Supporting Information

N-(4H-1,2,4-Triazol-4-yl)imines as a Building Block for the Synthesis of Substituted Pyridines

Contents

1.General information

All chemicals and solvents were purchased from commercial suppliers and used without further purification unless specially noted. DMSO was additionally refluxed over calcium hydride (10 g for 1 l) and distilled under vacuum. The water content, determined by Karl Fischer titration, was ≤ 0.1 wt%. Thin layer chromatography was carried out on Merck silica gel 60 F254 pre-coated aluminum foil sheets and visualized using UV light (254 nm). Column chromatography was carried out using slurry packed "Chrom-lab" 125-200 μm particle sized silica gel. The relative proportion of solvents in mixed chromatography solvents refers to the volume/volume ratio. NMR spectra were recorded from solutions in $CDCl_3$ and DMSO-*d*6 on Bruker AM 300 (300 MHz for ^1H and 75 MHz for ^{13}C) and Bruker AVANCE 600 spectrometers (600 MHz for ^1H and 150 MHz for ^{13}C). Chemical shifts are reported in (δ) ppm relative to tetramethylsilane (TMS) with the residual solvent as internal reference (δ_H 7.26 and δ_C 77.16 for $CDCl_3$, δ_H 2.50 and δ_C 39.50 for DMSO-d6). Coupling constants (J) are reported in Hertz (Hz). The multiplicity abbreviations used are: s singlet, d doublet, dd doublet of doublet, t triplet, m multiplet, br broad signal. All the reported compounds' spectral data (^1H NMR, ^{13}C NMR) agree with the cited references. Elemental analysis was performed on EA ID Micro Mass Spectrometer. New compounds were characterized by ^1H NMR, ^{13}C NMR and elemental analysis.

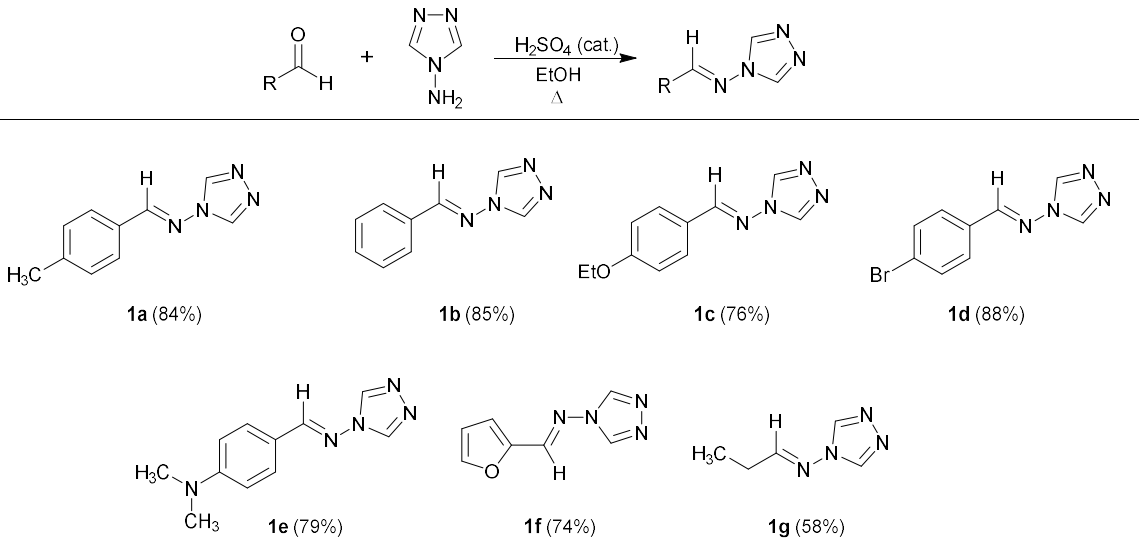
2. Synthesis of starting materials

2.1 Synthesis and characterization of imines 1 and 2

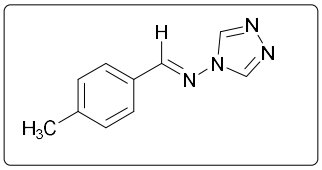
General procedure for the synthesis of imines **1a-g**:

Imines **1** of the corresponding aldehydes were prepared analogously to the method reported by Katritzky A.R. and Laurenzo K.S.[1] , except for the isolation and purification of the products.

A mixture of 4-amino-1,2,4-triazole (4.2 g, 50 mmol) and the corresponding aldehyde (50 mmol for non-volatile aldehydes; 250 mmol for volatile aldehydes, e.g., propionaldehyde) were dissolved in ethanol (50 mL) and treated with catalytic amounts of concentrated H_2SO_4 (20 μL) as catalyst. The solution was refluxed ($CaCl_2$ drying tube) for 6 h. Upon cooling, the precipitated solid was isolated by filtration and washed with cold ethanol. In cases where no precipitate formed, the mixture was concentrated in vacuo and the residue washed with cold ethanol.

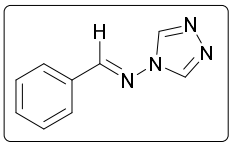


(E)-1-p-tolyl-N-(4H-1,2,4-triazol-4-yl)methanimine (1a)



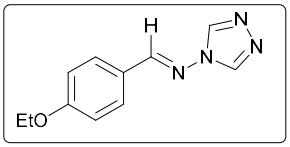
Filtered, washed with cold ethanol. White solid (7.82 g, 84%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 9.20 (s, 2H), 9.05 (s, 1H), 7.75 (d, J = 8.1 Hz, 2H), 7.37 (d, J = 7.9 Hz, 2H), 2.38 (s, 3H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 158.54, 142.74, 139.02, 129.81, 129.38, 128.47, 21.23. **Anal. Calcd. for $C_{10}H_{10}N_4$:** C, 64.50; H, 5.41; N, 30.09. **Found:** C, 64.61; H, 5.49; N, 30.18

(E)-1-phenyl-N-(4H-1,2,4-triazol-4-yl)methanimine (1b)



Filtered, washed with cold ethanol. White solid (7.32 g, 85%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 9.18 (s, 2H), 9.10 (s, 1H), 7.91 – 7.82 (m, 2H), 7.63 – 7.51 (m, 3H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 158.28, 139.03, 132.35, 132.14, 129.20, 128.41. **Anal. Calcd. for $C_9H_8N_4$:** C, 62.78; H, 4.68; N, 32.54. **Found:** C, 64.88; H, 4.54; N, 32.61.

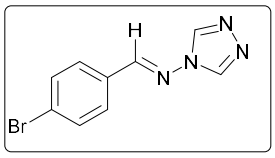
(E)-1-(4-ethoxyphenyl)-N-(4H-1,2,4-triazol-4-yl)methanimine (1c)



Filtered, washed with cold ethanol. White solid (8.22 g, 76%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 9.09 (s, 2H), 8.98 (s, 1H), 7.79 (d, J = 8.6 Hz, 2H), 7.08 (d, J = 8.6 Hz, 2H), 4.10 (q, J = 6.9 Hz, 2H), 1.34 (t, J = 6.9 Hz, 3H). **^{13}C NMR (151 MHz, DMSO-*d*6)**

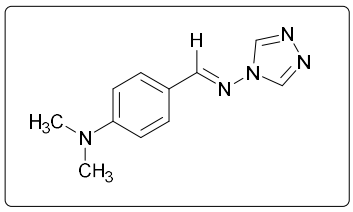
δ 161.83, 157.85, 138.91, 130.33, 124.44, 115.05, 63.51, 14.49. **Anal. Calcd. for $C_{11}H_{12}N_4O$:** C, 61.10; H, 5.59; N, 25.91. **Found:** C, 61.22; H, 5.67; N, 25.99.

(E)-1-(4-bromophenyl)-N-(4H-1,2,4-triazol-4-yl)methanimine (1d)



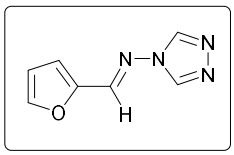
Filtered, washed with cold ethanol. White solid (11.05 g, 88%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 9.14 (s, 2H), 9.08 (s, 1H), 7.80 – 7.75 (m, 4H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 157.06, 139.01, 132.30, 131.40, 130.14, 125.89. **Anal. Calcd. for $C_9H_7BrN_4$:** C, 43.05; H, 2.81; N, 22.31. **Found:** C, 43.14; H, 2.86; N, 22.37.

(E)-4-(((4H-1,2,4-triazol-4-yl)imino)methyl)-N,N-dimethylaniline (1e)



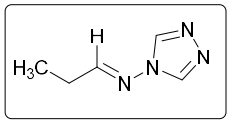
Filtered, washed with cold ethanol. Yellow solid (8.50g, 79%).**^{1}H NMR (600 MHz, DMSO-*d*6)** δ 9.03 (s, 2H), 8.83 (s, 1H), 7.66 (d, J = 9.0 Hz, 2H), 6.80 (d, J = 9.0 Hz, 2H), 3.02 (s, 6H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 158.40, 152.84, 138.82, 130.10, 118.79, 111.62, 39.62. **Anal. Calcd. for $C_{11}H_{13}N_5$:** C, 61.38; H, 6.09; N, 32.54. **Found:** C, 61.46; H, 6.14; N, 32.60.

(E)-1-(furan-2-yl)-N-(4H-1,2,4-triazol-4-yl)methanimine (1f)



Filtered, washed with cold ethanol. White solid (5.99 g, 74%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 9.11 (s, 2H), 8.94 (s, 1H), 8.04 – 8.00 (m, 1H), 7.20 (d, J = 3.5 Hz, 1H), 6.78 – 6.74 (m, 1H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 147.58, 147.46, 146.55, 138.98, 119.00, 112.94. **Anal. Calcd. for $C_7H_6N_4O$:** C, 51.85; H, 3.73; N, 34.55. **Found:** C, 51.96; H, 3.78; N, 34.63.

(E)-N-(4H-1,2,4-triazol-4-yl)propan-1-imine (1g)



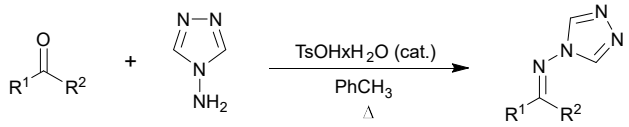
The reaction mass was evaporated, and the technical product was obtained in the form of a colorless oil, which solidified after 12 hours at -5°C. The resulting product

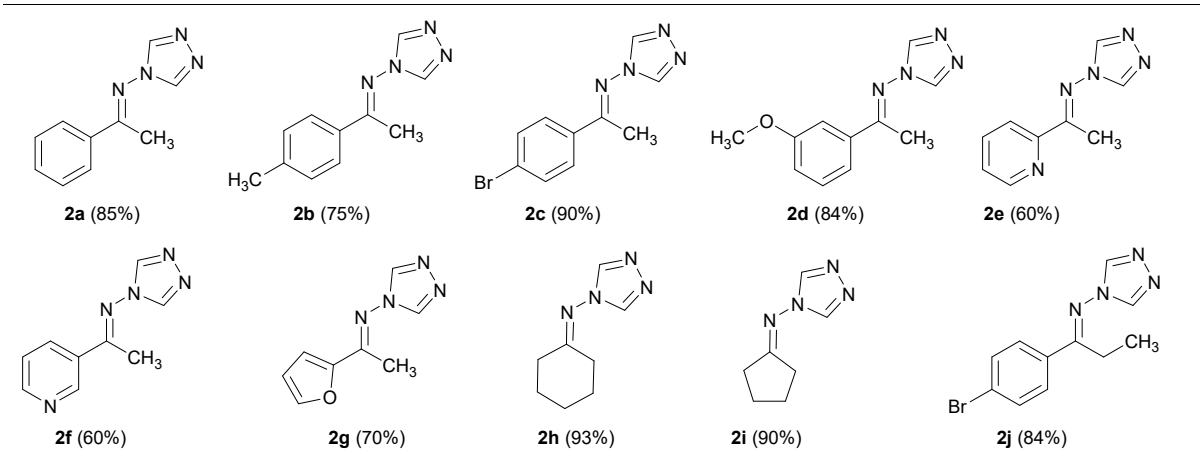
was washed with cold ethanol. White solid (3.60 g, 58%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 8.97 (s, 2H), 8.40 (t, J = 4.5 Hz, 1H), 2.46 (p, J = 6.8 Hz, 2H), 1.12 (t, J = 7.4 Hz, 3H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 164.91, 138.68, 25.66, 9.55. **Anal. Calcd. for $C_5H_8N_4$:** C, 48.37; H, 6.50; N, 45.13. **Found:** C, 48.46; H, 6.58; N, 45.31.

General procedure for the synthesis of imines **2a-j:**[2]

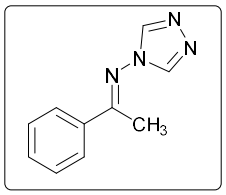
Imines **2** of the corresponding ketones were prepared analogously to the method reported by Lieberman et.al with minor changes[2]:

A mixture of corresponding ketone (44.0 mmoles), 4-amino-1,2,4-triazole (6.18 g, 73.5 mmol), and *p*-toluenesulfonic acid monohydrate (0.40 g, 2.1 mmol) in toluene (120 ml) was heated at reflux for 4.5 hours with azeotropic removal of water. The solvent was removed in vacuo and the resulting solid was partitioned between dichloromethane (140 ml) and aqueous sodium bicarbonate (40 ml). The aqueous phase was extracted with dichloromethane (3 x 30 ml). The combined organic phases were dried with anhydrous sodium sulfate and concentrated. The resulting imine was purified, if necessary, by recrystallization from ethanol or column chromatography.



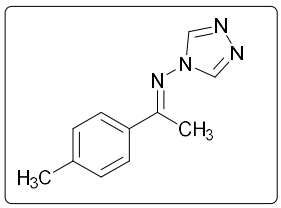


(E)-1-phenyl-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2a)[2]



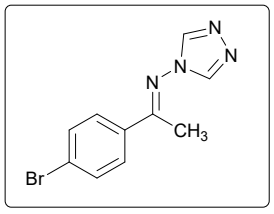
Recrystallized from ethanol. White solid (6.96 g, 85%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.23 (s, 2H), 7.89 (d, J = 7.3 Hz, 2H), 7.53 (t, J = 7.4 Hz, 1H), 7.48 – 7.42 (m, 2H), 2.37 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 173.38, 139.65, 135.34, 132.32, 128.88, 127.49, 16.72.

(E)-1-(p-tolyl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2b)



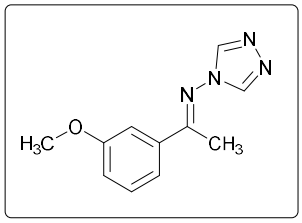
Recrystallized from ethanol. White solid (6.61 g, 75%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.22 (s, 2H), 7.81 (d, *J* = 7.5 Hz, 2H), 7.27 (d, *J* = 7.7 Hz, 2H), 2.41 (s, 3H), 2.34 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 173.43, 143.07, 139.67, 132.51, 129.59, 127.49, 21.52, 16.50. **Anal. Calcd. for $C_{11}H_{12}N_4$:** C, 65.98; H, 6.04; N, 27.98. **Found:** C, 65.89; H, 5.99; N, 27.22.

(E)-1-(4-bromophenyl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2c)



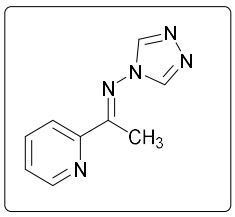
Recrystallized from ethanol. White, slightly brownish solid (10.50 g, 90%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.25 (s, 2H), 7.80 (d, J = 8.0 Hz, 2H), 7.62 (d, J = 8.0 Hz, 2H), 2.39 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 172.01, 139.68, 134.27, 132.26, 129.08, 127.35, 16.68. **Anal. Calcd. for $C_{10}H_9BrN_4$:** C, 45.31; H, 3.42; N, 21.13. **Found:** C, 45.44; H, 3.51; N, 21.26.

(E)-1-(3-methoxyphenyl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2d)



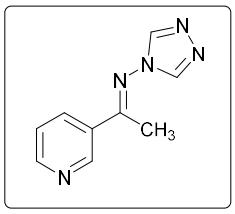
Recrystallized from ethanol. White solid (7.99 g, 84%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 8.76 (s, 2H), 7.55 (d, *J* = 8.0 Hz, 1H), 7.50 (s, 1H), 7.45 (t, *J* = 8.0 Hz, 1H), 7.18 (dd, *J* = 8.2, 1.9 Hz, 1H), 3.83 (s, 3H), 2.37 (s, 3H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 173.34, 159.34, 140.06, 137.09, 129.89, 120.12, 117.73, 112.46, 55.35, 16.80. **Anal. Calcd. for $C_{10}H_{12}N_4O$:** C, 61.10; H, 5.59; N, 25.91. **Found:** C, 61.23; H, 5.65; N, 25.98.

(E)-1-(pyridin-2-yl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2e)



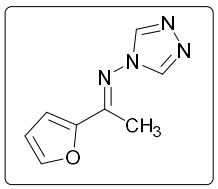
Purified by silica gel chromatography (DCM:MeOH=95:5), R_f=0.27. Brownish solid (4.94 g, 60%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.69 (d, J = 4.5 Hz, 1H), 8.33 (s, 2H), 8.19 (d, J = 8.0 Hz, 1H), 7.82 (t, J = 7.8 Hz, 1H), 7.47 – 7.40 (m, 1H), 2.57 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 172.79, 153.12, 149.32, 139.88, 136.91, 126.22, 122.06, 15.88. **Anal. Calcd. for $C_9H_9N_5$:** C, 57.74; H, 4.85; N, 37.41. **Found:** C, 57.86; H, 4.88; N, 37.53.

(E)-1-(pyridin-3-yl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2f)[2]



Recrystallized from ethanol. Brownish solid (4.98 g, 60%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 9.13 (s, 1H), 8.82 – 8.75 (m, 1H), 8.29 (s, 2H), 8.26 (d, J = 8.1 Hz, 1H), 7.48 – 7.40 (m, 1H), 2.47 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 170.64, 153.09, 148.86, 139.71, 134.81, 131.33, 123.75, 16.78.

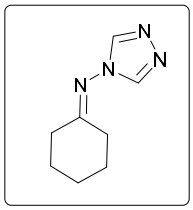
(E)-1-(furan-2-yl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2g)



Recrystallized from ethanol. Brownish solid (5.43 g, 70%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.22 (s, 2H), 7.65 – 7.59 (m, 1H), 7.12 (d, J = 3.5 Hz, 1H), 6.58-6.56

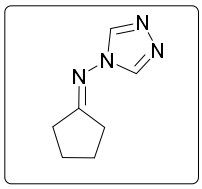
(m, 1H), 2.30 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 163.01, 149.64, 146.78, 139.78, 116.58, 112.70, 15.63. **Anal. Calcd. for $C_8H_8N_4O$:** C, 54.54; H, 4.58; N, 31.80. **Found:** C, 54.61; H, 4.53; N, 31.78.

N-(4H-1,2,4-triazol-4-yl)cyclohexanimine (2h)



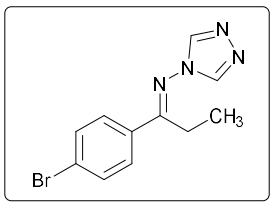
Brown solid (6.72 g, 93%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 8.57 (s, 2H), 2.53 – 2.44 (m, 2H), 2.26 – 2.18 (m, 2H), 1.82 – 1.71 (m, 2H)., 1.67 – 1.58 (m, 4H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 183.30, 139.77, 34.92, 28.97, 26.68, 26.03, 24.53. **Anal. Calcd. for $C_8H_{12}N_4$:** C, 58.51; H, 7.37; N, 34.12. **Found:** C, 58.62; H, 7.45; N, 34.22

N-(4H-1,2,4-triazol-4-yl)cyclopentanimine (2i)



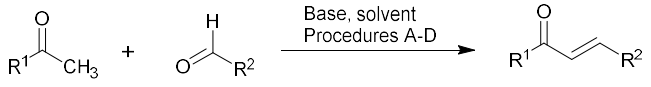
Brown solid (5.95g, 90%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 8.70 (s, 2H), 2.63 – 2.55 (m, 2H), 2.52 – 2.44 (m, 2H), 1.84 – 1.76 (m, 4H) **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 186.86, 139.66, 34.01, 31.01, 24.45, 23.82. **Anal. Calcd. for $C_7H_{10}N_4$:** C, 55.98; H, 6.71; N, 37.31. **Found:** C, 56.09; H, 6.77; N, 37.40

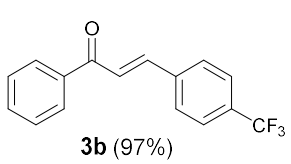
(E)-1-(4-bromophenyl)-N-(4H-1,2,4-triazol-4-yl)propan-1-imine (2j)

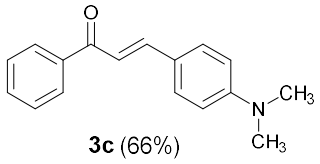


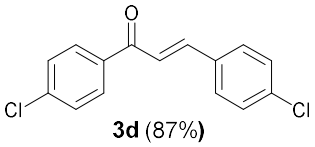
After isolation, washed with a small amount of cold ethanol and then with hot hexane. White solid (10.32 g, 84%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.24 (s, 2H), 7.76 (d, J = 8.6 Hz, 2H), 7.64 (d, J = 8.6 Hz, 2H), 2.73 (q, J = 7.7 Hz, 2H), 1.19 (t, J = 7.7 Hz, 3H). **^{13}C NMR (151 MHz Chloroform-*d*)** δ 178.11, 139.47, 132.82, 132.39, 129.41, 127.24, 22.32, 12.61. **Anal. Calcd. for $C_{11}H_{11}BrN_4$:** C, 47.33; H, 3.97; N, 20.07. **Found:** C, 47.41; H, 4.04; N, 20.18

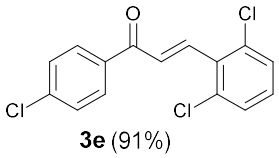
2.2 Synthesis and characterization of chalcones

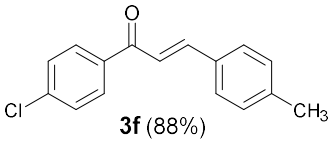


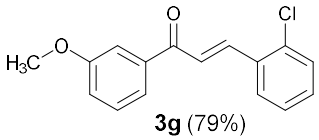

3b (97%)

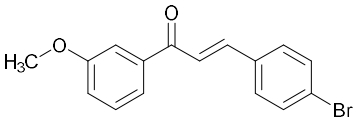

3c (66%)

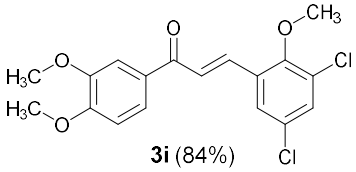

3d (87%)

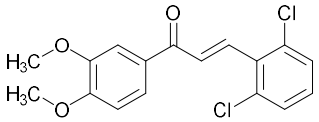

3e (91%)

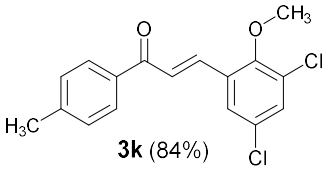

3f (88%)

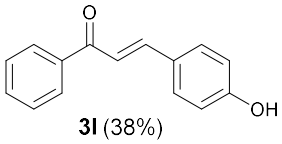

3g (79%)

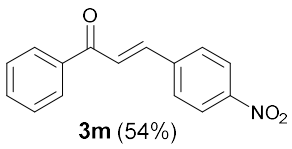

3h (64%)

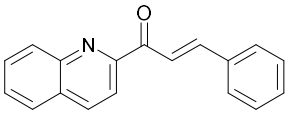

3i (84%)

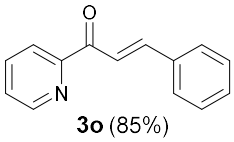

3j (98%)

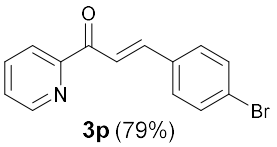

3k (84%)

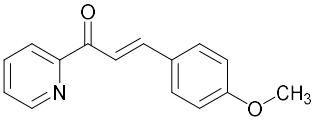

3l (38%)

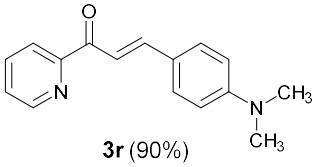

3m (54%)

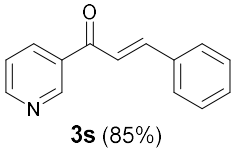

3n (38%)

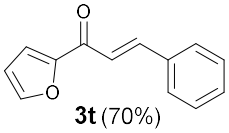

3o (85%)

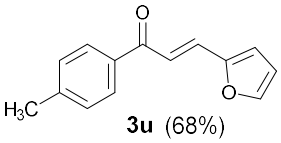

3p (79%)


3q (56%)


3r (90%)


3s (85%)


3t (70%)


3u (68%)

All chalcones, including previously unknown, were prepared from the corresponding benzaldehydes and acetophenones according to known procedures. Spectral data (^{1}H NMR, ^{13}C NMR) of the previously described chalcones agree with the cited references.

Procedure A (for 3b-3k, 3m, 3q,3r,3t, 3u)[3]

To a solution of 500 mg (12.5 mmol, 1.25 equiv.) of NaOH in 15 ml of a mixture EtOH:H_2O=1:2 was added acetophenone derivative (10 mmol, 1.00 equiv.). The reaction mixture was cooled in ice bath, and the substituted benzaldehyde (10 mmol, 1 equiv.) was added dropwise

(or by small portions if solid). The reaction mixture was then allowed to reach room temperature and was stirred at room temperature for 16 h (overnight). The precipitated solid was filtered off, washed with H_2O, dried, and recrystallized from EtOH.

If precipitation did not occur, the reaction mixture was extracted with Et_2O (3 × 50 mL). The combined Et_2O layers were washed with brine, dried with Na_2SO4, and concentrated *in vacuo*.

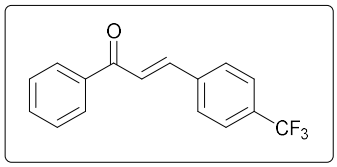
Procedure B (for 3n-3p, 3s) [4]

A 10% solution of NaOH (3.0 ml) was added dropwise to a mixture of acetophenone derivative (10 mmol, 1.00 equiv.) and benzaldehyde (10.8 mmol, 1.08 equiv.) in water (60 ml) with stirring, and stirring was continued for 16 h (overnight). at room temperature. The precipitated solid was filtered off, washed with H_2O, dried, and recrystallized from EtOH.

Procedure C (for 3l) [5]

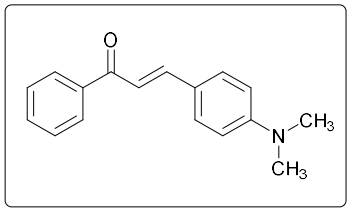
A mixture of acetophenone (1.20 g, 10 mmol) and 4-hydroxybenzaldehyde (1.22 g, 10 mmol) was stirred in EtOH. (50 mL). To this solution, sodium hydroxide (1.2 g, 30 mmol) was added slowly and stirred at room temperature overnight. The mixture was poured into crushed ice and acidified with dilute hydrochloric acid The precipitated solid was filtered off, washed with H_2O and dried, and recrystallized from EtOH.

(E)-1-phenyl-3-(4-(trifluoromethyl)phenyl)prop-2-en-1-one (3b)[6]



White solid (2.68 g, 97%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.03 (d, J = 7.5 Hz, 2H), 7.81 (d, J = 15.7 Hz, 1H), 7.74 (d, J = 8.0 Hz, 2H), 7.67 (d, J = 8.1 Hz, 2H), 7.63 – 7.57 (m, 2H), 7.52 (t, J = 7.6 Hz, 2H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 190.16, 142.85, 138.42, 137.93, 133.28, 132.03 (C-F, q, ^{2}J = 32.6 Hz).128.89, 128.70, 128.64, 126.05 (C-F, q, ^{3}J = 3.8 Hz)., 124.37, 123.97 (C-F, q, ^{1}J = 272.3 Hz).

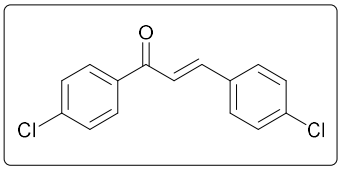
(E)-3-(4-(dimethylamino)phenyl)-1-phenylprop-2-en-1-one (3c)[7]



Orange solid (1.66 g, 66%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.00 (d, J = 7.2 Hz, 2H), 7.79 (d, J = 15.5 Hz, 1H), 7.54 (d, J = 8.6 Hz, 3H), 7.48

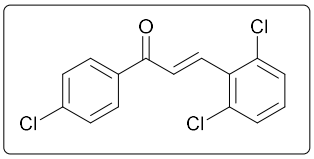
(t, J = 7.4 Hz, 2H), 7.34 (d, J = 15.5 Hz, 1H), 6.69 (d, J = 8.5 Hz, 2H), 3.03 (s, 6H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 190.79, 152.14, 145.98, 139.17, 132.24, 130.52, 128.54, 128.40, 122.71, 116.99, 111.92, 40.20.

(E)-1,3-bis(4-chlorophenyl)prop-2-en-1-one (3d)[8]



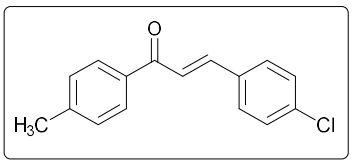
Pale yellow solid (2.41 g, 87%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 7.95 (d, J = 8.3 Hz, 2H), 7.75 (d, J = 15.7 Hz, 1H), 7.56 (d, J = 8.2 Hz, 2H), 7.50 – 7.41 (m, 3H), 7.39 (d, J = 8.2 Hz, 2H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 188.92, 143.89, 139.50, 136.77, 136.43, 133.30, 130.02, 129.76, 129.41, 129.11, 121.96.

(E)-1-(4-chlorophenyl)-3-(2,6-dichlorophenyl)prop-2-en-1-one (3e)



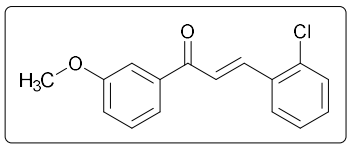
Pale yellow solid (2.84 g, 91%). **^{1}H NMR (300 MHz, Chloroform-*d*)** δ 7.96 (d, J = 8.5 Hz, 2H), 7.86 (d, J = 16.1 Hz, 1H), 7.62 (d, J = 16.1 Hz, 1H), 7.48 (d, J = 8.5 Hz, 2H), 7.39 (d, J = 8.0 Hz, 2H), 7.27 – 7.16 (m, 1H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 189.05, 139.75, 138.43, 136.09, 135.35, 132.56, 130.27, 130.13, 130.09, 129.19, 129.04. **Anal. Calcd. for $C_{15}H_9Cl_3O$:** C, 57.82; H, 2.91. **Found:** C, 57.73; H, 2.98.

(E)-3-(4-chlorophenyl)-1-(p-tolyl)prop-2-en-1-one (3f)[9]



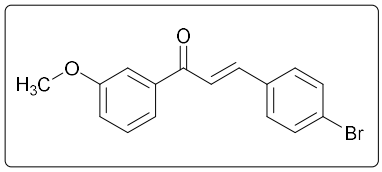
Pale yellow solid (2.26 g, 88%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 7.93 (d, J = 7.8 Hz, 2H), 7.74 (d, J = 15.7 Hz, 1H), 7.60 – 7.47 (m, 3H), 7.38 (d, J = 8.0 Hz, 2H), 7.30 (d, J = 7.8 Hz, 2H), 2.44 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 189.80, 143.96, 142.97, 136.41, 135.59, 133.63, 129.68, 129.51, 129.34, 128.78, 122.62, 77.37, 77.16, 76.95, 21.82.

(E)-3-(2-chlorophenyl)-1-(3-methoxyphenyl)prop-2-en-1-one (3g)



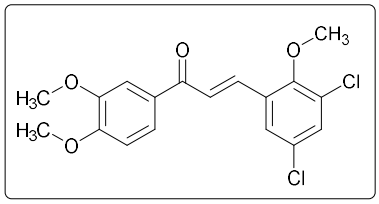
Pale yellow solid (2.15 g, 79%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.18 (d, J = 15.8 Hz, 1H), 7.74 (dd, J = 7.3, 1.9 Hz, 1H), 7.59 (d, J = 7.6 Hz, 1H), 7.54 (s, 1H), 7.49 – 7.38 (m, 3H), 7.35 – 7.29 (m, 2H), 7.14 (dd, J = 8.2, 2.5 Hz, 1H), 3.88 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 190.30, 160.05, 140.76, 139.42, 135.62, 133.38, 131.31, 130.43, 129.74, 127.91, 127.22, 124.99, 121.31, 119.63, 113.06, 55.60. **Anal. Calcd for $C_{16}H_{13}ClO_2$:** C, 70.46; H, 4.80. **Found:** C, 70.41; H, 4.88.

(E)-3-(4-bromophenyl)-1-(3-methoxyphenyl)prop-2-en-1-one (3h)



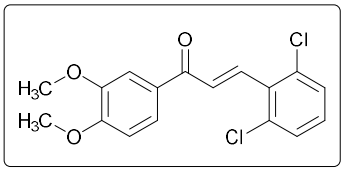
Pale yellow solid (2.03 g, 87%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 7.73 (d, J = 15.7 Hz, 1H), 7.59 (d, J = 7.6 Hz, 1H), 7.57 – 7.47 (m, 6H), 7.41 (t, J = 7.9 Hz, 1H), 7.17 – 7.10 (m, 1H), 3.88 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 190.06, 160.09, 143.50, 139.53, 133.94, 132.35, 129.94, 129.76, 124.95, 122.72, 121.17, 119.57, 113.02, 55.63. **Anal. Calcd for $C_{16}H_{13}BrO_2$:** C, 60.59; H, 4.13. **Found:** C, 60.45; H, 4.11.

(E)-3-(3,5-dichloro-2-methoxyphenyl)-1-(3,4-dimethoxyphenyl)prop-2-en-1-one (3i)



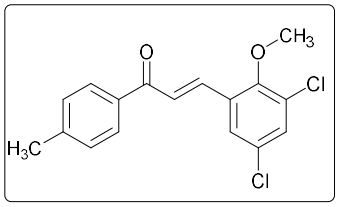
Pale yellow solid (3.08 g, 84%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 7.91 (d, J = 15.8 Hz, 1H), 7.67 (d, J = 8.3 Hz, 1H), 7.63– 7.58 (m, 2H), 7.54 (s, 1H), 7.40 (s, 1H), 6.92 (d, J = 8.3 Hz, 1H), 3.96 (s, 6H), 3.86 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 188.11, 154.28, 153.72, 149.49, 136.56, 131.83, 131.43, 131.02, 129.94, 129.86, 126.44, 125.12, 123.37, 110.84, 110.11, 61.87, 56.24, 56.17. **Anal. Calcd. for $C_{18}H_{16}Cl_2O_4$:** C, 58.87; H, 4.39. **Found:** C, 58.98; H, 4.45.

(E)-3-(2,6-dichlorophenyl)-1-(3,4-dimethoxyphenyl)prop-2-en-1-one (3j)



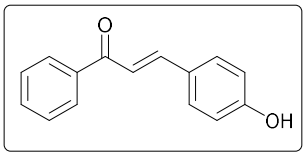
Yellow solid (3.30 g, 98%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 7.82 (d, J = 16.1 Hz, 1H), 7.71 – 7.58 (m, 3H), 7.37 (d, J = 8.1 Hz, 2H), 7.19 (t, J = 8.0 Hz, 1H), 6.92 (d, J = 8.4 Hz, 1H), 3.96 (s, 6H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 188.51, 153.66, 149.40, 137.09, 135.25, 132.96, 130.94, 130.42, 129.83, 128.94, 123.61, 110.93, 110.18, 56.22, 56.13. **Anal. Calcd. for $C_{17}H_{14}Cl_2O_3$:** C, 60.55; H, 4.19. **Found:** C, 60.48; H, 4.26.

(E)-3-(3,5-dichloro-2-methoxyphenyl)-1-(p-tolyl)prop-2-en-1-one (3k)



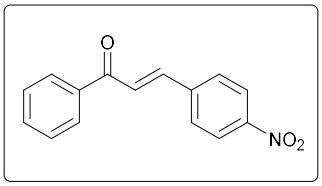
White solid (2.71 g, 84%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 7.98– 7.88 (m, 3H), 7.66 – 7.49 (m, 2H), 7.41 (s, 1H), 7.31 (d, J = 7.6 Hz, 2H), 3.87 (s, 3H), 2.44 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 189.48, 154.34, 144.25, 136.93, 135.32, 131.77, 131.54, 129.98, 129.89, 129.58, 128.87, 126.40, 125.42, 61.93, 21.84. **Anal. Calcd. for $C_{17}H_{14}Cl_2O_2$:** C, 63.57; H, 4.39. **Found:** C, 63.50; H, 4.44.

(E)-3-(4-hydroxyphenyl)-1-phenylprop-2-en-1-one (3l) [5]



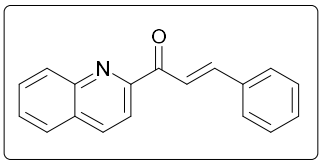
Yellow, slightly brownish solid (0.86 g, 38%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 10.11 (s, 1H), 8.12 (d, J = 7.4 Hz, 2H), 7.82 – 7.48 (m, 7H), 6.85 (d, J = 8.5 Hz, 2H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 189.04, 160.20, 144.57, 138.00, 132.82, 131.06, 128.73, 128.36, 125.80, 118.52, 115.86.

(E)-3-(4-nitrophenyl)-1-phenylprop-2-en-1-one (3m) [10]



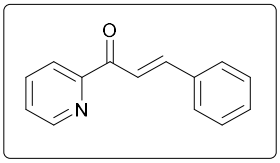
Pale yellow solid (1.38 g, 54%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.27 (d, J = 8.6 Hz, 2H), 8.03 (d, J = 7.7 Hz, 2H), 7.84 – 7.76 (m, 3H), 7.68 – 7.60 (m, 2H), 7.55 – 7.50 (m, 2H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 189.74, 148.67, 141.61, 141.16, 137.65, 133.49, 129.06, 128.94, 128.71, 125.83, 124.33.

(E)-3-phenyl-1-(quinolin-2-yl)prop-2-en-1-one(3n)[11]



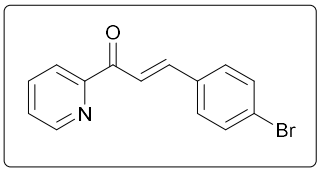
Pale orange solid (0.98 g, 38%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.56 (d, J = 16.1 Hz, 1H), 8.32 – 8.26 (m, 3H), 8.01 (d, J = 16.1 Hz, 1H), 7.89 (d, J = 8.1 Hz, 1H), 7.83 – 7.75 (m, 3H), 7.66 (t, J = 7.9 Hz, 1H), 7.48 – 7.41 (m, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 189.81, 154.03, 147.33, 144.77, 137.19, 135.43, 130.76, 130.68, 130.13, 129.65, 129.02, 128.69, 128.64, 127.84, 121.16, 119.23.

(E)-3-phenyl-1-(pyridin-2-yl)prop-2-en-1-one(3o) [12]



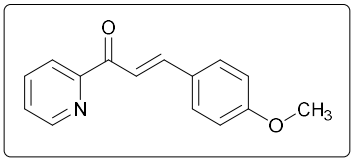
Pale yellow solid (1.78 g, 85%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.77– 8.72 (m, 1H), 8.31 (d, J = 16.0 Hz, 1H), 8.19 (d, J = 7.8 Hz, 1H), 7.95 (d, J = 16.0 Hz, 1H), 7.87 (td, J = 7.7, 1.7 Hz, 1H), 7.77 – 7.69 (m, 2H), 7.51– 7.46 (m, 1H), 7.44– 7.39 (m, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 189.62, 154.36, 148.99, 144.91, 137.14, 135.29, 130.69, 128.99, 128.97, 127.02, 123.05, 120.99.

(E)-3-(4-bromophenyl)-1-(pyridin-2-yl)prop-2-en-1-one(3p)[11]



White, slightly grayish solid (2.28 g, 79%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.73 (d, J = 4.0 Hz, 1H), 8.29 (d, J = 16.0 Hz, 1H), 8.18 (d, J = 7.8 Hz, 1H), 7.90 – 7.82 (m, 2H), 7.58 (d, J = 8.4 Hz, 2H), 7.54 (d, J = 8.5 Hz, 2H), 7.49 (ddd, J = 7.6, 4.7, 1.2 Hz, 1H).**^{13}C NMR (151 MHz, Chloroform-*d*)** δ 189.41, 154.16, 149.01, 143.36, 137.20, 134.21, 132.24, 130.29, 127.14, 124.96, 123.09, 121.56.

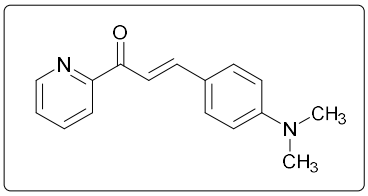
(E)-3-(4-methoxyphenyl)-1-(pyridin-2-yl)prop-2-en-1-one (3q)[13]



Pale yellow solid (1.34 g, 56%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.71 (s, 1H), 8.26– 8.10 (m, 2H), 7.90 (d, J = 16.0 Hz, 1H), 7.86 – 7.79 (m, 1H),

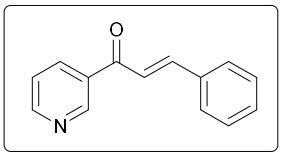
7.74 – 7.60 (m, 2H), 7.44 (s, 1H), 7.02 – 6.80 (m, 2H), 3.82 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 189.45, 161.81, 154.54, 148.87, 144.74, 137.05, 130.73, 128.03, 126.80, 122.92, 118.59, 114.41, 55.45.

(E)-3-(4-(dimethylamino)phenyl)-1-(pyridin-2-yl)prop-2-en-1-one (3r)[14]



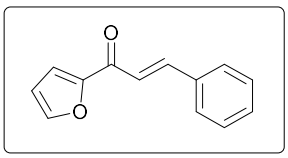
Orange solid (2.27 g, 90%). **^{1}H NMR (600 MHz, DMSO-*d*6)** δ 8.77 (d, J = 4.6 Hz, 1H), 8.08 (d, J = 7.6 Hz, 1H), 8.05 – 7.98 (m, 2H), 7.79 (d, J = 15.8 Hz, 1H), 7.67 – 7.60 (m, 3H), 6.75 (d, J = 8.8 Hz, 2H), 3.00 (s, 6H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 188.03, 154.16, 152.16, 149.01, 145.27, 137.58, 130.74, 127.11, 122.19, 121.94, 114.73, 111.87, 40.06.

(E)-3-phenyl-1-(pyridin-3-yl)prop-2-en-1-one (3s)[15]



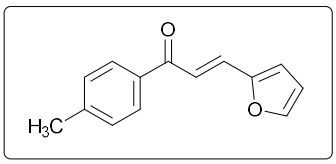
White solid (1.78 g, 85%). **^{1}H NMR (300 MHz, Chloroform-d)** δ 9.24 (s, 1H), 8.81 (d, J = 4.7 Hz, 1H), 8.29 (d, J = 7.9 Hz, 1H), 7.85 (d, J = 15.7 Hz, 1H), 7.72–7.58 (m, 2H), 7.56 – 7.29 (m, 5H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 189.18, 153.25, 149.83, 146.05, 135.95, 134.50, 133.55, 131.08, 129.13, 128.70, 123.74, 121.44.

(E)-1-(furan-2-yl)-3-phenylprop-2-en-1-one(3t)[16]



White solid (1.39 g, 70%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 7.87 (d, J = 15.7 Hz, 1H), 7.68 – 7.61 (m, 3H), 7.45 (d, J = 15.8 Hz, 1H), 7.42 – 7.38 (m, 3H), 7.33 (d, J = 3.5 Hz, 1H), 6.59 (dd, J = 3.6, 1.7 Hz, 1H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 178.11, 153.81, 146.65, 144.07, 134.82, 130.72, 129.05, 128.64, 121.26, 117.63, 112.66.

(E)-3-(furan-2-yl)-1-(p-tolyl)prop-2-en-1-one (3u)



White, slightly brownish solid (1.44 g, 68%). **^{1}H NMR (600 MHz, DMSO-d6)** δ 7.97 (d, J = 8.1 Hz, 2H), 7.91 (s, 1H), 7.59 – 7.47 (m, 2H), 7.36 (d, J = 7.9 Hz, 2H), 7.10 (d, J = 3.3 Hz, 1H), 7.70 – 7.68 (m, 1H), 2.39 (s, 3H). **^{13}C NMR (151 MHz, DMSO-d6)** δ 188.05, 151.18, 146.12, 143.51, 134.99, 130.18, 129.41, 128.42, 118.74, 116.86, 113.10, 21.16. **Anal. Calcd. for $C_{14}H_{12}O_2$:** C, 79.23; H, 5.70. **Found:** C, 79.19; H, 4.08.

3. Synthesis and characterization of pyridines

General procedure A:

A 10 mL round-bottom flask with stir bar was sequentially charged with N-(4H-1,2,4-triazol-4-yl) imine **1** (1.08 mmol), arylmethylketone derivative (2.16 mmol) and DMSO (3.5 mL). Then KOH (143 mg, 2.16 mmol) was added, the reaction flask was capped with a glass stopper, and the reaction mixture was stirred for 24 hours at room temperature (20-25^{o}C). The reaction mixture was then quenched with saturated ammonium chloride (35 mL) and extracted with chloroform (3 × 20 mL). The combined organic layers were washed with water (2 × 50 mL), brine (50 ml), dried with anhydrous sodium sulfate and evaporated *in vacuo*. After removal of the solvent, the residue was purified by column chromatography.

General procedure B:

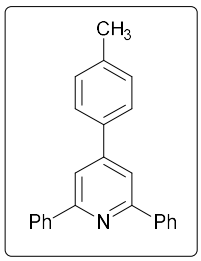
A 10 mL round-bottom flask with stir bar was sequentially charged with corresponding chalcone (2 mmol), N-(4H-1,2,4-triazol-4-yl)imine **2** (2 mmol) and DMSO (5 mL). Then ^{t}BuOK (448 mg, 4 mmol) was added, the reaction flask was capped with a glass stopper, and the reaction mixture was stirred for 24 hours at room temperature (20-25^{o}C). The reaction mixture was then quenched with saturated ammonium chloride (40 mL) and extracted with chloroform (3 × 30 mL). The combined organic layers were washed with water (2 × 50 mL), brine (50 ml), dried with anhydrous sodium sulfate and evaporated *in vacuo*. After removal of the solvent, the residue was purified by column chromatography.

