
Book review

Calorimetry, Wojciech Zielenkiewicz
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During the last few decades, there has been a rapid increase in research on as well as engineering in calorimetric systems, which become of wide use in modern material science. Sensor and chip technologies, instrumental and computerized systems of control and measurement have developed rapidly and the thermal properties of new materials, in particular thermokinetic effects and thermal stability has moved increasingly into the centre of interest. However, today's knowledge in the calorimetry is distributed among vast number of highly specialized publications. Therefore a collection and summarization of this knowledge is certainly most welcome and thus this book furnishes scientists and engineers with a publication containing the state-of-the-art.

The author has extensive experience and is probably one of the most knowledgeable scientists in the field of experimental and theoretical study related to thermochemistry and calorimetry, and has published intensively in the past on the subject of the book. Zielenkiewicz's new book passes in review the applications of a wide range of calorimetric techniques, including modified versions and combinations thereof.

The book contains 11 chapters, covering a wide field of topics related to thermophysical measurements, in particular determination of heat effects involved in various physical, chemical and biological processes, which is essential in molecular and supramolecular thermochemistry, in thermodynamic study of molecular interactions in liquid solutions, of the nature of bonds in alloys and polymers and in living organisms. Another field of interest is the industrial applications and biocalorimetric research on proteins.

Chapter 1 provides an excellent outline of the history of calorimetry development.

The first part of Chapter 2 presents a short overview on heat transfer. In the second part of the chapter the static-dynamic method for determination of heat effects in calorimeters are presented, restricted to fundamental knowledge alone. This chapter seems to be the most interesting one for scientists and practitioners using or developing thermal analysis devices. In Chapter 3, the analysis of heat effects courses occurring in the calorimeters as well as dynamic properties of calorimeters are discussed. Although Chapters 2 and 3 are written at a rather high physical and mathematical level, they contain only the absolutely necessary formulae.

Chapter 4 gives an almost state-of-the-art overview of classification of calorimeters and methods for determination of heat effects. A short review of calibration and test reactions is also included. In Chapter 5, the adiabatic calorimeters are outlined. Chapter 6 is a guide for isoperibol, batch and nonadiabatic–nonisothermal calorimeters. Chapter 7 is a short review of calorimetric and indirect methods of determination of enthalpy of sublimation. It is an important chapter, but offers only a few points of contact with the rest of the book. Chapter 8 is devoted to detailed discussion of the batch, displacement and flow calorimeters. Chapter 9 discusses the conduction calorimeters, their possibilities and limitations. Sections on thermokinetic studies and determination of kinetic parameters are included. The presentation is very clear and straightforward, even of the fairly complicated theoretical derivations. Chapter 10 reports nonisothermal–nonadiabatic scanning devices, systematically analyses their applications to thermal analysis and gives a summary of the principles of DSC. Chapter 11 reviews briefly the pressure scanning calorimeters. The paragraph, although very short, is of special interest for the transistometry.

Some of the chapters are excellent reviews of the literature while others are largely from the authors valuable own work. The necessary fundamental knowledge seems to be included almost completely even the special literature which can be found in the extensive list of references. The chapters of the book are correct presentations of the types of apparatus available, the methods of measurements and theories and applications associated with that part of the discipline under consideration.

The book provides the reader with information about the development of calorimetry and its present day applications. Besides generally discussing the calorimetric techniques and the possibilities of their applications the book also elaborates the measurement of a wide variety of physico-chemical data (enthalpy of solution, dilution, mixing, sublimation, fusion, evaporation, adsorption, reaction, transformations, decomposition, polymerization; heat capacity, kinetic parameters, etc). In addition to detailed presentation of these measurements the book also describes special applications such as e.g., for studying liquid-crystal substances, biopolymers and photo-thermoelastic-acoustic phenomena. The author also pays attention to techniques that are seldom found in other books.

The interested reader will profit by reading it and is guided through the essentials of this special, though important field which will rarely be found in normal books on thermal analysis. Therefore this book is a stop-gap work

and exposes both the experts and the scientists, who are not familiar with calorimetric methods, to this knowledge. The text is well-written and readable with only few errors. Symbols and definitions are consistent between chapters, but not always follow the IUPAC recommendations. The nomenclature is correct. The figures in the book are helpful and the figure quality is variable but appropriate in spite of the various origins. However, the book lacks for an explanatory list of symbols and subject index.

In summary, this book represents an excellent discussion of the theory and practice of calorimetry, will help to further an understanding of the various facets of the technique and should promote its application to new

problems. The book contains much useful information, serves a useful purpose as a reference publication. It is wholeheartedly recommended reading for both the experienced scientists and the newcomers. Hopefully, the book under review will be used as a frequently consulted work by everybody involved in the use of calorimeters.

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