



Special Issue Reprint

Thermal Analysis Kinetics for Understanding Materials Behavior

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Changing the temperature of a substance can stimulate dramatic changes of its state. These changes can be intermolecular (physical) and intramolecular (chemical) in nature. Physical changes occur without breaking intramolecular bonds, and lead to transitions between the four major phases: gas, liquid, crystal, and glass. Chemical changes are associated with chemical reactions that originate from breaking intramolecular bonds. Phase transitions as well as chemical reactions occur at finite rates. Measuring the rates of processes is the realm of kinetics. The kinetics of thermally stimulated processes is routinely measured using thermal analysis techniques such as differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). Knowing the process rates and their dependence on temperature is of vital importance for understanding the behavior of materials exposed to variations in temperature. In recent years, thermal analysis kinetics has made significant progress by developing computational tools for reliable kinetic analysis. It has also expanded its traditional application area to newly developed nano- and biomaterials. This Special Issue is a series of papers that reflect recent developments in the field and highlight the essential role of thermal analysis kinetics in understanding the processes responsible for the thermal behavior of various materials.

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