



卡托普利插层锌铝水滑石的超分子结构、热稳定性及缓释性能研究 Supramolecular Structure, Thermal Property and Sustained-release of Captopril-intercalated Zn/Al-layered Double Hydroxides

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英文关键词: [layered double hydroxides](#) [captopril](#) [supramolecular structure](#) [thermal stability](#) [sustained-release](#)

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中文摘要:

采用共沉淀及离子交换的方法将高血压类药物卡托普利(Cpl)插入到Zn/Al-NO₃-LDHs层间,借助XRD、FTIR、UV-Vis、TG-DTA和ICP等手段对样品进行表征。结果表明, Cpl 阴离子可取代层间的NO₃⁻, 组装得到晶体结构良好的Cpl-LDHs。XRD结果表明得到的Cpl-LDHs的层间距为1.955~2.053 nm, 并与根据PM3半经验分子轨道法优化计算得到的Cpl-三维尺寸进行比较, 推测客体Cpl-是沿长轴方向与层板呈一定角度双层倾斜的方式交替排布于层间, 与主体层板通过氢键与静电作用形成超分子结构; 该超分子结构材料与卡托普利相比, 其热稳定性及缓释性能得到较大提高; 缓释实验数据符合Higuchi及Korsmeyer-Peppas扩散模型, 说明本实验Cpl的释放很好的符合菲克扩散机理。

英文摘要:

The antihypertensive compound captopril (Cpl) anion pillared Zn-Al layered double hydroxides were assembled by coprecipitation and anion exchange methods. The samples thereby obtained were characterized by XRD, FTIR, UV-Vis, TG-DTA and ICP measurements. The results show that the original interlayer nitrate anions of the hydrotalcite can be replaced by captopril anions to obtain captopril intercalated Zn-Al layered double hydroxides with good crystallinity. XRD analyses indicated that the interlayer spaces of as-synthesized Cpl-LDHs are 1.955 nm to 2.053 nm. The comparison was made between the above results and three-dimensional molecular size of Cpl ion calculated from the PM3 semi-empirical molecular orbital method. The captopril guests were arranged with alternately and bilayer tilted (along the long axis orientation in proper angle) between layers. It was found that the interaction of the host layers and the guests is through hydrogen bonding and electrostatic attraction, confirming that the intercalated hydrotalcite has a supramolecular structure. The thermal stability, and sustained-release of captopril anion-pillared hydrotalcite were enhanced to a considerable extent, comparing with that of captopril. The release profiles were fitted by the theoretical models of Higuchi and Korsmeyer-Peppas, the fitting data primarily agree with the experimental results, indicating that the release of Cpl ion from Cpl-LDHs is based on Fickian diffusion mechanism.

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