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November 2003

ltsn
Learning and Teaching Support Network

Reviewed in this issue...

2 software packages

4 web sites

15 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

ltsn
Learning and Teaching Support Network
Physical Sciences

Physical Sciences Educational Reviews is the journal of the LTSN Physical Sciences Subject Centre. It is issued twice yearly in Spring and Autumn.

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

Items for review and offers to contribute to the review process are welcomed. Please contact the Centre.

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Editorial

Welcome to this the seventh issue of Physical Sciences Educational Reviews, the journal of the LTSN Physical Sciences Centre. This edition has 21 reviews, 14 for chemistry and 7 for physics and astronomy.

A question. Are these reviews useful to you? We would really like to hear from you if you have made use of the reviews in our journal, particularly if they have influenced your teaching or purchase of materials etc.

Additionally, we would again like to hear from you if you think there are other resources we should be reviewing. These might be books you use in your teaching, web sites you direct students to for self study, software items you use in CAL classrooms or even something completely different!

Roger Gladwin
Editor

In this issue...

Web reviews...

Book reviews...

Software reviews...

Chemistry Applets

Subject area
Chemistry.

Description
Interactive Java applets.

Authors
David N. Blauch.

Last updated
24th June 2002.

Level
Those with an interest in web authoring.

Plugins required
None.

Other features used
Java, Javascript.

Reviewed using
PC with 127MB RAM, LAN, Windows 98, Explorer 6.

Web address
http://www.chm.davidson.edu/ChemistryApplets/ChemistryApplets.html

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Jordanstown
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September 2003

Web authoring is no longer left to the specialist. With the help of authoring software and the web itself it is possible to launch a web site that is attractively designed and can contain sophisticated animations. One area that is more difficult, is the inclusion of interactive material. This is where Applets come in.

David Blauch has provided a number of Applets that will introduce interactivity to your chemistry web page.

Summary Review

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

Ease of navigation	*****
Speed of response	*****
Ease of learning	**
Content	***
Relevance	***
Accuracy	*****
Usefulness to student	**
Usefulness to teacher	**

On opening the web site, the first thing you read is:
“Chemistry applets simulate various experiments, apparatus, and chemical processes. The display and operation of an applet can be controlled by the user through the PARAM options in the APPLET tag and through JavaScript commands.”

From this statement it is obvious that some understanding JavaScript is needed. If JavaScript is a complete mystery to you the Applets will not be of immediate use.

The Applets available from the site may be configured by the user to create new web pages containing customized simulations and representations of chemical experiments.

The following Chemistry Applets are available (with JavaDoc documentation for supplemental classes provided by consulting the documentation link for information on PARAM options for the APPLET tag and for available methods and features for each applet).

Top-loading Balance
Glass Bulb
Two Glass Bulbs
Calorimeter
Chemical Equilibria Solver
Electron Density Plot
Manometer
Piston
Piston with Three Internal Regions
Spectrophotometer
Stopped Flow Apparatus
Thermometer.

Each Applet and all necessary material for their use may be downloaded directly from the web site or from the linked site, Physlets (link on home page of Chemistry Applets).

One of the examples shown in fig 1 is the Applet, “Electron Density Plot” The user selects n, l and m and on activating the Applet is provided with an electron density plot. The Documentation referred to above provides all the necessary information about the Archives needed to use the Applet.

Chemistry Applets

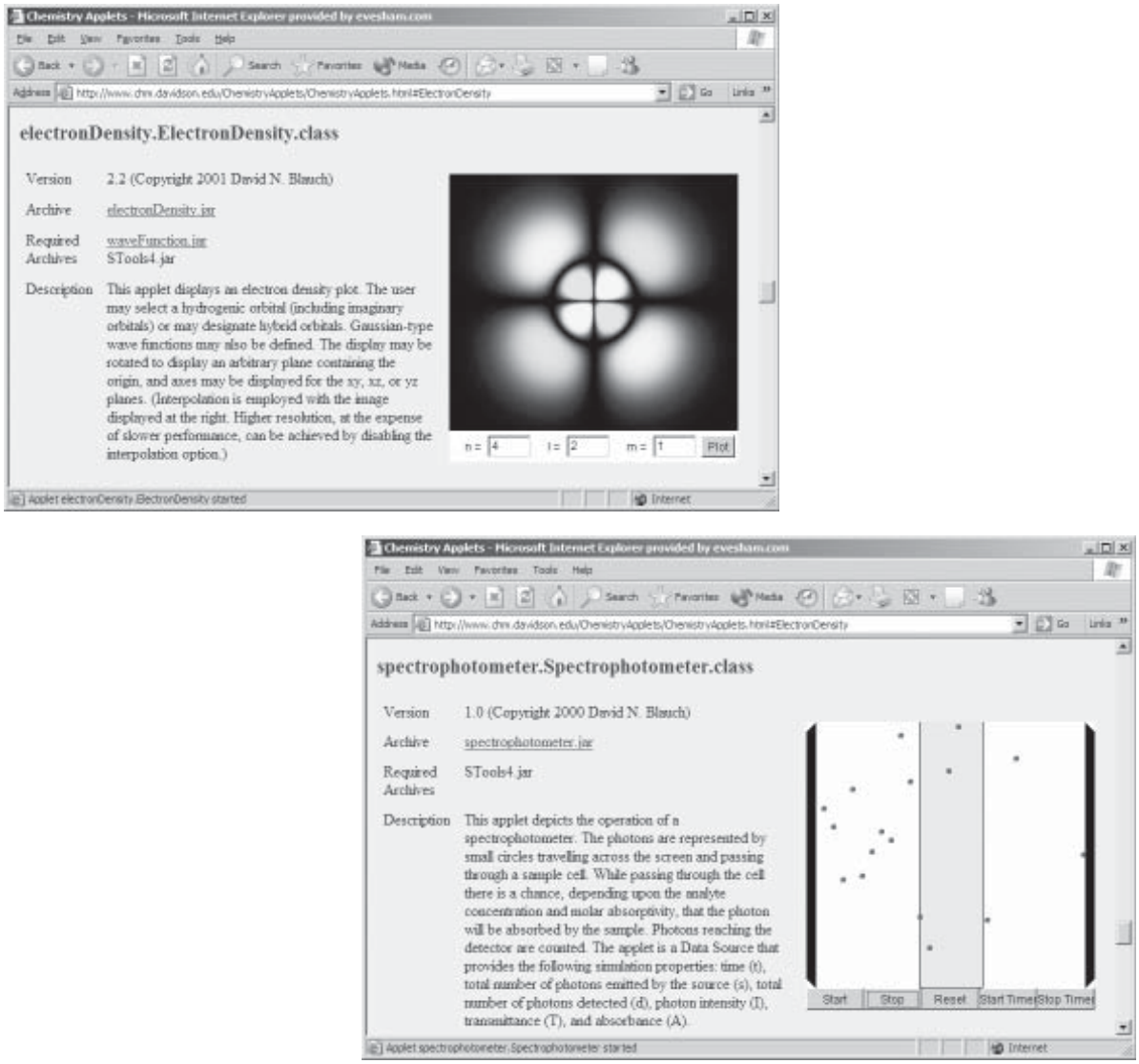

fig 1: Example screens from Chemistry Applets

Both the applets shown in fig 1 can be used as they stand but the majority require the use of additional Javascripting (i.e. from Data Connections in Physlets).

The site is well laid out and can provide all the information that is required to use the Applets. It clearly explains what is required for the use of applets and how they can be inserted. Viewing the page Source assists with the necessary HTML and more particularly the Javascript.

Having said this the web site is not a resource for those starting to design their own web pages as a knowledge of Javascripting is required.

Introchem.com

Subject area
Chemistry.

Description
Support material and links for introducing students to chemistry.

Authors
Thomas Dickson (Alchemy Press, PO Box 374, Orleans, MA 02653, USA).

Last updated
Not given.

Level
A-level, access, undergraduate.

Plugins required
Acrobat.

Other features used
None.

Reviewed using
1. Packard Bell 4605, modem (56K), Windows ME, Explorer 5.
2. Hewlett Packard Vectra VL, LAN, Windows 2000 Professional, Explorer 6.

Web address
http://Introchem.com

Geoff Potter
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University of the West of England
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Bristol, UK
BS16 1QY
October 2003

Summary Review

range: * very poor to ***** excellent	
Ease of navigation	*****
Speed of response	****
Ease of learning	***
Content	***
Relevance	****
Accuracy	not assessed
Usefulness to student	****
Usefulness to teacher	****

Introchem.com is a web site that calls itself "Your reference site for Chemistry". The publishers state that they are a publisher of Chemistry textbooks and also publish science fiction books. A link to their products, services and their chemistry textbooks is in preparation but reveals one science fiction title ("The great white T'roid" which is described as being based on "Moby Dick" and from which 'you may learn of many topics in science and classical mythology') and two CD's, one each of the Laboratory Experiments and the Study Guides that can be accessed through the site.

This may not seem a very promising beginning but the site shows its value as soon as the home page is accessed. On the basis that its aim is to introduce students to chemistry it does indeed do this by means of a large number of links to other sites and by presenting its own Study Guide and Laboratory Experiments and Laboratory Exercises.

This is a site in the making. I look forward to seeing their chemistry titles and I imagine there will be further science fiction titles in due course (hopefully containing much good chemistry in the plots). Additionally, and more importantly, there are frequent buttons for feedback to the publishers about the content and other links that could be added.

The site is simply laid out without the flashing lights and other gizmos that are so distracting in some sites. It works rapidly and without difficulty even on my home (narrow band) system. All the links I tried were successful.

From the home page (see fig 1) you can select from Students/Teachers/Periodic Tables/News options. However, there are no passwords or logging-in so there is nothing to stop students visiting the teachers' material. Indeed, there is a large overlap of the material presented whichever area is opened up. At the moment this is probably of no detriment to the site but suggests that the home page could be redesigned to maybe remove the distinction between students and teachers!

The Periodic Tables link provides a 'home-grown' interactive version, which provides basic information about the elements. This allows introductory students to focus on the elements without being distracted by numerous compounds. When wider reference is required, there are links to the excellent WebElements site and to the Los Alamos site among others.

The News option includes historical and personal material as well as up-to-date items (there was a reference to the MRI Nobel prize-winners within a day of the announcement). The historical is presented in terms of 'This week in Chemistry History' etc. Many links to descriptions of discoveries and the people behind them are given. There is also a link to Paul May's highly commendable 'Molecule of the Month'. All of this is very good for adding a human dimension to what is often taught in a very abstract manner.

On following the Student option you are given a list of 'Interesting Things'. Two of these, the News and Periodic Table links are those mentioned above. Two more, a Calendar and a Scientific Calculator are little more

Introchem.com

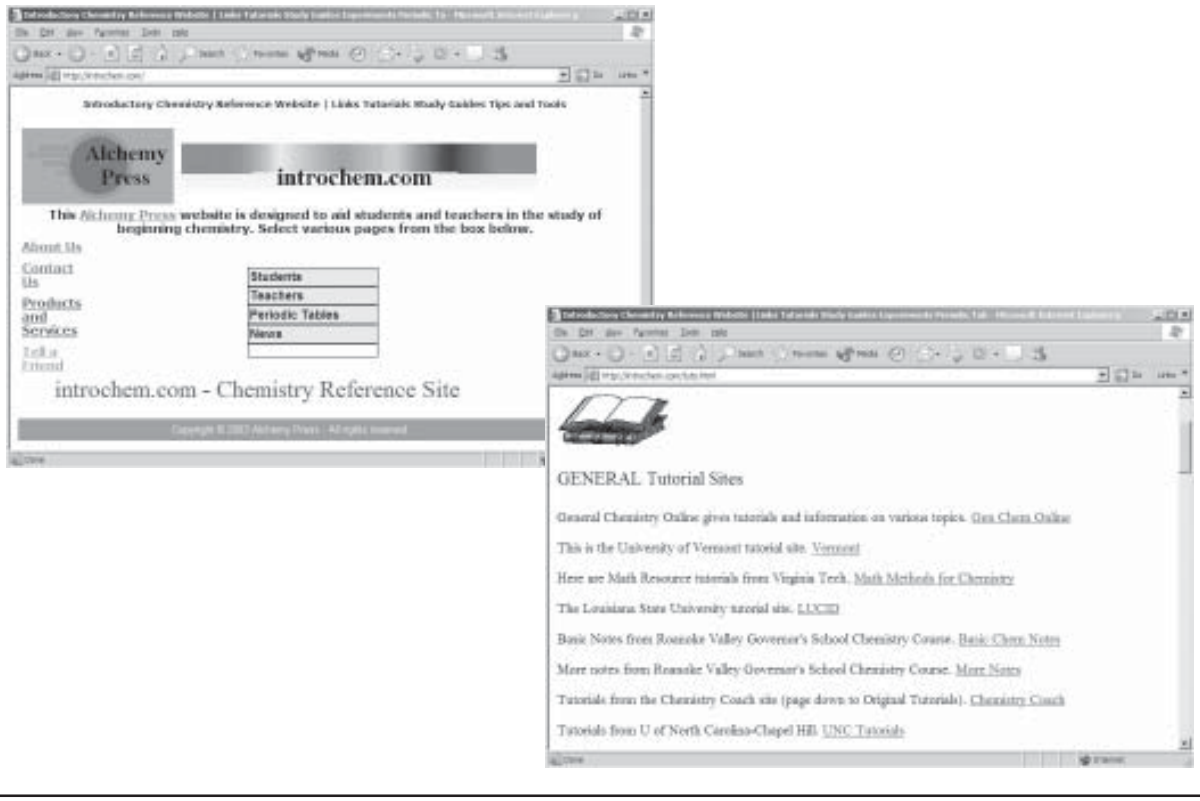

fig 1: The home page for Introchem.com and links to student tutorial pages

than make-weights – it is not clear how you might use the calendar and the calculator has no chemical functions. There are three other 'things' that are much more useful – Study Guides, Tutorials (see fig 1) and Tools and Useful Links. The Tutorials and the Links are collections of links to a variety of other sites, which mostly seem to be worth visiting. One link in the Tutorials takes you to the very imaginative Oxford neon site (even though it is referred to as "English Chem. Book"). The Study guides cover all the introductory topics. They are, however, straightforward text pages which, although copyright Alchemy, are offered as pdf files to be freely downloaded or printed. Now here is a great disappointment. They are virtually all text, with hardly any figures or diagrams. Like so many other sites (including several in the tutorial list), they are text-on-screen. They will not appeal to students although they might be useful for teachers to base a course on. No alternative presentation with interactivity is offered. Perhaps this will come in due course.