General procedure C:

A 10 mL round-bottom flask with stir bar was sequentially charged with corresponding chalcone (2 mmol), N-(4H-1,2,4-triazol-4-yl)imine (**1g, 2h-j**) (10 mmol), and DMSO (5 mL). Then tBuOK (448 mg, 4 mmol) was added, the reaction flask was capped with a glass stopper, and the reaction mixture was stirred for 24 hours at room temperature (20-25^{o}C). The reaction mixture

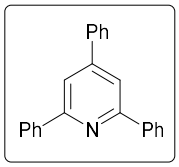
was then quenched with saturated ammonium chloride (50 mL) and extracted with chloroform (3 × 30 mL). The combined organic layers were washed with water (2 × 50 mL), brine (50 ml), dried with anhydrous sodium sulfate and evaporated in vacuo. After removal of the solvent, the residue was purified by column chromatography.

2,6-diphenyl-4-(p-tolyl)pyridine (4a)[17]



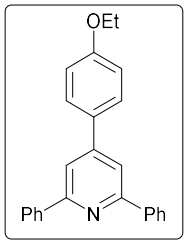
Prepared following procedure A. Isolated by column chromatography (PE:EA = 50:1), R_f=0.13. White solid (253 mg, 73%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.23 (d, J = 7.2 Hz, 4H), 7.90 (s, 2H), 7.68 (d, J = 8.1 Hz, 2H), 7.54 (t, J = 7.6 Hz, 4H), 7.47 (t, J = 7.3 Hz, 2H), 7.36 (d, J = 7.9 Hz, 2H), 2.46 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 157.59, 150.17, 139.82, 139.20, 136.21, 129.96, 129.12, 128.82, 127.27, 127.13, 117.02, 21.38.

2,4,6-triphenylpyridine (4b) [18]



Prepared following general procedure A: Isolated by column chromatography (PE:EA = 50:1), R_f=0.16. White solid (282 mg, 85%). **OR Prepared following general procedure B:** Isolated by column chromatography (PE:EA = 50:1). White solid (461 mg, 75%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.24 (d, J = 7.3 Hz, 4H), 7.92 (s, 2H), 7.77 (d, J = 7.3 Hz, 2H), 7.59 – 7.45 (m, 9H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 157.63, 150.31, 139.72, 139.19, 129.24, 129.18, 129.10, 128.84, 127.31, 127.27, 117.24.

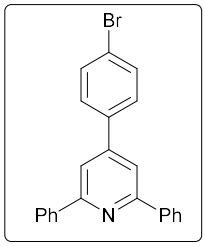
4-(4-ethoxyphenyl)-2,6-diphenylpyridine (4c)



Prepared following procedure A. Isolated by column chromatography (PE:EA = 50:1), R_f=0.06. White solid, (216 mg, 57%). **^{1}H NMR (300 MHz, Chloroform-d)** δ 8.21 (d, J = 7.7 Hz, 4H), 7.87 (s, 2H), 7.71 (d, J = 8.6 Hz, 2H), 7.60– 7.40 (m, 6H), 7.05 (d, J =

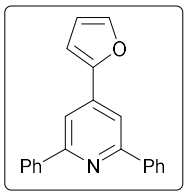
8.6 Hz, 2H), 4.12 (q, J = 6.9 Hz, 2H), 1.48 (t, J = 6.9 Hz, 3H). **^{13}C NMR (75 MHz, Chloroform-d)** δ 160.00, 157.56, 149.78, 139.88, 131.21, 129.08, 128.80, 128.42, 127.26, 116.69, 115.18, 63.77, 14.94. **Anal. Calcd. for $C_{25}H_{21}NO$:** C, 85.44; H, 6.02; N, 3.99. **Found:** C, 85.49; H, 6.08; N, 4.06

4-(4-bromophenyl)-2,6-diphenylpyridine (4d)[19]



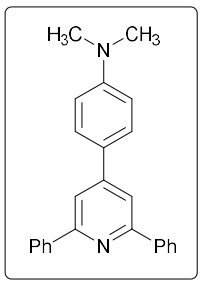
Prepared following procedure A. Isolated by column chromatography (PE:EA = 50:1), R_f=0.17. White solid, (309 mg, 74%). **^{1}H NMR (300 MHz, Chloroform-d)** δ 8.21 (d, J = 6.9 Hz, 4H), 7.84 (s, 2H), 7.70 – 7.42 (m, 11H). **^{13}C NMR (75 MHz, Chloroform-d)** δ 157.80, 149.08, 139.49, 138.06, 132.41, 129.31, 128.87, 127.25, 123.53, 117.24, 116.86.

4-(furan-2-yl)-2,6-diphenylpyridine (4e)[20]



Prepared following procedure A. Isolated by column chromatography (PE:EA = 50:1) , R_f=0.16. White solid, (196 mg, 61%). **^{1}H NMR (300 MHz, DMSO-d6)** δ 8.56 – 8.04 (m, 5H)., 7.95 (s, 1H), 7.70 – 7.37 (m, 6H), 6.75 (s, 1H). **^{13}C NMR (75 MHz, DMSO-d6)** δ 156.50, 150.98, 144.80, 139.10, 138.55, 129.35, 128.78, 126.78, 112.64, 112.50, 110.42.

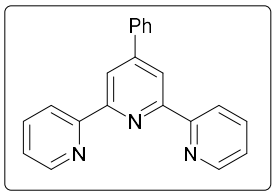
4-(2,6-diphenylpyridin-4-yl)-N,N-dimethylaniline (4f) [20]



Prepared following general procedure A: Isolated by column chromatography (PE:EA = 50:1), R_f=0.13. White solid (182 mg, 48%). **OR Prepared following general procedure B:** Isolated by column chromatography (PE:EA = 50:1), R_f=0.13. White solid (259 mg, 37%). The spectral data are identical. **^{1}H NMR (600 MHz, DMSO-d6)** δ 8.31 (d, J = 8.2 Hz, 4H), 8.11 (s, 2H), 7.93 (d, J = 8.6 Hz, 2H), 7.59 – 7.51 (m, 4H), 7.50 – 7.45 (m, 2H), 6.85 (d,

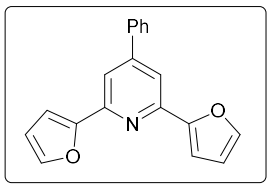
J = 8.7 Hz, 2H), 2.99 (s, 6H). **^{13}C NMR (151 MHz, DMSO-d6)** δ 156.27, 151.10, 149.40, 139.15, 129.01, 128.67, 127.90, 126.87, 124.29, 115.01, 112.25, 39.87(overlaps with DMSO signal).

4'-phenyl-2,2':6',2''-terpyridine (4g) [21]



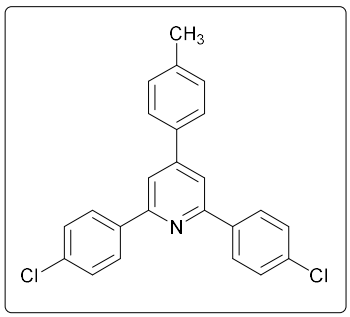
Prepared following general procedure A: Isolated by column chromatography (PE:EA = 5:1), R_f=0.26. White solid (261 mg, 78%). **OR Prepared following general procedure B:** Isolated by column chromatography (PE:EA = 5:1), R_f=0.26. White solid (446 mg, 72%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.75 (s, 2H), 8.74 – 8.72 (m, 2H), 8.67 (d, J = 7.9 Hz, 2H), 7.93 – 7.89 (m, 2H), 7.87 (td, J = 7.5, 1.8 Hz, 2H), 7.51 (t, J = 7.5 Hz, 2H), 7.45 (t, J = 7.3 Hz, 2H), 7.37 – 7.32 (m, 2H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 156.41, 156.06, 150.47, 149.27, 138.64, 136.98, 129.14, 129.05, 127.48, 123.94, 121.49, 119.06.

2,6-di(furan-2-yl)-4-phenylpyridine (4h) [22]



Prepared following general procedure A: Isolated by column chromatography (PE:EA = 20:1), R_f=0.29. White solid (140 mg, 45%). **Prepared following general procedure B:** Isolated by column chromatography (PE:EA = 20:1), R_f=0.29. White, slightly brownish solid (156 mg, 27%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 7.81 (s, 2H), 7.76 (d, J = 7.3 Hz, 2H), 7.57 (s, 2H), 7.54 – 7.45 (m, 3H), 7.21 (d, J = 3.2 Hz, 2H), 6.60 – 6.54 (m, 2H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 153.94, 149.90, 149.84, 143.43, 138.51, 129.26, 129.18, 127.17, 114.93, 112.20, 109.24.

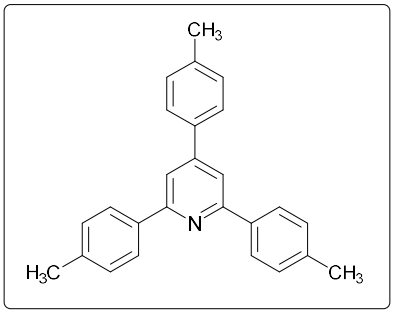
2,6-bis(4-chlorophenyl)-4-(p-tolyl)pyridine (4i)



Prepared following procedure A: Isolated by column chromatography (PE:EA = 50:1), R_f=0.11. White solid (215 mg, 51%). **^{1}H NMR (600 MHz,**

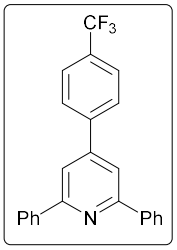
Chloroform-*d*) δ 8.12 (d, J = 8.4 Hz, 4H), 7.83 (s, 2H), 7.63 (d, J = 7.7 Hz, 2H), 7.48 (d, J = 8.4 Hz, 4H), 7.34 (d, J = 7.7 Hz, 2H), 2.45 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 156.42, 150.54, 139.50, 137.99, 135.82, 135.36, 130.04, 129.03, 128.49, 127.10, 116.98, 21.41. **Anal. Calcd. for $C_{24}H_{17}Cl_2N$:** C, 73.86; H, 4.39; N, 3.59. **Found:** C, 73.94; H, 4.32; N, 3.66

2,4,6-tri-p-tolylpyridine (4j)[23]



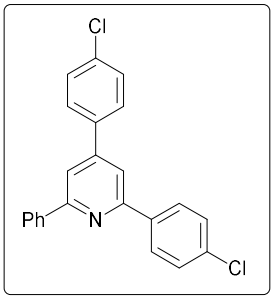
Prepared following procedure A: Isolated by column chromatography (PE:EA = 50:1), R_f=0.23. White solid (162 mg, 43%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.12 (d, J = 7.8 Hz, 4H), 7.84 (s, 2H), 7.66 (d, J = 7.7 Hz, 2H), 7.38–7.30 (m, 6H), 2.50–2.40 (m, 9H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 157.49, 150.00, 139.07, 139.02, 137.13, 136.43, 129.92, 129.52, 127.13, 116.44, 21.45, 21.38.

2,6-diphenyl-4-(4-(trifluoromethyl)phenyl)pyridine (5a) [24]



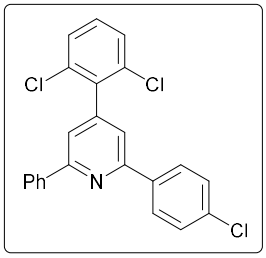
Prepared following procedure B: Isolated by column chromatography (PE:EA = 50:1), R_f=0.13. White solid (310 mg, 41%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.22 (d, *J* = 7.7 Hz, 4H), 7.87 (s, 2H), 7.85 (d, *J* = 8.0 Hz, 2H), 7.80 (d, *J* = 8.0 Hz, 2H), 7.54 (t, *J* = 7.5 Hz, 4H), 7.48 (t, *J* = 7.3 Hz, 2H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 157.92, 148.91, 142.79, 139.38, 131.11 (C-F, q, ^{2}J = 32.6 Hz), 129.43, 128.92, 127.76, 127.27, 126.21 (C-F, q, ^{3}J = 3.7 Hz), 124.20 (C-F, q, ^{1}J = 272.3 Hz), 117.17.

2,4-bis(4-chlorophenyl)-6-phenylpyridine (5b)



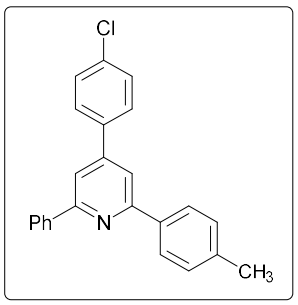
Prepared following procedure B: Isolated by column chromatography (PE:EA = 50:1), R_f=0.15. Slightly yellowish solid (490 mg, 65%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.25– 8.08 (m, 4H), 7.83 (s, 1H), 7.79 (s, 1H), 7.66 (d, J = 8.0 Hz, 2H), 7.59 – 7.43 (m, 7H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 157.89, 156.51, 149.22, 139.32, 137.90, 137.40, 135.45, 135.42, 129.50, 129.43, 129.04, 128.92, 128.56, 128.50, 127.23, 117.16, 116.63. **Anal. Calcd. for $C_{23}H_{15}Cl_2N$:** C, 73.42; H, 4.02; N, 3.72. **Found:** C, 73.33; H, 4.10; N, 3.83

2-(4-chlorophenyl)-4-(2,6-dichlorophenyl)-6-phenylpyridine (5c)



Prepared following procedure B: Isolated by column chromatography (PE:EA = 50:1), R_f=0.23. Slightly yellowish solid (427 mg, 52%). **^{1}H-NMR (300 MHz, Chloroform-d):** δ 8.25 – 8.05 (m, 4H), 7.65 (s, 1H), 7.61 (s, 1H), 7.57 – 7.40 (m, 7H), 7.39 – 7.28 (m, 1H), **^{13}C NMR (151 MHz, Chloroform-d)** δ 157.39, 156.03, 146.60, 139.19, 137.82, 137.50, 135.40, 134.47, 130.10, 129.42, 129.02, 128.89, 128.53, 128.51, 127.24, 120.05, 119.53. **Anal. Calcd for $C_{23}H_{14}Cl_3N$:** C, 67.26; H, 3.44; N, 3.41. **Found:** C, 67.17; H, 3.51; N, 3.49

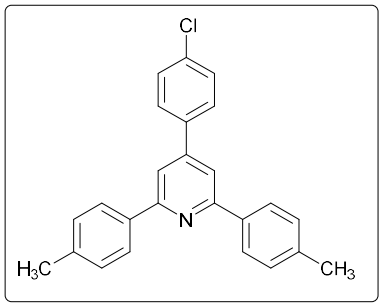
4-(4-chlorophenyl)-2-phenyl-6-(p-tolyl)pyridine (5d) [25]



Prepared following procedure B: Isolated by column chromatography (PE:EA = 50:1), R_f=0.13. White solid (356 mg, 50%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.20 (d, J = 7.1 Hz, 2H), 8.11 (d, J = 8.1 Hz, 2H), 7.87 – 7.76 (m, 2H), 7.67 (d, J = 8.6 Hz, 2H), 7.56 – 7.44 (m, 5H), 7.33 (d, J = 7.8 Hz, 2H), 2.45 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-d)**

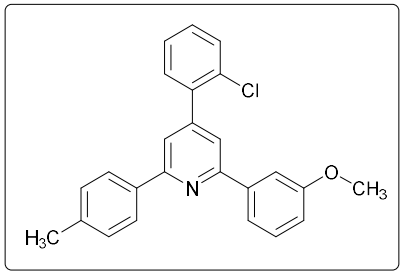
δ 157.77, 157.69, 148.95, 139.62, 139.32, 137.70, 136.73, 135.24, 129.59, 129.43, 129.24, 128.85, 128.58, 127.25, 127.12, 116.63, 116.57, 21.46.

4-(4-chlorophenyl)-2,6-di-p-tolylpyridine (5e) [26]



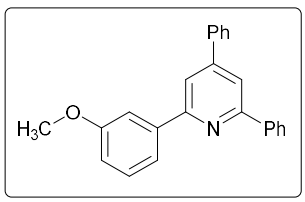
Prepared following procedure B: Isolated by column chromatography (PE:EA = 50:1), R_f=0.13. White solid (348 mg, 47%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.10 (d, J = 7.9 Hz, 4H), 7.79 (s, 2H), 7.67 (d, J = 8.5 Hz, 2H), 7.50 (d, J = 8.4 Hz, 2H), 7.32 (d, J = 7.8 Hz, 4H), 2.44 (s, 6H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 157.70, 148.90, 139.25, 137.84, 136.85, 135.19, 129.58, 129.42, 128.60, 127.12, 116.33, 21.47.

4-(2-chlorophenyl)-2-(3-methoxyphenyl)-6-(p-tolyl)pyridine (5f)



Prepared following procedure B: Isolated by column chromatography (PE:DCM = 1:1), R_f=0.50. Colorless oil (116 mg, 15%). **^{1}H NMR (300 MHz, Chloroform-*d*)** δ 8.10 (d, *J* = 8.0 Hz, 2H), 7.81 (s, 1H), 7.77 – 7.68 (m, 3H), 7.61 – 7.50 (m, 1H), 7.48 – 7.35 (m, 4H), 7.32 (d, *J* = 7.9 Hz, 1H), 7.00 (dd, *J* = 8.1, 2.1 Hz, 2H), 3.93 (s, 3H), 2.44 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 160.19, 156.98, 156.69, 148.62, 141.15, 139.24, 138.72, 136.71, 132.45, 131.05, 130.42, 129.80, 129.57, 127.30, 127.13, 119.68, 119.46, 119.42, 114.85, 112.79, 55.54, 21.46. **Anal. Calcd. for $C_{25}H_{20}ClNO$:** C, 77.81; H, 5.22; N, 3.63. **Found:** C, 77.92; H, 5.27; N, 3.74

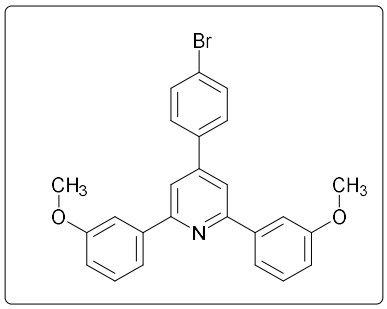
2-(3-methoxyphenyl)-4,6-diphenylpyridine (5g) [27]



Prepared following procedure B: Isolated by column chromatography (PE:EA = 50:1), R_f=0.10. White solid (297 mg, 44%). **^{1}H NMR (600 MHz,**

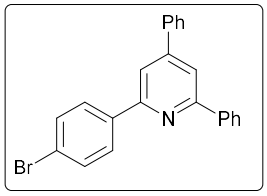
DMSO-*d*6) δ 8.33 (d, J = 7.8 Hz, 2H), 8.20 (s, 2H), 8.05 (d, J = 7.2 Hz, 2H), 7.91 (d, J = 7.8 Hz, 1H), 7.87 (s, 1H), 7.60 – 7.44 (m, 7H), 7.07 (dd, J=8.2, 1.6 Hz, 1H), 3.88 (s, 3H). **^{13}C NMR (151 MHz, DMSO-*d*6)** δ 159.73, 156.44, 156.29, 149.59, 140.31, 138.78, 137.71, 129.80, 129.27, 129.22, 129.06, 128.74, 127.39, 126.94, 119.35, 116.77, 116.74, 114.74, 112.41, 55.23.

4-(4-bromophenyl)-2,6-bis(3-methoxyphenyl)pyridine (5h)



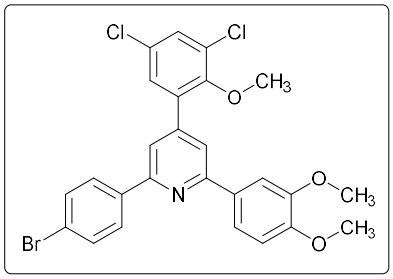
Prepared following procedure B: Isolated by column chromatography (PE:EA = 50:1), R_f=0.06. White solid (348 mg, 39%). **^{1}H NMR (600 MHz, DMSO-d6)** δ 8.20 (s, 2H), 8.03 (d, J = 8.5 Hz, 2H), 7.90 (d, J = 7.8 Hz, 2H), 7.87 (s, 2H), 7.75 (d, J = 8.5 Hz, 2H), 7.46 (t, J = 7.9 Hz, 2H), 7.06 (d, J = 8.1 Hz, 2H), 3.88 (s, 6H). **^{13}C NMR (151 MHz, DMSO-d6)** δ 159.72, 156.28, 148.30, 140.15, 136.82, 131.90, 129.82, 129.57, 122.93, 119.34, 116.70, 114.85, 112.36, 55.21. **Anal. Calcd. for $C_{25}H_{20}BrNO_2$:** C, 67.27; H, 4.52; N, 3.14. **Found:** C, 67.19; H, 4.48; N, 3.04

2-(4-bromophenyl)-4,6-diphenylpyridine(5i)[18]



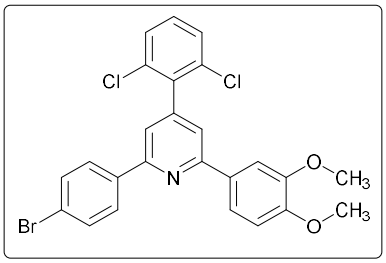
Prepared following procedure B: Isolated by column chromatography (PE:EA = 50:1), R_f=0.16. White solid (534 mg, 69%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.19 (d, J = 7.4 Hz, 2H), 8.09 (d, J = 8.5 Hz, 2H), 7.91 (s, 1H), 7.85 (s, 1H), 7.74 (d, J = 7.3 Hz, 2H), 7.64 (d, J = 8.5 Hz, 2H), 7.51–7.43 (m, 6H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 157.77, 156.40, 150.53, 139.50, 138.99, 138.56, 131.96, 129.32, 129.29, 129.23, 128.89, 128.81, 127.31, 127.25, 123.64, 117.56, 116.95.

2-(4-bromophenyl)-4-(3,5-dichloro-2-methoxyphenyl)-6-(3,4-dimethoxyphenyl)pyridine (5j)



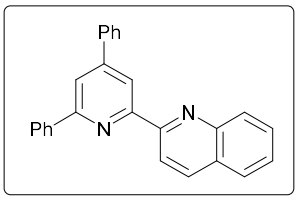
Prepared following procedure B: Isolated by column chromatography (PE:EA = 10:1), R_f=0.16. White solid (491 mg, 45%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.06 (d, *J* = 8.2 Hz, 2H), 7.82 (s, 2H), 7.79 (s, 1H), 7.71 (d, *J* = 8.3 Hz, 1H), 7.64 (d, *J* = 8.2 Hz, 2H), 7.49 (s, 1H), 7.37 (s, 1H), 6.99 (d, *J* = 8.3 Hz, 1H), 4.03 (s, 3H), 3.96 (s, 3H), 3.59 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 157.21, 156.06, 152.64, 150.53, 149.44, 145.93, 138.21, 135.80, 132.03, 131.98, 130.54, 130.05, 129.98, 128.99, 128.73, 123.83, 119.91, 118.40, 117.96, 111.25, 110.25, 61.32, 56.21, 56.15. **Anal. Calcd. for $C_{26}H_{20}BrCl_2NO_3$:** C, 57.27; H, 3.70; N, 2.57. **Found:** C, 57.20; H, 3.75; N, 2.54.

2-(4-bromophenyl)-4-(2,6-dichlorophenyl)-6-(3,4-dimethoxyphenyl)pyridine (5k)



Prepared following procedure B: Isolated by column chromatography (PE:EA = 10:1), R_f=0.13. White solid (587 mg, 57%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.05 (d, J = 8.4 Hz, 2H), 7.82 (s, 1H), 7.70 (d, J = 8.4 Hz, 1H), 7.63 (d, J = 8.4 Hz, 2H), 7.58 (s, 1H), 7.54 (s, 1H), 7.47 (d, J = 8.1 Hz, 2H), 7.32 (t, J = 8.1 Hz, 1H), 6.98 (d, J = 8.4 Hz, 1H), 4.03 (s, 3H), 3.96 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 157.05, 155.92, 150.43, 149.39, 146.52, 138.36, 137.55, 134.46, 132.13, 131.96, 130.06, 128.77, 128.49, 123.69, 119.93, 119.45, 118.96, 111.22, 110.27, 56.17, 56.14. **Anal. Calcd. for $C_{26}H_{20}BrCl_2NO_3$:** C, 57.27; H, 3.70; N, 2.57. **Found:** C, 57.20; H, 3.75; N, 2.54.

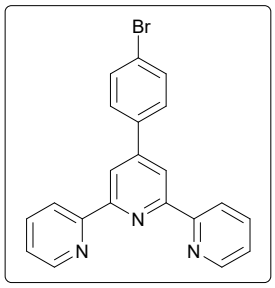
2-(4,6-diphenylpyridin-2-yl)quinolone (5n)



Prepared following procedure B: Isolated by column chromatography (PE:EA = 20:1), R_f=0.17. White solid (294 mg, 41%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.91 (s, 1H), 8.86 (d, J = 8.6 Hz, 1H), 8.32 (d, J = 8.6 Hz, 1H), 8.29 – 8.21 (m,

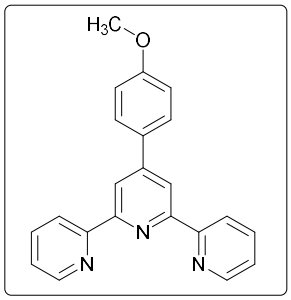
3H), 8.04 (s, 1H), 7.88 (d, J = 7.8 Hz, 3H), 7.76 (t, J = 7.5 Hz, 1H), 7.60 – 7.53 (m, 5H), 7.52 – 7.46 (m, 2H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 157.25, 156.60, 156.53, 150.45, 148.07, 139.61, 139.05, 136.78, 129.99, 129.63, 129.25, 129.20, 129.14, 128.92, 128.53, 127.79, 127.45, 127.26, 126.85, 119.55, 118.98, 118.42. **Anal. Calcd. for $C_{26}H_{18}N_2$:** C, 87.12; H, 5.06; N, 7.82. **Found:** C, 87.03; H, 5.11; N, 7.88.

4'-(4-bromophenyl)-2,2':6',2''-terpyridine (5o) [28]



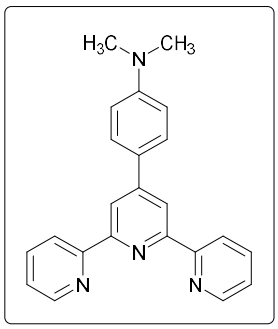
Prepared following procedure B: Isolated by column chromatography (PE:EA = 5:1), R_f=0.16. White solid (311 mg, 40%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.75-8.70 (m, 2H), 8.68 (s, 2H), 8.65 (d, *J* = 7.9 Hz, 2H), 7.87 (t, *J* = 7.5 Hz, 2H), 7.76 (d, *J* = 8.1 Hz, 2H), 7.62 (d, *J* = 8.1 Hz, 2H), 7.40 – 7.29 (m, 2H).**13C NMR (151 MHz, Chloroform-*d*)** δ 156.19, 156.15, 149.26, 149.14, 137.51, 137.03, 132.22, 129.00, 124.06, 123.60, 121.50, 118.66.

4'-(4-methoxyphenyl)-2,2':6',2''-terpyridine (5p) [29]



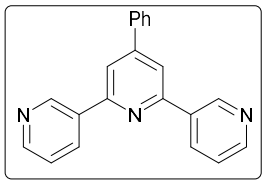
Prepared following procedure B: Isolated by column chromatography (PE:EA = 5:1), R_f=0.13. White solid (224 mg, 33%). **^{1}H NMR (300 MHz, Chloroform-*d*)** δ 8.80 – 8.69 (m, 4H), 8.66 (d, J = 7.9 Hz, 2H), 7.95 – 7.79 (m, 4H), 7.42 – 7.28 (m, 2H), 7.03 (d, J = 8.8 Hz, 2H), 3.87 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 160.64, 156.52, 155.97, 149.89, 149.23, 136.97, 130.89, 128.66, 123.88, 121.49, 118.40, 114.44, 55.50.

4-([2,2':6',2''-terpyridin]-4'-yl)-N,N-dimethylaniline (5q)[30]



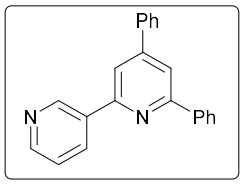
Prepared following procedure B: Isolated by column chromatography (DCM:MeOH=95:5), R_f=0.13. Bright yellow solid (374 mg, 53%). **^{1}H NMR (300 MHz, Chloroform-*d*)** δ 8.81-8.70 (m, 4H), 8.66 (d, J = 8.0 Hz, 1H), 7.98 – 7.76 (m, 4H), 7.40 – 7.28 (m, 2H), 6.81 (d, J = 8.8 Hz, 2H), 3.05 (s, 6H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 156.80, 155.81, 151.24, 150.11, 149.19, 136.91, 128.18, 125.62, 123.73, 121.49, 117.63, 112.41, 40.46.

4'-phenyl-3,2':6',3''-terpyridine (5r)[31]



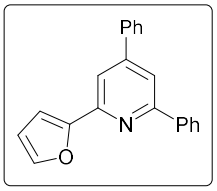
Prepared following procedure B: Isolated by column chromatography (PE:EA = 2:1), R_f=0.13. White solid (186 mg, 30%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 9.37 (s, 2H), 8.70 (s, 2H), 8.49 (d, J = 7.9 Hz, 2H), 7.94 (s, 2H), 7.74 (d, J = 7.4 Hz, 2H), 7.59 – 7.41 (m, 5H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 155.48, 151.02, 150.36, 148.57, 138.33, 134.76, 134.62, 129.58, 129.43, 127.28, 123.74, 117.86.

4,6-diphenyl-2,3'-bipyridine (5s)[32]



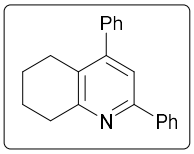
Prepared following procedure B: Isolated by column chromatography (PE:EA = 5:1), R_f=0.10. White solid (414 mg, 67%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 9.40 (s, 1H), 8.69 (d, J = 4.3 Hz, 1H), 8.52 (d, J = 7.9 Hz, 1H), 8.20 (d, J = 7.6 Hz, 2H), 7.94 (s, 1H), 7.90 (s, 1H), 7.75 (d, J = 7.5 Hz, 2H), 7.61-7.40 (m, 7H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 158.05, 155.05, 150.67, 150.14, 148.63, 139.29, 138.77, 135.16, 134.67, 129.44, 129.34, 128.92, 127.30, 127.23, 123.68, 117.89, 117.22.

2-(furan-2-yl)-4,6-diphenylpyridine(5t)[18]



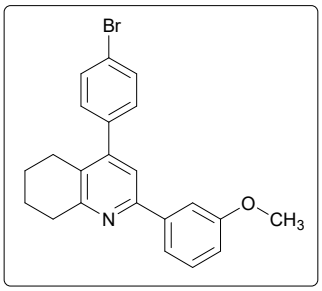
Prepared following procedure B: Isolated by column chromatography (PE:EA = 50:1), R_f=0.33. White solid (458 mg, 77%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.16 (d, J = 7.5 Hz, 2H), 7.89 (s, 1H), 7.82 (s, 1H), 7.76 (d, J = 7.4 Hz, 2H), 7.58 (s, 1H), 7.56–7.44 (m, 6H), 7.27 (d, J = 3.4 Hz, 1H), 6.59 (dd, J = 3.4, 1.7 Hz, 1H). **^{13}C NMR (151 MHz, Chloroform-*d*)** δ 157.82, 154.31, 150.11, 149.88, 143.35, 139.51, 138.87, 129.22, 129.18, 128.84, 127.25, 117.04, 115.15, 112.23, 109.15.

2,4-diphenyl-5,6,7,8-tetrahydroquinoline (6a) [18]



Prepared following procedure C: Isolated by column chromatography (PE:EA = 20:1), R_f=0.26. White solid (372 mg, 84%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 8.01– 7.98 (m, 2H), 7.49 – 7.34 (m, 9H), 3.12 (t, *J* = 6.6 Hz, 2H), 2.68 (t, *J* = 6.3 Hz, 2H), 1.99 – 1.91 (m, 2H), 1.81 – 1.74 (m, 2H). **13C NMR (151 MHz, Chloroform-*d*)** δ 157.76, 154.43, 150.35, 139.90, 139.87, 128.75, 128.68, 128.55, 128.45, 127.85, 126.98, 119.21, 33.50, 27.41, 23.25, 23.18.

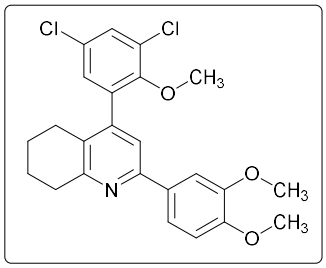
4-(4-bromophenyl)-2-(3-methoxyphenyl)-5,6,7,8-tetrahydroquinoline (6b)



Prepared following procedure C: Isolated by column chromatography (PE:EA = 20:1), R_f=0.15. White solid (589 mg, 74%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 7.58 (d, J = 8.4 Hz, 2H), 7.59 – 7.55 (m, 1H), 7.52 (d, J = 7.6 Hz, 1H), 7.37 – 7.33 (m, 2H), 7.22 (d, J = 8.4 Hz, 2H), 6.95 (ddd, J = 8.2, 2.6, 0.9 Hz, 1H), 3.90 (s, 3H), 3.08 (t, J = 6.6 Hz, 2H), 2.63 (t, J = 6.3 Hz, 2H), 1.97 – 1.90 (m, 2H), 1.80 – 1.73 (m, 2H). **13C NMR (151 MHz, Chloroform-d)** δ 160.15, 157.99, 154.37, 149.14, 141.23, 138.71, 131.69, 130.40, 129.80,

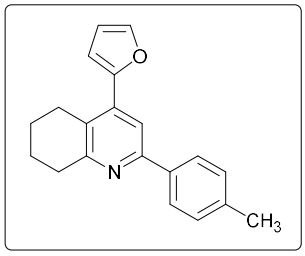
128.54, 122.18, 119.44, 119.04, 114.67, 112.26, 55.48, 33.46, 27.39, 23.17, 23.12. **Anal. Calcd. for $C_{22}H_{20}BrNO$:** C, 67.01; H, 5.11; N, 3.55. **Found:** C, 66.95; H, 5.18; N, 3.61.

4-(3,5-dichloro-2-methoxyphenyl)-2-(3,4-dimethoxyphenyl)-5,6,7,8-tetrahydroquinoline (6c)



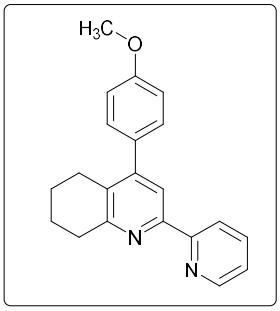
Prepared following procedure C: Isolated by column chromatography (PE:EA = 20:1), R_f=0.16. White solid (753 mg, 98%). **^{1}H NMR (600 MHz, Chloroform-*d*)** δ 7.64 (d, *J* = 2.1 Hz, 1H), 7.50 (dd, *J* = 8.4, 2.1 Hz, 1H), 7.44 (d, *J* = 2.6 Hz, 1H), 7.33 (s, 1H), 7.10 (d, *J* = 2.6 Hz, 1H), 6.92 (d, *J* = 8.4 Hz, 1H), 3.99 (s, 3H), 3.92 (s, 3H), 3.52 (s, 3H), 3.13-2.99 (m, 2H), 2.67-2.58 (m, 1H), 2.49-2.40 (m, 1H), 1.98 – 1.87 (m, 2H), 1.81 – 1.71 (m, 2H).**^{13}C NMR (151 MHz, Chloroform-d)** δ 157.80, 153.80, 152.18, 149.90, 149.35, 145.29, 136.27, 132.40, 129.96, 129.45, 129.37, 128.95, 128.83, 119.38, 118.12, 111.19, 109.94, 61.34, 56.09, 56.08, 33.49, 26.57, 23.14, 22.86**. Anal. Calcd. for $C_{24}H_{23}Cl_2NO_3$:** C, 64.87; H, 5.22; N, 3.15. **Found:** C, 64.88; H, 5.29; N, 3.21.

4-(furan-2-yl)-2-(p-tolyl)-5,6,7,8-tetrahydroquinoline (6d)



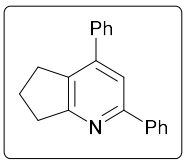
Prepared following procedure C: Isolated by column chromatography (PE:EA = 20:1), R_f=0.26. Brown solid (533 mg, 92 %). **^{1}H NMR (600 MHz, Chloroform-d)** δ 7.93 (d, J = 8.1 Hz, 2H), 7.88 (s, 1H), 7.60 – 7.56 (m, 1H), 7.27 (d, J = 7.9 Hz, 2H), 6.75 (d, J = 3.4 Hz, 1H), 6.56 (dd, J = 3.4, 1.8 Hz, 1H), 3.07 (t, J = 6.4 Hz, 2H), 2.92 (t, J = 6.3 Hz, 2H), 2.41 (s, 3H), 1.98 – 1.92 (m, 2H), 1.91 – 1.85 (m, 2H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 158.14, 154.52, 151.53, 142.96, 138.46, 137.62, 137.12, 129.47, 126.84, 126.20, 115.12, 111.96, 111.87, 33.92, 28.05, 23.24, 22.92, 21.39. **Anal. Calcd. $C_{20}H_{19}NO$:** C, 83.01; H, 6.62; N, 4.84. **Found:** C, 83.10; H, 6.72; N, 4.89.

4-(4-methoxyphenyl)-2-(pyridin-2-yl)-5,6,7,8-tetrahydroquinoline (6e)



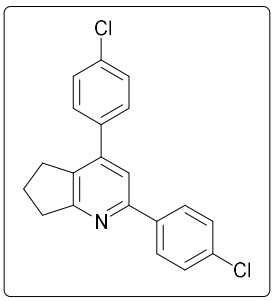
Prepared following procedure C: Isolated by column chromatography (PE:EA = 4:1), R_f=0.22. White solid (300 mg, 73%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.67 – 8.60 (m, 1H), 8.39 (d, J = 7.9 Hz, 1H), 8.04 (s, 1H), 7.78 (td, J = 7.9, 1.8 Hz, 1H), 7.30 (d, J = 8.8 Hz, 2H), 7.27 – 7.23 (m, 1H), 6.96 (d, J = 8.7 Hz, 2H), 3.85 (s, 3H), 3.08 (t, J = 6.6 Hz, 2H), 2.70 (t, J = 6.3 Hz, 2H), 1.98 – 1.91 (m, 2H), 1.81 – 1.71 (m, 2H). **^{1}3C NMR (151 MHz, Chloroform-d)** δ 159.31, 157.40, 156.85, 153.01, 150.25, 149.22, 136.88, 132.00, 130.48, 130.04, 123.31, 121.14, 119.71, 113.73, 55.41, 33.47, 27.72, 23.22, 23.20. **Anal. Calcd.** $C_{21}H_{20}N_2O$: C, 79.72; H, 6.37; N, 8.85. **Found:** C, 79.62; H, 6.46; N, 8.91.

2,4-diphenyl-6,7-dihydro-5H-cyclopenta[b]pyridine (6f) [33]



Prepared following procedure C: Isolated by column chromatography (PE:EA = 20:1), R_f=0.17. Colorless oil (48 mg, 9%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.04 – 7.97 (m, 2H), 7.57 – 7.52 (m, 3H), 7.51 – 7.37 (m, 6H), 3.18 (t, J = 7.6 Hz, 2H), 3.07 (t, J = 7.3 Hz, 2H), 2.16 (p, J = 7.5 Hz, 2H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 166.82, 156.64, 146.01, 140.12, 139.19, 133.20, 128.79, 128.74, 128.57, 128.37, 128.30, 127.12, 118.20, 34.93, 30.75, 23.66.

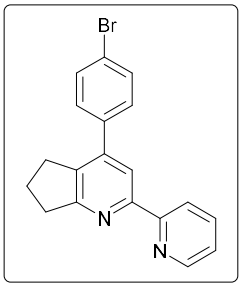
2,4-bis(4-chlorophenyl)-6,7-dihydro-5H-cyclopenta[b]pyridine (6g)



Prepared following procedure C: Isolated by column chromatography (PE:EA = 20:1), R_f=0.17. Colorless oil (50 mg, 7%). **^{1}H NMR (600 MHz, Chloroform-d**) δ 7.93 (d, J = 8.5 Hz, 2H), 7.48 – 7.39 (m, 7H), 3.14 (t, J = 7.6 Hz, 2H), 3.02 (t, J = 7.3 Hz, 2H), 2.16 (p, J = 7.5 Hz, 2H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 167.18, 155.45,

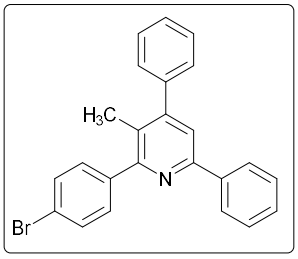
144.96, 138.31, 137.41, 134.78, 134.64, 133.44, 129.60, 129.04, 128.98, 128.33, 117.66, 34.85, 30.71, 23.61. **Anal. Calcd. $C_{20}H_{15}Cl_2N$:** C, 70.60; H, 4.44; N, 4.12. **Found:** C, 70.56; H, 4.48; N, 4.09.

4-(4-bromophenyl)-2-(pyridin-2-yl)-6,7-dihydro-5H-cyclopenta[b]pyridine (6h)



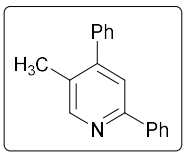
Prepared following procedure C: Isolated by column chromatography (PE:EA = 5:1), R_f=0.13. White solid (292 mg, 45%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.66 (d, J = 4.8 Hz, 1H), 8.40 (d, J = 8.0 Hz, 1H), 8.20 (s, 1H), 7.80 (td, J = 7.7, 1.8 Hz, 1H), 7.59 (d, J = 8.4 Hz, 2H), 7.44 (d, J = 8.4 Hz, 2H), 7.30 – 7.24 (m, 1H), 3.15 (t, J = 7.6 Hz, 2H), 3.04 (t, J = 7.3 Hz, 2H), 2.16 (p, J = 7.5 Hz, 2H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 166.72, 156.64, 155.32, 149.28, 144.99, 137.92, 137.00, 134.80, 131.84, 130.05, 123.52, 122.69, 121.15, 118.25, 34.75, 30.88, 23.69. **Anal. Calcd.** $C_{19}H_{15}BrN_2$: C, 64.97; H, 4.30; N, 7.98. **Found:** C, 64.91; H, 4.26; N, 7.93.

2-(4-bromophenyl)-3-methyl-4,6-diphenylpyridine(6i)



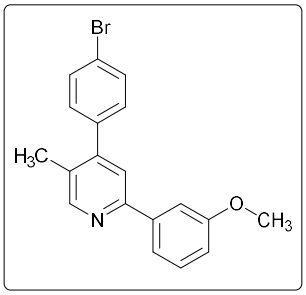
Prepared following procedure C: Isolated by column chromatography (PE:EA = 50:1), R_f=0.15. White solid (460 mg, 57%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.07 (d, J = 7.4 Hz, 2H), 7.65-7.60 (m, 3H), 7.56 (d, J = 8.4 Hz, 2H), 7.52 – 7.47 (m, 2H), 7.48 – 7.37 (m, 6H), 2.25 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 158.34, 154.34, 151.99, 140.43, 140.21, 139.24, 131.38, 131.33, 128.92, 128.88, 128.81, 128.64, 128.13, 127.02, 126.98, 122.35, 120.35, 18.06. **Anal. Calcd. $C_{24}H_{18}BrN$:** C, 72.01; H, 4.53; N, 3.50. **Found:** C, 72.08; H, 4.59; N, 3.47.

5-methyl-2,4-diphenylpyridine (6j)[34]



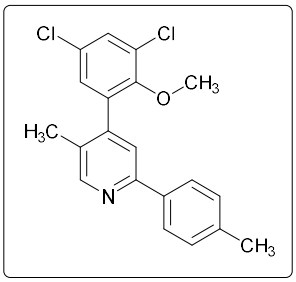
Prepared following procedure C: Isolated by column chromatography (PE:EA = 20:1), R_f=0.23. Colorless oil (38 mg, 7%). **^{1}H NMR (300 MHz, Chloroform-d)** δ 8.60 (s, 1H), 8.01 (d, J = 7.1 Hz, 2H), 7.62 (s, 1H), 7.54 – 7.34 (m, 8H), 2.32 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 155.43, 151.33, 150.08, 139.56, 139.45, 129.32, 128.84, 128.80, 128.71, 128.62, 128.12, 126.87, 121.12, 17.11.

4-(4-bromophenyl)-2-(3-methoxyphenyl)-5-methylpyridine (6k)



Prepared following procedure C: Isolated by column chromatography (PE:EA = 20:1), R_f=0.10. White solid (105 mg, 15%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.59 (s, 1H), 7.63 (d, J = 8.3 Hz, 2H), 7.60 (s, 1H), 7.58-7.53 (m, 2H), 7.38 (t, J = 7.9 Hz, 1H), 7.30 – 7.23 (m, 2H), 6.97 (dd, J = 8.1, 2.3 Hz, 1H). 3.90 (s, 3H), 2.31 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 160.12, 155.26, 151.30, 148.74, 140.63, 138.26, 131.75, 130.28, 129.75, 129.15, 122.39, 120.82, 119.14, 114.96, 111.85, 55.40, 16.96. **Anal. Calcd. $C_{19}H_{16}BrNO$:** C, 64.42; H, 4.55; N, 3.95. **Found:** C, 64.27; H, 4.48; N, 3.93.

