Supporting information

Copper bromide-decorated magnetic oyster shell biosupport as a sustainable catalyst for heterogeneous synthesis of imidazo[1,2-a]pyridines in glycerol

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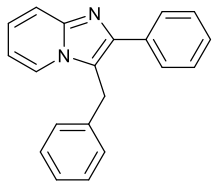
The Table of Contents

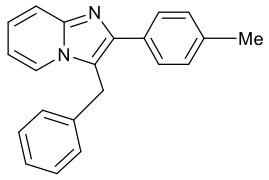
Characterization data of compounds

3-Benzyl-2-phenylimidazo[1,2-*a*]pyridine[1]



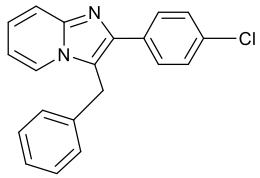
Yield: 93%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 4.50 (2H, s, CH_2), 6.70 (1H, t, *J* = 6.6 Hz, CH_{Ar}), 7.15 (2H, d, *J* = 7.4 Hz, $2CH_{ortho}$ of ph), 7.18 (1H, t, *J* = 7.5 Hz, CH_{para} of ph), 7.23-7.27 (1H, m, CH_{Ar}), 7.30 (2H, t, *J* = 7.5 Hz, $2CH_{meta}$ of Ph), 7.32 (1H, t, *J* = 7.7 Hz, CH_{para} of ph), 7.36 (1H, d, *J* = 7.4 Hz, CH_{Ar}), 7.43 (2H, t, *J* = 7.6 Hz, $2CH_{meta}$ of Ph), 7.67-7.69 (2H, m, CH_{Ar}), 7.80 (1H, d, *J* = 7.3 Hz, $2CH_{ortho}$ of Ph). ^{13}C NMR (125.77 MHz, $CDCl_3$) δ: 30.0 (CH_2), 112.3, 117.7, 117.8, 123.5, 124.2, 127.0, 127.8, 128.3, 128.7, 129.2, 134.7, 136.9, 144.4, 145.0.

3-Benzyl-2-(*p*-tolyl)imidazo[1,2-*a*]pyridine[2]



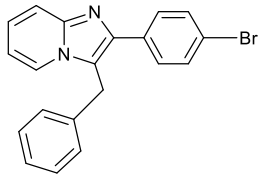
Yield: 87%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 2.40 (3H, s, CH_3), 4.50 (2H, s, CH_2), 6.70 (1H, t, *J* = 6.5 Hz, CH_{Ar}), 7.16 (2H, d, *J* = 7.5 Hz, 2CH of Ar), 7.18 (1H, t, *J* = 8 Hz, CH_{Ar}), 7.25-7.27 (3H, m, CH_{Ar}), 7.30-7.33 (2H, m, $2CH_{meta}$ of Ph), 7.68-7.70 (3H, m, CH_{Ar}), 7.71 (1H, d, *J* = 7.9 Hz, CH_{Ar}).

3-Benzyl-2-(4-chlorophenyl)imidazo[1,2-*a*]pyridine[1]



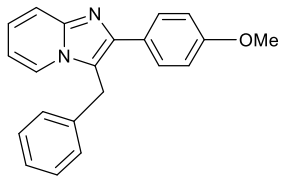
Yield: 85 %. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 4.48 (2H, s, CH_2), 6.73 (1H, t, *J* = 6.7 Hz, CH_{Ar}), 7.14 (2H, d, *J* = 7.3 Hz, 2CH of Ar), 7.21 (1H, t, *J* = 8.0 Hz, CH_{Ar}), 7.25-7.33 (3H, m, $3CH_{Ar}$), 7.41 (2H, d, *J* = 8.2 Hz, 2CH of Ar), 7.67-7.74 (4H, m, $4CH_{Ar}$).

3-Benzyl-2-(4-bromophenyl)imidazo[1,2-*a*]pyridine[1, 3]



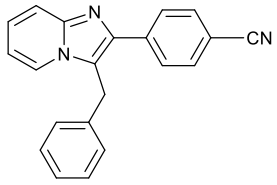
Yield: 83%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 4.48 (2H, s, CH_2), 6.74 (1H, t, *J* = 6.7 Hz, CH_{Ar}), 7.13 (2H, d, *J* = 7.5 Hz, 2CH of Ar), 7.21 (1H, t, *J* = 8.1 Hz, CH_{Ar}), 7.25-7.34 (3H, m, $3CH_{Ar}$), 7.56 (2H, d, *J* = 8.0 Hz, CH_{Ar}), 7.66 (2H, d, *J* = 8.4 Hz, CH_{Ar}), 7.69-7.72 (2H, m, CH_{Ar}).

3-Benzyl-2-(4-methoxyphenyl)imidazo[1,2-*a*]pyridine[2]



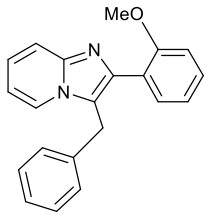
Yield: 90%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 3.83 (3H, s, OCH_3), 4.47 (2H, s, CH_2), 6.69 (1H, t, *J* = 6.7 Hz, CH_{Ar}), 6.97 (2H, d, *J* = 8.7 Hz, 2CH of Ar), 7.14 (2H, d, *J* = 7.0 Hz, 2CH of Ar), 7.16 (1H, t, *J* = 7.7 Hz, CH_{Ar}), 7.23-7.32 (3H, m, $3CH_{Ar}$), 7.67 (2H, t, *J* = 7.3 Hz, $2CH_{meta}$ of Ph), 7.72 (2H, d, *J* = 8.7 Hz, 2CH of Ar).

4-(3-Benzylimidazo[1,2-*a*]pyridin-2-yl)benzonitrile[4]



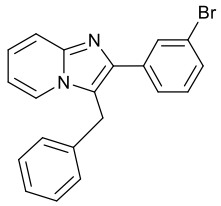
Yield: 65%. ^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm): 4.53 (2H, s, CH_2), 6.96 (1H, t, *J* = 6.6 Hz, CH_{Ar}), 7.13 (2H, d, *J* = 6.1 Hz, $2CH_{ortho}$ of ph), 7.30-7.40 (3H, m, $3CH_{Ar}$), 7.45 (1H, t, *J* = 7.9 Hz, CH_{para} of ph), 7.76 (2H, d, *J* = 8.6 Hz, $2CH_{Ar}$), 7.84 (1H, d, *J* = 6.9 Hz, CH_{Ar}), 7.92-8.02 (3H, m, $3CH_{Ar}$).

3-Benzyl-2-(2-methoxyphenyl)imidazo[1,2-*a*]pyridine[5]



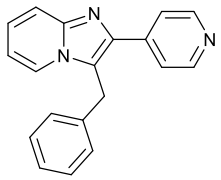
Yield: 76%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 3.83 (3H, s, OCH_3), 4.47 (2H, s, CH_2), 6.69 (1H, t, *J* = 6.5 Hz, CH_{Ar}), 6.97 (1H, d, *J* = 8.0 Hz, CH_{Ar}), 7.06 (1H, t, *J* = 6.9 Hz, CH_{Ar}), 7.13 (2H, d, *J* = 6.9 Hz, 2CH of Ar), 7.17 (1H, t, *J* = 6.8 Hz, CH_{Ar}), 7.22 (1H, d, *J* = 6.7 Hz, CH_{Ar}), 7.26-7.32 (2H, m, $2CH_{Ar}$), 7.37 (1H, t, *J* = 7.3 Hz, CH_{Ar}), 7.62-7.71 (3H, m, $3CH_{Ar}$).

