

研究论文

类水滑石催化酯交换反应活性、寿命及失活原因研究

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摘要 研究了5种不同阳离子组合的类水滑石对碳酸二甲酯与苯酚酯交换反应的催化活性和ZnAl, MgAl水滑石的使用寿命. 结果显示, 类水滑石的催化性能与组成的阳离子性质有关:

三价阳离子的性质影响类水滑石的催化活性高低, 二价阳离子的性质则影响其使用寿命长短.

通过对失活原因的研究发现, 特征的层状结构形式是类水滑石具有活性的关键: 层状结构塌陷, 活性随之消失;

层状结构稳定, 使用寿命长. 当苯酚与碳酸二甲酯的摩尔比为2: 1, 催化剂的质量分数为原料总质量的1%,

反应时间8 h时, MgAl水滑石具有最优的催化性能: 碳酸二甲酯转化率51.8%, 酯交换产物选择性94.2%, 5

次循环使用后催化活性保持稳定. 其催化性能明显优于文献报道的其它相关固体催化剂.

关键词 [类水滑石](#) [催化活性](#) [寿命](#) [酯交换反应](#) [碳酸二甲酯](#) [碳酸二苯酯](#)

分类号

Study on the Catalytic Activity, Life Time and Deactivation of Hydrotalcite-like Catalysts in Transesterification

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Abstract The catalytic activities of five samples of hydrotalcite-like compounds (HTLC) with different combinations of cation and the life time of ZnAl, MgAl-hydrotalcite catalysts have been investigated for transesterification of DMC and PhOH. The results show that the catalytic performance of HTLC was related to the character of involved cations. While the catalytic activity was influenced by trivalent cations, the life time of catalysts was influenced by divalent cations.

From the investigation of the reason for the deactivation of hydrotalcite-like catalysts, it was found that the characteristic layered structure of HTLC was the key factor to their catalytic activities. Once the layered structure collapsed, the activities were lost. When the molar ratio of PhOH to DMC was 2: 1, the mass fraction of catalyst to the total reaction mass was 1% and the reaction time last 8 h, MgAl-hydrotalcite showed the best catalytic performance: the conversion of DMC reached 51.8%, the selectivity to DPC and MPC reached 94.2%, and the catalytic activity kept unchanged after being used five times. The catalytic performance of MgAl-hydrotalcite was obviously better than the other solid catalysts reported in this transesterification.

Key words [hydrotalcite-like compound](#) [catalytic activity](#) [life time](#) [transesterification](#) [dimethyl carbonate](#) [diphenyl carbonate](#)

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