Magnetic core- shell dendritic mesoporous silica nanospheres anchored with diamine as an efficient and recyclable base catalyst.

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Electronic Supplementary information (ESI)

Knoevenagel Condensation Reaction.

1. 2-(4-nitrobenzylidene)malononitrile

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.85 (d, 2H, J= 6 Hz), 7.72 (s, 1H), 7.51 (d, 2H, J=4 Hz) ppm. ^{13}C NMR (75 MHz, $CDCl_3$): δ 158.45, 141.29, 132.03, 130.28, 129.34, 113.60, 112.50, 83.47 ppm. HRMS (ES) Calcd: 199.0382. Found: 200.0379 $[M + H]^+$; 201.0385 $[MH+2]^+$.

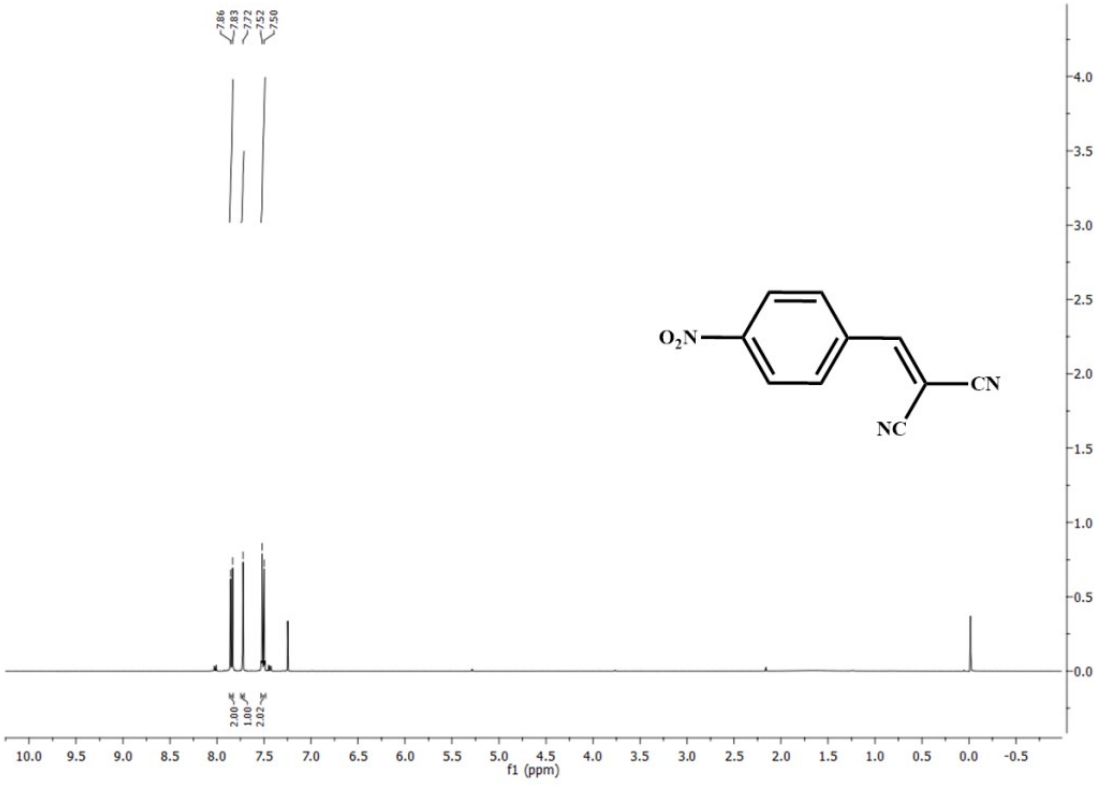

Figure 1 (a): ^{1}H NMR Spectra of 2-(4-nitrobenzylidene)malononitrile.

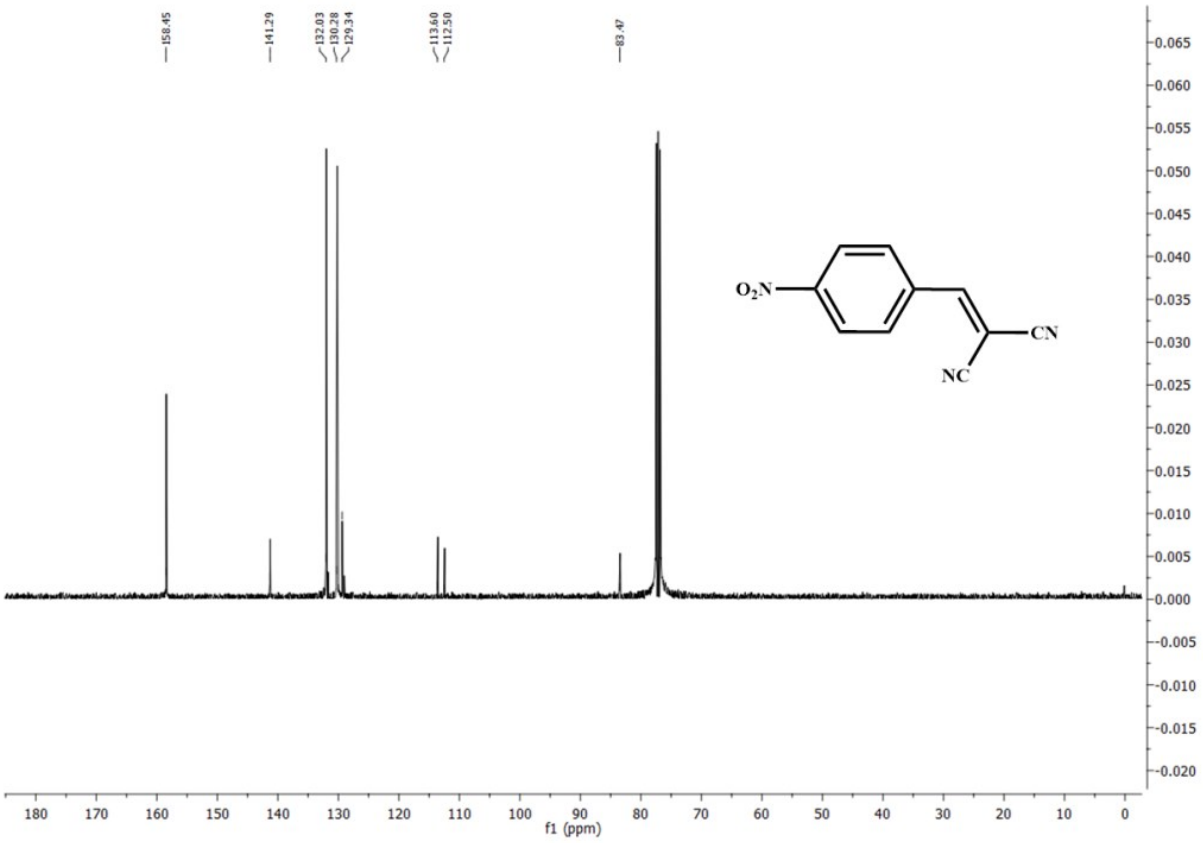

Figure 1 (b): ^{13}C NMR Spectra of 2-(4-nitrobenzylidene)malononitrile.

2. 2-(4-chlorobenzylidene)malononitrile

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.82 (d, 2H, J = 4.4 Hz), 7.71 (s, 1H), 7.49 (d, 2H, J = 4.2 Hz) ppm. ^{13}C NMR (75 MHz, $CDCl_3$): δ 158.46, 141.37, 131.95, 130.18, 129.33, 113.47, 112.44, 83.36 ppm. HRMS (ES) Calcd:188.0141. Found: 189.0155 $[M + H]^+$; 190.0149 $[MH+2]^+$.

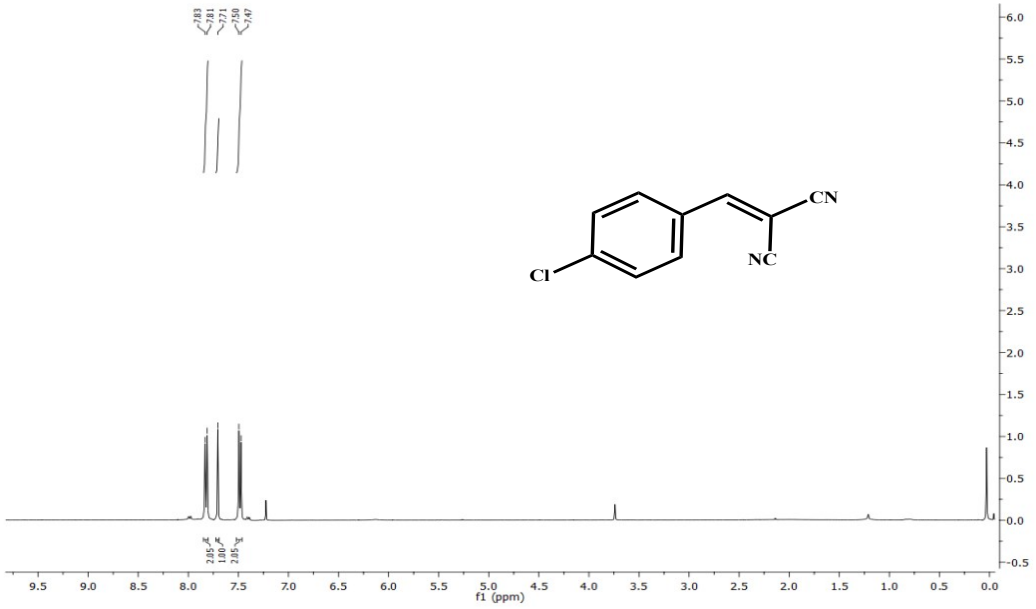

Figure 2 (a): ^{1}H NMR Spectra of 2-(4-chlorobenzylidene)malononitrile.

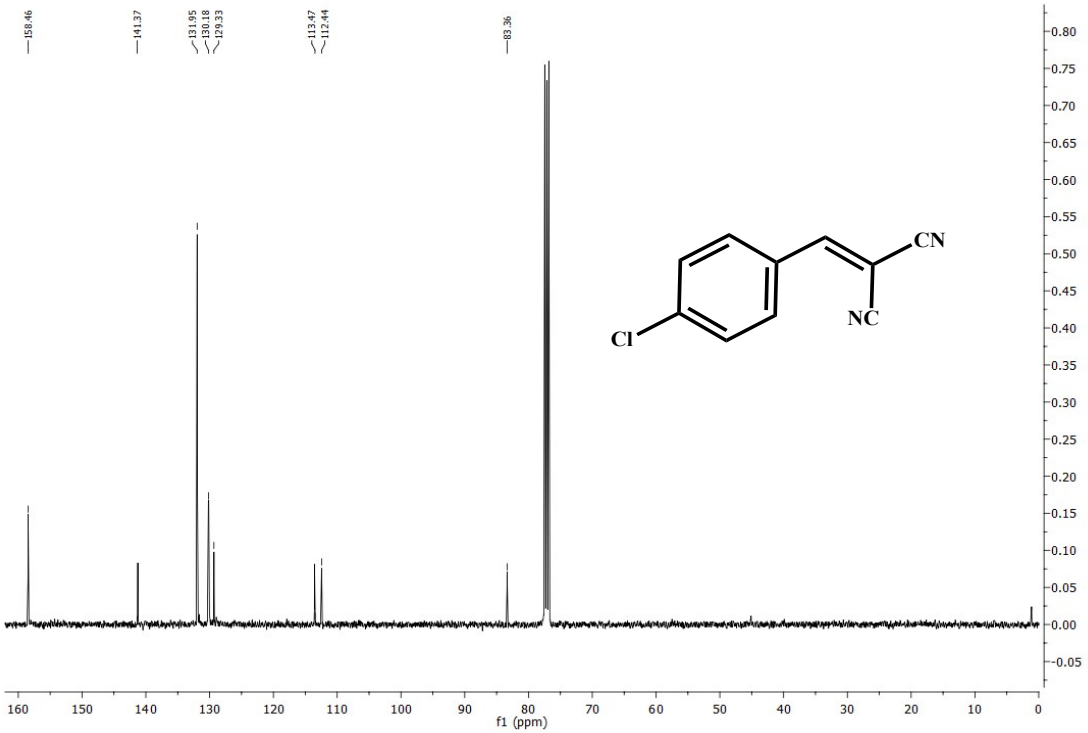

Figure 2 (b): ^{13}C NMR Spectra of 2-(4-chlorobenzylidene) malononitrile.

3. 2-(4-methoxybenzylidene)malononitrile

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.90 (d, 2H, J= 4 Hz), 7.64 (s, 1H), 7.00 (d, 2H, J= 4 Hz), 3.90 (s, 3H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$): δ 164.90, 158.96, 133.58, 124.14, 115.24, 114.52, 113.41, 78.67, 55.90 ppm. HRMS (ES) Calcd: 184.0637. Found: 185.0642 $[M + H]^+$; 186.0638 $[MH+2]^+$.

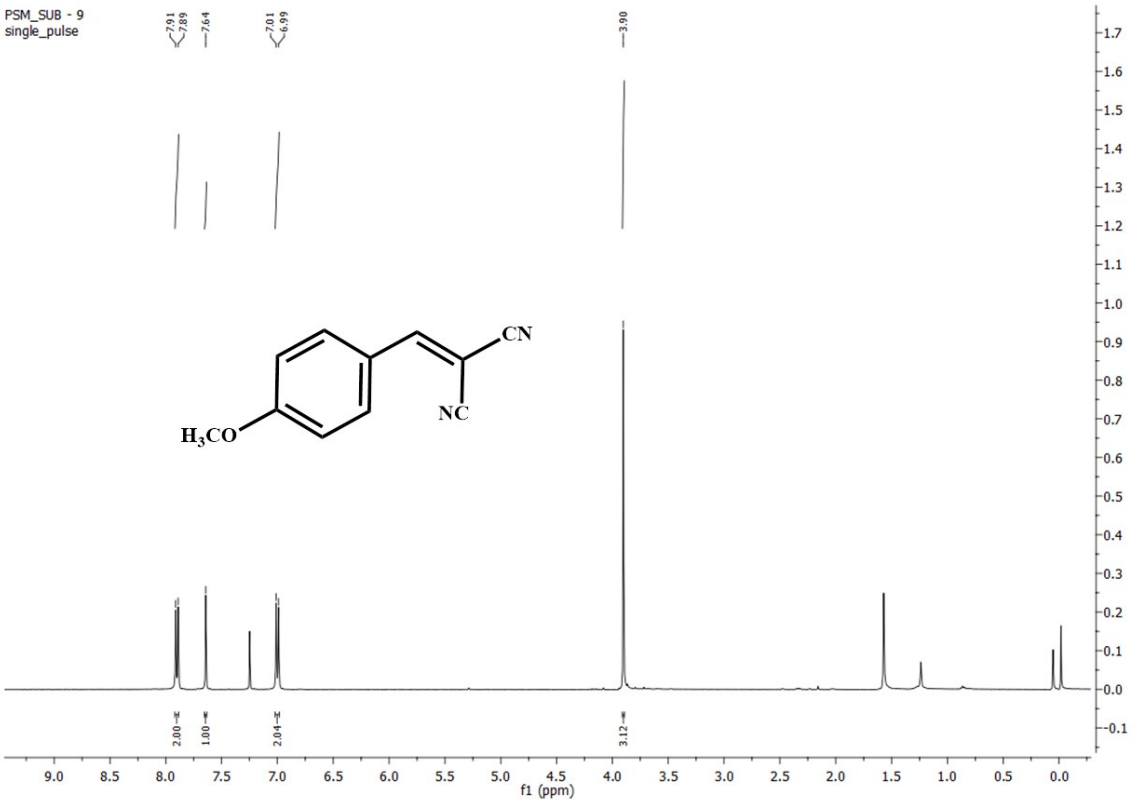

Figure 3 (a): ^{1}H NMR Spectra of 2-(4-methoxybenzylidene)malononitrile.

