

**NEW BOOKS**

**The Physical Chemistry of the Photographic Process.** A General Discussion held by the Faraday Society, May, 1923. The Faraday Society, 10 Essex Street, Strand, London, W. C. 2, 1923. 166 pp. Illustrated. 24.5 × 15 cm. Price sh. 12/6.

The presence of speakers from Belgium, Denmark, England, France, Germany, Jugoslavia and the United States gave this meeting a truly international character. All the more active organizations for photographic research, excepting Svedberg's laboratory, were represented. After the general introduction by W. D. Bancroft, the program divided itself into four sections: I, The Physical Chemistry of the Vehicle and of the Emulsion; II, Reactions of the Plate during Exposure; III, Development and Characteristics of the Developed Plate; IV, Adsorption Reactions in Photographic Films.

The general discussion of the introduction and of Sections I and II was especially profitable, bringing alike into sharp relief the matters upon which substantial agreement now exists, and those which still lend themselves to several interpretations. On the other hand, Section III contains the greatest concentration of hitherto unpublished material. Reassuring was the solemn affirmation of the emulsion makers that their technical secrets would be of negligible interest and helpfulness to research workers who have to take the finished product as their starting point.

As the president, Sir Robert Robertson, remarked, it would be impossible briefly to sum up the many aspects of the photographic process which were presented. The report, covering some 160 pages, offers to the non-specialist a splendid vantage ground which he could otherwise gain only by strenuous effort in the collation and critical study of a formidable and widely scattered literature.

G. S. FORBES

**Clouds and Smokes: The Properties of Disperse Systems in Gases and their Practical Applications.** By WILLIAM E. GIBBS, D.Sc., Chief Chemist to the Salt Union, Ltd., Liverpool. Foreword by Sir Oliver Lodge, F.R.S. P. Blakiston's Son and Company, 1012 Walnut Street, Philadelphia, 1924. xiii + 240 pp. 31 figs. 22.5 × 14.5 cm. Price \$3.00.

The book collects much information widely scattered throughout scientific literature, and therefore should be heartily welcomed by all interested in cloud and smoke formation and by that larger class interested in the purification of air from dusts and smokes. The most pleasing features of the book are its clear and scientific presentation of the laws that govern disperse systems in air and the numerous references given to the large amount of work that concerns such systems. The formation, stability and properties of aerosols are adequately discussed. Of particular interest are the facts showing the effect of electrical charges upon the formation

and stability of disperse systems. Methods of examination of aerosols are given and methods of purification of air are discussed. Dust explosions and the effects of atmospheric dust are considered at considerable length. There is a chapter on "The Industrial Preparation and Utilization of Substances in a Finely Divided Condition."

The chapter on Smoke in Warfare lacks all data on the travel of a smoke cloud and on the effectiveness of such a cloud (either as regards screening or toxicity) in the field, and hence it is not possible to translate the data given to field conditions. This lack is quite easily understood and is doubtless due to the small amount of published information on the subject.

The reviewer found much that was new and suggestive in various parts of the volume. Judging by that experience it is believed that others interested in the subject will find quite enough that is new and interesting to repay a careful reading.

J. E. MILLS

**Chemistry of the Rarer Elements.** By B. SMITH HOPKINS, Professor of Inorganic Chemistry, University of Illinois. D. C. Heath and Company, Boston, New York, Chicago; London; 1923. vii + 376 pp. 14 figs. 22 × 14 cm. Price \$4.00.

This is a book that has certainly been wanted for some time. The only regret is that it is not larger. As is usual with a new book there are omissions and slight errors. Under the occurrence of germanium and gallium we note that the important South African mineral germanite is missing, while the minerals euxenite, samarskite, gadolinite, fergusonite, which in all probability carry no germanium, are included.

The statement that zirconium forms no alloys with tin is not quite in accordance with our modern knowledge.

No mention has been made that Hunter has improved the preparation of titanium by the action of sodium on titanium tetrachloride. On p. 106 we read that "gadolinium may also be obtained (1) at the insoluble end of a double nickel nitrate series. . . . (3) at the insoluble end of a bromate series." This is rather misleading since gadolinium nickel nitrate is very soluble and gadolinium bromate quite soluble. It is true that they may be the least soluble salts undergoing fractionation, but they are far from insoluble.

The contents are well written and interesting. The book can be thoroughly recommended as an introduction to the rarer elements.

C. JAMES

**Chemie der Pflanzenstoffe.** (Chemistry of Plant Constituents.) By DR. GEORG TRIER, Privatdozent, Eidg. Techn. Hochschule, Zürich. Factory manager of the "Alkoholfreie Weine- und Konservenfabriken, Meilen." Gebrüder Borntraeger, W. 35 Schöneberger Ufer 12 a, Berlin, 1924. viii + 605 pp. 27 × 17.5 cm. Price \$7.20.

The chemistry of vegetable substances (*Pflanzenstoffe*) represents a large part of the field of organic chemistry, for it is well known that most organic substances are obtained either directly or indirectly from the vegetable kingdom. The scope of investigation in this particular field is therefore practically unlimited and with the extension of knowledge it has become necessary to effect some classification of the enormous amount of accumulated material, either for the purpose of reference or in order that the problems pertaining to individual substances or groups of related compounds may be further studied. In recent years the activity in the various divisions of plant chemistry has indeed been so great that it is difficult to present a survey of the entire field in even its broadest outlines, and for detailed information recourse must be had to special works of reference or even to monographs which are still more restricted in their scope. Any adequate account of such subjects as the essential oils and fatty oils, for example, with respect to their occurrence, characteristics, and composition, now necessitates the compilation of several volumes, while even the investigation of such recently known compounds as the vitamins has already given rise to a voluminous literature.

