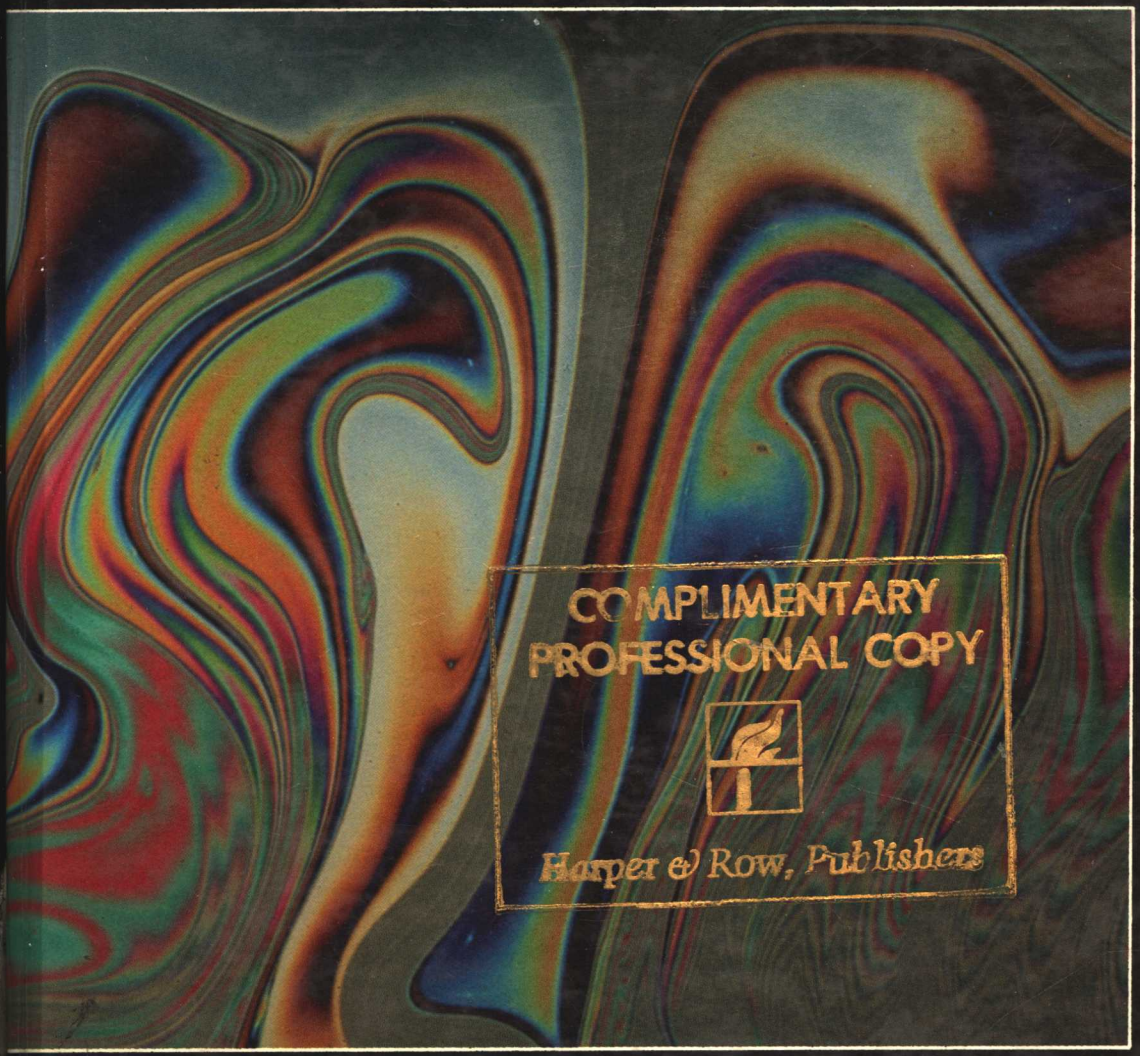
KAREN TIMBERLAKE

Chemistry



4TH EDITION

FOURTH EDITION

Chemistry

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Preface

Welcome to the fourth edition of *Chemistry*. It is my hope that the reshaping of this text over four editions has resulted in a book that makes teaching and learning chemistry a positive experience for both the teacher and the student. It remains my goal to assist students in their development of critical thinking and to establish a science framework so that students have the concepts and problem-solving techniques to make decisions about issues concerning our environment, medicine, and health that affect all our lives.

Over the years I have found that chemistry is a formidable subject to many students, and thus I have made a practice of associating chemistry concepts with applications to the allied health fields. This bridge between chemistry and the world of the students is designed to help students incorporate the ideas of chemistry into their lives and future careers. I have found discussions of applications of chemistry valuable in increasing student interest, motivation, concentration, and performance in class.

