Safely handling guideline for organic peroxides and inorganic peroxides by calorimetric approaches

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Abstract

Organic peroxides (OPs) and inorganic peroxides (IPs) are usually employed as an initiator for polymerization, a source of free radicals, a hardener, and a linking agent in low density polyethylene (LDPE), polyvinyl chloride (PVC), controlled-rheology polypropylene (CR-PP), styrene and so on.

Worldwide, due to their unstably reactive nature, OPs and IPs have caused many thermal explosions and runaway reaction incidents in the preparation, treatment, manufacturing process, shipping and handling. This study was conducted to elucidate its essentially hazardous characteristics. To analyze the runaway behavior of OPs and IPs in the traditional process, thermokinetic parameters, such as heat of decomposition ($\Delta H_d$), exothermic onset temperature ($T_0$), self-accelerating decomposition temperature (SADT), half-life time, time to maximum rate (TMR), critical temperature ($T_c$), etc., were measured by calorimetric approaches and calculation method.

Generally, safety and health information for shipping and handling information of hazardous materials and toxic substances has been noted in material safety data sheets (MSDS). However, the current MSDS has not provided important handling indicators in terms of runaways and thermal explosions. In view of loss prevention, more useful indicators must be provided in the sheets or guide book.

Keywords: Organic peroxides (OPs); inorganic peroxides (IPs); runaway reaction; half-life time; material safety data sheets (MSDS)