Synthesis of polysubstituted dihydropyrdines by four-component reactions of aromatic aldehydes, malononitrile, arylamines and acetylenedicarboxylate

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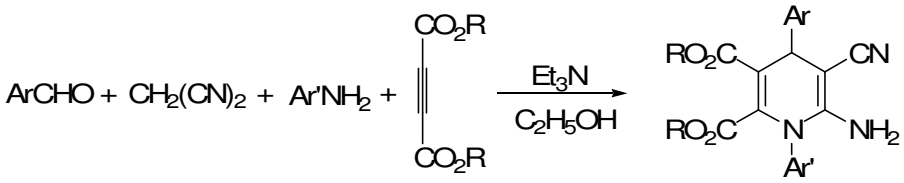
Supporting Information

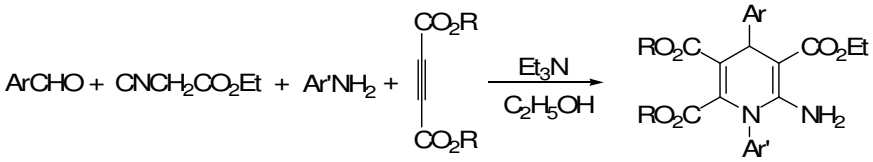
Crystallographic data (**1i:** CCDC 779704; **1r**: CCDC 779710; **1x**: CCDC 779711; **2l**: CCDC 779709; **2t**: CCDC 779707; **2v**: CCDC 781660; **3d**: CCDC 779706, **3g**: CCDC 779708; **3i**: CCDC 779705; **4e**: CCDC 781659) have been deposited vat the Cambridge Crystallographic Database Centre and is available on request from the Director, CCDC, 12 Union Road, Cambridge, CB2 1EZ, UK (Fax: +44-1223-336033; e-mail: deposit@ccdc.cam.ac.uk or www:http//www.ccdc.cam.ac.uk).

Table 1. The synthesis of polysubstituted dihydropyridines



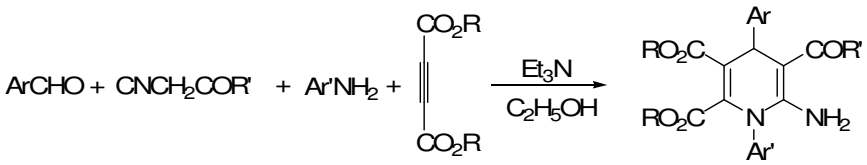
Entry	Compd	Ar	Ar'	R	Yield (%)
1	**1a**	C_6H_5	*p*-$CH_3C_6H_4$	Me	82
2	**1b**	*p*-$CH_3C_6H_4$	*p*-$CH_3C_6H_4$	Me	87
3	**1c**	*p*-$(CH_3)_2CHC_6H_4$	*p*-$CH_3C_6H_4$	Me	85
4	**1d**	*p*-$(CH_3)_3CC_6H_4$	*p*-$CH_3C_6H_4$	Me	84
5	**1e**	*p*-$CH_3OC_6H_4$	*p*-$CH_3C_6H_4$	Me	80
6	**1f**	*p*-FC_6H_4	*p*-$CH_3C_6H_4$	Me	88
7	**1g**	*m*-ClC_6H_4	*p*-$CH_3C_6H_4$	Me	95
8	**1h**	*p*-ClC_6H_4	*p*-$CH_3C_6H_4$	Me	95
9	**1i**	*p*-BrC_6H_4	*p*-$CH_3C_6H_4$	Me	94
10	**1j**	*m*-$NO_2C_6H_4$	*p*-$CH_3C_6H_4$	Me	96
11	**1k**	*p*-$CH_3OC_6H_4$	C_6H_5	Me	82
12	**1l**	*p*-ClC_6H_4	*m*-$CH_3C_6H_4$	Me	87
13	**1m**	C_6H_5	*p*-$CH_3OC_6H_4$	Me	88
14	**1n**	*p*-$CH_3C_6H_4$	*p*-$CH_3OC_6H_4$	Me	81
15	**1o**	*p*-ClC_6H_4	*p*-$CH_3OC_6H_4$	Me	87
16	**1p**	*p*-$CH_3OC_6H_4$	*o*-ClC_6H_4	Me	80
17	**1q**	*p*-ClC_6H_4	*m*-ClC_6H_4	Me	91
18	**1r**	*p*-ClC_6H_4	*p*-ClC_6H_4	Me	84
19	**1s**	*p*-$CH_3OC_6H_4$	*p*-$CH_3OC_6H_4$	Et	76
20	**1t**	*p*-$CH_3OC_6H_4$	*m*-ClC_6H_4	Et	85
21	**1u**	*p*-$CH_3OC_6H_4$	*p*-ClC_6H_4	Et	81
22	**1v**	*p*-ClC_6H_4	*o*-$CH_3C_6H_4$	Me	85
23	**1w**	*p*-$CH_3OC_6H_4$	*o*-$CH_3C_6H_4$	Et	80
24	**1x**	*p*-ClC_6H_4	*α*-Naph	Me	96

Table 2. The synthesis of polysubstituted dihydropyridines



Entry	Compd	Ar	Ar'	R	Yield (%)
1	**2a**	C_6H_5	*p*-ClC_6H_4	Me	86
2	**2b**	*p*-$CH_3C_6H_4$	*p*-ClC_6H_4	Me	82
3	**2c**	*p*-$(CH_3)_2CHC_6H_4$	*p*-ClC_6H_4	Me	87
4	**2d**	*p*-$(CH_3)_3CC_6H_4$	*p*-ClC_6H_4	Me	87
5	**2e**	*p*-$CH_3OC_6H_4$	*p*-ClC_6H_4	Me	86
6	**2f**	*p*-FC_6H_4	*p*-ClC_6H_4	Me	89
7	**2g**	*m*-ClC_6H_4	*p*-ClC_6H_4	Me	82
8	**2h**	*p*-ClC_6H_4	*p*-ClC_6H_4	Me	81
9	**2i**	*p*-BrC_6H_4	*p*-ClC_6H_4	Me	88
10	**2j**	*m*-$NO_2C_6H_4$	*p*-ClC_6H_4	Me	94
11	**2k**	*p*-ClC_6H_4	C_6H_5	Me	80
12	**2l**	*p*-ClC_6H_4	*m*-$CH_3C_6H_4$	Me	82
13	**2m**	*p*-$CH_3C_6H_4$	*p*-$CH_3C_6H_4$	Me	85
14	**2n**	*p*-ClC_6H_4	*p*-$CH_3OC_6H_4$	Me	87
15	**2o**	*p*-ClC_6H_4	*m*-ClC_6H_4	Me	84
16	**2p**	*p*-$(CH_3)_3CC_6H_4$	*p*-$CH_3OC_6H_4$	Et	78
17	**2q**	*p*-FC_6H_4	*p*-$CH_3OC_6H_4$	Et	79
18	**2r**	*m*-ClC_6H_4	*p*-$CH_3OC_6H_4$	Et	82
19	**2s**	*p*-ClC_6H_4	*p*-$CH_3OC_6H_4$	Et	75
20	**2t**	*p*-BrC_6H_4	*p*-$CH_3OC_6H_4$	Et	78
21	**2u**	*m*-$NO_2C_6H_4$	*p*-$CH_3OC_6H_4$	Et	92
22	**2v**	*p*-ClC_6H_4	α-Naph	Me	89

Table 3. The synthesis of dihydropyridines from reaction of pivaloylacetonitrile and cyanoacetamide



Entry	Compd	Ar	Ar'	R	R'	Yield (%)
1	**3a**	*p*-ClC_6H_4	*p*-ClC_6H_4	Me	$C(CH_3)_3$	80
2	**3b**	*p*-BrC_6H_4	*p*-ClC_6H_4	Me	$C(CH_3)_3$	82
3	**3c**	*p*-$(CH_3)_3CC_6H_4$	*p*-ClC_6H_4	Me	$C(CH_3)_3$	63
4	**3d**	*p*-FC_6H_4	*p*-ClC_6H_4	Me	$C(CH_3)_3$	80
5	**3e**	*p*-ClC_6H_4	*p*-$CH_3C_6H_4$	Et	$C(CH_3)_3$	73
6	**3f**	*p*-BrC_6H_4	*p*-$CH_3C_6H_4$	Et	$C(CH_3)_3$	75
7	**3g**	*m*-$NO_2C_6H_4$	*p*-$CH_3C_6H_4$	Et	$C(CH_3)_3$	65
8	**3h**	*p*-ClC_6H_4	*p*-ClC_6H_4	Et	$C(CH_3)_3$	78
9	**3i**	*p*-$CH_3C_6H_4$	*p*-$CH_3C_6H_4$	Me	NH_2	35
10	**3j**	*p*-ClC_6H_4	*p*-$CH_3C_6H_4$	Me	NH_2	46
11	**3k**	*p*-ClC_6H_4	*p*-$CH_3OC_6H_4$	Me	NH_2	51
12	**3l**	*p*-ClC_6H_4	*m*-$CH_3C_6H_4$	Me	NH_2	33
13	**3m**	*p*-ClC_6H_4	*m*-ClC_6H_4	Me	NH_2	38
14	**3n**	*p*-ClC_6H_4	*p*-ClC_6H_4	Me	NH_2	42
15	**3o**	*m*-$NO_2C_6H_4$	*p*-ClC_6H_4	Me	NH_2	45
16	**3p**	*p*-$CH_3C_6H_4$	*p*-BrC_6H_4	Me	NH_2	36

Scheme 1 The formation mechanism of polysubstituted duidropyridines

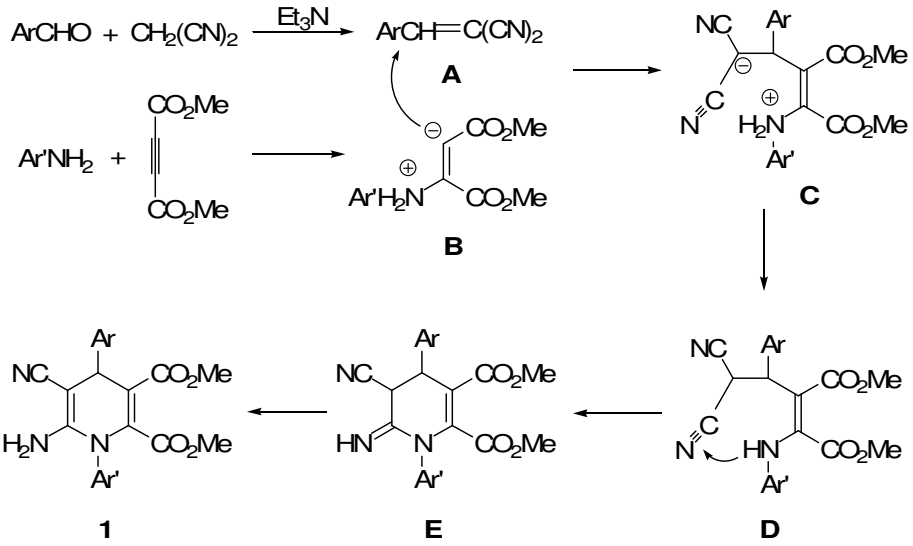
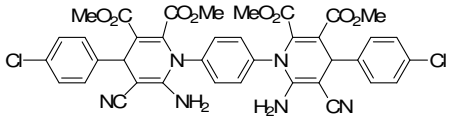
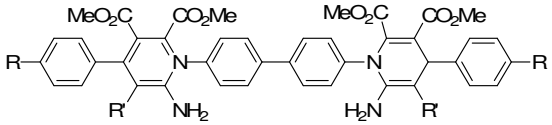


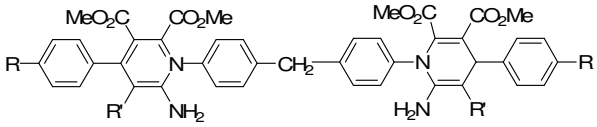
Figure 2 The synthesis of bis(dihydropyridines)



4a (82%)



4b: R = Cl, R' = CN (80%); **4c**: R = Cl, R' = CO_2Et (78%)



4d: R = Cl, R' = CN (84%); **4e**: R = CH_3, R' = CN (82%);

4f: R = Cl, R' = CO_2Et (75%)

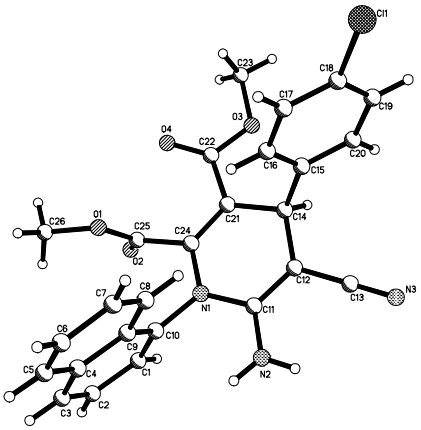


Figure 1 Molecular structure of dihydropyridine **1x**

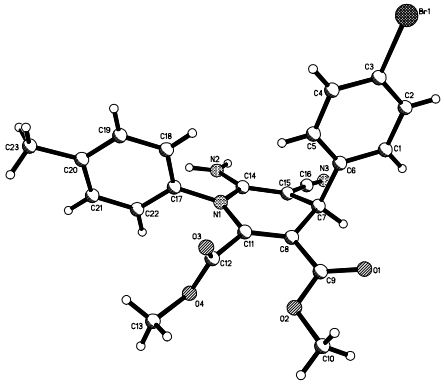


Figure s1 Molecular structure of dihydropyridine **1i**

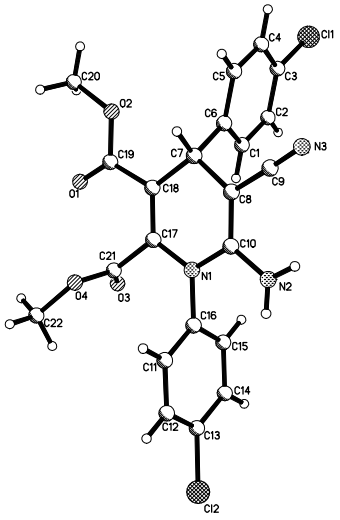


Figure s2 Molecular structure of dihydropyridine **1r**

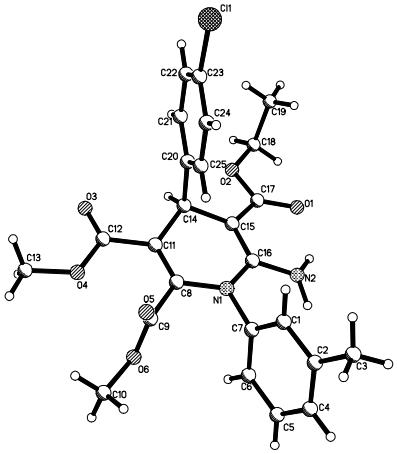


Figure s3 Molecular structure of dihydropyridine **2l**

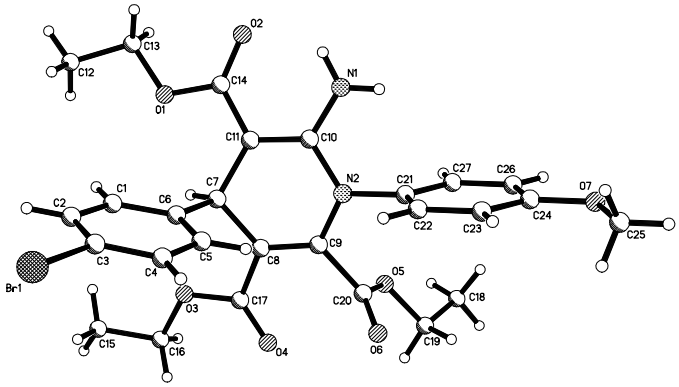


Figure s4 Molecular structure of dihydropyridine **2t**

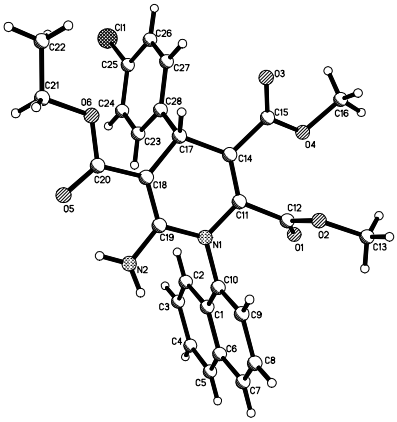


Figure s5 Molecular structure of dihydropyridine **2v**

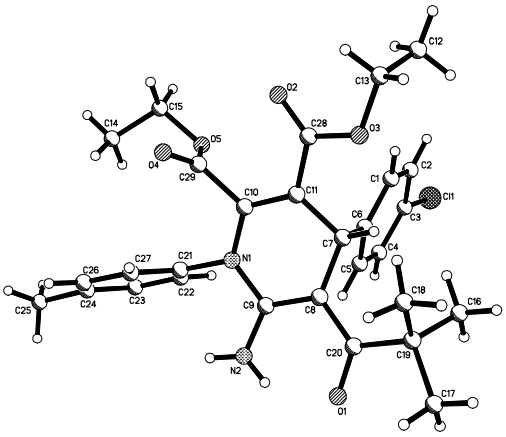


Figure s6 Molecular structure of dihydropyridine **3e**

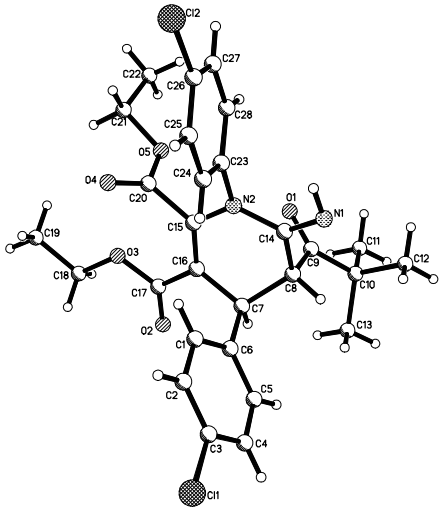


Figure s7 Molecular structure of dihydropyridine **3h**

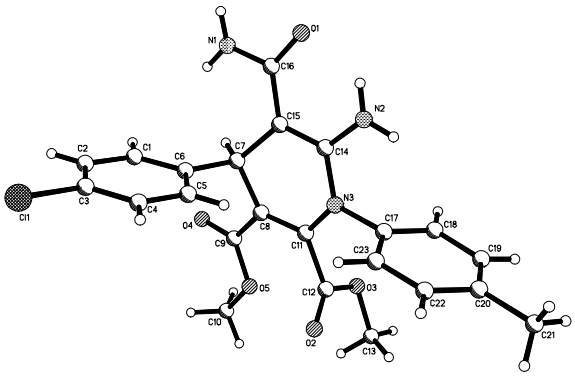


Figure s8 Molecular structure of dihydropyridine **3j**

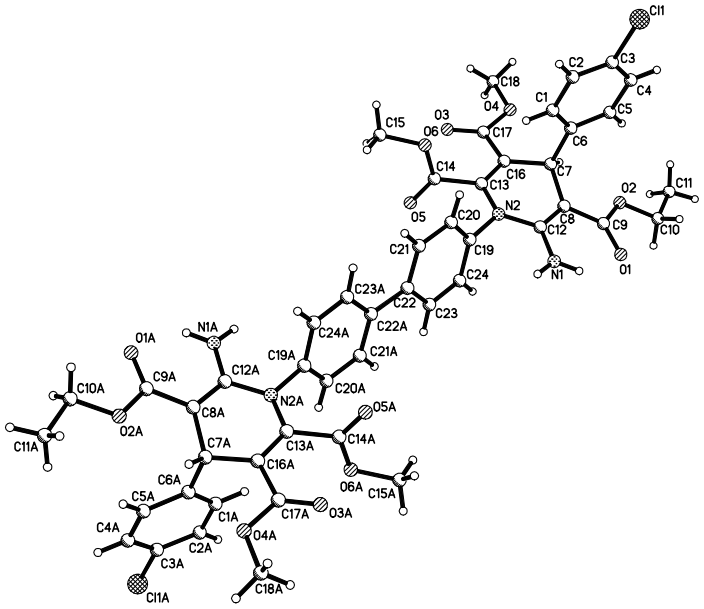
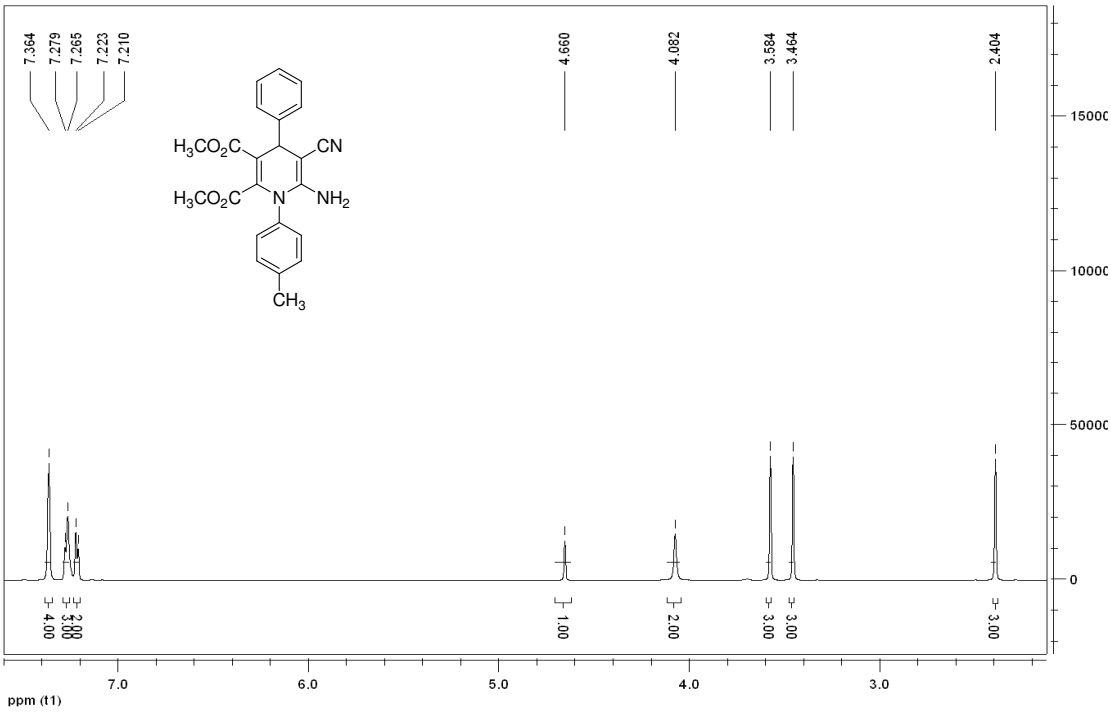
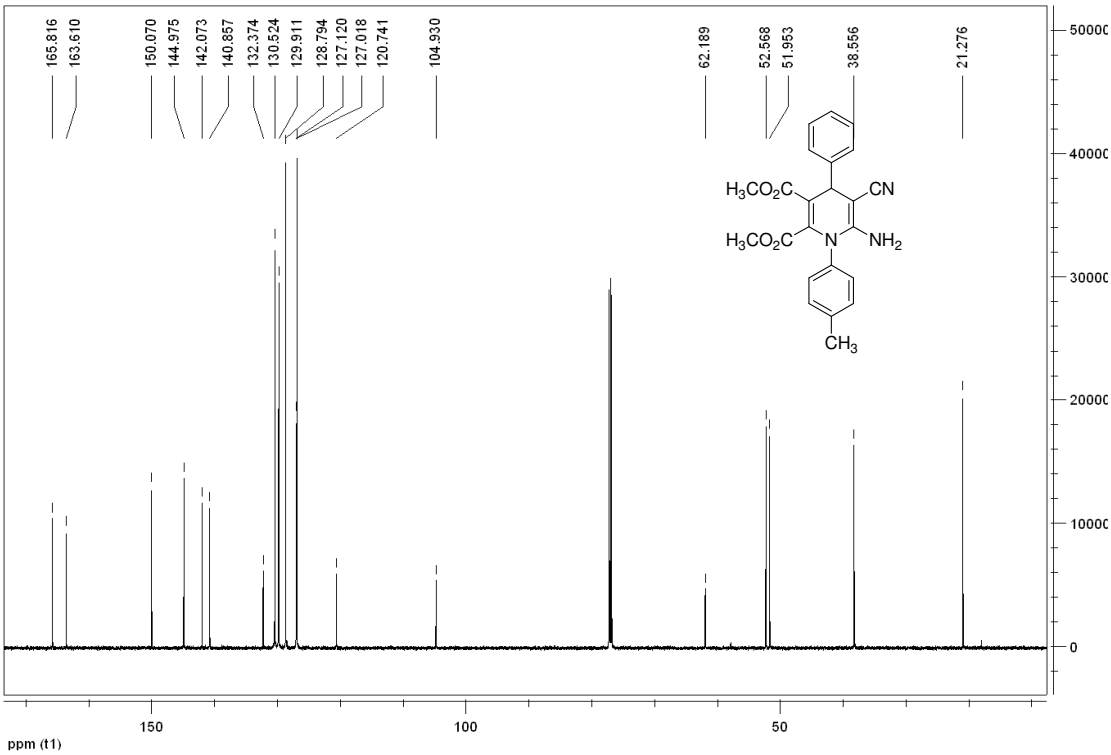


Figure s9 Molecular structure of dihydropyridine **4e**

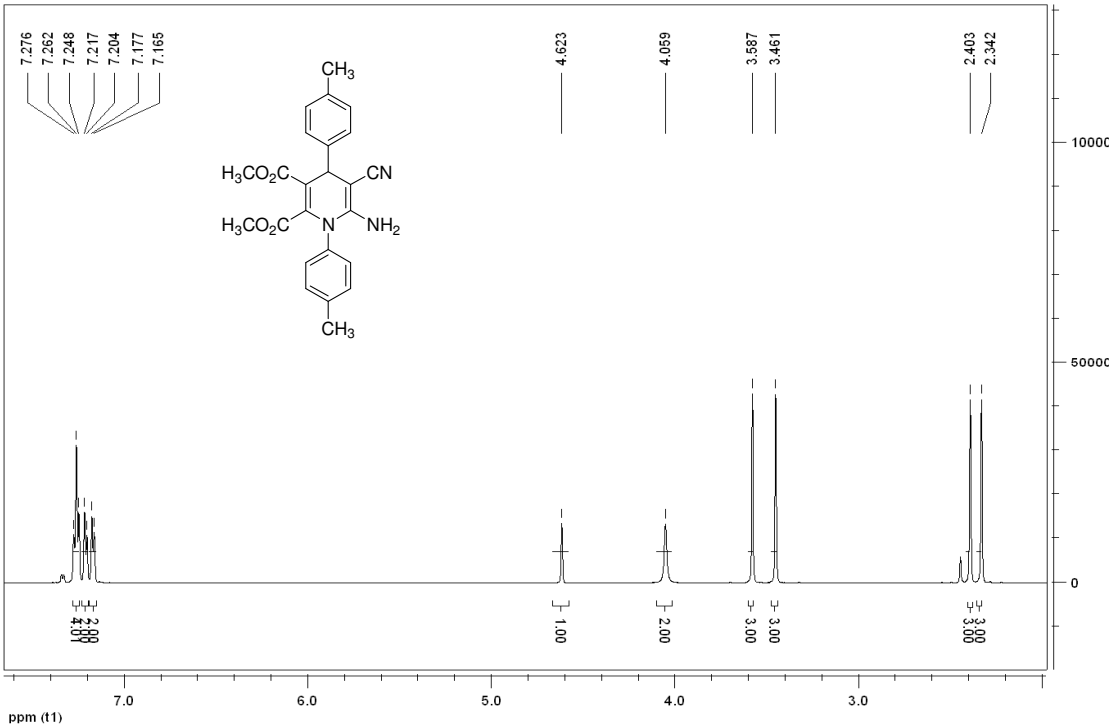
General procedure for the four component reaction of aromatic aldehydes, malononitrile, arylamine and dimethyl acetylenedicarboxylate: In a round bottom flask a mixture of aromatic aldehyde (2.0mmol), malononitrile (2.0 mmol, 0.144g) and trietylamine (2.0mmol, 0.202g) in 10 mL ethanol was stirred at room for ten minutes. Then a solution of arylamine (2.0 mmol) and dimethyl acetylenedicarboxylate (2.0mmol, 0.284g) in 5.0mL ethanol was added to it. The whole solution was stirred at room temperature for additional about ten hours. In most cases the resulting precipitates were collected by filtration and washed with cold alcohol to give the pure product for analysis. In fewer cases the solution was concentrated to half volume by evaporation to give the precipitates as products.

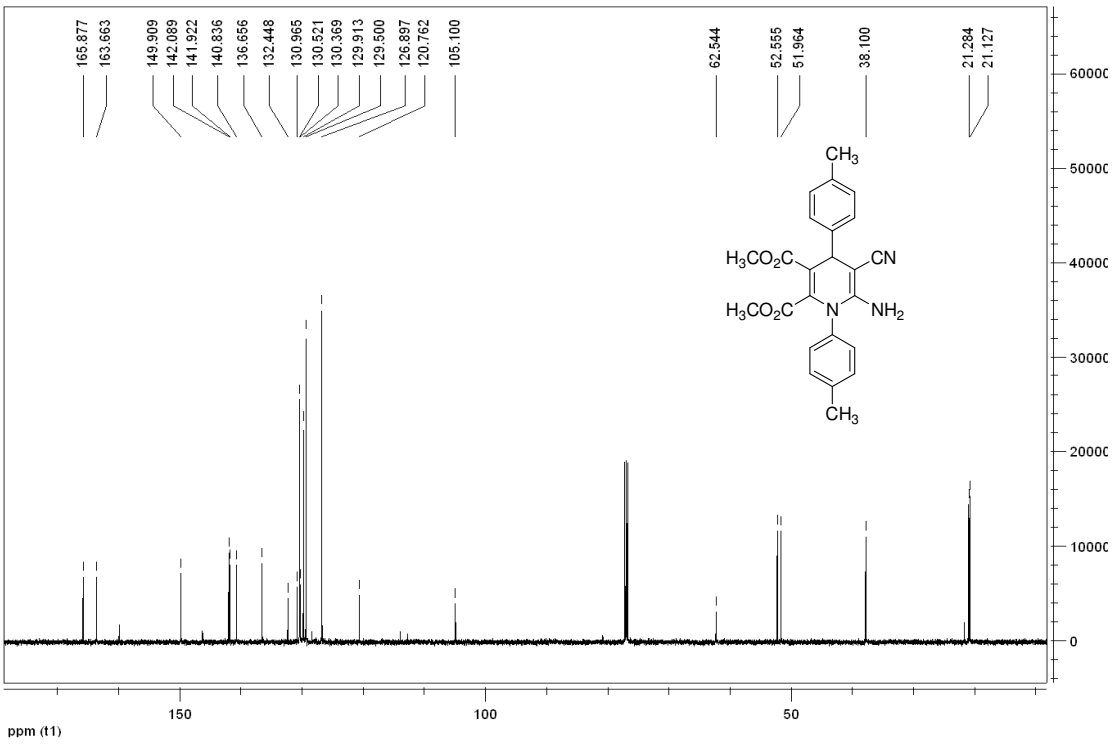
1a: yellow solid, 82%, m.p.164~165°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.36 (s, 4H, ArH), 7.28 (d, *J* = 8.4Hz, 3H, ArH), 7.22 (d, *J* = 7.8Hz, 2H, ArH), 4.66 (s, 1H, CH), 4.08 (s, 2H, NH_2), 3.58 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.40 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.8, 163.6, 150.1, 145.0, 142.1, 140.9, 132.4, 130.5, 129.9, 128.8, 127.1, 127.0, 120.7, 104.9, 62.2, 52.6, 52.0, 38.6, 21.3; IR (KBr) υ: 3459, 3405, 3327, 3231, 3025, 2950, 2184, 1749, 1710, 1653, 1574, 1510, 1419, 1357, 1325, 1298, 1224, 1115, 1053, 973, 933, 860, 826, 788, 760 cm^{-1}; MS (*m/z*): 404.31 ($[M+1]^+$) 100%. Anal Calcd for $C_{23}H_{21}N_3O_4$: C 68.47, H 5.25, N 10.42; Found: C 68.64, H 5.67, N 10.29.



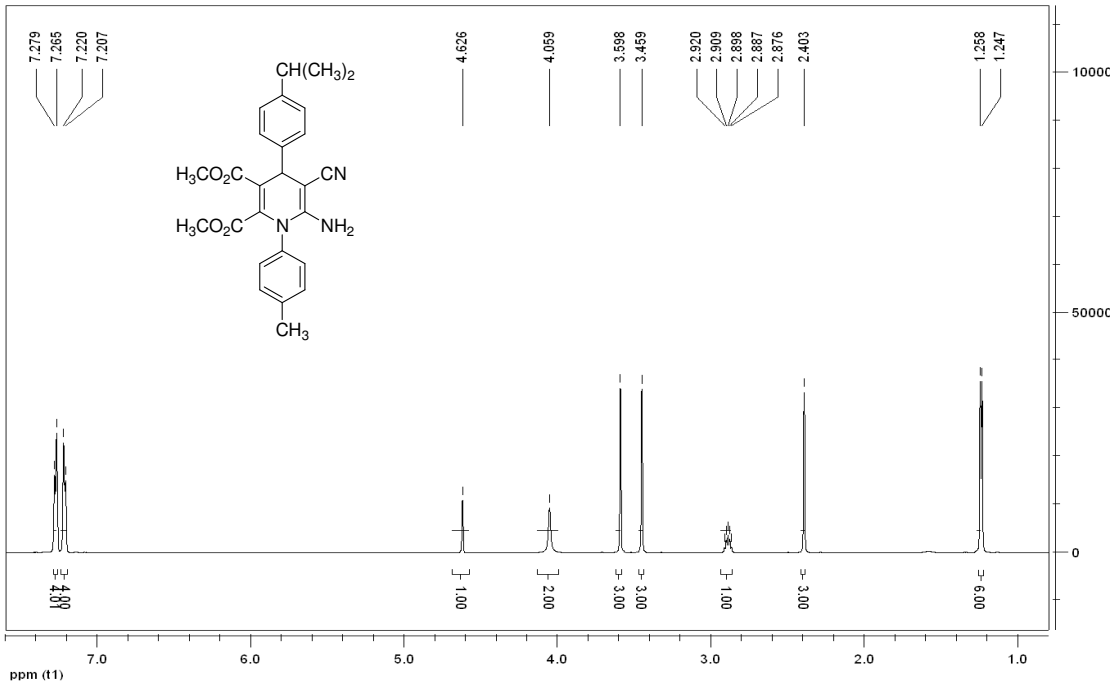


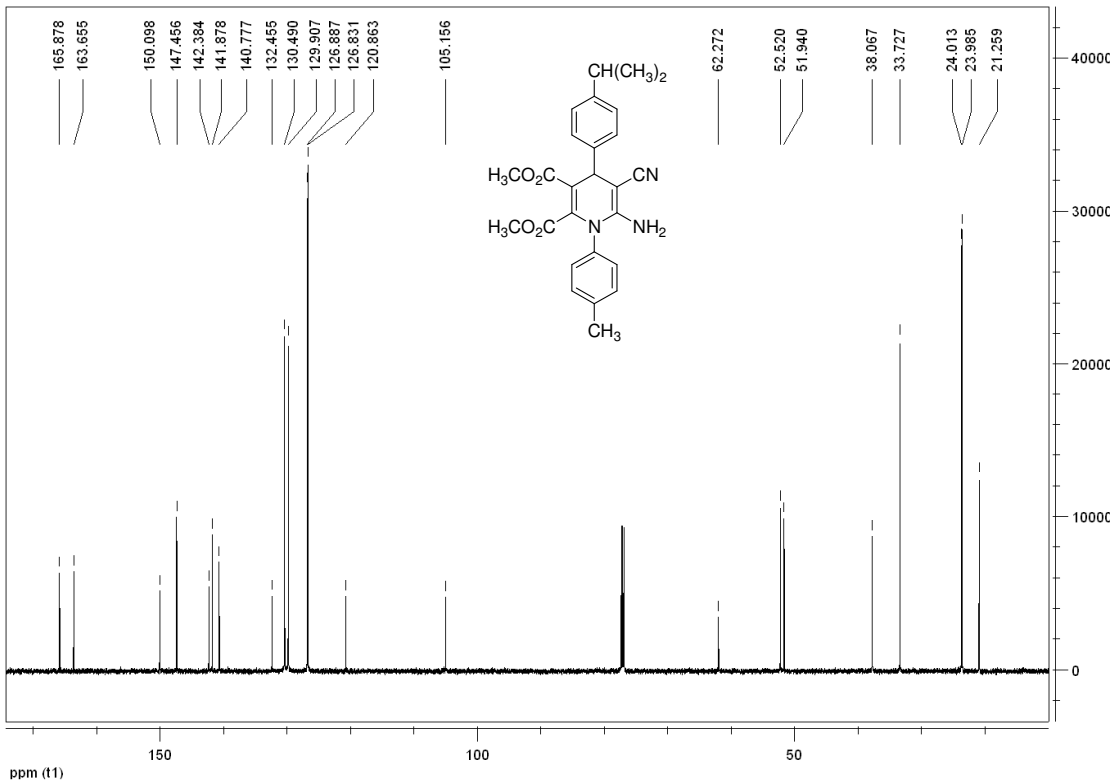
1b: light yellow solid, 87%, m.p.186~187°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.26 (t, *J* = 8.4Hz, 4H, ArH), 7.21 (d, *J* = 7.8Hz, 2H, ArH), 7.17 (d, *J* = 7.2Hz, 2H, ArH), 4.62 (s, 1H, CH), 4.06 (s, 2H, NH_2), 3.59 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.40 (s, 3H, CH_3), 2.34 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.9, 163.7, 149.9, 142.1, 141.9, 140.8, 136.7, 132.4, 131.0, 130.5, 130.4, 129.9, 129.5, 126.9, 120.8, 105.1, 62.5, 52.6, 52.0, 38.1, 21.3, 21.1; IR (KBr) υ: 3427, 3320, 3229, 3033, 2953, 2189, 1740, 1707, 1653, 1577, 1509, 1425, 1357, 1328, 1231, 1115, 1052, 974, 935, 867, 809, 787 cm^{-1}; MS (*m/z*): 418.30 ($[M+1]^+$) 100%. Anal Calcd for $C_{24}H_{23}N_3O_4$: C 69.05, H 5.55, N 10.07; Found: C 68.83, H 5.81, N 9.70.



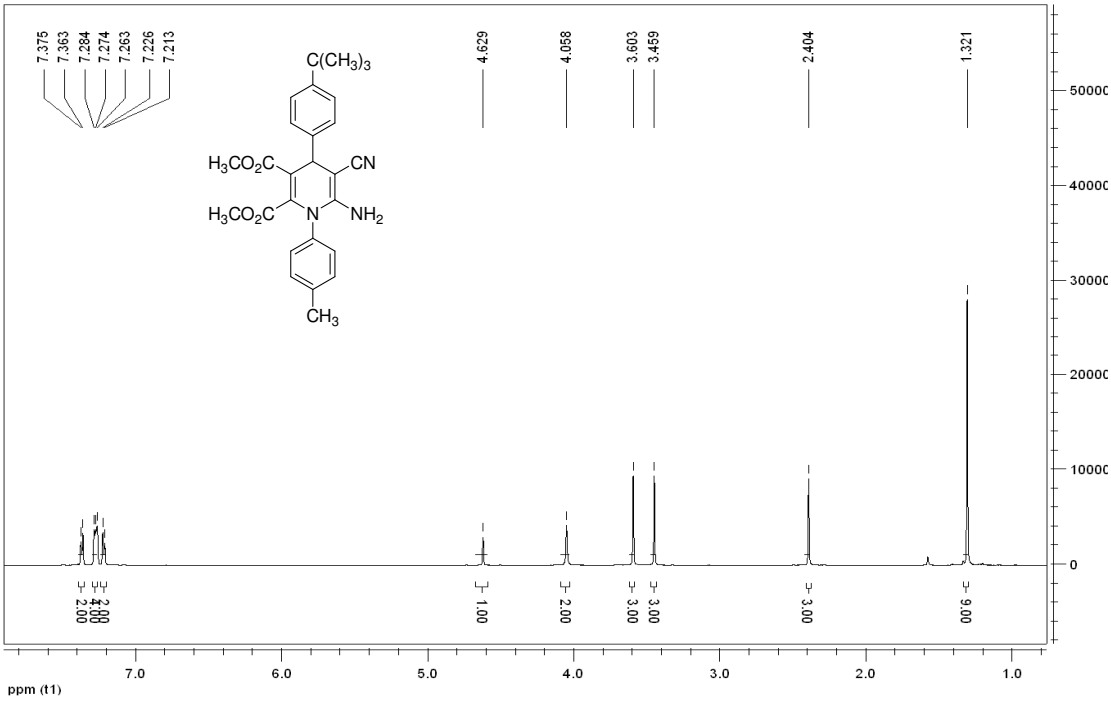


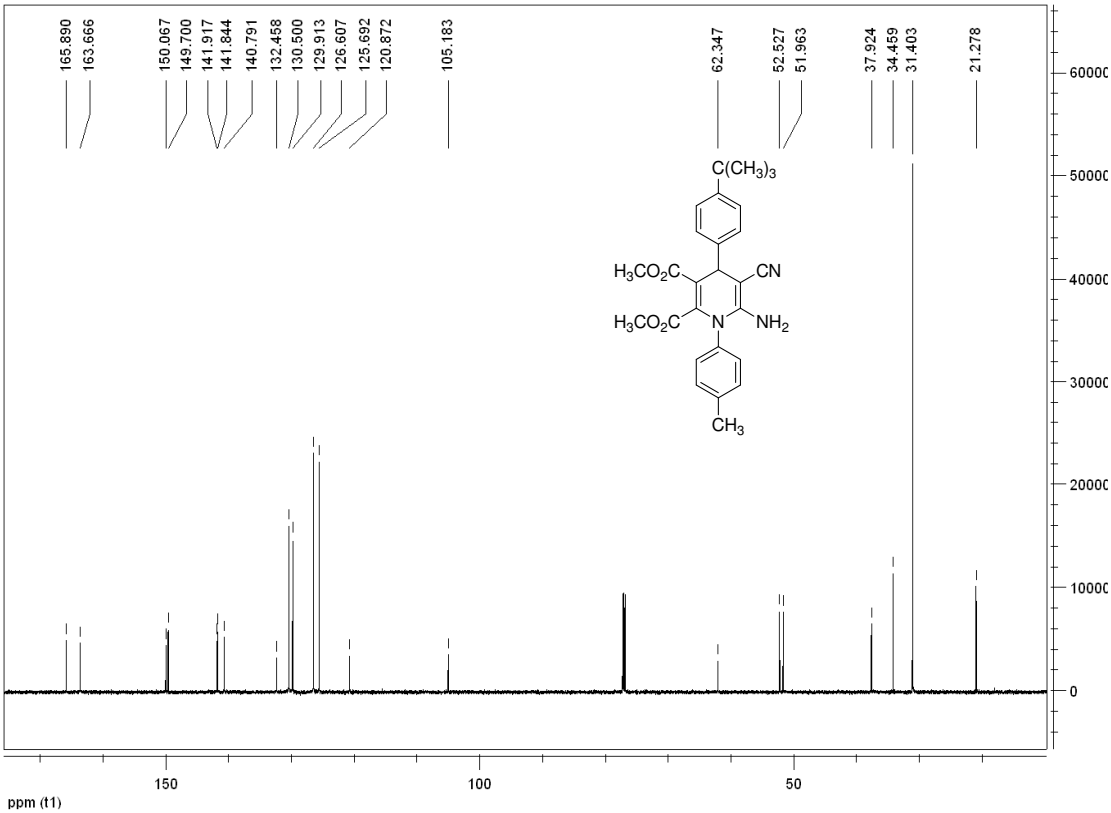
1c: light yellow solid, 85%, m.p.156~157°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.27 (d, *J* = 8.4Hz, 4H, ArH), 7.21 (d, *J* = 7.8Hz, 4H, ArH), 4.63 (s, 1H, CH), 4.06 (s, 2H, NH_2), 3.60 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.92~2.88 (m, 1H, CH), 2.40 (s, 3H, CH_3), 1.25 (d, *J* = 6.6Hz, 6H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.9, 163.7, 150.1, 147.5, 142.4, 141.9, 140.8, 132.5, 130.5, 129.9, 126.9, 126.8, 120.9, 105.2, 62.3, 52.5, 51.9, 38.1, 33.7, 24.0, 23.9, 21.3; IR (KBr) υ: 3468, 3318, 3221, 2957, 2182, 1747, 1708, 1654, 1577, 1510, 1414, 1358, 1326, 1250, 1219, 1154, 1113, 1055, 1024, 974, 931, 866, 813, 784, 767 cm^{-1}; MS (*m/z*): 446.31 ($[M+1]^+$) 100%. Anal Calcd for $C_{26}H_{27}N_3O_4$: C 70.09, H 6.11, N 9.43; Found: C 69.76, H 6.33, N 9.75.



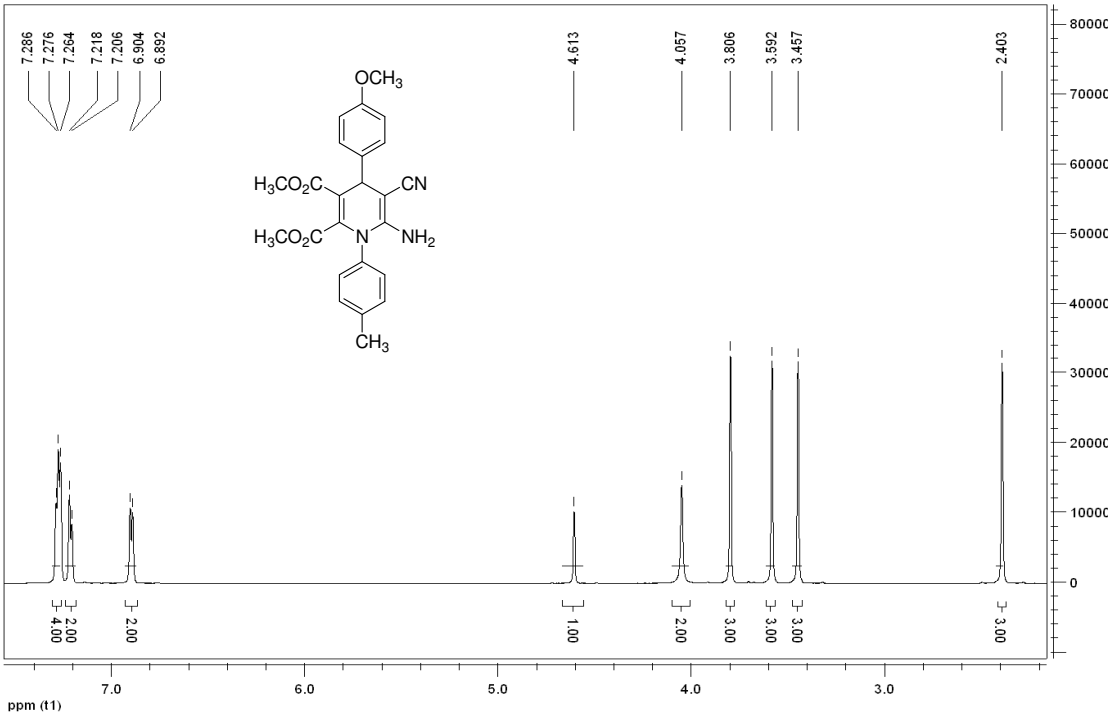


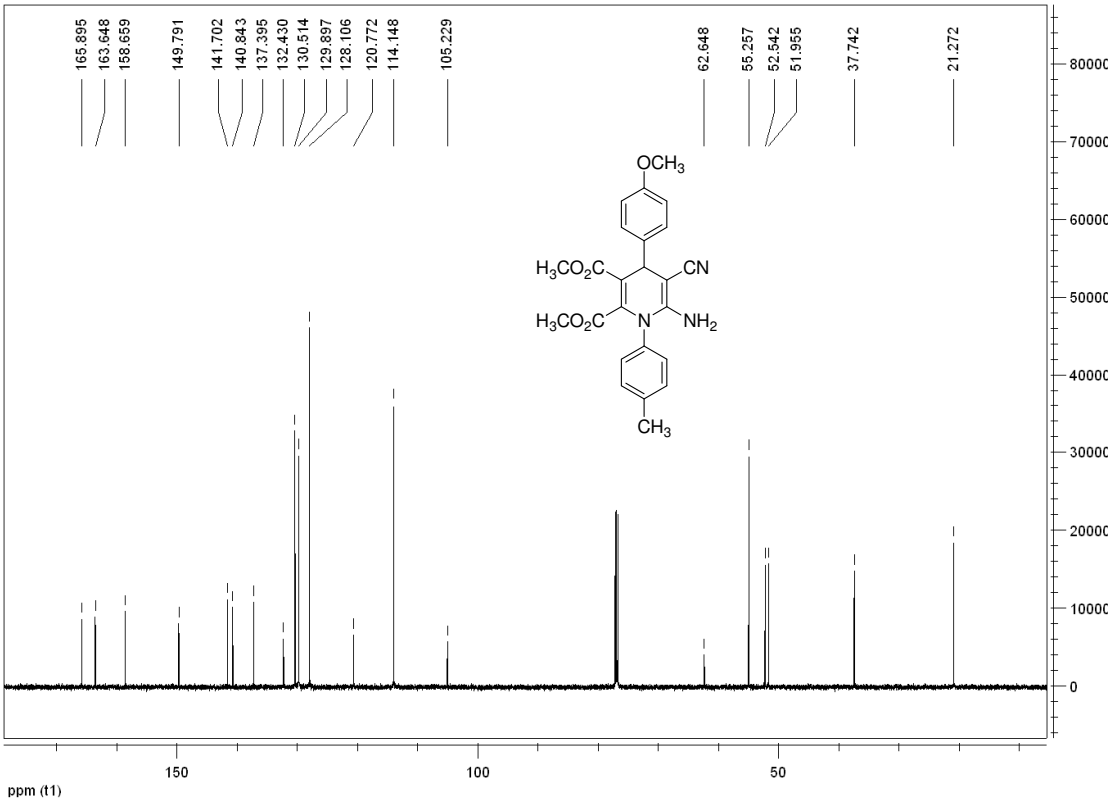
1d: light yellow solid, 84%, m.p.193~194°C;^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.37 (d, *J* = 7.2Hz, 2H, ArH), 7.28~7.26 (m, 4H, ArH), 7.22 (d, *J* = 7.8Hz, 2H, ArH), 4.63 (s, 1H, CH), 4.06 (s, 2H, NH_2), 3.60 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.40 (s, 3H, CH_3), 1.32 (s, 9H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.9, 163.7, 150.1, 149.7, 141.9, 141.8, 140.8, 132.5, 130.5, 129.9, 126.6, 125.7, 120.9, 105.2, 62.3, 52.5, 52.0, 37.9, 34.5, 31.4, 21.3; IR (KBr) υ: 3479, 3456, 3383, 3331, 3220, 2956, 2869, 2179, 1747, 1708, 1653, 1573, 1509, 1417, 1352, 1326, 1301, 1248, 1217, 1155, 1109, 1024, 972, 931, 867, 846, 816, 783, 764 cm^{-1}; MS (*m/z*): 460.32 ($[M+1]^+$) 100%. Anal Calcd for $C_{27}H_{29}N_3O_4$: C 70.57, H 6.36, N 9.14; Found: C 70.18, H 6.63, N 8.95.



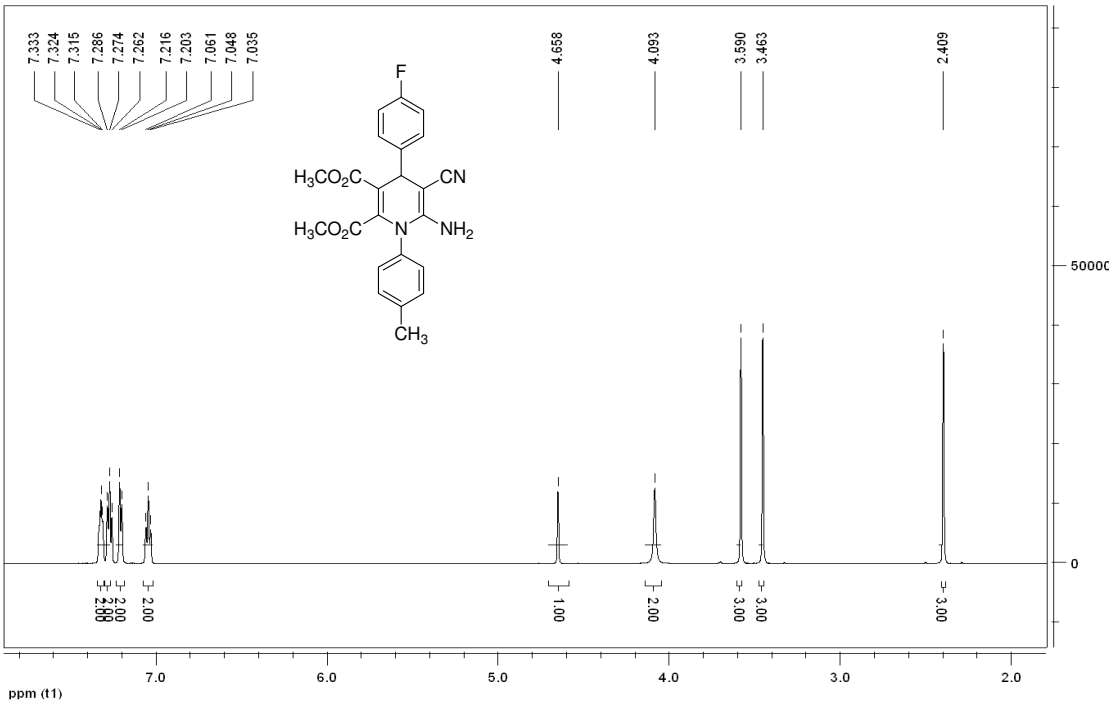


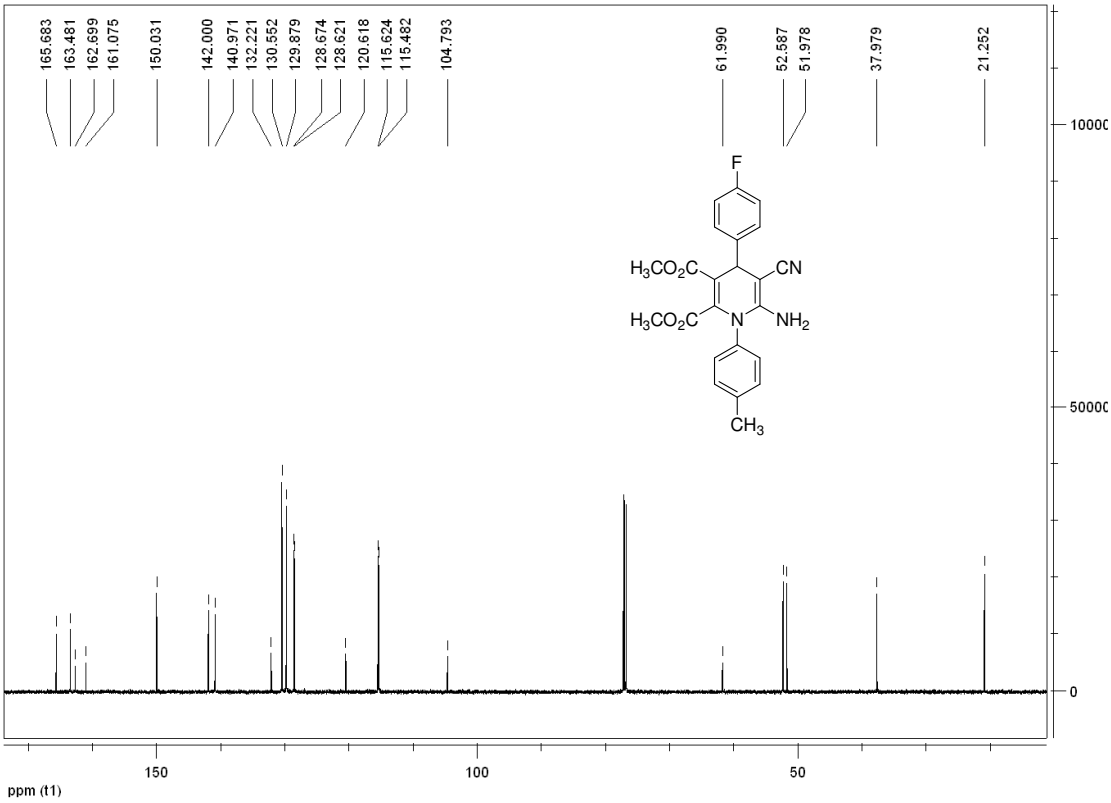
1e: white solid, 80%, m.p.168~169°C;^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.29~7.26 (m, 4H, ArH), 7.21 (d, *J* = 7.2Hz, 2H, ArH), 6.90 (d, *J* = 7.2Hz, 2H, ArH), 4.61 (s, 1H, CH), 4.06 (s, 2H, NH_2), 3.81 (s, 3H, OCH_3), 3.59 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.40 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.9, 163.6, 158.7, 149.8, 141.7, 140.8, 137.4, 132.4, 130.5, 129.9, 128.1, 120.8, 114.1, 105.2, 62.6, 55.3, 52.5, 52.0, 37.7, 21.3; IR (KBr) υ: 3472, 3336, 3003, 2951, 2182, 1749, 1712, 1651, 1610, 1573, 1509, 1413, 1354, 1331, 1300, 1228, 1175, 1114, 1034, 980, 932, 865, 819, 774 cm^{-1}; MS (*m/z*): 434.34 ($[M+1]^+$) 100%. Anal Calcd for $C_{24}H_{23}N_3O_5$: C 66.50, H 5.35, N 9.69; Found: C 66.47, H 5.72, N 9.33.



