

zation, "namely a structural and constitutional theory in one embracing representation."

Indeed, the subtitle should also include "A History of the Development of the Concept of Chemical Affinity," for the first two chapters are largely devoted to this topic and in the reviewer's opinion are the most charming chapters in the first volume. To one with even a casual interest in the history of chemistry, this historical analysis is worth the price of the book.

There follows a chapter on coordination theory of complex compounds, and the balance of Volume I is devoted to a more or less standard treatment of atomic structure, with emphasis on spectra with one and two emission electrons, magnetism, Raman effect, diffraction of x-rays, Mulliken's term symbols for molecules, and the chemical bond.

Volume II is to discuss volatility, crystal chemistry, silicates and glasses, metallic substances, and the chemical reaction.

The reader may be mystified by the introduction of the long chapter on complex compounds before the theoretical treatment. It would seem that a treatise that proposes to provide a basis for systematization would set up such a basis by a theoretical approach and then discuss this great mass of material in terms of the theory. Much of the chapter on complex compounds deals with the work of G. Jander and his students on polynuclear acids, and there are many chemists who will be unwilling to give this work the recognition here accorded.

Thermodynamics and reaction mechanisms have provided practical solutions and interpretations to more problems in inorganic chemistry than has the structural approach. What is really needed are more authors who can combine structure and thermodynamics into a unified interpretation. If one may judge from Volume I of *Structural Chemistry of Inorganic Compounds*, Hückel has not greatly advanced the basis for systematization. He has, however, provided a useful summary of many topics related to structural problems.

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Radio Communication at Ultra High Frequency.

John Thomson. London: Methuen; New York: Wiley, 1950. 203 pp. \$4.50.

It is the purpose of this book to provide an account of modern developments in radio communication techniques and systems applicable at frequencies above 100 Mc/s. The emphasis here is on communications rather than radar, and is largely written around the war and postwar work of the author in the Royal Naval Scientific Service.

Professor Thomson uses the vague, unscientific term "ultra high frequency" in the title of his book because of the lack of a better term in common use. He pro-

poses to remedy this situation by introducing a scientific nomenclature based on the decimal system in terms of wavelengths. For example, waves with lengths from 1 to 10 km would be called kilometric waves, and waves from 1 to 10 mm in length would be called millimetric waves.

The adoption of this nomenclature would eliminate, once and for all, such ambiguous terms as high frequencies, very high frequencies, ultra-high frequencies, and microwaves.

The first three chapters are on circuits and tubes used for metric or shorter waves. A sufficient amount of fundamental theory is given on transmission lines, wave guides, and resonators to aid in understanding how they are used as oscillator and amplifier circuits, wave meters, impedance matching elements, and filters. Factors that limit the frequency of conventional tubes are described, and the advantages of disk-seal tubes and velocity-modulated tubes in reducing these factors are presented. Simplified theories are used in explaining the operation of these devices.

There may be some justification for the short space, a third of a page, devoted to the magnetron, because of present limited applications for communication purposes. A discussion of the traveling wave tube, however, occupies only one page. In view of the importance of this tube as a wide band amplifier for communication purposes, the treatment seems inadequate.

The best part of the book is contained in the last four chapters. Chapter IV on receiver input circuits was written by the author's colleague, Peter E. Trier. It includes a discussion on the origin of noise in tubes and circuits and on design considerations for signal-frequency amplifiers. Mixer and local oscillator circuits are treated briefly. The next chapter is on modulation techniques. In addition to the usual amplitude and frequency modulation, it treats pulse amplitude, pulse length, and pulse position modulation. Chapter VI, on frequency control, describes various methods of control by crystals, cavities, and molecular absorption. The last chapter is on communication systems in which a comparison of the various modulation methods is made. Aerials and propagation are briefly considered. Some of the interesting possibilities in the way of radio networks at these high frequencies are discussed.

The book is well written and is easily read. The theory is kept to a minimum and is well supplemented by diagrams, curves, and numerical tables. Without going into great detail, it gives one a basic understanding of the present techniques and systems applicable to radio communications at ultra-high frequencies and a keen insight as to their future possibilities in new fields.

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