

Diphenyl amine (3a)¹

White solid, mp 51-52 °C (lit² mp 51-52 °C), ¹H NMR (400 MHz, CDCl₃): 7.37 (t, *J* = 8.2 Hz, 4H), 7.16 (d, *J* = 8.0 Hz, 4H), 7.03 (t, *J* = 8.6 Hz, 2H), 5.76 (br, NH, 1H). ¹³C NMR (100 MHz, CDCl₃): 143.2, 129.5, 121.1, 117.9. EI-MS: *m/z* 169 (M⁺).

4-Methy-*N*-phenyl aniline (3b)³

White solid, mp 89-90 °C (lit² mp 89-90 °C), ¹H NMR (400 MHz, CDCl₃): 7.30-7.26 (m, 2H), 7.13 (d, *J* = 7.6 Hz, 2H), 7.04-7.14 (m, 4H), 6.92 (t, *J* = 7.2 Hz, 1H), 5.80-5.60 (br, NH, 1H), 2.35 (s, 3H). ¹³C NMR (100 MHz, CDCl₃): 143.9, 140.2, 131.0, 129.9, 129.3, 120.4, 119.0, 116.9, 20.7.

2-Methy-*N*-phenyl aniline (3c)³

White solid, mp 43-45 °C (lit² mp 43-45 °C), ¹H NMR (400 MHz, CDCl₃): 7.34-7.26 (m, 4H), 7.21 (t, *J* = 7.6 Hz, 1H), 7.04-6.90 (m, 4H), 5.45 (br, NH, 1H), 2.33 (s, 3H). ¹³C NMR (100 MHz, CDCl₃): 144.0, 141.2, 131.0, 129.4, 128.3, 126.8, 122.0, 120.5, 118.7, 117.5, 18.0.

4-Methoxy-*N*-phenyl aniline (3d)³

White solid, mp 105-107 °C (lit² mp 105-107 °C), ¹H NMR (acetone-*d*₆): 7.19 (t, *J* = 8.0 Hz, 2H), 7.12 (d, *J* = 8.8 Hz, 2H), 6.98 (d, *J* = 8.0 Hz, 2H), 6.92-6.85 (m, 2H), 6.76 (t, *J* = 7.6 Hz, 1H), 3.78 (s, 3H). ¹³C NMR (100 MHz, acetone *d*₆): 154.4, 145.4, 136.4, 129.1, 120.9, 120.8, 118.7, 115.2, 114.5, 55.0.

3-Methoxy-*N*-phenyl aniline (3e)⁴

White solid, mp 78-80 °C (lit² mp 78-80 °C), ¹H NMR (400 MHz, CDCl₃): 7.31 (t, *J* = 8 Hz, 2H), 7.20 (t, *J* = 8 Hz, 1H), 7.15 (d, *J* = 8 Hz, 2H), 6.98 (t, *J* = 7.6 Hz, 1H), 6.68-6.71 (m, 2H), 6.25 (m, 1H), 5.93 (broad, 1H), 3.81 (s, 3H). ¹³C NMR (100 MHz, CDCl₃): 160.7, 144.5, 142.7, 130.1, 129.3, 121.3, 118.4, 110.2, 106.2, 103.3, 55.2.

N-Phenyl 3-hydroxy phenyl amine (3f)⁵

White solid, mp 79-80 °C (lit² mp 79-80 °C), ¹H NMR (400 MHz, CDCl₃): 7.31 (t, *J* = 8.0 Hz, 2H), 7.30-7.10 (m, 3H), 7.01 (t, *J* = 7.8 Hz, 1H), 6.65 (dd, *J* = 8.0 and 1.2 Hz, 1H), 6.60 (t, *J* = 2.0 Hz, 1H), 6.41 (dd, *J* = 8.0 and 2.0 Hz, 1H), 5.80-5.50 (br, OH, 1H), 5.20-4.5 (br, NH, 1H), ¹³C NMR (100 MHz, CDCl₃): 156.5, 144.9, 142.5, 130.1, 129.4, 121.6, 118.7, 110.0, 107.6, 103.9. EI-MS: *m/z* 185 (M⁺).

N-Propyl phenyl amine (3g)⁶

Colorless liquid, ¹H NMR (400 MHz, CDCl₃): 7.20 (t, *J* = 7.6, 2H), 6.73 (t, *J* = 7.2 Hz, 1H), 6.65 (d, *J* = 7.6 Hz, 2H), 3.90-3.60 (broad, 1H), 3.12 (t, *J* = 6.4 Hz, 2H), 1.85 (sxt, *J* = 7.2 Hz, 2H), 1.04 (t, *J* = 7.2 Hz, 3H), ¹³C NMR (100 MHz, CDCl₃): 148.5, 129.2, 117.2, 112.8, 45.9, 22.7, 11.7. EI-MS: *m/z* 135 (M⁺).

N-Butyl phenyl amine (3h)⁷

Colorless liquid, ¹H NMR (400 MHz, CDCl₃): 7.22-7.18 (m, 2H), 6.72 (t, *J* = 7.2 Hz, 1H), 6.65 (d, *J* = 7.6 Hz, 2H), 4.0-3.70 (br, NH, 1H), 3.15 (t, *J* = 7.2 Hz, 2H), 1.70-1.60 (m, 2H), 1.50-1.40 (m, 2H), 0.99 (t, *J* = 6.4 Hz, 3H), ¹³C NMR (100 MHz, CDCl₃): 148.3, 129.2, 117.3, 112.9, 43.8, 31.6, 20.3, 13.9. EI-MS: *m/z* 149 (M⁺).

N-*n*-Hexyl phenyl amine (3i)⁸

Colorless liquid, ^1H NMR (400 MHz, CDCl_3): 7.21 (m, $J = 7.6$, 2H), 6.73 (t, $J = 7.2$ Hz, 1H), 6.65 (d, $J = 7.6$ Hz, 2H), 3.80-3.50 (br, NH, 1H), 3.14 (t, $J = 7.2$ Hz, 2H), 1.63 (m, 2H), 0.94-1.41 (m, 9H). ^{13}C NMR (100 MHz, CDCl_3): 148.4, 129.3, 117.2, 112.8, 44.1, 31.9, 29.6, 26.8, 22.7, 14.1. EI-MS: m/z 177 (M^+).

***N*-Octyl phenyl amine (3j)⁹**

Colorless liquid, ^1H NMR (400 MHz, CDCl_3): 7.21 (t, $J = 7.6$ Hz, 2H), 6.73 (t, $J = 7.6$ Hz, 1H), 6.65 (d, $J = 7.6$ Hz, 2H), 3.80-3.40 (br, NH, 1H), 3.14 (t, $J = 7.2$ Hz, 2H), 1.65 (qui, $J = 7.3$ Hz, 2H), 1.33-1.44 (m, 12H), 0.94 (t, $J = 7.2$ Hz, 3H). ^{13}C NMR (100 MHz, CDCl_3): 148.6, 129.2, 117.1, 112.7, 44.0, 31.9, 29.6, 29.4, 29.3, 27.2, 22.7, 14.1.

***N*-Cyclohexyl phenyl amine (3k)⁷**

Colorless liquid, ^1H NMR (400 MHz, CDCl_3): 7.20 (t, $J = 7.6$, 1Hz), 6.70 (t, $J = 7.2$ Hz, 1H), 6.64 (d, $J = 7.6$, 2H), 3.65 (br, NH, 1H) 3.35-3.20 (m, 1H), 2.20-2.10 (m, 2H), 1.90-1.70 (m, 2H), 1.75-1.60 (m, 1H), 1.5-1.1 (m, 5H). ^{13}C NMR (100 MHz, CDCl_3): 147.3, 129.3, 116.9, 113.2, 51.8, 33.5, 26.0, 25.1. EI-MS: m/z 175 (M^+).

***N*-Allyl phenyl amine (3l)¹⁰**

Yellow liquid, ^1H NMR (400 MHz, CDCl_3): 7.22 (t, $J = 7.2$ Hz, 2H), 6.76 (t, $J = 7.2$ Hz, 1H), 6.67 (d, $J = 8$ Hz, 2H), 6.10-5.90 (m, 1H), 5.33 (dd, $J = 17.2$ and 1.6 Hz, 1H), 5.21 (dd, $J = 10.0$ and 1.2 Hz, 1H), 3.81 (d, $J = 6.4$, 3H). ^{13}C NMR (100 MHz, CDCl_3): 148.1, 135.5, 129.2, 117.5, 116.3, 113.0, 46.6. EI-MS: m/z 133 (M^+).

***N*-Phenyl 2-ethanol amine (3m)¹¹**

Colorless oil, ^1H NMR (400 MHz, CDCl_3): 7.22 (d, $J = 8$ Hz, 2H), 6.77 (t, $J = 7.6$ Hz, 1H), 6.71 (d, $J = 8$ Hz, 2H), 3.86 (t, $J = 5.2$ Hz, 2H), 3.33 (t, $J = 5.2$ Hz, 2H), 2.90-2.0 (br, NH and OH, 2H). ^{13}C NMR (100 MHz, CDCl_3): 148.1, 129.3, 118.0, 114.5, 61.0, 46.0. EI-MS: m/z 137 (M^+).

***N*-Phenyl *para*-toluene sulfonamide (3n)¹²**

White solid, mp 106-107 °C (lit² mp 106-107 °C), ^1H NMR (400 MHz, CDCl_3): 7.73 (d, $J = 8.0$ Hz, 2H), 7.52 (s, 1H, NH), 7.30-7.20 (m, 4H), 7.20-7.10 (m, 3H), 2.38 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3): 143.9, 136.7, 136.0, 129.7, 129.3, 127.3, 125.2, 121.4, 21.6. EI-MS: m/z 247 (M^+).

References

- [1] D.J. Dong, H.H. Li, S.K. Tian, *J. Am. Chem. Soc.* **2010**, *132*, 5018.
- [2] B. Kaboudin, Y. Abedi, T. Yokomatsu, *Eur. J. Org. Chem.* **2011**, 6656–6662.
- [3] J.C. Antilla, S.L. Buchwald, *Org. Lett.* **2001**, *3*, 2077-2079.
- [4] Y. Liu, M. Chen, Y. Hao, *Chem. Eng. J.* **2013**, *218*, 46–54.
- [5] A.N. Pankratov, A.E. Shchavlev, *Can. J. Chem.* **1999**, 2053.
- [6] A. Watanabe, K. Mori, A. Iwabuchi, *Macromolecules* **1989**, *22*, 3521.
- [7] T.D. Quach, R.A. Batey, *Org. Lett.* **2003**, *5*, 4397.
- [8] F.Y. Kwong, A. Klapars, S.L. Buchwald, *Org. Lett.* **2002**, *4*, 581.
- [9] T. N. Lokhande, M.A. Anuse, M.B. Chavan, *Talanta* **1998**, *46*, 163.
- [10] B. Duffel, R.A. Schoonheydt, *Langmuir*, **2001**, *17*, 1243.
- [11] M. Yang, F. Liu, *J. Org. Chem.* **2007**, *72*, 8969.
- [12] H. He, Y. Jin. Wu, *Tetrahedron Lett.* **2003**, *44*, 3385.