Supporting Information

Regio-specific Synthesis of 3-Substituted Imidazo[1,2-a]pyridines, Imidazo[1,2-a]pyrimidines and Imidazo[1,2-c]pyrimidine

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Characterization data for compounds **3b-g** and **3i, j** and NOE effects for compounds **3d-j**.

8-(Benzyloxy)-3-morpholinoimidazo[1,2-a]pyridine (3b): white prisms (acetone), mp 157–159 °C; ¹H NMR 7.63 (d, *J* = 6.7 Hz, 1H), 7.49 (d, *J* = 7.0 Hz, 2H), 7.39–7.30 (m, 3H), 7.26 (s, 1H), 6.64 (t, *J* = 7.3 Hz, 1H), 6.43 (d, *J* = 7.4 Hz, 1H), 5.32 (s, 2H), 3.89 (t, *J* = 4.5 Hz, 4H), 3.05 (t, *J* = 4.7 Hz, 4H); ¹³C NMR 148.2, 136.6, 136.3, 135.8, 128.6, 128.0, 127.3, 120.9, 115.3, 111.6, 101.8, 70.6, 67.1, 52.2. Anal. Calcd for C₁₈H₁₉N₃O₂: C, 69.88; H, 6.19; N, 13.58. Found: C, 69.88; H, 6.20; N, 13.58.

5,7-Dimethyl-3-morpholinoimidazo[1,2-a]pyridine (3c): off-white prisms (acetone), mp 122–123 °C; ¹H NMR 7.35 (s, 1H), 7.14 (s, 1H), 6.30 (s, 1H), 3.90 (d, *J* = 11.4 Hz, 2H), 3.74 (dt, *J* = 10.3, 3.3 Hz, 2H), 3.11–2.99 (m, 4H), 2.86 (s, 3H), 2.30 (s, 3H); ¹³C NMR 144.0, 137.1, 135.1, 134.4, 124.5, 115.9, 114.2, 66.6, 55.2, 20.7, 19.3. Anal. Calcd for C₁₃H₁₇N₃O: C, 67.51; H, 7.41; N, 18.17. Found: C, 67.51; H, 7.64; N, 18.27.

8-(Benzyloxy)-3-piperidinoimidazo[1,2-a]pyridine (3d): white prisms (acetone), mp 129–130 °C; ¹H NMR 7.59 (d, *J* = 6.9 Hz, 1H), 7.50 (d, *J* = 7.1 Hz, 2H), 7.38–7.30 (m, 3H), 7.19 (s, 1H), 6.61 (t, *J* = 7.1 Hz, 1H), 6.40 (d, *J* = 7.4 Hz, 1H), 5.32 (s, 2H), 2.97 (t, *J* = 4.9 Hz, 4H), 1.79–1.71 (m, 4H), 1.64–1.62 (m, 2H); ¹³C NMR 148.1, 137.3, 136.4, 136.3, 128.5, 127.9, 127.3, 120.2, 115.6, 111.1, 101.4, 70.5, 53.1, 26.1, 24.1. Anal. Calcd for C₁₉H₂₁N₃O: C, 74.24; H, 6.89; N, 13.67. Found: C, 74.22; H, 7.11; N, 13.67.

8-(Benzyloxy)-3-(1-pyrrolidinyl)imidazo[1,2-a]pyridine (3e): brown prisms (acetone), mp 129–130 °C; ¹H NMR 7.62 (dd, *J* = 6.7, 0.8 Hz, 1H), 7.52–7.49 (m, 2H), 7.39–7.30 (m, 3H), 7.16 (s, 1H), 6.59 (t, *J* = 7.3 Hz, 1H), 6.38 (d, *J* = 7.4 Hz, 1H), 5.32 (s, 2H), 3.21–3.17 (m, 4H), 2.02–1.98 (m, 4H); ¹³C NMR 148.0, 136.4, 136.3, 135.7, 128.5, 127.9, 127.3, 118.9, 116.1, 111.1, 101.1, 70.5, 52.2, 24.4. Anal. Calcd for C₁₈H₁₉N₃O: C, 73.69; H, 6.53; N, 14.32. Found: C, 73.43; H, 6.77; N, 14.31.

6-Chloro-3-morpholinoimidazo[1,2-a]pyridine (3f): white prisms (acetone), mp 129–130 °C; ¹H NMR 8.01 (d, *J* = 1.4 Hz, 1H), 7.48 (d, *J* = 9.5 Hz, 1H), 7.33 (s, 1H), 7.08 (dd, *J* = 9.6, 1.9 Hz, 1H), 3.90 (t, *J* = 4.7 Hz, 4H), 3.04 (t, *J* = 4.6 Hz, 4H); ¹³C NMR 140.4, 135.2, 124.9, 123.0, 120.3, 120.0,

118.6, 67.0, 52.1. Anal. Calcd for $C_{11}H_{12}ClN_3O$: C, 55.59; H, 5.09; N, 17.68. Found: C, 55.50; H, 5.13; N, 17.95.

