

Supporting Information

Oxidative C5–H Amination of Imidazo[1,2-*a*]pyrimidine *via* Iodine Catalysis

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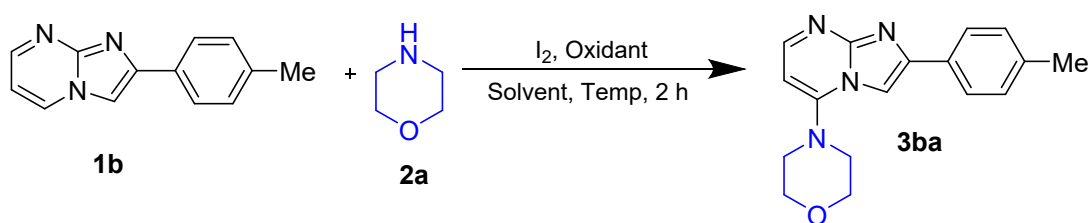
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1. General information

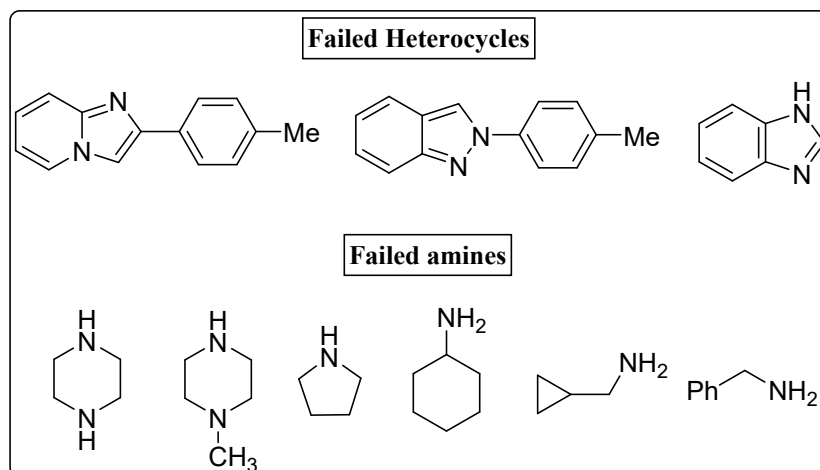
All reagents were commercially available and used without further purification. All the Imidazo[1,2-*a*]pyrimidine derivatives were prepared according to the literature procedure¹. TLC was done on silica gel coated glass slide. The column chromatography and thin layer chromatography (TLC) were done using DCM (Dichloromethane) and methanol as solvent combination except for compound **6a**, where combination of ethyl acetate and petroleum ether was used. ¹H NMR spectra were determined on 400 MHz spectrometer as solutions in DMSO-*d*₆ and CDCl₃. Chemical shifts are expressed in parts per million (δ) and the signals were reported as s (singlet), d (doublet), t (triplet), m (multiplet) and coupling constants (*J*) were given in Hz. ¹³C{¹H} NMR spectra were recorded at 100 MHz in CDCl₃ and DMSO-*d*₆. ¹⁹F NMR spectra were recorded at 376 MHz in CDCl₃ and DMSO-*d*₆. Chemical shifts as internal standards were referenced to and DMSO-*d*₆ (δ = 2.50 for ¹H and δ = 39.52 for ¹³C{¹H} NMR) and CDCl₃ (δ = 7.26 for ¹H and δ = 77.16 for ¹³C{¹H} NMR) as internal standard. High-resolution mass spectra (HRMS) were collected using electrospray ionization (ESI) on a time-of-flight (TOF) mass spectrometer. Melting points (M.P) were determined after recrystallization of the solid compounds from a solution of methanol/petroleum ether (1:3).

2 Optimization of the Reaction Conditions

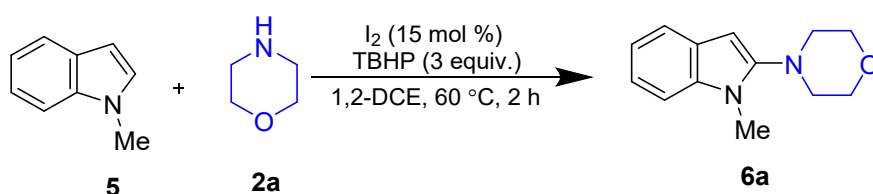
Table S1. Optimization of the Reaction Conditions



Entry	Temp (C)	I_2 (mol%)	Oxidant (3equiv.)	Solvent (2.0 mL)	Yield (%)
1	rt	15	TBHP	1,2-DCE	60
2	50	15	TBHP	1,2-DCE	72
3	60	15	TBHP	1,2-DCE	80, 78^a
4	70	15	TBHP	1,2-DCE	79
5	60	-	TBHP	1,2-DCE	nr
6	60	5	TBHP	1,2-DCE	65
7	60	10	TBHP	1,2-DCE	75
8	60	20	TBHP	1,2-DCE	80

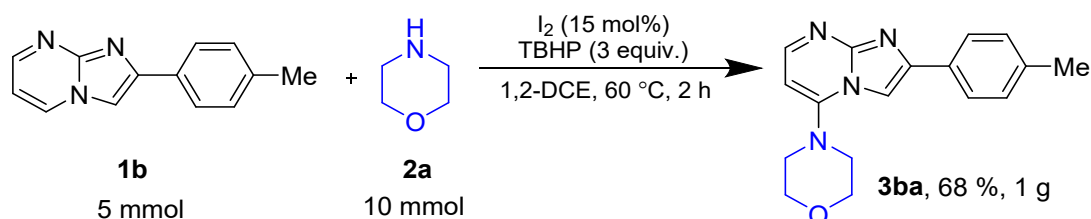


3.2 Typical experimental procedure for the compound 6a.



A mixture of N-methyl indole (0.25 mmol) (**5**), iodine (15 mol%) in 2mL 1,2-DCE were taken in an oven dried reaction tube. Then morpholine **2** (0.5 mmol) was added to the mixture followed by 3 equiv. of TBHP. The mixture was then allowed to stir at 60 °C for 2 h. After the completion, reaction mixture was quenched by saturated Na₂S₂O₃ solution and extracted with dichloromethane (DCM). The combined organic layers were dried over anhydrous Na₂SO₄ and concentrated under reduced pressure. The obtained residue was purified through column chromatography on silica gel using mixture of petroleum ether and ethyl acetate as eluent to give the product **6a**.

3.3 Large scale synthesis of 3ba

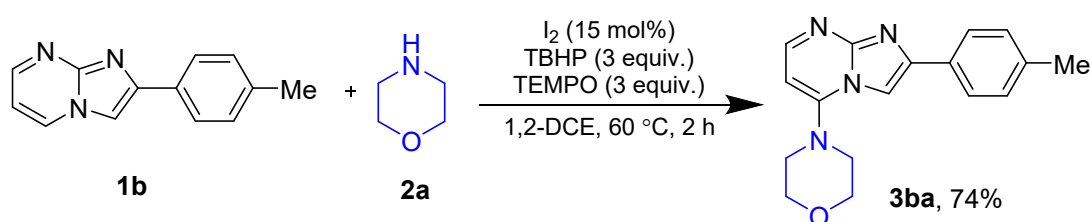


A mixture of 2-(*p*-tolyl)imidazo[1,2-*a*]pyrimidine **1b** (5 mmol, 1.04 g), iodine (15 mol%, 190 mg) in 2mL 1,2-DCE were taken in a pre-dried round bottom flask. Then morpholine **2a** (10 mmol, 870 mg) was added to the mixture followed by TBHP (15 mmol, 1.35 g). The mixture

was then allowed to stir at 60 °C for 2 h. After the completion, reaction mixture was quenched by saturated Na₂S₂O₃ solution and extracted with dichloromethane (DCM). The combined organic layers were dried over anhydrous Na₂SO₄ and concentrated under reduced pressure. The obtained residue was purified through column chromatography on silica gel using mixture of dichloromethane (DCM) and methanol (MeOH) as eluent to give the aminated product **3ba** (68%, 1 g).

3.4 Experimental procedures for mechanistic studies

3.4.1 Reactions in presence of radical scavengers



2-(*p*-tolyl)imidazo[1,2-*a*]pyrimidine **1b** (0.25 mmol), iodine (15 mol%) in 2 mL 1,2-DCE were taken in a pre-dried reaction tube. Then morpholine **2a** (0.5 mmol), TBHP (in decane, 3 equiv.), TEMPO (2,2,6,6-tetramethylpiperidine-1-oxyl) (3 equiv.) were added to the reaction mixture and allowed to stir at 60 °C for 2 h. After completion of the reaction, aminated product found in 74% yield.

In case of BHT (2,6-di-*tert*-butyl-4-methylphenol) as radical scavenger the product found in 52%.

3.4.2 Reactions with *N*-iodomorpholine hydroiodide (**7**)

N-iodomorpholine hydroiodide was prepared using morpholine and molecular iodine according to reported method.³

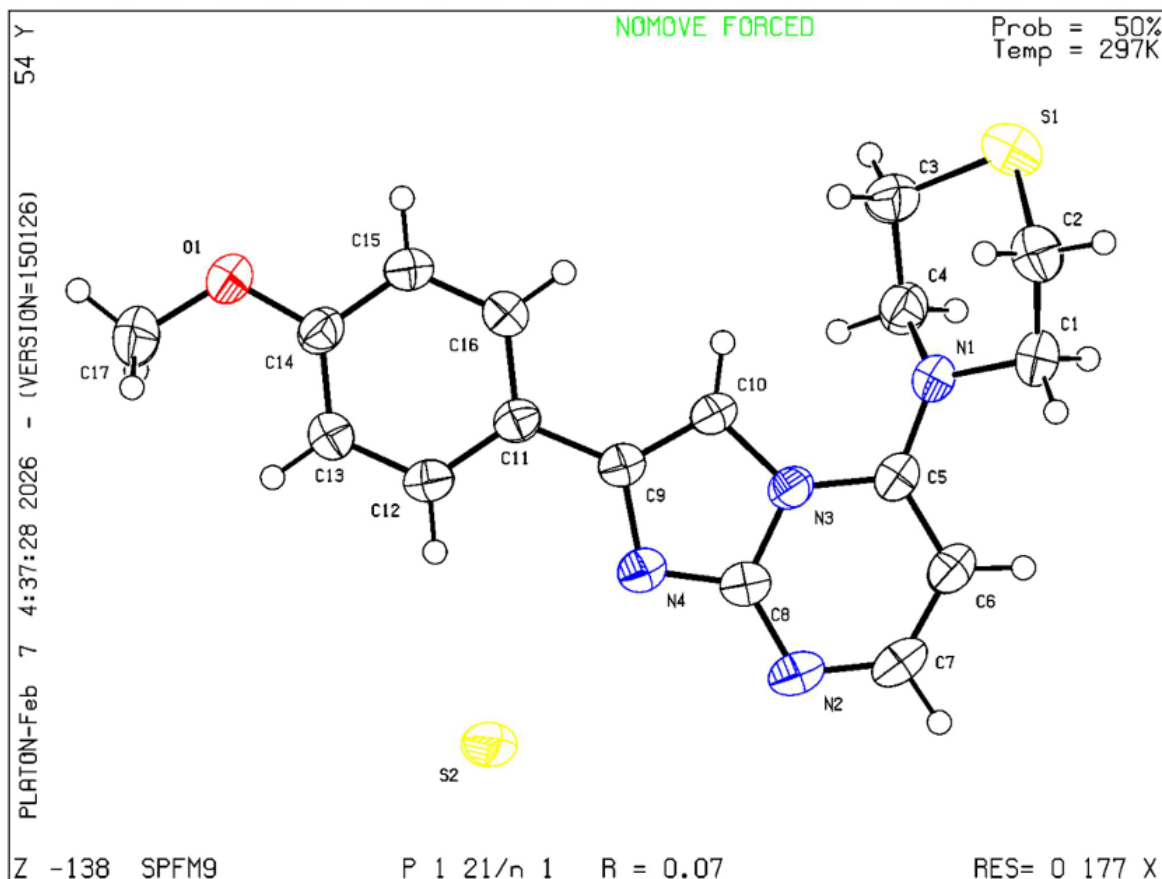
Entry 1: A mixture of 2-(*p*-tolyl)imidazo[1,2-*a*]pyrimidine **1b** (0.25 mmol), *N*-iodomorpholine hydroiodide **7** (0.50 mmol) were taken in 2 mL 1,2-DCE and stirred at 60 °C, under open atmosphere for 2 h.

Entry 2: A mixture of 2-(*p*-tolyl)imidazo[1,2-*a*]pyrimidine **1b** (0.25 mmol), *N*-iodomorpholine hydroiodide **7** (0.50 mmol), TBHP (in decane, 3equiv.) were taken in 2 mL 1,2-DCE and stirred at 60 °C, under open atmosphere for 2 h.

Entry 3: A mixture of 2-(*p*-tolyl)imidazo[1,2-*a*]pyrimidine **1b** (0.25 mmol), *N*-iodomorpholine hydroiodide **7** (0.2 equiv.), morpholine **2a** (0.50 mmol), TBHP (in decane, 3 equiv.) were taken in 2 mL 1,2-DCE and stirred at 60 °C, under open atmosphere for 2 h.

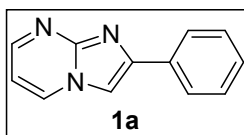
4. X-ray crystallographic data 4db:

Wavelength	0.71073 Å	
Formula	C ₁₇ H ₁₈ N ₄ OS ₂	
Crystal system	monoclinic	
Space group	P2 ₁ /n	
Unit cell dimensions	a = 8.3706(4) Å	α = 90°
	b = 20.1042(9) Å	β = 94.0050(10)°
	c = 10.0708(5) Å	γ = 90°
Volume	1690.62(14) Å ³	
Z	4	
R-factor (%)	6.85	

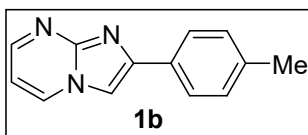


5. Characterization of the starting material and products

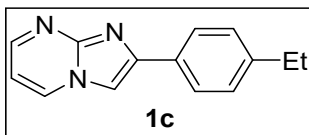
5.1 Characterization of the starting material



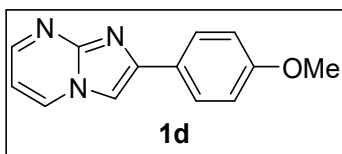
2-phenylimidazo[1,2-a]pyrimidine (1a)^{1,2}: Creamy colored solid; ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.96 (d, *J* = 5.2 Hz, 1H), 8.52 (s, 1H), 8.38 (s, 1H), 8.00 (d, *J* = 7.6 Hz, 2H), 7.46 (d, *J* = 6.8 Hz, 2H), 7.36 (d, *J* = 7.2 Hz, 1H), 7.05 (s, 1H).



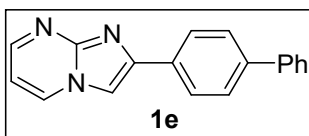
2-(*p*-tolyl)imidazo[1,2-a]pyrimidine (1b)²: Creamy colored solid; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.36-9.35 (m, 1H), 8.96 (d, *J* = 2.8 Hz, 1H), 8.79 (s, 1H), 7.96 (d, *J* = 8.0 Hz, 2H), 7.62-7.60 (m, 1H), 7.36 (d, *J* = 8.4 Hz, 2H), 2.36 (s, 3H).



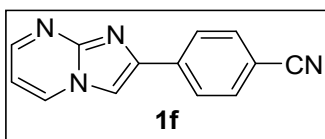
2-(4-ethylphenyl)imidazo[1,2-a]pyrimidine (1c): Creamy colored solid; M.p. 183-185 °C ; ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.95 (d, *J* = 5.2 Hz, 1H), 8.50 (s, 1H), 8.33 (s, 1H), 7.91 (d, *J* = 7.2 Hz, 2H), 7.29 (d, *J* = 6.8 Hz, 2H), 7.04 (t, *J* = 5.2 Hz, 1H), 2.66-2.60 (m, 2H), 1.19 (t, *J* = 7.2 Hz, 3H); ¹³C{¹H} NMR (100 MHz, DMSO-*d*₆): δ 150.2, 148.0, 145.5, 144.0, 135.0, 130.9, 128.3, 125.8, 108.9, 107.2, 28.0, 15.6; HRMS (ESI-TOF) *m/z*: [M + H]⁺ Calcd for C₁₄H₁₃N₃: 224.1182; found: 224.1145.



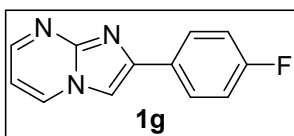
2-(4-methoxyphenyl)imidazo[1,2-a]pyrimidine (1d)^{1,2}: Creamy colored solid; ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.94 (d, *J* = 6.4 Hz, 1H), 8.49 (s, 1H), 8.28 (s, 1H), 7.94 (d, *J* = 8.4 Hz, 2H), 7.27-7.20 (m, 1H), 7.04 (d, *J* = 8.8 Hz, 1H), 3.80 (s, 3H).



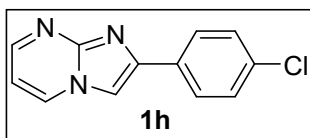
2-(1,1'-biphenyl-4-yl)imidazo[1,2-a]pyrimidine (1e): Creamy colored solid; M.p. 234-236 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.98 (d, *J* = 6.0 Hz, 1H), 8.54 (s, 1H), 8.45 (s, 1H), 8.10 (d, *J* = 8.0 Hz, 1H), 7.79-7.73 (m, 3H), 7.48 (t, *J* = 7.6 Hz, 1H), 7.39 (d, *J* = 7.2 Hz, 1H), 7.30-7.17 (m, 3H), 7.08-7.06 (t, *J* = 5.2 Hz, 1H); ¹³C{¹H} NMR (100 MHz, DMSO-*d*₆): δ 150.5, 148.1, 144.9, 139.8, 139.7, 135.1, 132.5, 129.0, 127.6, 127.1, 126.6, 126.3, 109.0, 107.8; HRMS (ESI-TOF) *m/z*: [M + H]⁺ Calcd for C₁₈H₁₃N₃: 272.1182; found: 272.1144.



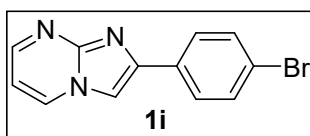
4-(imidazo[1,2-a]pyrimidin-2-yl)benzonitrile (1f): Creamy colored solid; M.p. above 250 °C ; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.00 (d, *J* = 5.2 Hz, 1H), 8.57 (s, 1H), 8.19 (d, *J* = 7.6 Hz, 2H), 7.92 (d, *J* = 7.6 Hz, 2H), 7.27 (s, 1H), 7.10 (s, 1H); ¹³C{¹H} NMR (100 MHz, DMSO-*d*₆): δ 151.5, 148.2, 143.2, 138.0, 135.5, 132.9, 126.3, 119.0, 110.3, 109.7, 109.4; HRMS (ESI-TOF) *m/z*: [M + H]⁺ Calcd for C₁₃H₈N₄: 221.0822; found: 221.0785.



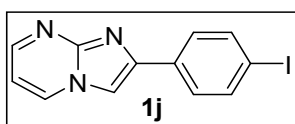
2-(4-fluorophenyl)imidazo[1,2-a]pyrimidine (1g)^{1,2}: Creamy colored solid; ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.96 (d, *J* = 6.0 Hz, 1H), 8.52 (s, 1H), 8.36 (s, 1H), 8.03 (d, *J* = 6.4 Hz, 2H), 7.28 (d, *J* = 8.4 Hz, 2H), 7.05 (d, *J* = 5.2 Hz, 1H).



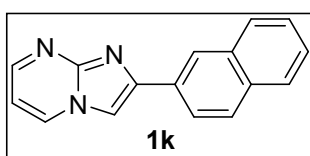
2-(4-chlorophenyl)imidazo[1,2-a]pyrimidine (1h)²: Creamy colored solid; ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.98 (d, *J* = 6.0 Hz, 1H), 8.53 (s, 1H), 8.44 (s, 1H), 8.02 (d, *J* = 8.4 Hz, 2H), 7.52 (d, *J* = 8.0 Hz, 2H), 7.08-7.05 (t, *J* = 5.6 Hz, 1H).



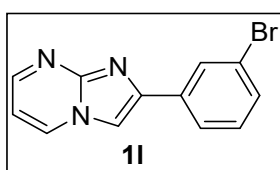
2-(4-iodophenyl)imidazo[1,2-a]pyrimidine (1i)²: Creamy colored solid; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.00-8.97 (m, 1H), 8.54-8.53 (m, 1H), 8.44 (s, 1H), 7.95 (d, *J* = 8.4 Hz, 2H), 7.66 (d, *J* = 8.4 Hz, 2H), 7.08-7.05 (m, 1H).



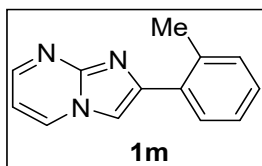
2-(4-iodophenyl)imidazo[1,2-a]pyrimidine (1j): Creamy colored solid; M.p. 248-250 °C ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.96 (d, *J* = 6.0 Hz, 1H), 8.53 (s, 1H), 8.42 (s, 1H), 7.81 (s, 1H), 7.31-7.19 (m, 2H), 7.06 (s, 1H); ¹³C{¹H} NMR (100 MHz, DMSO-*d*₆): δ 150.7, 148.1, 144.2, 137.6, 135.2, 133.0, 127.8, 109.1, 108.0, 94.5; HRMS (ESI-TOF) *m/z*: [M + H]⁺ Calcd for C₁₂H₈IN₃: 321.9836; found: 321.9800.



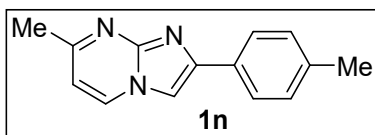
2-(naphthalen-2-yl)imidazo[1,2-a]pyrimidine (1k): Creamy colored solid; M.p. 220-222 °C ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.01 (s, 1H), 8.59-8.54 (m, 2H), 8.12 (s, 1H), 8.01-7.94 (m, 2H), 7.53-7.41 (m, 2H), 7.28-7.16 (m, 3H); ¹³C{¹H} NMR (100 MHz, DMSO-*d*₆): δ 150.8, 148.1, 144.9, 135.3, 133.2, 132.9, 130.7, 128.4, 128.3, 127.7, 126.6, 126.3, 124.5, 123.9, 109.1, 108.2; HRMS (ESI-TOF) *m/z*: [M + H]⁺ Calcd for C₁₆H₁₁N₃: 246.1026; found: 246.0989.



2-(3-bromophenyl)imidazo[1,2-a]pyrimidine (1l): Creamy colored solid; M.p. 208-210 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.01-8.98 (m, 1H), 8.55-8.54 (m, 1H), 8.50 (s, 1H), 8.18 (s, 1H), 7.99 (d, *J* = 8.0 Hz, 1H), 7.54 (d, *J* = 8.0 Hz, 1H), 7.43 (d, *J* = 7.6 Hz, 1H), 7.09-7.06 (m, 1H); ¹³C{¹H} NMR (100 MHz, DMSO-*d*₆): δ 151.0, 148.0, 143.5, 135.8, 135.4, 131.1, 130.9, 128.2, 124.7, 122.3, 109.26, 108.5; HRMS (ESI-TOF) *m/z*: [M + H]⁺ Calcd for C₁₂H₈BrN₃: 273.9974; found: 273.9940.

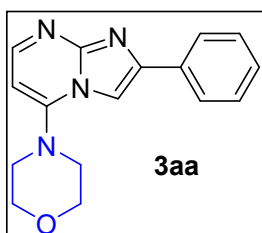


2-(*o*-tolyl)imidazo[1,2-a]pyrimidine (1m): Creamy colored solid; M.p. 128-130 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.96-8.93 (m, 1H), 8.54-8.53 (m, 1H), 8.16 (s, 1H), 7.91-7.88 (m, 1H), 7.30-7.28 (m, 2H), 7.07-7.04 (m, 1H), 2.53 (s, 3H); ¹³C{¹H} NMR (100 MHz, DMSO-*d*₆): δ 150.8, 147.4, 145.2, 135.7, 135.2, 132.9, 131.3, 129.4, 128.2, 126.3, 110.3, 109.1, 21.7; HRMS (ESI-TOF) *m/z*: [M + H]⁺ Calcd for C₁₃H₁₁N₃: 210.1026; found: 210.0986.

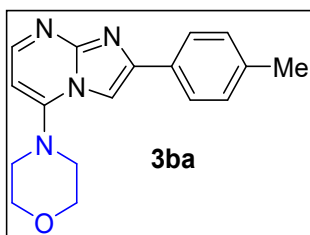


7-methyl-2-(*p*-tolyl)imidazo[1,2-a]pyrimidine (1n): Creamy colored solid; M.p. 224-226 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.76 (d, *J* = 6.8 Hz, 1H), 8.19 (s, 1H), 7.83 (d, *J* = 8.0 Hz, 2H), 7.25 (d, *J* = 8.0 Hz, 2H), 6.93 (d, *J* = 7.2 Hz, 1H), 2.51 (s, 3H), 2.32 (s, 3H); ¹³C{¹H} NMR (100 MHz, DMSO-*d*₆): δ 160.1, 148.2, 144.8, 137.7, 134.4, 130.9, 129.6, 125.7, 109.8, 106.7, 24.7, 21.1; HRMS (ESI-TOF) *m/z*: [M + H]⁺ Calcd for C₁₄H₁₃N₃: 224.1182; found: 224.1161.

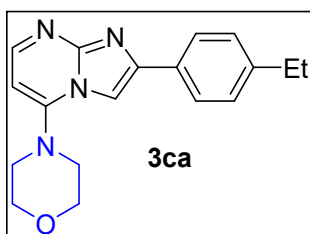
5.2 Characterization of the products



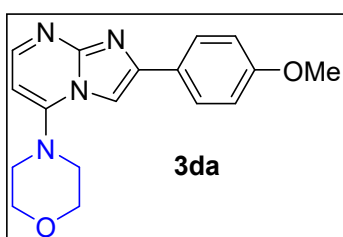
4-(2-phenylimidazo[1,2-a]pyrimidin-5-yl)morpholine (3aa): Light yellow solid (79%, 55 mg); *R_f* = 0.60 (DCM/MeOH = 96 : 4); M.p. 96-98 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 8.52 (d, *J* = 5.2 Hz, 1H), 8.34 (s, 1H), 8.12 (d, *J* = 7.6 Hz, 2H), 7.50 (t, *J* = 7.6 Hz, 2H), 7.42 (t, *J* = 7.6 Hz, 1H), 6.74 (t, *J* = 5.2 Hz, 1H), 3.87 (t, *J* = 4.4 Hz, 4H), 3.38 (t, *J* = 4.8 Hz, 4H); ¹³C{¹H} NMR (100 MHz, CDCl₃): δ 151.0, 150.7, 146.4, 133.0, 130.2, 128.8, 128.7, 126.4, 102.9, 95.7, 66.3, 49.0; HRMS (ESI-TOF) *m/z*: [M + H]⁺ Calcd for C₁₆H₁₆N₄O: 281.1397; found: 281.1393.



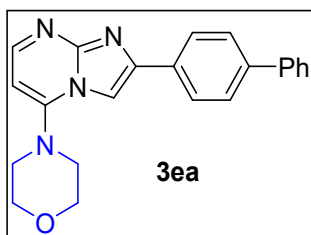
4-(2-(p-tolyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3ba): Light yellow solid (80%, 59 mg); $R_f = 0.60$ (DCM/MeOH = 96 : 4); M.p. 147-149 °C; $^1\text{H NMR}$ (400 MHz, DMSO- d_6): δ 8.47 (d, $J = 4.8$ Hz, 1H), 8.25 (s, 1H), 8.00 (d, $J = 7.6$ Hz, 2H), 7.30 (d, $J = 8.0$ Hz, 2H), 6.68 (d, $J = 4.8$ Hz, 1H), 3.87 (t, $J = 4.4$ Hz, 4H), 3.36 (t, $J = 4.0$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 150.9, 150.7, 150.0, 144.7, 137.5, 130.7, 129.2, 125.9, 104.0, 95.5, 65.7, 48.4, 20.9; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{17}\text{H}_{18}\text{N}_4\text{O}$: 295.1553; found: 295.1562.



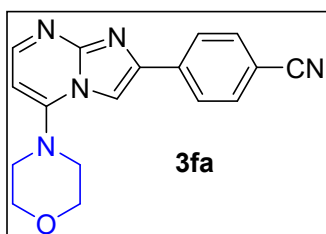
4-(2-(4-ethylphenyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3ca): Light yellow solid (77%, 59 mg); $R_f = 0.60$ (DCM/MeOH = 96 : 4); M.p. 152-154 °C; $^1\text{H NMR}$ (400 MHz, DMSO- d_6): δ 8.39 (d, $J = 4.8$ Hz, 1H), 8.19 (s, 1H), 8.02 (d, $J = 8.0$ Hz, 2H), 7.29 (d, $J = 8.0$ Hz, 2H), 6.55 (d, $J = 4.8$ Hz, 1H), 3.87 (t, $J = 4.4$ Hz, 4H), 3.30 (t, $J = 4.4$ Hz, 4H), 2.67-2.61 (m, 2H), 1.21 (t, $J = 7.6$ Hz, 3H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 150.9, 150.7, 150.0, 144.5, 143.9, 130.8, 128.0, 126.0, 104.0, 95.5, 65.7, 48.4, 28.0, 15.5; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{18}\text{H}_{20}\text{N}_4\text{O}$: 309.1710; found: 309.1719.



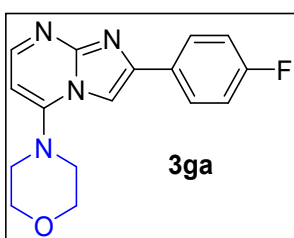
4-(2-(4-methoxyphenyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3da): Yellow solid (84%, 65 mg); $R_f = 0.50$ (DCM/MeOH = 96 : 4); M.p. 102-104 °C; $^1\text{H NMR}$ (400 MHz, CDCl_3): δ 8.39 (d, $J = 4.8$ Hz, 1H), 7.95 (d, $J = 8.8$ Hz, 2H), 7.53 (s, 1H), 6.96 (d, $J = 8.8$ Hz, 2H), 6.27 (d, $J = 4.8$ Hz, 1H), 3.97 (t, $J = 4.8$ Hz, 4H), 3.84 (s, 3H), 3.29 (t, $J = 4.8$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, CDCl_3): δ 160.0, 150.8, 150.7, 150.6, 146.3, 127.6, 125.8, 114.2, 101.9, 95.5, 66.3, 55.4, 48.8; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{17}\text{H}_{18}\text{N}_4\text{O}_2$: 311.1503; found: 311.1495.



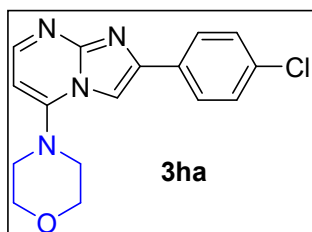
4-(2-((1,1'-biphenyl)-4-yl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3ea): Light yellow solid (82%, 73 mg); $R_f = 0.60$ (DCM/MeOH = 96 : 4); M.p. 189-191 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.42 (d, $J = 4.8$ Hz, 1H), 8.31 (s, 1H), 8.22 (d, $J = 8.4$ Hz, 2H), 7.77 (d, $J = 8.4$ Hz, 2H), 7.74 (d, $J = 7.6$ Hz, 2H), 7.48 (t, $J = 8.0$ Hz, 2H), 7.38 (t, $J = 7.2$ Hz, 1H), 6.56 (d, $J = 4.8$ Hz, 1H), 3.88 (t, $J = 4.4$ Hz, 4H), 3.31 (t, $J = 4.4$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 151.0, 150.1, 144.0, 139.79, 139.75, 132.5, 129.0, 127.6, 126.9, 126.6, 104.7, 95.7, 65.7, 48.4; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{22}\text{H}_{20}\text{N}_4\text{O}$: 357.1710; found: 357.1691.



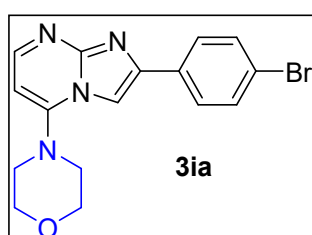
4-(5-morpholinoimidazo[1,2-a]pyrimidin-2-yl)benzonitrile (3fa): Light yellow solid (71%, 54 mg); $R_f = 0.50$ (DCM/MeOH = 96 : 4); M.p. 186-188 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.46 (s, 1H), 8.44 (s, 1H), 8.31 (d, $J = 8.4$ Hz, 2H), 7.92 (d, $J = 8.4$ Hz, 2H), 6.58 (d, $J = 4.8$ Hz, 1H), 3.87 (s, 4H), 3.31 (s, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 152.0, 151.4, 150.3, 142.4, 138.0, 132.7, 126.6, 119.1, 110.3, 106.7, 96.0, 65.7, 48.6; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{17}\text{H}_{15}\text{N}_5\text{O}$: 306.1349; found: 306.1320.



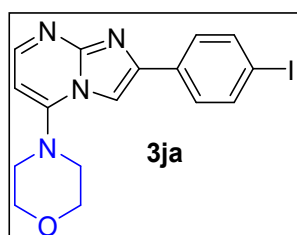
4-(2-(4-fluorophenyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3ga): Yellow solid (76%, 57 mg); $R_f = 0.50$ (DCM/MeOH = 96 : 4); M.p. 100-102 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.40 (d, $J = 4.8$ Hz, 1H), 8.22 (s, 1H), 8.17-8.14 (m, 2H), 7.29 (t, $J = 8.8$ Hz, 2H), 6.55 (d, $J = 5.2$ Hz, 1H), 3.87 (t, $J = 4.8$ Hz, 4H), 3.29 (t, $J = 4.4$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 162.2 (d, $J_{\text{C-F}} = 244.0$ Hz), 151.0 (d, $J_{\text{C-F}} = 5$ Hz), 150.1, 143.6, 130.0 (d, $J_{\text{C-F}} = 3$ Hz), 128.0 (d, $J_{\text{C-F}} = 9$ Hz), 115.5 (d, $J_{\text{C-F}} = 21$ Hz), 104.3, 95.6, 65.7, 48.4; ^{19}F NMR (376 MHz, DMSO- d_6): δ -113.8; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{16}\text{H}_{15}\text{FN}_4\text{O}$: 299.1303; found: 299.1313.



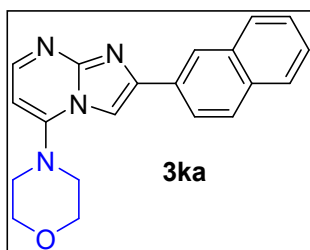
4-(2-(4-chlorophenyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3ha): Yellow solid (74%, 58 mg); $R_f = 0.50$ (DCM/MeOH = 96 : 4); M.p. 139-141 °C; $^1\text{H NMR}$ (400 MHz, CDCl_3): δ 8.45 (d, $J = 6.0$ Hz, 1H), 7.97 (d, $J = 8.4$ Hz, 2H), 7.63 (s, 1H), 7.40 (d, $J = 8.8$ Hz, 2H), 6.32 (d, $J = 4.8$ Hz, 1H), 3.99 (t, $J = 4.8$ Hz, 4H), 3.31 (t, $J = 4.8$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, CDCl_3): δ 151.2, 151.0, 150.7, 145.2, 134.4, 131.7, 129.0, 127.6, 103.0, 95.8, 66.3, 48.9; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{16}\text{H}_{15}\text{ClN}_4\text{O}$: 315.1007; found: 315.0982.



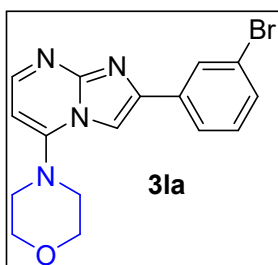
4-(2-(4-bromophenyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3ia): Yellow solid (74%, 66 mg); $R_f = 0.50$ (DCM/MeOH = 96 : 4); M.p. 160-162 °C; $^1\text{H NMR}$ (400 MHz, $\text{DMSO-}d_6$): δ 8.47 (d, $J = 5.2$ Hz, 1H), 8.34 (s, 1H), 8.07 (d, $J = 8.4$ Hz, 2H), 7.68 (d, $J = 8.4$ Hz, 2H), 6.66 (d, $J = 5.2$ Hz, 1H), 3.87 (t, $J = 4.4$ Hz, 4H), 3.35 (t, $J = 4.4$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$): δ 152.1, 151.3, 149.3, 141.4, 131.7, 131.3, 128.1, 121.8, 105.4, 96.6, 65.6, 48.5; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{16}\text{H}_{15}\text{BrN}_4\text{O}$: 359.0502; found: 359.0485.



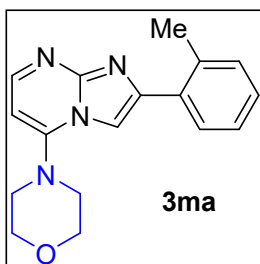
4-(2-(4-iodophenyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3ja): Light yellow solid (72%, 73 mg); $R_f = 0.60$ (DCM/MeOH = 96 : 4); M.p. 182-184 °C; $^1\text{H NMR}$ (400 MHz, $\text{DMSO-}d_6$): δ 8.41 (d, $J = 4.8$ Hz, 1H), 8.29 (s, 1H), 7.93 (d, $J = 8.4$ Hz, 2H), 7.81 (d, $J = 8.4$ Hz, 2H), 6.55 (d, $J = 4.8$ Hz, 1H), 3.87 (t, $J = 4.4$ Hz, 4H), 3.29 (t, $J = 4.4$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$): δ 151.14, 151.10, 150.1, 143.6, 137.3, 133.1, 128.0, 104.8, 95.6, 94.2, 65.7, 48.4; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{16}\text{H}_{15}\text{IN}_4\text{O}$: 407.0363; found: 407.0352.



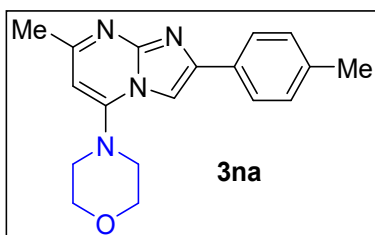
4-(2-(naphthalen-2-yl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3ka): Light yellow solid (81%, 67 mg); $R_f = 0.60$ (DCM/MeOH = 96 : 4); M.p. 188-190 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.66 (s, 1H), 8.45 (d, $J = 5.2$ Hz, 1H), 8.39 (s, 1H), 8.30-8.27 (m, 1H), 8.01-7.99 (m, 2H), 7.94 (d, $J = 7.6$ Hz, 1H), 7.56-7.50 (m, 2H), 6.59 (d, $J = 4.8$ Hz, 1H), 3.90 (t, $J = 4.4$ Hz, 4H), 3.34 (t, $J = 4.4$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 151.3, 151.1, 150.1, 144.0, 133.2, 132.9, 130.6, 128.2, 128.1, 127.7, 126.5, 126.2, 124.5, 124.3, 105.1, 95.8, 65.7, 48.5; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{20}\text{H}_{18}\text{N}_4\text{O}$: 331.1553; found: 331.1531.



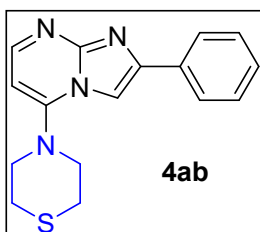
4-(2-(2-bromophenyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3la): Light yellow solid (73%, 65 mg); M.p. 101-103 °C; $R_f = 0.50$ (DCM/MeOH = 96 : 4); ^1H NMR (400 MHz, DMSO- d_6): δ 8.44 (d, $J = 5.2$ Hz, 1H), 8.36 (s, 1H), 8.32 (s, 1H), 8.13 (d, $J = 7.6$ Hz, 1H), 7.54 (d, $J = 8.0$ Hz, 1H), 7.43 (t, $J = 8.0$ Hz, 1H), 6.59 (d, $J = 5.2$ Hz, 1H), 3.88 (t, $J = 4.4$ Hz, 4H), 3.31 (t, $J = 4.4$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 151.6, 151.3, 149.9, 142.3, 135.5, 130.98, 130.93, 128.4, 125.0, 122.2, 105.5, 96.0, 65.7, 48.5; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{16}\text{H}_{15}\text{BrN}_4\text{O}$: 359.0502; found: 359.0482.



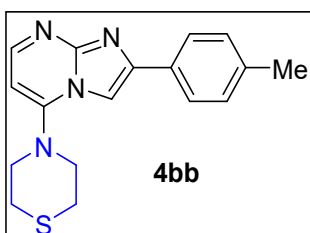
4-(2-(o-tolyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3ma): Light yellow solid (81%, 60 mg); $R_f = 0.60$ (DCM/MeOH = 96 : 4); M.p. 100-102 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.43 (d, $J = 5.2$ Hz, 1H), 7.88 (s, 1H), 7.82 (t, $J = 5.2$ Hz, 1H), 7.30-7.27 (m, 3H), 6.57 (d, $J = 4.8$ Hz, 1H), 3.84 (t, $J = 4.4$ Hz, 4H), 3.30 (t, $J = 4.0$ Hz, 4H), 2.55 (s, 1H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 150.9, 149.4, 145.0, 135.9, 133.0, 131.0, 129.7, 128.0, 125.9, 106.5, 95.5, 65.7, 48.5, 21.4; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{17}\text{H}_{18}\text{N}_4\text{O}$: 295.1553; found: 295.1534.



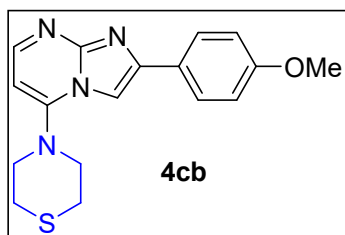
4-(7-methyl-2-(p-tolyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (3na): Light yellow solid (78%, 60 mg); $R_f = 0.50$ (DCM/MeOH = 98 : 2); M.p. 174-176 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.07 (s, 1H), 7.96 (d, $J = 7.6$ Hz, 2H), 7.24 (d, $J = 8.0$ Hz, 2H), 6.43 (s, 1H), 3.85 (t, $J = 4.4$ Hz, 4H), 3.25 (t, $J = 4.4$ Hz, 4H), 2.47 (s, 3H), 2.32 (s, 3H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 160.2, 150.5, 149.9, 144.2, 137.3, 130.9, 129.2, 125.8, 103.5, 95.8, 65.7, 48.5, 24.6, 20.9; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{18}\text{H}_{20}\text{N}_4\text{O}$: 309.1710; found: 309.1691.



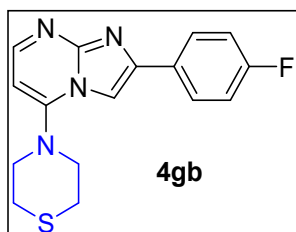
4-(2-phenylimidazo[1,2-a]pyrimidin-5-yl)thiomorpholine (4ab): Yellow solid (77%, 57 mg); $R_f = 0.60$ (DCM/MeOH = 98 : 3); M.p. 108-110 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.40 (d, $J = 4.8$ Hz, 1H), 8.10 (d, $J = 7.2$ Hz, 2H), 8.08 (s, 1H), 7.45 (t, $J = 8.0$ Hz, 2H), 7.34 (t, $J = 7.6$ Hz, 1H), 6.57 (d, $J = 5.2$ Hz, 1H), 3.51 (t, $J = 4.8$ Hz, 4H), 2.91 (t, $J = 4.8$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 151.5, 151.1, 150.1, 144.5, 133.4, 128.7, 128.3, 126.1, 104.2, 96.6, 50.8, 26.4; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{16}\text{H}_{16}\text{N}_4\text{S}$: 297.1168; found: 297.1137.



