



A Review on Differential Thermal Analysis

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Abstract Differential thermal analysis (DTA) is a thermal analysis technique, the term “differential” indicates that the difference in behaviour between the material under study and a supposedly inert reference material is examined. In this way the temperature at which any event either absorbs or releases heat can be found. The record is the thermogram or DTA curve; the temperature difference should be plotted on the ordinate with endothermic reactions downward and temperature or time on the abscissa increasing from left to right. This allows the determination of endothermic and exothermic transitions, e.g. chemical reactions, phase transition temperatures and the study of order-disorder transitions. The results given from the Differential thermal analysis curves depend on the preparation of the sample and on the instrument sensitivity and provide data that have occurred, such as glass transition, crystallization, melting and sublimation. It is a highly sensitive technique to study the thermotropic and chemical properties of a polymeric material.

Keywords Thermal analysis, Analytical Technique, Differential Thermal Analysis, Endothermic and Exothermic Reaction

1. Introduction

Thermal analysis is used to determine thermodynamic properties which are essential for understanding the behaviour of the material under different cooling and heating rates, under inert, oxidation or reduction atmosphere or under different gaseous atmosphere. The thermal analysis embraces a group of techniques in which a physical property of a substance is measured under a controlled temperature program. Differential thermal analysis is basically a modification of the classical procedure of studying phase transformation by the means of time temperature records during uniform heating or cooling of the system. It appears to have been first employed by Le Chatelier in 1887. It did not, however, receive extensive popular attention until after Norton's work which was reported in the Journal of the American Ceramic Society in 1939 [1]. The method of Differential Thermal Analysis, as it is known, become famous as other techniques such as x-ray diffraction, microscopes, etc. as a helpful research and control tool. Its importance is increasing because of the development of equipment refinements and the potential value of the data with the growth of the knowledge of crystal chemistry and thermodynamics of non-metals.

The adoption of the name for the technique is based on the method of measurement which determines the difference in temperature between the sample and the reference material or furnace by means of a differential thermocouple [2].

