ELSEVIER

Carbohydrate Research 267 (1995) C9–C10

CARBOHYDRATE RESEARCH

Book review

The Anomeric Effect and Associated Stereoelectronic Effects, ACS Symposium Series 539, Edited by Gregory R.J. Thatcher, American Chemical Society, Washington, DC, 1993. ISBN 0-8412-2729-2, 293 pages plus indexes, $74.95.

This book was developed from a symposium sponsored by the Division of Carbohydrate Chemistry of the American Chemical Society, at the 204th National Meeting of the American Chemical Society, held on 23–28 August 1992 in Washington, DC.

After a preface and an introduction there are 15 chapters and author, affiliation, and subject indexes. The present stage of knowledge of the anomeric effect is represented in this book from the standpoint of both theoretical and experimental chemistry with the aim "to provide a forum for competing viewpoints rather than to resolve the controversies surrounding the anomeric effect" (Editor's Preface). The book begins with a historical reminiscence describing the origin of the descriptions of the anomeric effect. The next chapter provides introductionary information on the anomeric and associated stereoelectronic effects (generalized anomeric effect, exo-anomeric effect, gauche effect, and reverse anomeric effect) and briefly describes its manifestations and many of the controversies that continue to surround the anomeric and related effects. This is particularly illustrated in the following four chapters where a good deal of detail is supplied on results of experimental approaches and which are consistent with the dominant role of either molecular orbital or electrostatic interactions in the rationalization of stereoelectronic effects. In Chapter 7, a theoretical study of proton-induced cleavage of acetals and glycosides using *ab initio* calculations on protonated and unprotonated dimethoxymethane is presented. In the subsequent chapter, a combination of NMR and molecular mechanics methods is used in order to evaluate the role of steric, electrostatic, and delocalization components of the anomeric and gauche effects. Two following chapters describe different *ab initio* approaches used to examine the origin of the anomeric effect in dimethoxymethane. Chapter 11 gives the results of extensive *ab initio* calculations on simple acyclic molecules and a decomposition of the resulting energies into truncated three-component Fourier series. Applications of the scope of the stereoelectronic effects beyond carbohydrate chemistry are presented in Chapter 12–14. Examples represent insertion reactions involving glycosylmanganese complexes, the structure and reactivity of phosphate and phosphoamidate ester, and the structure of pentaoxysulfuranes. The final chapter describes the results of efforts to reparametrize

SSDI 0008-6215(94)00338-6

molecular force fields for the O–C–N sequence of bonded atoms in nucleosides on the basis of *ab initio* calculations on model compounds.

Overall, this book provides a useful overview of some developments in the area of the anomeric and related effects that have been accomplished from 1977 when the first symposium on the anomeric effect entitled "Anomeric Effect: Origin and Consequences" was sponsored by the ACS Division of Carbohydrate Chemistry. However, in spite of evident progress in this area, it is clear that our understanding of these effects still does not provide a totally integrated rationalization of the puzzle named the anomeric effect.

This book should be valuable for readers needing to understand the anomeric effects as a complex phenomenon characterized, apart from the conformational preferences, by unique variations of valence geometry and reactivity with far-reaching significance on the behaviour of different biologically important molecules.

Institute of Chemistry,
Slovak Academy of Sciences,
Bratislava, Slovak republic

Igor Tvaroska