Supporting Information

Novel biocompatible Core/Shell Fe₃O₄@NFC@Co (II) as a new catalyst in multicomponent reaction: an efficient and sustainable methodology and novel reusable for one-pot synthesis of 4H-pyran and pyranopyrazole in aqueous medium

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Spectral data of compounds 4H-pyran and pyranopyrazol:

Spectral data of ethyl 6-amino-5-cyano-2-methyl-4-phenyl-4H-pyran-3-carboxylate (Table 3, entry 1)
Spectral data of ethyl-6-amino-4-(4-chlorophenyl)-5-cyano-2-methyl-4H-pyran-3-carboxylate (Table 3, entry 2):
Spectral data of ethyl 6-amino-4-(4-bromophenyl)-5-cyano-2-methyl-4H-pyran-3-carboxylate (Table 3, entry 3):
ethyl 6-amino-5-cyano-4-(4-hydroxyphenyl)-2-methyl-4H-pyran-3-carboxylate (Table 3, entry 4):
ethyl 6-amino-5-cyano-4-(4-methoxyphenyl)-2-methyl-4H-pyran-3-carboxylate (Table 3, entry 5):
ethyl 6-amino-5-cyano-2-methyl-4-(p-tolyl)-4H-pyran-3-carboxylate (Table 3, entry 6):
ethyl 6-amino-5-cyano-4-(4-fluorophenyl)-2-methyl-4H-pyran-3-carboxylate (Table 3, entry 7):
ethyl 6-amino-5-cyano-2-methyl-4-(4-nitrophenyl)-4H-pyran-3-carboxylate (Table 3, entry 8):
ethyl 6-amino-5-cyano-2-methyl-4-(3-nitrophenyl)-4H-pyran-3-carboxylate (Table 3, entry 9):
ethyl 6-amino-5-cyano-2-methyl-4-(2-nitrophenyl)-4H-pyran-3-carboxylate (Table 3, entry 10):
ethyl 6-amino-4-(2-chlorophenyl)-5-cyano-2-methyl-4H-pyran-3-carboxylate (Table 3, entry 11):
ethyl 6-amino-4-(2-bromophenyl)-5-cyano-2-methyl-4H-pyran-3-carboxylate (Table 3, entry 12):
amino-3-methyl-4-phenyl-2,4-dihydropyrano[2,3-c] pyrazole-5-carbonitrile (Table 3, entry 13):
6-amino-4-(4-chlorophenyl)-3-methyl-2,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 14):
6-amino-4-(4-bromophenyl)-3-methyl-2,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 15):
6-amino-4-(4-hydroxyphenyl)-3-methyl-2,4-dihydropyran[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 16):
6-amino-4-(4-methoxyphenyl)-3-methyl-2,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 17):
6-amino-3-methyl-4-(p-tolyl)-2,4-dihydropyran[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 18):
6-amino-4-(4-fluorophenyl)-3-methyl-2,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 19):
6-amino-3-methyl-4-(4-nitrophenyl)-2,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 20):
6-amino-3-methyl-4-(3-nitrophenyl)-2,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 21):
6-amino-3-methyl-4-(2-nitrophenyl)-2,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 22):
6-amino-4-(2-chlorophenyl)-3-methyl-2,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 23):
6-amino-4-(2-bromophenyl)-3-methyl-2,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (Table 3, entry 24):