing mathematics on a computer: it is hard to avoid comparing it with other so-called 'computer algebra' systems such as Mathematica, Mathcad and Maple. Of course, computer algebra is just one aspect of what all these programs offer: they embrace algebra, differential and integral calculus, numerical calculation, and graphics. Derive has been around for a long time, and appeared first as an MS-DOS program with very modest requirements in terms of disk space and RAM. It has grown since then into

a Windows program with enhanced capabilities and an improved user interface, yet without becoming as bloated as much Windows software: it only needs about 3 megabytes of disk space, and if you have enough memory to run Windows you have enough memory to run Derive 5. It is a 32-bit program, so it needs Windows 95, 98, Me, NT or 2000, and will not run under Windows 3.1.

Users of other Windows mathematics packages, and indeed of Windows programs in general, may find the Derive 5 user interface less than intuitive. It has about it a strong hint of an interface that has not fully shaken off its MS-DOS roots. When Derive 5 is first started, it opens a window with the familiar Windows pull-down keywords at the top, a toolbar below which includes icons for differentiation, integration and graphics (initially greyed out), a large empty pane (the Algebra window), a one-line Expression Entry window, and finally palettes of greek and mathematical symbols. That one-line Expression Entry window is the letter-box, as it were, through which the user posts mathematical expressions: Derive 5 will then display the expression in the Algebra window using a monospaced, single-sized typeface, looking like a typewritten manuscript rather than a typeset sheet. The basic mathematical operations of simplification, taking a limit, integration and summing are then available on the toolbar, and selecting them brings down appropriate additional choices such as definite or indefinite integrals.

Once one has got used to Derive 5's scheme, it soon becomes second nature to type an expression on the Entry line, transfer it to the algebra window, and then operate on it. The 277-page manual provides a very good introduction to the program, and is entirely suitable as a teach-yourself guide. Derive 5 is quite forgiving, automatically converting an entry such as $\tan(x)$ to $TAN(x)$ to refer to its built-in function, and its error messages are clear. Vectors, matrices and complex numbers are all handled gracefully. Solvers are included for algebraic and differential equations, algebraically or numerically, and symbolic solvers for differential equations. Plots of functions are only a couple of mouse-clicks away, so that students can easily check that the correct number of solutions has been found, or explore functions interactively. That 'couple of' is significant: although clicking the plot icon above the Algebra window opens a plot window, it does not also plot the graph. One has to select Insert Plot, click the Plot icon, or press the F4 key, once the Plot window is open: this is disconcerting initially. At first a new window is opened for the plot, overlaying the Algebra window, but the graphs can also be embedded in the Algebra window: this, together with embedded text, allows the user to produce documents that flow and are entirely readable. Three-dimensional plots are also straightforward to produce, and can easily be viewed from different positions or made to spin round.

Summary Review

range: * very poor to ***** excellent

Ease of use	***
Ease of learning	***
Documentation quality	*****
Academic content	****
Usefulness to student	***
Usefulness to teacher	***
Portability	****
Meets objectives	***
Accuracy	*****

Tony Harker
Department of Physics and
Astronomy
University College London
Gower Street
London
WC1E 6BT
October 2001

Derive 5

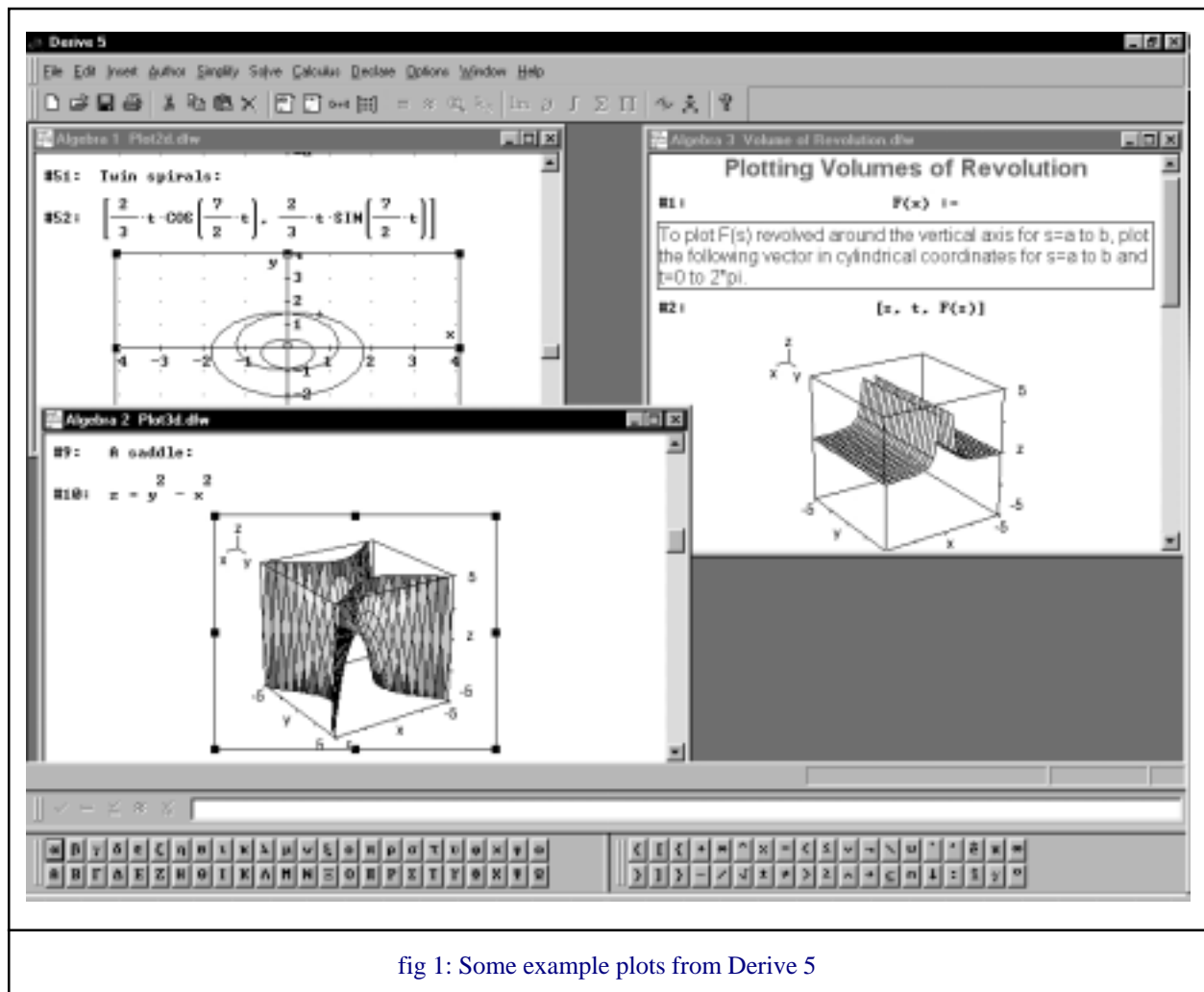


fig 1: Some example plots from Derive 5

The mathematics in Derive 5 is extensive, and includes a library of special functions that should satisfy most needs. It should be noted, though, that the more advanced functions are present only in forms that return numerical values, and symbolic derivatives and integrals cannot be taken. For a program that claims to be suitable for pre-university students, one of the results Derive 5 returned was a little unexpected. The value returned for the indefinite integral of x^n was $(x^{n+1} - 1)/(n+1)$ with the default (zero) constant of integration, and the corresponding result for x^n was even more confusing. The results are correct, of course, but could be unhelpful for a student using Derive 5 to check simple results.

