is the result of a set of equilibria under very particular conditions. Furthermore, the catalytic and synthetic activity of inorganic complexes again depend on equilibria. It is certain that the next few years will see a much greater emphasis on the study of the equilibria rather than the isolation of complexes, and that the study will extend much more to reactions in non-aqueous solvents and involving π-bonded complexes.

By some accounts it is not reasonable to be interested in species which are unisolable, but it is generally such species which are of greatest importance in solution and in any processes carried out in solution. The stepwise formation of complexes, for example,

$$Cr(H_2O)_6^{3+} \rightarrow Cr(NH_3)(H_2O)_5^{3+} \rightarrow Cr(NH_3)_2(H_2O)_4^{3+}$$

and the like, was first proved by Niels Bjerrum before 1915, but comparatively little quantitative work on equilibria in solution was carried out between the two world wars and the next major advance was the publication of the book, *Metal Ammine Formation in Aqueous Solution*, by Jannik Bjerrum in 1941. Subsequently, many systems have been studied and a large amount of data on equilibrium constants of simple systems are available in collections such as the Chemical Society's "Stability Constants".

It is on methods of study of such complexes that Professor Beck has written this book. The mathematics of the method have previously been considered in detail by F. J. C. Rossotti and H. Rossotti in, *The Determination of Stability Constants*, and Beck has wisely not attempted to compete with this but has, rather, concentrated on the chemistry rather than the algebra. I consider that he has been successful in this aim and has produced a readable book which has much detail but is not swamped by minutae.

The book is based on a Hungarian version published in 1965, but has been convincingly updated—it is certainly ahead of most Eastern European books in this respect. The field is covered fairly comprehensively, the major deficiency being the scant attention paid to the use of magnetic resonance techniques to the study of equilibria. The book could be well recommended to a masters or honours class studying this subject and yet is full enough to be of use to the research chemist. The price is reasonable by modern standards, but the printing is unattractive although the tables and figures are agreeably clear. There will undoubtedly be a much greater interest in this area in the future and I am therefore confident that this book will be of considerable use to many chemists.

D. W. A. Sharp

AZOMETHINE CHEMISTRY

The Chemistry of the Carbon–Nitrogen Double Bond

Edited by Saul Patai. (The Chemistry of Functional Groups: a Series of Advanced Treatises.) Pp. xiii + 794. (Wiley (Interscience): London and New York, February 1970.) 240*s*.

This is the seventh volume to appear under the editorship of Professor Saul Patai in this series of large monographs on the chemistry of individual linkages and functional groups. As with previous volumes it has been found necessary to go to press minus several of the originally projected chapters, in this case those on "Directing and Activating Effects", on "Syntheses and Use of Isotopically Labelled Azomethine Groups" (in both cases because of paucity of material), and on "Biological Formation and Reaction of Azomethine Groups".

The pattern of previous volumes is followed in that the first chapter deals with general and theoretical aspects of the group, and is followed by a long chapter (87 pp.) on methods of formation of C=N; the latter is an extremely useful survey and is particularly well documented with 531 references. The chapter on analysis proper is fairly straightforward, but there is, in addition, an interesting chapter on optical rotatory dispersion and circular dichroism of azomethines. There is also a lengthy chapter on the electrochemistry of the carbon–nitrogen double bond, but a fair amount of this does, in fact, deal with the electrochemical preparation of azomethines—quite interesting, but hardly what one might have expected from the chapter title. The account of the more general behaviour of the linkage is completed by an interesting chapter on its basic and complex-forming properties, and also a highly topical one on its photochemistry.

The "bread and butter" chemistry of the linkage is dealt with in chapters on addition reactions, cycloadditions, and on substitution at azomethine carbon and nitrogen atoms; and there is also an interesting and useful account of *syn-anti* isomerizations and rearrangements. This general section is completed by a chapter on the cleavage of carbon–nitrogen double bonds, but this account differs from the others in being almost wholly a study of the kinetic evidence on which current views about the mechanism of the reaction are based. The total account of the linkage is completed by longish chapters on two special topics of present interest, quinonediimines and related compounds, and imidoyl halides.

In general the coverage seems reasonable, but in comparing this with other volumes in the series there does seem some lack of proportion in devoting 794 pages to C=N, while according only 1,027 pages to the very much more important C=O. The reproduction of structural formulae is reasonably adequate; the coverage of the literature extends through 1967 (not to the end ?); there is a comprehensive author index, but a rather less satisfactory subject index.

Peter Sykes

PROTEIN TRANSFORMATIONS

Multiple Equilibria in Proteins

By Jacinto Steinhardt and Jacqueline A. Reynolds. (Molecular Biology: An International Series of Monographs and Textbooks.) Pp. x + 391. (Academic Press London and New York, February 1970.) 140*s*; $15.

One of the most important potentials of proteins is their ability to undergo specific and often reversible transformations, on association with metal ions, organic molecules and other proteins, and thereby to make possible particular biological processes. The energetics and equilibria of such complex changes are ably reviewed in this comparatively small book. The book does more than intelligently classify relevant information; it attempts to answer a number of fundamental problems, such as the differences between processes which give rise to multiple equilibria and those responsible for highly specific binding which are characteristic of enzyme-substrate, membrane-protein substrate, and hapten-antibody reactions; the characteristics essential for a protein to bind strongly many equivalents of a large variety of groups; the characteristics which make certain substrates ligands for proteins; the reasons for the large conformational changes in most proteins following the binding of a small number of equivalents of certain ligands; and finally the physiological utilization of such properties in a versatile protein carrier such as serum albumin.

The book consists of eight chapters starting with an introduction which classifies the problems with which the book is concerned. Chapter two covers very briefly thermodynamic and some other relevant physicochemical concepts. Chapter three enumerates and discusses critically many of the methods which have been used to determine the extent of binding and the isotherms involved. Chapter four covers present knowledge and hypo-