

## 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.

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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