

REVIEWS

pH IN PRACTICE

Hydrogen Ions, Their Determination and Importance in Pure Industrial Chemistry. Vols. I and II. By H. T. S. Britton. (Monographs on Applied Chemistry Series). (Chapman and Hall, Ltd., London), 1942, Third Edition. Vol. I pp. xix + 420, price 36sh.; and Vol. II pp. xix + 443, price 36sh.

One of the significant developments in industrial control and practice in the last decade and more has been the rapidly increasing recognition of the important role played by pH in many of the methods of industrial processing. Such developments have obviously run hand in hand with the increasing necessity for automatic and precise controls in large-scale productions of high quality and uniformity at competitive prices. The field controlled by hydrogen ions ranges from such subjects as ceramics and soil fertility to a multitude of the more obvious practices such as Textile and Dye Industry, Water Purification, Corrosion, Sewage Disposal, Baking, Brewing, Pulp and Paper Manufacture, Tanning Processes, Sugar Manufacture, Methods of Electro-Deposition and, finally, the important subjects of analytical and separation methods in Inorganic Chemistry. Thus the production of satisfactory paper depends on the efficient adjustment of the hydrogen ion concentration of the liquors employed, and more particularly in the sizing operations, as this determines the final quality of the paper; printers often find that their types and plates deteriorate more rapidly when used on some papers than on others although all were purchased as being of the same quality. In the manufacture of sugar the careful regulation of acidity and alkalinity of the various sugar solutions during the purification process has always been a problem of paramount importance. The control of hydrogen ion concentration in textile processes is a matter of definite practical importance, more particularly in the wet processing of ampholytic substances silk and wool, and especially their dyeing. Developments in biochemical researches have shown that in order to secure or avoid the optimum activity of enzymes and bacteria, specific ranges of hydrogen ion concentrations have to be established. A striking example is the effect of the less extreme variations in hydrogen ion concentration in the soil, which modify the distribution and activity of its teeming population of micro-organisms besides affecting the condition of plant nutrition. This has also a bearing on the incidence and severity of many plant diseases. Other biochemical processes in which hydrogen ion concentration is a useful index are the control and execution of the different preliminary stages of leather manufacture, the methods of mashing, malting, brewing and fermentation, the preservation of milk and other dairy processes, the baking industry, sewage disposal, etc. As is well known the measure of hydrogen ion concentration is of fundamental importance in inorganic

chemistry. Apart from the possibilities of potentiometric titrations, analytical and other processes involving precipitation of hydroxides and basic salts can be kept under perfect control by maintaining the appropriate pH value as indicated by colorimetric or electrometric methods. This specificity of pH for the precipitations of insoluble salts also underlies the need for a careful regulation of hydrogen ion concentration of the solutions from which certain basic metals such as nickel, cobalt, iron and manganese are cathodically deposited. The variations in the tanning properties of chrome solutions are in a similar way controlled by relations between pH and phenomena of "soluble basic salt" formation. It is interesting also to note how pH controls the simple and differential floatations of ores.

Prof. Britton's monograph is a storehouse of much valuable information on each of the topics briefly mentioned above and much else besides in the form of tables and graphs. The industrial applications are all considered in Volume II in a succession of chapters from XXII to XLVI. Volume I deals essentially with the several practical methods of pH measurement and control, leavened with just that amount of the fundamental theories of electrode potentials and behaviour of ions in solutions and ionisation constants, as will help to anchor the reader to the realities of his measurements. A new chapter XXI on Redox potentials makes up for a serious omission in the previous 1931 edition of this book. The reviewer is in agreement with the author in the limits set by him to the exposition of the theoretical concepts. This makes the book readable to the less initiated as well.

Altogether, this new edition is a very welcome publication and should be opportune to the large number of physical chemists who are now actively engaged in "essential war services". There is a 50 per cent. increase in the number of pages over the 1931 edition due to incorporation of new chapters and revision and substantial additions to old. This has obviously necessitated the split of the monograph into nearly equal volumes of more convenient size. It is, however, less obvious why the pages in second volume are numbered afresh while the figures and tables and chapters are all numbered in continuation of volume one. The printing and paper are of a high pre-war standard while the cost reflects the war-time conditions. This publication must find a place in every industrial and university library.

