SUPPORTING INFORMATION

A FRET Approach to Phosgene Detection

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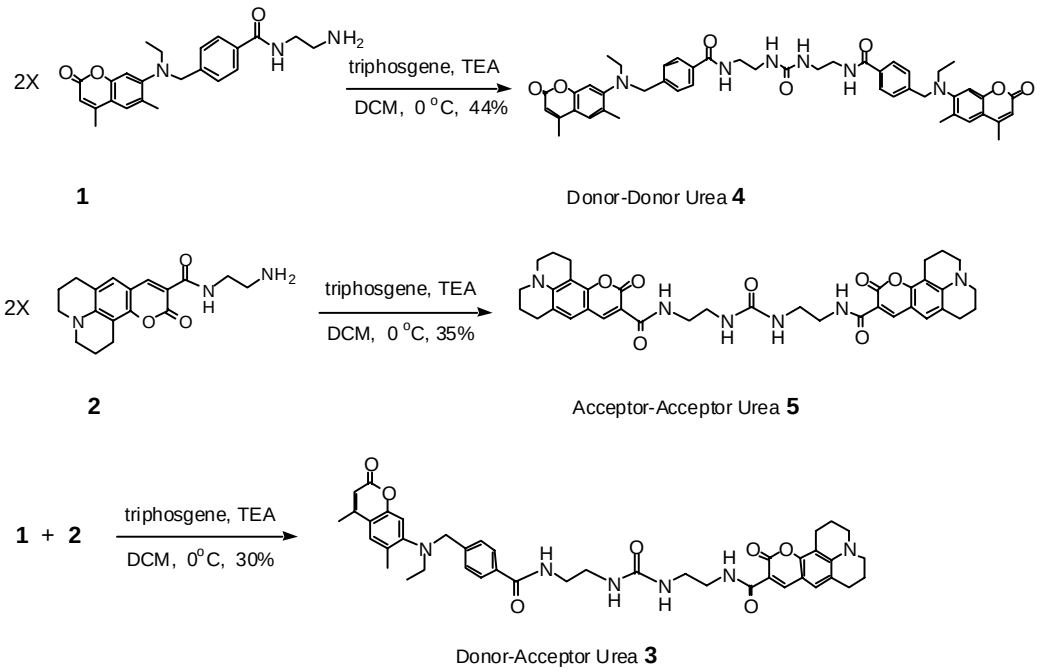
General. Melting points were determined on a Mel-Temp apparatus (Laboratory Devices, Inc.) and are uncorrected. ^{1}H, ^{13}C NMR, COSY and HMBC NMR spectra were recorded at 295 ± 1 K on JEOL 300 and 500 MHz spectrometers. Chemical shifts were measured relative to residual non-deuterated solvent resonances. FTIR spectra were recorded on a Bruker Vector 22 FTIR spectrometer. UV-vis spectra were measured on a Varian Cary-50 spectrophotometer. Fluorescence spectra were recorded on a JOBIN YVON FluoroMax-3 spectrofluorometer. ESI-TOF high resolution mass spectra were recorded on an Agilent ESI-TOF mass spectrometer at the Scripps Center for Mass Spectrometry (La Jolla, CA). Elemental analysis was performed on a Perkin-Elmer 2400 CHN analyzer. All experiments with moisture- and/or air-sensitive compounds were run under a dried nitrogen atmosphere. For column chromatography, Silica Gel 60 Å (Sorbent Technologies, Inc.; 200–425 mesh) was used.

Coumarin 2, coumarin 343, triphosgene, and methyl 4-(bromomethyl)benzoate were purchased from Acros Organics (Morris Plains, NJ), *t*-butyl *N*-(2-aminoethyl)carbamate was purchased from AK Scientific (Mountain View, CA), *N*-ethyl-*N*′-(3-dimethyl aminopropyl)carbodiimide hydrochloride (EDC•HCl) and 1-hydroxy-benzotriazole (HOBt) were delivered from Sigma-Aldrich (St. Louis, MO). The reagents were used as received.



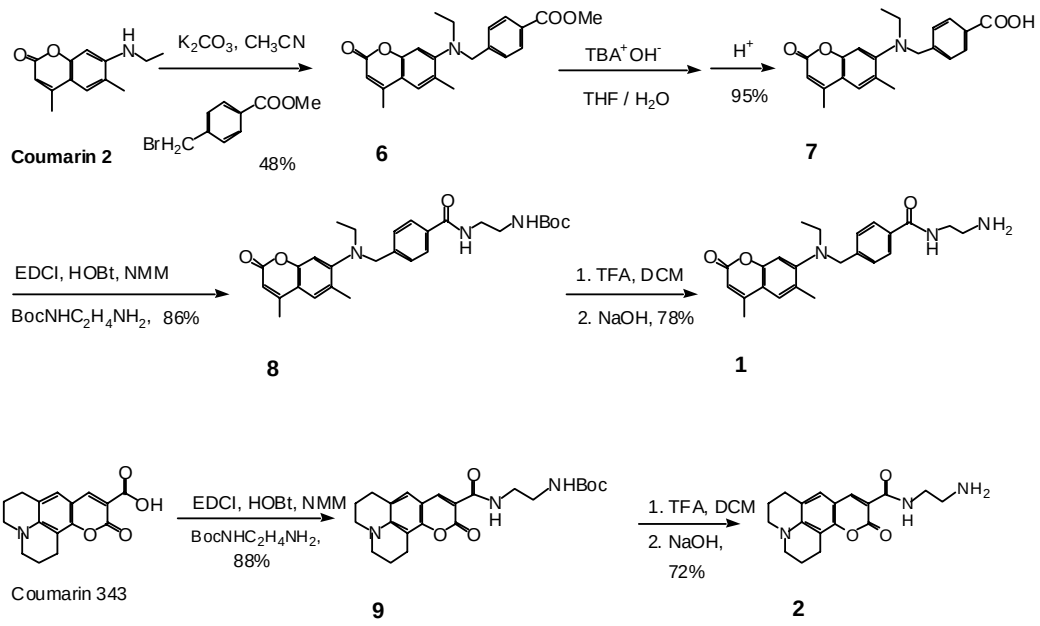
Scheme 1. *Preparation of ureas* ***3-5****.*

Donor-Acceptor Urea (3). To a dried CH_2Cl_2 (5 mL) solution of coumarin **1** (40 mg, 0.1 mmol) and TEA (0.1 mL), triphosgene (9.9 mg, 0.033 mmol) was added. The mixture was stirred at 0 ^{O}C for 15 min after which coumarin **2** (33 mg, 0.1 mmol) was added in CH_2Cl_2 (5 mL). The reaction mixture was stirred for an hour, the solvent was removed in vacuo, and the residue was applied to column chromatography, (CH_2Cl_2/MeOH, 15:1) to give product **3** as a yellow solid, R_f = 0.2. Yield 23 mg, 0.031 mmol, (30%), mp >300 ^{O}C (decomp); IR (KBr): ν 3295, 2928, 2490, 1689, 1616, 1531, 1309, 1175, 1062; ^{1}H NMR (DMSO-d_6, 500 MHz): δ 8.70 (br, 1 H), 8.49 (s, 1 H), 8.41 (br, 1 H), 7.75 (d, J = 8.0 Hz,

2 H), 7.51 (s, 1 H), 7.37 (d, J = 8.0 Hz, 2 H), 7.05, (s, 1 H), 6.98 (s, 1 H), 6.16 (s, 1 H), 6.10 (br, 2 H), 4.29 (s, 2 H), 3.5-3.0 (m, 12 H), 2.71 (q, J = 7.0 Hz, 2 H), 2.58-2.40 (m, 4 H), 2.36 (s, 3 H), 2.35 (s, 3 H), 1.92-1.80 (m, 4 H), 1.04 (t, J = 7.0 Hz, 3 H); ^{13}C NMR ($CDCl_3$, 500 MHz): δ 167.8, 164.8, 163.1, 161.8, 160.0, 153.7, 152.7, 152.6, 148.5, 148.0, 141.8, 135.3, 133.3, 129.7, 128.2, 127.4, 127.2, 126.7, 122.1, 121.9, 119.9, 114.9, 112.6, 109.2, 108.2, 108.1, 105.6, 56.3, 50.3, 49.9, 46.7, 42.5, 40.8, 39.9, 27.5, 21.1, 20.2, 20.1, 18.7, 18.6, 11.9; ESI-TOF MS: calcd for [MH^+] $C_{42}H_{47}N_6O_7$ 747.3501, found 747.3492.

Donor-Donor Urea (4). To a CH_2Cl_2 (5 mL) solution of coumarin **1** (80 mg, 0.2 mmol) and TEA (0.1 mL), triphosgene (9.9 mg, 0.033 mmol) was added. The mixture was stirred at 0 ^{O}C for 1 h. The solvent was removed in vacuo, and the residue was applied to column chromatography (CH_2Cl_2/MeOH, 15:1) to give urea **4** as a pale yellow solid, 35 mg, 0.043 mmol, (44%), R_f = 0.21, mp >300 ^{o}C (decomp); IR (KBr): ν 3382, 2926, 2855, 1717, 1613, 1547, 1502, 1391, 1267, 1158, 1060; ^{1}H NMR ($CDCl_3$, 500 MHz): δ 7.71 (d, J = 8.2 Hz, 4 H), 7.67 (br, 2 H), 7.33 (s, 2 H), 7.25 (d, J = 8.2 Hz, 4 H), 6.79 (s, 2 H), 6.08 (s, 2 H), 5.79 (br., 2 H), 4.20 (s, 4 H), 3.48-3.36 (m, 4 H), 3.36-3.26 (m, 4 H), 3.02 (q, J = 6.9 Hz, 4 H), 2.38 (s, 6 H), 2.35 (s, 6 H), 1.05 (t, J = 6.9 Hz, 6 H). ^{13}C NMR ($CDCl_3$, 500 MHz): δ 167.9, 161.7, 160.5, 153.4, 152.7, 152.6, 141.8, 133.1, 129.6, 128.3, 127.3, 126.7, 114.9, 112.6, 109.3, 56.1, 47.1, 41.9, 40.1, 18.7, 18.6, 12.0; ESI-TOF high MS: calcd for [MH^+] $C_{47}H_{53}N_6O_7$ 813.3970, found 813.3966.

Acceptor-Acceptor Urea (5). Prepared similarly to urea **4** by starting with coumarin **2** (66 mg, 0.2 mmol). R_f = 0.17. Yield bright yellow solid 25 mg, 0.036 mmol, (35%); (CH_2Cl_2/MeOH 15:1), mp >300 ^{O}C (decomp); IR (KBr): ν 3337, 2941, 2845, 1687, 1616, 1519, 1457, 1367, 1309, 1211, 1176; ^{1}H NMR ($CDCl_3$ + 10% CD_3OD, 500 MHz): δ 8.40 (s, 2 H), 6.91 (s, 2 H), 3.50-3.40 (m, 4 H), 3.40-3.20 (m, 12 H), 2.85-2.60 (m, 8 H), 2.00-1.80 (m, 8 H); ^{13}C NMR could not be obtained due to the low solubility. ESI-TOF MS: calcd for [MH^+] $C_{37}H_{41}N_6O_7$ 681.3031, found 681.3032.



Scheme 2. *Preparation of amines* ***1*** *and* ***2****.*

4-(N-coumarin)methylbenzoate (6).[1] Coumarin 2 (217 mg, 1.0 mmol), methyl 4-(bromomethyl)benzoate (275 mg, 1.2 mmol) and K_2CO_3 (690 mg, 5.0 mmol) were mixed in freshly distilled MeCN (30 mL) and refluxed for 72 h. The solvent was evaporated in vacuo and the residue was purified by column chromatography (CH_2Cl_2/CH_3OH 50:1) to give product **6** as a pale yellow solid (175 mg, 0.48 mmol, 48%), mp 92-93 ^{O}C; ^{1}H NMR (DMSO-d_6, 500 MHz): δ 7.87 (d, J = 8.3 Hz, 2 H), 7.54 (s, 1 H), 7.46 (d, J = 8.3 Hz, 2 H), 7.01 (s, 1 H), 6.18 (s, 1 H), 4.36 (s, 2 H), 3.23 (s, 3 H), 3.07 (q, J = 6.8 Hz, 2 H), 2.37 (s, 3 H), 2.36 (s, 3 H), 1.05 (t, J = 6.8 Hz, 3 H); ^{13}C NMR ($CDCl_3$, 500 MHz): δ 167.0, 161.6, 153.4, 152.7, 152.4, 143.7, 129.9, 129.8, 128.1, 126.6, 126.5, 115.1, 112.8, 109.4, 56.4, 52.1, 47.0, 18.7, 18.6, 11.9.

4-(N-Coumarin)methylbenzoic Acid (7). Compound **6** (175 mg, 0.48 mmol) and tetrabutylammonium hydroxide (TBA^+OH^-, 40% w/w, 0.78 mL, 1.2 mmol) were added to a mixture of THF (5 mL) and water (5 mL) and stirred overnight. The reaction mixture was then treated with aq HCl (1 M) until pH~4. The precipitate was filtered, washed with

water (3 x 20 mL) and dried to yield acid **7** as a white powder; yield 160 mg, 0.46 mmol, (95%), mp 203-204 ^{O}C; ^{1}H NMR (DMSO-d_6, 500 MHz): δ 7.85 (d, J = 8.2 Hz, 2 H), 7.54 (s, 1 H), 7.43 (d, J = 8.2 Hz, 2 H), 7.01 (s, 1 H), 6.18 (s, 1 H), 4.35 (s, 2 H), 3.08 (q, J = 6.4 Hz, 2 H), 2.38 (s, 3 H), 2.37 (s, 3 H), 1.05 (t, J = 6.4 Hz, 3 H); ^{13}C NMR (DMSO-d_6, 500 MHz): δ 167.7, 160.8, 153.6, (two peaks), 152.6, 144.4, 130.1, 129.9, 129.7, 128.6, 127.6, 114.8, 112.4, 109.1, 55.3, 47.6, 18.8, 18.5, 12.4.

***N*-Boc Donor Amine (8)**. *N*-Boc-Ethylenediamine (0.13 mL, 0.8 mmol) and acid **7** (140 mg, 0.4 mmol) were mixed with EDC•HCl (153 mg, 0.8 mmol), HOBt (108 mg, 0.8 mmol) and NMM (0.1 mL) in dry CH_2Cl_2 (25 mL) and stirred at 0 ºC overnight. The solution was evaporated to dryness. The solid was dissolved in CH_2Cl_2 (50 mL) and washed with 5% aq HCl (50 mL). The organic layer was separated, washed with water (3 x 50 mL), and evaporated. Column chromatography (CH_2Cl_2/CH_3OH 50:1) afforded product **8** as a yellow powder; yield 169 mg, 0.34 mmol, (86%), mp 86–87 ^{O}C; ^{1}H NMR (DMSO-d_6, 500 MHz): δ 8.40-8.30 (br, 1 H), 7.73 (d, J = 8.0 Hz, 2 H), 7.52 (s, 1 H), 7.38 (d, J = 8.0 Hz, 2 H), 6.98 (s, 1 H), 6.90-6.82 (br, 1 H), 6.16 (s, 1 H), 4.32 (s, 2 H), 3.30-3.20 (m, 2 H), 3.15-2.99 (m, 6 H), 2.37 (s, 3 H), 2.36 (s, 3 H), 1.34 (s, 9 H), 1.05 (t, J = 6.4 Hz, 3 H); ^{13}C NMR (DMSO-d_6, 500 MHz): δ 166.7, 160.8, 156.3, 153.7, 153.6, 152.6, 142.4, 133.8, 129.6, 128.3, 127.8, 127.6, 114.7, 112.3, 109.2, 78.2, 55.1, 47.7, 40.3, 40.1, 28.8, 18.8, 18.6, 12.4.

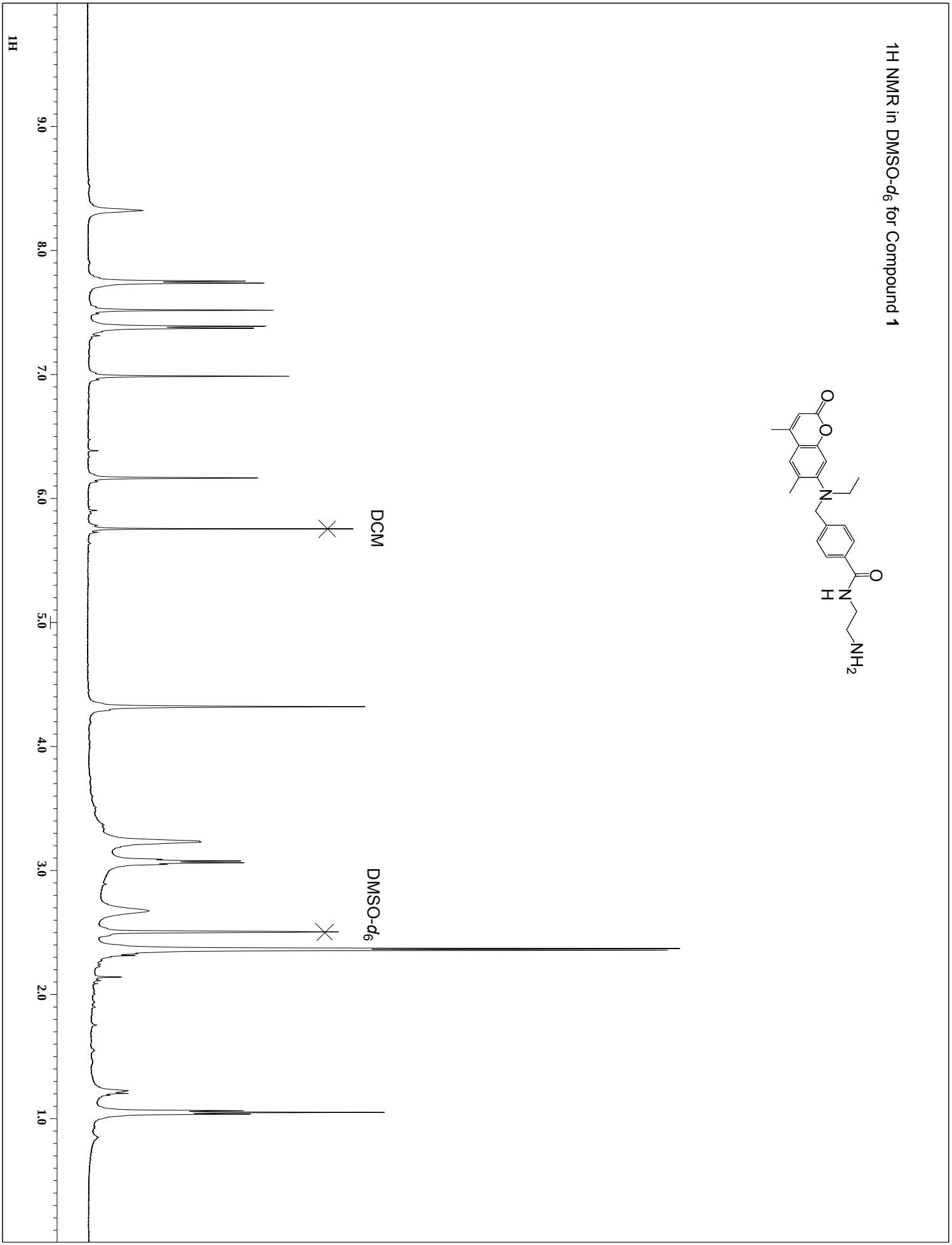
Donor Amine (1). Compound **8** (148 mg, 0.3 mmol) and TFA (5.0 mL, 0.07 mol) were dissolved in dry CH_2Cl_2 (10 mL) and stirred overnight. The solvent was evaporated, and the product was redissolved in CH_2Cl_2 (20 mL) and washed with 5% aq NaOH (25 mL) and water (3 x 25 mL). The organic layer was dried with Na_2SO_4 and evaporated to obtain amine **1** as a yellowish solid (92 mg, 0.23 mmol, 0.78%), mp 97-98 ^{O}C; IR (KBr): ν 3361, 2928, 2869, 1718, 1612, 1540, 1502, 1390, 1350, 1268, 1158, 1060; ^{1}H NMR (DMSO-d_6, 500 MHz): δ 8.32 (br, 1 H), 7.74 (d, J = 8.0 Hz, 2 H), 7.52 (s, 1 H), 7.38 (d, J = 8.0 Hz, 2 H), 6.99 (s, 1 H), 6.16 (s, 1 H), 4.32 (s, 2 H), 3.31-3.15 (m, 2 H), 3.08 (q, J =

6.8 Hz, 2 H), 2.67 (br, 2 H), 2.37 (s, 3 H), 2.36 (s, 3 H), 1.05 (t, J = 6.8 Hz, 3 H); ^{13}C NMR (DMSO-d_6, 500 MHz): δ 166.8, 160.8, 153.7 (two peaks), 152.6, 142.3, 134.0, 129.6, 128.3, 127.8, 127.6, 114.7, 112.3, 109.1, 55.1, 47.6, 43.5, 41.8, 18.8, 18.6, 12.4; ESI-TOF MS: calcd for [MH^+] $C_{23}H_{28}N_3O_3$ 394.2125, found 394.2130.

