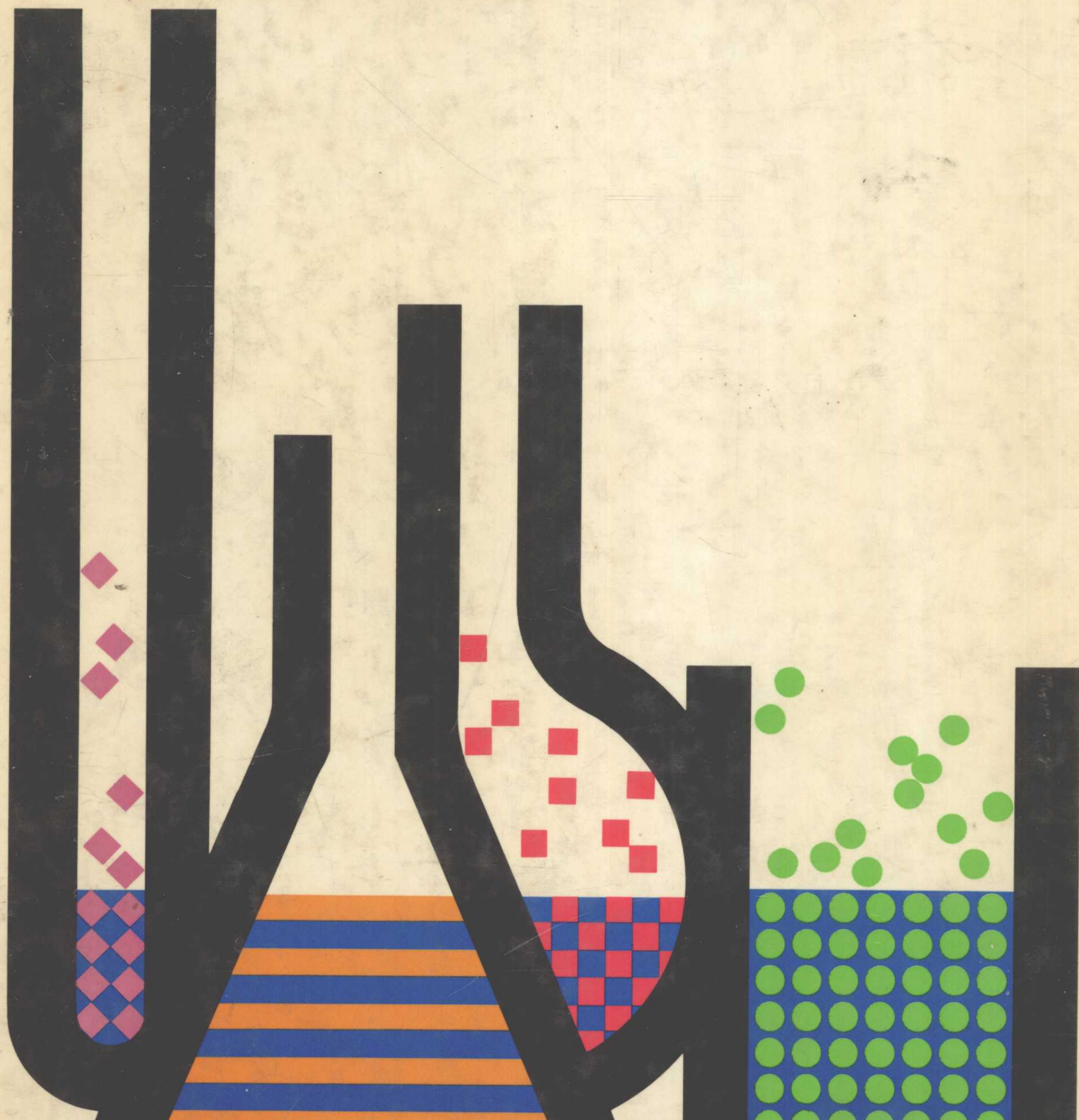


FRANK L. WISEMAN

CHEMISTRY IN THE MODERN WORLD

◆ CONCEPTS AND APPLICATIONS



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FRANK L. WISEMAN

Georgetown College

CHEMISTRY IN THE MODERN WORLD

Concepts and Applications

Chemistry
in the
Modern World:
Concepts
and Applications

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This book is dedicated to three people who have been most influential in helping me develop in the profession of teaching and thus, directly or indirectly, in bringing this book to reality.

To my wife Ellen, without whose encouragement I would not have had the courage to begin or the stamina to complete the writing of this text.

To W. Richard Stephens (then academic dean of Greenville College), who at a critical time in my career presented the mastery concept of education—the idea that the aim of teaching is to help all students learn the material at an acceptable level of accomplishment.