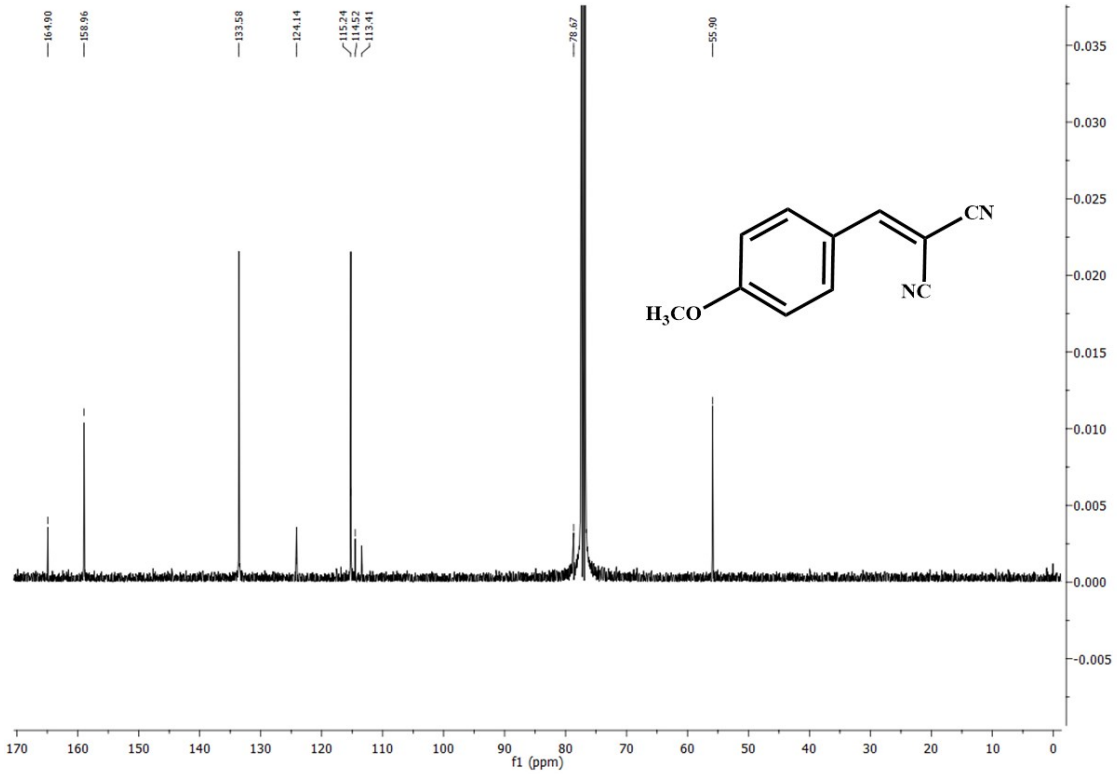

Figure 3 (b): ^{13}C NMR Spectra of 2-(4-methoxybenzylidene)malononitrile.

4. (E)-ethyl 2-cyano-3-(p-tolyl) acrylate

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.20 (s, 1H), 7.89 (d, 2H, J = 4.2 Hz), 7.29 (d, 2H, J = 4 Hz), 4.36 (q, 2H, J = 7.2 Hz), 2.42 (s, 3H), 1.38 (t, 3H, J = 6.8 Hz) ppm. ^{13}C NMR (75 MHz, $CDCl_3$): δ 162.89, 155.16, 144.79, 131.36, 130.13, 115.90, 101.58, 62.71, 21.97, 14.27 ppm. HRMS (ES) Calcd: 215.0946. Found: 216.0941 $[M + H]^+$; 217.0938 $[MH+2]^+$.

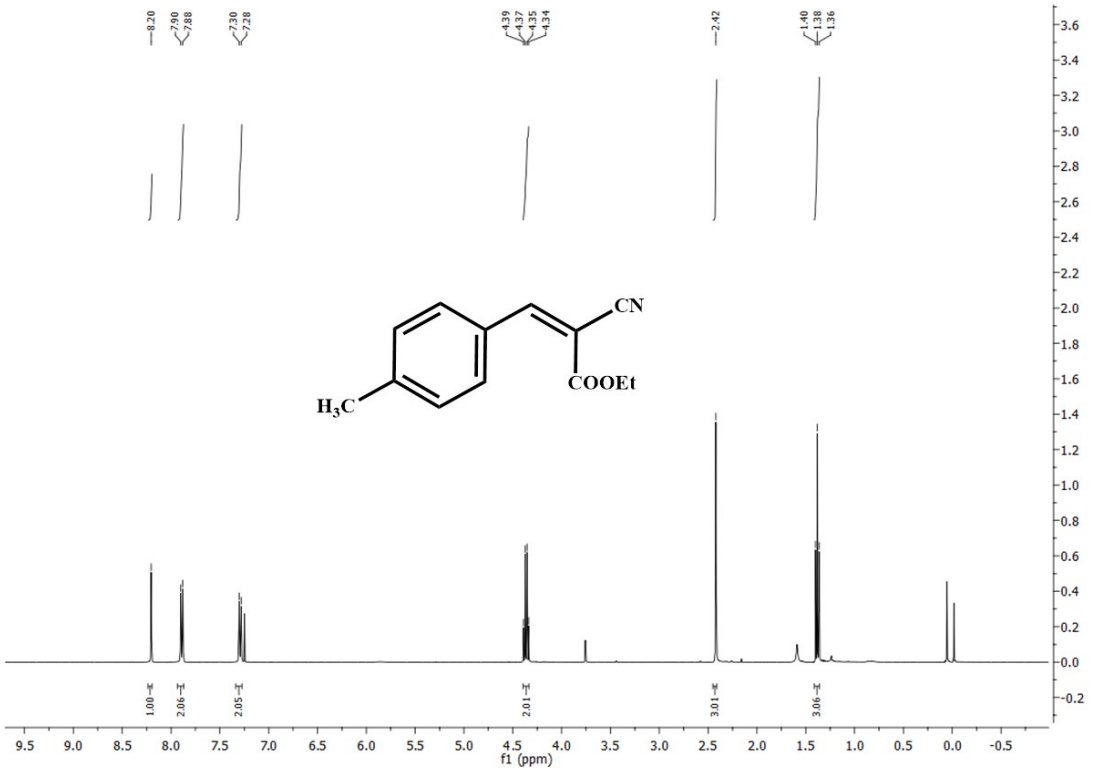

Figure 4 (a): ^{1}H NMR Spectra of (E)-ethyl 2-cyano-3-(p-tolyl) acrylate.

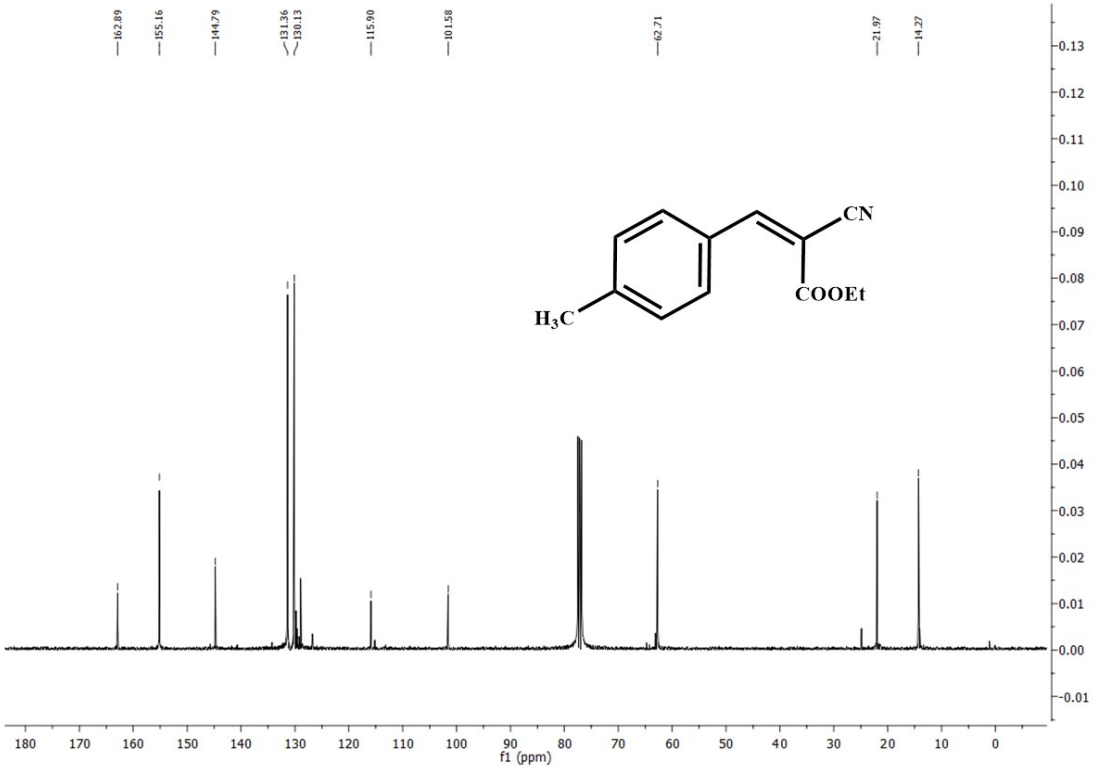

Figure 4 (b): ^{13}C NMR Spectra of (E)-ethyl 2-cyano-3-(p-tolyl) acrylate.

5. 2-(3-nitrobenzylidene)malononitrile

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.65 (s, 1H), 8.46 (d, 1H, J = 4.2 Hz), 8.32 (d, 1H, J= 4 Hz), 7.89 (s, 1H), 7.79 (t, 1H, J = 8 Hz) ppm. ^{13}C NMR (75 MHz, $CDCl_3$): δ 157.13, 148.79, 134.98, 132.16, 131.11, 128.36, 125.67, 112.78, 111.76, 86.98 ppm. HRMS (ES) Calcd: 199.0382. Found: 200.0387 $[M + H]^+$; 201.0382 $[MH+2]^+$.

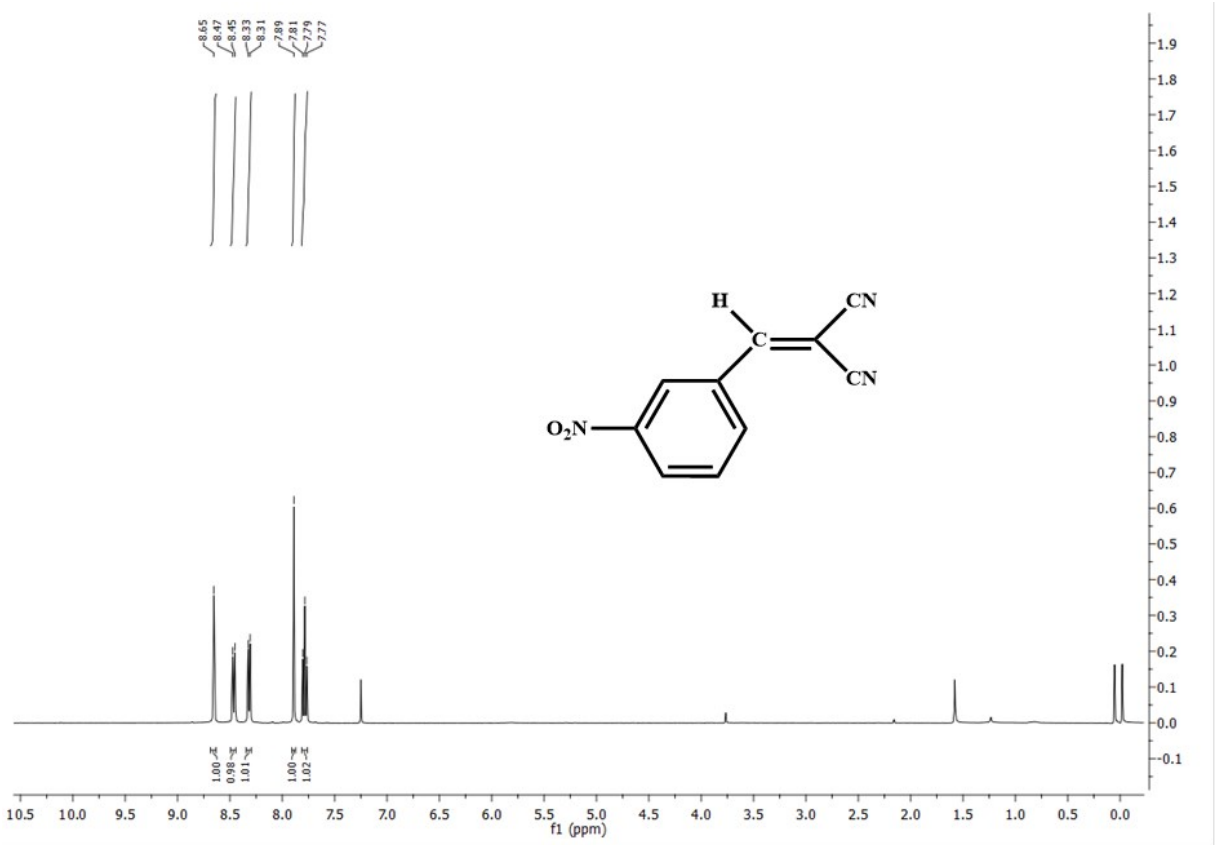

Figure 5 (a): ^{1}H NMR Spectra of 2-(3-nitrobenzylidene)malononitrile.

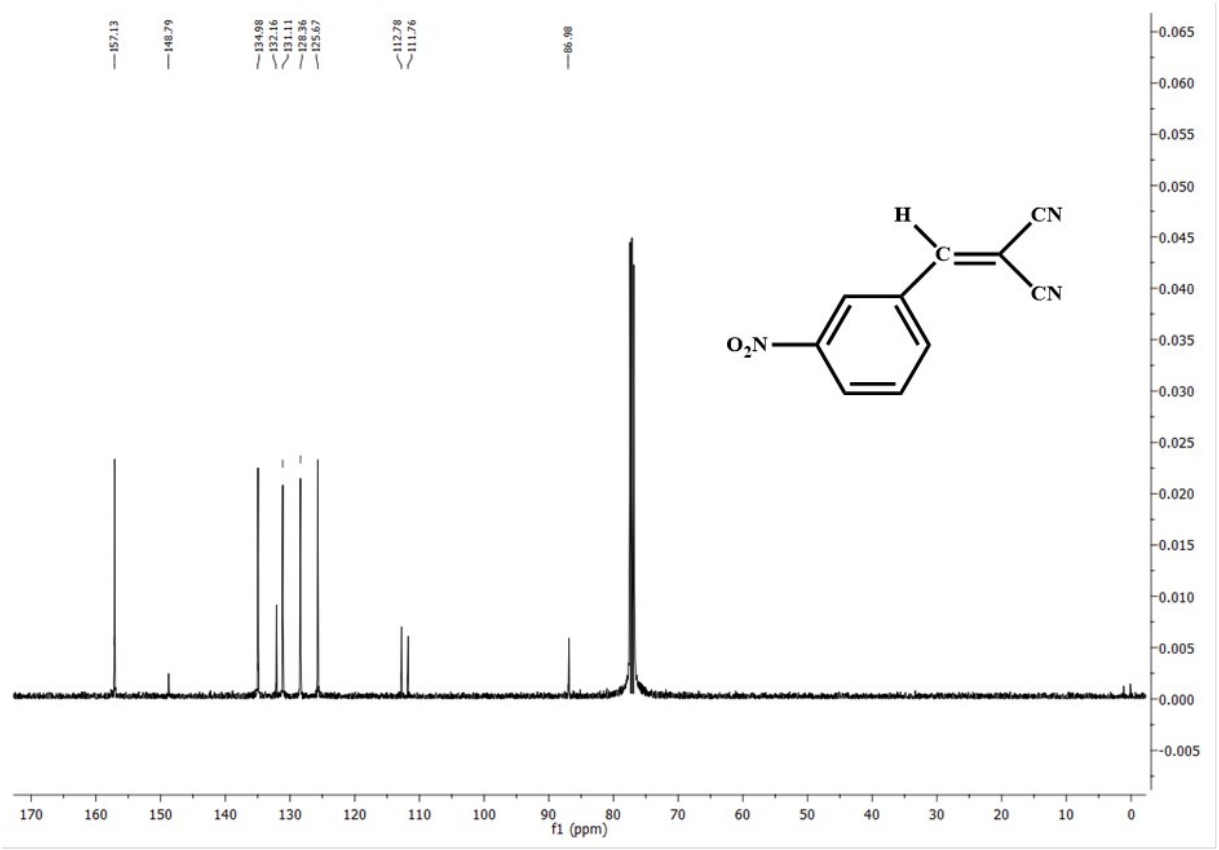

Figure 5 (b): ^{13}C NMR Spectra of 2-(3-nitrobenzylidene)malononitrile.

6. 2-benzylidenemalononitrile

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.88 (d, 2H, J= 3.8 Hz), 7.76 (s, 1H), 7.61 (t, 1H, J=7.2 Hz), 7.50-7.53 (m, 2H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$): δ 160.08, 134.74, 130.83, 129.73, 113.81, 112.65, 82.93 ppm. HRMS (ES) Calcd: 154.0531. Found: 155.0537 $[M + H]^+$; 156.0528 $[MH+2]^+$.

