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离子液体存在下脂肪醛的环化三聚反应

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摘要 在室温、不采用溶剂、FeCl₃酸性离子液体存在条件下, 乙醛、丙醛、正丁醛、异丁醛、正戊醛、异戊醛、正己醛和正辛醛经环化三聚反应高选择性的生成了相应的2,4,6-三烷氧基-1,3,5-三氧噁烷, 同时还考察了离子液体的种类、酸性和温度等因素对该反应的影响。实验结果表明, FeCl₃的摩尔分数为0.62 ($x(\text{FeCl}_3)=0.62$) 的离子液体是一类脂肪醛环化三聚反应的高效催化剂, 它们不仅易于从反应混合物中分离, 而且可以循环使用。在最佳的反应条件下 (异丁醛25.0 g, [Et₃NH]Cl/FeCl₃

($x(\text{FeCl}_3)=0.62$) 1.0 g, 25 °C, N₂保护下反应1

h), 异丁醛的转化率为91.1%, 对2,4,6-三异丙基-1,3,5-三氧噁烷的选择性达99.8%。

关键词 [脂肪醛,环化三聚反应,2,4,6-三烷氧基-1,3,5-三氧噁烷,离子液体](#)

分类号

Cyclotrimerization of Aliphatic Aldehydes Catalyzed by Ionic Liquids

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Abstract Aliphatic aldehydes such as ethanal, propanal, *n*-butanal, isobutyraldehyde, *n*-valeraldehyde, isovaleraldehyde, *n*-hexanal and *n*-octanal were converted into the corresponding 2,4,6-trialkyl-1,3,5-trioxanes through cyclotrimerization in the presence of the ferric chloride based ionic liquids at room temperature without solvent in high selectivity. The effects of different ionic liquids, acidity of ionic liquids and temperature on cyclotrimerization were also studied. The results showed that the ferric chloride based ionic liquids (apparent molar fraction of FeCl₃ ($x(\text{FeCl}_3)=0.62$)) were a kind of efficient catalysts for the cyclotrimerization of aliphatic aldehyde which could be separated conveniently from the reaction mixture and recycled without loss of catalytic activity. The conversion of isobutyraldehyde and the selectivity to 2,4,6-triisopropyl-1,3,5-trioxane were 91.1% and 99.8% respectively under optimum reaction condition (isobutyraldehyde 25.0 g, [Et₃NH]Cl/FeCl₃ ($x(\text{FeCl}_3)=0.62$) 1.0 g, 25 °C for 1 h).

Key words [aliphatic aldehyde](#) [cyclotrimerization](#) [2,4,6-trialkyl-1,3,5-trioxane](#) [ionic liquid](#)

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