

figures which acquaint the reader with some of the pieces of apparatus used. In the reviewer's opinion, these are of questionable value to a beginner, since very few details are given regarding the parts or the dimensions to show the size of the equipment. On the other hand, the experienced microanalysts will find them to be of considerable value as a guide when investigating new methods or making a choice between existing ones. The same condition applies to other chapters.

Chapter 8 (98 pp.), "The Nitrogen Functions," discusses eleven types of functions; some of these cover several related functions, such as azido, cyano, and isocyano. The material is presented in a manner similar to that of the oxygen functions—a general discussion of each function, which includes several methods, and the apparatus used. The authors discuss the gasometric method, but fail to include the manometric one. The apparatus for the latter is the more versatile and more frequently used today.

Chapter 9 (38 pp.), "The Sulfur Functions," has seven sections which describe fifteen functions in the same manner as the preceding chapters. It includes titrimetric, gasometric, oxidative, and colorimetric methods.

Chapter 10 (37 pp.), "The Unsaturated Functions," deals with compounds which have double or triple bonds between carbon atoms. Addition of halogens, mercuric salts, thiocyanogen, nitrogen tetroxide, ozone, mercapto compounds, etc., as well as hydrogenation, oxidation, formation of metal acetylides, etc., are all discussed.

Chapter 11 (84 pp.), "Miscellaneous Functions," covers such subjects as the determination of active hydrogen, C-methyl, water, arsenic, boron-, mercury-, phosphorus-, and silicon-containing compounds, etc. It also includes a number of useful tables, particularly those dealing with titration information. They show titrants and solvents for the determination of various functions, and Table 11.3 lists the electrode systems for potentiometric determinations.

Part Three. Experimental Procedures.—Chapter 12 (74 pp.), "Microdetermination of Functional Groups with Ordinary Equipment," describes procedures for 30 determinations using flasks, pipets, burets, pH meters, spectrophotometers, etc. These procedures give detailed information which includes the principle, apparatus, reagents, calculations, and notes. There are also some very informative comments which explain what the experiment demonstrates, what else can be determined by the same procedure, interferences, etc.

Chapter 13 (72 pp.) is the last chapter. Entitled "Microdetermination of Functional Groups Using Special Apparatus," it describes 27 functions using such apparatus as the Kjeldahl, alkoxy, hydrogenation, gas chromatographic, etc. The presentation is the same as in Chapter 12. Table 13.1 presents a good summary of the procedures and apparatus used for the determination of the functions treated in the chapter.

Appendix A lists a few supply houses for equipment and apparatus which will be helpful to the beginner, and Appendix B gives a schedule for a one-semester course.

In conclusion, it is the reviewer's opinion that this book will make an extremely valuable addition to the library of any research or analytical chemist who deals with organic compounds.

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Boron-Nitrogen Chemistry. Advances in Chemistry Series No. 42. An International Symposium Sponsored by the U. S. Army Research Office, Durham, at Duke University, Durham, N. C., April 23–25, 1963. KURT NIEDENZU, Symposium Chairman. Edited by ROBERT F. GOULD. American Chemical Society, 1155 Sixteenth St., N. W., Washington 6, D. C. 1964. x + 330 pp. 16 × 23.5 cm. Price \$7.50.

The isoelectronic analogy between B–N and C–C compounds has attracted the interest of organic and physical-theoretical chemists alike, leading to a large development of new chemical variety. The extremely fast growth of the B–N chemistry within the past ten years is apparent even from a glance at the table of contents of this printed version of the symposium held last year at Duke University. Dr. Niedenzu is to be congratulated on his ability to bring to one place so many B–N experts from so many countries and representing such a wide range of chemical experience.

Of the 32 papers, 20 would be classified as new syntheses. Many of these represent the introduction of B–N bonds into organic chemistry, with results which must seem quite spectacular from that viewpoint. There are five papers devoted primarily to bonding theory; four are concerned mostly with vibrational spectra; and only two deal especially with nuclear magnetic resonance—but most of the other papers depend in some part upon these modern sources of understanding.

The arrangement of papers roughly follows the order of types R_3NBR_3 , R_2NBR_2 and polymers, and $(RNBR)_n$ polymers, but many compounds do not fit these type-formulas even with a very broad interpretation of the symbol R. The whole impression of the book is somewhat like an issue of a well-refereed journal, in which it is difficult to detect any errors of either detail or general understanding. This book should do much to arouse the interest of chemists having widely different backgrounds of experience, and for the further progress of a subject offering great opportunities for still more chemical novelty.

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