

considered as the founders of the modern science of physical chemistry, which has received an elaborate exposition in the great work of Professor Ostwald. This work is probably quite as epoch-making in the domain of chemistry as Thomson and Tait's 'Natural Philosophy' has been in that of physics.

85.
Ostwald's
physical
chemistry.

I have already explained how in the development of chemistry the attention of its great representatives was almost entirely absorbed in gaining a knowledge of the different substances with which they had to deal, and how through preoccupation with the natural history of matter, its decomposition, analysis and synthesis, and appropriate classification, the other more scientific questions regarding the physical agencies which were at work in chemical processes—constituting the doctrine of chemical affinity—were almost completely neglected. This I traced largely to the influence of that powerful instrument of exact research, the atomic view, which had been introduced into chemical science through Lavoisier and Dalton.¹ The pursuit of physical chem-

¹ It is not an unusual experience to find that the change from one theory to another, though an advance from disproved to more correct views, is also accompanied by some loss either in definiteness or in actual knowledge of facts. The undulatory theory lost the definite notion of a rectilinear ray of light, which was only regained by prolonged and difficult analysis; the electro-magnetic theory of Maxwell has not as yet given a clear representation of those electrical charges which the older theory of Coulomb and Weber introduced in the form of stationary or moving electrical masses. Something similar hap-

pened when the older phlogiston theory was dispelled by the atomic theory, and all attention was concentrated upon change of weight. The older theory maintained that when a metal is calcined it loses something—viz., phlogiston; the new theory had proved that it gains something—i.e., weight in the form of combined oxygen. More recent knowledge has shown that both theories are right. It gains weight and loses potential energy, or power to do work—i.e., to combine, giving rise to molecular motion or heat. The phlogiston theory contained the correct idea that besides matter there is something else—