NEW BOOKS

J. F. GERECHT, BOOK REVIEW EDITOR

Cottonseed Chemistry and Technology, K.S. Murti and K.T. Achaya (Publications and Information Directorate, No. 598, CSIR, New Delhi, India, 1975, 348 p., $32.00).

This book is most welcome since it is the first coverage of this subject since Bailey's *Cotton and Cottonseed* (1948). It embodies an extensive treatment of the subject, supported by a detailed list of contents, a list of tables, and comprehensive author and subject indices. About a thousand literature references, patents, technical documents, and trade materials have been utilized in its preparation.

The topics covered include a history of cottonseed in India, trends in the production and utilization of cottonseed in India and elsewhere, the composition and characteristics of cottonseed varieties, a discussion of gossypol and its related pigments, and another on cottonseed storage in relation to biological processes, standards and specifications for cottonseed and its various products, cottonseed processing, recovery of oil and its conversion to edible forms through refining, bleaching, deodorizing, and hydrogenation processes. Also included are the physical and chemical properties of cottonseed oil; the preparation and properties of cake, meal, and edible flour; and the nature and utilization of linters and hulls. While certain chapters deal with cottonseed in India, treatment of chemical and technological subjects draws on world information in the field.

This book contains perhaps the most comprehensive and up-to-date treatment now available of the nature and utilization of cottonseed and its products. It should be a welcome addition to the library of an oilseed scientist.

M.E. WHITTEN
ARS, USDA
Beltsville, MD 20705

Immobilized Enzymes, Antigens, Antibodies and Peptides: Preparation and Characterization, Vol. I, Edited by Howard H. Weetall (Marcell Dekker, New York, NY, 1975, 661 p., $38.50).

Since three of the ten articles in this work were authored by staff members of the Corning Glass Works, and since the editor is also employed by Corning, it might be said that about one-third of the book emanates from the laboratories of that corporation. The fact that Corning's scientists and engineers have been among the leading investigators and innovators in the immobilization of proteins underlies and justifies this representation, which might otherwise be interpreted by some as a form of corporate nepotism of puffery. Each of the chapters is a review of published work, and, although the field is very large in most cases, it appears the authors have taken reasonable care to discuss a wide range of work by others. For example, the average number of references cited per chapter is about 45; the range goes from a low of 22 citations in the article by Hornby entitled "Modified Nylons in Enzyme Immobilization and Their Use in Analysis" (a rather narrow speciality) to a high of 171 in Guilbault's review of "Enzyme Electrode Probes."

The first chapter, written by Merrill Lynn and entitled "Inorganic Support Intermediates: Covalent Coupling of Enzymes on Inorganic Supports," emphasizes silanization and silane coupling agents for inorganic supports, with a significant treatment of the preparation of reactive intermediates from alkyl amine derivatives of inorganic materials. Coupling enzymes to such supports is then reviewed from the standpoint of inorganic supports bearing the following functionalities: carbonyl, carboxyl, acyl chloride, N-hydroxysuccinimide ester, p-nitrophenol ester, isothiocyanate, triazine, aromatic amines (azo coupling), azide, vicinal hydroxyls (cyanogen bromide coupling). In addition, the use of carbodiimide and isocyanide coupling reagents is also treated. This chapter concludes with a listing of enzymes which have been coupled to inorganic supports, including procedures and references; while not exhaustively complete, this should prove to be a most useful listing for screening purposes.

Garfield Royer has provided a useful review of the kinetic aspects of the reactions of immobilized enzymes in Chapter 2. Noteworthy details include lucid presentations of quantitative treatments of electrostatic effects and external-phase transport resistance. Also discussed are hydrophobic effects and the one dimensional formulation for internal diffusion in membranes and multienzyme systems. The chapter concludes with a discussion of certain practical aspects of kinetic analysis for enzyme assays and for the determination of the parameters of the simplest Michaelis-Menten rate expressions. Multisubstrate reactions and the various types of inhibition receive essentially no quantitative exhibition, however.

The effects of product and substrate inhibition at least are treated quantitatively in Chapter 3, "Engineering Aspects and Reactor Design of Immobilized Enzyme Systems," by W.H. Pitcher, Jr., and N.B. Havewala. This chapter reviews the design of enzyme reactors based on irreversible and reversible Michaelis-Menten Kinetics, including the aforementioned inhibition effects and the effects of internal and external mass transfer. Although backmixing, electrostatic effect, heat transfer, enzyme deactivation, and pressure-drop aspects are also covered, the discussion of reactor operation and overall system design considerations impressed me as most interesting and useful from the practical standpoint.

