Supporting Informations

Copper and electrocatalytic synergy for the construction of fused quinazolinones with 2-Aminobenzaldehydes and cyclic amines

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1. General information

All glassware was oven dried at 110 ℃ for several hours and cooled down under vacuum. Unless otherwise noted, materials were obtained from commercial suppliers and used without further purification. **The instrument for electrolysis** was dual display potentiostat (DJS-292B) (made in China). Anode electrode is carbon rod and cathodic electrode is aluminum rod.

Thin-layer chromatography was performed with EMD silica gel 60 F254 plates eluting with solvents indicated, visualized by a 254 nm UV lamp and stained with phosphomolybdic acid (PMA). Flash chromatography columns were packed with 200- 300 mesh silica gel in petroleum (bp. 60-90 ℃). **^{1}H NMR**, **^{13}C NMR** and spectra were obtained on Bruker Advance III (400 MHz). Chemical shifts were denoted in ppm (δ), and calibrated by using residual undeuterated solvent $CDCl_3$ (7.26 ppm), tetramethylsilane (0.00 ppm) asinternal reference for ^{1}H NMR and the deuterated solvent $CDCl_3$ (77.00 ppm) tetramethylsilane (0.00 ppm) as internal standard for ^{13}C NMR, multiplicities are as indicated: s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet. **High-resolution mass spectral analysis (HRMS) data** was measured on a Waters Acquity UPLC I-Class plus Xevo G2-XS (Q-TOF) mass spectrum by means of the ESI technique.

2 Typical experimental procedure

A 15-mL oven-dried undivided three-necked bottle was equipped with a aluminum rod cathode and a carbon rod anode which were connected to a DC regulated power supply (Figure S1). 2-aminobenzaldehyde **1a** (0.2 mmol) or 2-aminoacetophenone **2a** (0.2 mmol), tetrahydroisoquinoline **3a** (0.3 mmol), NH_4I (0.5 mmol), $Cu(CH_3COO)_2$ (0.003 mmol) and $^nBu_4NBF_4$ (0.5 mmol) dissolved in 10 mL CH_3OH, 30℃, under O_2 atmosphere were added to the cell and electrolyzed at a constant current of 5 mA. The electrolysis was terminated when the starting materials were consumed as determined by TLC. After electrolysis, the reaction mixture was diluted in 40 mL ethyl acetate, washed with a saturated solution of brine (3 × 15 mL), dried (Na_2SO_4) and concentrated in vacuum, and the resulting residue was purified by silica gel column chromatography (petroleum/ethyl acetate) to afford the products desired product **4a**.

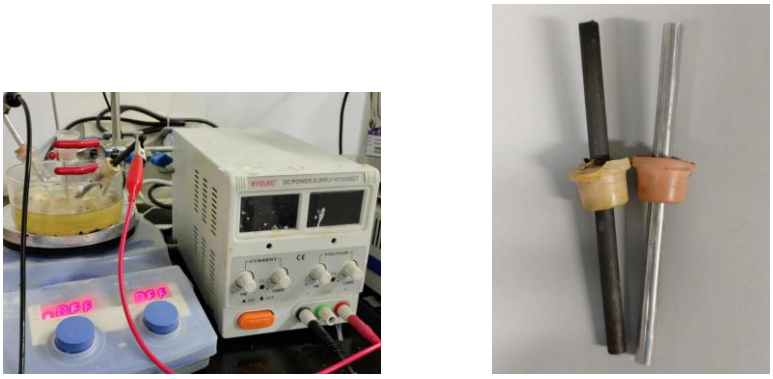


Figure S1 Electrolysis setup

Figure S2 Gram-scale amplification Electrolysis setup

3 Antibacterial Activity Experiments

Table S1 Summary of antibacterial activity of test samples and fluconazole against Candida albicans [a]

Compound	MIC_{50}（ug/mL）		FICI	
	Candida albicans fluconazole sensitive strain (SC5314)	Fluconazole resistant strains of Candida albicans (ATCC 14053)	Candida albicans fluconazole sensitive strain (SC5314)	Fluconazole resistant strains of Candida albicans (ATCC 14053)
FLC	1.53	＞200	--	--
4a	＞200	＞200	--	--
4r	＞200	＞200	--	--
4t	＞200	＞200	--	--
4o	＞200	＞200	--	--
4v	＞200	＞200	--	--
4i	＞200	＞200	--	--
4b	＞200	＞200	--	--
4f	＞200	＞200	--	--
4j	＞200	＞200	--	--
4k	＞200	＞200	--	--
4c	＞200	＞200	--	--
4h	＞200	＞200	--	--
4l	＞200	＞200	--	--
4n	＞200	＞200	--	--
4e	＞200	＞200	--	--
4m	＞200	＞200	--	--
4d	＞200	＞200	--	--
4y	＞200	＞200	--	--
4g	＞200	＞200	--	--
4a+FLC	1.81	12.11	1.19	0.061
4r+FLC	1.31	2.54	0.86	0.013
4t+FLC	1.06	1.41	0.70	0.007
4o+FLC	2.16	11.02	1.42	0.055
4v+FLC	1.56	73.49	1.03	0.367
4i+FLC	1.99	28.28	1.30	0.049
4b+FLC	1.26	38.92	0.83	0.062
4f+FLC	1.40	4.14	0.92	0.021
4j+FLC	1.61	72.53	1.06	0.363
4k+FLC	1.37	21.23	0.90	0.106
4c+FLC	1.03	1.37	0.67	0.007
4h+FLC	1.61	14.48	1.05	0.072
4l+FLC	0.79	1.39	0.52	0.007
4n+FLC	1.40	>200	0.92	--
4e+FLC	1.75	1.81	1.15	0.009
4m+FLC	2.63	3.25	1.73	0.016

4d+FLC	1.56	14.47	1.02	0.072
4y+FLC	1.20	2.82	0.79	0.014
4g+FLC	1.33	12.15	0.87	0.061

[a] Take a 96 well culture plate, dilute the sample and fluconazole to an initial concentration of 200 μg/mL, with 100 μL per well, and perform 5-fold dilution. There are 6 concentration gradients, with 3 replicate wells for each concentration gradient. After activating the strain twice, prepare a fungal suspension. Add 100 μL of fungal suspension to each well of a 96 well plate to achieve a final concentration of 1 × 105 CFU/mL. Incubate in a 37 ℃ constant temperature incubator for 24 hours. Measure the OD value at 625nm using an enzyme-linked immunosorbent assay (ELISA) reader. Simultaneously set up blank control of culture medium, bacterial solution control, and fluconazole positive drug control in the experiment.

4 Cyclic voltammetry experiments

Cyclic voltammetry was performed in a three-electrode cell connected to a schlenk line under nitrogen at room temperature. The working electrode was a steady glassy carbon disk electrode (≈5.0 mm^2), the counter electrode a platinum wire. The reference was an $Ag/AgNO_3$ electrode submerged in 0.1 M nBu_4NClO_4 and 0.01 M $AgNO_3$ in CH3CN. 10 mL of CH_3OH were poured into the electrochemical cell in all experiments. The redox potential of ferrocene/ferrocenium (Fc/Fc+) was measured (same experimental conditions) and used to provide an internal reference. The potential values were then adjusted relative to Fc/Fc+. The scan rate is 0.1 V/s, ranging from -0.2 V to 1.0 V.

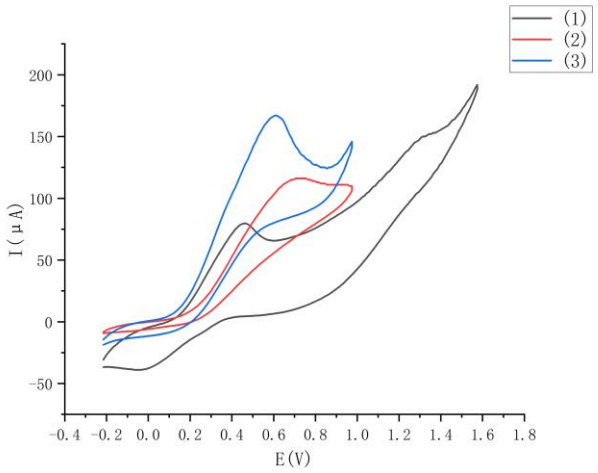
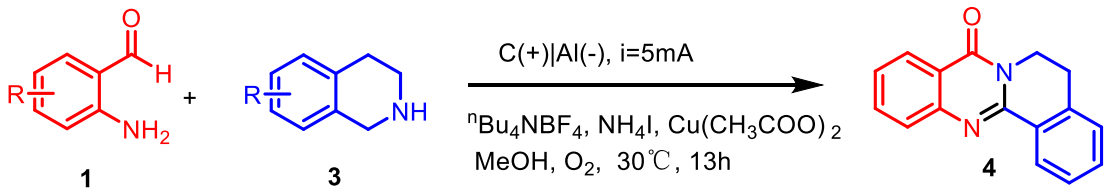


Figure S3 CV plotting convention (IUPAC)

In the Figure S3, cyclic voltammograms of in 10 mL of CH_3OH solution containing different compounds: (1) nBu_4NBF_4 (0.05 mmol), NH_4I (0.05 mmol); (2) nBu_4NBF_4 (0.05 mmol), NH_4I (0.05 mmol), tetrahydroisoquinoline (0.03 mmol); (3)

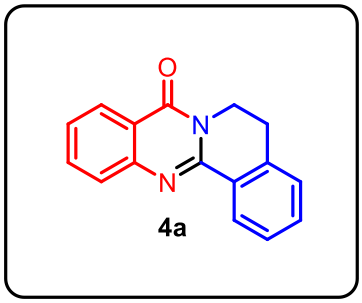
nBu_4NBF_4 (0.05 mmol), NH_4I (0.05 mmol), 2-aminobenzaldehyde (0.02 mmol); with a GC disk working electrode (≈5.0 mm^2), Pt counter electrode, and $Ag/AgNO_3$ reference electrode (internal solution, 0.1 M $^nBu_4NClO_4$ and 0.01 M $AgNO_3$ in CH_3CN) at 0.1 V/s scan rate.

5 Analytical data



1 3 4

General procedure for the preparation of **4a:** A 10-mL oven-dried undivided three-necked bottle was equipped with a aluminum rod cathode and a carbon rod anode, constant current = 5 mA, **1a** (0.2mmol), **3a** (0.3 mmol), $^nBu_4NBF_4$ (0.5 mmol), NH_4I (0.5 mmol), $Cu(CH_3COO)_2$ (0.003 mmol), CH_3OH (10 mL), 30℃, under O_2 atmosphere, undivided cell. Then stirred for 13 h. The resulting brown mixture was concentrated under a vacuum, the crude product was purified by flash column chromatography using petroleum ether/ethyl acetate (30:1) to give the title compounds **4a**.

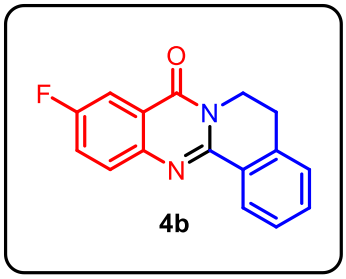


4a

5,6-dihydro-8H-isoquinolino[1,2-b] quinazolin-8-one (4a): According to the general proced ure, **4a** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and tetrahydroiso quinoline **3** (40.0 mg, 0.3 mmol) in 94% yield (46.6 mg) and as a yellow solid (silica ge l flash chromatography: petroleum ether/ethyl acetate = 15:1).

^{1}H NMR (400 MHz, DMSO-d_6) δ 8.37 (d, J = 6.4 Hz, 1H), 8.18 – 8.15 (m, 1H), 7.85 – 7.81 (m, 1H), 7.74 (d, J = 6.8 Hz, 1H), 7.57 – 7.50 (m, 2H), 7.47 (t, J = 3.6 Hz, 1 H), 7.41 (d, J = 7.6 Hz, 1H), 4.31 – 4.28 (t, 2H), 3.13 – 3.10 (t, 2H).

^{13}C NMR (100 MHz, DMSO-d_6) δ 160.6, 149.3, 147.3, 137.7, 134.4, 131.8, 129.1, 127.8, 127.4, 127.3, 127.2, 126.5, 126.3, 120.4, 39.2, 26.4.



4b

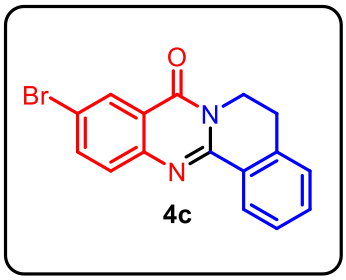
10-fluoro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4b): According to the genera lprocedure, **4b** was obtained using 2-Amino-5-fluorobenzaldehyde (27.8 mg, 0.2 mmol) and

tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 69% yield (36.7 mg) and as a yellow s olid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, DMSO-d_6) δ 8.33 (d, *J* = 7.6 Hz, 1H), 7.83 – 7.79 (m, 2H), 7.74 – 7.69 (m, 1H), 7.54 (t, *J* = 7.6 Hz, 1H), 7.45 (t, *J* = 8.0 Hz, 1H), 7.40 (d, *J* = 7.6 Hz, 1H), 4.30 – 4.27 (t, 2H), 3.13 – 3.09 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.8, 160.5 (d, *J* = 244.0 Hz), 148.6, 144.3, 136.8, 131. 6, 129.9, 129.1, 127.7, 127.4, 122.7 (d, *J* = 24.0 Hz), 121.7, 111.4 (d, *J* = 23.0 Hz), 39. 6, 27.2.

19F NMR (376 MHz, CDCl3) δ -113.2.

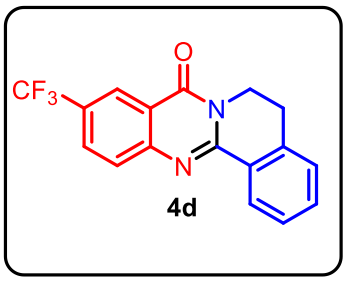


4c

10-bromo-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4c): According to the genera l procedure, **4c** was obtained using 2-Amino-5-bromobenzaldehyde (40.0 mg, 0.2 mmol) an d tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 81% yield (52.8 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 25:1).

^{1}H NMR (400 MHz, DMSO-d_6) δ 8.35 (d, *J* = 7.6 Hz, 1H), 8.23 (d, *J* = 2.4 Hz, 1H), 7.98 – 7.96 (m, 1H), 7.69 (d, *J* = 8.4 Hz, 1H), 7.58 – 7.54 (m, 1H), 7.48 – 7.40 (m, 2 H), 4.29 – 4.27 (t, 2H), 3.13 – 3.10 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.7, 149.8, 146.7, 137.5, 137.1, 132.1, 129.5, 129.5, 12 9.3, 128.1, 127.8, 127.7, 122.1, 120.0, 39.9, 27.4.



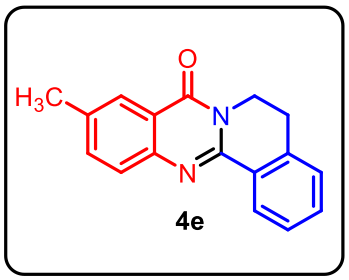
4d

10-trifluoromethyl-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4d): According to t he general procedure, **4d** was obtained using 2-Amino-5-trifluoromethyllbenzaldehyde (37.8 mg, 0.2 mmol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 70% yield (44.3 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 25: 1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.46 (d, *J* = 6.4 Hz, 1H), 7.70 – 7.64 (m, 1H), 7.56 (d, *J* = 8.4 Hz, 1H), 7.52 – 7.48 (m, 1H), 7.44 (t, *J* = 7.6 Hz, 1H), 7.30 (d, *J* = 7.6 Hz, 1 H), 7.12 – 7.07 (m, 1H), 4.40 – 4.37 (t, 2H), 3.12 – 3.09 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.5 (d, *J* = 264.0 Hz), 159.0 (d, *J* = 4.0 Hz), 150.4 (d, *J* = 1.0 Hz), 150.0, 137.4, 134.6 (d, *J* = 10.0 Hz), 132.2, 129.2, 128.3, 127.8, 127.7, 123.7 (d, *J* = 4.0 Hz), 113.1 (d, *J* = 21.0 Hz), 110.6 (d, *J* =7.0 Hz), 39.4, 27.5 .

19F NMR (376 MHz, $CDCl_3$) δ -111.8.

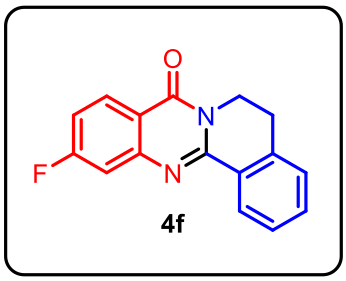


4e

10-methyl-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4e): According to the genera l procedure, **4e** was obtained using 2-Amino-5-methylbenzaldehyde (27.0 mg, 0.2 mmol) a nd tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 85% yield (44.6 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.55 – 8.52 (m, 1H), 8.16 (d, *J* = 8.0 Hz, 1H), 7.60 (d, *J* = 7.2 Hz, 1H), 7.49 – 7.41 (m, 2H), 7.34 (t, *J* = 7.6 Hz, 1H), 7.28 (d, *J* = 5.6 Hz, 1 H), 4.43 – 4.40 (t, 2H), 3.12 – 3.08 (t, 2H), 2.71 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 162.2, 148.1, 146.4, 137.1, 136.3, 134.9, 131.7, 130.1, 12 8.2, 127.7, 127.6, 126.3, 124.7, 120.8, 39.7, 27.6, 17.4.



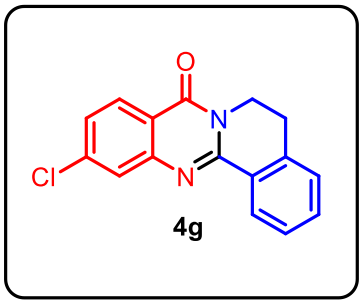
4f

11-fluoro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4f): According to the general procedure, **4f** was obtained using 2-Amino-4-fluorobenzaldehyde (27.8 mg, 0.2 mmol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 71% yield (37.8 mg) and as a yellow sol id (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.46 (d, *J* = 8.0 Hz, 1H), 8.32 – 8.29 (m, 1H), 7.51 – 7. 43 (m, 2H), 7.41 – 7.38 (m, 1H), 7.29 (d, *J* = 7.6 Hz, 1H), 7.19 – 7.14 (m, 1H), 4.41 – 4.38 (t, 2H), 3.12 – 3.08 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.6 (d, *J* = 252.0 Hz), 161.2 , 150.7, 150.1 (d, *J* = 13.0 Hz), 137.3, 132. 2, 129.7 (d, *J* = 11.0 Hz), 129.4, 128.3, 127.8 , 127.7, 117.6 (d, *J* = 2.0 Hz), 115.4 (d, *J* =23.0 Hz), 112.8 (d, *J* = 22.0 Hz), 39.7, 27.5 .

19F NMR (376 MHz, $CDCl_3$) δ -103.9.



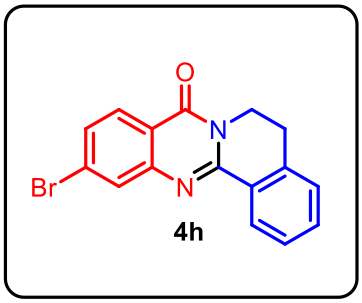
4g

11-chloro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4g): According to the genera

l procedure, **4g** was obtained using 2-Amino-4-chlorobenzaldehyde (31.1 mg, 0.2 mmol) an d tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 95% yield (53.6 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.46 – 8.43 (m, 1H), 8.22 (d, *J* = 8.4 Hz, 1H), 7.75 (d, *J* = 2.0 Hz, 1H), 7.51 – 7.43 (m, 2H), 7.40 – 7.38 (m, 1H), 7.29 (d, *J* = 7.6 Hz, 1H), 4.40 – 4.37 (t, 2H), 3.12 – 3.08 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.3, 150.7, 148.9, 140.5, 137.2, 132.2, 129.3, 128.5, 12 8.3, 127.8, 127.7, 127.2, 127.2, 119.3, 39.7, 27.5.

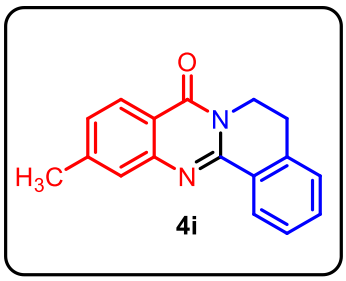


4h

11-bromo-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4h): According to the genera l procedure, **4h** was obtained using 2-Amino-4-bromobenzaldehyde (40.0 mg, 0.2 mmol) a nd tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 90% yield (58.7 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 25:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 – 8.34 (m, 1H), 8.05 (d, *J* = 8.8 Hz, 1H), 7.84 (d, *J* = 2.0 Hz, 1H), 7.46 – 7.32 (m, 3H), 7.20 (d, *J* = 8.0 Hz, 1H), 4.31 – 4.28 (t, 2H), 3. 03 – 3.00 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.4, 150.6, 148.9, 137.2, 132.2, 130.3, 129.9, 129.3, 12 9.0, 128.4, 128.3, 127.8, 127.7, 119.6, 39.7, 27.4.

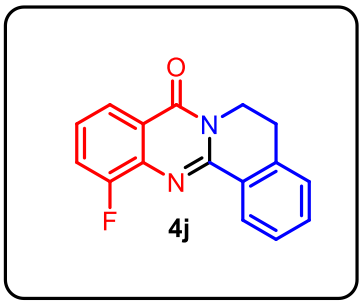


4i

11-methyl-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4i): According to the genera lprocedure, **4i** was obtained using 2-Amino-4-methylbenzaldehyde (27.0 mg, 0.2 mmol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 87% yield (45.6 mg) and as a yellow s olid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.48 – 8.46 (m, 1H), 8.19 (d, *J* = 8.0 Hz, 1H), 7.57 (s, 1H), 7.49 – 7.40 (m, 2H), 7.28 (d, *J* = 6.8 Hz, 2H), 4.41 – 4.38 (t, 2H), 3.11 – 3.07 (t, 2H), 2.51 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.8, 149.6, 148.0, 145.3, 137.2, 131.8, 129.8, 128.3, 12 8.1, 127.7, 127.6, 127.4, 126.8, 118.5, 39.6, 27.6, 22.0.



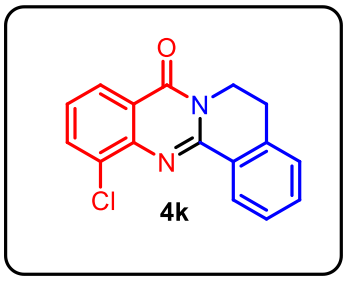
4j

12-fluoro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4j): According to the general procedure, **4j** was obtained using 2-Amino-3-fluorobenzaldehyde (27.8 mg, 0.2 mmol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 67% yield (35.7 mg) and as a yellow sol id (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.56 – 8.53 (m, 1H), 8.10 – 8.08 (m, 1H), 7.51 – 7.44 (m, 3H), 7.41 – 7.36 (m, 1H), 7.29 (d, *J* = 7.2 Hz, 1H), 4.44 – 4.41 (t, 2H), 3.13 – 3.1 0 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.0 (d, *J* = 3.0 Hz), 157.4 (d, *J* = 255.0 Hz), 150.0, 137.6 (d, *J* = 12.0 Hz), 137.1, 132. 2, 129.5, 128.6, 127.9, 127.6, 126.5 (d, *J* = 8.0 Hz), 122.8 (d, *J* = 1.0 Hz),12 2.5 (d, *J* = 4.0 Hz), 119.7 (d, *J* =19.0 Hz), 39.9, 27.5 .

19F NMR (376 MHz, $CDCl_3$) δ -125.6.

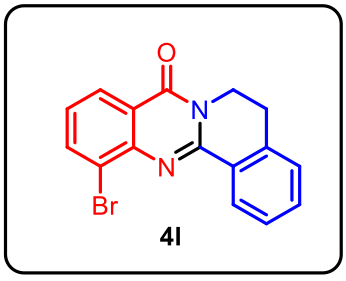


4k

12-chloro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4k): According to the genera l procedure, **4k** was obtained using 2-Amino-3-chlorobenzaldehyde (31.1 mg, 0.2 mmol) an d tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 81% yield (45.7 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.44 (d, *J* = 4.0 Hz, 1H), 8.25 (d, *J* = 2.4 Hz, 1H), 7.70 – 7.64 (m, 2H), 7.50 – 7.40 (m, 2H), 7.28 (d, *J* = 7.2 Hz, 1H), 4.41 – 4.38 (t, 2H), 3. 11 – 3.08 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.9, 149.7, 146.5, 137.1, 134.8, 132.3, 132.1, 129.4, 12 8.2, 127.8, 127.7, 126.3, 121.8, 39.9, 27.5.



