**Supporting Information**

**A green and convenient protocol for the synthesis of diarylmethanes via a one-pot, three-component reaction catalyzed by new silica tungstic acid (STA) under solvent free condition.**

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**Content:**

1. **Characterization data (4a-4j) and (7a-7e)**
2. **Spectral Copies of proton, carbon 13 NMR (4a-4j) and (7a-7e)**

1-(4-(Dimethylamino)benzyl)naphthalen-2-ol (**4a**) brown solid, mp 129–131 °C(Lit[11] 127−130 °C); IR (KBr): *v*=3768, 2920, 2356, 1609, 1441, 1255, 805, 746, 683 cm–1. 1H NMR (400 MHz, CDCl3): δ 2.86 (s, 6H, 2CH3), 4.34 (s, 2H, CH2), 5.10 (s, 1H, OH), 6.64 (d, 2H, J = 8.8 Hz, ArH), 7.06–7.09 (m, 3H, ArH),7.29–7.33 (m, 1H, ArH), 7.41-7.45 (m, 1H, ArH), 7.67 (d, 1H, J = 8.8 Hz, ArH), 7.77 (d, J = 8.1 Hz, 1H, ArH), 7.95 (d, J=8.4Hz, 1H, ArH) ppm; 13C NMR (100 MHz, CDCl3): δ 29.86, 41.01, 113.48, 118.20, 118.79, 123.22, 123.47, 126.67, 127.72, 128.39, 128.62, 128.96, 129.55, 133.78, 149.42, 151.51. HRMS (ESI, m/z): Calcd for C19H19NO (m/z) 277.1467; found: 277.1465.

1-(4-(Diethylamino)benzyl)naphthalen-2-ol (**4b**) brown solid, mp 84-87°C; IR (KBr): *v*=3772, 2920, 2366, 1619, 1440, 1265, 806, 745, 684 cm–1. 1H NMR (400 MHz, CDCl3): δ 1.08 (t, 6H, CH2CH3, J = 6.9 Hz), 3.25 (q, 4H, NCH2, J = 6.9 Hz), 4.31 (s, 2H, CH2), 6.56 (d, 2H, J=8.8Hz, ArH) 7.03(d, 2H, J=8.8 Hz, ArH), 7.07 (d, 1H, J=8.8 Hz, ArH), 7.30 (t, 1H, J=7.4 Hz, ArH), 7.24 (t, 1H, J=7.7 Hz, ArH), 7.65(d, 1H, J=8.8 Hz, ArH), 7.76 (d, 1H, J=8.1 Hz, ArH), 7.96 (d, 1H, J=8.8 Hz, ArH); 13C NMR (100 MHz, CDCl3): δ 12.63, 29.79, 44.50, 112.54, 118.24, 118.89, 123.16, 123.51, 126.08, 126.60, 128.30, 128.58, 129.15, 129.53, 133.80, 146.54, 151.59. HRMS (ESI, m/z): Calcd for C21H23NO (m/z) 305.1779; found: 305.1779.

1-(4-(N-Ethyl-N-methylamino)benzyl)naphthalen-2-ol (**4c**) brown solid, mp 94-97°C; IR (KBr): *v*=3296, 2980, 2845, 1632, 1436, 1248, 839, 742, 661. cm–1 1H NMR (400 MHz, CDCl3): δ 1.05 (t, 3H, J=6.7 Hz CH2CH3), 2.82 (s, 3H, NCH3), 3.31 (q, 2H, J=6.7, NCH2), 4.32 (s, 2H), 5.11 (s, 1H, OH), 6.60 (d, 2H, J=8.8 Hz, ArH), 7.05 (d, 2H, J=8.8 Hz, ArH), 7.08 (d, 1H, J=8.8 Hz, ArH), 7.29-7.33 (m, 1H), 7.40-7.49 (m, 1H, ArH), 7.66 (d, 1H, J=8.8 Hz, ArH), 7.77 (d, 1H, J=8.1 Hz, ArH), 7.96 (d, 1H, J=8.4 Hz, ArH); 13C NMR (100 MHZ, CDCl3): δ 11.27, 29.87, 37.64, 47.07, 113.12, 118.23, 118.84, 123.21, 123.50, 126.65, 126.78, 128.37, 128.62, 129.07, 129.58, 133.80, 147.95, 151.58. HRMS (ESI, m/z): Calcd for C20H21NO (m/z) 291.1623; found: 291.1623.

