Supporting Information

A new entry to Phenanthridine ring systems via sequential application of Suzuki and the Modified Pictet-Spengler Reactions

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3',4'-Dimethoxy-5-methyl [1,1'-biphenyl]-2-ylamine 2b:

Yield = 1.0 g (82%), light brown, mp 83-84^{o}C, R_f = 0.33 (1:5 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3020, 2974, 1513, 1216 cm^{-1}; ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.01-6.92. (m, 5H, ArH), 6.70-6.67 (d, 1H, *J* = 8.7 Hz, ArH), 3.92 (s, 3H, OCH_3), 3.89 (s, 3H, OCH_3), 3.88 (bs, 2H, NH_2), 2.28 (s, 3H, CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 149.2, 148.2, 141.1, 131.1, 128.9, 127.9, 127.7, 121.3, 115.9, 112.5, 111.7, 111.6, 56.1, 56.0; mass (ES^+) *m/z* 244.2 (M^+ + 1); Anal. Calcd for $C_{15}H_{17}NO_2$: C, 74.05; H, 7.04; N, 5.76; Found: C, 74.15; H, 7.13; N, 5.67.

2-(3,4-Dimethoxyphenyl)pyridin-3-amine 2e:

Yield = 0.21 g (80%), brown solid, mp 148-149^{o}C, R_f = 0.27 (1:5 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3439, 3058, 2962, 1641, 1516, 1455 cm^{-1}; ^{1}H NMR (200 MHz, $CDCl_3$): δ = 8.12 (t, 1H, *J* = 3.1 Hz, ArH), 7.28-7.22 (m, 2H, ArH), 7.05 (d, 2H, *J* = 3.1 Hz, ArH), 6.96 (d, 1H, *J* = 8.0 Hz, ArH), 3.93 (s, 6H, 2 x OCH_3), 3.86 (bs, 2H, NH_2); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 149.4, 149.2, 144.9, 140.1, 139.9, 131.4, 122.9, 122.7, 120.7, 112.0, 111.2, 56.1, 56.0; mass (ES^+) *m/z* 231.2 (M^+ + 1); Anal. Calcd for $C_{13}H_{14}N_2O_2$: C, 67.81; H, 6.13; N, 12.17; Found: C, 67.84; H, 6.11; N, 12.12.

2,4-Bis(3,4-dimethoxyphenyl) naphthalen-1-amine 2g:

Yield = 0.45 g (76%), brown solid, mp 193-195^{o}C, R_f = 0.20 (1:50 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3421, 3020, 1626, 1515 cm^{-1}; ^{1}H NMR (200 MHz, $CDCl_3$): δ = 7.99-7.92 (m, 2H, ArH), 7.62-7.37 (m, 2H, ArH), 7.30 (s, 1H, ArH), 7.11-7.08 (m, 2H, ArH), 7.04-6.96 (m, 4H, ArH), 4.10 (bs, 2H, NH_2), 3.95 (s, 3H, OCH_3), 3.94 (s, 3H, OCH_3), 3.91 (s, 3H, OCH_3), 3.89 (s, 3H, OCH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 149.4, 148.8, 148.4, 138.2, 133.9, 132.5, 131.8, 130.8, 129.5, 126.8, 125.9, 125.3, 124.0, 122.6, 121.9, 121.7, 121.5, 113.9, 113.0, 111.7, 111.2, 56.1; mass (ES^+) *m/z* 416.3 (M^+ + 1); Anal. Calcd for $C_{26}H_{25}NO_4$: C, 75.16; H, 6.06; N, 3.37; Found: C, 75.11; H, 6.09; N, 3.35.

8,9-Dimethoxy-2-methyl-6-phenylphenanthridine 6l:

Yield = 0.20 g (54%), white solid, mp 158°C, R_f = 0.32 (1:5 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 2935, 1616, 1518 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 8.23 (s, 1H, ArH), 8.10 (d, 1H, *J* = 8.4 Hz, ArH), 7.95 (s, 1H, ArH), 7.75-7.72. (m, 2H, ArH), 7.55-7.49 (m, 4H, ArH), 7.42 (s, 1H, ArH), 4.17 (s, 3H, OCH_3), 3.86 (s, 3H, OCH_3), 2.65 (s, 3H, CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 158.7, 152.3, 149.2, 141.9, 140.3, 136.3, 130.1, 129.8, 129.5, 129.0, 128.5, 128.4, 123.3, 121.0, 120.5, 108.3, 102.1, 56.1, 55.9, 22.0; mass (ES^+) *m/z* 330.3 (M^+ + 1); Anal. Calcd for $C_{22}H_{19}NO_2$: C, 80.22; H, 5.81; N, 4.25 Found: C, 80.26; H, 5.87; N, 4.31.

8,9-Dimethoxy-2-methyl-6-(4-methylphenyl)phenanthridine 6m:

Yield = 0.19 g (49%), white solid, mp 160-162°C, R_f = 0.48 (1:6 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 2919, 1618, 1517 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$): δ = 8.22 (s, 1H, ArH), 8.08 (d, 1H, *J* = 8.34 Hz, ArH), 7.94 (s, 1H, ArH), 7.64 (d, 2H, *J* = 8.0 Hz, ArH), 7.51 (dd, 1H, J_1 = 1.4 Hz, J_2 = 8.4 Hz, ArH), 7.47 (s, 1H, ArH), 7.35 (d, 2H, *J* = 7.8 Hz, ArH), 4.17 (s, 3H, OCH_3), 3.87 (s, 3H, OCH_3), 2.64 (s, 3H, CH_3), 2.46 (s, 3H, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 158.9, 152.3, 149.3, 142.1, 138.4, 137.5, 136.2, 130.2, 129.8, 129.6, 129.2, 129.0, 123.4, 121.0, 120.7, 108.6, 108.2, 56.2, 56.0, 22.1, 21.5; mass (ES^+) *m/z* 344.3 (M^+ + 1); Anal. Calcd for $C_{23}H_{21}NO_2$: C, 80.44; H, 6.16; N, 4.08; Found: C, 80.48; H, 6.19; N, 4.16.

6-(4-Chlorophenyl)-8,9-dimethoxy-3-(trifluoromethyl) phenanthridine 6n:

Yield = 0.15 g (66%), white solid, mp 199-201°C, R_f=0.37(1:5 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3057, 2933, 1614, 1529 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 8.58 (d, 1H, *J* = 8.6 Hz, ArH), 8.49 (s, 1H, ArH), 7.98 (s, 1H, ArH), 7.83 (dd, 1H, J_1 = 1.7 Hz, J_2 = 8.6 Hz, ArH), 7.73-7.68 (m, 2H, ArH), 7.60-7.53 (m, 2H, ArH), 7.43 (s, 1H, ArH), 4.19 (s, 3H, OCH_3), 3.91 (s, 3H, OCH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 159.8, 153.1, 150.5, 142.8, 138.2, 131.0, 129.7, 129.0, 128.8, 128.2, 128.1 (d, *J* = 4.0 Hz), 127.0, 125.8, 122.7, 122.5, 122.4, 121.3 (d, *J* = 27.3 Hz), 108.1, 102.6, 56.4, 56.2; mass (ES^+) *m/z* 418.2 (M^+ + 1); Anal.

Calcd for $C_{22}H_{15}ClF_3NO_2$: C, 63.24; H, 3.62; N, 3.35; Found: C, 63.19; H, 3.67; N, 3.31.

6-(4-Ethoxyphenyl)-8,9-dimethoxy-3-(trifluoromethyl) phenanthridine 6o:

Yield = 0.19 g (60%), white solid, mp 186-188^oC, R_f = 0.44 (1:9 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 1603, 1423 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 8.55 (d, 1H, *J* = 8.6 Hz, ArH), 8.49 (s, 1H, ArH), 7.97 (s, 1H, ArH), 7.80 (dd, 1H, J_1 = 1.8 Hz, J_2 = 8.6 Hz, ArH), 7.73-7.69 (m, 2H, ArH), 7.56 (s, 1H, ArH), 7.12-7.07 (m, 2H, ArH), 4.14 (s, 3H, OCH_3), 4.21 (q, 2H, *J* = 7.0 Hz, OCH_2), 3.91 (s, 3H, OCH_3), 1.52 (t, 3H, *J* = 7.0 Hz, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 160.8, 159.8, 152.8, 143.0, 132.0, 131.0, 128.7, 128.0 (d, *J* = 4.0 Hz), 125.6, 122.6, 121.7 (d, *J* = 27.5 Hz), 114.7, 108.7, 102.5, 63.8, 56.3, 56.1, 14.9; mass (ES^+) *m/z* 428.4 (M^+ + 1); Anal. Calcd for $C_{24}H_{20}F_3NO_3$: C, 70.06; H, 4.90; N, 3.40; Found: C, 70.01; H, 4.95; N, 3.36.

6-(3,4-Dimethoxyphenyl)-8,9-dimethoxy-3-(trifluoromethyl) phenanthridine 6p:

Yield = 0.18 g (59%), white solid, mp 177-179^oC, R_f = 0.18 (1:5 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3004, 2954, 1610, 1522 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 8.56 (d, 1H, *J* = 8.7 Hz, ArH), 8.50 (s, 1H, ArH), 7.98 (s, 1H, ArH), 7.81 (dd, 1H, J_1 = 1.7 Hz, J_2 = 8.6 Hz, ArH), 7.59 (s, 1H, ArH), 7.35-7.32 (m, 2H, ArH), 7.09-7.05 (m, 1H, ArH), 4.18 (s, 3H, OCH_3), 4.00 (s, 3H, OCH_3), 3.97 (s, 3H, OCH_3), 3.92 (s, 3H, OCH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 160.8, 152.9, 150.3, 150.0, 149.3, 142.9, 132.4, 130.0, 129.6, 128.8, 128.0 (d, *J* = 2.5 Hz), 126.2, 125.7, 122.7, 122.6, 122.4, 122.2, 121.7 (d, *J* = 35.5 Hz), 56.4, 56.21, 56.2, 56.1; mass (ES^+) *m/z* 444.3 (M^+ + 1); Anal. Calcd for $C_{24}H_{20}F_3NO_4$: C, 65.01; H, 4.55; N, 3.16; Found: C, 64.95; H, 4.61; N, 3.19.

6-(4-Fluorophenyl)-8,9-dimethoxy-3-(trifluoromethyl) phenanthridine 6q:

Yield = 0.20 g (61%), white solid, mp 202-204^oC, R_f = 0.29 (1:9 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3004, 2952, 1612, 1522 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 8.57 (d, 1H, *J* = 8.7 Hz, ArH), 8.49 (s, 1H, ArH), 7.98 (s, 1H, ArH), 7.83 (dd, 1H, J_1 = 1.7 Hz, J_2 = 8.6 Hz, ArH), 7.79-7.70 (m, 2H, ArH), 7.44 (s, 1H, ArH), 7.32-7.24 (m, 2H, ArH), 4.19 (s, 3H,

OCH_3), 3.91 (s, 3H, OCH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 163.4 (d, *J* = 247.0 Hz), 160.0, 153.0, 150.5, 142.8, 135.9, 135.8, 131.5, 131.4, 129.6, 128.8, 128.0 (d, *J* = 4.0 Hz), 127.0, 125.7, 122.6 (d, *J* = 16.5 Hz), 122.3 (d, *J* = 3.0 Hz), 121.4 (d, *J* = 19.5 Hz), 115.8 (d, *J* = 21.5 Hz), 108.3, 102.6, 56.4, 56.1; mass (ES^+) *m/z* 360.2 ($M^+ + 1$); Anal. Calcd for $C_{22}H_{15}F_4NO_2$: C, 65.84; H, 3.77; N, 3.49; Found: C, 65.80; H, 3.81; N, 3.51.

8,9-Dimethoxy-6-(4-methylphenyl)-3-(trifluoromethyl) phenanthridine 6r:

Yield = 0.16 g (56%), white solid, mp 188-190°C, R_f = 0.36 (1:9 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3058, 2966, 2933, 1625, 1515 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 8.56 (d, 1H, *J* = 8.6 Hz, ArH), 8.50 (s, 1H, ArH), 7.97 (s, 1H, ArH), 7.81 (dd, 1H, J_1 = 1.8 Hz, J_2 = 8.6 Hz, ArH), 7.68-7.64 (m, 2H, ArH), 7.54 (s, 1H, ArH), 7.40-7.36 (m, 2H, ArH), 4.18 (s, 3H, OCH_3), 3.90 (s, 3H, OCH_3), 2.48 (s, 3H, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 161.2, 152.9, 150.3, 143.0, 139.0, 136.9, 130.1, 129.6, 129.5, 129.4, 128.7, 128.1 (d, *J* = 4.0 Hz), 127.1, 125.7, 122.6, 122.1, 122.0, 121.6 (d, *J* = 15.5 Hz), 108.7, 102.5, 56.3, 56.1, 21.5; mass (ES^+) *m/z* 398.3 ($M^+ + 1$); Anal. Calcd for $C_{23}H_{18}F_3NO_2$: C, 69.52; H, 4.57; N, 3.52; Found: C, 69.48; H, 4.61; N, 3.45.

8,9-Dimethoxy-6-(4-*N*,*N*-dimethylphenyl)-3-(trifluoro methyl)phenanthridine 6s:

Yield = 0.19 g (60%), white solid, mp 213-215°C, R_f = 0.19 (1:6 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 1602, 1478 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 8.53 (d, 1H, *J* = 8.6 Hz, ArH), 8.48 (s, 1H, ArH), 7.96 (s, 1H, ArH), 7.79-7.69 (m, 4H, ArH), 6.90 (d, 2H, *J* = 8.9 Hz, ArH), 4.18 (s, 3H, OCH_3), 3.94 (s, 3H, OCH_3), 3.07 (s, 6H, 2 x CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 161.2, 152.7, 151.2, 150.1, 143.2, 130.9, 128.8, 127.9 (d, *J* = 4.0 Hz), 127.5, 125.5, 122.5, 121.7, 121.6 (d, *J* = 3.0 Hz), 112.2, 109.1, 102.5, 56.3, 56.2, 40.6; mass (ES^+) *m/z* 427.4 ($M^+ + 1$); Anal. Calcd for $C_{24}H_{21}F_3N_2O_2$: C, 67.60; H, 4.96; N, 6.57; Found: C, 67.64; H, 4.99; N, 6.53.

6-(4-Chlorophenyl)-7,9-dimethylphenanthridine 6t:

Yield = 0.21 g (53%), white solid, mp 146-148°C, R_f = 0.54 (1:99 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3020, 2923, 1605, 1478 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$): δ = 8.60-8.58 (m, 1H, ArH), 8.39 (s, 1H, ArH), 8.14 (dd, 1H, J_1 = 1.3 Hz, J_2 = 8.2 Hz, ArH), 7.74-7.62 (m, 2H, ArH), 7.46 (d, 4H, J = 3.1 Hz, ArH), 7.28 (s, 1H, ArH), 2.60 (s, 3H, CH_3), 2.08 (s, 3H, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 159.5, 143.3, 143.0, 140.7, 137.0, 135.1, 134.3, 133.3, 130.1, 129.9, 128.8, 128.7, 126.9, 123.8, 122.8, 122.3, 120.3, 25.2, 22.1; mass (ES^+) *m/z* 318.4 (M^+ + 1); Anal. Calcd for $C_{21}H_{16}ClN$: C, 79.36; H, 5.07; N, 4.41; Found: C, 79.31; H, 5.09; N, 4.40.

6-(3,4-Dimethoxyphenyl)-7,9-dimethylphenanthridine 6u:

Yield = 0.23 g (55%), white solid, mp 143-145°C, R_f = 0.29 (1:15 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3020, 2968, 2929, 1610, 1516 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 8.61-8.56 (m, 1H, ArH), 8.39 (s, 1H, ArH), 8.16. (dd, 1H, J_1 = 1.6 Hz, J_2 = 8.2 Hz, ArH), 7.75-7.58 (m, 2H, ArH), 7.28 (s, 1H, ArH), 7.08-6.95 (m, 3H, ArH), 3.96 (s, 3H, OCH_3), 3.91 (s, 3H, OCH_3), 2.60 (s, 3H, CH_3), 2.12 (s, 3H, CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 160.4, 149.3, 149.1, 143.1, 140.5, 137.7, 137.5, 135.1, 133.3, 128.7, 126.7, 123.8, 123.2, 122.3, 121.5, 120.2, 112.1, 111.3, 56.2, 56.1, 24.7, 22.1; mass (ES^+) *m/z* 344.3 (M^+ + 1); Anal. Calcd for $C_{23}H_{21}NO_2$: C, 80.44; H, 6.16; N, 4.08; Found: C, 80.41; H, 6.19; N, 4.04.

4-(7,9-Dimethylphenanthridin-6-yl)phenol 6v:

Yield = 0.18 g (54%), brown solid, mp >250°C, R_f = 0.36 (1:20 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3421, 3021, 1613, 1517 cm^{-1}; ^1H NMR (300 MHz, DMSO-d_6): δ = 9.70 (s, 1H, OH), 8.74 (d, 1H, J = 8.1 Hz, ArH), 8.57 (s, 1H, ArH), 7.99-7.96 (m, 1H, ArH), 7.75-7.62 (m, 2H, ArH), 7.34 (s, 1H, ArH), 7.25-7.23 (m, 2H, ArH), 6.89-6.86 (m, 2H, ArH), 2.55 (s, 3H, CH_3), 2.03 (s, 3H, CH_3); ^{13}C NMR (75 MHz, DMSO-d_6 + TFA): δ = 161.0, 160.8, 149.0, 142.5, 137.4, 136.3, 133.1, 132.1, 131.6, 130.4, 125.6, 124.9, 124.5, 122.0, 121.8, 118.1, 24.6, 22.5; mass (ES^+) *m/z* 300.4 (M^+ + 1); Anal. Calcd for $C_{21}H_{17}NO$: C, 84.25; H, 5.72; N, 4.68; Found: C, 84.21; H, 5.76; N, 4.63.

7,9-Dimethyl-6-(4-nitrophenyl)phenanthridine 6w:

Yield = 0.23 g (56%), yellow solid, mp 193-195^{o}C, R_f = 0.44 (1:33 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 1639, 1524, 1352 cm^{-1}; ^{1}H NMR (200 MHz, $CDCl_3$): δ = 8.64-8.59 (m, 1H, ArH), 8.43-8.42 (m, 1H, ArH), 8.42-8.34 (m, 2H, ArH), 8.16-8.05 (m, 2H, ArH), 7.75-7.68 (m, 3H, ArH), 7.32 (s, 1H, ArH), 2.62 (s, 3H, CH_3), 2.06 (s, 3H, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 151.2, 147.7, 142.8, 141.2, 140.1, 136.3, 135.1, 133.5, 130.6, 130.0, 129.8, 129.0, 127.4, 124.4, 123.9, 123.7, 122.4, 120.5, 25.4, 22.1; mass (ES^+) *m/z* 329.3 (M^+ + 1); Anal. Calcd for $C_{21}H_{16}N_2O_2$: C, 76.81; H, 4.91; N, 8.53; Found: C, 76.85; H, 4.90; N, 8.51.

8,9-Dimethoxy-6-(4-nitrophenyl)-6a,10a-dihydrobenzo [*c*][1,5]naphthyridine 7d:

Yield = 0.22 g (65%), yellow solid, mp 221-223^{o}C, R_f = 0.35 (2:3 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3014, 1602, 1515, 1344 cm^{-1}; ^{1}H NMR (200 MHz, $CDCl_3$): δ = 9.01 (dd, 1H, J_1 = 1.7 Hz, J_2 = 4.3 Hz, ArH), 8.68 (s, 1H, ArH), 8.48-8.43 (m, 3H, ArH), 7.99-7.95 (m, 2H, ArH), 7.71-7.65 (m, 1H, ArH), 7.27 (s, 1H, ArH), 4.22 (s, 3H, OCH_3), 3.91 (s, 3H, OCH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 157.9, 153.4, 151.2, 149.7, 148.3, 146.3, 140.6, 138.3, 137.6, 130.8, 130.7, 124.0, 123.7, 122.0, 106.7, 103.7, 56.7, 56.2; mass (ES^+) *m/z* 362.2 (M^+ + 1); Anal. Calcd for $C_{20}H_{15}N_3O_4$: C, 66.48; H, 4.18; N, 11.63; Found: C, 66.42; H, 4.19; N, 11.65.

6-(4-Ethoxyphenyl)-8,9-dimethoxy-6a,10a-dihydrobenzo [*c*][1,5]naphthyridine 7e:

Yield = 0.20 g (58%), white solid, mp 202-204^{o}C, R_f = 0.40 (2:3 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 1608, 1515, 1216 cm^{-1}; ^{1}H NMR (200 MHz, $CDCl_3$): δ = 8.95 (dd, 1H, J_1 = 1.5 Hz, J_2 = 4.3 Hz, ArH), 8.63 (s, 1H, ArH), 8.45 (dd, 1H, J_1 = 1.6 Hz, J_2 = 8.2 Hz, ArH), 7.74-7.70 (m, 2H, ArH), 7.66-7.60 (m, 1H, ArH), 7.50 (s, 1H, ArH), 7.12-7.07 (m, 2H, ArH), 4.21 (s, 3H, OCH_3), 4.16 (q, 2H, J = 6.9 Hz, OCH_2), 3.92 (s, 3H, OCH_3), 1.49 (t, 3H, J = 6.9 Hz, CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 160.2, 159.7, 152.8, 150.7, 148.7, 140.5,

138.4, 137.3, 132.2, 131.0, 130.8, 130.5, 123.3, 122.7, 114.9, 114.7, 107.9, 103.4, 63.7, 56.6, 56.1, 15.0; mass (ES^+) *m/z* 361.3 ($M^+ + 1$); Anal. Calcd for $C_{22}H_{20}N_2O_3$: C, 73.32; H, 5.59; N, 7.77; Found: C, 73.34; H, 5.56; N, 7.79.

8,9-Dimethoxy-6-(4-methylphenyl)-6a,10a-dihydrobenzo [*c*][1,5]naphthyridine 7f:

Yield = 0.17 g (56%), white solid, mp 142-144^oC, R_f = 0.39 (1:3 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 2969, 1612, 1514 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$): δ = 8.95 (dd, 1H, J_1 = 1.6 Hz, J_2 = 4.3 Hz, ArH), 8.64 (s, 1H, ArH), 8.46 (dd, 1H, J_1 = 1.6 Hz, J_2 = 8.3 Hz, ArH), 7.68-7.61 (m, 3H, ArH), 7.48 (s, 1H, ArH), 7.38 (d, 2H, J = 7.9 Hz, ArH), 4.21 (s, 3H, OCH_3), 3.91 (s, 3H, OCH_3), 2.48 (s, 3H, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 160.6, 152.9, 150.7, 148.8, 140.6, 139.0, 138.4, 137.5, 137.0, 130.5, 129.5, 129.4, 123.3, 122.7, 107.9, 103.4, 56.6, 56.1, 21.5; mass (ES^+) *m/z* 331.3 ($M^+ + 1$); Anal. Calcd for $C_{21}H_{18}N_2O_2$: C, 76.34; H, 5.49; N, 8.48; Found: C, 76.31; H, 5.46; N, 8.51.

6,12-Bis(3,4-dimethoxyphenyl)-8,9-dimethoxybenzo[c] phenanthridine 8h:

Yield = 0.25 g (75%), white solid, mp >250^oC, R_f = 0.18 (2:1 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3020, 1611, 1516 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 9.59 (dd, J_1 = 1.3 Hz, J_2 = 8.4 Hz, ArH), 8.35 (s, 1H, ArH), 7.99-7.94 (m, 2H, ArH), 7.76-7.59 (m, 3H, ArH), 7.57-7.54 (m, 2H, ArH), 7.24-7.17 (m, 2H, ArH), 7.13-7.07 (m, 2H, ArH), 4.16 (s, 3H, OCH_3), 4.03 (s, 3H, OCH_3), 4.02 (s, 6H, 2 x OCH_3), 3.96 (s, 6H, 2 x OCH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 157.2, 152.6, 149.7, 149.5, 149.1, 148.9, 148.8, 139.9, 139.1, 133.9, 133.6, 132.6, 132.2, 130.0, 127.1, 126.6, 126.1, 125.4, 123.0, 122.6, 121.1, 120.5, 119.5, 113.8, 113.6, 111.3, 111.1, 108.0, 102.2, 56.4, 56.3, 56.2, 56.1; mass (ES^+) *m/z* 562.4 ($M^+ + 1$); Anal. Calcd for $C_{35}H_{31}NO_6$: C, 74.85; H, 5.56; N, 2.49; Found: C, 74.81; H, 5.59; N, 2.46.

4-(12-(3,4-Dimethoxyphenyl)-8,9-dimethoxybenzo[c]phenanthridin-6-yl)-N,N-dimethyl aniline 8i:

Yield = 0.21 g (65%), yellowish green solid, mp 247-249^oC, R_f = 0.20 (2:3 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 1601, 1520 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ

= 9.62-9.58 (m, 1H, ArH), 8.33 (s, 1H, ArH), 7.97-7.88 (m, 4H, ArH), 7.83 (s, 1H, ArH), 7.75-7.54 (m, 2H, ArH), 7.20-7.17 (m, 2H, ArH), 7.09 (d, 1H, *J* = 8.0 Hz ArH), 6.98-6.94 (m, 2H, ArH), 4.15 (s, 3H, OCH_3), 4.02 (s, 3H, OCH_3), 3.98 (s, 3H, OCH_3), 3.95 (s, 3H, OCH_3), 3.10 (s, 6H, 2 x CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 157.7, 152.4, 151.0, 149.3, 148.9, 148.7, 140.2, 138.5, 134.1, 132.7, 132.2, 131.4, 131.2, 130.0, 128.8, 127.0, 126.5, 126.0, 125.6, 122.6, 121.2, 121.1, 120.6, 119.1, 113.9, 112.2, 111.3, 108.4, 102.2, 56.4, 56.3, 56.2, 56.1, 40.6; mass (ES^+) *m/z* 545.4 ($M^+ + 1$); Anal. Calcd for $C_{35}H_{32}N_2O_4$: C, 77.18; H, 5.92; N, 5.14; Found: C, 77.13; H, 5.95; N, 5.12.

6-(4-Bromophenyl)-12-(3,4-dimethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine 8j:

Yield = 0.20 g (62%), white solid, mp >250°C, R_f = 0.32 (1:3 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 2933, 1615, 1515 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 9.54-9.50 (m, 1H, ArH), 8.34 (s, 1H, ArH), 7.98-7.94 (m, 2H, ArH), 7.86-7.60 (m, 6H, ArH), 7.57 (s, 1H, ArH), 7.23-7.18 (m, 2H, ArH), 7.17 (d, 1H, *J* = 1.7 Hz, ArH), 4.15 (s, 3H, OCH_3), 4.02 (s, 3H, OCH_3), 3.95 (s, 3H, OCH_3), 3.94 (s, 3H, OCH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 156.2, 152.7, 149.7, 148.8, 139.9, 139.7, 139.5, 133.8, 132.6, 132.1, 131.9 131.7, 130.0, 127.3, 126.8 126.2, 125.3, 123.1, 122.6, 120.8, 120.4, 119.7, 113.7, 111.3, 107.3, 102.2, 56.4, 56.3, 56.2, 56.1; mass (ES^+) *m/z* 582.2 ($M^+ + 1$); Anal. Calcd for $C_{33}H_{26}BrNO_4$: C, 68.28; H, 4.51; N, 2.41; Found: C, 68.22; H, 4.54; N, 2.43.

12-(3,4-Dimethoxyphenyl)-6-(4-ethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine 8k:

Yield = 0.19 g (63%), whitish solid, mp 175-177°C, R_f = 0.30 (1:3 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 1619, 1519, 1216 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 9.57 (dd, 1H, J_1 = 1.2 Hz, J_2 = 8.3 Hz, ArH), 8.34 (s, 1H, ArH), 7.97-7.87 (m, 4H, ArH), 7.75-7.55 (m, 3H, ArH), 7.23-7.11 (m, 5H, ArH), 4.21 (q, 2H, *J* = 6.9 Hz, OCH_2), 4.17 (s, 3H, OCH_3), 4.15 (s, 3H, OCH_3), 4.02 (s, 3H, OCH_3), 3.95 (s, 3H, OCH_3), 1.51 (t, 3H, *J* = 6.9 Hz, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 159.6, 157.3, 152.5, 149.4, 148.8, 148.7, 140.0, 138.9, 133.9, 133.2, 132.6, 132.1, 131.6, 130.0, 127.0, 126.6, 126.1, 125.4, 122.6, 121.1, 120.5, 119.4, 114.5,

113.8, 111.3, 108.0, 102.2, 63.7, 56.3, 56.2, 56.1, 56.0, 15.0; mass (ES^+) *m/z* 546.3 ($M^+ + 1$); Anal. Calcd for $C_{35}H_{31}NO_5$: C, 77.04; H, 5.73; N, 2.57; Found: C, 77.01; H, 5.76; N, 2.54.

