

# Effects of ferric oxide on decompositions of methyl ethyl ketone peroxide

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## ABSTRACT

Methyl ethyl ketone peroxide (MEKPO) is a widely used initiator for polymerization reaction and hardener in glass-reinforced plastic. However, MEKPO is an unstable reactive chemical and has caused several serious accidents all over the world. This work studied the thermal stability of MEKPO in the presence of ferric oxide as the contaminant through calorimetric and kinetic studies. The calorimetry was performed using Automatic Pressure Tracking Adiabatic Calorimeter (APTAC) to identify the effects of ferric oxide (different concentration) on important reactive hazards such as onset temperature and pressure hazard. Kinetic modeling was then performed to study the kinetics of the runaway reaction and estimate important kinetic parameters. The results indicate that in the low concentration range (<0.3%), ferric oxide has no significant effect on the thermal stability of MEKPO. However, in the high and intermediate concentration range of ferric oxide (*i.e.*, 10%), the negative effect on the thermal stability of MEKPO was observed. This result is in agreement with the kinetic study result that the activation energy and frequency factor decrease dramatically in the high ferric oxide concentration range. The results provide necessary process safety information for the handling of MEKPO and also technical basis for the further study in this area.

**Keywords:** MEKPO; Ferric oxide; Thermal stability; APTAC; Runaway reaction