Appropriately, the shortest chapter, "Modified Nylons in Enzyme Immobilization and Their Use in Analysis," by W.E. Hornby and D.L. Morris, is also the most specialized, at least regarding the support. After a consideration of the cleavage of peptide bonds in nylon, there is a discussion of coupling enzymes with bifunctional reagents. This is followed by material on O-alkylation which does not require prior cleavage of peptide bonds. The chapter concludes with a discussion of applications in assay methods, including continuous flow analyzers such as the Technicon Auto-Analyzer.

The art of wet spinning for producing fibers from aqueous emulsions of polymer solutions by extrusion into a coagulating bath has been adapted by Dinelli and coworkers for immobilization of enzymes by entrapping them in the fibers so formed. This subject is reviewed in Chapter 5 by D. Dinelli, W. Marconi, and F. Morisi. The enzyme is merely added to the emulsion together with stabilizers. The resulting fibers are easy to prepare, possess high activity and mechanical stability, and have other advantages as well. This review covers the preparation, properties, and structure of such enzymatic fibers, as well as experimental results regarding stability and applications of many enzymes so prepared. The treatment is very detailed and exhaustive, including information as to 13 oxidoreductases, 7 trans-

ferases, 14 hydrolases, 4 lyases, and 2 isomerases.

Biomedical applications of immobilized enzymes, particularly microencapsulated enzymes, comprise the major theme of Chapter 6 by Thomas M.S. Chang. A salient aspect of this review is the ample discussion of such applications with respect to each of four different general methods of immobilization: covalent bonding, adsorption, matrix entrapment, and microencapsulation. The section on administration of immobilized enzymes is a grab bag of medical engineering problems, together with general suggestions for innovative approaches ranging from the potentials of immobilized enzymes for artificial kidneys, liver support function, and feedback control of artificial insulin dosage by in vivo enzymatic glucose analysis to futuristic speculation as to the eventual use of enzymatic fuel cells for cardiac pacemakers. This chapter is a storehouse of general concepts regarding potential biomedical applications of immobilized enzymes; these concepts might be viewed as creatively inspirational or highly speculative depending on the reader's viewpoint vis-a-vis reduction to engineering practice and medical regulatory barriers to innovation. Certainly a provocative presentation.

Enzyme electrode probes are thoroughly reviewed in Chapter 7 by one of the most active practitioners of the art and science, George G. Guilbault. The very thorough treatment covers many aspects ranging from the science and utilization of ion selective electrodes to detailed instructions for construction and use of enzyme electrodes—almost a do-it-yourself type rendering. Table 5, a summary of information on various electrodes, covers nine different substrate/enzyme types with information as to electrochemical sensor, immobilization method, stability, response time, concentration range, amount of enzyme required, wash time, and references. This is an excellent summary of this simple and versatile approach to highly specific chemical analysis which may be expected to assume increasing importance in the future.

Highly specific and efficient separations of biochemically active molecules are possible based on the formation of reversible complexes such as those between enzymes and substrates, inhibitors or coenzymes, between hormones and receptors or binding proteins, between antibodies and antigens, etc. This technique of "Affinity Chromatography" (based on immobilization of one of the specifically interacting molecules) is the subject of Chapter 8 by George Baum and Stanley J. Wrobel, especially from the experimental standpoint of column design, specific applications, and reported experimental results. The review covers support materials, spacers, ligands, adsorption, and elution. The chemistry of attachment of ligands to support materials is also given careful attention.

The immobilization of a specific antibody or antigen underlies the technique of solid phase immunoassay in which competitive binding forms the basis for analysis. In the most common variant, insoluble antibodies are complexed with labeled antigen. When this adduct is equilibrated with an unknown concentration of unlabeled antigen, the amount of labeled material displaced by competitive binding is a measure of the concentration of the (unknown) unlabeled antigen. When the labeling is due to a radioactive nuclide, the procedure is known as radioimmunoassay (RIA); labeling by conjugation of the antigen to a readily detectable enzyme is known as enzyme-linked immunoassay (ELISA). This review covers technique, carriers, methods of labeling, methods of protein determination, and a discussion of the immunoassay systems in current practical use. The tables summarize solid phase immunoassay procedures, commercial macroporous sup-

ports, functional groups, and commercially available solid phase RIA kits.