Derive 5 is much richer and more versatile than it at first appears. By default, in fact, many advanced options are turned off so that the beginner can produce results with a few simple operations. For example, only a single font can be used in text boxes until the Formatting Toolbar is turned on, to allow the usual Windows control over fonts and styles. Reasonable programming capability is built in, though the Expression Entry window is not ideal for entering long sequences of commands.

Overall Derive 5 is a powerful package, but it has not kept up with its competitors. Its user interface seems restrictive to a hardened Windows user, and the form in which it returns symbolic results could be confusing to beginners. The features that are new in Version 5, such as real-time rotation of three dimensional plots, are as good as can be found in other programs, but the time has probably come for a more radical overhaul.

Lewis Acid/Base Reaction Chemistry



Subject area

General chemistry.

Description

Book/CDROM combination to facilitate teaching/learning of Lewis Acid/Base Reaction Chemistry.

Authors

Mark R. Leach.

Suppliers/Distributors

meta-synthesis.com, 56 Downland Road, Brighton BN2 6DJ, UK (www.meta-synthesis.com).

Date/Version

1999/Version 1.0.

Level

Undergraduate.

Type of package

Computer assisted learning.

Price

£30.

Hardware required

A PC capable of running Win95/98/NT/2000 or Mac OS, 16MB RAM, CDROM drive.

Software required

Windows or Mac O/S.

Simon Bedford and Satpal Philora
Department of Chemistry
University of Bath
BA2 7AY
October 2001

The author states in the accompanying documentation that this package is of interest to undergraduate and postgraduate students preparing for a science degree, as well as teachers, lecturers and professional chemists. This claim made us a little suspicious, as it is difficult to believe any one educational product can be just as useful to novices as to those with more experience and *vice versa*. Nevertheless, we were curious to see if this approach could shed light on a subject that has always troubled and taxed learners.

The book itself has a very clear and effective layout, and begins slowly with an overview of the concepts encountered and utilised within. This is followed by an extremely thorough and systematic treatment of the possible Lewis acid/base combinations. The approach (and the basis of the whole package) is to encourage the user to think in terms of 6 types of Lewis acid, 4 types of Lewis base and hence 24 possible combination types. This is a logical and all-encompassing approach, but it may prove a little daunting for students at the early stages of a degree course. Another thing worth noting is that the text is quite dense with facts, and in order to function as an effective learning aid it would have to be read and digested in small portions. However, we felt used properly it would build a strong understanding of the ideas presented.

The accompanying poster is visually appealing, with clear diagrams depicting the 24 types of acid/base interaction in the 'Lewis Acid/Base Interaction Matrix'. It's just a pity it does contain rather a lot of information making it difficult to read. This is not helped by the fact that the text is smaller than that found in most books; hence it is more a reference chart than a positively communicative poster.

The CD on the whole, proves to be a disappointment, and we both felt it was included merely to appeal to students as part of the ever-increasing multimedia bandwagon. It comprises a tutorials section and a database section. The tutorials include an overview of the poster, revision on reaction chemistry and electronic theory, more thorough material on reaction chemistry (focusing on Lewis acids/bases) and finally an electronic version of the poster. Unfortunately, these tutorials allow for no input or interaction, consisting of pages of information which the user can navigate through by clicking on various buttons. While the information is given in a clear and easily absorbed format, it could just have easily been presented on paper and it is unfortunate that, given the potential of computers for interactive teaching methods, the creators of this software have merely produced an "electronic book". Incidentally there are a number of spelling mistakes throughout the tutorials, and we may have Mark Leach to blame when the next generation of chemists speak of the 'dipole molent' or the 'Afbau principle'.

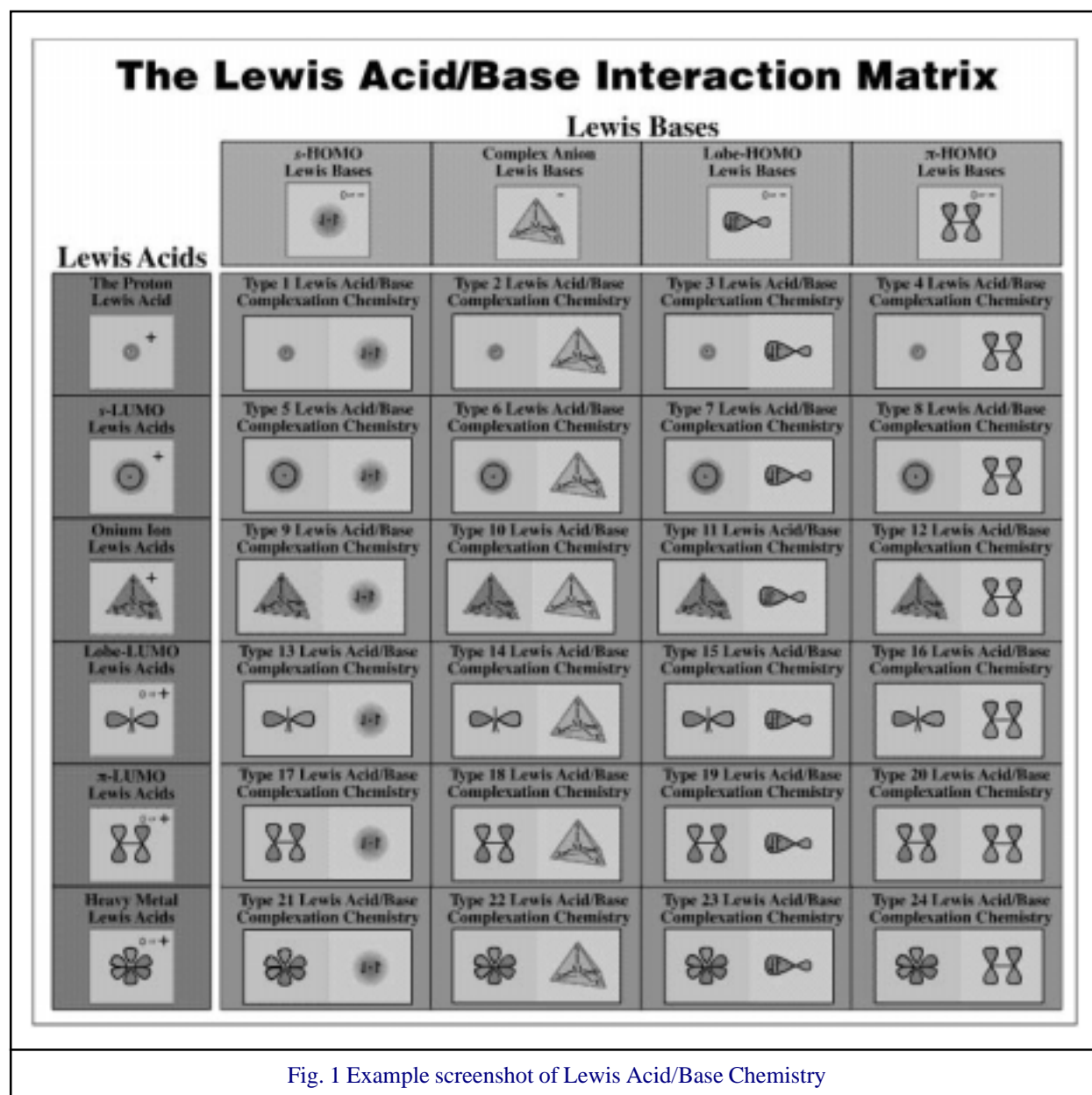
The database section comprises 3 main parts, one of which being the periodic table. The elements can be sorted in various ways, including by mass number, melting point, boiling point and atomic radius. Another database contains 2000 chemical species, which can be searched and sorted by name, formula, reactivity type etc. Finally there is a database of 1500 reactions that can be sorted by 19 fields, including products, reagents and mechanism. All of these databases are cross-referenced so clicking on a reagent while viewing a

