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Materials and product engineering

Polymorphism of D-mannitol: Crystal Structure and the Crystal Growth Mechanism[☆]

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Abstract

The polymorphism of D-Mannitol (mannitol) is reviewed in this paper. It was found that the structure of the stable form is consistent in most literatures, but different authors have given different information about the two metastable forms. Therefore the commonly used nomenclature of mannitol was summarized based on the crystal unit cell parameters with the help of X-ray powder diffraction. Moreover, the crystal growth mechanism of mannitol polymorphs was summarized. Considering the lack of kinetic data for the metastable form especially, a reported method was attempted to apply to δ mannitol in an aqueous cooling crystallization process based on the induction time previously measured, and it was identified that the growth of the δ form follows the two-dimensional (2D) nucleation-mediated mechanism. The results also indicates that the method based on induction time and supersaturation should have the potential to be expanded to the metastable polymorphs for the growth property study in a bulk system.

Keywords crystallization; pharmaceuticals; polymorphism; D-mannitol; crystal growth

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