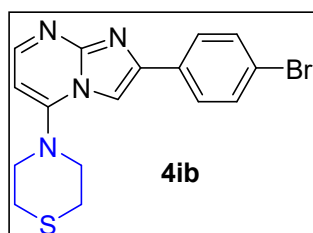
4-(2-(p-tolyl)imidazo[1,2-a]pyrimidin-5-yl)thiomorpholine (4bb): Yellow solid (78%, 60 mg); $R_f = 0.60$ (DCM/MeOH = 97 : 3); M.p. 144-146 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.41 (d, $J = 4.8$ Hz, 1H), 8.06 (s, 1H), 8.00 (d, $J = 8.0$ Hz, 2H), 7.27 (d, $J = 8.0$ Hz, 2H), 6.60 (d, $J = 4.8$ Hz, 1H), 3.52 (t, $J = 4.8$ Hz, 4H), 2.92 (t, $J = 4.8$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 151.4, 151.1, 149.7, 143.9, 137.7, 130.1, 129.2, 125.9, 103.8, 96.8, 50.7, 26.3, 20.9; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{17}\text{H}_{18}\text{N}_4\text{S}$: 311.1325; found: 311.1298.



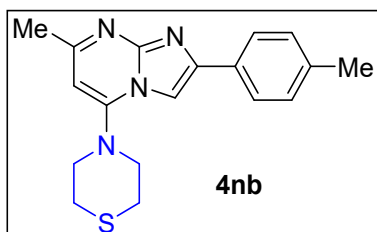
4-(2-(4-methoxyphenyl)imidazo[1,2-a]pyrimidin-5-yl)thiomorpholine (4cb): Yellow solid (82%, 67 mg); $R_f = 0.50$ (DCM/MeOH = 97 : 3); M.p. 103-105 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.38 (d, $J = 4.8$ Hz, 1H), 8.04 (d, $J = 8.8$ Hz, 2H), 7.99 (s, 1H), 7.01 (d, $J = 8.8$ Hz, 2H), 6.56 (d, $J = 4.8$ Hz, 1H), 3.80 (s, 3H), 3.50 (t, $J = 5.2$ Hz, 4H), 2.91 (t, $J = 4.8$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 159.4, 151.3, 150.6, 150.0, 144.5, 127.4, 125.9, 114.1, 103.1, 96.5, 55.2, 50.7, 26.4; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{17}\text{H}_{18}\text{N}_4\text{OS}$: 327.1274; found: 327.1257.



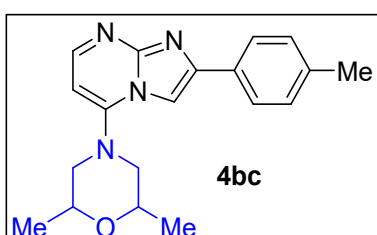
4-(2-(4-fluorophenyl)imidazo[1,2-a]pyrimidin-5-yl)thiomorpholine (4gb): Yellow solid (72%, 56 mg); $R_f = 0.50$ (DCM/MeOH = 97 : 3); M.p. 183-185 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.46 (d, $J = 5.2$ Hz, 1H), 8.17-8.15 (m, 2H), 8.13 (s, 1H), 7.34-7.30 (m, 2H), 6.68 (d, $J = 5.2$ Hz, 1H), 3.54 (s, 4H), 2.91 (t, $J = 4.4$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 162.4 (d, $J_{\text{C-F}} = 243$ Hz), 152.0, 151.7, 149.3, 141.6, 128.6, 128.3 (d, $J_{\text{C-F}} = 9$ Hz), 115.7 (d, $J_{\text{C-F}} = 22$ Hz), 104.6, 97.6, 50.8, 26.3; ^{19}F NMR (376 MHz, CDCl_3): δ -112.5; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{16}\text{H}_{15}\text{FN}_4\text{S}$: 315.1074; found: 315.1056.



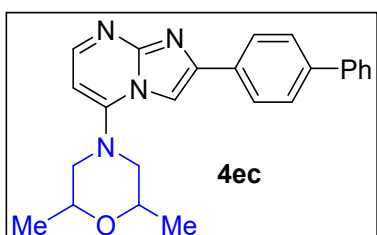
4-(2-(4-bromophenyl)imidazo[1,2-a]pyrimidin-5-yl)thiomorpholine (4ib): Yellow solid (71%, 67 mg); M.p. 200-202 °C $R_f = 0.50$ (DCM/MeOH = 97 : 3); ^1H NMR (400 MHz, DMSO- d_6): δ 8.59 (d, $J = 5.6$ Hz, 1H), 8.27 (s, 1H), 7.99 (d, $J = 8.4$ Hz, 2H), 7.74 (d, $J = 8.8$ Hz, 2H), 6.94 (d, $J = 5.6$ Hz, 1H), 3.69 (s, 4H), 2.89 (s, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 155.2, 152.6, 147.6, 136.3, 132.5, 128.8, 127.6, 123.8, 106.8, 100.7, 51.4, 26.4; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{16}\text{H}_{15}\text{BrN}_4\text{S}$: 375.0274; found: 375.0246.



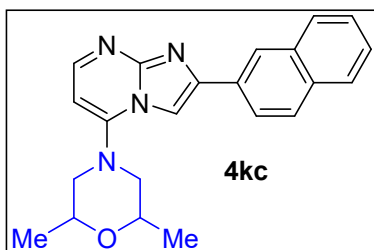
4-(2-(4-bromophenyl)imidazo[1,2-a]pyrimidin-5-yl)thiomorpholine (4nb): Yellow solid (76%, 62 mg); $R_f = 0.60$ (DCM/MeOH = 97 : 3); M.p. 194-196 °C; $^1\text{H NMR}$ (400 MHz, DMSO- d_6): δ 8.17 (s, 1H), 7.96 (d, $J = 8.0$ Hz, 1H), 7.34 (d, $J = 8.0$ Hz, 2H), 6.93 (s, 1H), 3.62 (s, 4H), 2.91 (s, 4H), 2.57 (s, 3H), 2.36 (s, 3H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 165.6, 151.6, 146.8, 139.7, 136.2, 129.8, 126.3, 125.2, 105.2, 100.7, 51.1, 26.2, 24.6, 21.1; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{18}\text{H}_{20}\text{N}_4\text{S}$: 325.1481; found: 325.1448.



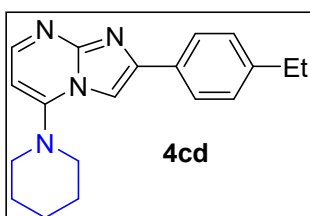
2,6-dimethyl-4-(2-(p-tolyl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (4bc): Light yellow solid (75%, 60 mg); $R_f = 0.50$ (DCM/MeOH = 96 : 4); M.p. 90-92 °C; $^1\text{H NMR}$ (400 MHz, DMSO- d_6): δ 8.35 (d, $J = 5.2$ Hz, 1H), 8.16 (s, 1H), 8.00 (d, $J = 8.0$ Hz, 2H), 7.25 (d, $J = 7.6$ Hz, 2H), 6.51 (d, $J = 4.8$ Hz, 1H), 3.93-3.89 (m, 2H), 3.59-3.56 (m, 2H), 2.60-2.49 (m, 2H), 2.33 (s, 3H), 1.16 (d, $J = 6.0$ Hz, 6H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 150.7, 150.6, 150.1, 144.6, 137.5, 130.7, 129.2, 126.0, 104.0, 95.7, 70.6, 53.2, 21.0, 18.6; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{19}\text{H}_{22}\text{N}_4\text{O}$: 323.1866; found: 323.1854.



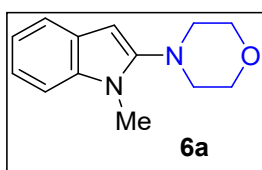
4-(2-([1,1'-biphenyl]-4-yl)imidazo[1,2-a]pyrimidin-5-yl)-2,6-dimethylmorpholine (4ec): Light yellow solid (80%, 77 mg); $R_f = 0.50$ (DCM/MeOH = 96 : 4); M.p. 108-110 °C; $^1\text{H NMR}$ (400 MHz, DMSO- d_6): δ 8.42 (d, $J = 5.2$ Hz, 1H), 8.32 (s, 1H), 8.22 (d, $J = 8.0$ Hz, 2H), 7.78 (d, $J = 8.4$ Hz, 2H), 7.74 (d, $J = 7.6$ Hz, 2H), 7.48 (t, $J = 8.0$ Hz, 2H), 7.38 (t, $J = 7.6$ Hz, 1H), 6.59 (d, $J = 5.2$ Hz, 1H), 3.94-3.91 (m, 2H), 3.64-3.61 (m, 2H), 2.65-2.60 (m, 2H), 1.18 (d, $J = 6.0$ Hz, 6H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 151.2, 150.8, 150.0, 143.4, 139.9, 139.7, 132.1, 129.0, 127.6, 126.9, 126.7, 126.6, 104.9, 96.2, 70.6, 53.3, 18.7; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{24}\text{H}_{24}\text{N}_4\text{O}$: 385.2023; found: 385.2003.



2,6-dimethyl-4-(2-(naphthalen-2-yl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (4kc): Light yellow solid (76%, 68 mg); $R_f = 0.50$ (DCM/MeOH = 96 : 4); M.p. 100-102 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.65 (s, 1H), 8.41 (d, $J = 4.8$ Hz, 1H), 8.35 (s, 1H), 8.29 (d, $J = 8.8$ Hz, 2H), 8.02-7.97 (m, 2H), 7.93 (d, $J = 7.6$ Hz, 1H), 7.55-7.49 (m, 2H), 6.56 (d, $J = 4.8$ Hz, 1H), 3.96-3.93 (m, 2H), 3.63-3.61 (m, 2H), 2.65-2.59 (m, 2H), 1.18 (d, $J = 6.0$ Hz, 6H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 151.1, 150.8, 150.3, 144.4, 133.2, 132.9, 131.0, 128.2, 128.0, 127.7, 126.5, 126.2, 124.6, 124.5, 105.1, 95.9, 70.6, 53.3, 18.7; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{22}\text{H}_{22}\text{N}_4\text{O}$: 359.1866; found: 359.1837.



2,6-dimethyl-4-(2-(naphthalen-2-yl)imidazo[1,2-a]pyrimidin-5-yl)morpholine (4cd): Light yellow solid (55%, 42 mg); $R_f = 0.60$ (DCM/MeOH = 96 : 4); M.p. 78-80 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 8.35 (d, $J = 4.8$ Hz, 1H), 8.01 (s, 1H), 7.99 (s, 2H), 7.28 (d, $J = 8.0$ Hz, 2H), 6.48 (d, $J = 5.2$ Hz, 1H), 3.24 (s, 4H), 2.66-2.60 (m, 2H), 1.77 (s, 4H), 1.67-1.66 (m, 2H), 1.20 (t, $J = 7.6$ Hz, 3H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6): δ 154.9, 152.2, 146.7, 146.4, 134.9, 128.6, 126.6, 124.3, 106.1, 100.1, 49.8, 28.1, 24.9, 23.4, 15.4; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{19}\text{H}_{22}\text{N}_4$: 307.1917; found: 307.1902.

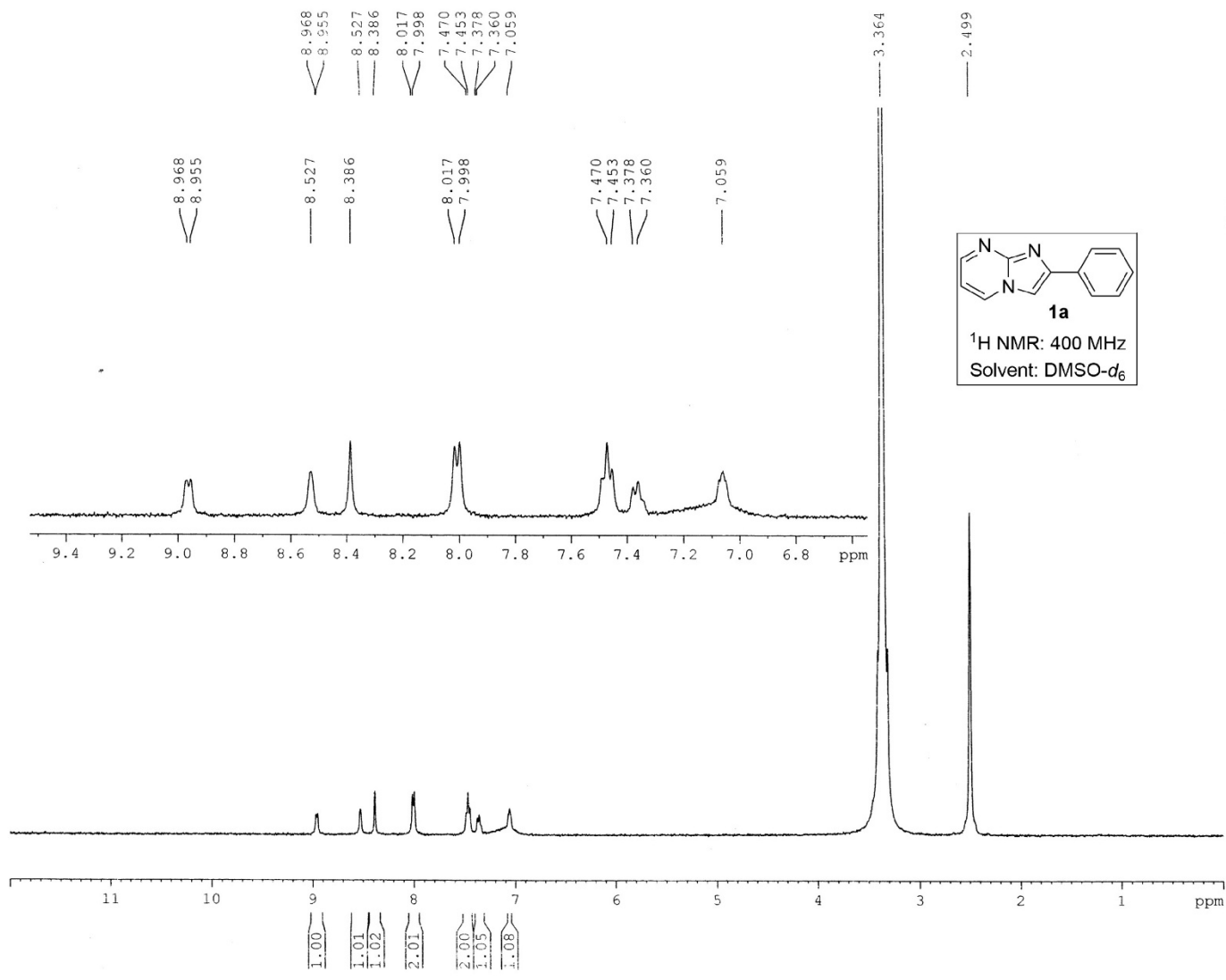


4-(1-methyl-1H-indol-2-yl)morpholine (6a):⁴ Light yellow solid (76%, 41 mg); $R_f = 0.40$ (PE : EA = 15 : 75); M.p. 92-94 °C; ^1H NMR (400 MHz, CDCl_3): δ 7.51 (d, $J = 7.6$ Hz, 1H), 7.24 (d, $J = 8.0$ Hz, 1H), 7.15 (t, $J = 7.6$ Hz, 1H), 7.09 (t, $J = 7.6$ Hz, 1H), 5.95 (s, 1H), 3.90 (t, $J = 4.4$ Hz, 4H), 3.63 (s, 3H), 3.03 (t, $J = 4.8$ Hz, 4H); $^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, CDCl_3): δ 150.0, 135.3, 127.5, 120.4, 119.7, 119.5, 108.8, 86.9, 66.9, 52.8, 29.1; HRMS (ESI-TOF) m/z : $[\text{M} + \text{H}]^+$ Calcd for $\text{C}_{14}\text{H}_{10}\text{N}_2\text{O}$: 217.1335; found: 217.1324.

6. References

1. A. Kamal, G. B. Kumar, V. L. Nayak, V. S. Reddy, A. B. Shaik, and M. K. Reddy, *Med. Chem. Commun.*, 2015, **6**, 606–612.
2. (a) D. Xu, B. Liu, and M. Zheng, *J. Chem. Res.*, **2003**(10), 645–647; (b) D. T. Hurst and J. A. Saldanha., *Heterocycles*. 1977, **6**, 929.
3. T. Froehr, C. P. Sindlinger, U. Kloeckner, P. Finkbeiner, and B. J. Nachtsheim., *Org. Lett.* 2011, **13**, 3754–3757.
4. Y. X. Li, K. G. Ji, H. X. Wang, S. Ali, and Y. M. Liang., *J. Org. Chem*, 2011, **76**, 744–747.

7. NMR Spectra for the Synthesized Products

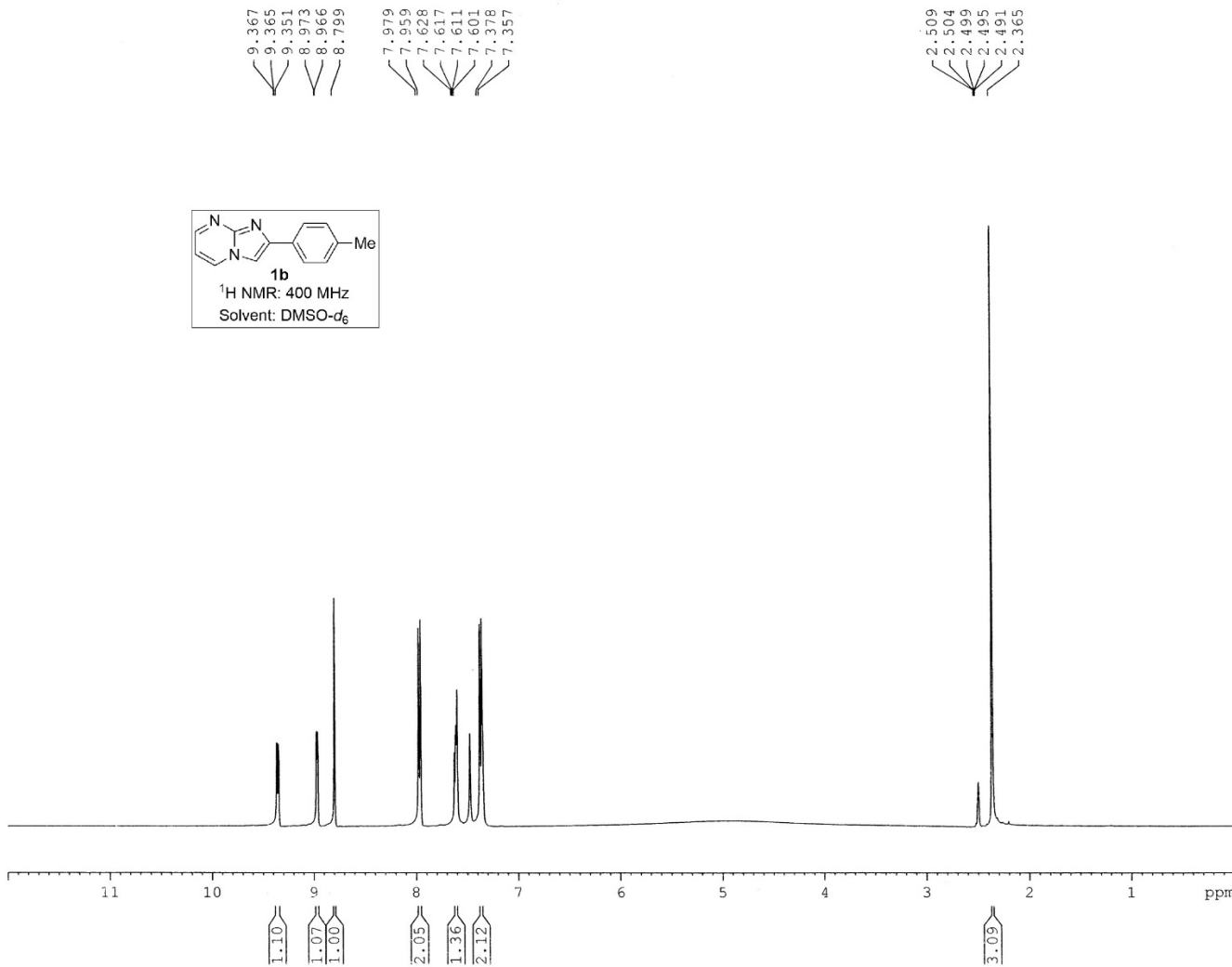


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EXPNO 308
PROCNO 1

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PULPROG zg30
TD 32768
SOLVENT DMSO
NS 8
DS 2
SWH 8223.685 Hz
FIDRES 0.250967 Hz
AQ 1.9922944 sec
RG 168.31
DW 60.800 usec
DE 6.50 usec
TE 291.1 K
D1 1.00000000 sec
TDO 1

==== CHANNEL f1 =====
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NUC1 1H
P1 14.75 usec
PLW1 12.00000000 W

F2 - Processing parameters
SI 16384
SF 400.1500029 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



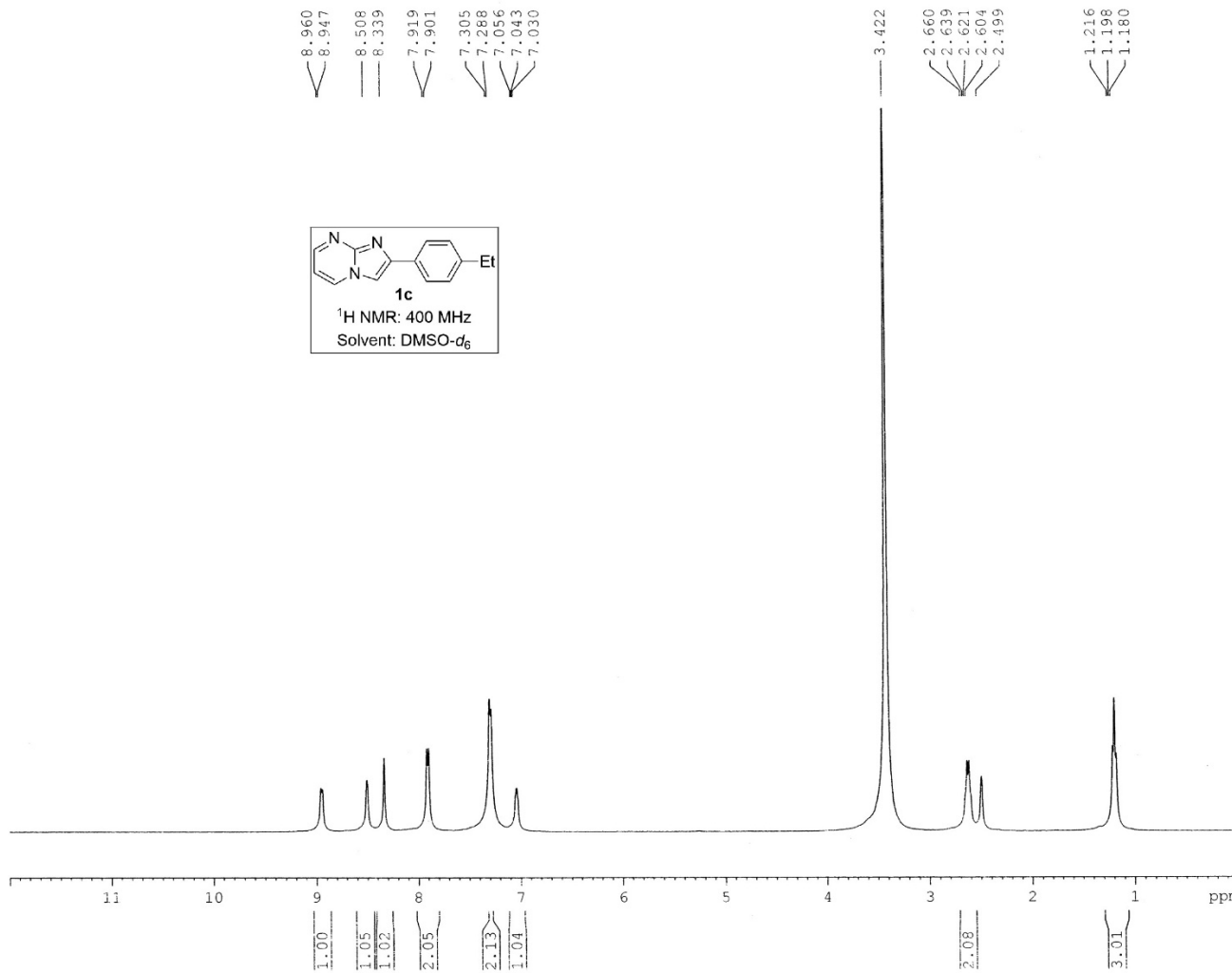
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EXPNO     113
PROCNO    1

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PULPROG   zg30
TD        32768
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NS         8
DS         2
SWH        8223.685 Hz
FIDRES     0.250967 Hz
AQ         1.9922944 sec
RG         62.69
DW         60.800 usec
DE         6.50 usec
TE         294.0 K
D1         1.00000000 sec
TD0        1

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NUC1       1H
P1         14.75 usec
PLW1       12.00000000 W

F2 - Processing parameters
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WDW        EM
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LB         0.30 Hz
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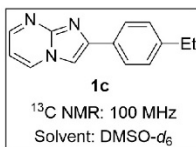
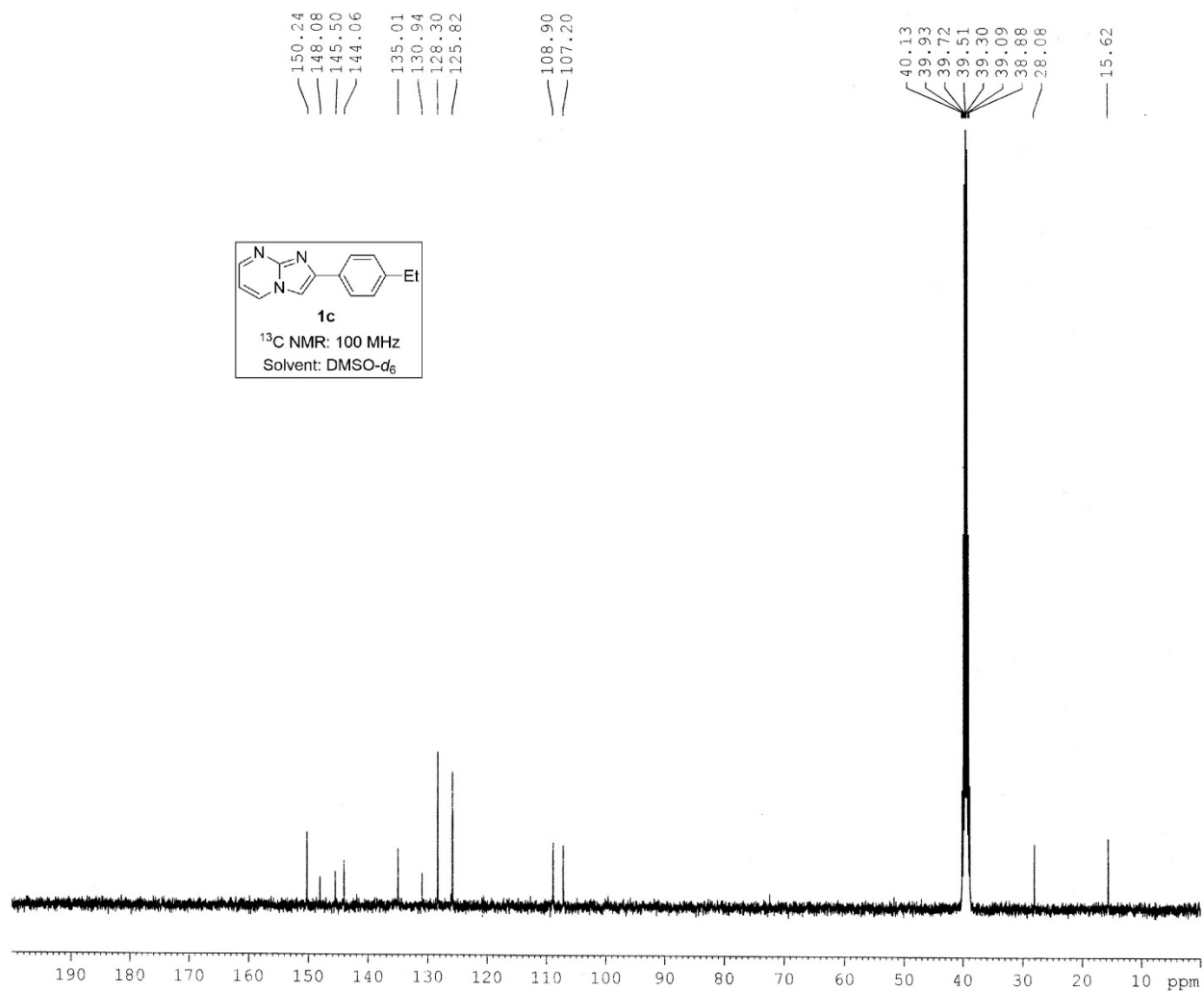


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 NAME Dr. A HAJRA 2026 1H
 EXPNO 85
 PROCNO 1

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 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 67.81
 DW 60.800 usec
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 TE 289.3 K
 D1 1.00000000 sec
 TD0 1

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 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

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 GB 0
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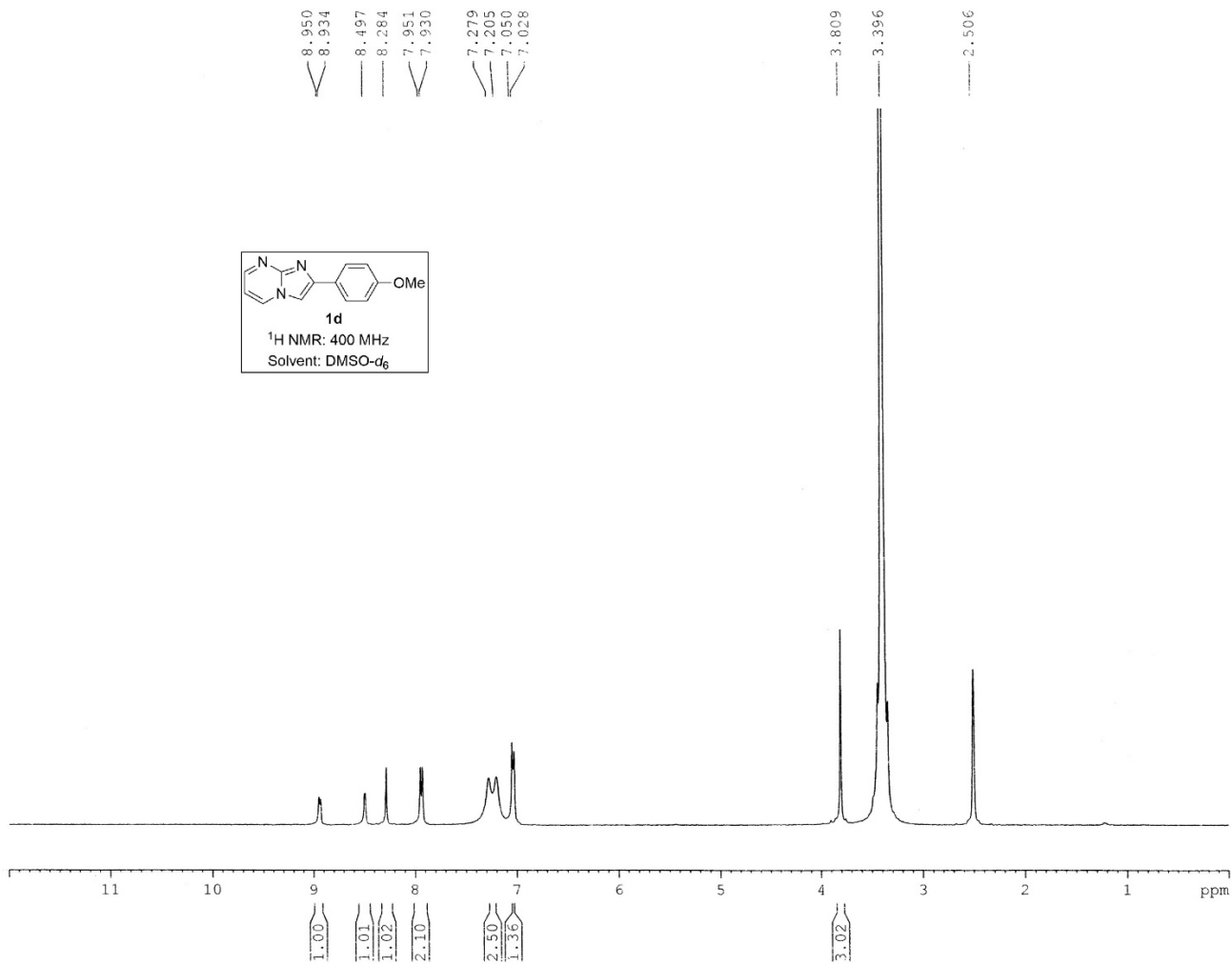
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 PROCNO 1

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 PULPROG zgpg30
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 SOLVENT DMSO
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 DS 2
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 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 289.7 K
 D1 2.0000000 sec
 D11 0.0300000 sec
 TD0 1

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 NUC1 13C
 P1 8.90 usec
 PLW1 54.0000000 W

----- CHANNEL f2 -----
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 NUC2 1H
 CPDPRG12 waltz16
 PCPD2 90.00 usec
 PLW2 12.0000000 W
 PLW12 0.32231000 W
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F2 - Processing parameters
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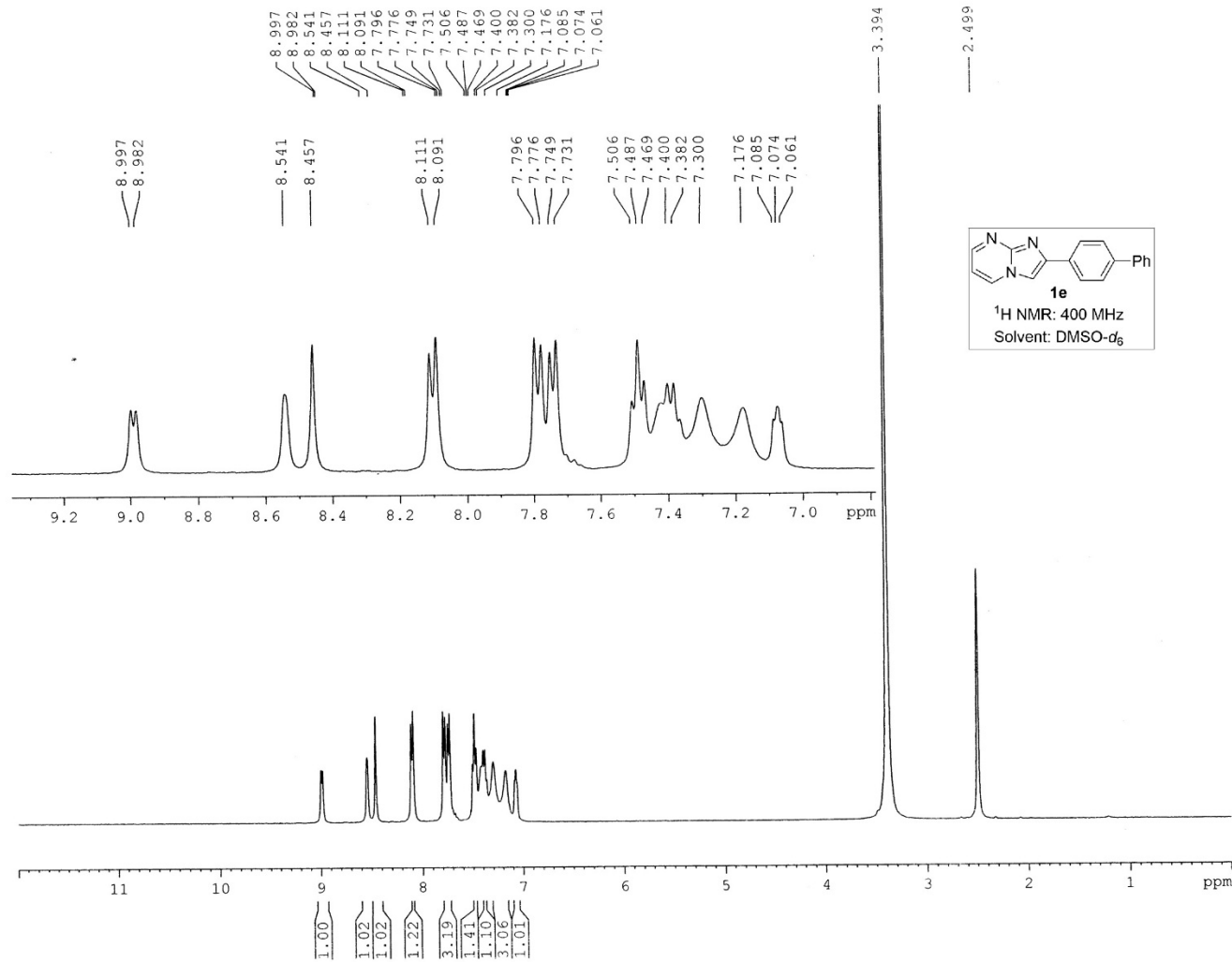


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 EXPNO 309
 PROCNO 1

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 PULPROG zg30
 TD 32768
 SOLVENT DMSO
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 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 168.31
 DW 60.800 usec
 DE 6.50 usec
 TE 291.0 K
 D1 1.00000000 sec
 TD0 1

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 NUC1 1H
 P1 14.75 usec
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F2 - Processing parameters
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 SSB 0
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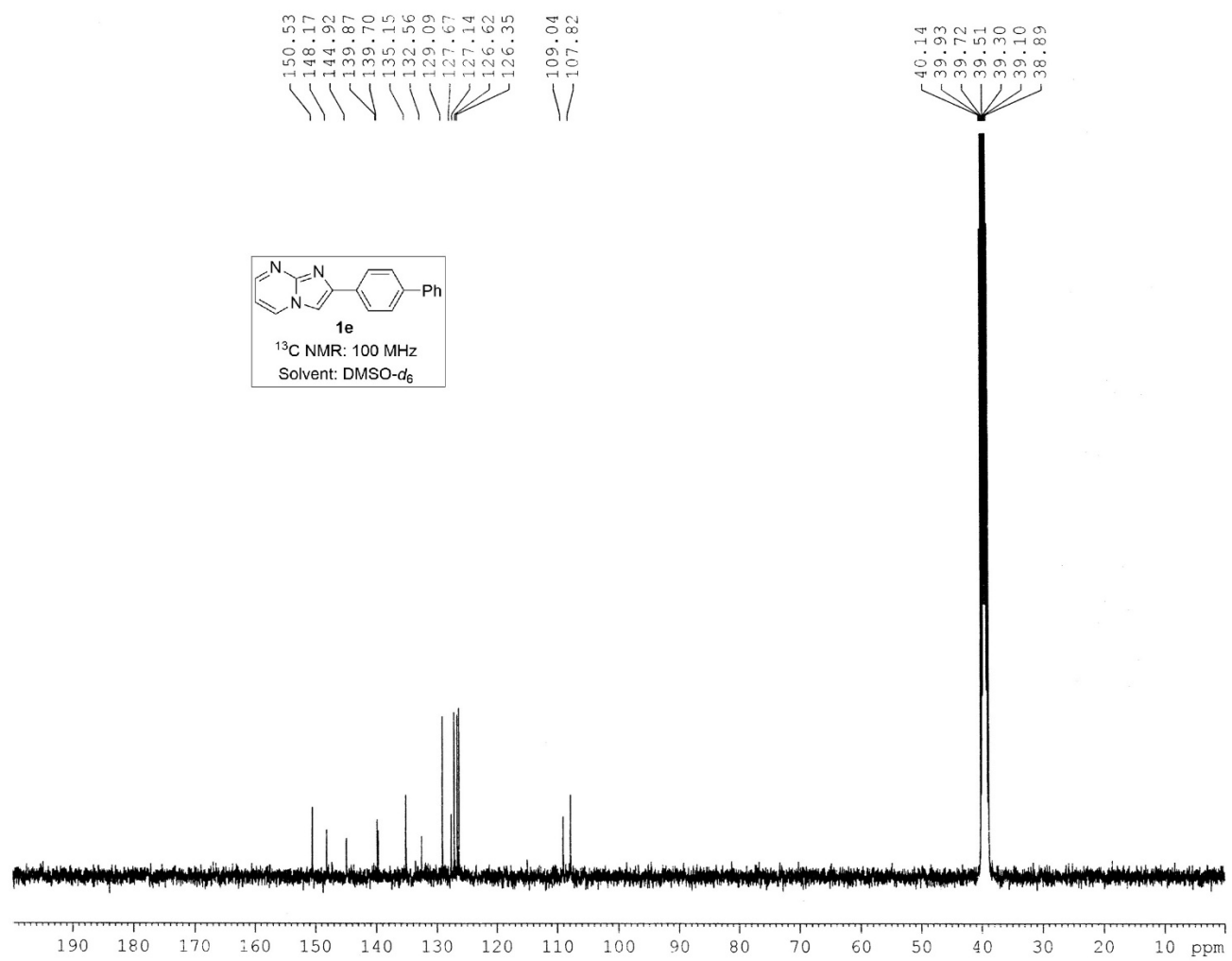


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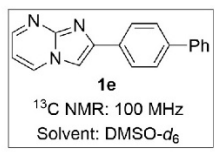
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 DS 2
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 FIDRES 0.250967 Hz
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 RG 148.91
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 TE 288.6 K
 D1 1.00000000 sec
 TD0 1

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 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
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 SF 400.1500024 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



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139.87
139.70
135.15
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129.09
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39.51
39.30
39.10
38.89

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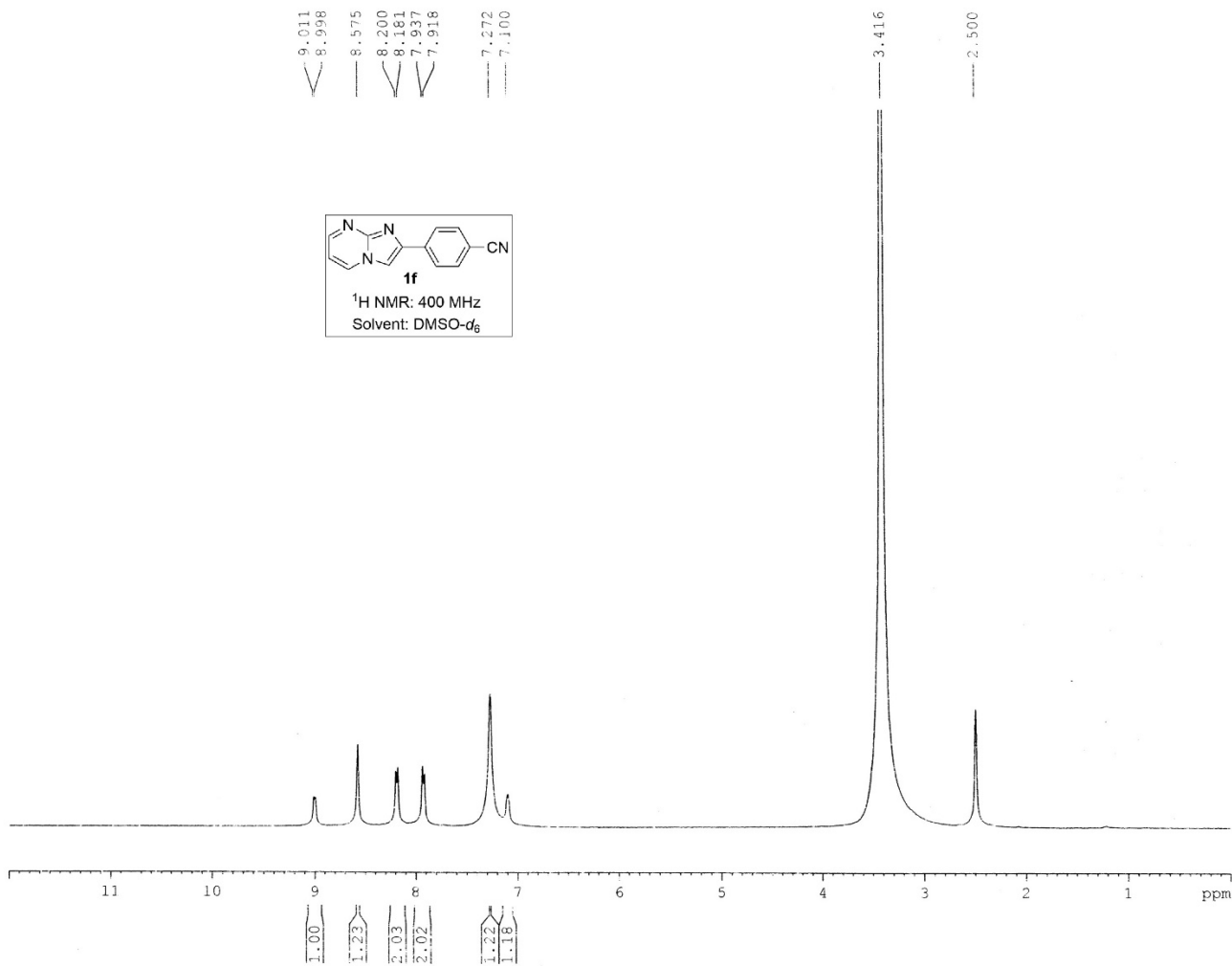
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EXPNO    8
PROCNO   1