Summary Review

range: * very poor to ***** excellent

Ease of use	****
Ease of learning	***
Documentation quality	***
Academic content	****
Usefulness to student	***
Usefulness to teacher	**
Portability	***
Meets objectives	**
Accuracy	***

Lewis Acid/Base Reaction Chemistry



reaction record will call up the properties for that reagent. There is a lot of information readily accessible by this method, but it is difficult to see how important this data will be to one trying to understand the nuances of Lewis acid/base interactions

This package would benefit immensely from closer links between the components and development of the CD, for example a system whereby the user reads a section in the book and then answers questions in an interactive program on the CD. Also, we are still unconvinced that the target market for this product is not over ambitious – perhaps focusing on just the undergraduate level, the group for which we would consider this most suited, would result in a more useful teaching tool. Modifications in this

vein would justify the inclusion of a CD, and maybe go some way towards justifying the price of what is at present a good idea, but one that has not been properly executed.

So while we might agree with the publisher's assertion that this package covers a topic that will be of interest to chemists of all levels, we cannot be sure that it will comprehensively assist their teaching/learning of it. We feel unable to recommend this package in its current state, which is a shame as there is some good material here.

LiveMath

**Subject area**

Mathematics.

Description

A computer algebra system.

Authors

Allan Bonadio.

Suppliers/Distributors

Theorist Interactive LLC.
In UK from Chartwell-Yorke,
114 High Street, Belmont, Bolton,
Lancashire, BL7 8AL.
(www.chartwellyorke.com).

Date/Version

Version 3.0.

Level

Undergraduate, research level.

Type of package

Utility.

Price

£49.

Hardware required

A PC capable of running Windows.

Software required

Windows.

Paul Yates
School of Chemistry and Physics
Lennard-Jones Laboratories
Keele University
Keele
Staffordshire
ST5 5BG
October 2001

LiveMath is a computer algebra system which attracts the attention of physical chemists in particular as they struggle to teach students whose grasp of mathematics frequently leaves a great deal to be desired. One area in which such a package has considerable potential is quantum mechanics, where the need to calculate tricky integrals tends to obscure the underlying concepts.

Installation is straightforward, although it does require the input of the longest license key I have ever seen, with corresponding opportunities for mistakes. The CD comes with a 14 page mini-manual, which is just as well as the Help system on the program I was sent appeared to have been disabled. However, this was only of limited help – for example, pressing CTRL-ALT-5 failed to produce the infinity symbol as promised.

On entering the program, a three section welcome screen appears. I found it easiest to start with a blank notebook, which is accompanied by a comprehensive palette containing most of the mathematical symbols you could imagine (see fig 1). Like most things, using this takes some getting used to but its operation does soon become second nature. For example, on choosing the definite integral symbol, the following display appears:

$$\int_{?}^{?} ? d ?$$

The question marks in this expression indicate that four pieces of information are required: the integrand, the integrated variable, the lower limit and the upper limit. Clicking on any of the question marks causes it to be highlighted, at which point the appropriate information may be entered. I liked this from a teaching point of view as a student is instantly aware of the information required, so avoids for example a missing dx.

I decided to test the program by calculating examples of a derivative and of an integral which would appear in most physical chemistry courses.

For an ideal gas dp/dV is a useful step in the determination of the overall differential dp . Choosing the d/dx symbol from the palette gave the display

$$\frac{d}{d} ?$$

where the expression to be differentiated and the variable to differentiate with respect to need to be input. This is straightforward; the program immediately displays the input nRT/V as

$$\frac{nRT}{V}$$

and converts

Summary Review	
range: * very poor to ***** excellent	
Ease of use	***
Ease of learning	**
Documentation quality	*
Academic content	***
Usefulness to student	**
Usefulness to teacher	***
Portability	***
Meets objectives	**
Accuracy	*

LiveMath

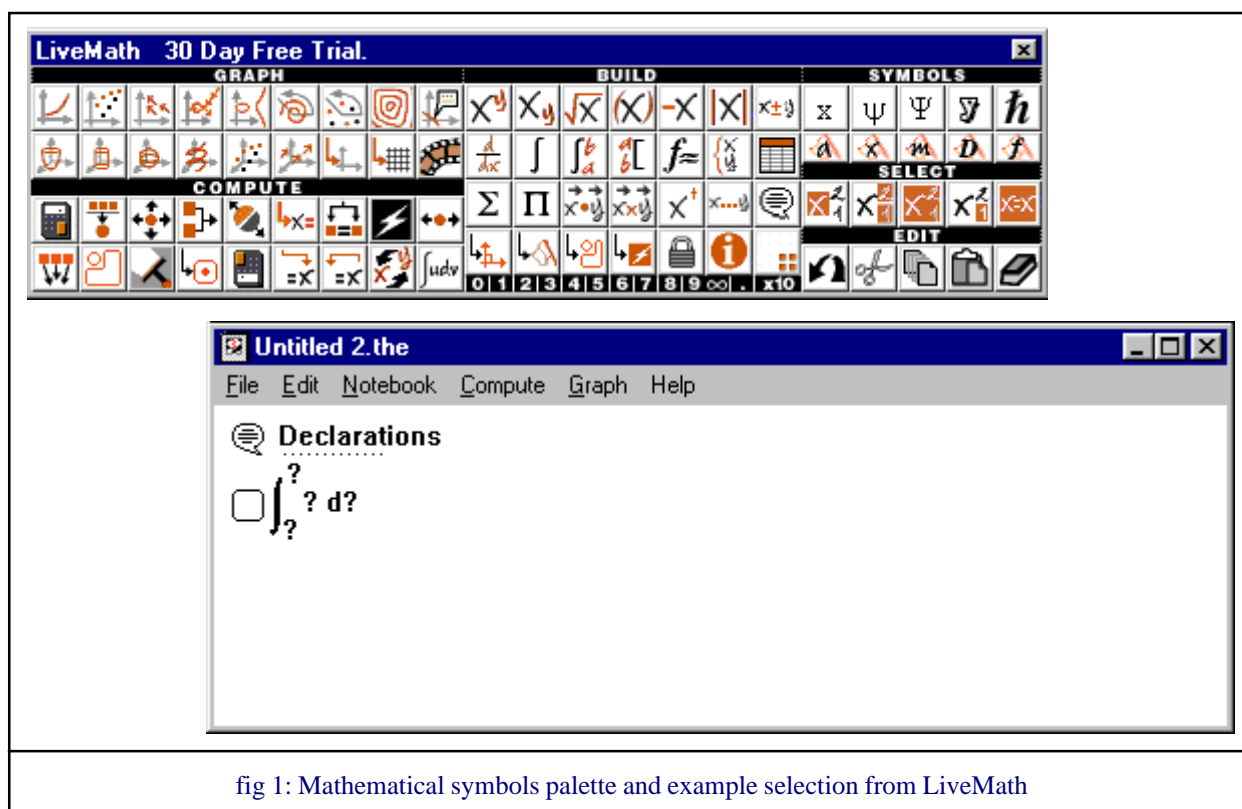


fig 1: Mathematical symbols palette and example selection from LiveMath

$$\frac{d}{dV} \quad \text{to} \quad \frac{\partial}{\partial V}$$

$$\int_{r=0}^{r=\infty} r^2 e^{-2r/a} dr$$

in recognition of the fact that this is a partial derivative. The whole expression can be highlighted, and the command Calculate chosen from the Compute menu. At this point the program queries the status of V, which is assigned as a variable, and of nRT which is assigned as a constant. It then returns the correct value

$$-\frac{nRT}{V^2}$$

for the derivative.