3-Morpholinoimidazo[1,2-a]pyridin-5-amine (3g): deep brown prisms (acetone), mp 129–130 °C; 1H NMR 7.35 (s, 1H), 7.03–6.97 (m, 1H), 6.90 (d, $J = 8.9$ Hz, 1H), 6.10 (br s, 2H), 5.77 (d, $J = 7.1$ Hz, 1H), 3.97 (d, $J = 11.5$ Hz, 2H), 3.72 (dt, $J = 11.4, 2.3$ Hz, 2H), 3.20 (d, $J = 11.8$ Hz, 2H), 3.09 (dt, $J = 11.5, 2.9$ Hz, 2H); ^{13}C NMR 144.4, 143.9, 135.0, 126.7, 124.1, 105.7, 91.4, 66.9, 55.7. Anal. Calcd for $C_{11}H_{14}N_4O$: C, 60.53; H, 6.47; N, 25.67. Found: C, 60.40; H, 6.71; N, 25.79.

5,7-Dimethyl-3-morpholinoimidazo[1,2-a]pyrimidine (3i): white prisms (acetone), mp 160–161 °C; 1H NMR 7.46 (s, 1H), 6.45 (s, 1H), 3.91 (br d, $J = 12.2$ Hz, 2H), 3.73 (dt, $J = 12.2, 2.6$ Hz, 2H), 3.2–3.0 (m, 4H), 2.90 (s, 3H), 2.53 (s, 3H); ^{13}C NMR 159.2, 146.2, 144.7, 135.5, 125.6, 110.6, 66.8, 55.1, 24.4, 18.8. Anal. Calcd for $C_{12}H_{16}N_4O$: C, 62.05; H, 6.94; N, 24.12. Found: C, 62.02; H, 7.18; N, 24.31.

5,7-Dimethyl-3-morpholinoimidazo[1,2-c]pyrimidine (3j): gray prisms (acetone), mp 83–85 °C; 1H NMR 7.32 (s, 1H), 7.07 (s, 1H), 3.96–3.93 (m, 2H), 3.81–3.77 (m, 2H), 2.95–3.09 (m, 7H), 2.44 (s, 3H); ^{13}C NMR 147.7, 147.5, 143.9, 135.7, 125.0, 108.1, 66.6, 54.9, 23.0, 21.6. HRMS calcd for $C_{12}H_{17}N_4O(M + 1)$ 233.1402, found 233.1402.

Table 2. The NOE effects in compounds **3d-j**

Compound	Irradiation peaks δ /ppm	Observed NOE effects δ /ppm
3d	2.97 (N(CH ₂) ₂ , piperidine ring)	7.59 (R ⁴ , pyridine ring) 7.19 (H-2, imidazole ring) 1.71-1.79 ((CH ₂) ₂ , piperidine ring)
3e	3.17-3.21 (N(CH ₂) ₂ , pyrrolidine ring)	7.62 (R ⁴ , pyridine ring) 7.16 (H-2, imidazole ring) 1.98-2.02 ((CH ₂) ₂ , pyrrolidine ring)
3f	3.04 (N(CH ₂) ₂ , morpholine ring)	8.01 (R ⁴ , pyridine ring) 7.33 (H-2, imidazole ring) 3.90 (O(CH ₂) ₂ , morpholine ring)
3g	3.09-3.20 (N(CH ₂) ₂ , morpholine ring) 6.10 (R ⁴ , pyridine ring)	7.35 (H-2, imidazole ring) 3.97 (O(CH ₂) ₂ , morpholine ring) 5.77 (R ⁵ , pyridine ring) 3.20 (N(CH ₂) ₂ , morpholine ring)
3h	3.07 (N(CH ₂) ₂ , morpholine ring)	7.48 (H-2, imidazole ring) 3.91 (O(CH ₂) ₂ , morpholine ring) 8.31 (R ⁴ , pyrimidine ring)
3i	3.00-3.20 (N(CH ₂) ₂ , morpholine ring)	7.46 (H-2, imidazole ring) 3.73-3.91 (O(CH ₂) ₂ , morpholine ring)
3j	2.53 (R ⁴ , pyrimidine ring) 2.95-3.09 (N(CH ₂) ₂ , morpholine ring)	6.45 (R ⁵ , pyrimidine ring) 7.32 (H-2, imidazole ring) 3.77-3.96 (O(CH ₂) ₂ , morpholine ring)