ally useful in the discussion of coupled electrochemical reactions and cells with thermal gradients.

Experimental implications of the theory are discussed throughout the book. For instance, the reader will be much interested in the treatment of corrosion reactions and the new idea that currents cannot be added algebraically in all rigor in the case of coupled electrode reactions.

This timely and well-written book should prove most interesting and stimulating to electrochemists and physical chemists.

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Introduction to Mathematical Logic. vol. 1. Princeton Mathematical Series, No. 17. Alonzo Church. Princeton University Press, Princeton, N. J., 1956. 384 pp. $7.50.

The first volume of Alonzo Church's projected two-volume textbook on mathematical logic is now available as No. 17 in the Princeton Mathematical Series. Its excellence in every respect requires no comment. A revised and greatly expanded edition of the author's well-known contribution of 1944 to the *Annals of Mathematics Studies,* the work is addressed to beginners in logic who possess a respectable mathematical background. As the preface notes, it is also intended for use "within limitations as a reference work." The principal business at hand is formalizing an object language, with theoretical syntax treated informally and semantical matters introduced primarily to motivate interest in the uninterpreted logistic systems. Generous footnotes together with special sections of the text give sources and fill in the historical background. A noteworthy feature is the large and varied collection of exercises. The problems range from those suitable for routine practice through others that are, in effect, "brief sketches of difficult developments to which whole sections of the main text might have been devoted."

Volume I consists of an introduction and five chapters. In the introduction the reader makes the acquaintance of proper and improper symbols, the logistic method, and the world of abstract objects—"meanings," propositions, truth-values, and functions—with the treatment of proper names, and of sentences as names of a special kind, adopted with minor modifications from Frege. Chapter I develops the various theorems and metatheorems of the propositional calculus in a formulation in which the primitive connectives are implication and a constant f, the O-ary connective denoting the truth-value falsehood in the intended principal interpretation. Chapter II offers an alternative formulation in which the primitive connectives are implication and negation. The two systems are shown to be equivalent, other formulations are developed, and various partial systems are considered.

Chapter III develops simultaneously the various functional calculi of the first order, the device of axiom schemata making unnecessary the use of primitive rules of substitution. The subjects treated include consistency, the deduction theorem, and duality. Chapter IV examines the pure functional calculus of first order, a system whose primitive symbols include all the propositional and functional variables but neither individual nor functional constants. Most of the developments apply in both the previous formulation and in an alternative formulation in which a finite number of axioms replace the axiom schemata. The subjects treated include Gödel's completeness theorem. Löwenheim's theorem, and the solution of the decision problem in special cases.

Chapter V offers proofs of consistency and completeness for some of the functional calculi of second order. It also considers certain axioms, including various axioms of infinity, that can be expressed in the notation of the system under investigation, and closes with a note on the ramified functional calculi of second order. A digression, occupying more than a third of the chapter, shows how postulates, either as added axioms of a logistic system or as propositional functions, may serve as a basis for a special branch of mathematics.—J.T.

Chemistry of Carbon Compounds. vol. III, pt. B. *Aromatic Compounds.* E. H. Rodd, Ed. Elsevier, Amsterdam–Princeton, 1956 (order from Van Nostrand, Princeton, N.J.). 1669 pp. Illus. $25.

This book is a direct continuation of volume III, part A, completing the survey of aromatic compounds. The high standard of the previous volumes in the series is maintained, and there is a remarkable uniformity in the presentation of chapters by different authors. The literature seems to have been well covered up to about 1954 with occasional references to material published in 1955.

The chapters in this book serve as an excellent introduction to the study of a particular class of compound and for one seeking analogous reactions in a field other than his own. This subvolume covers the chemistry of benzoquinones; oxygen-containing derivatives of phenols (salicylic acid, hydrolyzable tannins, and so forth); polyhydric aromatic alcohols and their oxidation products (phthalic acid, mandelic acid, and so forth); unsaturated benzene derivatives (styrene, cinnamic acid, and so forth); phenylbenzenes; di-, tri-, and tetraphenylmethanes; di- and polyphenyl alkanes (paracyclophanes, benzilic acid, chalkones, and so forth); quasi-aromatic compounds (tropolone, diazocyclopentadiene, and so forth); bicyclic condensed nuclei (naphthalene, azulene, indene, and so forth); and finally compounds with three or more condensed aromatic nuclei (anthracene, phenanthrene, and so forth).

Historical accounts of the elucidation of the structure of natural products have, in general, been omitted and wisely so. It is good to see brief accounts of the biological aspects of various compounds or class of compound in the text. The mechanistic aspect of organic chemistry is not emphasized, but topics such as the Claisen rearrangement, ketene reactions, and tropolone chemistry are dealt with competently and with restraint. Ample references are given throughout to recent work on the physical-organic aspects of the subject matter.

The chapters on naphthalene, anthracene, and the more complex hydrocarbons are inevitably condensed, and it is probable that a person desiring information on compounds in this section will consult the published volumes of Elsevier's *Encyclopedia of Organic Chemistry.* However, this treatise is more pleasant to read than an encyclopedia, with numerous clear structural formulas breaking up the text. Misprints are few, the binding is good, and the book should withstand frequent consultation. It is a book that all organic chemists will wish to possess.

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New Books

Synthetic Polypeptides. Preparation, structure and properties. C. H. Bamford, A. Elliott, W. E. Hanby. Academic Press, New York, 1956. 445 pp. $10.

Chemical Process Economics in Practice. J. James Hur, Ed. Reinhold, New York; Chapman & Hall, London, 1956. 115 pp. $3.95.

The Person behind the Disease. Julius Bauer. Grune & Stratton, New York, 1956. 136 pp.

Your Child's Speech. A practical guide for parents for the first five years. Flora R. Schreiber. Putnam's, New York, 1956. 256 pp. $3.50.