4-(3,5-dichloro-2-methoxyphenyl)-5-methyl-2-(p-tolyl)pyridine (6l)

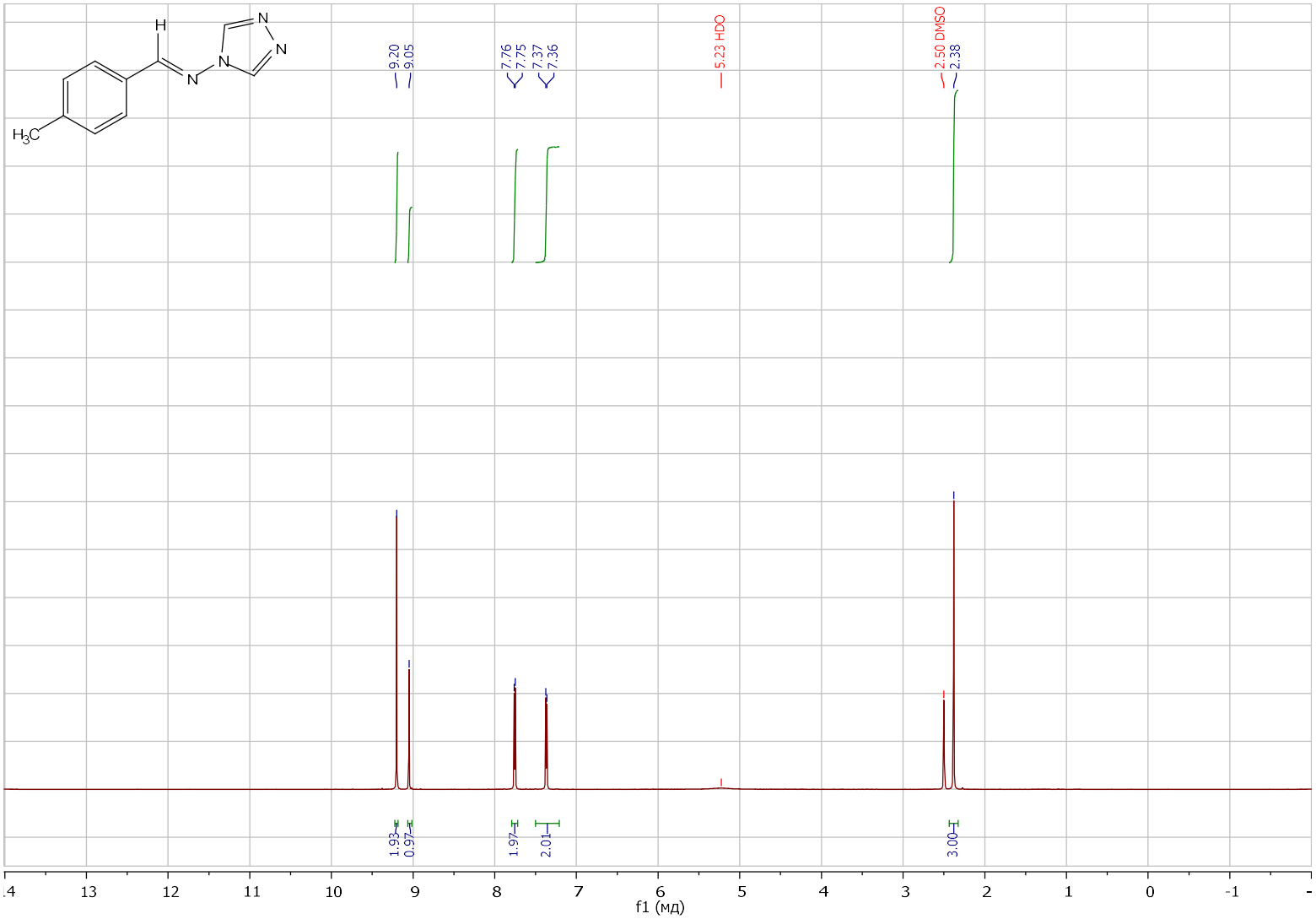


Prepared following procedure C: Isolated by column chromatography (PE:EA = 15:1), R_f=0.17. Yellow oil (75 mg, 10%). **^{1}H NMR (600 MHz, Chloroform-d)** δ 8.58 (s, 1H), 7.90 (d, J = 8.1 Hz, 2H), 7.56 (s, 1H), 7.47 (d, J = 2.5 Hz, 1H), 7.27 (d, J = 8.0 Hz, 2H), 7.12 (d, J = 2.5 Hz, 1H), 3.49 (s, 3H), 2.40 (s, 3H), 2.20 (s, 3H). **^{13}C NMR (151 MHz, Chloroform-d)** δ 155.23, 152.28, 151.03, 145.06, 139.03, 136.18, 135.92, 130.22, 130.04, 129.62, 129.56, 129.50, 129.00, 126.68, 120.49, 61.26, 21.37, 16.71. **Anal. Calcd. $C_{20}H_{17}Cl_2NO$:** C, 67.05; H, 4.78; N, 3.91. **Found:** C, 67.01; H, 4.73; N, 3.92.

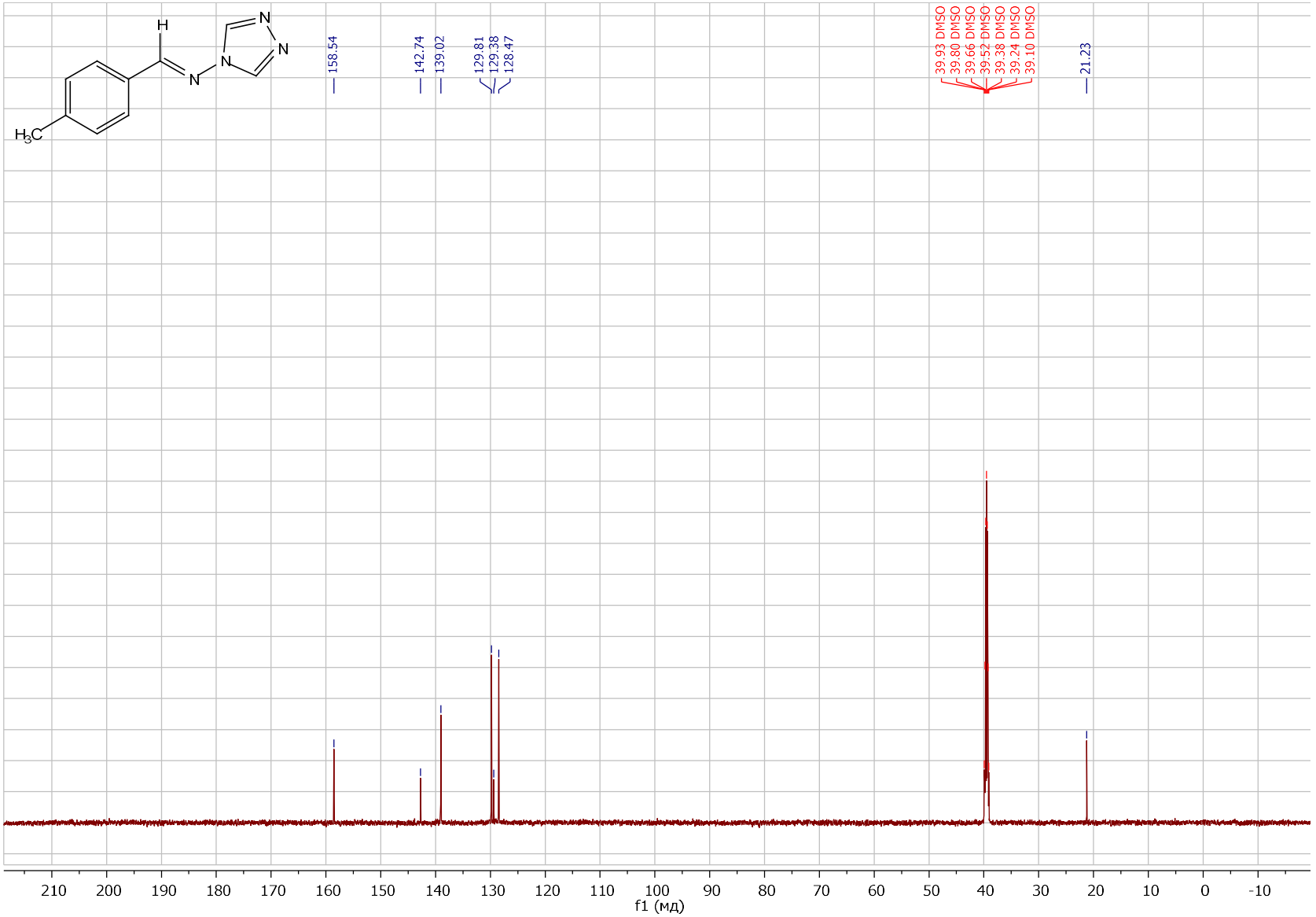
4. The NMR Charts

4.1 Imines

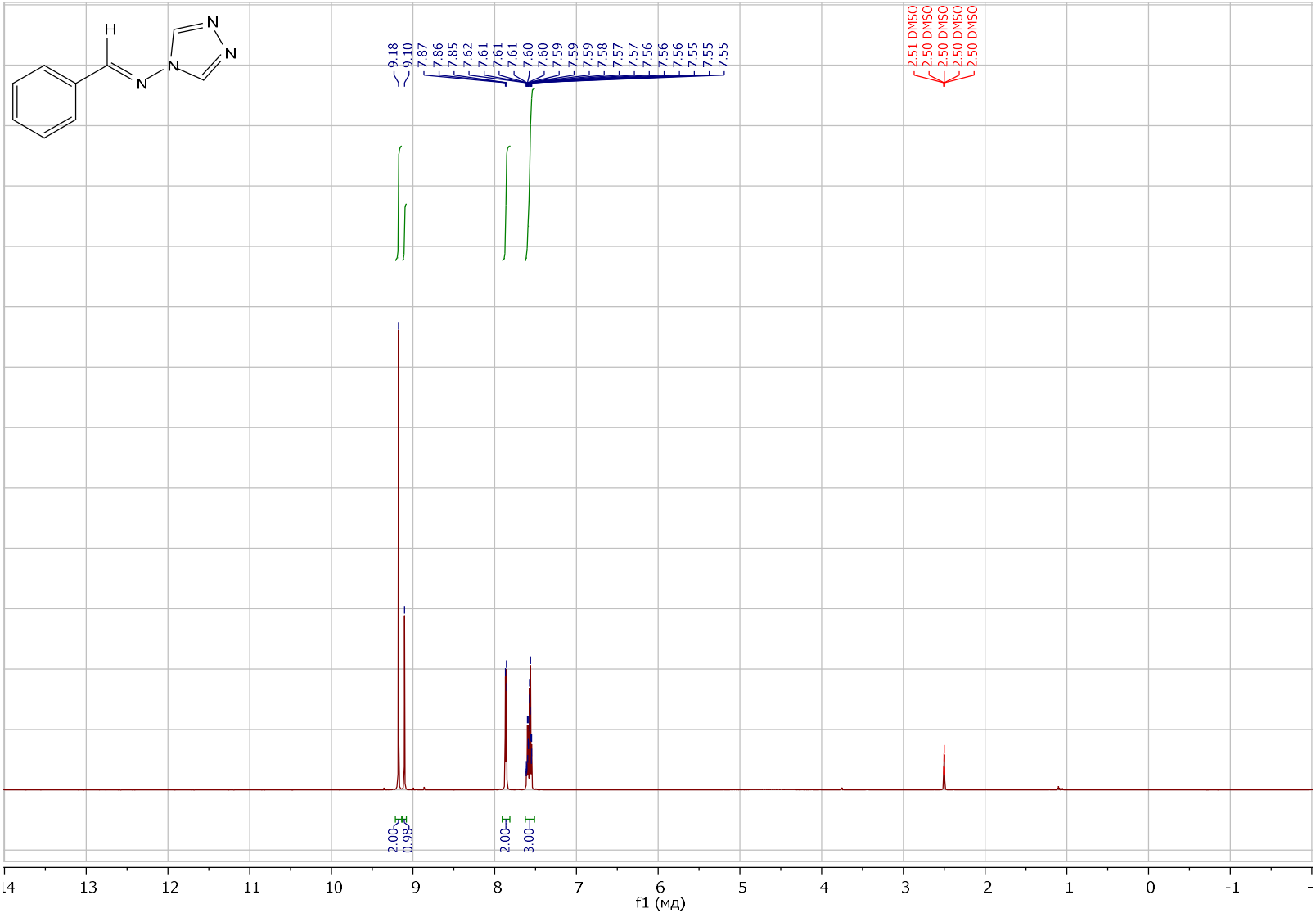
^{1}H NMR (600 MHz, DMSO-*d*6) of (E)-1-p-tolyl-N-(4H-1,2,4-triazol-4-yl)methanimine (1a)



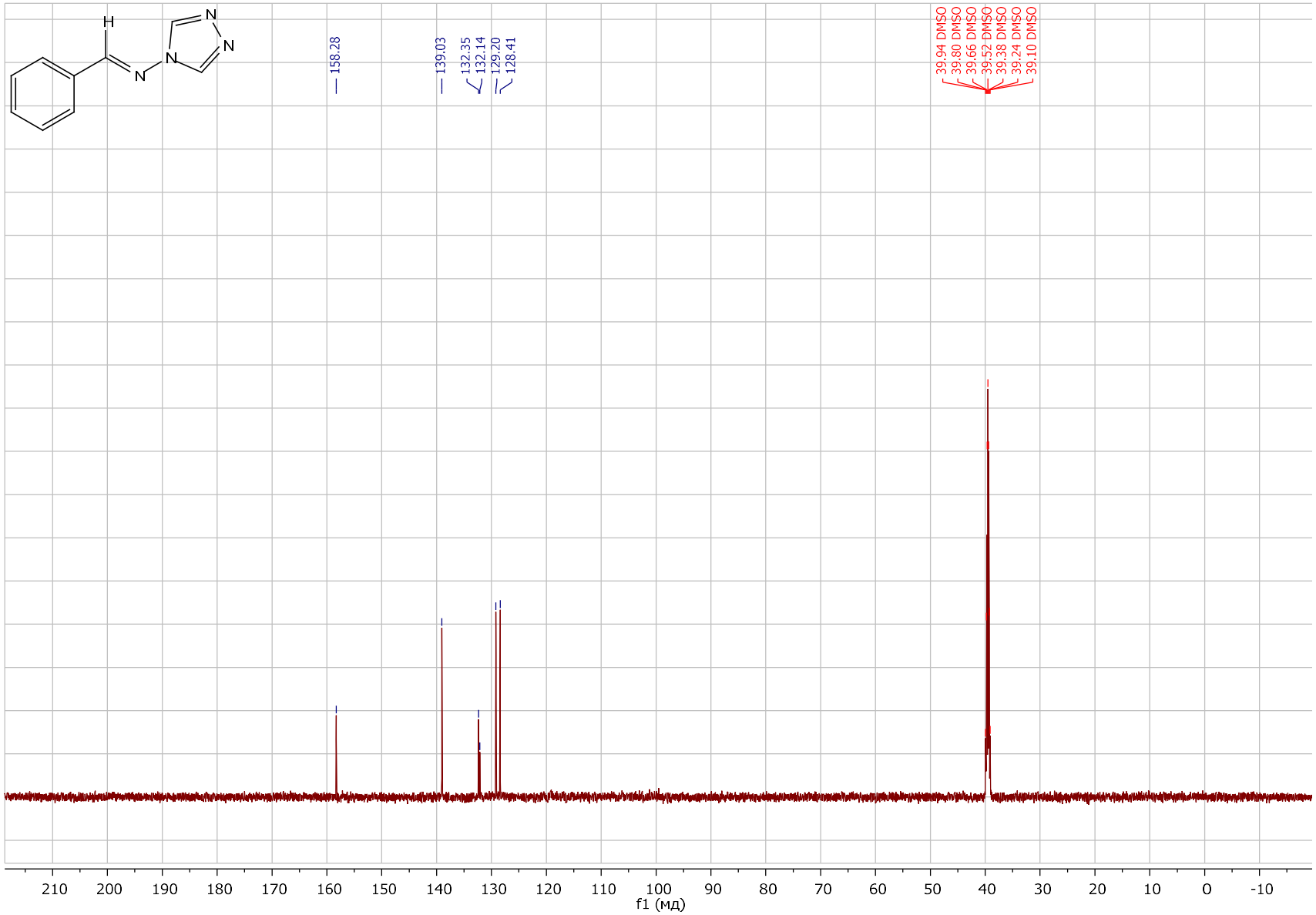
^{13}C NMR (151 MHz, DMSO-*d*6) of (E)-1-p-tolyl-N-(4H-1,2,4-triazol-4-yl)methanimine (1a)



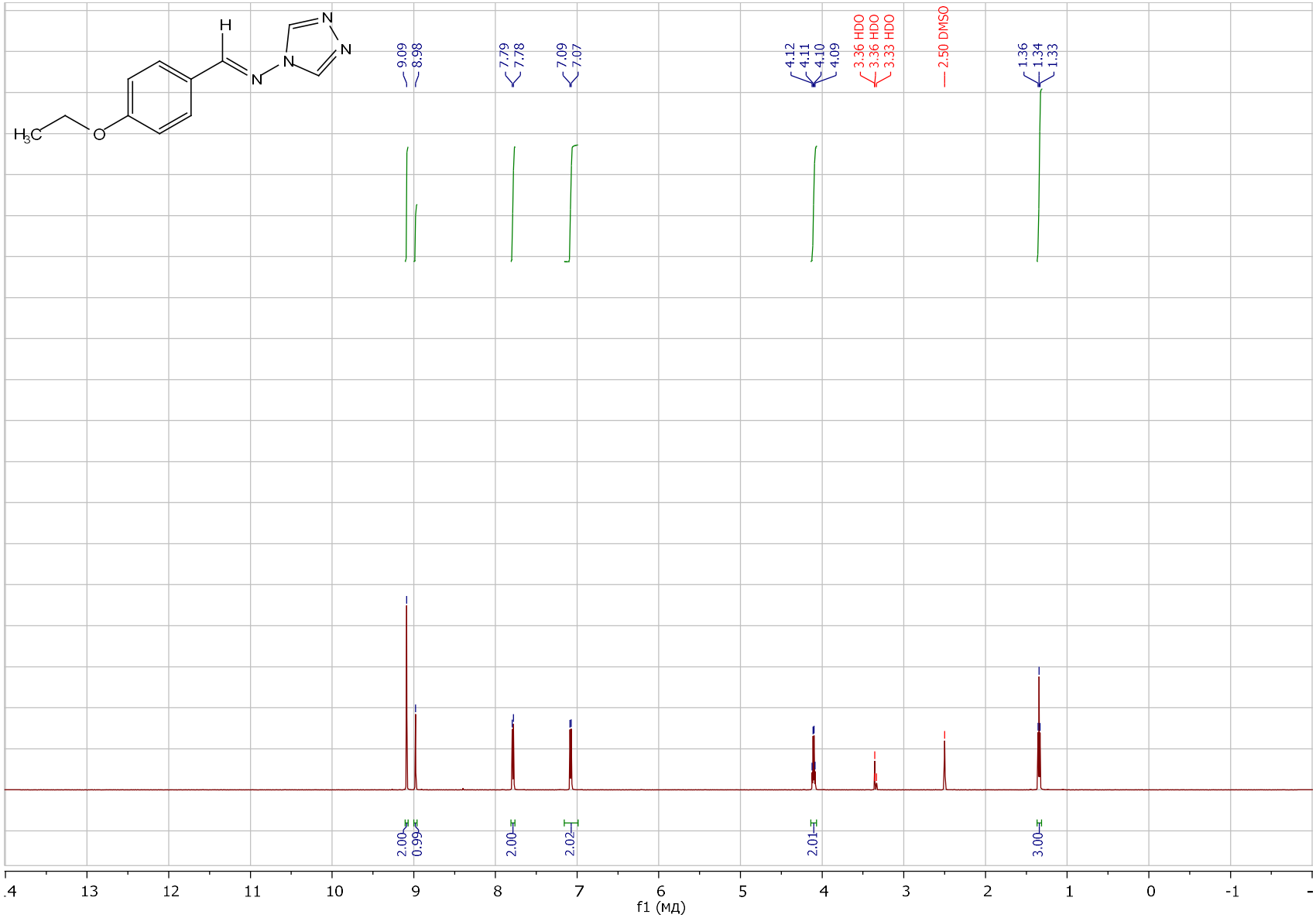
^{1}H NMR (600 MHz, DMSO-*d*6) of (E)-1-phenyl-N-(4H-1,2,4-triazol-4-yl)methanimine (1b)



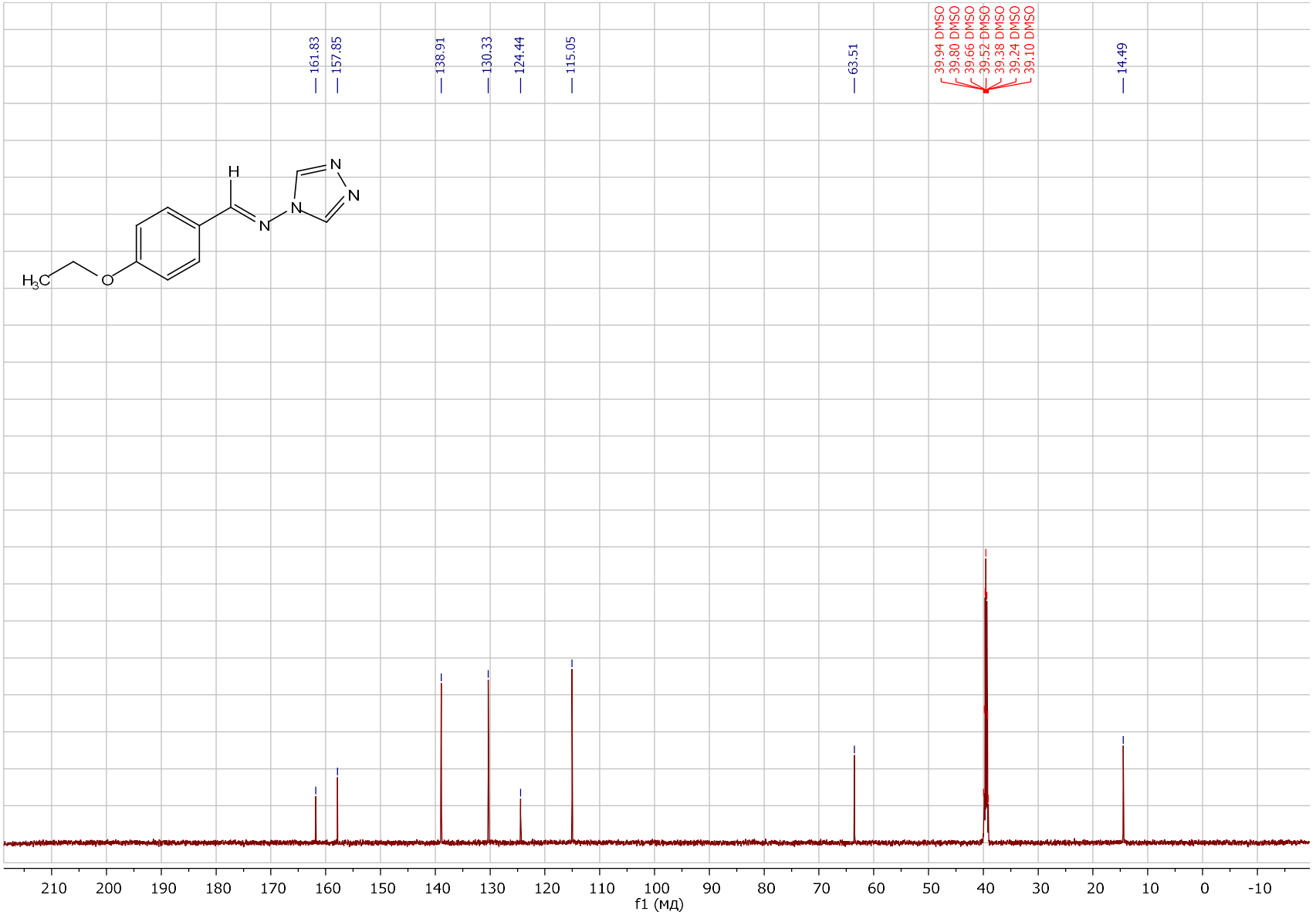
^{13}C NMR (151 MHz, DMSO-*d*6) of (E)-1-phenyl-N-(4H-1,2,4-triazol-4-yl)methanimine (1b)



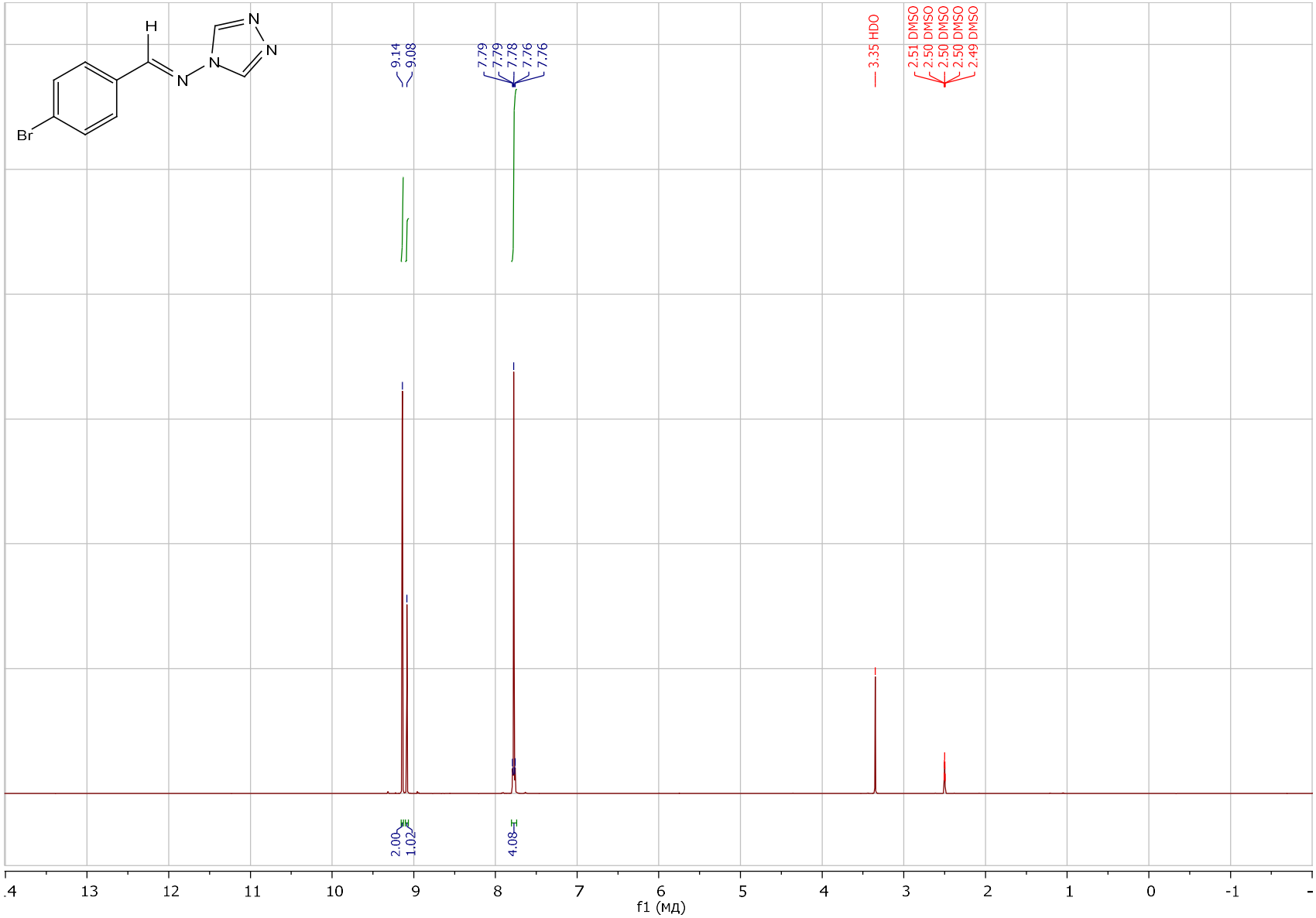
^{1}H NMR (600 MHz, DMSO-*d*6) of (E)-1-(4-ethoxyphenyl)-N-(4H-1,2,4-triazol-4-yl)methanimine (1c)



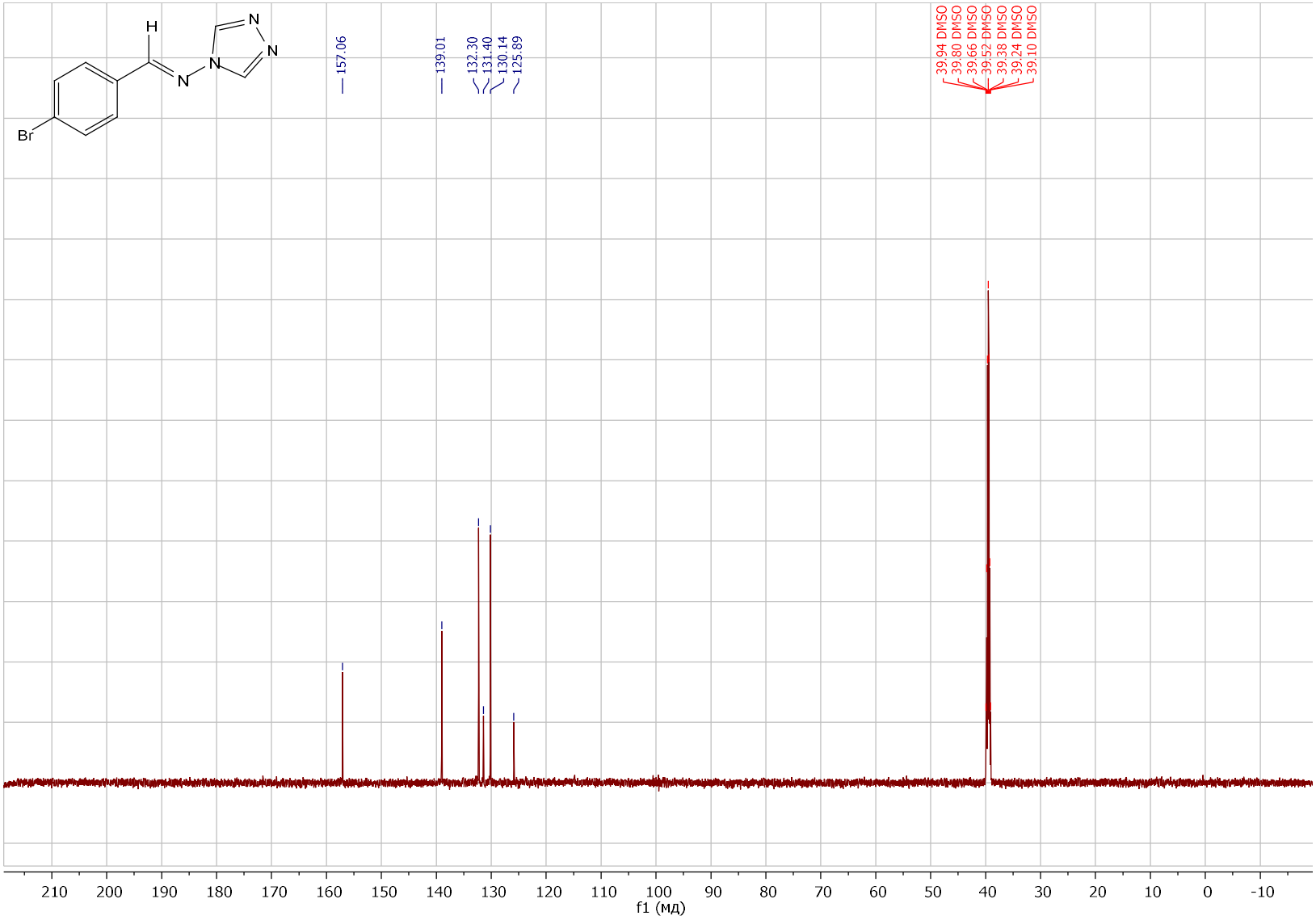
^{13}C NMR (151 MHz, DMSO-*d*6) of (E)-1-(4-ethoxyphenyl)-N-(4H-1,2,4-triazol-4-yl)methanimine (1c)



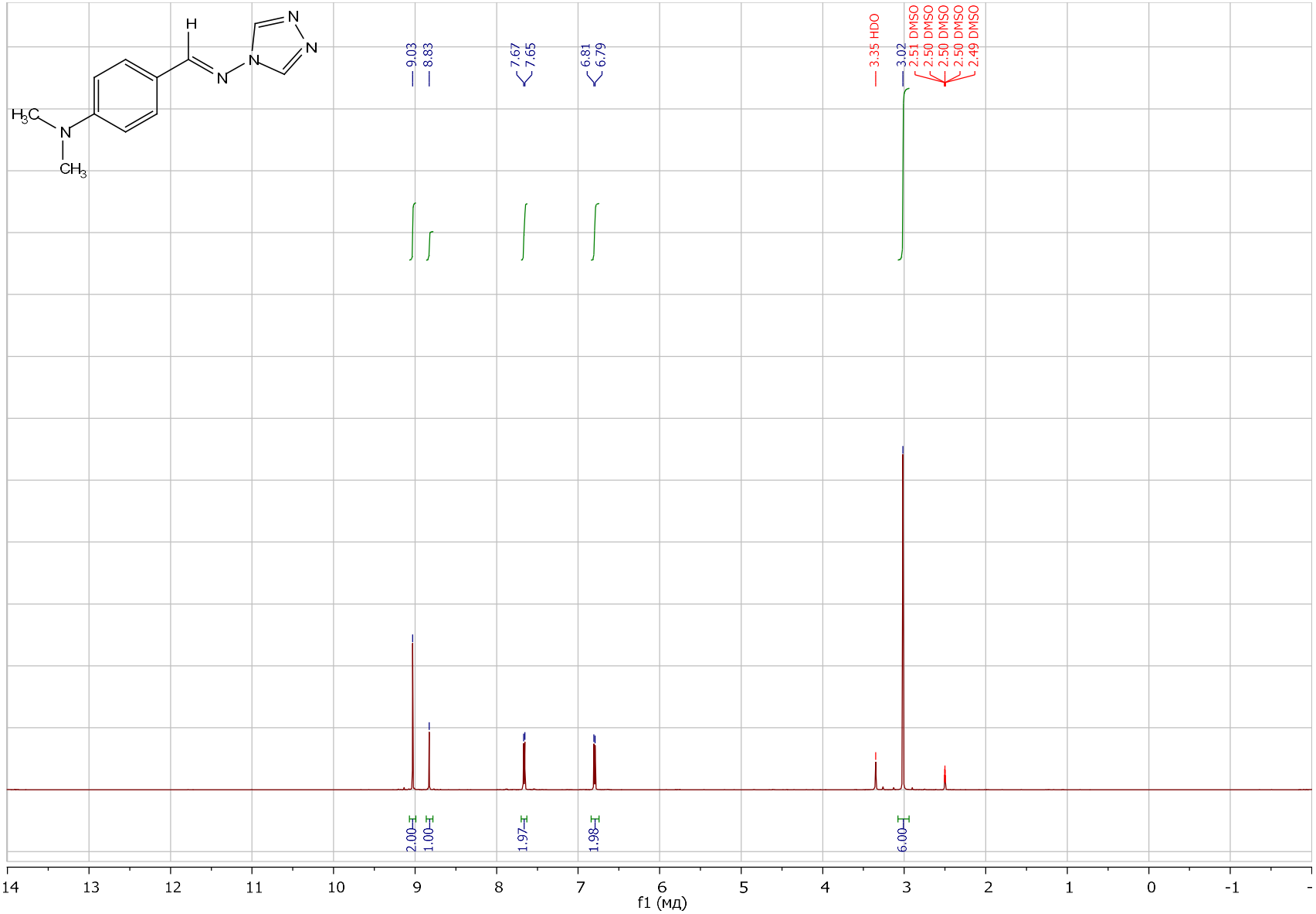
^{1}H NMR (600 MHz, DMSO-*d*6) of (E)-1-(4-bromophenyl)-N-(4H-1,2,4-triazol-4-yl)methanimine (1d)



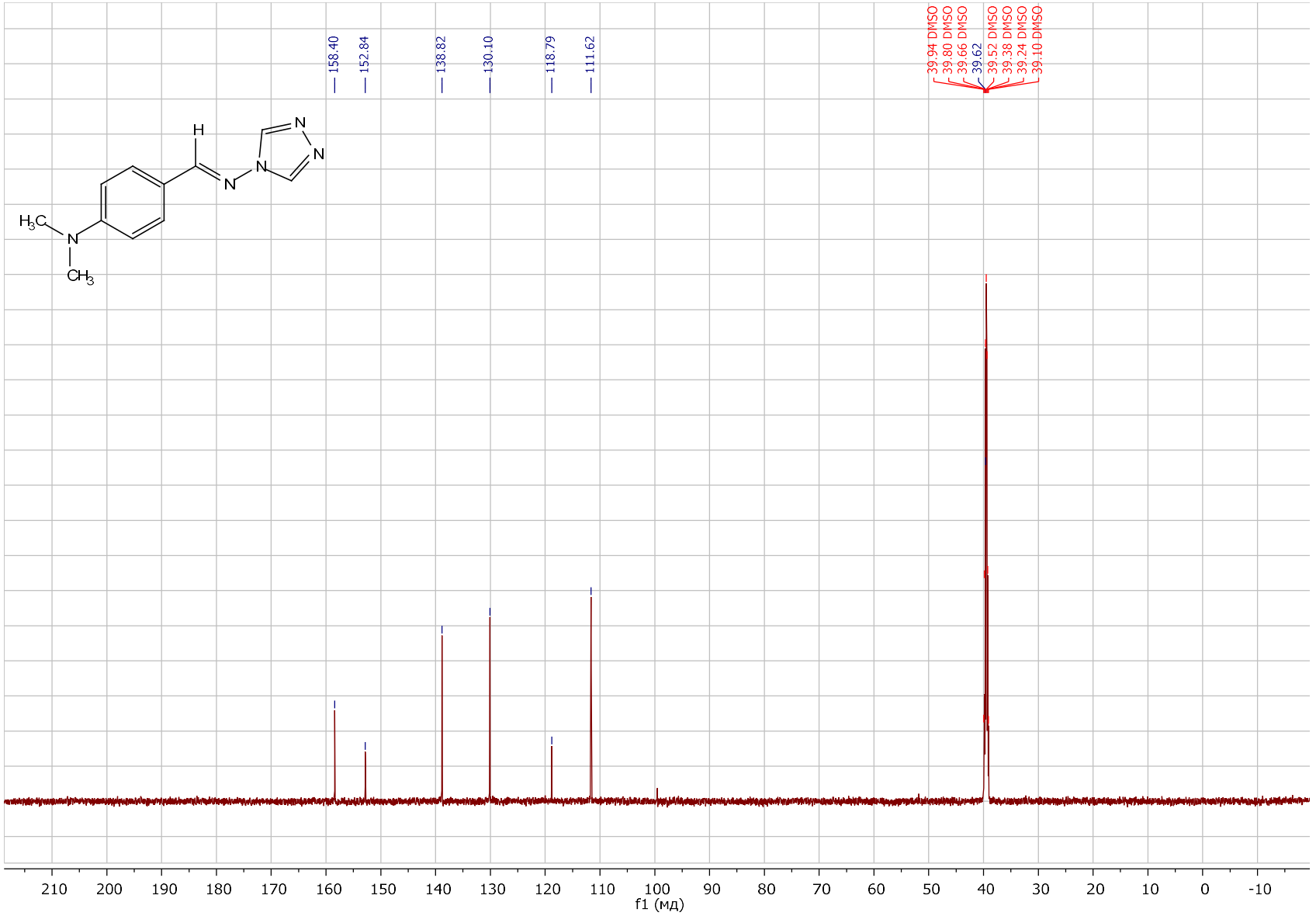
^{13}C NMR (151 MHz, DMSO-*d*6) of (E)-1-(4-bromophenyl)-N-(4H-1,2,4-triazol-4-yl)methanimine (1d)



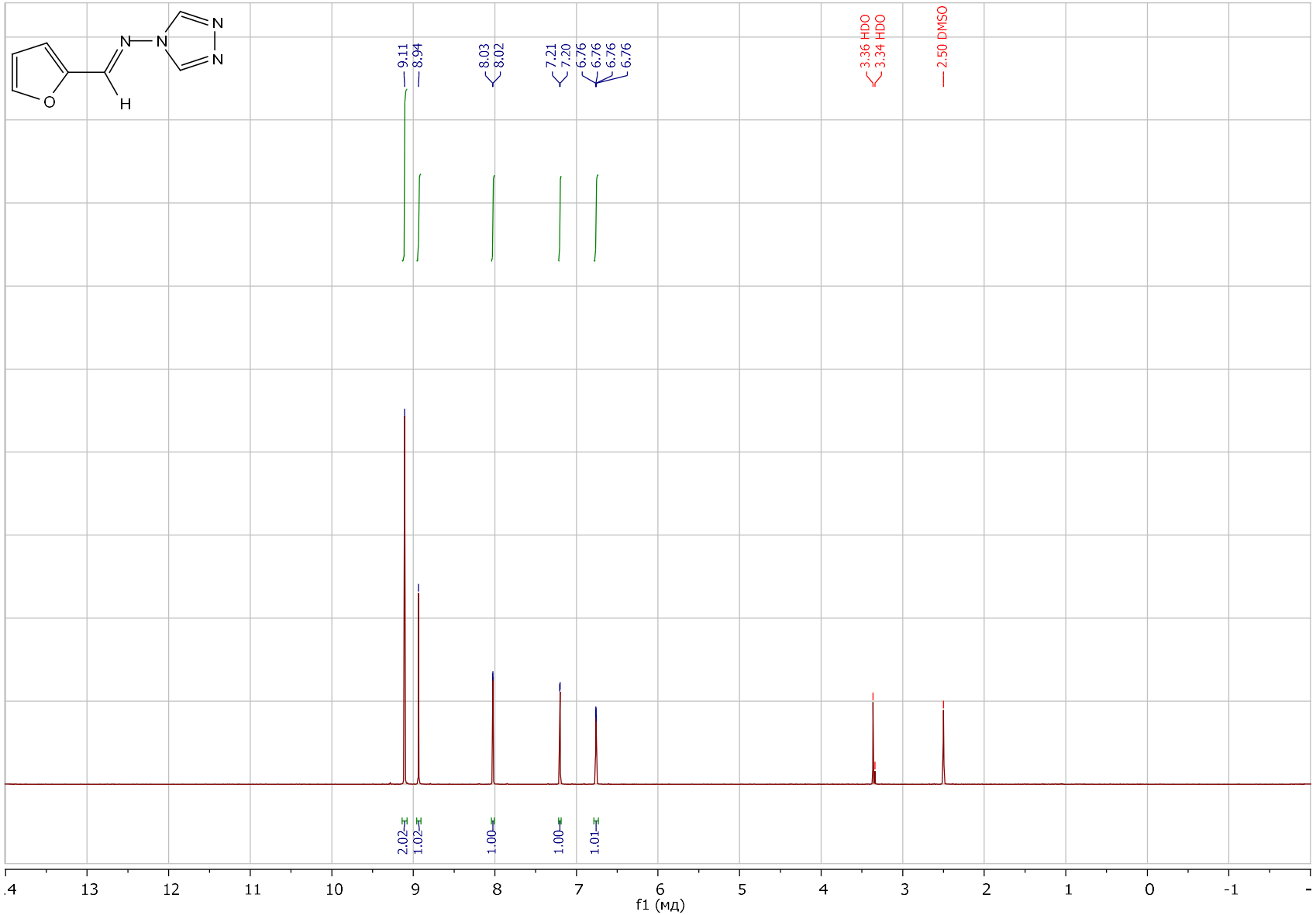
^{1}H NMR (600 MHz, DMSO-*d*6) of (E)-4-(((4H-1,2,4-triazol-4-yl)imino)methyl)-N,N-dimethylaniline (1e)



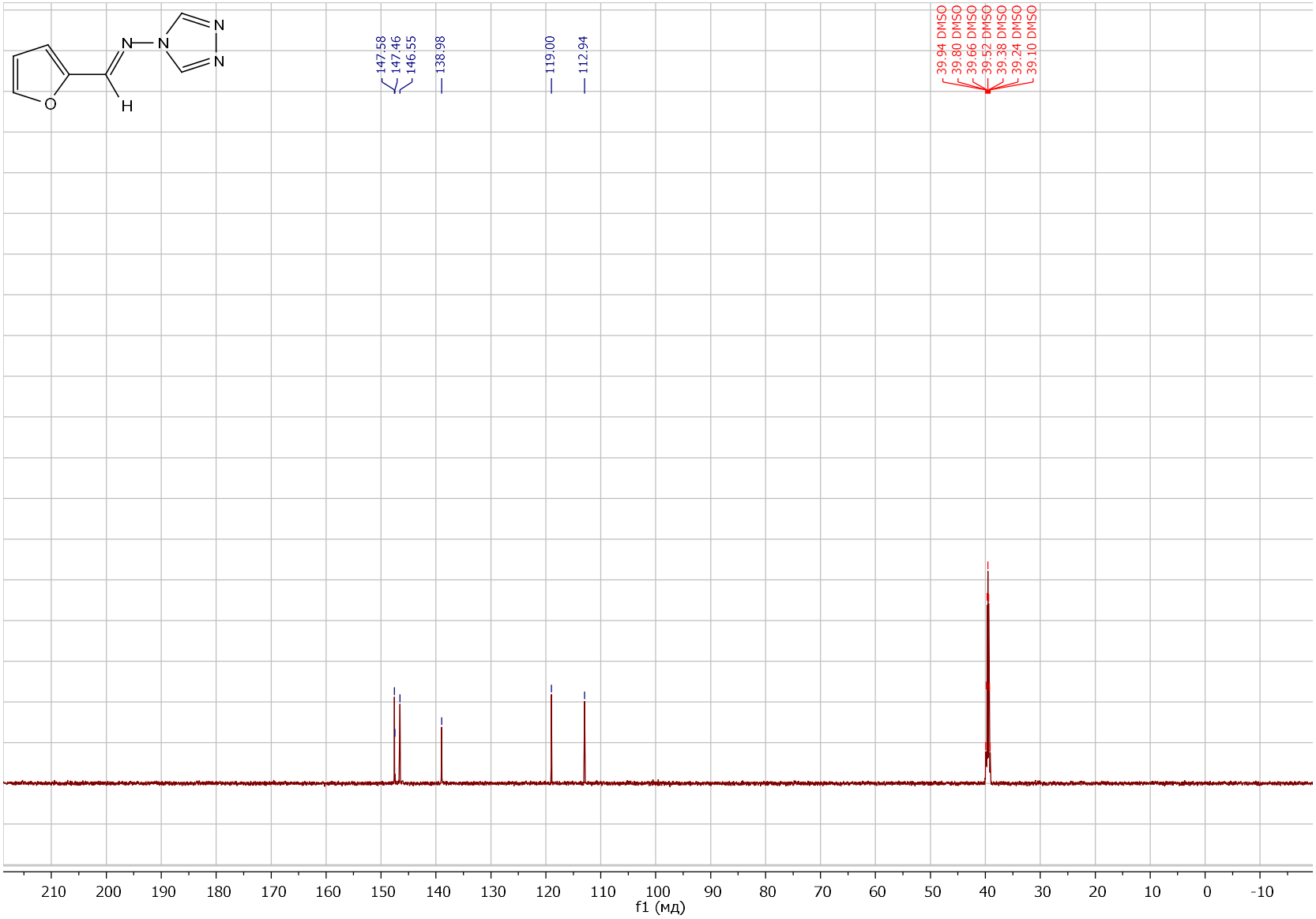
^{13}C NMR (151 MHz, DMSO-*d*6) of (E)-4-(((4H-1,2,4-triazol-4-yl)imino)methyl)-N,N-dimethylaniline (1e)



