

Book Review

F Paulik: Special trends in thermal analysis

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459 pages

It is a pleasure to review this book, a valuable contribution to the literature on thermal analysis. One of the doyens of the field, Ferenc Paulik has undertaken the work of publishing the results of his manifold scientific activities of over four decades in a form different from most other books.

Ferenc Paulik (together with his late brother Jenő Paulik who died in 1988 and with their common professor, the late László Erdey) has revolutionized thermal analysis by his work starting in the mid 1950s. The data which were provided by monofunctional methods of thermal analysis known from the beginning of the century were very difficult to compare. The introduction of simultaneous measurement techniques by the Paulik brothers gave a tremendous impetus and new possibilities to the development of thermal analysis. They preferred devising simultaneous techniques to increasing the sensitivity of monofunctional methods, which means a conceptual change in the field, often referred to as the Hungarian approach of the Hungarian school.

The derivative thermogravimetric (DTG) curve produced by simultaneous derivation of the TG curve greatly facilitated separation and evaluation of individual steps of complex thermal reactions. The instrument devised by the Paulik brothers, the derivatograph, which permitted simultaneous recording of TG, DTA and DTG curves, was a great success on the marketplace. Hungarian Optical Works (MOM, Budapest) has produced over 4000 instruments.

The constructor have further developed the simultaneous technique in order to couple thermal analysis with other methods such as dilatometry, thermo-gas titrimetry and mass spectrometry, and to complete the measurements by recording the derived curves where possible.

The author's thorough and persevering work has proved that modification of the sample holder may result in new directions of research. The use of specially shaped crucibles (like a potcake tin) permitted simultaneous techniques to be devised, while the multiplate sample holder, the covered crucible and the so called labyrinth crucible extended the applicability of simultaneous methods.

The introduction of quasi-isothermal, quasi-isobaric measurement techniques has opened again new vistas for thermal analysis. These methods, together with the use of various sample holder types, and supplemented by other simultaneous measurements (dilatometry, thermo-gas titrimetry) provided an arsenal of tools and a wealth of results which prompted the author to sum up his wide-ranging scientific activities in the form of a book. The venture has been successful, it resulted a book valuable for a wide circle of people. The author's intention by presenting methods, methodologies and numerous examples

has not only been to summarize a life's work, but also to provide a list of papers published on the use of the derivatograph.

The book (pp. 459) consists of three chapters, and a List of Publications complete with a detailed Subject Index (pp. 62).

Chapter I entitled "Simultaneous thermoanalytical examinations under conventional conditions" describes derivative thermogravimetry, the simultaneous DTA and TG method supplemented by DTG, and provides numerous practical examples. Separate sections are devoted to derivative dilatometry, thermo-gas titrimetry and to the description of various sample holders devised to increase the selectivity of measurements. A water detector, the adapter constructed to determine ignition temperatures, and evolved gas analysis by means of Q-MS coupled with a derivatograph are each treated in separate sections.

Chapter II entitled "Kinetics and mechanism of thermal reactions" gives an overview of the decomposition of inorganic compounds, dehydration of salt hydrates and minerals, solid-phase reactions, autocatalytic decomposition reactions, and calculation of reaction kinetic parameters.

Chapter III bearing the title "Thermoanalytical studies under quasi-isothermal, quasi-isobaric conditions" describes how the technique was developed along with some interesting examples, and the combination of the quasi-technique with other methods (thermo-gas titrimetry, dilatometry, DTA and magnetic measurements).

The List of Publications comprises about 3000 references to papers published on the applications of the derivatograph. The numbering of the references by five-digit numbers is unusual, but offers the advantage that the first two digits refer to the year of publication.

The appearance of the book is fine, the good arrangement and lucidity of the figures is worth mentioning. The fact that the figures speak for themselves, points to the excellent didactic feel of the author. Unfortunately, a number of interesting results achieved by means of simultaneous thermoanalytical methods could not be dealt with any detail because of the limited length of the book.

The book is interesting and thought-provoking at various levels, for university students, starting thermoanalysts as well as for experienced experts. It calls the attention of the reader to wide potentialities of thermal analysis, provides a sound background of the methodology and the theoretical fundamentals of the application.

György Liptay
Professor
Technical University
Budapest, Hungary