

tion, and P. W. Kent *et al.* indulge in some interesting speculations on the role of sulfate groups in glycoproteins as potential, informational regulators. The chapters that describe original work, usually with full experimental detail, were of particular interest to the reviewer. The synthesis and properties of ascorbic acid sulfates, attempts at making heparin substitutes from amylose, and novel methods and results in sulfation of polysaccharides are all excellent chapters. For the industrial or pharmaceutical chemist, papers on the preparation of a uniformly substituted cellulose sulfate *via* the nitrite, the reaction of starch with chlorosulfonic acid and formamide, the cross-linking of heparin, and the graft copolymerization and sulfation of xanthan gum form worthwhile contributions. Another group of chapters, dealing with the methodology and theory of interactions between sulfated polysaccharides and inorganic ions or proteins, are important in helping our understanding of what is happening at the molecular level, and point the way to a field of study that should develop rapidly in the next few years.

Most of the chapters contain adequate, sometimes exhaustive, lists of references up to 1977. The volume suffers from the fact that the chapters are photocopies of the original authors' manuscripts, complete with typographical and other errors, of which there are far too many; proof reading must be a dying occupation. Nevertheless, the volume should certainly be purchased by the library of any academic or industrial laboratory interested in the chemistry or biochemistry of carbohydrate sulfates, and will, I suspect, find its way onto the bookshelves of many individual scientists.

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*Nucleic Acid Chemistry*, Parts 1 and 2, edited by LEROY B. TOWNSEND and R. STUART TIPSON, John Wiley & Sons, Inc., New York, N.Y., 1978, 2 vols., xv + 1122 pages, \$70.00.

These volumes are an extension of the renowned two-volume set *Synthetic Procedures in Nucleic Acid Chemistry*, edited by W. W. Zorbach and the second of the present editors, which appeared in 1968 and 1973. The rapid progress in synthetic and analytical nucleic acid chemistry during the intervening period has created a need for a definitive compilation of sound, proven synthetic procedures, methods, and techniques. The present set meets this requirement admirably. The contributors comprise an international selection of experts in this field, and the broad range of compounds cited as starting materials or synthetic products ensures that the reader will find a reaction or technique which is applicable to his research needs.

These books contain 177 chapters on eight major areas of nucleic acid chem-

istry. The areas covered are heterocyclic compounds (28 chapters), carbohydrates (8), nucleosides (98), nucleotides and polynucleotides (20), isotopically-labeled compounds (5), chemical and enzymic syntheses (6), reagents, intermediates, and miscellaneous compounds (6), and instrumental or analytical techniques and applications (5). Many of the chapters have subtitles which describe the mode of synthesis involved or a novel feature of, or use for, the target compounds.

The 28 chapters on heterocyclic compounds are principally concerned with purines and pyrimidines, as might be expected, but also give synthetic routes to heterocyclic compounds which have novel substituent groups, ring-atom substitution, or other rings fused to the parent heterocyclic system.

The eight chapters on carbohydrates describe conventional synthetic pathways to new and useful compounds. New glycosyl halides and glycosides, intended for subsequent conversion into nucleotides, are described.

The section on nucleosides contains 98 diverse and valuable chapters. A great variety of monocyclic and bicyclic bases, and of carbohydrate compounds, is employed in the synthetic schemes. The reader will find no difficulty in locating a reaction easily adaptable to his needs. All target compounds in this section, as in all of the chapters, are fully characterized by physical and spectroscopic data.

The preparation and application of novel reagents which find direct application to the synthesis of aglycons, carbohydrates, or nucleotides are discussed in the section on reagents, intermediates, and miscellaneous compounds. The section on isotopically-labeled compounds gives practical methods for labeling bases with as many as three different stable isotopes, and one contribution provides a detailed discussion of isotope-dilution analysis by mass spectrometry. In the section on chemical and enzymic syntheses, enzymic phosphorylation and polymerization yielding homopolynucleotides are separately discussed.

The five chapters on instrumental or analytical techniques and applications cover computer-based strategies for interpretation of the ultraviolet spectra of equilibrated nucleic acid mixtures, high-performance liquid chromatography (2 chapters), determination of anomeric configuration by proton magnetic resonance spectroscopy, and thin-layer chromatography. These applications of standard techniques are a useful adjunct to a book which otherwise is oriented to synthesis.

The set is primarily aimed at synthetic organic chemists, but will also prove valuable to medicinal chemists and biochemists whose research extends into the areas covered by these books. The two volumes are produced from typescript which has been carefully prepared and is virtually error-free. The figures are clearly drawn and reproduced, and are easy to follow. Complete author and subject indexes are contained in each volume. The set gives good value for its price, which is not unreasonable by current standards.

It can be expected that these volumes will become a standard reference work in the field, due to their soundness, scope, and usefulness.