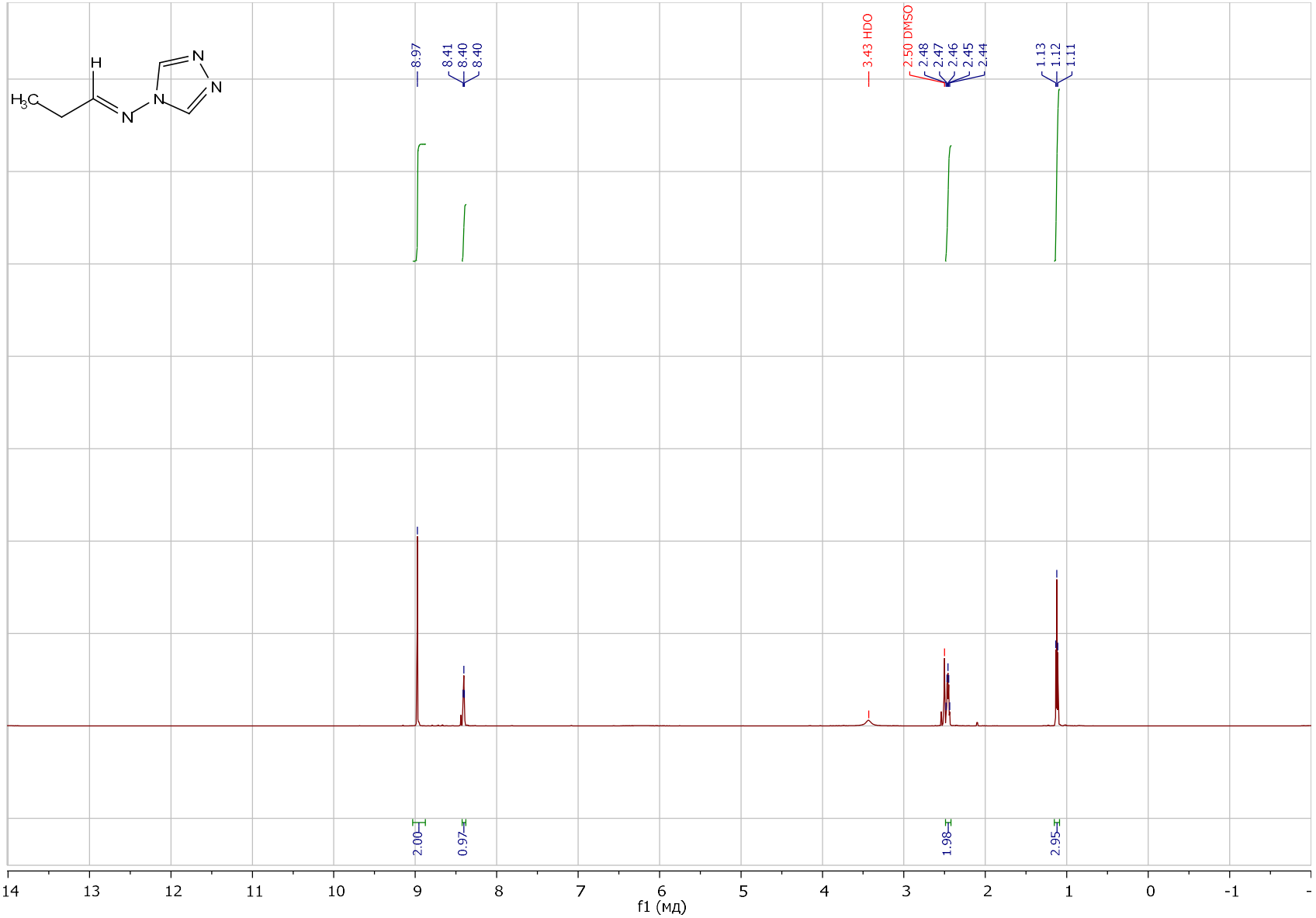
^{1}H NMR (600 MHz, DMSO-*d*6) of (E)-1-(furan-2-yl)-N-(4H-1,2,4-triazol-4-yl)methanimine (1f)



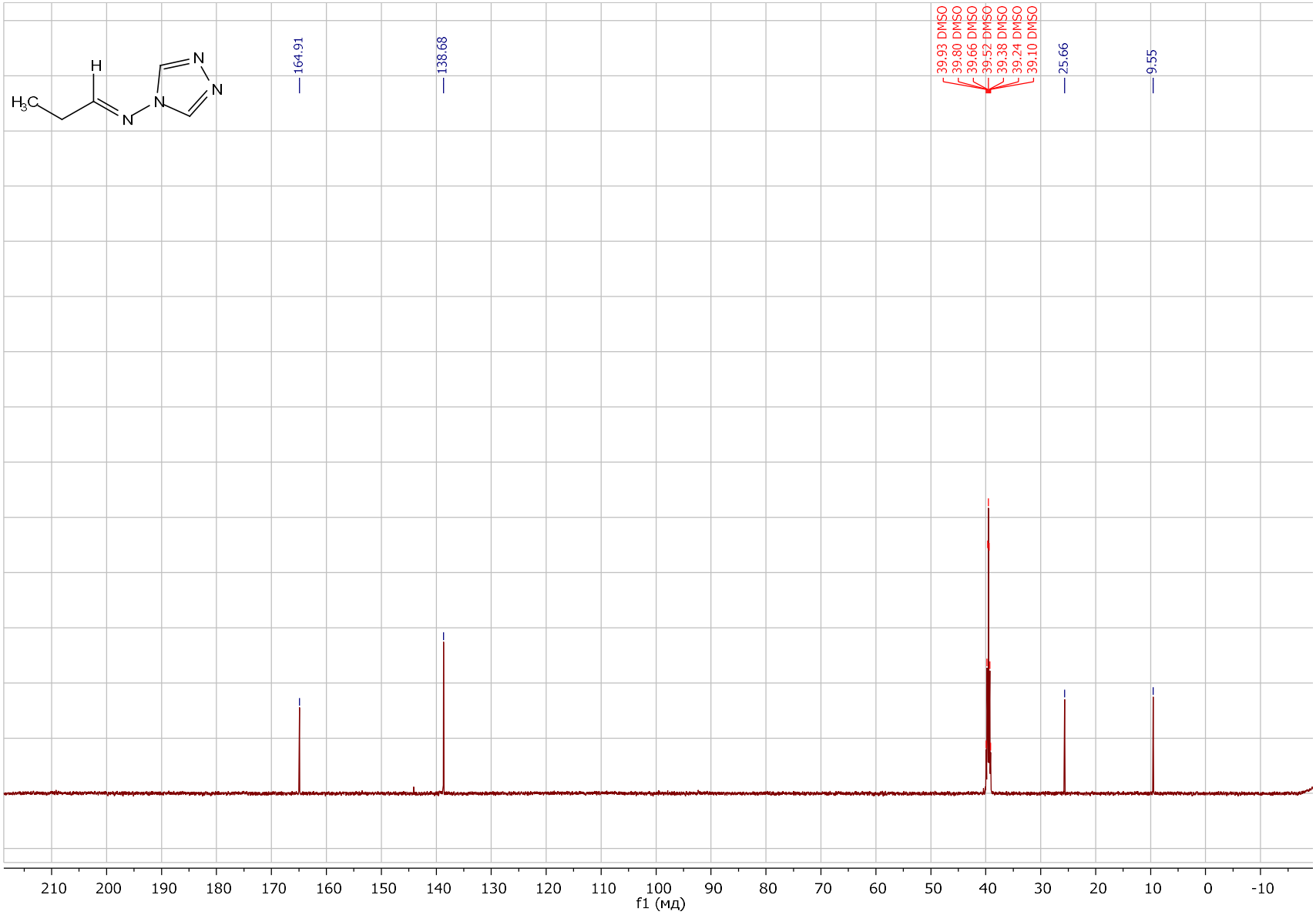
^{13}C NMR (151 MHz, DMSO-*d*6) of (E)-1-(furan-2-yl)-N-(4H-1,2,4-triazol-4-yl)methanimine (1f)



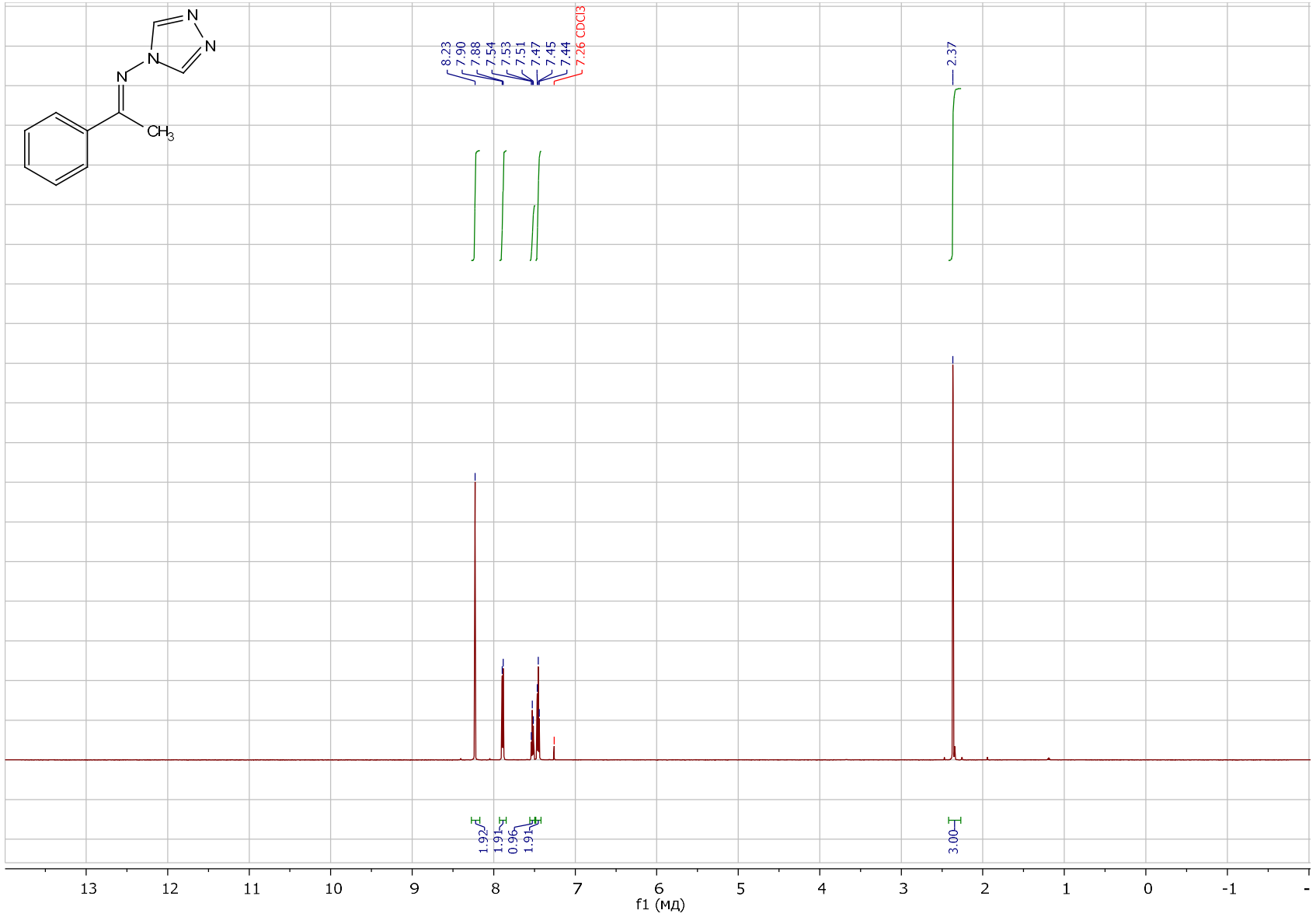
^{1}H NMR (600 MHz, DMSO-*d*6) and ^{13}C NMR (151 MHz, DMSO-*d*6) of (E)-N-(4H-1,2,4-triazol-4-yl)propan-1-imine (1g)



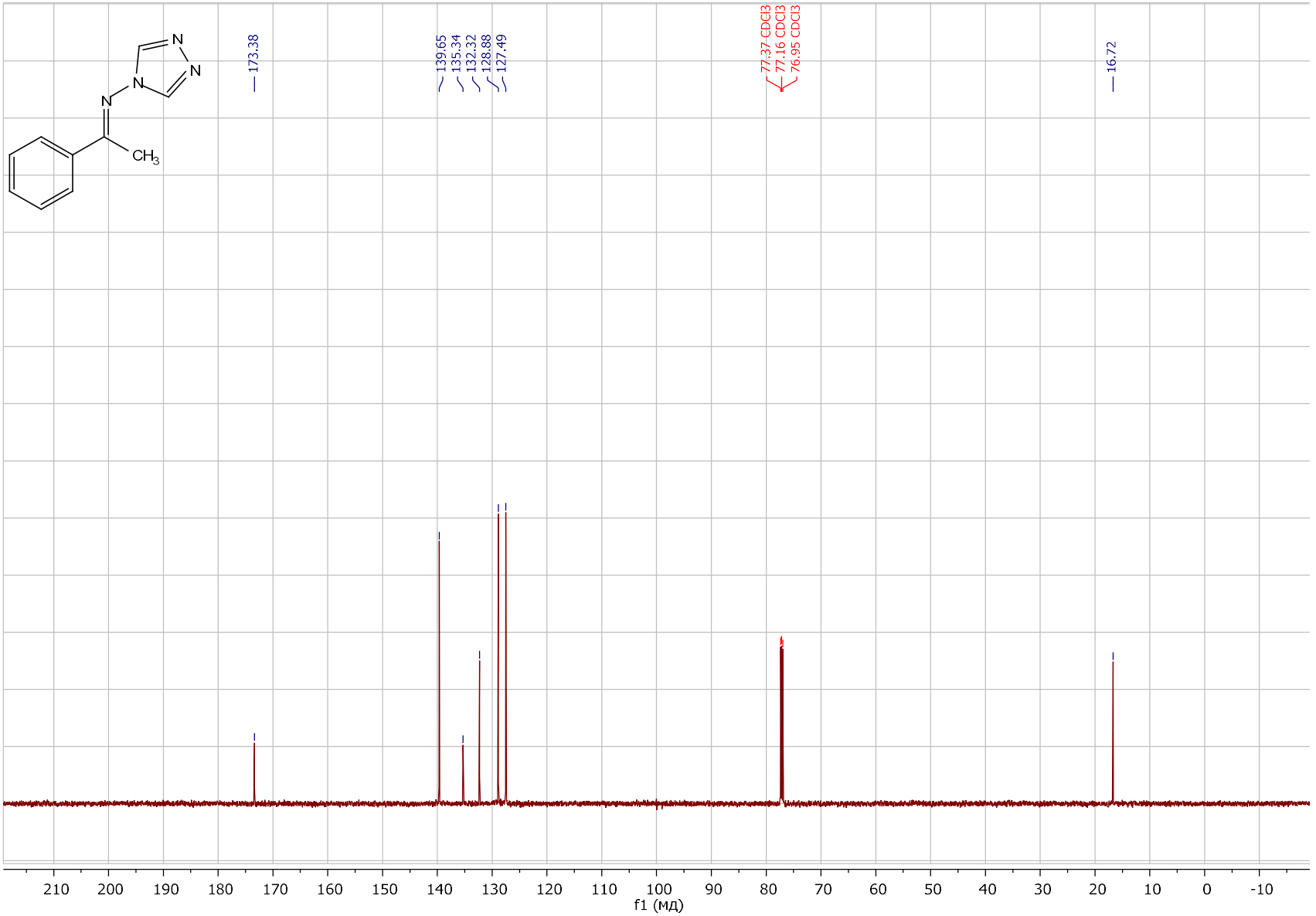
^{13}C NMR (151 MHz, DMSO-*d*6) of (E)-N-(4H-1,2,4-triazol-4-yl)propan-1-imine (1g)



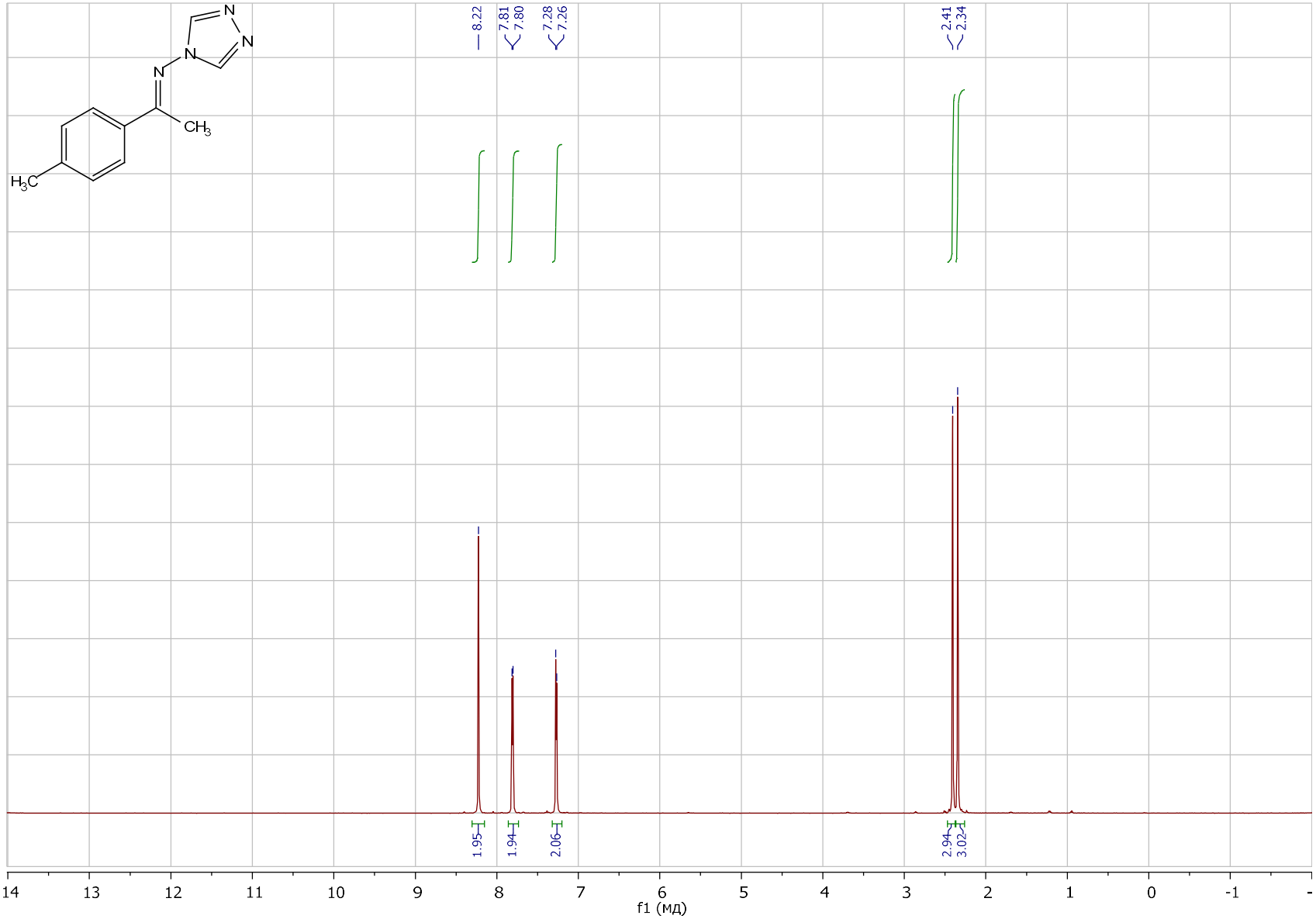
^{1}H NMR (600 MHz, Chloroform-*d*) and ^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-phenyl-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2a)



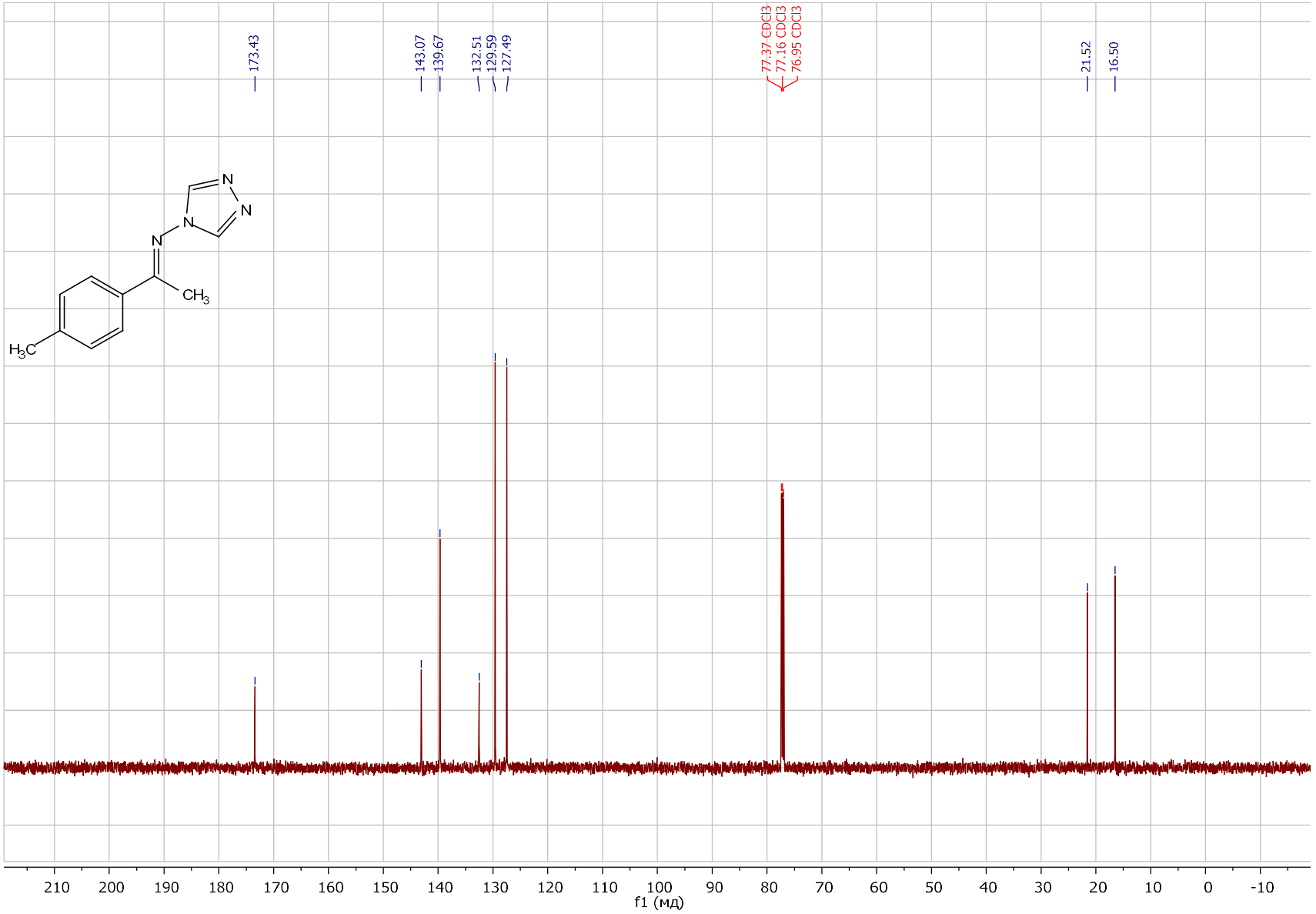
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-phenyl-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2a)



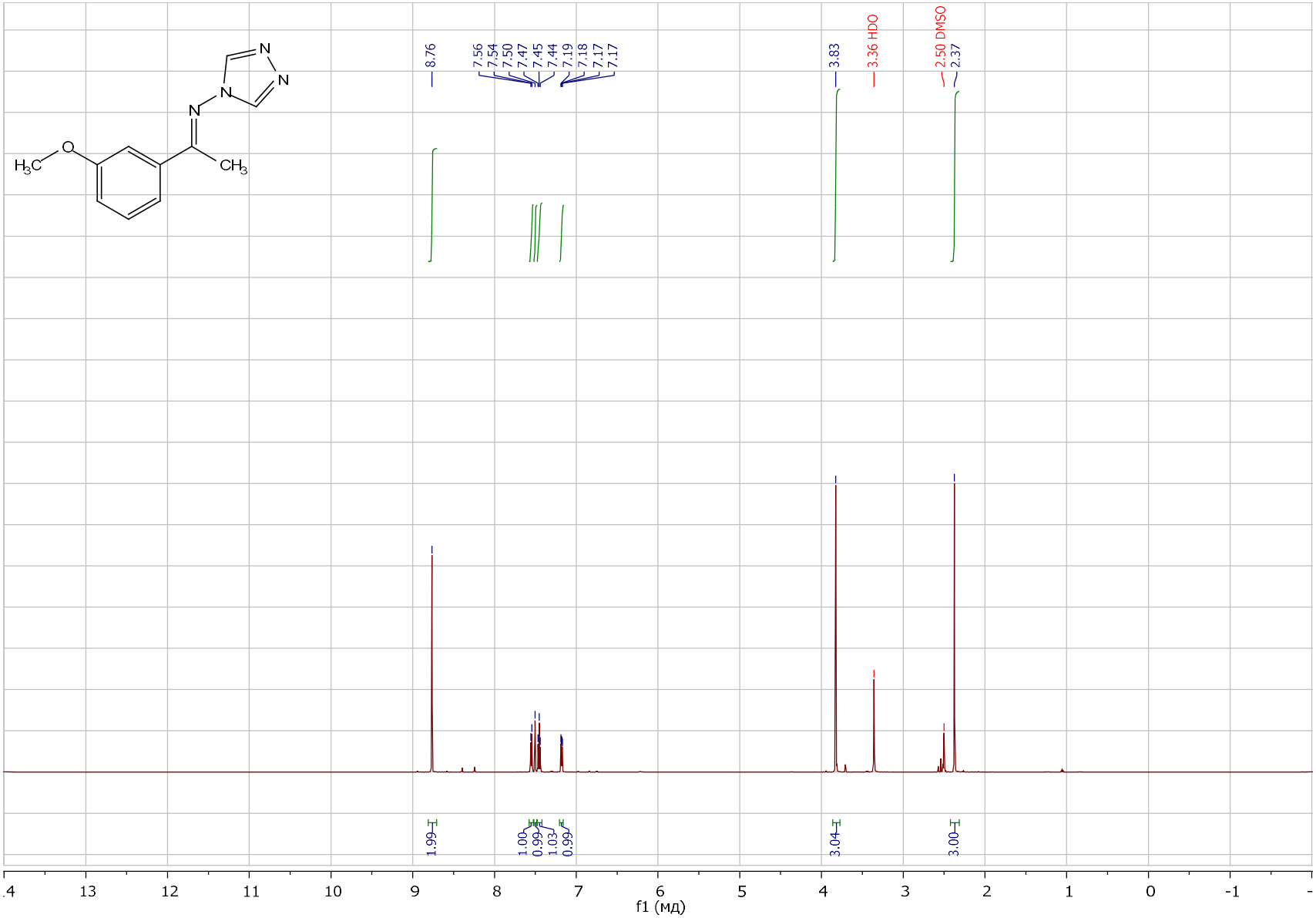
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1-(p-tolyl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2b)



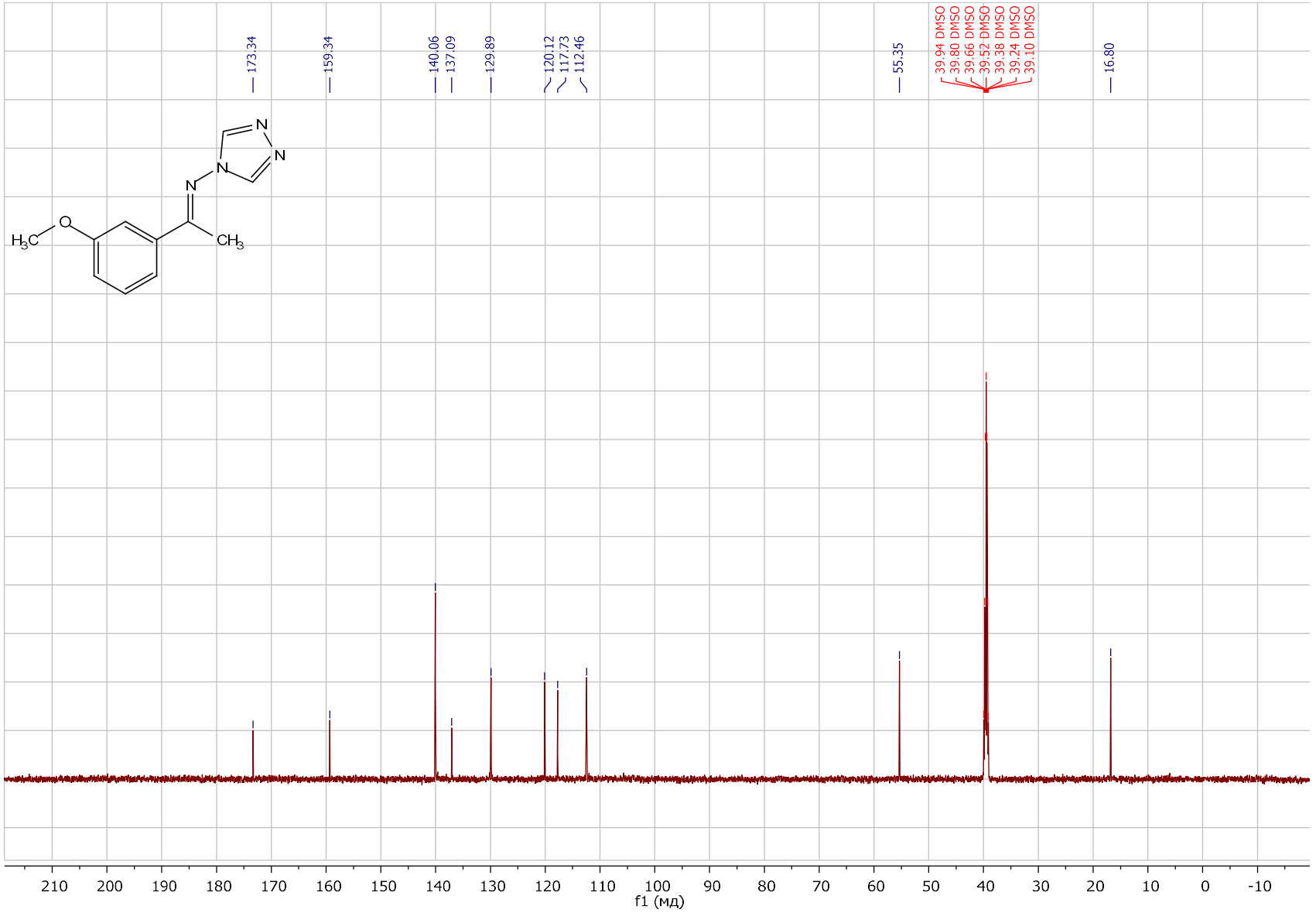
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-(p-tolyl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2b)



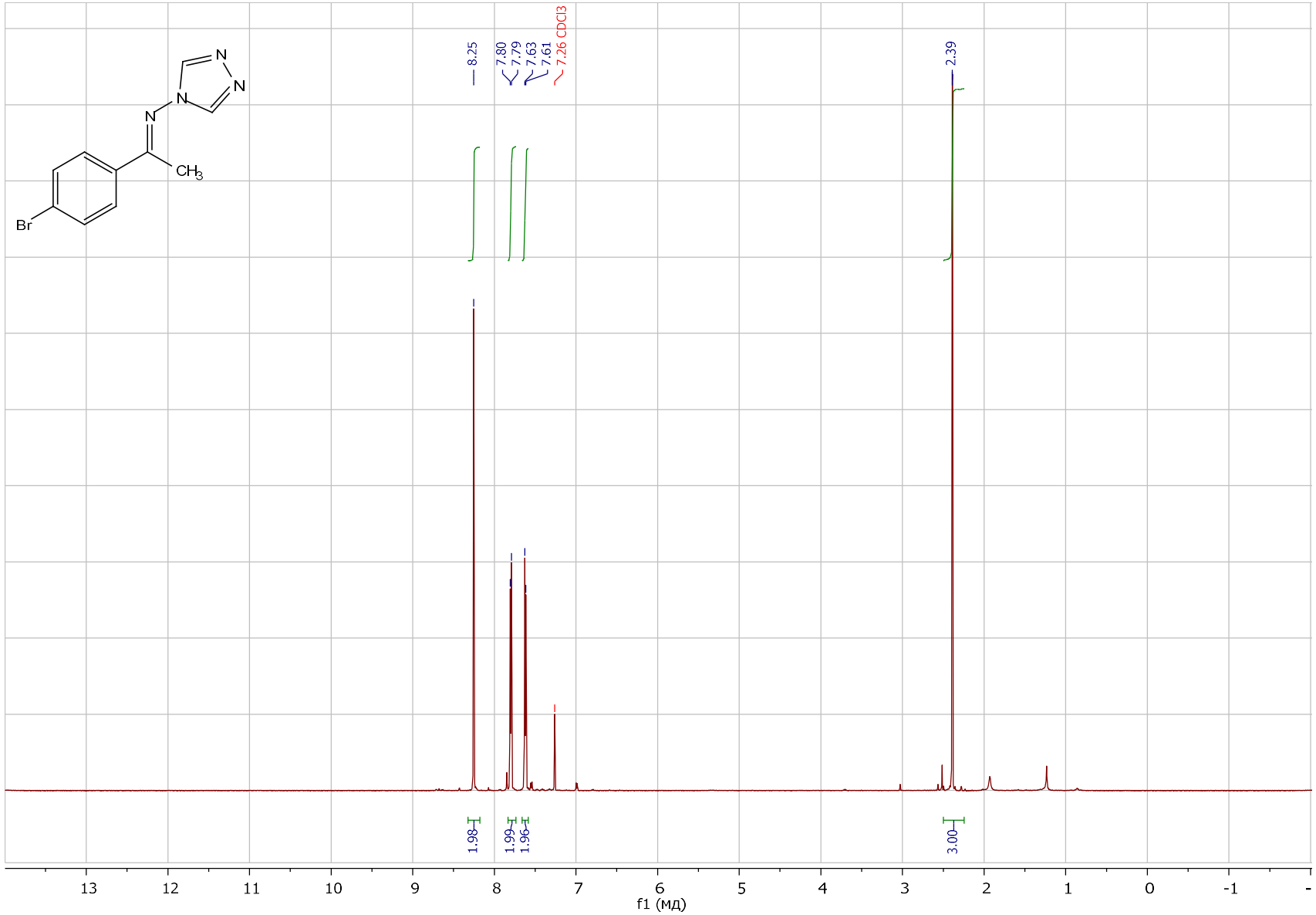
^{1}H NMR (600 MHz, DMSO-*d*6) of (E)-1-(3-methoxyphenyl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2c)



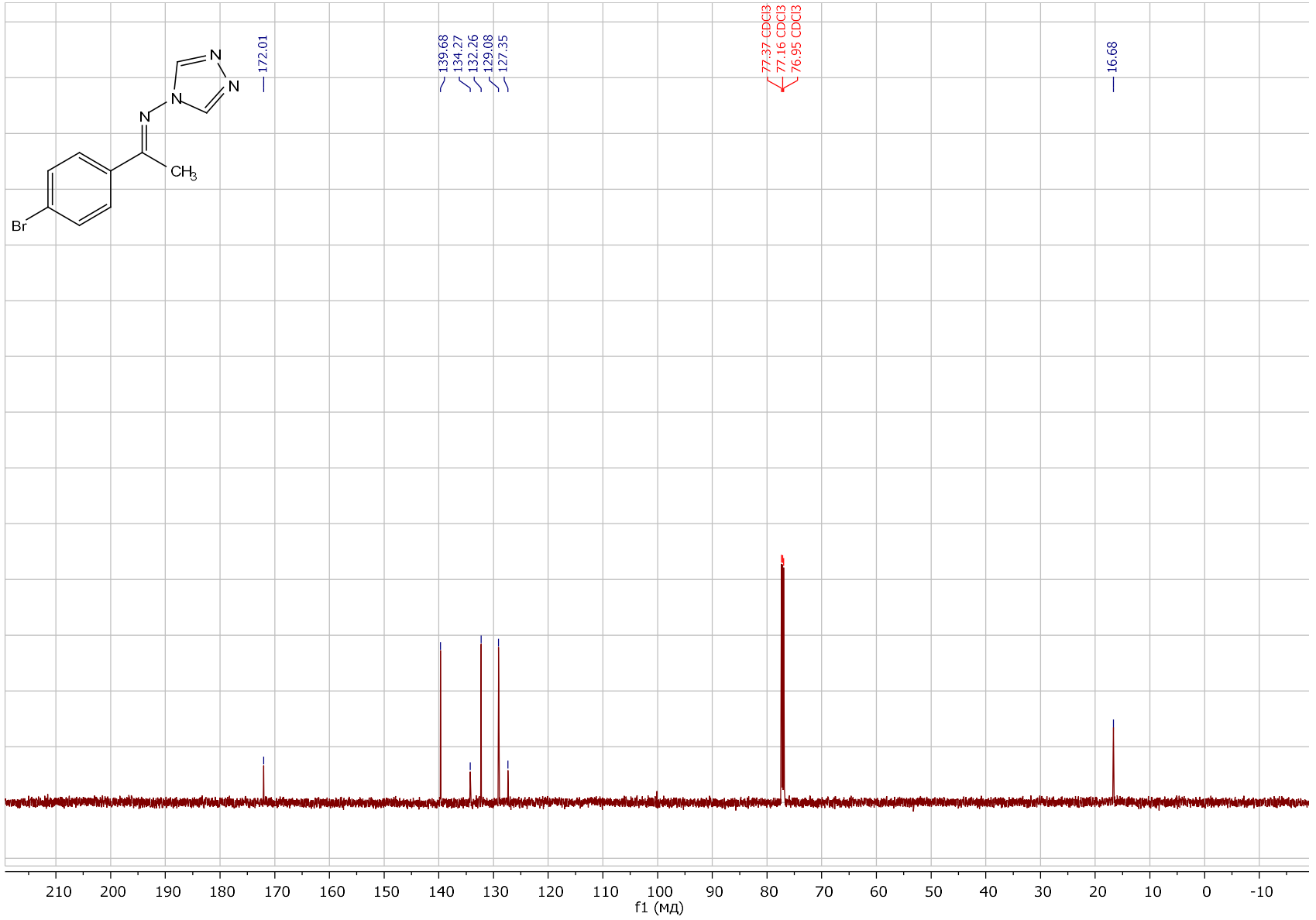
^{13}C NMR (151 MHz, DMSO-*d*6) of (E)-1-(3-methoxyphenyl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2c)



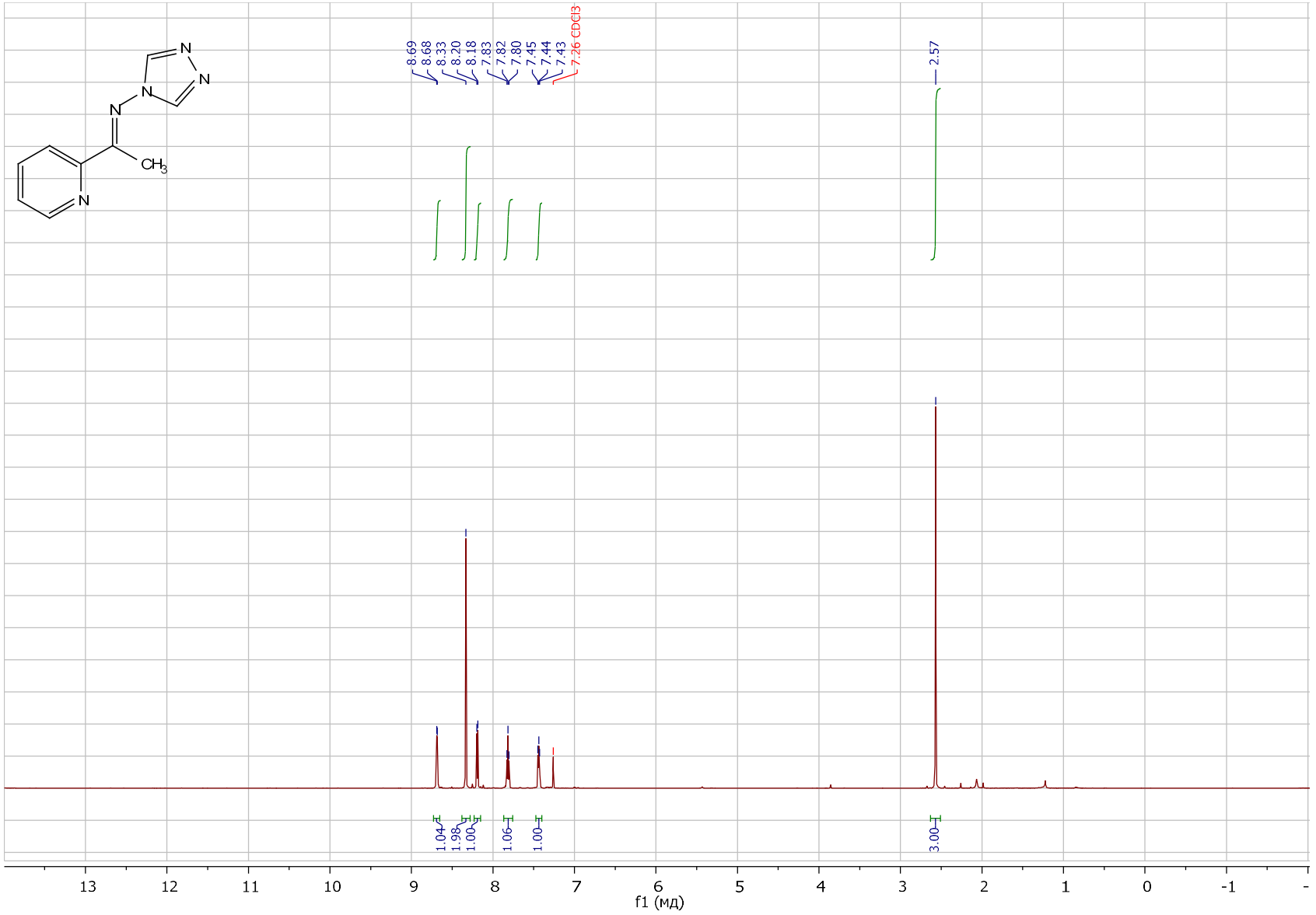
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1-(4-bromophenyl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2d)



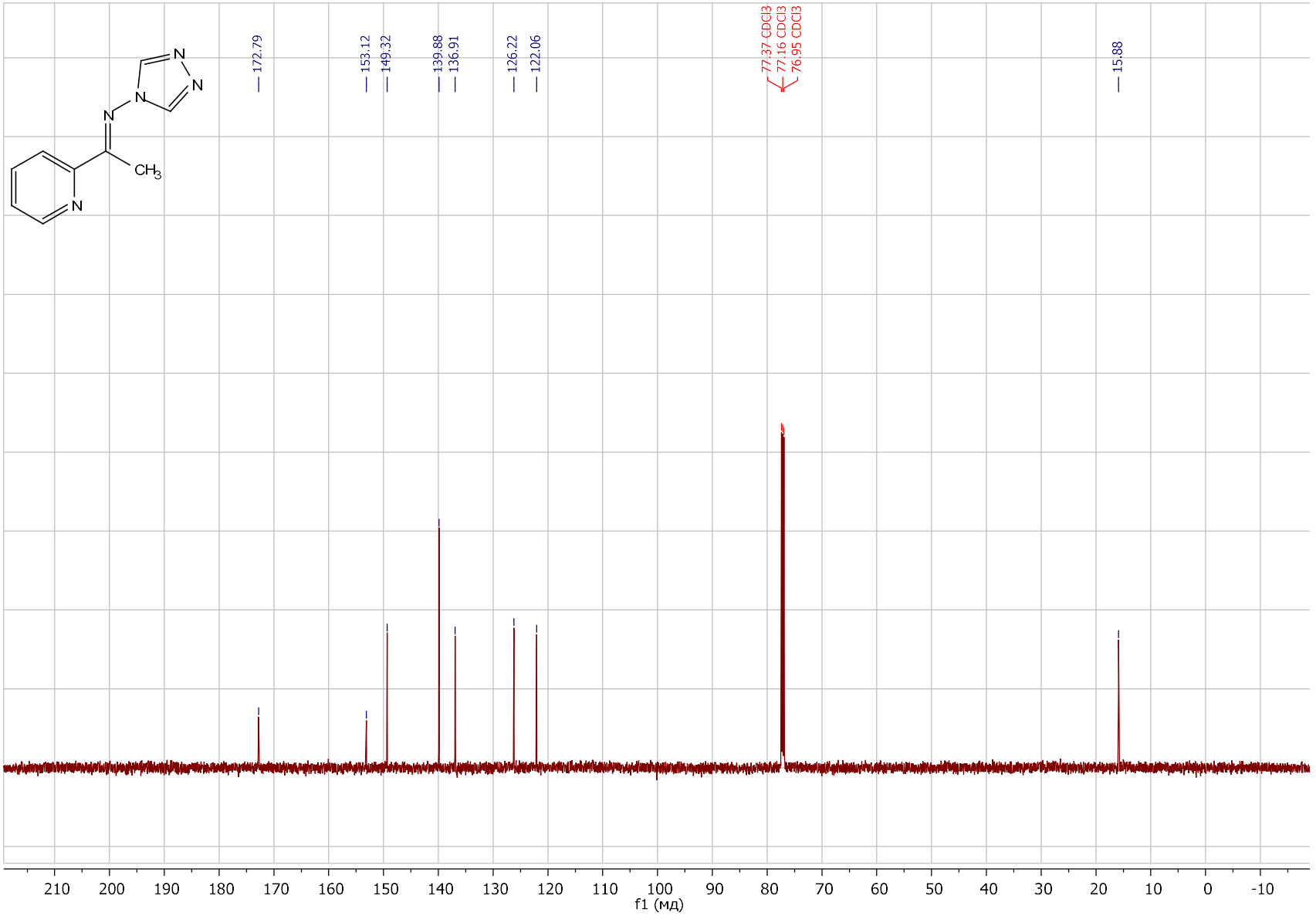
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-(4-bromophenyl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2d)



