

## Supplementary Material

### Cellulose supported ionic liquid phase catalyst mediated Mannich reaction

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### Spectral data of synthesized compounds

1,3-Diphenyl-3-(phenylamino)propan-1-one, C<sub>21</sub>H<sub>19</sub>NO; (**Table 3, entry 14a**): IR (KBr, thin film):  $\nu = 3384, 3098, 3023, 2878, 1669, 1598, 1509, 1448, 1369, 1290, 1176, 1001, 743, 687$  cm<sup>-1</sup>; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>):  $\delta$  7.88 (d,  $J = 9$  Hz, 2H), 7.59-7.40 (m, 5H), 7.34-7.24 (m, 4H), 7.14 (t,  $J = 9$  Hz, 2H), 6.85-6.75 (m, 3H), 5.04 (t,  $J = 6.6$  Hz, 1H), 3.68 (d,  $J = 6.3$  Hz, 2H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>):  $\delta$  190.5, 144.8, 136.6, 134.9, 133.4, 129.1, 128.9, 128.8, 128.6, 128.4, 127.6, 126.8, 122.2, 55.3, 46.0; MS (EI):  $m/z = 301$  (M<sup>+</sup>); Anal. Calcd. for C<sub>21</sub>H<sub>19</sub>NO (301.15): C, 83.69; H, 6.35; N, 4.65. Found: C, 83.65; H, 6.31; N, 4.67.

1-(4-Methoxyphenyl)-3-phenyl-3-(phenylamino)propan-1-one, C<sub>22</sub>H<sub>21</sub>NO<sub>2</sub>; (**Table 3, entry 4b**): IR (KBr, thin film):  $\nu = 3383, 3026, 2928, 1663, 1660, 1514, 1458, 1401, 1219, 1021, 832, 741, 682$  cm<sup>-1</sup>; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>):  $\delta$  7.97-7.82 (d,  $J = 8.9$  Hz, 2H); 7.42-7.41 (m, 2H), 7.31-7.28 (m, 3H), 7.18-7.03 (m, 2H), 6.98 (d,  $J = 8.9$  Hz, 2H), 6.72-6.66 (m, 3H), 4.92 (t,  $J = 6.8$  Hz, 1H), 3.81 (s, 3H), 3.66-3.42 (m, 2H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>):  $\delta$  196.5, 163.3, 146.2, 143.9,

130.1, 130.5, 129.7, 128.4, 127.0, 126.8, 117.2, 114.7, 113.2, 55.8, 55.7, 45.3; MS (EI):  $m/z = 331$  ( $M^+$ ); Anal. Calcd. for  $C_{22}H_{21}NO_2$  (331.16): C, 79.73; H, 6.39; N, 4.23. Found: C, 79.77; H, 6.34; N, 4.27.

1-(3-Methoxyphenyl)-3-phenyl-3-(phenylamino)propan-1-one,  $C_{22}H_{21}NO_2$ ; (**Table 3, entry 4c**): IR (KBr, thin film):  $\nu = 3390, 3003, 2919, 1731, 1671, 1578, 1512, 1492, 1451, 1289, 1176, 1005, 748, 692\text{ cm}^{-1}$ ;  $^1\text{H NMR}$  (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  7.48-7.26 (m, 5H), 7.42 (d, 3H), 7.27 (t,  $J = 0.9, 7.5\text{ Hz}$ , 2H), 6.66 (t,  $J = 7.5, 7.2\text{ Hz}$ , 3H), 6.60-6.57 (m, 1H), 5.05-5.02 (m, 1H), 4.56 (s, 1H), 3.85 (s, 3H), 3.56-3.38 (m, 2H);  $^{13}\text{C NMR}$  (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  198.1, 159.9, 146.9, 142.9, 138.0, 129.6, 129.1, 128.8, 127.3, 126.3, 120.8, 120.0, 117.7, 113.8, 112.3, 55.4, 54.8, 46.4; MS (EI):  $m/z = 331$  ( $M^+$ ); Anal. Calcd. for  $C_{22}H_{21}NO_2$  (331.16): C, 79.73; H, 6.39; N, 4.23. Found: C, 79.70; H, 6.42; N, 4.25.