1-(4-(Dimethylamino)-2-methylbenzyl)naphthalen-2-ol (**4d**) Brown solid, mp 137-139°C (Lit[11] 138-140 °C); IR (KBr): *v*=3752, 2910, 2376, 1617, 1440, 1262, 801, 744, 681 cm–1. 1H NMR (400 MHz, DMSO-*d6*); δ 2.42 (s, 3H, ArCH3), 2.75(s, 6H, N(2CH3)), 4.14 (s, 2H), 6.19-6.27 (m, 2H, ArH), 6.61 (s, 1H, ArH), 7.21-7.33 (m, 3H, ArH), 7.56 (d, 1H, J=8.4 Hz, ArH), 7.71 (d, 1H, J=8.8 Hz, ArH), 7.78 (d, 1H, J=8.1 Hz, ArH), 9.58 (s, 1H, OH).13C NMR (100 MHz, DMSO-*d6*): 20.03, 26.39, 40.41, 110.23, 114.47, 117.39, 118.13, 122.16, 123.27, 125.99, 126.74, 127.49, 127.58, 128.23, 133.72, 135.93, 148.63, 152.90. HRMS (ESI, m/z): Calcd for C20H21NO (m/z) 291.1623; found: 291.1624.

1-(4-(Dimethylamino)-2,6-dimethylbenzyl)naphthalen-2-ol (**4e**) Pale yellow solid, mp 143-144 °C; IR (KBr): *v*=3360, 3059, 2956, 1603, 1439, 1283, 813, 737, 687 cm–1. 1H NMR (400 MHz, CDCl3); δ 2.26 (s, 6H, ArCH3), 2.93 (s, 6H, N(2CH3)), 4.39 (s, 2H), 5.81 (s, 1H, OH), 6.51 (s, 2H, ArH), 6.93 (d, 1H, J=8.8 Hz, ArH), 7.34 (t, 1H, J=8.1 Hz, ArH), 7.51 (t, 1H, J=8.4 Hz, ArH), 7.60 (d, 1H, J=8.8 Hz, ArH), 7.77 (d, 1H, J=7.7 Hz, ArH), 8.08 (d, 1H, J=8.4 Hz, ArH); 13C NMR (100 MHz, CDCl3): δ 21.21, 28.18, 40.58, 113.44, 114.12, 119.69, 121.65, 112.45, 123.02, 126.52, 128.24, 128.91, 129.41, 133.60, 138.91, 150.11, 153.59. HRMS (ESI, m/z): Calcd for C21H23NO (m/z) 305.1779; found: 305.1780

1-(4-(Dimethylamino)benzyl)naphthalene-2,7-diol (**4f**) brown solid, mp 184-187°C; IR (KBr): *v*=3773, 2921, 2376, 1612, 1442, 1260, 802, 741, 680 cm–1 1H NMR (400 MHz, CDCl3): δ 2.82 (s, 6H, 2CH3), 4.22 (s, 2H, CH2), 6.58 (d, 2H, J=8.4 Hz, ArH), 6.85 (dd, 1H, J=1.8 Hz, 8.8 Hz, ArH), 6.99 (d, 1H, J=8.8 Hz, ArH), 7.10 (d, 2H, J=8.4 Hz, ArH), 7.19 (s,1H, ArH), 7.47(d, 1H, J=8.8 Hz, ArH), 7.55 (d, 1H, J=8.8 Hz, ArH), 8.65 (s, 1H, OH), 8.93 (s, 1H, OH); 13C NMR (100 MHz, CDCl3 + DMSO-*d6*): δ 29.19, 40.58, 105.31, 112.63, 114.49, 114.84, 116.90, 123.23, 126.96, 128.59, 129.39, 135.11, 148.46, 152.46, 155.13. HRMS (ESI, m/z): Calcd for C19H19NO2 (m/z) 293.1415; found: 293.1416.

