

giving full directions for carrying out the experiments shown. The book thereby acquires a greatly enhanced value for the lecturer and teacher. For such a person this book is to be recommended. It will be found of very great value.

ALEXANDER FINDLAY.

GRUNDLEGENDE OPERATIONEN DER FARBENCHEMIE.
By H. E. FIERZ. Pp. ix.+323. (Zürich: Schulthess and Co. 1920 [1919].)

Of the four sections into which this highly practical treatise is divided, two are devoted to the fundamental operations involved in the production of coal tar intermediates and synthetic dyes; the third part furnishes technical details of the manufacture of these materials, and the fourth indicates methods of proximate analysis for the testing of the products. The chapter on sulphonation furnishes typical examples of the technology of this operation and includes also exercises in nitrations reductions and alkali fusions leading to the preparation of such important naphthalene derivatives as the naphthylamine-sulphonic acids and the technically valuable aminonaphtholsulphonic acids. To working descriptions suitable for operations on the laboratory scale the author adds useful memoranda concerning the carrying out of these preparations in the factory.

In the chapter specially devoted to nitrations and reductions one is glad to notice the substitution of cheap works recipes for the expensive academic methods of reducing nitro-compounds with tin and excess of acid or with alcoholic ammonium sulphide. The salting out of aniline from water replaces its extravagant extraction with ether.

Suitable examples of chlorination and oxidation are followed by the section on colouring matters, where a typical selection of azo-dyes is introduced.

A patriotic motive has prompted the author to add an interesting chapter on the synthesis of indigestion by Sandmeyer's method. This Swiss process, although no longer employed commercially, is a classical example of the combination of science and technology. It proceeds in five stages from aniline to indigo, giving an over-all yield of 80 per cent. of the calculated amount.

The section on technical details deals with distillation under diminished pressure, with the construction and employment of autoclaves, with the construction of the dye factory, and with other practical details essential to the successful management of a colour works.

The fourth and final section, which offers an introduction to the analytical control of coal tar intermediates might with advantage have been expanded so as to give a more detailed explanation of the analytical operations involved.

This treatise is profusely illustrated with plates and diagrams of apparatus and plants. The entire work is so completely up to date that it seems unnecessary to give it an incorrect date of publication ("1920"), a tampering with time which is not justified even by the most recent and advanced views on relativity.

This manual may be recommended with confidence not only to those making a special study of synthetic dye wares, but also to the general student of organic chemistry, to whom it offers a graduated series of laboratory experiments on the preparation of aromatic derivatives.

G. T. MORGAN.

IRON BACTERIA. By D. ELLIS. With 45 illustrations and five plates. Pp. 179. (London: Methuen and Co., Ltd. 1919.) Price 10s. 6d. net.

This book is designed mainly to assist the water engineer and chemist, by giving descriptions of the chief types of "iron bacteria" at present known, and by indicating the manner in which the know-

ledge so far gained may help in dealing with the attacks of these organisms.

From the point of view of the bacteriologist it must be admitted that our knowledge of this physiological group is scarcely sufficient to warrant a treatise, but Dr. Ellis's book reviews the present state of the subject, gives a useful list of the literature, and should serve to draw attention to the need for further research.

In the first portion of the book the author describes the various types of "iron bacteria" commonly met with, and gives diagrams and microphotographs illustrating their morphology. As in the case of many other bacteria, a good deal of uncertainty exists as to the specific distinctness of the various forms. For example, the group of *Leptothrix ochracea* and its allied forms *Gallionella* and *Spirophyllum* differ in the twisting and shape of the threads, and the author inclines to the view that they are variations of a single type. It would seem that further cultural study should enable this point to be settled. A similar example is seen in the case of *Cladothrix dichotoma* and its related forms.

However, the chief interest in connexion with the "iron bacteria" is centred round the physiology of their nutrition. The author devotes a chapter to the consideration of the various theories connected with the deposition of iron oxide by the organisms. General attention was first drawn to the subject by Winogradsky's theory, that they derived energy by the exothermic reaction involved in the oxidation of ferrous to ferric compounds. This theory, supported chiefly from an analogy with the sulphur bacteria, has been largely discredited since the behaviour of *Leptothrix* in pure culture was studied by Molisch, who showed that a ferruginous medium is not essential, but that the organism will grow as a saprophyte in the presence of organic matter, and that the presence of this organic matter is essential to its growth.

Molisch has suggested that the iron bacteria make use of organic matter which is in combination with an iron radical, casting out the iron as hydroxide. However, as the author points out, if we accept this theory, we must assume that the organisms possess an exceptional affinity for organic iron compounds. Until the possession of this power has been demonstrated the question of their metabolism cannot be regarded as settled.

The book contains two chapters dealing with the practical aspect of the subject and the detrimental effects of the organisms in reservoirs and water-pipes is described. The author suggests curative measures chiefly depending on the oxidation of the organic food material in the water and on the formation of an alkalinity unfavourable to growth by the addition of lime. At present, however, it is only possible to indicate the broad lines upon which treatment may be effective, and more research is needed before curative methods can be perfected.

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PUBLICATIONS RECEIVED.

THE CHEMICAL ANALYSIS OF ROCKS. By HENRY S. WASHINGTON. Third edition, revised and enlarged. Pp. 271. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall. 1919.) Price 11s. 6d.

THE PREPARATION OF ORGANIC COMPOUNDS. By E. DE BARRY BARNETT. Second edition, with 54 illustrations. Pp. 273. (London: J. and A. Churchill, 1920.) Price 10s.

INDUSTRIAL CASES. By H. O. Greenwood. Pp. xvii.+371. (London: Baillière, Tindall and Cox. 1919.) Price 12s. 6d.