1-(2-Methoxyphenyl)-3-phenyl-3-(phenylamino)propan-1-one,  $C_{22}H_{21}NO_2$ ; (**Table 3, entry 4d**): IR (KBr, thin film):  $\nu = 3421, 3019, 2846, 1673, 1597, 1507, 1458, 1433, 1292, 1211, 1029, 751, 669\text{ cm}^{-1}$ ;  $^1\text{H NMR}$  (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  7.69 (dd,  $J = 7.9, 2.0\text{ Hz}$ , 1H), 7.52-7.42 (m, 3H), 7.37-7.14 (m, 3H), 7.19-7.11 (m, 2H), 7.11-6.89 (m, 2H), 6.81-6.67 (m, 3H), 5.04-4.87 (m, 1H), 3.87 (s, 3H), 3.62-3.51 (m, 2H);  $^{13}\text{C NMR}$  (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  200.9, 158.1, 148.1, 143.1, 134.3, 131.8, 129.5, 128.2, 129.6, 127.3, 125.2, 121.1, 117.1, 113.3, 111.9, 55.8, 55.2, 51.5; MS (EI):  $m/z = 331$  ( $M^+$ ); Anal. Calcd. for  $C_{22}H_{21}NO_2$  (331.16): C, 79.73; H, 6.39; N, 4.23. Found: C, 79.76; H, 6.35; N, 4.27.

1-(4-Chlorophenyl)-3-phenyl-3-(phenylamino)propan-1-one,  $C_{21}H_{18}ClNO$ ; (**Table 3, entry 4e**): IR (KBr, thin film):  $\nu = 3371, 3019, 2931, 2324, 1922, 1689, 1609, 1592, 1509, 1438, 1351, 1211, 1172, 1099, 831, 751, 695\text{ cm}^{-1}$ ;  $^1\text{H NMR}$  (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  7.88 (d,  $J = 8.4\text{ Hz}$ , 2H), 7.51-7.22 (m, 7H), 7.21-7.15 (m, 2H), 6.87-6.61 (m, 3H), 5.10 (t,  $J = 6.5\text{ Hz}$ , 1H), 3.61-3.51 (m,

2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  197.8, 147.1, 142.6, 139.2, 135.9, 129.1, 129.6, 129.3, 129.1, 127.9, 126.2, 118.7, 115.2, 55.9, 46.6; MS (EI):  $m/z = 337$  ( $\text{M}+2$ ) $^+$ ; Anal. Calcd. for  $\text{C}_{21}\text{H}_{18}\text{ClNO}$  (335.83): C, 75.11; H, 5.40; N, 4.17. Found: C, 79.16; H, 6.46; N, 4.13.

3-(4-Bromophenylamino)-1,3-diphenylpropan-1-one,  $\text{C}_{21}\text{H}_{18}\text{BrNO}$ ; (**Table 3, entry 4f**): IR (KBr, thin film):  $\nu = 3371, 3022, 1668, 1599, 1581, 1502, 1441, 1401, 1315, 1289, 1078, 914, 841$   $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  7.84 (d,  $J = 7.5$  Hz, 2H), 7.65-7.12 (m, 10H), 6.64 (d,  $J = 8.6$  Hz, 2H), 4.93 (t,  $J = 6.2$  Hz, 1H), 3.61 (d,  $J = 6.2$  Hz, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  197.2, 148.7, 145.1, 138.6, 133.3, 133.1, 129.6, 129.6, 129.1, 128.2, 127.2, 116.5, 54.2, 47.7; MS (EI):  $m/z = 381$  ( $\text{M}+2$ ) $^+$ ; Anal. Calcd. for  $\text{C}_{21}\text{H}_{18}\text{BrNO}$  (379.06): C, 66.33; H, 4.77; N, 3.68. Found: C, 66.36; H, 4.71; N, 3.72.

3-[(2-Nitrophenyl)amino]-1,3-diphenylpropan-1-one,  $\text{C}_{21}\text{H}_{18}\text{N}_2\text{O}_3$ ; (**Table 3, entry 4g**): IR (KBr, thin film):  $\nu = 3362, 1664, 1625, 1597, 1569, 1507, 1350, 1264, 1221, 731, 694$   $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR ( $\text{CDCl}_3$ ):  $\delta$  3.49 (dd,  $J = 5.2, 16.5$  Hz, 1H), 3.61 (dd,  $J = 7.2, 16.5$  Hz, 1H) 5.34 (dd,  $J = 6.7, 12.4$  Hz, 1H). 6.60–6.63 (m, 1H), 6.77 (d,  $J = 8.6$  Hz, 1H), 7.22–7.25 (m, 1H), 7.26–7.29 (m, 1H), 7.31 (t,  $J = 7.5$  Hz, 1H), 7.49 (m,  $J = 7.0$  Hz, 4H), 7.52 (t,  $J = 7.2$  Hz, 1H), 7.89 (d,  $J = 7.2$  Hz, 2H), 8.12 (dd,  $J = 1.4, 8.4$  Hz, 1H), 8.65 (d,  $J = 5.4$  Hz, 1H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  46.6, 53.7, 114.9, 115.8, 126.1, 126.6, 127.6, 128.0, 128.9, 129.2, 132.7, 133.4, 136.2, 136.8, 141.8, 144.5, 196.4; MS (EI):  $m/z = 346$  ( $\text{M}^+$ ); Anal. Calcd. for  $\text{C}_{21}\text{H}_{18}\text{N}_2\text{O}_3$  (346.13): C, 72.82; H, 5.24; N, 8.09. Found: C, 72.86; H, 5.21; N, 8.14.