The Teachers' options include the same links to the Study Guides, the Periodic Tables and the News. The additional features are Chemistry Links, Laboratory experiments, Laboratory Exercises and Teaching Tips. Both the Chemistry Links and the Tips have a wide range of useful links and I came across several snippets that would be very useful for introducing an informal note into lectures and tutorials. However, the Laboratory experiments and exercises are a bit of a puzzle. It is not clear what the difference is. Both are fairly simple experiments written in a very traditional recipe style. Both are introduced as being for Instructors only although some describe operations that might be done in the kitchen. Again, both are (pdf) files (still no figures or diagrams) and are offered as free printouts. There are phrases such as '… observe signs of reaction …' without any indication as to what these might be. It would seem that these can only be useful if an instructor is present. There are 29 pages of notes to accompany the experiments/exercises which give details of the materials to be used and hints about what to expect but no chemical explanations.

In spite of the shortcomings, the site as a whole can be very useful to anyone studying or teaching introductory chemistry. The strengths are in the simplicity of the site, the numerous links of good quality. It will quickly lead students new to chemistry into useful other sites and provides much extra interest without excessive detail. It is very suitable for undergraduate students (particularly those not doing mainstream chemistry) and should be on the 'recommended websites' list for any introductory chemistry course.

Laboratorytalk

Subject area
Analytical chemistry.

Description
The site comprises 11 online books on chromatography.

Authors
R.P.W. Scott.

Last updated
2002.

Level
Undergraduate.

Plugins required
None.

Other features used
None.

Reviewed using
PC with broadband modem, Windows 98, Explorer 6.0.

Web address
http://www.laboratorytalk.com/books/chem/chrom

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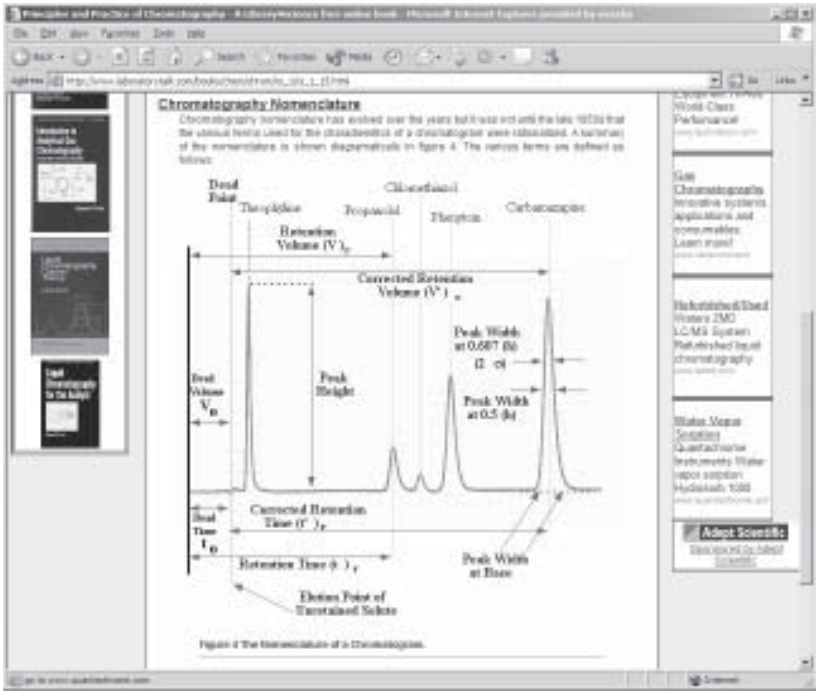
October 2003

The site has 11 different online chromatography books. Including Principles and Practice of Chromatography, Gas & Liquid Chromatography, Plate Theory, Detectors, Thermodynamics and Dispersion. You can either use the books online or you can download PDF files for $4.95. They are free to access and would be an ideal resource to refer students to to help back up a series of lectures on chromatography or for staff preparing their lectures. The level of the books varies, starting from introductory, suitable for year 1, to being useful to final year project students as background reading. You would need to visit the site to help the students choose the right book.

Summary Review

range: * very poor to ***** excellent	
Ease of navigation	*****
Speed of response	*****
Ease of learning	****
Content	*****
Relevance	*****
Accuracy	*****
Usefulness to student	****
Usefulness to teacher	*****



This is an ideal site to use to avoid students (or the library) having to buy books that they may only use a few times. The factual content is good and most diagrams are simple and clear, a few more complicated diagrams do not show clearly on the screen. Each book has a table of contents that you can use to easily navigate to the right chapter. The site runs very smoothly and quickly. Where the resource is limited is that there are no search facilities and once you have reached a section you have to go through a page at a time to find the information you need. Each chapter is broken down into quite small sections so the number of pages per section is quite low.

To summarise - a useful resource to help provide background material for a range of chromatography courses.

V.R.I – Virtual Radio Interferometer

Subject area
Astronomy.

Description
An experimental Java applet that simulates various real radio interferometers, and allows users to conduct a number of virtual experiments.

Authors
Nuria McKay, Derek McKay, Mark Wieringa.

Last updated
5th May 1998/version 2.

Level
A-level, access, undergraduate.

Plugins required
None.

Other features used
Java.

Reviewed using
PC, 133 MHz Pentium, 48MB RAM over a LAN.

Web address
http://www.jb.man.ac.uk/vri/

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October 2003

This website consists of one Java applet that simulates the operation of a technique in radio astronomy called earth rotation aperture synthesis. It provides the user with simulations of various real radio interferometers and the opportunity to conduct a number of virtual experiments. The authors have also provided, easy to access, on-line documentation that is useful to both newcomers to this area of astronomy as well as those using this tool.

Summary Review

range: * very poor to ***** excellent	
Ease of navigation	***
Speed of response	**
Ease of learning	***
Content	***
Relevance	****
Accuracy	***
Usefulness to student	***
Usefulness to teacher	***

The Applet
The actual VRI applet is seen as a screen divided into four panels (see fig 1) surrounded by various interactive buttons (widgets). Since at this point I wasn't able to grasp the function of every interactive button I began to work through the example as recommended in the "Guide to VRI Concepts".

Whilst trying out the applet I noticed that once you change values you need to press Return/Enter for your choices to be accepted before you choose plot. Also you may find (like I did) that you need to Zoom earlier than the example suggests to be able to see the plotted image.

As a user you choose the number and location of antennae and can see the resulting effect on the uv-coverage. You are also able to plot the fourier transform relationship between the accumulated radio visibilities and the resultant image.

Documentation
1. *Introduction*
The Introduction page gives a concise and general description of VRI, as well as links to the applet and the two other on-line documents. A good starting point when trying to decide whether this applet would be useful to your course.

2. *Guide to VRI concepts* (VRI Guide)
The Guide to VRI is a document, intended for newcomers to radio interferometry, describing the concepts and basic operation of this area of astronomy. It includes a concise and short explanation of why several radio telescopes are used instead of just one big one. Also here is the worked example which helps the user to clarify the basic concepts of Radio Interferometry. I found this section very informative.

3. *Documentation* (Operation manual)
This is the main on-line document and it provides the user with the technical information on how to use the applet. I agree with the authors that the user needs to read this operation manual before attempting to do any experiments (of your own design).

One thing I came across during this review was the need to have access to both the applet and documentation at the same time. For me the best way was to have the applet open on one machine and the documentation open on another, as I found swapping between two windows on one machine

Continued on page 8

V.R.I – Virtual Radio Interferometer

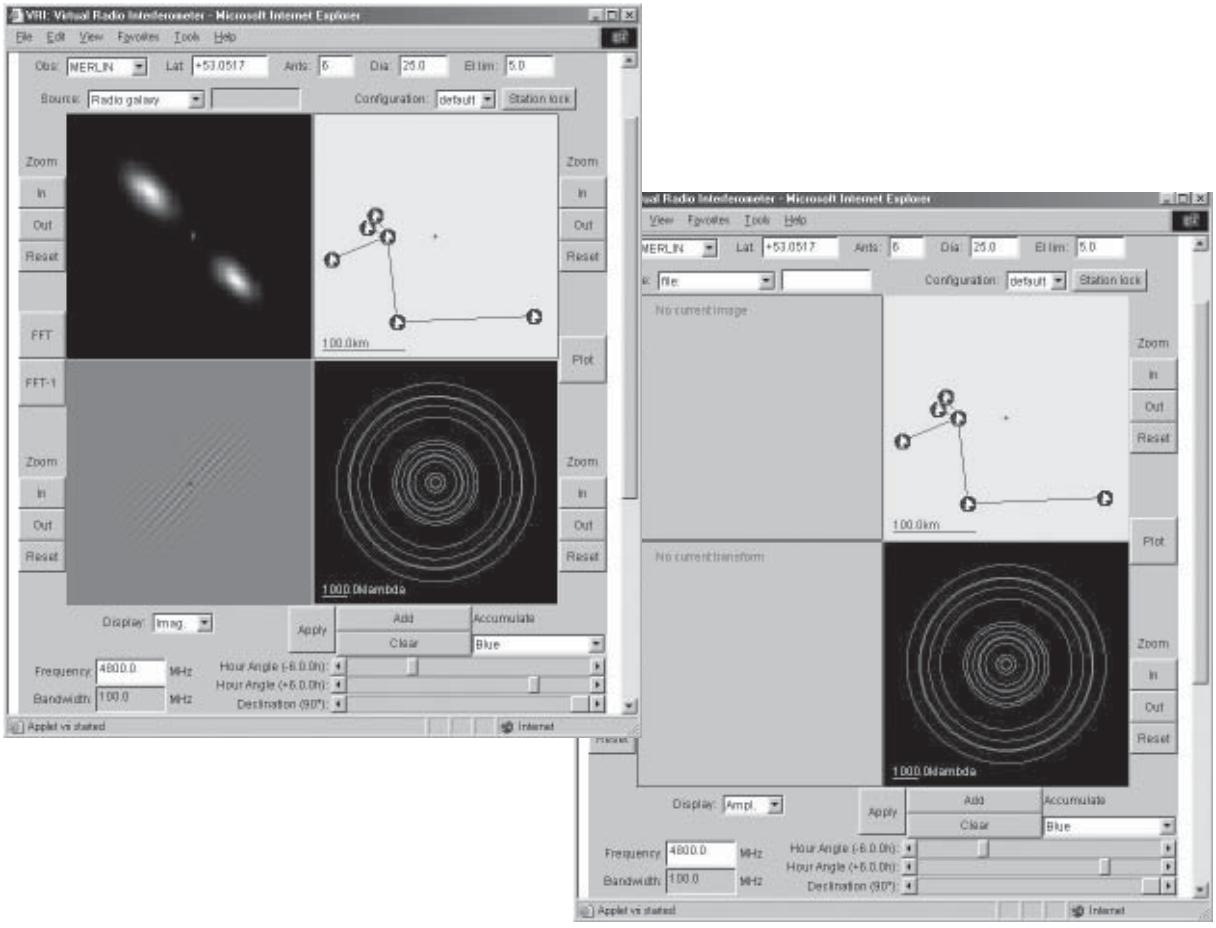

fig 1: Example screens from the Virtual Radio Interferometer

Continued from page 7

very irritating. Although once you decide to use it regularly then printing off the documentation would solve this problem.

Conclusions

It is clear that you need a good understanding of interferometry to be able to use the tool fully, but by then you realise that you want a tool that could do a more detailed analysis of uv-coverage. This tool would be useful for introducing concepts and techniques on running experiments using similar tools.

Although the applet is being kept available for the foreseeable future (Jodrell Bank web site) there are no intentions of modifying it anymore. This will lead eventually to the material not being up-to-date enough for Astronomy courses.

I feel that although the applet could be both an interesting and useful addition to an Astronomy course, it requires time for any user to become fully aware of how to use all of the functions.

Astrophysical Techniques

Subject area
Astronomy.

Description
This book is aimed at the undergraduate science student who is pursuing an astronomy course or who has an astronomy related section of their course.

