Supporting Information

Amine-functionalized MIL-101(Cr) embedded with Co(II) phthalocyanine as a durable catalyst for one-pot tandem oxidative A^3 coupling reactions of alcohols

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Spectral data:

All of the products are known compounds and were reported previously.\(^1\)

1-(1,3-Diphenylprop-2-yn-1-yl)piperidine (5a)

Yellow oil (0.250 g, 91%): \(^1\)H NMR (300.13 MHz, CDCl\(_3\)) \(\delta\): 1.35-1.50 (2H, m, CH\(_2\)), 1.55-1.77 (4H, m, 2CH\(_2\)), 2.57-2.60 (4H, m, 2CH\(_2\)), 4.82 (1H, s, CH\(_{\text{benzylic}}\)), 7.31-7.67 (10H, m, H\(_{\text{arom}}\)).

1-(3-Phenyl-1-(p-tolyl)prop-2-yn-1-yl)pyrrolidine (5d)

Yellow oil (0.236 g, 86%): \(^1\)H NMR (300.13 MHz, CDCl\(_3\)) \(\delta\): 1.84 (4H, br s, 2CH\(_2\)), 2.38 (3H, s, CH\(_3\)), 2.76 (4H, br s, 2CH\(_2\)), 4.93 (1H, s, CH\(_{\text{benzylic}}\)), 7.19-7.55 (9H, m, H\(_{\text{arom}}\)).

4-(3-Phenyl-1-(p-tolyl)prop-2-yn-1-yl)morpholine (5e)

Yellow oil (0.241 g, 83%): \(^1\)H NMR (300.13 MHz, CDCl\(_3\)) \(\delta\): 2.38 (4H, br s, 2CH\(_2\)), 2.64 (4H, br s, 2CH\(_2\)), 3.72 (4H, 2H, br s, 2CH\(_2\)), 4.76 (1H, s, CH\(_{\text{benzylic}}\)), 7.13-7.53 (9H, m, H\(_{\text{arom}}\)).

4-(1-(4-Methoxyphenyl)-3-phenylprop-2-yn-1-yl)morpholine (5g)

Yellow oil (0.267 g, 87%): \(^1\)H NMR (300.13 MHz, CDCl\(_3\)) \(\delta\): 2.63 (4H, br s, 2CH\(_2\)), 3.74 (4H, 2H, br s, 2CH\(_2\)), 3.83 (3H, s, OCH\(_3\)), 4.74 (1H, s, CH\(_{\text{benzylic}}\)), 6.90-7.62 (9H, m, H\(_{\text{arom}}\)).

References

Figure 1. $^1$H NMR spectrum of 1-(1,3-diphenylprop-2-yn-1-yl)piperidine (5a).

Figure 2. $^1$H NMR spectrum of 1-(3-phenyl-1-(p-tolyl)prop-2-yn-1-yl)pyrrolidine (5d).
Figure 3. $^1$H NMR spectrum of 4-(3-phenyl-1-(p-tolyl)prop-2-yn-1-yl)morpholine (5e).

Figure 4. $^1$H NMR spectrum of 4-(1-(4-methoxyphenyl)-3-phenylprop-2-yn-1-yl)morpholine (5g).