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Magnetic Starch Nanocomposite as a Green Heterogeneous Support for Immobilization of Large Amounts of Copper Ions

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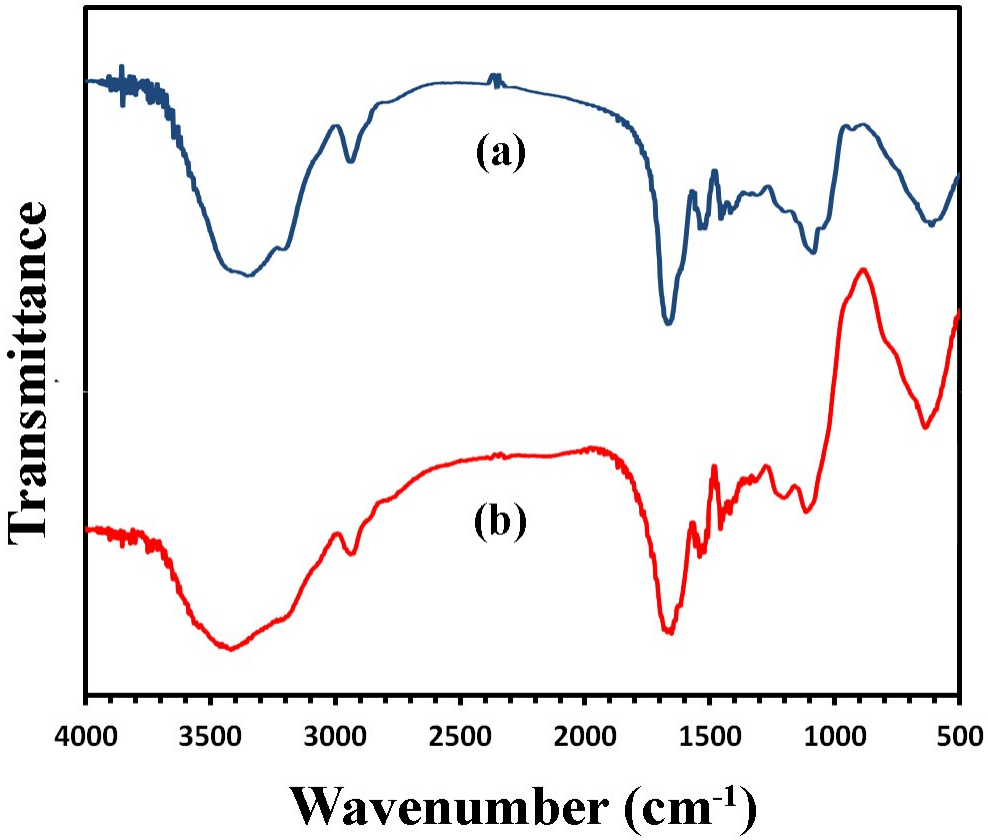
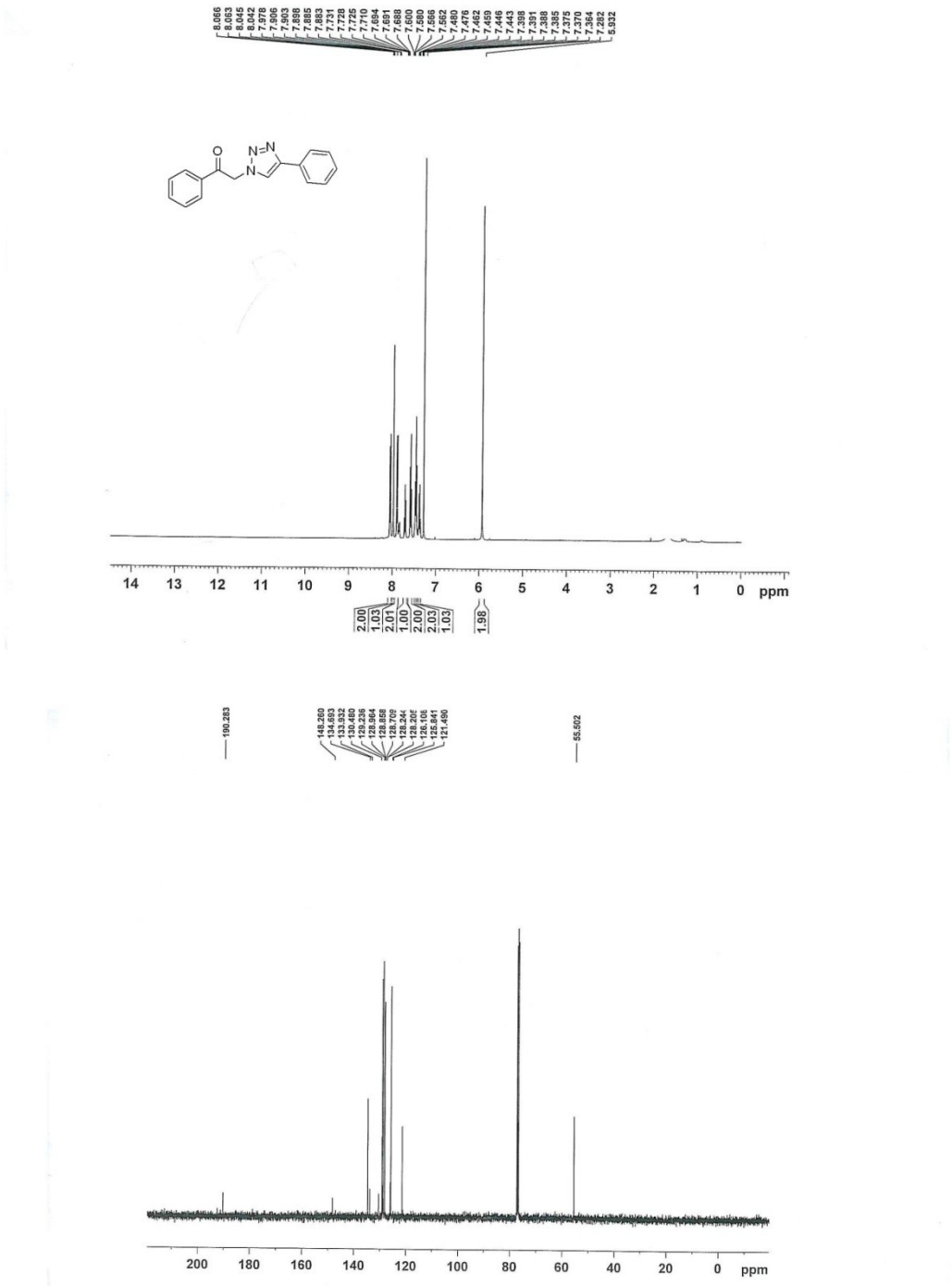