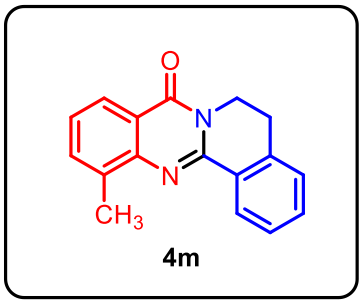
4l

12-bromo-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4l): According to the general procedure, **4l** was obtained using 2-Amino-3-bromobenzaldehyde (40.0 mg, 0.2 mmol) and

tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 77% yield (50.2 mg) and as a yellow s olid (silica gel flash chromatography: petroleum ether/ethyl acetate = 25:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.34 – 8.32 (m, 1H), 8.30 (d, *J* = 2.4 Hz, 1H), 7.71 – 7. 68 (m, 1H), 7.50 (d, *J* = 8.8 Hz, 1H), 7.40 – 7.36 (m, 1H), 7.34 – 7.30 (m, 1H), 7.17 (d, *J* = 7.2 Hz, 1H), 4.30 – 4.27 (t, 2H), 3.01 – 2.98 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.6, 149.8, 146.7, 137.4, 137.1, 132.0, 129.5, 129.5, 12 9.3, 128.1, 127.8, 127.6, 122.1, 120.0, 39.8, 27.4.

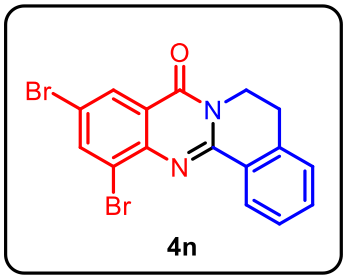


4m

12-methyl-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4m): According to the gener al procedure, **4m** was obtained using 2-Amino-3-methylbenzaldehyde (27.0 mg, 0.2 mmol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 91% yield (47.7 mg) and as a yello w solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.41 – 8.39 (m, 1H), 8.03 (d, *J* = 8.0 Hz, 1H), 7.46 (d, *J* = 6.8 Hz, 1H), 7.35 – 7.28 (m, 2H), 7.21 (t, *J* = 7.6 Hz, 1H), 7.14 (t, *J* = 5.6 Hz, 1 H), 4.29 – 4.26 (t, 2H), 2.98 – 2.95 (t, 2H), 2.59 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 162.1, 148.0, 146.3, 137.0, 136.1, 134.7, 131.6, 130.0, 12 8.1, 127.6, 127.5, 126.1, 124.6, 120.7, 39.6, 27.5, 17.4.

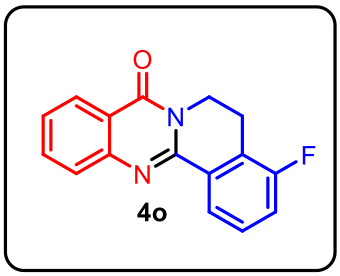


4n

10,12-dibromo-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4n): According to the g eneral procedure, **4n** was obtained using 2-Amino-3,5-Dibromobenzaldehyde (55.8 mg, 0.2 mmol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 63% yield (50.9 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.60 – 8.57 (m, 1H), 8.39 (d, *J* = 2.0 Hz, 1H), 8.13 (d, *J* = 2.0 Hz, 1H), 7.54 – 7.49 (m, 1H), 7.49 – 7.44 (m, 1H), 7.29 (d, *J* = 8.0 Hz, 1H), 4.42 – 4.38 (t, 2H), 3.13 – 3.10 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.3, 150.5, 144.7, 140.4, 137.1, 132.6, 129.6, 129.2, 12 8.8, 128.1, 127.7, 124.1, 123.0, 119.6, 40.1, 27.3.

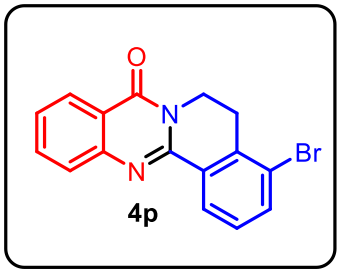


4-fluoro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4o): According to the generalp rocedure, **4o** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and 5-Fluor o-1,2,3,4-tetrahydroisoquinoline hydrochloride (56.3 mg, 0.3 mmol) in 53% yield (28.2 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30: 1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.53 – 8.49 (m, 1H), 8.31 (d, *J* = 8.0 Hz, 1H), 8.76 – 8. 74 (m, 2H), 7.48 – 7.44 (m, 1H), 7.15 – 7.10 (m, 1H), 7.01 – 6.98 (m, 1H), 4.44 – 4.4 1 (t, 2H), 3.12 – 3.08 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 164.9 (d, *J* = 252.0 Hz), 161.8 , 148.8, 147.9, 139.8 (d, *J* = 9.0 Hz), 134.5, 130.9 (d, *J* = 10.0 Hz), 127.7, 127.1, 126.7, 126.0 (dd, *J* = 8.0, 5.0 Hz), 120.8, 115.3 (d, *J* = 21.0 Hz), 114.4 (d, *J* =22.0 Hz), 39.6, 27.7.

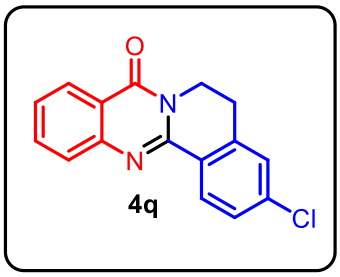
19F NMR (376 MHz, $CDCl_3$) δ -107.6.



4-bromo-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4p): According to the general procedure, **4p** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and 5-bro mo-1,2,3,4-tetrahydroisoquinoline hydrochloride (74.6 mg, 0.3 mmol) in 51% yield (33.3 m g) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.51 (d, *J* = 8.0 Hz, 1H), 8.32 (d, *J* = 8.0 Hz, 1H), 7.80 – 7.72 (m, 3H), 7.51 – 7.47 (m, 1H), 7.32 (t, *J* = 8.0 Hz, 1H), 4.44 – 4.40 (t, 2H), 3. 24 – 3.21 (t, 2H).

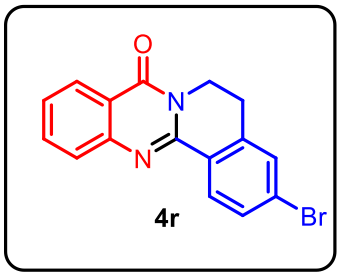
^{13}C NMR (100 MHz, $CDCl_3$) δ 161.7, 147.8, 136.9 , 136.6, 134.5, 131.9, 128.2, 127.9, 127.5, 127.1, 127.1 , 123.5, 120.9 , 39.2, 27.6.



3-chloro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4q): According to the general procedure, **4q** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and 6-Chlo ro-1,2,3,4-tetrahydroisoquinoline hydrochloride (61.2 mg, 0.3 mmol) in 50% yield (28.2 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 25: 1).

^{1}H NMR (400 MHz, DMSO-d_6) δ 8.35 (d, J = 8.4 Hz, 1H), 8.18 – 8.15 (m, 1H), 7.86 – 7.82 (m, 1H), 7.74 (d, J = 8.4 Hz, 1H), 7.55 – 7.51(m, 3H), 4.31 – 4.28 (t, 2H), 3.14 – 3.11 (t, 2H).

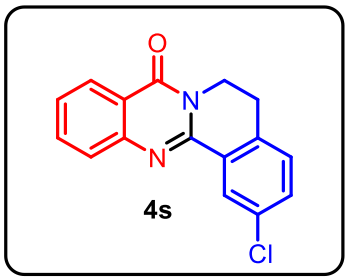
^{13}C NMR (100 MHz, $CDCl_3$) δ 161.7, 148.7, 147.7 , 138.7, 138.0, 134.5, 129.7, 128.2, 128.1, 127.7 , 127.7, 127.1, 126.9, 120.8, 39.5, 27.4.



3-bromo-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4r): According to the general procedure, **4r** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and 6-bro mo-1,2,3,4-tetrahydroisoquinoline hydrochloride (74.6 mg, 0.3 mmol) in 51% yield (33.3 m g) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (d, J = 8.4 Hz, 1H), 8.30 (d, J = 8.0 Hz, 1H), 7.76 – 7.75 (m, 2H), 7.58 – 7.55 (m, 1H), 7.49 – 7.45 (m, 2H), 4.42 – 4.39 (t, 2H), 3.10 – 3.07 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.7, 148.8, 147.8 , 138.9, 134.5, 131.1, 130.7, 129.9, 128.7, 127.8 , 127.1, 126.9, 126.6 , 120.9, 39.6, 27.4.

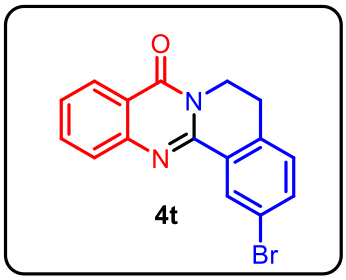


2-chloro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4s): According to the generalp rocedure, **4s** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and 7-Chlor o-1,2,3,4-tetrahydroisoquinoline hydrochloride (61.2 mg, 0.3 mmol) in 52% yield (29.3 mg)

and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 25: 1).

^{1}H NMR (400 MHz, DMSO-d_6) δ 8.31 (d, *J* = 2.4 Hz, 1H), 8.18 – 8.15 (m, 1H), 7.87 – 7.83 (m, 1H), 7.78 (d, *J* = 8.0 Hz, 1H), 7.62 – 7.59 (m, 1H), 7.56 – 7.52 (m, 1H), 7. 46 (d, *J* = 8.0 Hz, 1H), 4.30 – 4.27 (t, 2H), 3.13 – 3.10 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.7, 148.3, 147.6 , 135.4, 134.5, 133.8, 131.8, 131.2, 129.1, 128.0 , 127.8, 127.1, 127.0, 121.0, 39.6, 27.1.

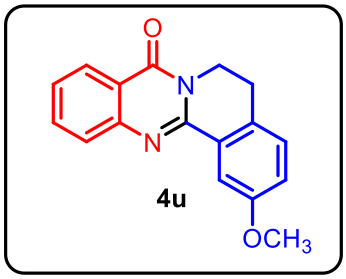


4t

2-bromo-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4t): According to the general procedure, **4t** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and 7-brom o-1,2,3,4-tetrahydroisoquinoline hydrochloride (74.6 mg, 0.3 mmol) in 86% yield (56.1 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30: 1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.63 (d, *J* = 2.0 Hz, 1H), 8.31 (d, *J* = 8.0 Hz, 1H), 7.78 – 7.77 (d, 2H), 7.60 – 7.57 (m, 1H), 7.50 – 7.46 (m, 1H), 7.18 (d, *J* = 8.0 Hz, 1H), 4. 42 – 4.39 (t, 2H), 3.08 – 3.05 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.7, 148.1, 147.7 , 135.9, 134.7, 134.6, 131.5, 130.9, 129.3, 127.9 , 127.1, 127.1, 121.6 , 121.0, 39.6, 27.2.

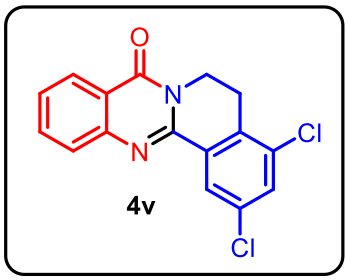


4u

2-methoxy-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4u): According to the gener alprocedure, **4u** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and 7-me thoxy-1,2,3,4-tetrahydroisoquinoline hydrochloride (48.9 mg, 0.3 mmol) in 57% yield (31.7 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 15:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.32 (d, *J* = 7.6 Hz, 1H), 8.01 (d, *J* = 2.8 Hz, 1H), 7.80 – 7.74 (m, 2H), 7.47 (t, *J* = 1.6 Hz, 1H), 7.20 (d, *J* = 8.4 Hz, 1H), 7.06 – 7.04 (m, 1 H), 4.42 – 4.38 (t, 2H), 3.94 (s, 3H), 3.06 – 3.02 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.9, 159.2, 149.5 , 147.8, 134.4, 130.6, 129.6, 128.8, 127.7, 127.0 , 126.7, 120.9, 119.4 , 111.4, 55.8, 30.0, 26.8.

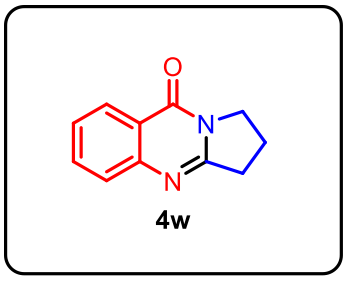


4v

2,4-dichloro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4v): According to the gen eralprocedure, **4v** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and 5,7 -Chloro-1,2,3,4-tetrahydroisoquinoline hydrochloride (60.3 mg, 0.3 mmol) in 43% yield (31. 0 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.46 (d, *J* = 2.0 Hz, 1H), 8.33 – 8.31 (m, 1H), 7.79 – 7. 78 (m, 2H), 7.78 (d, *J* = 8.0 Hz, 1H), 7.53 – 7.49 (m, 1H), 4.41 – 4.40 (t, 2H), 3.20 – 3.17 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.4, 146.3, 133.5 , 132.8, 132.7, 132.4, 131.5, 130.7, 126.8, 126.3, 125.9, 125.6, 119.8, 37.8, 23.2.

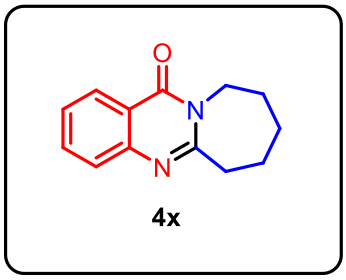


4w

2,3-dihydropyrrolo[2,1-b]quinazolin-9(1H)-one(4w): According to the generalprocedure, **4w** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and Pyrrolidine (21.3 mg, 0.3 mmol) in 26% yield (9.7 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.67 – 7.65 (m, 1H), 7.54 – 7.47 (m, 2H), 7.32 – 7.28 (m, 1H), 1.33 – 1.25 (t, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 144.6, 134.9, 134.3 , 129.2, 124.5, 120.5, 31.6, 30.3, 29.9.

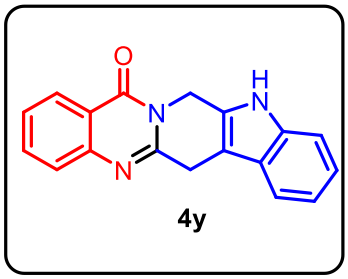


4x

7,8,9,10-tetrahydroazepino[2,1-b]quinazolin-12(6H)-one(4x): According to the general-procedure, **4x** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and Hexamethy-leneimine (29.8 mg, 0.3 mmol) in 35% yield (15.0 mg) and as a yellow oil (silica gel flash chromatography: petroleum ether/ethyl acetate = 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.27 – 8.24 (m, 1H), 7.73 – 7.69 (m, 1H), 7.61 (d, *J* = 8.0 Hz, 1H), 7.46 – 7.42 (m, 1H), 4.41– 4.38 (t, 2H), 3.09 – 3.06 (t, 2H), 1.89 – 1.81 (m, 6H),.

^{13}C NMR (100 MHz, $CDCl_3$) δ 162.1, 160.0, 134.4 , 127.2, 126.8, 126.6, 120.3, 43.1, 37.8, 29.7, 28.2, 25.6.

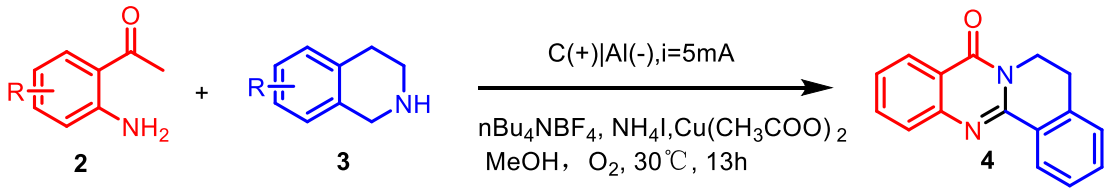


4y

6,14-dihydroindolo [3',2':4,5] pyrido[2,1-b] quinazolin-8(5H)-one(4y): According to the generalprocedure, **4y** was obtained using 2-aminobenzaldehyde **1** (24.2 mg, 0.2 mmol) and 1,2,3,4-Tetrahydro-9H-Pyrido [3,4-B] Indole (51.7 mg, 0.3 mmol) in 22% yield (12.6 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 10:1).

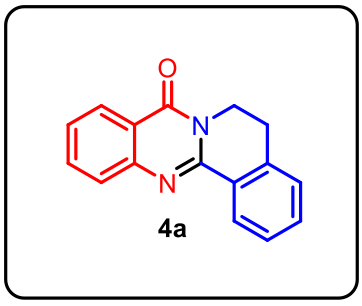
^{1}H NMR (400 MHz, $CDCl_3$) δ 9.59 (s, 1H), 8.34 – 8.31 (m, 1H), 7.72 – 7.68 (m, 1H), 7.65 – 7.62 (t, 2H), 7.44 – 7.40 (m, 1H), 7.36 (d, *J* = 8.0 Hz, 1H), 7.31 (t, *J* = 8.0 Hz, 1H), 7.17 (t, *J* = 7.6 Hz, 1H), 4.61– 4.57 (t, 2H), 3.25 – 3.22 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.7, 147.5, 145.3, 138.5 , 134.5, 127.4, 127.2, 126.6, 126.4, 125.7, 125.7, 121.3, 120.7, 120.2, 118.6, 112.3, 41.3, 19.8.



2 **3** **4**

General procedure for the preparation of **4a:** A 10-mL oven-dried undivided three-necked bottle was equipped with a aluminum rod cathode and a carbon rod anode, constant current = 5 mA, **2a** (0.2mmol), **3a** (0.3 mmol), ^{n}Bu_4NBF_4 (0.5 mmol), NH_4I (0.5 mmol), $Cu(CH_3COO)_2$ (0.003 mmol), CH_3OH (10 mL), 30℃, under O_2 atmosphere, undivided cell. Then stirred for 15 h. The resulting brown mixture was concentrated under a vacuum, the crude product was purified by flash column chromatography using petroleum ether/ethyl acetate (30:1) to give the title compounds **4a**.

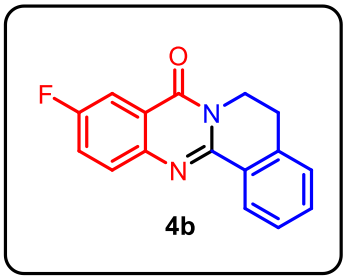


4a

5,6-dihydro-8H-isoquinolino[1,2-b] quinazolin-8-one (4a): According to the general proced ure, **4a** was obtained using 2-Aminoacetophenone **2** (27.0 mg, 0.2 mmol) and tetrahydrois oquinoline **3** (40.0 mg, 0.3 mmol) in 60% yield (29.8 mg) and as a yellow solid (silica g el flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.38 (d, *J* = 7.6 Hz, 1H), 8.21 (d, *J* = 7.6 Hz, 1H), 7.67 – 7.64 (m, 2H), 7.38 – 7.33 (m, 3H), 7.19 – 7.17 (m, 1H), 4.33 – 4.29 (t, 2H), 3.01 – 2.98 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.6, 149.3, 146.7, 136.0, 133.2, 130.7, 128.5, 126.9, 126.6, 126.5, 126.5, 125.8, 125.5, 119.7, 39.2, 26.4.



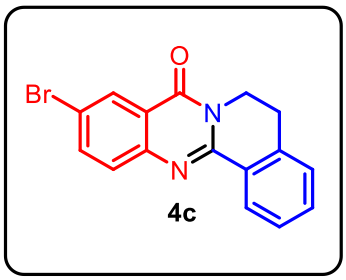
4b

10-fluoro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4b): According to the general procedure, **4b** was obtained using 1-(2-Amino-5-fluorophenyl)ethanone (30.6 mg, 0.2 mmol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 49% yield (26.1 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.35 (d, *J* = 7.6 Hz, 1H), 7.83 (d, *J* = 8.4 Hz, 1H), 7.66 (s, 1H), 7.39 – 7.34 (m, 3H), 7.19 (d, *J* = 6.8 Hz, 1H), 4.33 – 4.29 (t, 2H), 3.03 – 2.99 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.1 (d, *J* = 4.0 Hz), 160.8 (d, *J* = 247.0 Hz), 148.9, 144.6, 137.0, 131.9, 130.1 (d, *J* = 8.0 Hz), 129.4, 128.0, 127.8, 127.6, 123.0 (d, *J* = 24.0 Hz), 122.0 (d, *J* = 8.0 Hz), 111.7 (d, *J* = 23.0 Hz), 39.9, 27.5.

19F NMR (376 MHz, $CDCl_3$) δ -113.0.

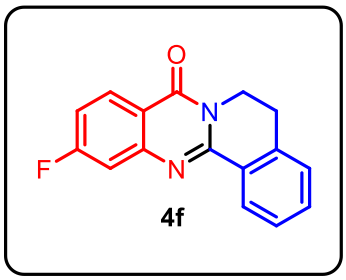


4c

10-bromo-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4c): According to the general procedure, **4c** was obtained using 1-(2-Amino-5-bromophenyl)ethanone (42.8 mg, 0.2 mmol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 70.6% yield (46.0 mg) and as a yellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 25:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.47 – 8.44 (m, 2H), 7.84 – 7.81 (m, 1H), 7.64 (d, *J* = 8.8 Hz, 1H), 7.50 (d, *J* = 7.2 Hz, 1H), 7.44 (d, *J* = 7.6 Hz, 1H), 7.30 (d, *J* = 7.2 Hz, 1H), 4.43 – 4.39 (t, 2H), 3.13 – 3.09 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 160.8, 149.9, 146.8, 137.6, 137.2, 132.2, 129.6, 129.4, 128.2, 127.9, 127.7, 122.2, 120.1, 39.9, 27.5.



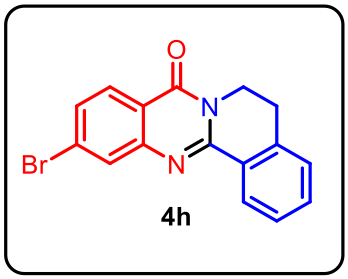
4f

11-fluoro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4f): According to the general procedure, **4f** was obtained using 1-(2-Amino-4-fluorophenyl)ethanone (30.6 mg, 0.2 mmol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 40% yield (21.3 mg) and as a yello w solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.47– 8.44 (m, 1H), 8.32– 8.29 (m, 1H), 7.51 – 7.43 (m, 2H), 7.41 – 7.38 (m, 1H), 7.29 (d, *J* = 7.6 Hz, 1H), 7.19 – 7.14 (m, 1H), 4.41 – 4.38 (t, 2H), 3.12 – 3.08 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 166.6 (d, *J* = 252.0 Hz), 161.2 , 150.7, 150.1 (d, *J* = 14.0 Hz), 137. 3, 132. 2, 129.7 (d, *J* = 11.0 Hz), 129.4, 128.3, 127.8, 127.7, 117.6 (d, *J* = 2.0 Hz), 115.4 (d, *J* = 23.0 Hz), 112.8 (d, *J* = 21.0 Hz), 39.7, 27.5.

19F NMR (376 MHz, $CDCl_3$) δ -103.9.

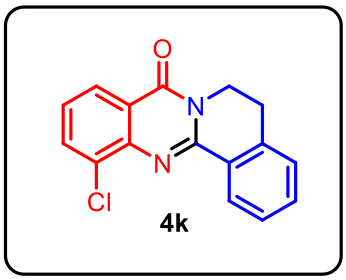


4h

11-bromo-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4h): According to the genera l procedure, **4h** was obtained using 1-(2-Amino-4-bromophenyl)ethanone (42.8 mg, 0.2 mm ol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 78% yield (50.9 mg) and as a y ellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 25:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.46 – 8.44 (m, 1H), 8.15 (d, *J* = 8.8 Hz, 1H), 7.95 (d, *J* = 2.0 Hz, 1H), 7.56 – 7.54 (m, 1H), 7.52 – 7.48 (m, 1H), 7.46 – 7.42 (m, 1H), 7.29 (d, *J* = 7.2 Hz, 1H), 4.41 – 4.38 (t, 2H), 3.12 – 3.09 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 161.4, 150.6, 149.0, 137.3, 132.2, 130.4, 130.0, 129.4, 12 9.0, 128.5, 128.3, 127.9, 127.7, 119.7, 39.8, 27.5.



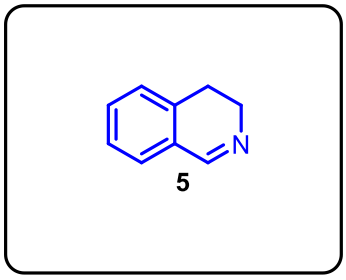
4k

12-chloro-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(4k): According to the genera l procedure, **4k** was obtained using 1-(2-Amino-3-chlorophenyl)ethanone (33.9 mg, 0.2 mm ol) and tetrahydroisoquinoline **3** (40.0 mg, 0.3 mmol) in 59% yield (33.9 mg) and as a y

ellow solid (silica gel flash chromatography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.45 (d, *J* = 7.6 Hz, 1H), 8.26 (d, *J* = 2.4 Hz, 1H), 7.71 – 7.65 (m, 2H), 7.51 – 7.41 (m, 2H), 7.29 (d, *J* = 11.2 Hz, 1H), 4.42 – 4.39 (t, 2H),3. 12 – 3.09 (t, 2H).

