Incorporating Pressure Data in Reactive Chemicals Screening Analysis

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ABSTRACT

Evaluation of reactivity hazards often involves interpretation of reactive chemicals test data from techniques as Accelerating Rate Calorimetry (ARC), Reactive System Screening Tool (RSST), or Vent Sizing Package (VSP). Incorporation of pressure and pressure rate data in the screening analysis provides key information to better understand the potential for runaway reaction and/or gas evolution. Simple models may be used to better estimate temperature of no return, time to maximum rate, heat and gas evolution rate at relief device set pressure, or similar hazard screening criteria. In some cases, autocatalysis or an overall mechanism involving consecutive reactions may be distinguished from simple Arrhenius kinetics where pressure rate and temperature rate does not appropriately match. Screening for potential autocatalytic behavior may help identify runaway reactions which may occur at lower temperature than expected following prolonged exposure at process conditions.