3-Benzyl-2-(3-bromophenyl)imidazo[1,2-*a*]pyridine[3]



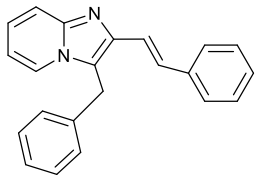
Yield: 81%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 4.50 (2H, s, CH_2), 6.74 (1H, t, *J* = 6.8 Hz, CH_{Ar}), 7.14 (2H, d, *J* = 7.2 Hz, 2CH of Ar), 7.21 (1H, t, *J* = 7.4, CH_{Ar}), 7.27-7.35 (4H, m, $4CH_{Ar}$), 7.49 (1H, d, *J* = 8.0 Hz, CH_{Ar}), 7.66-7.70 (2H, m, $2CH_{meta}$ of Ph), 7.73 (1H, d, *J* = 6.9 Hz, CH_{Ar}), 8.03 (1H, t, *J* = 1.6 Hz, CH_{Ar}). ^{13}CNMR (125.77 MHz, $CDCl_3$) δ: 29.8 (CH_2), 112.4, 117.7, 118.2, 122.9, 123.5, 124.5, 126.5, 127.0, 127.7, 129.1, 130.1, 130.7, 131.2, 136.5, 136.7, 142.6, 144.9.

3-Benzyl-2-(pyridin-4-yl)imidazo[1,2-a]pyridine[4]



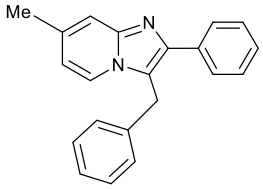
Yield: 74%. ^{1}H NMR (400.20 MHz, $CDCl_3$) δ (ppm): 4.68 (2H, s, CH_2), 6.95 (1H, t, *J* = 6.5 Hz, CH_{Ar}), 7.11 (2H, d, *J* = 7.5 Hz, $2CH_{ortho}$ of Ph), 7.22-7.24 (1H, m, CH_{Ar}), 7.28-7.30 (2H, m, $2CH_{Ar}$), 7.32-7.35 (1H, m, CH_{Ar}), 7.67 (1H, d, *J* = 9 Hz, CH_{Ar}), 7.79 (2H, d, *J* = 5 Hz, $2CH_{Ar}$), 8.26 (1H, d, *J* = 6.9 Hz, CH_{Ar}), 8.62 (2H, d, *J* = 4.8 Hz, $2CH_{Ar}$).

(*E*)-3-Benzyl-2-styrylimidazo[1,2-*a*]pyridine[1, 3]



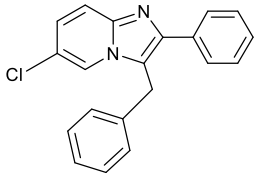
Yield: 72%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ: 4.42 (2H, s, CH_2), 6.68 (1H, t, *J* = 6.8 Hz, CH_{Ar}), 7.15-7.18 (3H, m, $2CH_{ortho}$ of Ph), 7.23-7.32 (5H, m, CH_{Ar}), 7.37 (2H, t, *J* = 7.8 Hz, $2CH_{meta}$ of Ph), 7.58 (2H, d, *J* = 7.4 Hz, CH_{ortho} of Ph), 7.62 (1H, d, *J* = 9.1 Hz, CH_{Ar}), 7.70 (1H, d, *J* = 4.1 Hz, CH_{Ar}), 7.72 (1H, d, *J* = 13.0 Hz, CH_{Ar}).

3-Benzyl-7-methyl-2-phenylimidazo[1, 2-*a*]pyridine[1]



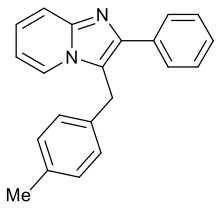
Yield: 85%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 2.40 (3H, s, CH_3), 4.48 (2H, s, CH_2), 6.54 (1H, d, *J* = 7.0 Hz, CH_{Ar}), 7.16 (2H, d, *J* = 7.1 Hz, $2CH_{ortho}$ of Ph), 7.25-7.36 (4H, m, $4CH_{Ar}$), 7.41-7.46 (3H, m, $3CH_{Ar}$), 7.58 (1H, d, *J* = 6.9 Hz, CH_{Ar}), 7.78-7.80 (2H, m, $2CH_{ortho}$ of Ph).

3-Benzyl-6-chloro-2-phenylimidazo[1,2-*a*]pyridine[1]



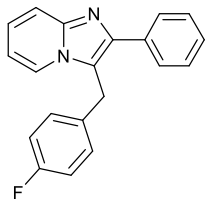
Yield: 75%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 4.47 (2H, s, CH_2), 7.12-7.16 (3H, m, CH_{Ar}), 7.27-7.33 (3H, m, CH_{Ar}), 7.34-7.38 (1H, m, CH_{Ar}), 7.43 (2H, t, *J* = 7.9 Hz, CH_{Ar}), 7.62 (1H, d, *J* = 9.5 Hz, CH_{Ar}), 7.73 (1H, d, *J* = 2.0 Hz, CH_{Ar}), 7.75-7.78 (2H, m, CH_{Ar}). ^{13}CNMR (125.77 MHz, $CDCl_3$) δ: 30.0 (CH_2), 118.1, 118.5, 120.6, 121.3, 125.6, 127.3, 127.8, 128.1, 128.3, 128.8, 129.3, 134.2, 136.3, 143.4, 145.4.

3-(4-Methylbenzyl)-2-phenylimidazo[1,2-a]pyridine[2]



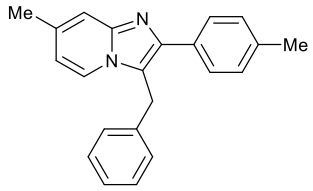
Yield: 80%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 2.33 (3H, s, CH_3), 4.46 (2H, s, CH_2), 6.72 (1H, t, *J* = 6.7 Hz, CH_{Ar}), 7.04 (2H, d, *J* = 7.8 Hz, $2CH_{Ar}$), 7.12 (2H, d, *J* = 7.8 Hz, $2CH_{Ar}$), 7.19 (1H, t, *J* = 7.5 Hz, CH_{Ar}), 7.35 (1H, t, *J* = 7.5 Hz, CH_{para} of Ph), 7.43 (2H, t, *J* = 7.5 Hz, $2CH_{meta}$ of Ph), 7.70-7.72 (2H, m, $2CH_{Ar}$), 7.78 (2H, d, *J* = 7.5 Hz, $2CH_{ortho}$ of Ph).

3-(4-Fluorobenzyl)-2-phenylimidazo[1,2-a]pyridine[2, 6]



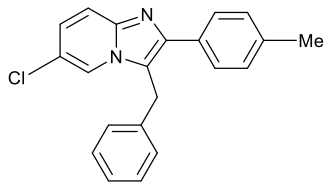
Yield: 85%. ^{1}H NMR (500.13 MHz, $CDCl_3$) δ (ppm): 4.46 (2H, s, CH_2), 6.74 (1H, t, *J* = 6.8 Hz, CH_{Ar}), 7.00 (2H, t, *J* = 8.6 Hz, $2CH_{ortho}$ of ph), 7.08-7.11 (2H, m, CH_{Ar}), 7.20 (1H, t, *J* = 8.0 Hz, CH_{Ar}), 7.36 (1H, t, *J* = 6.5 Hz, CH_{Ar}), 7.44 (2H, t, *J* = 8.0 Hz, CH_{Ar}), 7.67-7.72 (2H, m, CH_{Ar}), 7.76 (2H, d, *J* = 7.2 Hz, CH_{Ar}).