The integration example was somewhat more challenging. The integral

$$\int_0^{\infty} r^2 e^{-2r/a} dr$$

is required in the normalisation of the wavelength representing the lowest electronic state of the hydrogen atom. This can be evaluated using integration by parts, but we gave up trying to teach this to our students long ago. On entering this expression the program gave the answer

which is not of much use. It may be that I had made a mistake in entering the original expression, but this wasn't at all obvious and certainly wouldn't be to a mathematically weak student. I obtained similar results when attempting to evaluate similar integrals need in the analysis of the harmonic oscillator.

In conclusion, this package promised much but failed to deliver when it really mattered, i.e. in those cases where a chemistry student would find the mathematics really difficult. Personally, I will go back to using MuPad Light – it is free, and in most cases does actually perform the calculation.

MathType: The Mathematical Equation Editor for Windows



Subject area

Mathematics.

Description

Replaces Equation Editor for professionals.

Authors

Design Science Inc.

Suppliers/Distributors

Design Science Inc.
In UK by Chartwell-Yorke,
114 High Street, Belmont, Bolton
Lancashire, BL7 8AL
(www.chartwellyorke.com).

Date/Version

Version 4.

Level

Undergraduate, research level.

Type of package

Word processing, utility.

Price

£69, £59 for academic users, £35 for upgrade.

Hardware required

A PC capable of running Windows.

Software required

Not freestanding. Replaces Equation Editor in MS/Word etc.

Alan Hinchliffe
Department of Chemistry
UMIST
Sackville Street
Manchester
M60 1QD
September 2001

Perhaps, like me, you spend much of your professional life dealing with mathematical equations such as equation 1

(the wavefunction for a particle in a three-dimensional box), or equation 2 (a Maxwell equation). If so, you will have come across Equation Editor by Design Science, which is included in many packages such as MS/Word, Corel WordPerfect and Appleworks. I assume that you are familiar with Equation Editor. If not, you are probably wasting your time reading this Review. MathType⁴ is not for you.

Summary Review

range: * very poor to ***** excellent

Ease of use	*****
Ease of learning	*****
Documentation quality	*****
Academic content	no data
Usefulness to student	no data
Usefulness to teacher	no data
Portability	*****
Meets objectives	*****
Accuracy	no data

I have always found Equation Editor to be fiddly. It can take forever to build a complicated equation, and all the features you would have liked (for example,

$$\psi_{n,k,l} = \left(\frac{2}{L}\right)^{3/2} \sin\left(\frac{n\pi}{L}x\right) \sin\left(\frac{k\pi}{L}y\right) \sin\left(\frac{l\pi}{L}z\right)$$

Equation 1

many common fonts, automatic equation numbering and the ability to store frequently used equations and sub-expressions such as the

$$\partial \mathbf{D} / \partial t$$

in equation 2 just aren't there.

$$\text{curl } \mathbf{B} = \mu_0 \left(\mathbf{J} + \frac{\partial \mathbf{D}}{\partial t} \right)$$

Equation 2

On default installation, MathType⁴ adds a menu and toolbar that provides commands for inserting a new equation, equation numbering, formatting and editing (see fig 1). MathType⁴ replaces Equation Editor.

A typical MathType⁴ window overlaying a Word document is shown below (see fig 1).

Equation Editor users will recognise the placeholders, the templates and the palettes; MathType⁴ has about 175 templates in all, and 214 special mathematical symbols. Many of these symbols are unique to MathType⁴ and not available in the Symbol font. MathType⁴ uses Symbol, MT Extra and Euclid, but any character available on your PC can be selected with **Edit @ Insert Symbol**.

MathType: The Mathematical Equation Editor for Windows



fig 1: Default installation in MS/Word and Overlay

The Tabs (line commencing **Algebra Derivs...**) allow you to organize your symbols, expressions and templates into named collections. There are two 'empty' Tab sets that you can customize; I have used one (**Vect Calc**) to store three common expressions in vector calculus. Simply drag and drop items onto the tabbed bar.

When creating a MS/Word document containing equations, you will probably want the body text to match the equation text in terms of font and size. The way to do this is to create a *style* in MathType⁴, just as in Word.

MathType⁴ is actually an OLE object server, and it allows equation objects to be placed in documents created by any application that supports OLE. It can also produce equations in formats such as .wmf, .eps, and .gif. The objects can also be converted to TeX, LaTeX, etc.

There is a clear manual (iii + 119) that contains 15 Tutorials covering topics such as 'Fractions and Square Roots', 'Inserting unusual symbols' and 'Working with TeX, LaTeX, MathML and other languages'.

There is a useful Internet site, <http://www.mathtype.com/> with technical support available.

MathType⁴ can be purchased online (a download costs US\$129/\$99 Academic).

There are excellent facilities for creating equations for web pages. The installation disk has a copy of WebEQ™.

Design Science claim that MathType is the professional version of *Equation Editor*, and in my opinion it is exactly that. To turn the sentence around, MathType is the version of Equation Editor for professionals. It is simply a must have.

MCH Multimedia General Chemistry CDROM



Subject area

General chemistry.

Description

General chemistry multimedia teaching package on CDROM.

Authors

Bryan C. Sanctuary.

Suppliers/Distributors

MCH Multimedia Inc., #210
372 St. Catherine St. W., Montreal,
Canada, H3B 1A2 (updated Jan 02)
(www.mchmultimedia.com).

Date/Version

2000/Version 5.00.

Level

A-level, access, first-year undergraduate.

Type of package

Computer assisted learning.

Price (USD)

\$79.99 for single licence, \$39.99 for students. For multiple copies contact supplier. (updated Jan 02)

Hardware required

A 486 PC with 40MB free hard disk, 12MB free RAM, 256 VGA graphics, sound card, CDROM drive or Macintosh PowerPC with similar specification.

Software required

Windows 95 or later or MacOS 7.5.1 or later.

J. David Ruddick
School of Applied Medical Sciences
& Sports Studies
University of Ulster
Jordanstown
Newtownabbey
Co. Antrim
BT37 0QB
August 2001

This is one of three CDROM chemistry tutorial resources written by B.C. Sanctuary. An earlier version has been reviewed¹. The General Chemistry topics are: general scientific principles, maths review, ideal gases, kinetic theory, acids & bases, equilibrium, thermodynamics, electrochemistry, electromagnetic theory, pre-quantum experiments, quantum mechanics, bonding, chemical kinetics, solids, main group elements, transition element chemistry. The Utilities menu also gives access to an interactive periodic table, a calculator (but see below), glossary, various tables of data and formulae, and (via an internet link) a gallery of 3D structures (mostly organic and biochemical).

