such as dielectric loss. Applications will continue in this important and still vigorous field; but principles have largely been established. Therefore, this book also is timely.

The book has been arranged to suit the probable needs of its readers. The general theoretical basis is given first; and then those interested in dielectric constant and loss have their three chapters with one on measurement following, while those interested mainly in the measurement and application of electric dipole moments have several chapters grouped together. Amino acids, peptides and proteins are treated in a special chapter; and finally there is one on electronic and atomic polarization.

The author, very wisely, does not give detailed theory which can be found in other current books; but he does survey the principles very adequately and he gives a most useful guide to help the plain man through the recent jungle growth of rigorous theories which cannot be readily applied and of semi-empirical expressions which lack clear theoretical significance. These chapters are excellent, being both clear and comprehensive: and so too are those which follow, wherein the observations are critically discussed. Minor criticisms are that the reason for seeking an expression such as that of Clausius and Mosotti is not immediately made obvious: and in the discussion of semi-empirical methods of deriving "gas" values of dipole moments from solution values, more reference might be made to the recent work of Le Fèvre and his pupils. A somewhat more important one is that there appears to be no mention of investigations of the state of adsorbed substances by dielectric loss measurements: although not yet much developed, this is a promising application.

There are five chapters on the relation of dipole moment to molecular structure, *viz.*, a general one, and then one each on aliphatic and alicyclic compounds, on aromatic compounds, on intramolecular rotation, and on inorganic and organometallic compounds. The mass of data to be digested is vast; and the author's scheme is a good one. It requires the approach to be "Here are some dipole moments. What can they tell us about chemical problems?" rather than "Here are some chemical problems. What can dipole moments do about them?" However, it encourages a systematic treatment. A complete review is now impracticable: some of the recent, more elaborate applications have not been dealt with; but the basic ones have been, and they are discussed very clearly and fully.

The two remaining, special chapters are of the same high quality. Altogether it is a fine book. The author has clearly enjoyed writing it. All of us concerned, physicists, chemists, or engineers, are grateful to him for his labor.

The printing and the binding are excellent: the price is reasonable.

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Elementary Theory of Nuclear Shell Structure. BY MARIA GOEPPERT MAYER, Argonne National Laboratory and University of Chicago, and J. HANS D. JENSEN, University of Heidelberg. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, New York, 1955. xiv + 269 pp. 15.5 × 23.5 cm. Price, $7.75.

The authors have succeeded admirably in their purpose to make available to physicists and nuclear chemists a thorough survey of the scattered work in the literature relating to the shell structure of the nucleus. The treatment is elementary in the sense that this is an introduction to the subject and that only limited use is made of the mathematical concepts of modern physics. Such mathematical material as is necessary to show the limitations of shell theory is presented in a 37 page appendix.

The experimental evidence that supports the idea of "magic numbers" and nuclear shell structure is given in some detail. A brief review of the electronic structure of atoms serves as a natural introduction to a discussion of energy levels in the nucleus. The theory is then applied to and correlated with the experimental facts observed for various types of nuclei. These include properties of ground states, angular distribution of products in stripping reactions, β-decay, quadrupole moments, nuclear spectroscopy, isomerism in nuclei of odd mass number, etc. Where difficulties with the theory arise, they are not glossed over in favor of its many successes.

This lucid presentation of nuclear shell structure by two of the most active workers in the development of the theory is commended to all scientists interested in nuclear behavior.

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Biochemical Preparations. Volume 4. BY W. W. WESTERFELD, Editor-in-Chief. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1955. vii + 108 pp. 15.5 × 23.5 cm. Price, $3.75.

"Based on the suggestions, criticisms and labors of a great number of leading workers in the field of biochemistry, this book covers twenty hard-to-get biochemical substances. It provides reliable methods for preparing essential substances of interest which cannot be obtained readily from commercial sources or which are expensive to buy. All the preparations have been checked for workability."

The above statements made by the Publishers are certainly endorsed by this reviewer. The systematic checking by independent experts of the directions submitted to the "Biochemical Preparations" is a valuable feature of this Series, especially, since the pertinent comments of the checkers have not been merged with the original text but appear in separate footnotes. Thus, for example, in the Chapter "α-Lactalbumine" the reader receives additional help for avoiding pitfalls.

The recent Volume 4 presents experimental directions originating from various laboratories in the United States and from Sweden. The list of the contributors follows: R. G. Hansen, W. J. Rutter and P. Krichevsky; H. Wolkowitz and M. S. Dunn; D. J. Hanahan and M. E. Jayko; W. G. Gordon and J. Ziegler; B. L. Larson and R. Jenness; N. G. Brink and R. K. Bonnichsen; L. A. Heppel and R. J. Hilmoe; N. C. Davis and E. L. Smith; H. Bauer, E. Adams and H. Tabor; A. H. Mehler, H. Tabor and O. Hayaishi; J. H. Boyer; H. H. Powers, G. Tabakoglu and H. Z. Sable; N. S. Radin and D. E. Metzler; R. M. McCready and W. Z. Hassid; G. B. Brown, J. Davoll and B. A. Lowy; P. B. Hamilton and P. J. Ortiz; A. Lepp and M. S. Dunn; W. E Parker, R. E. Koos and D. Swern; W. R. Sherman; A. Lepp, M. N. Camien and M. S. Dunn.

The treatment of the matter is homogeneous throughout the volume but too much uniformity in this Series has been avoided by assigning the organization of each volume to a different Editor-in-chief.

It should be noted that in the present volume two procedures for the preparation of D-glutamic acid appear, whereby the "Crookes" strain of *Escherichia coli* and *Clostridium perfringens* cells were used, respectively, as the source of the decarboxylase. It is suggested that such duplications should be made use of to an increasing extent in future volumes. In many instances, although the degree of purity of preparations obtained *via* different routes might be the same, the nature of the contaminants present in the end products may show substantial variations. A comparison of such products may provide the worker with additional information on the physical and biochemical properties of the (not available) absolutely pure compound.

The volume under review contains a Cumulative Subject Index and a list of biochemically interesting compounds whose preparation has been described in the well-known Series, *Organic Syntheses*, through Volume 34.

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