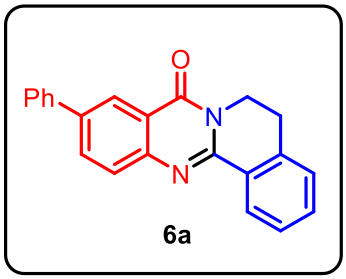
^{13}C NMR (100 MHz, $CDCl_3$) δ 161.4, 150.1, 144.6, 137.1, 134.6, 132.3, 132.2, 129.5, 12 8.7, 128.0, 127.6, 126.6, 125.9, 122.4, 39.9, 27.4.



5

3,4-dihydroisoquinoline(5): 48% yield (12.6 mg) and as a yellow solid (silica gel flash chroma- tography: petroleum ether/ethyl acetate = 30:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.25 (s, 1H), 7.30 – 7.26 (m, 1H), 7.24 – 7.18 (m, 2H),7. 08 (d, *J* = 7.6 Hz, 1H), 4.71 – 4.67 (m, 2H), 2.69 – 2.65 (t, 2H).

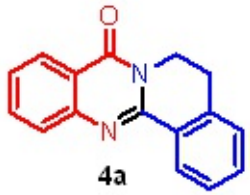


6a

10-phenyl-5,6-dihydro-8H-isoquinolino[1,2-b]quinazolin-8-one(6a): 80% yield (13.0 mg) a nd as a yellow solid (silica gel flash chroma- tography: petroleum ether/ethyl acetate = 30: 1).

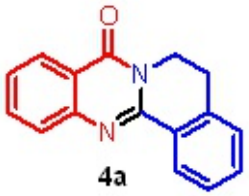
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.57 (s, 1H), 8.51 (d, *J* = 7.6 Hz, 1H), 8.02 (d, *J* = 8.8 Hz, 1H), 7.85 (d, *J* = 7.2 Hz, 1H), 7.74 – 7.72 (d, 2H), 7.51 – 7.45 (m, 4H), 7.44 – 7. 37 (m, 1H), 7.31 (d, *J* = 7.2 Hz, 1H), 4.47 – 4.44 (t, 2H), 3.15 – 3.11 (t, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 162.0, 149.5, 147.2, 139.9, 139.5, 137.2, 133.3, 131.9, 12 9.8, 129.1, 128.3, 128.2, 127.9, 127.8, 127.7, 127.3, 124.9, 121.1, 39.9, 27.6.



4a

^{1}H NMR (400 MHz, DMSO-d_6)



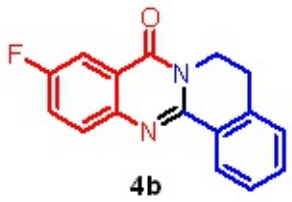
4a

^{13}C NMR (100 MHz, DMSO-d_6)

160.61
149.30
147.29
137.74
134.39
131.77
129.07
127.79
127.38
127.30
127.20
126.53
126.30
120.38

40.15
39.94
39.73
39.52
39.31
39.24
39.10
38.89
26.40

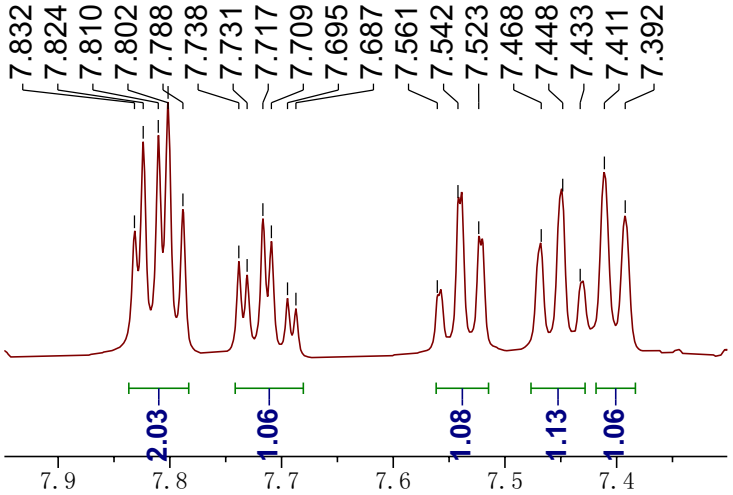
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10



4b

^{1}H NMR (400 MHz, DMSO-d_6)

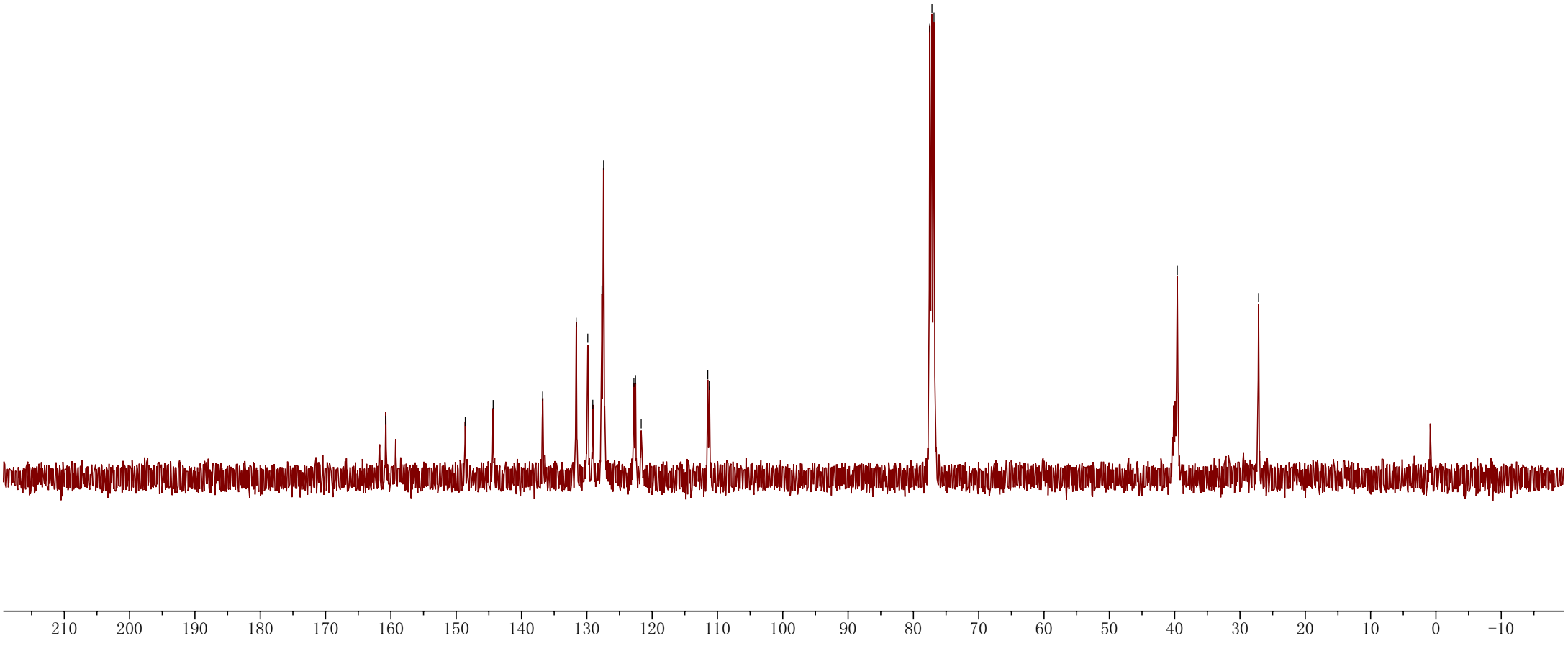
8.343 8.324 7.832 7.824 7.810 7.802 7.788 7.738 7.731 7.717 7.709 7.695 7.687 7.561 7.542 7.523 7.468 7.448 7.433 7.411 7.392 4.303 4.288 4.271 3.125 3.109 3.093 2.509 2.505 2.500 2.495 2.491

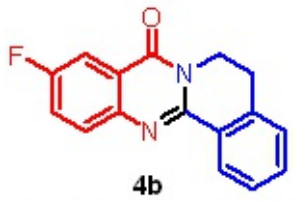


4b

^{13}C NMR (100 MHz, $CDCl_3$)

160.80
148.61
144.34
136.76
131.63
129.85
129.09
127.68
127.43
122.79
122.55
121.68
111.48
111.25
77.48
77.16
76.84
39.60
27.15



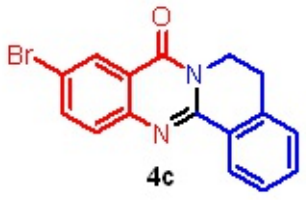


4b

^{19}F NMR (376 MHz, $CDCl_3$)

-113.21

10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210



4c

^{1}H NMR (400 MHz, DMSO-d_6)

8.230 7.984 7.978 7.963 7.957 7.701 7.680 7.580 7.576 7.561 7.558 7.543 7.539 7.482 7.479 7.463 7.460 7.444 7.441 7.424 7.421 7.405 7.402

4.291 4.288 4.273

3.132 3.116 3.099

2.509 2.505 2.500 2.495 2.491

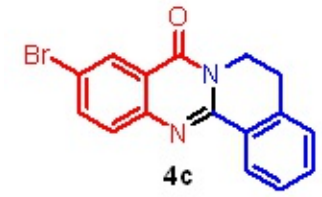
8.364 8.345 8.236 8.230 7.984 7.978 7.963 7.957 7.701 7.680 7.561 7.558 7.543 7.539 7.463 7.460 7.424 7.421 7.405 7.402

1.00 0.91 1.00 0.99 1.09 2.09

8.5 8.4 8.3 8.2 8.1 8.0 7.9 7.8 7.7 7.6 7.5 7.4 7.3

1.00 0.91 1.00 0.99 1.09 2.09 2.01 2.05

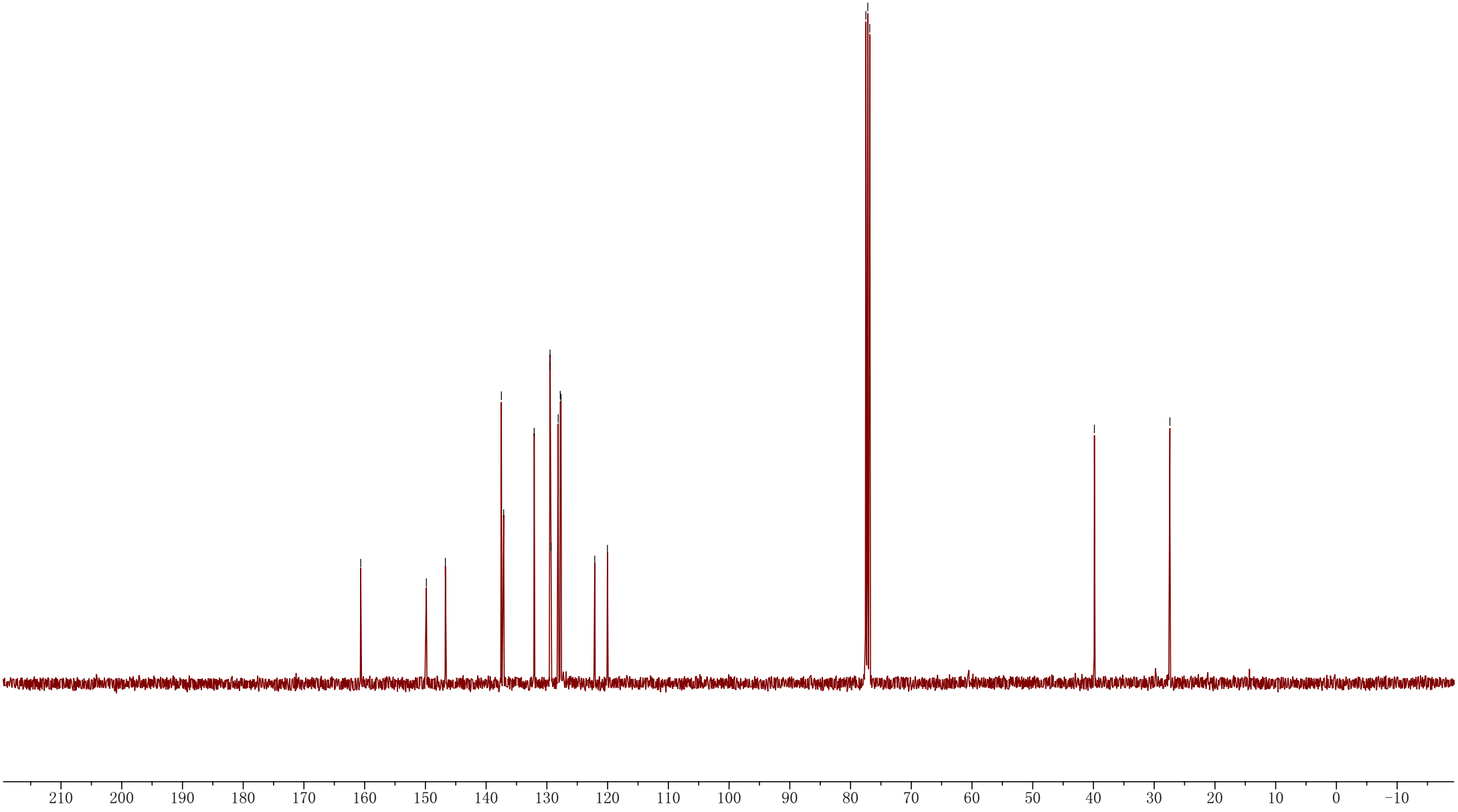
.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0

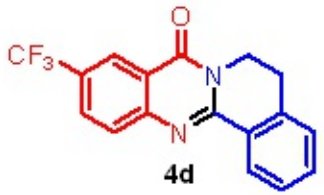


4c

^{13}C NMR (100 MHz, $CDCl_3$)

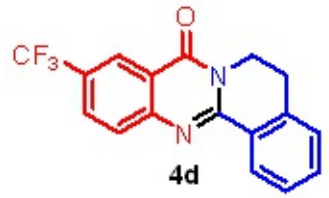
160.66
149.84
146.71
137.49
137.12
132.08
129.50
129.47
129.32
128.13
127.80
127.67
122.12
120.03
77.48
77.16
76.84
39.85
27.42





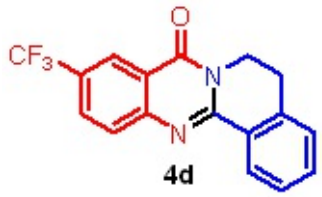
4d

^{1}H NMR (400 MHz, $CDCl_3$)



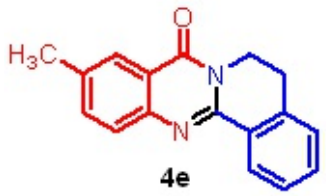
4d

^{13}C NMR (100 MHz, $CDCl_3$)



4d

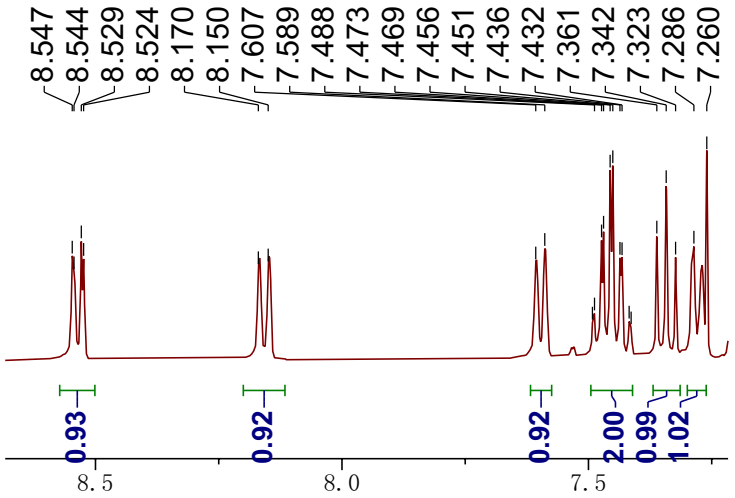
^{19}F NMR (376 MHz, $CDCl_3$)

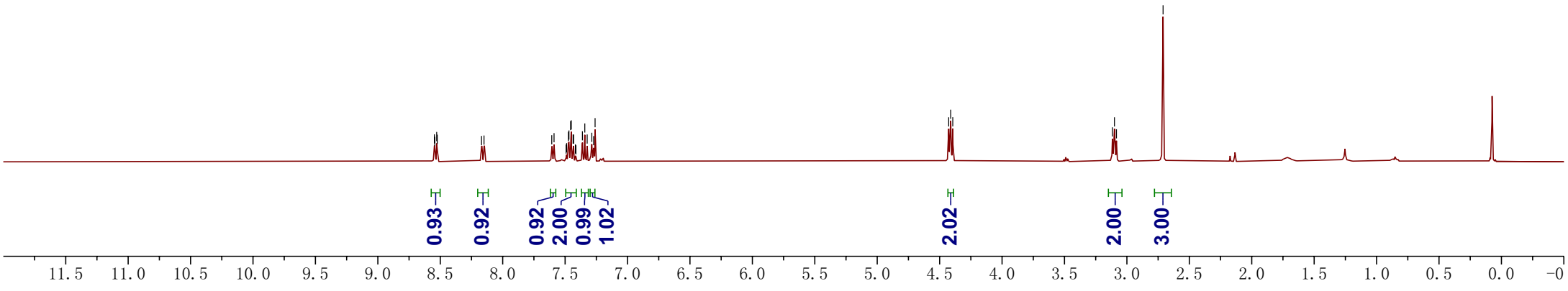


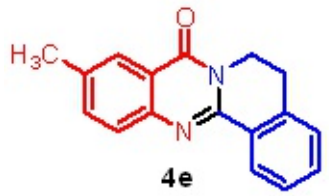
4e

^{1}H NMR (400 MHz, $CDCl_3$)

8.547 8.544 8.529 8.524 8.170 8.150 7.607 7.589 7.492 7.488 7.473 7.469 7.456 7.451 7.436 7.432 7.418 7.413 7.361 7.342 7.323 7.286 7.272 7.260 4.427 4.412 4.395 3.116 3.100 3.084 2.710

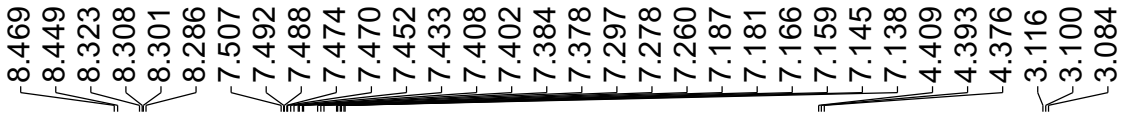


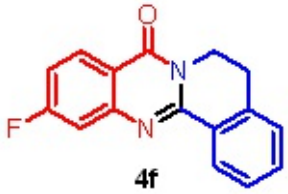




4e

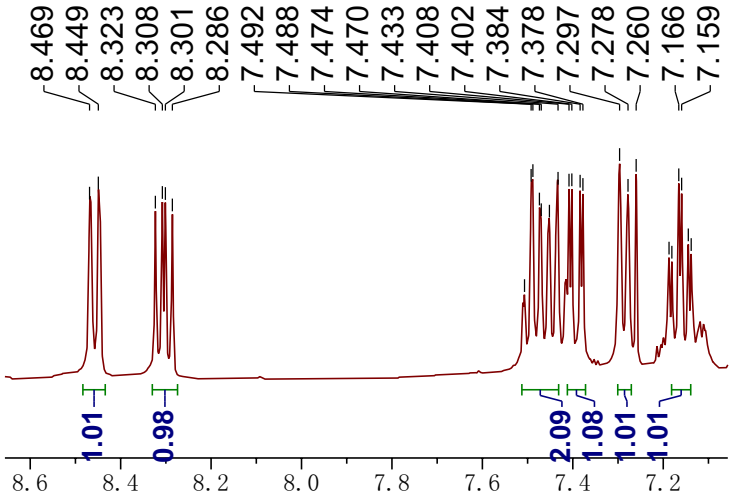
^{13}C NMR (100 MHz, $CDCl_3$)

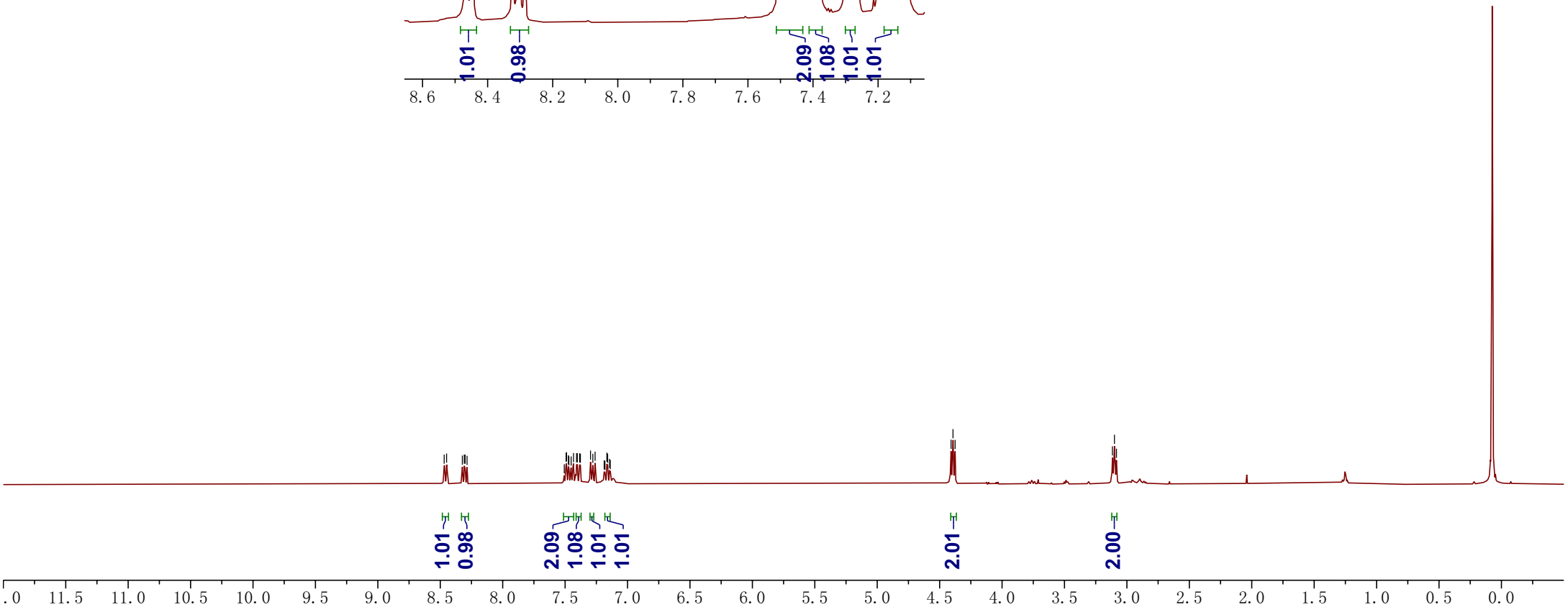


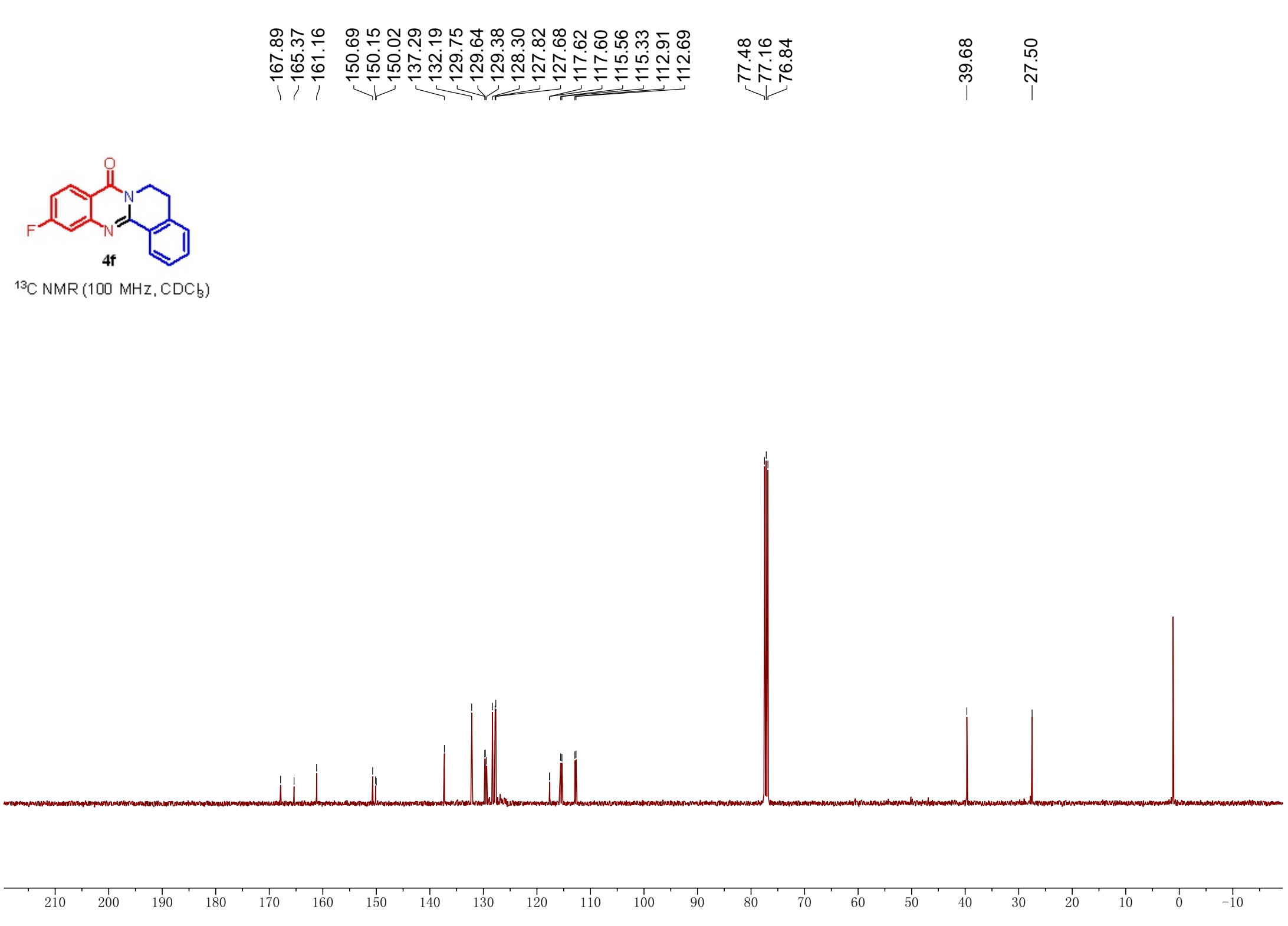


4f

^{1}H NMR (400 MHz, $CDCl_3$)





