高等学校化学学报 2007 , 28 (10): 1995—1999 ISSN: 0251-0790 CN: 22-1131/O6

研究论文

新型两亲性壳聚糖衍生物的合成、表征及对难溶性药物的增溶性

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收稿日期 2007-4-17 修回日期 网络版发布日期 2007-10-24 接受日期

摘要 以天然可生物降解的壳聚糖为原料, 通过在壳聚糖6位羟基上引入羧甲基, 在2位氨基上引入疏水烷基链, 制得*N*-辛基-*O,N*-羧甲基壳聚糖(OCC)两亲性衍生物, 分别用FTIR、^{1}H NMR和元素分析等技术对其结构进行表征, 用广角X射线衍射(WAXD)和差示扫描量热法(DSC)对其物理性质进行分析, 并考察其在各种溶剂中的溶解性能及其对难溶性药物的增溶能力. 所制备的OCC羧甲基取代度为115.9%, 取代主要发生在6位羟基上; 辛基取代度58.0%, 取代主要发生在2位氨基上; 与壳聚糖相比, OCC分子间/内氢键作用减弱; OCC在常用的有机溶剂中不溶, 但在水中溶解度增加, 能够形成具有淡蓝色乳光的纳米胶体溶液, 对难溶性抗肿瘤药物紫杉醇具有优越的增溶能力, 使紫杉醇在水中的溶解度提高近500倍, 载药量为34.6%(质量分数), 包封率为89.9%. OCC是潜在的优良的难溶性药物增溶载体材料.

关键词 壳聚糖 聚合物胶束 合成 紫杉醇 增溶

分类号 0631

Synthesis and Characterization of Novel Amphiphilic Chitosan Derivatives and Its Solubilizing Abilities for Water-insoluble Drugs

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Abstract Novel chitosan derivative with long alky groups as the hydrophobic moieties and carboxymethyl groups as the hydrophilic moieties was synthesized. The chemical structure of *N*-octyl-*O,N*-carboxymethyl chitosan(OCC) was characterized *via* FTIR, ^{1}H NMR and elemental analysis. The physical properties were analyzed with wide angle X-ray diffraction(WAXD) and differential scanning calorimetry(DSC). The solubilities in some solvents were investigated and solubilization abilities of OCC for water-insoluble drugs were evaluated. The results show that the degree of substitution of carboxymethyl groups and octyl groups are determined to be 115.9% and 58.0%, respectively. OCC are insoluble in organic solvents while show a much better solubility in water and formed opalescence solutions, which increased the solubility of paclitaxel up to 500 folds in water. The drug loading and drug encapsulation efficiency of OCC are 34.6% and 89.9%, respectively. It was concluded that the present OCC could be potentially useful as the novel delivery carrier materials for insoluble drugs.

Key words Chitosan Polymeric micelle Synthesis Paclitaxel Solubilizing ability

DOI:

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