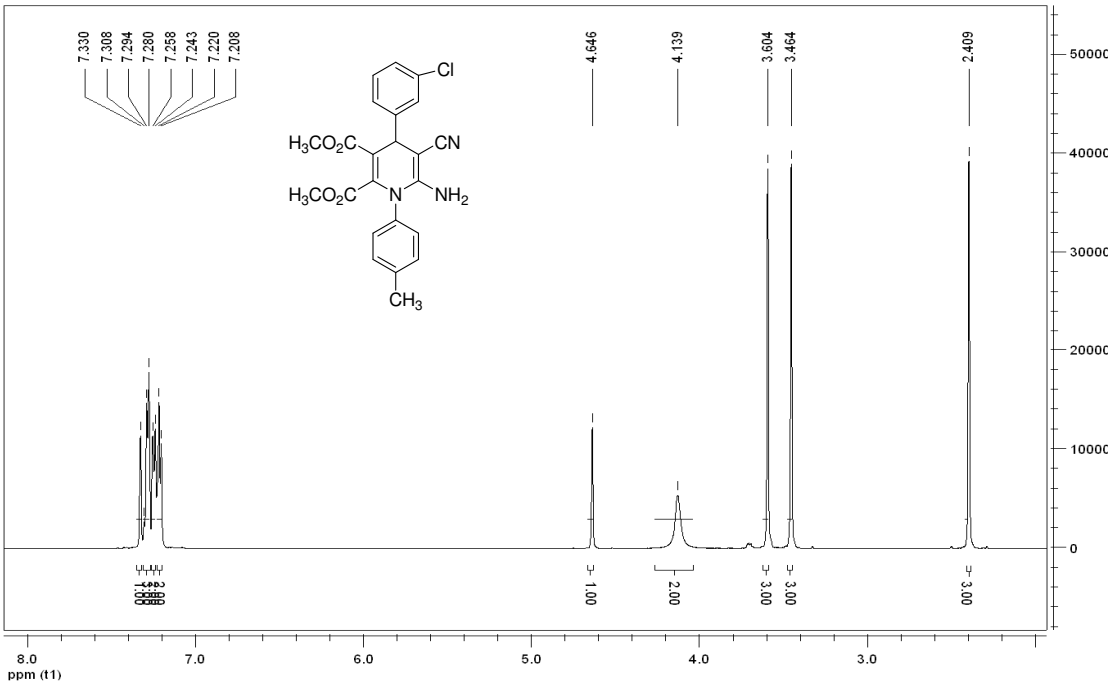


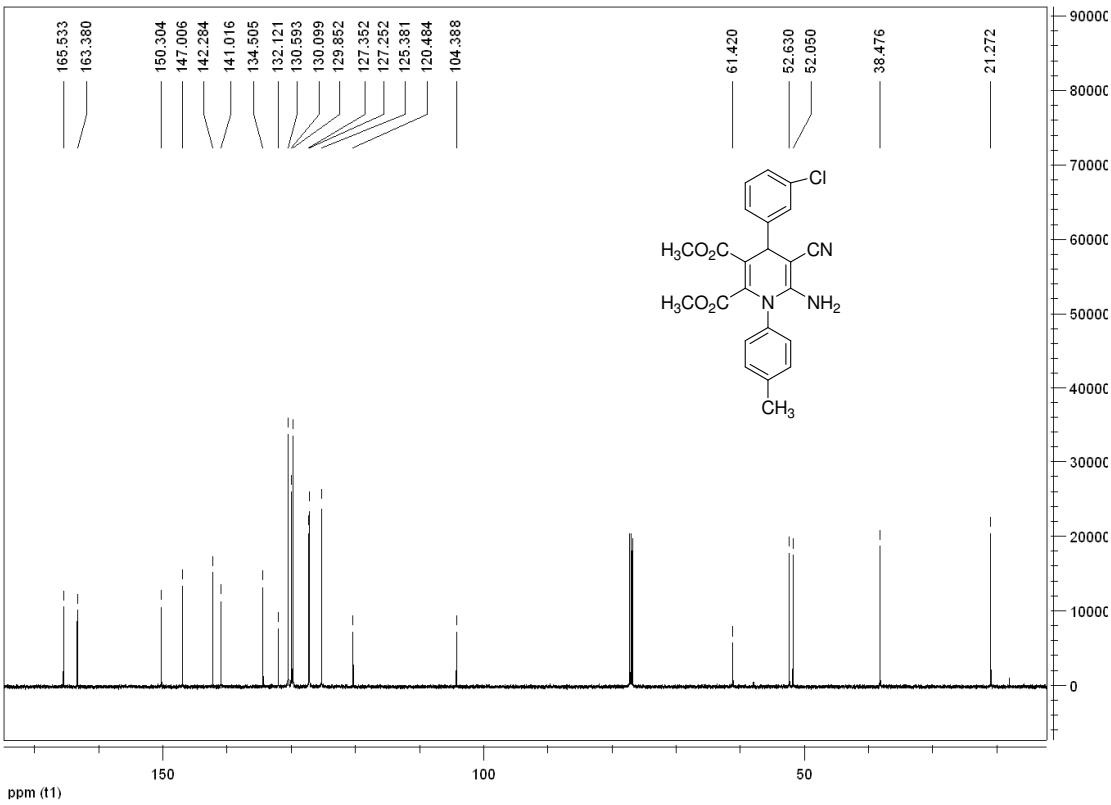
1f: light yellow solid, 88%, m.p.170~171°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.32 (t, *J* = 5.4Hz, 2H, ArH), 7.28 (d, *J* = 7.2Hz, 2H, ArH), 7.21 (d, *J* = 7.8Hz, 2H, ArH), 7.05 (d, *J* = 7.8Hz, 2H, ArH), 4.66 (s, 1H, CH), 4.09 (s, 2H, NH_2), 3.59 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.41 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.7, 163.5, 162.7, 161.1, 150.0, 142.0, 141.0, 132.2, 130.6, 129.9, 128.7, 128.6, 120.6, 115.6, 115.5, 104.8, 62.0, 52.6, 52.0, 38.0, 21.3; IR (KBr) υ: 3458, 3329, 3224, 3040, 2952, 2185, 1744, 1711, 1651, 1571, 1507, 1418, 1359, 1329, 1296, 1227, 1157, 1118, 1054, 974, 931, 866, 816, 778, 755 cm^{-1}; MS (*m/z*): 422.51 ($[M+1]^+$) 100%. Anal Calcd for $C_{23}H_{20}FN_3O_4$: C 65.55, H 4.78, N 9.97; Found: C 65.37, H 5.26, N 9.68.



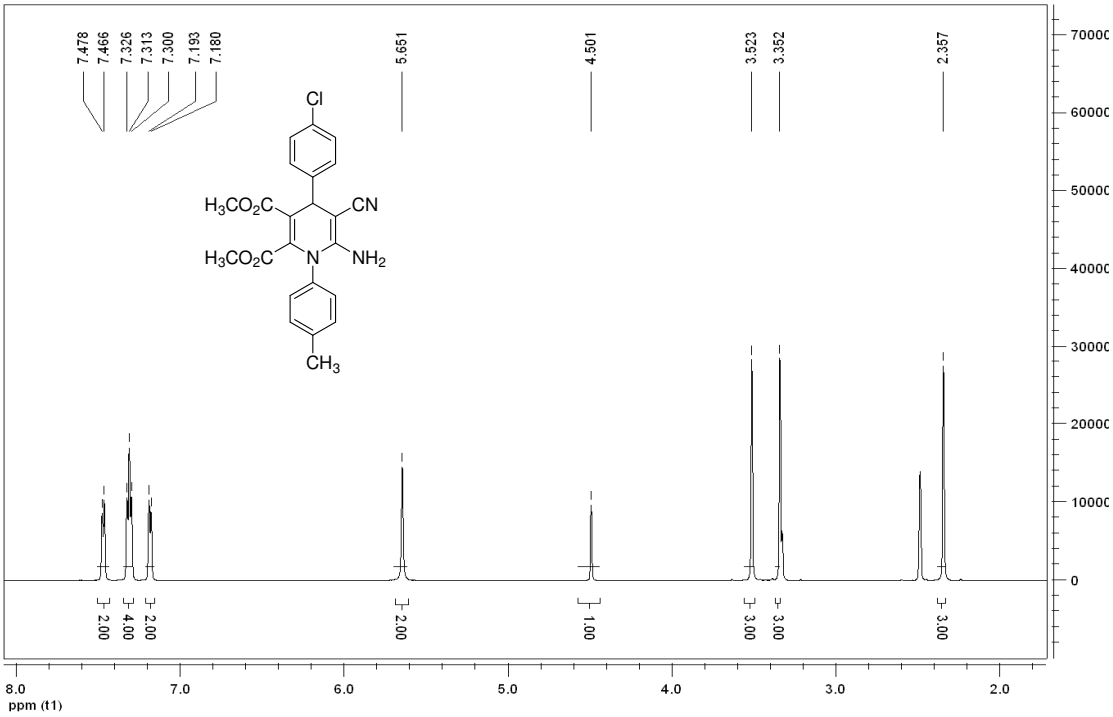


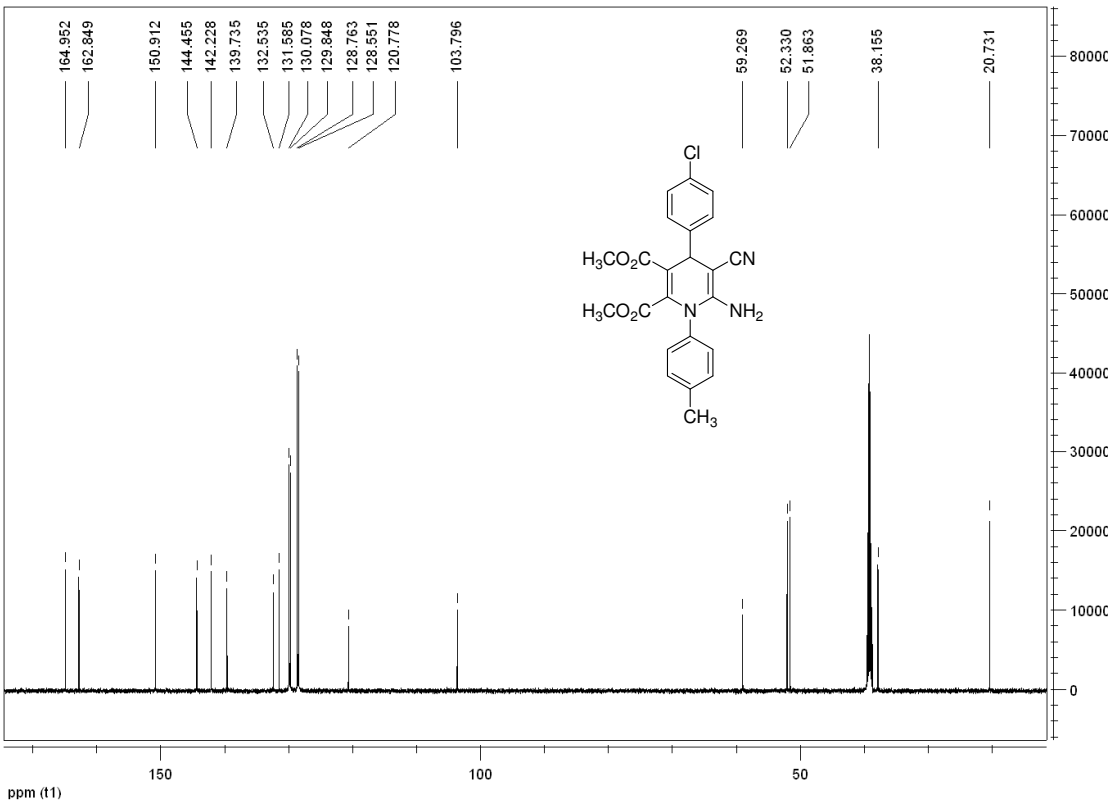
1g: light yellow solid, 95%, m.p.181~182°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.33 (s, 1H, ArH), 7.29 (t, *J* = 8.4Hz, 3H, ArH), 7.25 (d, *J* = 9.0Hz, 2H, ArH), 7.21 (d, *J* = 7.2Hz, 2H, ArH), 4.65 (s, 1H, CH), 4.14 (s, 2H, NH_2), 3.60 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.41 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.5, 163.4, 150.3, 147.0, 142.3, 141.0, 134.5, 132.1, 130.6, 130.1, 129.9, 127.4, 127.3, 125.4, 120.5, 104.4, 61.4, 52.6, 52.1, 38.5, 21.3; IR (KBr) υ: 3471, 3377, 3061, 2952, 2182, 1749, 1710, 1653, 1571, 1510, 1414, 1360, 1313, 1226, 1187, 1119, 1062, 1031, 974, 932, 874, 798, 770cm^{-1}; MS (*m/z*): 438.46 ($[M+1]^+$) 100%, 440.27 ($[M+3]^+$) 28%. Anal Calcd for $C_{23}H_{20}ClN_3O_4$: C 63.09, H 4.60, N 9.60; Found: C 63.41, H 4.79, N 9.25.



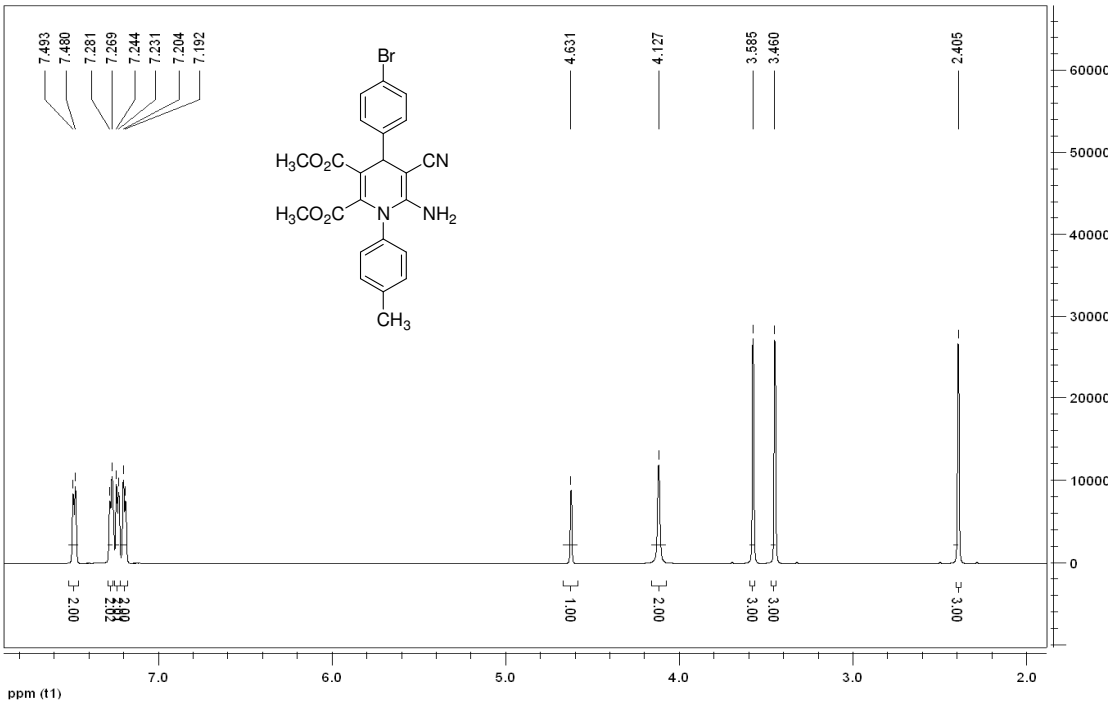


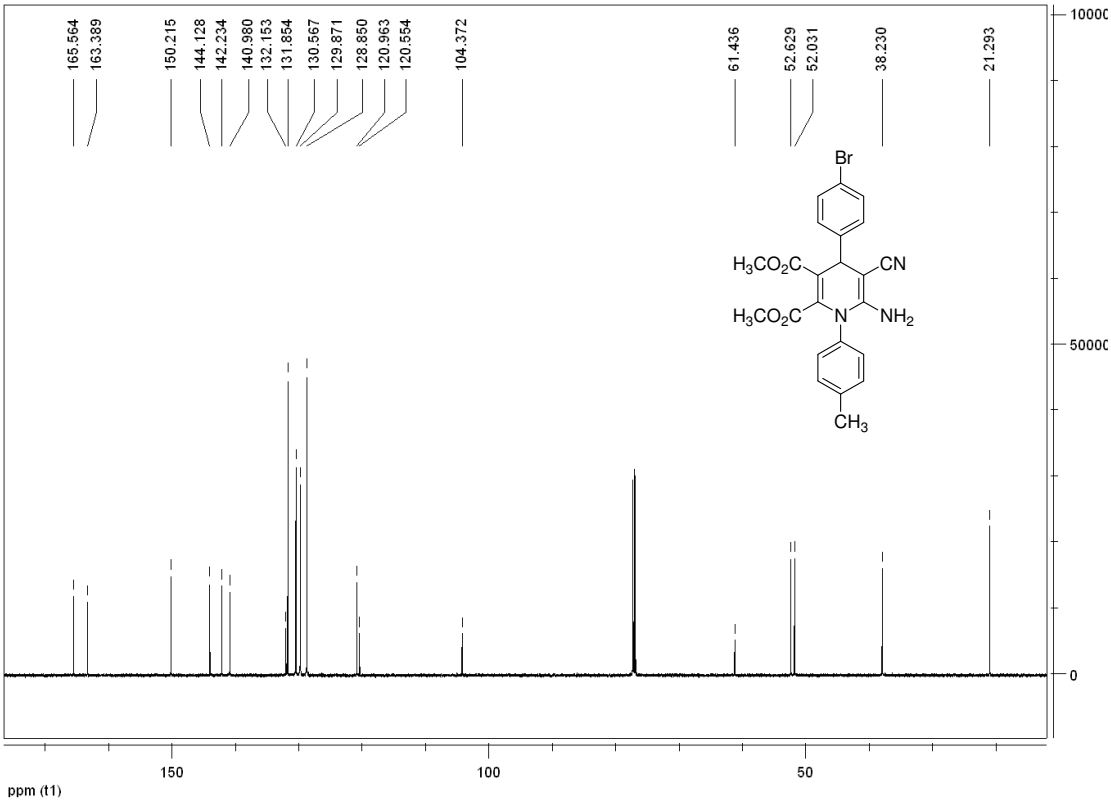
1h: light yellow solid, 95%, m.p.188~189°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.47 (d, J = 7.2Hz, 2H, ArH), 7.31 (t, J = 7.8Hz, 4H, ArH), 7.19 (d, J = 7.8Hz, 2H, ArH), 5.65 (s, 2H, NH_2), 4.50 (s, 1H, CH), 3.52 (s, 3H, OCH_3), 3.35 (s, 3H, OCH_3), 2.36 (s, 3H, CH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 165.0, 162.8, 150.9, 144.5, 142.2, 139.7, 132.5, 131.6, 130.1, 129.8, 128.8, 128.6, 120.8, 103.8, 59.3, 52.3, 51.9, 38.2, 20.7; IR (KBr) υ: 3474, 3364, 3219, 3036, 2951, 2177, 1742, 1699, 1646, 1615, 1576, 1508, 1412, 1355, 1327, 1301, 1251, 1216, 1177, 1114, 1017, 970, 929, 870, 836, 811, 769 cm^{-1}; MS (*m/z*): 438.38 ([M+1]$^{+}$) 100%. Anal Calcd for $C_{23}H_{20}ClN_3O_4$: C 63.09, H 4.60, N 9.60; Found: C 62.81, H 4.74, N 9.23.



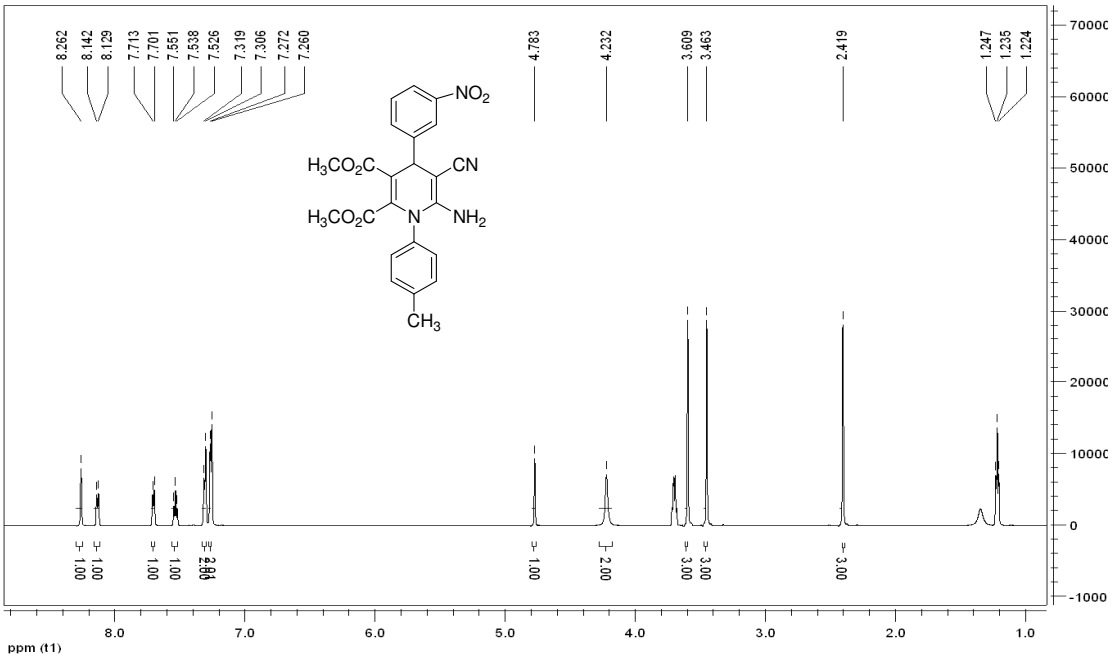


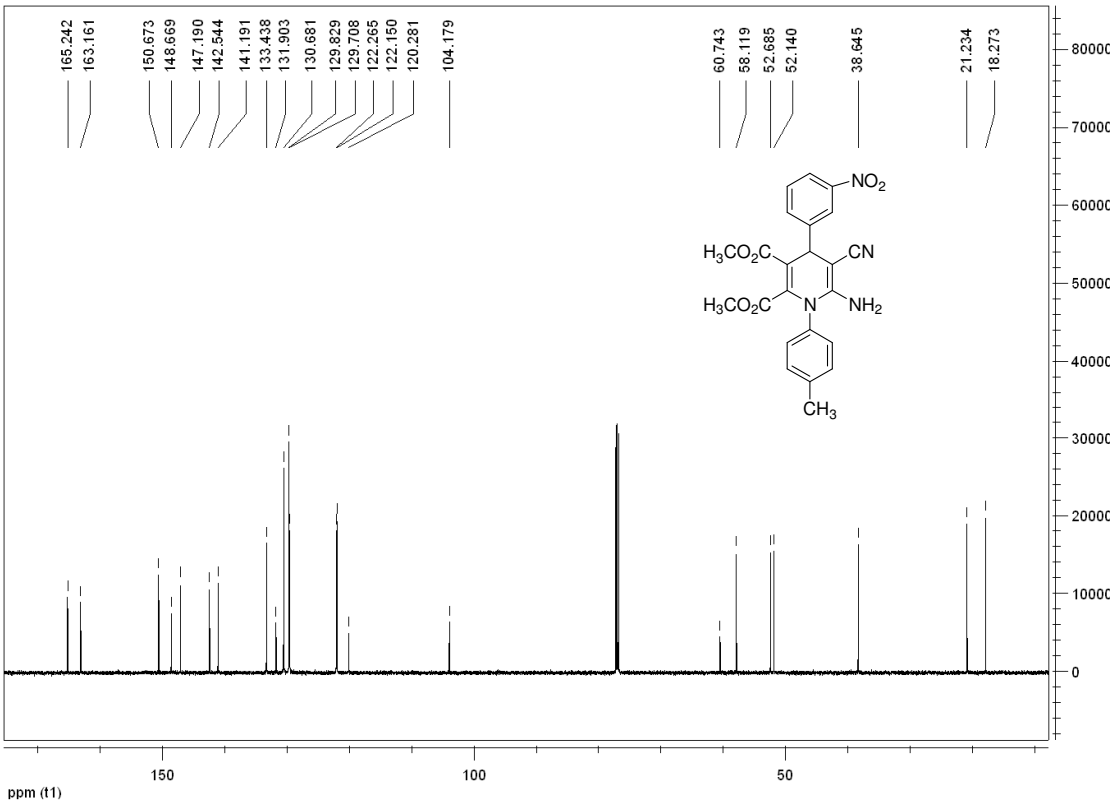
1i: light yellow solid, 94%, m.p.187~188°C;^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.49 (d, *J* = 7.8Hz, 2H, ArH), 7.28 (t, *J* = 7.2Hz, 2H, ArH), 7.24 (d, *J* = 7.8Hz, 2H, ArH), 7.20 (d, *J* = 7.2Hz, 2H, ArH), 4.63 (s, 1H, CH), 4.13 (s, 2H, NH_2), 3.59 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.41 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.6, 163.4, 150.2, 144.1, 142.2, 141.0, 132.2, 131.9, 130.6, 129.9, 128.9, 121.0, 120.6, 104.4, 61.4, 52.6, 52.0, 38.2, 21.3; IR (KBr) υ: 3475, 3365, 3036, 2951, 2176, 1741, 1700, 1647, 1615, 1575, 1509, 1486, 1412, 1356, 1328, 1250, 1115, 1072, 1011, 971, 929, 870, 835, 812, 769 cm^{-1}; MS (*m/z*): 482.38 ($[M+1]^+$) 100%, 484.17 ($[M+3]^+$) 98%. Anal Calcd for $C_{23}H_{20}BrN_3O_4$: C 57.27, H 4.18, N 8.71; Found: C 57.50, H 4.43, N 8.52.



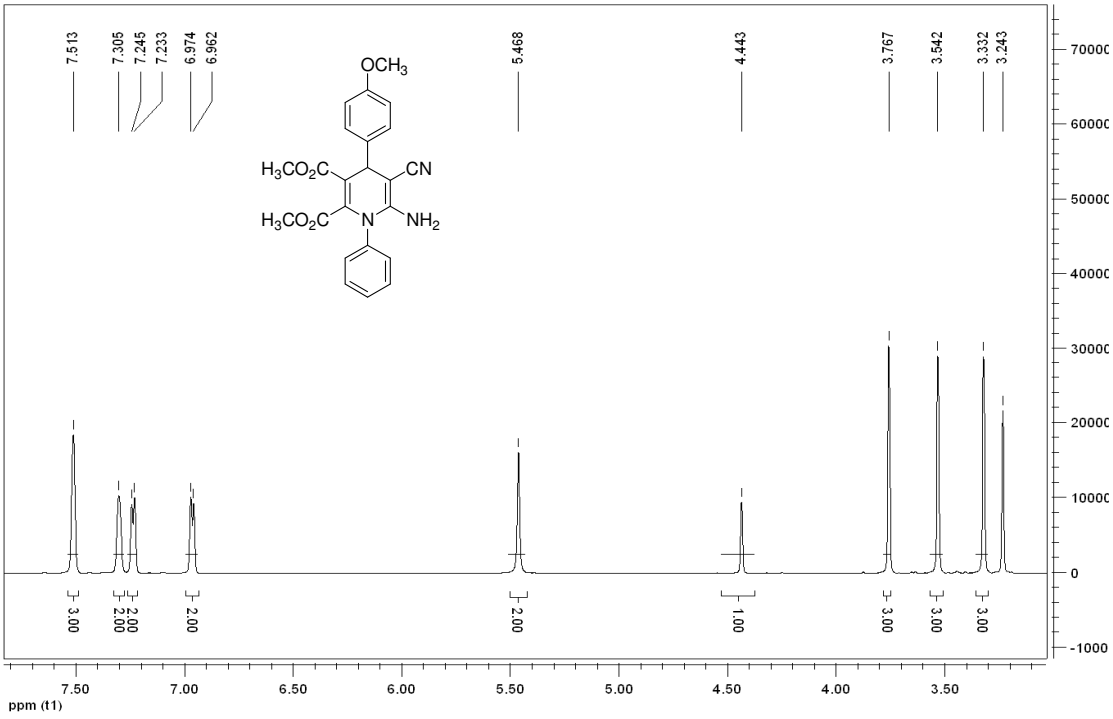


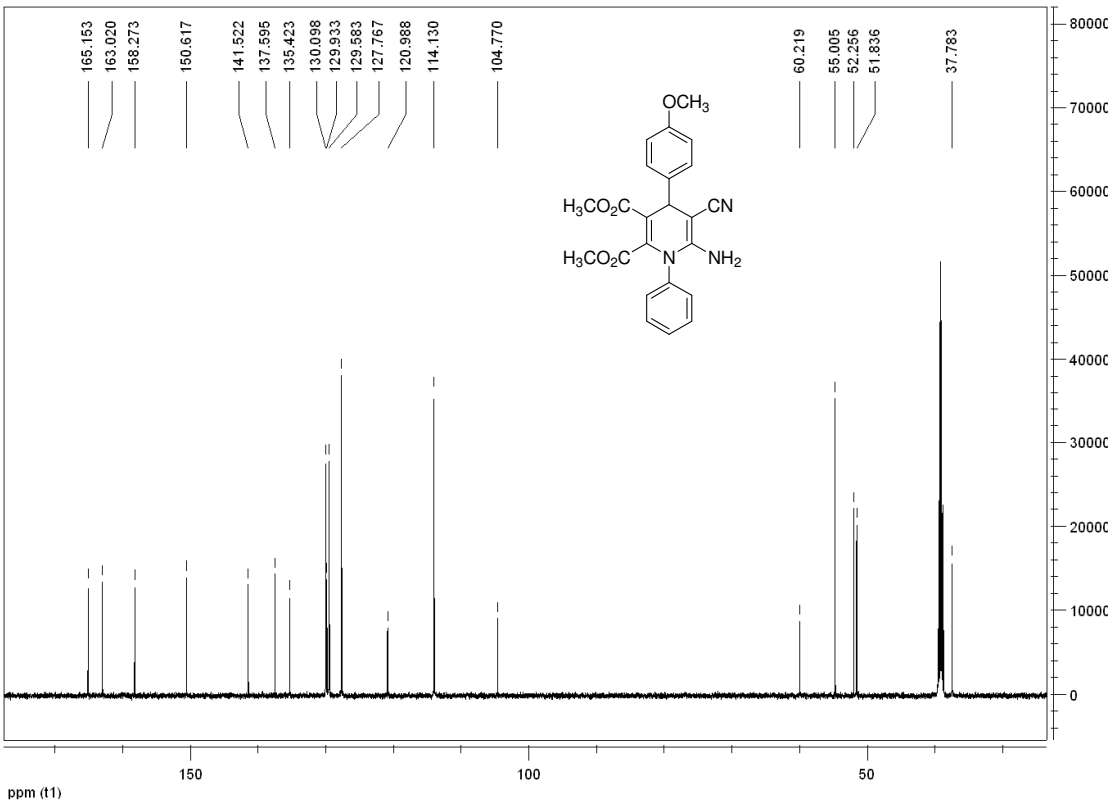
1j: yellow solid, 96%, m.p.213~214°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 8.26 (s, 1H, ArH), 8.14 (d, *J* = 7.8Hz, 1H, ArH), 7.71 (t, *J* = 7.2Hz, 1H, ArH), 7.54 (t, *J* = 7.8Hz, 2H, ArH), 7.31 (d, *J* = 7.2Hz, 2H, ArH), 7.27 (d, *J* = 7.8Hz, 2H, ArH), 4.78 (s, 1H, CH), 4.23 (s, 2H, NH_2), 3.61 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.42 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.2, 163.2, 150.7, 148.7, 147.2, 142.5, 141.2, 133.4, 131.9, 130.7, 129.8, 129.7, 122.3, 122.2, 120.3, 104.2, 60.7, 58.1, 52.7, 52.1, 38.6, 21.2, 18.3; IR (KBr) υ: 3421, 3375, 3182, 2962, 2184, 1752, 1702, 1653, 1572, 1526, 1423, 1349, 1250, 1217, 1108, 1050, 970, 930, 872, 809, 783 cm^{-1}; MS (*m/z*): 449.22 ($[M+1]^+$) 100%. Anal Calcd for $C_{23}H_{20}N_4O_6$: C 61.60, H 4.50, N 12.49; Found: C 61.49, H 4.85, N 12.11.



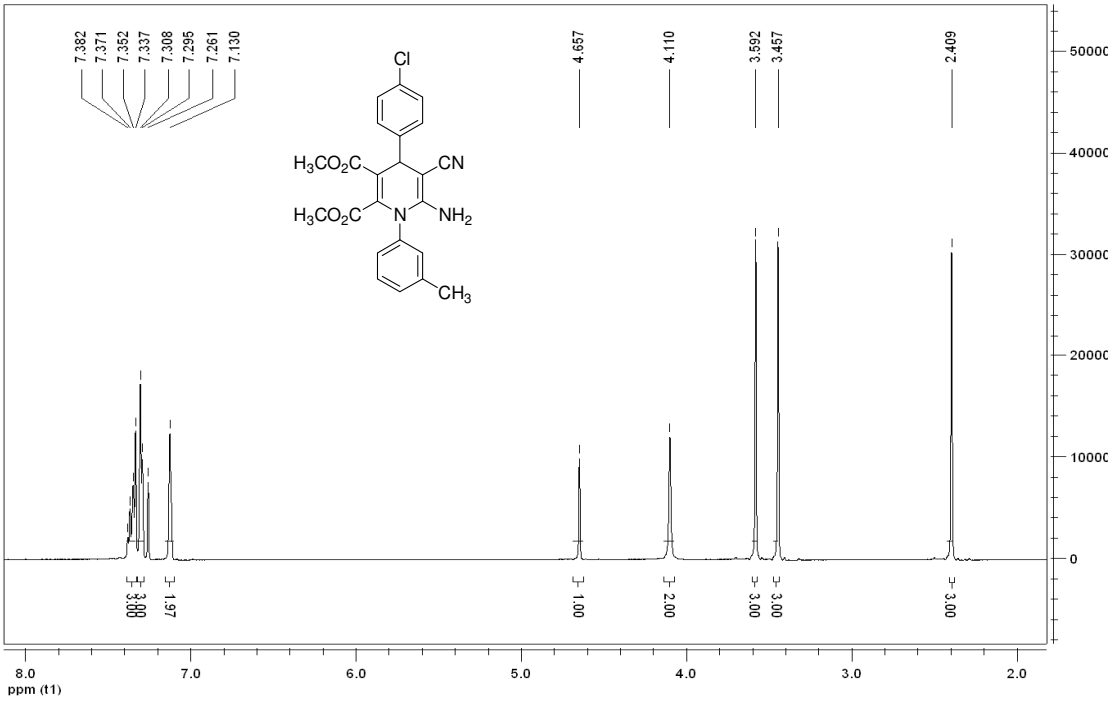


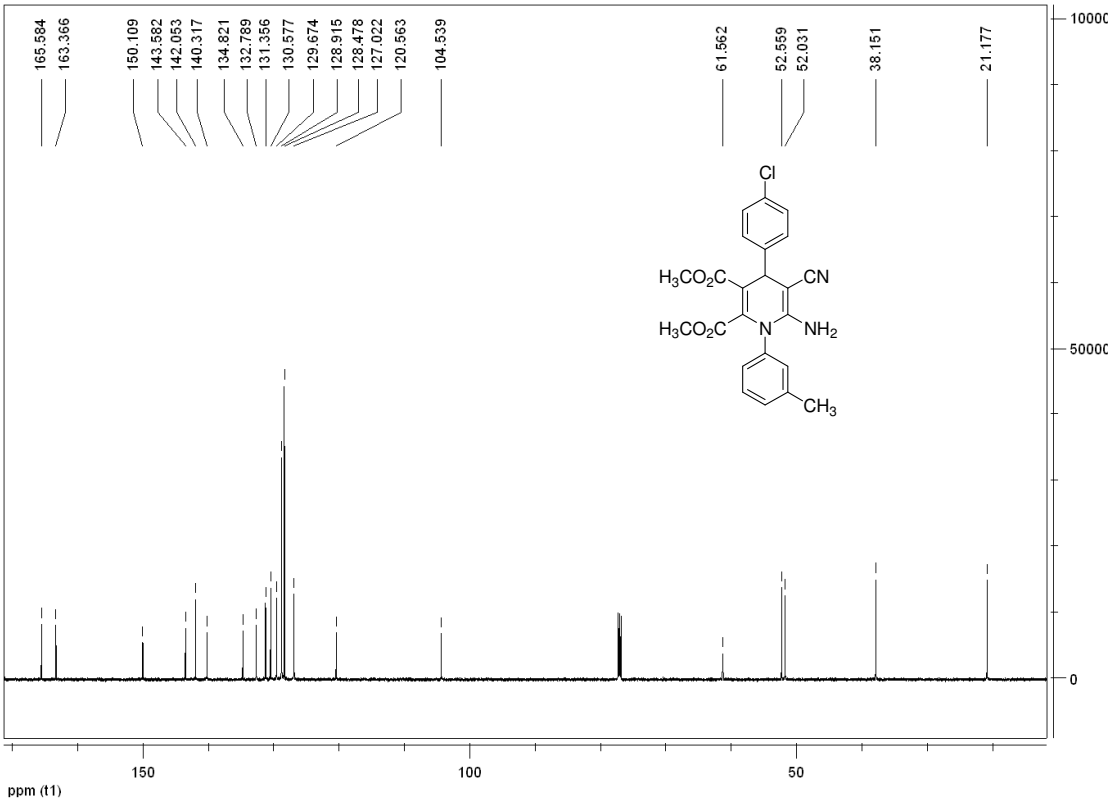
1k: white solid, 82%, m.p.168~169°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.51 (s, 3H, ArH), 7.31 (s, 2H, ArH), 7.24 (d, J = 7.2Hz, 2H, ArH), 6.97 (d, J = 7.2Hz, 2H, ArH), 5.47 (s, 2H, NH_2), 4.44 (s, 1H, CH), 3.77 (s, 3H, OCH_3), 3.54 (s, 3H, OCH_3), 3.33 (s, 3H, OCH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 165.2, 163.0, 158.3, 150.6, 141.5, 137.6, 135.4, 130.1, 129.9, 129.6, 127.8, 121.0, 114.1, 104.8, 60.2, 55.0, 52.3, 51.8, 37.8; IR (KBr) υ: 3471, 3316, 3219, 3053, 3002, 2950, 2900, 2836, 2187, 1747, 1714, 1653, 1574, 1506, 1457, 1420, 1352, 1324, 1300, 1245, 1211, 1170, 1112, 1031, 974, 929, 860, 833, 805, 785, 764 cm^{-1}; MS (m/z): 420.26 ([M+1]$^+$) 100%. Anal Calcd for $C_{23}H_{21}N_3O_5$: C 65.86, H 5.05, N 10.02; Found: C 65.50, H 5.44, N 9.81.



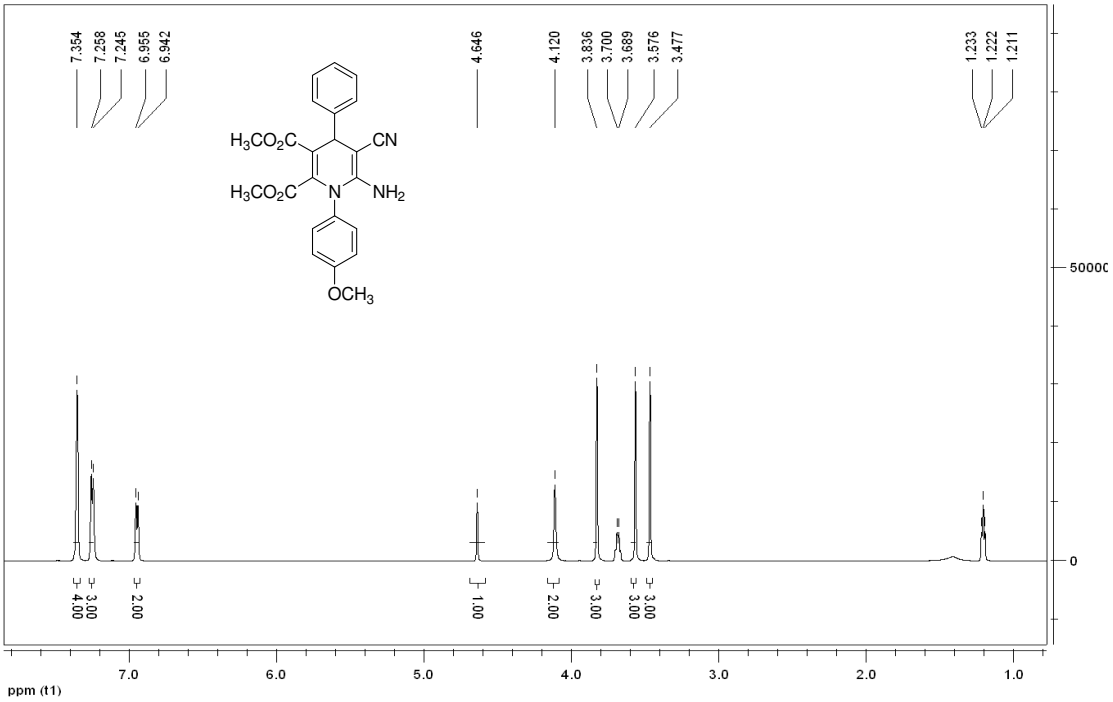


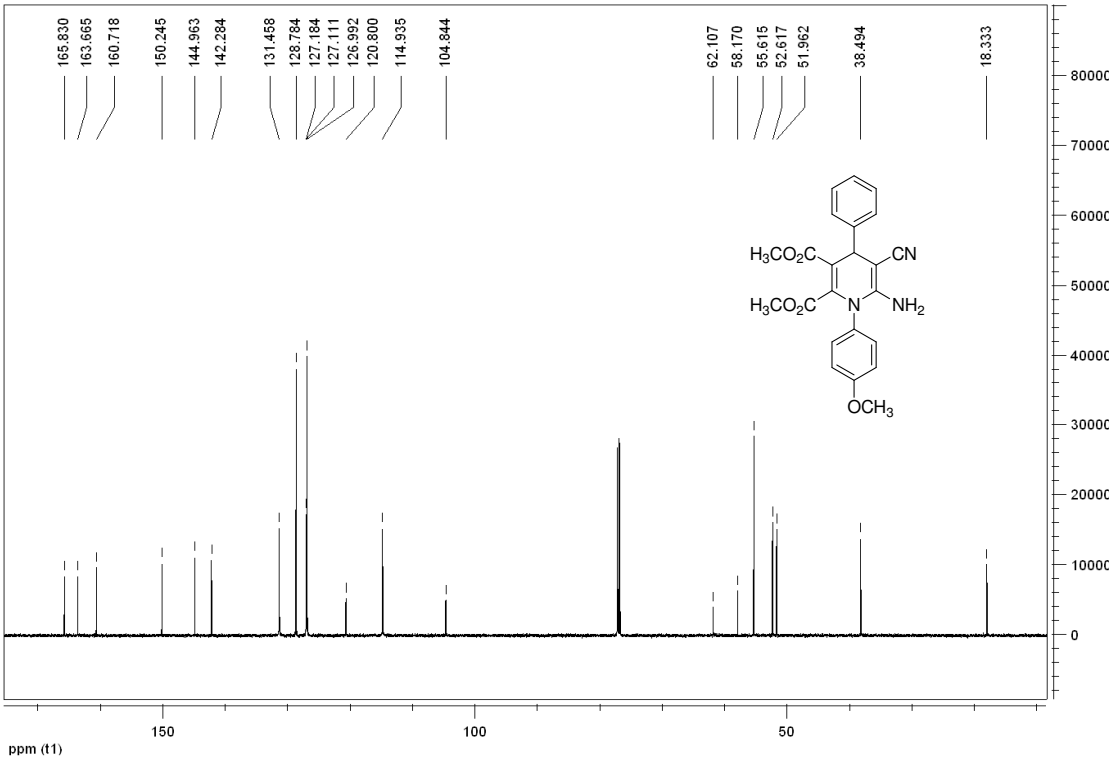
1l: light yellow solid, 87%, m.p.157~158°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.38~7.34 (m, 3H, ArH), 7.30 (d, *J* = 7.8Hz, 3H, ArH), 7.13 (s, 2H, ArH), 4.66 (s, 1H, CH), 4.11 (s, 2H, NH_2), 3.59 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 2.41 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.6, 163.4, 150.1, 143.6, 142.1, 140.3, 134.8, 132.8, 131.4, 130.6, 129.7, 128.9, 128.5, 127.0, 120.6, 104.5, 61.6, 52.6, 52.0, 38.2, 21.2; IR (KBr) υ: 3656, 3470, 3329, 3219, 3052, 2952, 2184, 1747, 1708, 1653, 1576, 1488, 1415, 1355, 1327, 1254, 1224, 1147, 1113, 1032, 1013, 974, 931, 862, 835, 782 cm^{-1}; MS (*m/z*): 438.52 ($[M+1]^+$) 100%, 440.35 ($[M+3]^+$) 35%. Anal Calcd for $C_{23}H_{20}ClN_3O_4$: C 63.09, H 4.60, N 9.60; Found: C 62.88, H 4.79, N 9.24.



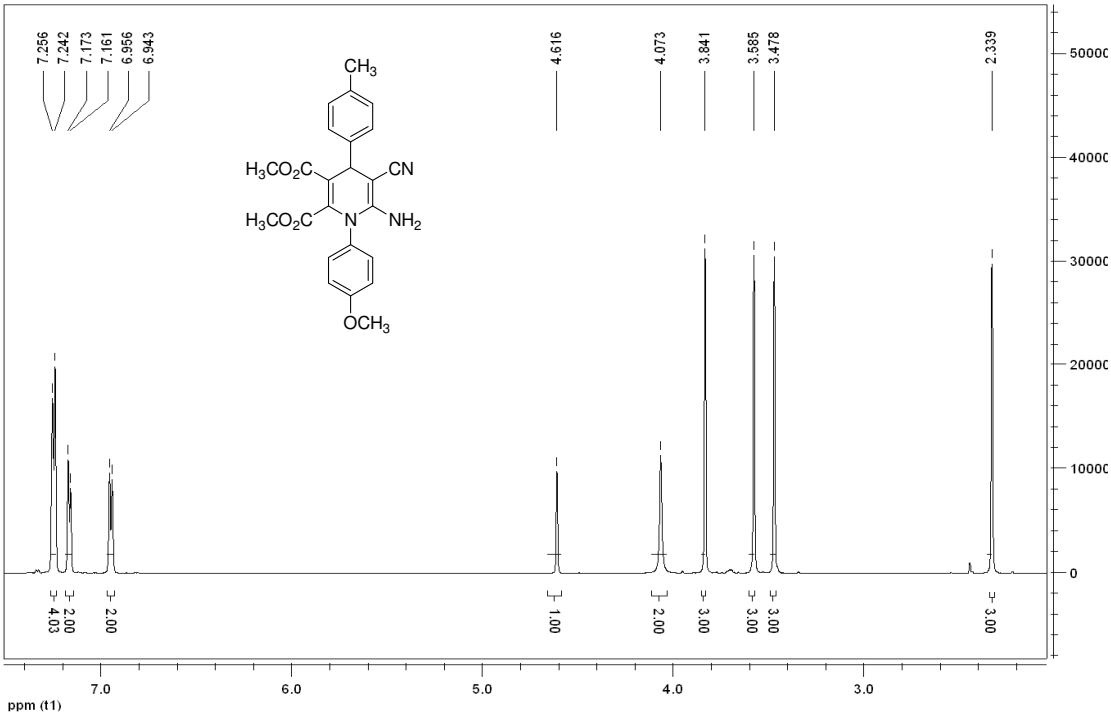


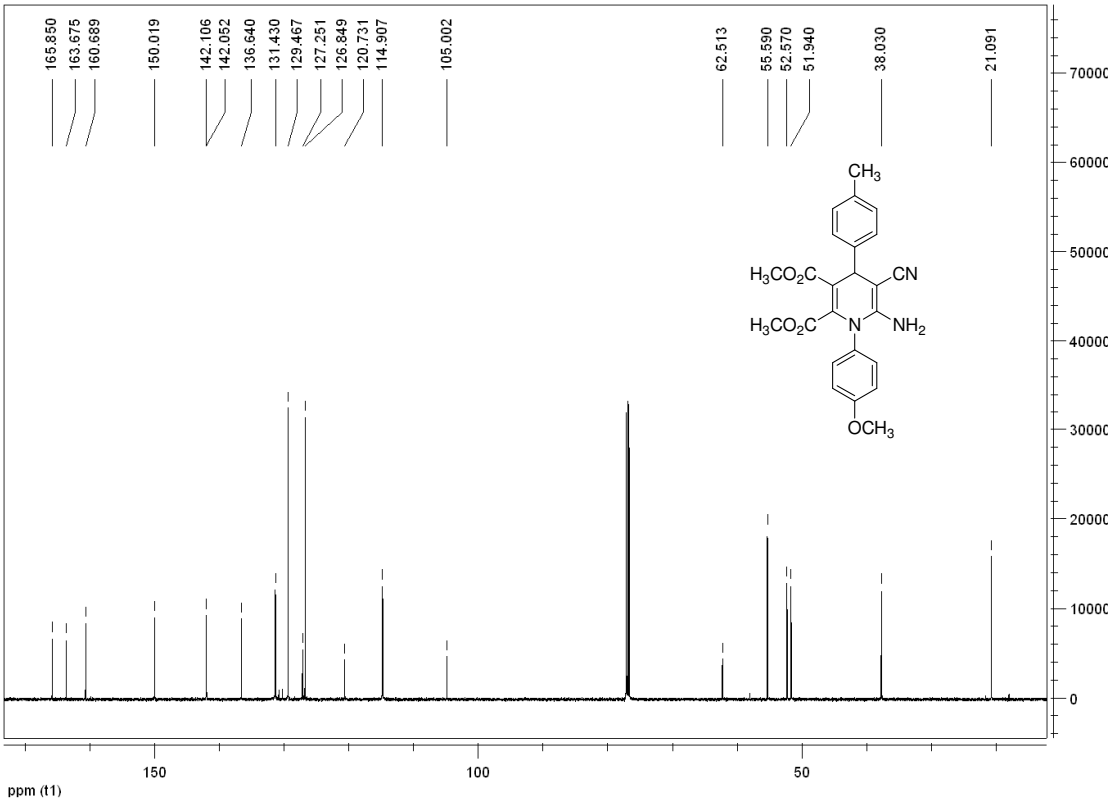
1m: light yellow solid, 88%, m.p.186~187°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.35 (s, 4H, ArH), 7.25 (d, *J* = 7.8Hz, 3H, ArH), 6.95 (d, *J* = 7.8Hz, 2H, ArH), 4.65 (s, 1H, CH), 4.12 (s, 2H, NH_2), 3.84 (s, 3H, OCH_3), 3.58 (s, 3H, OCH_3), 3.48 (s, 3H, OCH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.8, 163.7, 160.7, 150.2, 145.0, 142.3, 131.5, 128.8, 127.2, 127.1, 127.0, 120.8, 114.9, 104.8, 62.1, 58.2, 55.6, 52.6, 52.0, 38.5, 18.3; IR (KBr) υ: 3529, 3449, 3326, 3226, 3004, 2952, 2843, 2185, 1749, 1708, 1652, 1574, 1510, 1423, 1355, 1330, 1300, 1252, 1224, 1178, 1111, 1075, 1050, 1020, 971, 930, 863, 831, 790, 754 cm^{-1}; MS (*m/z*): 420.26 ($[M+1]^+$) 100%. Anal Calcd for $C_{23}H_{21}N_3O_5$: C 65.86, H 5.05, N 10.02; Found: C 65.55, H 5.40, N 9.73.



