THE ORIGIN OF SPECTRA

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649157570

The origin of spectra by Paul D. Foote & F. L. Mohler

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Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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American Chemical Society
Monograph Series

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BOOK DEPARTMENT

The CHEMICAL CATALOG COMPANY *Inc.*
19 EAST 24TH STREET, NEW YORK, U. S. A.
1922

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Press of
J. J. Little & Ives Company
New York, U. S. A.

GENERAL INTRODUCTION

American Chemical Society Series of Scientific and Technologic Monographs

By arrangement with the Interallied Conference of Pure and Applied Chemistry, which met in London and Brussels in July, 1919, the American Chemical Society was to undertake the production and publication of Scientific and Technologic Monographs on chemical subjects. At the same time it was agreed that the National Research Council, in coöperation with the American Chemical Society and the American Physical Society, should undertake the production and publication of Critical Tables of Chemical and Physical Constants. The American Chemical Society and the National Research Council mutually agreed to care for these two fields of chemical development. The American Chemical Society named as Trustees, to make the necessary arrangements for the publication of the monographs, Charles L. Parsons, Secretary of the American Chemical Society, Washington, D. C.; John E. Teeple, Treasurer of the American Chemical Society, New York City; and Professor Gellert Alleman of Swarthmore College. The Trustees have arranged for the publication of the American Chemical Society series of (a) Scientific and (b) Technologic Monographs by the Chemical Catalog Company of New York City.

The Council, acting through the Committee on National Policy of the American Chemical Society, appointed the editors, named at the close of this introduction, to have charge of securing authors, and of considering critically the manuscripts prepared. The editors of each series will endeavor to select topics which are of current interest and authors who are recognized as authorities in their respective fields. The list of monographs thus far secured appears in the publisher's own announcement elsewhere in this volume.

The development of knowledge in all branches of science, and especially in chemistry, has been so rapid during the last fifty years and the fields covered by this development have been so varied that it is

difficult for any individual to keep in touch with the progress in branches of science outside his own specialty. In spite of the facilities for the examination of the literature given by Chemical Abstracts and such compendia as Beilstein's Handbuch der Organischen Chemie, Richter's Lexikon, Ostwald's Lehrbuch der Allgemeinen Chemie, Abegg's and Gmelin-Kraut's Handbuch der Anorganischen Chemie and the English and French Dictionaries of Chemistry, it often takes a great deal of time to coördinate the knowledge available upon a single topic. Consequently when men who have spent years in the study of important subjects are willing to coördinate their knowledge and present it in concise, readable form, they perform a service of the highest value to their fellow chemists.

It was with a clear recognition of the usefulness of reviews of this character that a Committee of the American Chemical Society recommended the publication of the two series of monographs under the auspices of the Society.

Two rather distinct purposes are to be served by these monographs. The first purpose, whose fulfilment will probably render to chemists in general the most important service, is to present the knowledge available upon the chosen topic in a readable form, intelligible to those whose activities may be along a wholly different line. Many chemists fail to realize how closely their investigations may be connected with other work which on the surface appears far afield from their own. These monographs will enable such men to form closer contact with the work of chemists in other lines of research. The second purpose is to promote research in the branch of science covered by the monograph, by furnishing a well digested survey of the progress already made in that field and by pointing out directions in which investigation needs to be extended. To facilitate the attainment of this purpose, it is intended to include extended references to the literature, which will enable anyone interested to follow up the subject in more detail. If the literature is so voluminous that a complete bibliography is impracticable, a critical selection will be made of those papers which are most important.

The publication of these books marks a distinct departure in the policy of the American Chemical Society inasmuch as it is a serious attempt to found an American chemical literature without primary regard to commercial considerations. The success of the venture will depend in large part upon the measure of coöperation which can be secured in the preparation of books dealing adequately with topics of general interest; it is earnestly hoped, therefore, that every member of

the various organizations in the chemical and allied industries will recognize the importance of the enterprise and take sufficient interest to justify it.

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PREFACE

Although several accounts of the quantum theory of spectra from the mathematical standpoint have appeared in the past year, the experimental aspect of the problem has been greatly subordinated.

In this book the authors have endeavored to present the subject from the experimental side. However, in order to do this, it was found necessary to briefly discuss the theoretical developments. In this regard, the important assumptions involved are enumerated, and only the essential steps in the mathematical analysis are presented. The reader will find the detailed mathematical treatment in the papers given as references, especially in the works of Bohr and Sommerfeld.

The experimental phase of the quantum hypothesis as applied to spectroscopy was given its first impetus by the pioneer work of J. Franck whose later important researches have contributed much to the development of the subject. The theoretical deductions of Sommerfeld on fine structure have been beautifully verified by the precision spectroscopic work of Paschen. The most recent contributions of Bohr on atomic structure have removed many of the objections of the chemist to the physicist's conception of a planetary structure with revolving electrons. At the same time Bohr's viewpoint has necessitated the revision of some of the conceptions of the physicist.

The subject matter is recognizedly in a transitional stage and the theoretical interpretation of experimental phenomena here given is in no sense complete or final. However, the experimental facts will remain and no time is more opportune for their systematic correlation than the present moment.

This book is incomplete in many respects. For example, consideration of the extensive experiments on the Stark and Zeeman effects and on band spectra has been omitted, in part because their adequate treatment seemed to require more space than was deemed advisable to devote to these subjects, and in part because of the authors' inexperience in these fields of spectroscopy.