***N*-Boc Acceptor Amine (9)**. *N*-Boc Ethylenediamine (0.20 mL, 1.3 mmol), coumarin 343 (185 mg, 0.65 mmol), EDC•HCl (248 mg, 1 mmol), HOBt (175 mg, 1.3 mmol) and NMM (0.1 mL) were mixed in dried CH_2Cl_2 (25 mL) and stirred at 0 ºC overnight. The solution was evaporated to dryness. The solid was dissolved in CH_2Cl_2 (50 mL) and washed with 5% aq HCl (50 mL). The organic layer was separated, washed with water (3 x 50 mL), and evaporated. Column chromatography (CH_2Cl_2/CH_3OH 50:1) afforded product **9** as a bright yellow powder (245 mg, 0.57 mmol, 88%), R_f = 0.16, mp 220 ^{o}C; ^{1}H NMR (DMSO-d_6, 500 MHz): δ 8.72 (t, J = 5.8 Hz, 1 H), 8.47 (s, 1 H), 7.20 (s, 1 H), 6.91 (t, J = 4.6 Hz, 1 H), 3.40-3.25 (m, 6 H), 3.08 (q, J = 6.0 Hz, 2 H), 2.75-2.65 (m, 4 H), 1.94-1.81 (m, 4 H), 1.37 (s, 9 H); ^{13}C NMR (DMSO-d_6, 300 MHz): δ 163.3, 162.2, 156.3, 152.6, 148.5, 148.0, 127.6, 119.9, 108.4, 107.8, 105.1, 78.2, 50.1, 49.5, 40.0, 39.7, 28.7, 27.3, 21.0, 20.1 (two peaks).

Acceptor Amine (**2**). Compound **9** (245 mg, 0.57 mmol) and TFA (5.0 mL, 0.07 mol) were dissolved in dried CH_2Cl_2 (10 mL) and stirred overnight. The solvent was evaporated and the residue was redissolved in CH_2Cl_2 (50 mL) and washed with 5% aq NaOH (25 mL) and water (3 x 25 mL). The organic layer was dried with Na_2SO_4 and evaporated to yield amine **2** as a brown solid (135 mg, 0.41 mmol, 72%), mp >300 ^{o}C (decomp); IR (KBr): ν 3320, 2938, 2854, 1692, 1616, 1517, 1367, 1309, 1212, 1174; ^{1}H NMR ($CDCl_3$, 500 MHz): δ 9.05 (t, J = 8.2 Hz, 1 H), 8.52 (s, 1 H), 6.94 (s, 1 H), 3.62-3.50 (m, 2 H), 3.35-3.25 (m, 4 H), 3.02 (t, J = 5.0 Hz, 2 H), 2.89-2.79 (m, 2 H), 2.78-2.69 (m, 2 H), 2.02-1.88 (m, 4 H); ^{13}C NMR ($CDCl_3$, 500 MHz): δ 164.5, 163.1, 152.8, 148.3, 148.2, 127.2, 119.7, 108.8, 108.3, 105.7, 50.3, 49.9, 41.8, 41.7, 27.5, 21.2, 20.3, 20.2. ESI-TOF MS: calculated for [MH^+] $C_{18}H_{22}N_3O_3$ 328.1656, found 328.1653.

Fluorescent Measurements: In a typical experiment, an aliquot from the stock solution of triphosgene ([triphosgene] = 6.7 x 10^{-3} M) in $CHCl_3$ was added to the flask containing a mixture of donor amine **1** (2.0 mg, 0.005 mmol), acceptor amine **2** (1.7 mg, 0.005 mmol) and TEA (~10-15 eq) in $CHCl_3$ (5 mL; [**1**] = [**2**] = 1 x 10^{-3} M). After homogenization, an aliquot was taken and diluted 1000 times to 10^{-6} M. The fluorescence spectrum was recorded. The emission at λ= 464 nm was monitored upon excitation at λ= 343 nm. Additional aliquots of triphosgene were then added and, after dilution, the spectrum was recorded again. The triphosgene concentration ranged between 3 x 10^{-5} and 1.5 x 10^{-2} M. In addition, solutions with concentrations [**1**] = [**2**] between 5 x 10^{-4} and 1 x 10^{-2} M were tested. All titration experiments were performed at least in triplicate showing good reproducibility.


1H NMR in DMSO-d_6 for Compound **1**
DCM
DMSO-d_6
1H
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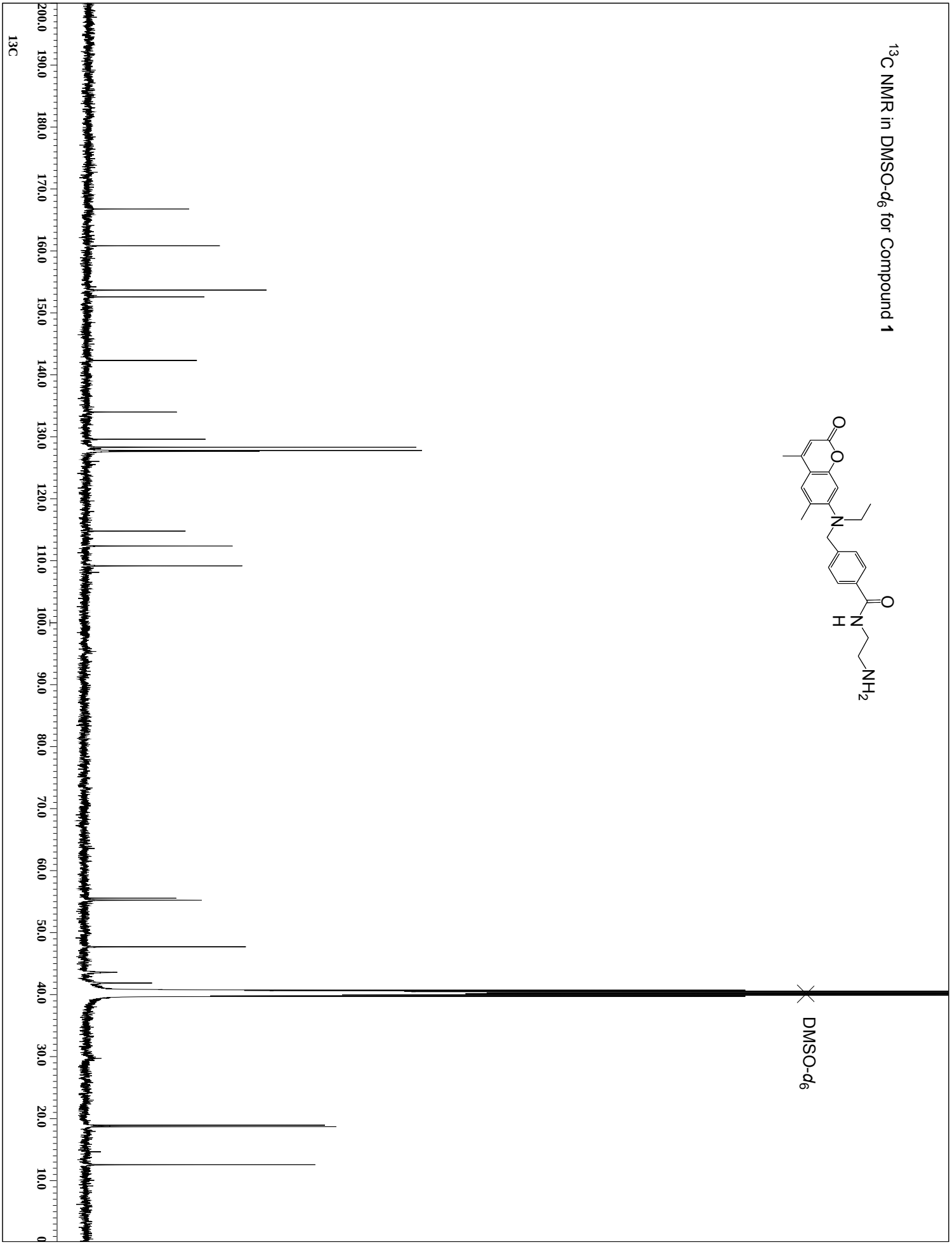
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0


^{13}C NMR in DMSO-d_6 for Compound **1**
DMSO-d_6
13C
200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
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50.0
40.0
30.0
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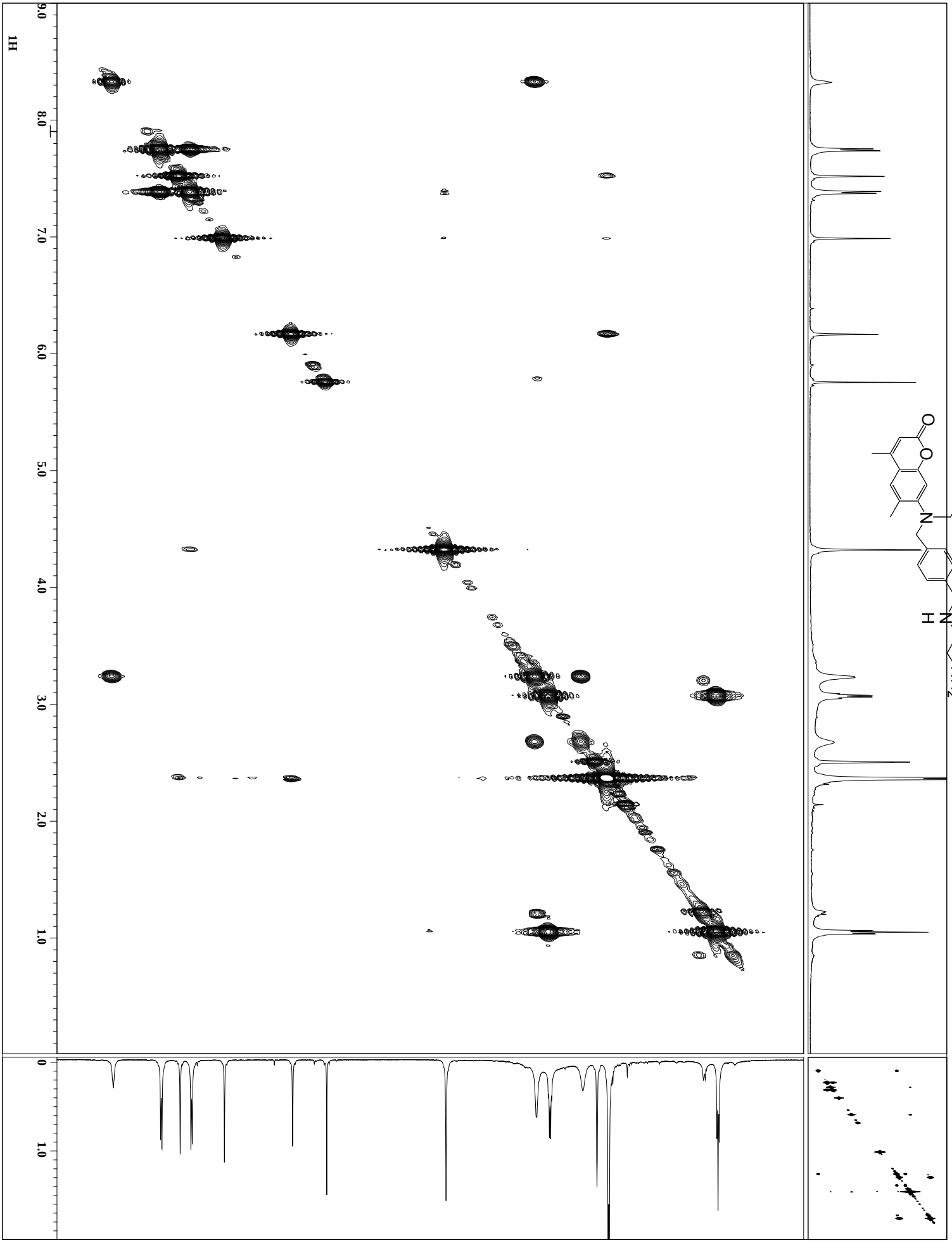
10.0
0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1H
9.0
8.0
7.0
6.0
5.0
4.0
3.0
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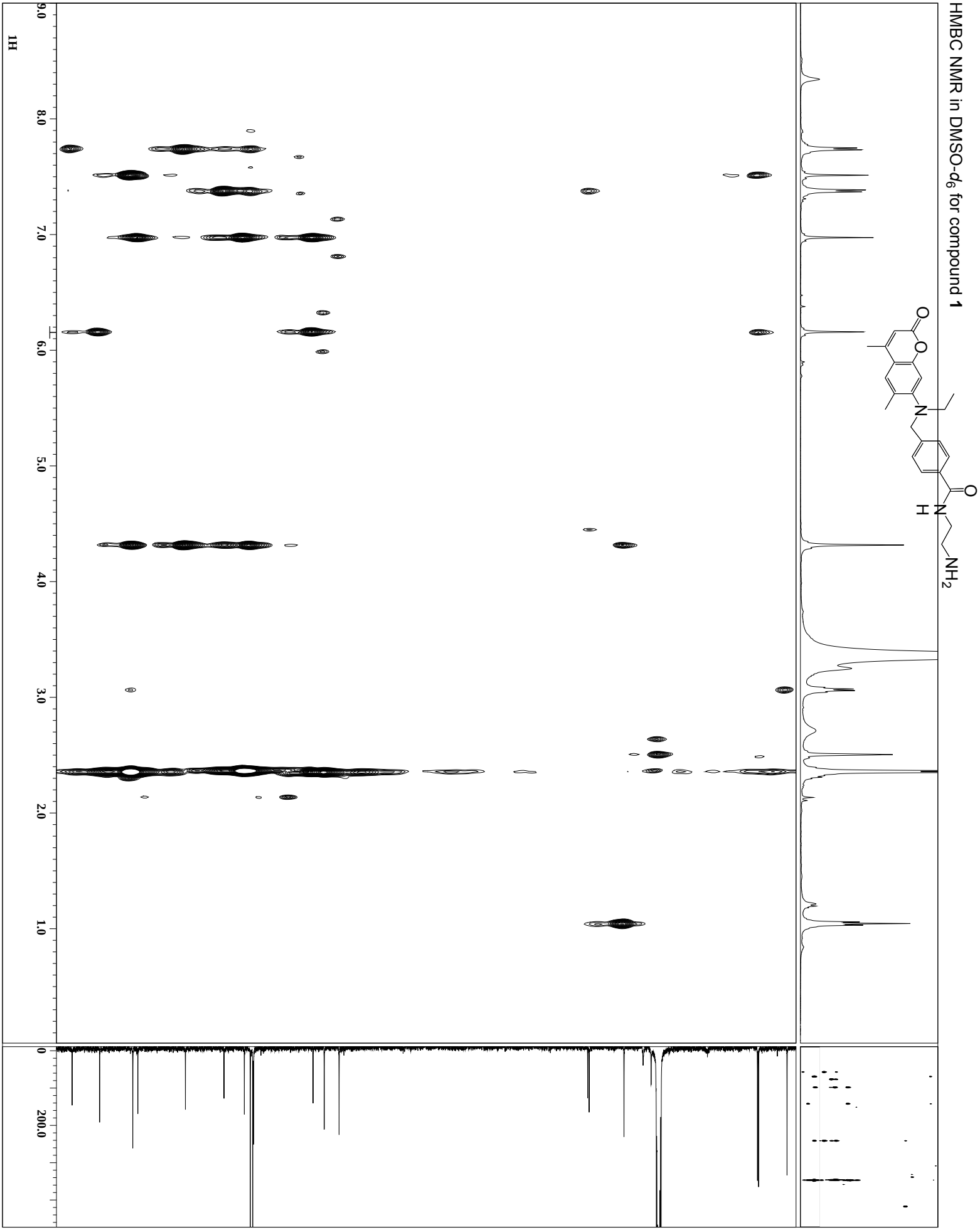
0
1.0
O
O
N
O
N
H
NH_2


HMBC NMR in DMSO-d_6 for compound **1**
1H
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
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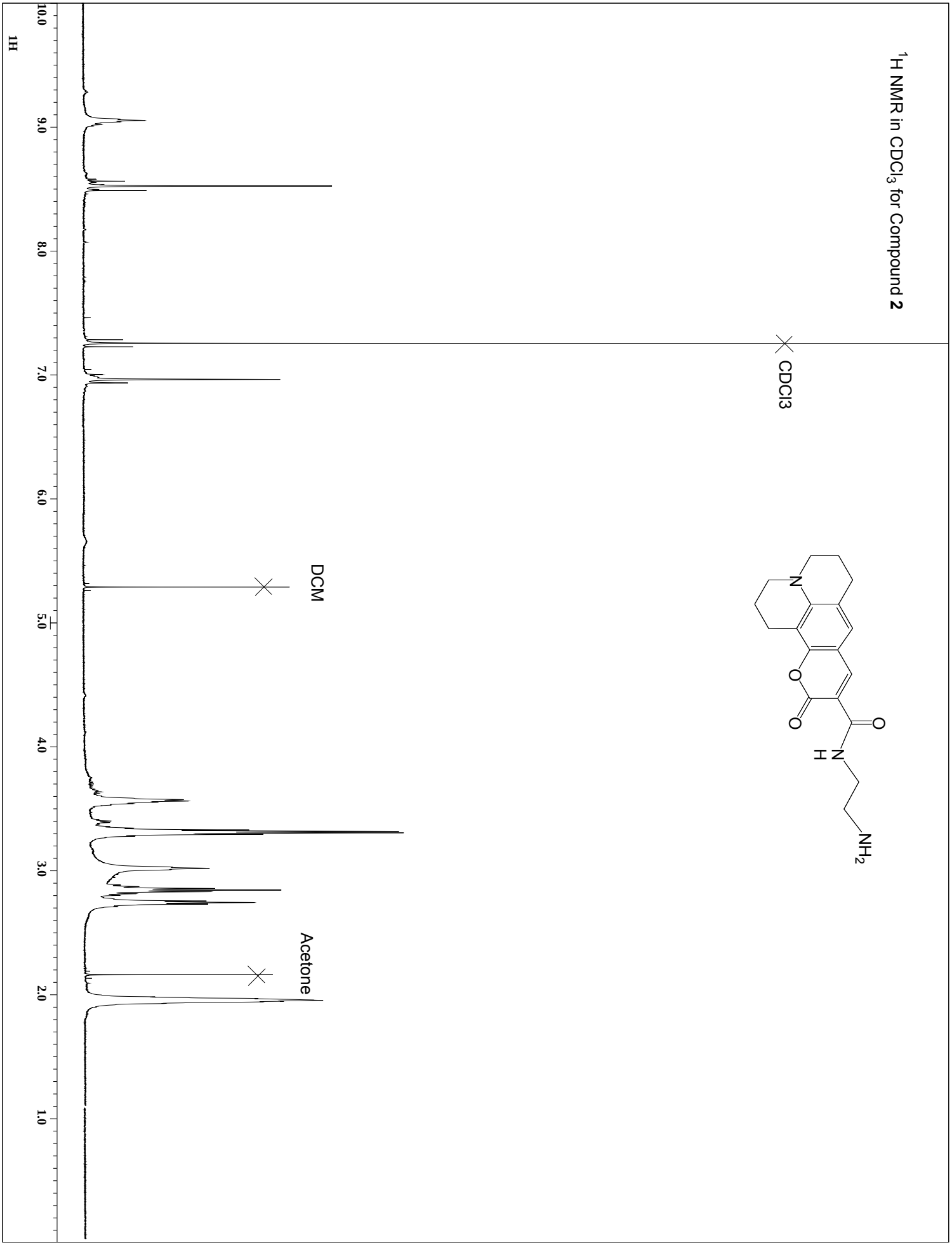
0
200.0
O
O
N
O
N
H
NH2


