Using Low Thermal Inertia Adiabatic Calorimetry Data with AKTS-Thermokinetics Software: A Case Study

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When determining self accelerating decomposition temperatures (SADT) for shipment purposes, the kinetics of the decomposition reaction of the materials must be known. Simplified models assuming first order decomposition kinetics are generally applied; however, this traditional approach fails in correctly determining the SADT for autocatalytic and multistage overlapped reactions. For these cases, a more universal, yet easily implemented, advanced method will be presented in which the detailed kinetic mechanism does not need to be known to correctly predict SADT. Studies have previously been performed using a series of DSC tests to extract kinetic parameters by the differential isoconversional approach. The kinetics developed have subsequently been applied for the prediction of the chemical's behavior on the kilogram scale. Recently, this approach has been extended so that one DSC test along with one adiabatic calorimetry test can be used to obtain the same kinetic information. The results of the determination of decomposition kinetics of azodicarbonamide will be presented and applied to evaluate the SADT for a 50 kg package. Results obtained from a DSC test and an adiabatic calorimetry (VSP2) test will be compared to those determined based only on a series of DSC tests.

References:

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