3-Benzyl-7-methyl-2-(4-methylphenyl)imidazo[1,2-*a*]pyridine



Yield: 60%. ^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm): 2.39 (3H, s, CH_3), 2.41 (3H, s, CH_3), 4.47 (2H, s, CH_2), 6.60 (1H, d, *J* = 8.6 Hz, CH_{Ar}), 7.14 (2H, d, *J* = 6.7 Hz, $2CH_{Ar}$), 7.22-7.32 (5H, m, $5CH_{Ar}$), 7.54-7.62 (2H, m, $2CH_{Ar}$), 7.68 (2H, d, *J* = 7.9 Hz, $2CH_{Ar}$).

3-Benzyl-6-chloro-2-(4-methylphenyl)imidazo[1,2-*a*]pyridine



Yield: 63%. ^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm): 2.39 (3H, s, CH_3), 4.48 (2H, s, CH_2), 7.14 (2H, d, *J* = 7.5 Hz, $2CH_{Ar}$), 7.20-7.40 (6H, m, $6CH_{Ar}$), 7.68 (2H, d, *J* = 7.8 Hz, $2CH_{Ar}$), 7.77 (2H, d, *J* = 6.6 Hz, $2CH_{Ar}$).

The ^{1}H and ^{13}C NMR spectra of compounds

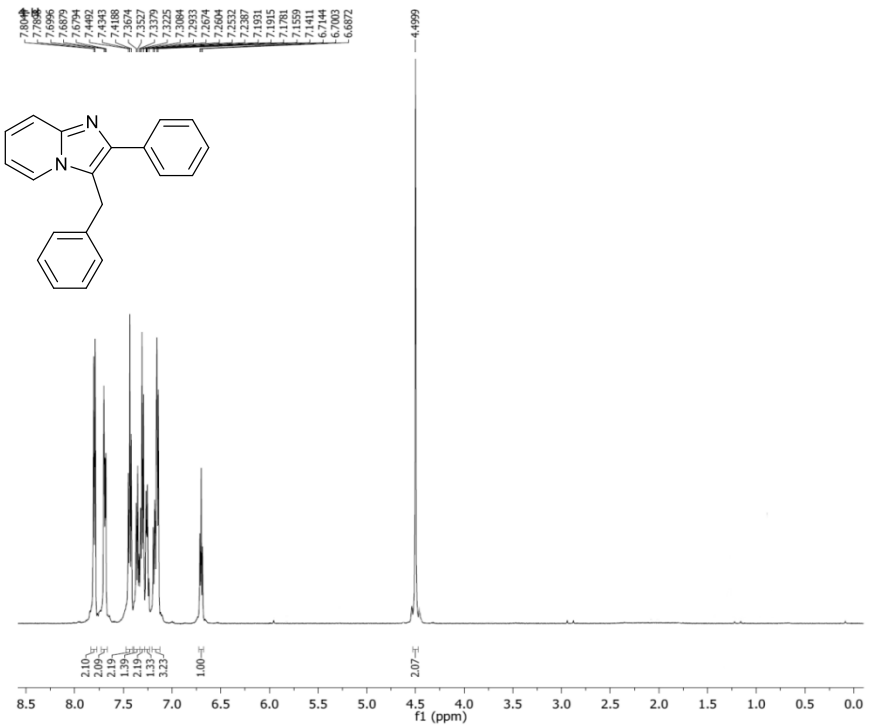


Figure 1. The ^{1}H NMR spectrum of 3-Benzyl-2-phenylimidazo[1,2-*a*]pyridine

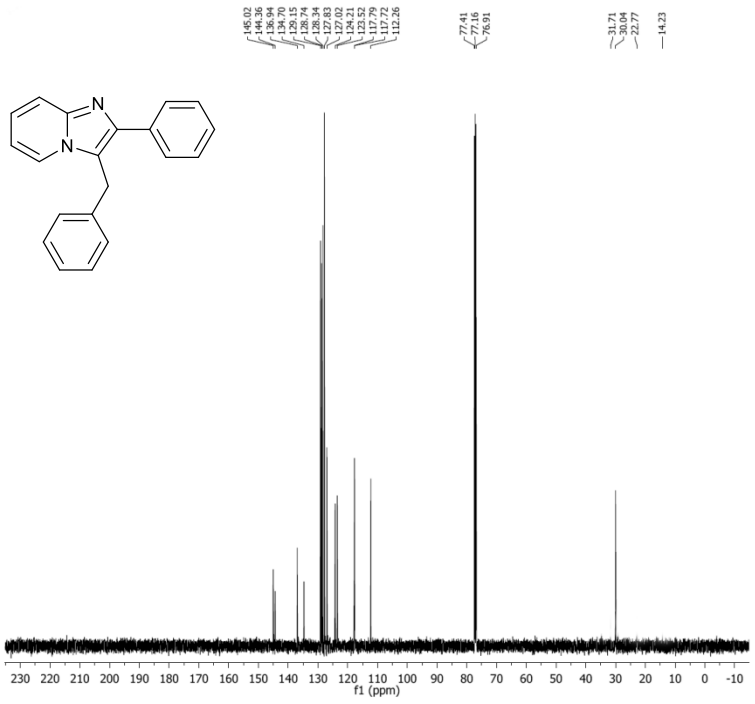


Figure 2. The ^{13}C NMR spectrum of 3-Benzyl-2-phenylimidazo[1,2-*a*]pyridine

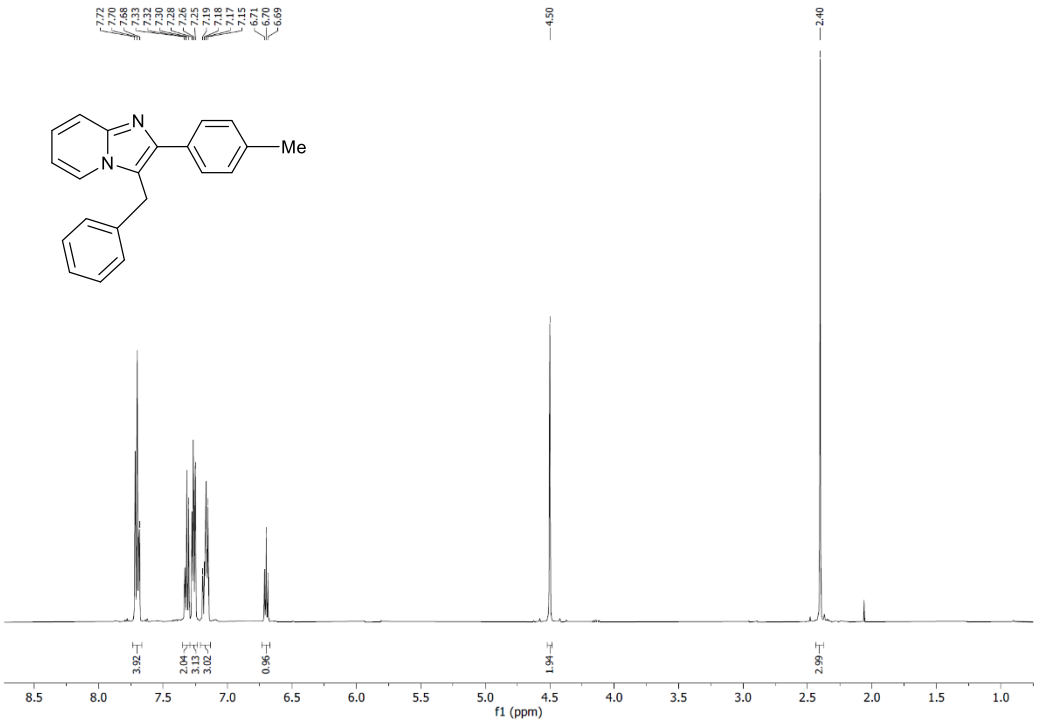


Figure 3. The ^{1}H NMR spectrum of 3-Benzyl-2-(*p*-tolyl)imidazo[1,2-*a*]pyridine