^{1}H NMR in $CDCl_3$ for Compound **2**
CDCl3
DCM
Acetone
1H
10.0
9.0
8.0
7.0
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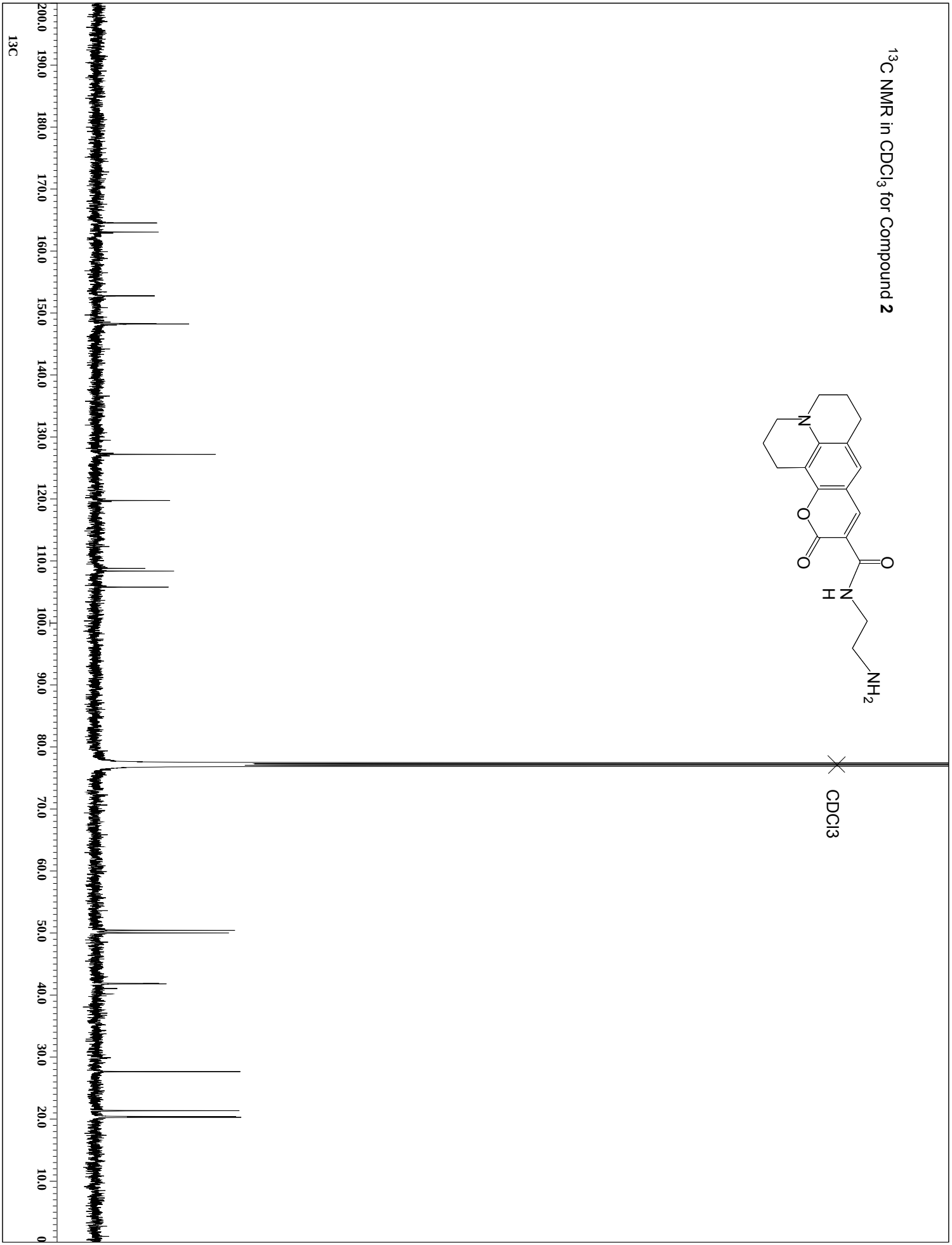
3.0
2.0
1.0
O
O
O
N
H
NH_2


^{13}C NMR in $CDCl_3$ for Compound **2**
CDCl3
13C
200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
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10.0
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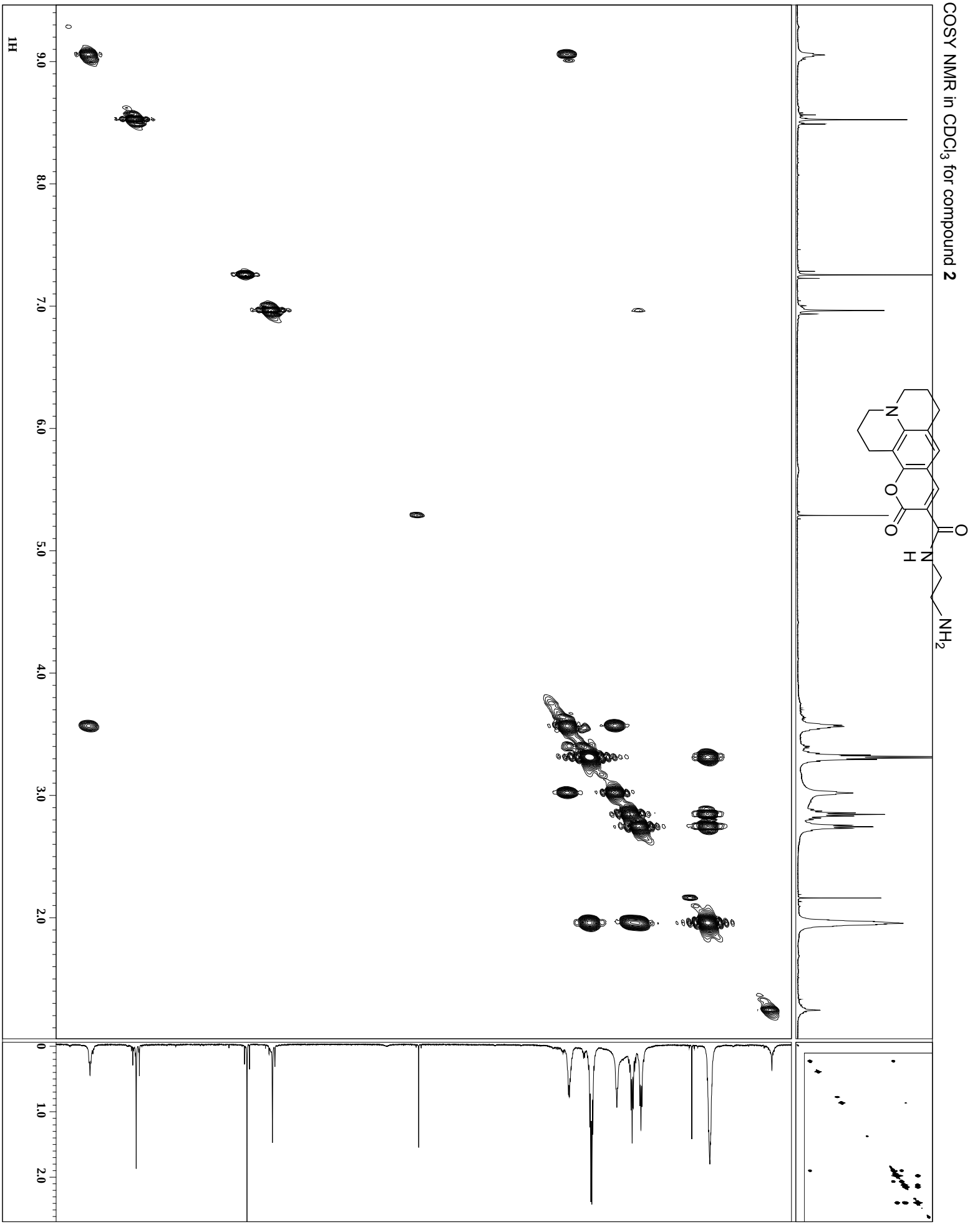
COSY NMR in CDCl3 for compound 2
1H
9.0
8.0
7.0
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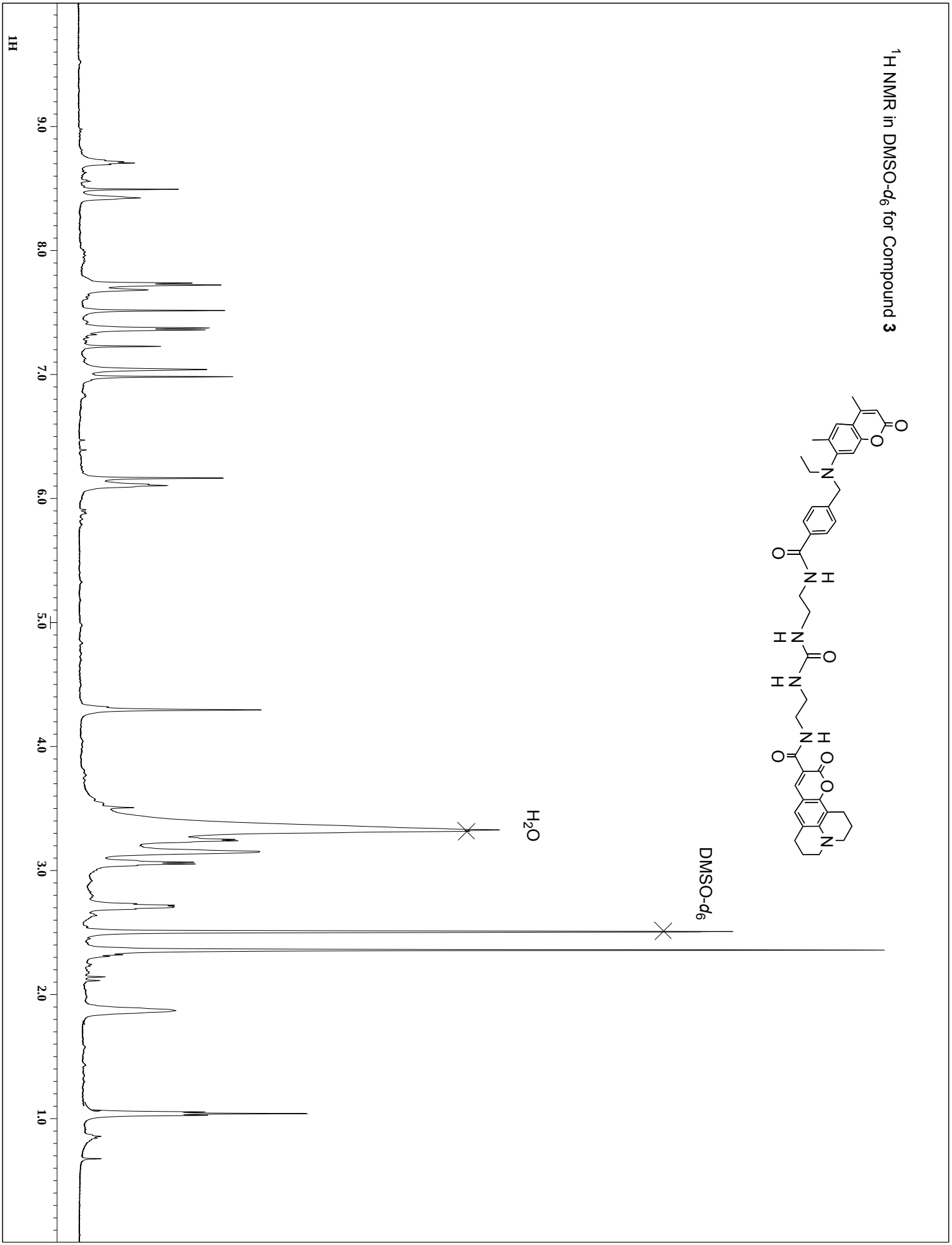
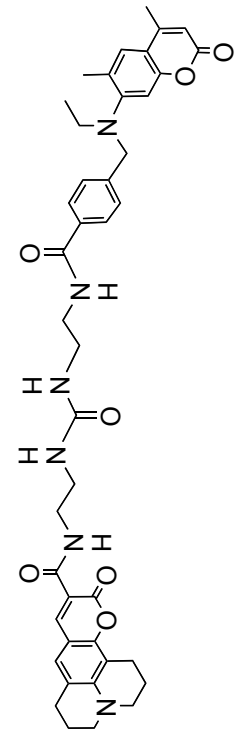
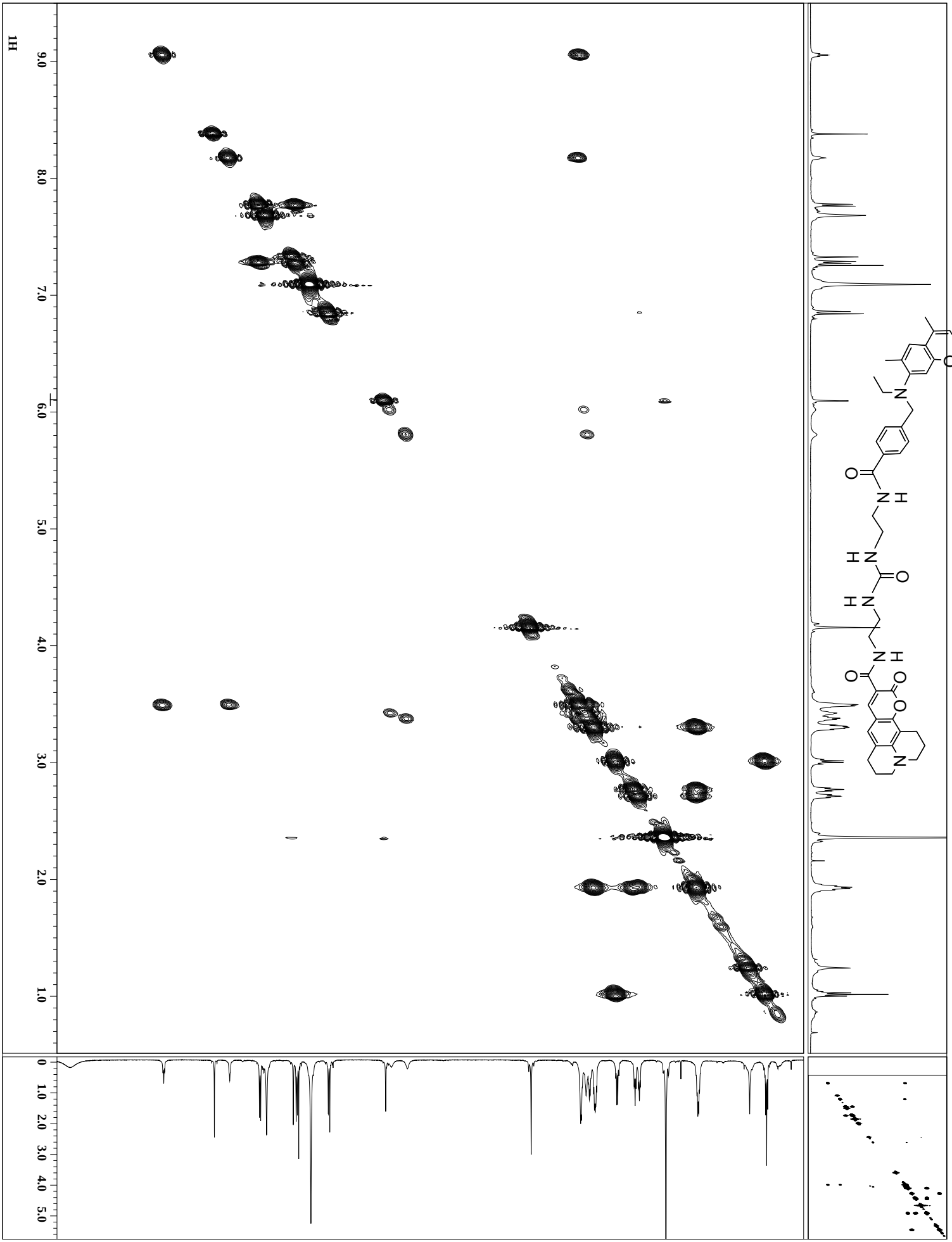
1.0
0
N
O
O
O
N
H
NH2


^{1}H NMR in DMSO-d_6 for Compound **3**
DMSO-d_6
H_2O
1H
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0

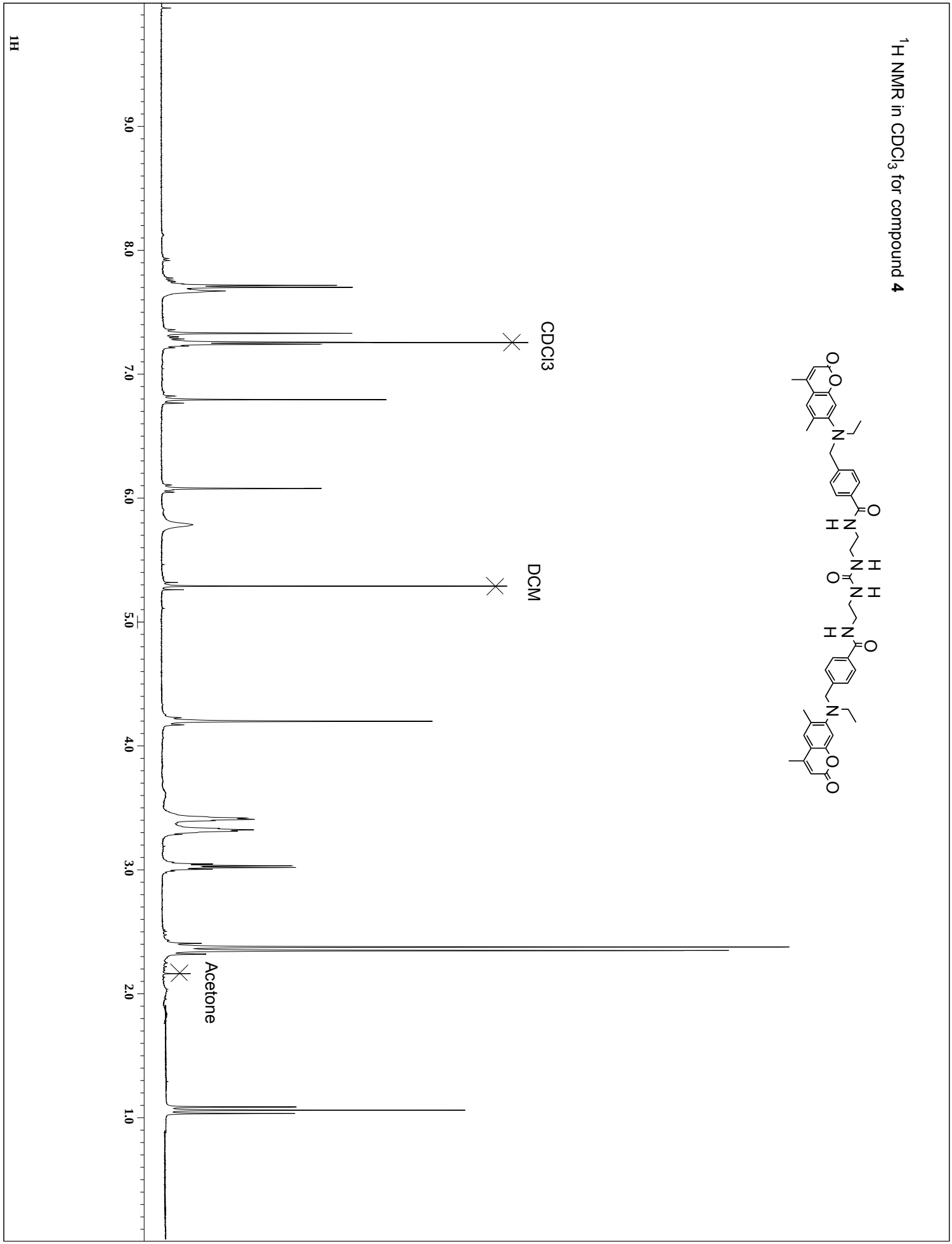
^{13}C NMR in $CDCl_3$ for Compound **3**