1-(4-(Diethylamino)benzyl)naphthalene-2,7-diol (**4g**) brown solid, mp 131-134°C (Lit[11] 130-134°C); IR (KBr): *v*=3762, 2922, 2365, 1621, 1444, 1261, 801, 745, 682 cm–1 1H NMR (400 MHz, CDCl3): δ 1.07 (t, 6H, CH2CH3, J = 6.9 Hz), 3.25 (q, 4H, NCH2, J = 6.9 Hz), 4.17 (s, 2H, CH2), 6.57 (d, 2H, J=8.8 Hz, ArH) 6.89-6.94 (m, 2H, ArH), 7.00 (d, 2H, J=8.8 Hz, ArH), 7.18 (d, 1H, J=8.1 Hz, ArH), 7.57 (d, 1H, J=8.8 Hz, ArH), 7.64 (d, 1H, J=8.8 Hz, ArH); 13C NMR (100 MHz, CDCl3): δ 11.55, 29.89, 44.59, 106.04, 112.93, 114.95, 115.73, 117.35, 124.93, 126.26, 128.21, 129.10, 130.55, 135.28, 146.53, 152.17, 154.41. HRMS (ESI, m/z): Calcd for C21H23NO2 (m/z) 321.1728; found: 321.1728.

1-(4-(N-Ethyl-N-methylamino)benzyl)naphthalene-2,7-diol (**4h**) brown solid, mp 137-139°C; IR (KBr): *v*=3294, 2946, 2545, 1627, 1425, 1243, 821, 743, 694 cm–1. 1H NMR (400 MHz, CDCl3): δ 1.02 (t, 3H, J=7.0 Hz CH2CH3), 2.78 (s, 3H, NCH3), 3.28 (q, 2H, J=7.0, NCH2), 4.22 (s, 2H), 6.55 (d, 2H, J=8.8 Hz, ArH), 6.86 (dd, 1H, J=2.2 Hz, 8.8 Hz, ArH), 6.99 (d, 1H, J=8.8 Hz, ArH), 7.08 (d, 2H, J=8.8 Hz, ArH), 7.21 (s, 1H, ArH), 7.47 (d, 1H, J=8.8 Hz, ArH), 7.55 (d, 1H, J=8.8 z, ArH), 8.50 (s, 1H, OH), 8.81 (s, 1H, OH); 13C NMR (100 MHZ, CDCl3 + DMSO-*d6*): δ 10.80, 29.31, 37.35, 46.69, 105.52, 112.53, 114.46, 115.00, 117.10, 123.43, 127.09, 128.82, 129.53, 135.27, 146.99, 152.55, 155.22. HRMS (ESI, m/z): Calcd for C20H21NO2 (m/z) 307.1572; found: 307.1572.

1-(4-(Dimethylamino)-2-methylbenzyl)naphthalene-2,7-diol (**4i**) Brown solid, mp 158-160°C (Lit[11] 157-160 °C); IR (KBr): *v*=3712, 2910, 2316, 1619, 1410, 1245, 816, 745, 664 cm–1. 1H NMR (400 MHz, DMSO-*d6*); δ 2.43 (s, 3H, ArCH3), 2.77 (s, 6H, N(2CH3), 4.02 (s, 2H), 6.23-6.30 (m, 2H, ArH), 6.62 (s, 1H, ArH), 6.79-6.81 (m, 2H, ArH), 7.00 (d, 1H, J=8.8 Hz, ArH), 7.55 (d, 1H, J=8.8 Hz, ArH), 7.61 (d, 1H, J=9.5, ArH), 9.40 (s, 1H, OH), 9.44 (s, 1H, OH). 13C NMR (100 MHz, DMSO-*d6*): δ 20.06, 26.58, 40.49, 105.06, 110.32, 114.55, 114.65, 114.76, 115.55, 122.97, 126.64, 127.39, 127.43, 129.81, 135.49, 135.97, 148.71, 153.22, 155.56. HRMS (ESI, m/z): Calcd for C20H21NO2 (m/z) 307.1572; found: 307.1573.