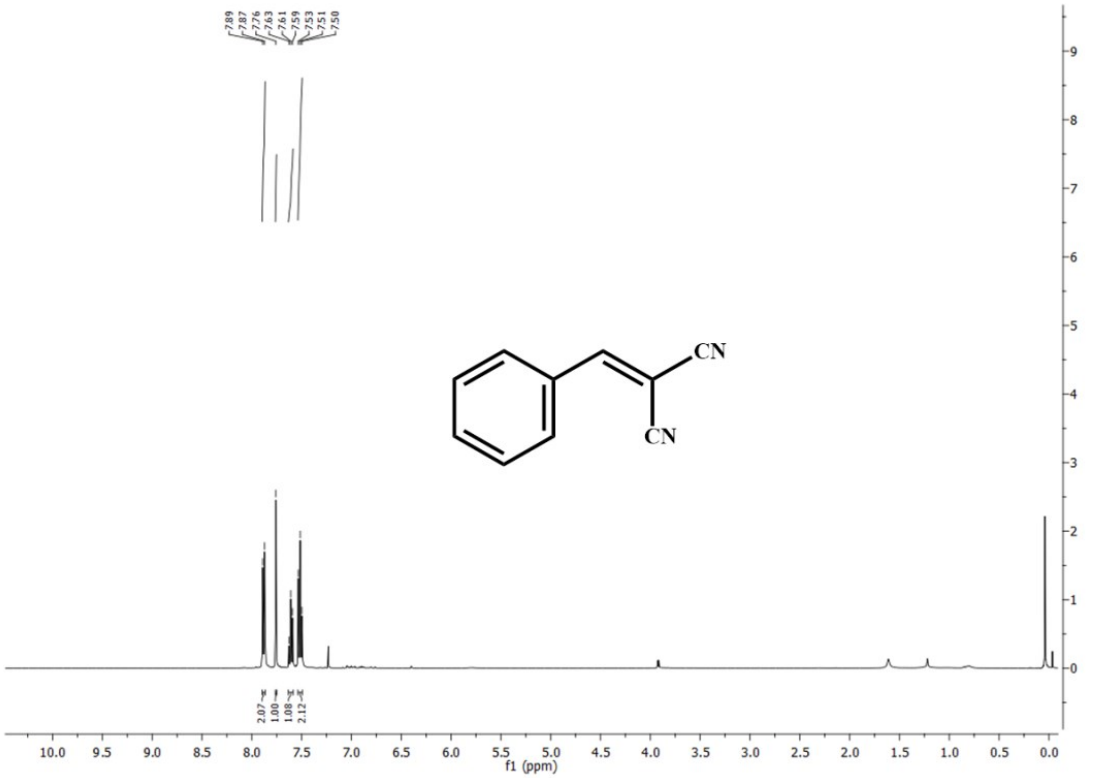

Figure 6 (a): ^{1}H NMR spectra of 2-benzylidenemalononitrile.

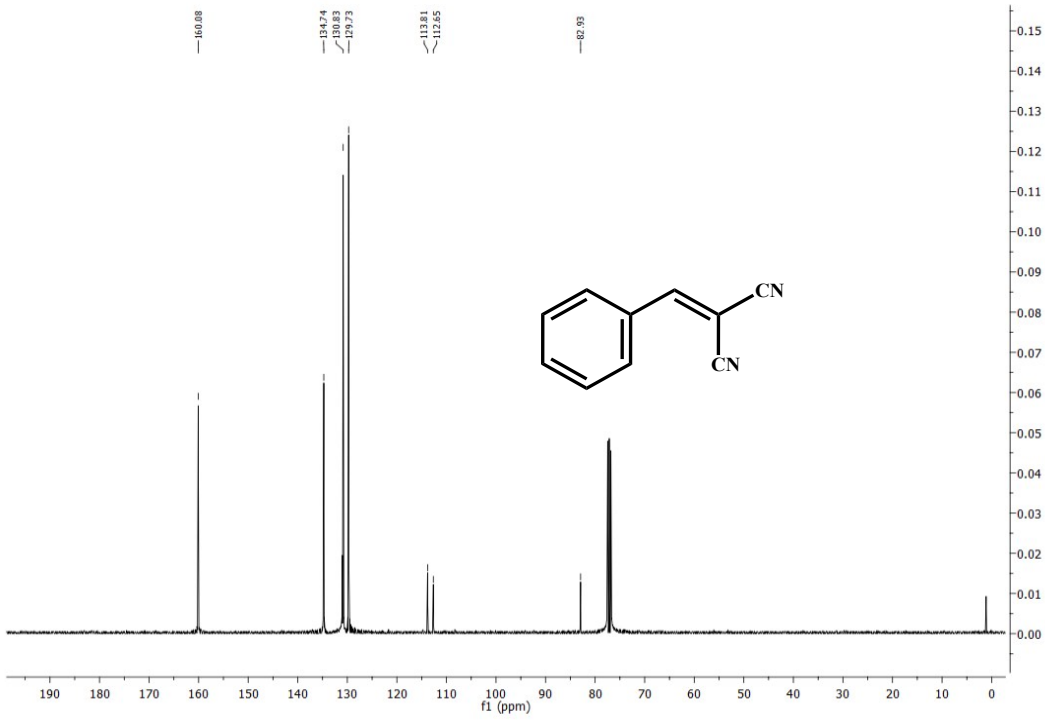

Figure 6 (b): ^{13}C NMR spectra of 2-benzylidenemalononitrile.

7. 2-(3,4,5-trimethoxybenzylidene)malononitrile

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.64 (s, 1H), 7.17 (s, 2H), 3.96 (s, 3H), 3.89 (s, 6H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ 159.56, 153.43, 144.03, 126.03, 114.10, 113.30,

108.35, 80.62, 61.35, 56.43 ppm. HRMS (ES) Calcd: 244.0848. Found: 245.0851 [M + H]$^+$; 246.0848 [MH+2]$^+$.

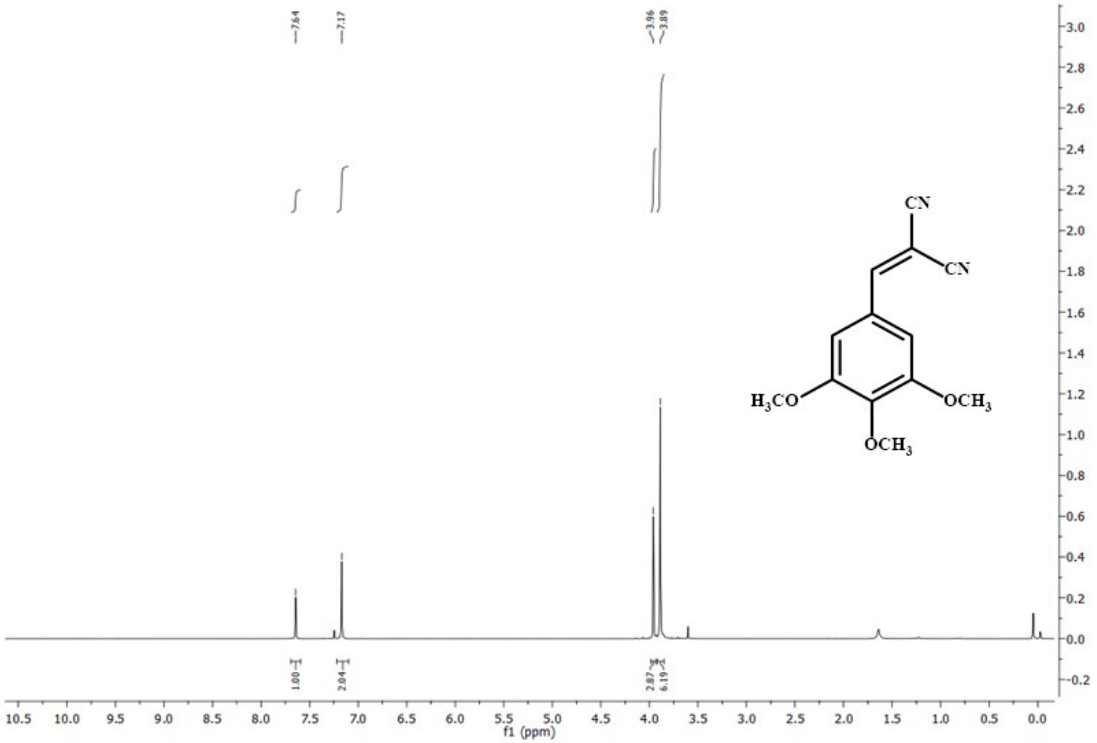

Figure 7 (a): ^{1}H NMR Spectra of 2-(3,4,5-trimethoxybenzylidene)malononitrile.

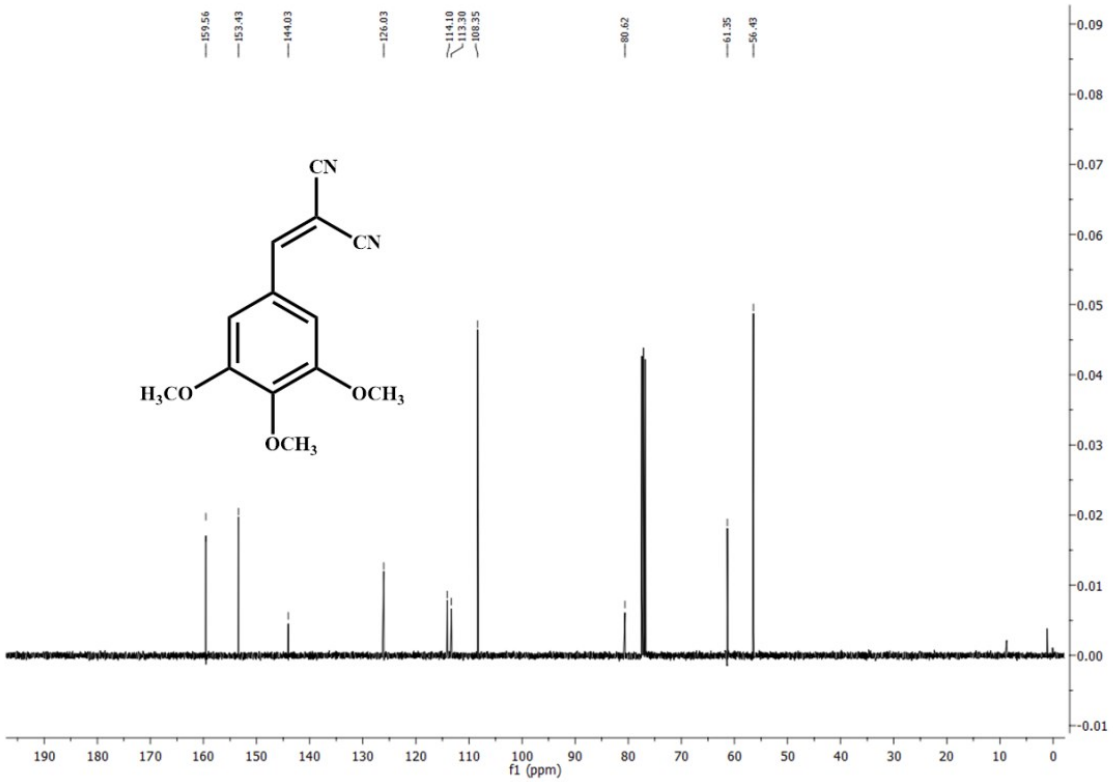

Figure 7 (b): ^{13}C NMR Spectra of 2-(3,4,5-trimethoxybenzylidene)malononitrile.

8. (E)-ethyl 2-cyano-3-(4-methoxyphenyl)acrylate

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.14(s, 1H), 7.97 (d, 2H, J=3.6 Hz), 6.96 (d, 2H), 4.33 (q, 2H, J= 6.4 Hz), 3.86 (s, 3H), 1.35 (t, 3H, J = 6.8 Hz) ppm. ^{13}C NMR (75 MHz $CDCl_3$) δ 190.95, 163.86, 163.21, 154.50, 133.73, 132.08, 124.41, 116.32, 114.84, 114.39, 99.36, 62.51, 55.70, 26.33, 14.27 ppm. HRMS (ES) Calcd: 231.0895. Found: 232.0897 $[M + H]^+$; 233.0889 $[MH+2]^+$.

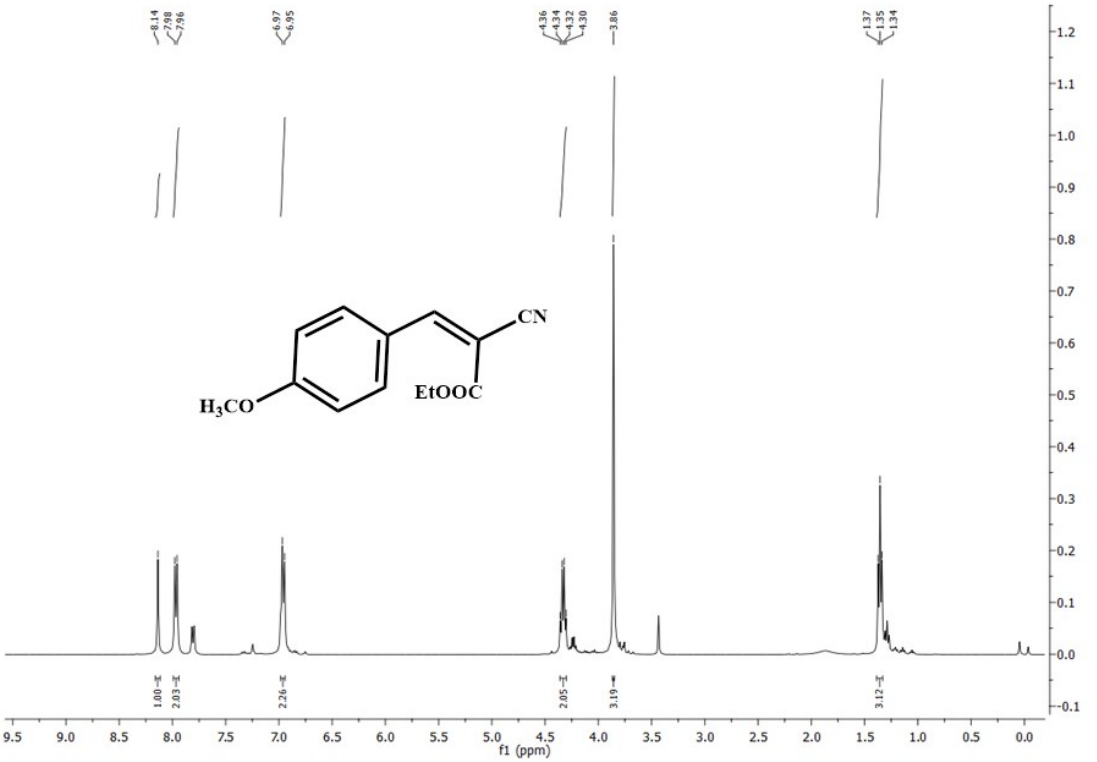

Figure 8 (a):^{1}H NMR Spectra of (E)-ethyl 2-cyano-3-(4-methoxyphenyl)acrylate.

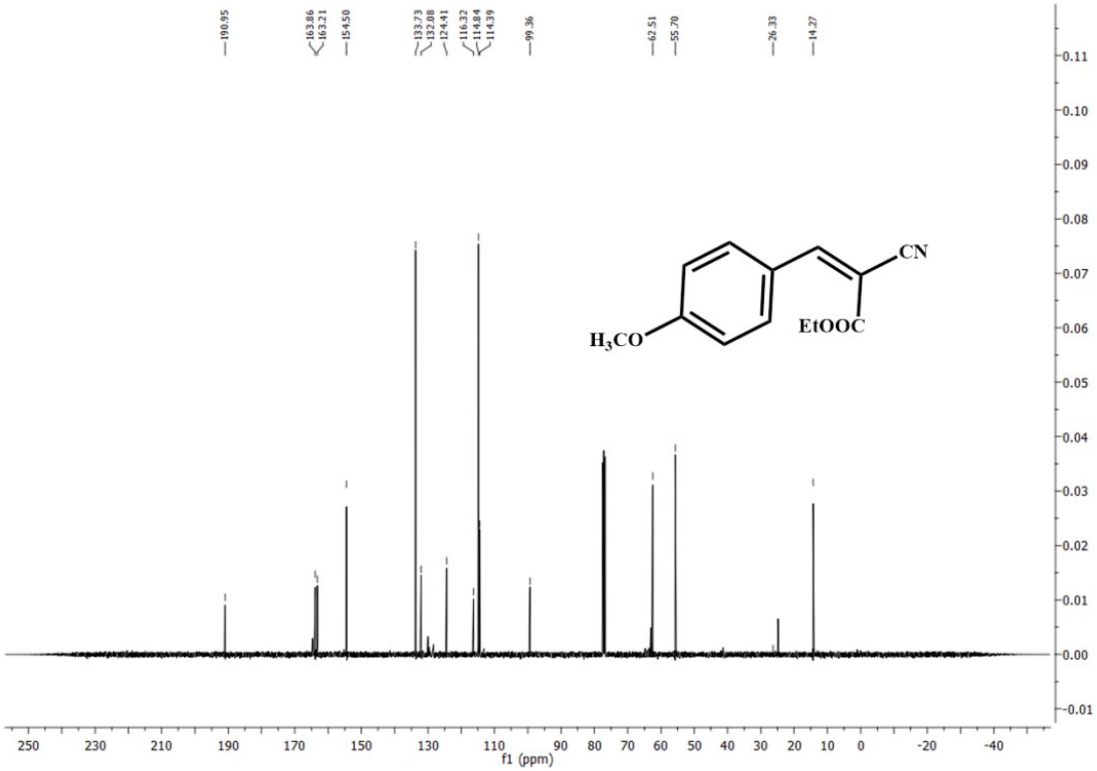

Figure 8 (b):^{1}H NMR Spectra of (E)-ethyl 2-cyano-3-(4-methoxyphenyl)acrylate.