12-(3,4-Dimethoxyphenyl)-6-(4-fluorophenyl)-8,9-dimethoxy benzo[c]phenanthridine 8l:

Yield = 0.18 g (64%), white solid, mp 227-229°C, R_f = 0.28 (1:3 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 1610, 1515 cm^{-1}; ^1H NMR (200 MHz, $CDCl_3$): δ = 9.54 (dd, 1H, J_1 = 1.1 Hz, J_2 = 8.3 Hz, ArH), 8.35 (s, 1H, ArH), 7.99-7.90 (m, 4H, ArH), 7.77-7.57. (m, 3H, ArH), 7.35-7.17 (m, 4H, ArH), 7.09 (d, 1H, *J* = 8.1 Hz, ArH), 4.16 (s, 3H, OCH_3), 4.02 (s, 3H, OCH_3), 3.96 (s, 3H, OCH_3), 3.95 (s, 3H, OCH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 163.1 (d, *J* = 246.0 Hz), 156.4, 152.7, 149.6, 148.9, 148.8, 139.9, 139.3, 136.9, 136.8, 133.8, 132.6, 132.2, 132.1, 132.0, 130.0, 127.2, 126.8, 126.2, 125.3, 122.6, 121.0, 120.5, 119.6, 115.5 (d, *J* = 21.5 Hz), 113.8, 111.3, 107.6, 102.3, 56.4, 56.3, 56.2, 56.0; mass (ES^+) *m/z* 520.3 ($M^+ + 1$); Anal. Calcd for $C_{33}H_{26}FNO_4$: C, 76.29; H, 5.04; N, 2.70; Found: C, 76.24; H, 5.07; N, 2.72.

6-(4-Chlorophenyl)-7,8,9-trimethyl-12-(3,4,5-trimethylphenyl) benzo[c]phenanthridine 8m:

Yield = 0.12 g (61%), white solid, mp >250°C, R_f = 0.60 (1:33 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 2924, 1636, 1440 cm^{-1}; ^1H NMR (300 MHz, $CDCl_3$): δ = 9.44 (d, 1H, *J* = 8.2 Hz, ArH), 8.45-8.41 (m, 2H, ArH), 8.02-7.93 (m, 1H, ArH), 7.71-7.68 (m, 2H, ArH), 7.64-7.48 (m, 4H, ArH), 7.29 (s, 1H, ArH), 7.25 (s,1H, ArH), 2.59 (s, 3H, CH_3), 2.43 (s, 6H, 2 x CH_3), 2.38 (s, 3H, CH_3), 2.33 (s, 3H, CH_3), 2.13 (s, 3H, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 156.9, 143.9, 140.0, 139.8, 138.9, 138.2, 136.9, 136.6, 134.6, 134.3, 134.2, 133.2, 132.2, 132.1, 130.7, 130.4, 129.5, 128.6, 128.5, 127.0, 126.6, 126.3, 125.2, 124.4, 120.9, 120.8, 119.5, 22.6, 22.2, 20.9, 16.5, 15.5; mass (ES^+) *m/z* 500.5 ($M^+ + 1$); Anal. Calcd for $C_{35}H_{30}ClN$: C, 84.06; H, 6.05; N, 2.80; Found: C, 84.02; H, 6.09; N, 2.83.

6-(3,4-Dimethoxyphenyl)-7,8,9-trimethyl-12-(3,4,5-trimethylphenyl) benzo[c] phenanthridine 8n:

Yield = 0.14 g (63%), white solid, mp >250^{o}C, R_f = 0.32 (1:7 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 1638, 1515 cm^{-1}; ^{1}H NMR (300 MHz, $CDCl_3$): δ = 9.40 (d, 1H, *J* = 7.6 Hz, ArH), 8.46-8.40 (m, 2H, ArH), 8.02-7.94 (m, 1H, ArH), 7.72-7.50 (m, 3H, ArH), 7.40 (d, 1H, *J* = 0.2, Hz, ArH), 7.31 (s, 1H, ArH), 7.24-7.21 (m, 1H, ArH), 7.01 (d, 1H, *J* = 8.3 Hz, ArH), 4.00 (s, 3H, OCH_3), 3.99 (s, 3H, OCH_3), 2.59 (s, 3H, CH_3), 2.43 (s, 6H, 2 x CH_3), 2.38 (s, 3H, CH_3), 2.33 (s, 3H, CH_3), 2.16 (s, 3H, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 157.9, 149.5, 149.1, 139.8, 139.3, 138.9, 138.3, 136.7, 136.6, 134.9, 134.5, 133.2, 132.2, 132.1, 130.4, 129.5, 126.9, 126.4, 126.3, 125.3, 124.6, 122.4, 120.8, 120.7, 119.4, 112.6, 111.2, 22.2, 22.1, 20.9, 16.5, 15.4; mass (ES^{+}) *m/z* 526.4 (M^{+} + 1); Anal. Calcd for $C_{37}H_{35}NO_2$: C, 84.54; H, 6.71; N, 2.66; Found: C, 84.51; H, 6.74; N, 2.63.

7,8,9-Trimethyl-6-(4-nitrophenyl)-12-(3,4,5-trimethylphenyl) benzo[c]phenanthridine 8o:

Yield = 0.13 g (60%), yellow solid, mp >250^{o}C, R_f = 0.36 (1:20 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 2925, 1597, 1515, 1343 cm^{-1}; ^{1}H NMR (200 MHz, $CDCl_3$): δ = 9.43-9.40 (m, 1H, ArH), 8.48-8.36 (m, 4H, ArH), 8.05-7.89 (m, 3H, ArH), 7.77-7.55 (m, 3H, ArH), 7.30 (s, 1H, ArH), 2.61 (s, 3H, CH_3), 2.44 (s, 6H, 2 x CH_3), 2.40 (s, 3H, CH_3), 2.34 (s, 3H, CH_3), 2.12 (s, 3H, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 155.5, 151.6, 147.6, 140.6, 140.5, 138.8, 138.0, 137.4, 136.7, 134.7, 133.6, 133.2, 132.2, 132.1, 130.2, 129.4, 127.3, 126.8, 126.5, 125.0, 124.2, 123.7, 121.2, 120.6, 119.9, 22.9, 22.2, 20.9, 16.6, 15.5; mass (ES^{+}) *m/z* 511.4 (M^{+} + 1); Anal. Calcd for $C_{35}H_{30}N_2O_2$: C, 82.33; H, 5.92; N, 5.49; Found: C, 82.36; H, 5.90; N, 5.46.

6-(4-Bromophenyl)-7,8,9-trimethyl-12-(3,4,5-trimethyl phenyl) benzo[c]phenanthridine 8p:

Yield = 0.15 g (59%), yellowish green solid, mp >250^{o}C, R_f = 0.45 (1:50 v/v Ethylacetate/Hexane), IR (KBr) ν_{max} 3021, 1523, 1426 cm^{-1}; ^{1}H NMR (300 MHz, $CDCl_3$): δ = 9.44 (d, 1H, *J* = 8.3 Hz, ArH), 8.45-8.41 (m, 2H, ArH), 8.01-7.98 (m, 1H, ArH), 7.73-7.55 (m, 7H, ArH), 7.29 (s, 1H, ArH), 2.59 (s, 3H, CH_3), 2.43 (s, 6H, 2 x CH_3), 2.38 (s, 3H, CH_3), 2.32 (s, 3H, CH_3), 2.13 (s, 3H, CH_3); ^{13}C NMR (50 MHz, $CDCl_3$): δ = 156.9, 144.3, 140.0,

139.8, 138.9, 138.2, 136.9, 136.6, 134.5, 134.3, 133.2, 132.2, 132.1, 131.6, 131.0, 129.5, 128.5, 127.0, 126.6, 126.3, 125.2, 122.5, 120.9, 120.8, 119.5, 22.6, 22.2, 20.9, 16.5, 15.5; mass (ES^+) *m/z* 546.4 ($M^+ + 1$); Anal. Calcd for $C_{35}H_{30}BrN$: C, 77.20; H, 5.55; N, 2.57; Found: C, 77.15; H, 5.58; N, 2.62.

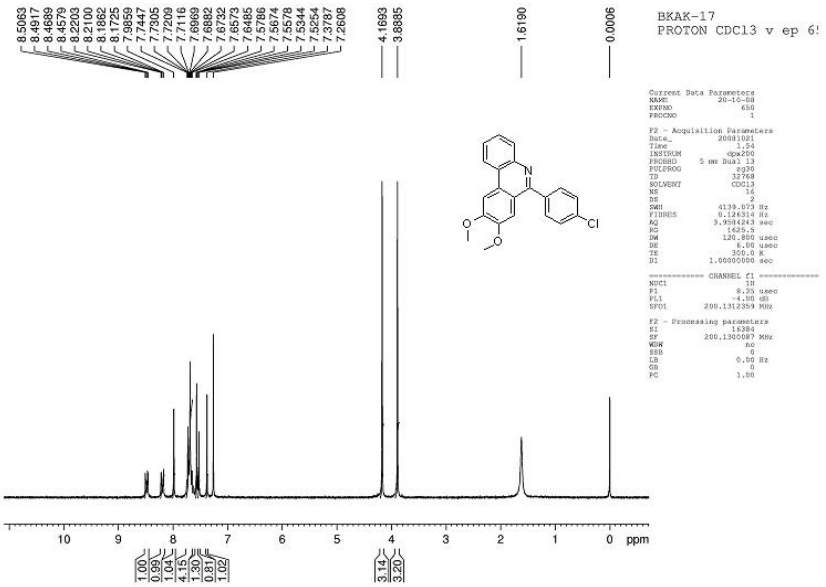

Figure 1: ^{1}H NMR spectrum of 6-(4-Chlorophenyl)-8,9-dimethoxyphenanthridine **(6a)**

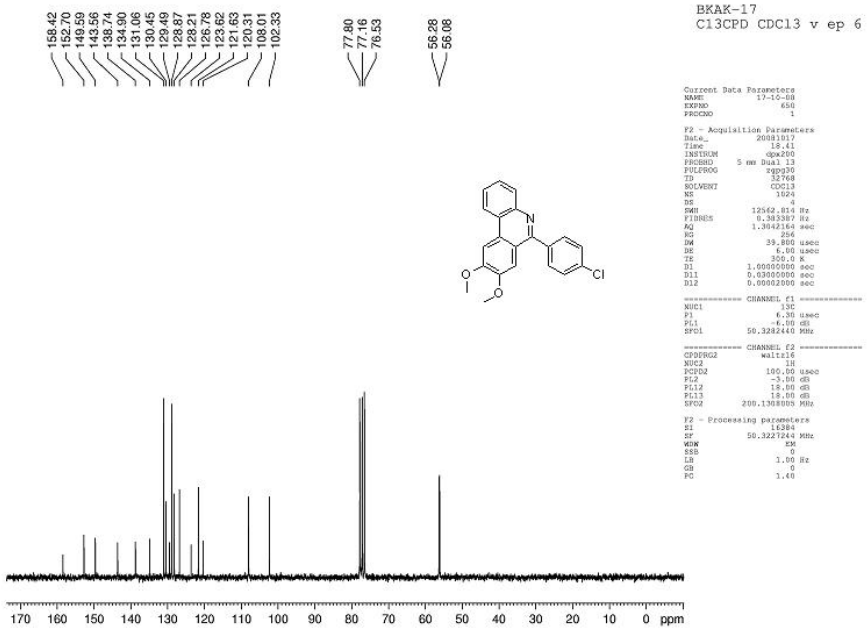

Figure 2: ^{13}C NMR spectrum of 6-(4-Chlorophenyl)-8,9-dimethoxyphenanthridine **(6a)**

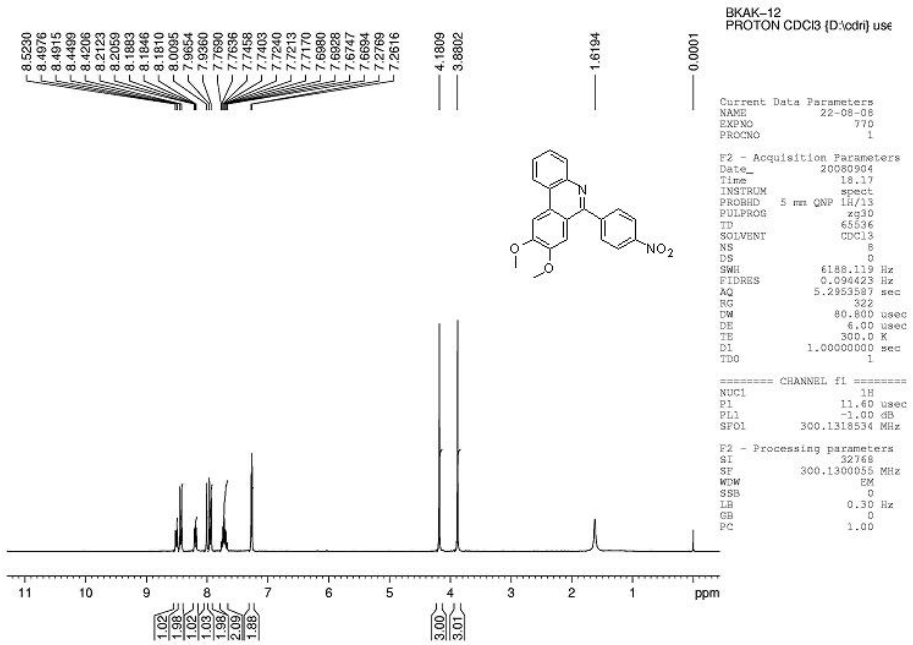

Figure 3: ^{1}H NMR spectrum of 6-(4-Ntrophenyl)-8,9-dimethoxyphenanthridine **(6b)**

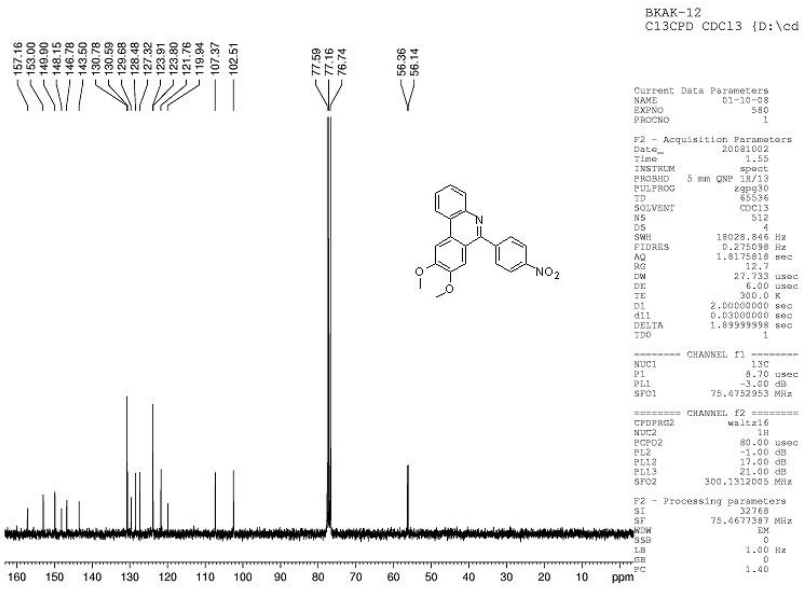

Figure 4: ^{13}C NMR spectrum of 6-(4-Ntrophenyl)-8,9-dimethoxyphenanthridine **(6b)**

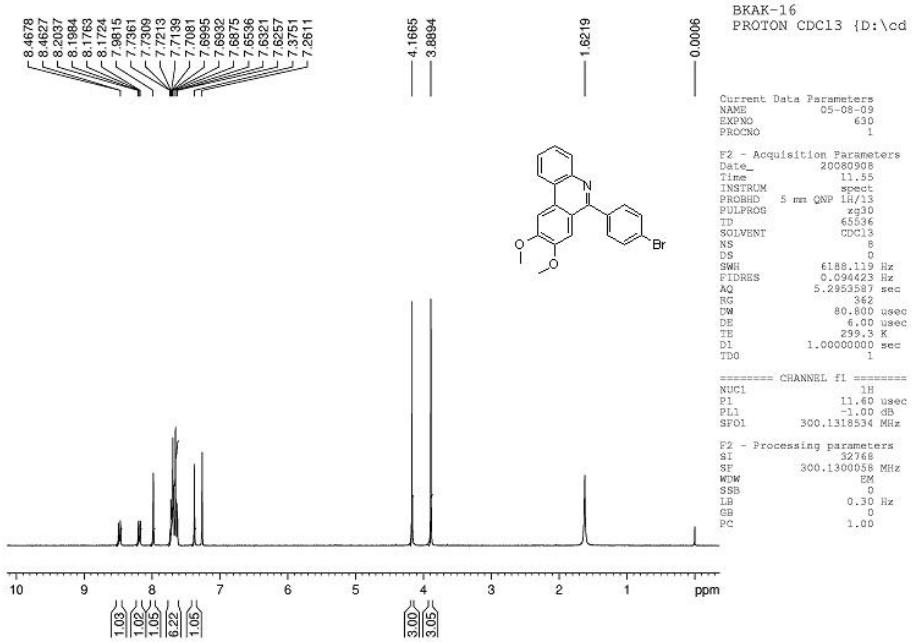

Figure 5:[1]H NMRspectrumof6-(4-bromophenyl)-8,9-dimethoxyphenanthridine **(6c)**

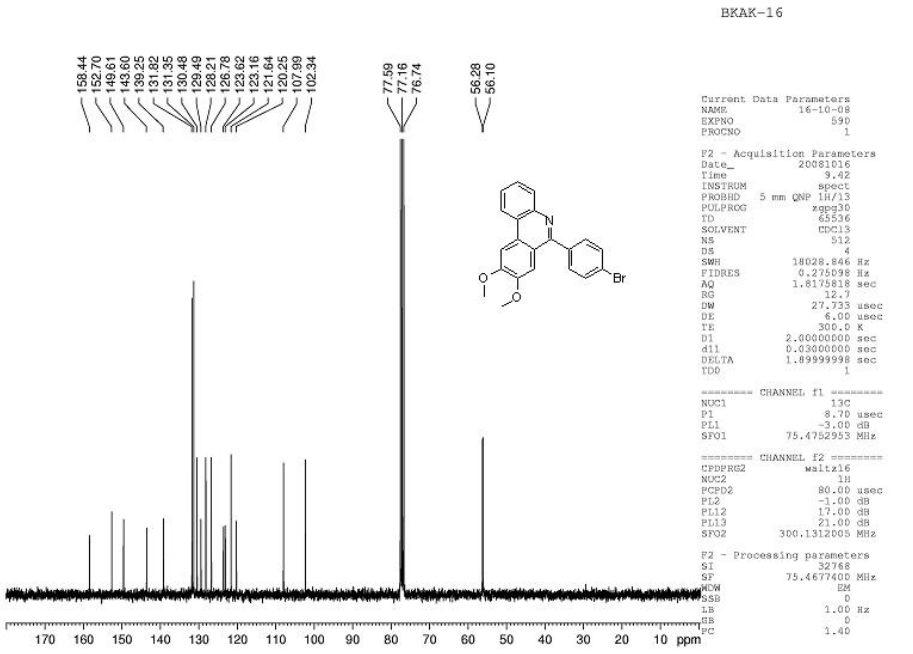

Figure 6:[13]C NMR spectrum of 6-(4-bromophenyl)-8,9-dimethoxyphenanthridine **(6c)**

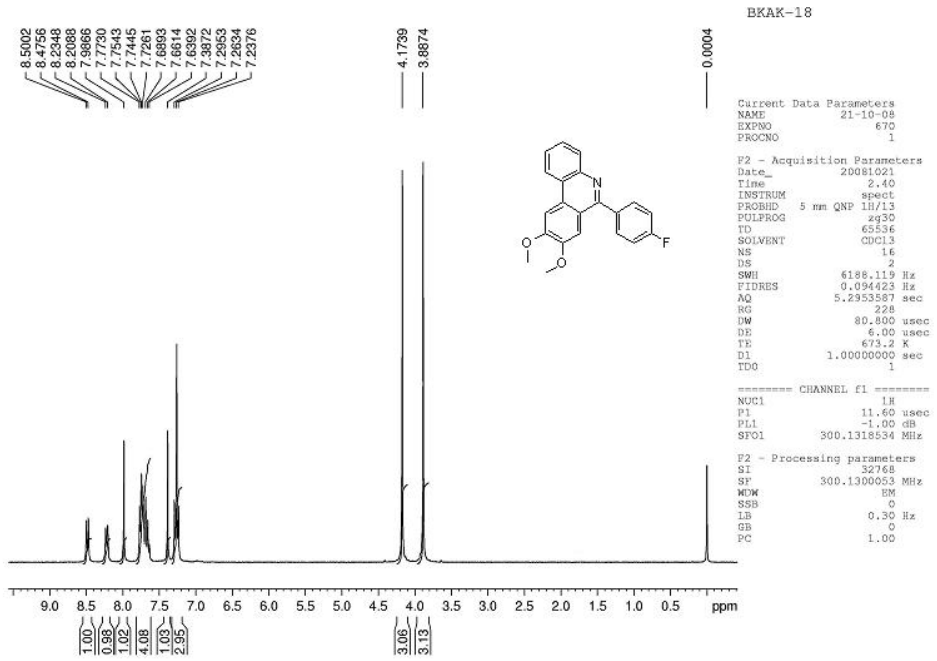

Figure 7: ^{1}H NMR spectrum of 6-(4-Fluorophenyl)-8,9-dimethoxyphenanthridine **(6d)**

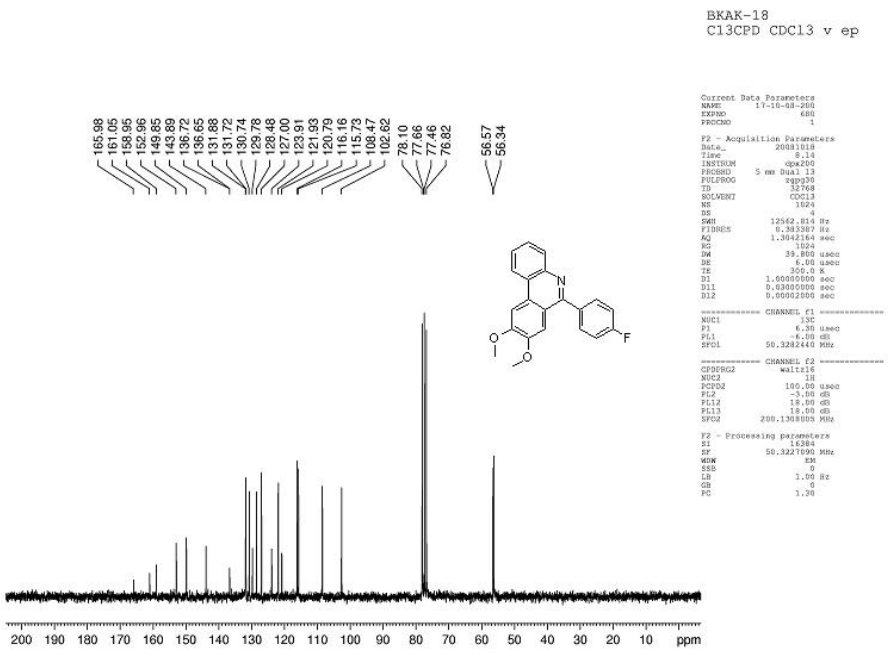

Figure 8: ^{1}H NMR spectrum of 6-(4-Fluorophenyl)-8,9-dimethoxyphenanthridine **(6d)**

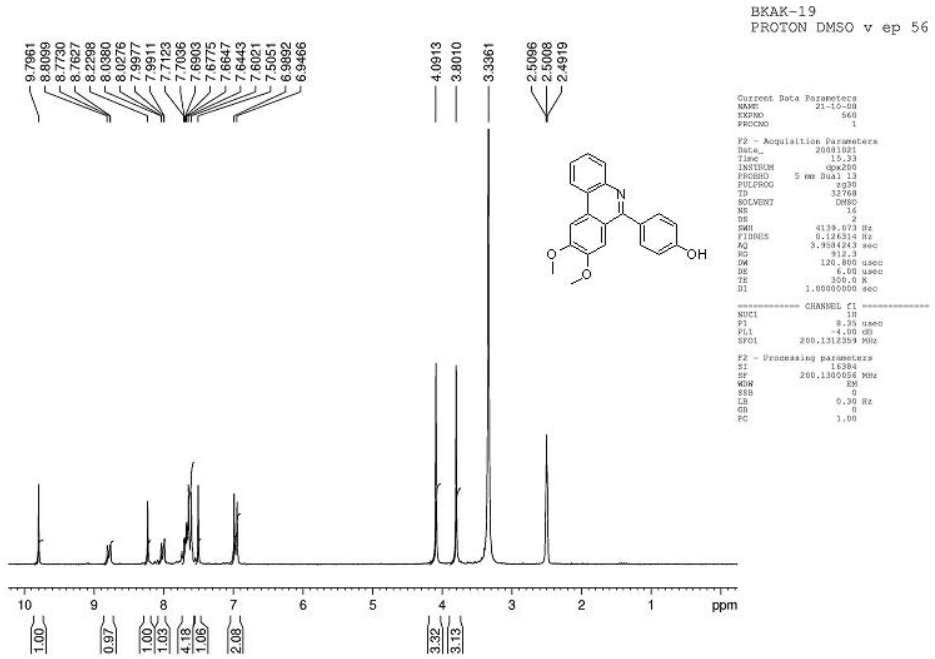

Figure 9: ^{1}H NMR spectrum of 4-(8,9-Dimethoxyphenanthridin-6-yl)phenol **(6e)**

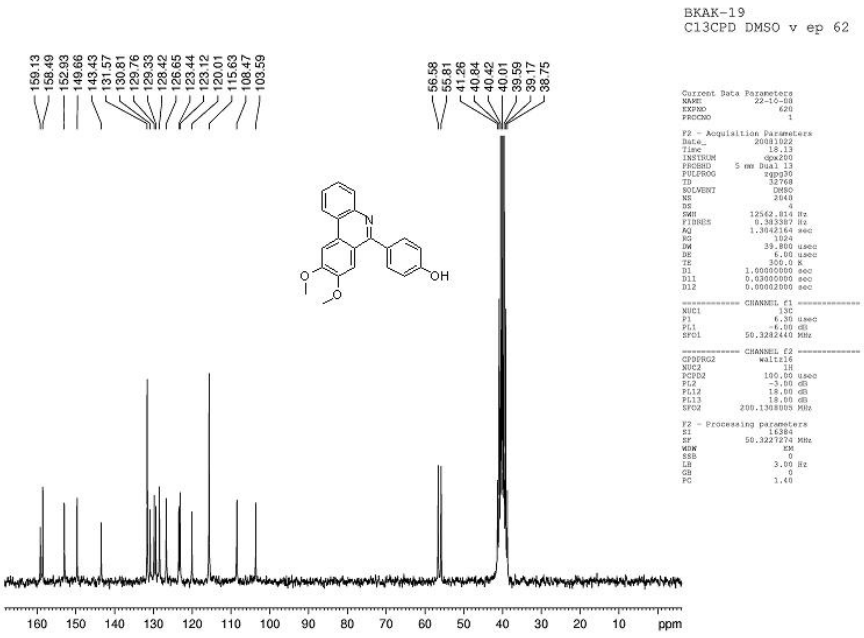

Figure 10: ^{13}C NMR spectrum of 4-(8,9-Dimethoxyphenanthridin-6-yl)phenol **(6e)**