1-(4-(Dimethylamino)-2,6-dimethylbenzyl)naphthalene-2,7-diol (**4j**) Off white solid, mp 195-196°C; IR (KBr): *v*=3358, 3046, 2916, 1622, 1448, 1292, 821, 738, 665 cm–1. 1H NMR (400 MHz, DMSO); δ 2.14 (s, 6H, Ar 2CH3), 2.79 (s, 6H, N(2CH3)), 4.11 (s, 2H), 6.76 (dd, 1H, J=2.2 Hz, J=6.6 Hz, ArH), 6.83 (s, 1H, ArH), 6.9 (d, 1H, J=8.8 Hz, ArH), 7.46 (d, 1H, J=8.8 Hz, ArH), 7.54 (d, 1H, J=8.8 Hz, ArH), 9.39 (s, 1H, OH), 9.42 (s, 1H, OH). 13C NMR (100 MHz, DMSO-*d6*): δ 21.12, 25.30, 40.31, 105.51, 113.16, 114.43, 114.71, 116.73, 123.00, 126.73, 127.10, 129.74, 135.38, 136.73, 148.03, 152.82, 155.04. HRMS (ESI, m/z): Calcd for C21H23NO2 (m/z) 321.1728; found: 321.1729.

4-((1H-Indol-3-yl)methyl)-N,N-dimethylbenzenamine (**7a**) White crystals, mp 142-144°C (Lit[12a] 143°C); IR (KBr): *v*=3390, 3057, 2854, 1610, 1443, 1224, 834, 732, 696 cm–1. 1H NMR (400 MHz, CDCl3); δ 2.89 (s, 6H), 4.02 (s, 2H), 6.69 (d, 2H, J=8.4 Hz, ArH), 6.87 (s, 1H), 7.06 (t, 1H, J=8.1 Hz, ArH), 7.15 (d, 2H, J=8.4 Hz, ArH), 7.33 (d, 1H, J=7.3 Hz, ArH), 7.54 (d, 1H, J=7.7 Hz), 7.88(s , 1H, NH); 13C NMR (100 MHz, CDCl3): δ 30.66, 41.08, 111.11, 113.17, 116.93, 119.37, 122.05, 122.27, 129.41, 129.57, 136.62, 149.26. HRMS (ESI, m/z): Calcd for C17H18N2 (m/z) 250.1472; found: 250.1471

4-((1H-Indol-3-yl)methyl)-N,N-diethylbenzenamine (**7b**) White crystals, mp 139°C (Lit[12a] 139°C); IR (KBr): *v*=3380, 3027, 2851, 1620, 1433, 1224, 8343, 730, 691 cm–1. 1H NMR (400 MHz, CDCl3); δ 1.16 (t, 6H, J=7.0 Hz, CH2CH3), 3.30 (q, 4H, J =7.0 Hz, NCH2CH3), 4.00 (s, 2H), 6.62 (d, 2H, J= 8.8, ArH), 6.89 (s, 1H, ArH), 7.05-7.18 (m, 4H, ArH), 7.33 (d, 1H, J=8.1 Hz, ArH), 7.56(d, 1H, J=7.7 Hz, ArH), 7.87 (s , 1H); 13C NMR (100 MHz, CDCl3): δ 12.73, 30.56, 44.57, 111.09, 112.36, 117.04, 119.33, 119.41, 112.01, 112.27, 127.73, 128.22, 129.57, 136.60, 146.31. HRMS (ESI, m/z): Calcd for C19H22N2 (m/z) 278.1783; found: 278.1784.

