detail the particular pitfalls and delicacies that attend legitimate encompassment of certain kinds of prescribed conditions, and conclude with a concise account of the connection between solution of a problem by Laplace transforms and by functional analysis through the common denominator of the role of the pertinent Green's function. Illustration of application of this theory is drawn largely from well-known problems in the two domains of heat flow in thermally conducting planar areas and of voltage and current propagation in electric transmission lines.

Part V, "Difference equations," includes three short chapters: "Ordinary difference equations in the original domain" (pages 91–106); "Ordinary difference equations in the transform domain" (pages 107–115); and "Partial difference equations" (pages 116–130). This division of content advances the basic theory that underlies transform solution of ordinary difference and difference-differential equations in one ordinary variable (for example, t) and application to determination of current response in resistive ladder networks; the solution of ordinary and difference-differential equations in the Laplace variables, with exemplification through the classic functional equation of the gamma function; and solution of partial differential and difference-differential equations in the original domain, with the subtler details underscored through solution of two problems in planar heat conduction.

Part VI, "Integral equations and integral relationships," comprises six substantial chapters: "Integral equations of real convolution type in the finite interval" (pages 133–171); "Integral equations of real convolution type in the infinite interval" (pages 172–186); "Functional relations among real convolution integrals, especially transcendental addition theorems" (pages 187–198); "Integral equations of complex convolution type" (pages 199–208); "Correspondences between complex convolution integrals of transform functions and products of their original inverse functions" (pages 209–214); and "Various types of integral equations solvable by use of Laplace transforms (pages 215–221).

These chapters comprise a thorough exploration of the basic theory pertinent to solution of the Volterra-type equation in which the kernel depends only on $(t-\tau)$; thus, with kernel, $K(t-\tau)$. In such an equation the encompassed integral comprises a convolution transform, and this fact affords a very desirable conciseness and unification of theory of solution through the use of earlier developed Laplace transform theory. Thus, solution of linear integral equations of the first and second kind, to which one-sided and two-sided Laplace transforms are respectively pertinent, is detailed and illustrated by consideration of such familiar examples as Abel's integral equation. Next, inversion of products of transforms with parameters that satisfy the algebraic addition theorem is shown to be easily accomplished by use of the pertinent transcendental addition theorem. This is supported by numerous examples that involve the theta, Bessel, and hypergeometric functions, the Hermite and Laguerre polynomials, and other entities of the transcendental realm of functional analysis. Next, a somewhat analogous body of work is advanced for integral equations in which the independent variable is the transform variable s. The concluding chapter of this section illustrates, through specific examples, other equations, of various types, whose solution is facilitated by Laplace transform techniques; these include equations that can be transformed into equations of known solution, with kernels whose Laplace transforms are exponential functions, with kernels that are involutional in nature, and so forth.

The final part VII, "Entire functions of exponential type and finite Laplace transforms," includes two short chapters: "The finite Laplace-transform" (pages 225–232) and "Entire functions of exponential type" (pages 233–254). Essentially, these give, in detail, basic theory of existence, inversion, and so on of finite transforms of both classes I and II and illustration of use to obtain the mean-squared-value of functions of exponential type and to investigate certain relationships on its derivatives.

The main text is supported by a "Foreword"; short "Connective remarks"; a "Table of contents"; "Addenda to volume I" (pages 253–259); a lengthy "Literatureal and historical commentary" (pages 261–276) that gives illuminating critical comment and historical data pertinent to various points in the text; a list of "Books" that are especially concerned with applications of Laplace transforms (it may be of value to note, for the benefit of the interested reader, that during the past decade I have been able to purchase all of the 24 items that are listed, with the exception of those by Droste and Schulz, stocks of which were evidently destroyed in Berlin during World War II); a lengthy "Bibliography" (pages 279–286) of periodical articles and books, arranged alphabetically by author; a "Subject index"; a list of "Amendations to Volume II"; and a listing of the major division headings of volumes I and II.

