

研究论文

交联壳聚糖树脂对Ni(II)的吸附行为研究

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摘要 研究了甲醛、环氧氯丙烷交联壳聚糖树脂(AECTS)对Ni(II)的吸附行为和吸附Ni(II)对树脂结构及性能的影响. 用FTIR, WAXD, TGA和DSC对吸附产物进行了结构表征, 并深入分析了AECTS与Ni(II)之间的作用机理. 结果表明: AECTS主要以配位形式吸附Ni(II); AECTS吸附Ni(II)后, 结晶度下降, 总体上热稳定性变差; Ni(II)对AECTS的主链分解具有明显的催化功能, 而空气气氛中对AECTS在500 °C附近的分解表现出火焰缓蚀作用. AECTS对Ni(II)的吸附行为符合Langmuir模型, 属于单分子层吸附, 所有吸附位对Ni(II)的作用近似相同; 与壳聚糖(CTS)比较, 造成AECTS对Ni(II)吸附量增大的主要原因是AECTS结晶度下降和孔隙率增加, 二者导致在交联处理前Ni(II)难于接近的吸附位点“活性”相对增大, 使其更容易与Ni(II)相结合; 不同介质对AECTS吸附Ni(II)的影响大小顺序为HCl>CdCl₂>MgCl₂>NaCl, 前两者使吸附量减小, MgCl₂使吸附量稍有增加, NaCl对吸附量基本没有影响.

关键词 [交联壳聚糖](#) [Ni\(II\)](#) [配位](#) [吸附机理](#) [介质](#)

分类号

Study on the Adsorption Behavior of Crosslinked Chitosan for Ni(II)

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Abstract In this paper the adsorption thermodynamics properties of new type chitosan crosslinked by aldehyde and epichlorohydrin (AECTS) for Ni(II) and the influence of Ni(II) on the AECTS structure and performance were investigated. The structure of adsorption products was characterized by Fourier transform IR, WAXD, TGA and DSC. The influence of different medium on adsorption was also studied. The results showed that AECTS adsorbed Ni(II) mainly by complexation, the experimental data fit well into the Langmuir adsorption isotherm and the process obeyed the formation of monolayer adsorption. Compared with chitosan, the main reasons that AECTS may adsorb more Ni(II) are its crystallinity decrease and porosity increase which make the adsorption site adsorb Ni(II) more easily. Compared with AECTS, the structure and properties of AECTS-Ni(II) have been markedly changed. Its crystallinity and generally thermal stability decreased. The metal ion had evident catalyzing function to the decomposition of AECTS main chains but represented marked fire-retardant function to the residue decomposition of AECTS in air at about 500 °C. The effect decreased in the following of media on adsorption process HCl>CdCl₂>MgCl₂>NaCl. HCl and CdCl₂ made the adsorption quantity of AECTS acutely decrease, while MgCl₂ made the adsorption quantity of AECTS slightly increase and NaCl almost had no influence. Their effect mechanism was analyzed and discussed.

Key words [crosslinked chitosan](#) [Ni\(II\)](#) [complexation](#) [adsorption mechanism](#) [medium](#)

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