Authors
C.R. Kitchin.

Publishers/Suppliers
Institute of Physics Publishing (http://bookmarkphysics.iop.org/).

Date/Edition
4th Edition.

ISBN
0-750-30946-6.

Level
Undergraduate.

Price
£35.00.

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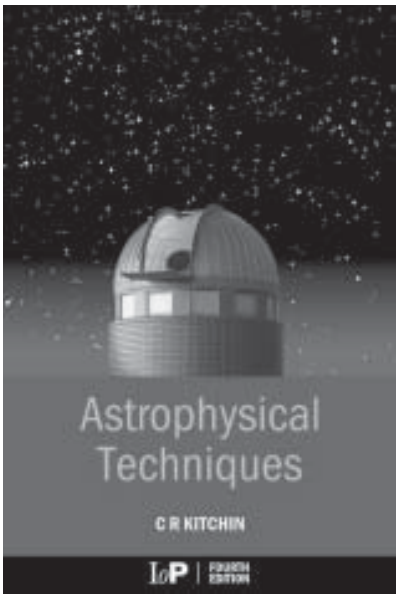
LTSN Physical Sciences
University of Liverpool
Liverpool L69 7ZD
November 2003

Summary Review

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

Chris Kitchin is the Emeritus Professor of Astronomy at the University of Hertfordshire which most certainly gives him good credentials to write this book, Astrophysical Techniques. Aimed at the undergraduate science student, this book is perfect for anyone who is pursuing an astronomy course or who has a section of their course content which is astronomy related. The book itself is split up in to five main sections, these being detectors, imaging, photometry, spectroscopy and other techniques.



The first chapter covers detectors and is itself split into several sub-sections each specialising in the different areas of the electromagnetic spectrum. Each of these sub sections is a complete overview of the technologies and techniques employed for that particular wavelength. The second chapter on imaging, explains the various techniques used by astronomers to get the most information out of the scant electromagnetic radiation that falls on to the detectors. These include such topics as scanning, interferometry and photography. The chapter on photometry explores the magnitude and UBV filter systems and how they are used to find stellar parameters such as temperature, spectral type and luminosity. The spectroscopy chapter covers the numerous spectroscopes astronomers use. This chapter relies quite heavily on mathematics to work out the various properties of prisms and grating spectroscopes.

Now in its fourth edition, this book has included more techniques relevant to the modern astronomer as well as dropping older ones no longer in use. References are also made to actual telescopes and space missions that employ the techniques described in the book. These references, although useful for a student, could date the book in only a matter of a few years. The mathematical content is at just the right depth for a book of this educational level. The equations used are clearly explained and any derivatives are followed through at such a pace that anyone with college level mathematics can easily understand.

Overall I would say that this book is ideal to introduce a student to an astronomical speciality such as spectroscopy for example. Then armed with this information, the student will know what to look for in other resources if they need to delve deeper. The author keeps the rhythm going throughout the book which makes it an easy and informative read.

Chemistry

Subject area
Chemistry.

Description
General chemistry book aimed at US education system.

Authors
Raymond Chang.

Publishers/Suppliers
McGraw Hill
(http://books.mcgraw-hill.co.uk/).

Date/Edition
2002/7th Edition.

ISBN
0-07-365601-1.

Level
A-level, access, undergraduate.

Price
£38.99 in paperback, £101.99 in hardback (www.amazon.co.uk).

John Leaver
10 Willow Bank Drive
Bollington
Macclesfield
Cheshire
SK10 5DG
September 2003

Summary Review

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

Chemistry, by Chang is a general chemistry text. In other words it focuses substantially on aspects of physical chemistry but with some material to cover inorganic and organic aspects of the subject. It also explores some topics with a foundation in chemistry such as atmospheric chemistry. It is an American text and pitched at a level that fits somewhat awkwardly into the UK education framework. The majority of the content will (or should) be intelligible to a student at NQF level 3 (i.e. A-level, AVCE, BTEC National) while there is also material that is more likely to be of relevance to a student at NQF level 4. That having been said, able level 3 students might find the book interesting, stimulating and useful as it has many good features.

The text is clearly written in readily accessible language and in many places Professor Chang's enthusiasm for his subject is conveyed. The illustrations are generally excellent and there are many striking images, likely to elicit the interest of the casual browser. The layout and presentation is generally clear and effective. The likely appeal of the book to those not intending to go on to study chemistry at a higher level (and also those who are) is greatly enhanced by many well-chosen examples to show the relevance of chemistry. These examples appear in the form of panels entitled 'Chemistry in Action'. More than fifty of these panels appear throughout the book and to give a flavour of the material covered a randomly selected ten percent are: 'Distribution of Elements on Earth and in Living Systems', 'Metal from the Sea', 'How a Bombardier Beetle Defends Itself', 'Microwave Ovens - Dipole Moments at Work' and 'The Thermodynamics of a Rubber Band'. In addition to the 'Chemistry in Action' panels there are also a few 'Chemical Mystery' panels with titles such as: 'Who Killed Napoleon' and 'Dating Paintings with Prussian Blue'.

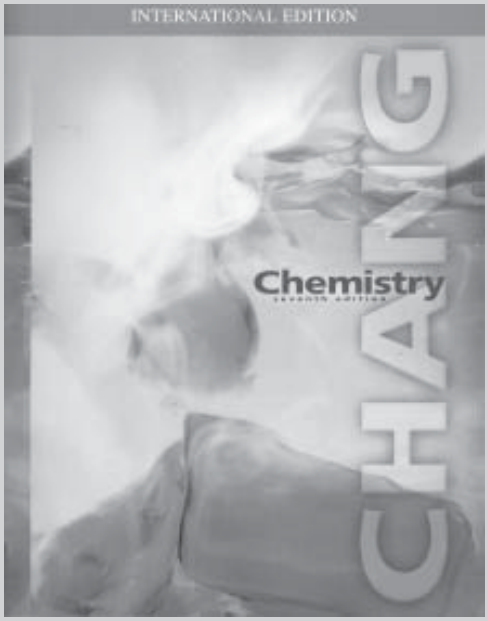
There are many worked examples provided for the various calculations that are required by the physical chemistry content of the book. The text is also well provided with problems and there are answers to the even numbered problems provided at the back of the book. No errors were detected within an (admittedly rather small) random selection of these answers.

There are various aids to learning provided throughout: each chapter has a concise and effective introduction; the worked examples and exercises come at relevant points in the text, important equations are highlighted at the end of each chapter (where relevant), all important facts and concepts are summarised and key words are listed together with a reference to the page on which they are defined.

There is also a variety of instructor resources available; such as computer-based tests, an instructors manual, overhead transparencies, animations, PowerPoint presentations and an on-line learning website. The website provides a selection of support materials. Each chapter has its own hyperlink and the materials provided include reminders of key concepts and topics, links to important equations, and some audiovisual material that makes use of the Shockwave plugin.

As well as the instructor resources, there are also additional student resources such as a study guide and solutions manual.

Chemistry



From the publisher...

Chemistry, 7/e

Raymond Chang.

Chang's Chemistry is the most concise, accurate and straightforward text for the two-semester general chemistry course for science majors. The strength of the seventh edition is the integration of many tools that are designed to inspire both students and instructors. The textbook is the foundation for the technology. The multimedia package for the new edition stretches students beyond the confines of the traditional textbook.

0-07-365601-1 489pp 2002 £38.99

Despite the fact that the book is aimed at a specific aspect of the American education system and therefore does not coincide perfectly with any aspect of the UK system it is a well written, interesting and very attractively produced volume. I would not recommend the book as a standard text for any of the current UK NQF Level 3 courses with chemistry content, however, a student on such a course who had a copy would very likely find it to be an interesting and useful learning resource.

Chemistry in Context

Subject area
General Chemistry.

Description
General chemistry book aimed at US education system.

Authors
American Chemical Society (Stanitski et al.).

Publishers/Suppliers
McGraw Hill (http://books.mcgraw-hill.co.uk/).

Date/Edition
2003/4th Edition.

ISBN
0-07-241015-9.

Level
A-level, access, undergraduate.

Price
£32.99.

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September 2003

Summary Review

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

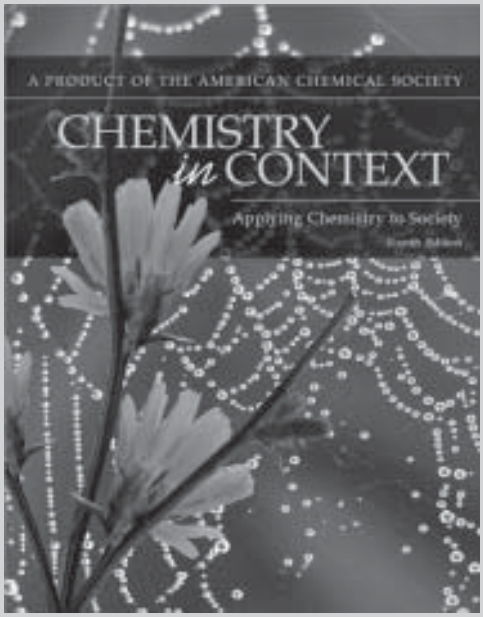
This is the fourth edition of what is now a well established American textbook. The book differs considerably from the vast majority of current chemistry textbooks being used at tertiary level in that it seeks to develop chemical principles, on a strictly need to know basis, by considering a range of contexts. The book contains twelve chapters entitled respectively:
The Air We Breathe
Protecting the Ozone Layer
The Chemistry of Global Warming
Energy, Chemistry and Society
The Water We Drink
Neutralising the Threat of Acid Rain
The Fires of Nuclear Fission
Energy from Electron Transfer
The World of Plastics and Polymers
Manipulating Molecules and Designing Drugs
Nutrition: Food for Thought
Genetic Engineering and The Chemistry of Heredity.

Chemical principles are gradually developed, through the book, within a contextual framework of social, economic, political and ethical issues. The book is therefore likely to go some way towards countering the charge that Chemistry today is boring and lacking in relevance and may well motivate students to learn some chemistry.

The first six chapters in the book all concern the environment and are the core. Here the foundations are laid from which other chemical principles are developed in the later chapters. Chapters seven and eight consider non-fossil fuel energy sources while the final four chapters of the book consider polymers, drugs, nutrition and genetics and have an organic biochemistry flavour. The authors consider that a suitable introductory semester course should involve the first six chapters and any two or three of the later chapters to suit the emphasis of a particular course. I was initially sceptical that the chemistry might easily get lost in the context but have been pleasantly surprised by the range of chemistry well covered by this text.

The book uses sound pedagogy with each chapter beginning with an overview and finishing with a summary highlighting important aspects which have been developed in the chapter. Marginal notes are used extensively to emphasise key points and to link the current section to other chapters in the book. An extensive range of problems is offered both within the text and at the end of each chapter. The end of chapter problems are divided into three categories: Emphasising Essentials which test factual recall and the ability to apply simple algorithms, Concentrating on Concepts which focus on chemical concepts and their relationship to a range of socio-technological aspects and Exploring Extensions which challenge the reader to go beyond the material provided in the text. Activities in the text and problems in the latter two categories encourage the reader to access appropriate web sites via McGraw-Hill Online

Chemistry in Context



From the publisher...

Chemistry in Context, 4/e

Conrad L. Stanitski, Lucy Pryde Eubanks, Catherine H. Middlecamp, Norbert J. Pienta, Wilmer Stratton.

The fourth edition of Chemistry in Context maintains the outlook and strengths of its preceding editions while bringing new and exciting dimensions to the textbook. The basic philosophy and approach remain constant: chemistry set within a contextual framework. Significant societal-technological issues serve to introduce the chemistry, which is developed within its political, economic, social, global, and personal contexts. Chemical principles are introduced on a need-to-know basis. In-chapter and chapter-end exercises apply and extend the chemical concepts.

0-07-241015-9 544pp 2003 £32.99

Resources to obtain up to date opinions and data. I was particularly impressed by the way in which the book encourages routine use of the internet as a source of up to date information. Unfortunately although access to the McGraw-Hill web resources was promised on purchase of a new book I was unable to register for the site despite following the extremely simple instructions provided. I would see regular use of the web resources as a potentially valuable learning activity but it is surely essential that access is more easily obtained.

The book is written primarily for the American market and is aimed at non-science majors. It does not readily therefore lend itself to current tertiary education chemistry courses in the UK. That said, it is I believe, a good book and well worth considering as a text for a range of ancillary chemistry courses. I enjoyed reading this well written text and would suggest that teachers of both A-level and first year university chemistry courses are likely to find that parts of the book provide useful context to their own lectures.

d- and f- block chemistry

Subject area
Inorganic chemistry.

Description
Tutorial text.

Authors
Chris J. Jones.

Publishers/Suppliers
Royal Society of Chemistry
(http://www.rsc.org/).

Date/Edition
2001.

ISBN
0-85404-637-2.

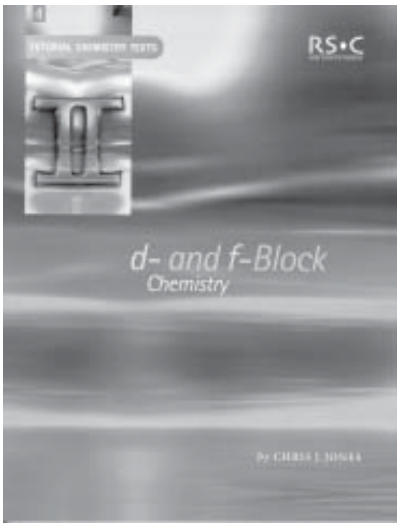
Level
Undergraduate.

