

THE PRESENT STATUS OF THE THEORY OF ELECTROLYTES*

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1. **Introduction.** It is not generally recognized that physical research is quite as dependent upon aids to the mind as it is upon aids to the senses. Indeed, it is the aids to the mind that are fashioned with greatest difficulty; only at long intervals does there appear a figure possessing that high degree of originality necessary for the construction of a new mental device that may be used successfully in analyzing the complex phenomena of nature. In chemistry, we have three such devices, namely: thermodynamics, statistical mechanics, and quantum mechanics. For the first two of these we are largely indebted to Josiah Willard Gibbs. Although a mathematician by training, Gibbs possessed that intuitive physical sense which enabled him to reduce physical phenomena to their lowest terms. His contributions to chemical science rank in importance with those of Lavoisier and Dalton.

To the layman it must appear that the rapid progress of modern science is due to experimentation. Nothing could be farther from the truth. In all ages, there have been men who experimented, just as there have been those who philosophized; but their contributions to scientific knowledge were few in number and limited in scope. What distinguishes our present age from all others is that experiment and theory have been joined in complementary fashion. The achievements of science have been due to this happy combination.

The subject that I propose to discuss is a small segment of a much broader one, namely, the relation between electricity and matter. While the problem of electrolytes is but a fraction of the broader problem, its study has led to the development of concepts which have made it possible to interpret matter in all its forms in terms of electrically charged particles.†

Interesting and instructive as it might be, an historical introduction is not possible on this occasion. Suffice it to say that the problem

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† This excepts the neutron, the relation of which to other types of ultimate particles of matter is as yet little understood.