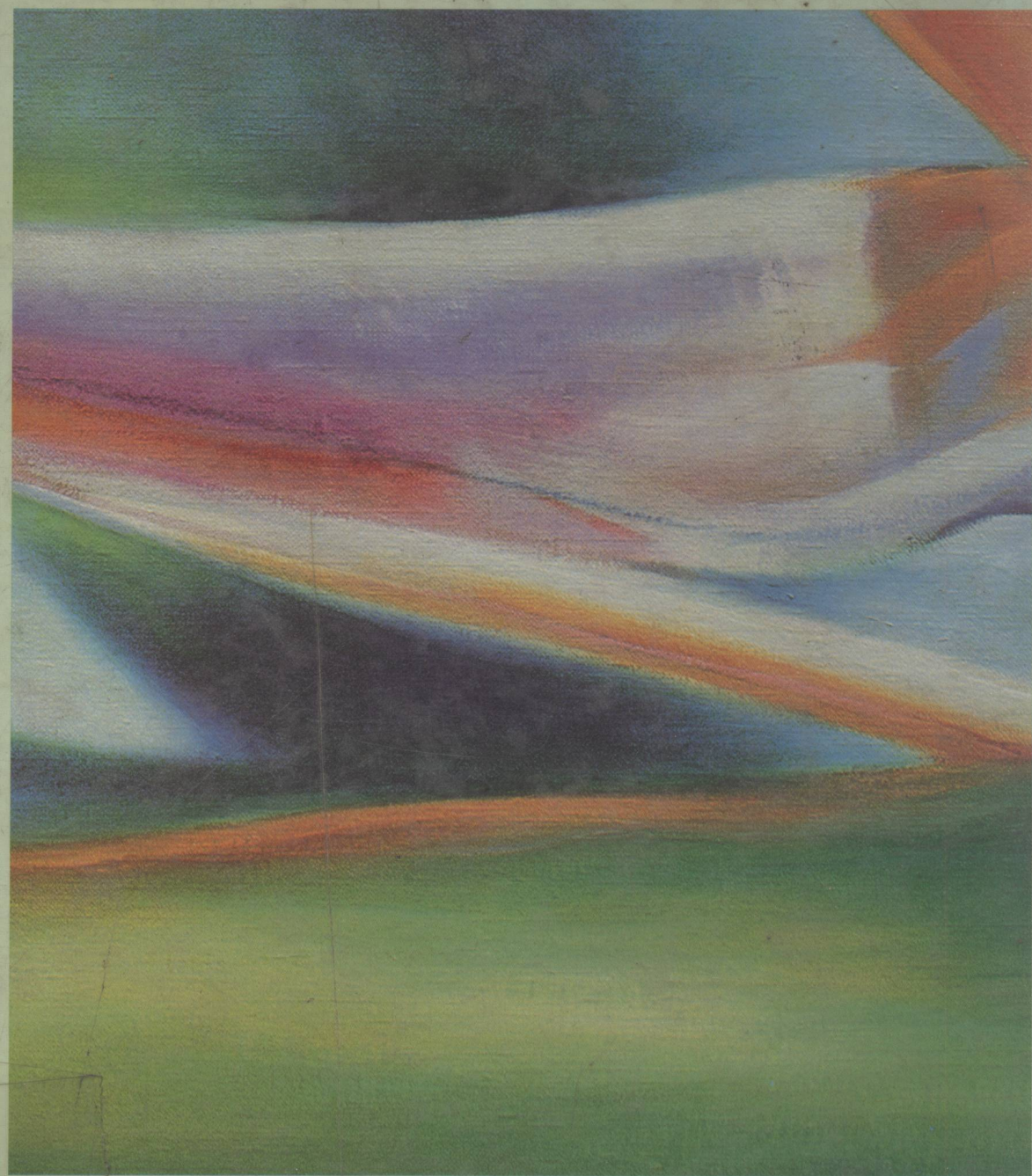


C H E M I S T R Y

AND THE LIVING ORGANISM



FOURTH EDITION

MOLLY M. BLOOMFIELD

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**CHEMISTRY  
AND THE  
LIVING ORGANISM**

FOURTH EDITION

**MOLLY M.  
BLOOMFIELD**

**JOHN WILEY & SONS**  
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# CHEMISTRY AND THE LIVING ORGANISM

**TO THE STUDENT:** *A Study Guide for the textbook is available through your college bookstore under the title Study Guide to Accompany Chemistry and the Living Organism by Molly M. Bloomfield. The Study Guide can help you with course material by acting as a tutorial, review, and study aid. If the Study Guide is not in stock, ask the bookstore manager to order a copy for you.*

To Stefan, Rebecca, and Jonathan

## PREFACE TO THE FOURTH EDITION

This fourth edition of *Chemistry and the Living Organism* follows very closely the third edition in providing a highly motivating and student-oriented approach to the study of chemistry. As in previous editions, my goal is to present an introduction to the basic principles of general, organic, and biological chemistry in a style that is easy to understand and enjoyable to read. This new edition updates the discussions in the third edition and provides additional motivational and skill-building material for the student.