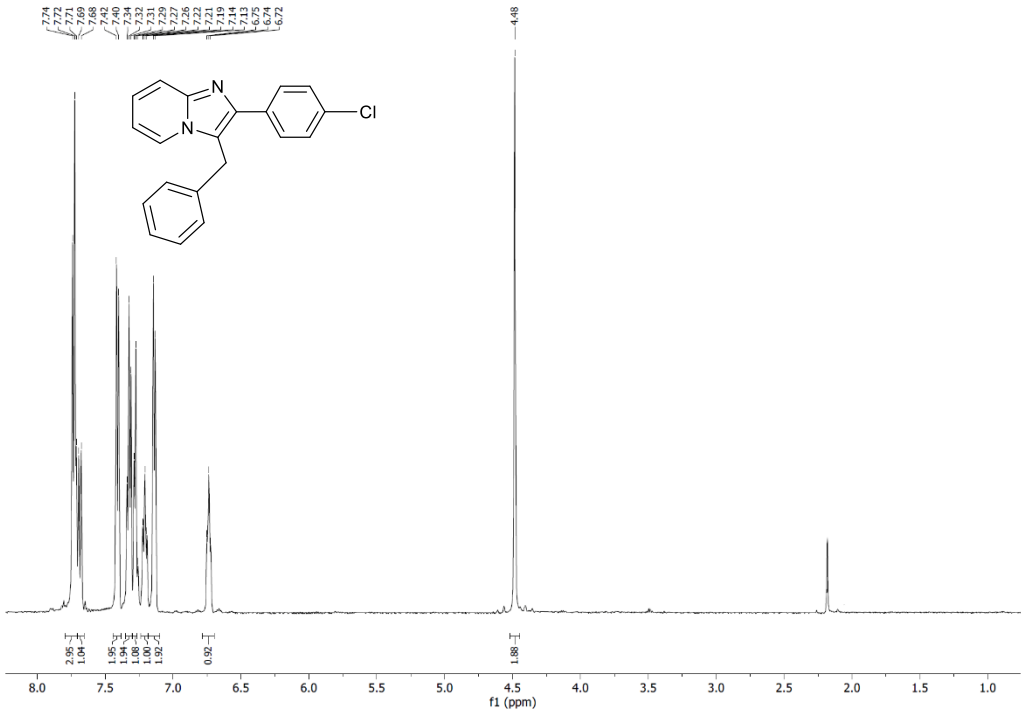


Figure 4. The ^{1}H NMR spectrum of 3-Benzyl-2-(4-chlorophenyl)imidazo[1,2-*a*]pyridine

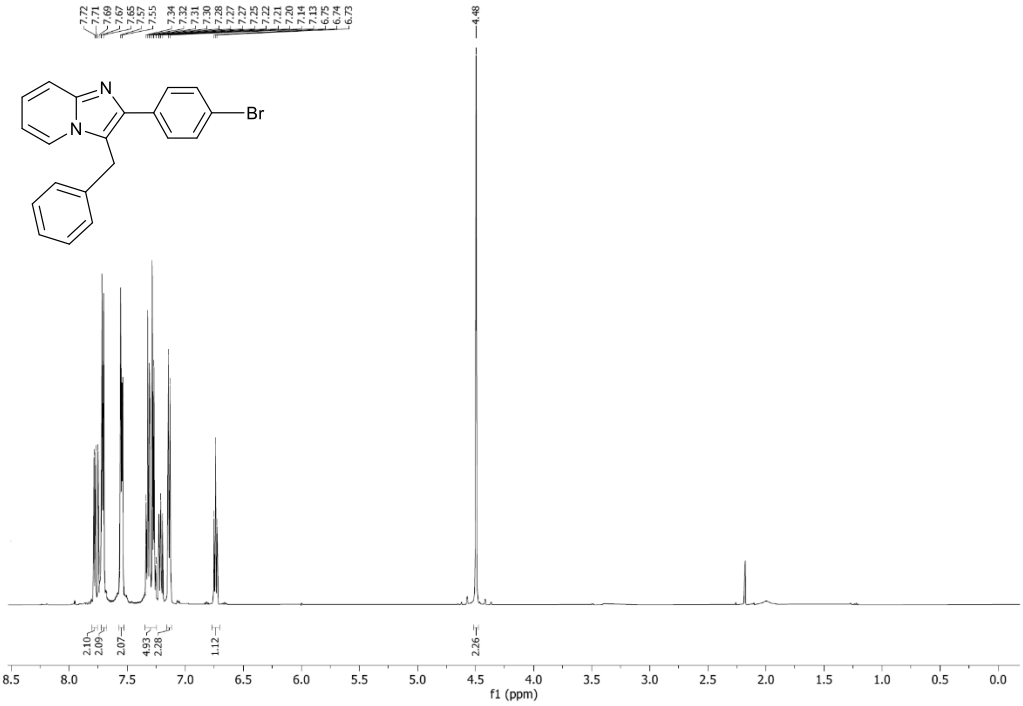


Figure 5. The ^{1}H NMR spectrum of 3-Benzyl-2-(4-bromophenyl)imidazo[1,2-*a*]pyridine

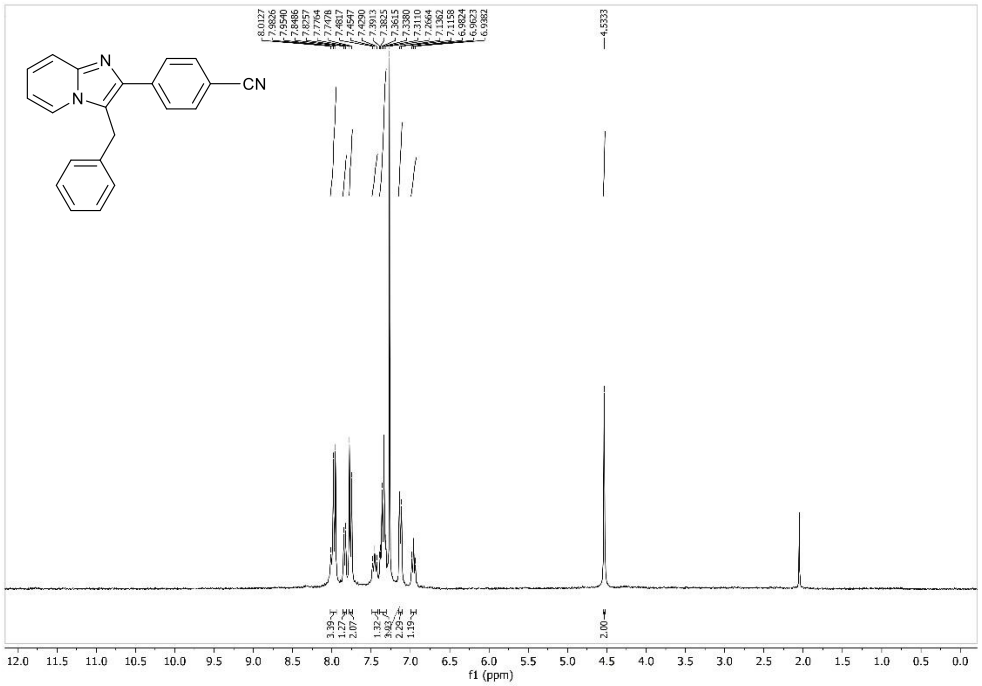


Figure 6. The ^{1}H NMR spectrum of 4-(3-Benzylimidazo[1,2-*a*]pyridin-2-yl)benzonitrile

