Electronic Supplementary Material (ESI) for New Journal of Chemistry

Stabilizing Pd^{II} on hollow magnetic mesoporous spheres: a highly active and recyclable catalyst for carbonylative cross-coupling and Suzuki coupling reactions

Jianrui Niu, Mengmeng Liu, Peng Wang, Yu Long, Miao Xie, Rong Li[*] and Jiantai Ma[*]

[*] *Corresponding author: Tel: +86-931-891-3597. Fax: +86-0931-891-2582*
E-mail address: liyirong@lzu.edu.cn.
[*] *Corresponding author: Tel: +86-931-891-2311. Fax: +86-0931-891-2582*
E-mail address: majiantai@lzu.edu.cn.

1. Biphenyl. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
   δ 7.343 (t, 2H, J_{HH}=7.2 Hz), 7.439 (t, 4H, J_{HH}=7.6 Hz), 7.594 (d, 4H, J_{HH}=4.0 Hz)

2. 4-methyl-biphenyl. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
   δ 2.376 (s, 3H, CH_3), 7.230 (d, 2H, J_{HH}=4.0 Hz), 7.302 (t, 1H, J_{HH}=7.2 Hz), 7.405 (t, 2H, J_{HH}=7.6 Hz), 7.468 (t, 2H, J_{HH}=9.6 Hz), 7.564 (d, 2H, J_{HH}=4.0 Hz)

3. 4-Nitro-biphenyl. ^{1}H NMR ($(CD_3)_2SO$, 400 MHz, 25℃)
   δ 6.849 (d, 1H, J_{HH}=8.8 Hz), 7.268 (t, 2H, J_{HH}=7.6Hz), 7.402 (t, 2H, J_{HH}=7.8 Hz), 7.478 (d, 2H, J_{HH}=8.4 Hz), 7.566 (d, 2H, J_{HH}=7.6 Hz)

4. 1-biphenyl-4-yl-ethanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
   δ 2.643 (s, 3H, $COCH_3$), 7.405 (t, 1H, J_{HH}=7.2 Hz), 7.478 (t, 2H, J_{HH}=7.6 Hz), 7.633 (d, 2H, J_{HH}=3.6 Hz), 7.689 (d, 2H, J_{HH}=4.0 Hz), 8.037 (d, 2H, J_{HH}=4.0 Hz)

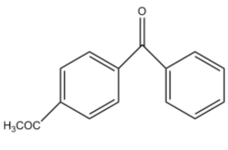
5. 4-methyl-4'-niro-biphenyl. ^{1}H NMR ($(CD_3)_2SO$, 400 MHz, 25℃)
   δ 2.365 (s, 3H, CH_3), 7.336 (d, 2H, J_{HH}=4.0 Hz), 7.685 (d, 2H, J_{HH}=3.6 Hz), 7.928 (d, 2H, $^{2}J_{HH}$=4.0 Hz), 8.275 (d, 2H, J_{HH}=4.0 Hz)

6. 4,4'-dimethyl-biphenyl. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
   δ 2.381 (s, 6H), 7.229 (d, J_{HH} =7.6 Hz, 4H), 7.473(d, J_{HH} =8.0 Hz, 4H)

7. Benzophenone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
   δ 7.81 (d, J_{HH}=8.2Hz, 4H), 7.60 (m, 2H), 7.50 (t, J_{HH}=7.6 Hz, 4H)

8. phenyl(p-tolyl)methanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
   δ 7.79 (d, J_{HH}=7.2Hz, 2H), 7.723 (d,J=8.0Hz, 2H), 7.58 (t, J_{HH}=7.4 Hz, 1H), 7.53 (t, J_{HH}=7.8Hz, 2H), 7.29 (d, J=8.0Hz, 2H), 2.43 (s, 3H)

9. (4-methoxyphenyl)(phenyl)methanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
   δ 7.81 (d, J_{HH}=7.2Hz, 2H), 7.75 (d, J_{HH}=5.2Hz, 2H), 7.54 (t, J_{HH}=7.2 Hz, 1H), 7.45 (t, J_{HH}=7.4Hz, 2H), 6.98 (d, J_{HH}=7.6Hz, 2H), 3.86 (s, 3H)

10. 

   ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
   δ 8.06 (d, J_{HH}=8.8Hz, 2H), 7.87 (d, J_{HH}=8.4Hz, 2H), 7.80 (d, J_{HH}=8.4Hz, 2H), 7.62 (t, J_{HH}=8.8Hz, 1H), 7.50 (t, J_{HH}=7.5Hz, 2H), 2.67 (s, 3H)

11. (4-chlorophenyl)(phenyl)methanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
   δ 7.77 (m, 4H), 7.60 (m, 1H), 7.49 (m, 4H),

12. (2-aminophenyl)(phenyl)methanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 7.63 (d, J_{HH}=8.1Hz, 2H), 7.50 (d, J_{HH}=7.3Hz, 2H), 7.44 (t, J_{HH}=5.9Hz,1H), 7.27 (m, 2H), 6.72 (d, J_{HH}=8.0Hz, 1H), 6.58 (t, J_{HH}=7.9Hz, 1H), 6.1 (br, 2H).

13. (4-chlorophenyl)(p-tolyl)methanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 7.76 (d, J_{HH}=8.4Hz, 2H), 7.70 (d, J_{HH}=8.0Hz, 2H), 7.46 (d, J_{HH}=8.4Hz,2H), 7.30 (d, J_{HH}=8.0Hz, 2H), 2.44 (s, 3H).

14. (4-chlorophenyl)(4-methoxyphenyl)methanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 7.79 (m, 2H), 7.70 (m, 2H), 7.44 (m, 2H), 6.97 (m, 2H), 3.87 (s, 3H).

15. (4-methoxyphenyl)(p-tolyl)methanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 7.82 (m, 2H), 7.68 (d, J_{HH}=8.0Hz, 2H), 7.27 (d, J_{HH}=8.4Hz, 2H), 6.97 (m, 2H), 3.89 (s, 3H), 2.44 (s, 3H).

16. di-p-tolylmethanone. ^{1}H NMR ($CDCl_3$, 400 MHz, 25℃)
δ 7.71 (d, J_{HH}=8.0Hz, 4H), 7.27 (d, J_{HH}=8.0Hz, 4H), 2.44 (s, 6H).