NMR Spectroscopy: An Introduction

by H. Gunther
Wiley; Brisbane, Chichester, New York, Toronto, 1980
xiv + 436 pages; £7.95

This useful introduction to the chemical applications of high-resolution NMR spectroscopy is a substantially revised translation of a German text which originally appeared in 1973. It begins with a simple description of the NMR experiment, and the bulk of the first third of the book is then devoted to a description of the origins of the chemical shift and spin–spin coupling and their dependence on chemical structure. A long chapter devoted to the quantum mechanical formalism for the analysis of multiplets arising from spin–spin coupling is followed by a short but valuable chapter on the effects of magnetic equivalence. In chapter VII, we return to the basic NMR experiment, this time discussed in terms of the behaviour of the magnetisation vector leading to a description of relaxation and the Fourier transform experiment. There follows a description of the effects of chemical exchange, illustrated by examples of hindered rotation, inversion and valence tautomerism. Chapter IX on 'Special experimental techniques' deals primarily with double resonance experiments and the Fourier transform method, with brief descriptions of a number of more specialised techniques. The final chapter contains a discussion of ^{19}F and ^{13}C chemical shifts and coupling constants.

The central virtue of this book lies in the large number of carefully chosen and well illustrated examples used to illuminate the discussions of chemical effects in NMR spectra. Together with some useful compilations of data in the Appendix, these examples will provide the careful reader with a clear and quite detailed understanding of the relationship between chemical structure and the NMR spectrum. This is achieved with minimal requirements of mathematical sophistication – although this somewhat uneven through the book. Thus the rather straightforward Bloch equations are relegated to the Appendix, while the discussion of the analysis of multiplet structure in chapter V will probably tax many biochemists; this could however be omitted at first reading.

The revision of the first edition has consisted primarily of an expanded coverage of the Fourier transform method which has come to dominate NMR instrumentation since the original publication. This could with advantage have been more fully integrated, since the discussion of the method is divided between chapters VII and IX, with additional discussion of instrumental topics in chapter III. The standard of production is generally high, with an effective use of red and black line diagrams only occasionally marred by imperfect registration of the two colours.

The book can be thoroughly recommended as an introduction to the chemical applications of NMR. It will also serve well as a first text for those interested primarily in biochemical applications, although one of the specialised monographs on biochemical NMR will have to be consulted for further necessary detail, notably on relaxation phenomena.

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4.1 Introduction to Gradient Shimming. 4.2 Deuterium Gradient Shimming. 4.3 Homospoil Gradient Shimming.Â NMR Spectroscopy, User Guide Varian NMR Systems with VnmrJ Software Pub. No. 01-999343-00, Rev. B 1207.Â NMR Spectroscopy User Guide. 5. Table of Contents.