عنوان مقاله:

A review of co-crystallization methods of energetic materials

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خلاصه مقاله:

Co-crystals are a kind of solid state of materials that are formed during a process called co-crystallization by combining two or more different molecules or ions in specific stoichiometric ratios. Today, co-crystallization as a newfound technology and a new method is of great interest in various fields of chemical industries. Because in this process, the physical, chemical and mechanical properties of the final product can be adjusted by controlling the intermolecular bonds and the morphology of the co-crystals. The ability to control properties in co-crystallization is very attractive for the field of energetic materials, as it provides a potential capacity for the synthesis of new materials with better sensitivity and performance properties than common high-energy organic and mineral crystals in a safe process. Therefore, it is necessary to study different methods of synthesis of high-energy co-crystals and to identify process bottlenecks. In this article, the co-crystallization methods used in the field of high-energy materials were studied from a process point of view in two groups, solvent-based methods including solvent evaporation, solvent/nonsolvent, slurry, suspension, cooling crystallization and wet grinding, and solvent-free methods, including dry grinding, melting, and resonant acoustic mixing. And the most important advantages and disadvantages, cost and safety of the process, environmental compatibility and their scalability have been investigated. Choosing the suitable solvent in solvent-based methods is the most important parameter affecting product properties and process bottleneck and the most important challenge in solvent-free methods is the safety limitations in the synthesis of energetic friction-sensitive crystals.

کلمات کلیدی:

co-crystal, co-crystallization, high energy materials, synthesis, co-crystallization of high-energy materials.