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PULPROG  zgpg30
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DS       2
SWH      24038.461 Hz
FIDRES   0.733596 Hz
AQ       0.6815744 sec
RG       186.42
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DE       6.50 usec
TE       288.9 K
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NUC1     13C
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NUC2     1H
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PLW12    0.32231000 W
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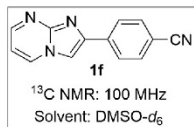
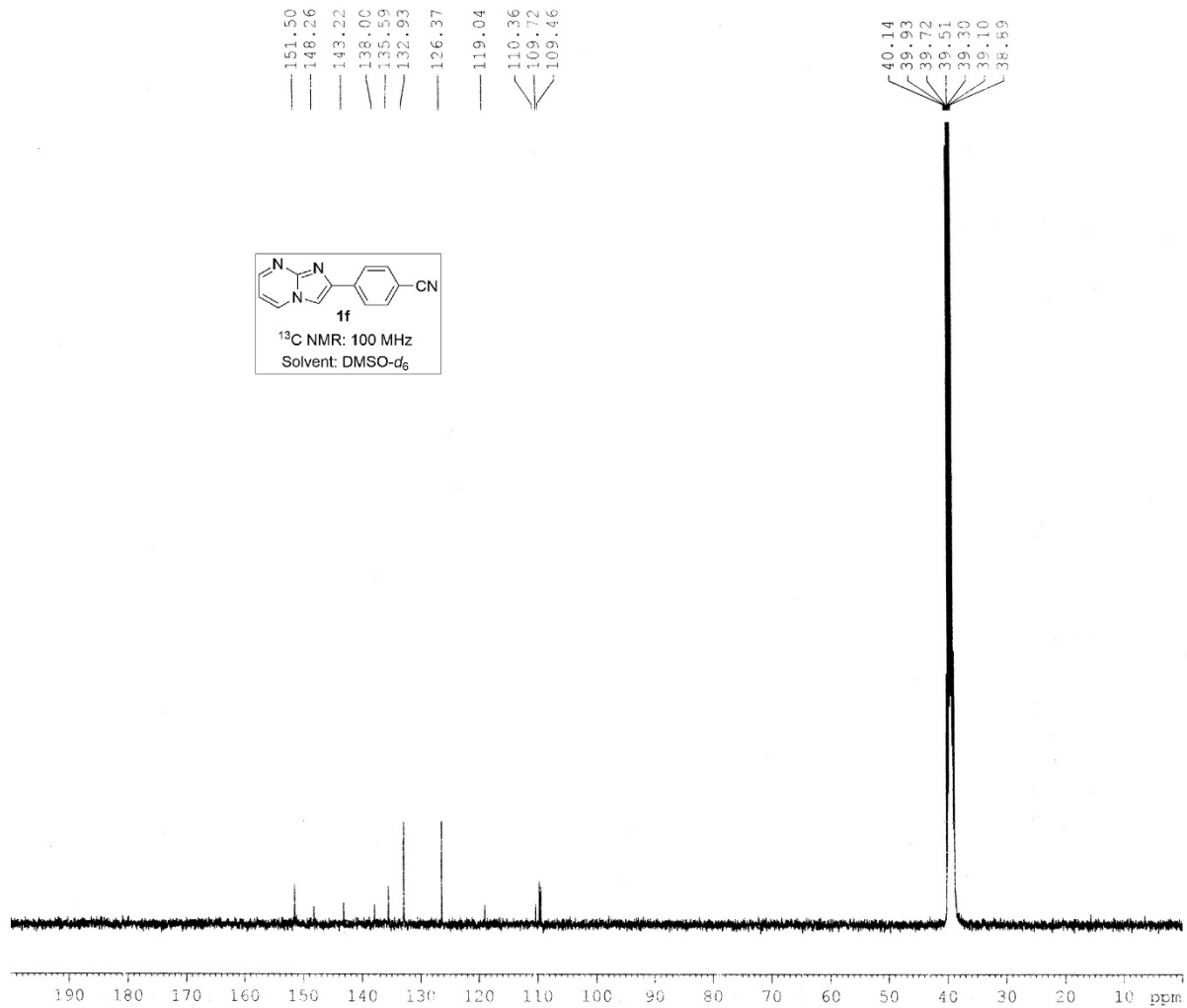


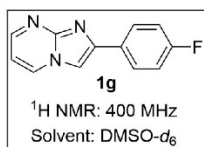
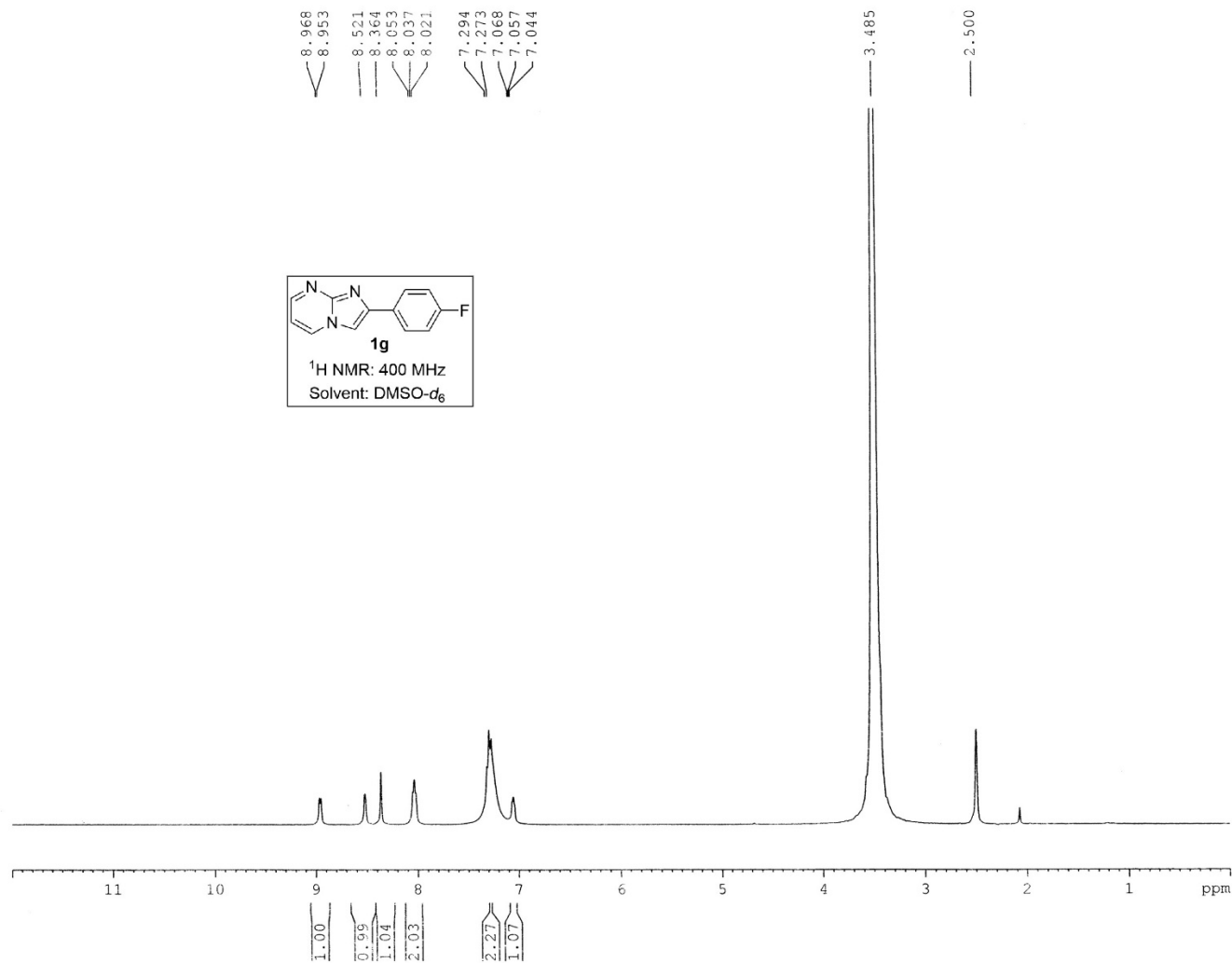
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 DE 6.50 usec
 TE 291.3 K
 D1 1.00000000 sec
 TD0 1

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 NUC1 ¹H
 P1 14.75 usec
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F2 - Processing parameters
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 PC 1.00



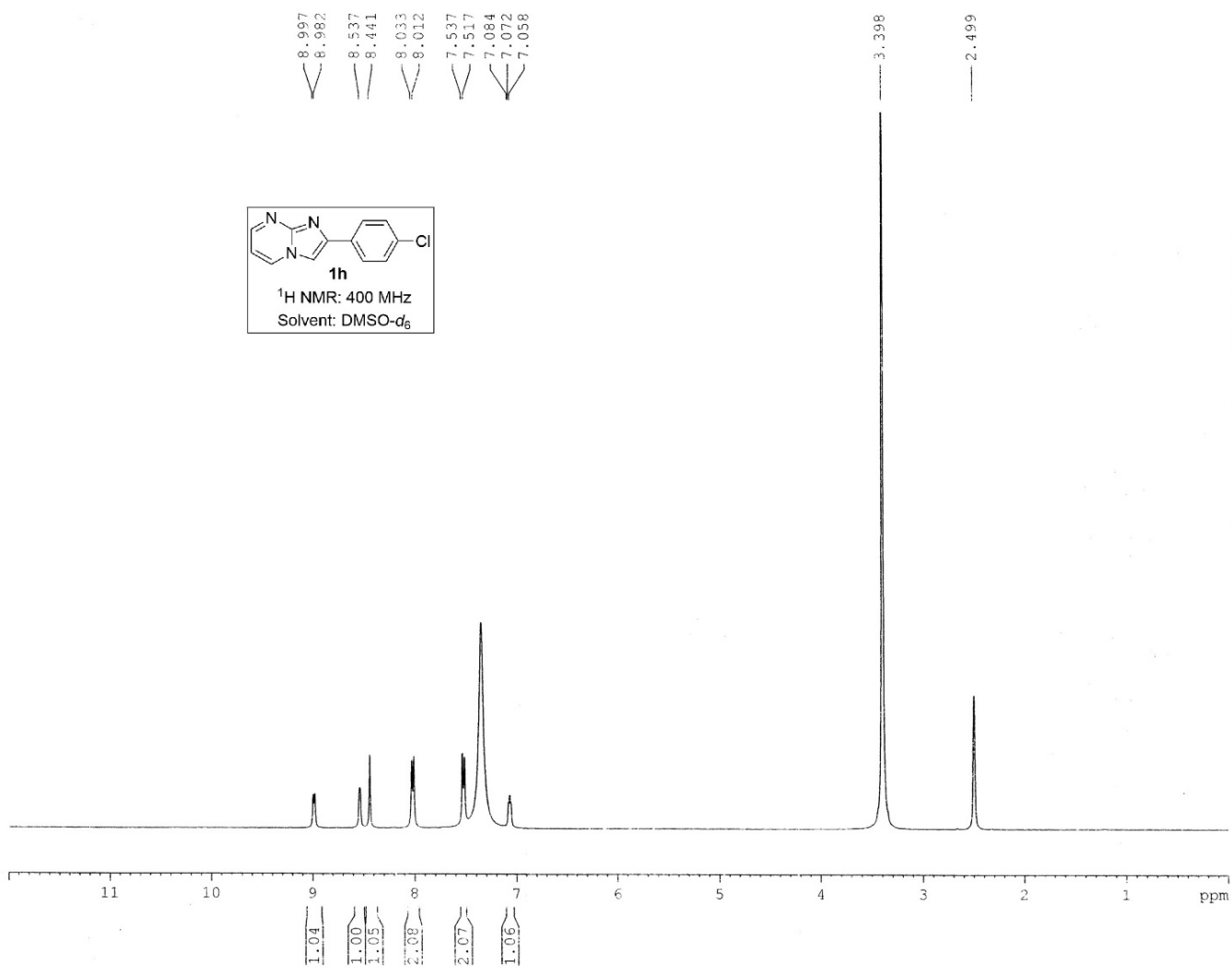


Current Data Parameters
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 EXPNO 121
 PROCNO 1

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 TDO 1

===== CHANNEL f1 =====
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F2 - Processing parameters
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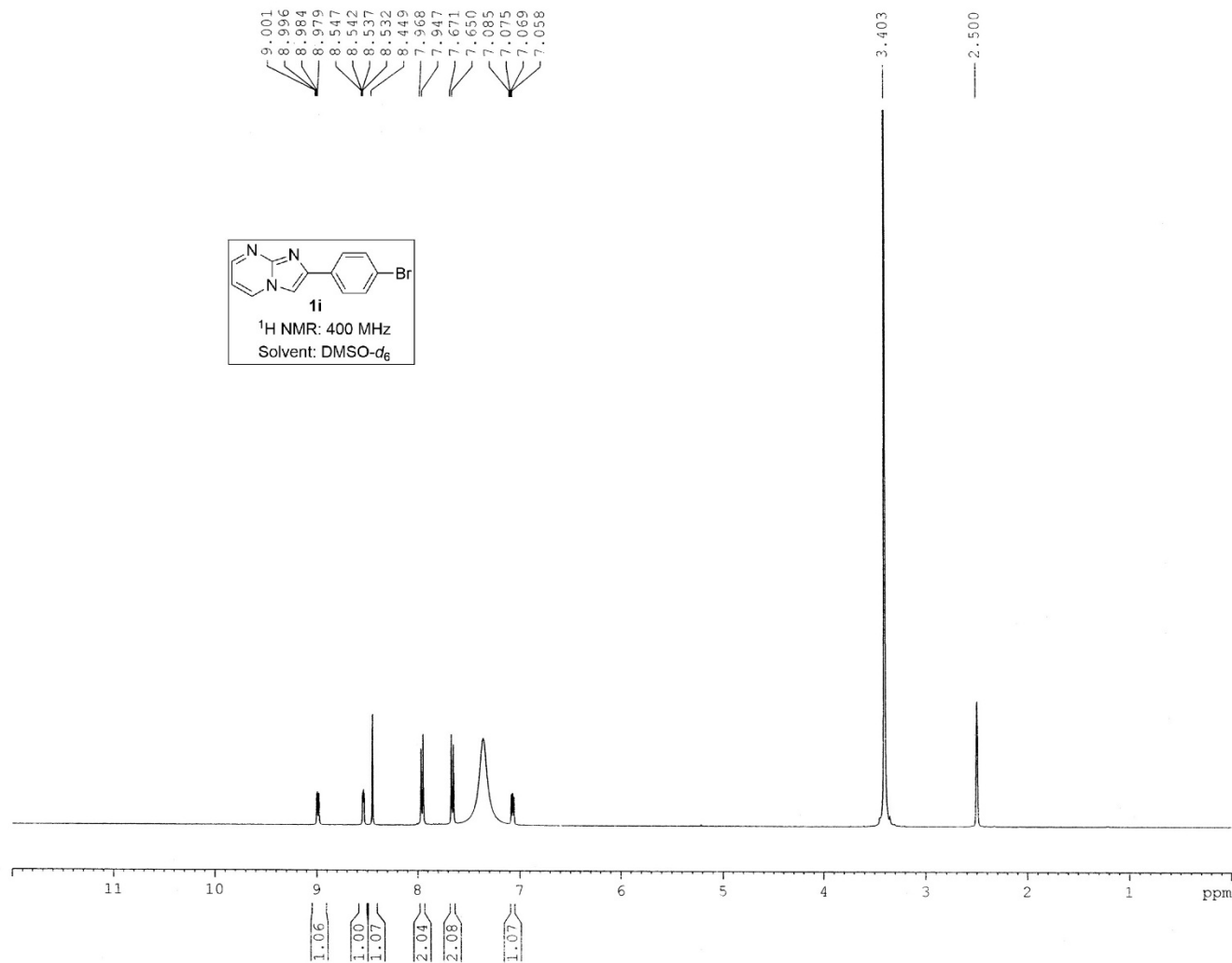


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 PROCNO 1

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 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
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 P1 14.75 usec
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F2 - Processing parameters
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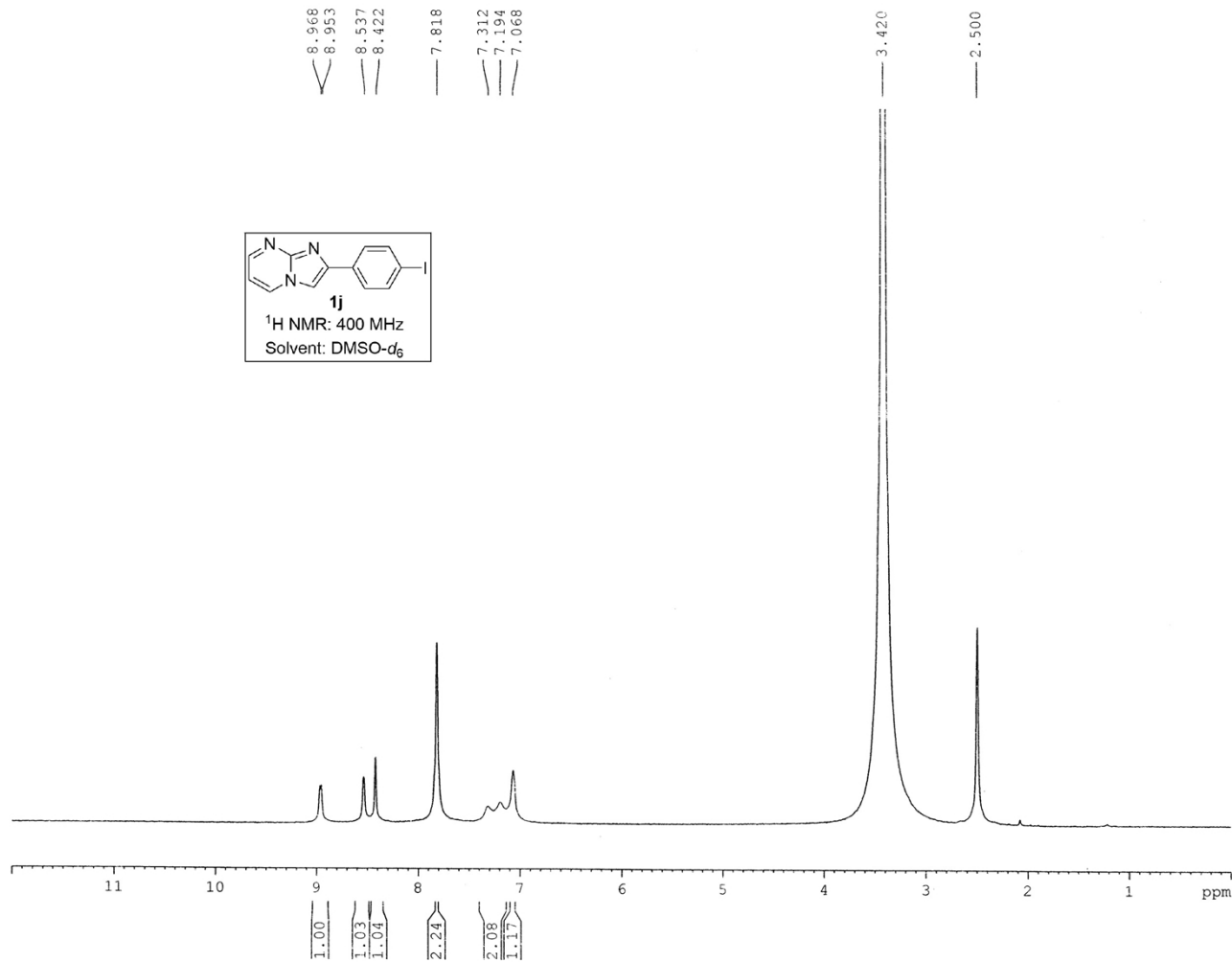


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 DW 60.800 usec
 DE 6.50 usec
 TE 289.1 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
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 NUC1 1H
 P1 14.75 usec
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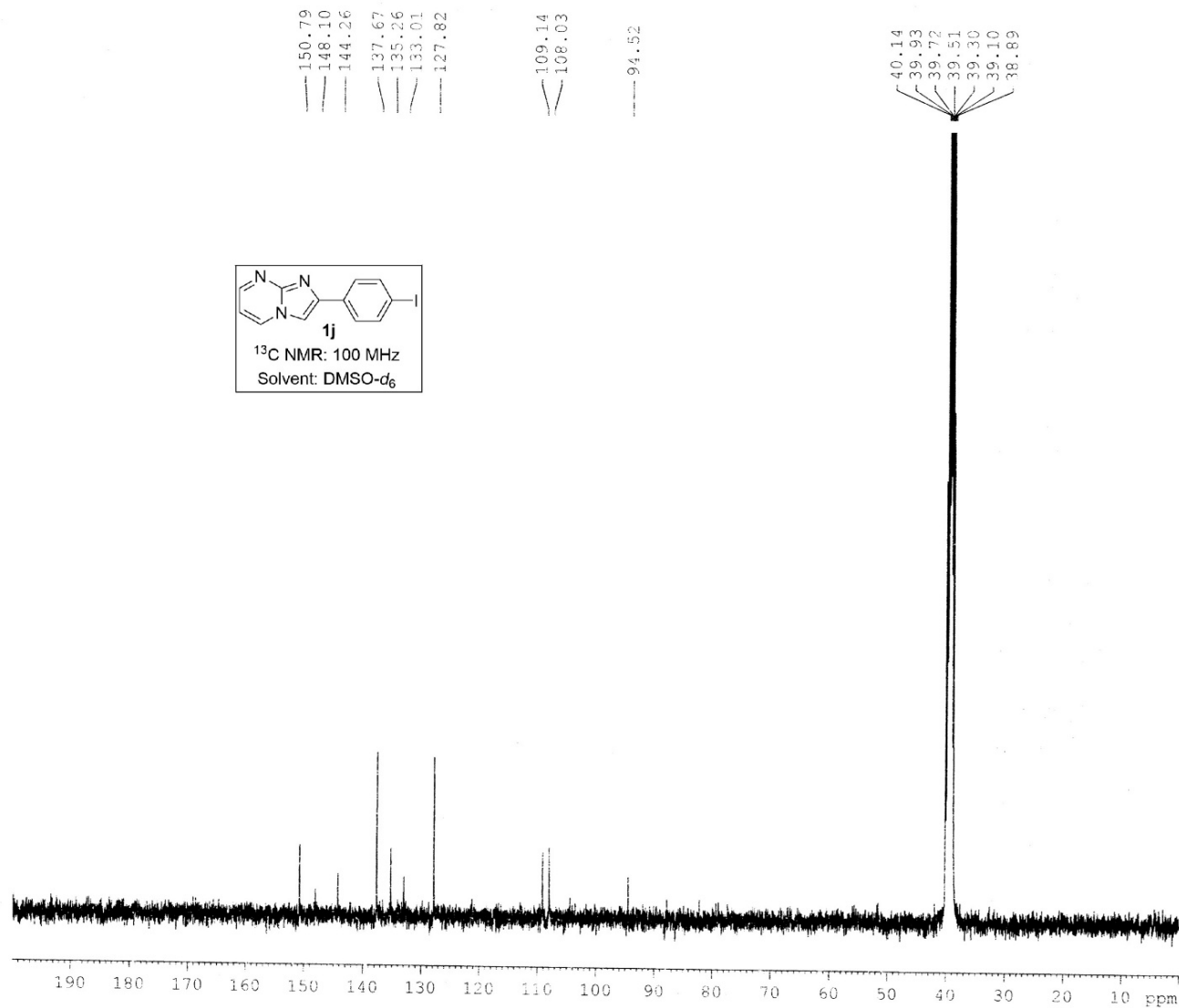
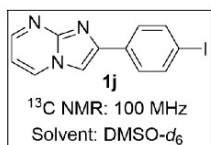


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 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 93.46
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 DE 6.50 usec
 TE 288.3 K
 D1 1.00000000 sec
 TD0 1

==== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500018 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



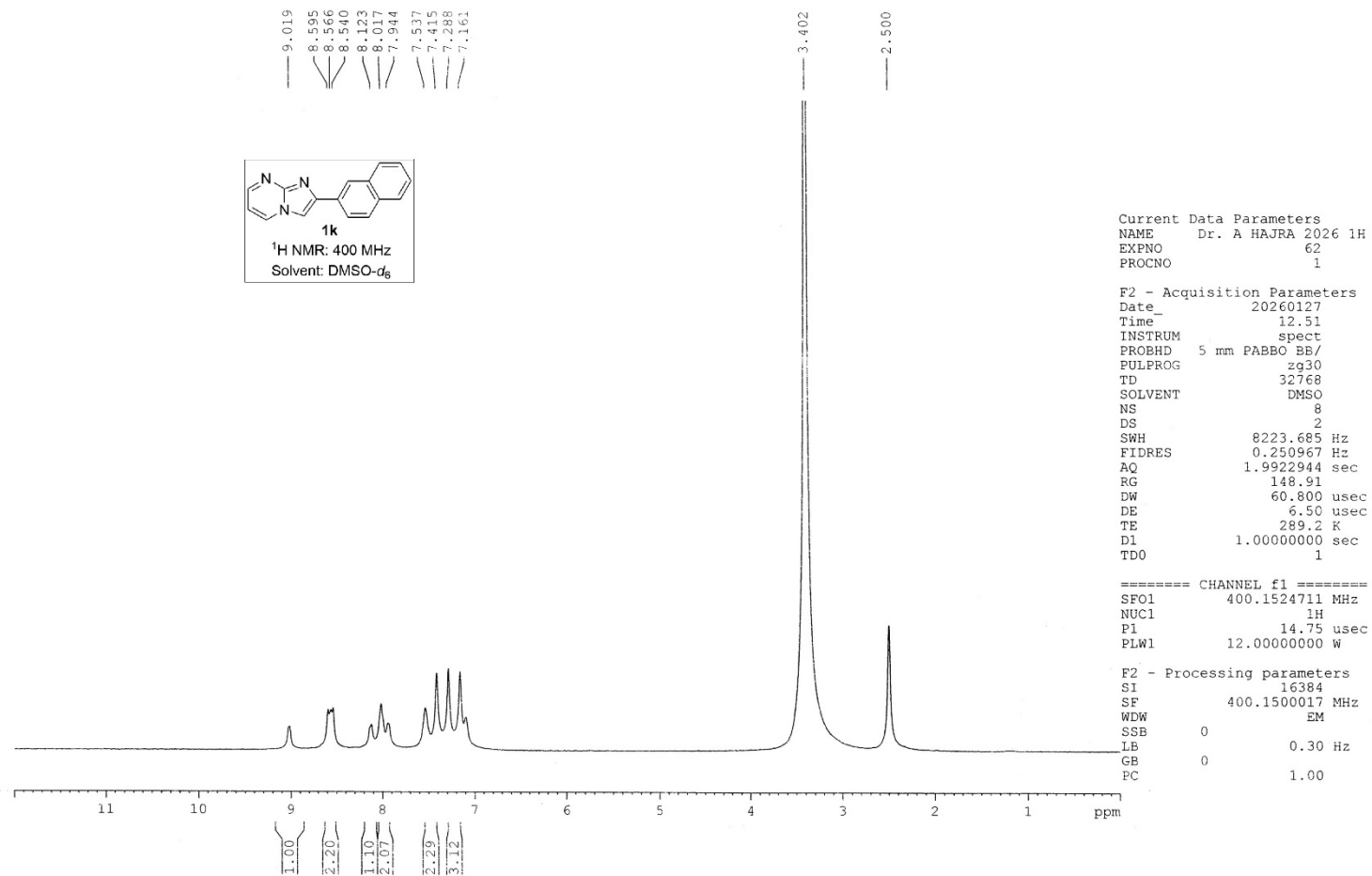
Current Data Parameters
 NAME Dr. A HAJRA-2026-13C
 EXPNO 51
 PROCNO 1

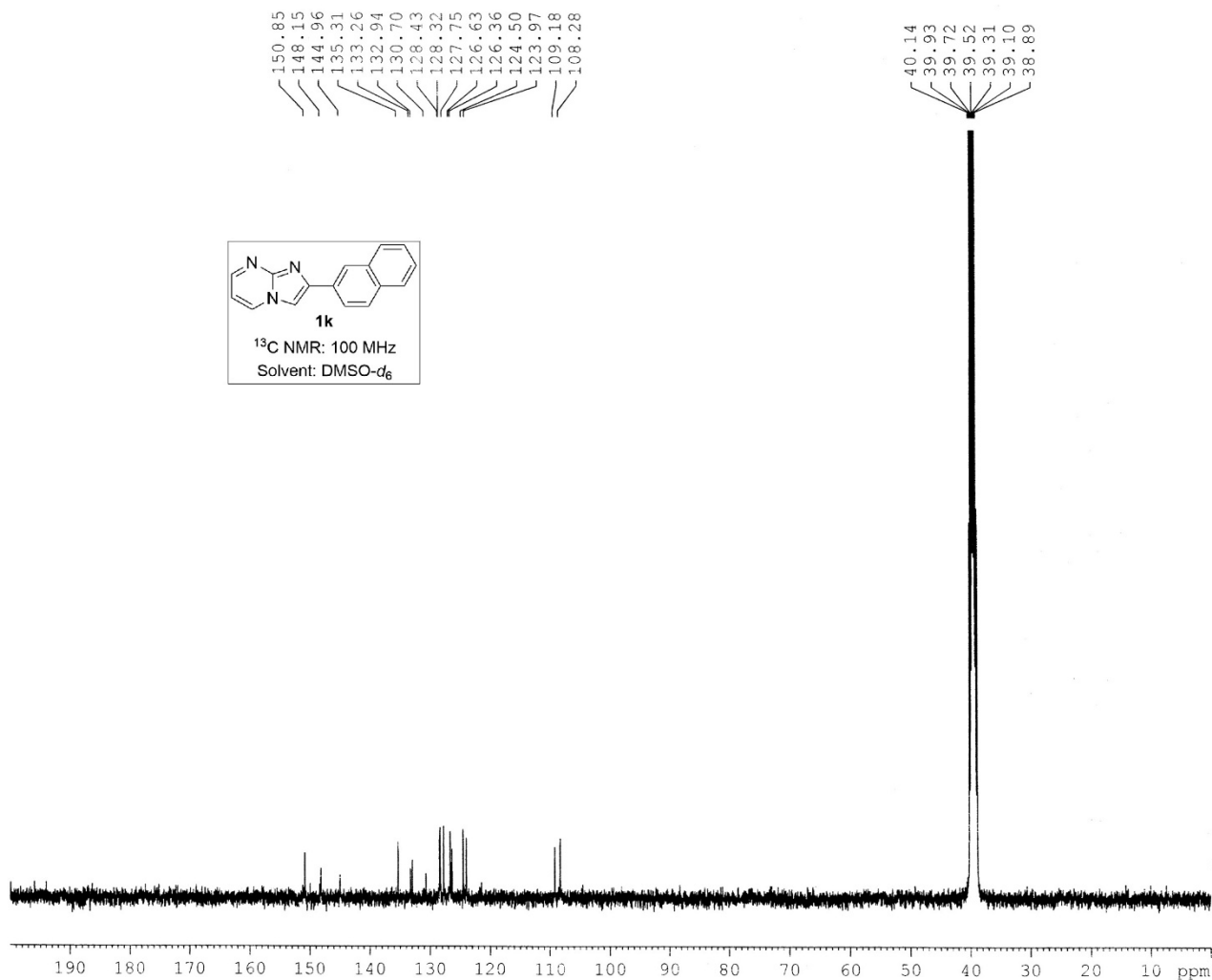
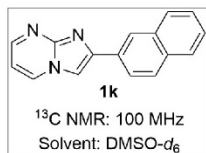
F2 - Acquisition Parameters
 Date_ 20260203
 Time 19.11
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 950
 DS 2
 SWH 24056.441 Hz
 FIDRES 0.753536 Hz
 AQ 0.6215744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 289.9 K
 D1 2.0000000 sec
 D11 0.0300000 sec
 TDC 1

===== CHANNEL f1 =====
 SFO1 100.6270588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.0000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG12 waltz16
 PCPD3 90.00 usec
 PLW2 12.0000000 W
 PLW12 0.32251000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178370 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 EC 1.40





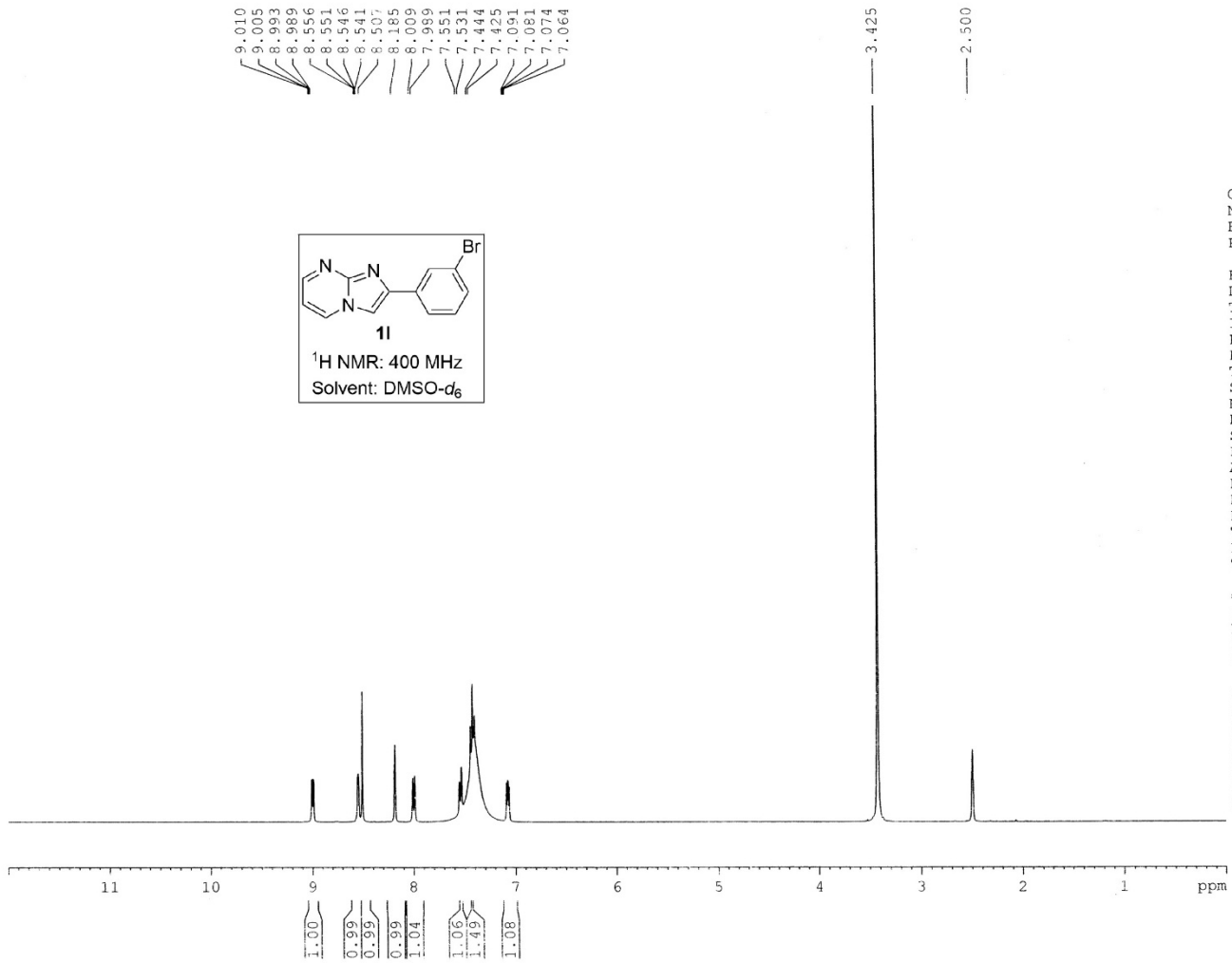
Current Data Parameters
 NAME Dr. A HAJRA-2026-13C
 EXPNO 56
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260207
 Time_ 13.13
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 700
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 289.6 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TDO 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178369 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

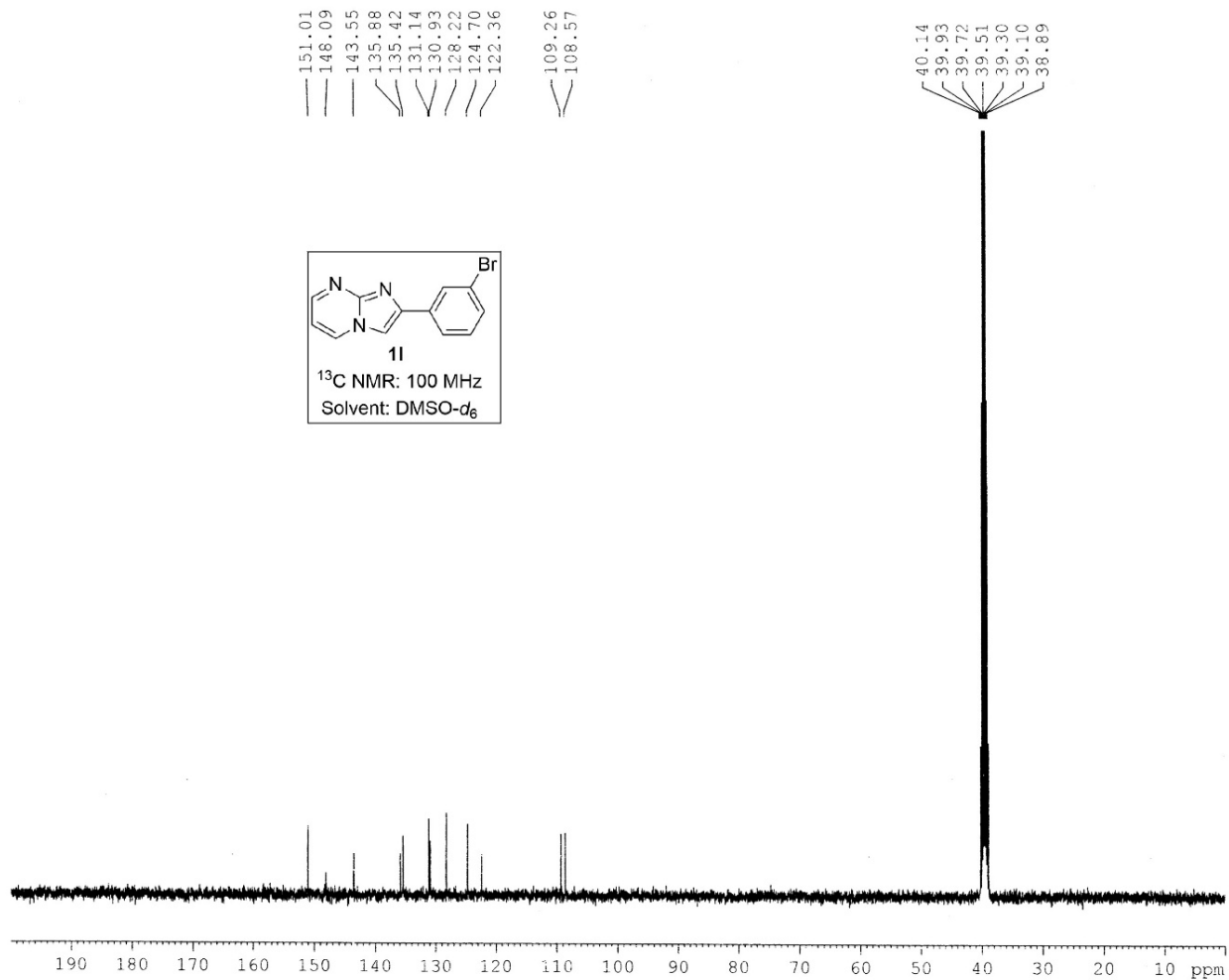


Current Data Parameters
 NAME Dr. A HAJRA 2026 1H
 EXPNO 83
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260202
 Time 14.19
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 120.16
 DW 60.800 usec
 DE 6.50 usec
 TE 289.5 K
 D1 1.00000000 sec
 TD0 1

==== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500023 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



