

Book Review

COMPOSITIONAL ANALYSIS BY THERMOGRAVIMETRY

Charles M. Barnest, editor

ASTM Special technical publication 997, American Society for Testing and Materials, Philadelphia 1988. x + 293 pp.

The book contains the papers of the Symposium on Compositional Analysis held in Philadelphia, PA 16–17 March 1987, organized and sponsored by the ASTM Committee E-37 on Thermal measurements. The majority of the 22 papers included in the volume was written by American experts.

After a short overview by the editor the papers (each evaluated by three peer reviewers) are presented in four sections. Section "General Papers" contains five contributions, covering the basic aspects of thermogravimetric analysis of composition (e.g., calibration, using additional methods, comparison of informations from TG data obtained in different atmospheres) and giving an outline of the main fields of application (from amorphous metals and coals to pharmaceuticals and, of course, polymers). A separate paper is devoted to a standard method accepted by ASTM for the analysis of materials by thermogravimetry.

The second section presents five papers dealing with polymers and polymer composites. Applications reported in these papers cover the quantitative analysis of polymer blends, identification of different products of the same type, analysis of polymer-filler systems and the description of compositional inhomogeneities. It is worth mentioning that DSC was used in several cases to provide necessary additional information (e.g., in the analysis of electrical switch contact carriers consisting of polyphenylene, PTFE, carbon fibers and inorganic filler).

Hyphenated (i.e., coupled and simultaneous) techniques often expand the field of application and increase the potential of thermogravimetry. Complementing

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methods discussed in the papers of the third section are atmospheric pressure chemical ionization MS, FTIR, DSC and a multielement EGA (based on the combustion of evolved gases and mass spectrometry of the combustion products).

The last section consists of eight papers about thermogravimetric analysis of inorganics, fuels, minerals and raw materials. Just a listing of material types discussed in this part demonstrates the power of TG as an analytical tool: lanthanide complexes, portland cement, oil shale, "from wood to coal", combustion efficiency of a fluidized bed furnace, flue gas scrubber materials, refuse derived fuels and clays.

The style of all the papers are clear, the outlay of the book is faultless. For a number of systems, the reader can find easily applicable methods of analysis in the book. However, the papers offer more: they can be used as a guide when working out special procedures of analysis by TG.

Actually, modern thermal analysis has three basic areas of use: (1) analysis in the narrower sense, i.e., qualitative and quantitative determination of components, (2) measurement of physical and physico-chemical parameters as functions of temperature and time and (3) desorption of phase transitions and chemical reactions. "Compositional Analysis by Thermogravimetry" may convince the reader that TG is a powerful tool area (1) mentioned here. The book can be emphatically recommended to all chemists and engineers applying or teaching thermal analysis.

György Pokol