

Precipitation of HMX and RDX in Supercritical Fluid Process

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The properties of the explosives such as quality, crystal phase, size and shape influence all steps of processing and mechanical properties. Especially the particle size and shape are one important way to control burn rate and sensitivity. In this study, cyclotrimethylenetrinitramin (RDX) and cyclotetramethylenetetranitramine (HMX) were precipitated by the Rapid Expansion of Supercritical Solution (RESS) process and Gas Anti-solvent (GAS) process, respectively. RDX particles dissolved in compressed liquid DME were successfully precipitated to submicron-sized particles with spherical morphologies. After the RESS processing, there were no significant changes in physical properties of the RDX particles. However, the enthalpy change for the exothermic decomposition of precipitated RDX was much higher than that of the original RDX. As a process for the preparation of fine β -HMX particles, GAS process using sc-CO₂ as an antisolvent was employed. The influences of organic solvents and process variables on the morphology, particle size (PS), and particle size distribution (PSD) were examined.