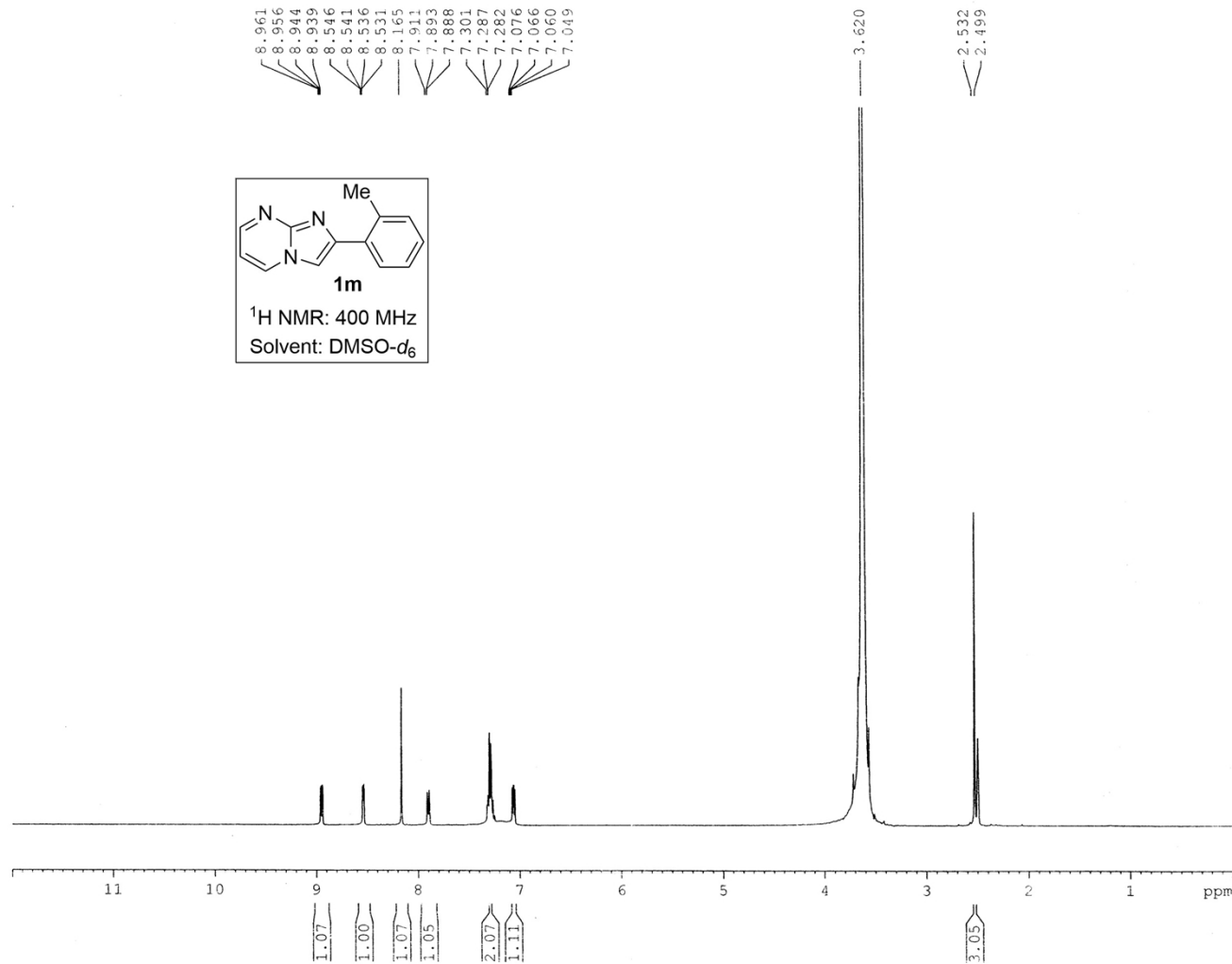
Current Data Parameters
 NAME Dr. A HAJRA-2026-13C
 EXPNO 50
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260202
 Time 14.29
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 150
 DS 2
 SHH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 166.42
 DW 20.800 usec
 DE 6.50 usec
 TE 289.5 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TDG 1

===== CHANNEL f1 =====
 SF01 100.6278589 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SF02 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waitz1f
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178355 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 EC 1.40

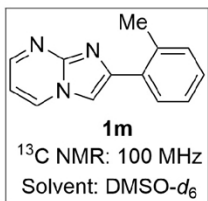
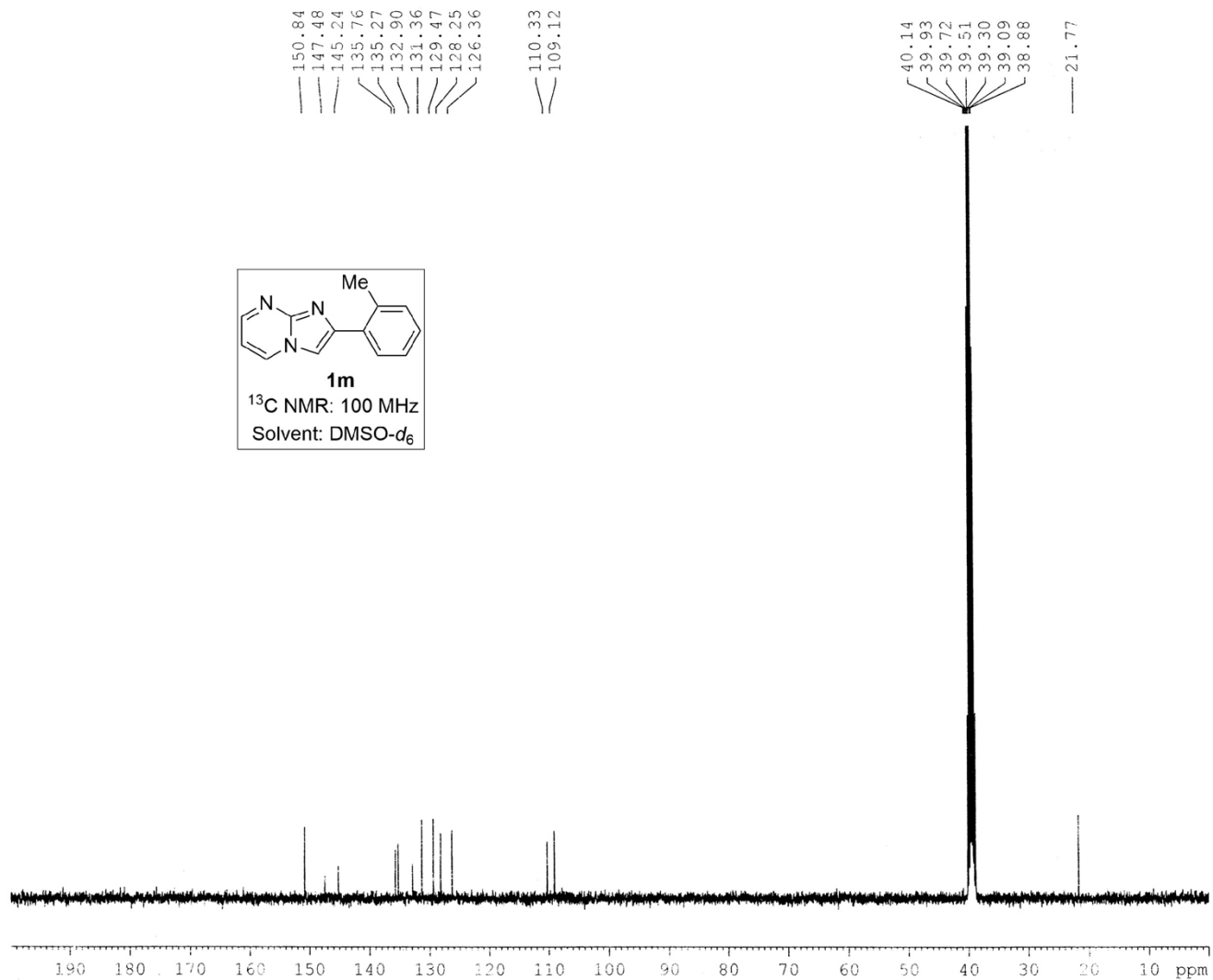


Current Data Parameters
 NAME Dr. A HAJRA 2026 1H
 EXPNO 79
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260202
 Time_ 13.55
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 30.11
 DW 60.800 usec
 DE 6.50 usec
 TE 290.3 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500029 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



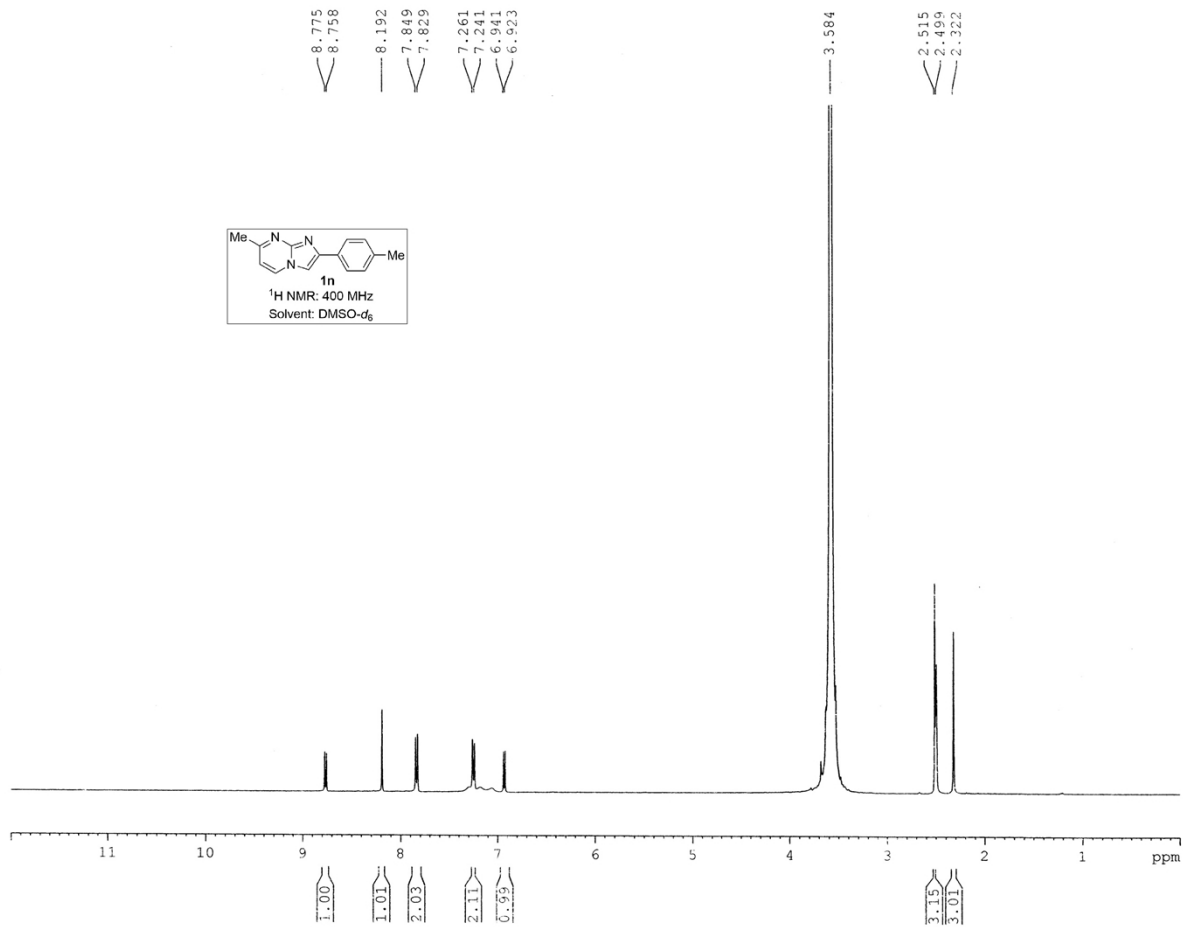
Current Data Parameters
 NAME Dr. A HAJRA-2026-13C
 EXPNO 49
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260202
 Time 14.11
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 250
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733396 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 290.2 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

==== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

==== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waitz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178135 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

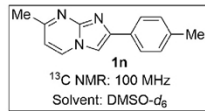
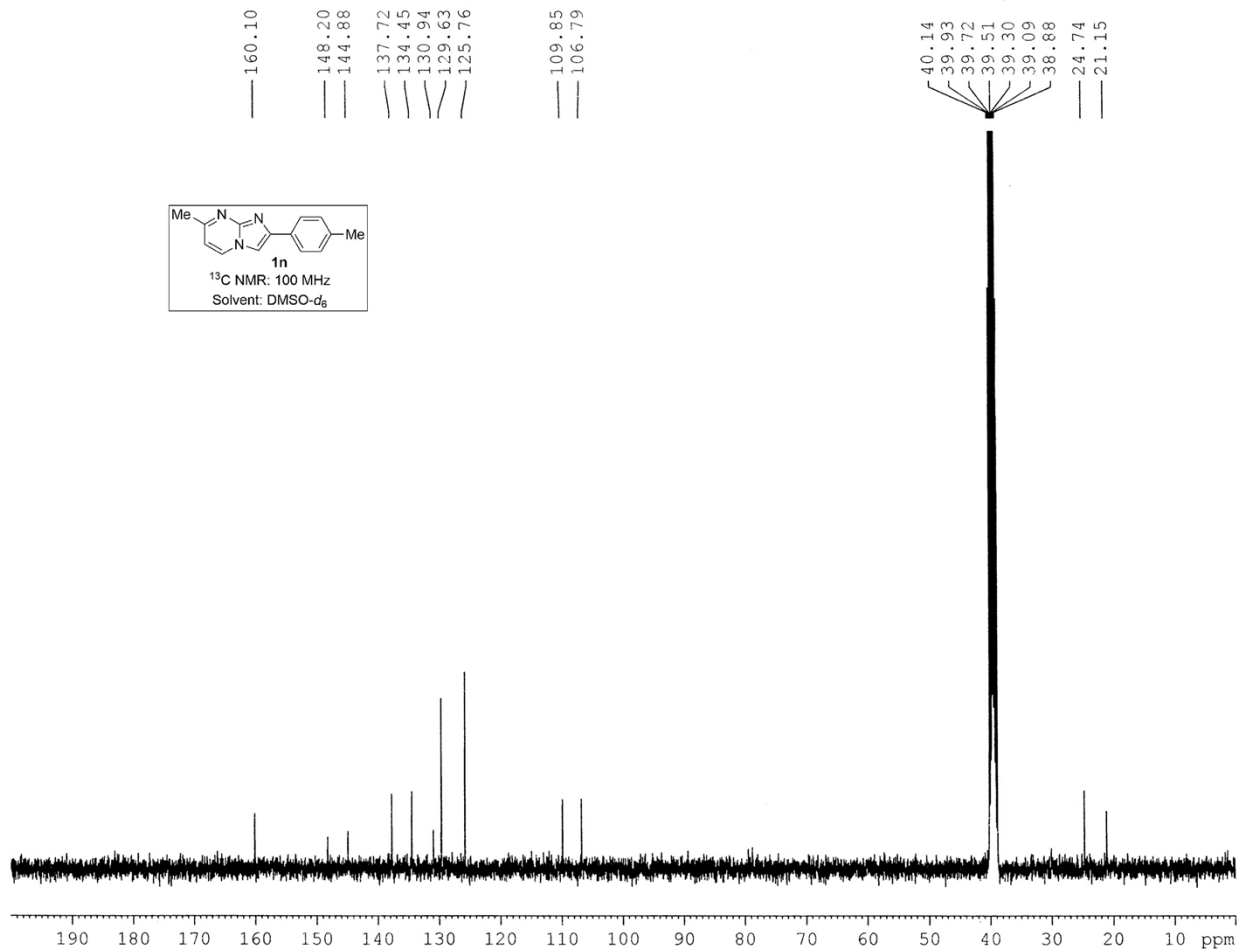


Current Data Parameters
 NAME Dr. A HAJRA 2026 1H
 EXPNO 10
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260108
 Time 12.20
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 9223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 37.83
 DW 60.800 usec
 DE 6.50 usec
 TE 288.4 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500026 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



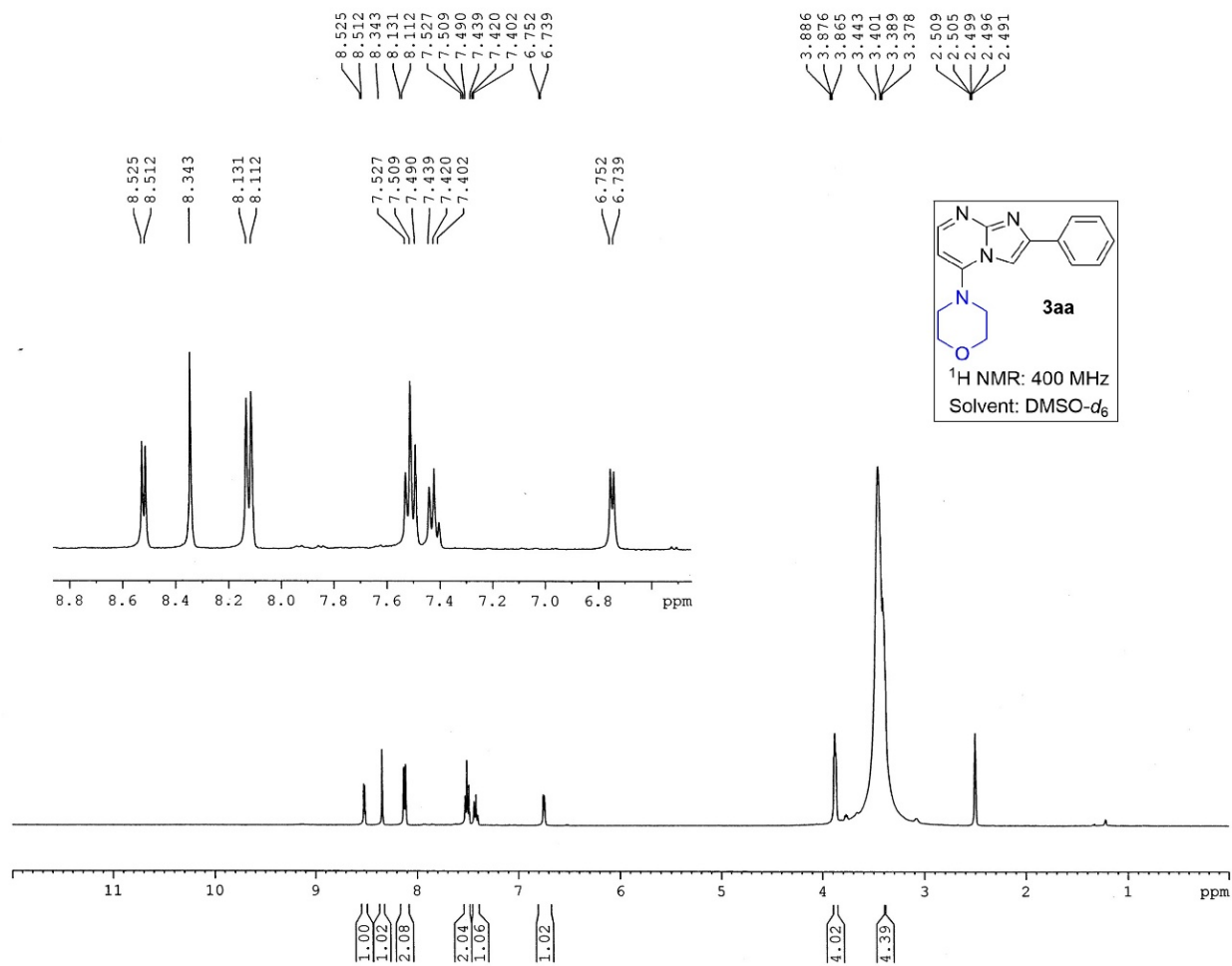
Current Data Parameters
 NAME Dr. A HAJRA-2026-13C
 EXPNO 7
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260108
 Time 12.55
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 660
 LS 2
 SWH 24038.461 Hz
 FLDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 298.8 K
 D1 2.0000000 sec
 D11 0.0360000 sec
 TDO 1

==== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.0000000 W

==== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG(2) waltz16
 PCPD2 90.06 usec
 PLW2 12.0000000 W
 PLW12 0.3223100 W
 PLW13 0.1621200 W

F2 - Processing parameters
 SI 16384
 SF 100.6178170 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 FC 1.40

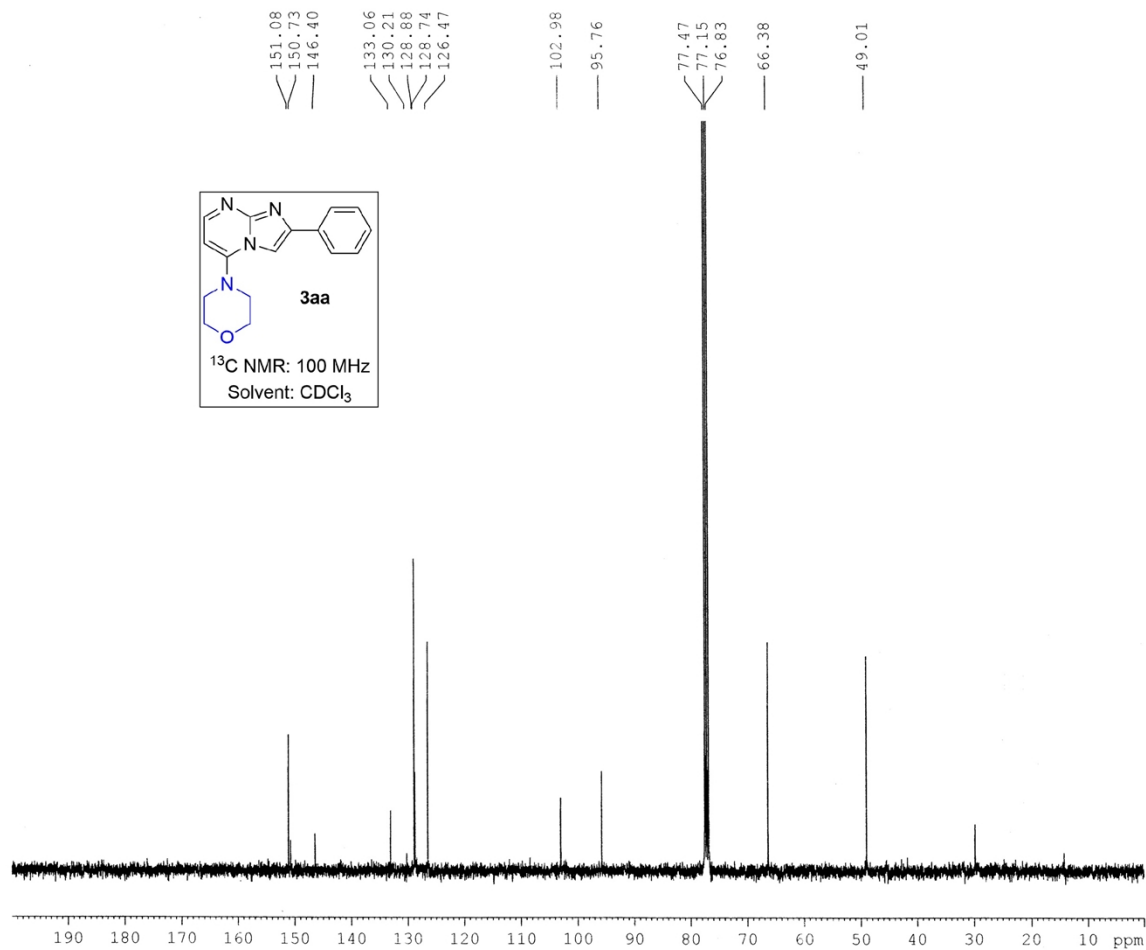


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 375
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250704
 Time 12.42
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 87.66
 DW 60.800 usec
 DE 6.50 usec
 TE 293.3 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



```

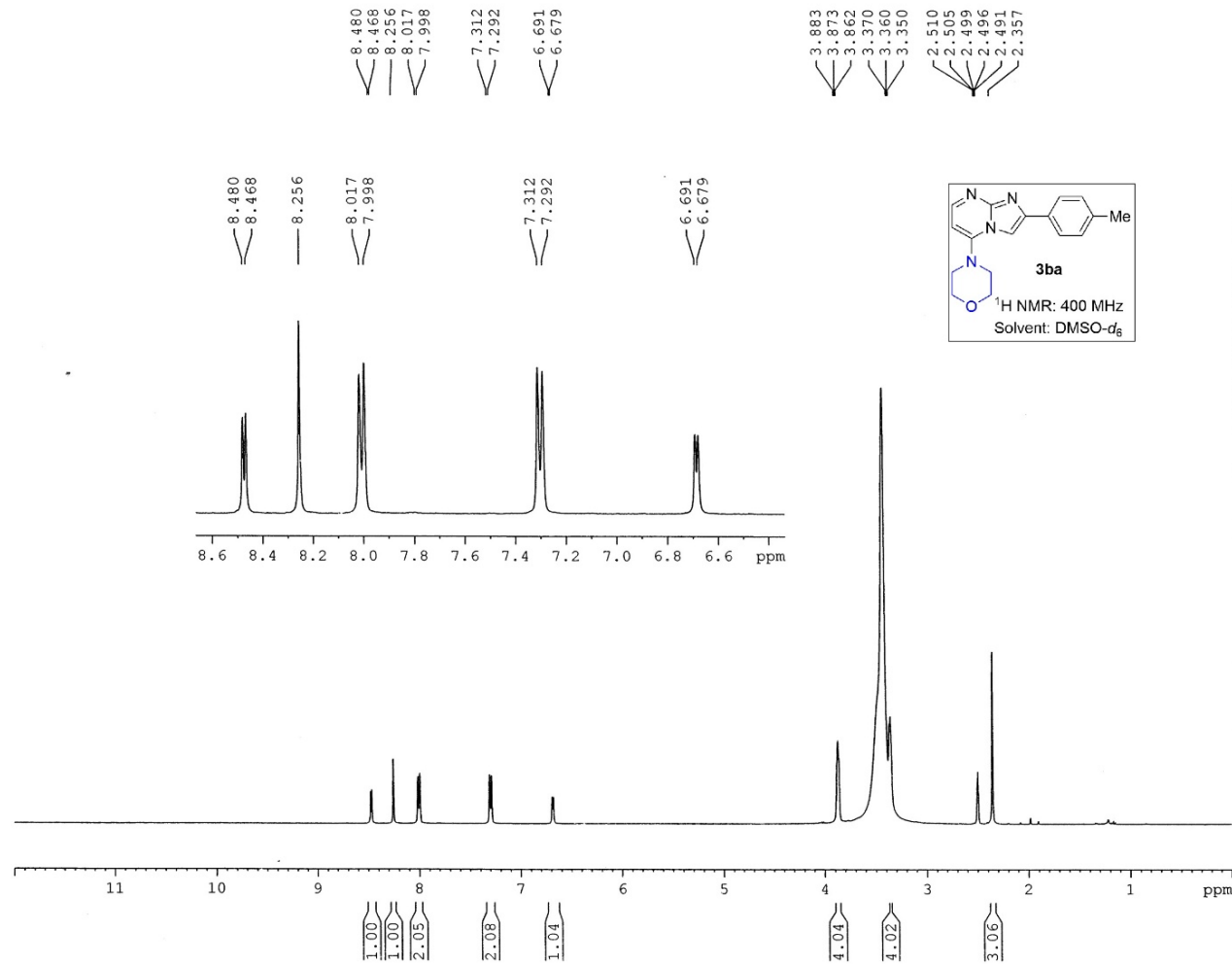
Current Data Parameters
NAME      Dr. A HAJRA-2025-13C
EXPNO    163
PROCNO   1

F2 - Acquisition Parameters
Date_    20250516
Time     17.55
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD       32768
SOLVENT  CDCl3
NS       1000
DS       2
SWH      24035.4e1 Hz
FIDRES   0.75356 Hz
AQ       0.681574 sec
RG       196.45
DW       20.800 usec
DE       6.50 usec
TE       297.2 K
D1       2.0000000 sec
D11      0.0300000 sec
TDO      1

===== CHANNEL f1 =====
SFO1    100.6278568 MHz
NUC1     13C
P1       8.90 usec
PLW1    54.00000000 W

===== CHANNEL f2 =====
SFO2    400.1516006 MHz
NUC2     1H
CPDPRG12  waltz16
PCPD2    90.00 usec
PLW2    12.00000000 W
PLW12   0.32231000 W
PLW13   0.16212000 W

F2 - Processing parameters
SI       16384
SF       100.6177858 MHz
WUW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40
  
```

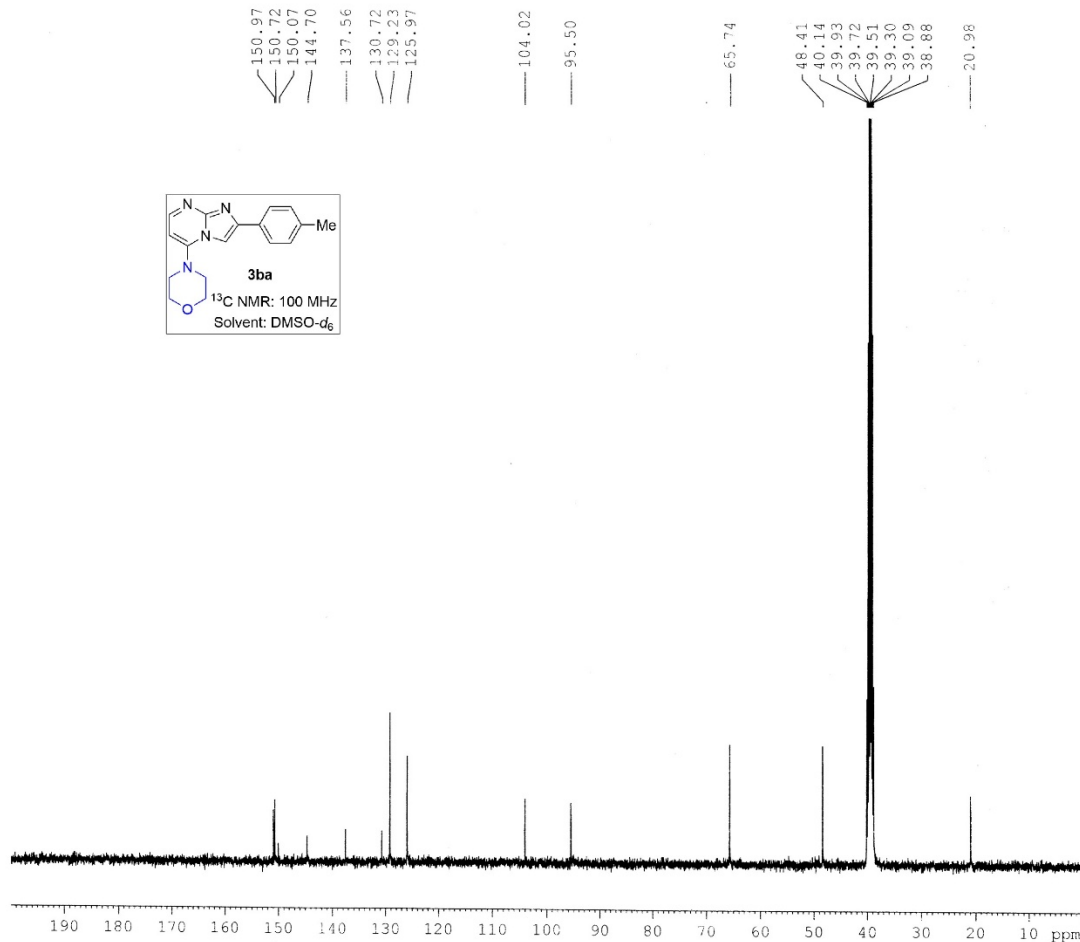


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 286
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250527
 Time 17.16
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 77.59
 DW 60.800 usec
 DE 6.50 usec
 TE 295.5 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



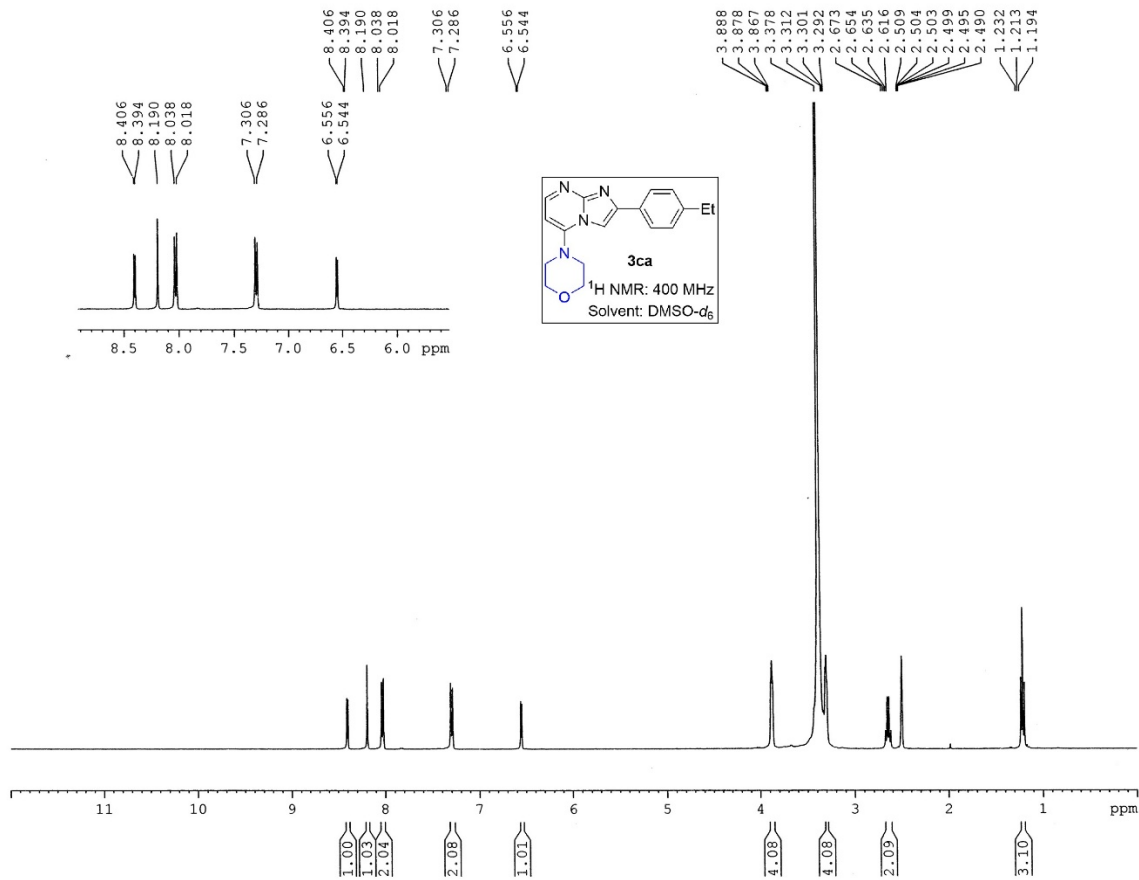
Current Data Parameters
 NAME Dr. A HA7RA-2026-13C
 EXPNO 81
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260222
 Time_ 11.52
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 500
 DS 2
 SWH 24039.461 Hz
 FIDRES 0.733594 Hz
 AQ 0.6915744 sec
 RG 186.42
 LW 26.800 usec
 DE 6.50 usec
 TE 290.4 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

***** CHANNEL f1 *****
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

***** CHANNEL f2 *****
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG12 waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16394
 SF 100.6178583 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

