

Optimal design of continuous Gas Anti-Solvent (GAS) process for recrystallization of HMX

김성호, 이신제, 이윤우, 이종민*
서울대학교
(jongmin@snu.ac.kr*)

This work studies optimal process design for recrystallization of Cyclotetramethylenetetranitramine (HMX) by precipitation. HMX is a powerful and relatively insensitive explosive. Since the shape and particle size are important properties for explosive crystals, there have been many efforts to control these properties. However, due to their vulnerability to heat and impact, traditional methods like milling, solution-based recrystallization are difficult to use and even ineffective to control the properties. As an alternative to those methods, Gas Anti-Solvent (GAS) process with supercritical carbon dioxide as an anti-solvent is found to be able to obtain desired shape and uniform particle size distribution. This process, however, has been tested at a laboratory scale experiments in a semi-batch mode. The main purpose of this study is to design a continuous GAS process and find the optimal operating condition for large-scale production. The proposed continuous process consists of a reactor, heat exchangers, a separator, and pumps. Additional studies on energy consumption and operation cost are also provided in this study.