In physical aspect this volume is of the same excellence as are the earlier volumes. It has glossy paper of high quality, stout board covers in an attractive green cloth binding, superlative typography, nicely displayed equations, detailed line drawings, and a convenient page size. The textual content is couched in a lucid style that materially aids the reader to grasp the theoretical developments and supporting illustrative examples. The accuracy of theory, precision of statement, and detail of treatment are evidence of the breadth of knowledge, originality, and command of application that stamp the author as one of the foremost European mathematicians in the domain of Laplace transform analysis.

This volume, like its predecessors, will of course prove to be of greatest interest to mathematicians, particularly to those concerned with analysis and applied mathematics. However, because of the power, utility, and rapidly increasing use of integral transforms—especially of Laplace transforms—for the solution of specified problems or the development of general theory in all branches of present-day physics, chemistry, and celestial mechanics and in every domain of engineering and associated technologies (especially in such difficult phases as variable-media wave-propagation theory and nonlinear system analysis, where integral equation formulations provide especially fruitful means of solution), this volume deserves close study and assimilation by all physical scientists and engineers who wish to keep abreast of those developments in mathematical analysis which underlie the analytic foundations of their own domains of professional endeavor.

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Laboratory Engineering. vol. III, pt. II of *Technique of Organic Chemistry.* Arnold Weissberger, Ed. Interscience, New York, ed. 2, 1957. 391 pp. Illus. $8.

The first edition of *Laboratory Engineering* treated the general engineering aspects of operations used in preparative organic chemistry. In the new second edition, the volume has been split into two parts. The first part deals with separational methods, while part II is concerned with the engineering type of problems commonly encountered in the chemical laboratory.

The book is divided into five sections. Two of the sections on "Mixing" and "Heating and cooling" have been updated from the first edition, while the other three sections, "Operations with gases," "Selection of materials for the construction of equipment," and "Grinding, screening, and classifying," are completely new. All of the sections emphasize applications of equipment and engineering methods in the laboratory or in small-scale plants. The purpose of the

book is to supply the chemist with information that he can use directly in his laboratory. As a result, the treatment is mainly from a practical viewpoint, with little emphasis on theory or basic principles.

Approximately one-half of the section on materials of construction is devoted to the corrosion of metals, while the remaining part gives a brief treatment of physical properties for metals and nonmetals. A number of different methods for measuring pressures and gas flow rates are discussed in the section on operations with gases. This section also presents an excellent, although brief, treatment of valves for use on gas lines.

Although the sections on heating and cooling, mixing, and grinding, screening, and classifying do include a small amount of elementary theory, they are devoted primarily to a discussion of equipment for carrying out these operations. The chemist who has no engineering background will find that these sections clearly explain the use of the various types of laboratory engineering equipment.

The book is well written, and, in general, the material requires little technical background for a complete understanding. The approach is almost completely qualitative, and most of the book is devoted to description of equipment. The engineer will find that very little information is presented that is not already well covered in the various textbooks and handbooks on chemical engineering. However, the chemist, and in particular the organic chemist, will find that the book fulfills its purpose of supplying a useful, concise, and fairly complete coverage of engineering methods and equipment for laboratory applications.

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The Leibniz-Clarke Correspondence. Together with extracts from Newton's *Principia* and *Opticks,* edited with introduction and notes by H. G. Alexander. Philosophical Library, New York, 1956. 200 pp. $4.75.

In the years 1715–16 Leibniz, the greatest philosopher on the Continent, engaged in a critical correspondence with Samuel Clarke, a scientific-minded theologian, a friend and disciple of Isaac Newton. It was through the efforts of Caroline, Princess of Wales, to whom Leibniz had first written a criticism of the theological implications of Newtonian philosophy, that this exchange of letters took place. Clarke had Newton's help in composing his replies and attacks. Thus, in effect, these letters reveal the coming to grips of the thought of the two greatest philosophic and scientific minds of that great age.