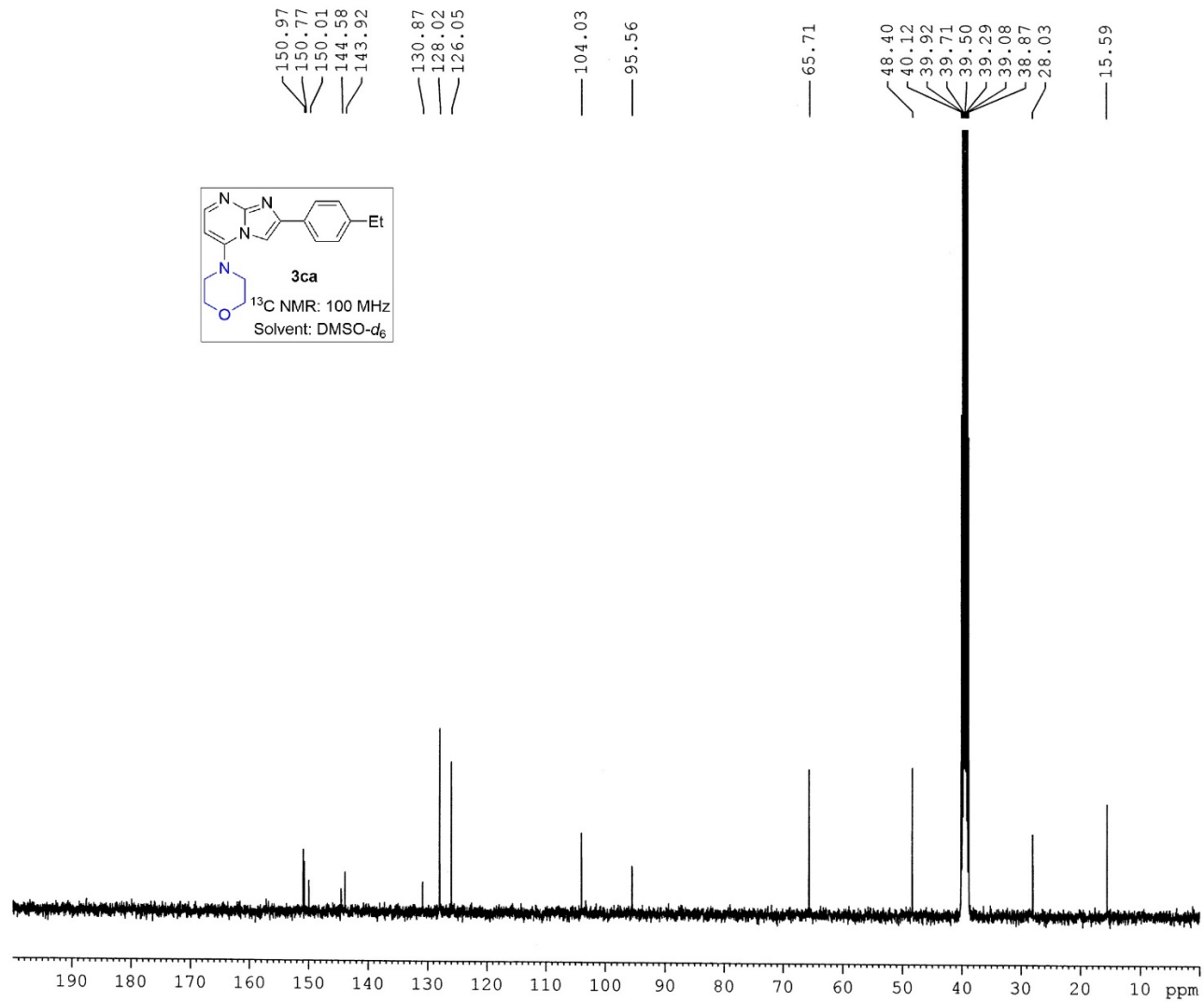


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 313
 PROCNO 1

F2 - Acquisition Parameters
 Date 20250608
 Time 18.57
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 106.66
 DW 60.800 usec
 DE 6.50 usec
 TE 293.9 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



```

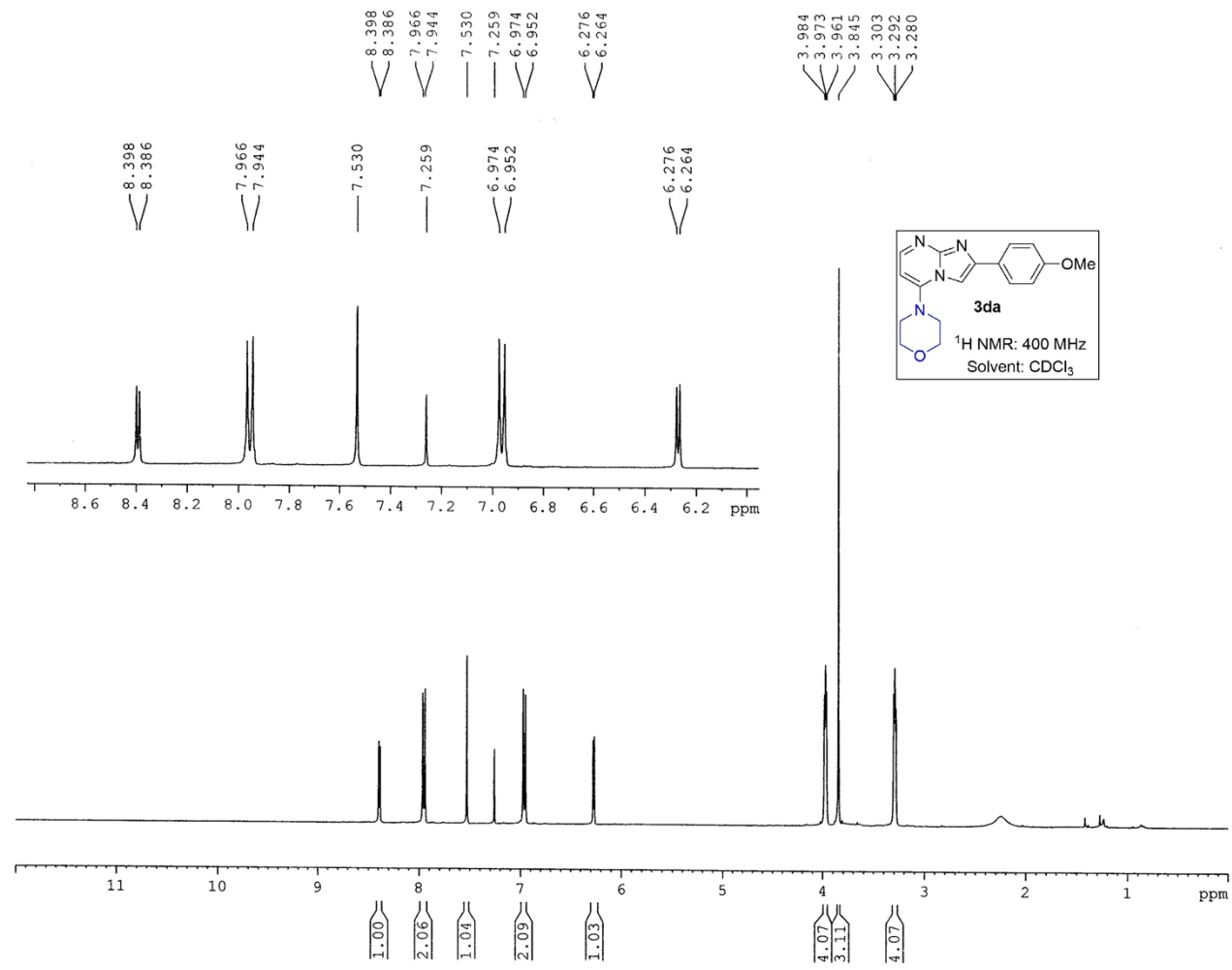
Current Data Parameters
NAME      Dr. A HAJRA-2025-13C
EXPNO     190
PROCNO    1

F2 - Acquisition Parameters
Date_     20250608
Time_     20.34
INSTRUM   spect
PROBHD    5 mm PABBO BB/
PULPROG   zgpg30
TD         32768
SOLVENT   DMSO
NS         2000
DS         2
SWH        24038.461 Hz
FIDRES     0.733596 Hz
AQ         0.6815744 sec
RG         186.42
DW         20.800 usec
DE         6.50 usec
TE         295.1 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
SFO1      100.6278588 MHz
NUC1       13C
P1         8.90 usec
PLW1       54.00000000 W

===== CHANNEL f2 =====
SFO2      400.1516006 MHz
NUC2        1H
CPDPRG[2]  waltz16
PCPD2      90.00 usec
PLW2       12.00000000 W
PLW12      0.32231000 W
PLW13      0.16212000 W

F2 - Processing parameters
SI         16384
SF         100.6178411 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```

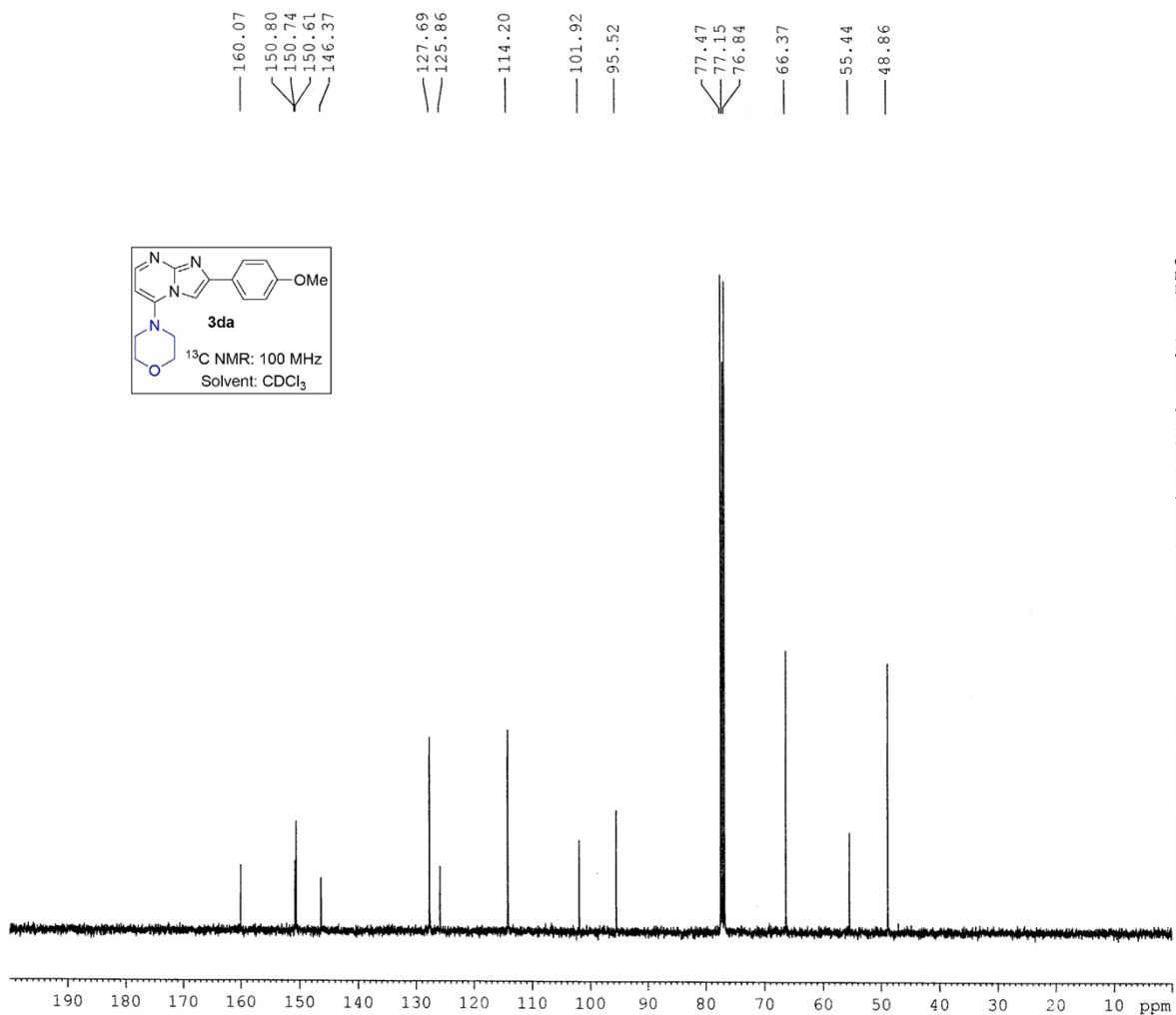


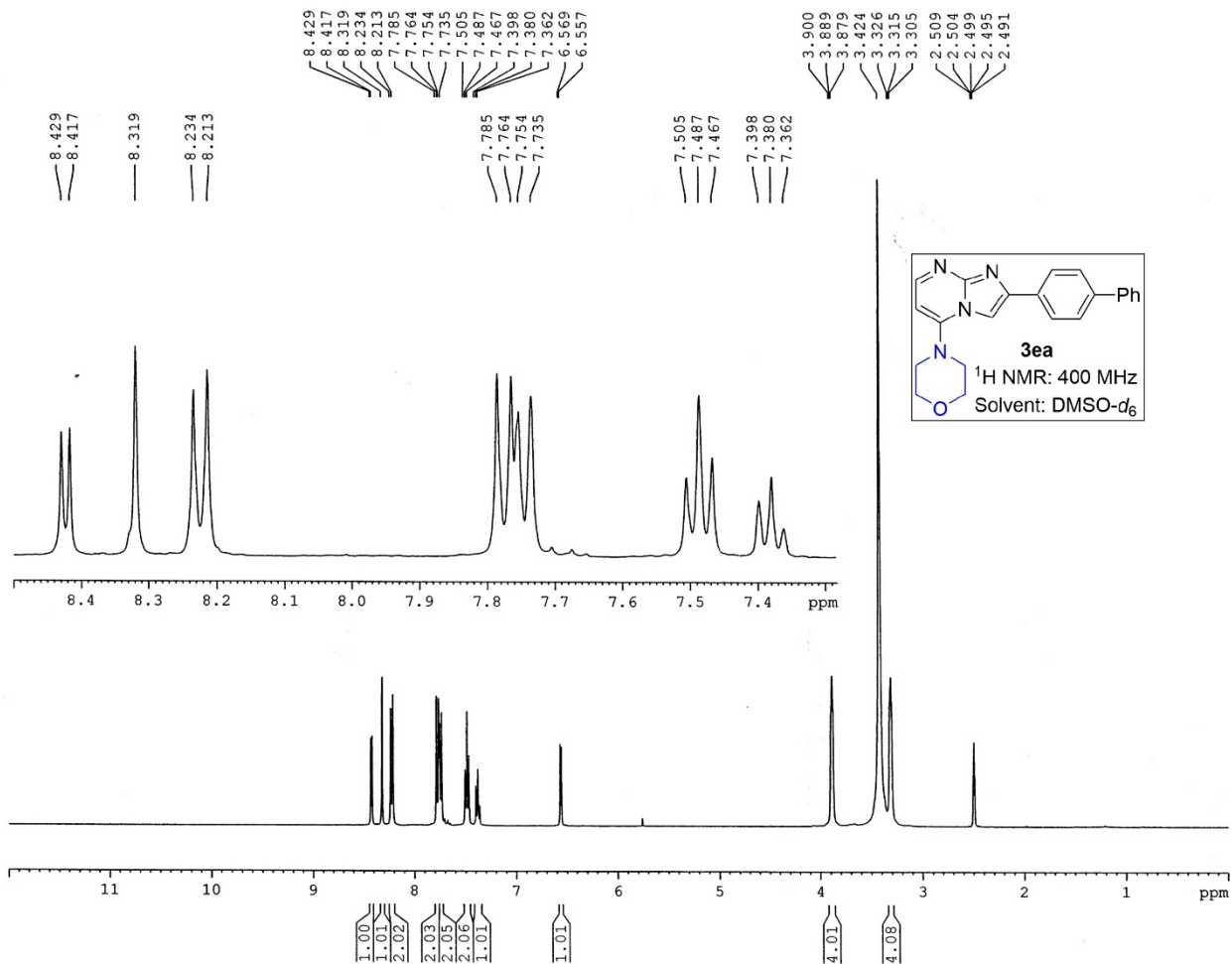
Current Data Parameters
NAME Dr. A HAJRA 2026 1H
EXPNO 269
PROCNO 1

F2 - Acquisition Parameters
Date_ 20260502
Time 11.07
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 8
DS 2
SWH 8223.685 Hz
FIDRES 0.250967 Hz
AQ 1.9922944 sec
RG 87.66
DW 60.800 usec
DE 6.50 usec
TE 290.2 K
D1 1.00000000 sec
TD0 1

==== CHANNEL f1 =====
SFO1 400.1524711 MHz
NUC1 1H
P1 14.75 usec
PLW1 12.00000000 W

F2 - Processing parameters
SI 16384
SF 400.1500100 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



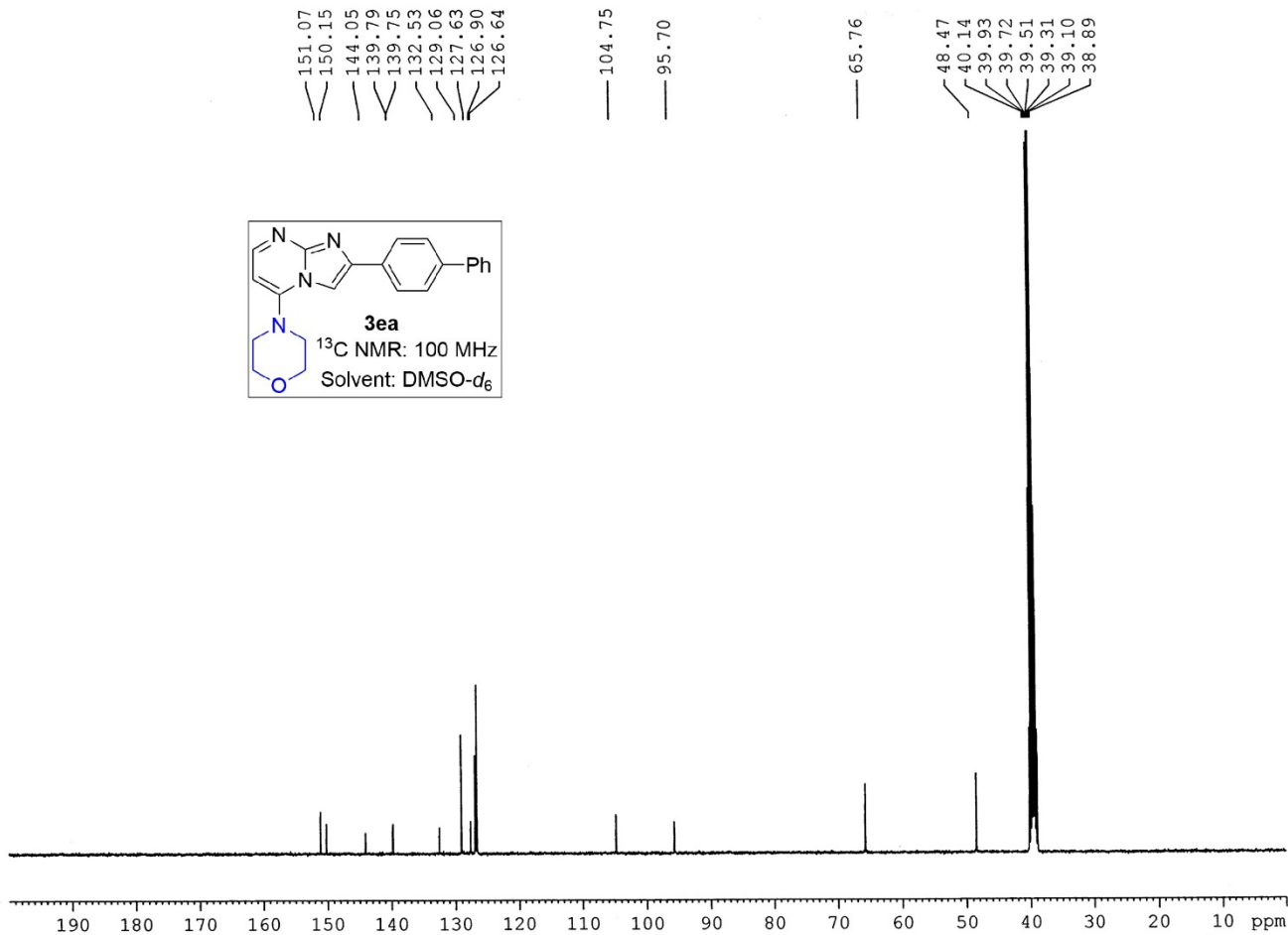
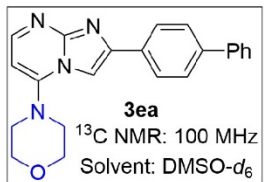


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 662
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251108
 Time_ 12.12
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 93.46
 DW 60.800 usec
 DE 6.50 usec
 TE 289.1 K
 D1 1.00000000 sec
 TDO 1

===== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500028 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



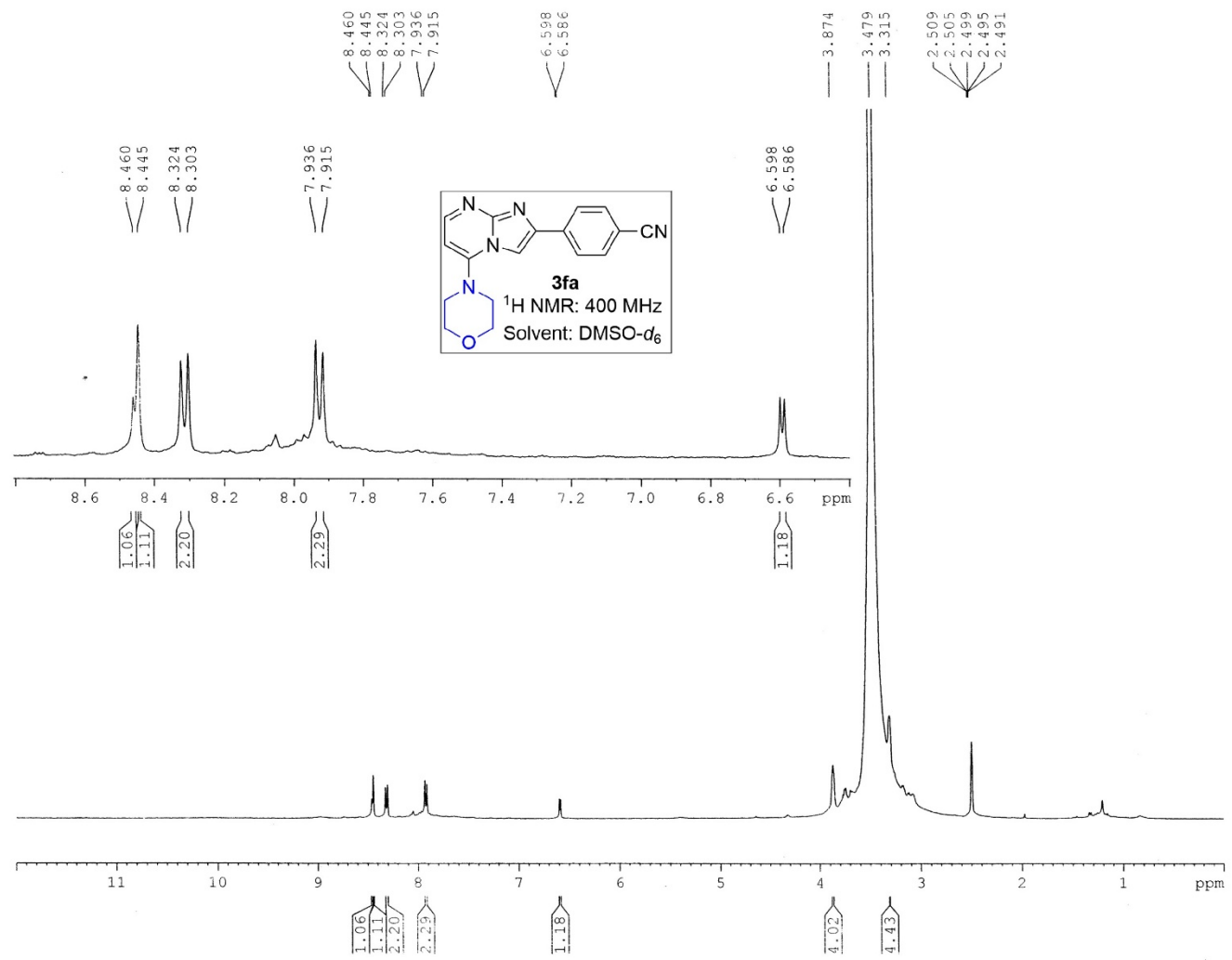
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 383
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251108
 Time 14.47
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 1500
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 290.8 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.0000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waitz16
 ECPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178376 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

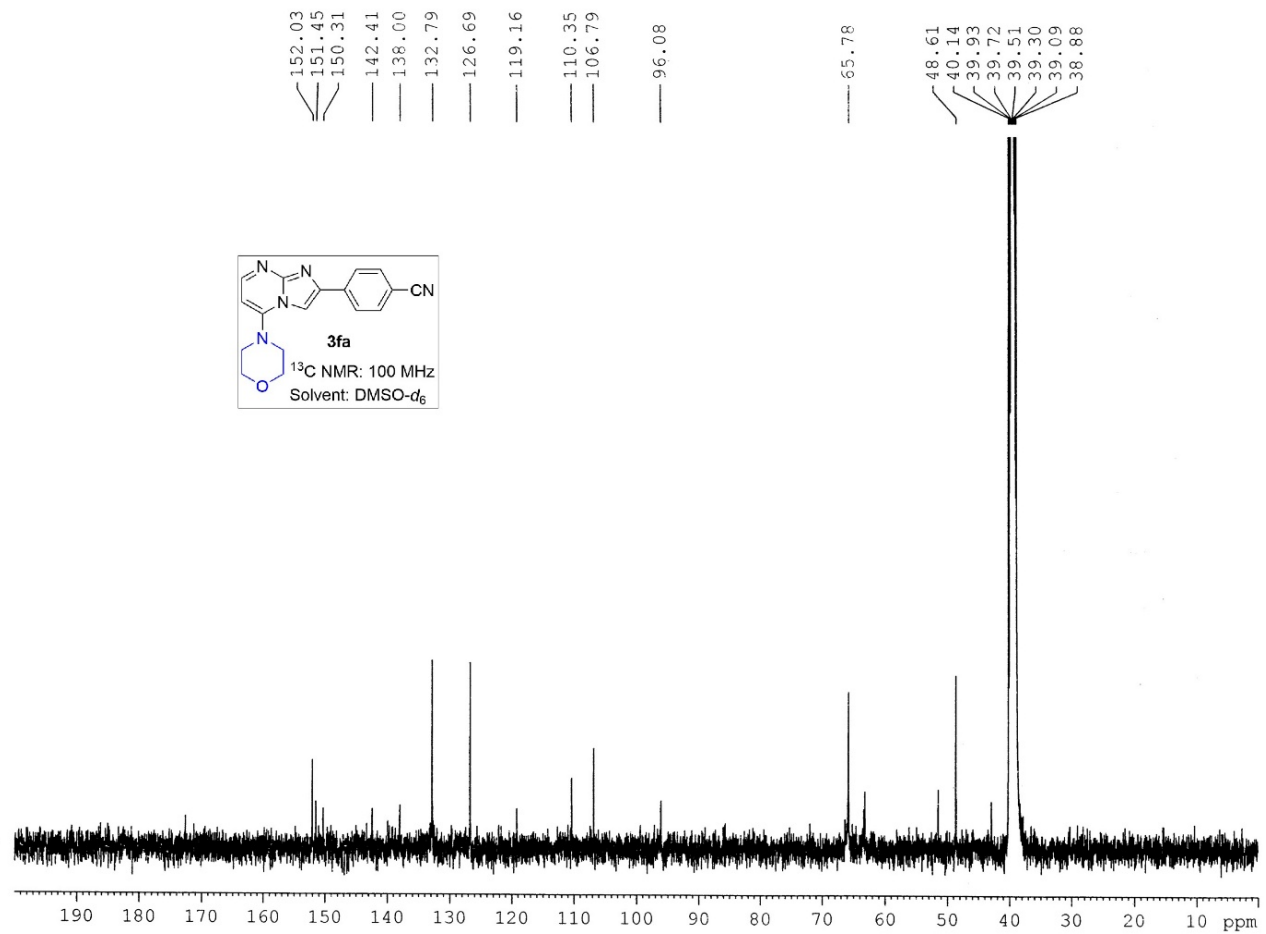


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 325
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250618
 Time_ 18.10
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 57.28
 DW 60.800 usec
 DE 6.50 usec
 TE 292.1 K
 D1 1.00000000 sec
 TD0 1

==== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



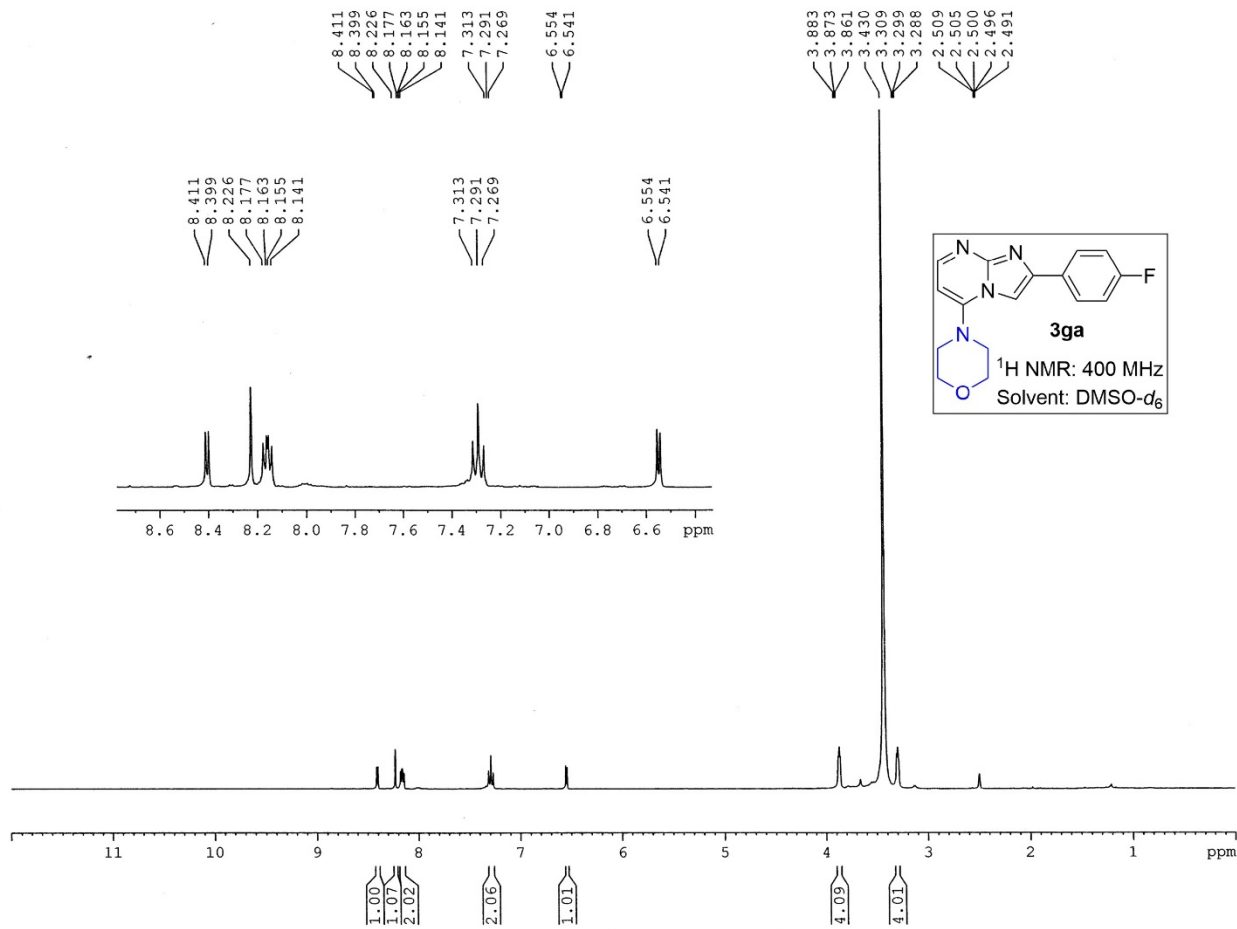
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 198
 PROCNO 1

F2 - Acquisition Parameters
 Date 20250618
 Time 19.36
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 1750
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 295.4 K
 D1 2.0000000 sec
 D11 0.6300000 sec
 TDO 1

----- CHANNEL f1 -----
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

----- CHANNEL f2 -----
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178302 MHz
 WDWB EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

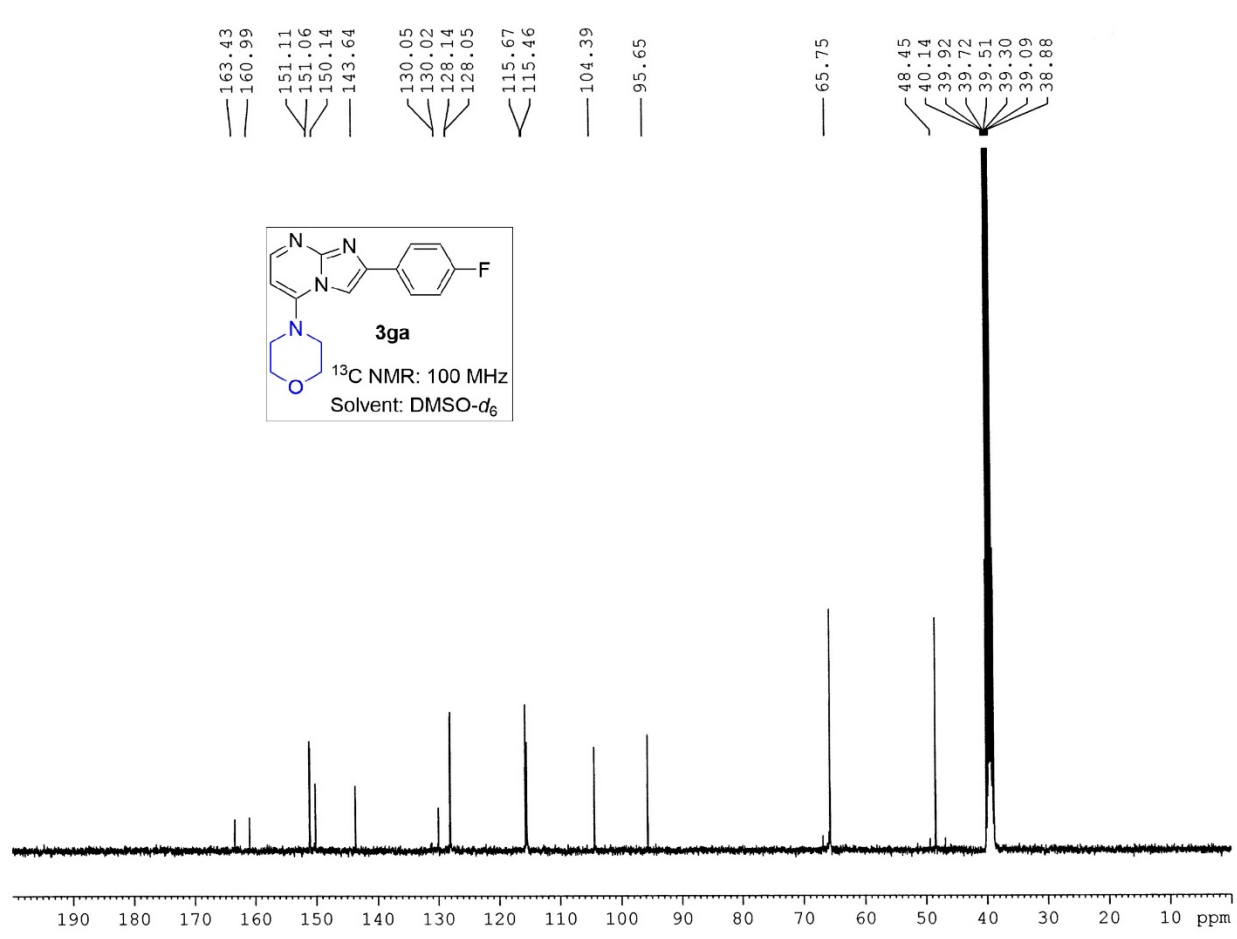


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 322
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250617
 Time 12.19
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 62.69
 DW 60.800 usec
 DE 6.50 usec
 TE 295.0 K
 D1 1.00000000 sec
 TDO 1

===== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



```

Current Data Parameters
NAME      Dr. A HAJRA-2025-13C
EXPNO    197
PROCNO   1

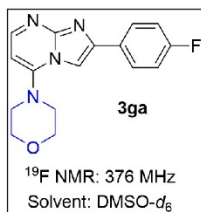
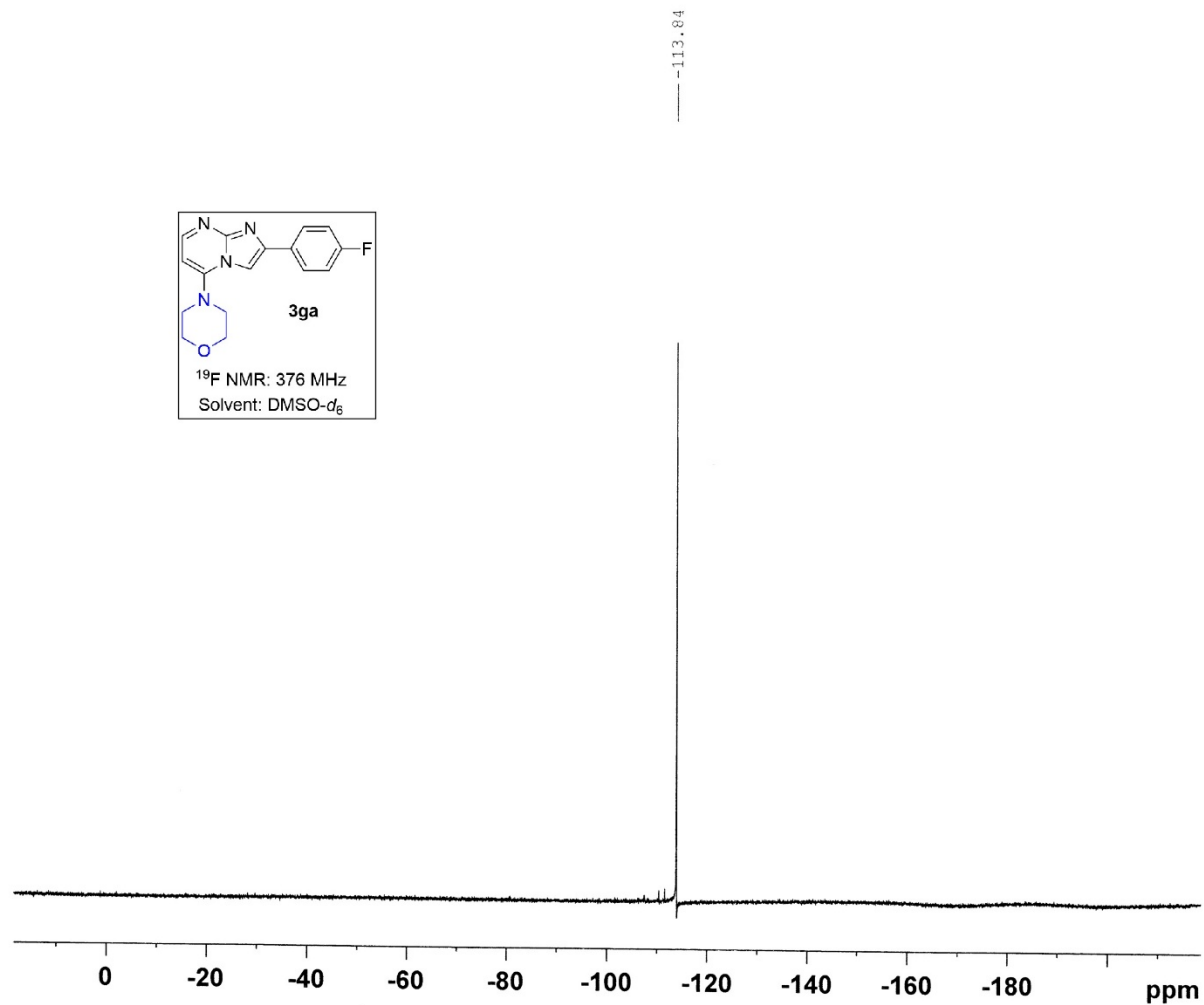
F2 - Acquisition Parameters
Date_    20250617
Time     13.40
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD       32768
SOLVENT  DMSO
NS       1650
DS       2
SWH      24038.461 Hz
FIDRES   0.733596 Hz
AQ       0.6815744 sec
RG       186.42
DW       20.800 usec
DE       6.50 usec
TE       294.8 K
D1       2.00000000 sec
D11      0.03000000 sec
TD0      1

----- CHANNEL f1 -----
SFO1    100.6278588 MHz
NUC1     13C
P1       8.90 usec
PLW1    54.00000000 W

----- CHANNEL f2 -----
SFO2    400.1516006 MHz
NUC2     1H
CPDPRG2  waltz16
PCPD2    90.00 usec
PLW2    12.00000000 W
ELW12   0.32231000 W
ELW13   0.16212000 W