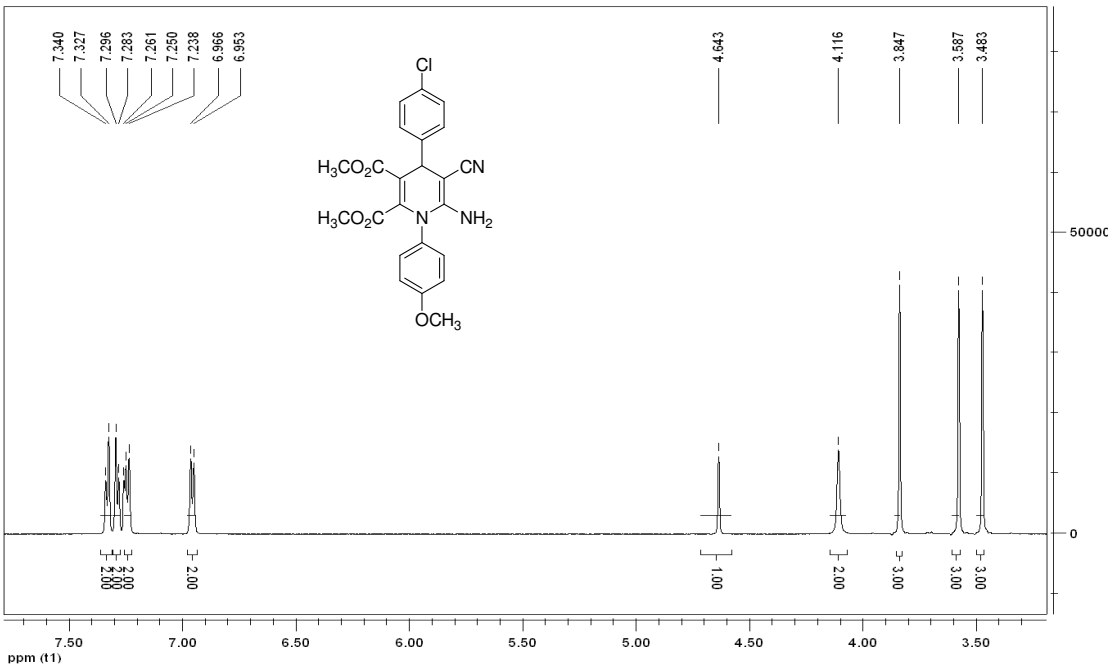


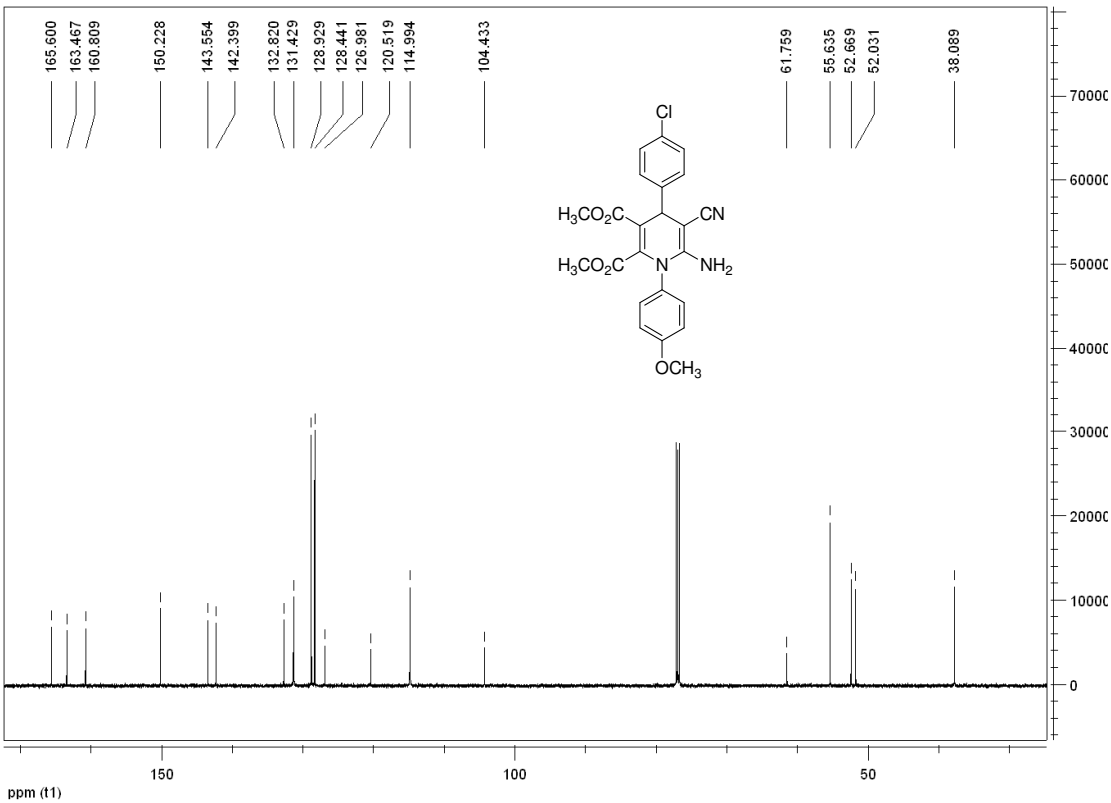
1n: yellow solid, 81%, m.p.202~203°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.25 (d, *J* = 8.4Hz, 4H, ArH), 7.17 (d, *J* = 7.2Hz, 2H, ArH), 6.95 (d, *J* = 7.8Hz, 2H, ArH), 4.62 (s, 1H, CH), 4.07 (s, 2H, NH_2), 3.84 (s, 3H, OCH_3), 3.59 (s, 3H, OCH_3), 3.48 (s, 3H, OCH_3), 2.34 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.9, 163.7, 160.7, 150.0, 142.1, 142.0, 136.6, 131.4, 129.5, 127.3, 126.8, 120.7, 114.9, 105.0, 62.5, 55.6, 52.6, 51.9, 38.0, 21.1; IR (KBr) υ: 3432, 3324, 3229, 3003, 2951, 2887, 2845, 2559, 2189, 1877, 1740, 1706, 1655, 1578, 1510, 1420, 1357, 1332, 1301, 1230, 1165, 1111, 1053, 1026, 974, 933, 866, 836, 817, 786, 751 cm^{-1}; MS (*m/z*): 434.24 ($[M+1]^+$) 100%. Anal Calcd for $C_{24}H_{23}N_3O_5$: C 66.50, H 5.35, N 9.69; Found: C 66.59, H 5.72, N 9.34.



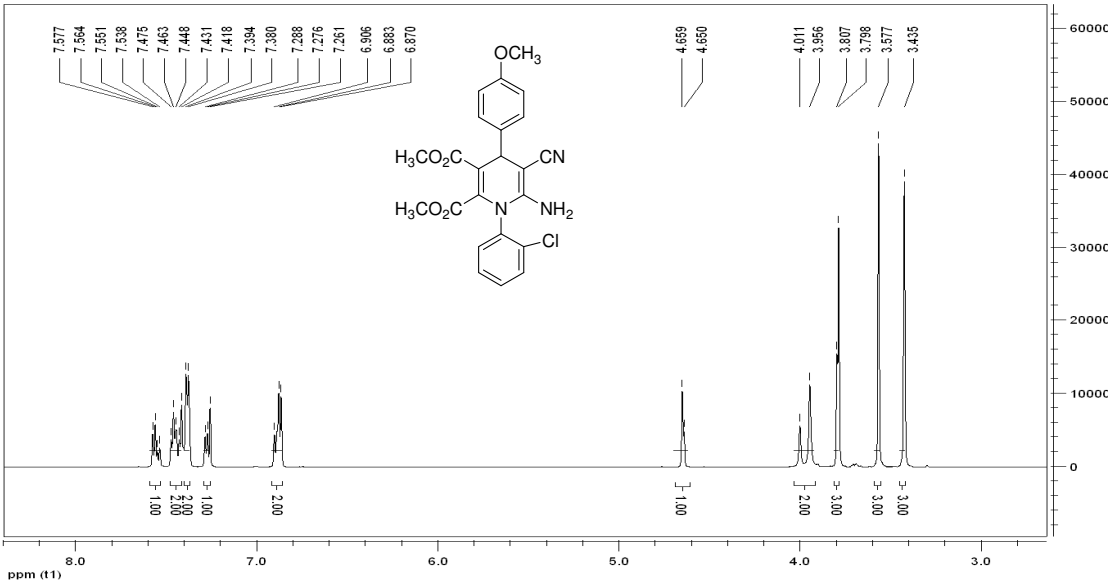


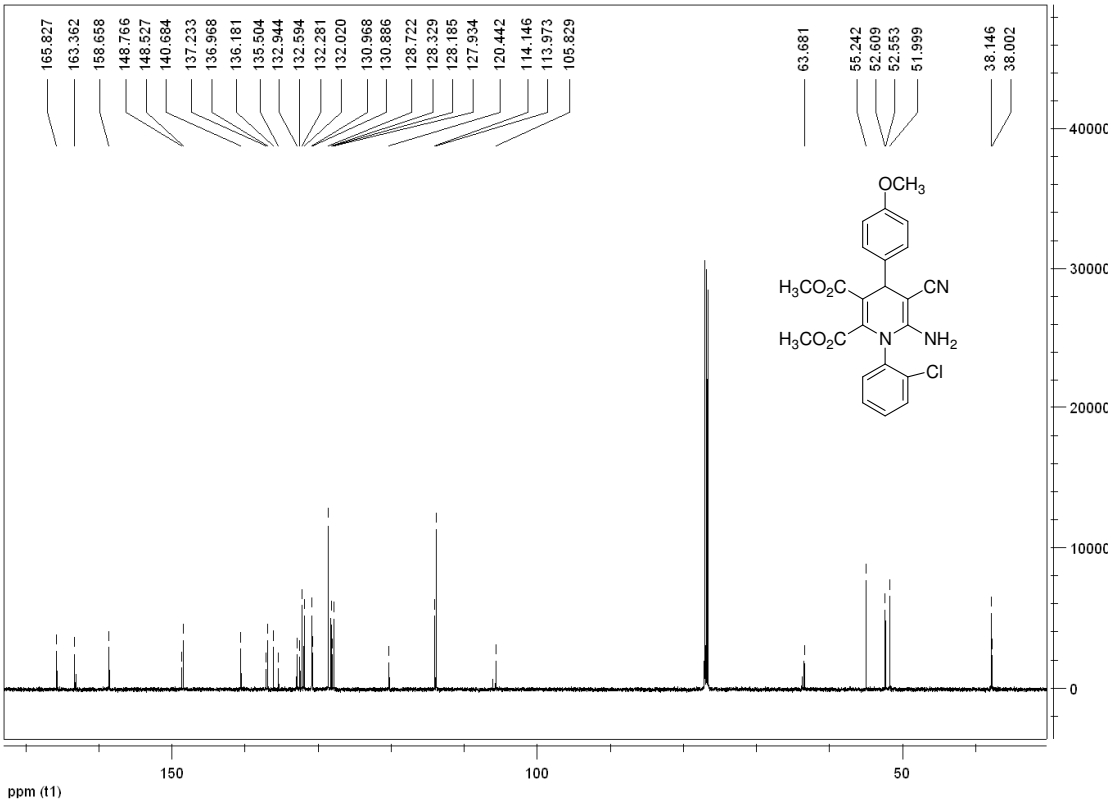
1o: light yellow solid, 87%, m.p.173~174°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.33 (d, *J* = 7.8Hz, 2H, ArH), 7.29 (d, *J* = 7.8Hz, 2H, ArH), 7.24 (d, *J* = 7.2Hz, 2H, ArH), 6.96 (d, *J* = 7.8Hz, 2H, ArH), 4.64 (s, 1H, CH), 4.12 (s, 2H, NH_2), 3.85 (s, 3H, OCH_3), 3.59 (s, 3H, OCH_3), 3.48 (s, 3H, OCH_3), 2.34 (s, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.6, 163.5, 160.8, 150.2, 143.6, 142.4, 132.8, 131.4, 128.9, 128.4, 127.0, 120.5, 115.0, 61.8, 55.6, 52.7, 52.0, 38.1; IR (KBr) υ: 3465, 3333, 3215, 3015, 2953, 2839, 2181, 1749, 1706, 1650, 1572, 1509, 1451, 1355, 1328, 1305, 1253, 1219, 1183, 1119, 1057, 1028, 972, 929, 865, 831, 772 cm^{-1}; MS (*m/z*): 454.26 ($[M+1]^+$) 100%, 456.17 ($[M+3]^+$) 33%. Anal Calcd for $C_{23}H_{20}ClN_3O_5$: C 60.86, H 4.44, N 9.26; Found: C 60.54, H 4.81, N 8.77.



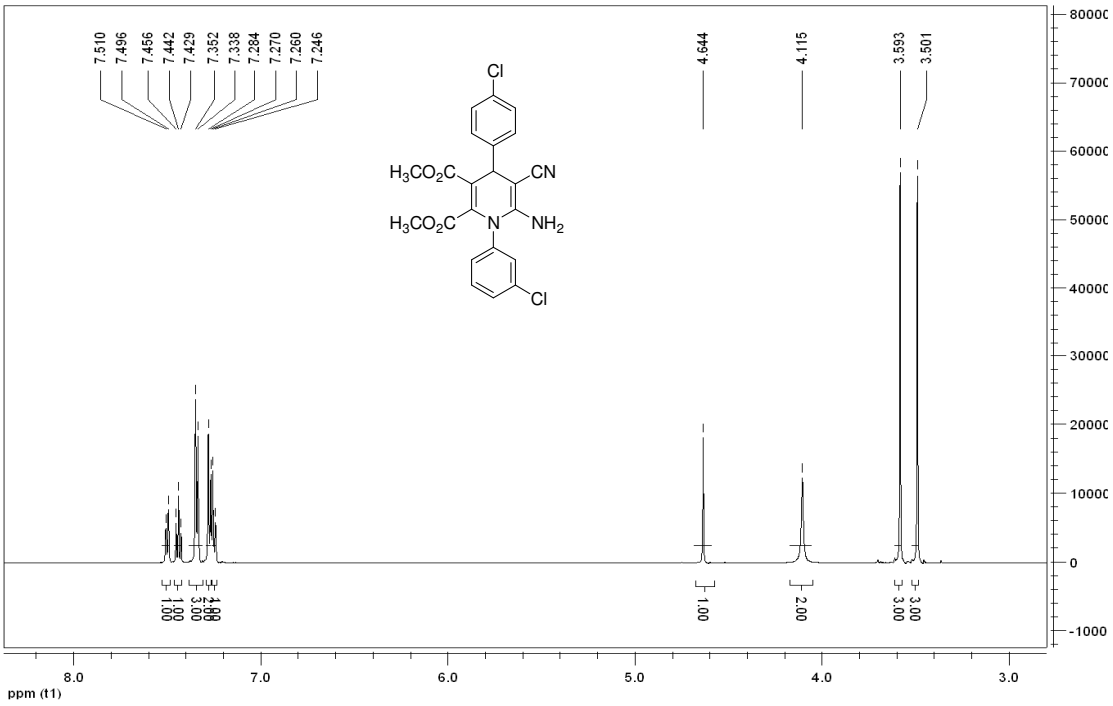


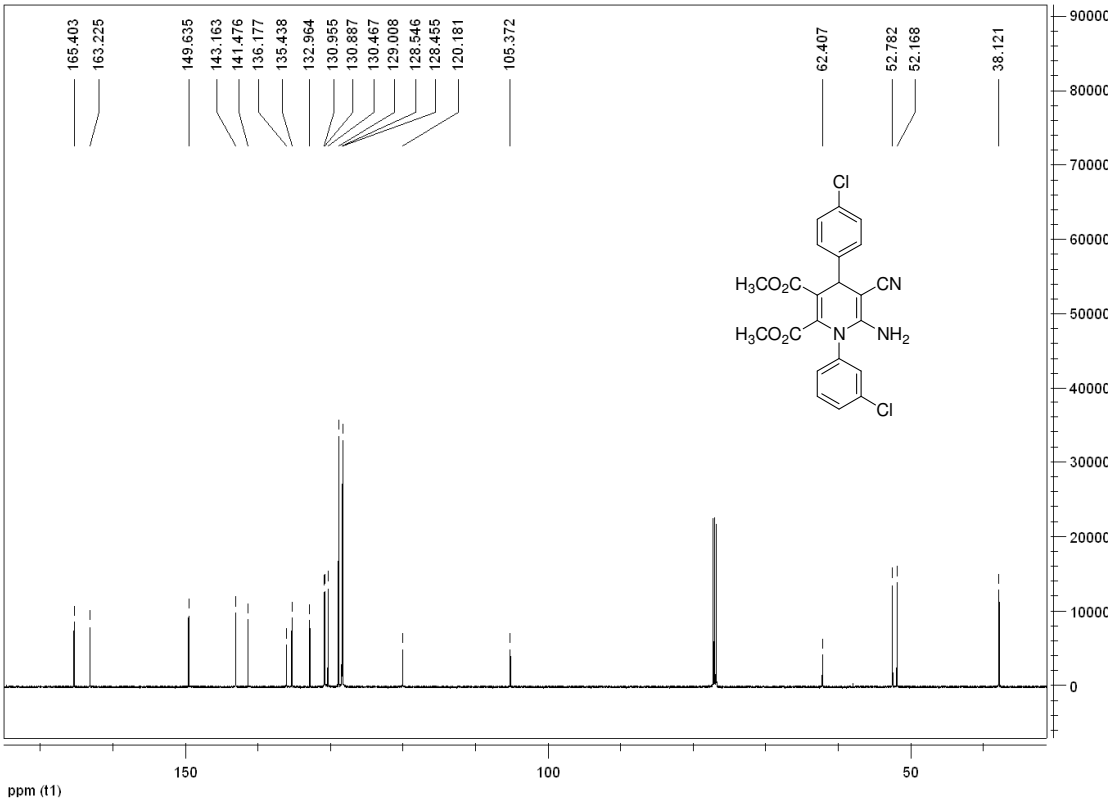
1p: white solid, 80%, m.p.200~201°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.58~7.54 (m, 1H, ArH), 7.48~7.42 (m, 2H, ArH), 7.39 (d, *J* = 8.4Hz, 2H, ArH), 7.29~7.26 (m, 1H, ArH), 6.91~6.87 (m, 2H, ArH), 4.65 (d, *J* = 5.4Hz, 1H, CH), 4.01~3.96 (m, 2H, NH_2), 3.80 (d, *J* = 5.4Hz, 3H, OCH_3), 3.58 (s, 3H, OCH_3), 3.44 (s, 3H, OCH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.8, 163.4, 158.7, 148.8, 148.5, 140.7, 137.2, 137.0, 136.2, 135.5, 132.9, 132.6, 132.3, 132.0, 131.0, 130.9, 128.7, 128.3, 128.2, 127.9, 120.4, 114.1, 114.0, 105.8, 63.7, 55.2, 52.6, 52.5, 52.0, 38.1, 38.0; IR (KBr) υ: 3450, 3333, 3005, 2951, 2903, 2834, 2318, 2182, 1749, 1704, 1653, 1610, 1574, 1510, 1473, 1419, 1351, 1329, 1303, 1244, 1212, 1177, 1113, 1073, 1029, 971, 930, 831, 807, 772 cm^{-1}; MS (*m/z*): 454.28 ($[M+1]^+$) 100%, 456.16 ($[M+3]^+$) 45%. Anal Calcd for $C_{23}H_{20}ClN_3O_5$: C 60.86, H 4.44, N 9.26; Found: C 60.47, H 4.49, N 9.13.



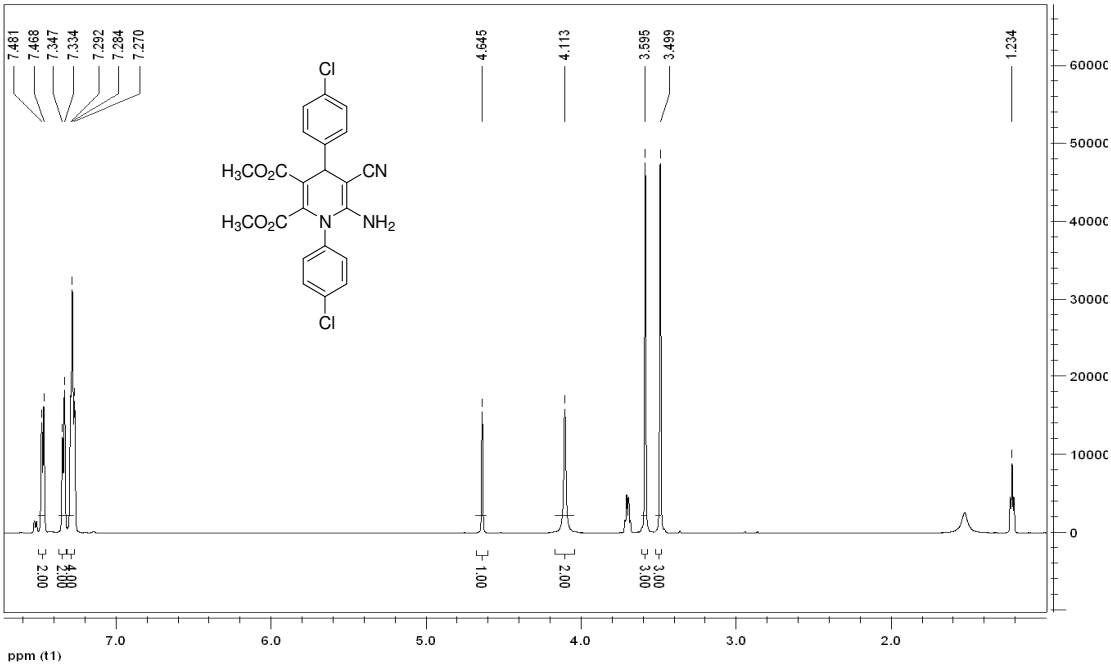


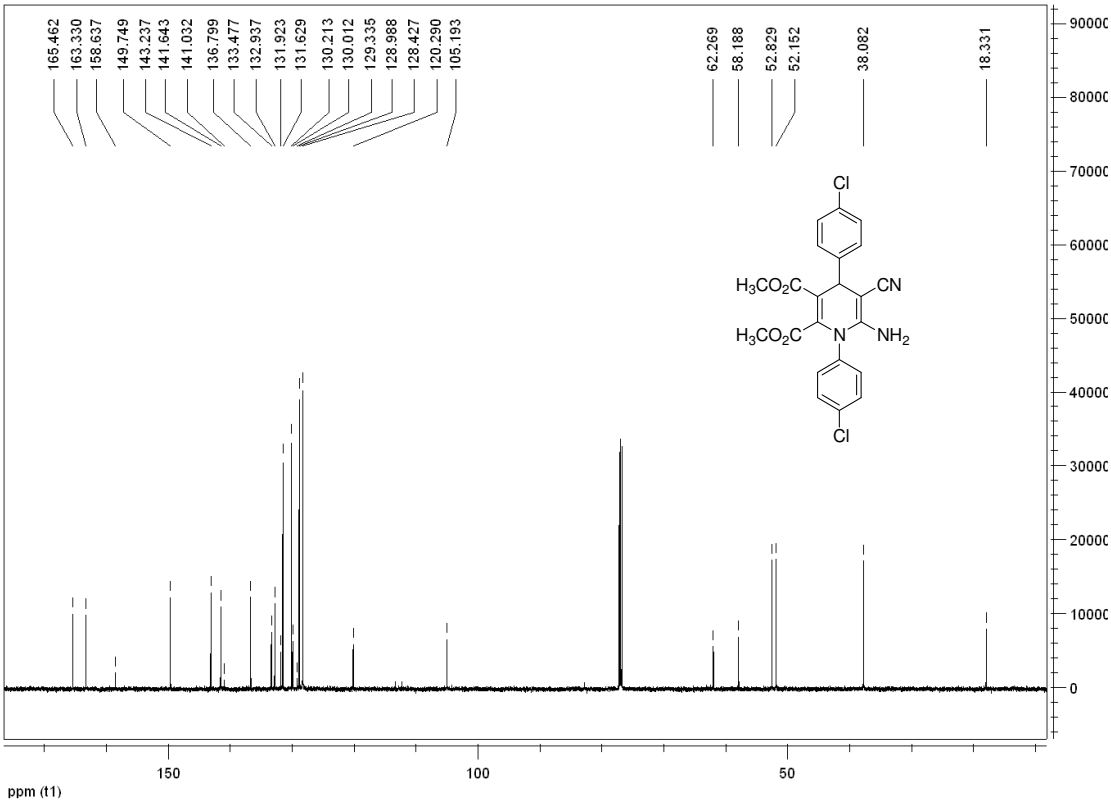
1q: light yellow solid, 91%, m.p.120~121°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.50 (d, *J* = 8.4Hz, 1H, ArH), 7.44 (t, *J* = 8.4Hz, 1H, ArH), 7.35 (d, *J* = 8.4Hz, 3H, ArH),7.28 (d, *J* = 8.4Hz, 2H, ArH), 7.25 (d, *J* = 8.4Hz, 1H, ArH), 4.64 (s, 1H, CH), 4.12 (s, 2H, NH_2), 3.59 (s, 3H, OCH_3), 3.50 (s, 3H, OCH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ:165.4, 163.2, 149.6, 143.2, 141.5, 136.2, 135.4, 133.0, 131.0, 130.9, 130.5, 129.0, 128.5, 128.4, 120.2, 105.4, 62.4, 52.8, 52.2, 38.1; IR (KBr) υ: 3465, 3341, 3227, 3066, 2952, 2185, 1749, 1707, 1654, 1579, 1484, 1417, 1351, 1321, 1301, 1254, 1222, 1109, 1051, 973, 930, 886, 861, 837, 798, 758 cm^{-1}; MS (*m/z*): 460.39 ($[M+1]^+$) 100%. Anal Calcd for $C_{22}H_{17}Cl_2N_3O_4$: C 57.66, H 3.74, N 9.17; Found: C 57.39, H 4.10, N 8.76.



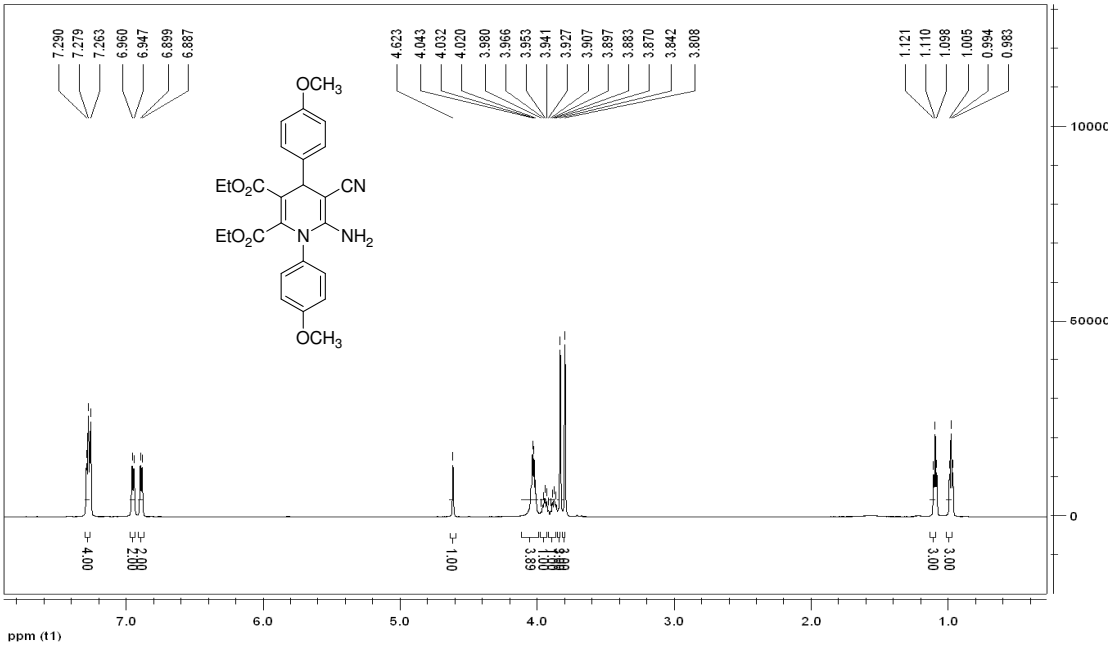


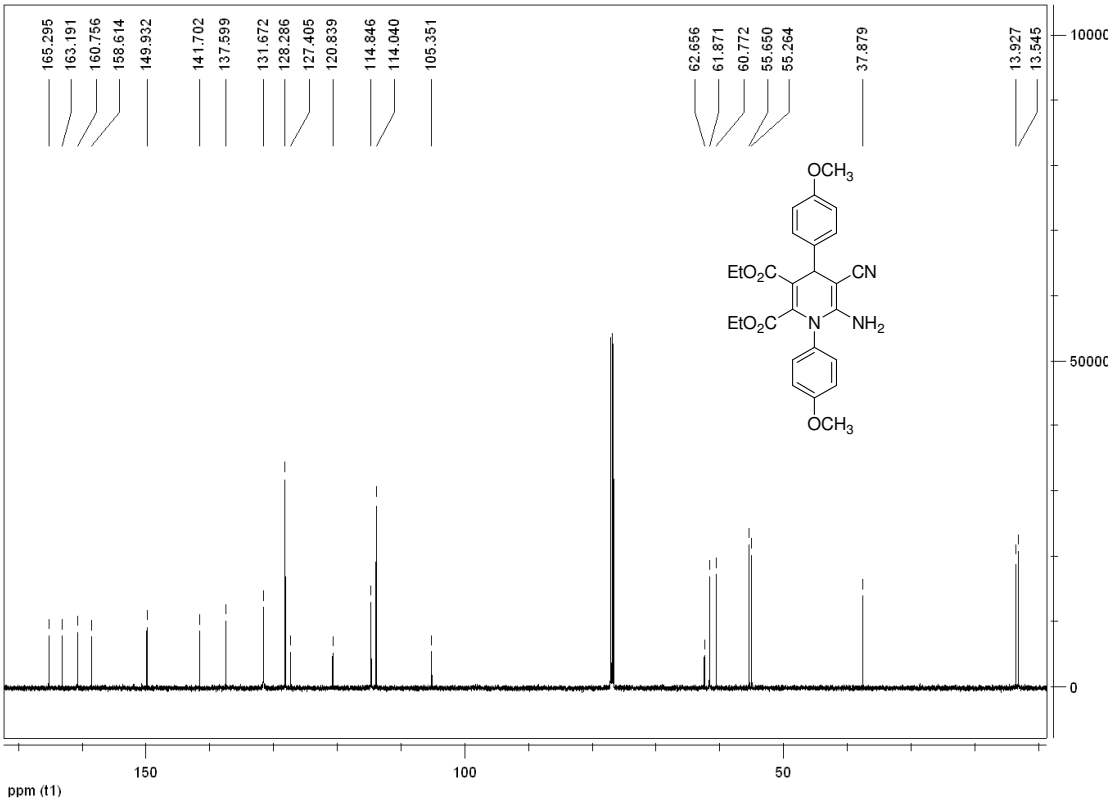
1r: yellow solid, 84%, m.p.128~129℃; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.47 (d, *J* = 7.8Hz, 2H, ArH), 7.34 (t, *J* = 7.8Hz, 2H, ArH), 7.29~7.27 (m, 4H, ArH), 4.65 (s, 1H, CH), 4.11 (s, 2H, NH_2), 3.60 (s, 3H, OCH_3), 3.50 (s, 3H, OCH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.5, 163.3, 158.6, 149.7, 143.2, 141.6, 141.0, 136.8, 133.5, 132.9, 131.9, 131.6, 130.2, 130.0, 129.3, 129.0, 128.4, 120.3, 105.2, 62.3, 58.2, 52.8, 52.2, 38.1, 18.3; IR (KBr) υ: 3438, 3337, 3227, 2951, 2227, 2187, 1746, 1707, 1651, 1575, 1487, 1418, 1355, 1329, 1296, 1226, 1116, 1090, 1049, 1012, 973, 929, 870, 817, 763 cm^{-1}; MS (*m/z*): 460.30 ([M+1]$^{+}$) 100%. Anal Calcd for $C_{22}H_{17}Cl_2N_3O_4$: C 57.66, H 3.74, N 9.17; Found: C 57.50, H 4.03, N 8.95.



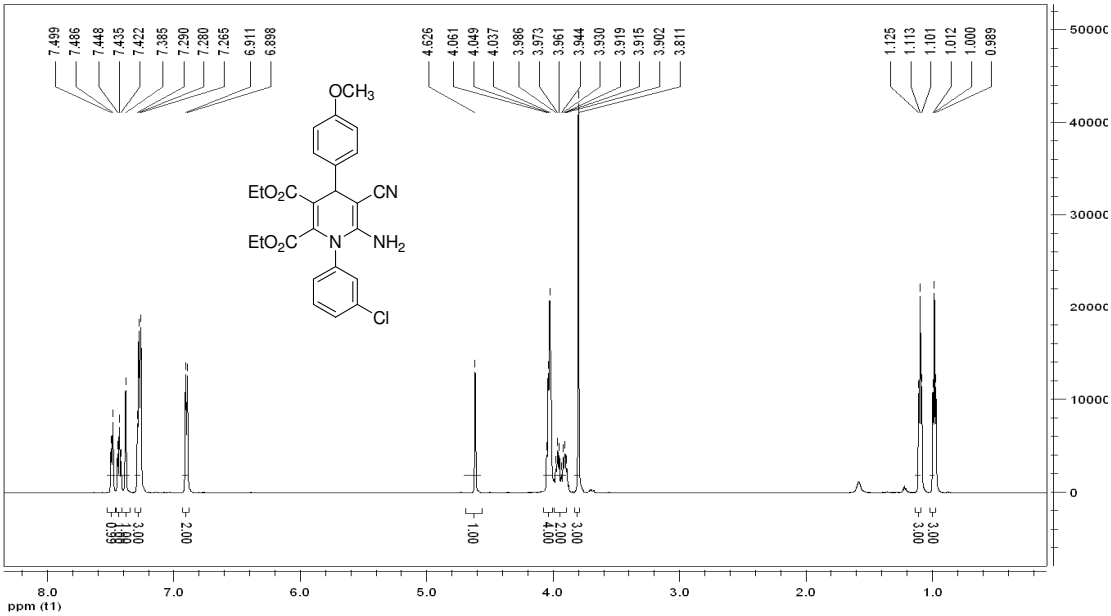


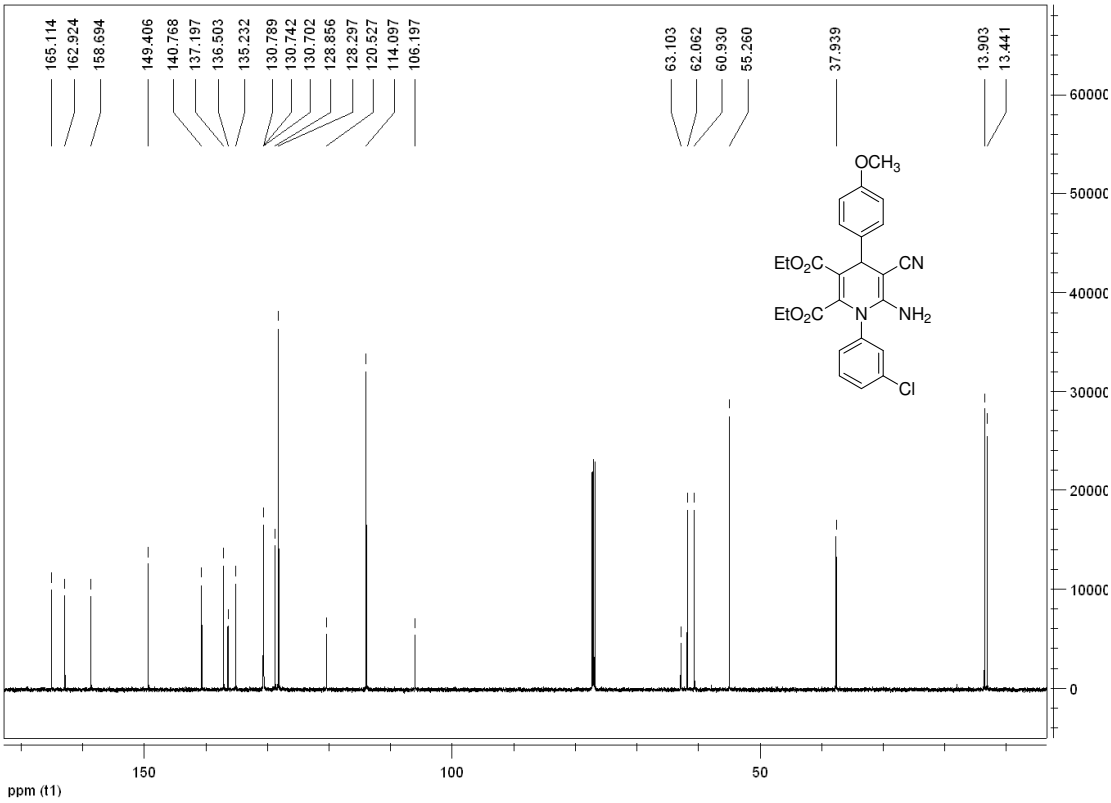
1s: white solid, 76%, m.p.171~172°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.29~7.26 (m, 4H, ArH), 6.95 (d, *J* = 7.8Hz, 2H, ArH), 6.89 (d, *J* = 7.2Hz, 2H, ArH), 4.62 (s, 1H, CH), 4.04~4.02 (m, 4H, CH_2, NH_2), 3.98~3.93 (m, 1H, CH_2), 3.91~3.87 (m, 1H, CH_2), 3.84 (s, 3H, OCH_3), 3.81 (s, 3H, OCH_3), 1.11 (t, *J* = 6.6Hz, 3H, CH_3), 0.99 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.3, 163.2, 160.8, 158.6, 149.9, 141.7, 137.6, 131.7, 128.3, 127.4, 120.8, 114.8, 114.0, 105.4, 62.7, 61.9, 60.8, 55.7, 55.3, 37.9, 13.9, 13.5; IR (KBr) υ: 3452, 3318, 3216, 2973, 2929, 2833, 2181, 1745, 1697, 1652, 1610, 1571, 1510, 1463, 1418, 1372, 1344, 1324, 1300, 1243, 1207, 1175, 1111, 1027, 827, 781 cm^{-1}; MS (*m/z*): 478.30 ($[M+1]^+$) 100%. Anal Calcd for $C_{26}H_{27}N_3O_6$: C 65.40, H 5.70, N 8.80; Found: C 65.57, H 5.81, N 8.49.



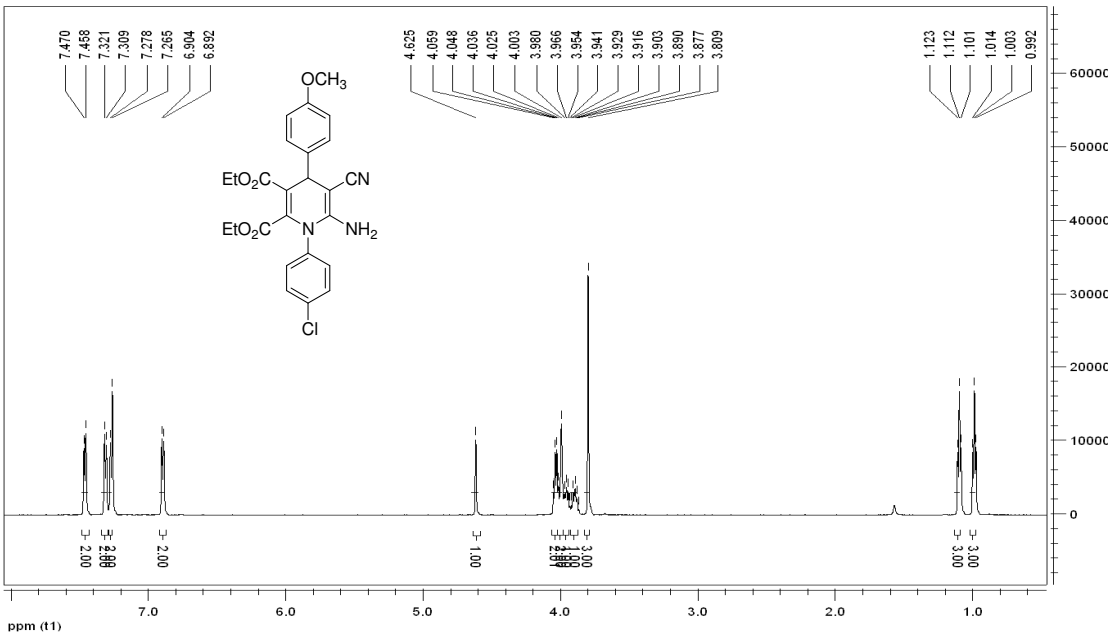


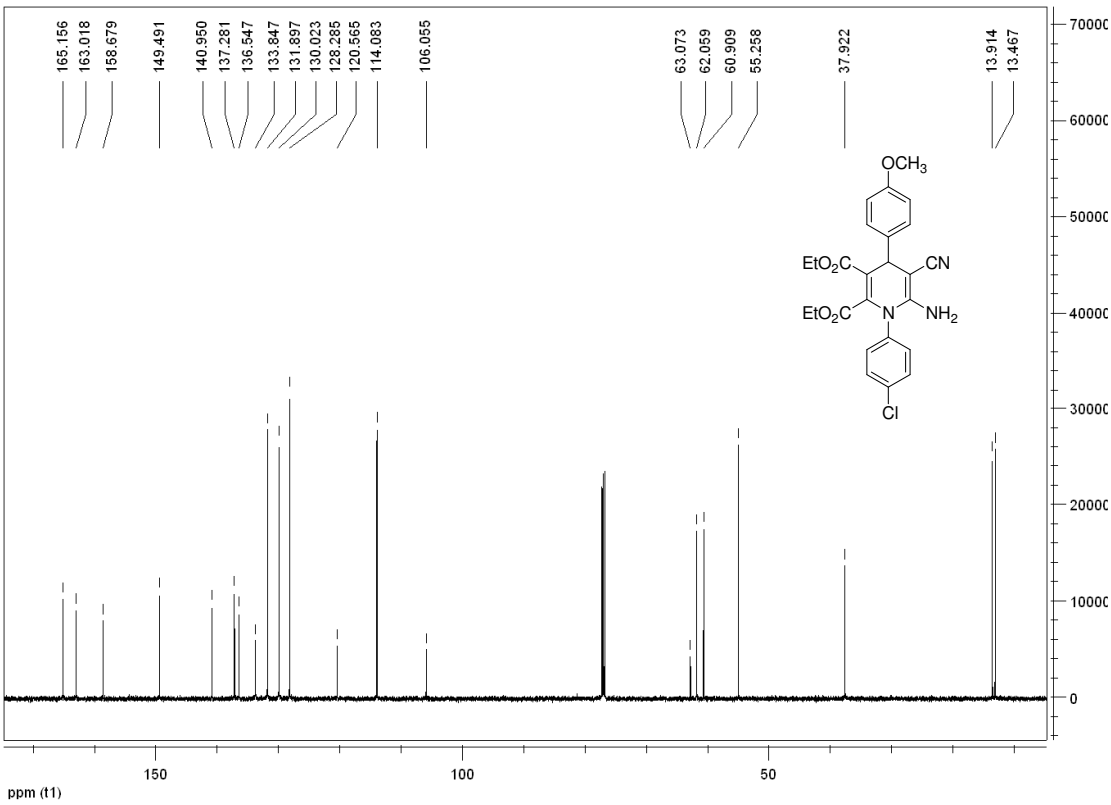
1t: white solid, 85%, m.p.118~120°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.49 (d, *J* = 7.8Hz, 1H, ArH), 7.44 (t, *J* = 7.8Hz, 1H, ArH), 7.39 (s, 1H, ArH), 7.29~7.27 (m, 3H, ArH), 6.91 (d, *J* = 7.8Hz, 2H, ArH), 4.63 (s, 1H, CH), 4.06~4.04 (m, 4H, CH_2, NH_2), 3.99~3.90 (m, 2H, CH_2), 3.81 (s, 3H, OCH_3), 1.11 (t, *J* = 7.2Hz, 3H, CH_3), 1.00 (t, *J* = 7.2Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.1, 162.9, 158.7, 149.4, 140.8, 137.2, 136.5, 135.2, 130.8, 130.7, 128.9, 128.3, 120.5, 114.1, 106.2, 63.1, 62.1, 60.9, 55.3, 37.9, 13.9, 13.4; IR (KBr) υ: 3645, 3461, 3325, 3321, 3066, 2979, 2935, 2836, 2187, 1745, 1698, 1652, 1580, 1508, 1471, 1409, 1367, 1337, 1320, 1300, 1245,1201, 1171, 1107, 1056, 1032, 985, 903, 879, 860, 835, 795, 750 cm^{-1}; MS (*m/z*): 482.01 ($[M+1]^+$) 58%, 484.16 ($[M+3]^+$) 100%. Anal Calcd for $C_{25}H_{24}ClN_3O_5$: C 62.31, H 5.02, N 8.72; Found: C 62.19, H 5.47, N 8.44.



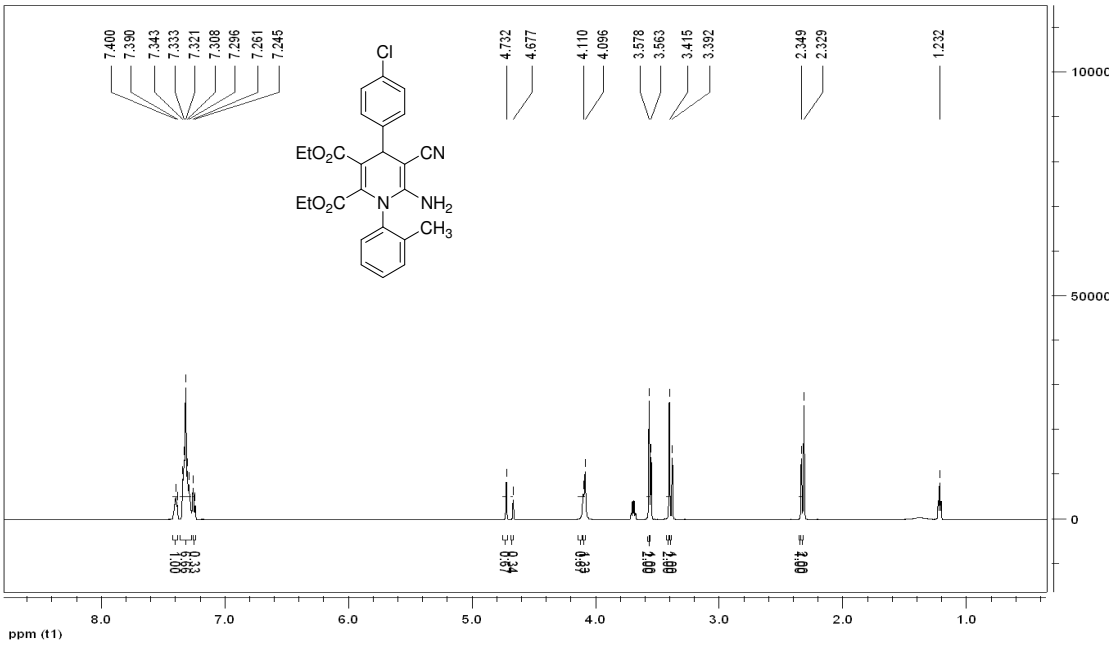


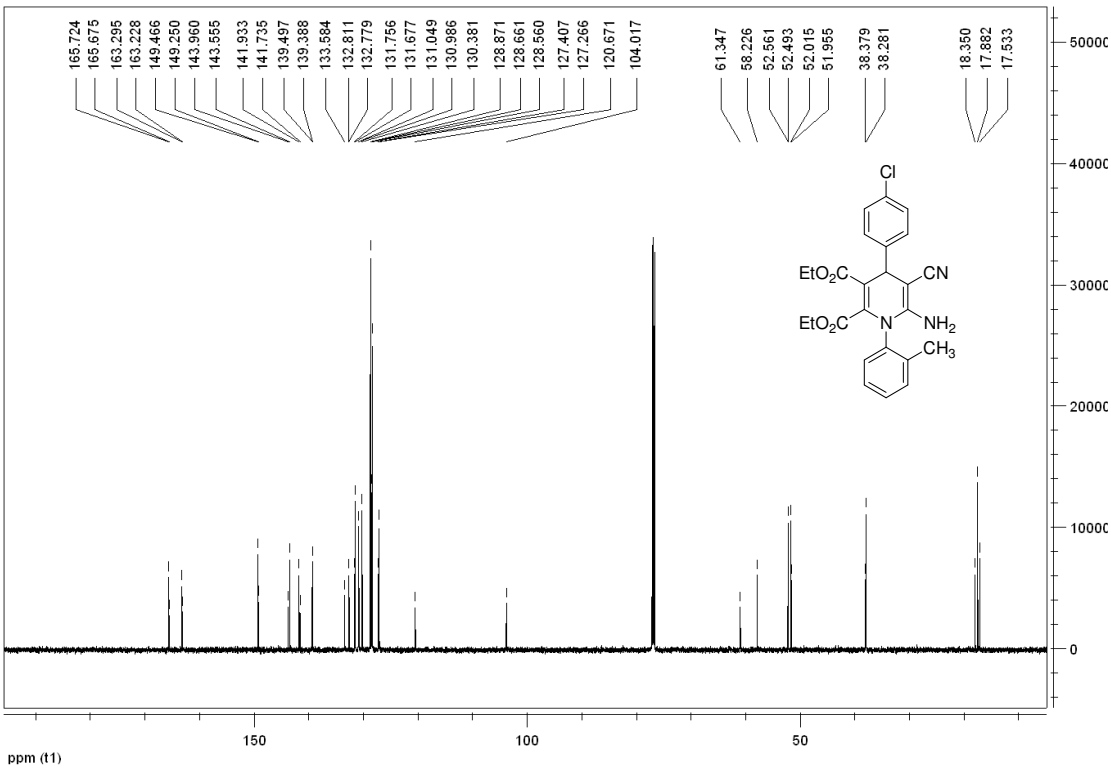
1u: light yellow solid, 81%, m.p.170~171°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.46 (d, *J* = 7.2Hz, 2H, ArH), 7.32 (d, *J* = 7.2Hz, 2H, ArH), 7.27 (d, *J* = 7.8Hz, 2H, ArH), 6.90 (d, *J* = 7.2Hz, 2H, ArH), 4.63 (s, 1H, CH), 4.06~4.03 (m, 2H, CH_2), 4.00 (s, 2H, NH_2), 3.98~3.94 (m, 1H, CH_2), 3.93~3.88 (m, 1H, CH_2), 3.81 (s, 3H, OCH_3), 1.11 (t, *J* = 6.6Hz, 3H, CH_3), 1.00 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.2, 163.0, 158.7, 149.5, 149.0, 137.3, 136.5, 133.8, 131.9, 130.0, 128.3, 120.6, 114.1, 106.1, 63.1, 62.1, 60.9, 55.3, 37.9, 13.9, 13.5; IR (KBr) υ: 3663, 3454, 3321, 3221, 3090, 2980, 2833, 2179, 1744, 1706, 1653, 1574, 1509, 1479, 1418, 1371, 1321, 1241, 1215, 1172, 1108, 1033, 824, 771 cm^{-1}; MS (*m/z*): 482.66 ($[M+1]^+$) 100%, 484.88 ($[M+3]^+$) 58%. Anal Calcd for $C_{25}H_{24}ClN_3O_5$: C 62.31, H 5.02, N 8.72; Found: C 62.55, H 5.29, N 8.56.



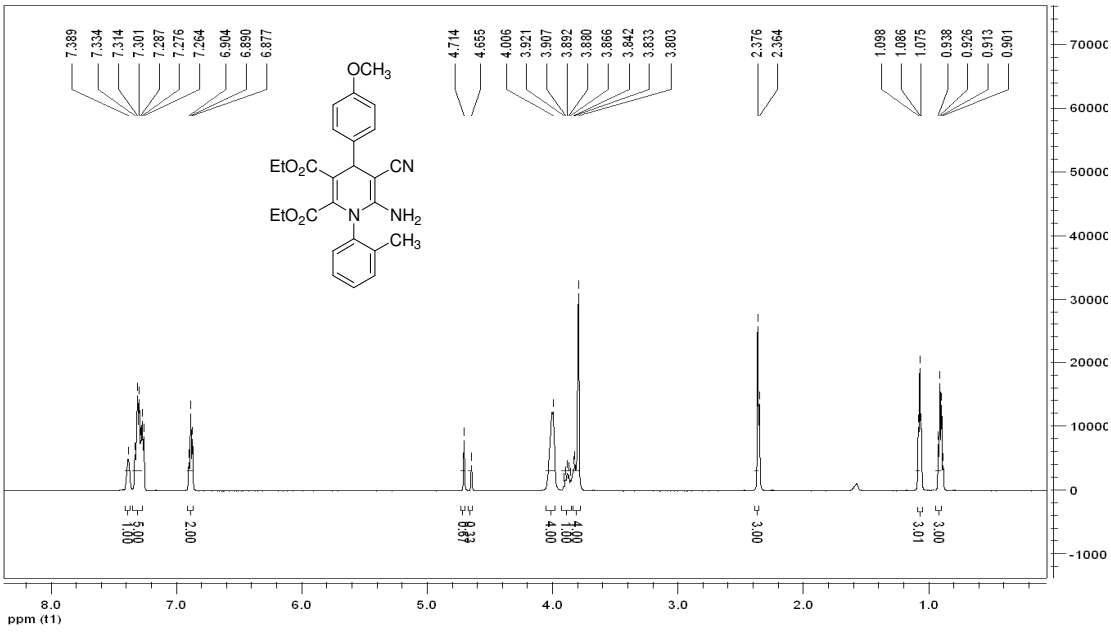


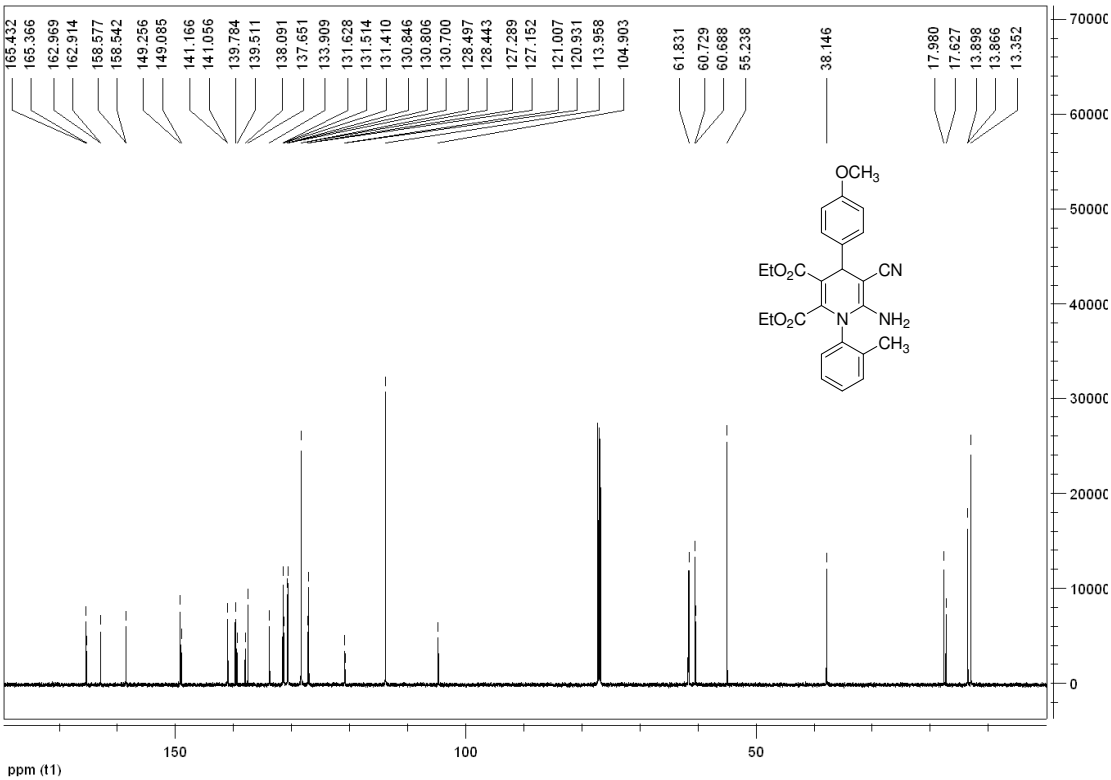
1v: light yellow solid, 85%, m.p.184~185°C; ^{1}H NMR (600 MHz, $CDCl_3$) (2:1) δ: 7.40~7.39 (m, ArH), 7.34~7.30 (m, ArH), 7.25 (m, ArH), 4.73 (s, 0.67H, CH), 4.68 (s, 0.34H, CH), 4.11 (s, 0.67H, NH_2), 4.10 (s, 1.33H, NH_2), 3.58 (s, 2H, OCH_3), 3.56 (s, 1H, OCH_3), 3.42 (s, 2H, OCH_3), 3.39 (s, 1H, OCH_3), 2.35 (s, 1H, CH_3), 2.33 (s, 2H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 165.7, 165.6, 163.3, 163.2, 149.5, 149.3, 144.0, 143.6, 141.9, 139.5, 139.4, 133.6, 132.8, 132.7, 131.8, 131.7, 131.0, 130.9, 130.4, 128.9, 128.7, 128.6, 127.4, 127.3, 120.7, 104.0, 61.3, 58.2, 52.6, 52.5, 52.0, 51.9, 38.4, 38.3, 18.4, 17.9, 17.5; IR (KBr) υ: 3642, 3442, 3325, 3178, 2951, 2182, 1745, 1708, 1652, 1575, 1487, 1413, 1353, 1323, 1250, 1223, 1111, 1051, 1014, 971, 929, 861, 821, 778, 762 cm^{-1}; MS (*m/z*): 438.51 ($[M+1]^+$) 100%, 440.65 ($[M+3]^+$) 62%. Anal Calcd for $C_{23}H_{20}ClN_3O_4$: C 63.09, H 4.60, N 9.60; Found: C 62.78, H 4.75, N 9.53.



