

recently measured relaxation times are included. The chapter closes with a brief mention of several other effects which involve rotational relaxation: structure of the scattered Rayleigh line, nuclear spin-lattice relaxation and ultrasonic relaxation.

Merz describes the structures which are characteristic of soft and hard ferroelectric materials and then reviews recent research on the various properties of ferroelectrics. Domain formation and domain wall motion are presented in considerable detail. This section closes with a catalog (5 pages) of ferroelectric materials, many of them discovered only recently.

The basic processes (impact ionization, electron capture, photoionization and cathode emission) involved in gas breakdown are discussed by Dakin and Berg. Breakdown in uniform fields, with a detailed presentation of the Townsend mechanism and then breakdown in non-uniform fields are next presented. Selected experimental results are used to illustrate the discussion. This chapter closes with a discussion of the statistical and the formative time lags involved in gas breakdown. Sharbaugh and Watson then present a review of breakdown in liquids, after an introductory section on the conductance of "insulating" liquids. Experimental work on breakdown in liquids since the review by T. J. Lewis on the same subject in the first volume of this series is summarized, and finally several hypotheses regarding the mechanism of breakdown in liquids are critically considered.

The final paper considers "all processes for producing the segregation of positive and negative electrical charges by mechanical actions which operate by contact or impact between solid surfaces, solid and liquid surfaces, or in the rupture or separation of solid or liquid surfaces by gases or otherwise, including also the action of ionized gases. These processes may involve frictional, contact or tribo electrification, spray electrification and electrification in dust, snow or thunderstorms." A wide variety of phenomena are discussed; this review will be continued in the next volume of the series.

The book is well written and contains excellent bibliographies for the special fields covered. It is, however, a book written by experts for experts and is not intended for the general reader. It is recommended to libraries and to specialists in dielectrics.

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Molekulverbindungen und Koordinationsverbindungen in Einzeldarstellungen. Elektronen-Donator-Acceptor-Komplexe. By GUNTHER BRIEGLEB, o. Professor der Physikalisches Chemie an der Universität Würzburg. Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany. 1961. x + 279 pp. 16 × 23.5 cm. Price, DM. 48--.

This is an authoritative account written by one whose own contribution to the study of molecular complexes has been outstanding during the last decade. No other work even approximates the very thorough coverage of Dr. Briegleb's book which is a "must" for everyone interested not only in molecular complexes themselves but also in the more general area of solution spectroscopy, solvent effects, equilibria in solution, etc.

It excludes in its coverage only the complexes of metal ions with electron pair donors, complexes involving "biochemical" molecules, and the study of situations in which complex formation is rapidly followed by chemical reaction. The omissions are probably justified, since these areas are either insufficiently studied, or have developed along lines rather different from those around which Dr. Briegleb's work is focused.

The subject is treated primarily for the spectroscopic standpoint. This is inevitable since the study of charge-transfer spectra has been the most useful single tool, and has been the authors own special field. Other areas of study are not neglected, however. A fairly complete account is given of the investigation of dipole moments of complexes, another subject to which the author is a distinguished contributor, the determination of equilibrium constants, and thermodynamic properties. The scanty X-ray data on the geometry of charge-transfer complexes are also reviewed. The spectroscopic coverage is not entirely restricted to charge-transfer spectra. Shifts in infrared frequencies observed on complexing are well covered, as is the rather less extensive work on changes in the higher-energy absorption bands of the components on complex formation.

Useful tables of charge-transfer band positions and intensities are included. The range of donor molecules covered is very wide. That of the acceptors is more limited, but includes as well as the halogen, chloranil and trinitrobenzene "old stagers" a good deal of more recent work on such substances as tetrachlorophthalic anhydride and tetracyanoethylene.

Theoretical aspects of the subject are fairly well dealt with—essentially from the standpoint developed by Mulliken. In the interest of consistency in his own treatment, however, the author has re-formulated several of the well-known approaches in his own terms. For the reviewer at least this made, for example, the Mulliken-Orgel treatment of contact charge transfer, or of

the equilibrium between several isomeric C.T. complexes seem rather unfamiliar. Even the Benesi-Hildebrand treatment of simple charge-transfer equilibria suffers some inversions and changes of notation. Nevertheless it must be admitted that Briegleb's approach may make easier reading for the student entering the field than are the original materials.

On the negative side, a good many interesting phenomena are presented without much attempt at interpretation, either in terms of more sophisticated quantum theory than that presented in the theoretical section, or even in terms of precise assignments of energy levels involved. Thus, for example, although several general reasons are given for the appearance of more than one charge-transfer band in certain complexes, none of the several examples quoted is assigned precisely to a specific cause. The question of the symmetry of components and complex also receives scant treatment.

A brief section at the end deals with the rapidly developing area of semiconductivity, photoconductivity, E.S.R. spectra and the general "solid state" approach to the study of donor-acceptor complexes. One gets the impression that this material has been added as an afterthought and that it is less complete and perhaps less well-organized than the rest of the book.

Nevertheless there are few serious criticisms that can be made of such an admirable work and the above remarks refer to what are relatively minor defects.

References are included up to the middle of 1960 and form the most comprehensive collection of donor-acceptor studies available for those wishing to survey the field.

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Kern- und Radiochemie. Grundlagen. Praktische Methoden und Technische Anwendung. By ROLAND LINDNER, Lehrstuhl und Institut für Kernchemie der Technischen Hochschule Göteborg/Schweden. Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany. 1961. xii + 369 pp. 16.5 × 24 cm. Price, DM. 49.80.

Lectures in a two-semester course in Nuclear and Radiochemistry at Göteborg led to a manuscript written in Swedish and later translated into the German for this book. The text is designed primarily for chemists, physicists and engineers, though it is admitted that the chapters on nuclear theory may seem elementary to the physicist.

After an introductory chapter on the structure and properties of the atomic nucleus there are chapters dealing with radioactivity, nuclear reactions, nuclear chain reactions and reactors, radiation danger and protection, determination of radioactivity, radiochemical separation of the important, commonly used radio-nuclides, reactor chemistry, and finally a discussion of numerous scientific and technical applications. Topics which are generally regarded as falling within the compass of nuclear chemistry comprise approximately forty per cent of the book.

The topics that are covered have been done well. The text is up-to-date as indicated by the inclusion of such material as the discovery of elements 102 and 103, the Mössbauer effect and the selection of applications of radioactivity. With a number of good texts published in English available there will be little appeal of "Kern- und Radiochemie" to those who prefer not to do their reading in a foreign language.

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High Polymers. Volume XV. Radiation Chemistry of Polymeric Systems. By ADOLPHE CHAPIRO, Laboratoire de Chimie Physique de la Faculté des Sciences de Paris, Paris, France, and Laboratoire de Chimie des Radiations du Centre National de la Recherche Scientifique, Bellevue (S. et O.), France. Interscience Division, John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1962. xvi + 712 pp. 16 × 23.5 cm. Price, \$21.00.

Over the past ten years radiation chemistry of polymeric systems has been one of the most actively studied fields of science and technology. In earlier years anyone could stay abreast of the entire field of radiation chemistry and polymers by reading a small number of papers. Now, with a plethora of theoretical and applied publications in this field, anyone desiring full information would have difficulty keeping abreast of publication abstracts much less complete articles. Dr. Chapiro's book fills the need for a comprehensive and up-to-date review of the subject matter. The text gives a comprehensive survey of polymerization initiated by ionizing radiation followed by a detailed discussion of radiation effects in natural and synthetic polymers.

The author's prose style is clear and incisive and makes the book a pleasure to read.