Price
£9.95.

Summary Review

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

I had not studied one of the new RSC Tutorial Chemistry Texts before reading Chris Jones' treatment of d- and f-transition metal chemistry. I was impressed by the clarity of explanation and presentation, and the amount of material covered in 150 pages (excluding answers to problems). Each chapter starts with its aims and finishes with a summary and a set of problems (with short answers given at the back). There are also short, worked examples in the text, boxes explaining or illustrating important ideas or points, and sidebars giving definitions and background material. Two-colour printing is used to good effect to enhance the readability and impact of the text and illustrations. Although this book is aimed at 1st/2nd year undergraduates, it also manages to alert students to some current research topics, such as metal clusters, metal templated reactions etc.



The book manages to cover the basics of the subject with enough examples to illustrate their application, without burdening students with excessive detail of chemical formulae and reactions, in contrast to Cotton and Wilkinson. I liked the way the author referred students to other books to answer particular problems. Getting students to read and use any textbook consistently is increasingly a problem. Module-sized books like this on specific areas of chemistry, rather than bulky comprehensive tomes, may help break down students' resistance to reading with a more attractive and manageably-sized text. Most people prefer reading a paperback to a dictionary or encyclopedia! The value of a short, single-topic book like this one is that it can be read and mastered in a reasonable time, and provides the student with an adequate background to tackle more advanced texts. It is always a good idea educationally to go from the short and simple to the long and complex, rather than the other way round. Despite the title, the book only deals with the theory of d- and f-block metals – there is very little descriptive chemistry, and this is a possible weakness. However, a firm grasp of the basic ideas from this book will enable the chemistry student to make sense of the chemistry and biochemistry of these important elements. It may look like a paperback but it is no easy read – an able student will have to work hard to understand and master all the concepts in this book, which have been concisely and clearly explained by Chris Jones. I believe that a student will find it worth the effort to work their way through this book, as a way in to more advanced treatments of transition metal chemistry. If all the books in this series are as good as this one, then the RSC Tutorial Chemistry Texts will be widely read and used.

Peter E. Childs
Department of Chemical &
Environmental Sciences
University of Limerick
Limerick
Ireland
July 2003

Descriptive Inorganic Chemistry

Subject area
Inorganic chemistry.

Description
An introductory level inorganic chemistry textbook.

Authors
Geoff Rayner-Canham and Tina Overton.

Publishers/Suppliers
W.H. Freeman and Company (http://www.whfreeman.com/).

Date/Edition
3rd Edition.

ISBN
0-7167-4620-4.

Level
A-level, access, undergraduate.

Price
£35.99 (www.amazon.co.uk).

Simon Higgins
Department of Chemistry
University of Liverpool
Liverpool L69 7ZD
October 2003

This textbook is aimed principally at the US sophomore (introductory) market, where large numbers of students who eventually specialise in subjects other than chemistry, such as pharmacy, earth sciences, medicine etc., are likely to encounter a one-semester course in inorganic chemistry.

Summary Review

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

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

In the UK, I suspect that teachers of chemistry undergraduate students would be more likely to recommend one of the more advanced level texts, such as Shriver and Atkins' 'Inorganic Chemistry'. However, students doing degrees in environmental science or earth sciences, and encountering inorganic chemistry in subsidiary courses, will find the material covered in Descriptive Inorganic Chemistry more accessible than that in the more advanced texts, as may specialist chemistry students in their first year, and I would expect the book to be a valuable addition to undergraduate collections in libraries.

The first edition was reviewed in J. Chem. Ed.[1]. In this, the third edition, Geoff Rayner–Canham has a co-author, Tina Overton, and among the changes to the book since the second edition are a new chapter on periodicity, a chapter on organometallic chemistry, and new end-of-chapter problems ('Beyond the basics'), designed to encourage critical thinking.

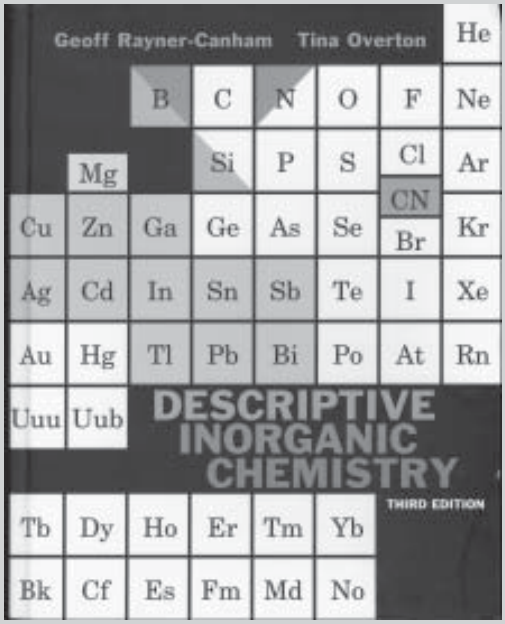
The book begins with nine chapters on fundamental material, including a non-mathematical description of the electronic structure of the atom, the origin of the periodic table, periodic trends, covalent, ionic and metallic bonding, basic thermodynamics, acid-base concepts and redox chemistry. The following chapters deal in turn with each group or block of the periodic table. The text is leavened with boxed paragraphs dealing with historical anecdotes, social questions and controversies involving inorganic topics, and these are well–related to the chemistry under discussion. For example, the history of tetraethyl lead, mining the seafloor for manganese nodules, and biomineralization, each warrant such attention. The balance of theoretical to descriptive material is probably appropriate for the target audience. At the end of each chapter are a number of problems. Students seeking model answers to these may be surprised to find that there are two softback solutions manuals available, one containing answers to even–numbered problems, the other, to odd–numbered problems. I did not find any errors in the solutions to problems that I looked at.

Earlier reviewers noted that there were few errors in previous editions, and I found very few, mostly minor typographical errors. Among them, the 18-electron rule becomes a 17-electron rule in the index, and the h of Planck's constant inadvertently becomes a b on page 4 in the Schrödinger equation.

My only minor criticism of the book is that it takes an internally contradictory view over the question of d–orbital involvement in the bonding of main–group compounds. It is not alone among current inorganic chemistry texts in doing this.

Continued on page 16

Descriptive Inorganic Chemistry



From the publisher...

Descriptive Inorganic Chemistry
Third Edition
Geoff Rayner-Canham , Tina Overton.

Geoff Rayner-Canham's bestselling text sets the standard for the introductory-level, descriptive-based inorganic chemistry course. Moving from basic concepts to systematic coverage of specific elements and compounds, the book uses the periodic table as a framework for understanding chemical properties and uncovering little-recognized relationships between elements in different groups. The book also familiarizes students with the rich historical background of inorganic chemistry as well as with crucial applications, especially in regards to industrial processes and environmental issues. The revision addresses the greatest challenge people have in teaching the course: finding a way to unify the concepts taught. The new edition, written with new coauthor Tina Overton, is thoroughly updated throughout, and adds a new chapter on Periodic Trends, which ties together ideas and concepts in descriptive chemistry.
0-7167-4620-4 540pp 2003 £35.99

Continued from page 15

When the question of molecules where the central atom exceeds the octet is addressed (P48), the reader is told unequivocally (and in my view, incorrectly) that elements beyond the second period can use d–orbitals for bonding. However, on P55, where hybridisation involving d–orbitals is discussed, the authors do concede that 'theoretical chemists now contend that d–orbitals play a minimal role in covalent bonding' (although without stating in what circumstances this is so). Moreover, after rationalising the strength of Si-O single bonds in terms of Si 3d involvement in bonding to O (P302), when pi–backbonding between metals and phosphine ligands is discussed on P554, the reader is told (correctly) that the phosphine orbitals involved are P–C sigma* orbitals (as opposed to vacant P 3d orbitals).

However, on balance this is a very good textbook for the market for which it is designed, and I am sure that it will continue to thrive.

Reference

1. Haworth, D.T. J. Chem. Ed. **73** A174 (1996)

Enhancing undergraduate laboratories

Subject area
Chemistry.

Description
Booklet aimed at enhancing undergraduate laboratory experience.

Authors
J. Carnduff and N. Reid.

Publishers/Suppliers
Royal Society of Chemistry (http://www.rsc.org/).

Date/Edition
2003.

ISBN
0-85404-378-0.

Level
Academic staff and laboratory course organisers.

Price
£17.95.

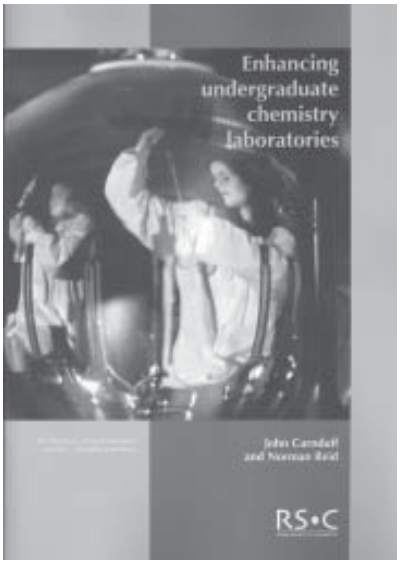
Simon Jones
Department of Chemistry
University of Sheffield
Dainton Building
Brook Hill
Sheffield
S3 7HF
September 2003

Summary Review

range: * very poor to ***** excellent	
Academic content	****
Usefulness to student	n/a
Usefulness to teacher	****
Meets objectives	****
Accuracy	*****

This book has been produced as a resource for undergraduate laboratory course organisers and provides specific examples of pre- and post-laboratory exercises that can be used to further develop practical chemistry sessions.

Any academic who has been charged with developing a new practical course or resuscitating an old course that has long passed its sell-by date will probably have asked themselves “How can I make it interesting?” and “How can I get the students to think about this experiment?” This booklet aims to address these questions and others through a series of pre-and post-experiment exercises that attempt to engage the student and to involve them in the fundamental ideas behind the experiment. It also gives an overview of the problems associated with getting students to engage before, during and after the practical session.



The start and end of the book contains a good summary of the main problems associated with turning a practical session from cookery to a serious scientific exercise through which the student will actively learn from the experience. These sections are concise and clearly written and illustrated. The latter section introduces the reader to the educational views of the role of practical sessions in learning and while this may at first seem better placed in a journal such as J. Chem. Ed., this concise article would be of great benefit to those educators who are serious about developing a practical course that students will enjoy and learn from.

The main portion of this book is then devoted to twenty examples drawn from the breadth of the three classical chemistry sub-disciplines. These are primarily aimed at first and second year experiments which is entirely appropriate, since many educational establishments now run mini-projects or more focussed practicals at later stages in the degree programme. Although the ideas and detail of the pre- and post-experiment questions and exercises are very useful, it would be hard to build such practical ideas into a new practical course without the details of the experiment itself. Naturally if one already used the experiment or a close modification of it then these ideas are invaluable. This point should not be taken as a serious pitfall since an experienced educator should be able to visualise the experiment in question and use the information accordingly, however I do feel that a set of complete experiments would be more appropriate than those presented here.

Overall the booklet is a good resource that could have been expanded further and would definitely be of use to all laboratory course organisers who are desperately trying to find answers to the inevitable comments on student-feedback questionnaires.

Explorations in Physics

Subject area
Physics.

Description
A workbook/activity guide designed to enable students with a limited experience of science to discover the fundamentals of Physics through a series of stand-alone units.

Authors
David P. Jackson, Priscilla W. Laws and Scott V. Franklin.

Publishers/Suppliers
John Wiley & Sons, Inc (http://www.wiley.co.uk/).

Date/Edition
2003.

ISBN
0-471-32424-8.

Level
A-level, access, undergraduate.

Price
£29.95.

David Harwood
Institute for Science Education
School of Ocean Earth & Environmental Sciences
University of Plymouth
Plymouth PL4 8AA
October 2003

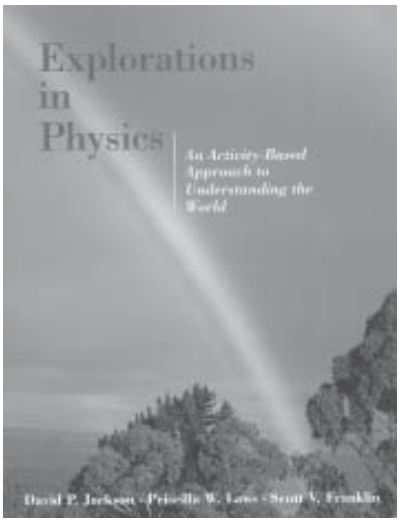
This is a well presented workbook with a glossy colour cover but a black/white/grey interior, designed to keep costs down. It divides the subject into a series of four units: A. Force, Motion and Scientific Theories; B. Light Sight and Rainbows; C. Heat, Temperature and Cloud Formation and D. Buoyancy, Pressure and Flight.