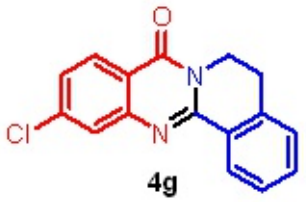

167.89
165.37
161.16
150.69
150.15
150.02
137.29
132.19
129.75
129.64
129.38
128.30
127.82
127.68
117.62
117.60
115.56
115.33
112.91
112.69
77.48
77.16
76.84
39.68
27.50
O
N
F
N
4f
13C NMR (100 MHz, CDCl3)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
−10

4f

^{19}F NMR (376 MHz, $CDCl_3$)

-103.88

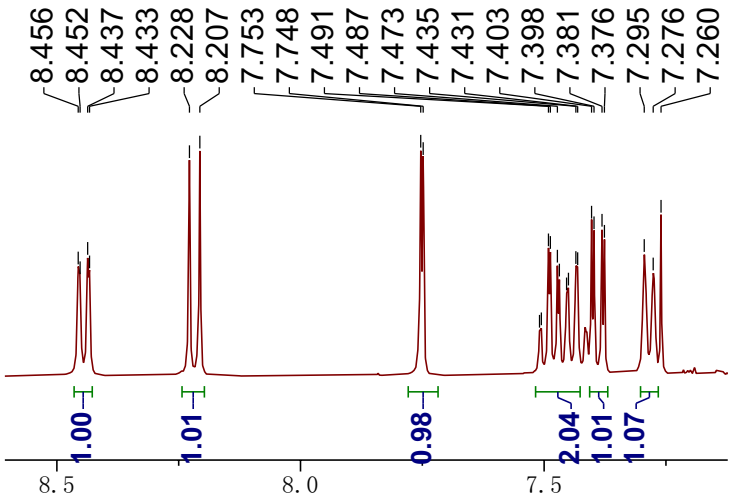
10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210

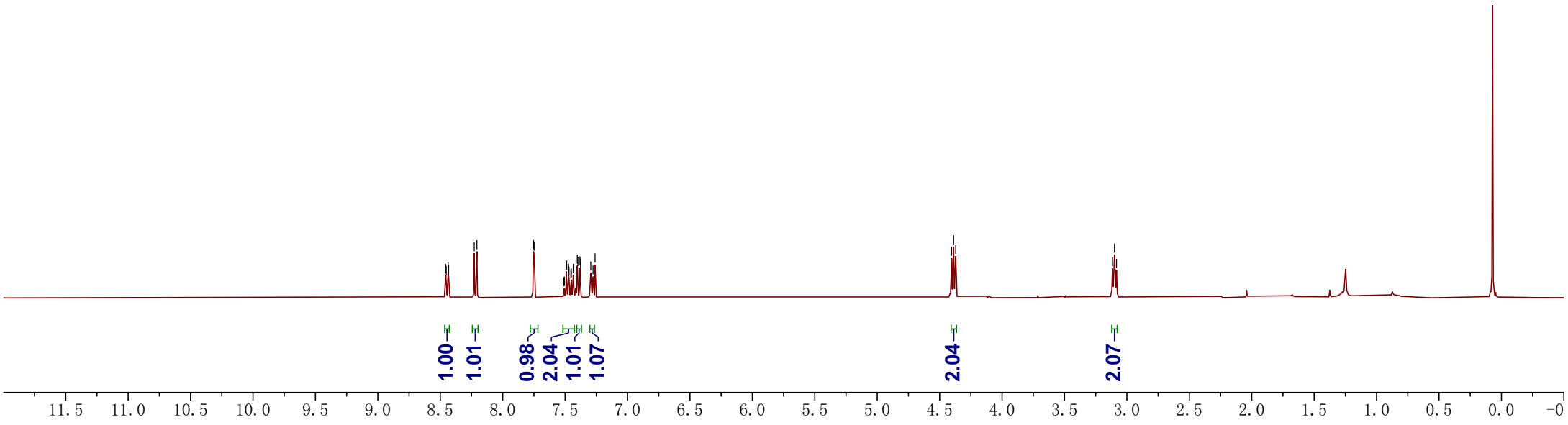


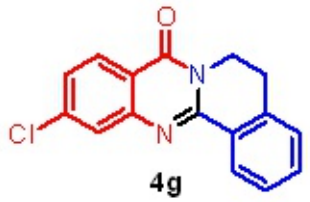
4g

^{1}H NMR (400 MHz, $CDCl_3$)

8.456 8.452 8.437 8.433 8.228 8.207 7.753 7.748 7.509 7.506 7.491 7.487 7.473 7.469 7.454 7.450 7.435 7.431 7.403 7.398 7.381 7.376 7.295 7.276 7.260 4.404 4.388 4.371 3.116 3.099 3.083



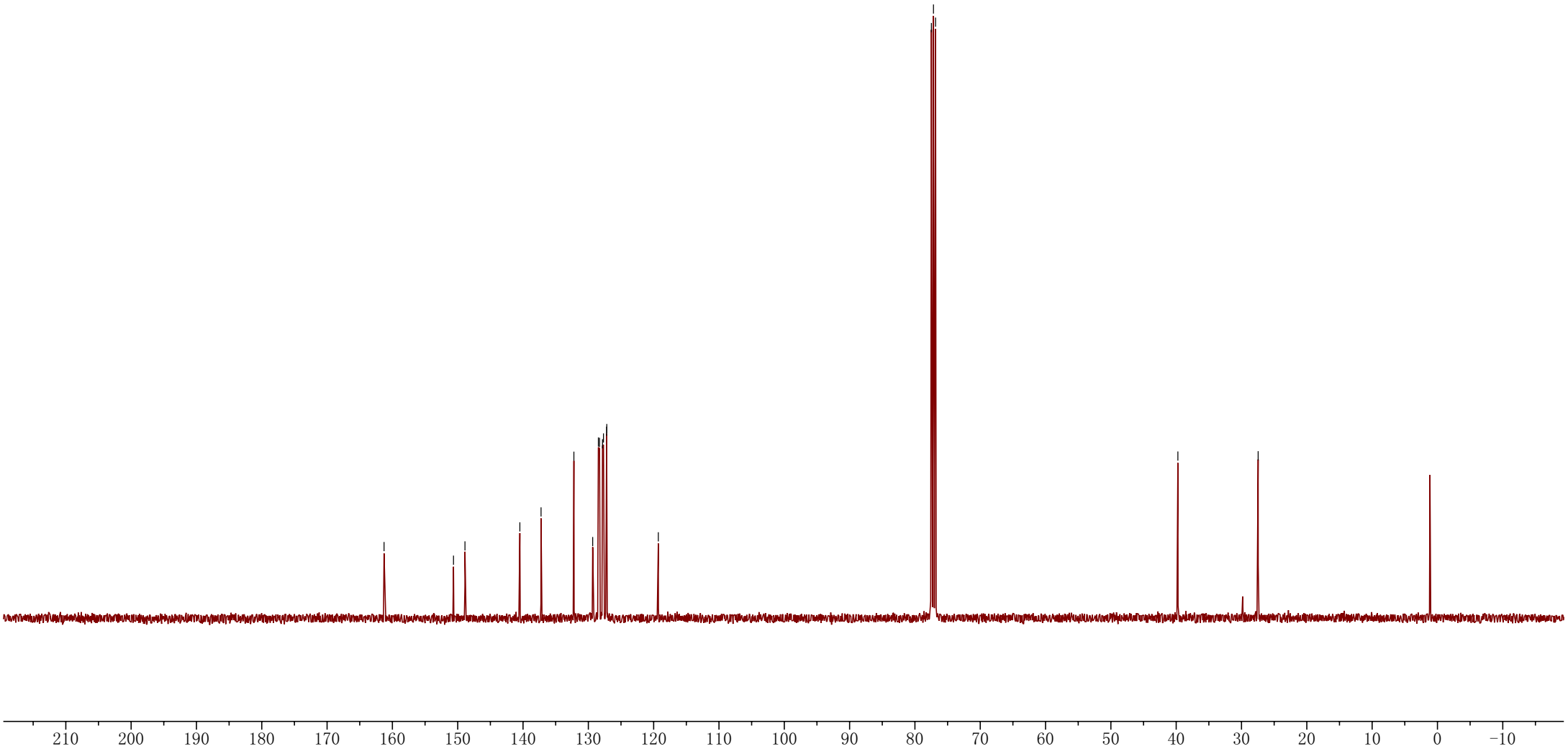


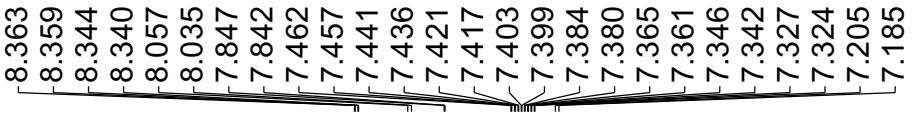


4g

^{13}C NMR (100 MHz, $CDCl_3$)

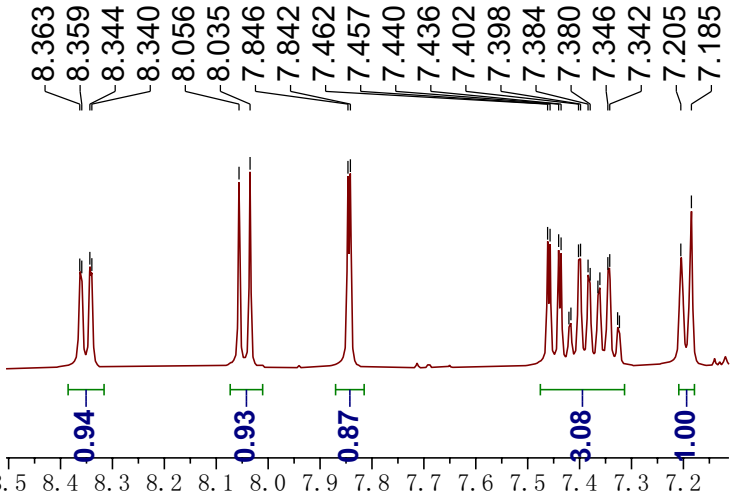
161.28
150.65
148.89
140.49
137.24
132.21
129.33
128.47
128.29
127.83
127.68
127.20
127.18
119.29
77.48
77.16
76.84
39.74
27.45

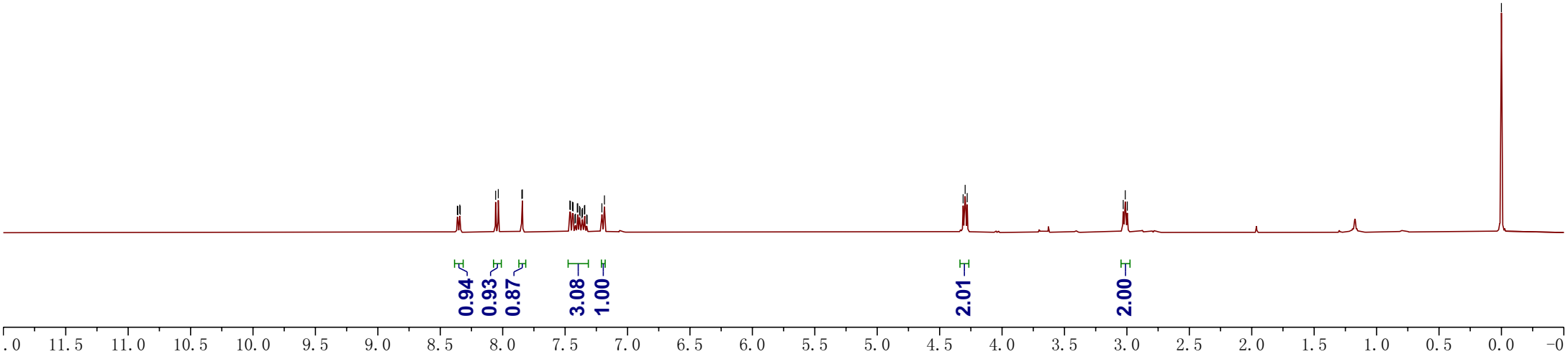


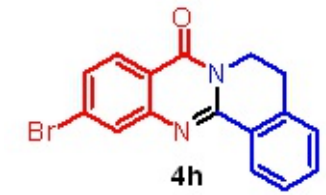


4h

^{1}H NMR (400 MHz, $CDCl_3$)



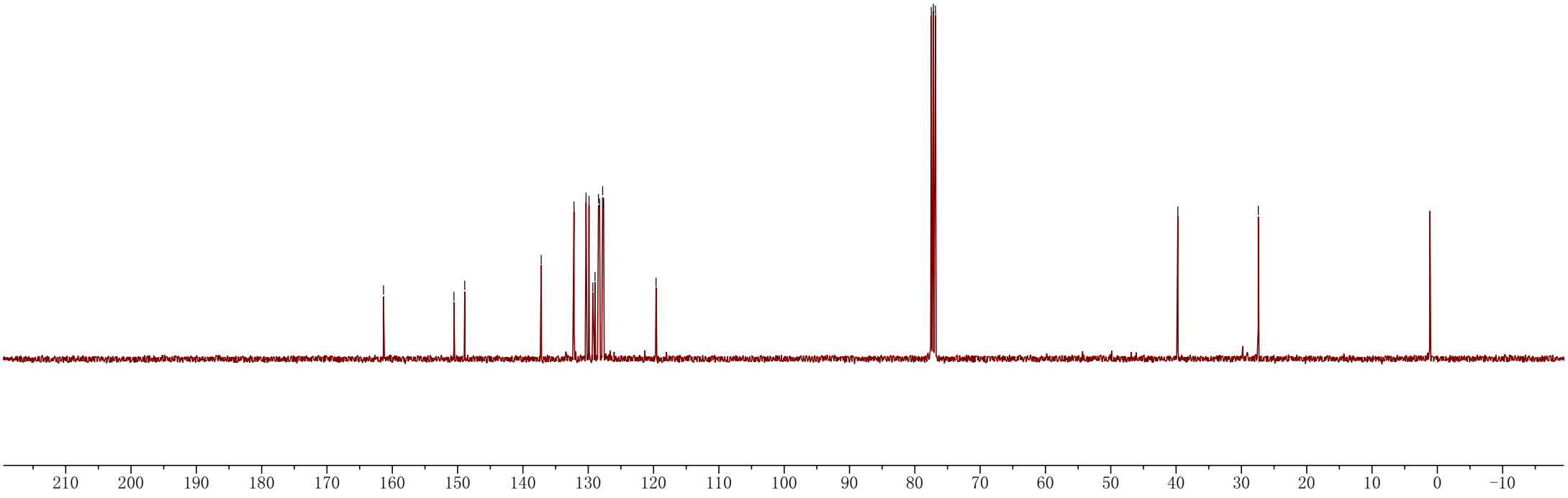




4h

^{13}C NMR (100 MHz, $CDCl_3$)

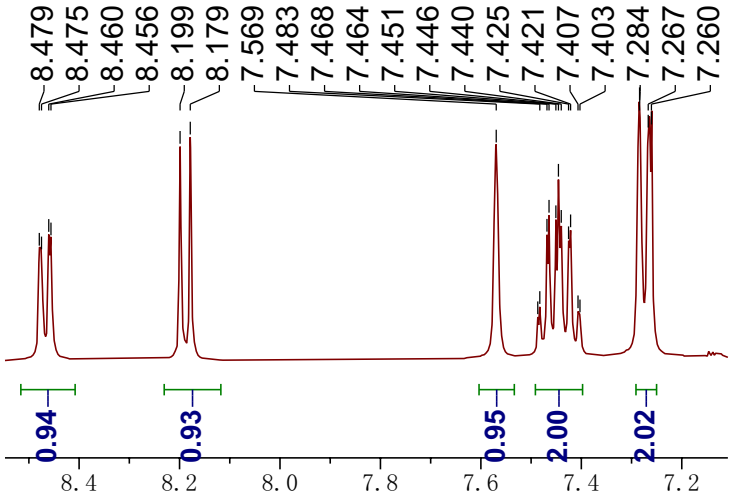
161.35
150.56
148.91
137.20
132.18
130.34
129.88
129.30
128.96
128.44
128.26
127.79
127.65
119.62
77.48
77.16
76.84
39.73
27.41

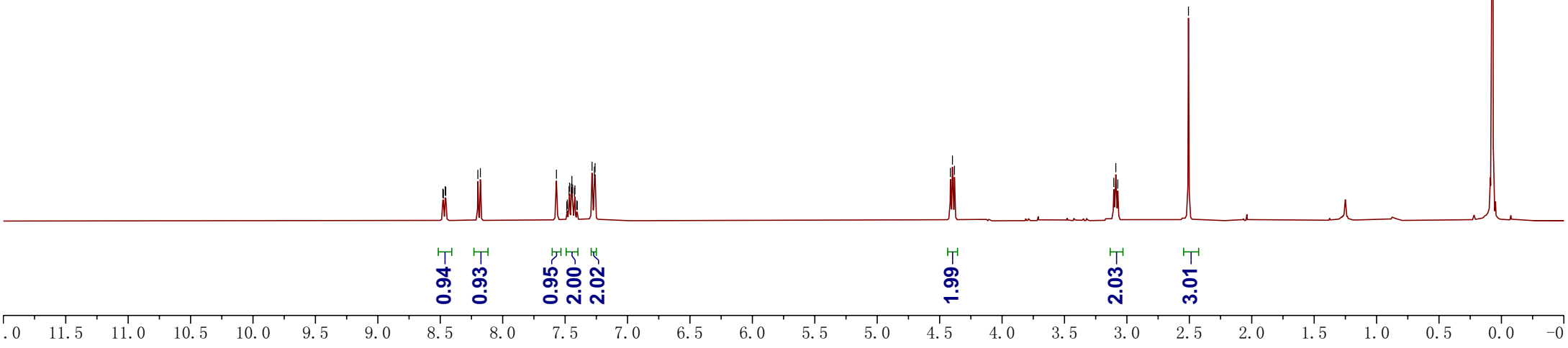


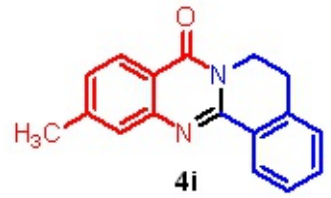
4i

^{1}H NMR (400 MHz, $CDCl_3$)

8.479 8.475 8.460 8.456 8.199 8.179 7.569 7.487 7.483 7.468 7.464 7.451 7.446 7.440 7.425 7.421 7.407 7.403 7.284 7.266 7.260 4.414 4.397 4.381 3.105 3.089 3.073 2.507



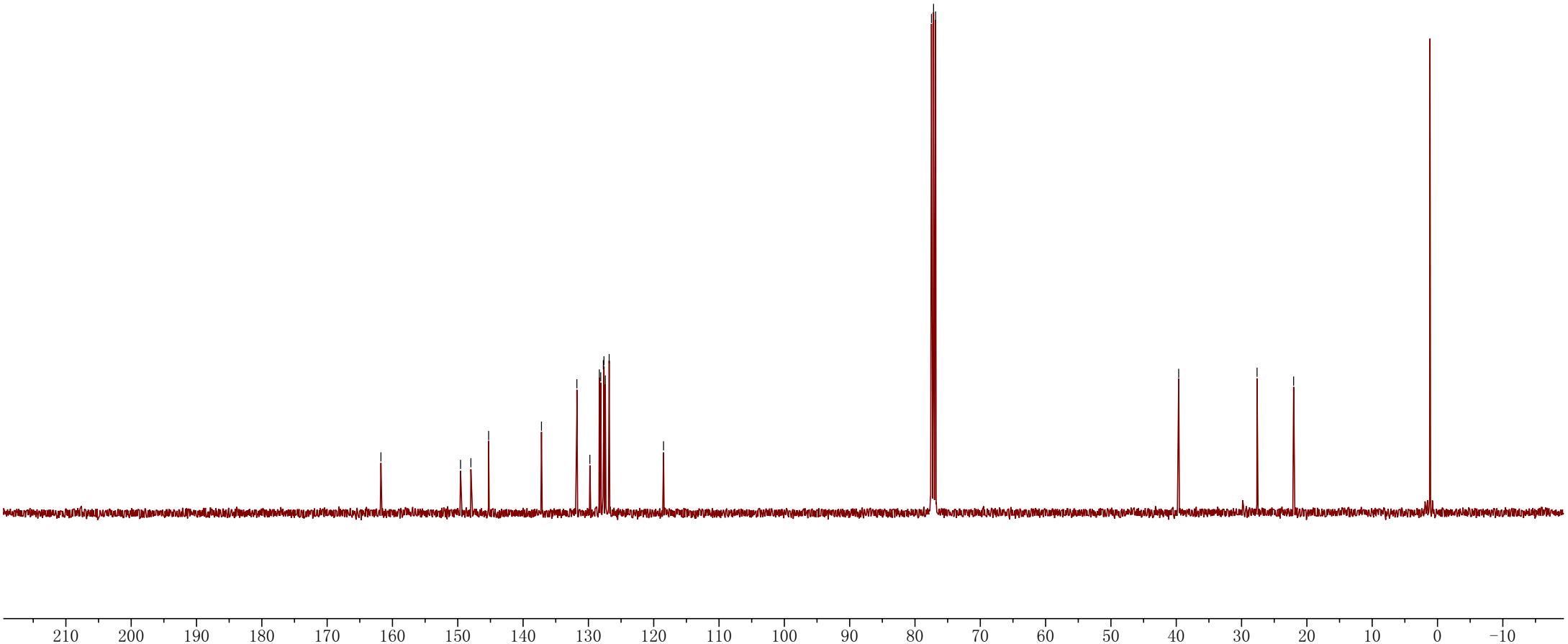


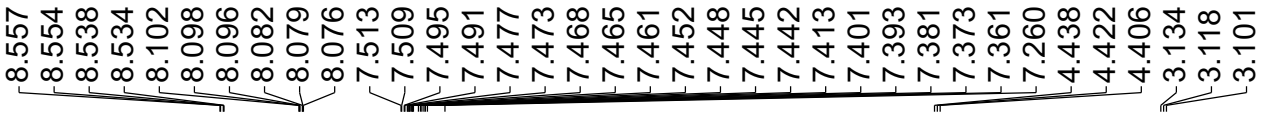


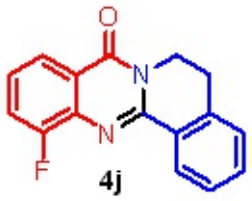
4i

^{13}C NMR (100 MHz, $CDCl_3$)