Summary Review

range: * very poor to ***** excellent

Ease of use	*****
Ease of learning	*****
Documentation quality	***
Academic content	****
Usefulness to student	*****
Usefulness to teacher	****
Portability	*****
Meets objectives	****
Accuracy	****

The package installed easily from the CDROM (but requires the CD to remain in the drive; a network licence can be purchased). It offered installation of the Chime2.6 plugin for animations. There is some on-line documentation and an animated overview of how to use the program and menus. This didn't cover all the interactivities, so I had to work out how to make some of the required inputs by trial and error (see below). Navigation is very clear: each topic is divided into subtopics, which are further subdivided (and sometimes split again), but all appear in a list at the right of the frame, with markers to show where you are. If you revisit a topic, the book icon lets you see which sections you have already studied.

The screens are designed to look like frames in a browser page, with only moderate amounts of text; such text appears in short chunks in response to a mouse click. There are lots of animations, both of diagrams and of formulae/calculations. The most striking feature is the large amount of interactivity in most of the sections; for instance, you can vary the parameters in the Equilibrium and Kinetics examples to study the effects on the system, you can get the coordinates of a point on a graph, measure the slope, etc. Input data that can be changed are highlighted in colour, but I had to discover for myself that you must click on the item, type over and then press Enter.

All the topics, and many subsections, are introduced by the author's voiceover. I found his idiosyncratic enunciation and his habit of referring to information that is not on the current screen to be irritating. The voice can be switched off (retaining other sounds), but then you lose some information that is not repeated on screen and in some cases you still have to wait for the (hidden) speech to finish before the screen becomes active.

However, I enjoyed adding more and more moving gas molecules to generate pressure in a box, squeezing a piston to make NO_2 change to N_2O_4 , operating a simulated bomb calorimeter, attempting enthalpy and entropy calculations (help is given if you get the wrong answer twice), calculating cell emf's and balancing redox equations, shooting various photons at a surface to generate photoelectrons, studying the animated graphic which illustrates the Uncertainty Principle and the shrinking particle in a box that becomes a wave, seeing hybrid orbitals being generated and rotated, relating activation energy (animated energy diagram) to reaction pathway (animated hydrolysis of a haloalkane), identifying the holes in lattice structures, and working with the animated d-orbitals to develop Crystal Field Theory for coordination compounds.

MCH Multimedia General Chemistry CDROM

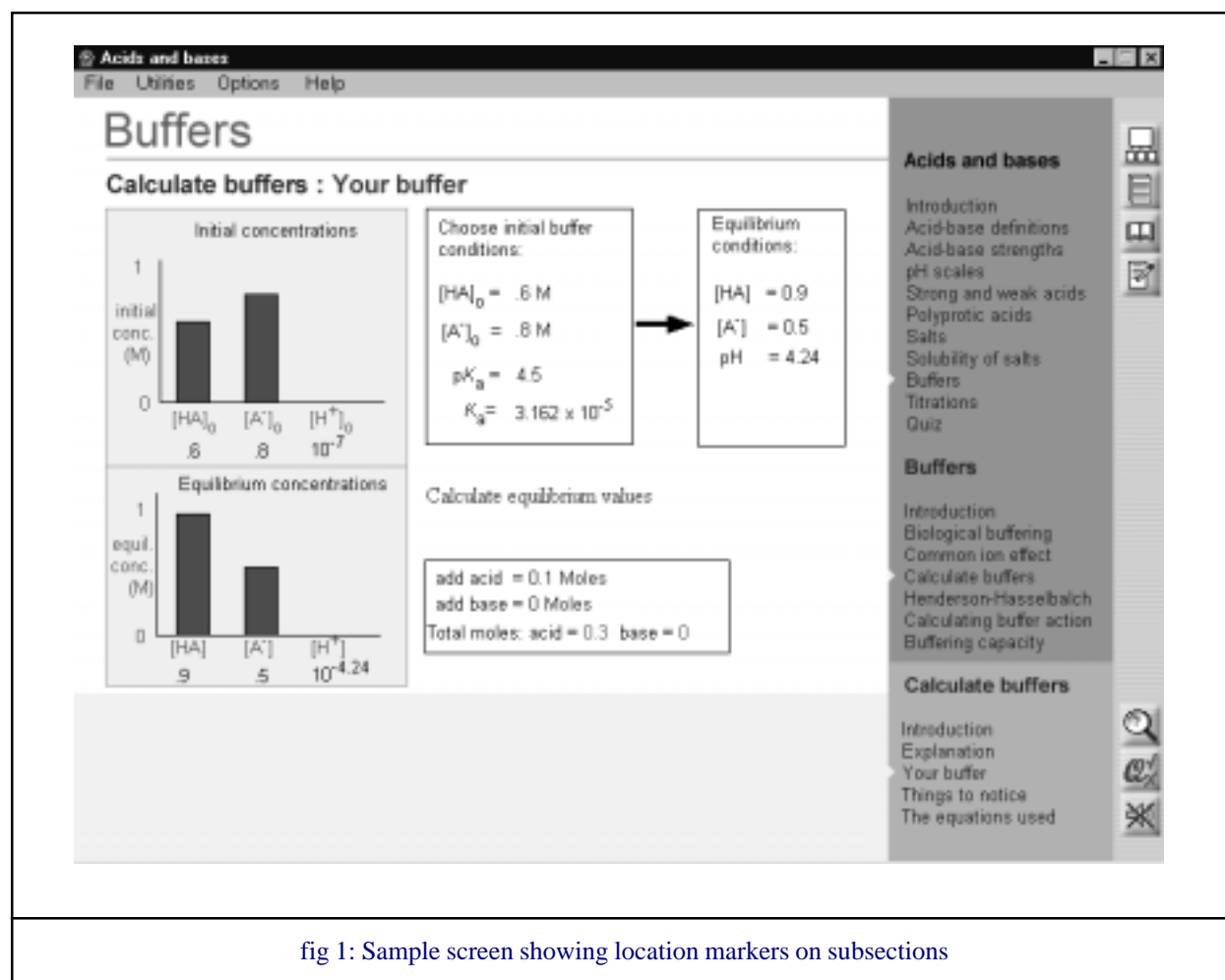


fig 1: Sample screen showing location markers on subsections

There are summary quizzes at the end of each topic (with the correct answers available), plus a final set of practice problems. The latter can be set up as practice (with hints) on any selected topics, or done as a timed practice test (with hints and answers still available).

On the downside, the package content lacks balance. There is not even one chapter on Organic chemistry (but there is a separate CDROM), and there are only a few specific chemical reactions mentioned for the main group and transition elements (the emphasis is on uses). An opportunity has been missed to show some brief movies of reactions. The overall emphasis is on calculations, and this is done well (with plenty of maths support).

There is a small number of factual errors, and several typographical errors (mainly in Electrochemistry and Transition Elements), but all the links ran smoothly except for the calculator (missing). My computer did not cope well with several animations that had a black background; some dark coloured atoms and the fainter parts of atomic orbitals were almost impossible to see.

However, these are quite minor criticisms of a stimulating package that uses a variety of teaching styles and constantly prompts the user to think. It is suitable for first year undergraduates and as support for British sixth-form students.

Reference

1. Roger Gladwin, M.C.H. General Chemistry CDROM, Software Reviews 18, CTI Chemistry, 1998.

**Subject area**

Physical chemistry.

Description

NMR data acquisition & processing simulation software.

Authors

Simon Belt, Simon Duckett & John Garratt.

Suppliers/Distributors

The eLABorate project, University of York, York, UK (www.york.ac.uk/depts/chem/staff/elaborate).