Summary Review

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

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

Each unit begins with clear objectives and guides the student through the topic using short overviews of the basic concepts, together with a series of experiments and activities which are well designed both to reinforce these and to build a more sophisticated model in the students' mind. This learning by discovery strategy engages the student not only in the basic physics but also in the scientific methodology of discovery by experiment and careful observation, leading to the formation of a theory. Another great strength of this small book is the application of the ideas to real world phenomena rather than the more traditional, often over-simplified, idealised world of the physics text book. Hence the book is very useful for non-physicists, having wide application in a range of undergraduate disciplines.



The material is well presented and clear. There are spaces left in the book for calculations, to answer questions, draw diagrams etc and the questions are well structured in that they guide the student into making the discovery with useful hints.

The book is clearly designed for a workshop learning environment and is well suited to small group laboratory based teaching. Although some parts of the units could be used as a self-paced study guide for autonomous learners, it would work best with some tutor guidance as some of the experiments require careful setting up if they are to work properly. The apparatus and materials required are fairly standard and the authors have done very well in keeping the use of specialised equipment to an absolute minimum.

Another strength of the book is the use of project work: projects are an excellent way of helping students to acquire deeper, more sophisticated ideas about basic scientific principles. They can also provide a very entertaining way of learning physics. There are some excellent suggestions for project work but the guidance on preparing a project proposal and project management might need to be expanded. Perhaps my favourite sections were the scientific problems such as "How did Archimedes expose the fraud?" using Archimedes' principle to test whether a material was pure gold or measuring the density of fog.

A useful, well researched and interesting book. Whether or not it is used with students as a workbook, it is an excellent source of inventive and fascinating teaching ideas which will serve to enliven the teaching of basic physics.

Fundamentals of Chemistry

Subject area
Chemistry.

Description
A general chemistry textbook.

Authors
David E. Goldberg.

Publishers/Suppliers
McGraw Hill
(http://books.mcgraw-hill.co.uk/).

Date/Edition
2003.

ISBN
0-07-121463-1.

Level
A-level, access, undergraduate.

Price
£37.99.

Tony Mitchell
7 East Willow Street
Beacon
NY 12508
USA
October 2003

In many ways this textbook is no different from other similar textbooks. This works for the text as well as works against the text. Since it is so similar to other texts, the reason for choosing it will based on non-pedagogical reasons. But since it is so similar to other texts, it quickly becomes like the other textbooks and offers nothing new.

Summary Review

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

The particular text that I obtained was easy to handle, in a reasonable easy font to read (though perhaps a bit smaller than convenient) and in paperback. This is a relief when you consider some of textbooks the readers and current students have to haul around today. Since it is a paperback, its durability will come into play and usage will determine its shelf life.

The order of the topics in the textbook is substantially no different from similar textbooks and this is going back some forty years. This makes it easily comparable to other texts but also points out the flaw of the textbooks in that it maintains the physical chemistry/theoretical chemistry approach that has dominated textbook development since the glory days of CHEM Study and the Chemical Bond Approach. Like many other authors, Dr. Goldberg has included “real-world problems” so students using this text will have some idea of how the material being covered applies to chemistry. But like others, these problems are used to reinforce the particular concept and not used as a means of developing the concept.

Similarly, in the nomenclature chapter, this text presents only the accepted Stock system. Even though this is the system preferred, it ignores the fact that industrial chemistry still uses old style names. While not arguing for a return to the “good old days” of memorizing Latin names and suffixes, there must be some realization that the old system is still used.

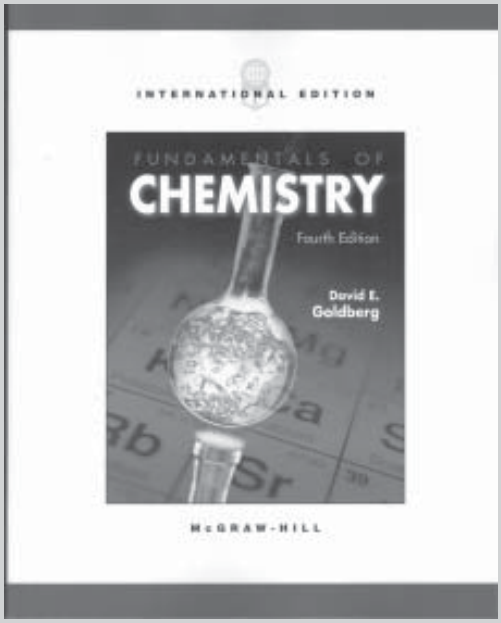
The text does a good job of providing real data in form of pictures and other artwork. It also comes with the ability to access an on-line resource as well as a second, independent website that has problems correlated with the textbook.

Both websites have student access points and instructor access points. In reviewing this material, the instructor access codes were not provided for either website. The first website (courtesy of the publisher McGraw-Hill and the author - see note 1) did come with a registration code for the student to use. This could be a problem if a student who purchases the text registers and later sells or gives away the text. The registration code that accompanies the text is a one-time code and cannot be transferred to other students (per text and login instructions).

The second website required a login code that would have been provided with a CDROM that came with the textbook. This textbook that I was provided with for this review did not come with a CDROM and there was no indication in the preface to the 4th edition that additional information was needed to log onto the second website. It also noted that the initial code was also a one-time registration code.

Continued on page 20

Fundamentals of Chemistry



From the publisher...

Fundamentals of Chemistry, 4/e

David E Goldberg.

This text is written primarily for use in courses designed to prepare students who wish to pursue a science major requiring a comprehensive course in general chemistry. These students, in most cases, have never taken a course in chemistry or have had limited instruction in the basic math that is required to solve chemistry problems, so a chemistry course can be very threatening to them.
To address this issue, this text has two major goals:
1. To provide a clear, consistent methodology that a student can follow to develop conceptual and quantitative problem-solving skills.
2. To engage the student by relying heavily on analogies that relate chemistry to daily life.

0-07-121463-1 704pp 2003 £37.99

Continued from page 19

It would have been nice to have look at how these two websites correlated with the textbook. It would be an advantage in using a text if there were an active correlation between the website and textbook problems. This makes it one of the first texts that I am aware of to do so. Is it enough to make it the text of choice for a class? That can only be answered by individual professors with knowledge of the students in their particular class.

Overall, this text is a fairly reasonable representation of the general chemistry textbook of today. Its use of pictures to show actual experimental results is commendable. Its attempt to use web-based information shows thinking beyond the traditional box of curriculum support (it is a shame that access is limited).

It certainly rates a more detailed examination by anyone thinking of a new textbook for their basic or introductory chemistry courses.

Note 1.
The text that I reviewed was a student edition and came with a student registration code. Instructors must request the appropriate registration code from their textbook representative. From the login instructions, what the student sees and what the instructors see may be two different things.

General Chemistry - the essential concepts

Subject area
General chemistry.

Description
A textbook designed for the first year of a North American degree programme.

Authors
Raymond Chang.

Publishers/Suppliers
McGraw Hill
(http://books.mcgraw-hill.co.uk/).

Date/Edition
3rd Edition.

ISBN
0-07-115115-X.

Level
A-level, access, undergraduate.

Price
£31.99.

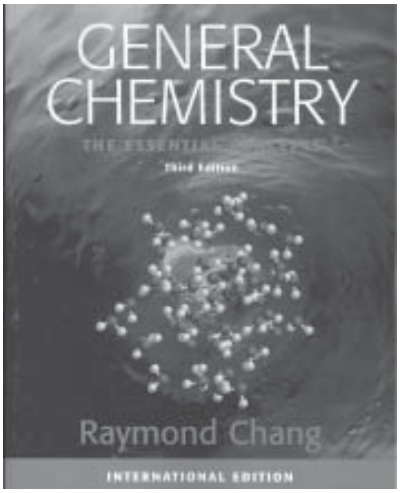
Gareth Price
Department of Chemistry
University of Bath
BATH
BA2 7AY
September 2003

Summary Review

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

This book is one of a number aimed at the first year of a typical North American university course which will typically consist of one semester of "general" chemistry followed by a semester of organic chemistry. As such, it is difficult to place the book within the UK market; it would certainly be useful for good A2 level students and also for many UK undergraduates although there are some topics where more depth might be required.

The most obvious problem for the UK market is, not untypically, the dearth of organic chemistry. The whole topic is treated in 30 pages and essentially only introduces the concepts of functional groups with little or no mechanistic information. This suits the US market but is a major limitation to widespread use in this country.



Most of the topics met in the first year of UK courses which might be categorised as inorganic or physical chemistry are covered. Most chapters start at a basic level and so the text would be useful as revision. Many topics are dealt with in sufficient depth to cover most courses although some such as MO theory might not go into sufficient depth. In others, some background is omitted; for example the Clausius-Clapeyron equation is merely stated with no account of where it comes from. Such an approach will limit the understanding of good students.

The layout of the book is good and the presentation is attractive with good use of colour and photographs. It is very readable and written in a "student-friendly" manner.

The material is presented in 22 chapters and, while the order may be rather eclectic in places, each covers a well defined section of work and contains a good selection of worked examples. Each chapter is also followed by a series of problems with selected answers.

In addition to the book, as usual these days there is a wealth of supplementary material available. As well as the Instructors' and students' study guide, there is access to a web site which contains diagrams, animations and links to other web sites. Some of these are straightforward while others are very useful. For example, the animation on intermolecular forces makes an excellent link between the bulk behaviour of a block of ice with what is happening to the individual water molecules.

Overall, this is a well produced and presented book which should serve its target audience well. However, the differences in style between the UK and North America mean that it will be less useful in this country although it would certainly find favour as a subsidiary text for chemistry programmes or, if supplemented by an introductory organic text, for introductory chemistry courses provided for other subjects.

General, Organic and Biochemistry

Subject area
Biochemistry for health-related subjects.

Description
A general chemistry textbook aimed at those for who the study of chemistry is not their main academic discipline.

Authors
Katherine J. Denniston, Joseph J. Topping, Robert L. Caret.

Publishers/Suppliers
McGraw Hill
(http://books.mcgraw-hill.co.uk/).

Date/Edition
2001/3rd Edition.

ISBN
0-07-118073-7.

Level
Undergraduate.

Price
£32.99 (www.amazon.co.uk).

Ron Cole
School of Applied Medical Sciences & Sports Studies
University of Ulster
Jordanstown
Newtownabbey
Co. Antrim BT37 0QB
September 2003

Summary Review

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

General, Organic, and Biochemistry is part of a learning/teaching package that is available for both the student and instructor.

For the Student:
Student Study Guide/Solutions Manual.
Laboratory Manual.
Is Your Math Ready for Chemistry.
Problem Solving Guide to General Chemistry.
Schaum's Outline of General, Organic and Biological Chemistry (this emphasises problem solving).
How to Study Science.
Book-Specific Website
(http://www.mhhe.com/physsci/chemistry/denniston).

For the Instructor:
An Instructor's manual.
Transparencies.
Computerised Test Bank.
Laboratory Resource Guide.
Book-Specific Website
(http://www.mhhe.com/physsci/chemistry/denniston).

In this review I shall be looking at two elements of the package, the Textbook and the Student Study Guide/Solutions Manual.

General, Organic, and Biochemistry
In their preface to the book the authors clearly state their market, "undergraduates of health-related subjects".
They further define their goals by stating: "It (i.e. the book) is written at a level intended for students whose primary professional goals do not include a mastery of chemistry, but for whom an understanding of the principles of chemistry and their practical ramifications is a necessity."

How many of us teach such students and so would welcome a text that fulfils these aims?

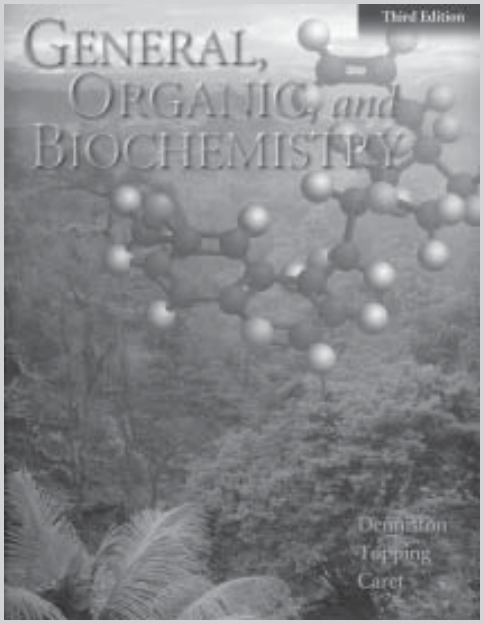
The book itself is divided into three sections:
General Chemistry
Organic Chemistry
Biochemistry

Each topic within each of the sections is clearly laid out, well explained and illustrated with excellent and appropriate diagrams. In addition the aims are spelt out and additional information is provided to add interest and impact.

The **General Chemistry** section covers, measurement, atoms & molecules, structure & bonding, calculations, states of matter, reactions, chemical & physical change, charge transfer reactions and radioactivity. Each topic is well structured and clearly discussed, providing examples where appropriate and ending with a summary, a list of key terms, and a number of questions and problems.

This section provides a good background for the studies in the subsequent sections and the absence of any mention of the d-block elements clearly indicates the emphasis of the book.

General, Organic and Biochemistry



From the publisher...

General, Organic and Biochemistry, 3/e

Katherine J. Denniston, Joseph J. Topping, Robert L. Caret.