M. A. G. RAU.

Intermediate Practical Physics. By Prof. Vissa Appa Rao. (Andhra University Series No. 28, Waltair), 1942. Pp. viii + 337. Price Rs. 4. It is a happy augury for the future that more and more science text-books are being produced in India, which can really be called text-books and are not merely "Notes" or "Cram" books. The present book is a good example of the excellent volumes that are now seeking

to supply the wants of Indian students and is apparently the handiwork of an experienced teacher. It gives a description of those experiments which constitute the course in practical Physics for the Intermediate Examination of Indian Universities, with fine model results set out for every experiment. A concise presentation of the underlying theory precedes the description of the experiment and it is surprising to see the amount of theory compressed into a short space in this way. The course of experiments is that common to most Indian Universities and the apparatus described is also mostly standard. The same absence of superfluous words characterises the description of the experiments, as was noticed in the presentation of the theory. Now and again a question is interposed with a 'why' or a (?) which serves to draw the student's attention to important points worth careful thought. The language is adequate and acceptable, barring a few slips here and there, such as 'compass' for 'compasses', 'a point "impressed by" forces' for 'a point "acted upon by" forces', 'slow motion "affected" with the help of a screw' for "effected", etc., 'small boats and "rafters"' for 'rafts', etc., the symbols ' and " for minutes and seconds of time instead of " and " and so on. There are a few wrong statements which require correction. For example, it is stated that as the elasticity of a fluid is independent of direction, the pressure at any point is communicated equally in all directions. In explaining the relative expansion of a liquid inside a flask, it is stated that a point on the neck coinciding with the initial level of the liquid changes position owing to the expansion of the vessel and thus prevents the full expansion of the liquid from being noticed. Surely it is not merely the motion of such a point of reference but the expansion of the whole vessel that affects the observed expansion of the liquid. The statement that "molecules have the same properties as the body, and any further subdivision of these destroys their characteristic physical properties" should be removed at the first opportunity. To say that "the incident rays, reflected rays and the normal are in the plane of the paper and this verifies the first law" is not correct; when only the marks left by the pins on the paper are joined, how has it been proved that the incident and reflected rays lie in the plane of the paper? We have indicated these errors only because we feel that the book is a good one which will certainly gain a well-deserved wide currency and we should like it to be as free as possible from such blemishes. A verification of the fact that a reflected ray turns through twice the angle through which the mirror turns, and of the lateral shift of the emergent ray in refraction through a slab may be included. The printing and get-up of the book leave nothing to be desired. We feel quite certain that the book will have a richly deserved popularity among Intermediate students all over the country, and we heartily recommend it to the attention of all teachers handling Intermediate Classes.

T. S. S.

Electric Power System Control. By H. P. Young. (Chapman and Hall), 1942. Pp. 319 + xii. Price 25sh.

This book is the eleventh volume of the series of monographs on electrical engineering subjects coming out under the editorship of Mr. H. P. Young.

In this book the author (Mr. Young himself) has succeeded in bringing together all the latest and important information on the subject of system control and presenting it in a coherent and readable form. It is, therefore, very useful to the power supply engineer who cannot afford the necessary time to go through the voluminous mass of available literature on the subject. To engineers in India who very often have no access to good technical libraries it must have an especial appeal. The advanced student of the subject also finds in it much that is of value to him.

The scheme of the book is as follows. There is an introductory chapter on the parallel operation of generators and characteristics of exciters. The two that follow deal with the various aspects of voltage control of alternators and describe the several auxiliaries employed for voltage regulation. We then have in another chapter a good description of the more important synchronising gears in use to-day. The next four contain a treatment of the various aspects of system design such as control of power transfer, circuit breakers and circuit interruption, short circuit calculation and protection, and all the other complex problems, theoretical and practical, arising out of the interconnection of large power stations. A description of the apparatus used for interconnector control is the content of the ninth chapter; while the last one deals briefly with the principles of the latest development of system control, that is, supervisory control systems.

The material for the book has thus been carefully selected and well arranged, and covers all the important aspects of system design. The information included under each topic is up-to-date. A short bibliography at the end of the book giving references to the more important publications on the subject adds to the value of this monograph.

The printing and get-up of the book are in the usual Chapman style. The few misprints that still persist will, the reviewer hopes, be removed in the next edition.

The book is in short a worthy companion to the preceding ten volumes of the series, and is confidently recommended to the profession.

S. KRISHNASWAMY.

Amaravati Sculptures in the Madras Museum. *Bulletin of the Madras Government Museum* (New Series, General Section, Vol. IV). By C. Sivarama Murthi. Pp. xviii + 376. Price Rs. 14-8-0.

One of the greatest attractions to the Madras Government Museum has been for long its fine Archæological Section. And in that collection, the portion of the Amaravati Sculptures lodged forms the gem. This monograph deals exhaustively yet comprehensively with the whole subject of the unique sculptures that come from near and about Amaravati in