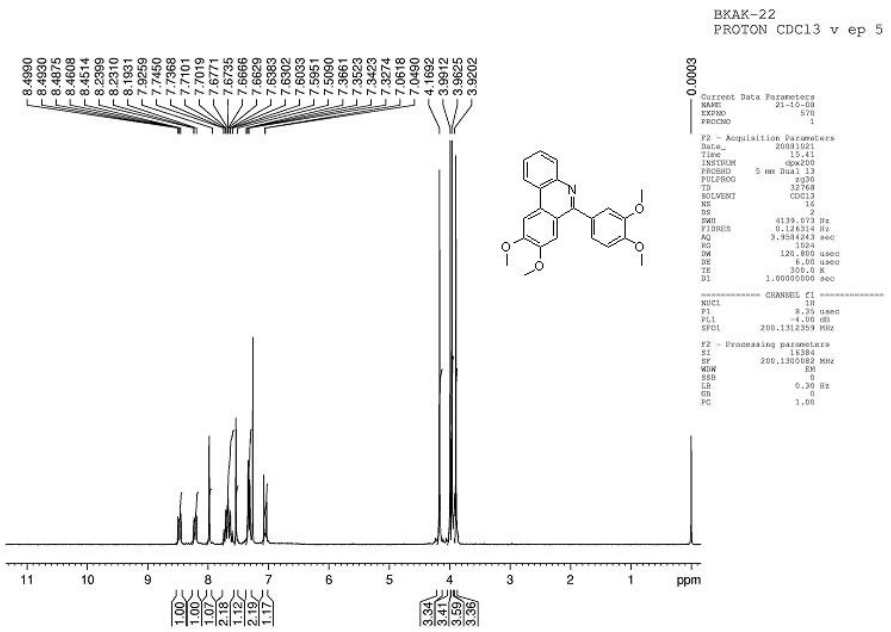

Figure 11: ^{1}H NMR spectrum of 6-(3,4-Dimethoxyphenyl)-8,9-dimethoxyphenanthridine **(6f)**

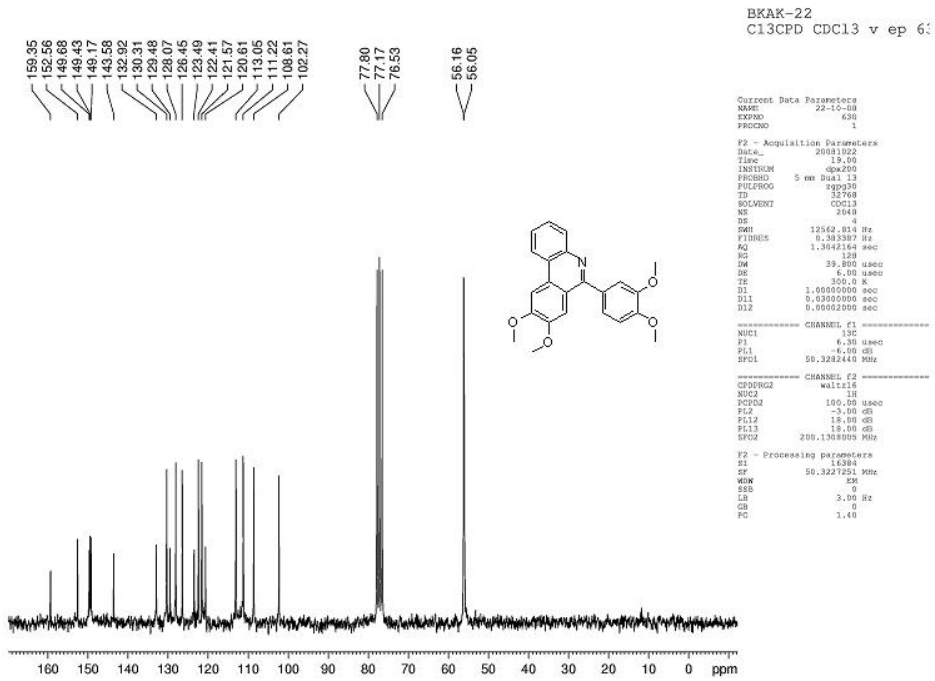

Figure 12: ^{13}C NMR spectrum of 6-(3,4-Dimethoxyphenyl)-8,9-dimethoxyphenanthridine **(6f)**

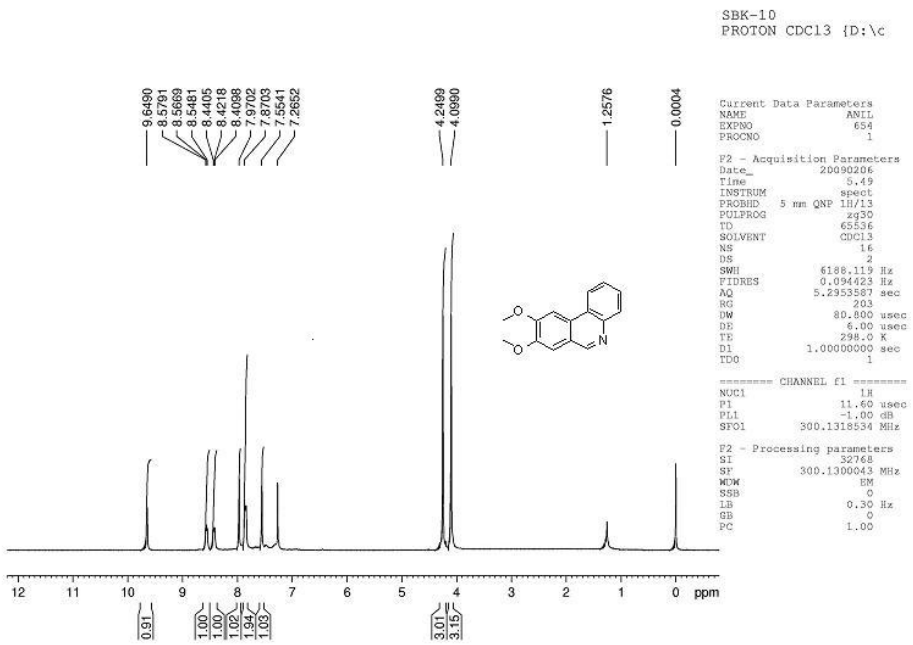

Figure 13: ^{1}H NMR spectrum of 8,9-dimethoxy phenanthridine **(6g)**

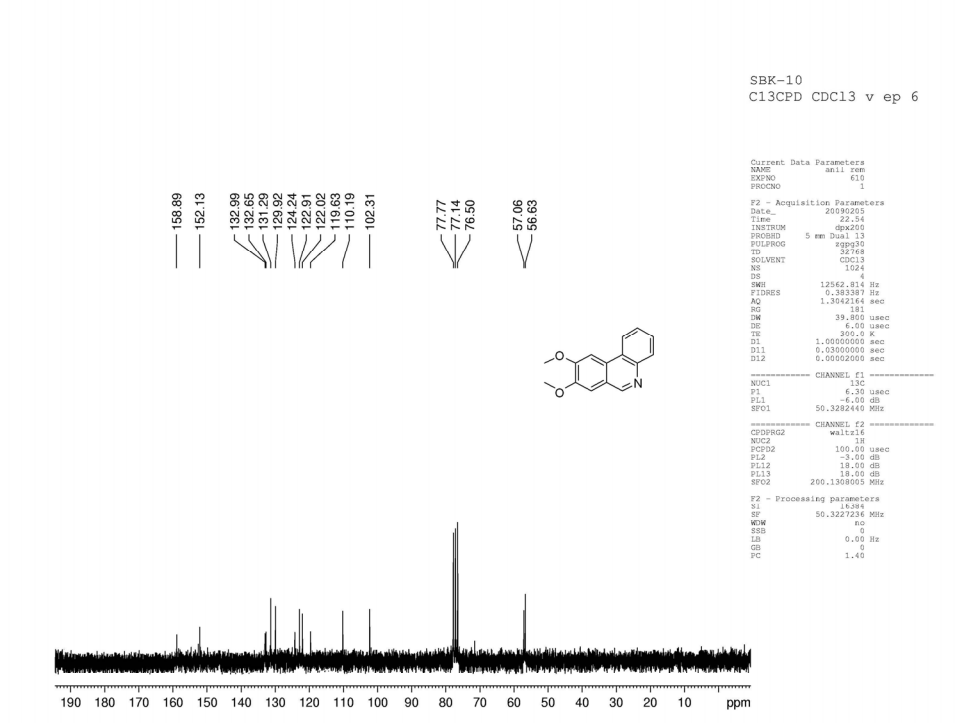

Figure 14: ^{13}C NMR spectrum of 8,9-dimethoxy phenanthridine **(6g)**

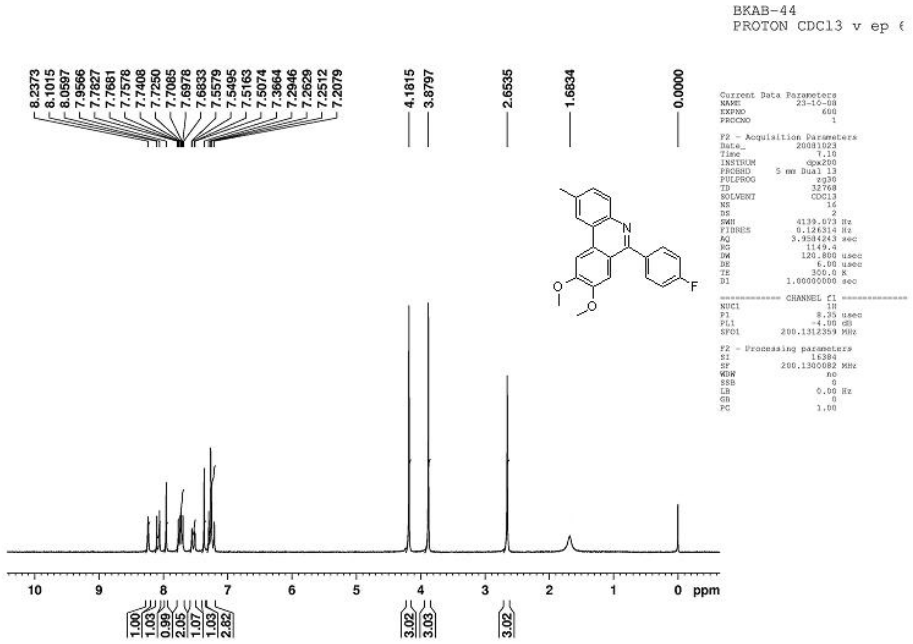

Figure 15: ^{1}H NMR spectrum of 6-(4-fluorophenyl)-8,9-dimethoxy-2-methylphenanthridine **(6h)**

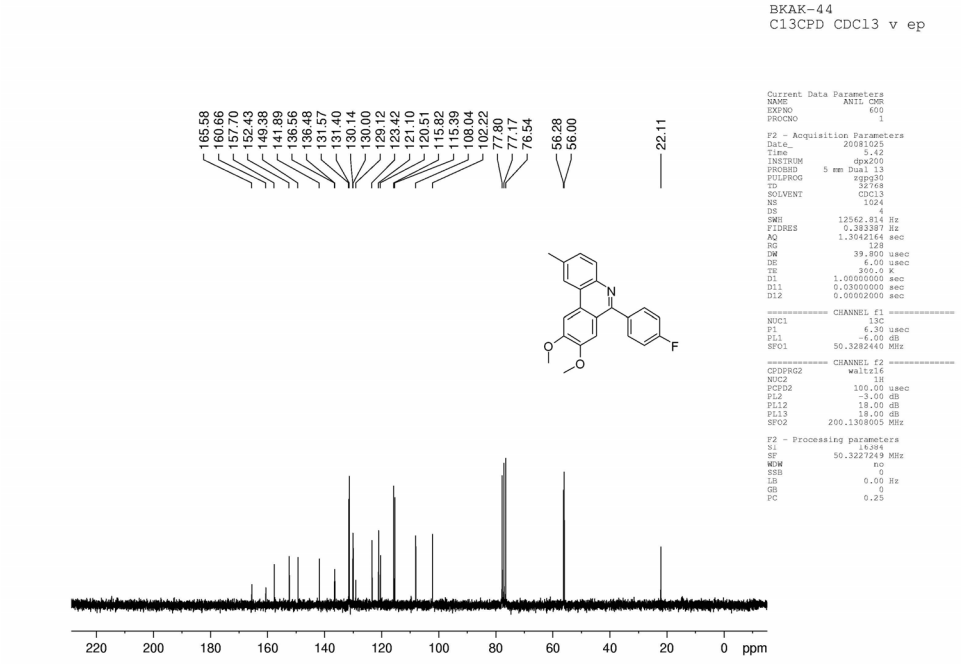

Figure 16: ^{13}C NMR spectrum of 6-(4-fluorophenyl)-8,9-dimethoxy-2-methylphenanthridine **(6h)**

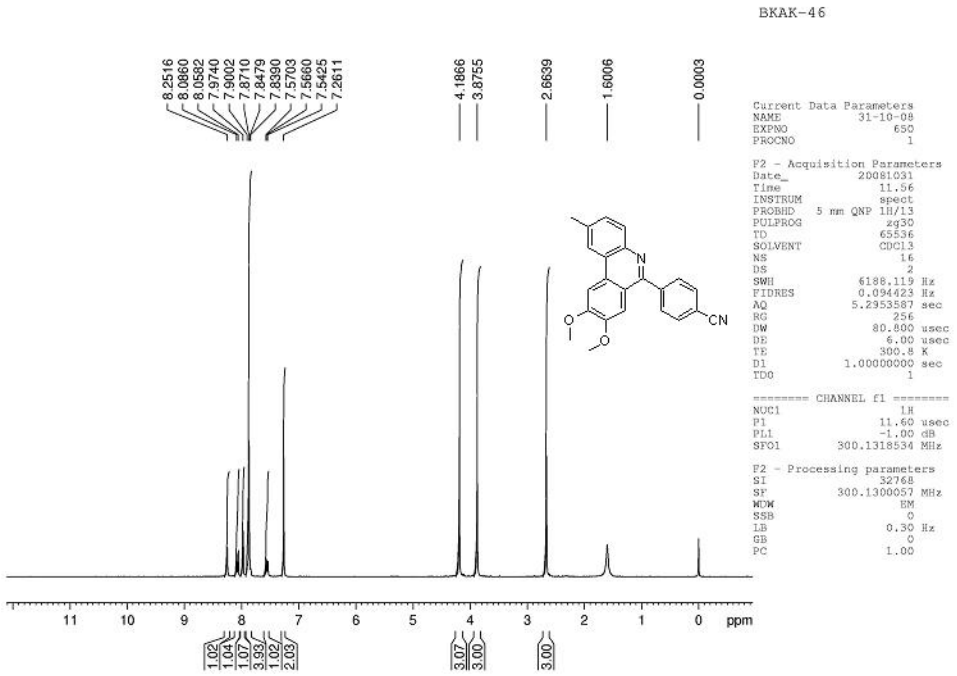

Figure 17: ^{1}H NMR spectrum of 4-(8,9-dimethoxy-2-methylphenanthridin-6-yl)benzonitrile **(6i)**

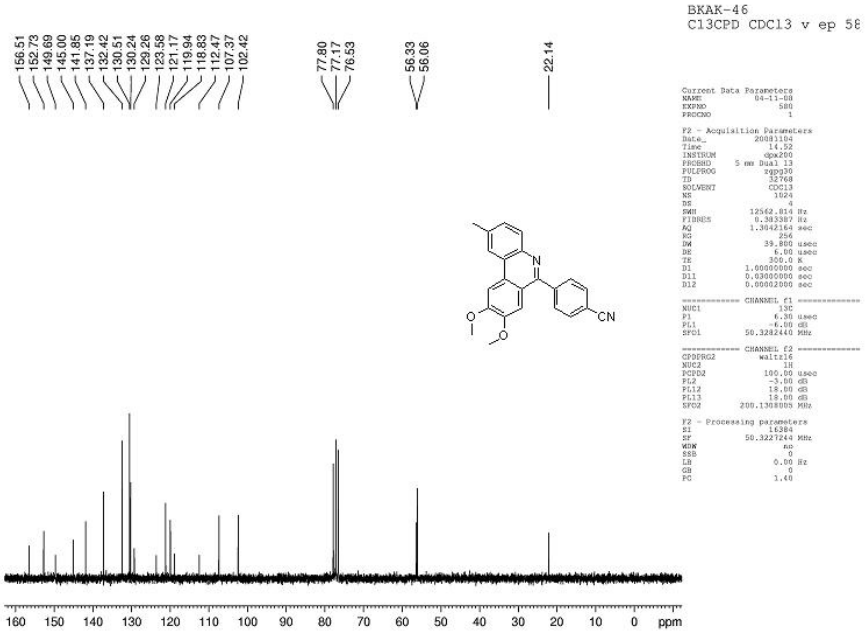

Figure 18: ^{13}C NMR spectrum of 4-(8,9-dimethoxy-2-methylphenanthridin-6-yl)benzonitrile **(6i)**

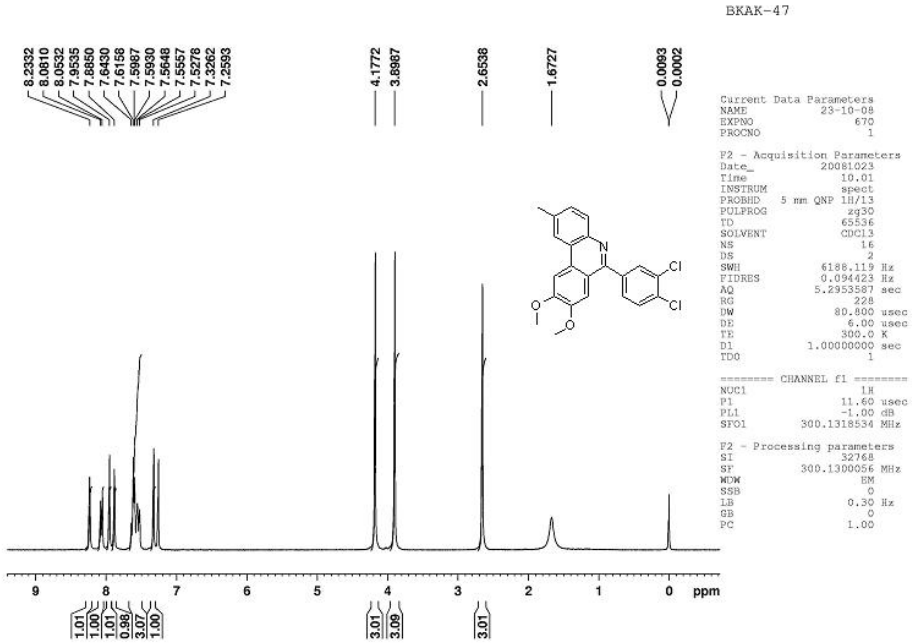

Figure 19: ^{1}H NMR spectrum of 6-(3,4-dichlorophenyl)-8,9-dimethoxy-2-methylphenanthridine **(6j)**

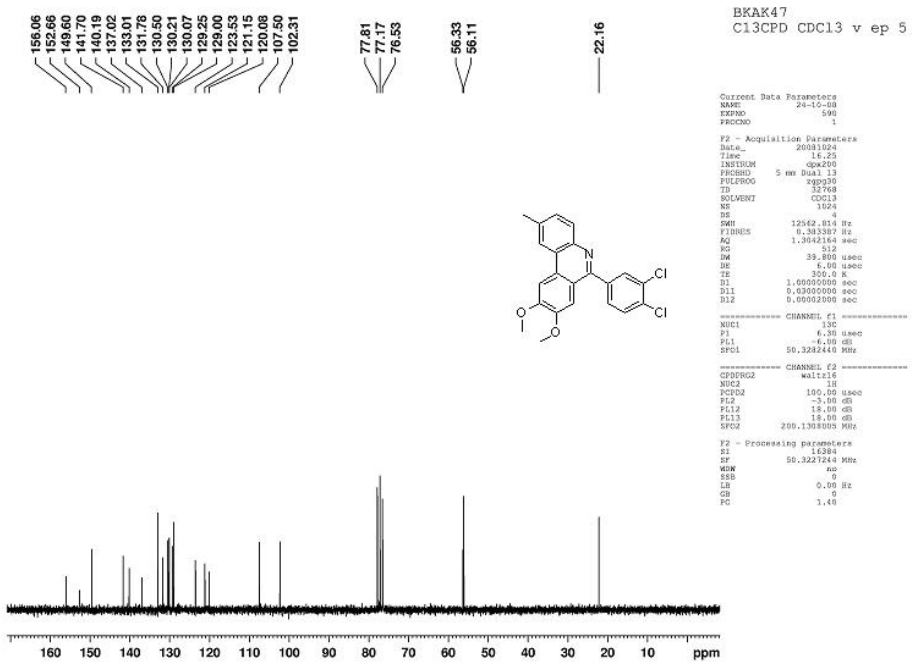

Figure 20: ^{13}C NMR spectrum of 6-(3,4-dichlorophenyl)-8,9-dimethoxy-2-methylphenanthridine **(6j)**

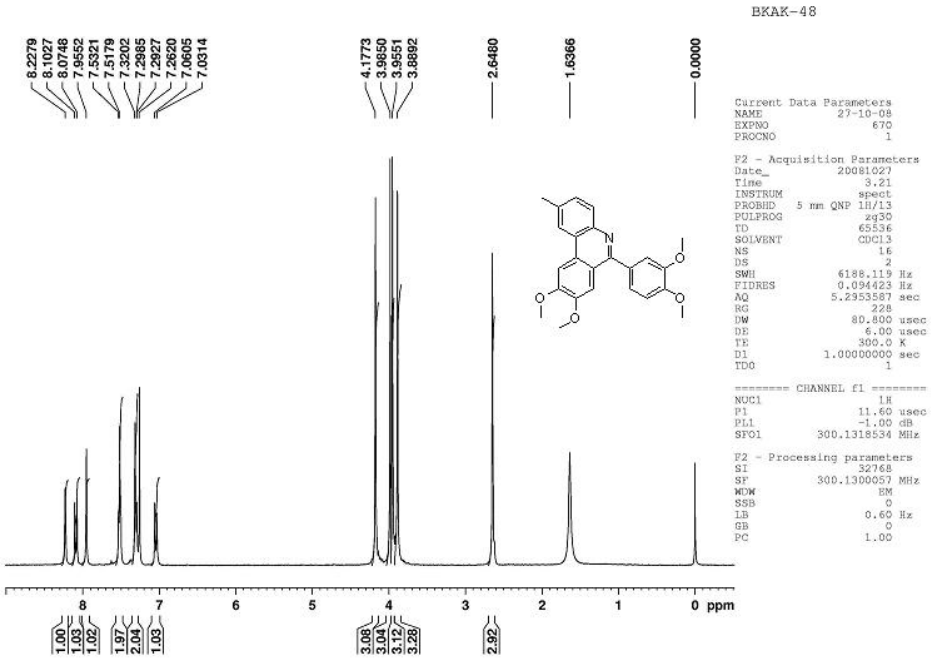

Figure 21: ^{1}H NMR spectrum of 6-(3,4-dimethoxyphenyl)-8,9-dimethoxy-2-methylphenanthridine **(6k)**

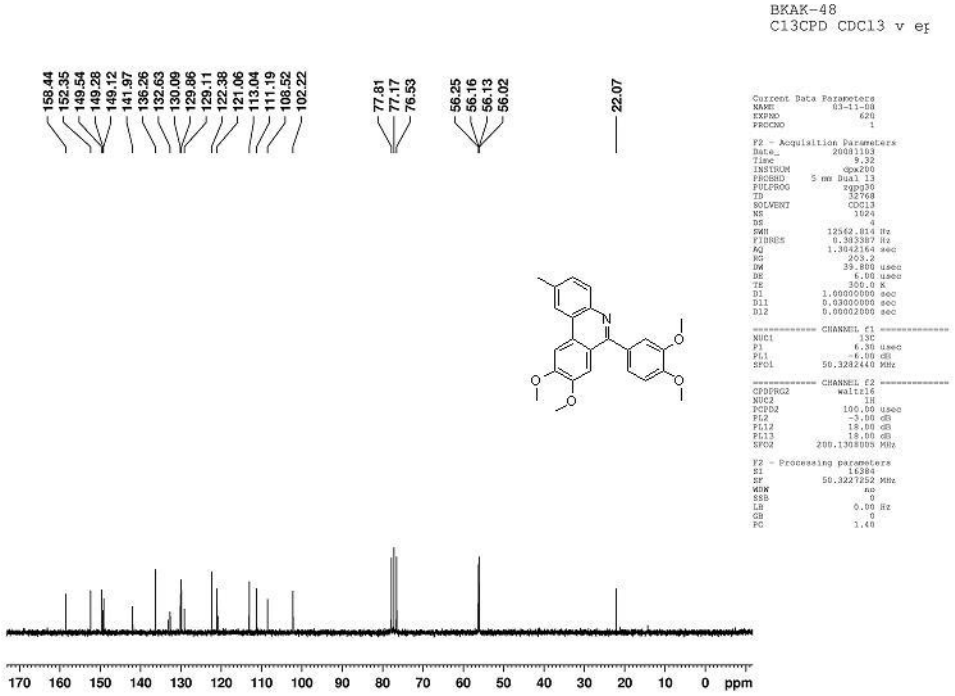

Figure 22: ^{13}C NMR spectrum of 6-(3,4-dimethoxyphenyl)-8,9-dimethoxy-2-methylphenanthridine **(6k)**

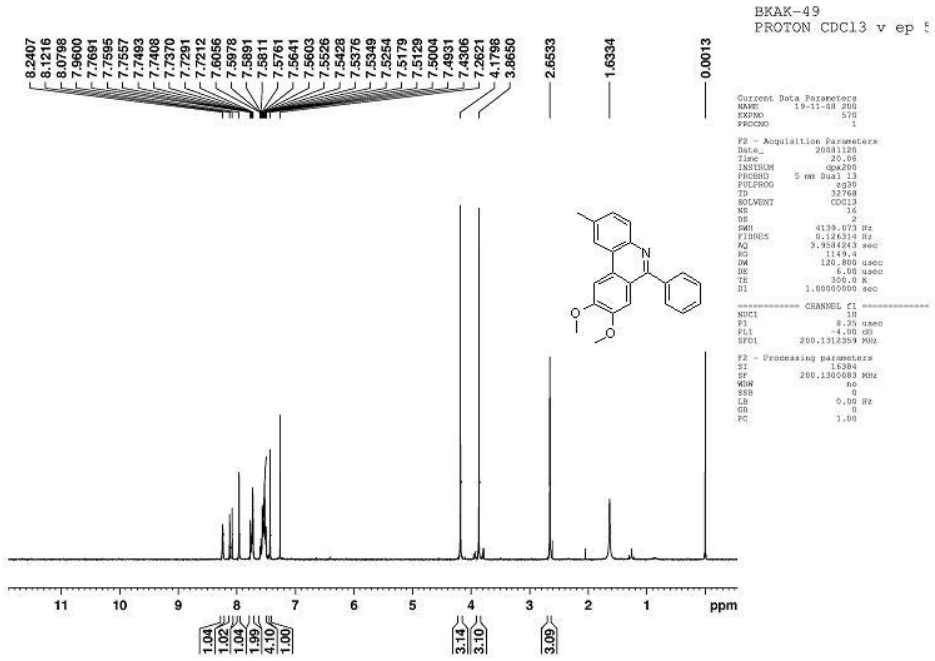

Figure 23:[1]H NMR spectrum of 8,9-dimethoxy-2-methyl-6-phenyl phenanthridine **(6l)**