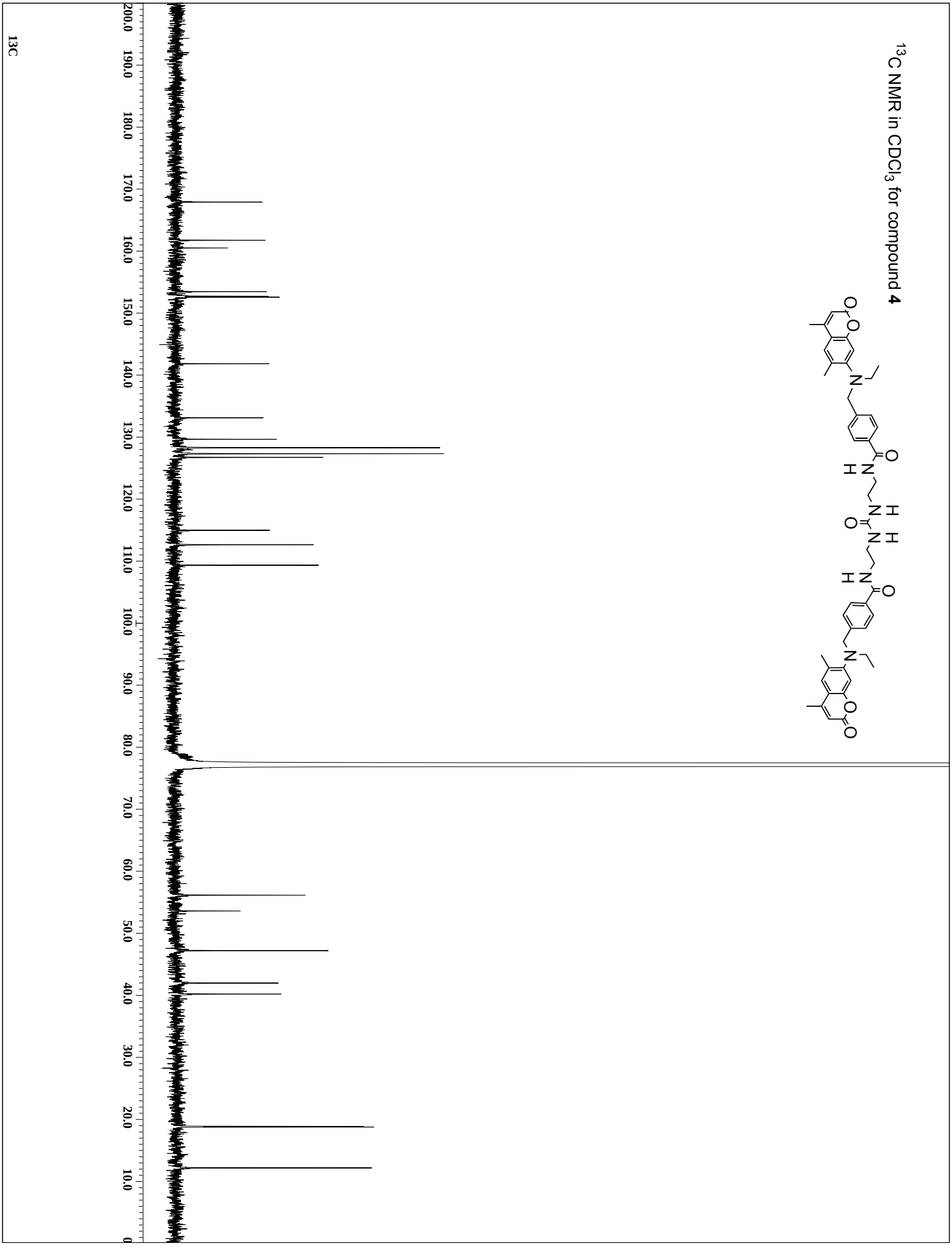
COSY NMR in $CDCl_3$ for compound **3**



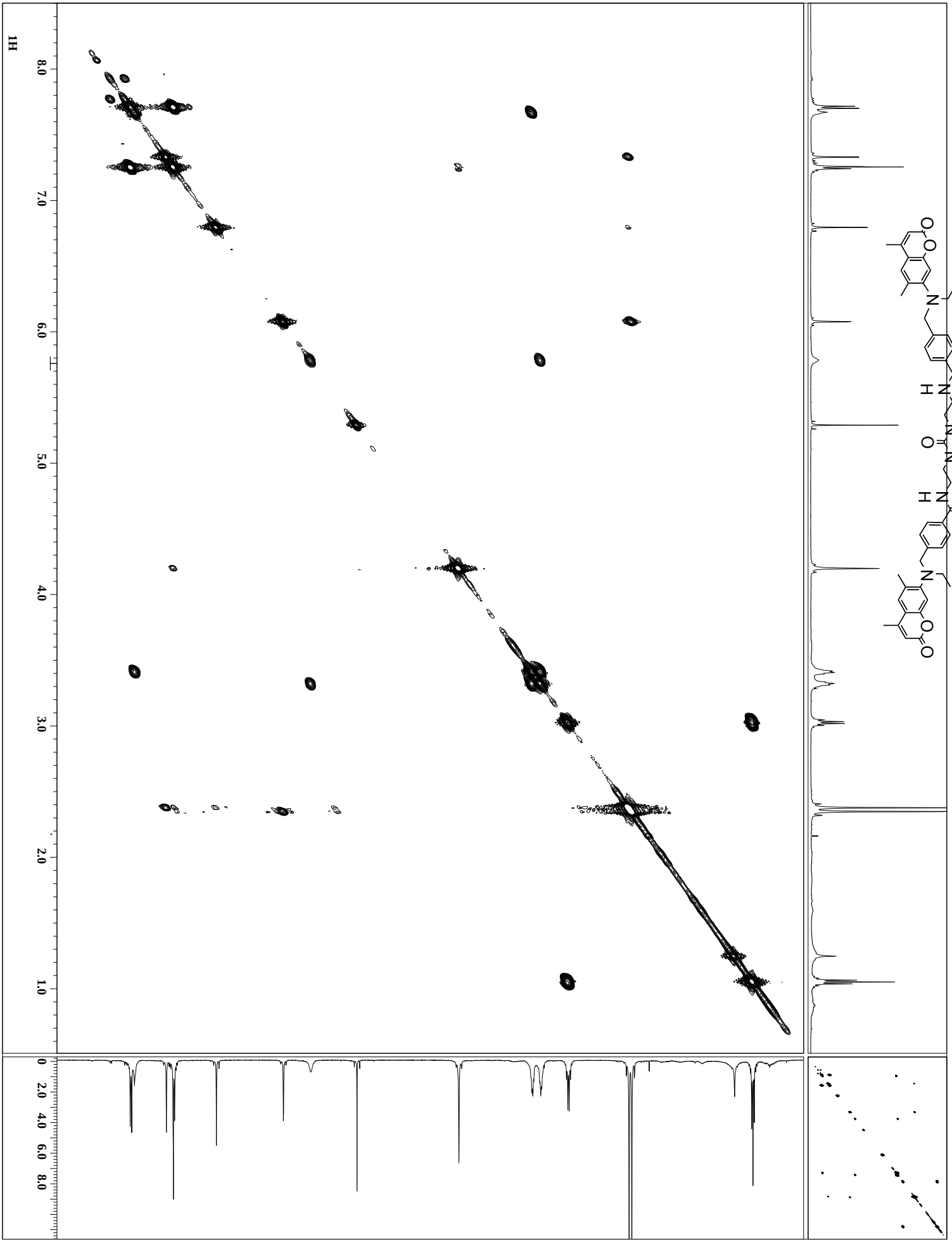
^{1}H NMR in $CDCl_3$ for compound **4**



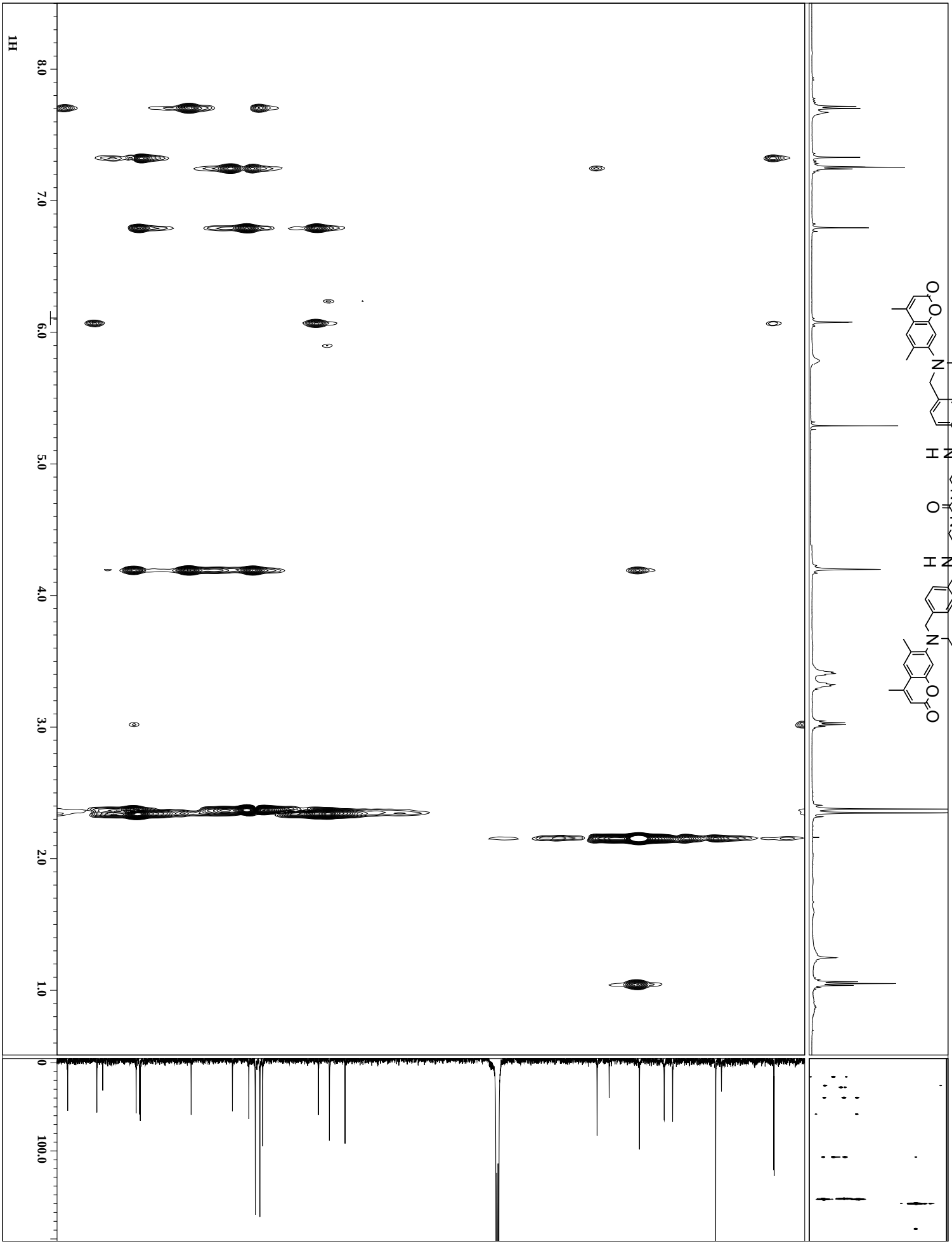
^{13}C NMR in $CDCl_3$ for compound **4**