Date/Version

1997/Version 1.1.

Level

Undergraduate.

Type of package

Computer assisted learning, simulation.

Price

Free to UK HE academic users.

Hardware required

A PC with at least a 486DX processor.

Software required

Windows.

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Introduction

The nmrLAB software package has been designed with the aim of training students in the technical aspects of pulse NMR spectroscopy, data acquisition and processing. As the package does not cover the theory of NMR, the student will need to be familiar with the ideas of chemical shift and coupling in ^1H and ^{13}C NMR. A working knowledge of the FT NMR instrumentation and practise is essential.

General Comments

Installation of the software was easy, though the program expects a particular screen resolution and font size, which differs from the standard on our local network. In common with many networked machines this is not an aspect of the PC set-up that can be altered on the machine used for testing the software. The result was that the non-resizable data collection windows could not display their entire contents without resort to the use of scroll bars. This was irritating and affected ease-of-use, but did not affect the operation of the software in any material way. In an ideal world software would not depend on a particular system set-up! Fortunately the display of free induction decays (FIDs) and NMR spectra were not affected as they were displayed full-screen without clipping. The age of the software is evident in the appearance of some of the windows, though it is possible that the inability to use the correct font size contributed to the rather flat appearance of certain of the screens.

Guides for both student and tutor are provided, as are summary documents explaining the capabilities of the software. The guides are quite comprehensive and contain adequate information to set up and implement the software in a classroom setting. Twelve data files are provided allowing the user to simulate the collection of various types of NMR spectra from a range of compounds. Instructions are provided in the Notes for Tutors for the construction of data files for new compounds. There is no onscreen help function, so paper copies or PDF versions of the documentation must be provided by the instructor.

Description of the Package

The software is designed to be used as part of a structured tutorial programme of between three and four hours duration. ^1H and several ^{13}C NMR experiments are simulated by the software. The bulk of the program deals with the simulated acquisition of an FID from one of several chemical samples and its subsequent manipulation and Fourier transformation. Students are required to set up spectrometer parameters such as pulse width, sweep width, receiver gain and so on in, order to optimise the gathering of NMR data. There is a description of the principles of FT NMR in the Student Notes, with the significance and function of each of the eight spectrometer parameters that are under the control of the operator. These notes are adequate for students to refresh their memories of the principles of pulse NMR, but would not be sufficient as an introduction to the subject, as is acknowledged by the authors.

The software has four main screens. The first three screens allow the user to choose the sample and set up the data acquisition parameters of the virtual spectrometer and have a button to allow the user to return to the previous screen if required. The final FID/spectrum display-screen will only allow the user to return to previous screens via drop down menu options. These menus are largely inaccessible in the first three screens, making navigation round the program a little unintuitive at first.

Summary Review

range: * very poor to ***** excellent

Ease of use	***
Ease of learning	***
Documentation quality	*****
Academic content	****
Usefulness to student	***
Usefulness to teacher	***
Portability	no data
Meets objectives	****
Accuracy	****

nmrLAB

The first screen allows the user to select a sample from a menu of available compounds. Each sample requires a data file, which must contain the chemical shift of each hydrogen or ^{13}C nucleus in the molecule, along with spin-spin relaxation time and in the case of ^{13}C the number of coupled ^1H nuclei. It is fairly straightforward to create new sample data files and instructions for this are given in the tutor notes.

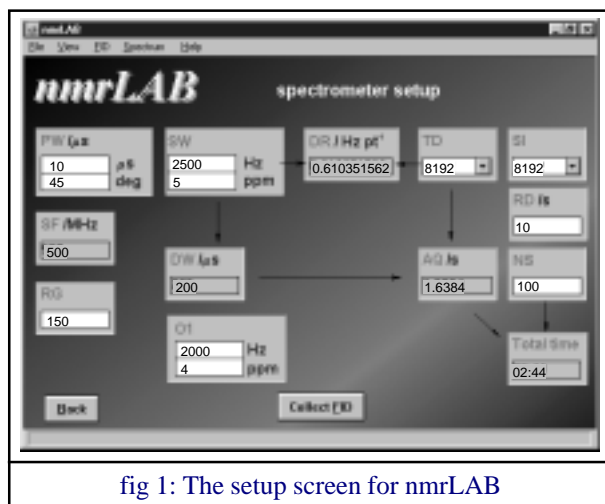


fig 1: The setup screen for nmrLAB

Having selected a sample, the second screen allows one to select the type of NMR experiment to be simulated. The options are ^1H , ^{13}C proton decoupled and 45° , 90° and 135° ^{13}C DEPT spectra. Details of the pulse sequences for these experiments are beyond the scope of the software and are not discussed in the text. Once the type of NMR experiment has been chosen, the user enters the third screen (see fig 1) where the spectrometer acquisition parameters are set. The user has control over eight parameters. These parameters use the two letter names familiar to users of Bruker AM/AMX type spectrometers; SW for sweep width, RG for receiver gain and so on. Appropriate values must be chosen for these parameters and a set of default values for ^1H data acquisition are found on first running the program. In order to successfully collect an FID, the parameters must be carefully chosen. The Student Notes give plenty of guidance on this, but the problem is that students unfamiliar with the concepts will struggle to understand what they are doing - why the pulse width effects the signal-to-noise and so on.

With an FID collected, processing by zero filling or apodization is possible prior to Fourier transformation. It was here that I encountered a programming bug. If one attempts to use the Display (Apodization) Function before applying it to the FID, the program crashes irretrievably, at least on my system. This bug is caused by a "divide by zero" error that has not been trapped by the programmers and is entirely reproducible. After Fourier transformation, phase correction is applied to the spectrum, using zero and first order correction parameters. The effects of phase correction are displayed in real time on screen so it is relatively easy to perform this operation, even for the novice.

It is possible to zoom in on parts of the spectrum, measure coupling constants and chemical shifts with a cursor and determine signal to noise ratio using simple tools. Simple printing of spectra is also possible.

Performance & Utility

In use the software performed well, notwithstanding the problems encountered above. The package offers several areas for students to explore and should reinforce some of the concepts encountered in theoretical courses on NMR. However, the main use of the software would be in demonstrating to students how to acquire and process simple NMR spectra. Perhaps the most important lesson for the student is to understand how detailed acquisition conditions influence things such as signal to noise ratios, line width, spectral and digital resolution and so on. Such technical topics are often omitted from undergraduate chemistry courses, so the software reviewed here could be used to broaden the student's experience of NMR. However, most undergraduates do not run their own NMR spectra, or if they do, use standard methods already set up in macro programs suitable for the local instrumentation. This being the case one wonders if nmrLAB has missed the target a little. The purpose of this program seems to be to attempt to countermand the "black box" attitude to spectroscopy that is evidently increasing. In a postgraduate context I can envisage the software having more utility, as it is here that most chemistry researchers first encounter the need to run NMR spectra routinely. nmrLAB could be used effectively as part of an NMR course in this situation. However, it would not be a substitute for the "real thing" since there are important aspects of FT NMR that are left untouched - such as choosing an appropriate pulse sequence, determining the 90° pulse length etc. As such I can't help feeling that the program falls between two stools - being beyond the scope of many undergraduate NMR courses and insufficient for training postgraduate student NMR practitioners. The authors suggest that the program could also be used in spectral interpretation exercises. While true, I suggest that there are simpler and better methods of undertaking such exercises. However, the areas that are addressed by the program are dealt with very well. The program has a lot of the feel of a real NMR spectrometer.

