Ammonium Nitrate Thermal Decomposition with Additives

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Abstract
Runaway reactions present a potentially serious threat to the chemical process industry. This research looks at identifying the root causes associated with ammonium nitrate (AN) explosion, specifically the effects of additives, while maintaining its agricultural benefit. On one hand, the safety issues associated with the storage AN have been considered. On the other hand, more efforts have been spent on developing the important parameters related to AN, such as onset temperature and rate of temperature rise. Reactive Systems Screening Tool (RSST) is used for reactivity evaluation to better study the mechanisms that result in explosion hazards. The runaway behavior of AN in solid form and water solution has been tested, as well AN mixture with additives to study the effect of contamination. Multiple tests were conducted to find out the characteristics of AN decomposition. The presence of sodium sulfate (SS) can increase the onset temperature of AN decomposition; while potassium chloride (PC) tends to decrease the onset temperature. Water has impacts on the decomposition of AN in several aspects.