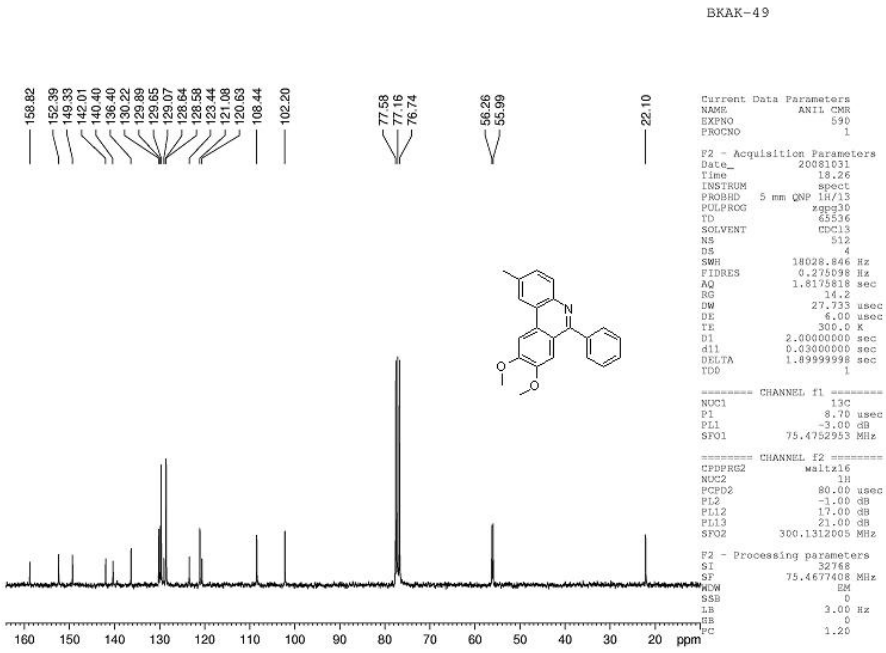

Figure 24:[13]C NMR spectrum of 8,9-dimethoxy-2-methyl-6-phenyl phenanthridine **(6l)**

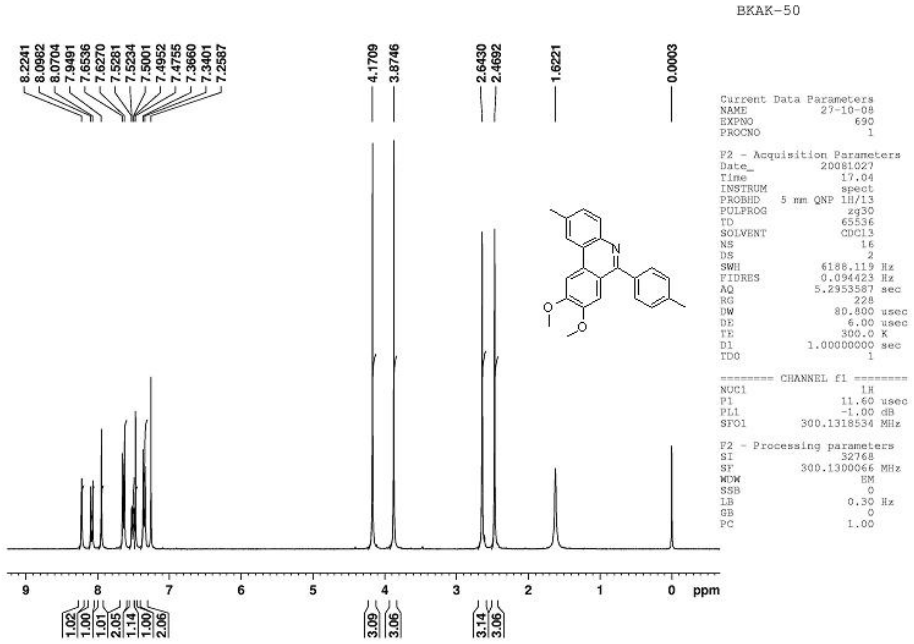

Figure 25: ^{1}H NMR spectrum of 8,9-dimethoxy-2-methyl-6-(4-methylphenyl)phenanthridine **(6m)**

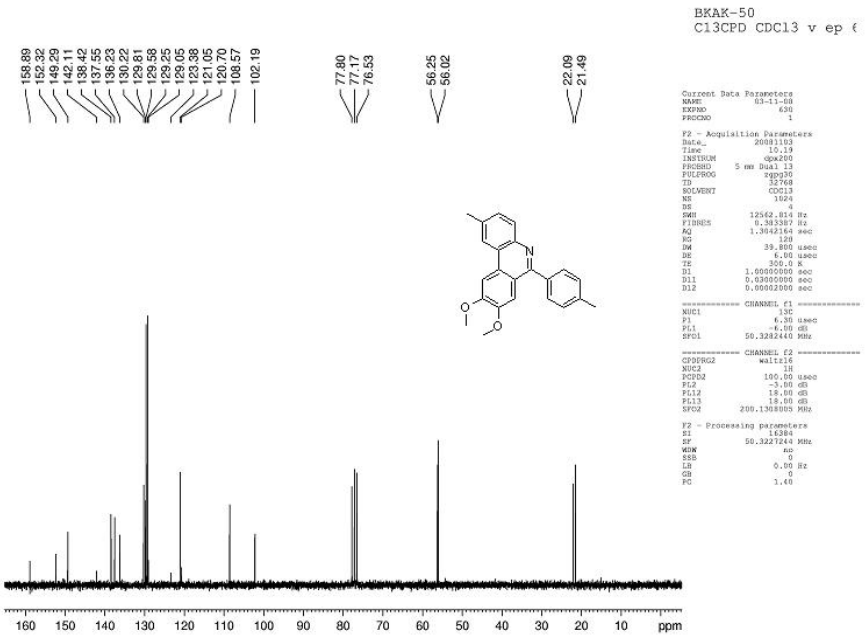

Figure 26: ^{13}C NMR spectrum of 8,9-dimethoxy-2-methyl-6-(4-methylphenyl)phenanthridine **(6m)**

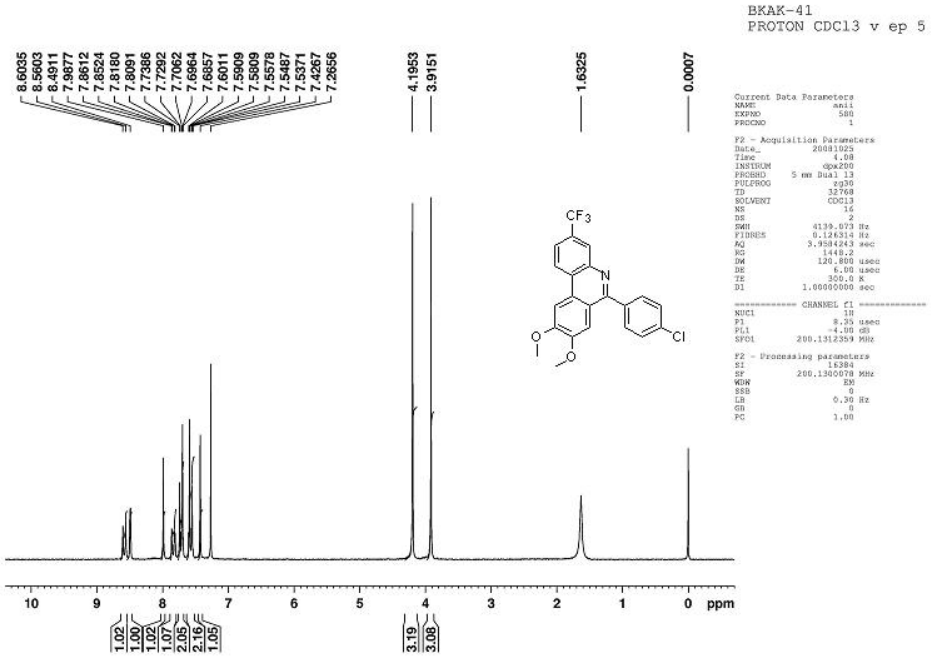

Figure 27: ^{1}H NMR spectrum of 6-(4-chlorophenyl)-8,9-dimethoxy-3-(trifluoromethyl)phenanthridine **(6n)**

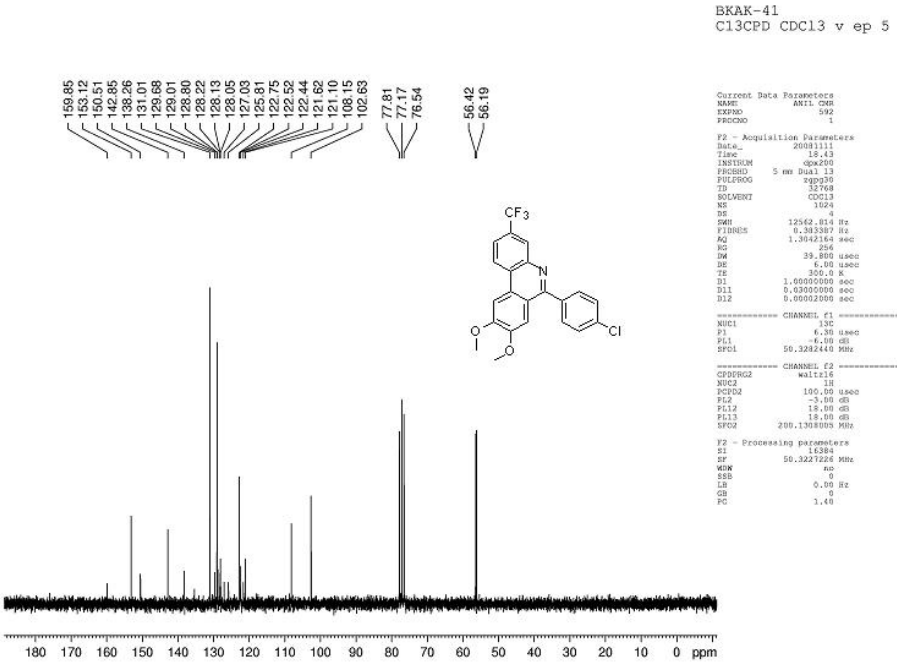

Figure 28: ^{13}C NMR spectrum of 6-(4-chlorophenyl)-8,9-dimethoxy-3-(trifluoromethyl)phenanthridine **(6n)**

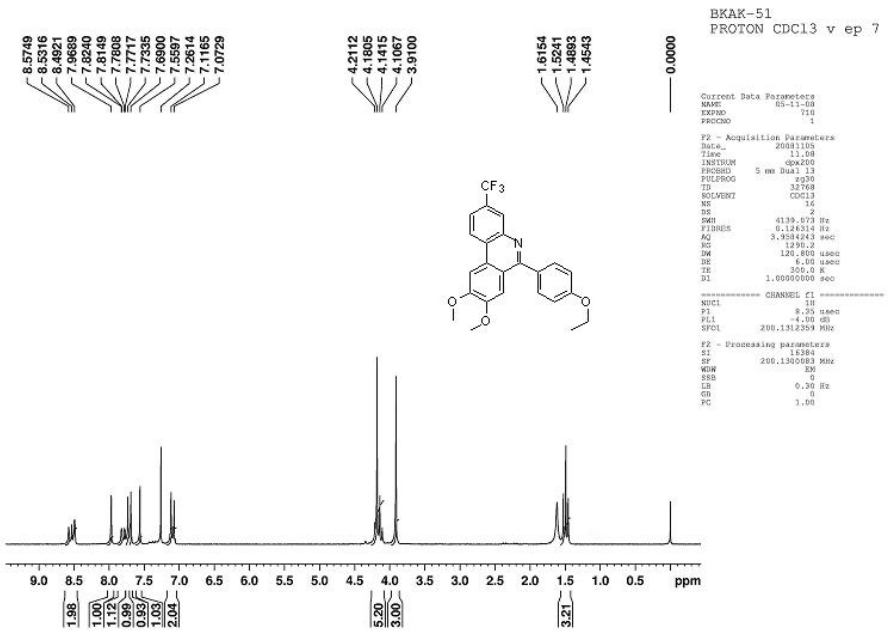

Figure 29: ^{1}H NMR spectrum of 6-(4-ethoxyphenyl)-8,9-dimethoxy-3-(trifluoromethyl)phenanthridine **(6o)**

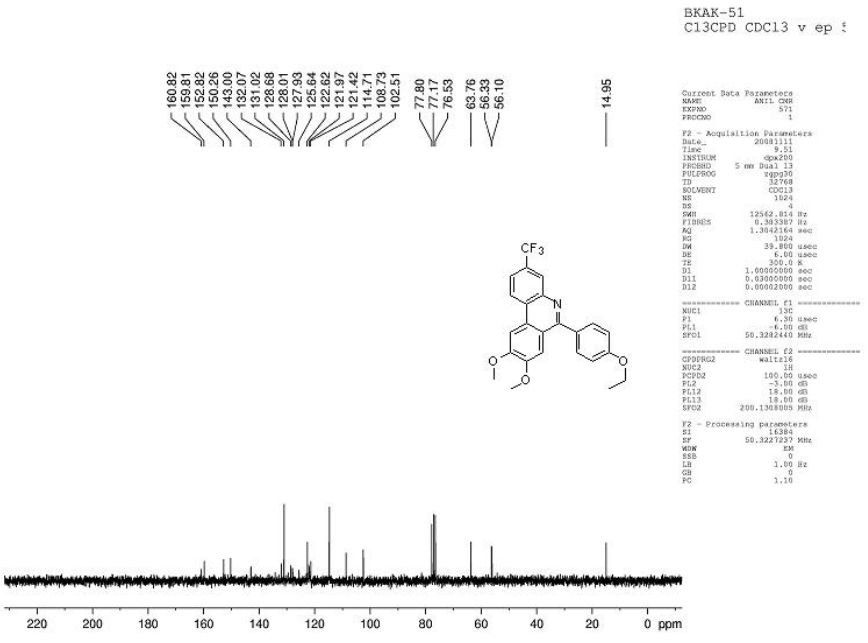

Figure 30: ^{13}C NMR spectrum of 6-(4-ethoxyphenyl)-8,9-dimethoxy-3-(trifluoromethyl)phenanthridine **(6o)**

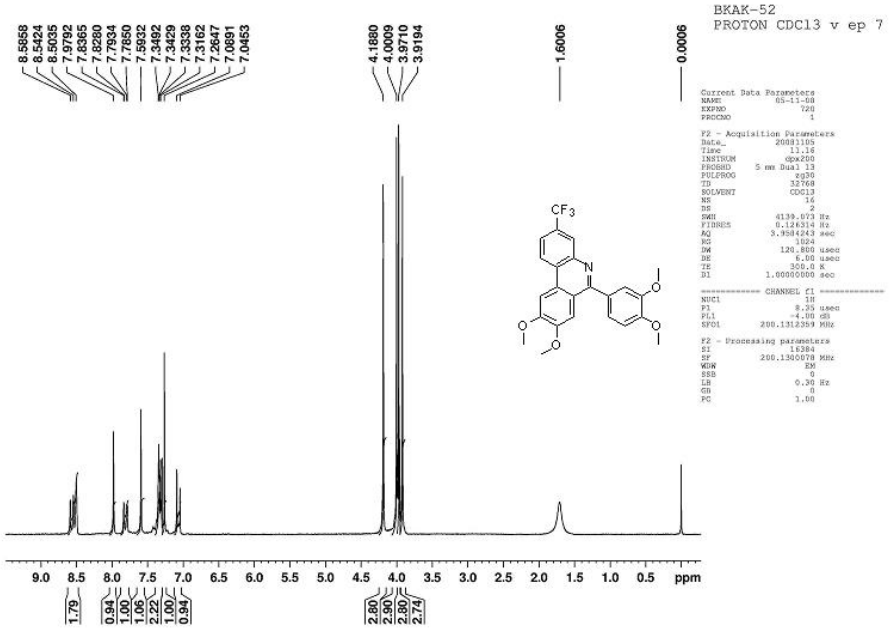

Figure 31: ^{1}H NMRspectrumof 6-(3,4-dimethoxyphenyl)-8,9-dimethoxy-3-(trifluoromethyl)phenanthridine **(6p)**

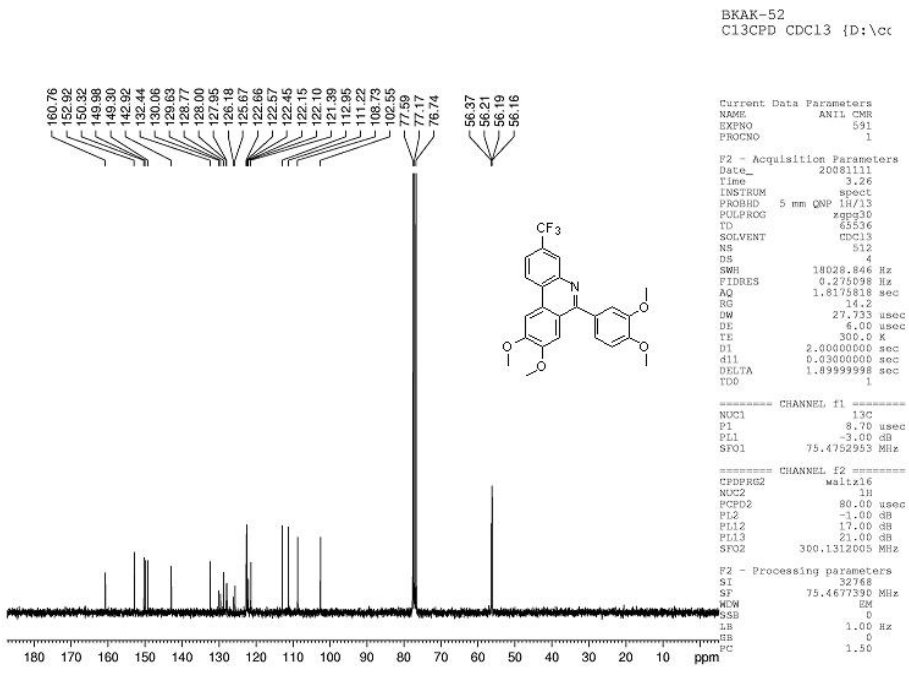

Figure32: ^{13}C NMRspectrumof 6-(3,4-dimethoxyphenyl)-8,9-dimethoxy-3-(trifluoromethyl)phenanthridine **(6p)**

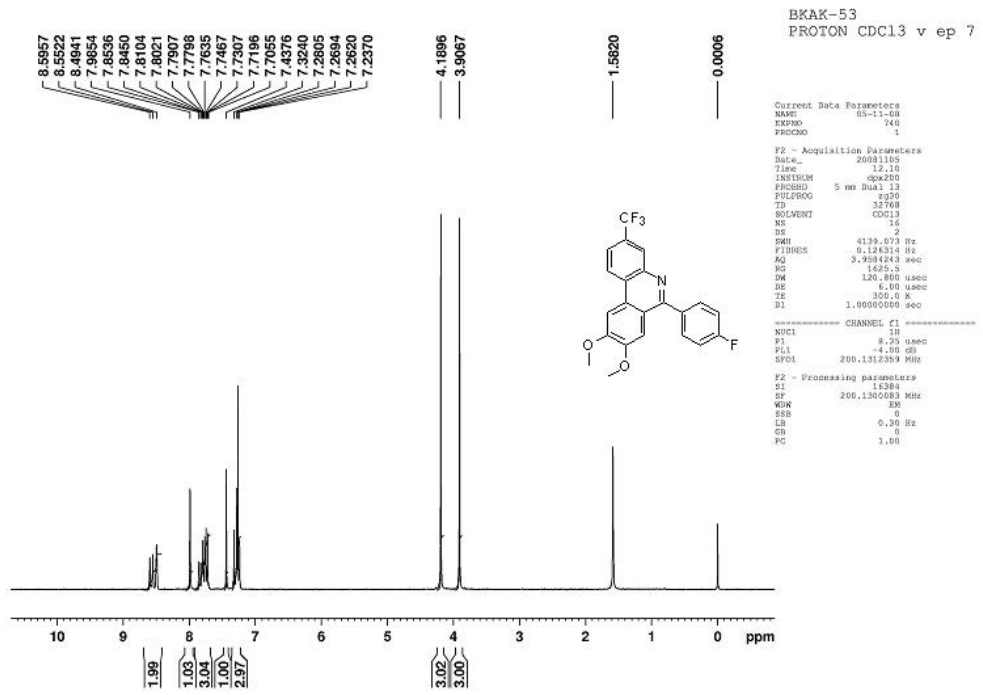

Figure 33:[1]H NMR spectrumof 6-(4-fluorophenyl)-8,9-dimethoxy-3-(trifluoromethyl)phenanthridine **(6q)**

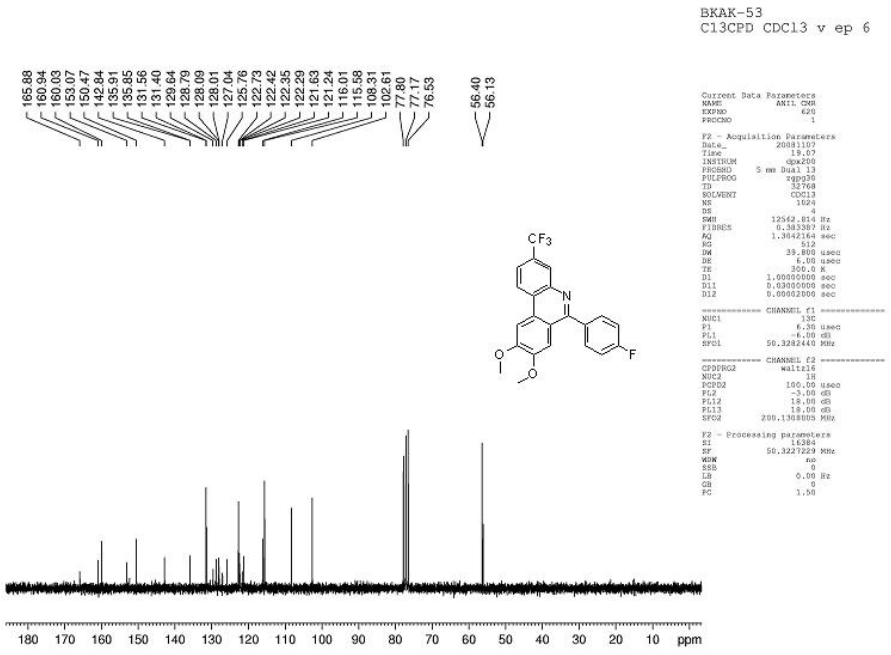

Figure 34:[13]C NMR spectrumof 6-(4-fluorophenyl)-8,9-dimethoxy-3-(trifluoromethyl)phenanthridine **(6q)**

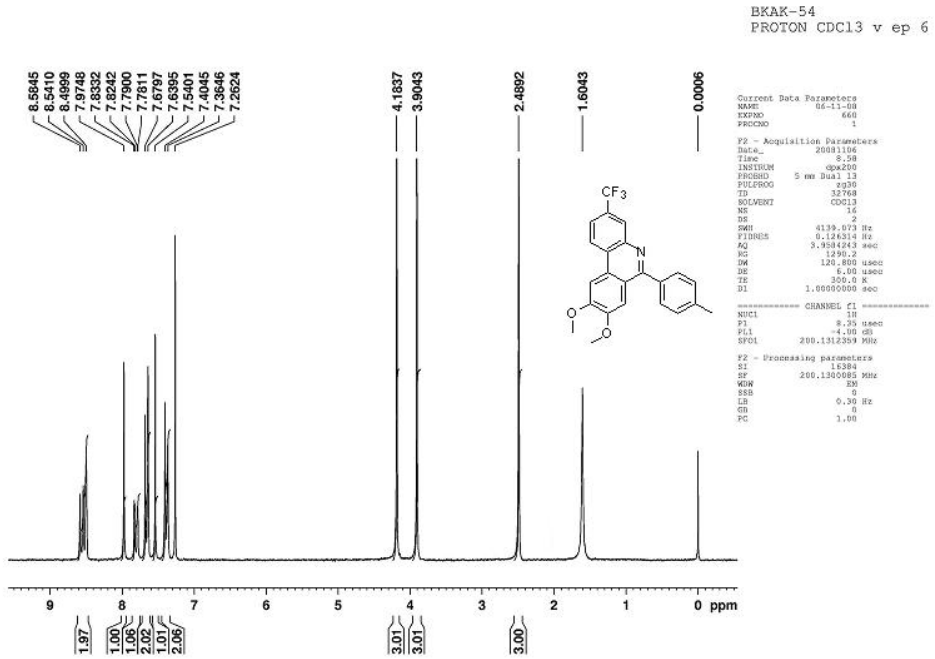

Figure 35:[1]H NMR spectrumof 8,9-dimethoxy-6-(4-methylphenyl)-3-(trifluoromethyl)phenanthridine **(6r)**

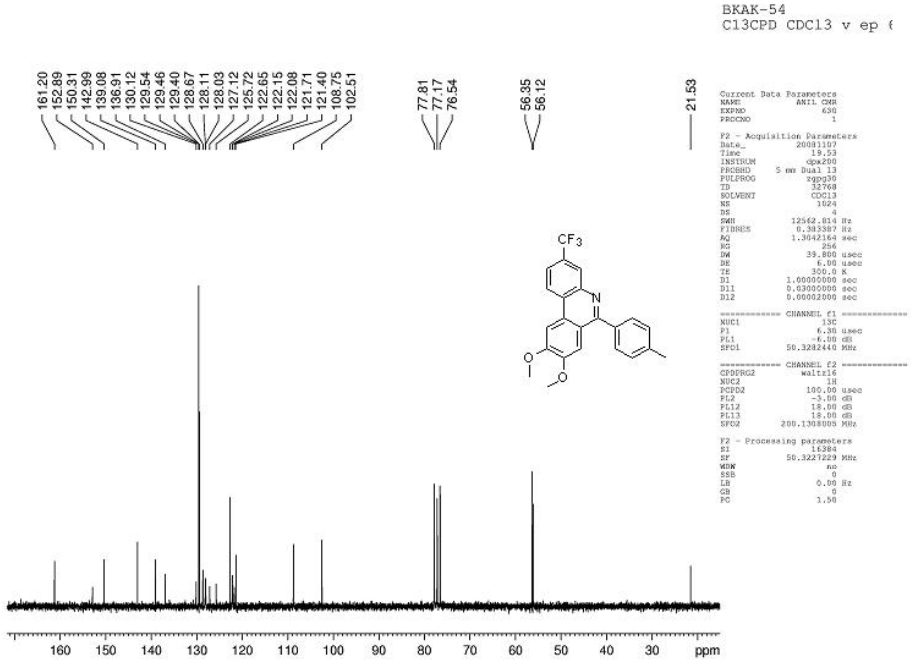

Figure 36:[13]C NMR spectrum of 8,9-dimethoxy-6-(4-methylphenyl)-3-(trifluoromethyl)phenanthridine **(6r)**

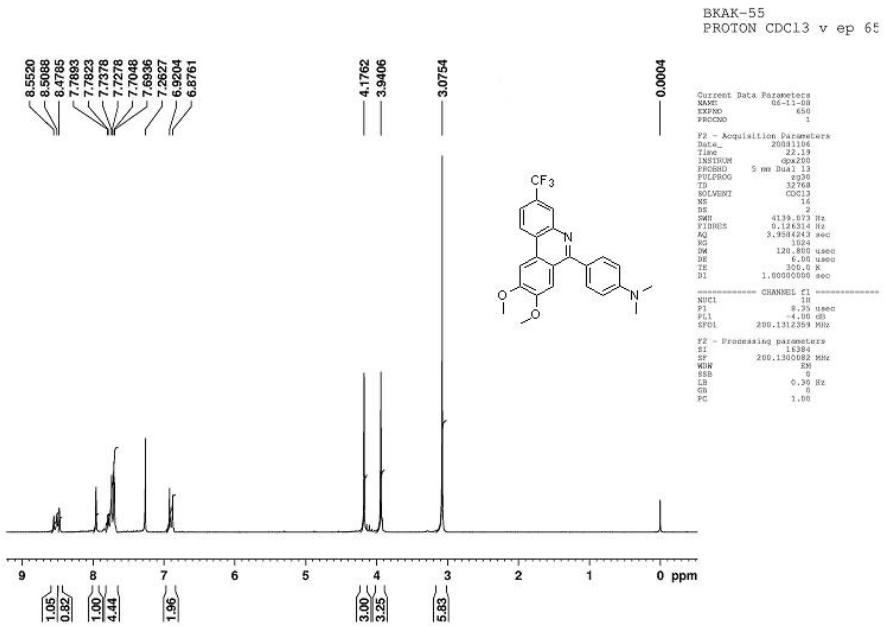

Figure 37: ^{1}H NMR spectrum of 8,9-dimethoxy-6-(4-*N,N*-dimethylphenyl)-3-(trifluoromethyl)phenanthridine **(6s)**

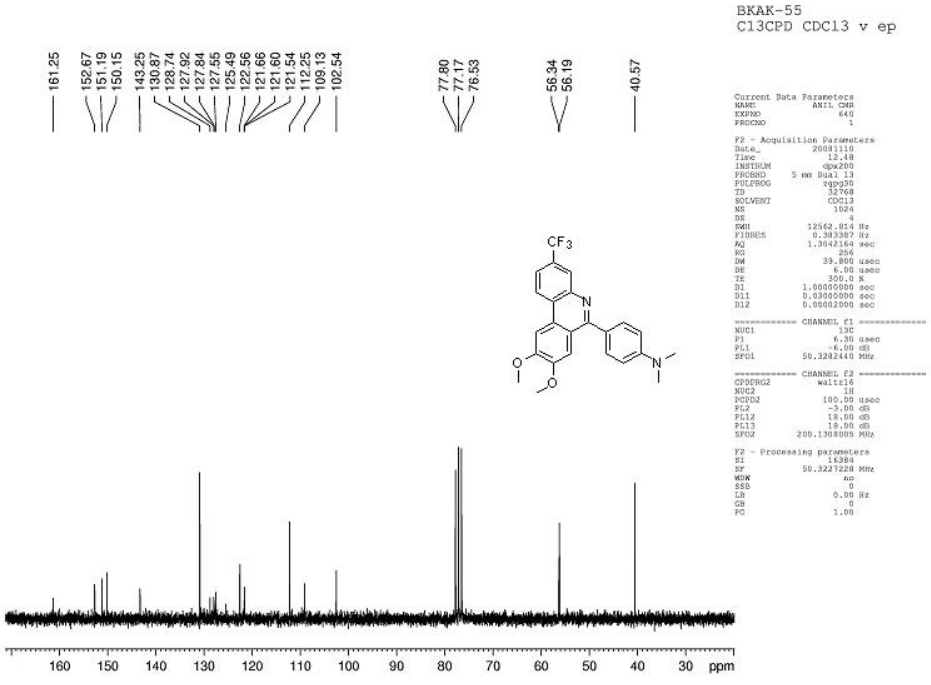

Figure 38: ^{13}C NMR spectrum of 8,9-dimethoxy-6-(4-*N,N*-dimethylphenyl)-3-(trifluoromethyl)phenanthridine **(6s)**

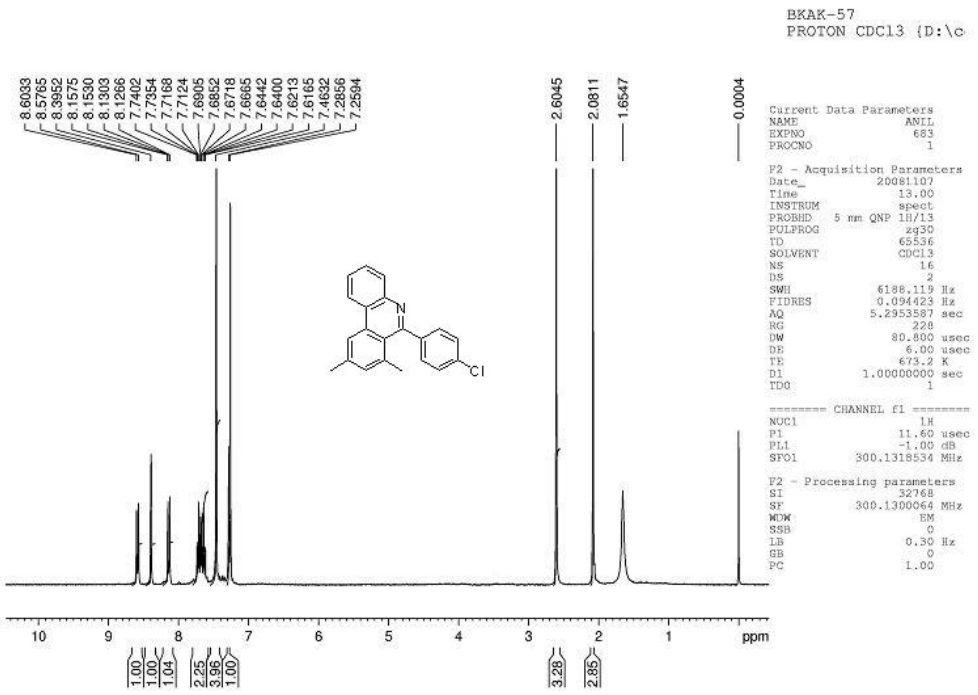

Figure 39: [1]H NMR spectrum of 6-(4-chlorophenyl)-7,9-dimethylphenanthridine **(6t)**

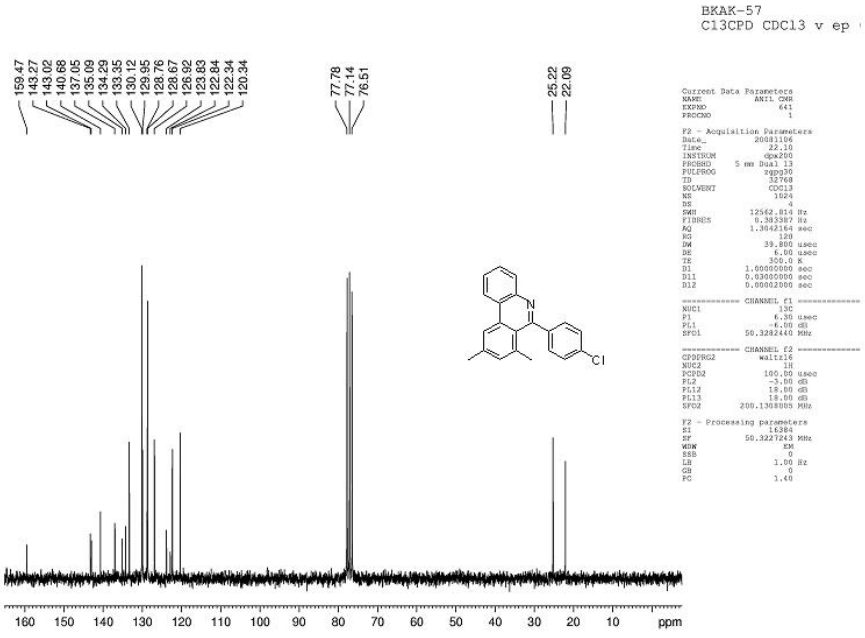

Figure 40: [13]C NMR spectrum of 6-(4-chlorophenyl)-7,9-dimethylphenanthridine **(6t)**

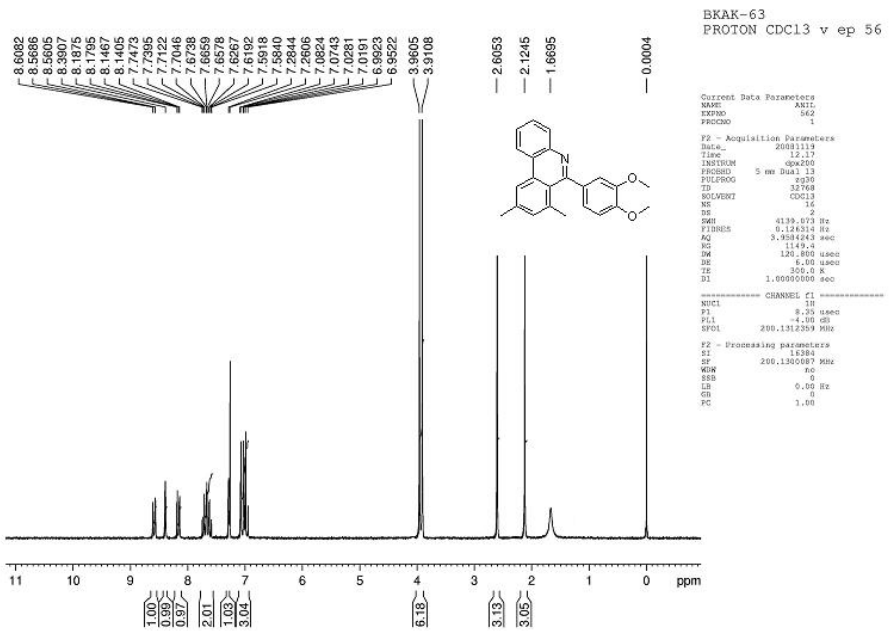

Figure 41: ^{1}H NMR spectrum of 6-(3,4-dimethoxyphenyl)-7,9-dimethylphenanthridine **(6u)**

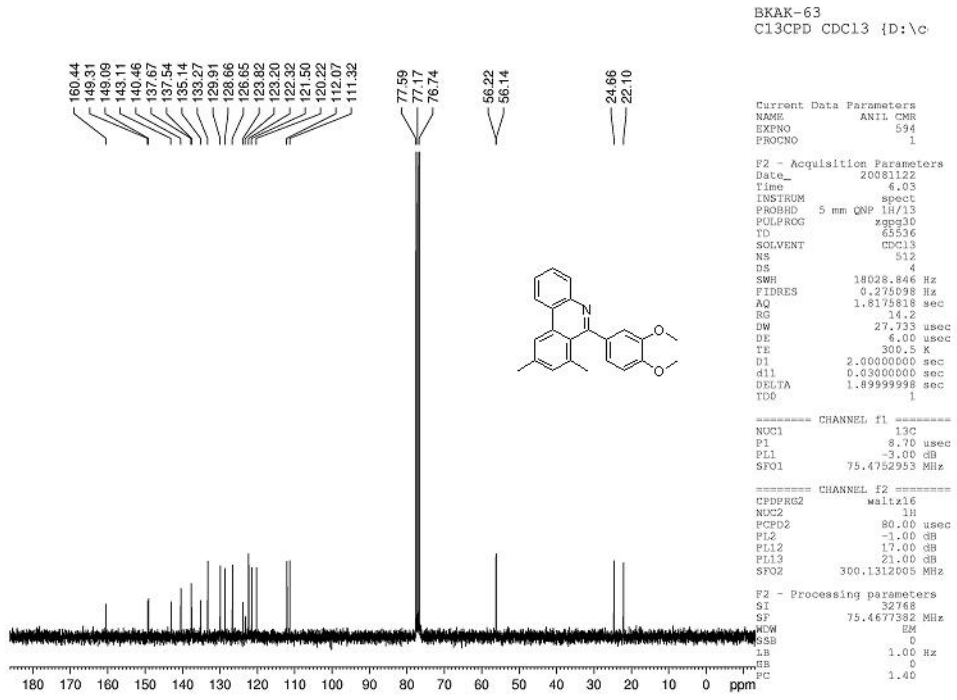

Figure 42: ^{13}C NMR spectrum of 6-(3,4-dimethoxyphenyl)-7,9-dimethylphenanthridine **(6u)**

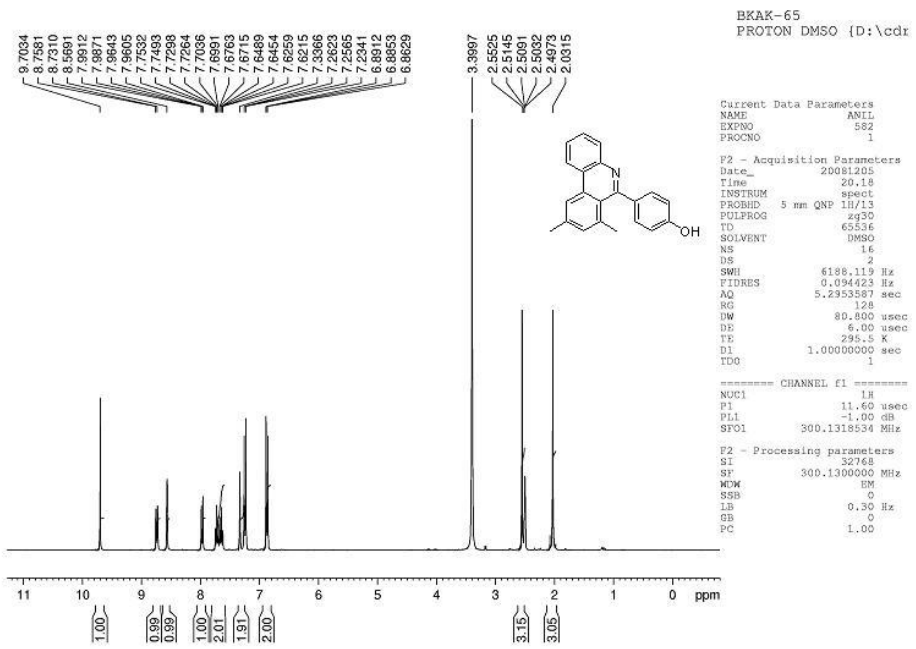

Figure 43:[1]H NMR spectrum of 4-(7,9-dimethylphenanthridin-6-yl)phenol **(6v)**

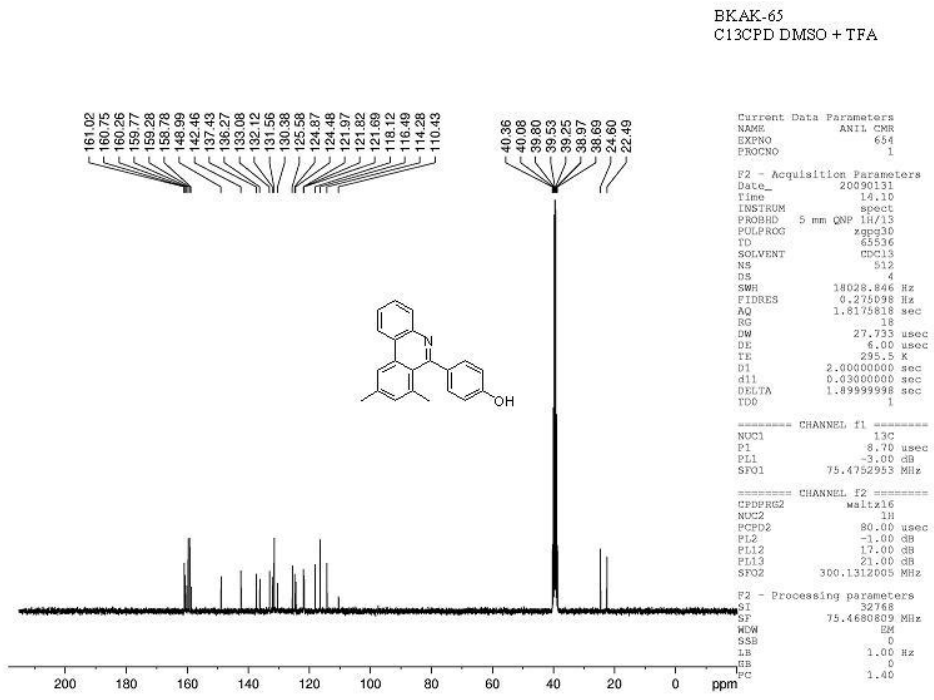

Figure 44:[13]C NMR spectrum of 4-(7,9-dimethylphenanthridin-6-yl)phenol **(6v)**

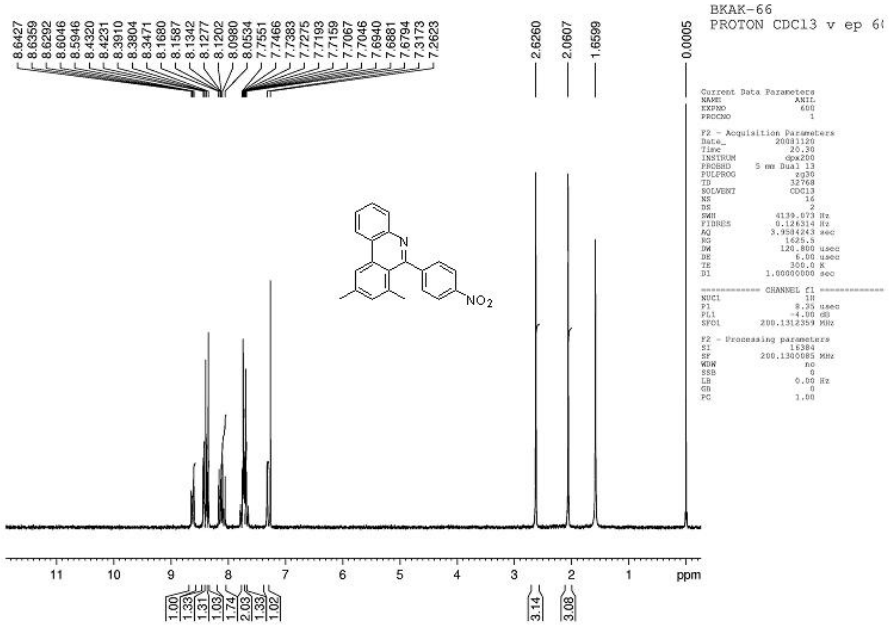

Figure 45:[1]H NMR spectrum of 7,9-dimethyl-6-(4-nitrophenyl)phenanthridine **(6w)**

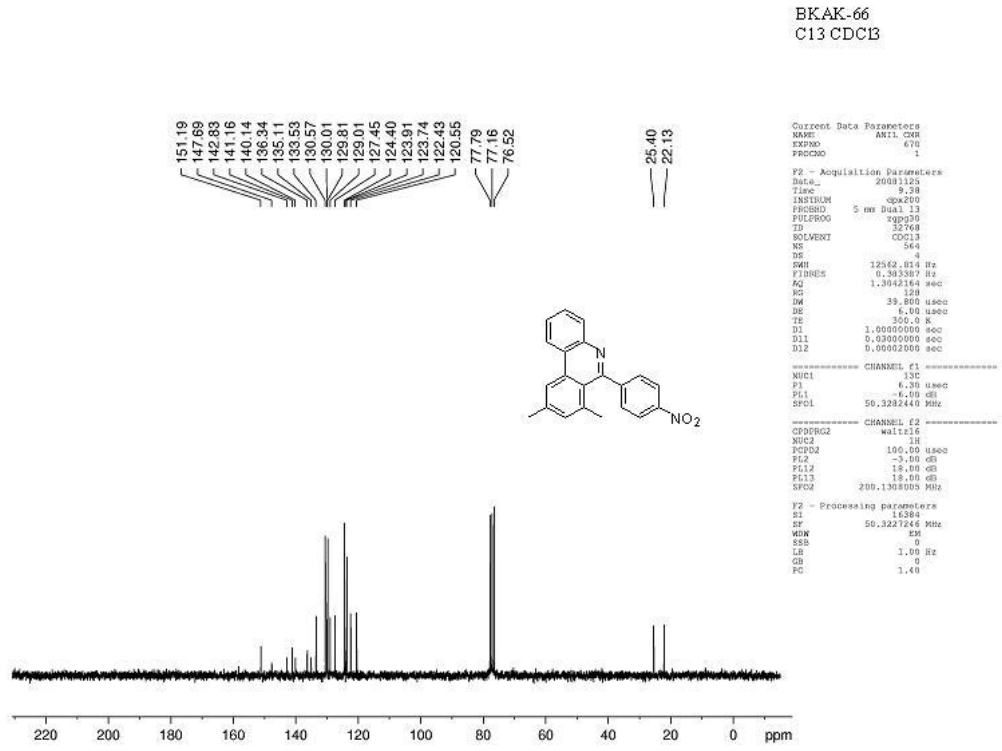

Figure 46:[13]C NMR spectrum of 7,9-dimethyl-6-(4-nitrophenyl)phenanthridine **(6w)**

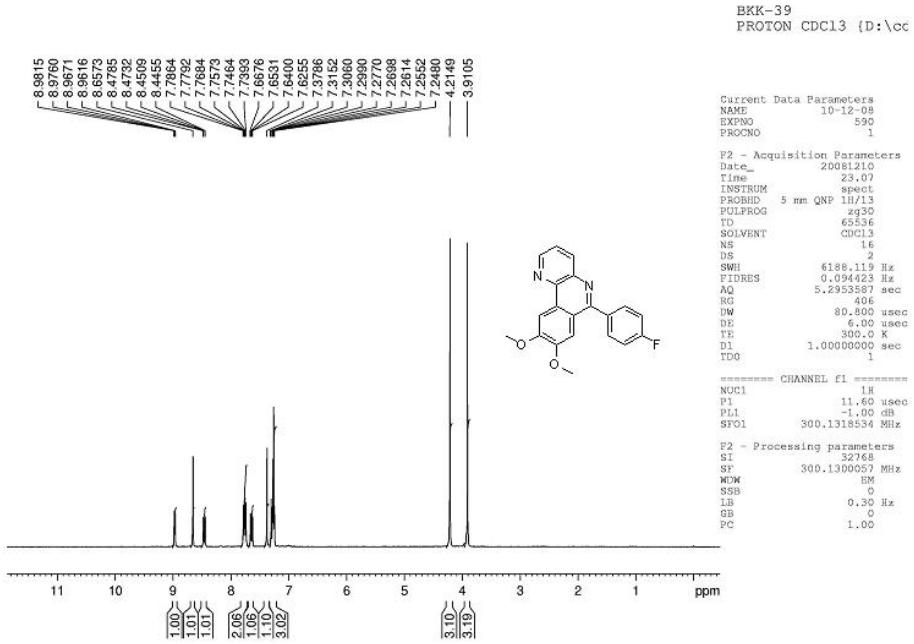

Figure 47:[1]H NMR spectrum of 6-(4-fluorophenyl)-8,9-dimethoxy-6a,10a-dihydrobenzo[*c*][1,5] naphthyridine **(7a)**

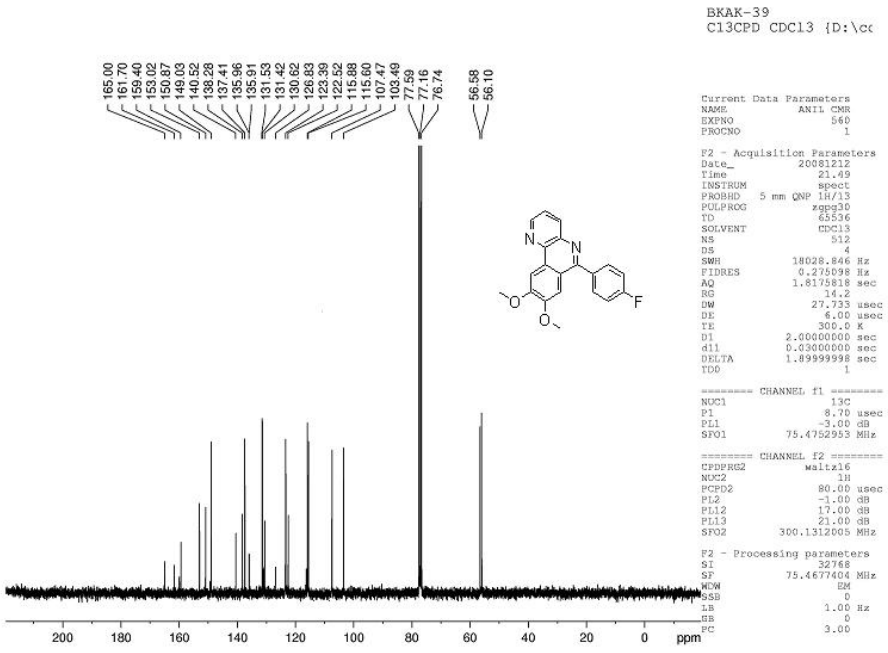

Figure 48:[13]C NMR spectrum of 6-(4-fluorophenyl)-8,9-dimethoxy-6a,10a-dihydrobenzo[*c*] [1,5]naphthyridine **(7a)**

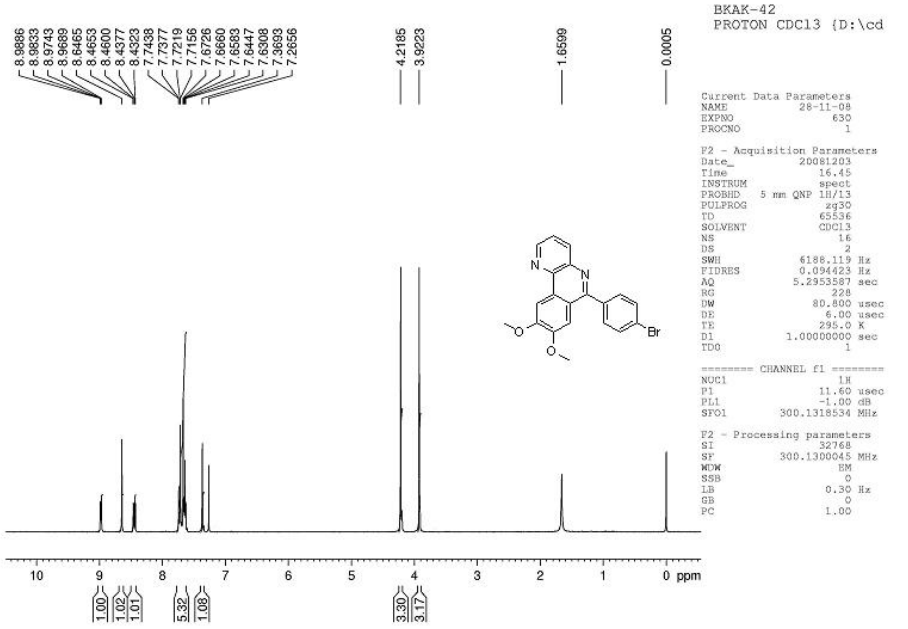

Figure 49:[1]H NMR spectrum of 6-(4-bromophenyl)-8,9-dimethoxy-6a,10a-dihydrobenzo[*c*][1,5] Naphthyridine (**7b)**

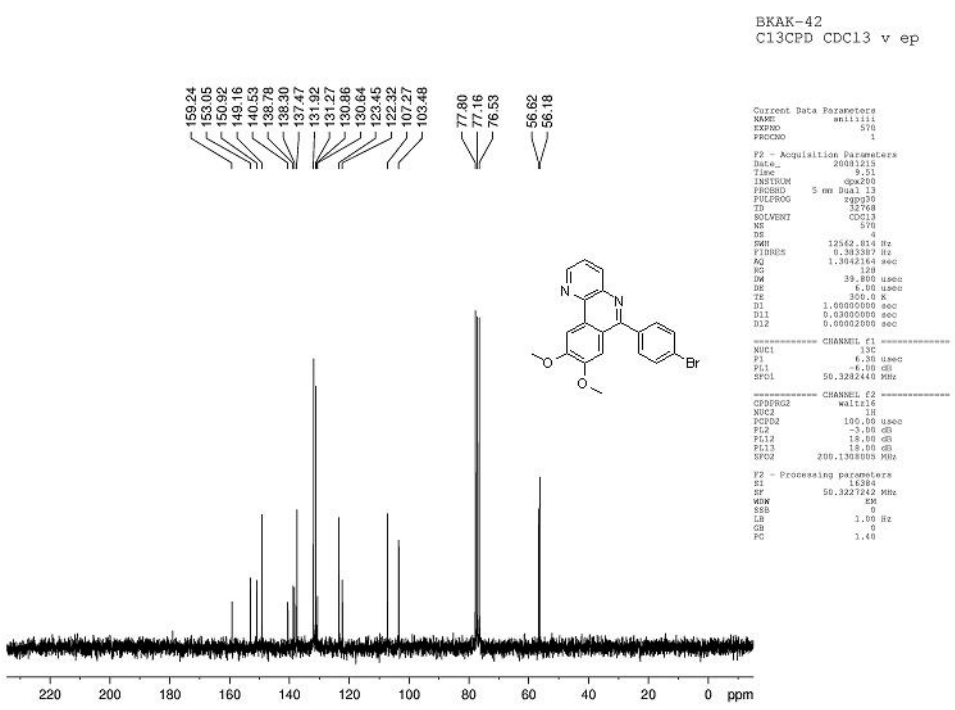

Figure 50:[13]C NMR spectrum of 6-(4-bromophenyl)-8,9-dimethoxy-6a,10a-dihydro benzo[*c*][1,5]naphthyridine **(7b)**

