

Supplementary Information

Histidine-functionalized chitosan-Cu (II) complex: a novel and green heterogeneous nanocatalyst for two and three component C—S coupling reactions

Abdol R. Hajipour^{1,2}, Seyed Mostafa Hosseini¹, Saeideh Jajarmi¹

¹ *Pharmaceutical Research Laboratory, Department of Chemistry, Isfahan University of Technology, Isfahan 84156, Islamic Republic of Iran*

² *Department of Neuroscience, University of Wisconsin, Medical School, Madison, WI53706-1532, USA*

Spectral Data:

Benzyl phenyl sulfane (table 3, entries 1 and 2): colorless oil, ^1H NMR (CDCl_3 , 300 MHz): δ 7.05-7.23 (m, 10 H), 4.013 (s, 2 H); ^{13}C NMR (CDCl_3 , 75 MHz): δ 137.51, 136.45, 129.84, 128.90, 128.56, 127.25, 126.39, 39.08.

benzyl(4-methoxyphenyl)sulfane (table 3, entry 4): white solid. ^1H NMR (300 MHz, CDCl_3) δ : 7.13-7.16 (m, 5 H), 7.08-7.11 (m, 2 H), 6.7 (d, 2 H), 3.9 (s, 2 H), 3.66 (s, 3 H); ^{13}C NMR (75 MHz, CDCl_3) δ : 159.2, 138.2, 134.1, 128.9, 128.6, 128.4, 127.0, 126.1, 114.5, 55.3, 41.3.

benzyl(4-nitrophenyl)sulfane (table 3, entries 5 and 6): white solid. ^1H NMR (300 MHz, CDCl_3) δ : 8.01-8.03 (m, 2 H), 7.18-7.32(m, 7 H), 4.17 (s, 2 H); ^{13}C NMR (75 MHz, CDCl_3) δ : 147.2, 145.5, 135.5, 128.9, 128.7, 127.8, 1265.7, 123.9, 37.1.

Diphenylsulfane(Table 4, entries 1 and 2): ^1H NMR (300 MHz, CDCl_3 , TMS): δ 7.33–7.16 (m, 10H). ^{13}C NMR (75 MHz, CDCl_3 , TMS): δ 135.8, 131.1, 129.1, 127.0.

Bis(2-nitrophenyl)sulfane(Table 4, entries 11 and 12): ^1H NMR (300 MHz, CDCl_3 , TMS): δ 8.11 (d, $J=8.0$ Hz, 2H), 7.59-7.47 (m, 4H), 7.31 (d, $J=8.0$ Hz, 2H). ^{13}C NMR (75 MHz, CDCl_3 , TMS): δ 149.4, 133.8, 133.7, 131.5, 128.7, 125.5.

Bis(4-methoxyphenyl)sulfane(Table 4, entry 4): ^1H NMR (300 MHz, CDCl_3 , TMS): δ 7.50–7.22 (m, 4H), 6.81 (d, 4H, $J = 8.60$ Hz), 3.74 (s, 6H). ^{13}C NMR (75 MHz, CDCl_3 , TMS): δ 159.0, 132.7, 114.6, 114.5, 55.2.