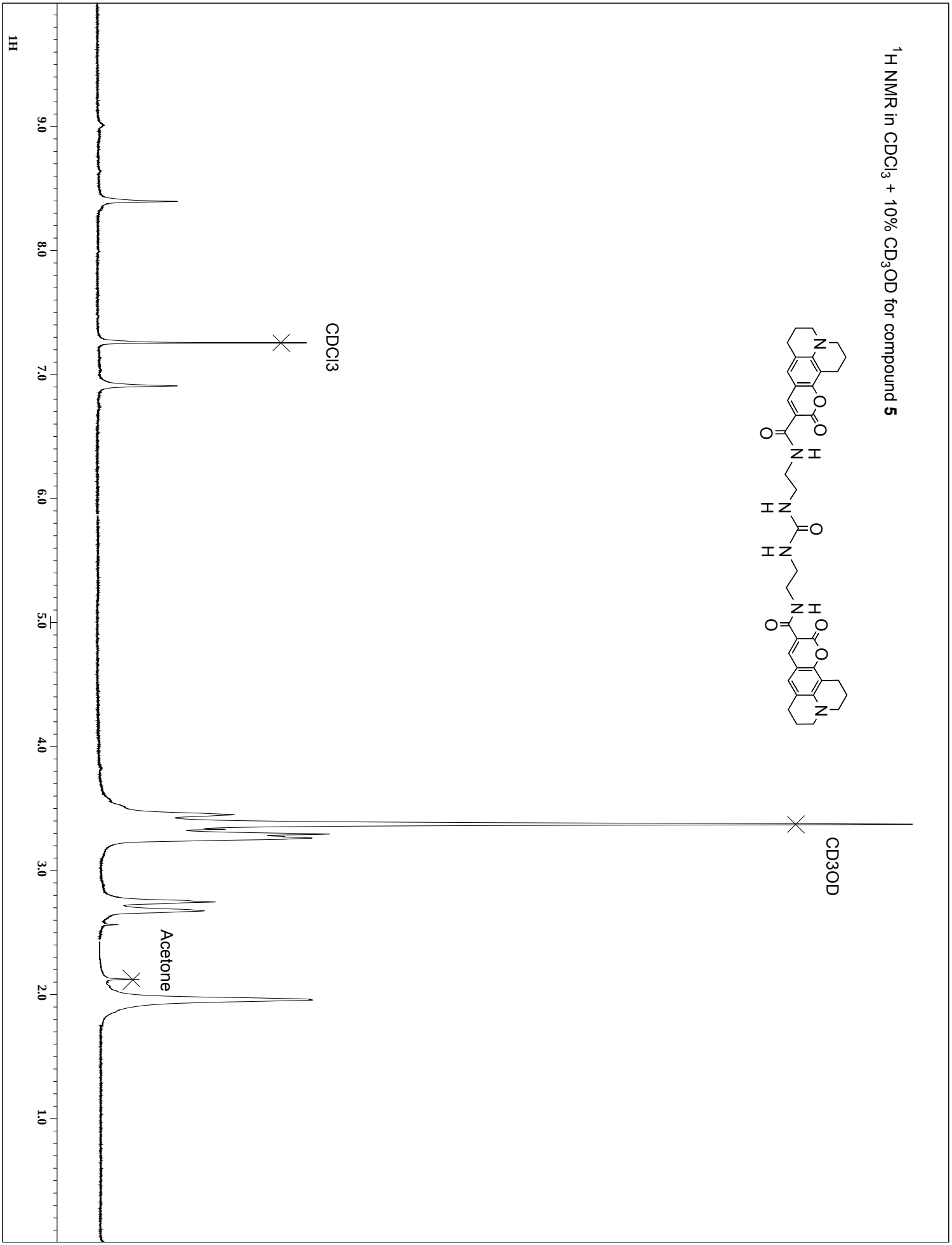


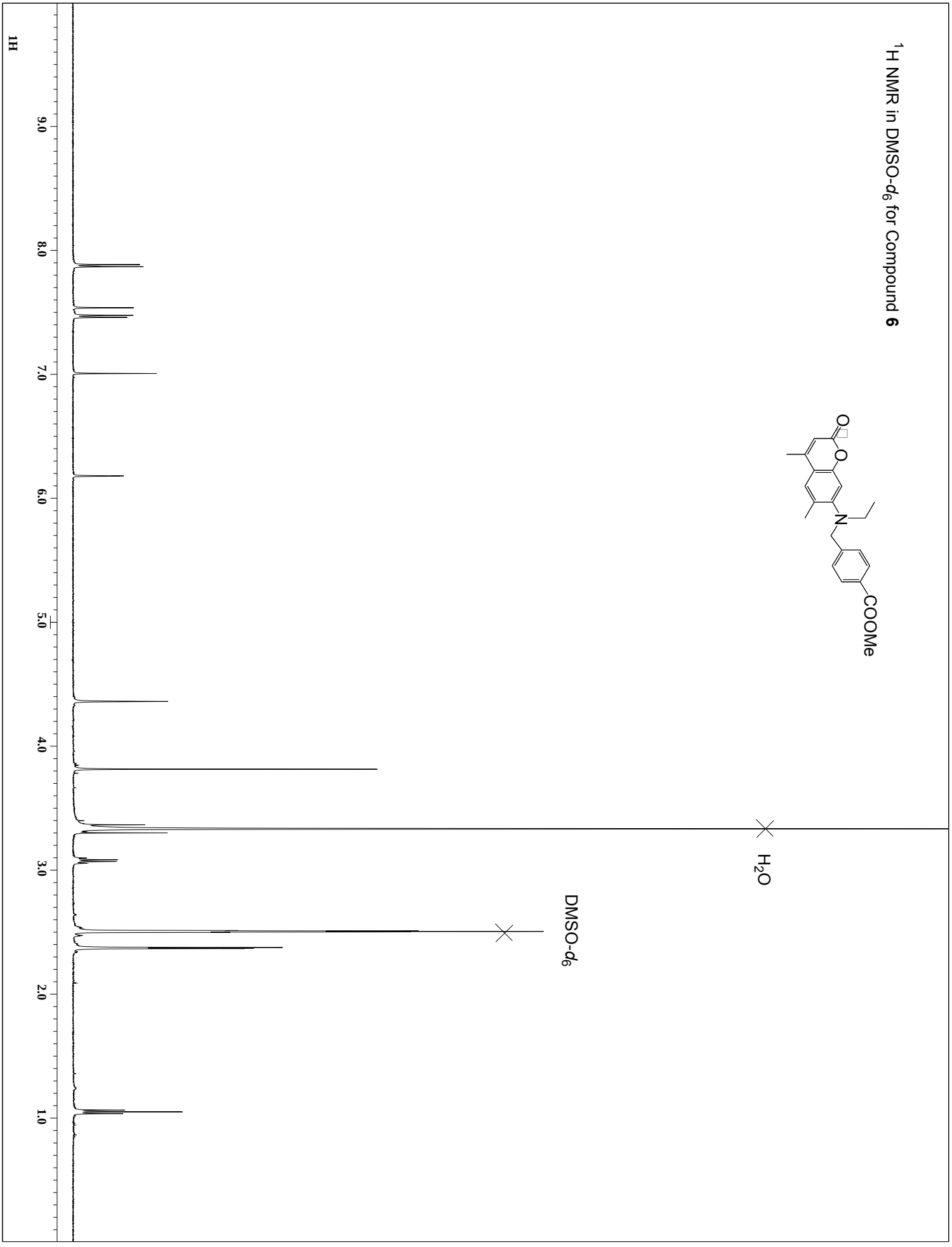
COSY NMR in $CDCl_3$ for compound **4**

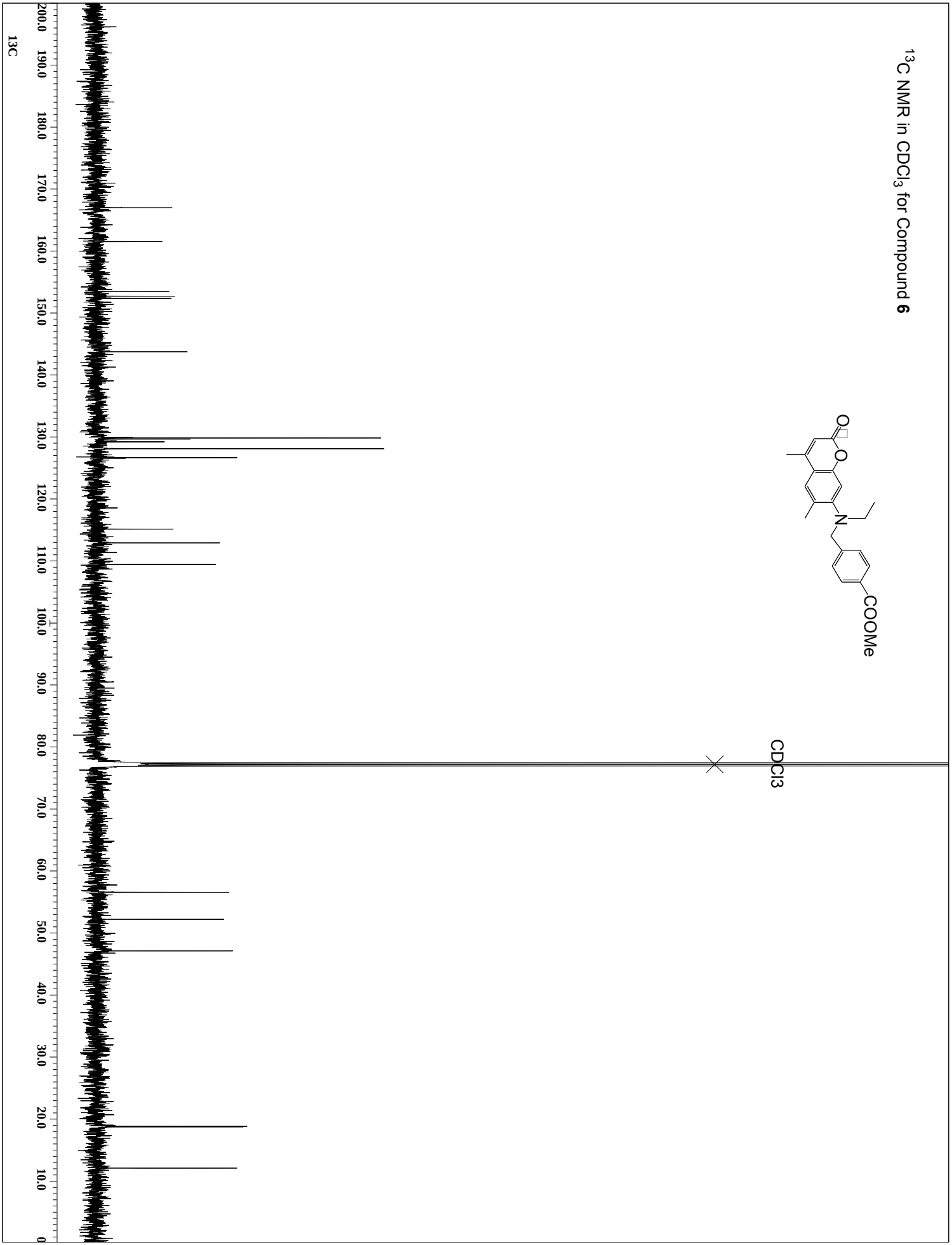


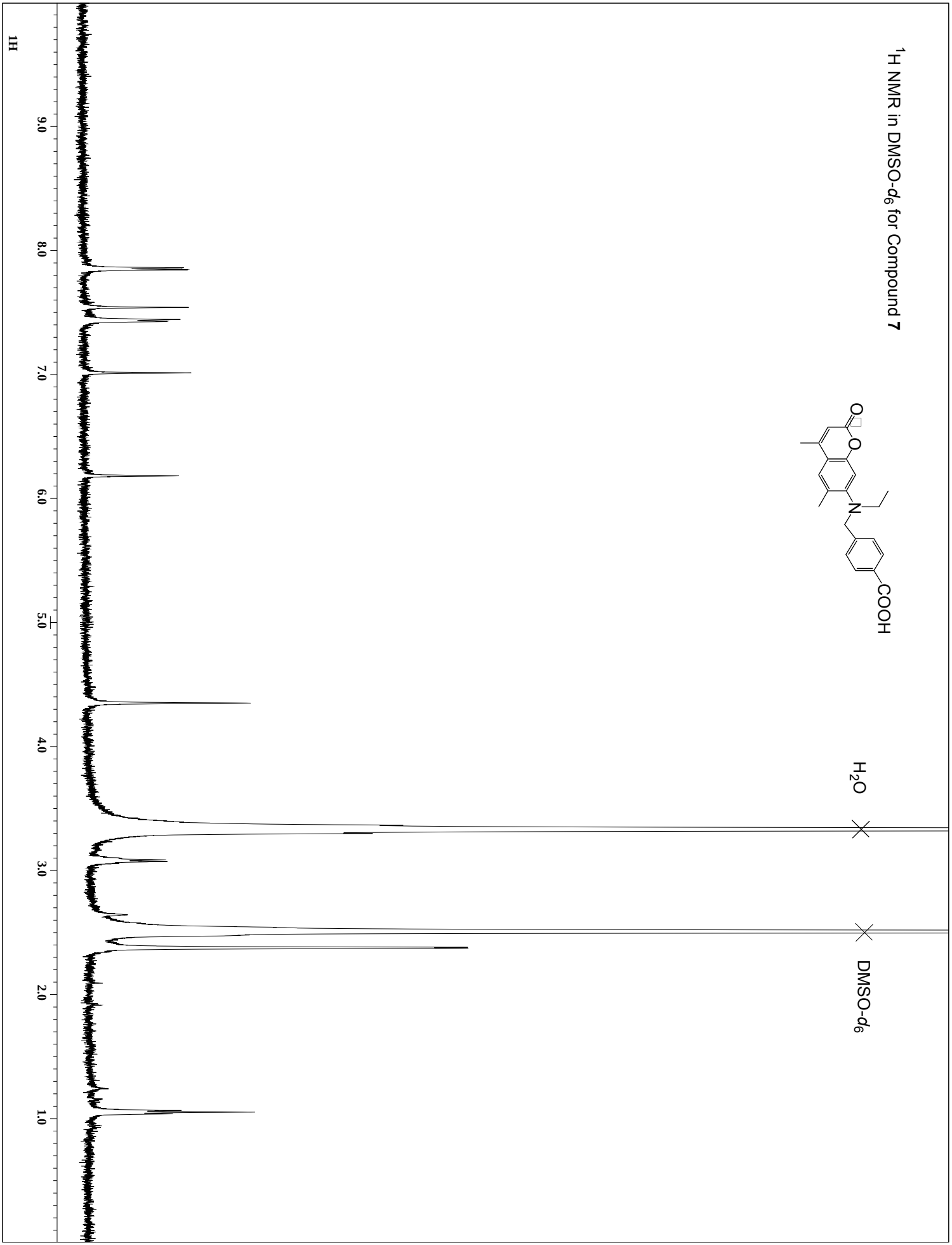
HMBC NMR in $CDCl_3$ for compound **3**



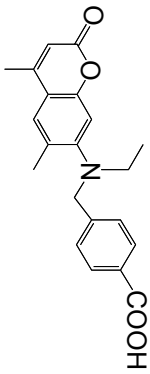

^{1}H NMR in $CDCl_3$ + 10% CD_3OD for compound **5**
CDCl3
CD3OD
Acetone
1H
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0


^{1}H NMR in DMSO-d_6 for Compound **6**
O
O
N
COOMe
H_2O
DMSO-d_6
1H
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0

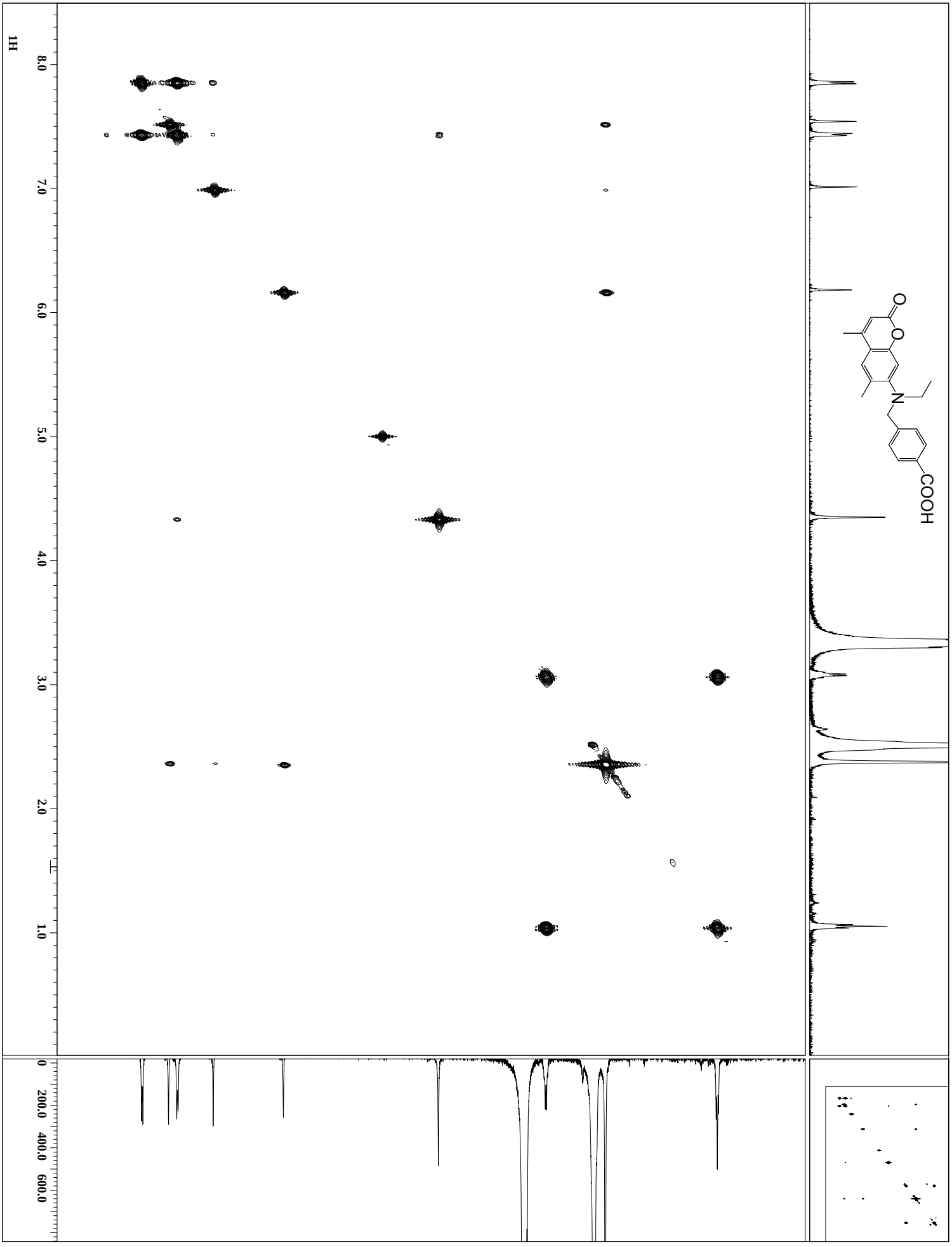

^{13}C NMR in $CDCl_3$ for Compound **6**
O
O
N
COOMe
CDCl3
13C
200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0


^{1}H NMR in DMSO-d_6 for Compound **7**
O
O
N
COOH
H_2O
DMSO-d_6
1H
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0

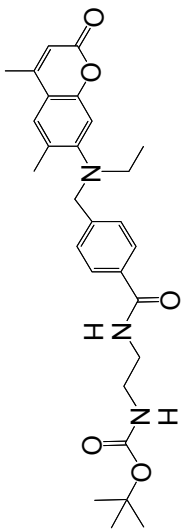
^{13}C NMR in DMSO-d_6 for Compound **7**

