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吗啡啉碱性离子液体催化合成油酸甲酯

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Catalytic synthesis of methyl oleate by morpholine basic ionic liquid

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摘要 采用两步法合成了由阳离子N-甲基-N-丁基吗啡啉和阴离子氢氧根搭配的[Nbmm]OH新型碱性离子液体。实验利用FT-IR、元素分析和TGA分别对该离子液体的化学结构和热稳定性进行了表征。结果表明,该离子液体的热稳定性超过200℃。对该离子液体的溶解性能进行了考察, 结果表明,该离子液体能与强极性溶剂互溶,而且其水溶液的碱性较强。为了考察该离子液体对酯化反应的催化活性,实验过程中以油酸和甲醇反应生成油酸甲酯的酯化反应为模型反应,评价该离子液体的催化活性。结果表明,当反应温度60℃、酸醇比为1:6、离子液体加入量为原料总质量的15%、反应10 h时,油酸转化率达93.9%,而且该离子液体易于从反应体系中分离,可以循环使用。

关键词: 碱性离子液体　吗啡啉　油酸甲酯　催化剂

Abstract: Basic ionic liquid *N*-methyl-*N*-butyl morpholine hydroxide ([Nbmm]OH) was synthesized by two-step methods with *N*-methyl morpholine, *N*-butane bromide and potassium hydroxide as the materials. The chemical structure and thermal stability of the basic ionic liquid [Nbmm]OH were characterized by FT-IR, elemental analysis and TGA; its solubility and catalytic performance in the esterification of oleic acid with methanol were investigated. The results showed that the basic ionic liquid has a good thermal stability; it is stable at a temperature above 200℃. The ionic liquid [Nbmm]OH is soluble in the solvent of strong polarity and the solution in water exhibits strong alkalinity. The basic ionic liquid performs well as a catalyst in the synthesis of methyl oleate from oleic acid and methanol; with a molar ratio of oleic acid to methanol of 1:6 and the amount of catalysts of 15%, the conversion of oleic acid reaches 93.9% after reaction under 60℃ for 10 h. Moreover, the basic ionic liquid synthesized in this work is potential for application in industry, due to its easy recyclability from the reaction system as well as the green and reusable nature.

Key words: basic ionic liquid　morpholine　methyl oleate　catalyst

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