化工学报 2009 60 (6): 1573-1580 ISSN: 0438-1157 CN: 11-1946/TQ

材料化学工程与纳米技术

机械活化甘蔗渣与丙烯[BF]酸(钠)的接枝共聚反应

黄祖强, 梁兴唐, 高利, 胡华宇, 童张法

广西大学化学化工学院

收稿日期 2008-11-17 修回日期 2009-3-6 网络版发布日期 2009-6-17 接受日期

摘要

采用搅拌球磨对甘蔗渣进行机械活化，以不同活化时间的甘蔗渣为原料，过硫酸铵和亚硫酸钠为引发剂，在水溶液中与部分中和的丙烯酸进行接枝共聚反应。以接枝率和接枝效率为评价指标，考察了活化时间、丙烯酸与甘蔗渣的用量比、反应时间和反应温度等因素对接枝反应的影响。并采用SEM、FT-IR对甘蔗渣和产物进行表征。结果表明：机械活化明显强化了甘蔗渣与丙烯酸的接枝共聚反应，接枝率和接枝效率随着活化时间的延长而增大，主要是由于机械活化破坏了甘蔗渣中木质素对纤维素的包裹作用，降低纤维素的结晶度，提高了其反应活性。以活化1.5 h的甘蔗渣为原料进行接枝共聚反应，在反应时间为3 h、丙烯酸（体积，ml）与甘蔗渣（质量，g）的用量比为6、反应温度为60℃的条件下，制得接枝率和接枝效率分别为165.29%和82.70%的接枝共聚产物。

关键词

甘蔗渣 机械活化 丙烯酸 接枝共聚

分类号

Graft co-polymerization of mechanically activated sugarcane bagasse and acrylic acid(sodium acrylate)

HUANG Zuqiang, LIANG Xingtang, GAO Li,HU Huayu,TONG Zhangfa

Abstract

Sugarcane bagasse (SCB) was mechanically activated by a stirring-type ball mill.Graft copolymer (SCB-g-PAA) of SCB with different mechanical activation times and partially neutralized acrylic acid (AA) was synthesized by free radical polymerization using ammonium persulfate/sodium sulfite redox pair in aqueous solution.The effects of activation times, ratio of SCB to AA, reaction time and reaction temperature on the grafting ratio and grafting efficiency were investigated.The granule morphology, functional groups, crystal structure of the SCB with different activation times and SCB-g-PAA were characterized by using scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FT-IR). It was found that the graft co-polymerization was strengthened obviously by mechanical activation, and grafting ratio and grafting efficiency increased with activation time.This could be attributed to that mechanical activation broke the sealing of cellulose by lignin, decreased the degree of crystallinity of cellulose, made it more accessible to AA, and improved the reactivity of cellulose.Grafting ratio and Grafting efficiency were obtained in the values of 165.29% and 82.70% by graft co-polymerization of bagasse activated for 1.5 h and acrylic acid in the conditions: reaction time 3 h, ratio of acrylic acid(volume) to sugarcane bagasse(mass) 6 and reaction temperature 60℃.

Key words

sugarcane bagasse mechanical activation acrylic acid graft co-polymerization

DOI:

通讯作者 黄祖强 huangzq@gxu.edu.cn