The concluding chapter, "Solid-Phase Sequencing" by Richard A. Laursen, concerns an important improvement in the Edman degradation by which the primary structures of proteins can be ascertained through cleaving amino acids stepwise from the N-terminus of the peptide or protein. In the improved method, of which the author was a major developer, the peptide to be analyzed is anchored to an insoluble support by bonding at or near the C-terminus before the sequential degradations are performed. This chapter is similar to Chapter 1 with regard to the richness of experimental detail presented; there is some small overlap of chemical subject matter as well. Chapter 10 not only covers the chemistry of protein degradation and attachment to a variety of supports, but also treats such important matters as sources of reagents and their required purity, thin layer chromatography of the phenylthiohydantoin derivatives of amino acids produced by cleavage, construction of columns and equipment and the like. Examples are also given of the results obtained with several proteins.

Overall, this volume should prove of value to workers concerned with the technology of enzyme applications and enzymatic analysis as well as those concerned with the immunochemistry and primary structure of proteins. Because of the richness of detail presented, including the number of references, this collection of reviews will serve as a convenient reference book for active researchers in these fields.

ROBERT W. COUGHLIN
Department of Chemical Engineering
Lehigh University
Bethlehem, PA 18015

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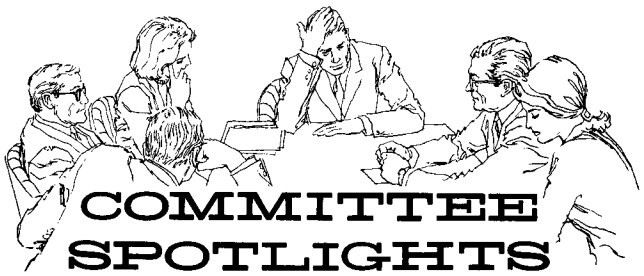

Ways and Means Committee

The Ways and Means Committee is an Administrative Committee with responsibilities to develop feasible operating procedures for the implementation of specific projects assigned to, or developed by, this committee. Projects can include (a) ways to implement motions adopted by the Governing Board; (b) functions developed by the Society Improvement Committee; and (c) specific assignments from the President, the Executive Committee, the Governing Board, Society officers, and other Society committees.

The present chairman is Robert J. Hlavacek and members are R.J. Bell, J.G. Endres, H.G. Salomon, and R.J. Sims.

RETIRING THE MORTGAGE

Background

Part of the original concept of the AOCS Foundation was to generate funds to retire the mortgage. In 1974, the Executive Committee assigned this responsibility to the Ways and Means Committee, with the specific charge to develop an appropriate plan. Subsequently, the Ways and Means Committee recommended seeking professional fund raising guidance, which was approved by the Governing Board.

In December 1974, two Ways and Means Committee members met with professional counsel, who made several important recommendations. These recommendations were not acted upon by the Executive Committee, and the Ways and Means Committee was once again charged to develop a plan.

Current Status

Its October 1975 report to the Governing Board was the entire Ways and Means Committee's first opportunity, since the January report, to convene and review the prospects of a "burn the mortgage" campaign. It was the unanimous recommendation of the committee that such a fund raising campaign be abandoned for the following reasons, many of which were reported in January 1975:

1. There is no demonstrated financial need.
2. It is impossible to generate any appealing, industry-wide cause based on the availability of an additional $20,000 per year which might then be available.
3. The total amount of the mortgage, $60,000-$70,000, is not a large enough sum to really excite the zeal of potential contributors.
4. A building fund many years after the purchase of a new facility will gain little membership enthusiasm, particularly with our present financial situation. Such a campaign should have been undertaken before or concurrently with a commitment to new facilities.

If there was a need to generate additional resources, the Ways and Means Committee recommended that the Governing Board consider small increases in dues, the need for which was well publicized to the membership. In its October report, the committee suggested that the entire country is now reconciled to inflation as a way of life; small dues increases of perhaps $2.00 would probably result in less attrition than a single, much larger increase after several years.

ACTIVITIES OF THE WAYS AND MEANS COMMITTEE

It is the general consensus of the committee that it should be responsive to assignments from the Executive Committee or the Governing Board. The Ways and Means Committee should probably not generate its own program but rather attempt to outline the ways and means to establish specific Society goals. The committee has had only one assignment in recent months, and the members feel that their responsibilities in this area have been fulfilled.

To maintain a viable committee, the members feel that other assignments should be forthcoming from either of the previously mentioned groups. As an alternative, the Ways and Means Committee might write to each active committee, offering its services in the solution of major problems with which they are faced.

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