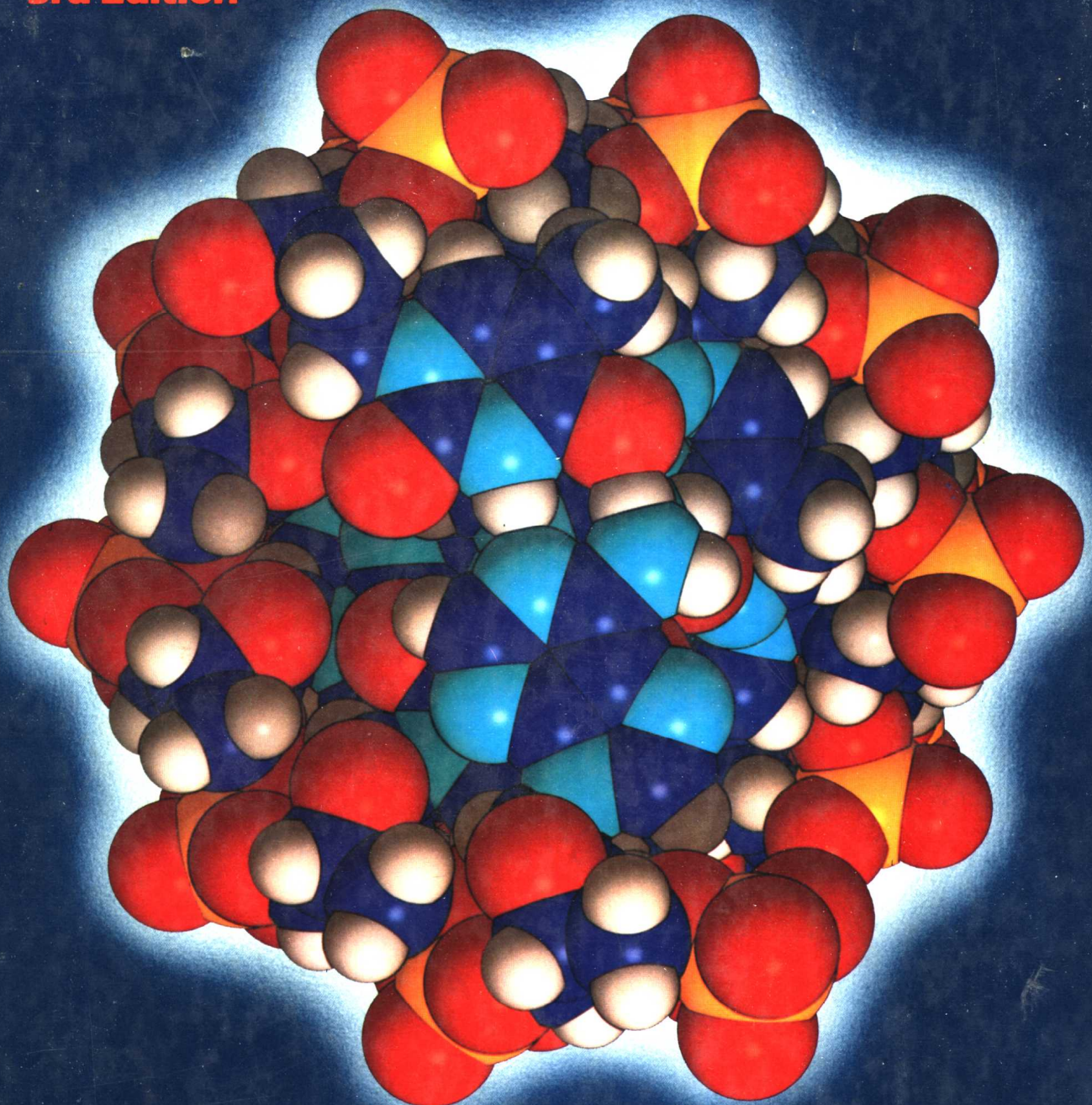
COLLEGE CHEMISTRY

An Introduction to General, Organic, and Biochemistry

HEIN / BEST / PATTISON

3rd Edition



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An Introduction to General, Organic, and Biochemistry

3RD EDITION

Morris Hein / Leo R. Best / Scott Pattison

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To Edna, Louise, and Joan

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Preface

As in the previous editions, the primary purpose of this third edition of *College Chemistry* is to instruct students in the basic concepts of chemistry. This book is intended for students who, although not majoring in chemistry, require a basic course in the subject including an introduction to organic chemistry and biochemistry. The text is written with the assumption that the students have not taken a previous chemistry course.

