

and extraneous sources of heat must be avoided, and the furnaces made practically self-contained, if anything approaching perfection is to be attained. It must be upon simplicity, ease of working, and freedom from complicated parts that the progress of liquid fuel must chiefly depend.

"The direct pulverisation of the oil is now coming to be recognised as the proper method; it is the most efficient and the most economical."

The next two chapters are devoted to discussing the use of oil fuel for marine and naval purposes, but the division into two chapters is hardly needed, as the naval side of the question is scarcely touched upon, the bulk of the matter in that chapter being taken up with the trials of liquid fuel on the s.s. *Mariposa*, and the tests made on land by the American Liquid Fuel Navy Board.

The chapter on oil fuel in locomotives is an excellent summary of the work of Urquhart and Holden, whilst the use of oil fuel for metallurgical and domestic purposes also receives some attention.

The whole work compares very favourably indeed with the far more pretentious treatise on the subject which until now has been the only book of reference, and everyone interested in this important question will welcome Mr. North's excellent text-book.

THE DYNAMICS OF CHEMICAL CHANGE.

Chemical Statics and Dynamics. By J. W. Mellor, D.Sc. (N.Z.), B.Sc. (Vict.). Pp. xiii + 538. (London: Longmans, Green, and Co.) Price 7s. 6d.

FOR some years past a marked increase of attention on the part of English chemists towards the rapidly developing physical chemistry has been observable. Until recently, however, the available English literature on the subject was confined to German translations, a state of things which is now being in a large measure remedied.

The present work forms one of the series of text-books of physical chemistry edited by Sir William Ramsay. According to the table of contents, four chapters are devoted to the consideration of homogeneous reactions, and in succeeding sections the initial periods in chemical change, heterogeneous reactions, equilibrium and dissociation, electrolytic dissociation, catalysis and the theory of chemical change, fermentation, the influence of temperature and pressure in chemical reactions, and finally explosions, are dealt with.

Since the appearance of van 't Hoff's "Etudes de Dynamique Chimique" a vast amount of work has been done in connection with the problems involved here, and the necessity for a summary of newly discovered facts, a criticism of recent theories, and an unbiased statement of our present position in regard to the dynamics of chemical change and allied problems must have been felt by many. Dr. Mellor's work will, therefore, receive an undoubted welcome.

The accumulated evidence on the nature of chemical change resulting from kinetic studies leads the author to favour the view that the "association" or "intermediate compound" theories describe in the most rational manner the mechanism of the majority

of reactions. Simple consecutive changes determine the character of many apparently complex reactions.

In connection with the determination of the number of molecules taking part in reactions in gaseous systems the author sounds a very necessary warning note. The rate of decomposition of phosphine or arsine is a frequent text-book illustration of one of the methods employed, and the experimental data fit in with the assumption that the reaction is unimolecular and non-reversible. But there is another side to this and similar problems. It is not improbable that the reaction takes place on the surface of the walls of the containing vessel, and that its rate is conditioned solely by the rate of absorption of the gas by this surface. The course of the reaction will in this case also be that of a unimolecular change.

In the section on the measurement of chemical affinity we meet old and familiar friends in the illustrations of the thermal and density methods of comparing the affinities of two acids. The very moderate accuracy attainable in these methods, which involve the small difference between two experimental quantities, and in which corrections have frequently to be introduced in consequence of secondary changes, is scarcely ever sufficiently emphasised, and attention might have been directed to this point. A method depending upon the measurement of a property possessed by only one component of a system has obvious advantages, even if such methods are of limited application. Whether Thomsen's relative avidities and the relative ionic affinity coefficients are always identical conceptions is left for the reader to infer.

Chapter x., dealing with catalysis and the theory of chemical change, is most attractive reading. Here the processes of slow combustion or autoxidation are discussed in the light of the theories of Brodie, Schönbein, Clausius, van 't Hoff, Traube, Bach, Engler and Wild, and the interesting phenomena included under induced or sympathetic reactions are treated. In the chapter on explosions the account of older work is supplemented by many new and interesting facts.

In the reviewer's opinion Dr. Mellor's work is to be warmly recommended. The fact that it contains three thousand or so references to original papers is in itself evidence of its utility to the teacher, to the advanced student, and to the physical chemist engaged in research.

H. M. DAWSON.

RECENT EARTHQUAKES.

A Study of Recent Earthquakes. By Charles Davison, Sc.D., F.G.S. Pp. xii + 355; 80 illustrations. (London: Walter Scott Publishing Co., Ltd.) Price 6s.

IN this copiously illustrated volume Dr. Charles Davison, whose seismological investigations, especially those relating to British earthquakes, are so well known, gives a popular account of the results which have been arrived at by modern seismology. The method in which he treats his subject is one that appeals to the general reader. Rather than grouping