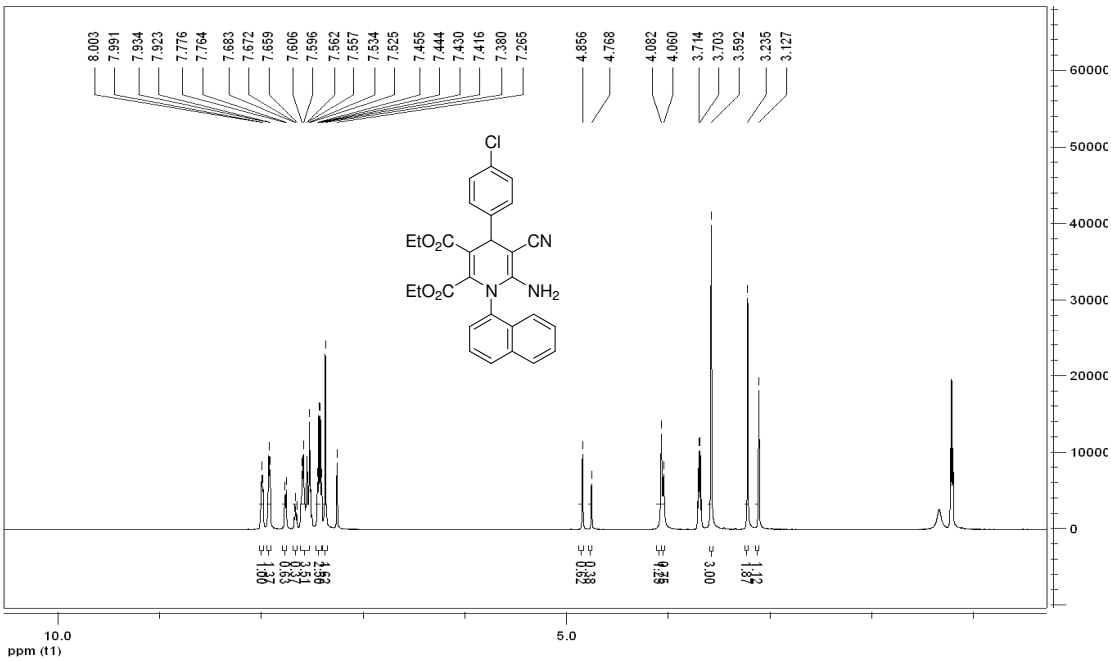


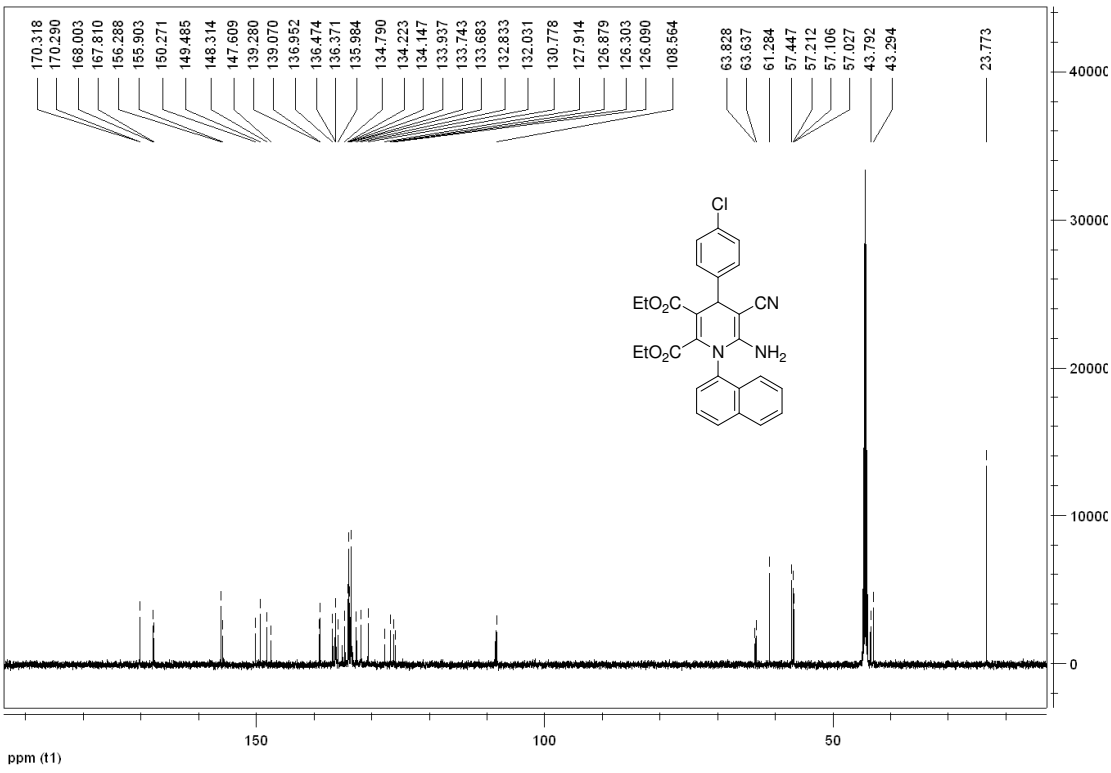
1w: light yellow solid, 80%, m.p.136~138°C;^{1}H NMR (600 MHz, $CDCl_3$) (2:1) δ: 7.39 (s, ArH), 7.33 ~7.28 (m, ArH), 6.90~6.88 (m, ArH), 4.71 (s, 0.67H, CH), 4.66 (s, 0.33H, CH), 4.01 (brs, 4H, NH_2, CH_2), 3.92~3.87 (m, 1H, CH_2), 3.84~3.80 (m, 4H, OCH_3, CH_2), 2.38~2.36 (m, 3H, CH_3), 1.10~1.08 (m, 3H, CH_3), 0.94~0.90 (m, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ:165.4, 165.3, 163.0, 162.9, 158.6, 158.5, 149.3, 149.1, 141.2, 141.1, 139.8, 139.6, 138.1, 137.7, 133.9, 131.6, 131.5, 131.4, 130.8, 130.7, 128.5, 128.4, 127.3, 127.2, 121.0, 120.9, 114.0, 104.9, 61.8, 60.7, 55.2, 38.1, 18.0, 17.6, 13.9, 13.8, 13.4; IR(KBr) υ: 3642, 3453, 3324, 3057, 2984, 2932, 2903, 2833, 2182, 1747, 1701, 1646, 1608, 1567, 1508, 1461, 1420, 1393, 1370, 1340, 1311, 1247, 1200, 1172, 1111, 1030, 989, 860, 831, 780cm^{-1}; MS (*m/z*): 462.51 ([M+1]$^{+}$) 100%. Anal Calcd for $C_{22}H_{17}Cl_2N_3O_4$: C 57.66, H 3.74, N 9.17; Found: C 57.39, H 4.10, N 8.76.



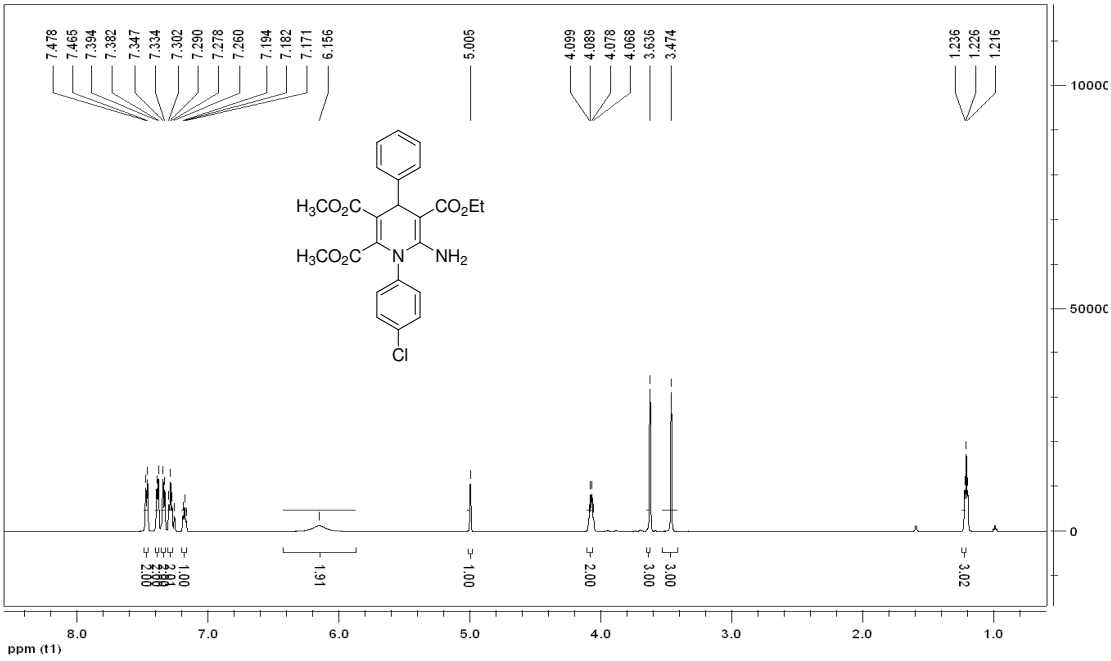


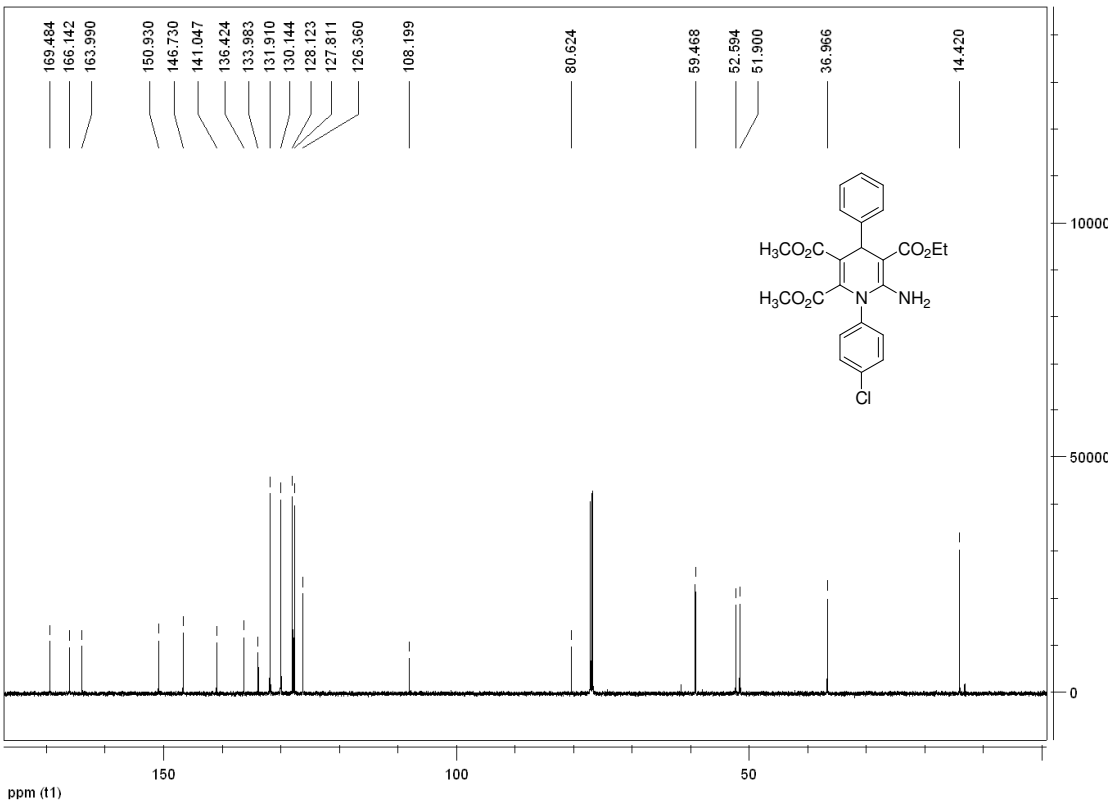
1x: yellow solid, 96%, m.p.154~155°C; ^{1}H NMR (600 MHz, $CDCl_3$) (5:3) δ: 8.00~7.99 (m, ArH), 7.93~7.92 (m, ArH), 7.77 (d, *J* =7.2Hz, ArH), 7.68~7.66 (m, ArH), 7.61~7.53 (m, ArH), 7.46~7.42 (m, ArH), 7.38 (s, ArH), 4.86 (s, 0.62H, CH), 4.77 (s, 0.38H, CH), 4.08 (s, 1.25H, NH_2), 4.06 (s, 0.75H, NH_2), 3.59 (s, 3H, OCH_3), 3.24 (s, 1.87H, OCH_3), 3.13 (s, 1.12H, OCH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ:170.3, 170.2, 168.0, 167.8, 156.3, 155.9, 150.3, 149.5, 148.3, 147.6, 139.3, 139.1, 136.5, 136.4, 136.0, 134.8, 134.2, 134.1, 133.9, 133.7, 133.6, 132.8, 132.0, 130.8, 127.9, 126.9, 126.3, 108.6, 63.8, 63.6, 61.3, 57.4, 57.2, 57.1, 57.0, 43.8, 43.3, 23.8; IR (KBr) υ: 3530, 3433, 3337, 3225, 2952, 2177, 1743, 1708, 1651, 1571, 1486, 1420, 1352, 1320, 1230, 1119, 1039, 1010, 964, 927, 847, 838, 806, 770 cm^{-1}; MS (*m/z*): 474.34 ($[M+1]^+$) 100%, 476.15 ($[M+3]^+$) 29%. Anal Calcd for $C_{26}H_{20}ClN_3O_4$: C 65.99, H 4.25, N 8.87; Found: C 65.64, H 4.57, N 8.49.



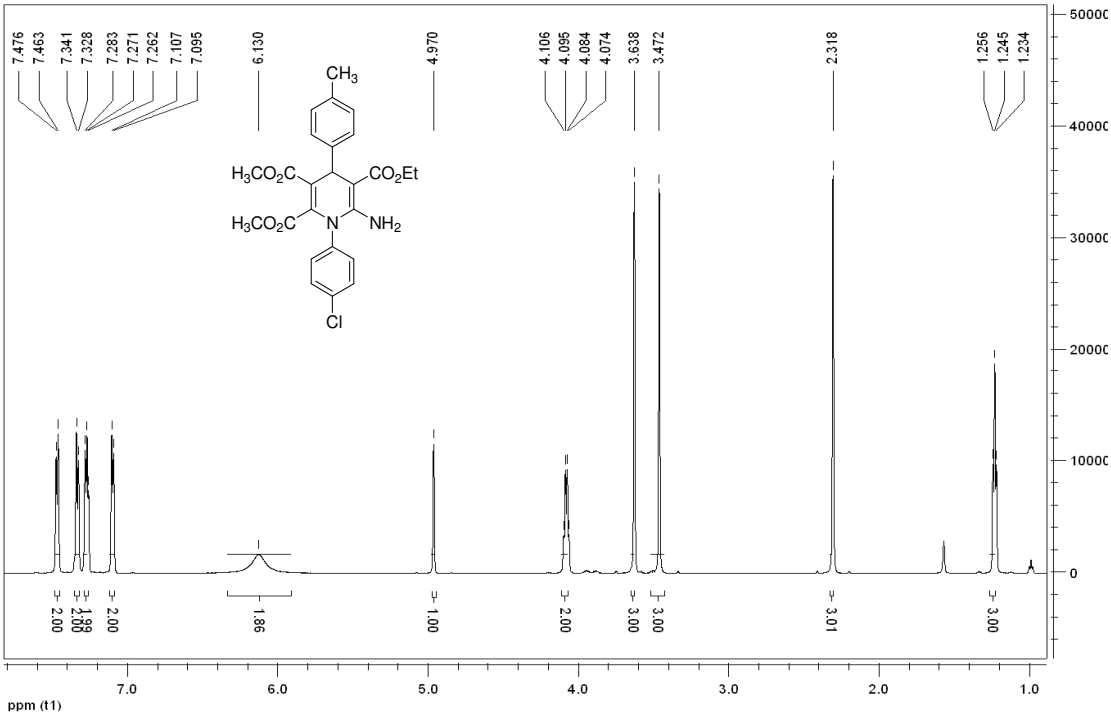


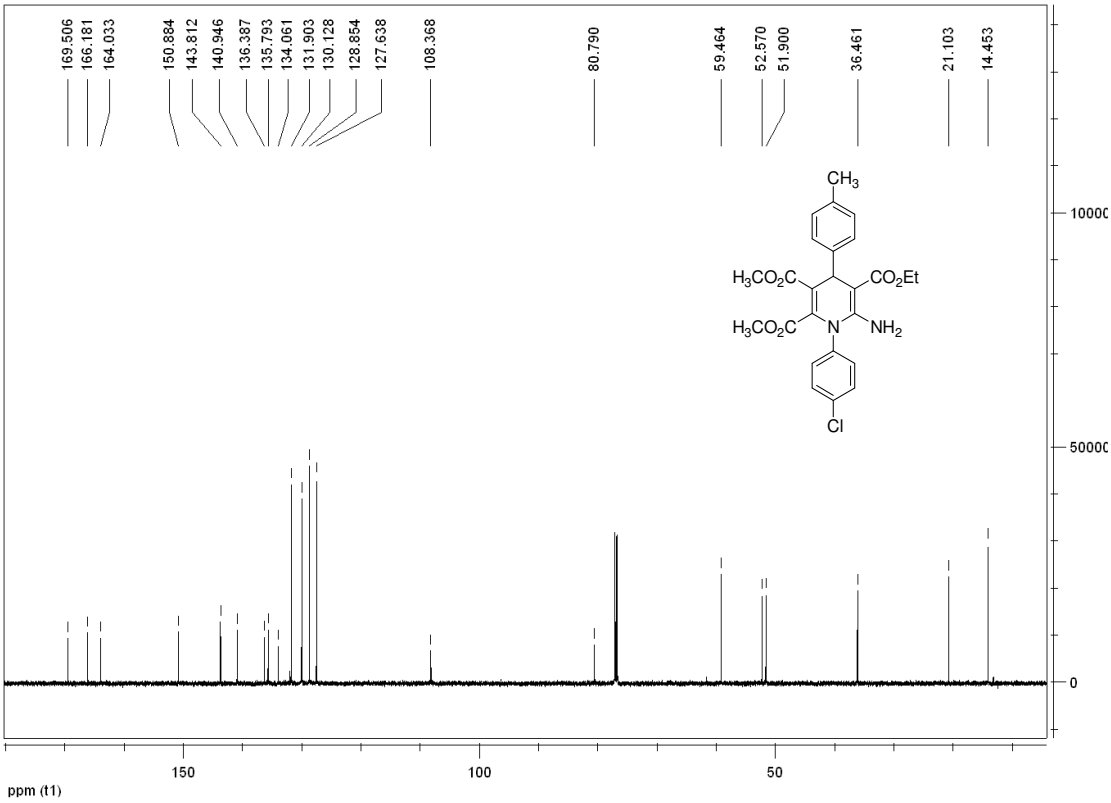
2a: light yellow solid, 86%, m.p.185~186°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.47 (d, *J* = 7.8Hz, 2H, ArH), 7.39 (d, *J* = 7.2Hz, 2H, ArH), 7.34 (d, *J* = 7.8Hz, 2H, ArH), 7.29 (t, *J* = 7.2Hz, 2H, ArH), 7.18 (t, *J* = 7.2Hz, 1H, ArH), 6.16 (brs, 2H, NH_2), 5.01 (s, 1H, CH), 4.08 (q, *J* = 6.0Hz, 2H, CH_2,), 3.64 (s, 3H, OCH_3), 3.47 (s, 3H, OCH_3), 1.23 (t, *J* = 6.0Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.5, 166.1, 164.0, 150.9, 146.7, 141.0, 136.4, 134.0, 131.9, 130.1, 128.1, 127.8, 126.4, 108.2, 80.6, 59.5, 52.6, 51.9, 37.0, 14.4; IR (KBr) υ: 3451, 3262, 2982, 2950, 1749, 1709, 1668, 1601, 1512, 1442, 1400, 1328, 1214, 1107, 1042, 933, 832, 762 cm^{-1}; MS(*m/z*): 471.62 ($[M+1]^+$) 100%, 473.22 ($[M+3]^+$) 90%. Anal Calcd for $C_{24}H_{23}ClN_2O_6$: C 61.21, H 4.92, N 5.95; Found: C 61.45, H 4.78, N 5.75.



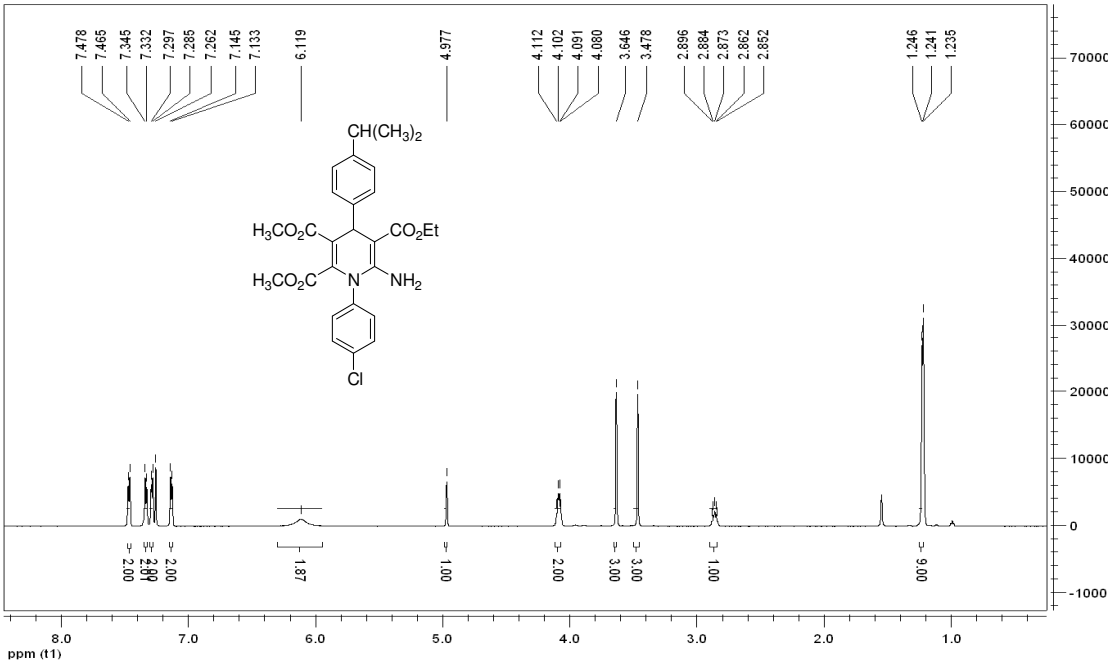


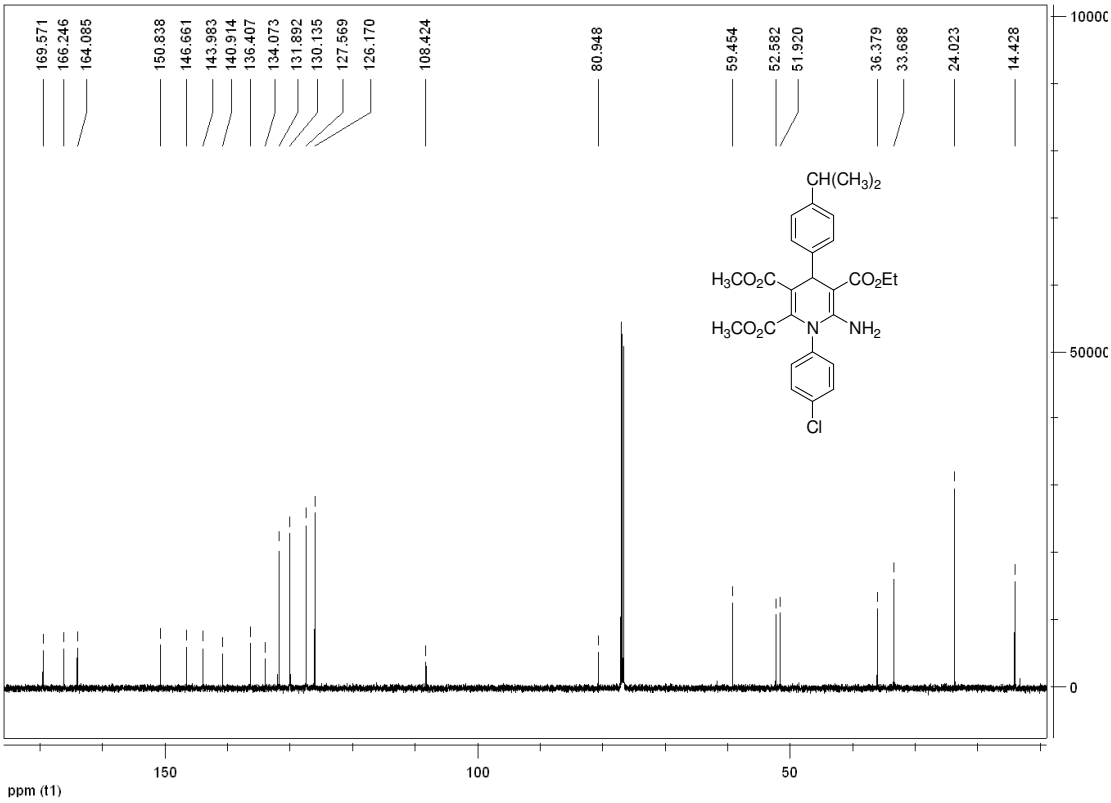
2b: white solid, 82%, m.p.191~192°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.47 (d, *J* = 7.8Hz, 2H, ArH), 7.33 (d, *J* = 7.8Hz, 2H, ArH), 7.28 (d, *J* = 7.2Hz, 2H, ArH), 7.10 (d, *J* = 7.2Hz, 2H, ArH), 6.16 (brs, 2H, NH_2), 4.97 (s, 1H, CH), 4.09 (q, *J* = 6.6Hz, 2H, CH_2,), 3.64 (s, 3H, OCH_3), 3.47 (s, 3H, OCH_3), 2.32 (s, 3H, CH_3), 1.25 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.5, 166.2, 164.0, 150.9, 143.8, 140.9, 136.4, 135.8, 134.1, 131.9, 130.1, 128.9, 127.6, 108.4, 80.8, 59.5, 52.6, 51.9, 36.5, 21.1, 14.4; IR (KBr) υ: 3396, 3273, 2952, 1744, 1712, 1656, 1495, 1430, 1330, 1214, 1094, 792, 753 cm^{-1}; MS (*m/z*): 485.51 ($[M+1]^+$) 100%, 47.20 ($[M+3]^+$) 39%. Anal Calcd for $C_{25}H_{25}ClN_2O_6$: C 61.92, H 5.20, N 5.78; Found: C 61.68, H 5.63, N 5.44.



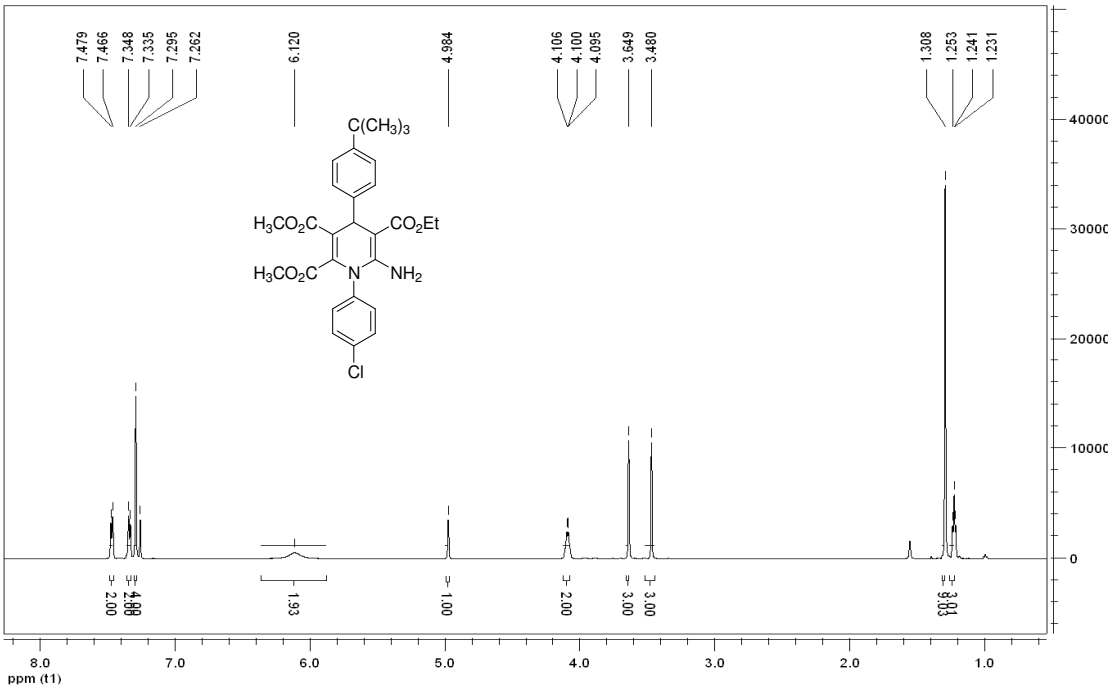


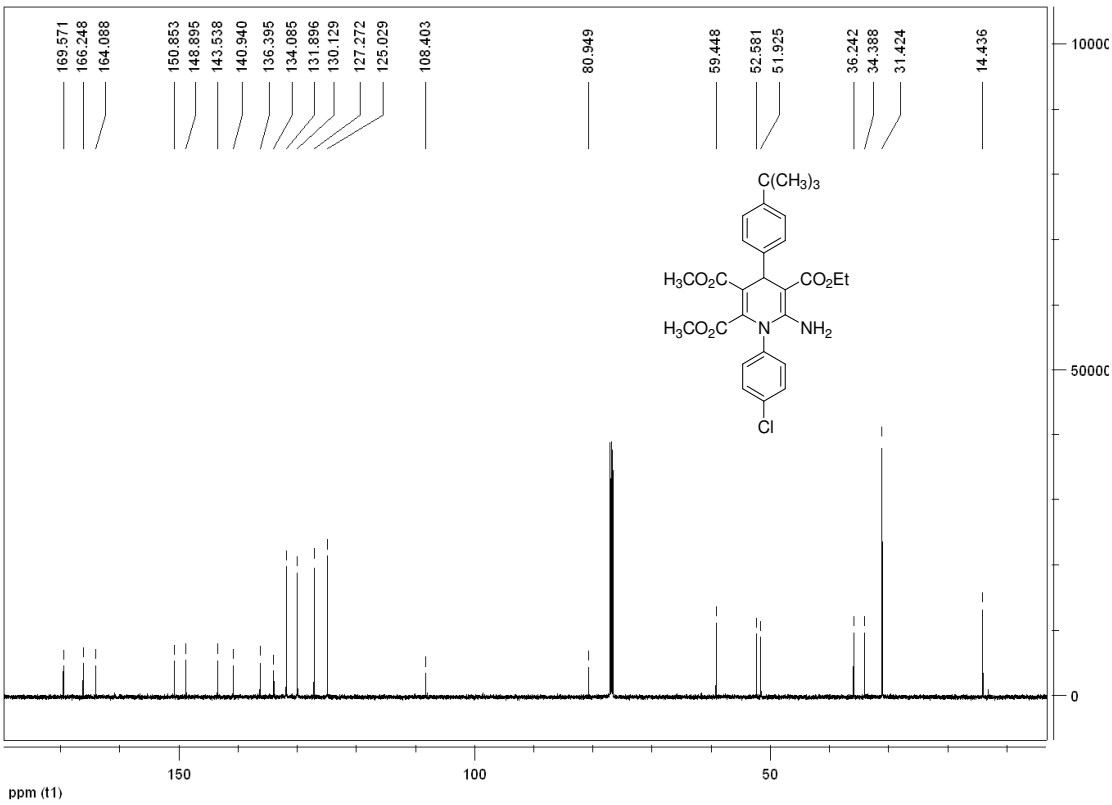
2c: hite solid, 87%, m.p.151~152°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.47 (d, *J* = 7.8Hz, 2H, ArH), 7.34 (d, *J* = 7.8Hz, 2H, ArH), 7.29 (d, *J* = 7.2Hz, 2H, ArH), 7.14 (d, *J* = 7.2Hz, 2H, ArH), 6.12 (brs, 2H, NH_2), 4.98 (s, 1H, CH), 4.10 (q, *J* = 6.6Hz, 2H, CH_2,), 3.65 (s, 3H, OCH_3), 3.48 (s, 3H, OCH_3), 2.90~2.85 (m, 1H, CH), 1.25~1.24 (m, 9H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.6, 166.2, 164.1, 150.8, 146.7, 144.0, 140.9, 136.4, 134.1, 131.9, 130.1, 127.6, 126.2, 108.4, 80.9, 59.4, 52.6, 51.9, 36.4, 33.7, 24.0, 14.4; IR (KBr) υ: 3386, 3264, 2959, 1744, 1712, 1657, 1490, 1429, 1327, 1208, 1090, 1021, 931, 828, 784, 751 cm^{-1}; MS (*m/z*): 513.05 ($[M+1]^+$) 100%, 515.36 ($[M+3]^+$) 37%. Anal Calcd for $C_{27}H_{29}ClN_2O_6$: C 63.22, H 5.70, N 5.46; Found: C 62.84, H 6.03, N 5.40.



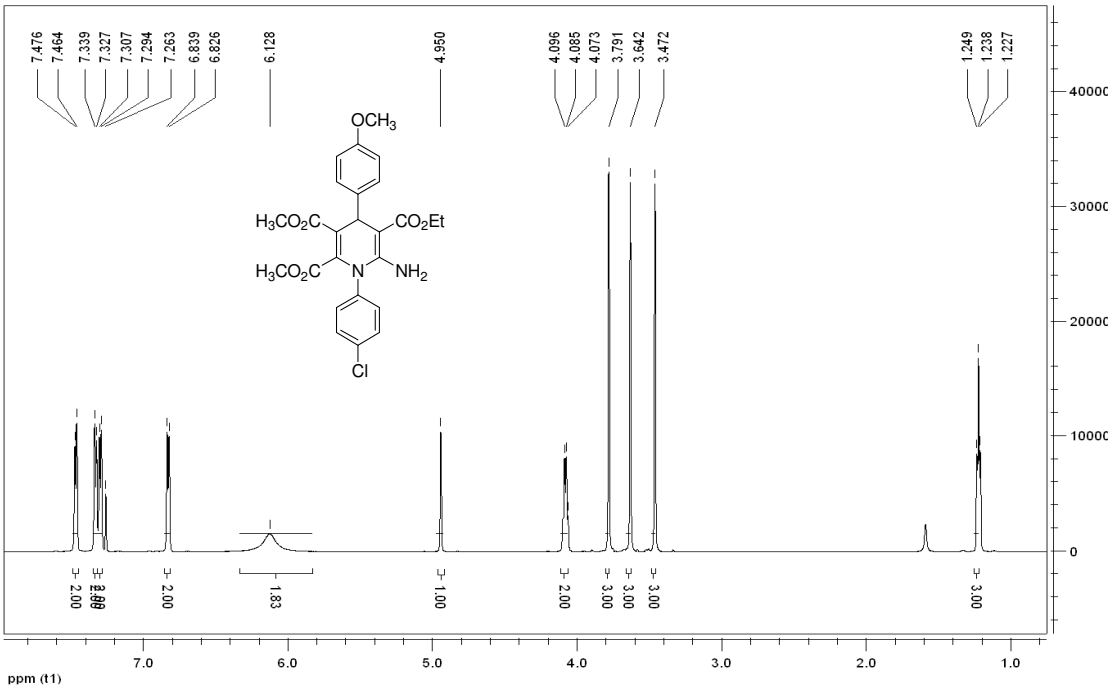


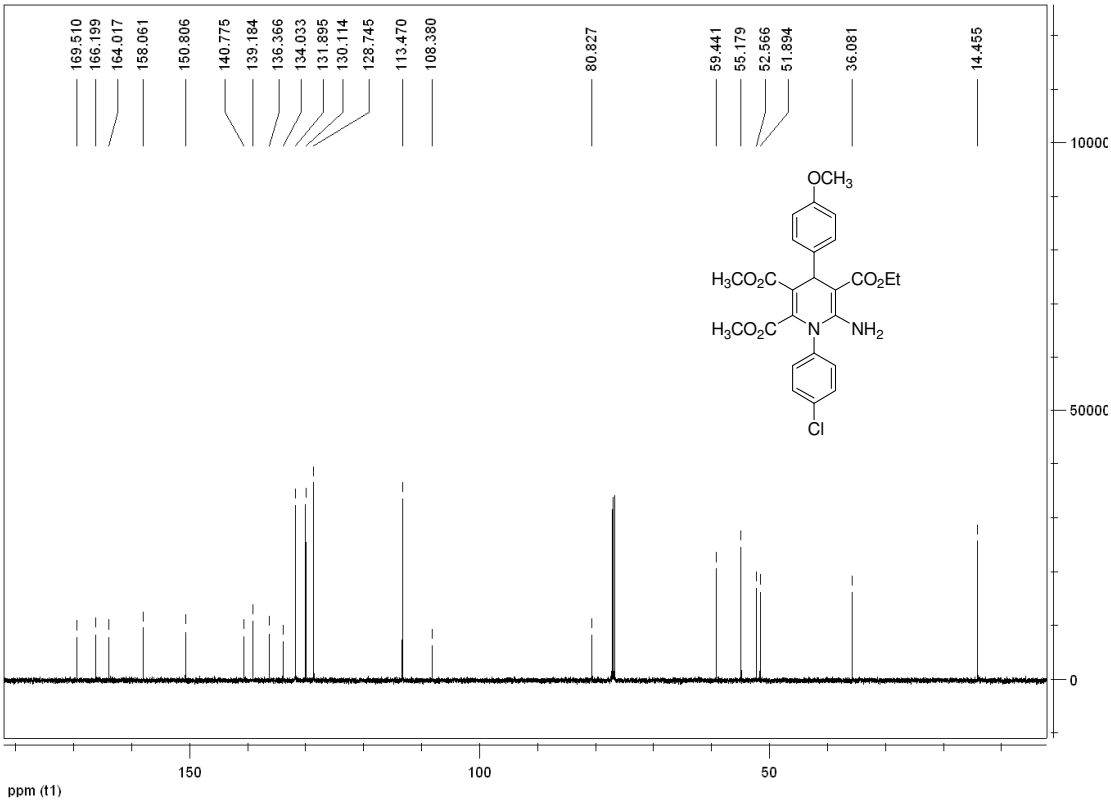
2d: white solid, 87%, m.p.162~163°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.47 (d, *J* = 7.8Hz, 2H, ArH), 7.34 (d, *J* = 7.8Hz, 2H, ArH), 7.30 (s, 4H, ArH), 6.12 (brs, 2H, NH_2), 4.98 (s, 1H, CH), 4.11~4.10 (m, 2H, CH_2,), 3.65 (s, 3H, OCH_3), 3.48 (s, 3H, OCH_3), 1.31 (s, 9H, CH_3), 1.24 (t, *J* = 6.0Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.6, 166.2, 164.1, 150.8, 148.9, 143.5, 140.9, 136.4, 134.1, 131.9, 130.1, 127.3, 125.0, 108.4, 80.9, 59.4, 52.6, 51.9, 36.2, 34.4, 31.4, 14.4; IR (KBr) υ: 3387, 3263, 2959, 1744, 1713, 1657, 1612, 1490, 1431, 1369, 1329, 1209, 1091, 1021, 931, 826, 782 cm^{-1}; MS (*m/z*): 527.42 ($[M+1]^+$) 100%, 529.36 ($[M+3]^+$) 58%. Anal Calcd for $C_{28}H_{31}ClN_2O_6$: C 63.81, H 5.93, N 5.32; Found: C 63.57, H 6.31, N 5.11.



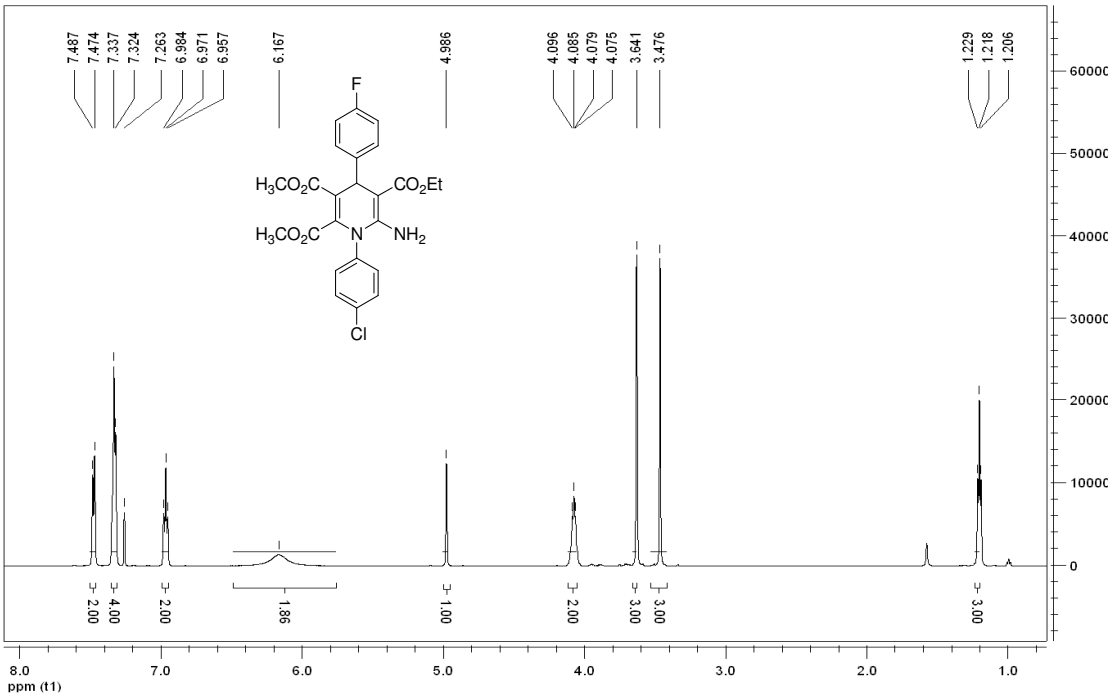


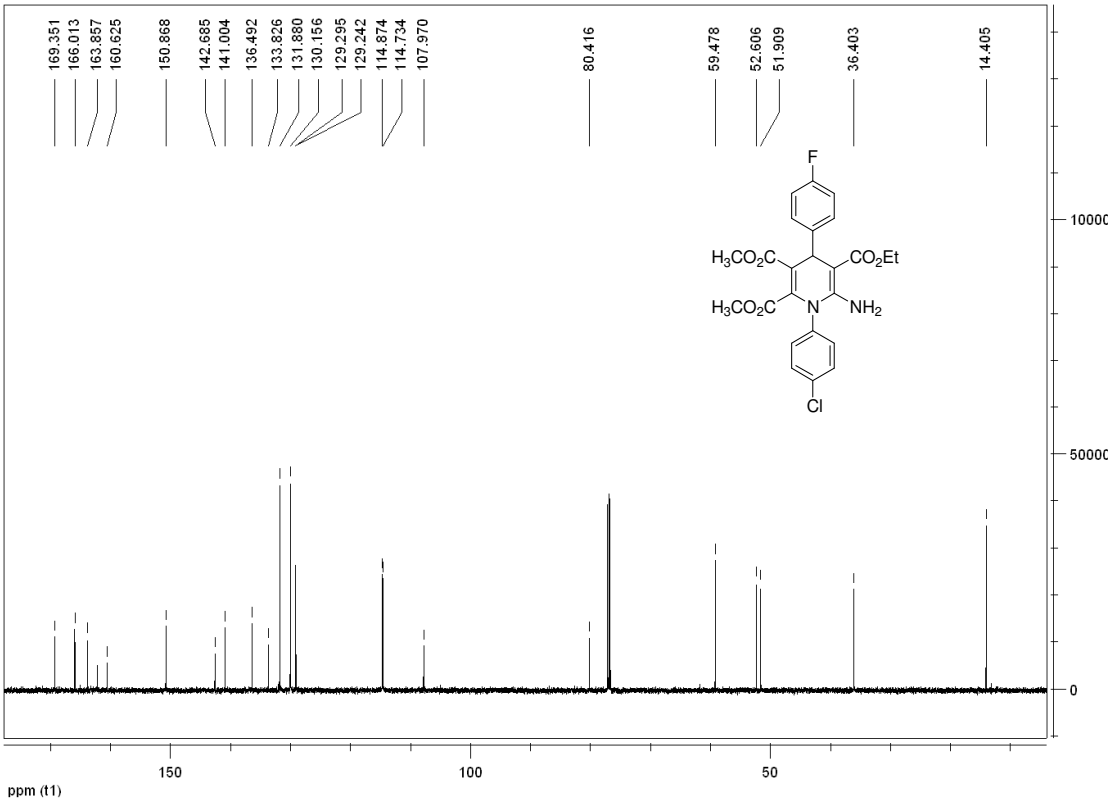
2e: white solid, 86%, m.p.181~182°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.47 (d, *J* = 7.2Hz, 2H, ArH), 7.33 (d, *J* = 7.2Hz, 2H, ArH), 7.30 (d, *J* = 7.8Hz, 2H, ArH), 6.83 (d, *J* = 7.8Hz, 2H, ArH), 6.13 (brs, 2H, NH_2), 4.95 (s, 1H, CH), 4.10~4.07 (m, 2H, CH_2), 3.79 (s, 3H, OCH_3), 3.64 (s, 3H, OCH_3), 3.47 (s, 3H, OCH_3), 1.24 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.5, 166.2, 164.0, 158.1, 150.8, 140.8, 139.2, 136.4, 134.0, 131.9, 130.1, 128.7, 113.5, 108.4, 80.8, 59.4, 55.2, 52.6, 51.9, 36.1, 14.4; IR (KBr) υ: 3389, 3274, 2951, 1742, 1712, 1655, 1499, 1327, 1214, 1092, 1028, 931, 824, 792 cm^{-1}; MS (*m/z*): 501.55 ($[M+1]^+$) 100%, 503.20 ($[M+3]^+$) 39%. Anal Calcd for $C_{54}H_{25}ClN_2O_7$: C 59.94, H 5.03, N 5.59; Found: C 59.57, H 5.39, N 5.22.



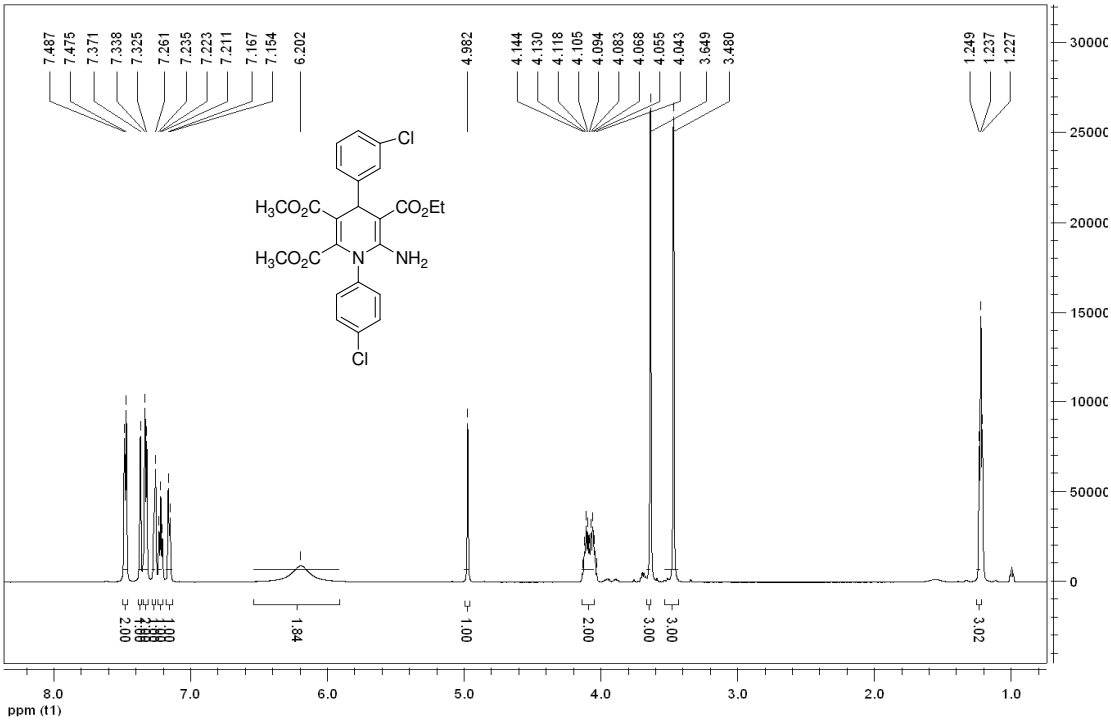


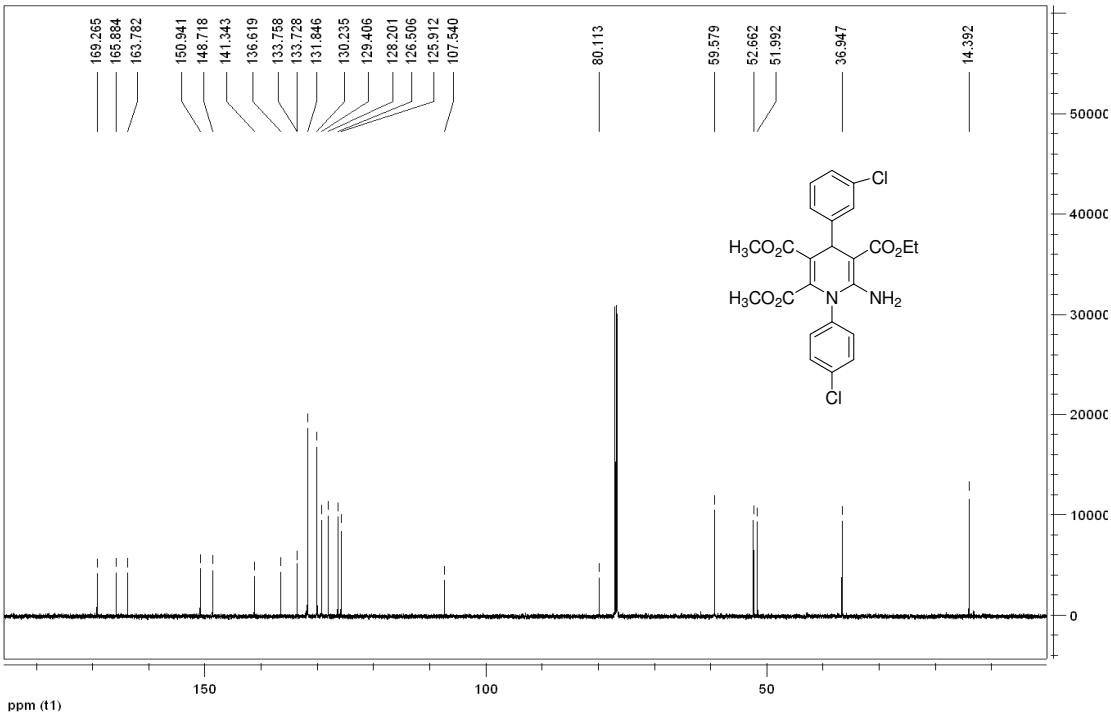
2f: light yellow solid, 89%, m.p.180~181°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.48 (d, *J* = 7.8Hz, 2H, ArH), 7.33 (d, *J* = 7.8Hz, 4H, ArH), 6.97 (t, *J* = 7.8Hz, 2H, ArH), 6.17 (brs, 2H, NH_2), 4.99 (s, 1H, CH), 4.10~4.08 (m, 2H, CH_2), 3.64 (s, 3H, OCH_3), 3.48 (s, 3H, OCH_3), 1.22 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.4, 166.0, 163.9, 160.6, 150.9, 142.7, 141.0, 136.5, 133.8, 131.9, 130.2, 129.3, 129.2, 114.9, 114.7, 108.0, 80.4, 59.5, 52.6, 51.9, 36.4, 14.4; IR (KBr) υ: 3454, 3264, 2982, 1749, 1706, 1670, 1601, 1509, 1439, 1401, 1326, 1233, 1097, 931, 834, 800 cm^{-1}; MS (*m/z*): 489.49 ($[M+1]^+$) 100%, 491.19 ($[M+3]^+$) 38%. Anal Calcd for $C_{24}H_{22}ClFN_2O_6$: C 58.96, H 4.54, N 5.73; Found: C 58.65, H 4.80, N 5.46.



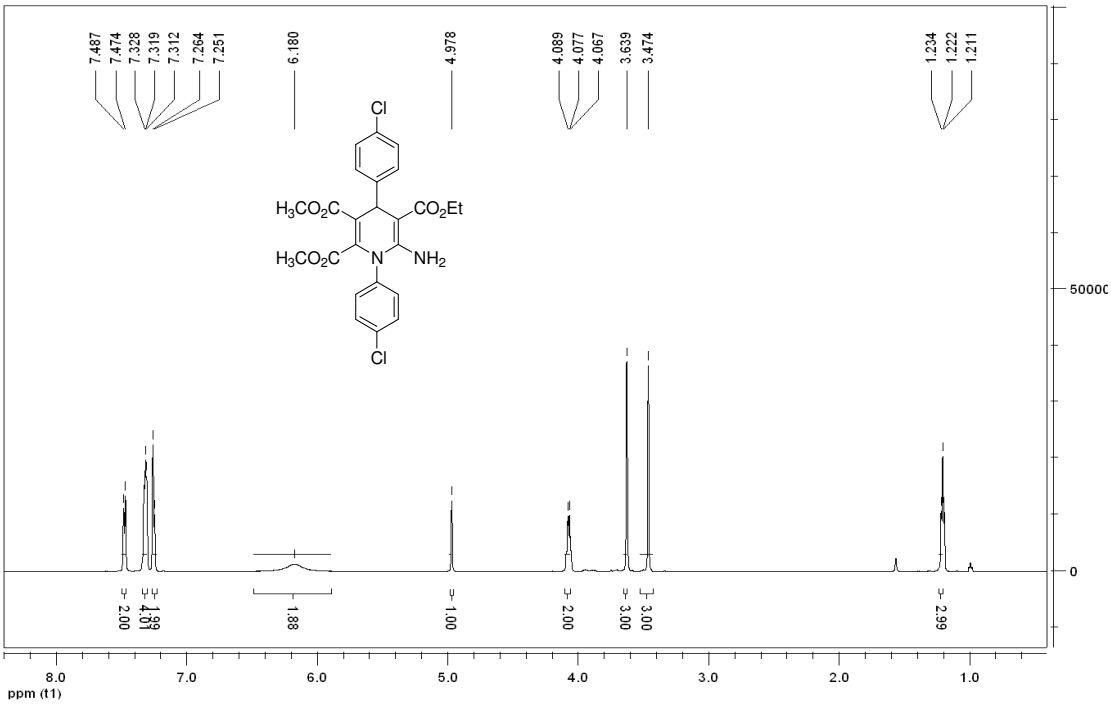


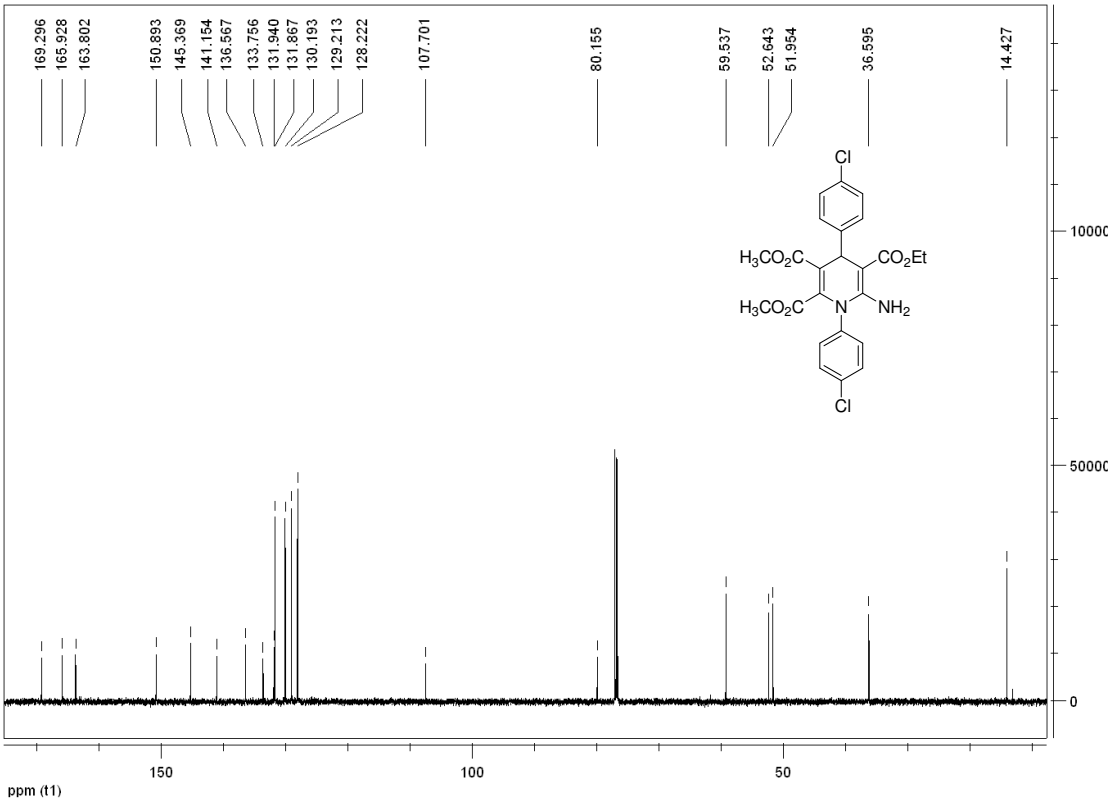
2g: white solid, 82%, m.p.140~141°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.48 (d, *J* = 7.2Hz, 2H, ArH), 7.37 (s, 1H, ArH), 7.33 (d, *J* = 7.8Hz, 2H, ArH), 7.26 (brs, 1H, ArH), 7.22 (t, *J* = 7.2Hz, 1H, ArH), 7.16 (d, *J* = 7.8Hz, 1H, ArH), 6.20 (brs, 2H, NH_2), 4.98 (s, 1H, CH), 4.14~4.04 (m, 2H, CH_2), 3.65 (s, 3H, OCH_3), 3.48 (s, 3H, OCH_3), 1.24 (t, *J* = 6.0Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.3, 165.9, 163.8, 150.9, 148.7, 141.3, 136.6, 133.8, 133.7, 131.8, 130.2, 129.4, 128.2, 126.5, 125.9, 107.5, 80.1, 59.6, 52.7, 52.0, 36.9, 14.4; IR (KBr) υ: 3444, 3226, 2951, 1753, 1704, 1660, 1596, 1505, 1436, 1338, 1236, 1091, 875, 822, 781cm^{-1}; MS(*m/z*): 505.42 ($[M+1]^+$) 100%, 507.18 ($[M+3]^+$) 76%, 509.08 ($[M+5]^+$) 13%. Anal Calcd for $C_{24}H_{22}Cl_2N_2O_6$: C 57.04, H 4.39, N 5.54; Found: C 56.82, H 4.50, N 5.23.