161.76
149.58
147.99
145.28
137.19
131.76
129.77
128.33
128.11
127.72
127.61
127.41
126.82
118.50
77.48
77.16
76.84
39.63
27.63
22.03

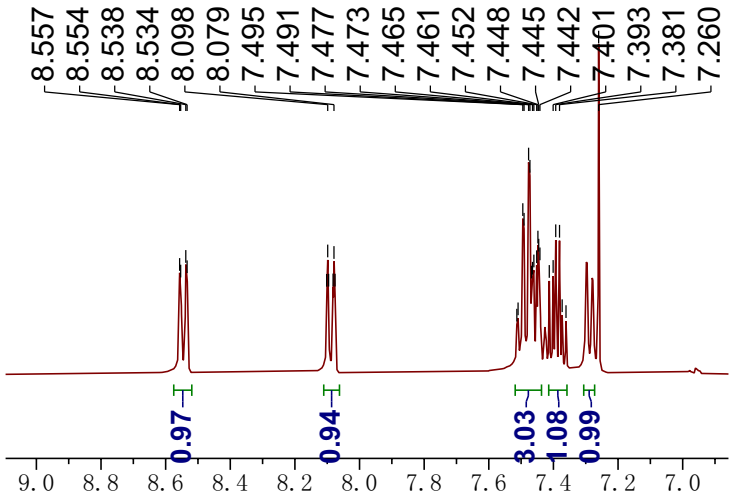






4j

^{1}H NMR (400 MHz, $CDCl_3$)



4j

^{13}C NMR (100 MHz, $CDCl_3$)

161.05
161.02
158.71
156.16
150.02
137.70
137.58
137.12
132.22
129.46
128.60
127.93
127.61
126.58
126.50
122.79
122.78
122.54
122.50
119.78
119.59
77.48
77.16
76.84
39.91
27.48

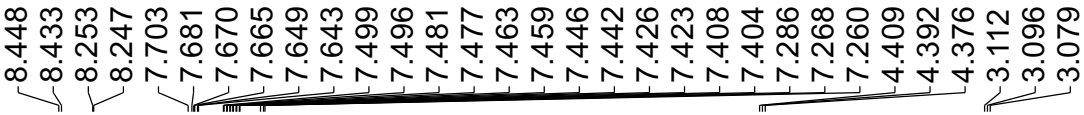
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10

4j

^{19}F NMR (376 MHz, $CDCl_3$)

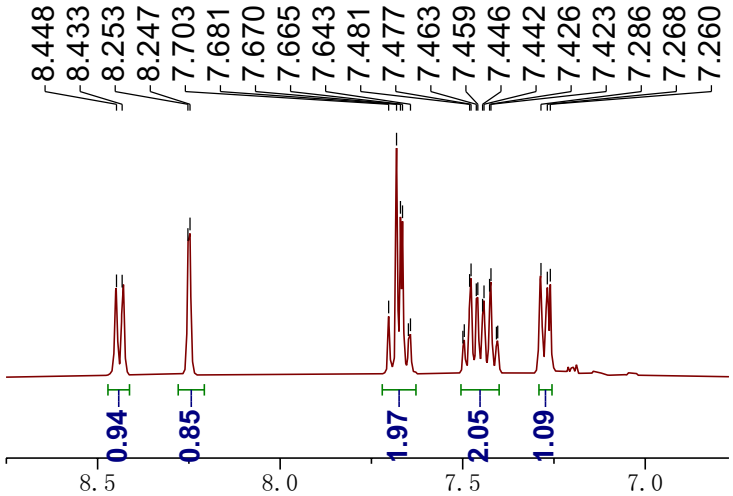
125.611

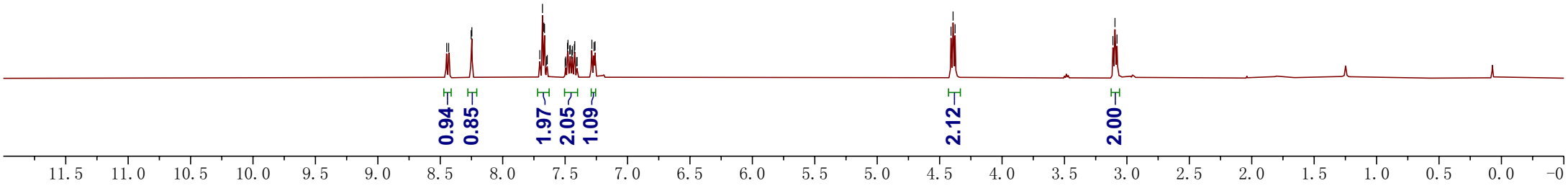
10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210



4k

^{1}H NMR (400 MHz, $CDCl_3$)

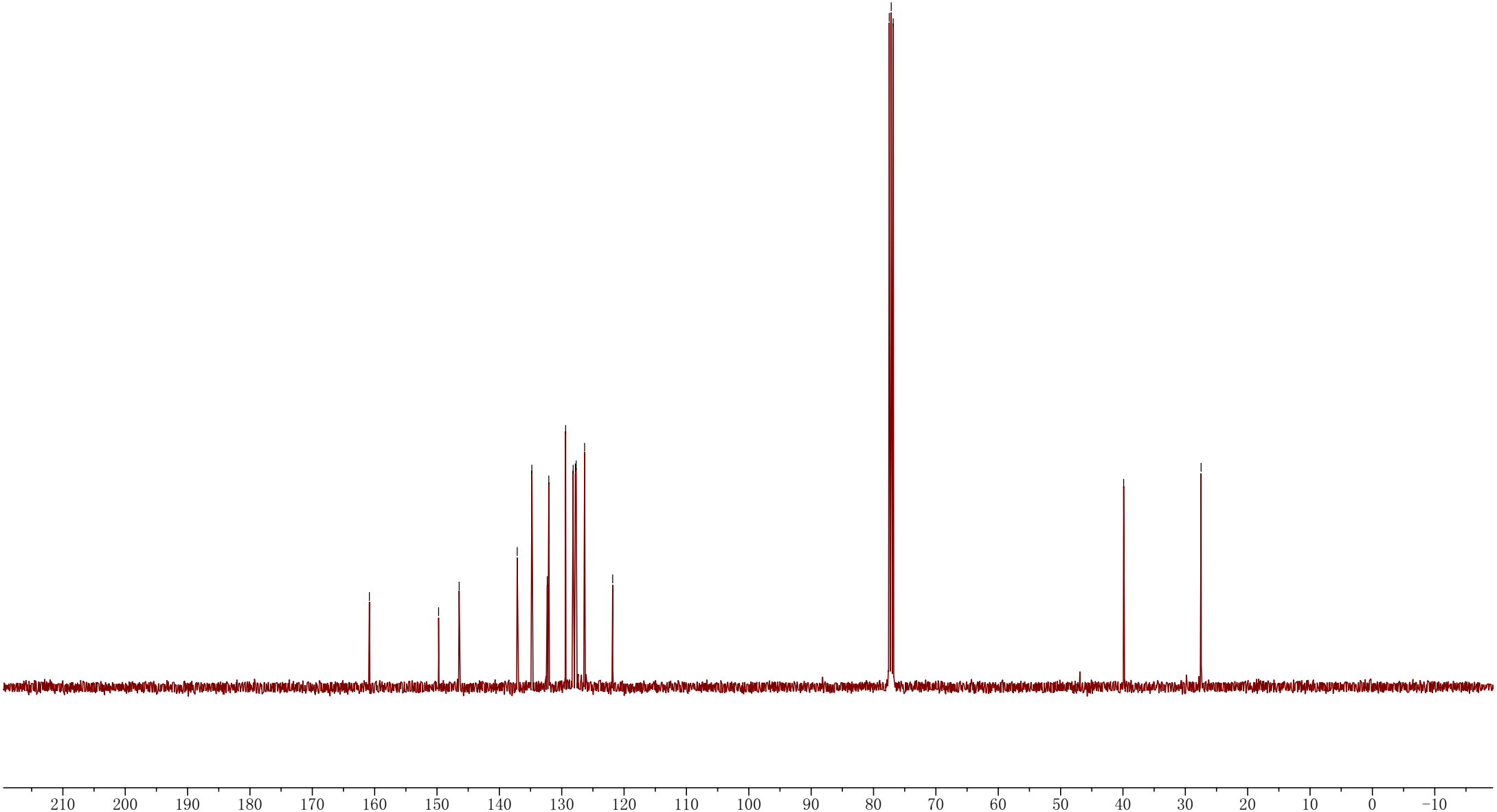


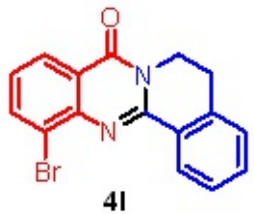


4k

^{13}C NMR (100 MHz, $CDCl_3$)

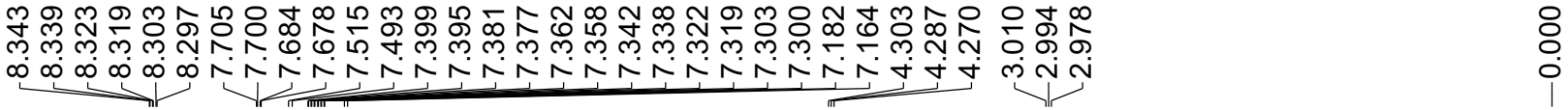
160.85
149.74
146.45
137.14
134.79
132.32
132.07
129.38
128.17
127.82
127.69
126.33
121.83
77.48
77.16
76.84
39.89
27.47

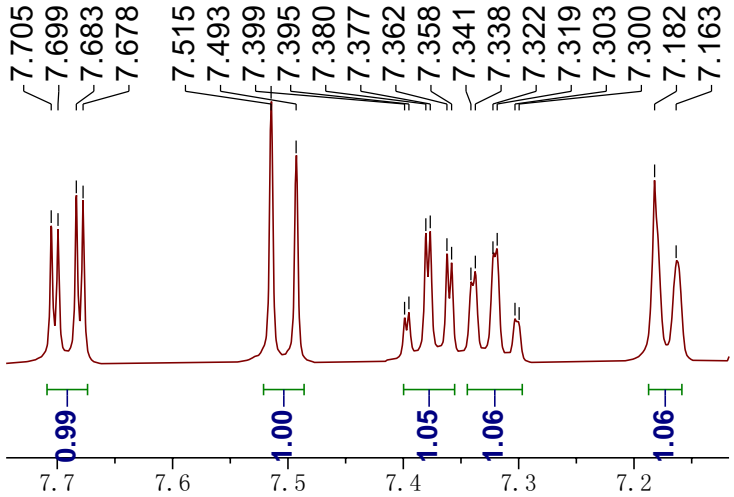


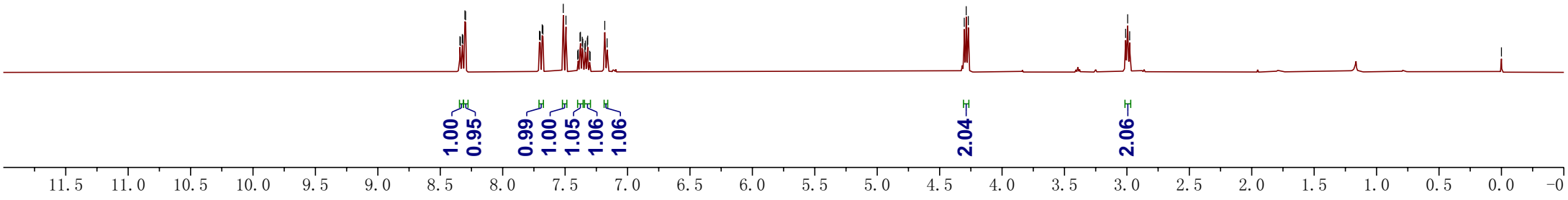


4l

^{1}H NMR (400 MHz, $CDCl_3$)



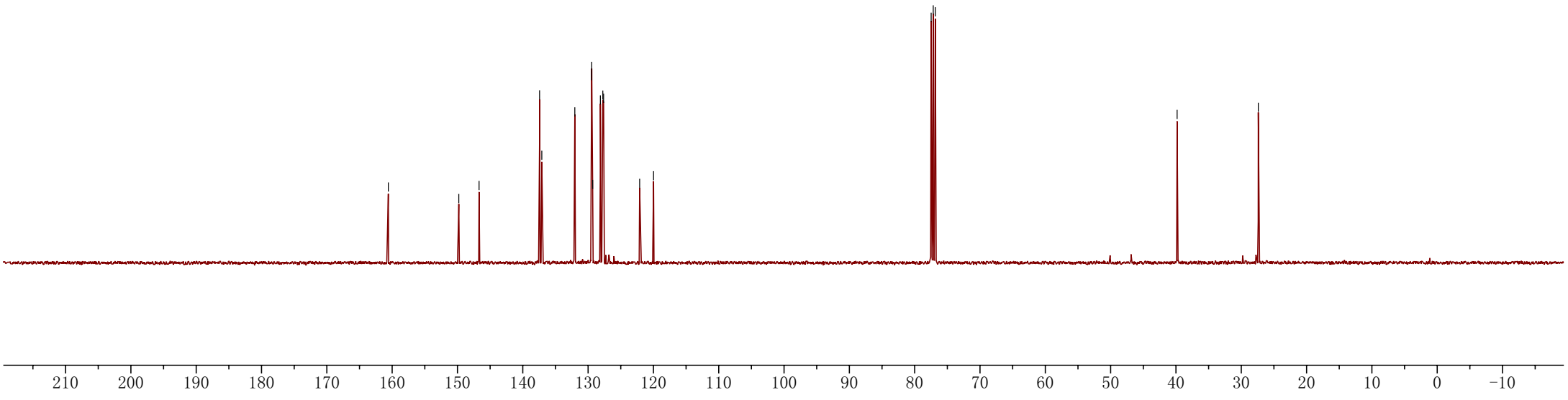


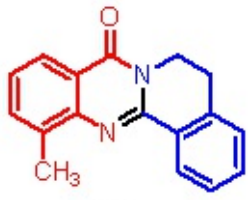


4l

^{13}C NMR (100 MHz, $CDCl_3$)

160.59
149.80
146.69
137.43
137.09
132.04
129.46
129.45
129.30
128.12
127.75
127.63
122.11
119.98
77.48
77.16
76.84
39.82
27.39

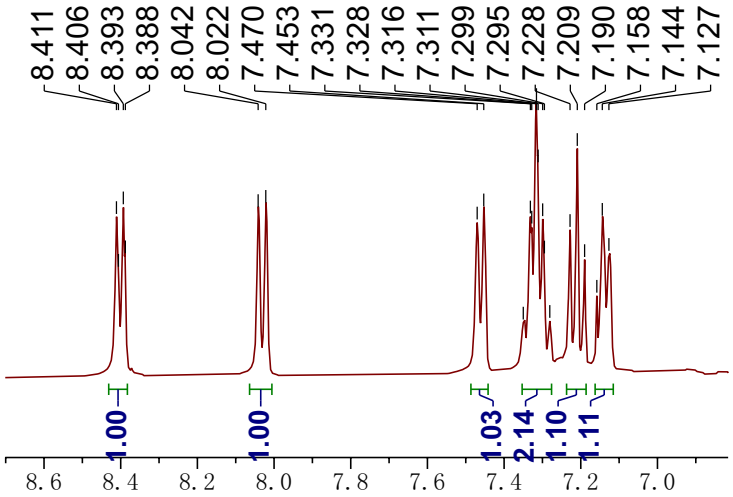


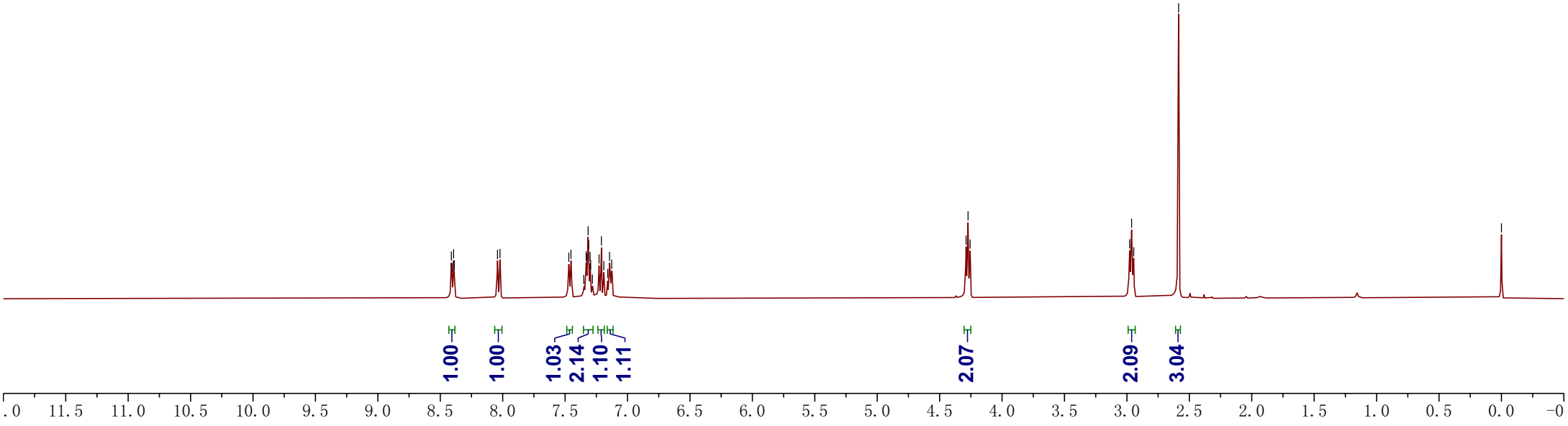


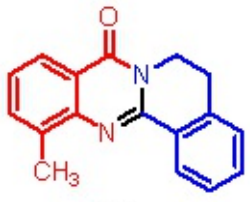
4m

^{1}H NMR (400 MHz, $CDCl_3$)

8.411 8.406 8.393 8.388 8.042 8.022 7.470 7.453 7.350 7.332 7.328 7.316 7.311 7.300 7.295 7.281 7.228 7.209 7.190 7.158 7.144 7.127 4.288 4.272 4.256 2.978 2.962 2.945 2.586 —0.000

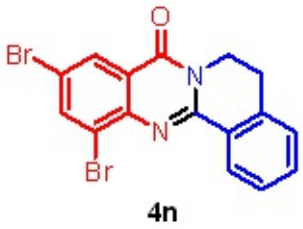






4m

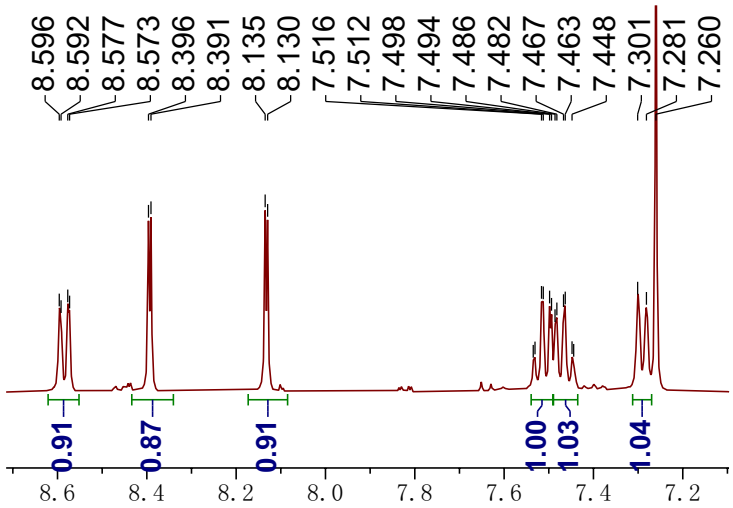
^{13}C NMR (100 MHz, $CDCl_3$)

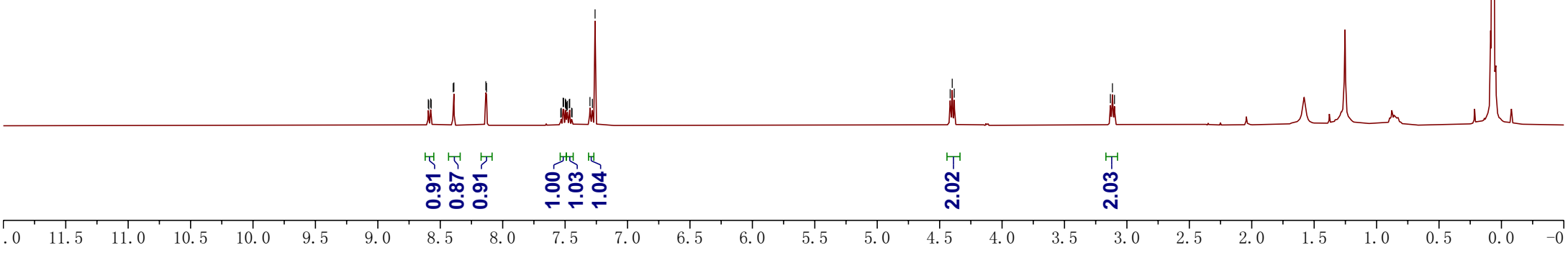


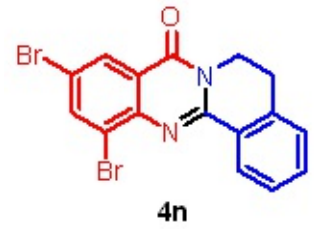
4n

^{1}H NMR (400 MHz, $CDCl_3$)

8.596 8.592 8.577 8.573 8.396 8.391 8.135 8.130 7.535 7.531 7.516 7.512 7.498 7.494 7.486 7.482 7.467 7.463 7.448 7.444 7.301 7.281 7.260 4.415 4.399 4.383 3.132 3.116 3.100





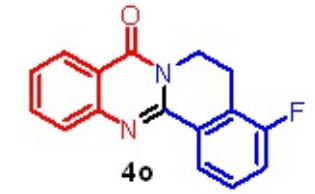


4n

^{13}C NMR (100 MHz, $CDCl_3$)

160.34
150.47
144.67
140.36
137.10
132.58
129.58
129.20
128.84
128.07
127.69
124.05
122.97
119.57
77.48
77.16
76.84
40.11
27.31

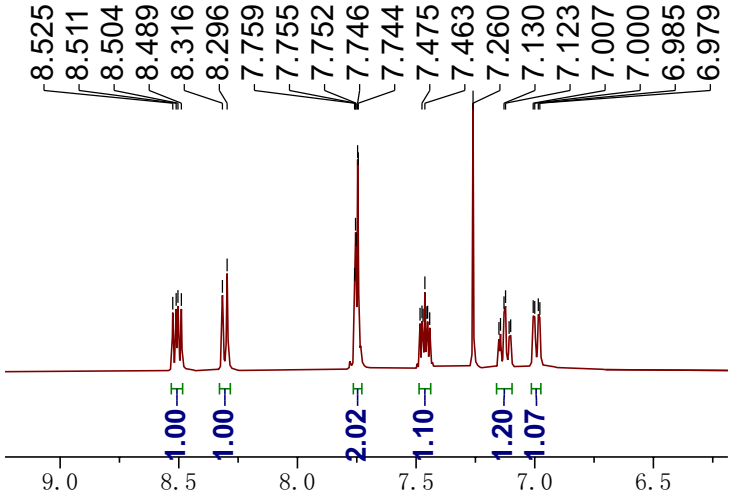
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10

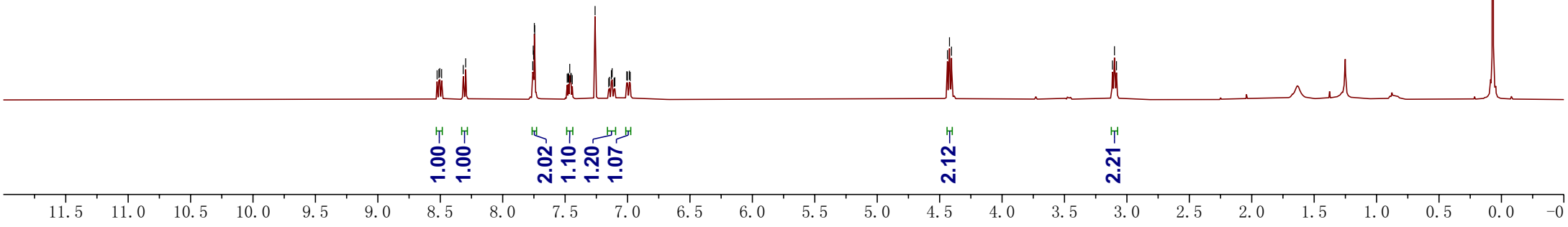


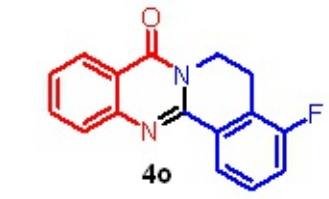
4o

H NMR (400 MHz, $CDCl_3$)