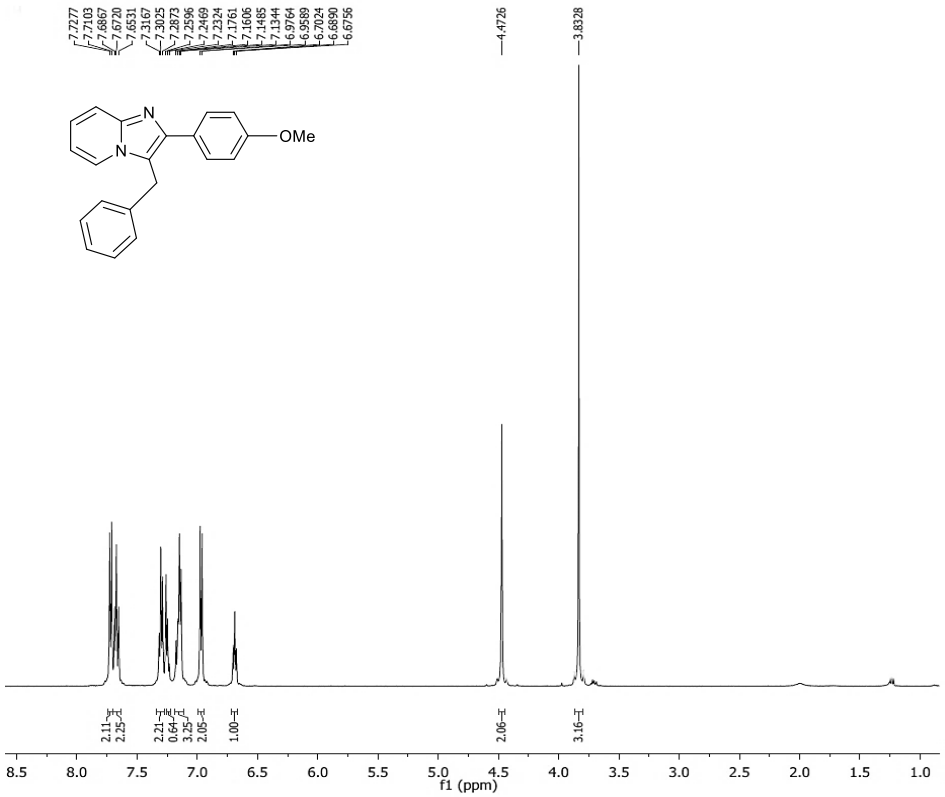


Figure 7. The ^{1}H NMR spectrum of 3-Benzyl-2-(4-methoxyphenyl)imidazo[1,2-*a*]pyridine

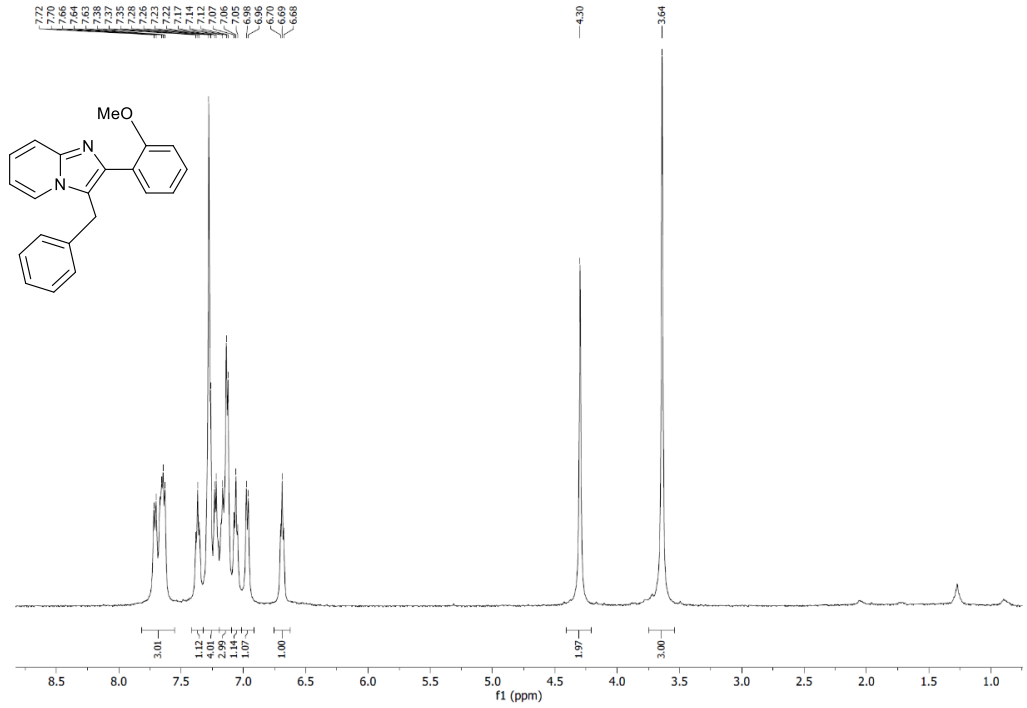


Figure 8. The ^{1}H NMR spectrum of 3-Benzyl-2-(2-methoxyphenyl)imidazo[1,2-*a*]pyridine

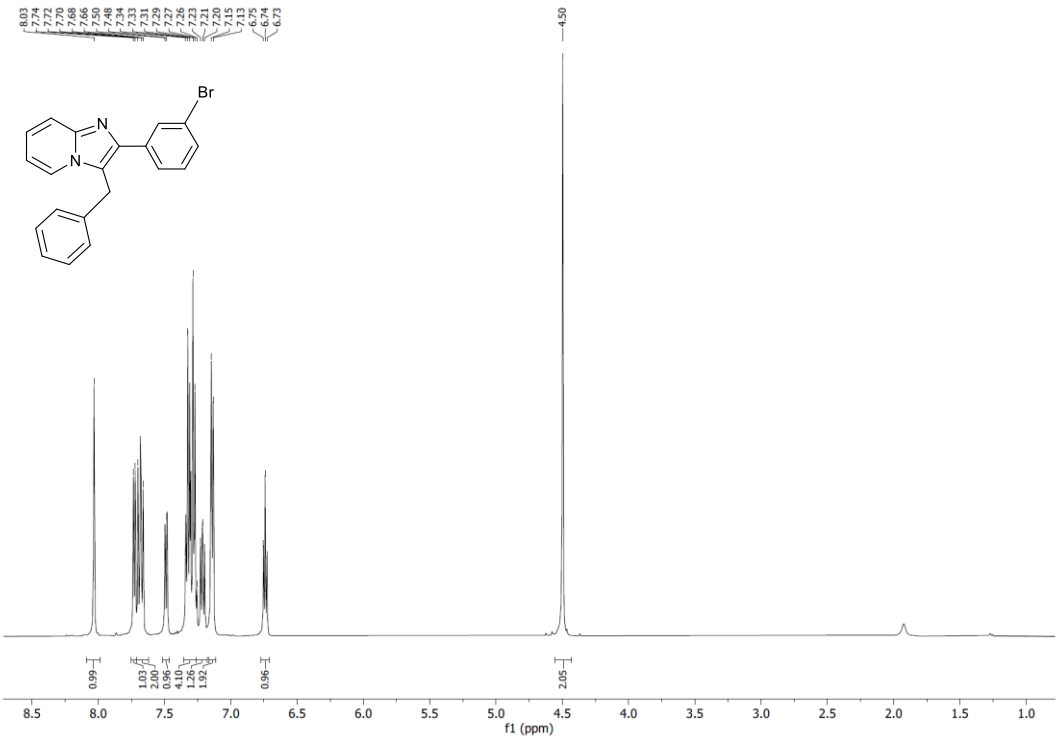


Figure 9. The ^{1}H NMR spectrum of 3-benzyl-2-(3-bromophenyl)imidazo[1,2-*a*]pyridine