Behind this correspondence lay the long-standing controversy between Leibniz and Newton concerning the invention of the calculus. Fundamental differences in outlook, both scientific and philosophic, were factors in this quarrel. But these were obscured as the course of the debate took an increasingly bitter and shameful turn. The Leibniz-Clarke exchange is a far more temperate and significant reexamination of these differences.

Although the correspondence begins with certain theological considerations, the argument soon goes on to cover the range of basic philosophic-scientific ideas —the central topics of that branch of learning then known as "natural philosophy." So we find Leibniz criticizing the Newtonian account of gravity and the existence of a vacuum. He advances his own theory of space and time, in which these are taken to be relational and mathematically "ideal" orders, as against Newton's treatment of them as absolute and, in some sense, independently existing "substances." It remained for later readers to point out the critical difficulties to be found in both positions. But the letters draw the differences sharply and clarify the problems. Hence, they were to serve as valuable guides to all subsequent understanding of the thought of Leibniz and Newton and to provide a fertile source for future work on the problems they raise.

It is surprising, in view of the interest and historical significance of the correspondence, that the present book is the first complete English edition to be published since 1738. The original text is here, in modernized spelling and type. In appendixes the editor has wisely included pertinent selections from Newton's *Principia* and *Opticks* and from letters by Leibniz (and one by Newton) all bearing on issues that relate to the correspondence. These valuable additions to the original work are supplemented by H. G. Alexander's informative footnotes in the text. Furthermore, he has written a clear and thoughtful 50-page introduction, which surveys and discusses the problems raised in the letters and briefly traces some of the major phases of the subsequent history of the space-time controversy, from Berkeley and Euler, through Kant, to Mach and Einstein.

A few of the things Alexander has to say in this generally able discussion will cause some disagreement. The critical comments on Leibniz, for example, are not altogether clear. This may be partly due to the fact that not only is Leibniz difficult but we do not as yet have full access to his thought and to those of his writings that are still preserved for us. [There exists no complete edition of Leibniz. The first ample edition of his papers to appear in English has just been published by the University of Chicago Press (1957)]. It is not an easy matter to disengage "metaphysical" from "scientific" ideas and interests in Leibniz. It is very easy to be misled by his language into viewing the controversy as theology-metaphysics (Leibniz) versus mathematical science (Newton). Actually, all of these interests are shared by both sides to the controversy.

These are, however, relatively minor considerations and Alexander is to be congratulated for making this classic available and presenting it to us in a competent and attractive form. No secondary account can reproduce the vitality and contagious interest with which the Leibniz-Clarke debate was conducted. This book will prove valuable reading for all those with an interest in the background of modern science and philosophy.

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Hormones, Brain Function, and Behavior. Proceedings of a conference on neuroendocrinology held at Arden House, Harriman, N.Y., 1956. Hudson Hoagland, Ed. Academic Press, New York, 1957. 257 pp. Illus. $7.

Neuroendocrinologists have provided us with numerous clues to endocrine physiology since the studies and treatise of William Buchan of Edinburgh, who in 1779 stated that "the passions have great influence both in cause and cure of diseases. How mind acts upon matter will, in all probability, ever remain a secret. It is sufficient for us to know that there is established a reciprocal influence betwixt the mental and corporeal parts, and that whatever disorders the one, likewise affects the other." In this regard, Buchan's treatise remained as a challenge to future investigators, and the progress made in neuroendocrinology gives witness to the wide acceptance of the carefully documented challenge.

Hormones, Brain Function, and Behavior highlights the thinking of certain investigators concerned with (i) steroids in neuropsychiatry (R. A. Cleghorn); (ii) effects of adrenocortical steroids on the brain (D. M. Woodbury, P. S. Timiras, and A. Vernadakis); (iii) steroid anesthetic and brain metabolism (H. W. Elliott, B. F. Krueckel, and V. C. Sutherland); (iv) determinants of sexual behavior patterns (W. C. Young); (v) control of sex behavior in animals (Allan C. Goldstein); (vi) serotonin in mental disorders (D. W. Woolley); (vii) biochemical studies on, and physiological