4-((1H-Indol-3-yl)methyl)-N-ethyl-N-methylbenzenamine (**7c**) White crystal, mp 138°C; IR (KBr): *v*=3392, 3059, 2851, 1612, 1440, 1204, 824, 731, 692 cm–1. 1H NMR (400 MHz, CDCl3); δ 1.08 (t, 3H, J=7.1 Hz, CH2CH3), 2.86 (s, 3H), 3.35 (q, 2H, J=7.14, (NCH2CH3), 4.01 (s, 2H), 6.66 (d, 2H, J=8.8 Hz, ArH), 6.87 (s, 1H), 7.06 (t, 1H, J=8.1 Hz, ArH), 7.12-7.18 (m, 3H, ArH), 7.32 (d, 1H, J=8.1 Hz, ArH), 7.55 (d, 1H, J=8.1 Hz, ArH) 7.88 (s, 1H, NH); 13C NMR (100 MHz, CDCl3): δ 11.31, 30.63, 37.73, 47.20, 111.10, 112.91, 116.98, 119.34, 119.41, 122.02, 122.27, 128.94, 129.51, 136.60, 147.68. HRMS (ESI, m/z): Calcd for C18H20N2 (m/z) 264.1626; found: 264.1627.

4-((1H-Indol-3-yl)methyl)-N,N,3-trimethylbenzenamine (**7d**) White crystal, 158-160°C(Lit[12a] 159°C); IR (KBr): *v*=3397, 3067, 2864, 1620, 1442, 1214, 834, 722, 686 cm–1. 1H NMR (400 MHz, CDCl3); δ 2.27 (s, 3H, ArCH3), 2.89 (s, 6H, N(2CH3)), 3.96 (s, 2H), 6.54 (dd, 1H, J=2.9 Hz,J=5.5 Hz, ArH), 6.61-6.63 (m, 2H, ArH), 7.02-7.09 (m, 2H, ArH), 7.14-7.18 (m, 1H, ArH), 7.26 (d, 1H, J=8.1 Hz, ArH), 7.57 (d, 1H, J=8.1 Hz, ArH), 7.79 (s, 1H, NH). 13C NMR (100 MHz, DMSO-*d6*): δ 20.16, 28.38, 41.08, 110.83, 111.13, 115.15, 116.15, 119.20, 119.26, 121.94, 122.43, 127.68, 127.79, 130.23, 136.55, 137.10, 149.46. HRMS (ESI, m/z): Calcd for C18H20N2 (m/z) 264.1626; found: 264.1626.

4-((1H-Indol-3-yl)methyl)-N,N,3,5-tetramethylbenzenamine (**7e**) White crystal, mp 134-135°C; IR (KBr): *v*=3389, 3058, 2851, 1600, 1441, 1222, 834, 732, 696 cm–1. 1H NMR (400 MHz, CDCl3); δ 2.25 (s, 6H, ArCH3), 2.92 (s, 6H, N(2CH3)), 3.98 (s, 2H), 6.40 (s, 1H, ArH), 6.51 (s, 2H, ArH), 7.12-7.22 (m, 2H, ArH), 7.31(d, 1H, J=8.1 Hz, ArH), 7.67 (d, 1H, J=7.7 Hz, ArH), 7.79 (s, 1H, NH); 13C NMR (100 MHz, CDCl3): δ 20.57, 24.71, 41.07, 111.15, 113.04, 115.86, 118.92, 119.21, 121.78, 121.99, 126.27, 127.69, 136.69, 137.68, 149.11. HRMS (ESI, m/z): Calcd for C19H22N2 (m/z) 278.1783; found: 278.1783.

























































