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改性壳聚糖CAD与微生物絮凝剂MBF8复配絮凝研究 Flocculation properties of the compound bioflocculant

关键词: [微生物絮凝剂](#) [改性壳聚糖](#) [复配絮凝](#) [絮凝特性](#)

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作者 单位

于琪 华南理工大学环境与能源学院,工业聚集区污染控制与生态修复教育部重点实验室,广州 510006

胡勇有 1. 华南理工大学环境与能源学院,工业聚集区污染控制与生态修复教育部重点实验室,广州 510006;
2. 华南理工大学制浆造纸工程国家重点实验室,广州 510640

雷志斌 1. 华南理工大学环境与能源学院,工业聚集区污染控制与生态修复教育部重点实验室,广州 510006;
2. 华南理工大学制浆造纸工程国家重点实验室,广州 510640

摘要: 采用水溶液自由基聚合反应,将丙烯酰胺(AM)、二甲基二烯丙基氯化铵(DMDAAC)接枝到壳聚糖分子上制成了阳离子改性壳聚糖(CAD).经FT-IR、XRD、zeta(ζ)电位、凝胶色谱等分析确定,CAD为淡黄色透明液体,pH值为3.7,相对分子质量为 2.88×10^6 ,阳离子度为16.7,等电点(0.1%溶液)约为pH值10.5,有效成分2.6%,主要特征官能团有羟基、氨基、季铵基和酰胺基,呈不规则晶体结构.将CAD与相对分子质量 3.67×10^5 的多糖类电负性微生物絮凝剂MBF8复配,对浊度12~460 NTU、离子强度 $3.0 \text{ mmol} \cdot \text{L}^{-1}$ 的高岭土悬浊液进行烧杯实验.结果表明,MBF8与CAD的最佳使用方式为先投加MBF8后投加CAD,复配比5:3时效果最好,适用的pH范围为6.0~10.0.采用PAC($3.0 \text{ mg} \cdot \text{L}^{-1}$)+MBF8+CAD($1.0 \text{ mg} \cdot \text{L}^{-1}$)复配絮凝,pH=8.0下,对浊度为110 NTU的高岭土悬浊液,浊度去除率>97%,残余铝 $<0.08 \text{ mg} \cdot \text{L}^{-1}$,絮体大、沉降快,絮凝效果优于PAC+分子量800万、1200万的阴离子PAM及分子量1500万的阳离子PAM.

Abstract. Cationic modified chitosan (CAD) was made by grafting acrylamide (AM) and dimethyl diallyl ammonium chloride (DMDAAC) to the chitosan molecules through free radical polymerization in aqueous solution. Characterized by FT-IR, XRD and Gel Chromatography, CAD was faint yellow transparent liquid with pH 3.7, relative molecular mass 2.88×10^6 , cationic degree 16.7, isoelectric point (0.1% solution) about pH 10.5 and effective components 2.6%. The main functional groups of CAD were hydroxyl, amino, quaternary ammonium group and amide group. The microbial flocculant MBF8 produced by fermentation of *aspergillus fumigatus* was polysaccharide electronegativity polymer with relative molecular weight of 3.67×10^5 . The flocculation characteristics of the complex of MBF8 and CAD were investigated by flocculation of pairing kaolin suspension (turbidity 12~460 NTU, ionic strength $3 \text{ mmol} \cdot \text{L}^{-1}$) in beaker. The result showed that MBF8 should be preferentially added with optimum doses ratio 5:3 and pH 6.0~10.0. Under turbidity 110 NTU and pH 8, the combination of PAC ($3 \text{ mg} \cdot \text{L}^{-1}$)+MBF8+CAD ($1.0 \text{ mg} \cdot \text{L}^{-1}$) showed high efficiency for flocculation of kaolin suspension that could remove up to 97% of turbidity. The residual aluminum was less than $0.08 \text{ mg} \cdot \text{L}^{-1}$. The flocs can be settled quickly due to their compact clustering and the flocculation performance was better than that of PAC + cationic PAM with molecular weight between 8 million and 12 million and of PAC + anionic PAM with molecular weight of 15 million.

Key words. [microbial flocculant](#) [modified chitosan](#) [combined flocculation](#) [flocculation properties](#)

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主办单位：中国科学院生态环境研究中心

单位地址：北京市海淀区双清路18号 邮编：100085

服务热线：010-62941073 传真：010-62941073 Email: hjkxxb@rcees.ac.cn

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