1,3-Diphenyl-3-(3-nitrophenylamino)-1-propanone,  $\text{C}_{21}\text{H}_{18}\text{N}_2\text{O}_3$ ; (**Table 3, entry 4h**): IR (KBr, thin film):  $\nu = 3409, 1682, 1607, 1527, 1496, 723$   $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR ( $\text{CDCl}_3$ ):  $\delta$  3.42-3.42-3.55 (m, 2H), 5.12 (s, 1 H), 6.78-6.83 (m, 1H). 7.22 (t, 1H), 7.26 (t, 2H), 7.30–7.34 (m, 3H), 7.39–7.44 (m, 5H), 7.59 (t, 1H), 7.92 (d, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  46.2, 54.7, 77.1, 107.9, 112.5,

119.6, 126.4, 127.6, 128.9, 129.1, 129.7, 133.8, 136.5, 141.7, 147.7, 149.2, 197.7; MS (EI):  $m/z$  = 346 ( $M^+$ ); Anal. Calcd. for  $C_{21}H_{18}N_2O_3$  (346.13): C, 72.82; H, 5.24; N, 8.09. Found: C, 72.79; H, 5.27; N, 8.12.

3-(4-Nitro-phenylamino)-1,3-diphenyl-propan-1-one,  $C_{21}H_{18}N_2O_3$ ; (**Table 3, entry 4i**): IR (KBr, thin film):  $\nu$  = 3372, 1637, 1601, 1529, 1485, 725  $cm^{-1}$ ;  $^1H$  NMR ( $CDCl_3$ ):  $\delta$  3.55 (d, 2H,  $J$  = 6.7 Hz), 5.14 (t, 1 H), 6.35 (s, 2 H), 6.62 (d, 2H,  $J$  = 6.5), 7.18-7.22 (m, 1 H), 7.27-7.36 (m, 2H), 7.39 (d, 2H,  $J$  = 7.7 Hz), 7.57-7.65 (m, 3H), 7.98 (d, 2H,  $J$  = 7.1 Hz);  $^{13}C$  NMR (75 MHz,  $CDCl_3$ ):  $\delta$  45.4, 53.4, 111.5, 125.8, 126.3, 127.6, 128.7, 128.1, 128.0, 130.7, 132.6, 136.9, 138.7, 140.1, 197.1; MS (EI):  $m/z$  = 346 ( $M^+$ ); Anal. Calcd. for  $C_{21}H_{18}N_2O_3$  (346.13): C, 72.82; H, 5.24; N, 8.09. Found: C, 72.87; H, 5.19; N, 8.16.

1,3-Diphenyl-3-p-tolylamino-propan-1-one,  $C_{22}H_{21}NO$ ; (**Table 3, entry 4j**): IR (KBr, thin film):  $\nu$  = 3351, 1667, 1605, 1524, 1487, 721  $cm^{-1}$ ;  $^1H$  NMR ( $CDCl_3$ ):  $\delta$  2.19 (s, 3H), 3.60-3.43 (m, 2H), 4.96 (t, 1H), 6.84 (d, 2H,  $J$  = 8.5 Hz), 7.01 (d, 2H,  $J$  = 8.0 Hz), 7.05-7.01 (m, 2H), 7.17 (d, 2H,  $J$  = 6.4 Hz), 7.29-7.33 (m, 1H), 7.44-7.47 (m, 2H), 7.67-7.70 (m, 1H), 7.81 (d, 2H,  $J$  = 7.7 Hz);  $^{13}C$  NMR (75 MHz,  $CDCl_3$ ):  $\delta$  21.0, 47.5, 55.7, 111.2, 114.2, 117.2, 119.7, 121.9, 122.4, 128.5, 128.7, 131.7, 132.4, 136.5, 143.1, 198.4; MS (EI):  $m/z$  = 315 ( $M^+$ ); Anal. Calcd. for  $C_{22}H_{21}NO$  (315.16): C, 83.78; H, 6.71; N, 4.44. Found: C, 83.84; H, 6.68; N, 4.47.