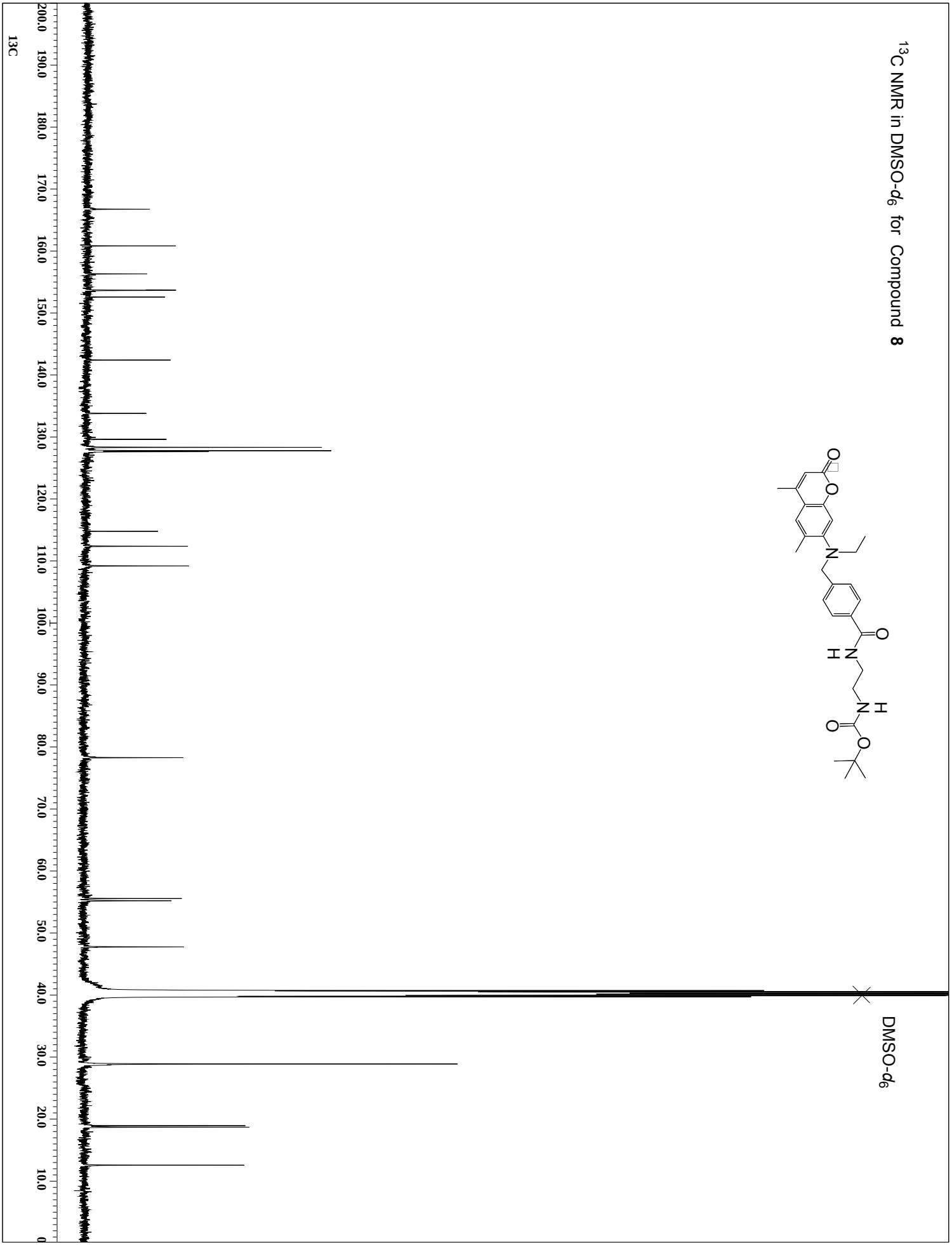


COSY NMR in DMSO-d_6 for compound **7**

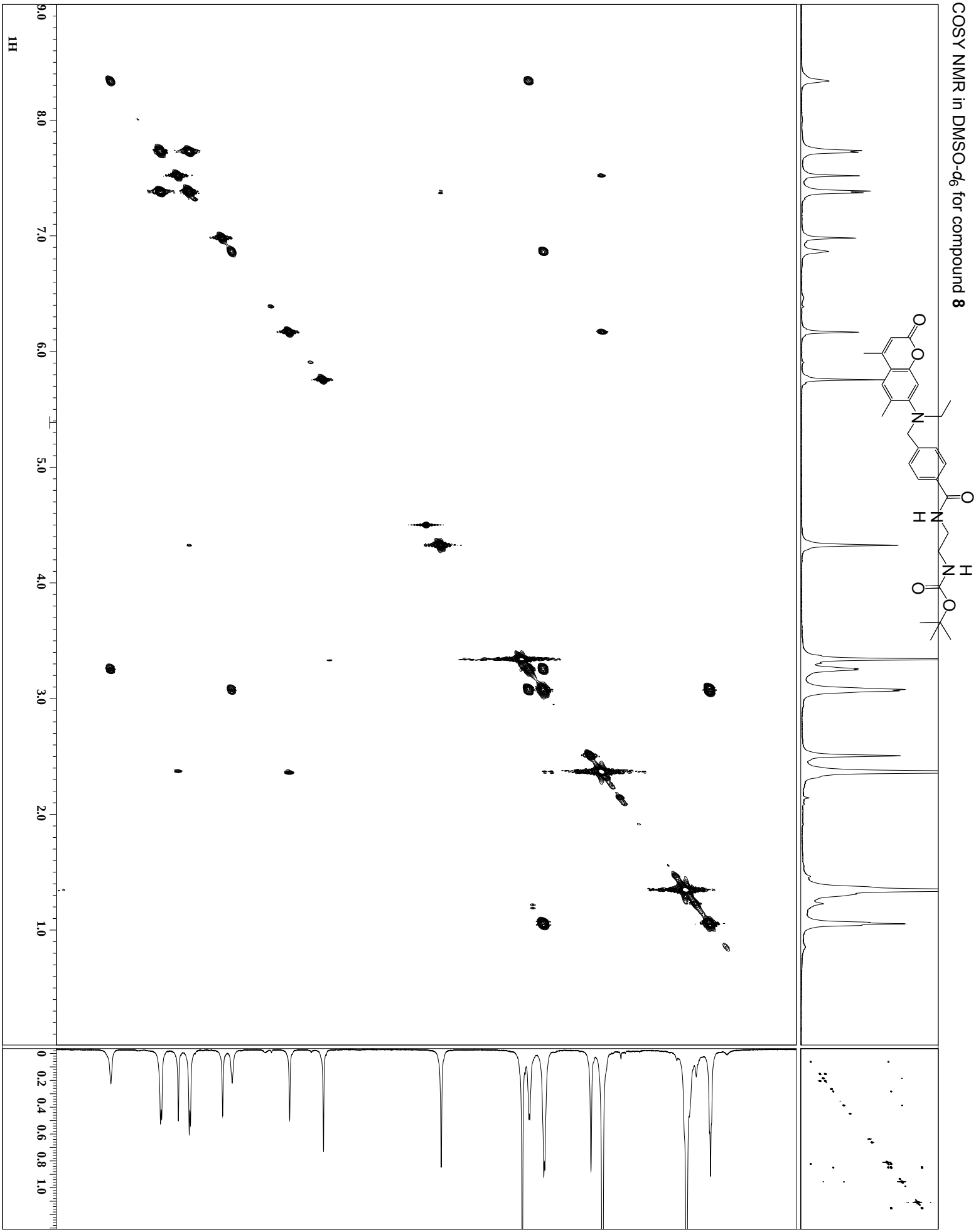


^{1}H NMR in DMSO-d_6 for Compound **8**

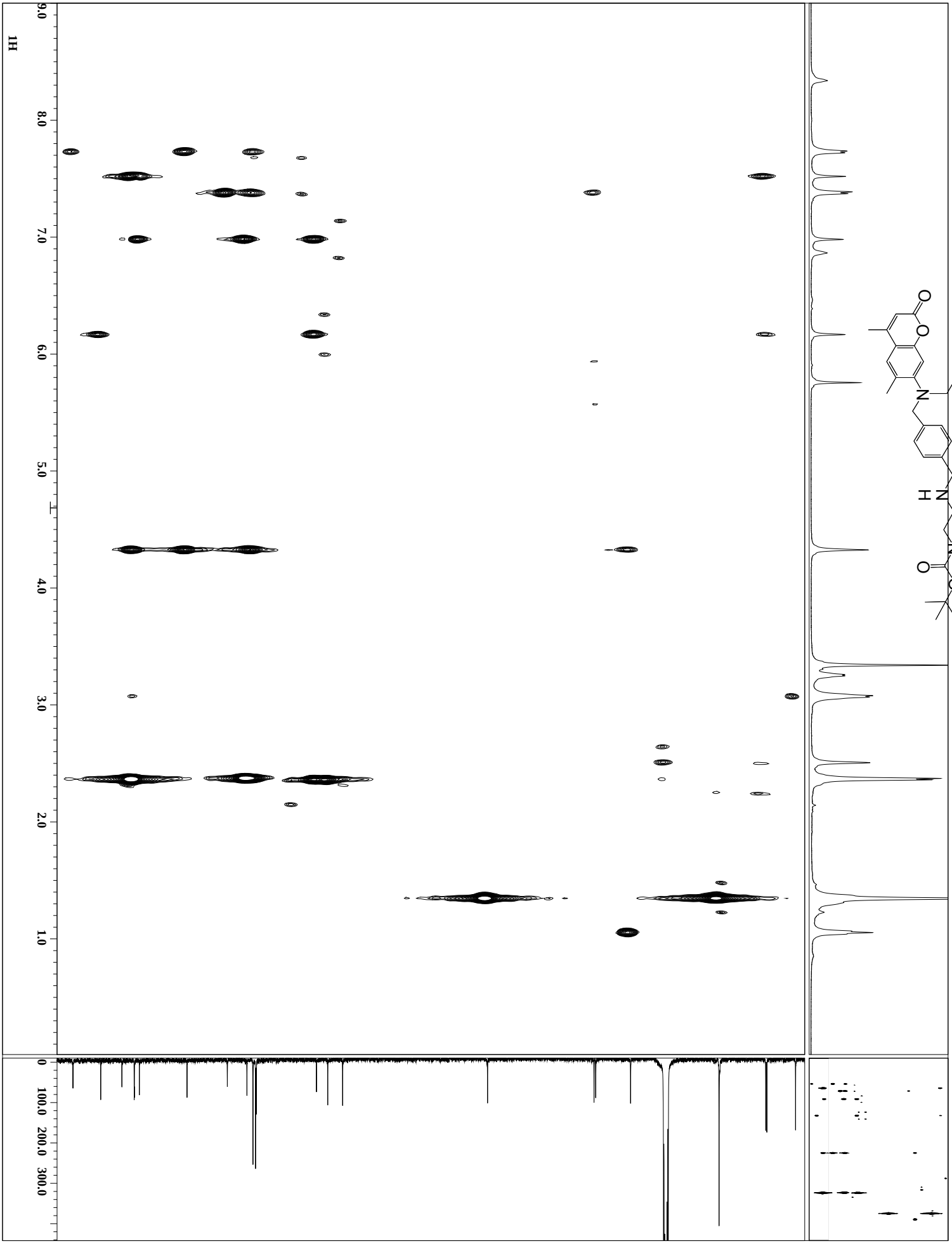


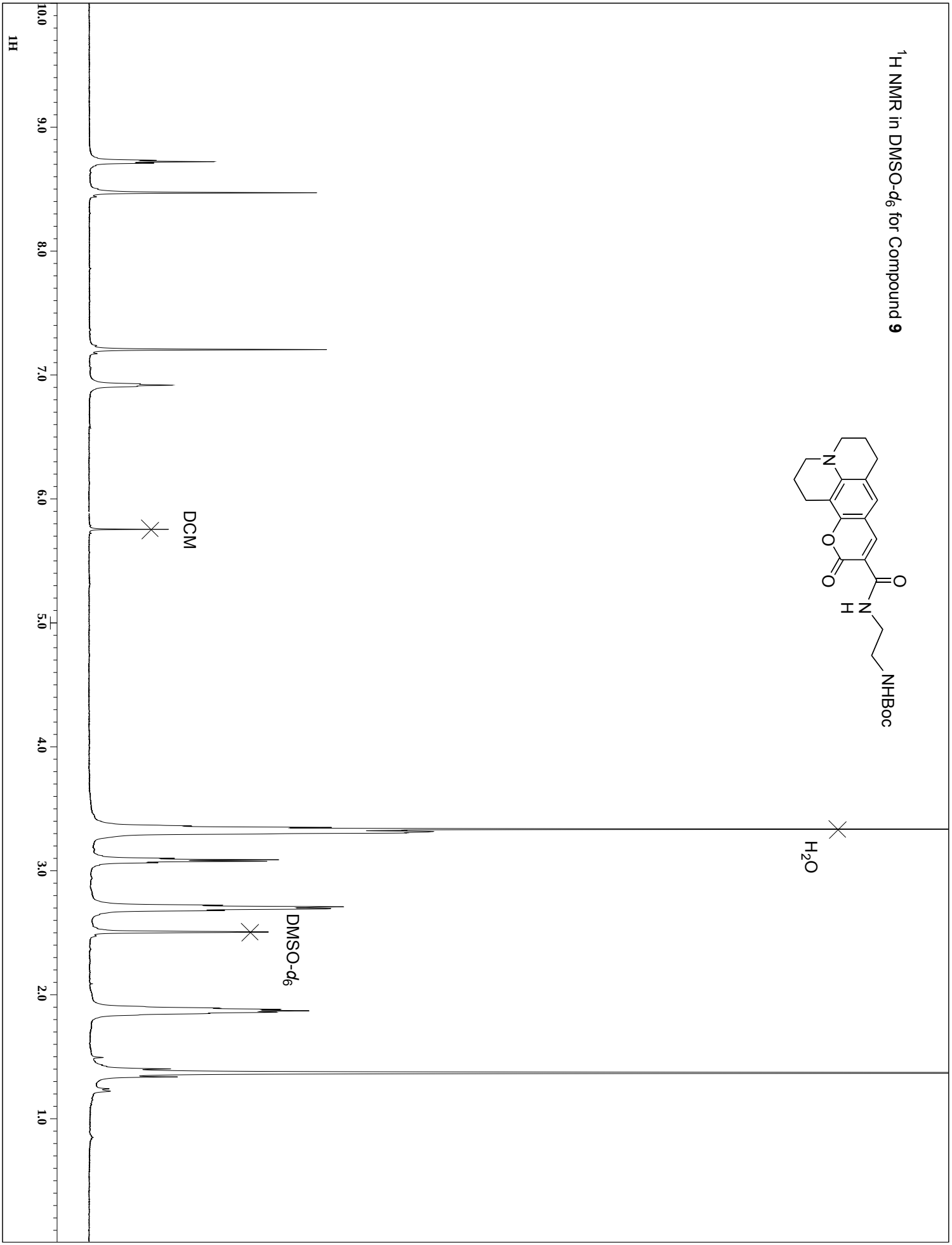

^{13}C NMR in DMSO-d_6 for Compound **8**
DMSO-d_6
13C
200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0

COSY NMR in DMSO-d_6 for compound **8**

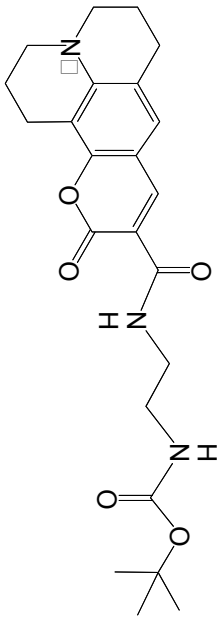


HMBC NMR in DMSO-d_6 for compound **8**

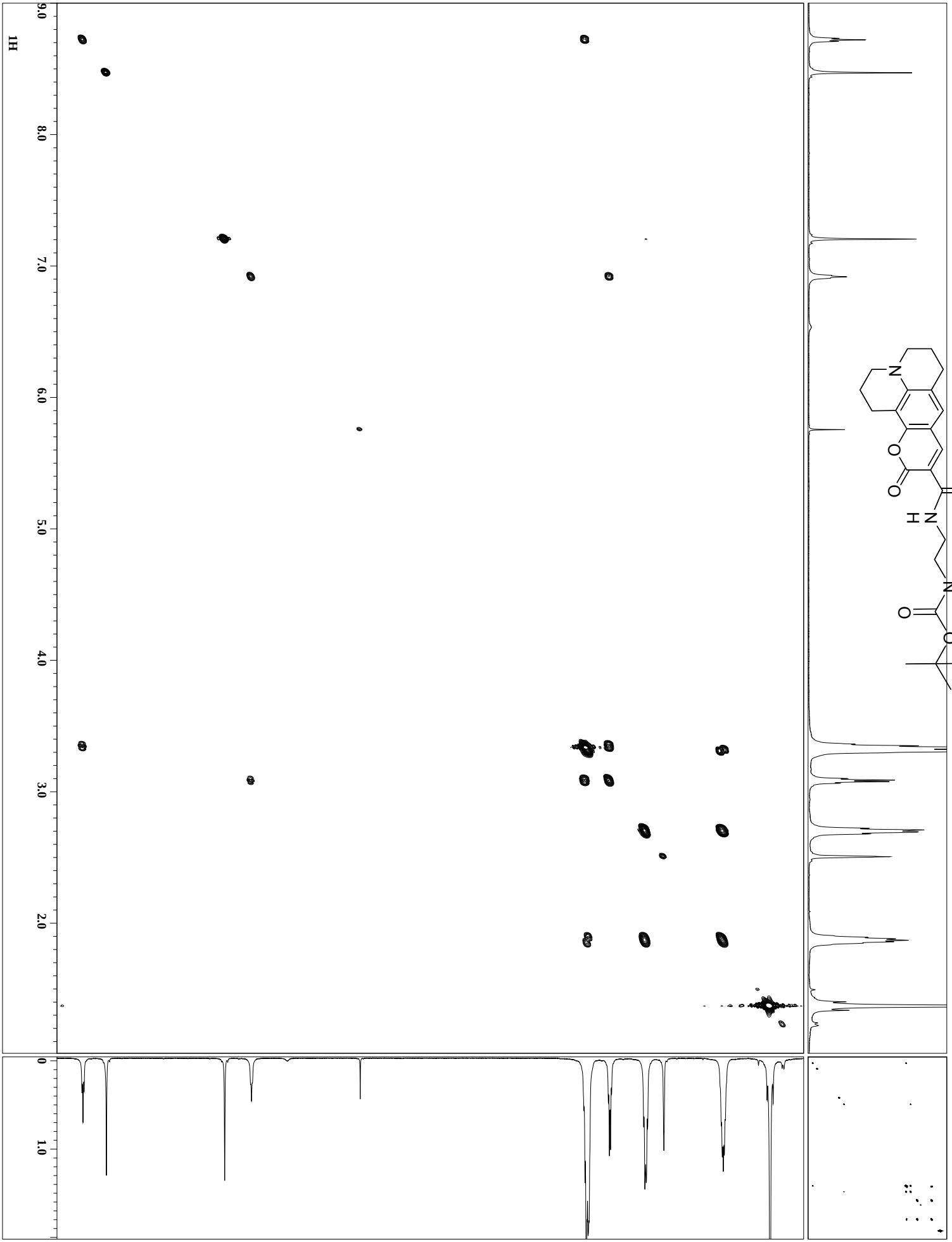


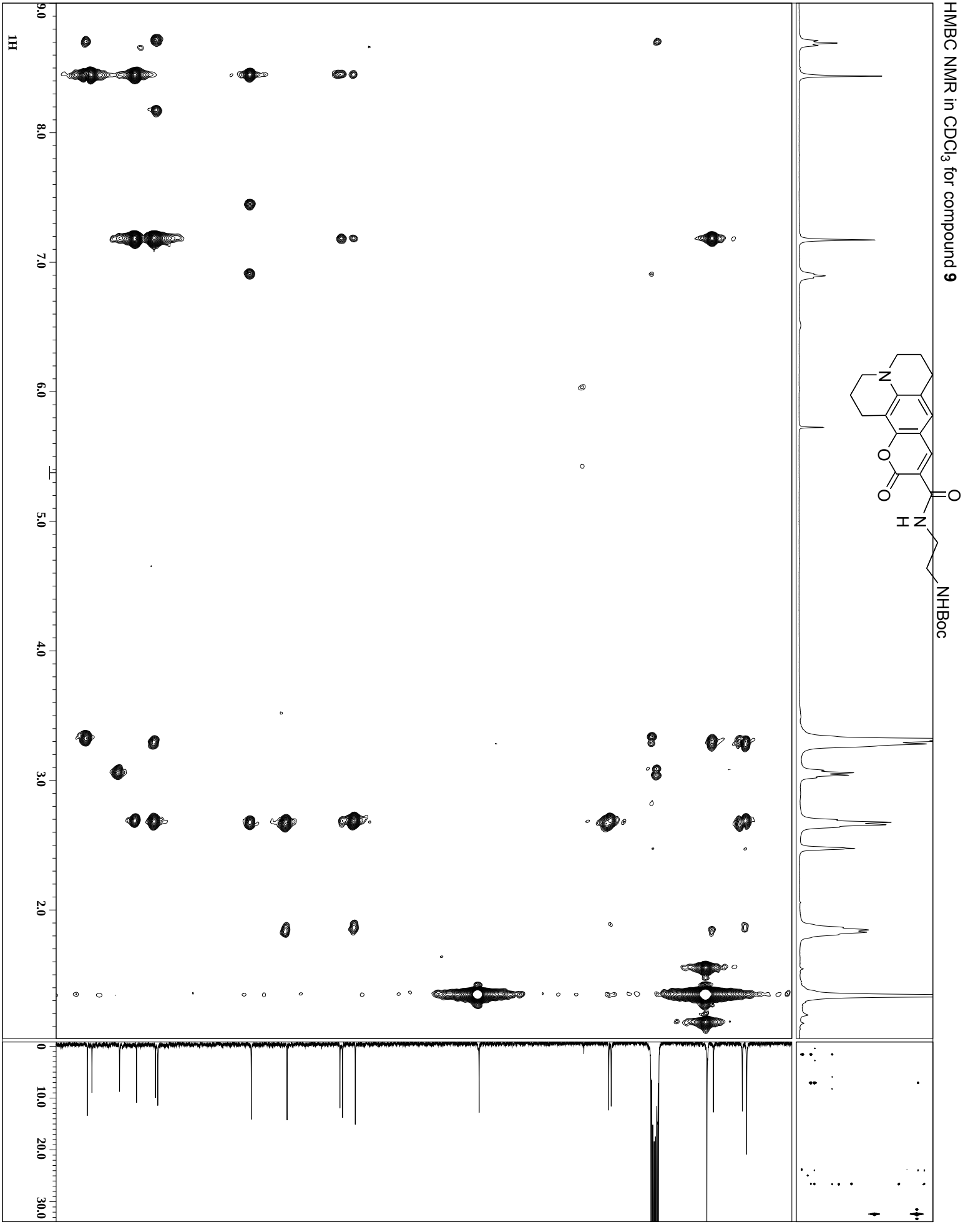

^{1}H NMR in DMSO-d_6 for Compound **9**
NHBoc
DCM
H_2O
DMSO-d_6
1H
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0

^{13}C NMR in DMSO-d_6 for Compound **9**



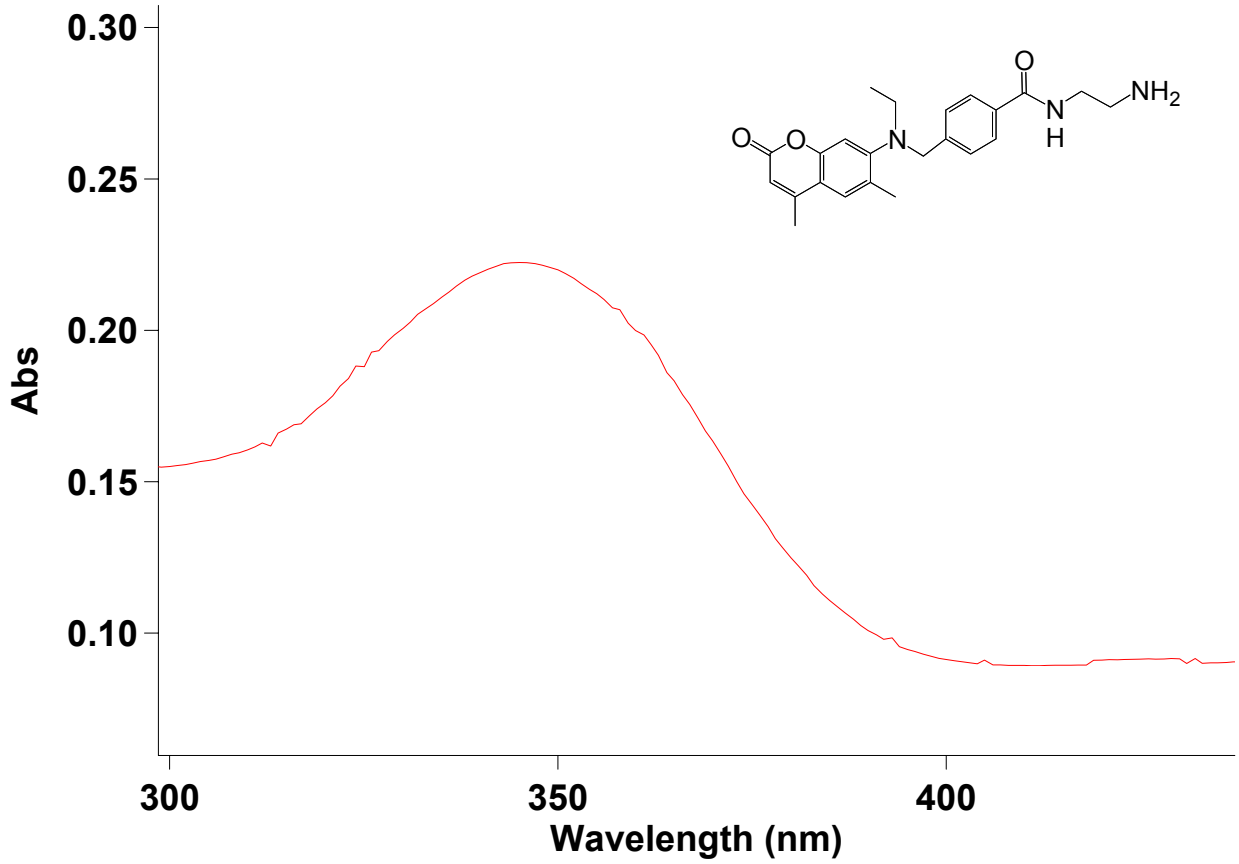
COSY NMR in DMSO-d_6 for compound **9**




HMBC NMR in CDCl3 for compound 9
1H
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
0
10.0
20.0
30.0
O
N
H
O
O
O
N
NHBoc

