

**Optimal Design of HMX recrystallization by gas
anti-solvent process using scCO₂ as antisolvent**

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This work studies optimization of recrystallization process of Cyclotetramethylenetetranitramine (HMX) by precipitation. HMX is a powerful and relatively insensitive explosive which used in various industrial application. Since its particle size and shape are important properties for explosive materials, there have been many trials to control those properties. Due to their vulnerability to impact and heat traditional methods like milling and solution-based recrystallization are inapplicable. Gas Anti-Solvent (GAS) process with supercritical carbon dioxide as an antisolvent does not have such safety issues and can produce particles with required shape and size distribution. This process, however, has been tested mostly in laboratory scale semi-batch reactors. The main purpose of this study is to develop a process flowsheet model for large-scale GAS processes and determine optimal process economics. The proposed process consists of a reactor, a separator, and recycle of carbon dioxide. An optimal operating point is also determined.