Fig. S1 FT-IR spectra of fresh (a) and recycled (b) catalyst.

1H NMR of selected compounds:

1-phenyl-2-(4-phenyl-1H-1,2,3-triazol-1-yl)ethanone:

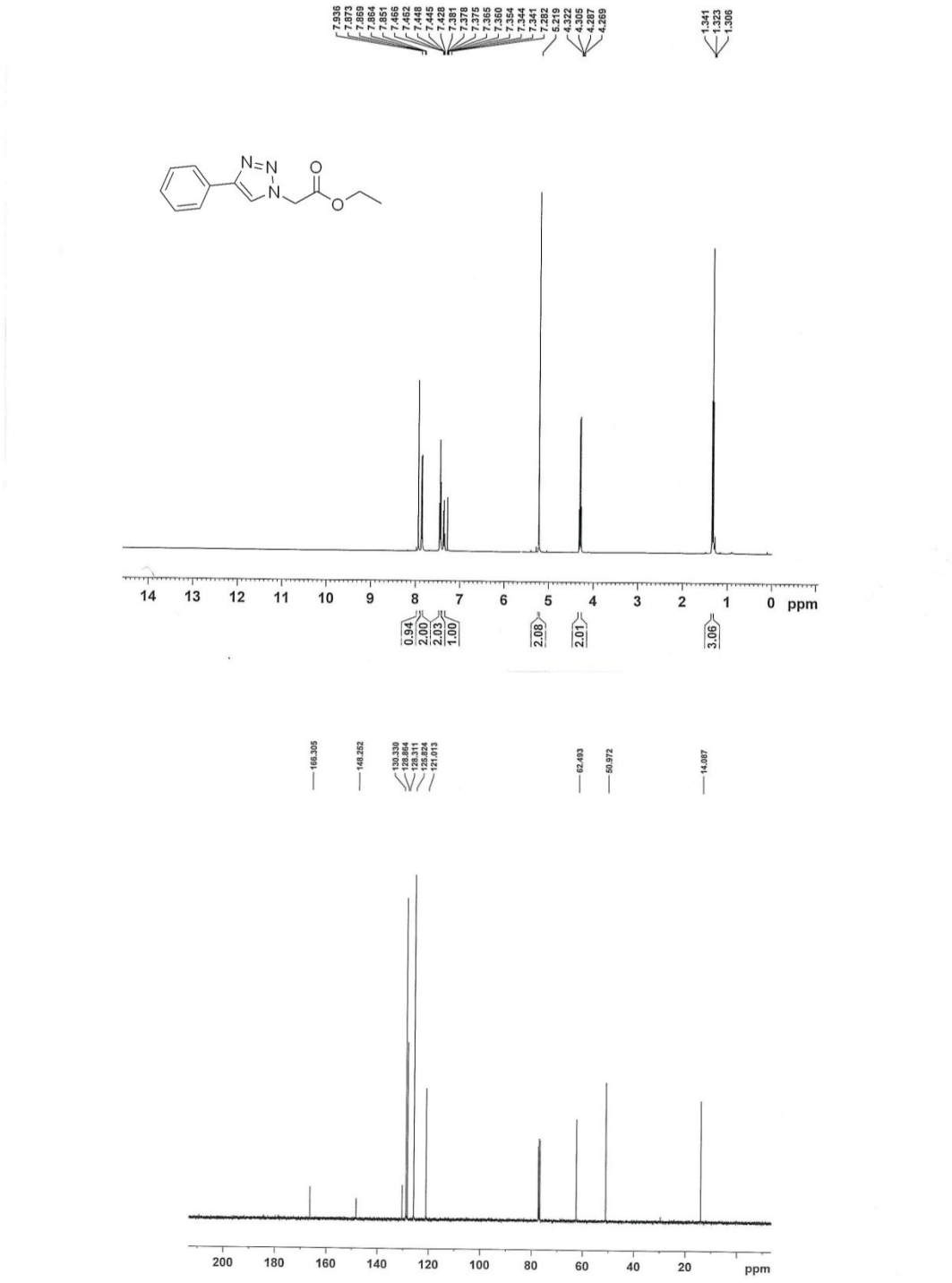
Colourless solid; ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.93 (s, 2H), 7.36-7.90 (m, 6H), 8.01 (d, J = 7.2 Hz, 2H); 8.04 (s, 1H); 8.06 (d, J = 7.2 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 55.4, 121.4, 125.8, 128.2, 128.8, 129.2, 130.5, 133.9, 134.6, 148.2, 190.2



ethyl 2-(4-phenyl-1H-1,2,3-triazol-1-yl)acetate:

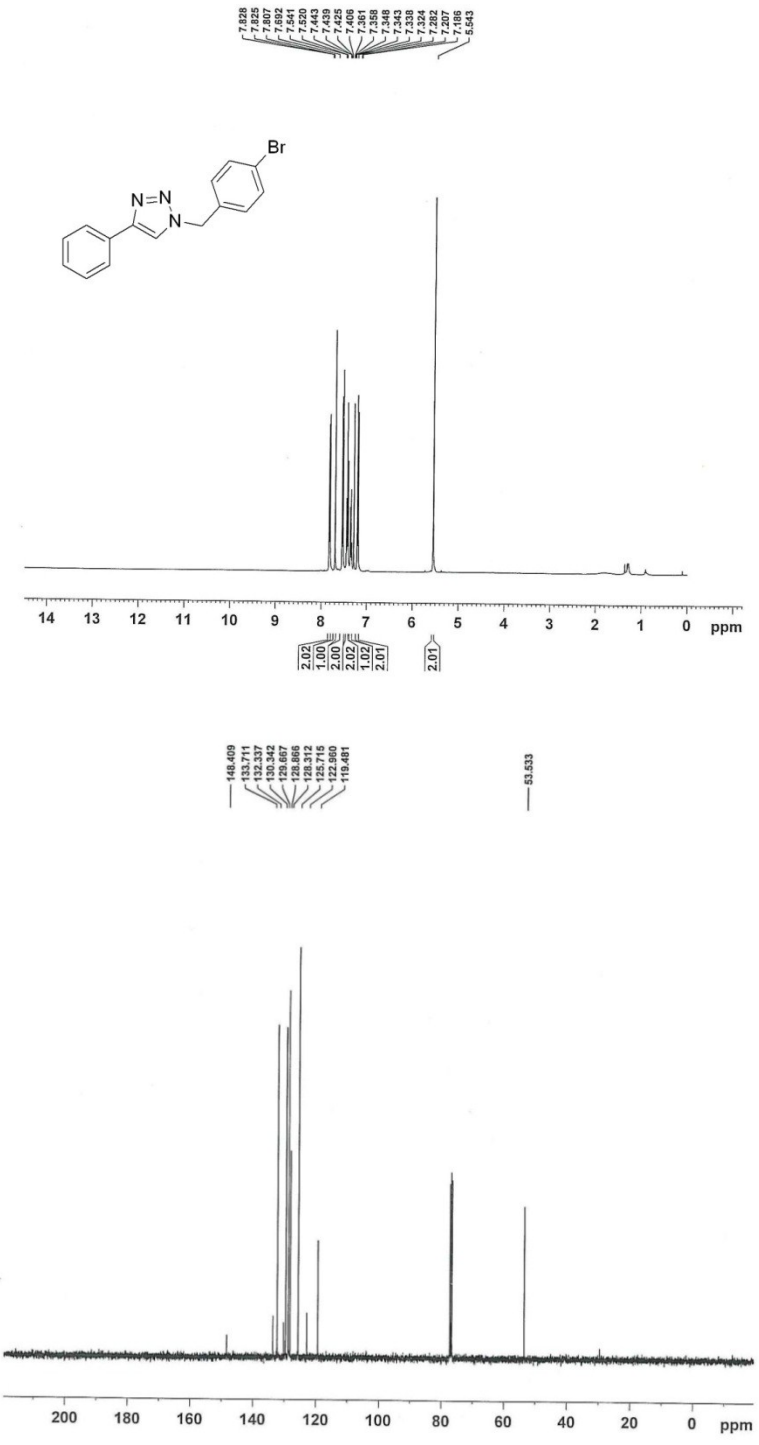
^{1}H NMR (400 MHz, $CDCl_3$) δ: 1.33 (3H, t, J =7.6 Hz), 4.26 (2H, q, J =7.6 Hz), 5.20 (2H, s), 7.34-7.46 (3H, m), 7.85-7.87 (2H, m, ortho to Ar), 7.93 (1H, s);

^{13}C NMR (100MHz, $CDCl_3$) δ: 14.0, 50.9, 62.4, 121.0, 125.8, 128.3, 128.8, 130.3, 148.2, 166.3;