9. (Z)-ethyl 2-cyano-3-phenylacrylate

^{1}H NMR ($CDCl_3$, 400 MHz): δ 8.23 (s, 1H), 7.97(d, 2H, J = 3.6 Hz), 7.48-7.53 (m, 3H), 4.36 (q, 2H, J = 6.4 Hz), 1.37 (t, 3H, J = 6.8 Hz) ppm. ^{13}C NMR ($CDCl_3$, 75 MHz) δ 162.57, 155.16, 133.41, 131.16, 129.37, 115.58, 103.06, 62.83, 14.24 ppm. HRMS (ES) Calcd: 201.0790. Found: 202.0787 $[M + H]^+$; 203.0794 $[MH+2]^+$.

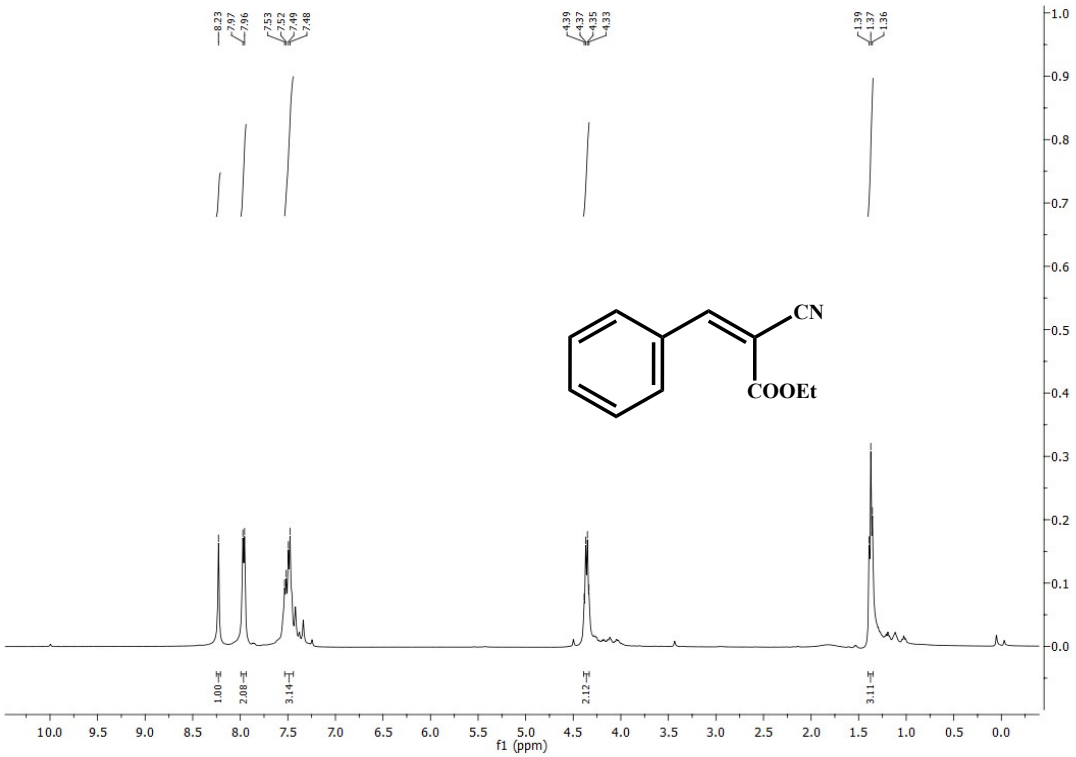

Figure 9 (a): ^{1}H NMR Spectra of (Z)-ethyl 2-cyano-3-phenylacrylate.

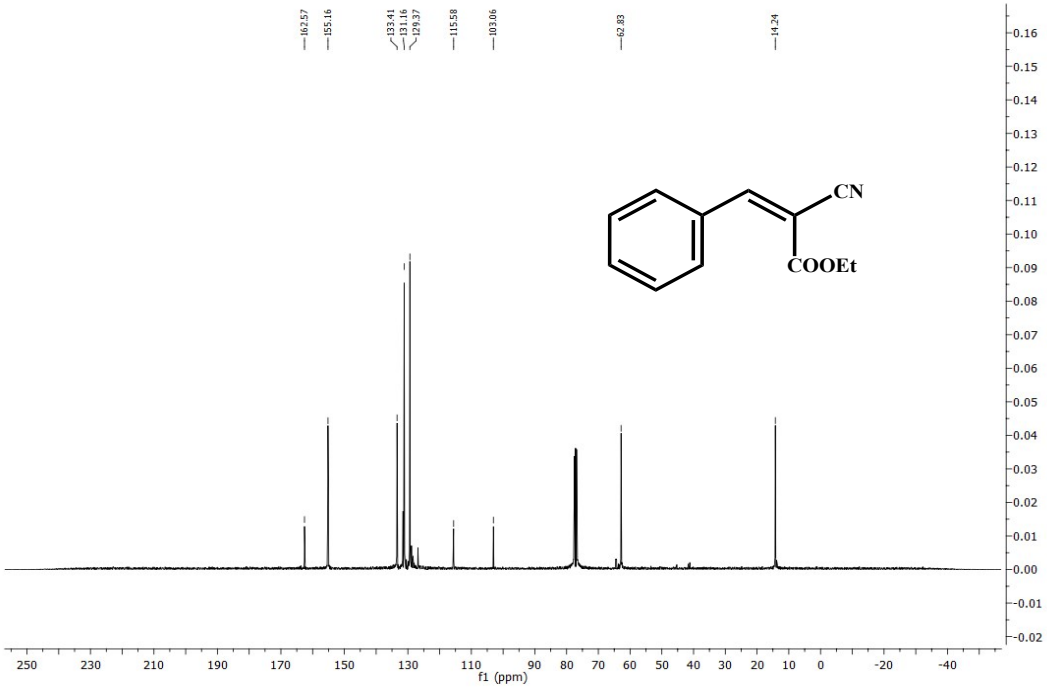

Figure 9 (a): ^{13}C NMR Spectra of (Z)-ethyl 2-cyano-3-phenylacrylate.

10. 2-pentylidenemalononitrile.

^{1}H NMR ($CDCl_3$, 400 MHz): 7.28 (t, 1H, J = 8 Hz), 2.51 (q, 2H, J = 7.6 Hz), 1.29-1.36 (m, 4H), 0.88 (t, 3H, J = 7.2 Hz) ppm. ^{13} C NMR ($CDCl_3$, 75 MHz): 170.09, 112.18, 110.58, 89.77, 32.62, 29.55, 22.24, 13.58 ppm. HRMS (ES) Calcd: 134.0844 Found: 135.0849 $[M + H]^+$; 136.0839 $[MH+2]^+$.

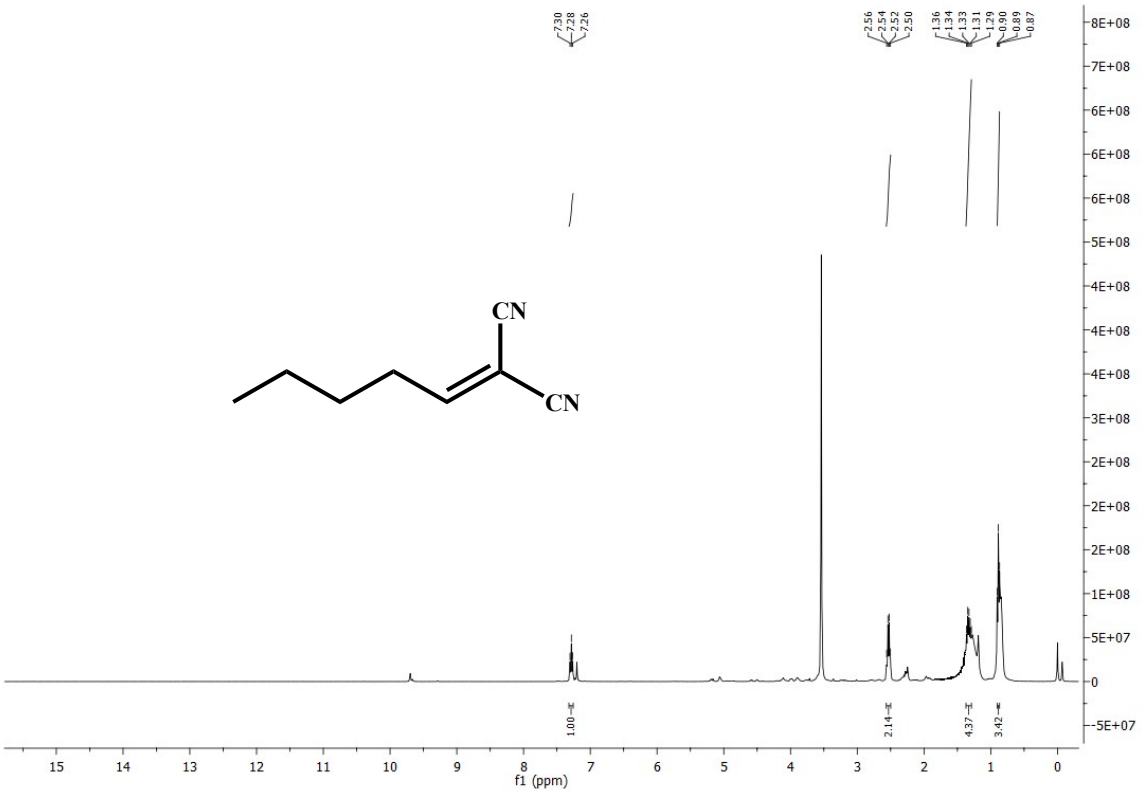

Figure 10 (a): ^{1} H NMR Spectra of 2-pentylidenemalononitrile.

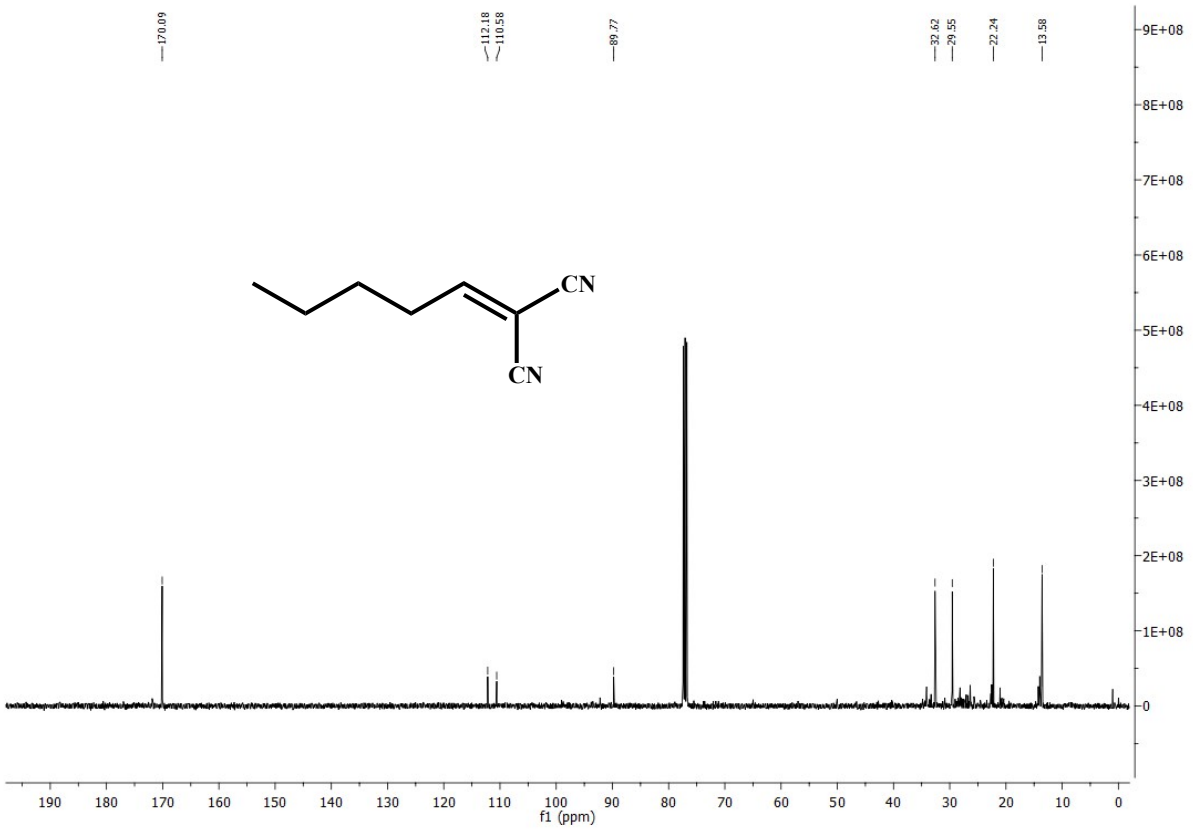

Figure 10 (a): ^{13}C NMR Spectra of 2-pentylidenemalononitrile.

11. 2-butylidenemalononitrile.

^{1}H NMR ($CDCl_3$, 400 MHz): 7.29 (t, 1H, J= 8 Hz), 2.51 (q, 2H, J= 7.6 Hz), 1.51-1.58 (m, 2H), 0.95 (t, 3H, J=7.2 Hz) ppm. ^{13}C NMR ($CDCl_3$, 75 Hz): 169.86, 112.17, 110.60, 89.94, 34.68, 21.06, 13.56 ppm. HRMS (ES) Calcd: 120.0687 Found: 121.0682 $[M + H]^+$; 122.0689 $[MH+2]^+$.

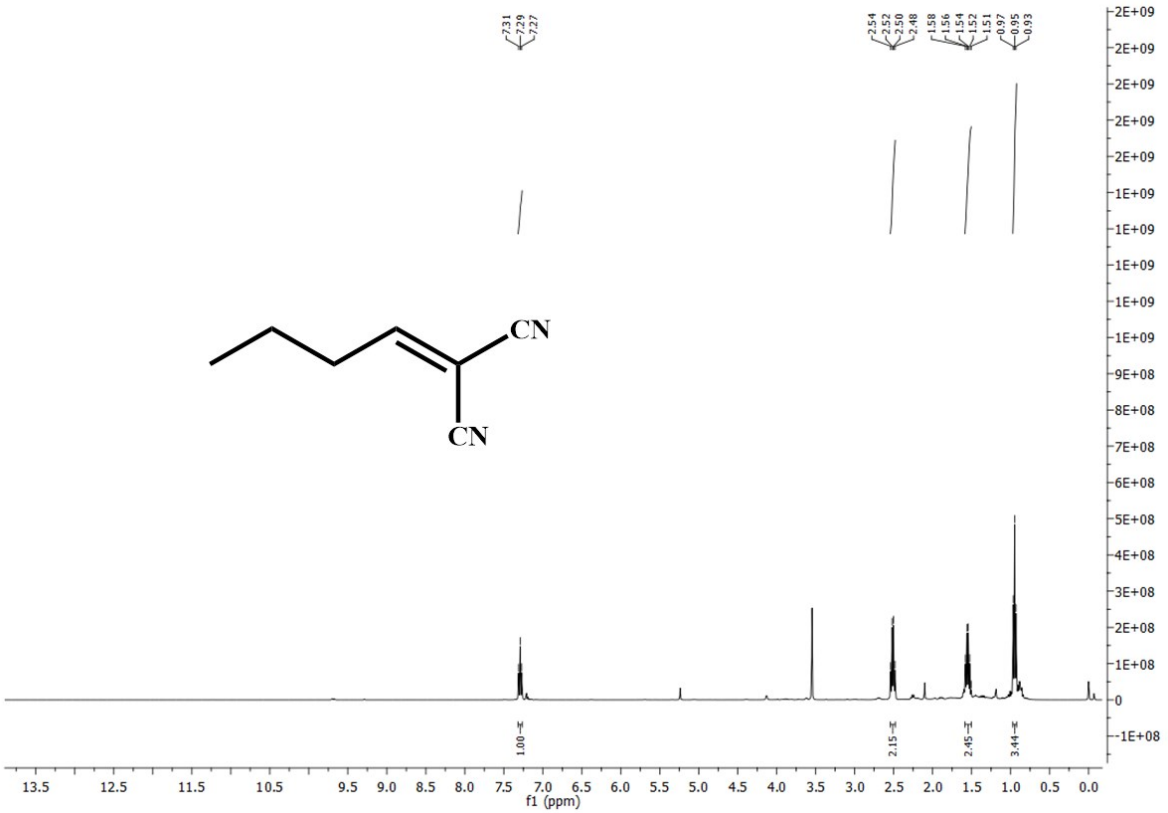

Figure 11 (a): ^{1}H NMR Spectra of 2-butylidenemalononitrile.

