Physical chemistry texts

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A Textbook of Physical Chemistry. Second edition. By Arthur W. Adamson. Pp.953. (Academic: New York, 1979.) $22.95. *Physical Chemistry.* Fifth edition. By Robert A. Alberty and Farrington Daniels. Pp.682. (Wiley: New York, 1979.) $19.50. *Physical Chemistry: A Step-by-Step Approach.* By Marwin K. Kemp. Pp.1034. (Marcel Dekker: New York, 1979.) $23.75.

IN *A Textbook of Physical Chemistry* Adamson has put some new twists into the traditional format of physical chemistry texts. The ordering of topics, for instance, is significantly altered; a chapter on additive physical properties of matter appears near the beginning of the book. This chapter covers absorption of light, molar refraction, molar polarisation, and dipole moments. These topics would normally be found much later, after discussions of molecular structure. Another novelty is the placement of statistical mechanics in this text. Rather than devote a separate chapter to this topic Adamson includes discussions of statistical mechanics in chapters on thermodynamics. This makes the link between statistical mechanics and thermodynamics more apparent than in many texts.

Other non-standard features of this text include 'Commentary and Notes' and 'Special Topics' sections at the end of each chapter. These contain expansions of topics covered in the chapter, discussions of historical points of interest, and brief discussions of related topics. Unfortunately, some of these sections discuss material much more advanced than material covered in the related chapter. Also, many of the 'Special Topics' are topics normally discussed in physical chemistry texts. Here they are merely added at the end of chapters rather than integrated into the main text.

Overall, this book is a rigorous, rather sophisticated text that would make a fine reference source. It has a fine index and many good figures which help clarify the text. As a book to introduce students to the subject of physical chemistry, however, it seems too sophisticated. Many discussions are too advanced and the ordering of topics sometimes makes the material difficult to understand. There are many problems for students to solve, separated into sections of straightforward exercises, demanding problems, and special topics problems. These are fine learning tools for students. For all but the most sophisticated student, however, the main text will probably be difficult to follow.

Physical Chemistry, by R.A. Alberty and F. Daniels, is a rather traditional textbook for a year-long physical chemistry course. It presents little history behind the subject areas or motivation for studying them. Instead, the emphasis seems to be on presenting formulae to be used in a physical chemistry course. This may be reasonable for use in a course based on a lecture format where the instructor provides background and motivation. This approach leads, however, to a rather dry text. Consistent with this format of a text to supplement lectures, the book presents many problems and answers to about half of them. This is probably the strongest feature of the book from the instructor viewpoint.

Treatments of various topics in the book vary greatly. Many topics are presented too tersely, making it seem that learning facts and formulae is more important than understanding underlying principles. This seems particularly true of the coverage of quantum theory and, to a lesser extent, of thermodynamics. Later sections covering Statistical Mechanics and Kinetics, however, are quite well done.

Some topics covered in this book, such as equilibrium for biochemical reactions, macromolecules, and surface thermodynamics, are not found in most textbooks of physical chemistry. They add a very nice supplement to the traditional topics found in most texts. On the other hand, these chapters again tend to emphasise facts rather than present a general overview of these special topics.

In all, this book would be useful in courses where lectures provide the primary source of fundamental material. It does not, however, stand on its own as a primary learning tool for physical chemistry.

Physical Chemistry: A Step-by-Step Approach, by M.K. Kemp, differs from other physical chemistry texts in that it is designed for use in a self paced (sometimes called 'Keller Plan' or personalised system of instruction) course. In such a course there are often no lectures and the book becomes the primary source of information for students. Thus, the book must be very clear. This book is just that.

Each topic in the book is introduced with a statement of the importance of understanding the topic as well as a list of learning objectives the student must keep in mind. After discussion of each topic there are problems, with detailed solutions given in an appendix, and a self test. A detailed table of contents and a list of symbols and definitions also precede each topic to aid the student.

This book has very few weak points. There are not as many problems as one might wish and the introduction to quantum theory is weak. However, later sections on atomic structure and spectroscopy are excellent. Most topics are introduced at a very elementary level and progress through to a rather high level of sophistication. Treatments of real gases, colloid and surface chemistry, and polymers are particularly thorough.

In all, this is an outstanding text for physical chemistry courses using a self paced format or a standard lecture format. *Physical Chemistry,* by P.W. Atkins (Freeman: San Francisco, 1978), is the only other physical chemistry text this reviewer has seen which matches this book in clarity of presentation. □

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Physical chemistry for the life sciences

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Physical Chemistry with Applications to the Life Sciences. By David Eisenberg and Donald Crothers. Pp.868. (Benjamin Cummings: Menlo Park, California, 1979.) $21.95.

THIS book surpasses all other life science-orientated physical chemistry texts I have examined in both the extent and depth of its coverage of traditional physical chemistry topics. Thermodynamics, solutions, electrochemistry, statistical mechanics and X-ray structure analysis are all presented at about the same conceptual and mathematical level as found in standard 'for chemists' texts, such as the most recent edition of *Physical Chemistry* by Moore (Prentice-Hall: Englewood Cliffs, New Jersey, 1972). This is not to say it could replace a text like Moore's in a traditional two-semester 'for chemists' course. Its treatment of atomic structure and chemical bonding is neither extensive nor rigorous enough, and it has little to say about gas properties, kinetic molecular theory or reactions in the gas phase.

This text also has much to offer in the way of biological applications. Along with the usual topics (enzyme kinetics, transport properties, membrane equilibria, bioenergetics) it provides a more extensive treatment of macromolecular biophysics, including DNA characterisation, than any of the competing texts I know of, and it contains a lengthy qualitative section on the application of symmetry to the description of biological systems. Another attractive feature is that many of the mathematical results derived in the text are accompanied by a verbal description of their physical significance, and in most instances the explanations successfully illuminate the equations.