THE SCIENTIFIC FOUNDATIONS OF ANALYTICAL CHEMISTRY, TREATED IN AN ELEMENTARY MANNER

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BY

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TRANSLATED WITH THE AUTHOR'S SANCTION

BY

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DEDICATED

TO

Johannes Wislicenus

IN

AFFECTIONATE RESPECT AND FRIENDSHIP

AUTHOR'S PREFACES

TO THE FIRST, SECOND AND THIRD GERMAN EDITIONS

ANALYTICAL Chemistry, or the art of recognising different substances and determining their constituents, takes a prominent position among the applications of the science, since the questions which it enables us to answer arise wherever chemical processes are employed for scientific or technical purposes. Its supreme importance has caused it to be assiduously cultivated from a very early period in the history of chemistry, and its records comprise a large part of the quantitative work which is spread over the whole domain of the science. There is, however, a remarkable contrast between the extent to which the *technique* of analytical chemistry has been elaborated and its scientific treatment. Even in the best works on the subject the latter is almost entirely confined to the giving of equation-formulæ, which show the results of the chemical reactions in question *in the ideal limit cases.* That as a matter of fact, instead of the supposed complete reactions, incomplete ones leading to a state of chemical equilibrium take place, that there is no such

thing as a perfectly insoluble substance, and that absolutely exact methods of separation and estimation are an impossibility—remains not merely unknown to the student, but also occurs less frequently, I fear, to the mind of the accomplished analyst than is to be desired in the interests of a sound criticism of analytical methods and their results.

Analytical chemistry thus fills the subordinate but at the same time indispensable position of handmaid to the other branches of our science. While we everywhere find the liveliest activity with regard to the theoretical arrangement of scientific material, and observe that questions of this kind always arouse far more interest than purely experimental problems, analytical chemistry is content with fashions of theory which have long been discarded elsewhere, and sees no harm in presenting its results in a shape which has really been antiquated for the last half-century. Thus, we find it considered permissible to give at the present day (for example) K_2O and SO_3 as the constituents of potassium sulphate, in accordance with the electrochemical dualism of 1820; and the case is made no better by the fact that chlorine is brought into the report of an analysis as chlorine, and its 'oxygen equivalent' therefore deducted from the sum total.

We may, however, take it for certain that when such a striking and pronounced custom holds its own for so long, there must be good grounds for it. And it must be added, without any circumlocution, that a scientific foundation and system of analytical