Conclusions

Apart from a couple of niggles, this is a well behaved and quite impressive piece of software which ably achieves what it sets out to. The documentation is good and there are good suggestions for possible tutorials using the program. In the right context the program could be a valuable teaching aid. I stop short of wholehearted recommendation because of the doubts expressed above as to its exact purpose and appropriateness in the general context of teaching NMR spectroscopy. The program could become the core of a fully fledged "virtual NMR spectrometer" by the addition of sections dealing with other aspects such as pulse sequences for different experiments. This would in my opinion greatly widen the uses of the program, but I suspect the practicalities of such a rewrite effectively rule it out.

The Chemical Thesaurus 2



Subject area

General chemistry.

Description

A database on CDROM.

Authors

Mark R. Leach.

Suppliers/Distributors

meta-synthesis.com, 56 Downland Road, Brighton BN2 6DJ, UK (www.meta-synthesis.com).

Date/Version

2001/Version 2.0.

Level

Undergraduate and research level.

Type of package

Database.

Price

£19.95.

Hardware required

A Mac or PC.

Software required

Windows or Mac O/S.

The question I am wrestling with in reviewing this software is: what is it for? Its title, "Chemical Thesaurus 2" suggests a systemised treasury of chemical information, a title it lives up to. But who is it aimed at and for what purpose?

The press release suggests that the target audience includes chemistry undergraduates, post-graduates and HE teachers and implies that it aims to supersede reaction textbooks. In my view it succeeds in part in fulfilling these aims.

Chemical Thesaurus 2 is a database of reaction chemistry including 2600 reactions, along with other data. It is a self-contained product, powered by FileMakerPro, and ran at a satisfactory speed on my iBook direct from the CDROM with no crashes. The CDROM is accompanied by negligible documentation, but following the Overview's advice to "just click around" I was soon able to get a good feel for the package.

The user interface feels like a web page with 12 buttons on the main index screen. The biggest and most significant buttons allow one to browse or search the chemical species and reactions contained in the database. The search options operate by the selection of various prescribed options (e.g. by element or class of reaction) without the user inputting text or structures, this system works well but was occasionally rather slow.

The data one retrieves is generally presented graphically with some supporting text but without references to the literature. Reaction mechanisms are discussed, using curly arrows or molecular orbitals in some cases. So, for example, a species search for boron gives 48 boron containing species which may be re-ordered by various criteria, a further click on triethylborane takes one to a screen describing the reagent as "real, long lived, electronically neutral", with a curly arrow scheme displaying its action as a Lewis acid, some physical data and a link to the reactions featuring it in the database (one in this case, its synthesis from borane and ethene). Similarly a reaction search of the pericyclic reaction category provides links to 7 classes of reaction and selecting the Claisen rearrangement provides two examples and a brief mechanistic description. The species and reactions may also be browsed with the former ordered by name and with the option to order the latter by substrate, reagent, or products (as warned re-ordering is slow).

The smaller buttons on the main index screen allow one to navigate around the database using other criteria: through an attractive "Lewis acid/base interaction matrix" that depicts the HOMO - LUMO interactions; or using a periodic table, which also provides information and data on the elements. The other smaller buttons provide congeneric series, a glossary of terms, and a user definable aromatic substitution reaction predictor (though limited and without rationales).

The data entry and editing facility was not active on the review copy I received.

Summary Review

range: * very poor to ***** excellent

Ease of use	****
Ease of learning	****
Documentation quality	no data
Academic content	****
Usefulness to student	****
Usefulness to teacher	***
Portability	*****
Meets objectives	****
Accuracy	****

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LL57 2UW
September 2001

The Chemical Thesaurus 2

The figure displays three overlapping screenshots from The Chemical Thesaurus 2 database.

Top Screenshot: All Species by Synonym
 - Title: All Species by Synonym
 - Action: Select species by clicking
 - List of species: Acetate ion, Acetic acid, Acetic acid, aqueous, Acetic acid, dimer, Acetic acid, protonated, Acetic anhydride, **Acetone** (circled), Acetone-enolate ion, Acetone, protonated, AcetoneMethanol Complex, Acetonitrile, Acetonitrile anion, Acetonitrile, protonated, Acetophenone, Acetophenone, 4-nitro, Acetophenone, α -amino-4-, Acetophenone, α -bromo-4-, Acetophenone lithium enolate, Acetylation, Acetyl coenzyme A, Acetyl hydroperoxide.

Middle Screenshot: Select reaction by clicking
 - Title: Select reaction by clicking
 - Chemical structure: CC(=O)C
 - Reaction 1: CC(=O)C \rightarrow CC(=O)C + H^+ / H^-
 - Reaction 2: CC(=O)C + H^- \rightarrow CC(O)C
 - Reaction 3: CC(=O)C + H^+ / H^- \rightarrow CC(=O)C + H^+ / H^-
 - Reaction 4: CC(=O)C \rightarrow CC(=O)C + CH_4 (circled)

Bottom Screenshot: Species Detail
 - Title: 242
 - Synonyms: Acetone, Dimethylketone, Propanone
 - Chemical structure: CC(=O)C
 - Resonance structure: CC(=O)C \leftrightarrow CC(O)C
 - Description: Species is a real, long lived, electronically neutral reagent chemical
 - Formula: C_3H_6O
 - Material type: Molecular
 - mp: 56.05
 - bp: -94.0
 - sp: 56.0
 - density: 0.791
 - Solubility in water @ 25°C: ∞ miscible
 - Solubility in organic solvents: ∞ miscible
 - Spectral I: 1H NMR (circled)

fig 1: A series of example screens (with some cropping) from The Chemical Thesaurus 2

Overall I enjoyed clicking around this database and found it easy to use. But I am still vexed by the question of what it is for. It certainly is not where I would search for a reaction I wished to perform as no literature references are provided and there are better and much more comprehensive on-line databases to which I would turn, thus I consider its research applications to be limited. It seems to me to be comparable with an introductory undergraduate textbook, though with less actual text. The abilities to browse, search and interconnect in a non-linear manner

are the great strengths of Chemical Thesaurus 2, as is its portability; these facilities may prove to be useful to HE teachers and students. To chemistry students (undergraduate and postgraduate) I would recommend Chemical Thesaurus 2 only as a (useful, user-friendly, affordable and possibly unique) supplement to one of the standard textbooks. HE teachers are also likely to enjoy browsing around this database and may find its approach to ordering material useful and challenging.

The Chemistry of Life



Subject area

Biochemistry.

Description

A CDROM teaching and learning program which sets out the chemical principles required for an understanding of biochemistry.

Authors

Robert M. Thornton.

Suppliers/Distributors

Benjamin/Cummings - Pearson Group (www.awl.com/bc).

Date/Version

1998.

ISBN

0-8053-8150-3.

Level

A-level, access, first-year undergraduate.

Type of package

Computer assisted learning.

Price

\$15.

Hardware required

A PC with 486/50 or Pentium 75 processor or Macintosh 68040 or Power PC, 8MB RAM, 13" VGA monitor, 256 colours.

Software required

Windows or Mac O/S 7.1 or later.

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October 2001

"This CDROM will help you learn or review the chemistry you need to succeed in your biology courses" announces the colourful sleeve of this teaching and learning package. This modest claim and, also on the sleeve, a brief overview and computer system requirements are the only written documentation provided. None is required - installation on my P75 system using the instructions in the ReadMe file was straightforward and the software is intuitive and a pleasure to use.