Ours is an age when an understanding of chemistry has become an increasingly important aspect of medicine. The third edition of General, Organic, and Biochemistry has been designed to help undergraduate health-related majors and students of all majors understand key concepts and appreciate the significant connections between chemistry, health, disease, and the treatment of disease. This text strikes a balance between theoretical and practical chemistry, while emphasizing material that is unique to health-related studies. It is written at a level intended for students whose professional goals do not include a mastery of chemistry, but for whom an understanding of the principles of chemistry and their practical ramifications is a necessity.

0-07-118073-7 880pp 2001 £32.99

The **Organic Chemistry** section is once again well laid out and illustrated providing an excellent introduction. Each topic is again structured in the same way to provide a good learning environment. This section covers all the major organic function groups with a significant number of the examples drawn from biochemistry. In fact the Organic chemistry and Biochemistry are treated together so that the amines section also introduces us to proteins. This is the end of the Organic Chemistry section but there is no heading, *Biochemistry*, as we move into the consideration of the biomolecules.

The **Biochemistry** section provides a comprehensive introduction to biomolecules, their structure and function together with a consideration of enzymes, carbohydrate and fatty acid metabolism, aerobic respiration and energy production and molecular genetics.

The Student Study Guide/Solutions Manual
This compliments the main textbook.

The Study Guide provides a basic outline to the topic being studied and then provides a range of graded questions that will reinforce and enhance the learning. In some cases the aims were the same but in others the study guide builds on the information provided in the textbook.

The aim from within the textbook may be that the student should “learn” a number of facts. The questions within the study guide require the student to “recognise and discuss” the facts.

Examples of questions:

a. What does the ending –ane mean?
b. Give the molecular formula of ribose.
c. Normal physiological saline solution is a 0.09% (w/v) NaCl solution. How many grams of solid NaCl are needed to prepare 1.50 litres of this solution?
d. After NADH is oxidised to NAD^+ in the first step of the electron transport system, what happens to NAD^+?

Conclusion
The textbook is very well laid out with many excellent diagrams and illustrations. The Study Guide has a much more basic presentation style (presumably) to reduce the cost. There are very few errors in either text.

The books have a specific market and they fulfil their aim for this market. Many general chemistry textbooks have a very limited organic section. In this one certainly the inorganic chemistry is very limited.

This is an excellent textbook for the market at which it is aimed and the study guide provides good support.

Organic Chemistry

Subject area
Organic Chemistry.

Description
Undergraduate text for general organic chemistry.

Authors
Francis A. Carey.

Publishers/Suppliers
McGraw Hill
(http://books.mcgraw-hill.co.uk/).

Date/Edition
2003/5th Edition.

ISBN
0-07-242458-3.

Level
Undergraduate.

Price
£39.99.

John Leaver
10 Willow Bank Drive
Bollington
Macclesfield
Cheshire
SK10 5DG
September 2003

Summary Review

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

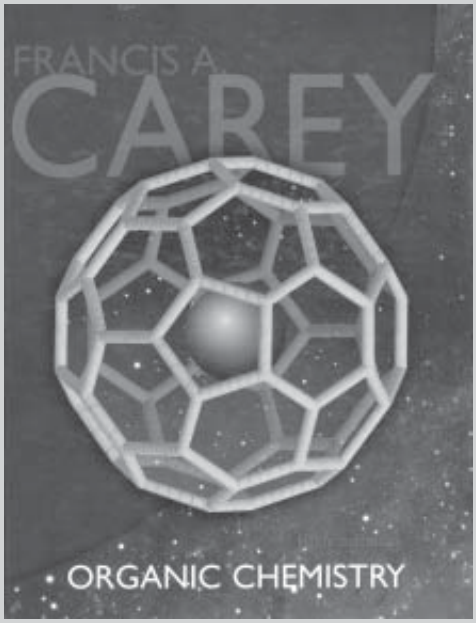
This latest edition of Carey is a comprehensive text for the undergraduate student of organic chemistry. The material covered is what one would expect for an Organic Chemistry text at this level. There are chapters on the usual range of functional groups, reaction mechanisms, spectroscopic techniques (concisely but very clearly described) and also chapters on molecules of biological interest (again, these are the ones that would be expected; lipids, amino acids etc). The written style is very readable and approachable while maintaining a high level of technical precision and clarity. There are many features to enhance the usefulness of the book, for example, the very effective use of colour and the clear layout. The depiction of molecules, reactions and reaction mechanisms is greatly aided by the use of colour to highlight the important features. The problems that are provided throughout the book have a distinctive and attractive layout and use of colour, which draws the eye to them and somehow makes one want to start answering them. At least, this was the effect on me! There are additional problems at the end of each chapter; presented in a more traditional style - and these seem far easier to skip over!

Some other useful features include marginal comments that serve a variety of purposes such as; highlighting important points, cross-referencing to other sections of the text and referring to the molecular modelling software packages included on a CDROM with the book (although unfortunately this was absent from the review copy). The software (SpartanBuild and SpartanView) is described in one of the appendices and looks as though it would provide a useful addition to the learning resources available to the student. It is intended that the modelling software be used by the learner while solving problems in the text and also as an alternative to the familiar plastic modelling kits. There are many useful tables provided throughout the book; the fact that these will easily ‘disappear’ into the thousand plus pages of the text has been recognised and a very useful ‘Where to find it’ page is provided. One table is deemed (correctly in my view) to be so useful that it is provided as a separate card; this is, of course, a table of acid dissociation constants.

Another appendix provides concise answers to all of the in-text problems. The answers to the end of chapter problems and further discussion of the in-text problems are apparently provided in a ‘Solution Manual’ to accompany the text, but this was not provided for review. During random sampling of the answers provided to the in-text problems no spurious or confusing answers were encountered.

To supplement further the learning materials available, access to supporting web content is also provided. A card bound into the front of the book has a tear-off strip with a registration code to be used to gain access to the supporting on-line resources. The login and registration procedure was achieved without problem. Several useful resources are available. Practice problems are provided for each chapter. These are presented in a multiple-choice format using a web-form and immediate feedback is provided upon submitting the chosen answer. There is tutorial material available for each of the topics covered in the printed chapters. The tutorial information provides a useful extension of the flexibility of the learning materials as a consequence of its hyperlinked nature, allowing one to

Organic Chemistry



From the publisher...

Organic Chemistry, 5/e

Francis Carey.

From the first edition through this, its fifth, Organic Chemistry has been designed to meet the needs of the "mainstream," two-semester undergraduate organic chemistry course. From the beginning and with each new edition, we have remained grounded in some fundamental notions. These include important issues concerning the intended audience. Is the topic appropriate for them with respect to their interests, aspirations, and experience? Just as important is the need to present an accurate picture of the present state of organic chemistry. How do we know what we know? What makes organic chemistry worth knowing? Where are we now? Where are we headed?

0-07-242458-3 1297pp 2003 £39.99

explore the topic by clicking on links. These tutorials also make use of the CHIME plugin to display molecular graphics. There are also chapter summaries in the form of pdf files. These are actually the chapter summaries from the printed version, but their availability in electronic format will make them useful as revision material.

Overall this edition of Carey's 'Organic Chemistry' provides a useful collection of learning resources (including the book itself!) for the undergraduate student. It is well presented, easy to use, covers a relevant range of material, effectively and can be thoroughly recommended to its target audience.

Physics by Inquiry Volume 1

Subject area
Physical sciences.

Description
Part of set of laboratory-based modules that provide a step-by-step introduction to physics and the physical sciences.

Authors
Lillian C. McDermott and the Physics Education Group at the University of Washington.

Publishers/Suppliers
John Wiley & Sons, Inc (http://www.wiley.co.uk).

Date/Edition
1996.

ISBN
0-471-14440-1.

Level
A-level, access, undergraduate.

Price
£31.95.

Alan Hinchliffe
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UMIST
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September 2003

This text forms part of a set of laboratory-based modules that are said to provide step-by-step introduction to physics and the physical sciences. Students work through simple experiments, often in pairs, and then discuss their findings with each other and with the Instructor.

Summary Review

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

Topics covered in Volume 1 are Measurements of matter; Pure substances; Scientific representations; Solutions of solids in water; Solutions of solids, liquids and gases; Measurement of heat and temperature; Thermal properties of matter; Light and shadows; Pigments and coloured light; Behaviour of magnets; Magnetic materials, Astronomy by sight.

There is a lot that is good in the text, and a few things that irritated me and need careful revision. I can illustrate both points by taking a few examples.

First the irritating.

1. On page 101 we read…
"We have now expressed solution concentration as the mass of solute (eg, salt) dissolved in 100 mL of solvent (eg water) and as the mass of solute dissolved in 100 g of solution (eg, salt water)."

I don't think so; concentration is amount divided by volume. The mole is conspicuous by its absence from the text.

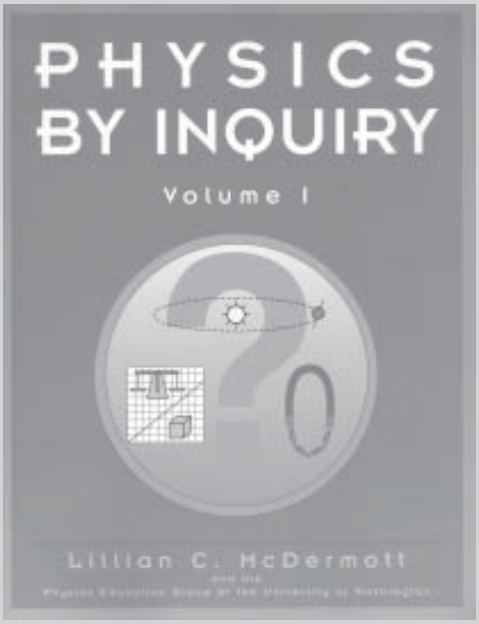
2. The completely cavalier treatment of quantities and quantity calculus, as exemplified by page 211…
Problem: A 250 g piece of a certain kind of metal receives 1000 cal of heat and increases its temperature from 20 °C to 44°C. If 300 cal of heat is delivered to 120 g of this metal, what will be the temperature change?
Solution
44 – 20 = 24
1000/250 = 4
4/24 = 1/6
1/6 ´ 120 = 20
300/20 =15
The sad part is, I know what the authors mean because I did my scientific training in an earlier era, but where are the physical quantities? It just isn't on.

The thing is that the authors seem to be getting confused between number calculus, where a symbol is the number of things as in page 87…
Let V be the volume in cm^3 of water added to each of the samples

and quantity calculus where we deal with physical quantities, as on page 182...
The specific heat of iron is about 0.1 something. What are the units?

To paraphrase Wellington before the battle of Waterloo, "I don't know what it does to the students, but by God it frightens me".

Physics by Inquiry Volume 1



From the publisher...

Physics by Inquiry, Volume 1

Lillian C. McDermott, Physics Education Group, Univ. of Washington.

These volumes consist of a set of interactive based modules that offer a step-by-step introduction to physics and the physical sciences. Through an in-depth study of a few fundamental concepts, readers develop critical scientific reasoning skills. Volume 1 introduces basic physical ideas and includes topics which represent the essential background for the study of physical sciences. Volume 2 extends coverage of several subjects treated in the first volume and introduces additional important topics.

0-471-14440-1 400pp 1996 £31.95

Then on to the things of which I do approve, exemplified by the following.

3. (page 40). Obtain a syringe from the staff. Compress the gas inside and observe what happens. Then resolve the following dispute between two students.
Student 1. I say that the volume decreased. Volume is the number of standard cubes that fits inside, and fewer cubes would fit inside after the piston is compressed.
Student 2. No, the volume is still the same. This is a closed system. Nothing could get in or out, so there is still the same number of cubes of air inside the syringe. Since there is the same number of cubes of air inside, the volume is the same.

Check your reasoning with a staff member.

This is all about communication and learning how to defend a hopeless position.

4. (page 327, Sun Shadows). Make a shadow plot every sunny day during the next few weeks. Each plot should include at least the period from about 9:30 AM to 3:30 PM. On each plot ….

As you make the plots, compare them with your predictions in Experiment 1.2.

Given the number of sunny days per annum in Manchester, this should keep them away from my office door for a considerable period of time (or number of hours, as the authors would have it).

We might just find a use for the text in our Foundation Studies, but the level is way below UK University First Year. But give us time.

Editor's note: see also the review of Physics by Inquiry Vol 2 on p31

Teaching Introductory Physics

Subject area
Physics.

Description
Teachers guide and introductory text.

Authors
Arnold B. Arons.

Publishers/Suppliers
John Wiley & Sons, Inc (http://www.wiley.co.uk/).

Date/Edition
1997.

ISBN
0-471-13707-3.

Level
Beginning lecturers, teachers of foundation/year one undergraduate physics, those with an academic interest in physics education.

Price
£57.50.

Gren Ireson
Matthew Arnold Building
Loughborough University
Leicestershire
LE11 3TU
September 2003

Summary Review

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

This text, which is not a traditional textbook, is in three parts. Part one, 410 pages, takes the reader through the research into physics education. Following a strongly developed case for teaching some basics skills before rushing into the physics usually taught the author gives a teachers' guide to a possible teaching approach for kinematics, dynamics, momentum, energy, static electricity, current electricity, electromagnetism, waves, light and early modern physics. However this is not the only material covered in part one. Of particular interest is the manner in which the author integrates the concept of energy into each theme and a much neater, than any other text, introduction of the first law of thermodynamics. The author also addresses scientific literacy, critical thinking and a host of miscellaneous topics, including an approach for the mathematically gifted student. For anyone wishing to delve further into the physics education research part one is extensively referenced.

