

**EXPERIMENTAL
ORGANIC
CHEMISTRY**

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Experimental Organic Chemistry by James F. Norris

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EXPERIMENTAL ORGANIC CHEMISTRY

BY

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PREFACE

This book is designed primarily to be used as a laboratory guide in connection with courses in organic chemistry in which the student follows in the laboratory the subject as developed in the class-room. An attempt has been made to furnish directions for experiments to illustrate the methods of preparation and the chemical properties of the more important classes of organic compounds. As a consequence, the student following the work as given, comes in contact with many substances of importance which are not handled by one whose laboratory work consists solely in the preparation of a few compounds. For example, directions are given in considerable detail for experiments which illustrate the properties of fatty amines, hydroxy acids, carbohydrates, fats, proteins, etc., subjects which receive scant, if any, attention in many laboratory courses in organic chemistry.

Directions for a large number of preparations are also given. These serve to illustrate the more important synthetic methods and the different kinds of laboratory technique with which the student should become acquainted. In connection with the directions for the preparation of typical compounds, experiments are given which illustrate the properties of the compounds made. These experiments include in each case a study of the reactions of the substance which are of particular value in the identification of the characteristic group present.

No attempt has been made to introduce novel preparations; the ones given are, in the main, those commonly used. These have been selected on account of their simplicity and the fact that they illustrate the principles to be taught; they are as novel to the student as any that could be devised. Although the older preparations are used, the laboratory details are, in many cases, different from those commonly employed. The changes have been the result of a detailed study of the preparations which, in many cases, resulted in simplification and improvement. A few new preparations are described; these are to illustrate, in most cases, the properties of compounds that have not been studied commonly in laboratory courses in organic chemistry.

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A feature of the book is the introduction of directions for the preparation of certain compounds on a very small scale. Students often acquire the habit of careless work in the laboratory practice in organic chemistry. Preparation-work on the small scale serves to counteract this effect and to develop a technique that is valuable. Such work is often necessary in the identification of unknown compounds when a small amount only of the substance is available. In many cases a crystalline derivative whose melting-point can be determined, can be prepared in a pure condition from but two or three drops of a substance. Among the examples of work of this kind which are given are the preparation of acetanilide from acetic acid, glyceryl tribenzoate from glycerol, dinitrobenzene from benzene, and dibenzalacetone from acetone. In order to facilitate such work, a section in the first chapter is devoted to a consideration of the technique used in the manipulation of small quantities of substances.

The final chapter of the book deals with the methods used to identify organic compounds by a study of their chemical behavior and physical properties. The method is outlined only, since the pedagogical value of the work depends largely upon giving the student opportunity to apply the knowledge he has gained throughout the course in the study of the behavior of the typical classes of organic compounds. It has been the experience of the author for a number of years, that laboratory practice of this kind undertaken at the end of the course, is of great value to the student, on account of the fact that it gives him an opportunity to review, correlate, and apply many of the facts he has learned. The practical application of his knowledge is evident. When a student has been able to identify definitely a number of compounds which were unknown to him, he feels that he has gained power in handling problems in organic chemistry.

A chapter of the book is devoted to detailed directions for carrying out the simpler operations used in laboratory work in organic chemistry. In order that the student may make use of this information when it is necessary, references are given throughout the book to the paragraph and page where the particular process to be employed is described. It is impossible to repeat in the laboratory directions details for these processes, and if the student does not have these details before him he is apt to carry

out the operation in a careless manner. It is believed that a definite reference to the place where the process is described may be useful.

The book contains directions for more work than can be done in a laboratory course of the usual length. An opportunity is thus given the teacher to select the work that is best adapted to the needs of his students. The method of numbering and lettering the experiments makes it possible to assign readily the work to be done by the class.

The author has consulted all the well-known texts on laboratory work in organic chemistry in the preparation of the book. In writing the directions for the preparation of compounds on a small scale, valuable help was obtained from S. P. Mulliken's "The Identification of Pure Organic Compounds." A number of experiments on fats, carbohydrates, and proteins have been adapted, with the permission of the author, from a laboratory manual in descriptive organic chemistry prepared for the use of students of household economics, by Professor Alice F. Blood, of Simmons College. The author wishes to express his thanks for the courtesy shown in granting permission to make use of this material.

All the figures in the book were prepared from drawings made by the wife of the author; for this help and for assistance in reading the proof he is deeply grateful.

The author will be pleased to have called to his attention any mistakes which may be discovered by those who use the book; any suggestions as to improved directions for the experiments will also be gladly received.

JAMES F. NORRIS.