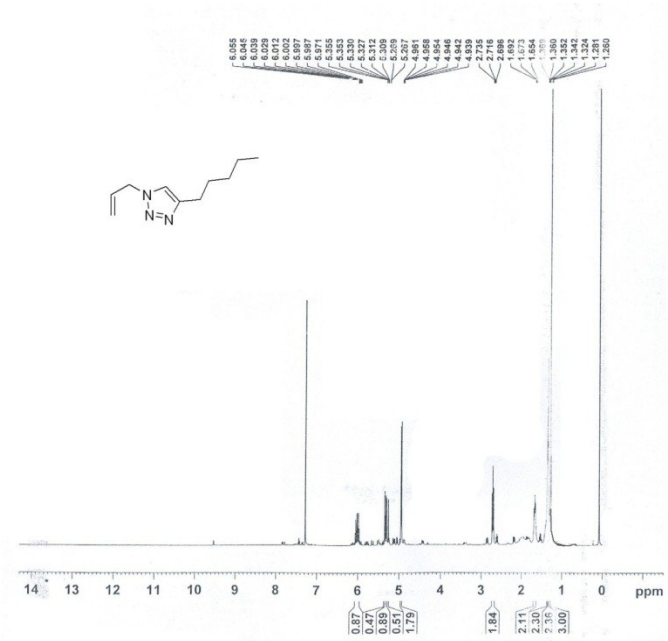
1-(4-bromobenzyl)-4-phenyl-1H-1,2,3-triazole:

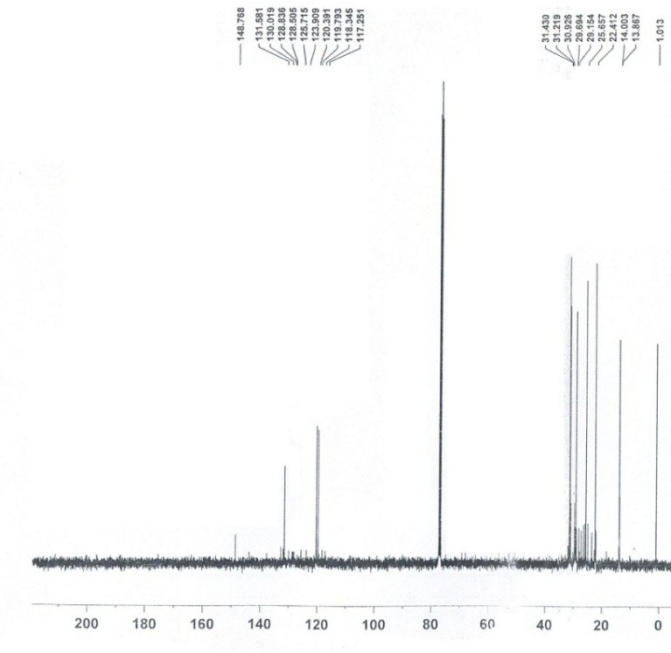
^{1}H NMR (400 MHz, $CDCl_3$) δ = 5.69 (2H, s), 7.31-7.36 (1H, m), 7.40-7.44 (4H, m), 7.76 (s, 1 H), 7.81 (2H, d, *J* = 6.8 Hz), 8.22 (2H, d, *J* = 6.8Hz,); ^{13}C NMR (100 MHz, $CDCl_3$) 53.1, 119.7, 124.0, 124.2, 125.7, 128.4, 128.5, 128.8, 130. 0, 141.7, 148.0, 148.6;



1-allyl-4-pentyl-1H-1,2,3-triazole:

^{1}H NMR (400 MHz, $CDCl_3$) δ = 1.28 (3H, t), 1.32-1.37 (2H, m), 1.35-1.36 (4H, m), 1.67 (2H, t), 2.27 (2H, t), 4.92 (2H, d), 5.26-5.36 (2H, m), 5.97-6.05 (1H, m), 7.46 (1H, s); ^{13}CNMR (100 MHz, $CDCl_3$) : 13.8, 22.4, 25.6, 29.6, 30.9, 31.4, 119.7, 120.4, 130.0, 148.7



