

## Preface

*Unitized Experiments in Organic Chemistry* represents an embodiment of the conviction that a tremendous amount of organic chemistry can be taught—and learned—in the laboratory. Not only the techniques, skills, and philosophy involved in organic synthesis, but, if the experiments are well designed, much of the fundamental theory and factual material of organic chemistry, as well, can be mastered by the student during the several hours a week which he spends in the laboratory. This can be achieved for an entire class only if every student, the best as well as the poorest, works to capacity, thoughtfully and productively, and only if the lectures and laboratory work are coordinated into a single integrated unit. These are the goals which we hope the present manual will aid the teacher in achieving.

Carefully tested time schedules, along with thought-provoking questions, are provided with each experiment to challenge the student to maximum efficiency. Optional experiments are provided for superior students who are able to complete the regular work in less than the allotted time.

Every experiment has been designed, not only to teach the basic skills and techniques of organic laboratory work, but also to clothe in flesh and blood the skeleton of words to which lectures and textbooks are necessarily restricted. Each day's experiment is preceded by an introduction which places the work of the day in proper context in the scheme of organic chemistry and encourages the student to think about the important principles that are being illustrated. Together, the discussion and experimental work constitute a complete, finished unit which affords the student a real sense of accomplishment and leaves him with a sharply defined picture of what the day's assignment is designed to teach.

The first eight units cover the theory and practice of the most important fundamental techniques employed in the organic chemistry laboratory. Each discussion is followed immediately by an experimental section designed to drive home the underlying principles involved. The discussions are, however, sharply divided from the experimental sections so that the student may refer to them continuously without being forced to re-read detailed instructions for a specific experiment. The early introduction of these units on techniques, which may be performed in regular order or assigned individually at such times as will enable the

teacher to keep the laboratory work completely synchronized with the lectures, provides a high degree of flexibility. Once the student has completed these early experiments, he should be prepared to perform the remaining experiment, both those on aliphatic and those on aromatic compounds, in any order the teacher may wish to follow.

Further flexibility is made possible by the inclusion of more units than can be performed normally in a two-semester course so that the instructor may exercise considerable selection. For a one-semester course, we have found highly successful the plan of assigning different experiments to different groups, with an opportunity provided for comparison of results. In this way, each student is given an insight into the experimental aspects of many more experiments than he can perform personally.

Every experiment has been carefully tested with hundreds of students under close supervision by the authors and we believe that all are eminently workable. Special emphasis has been placed on clear, accurate, and reliable experimental directions, given in sufficient detail to lead to successful and satisfying results in the hands of even the most inexperienced beginner; at the same time special skill and technique will be rewarded with sufficiently superior results to stimulate and challenge the best of students. Hazards and pitfalls have been either eliminated or properly recognized and pointed out. Often alternative procedures are described to allow for differences in equipment available to students at different institutions.

Students in the beginning courses in organic chemistry lack the experience to organize their work efficiently on their own. The present manual is based on the philosophy that at this stage the very best training for the future is that which shows the student how his work can be organized for maximum productivity.

Over the years, the authors have been led to the conviction that by far the most successful experiments in organic chemistry are those whose results the student can submit as an actual preparation or report as a numerical answer or an unknown. The interest and enthusiasm with which our own students have received the present manual have confirmed that conviction.

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