Magnetically recoverable Cu_2O–Fe_3O_4@TNT catalytic system for click chemistry in water: multi-component synthesis of 1,2,3-triazoles at room temperature

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Spectral data of synthesized compounds:

1-benzyl-4-(phenoxymethyl)-1H-1,2,3-triazole
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (s, 1H), 7.46 – 7.34 (m, 4H), 7.22 – 7.12 (m, 4H), 6.78 (t, *J* = 6.1 Hz, 3H), 5.54 (s, 2H), 5.17 (s, 2H).

1-nonyl-4-phenyl-1H-1,2,3-triazole
1H NMR (400 MHz, CDCl3) δ 7.84 (dt, J = 8.0, 1.7 Hz, 2H), 7.75 (s, 1H), 7.63 (d, J = 7.0 Hz, 2H), 7.46 – 7.31 (m, 2H), 4.40 (t, J = 7.2 Hz, 2H), 1.95 (p, J = 7.3 Hz, 2H), 1.41 – 1.20 (m, 12H), 0.87 (t, J = 6.9 Hz, 3H).

1-benzyl-4-((4-chlorophenoxy)methyl)-1H-1,2,3-triazole
1H NMR (400 MHz, CDCl3) δ 7.52 (s, 2H), 7.42 – 7.34 (m, 3H), 7.32 – 7.19 (m, 4H), 6.96 – 6.84 (m, 2H), 5.54 (s, 2H), 5.15 (s, 2H).

1-(4-methoxyphenyl)-4-phenyl-1H-1,2,3-triazole
1H NMR (400 MHz, CDCl3) δ 8.12 (s, 1H), 7.96 – 7.84 (m, 2H), 7.74 – 7.64 (m, 2H), 7.47 (dd, J = 10.4, 4.7 Hz, 2H), 7.40 – 7.33 (m, 1H), 7.13 – 6.96 (m, 2H), 3.88 (s, 3H).

1-decyl-4-phenyl-1H-1,2,3-triazole
1H NMR (400 MHz, CDCl3) δ 7.89 – 7.80 (m, 2H), 7.75 (s, 1H), 7.48 – 7.40 (m, 2H), 7.36 – 7.30 (m, 1H), 4.39 (t, J = 7.2 Hz, 2H), 2.02 – 1.88 (m, 2H), 1.46 – 1.14 (m, 14H), 0.87 (t, J = 6.9 Hz, 3H).

1-octyl-4-phenyl-1H-1,2,3-triazole
1H NMR (500 MHz, CDCl3) δ 7.92 – 7.77 (m, 2H), 7.74 (s, 1H), 7.49 – 7.39 (m, 2H), 7.35 – 7.30 (m, 1H), 4.39 (t, J = 7.3 Hz, 2H), 2.02 – 1.87 (m, 2H), 1.42 – 1.17 (m, 10H), 0.87 (t, J = 7.0 Hz, 3H).

4-hexyl-1-octyl-1H-1,2,3-triazole
1H NMR (500 MHz, CDCl3) δ 7.25 (d, J = 14.5 Hz, 1H), 4.30 (t, J = 7.3 Hz, 2H), 2.82 – 2.62 (m, 2H), 1.88 (dd, J = 14.2, 7.1 Hz, 2H), 1.79 – 1.52 (m, 2H), 1.41 – 1.14 (m, 16H), 0.88 (td, J = 6.9, 3.3 Hz, 3H).

1-benzyl-4-((p-tolyloxy)methyl)-1H-1,2,3-triazole
1H NMR (500 MHz, CDCl3) δ 7.51 (s, 1H), 7.41 – 7.33 (m, 3H), 7.31 – 7.26 (m, 2H), 7.10 – 7.03 (m, 2H), 6.91 – 6.81 (m, 2H), 5.52 (s, 2H), 5.19 – 5.12 (m, 2H), 2.28 (s, 3H).