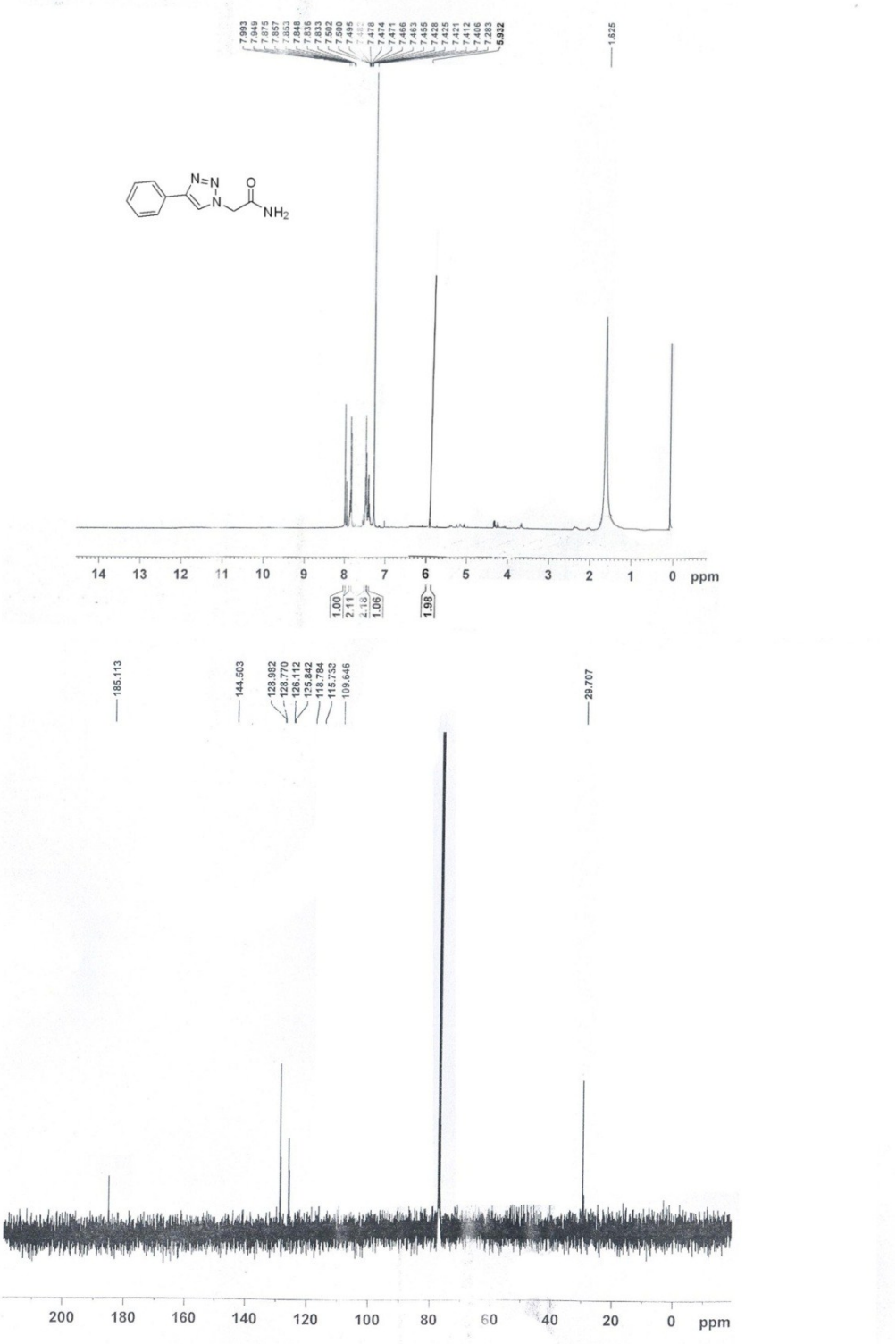


2-(4-phenyl-1H-1,2,3-triazol-1-yl)acetamide:

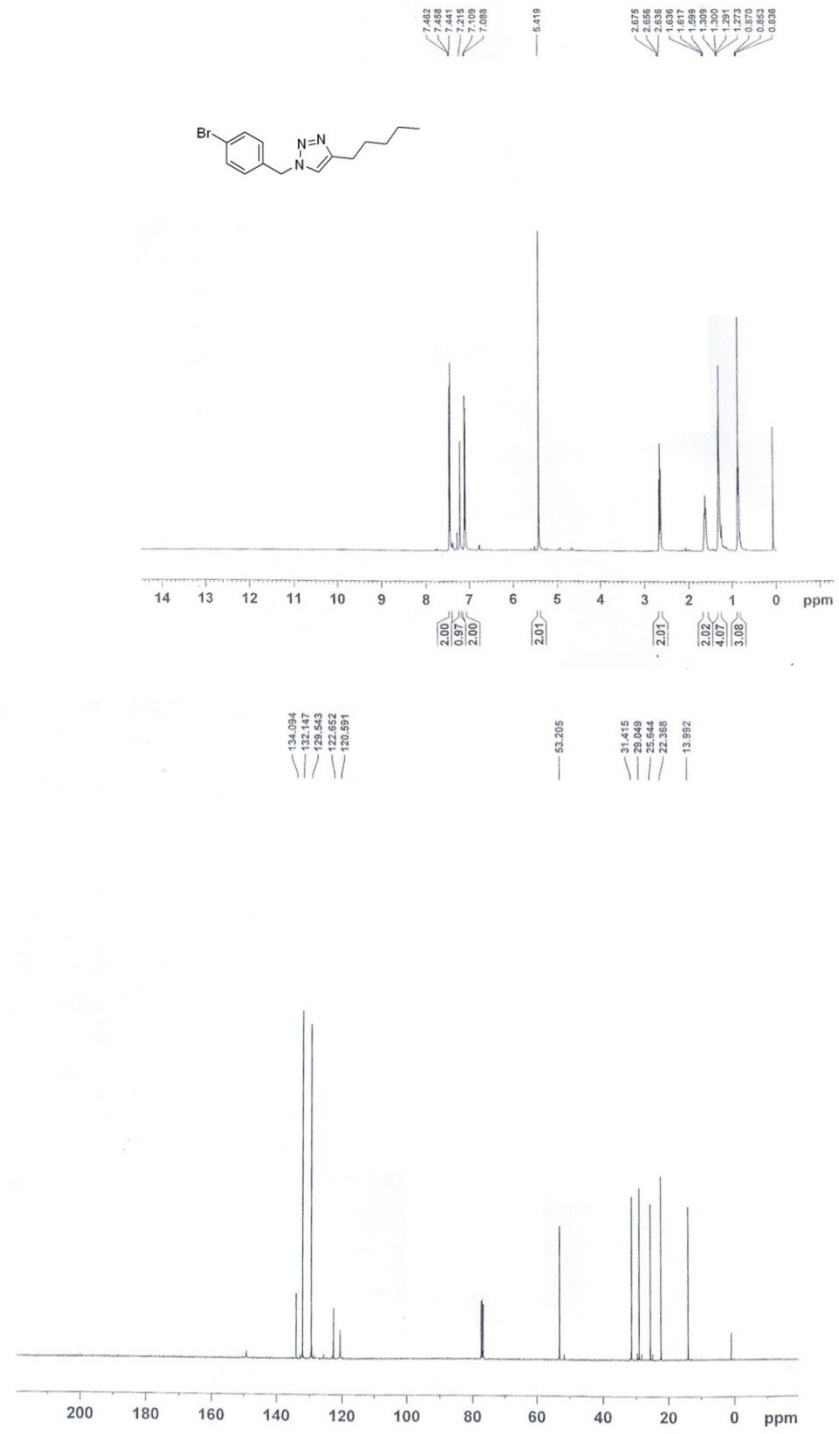
White solid, mp 102-104^{o}C;