Many students are somewhat apprehensive about beginning the study of chemistry. Accordingly, one of our major goals has been to present the subject in a well-organized and readily understandable fashion. Each chapter was written with this thought in mind: Is our language clear—will the student be able to understand this material?

We believe that a fair amount of quantitative reasoning is essential to the study of chemistry. Therefore, another major goal has been to provide careful, step-by-step explanations of the topics that require quantitative reasoning. These explanations are then illustrated by one or more problems. These example problems are generally set up and worked by the conversion-factor dimensional analysis approach. This approach has proven to be an effective tool and requires no mathematics beyond arithmetic and elementary algebra. From experience, however, we know that to develop sufficient skill in quantitative reasoning, most students need considerable practice in working numerical problems. Consequently, we have provided many end-of-chapter problems. Fortunately, much of the time students formerly spent doing calculations by hand can now be saved by using an inexpensive electronic calculator.

In planning this revision, a nationwide survey of instructors who were users or potential users of the text provided suggestions for changes or

additions. The results of this survey indicated the need for the expanded and more effectively integrated biochemistry section found in this edition. Two additional major goals of this revision have been (1) to relate the phenomena of biochemistry to the chemical principles that are developed in the chapters on general and organic chemistry, and (2) to emphasize the central role of energy in the biochemistry of the cell.

The survey also revealed that Chapters 19–21 of the second edition dealing with metals, nonmetals, and air pollution (although generally considered to be interesting and valuable material), were the most frequently omitted in course outlines. Therefore, these three chapters were eliminated to make room for the expanded biochemistry.

The following features—some of which were developed from suggestions received from the survey—are intended to serve both as learning aids and to make the book one that students can read, understand, and study by themselves.

- A list of achievement goals is given at the beginning of each chapter as a guide to students.
- Important new terms are set in boldface type, defined in the text, and printed in the margin in color.
- Nearly all chapters have at least one self-evaluation question that contains a fairly large number of "correct" or "not correct" statements. Answers to these questions are given in Appendix V.
- A detailed discussion of scientific notation, significant figures, and rounding off numbers is given in Chapter 2. Appendix I contains a concise review of the mathematics pertinent to *College Chemistry*.
- Numerous end-of-chapter problems, mostly new or revised, are provided. These are generally arranged in order of related material within a chapter, and a few of the more challenging problems are marked with asterisks. Answers to all mathematical problems are given in Appendix V.
- The mole is used as a unifying chemical concept wherever possible.
- Material on inorganic nomenclature appears in several chapters, but for convenient reference the basic rules for naming inorganic compounds are brought together in Chapter 8.
- Examples relating to health topics are used extensively.
- The biochemical functions of various organelles are treated in the overall context of cell function.
- New chapters deal with *nutrition*, *the cell*, and *bioenergetics* as major topics.
- Supplementary materials that accompany *College Chemistry* are a student study guide, a laboratory manual, and a solutions manual.

It is impossible to thank by name each of the many people who have been involved and helpful in making this revision of *College Chemistry*. We are grateful for the friendship and many helpful comments and suggestions from our colleagues and students who, over the years, have made this book possible.

We are most appreciative of the critical professional reviews and suggestions by the following individuals: Gilbert Albelo, Mt. Hood Community College; Susan J. Ambo, Macomb Community College; Joseph L. Barnes, Pasadena City College; Douglas J. Bauer, Mohawk Valley Community College; Bernhard Binder, Southern Oregon State College; Arthur Breyer, Beaver College; James C. Chickos, University of Missouri, St. Louis; Phillip Dougherty, Albright College; Michael Frechette, University of Lowell, South; Karen E. Harding, Ft. Steilacoom Community College; Norbert Hepfinger, Rensselaer Polytechnic; Daniele J. Keily, Seattle Central Community College; Joseph Landesberg, Adelphi University; Paul Lauren, Suffolk County College; Robert N. Lindquist, San Francisco State University; Anthony Maniscalco, Springfield College; Clinton McPherson; Stephen Metzner, University of South Dakota; William Schultz, Eastern Kentucky University; Allan E. Smith, University of Southern Maine; Paul Whittaker, Rochester Community College; Vaughn Vandergrift, Murray State University.

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Last, but certainly not least, we are grateful to our wives, Edna, Louise, and Joan, for their patience and understanding during this revision.

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