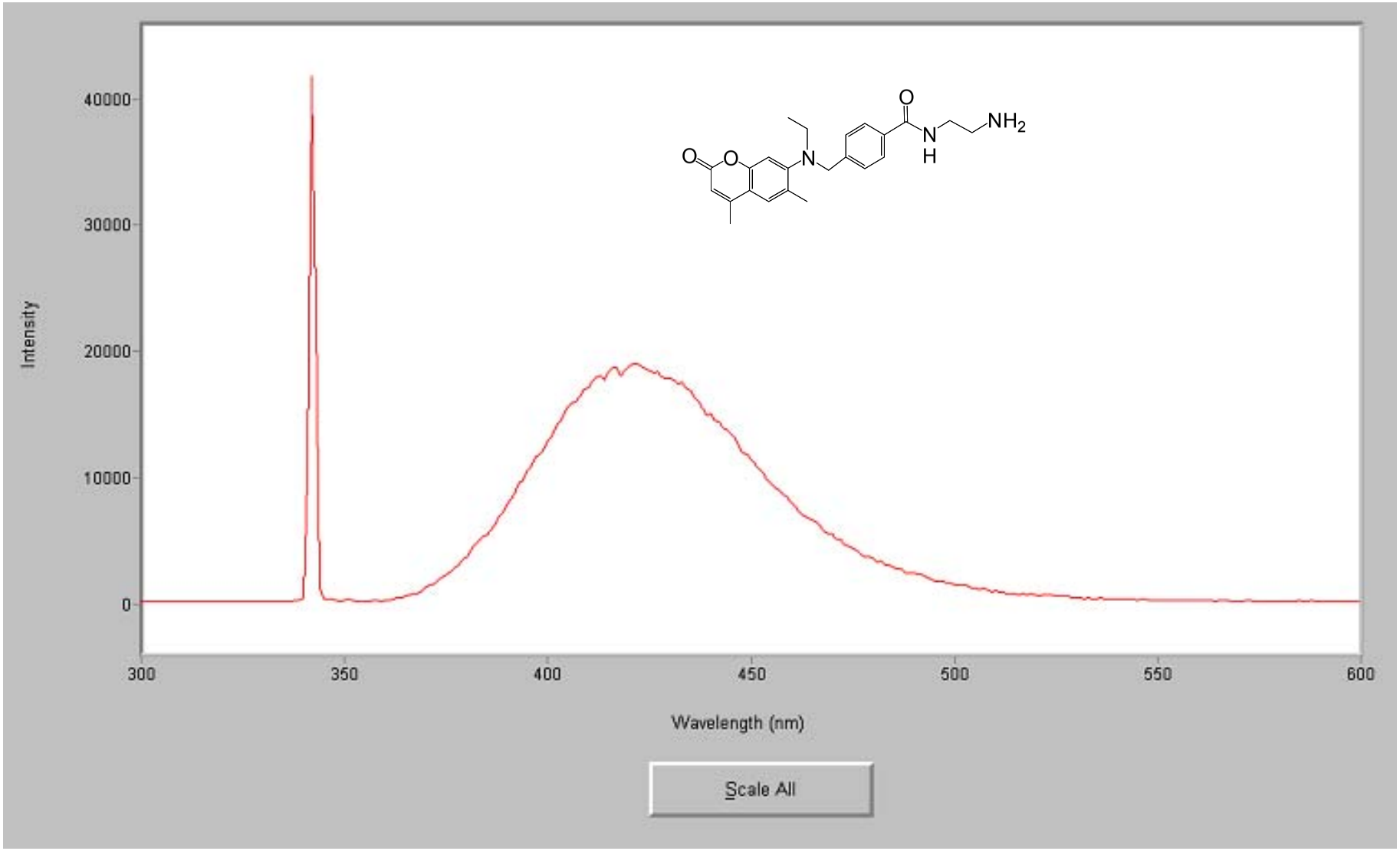
UV-vis Spectrum

Compound **1**: [c] = 1 x 10^{-6} M, λ_{max} = 343 nm



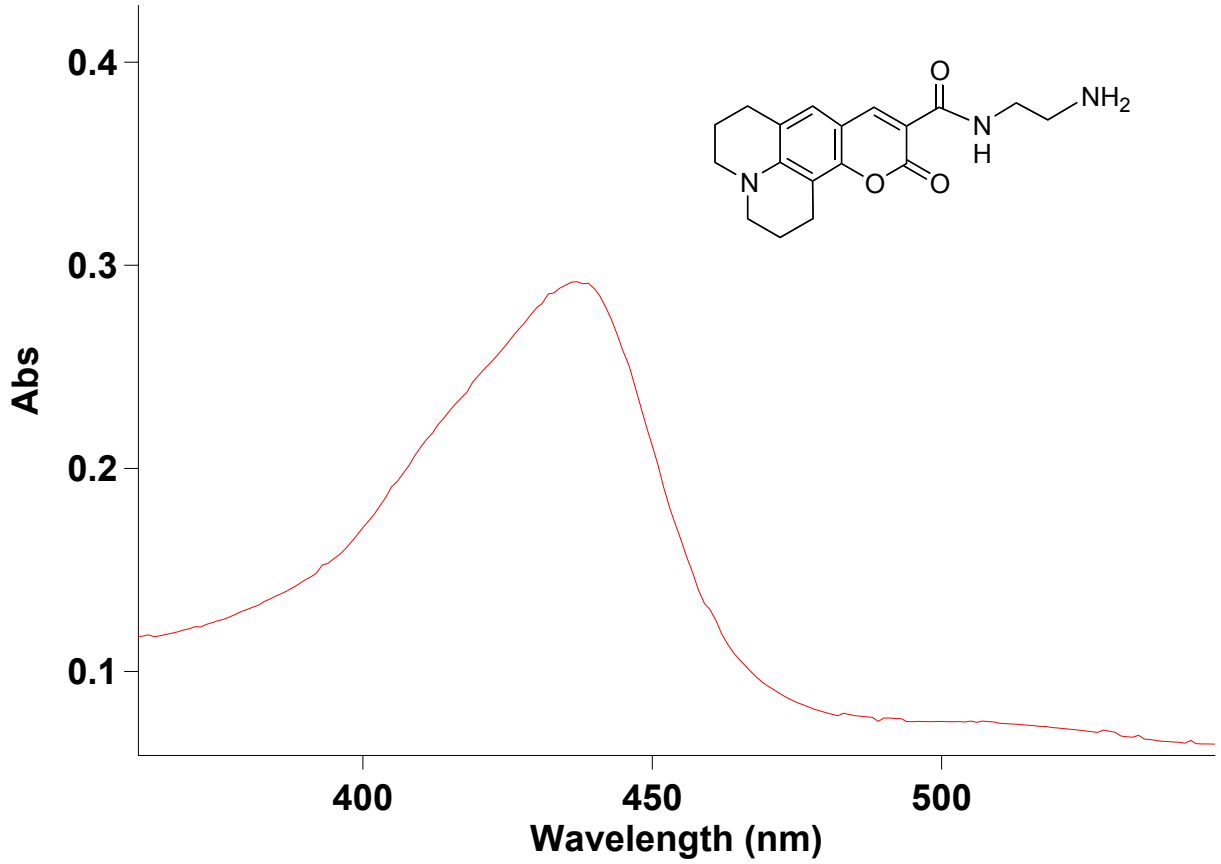
Fluorescence Spectrum:

Compound **1**: [c] = 1 x 10^{-6} M. λ_{ex} = 343 nm, λ_{em} = 425 nm



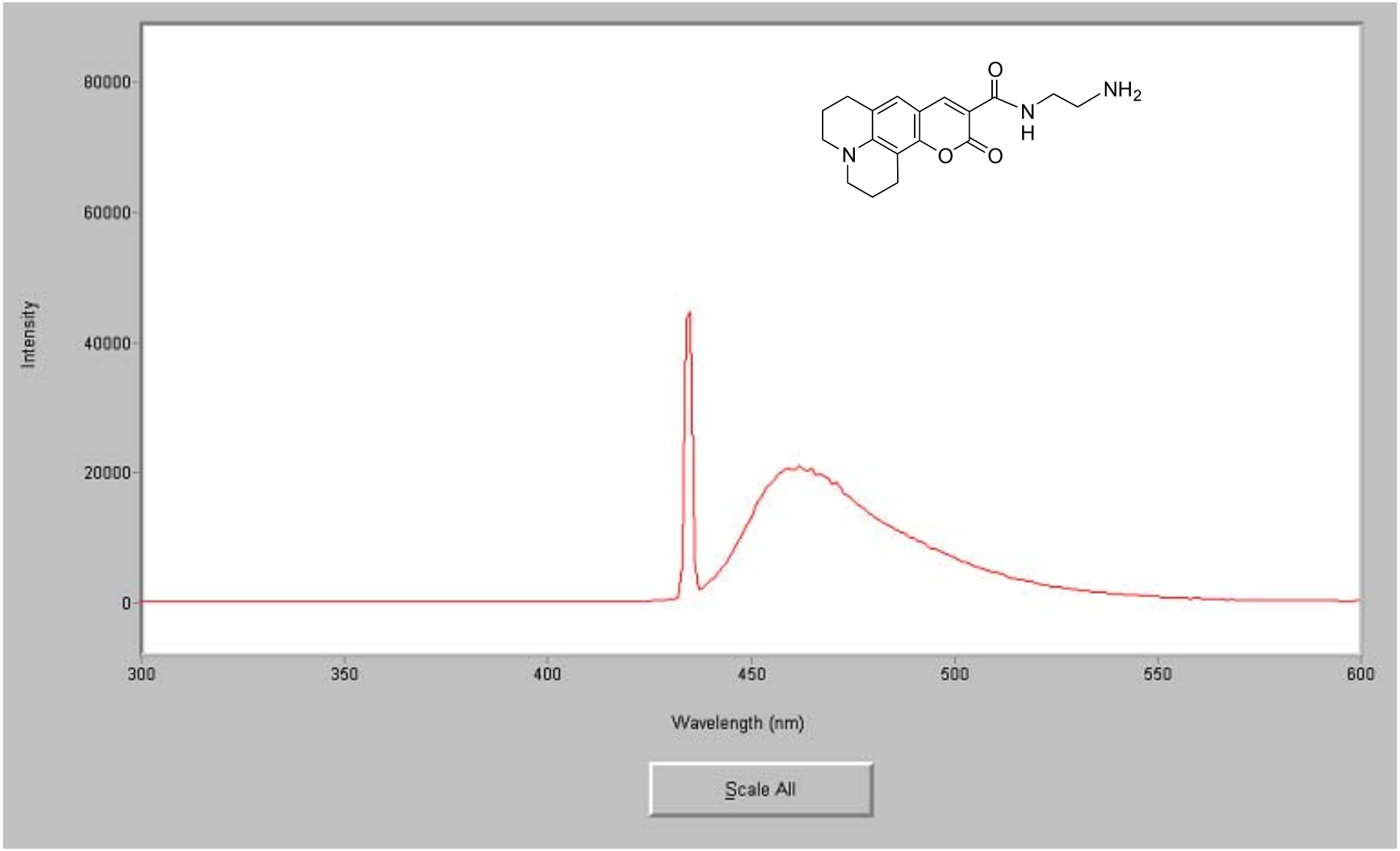
UV-vis Spectrum

Compound **2**: [c] = 1 x 10^{-6} M, λ_{max} = 435 nm



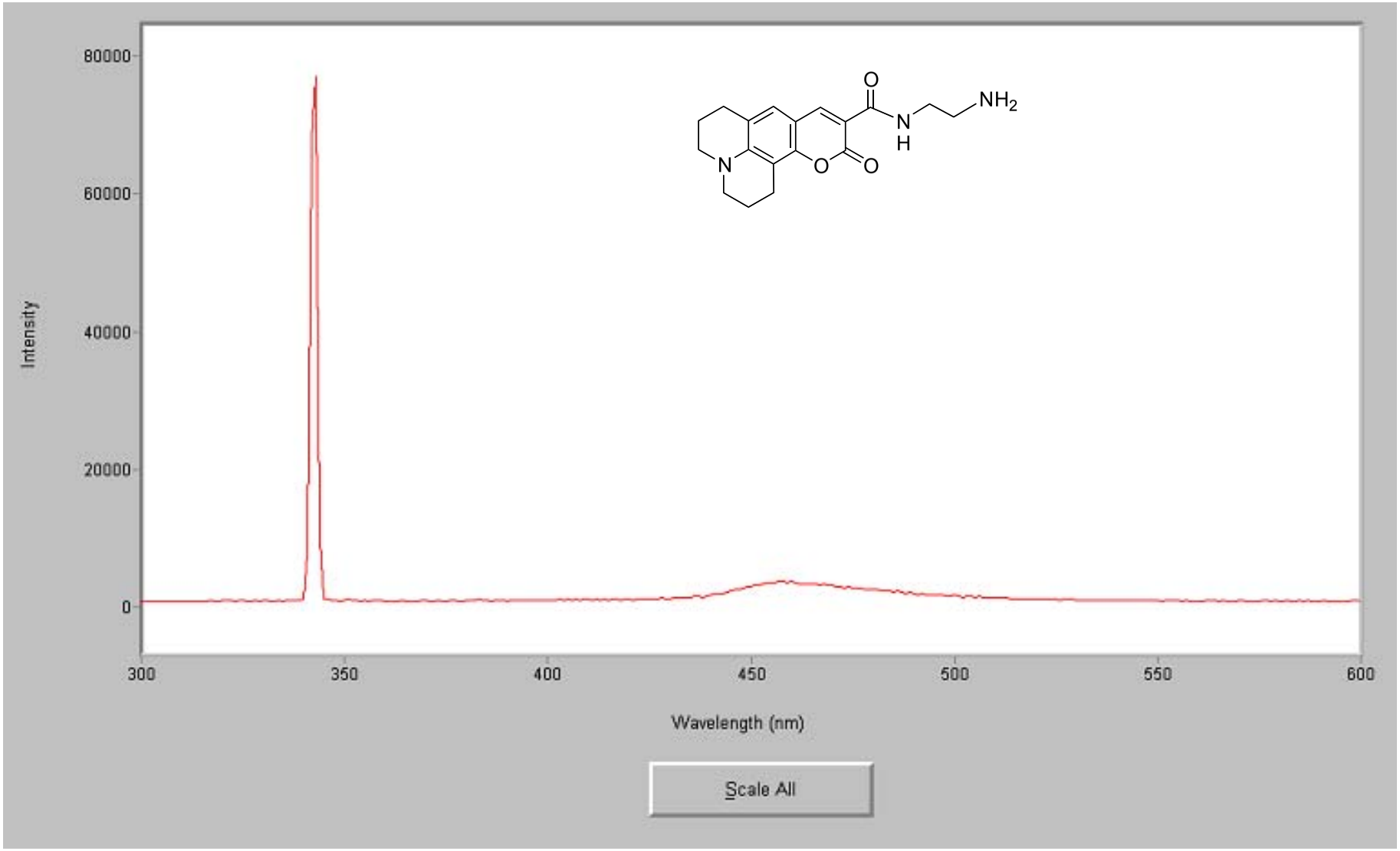
Fluorescence Spectrum:

Compound **2**: [c] = 1 x 10^{-6} M. λ_{ex} = 435 nm, λ_{em} = 468 nm



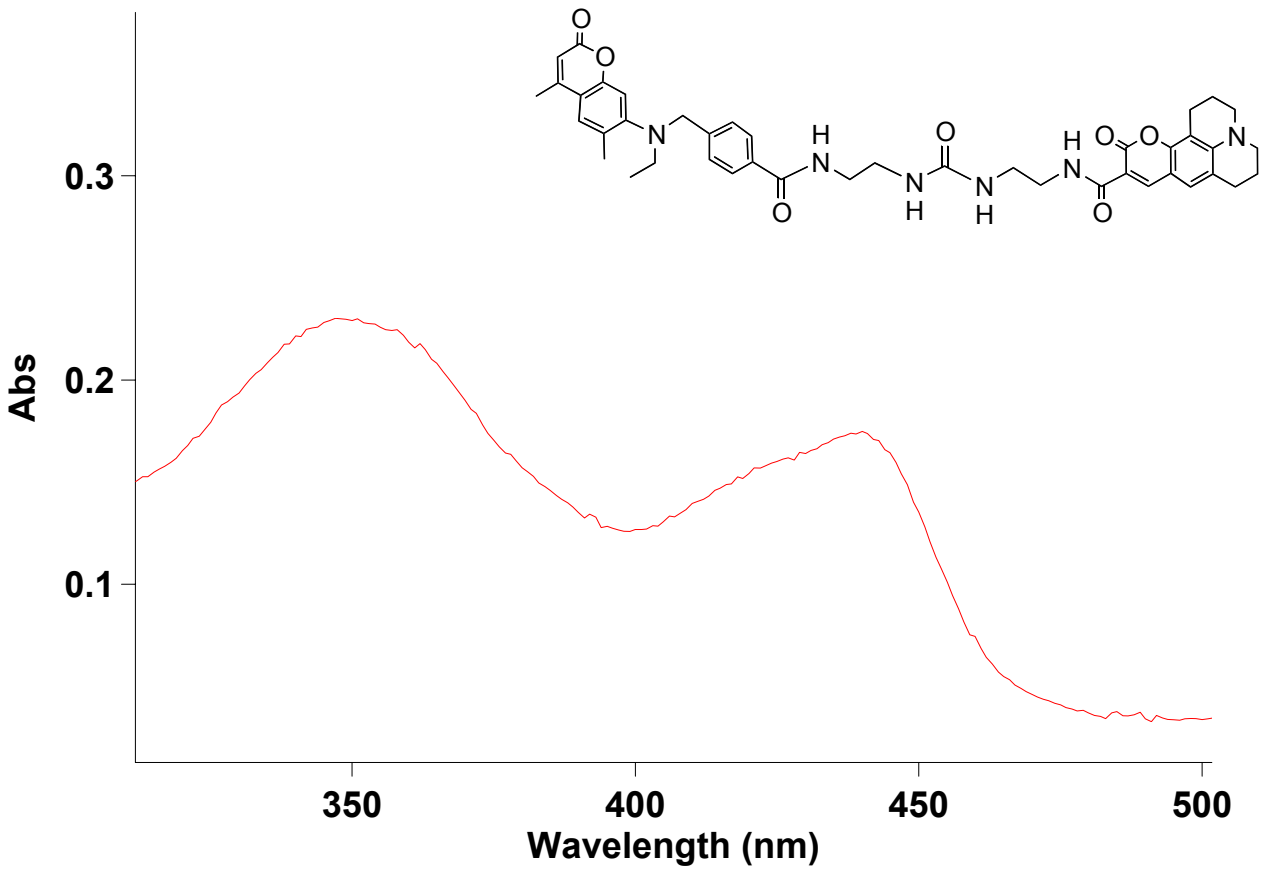
Fluorescence Spectrum:

Compound **2**: [c] = 1 x 10^{-6} M. λ_{ex} = 343 nm, Emission is weak.



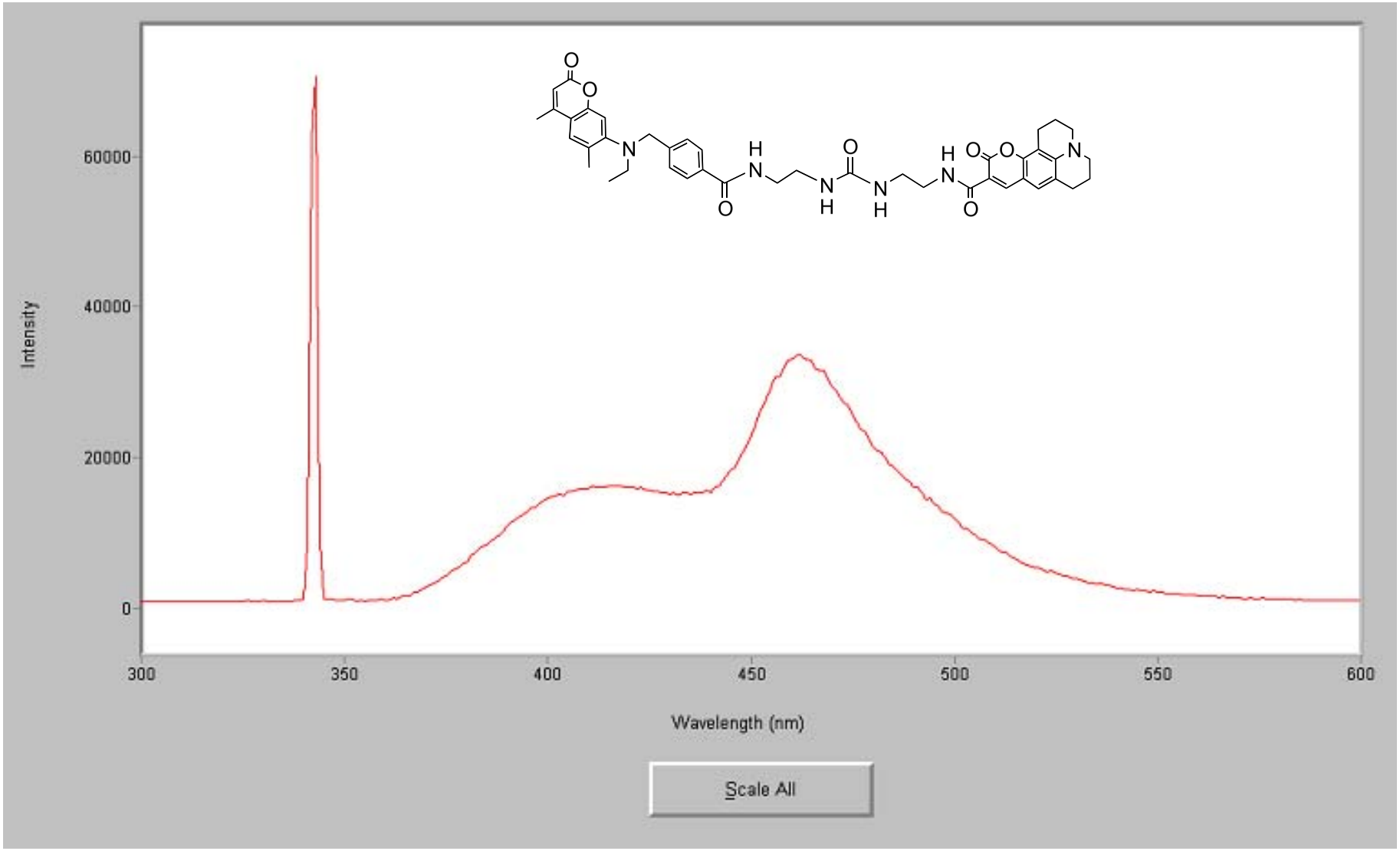
UV-vis Spectrum

Compound **3**: [c] = 1 x 10^{-6} M, λ_{max1} = 343 nm, λ_{max2} = 438 nm



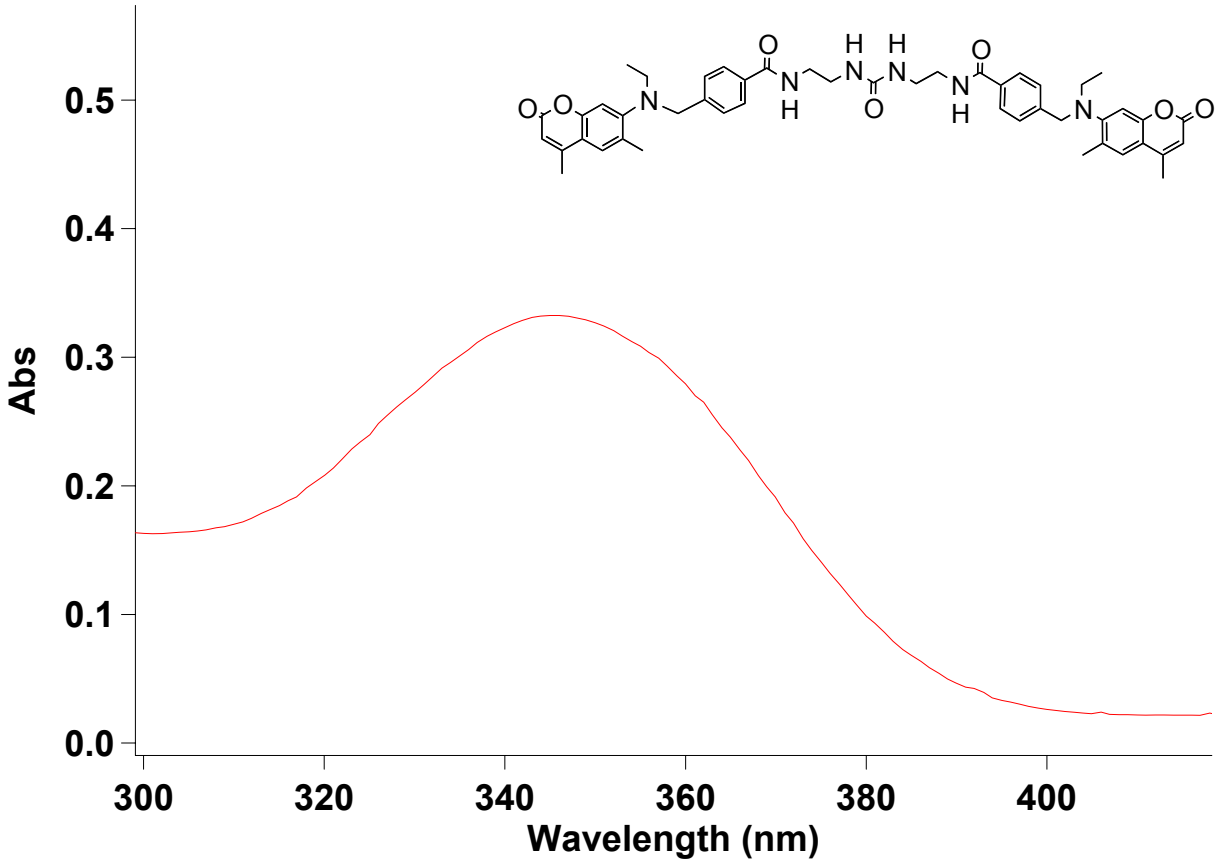
Fluorescence Spectrum:

Compound **3**: [c] = 1 x 10^{-6} M. λ_{ex} = 343 nm, λ_{em1} = 422 nm, λ_{em2} = 464 nm.