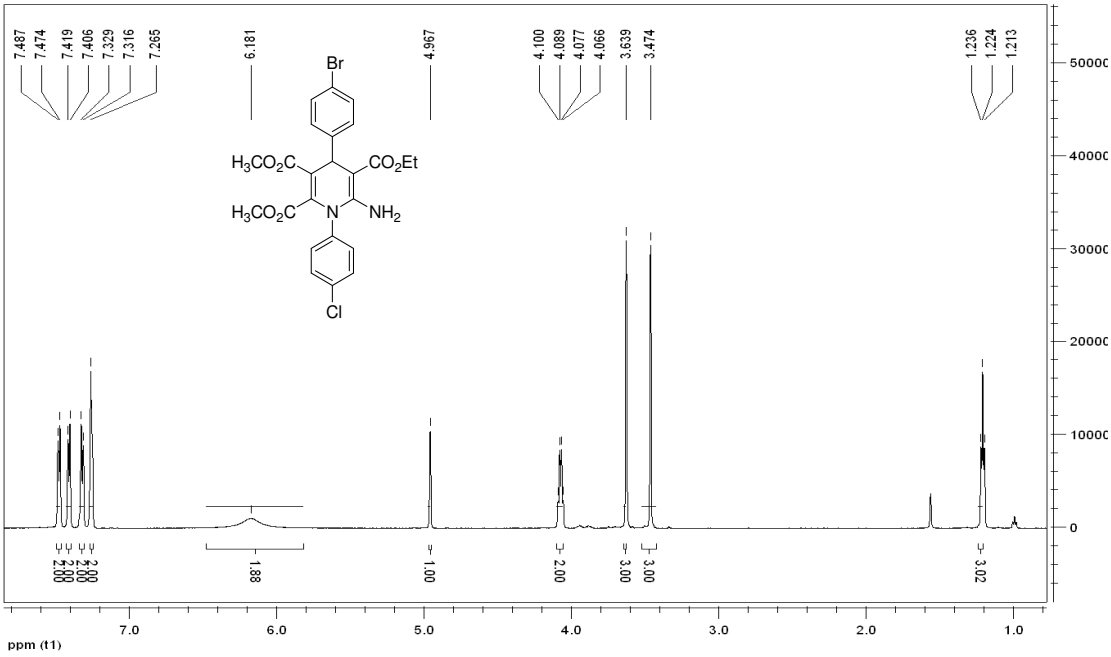


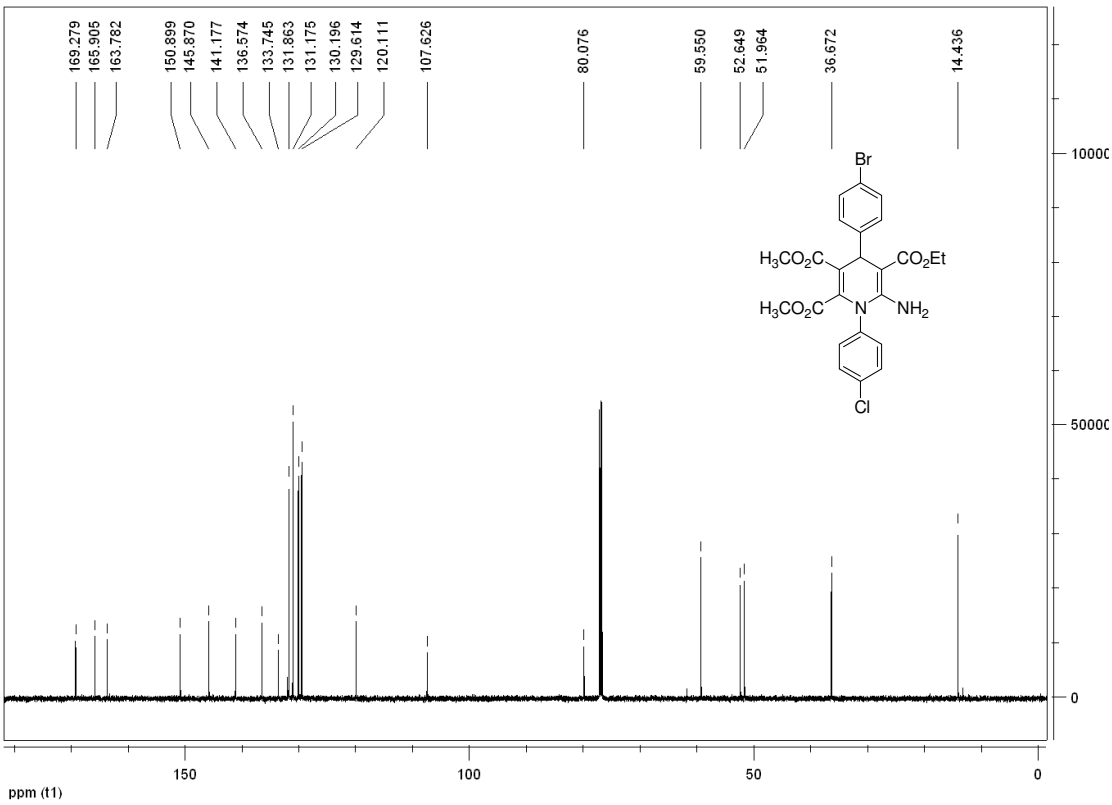
2h: light yellow solid, 81%, m.p.180~181°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.48 (d, *J* = 7.8Hz, 2H, ArH), 7.33~7.31 (m, 4H, ArH), 7.26 (d, *J* = 7.8Hz, 2H, ArH), 6.18 (brs, 2H, NH_2), 4.98 (s, 1H, CH), 4.09~4.07 (m, 2H, CH_2), 3.64 (s, 3H, OCH_3), 3.47 (s, 3H, OCH_3), 1.22 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.3, 165.9, 163.8, 150.9, 145.4, 141.2, 136.6, 133.8, 131.9, 131.8, 130.2, 129.2, 128.2, 107.7, 80.2, 59.5, 52.6, 52.0, 36.6, 14.2; IR (KBr) υ: 3454, 3257, 2980, 1734, 1708, 1663, 1595, 1499, 1438, 1406, 1328, 1212, 1092, 1043, 1013, 933, 828, 780 cm^{-1}; MS (*m/z*): 505.54 ($[M+1]^+$) 100%, 507.27 ($[M+3]^+$) 80%, 509.17 ($[M+5]^+$) 17%. Anal Calcd for $C_{24}H_{22}Cl_2N_2O_6$: C 57.04, H 4.39, N 5.54; Found: C 56.75, H 4.66, N 5.40.



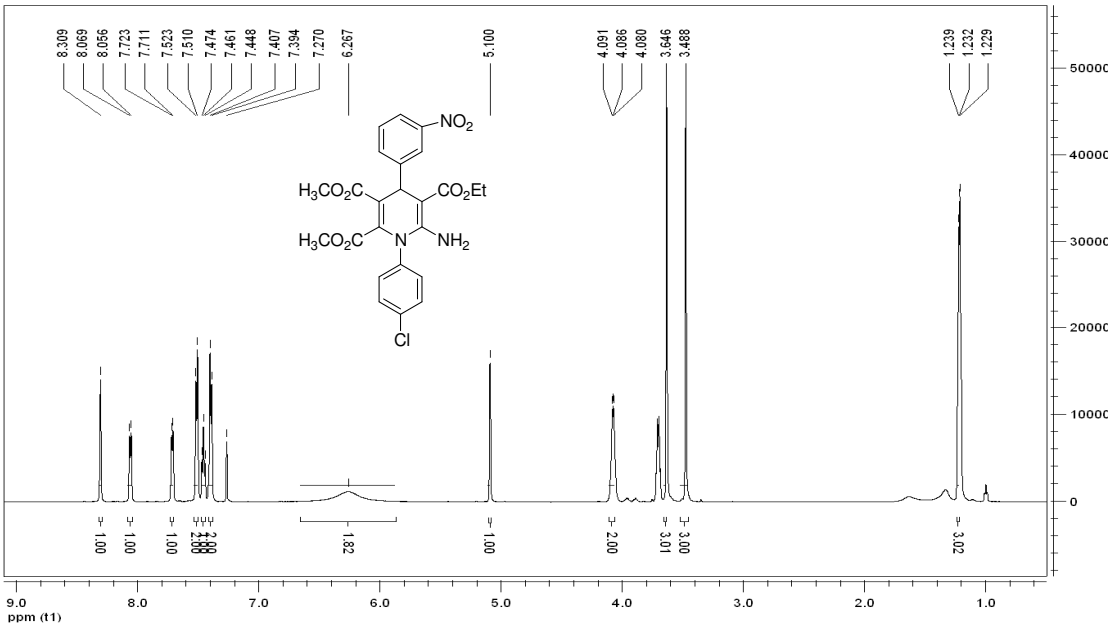


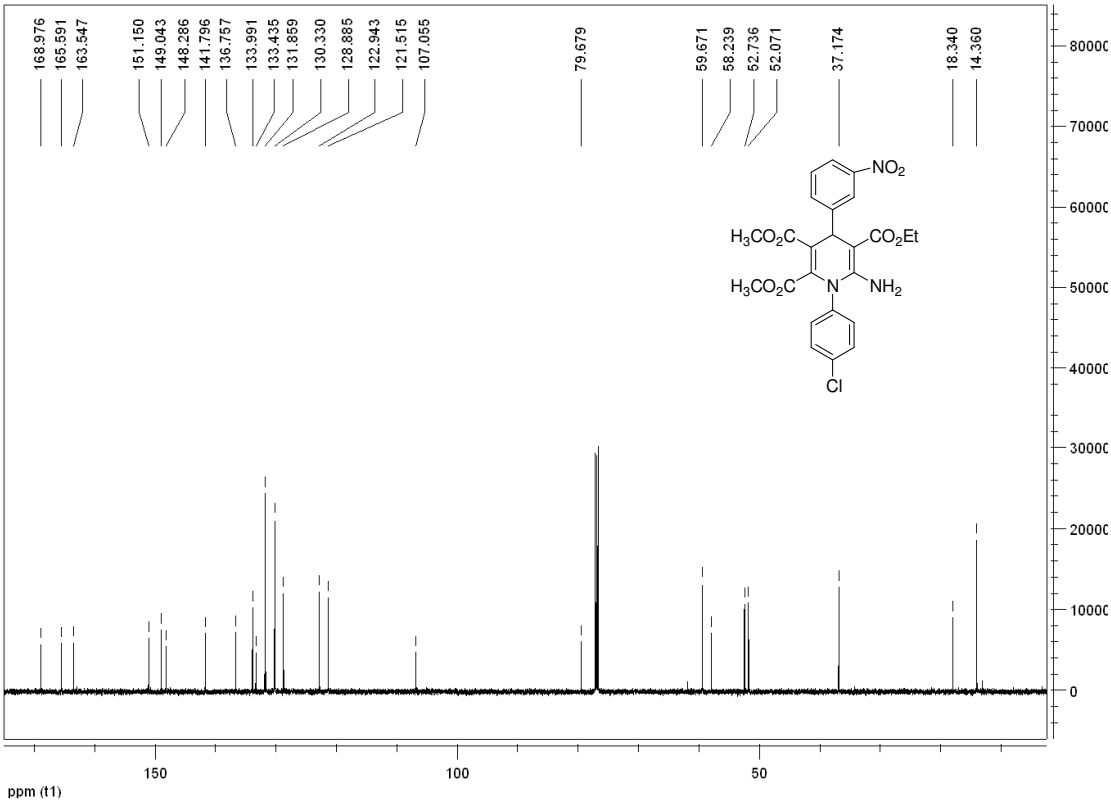
2i: light yellow solid, 88%, m.p.179~180°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.48 (d, *J* = 7.8Hz, 2H, ArH), 7.41 (d, *J* = 7.8Hz, 2H, ArH), 7.32 (d, *J* = 7.8Hz, 2H, ArH), 7.27 (brs, 2H, ArH), 6.18 (brs, 2H, NH_2), 4.97 (s, 1H, CH), 4.08 (q, *J* = 6.6Hz, 2H, CH_2), 3.64 (s, 3H, OCH_3), 3.47 (s, 3H, OCH_3), 1.22 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.3, 165.9, 163.8, 150.9, 145.9, 141.2, 136.6, 133.7, 131.9, 131.2, 130.2, 129.6, 120.1, 107.6, 80.1, 59.6, 52.6, 52.0, 36.7, 14.4; IR (KBr) υ: 3452, 3256, 2977, 1735, 1708, 1664, 1594, 1498, 1437, 1405, 1327, 1210, 1092, 1010, 931, 826, 778 cm^{-1}; MS (*m/z*): 549.55 ($[M+1]^+$) 72%, 551.17 ($[M+3]^+$) 100%, 553.05 ($[M+5]^+$) 16%. Anal Calcd for $C_{24}H_{22}BrClN_2O_6$: C 52.43, H 4.03, N 5.10; Found: C 52.37, H 4.36, N 4.85.



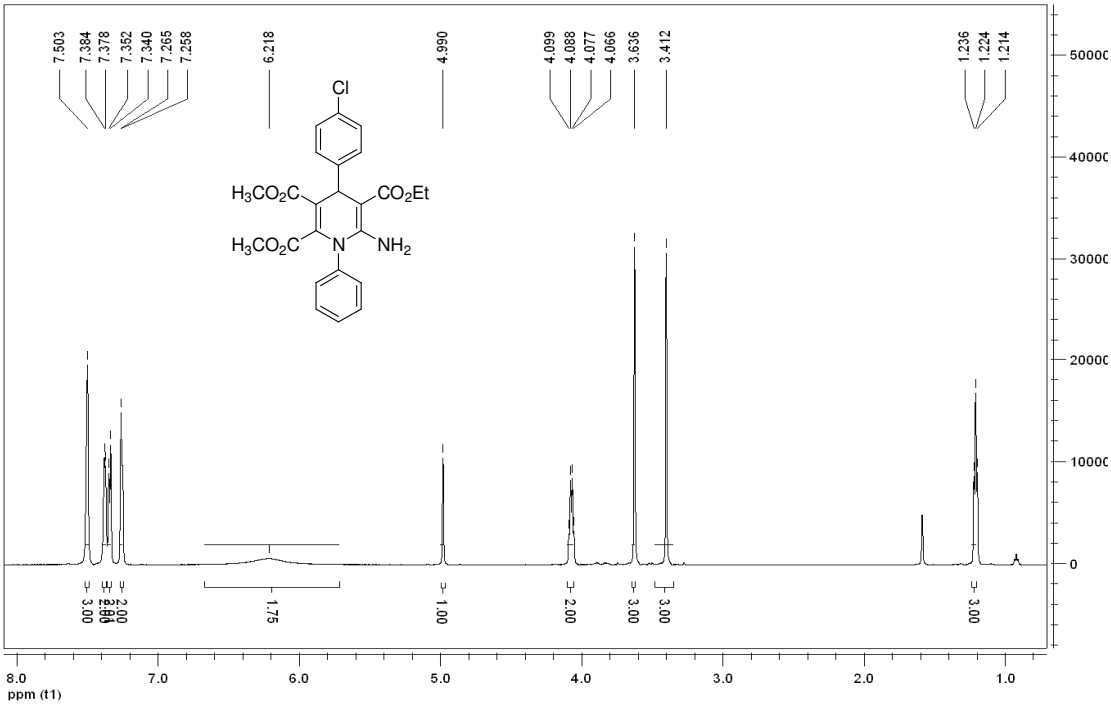


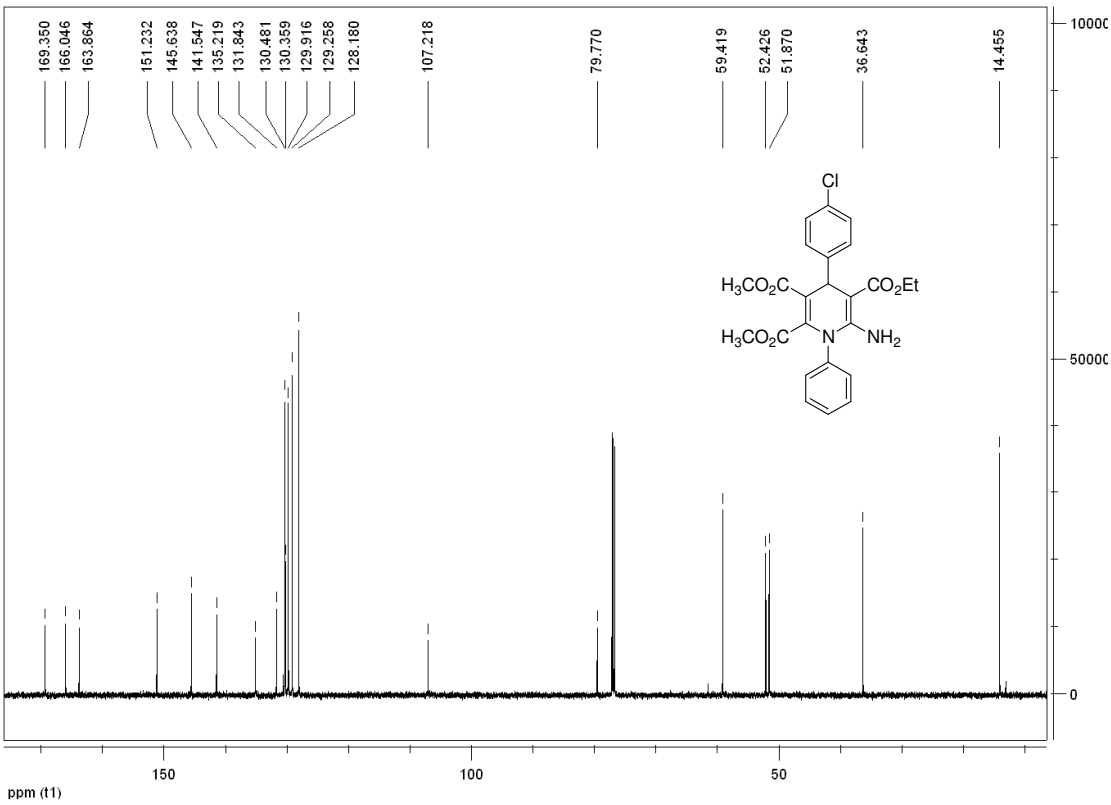
2j: light yellow solid, 94%, m.p.186~187°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 8.31 (s, 1H, ArH), 8.06 (d, *J* = 7.8Hz, 1H, ArH), 7.72 (d, *J* = 7.2Hz, 1H, ArH), 7.52 (d, *J* = 7.8Hz, 2H, ArH), 7.46 (t, *J* = 7.8Hz, 1H, ArH), 7.40 (d, *J* = 7.8Hz, 2H, ArH), 6.27 (brs, 2H, NH_2), 5.10 (s, 1H, CH), 4.09~4.08 (m, 2H, CH_2), 3.65 (s, 3H, OCH_3), 3.49 (s, 3H, OCH_3), 1.24~1.23 (m, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.0, 165.6, 163.5, 151.2, 149.0, 148.3, 141.8, 136.8, 134.0, 133.4, 131.8, 130.3, 128.9, 122.9, 121.5, 107.0, 79.7, 59.7, 52.7, 52.1, 37.2, 14.4; IR (KBr) υ: 3443, 3223, 3105, 2987, 2953, 1753, 1709, 1663, 1600, 1522, 1440, 1404, 1346, 1236, 1095, 1041, 978, 936, 902, 819, 776 cm^{-1}; MS (*m/z*): 516.57 ($[M+1]^+$) 100%, 518.27 ($[M+3]^+$) 46%. Anal Calcd for $C_{24}H_{22}ClN_3O_8$: C 55.87, H 4.30, N 8.15; Found: C 55.53, H 4.81, N 7.79.



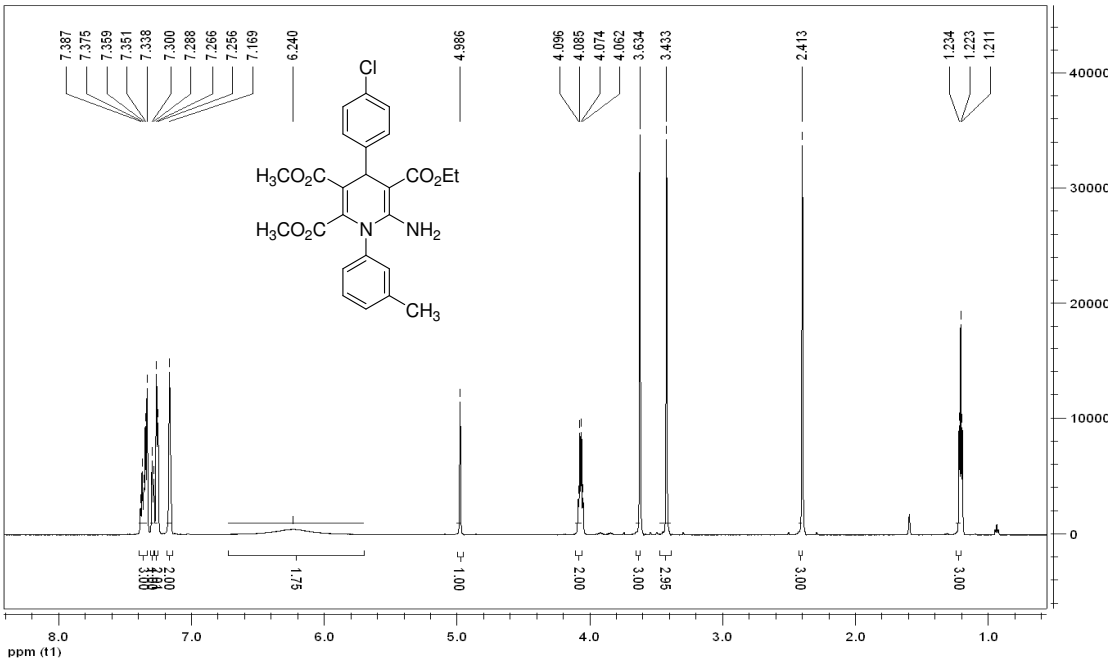


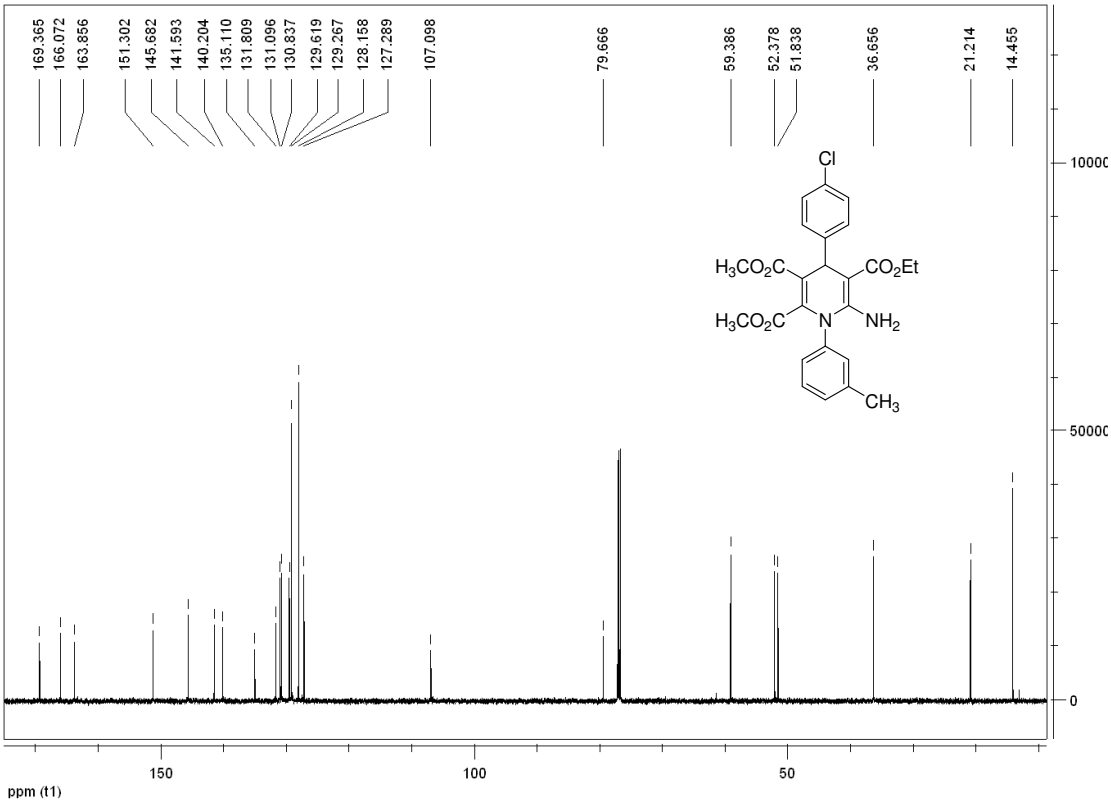
2k: white solid, 80%, m.p.129~130°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.50 (s, 3H, ArH), 7.38 (d, *J* = 3.6Hz, 2H, ArH), 7.35 (d, *J* = 7.2Hz, 2H, ArH), 7.26 (d, *J* = 4.2Hz, 2H, ArH), 6.22 (brs, 2H, NH_2), 4.99 (s, 1H, CH), 4.08 (q, *J* = 6.6Hz, 2H, CH_2), 3.64 (s, 3H, OCH_3), 3.41 (s, 3H, OCH_3), 1.22 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.4, 166.0, 163.9, 151.2, 145.6, 141.5, 135.2, 131.8, 130.5, 130.4, 129.9, 129.3, 128.2, 107.2, 79.8, 59.4, 52.4, 51.9, 36.6, 14.5; IR (KBr) υ: 3427, 3275, 2952, 1749, 1713, 1657, 1598, 1502, 1407, 1326, 1210, 1094, 785cm^{-1}; MS (*m/z*): 471.42 ([M+1]$^+$) 100%, 473.29 ([M+3]$^+$) 76%. Anal Calcd for $C_{24}H_{23}ClN_2O_6$: C 61.21, H 4.92, N 5.95; Found: C 60.97, H 5.33, N 5.78.



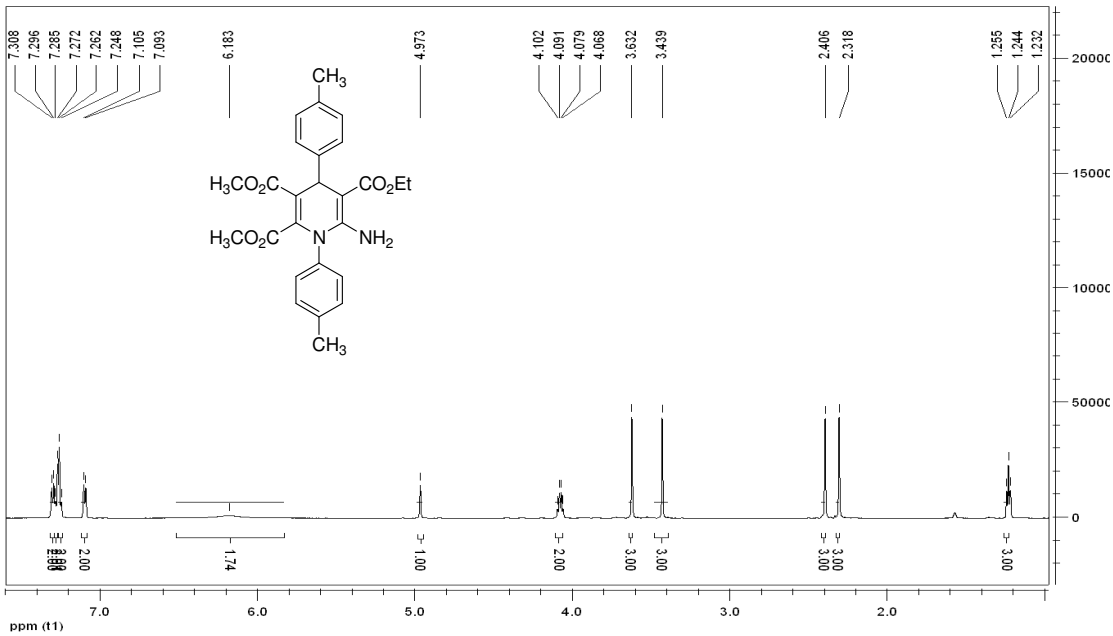


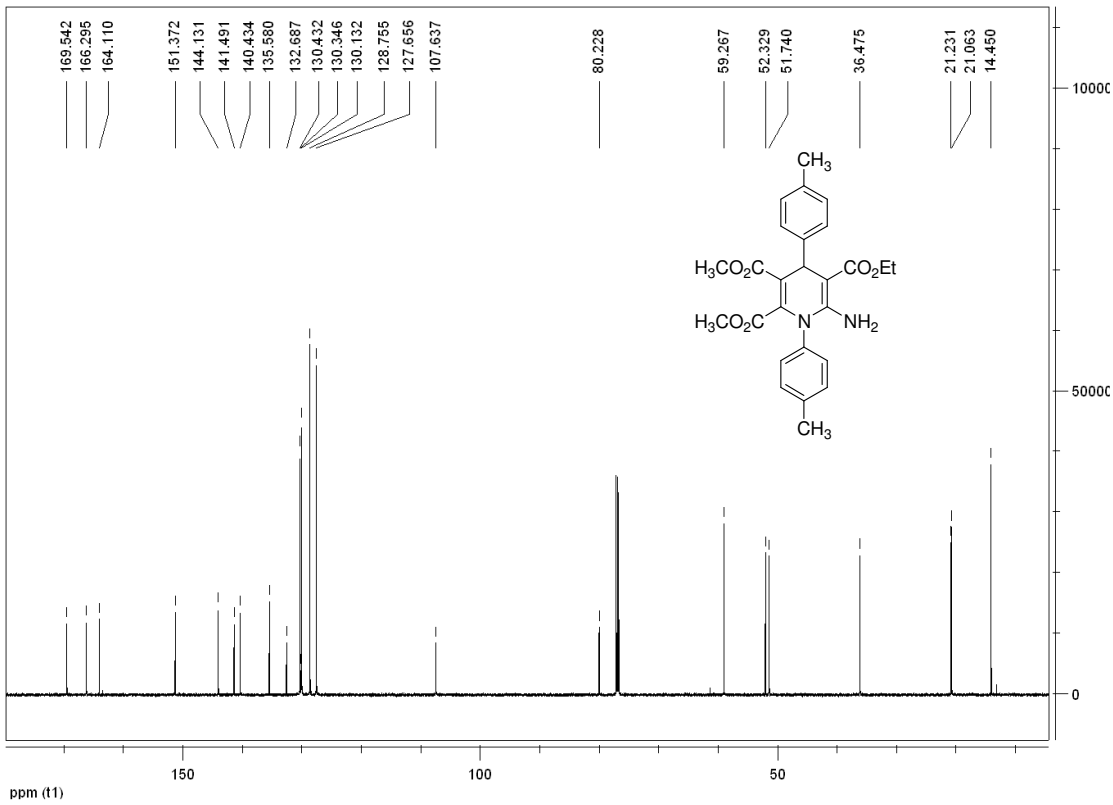
2l: white solid, 82%, m.p.152~153°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.39~7.34 (m, 3H, ArH), 7.29 (d, *J* = 7.2Hz, 1H, ArH), 7.26 (d, *J* = 6.0Hz, 2H, ArH), 7.17 (s, 2H, ArH), 6.24 (brs, 2H, NH_2), 4.99 (s, 1H, CH), 4.08 (q, *J* = 6.6Hz, 2H, CH_2), 3.63 (s, 3H, OCH_3), 3.43 (s, 3H, OCH_3), 2.41 (s, 3H, CH_3), 1.22 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.4, 166.1, 163.8, 151.3, 145.7, 141.6, 140.2, 135.1, 131.8, 131.1, 130.9, 129.6, 129.3, 128.2, 127.3, 107.1, 79.2, 59.4, 52.4, 61.8, 36.7, 21.2, 14.4; IR (KBr) υ: 3451, 3275, 2951, 1737, 1706, 1659, 1596, 1490, 1438, 1349, 1325, 1262, 1209, 1172, 1108, 1037, 930, 834, 787 cm^{-1}; MS (*m/z*): 485.79 ($[M-1]^+$) 100%. Anal Calcd for $C_{25}H_{25}ClN_2O_6$: C 61.92, H 5.20, N 5.78; Found: C 61.65, H 5.48, N 5.66.



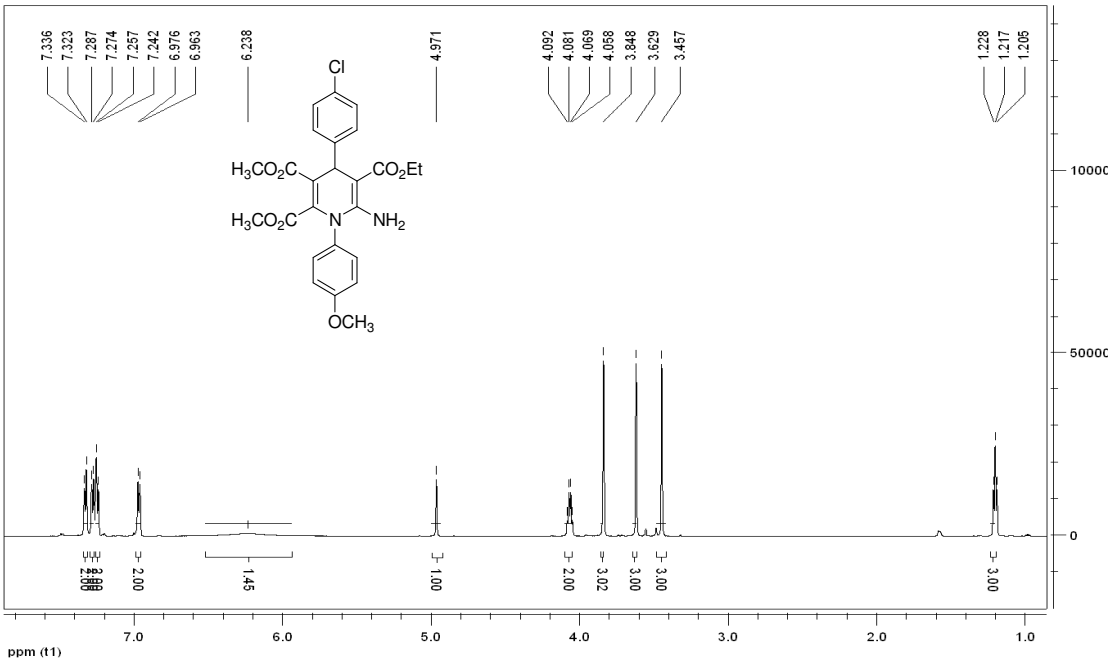


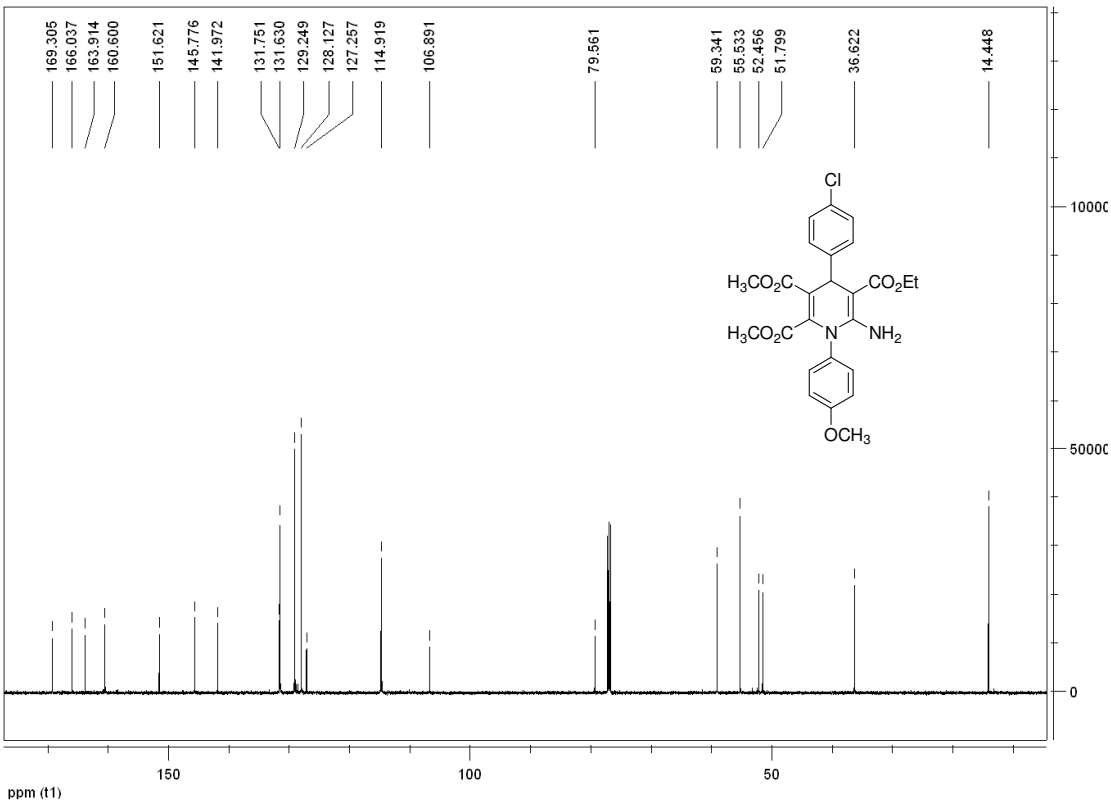
2m: white solid, 85%, m.p.151~152°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.30 (d, *J* = 7.2Hz, 2H, ArH), 7.28 (d, *J* = 7.8Hz, 2H, ArH), 7.26 (d, *J* = 8.4Hz, 2H, ArH), 7.10 (d, *J* = 7.2Hz, 2H, ArH), 6.18 (brs, 2H, NH_2), 4.97 (s, 1H, CH), 4.09 (q, *J* = 6.6Hz, 2H, CH_2), 3.63 (s, 3H, OCH_3), 3.44 (s, 3H, OCH_3), 2.41 (s, 3H, CH_3), 2.32 (s, 3H, CH_3), 1.24 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.5, 166.3, 164.1, 151.4, 144.1, 141.5, 140.4, 135.6, 132.7, 130.4, 130.3, 130.1, 128.8, 127.7, 107.7, 80.2, 59.3, 52.3, 51.7, 36.5, 21.2, 21.1, 14.5; IR (KBr) υ: 3430, 3272, 2975, 2951, 1746, 1713, 1654, 1604, 1501, 1434, 1368, 1344, 1323, 1242, 1210, 1094, 1054, 973, 931, 822, 789, 762 cm^{-1}; MS (*m/z*): 465.38 ([M+1]$^{+}$) 100%. Anal Calcd for $C_{26}H_{28}N_2O_6$: C 67.23, H 6.08, N 6.03; Found: C 66.89, H 6.40, N 5.76.



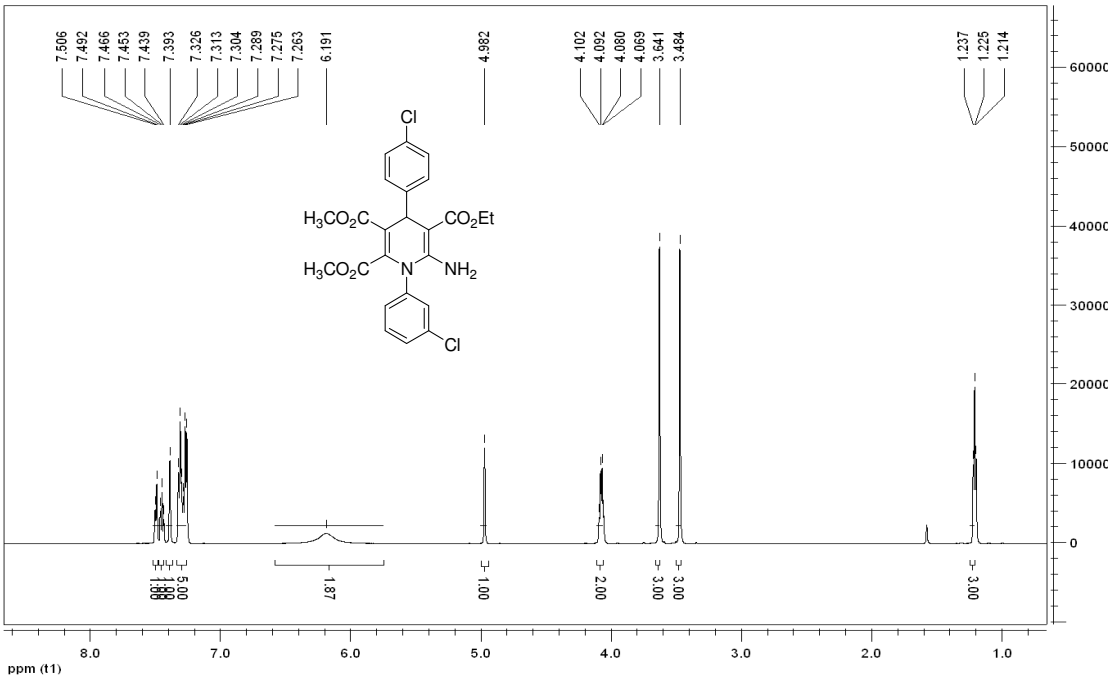


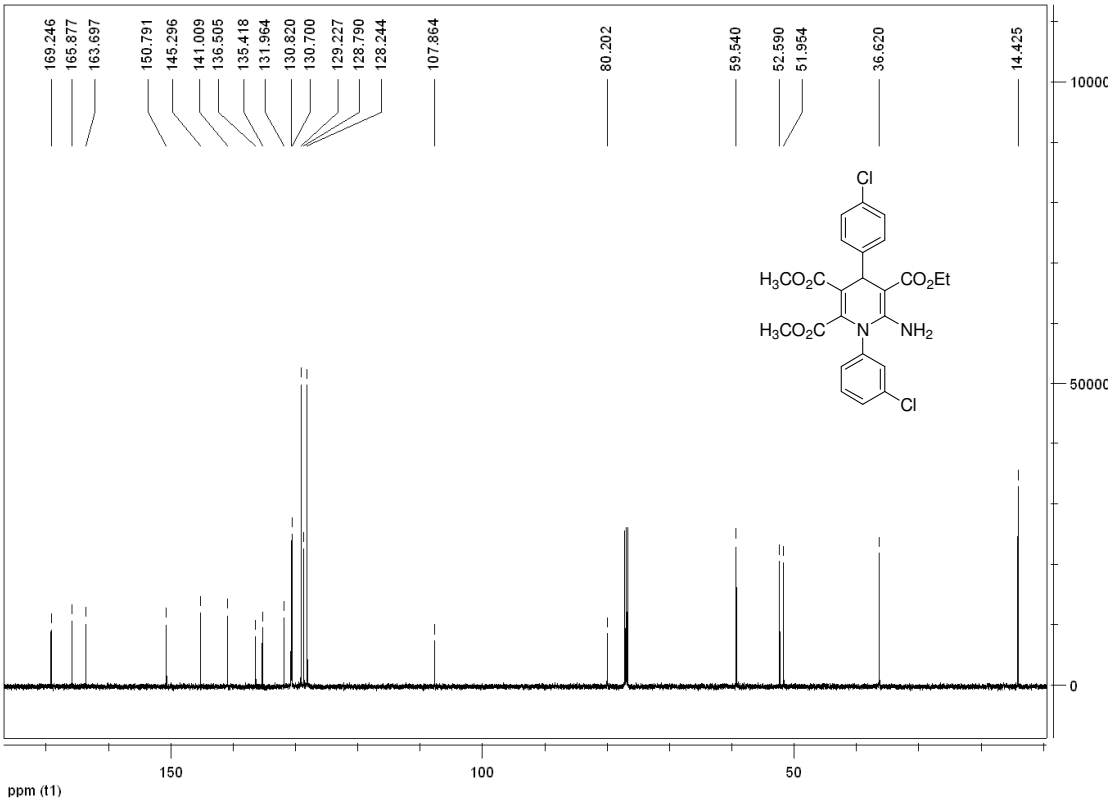
2n: white solid, 87%, m.p.152~153°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.33 (d, *J* = 7.8Hz, 2H, ArH), 7.28 (d, *J* = 7.8Hz, 2H, ArH), 7.25 (d, *J* = 7.8Hz, 2H, ArH), 6.97 (d, *J* = 7.8Hz, 2H, ArH), 6.24 (brs, 2H, NH_2), 4.97 (s, 1H, CH), 4.08 (q, *J* = 6.6Hz, 2H, CH_2), 3.85 (s, 3H, OCH_3), 3.63 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 1.22 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.4, 165.5, 163.5, 160.7, 151.6, 145.9, 141.7, 131.9, 131.7, 129.5, 128.0, 127.4, 114.8, 107.0, 79.6, 61.7, 60.7, 59.3, 55.6, 36.8, 14.4, 14.0, 13.5; IR (KBr) υ: 3491, 3306, 2982, 2959, 2905, 2840, 1741, 1710, 1660, 1602, 1483, 1439, 1408, 1352, 1320, 1258, 1207, 1108, 971, 927, 866, 833, 791, 771 cm^{-1}; MS (*m/z*): 501.53 ($[M+1]^+$) 100%, 503.23 ($[M+3]^+$) 39%. Anal Calcd for $C_{25}H_{25}ClN_2O_7$: C 59.94, H 5.03, N 5.59; Found: C 59.60, H 5.41, N 5.53.



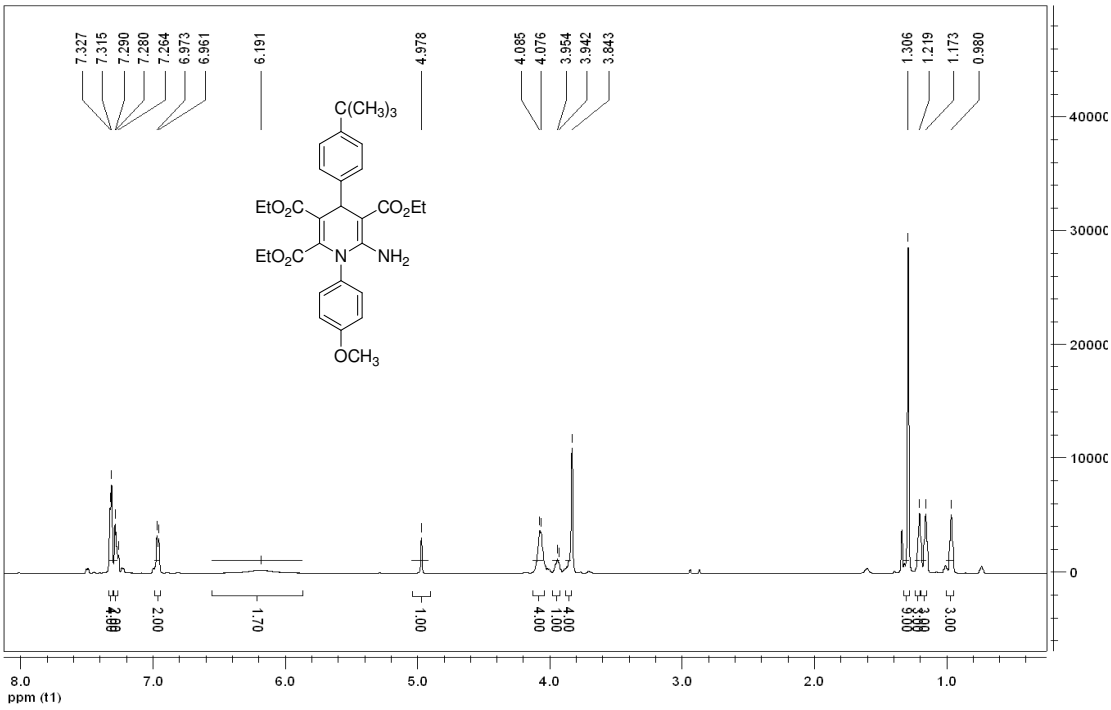


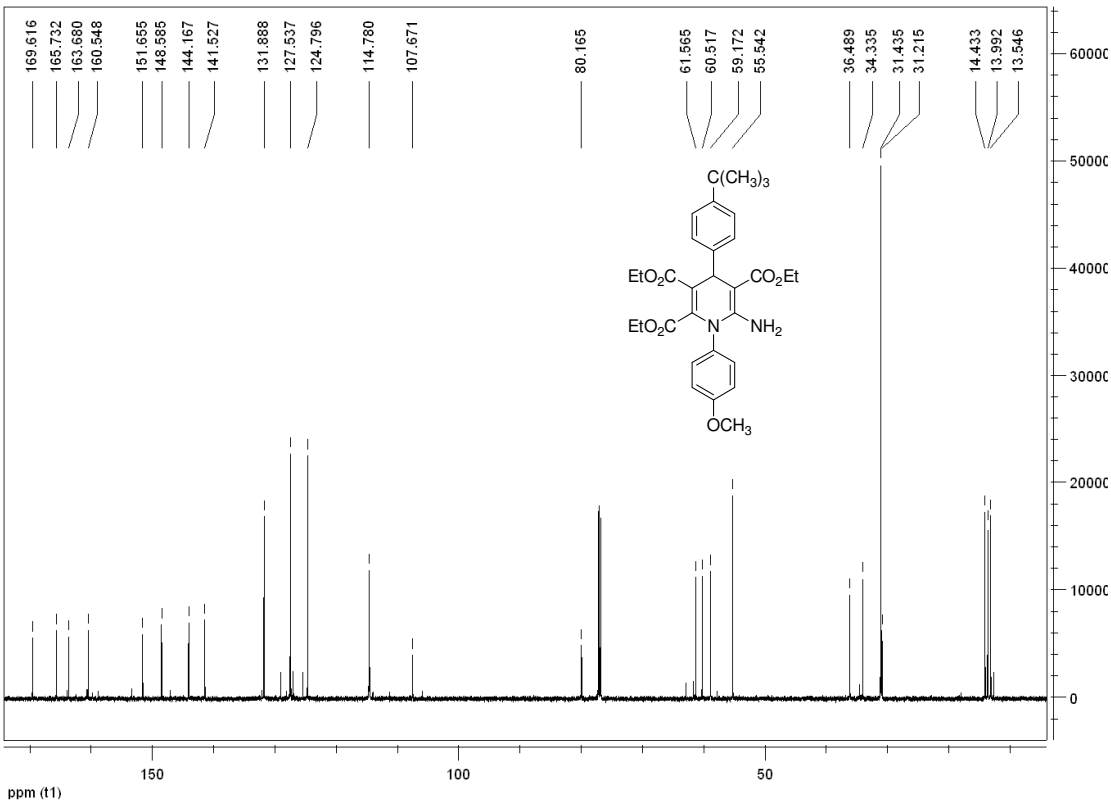
2o: white solid, 84%, m.p.142~143°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.50 (d, *J* = 8.4Hz, 1H, ArH), 7.45 (t, *J* = 8.4Hz, 1H, ArH), 7.39 (s, 1H, ArH), 7.33~ 7.26(m, 5H, ArH), 6.19 (brs, 2H, NH_2), 4.98 (s, 1H, CH), 4.09 (q, *J* = 6.6Hz, 2H, CH_2), 3.64 (s, 3H, OCH_3), 3.48 (s, 3H, OCH_3), 1.23 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.2, 165.9, 163.7, 150.8, 145.3, 141.0, 136.5, 135.4, 132.0, 130.8, 130.7, 129.2, 128.8, 128.2, 107.9, 80.2, 59.5, 52.6, 52.0, 36.2, 14.4; IR (KBr) υ: 3457, 3270, 2950, 1712, 1660, 1593, 1489, 1438, 1325, 1255, 1207, 1110, 1038, 977, 932, 894, 834, 791cm^{-1}; MS (*m/z*): 505.55 ([M+1]$^+$) 100%, 507.25 ([M+3]$^+$) 85%. Anal Calcd for $C_{24}H_{22}Cl_2N_2O_6$: C 57.04, H 4.39, N 5.54; Found: C 56.77, H 4.35, N 5.18.



