

Preface

The principal aim of this text is to ensure that it presents all the material required for a course in physical chemistry for students of the life sciences, including biology and biochemistry. To that end we have provided the foundations and biological applications of thermodynamics, kinetics, quantum theory, and molecular spectroscopy.

The text is characterized by a variety of pedagogical devices, most of them directed toward helping with the mathematics that must remain an intrinsic part of physical chemistry. One such device is what we have come to think of as a “bubble.” A bubble is a little flag on an equals sign to show how to go from the left of the sign to the right—as we explain in more detail in “About the Book,” which follows. Where a bubble has insufficient capacity to provide the appropriate level of help, we include a *Comment* on the margin of the page to explain the mathematical procedure we have adopted.

Another device that we have invoked is the *Note on good practice*. We consider that physical chemistry is kept as simple as possible when people use terms accurately and consistently. Our *Notes* emphasize how a particular term should and should not be used (by and large, according to IUPAC conventions). Finally, background information from mathematics, physics, and introductory chemistry is reviewed in the *Appendices* at the end of the book.

Elements of biology and biochemistry are incorporated into the text’s narrative in a number of ways. First, each numbered section begins with a statement that places the concepts of physical chemistry about to be explored in the context of their importance to biology. Second, the narrative itself shows students how physical chemistry gives quantitative insight into biology and biochemistry. To achieve this goal, we make generous use of illustrations (by which we mean quick numerical exercises) and worked examples, which feature more complex calculations than do the illustrations. Third, a unique feature of the text is the use of *Case studies* to develop more fully the application of physical chemistry to a specific biological or biomedical problem, such as the action of ATP, pharmacokinetics, the unique role of carbon in biochemistry, and the biochemistry of nitric oxide. Finally, in *The biochemist’s toolbox* sections, we highlight selected experimental techniques in modern biochemistry and biomedicine, such as differential scanning calorimetry, gel electrophoresis, fluorescence resonance energy transfer, and magnetic resonance imaging.

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