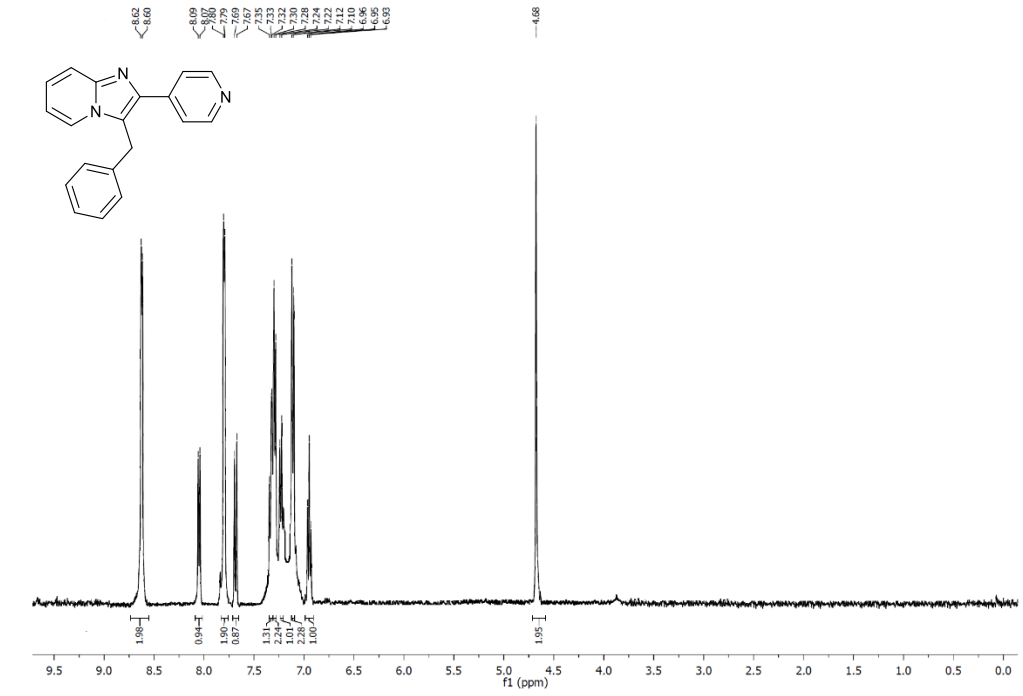


Figure 10. The ^{1}H NMR spectrum of 3-benzyl-2-(pyridin-4-yl)imidazo[1,2-a]pyridine

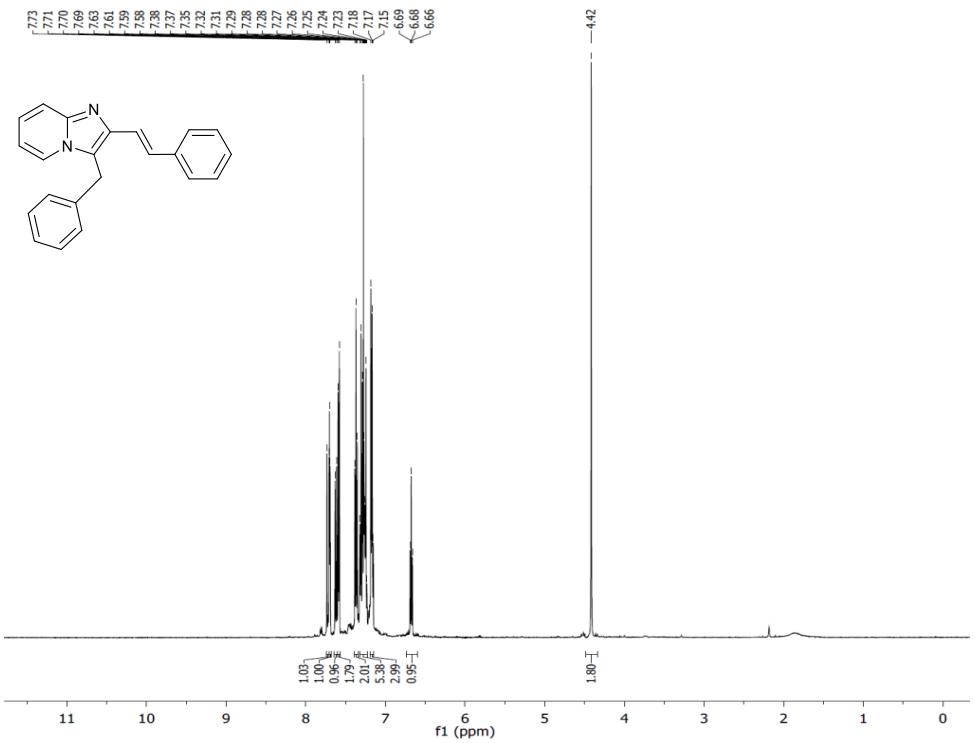


Figure 11. The ^{1}H NMR spectrum of (*E*)-3-Benzyl-2-styrylimidazo[1,2-*a*]pyridine

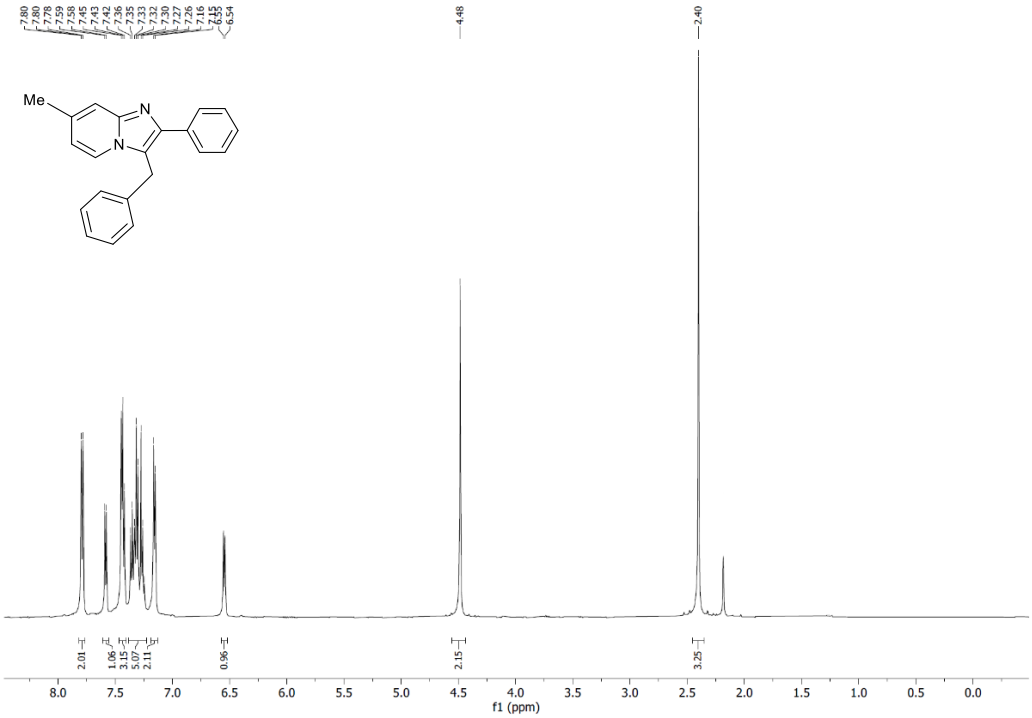


Figure 12. The ^{1}H NMR spectrum of 3-Benzyl-7-methyl-2-phenylimidazo[1, 2-*a*]pyridine