To Diane Russo, whose advice and friendship have been so very valuable, both professionally and personally. She exemplifies the many good students I have had, yet stands out among them as special. Her positive response to my teaching methods encouraged me to develop even better ways by which students could learn chemistry. The programmed method used in this text was a result.

To the Student

You are about to begin your study of chemistry. It is not only central to the sciences in general but important in our culture, since it provides many of the necessities and conveniences available to each one of us.

Many students taking introductory chemistry are natural science majors; but an increasing number of students with majors outside the natural sciences are choosing chemistry as part of their general education and as a means of becoming more effective in their chosen professions. For some nonmajors, the idea of taking a chemistry course is alarming; these students frequently feel intimidated by the mathematical tools, the scientific principles, or simply the unfamiliarity of the subject. This book is written with this naturally felt apprehension in mind. I have tried hard to produce *learning devices* that are appropriate for the student who is just beginning; I will assume no prior knowledge of the subject at hand.

The learning devices include:

- 1** Lists of terms to learn, in a study guide at the end of each chapter. The meanings can be found in the text; and, in most cases, a concise definition can be found in the glossary.
- 2** Practice problems and questions, as well as questions requiring you to think about a controversial topic or state an opinion. These are also in the end-of-chapter study guides.
- 3** Programmed learning units. These are sections within chapters, designed to develop skill in various technical areas. Examples are worked out in a stepwise fashion, and each step is explained. Then the student is given the chance to work a similar problem and the work can be checked, since most problems are worked for you immediately in the program.

The following are the goals for this book:

- 1** To give an understanding of the scientific process and the place of science in our culture.
- 2** To give an understanding of the nature of matter and the basic principles of chemistry *in a way that can be mastered by the beginner*. Chemistry need

not be the awful course it is reputed to be. With this goal in mind, games, animations, and careful stepwise procedures for skill development have been provided.

3 To give an understanding of the current technical aspects of our culture so that the student as a citizen and consumer will be better able to make decisions when voting and purchasing goods and services.

4 To provide a reasonable amount of practical information that can be used by the student to solve common household problems.

I wish you the best as you begin this new adventure in knowledge and hope that you will learn to appreciate this field of chemistry and find here some of what will make you the person you are to become as well as information that will be of value to you at many points in your future.

Frank L. Wiseman

To the Instructor

My desire in writing this book was to produce a text that would be as versatile as possible, since there seems to be a great diversity in how chemistry courses for nonmajors are taught and at what level they are taught.

The order of the chapters is always debatable in a text of this type, and each instructor has different ideas about what is appropriate. I have started the text with a chapter on the nature of chemistry which contains some subject material that should be mastered. It is followed by a short chapter on how to study chemistry, with the idea that the student will be more motivated to pay attention to Chapter 2 *after* seeing what kinds of material are to be covered.

Chapter 3, "Chemistry and Society," was placed near the beginning of the book because it was felt that an overview at the start would be more beneficial than a review at the end of the text. It should be pointed out, however, that both Chapter 2 and Chapter 3 can be skipped, or used later or earlier, without doing damage to the flow of the more standard chemical coverage.

The more complex material (which some instructors prefer to have and others to skip) has been separated as advanced study (as in Chapter 3) or as appendixes (Appendixes B–F, for Chapters 4, 6, and 8). It can be referred to at the appropriate time, if desired, or not used at all. Future chapters do not build on the material covered in Appendixes B–F.

Chapter 3 contains material on educational institutions, because the author has observed that most college students don't even know what *Ph.D.* stands for, much less how one is earned.

The section on religious thought in Chapter 3 was included because many students have religious convictions of some strength. Religion is an important force in culture and does indeed touch science at a few points. I have tried to treat this topic briefly and factually, so that no violation of students' personal beliefs or problems of "separation of church and state" will occur. However, that section can be ignored in class discussion if it is not desired by the instructor (religion is not mentioned again in the text).

I have included sections on inorganic and organic nomenclature as a part of the regular text (in Chapters 10 and 11, respectively), even though some instructors do not use it. I have used programmed learning units to help the students with mastery in these areas. It was felt that these are areas that can be

mastered relatively easily by the students taking this course and thus give the student a sense of accomplishment. Again, little if any building is done on these sections, and they could be omitted.

It is hoped that these “blocks” of material will make the text a flexible one.

An Instructor’s Manual is available; it includes such material as alternative chapter sequences, lecture games, demonstrations, and student animations. There are also test questions and references to articles for outside reading assignments. Laboratory exercises are also given; some of these can be used in a formal laboratory period and others can be given as special assignments.

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Frank L. Wiseman

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