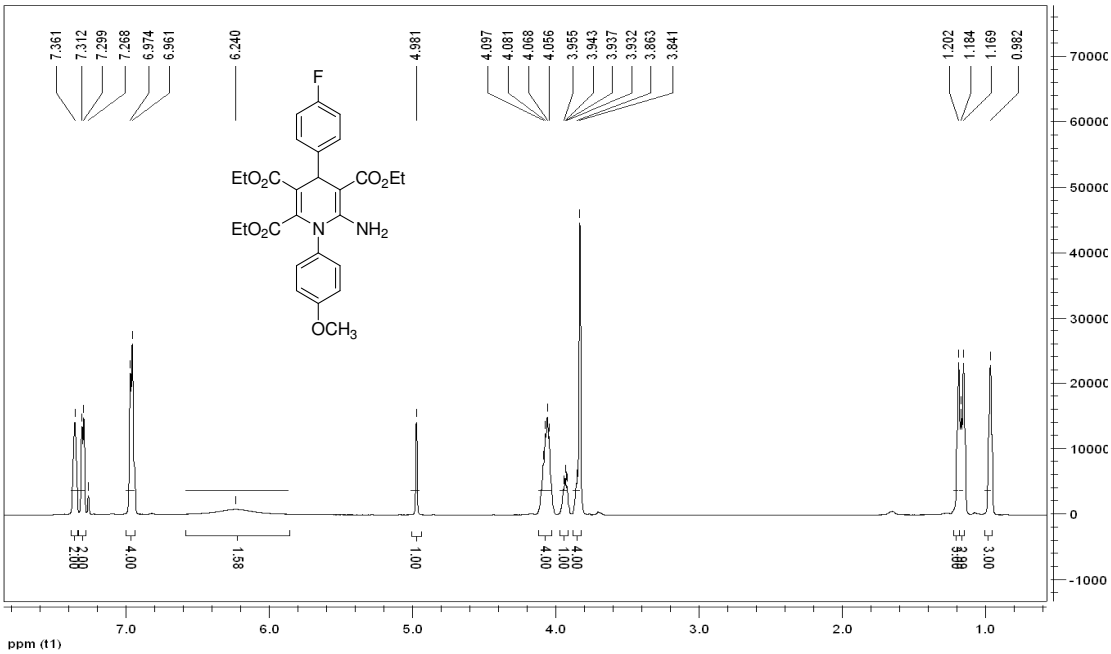


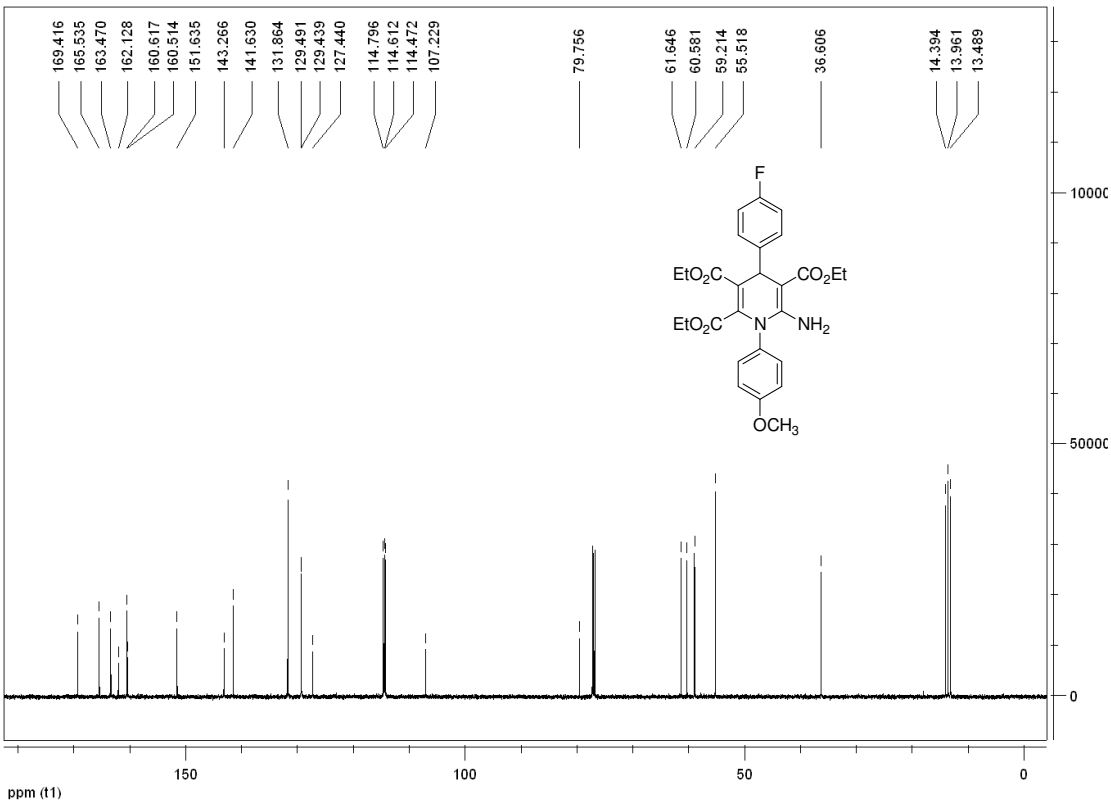
2p: yellow solid, 78%, m.p.150~151°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.33~7.26 (m, 4H, ArH), 7.29~7.28 (m, 2H, ArH), 6.97 (d, *J* = 7.2Hz, 2H, ArH), 6.19 (brs, 2H, NH_2), 4.98 (s, 1H, CH), 4.09~4.08 (m, 4H, CH_2), 3.95~3.94 (m, 1H, CH_2), 3.88~3.84 (m, 4H, CH_2, OCH_3), 1.31 (s, 9H, CH_3), 1.22 (brs, 3H, CH_3), 1.17 (brs, 3H, CH_3), 0.98 (brs, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.6, 165.7, 163.7, 160.5, 151.7, 148.5, 144.2, 141.5, 131.9, 127.5, 124.8, 114.8, 107.7, 80.2, 61.6, 60.5, 59.2, 55.5, 36.5, 34.3, 31.4, 31.2, 14.4, 14.0, 13.5; IR (KBr) υ: 3443, 3256, 2966, 1739, 1701, 1663, 1599, 1506, 1369, 1326, 1202, 1099, 1021, 831, 767 cm^{-1}; MS (*m/z*): 551.55 ($[M+1]^+$) 100%. Anal Calcd for $C_{31}H_{38}N_2O_7$: C 67.62, H 6.96, N 5.09; Found: C 67.50, H 7.24, N 4.83.



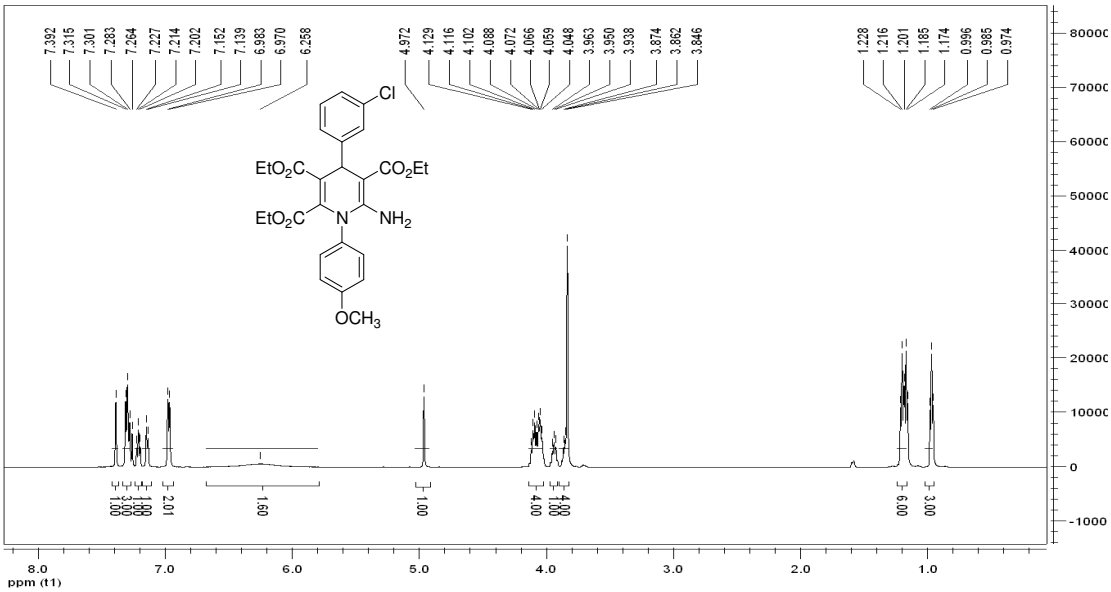


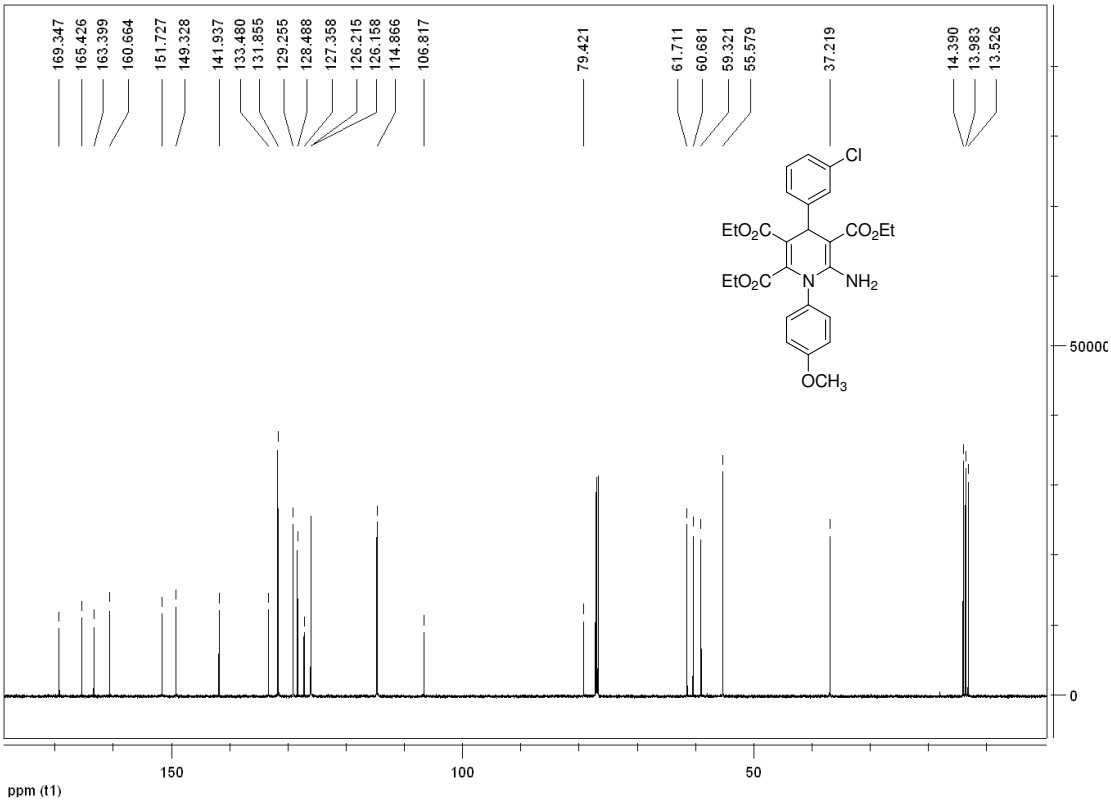
2q: light yellow solid, 79%, m.p.111~112°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.36 (s, 2H, ArH), 7.31 (d, *J* = 7.8Hz, 2H, ArH), 6.97 (d, *J* = 7.8Hz, 4H, ArH), 6.24 (brs, 2H, NH_2), 4.98 (s, 1H, CH), 4.10~4.06 (m, 4H, CH_2), 3.96~3.93 (m, 1H, CH_2), 3.86~3.84 (m, 4H, CH_2, OCH_3), 1.20 (s, 3H, CH_3), 1.18~1.17 (m, 3H, CH_3), 0.98 (brs, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ:169.4, 165.5, 163.5, 162.1, 160.6, 160.5, 151.6, 143.3, 141.6, 131.9, 129.5, 129.4, 127.4, 114.8, 114.6, 114.5, 107.2, 79.8, 61.6, 60.6, 59.2, 55.5, 36.6, 14.4, 14.0, 13.5; IR (KBr) υ: 3439, 3258, 2980, 1737, 1705, 1661, 1599, 1506, 1463, 1373, 1329, 1248, 1203, 1105, 1018, 836, 798 cm^{-1}; MS (*m/z*): 513.39 ($[M+1]^+$) 100%. Anal Calcd for $C_{27}H_{29}FN_2O_7$: C 63.27, H 5.70, N 5.47; Found: C 63.01, H 6.10, N 5.64.



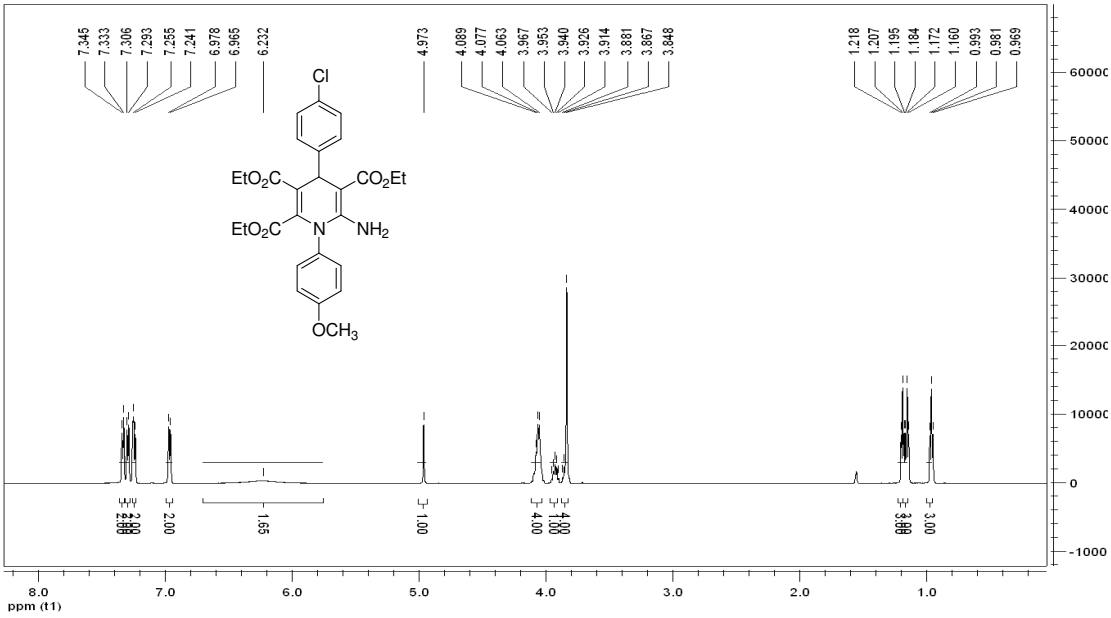


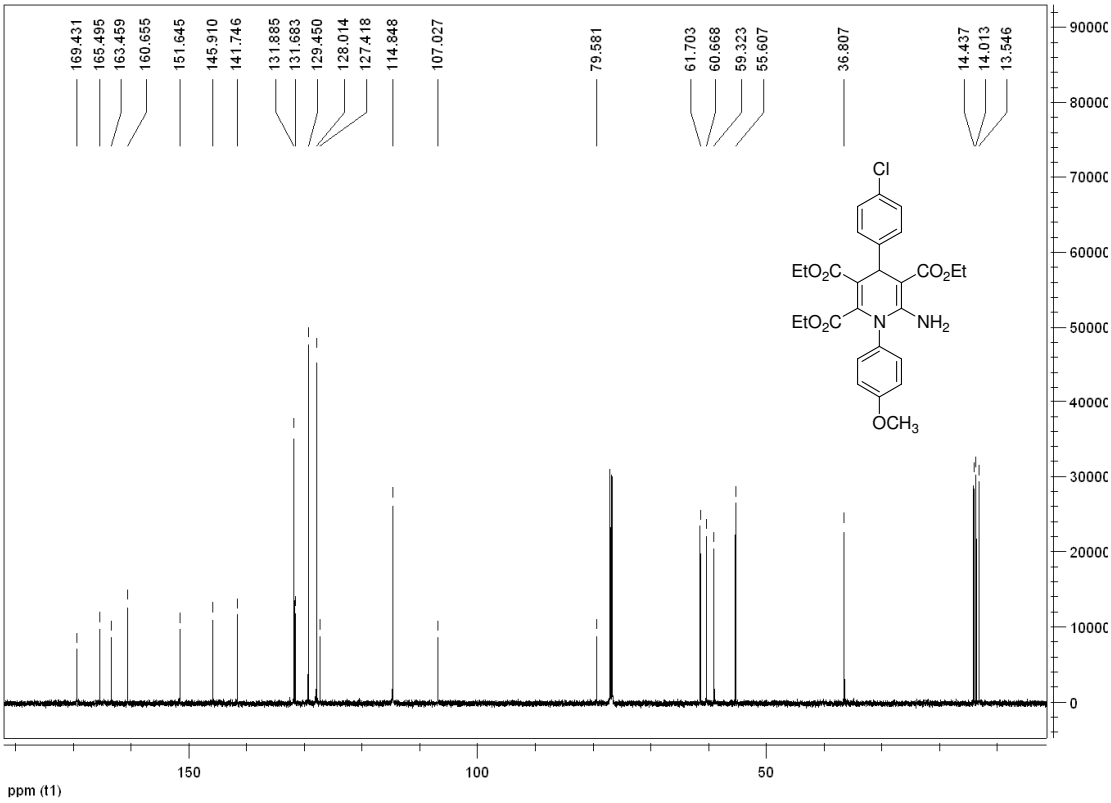
2r: white solid, 82%, m.p.154~155°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.39 (s, 1H, ArH), 7.32~7.28 (m, 3H, ArH), 7.21 (t, *J* = 7.8Hz, 1H, ArH), 7.15 (d, *J* = 7.8Hz, 1H, ArH), 6.98 (d, *J* = 7.8Hz, 2H, ArH), 6.26 (brs, 2H, NH_2), 4.97 (s, 1H, CH), 4.13~4.05 (m, 4H, CH_2), 3.96~3.94 (m, 1H, CH_2), 3.87~3.85 (m, 4H, CH_2, OCH_3), 1.23~1.17 (m, 6H, CH_3), 0.99 (t, *J* = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.3, 165.4, 163.4, 160.7, 151.7, 149.3, 141.9, 133.5, 131.9, 129.3, 128.5, 127.4, 126.2, 126.1, 114.9, 106.8, 79.4, 61.7, 60.7, 59.3, 55.6, 37.2, 14.4, 14.0, 13.5; IR (KBr) υ: 3443, 3272, 2979, 2898, 2838, 1886, 1739, 1699, 1659, 1596, 1506, 1464, 1391, 1369, 1337, 1317, 1249, 1198, 1095, 862, 834, 779cm^{-1}; MS (*m/z*): 529.61 ([M+1]$^{+}$) 100%, 531.26 ([M+3]$^{+}$) 53%. Anal Calcd for $C_{27}H_{29}ClN_2O_7$: C 61.30, H 5.53, N 5.30; Found: C 61.67, H 5.62, N 5.04.



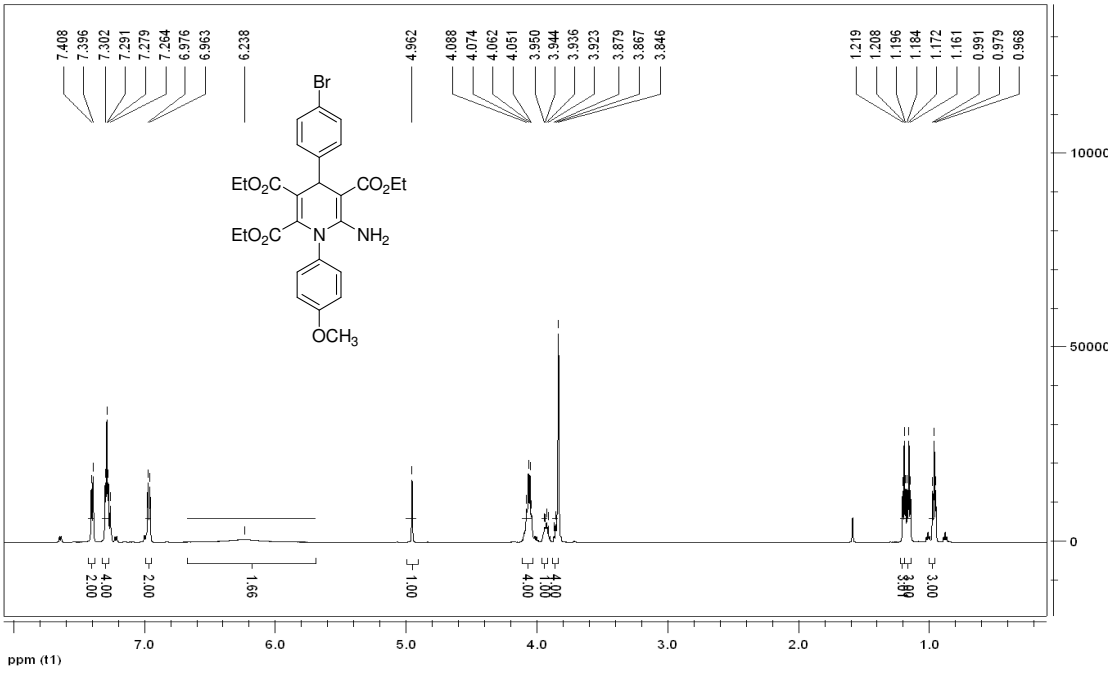


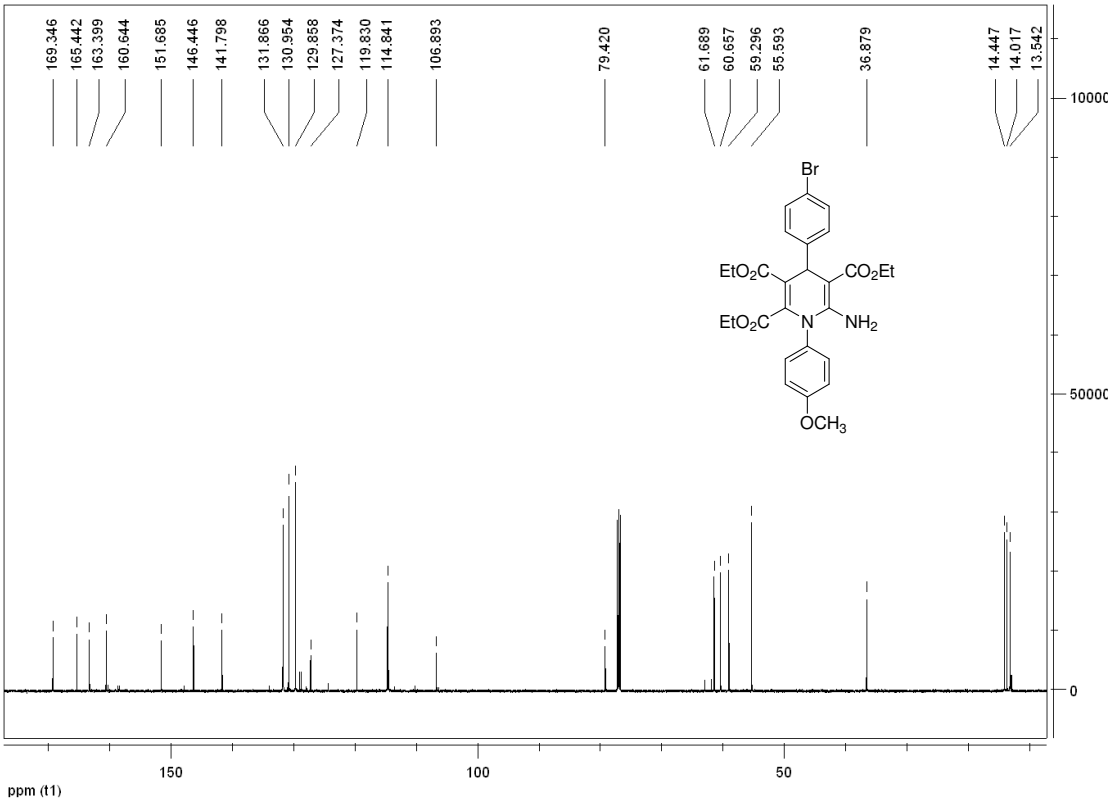
2s: light yellow solid, 75%, m.p.109~110°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.34 (t, *J* = 7.2Hz, 2H, ArH), 7.30 (d, *J* = 7.8Hz, 2H, ArH), 7.25 (d, *J* = 8.4Hz, 2H, ArH), 6.97 (d, *J* = 7.8Hz, 2H, ArH), 6.23 (brs, 2H, NH_2), 4.97 (s, 1H, CH), 4.09~4.06 (m, 4H, CH_2), 3.97~3.91 (m, 1H, CH_2), 3.88~3.85 (m, 4H, CH_2, OCH_3), 1.21 (t, *J* = 7.2Hz, 3H, CH_3), 1.17 (t, *J* = 7.2Hz, 3H, CH_3), 0.98 (t, *J* = 7.2Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.4, 165.5, 163.5, 160.7, 151.6, 145.9, 141.7, 131.9, 131.7, 129.5, 128.0, 127.4, 114.8, 107.0, 79.6, 61.7, 60.7, 59.3, 55.6, 36.8, 14.4, 14.0, 13.5; IR (KBr) υ: 3464, 3302, 2981, 2937, 2903, 2839, 1897, 1740, 1704, 1660, 1595, 1507, 1413, 1369, 1321, 1201, 1091, 1037, 1017, 862, 833, 783, 766 cm^{-1}; MS (*m/z*): 529.60 ($[M+1]^+$) 100%, 531.25 ($[M+3]^+$) 54%. Anal Calcd for $C_{27}H_{29}ClN_2O_7$: C 61.30, H 5.53, N 5.30; Found: C 60.97, H 5.89, N 4.95.



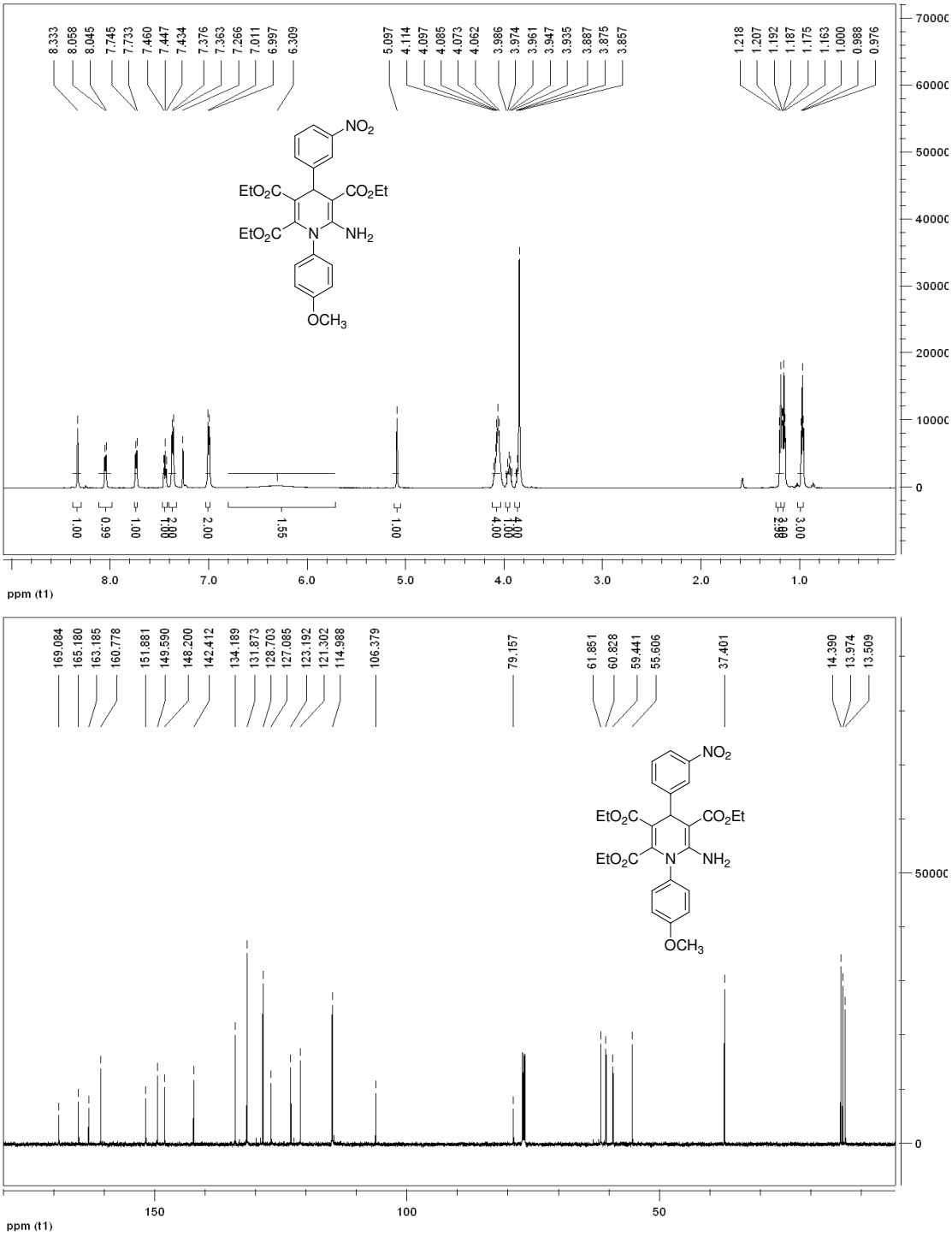


2t: light yellow solid, 78%, m.p.110~111°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.40 (t, *J* = 7.2Hz, 2H, ArH), 7.29 (d, *J* = 7.2Hz, 4H, ArH), 6.97 (d, *J* = 7.8Hz, 2H, ArH), 6.24 (brs, 2H, NH_2), 4.96 (s, 1H, CH), 4.09~4.05 (m, 4H, CH_2), 3.95~3.92 (m, 1H, CH_2), 3.88~3.85 (m, 4H, CH_2, OCH_3), 1.21 (t, *J* = 6.6Hz, 3H, CH_3), 1.17 (t, *J* = 6.6Hz, 3H, CH_3), 0.98 (t, *J* = 7.2Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.3, 165.4, 163.4, 160.6, 151.7, 146.4, 141.8, 131.9, 131.0, 130.0, 127.4, 119.8, 114.8, 106.9, 79.4, 61.7, 60.7, 59.3, 55.6, 36.9, 14.4, 14.0, 13.5; IR (KBr) υ: 3665, 3464, 3301, 2981, 2903, 2838, 1740, 1704, 1662, 1596, 1507, 1411, 1369, 1331, 1201, 1102, 1014, 832, 785, 764cm^{-1}; MS (*m/z*): 573.67 ([M+1]$^+$) 55%, 575.22 ([M+3]$^+$) 100%. Anal Calcd for $C_{27}H_{29}BrN_2O_7$: C 56.55, H 5.10, N 4.89; Found: C 56.22, H 5.38, N 4.56.

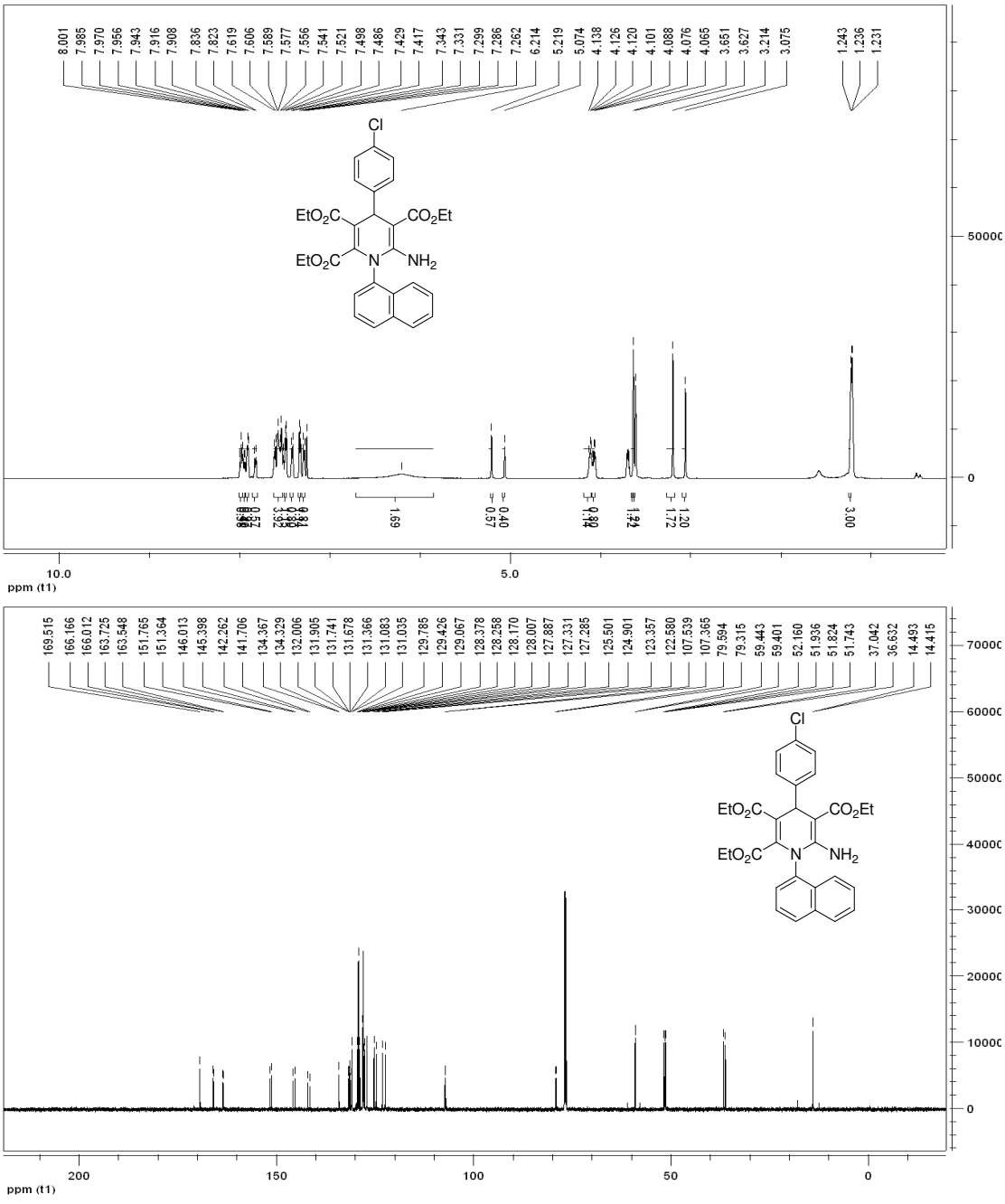




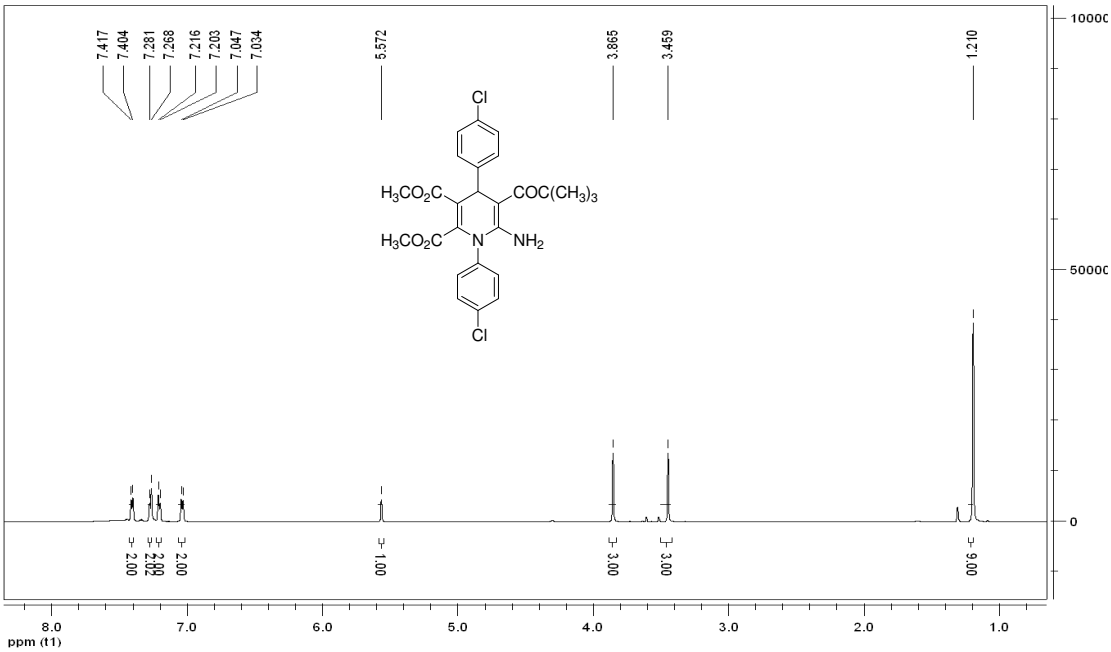
2u: light yellow solid, 92%, m.p.154~155°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 8.33 (s, 1H, ArH), 8.05 (t, *J* = 7.2Hz, 1H, ArH), 7.74 (d, *J* = 7.2Hz, 1H, ArH), 7.45 (t, *J* = 7.8Hz, 1H, ArH), 7.37 (d, *J* = 7.8Hz, 2H, ArH) 7.01 (t, *J* = 8.4Hz, 1H, ArH), 6.31 (brs, 2H, NH_2), 5.10 (s, 1H, CH), 4.11~4.06 (m, 4H, CH_2), 3.99~3.94 (m, 1H, CH_2), 3.89~3.86 (m, 4H, CH_2, OCH_3), 1.21~1.19 (m, 3H, CH_3), 1.18 (t, *J* = 7.2Hz, 3H, CH_3), 0.99 (t, *J* = 7.2Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.1, 165.2, 163.2, 160.8, 151.9, 149.6, 148.2, 142.4, 134.2, 131.9, 128.7, 127.1, 132.2, 121.3, 115.0, 106.4, 79.2, 61.9, 60.8, 59.4, 55.6, 37.4, 14.4, 14.0, 13.5; IR (KBr) υ: 3729, 3447, 3245, 3110, 2985, 2903, 2844, 2360, 1749, 1707, 1662, 1640, 1596, 1528, 1506, 1402, 1400, 1370, 1350, 1327, 1299, 1219, 1199, 1098, 1021, 910, 863, 830 cm^{-1}; MS (*m/z*): 540.62 ($[M+1]^+$) 100%. Anal Calcd for $C_{27}H_{29}N_3O_9$: C 60.11, H 5.42, N 7.79; Found: C 59.80, H .71, N 7.66.

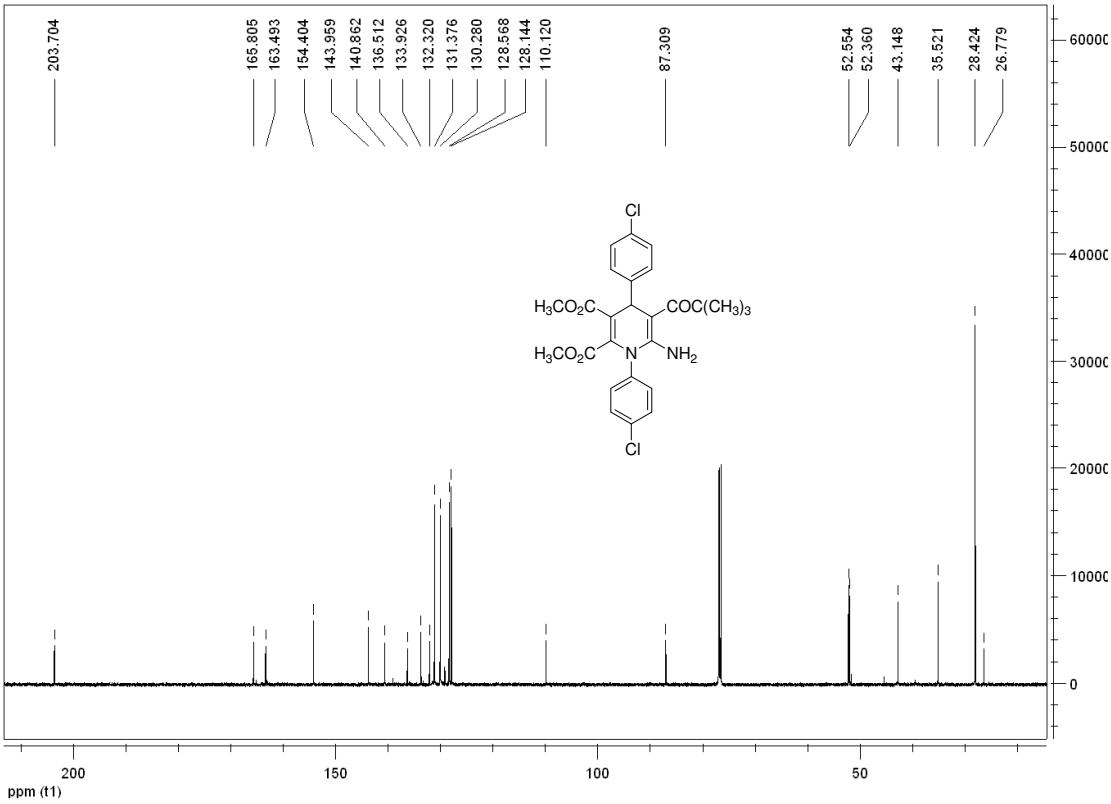


2v: white solid, 89%, m.p.162~164°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 8.00~7.91 (m, ArH), 7.83 (d, *J* = 7.8Hz, ArH), 7.62~7.52 (m, ArH), 7.49 (d, *J* = 7.2Hz, ArH), 7.42 (d, *J* = 7.2Hz, ArH), 7.34 (d, *J* = 7.2Hz, ArH), 7.29 (d, *J* = 7.8Hz, ArH), 6.21 (brs, 2H, NH_2), 5.22 (s, 0.57H, CH), 5.07 (s, 0.4H, CH), 4.14~4.12 (m, 1.14H, CH_2), 4.10~4.07 (m, 0.8H, CH_2), 3.65 (s, 1.72H, OCH_3), 3.63 (s, 1.21H, OCH_3), 3.21 (s, 1.72H, OCH_3), 3.08 (s, 1.20H, OCH_3), 1.24~1.23 (m, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ:169.5, 166.2, 166.0, 163.7, 163.5, 151.8, 151.4, 146.0, 145.4, 142.3, 141.7, 134.4, 134.3, 132.0, 131.9, 131.7, 131.6, 131.4, 131.1, 131.0, 129.8, 129.4, 129.1, 128.4, 128.3, 128.2, 128.0, 127.9, 127.3, 127.2, 125.5, 124.9, 123.4, 122.6, 107.5, 107.4, 79.6, 79.3, 59.4, 52.2, 51.9, 51.8, 51.7, 37.0, 36.6, 14.5, 14.4; IR (KBr) υ: 3449, 3267, 1945, 1751, 1704, 1657, 1597, 1488, 1436, 1318, 1258, 1205, 1167, 1114, 1028, 931, 812, 771 cm^{-1}; MS (*m/z*): 521.58 ($[M+1]^+$) 100%, 523.25 ($[M+3]^+$) 57%. Anal Calcd for $C_{28}H_{25}ClN_2O_6$: C 64.55, H 4.84, N 5.38; Found: C 64.76, H 5.23, N 5.65.

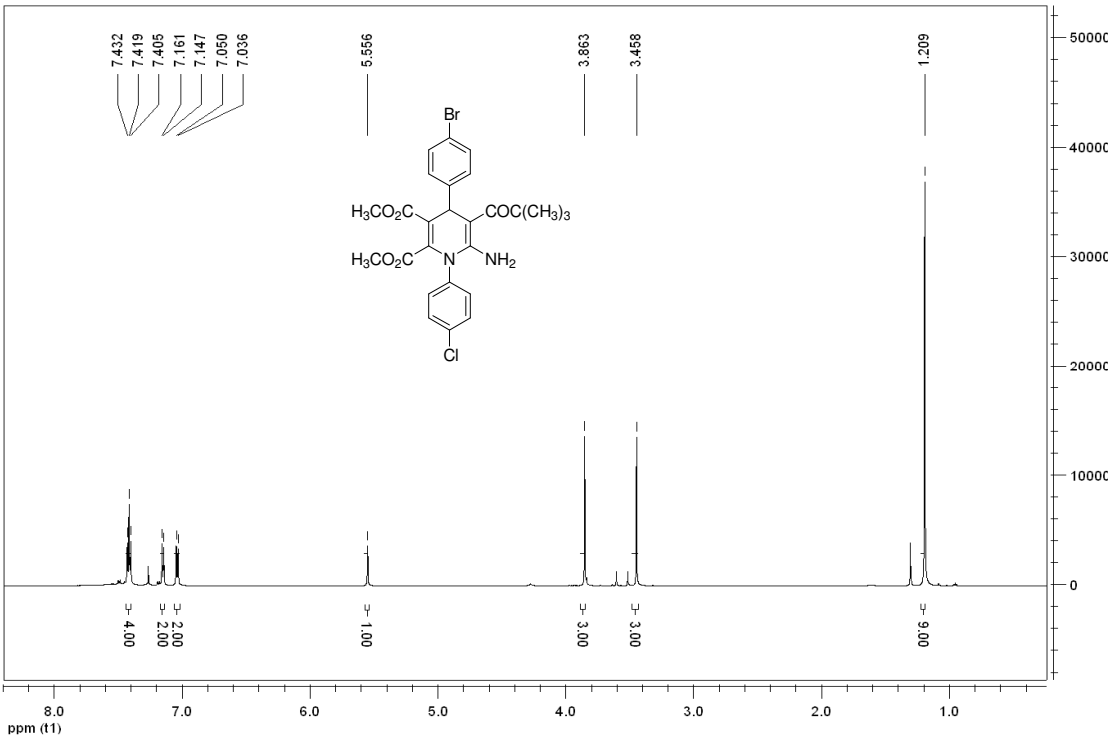


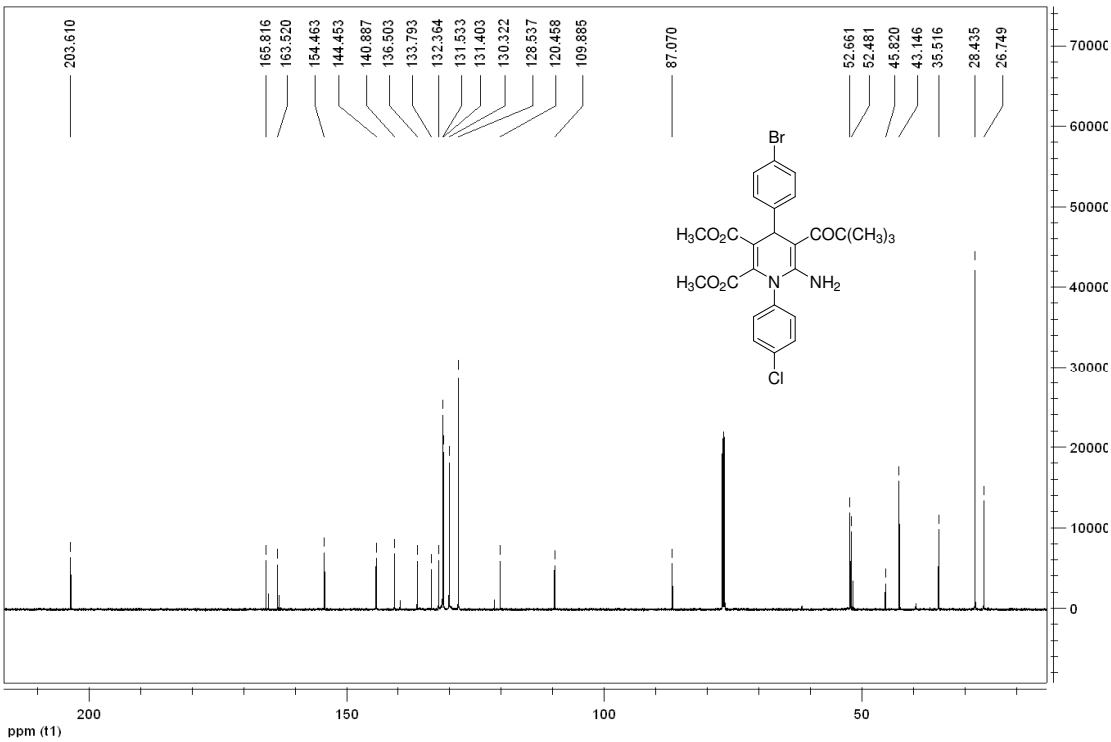
3a: white solid, 80%, m.p.201~203°C;^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.41 (d, *J* = 7.8Hz, 2H, ArH), 7.27 (d, *J* = 7.8Hz, 2H, ArH), 7.21 (d, *J* = 7.8Hz, 2H, ArH), 7.04 (d, *J* = 7.8Hz, 2H, ArH), 5.57 (s, 1H, CH), 3.87 (s, 3H, OCH_3), 3.50 (s, 3H, OCH_3), 1.21 (s, 9H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 203.7, 165.8, 163.5, 154.4, 144.0, 140.9, 136.5, 133.9, 132.3, 131.4, 130.3, 128.6, 128.1, 110.1, 87.3, 52.6, 52.4, 43.1, 35.5, 28.4, 26.8; IR(KBr) υ: 3458, 3077, 2956, 1741, 1705, 1636, 1587, 1484, 1439, 1337, 1230, 1164, 1117, 1053, 1015, 971, 915, 858, 823, 788 cm^{-1}; MS (*m/z*): 517.49 ($[M+1]^+$) 100%, 519.23 ($[M+3]^+$) 97%. Anal Calcd for $C_{26}H_{26}Cl_2N_2O_5$: C 60.36, H 5.07, N 5.41; Found: C 60.42, H 5.56, N 5.21.



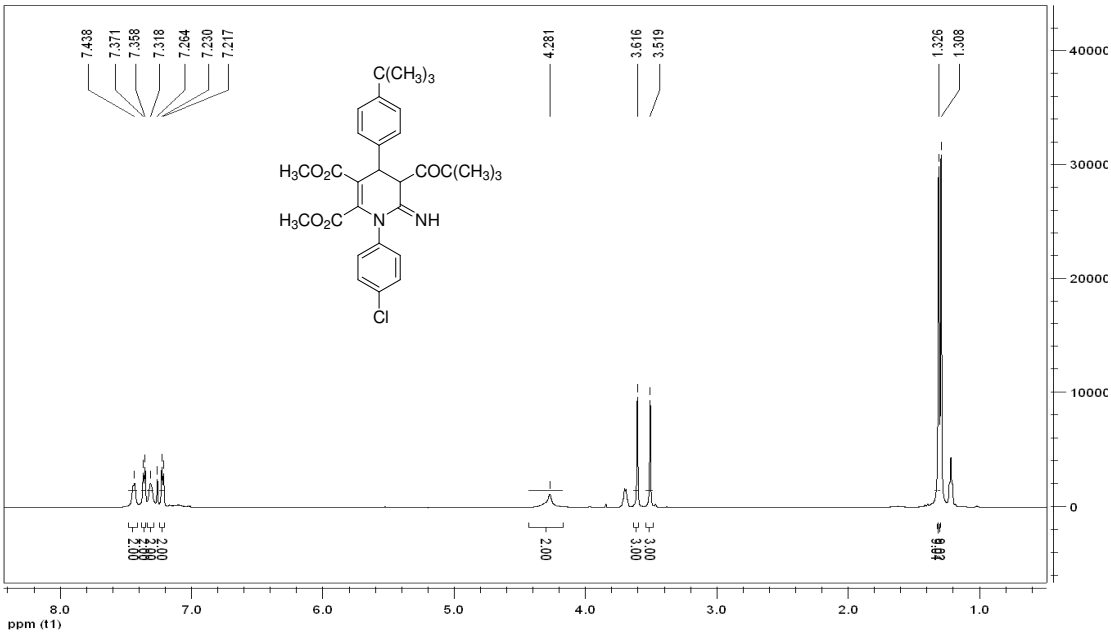


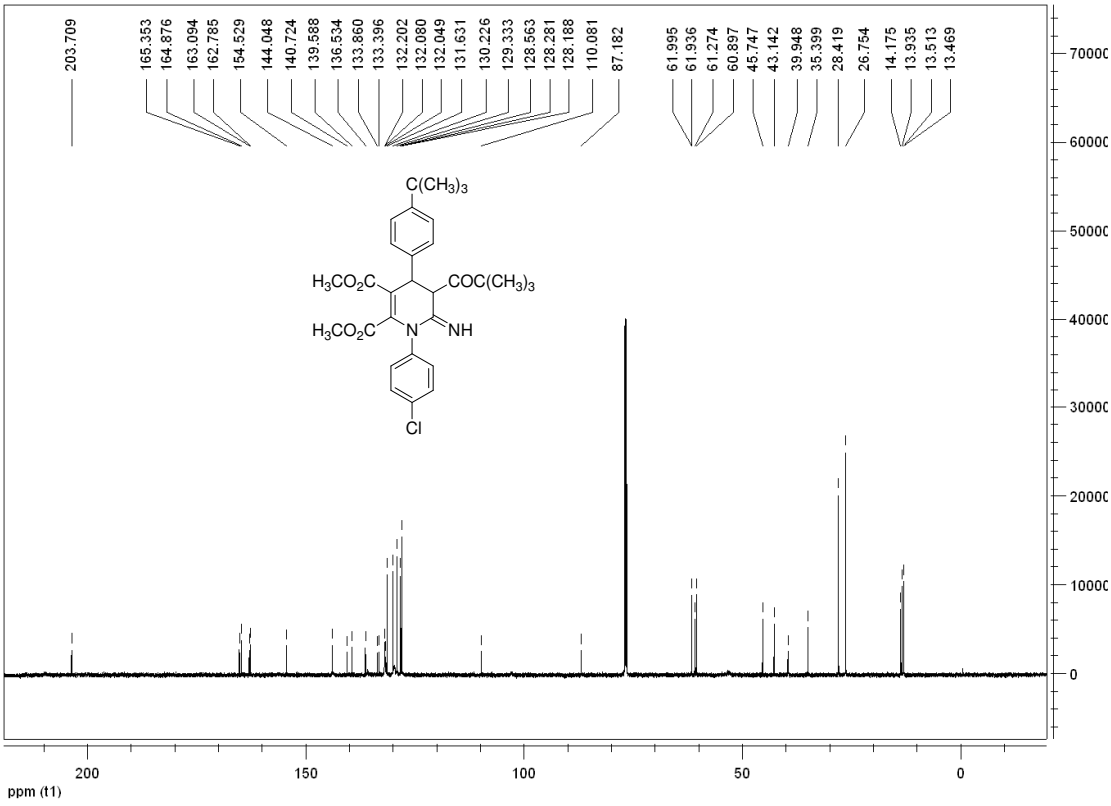
3b: white solid, 82%, m.p.207~209°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.42 (t, *J* = 8.4Hz, 4H, ArH), 7.15 (d, *J* = 8.4Hz, 2H, ArH), 7.04 (d, *J* = 8.4Hz, 2H, ArH), 5.56 (s, 1H, CH), 3.86 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 1.21 (s, 9H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 203.6, 165.8, 163.5, 154.5, 144.5, 140.9, 136.5, 133.8, 132.4, 131.5, 131.4, 130.3, 128.5, 120.5, 109.9, 87.1, 52.7, 52.5, 45.8, 43.1, 35.5, 28.4, 26.7; IR(KBr) υ: 3456, 2956, 1741, 1706, 1637, 1585, 1483, 1337, 1229, 1163, 1115, 1055, 1011, 970, 914, 856, 821 cm^{-1}; MS (*m/z*): 561.36 ($[M+1]^+$) 54%, 563.15 ($[M+3]^+$) 100%. Anal Calcd for $C_{26}H_{26}BrClN_2O_5$: C 55.85, H 4.66, N 4.99; Found: C 55.44, H 4.87, N 4.58.