More than fifty years have now elapsed since the publication of the first comprehensive work by Husemann entitled "Die Pflanzenstoffe," which in its second and last edition appeared in 1882. In this work not only the chemical characters of vegetable substances were considered but also their physiological and pharmacological properties. In the more recent work by Wehmer, published in 1911, which was likewise entitled "Die Pflanzenstoffe," the more important constituents of plants were enumerated in a strictly botanical classification with abundant citations of the periodical literature. The treatise by Trier which is now under consideration differs essentially in its plan from both of the preceding compilations, inasmuch as the substances selected to represent the various classes of compounds found in the vegetable kingdom are considered in their purely chemical aspects.

As an introduction to the present work an interesting account is given of the historical development of plant chemistry together with some general observations pertaining thereto. The subject matter is divided into three principal sections, comprising I. Simple plant constituents; II. Complex plant constituents; III. Plant constituents of unknown composition. In each of these sections there are numerous subdivisions.

The first section includes a consideration of both aliphatic and cyclic compounds, the former comprising, for example, the simpler acids, ketones, aldehydes, alcohols and hydrocarbons, together with the aldehyde and ketone alcohols or monosaccharides, while under the various classes of cyclic compounds are described the terpenes, sesquiterpenes and related substances, benzene derivatives, and such heterocyclic compounds as contain either nitrogen or oxygen. Plant constituents of unknown constitution are likewise noted, such as the resins, so-called bitter principles, and various coloring matters.

The second section comprises the glucosides and glucosidal compounds, among which are enumerated the sugars and other complex carbohydrates, starch, gum, cellulose, pectin, etc. Various ester-like compounds, such as the tannins, fats, waxes, lecithin and chlorophyll, as well as albuminous substances, have also received consideration.

The third section is devoted to a comparatively brief account of the toxins of bacteria and of the fungi and higher plants, the vitamins and enzymes.

It would naturally not be practicable to attempt a critical inspection of all the details of such a comprehensive work, but a more general survey of its contents has not disclosed many errors. The statement on page 147 that the so-called aliphatic terpenes were first recognized as such by Semmler is incorrect. It may therefore be noted that the first representative of this class of compounds was isolated from bay oil by Power and Kleber, who designated it as *myrcene* and fully described its characteristics.<sup>1</sup> The description given on p. 104 of the acids of chaulmoogra oil is unfortunately much confused, and prominence has been given to statements regarding the so-called "gynocardic acid" which have long since been shown to be incorrect.<sup>2</sup> It is probably only through inadvertence that the empirical formula of chaulmoogric acid is given as  $C_{18}H_{28}O_2$  instead of  $C_{18}H_{32}O_2$ .

The work is provided with numerous citations of current literature, and in a supplement of 17 pages references are given to the most recent publications. The index is also apparently quite complete. Notwithstanding minor defects and the necessary limitations in scope this most recent treatise on the chemistry of vegetable substances may be recommended for its general excellence and for the extent of useful information it contains.

F. B. POWER

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<sup>1</sup> Power and Kleber, *Pharm. Rundschau*, **13**, 60 (1895) and "The Volatile Oils," by Gildemeister and Hoffmann, English translation by Kremers. Longmans, Green and Co., London, **1913** and **1922**, vol. I, p. 279 and vol. III, p. 193.

<sup>2</sup> *J. Chem. Soc.*, **85**, 839 (1904).

**Die Blattfarbstoffe.** (The Leaf Pigments.) By RICHARD WILLSTÄTTER. Urban and Schwarzenberg, Friedrichstrasse 105 B, Berlin N 24, 1924. 70 pp. 17.5 × 25.5 cm.

The monograph on Leaf Pigments by Willstätter is an excerpt from the well-known, compendious work by Abderhalden, entitled "Handbuch der biologischen Arbeitsmethoden" and represents fascicle 117 of that portion of the work which deals with chemical methods. The subject matter of the present monograph comprises I. Analysis of leaf pigments (colorimetric determination of the total chlorophyll; quantitative determination of the four chloroplast pigments; method for the separation and determination of chlorophyll derivatives; the porphyrins from hemin). II. Preparation of leaf pigments (preparation of chlorophyll from dried leaves; preparation of chlorophyll from fresh leaves; isolation of the two components, chlorophyll *a* and *b*; colloidal solutions of chlorophyll; preparation of the carotinoids). III. Preparation of the first degradation products of chlorophyll ("crystallized chlorophyll;" pheophytin; production and separation of the pheophorbids *a* and *b*; phytochlorin *e* and phyto-rhodin *g*; alkali salts of chlorophyllin; phytol).

The green coloring matter of leaves has attracted the attention of many investigators during a long period of time, and even the name chlorophyll was first employed in this connection so long ago as 1817 by Pelletier and Caventou. It was, however, only through the classical researches of Willstätter and his pupils that the true chemical character and constitution of chlorophyll have been revealed, and a summary of their investigations on the subject was published in 1913 by Willstätter and Stoll, in the work entitled "Untersuchungen über Chlorophyll," a volume of 424 pages and 11 plates.

The particular value of the monograph which has now been made available consists in a detailed description of the chemical methods employed for the separation and identification of the leaf pigments, with consideration also of their derivatives or degradation products. It may especially be commended for the clearness and completeness with which some of the most difficult problems of chemical research have been elucidated.

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