

药用高分子材料

可溶性淀粉交联微球的研究

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摘要

目的 获得对碘具有良好吸附性的载体。方法 使用反相悬浮交联法制备淀粉微球,对乳化过程中影响粒径分布的单因素进行考察;在交联过程中,以吸附量为指标,采用正交实验,确定最佳反应条件;用SSX-550扫描电镜、激光衍射粒度分析仪、傅立叶红外光谱仪、差示扫描量热器、热重分析仪等对微球的结构及外观进行考察和表征。结果 最佳合成工艺条件为:可溶性淀粉、水、氢氧化钠的质量比为7:20:2;水相的总量为20 g,油相的体积为160 mL,乳化剂用量为8 g,搅拌速度为500 r?min⁻¹,乳化时间20 min,分散均匀后,加入4 mL环氧氯丙烷,45 ℃水浴交联4 h。获得的微球粒径在68 μm左右,形状圆整。红外光谱和热分析证明,糊精在交联后结构和性质发生很大变化,大量羟基的存在和三维网络结构使产物仍保持强亲水性和一定的机械强度,在溶液中可以溶胀并吸附载药。结论 制备的交联可溶性淀粉微球可以作为碘的载体,用于局部消炎和杀菌。

关键词 药剂学 微球 反相悬浮交联法 可溶性淀粉 交联 吸附 碘

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Preparation of crosslinked water-soluble- starch microspheres

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Abstract

Objective To prepare hydrophilic but insoluble microspheres from water soluble starch, and optimize its preparation process by orthogonal experiments. Methods An inverse suspension polymerization method was utilized to synthesize crosslinked starch microspheres, factors influencing emulsification and crosslinking reaction were studied. Fourier-transformed infrared spectrometry, SEM, laser particle size analyser, differential scanning calorimetry and thermo-gravimetry were employed to characterize the structure and properties of the starch microspheres. Results When the starch-water-alkali ratio was 7:20:2(m:m:m), the amount of water was 20 g, oil 160 mL, emulsifier 8 g and the stirring rate 500 r · min⁻¹, fine emulsions were formed after 20 min stirring. Then the crosslinker was added under 45 ℃, and the reaction was continued for 4h. The microspheres with diameter around 68μm, a narrow particle size distribution (PSD) and good spherical shape were obtained. Fourier-transformed infrared spectrometry and thermoanalysis technique proved that the structure and characteristics of starch changed dramatically after crosslinking. The existence of abundant hydroxyl groups ensured the hydrophilicity and good water absorption ability of crosslinked starch microspheres. Conclusion The crosslinked starch microspheres prepared can be used as a drug-carrier for iodine, which is usually used as a bactericide.

Key words: pharmaceutics; microspheres; inverse suspension polymerization method; soluble- starch; crosslinking; absorption; iodine

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