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Polymorphism of Curcumin from Dense Gas Antisolvent Precipitation

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Abstract

Within the group of dense gas micronization processes, batch processes are attractive for the relative ease and cost-effectiveness of their scale-up. However, process parameters and product characteristics can differ significantly between processes. In this study, a comparison of the micronization of the polyphenolic compound curcumin by two batch-dense gas antisolvent methods was conducted. The effects of solvent selection and operating temperature on process performance, product morphology and crystallinity were investigated. Particles were precipitated from acetone, ethanol, methanol and acetone-ethanol feed solutions with the use of the gas antisolvent (GAS) and the atomized rapid injection of solvent extraction (ARISE) processes. Processing was operated at 9.5-10 MPa and 298-313 K. Both processes allowed the production of polymorphic curcumin with interesting implications for the preparation of therapeutic formulations. The GAS process generated recoveries up to 36%, while process recoveries for ARISE were up to 60%.

Keywords: morphology, crystallinity, curcumin, ARISE, GAS, polymorphism

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