^{1}H NMR (400 MHz, $CDCl_3$) δ: 1.62 (2H, broad), 5.93 (2H, s), 7.28 (1H, s), 7.40-7.40 (2H, m), 7.83-7.99 (3H, m, ortho to Ar)

^{13}C NMR (100 MHz, $CDCl_3$) δ: 29.70, 109.64, 115.73, 118.78, 126.11, 128.98, 144.50, 185.11;

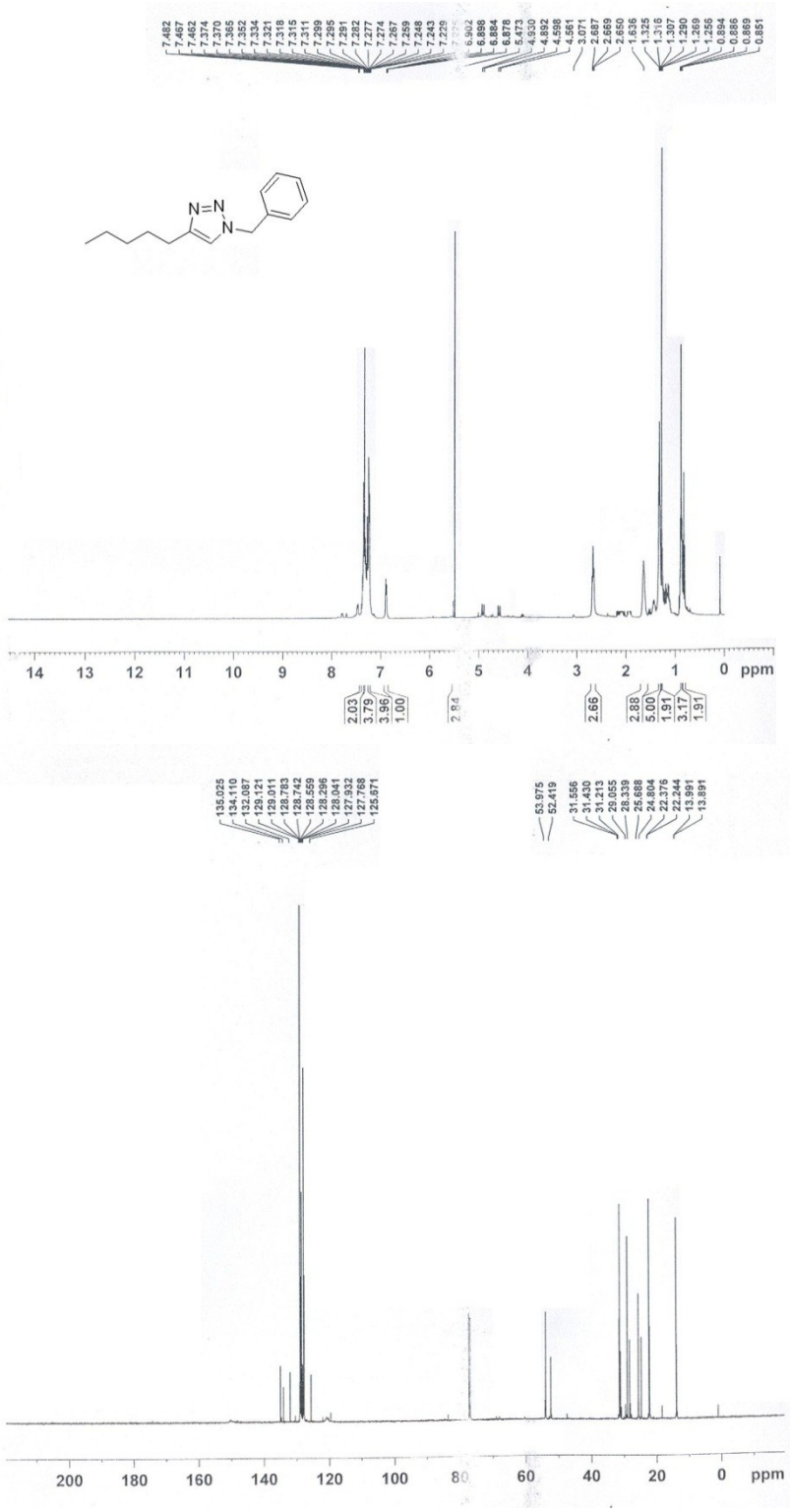


1-(4-bromobenzyl)-4-pentyl-1H-1,2,3-triazole: ^{1}H NMR (400 MHz, $CDCl_3$) δ = 0.85 (3H, t, *J* = 6.9 Hz), 1.27-1.30 (4 H, m), 1.59-1.63 (2H, m), 2.65 (2H, t, *J* = 7.4 Hz), 5.41 (2H, s), 7.09 (2H, d, *J* = 6.3 Hz,), 7.21 (1H, s), 7.46 (2H, d, *J* = 6.3 Hz); ^{13}C NMR (100 MHz, $CDCl_3$) 13.9, 22.3, 25.6, 29.0, 13.9, 22.3, 25.6, 29.0, 31.4, 53.2, 120.5, 122.6, 129.5, 132.1, 134.0;