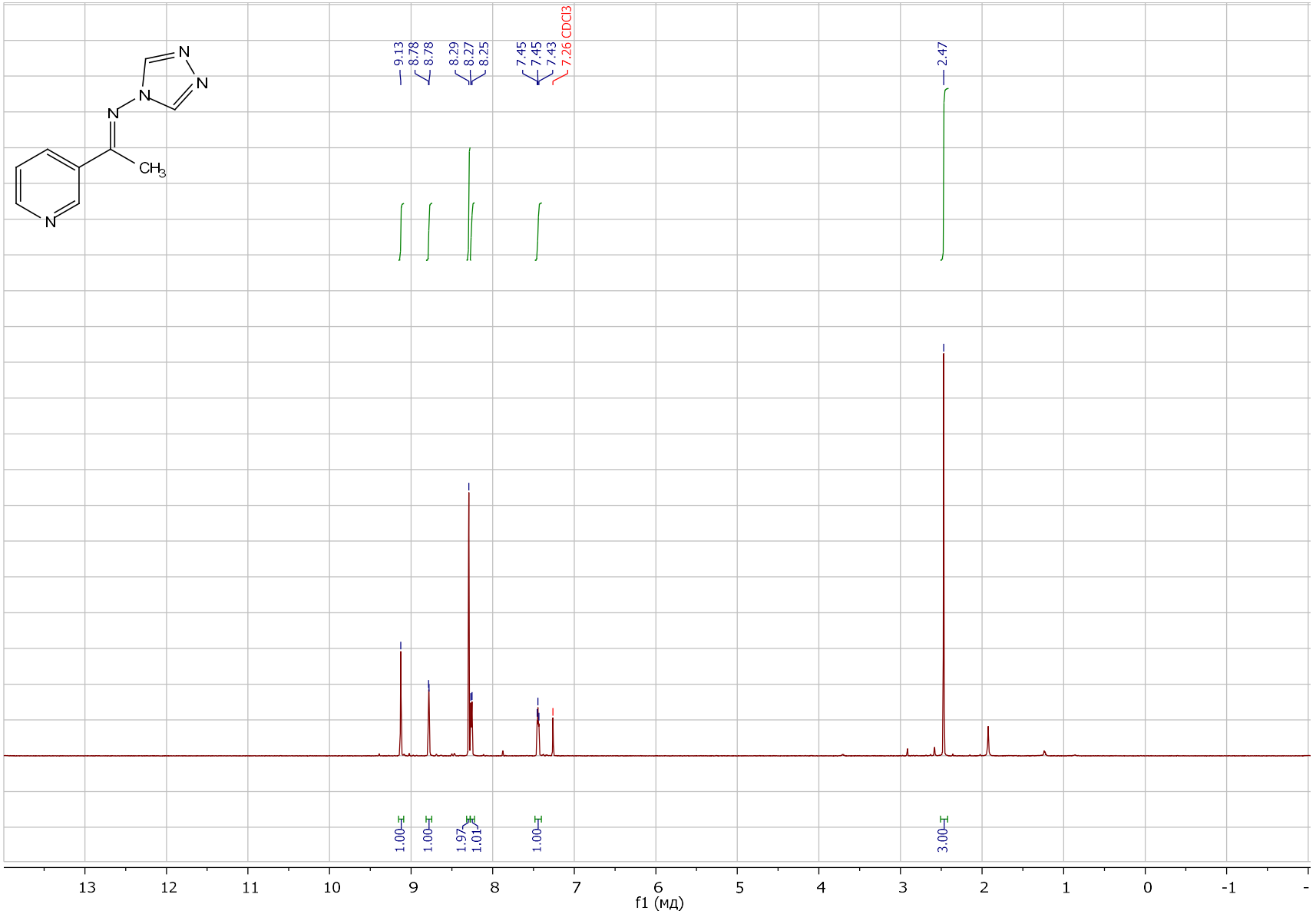
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1-(pyridin-2-yl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2e)



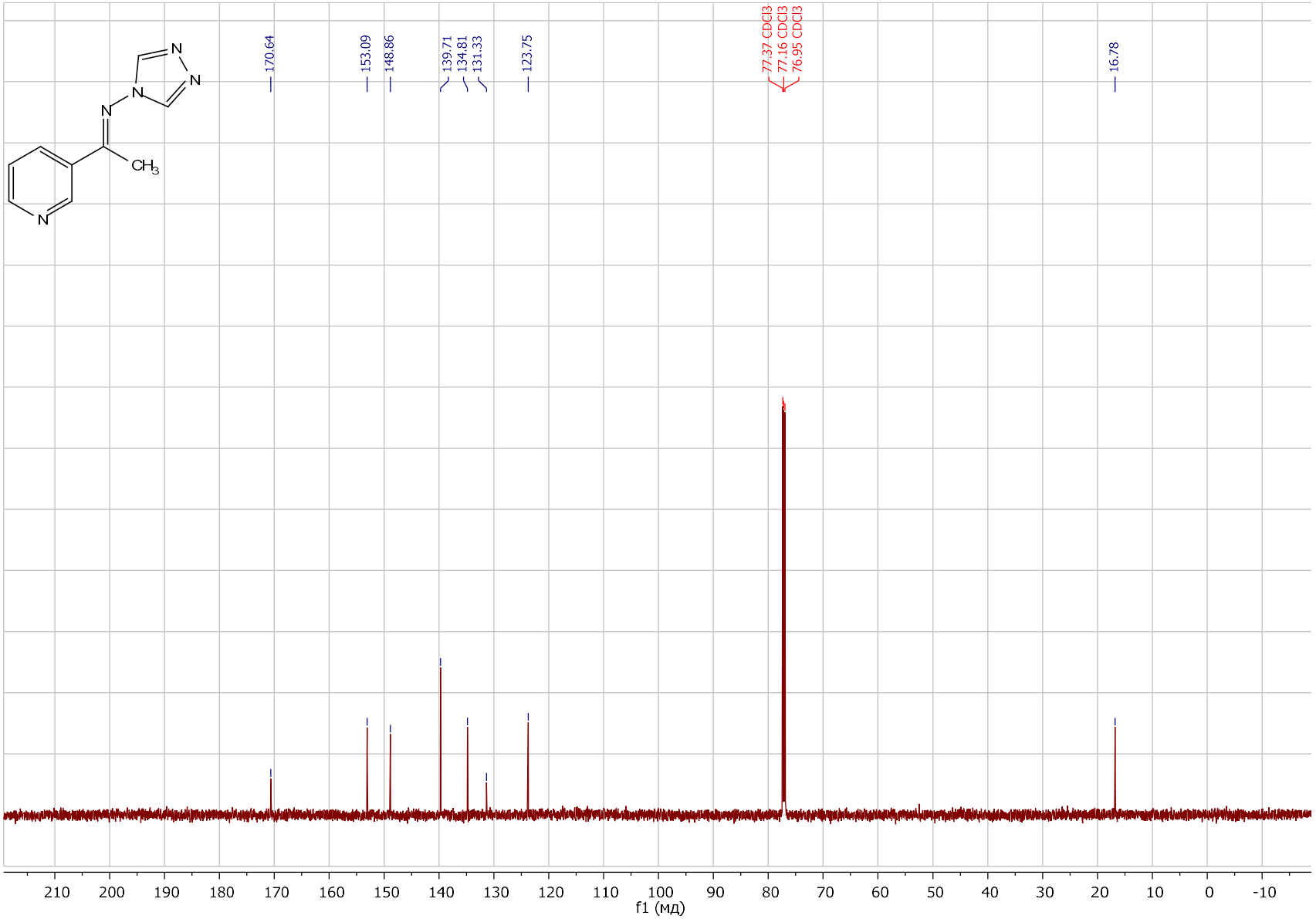
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-(pyridin-2-yl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2e)



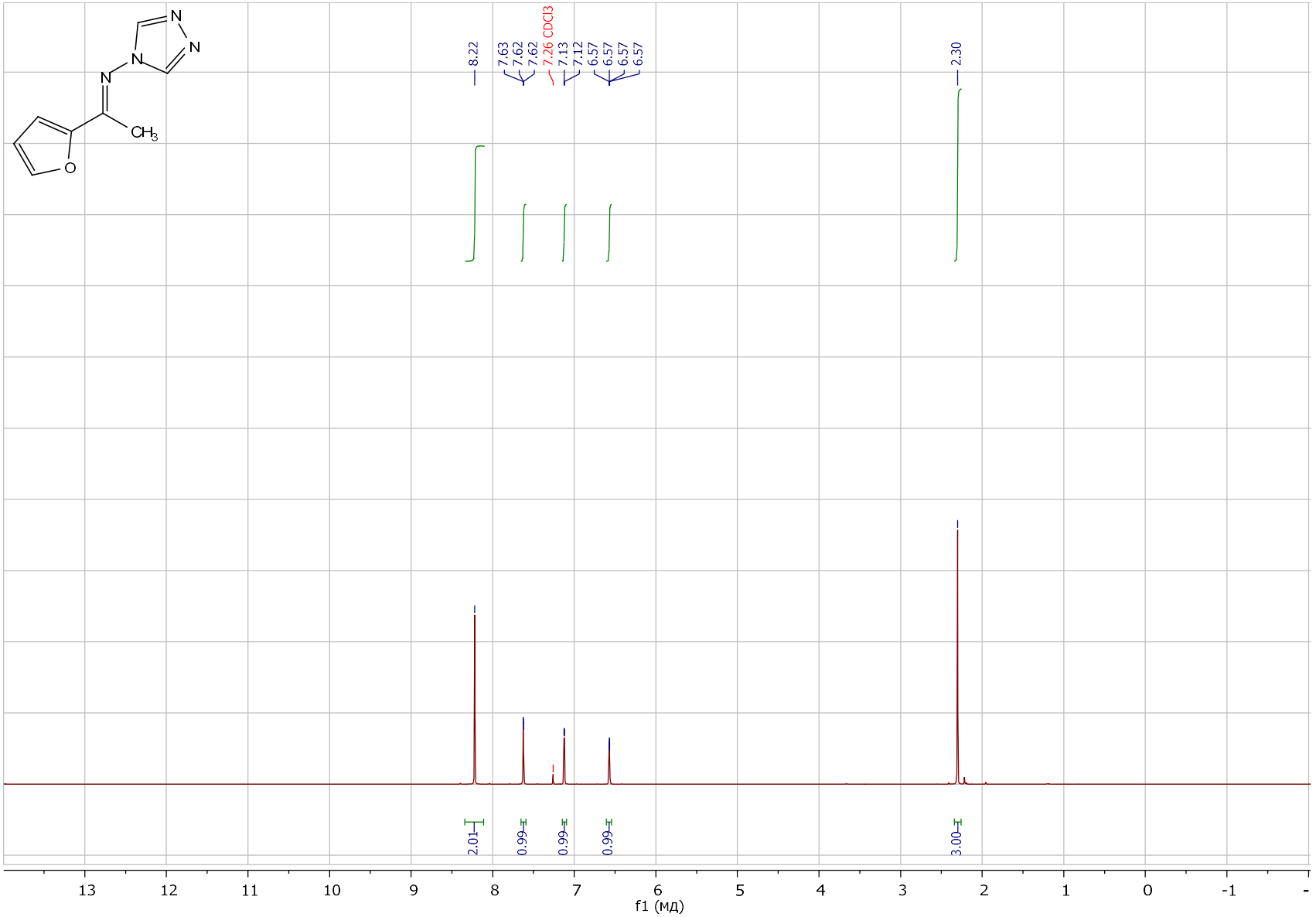
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1-(pyridin-3-yl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2f)



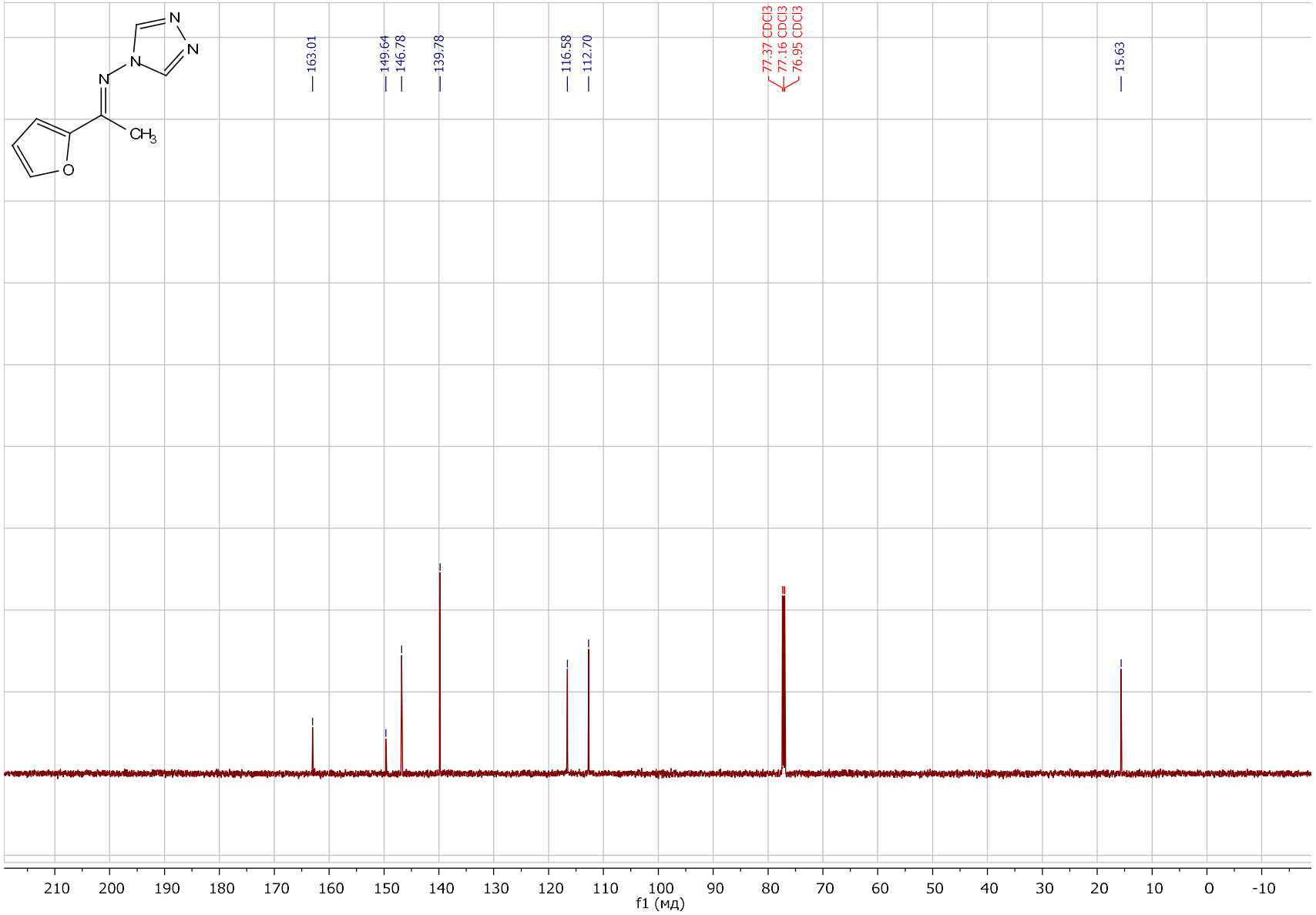
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-(pyridin-3-yl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2f)



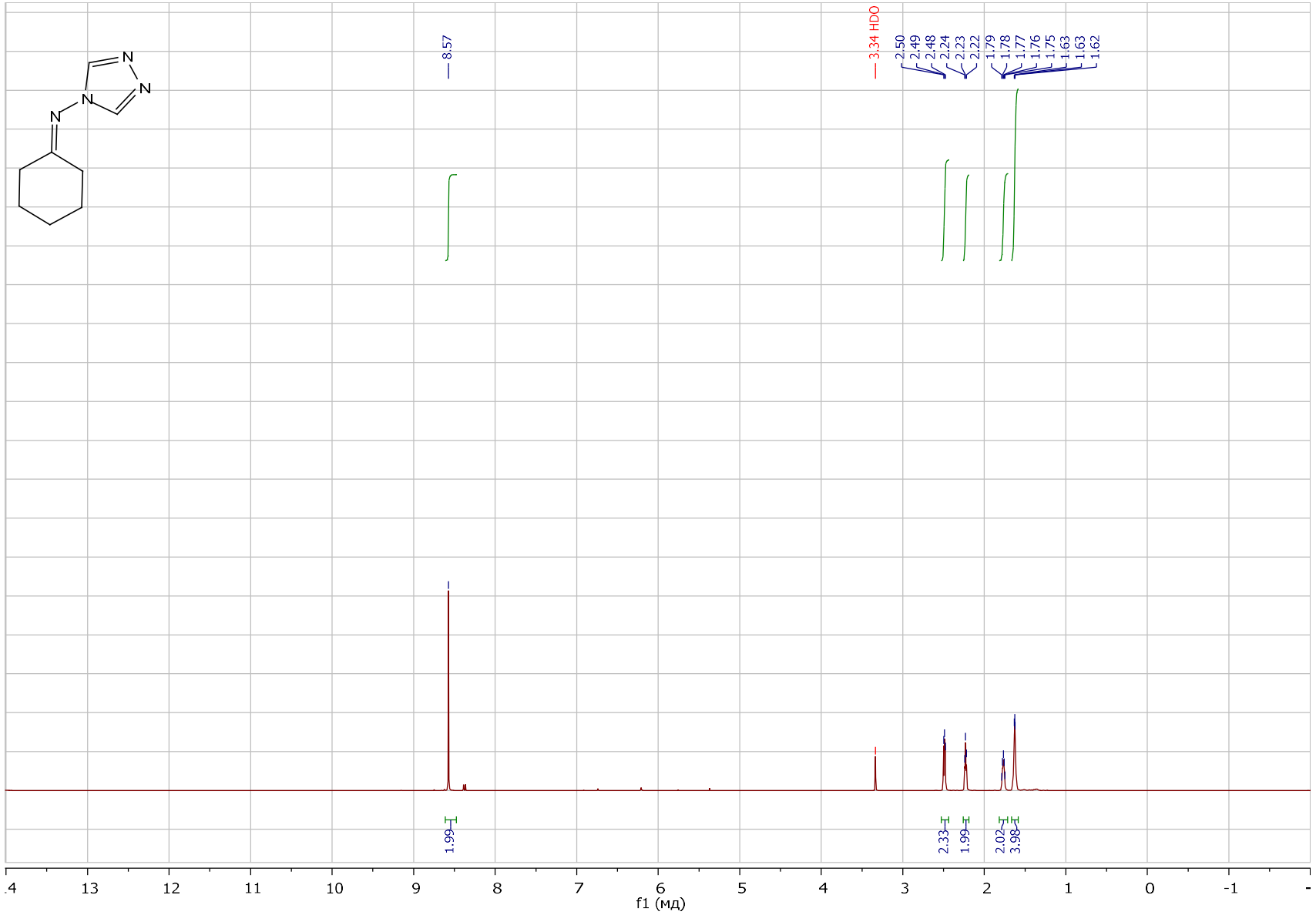
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1-(furan-2-yl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2g)



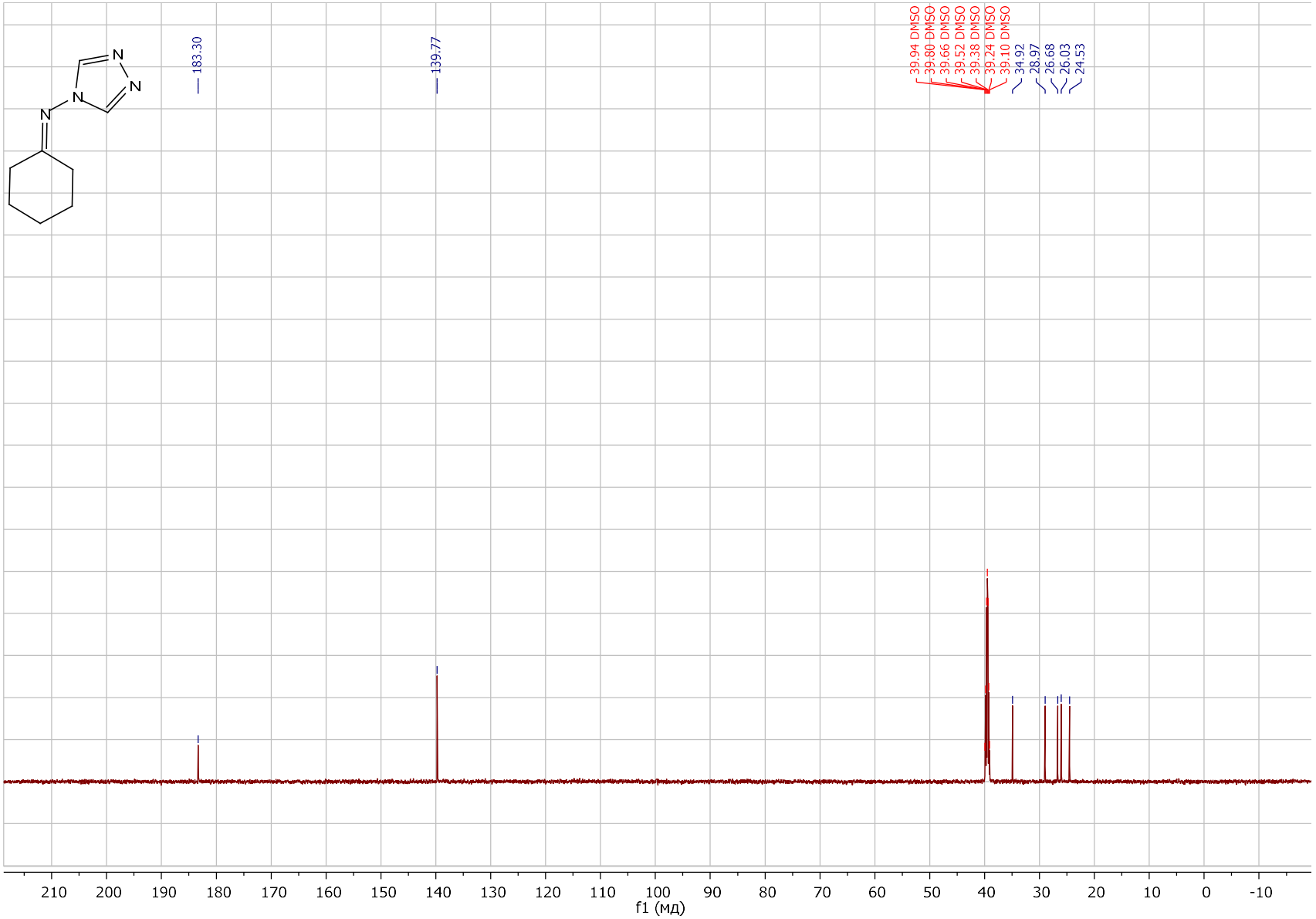
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-(furan-2-yl)-N-(4H-1,2,4-triazol-4-yl)ethan-1-imine (2g)



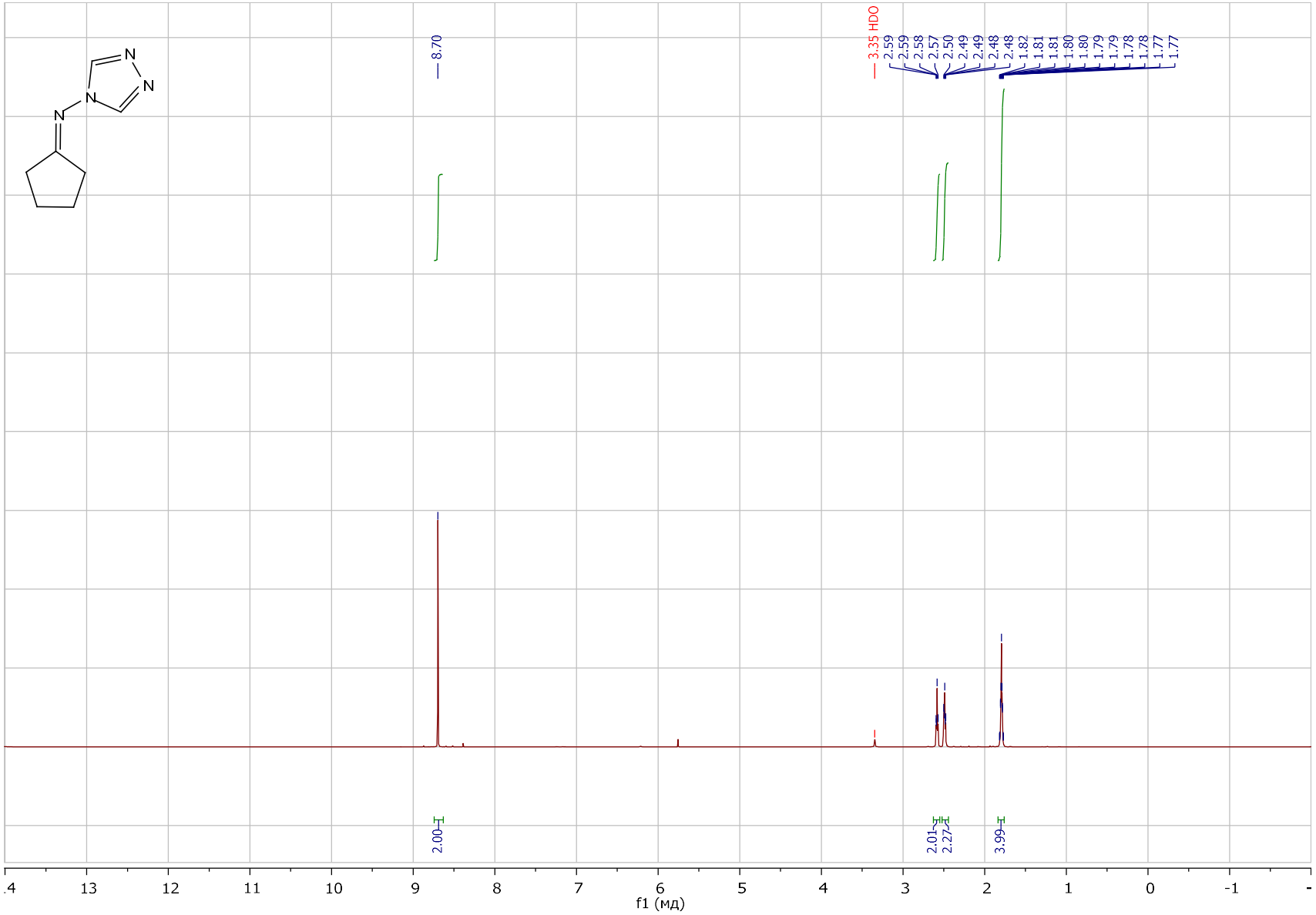
^{1}H NMR (600 MHz, DMSO-*d*6) of N-(4H-1,2,4-triazol-4-yl)cyclohexanimine (2h)



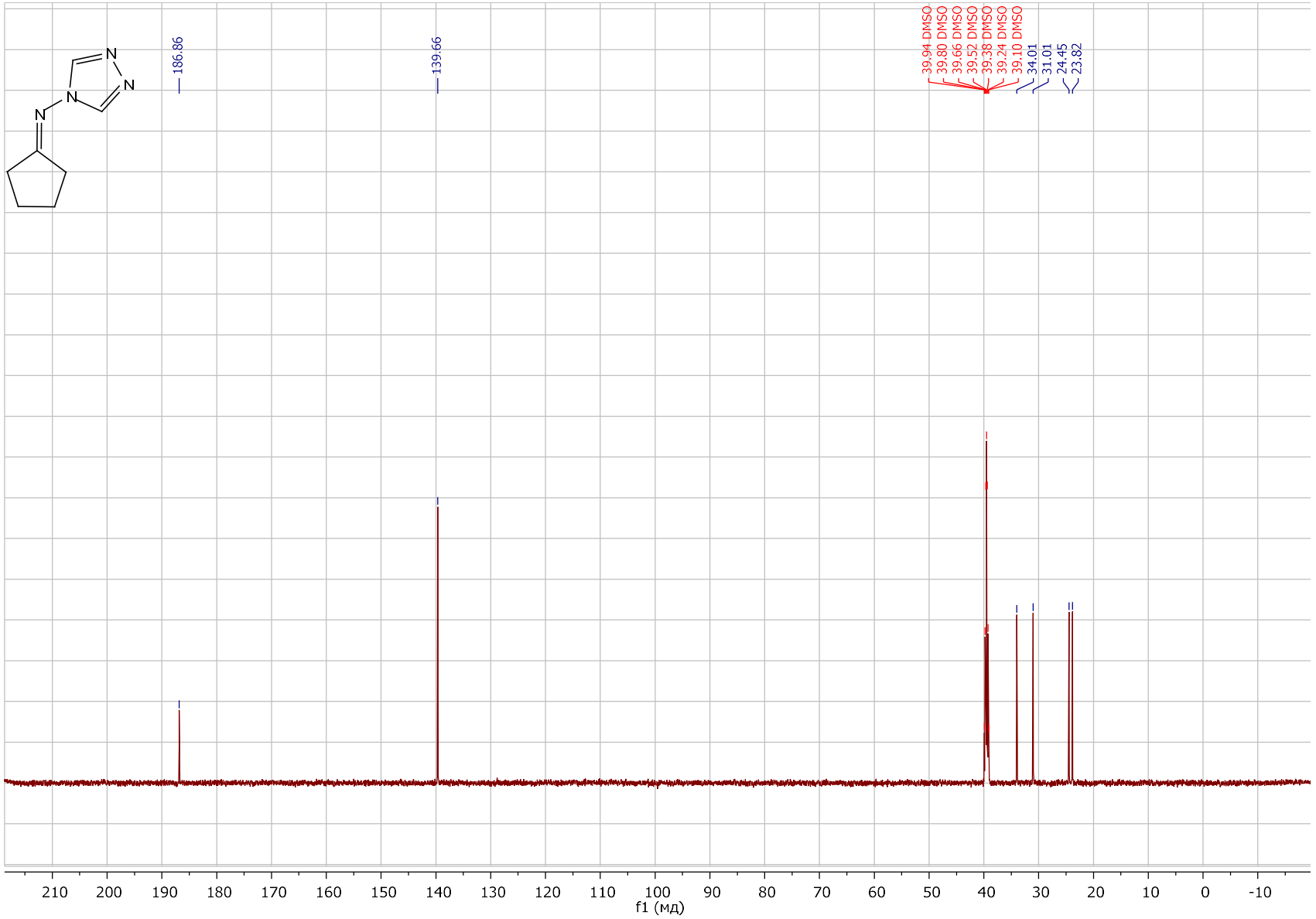
^{13}C NMR (151 MHz, DMSO-*d*6) of N-(4H-1,2,4-triazol-4-yl)cyclohexanimine (2h)



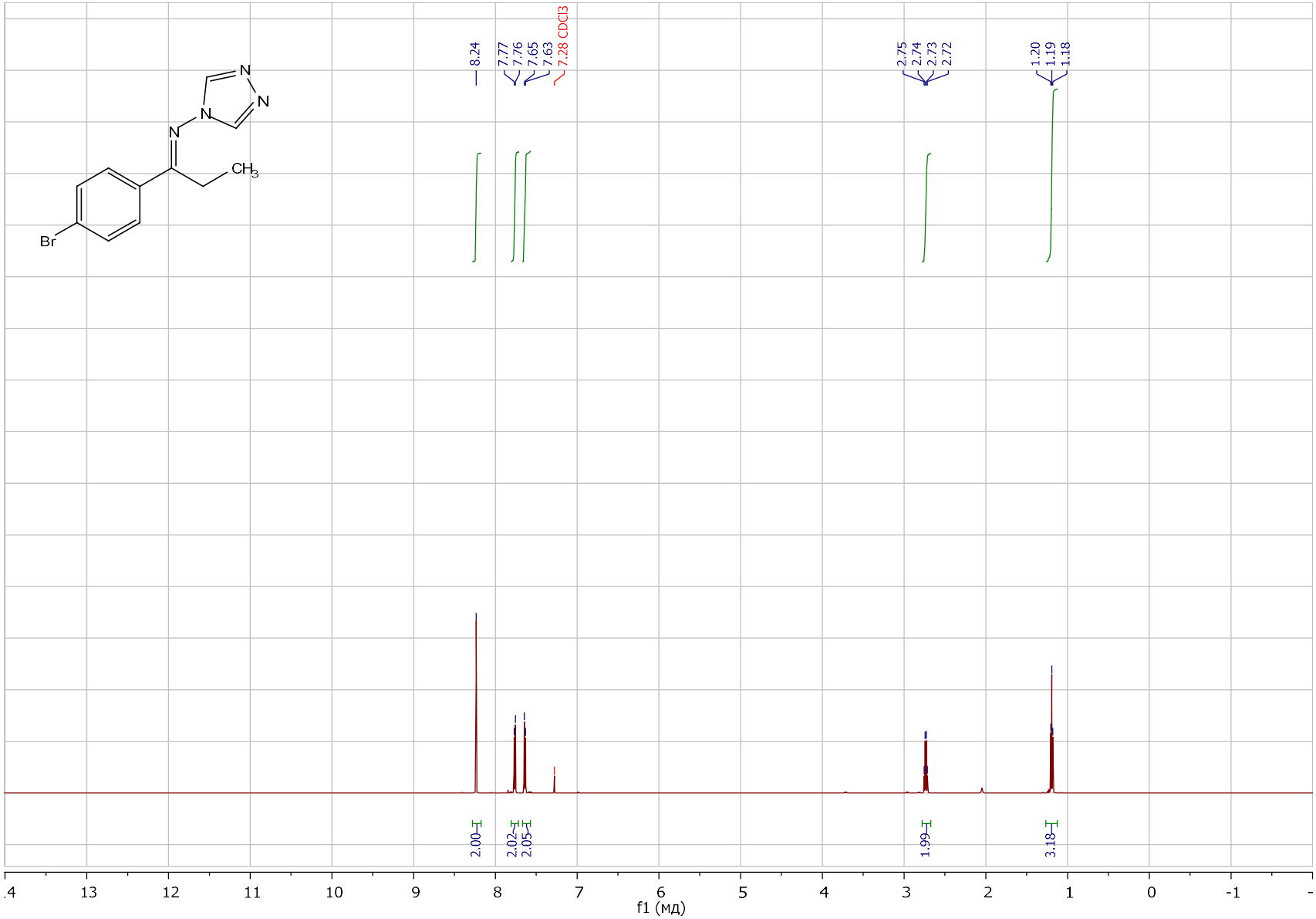
^{1}H NMR (600 MHz, DMSO-*d*6) of N-(4H-1,2,4-triazol-4-yl)cyclopentanimine (2i)



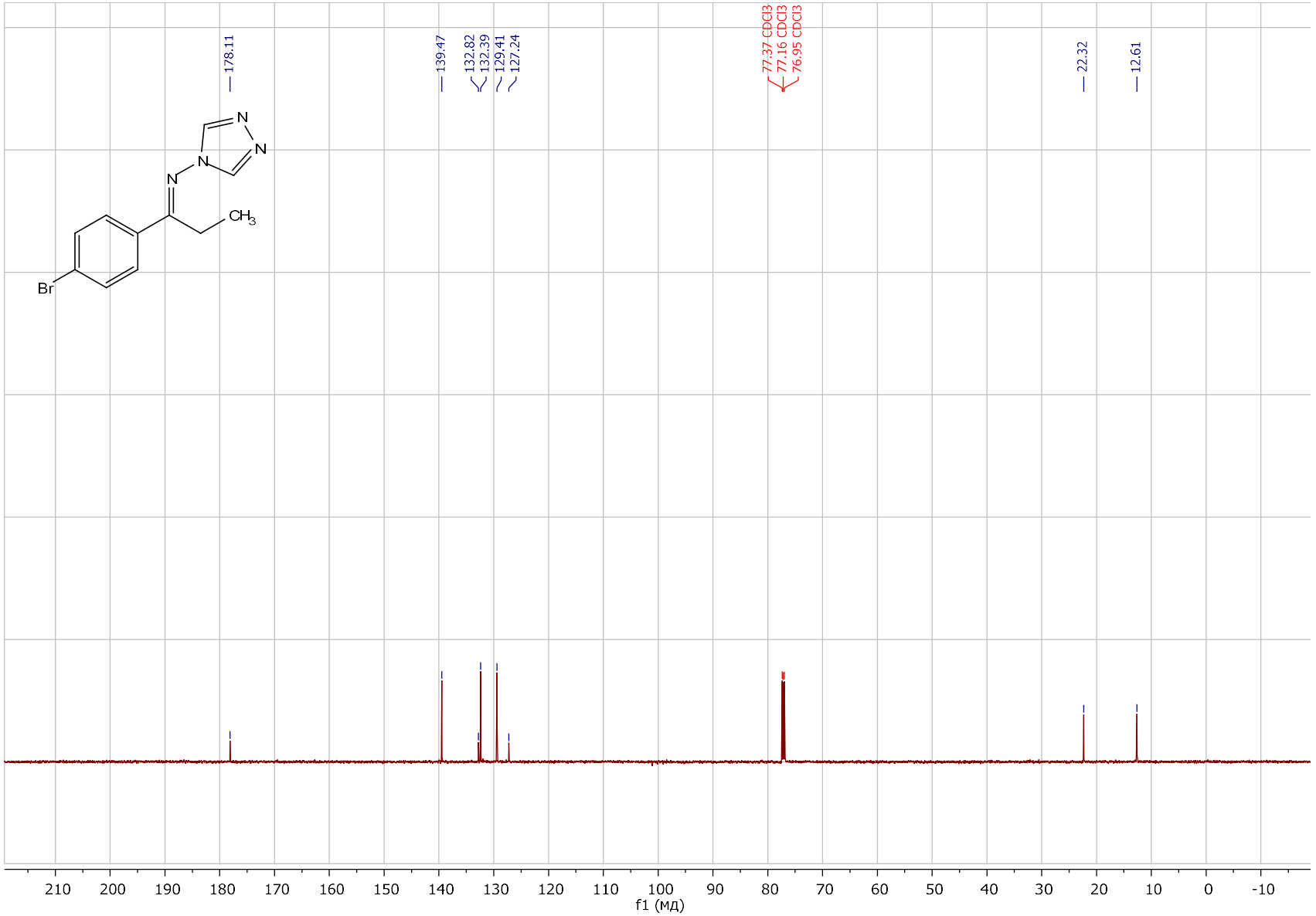
^{13}C NMR (151 MHz, DMSO-*d*6) of N-(4H-1,2,4-triazol-4-yl)cyclopentanimine (2i)



^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1-(4-bromophenyl)-N-(4H-1,2,4-triazol-4-yl)propan-1-imine (2j)

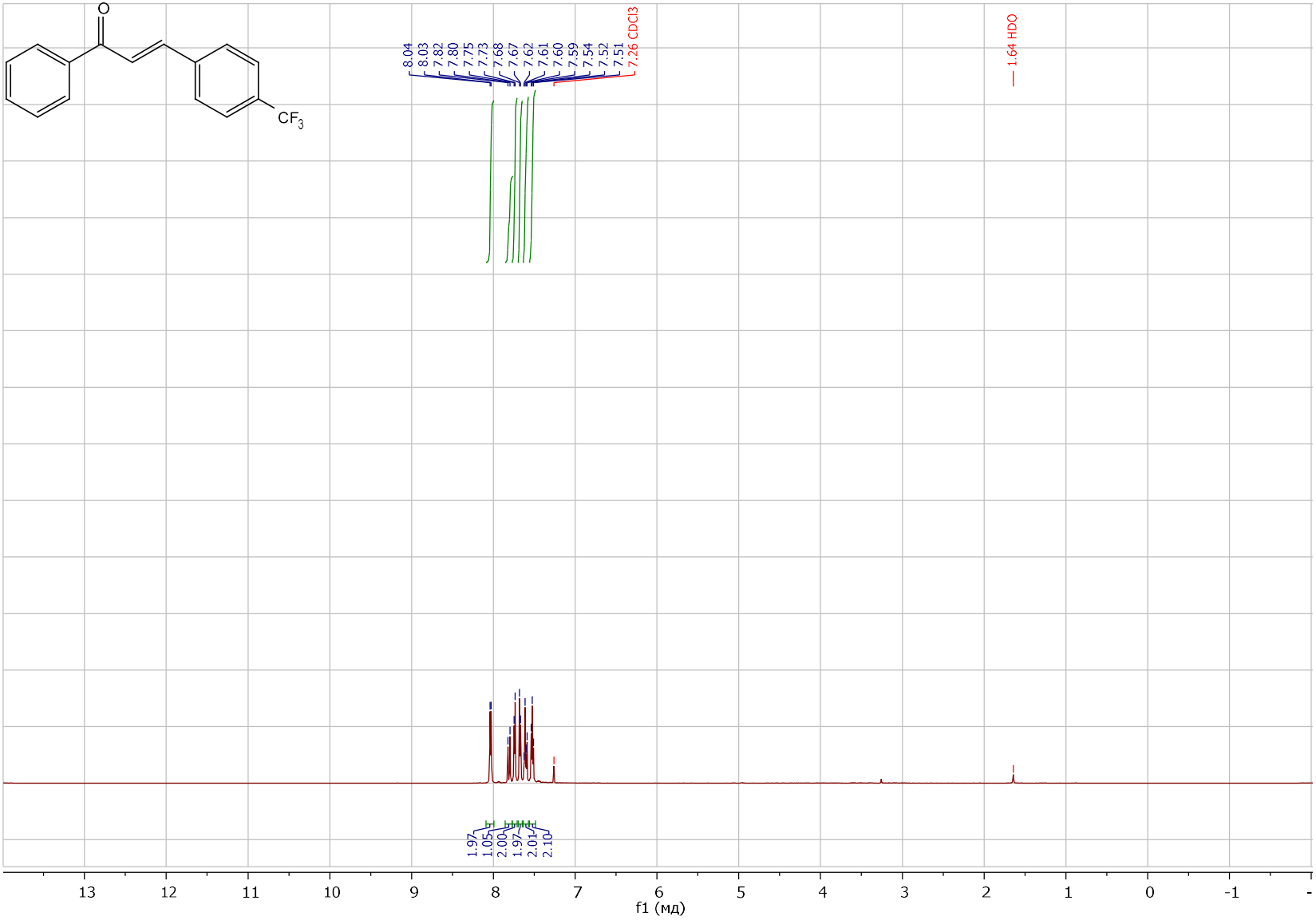


^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-(4-bromophenyl)-N-(4H-1,2,4-triazol-4-yl)propan-1-imine (2j)

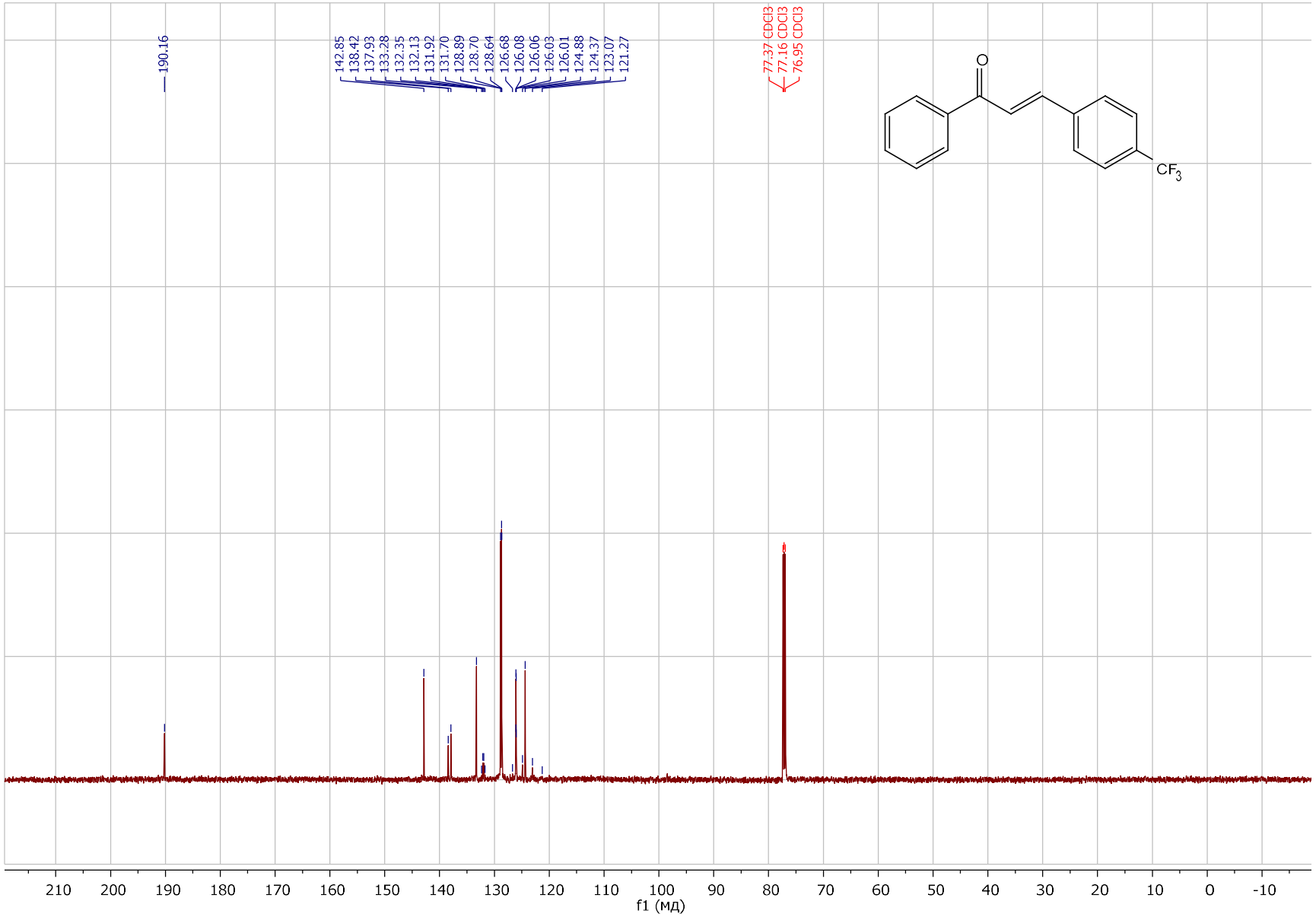


4.2 Chalcones

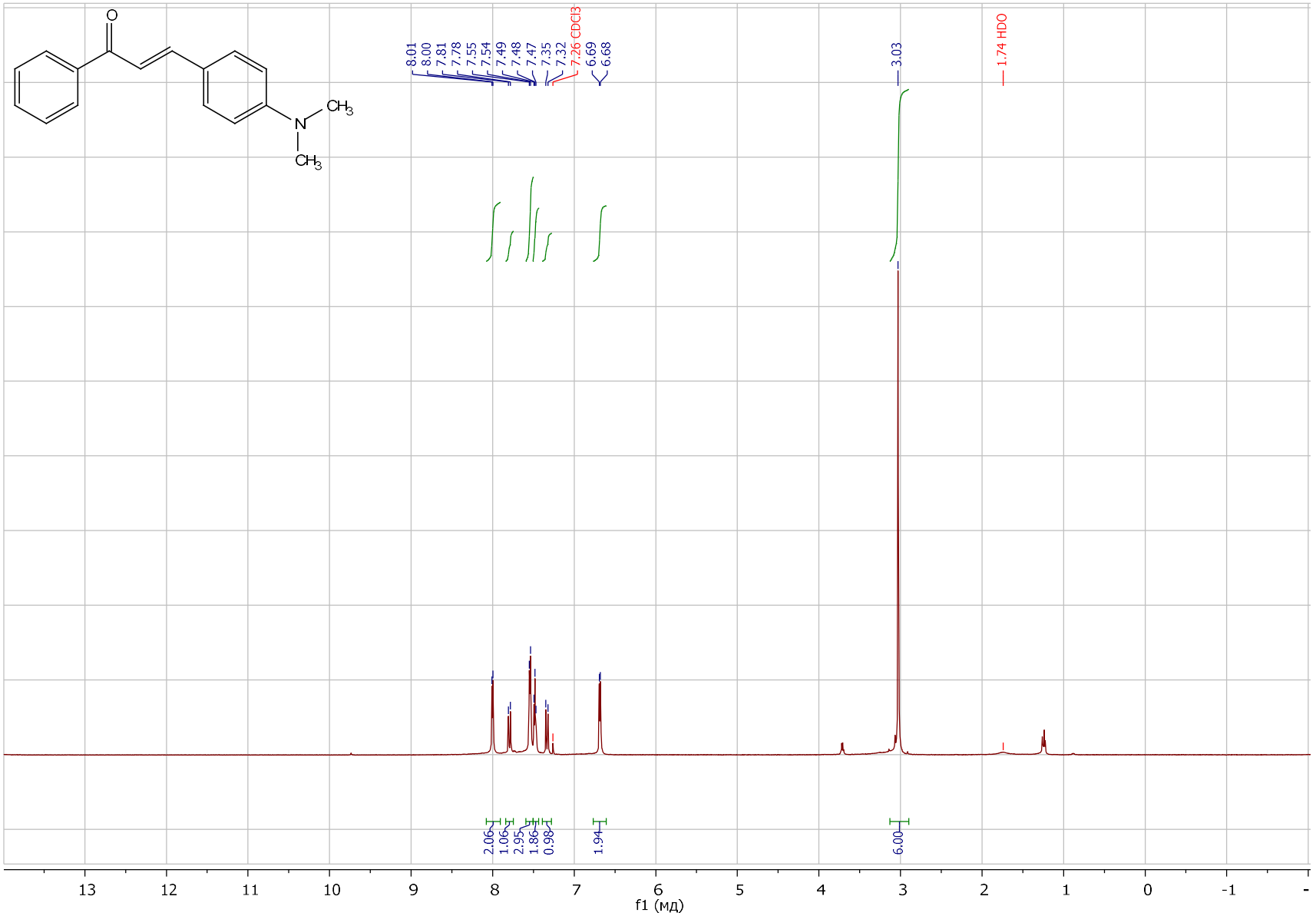
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1-phenyl-3-(4-(trifluoromethyl)phenyl)prop-2-en-1-one (3b)



