student) to choose from. *Experimental Organic Chemistry* follows a similar pattern. What distinguishes it from other texts are the experiments. They are not a rehash of familiar experiments, but a set of new ones. Moreover, they are interrelated since the product of one experiment can serve as the starting material for another. The authors suggest that besides being educationally beneficial, it can also whittle down the cost of the laboratory course. By choosing readily available chemicals for both the starting materials and the products, the authors have avoided the pitfall of locking the user into a prescribed set of experiments and the vexing problem of what to do with the student who gets a poor yield. The variety of experiments is impressive — Sn1 substitution, Sn2 substitution, enzymatic hydrolysis, phase transfer catalysis and so on — and they include a good collection of short multistep (two or three steps) syntheses. The book has much to recommend it besides the experiments. The techniques are explained fully and clearly, the experimental procedures are detailed and clear, the artwork is accurate and well drawn, and the reproductions of the IR and NMR spectra are sharp. All in all, this is a well crafted book, definitely one to be considered when choosing a text for laboratory courses.

One of the most familiar books for the organic qualitative analysis course has been *The Systematic Identification of Organic Compounds.* A sixth edition has been recently published and this edition is markedly different from its predecessors. The most obvious difference is the size; the newest edition is approximately 50% wider than the fifth edition. This larger size is needed to contain the expanded text. For the most part, all of the elements of the older editions are incorporated in this edition, including the measurement of physical properties, the classification tests, the preparation of derivatives and the comprehensive tables of derivatives. What has been added are more extensive discussions of spectroscopic methods of identification and chromatographic methods of separation. The latter topic was completely omitted in previous editions.

Other additions are a larger introduction, including a discussion of laboratory safety, a more detailed explanation of basic laboratory techniques such as distillation and recrystallization, and a chapter on the literature of organic chemistry (principally an annotated bibliography). The book would be useful for the classic organic qualitative analysis course (if any of these still exist). It could also be used in an introductory organic laboratory course emphasizing qualitative analysis if supplementary material describing the theory of the basic techniques is available, since no theory is explained in the text. □

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Joys of general chemistry

Charles A. McAuliffe

Chemistry (With Inorganic Qualitative Analysis). By T. Moeller *et al.* Pp.1085. (Academic: 1980.) £14, $21.95. *Chemistry: A Systematic Approach.* By Harry H. Sisler, Richard D. Dresdner and William T. Mooney Jr. Pp.960. (Oxford University Press: 1980.) £13.50, $19.95. *First Year Chemistry.* By J. M. Coxon, J. E. Fergusson and L. F. Phillips. Pp.376. (Edward Arnold: 1980.) Pbk £9.75.

I HAVE been reviewing freshman chemistry texts for this edition of *Nature* for four years and, despite a long association with a number of American universities and their methods of teaching, each particular year of carrying out this task offers me an opportunity of seeing new facets in these books. For example, the best of this type of book, in addition to expounding chemical fact and theory, also stresses the application of chemistry to everyday life. I have been particularly pleased by attempts in a number of excellent texts at the way in which environmental problems are related to the chemistry being illustrated. For example, consideration of the reactions involved in the generation of photochemical smog cannot only make a student appreciate the chemistry of the nitrogen oxides and ozone, but also that of organic free radicals and the importance of light in initiating chemical reactions. Similarly, dealing with elemental cycles in the biosphere not only emphasizes their importance to life but also serves to make simple chemistry very real; for example, the most important of all chemical processes, photosynthesis, should not be dealt with in isolation, large subject though it is, but can in a freshman text be linked to the oxygen and carbon cycles and fossil fuel generation.

The enormous market for freshman (or general chemistry) texts in the United States ensures that many are available. In previous years I have emphasized how awful some of these texts are, and one shudders to think of them being foisted on students by their authors; many potentially creative chemists must be lost in this way. However, the three texts dealt with here are, in their different ways, a joy to behold.

Chemistry (with Inorganic Qualitative Analysis) has so much to recommend it. There are 32 chapters and it is sensible to give a brief indication of their range so that one can understand the scope of a large textbook such as this. Atomic structure and nuclear chemistry, chemical bonding, periodic properties, thermodynamics, kinetics and electrochemistry provide an adequate theoretical basis. Descriptive group chemistry and some, though never enough, organic chemistry is related to reactivity and stoichiometry. There are several chapters on qualitative analysis.

It is difficult to single out individual sections of this book for praise. I used the extensive index a great deal in examining the book. Nothing which should be included has been omitted; the text is concise and illuminating. Like many such books, the diagrams are excellent. I particularly enjoyed the copious vignettes entitled "Thoughts on Chemistry". These are enlightening quotes, a page or so in length, which range from "The Requisites of a Good Hypothesis" (Robert Boyle), "The World's Biggest Membrane" (from Lewis Thomas's memorable observations in *The Lives of a Cell: Notes of a Biology Watcher*), "The Chemical History of a Candle" (Michael Faraday), "The Centrality of Chemistry" (Martin Sherwood), to "The Epigrams of Remigius Fresenious". This book is to be highly recommended. I have only two criticisms. The minor criticism is that on the same page (p. 21) which shows the structure of chlorophyll *a* there is advice on how to pronounce $NaNO_3$ ("N-A-N-oh-three") and H_2SO_4 ("H-two-S-oh-four") — this grated on me. More serious is the large amount of space they devote to inorganic qualitative analysis. This is a grindingly boring topic and, if included at all, should be kept to a minimum. The authors would do well to extend their good descriptions of infrared, ultraviolet and nuclear magnetic resonance spectroscopy.

Chemistry: A Systematic Approach is also to be recommended. It is comprehensive and I particularly enjoyed the chapter on the chemistry of living systems. An instructor's manual (by W. H. Myers) is available.

First Year Chemistry is a somewhat different book. The authors aim to produce a text in which approximately equal weight is given to physical, inorganic and organic chemistry, and minimizes the divisions. It is a very good attempt, but the book may have limited appeal. It assumes a much greater basic knowledge than do the other texts and may be only suitable for the New Zealand system, in which the authors work.

Finally, might I appeal to all of these authors? Expressing photosynthesis as

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2 + \text{energy}$$

is very misleading, even though this is the way major biology texts frequently express it. Carbon dioxide does not react with water as implied by the equation. Further explanation would be enlightening □

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