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传递现象

水力空化混合强化超临界流体辅助雾化制备罗红霉素超细微粒

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摘要

分析了超临界流体辅助雾化（SAA）过程，发现饱和器内超临界二氧化碳与溶液的混合是SAA成功的关键因素之一，由此引入了水力空化混合器以强化饱和器内两相间的传质。在自行组建的引入水力空化混合器的超临界流体辅助雾化（SAA-HCM）装置上，以罗红霉素为模型药物，考察了混合器压力、沉淀器温度、溶剂、进料中CO_2与液体溶液流量比（R）和溶液浓度对微粒形态和粒径的影响。结果表明，水力空化混合器能有效地强化两相间的传质，SAA-HCM工艺可制备出罗红霉素超细微粒，大部分微粒形态呈球形，通过改变操作参数可制得粒径在1～3 μm的适于吸入式给药的气溶胶药物微粒和粒径小于1 μm的超细微粒。

关键词

超临界流体辅助雾化 水力空化 罗红霉素 超细微粒

分类号

Supercritical fluid assisted atomization introduced by hydrodynamic cavitation mixer for micronization of roxithromycin

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Abstract

Based upon the mechanism of supercritical fluid assisted atomization (SAA) technology, a promising process for producing micronic particles of controlled diameter, it was proposed that the mixing between supercritical CO 2 and liquid solution in the saturator was one of the key factors likely responsible for the particle size distribution (PSD) width.The SAA introduced by hydrodynamic cavitation mixer (SAA-HCM) experimental apparatus was built to intensify mass transfer and form a homogeneous fluid mixture.Using roxithromycin as the model drug, the effects of process parameters, such as cavitation generator, mixer pressure, precipitator temperature, different solvents, mass flow ratio between CO 2 and liquid solution and solute concentration in the liquid solution were investigated to evaluate their influences on the morphology and size of precipitated particles.The results indicated that hydrodynamic cavitation mixer improved effectively mass transfer, and successful micronization of the roxithromycin was achieved with a narrow PSD.Most of the particles obtained by using the SAA-HCM were well-defined spherical in morphology.By adjusting process parameters, microparticles with a diameter ranging between 1μm and 3μm suitable for inhalation delivery and ultrafine microparticles with a diameter lower than 1μm could be obtained.

Key words

supercritical fluid assisted atomization hydrodynamic cavitation mixer roxithromycin micronization

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