有机化学 2005 25 (11): 1434-1436 ISSN: 0567-7351 CN: 31-1320/06

研究简报

全氟辛基磺酸稀土金属盐催化氟两相酯化反应

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收稿日期 2005-3-24 修回日期 2005-5-21 网络版发布日期 接受日期

摘要 制备了全氟辛基磺酸稀土金属盐[RE($OSO_2C_8F_{17}$)$_3$, RE＝Sc, Y, La～Lu]并研究了该催化剂作用下氟两相酯化反应. 全氟己烷(C_6F_{14})、全氟甲苯(C_7F_8)、全氟甲基环己烷(C_7F_{14})、全氟辛烷(C_8F_{18})、1-溴代全氟辛烷($C_8F_{17}Br$)和全氟萘烷($C_{10}F_{18}$, 顺式与反式的混合物)可作为该反应的氟溶剂. 研究表明Yb($OSO_2C_8F_{17}$)$_3$和$C_{10}F_{18}$分别是最好的氟代催化剂和氟溶剂. 以Yb($OSO_2C_8F_{17}$)$_3$为催化剂在$C_{10}F_{18}$中苯甲酸和异戊醇的酯化反应得率为99%. 含有催化剂的氟相通过简单的相分离, 就可回收利用, 氟相重复使用5次, 其催化活性减少不大.

关键词 氟两相催化 全氟辛基磺酸稀土金属盐 全氟溶剂 酯化

分类号

Esterification of Fluorous Biphasic System Catalyzed by Rare Earth(III) Perfluorooctanesulfonates

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Abstract The catalyst of rare earth(III) perfluorooctanesulfonates [RE($OSO_2C_8F_{17}$)$_3$, RE＝Sc, Y, La～Lu] has been prepared for the esterification in fluorous biphasic system. Perfluorohexane (C_6F_{14}), perfluoromethylcyclohexane (C_7F_{14}), per-fluorotoluene (C_7F_8), perfluorooctane (C_8F_{18}), per-fluorooctyl bromide ($C_8F_{17}Br$) or perfluorodecalin ($C_{10}F_{18}$, *cis*- and *trans*-mixture) could be used as fluorous solvent for this reaction. The results showed that Yb($OSO_2C_8F_{17}$)$_3$ and $C_{10}F_{18}$ were the best catalyst and fluorous solvent respectively. The yield of Yb($OSO_2C_8F_{17}$)$_3$ catalyzed esterification of benzoic acid with isopentanol was 99% in $C_{10}F_{18}$. By simple phase separation the fluor-ous phase containing catalyst could be re-utilized up to five times only with a little decrease in activity.

Key words fluorous biphasic catalysis rare earth(III) perfluorooctanesulfonate perfluorocarbon esterification

DOI:

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