$Fe(HSO_4)_3$: An efficient, heterogeneous and reusable catalyst for alkylation of 1,3-dicarbony compounds

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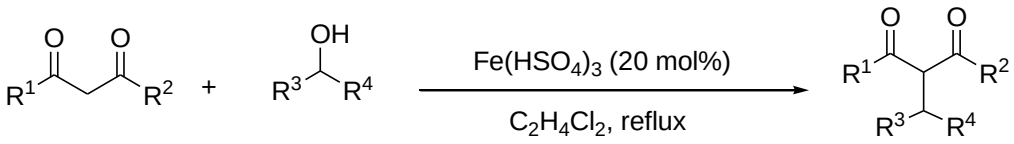
The construction of carbon–carbon bond is a fundamental taskin organic synthesis. Alkylation of active methylene compounds, such as β-diketones , β-diketoesters and malonic esters with alcohols is a useful transformation involving C-C bond formation.[1]However,because of the poor leaving ability of the hydroxyl group, excessamount of Brönsted or Lewis acids is required for this kind of transformation.[2] VariousLewis acids such as $InCl_3$,[3] $InBr_3$,[4] $FeCl_3$,[5]$M(OTf)_3$,[6] Lewis acid ruthenium complex,[7] as well as montmorillonite,[8]*p*-toluenesulfonic acid [9] have been demonstrated to facilitate the dehydrative substitution of allylic and benzylic alcohols with 1,3-dicarbonyl compounds.Unfortunately many of these methods for the alkylationreactionhas major or minor disadvantage such as long reaction times, low yields ofthe products, tedious work up procedures and use of the toxic solvents.Therefore, it is necessary to develop an efficient and convenient method for alkylation of 1,3-dicarbony compounds.
Recently, ferric hydrogen sulfate $Fe(HSO_4)_3$ has emerged as a promising solid acid catalyst for acid catalyzed reactions. In this study we wish toreport an efficient and convenient method for alkylationof a wide variety of 1,3-dicarbonyl compounds in the presence of $Fe(HSO_4)_3$ as catalyst.



References
[1] A. C. Cope, H. L. Holmes, H. O. House, Org. React. 9 (1957) 108.
[2] G. C. Gullickson, D. E. Lewis, Aust. J. Chem. 56 (2003) 385.
[3] M. Yasuda, T. Somyo, A. Baba, Angew. Chem.Int. Ed. 45 (2006) 793.
[4] P. Vicennati, P.G. Cozzi, Eur. J. Org. Chem. (2007) 2248.
[5] J. Kischel, K. Mertins, D. Michalik, A. Zapf, M. Beller, Adv. Synth.Catal.349 (2007)865.
[6] M. Noji, Y. Konno, K. Ishii, J. Org.Chem.72 (2007) 5161.
[7] P. N. Liu, Z. Y. Zhou, C. P. Lau, Chem. Eur. J. 13 (2007) 8610.
[8] K. Motokura, N. Nakagiri, T. Mizugaki, K. Ebitani, K.Kaneda, J. Org. Chem. 72(2007) 6006.
[9] R. Sanz, A. Martıĭnez, D. Miguel, J. M. A. Álvarez Gutiérrez, F. Rodrıĭguez, Adv.Synth. Catal.348 (2006) 1841.
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