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THE DETECTION OF CONFORMATIONAL DISORDER BY THERMAL ANALYSIS

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ABSTRACT

Conformational disorder in crystals is found in many molecules that possess a plurality of conformational isomers [1]. Typical examples are linear macromolecules such as polyethylene, polytetrafluoroethylene and trans-1,4-polybutadiene; and small molecules such as paraffins, cycloparaffins, soaps, lipids and many liquid-crystal forming molecules. Conformational motion is often coupled with the cooperative creation of disorder. In this case heat and entropy of transition are observed by thermal analysis. Levels of transition entropies can be estimated, assuming most of the disorder can be traced to conformational isomerism. In case there is conformational disorder frozen-in at low temperature, thermal analysis can be used to find the glass transition of a condis crystal. An Advanced Thermal Analysis System [2] has been developed, and will be described that permits a detailed interpretation of the thermal analysis traces. It rests with the establishment of high quality heat capacity for the rigid solid state (vibration only) and the mobile liquid state (vibrations and large amplitude cooperative motion).

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REFERENCES

1 Adv. Polm. Sci. 60/61 (1984) 1 and to be published (1988).
2 Gaz. Chim. It. 116 (1986) 345.

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