

BOOK REVIEW

Physical Chemistry for Students of Biology and Chemistry: By David Freifelder. (Science Books International, Inc., Boston, Massachusetts, MA 02116) 1982, pp. 767. Price: Not given.

This book gives a comprehensive account of Physical Chemistry useful to students aiming at careers in the life sciences, and discusses the fundamental concepts needed for a researcher in the biological sciences.

Many students of biology do not need a great deal of traditional material of Physical Chemistry, but it cannot be deleted from a text book. This is because to understand the increasing complex problems in biological sciences, a thorough background of Physical Chemistry is a must. However, many students of biology ordinarily do not have the necessary background in mathematics or the motivation to learn mathematics necessary to follow or understand some of the important derivations or the theoretical basis of some of the concepts in Physical Chemistry which are of relevance to life sciences.

This book offers an excellent compromise in providing all the basic material in Physical Chemistry, but at the same time not burdening with too many derivations and not deleting also the subjects of considerable significance. In this book, no mathematics more advanced than elementary calculus and simple probability theory is used and even these subjects are reviewed in appendices given at the end of the book. Moreover, it is suitable not only to students majoring in biological sciences, but also to those in chemistry, physics or even medical sciences. Since a student seeking a career in life sciences needs a Physical Chemistry text written by an experimental biologist, this book is just the right type as the author has a good background in Physical Chemistry and experimental Biology and it has been written in a lucid style with strong practical orientation.

This book has certain special features compared to other books in Physical Chemistry and also to those specifically meant for the students of biological sciences. Every chapter in the book has been given a biological bias considering biological examples for discussion at the end of each chapter. It contains an extensive discussion on macromolecules such as proteins and nucleic acids which are the common examples considered at the end of each chapter. This is because most biologists devote more time to the properties of macromolecules than to smaller molecules. In

biological sciences, Physical Chemistry can be applied more directly to the study of macromolecules rather than to smaller molecules. A chapter has been assigned to lengthy discussions of each of these properties of macromolecules, which are of importance to all those trying to study the life sciences. Furthermore, quantum mechanics is introduced mainly to understand spectroscopy which is being largely used at present to study the biological phenomena.

Thermodynamics has been given a molecular approach. The molecular view point has been used to explain the concepts of internal energy, enthalpy, entropy and free energy. Molecular approach is quite appropriate for discussing many biological phenomena as it gives a clearer physical picture. Suitable examples have been considered at every stage.

The chapter on intermolecular forces describes in depth the nature and the types of bonding in biological systems discussing their importance. The chapters on uncharged molecules, electrolytes, acid-base equilibria and on electrochemistry are exhaustive and have been discussed with particular reference to proteins and nucleic acids. Chemical Kinetics has been given exhaustive treatment with rate equations, mechanisms, theories of reaction rates and with methods for studying the different types of reaction. The chapter on catalysis and enzyme kinetics is excellent.

The chapters on surfaces and their electrical and transport properties have been discussed with particular reference to membranes, their structure and function and the transport of ions through them. The chapter on ligand binding is very interesting as it discusses the theoretical treatment of the problem and the analysis of the data obtained from the binding studies of ions and neutral molecules with biological macromolecules and their importance from the biological view point. In the end Photochemistry, Radiation chemistry and Radiobiology have been considered exhaustively discussing the photochemical mechanisms and damage to biological molecules and to living organisms.

In conclusion the reviewer recommends this nice book to students of biology and chemistry who would like to have a basic knowledge of physical chemistry.

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