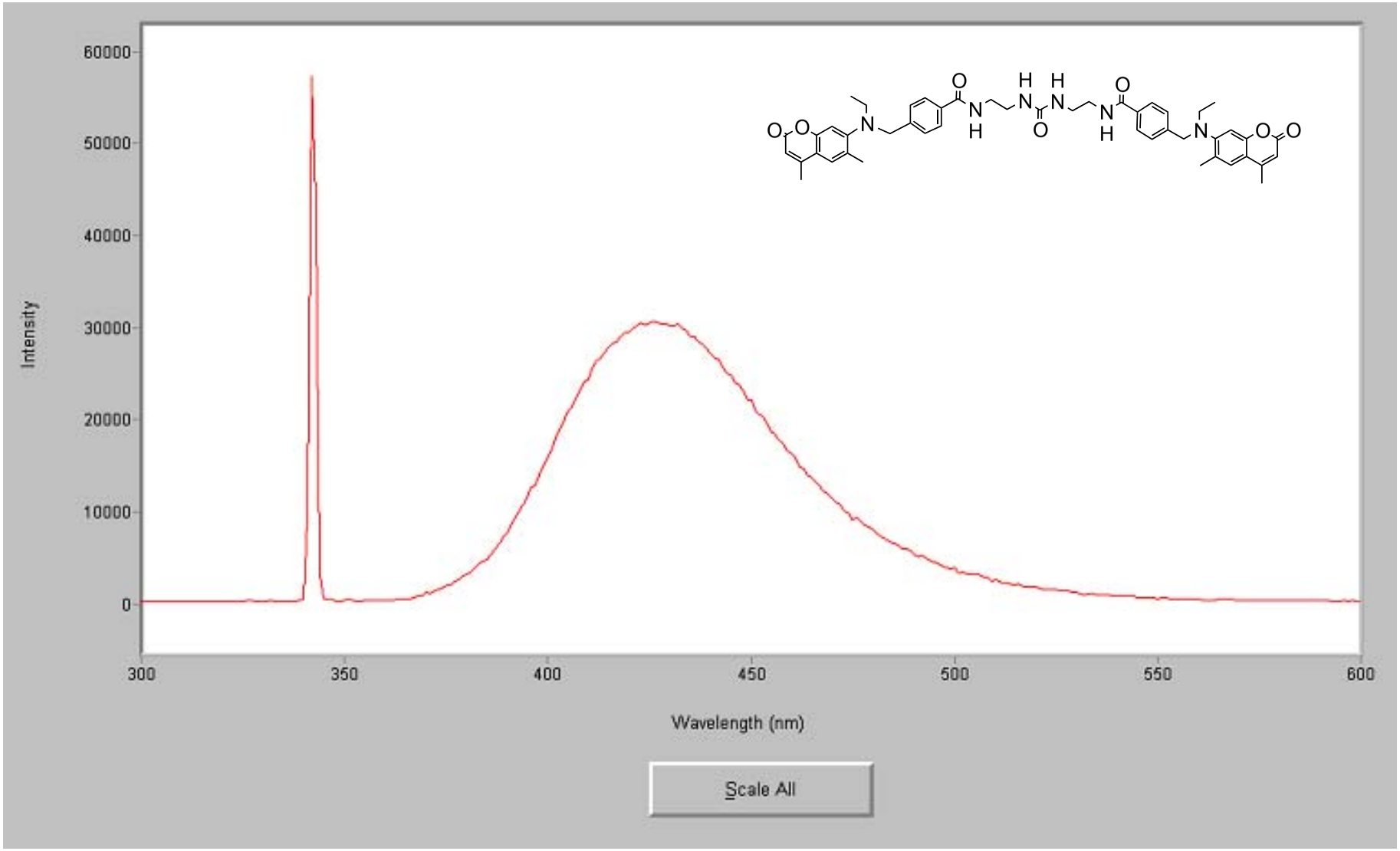
UV-vis Spectrum

Compound **4**: [c] = 1 x 10^{-6} M, λ_{max} = 344 nm



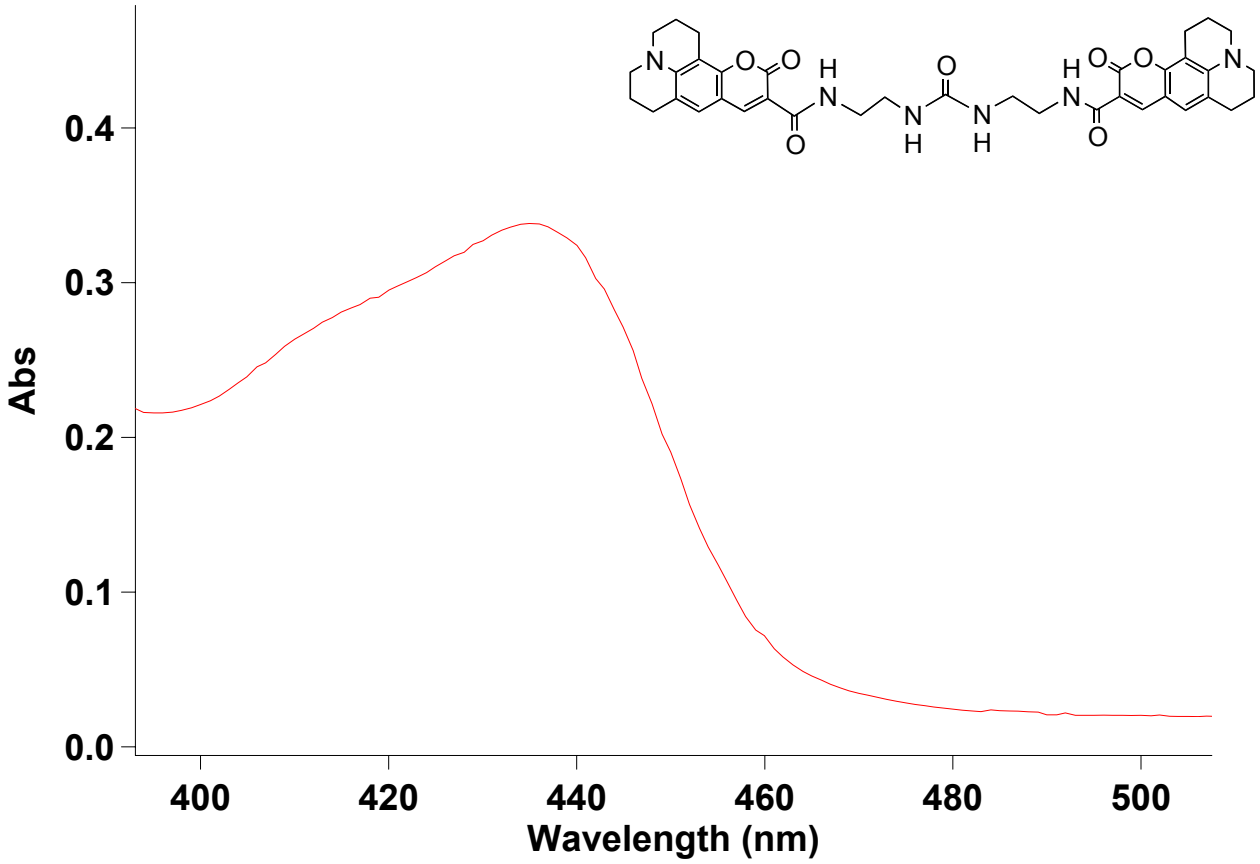
Fluorescence Spectrum:

Compound 4: [c] = 1 x 10^{-6} M. λ_{ex} = 344 nm, λ_{em} = 424 nm



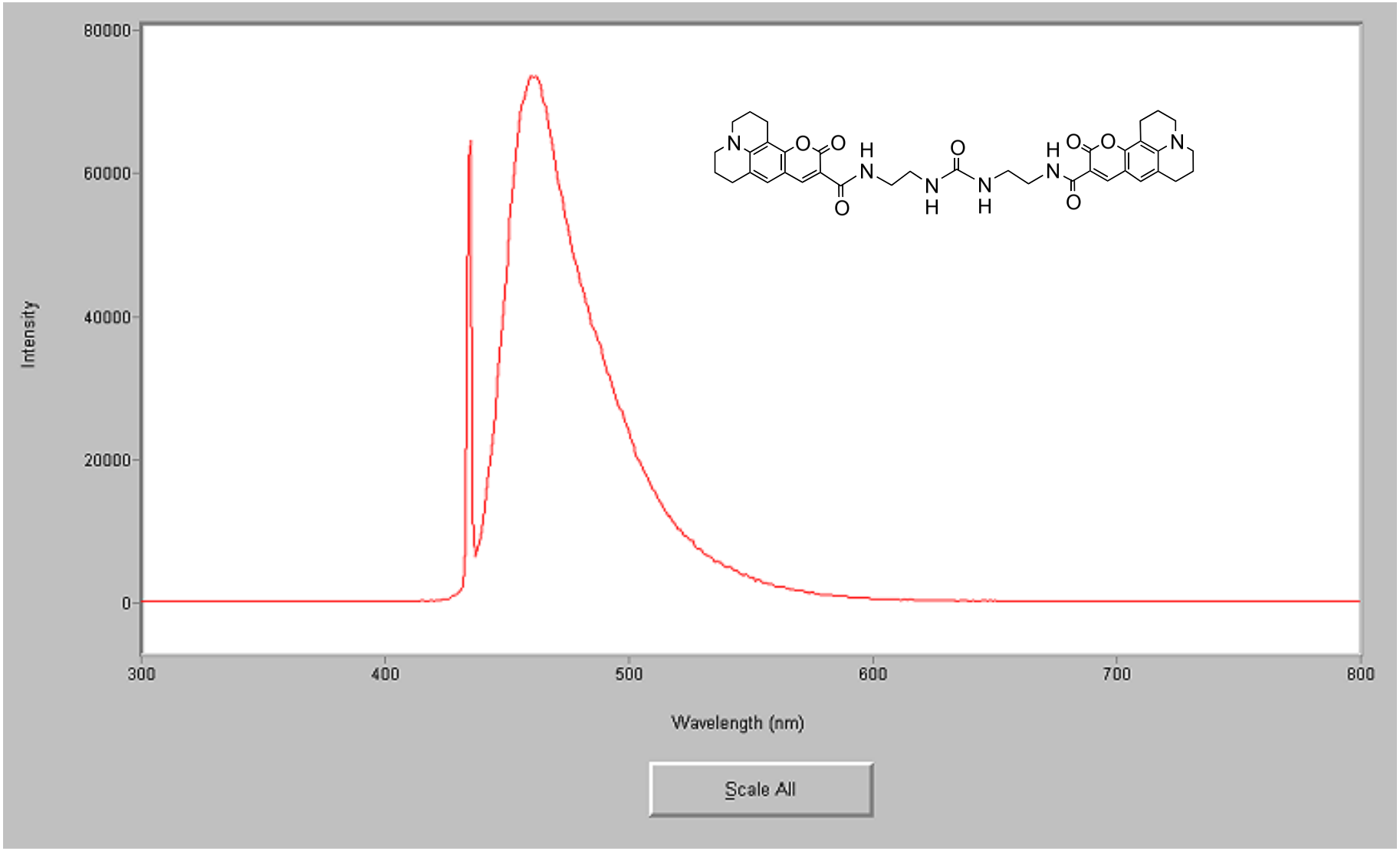
UV-vis Spectrum

Compound **5**: [c] = 1 x 10^{-6} M, λ_{max} = 435 nm



Fluorescence Spectrum:

Compound **5**: [c] = 1 x 10^{-6} M. λ_{ex} = 435 nm, λ_{em} = 462 nm



Titration Results:

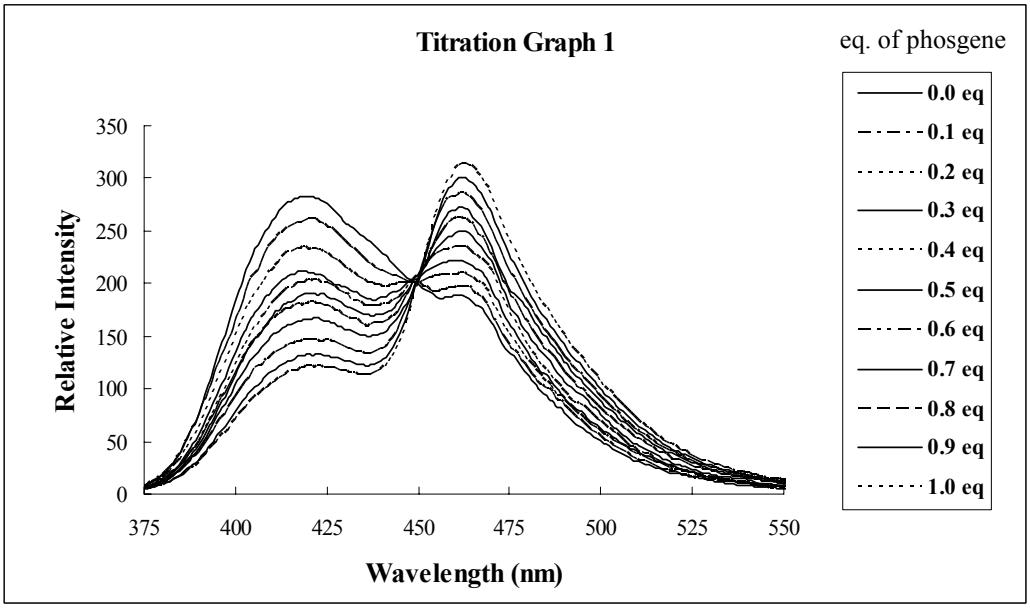


Fig. 1. Fluorescence emission spectra on titration with triphosgene. Coumarins **1** and **2** were mixed in 1:1 ratio at 1 x 10^{-2} M in $CHCl_3$, TEA (10 eq) was added. 1/3 equivalent triphosgene (equal to 1 equivalent phosgene) was added step by step. Aliquots were taken and diluted to 10^{-5} M then emission spectra were recorded. The similar result was shown in 10^{-6} M dilutions.

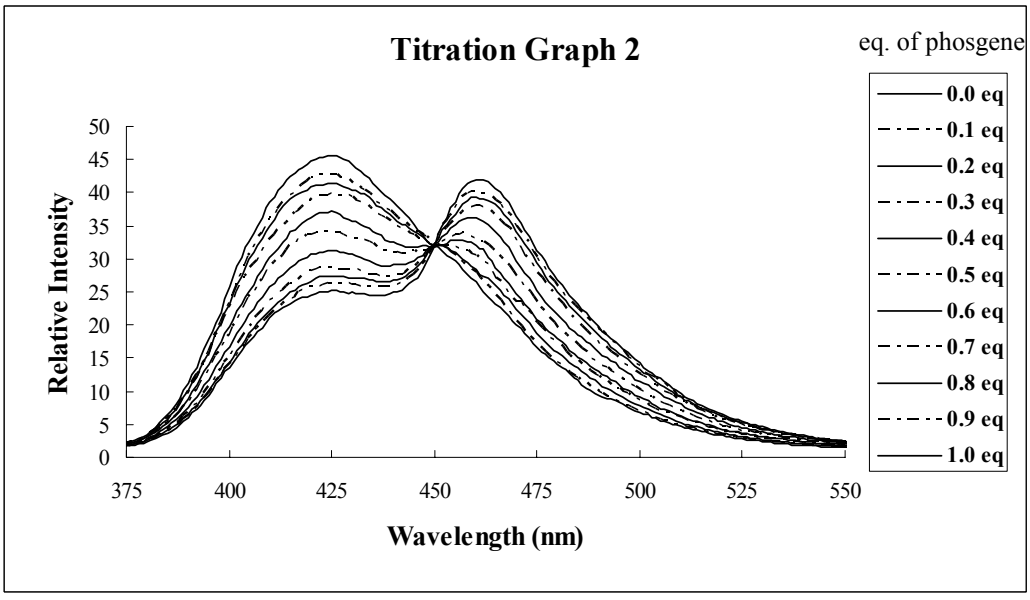


Fig. 2. Fluorescence emission spectra on titration with triphosgene. Coumarins **1** and **2** were mixed in 1:1 ratio at 1x 10^{-3} M in $CHCl_3$, TEA (10 eq) was added. 1/3 equivalent triphosgene (equal to 1 equivalent phosgene) was added step by step. Aliquots were taken and diluted 10^{-6} M then emission spectra were recorded

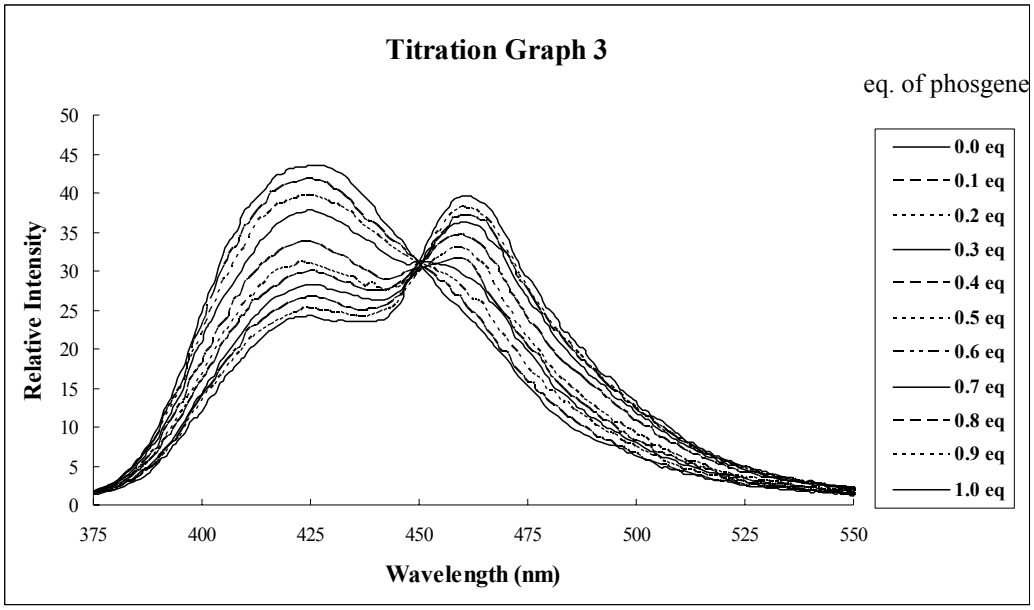


Fig. 3. Fluorescence emission spectra on titration with triphosgene. Coumarins **1** and **2** were mixed in 1:1 ratio at 5 x 10^{-4} M in $CHCl_3$, TEA (10 eq) was added. 1/3 equivalent triphosgene (equal to 1 equivalent phosgene) was added step by step. Aliquots were taken and diluted to 10^{-6} M then emission spectra were recorded