F2 - Processing parameters
SI       16384
SF       100.6178361 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40

```

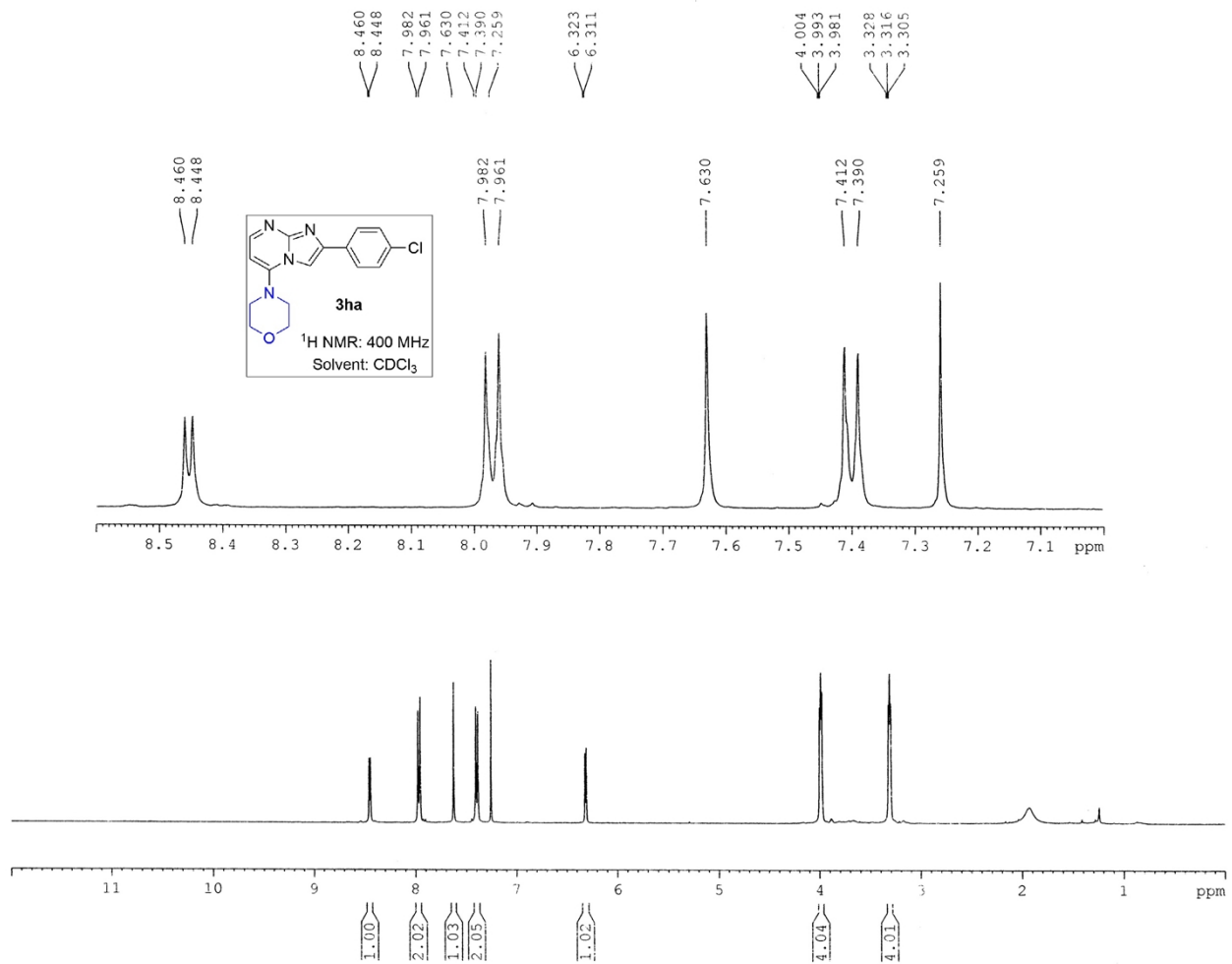


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 323
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250617
 Time 13.47
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgflqn
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 89285.711 Hz
 FIDRES 2.724784 Hz
 AQ 0.1835008 sec
 RG 186.42
 DW 5.600 usec
 DE 6.50 usec
 TE 294.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 376.4795333 MHz
 NUC1 19F
 P1 12.50 usec
 PLW1 20.00000000 W

F2 - Processing parameters
 SI 16384
 SF 376.5171850 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

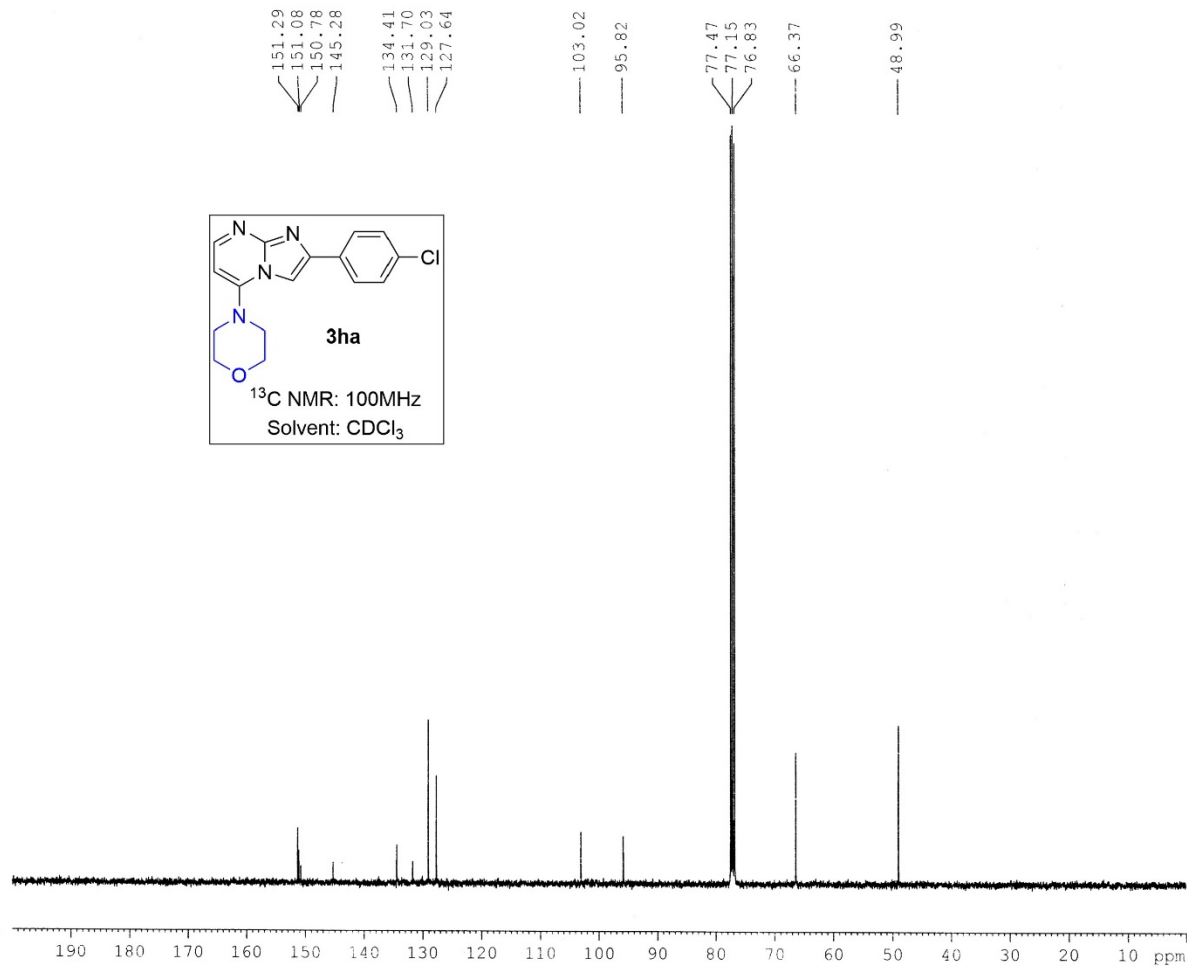


Current Data Parameters
 NAME Dr. A HAJRA 2026 1H
 EXPNO 24
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260117
 Time 16.45
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT CDCl3
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.992294 sec
 RG 135.7
 DW 60.800 usec
 DE 6.50 usec
 TE 292.5 K
 D1 1.0000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.0000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500097 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



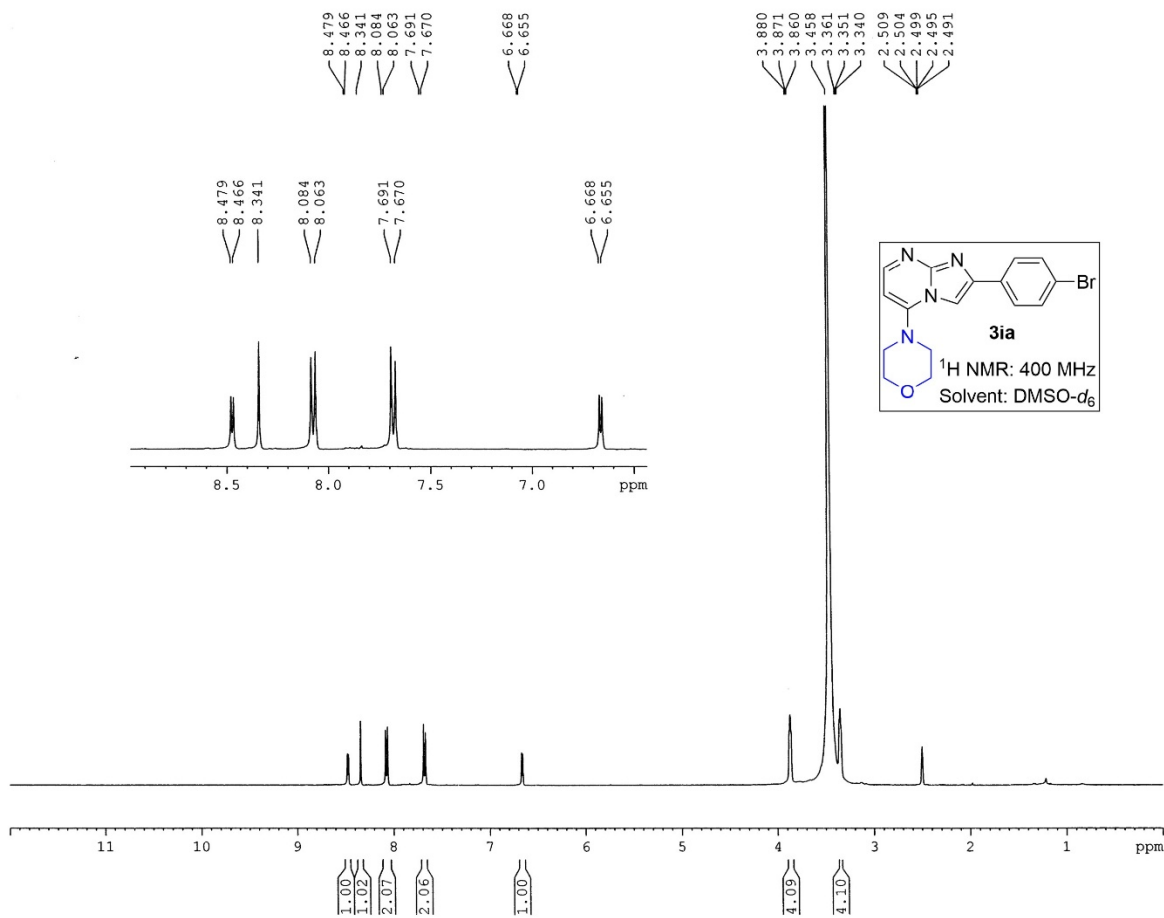
Current Data Parameters
 NAME Dr. A HAJRA-2026-13C
 EXPNO 14
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260117
 Time 17.45
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT CDC13
 NS 1200
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 IW 20.800 usec
 DE 6.50 usec
 TE 289.6 K
 B1 2.0000000 sec
 D1 0.0300000 sec
 FIDC 1

----- CHANNEL f1 -----
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 6.90 usec
 PLW1 54.0000000 W

----- CHANNEL f2 -----
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG2 waltz16
 PCPD2 90.00 usec
 PLW2 12.0000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6177873 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

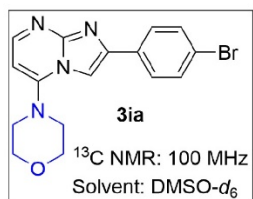
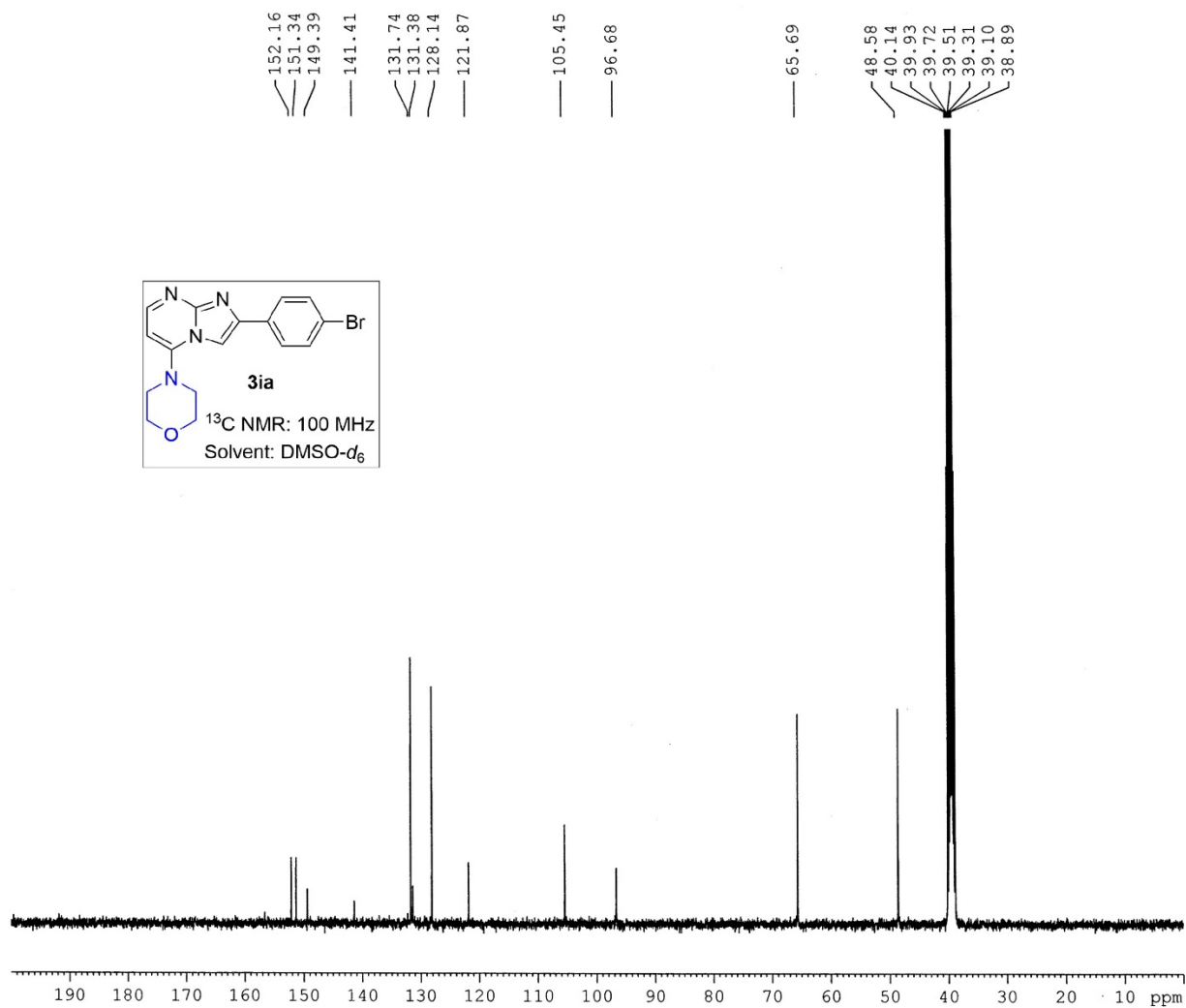


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 320
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250615
 Time_ 11.39
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 62.69
 DW 60.800 usec
 DE 6.50 usec
 TE 296.9 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500030 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



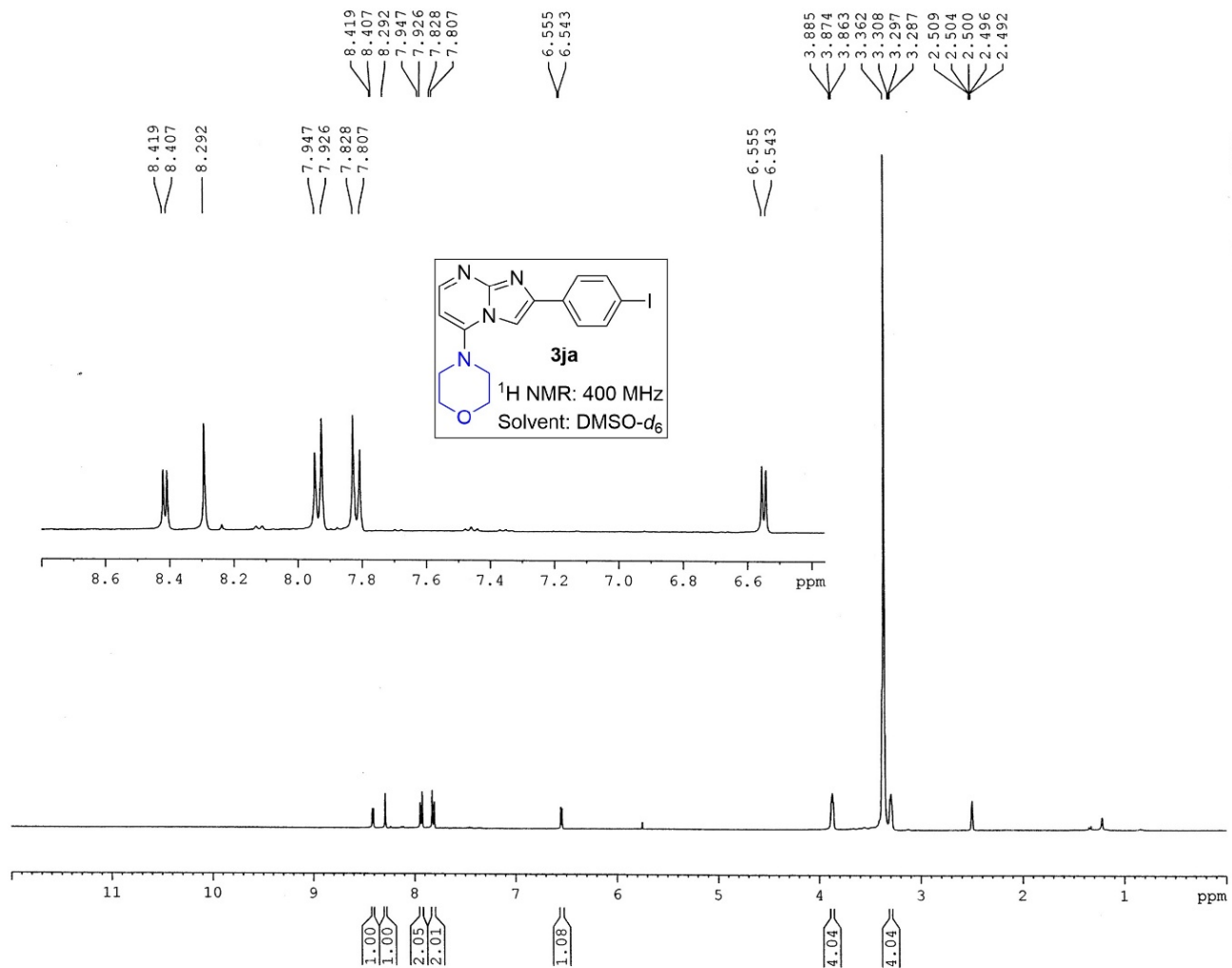
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 195
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250615
 Time 13.07
 INSTRUM spect
 FROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 1800
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 297.2 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178376 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

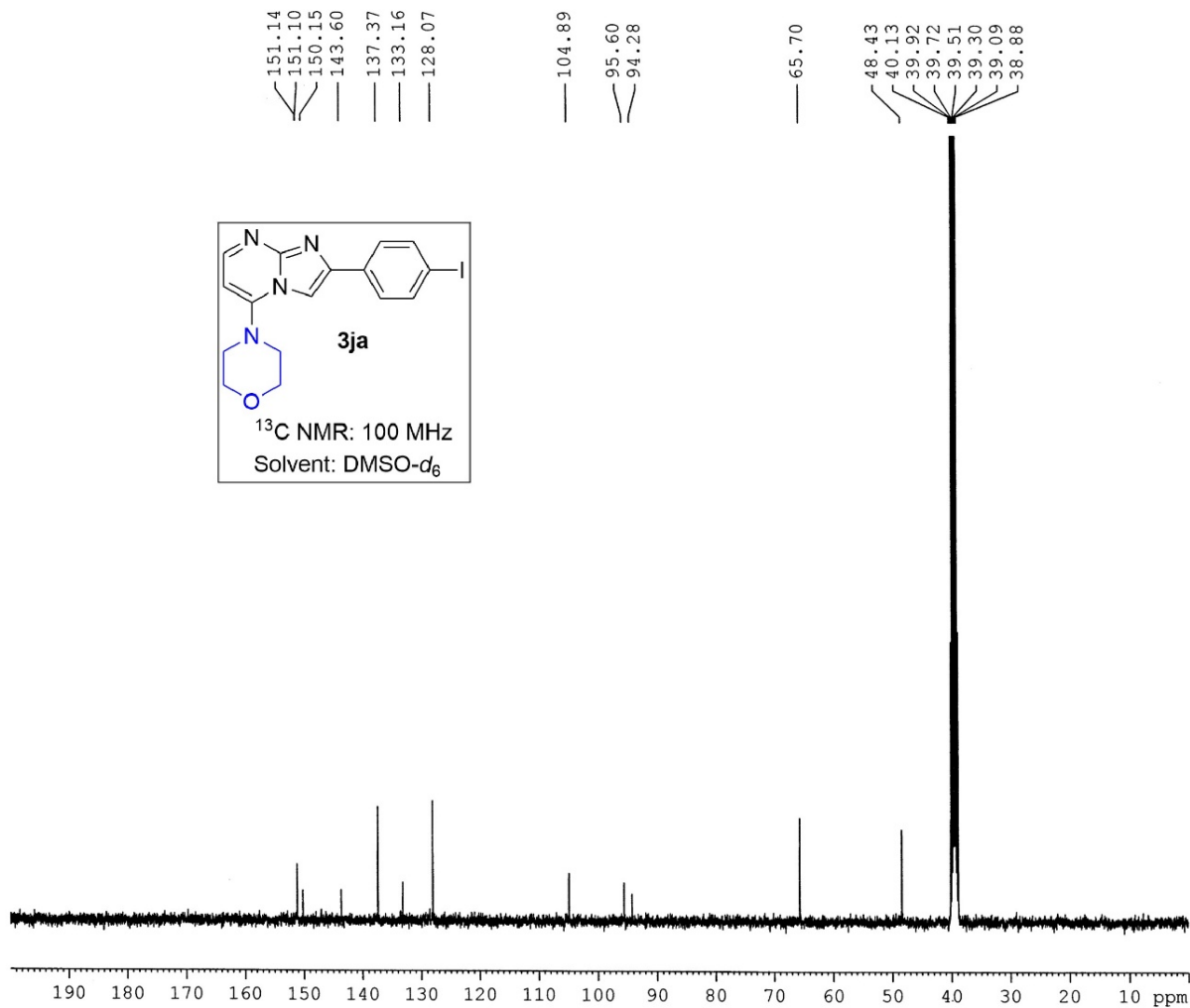


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 361
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250629
 Time_ 11.16
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 135.7
 DW 60.800 usec
 DE 6.50 usec
 TE 296.0 K
 D1 1.00000000 sec
 TDO 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



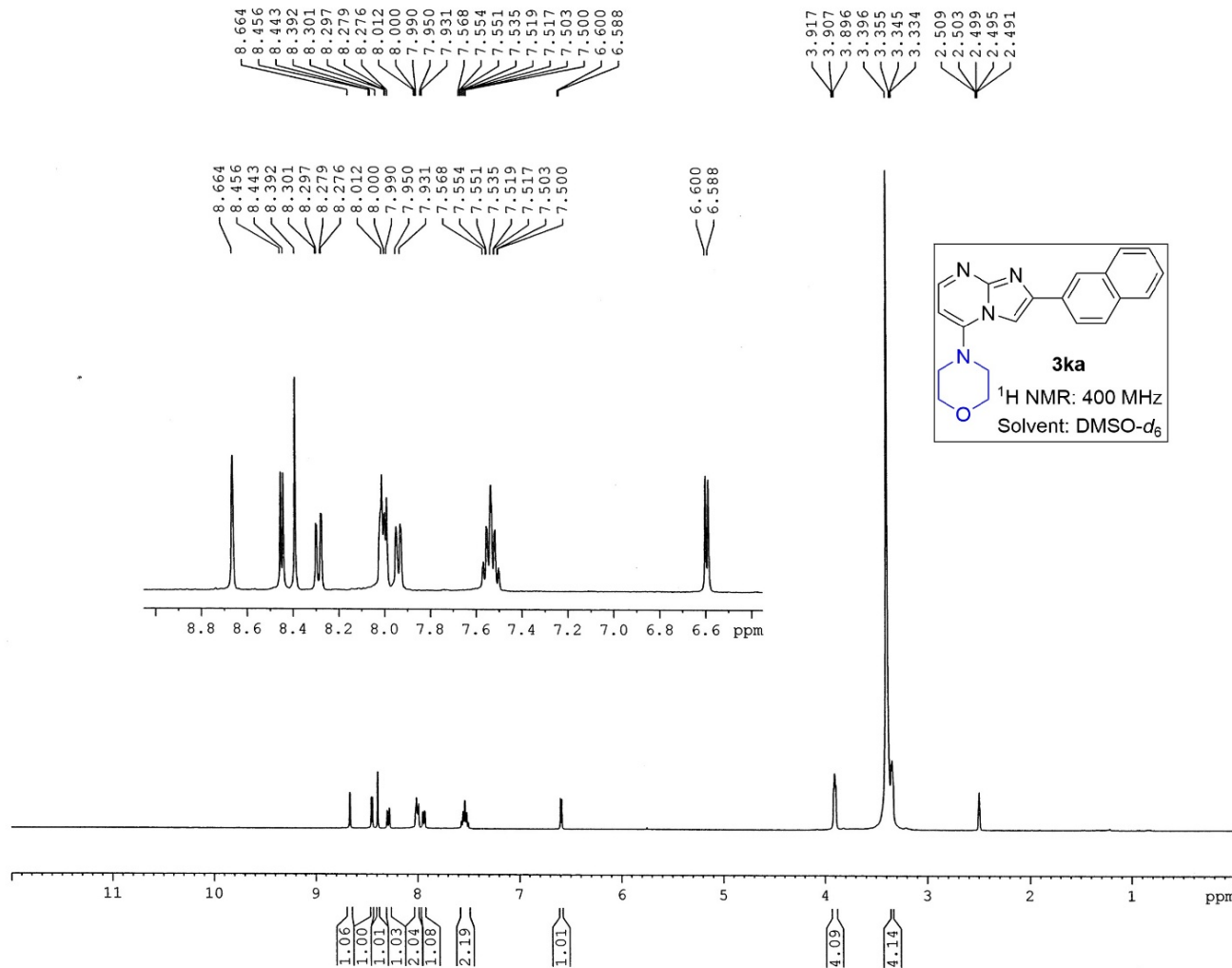
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 206
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250629
 Time 11.54
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 700
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 295.7 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178419 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

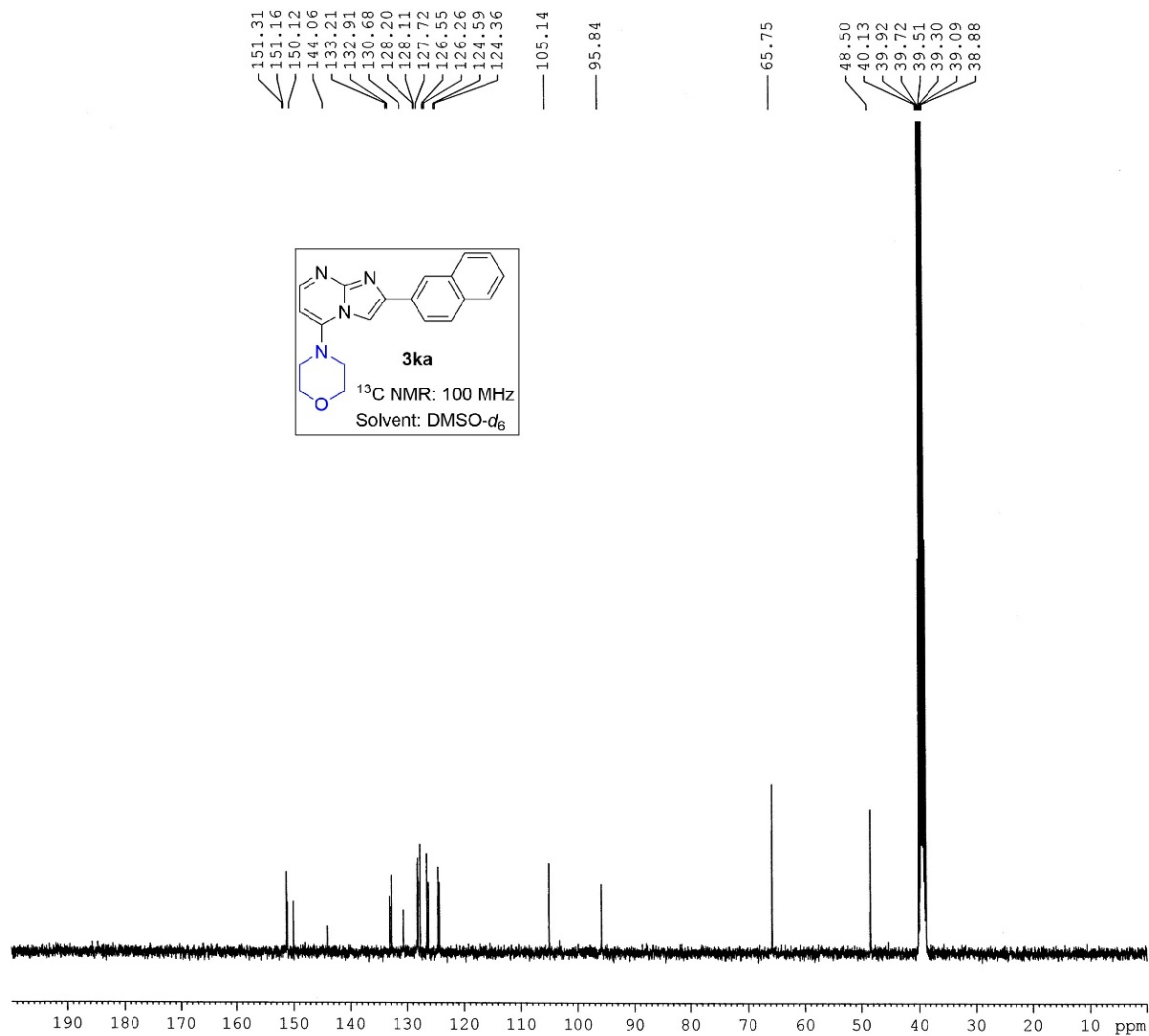


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 362
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250629
 Time 13.02
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 135.7
 DW 60.800 usec
 DE 6.50 usec
 TE 294.6 K
 D1 1.0000000 sec
 TD0 1

==== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500035 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



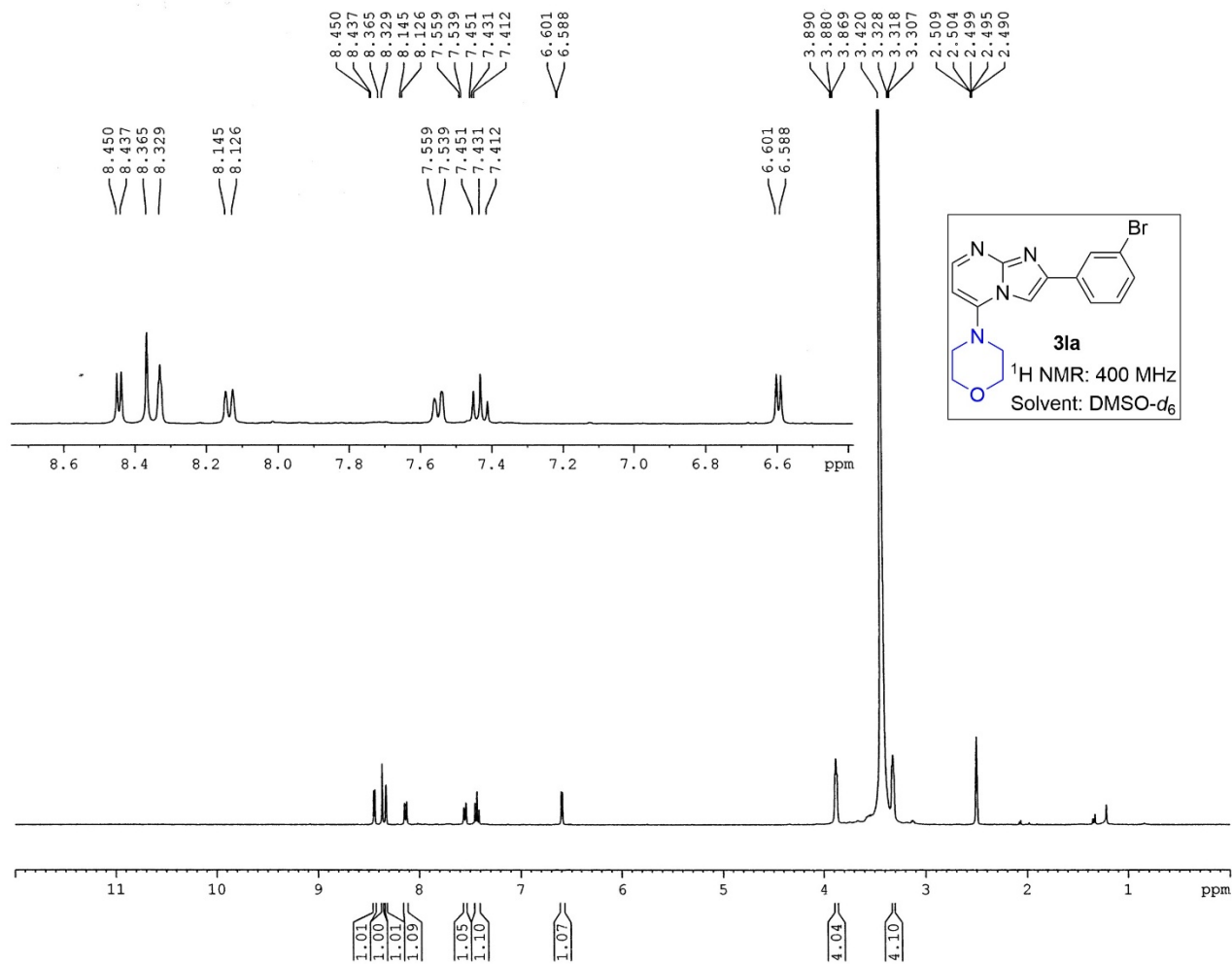
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 207
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250629
 Time 14.06
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 1300
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 294.4 K
 D1 2.0000000 sec
 D11 0.0300000 sec
 TDO 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 F1 8.90 usec
 PLW1 54.0000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.0000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178405 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

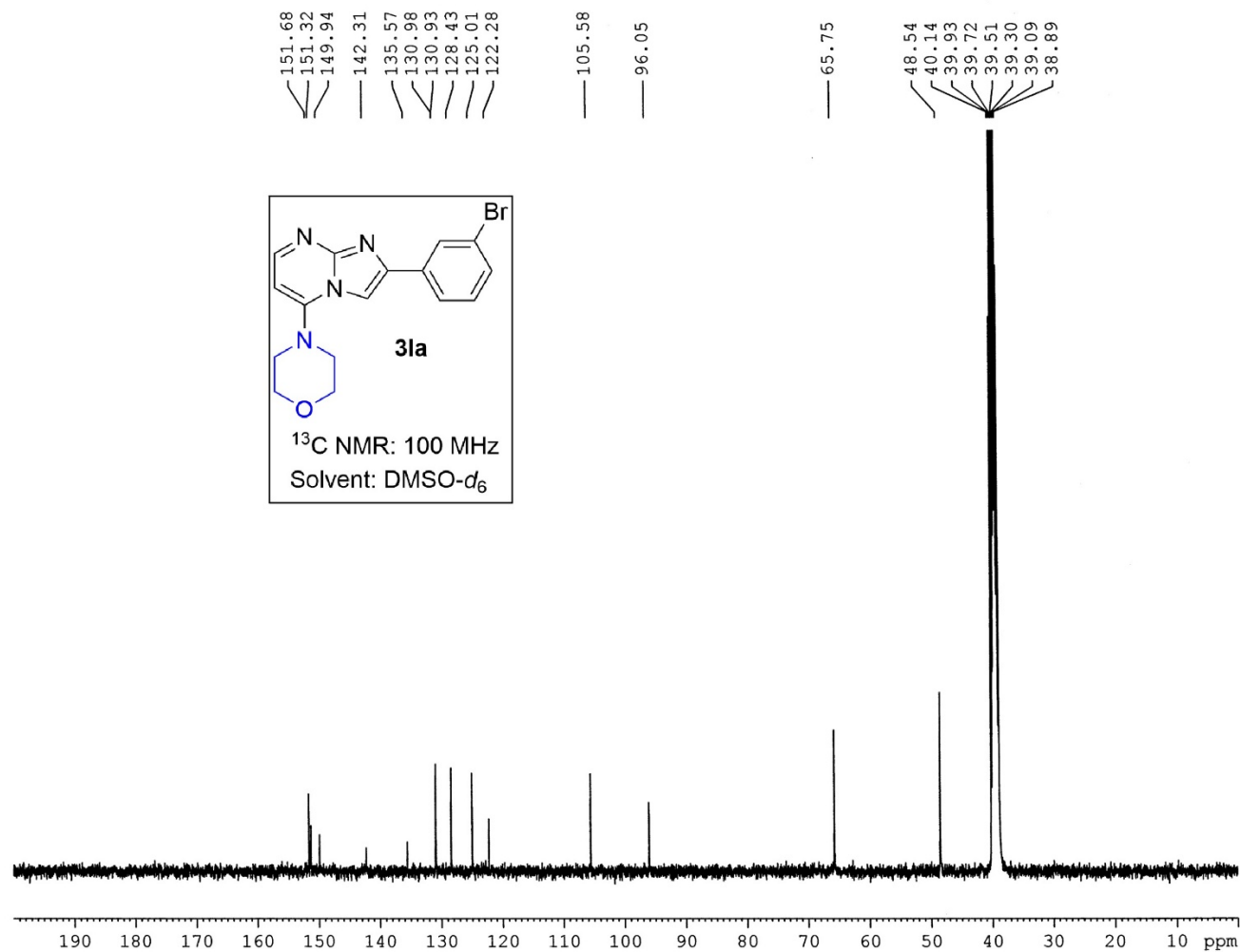


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 615
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251019
 Time_ 11.58
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 106.66
 DW 60.800 usec
 DE 6.50 usec
 TE 292.6 K
 D1 1.0000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.0000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500030 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



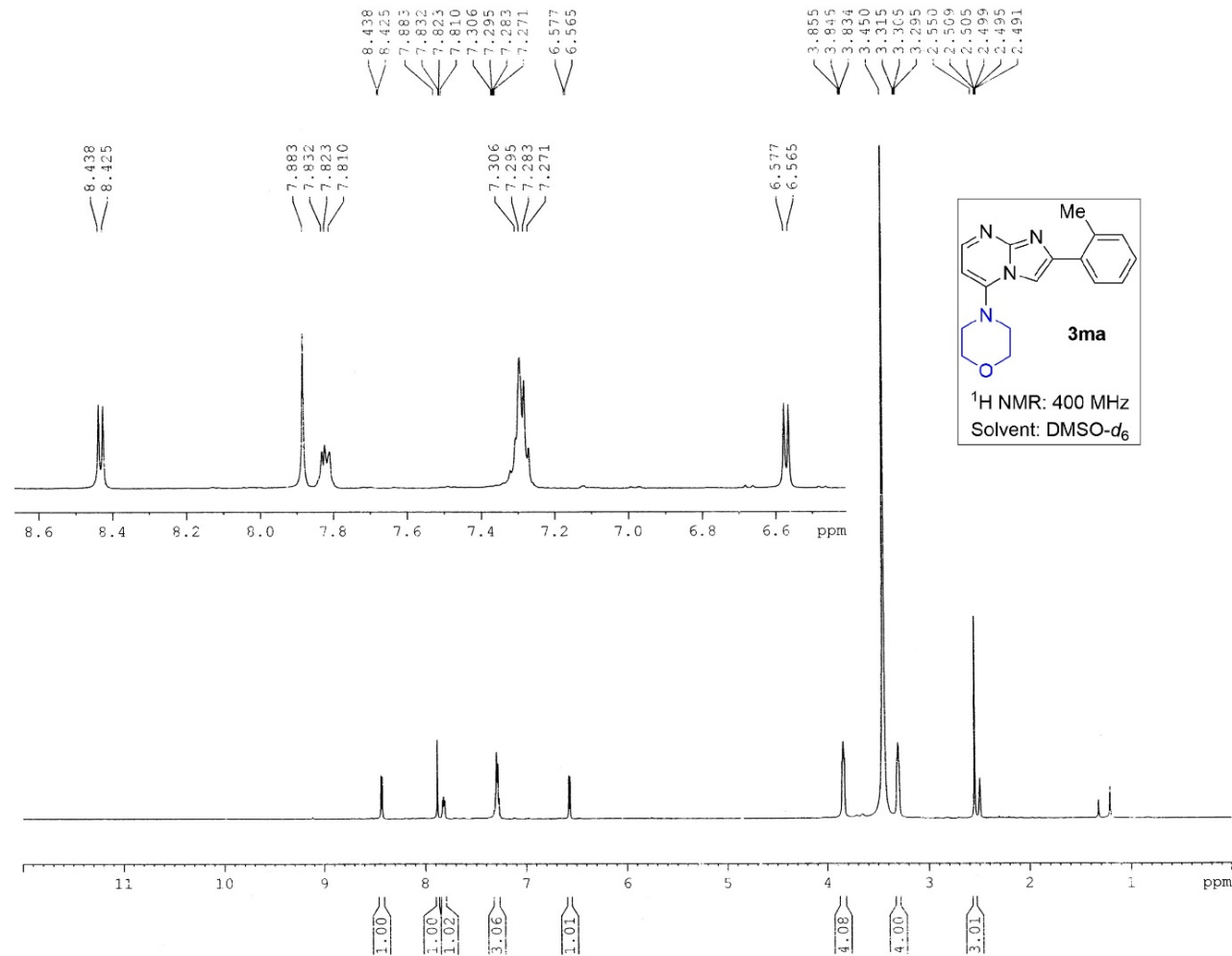
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 350
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251019
 Time 15.17
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 1900
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 293.5 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178361 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

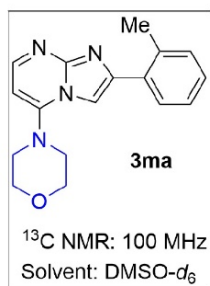
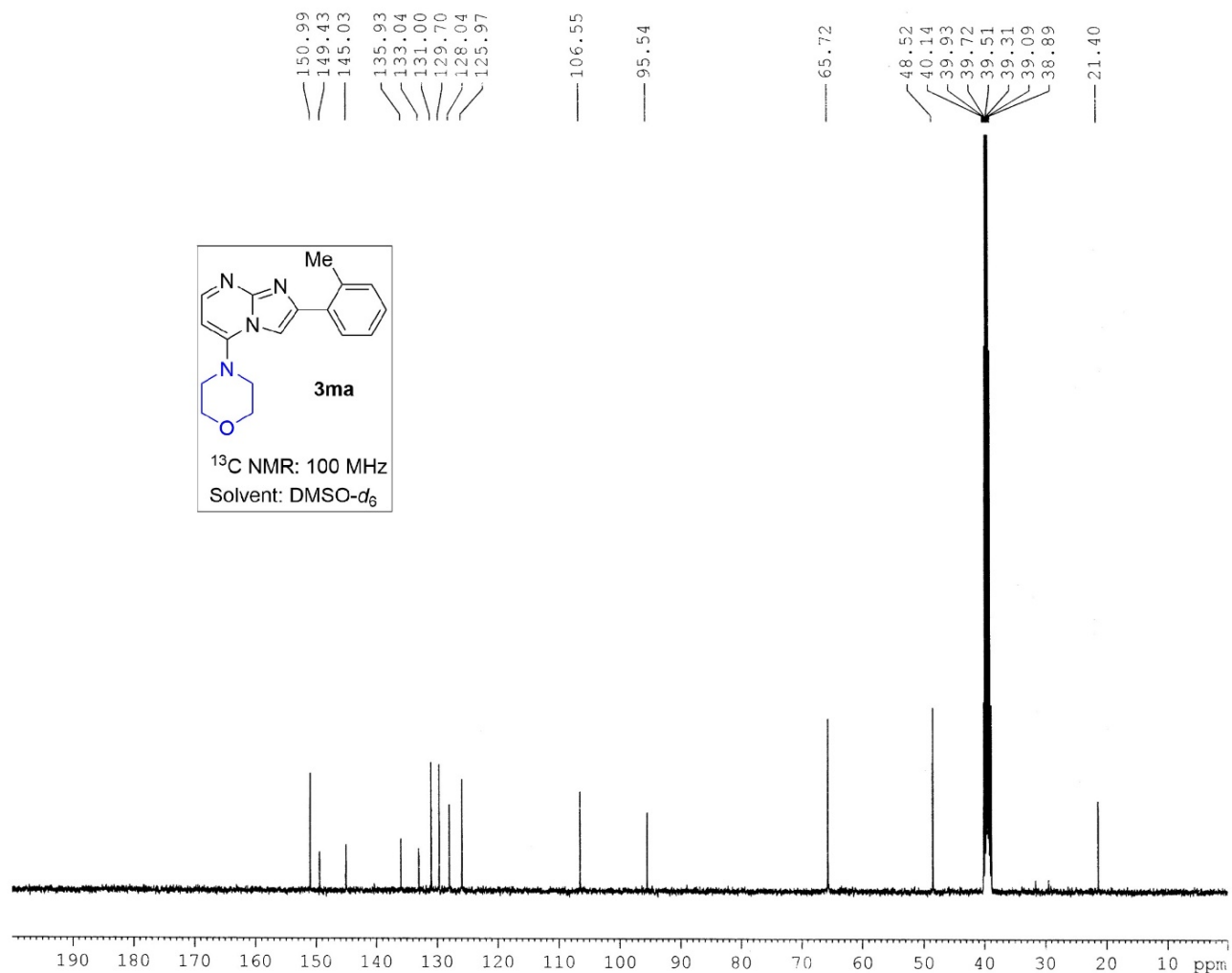


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 692
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251126
 Time_ 12.22
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 57.28
 DW 60.800 usec
 DE 6.50 usec
 TE 287.4 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500026 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



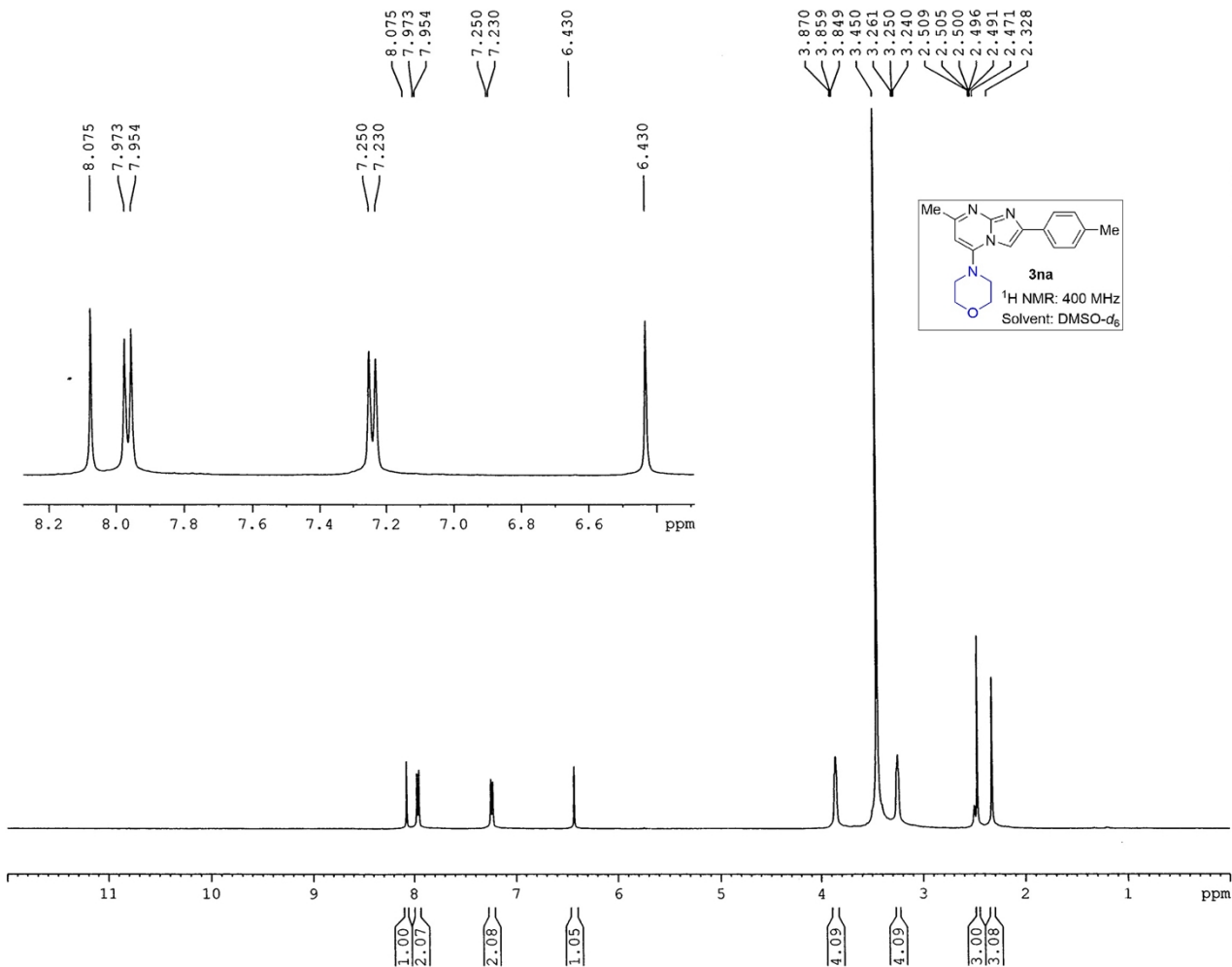
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 406
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251126
 Time 12.56
 INSTRUM spect
 PROBHD 5 mm PABBO BE/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 650
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 288.1 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TDC 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178317 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

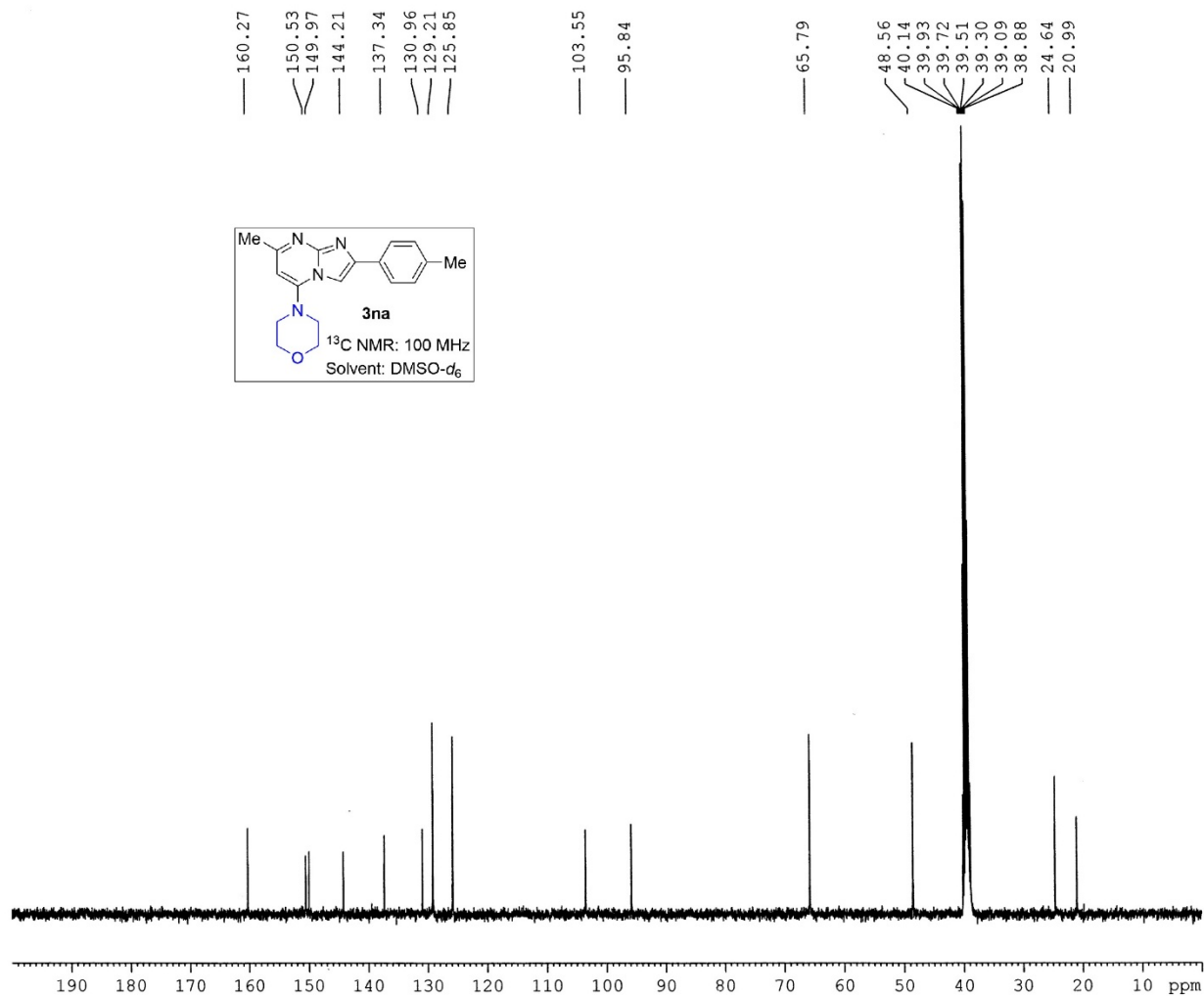


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 450
