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化学与化工

Poly(AM / AMPS)反相乳液的Hofmann降解及其在脱除Cu^{2+}方面的应用

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摘要:

通过Hofmann降解反应制备对铜离子(Cu^{2+}) 具有高效吸附作用的两性聚合物—聚(丙烯酰胺 / 2-丙烯酰胺基-2-甲基丙磺酸 / 乙烯胺)(Poly(AM / AMPS / VAm))。首先以AM和AMPS为单体,通过反相乳液聚合法制备了Poly(AM / AMPS) 反相乳液,然后在反相乳液中通过Hofmann降解反应将Poly(AM / AMPS) 的部分酰胺基转变为氨基,得到两性聚合物Poly(AM / AMPS / VAm)。讨论了合成条件、降解反应条件对产物性能的影响。利用红外光谱对其结构进行表征,并利用电导法测定其胺化度。在模拟废水环境下,进行了重金属Cu^{2+}的脱除试验,探讨了搅拌时间、温度、pH值、Cu^{2+} 摩尔浓度及两性聚合物Poly(AM / AMPS / VAm) 用量对Cu2+脱除率的影响。用SEM表征了产物表面吸附Cu^{2+}前后的变化。结果表明该两性聚合物Poly(AM / AMPS / VAm) 是一种非常有效的Cu^{2+}脱除剂。

关键词: 丙烯酰胺 反相乳液 Hofmann降解 铜离子 2-丙烯酰胺基 2-甲基丙磺酸

Hofmann degradation of poly(AM / AMPS) in inverse emulsion and its application in removal of the Cu(II) ion

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Abstract:

An amphoteric poly(acrylamide / 2-acrlamido-2-methylpropane sulphonic acid / vinylamine)(poly(AM / AMPS / VAm)) with strong absorbability of copper(II) ions was prepared by Hofmann degradation. First, the poly (AM / AMPS) was synthesized by inverse emusion polymerzation using AM and AMPS as monomers. Second, the partial amide groups of the poly(AM / AMPS) were transformed to amine groups by the Hofmann degradation in the inverse emusion to obtain amphoteric poly(AM / AMPS / VAm). The effects of copolymerization and Hofmann degradation on their properties were discussed. The amine groups were confirmed using a FT-IR spectroscopy, and their amination value was calculated by the conductivity method. The influencing factors of removing the copper(II) ions in the simulated environment of the wastewater were investigated, such as reaction time, reaction temperature, pH value, concentration of the copper(II) ions and the amount of products. The products before and after absorbed Cu^{2+} were characterized by SEM. The results indicated that the amphoteric poly(AM / AMPS / VAm) were of significant utility to remove the copper(II) ions.

Keywords: acrylamide inverse emulsion Hofmann degradation copper(II) ion 2-acrlamido-2-methylpropane sulphonic acid

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