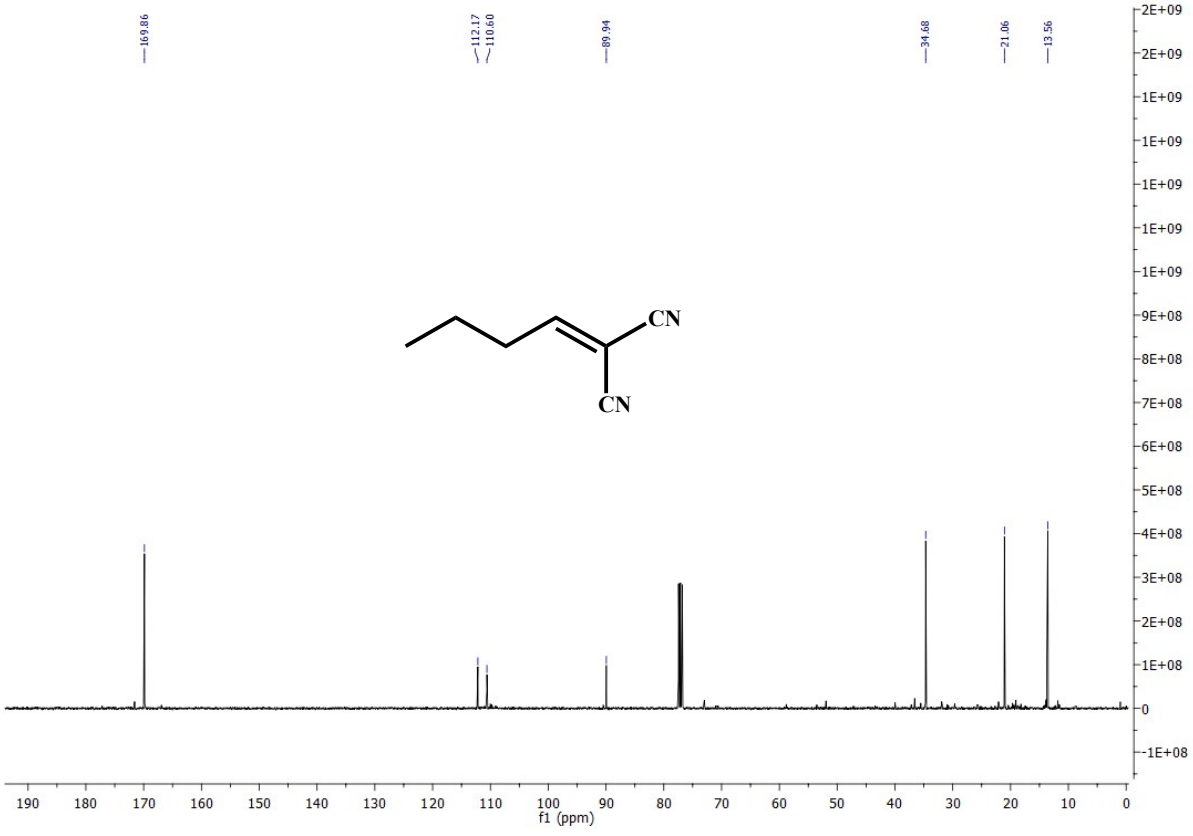

Figure 11 (b): ^{13}C NMR Spectra of 2-butylidenemalononitrile.

12. 2-propylidenemalononitrile.

^{1}H NMR ($CDCl_3$, 100 MHz): δ 7.31 (t, 1H, J= 7.6 Hz), 2.51-2.59 (m, 2H), 1.13 (t, 3H, J= 7.6 Hz) ppm. ^{13}C NMR ($CDCl_3$, 75 MHz): δ 171.43, 111.94, 109.41, 86.02, 24.58, 11.90 ppm. HRMS (ES) Calcd: 106.0531 Found: 107.0528 $[M + H]^+$; 108.0537 $[MH+2]^+$.

Figure 12 (a): ^{1} H NMR Spectra of 2-propylidenemalononitrile.

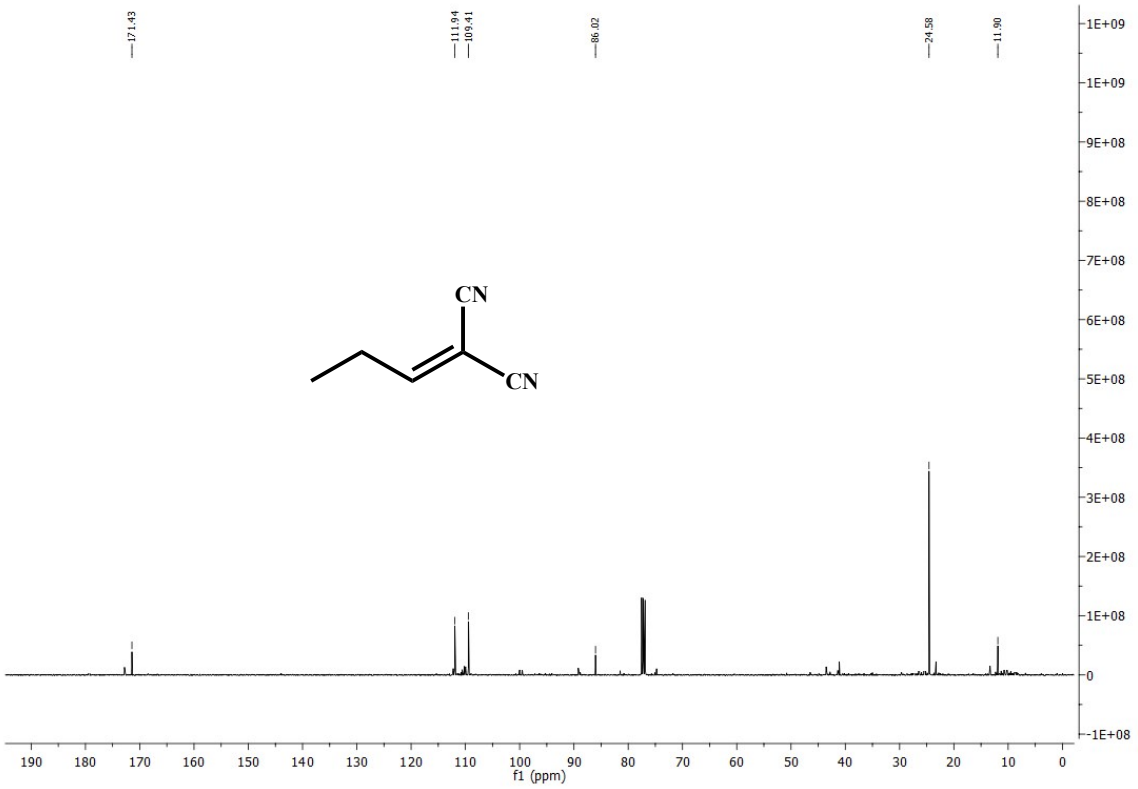

Figure 12 (b): ^{13}C NMR Spectra of 2-propylidenemalononitrile.

Hanstch Condensation

1. **Ethyl 2,7,7-trimethyl-5-oxo-4-phenyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate**

   ^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.17 (d, 2H, J=7.6 Hz), 6.97-7.07 (m, 3H), 4.99 (s, 1H), 4.05 (q, 2H, J= 7.2 Hz), 2.23-2.32 (m, 7H), 1.19 (t, 3H, J= 6.8 Hz), 1.04 (s, 3H), 0.92 (s, 3H) ppm. ^{13}C NMR ($CDCl_3$, 75 MHz): δ 195.76, 167.63, 148.43, 144.27, 143.45, 135.45, 129.03, 128.67, 127.95, 126.73, 115.80, 112.28, 106.27, 59.88, 50.81, 41.10, 36.16, 32.77, 31.49, 29.49, 27.28, 21.12, 19.41, 14.29 ppm. HRMS (ES) Calcd: 339.1834. Found: 340.1838 $[M + H]^+$; 341.1842 $[MH+2]^+$.

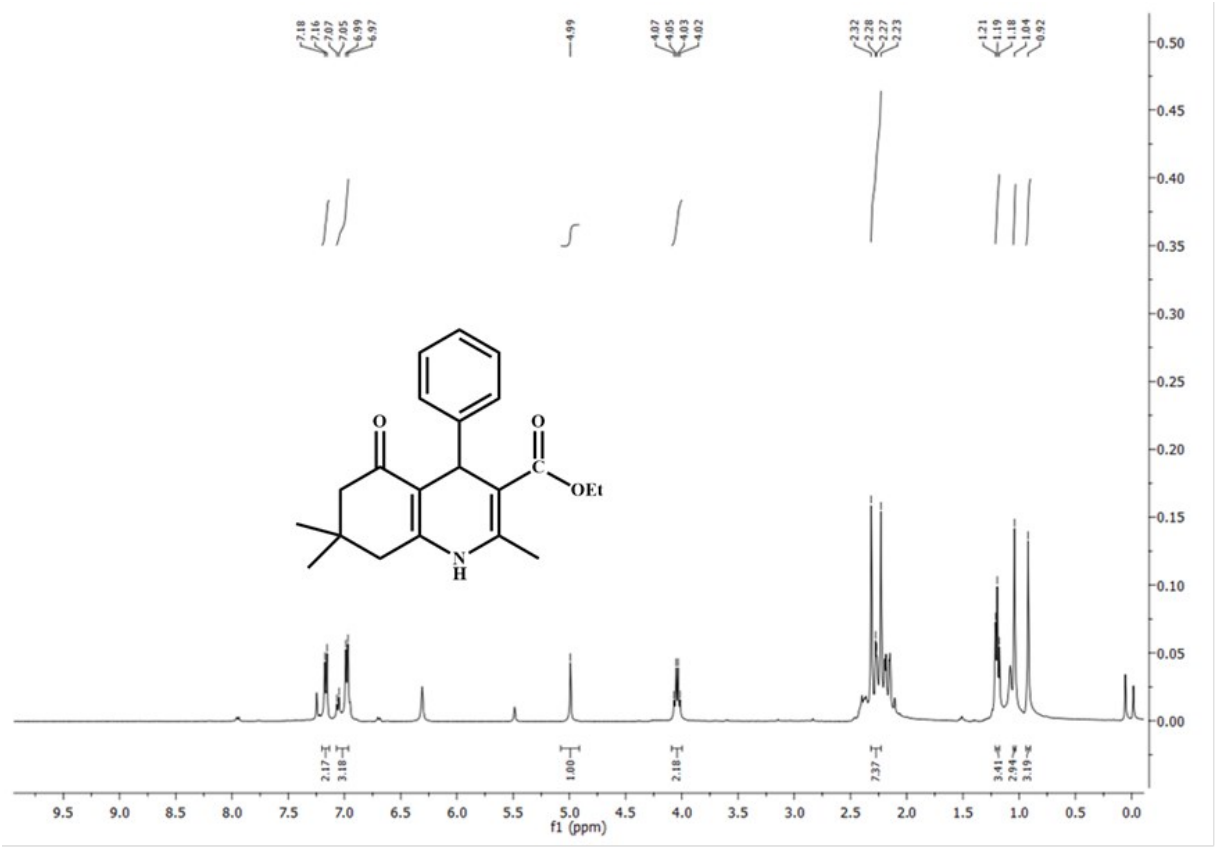

Figure 1 (a): ^{1}H NMR Spectra of Ethyl 2,7,7-trimethyl-5-oxo-4-phenyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

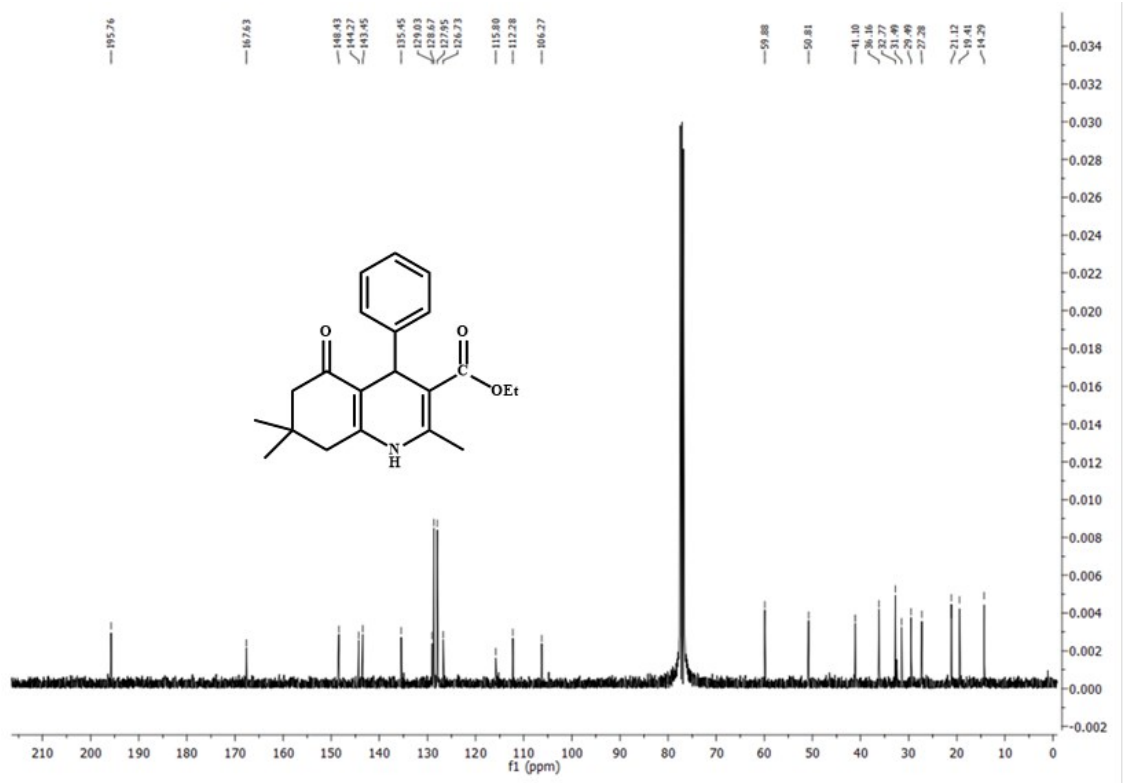

Figure 1 (b): ^{13}C NMR Spectra of Ethyl 2,7,7-trimethyl-5-oxo-4-phenyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

2. **Ethyl 2,7,7-trimethyl-5-oxo-4-(p-tolyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate**

^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.17 (d, 2H, J= 7.6 Hz), 6.98 (d, 2H, J= 8 Hz), 4.99 (s, 1H), 4.05 (q, 2H, J= 7.2 Hz), 2.32 (s, 3H), 2.15-2.27 (m, 7H), 1.20 (t, 3H, J= 7.2 Hz), 1.05 (s, 3H), 0.92 (s, 3H) ppm. ^{13}C NMR ($CDCl_3$, 75 MHz): δ 195.71, 167.61, 148.28, 144.25, 143.38, 135.47, 128.68, 127.95, 112.33, 106.30, 59.89, 50.81, 41.15, 36.15, 32.79, 29.50, 27.30, 21.12, 19.47, 14.30 ppm. HRMS (ES) Calcd: 353.1991. Found: 354.1995 $[M + H]^+$; 355.1989 $[MH+2]^+$.