8.525 8.511 8.504 8.489 8.316 8.296 7.759 7.755 7.752 7.746 7.744 7.483 7.475 7.471 7.463 7.455 7.451 7.443 7.260 7.151 7.144 7.130 7.123 7.108 7.101 7.007 7.000 6.985 6.979 4.437 4.421 4.405 3.116 3.100 3.083



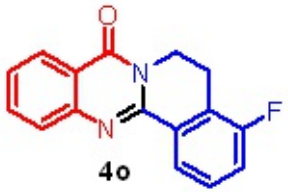




4o

^{13}C NMR (100 MHz, $CDCl_3$)

166.17
163.65
161.77
148.77
147.85
139.89
139.80
134.48
130.98
130.88
127.67
127.06
126.73
126.04
125.99
125.96
125.92
120.77
115.37
115.16
114.54
114.32
77.48
77.16
76.84
39.56
27.65



4o

^{19}F NMR (376 MHz, $CDCl_3$)

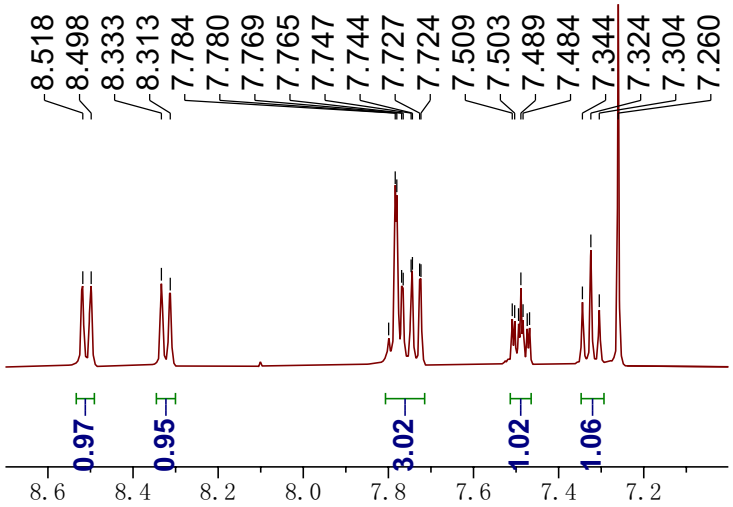
-107.579

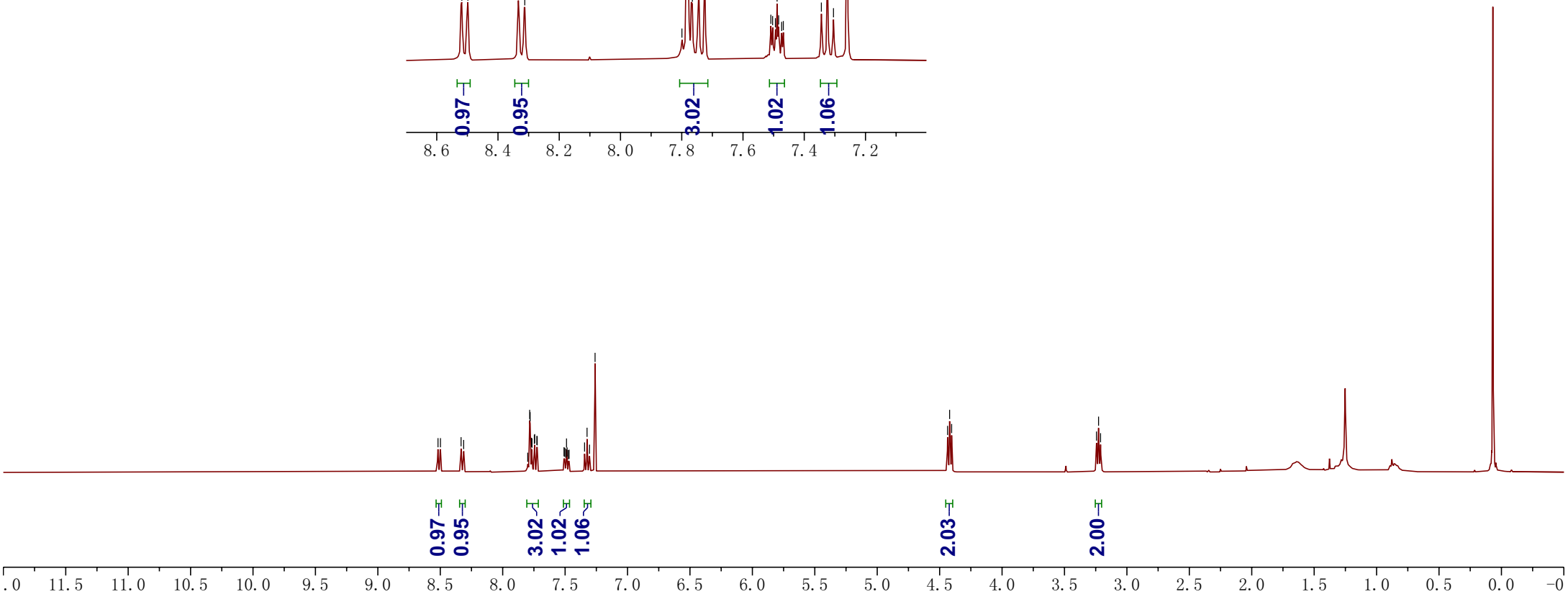
10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210

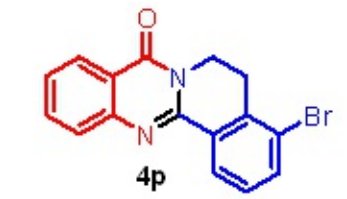
4p

^{1}H NMR (400 MHz, $CDCl_3$)

8.518 8.498 8.333 8.313 7.799 7.784 7.780 7.769 7.765 7.747 7.744 7.727 7.724 7.509 7.503 7.494 7.489 7.484 7.474 7.468 7.344 7.324 7.304 7.260 4.436 4.420 4.404 3.244 3.227 3.211





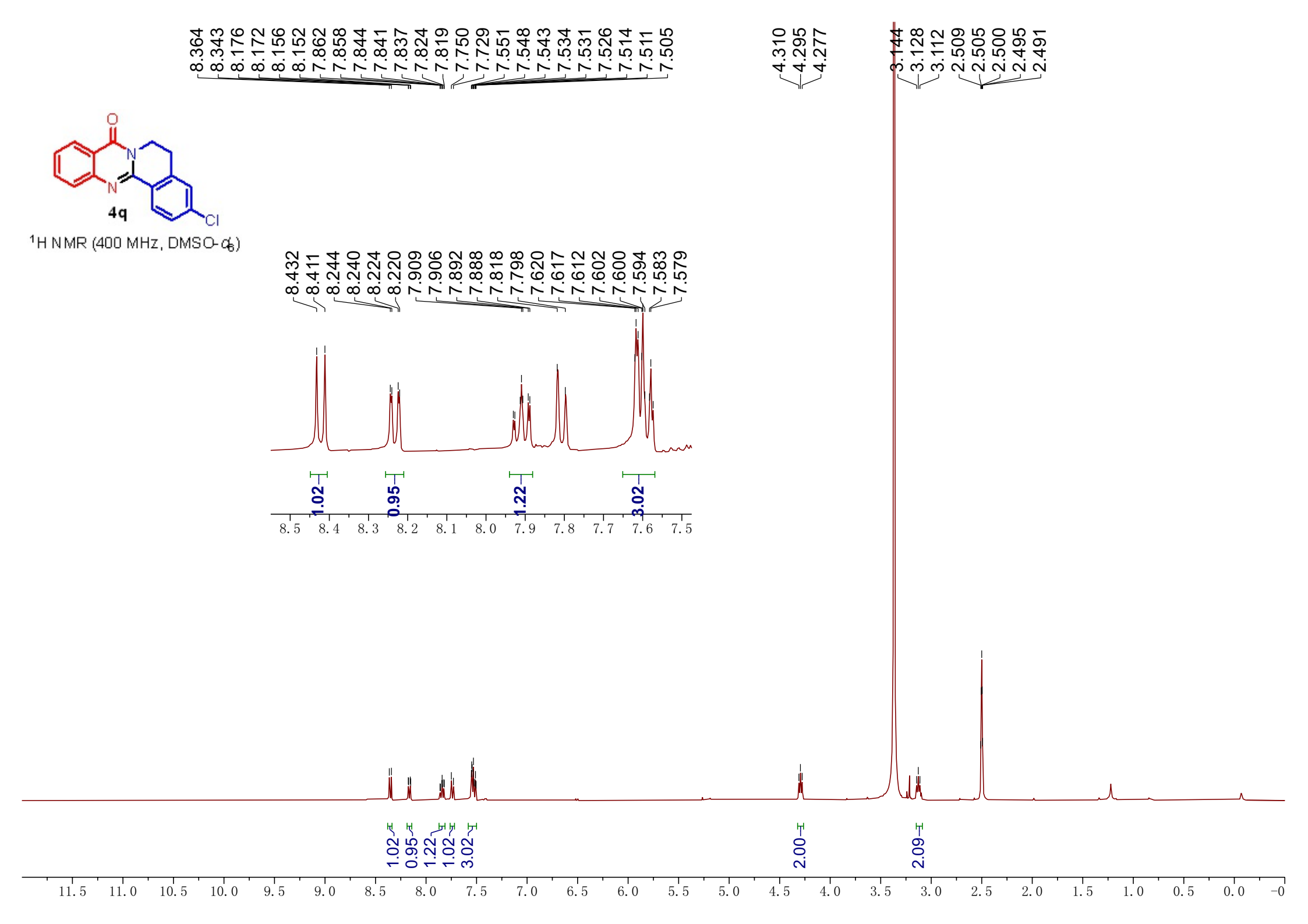


4p

^{13}C NMR (100 MHz, $CDCl_3$)

161.66
147.80
136.91
135.62
134.54
131.85
128.82
127.87
127.51
127.07
127.05
123.47
120.90
77.48
77.16
76.84
39.15
27.55

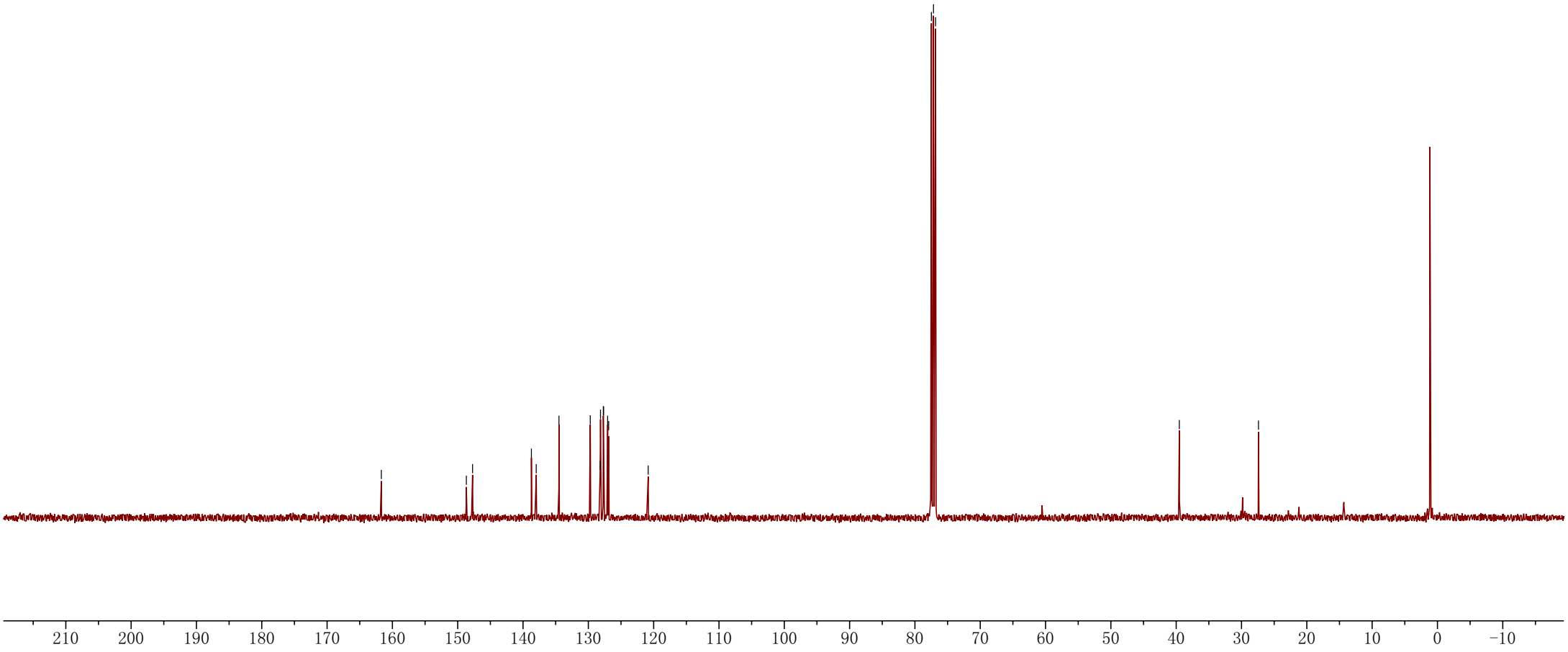
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10


8.364
8.343
8.176
8.172
8.156
8.152
7.862
7.858
7.844
7.841
7.837
7.824
7.819
7.750
7.729
7.551
7.548
7.543
7.534
7.531
7.526
7.514
7.511
7.505
4.310
4.295
4.277
3.144
3.128
3.112
2.509
2.505
2.500
2.495
2.491
O
N
N
Cl
4q
1H NMR (400 MHz, DMSO-d6)
8.432
8.411
8.244
8.240
8.224
8.220
7.909
7.906
7.892
7.888
7.818
7.798
7.620
7.617
7.612
7.602
7.600
7.594
7.583
7.579
1.02
0.95
1.22
3.02
8.5 8.4 8.3 8.2 8.1 8.0 7.9 7.8 7.7 7.6 7.5
1.02
0.95
1.22
1.02
3.02
2.00
2.09
11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0

4q

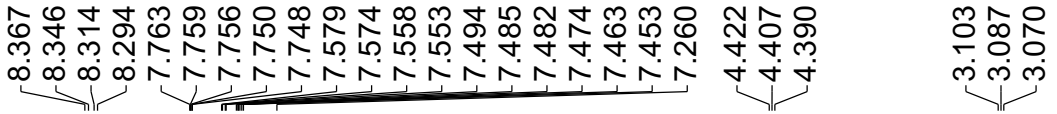
^{13}C NMR (100 MHz, $CDCl_3$)

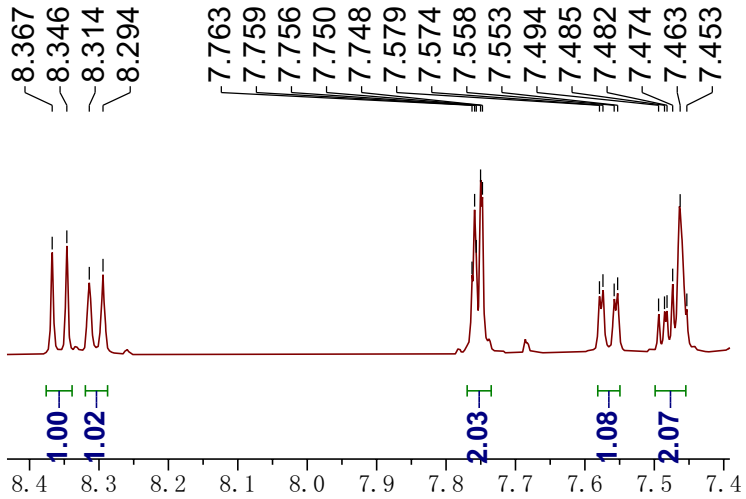
161.69
148.68
147.73
138.72
137.98
134.50
129.71
128.20
128.14
127.71
127.66
127.05
126.89
120.84
77.48
77.16
76.84
39.52
27.40

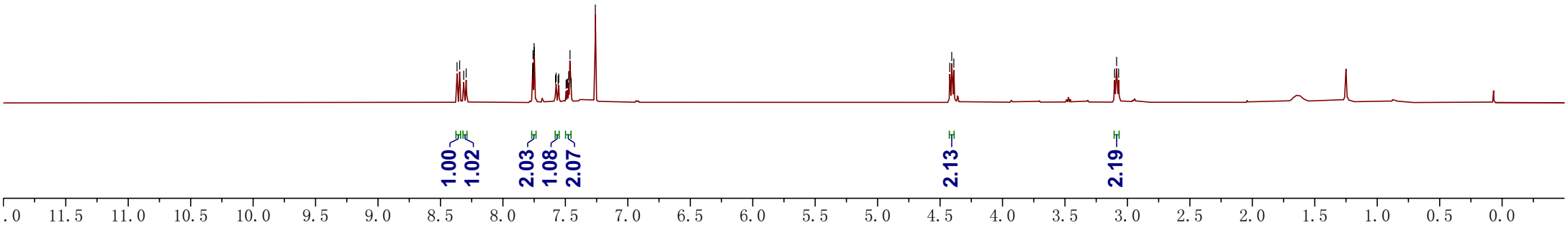


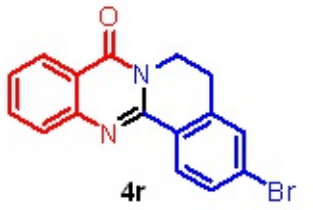
4r

^{1}H NMR (400 MHz, $CDCl_3$)







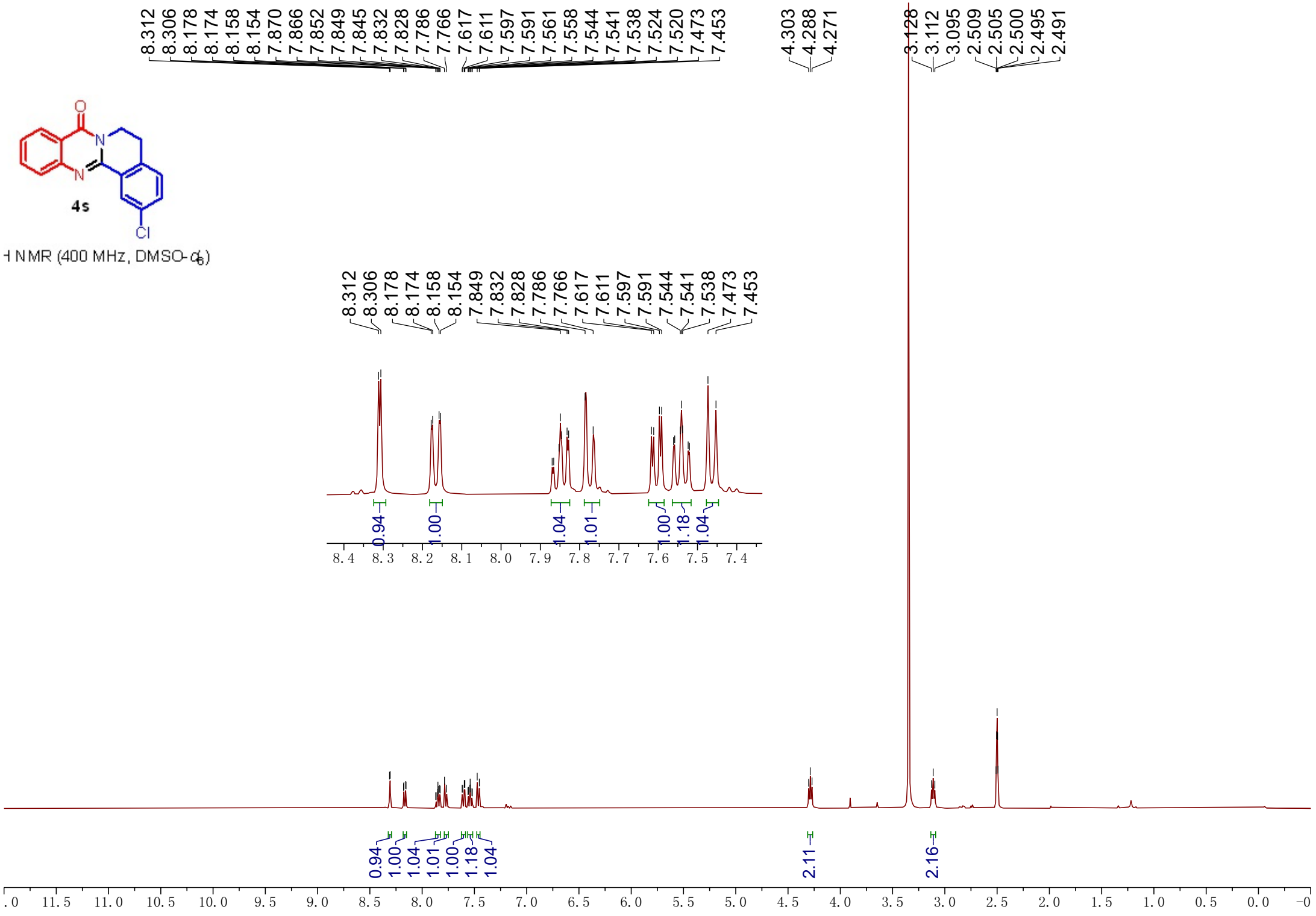


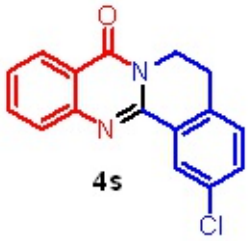
4r

^{13}C NMR (100 MHz, $CDCl_3$)

161.70
148.78
147.76
138.92
134.51
131.10
130.65
129.85
128.70
127.76
127.08
126.93
126.56
120.91
77.48
77.16
76.84
39.55
27.36

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10


8.312
8.306
8.178
8.174
8.158
8.154
7.870
7.866
7.852
7.849
7.845
7.832
7.828
7.786
7.766
7.617
7.611
7.597
7.591
7.561
7.558
7.544
7.541
7.538
7.524
7.520
7.473
7.453
4.303
4.288
4.271
3.128
3.112
3.095
2.509
2.505
2.500
2.495
2.491
O
N
N
Cl
4s
H NMR (400 MHz, DMSO-d6)
0.94
1.00
1.04
1.01
1.00
1.18
1.04
2.11
2.16



4s

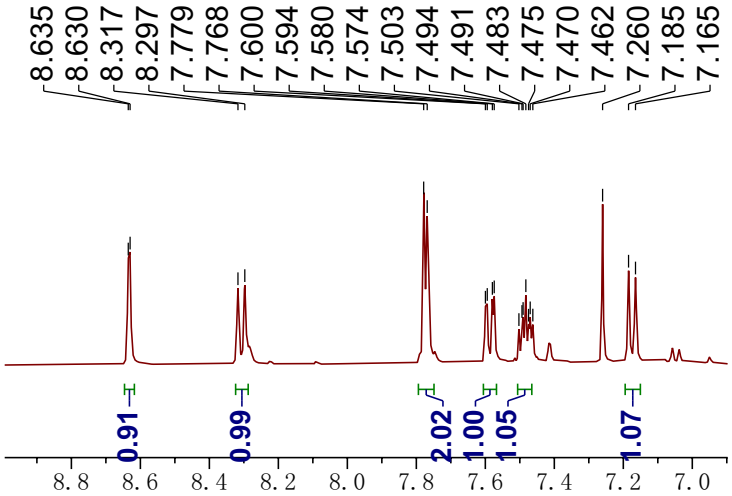
^{13}C NMR (100 MHz, $CDCl_3$)