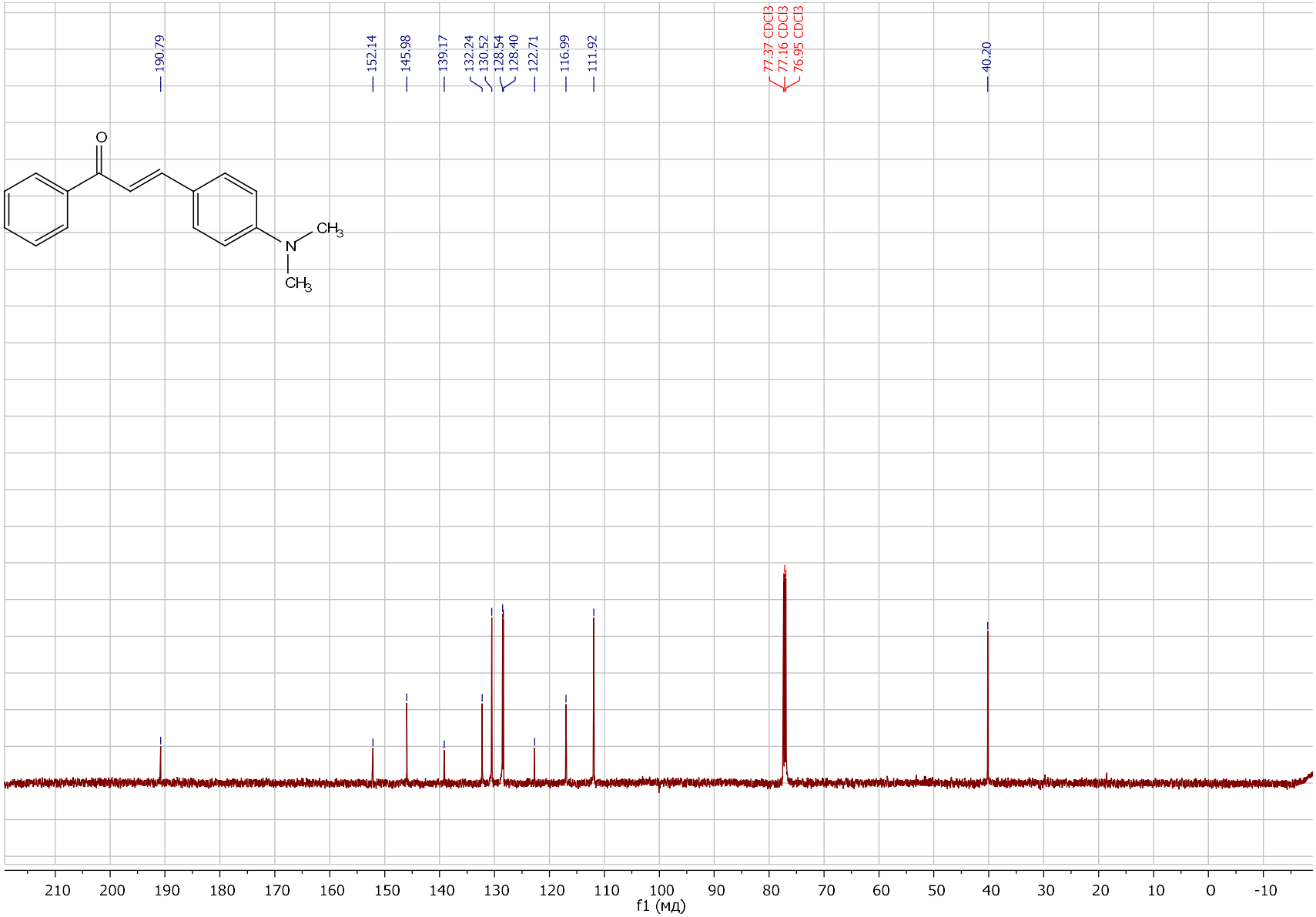
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-phenyl-3-(4-(trifluoromethyl)phenyl)prop-2-en-1-one (3b)



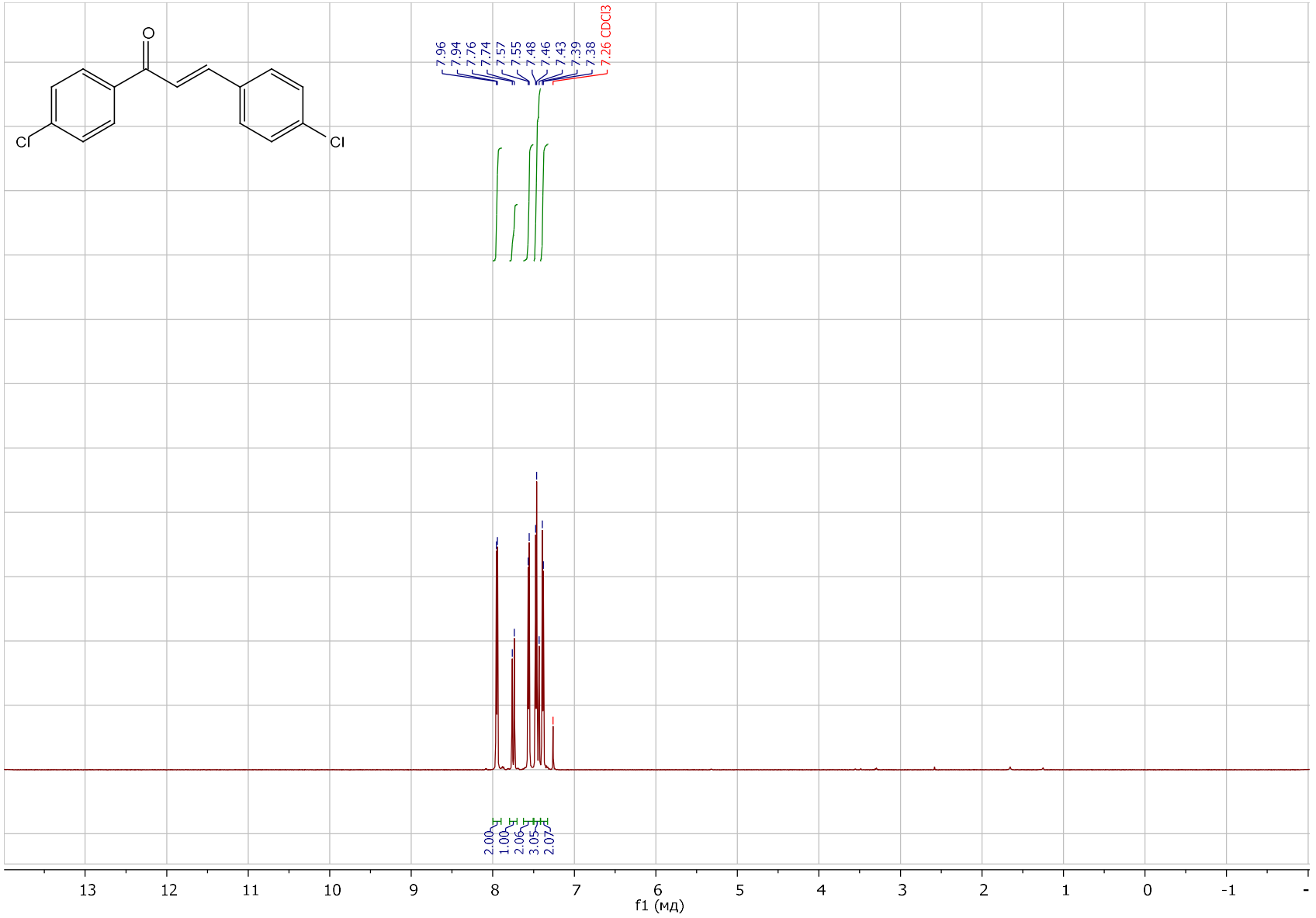
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(4-(dimethylamino)phenyl)-1-phenylprop-2-en-1-one (3c)



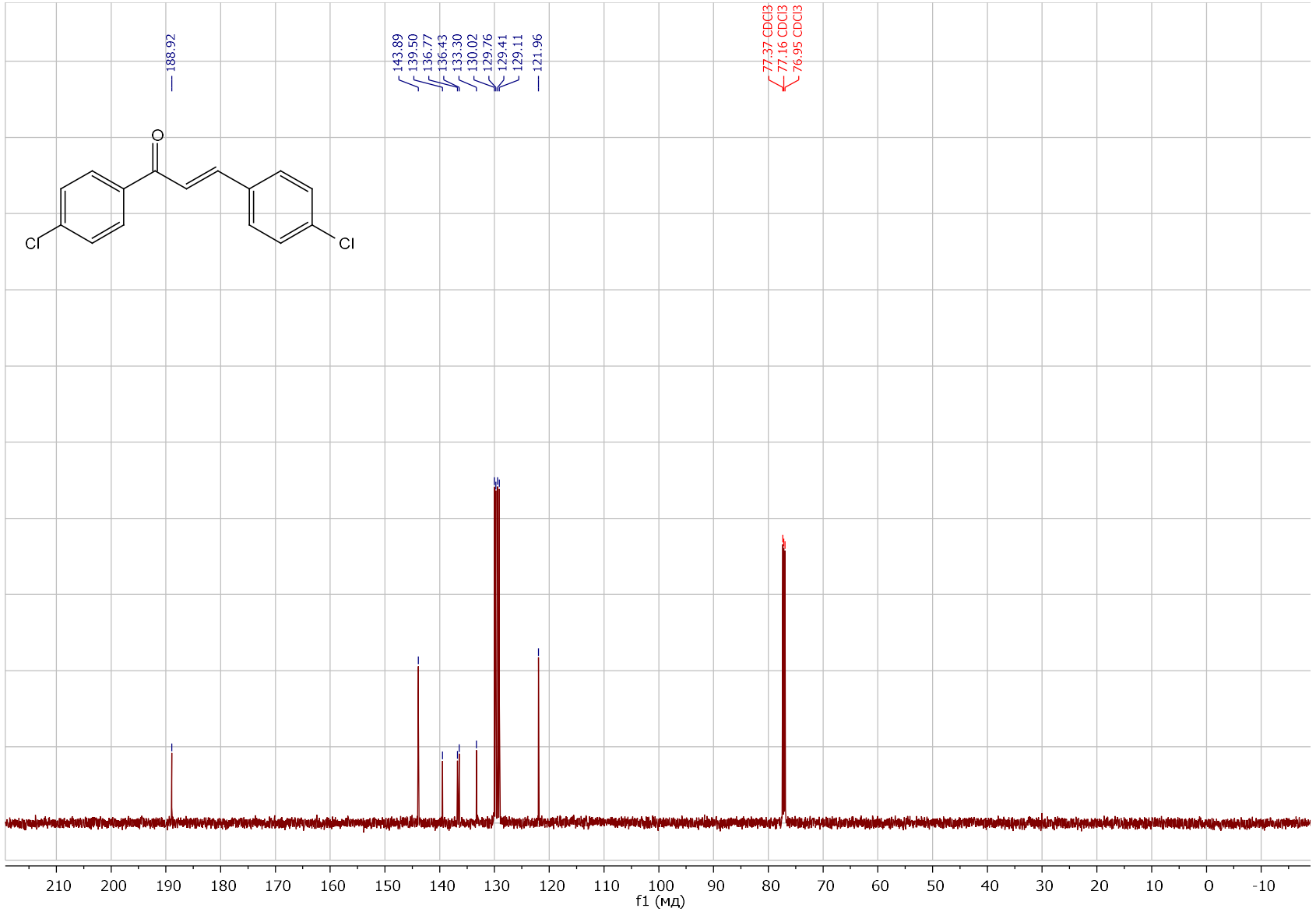
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(4-(dimethylamino)phenyl)-1-phenylprop-2-en-1-one (3c)



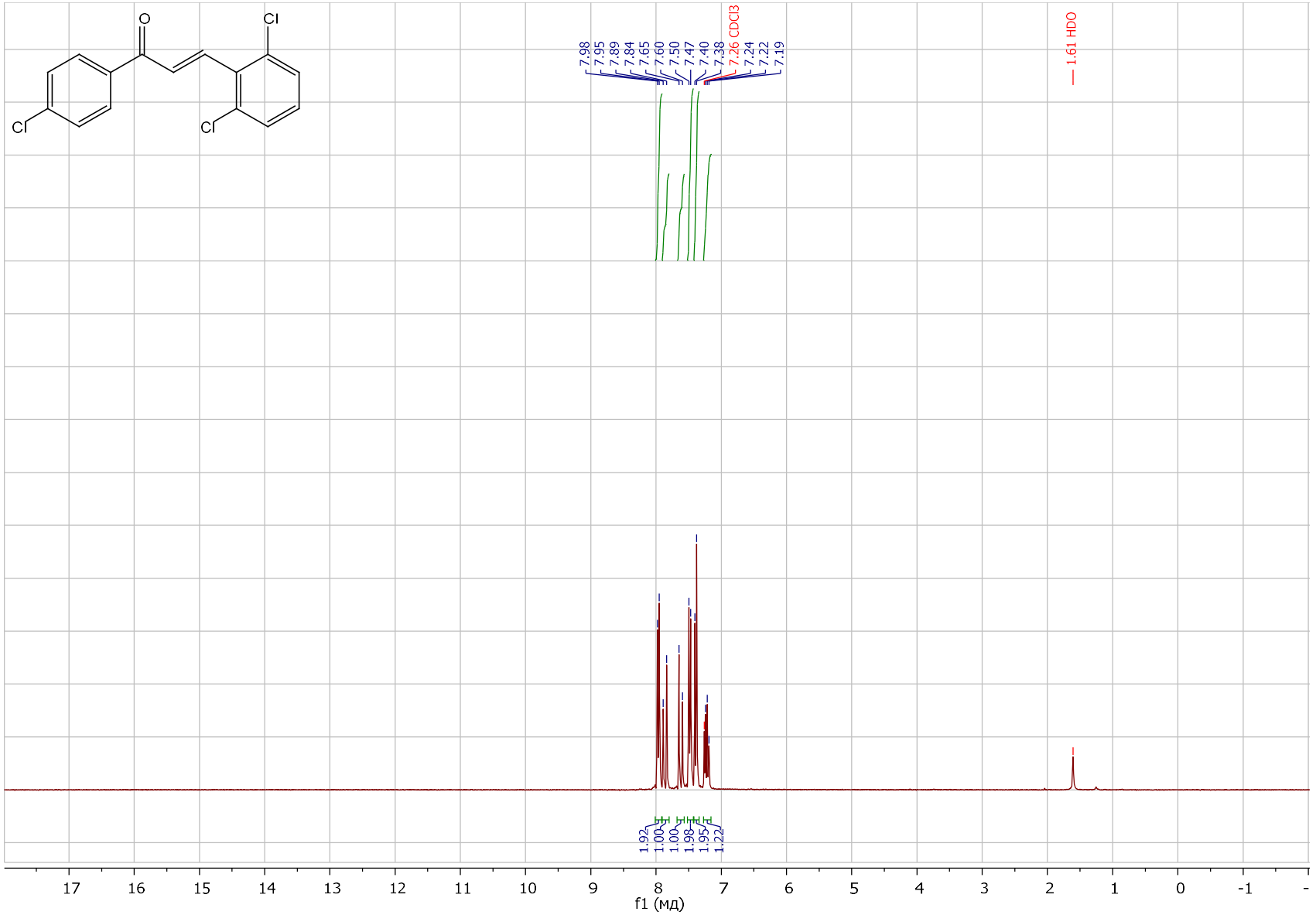
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1,3-bis(4-chlorophenyl)prop-2-en-1-one (3d)



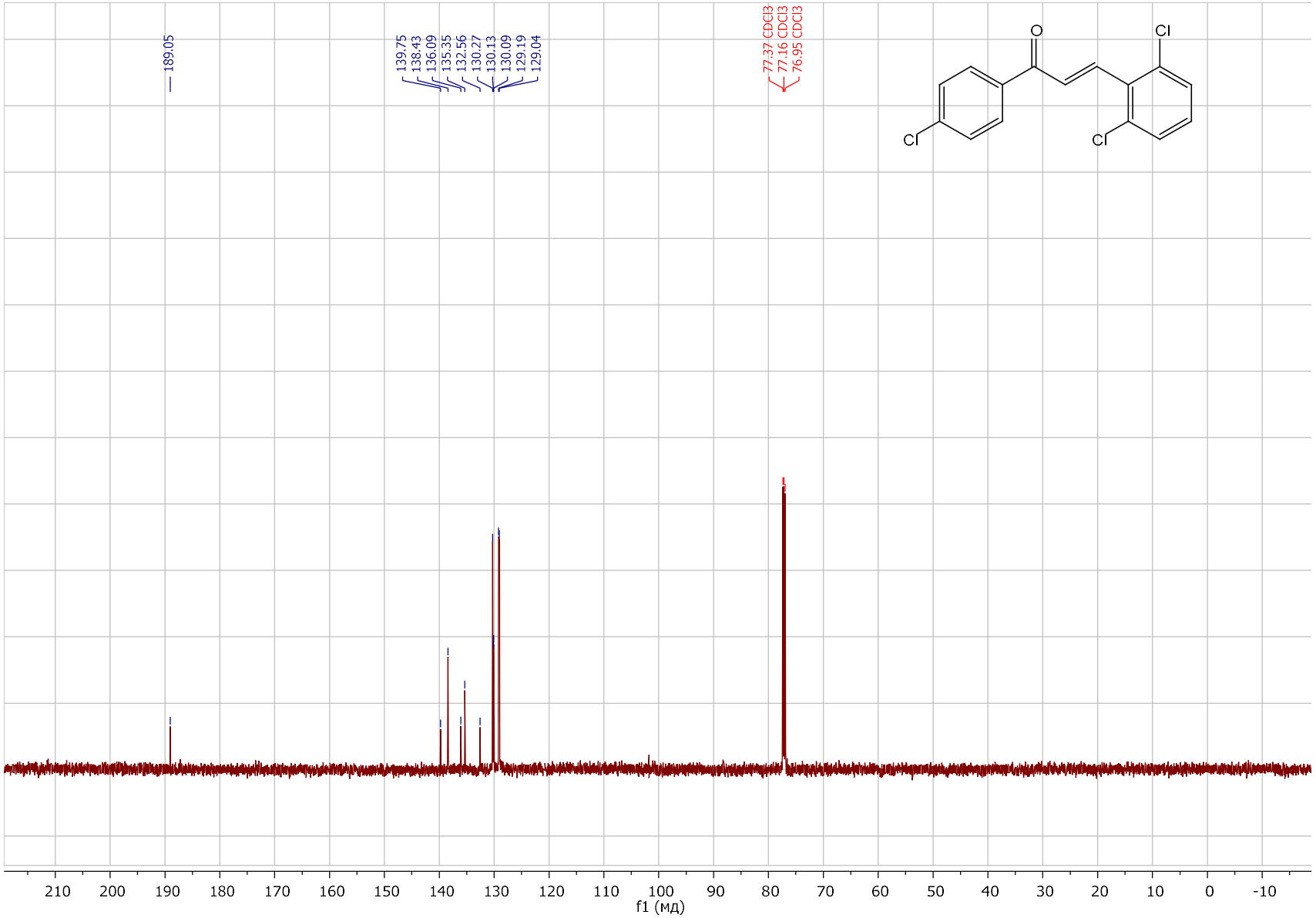
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1,3-bis(4-chlorophenyl)prop-2-en-1-one (3d)



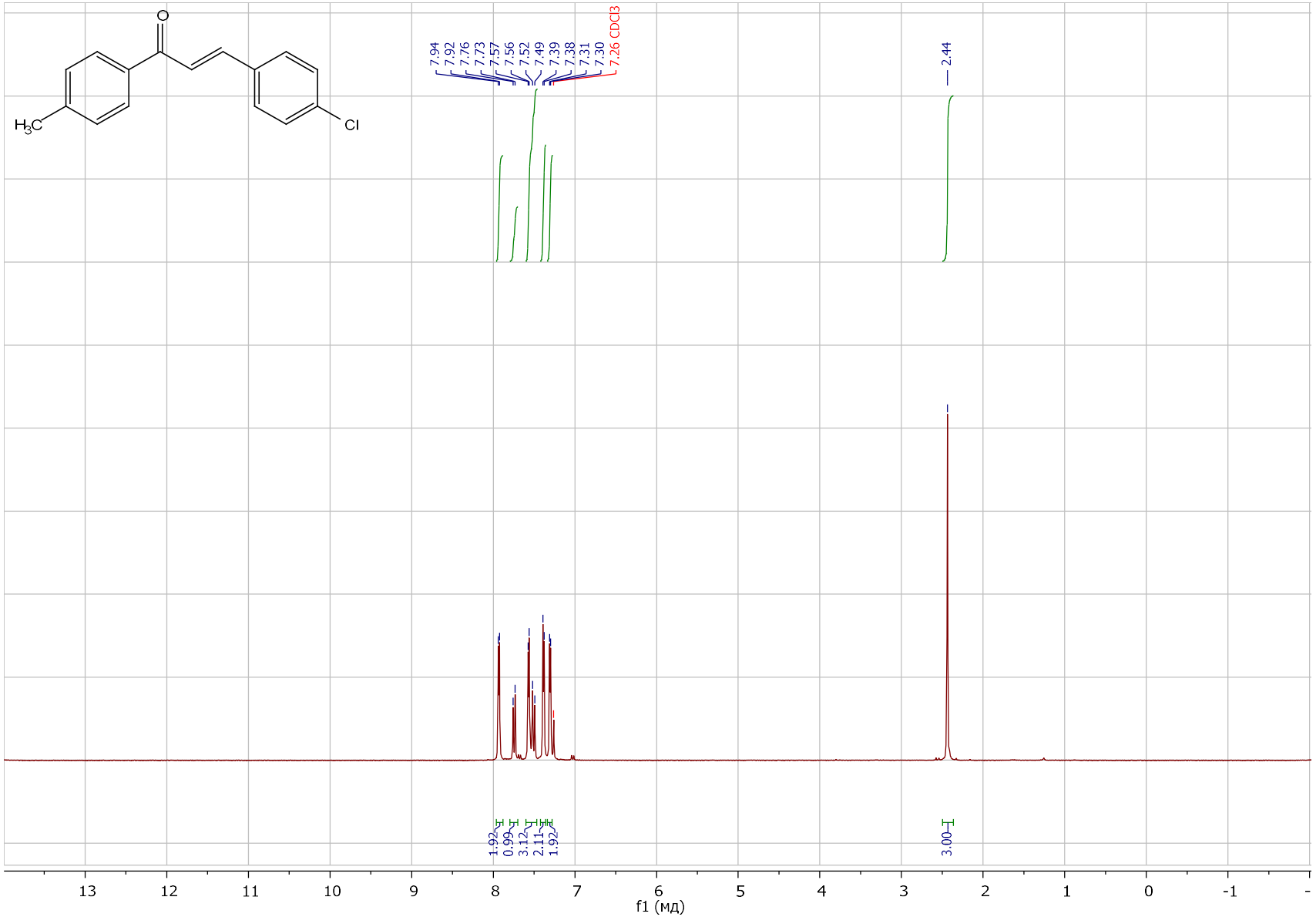
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1-(4-chlorophenyl)-3-(2,6-dichlorophenyl)prop-2-en-1-one (3e)



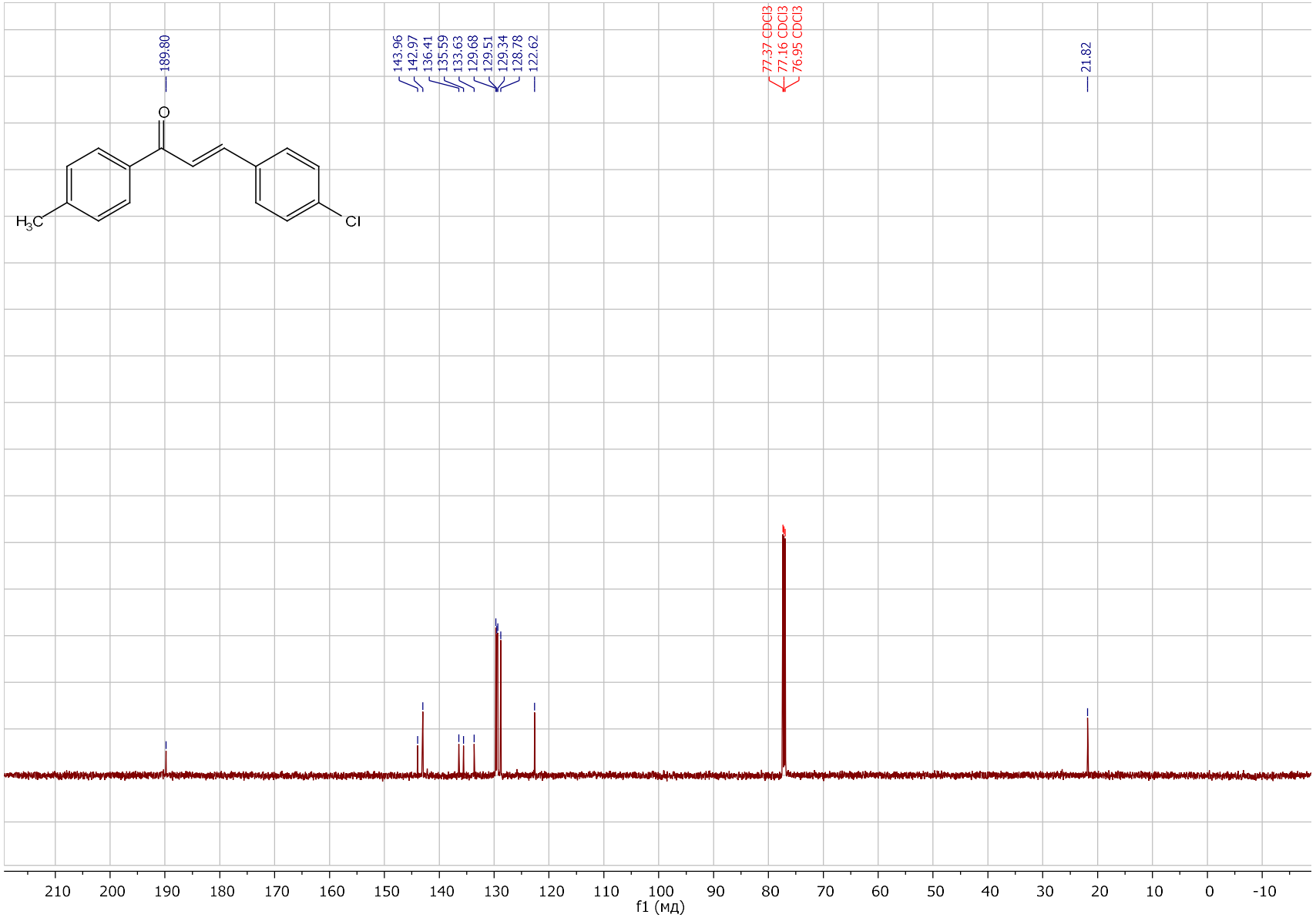
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-(4-chlorophenyl)-3-(2,6-dichlorophenyl)prop-2-en-1-one (3e)



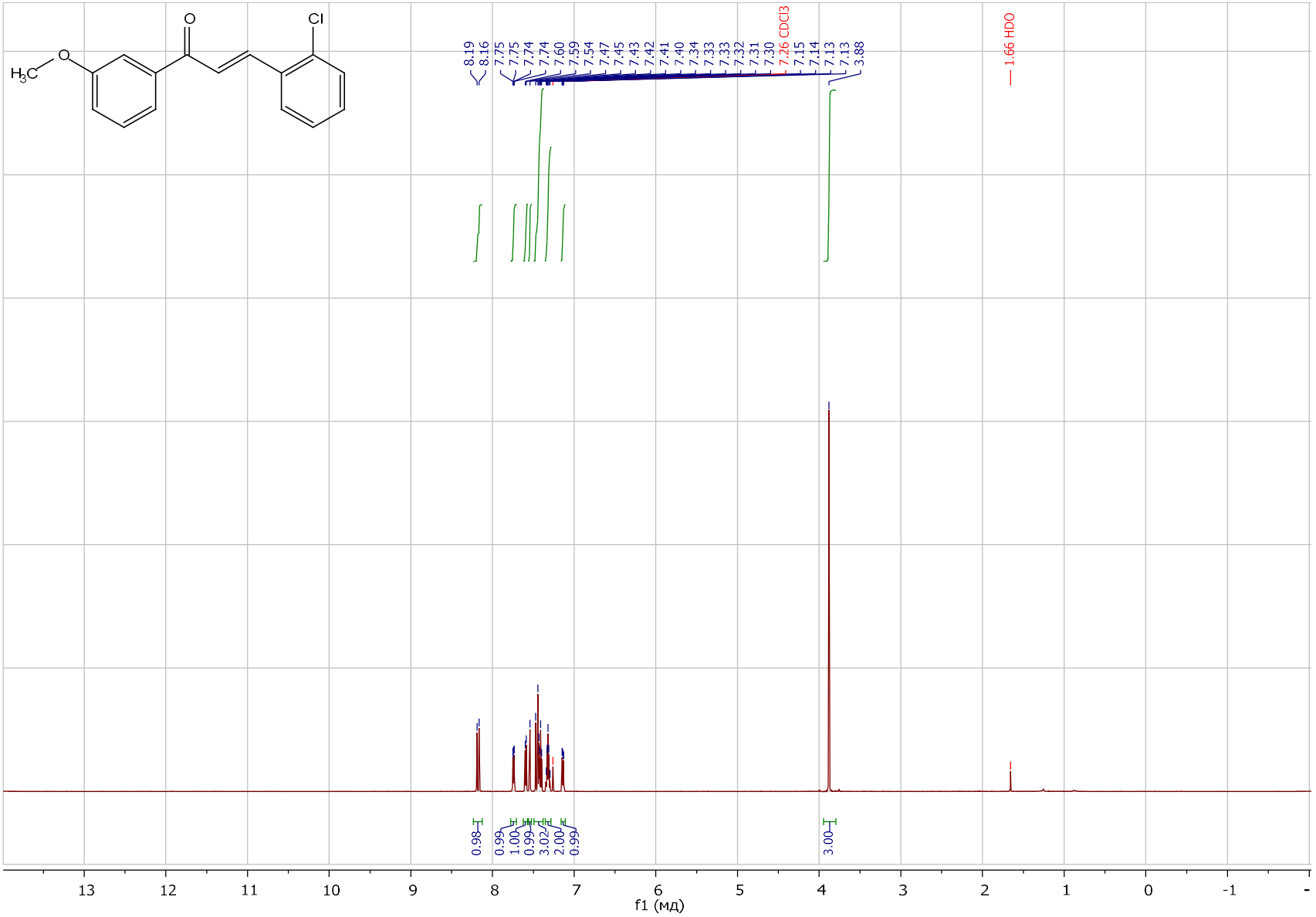
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(4-chlorophenyl)-1-(p-tolyl)prop-2-en-1-one (3f)



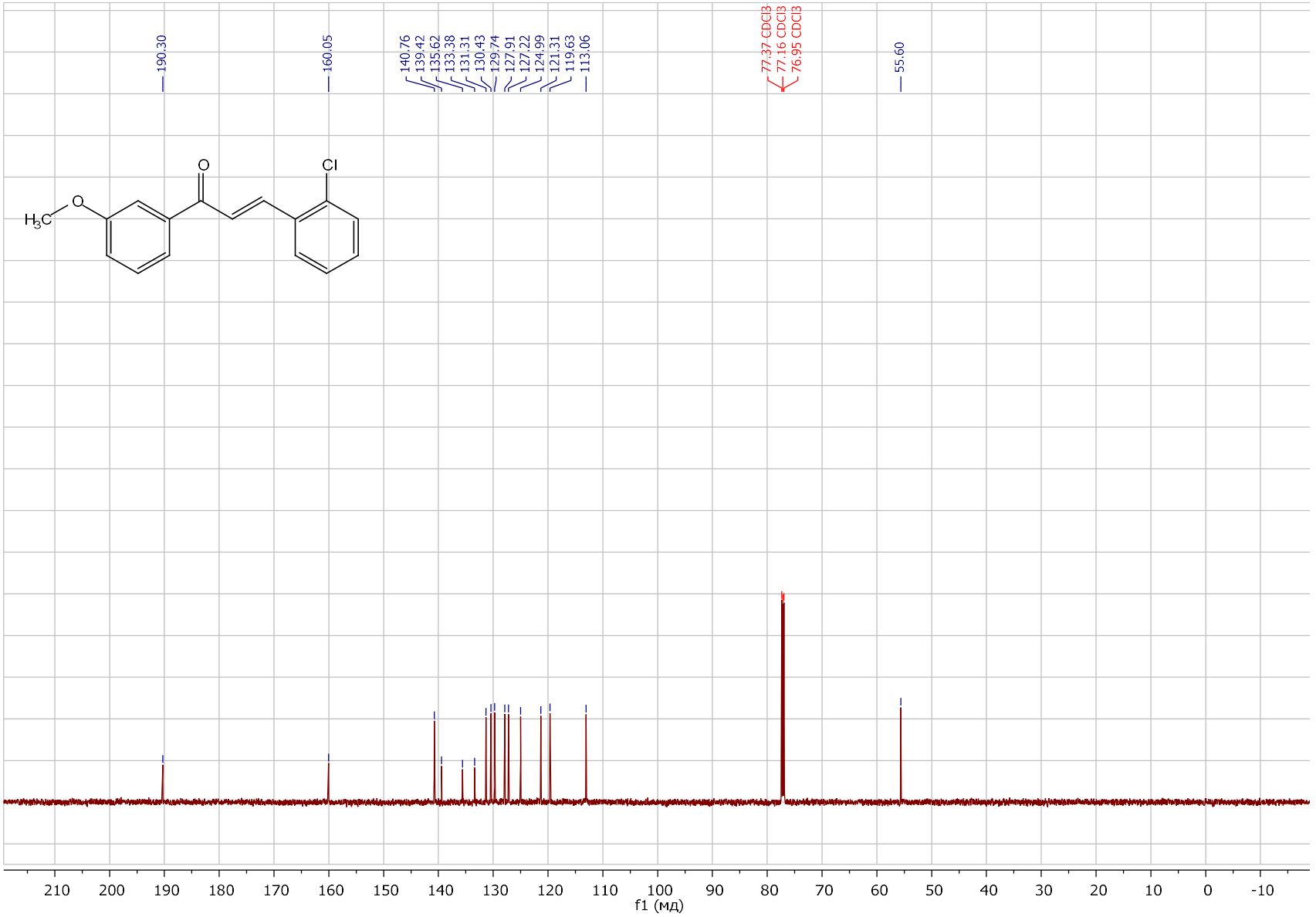
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(4-chlorophenyl)-1-(p-tolyl)prop-2-en-1-one (3f)



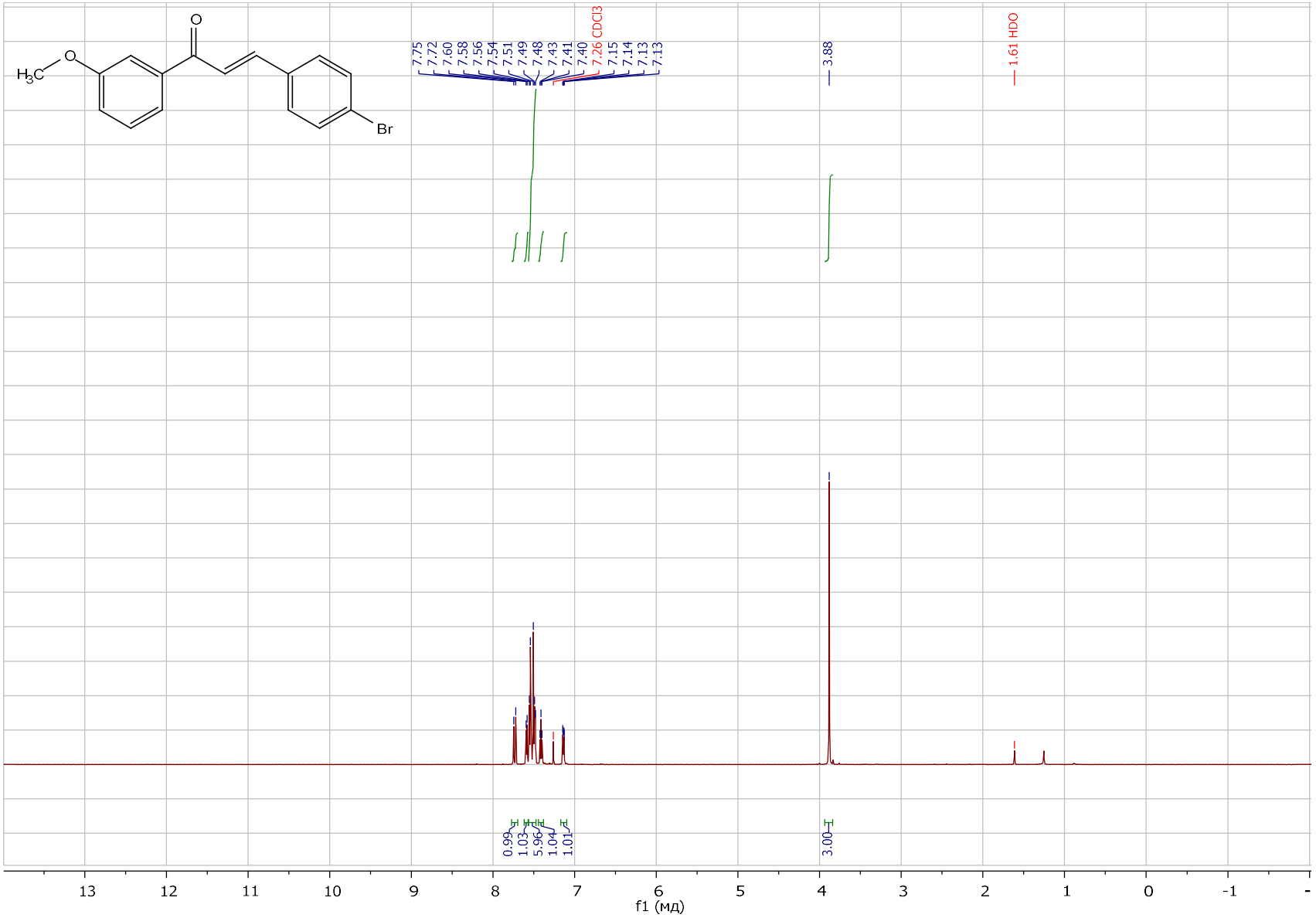
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(2-chlorophenyl)-1-(3-methoxyphenyl)prop-2-en-1-one (3g)



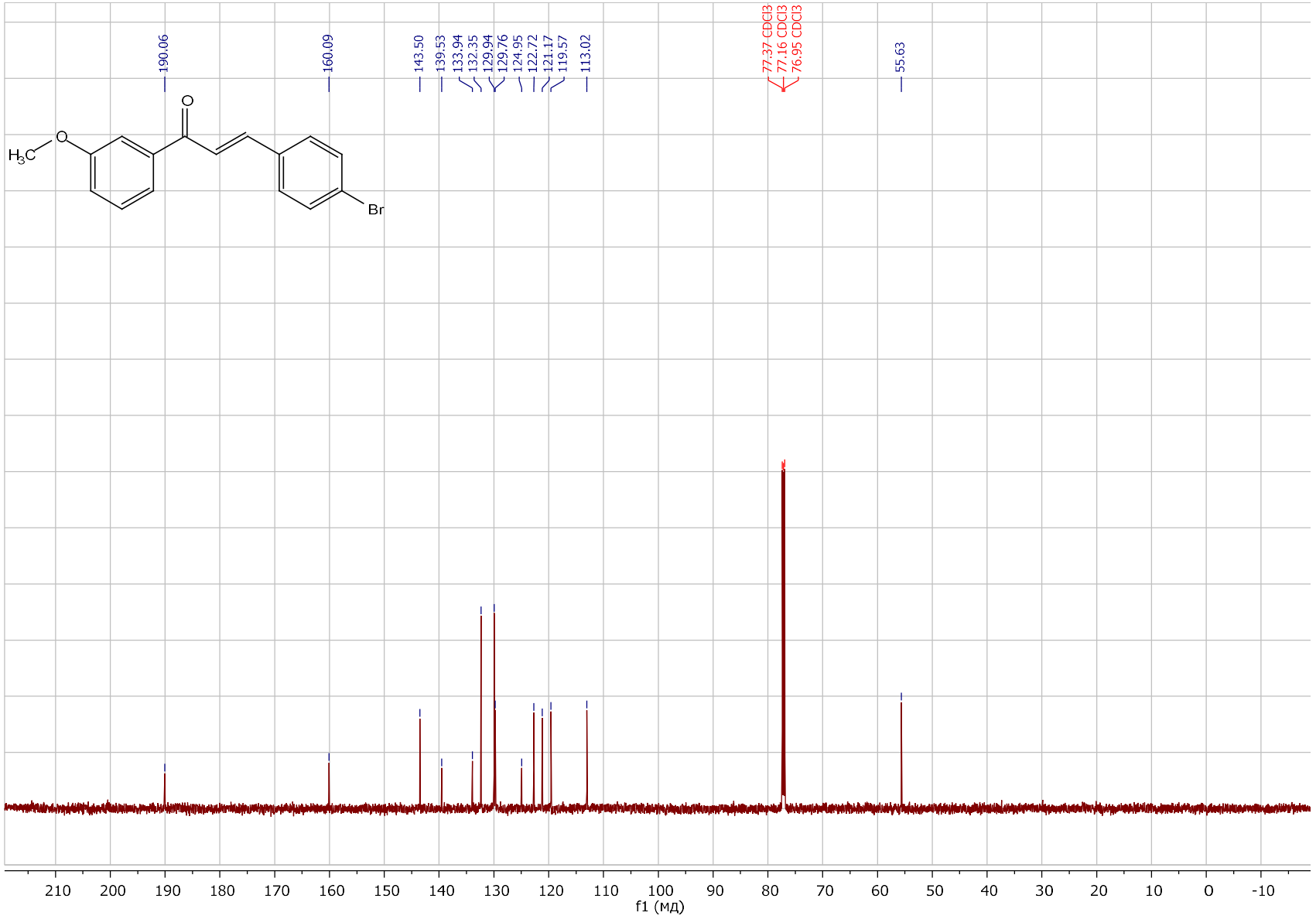
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(2-chlorophenyl)-1-(3-methoxyphenyl)prop-2-en-1-one (3g)



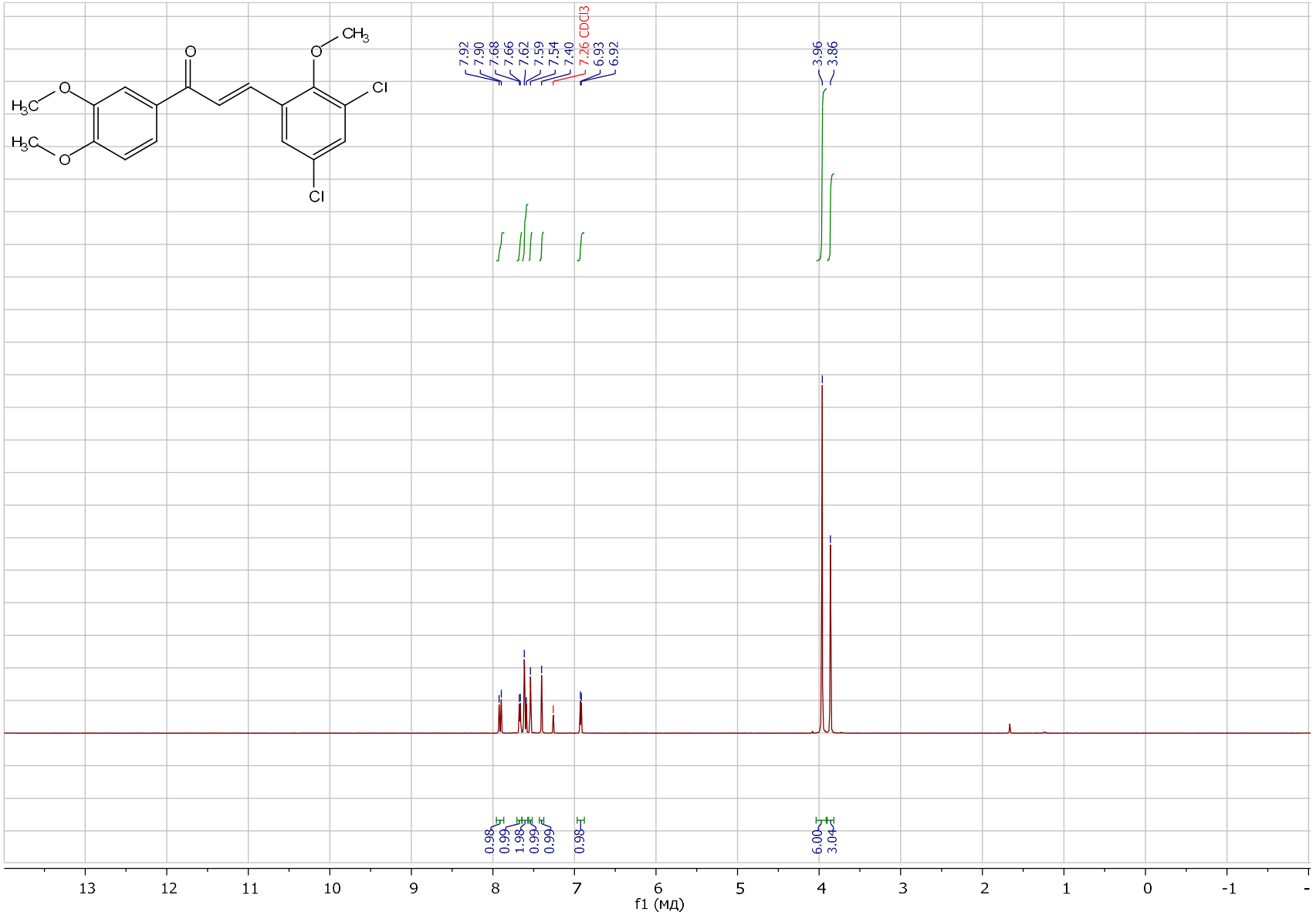
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(4-bromophenyl)-1-(3-methoxyphenyl)prop-2-en-1-one (3h)