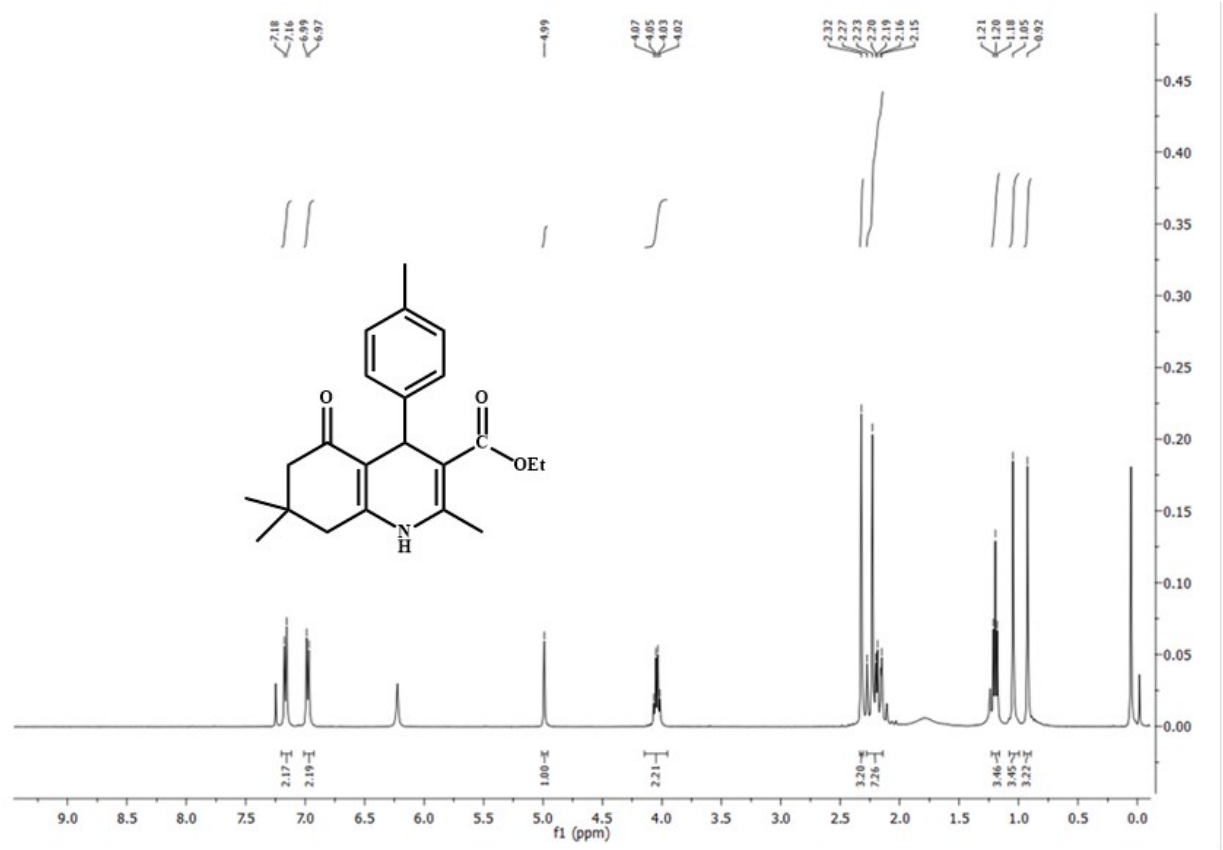

Figure 2 (a): [1]H NMR Spectra of Ethyl 2,7,7-trimethyl-5-oxo-4-(p-tolyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

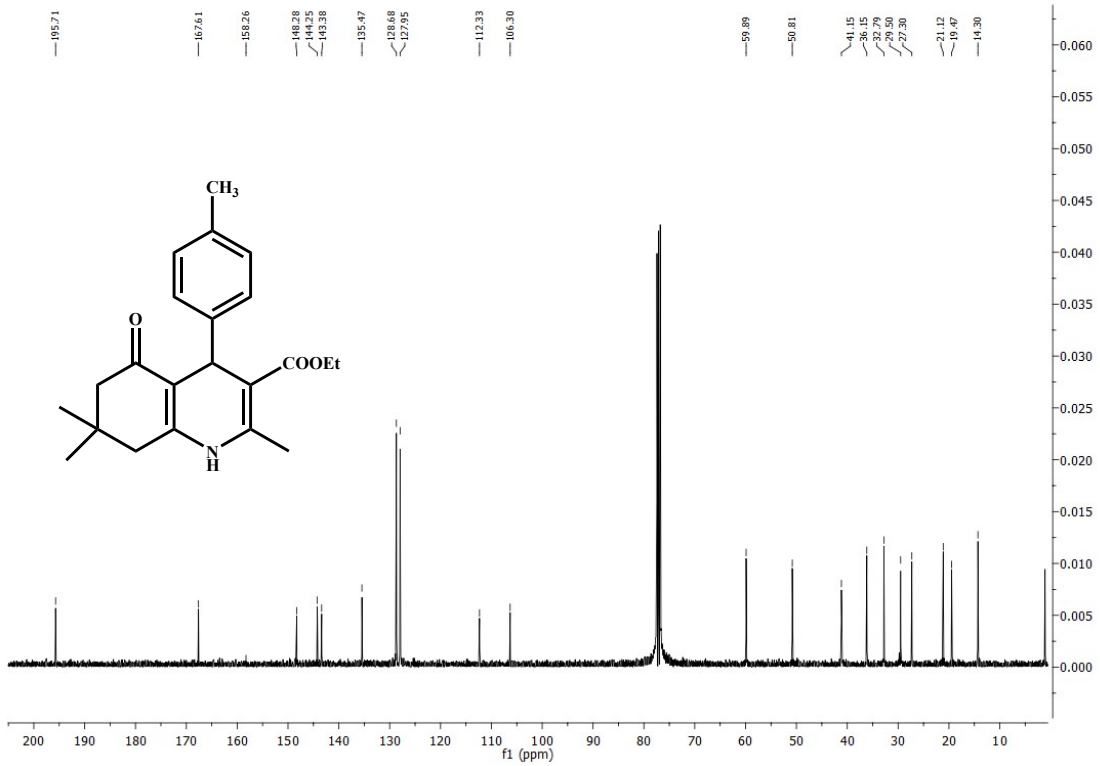

Figure 2 (b): [13]C NMR Spectra of Ethyl 2,7,7-trimethyl-5-oxo-4-(p-tolyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

3. **Ethyl 4-(4-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate**

^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.19 (d, 2H, J= 8.8 Hz), 6.71 (d, 2H, J= 8.8 Hz), 4.97 (s, 1H), 4.05 (q, 2H, J= 6.8 Hz), 3.71 (s, 3H), 2.14-2.32 (m, 7H), 1.19 (t, 3H, J= 7.2 Hz), 1.04 (s, 3H), 0.91 (s, 3H) ppm. ^{13}C NMR ($CDCl_3$, 75 MHz): δ 195.69, 167.56, 157.78, 148.17, 143.25, 139.66, 128.97, 113.25, 112.29, 106.30, 59.79, 55.12, 50.77, 41.01, 35.71, 32.69, 29.45, 27.17, 19.36, 14.25 ppm. HRMS (ES) Calcd: 369.1941. Found: 370.1935 $[M + H]^+$; 371.1930 $[MH+2]^+$.

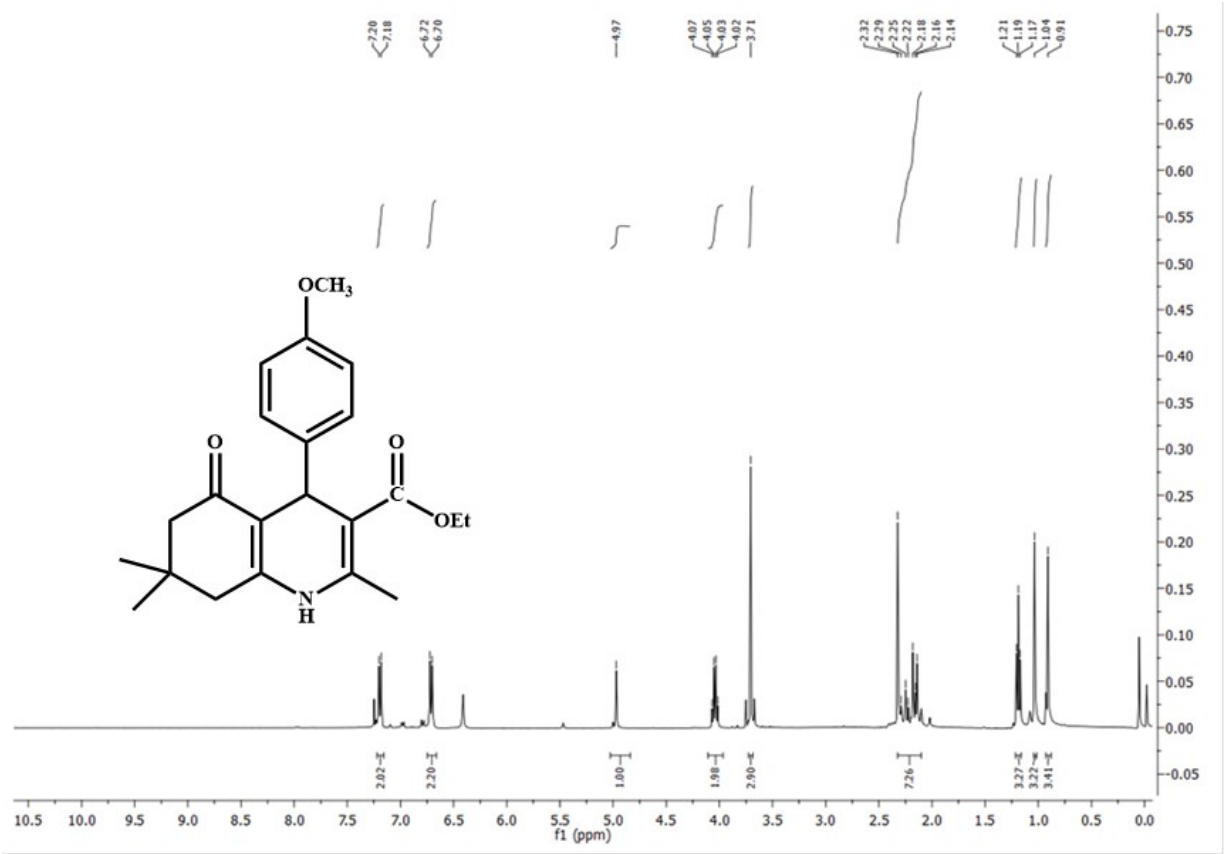

Figure 3 (a): ^{1}H NMR Spectra of Ethyl 4-(4-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

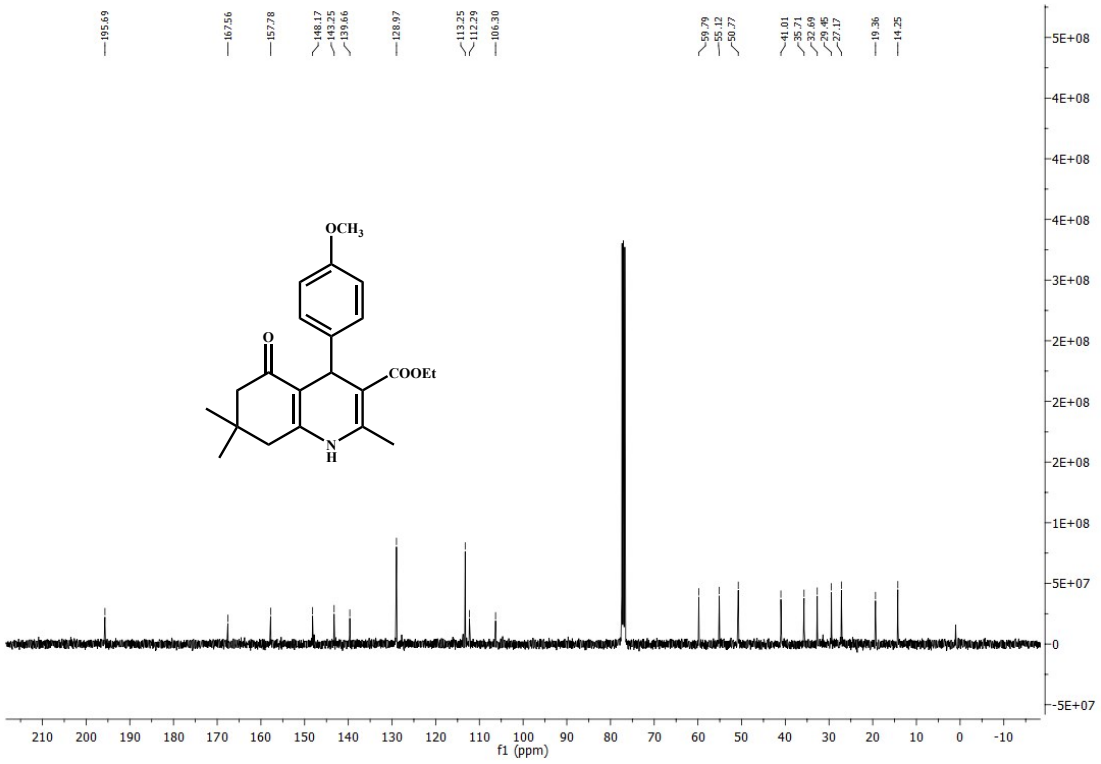

Figure 3 (b): ^{13}C NMR Spectra of Ethyl 4-(4-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

4. **Ethyl 4-(4-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate**

^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.22 (d, 2H J= 8.4 Hz,), 7.14 (d, 2H, J= 8.8 Hz), 5.00 (s, 1H), 4.04 (q, 2H, J= 7.2 Hz), 2.16-2.34 (m, 7H), 1.17 (t, 3H, J= 7.2 Hz), 1.04 (s, 3H), 0.90 (s, 3H) ppm. ^{13}C NMR ($CDCl_3$, 75 MHz): δ 190.76, 189.52, 136.81, 131.57, 131.01, 129.53, 128.40, 128.30, 115.37, 47.07, 46.47, 32.44, 31.48, 29.68, 27.47 ppm. HRMS (ES) Calcd: 373.1445. Found: 374.1449 $[M + H]^+$; 375.1454 $[MH+2]^+$.

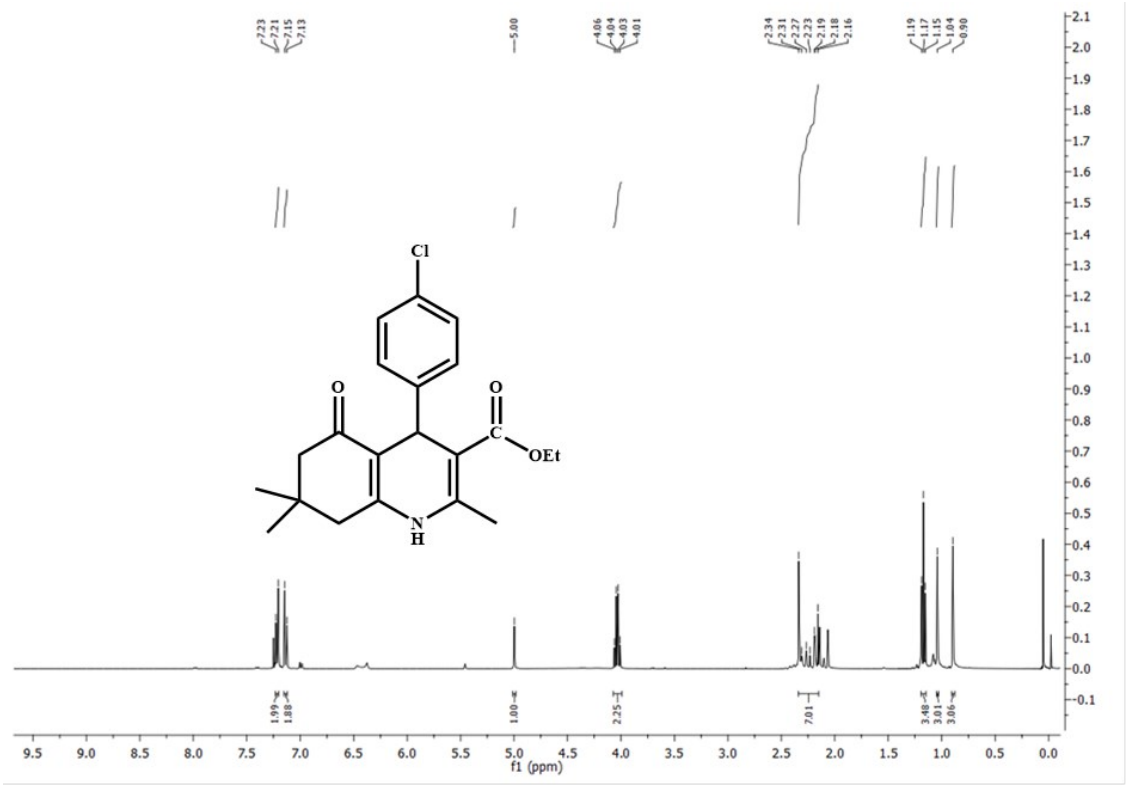

Figure 4 (a): ^{1}H NMR Spectra of Ethyl 4-(4-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

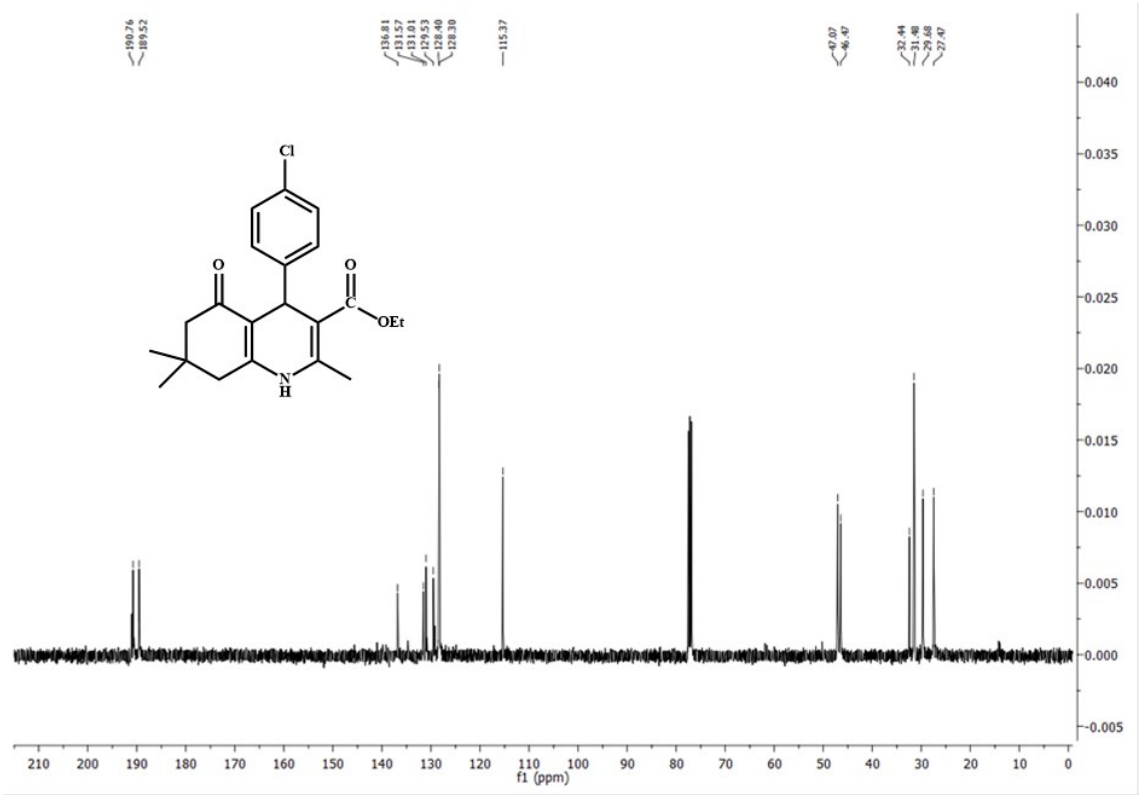

Figure 4 (b): ^{13}C NMR Spectra of Ethyl 4-(4-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

5. **Ethyl 4-(4-nitrophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.**

^{1}H NMR ($CDCl_3$, 400 MHz): δ 8.01 (d, 2H, J= 8.4 Hz), 7.44 (d, 2H, J= 8 Hz), 5.09 (s, 1H), 4.00 (q, 2H, J= 6.8 Hz), 2.30 (s, 3H), 2.16-2.23 (m, 2H), 2.01-2.09 (m, 2H), 1.12 (t, 3H, J= 7.2 Hz), 1.00 (s, 3H), 0.83 (s, 3H) ppm. ^{13}C NMR ($CDCl_3$, 75 MHz): δ 196.14, 175.66, 167.15, 154.71, 150.33, 146.18, 145.21, 129.04, 127.77, 123.55, 123.35, 114.89, 110.63, 104.68, 60.16, 50.56, 40.65, 37.31, 32.68, 31.54, 29.41, 27.01, 21.03, 19.19, 14.24 ppm. HRMS (ES) Calcd: 384.1685. Found: 385.1690 $[M + H]^+$; 386.1686 $[MH+2]^+$.