4-hexyl-1-nonyl-1H-1,2,3-triazole
1H NMR (400 MHz, CDCl3) δ 7.28 – 7.26 (m, 1H), 4.30 (t, J = 7.3 Hz, 2H), 2.77 – 2.66 (m, 2H), 1.88 (p, J = 7.2 Hz, 2H), 1.66 (dt, J = 15.4, 7.5 Hz, 2H), 1.41 – 1.18 (m, 18H), 0.88 (td, J = 6.9, 2.1 Hz, 6H).

1-benzyl-4-((2-chlorophenoxy)methyl)-1H-1,2,3-triazole
1H NMR (500 MHz, CDCl3) δ 7.59 (s, 1H), 7.41 – 7.32 (m, 4H), 7.29 – 7.24 (m, 2H), 7.20 (ddd, J = 8.3, 6.4, 2.7 Hz, 1H), 7.09 (dd, J = 8.3, 1.3 Hz, 1H), 6.97 – 6.86 (m, 1H), 5.53 (s, 2H), 5.27 (s, 2H)

1-octyl-4-phenyl-1H-1,2,3-triazole
1H NMR (400 MHz, CDCl3) δ 8.04 – 7.97 (m, 2H), 7.67 (ddd, J = 7.0, 2.4, 1.2 Hz, 1H), 7.58 – 7.50 (m, 2H), 7.44 (s, 1H), 5.82 (s, 2H), 2.81 – 2.68 (m, 2H), 1.44 – 1.27 (m, 10H), 0.93 – 0.85 (m, 3H).

1-(4-nitrophenyl)-4-phenyl-1H-1,2,3-triazole
1H NMR (500 MHz, CDCl3) δ 8.53 – 8.41 (m, 2H), 8.30 (s, 1H), 8.11 – 8.02 (m, 2H), 7.96 – 7.89 (m, 2H), 7.53 – 7.45 (m, 2H), 7.44 – 7.38 (m, 1H).

1-(4-methoxyphenyl)-4-phenyl-1H-1,2,3-triazole
1H NMR (500 MHz, CDCl3) δ 8.00 (t, J = 5.8 Hz, 2H), 7.95 (s, 1H), 7.87 (dd, J = 5.1, 3.3 Hz, 2H), 7.43 (dd, J = 10.5, 4.8 Hz, 2H), 7.37 – 7.31 (m, 1H), 7.09 – 6.94 (m, 2H), 5.83 (s, 2H), 3.90 (s, 3H).

4-hexyl-1-(4-nitrophenyl)-1H-1,2,3-triazole
1H NMR (400 MHz, CDCl3) δ 8.51 – 8.35 (m, 2H), 8.07 – 7.91 (m, 2H), 7.83 (s, 1H), 2.94 – 2.71 (m, 2H), 1.88 – 1.69 (m, 2H), 1.47 – 1.23 (m, 6H), 1.01 – 0.78 (m, 3H).

2-(4-hexyl-1H-1,2,3-triazol-1-yl)-1-phenylethan-1-one
1H NMR (500 MHz, CDCl3) δ 8.03 – 7.96 (m, 2H), 7.69 – 7.63 (m, 1H), 7.57 – 7.51 (m, 2H), 7.46 – 7.43 (m, 1H), 5.82 (s, 2H), 2.74 (dd, J = 17.5, 9.7 Hz, 2H), 1.70 (dt, J = 15.4, 7.5 Hz, 2H), 1.42 – 1.26 (m, 6H), 0.91 – 0.85 (m, 3H).

1-Benzyl-4-phenoxymethyl-1*H*-1,2,3-triazole
1H NMR (500 MHz, CDCl3) δ 7.51 (s, 1H), 7.41 – 7.33 (m, 3H), 7.31 – 7.26 (m, 4H), 7.10 – 7.03 (m, 2H), 6.99 – 6.95 (m, 2H), 5.53 (s, 2H), 5.19 (m, 2H).