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Editorial

We regret to announce that due to the necessity of economising paper we have had to curtail publication of two issues again this year. We are therefore extremely grateful to the Institutions whose Transactions and the Librarians, Editors, Managers and Proprietors of those esteemed periodicals which we have received for display in our Association's free reading room and Library in spite of our inability to present any publication in exchange. We assure them of our intention to make good this exchange at the earliest opportunity after the conclusion of the war.

Mr. A. C. BANNERJEE

Since our last issue we have undergone many unfortunate changes. We have had to mourn the sad loss by death of our valuable Honorary Secretary, Mr. A. C. Bannerjee. In him we have lost a sincere friend of the Association, one who was a perfect gentleman and who performed every duty ungrudgingly and unostentatiously. He endeared himself to all who came in touch with him and was never known to have ever uttered a harsh word to anyone. In this age of conflicts he has succeeded in passing through this world without ruffling a single temper and he leaves behind him with each and everyone who knew him the memory of a relationship entirely pleasant and a feeling of sad and irretrievable loss.

pH Value of Water. Analysis of water composition for the determination of its quality such as potability, acidity, alkalinity, hardness or softness prior to its distribution to the

public is of the greatest importance to the health of the public and the wealth of the industrial consumers. Methods of analysis are, therefore, of deep interest to the technical workers engaged in the preparation of analysis. For them we have in this issue a paper dealing with what is termed the "pH Value" and its effect on various compositions of water.

The recent alarm spread by the disclosure of deterioration of quality of filtered water supply in Calcutta lends a topical interest to this paper, and we will be glad to have as early as possible contributions containing discussions on the subject matter of the paper. The paper was presented and read by Mr. Sudhananda Chatterjee before the meeting of the Association of Engineers on the 7th April. But could not be circulated prior to the meeting due to shortage of paper.

A few copies of the paper have been circulated to those members who desire to discuss points in the paper and contributions from them are expected to arrive in due course.

In this paper it will be seen that the pH value is a reliable measure of the acidity or alkalinity of water. It is commonly known that acidity of a solution increases and alkalinity decreases the rate of corrosion of unpainted steel immersed in water. The pH value could therefore give a good indication of the corrosive effect that may be expected of the water of any locality on steel structures immersed in it, e.g., the effect of river water on steel piles, water of a port on the mooring buoys and chains, or water of a ship-building yard's fitting-out basin on a ship's steel hull. A knowledge of the pH value of water is of some importance to shipbuilders as most fitting-out basins are in or near rivers which usually contain dissolved materials foreign to normal water supplies.

Water molecules $H.OH$, each contain one H -ion and one negative OH -ion. When a piece of iron is placed in water, particles of iron with a positive charge (iron-ions) tend to go into solution and acquire a negative charge while a number of Hydrogen-ions (H -ions) with an equal positive charge tends to be released and thus to maintain the solution electrically neutral. The iron-ions are converted by the water into rust. Salts contained in Sea water help greatly in the transfer of

the iron particles and so rusting takes place quicker in sea water than in fresh. Some substances, notably acids, tends to increase the supply of Hydrogen-ions that are available in the solution for immediate discharge in return for iron-ions from the metal. Other substances, notably alkaline materials such as Soda and Potash have the reverse effect by increasing the number of negative OH-ions.

The **concentration of Hydrogen-ions** is expressed by what is known as the **pH value**. The **product** of the two quantities of Hydrogen and Hydroxide-ion concentration is always **constant** in water or any aqueous solution. The value of that constant is $10^{-14.07}$, i.e., approximately, 10^{-14} at (British) room temperature. If the concentration of the hydrogen-ion is 10^{-4} gm. equivalent per litre then the concentration of the hydroxide-ions is 10^{-10} . If the concentration of the hydrogen-ions is 10^{-7} , then the concentration of the hydroxide-ions is also 10^{-7} . For convenience of plotting on rectangular co-ordinates this is expressed as the log of 1/hydrogen-ion concentration, which is given the symbol pH, suggested first by Sorensen. So that when the Hydrogen-ion concentration is 10^{-4} the pH value is said to be 4; and when the hydrogen-ion concentration is 10^{-7} the pH value is said to be 7.

The acid properties are entirely due to the Hydrogen-ions, and the alkaline properties due to the Hydroxide. When these ions are present in equal quantities the solution is neutral.

Pure neutral water has a pH value of 7, acids a pH of less than 7 and Alkalies more than 7.

Damodar Floods. This year the Damodar in western Bengal has again flooded her banks. This event is not an unexpected one. But this time the damage caused by the flood has been serious on account of the loss it has caused to life, property, and communications. A considerable portion of the East Indian Railway Lines, both Grand Chord and Main lines had been severely breached. It took over three months to complete temporary repairs. Crops have been washed away and whole village dwelling houses destroyed by the terrific force of the current.

Some had feared that an event of this kind was most likely to take place. But the warnings were not heeded. It was

feared that the closing of the left bank of the Damodar to irrigation for the protection of the Railway lines had increased the pressure on the embankment to a dangerous limit. The occurrence of the breach shows that the fears were not unfounded. Had there been more irrigation canals led off from the embankment higher up the river, the flood might have been brought under control. It is therefore imperative that earnest efforts should be made to carry out the scheme proposed by the Government of Bengal in 1940 but held up for want of funds due to concentration on the War effort. The scheme was not at the time considered as being helpful to the war effort and the funds were sought to be obtained by the floating of a loan which again was to be avoided, if possible, during wartime. But the obstruction that the floods have caused to communications must have so hampered the war effort that it will now be thought that a scheme for the control of the Damodar floods is in effect a scheme to aid the progress of the war. We understand that a committee has recently been appointed to determine whether it would really be so.

A report of the discussion on the Government scheme in the assembly will be found in the September issue of the *Journal of the Association of Engineers of 1940*, Vol. XVI, No. 3. In this connection it may also be well to refer to the lectures of Sir William Wilcox on the "Ancient system of irrigation in Bengal," published in 1930, by the University of Calcutta—a copy of which will be found in the Association Library.

It is emphasised there that the so called "dead rivers" in Bengal were actually canals which had in the past been utilised for the purpose of draining away the flood waters of the Damodar and properly distributing the silt and the fish carried by the surface of the flood water among the fields and tanks of the cultivated areas. The blocking up of these drainage canals by the left embankment is said to have resulted in the loss of the manure that was derived from the silt and the increase of malaria bearing mosquitoes which had formerly been destroyed by the fish that came down with the flood.—This is a matter that should not be lost sight of when strengthening of the bank is considered.