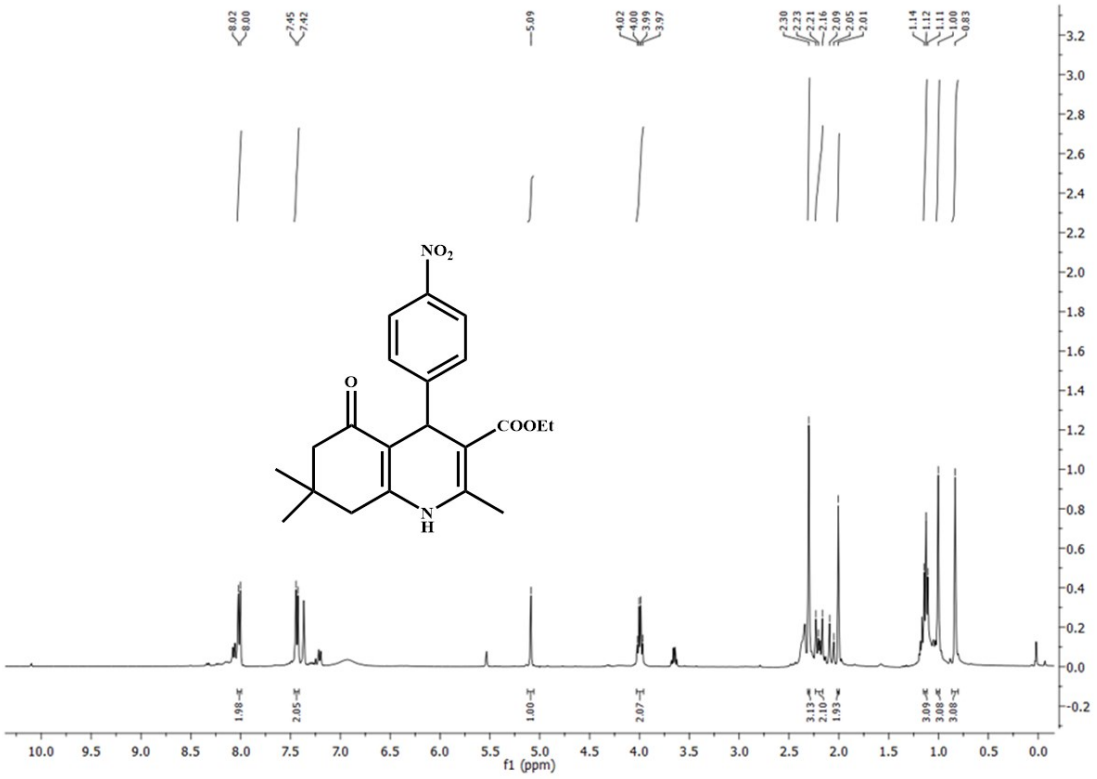

Figure 4 (a) : ^{1}H NMR Spectra of Ethyl 4-(4-nitrophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

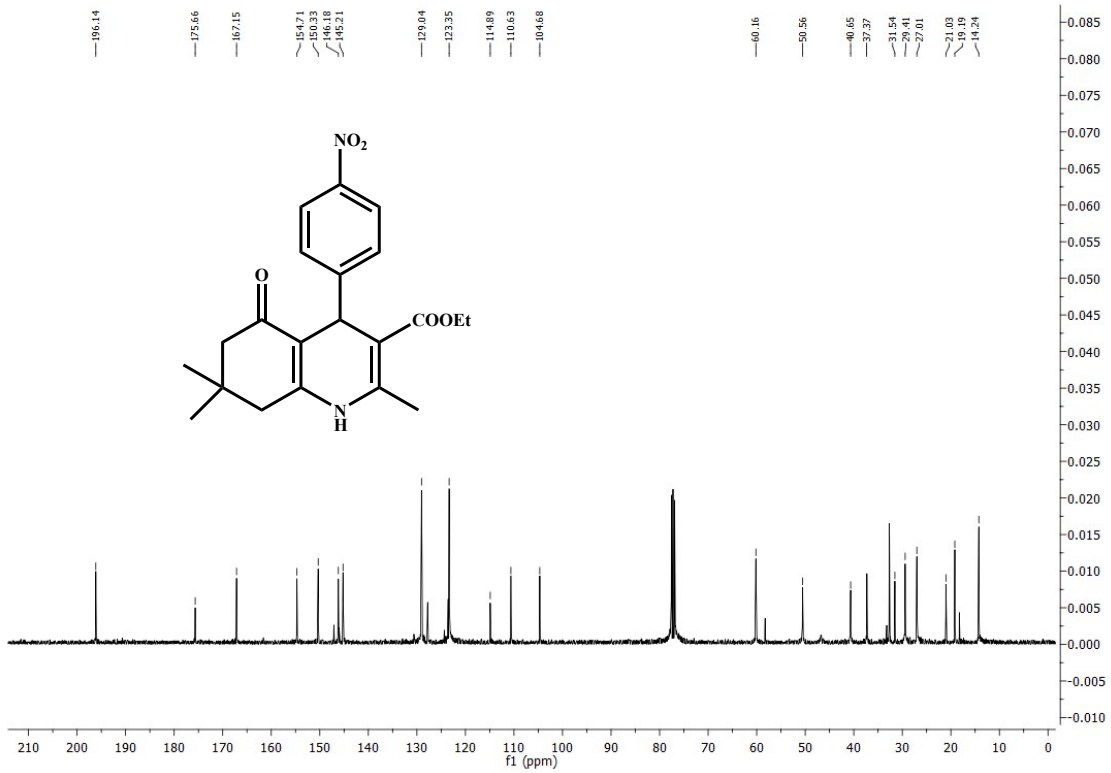

Figure 4 (b): ^{13}C NMR Spectra of Ethyl 4-(4-nitrophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

6. **Ethyl 4-(3-bromophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3 carboxylate**

^1H NMR ($CDCl_3$, 400 MHz): δ 7.38 (s, 1H), 7.19-7.25 (m, 2H), 7.05 (t, 1H, J= 7.6 Hz), 4.99 (s, 1H), 4.05 (q, 2H, J= 5.6 Hz), 2.18-2.33 (m, 7H), 1.19 (t, 3H, J= 7.2 Hz), 1.05 (s, 3H), 0.93 (s, 3H) ppm. . ^{13}C NMR ($CDCl_3$, 75 MHz): δ 195.83, 167.33, 149.44, 149.06, 144.20, 131.15, 129.55, 129.23, 127.01, 122.14, 111.49, 105.51, 60.05, 50.73, 40.94, 36.72, 32.81, 29.50, 27.23, 19.45, 14.29 ppm. HRMS (ES) Calcd: 417.0940. Found: 418.0944 $[M + H]^+$; 419.0939 $[MH+2]^+$.

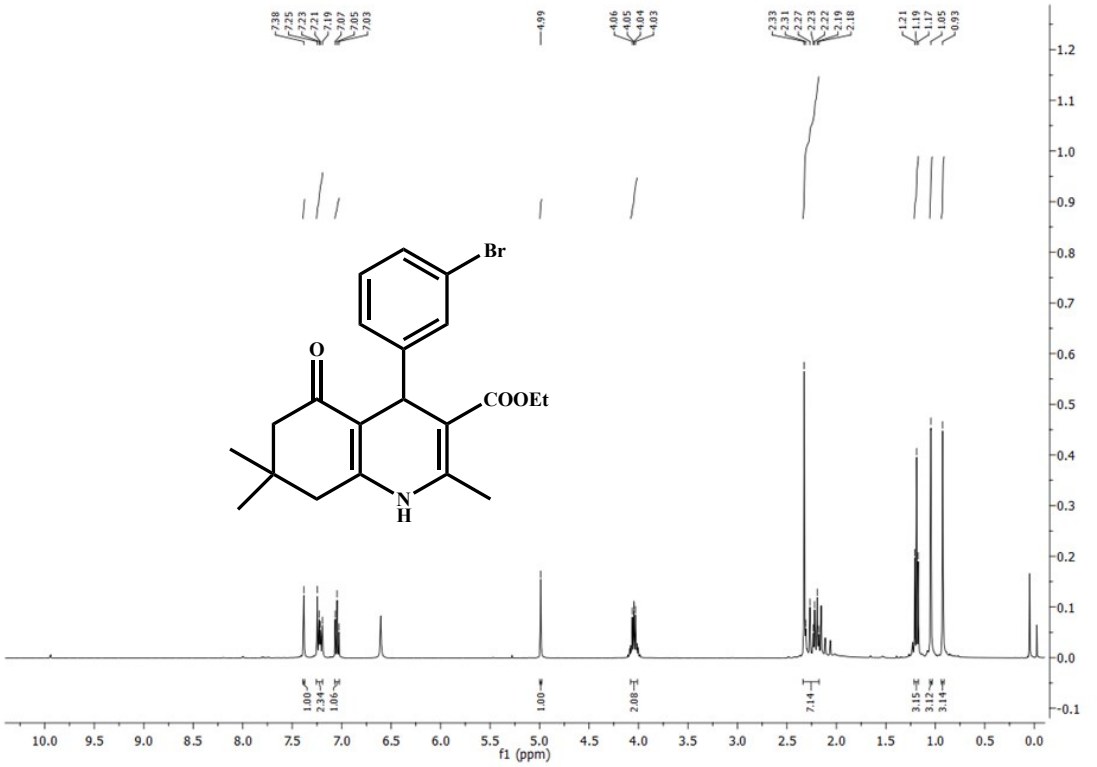

Figure 6 (a): ^{1}H NMR Spectra of Ethyl 4-(3-bromophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3 carboxylate.

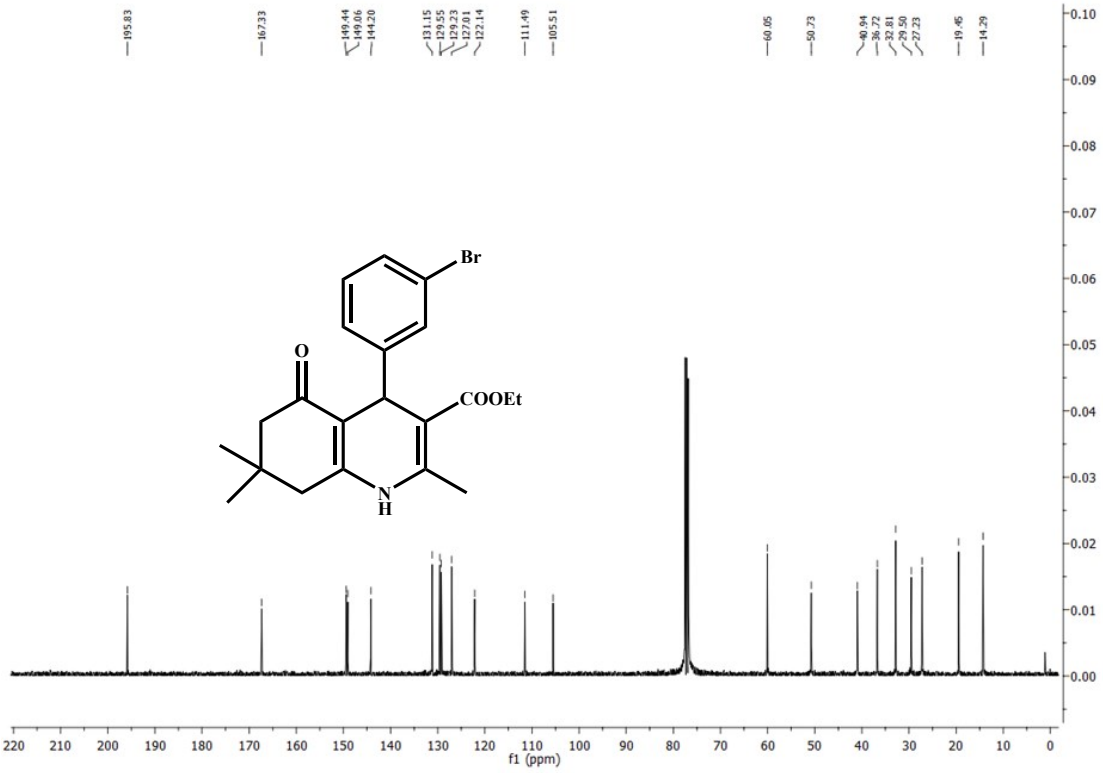

Figure 6 (b): ^{13}C NMR Spectra of Ethyl 4-(3-bromophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3 carboxylate.

7. **Ethyl 2,7,7-trimethyl-4-(3-nitrophenyl)-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate**

^{1}H NMR ($CDCl_3$, 400 MHz): δ 8.09 (s, 1H), 7.94 (d, 1H, J = 4Hz), 7.68 (d, 1H, J=3.8 Hz), 7.34 (t, 1H, J = 8 Hz), 5.11(s, 1H), 4.02 (q, 2H, J = 6.8 Hz), 2.20-2.32 (m, 7H), 1.16 (t, 3H, 7.2 Hz), 1.04 (s, 1H), 0.88 (s, 1H) ppm. ^{13}C NMR ($CDCl_3$, 75 MHz): δ 196.07, 167.15, 149.37, 148.24, 144.97, 134.86, 128.72, 122.96, 121.35, 111.04, 105.03, 60.18, 50.56, 40.78, 37.05, 32.79, 29.44, 27.09, 19.33, 14.25 ppm. HRMS (ES) Calcd: 384.1685 Found: 385.1689 $[M + H]^+$; 386.1692 $[MH+2]^+$.