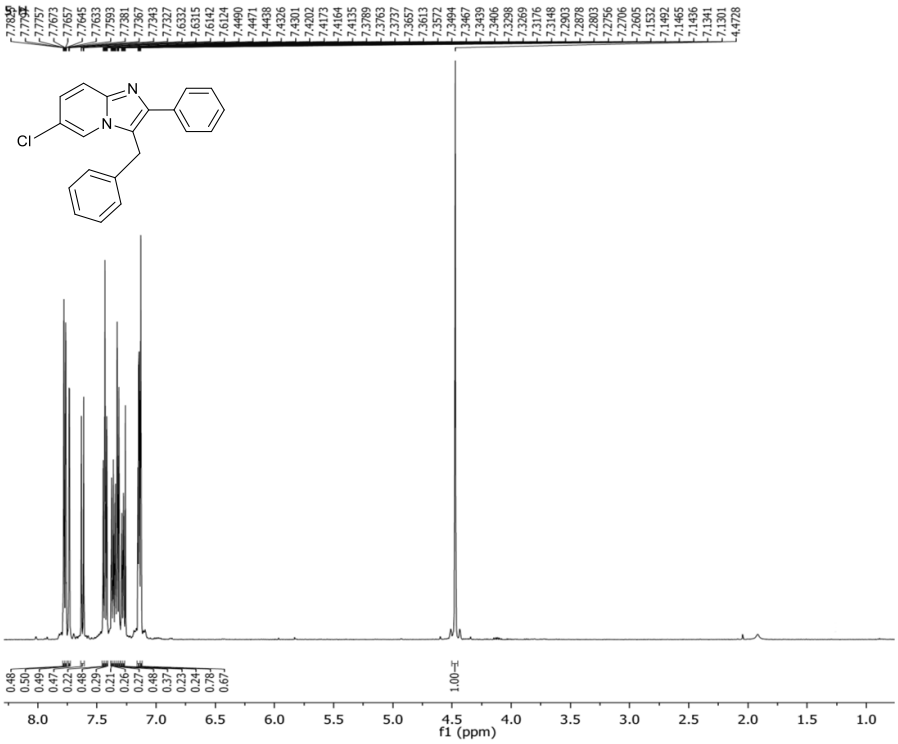


Figure 13. The ^{1}H NMR spectrum of 3-Benzyl-6-chloro-2-phenylimidazo[1,2-*a*]pyridine

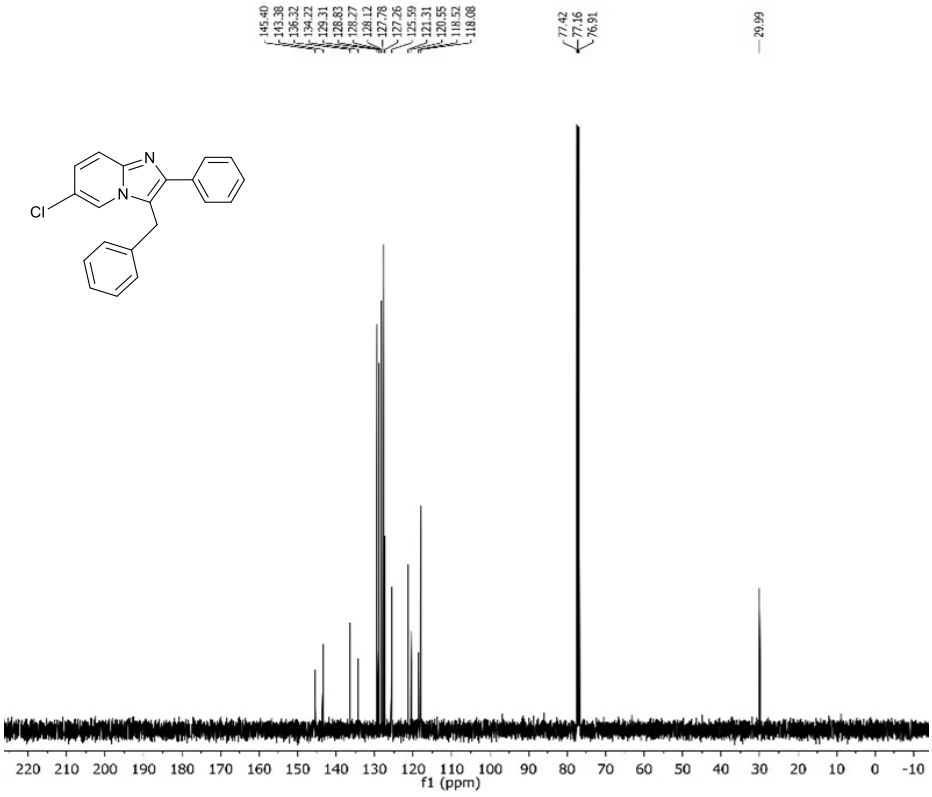


Figure 14. The ^{13}C NMR spectrum of 3-Benzyl-6-chloro-2-phenylimidazo[1,2-*a*]pyridine

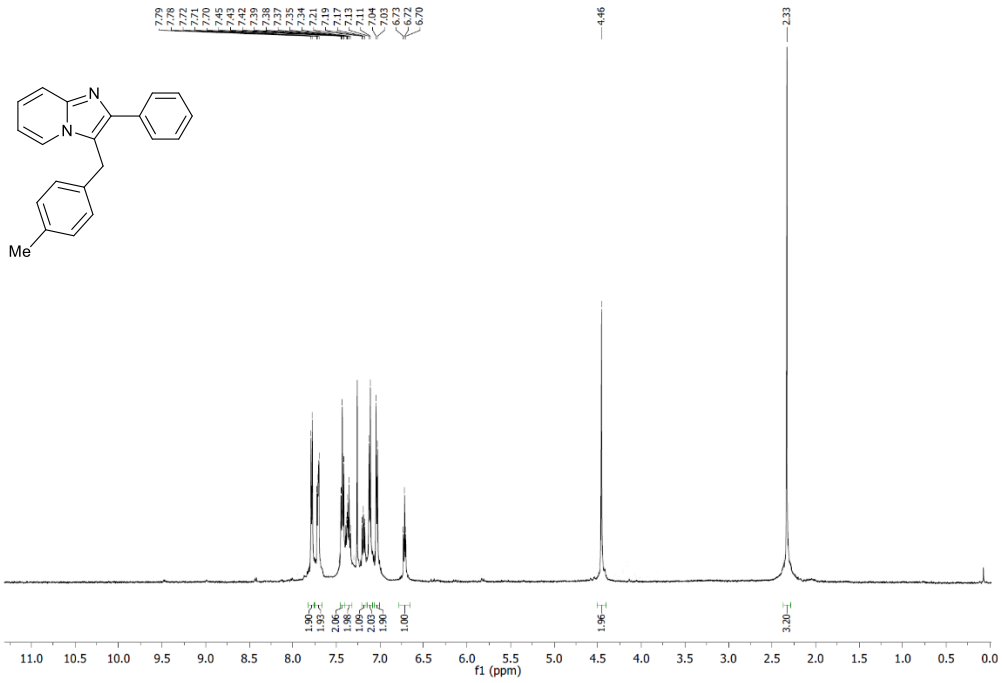


Figure 15. The ^{1}H NMR spectrum of 3-(4-Methylbenzyl)-2-phenylimidazo[1,2-a]pyridine