3-[(2-Methylphenyl)amino]-1,3-diphenylpropan-1-one,  $C_{22}H_{21}NO$ ; (**Table 3, entry 4k**): IR (KBr, thin film):  $\nu$  = 3407, 1678, 1601, 1518, 1447, 687  $cm^{-1}$ ;  $^1H$  NMR ( $CDCl_3$ ):  $\delta$  2.22 (d, 3H,  $J$  = 3.6 Hz), 3.40-3.44 (m, 1H), 3.50-3.53 (m, 1H), 4.60 (s, 1H), 5.01-5.03 (m, 1H), 6.35-6.37 (m, 1H), 7.21-7.24 (m, 1H), 7.27-7.31 (m, 2H), 7.39-7.42 (m, 4H), 7.55-7.58 (m, 3H), 7.90-7.92 (m, 2H);  $^{13}C$  NMR (75 MHz,  $CDCl_3$ ):  $\delta$  18.1, 46.7, 55.4, 111.2, 117.6, 122.3, 126.5, 126.8, 127.7,

128.5, 128.7, 129.0, 130.1, 133.6, 136.9, 143.4, 144.7, 198.4; MS (EI):  $m/z = 315$  ( $M^+$ ); Anal. Calcd. for  $C_{22}H_{21}NO$  (315.16): C, 83.78; H, 6.71; N, 4.44. Found: C, 83.82; H, 6.69; N, 4.49.

1,3-Diphenyl-3-(p-methoxyphenylamino)-1-propanone,  $C_{22}H_{21}NO_2$ ; (**Table 3, entry 4l**): IR (KBr, thin film):  $\nu = 3394, 1678, 1505, 1292, 819, 703$   $cm^{-1}$ ;  $^1H$  NMR ( $CDCl_3$ ):  $\delta$  2.44 (s, 3H), 3.34-3.52 (m, 2H), 4.91 (t,  $J = 6.3$  Hz, 1H), 6.50 (d, 2H,  $J = 8.4$  Hz), 6.87 (d, 2H,  $J = 8.3$  Hz), 7.25 (t, 1H), 7.35 (t, 2H), 7.45-7.50 (m, 4H), 7.50 (t, 1H), 7.93 (d, 2H,  $J = 7.4$  Hz);  $^{13}C$  NMR (75 MHz,  $CDCl_3$ ):  $\delta$  47.0, 57.4, 57.9, 116.2, 122.9, 126.6, 127.5, 128.4, 128.7, 129.0, 129.7, 133.8, 136.5, 142.4, 150.5, 197.0; MS (EI):  $m/z = 331$  ( $M^+$ ); Anal. Calcd. for  $C_{22}H_{21}NO_2$  (331.16): C, 79.73; H, 6.39; N, 4.23. Found: C, 79.78; H, 6.44; N, 4.21.

3-(4-Chlorophenyl)-1-phenyl-3-(phenylamino)propan-1-one,  $C_{21}H_{18}ClNO$ ; (**Table 3, entry 4m**): IR (KBr, thin film):  $\nu = 3391, 3016, 2398, 1685, 1603, 1507, 1442, 1404, 1217, 1018, 821, 752, 698$   $cm^{-1}$ ;  $^1H$  NMR (300 MHz,  $CDCl_3$ ):  $\delta$  7.96-7.90 (m, 2H, Ar-H), 7.68-7.29 (m, 7H), 7.19 (t,  $J = 7.8$  Hz, 2H), 6.72 (t,  $J = 7.3$  Hz, 1H), 6.71 (d,  $J = 7.9$  Hz, 2H), 5.02 (t,  $J = 6.8$  Hz, 1H), 3.51 (d,  $J = 6.4$  Hz, 2H);  $^{13}C$  NMR (75 MHz,  $CDCl_3$ ):  $\delta$  197.2, 146.9, 141.1, 136.2, 133.1, 135.0, 128.6, 128.2, 128.1, 121.1, 128.1, 118.9, 114.7, 54.8, 47.0; MS (EI):  $m/z = 335$  ( $M^+$ ); Anal. Calcd. for  $C_{22}H_{21}NO_2$  (335.11): C, 75.11; H, 5.40; N, 4.17. Found: C, 75.14; H, 5.45; N, 4.20.