Electronic Supplementary Material (ESI) for Catalysis Science & Technology

Supporting information

Magnetically recoverable γ-Fe2O3 nanocatalyst for the synthesis of 2-phenylquinazolines under solvent free conditions

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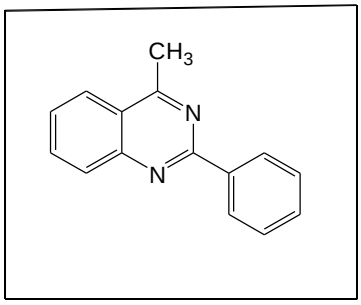
General information

All chemicals were purchased from Sigma Aldrich. Analytical TLC was performed by using silica gel 60 F254 pre-coated plates and the products were visualized by UV lamp. All products were characterized by ^{1} H & ^{13}C NMR spectra. ^{1}H NMR and ^{13}C NMR recorded on 200 or 300 MHz and 75 MHz in CDCl3. Chemical shifts were reported in parts per million (ppm, δ) using TMS as the internal standard downfield from the tetramethylsilane

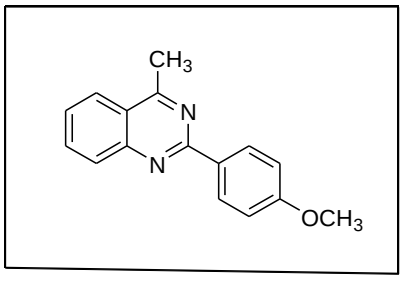
Characterization data of 2-phenylquinazoline compounds

4-methyl-2-phenylquinazoline *(Table 3, Entry 1)* [1]



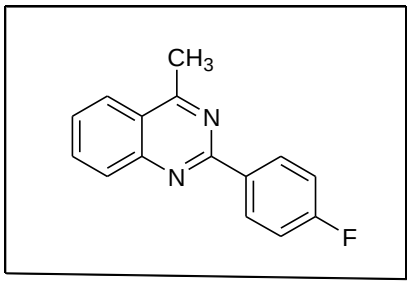
m.p. 72-76 ^{0}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 2.99 (s, 3H), 7.50-7.59 (m, 4H), 7.85 (t, *J* = 8.3, 1H), 8.07 (d, *J* = 8.3 Hz, 2H), 8.60--8.63 (m, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 21.7, 122.7, 123.6, 124.9, 126.7, 128.2, 128.2, 129.3, 130.3, 133.0, 138.2, 139.1, 150.1, 160.2, 168.1 ppm.

2-(4-methoxyphenyl)-4-methylquinazoline *(Table 3, Entry 2)* [1]



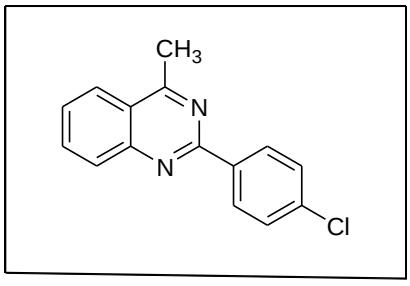
m.p. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 2.95 (s, 3H), 3.85 (s, 3H), 6.96 (d, *J* = 9.1 Hz, 1H), 7.19 (t, *J* = 8 Hz, 2H), 7.63 (d, *J* = 8.3, 2H), 7.78 (t, *J* = 8.3 Hz, 1H), 7.97 (d, *J* = 8.3 Hz, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 21.7, 55.0, 113.5, 115.2, 122.5, 124.7, 126.0, 128.8, 130.7, 131.7, 133.1, 134.0, 150.3, 159.5, 161.8, 166.9

2-(4-fluorophenyl)-4-methylquinazoline *(Table 3, Entry 3)* [1]



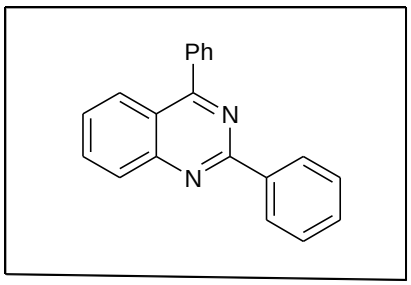
m.p. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 2.89 (s, 3H), 7.40-7.48 (m, 3H), 7.77-7.82 (m, 1H), 7.92-7.96 (m, 2H), 8.51 (d, *J* = 8.2 Hz, 2H), ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 21.7, 122.5, 124.1, 124.7, 126.8, 128.3, 129.0, 130.0, 133.2, 136.6, 136.9, 150.5, 158.9, 161.2, 168.0 .