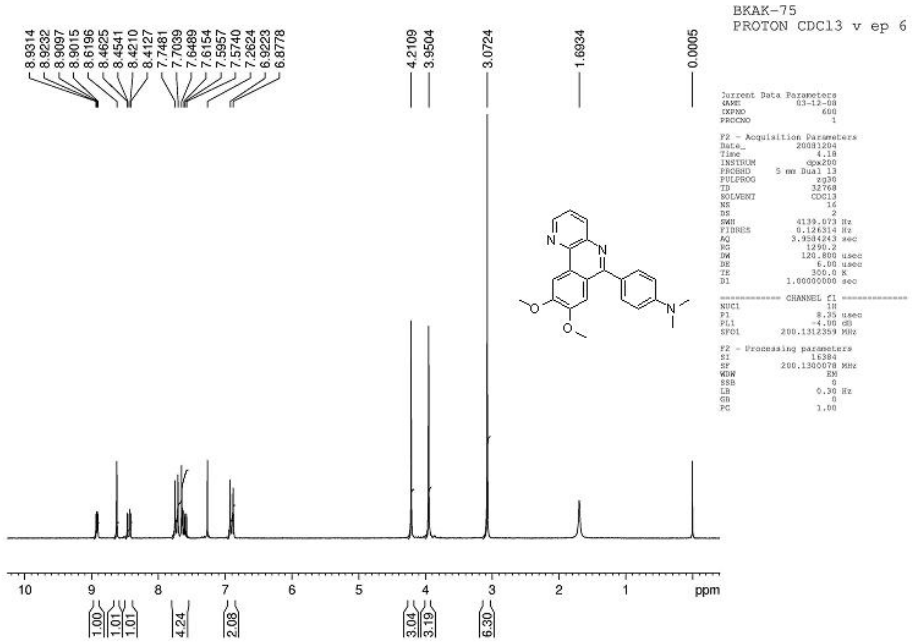

Figure 51:[1]**H NMR** spectrum **of** 4-(8,9-dimethoxy-6a,10a-dihydrobenzo[*c*][1,5]naphthyridin-6-yl)-***N*,*N***-dimethyl aniline **(7c)**

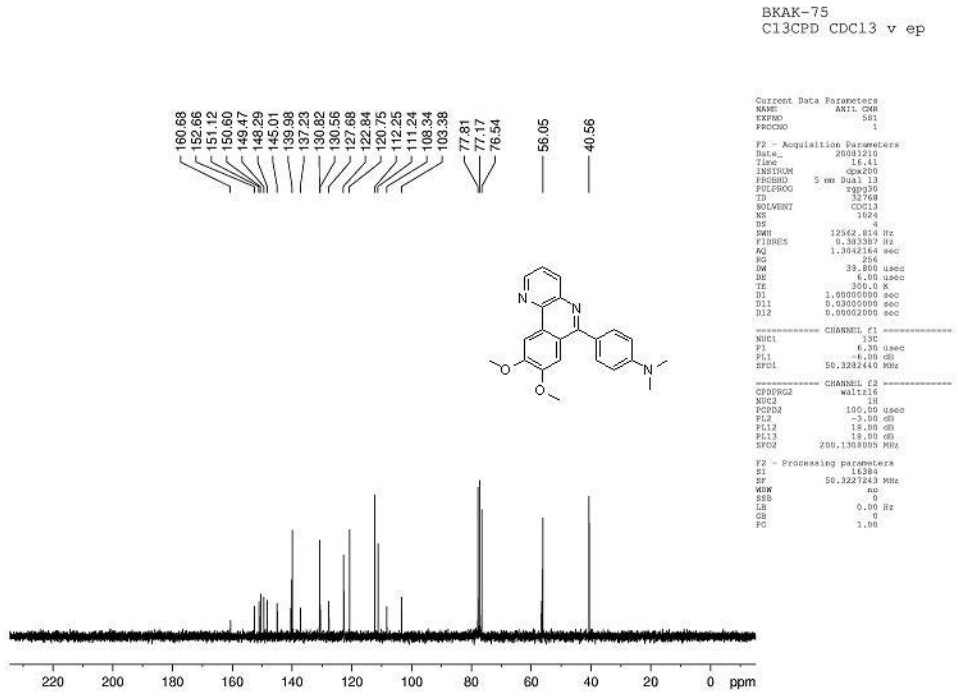

Figure 52:[13]**C NMR** spectrum **of** 4-(8,9-dimethoxy-6a,10a-dihydrobenzo[*c*][1,5]naphthyridin-6-yl)-***N*,*N*** dimethyl aniline **(7c)**

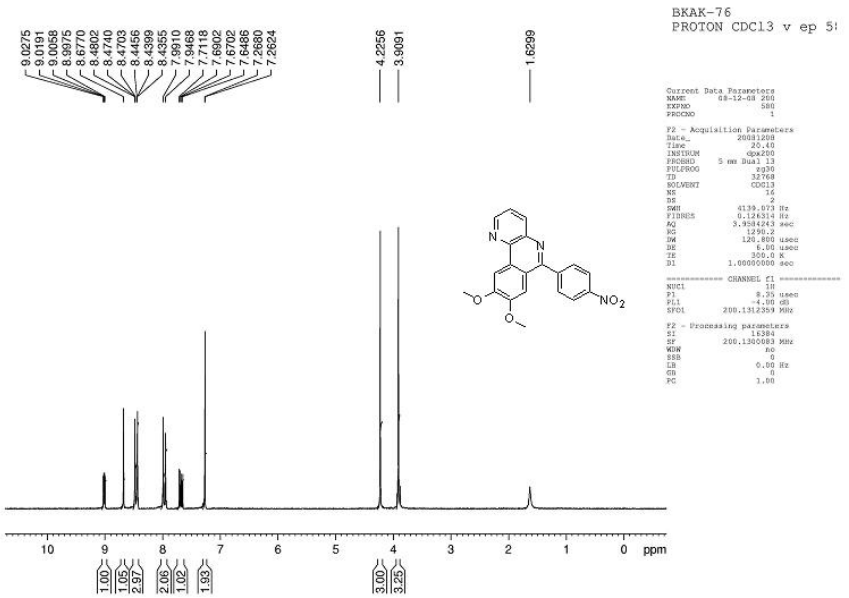

Figure 53:[1]H NMR spectrum **of** 8,9-dimethoxy-6-(4-nitrophenyl)-6a,10a-dihydro benzo[*c*][1,5]naphthyridine **(7d)**

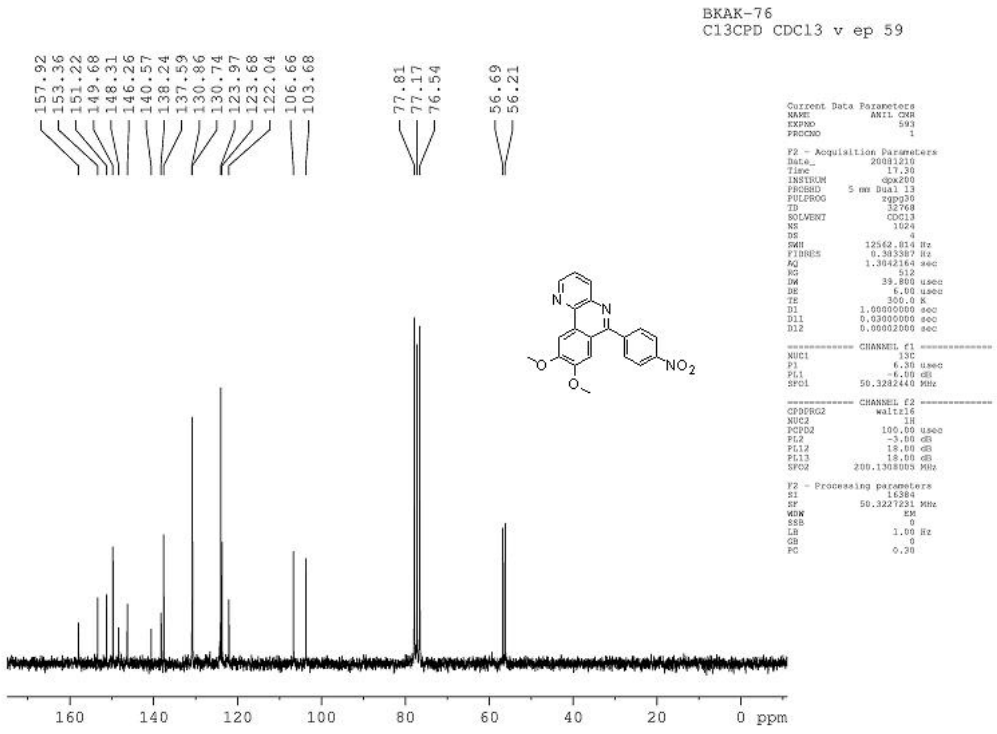

Figure 54:[13]C NMR spectrum **of** 8,9-dimethoxy-6-(4-nitrophenyl)-6a,10a-dihydro benzo[*c*][1,5]naphthyridine **(7d)**

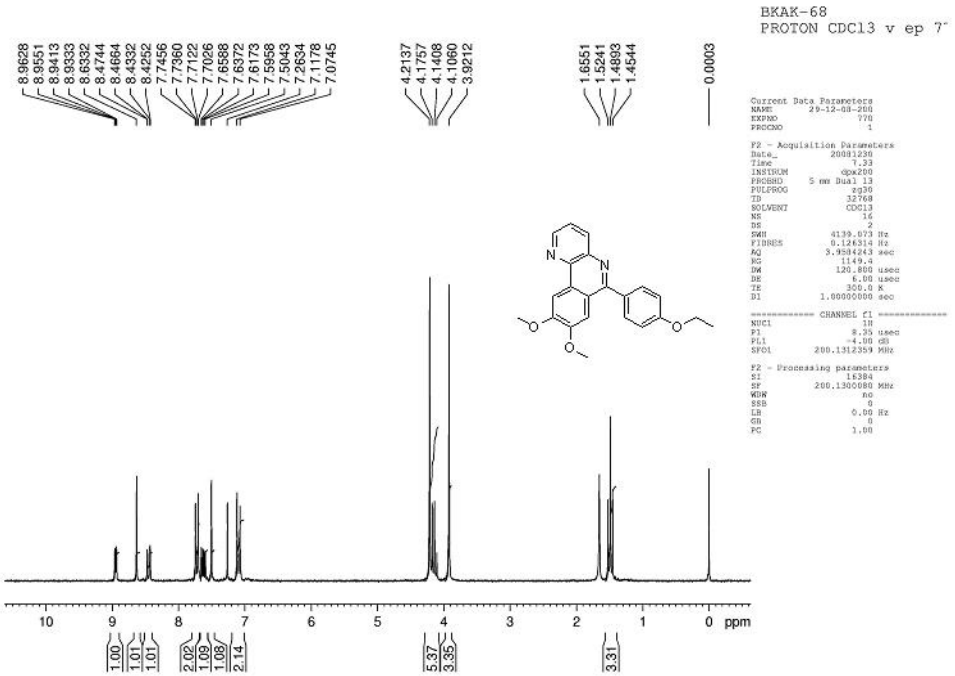

Figure 55:[1]H NMR spectrum of 6-(4-ethoxyphenyl)-8,9-dimethoxy-6a,10a-dihydro benzo[*c*][1,5]naphthyridine **(7e)**

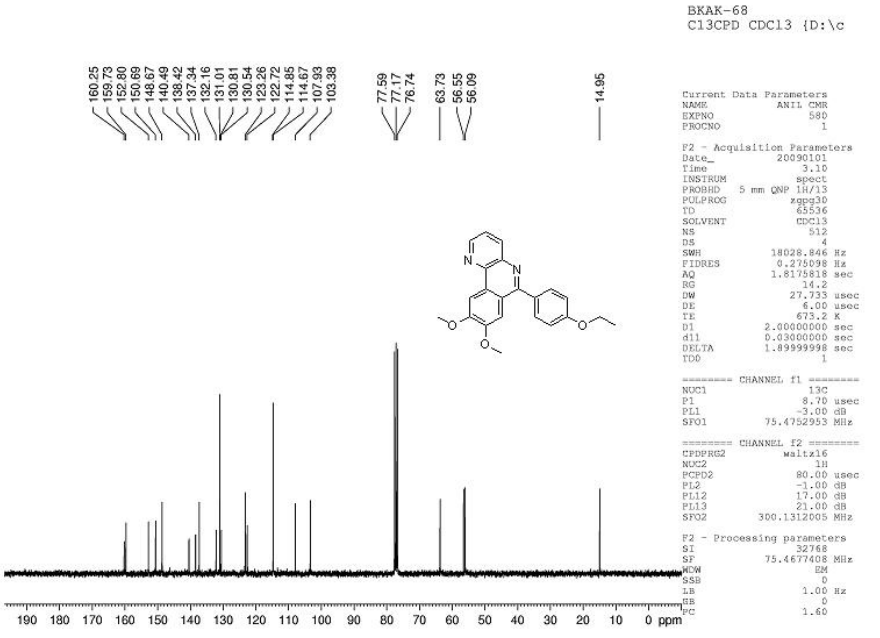

Figure 56:[13]C NMR spectrum of 6-(4-ethoxyphenyl)-8,9-dimethoxy-6a,10a-dihydro benzo[*c*][1,5]naphthyridine (**7e)**

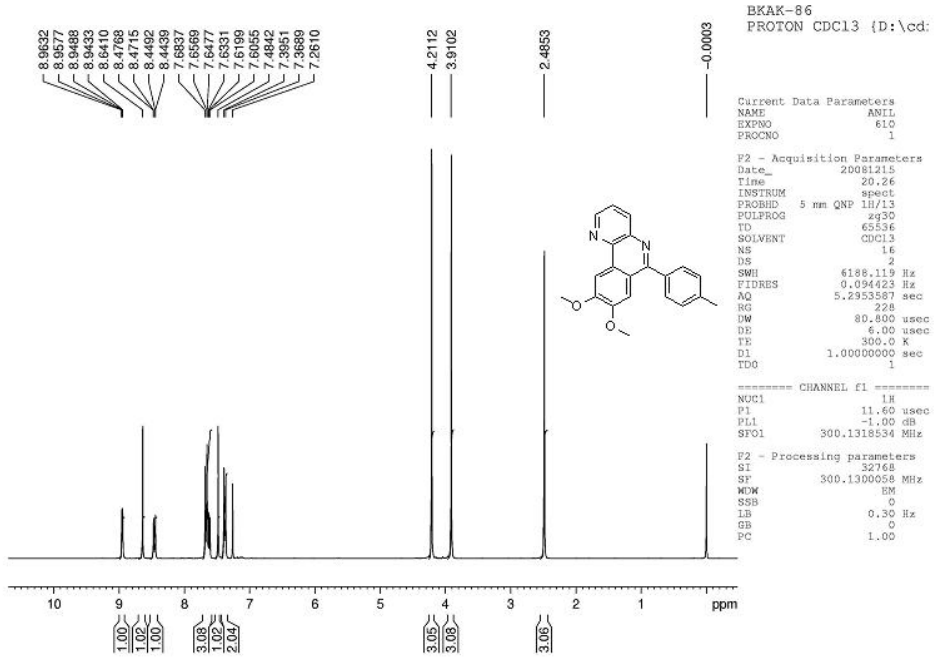

Figure 57:[1]H NMR spectrum of 8,9-dimethoxy-6-(4-methylphenyl)-6a,10a-dihydrobenzo[*c*] [1,5]naphthyridine (7f)

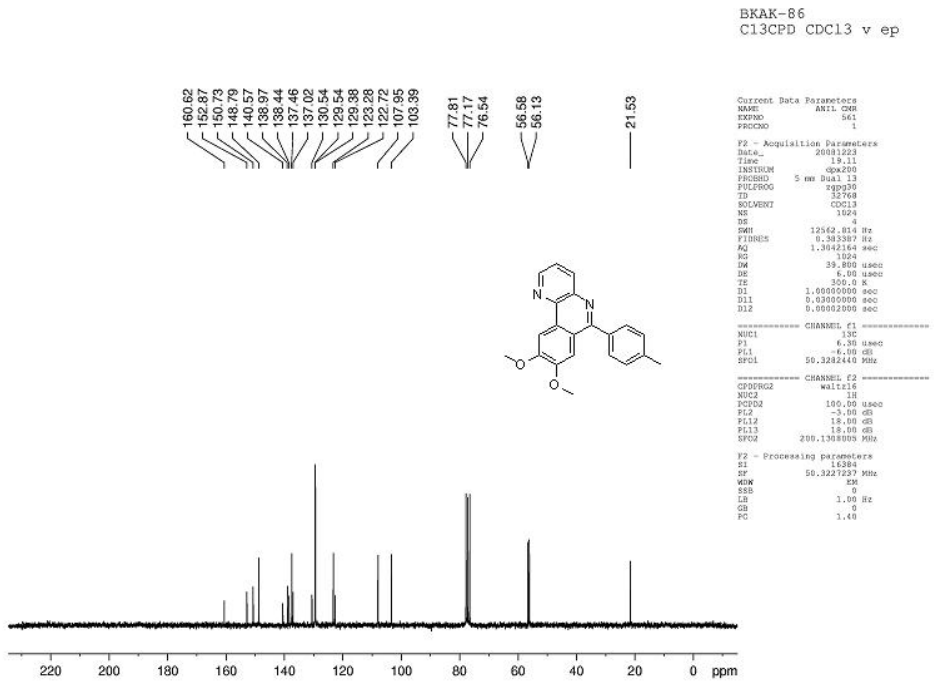

Figure 58:[13]C NMR spectrum of 8,9-dimethoxy-6-(4-methylphenyl)-6a,10a-dihydrobenzo[*c*] [1,5]naphthyridine (7f)

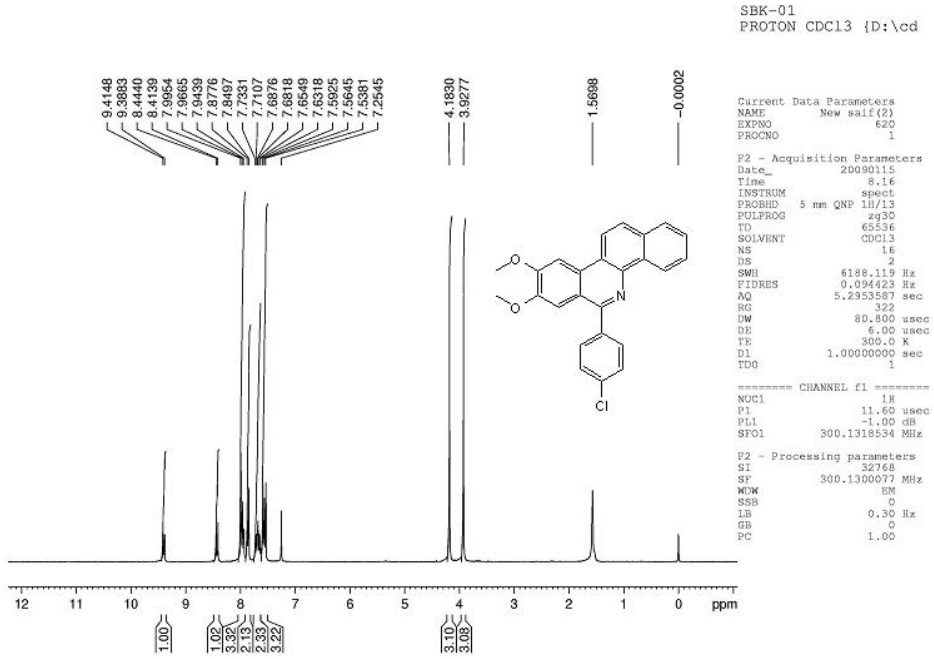

Figure 59:[1]H NMR spectrum of 6-(4-chlorophenyl)-8,9-dimethoxybenzo[*c*]phenanthridine **(8a)**

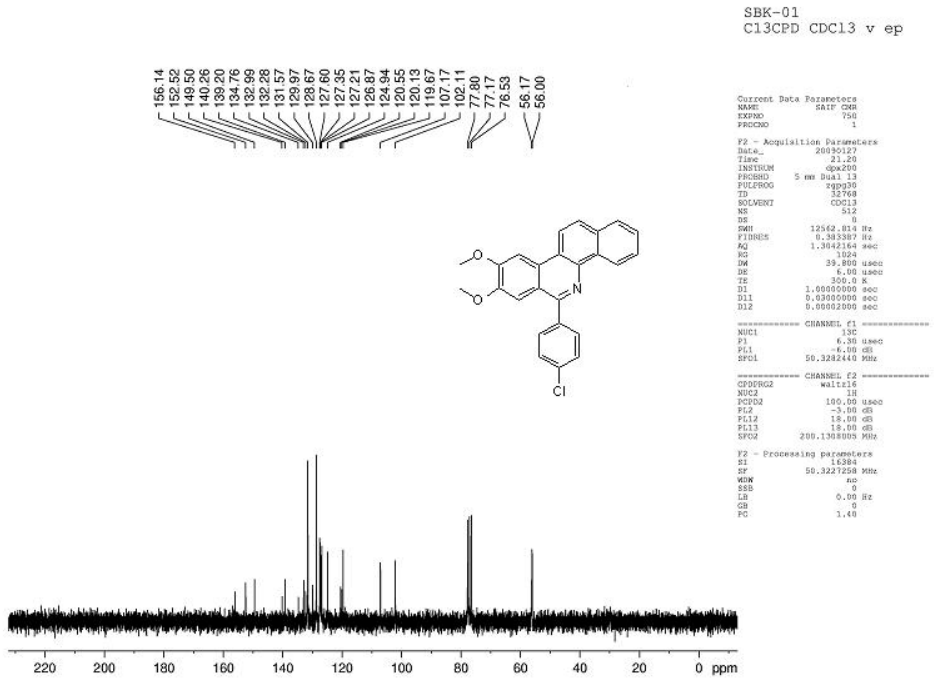

Figure 60:[13]C NMR spectrum of 6-(4-chlorophenyl)-8,9-dimethoxybenzo[*c*]phenanthridine **(8a)**

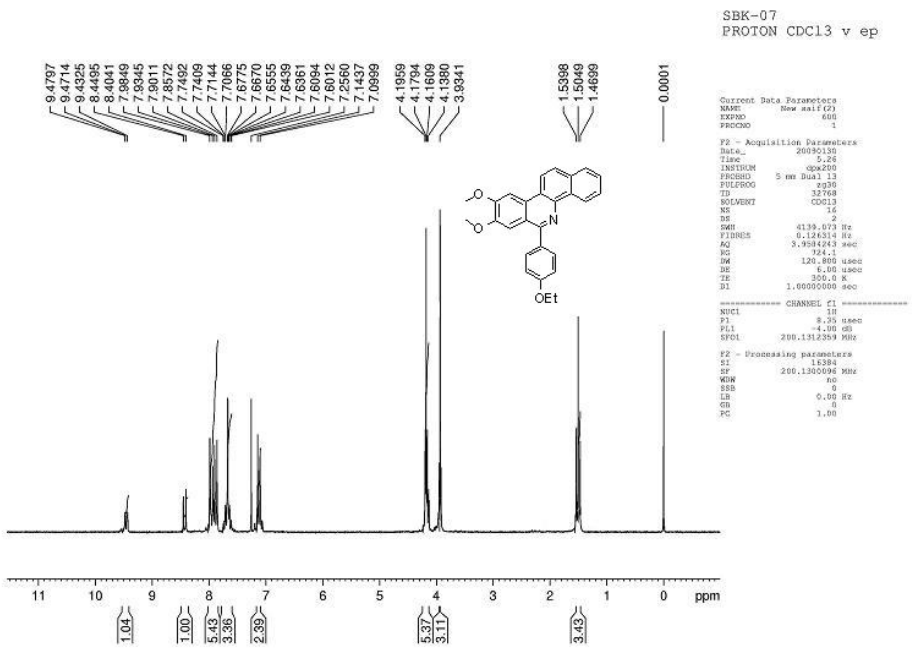

Figure 61:[1]H NMR spectrum of 8,9-dimethoxy-6-(4-ethoxyphenyl)benzo[*c*]Phenanthridine **(8b)**

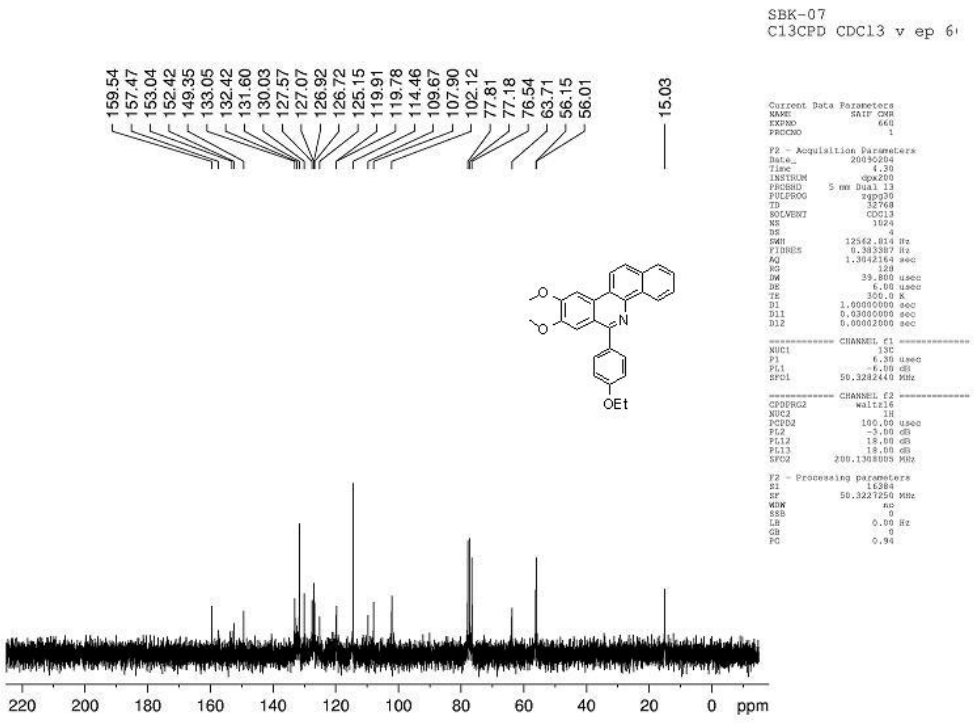

Figure 62:[13]C NMR spectrum of 8,9-dimethoxy-6-(4-ethoxyphenyl)benzo[*c*]Phenanthridine **(8b)**

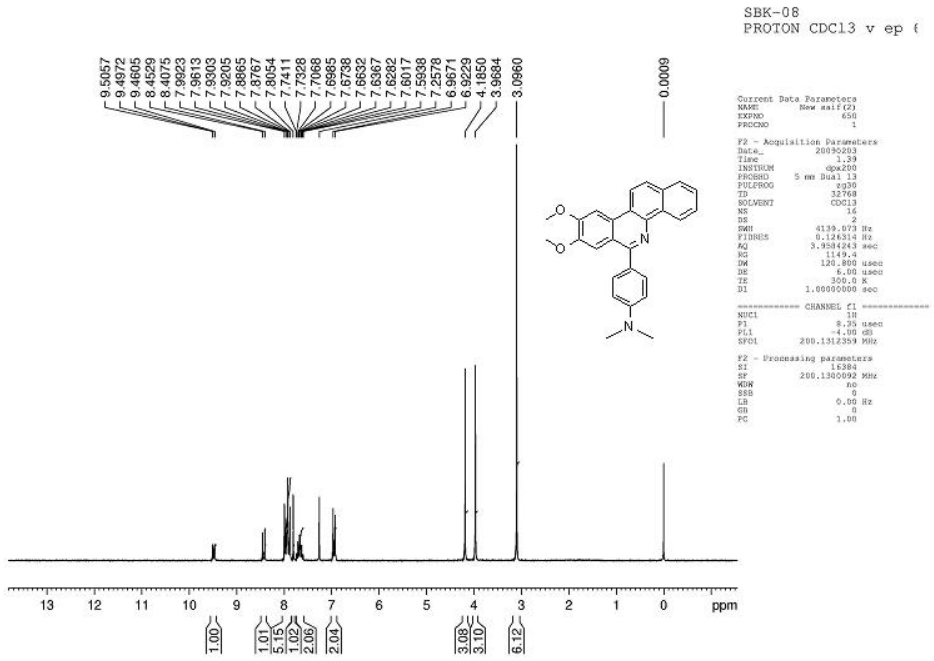

Figure 63:[1]H NMR spectrum of 8,9-dimethoxy-6-(4- *N*,*N*-dimethylaminephenyl)benzo[*c*]phenanthridine **(8c)**

