Simple guidelines for a self-built laboratory-scale supercritical anti-solvent system.

ABSTRACT

A technique to generate supercritical fluid (SCF) particles has gained attention in pharmaceutical, cosmetic and paint applications. However, the scarcity of information on the design of this type of laboratory-scale equipment is a significant obstacle to its technological progress. Therefore, the purpose of this study was to design and develop a laboratory supercritical anti-solvent (SAS) system for producing microparticles and microcapsules of acetaminophen. The designed SAS system was operated at 110 bars of pressure, 35 °C, 35 mg/ml polymer concentration and 1.75 ml/min feed flow rate. The morphological, thermal and crystallographic properties of the microparticles and microcapsules were characterised using scanning electron microscopy, thermogravimetric analysis and X-ray powder diffraction, respectively. The in vitro drug release by the microparticles and microcapsules was also investigated. Following the SAS process, a more homogenous microparticle size distribution was observed in addition to a change in the crystallinity, and the drug thermal stability was maintained. Furthermore, the microcapsules significantly prolonged the drug release during the in vitro study. These results demonstrate that the designed SAS system successfully produced microparticles and microcapsules of the selected drug.

Keyword: SAS design; Particle formation; Encapsulation; Supercritical fluids; Microcapsule.