Physical Aspects of Protein Interactions

Developments in Biochemistry, Volume 3

Edited by N. Catsimpoolas
Elsevier/North-Holland; Amsterdam, New York, 1978
viii + 308 pages. Dfl 101.00, $45.00

This volume is comprised of papers presented at a symposium of the American Chemical Society on 'Protein Interactions' in September 1978, and its publication within two months of this date does credit to authors, editor and publisher. Despite the variety of topics covered, each author has given a lucid thermodynamic treatment of his favoured system, and similar concepts appear in several places. This is not to denigrate the book; indeed it is useful to have collected together such a wealth of information on the most actively studied systems exhibiting protein–protein interactions, and to see that the process of self-association is almost inevitably an entropy-driven one, a point made most explicitly in Lauffer's article on the tobacco mosaic virus protein.

Other self-associating protein systems covered in detail are yeast enolase, apolipoprotein A-I brain tubulin and, inevitably, haemoglobin. There are also several papers on the more general principles and practice of treating self-associating protein systems, both theoretically and experimentally. Ultracentrifugation, light scattering and osmometry feature heavily in the latter considerations, whilst the former are supplemented by, in addition to the more usual treatments, a contribution to the problem of sample heterogeneity and the 'anomaly' that the Van't Hoff expression is not obeyed in many cases.

There is only one article on the interaction of proteins with other types of ligands, that by Wilchek and co-workers, who provide a very thoughtful treatment of the contribution to 'biospecificity' of affinity ligands in terms of the different interactions in which differing groups of the ligand may take part.

This is certainly a book for the postgraduate student with an interest in the physical chemistry of proteins; too much is taken for granted for the reviewer to recommend it to an undergraduate audience. This said, however, biochemists will find this a useful source work for some time to come, and a space should be reserved for it in the departmental, though not I fear, at this price, the individual library.

Douglas Kell

Immobilized Enzymes – Research and Development

Edited by Ichiro Chibata
John Wiley and Sons; London, New York, Sydney, Toronto, 1979
viii + 284 pages. £24.50, $46.00

Enzymes are among the oldest known catalysts and have been applied on an industrial scale long before they were available in a purified form. Such application for the most part has been confined to their use for the manipulation of biopolymers although the production of dyes such as indigo and even of

materials such as saltpetre for the manufacture of gunpowder may be cited as examples of their useful virtuosity. The ever-widening scope of the reactions which were found to be catalysed by specific enzymes during the first half of the present century inevitably led to speculations about their potential as industrial catalysts in areas other than biopolymers. The expense and comparative lability of most of the enzymes of potential interest thus inevitably suggested that attachment to solid supports would be a means of making them comparable to other industrial catalysts. A number of investigators began work along these lines around 1960 and the subject expanded very rapidly. The greater part of the research has come from the US and Japan but with important contributions from Denmark, France and Israel. Industrial applications of immobilised enzymes have commenced, notably the large scale isomerisation of glucose. The more interesting of these have occurred in Japan which has shown itself able to exploit this new technology in a manner quite unlike that elsewhere. Since the early thirties Japan has had a tradition of work on natural products which has been much stronger than in most other countries and this bias is now showing in the amount and versatility of Japanese research in this field. The present work from the leading Japanese team is therefore particularly welcome. There are already a number of texts on immobilised enzymes and 'enzyme engineering' but they tend to concentrate upon the physical chemistry and chemical engineering process theory involved or upon the analytical use of immobilised enzymes. The present work is written by Ichiro Chibata, Tetsuya Tosa, Tadashi Sato and Takao Mari all of the Applied Biochemistry Research Laboratories of the Tanabe Seiyaku Company in Osaka. Not surprisingly, therefore, it has a strong practical and industrial slant and concentrates on data rather than theory. This is very clearly and competently presented so that the text constitutes a valuable and up to date compendium of the means available for preparing and using immobilised enzymes in every known form, including immobilised whole cells. The latter is almost a Japanese speciality and this is certainly the best account of this aspect of the subject showing both the achievement and the potential. There are three main sections to the book dealing with preparation, properties and applications. Each is very fully documented and there are in all 1077 references, those in the preparation section alone running to 625 items. The emphasis throughout is upon data. There is a good descriptive text, but perhaps even more valuable are the comprehensive tables in which, are set out, all the available methods and numerical data together with their literature references. The preparation section is evidently as complete as it can be made – a Beilstein of methods of immobilisation, types of supports, coupling reactions and of enzymes and co-factors immobilised. There is also an appendix of 9 pages listing the commercially available immobilised enzymes and activated supports. The section on properties is not so complete in that it deals only sketchily with theoretical work and concentrates on assessing the available practical data. Similarly, the section on applications concentrates on industrial applications, but although it surveys the various types of reactor and deals with various experimental processes it makes no attempt to go into the chemical engineering of enzyme reactors. This is a strength rather than a weakness as the physical chemistry of immobilised enzymes and kinetics of enzyme reactors have been dealt with at length in other texts and reviews. The applications section contains, in addition, a brief survey of analytical and medical applications of immobilised enzymes and of the closely related subject of affinity chromatography. Although this does no more than refer to the main developments in the area it serves to round out a view of the general scope and potentialities of the whole subject. The authors are to be congratulated on producing a valuable addition to the practical enzyme literature. It will be of great help both to those already working in the field and to newcomers. It is the sort of books that workers will want to have in the laboratory and which will quickly show the marks of continual use. Apart from the few photographs which are disgracefully poor for so expensive a book, the production is good.

E. M. Crook

assay Laboratory experiment used to measure some physical or chemical aspect of a sample. chromatin DNA, its structure for packaging, and the attached biomolecules. chromatin accessibility Measurement of the openness of chromatin. chromatin state Label summarizing multiple properties of a region of chromatin, which often include histone.Â BS-seq DNA methylation CETCh-seq associated protein. ChIA-PET long-range interactions ChIP-exo associated protein. ChIP-nexus associated protein ChIP-seq associated protein. CUT&RUN associated protein DNase-seq chromatin accessibility. Heavy BAD proteinâ€“protein interaction. Panel A: Coomassie-stained SDS-PAGE gel of recombinant light and heavy BAD-GST-HA-6xHIS purified from HeLa IVT lysates (L), using glutathione resin (E1) and cobalt resin (E2) tandem affinity. The flow-through (FT) from each column is indicated. Panel B: Schematic of BAD phosphorylation and protein interactions during cell survival and cell death (i.e., apoptosis).Â The measurable effects of protein interactions have been outlined as follows: Alter the kinetic properties of enzymes, which may be the result of subtle changes in substrate binding or allosteric effects. Allow for substrate channeling by moving a substrate between domains or subunits, resulting ultimately in an intended end product. Apart from protein-protein interactions, arrays were used to study interactions with lipids. The significance of understanding such interaction has a great impact on elucidating the role of lipids, such as steroid hormones, in regulating gene expression, and also on deciphering the mechanism of membrane transport as mediated by lipid-binding proteins found in the cell membrane. Aided by a protein array of 5,800 proteins, several lipid-binding proteins have been identified in yeast [47]. Physical Aspects of Protein Interactions. FEBS LETTERS. Developments in Biochemistry, Volume 3.Â This is certainly a book for the postgraduate stu-dent with an interest in the physical chemistry of proteins; too much is taken for granted for the reviewer to recommend it to an undergraduate audience. This said, however, biochemists will find this a useful source work for some time to come, and a space should be reserved for it in the departmental, though not I fear, at this price, the individual library.