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250727
 Time_ 12.08
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 47.25
 DW 60.800 usec
 DE 6.50 usec
 TE 293.1 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500030 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



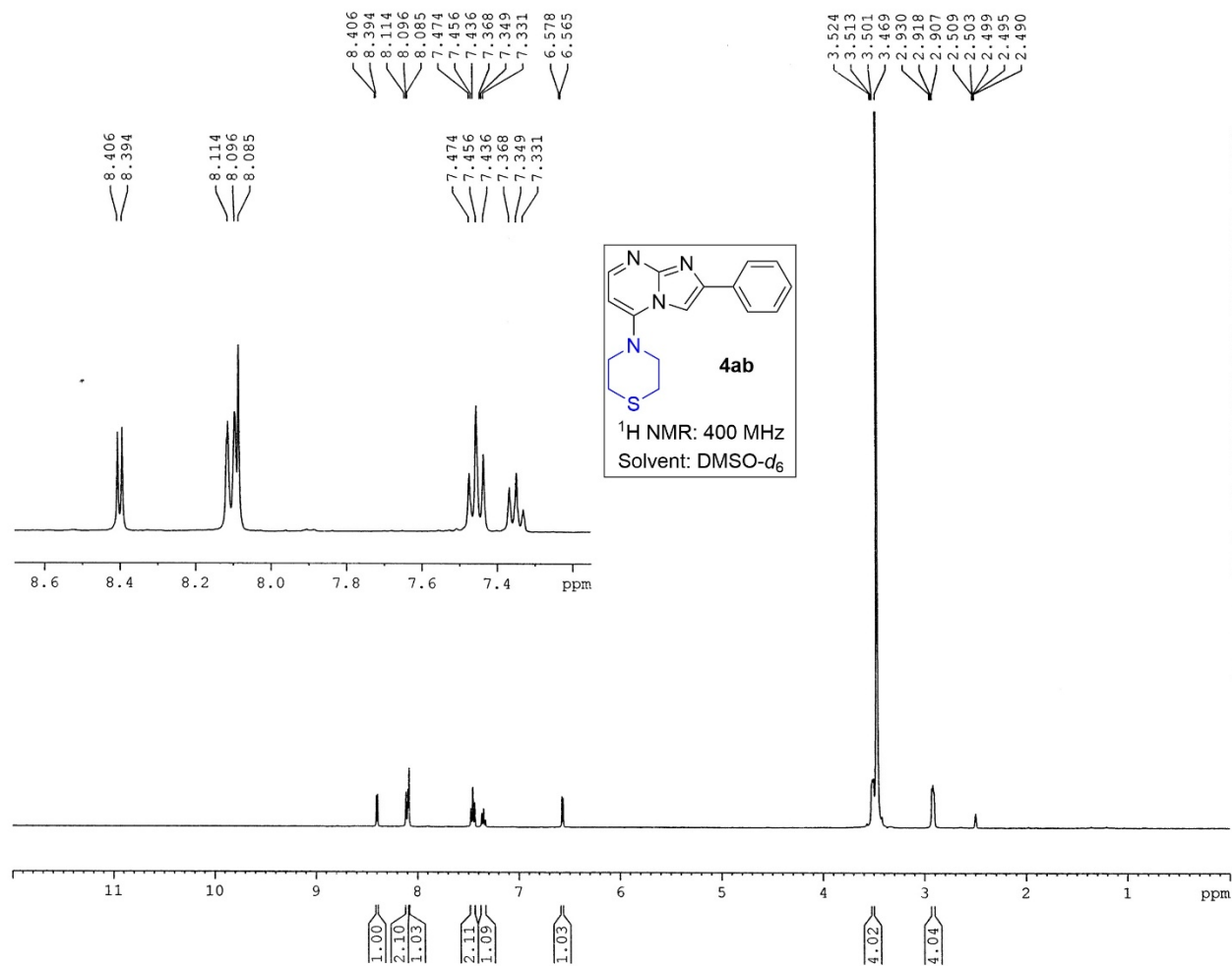
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 261
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250727
 Time 12.22
 INSTRUM spect
 PROBHD 5 mm FAPBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 200
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 293.4 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TDO 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 P1 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178346 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

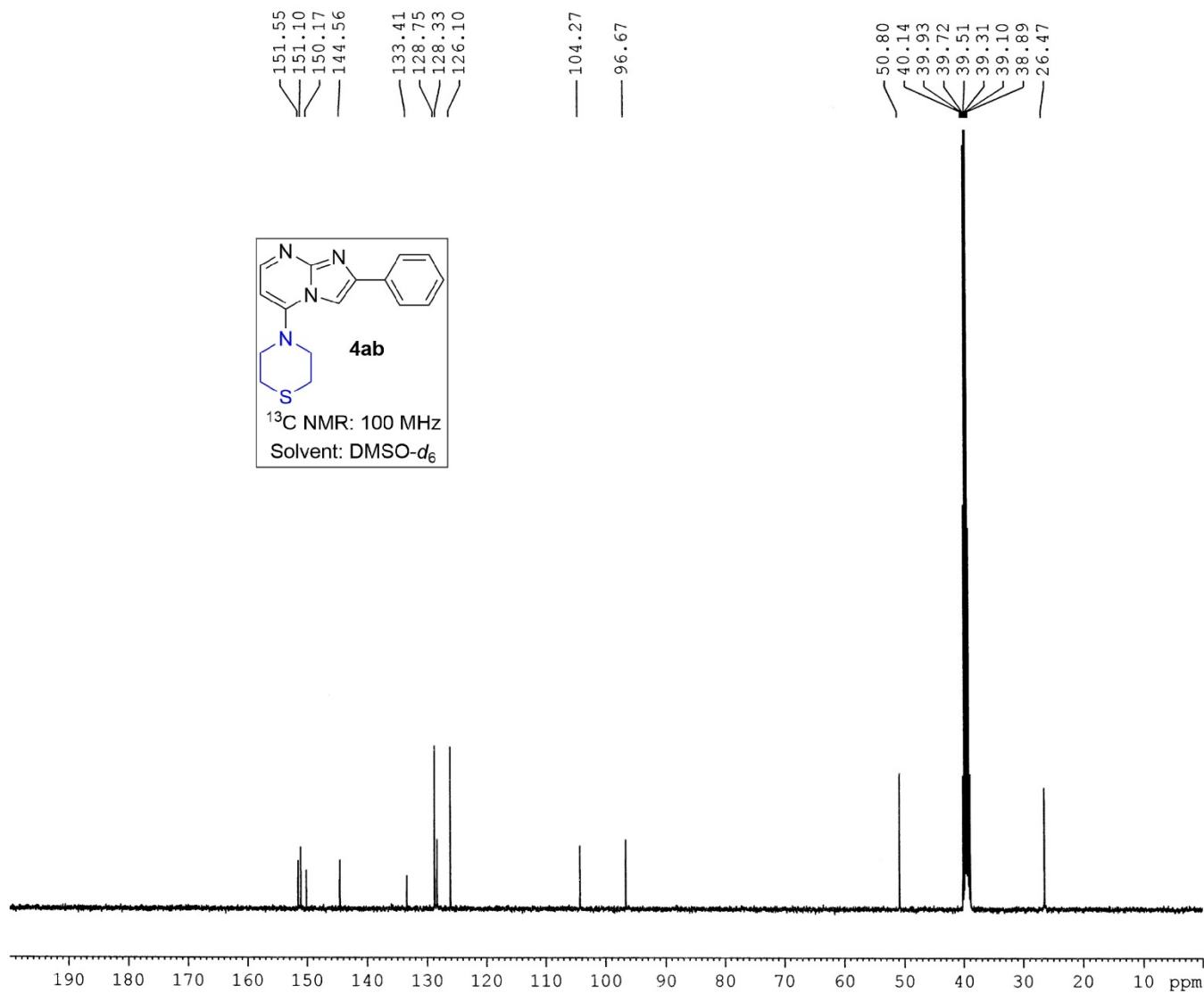


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 402
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250716
 Time 12.21
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 54.07
 DW 60.800 usec
 DE 6.50 usec
 TE 293.6 K
 D1 1.00000000 sec
 TD0 1

==== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



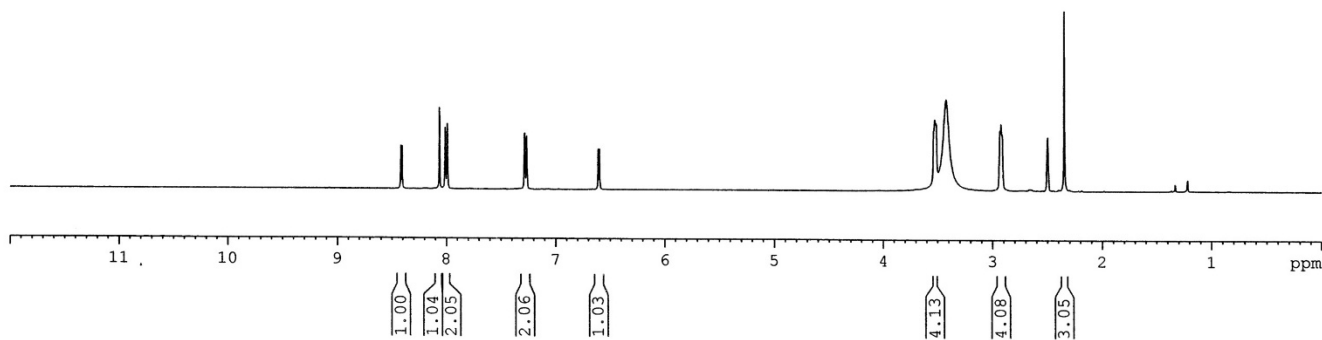
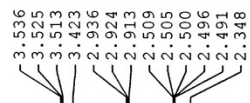
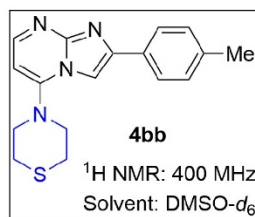
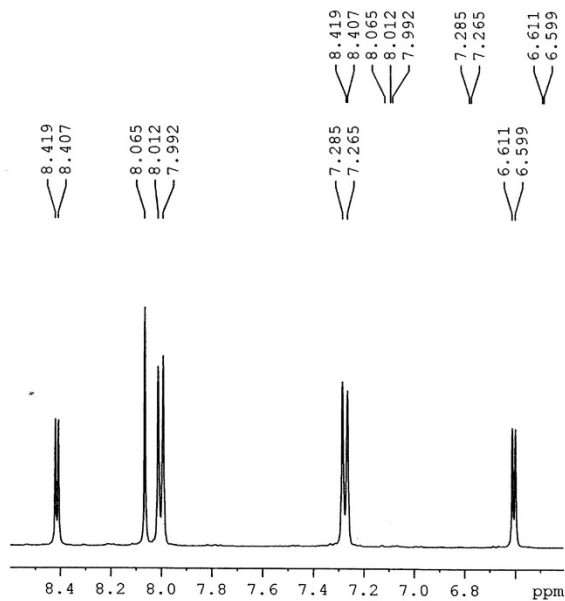
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 233
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250716
 Time_ 12.53
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 560
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 293.8 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178317 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 EC 1.40

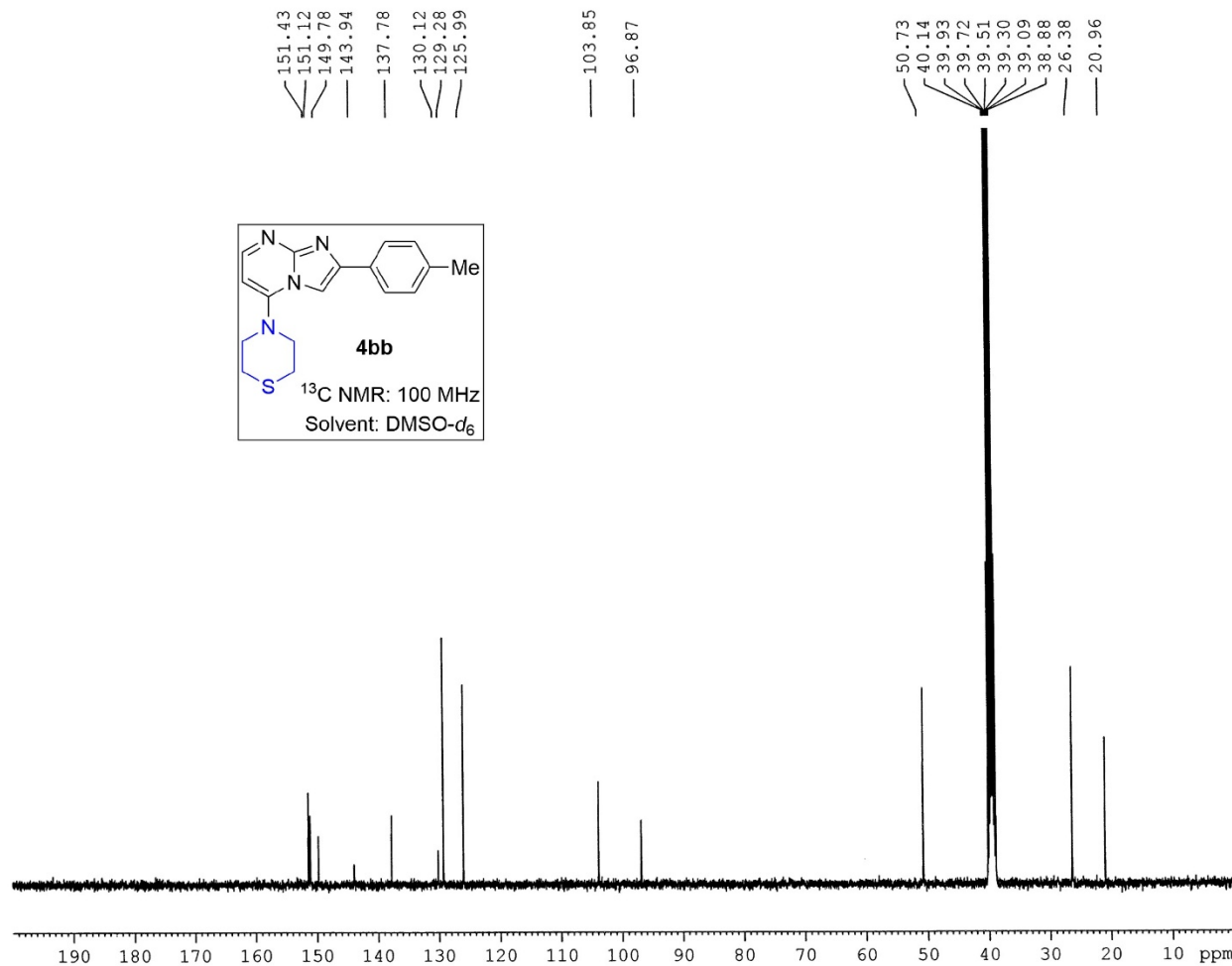


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 417
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250719
 Time_ 12.08
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 93.46
 DW 60.800 usec
 DE 6.50 usec
 TE 293.0 K
 D1 1.00000000 sec
 TD0 1

==== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500030 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



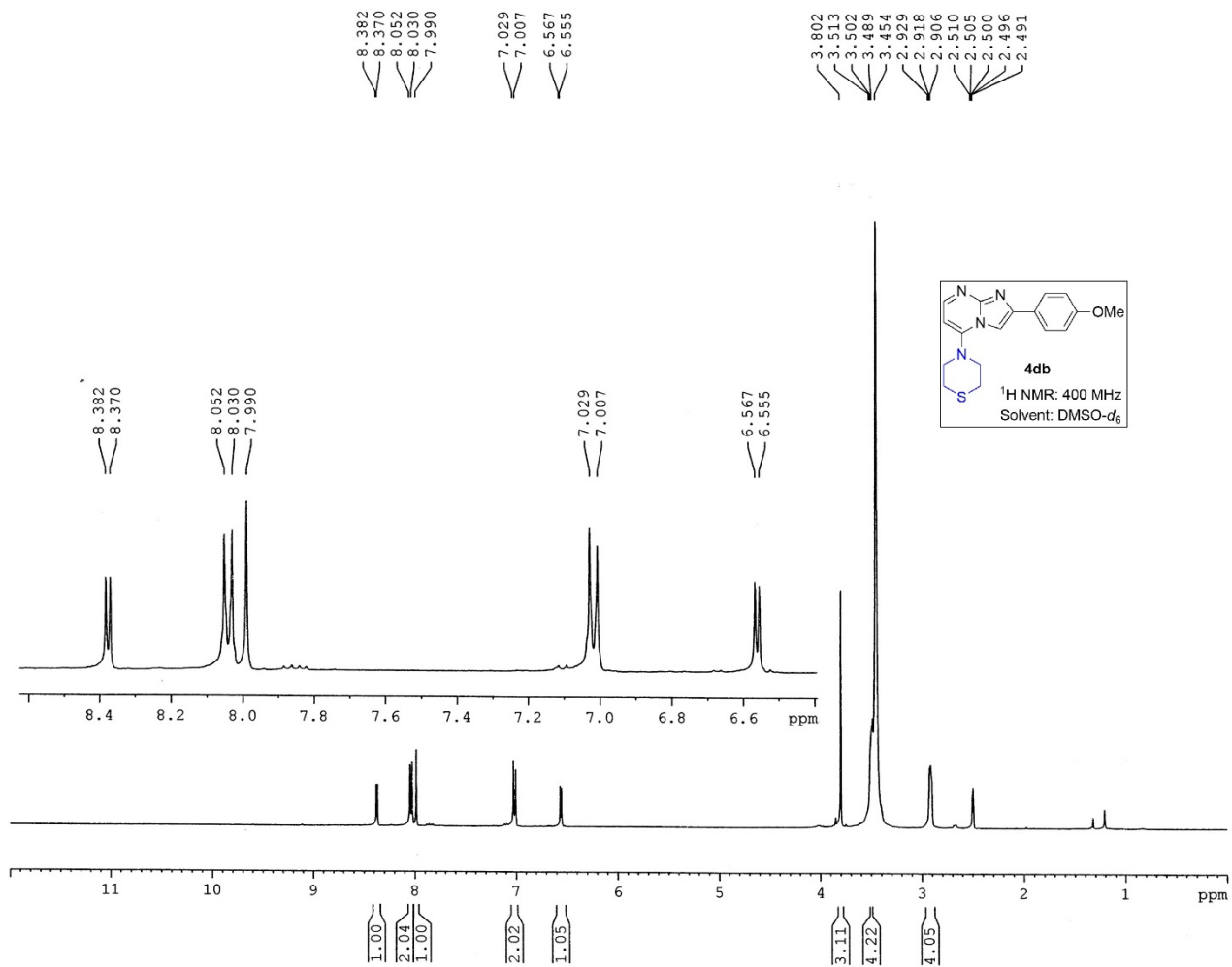
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 243
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250719
 Time 12.59
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 1000
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 293.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TDO 1

==== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

==== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178405 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

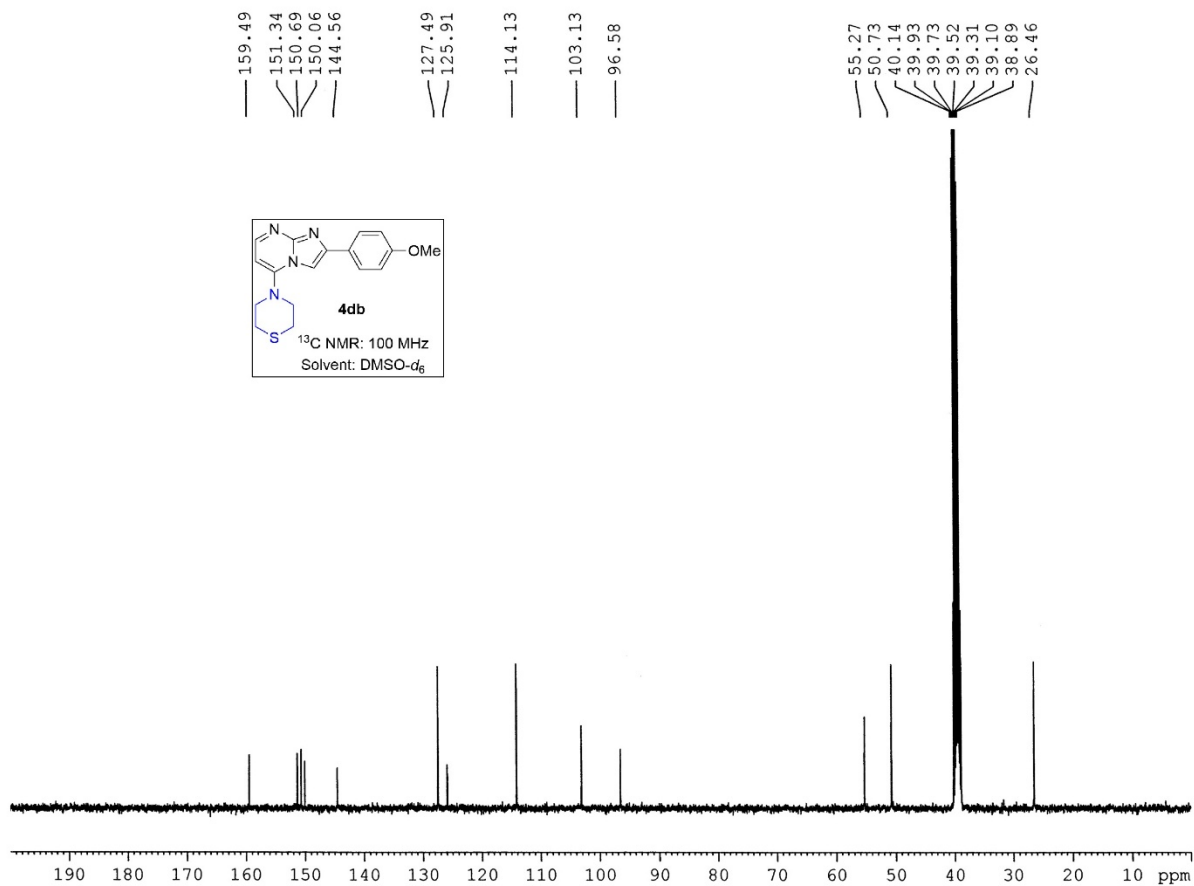


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 573
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250922
 Time 18.37
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 62.69
 DW 60.800 usec
 DE 6.50 usec
 TE 289.4 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500026 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



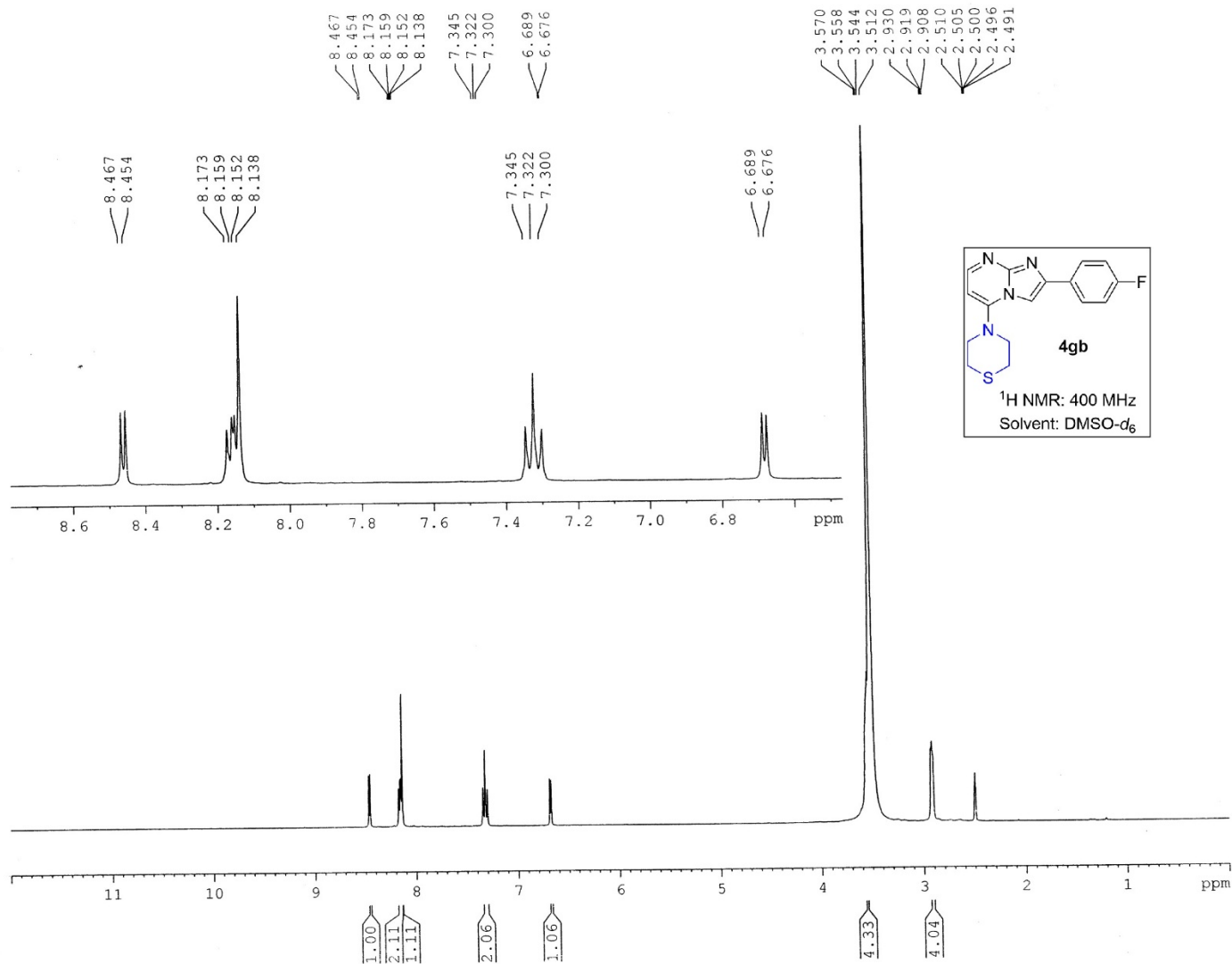
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 328
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250922
 Time_ 19.08
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 600
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 290.0 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TDO 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 FCFD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178332 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

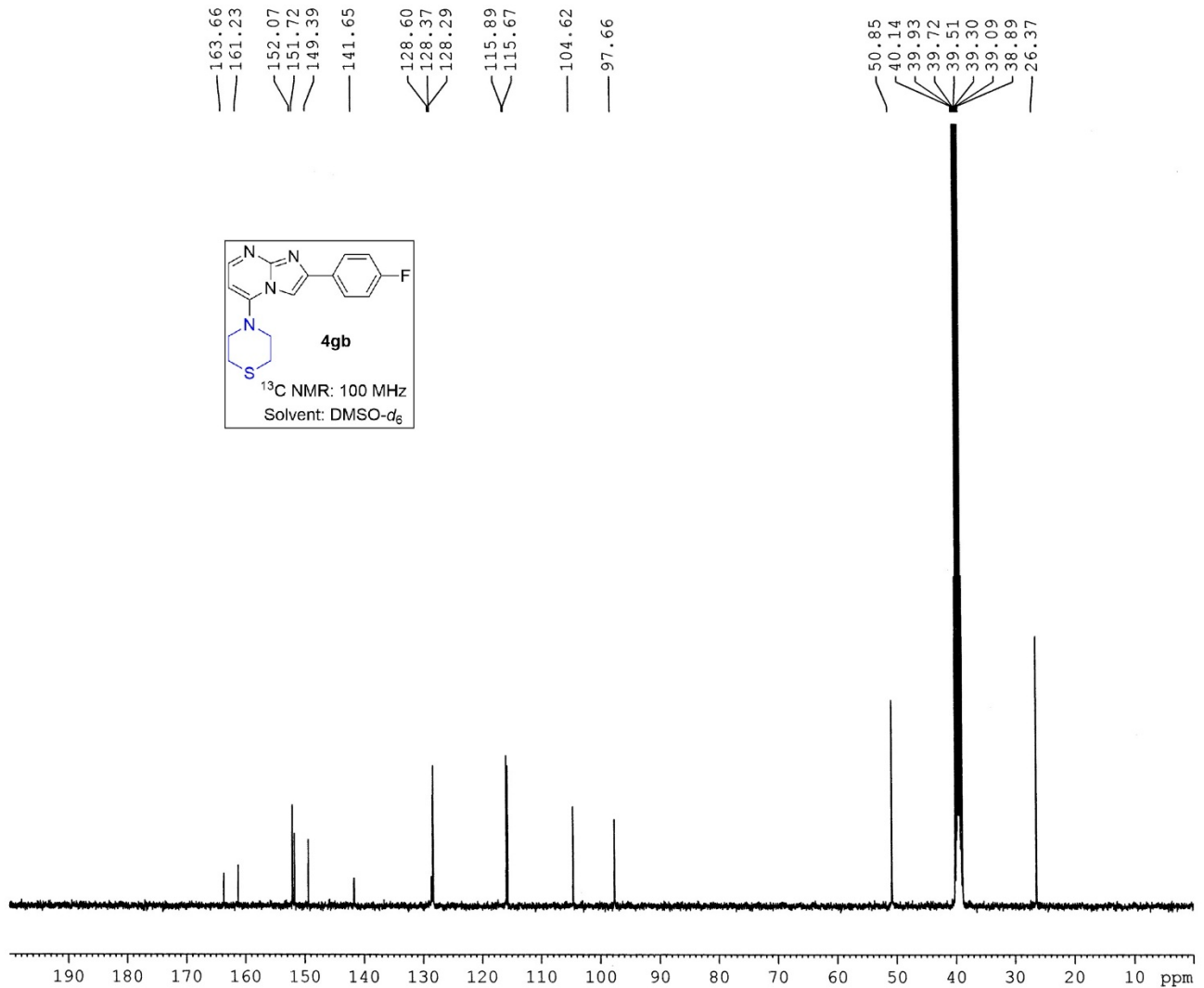


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 563
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250918
 Time_ 18.52
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 62.69
 DW 60.800 usec
 DE 6.50 usec
 TE 293.4 K
 D1 1.00000000 sec
 TD0 1

==== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



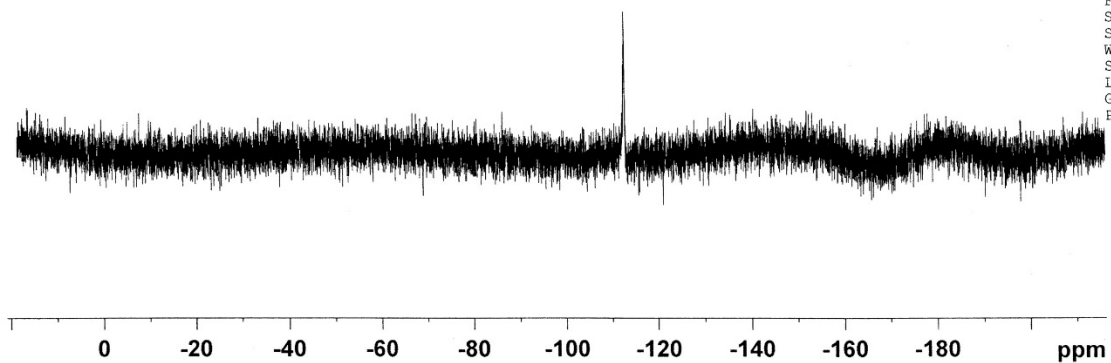
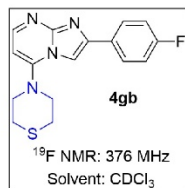
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 322
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250918
 Time 20.12
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 1600
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 294.5 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 FCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178347 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

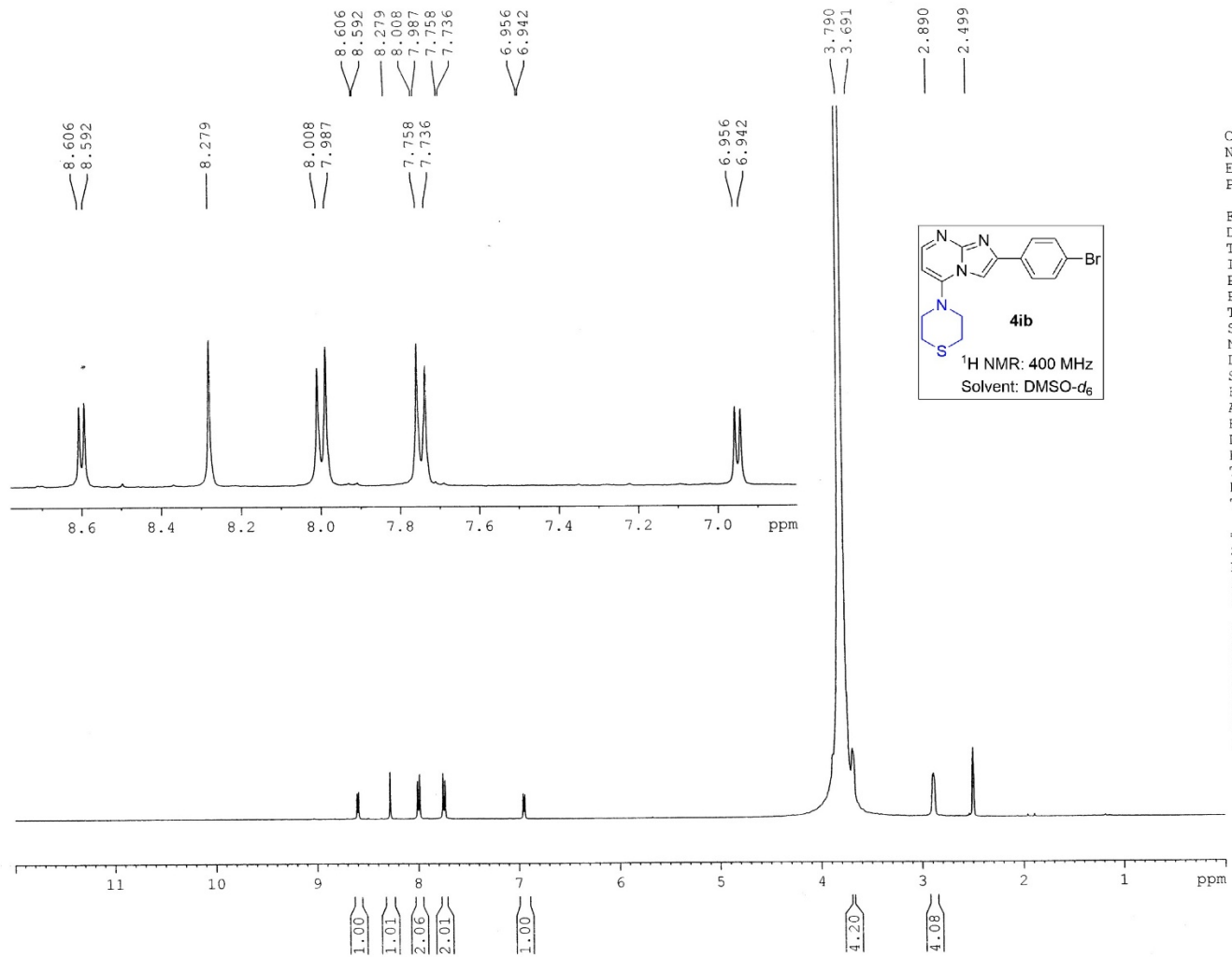


Current Data Parameters
 NAME Dr. A HAJRA 2026 1H
 EXPNO 153
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260227
 Time_ 19.08
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgflqn
 TD 32768
 SOLVENT CDCl3
 NS 8
 DS 2
 SWH 89285.711 Hz
 FIDRES 2.724784 Hz
 AQ 0.1835008 sec
 RG 186.42
 DW 5.600 usec
 DE 6.50 usec
 TE 287.6 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 376.4795333 MHz
 NUCL 19F
 P1 12.50 usec
 PLW1 20.00000000 W

F2 - Processing parameters
 SI 16384
 SF 376.5171850 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

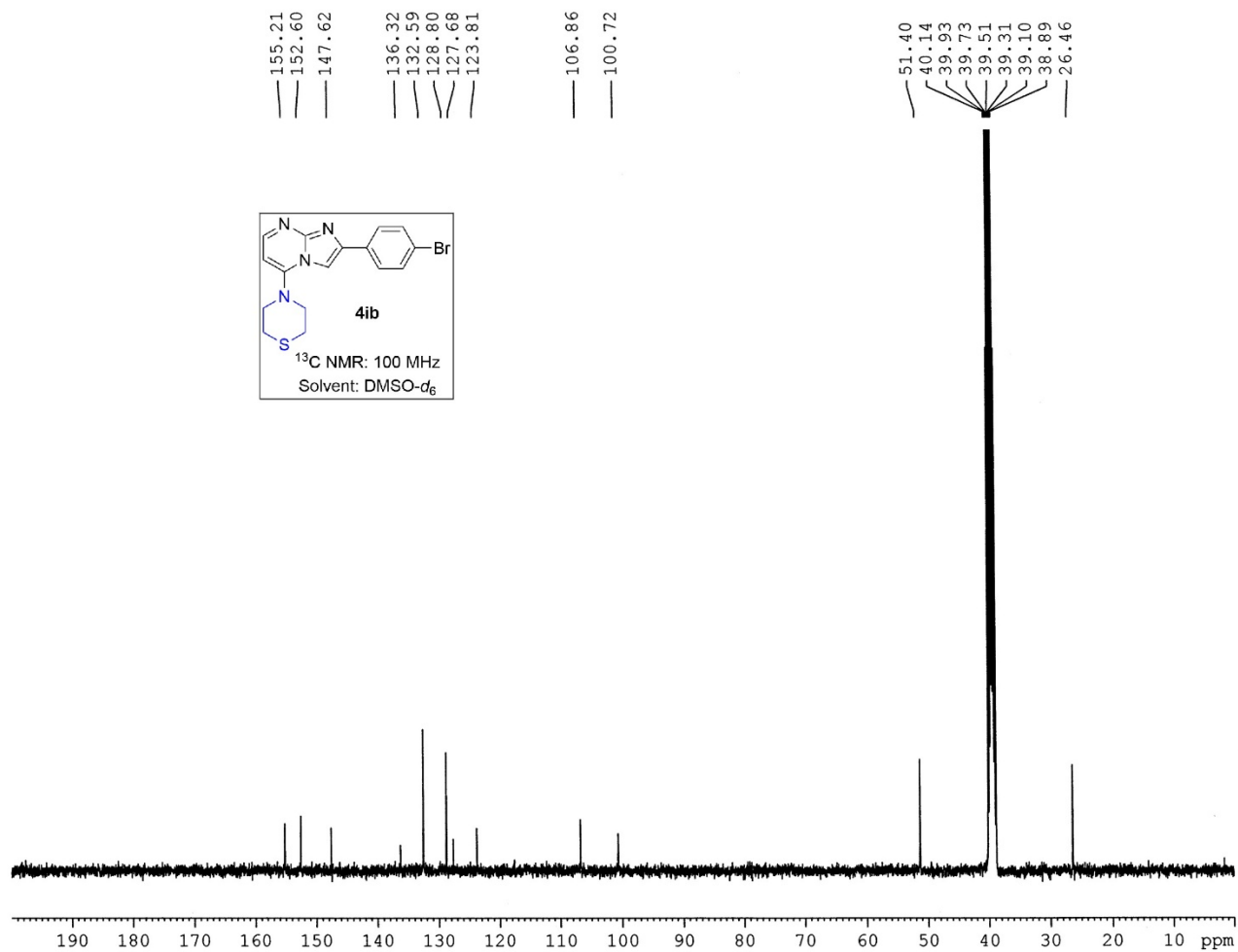


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 587
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250925
 Time 18.26
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 14.61
 DW 60.800 usec
 DE 6.50 usec
 TE 291.0 K
 D1 1.0000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500032 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



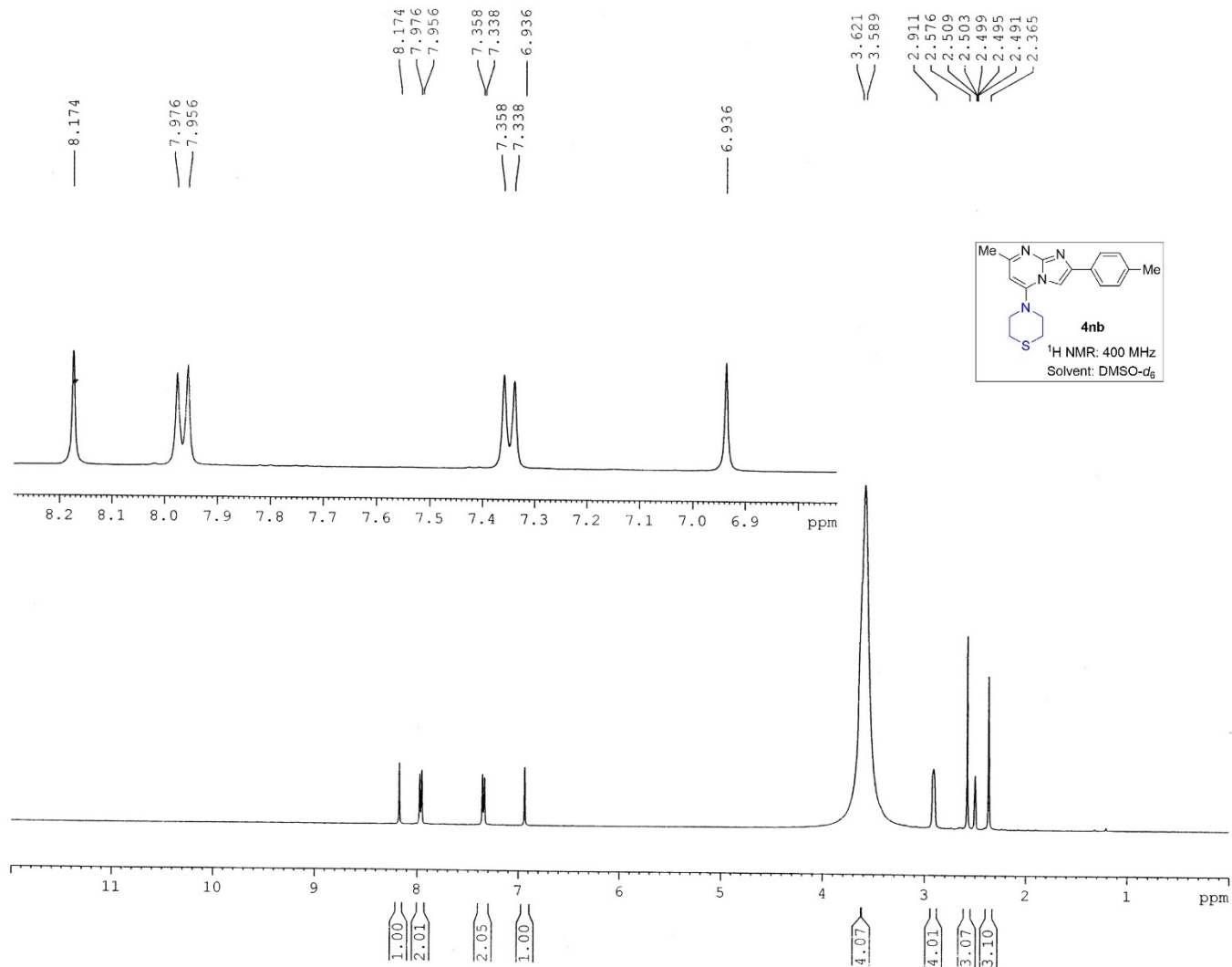
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 340
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250925
 Time 19.57
 INSTRUM spect
 PROBHD 5 mm FAPBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 1900
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 293.2 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TDO 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.0000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 FCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6177980 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

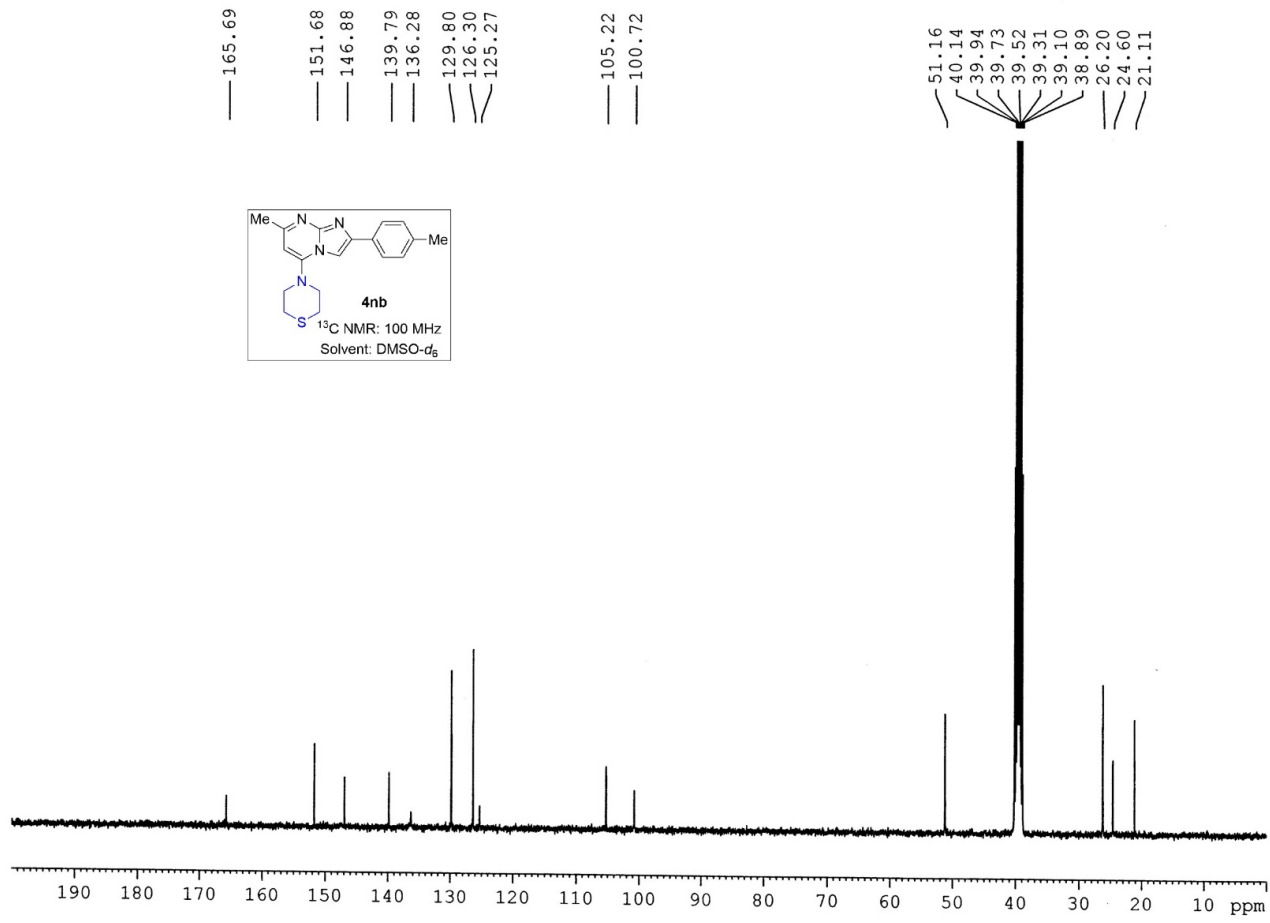


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 542
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250909
 Time 12.32
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 54.07
 DW 60.800 usec
 DE 6.50 usec
 TE 292.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500030 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