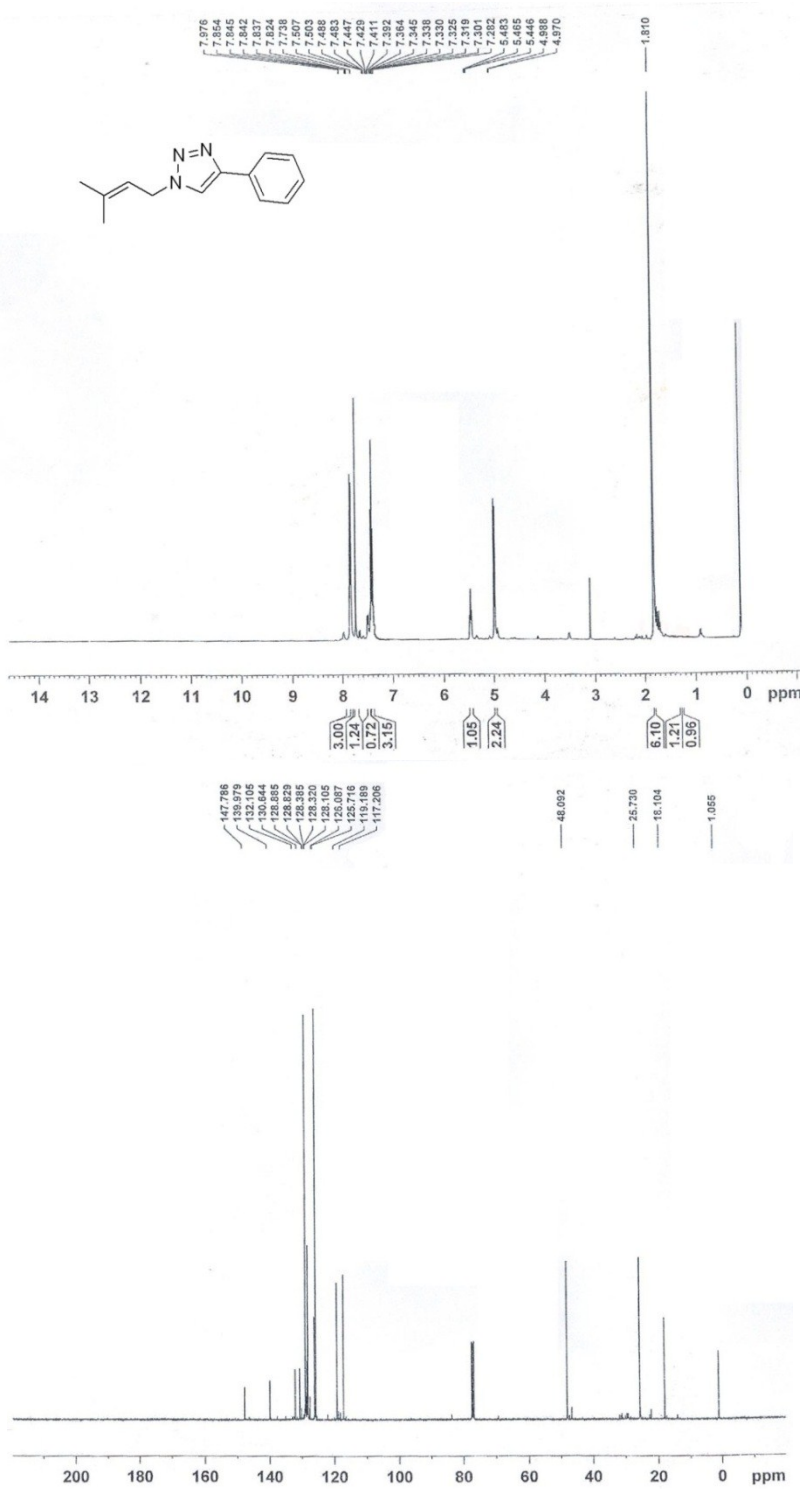
1-benzyl-4-pentyl-1H-1,2,3-triazole:

^{1}H NMR (400 MHz, $CDCl_3$) δ = 0.87 (3H, t, *J* = 6.9 Hz), 1.29-1.33 (4H, m), 1.61-1.65 (2H, m), 2.67 (2H, t, *J* = 7.4 Hz), 5.49 (2H, s), 7.17 (1H, s), 7.25 (2H, d, *J* = 8.0 Hz), 7.34-7.38 (3H, m,);
^{13}C NMR (100 MHz, $CDCl_3$) 13.9, 22.3, 25.6, 29.0, 31.4, 53.9, 120.4, 127.9, 128.5, 129.0, 135.0, 148.9;