2-(4-chlorophenyl)-4-methylquinazoline *(Table 3, Entry 4)* [1]



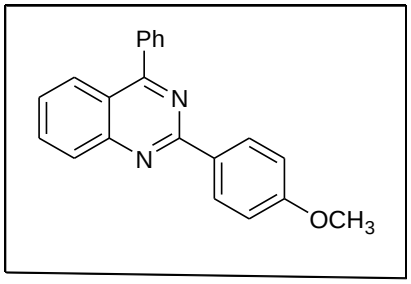
m.p. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 2.90 (s, 3H), 7.39-7.47 (m, 3H), 7.75-7.79 (m, 1H), 7.93-7.96 (m, 2H), 8.52 (d, *J* = 8.2 Hz, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 22.1, 123.1, 123.8, 124.9, 126.7, 128.5, 129.0, 129.7, 133.4, 136.4, 136.7, 150.0,150.4, 158.9, 168.5.

2,4-diphenylquinazoline *(Table 3, Entry 5)* [2]



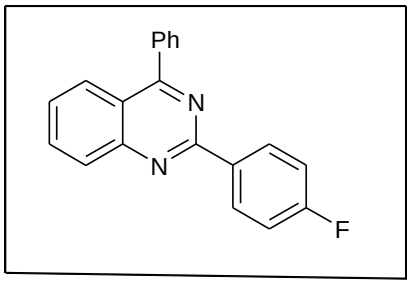
m.p. 117-119 ^{0}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 7.45-7.54 (m, 4H), 7.54-7.61 (m, 3H), 7.84-7.89 (m, 3H), 8.09-8.18 (m, 2H), 8.65-8.71 (m, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 121.6, 126.8, 128.5, 128.8, 129.2, 129.8, 130.1, 130.5, 133.5, 137.7, 138.3, 152.1, 160.2, 168.3.

2-(4-methoxyphenyl)-4-phenylquinazoline *(Table 3, Entry 6)* [2]



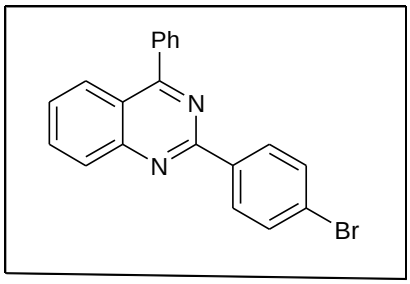
m.p. 158-161 ^{o}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 3.89 (s, 3H), 7.02-7.07 (m, 2H), 7.35-7.42 (m, 1H), 7.51-7.60 (m, 4H), 7.82-7.89 (m, 4H), 8.10-8.17 (m, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 55.5, 113.9, 121.6, 126.2, 127.2, 128.4, 128.7, 129.9, 130.1, 130.2, 130.9, 133.8, 137.2, 150.5, 160.1, 161.7, 167.6.

2-(4-fluorophenyl)-4-phenylquinazoline *(Table 3, Entry 7)* [2]



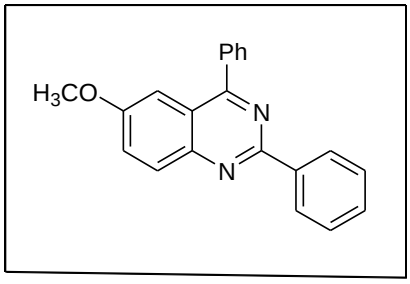
m.p. 154-156 ^{o}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 7.50-7.54 (m, 3H), 7.59-7.63 (m, 3H), 7.78-7.89 (m, 3H), 8.09-8.12 (m, 2H), 8.68-8.71 (m, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 115.2, 115.6, 121.7, 126.4, 126.9, 128.6, 128.9, 129.9, 130.1, 130.6, 130.9, 133.4, 134.3, 134.9, 137.7, 152.3, 160.2, 163.1, 165.7,168.0 .

2-(4-bromophenyl)-4-phenylquinazoline *(Table 3, Entry 8)* [2]



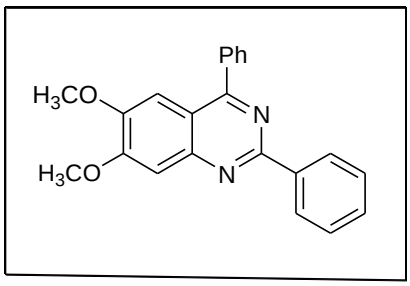
m.p. 141-144 ^{o}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 7.45-7.59 (m, 4H), 7.70-7.79 (m, 4H), 7.86 (t, *J* = 8.4 Hz, 1H), 8.05 (d, *J* = 8.3 Hz, 1H), 8.15 (d, *J* = 8.4 Hz, 1H), 8.64-8.68 (m, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 121.4, 124.4, 126.4, 127.2, 128.3, 128.6, 129.3, 130.6, 131.8, 133.6, 134.4, 136.7, 137.9, 151.9, 160.3, 166.9.