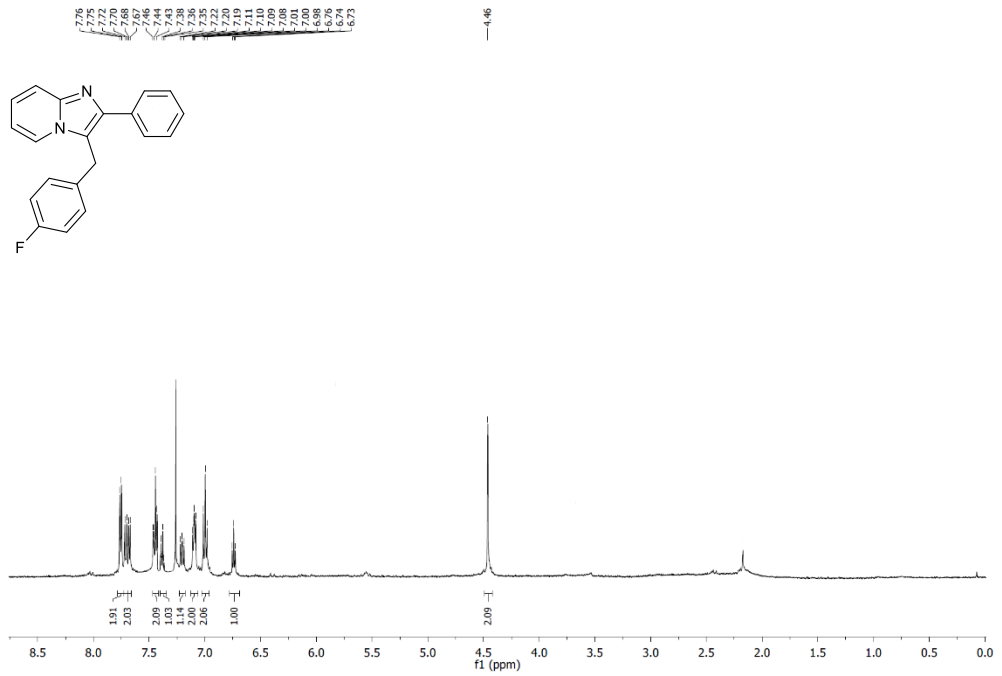


Figure 16. The ^{1}H NMR spectrum of 3-(4-Fluorobenzyl)-2-phenylimidazo[1,2-a]pyridine

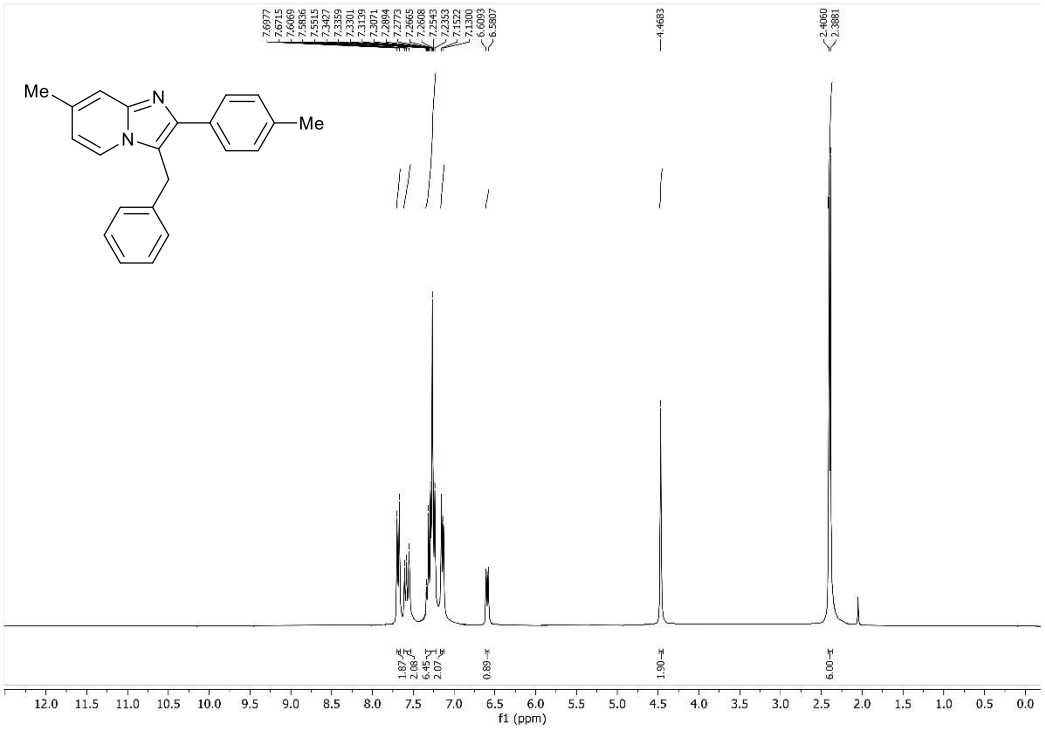


Figure 17. The ^{1}H NMR spectrum of 3-Benzyl-7-methyl-2-(4-methylphenyl)imidazo[1,2-*a*]pyridine

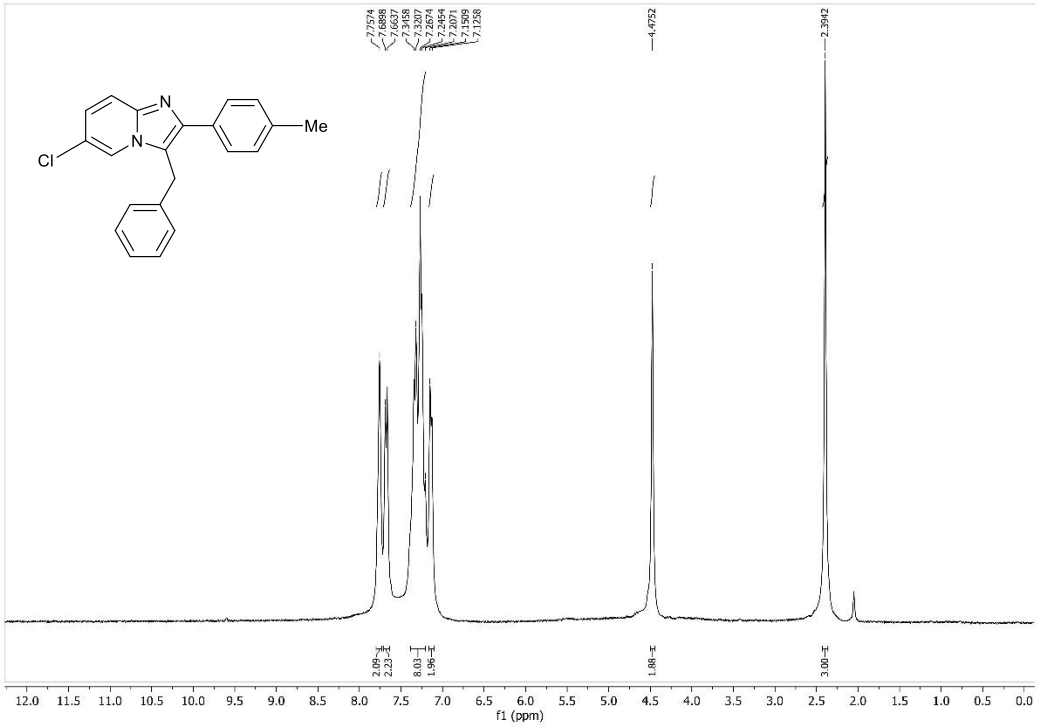


Figure 18. The ^{1}H NMR spectrum of 3-Benzyl-6-chloro-2-(4-methylphenyl)imidazo[1,2-*a*]pyridine

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