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Immobilized Pd complexes over HMMS as catalysts for Heck cross-coupling and selective hydrogenation reactions

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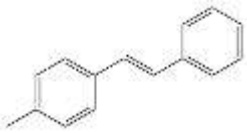
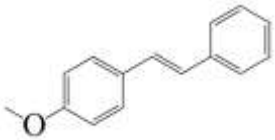
1.(E)-Stilbene  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

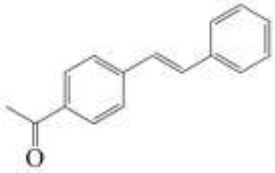
δ 7.60 (d, J=1.0 Hz, 4H), δ 7.43 (t, J=7.5 Hz, 4H), δ 7.32 (t, J=7.2 Hz, 2H), δ 7.19 (s, 2H).

2. 4-Methylstilbene  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

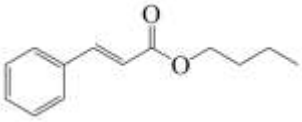
δ 7.48 (d, J=7.6 Hz, 2H), δ 7.40 (d, J=8.0 Hz, 2H), δ 7.33 (t, J=8.0 Hz, 2H), δ 7.23 (t, J=7.2 Hz,1H), δ 7.15 (d, J=8.0 Hz, 2H), δ 7.06 (d, J=2.4 Hz, 1H), δ 2.34 (s, 3H).

3. 4-Methoxystilbene  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

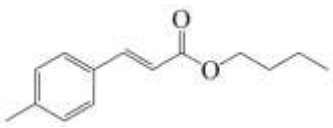
δ 7.36 (d, J=7.4 Hz, 2H), δ 7.33 (d, J=8.7 Hz, 2H), δ 7. 24 (m, 1H), δ 6.94 (d, J=16.3 Hz, 1H), δ 6.84 (d, J=16.3 Hz, 1H), δ 6.76 (d, J=8.7 Hz, 2H), δ 3.71 (s, 3H).

4. 4-Acetylstilbene  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

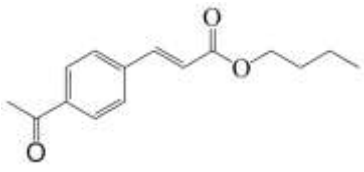
δ 7.90 (d, J=8.4 Hz, 2H), δ 7.53 (d, J=8.4 Hz, 2H), δ 7.48 (m, 2H), δ 7.35 (m, 2H), δ 7.28 (m, 1H), δ 7.17 (d, J=16.3 Hz, 1H), δ 7.07 (d, J=16.3 Hz, 1H), δ 2.55 (s, 3H)

5. (E)-n-butyl cinnamate  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

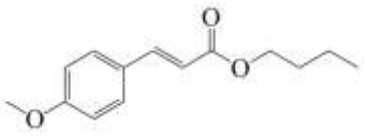
δ 7.72 (d, J=16.0 Hz, 1H), δ 7.56 (q, J=3.7 Hz, 2H), δ 7.41 (t, J=1.0 Hz, 3H), δ 6.48 (d, J=16.0 Hz, 1H), δ 4.26 (t, J=6.7 Hz, 2H), δ 1.74 (m, 2H), δ 1.49 (m, 2H), δ 1.01 (t, J=7.4 Hz, 3H)

6. (E)-butyl 3-(p-tolyl)acrylate  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

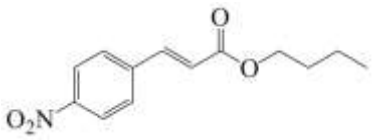
δ 0.88 (t, J = 7.5 Hz, 3H), δ 1.20 (m, J =7.3 Hz, 2H), δ 1.99 (m, J = 6 Hz, 2H), δ 2.80 (s, 3H), δ 4.90 (t, J = 6.5 Hz, 2H), δ 6.60 (d, J = 16 Hz, 1H), δ 7.25 (d, J = 8.5 Hz, 2H), δ 7.55 (d, J = 8.5 Hz, 2H), δ 7.87 (d, J = 16 Hz, 1H).

7. (E)-butyl 3-(4-acetylphenyl)acrylate  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

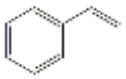
δ 7.96 (m, 2H), δ 7.69 (d, J=16.0 Hz, 1H), δ 7.59 (m, 2H), δ 6.53 (d, J=16.0 Hz, 1H), δ 4.22 (t, J=6.6 Hz, 2H), δ 2.57 (s, 3H), δ 1.69 (m, 2H), δ 1.46 (m, 2H), δ 0.96 (t, J=7.4 Hz, 3H.)

8. (E)-butyl 3-(4-methoxyphenyl)acrylate  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

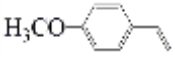
δ 7.68 (d, J=16.0 Hz, 1H), δ 7.51 (m, 2H), δ 6.93 (m, 2H), δ 6.35 (d, J=16.0 Hz, 1H), δ 4.24 (t, J=6.6 Hz, 2H), δ 3.86 (s, 3H), δ 1.72 (m, 2H), δ 1.46 (m, 2H), δ 0.99 (t, J=7.3 Hz, 3H).

9. (E)-butyl 3-(4-nitrophenyl)acrylate  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

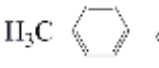
δ 0.93 (t, J = 7.5Hz, 3H), δ 1.40 (m, 2H), 1.66 (m, 2H), 4.17 (t, J= 7.5 Hz, 2H), 6.53 (d, J = 16.0 Hz, 1H), 7.68 (m, 3H), δ 8.20 (d, 2H, J = 8.7 Hz)

10. Styrene  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

δ 7.393 (d, J= 8 Hz, 2H), δ 7.32-7.23 (m, 2H), δ 7.22 (t, J=6.4 Hz 1H), δ 6.67-6.74 (m, 1H), δ 5.71-5.76 (m, 1H), δ 5.18 (d, J=10.8 Hz, 1H).

11. 4-Methyl styrene  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

δ 7.41 (d, J=8.8 Hz, 2H), δ 6.92 (d, J=8.8 Hz, 2H), δ 6. 70-6.77 (m, 1H), δ 5.68 (d, J=4.8 Hz, 1H), δ 5.19 (d, J=5.6 Hz, 1H), δ 3.16 (s, 3H).

12. 4-methoxy styrene  ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)

δ 7.29 (d, J=4 Hz, 2H), δ 7.11 (d, J= 4.0 Hz, 2H), δ 6.64-6.71 (m, 1H), 5.68 (d, J=17.6 Hz, 1H), δ 5.17 (d, J= 10.8 Hz, 1H), δ 2.32 (s, 3H).