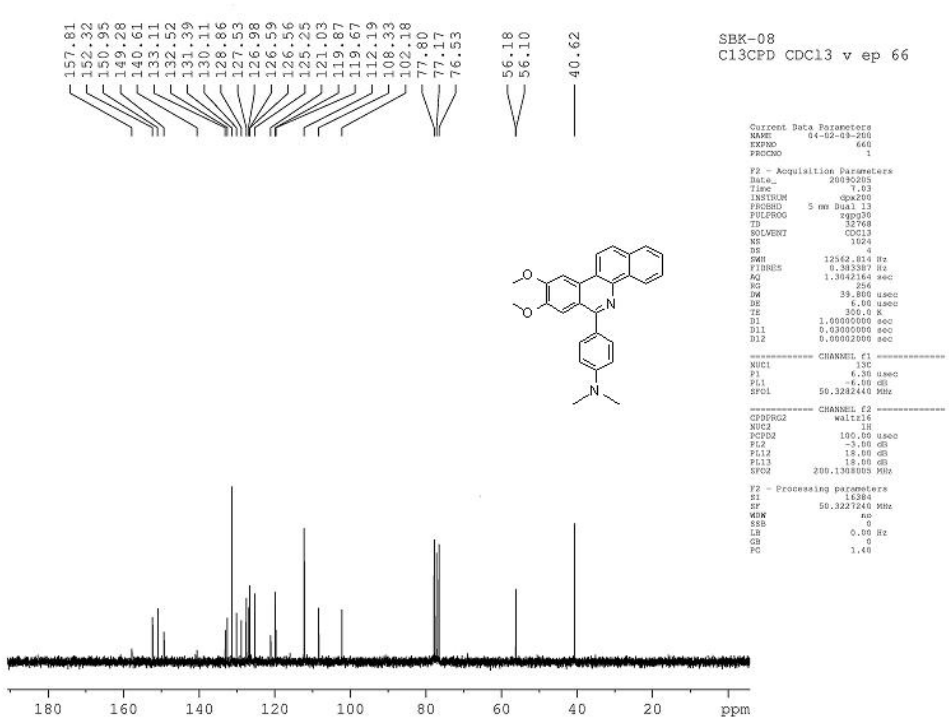

Figure 64:[13]C NMR spectrum of 8,9-dimethoxy-6-(4- *N*,*N*-dimethylaminephenyl)benzo[*c*]phenanthridine **(8c)**

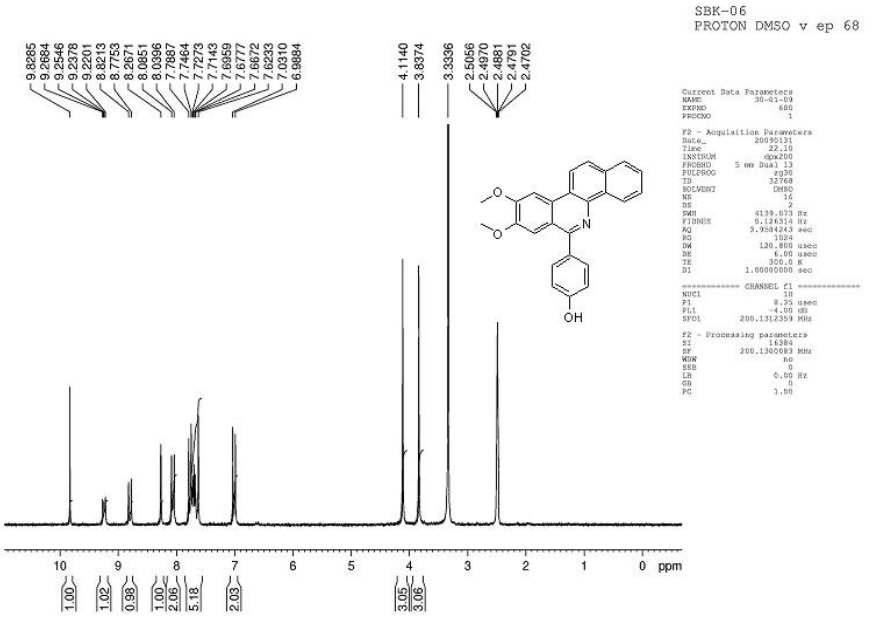

Figure 65:[1]H NMR spectrum of 4-(8,9-dimethoxybenzo[*c*]phenanthridin-6-yl)phenol **(8d)**

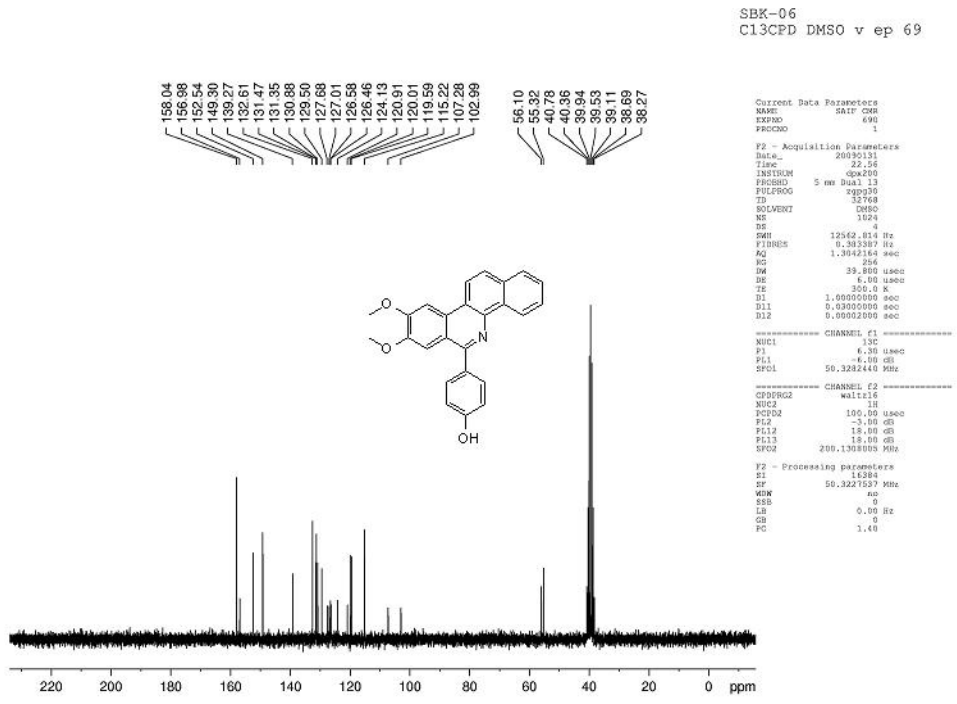

Figure 66:[13]C NMR spectrum of 4-(8,9-dimethoxybenzo[*c*]phenanthridin-6-yl)phenol **(8d)**

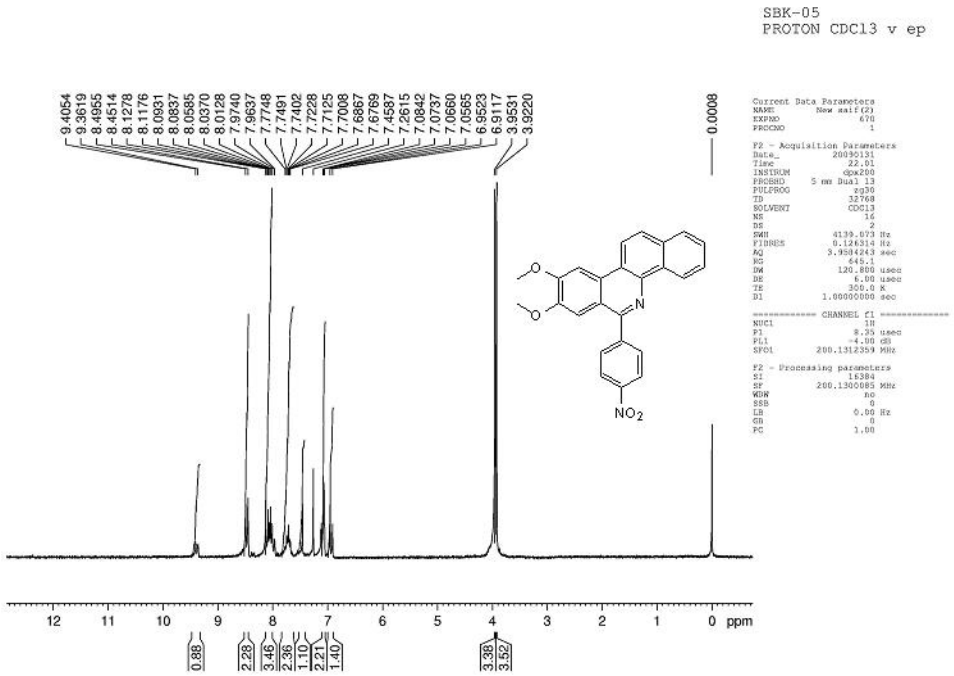

Figure 67:[1]H NMR spectrum of 8,9-dimethoxy-6-(4-nitrophenyl)benzo[*c*]Phenanthridine **(8e)**

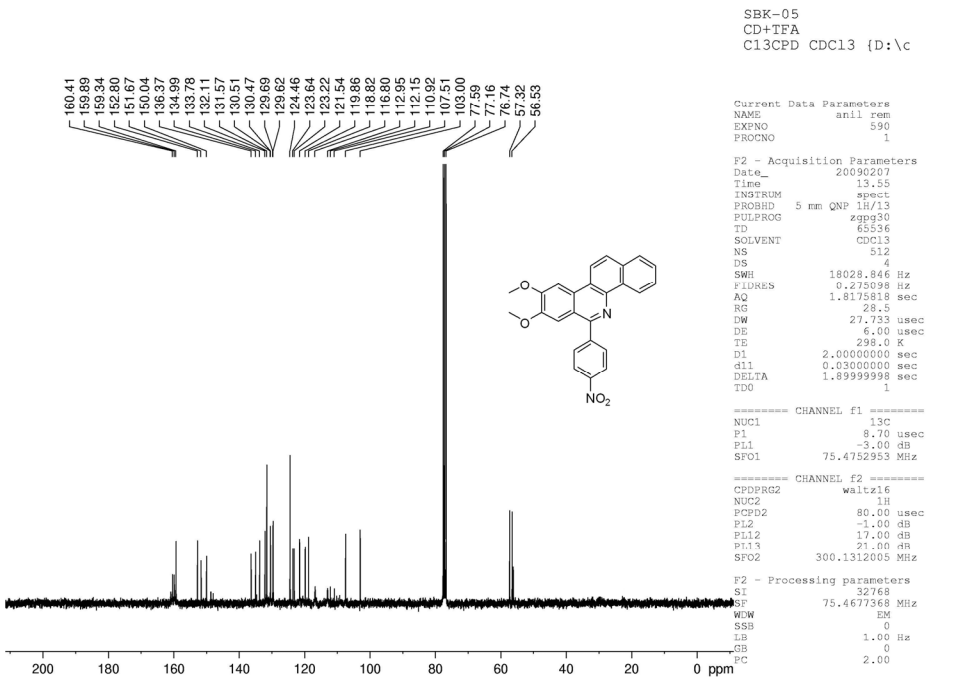

Figure 68:[13]C NMR spectrum of 8,9-dimethoxy-6-(4-nitrophenyl)benzo[*c*]Phenanthridine **(8e)**

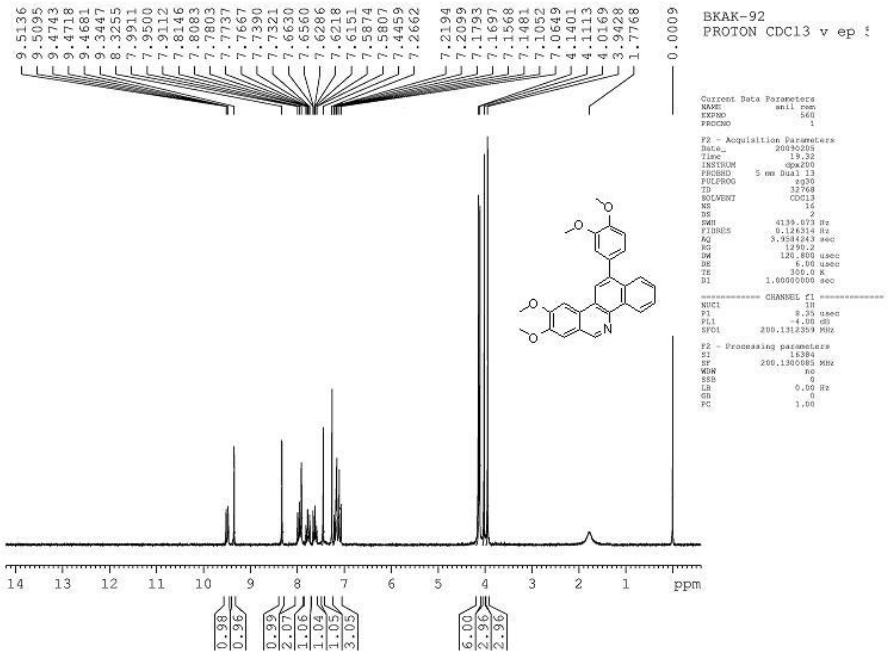

Figure 69:[1]H NMR spectrum of 12-(3,4-dimethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8f)**

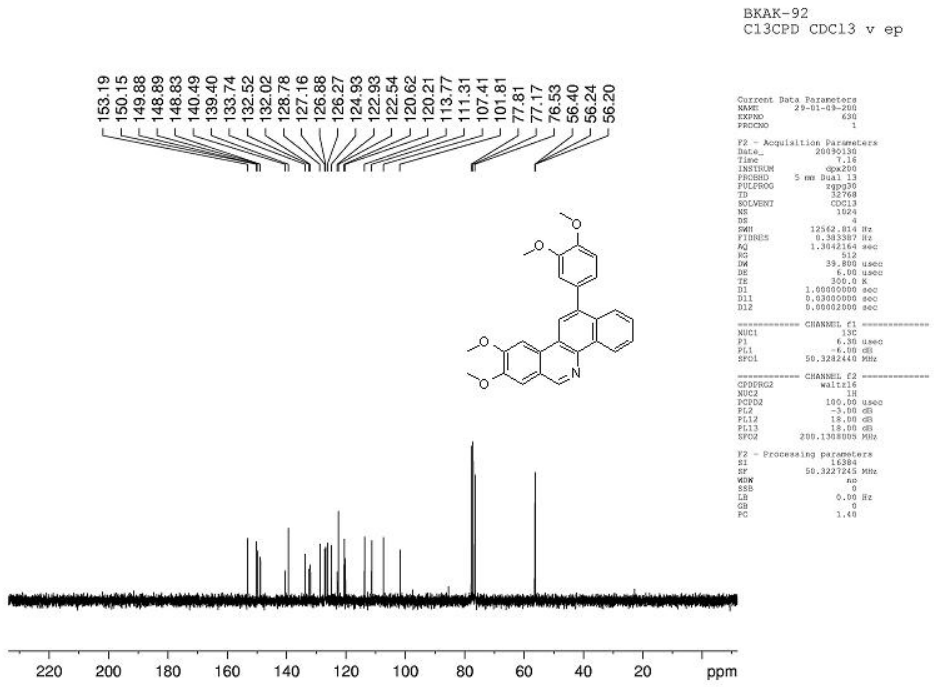

Figure 70:[13]C NMR spectrum of 12-(3,4-dimethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8f)**

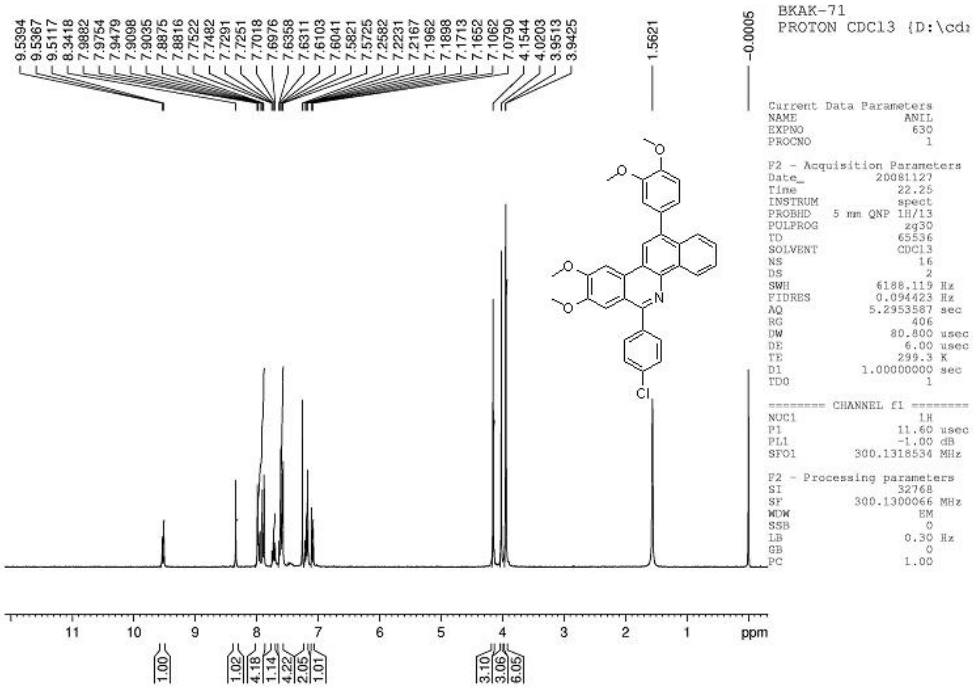

Figure 71:[1]H NMR spectrum of 6-(4-chlorophenyl)-12-(3,4-dimethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8g)**

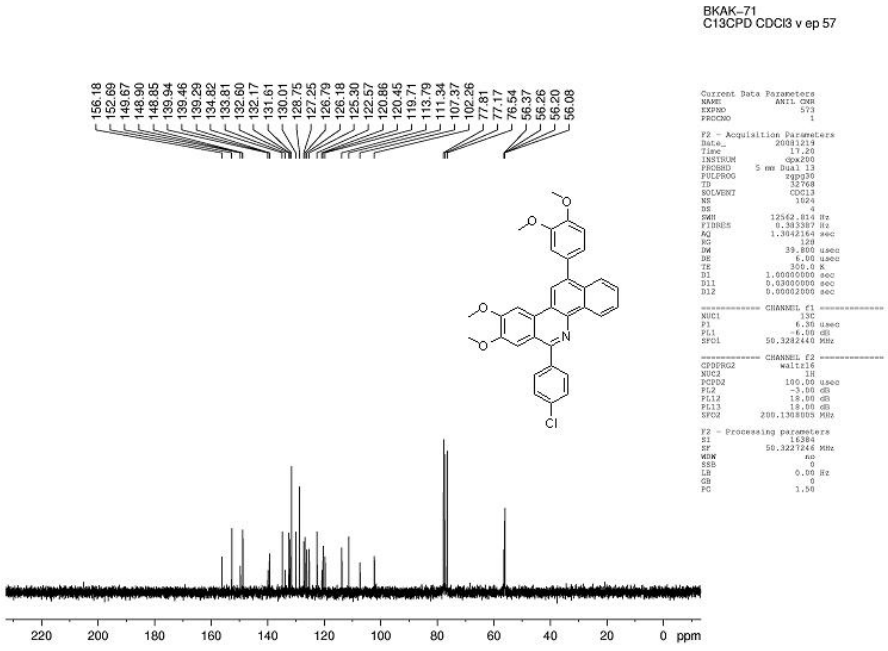

Figure 72:[13]C NMR spectrum of 6-(4-chlorophenyl)-12-(3,4-dimethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8g)**

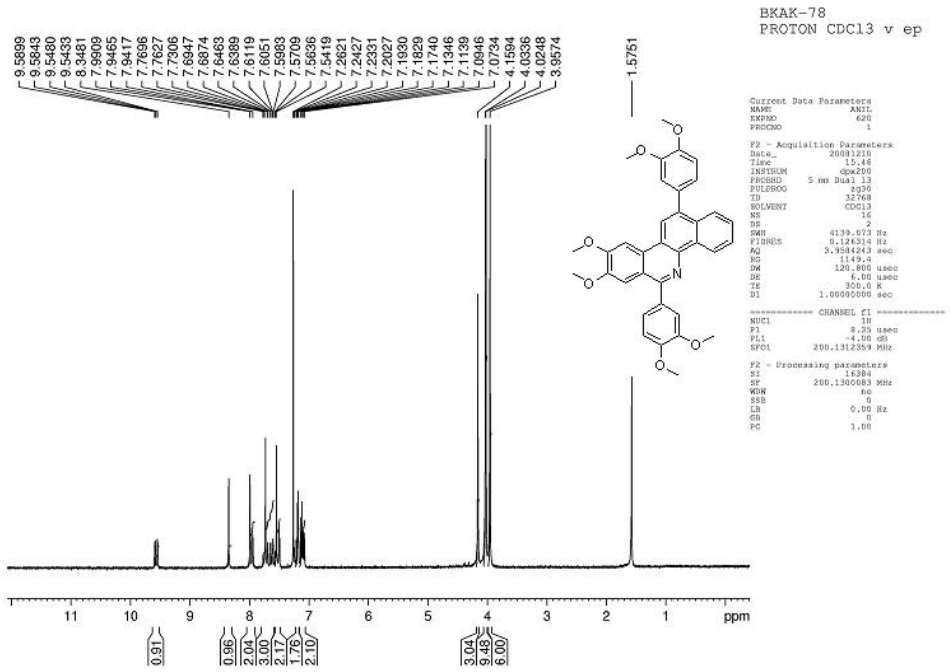

Figure 73:[1]H NMR spectrum of 6,12-bis(3,4-dimethoxyphenyl)-8,9-dimethoxybenzo[c]phenanthridine **(8h)**

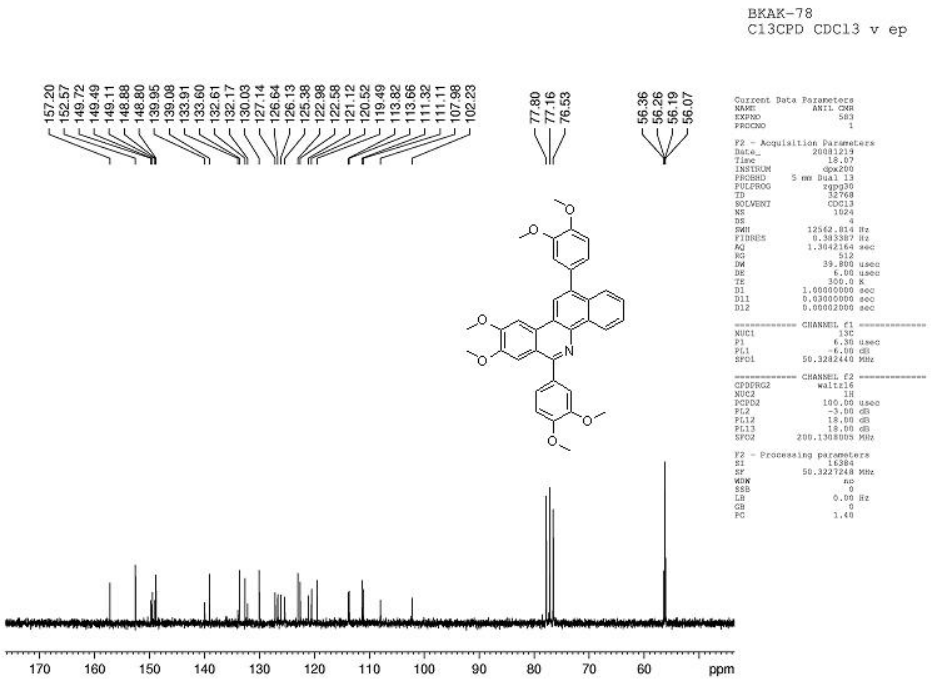

Figure 74:[13]C NMR spectrum of 6,12-bis(3,4-dimethoxyphenyl)-8,9-dimethoxybenzo[c]phenanthridine **(8h)**

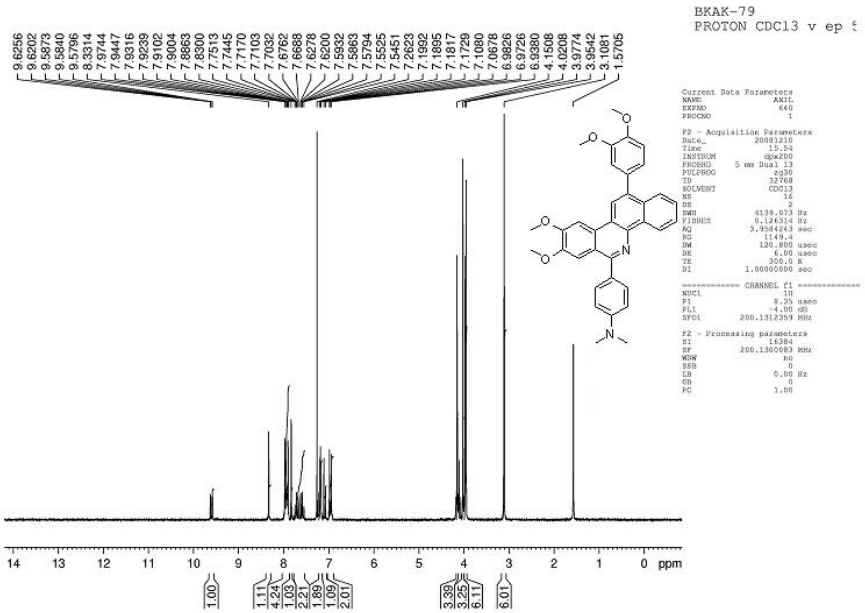

Figure 75:[1]H NMR spectrum of 4-(12-(3,4-dimethoxyphenyl)-8,9-dimethoxybenzo[c]phenanthridin-6-yl)-N,N-dimethylaniline **(8i)**

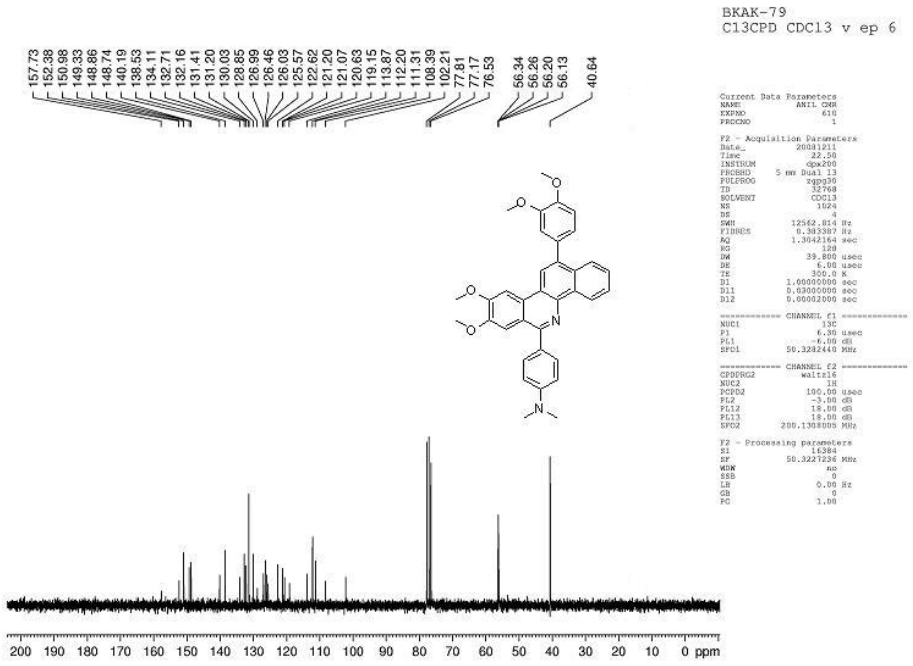

Figure 76:[13]C NMR spectrum of 4-(12-(3,4-dimethoxyphenyl)-8,9-dimethoxybenzo[c]phenanthridin-6-yl)-N,N-dimethylaniline **(8i)**