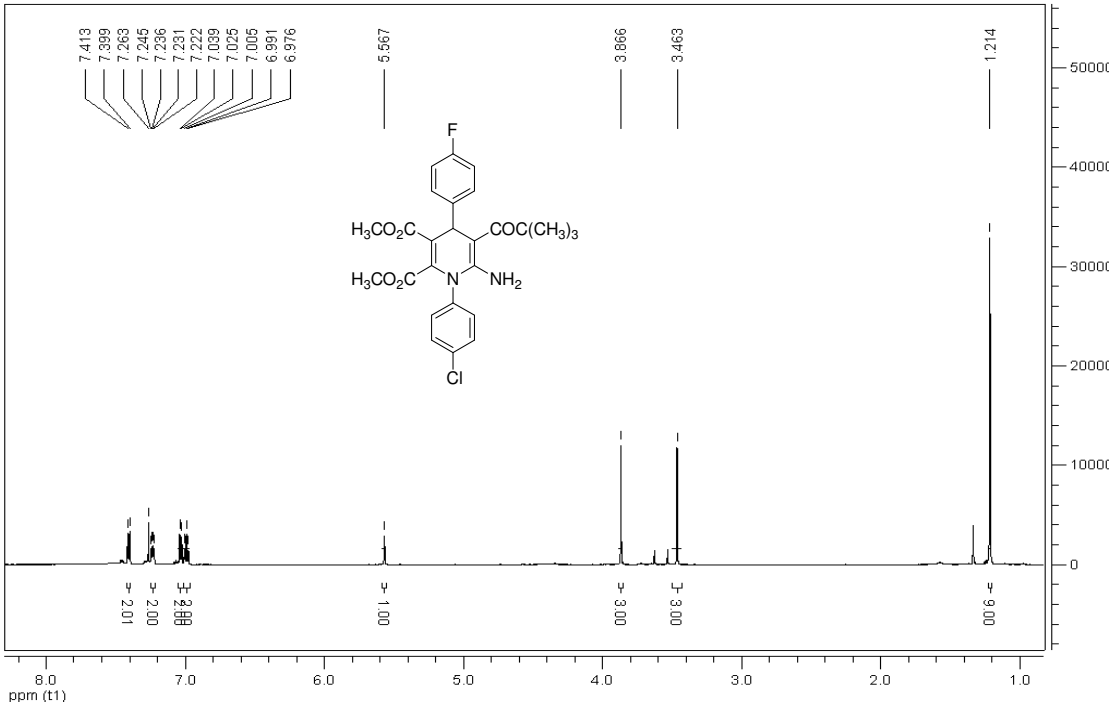


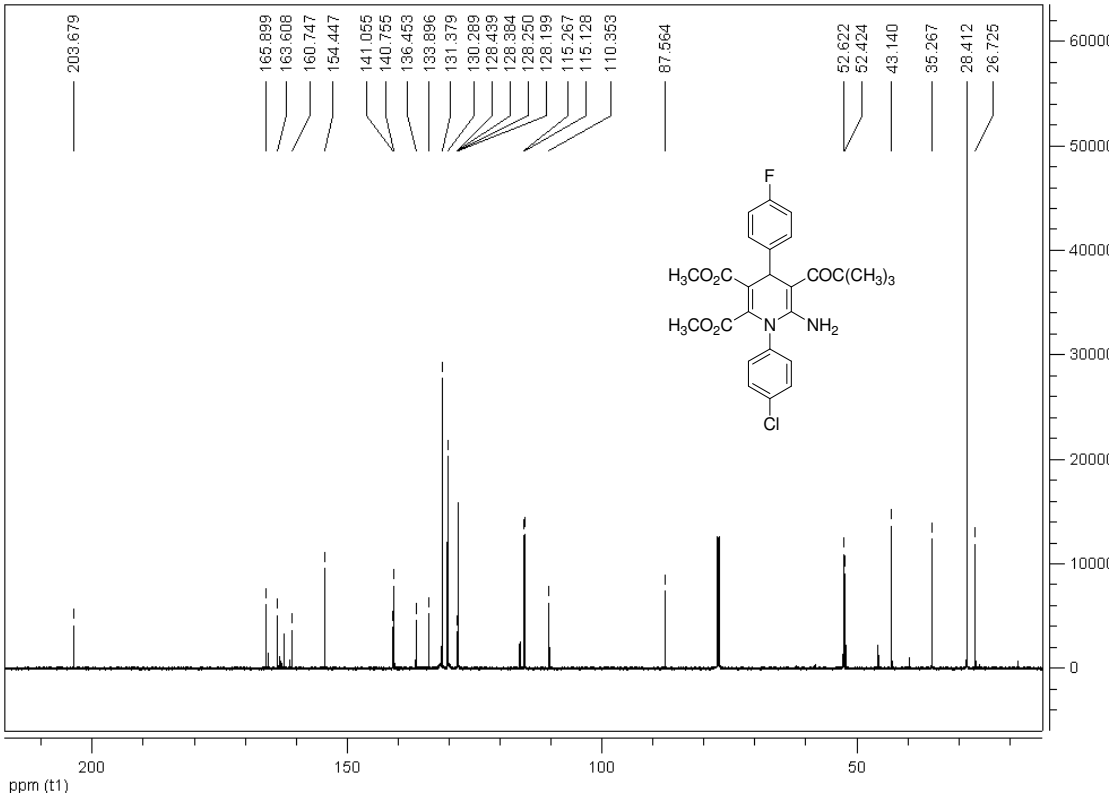
3c: white solid, 63%, m.p.169~171°C;^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.44 (s, 2H, ArH), 7.36 (d, *J* = 7.8Hz, 2H, ArH), 7.32 (s, 2H, ArH), 7.22 (d, *J* = 7.8Hz, 2H, ArH), 4.28 (s, 1H, CH), 3.62 (s, 3H, OCH_3), 3.52 (s, 3H, OCH_3), 1.33 (s, 9H, CH_3), 1.21 (s, 9H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 203.7, 165.4, 164.9, 163.1, 162.8, 154.5, 144.0, 140.7, 139.6, 136.5, 133.9, 133.4, 132.2, 132.1, 132.0, 131.6, 130.2, 129.3, 128.6, 128.3, 128.2, 128.1, 111.1, 87.2, 62.0, 61.9, 61.3, 60.9, 45.7, 43.1, 39.9, 35.4, 28.4, 26.8, 14.2, 13.9, 13.5, 13.4; IR(KBr) υ: 3440, 3304, 2960, 1746, 1705, 1631, 1443, 1370, 1300, 1226, 1124, 916, 833 cm^{-1}; MS (*m/z*): 539.73 ($[M+1]^+$) 100%, 540.64 ($[M+3]^+$) 43%. Anal Calcd for $C_{30}H_{35}ClN_2O_5$: C 66.84, H 6.54, N 5.20; Found: C 66.52, H 6.75, N 4.79.



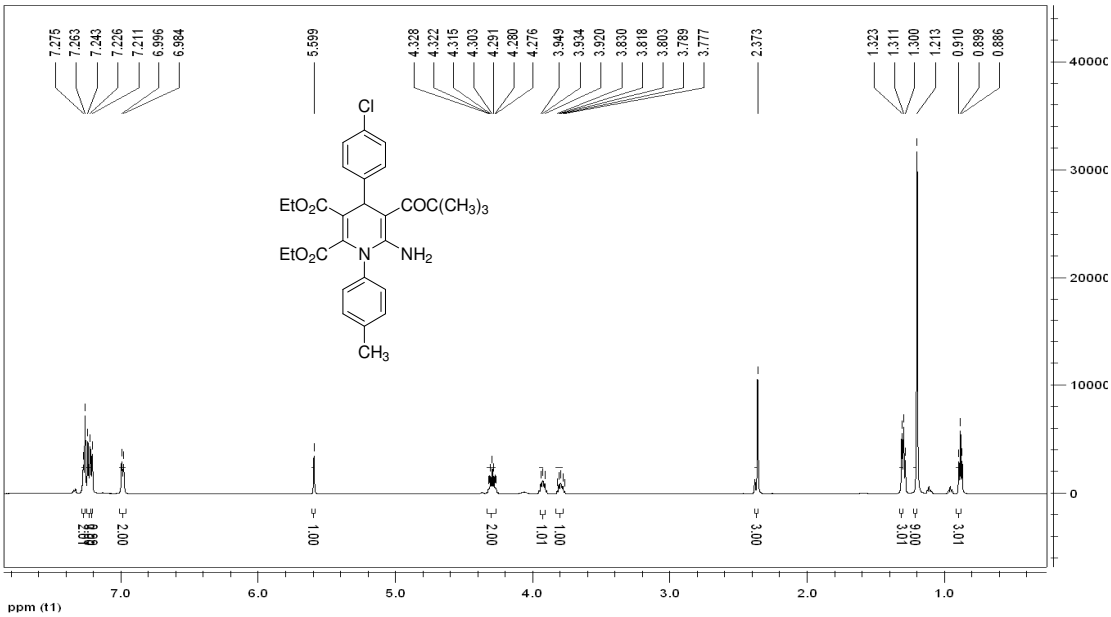


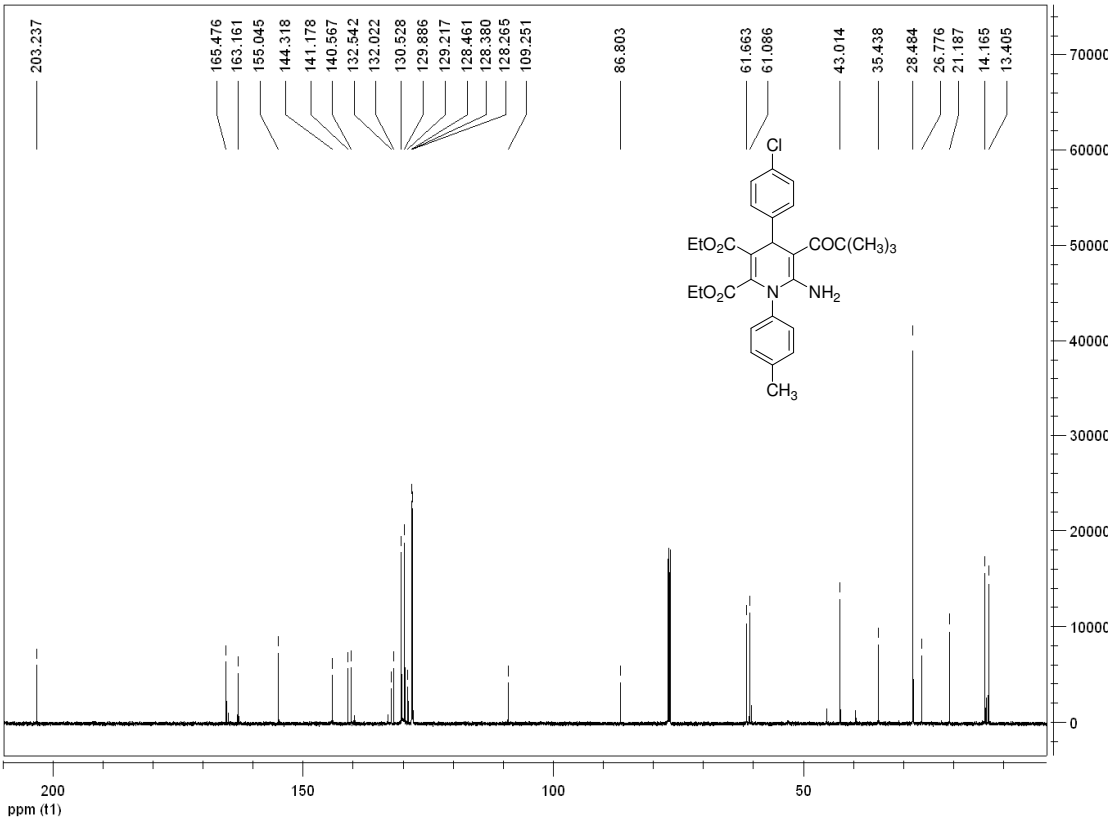
3d: white solid, 80%, m.p.186~187°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.41 (d, *J* = 8.4Hz, 2H, ArH), 7.25~7.22 (m, 2H, ArH), 7.03 (d, *J* = 8.4Hz, 2H, ArH), 6.99 (t, *J* = 8.4Hz, 2H, ArH), 5.57 (s, 1H, CH), 3.87 (s, 3H, OCH_3), 3.46 (s, 3H, OCH_3), 1.21 (s, 9H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 203.7, 165.9, 163.6, 160.7, 154.4, 141.1, 140.8, 136.5, 133.9, 131.4, 130.3, 128.4, 128.3, 128.2, 115.3, 115.1, 110.4, 87.6, 52.6, 52.4, 43.1, 35.3, 28.4, 26.7; IR (KBr) υ: 3466, 2989, 2974, 2953, 1745, 1715, 1635, 1596, 1567, 1499, 1447, 1364, 1340, 1230, 1213, 1156, 1113, 1095, 1053, 1018, 966, 915, 864, 841, 827, 799, 777 cm^{-1}; MS (*m/z*): 501.87 ($[M+1]^+$) 100%, 503.92 ($[M+3]^+$) 56%. Anal Calcd for $C_{26}H_{26}ClFN_2O_5$: C 62.34, H 5.23, N 5.59; Found: C 62.60, H 5.41, N 5.37.



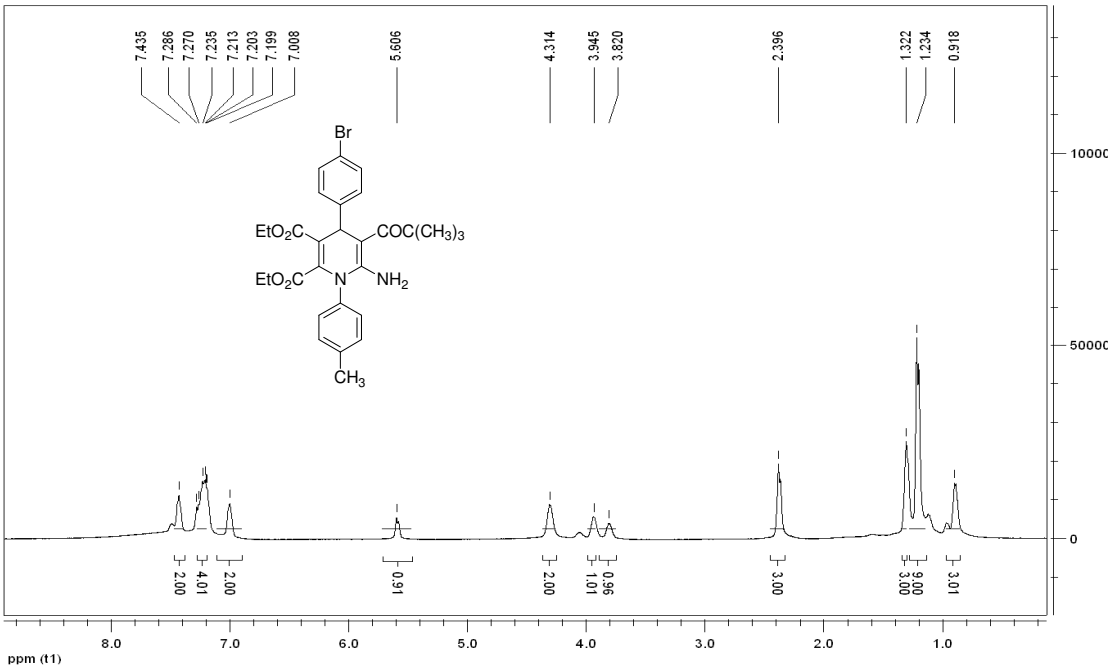


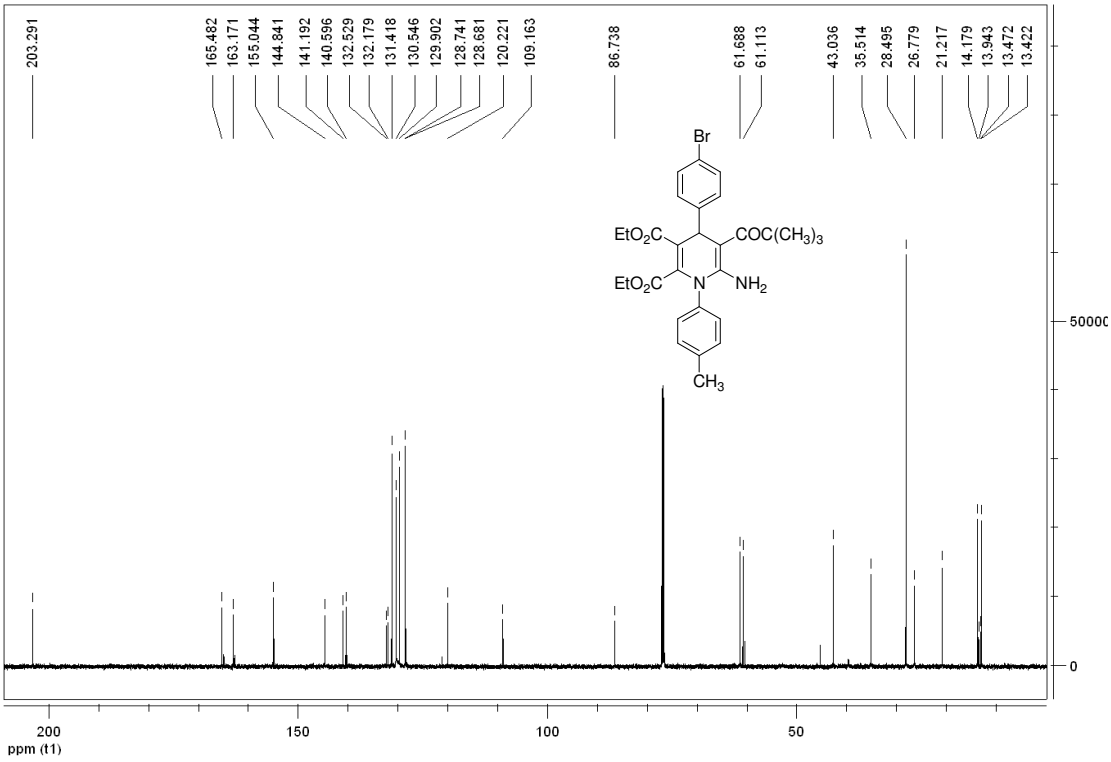
3e: white solid, 73%, m.p.137~139°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.27 (d, *J* = 7.2Hz, 2H, ArH), 7.24~7.23 (m, 3H, ArH), 7.21 (s, 1H, ArH), 6.99 (d, *J* = 7.2Hz, 2H, ArH), 5.60 (s, 1H, CH), 4.33~4.28 (m, 2H, CH_2), 3.95~3.92 (m, 1H, CH_2), 3.83~3.78 (m, 1H, CH_2), 2.37 (s, 3H, CH_3), 1.31 (t, *J* = 7.2Hz, 3H, CH_3), 1.21 (s, 9H, CH_3), 0.90 (t, *J* = 7.2Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ:203.2, 165.5, 163.2, 155.0, 144.3, 141.2, 140.6, 132.5, 132.0, 130.5, 129.9, 129.2, 128.5, 128.4, 128.3, 109.3, 86.8, 61.7, 61.1, 43.0, 35.4, 28.5, 26.8, 21.1, 14.2, 13.4; IR (KBr) υ: 3729, 3453, 2979, 1091, 1724, 1708, 1639, 1597, 1565, 1509, 1486, 1441, 1396, 1368, 1335, 1225, 1161, 1112, 1051, 1015, 940, 855, 812 cm^{-1}; MS (*m/z*): 525.33 ($[M+1]^+$) 100%, 527.50 ($[M+3]^+$) 76%. Anal Calcd for $C_{29}H_{33}ClN_2O_5$: C 66.34, H 6.34, N 5.34; Found: C 66.30, H 6.71, N 5.15.



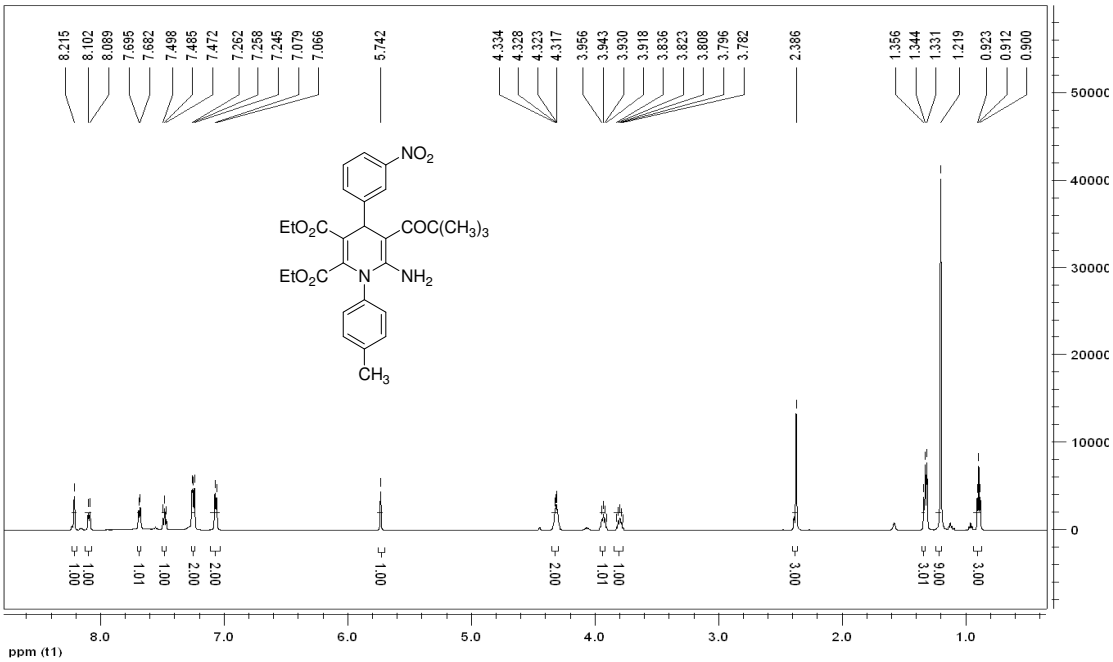


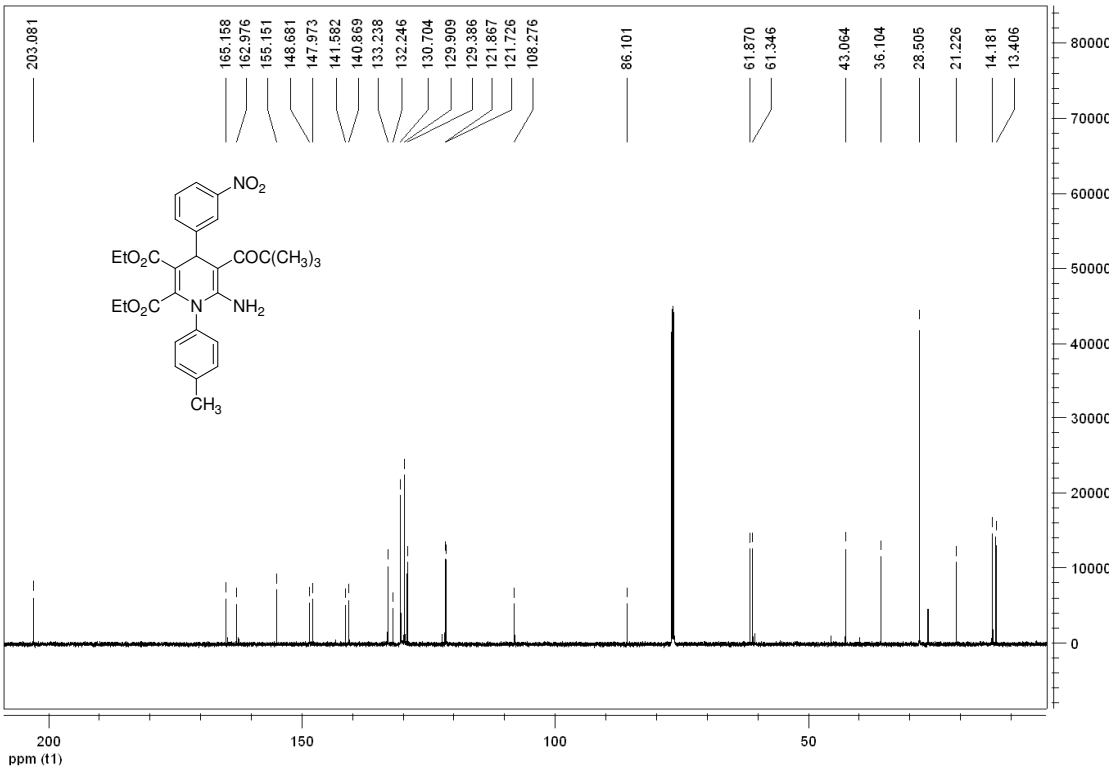
3f: white solid, 75%, m.p.143~145°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.44 (s, 2H, ArH), 7.29~7.20 (m, 4H, ArH), 7.01 (s, 2H, ArH), 5.61 (brs, 1H, CH), 4.31 (s, 2H, CH_2), 3.95 (s, 1H, CH_2), 3.82 (s, 1H, CH_2), 2.40 (brs, 3H, CH_3), 1.32 (s, 3H, CH_3), 1.23 (brs, 9H, CH_3), 0.92 (brs, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ:203.3, 165.5, 163.2, 155.0, 144.8, 141.2, 140.6, 132.5, 132.2, 131.4, 130.5, 129.9, 128.7, 128.6, 120.2, 109.2, 86.7, 61.7, 61.1, 43.0, 35.5, 28.5, 26.8, 21.2, 14.2, 13.9, 13.5, 13.4; IR (KBr) υ: 3669, 3452, 2978, 1742, 1707, 1639, 1596, 1564, 1509, 1442, 1393, 1368, 1336, 1225, 1161, 1113, 1051, 1010, 941, 854, 804 cm^{-1}; MS (*m/z*): 569.70 ($[M+1]^+$) 78%, 571.52 ($[M+3]^+$) 100%. Anal Calcd for $C_{29}H_{33}BrN_2O_5$: C 61.16, H 5.84, N 4.92; Found: C 60.77, H 6.23, N 4.69.



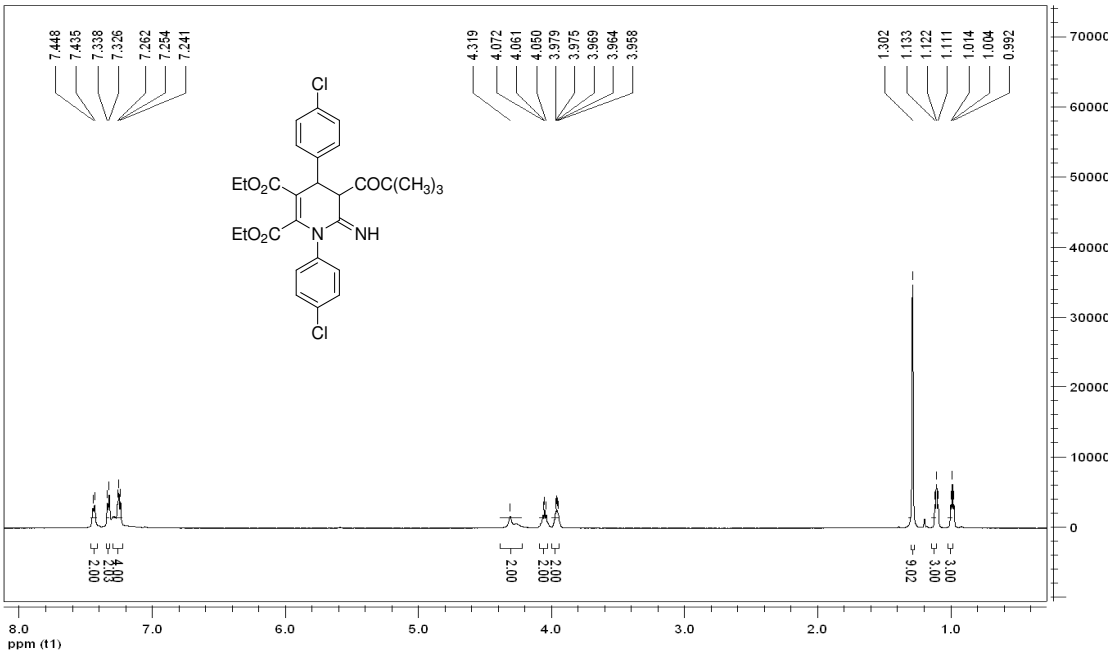


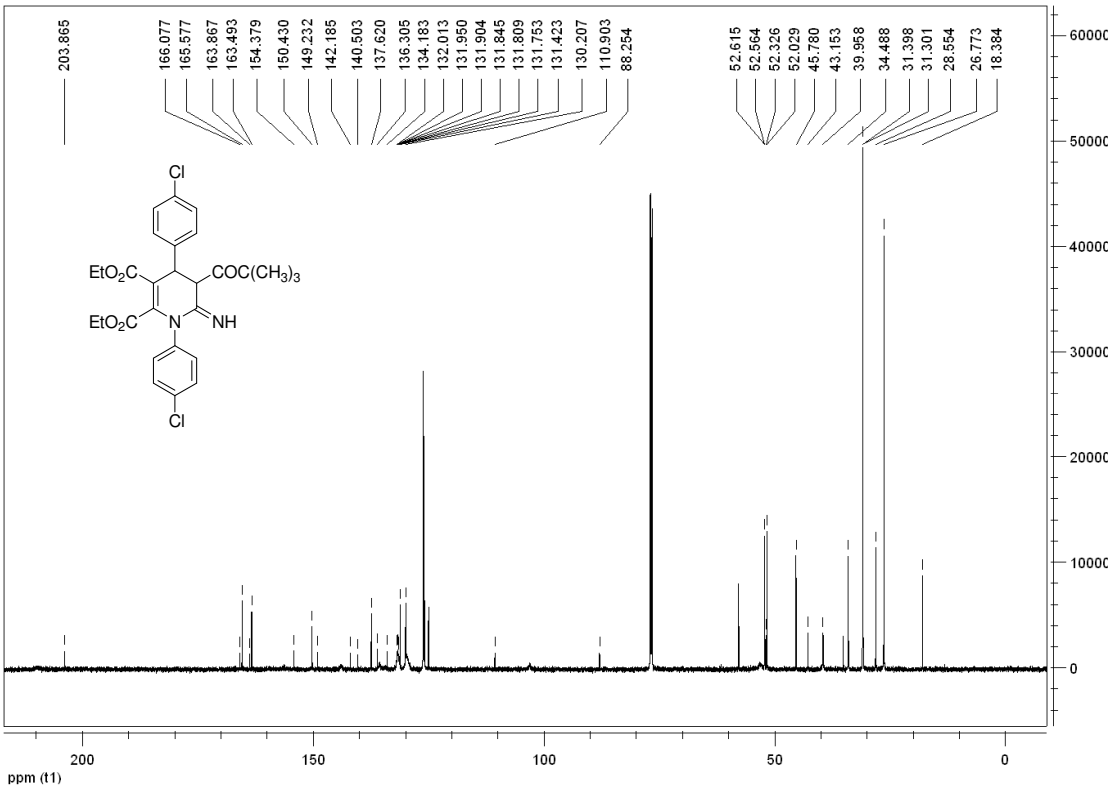
3g: yellow solid, 65%, m.p.166~168°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 8.22 (s, 1H, ArH), 8.10 (d, *J* = 7.8Hz, 1H, ArH), 7.69 (d, *J* = 7.8Hz, 1H, ArH), 7.49 (t, *J* = 7.8Hz, 1H, ArH), 7.25 (d, *J* = 7.8Hz, 2H, ArH), 7.07 (d, *J* = 7.8Hz, 2H, ArH), 5.74 (s, 1H, CH), 4.33~4.32 (m, 2H, CH_2), 3.96~3.92 (m, 1H, CH_2), 3.84~3.78 (m, 1H, CH_2), 2.39 (s, 3H, CH_3), 1.34 (t, *J* = 7.2Hz, 3H, CH_3), 1.22 (s, 9H, CH_3), 0.90 (t, *J* = 7.2Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 203.6, 165.2, 163.0, 155.2, 148.7, 148.0, 141.6, 140.9, 133.2, 132.2, 130.7, 129.9, 129.4, 121.9, 121.7, 108.3, 86.1, 61.9, 61.3, 43.1, 36.1, 28.5, 21.2, 14.2, 13.4; IR (KBr) υ: 3444, 2978, 1739, 1694, 1644, 1597, 1530, 1445, 1359, 1251, 1159, 1110, 1017, 938, 823, 780 cm^{-1}; MS (*m/z*): 536.65 ($[M+1]^+$) 100%. Anal Calcd for $C_{29}H_{33}N_3O_7$: C 65.03, H 6.21, N 7.85; Found: C 64.76, H 6.44, N 7.56.



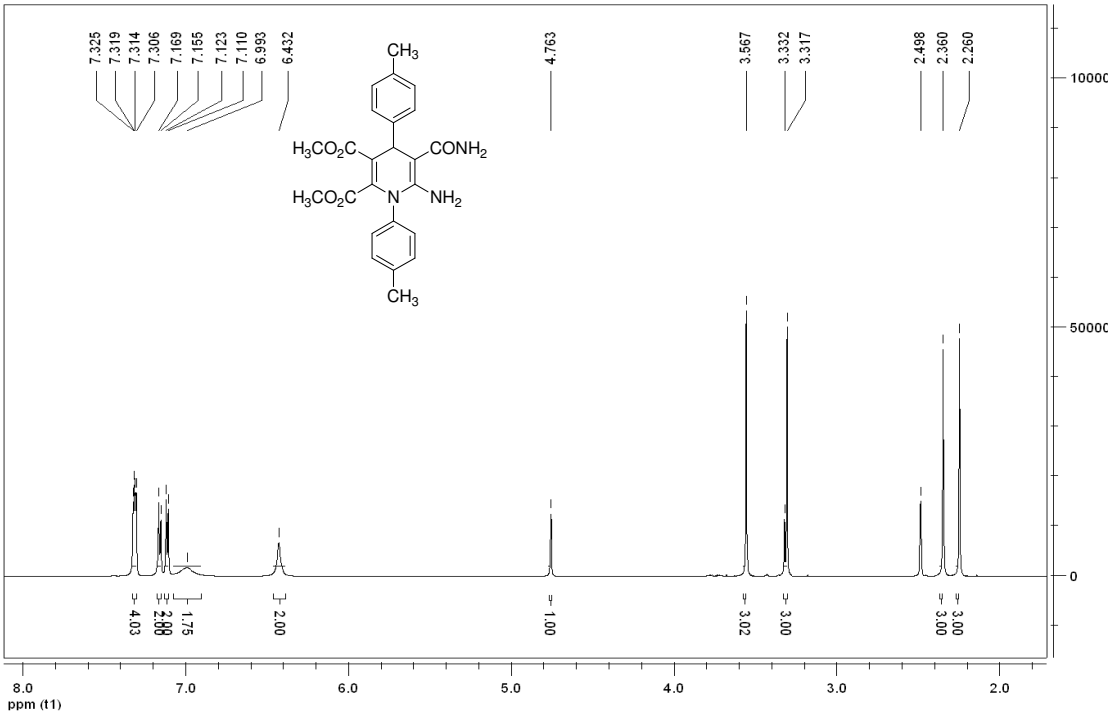


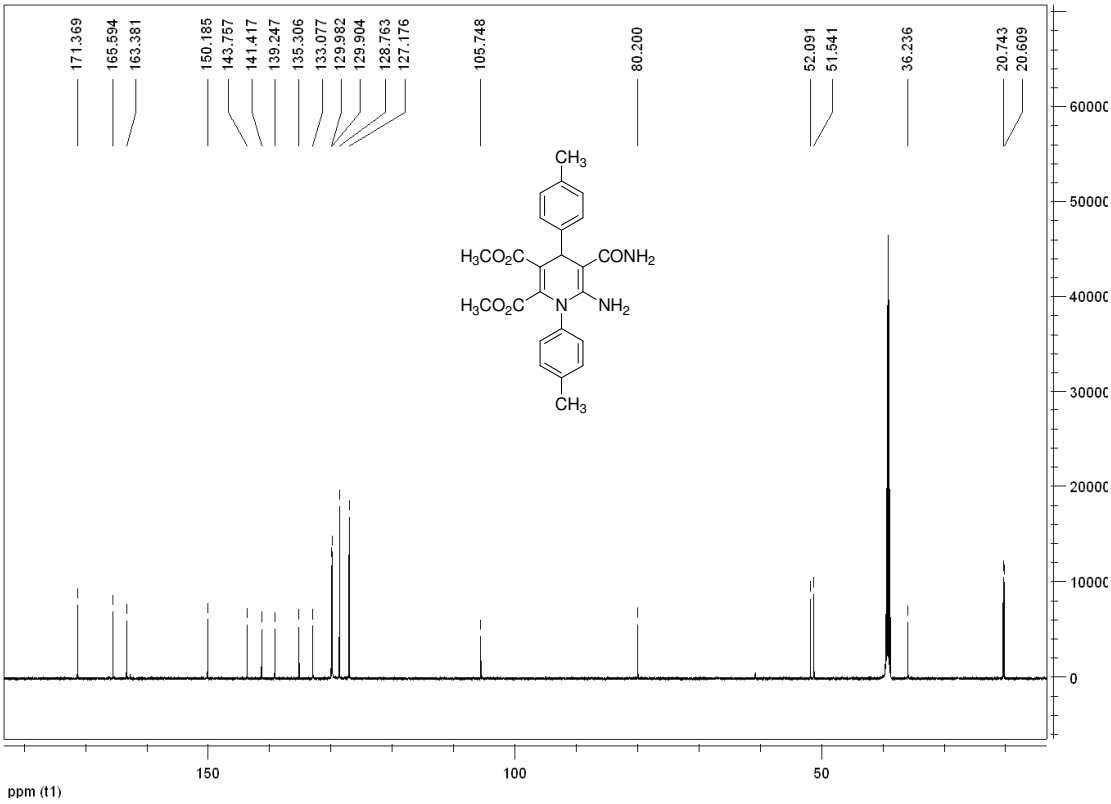
3h: white solid, 78%, m.p.154~155°C; ^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.44 (d, *J* = 7.8Hz, 2H, ArH), 7.33 (d, *J* = 7.2Hz, 2H, ArH), 7.25 (t, *J* = 7.8Hz, 4H, ArH), 4.32 (s, 2H, CH), 4.07~4.05 (m, 2H, CH_2), 3.98~3.96 (m, 2H, CH_2), 1.30 (s, 9H, CH_3), 1.12 (t, *J* = 6.6Hz, 3H, CH_3), 1.00 (t, *J* = 7.2Hz, 3H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 203.9, 166.1, 165.6, 163.9, 163.5, 154.4, 150.4, 149.2, 142.2, 140.5, 137.6, 136.3, 134.2, 132.0, 131.9, 131.8, 131.7, 131.4, 130.2, 110.9, 88.3, 52.6, 52.5, 52.3, 52.0, 45.8, 43.2, 40.0, 34.5, 31.4, 31.3, 28.6, 26.8, 18.4; IR (KBr) υ: 3450, 3275, 3061, 2979, 1740, 1699, 1636, 1484, 1363, 1304, 1253, 1211, 1136, 1083, 1006, 922, 859, 825 cm^{-1}; MS (*m/z*): 545.75 ($[M+1]^+$) 29%, 547.40 ($[M+3]^+$) 100%. Anal Calcd for $C_{28}H_{30}Cl_2N_2O_5$: C 61.65, H 5.54, N 5.14; Found: C 61.39, H 5.70, N 4.81.



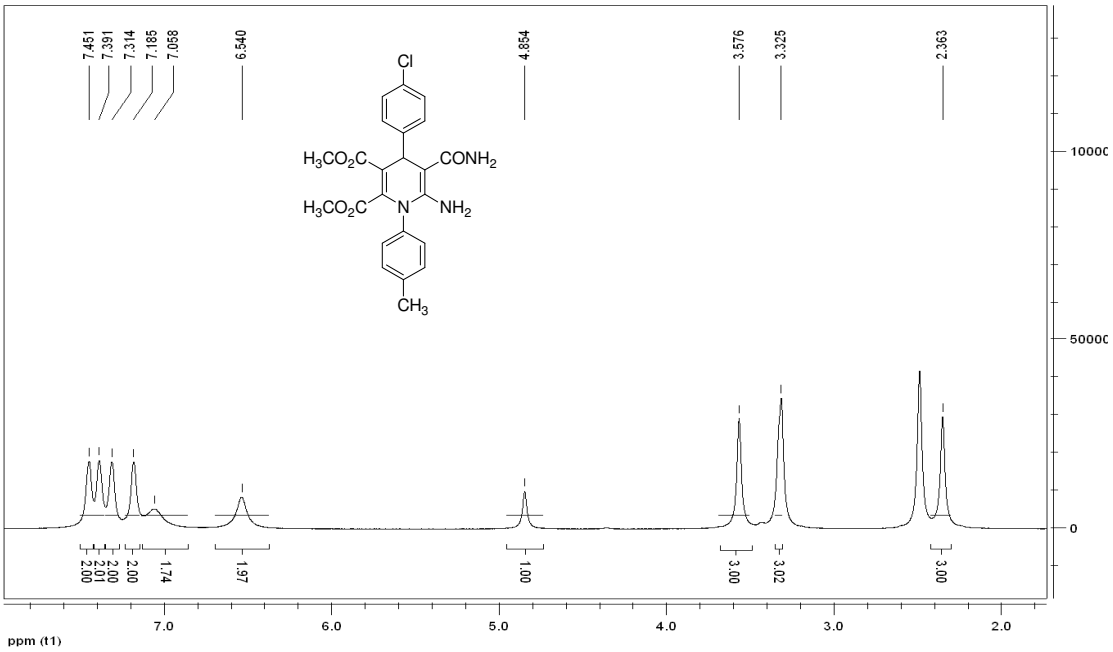


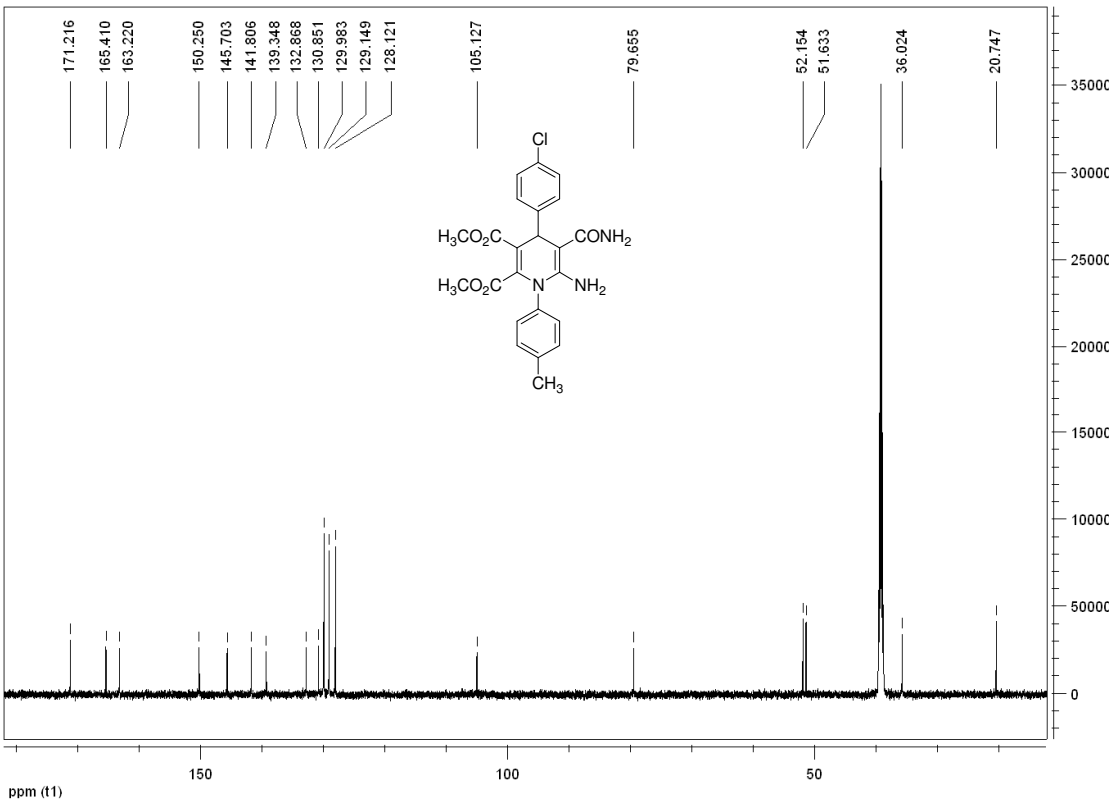
3i: light yellow solid, 35%, m.p.222~223°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.33~7.31 (m, 4H, ArH), 7.16 (d, J = 8.4Hz, 2H, ArH), 7.12 (d, J = 7.8Hz, 2H, ArH), 6.99 (brs, 2H, NH_2), 4.76 (s, 1H, CH), 3.57 (s, 3H, OCH_3), 3.32 (s, 3H, OCH_3), 2.36 (s, 3H, CH_3), 2.26 (s, 3H, CH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 171.4, 165.6, 163.4, 150.2, 143.8, 141.4, 139.2, 135.3, 133.1, 130.0, 129.9, 128.8, 127.2, 105.7, 80.2, 52.1, 51.5, 36.2, 20.7, 20.6; IR (KBr) υ: 3449, 3320, 3185, 1748, 1654, 1575, 1484, 1402, 1256, 1212, 1111, 789 cm^{-1}; MS(*m/z*): 436.44 ([M+1]$^{+}$) 100%. Anal Calcd for $C_{24}H_{25}N_3O_5$: C 66.19, H 5.79, N 9.65; Found: C 65.84, H 6.12, N 9.28.



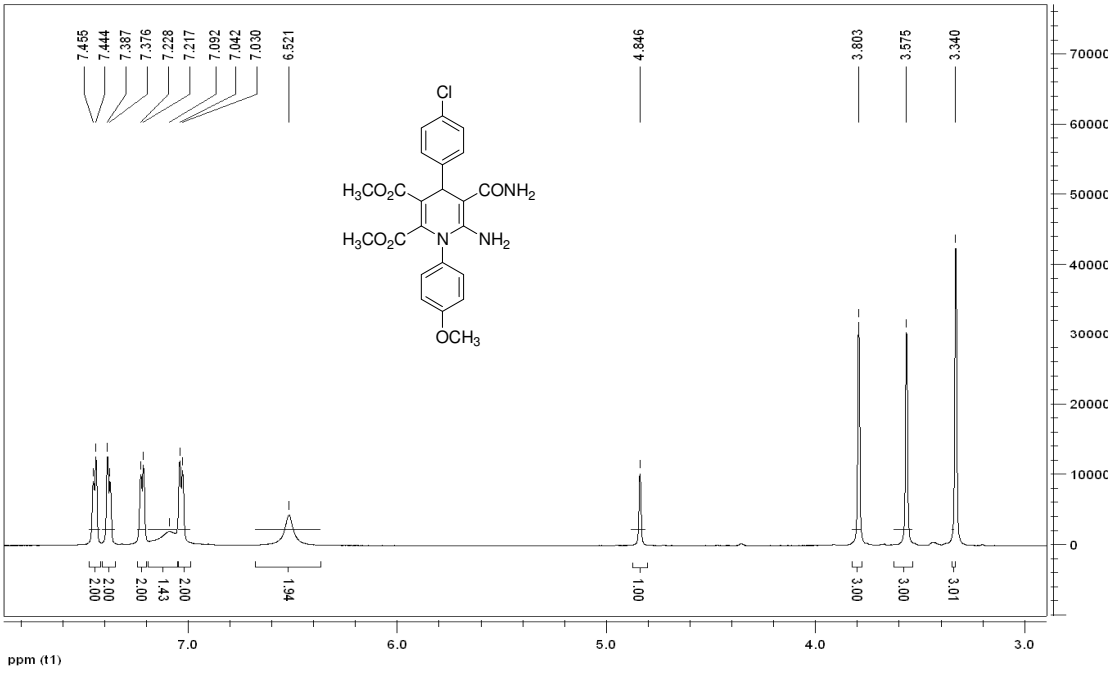


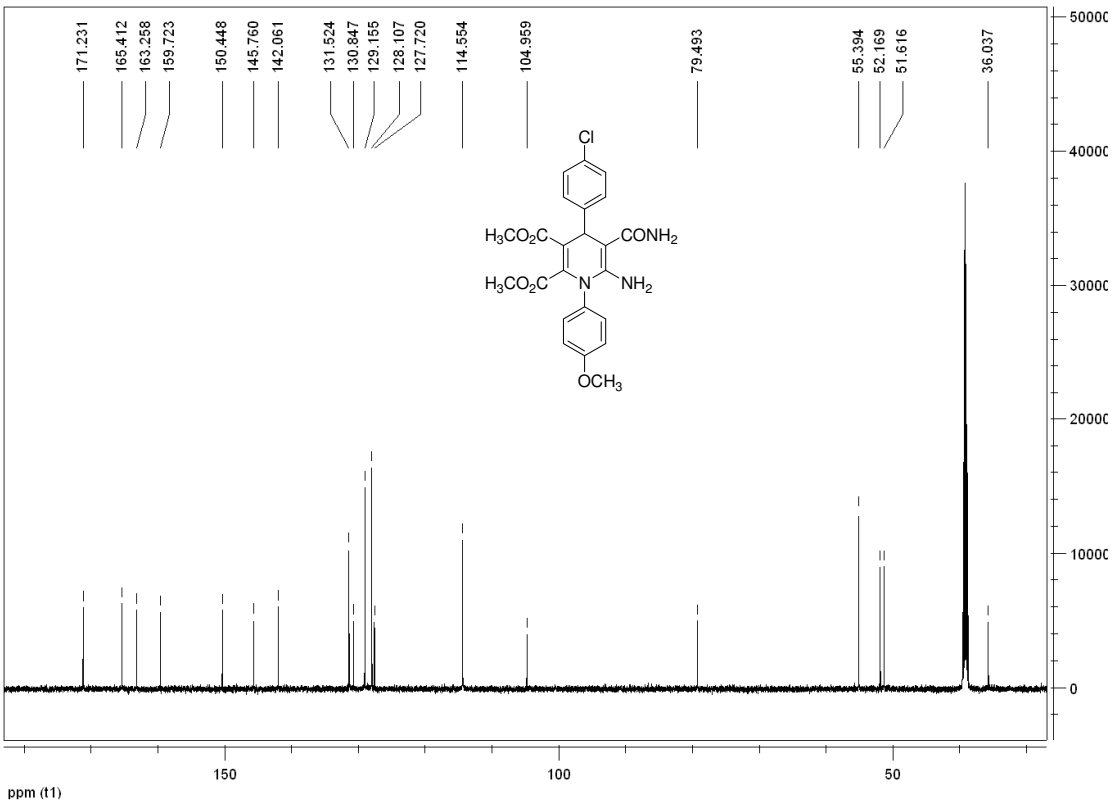
3j: light yellow solid, 46%, m.p.223~224°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.45 (s, 2H, ArH), 7.39 (s, 2H, ArH), 7.31 (s, 2H, ArH), 7.19 (s, 2H, ArH), 7.06 (brs, 2H, NH_2), 4.85 (s, 1H, CH), 3.58 (s, 3H, OCH_3), 3.33 (s, 3H, OCH_3), 2.36 (s, 3H, CH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ:171.2, 165.4, 163.2, 150.3, 145.7, 141.8, 139.3, 132.9, 130.9, 130.0, 129.1, 128.1, 105.1, 79.7, 52.2, 51.6, 36.0, 20.7; IR (KBr) υ: 3653, 3457, 3328, 3177, 2950, 1748, 1686, 1656, 1573, 1483, 1435, 1406, 1332, 1259, 1217, 1109, 1060, 1018, 973, 933, 833, 814 cm^{-1}; MS (*m/z*): 456.54 ($[M+1]^+$) 100%, 458.24 ($[M+3]^+$) 53%. Anal Calcd for $C_{23}H_{22}ClN_3O_5$: C 60.59, H 4.86, N 9.22; Found: C 60.47, H 5.20, N 8.85.



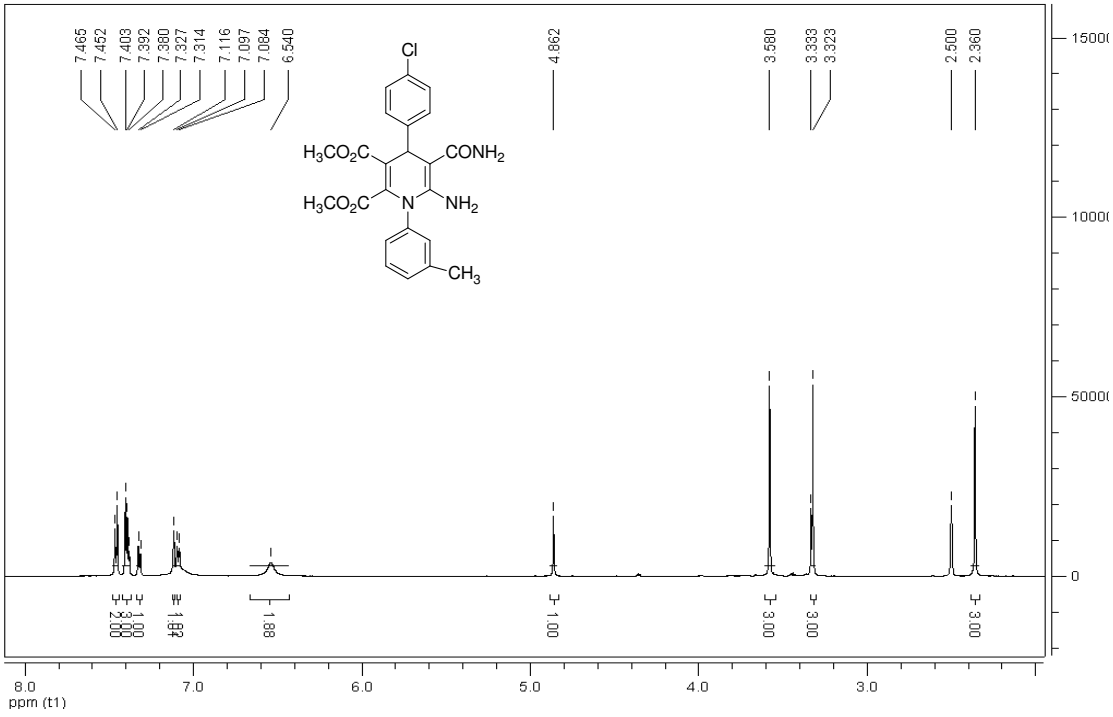


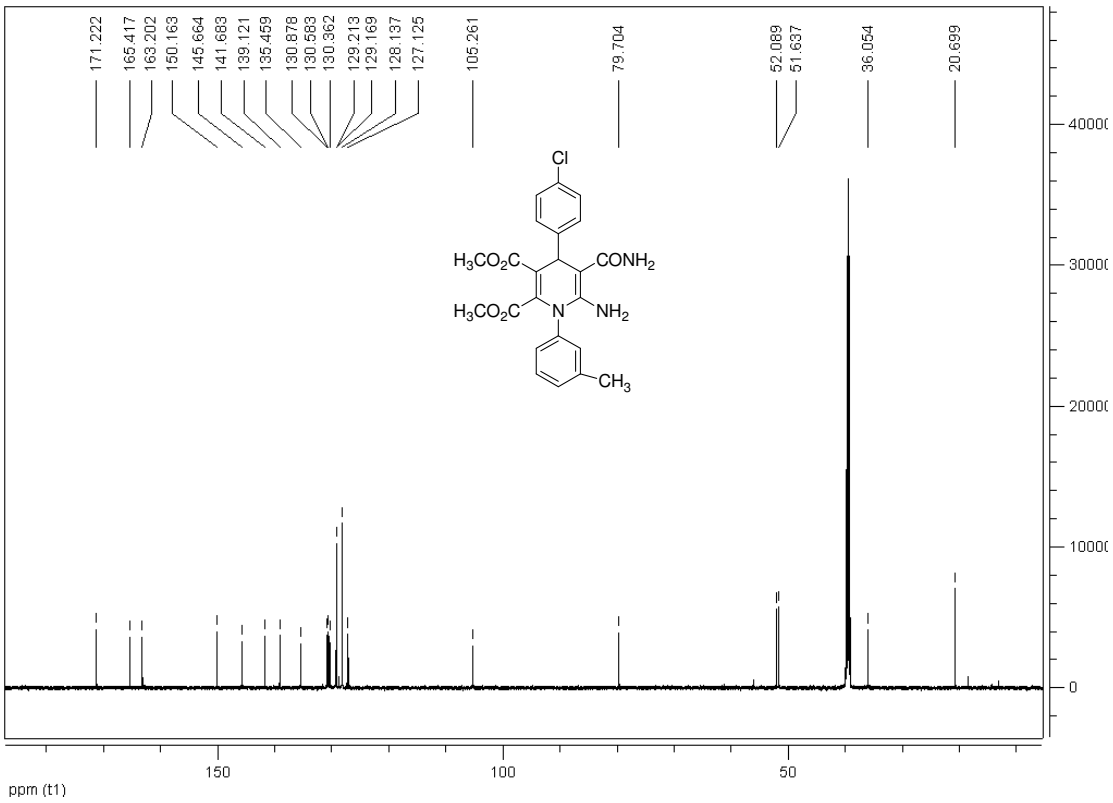
3k: light yellow solid, 51%, m.p.222~224°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.45 (d, J = 6.6Hz, 2H, ArH), 7.38 (d, J = 6.6Hz, 2H, ArH), 7.22 (d, J = 6.6Hz, 2H, ArH), 7.09 (brs, 2H, NH_2), 7.04 (d, J = 7.2Hz, 2H, ArH), 6.52 (s, 2H, NH_2), 4.85 (s, 1H, CH), 3.80 (s, 3H, OCH_3), 3.58 (s, 3H, OCH_3), 3.34 (s, 3H, OCH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 171.2, 165.4, 163.3, 159.7, 150.4, 145.8, 142.1, 131.5, 130.8, 129.2, 128.1, 127.7, 114.6, 105.0, 79.5, 55.4, 52.2, 51.6, 36.0; IR (KBr) υ: 3450, 3328, 3180, 2950, 2842, 1747, 1685, 1655, 1572, 1480, 1437, 1404, 1336, 1299, 1254, 1217, 1185, 1110, 1061, 1021, 975, 932, 829, 791 cm^{-1}; MS (m/z): 472.54 ([M+1]$^{+}$) 100%, 474.23 ([M+3]$^{+}$) 51%. Anal Calcd for $C_{23}H_{22}ClN_3O_6$: C 58.54, H 4.70, N 8.90; Found: C 58.33, H 5.06, N 8.57.