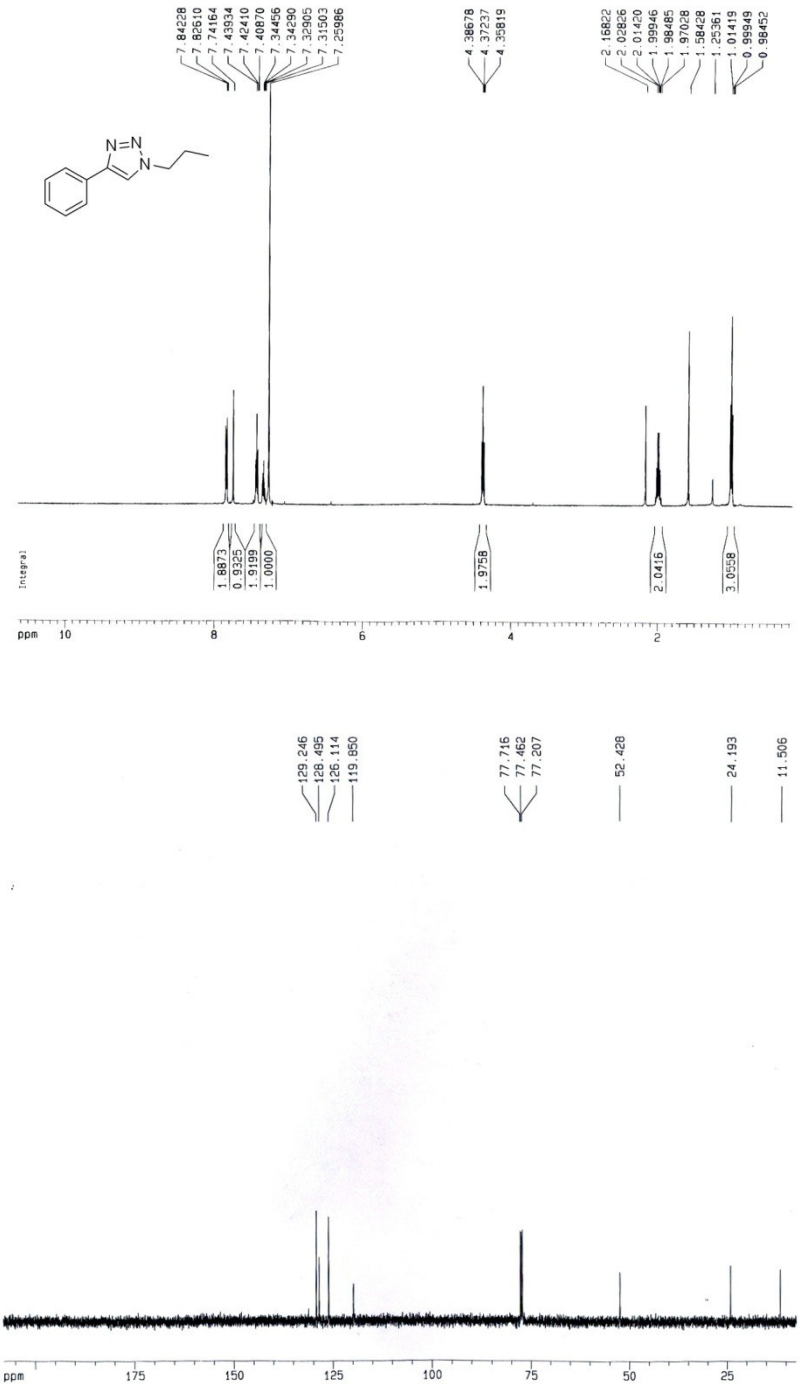


1-(3-methylbut-2-en-1-yl)-4-phenyl-1H-1,2,3-triazole:

^{1}H NMR (400 MHz, $CDCl_3$) δ = 1.81(6H, s), 4.97 (2H, d, *J*= 7.2Hz), 5.46 (1H, t, *J*= 7.2Hz), 7.28-7.36 (3H, m), 7.73 (1H, s), 7.82-7.85 (2H,m); ^{13}C NMR (100 MHz, $CDCl_3$) 18.1, 25.7, 48.1, 117.2, 119.2, 126.7, 128.1, 128.8, 139.9, 147.7



4-phenyl-1-propyl-1H-1,2,3-triazole:
White solid, mp 62-64ºC, ^{1}H NMR (400 MHz, $CDCl_3$) δ: 0.99 (3H, t, *J*= 7.3), 1.97-2.02 (2H, m), 4.37 (2H, t, *J*=7.3), 7.26-7.34 (1H, m, Ar), 7.42 (2H, t, Ar), 7.74 (1H, s), 7.83 (2H, d); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 11.5, 24.1, 51.9, 119.8 , 126.1, 128.5, 129.2, 130.70, 147.61



1-(naphthalen-2-ylmethyl)-4-phenyl-1H-1,2,3-triazole: ^{1}H NMR (400 MHz, $CDCl_3$) δ = 6.02 (2H, s), 7.25-7.26 (2H, m), 7.33-7.34 (2H, m), 7.47-7.53 (4H, m), 7.72-7.74(2H, m), 7.90 (2H, d, *J*= 5.2), 8.00 (1H, d, *J*= 5.2); ^{13}C NMR (100 MHz, $CDCl_3$) 52.8, 119.8, 123.3, 125.7, 126.0, 126.8, 127.8, 128.3, 128.5, 129.1, 129.3, 130.2, 130.5, 130.9, 131.6, 134.3