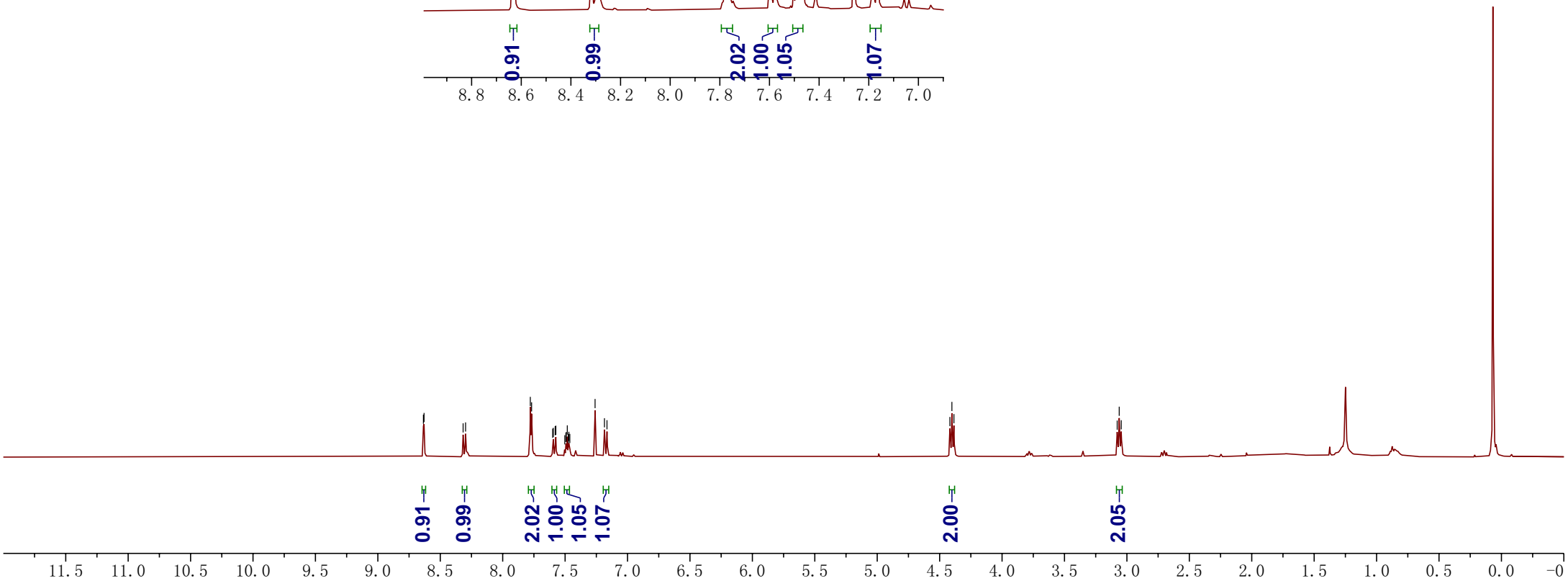
161.68
148.28
147.63
135.43
134.54
133.77
131.76
131.24
129.08
127.96
127.83
127.06
127.04
120.96
77.48
77.16
76.84
39.60
27.07

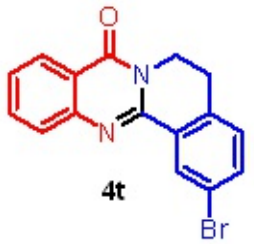
4t

^{1}H NMR (400 MHz, $CDCl_3$)

8.635 8.630 8.317 8.297 7.779 7.768 7.600 7.594 7.580 7.574 7.503 7.494 7.491 7.483 7.475 7.470 7.462 7.260 7.185 7.165 4.418 4.402 4.386 3.078 3.062 3.045



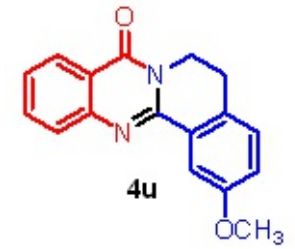




4t

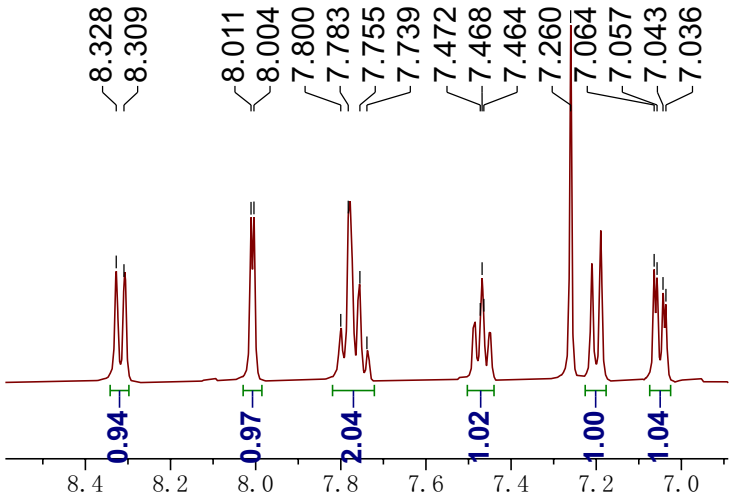
^{13}C NMR (100 MHz, $CDCl_3$)

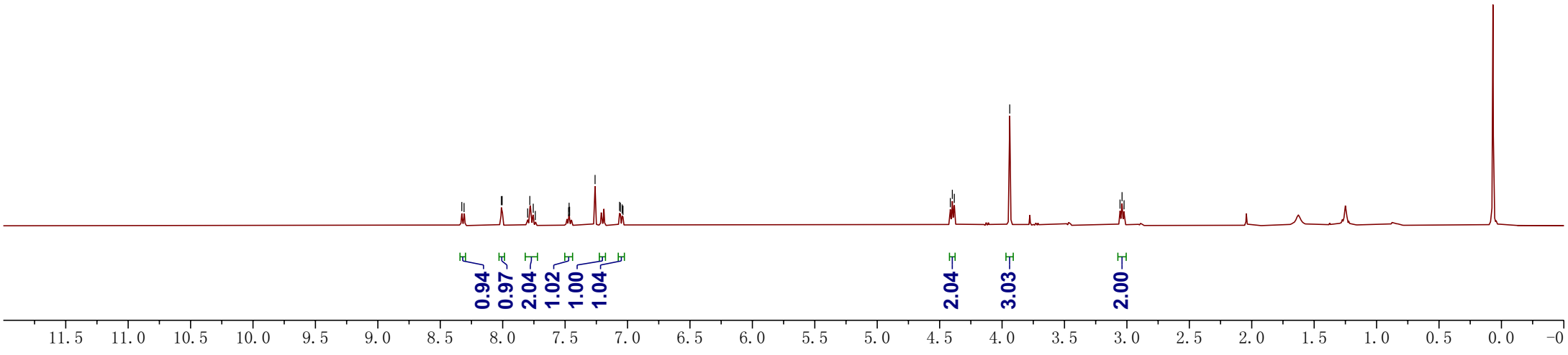
161.68
148.14
147.65
135.92
134.65
134.56
131.53
130.92
129.32
127.86
127.08
127.05
121.59
120.98
77.48
77.16
76.84
39.56
27.17

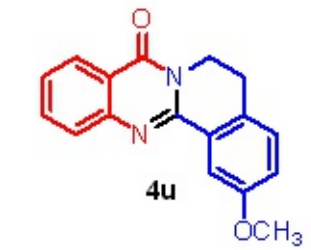


^{1}H NMR (400 MHz, $CDCl_3$)

8.328
8.309
8.011
8.004
7.800
7.783
7.755
7.739
7.472
7.468
7.464
7.260
7.064
7.057
7.043
7.036
4.415
4.398
4.382
3.939
3.055
3.039
3.023

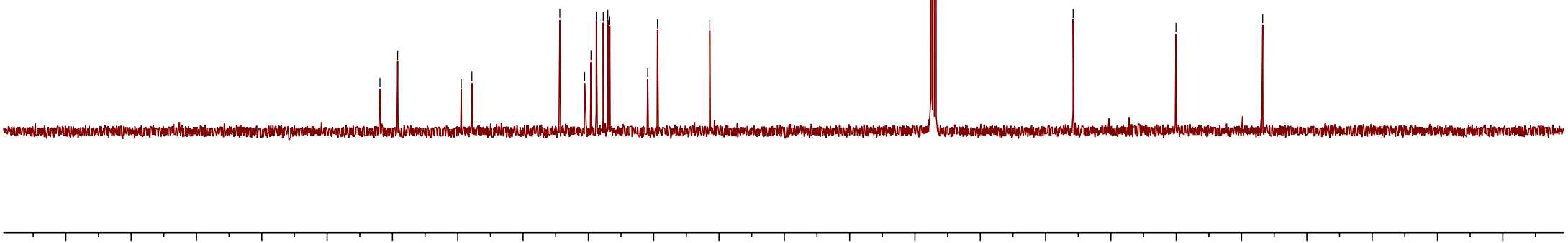


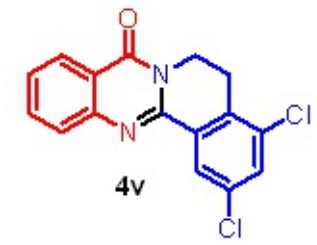




^{13}C NMR (100 MHz, $CDCl_3$)

161.91
159.20
149.46
147.83
134.37
130.57
129.60
128.78
127.72
127.02
126.72
120.92
119.42
111.40
77.48
77.16
76.84
55.78
40.04
26.76

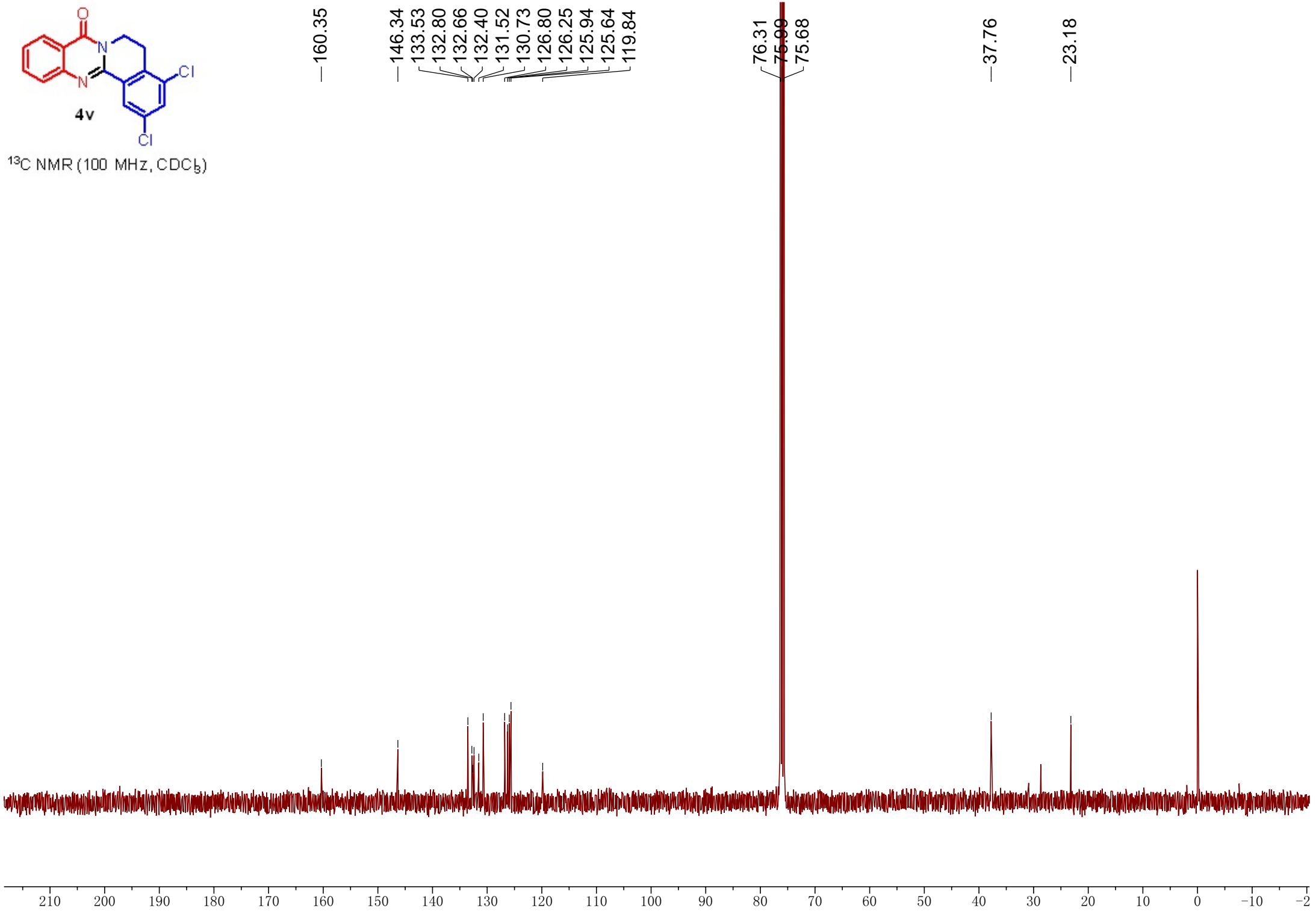


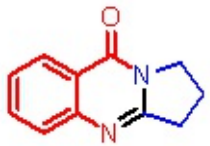


^{1}H NMR (400 MHz, $CDCl_3$)

8.458 8.453 8.334 8.331 8.328 8.314 8.311 8.309 7.791 7.787 7.785 7.778 7.776 7.562 7.557 7.528 7.520 7.516 7.508 7.499 7.496 7.487 7.260 4.412 4.410 4.395 3.204 3.188 3.172

0.91 0.98 2.01 0.97 1.05 2.06 2.00


4v
13C NMR (100 MHz, CDCl3)
160.35
146.34
133.53
132.80
132.66
132.40
131.52
130.73
126.80
126.25
125.94
125.64
119.84
76.31
75.00
75.68
37.76
23.18
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
−10
−2



4w

^{1}H NMR (400 MHz, $CDCl_3$)

7.673 7.671 7.668 7.655 7.652 7.650 7.536 7.534 7.520 7.518 7.515 7.506 7.503 7.488 7.485 7.469 7.466 7.260

1.332 1.282 1.251

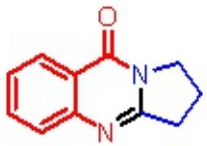
7.673 7.671 7.668 7.655 7.652 7.650 7.536 7.534 7.520 7.518 7.515 7.506 7.503 7.488 7.485 7.315 7.312 7.297 7.293 7.260

0.96 2.08 1.00

7.7 7.6 7.5 7.4 7.3 7.2 7.1

0.96 2.08 1.00 6.02

12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0

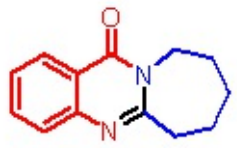


4w

^{13}C NMR (100 MHz, $CDCl_3$)

144.59
134.85
134.31
129.24
124.49
120.46
77.48
77.16
76.84
31.58
30.33
29.85

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10



4x

^{1}H NMR (400 MHz, $CDCl_3$)

8.266 8.262 8.246 8.242 7.733 7.729 7.716 7.712 7.709 7.695 7.691 7.622 7.602 7.456 7.453 7.438 7.435 7.260 4.406 4.393 4.383 3.090 3.079 3.064 1.888 1.866 1.855 1.838 1.827 1.810

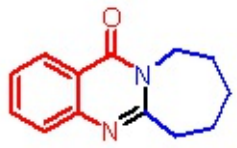
8.266 8.262 8.246 8.242 7.733 7.729 7.716 7.712 7.709 7.695 7.691 7.622 7.602 7.456 7.453 7.438 7.435 7.433 7.418 7.415

0.95 0.97 0.92 1.01

8.3 8.2 8.1 8.0 7.9 7.8 7.7 7.6 7.5 7.4 7.3

0.95 0.97 0.92 1.01 2.00 2.01 6.00

.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0



4x

^{13}C NMR (100 MHz, $CDCl_3$)

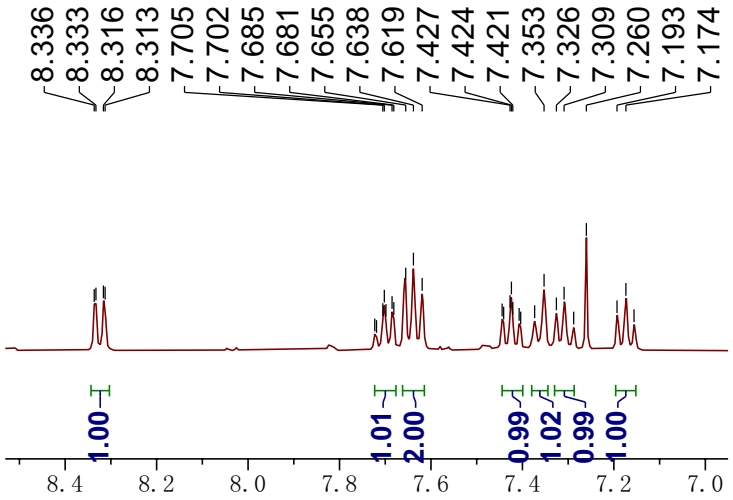
162.06
159.99
134.37
127.20
126.80
126.61
120.34
77.48
77.16
76.84
43.08
37.79
29.72
28.22
25.55

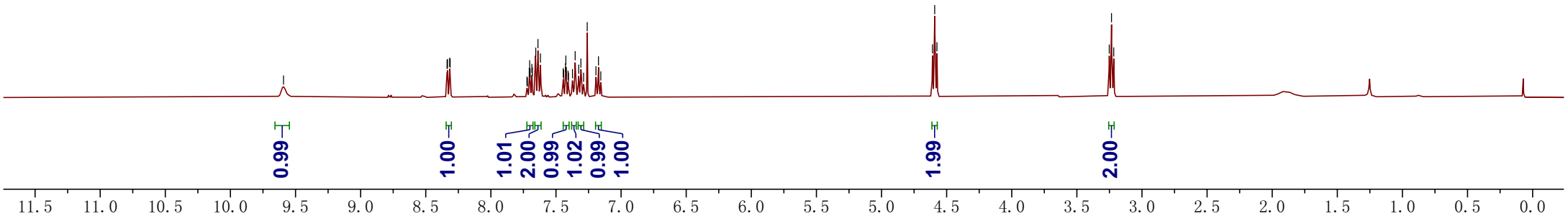
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10

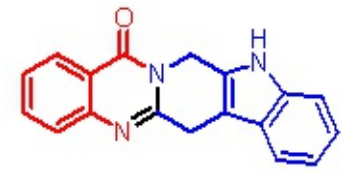
^{1}H NMR (400 MHz, $CDCl_3$)

9.592

8.336 8.333 8.316 8.313 7.723 7.719 7.705 7.702 7.699 7.685 7.681 7.655 7.638 7.619 7.444 7.441 7.427 7.424 7.421 7.407 7.404 7.373 7.353 7.326 7.309 7.288 7.260 7.193 7.174 7.156 4.609 4.592 4.574 3.251 3.234 3.217



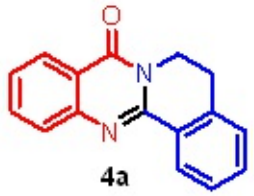




^{13}C NMR (100 MHz, $CDCl_3$)

161.74
147.53
145.28
138.49
134.53
127.40
127.23
126.62
126.38
125.71
125.69
121.26
120.72
120.20
118.61
112.27
77.48
77.16
76.84
41.29
19.79

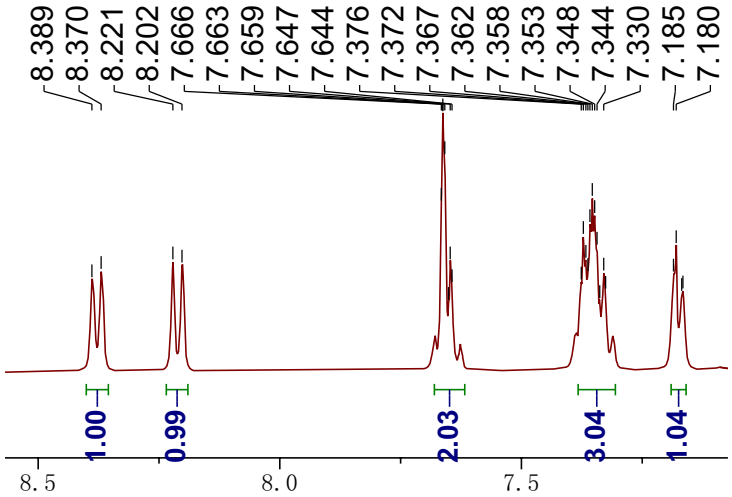
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10

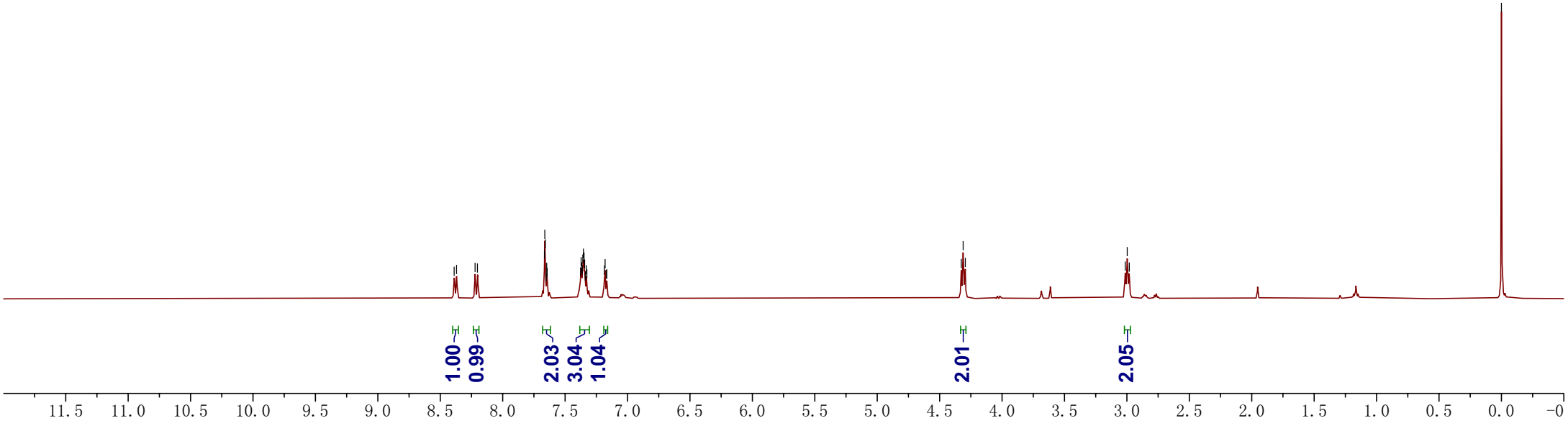


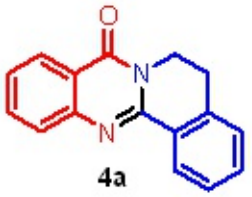
4a

^{1}H NMR (400 MHz, $CDCl_3$)

8.389 8.370 8.221 8.202 7.666 7.663 7.659 7.651 7.647 7.644 7.376 7.372 7.367 7.362 7.358 7.353 7.348 7.344 7.338 7.330 7.326 7.185 7.180 7.168 7.166 4.327 4.312 4.294 3.014 2.997 2.981 —0.000



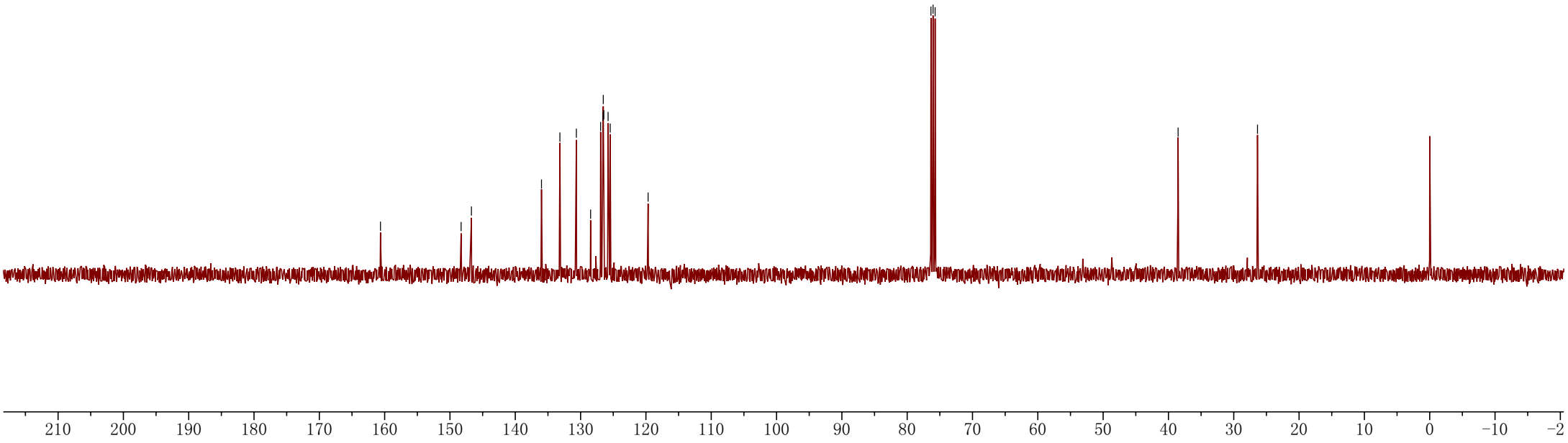


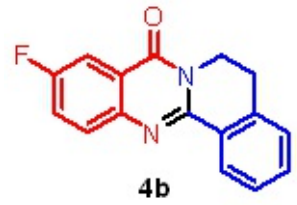


4a

^{13}C NMR (100 MHz, $CDCl_3$)