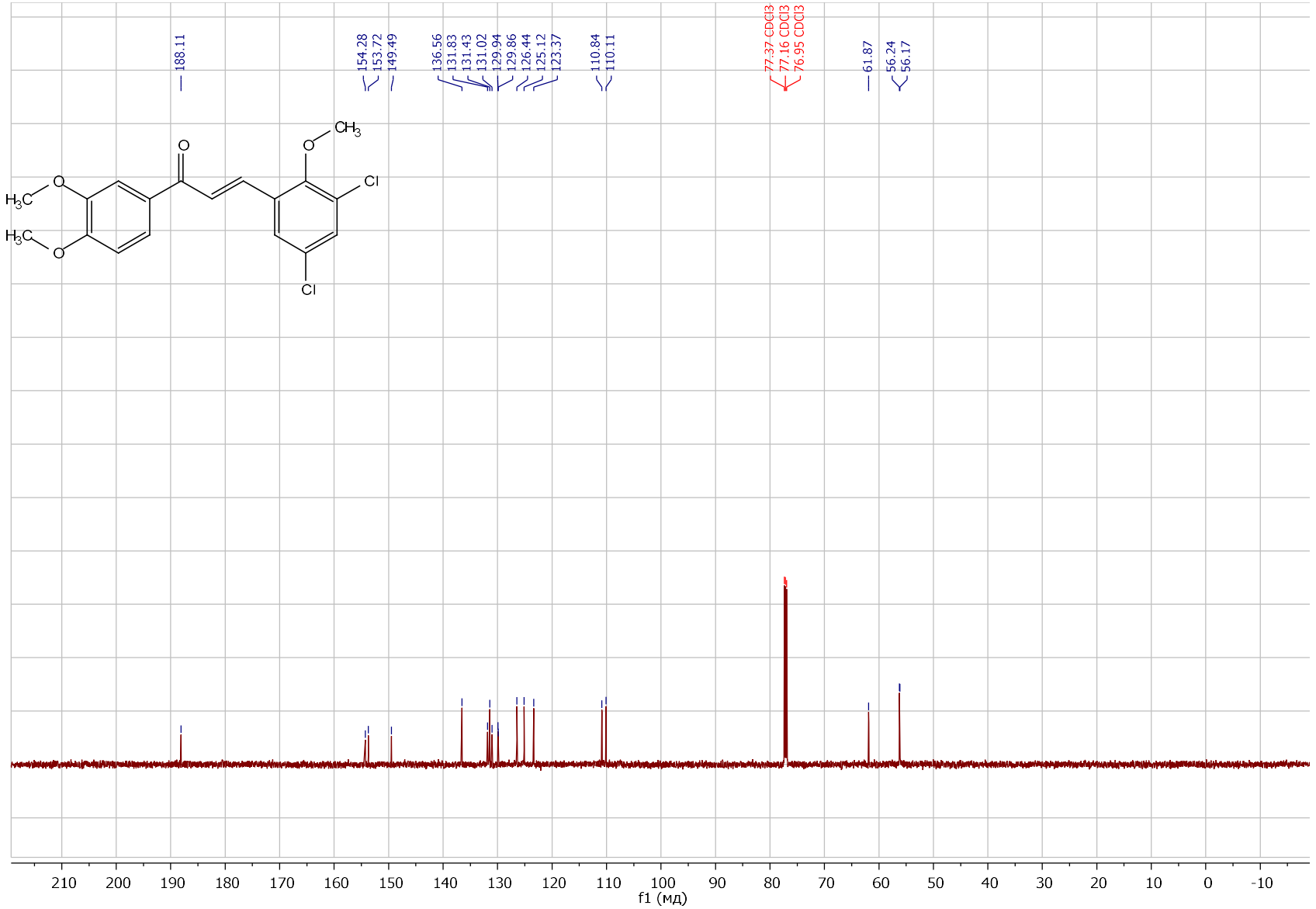
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(4-bromophenyl)-1-(3-methoxyphenyl)prop-2-en-1-one (3h)



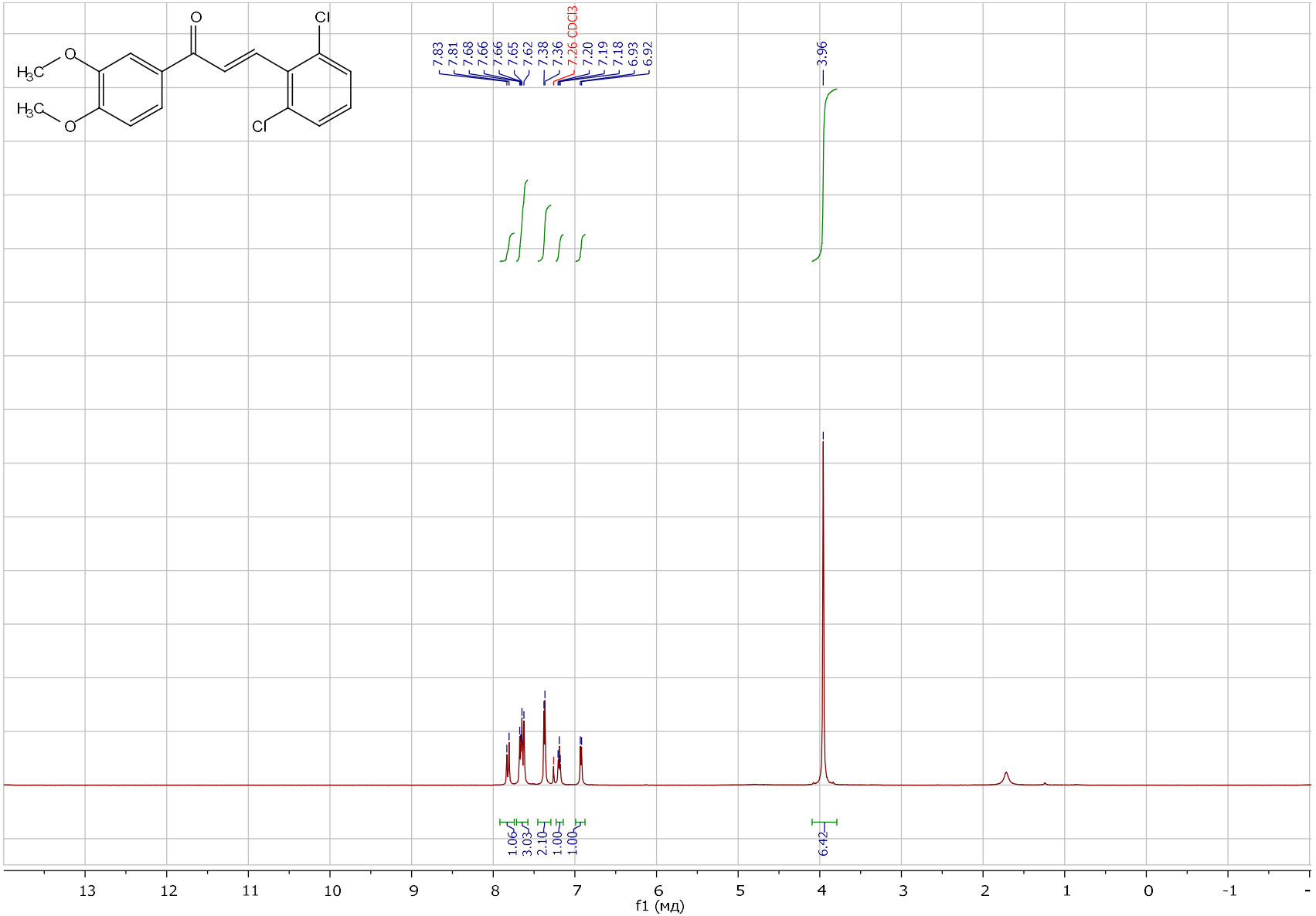
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(3,5-dichloro-2-methoxyphenyl)-1-(3,4-dimethoxyphenyl)prop-2-en-1-one (3i)



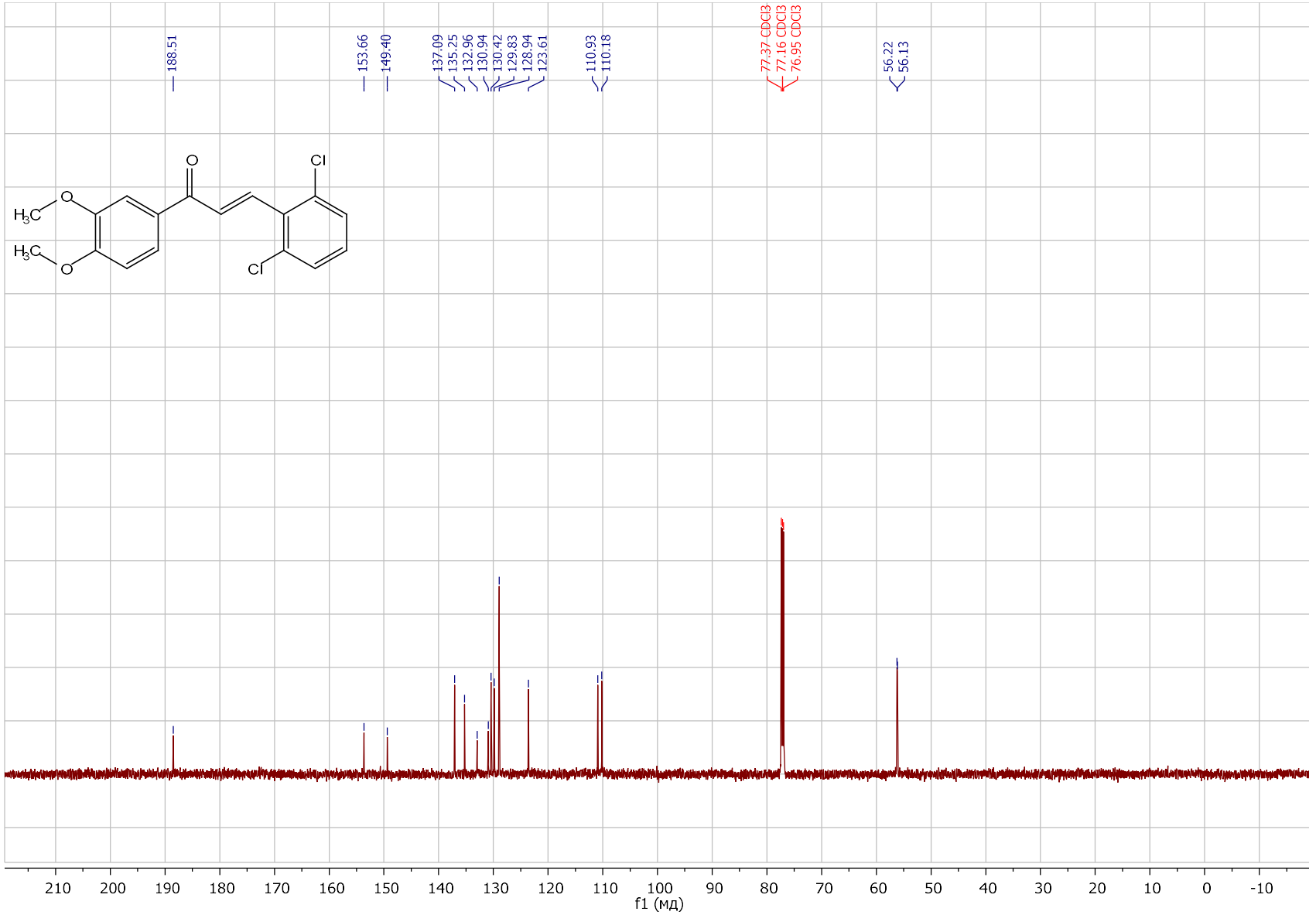
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(3,5-dichloro-2-methoxyphenyl)-1-(3,4-dimethoxyphenyl)prop-2-en-1-one (3i)



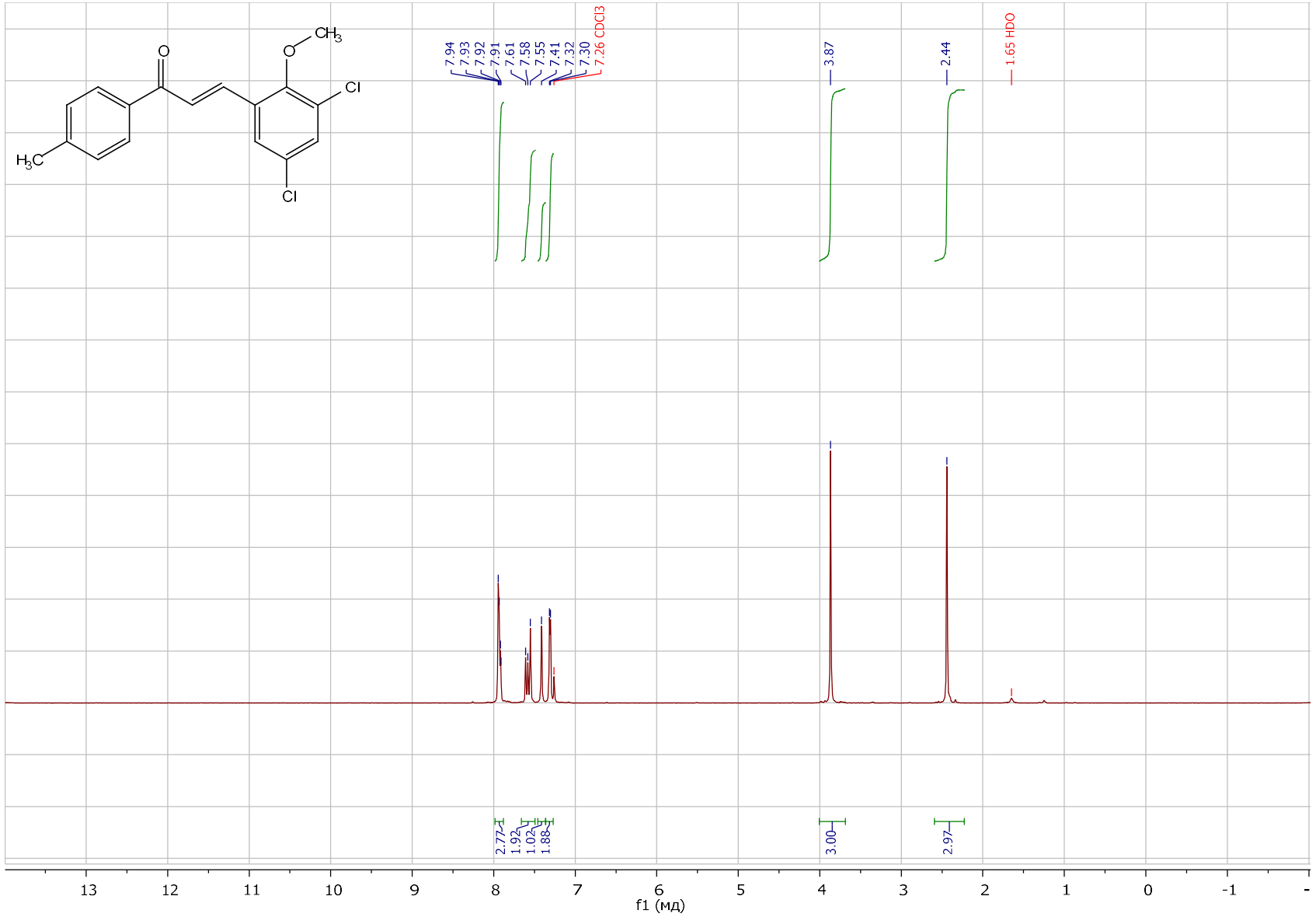
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(2,6-dichlorophenyl)-1-(3,4-dimethoxyphenyl)prop-2-en-1-one (3j)



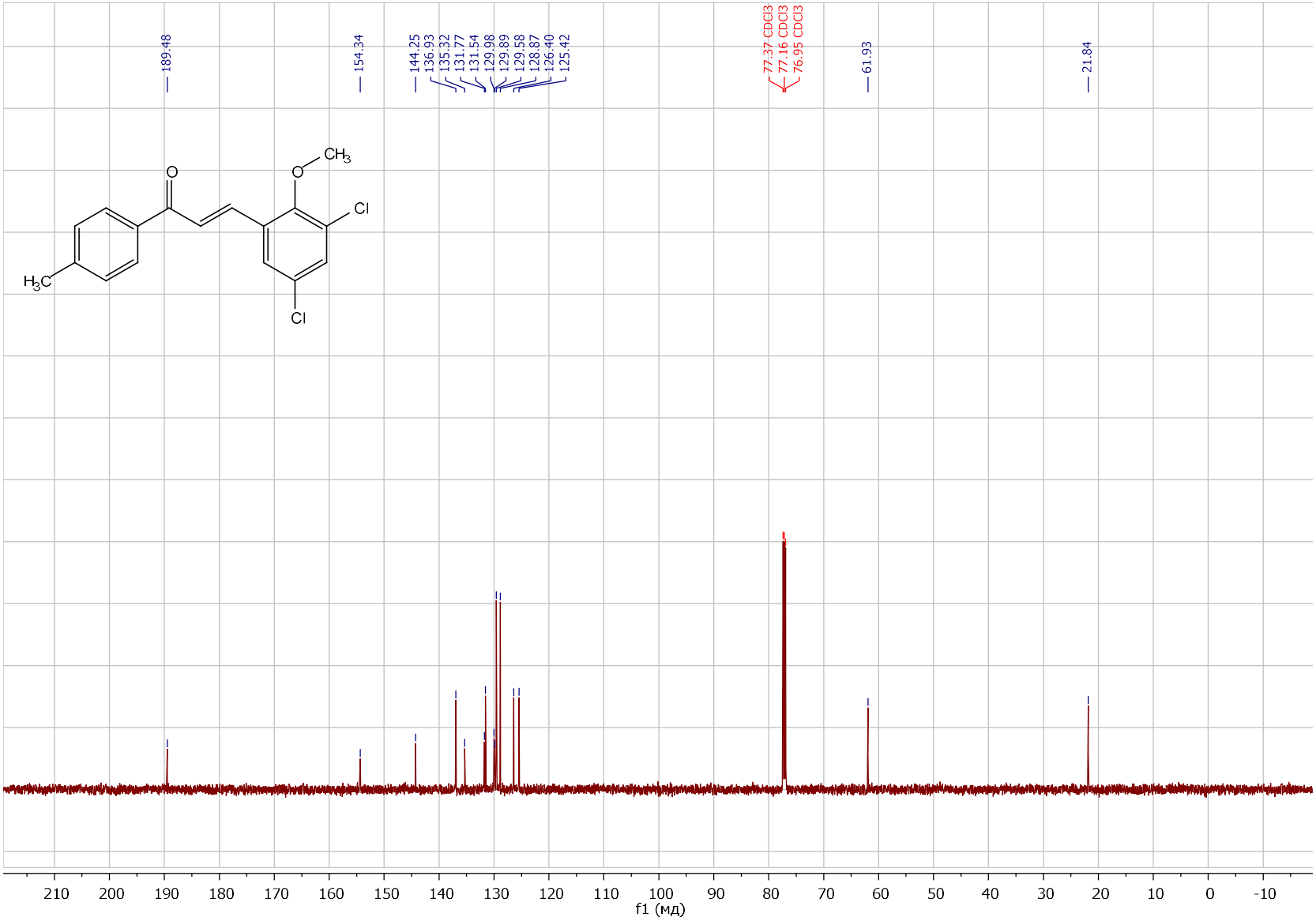
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(2,6-dichlorophenyl)-1-(3,4-dimethoxyphenyl)prop-2-en-1-one (3j)



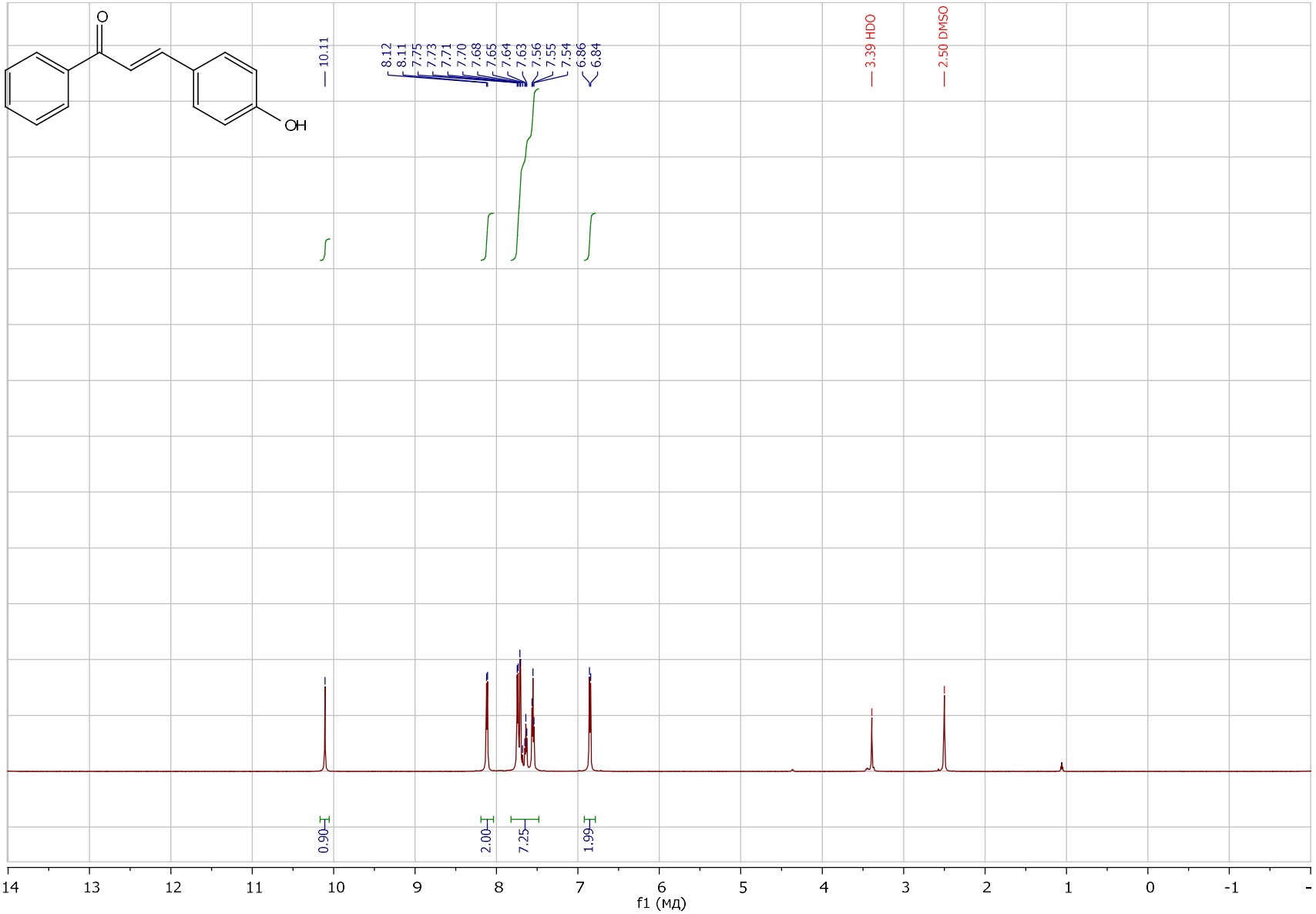
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(3,5-dichloro-2-methoxyphenyl)-1-(p-tolyl)prop-2-en-1-one (3k)



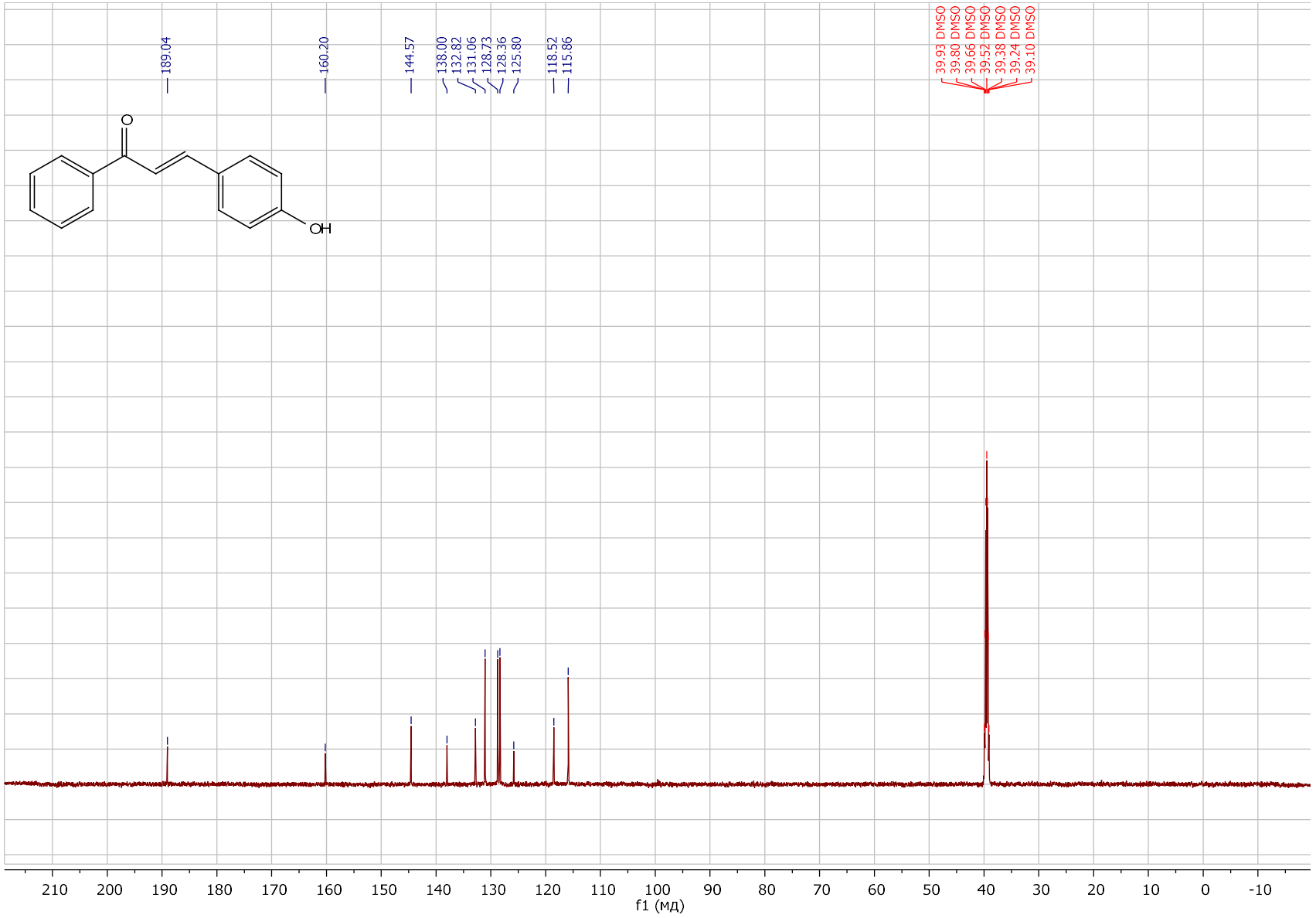
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(3,5-dichloro-2-methoxyphenyl)-1-(p-tolyl)prop-2-en-1-one (3k)



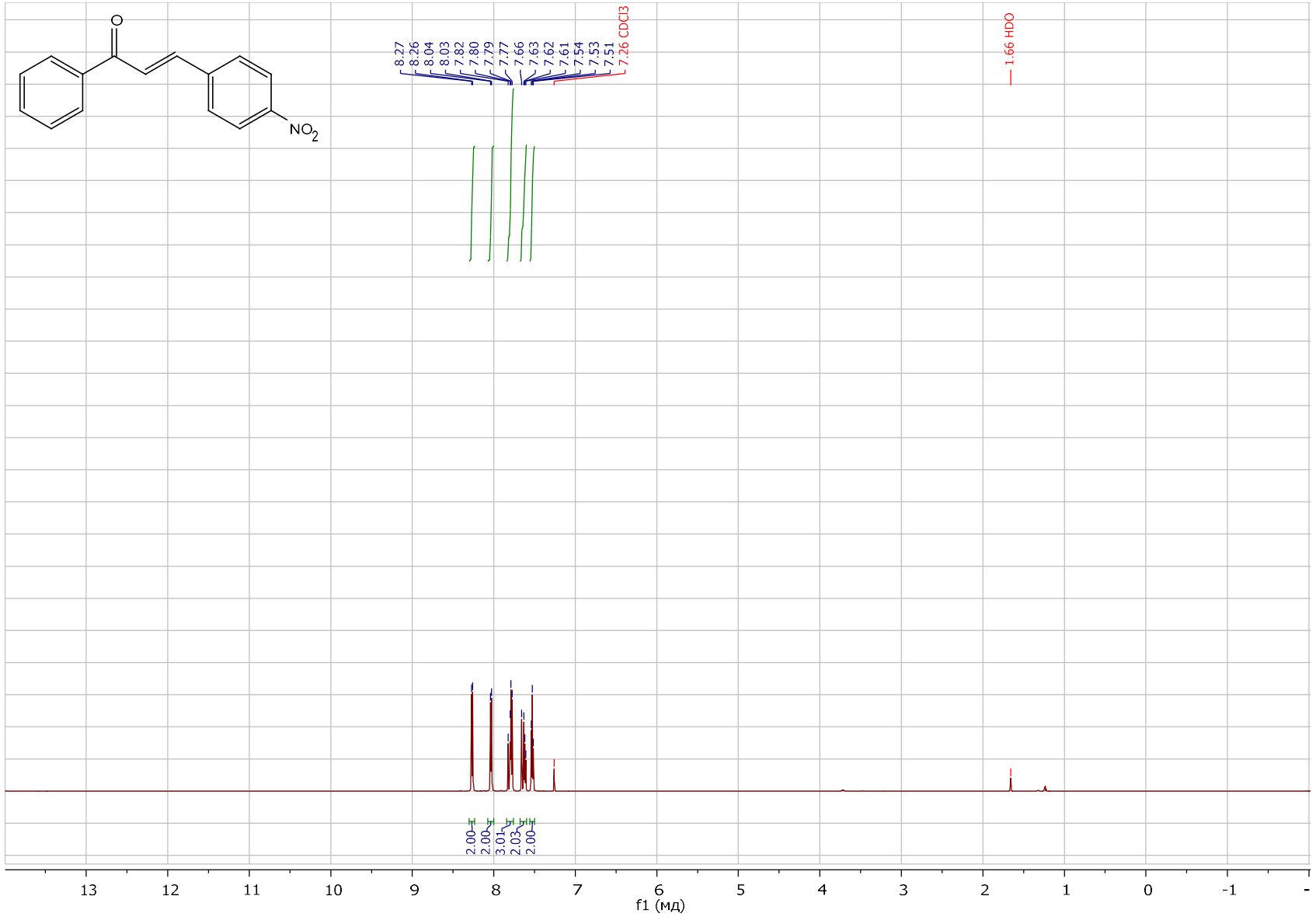
^{1}H NMR (600 MHz, DMSO-*d6*) of (E)-3-(4-hydroxyphenyl)-1-phenylprop-2-en-1-one (3l)



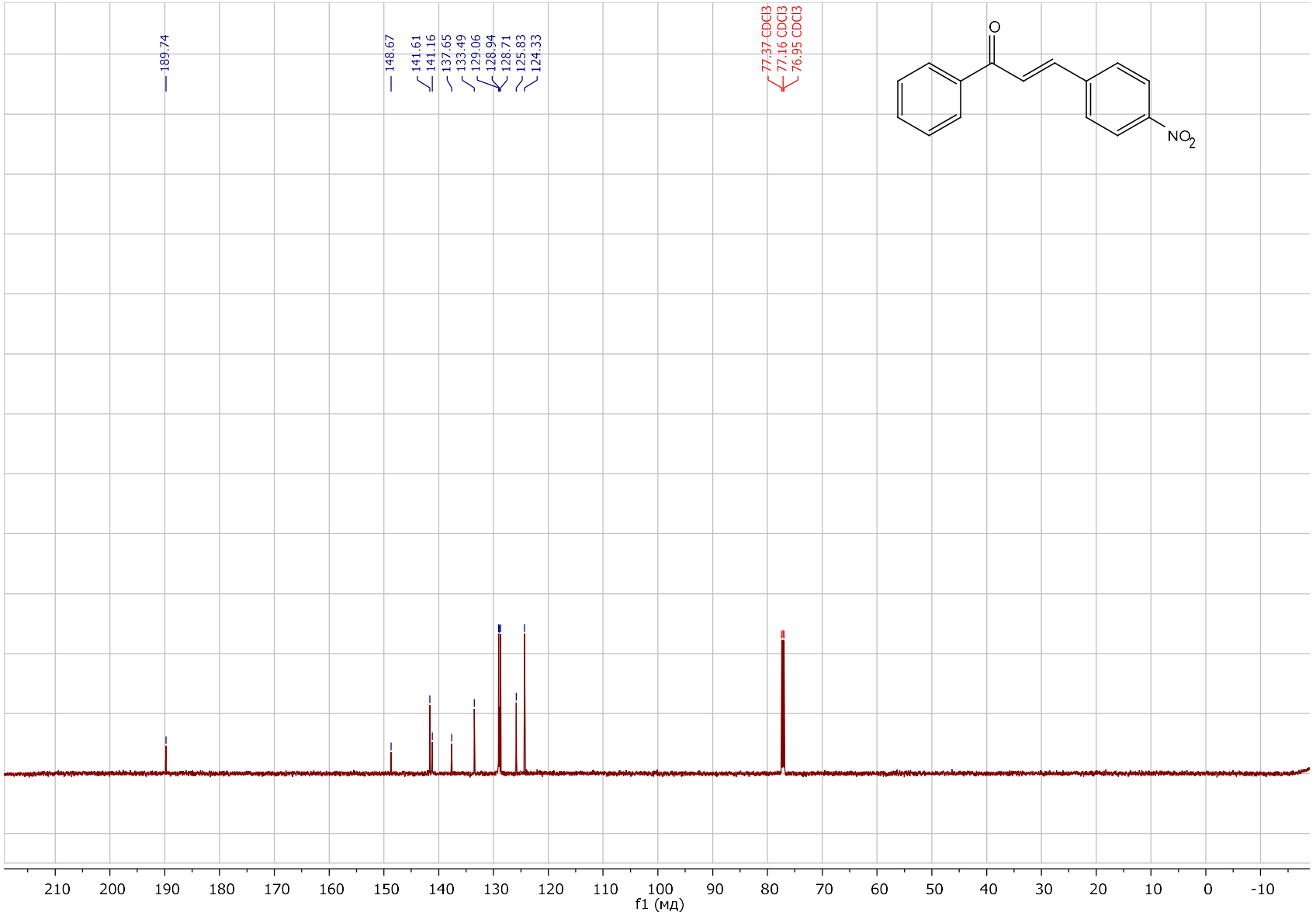
^{13}C NMR (151 MHz, DMSO-*d6*) of (E)-3-(4-hydroxyphenyl)-1-phenylprop-2-en-1-one (3l)



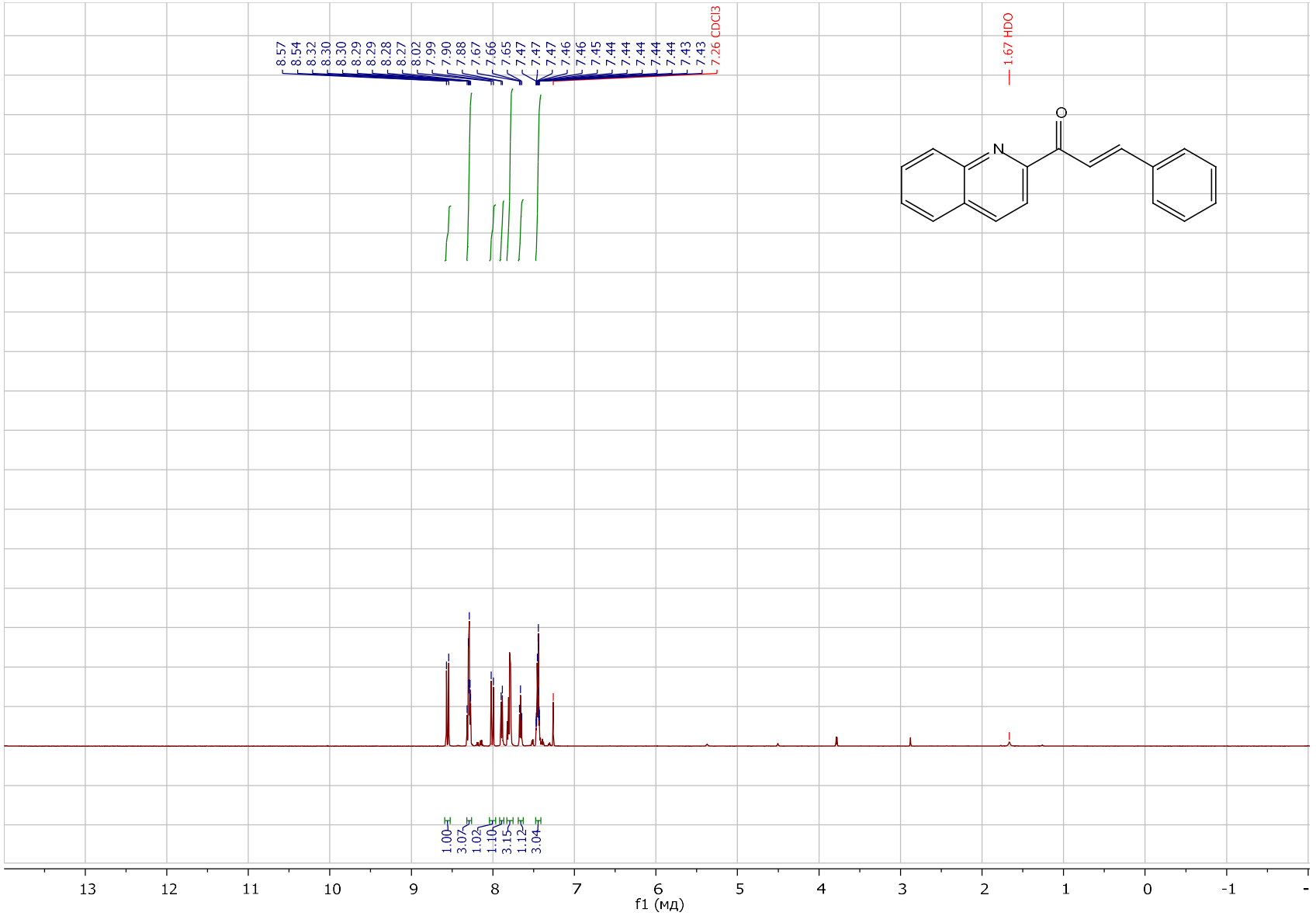
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(4-nitrophenyl)-1-phenylprop-2-en-1-one (3m)



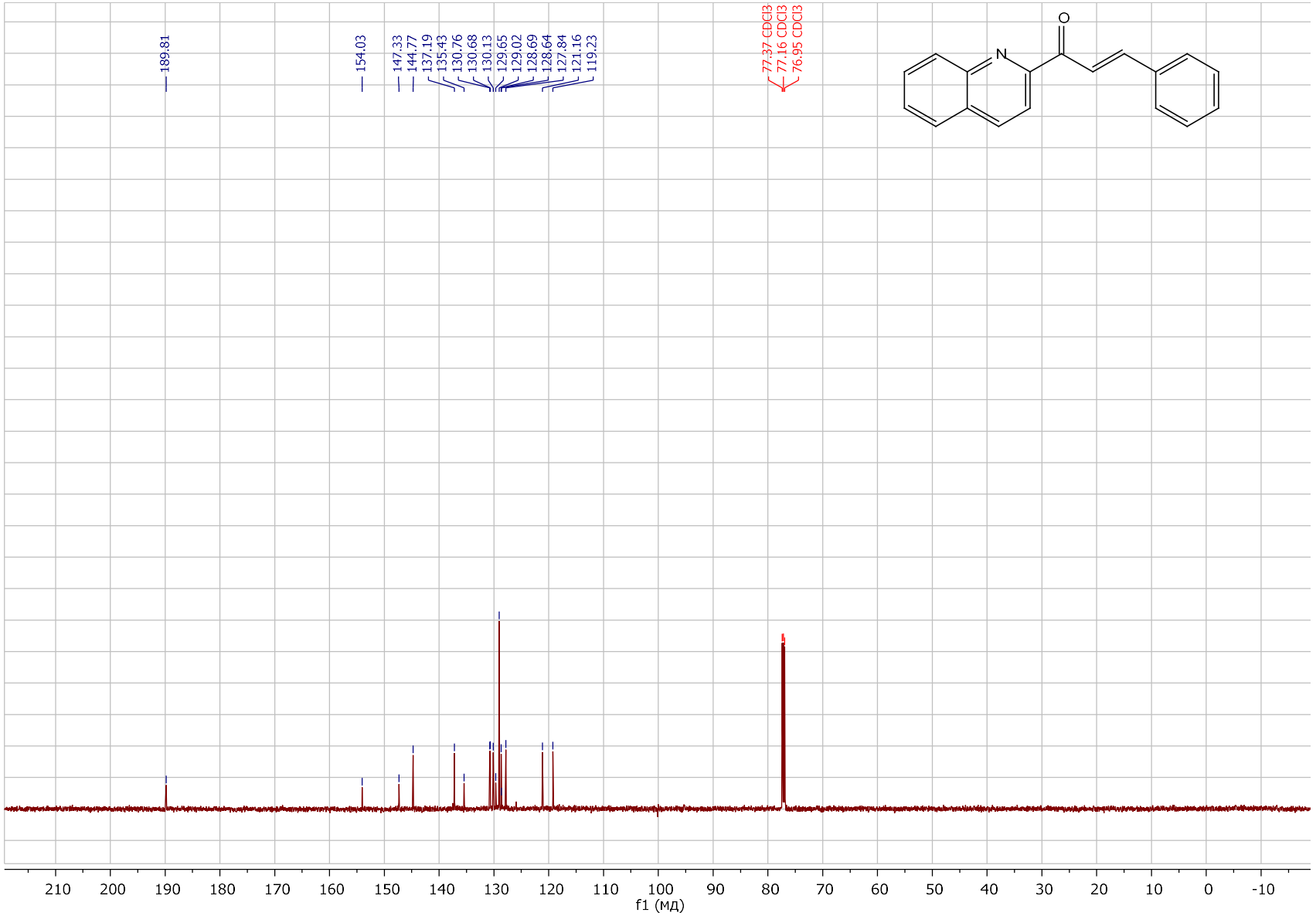
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(4-nitrophenyl)-1-phenylprop-2-en-1-one (3m)



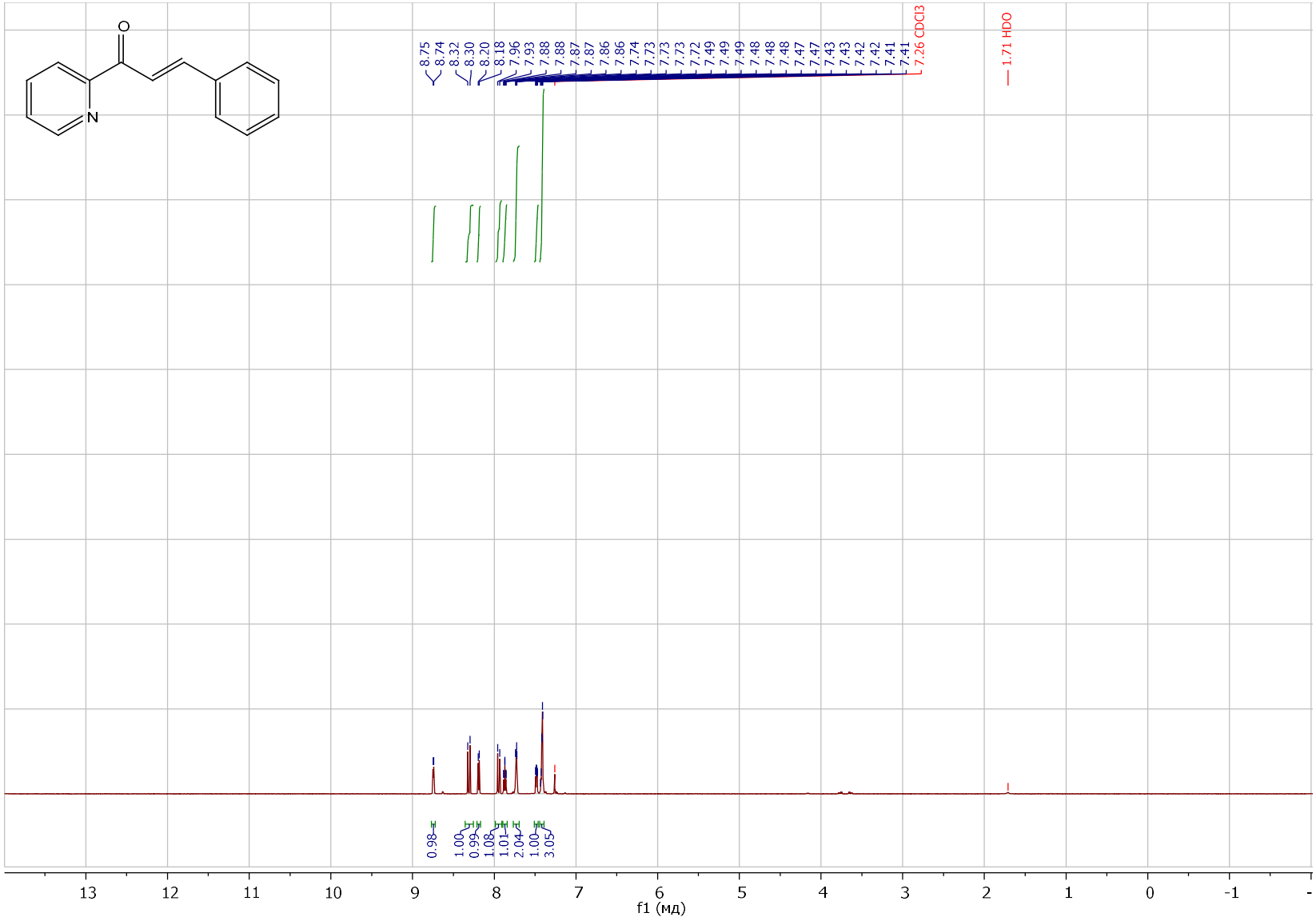
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-phenyl-1-(quinolin-2-yl)prop-2-en-1-one (3n)