New in This Edition

In response to the needs to my students as well as to suggestions of teachers and reviewers, several changes have been made in the fourth edition. More examples have been added to every chapter. All examples have been rewritten so that they now include fully worked-out solutions. This is intended to assist the student

with the patterns of problem solving that lead to correct answers. All the applications to health, including many new ones, are now set off as *Health Notes* for easier identification. Many of the problem sets have been rewritten with more problems to engage the student in more problem solving at various levels of difficulty. A new appendix has been written to deal with calculations and measured numbers.

Pedagogical changes include a fuller use of a second color to highlight major ideas, as well as a change of type size and typeface for easier reading. The wider margins allows for marginal notes for key words and key points. The problem sets have been expanded to include more problems for practice problem solving. The problems are listed by section and objective number for easy reference to the chapter. The appendixes include math and the calculator, scientific notation, and answers to all the problems in the text.

To Accompany the Text

The three supplements to the fourth edition are the *Study Guide*, the *Laboratory Manual*, and the *Instructor's Manual*. The *Study Guide* reviews the basic concepts, provides learning drills, and gives a practice exam, all with answers, for each of the 20 chapters. Students can grade their own practice exams and then check to determine if they have mastered the material. In this way, they can assess areas of difficulty and review the material again.

The *Laboratory Manual* contains some new experiments, including percent water in a hydrate. Each laboratory experiment includes a report page and questions that relate the experiment to the corresponding information in the text. Some questions require essays, which promotes writing skills in the content area. The overall thesis of the *Laboratory Manual* is first to introduce students to basic laboratory skills and then to present some investigative problems to develop the skills of gathering and reporting data, problem solving, calculating, and drawing conclusions. In this edition, as in the previous ones, there is an emphasis on safety in the laboratory. I have attempted to remove those chemicals and procedures that are known or suspected to be dangerous. I have also attempted to reduce the amounts of chemicals needed, in view of the austerity programs that many of our schools now face.

Acknowledgments

I wish to thank my husband, Bill, for his invaluable assistance, support, and advice in the preparation of the manuscript. Thanks also go to my son, John, for his cooperation during the time we were writing this text.

The following people provided outstanding reviews that contained constructive and helpful criticism and support, for which I am very grateful: Thomas Berke, Brookdale Community College; Lew Milner, North Central Technical College, Mansfield, Ohio; John Macklin, University of Washington, Seattle; Thomas Berke, Brookdale Community College, Lincroft, New Jersey;

Barbara Frohardt, Oakdale Community College, Bloomfield Hills, Michigan; and Stanley Mehlman, State University of New York at Farmingdale.

Many thanks are due to the people at Harper & Row, who believe in my approach to teaching chemistry and who have worked with me on this new edition, especially my editor, Lisa Berger, who continually encouraged and supported me.

Writing a chemistry text is an ongoing process as students, teachers, and concepts change. I believe that teaching chemistry involves more than a transmission of chemical facts; teaching also means developing positive attitudes toward science, encouraging students to use new thinking patterns and problem-solving techniques, and developing their reasoning powers. With this aim, I have revised *Chemistry*. I look forward to your use of this text and to hearing from both you and your students. I welcome any suggestions, criticism, or overall comments on this revision.

Karen Timberlake

To the Student

Here you are in chemistry, perhaps because you need a science course or perhaps just because you want to find out something about chemistry. Maybe you want to be a nurse or respiratory therapist or to enter some profession in the health sciences. If so, as you progress through this text, you will discover that chemistry is indeed exciting to learn and that it has an important relation to the world around you. Every chapter in this fourth edition includes application of chemistry to health, medicine, and the environment. Your interest in the sciences will help you learn chemistry, and by learning chemistry you will gain a deeper understanding of physiology, medical care, and major issues of today, including pollution, nuclear energy, and recombinant DNA.

I have designed this text with you in mind. To aid your learning process, each chapter begins with a set of objectives that tell you precisely what to expect in the chapter and what you need to accomplish. Each chapter then has a section called "Scope." This section relates those experiences that involve chemistry or the text material to specific health science areas. Each "Scope" section sets the stage for the chemical concepts discussed throughout the chapter.

As you work through each chapter, take time to consider the objectives for each section. To see if you have mastered the objectives, do the example problems in the section. If you have difficulty with an example, study that part of the unit again before you proceed. For further self-testing, work the problems at the end of the chapter. These problems are grouped by chapter objectives. You can check your answers by referring to Appendix C. It is not necessary to study a chapter all the way through at one time. Instead, you may wish to cover only a few objectives as you study. Also, if you know what your teacher is going to cover in class, you can be prepared for lecture by reading ahead in the text.

To review your knowledge of the important ideas in a chapter, read over the glossary at the end of the chapter. Study the tables and figures, which highlight and summarize important concepts. If you want to go back to a certain topic, look for the marginal notes in color that have been provided for quick reference; those notes are placed alongside the term or terms being discussed.

The study of chemistry involves some hard work, but I hope that you will find the effort rewarding when you see and understand the role of chemistry in many related fields. If you would like to share your feelings about chemistry or offer comments about this text, I should appreciate hearing from you.

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