160.64
148.29
146.71
135.99
133.17
130.65
128.47
126.93
126.56
126.53
126.45
125.79
125.47
119.66
76.36
76.04
75.72
38.52
26.37

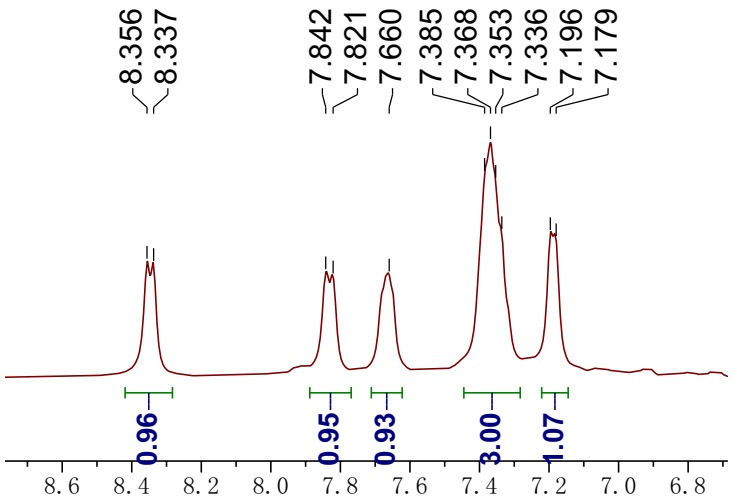


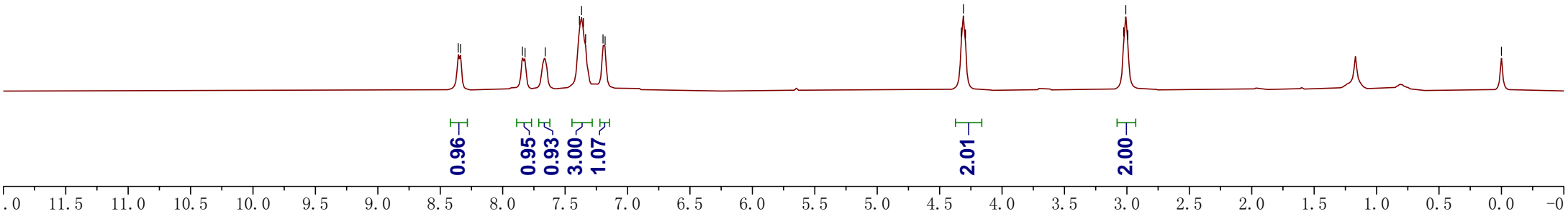


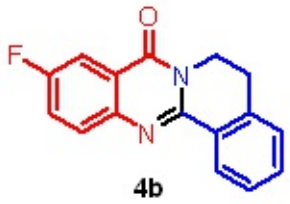
4b

^{1}H NMR (400 MHz, $CDCl_3$)

8.356
8.337
7.842
7.821
7.660
7.385
7.368
7.353
7.336
7.196
7.179
4.326
4.310
4.293
3.025
3.009
2.992
0.000

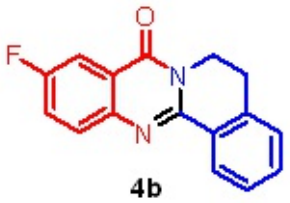






4b

^{13}C NMR (100 MHz, $CDCl_3$)



4b

^{19}F NMR (376 MHz, $CDCl_3$)

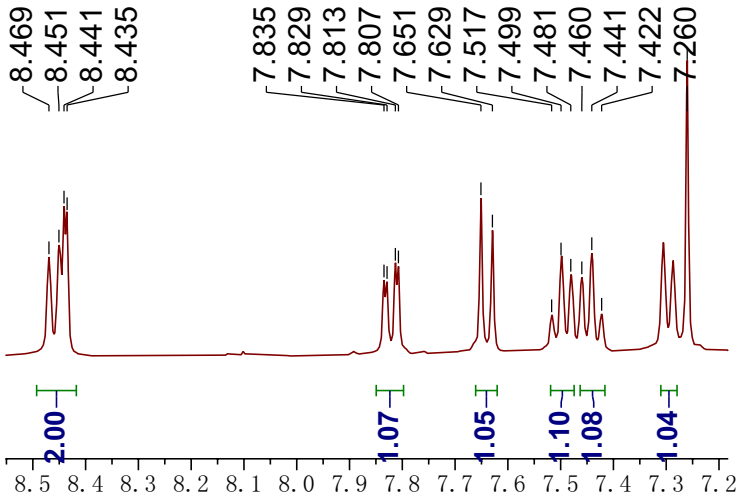
-112.98

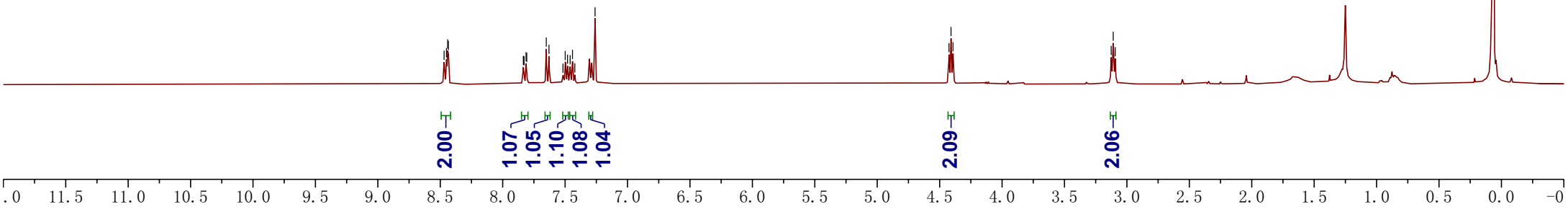
10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210

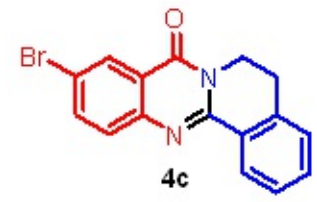
4c

^{1}H NMR (400 MHz, $CDCl_3$)

8.469 8.451 8.441 8.435 7.835 7.829 7.813 7.807 7.651 7.629 7.517 7.499 7.481 7.460 7.441 7.422 7.260 4.425 4.409 4.393 3.126 3.110 3.093





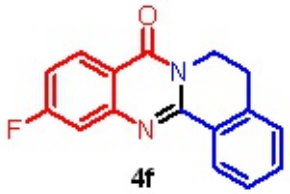


4c

^{13}C NMR (100 MHz, $CDCl_3$)

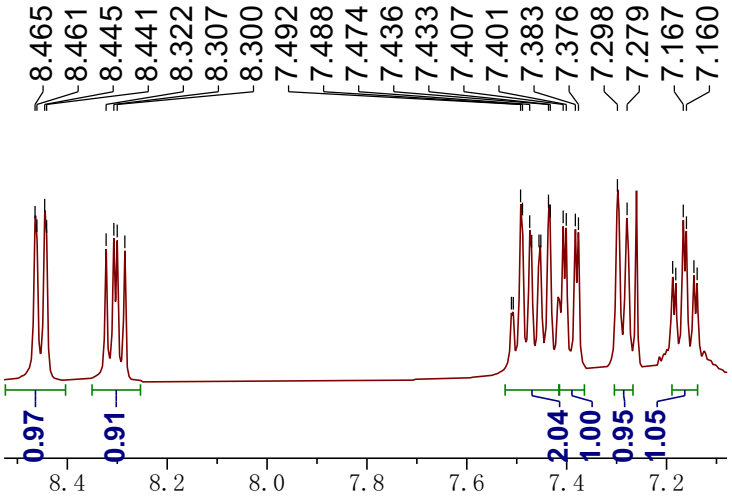
160.75
149.94
146.81
137.59
137.20
132.16
129.58
129.43
128.24
127.88
127.74
122.22
120.12
77.48
77.16
76.84
39.93
27.51

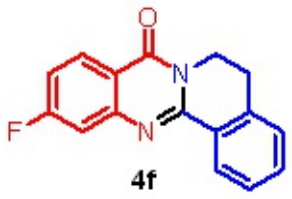
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10



4f

^{1}H NMR (400 MHz, $CDCl_3$)



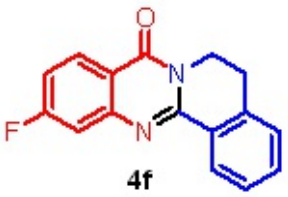


4f

^{13}C NMR (100 MHz, $CDCl_3$)

167.87
165.35
161.16
150.67
150.12
149.98
137.28
132.19
129.74
129.63
129.35
128.27
127.82
127.68
117.59
117.57
115.56
115.33
112.89
112.68
77.48
77.16
76.84
39.66
27.47

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10

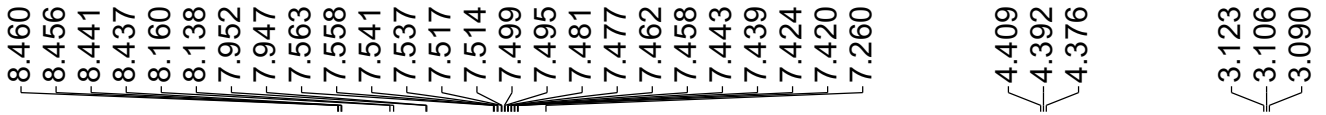


4f

^{19}F NMR (376 MHz, $CDCl_3$)

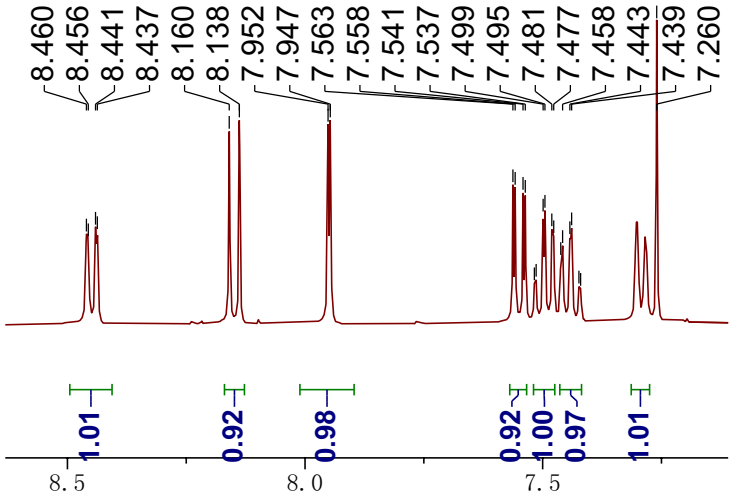
-103.85

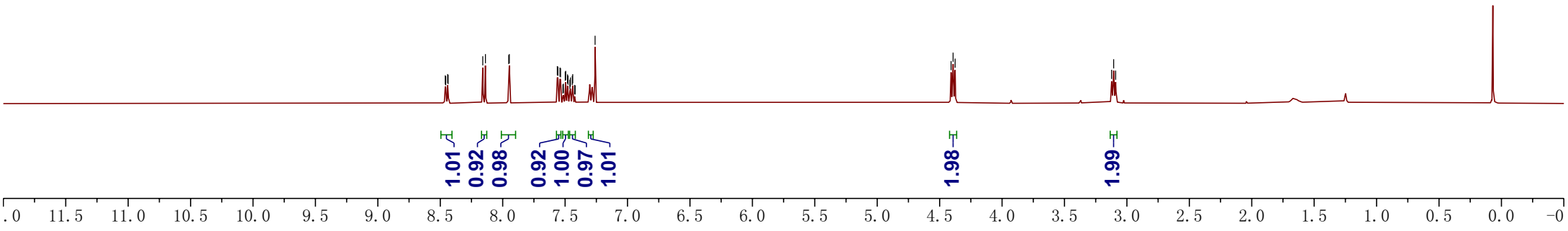
10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130 −140 −150 −160 −170 −180 −190 −200 −210

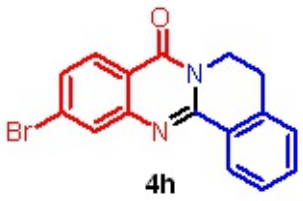


4h

^{1}H NMR (400 MHz, $CDCl_3$)





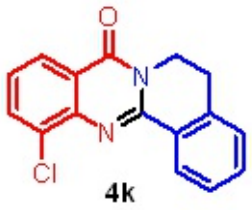


4h

^{13}C NMR (100 MHz, $CDCl_3$)

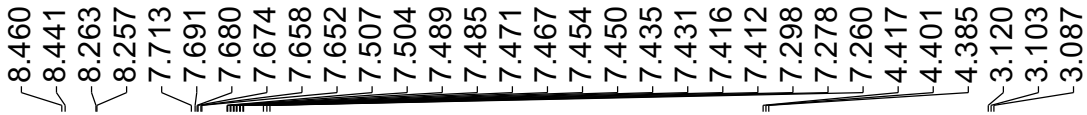
161.43
150.63
148.97
137.25
132.24
130.40
129.96
129.35
129.03
128.50
128.31
127.86
127.70
119.67
77.48
77.16
76.84
39.79
27.46

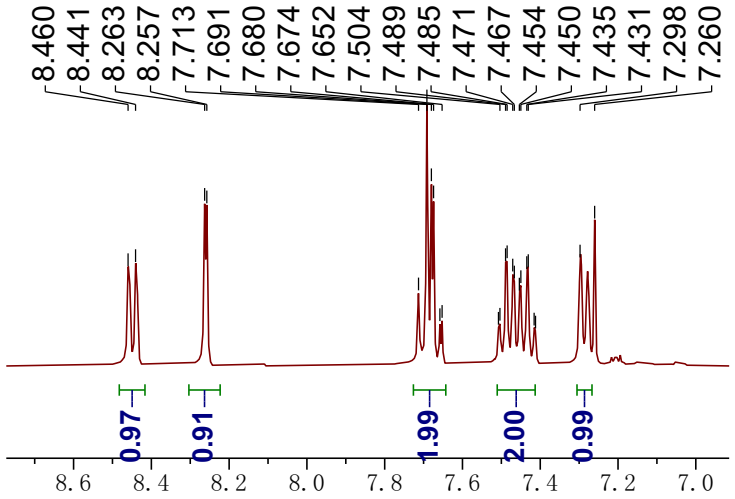
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10

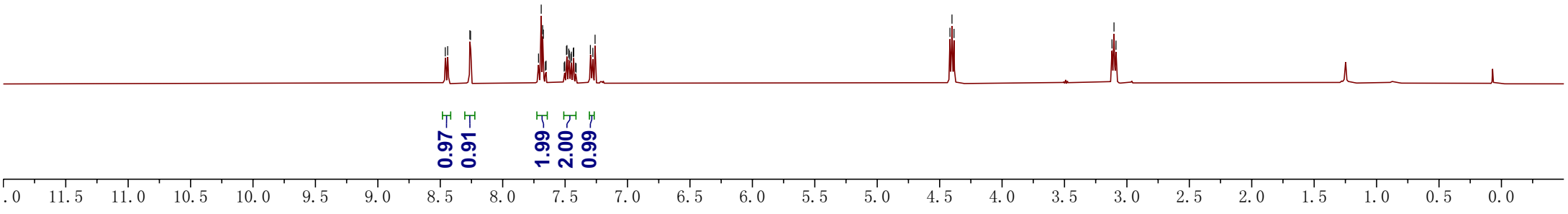


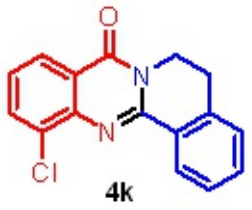
4k

^{1}H NMR (400 MHz, $CDCl_3$)







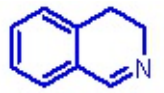


4k

^{13}C NMR (100 MHz, $CDCl_3$)

161.41
150.07
144.63
137.12
134.61
132.29
132.24
129.48
128.71
127.97
127.60
126.57
125.85
122.38
77.48
77.16
76.84
39.90
27.40

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10

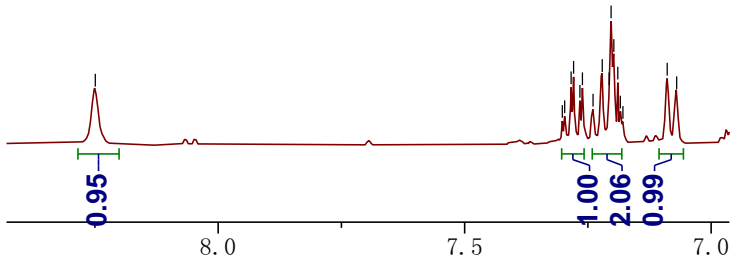


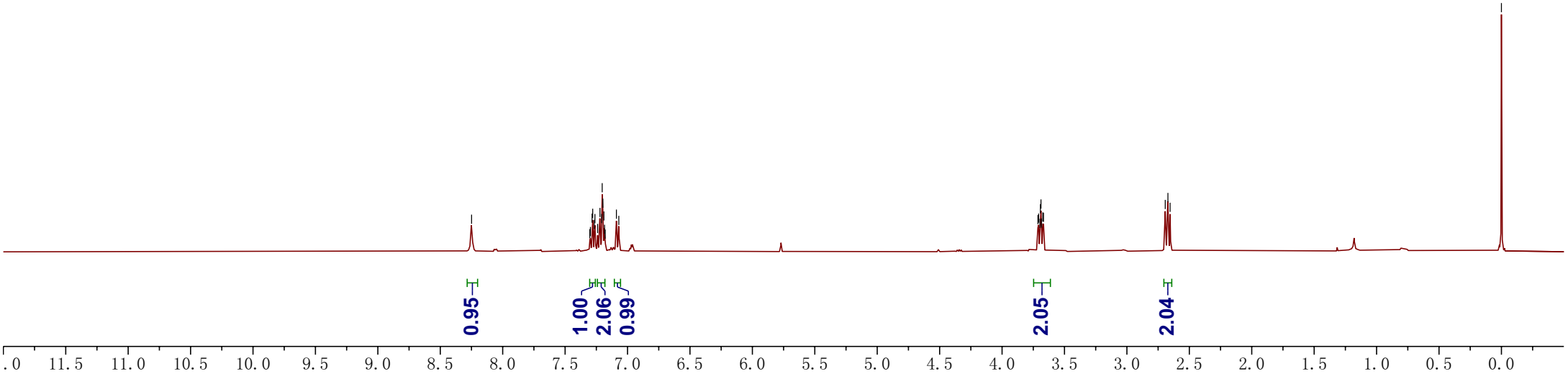
5

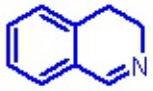
^{1}H NMR (400 MHz, $CDCl_3$)

8.249
7.302
7.297
7.284
7.279
7.266
7.261
7.240
7.221
7.207
7.203
7.197
7.189
7.184
7.179
7.089
7.070
3.713
3.707
3.697
3.693
3.688
3.684
3.674
3.668
2.693
2.671
2.654
0.000

8.249
7.302
7.297
7.284
7.279
7.266
7.261
7.240
7.221
7.207
7.203
7.197
7.189
7.184
7.179
7.089
7.070





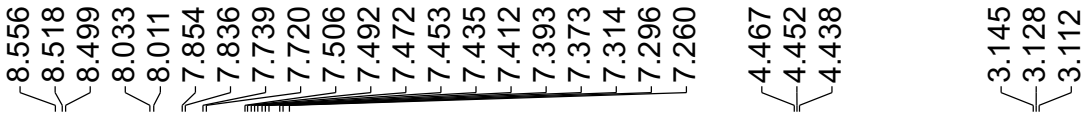


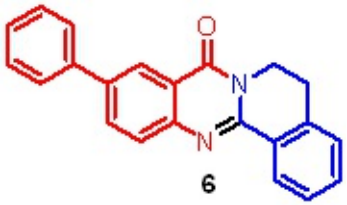
5

^{13}C NMR (100 MHz, $CDCl_3$)

160.14
136.09
130.86
128.26
127.23
127.00
126.88
77.48
77.16
76.84
47.17
24.80

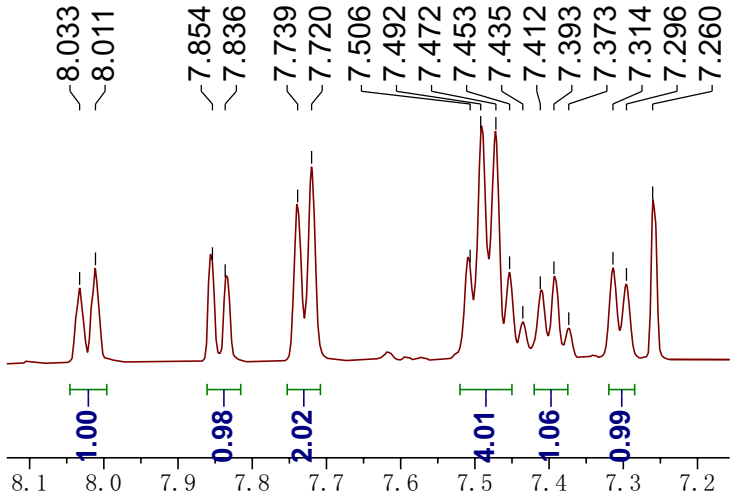
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10

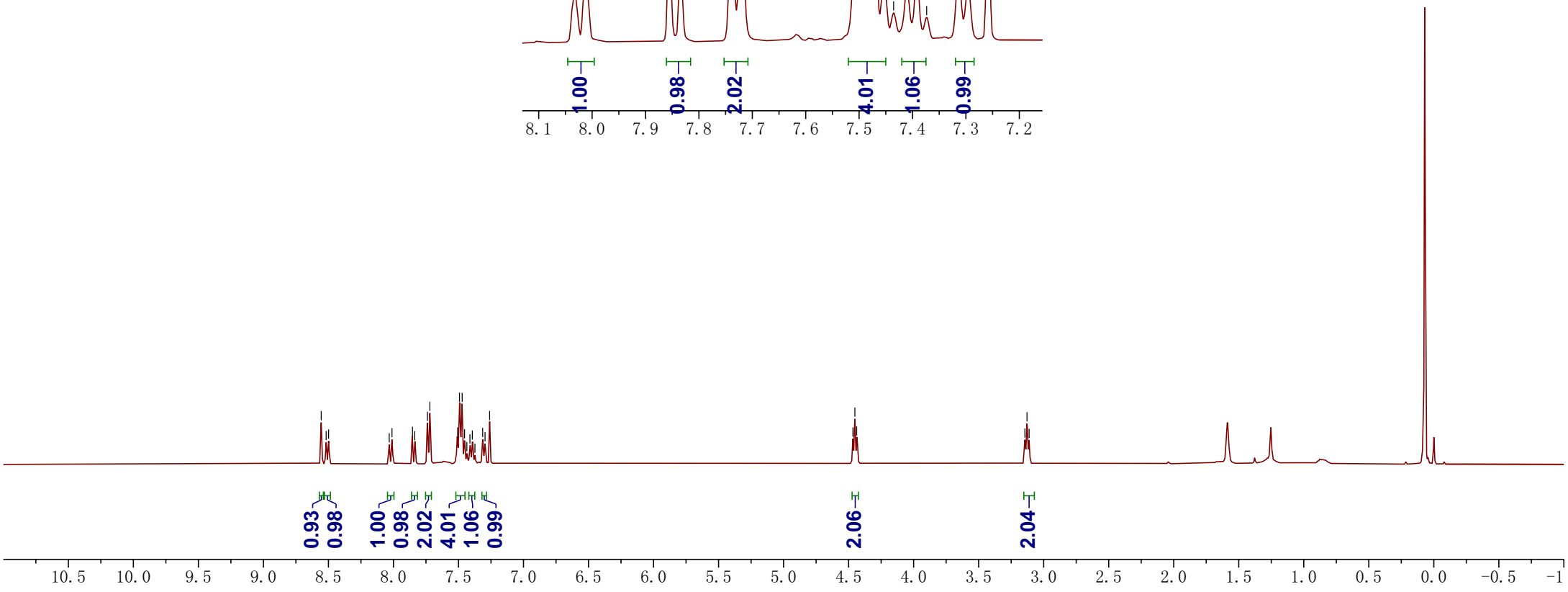


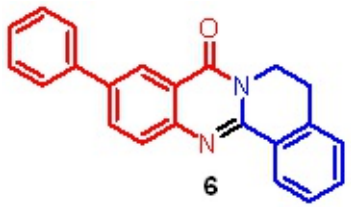


6

^{1}H NMR (400 MHz, $CDCl_3$)







6

^{13}C NMR (100 MHz, $CDCl_3$)

161.97
149.47
147.20
139.89
139.52
137.19
133.32
131.89
129.75
129.12
128.30
128.18
127.93
127.83
127.69
127.32
124.90
121.12
77.48
77.16
76.84
39.85
27.64

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10