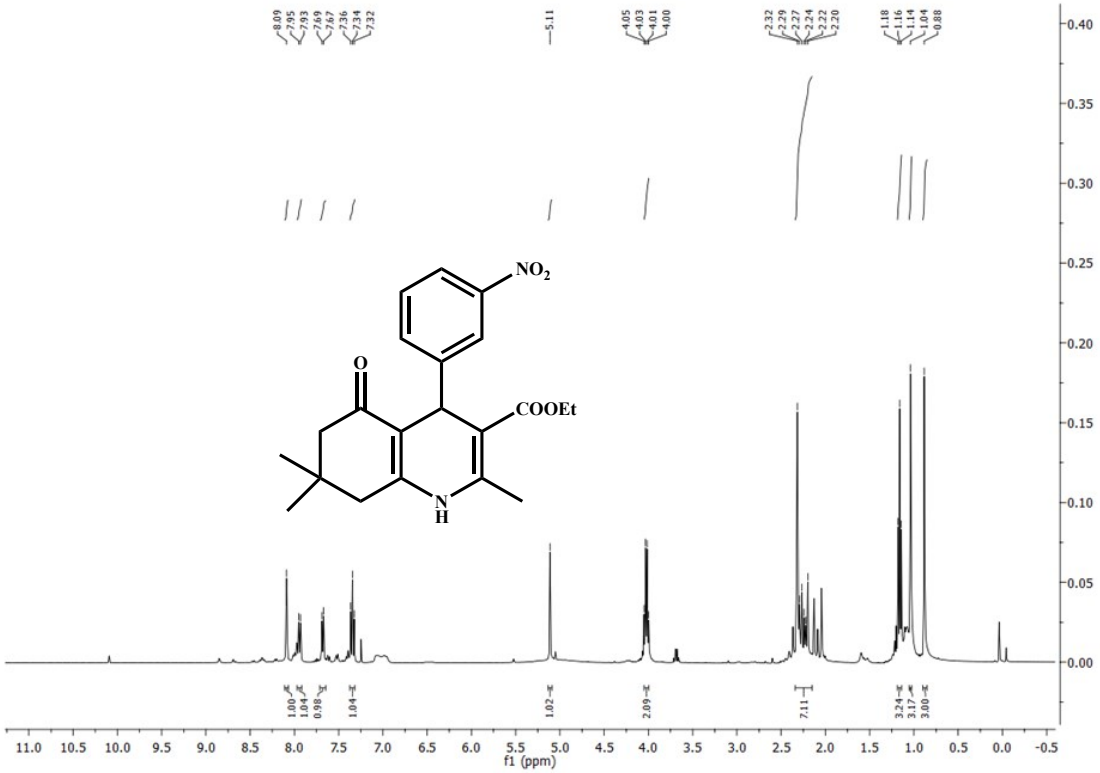

Figure 7 (a): ^{1}H NMR Spectra of Ethyl 2,7,7-trimethyl-4-(3-nitrophenyl)-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

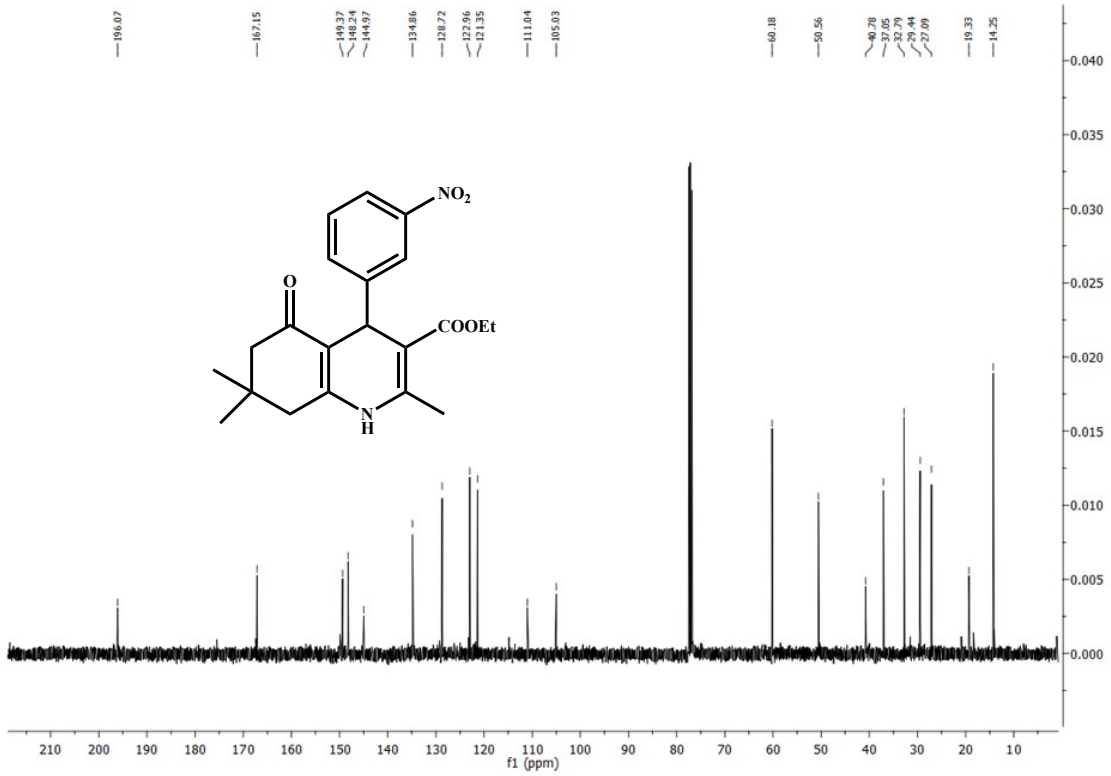

Figure 7 (b): ^{13}C NMR Spectra of Ethyl 2,7,7-trimethyl-4-(3-nitrophenyl)-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

8. **Ethyl 2,7,7-trimethyl-5-oxo-4-propyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.**

^{1}H NMR ($CDCl_3$, 400 MHz): 4.10 (q, 2H, J= 7.6 Hz), 3.94 (t, 1H, J = 4.4 Hz), 2.12-2.23 (m, 5H), 2.00 (s, 2H), 1.17-1.25 (m, 7H), 1.01 (s, 6H), 0.75 (t, 3H, J = 6.8 Hz) ppm. ^{13}C NMR: 195.41, 167.11, 149.35, 143.31, 110.13, 104.47, 58.70, 49.80, 40.00, 37.77, 31.51, 28.82, 28.67, 26.03, 20.09, 18.11, 17.28, 13.36 ppm**.** HRMS (ES) Calcd: 305.1991 Found: 306.1987 $[M + H]^+$; 307.1994 $[MH+2]^+$.

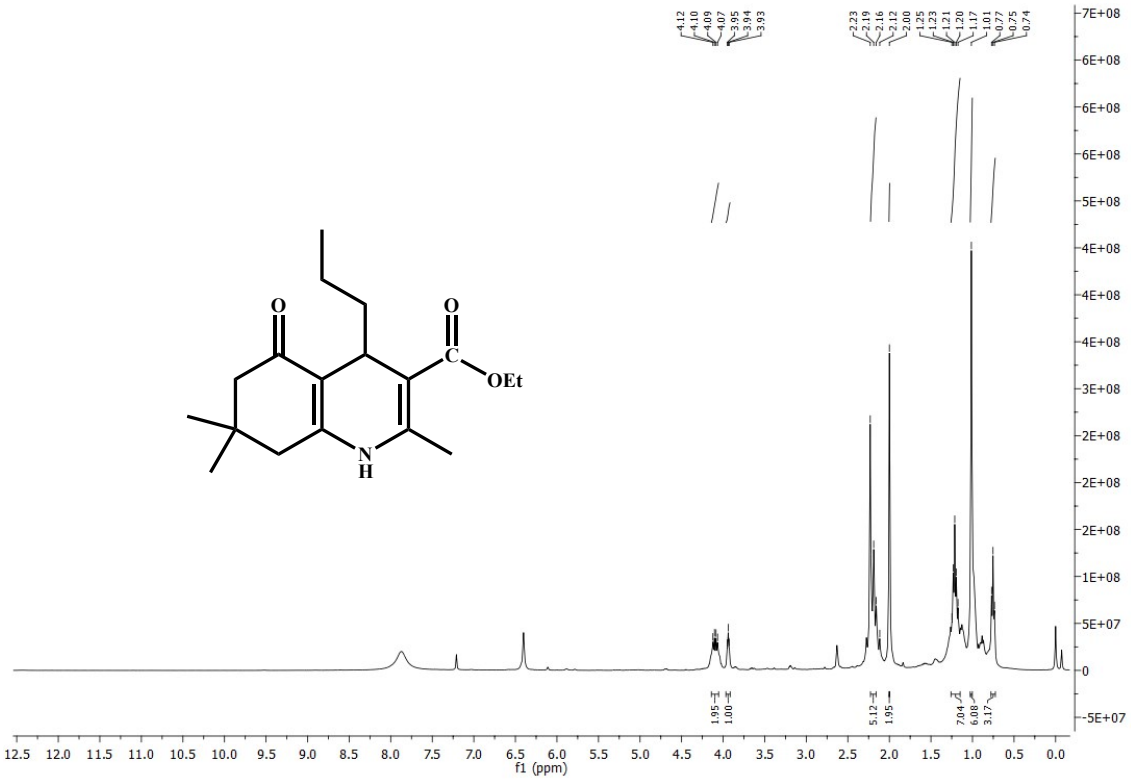

Figure 8 (a): ^{1}H NMR Spectra of ethyl 2,7,7-trimethyl-5-oxo-4-propyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate

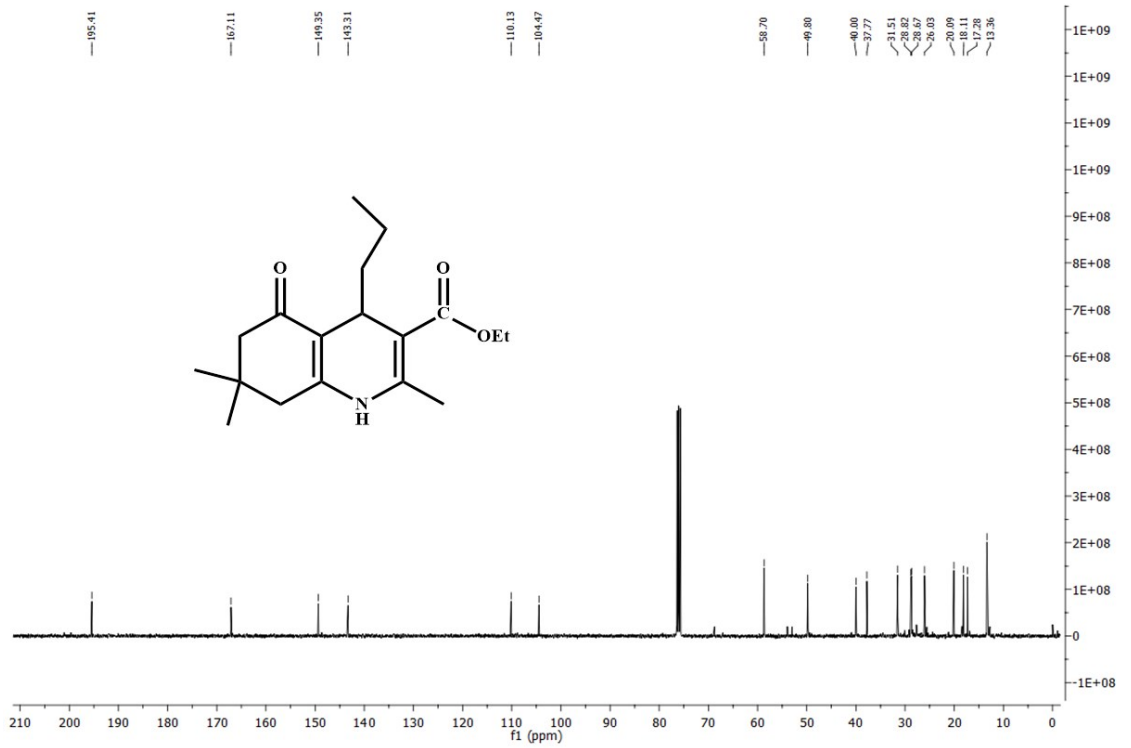

Figure 8 (b): ^{13}C NMR Spectra of ethyl 2,7,7-trimethyl-5-oxo-4-propyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

9. Ethyl 4-butyl-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

^{1}H NMR ($CDCl_3$, 400 MHz): 4.17 (q, 2H, J = 7.2 Hz), 4.01 (t, 1H, J= 5.2 Hz), 2.17-2.31 (m, 7H), 1.22-1.30 (m, 9H), 1.09 (s, 6H), 0.82 (t, 3H, J = 7.2 Hz) ppm. ^{13}C NMR ($CDCl_3$, 75 MHz): 195.93, 168.03, 149.35, 143.93, 111.43, 105.59, 59.68, 50.93, 41.23, 36.00, 32.57, 29.93, 29.73, 27.26, 27.06, 22.97, 19.31, 14.39, 14.19 ppm. HRMS (ES) Calcd: 319.2147 Found: 320.2152 $[M + H]^+$; 321.2149 $[MH+2]^+$.

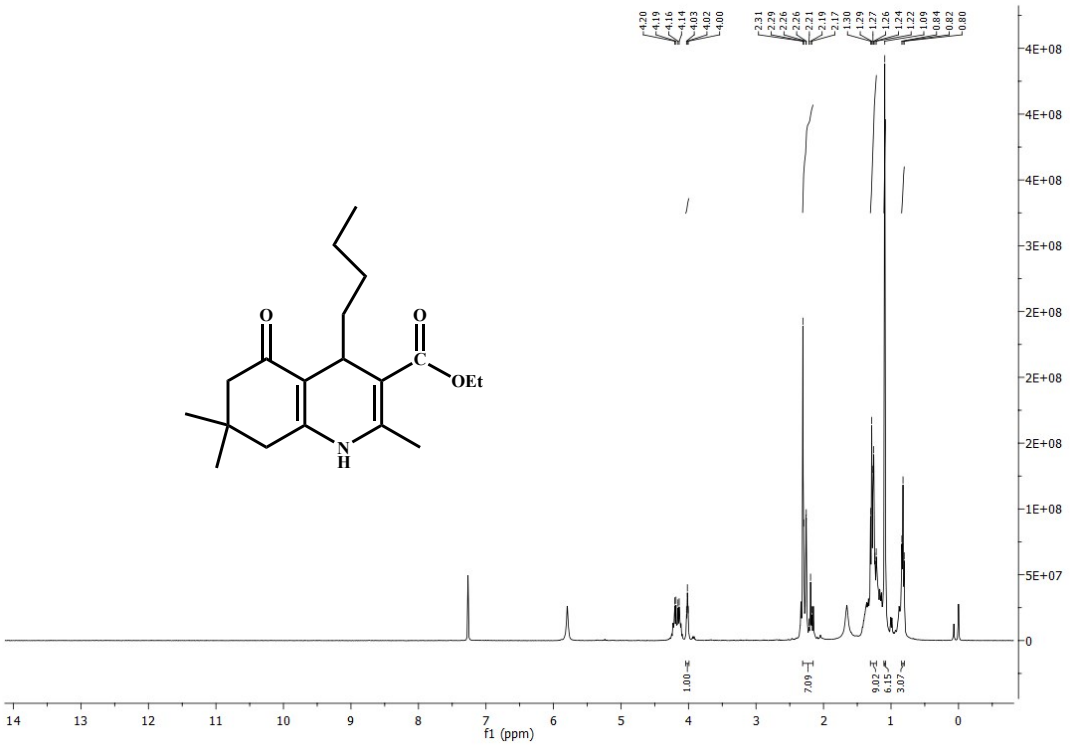

Figure 9 (a): ^{1} H NMR Spectra of ethyl 4-butyl-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.

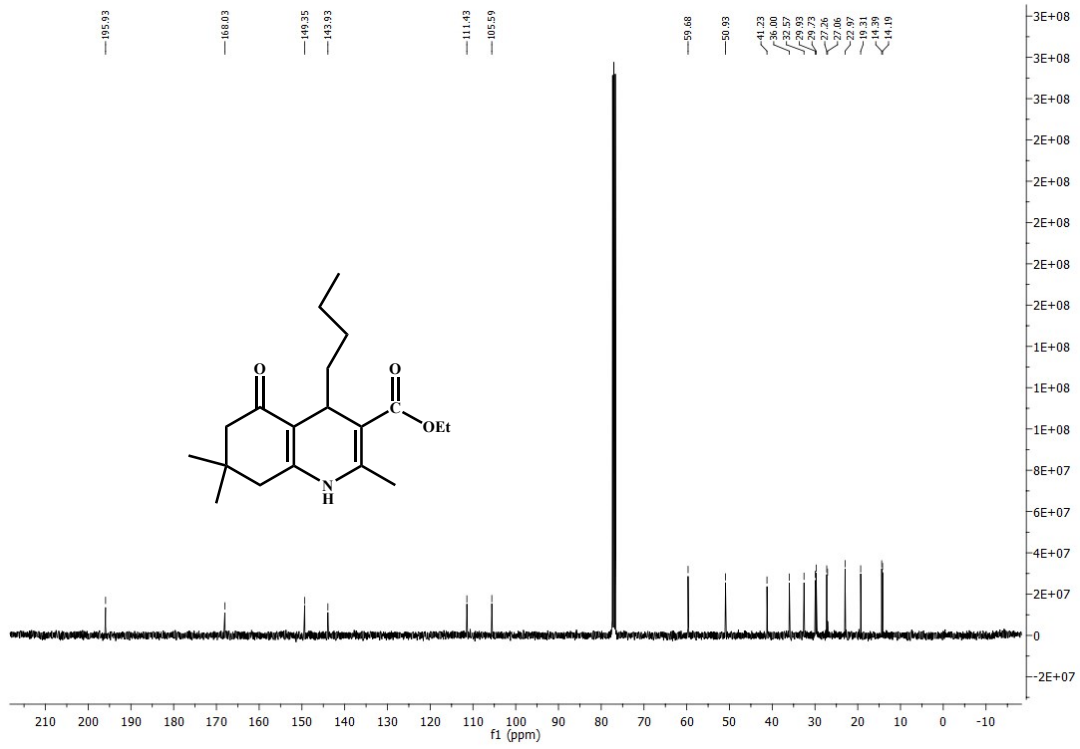

Figure 9 (b): ^{1}H NMR Spectra of ethyl 4-butyl-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate.