

Book Review

P. VALLET: *Thermogravimétrie. Etude critique et théorique, utilisation, principaux usages.* Gauthier-Villars, Paris, 1972. 422 pp., 88 figures, 30 tables, 503 citations. Price: F 160.—

The book consists of seven chapters: I. Principle of thermogravimetry. II. Obtaining thermograms: the main types of thermobalances. III. Release and uptake of material. The main factors that influence the shape of the thermograms. IV. Difficulties in the interpretation of the thermograms. V. Application of thermogravimetry in heterogeneous kinetics. VI. Various applications of thermogravimetry. VII. Thermogravimetry and biological phenomena.

After a short historical survey the author — who has been dealing with thermogravimetry since his thesis — outlines the principle of the methods and types of reactions studied by it. In a small chapter he gives a survey of the main types of thermobalances from the balances built in a laboratory up to the commercial products, special TG apparatus and those combined with other methods. A brief survey of the thermal processes from both thermodynamic and kinetic points of view is followed by a detailed discussion of the factors influencing the shape of the thermogravimetric curves. Isothermal thermogravimetry and — according to the nomenclature of the author — real thermogravimetry are treated parallelly.

The problem of precision regarding the measurement of mass as well as that of temperature — subjects often neglected — are discussed in the same chapter in which the evaluation of TG curves is described taking into consideration the influence of

phase-transitions and adsorption phenomena too.

The author devoted about 100 pages to the application of thermogravimetry (including also isothermal methods) in the study of heterogeneous kinetics. Isothermal and non-isothermal thermogravimetry is dealt with from both theoretical and experimental points of view.

In the first part among the supposed plausible reaction mechanisms the Bou-langer-Urbain theory and three cases of the diffusion are outlined. The behaviour of crystalline powdered materials is treated separately from both theoretical and practical points of view. The determination of kinetic parameters from data of real thermogravimetry is reviewed. Besides the method based on the Arrhenius law also those based on two other functions are dealt with. (The tabulated values of the function “J” calculated earlier by the author can be found in the Appendix at the end of the book.) In the experimental part of this chapter the results obtained for dehydration and decarbonization reactions are used as examples. The author sums up in a very short part (six pages) the theories and experiments concerning the kinetical interpretation of TG curves published since about 1963. Without setting up claim to a complete survey the subject would deserve more attention.

Chapter VI contains the different fields where thermogravimetry can be employed: the investigation of intermediates of a thermal decomposition, application in analytical chemistry (including the reactions used in gravimetry), for investigation of chemical reactions and reversible equilibria.

In Chapter VII mainly the kinetical

aspects of the thermogravimetry of biological samples are discussed.

At the end of the well-presented book the author gives the limitations of thermogravimetry (and at the same time that of his

book): the impossibility of the phase identification on the basis of mass-loss or gain alone, and stresses the need for combination with other methods.

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