

Book Review

Differential Thermal Analysis

Edited by R. C. Mackenzie. Vol. 1. 1970. Academic Press Inc., London. 775 pp., 313 figures, 61 tables. Price: £ 12.

The first volume of this two-volume book has appeared, which contains 25 chapters of the total of 45, and is completed by 1762 references. It was an excellent idea to invite internationally acknowledged experts to write the various chapters of the book. Special appreciation is due to the editor for his successful efforts to ensure uniform treatment of the subject and the use of the ICTA nomenclature throughout the book.

In contrast to the books which have appeared so far on differential thermal analysis, this book has a notable advantage that the authors of the various chapters, internationally known experts of the field, have critically selected from the ample literature those papers which are of assistance not only to those wanting to become acquainted with the method but also to research workers active in the field of thermal analysis. The references contain some data even from 1969. The subtitle of the first volume is *Fundamental Aspects*, that of the second one *Applications*.

The 25 chapters of the first volume are grouped in three sections.

Section A: General; Chapters 1–5.

Section B: Inorganic Materials; Chapters 6–21

Section C: Organic Materials; Chapters 22–25.

In the General section the fundamentals and history, theory, apparatus and techniques

of the DTA method and some complementary methods are given.

Of the theoretical aspects special attention is given to the relationship between experimental parameters and the shape of the base time and the DTA curve. The fundamentals of the evaluation of DTA curves are treated separately. The principles of operation, possibilities of use and limitations of the apparatus are treated critically and the commercially available ones are described in detail.

In introducing the experimental DTA technique, with proper moderation only those parameters are dealt with which greatly influence the results (parameters of the equipment, sample and reference material).

In the chapter entitled *Complementary Methods* the possibilities of application of mass-spectrometry, X-ray diffraction technique, optical, magnetic, gas chromatographic etc. measurements are described, in addition to various thermoanalytical methods, although, due to the limited scope of the chapter, the main purpose was to arouse the interest of the reader.

The longest section was devoted to *Inorganic Materials*. This is justified by the fact that earlier the DTA method was applied exclusively to the investigation of inorganic materials.

The results obtained in studies on the structures, specific heats and phase transformations of metals and alloys are presented in tables and very clear graphs.

The investigation of chalcogenides by DTA method is rather complicated since oxidation processes may take place. The book, however, gives valuable information on the means of eliminating oxidation and of performing differential thermal analysis in this case too.

In chapters 8 and 9 the results of the investigation of the oxides of metals of different valencies are given. The authors describe the appropriate experimental conditions and emphasize that if these are not maintained no reproducible results can be expected.

In the chapters on carbonates, simple salts, chlorates and perchlorates, oxysalts, complex salts, inclusion compounds, salt minerals and silica minerals (chapters 10 to 17) the papers which have appeared on the DTA investigation of these materials are reviewed thoroughly. The conditions which affect the estimation of enthalpy changes accompanying dehydration, thermal decomposition and change of modification are also dealt with in detail.

Chapters 18 to 21 entitled Simple phyllosilicates based on gibbsite and boncite — such as Skeets, Interstratified phyllosilicates, Palygorskites and sepiolites and Other silicates are extremely valuable to engineers and research workers by giving a proper interpretation of the enthalpy changes accompanying various transformations.

Although a great number of references are given, the results summarized in the Organic Materials section do not reflect the changes which have taken place during the past 4–5 years by expanding the field of application of DTA method to organic materials. These recent results have a good reproducibility and besides qualitative data the amount of quantitative data has been increasing. In the chapter Organic compounds relatively simple compounds are dealt with including the possibilities of quantitative evaluation.

The authors of chapters 23–25, Polymeric materials, Biological materials and Solid fuels have been too moderate in treating their subjects which, due to their increasing importance, might have been dealt with in greater detail.

In this book the people working in the field of differential thermal analysis have received a thoroughly written and compiled work which demonstrates the great and ever increasing significance of the method.

The greatest deficiency of the book is that its second volume has not yet appeared.

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