

Book Reviews

M. M. Pintar: Introductory Essays. Vol. 13 of "NMR—Basic Principles and Progress", P. Diehl, E. Fluck, R. Kosfeld Eds. Berlin-Heidelberg-New York: Springer Verlag 1976. XI + 154 pages, 48 figs., price: US-\$29.60 (DM 72,—)

These "Introductory Essays" are a collection of contributions presented at the "International Summer School on NMR", Waterloo 1975. It is attempted to acquaint the reader, by giving an introductory survey, with some significant fields of NMR spectroscopy of interest from a general theoretical standpoint. The following quotation taken from A. G. Redfield's contribution "A Guide to Relaxation Theory" is typical of the style of the "Essays": "We will not repeat things which you can find in readily available texts and reviews, but merely point you to them." Readers from all fields of physics and chemistry will doubtless encounter phenomena and connections in the book that have been unknown to them so far, and incite them to reading the literature cited.

Apart from Redfield's article, also the contributions by F. R. McCourt, R. L. Armstrong, and R. Blinc, are dealing with NMR-relaxation (in gases and in nematic fluids). S. Clough and M. M. Pintar report on the influences of rotatory quantum effects (molecular tunnelling) in solids on NMR-spectra. G. Bene is writing about spin-phenomena "off resonance". J. S. Waugh treats the theoretical foundations of pulse-methods which, inter alia, have rendered possible high resolution and NMR-spectroscopy in solids. E. L. Hahn compares these methods with the corresponding techniques of optical spectroscopy (photon echo, self-induced transparency). Some thoughts by A. G. Redfield concerning the construction of a FT-NMR-spectrometer for biologic purposes close the volume—as we believe, somewhat inappropriately.

The authors almost exclusively belong to the "top set" of the theoretical physicists who far-reachingly report on their own "classical" work. Therefore, the demands on the reader's education are correspondingly high. The answer to the question whether the book has something to do with theoretical chemistry is negative if we equalize theoretical chemistry and quantum theory of chemical bonding. However, some of those meditating on the substance and scope of theoretical chemistry will find the book inspiring.

Hans Sillescu

Received April 15, 1977

M. Mehring: High Resolution NMR Spectroscopy in Solids. Vol. 11 of "NMR—Basic Principles and Progress", P. Diehl, E. Fluck, R. Kosfeld Eds. Berlin-Heidelberg-New York: Springer Verlag 1976. XI + 246 pages, 104 figs., price: US-\$27.90 (DM 68,—)

Mehring's book is above all a monograph on relatively new methods of NMR-spectroscopy by which highly resolved solid state NMR spectra have become available. In two chapters following an introductory survey on nuclear spin interaction in solids, "multiple pulse" and double resonance or cross polarization methods, respectively, are reported on. The level of the presentation is such that the reader must have a sound knowledge of the theoretical foundations to NMR-spectroscopy, a fact to which the author refers in his foreword. (Incidentally, by "the fundamental book by A. Abragam and M. Goldman" and "the review article written by U. Haeberlen" 3 books, one each by the authors mentioned, are referred to. See e.g. Refs. 10, 11, and 25 of Chapt. 3.)

The last two chapters justify reviewing the book in this journal. The first of the two is on the magnetic screening tensor (chemical shift). While only the trace of this tensor is accessible in fluids, the new methods permit its complete determination in solids. Mehring has given, in some tables, the tensors measured so far of ^1H , ^{19}F , ^{13}C , ^{15}N , and some further nuclei. He also reports on the theoretical ansätze published so far to explain these quantities which are without doubt of great significance for the theory of the electronic structure of molecules. The second chapter on spin relaxation treats the new possibilities to study the molecular dynamics in solids as presented by the new NMR-methods. Therefore, it also calls for the theoretician who is interested in the motion and the intermolecular potentials in solids and fluids.

Seen on the whole, the book is clearly formulated, well arranged and, as compared with the original literature treated, easily readable. It can be recommended without reservation to every reader interested in the field.

Hans Sillescu

Received April 15, 1977