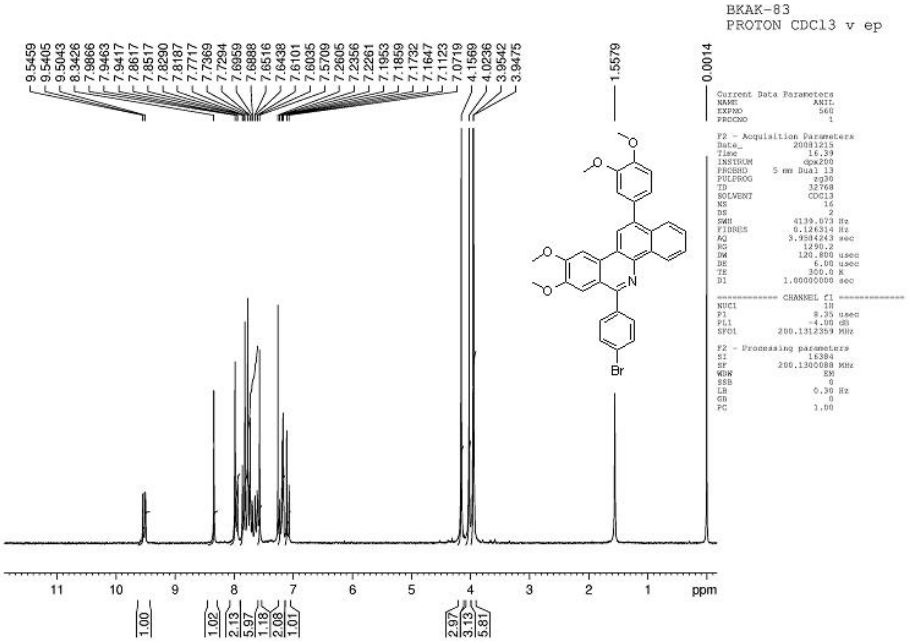

Figure 77:[1]H NMR spectrum of 6-(4-bromophenyl)-12-(3,4-dimethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8j)**

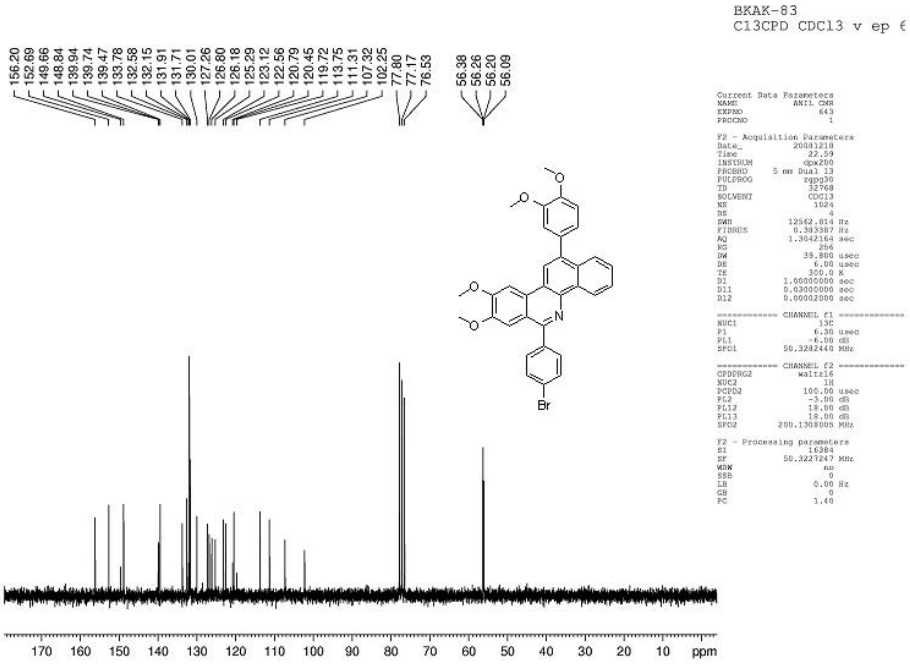

Figure 78:[13]C NMR spectrum of 6-(4-bromophenyl)-12-(3,4-dimethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8j)**

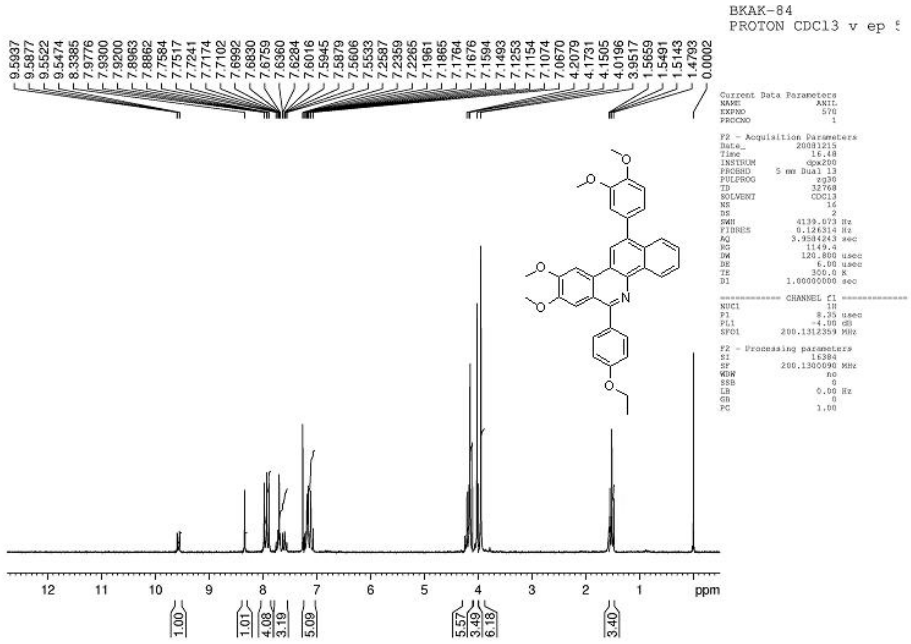

Figure 79:[1]H NMR spectrum of 12-(3,4-dimethoxyphenyl)-6-(4-ethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8k)**

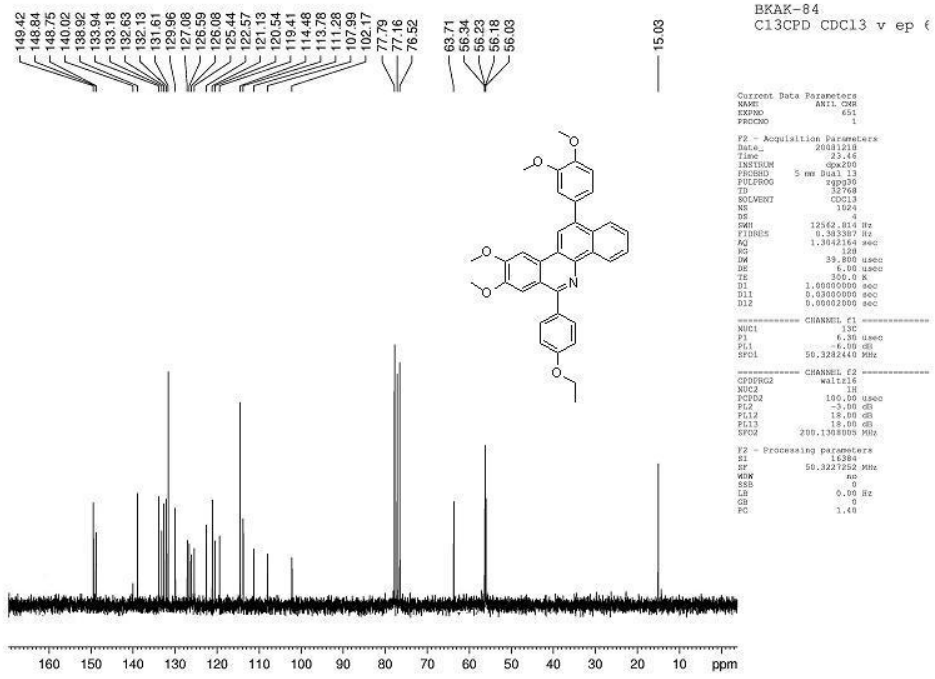

Figure 80:[13]C NMR spectrum of 12-(3,4-dimethoxyphenyl)-6-(4-ethoxyphenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8k)**

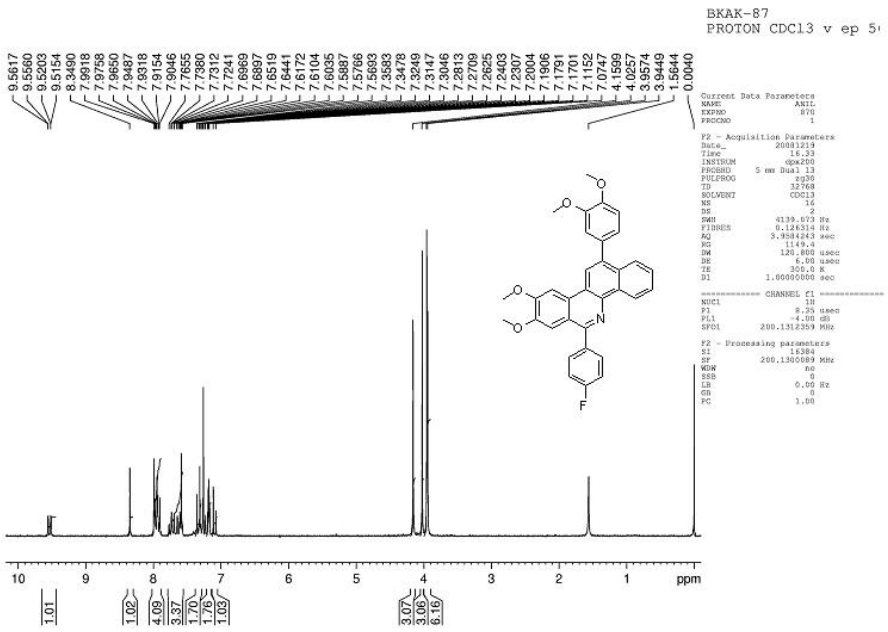

Figure 81:[1]H NMR spectrum of 12-(3,4-dimethoxyphenyl)-6-(4-fluorophenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8l)**

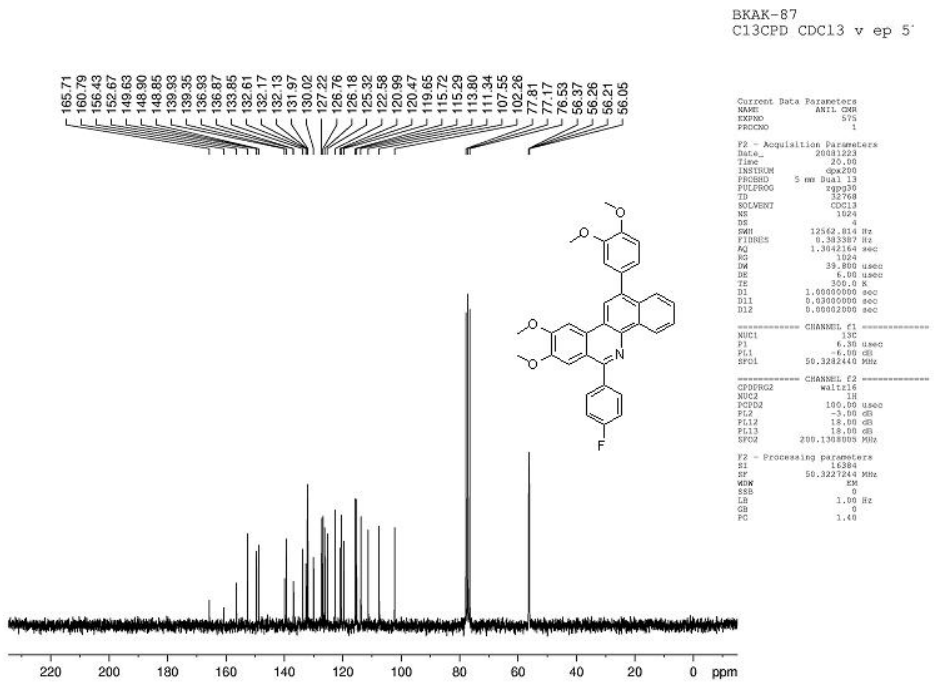

Figure 82:[13]C NMR spectrum of 12-(3,4-dimethoxyphenyl)-6-(4-fluorophenyl)-8,9-dimethoxy benzo[c]phenanthridine **(8l)**

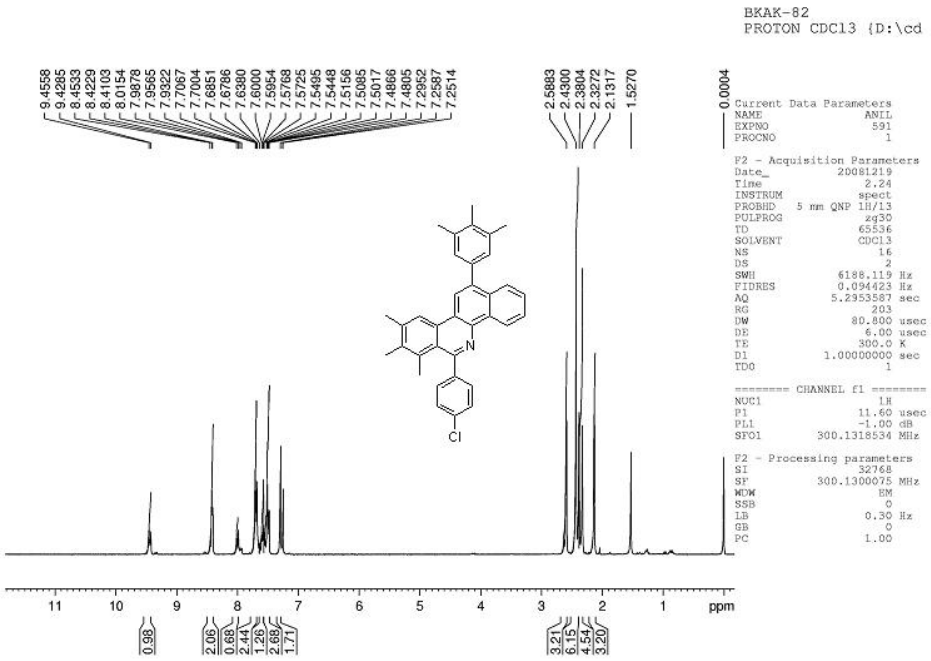

Figure 83:[1]H NMR spectrum of 6-(4-chlorophenyl)-7,8,9-trimethyl-12-(3,4,5-trimethylphenyl) benzo[c]phenanthridine **(8m)**

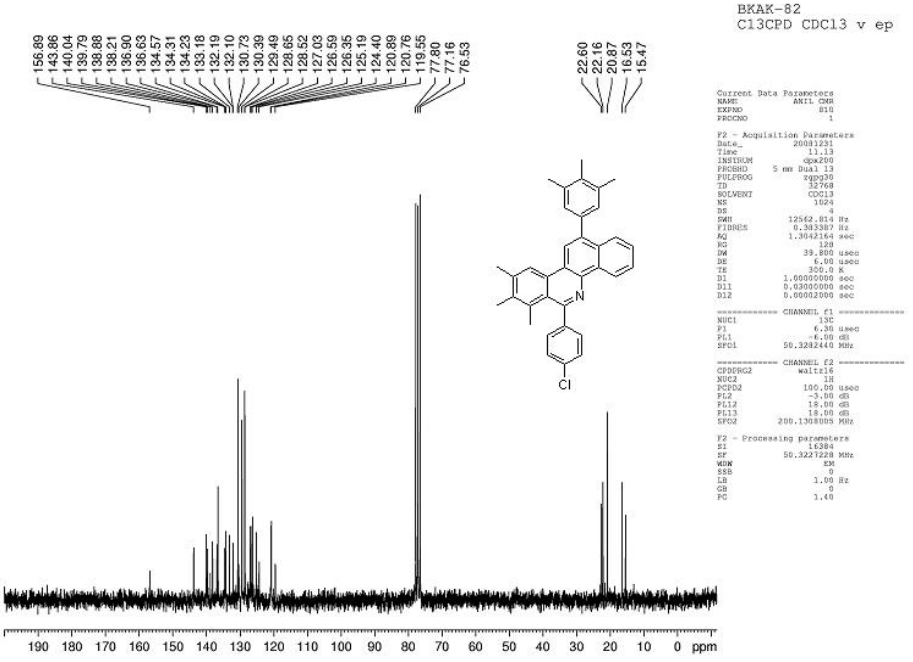

Figure 84:[13]C NMR spectrum of 6-(4-chlorophenyl)-7,8,9-trimethyl-12-(3,4,5-trimethylphenyl) benzo[c]phenanthridine **(8m)**

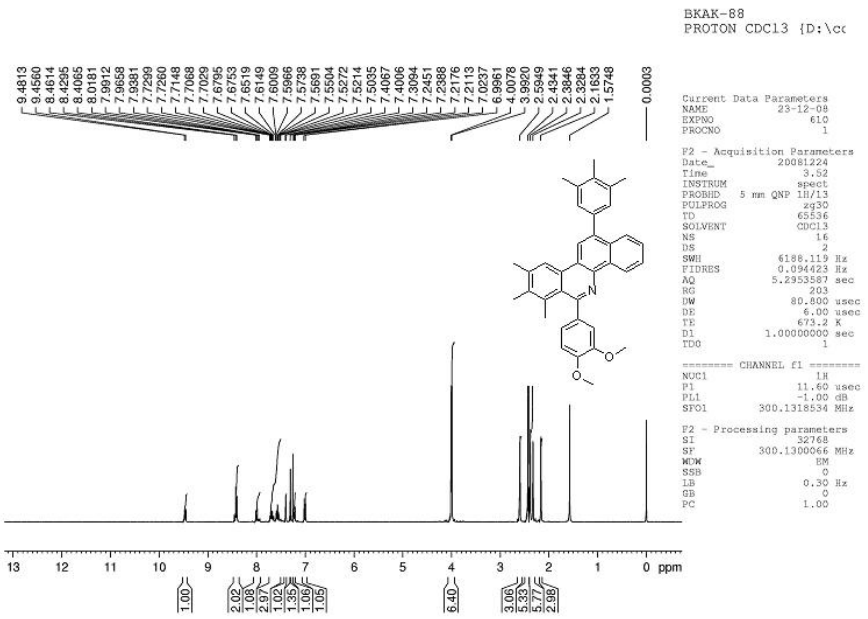

Figure 85:[1]H NMR spectrum of 6-(3,4-dimethoxyphenyl)-7,8,9-trimethyl-12-(3,4,5-trimethylphenyl) benzo [c]phenanthridine **(8n)**

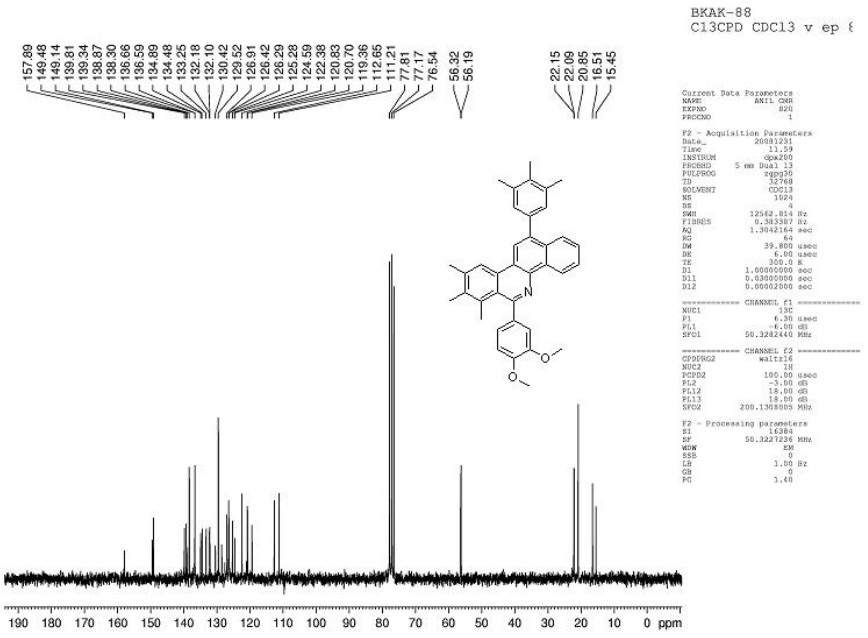

Figure 86:[13]C NMR spectrum of 6-(3,4-dimethoxyphenyl)-7,8,9-trimethyl-12-(3,4,5-trimethylphenyl) benzo [c]phenanthridine **(8n)**

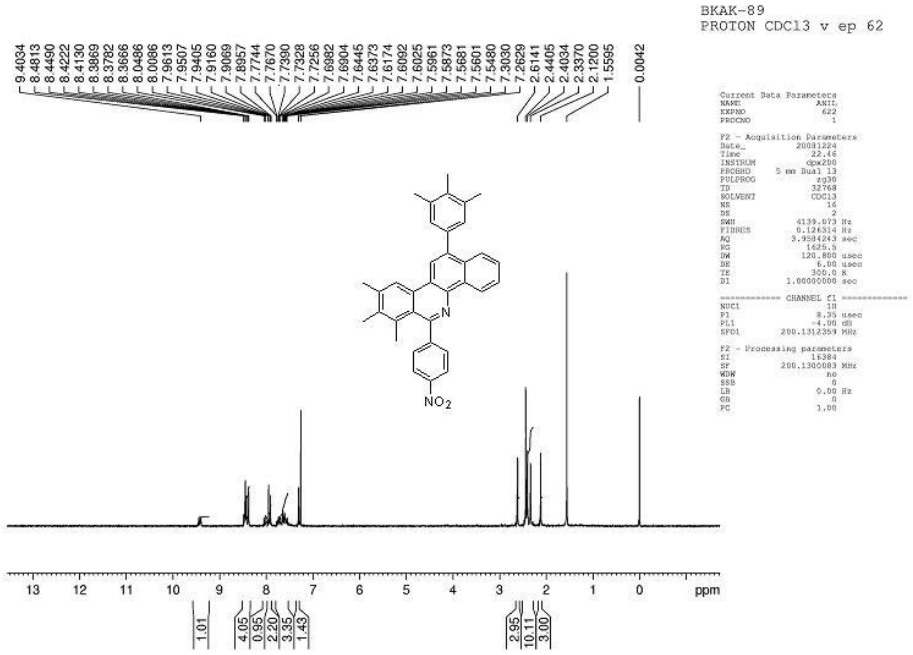

Figure 87:[1]H NMR spectrum of 7,8,9-trimethyl-6-(4-nitrophenyl)-12-(3,4,5-trimethylphenyl) benzo[c]phenanthridine (**8o)**

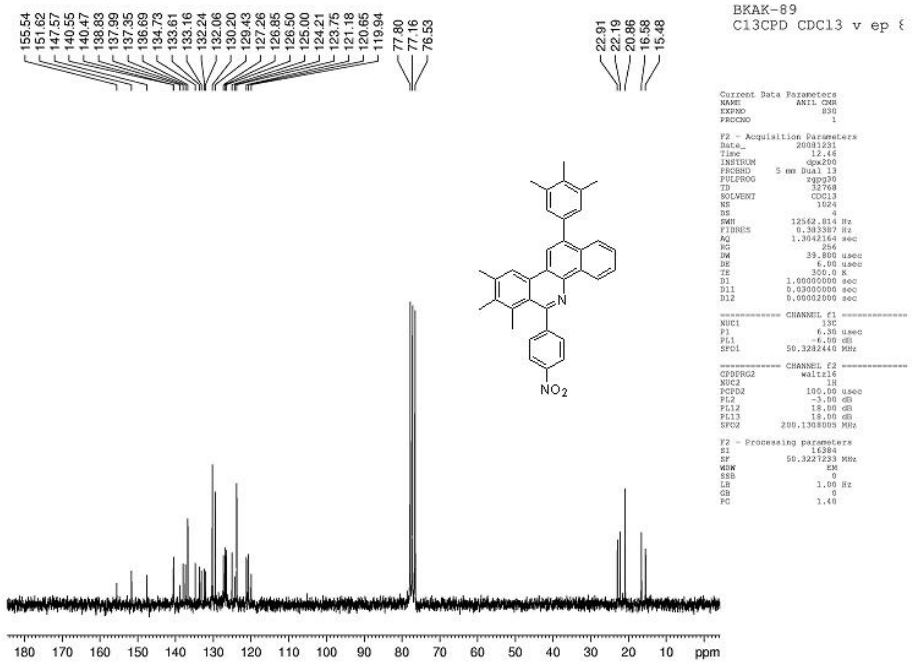

Figure 88:[13]C NMR spectrum of 7,8,9-trimethyl-6-(4-nitrophenyl)-12-(3,4,5-trimethylphenyl) benzo[c]phenanthridine **(8o)**

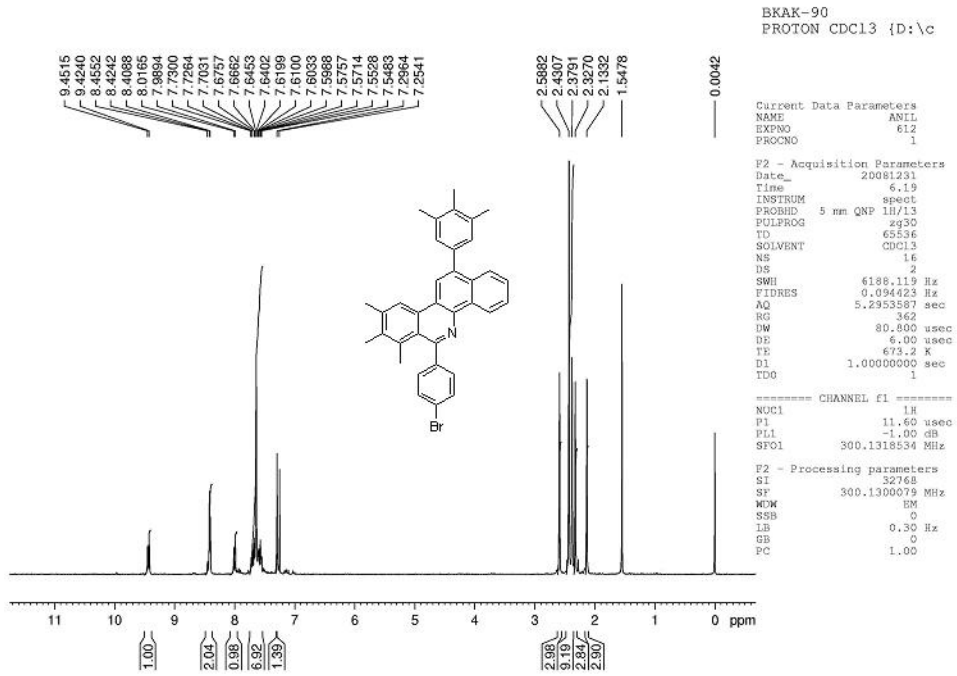

Figure 89:[1]H NMR spectrum of 6-(4-bromophenyl)-7,8,9-trimethyl-12-(3,4,5-trimethylphenyl) benzo[c]phenanthridine **(8p)**

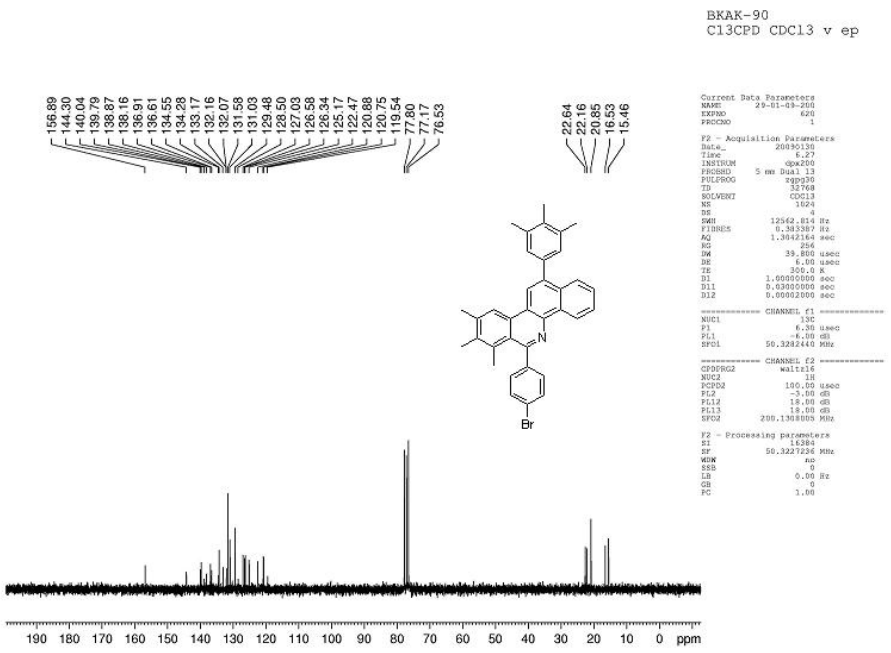

Figure 90:[13]C NMR spectrum of 6-(4-bromophenyl)-7,8,9-trimethyl-12-(3,4,5-trimethylphenyl) benzo[c]phenanthridine (**8p)**