Organic chemistry, in theory . . .

John Mann

Organic Chemistry. 2nd Edn. By T. W. G. Solomons. Pp.1066. (Wiley: 1980.) Hbk £15.25, \$33.25; pbk £7.90, \$18. *Organic Chemistry*. By D. S. Kemp and F. Vellaccio. Pp.1421. (Worth: 1980.) Hbk \$26.95, £10.25; pbk \$14.95, £5.

It is not often that an organic chemistry textbook is the subject of a plagiarism suit, but such was the fate that befell the first edition of *Organic Chemistry* by T. W. G. Solomons. After a four-month hearing the book and its author were cleared in March 1980, just prior to the release of the second edition. Personally, I have always found the other book in question (*Organic Chemistry* by R. T. Morrison and R. N. Boyd; Allyn & Bacon, 3rd Edn 1973) pretty indigestible and rather old-fashioned, though students seem to like the summaries of functional group chemistry.

Professor Solomons's book has similar summaries at the end of most chapters, but it also has a great many features which enhance its value relative to Morrison and Boyd. The order of treatment is conventional, commencing with hydrocarbons and bonding, and proceeding through the various functional groups to carbohydrates and proteins. Well-chosen special topics are interspersed throughout, and complement the chapters in which they appear. We thus have naturally-occurring alkenes and the photochemistry of vision at the end of the chapter on conjugated unsaturated systems; a beautifully illustrated and lucid account of protein biosynthesis accompanies the chapter on amino acids and proteins; and there are also useful sections on applications of the Woodward-Hoffmann rules, halo-organic insecticides, polymerization, and biosynthesis of fatty acids and steroids. One small puzzle is why thallation deserves a six-page section of its own, while the Wittig reaction and organosulphur chemistry (both much more important in modern organic chemistry) receive only scant attention. The chapter on spectroscopic techniques, now a must for any organic text, provides a very good introduction to the subject, and is comparable with the corresponding section in *Introduction to Organic Chemistry* by A. Streitweiser and C. H. Heathcock (Macmillan, New York, 1976), the book that we recommend to our students.

There are a few disappointments in Professor Solomons's book. For example the absence of a section on the strategy of synthesis, and the rather old-fashioned account of synthesis and reactions of β -dicarbonyl compounds which contains a long list of named reactions, but little in the way of modern synthetic applications or mention of their relevance to biochemistry. These criticisms aside, the main functional group chemistry is well done, the book is

beautifully produced with two-tone drawings and section headings, and there are clear chemical structures throughout. It is readable and reasonably up-to-date in most areas, and has innumerable useful problems throughout, with answers supplied at the end of the book or in the separate solutions manual.

The authors of the second glossy American book under review, D. S. Kemp and F. Vellaccio, claim that there is a need for a text emphasizing the chemistry of the oxygen- and nitrogen-containing functional groups. The book is designed for an American one-year/three-semester course (as I suspect Solomons's book is), and it is divided into three main parts: chemistry of functional groups and structure proof; chemistry of hydrocarbons and carbonyl chemistry; and advanced topics. The order of treatment is thus somewhat different from that of most other texts. Apart from this difference, the treatment of topics is rather similar to that in Solomons, except that there is more emphasis of applications to organic synthesis. The authors claim that their treatment of carbonyl chemistry is the "most accessible and interesting of any that are available", and in this they are probably correct. The chapter on spectroscopic methods provides a good introduction to NMR and IR, but is very weak on mass spectrometry (a mere three and a half pages), while chapters on carbohydrates, proteins and nucleic acids are

good, though not so well done as in Solomons. There are good sections on the Woodward-Hoffmann rules; rearrangement reactions; reactive intermediates; and organometallic reagents, which includes as special topics hydroboration, silanes, organomercury compounds and thallation. Coverage of heterocyclic chemistry is, however, rather weak, and natural products are dealt with in a somewhat fragmented way. The penultimate chapter, on the synthesis of six compounds of theoretical or practical importance, is novel and makes interesting reading. It includes, amongst other topics the conversion of penicillins into cephalosporins, and capped porphyrins. Again, there are useful problems throughout, and the 670-page workbook and solutions manual should find many friends amongst both students and academics. Throughout, the illustrations are very good, but the book is not quite so lucid or readable as Solomons, and many students will miss the reaction summaries.

Both books are modern texts comparable to the excellent Streitweiser and Heathcock, and will I am sure sell well, especially in the USA. However neither of them has everything quite right, and the ultimate text has still to be written. But then, there is probably no such thing! □

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Experimental Organic Chemistry. By Michael P. Doyle and William S. Mungall. Pp.490. (Wiley: 1980.) Hbk £10.10, \$23.70; pbk £5.95, \$13. *The Systematic Identification of Organic Compounds*. 6th Edn. By R.L. Shriner et al. Pp.604. (Wiley: 1980.) Hbk £13, \$30.55; pbk £6.90, \$15.90.

THE pedagogical aim of an organic laboratory course is to introduce the student to the basic techniques used by chemists for the preparation, separation, purification and identification of organic compounds. Besides demonstrating such techniques as distillation, recrystallization, chromatography and extraction, the laboratory is a showplace for demonstrating the chemical properties of the various organic functional groups. Most introductory laboratory courses use what might be dubbed "the synthetic approach". The techniques are introduced in the context of carrying out typical organic reactions, such as an S_N1 substitution or an $E2$ elimination, isolating and

purifying the product, and confirming the identity of the product. An alternative approach to teaching in the organic chemistry laboratory could be called "the characterization approach". In this approach, the laboratory techniques are taught in the context of classifying and identifying organic compounds by functional groups. Typically, derivatives of compounds are prepared and purified, and then identified by measuring physical properties. Although most qualitative analysis courses are usually reserved for intermediate or advanced level undergraduate students, many modern introductory courses employing the "synthetic approach" also incorporate a qualitative analysis component into the curriculum.

There are a large number of textbooks (or laboratory manuals) available for the introductory laboratory and the manner in which they treat the material is very similar. There is a section introducing basic techniques, there is a section on qualitative analysis and there is a section containing a variety of experiments for the instructor (or