The book is written for a one- or two-term survey course for students in the allied health sciences and related fields. One difficulty in writing such a textbook is the lack of agreement on the topics that should be included in this type of survey course. In recognition of this problem, the book includes more topics than can be covered in one term, thus providing more flexibility in choosing those topics best meeting the students' needs. The text is written in a very conversational style, and fundamental chemical concepts are illustrated with examples relevant to the student's own life. Each chapter begins with a set of learning objectives, helping the student identify the important concepts within the chapter. The presentation of those concepts involving mathematical operations is always accompanied by several worked-out examples. These examples are set off from the main text by a shaded background, allowing them to be easily referenced when the student is reviewing for an exam. Each set of examples, in turn, is followed by several exercises (with answers in the back of the book) that students may use to check their understanding of the concepts. As a further study aid, each chapter contains a summary that reviews all the key equations used in the chapter.

All chapters conclude with exercises and problems that drill the student on specific concepts and mathematical operations, and test the

student's basic understanding through applied problems in a practical context. In this edition, the exercises and problems have been expanded to include more drills. Additionally, several new sections of integrated problems now require the student to use appropriate principles from previous chapters to solve realistic problems based on professional applications. The comprehensive glossary at the end of the text has also been expanded to include definitions of all boldfaced and medical terms used in the text.

Through the use of dramatic chapter-opening stories, pertinent examples throughout each chapter, and end-of-chapter problems with clear practical applications, the book constantly emphasizes the relevance of otherwise abstract chemical principles to the student's personal and professional life. To keep students abreast of the most current developments in scientific and medical research, many of the chapter-opening stories and in-chapter examples have been rewritten to reflect these important advances. For example, reference is now made to the events in Chernobyl, the importance of LDL receptors in cholesterol metabolism, new treatments for hypothermia and cancer, the continuing acid-rain controversy, and new research in such fields as genetic engineering and trace-element nutrition.

The organization of the text remains the same as in the third edition. In particular, in recognition of the extreme public interest in matters relating to nuclear energy and radioactivity, the two chapters covering radioactivity and its medical implications continue to appear early in the text. Also, the growing public awareness (and occasional misinformation) regarding trace-element nutrition is reflected in this text by a chapter devoted entirely to a comprehensive treatment of this important subject. However, if time constraints prevent these chapters from being covered in the term, they may be skipped without loss of continuity.

To meet the changing needs of our students and society at large, the revision of this text must be an ongoing process. I look forward to hearing comments, criticisms, and suggestions from the students, professors, and other concerned individuals who may use this text.

## **Supplemental Materials**

The following supplemental materials are available for use with the fourth edition:

**Student Study Guide** The student study guide contains a brief summary of each section of the text and a list of important terms appearing in that section. The study guide features many worked-out examples and self-test questions (with answers) for each chapter.

**Laboratory Manual** The revised fourth edition of the laboratory manual, written by Joseph Bauer of William Rainey Harper College, contains 26 experiments carefully coordinated with the text.

**Teacher's Manual** The teacher's manual contains the answers to all end-of-chapter problems in the textbook, answers to the laboratory exercises, and a list of chemicals and equipment for the laboratory experiments.



## Acknowledgments

The continual improvement of this text reflects the comments and suggestions of many people. I would specifically like to thank Joseph Bauer, William Rainey Harper College; Robert Becker, Ralph Quatrano, Jean Peters, and Daniel Selivonchick of Oregon State University; Lawrence Stephens, Elmira College; Robert Shine, Rampano College of New Jersey; David Schroeder, Emporia State University; John Albright, Texas Christian University; Patricia McCoy, Jefferson Community College; Sarah Margaret Willoughby, the University of Texas at Arlington; Barbara Gage, Prince George's Community College; Florence Haimes, California State University, San Francisco; Carl Bonhorst, Portland State University; James Stewart, Cypress College; Miriam Smith, Pasadena City College; Mahesh Sharma, Columbus College; Carol Swezey, Purdue University; C. R. Winkel, Ricks College; Leslie Loew, State University of New York at Binghamton; Robert Hawthorne, Jr., Purdue University—North Central Campus; Henry Benz, Normandale Community College; David Shaw, Madison Area Technical College; W. J. Wasserman and Margaret Goodrich of Seattle Central College; William Leoschke, Valparaiso University; Thomas Rowland, University of Puget Sound; and Kenneth Wright, North Idaho College.

This edition contains many new chapter-opening case histories, requiring substantial professional expertise. I am grateful for the generous help I have received from Allan Lefohn, ALS Associates; Dr. Anita Jansen and Dr. James Riley, Corvallis Clinic; Dr. William Lloyd and Dr. Michael Huntington, Good Samaritan Hospital, Corvallis, Oregon; Dwight Fullerton and Brian Dodd, Oregon State University; Judy Ladd, Benton County Health Department; and Charles Vaughan and James Pex, Oregon State Police Department Crime Laboratory.

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