

pitchy residues also find mention. The methods detailed relate more particularly to the German petroleum industry and requirements.

Part II, of about twenty pages, deals with various tarry products from brown coal, shale, and peat and also with ozokerite.

In Part III the saponifiable waxes and fats are discussed—making up nearly one-fourth of the volume. The discussion embraces the preparation and extraction of these oils and the usual physical and chemical tests.

Part IV treats of the tests to be applied to the technical products obtained from the three preceding; *viz.*, candles, wool oil, soaps and soap powders, Turkey-red oil, varnishes and lacquers, blown oils, dégras, linoleum and rubber substitutes.

A useful feature of the book is the system of tables of the preparation and properties of the various oils and of certain lubricants which have proved their value; also the requirements of various German railroads for their oils.

The work contains much valuable information not to be found elsewhere and may be warmly recommended to all interested in the subjects treated.

A. H. GILL.

EXPERIMENTAL ELECTROCHEMISTRY. By N. MONROE HOPKINS, PH.D.
New York: D. Van Nostrand & Co. 284 pp. Price, \$3.00.

This book was evidently written by one who has experimented upon many of the subjects discussed. Photographic reproductions and drawings are very frequently used. It gives the impression that the author was willing to base it upon present theories of electrolytic dissociation, and unwilling to neglect many of the questions which their use force upon a reader. Probably most readers of the average book on the subject have asked themselves: Can an electric current be shown in an electrolytic conductor without electrodes? Is gaseous conduction similar to electrolytic conduction, etc. Such matters are considered experimentally at some length.

No references to the literature are made in the text, though an extensive and general electrochemical bibliography forms a part of the book. The discussion of electrodeless conduction makes it appear that the author is the originator of the scheme for the production of alternating currents in solutions by magnetic induction. Hering outlined these general processes in the *Trans-*

actions of the American Institute of Electrical Engineers four years ago, nor were they new at that time.

Among the typographical errors to which attention should be called is the expression for Ohm's Law, p. 14, and the incomplete chemical symbol on p. 217.

The full description under each illustration is very useful.

Many of the successful, as well as unsuccessful commercial electrolytic processes are considered in detail, often accompanied by descriptions of the author's experiments along the same line.

Among the "definitions of new terms" we find: "Elevation of the boiling-point, often expressed in works on physical chemistry as 'the lowering of the vapor-tension of the solvent.'"

The statement (p. 32) "Raoult,.....to make a long story short, found that all non-electrolytes of equal concentration lowered the freezing-point of pure water to the same extent" is too short to be true. Also: "Raoult.....found 1.85° C.and we may say, therefore, that all..... lower the freezing-point of water 1.86° C." Possibly this is permissible if one does not care what he says within one part in 186. On p. 33 we are apparently told that Raoult gave us the same depression.....as a gram-molecule of an electrolyte, which can hardly be allowed even metaphorically. Dangerous abbreviation is disclosed on p. 38, where we are told that for the heat of neutralization "it matters not what acid or base we use or what salt is formed, we always get experimentally..... 13,700 calories." Hydrofluoric acid and ammonia are too common reagents to be thus slighted.

On p. 53, we learn that ions "then become ordinary atoms of hydrogen and may readily be seen in the capillary"; on p. 55 that "the electricity from a frictional machine is almost all potential difference!"

On p. 86, "The errors in weighing a decided increase in the respective cathodes being less than in weighing a slight increase." "There can be no electrolytic conduction without the corresponding setting-free of substances in the ratios of their chemical equivalents" (p. 86) is a careless statement in the light of his detailed experiments with induced currents where the opposite is proved.

On p. 248, in charging a storage battery "oxygen and hydrogen are of course given off from both electrodes."

On p. 253, "It has been found that a couple made of bismuth and antimony, heated at the point of union, corresponds very closely in electromotive force to a couple consisting of zinc and copper immersed in sulphuric acid." In fact, this thermo-potential cannot be over a few hundredths of that of the zinc-copper-acid combination.

The problem of electricity from carbon is given a short chapter, in which all the energy thus far derived from carbon cells is attributed to thermo-electric operations. The manufactures of ozone and nitric acid from the atmosphere are given quite extensive treatment.

Chapter XVI is devoted to the primary cell. No attempts are made to introduce the usual mathematical formulas expressing relationship between ionic concentrations, migration rates and electromotive forces. The familiar and incorrect system of calculating electromotive force corresponding to a given reaction, from heats of formation alone, is given in this chapter and is also previously used to determine the minimum electromotive force necessary to produce a current through an electrolyte.

W. R. WHITNEY.

A SYNOPSIS OF A COURSE OF LECTURES IN GENERAL CHEMISTRY PUT IN THE FORM OF QUESTIONS. By S. L. BIGELOW. Ann Arbor: George Wahr. 1905. 104 pp. Price, 50 cents.

The author's attempt to furnish a series of questions, that shall help a student assimilate the facts acquired in the lecture room and direct his study of some text-book to the best advantage, is very successful. The questions are well chosen, clearly put, and broad enough in their scope to satisfy the demands of most elementary courses. A few tables of constants, and some hints regarding problems concerning gases and solutions are placed in an appendix.

L. B. HALL.

RECENT PUBLICATIONS.

THE MODERN PACKING HOUSE: A COMPLETE TREATISE ON THE DESIGNING, CONSTRUCTION, EQUIPMENT AND OPERATION OF A MODERN ABATTOIR AND PACKING HOUSE, ACCORDING TO PRESENT AMERICAN PRACTICE, INCLUDING FORMULAS FOR THE MANUFACTURE OF LARD AND SAUSAGE, THE CURING OF MEATS, ETC., AND METHODS OF CONVERTING ALL BY-PRODUCTS INTO COMMERCIAL ARTICLES. By F. W. Wilder. Chicago: Nickerson & Collins Co. 1905. 581 pp. Cloth, \$10.00. Mor., \$12.00.