Comparison of the Vinyl Acetate solution Polymerization measurements in different calorimeters

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The Vinyl Acetate solution polymerization in Toluene with Dilauroyl peroxide as free-radical initiator was investigated by Adiabatic Calorimetry (VSP2), Calvet Calorimetry (C80) and Differential Scanning Calorimetry (DSC) measurements. In this work different thermal process safety parameters were determined and compared, i.e. reaction heat, Time to Maximum Rate under adiabatic conditions (TMRad), temperature increase rate (dT/dt) and pressure increase rate (dP/dt) under adiabatic conditions.

Dynamic experiments were performed at different heating rates between 0.5 – 8 K/min and 0.06 – 1 K/min respectively for DSC and C80. These experiments were used by AKTS-Thermokinetics Software to determine the kinetic parameters using differential isoconversional method. Reaction rate and conversion were simulated and then compared with experimental curves. Isothermal measurements were performed in order to verify the predictions. A possible effect of the temperature and time constant correction on the C80 thermograms was studied. In the VSP2 adiabatic calorimeter the kinetic parameters were determined by zero-order kinetics.

Differences of the determined safety parameters and its origins are discussed. The temperature and time constant correction on C80 measurements showed no significant influence on the results.