

with physicists, we are even treated by one author to a saying of Lao-Tzu: 'The highest form of goodness is the water, water knows how to benefit all things without striving with them.'

Volume 6 manages to maintain an equally fine balance between 'chat' and mathematics.

J. B. HASTED

Analytical Methods for Glycerol

M. R. F. ASHWORTH (Editor)

Academic Press, London, 1979, pp. 258, £21.00

This unique book is a study of many detailed approaches to analysis of glycerol and glycerol compounds. Practically every chromatographic method for the analysis of the parent compound is described, as well as oxidation, esterification, etherification, dehydration, condensation and physical methods. The book provides even greater detail of methods for glycerol compounds, and these are divided into methods based on residual hydroxy groups, release of glycerol from the sample, probable participation of the complete molecules of the sample and enzymic determination [including the GK-GPDH (glycerol kinase-glycerol phosphate dehydrogenase) method, GDH (glycerol dehydrogenase) method, GK-GDH method, GK-PK (pyruvate kinase)-LDH (lactate dehydrogenase) method and enzymic-radiometric method]. There is a further chapter on the

analysis of glycerol for impurities. Chapters are thoroughly bibliographed (up to 1976) and neatly subheaded. Although the book is replete with methodological detail, it describes the context and chemistry of each method sufficiently well to satisfy a chemist or biochemist. The editor does not hesitate to draw informed conclusions about the functions of reagents in the various methods and this helps to set the framework of the subject into perspective.

Although the book is designed for laboratory staff engaged in organic and biochemical work, it is also of interest to a wide range of food scientists, nutritionists and medical research workers, because glycerol is now finding extensive use in food, cosmetic and therapeutic preparations.

G. G. BIRCH

Applied Biochemistry and Bioengineering (Volume 2: Enzyme Technology)

LEMUEL B. WINGARD, JR.,
EPHRAIM KATCHALSKI-KATZIR and
LEON GOLDSTEIN (Editors)

Academic Press, New York, San Francisco and London, 1979, pp. 306, \$32.50

The first volume of this series, entitled *Immobilised Enzyme Principles* appeared in 1976 among a plethora of similar review volumes and was by no means the best of the bunch. The present volume, however, is a great improvement, and should be included in the library of any organization involved in any way with the production and use of enzymes. Enzyme technology is a multi-disciplinary subject par excellence and depends for success on the close association of microbiologists, biochemists, chemists and engineers; reviews in this volume will help workers in each discipline to understand each other's contributions and problems.

Professor Lilly discusses the factors influencing intracellular microbial enzyme production from choice of micro-organism, medium selection, inoculum or seed culture production through fermentation parameters in batch and continuous culture to enzyme extraction and isolation. Dr. Aunstrup provides a similar range of information on the production of extracellular enzymes, exemplified by many commercially available products of his own company (Novo Industri A/S) and others. These two papers comprehensively review the present state of knowledge of the production of microbial enzymes on a large scale. Dr. Kula reviews the use of aqueous two-phase systems in the extraction and purification of enzymes, a technique that probably merits much more attention from enzyme technologists than it has received so far.

Clinton Corn Processing Company was the first of many commercial organizations to produce high-fructose/glucose syrups, and it is appropriate that Dr. Antrim, Dr. Colilla and Dr. Schnyder of that company should review the use of glucose isomerase, and what a 'blockbuster' they have produced! Everything there is to be known about glucose isomerase is there (including quotation of a wildly inaccurate article from the

commercial press about the reviewer's own company's involvement). After 57 fact-packed pages it is hard to imagine what more there could be to say about glucose isomerase, but Dr. Hemmingsen manages this by describing the development and use of Novo's widely used preparations of glucose isomerase. Professor Reilly provides a welcome review of the use of glucoamylase, soluble and immobilized, in starch hydrolysis. Glucoamylase has been overshadowed in the literature by glucose isomerase so a bringing-together of information on the properties and use of glucoamylase is particularly valuable. It is perhaps significant that Professor Reilly, from an academic laboratory, is more optimistic about the potential of immobilized glucoamylase than are the enzyme companies.

The next two papers are both concerned with the commercial application of a range of enzymes and read, in places, slightly like extracts of companies' sales brochures. Both have sections devoted to glucose isomerase which, after what has gone before, could be omitted or at least shortened. (Surely 'editors' of such volumes as this should be called 'compilers'.) Dr. Sweigert deals briefly with applications of immobilized glucose isomerase, glucoamylase and lactase and Dr. Marconi and Dr. Morisi describe more extensively various applications of their very elegant method of trapping micro-droplets of enzyme solutions within polymer fibres. This is another very worthwhile paper.

A review from the U.S.S.R. is welcome; there is more enzyme technology going on there, one suspects, than is read about in the West. Dr. Berezin and Dr. Varfolomeev discuss the approaches that have been made for employing immobilized enzymes, chloroplasts and cells for power generation and stress the great amount of basic research that has still to be done before the processes described can be implemented.

Immobilized living organisms have perhaps more potential for

Applied Biochemistry and Bioengineering (Volume 2: Enzyme Technology). August 1980 • Biochemical Society Transactions. C. BUCKE. • Less than 50 different enzymes are used on a larger industrial scale with a strong emphasis on detergents and food processing. In 1992, the dairy industry and starch/sugar-processing shared 56 mio and 44 mio US\$, respectively, of the total sales of 350 mio US\$ of technical enzymes in Europe. The vast majority of enzymes in food processing are hydrolases, such as amylases, proteases, pectinases, cellulases, pentosanases, invertase, and lactase. Biotechnology and Applied Biochemistry is a bimonthly peer-reviewed scientific journal covering biotechnology applied to medicine, veterinary medicine, and diagnostics. Topics covered include the expression, extraction, purification, formulation, stability and characterization of both natural and recombinant biological molecules. It is published by Wiley-Blackwell on behalf of the International Union of Biochemistry and Molecular Biology.