BOOK REVIEW

HANDBOOK OF TRITIUM NMR SPECTROSCOPY AND APPLICATIONS
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Published by John Wiley and Sons, Chichester and New York, 1985,
xiv + 249 pages

ISBN 0-471-90583-6 Price: £25.50

Tritium nmr is a technique of considerable potential which has remained somewhat underdeveloped. There are various reasons for this. One is the cost of the special tritium nmr probe required, and another, but much larger barrier, has been anxiety about the potential hazards caused by the seemingly large amounts of radioactivity employed. The appearance of this book, written by two groups who between them have pioneered tritium nmr spectroscopy and its applications, one from Amersham International plc and the other from the Department of Chemistry of the University of Surrey, will thus be most welcome to those who use, or are considering the use of, the technique. Basically the book falls into three major chapters with sub-sections.

The first of these deals with experimental aspects, covering the principles of nmr spectroscopy with special reference to tritium, and those aspects which cause anxiety such as safety, sample preparation and limits of detection. The technique will always be compared with deuterium nmr which uses a non-radioactive nucleus. For many purposes lack of radioactivity will be advantageous - though not for every type of experiment. However, deuterium resonances are broad, a fact that sometimes spoils an otherwise attractive experiment, and the nmr sensitivity of the nucleus is low (^{1}H, 1.0; ^{2}H, 9.65×10^{-3}; ^{3}H, 1.21). Tritium is a very sensitive nucleus giving sharp signals. Nowadays, using a 9.38T superconducting magnet and a modern FT spectrometer (426.66 MHz),, 200-300 μCi of ^{3}H per site (0.0007-0.001% ^{3}H/site) should give acceptable signals in a reasonable time. Whilst safety considerations are of the highest importance, it is foolish to get hazards out of perspective and one must remember that whilst the amounts of radioactivity are seemingly rather large, tritium is the least toxic (and incidentally one of the least expensive) of the radionuclides, and that simple and safe routines have been developed for its use.

The second chapter deals with methods for tritium labelling-chemical synthesis, hydrogen-tritium exchange and biochemical methods - and with

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the resulting patterns of labelling. These are often as expected, but not always so: unexpected revelations about the path of hydrogen and its isotopes may emerge and be a source of discovery and excitement. Some of those cases are to be found in the final chapter on applications of tritium nmr spectroscopy - applications in reaction mechanism studies, biochemistry, catalysis, analysis, environmental chemistry and radiation chemistry. Useful tables on radioactivity units and hydrogen nmr data complete the work. The present book takes its place alongside Dr Evans' classic earlier work 'Tritium and Its Compounds' and those interested in this radionuclide now have two excellent and complementary reference works. Tritium nmr spectroscopy has much to offer. Its ability to pinpoint the exact position of labels, quantitatively, and by-passing lengthy and uncertain degradation, gives it much merit. The present account is easy and pleasant to read, and deserves to reach a wide readership.

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