theory is also compared; it too is far from fitting the experimental cross section. There is no mention that the essential feature which must be explained is the occurrence of a resonance in a single partial wave. Belonging to the Heitler school, the author doesn't use partial waves; this like perturbation theory is all right for electrodynamics, but hopeless in the strong interactions.

Finally, I note that credit is given by name to recent researchers, but this is little aid to the student desiring to investigate the original sources, since no bibliography except textbooks is given. Limited space is perhaps the explanation, but merely the insertion of the year would enable an article to be found easily through the abstract literature.

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Statistical Theory of Irreversible Processes. By R. EISENSCHITZ, Dr. Phil., D.Sc., F. Inst. P., Professor of Theoretical Physics, in the University of London. Oxford University Press, 417 Fifth Avenue, New York 16, N. Y. 1959. viii + 84 pp. 14 × 21.5 cm. Price, $2.00.

This small volume presents a stimulating survey of important topics in classical and quantum statistical mechanics. Following an examination of the equilibrium theory of gases, liquids and solids, the major part of this monograph is devoted to the study of irreversible processes. The chapters on the non-equilibrium theory include discussions of the Maxwell–Boltzmann integro-differential equation, which is appropriate for dilute gases, and the Fokker–Planck equation, which provides rough estimates for liquids. These basic equations are then applied to the evaluation of the coefficients of shear viscosity and thermal conductivity of fluids. There are sections devoted to topics such as the calculation of the thermal conductivity of solids and the dielectric loss of polar liquids, as well as presentations of the basic concepts of Brownian motion and Boltzmann's famous H-Theorem, which explains the entropy evolution of ideal gases.

The price for compressing this wealth of subject matter into 84 pages is frequent oversimplification of important aspects of the theory. Due to the generous sprinkling of misprints and the various alternative approaches that are being considered these days, the interested reader would be well advised to consult the references in the bibliography. These drawbacks are, however, more than compensated by the lucid explanation in physical terms of a variety of phenomena. This book can be recommended to those who have had an elementary introduction to statistical mechanics.

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Interscience Monographs in Physics and Astronomy. Volume III. **Introduction to the Theory of Quantized Fields.** By N. N. BOGOLIUBOV and D. V. SHIRKOV, Steklov Mathematical Institute, Academy of Sciences, Moscow, U.S.S.R., Joint Institute for Nuclear Research, Dubna, U.S.S.R. Edited by R. E. Marshak, University of Rochester, Rochester, New York. Authorized English Edition. Revised and Enlarged by the Authors. Translated from the Russian by G. M. Volkoff, Department of Physics, University of British Columbia, Vancouver, B. C., Canada. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1959. xvi + 720 pp. 16.5 × 23.5 cm. Price, $17.00.

Spontaneous emission of a photon by an atom in an excited state, which will occur no matter how well isolated the atom is from external disturbances, may be regarded as demonstrating the existence of the quantized electromagnetic field. Regarding such a field as a collection of oscillators we may say that the quantum-mechanical zero-point fluctuations of these oscillators produce an effect on the atom which leads to the de-excitation of the atom and the excitation of the field. This picture which follows naturally from an application of quantum mechanics to Maxwell's equations has enabled extensive and successful calculations of such things as the photoelectric effect, the Compton effect and so on. The picture may be generalized immediately to give a field theory for electrons and positrons which has a wider validity than the simple "one electron" theory, and similarly for different kinds of mesons and for the various new and strange particles.

The purpose of the present book, one which it most brilliantly accomplishes, is to give a systematic account of the properties of quantized fields and the interactions between them. It is not primarily concerned with the practical matter of calculating cross-sections and lifetimes for various processes, though it does incidentally instruct the reader on many of these things too; instead it gives the mathematical formalism of quantized fields in a completely modern way and equips the reader to face the very great outstanding problems of the subject, problems among the most important of modern physics.

These problems arise from the fact that quantized fields have an infinite number of degrees of freedom. The interaction of electrons with the electromagnetic field is sufficiently weak (characterized by the small number $e^2/\hbar c = 1/137$) that perturbation solutions may be found, the leading terms of which produce the results of practical interest. Even here there enter in the later terms infinities and convergence failures whose significance is only a little understood. For interactions of other fields a perturbation procedure is often hopeless and the problem is then one of enormous complexity.

The first two chapters of the book (200 pages) review the properties of the classical and the quantized fields. The next four chapters (300 pages) discuss for the most part the perturbation solutions for interacting fields. The last three chapters (200 pages) discuss current attempts to handle the problems without resort to perturbation procedures. In every chapter new light is shed on old problems and the new problems are clearly stated and discussed.

The book appears to have been excellently translated; the printing and binding are very fine. It is an absolute essential for the student or research worker concerned with this subject and will be found surprisingly readable by others—a very important book.

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Treatise on Analytical Chemistry. Part I. **Theory and Practice.** Volume 1. Edited by I. M. KOLTHOFF, School of Chemistry, University of Minnesota, and PHILIP J. ELVING, Department of Chemistry, University of Michigan. With the assistance of ERNEST B. SANDELL, School of Chemistry, University of Minnesota. Interscience Encyclopedia, 250 Fifth Avenue, New York 1, N. Y. 1959. xxvi + 809 pp. 17 × 24 cm. Price, $17.50; subscription price, $15.00.

The purpose of this Treatise, as stated in the opening sentence of the Preface, is "to present a concise, critical, comprehensive, and systematic, but not exhaustive, treatment of all aspects of classical and modern analytical chemistry." It would be difficult to name anyone who could bring to a project of this magnitude greater editorial competence, or more experience over the whole wide field of analytical chemistry, than Professors Kolthoff, Elving and Sandell. If in future volumes these Editors are able to enlist the coöperation of a group of authors as capable in their individual subjects as those who have contributed to the present first volume the ultimate success of this ambitious undertaking will be assured.

It is planned to publish the Treatise in three parts, namely, Part I, Theory and Practice; Part II, Analytical Chemistry of the Elements; and Part III, Analysis of Industrial Products. Each of these parts will have many volumes, and, because it is not feasible to publish each volume and each Part *seriatim*, the various volumes of the three parts will be published one by one as the manuscripts become available to the publisher.

The present volume is the first one of Part I; it is only the beginning and yet comprises 809 pages! Its nineteen chapters and their authors are as follows: Methods of Analytical Chemistry (Ernest B. Sandell and Philip J. Elving);