```

Current Data Parameters
NAME      Dr. A HAJRA-2025-13C
EXPNO     310
PROCNO    1

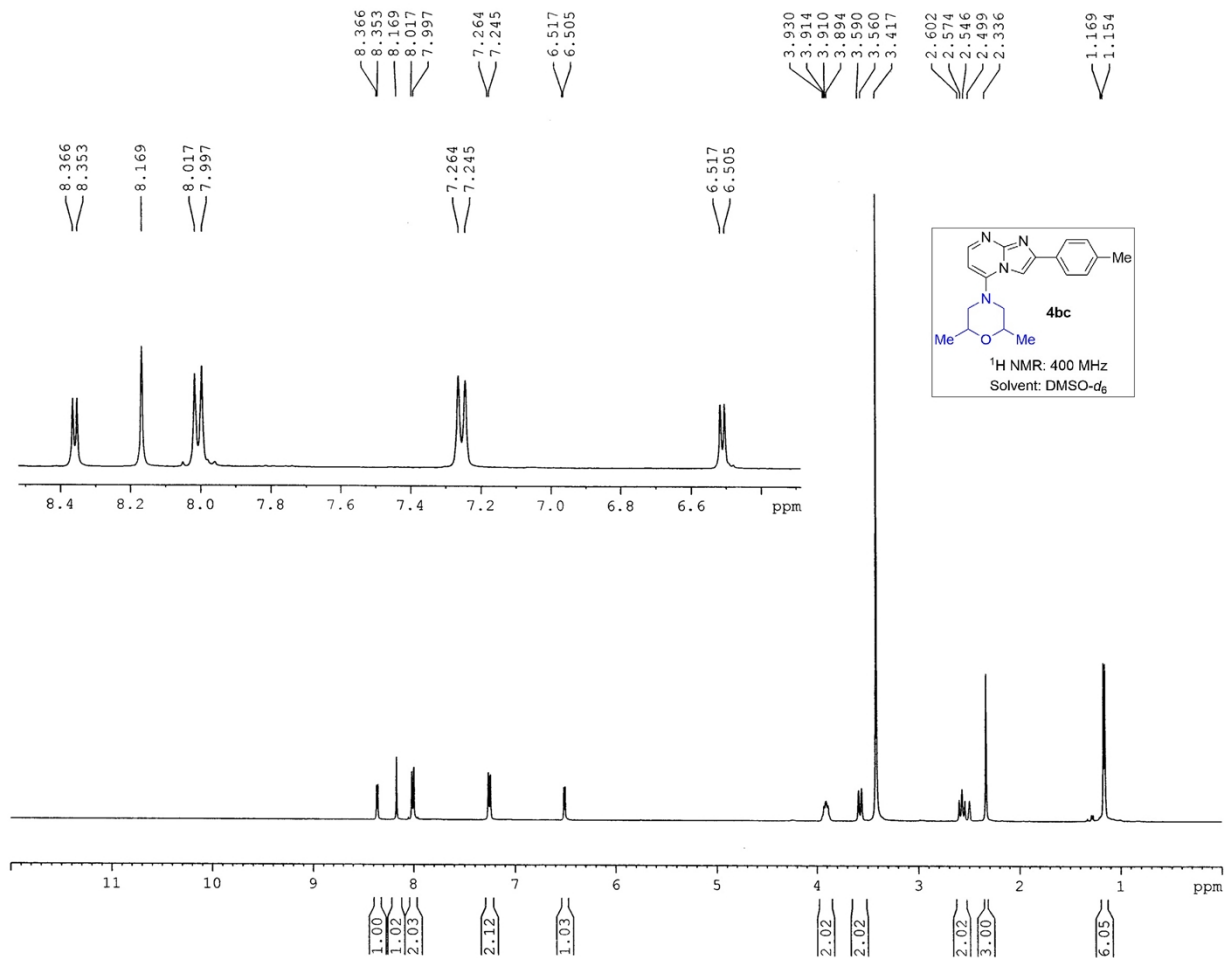
F2 - Acquisition Parameters
Date_     20250909
Time      14.11
INSTRUM   spect
PROBHD    5 mm PABBO BB/
PULPROG   zgpg30
TD         32768
SOLVENT   DMSO
NS         2000
DS         2
SWH        24038.461 Hz
FIDRES     0.733596 Hz
AQ         0.6815744 sec
RG         186.42
DW         20.800 usec
DE         6.50 usec
TE         292.4 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
SFO1      100.6278588 MHz
NUC1       13C
P1         8.90 usec
PLW1       54.00000000 W

===== CHANNEL f2 =====
SFO2      400.1516006 MHz
NUC2        1H
CPDPRG[2]  waltz16
PCPD2      90.00 usec
PLW2       12.00000000 W
PLW12      0.32231000 W
PLW13      0.16212000 W

F2 - Processing parameters
SI         16384
SF         100.6178288 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

```

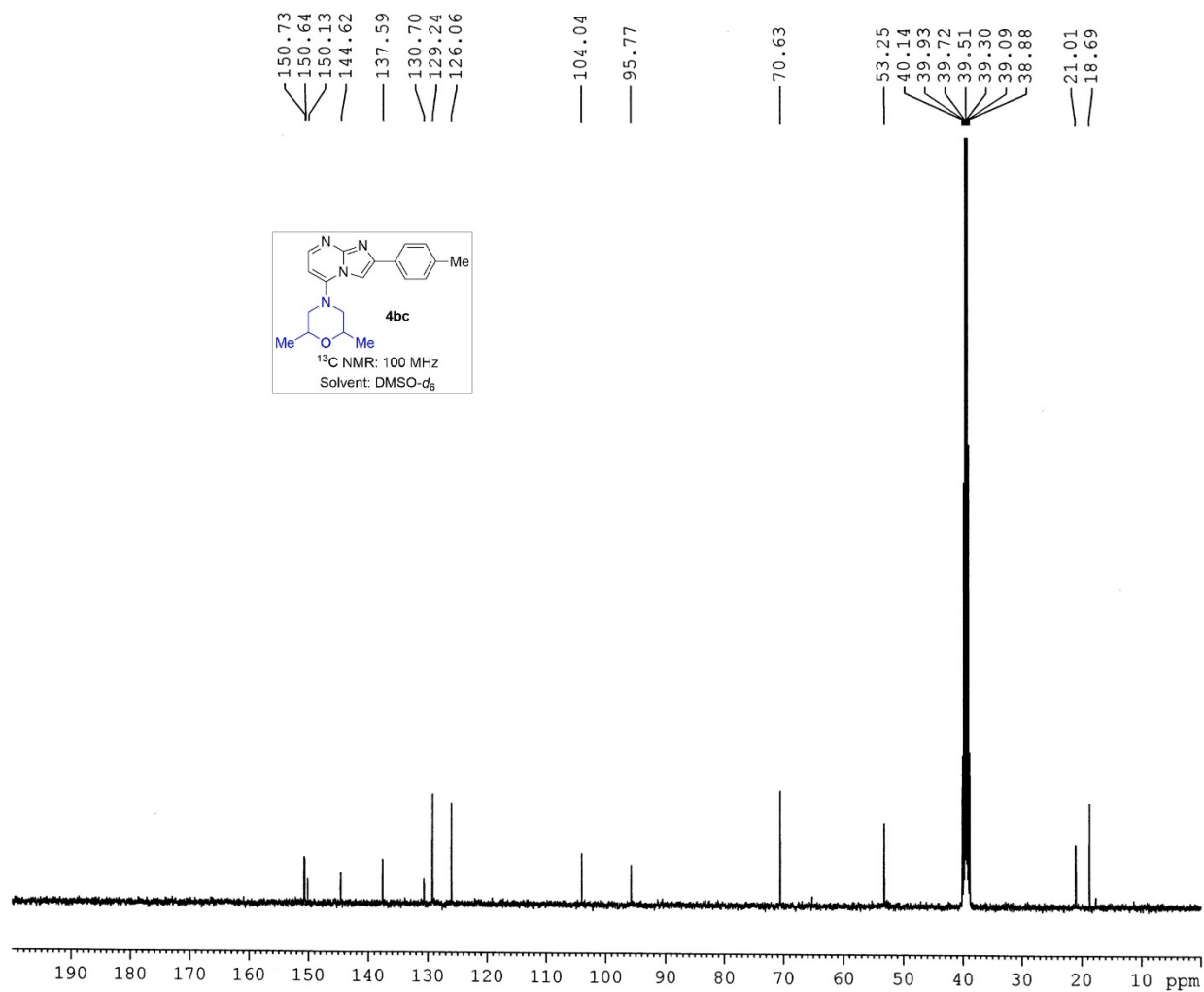


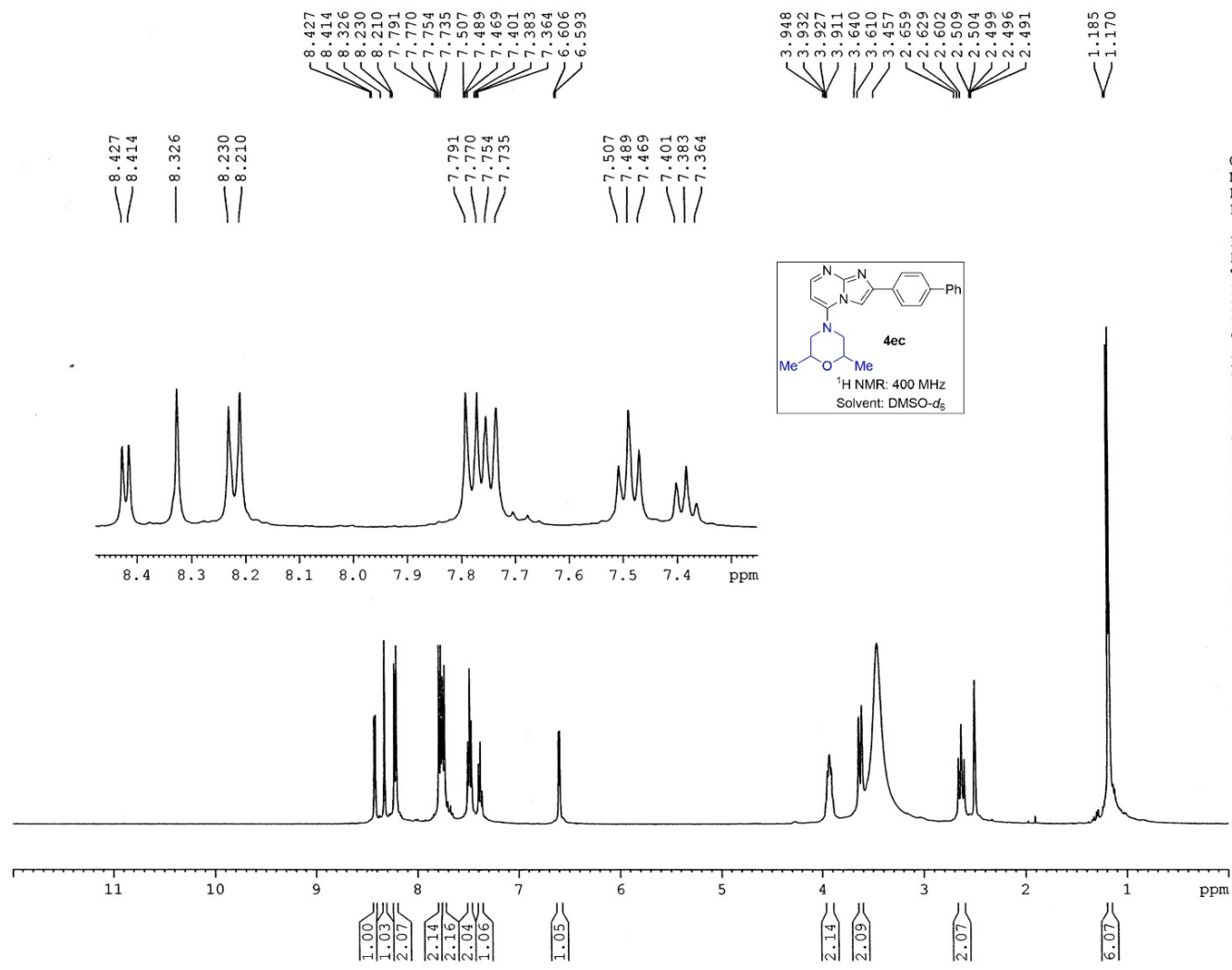
Current Data Parameters
 NAME Dr. A HAJRA 2026 1H
 EXPNO 273
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260505
 Time 12.03
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 62.69
 DW 60.800 usec
 DE 6.50 usec
 TE 290.5 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500028 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



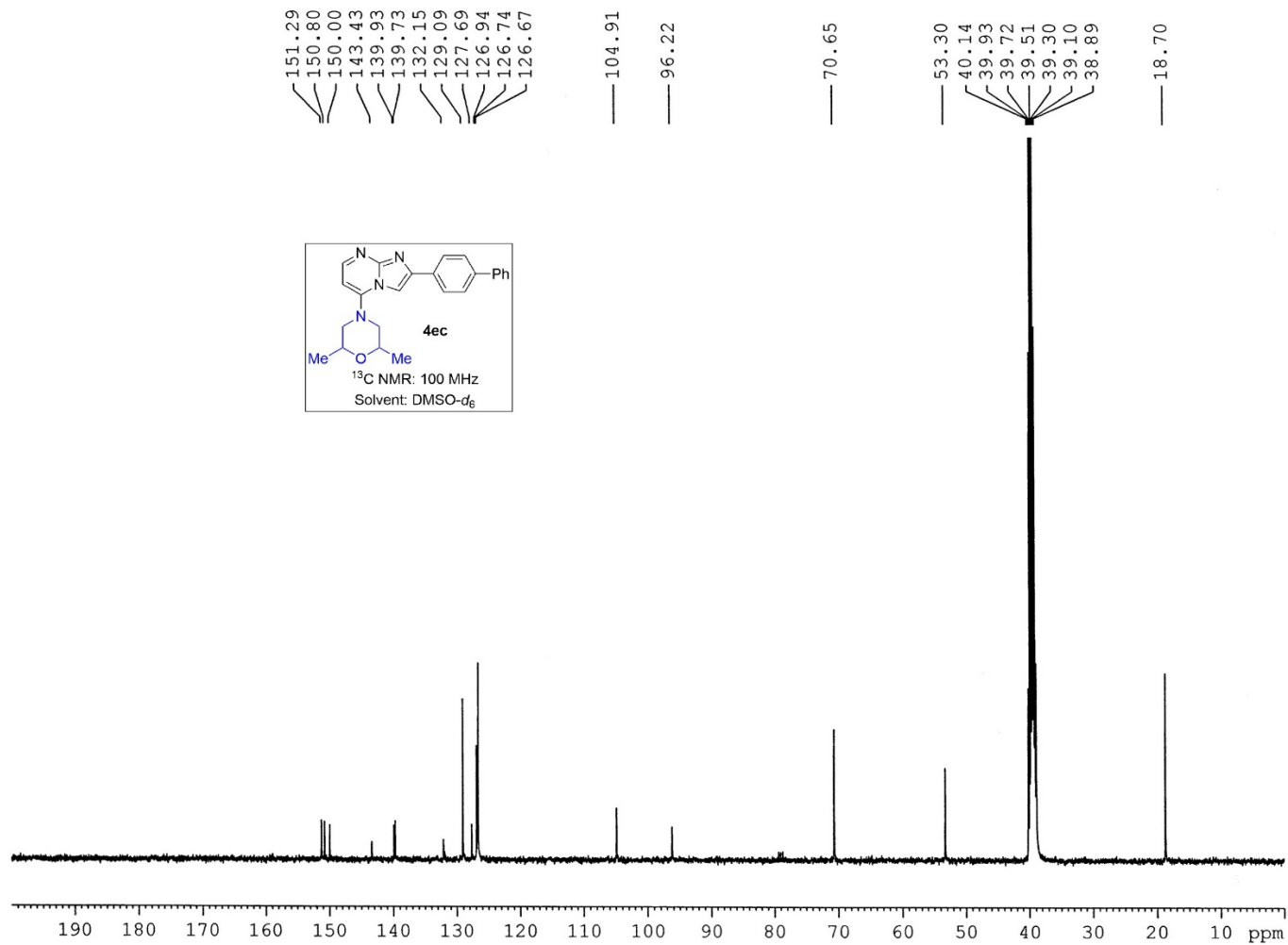


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 666
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251114
 Time_ 12.21
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 77.59
 DW 60.800 usec
 DE 6.50 usec
 TE 288.9 K
 D1 1.00000000 sec
 TD0 1

==== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



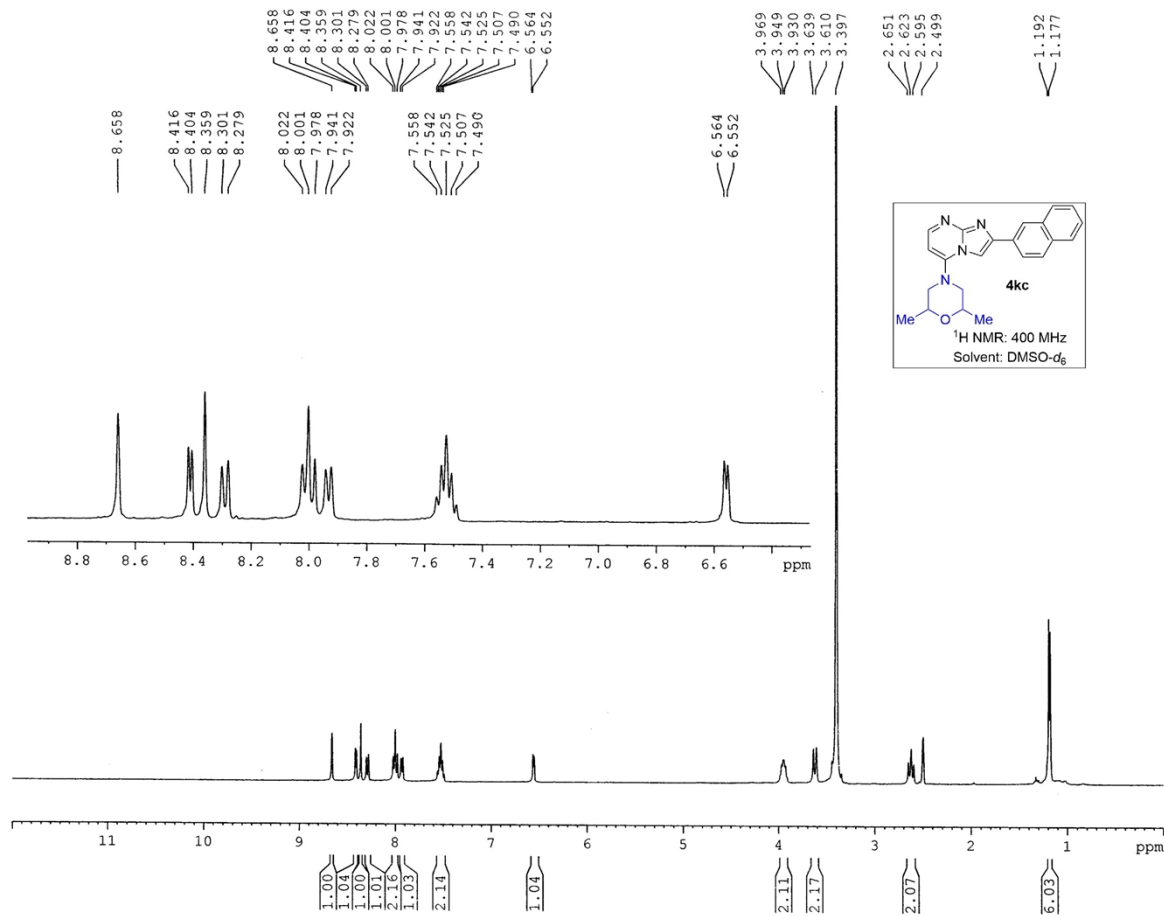
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 392
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251116
 Time_ 13.31
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 1800
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 289.8 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178346 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 FC 1.40

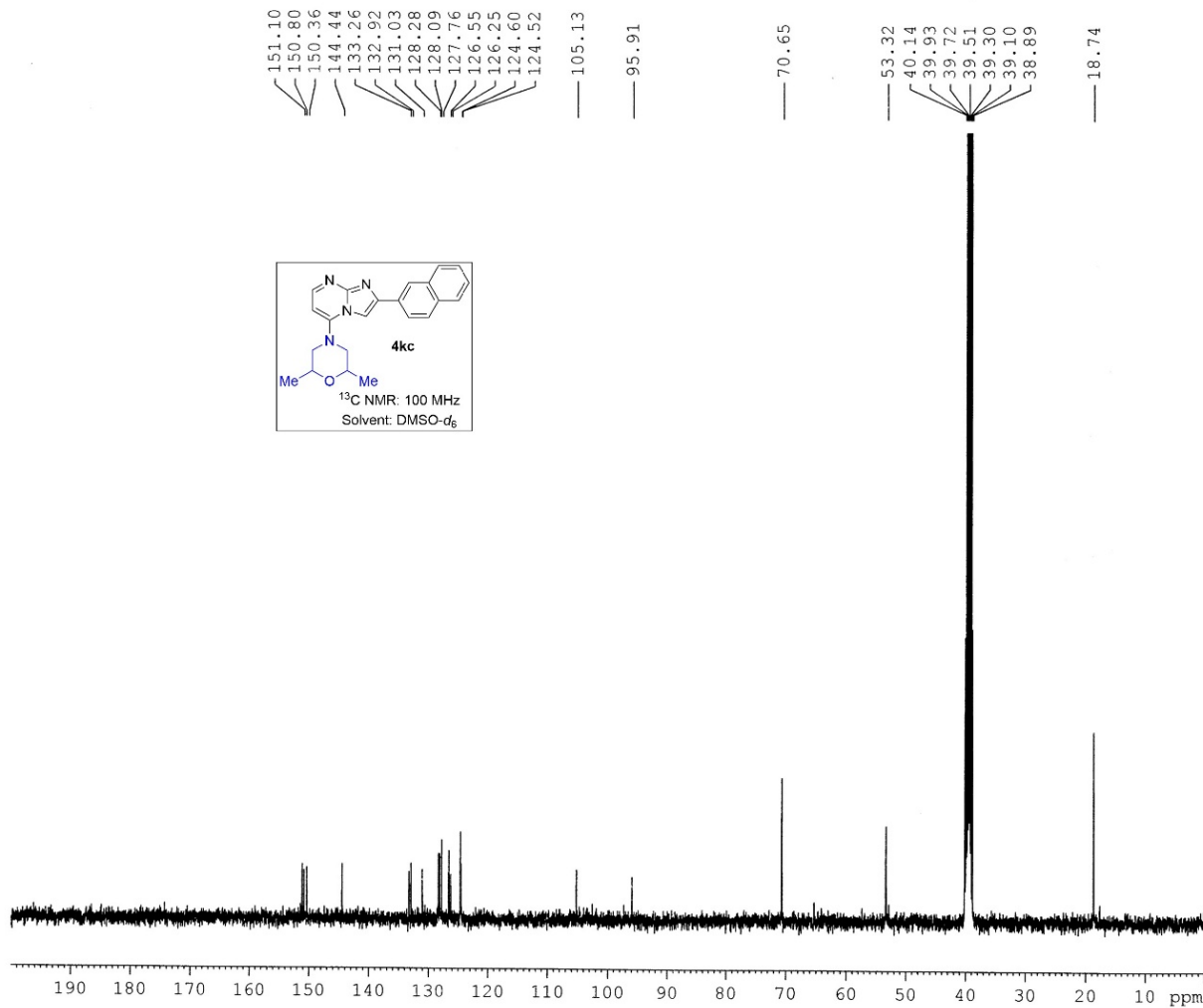


Current Data Parameters
 NAME Dr. A HAJRA 2026 1H
 EXPNO 276
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260506
 Time_ 12.00
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 87.66
 DW 60.800 usec
 DE 6.50 usec
 TE 294.2 K
 D1 1.00000000 sec
 TDO 1

==== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500032 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



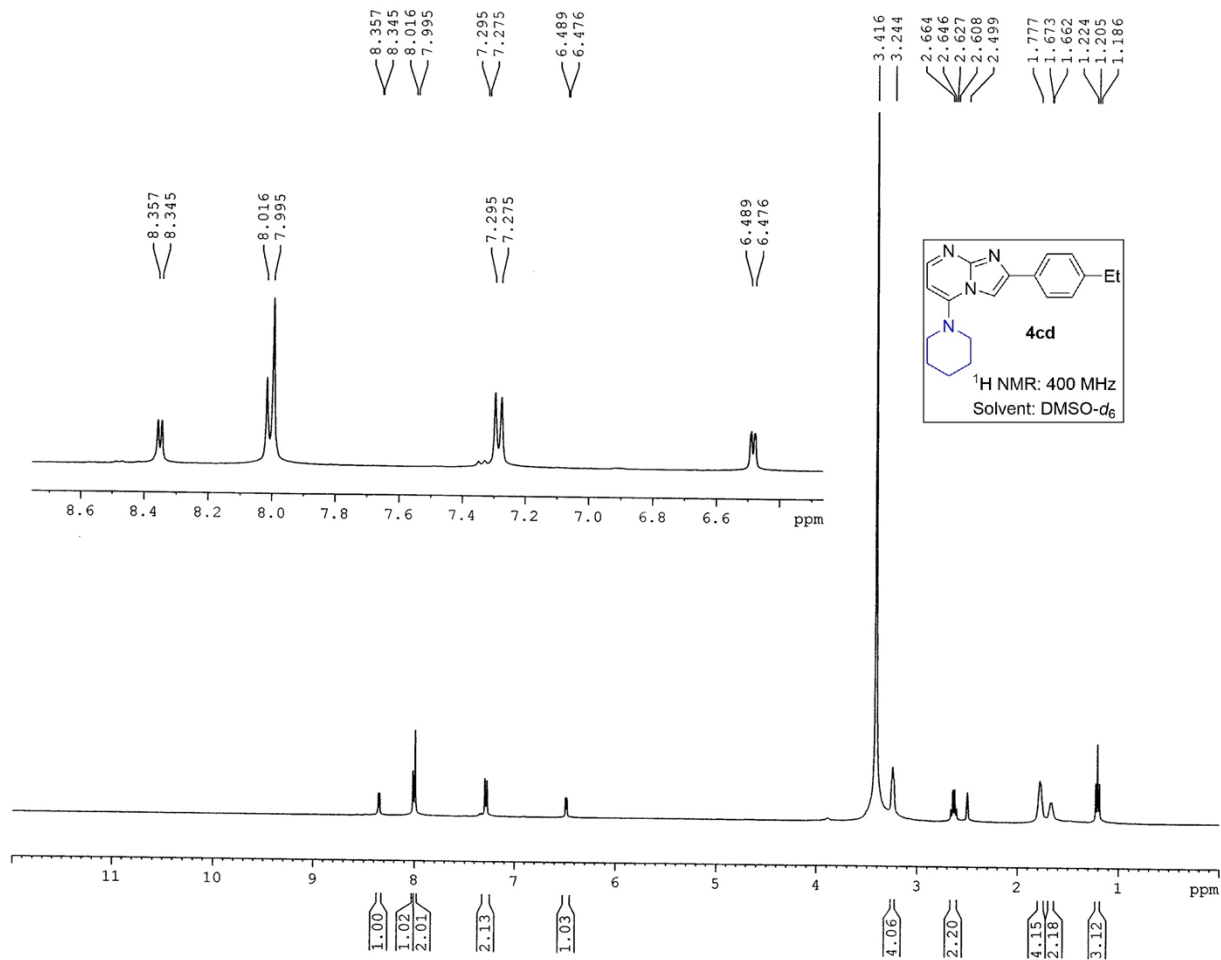
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 414
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251209
 Time 12.25
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 260
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 287.7 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TDO 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRGf2 waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178354 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

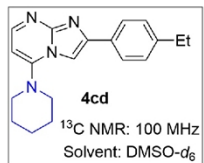
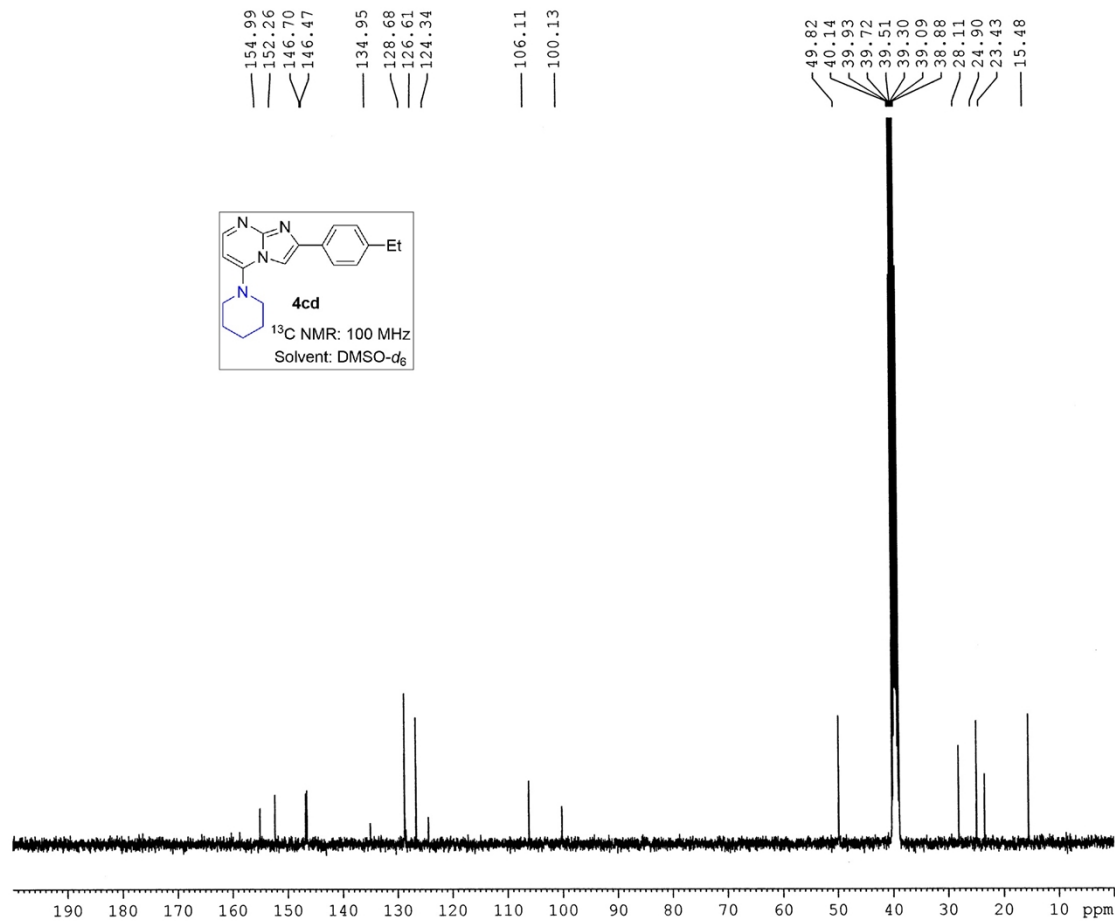


Current Data Parameters
 NAME Dr. A HAJRA 2026 1H
 EXPNO 272
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20260503
 Time 12.26
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 62.69
 DW 60.800 usec
 DE 6.50 usec
 TE 292.8 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 SF01 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500031 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



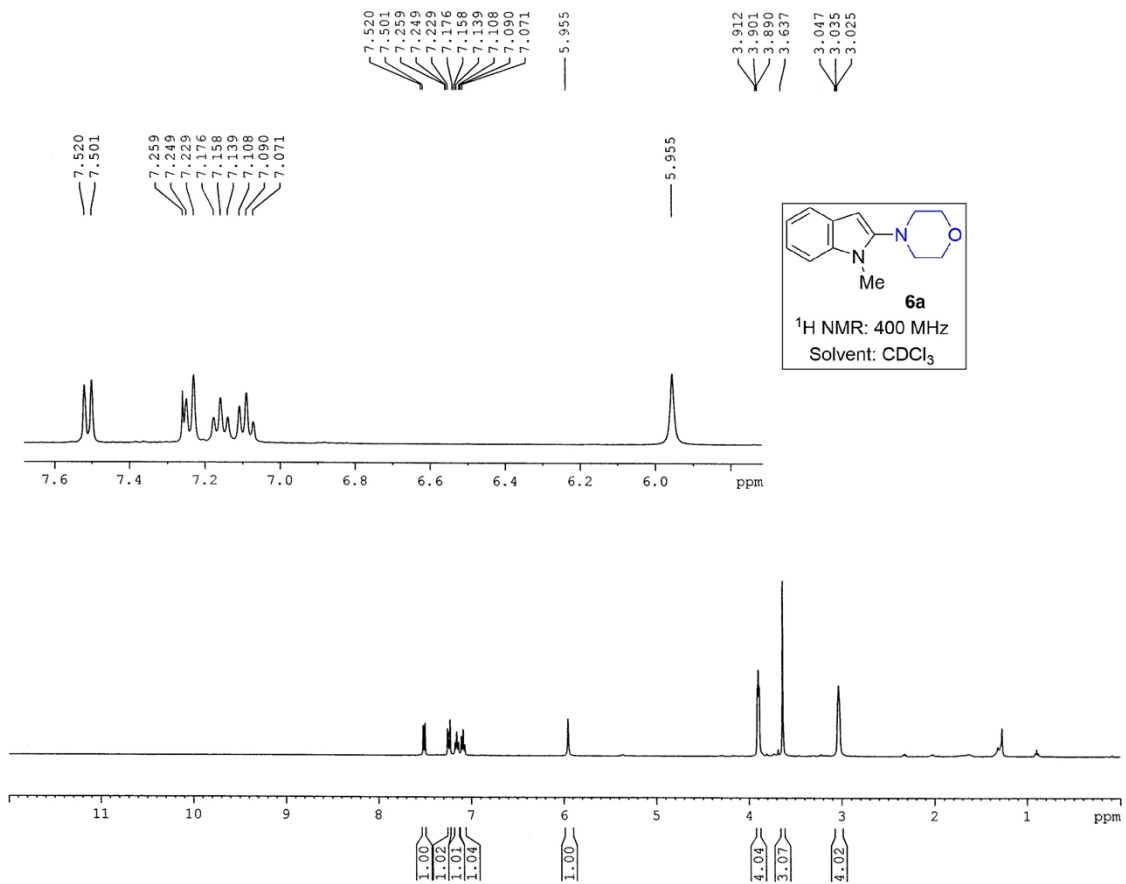
Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 250
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20250722
 Time 14.44
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT DMSO
 NS 2000
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 292.7 K
 D1 2.0000000 sec
 D11 0.0300000 sec
 TDO 1

----- CHANNEL f1 -----
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.0000000 W

----- CHANNEL f2 -----
 SFO2 400.1516906 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.0000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6178361 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

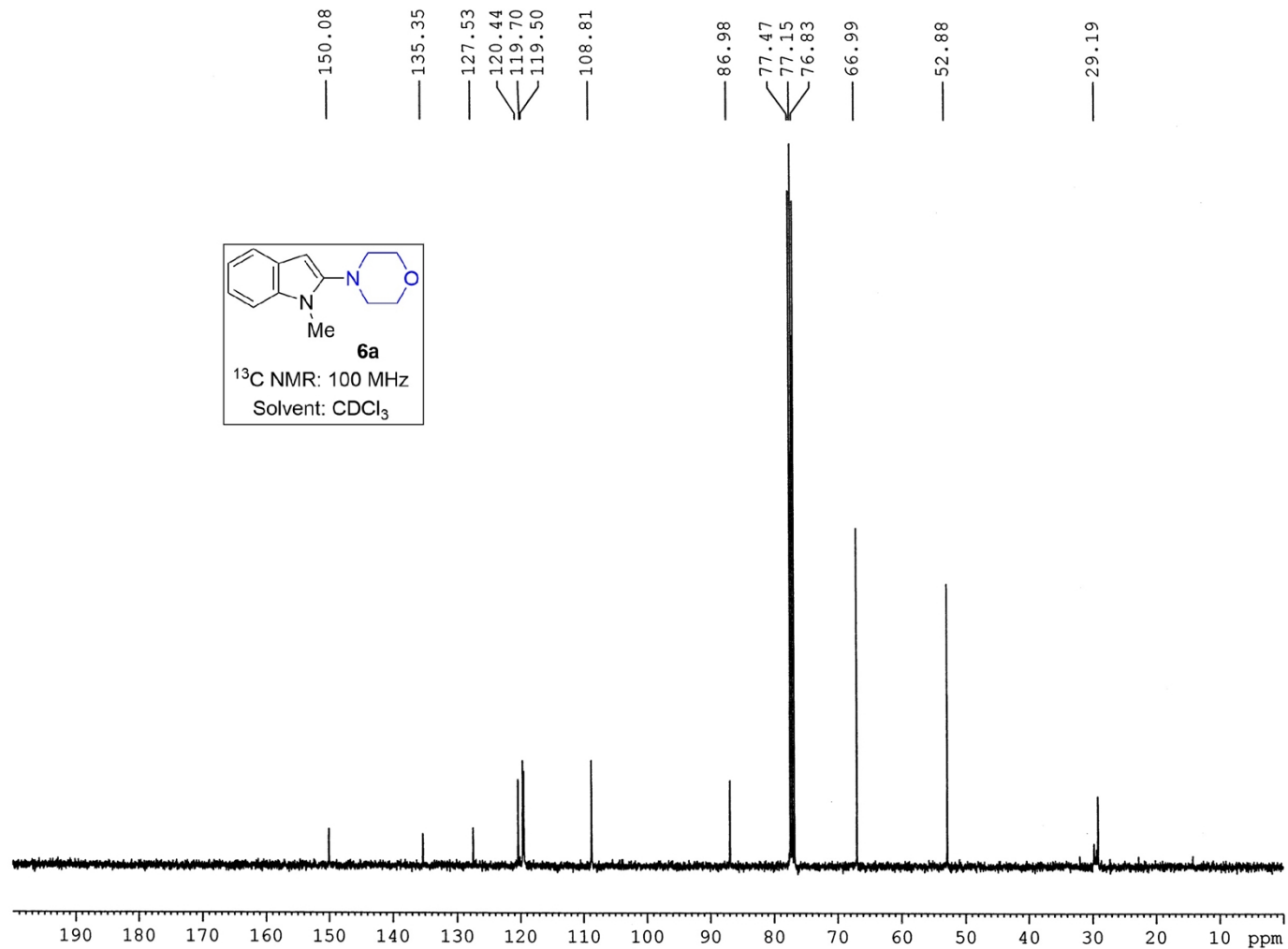


Current Data Parameters
 NAME Dr. A HAJRA 2025 1H
 EXPNO 641
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251031
 Time 12.16
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zg30
 TD 32768
 SOLVENT CDCl3
 NS 8
 DS 2
 SWH 8223.685 Hz
 FIDRES 0.250967 Hz
 AQ 1.9922944 sec
 RG 67.81
 DW 60.800 usec
 DE 6.50 usec
 TE 291.9 K
 D1 1.00000000 sec
 TDO 1

==== CHANNEL f1 =====
 SFO1 400.1524711 MHz
 NUC1 1H
 P1 14.75 usec
 PLW1 12.00000000 W

F2 - Processing parameters
 SI 16384
 SF 400.1500097 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00



Current Data Parameters
 NAME Dr. A HAJRA-2025-13C
 EXPNO 371
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20251031
 Time 12.43
 INSTRUM spect
 PROBHD 5 mm PABBO BB/
 PULPROG zgpg30
 TD 32768
 SOLVENT CDCl3
 NS 420
 DS 2
 SWH 24038.461 Hz
 FIDRES 0.733596 Hz
 AQ 0.6815744 sec
 RG 186.42
 DW 20.800 usec
 DE 6.50 usec
 TE 291.8 K
 D1 2.00000000 sec
 D11 0.03000000 sec
 TD0 1

===== CHANNEL f1 =====
 SFO1 100.6278588 MHz
 NUC1 13C
 P1 8.90 usec
 PLW1 54.00000000 W

===== CHANNEL f2 =====
 SFO2 400.1516006 MHz
 NUC2 1H
 CPDPRG[2] waltz16
 PCPD2 90.00 usec
 PLW2 12.00000000 W
 PLW12 0.32231000 W
 PLW13 0.16212000 W

F2 - Processing parameters
 SI 16384
 SF 100.6177902 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40