Part two, 212 pages, of the text covers homework and test questions grouped by chapter heading from part one. However, once again, this is not what it may appear for these are not the typical end of chapter questions you would find in a typical course text. The emphasis in these questions is more on the explanation of reasoning than the calculation of the answer. Indeed the author suggests that many of the problems would be better suited to group discussion exercises and we are told that the majority of them have been field tested in this way. This part of the text concludes with, chapter-by-chapter, learning objectives, which one assumes would more than adequately allow a newly appointed lecturer to demonstrate their competence in this area.

Part three, 153 pages, is basically a monograph on the classical conservation laws covering linear momentum, conservation of mass, the concept of heat and the concept of energy. This part of the text makes a self-contained course on conservation laws at a level suitable for any introductory, calculus based, course of study with ample questions embedded in the text. Indeed if part three was available as a separate text it would make a suitable course text for students being both easy to read and scientifically sound.

The numerical questions tried by myself and colleagues cover a wide range of both topics and demand. The less typical questions, pushing for explanation rather than calculation, also provide a basis for some hard thinking and heated debate!

Taken as a whole it becomes difficult to suggest where it would be used. It is certainly not, in my view, a text that could be given to a student as a course book. Perhaps the new lecturer, especially one working through an induction programme, would get some useful insights into the application of current research into teaching and learning in physics. To this end the text clearly shows the difference in approach between UK and US physics departments – what chance such research being carried out in a UK physics department?

However perhaps it would become us all to dip into, even if occasionally, a text of this nature, the only losers, if we don't, will be the students.

The Physics Companion

Subject area
Physics.

Description
A revision aid and study guide for undergraduates in physics.

Authors
A.C. Fischer-Cripps.

Publishers/Suppliers
Institute of Physics Publishing (http://bookmarkphysics.iop.org/).

Date/Edition
2003.

ISBN
0-750-30953-9.

Level
Undergraduate.

Price
£13.00.

Ashley Clarke
Department of Physics & Astronomy
University of Leeds
Leeds
LS2 9JT
October 2003

This A5 - sized reference/ revision book is reasonably light-weight (at least compared with the tomes of Tipler, O'Hanian and their ilk) and is aimed at first year undergraduate students. It is competitively priced at £13 from the Institute of Physics Publishing.

Summary Review

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

It is split into five broad sections: Thermal Physics (67 pages), Waves & Optics (87 pages), Electricity (85 pages), Mechanics (70 pages) and Properties of Matter (56 pages). The brief description of the book contents on the rear cover says that '… topics covered also include Atomic & Molecular Physics, Nuclear Physics and Space Science' - but it really has very few pages on these topics, except for Space Science which is within the Properties of Matter section.

It is obviously written by an author who has experience of teaching at this level. The students will appreciate the single page, equation summaries, the worked examples and also the useful asides (like … 'make sure that you are in radian mode when running this calculation on angles'). I think that it has been well proof read (no spelling errors or equation errors were detected) and the many illustrations are clear and informative. The language used is straightforward and uncomplicated but possibly with the odd, potentially confusing to the student, mathematical shortcut e.g.

$$\frac{I}{I_0} = \cos^2 30 = 75\%$$

(rather than equals 0.75 and then state it as a percentage).

Thermal Physics:
In this section, there are some interesting asides which aim to develop the physicists intuition and it includes the gas laws, work and thermodynamics, gas processes into kinetic theory and heat engines, ending with entropy and the second law of thermodynamics.

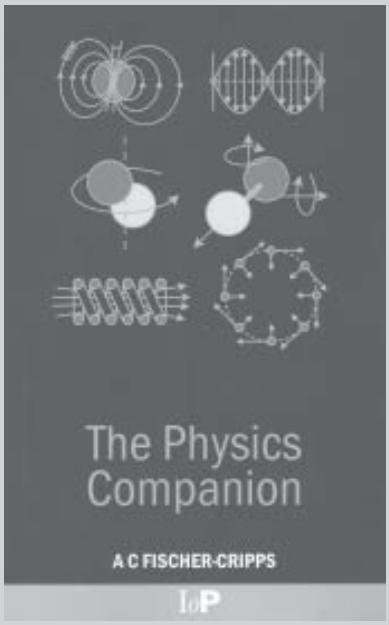
Wave and Optics:
It is standard stuff in this section: wave motion and shm, energy transfers and superposition of waves, fourier analysis and propagation of sound, reflection and refraction leading onto mirrors and thin lenses. It also includes ray diagrams for optical instruments, together with interference, diffraction and polarisation.

Electricity:
This section title does not do justice to its scope. It has not only electrostatics but also the basics of circuit theory (typical waveforms seen in RLC circuits) and there are vignettes on magnetism and magnetic material effects too, ending with Maxwell's equations and EM waves.

Mechanics:
There is a nice treatment (from the basics) of scalars, vectors and vector operations through to moments, forces rotational motion, work and energy and finally impulse and momentum. Increasingly, more departments of physics will require remedial input to their first year Mechanics teaching and this book could help the student with revision.

Continued on page 30

The Physics Companion



From the publisher...

The Physics Companion

A C Fischer-Cripps.

The Physics Companion is a revision aid and study guide for undergraduates in physics. It covers the core topics taught in undergraduate physics degrees world-wide, deriving key concepts and equations in clear one-page figure-rich descriptions. Each subsection contains a summary of the main equations, together with a set of worked examples. The topics covered include -

· Thermal Physics
· Electricity and Magnetism
· Waves and Optics
· Mechanics
· States of Matter
· Quantum Physics

It is not intended to be a course textbook, but instead should be used as supporting material for other texts. The book will be an essential resource for undergraduate students throughout the course of their degree.

0-750-30953-9 378pp 2003 £13

Continued from page 29

Properties of Matter:
This is a wide ranging section which discusses fluids, solids leading onto photons, the photoelectric effect and the Balmer series. Discussion on the de Broglie, Heisenberg and Schroedinger equations leads onto Einstein's energy equation, a few pages of nuclear physics and finally Space Science.

On the back cover of the book, even more examples and worked solutions are promised at the website, http://bookmarkphysics.iop.org. However, having accessed that website, it is not obvious to me how exactly one is to obtain problems and solutions in connection with this book! But maybe that speaks volumes about my limited skills in web-surfing.

In fact, this book (all 378 pages) forms a good companion text to the pocket-size, equations leaflet that the LTSN Physical Sciences Subject Centre has recently produced of equations relevant for first year physics undergraduate students. As far as I can tell, most of those equations selected by LTSN are covered in this book. The compact, explanatory cameos, associated with the different basic physical concepts found in 'The Physics Companion', should form a sound link to the more complete explanations in the traditional, hernia-inducing, physics textbooks.

Tutorials in Introductory Physics/Physics by Inquiry Volume 2

Subject area
Physical sciences.

Description
Tutorials and laboratory-based modules that provide a step-by-step introduction to physics and the physical sciences.

Authors
1. Tutorials in Introductory Physics.
L.C. McDermott, P.S. Shaffer and the Physics Education Group, University of Washington.
2. Physics by Inquiry.
Lillian C. McDermott and the Physics Education Group at the University of Washington.

Publishers/Suppliers
1. Tutorials in Introductory Physics.
Prentice Hall
(http://www.prenhall.com).
2. Physics by Inquiry.
John Wiley & Sons, Inc
(http://www.wiley.co.uk).

Date/Edition
1. Tutorials in Introductory Physics.
2002.
2. Physics by Inquiry. 1996.

ISBN
1. Tutorials in Introductory Physics.
0-13-097069-7.
2. Physics by Inquiry. 0-471-14441-X.

Level
A-level, access, undergraduate.

Price
Tutorials in Introductory Physics.
£19.99 (www.amazon.co.uk).
Physics by Inquiry. £31.95.

Summary Review

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

Physics is a bit like magic. We start with macroscopic materials which we analyse into molecules and atoms with properties nothing like those we measure for the initial material, but which we are sure are correct. Then we put the atoms together and magically the macroscopic properties emerge. Physics education, when it works, is also like magic. We analyse how we do physics into a number of atomic operations, through which we painstakingly take our students hoping that in the end a physicist will emerge. Too often however, we do not analyse what we do, but what we know, and just hope that it will be effective. Sometimes it is not. (In Einstein's memorable phrase, 'never have I met a man who knew so much and understood so little'.) This is where McDermott's Physics by Inquiry comes in.

McDermott has spent two decades looking at how the specific difficulties of physics teaching can be addressed, and it is not through the mere telling of the story. This book breaks down physical ideas into a large number of simple experiments, which are used to illustrate physical principles in such a way that students can build up a picture of how these operate. Students are expected to work through the experiments in groups and, by answering carefully crafted questions, to see the physics emerging. The level is that of a school physics course and I imagine it would be the sort of thing that enlightened teachers would be doing here in those schools where our students still do experiments.

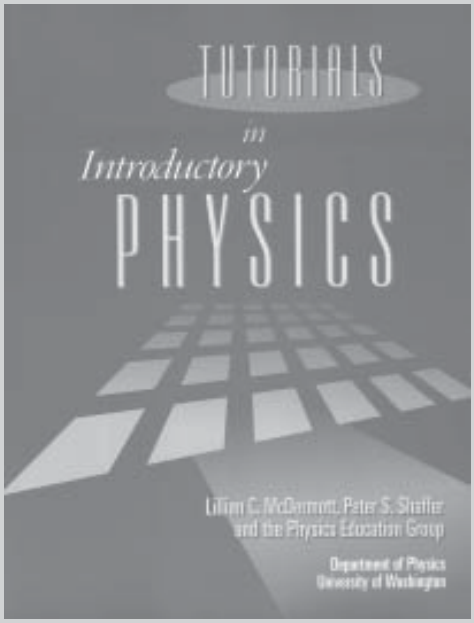
The difference between McDermott's course and what we probably remember of school physics is the scale of the experiments. Here they are designed at the micro level. For example, to build up an understanding of resistors in series and in parallel there is a sequence of 14 experiments with batteries and light bulbs. The volume under review provides the material for an introductory physics course in current electricity, electromagnetics, optics and kinematics. I like the setting of kinematics at the end – the experiments include a lot of pencil and paper exercises that might send out the wrong message at the beginning.

I know the material has been extensively tested, so it must work, but I cannot suppress some doubts. For example, in the history of science such matters as the division of unlike quantities, such as space and time intervals, to form a meaningful ratio, and the analysis of velocity-time graphs to elucidate the nature of uniform and non-uniform acceleration (by comparison with distance-time graphs) were two major intellectual insights. I do not believe this comes across. Perhaps the answer would be that such things should appear elsewhere in a physics course and not interrupt the clear, cold logic of an orderly presentation. There are also some minor quibbles. I really do wonder whether to treat the usual form of average speed as $\Delta x/\Delta t$ as something that emerges from a time-weighted average of speeds, rather than the other way round, really does aid intuition. For the record, volume I provides an approach to scientific reasoning and an introduction to fundamental concepts.

Derek Raine
Department of Physics & Astronomy
University of Leicester
Leicester LE1 7RH
October 2003

Continued on page 32

Tutorials in Introductory Physics/Physics by Inquiry Volume 2



From the publisher...

Tutorials In Introductory Physics and Homework Package

Lillian C. McDermott, Peter S. Shaffer, Physics Education Group, Univ. of Washington.

For use as a supplemental text for conceptual recitation/tutorial sections of introductory undergraduate physics courses.

This landmark book presents a series of physics tutorials designed by a leading physics education research group. Emphasizing the development of concepts and scientific reasoning skills, the tutorials focus on the specific conceptual and reasoning difficulties that students tend to encounter. The tutorials cover a range of topics in Mechanics, E & M, and Waves & Optics.

0-13-097069-7 445pp 2002 £19.99

Continued from page 31

The other aspect of the dissection of knowledge that emerges is the extent to which material has to be broken down to reach an atom of instruction. Tutorials in Introductory Physics, from the same stable, is based on the premise that the standard textbooks do not break things down enough. The book is again meant to be used for small group study. Its 250 pages take the students through sets of problems in mechanics, electromagnetism, waves and optics essentially at advanced school level, again emphasizing independent learning. There is a homework book for individual work. The idea is not to calculate anything without understanding what is being calculated. This is certainly a welcome addition to the standard end-of chapter exercises.

The books are written at a level that is probably not that useful for a university student in the UK although it should certainly be studied by school instructors. I would like to say that it might inspire fresh insights into the teaching of physics at university level. However, one cannot but be intimidated by the amount of effort such an approach might require. Rather we should perhaps hold on to the idea that well-directed group work and targeted instructor-student interaction, rather than the atomic form of the material itself, is the key.

Editor's note: see also the review of Physics by Inquiry Vol 1 on p26

Desktop Molecular Modeller

Subject area
Organic chemistry and biochemistry.

Description
A PC program for displaying molecules.

Authors
Polyhedron Software; M. J. Crabbe.

Suppliers/Distributors
Polyhedron Software (http://www.polyhedron.com/dtmm/dtmm.html).

Date/Version
Version 4.1.

Level
Undergraduate.

Type of package
Molecular modelling.