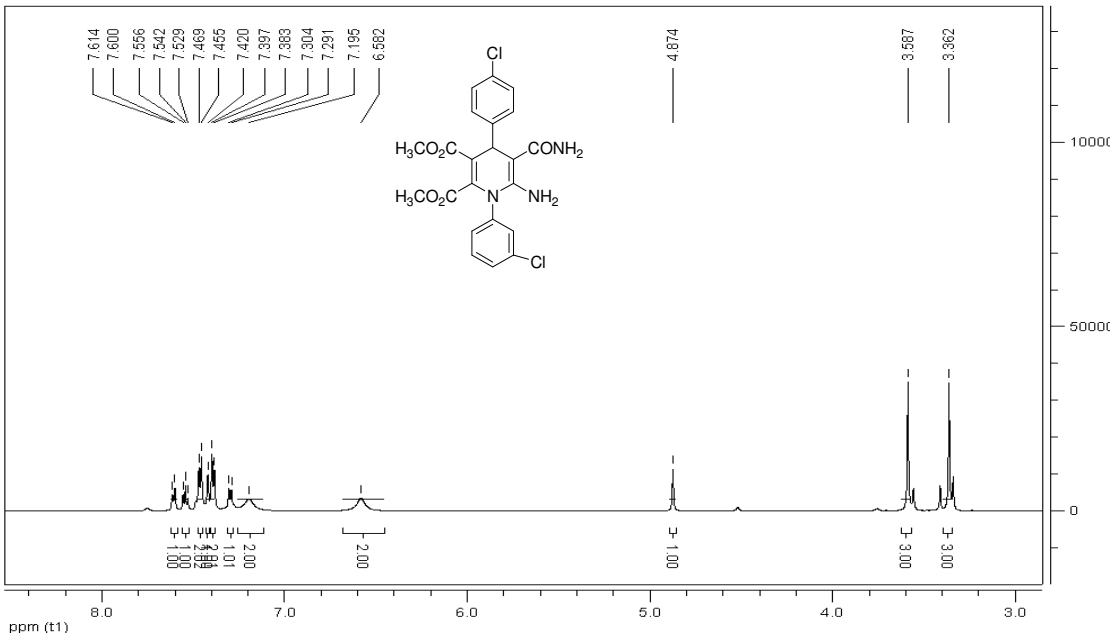


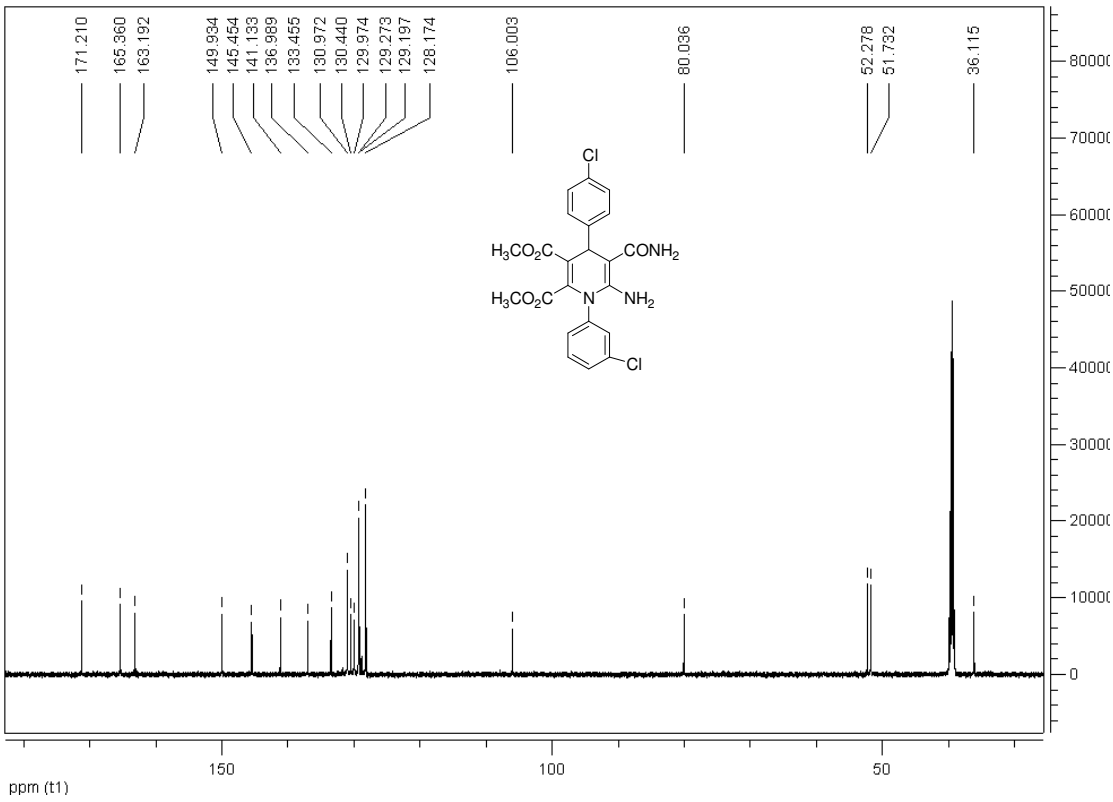
3l: yellow solid, 33%, m.p. 215~216°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.46 (d, J = 7.8Hz, 2H, ArH), 7.40~7.38 (m, 3H, ArH), 7.32 (d, J = 7.8Hz, 1H, ArH), 7.12 (s, 1H, ArH), 7.09 (d, J = 7.8Hz, 1H, ArH), 6.54 (s, 2H, NH_2), 4.86 (s, 1H, CH), 3.58 (s, 3H, OCH_3), 3.32 (s, 3H, OCH_3), 2.36 (s, 3H, CH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 171.2, 165.4, 163.2, 150.2, 145.7, 141.7, 139.1, 135.5, 130.9, 130.6, 130.4, 129.2, 129.1, 128.1, 127.1, 105.3, 79.7, 52.1, 51.6, 36.1, 20.7; IR (KBr) υ: 3462, 3352, 3211, 2951, 1739, 1693, 1648, 1573, 1479, 1398, 1259, 1122, 926, 838, 795 cm^{-1}; MS (m/z): 456.22 ([M+1]$^+$) 100%, 458.17 ([M+3]$^+$) 16%. Anal Calcd for $C_{23}H_{22}ClN_3O_5$: C 60.59, H 4.86, N 9.22; Found: C 60.79, H 5.31, N 8.85.



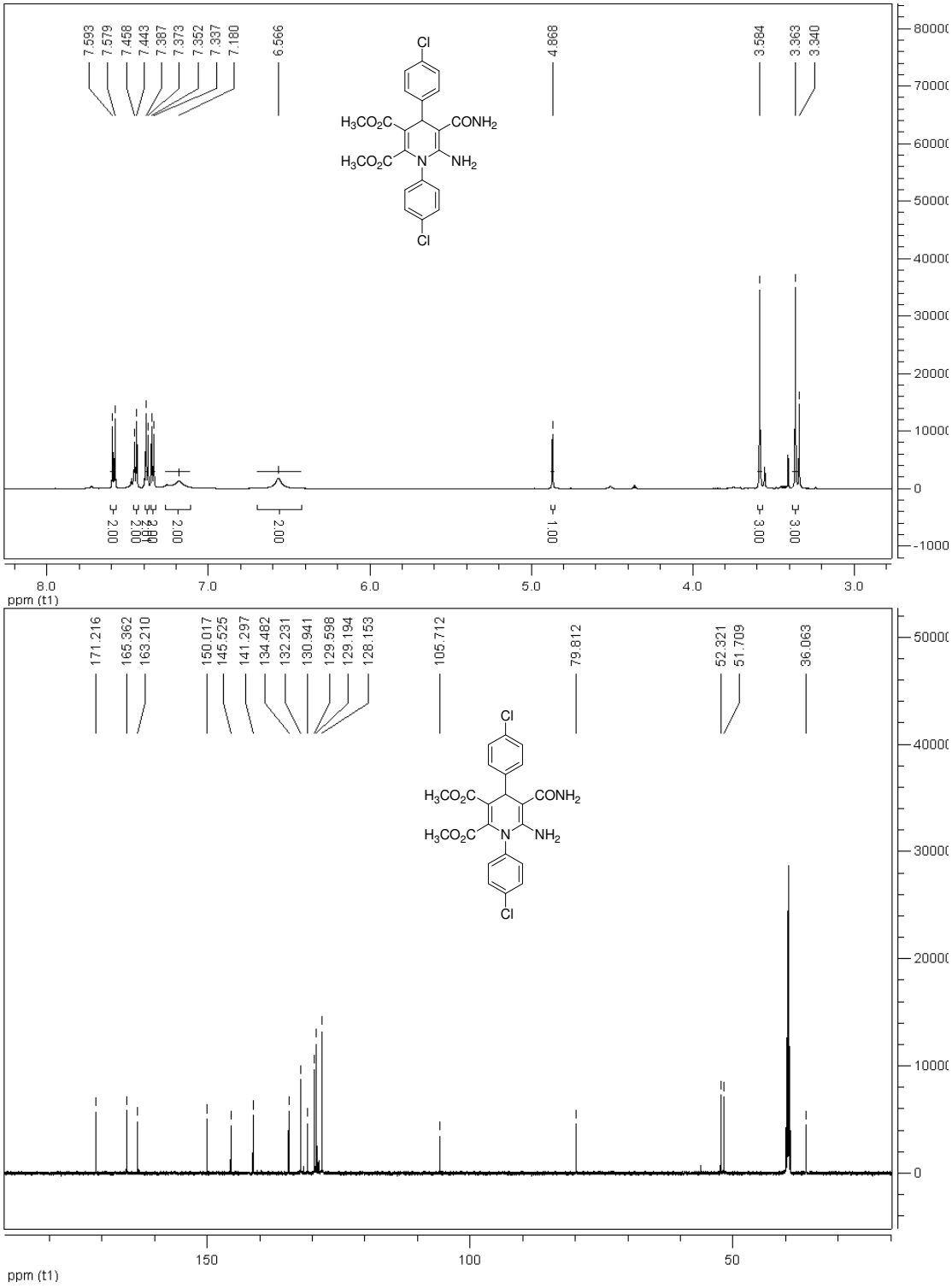


3m: light yellow solid, 38%, m.p. 204~206°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.61 (d, J = 8.4Hz, 1H, ArH), 7.54 (t, J = 8.4Hz, 1H, ArH), 7.46 (d, J = 8.4Hz, 2H, ArH), 7.42 (s, 1H, ArH), 7.39 (d, J = 8.4Hz, 2H, ArH), 7.30 (d, J = 7.8Hz, 1H, ArH), 7.20 (s, 2H, NH_2), 6.58 (s, 2H, NH_2), 4.87 (s, 1H, CH), 3.59 (s, 3H, OCH_3), 3.36 (s, 3H, OCH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 171.2, 165.4, 163.2, 149.9, 145.5, 141.1, 137.0, 133.5, 131.0, 130.4, 130.0, 129.3, 129.2, 128.2, 106.0, 80.0, 52.3, 51.7, 36.1; IR (KBr) υ: 3458, 3353, 3215, 2950, 1739, 1693, 1654, 1598, 1570, 1476, 1438, 1407, 1382, 1338, 1258, 1216, 1184, 1133, 1112, 1092, 1024, 932, 891, 881, 854, 837, 807, 796, 785, 769cm^{-1}; MS (*m/z*): 476.31 ([M+1]$^{+}$) 100%, 478.12 ([M+3]$^{+}$) 64%, 480.04 ([M+5]$^{+}$) 9%. Anal Calcd for $C_{22}H_{19}Cl_2N_3O_5$: C 55.48, H 4.02, N 8.82; Found: C 55.64, H 4.49, N 8.60.

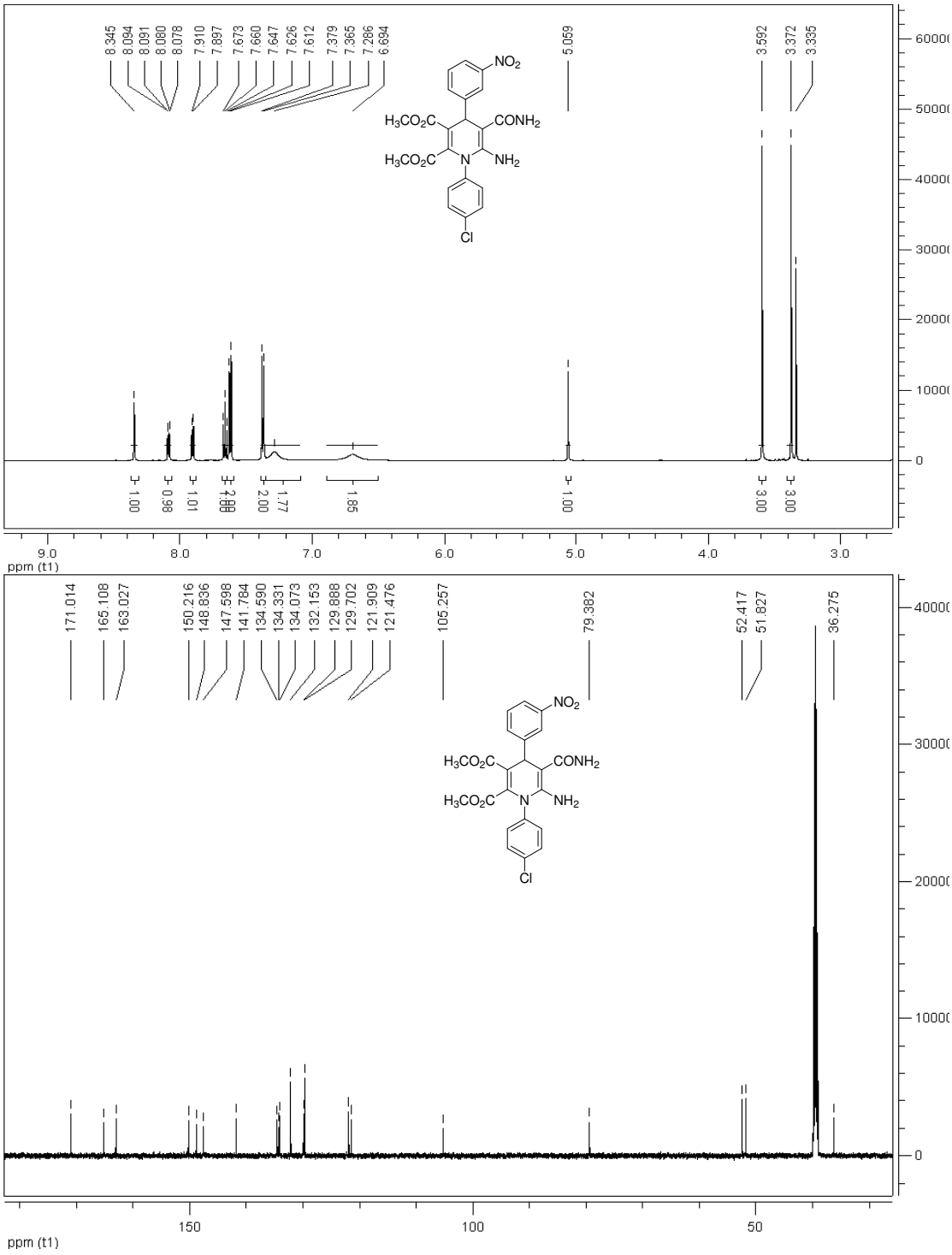




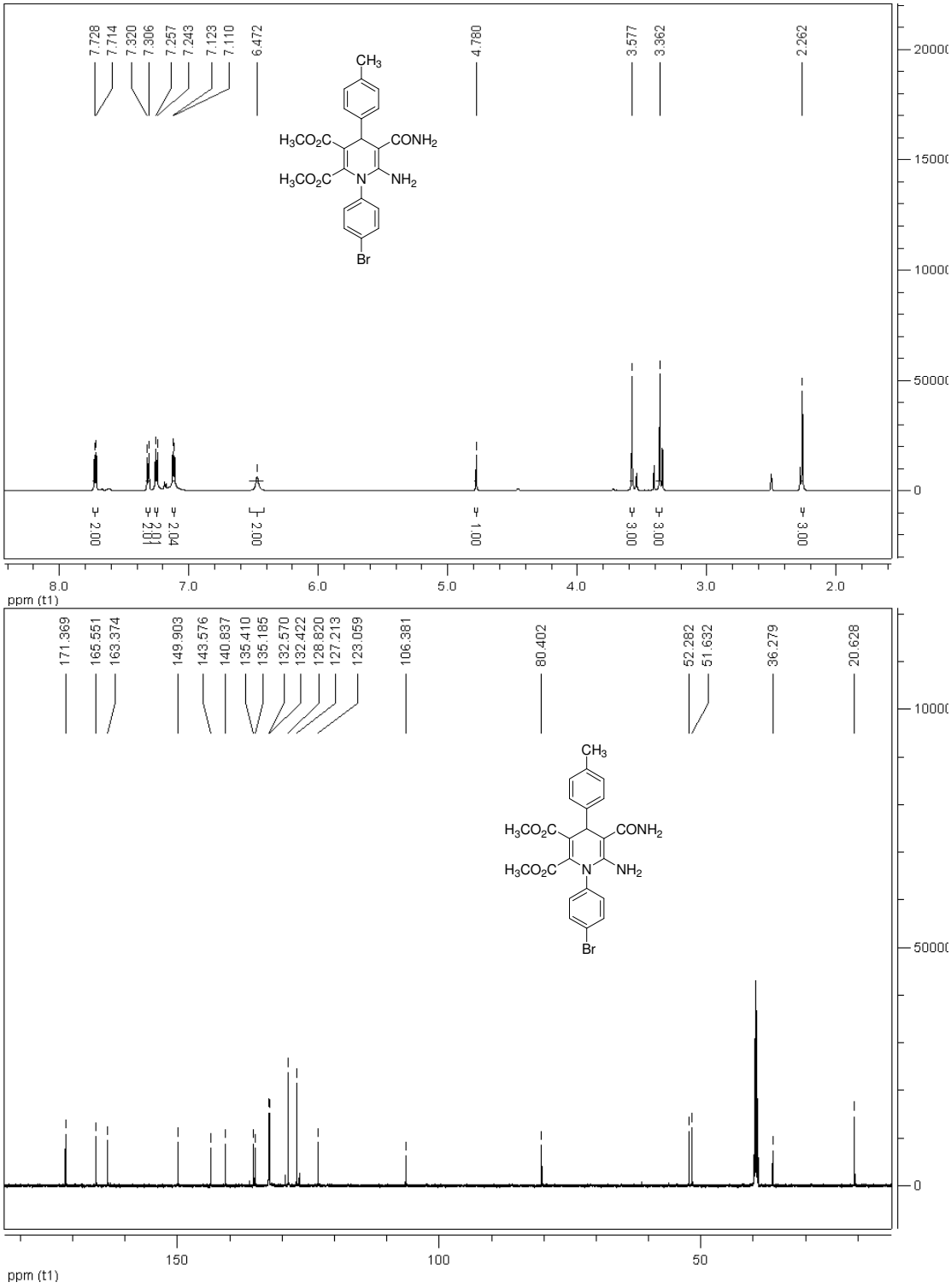
3n: light yellow solid, 42%, m.p. 212~213°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.59 (d, J = 8.4Hz, 2H, ArH), 7.45 (d, J = 9.0Hz, 2H, ArH), 7.38 (d, J = 8.4Hz, 2H, ArH), 7.34 (d, J = 9.0Hz, 2H, ArH), 7.18 (s, 2H, NH_2), 6.57 (s, 2H, NH_2), 4.87 (s, 1H, CH), 3.58 (s, 3H, OCH_3), 3.36 (s, 3H, OCH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 171.2, 165.4, 163.2, 150.0, 145.5, 141.3, 134.5, 132.2, 130.9, 129.6, 129.2, 128.2, 105.7, 79.8, 52.3, 51.7, 36.1; IR(KBr) υ: 3463, 3327, 3187, 2951, 1747, 1689, 1657, 1600, 1574, 1487, 1439, 1404, 1368, 1338, 1263, 1216, 1130, 1094, 1014, 966, 926, 871, 835, 787cm^{-1}; MS(*m/z*): 476.24 ([M+1]$^+$) 100%, 478.12 ([M+3]$^+$) 53%, 480.03 ([M+5]$^+$) 6%. Anal Calcd for $C_{22}H_{19}Cl_2N_3O_5$: C 55.48, H 4.02, N 8.82; Found: C 55.29, H 4.33, N 8.71.



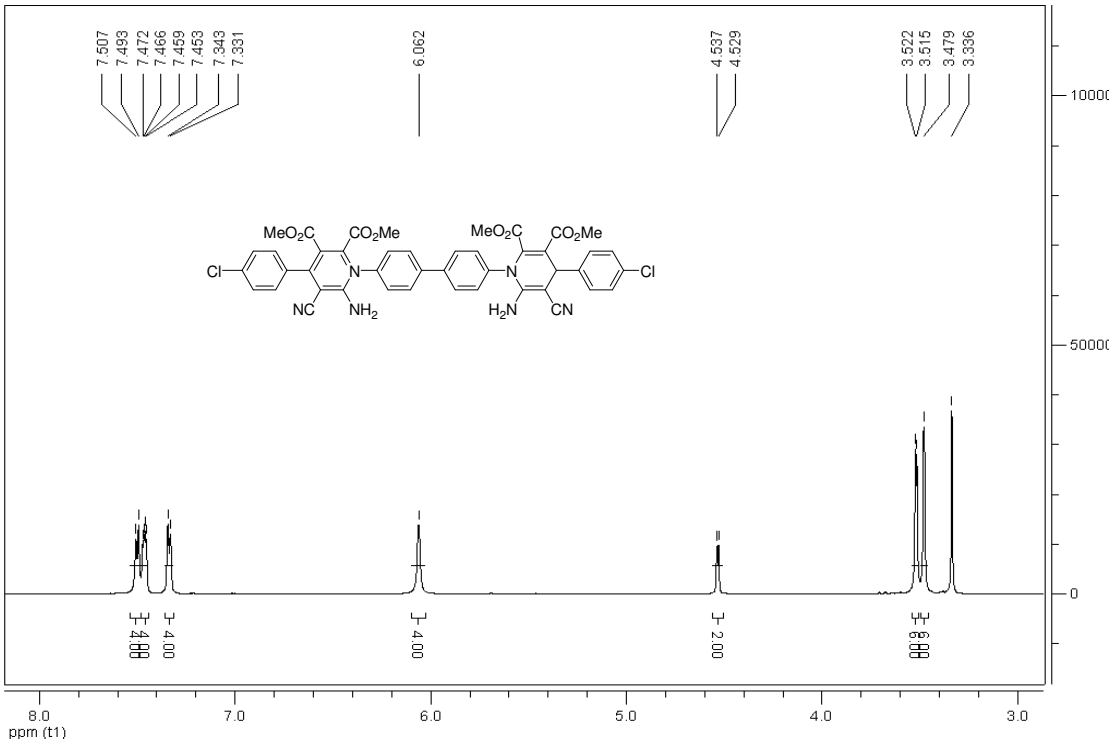
3o: yellow solid, 45%, m.p. 210~211°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 8.35 (s, 1H, ArH), 8.09~8.08 (m, 1H, ArH), 7.90 (d, J = 7.8Hz, 1H, ArH),7.66 (t, J = 7.8Hz, 1H, ArH), 7.62 (d, J = 8.4Hz, 2H, ArH), 7.37 (d, J = 8.4Hz, 2H, ArH),7.29 (s, 2H, NH_2), 6.69 (s, 2H, NH_2), 5.06 (s, 1H, CH), 3.59 (s, 3H, OCH_3), 3.37 (s, 3H, OCH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 171.0, 165.1, 163.0, 150.2, 148.8, 147.6, 141.8, 134.6, 134.3, 134.1, 132.2, 129.9, 129.7, 121.9, 121.5, 105.3, 79.4, 52.4, 51.8, 36.3; IR(KBr) υ: 3466, 3408, 3183, 2949, 1743, 1702, 1658, 1593, 1526, 1489, 1436, 1406, 1374, 1349, 1330, 1255, 1222, 1132, 1108, 1016, 973, 931, 872, 823, 811, 787 cm^{-1}; MS (*m/z*): 487.13 ($[M+1]^+$) 100%, 489.10 ($[M+3]^+$) 21%. Anal Calcd for $C_{22}H_{19}ClN_4O_7$: C 54.27, H 3.93, N 11.51; Found: C 53.88, H 4.30, N 11.47.

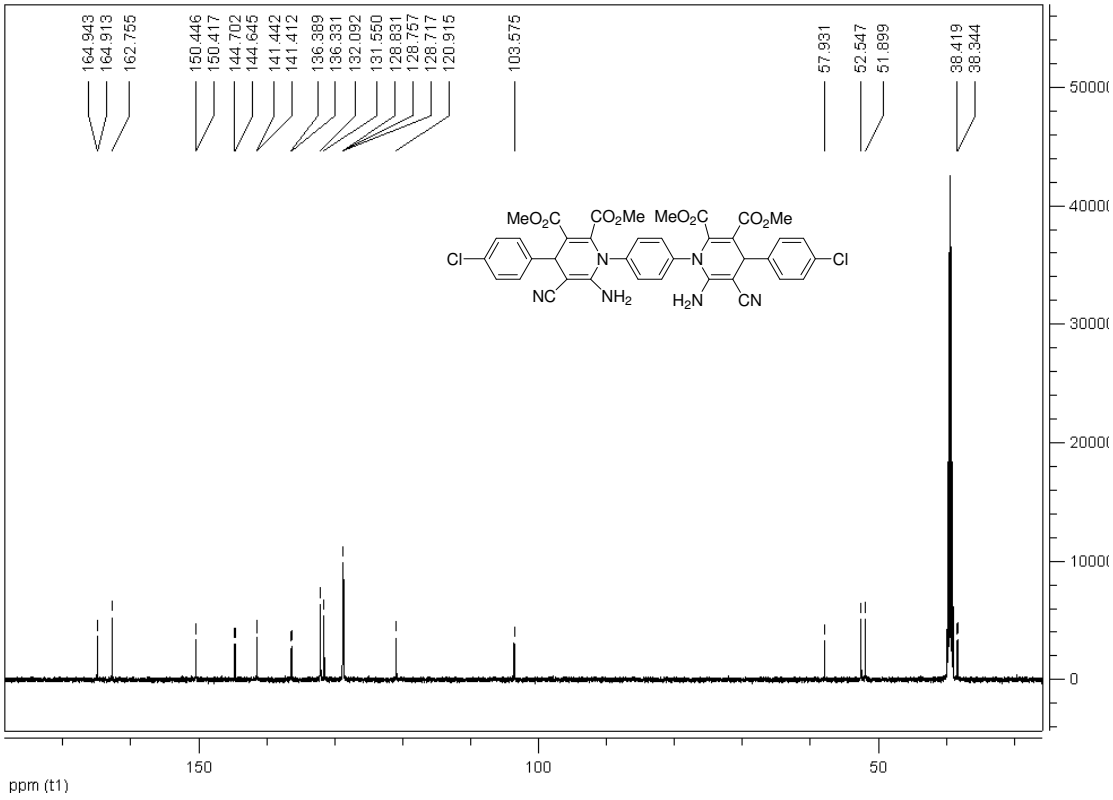


3p: light yellow solid, 36%, m.p. 211~212°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.72 (d, J = 8.4Hz, 2H, ArH),7.31 (d, J = 8.4Hz, 2H, ArH), 7.25 (d, J = 8.4Hz, 2H, ArH), 7.12 (d, J = 7.8Hz, 2H, ArH), 6.47 (s, 2H, NH_2), 4.78 (s, 1H, CH), 3.58 (s, 3H, OCH_3), 3.36 (s, 3H, OCH_3) , 2.26 (s, 3H, CH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 171.4, 165.6, 163.4, 149.9, 143.6, 140.8, 135.4, 135.2, 132.6, 132.4, 128.8, 127.2, 123.1, 106.4, 80.4, 52.3, 51.6, 36.3, 20.6; IR(KBr) υ: 3453, 3189, 2952, 1745, 1692, 1657, 1573, 1485, 1436, 1399, 1258, 1216, 1128, 1106, 1072, 1012, 966, 925, 814, 794cm^{-1}; MS(m/z): 500.23 ([M+1]$^+$) 100%, 502.14 ([M+3]$^+$) 64%. Anal Calcd for $C_{23}H_{22}BrN_3O_5$: C 55.21, H 4.43, N 8.40; Found: C 55.47, H 4.66, N 8.23.

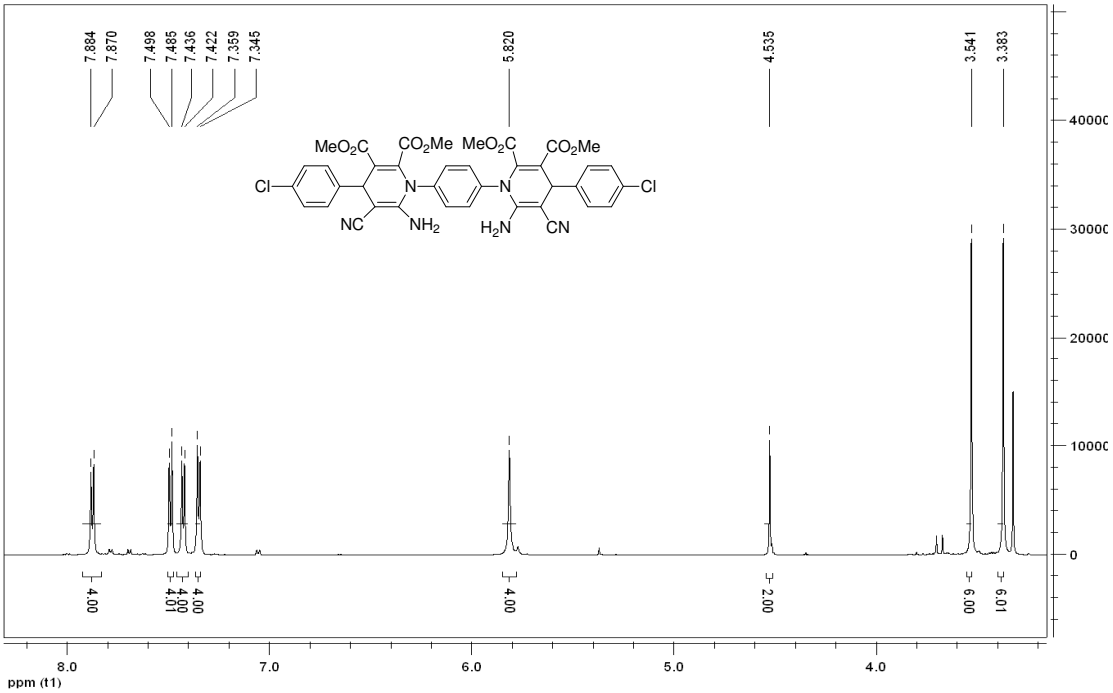


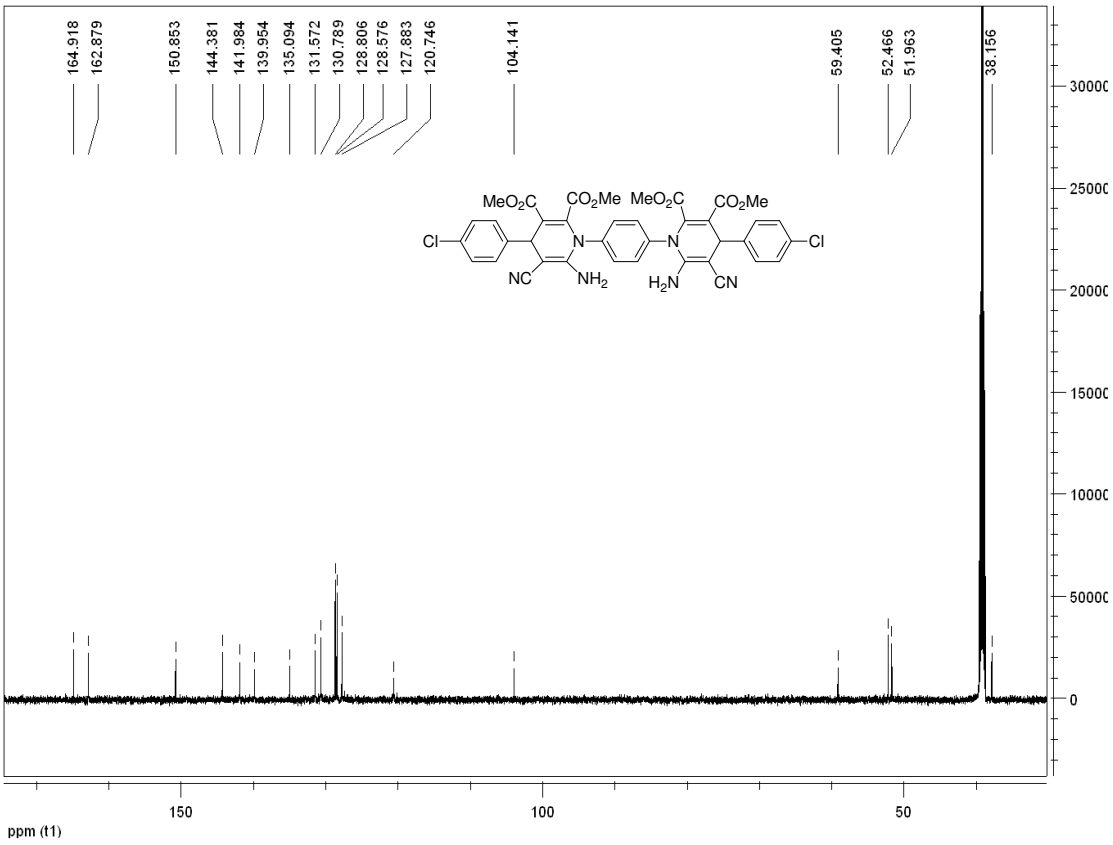
4a: grey solid, 82%, m.p. 204~206°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.50 (d, J = 8.4Hz, 4H, ArH), 7.47~7.45 (m, 4H, ArH), 7.34 (d, J = 7.2Hz, 4H, ArH), 6.06 (s, 4H, NH_2), 4.53 (d, J = 4.8Hz, 2H, CH), 3.52 (d, J = 4.2Hz, 6H, OCH_3), 3.48 (s, 6H, OCH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 164.9, 162.8, 150.4, 144.7, 144.6, 141.4, 136.4, 136.3, 132.1, 131.2, 128.8, 128.7, 120.9, 103.6, 57.9, 52.5, 51.9, 38.4, 38.3; IR (KBr) υ: 3374, 2954, 2181, 1747, 1709, 1652, 1576, 1499, 1420, 1347, 1246, 1111, 1023, 971, 929, 823 cm^{-1}; MS (*m/z*): 769.09 ([M+1]$^{+}$) 100%. Anal Calcd for $C_{38}H_{30}Cl_2N_6O_8$: C 59.31, H 3.93, N 10.92; Found: C 59.57, H 4.35, N 10.60.



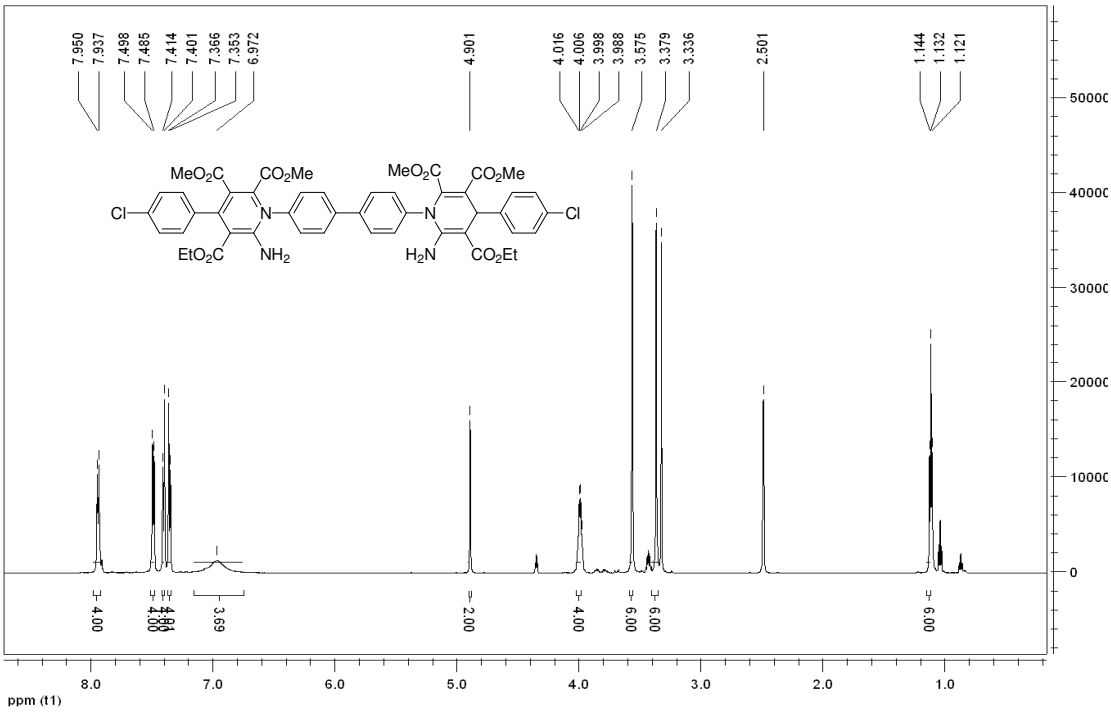


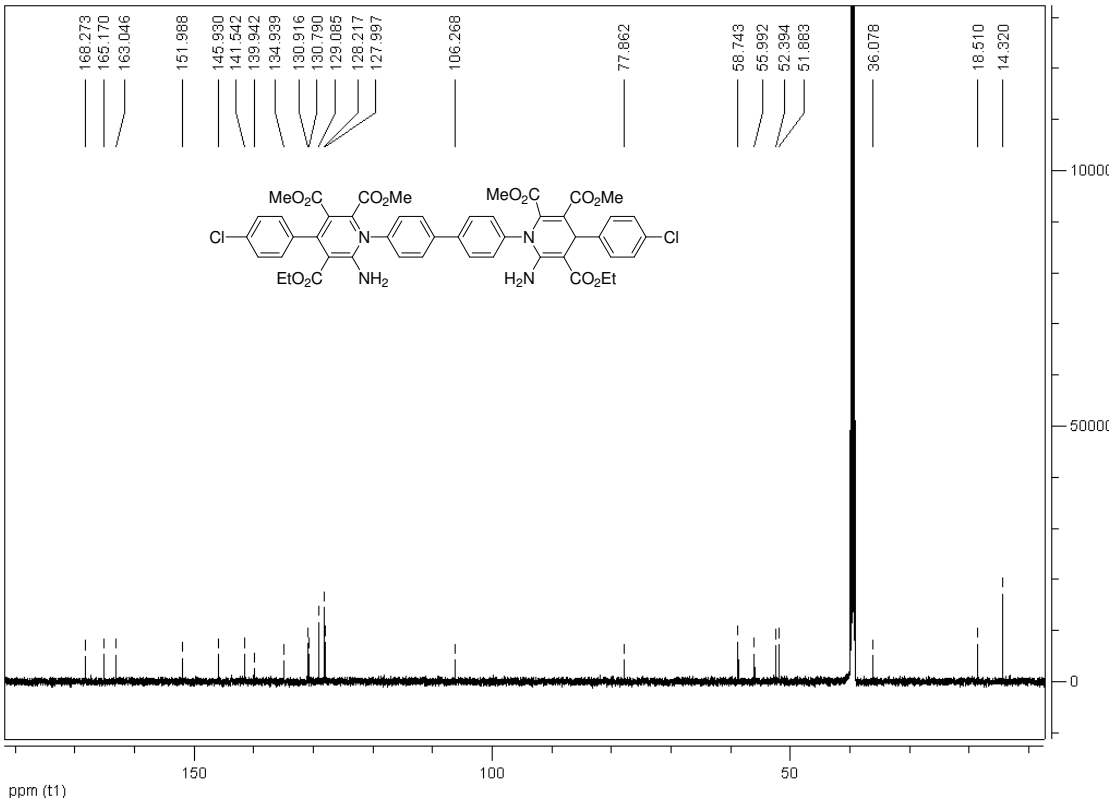
4b: yellow solid, 80%, m.p. >250°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.88 (d, J = 8.4Hz, 4H, ArH), 7.49 (d, J = 7.8Hz, 4H, ArH), 7.43 (d, J = 8.4Hz, 4H, ArH), 7.35 (d, J = 8.4Hz, 4H, ArH), 5.82 (s, 4H, NH_2), 4.54 (s, 2H, CH), 3.54 (s, 6H, OCH_3), 3.38 (s, 6H, OCH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 164.9, 162.9, 150.9, 144.4, 142.0, 140.0, 135.1, 131.6, 130.8, 128.8, 128.6, 127.9, 120.7, 104.1, 59.4, 52.5, 52.0, 38.2; IR (KBr) υ: 3460, 3329, 2951, 2186, 1745, 1708, 1652, 1576, 1493, 1416, 1347, 1226, 1111, 1017, 973, 930, 821 cm^{-1}; MS (*m/z*): 843.47 ([M-1]$^{+}$) 100%. Anal Calcd for $C_{44}H_{33}Cl_2N_6O_8$: C 62.57, H 3.94, N 9.95; Found: C 62.38, H 4.21, N 9.67.



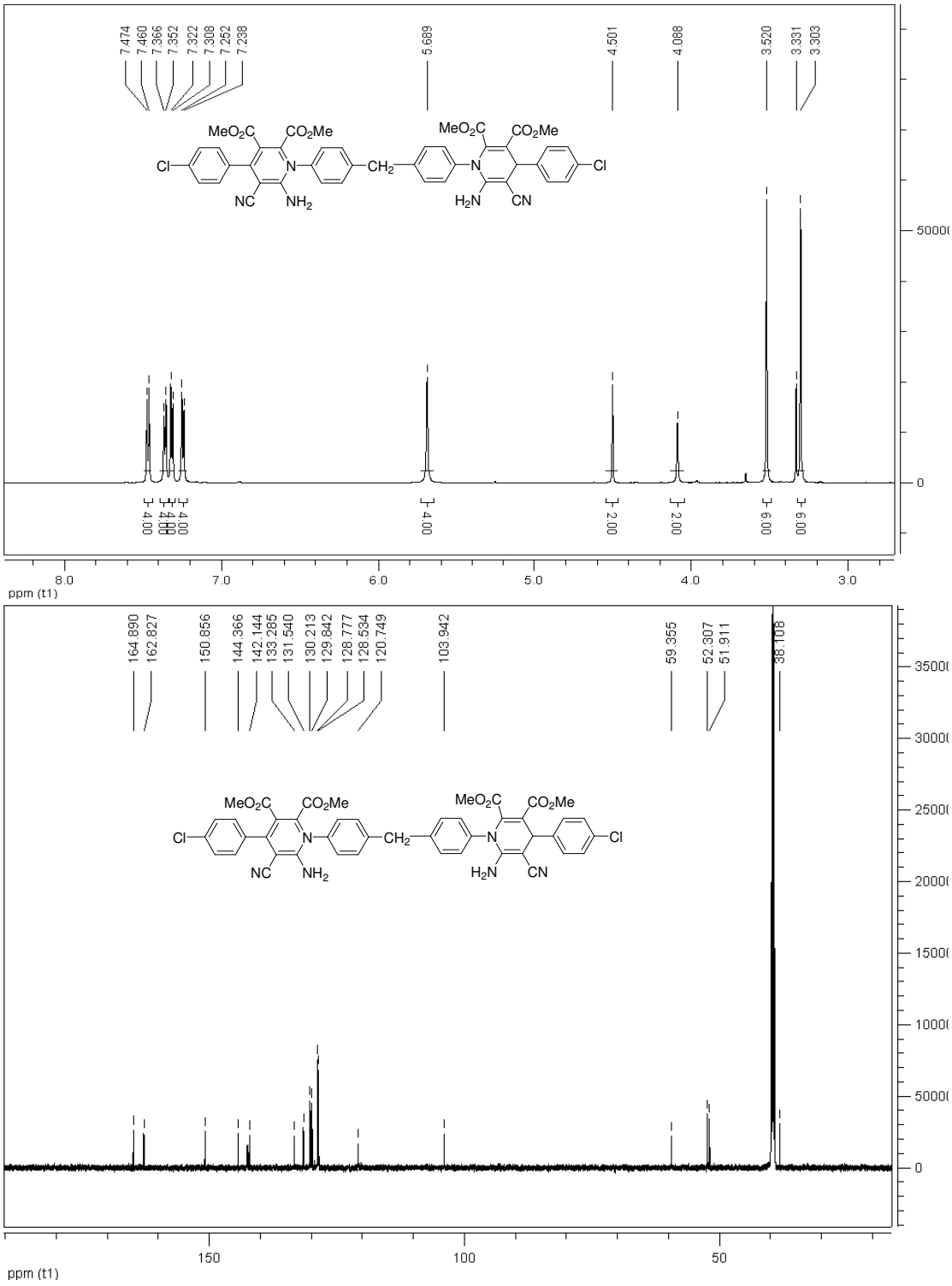


4c: grey solid, 78%, m.p. 184~186°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.94 (d, J = 7.8Hz, 4H, ArH), 7.49 (d, J = 7.8Hz, 4H, ArH), 7.41 (d, J = 7.8Hz, 4H, ArH), 7.36 (d, J = 7.8Hz, 4H, ArH), 6.97 (brs, 4H, NH_2), 4.90 (s, 2H, CH), 4.02~3.99 (m, 4H, CH_2,), 3.58 (s, 6H, OCH_3), 3.38 (s, 6H, OCH_3), 1.13 (t, J = 6.6Hz, 3H, CH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 168.3, 165.2, 163.0, 152.0, 145.9, 141.5, 139.9, 134.9, 130.9, 130.8, 129.1, 128.2, 128.0, 106.3, 77.9, 58.7, 56.0, 52.4, 51.9, 36.1, 19.5, 14.3; IR (KBr) υ: 3466, 3280, 2950, 1746, 1707, 1662, 1499, 1406, 1327, 1215, 1100, 1042, 934, 826 cm^{-1}; MS (*m/z*): 939.74 ([M+1]$^{+}$) 100%. Anal Calcd for $C_{48}H_{43}Cl_2N_4O_{12}$: C 61.41, H 4.62, N 5.97; Found: C 61.19, H 4.85, N 5.71.

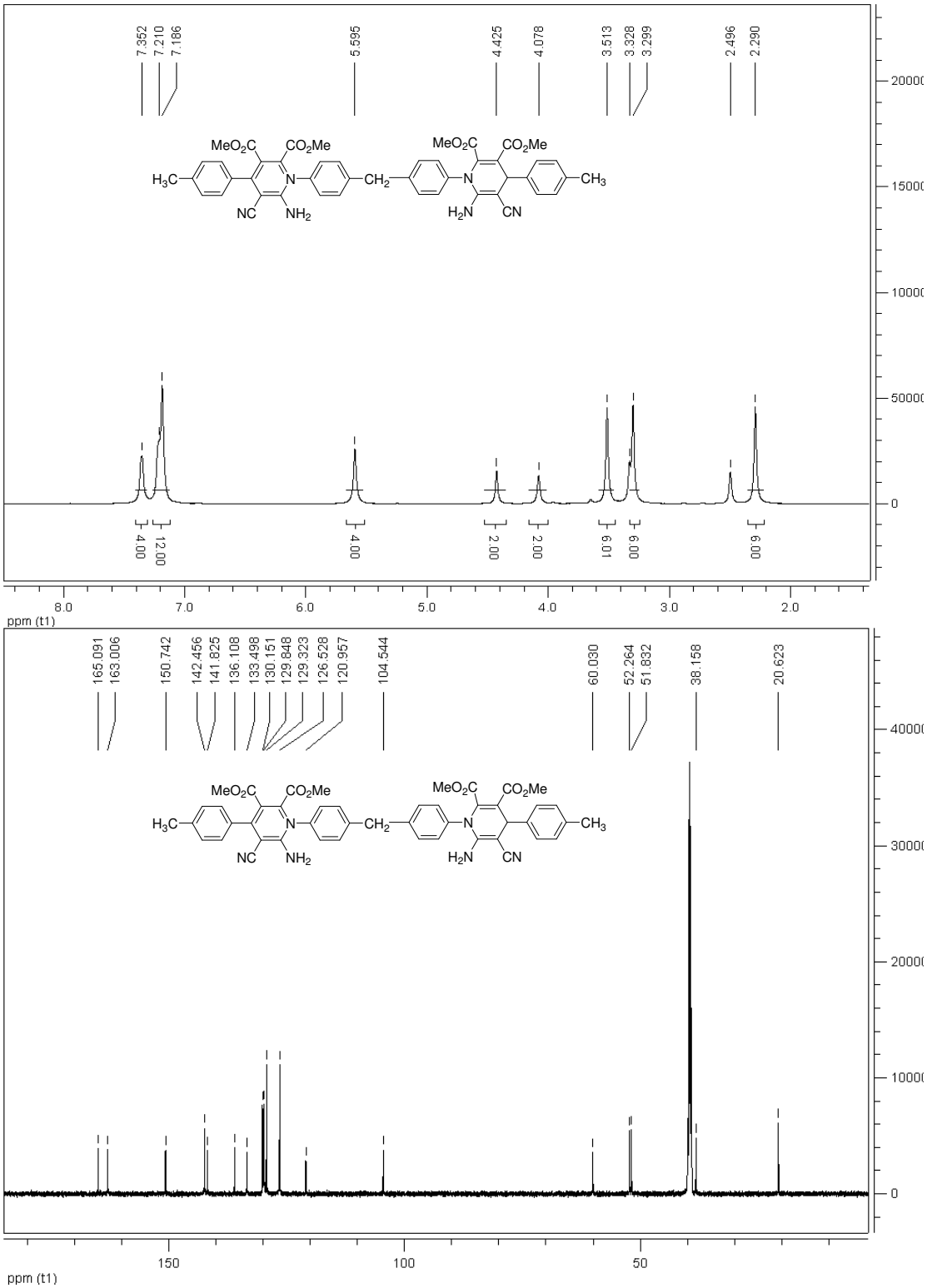




4d: grey solid, 84%, m.p. 236~238°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.47 (d, J = 8.4Hz, 4H, ArH), 7.36 (d, J = 8.4Hz, 4H, ArH), 7.32 (d, J = 8.4Hz, 4H, ArH), 7.25 (d, J = 8.4Hz, 4H, ArH), 5.69 (s, 4H, NH_2), 4.50 (s, 2H, CH), 4.09 (s, 2H, CH_2), 3.52 (s, 6H, OCH_3), 3.30 (s, 6H, OCH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 164.9, 162.8, 150.9, 144.4, 142.1, 133.3, 131.5, 130.2, 129.8, 128.8, 120.7, 103.9, 59.4, 52.3, 51.9, 38.1; IR (KBr) υ: 3473, 3338, 3227, 3036, 2951, 2183, 1747, 1708, 1651, 1574, 1500, 1419, 1348, 1236, 1109, 1022, 972, 931, 828, 775 cm^{-1}; MS (*m/z*): 857.74 ([M-1]$^{+}$) 100%. Anal Calcd for $C_{45}H_{35}Cl_2N_6O_8$: C 62.94, H 4.41, N 9.79; Found: C 62.63, H 4.77, N 9.58.



4e: grey solid, 82%, m.p. 246~247°C; ^{1}H NMR (600 MHz, DMSO-d_6) δ: 7.35 (s, 4H, ArH), 7.21~7.19 (m, 12H, ArH), 5.60 (s, 4H, NH_2), 4.43 (s, 2H, CH), 4.08 (s, 2H, CH_2), 3.51 (s, 6H, OCH_3), 3.30 (s, 6H, OCH_3), 2.29 (s, 6H, CH_3); ^{13}C NMR (150 MHz, DMSO-d_6) δ: 165.1, 163.0, 150.7, 142.5, 141.8, 136.1, 133.5, 130.2, 129.8, 129.3, 126.5, 121.0, 104.5, 60.0, 52.3, 51.8, 38.2, 20.6; IR (KBr) υ: 3474, 3337, 3220, 3025, 2950, 2181, 1747, 1709, 1651, 1574, 1508, 1418, 1348, 1236, 1110, 1027, 972, 930, 783cm^{-1}; MS (*m/z*): 819.16 ([M+1]$^{+}$) 100%. Anal Calcd for $C_{47}H_{41}N_6O_8$: C 69.02, H 5.05, N 10.28; Found: C 68.63, H 5.47, N 9.85.



4f: yellow solid, 75%, m.p. 123~124°C;^{1}H NMR (600 MHz, $CDCl_3$) δ: 7.34~7.30 (m, 12H, ArH), 7.26 (s, 2H, ArH), 7.25 (s, 2H, ArH), 6.23 (brs, 4H, NH_2), 4.98 (s, 2H, CH), 4.10~4.06 (m, 6H, CH_2), 3.64 (s, 6H, OCH_3), 3.43 (s, 6H, OCH_3), 1.22 (t, *J* = 7.2Hz, 6H, CH_3); ^{13}C NMR (150 MHz, $CDCl_3$) δ: 169.4, 166.0, 163.9, 151.1, 145.5, 142.4, 141.4, 133.7, 131.9, 130.8, 130.3, 129.2, 128.2, 107.4, 80.0, 59.5, 52.5, 41.1, 36.6, 14.4; IR(KBr) υ: 3466, 2950, 1747, 1710, 1664, 1601, 1503, 1435, 1410, 1369, 1322, 1206, 1093, 1037, 1014, 933, 834, 789cm^{-1}; MS(*m/z*): 953.18 ([M+1]$^{+}$) 100%. Anal Calcd for $C_{49}H_{45}N_4O_{12}$: C 61.77, H 4.76, N 5.88; Found: C 61.45, H 5.03, N 5.49.