

## Book Review

---

*Differential Thermal Analysis, Application and Results in Mineralogy.* Smykatz-Kloss, Werner

XIV + 185 pp. 82 Figs. Springer-Verlag Berlin, Heidelberg, New York. 1974. Minerals and Rocks Series, Vol. 11. ISBN 3-540-06906-2 DM 58.— US \$ 29.70

The reader may take the book in hand with some doubt as to whether it can give anything new and progressive, since a number of books have already appeared on similar topics. However, all his doubts are dispelled, for the book is an excellent monograph on the thermal analysis of minerals, presenting not only new data, but also several new methods for quantitative determination of minerals. The value of the book is enhanced by the fact that the determinations described have all been elaborated by the author himself, which facilitates comparison and evaluation of the curves.

The book is divided into three main parts. In the first the methods are treated, in the second the applications of differential thermal analysis in mineralogy, and in the third the special fields of application.

In the first chapter entitled "Methods", the basic principles of differential thermal analysis, and unfortunately only this method, are given. Various factors affecting the measurements, and their effects on the shapes of the curves and on the results are treated in detail. This chapter also discusses the concept of PA (Proben-Abhängigkeit, in English: curve of sample amount dependence), introduced earlier (Smykatz-Kloss 1967). The PA curve is a simple logarithmic function that describes the thermal effect of a mineral as a function of the amount. This

must be determined for each mineral as a calibration curve. The combined thermo-analytical methods too are briefly summarized in this chapter. It would have been useful to treat the application of the Derivatograph in greater detail here and also in the chapter where various quantitative determinations are described.

In the second part, entitled "Application of Differential Thermal Analysis to Mineralogy: Identification and Semi-Quantitative Determination of Minerals", DTA data obtained for various groups of minerals are presented. Investigations carried out under precisely the same conditions covered most groups of minerals, and the thermoanalytical data of a number of rare minerals are also given. In my opinion, this part of the book will be used most often. In addition to DTA curves recorded under precisely the same conditions, the PA curves are included for some important minerals, this being of great assistance for analytical chemists. Figures 8 and 9 on sulphide minerals are of great value. It would have been useful to give here, for the sake of comparison, some curves taken from the "Atlas of Thermoanalytical Curves". Those who deal with clay minerals will be pleased to see Table 24, in which thermal data on mixtures of some minerals are given along with qualitative and quantitative characteristics.

The second part of the book ends with the tabulation of thermal data on 135 minerals, including the peak heights as a function of temperature, for purposes of identification.

The third part, entitled "Special Application of Differential Thermal Analysis in Mineralogy: Statements about Chemical Composition, Degree of Disorder, and

Genesis of Minerals", deals with the applicability of DTA in the solution of some important problems, such as the determination of isomorphous substitution in calcite and aragonite, the influence of impurities on the Curie-temperature of magnetite, and the possibilities of classification of chlorites. The differentiation of smectites and vermiculites and the determination of the particle size distribution help to solve some other important problems. The degree of disorder of kaolinities can be determined very easily by using the method introduced by the author.

A very good procedure is presented for the elucidation of the genesis of sedimentary rocks.

The transformation temperatures of quartz crystals of different origins were studied by the author and found to be different, the difference reaching 30° in some cases. Thus, if the transition temperature is known, the origin of the sample can be given.

The book is completed by 329 references. It is a pity that the "Atlas of Thermoanalytical Curves" is not mentioned, although its first three volumes had already appeared when the manuscript of the book was ready.

The book, which contains very valuable data, is a great asset to the technical literature and will probably soon reach all people dealing with the analysis of minerals.

G. BIDLÓ

*Thermal Analysis. Comparative studies on materials.* Edited by H. Kambe and P. D. Garn

Kodansha Ltd., Tokyo, and John Wiley & Sons, New York—London—Sidney—Toronto. 1974, 326 pp. † 3500

The book contains the material of the joint U. S.—Japanese Seminar held in Akron in 1974. The general topic was comparative investigations of new materials with the purpose of making data obtained by thermal analysis available as soon as possible for those who work in other fields.

It is pointed out in the preface that the best means of transfer of knowledge is a meeting large enough to be comprehensive in character without losing the opportunity

for individual contact. Therefore, it was considered that after the oral presentation of a previously circulated manuscript a formally non-limited time be available for discussion. The published volume contains in many places papers already modified on the basis of the discussion.

Among papers with emphasis on methodology, DTA measurements in a sealed tube are dealt with by H. W. Hoyer, gas flow DTA and high pressure DTA by T. Ishii, the thermomechanical properties of aromatic polymer films by H. Kambe and co-workers, and the dilatometric investigation of polyethylene is reported by Y. Maeda and H. Kanetsuna. Among papers on calorimetry, the application of laser flash calorimetry to the determination of the thermal capacity of very small samples is reported by H. Suga and S. Seki; the complementary nature of calorimetry and thermal analysis is emphasized, and the investigation of the low-temperature transformations of, e.g., quinol methanol clathrates, cyclohexanol and ethanol, and the measurement of their thermal capacity using DTA instruments constructed by the authors for measurements at low temperatures and for the simultaneous measurement of dielectric loss are reported.

The role of the use of classical thermoanalytical methods in the chemistry of coordination compounds is pointed out by P. K. Gallagher. The thermodynamics of mesophases (liquid crystals) is surveyed by E. M. Barrall II, with special regard to cholesteric mesogens. The liquid crystal state has been studied on the esters of compounds similar in structure to cholesterol (campesterol, sitosterol and stigmaterol) by R. Y. Krzewski and R. S. Porter. Microcalorimetric studies on biochemical processes are reported by E. J. Prosen and coworkers.

Among inorganic compounds, the thermal analysis of sepiolite and its various treated modifications is described in a paper by R. Otsuka and coworkers, and the following of precipitation processes taking place in aluminium alloys by specific heat measurements by K. Hirano.

The thermogravimetry of elastomers is reported by W. R. Griffin, and the thermal investigation of complex copolymers, carried out mainly with special regard to the

glass-transition temperature ( $T_g$ ), is dealt with by I. Y. Maurer.

The applicability of thermal analysis in the aerospace industry is discussed by H. L. Friedmann.

The present state and recent problems of non-isothermal kinetics are surveyed by T. Ozawa.

The possibilities of evaluation of the ex-

perimental data yielded by thermal analysis are dealt with in detail by P. D. Garn, using data obtained in the framework of the Second International Test Program of ICTA.

The various fields are critically surveyed in the majority of papers, and the book is therefore useful for both specialists and those having an interest in the field.

É. BUZÁGH