Price
£69.00.

Hardware required
A PC capable of running Windows 95, mouse, 15 MB hard disk space.

Software required
Windows.

Jonathan M. Goodman
Department of Chemistry
Lensfield Road
Cambridge
CB2 1EW
September 2003

Desktop Molecular Modeller (DTMM) is, according to its website (http://www.polyhedron.com/dtmm/dtmm.html), 'a simple-to-use molecular modelling program that enables you to perform powerful molecular synthesis, editing, energy minimizations (see fig 1), and display. The package, substantially enhanced from previous versions of DTMM, will run on any PC with Windows 95, 98 or NT.'

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	**

I reviewed an earlier version of this package ten years ago. At that time, I was impressed by the libraries of molecules which were available with the program and the accompanying booklets. The ability to visualise and manipulate a range of molecules was a valuable teaching aid. Now that 3D manipulation is commonplace and there are libraries of molecules freely available on the web, I looked forward to seeing how the package had developed over the last decade.

The list of new features for DTMM version 4 showed that the improvements have mainly been presentational: improved display styles; new interface; extensive button bars. After installation, which was straightforward, I immediately started experimenting with the program, and I was able to build and rotate a peptide strand quite quickly using the peptide builder. I then moved on to organic molecules, and I tried to build cyclohexane. After some experimentation, I was reluctantly obliged to turn to the help files and tutorials, which are available on-line as a part of the package and also available on the Polyhedron website (http://www.polyhedron.com/dtmm/manual.zip).

After reading the instructions, I was able to build molecules quite effectively, although the interface required more mouse clicks than necessary for an unambiguous definition of the structures. For many operations, there is a choice of using menu features, or using the 'speedbar buttons' which are icons around the screen duplicating some of the menu functionality. With some practice, the 'speedbar buttons' would probably be the quickest option, but for a beginner they are rather cryptic, particularly as choosing some buttons makes others appear and disappear.

One useful feature of the program retained from earlier releases is the availability of more than 250 structures supplied in data files with the package. The best way to draw cyclohexane was to load it from this library. DTMM has the facility to do force-field based energy calculations, so I tried to calculate the energy of cyclohexane. Again, the strategy of choosing promising looking commands and hoping was unsuccessful, but a search through the help files revealed the procedure is to click on 'Fragments', which makes the right speedbar buttons appear, and then select all atoms (Edit menu), and then click on energy. The results of the calculation were written to an HTML file, which could be displayed with a web browser.

Continued on page 34

Desktop Molecular Modeller

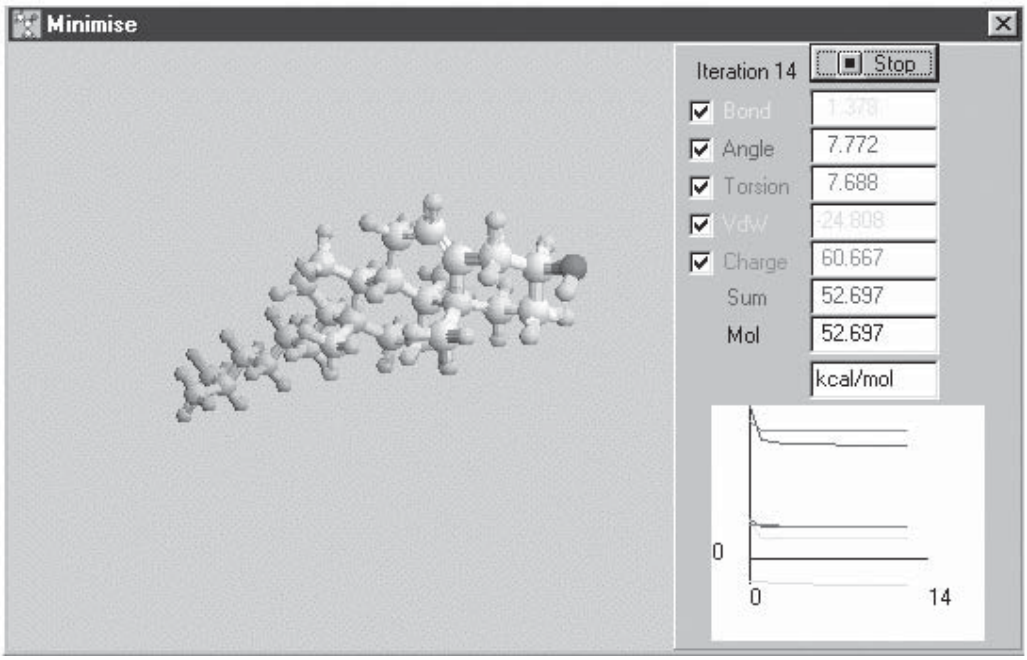


fig1: Minimiser window in DTMM v4.1

Continued from page 33

I then distorted cyclohexane into a twist boat shape, and re-minimised it. This produced a symmetrical boat, and not the twist boat that I expected. This could be a problem with the force field, on which little information is available. It could be a problem with the minimisation method: a 'fragment-based Newton-Raphson approach'. It could be a problem with the 'space hunting' automatic conformation analysis procedure which means that structures may not minimise to the nearest local minimum. DTMM's energy calculation procedures provide an introduction to molecular modelling, but it is not clear exactly what procedures are being followed, and in this example the results are misleading.

The surface area calculations, volume calculations, and intermolecular energy calculations are useful resources, and DTMM's ability to check chemical connectivity is a handy feature. The program also provides a reasonable set of tools for molecular display and superimposition. The quality of the images it produces is not very high, and the program did not take advantage of the graphics capability of the computer I was using, which has a run-of-the-mill graphics card by 2003 standards.

DTMM is a package in a market with stiff competition. There are commercial competitors, which offer much greater functionality sometimes for somewhat greater cost, and free software which can display and manipulate molecules as effectively. I know of no other package, however, which has exactly the same combination of features.

In conclusion, DTMM v4 is a useful program especially if the features it offers fit well with those required for a particular application. However, it is not cheap in terms of the features it provides, and there are many other programs available which could be used to provide similar molecular displays. DTMM has the advantages that it can be used on older computers, including Windows 95 PCs, and requires only a small amount of disk space for installation, and so these features make it attractive for some teaching applications.

KnowItAll Academic Edition

Subject area
Analytical chemistry.

Description
An integrated informatics package for analytical chemistry.

Authors
Bio-Rad Laboratories.

Suppliers/Distributors
In UK: Bio-Rad Laboratories, Informatics Division, Bio-Rad House, Maylands Avenue, Hemel Hempstead, Herts HP2 7TD (http://www.knowitall.com/academic/).

Date/Version
2003/Academic Edition Version 3.0.

Level
Undergraduate, research.

Type of package
Cheminformatics.

Price
Free to students and academics for personal use. Other versions are available – contact supplier for details.

Hardware required
Windows-compatible PC, Pentium III (or equivalent) processor, 128 MB of RAM, 100 MB of free hard disk space.

Software required
Windows 2000, Windows XP.

Roger Gladwin
LTSN Physical Sciences
University of Liverpool
Liverpool L69 7ZD
October 2003

This integrated software package from Bio-Rad is available free-of-charge to the academic community as a ca. 50MB download. Once the download and registration are complete a Product Registration Code will be emailed with instructions for activation of the system. Some parts of the interface, and the large download, are via the internet so a good connection is required.

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	****

With the Academic Edition of KnowItAll, you can draw structures, perform IR and Raman functional group analysis, access a multi-technique spectral database with cross-references, and generate high-quality reports. The set of tools resides in one common integrated interface making it easy to learn and easy to transfer data from application to application. There are also free on-line training movies to show how to use and get the most out of the software.

The following applications and features are included in the KnowItAll Academic Edition:

DrawIt
This is a 'typical' drawing package for chemistry with 'chemical sense' that allows the user to draw 2D and 3D structures. It also features the facility to assign stereochemical designators for R/S centres and E/Z bonds, and for R/S centres in Fischer projections of sugars. The package works well, within minutes you can generate a 2D structure and, once complete, use the 'Transfer to' toolbar to convert it to a 3D representation (or one of the other applications available) and optionally use the 'Compute' menu to create 'true 3D coordinates'.

ReportIt
With this unit it is possible to generate laboratory reports containing IR, NMR, MS, and Raman spectra, and chromatograms in common native file formats and/or reports complete with structures, spectra, tables etc and to access laboratory glassware and engineering symbol clip art for inclusion in the report where appropriate. There are in-built templates or, if you want something special, you can create one from scratch. This is potentially very useful as there are many graphics examples to chose from as well as those generated by the system or drawn (say) using DrawIt. I can see students finding this resource particularly useful when writing up laboratory reports.

AnalyzeIt
This can provide help with interpretation of IR and Raman spectra. Draw a structure in DrawIt and 'Transfer to' the appropriate application or load a spectrum file from a database directly into the AnalyzeIt application. Then when you click on a peak of interest the system will generate a list of functional groups possible for that frequency. You can also correlate the expected group frequencies from a structure with a spectrum. This is a powerful tool and could be used successfully for teaching the interpretation of spectra.

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KnowItAll Academic Edition

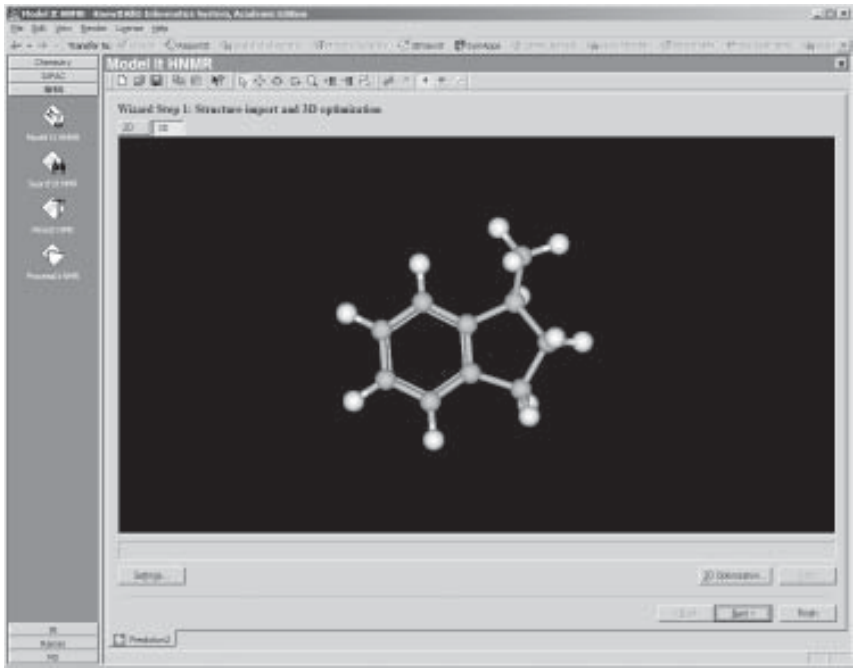

fig 1: Example screen from ModelIt HNMR in KnowItAll

There is also limited access to IUPAC NameIt which allows a structure to be systematically named, IUPAC DrawIt which takes a name and draws the predicted structure and ModelIt HNMR which takes a 2D structure, generates an optimised 3D representation (see fig 1) then calculates a predicted HNMR spectrum.

There are other versions of the KnowItAll system which require purchase of a licence from Bio-Rad (although some limited features can be accessed for free). These include an ADME/Tox version for drug discovery application and an Analytical version with more emphasis on analytical techniques.

As supplied via the download the Academic version comes with a small demonstration database with ten entries. It is possible to use the tools provided to create user databases or others may be purchased through subscription. I counted 170 databases listed for KnowItAll, including Pesticides & Agricultural Chemicals, Solvents by Vapour Phase, Petroleum Chemicals and Polymer Additives.

KnowItAll 3.0 will not work on Windows 95, Windows 98, Windows 98 SE, Windows ME or Windows NT 4.0 and there is no Macintosh version of this software. When using Windows 2000 or Windows XP Professional you need to log on with Local Administrator privilege when you install the Academic Edition. Activation of the Academic Edition with the Product Registration Code which has to be emailed to you also requires that you are logged on with Local Administrator privilege.

There is also a KnowItAll Community Web Discussion Board (but I couldn't find any entries).

All in all, for the price, this is a useful package. However, if you find you are wanting more than the basic facilities then you will have to pay.

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RefineIt IR and Raman and ProcessIt NMR
These units allow the importing and processing of spectra from various instrumental sources. The output may be a spectrum with experimental artefacts removed or with baseline correction or smoothing etc. There will be those who say you shouldn't be doing any of this – I guess it depends on your application.

Sadtler Spectroscopy Handbooks – Internet Edition
There is a link on the start-up page which offers access to these handbooks - only the Handbook of IR Spectroscopy is available as yet. There is information here to confirm data found via the AnalyzeIt application. As the name implies, this application requires an internet connection.

SymApps
This is the well-known package for molecular symmetry analysis. It allows you to calculate, display and animate the symmetry for a molecule, to create movies for the three basic rotations and calculate point groups, bond lengths, angles, and dihedral angles for all the atoms in a structure.

General laboratory calculations
There are three general purpose chemistry tools…
1. Convert from mole to mass or mass to mole
2. Calculate molecular weight from structure
3. Access MS fragmentation & MS documentation tools

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