

book reviews

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Chemistry: Facts, Patterns, and Principles

W. R. Kneen, Bedfordshire Cty. Council, M. J. W. Rogers, Malvern College, and P. Simpson, University of Sussex. Addison-Wesley Publishers, Ltd., London, 1973. 861 pp. Figs. and tables. 23.5 × 20 cm. \$12.50.

As suggested by the subtitle, the goal of this text is the presentation of the facts, patterns, and principles of chemistry. The authors perform an admirable job in fulfilling this aim. Nevertheless, the book has been written for the A-level student in the British school system, and is not suitable as a textbook for the chemistry curriculum in this country.

The text consists of three parts. The first third is a qualitative introduction to the basic concepts of structure, bonding, energetics, equilibria, and rates. The next third is an outline of inorganic chemistry with emphasis on structure and thermodynamics. The final section is a survey of organic chemistry based on functional groups.

The major failing of the book is its stress on descriptive chemistry. According to the authors, "for many students, too early a development of mathematical formulation obscures rather than clarifies the subject." Thus, problem solving is neglected almost entirely. Stoichiometry, for example, is not mentioned at all. There is but one paragraph on the mole concept, three pages on the gas laws and kinetic theory, and only several sentences on expressing the concentration of a solution. The topics of molecular orbitals and hybridization are relegated to brief appendices, because, as the authors state, such models "are not for beginners." However, relatively more esoteric subjects such as Ellingham diagrams and the Born-Haber cycle are covered in

detail. The emphasis in this text is not one which we are accustomed to.

It is true that the book provides a "wide range of factual material . . . from which the student may select." However, the student must already have had some introduction to basic chemical concepts to avail himself of this information. In addition, the authors have the tendency to use undefined terms in the early chapters, giving a later section of the book as reference. There is a factual error in Chapter 3: the statement that in Fourier maps, "electron density is an expression of the charge density at positions between nuclei." The first solved problem at the end of the book is incorrect.

Despite these shortcomings, the text does provide a handy compendium of data in the form of tables, charts, and summaries, in addition to the text itself. In the inorganic section, one finds oxidation state and reduction potential diagrams, tables of elemental properties, charts of reactions, and detailed tables of chemical and structural comparisons. Frequent graphs of properties are presented, as well as structural diagrams of compounds mentioned in the text. The organic section includes summary charts of reaction types. There is a useful bibliography at the end of each chapter, although some of the books may not be readily available in this country.

"Chemistry: Facts, Patterns, and Principles" is not mathematical enough for most general chemistry courses and is too technical for courses geared to the non-science major. It can be recommended, however, as a worthy addition to the reference shelf as a summary of descriptive chemistry for the undergraduate student.

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Chemistry: Its Role in Society

James S. Chickos, David L. Garin, and Robert A. Rouse, all of the University of Missouri, D. C. Heath and Company, Lexington, Massachusetts, 1973. xiii + 301 pp. Figs. and tables. 16 × 23.5 cm. \$6.95.

This is an introductory textbook in chemistry (not sociology) for nonmajors, which attempts to situate chemical concepts and molecular structures in the context of general human concerns. Topical issues are selected with a view to promoting citizen action on social issues. The chemistry then illuminates the issues. In this way, there is an almost immediate motive for grasping each chemical idea. Mirror image isomerism, for example, explains why LSD sometimes gives a bad trip.

Cardboard punchout molecular models are bound inside the covers to convey stereochemical relationships. The concept of the mole is relegated (at student request) to a short citation in an appendix. The text is well illustrated and explanations are consistently clear and to the point. However, some sections are extremely brief. After only nine pages of organic chemistry, for example, one meets the structure of cholesterol; soon follow 16 pages of complex drug structures and physiology. Organic reaction mechanisms are completely ignored. Biochemistry is "covered" in 43 pages of well-written text and charts that bring one through the structure of ribonuclease and the genetic code.

Each of the seven chapters concludes with provocative "homework" questions and a bibliography that refers to such sources as Isaac Asimov, *Chemical & Engineering News*, and *Time* magazine. The style is pleasingly informal. Short quotes enliven the text, from Adlai Stevenson on "spaceship earth" to Teilhard de Chardin on cosmic love.

Problems of ecology, such as nuclear power plants, strip mining, oil spills, pesticides, and atmospheric nitrogen oxides receive relatively full attention. The section of food additives, for example, includes some 300 chemicals from the USDA's GRAS list. Controversial issues are explored objectively. Chemistry is portrayed as a two-edged sword, a force for good or for evil. No simplistic solutions are advocated; the hazards of phosphate detergents, non-phosphate detergents, and even soap are cited in turn.

The authors have succeeded in producing a lively, readable, one-semester survey of applied chemistry that has apparently already fascinated many students whose chief motivation had been merely to meet the general science requirement of their college. It will certainly help students to read newspapers with greater assurance and may even entice a few to explore further the fascinations of chemistry itself.

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