

the concentration of hydrogen ions. Indeed, these ions are the effective agents in the process.

Reactions of this type, in which carbohydrates, fats, proteins, and other substances take part, make up a very large, if not the largest fraction of all the processes of metabolism, and there can be no doubt that for their regulation very accurate adjustment of acidity and alkalinity is essential. In the body, to be sure, such reactions are under the control of enzymes, but the concentration of hydrogen and hydroxyl ions is not less, rather more important for that reason. Beside retaining their direct influence upon the reaction, the ions also exert an influence upon the enzymes themselves. Moreover, not only enzymes, but almost all colloidal bodies, especially such unstable structures as the colloids of protoplasm, are profoundly affected by changes of reaction, and for the preservation of their stability they also are absolutely dependent upon constancy of acidity and alkalinity.

Finally, it is to be noted that glucose, which is the principal source of energy in physiological processes, is very unstable in even faintly alkaline solutions, and that its stability varies in most marked degree with the slightest change in the concentration of hydroxyl