6-methoxy-2,4-diphenylquinazoline *(Table 3, Entry 9)* [1]



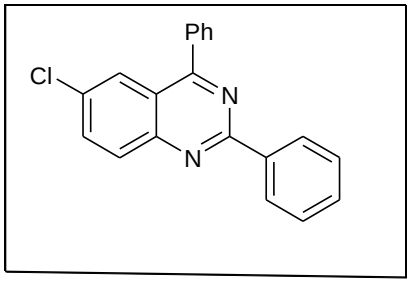
m.p. 169-175 ^{o}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 3.89 (s, 3H), 7.03-7.10 (m, 2H), 7.35-7.42 (m, 1H), 7.52-7.57 (m, 4H), 7.81-7.87 (m, 4H), 8.16-8.20 (m, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 55.1, 113.1, 122.7, 125.9, 128.6, 129.1, 129.4, 129.9, 130.2, 130.7, 132.6, 133.9, 134.3, 139.2, 151.4, 160.4, 167.6.

6,7-dimethoxy-2,4-diphenylquinazoline *(Table 3, Entry 10)* [2]



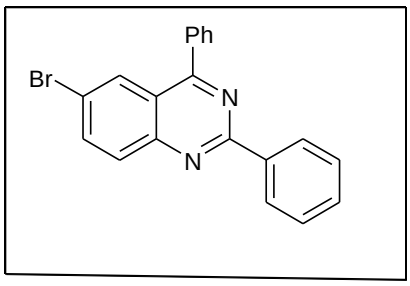
m.p. 179-184 ^{o}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 3.89 (s, 3H), 4.08(s, 3H), 7.32 (s, 1H), 7.45-7.51 (m, 4H), 7.57-7.61 (m, 3H), 7.85-7.88 (m, 2H), 8.60--8.64 (m, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 55.3, 56.1, 104.3, 107.6, 117.1, 127.9, 128.6, 128.9, 129.6, 129.9, 130.2, 138.6, 139.1, 150.4, 151.4, 155.4, 160.5, 167.0

6-chloro-2,4-diphenylquinazoline *(Table 3, Entry 11)* [2]



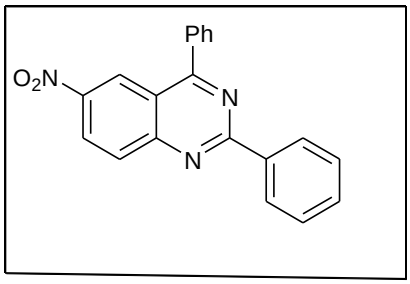
m.p. 198-203 ^{o}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 7.54-7.50 (m, 3H), 7.60-7.62 (m, 3H), 7.79-7.86 (m, 3H), 8.06-8.11 (m, 2H), 8.68-8.72 (m, 2H) . ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 121.8, 125.9, 128.3, 128.9, 129.7, 130.2, 130.4, 130.9, 132.5, 133.2, 134.6, 136.9, 137.6, 150.7, 160.3, 167.9

6-bromo-2,4-diphenylquinazoline *(Table 3, Entry 12)* [2]



m.p. 209-212 ^{o}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 7.49-7.57 (m, 4H), 7.72-7.79 (m, 4H), 7.88 (t, *J* = 8.3, 1H), 8.04 (d, *J* = 8.4 Hz, 1H), 8.16 (d, *J* = 8.4 Hz, 1H), 8.63-8.68 (m, 2H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 121.2, 124.7, 126.5, 127.1, 128.5, 128.7, 129.3, 130.6, 131.9, 133.2, 136.5, 138.0, 151.0, 160.6, 167.5.

6-nitro-2,4-diphenylquinazoline *(Table 3, Entry 13)* [1]



m.p. 215-217 ^{o}C. ^{1}H NMR (300MHz, $CDCl_3$, TMS) δ (ppm) 7.25 (s, 1H), 7.51-7.52 (m, 3H), 7.65-7.68 (m, 3H), 7.91 (m, 2H), 8.21 (d, *J* = 9.5 Hz, 1H), 8.72-8.75 (m, 2H), 9.03 (s, 1H). ^{13}C NMR (75MHz $CDCl_3$, TMS) δ (ppm) 123.9, 126.8, 128.7, 129.1, 129.2, 130.3, 130.6, 131.1, 131.7, 132.4, 150.8, 160.6, 167.9 .

References

[1] K. Karnakar, J. Shankar, S. Narayana Murthy, K. Ramesh and Y. V. D. Nageswar, Synlett., 2011, 8, 1089.

[2] J. Zhang, D. Zhu, C. Yu, C. Wan and Z. Wang, Org. Lett., 2010, 12, 2841