The program runs not in a standard Windows 95 window but in one of its own which occupies about 40% of an otherwise white screen. The desktop is uncluttered and well-designed. What is presented is a series of Lessons on Atoms & Molecules, Water, Acids Bases & pH, Organic Molecules, Carbohydrates, Lipids, Proteins, Nucleic Acids and Reactions & Enzymes.

Lessons are divided into sections and these comprise between one and nine screens. Navigation through these is by mouse clicks on forward or back arrows. A Lesson Navigator screen allows each screen to be previewed as a large thumbnail and its learning objectives to be listed. The amount of text on any particular screen is kept to a minimum and clicking on highlighted keywords leads to a comprehensive glossary. This can be accessed independently at any time. Some screens provide an opportunity for delving deeper via pop-up More Info boxes (see fig 1). There is a speech facility which can be disabled although this is not as annoying as I thought it might be.

Screens are illustrated throughout with tasteful and high-quality artwork, photographs, diagrams and structures. Many of the latter fade smoothly on request between structural formulae, ball and stick and space-filling representations. There are many animations included which are kept simple but are remarkably effective. The attention of the student is ensured by the degree of interaction required. Program navigation and the animations ran smoothly and with adequate speed on my system.

A set of searching questions for each Lesson allows the student to test their understanding of the subject matter. The material relevant to each question can be reviewed if necessary - clicking on the Review button brings up the appropriate Lesson screen. There are between 14 and 33 fixed questions in each Quiz and 50 in the Exam Quiz which covers all Lessons. The student's performance in a Quiz can be recorded in a user datafile.

The user datafile can also store personal Bookmarks to particular screens and the contents of the on-screen Notebook. The student can copy and paste text from screen into the Notebook to accompany their own notes. The Notebook, Quizzes together with all screens except the pop-up ones can be printed out.

Screen contents are cross-referenced to pages and figures in a number of American Biosciences textbooks. Whilst this typifies the thoroughness of this product, it is likely to date it more than anything else, given the frequency with which new editions arrive.

Summary Review

range: * very poor to ***** excellent

Ease of use	*****
Ease of learning	*****
Documentation quality	***
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Portability	*****
Meets objectives	*****
Accuracy	*****

The Chemistry of Life

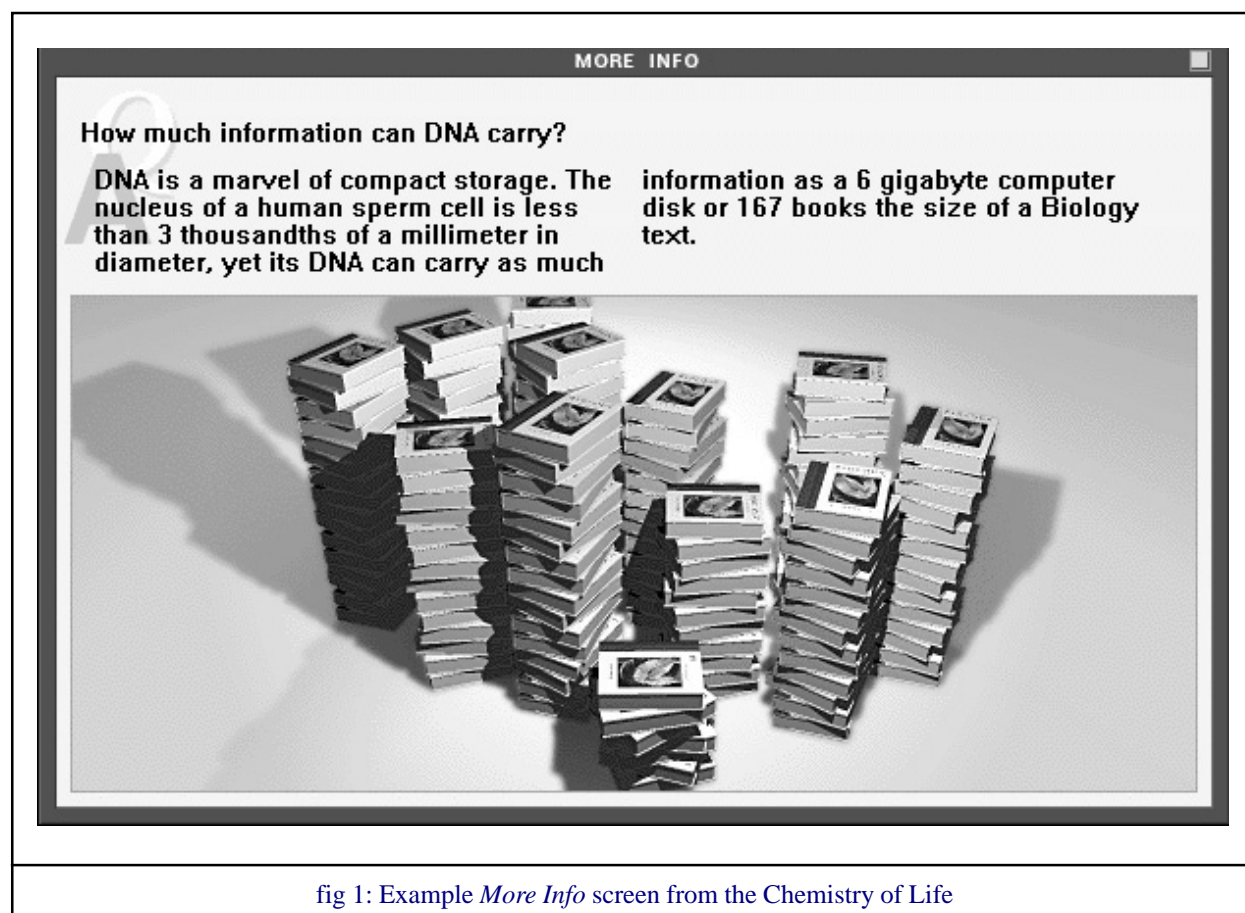


fig 1: Example *More Info* screen from the Chemistry of Life

The first four Lessons and part of the last one do indeed provide a valuable chemistry resource for students of biology though weaker chemistry students would certainly benefit also. The chemistry is presented on a 'need to know' basis - for example, there is only a very brief mention of orbitals and bonding in organic molecules is dealt with using Lewis dot-cross diagrams.

The remaining Lessons in my opinion have an additional use apart from the one above. Building on the chemical principles already set out, this program goes on to provide support materials for an introduction to biochemistry. In this respect it is such a pity that the key metabolic pathways have not been covered here - most other aspects are. Nevertheless I feel that the target audience is wider than Thornton proposes - it will also appeal to chemistry students taking biochemistry or biological topics in general.

Thus far I have suggested that this product would be used by motivated students on their own stand-alone hardware. I should point out perhaps that network installation is not mentioned in the ReadMe file and I have not had the opportunity to check how feasible this would be. However the product does represent a valuable resource for the teacher. I intend to use this to enhance my biochemistry lectures and tutorials to first year chemistry undergraduates. Many of the animations will be useful in this context as will be the Quizzes for revision.

I have been impressed by this software - it has been well thought out and carefully produced. The only error I have spotted is where part of an amylose molecule is referred to as a protein; the only major omission being 'translation' from the Nucleic Acids lesson. The package's American heritage shows in the use of the names ethylene, acetylene and molecular weight but I was surprised and delighted to see the joule being used as the unit of energy. I look forward to using *The Chemistry of Life* in my teaching.

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