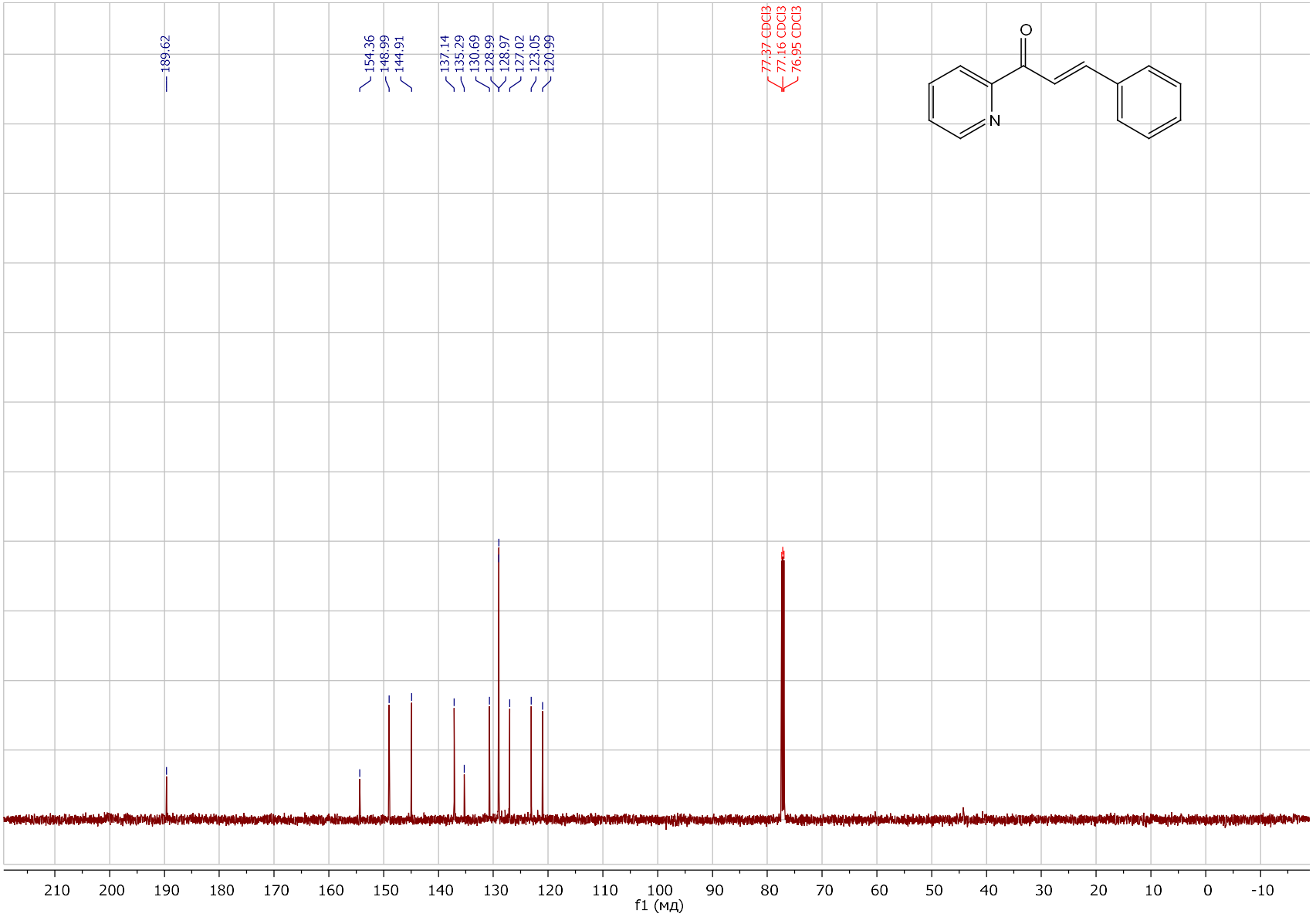
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-phenyl-1-(quinolin-2-yl)prop-2-en-1-one (3n)



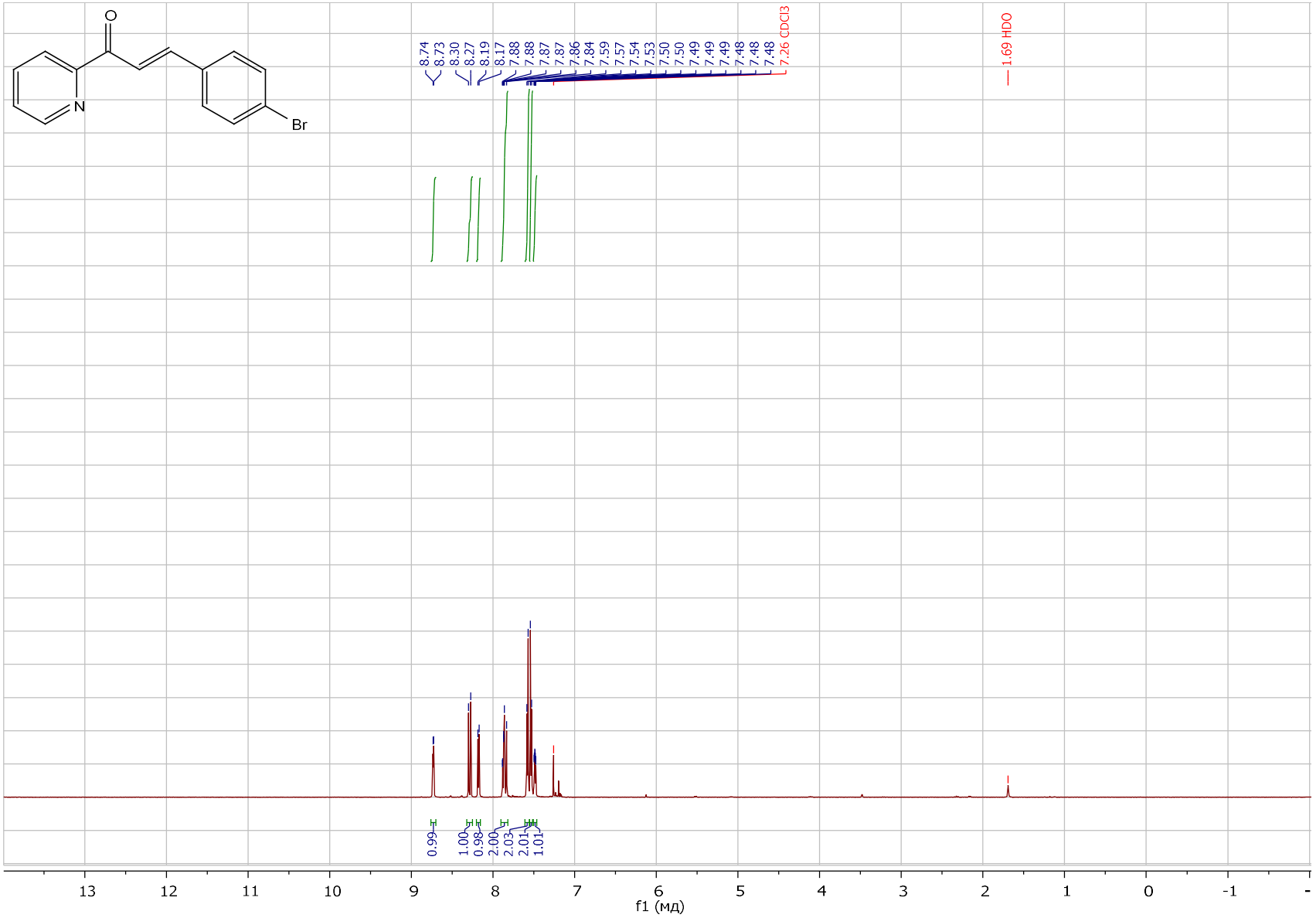
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-phenyl-1-(pyridin-2-yl)prop-2-en-1-one (3o)



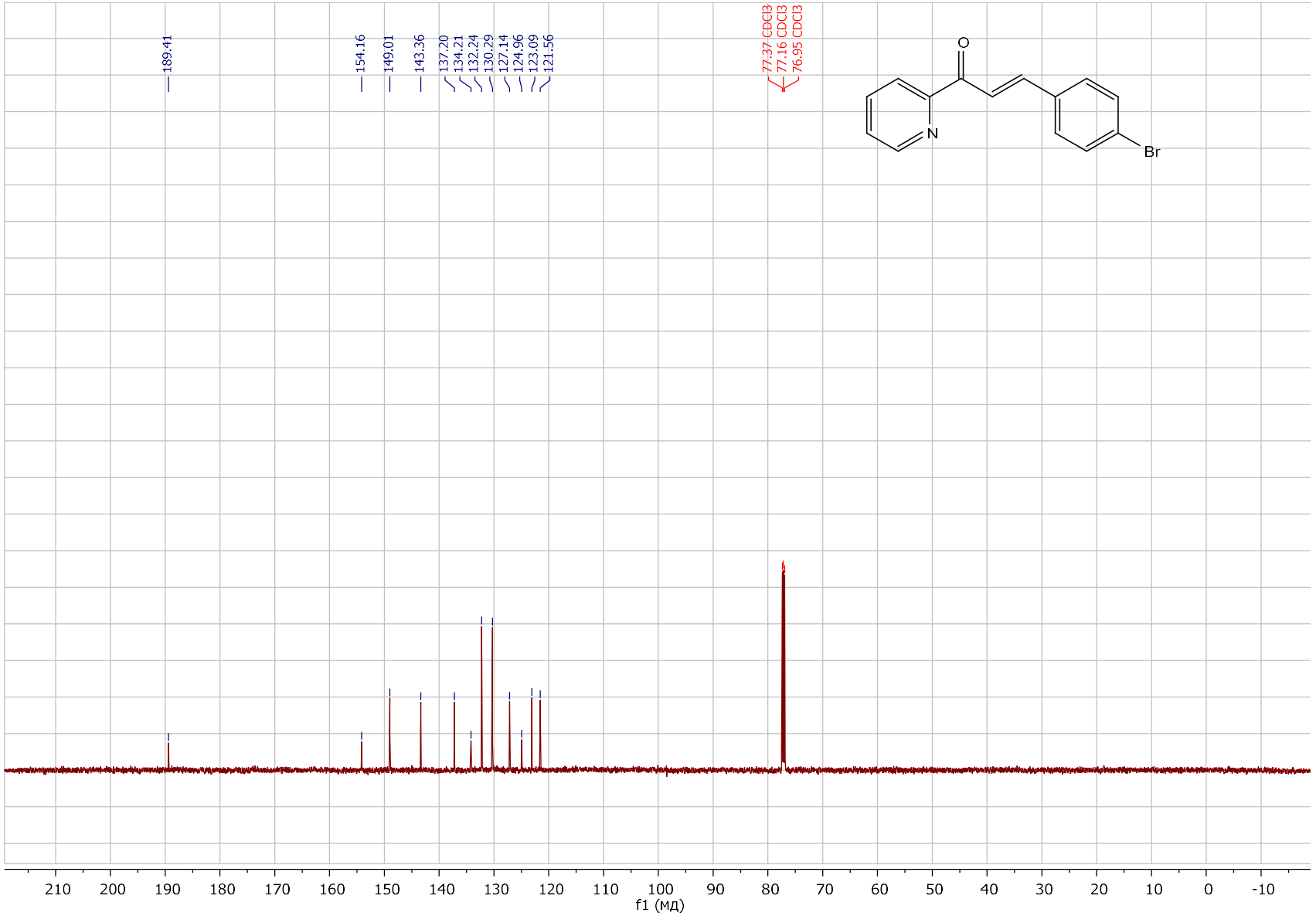
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-phenyl-1-(pyridin-2-yl)prop-2-en-1-one (3o)



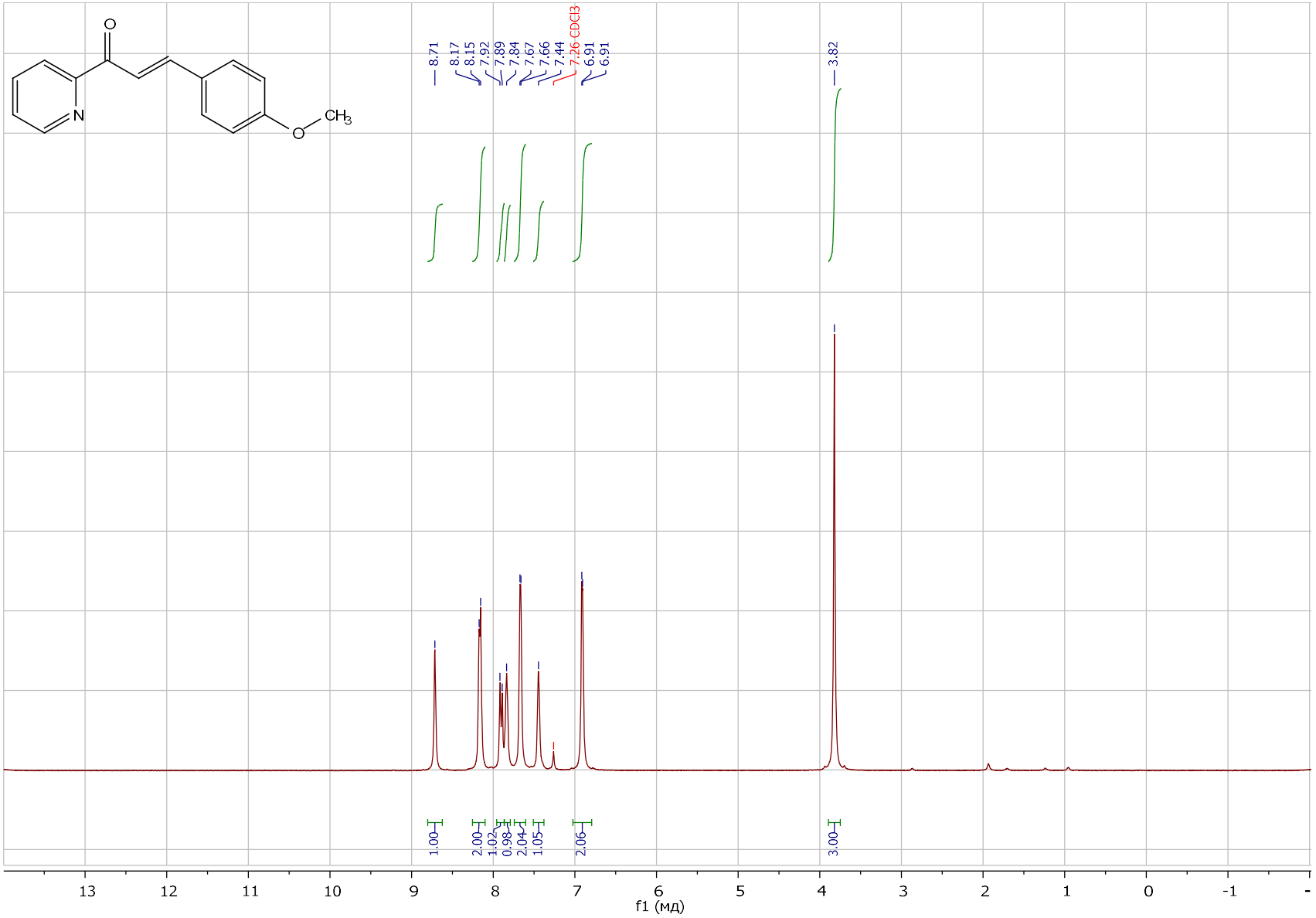
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(4-bromophenyl)-1-(pyridin-2-yl)prop-2-en-1-one (3p)



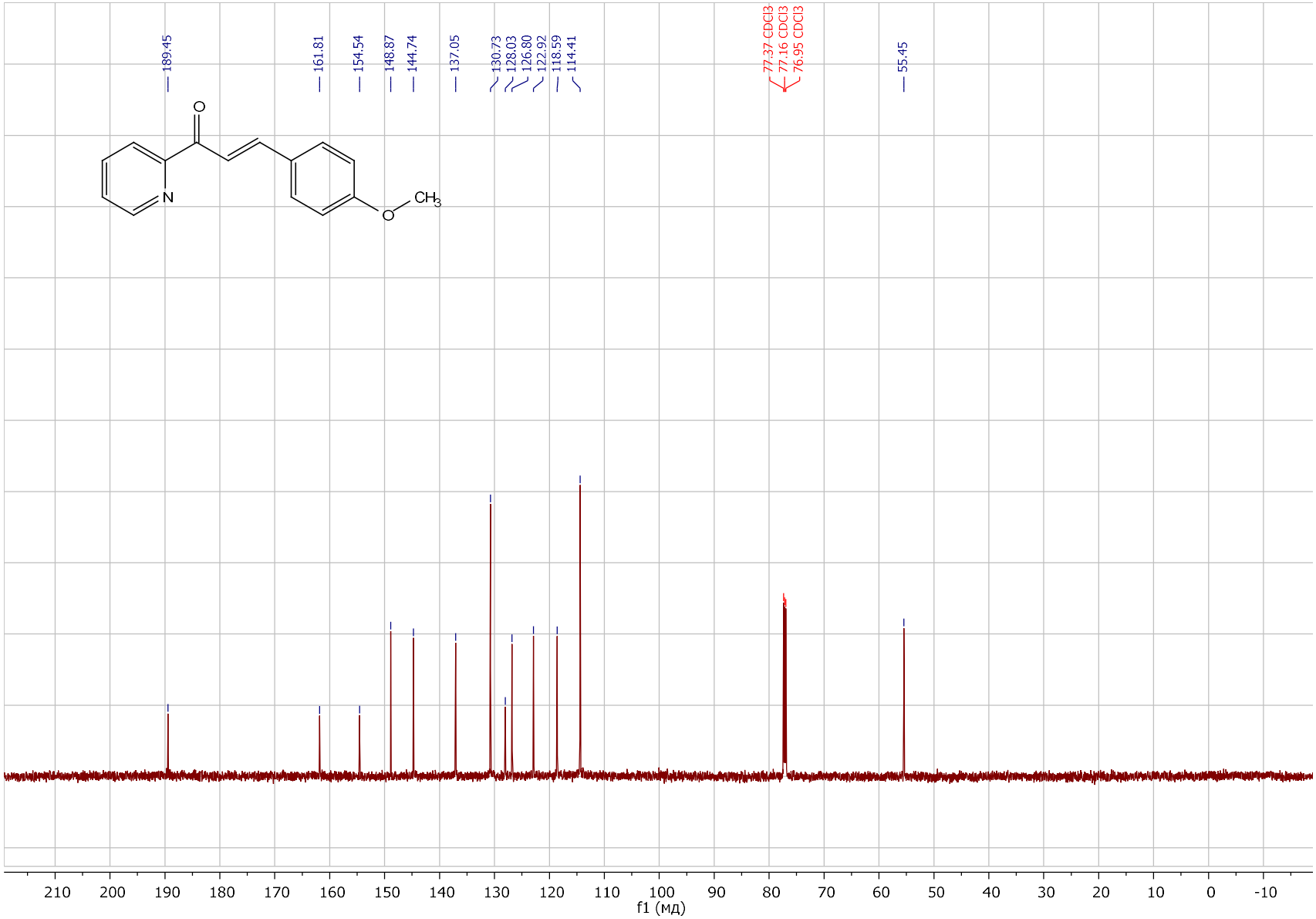
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(4-bromophenyl)-1-(pyridin-2-yl)prop-2-en-1-one (3p)



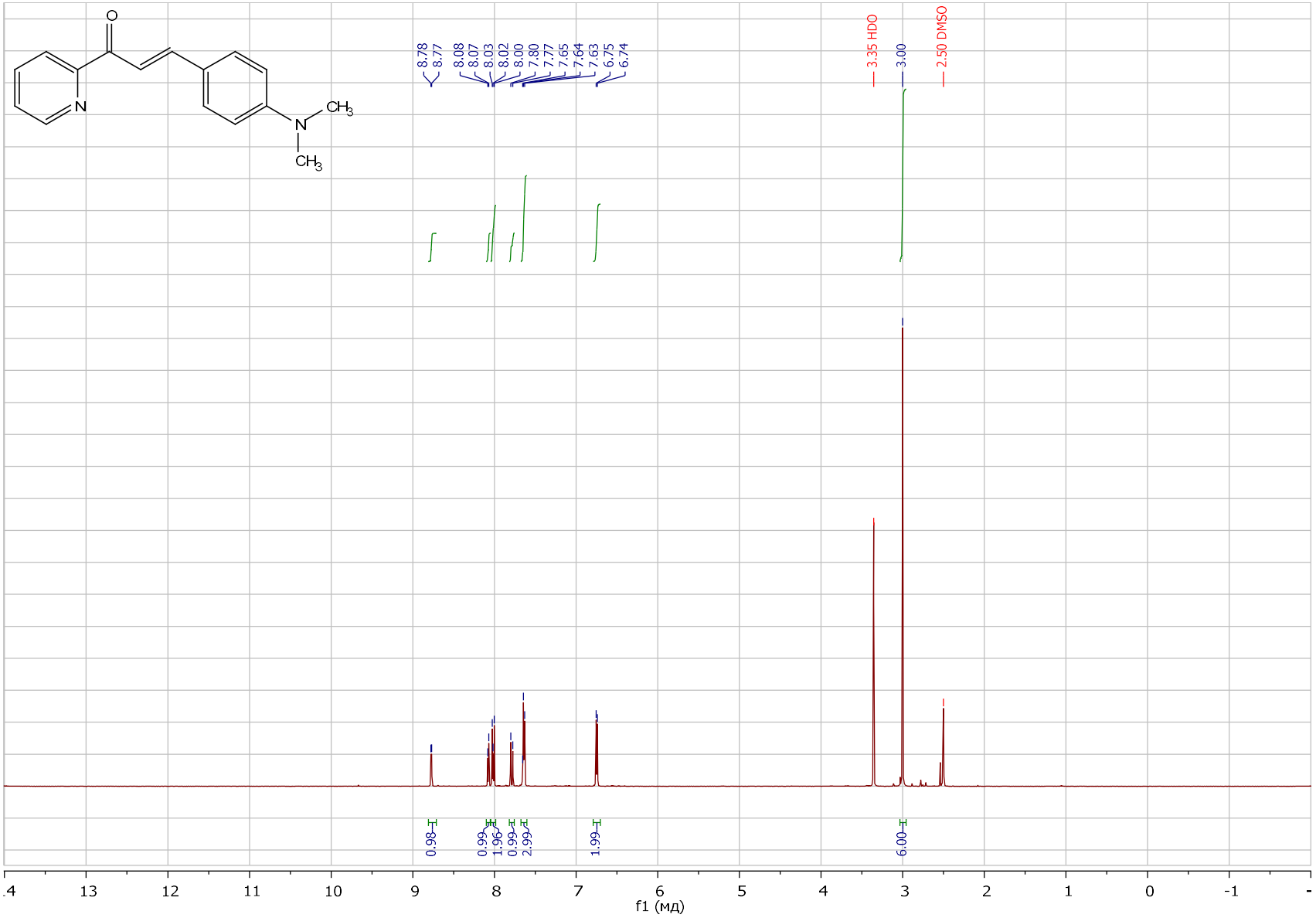
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-3-(4-methoxyphenyl)-1-(pyridin-2-yl)prop-2-en-1-one (3q)



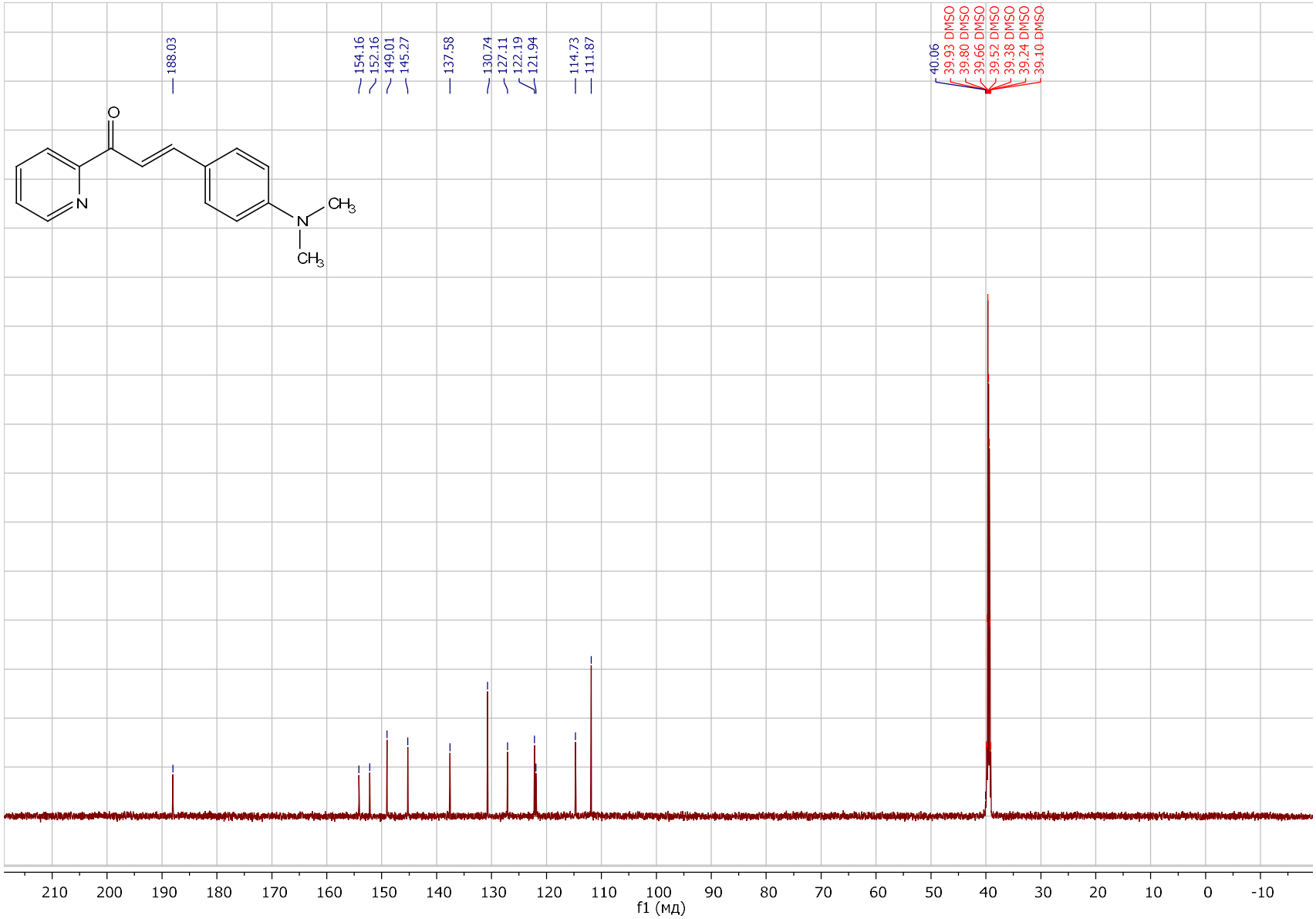
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-(4-methoxyphenyl)-1-(pyridin-2-yl)prop-2-en-1-one (3q)



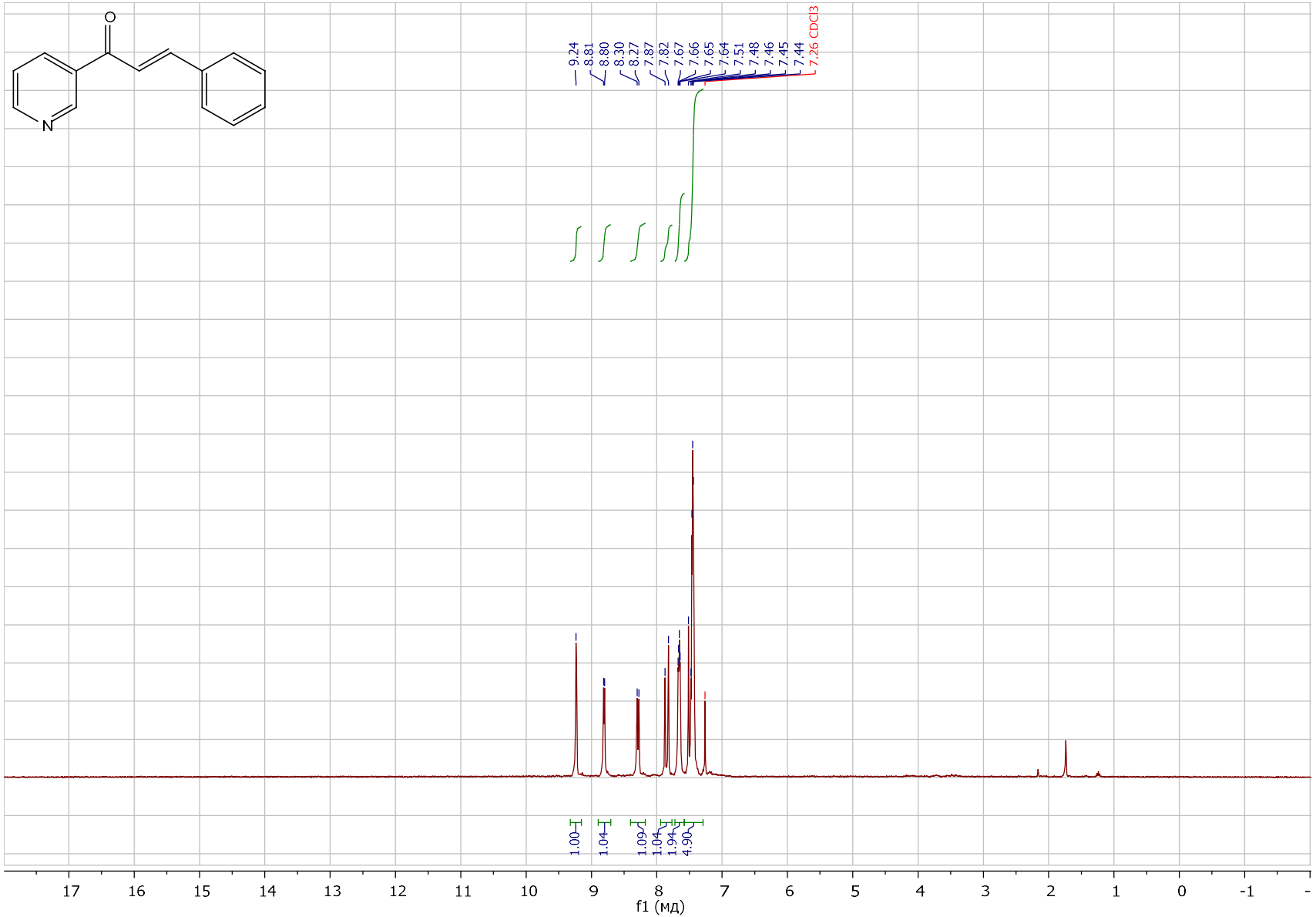
^{1}H NMR (600 MHz, DMSO-*d6*) of (E)-3-(4-(dimethylamino)phenyl)-1-(pyridin-2-yl)prop-2-en-1-one (3r)



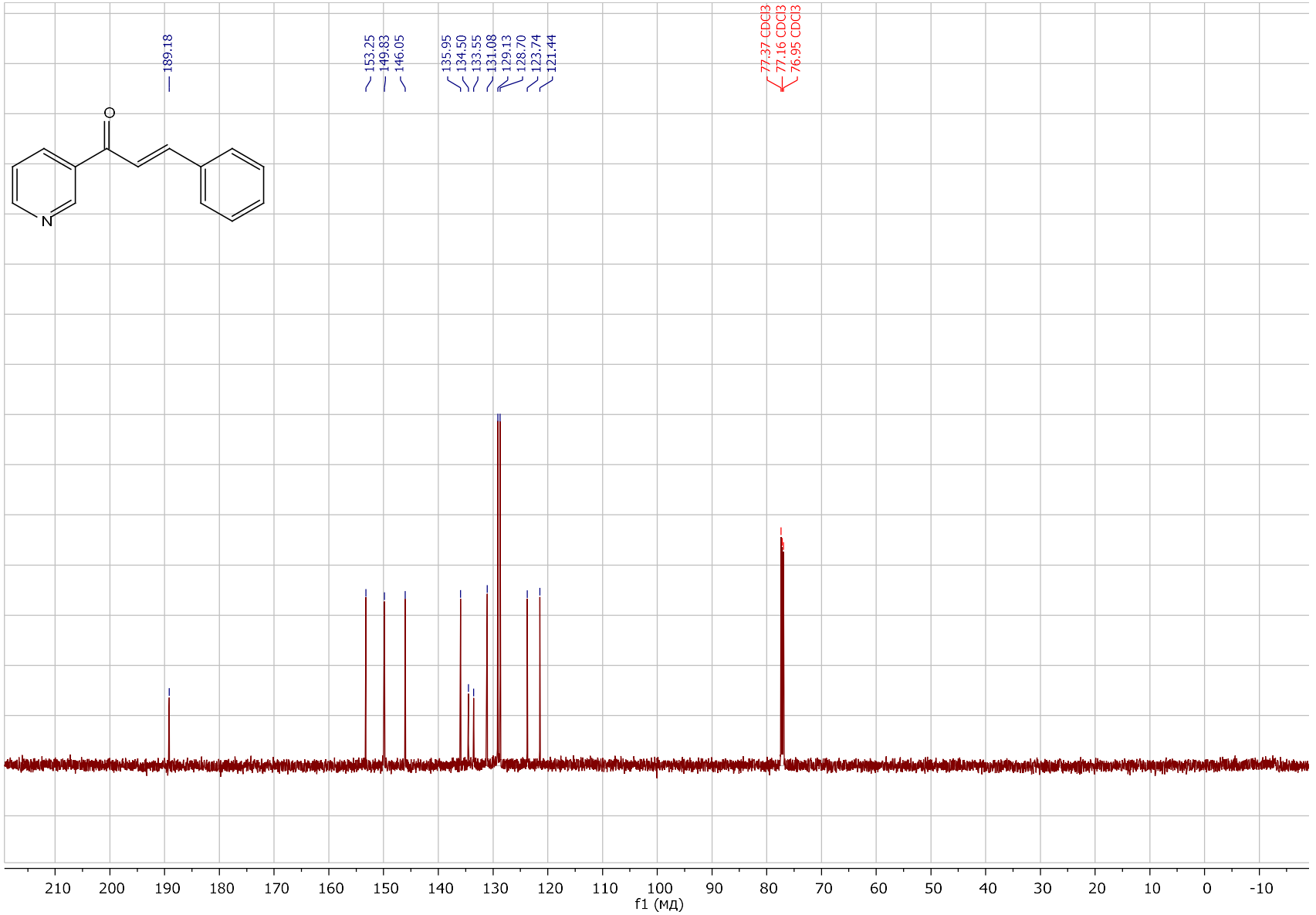
^{13}C NMR (151 MHz, DMSO-*d6*) of (E)-3-(4-(dimethylamino)phenyl)-1-(pyridin-2-yl)prop-2-en-1-one (3r)



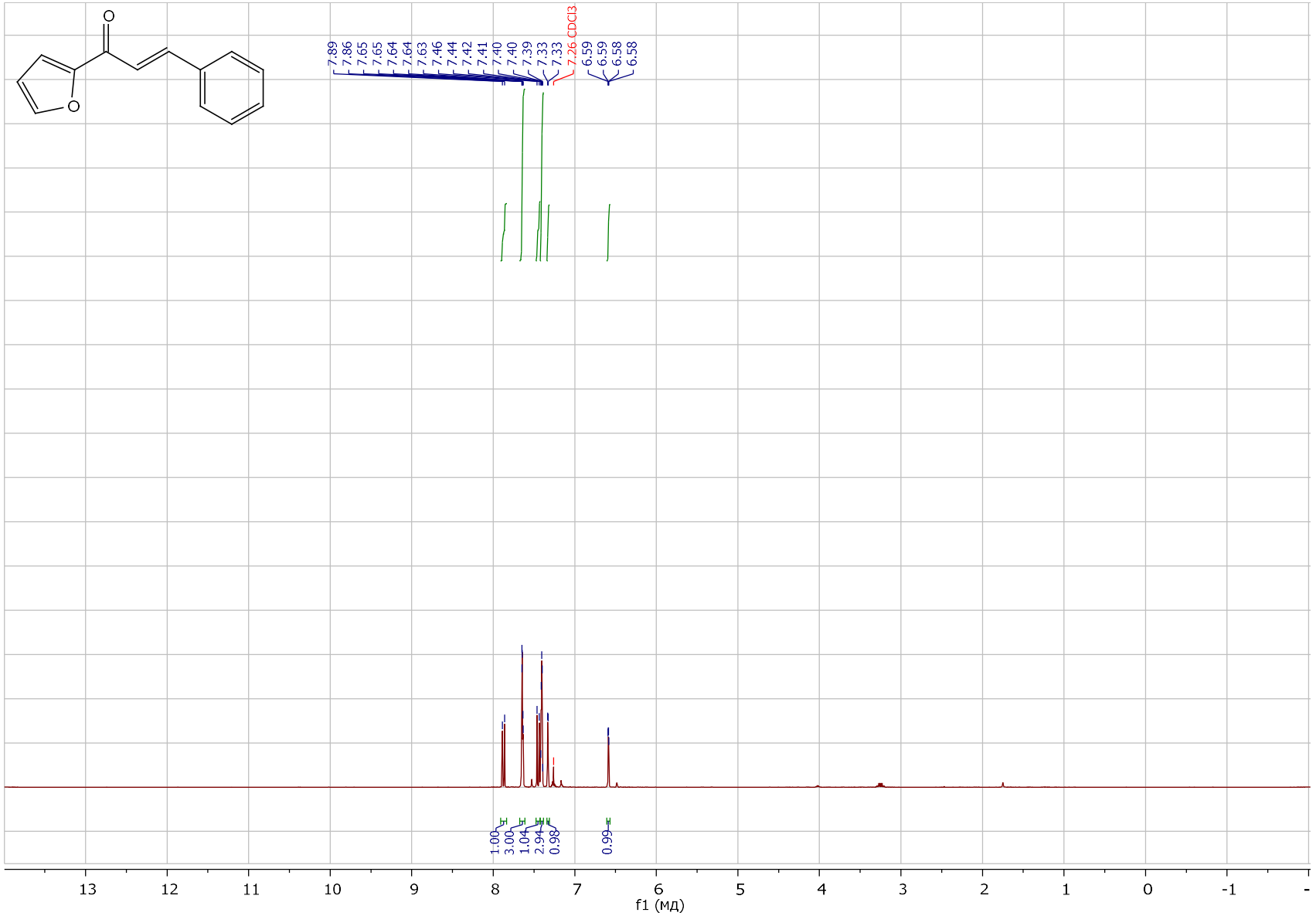
^{1}H NMR (300 MHz, Chloroform-*d*) of (E)-3-phenyl-1-(pyridin-3-yl)prop-2-en-1-one (3s)



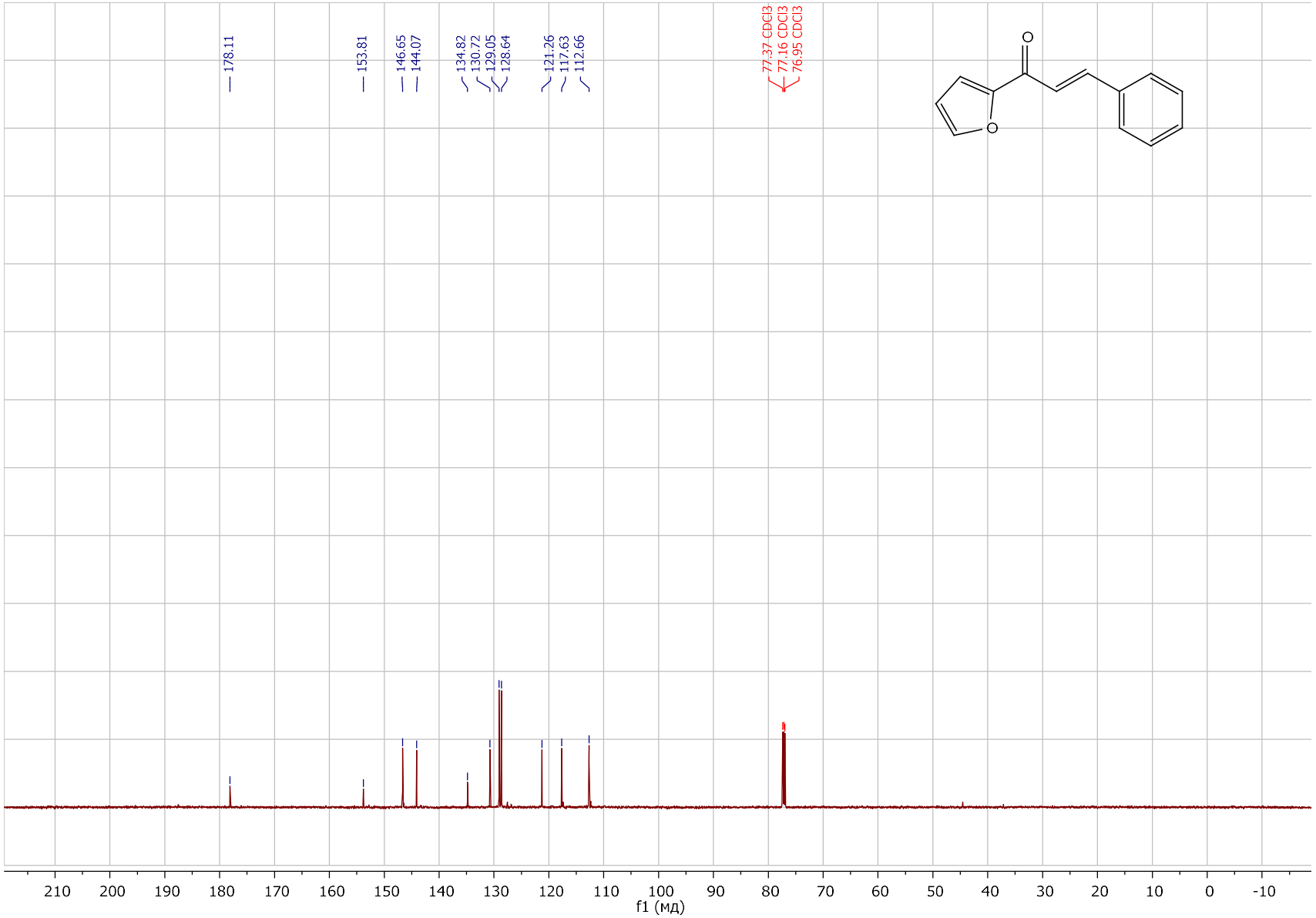
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-3-phenyl-1-(pyridin-3-yl)prop-2-en-1-one (3s)



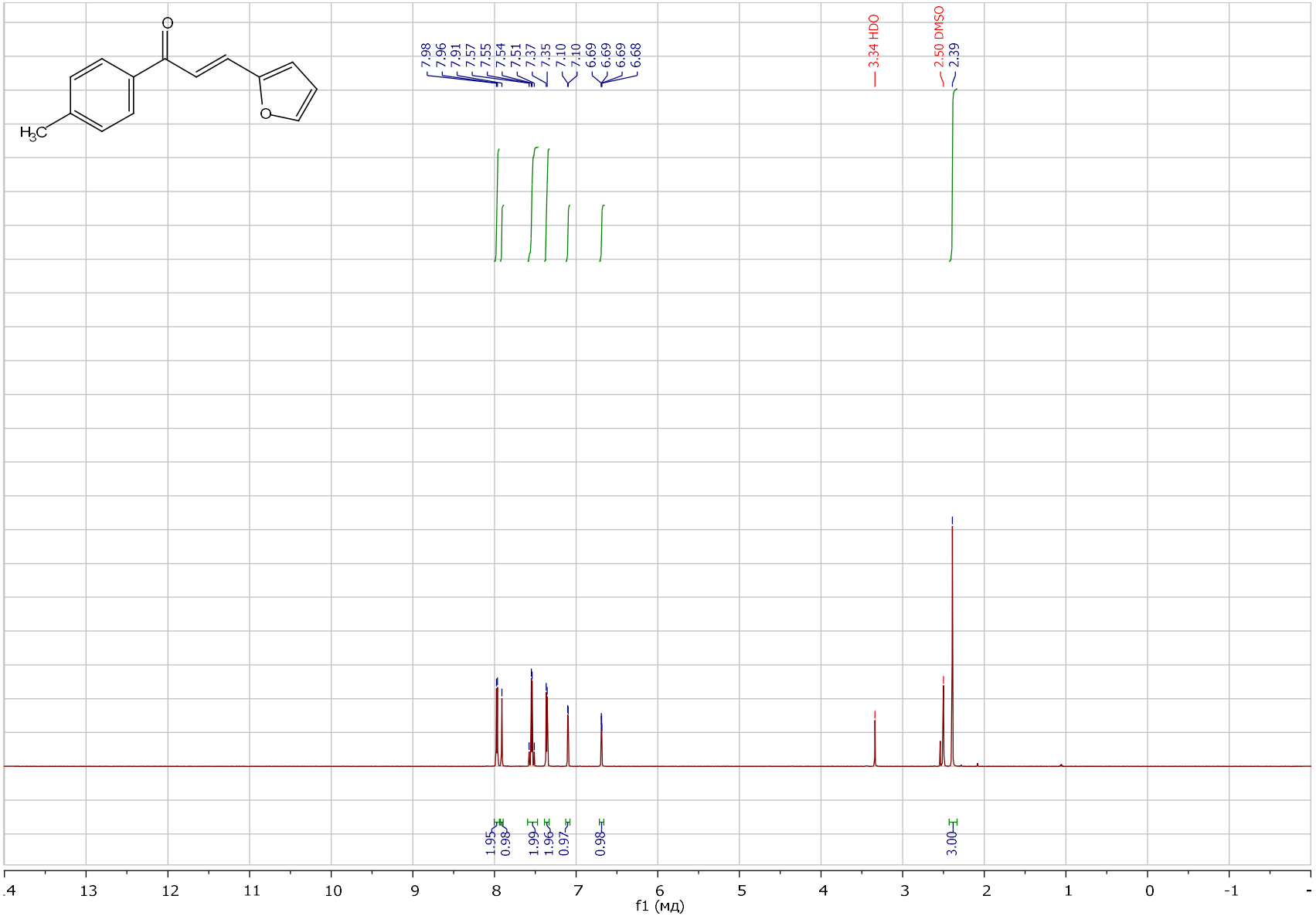
^{1}H NMR (600 MHz, Chloroform-*d*) of (E)-1-(furan-2-yl)-3-phenylprop-2-en-1-one (3t)



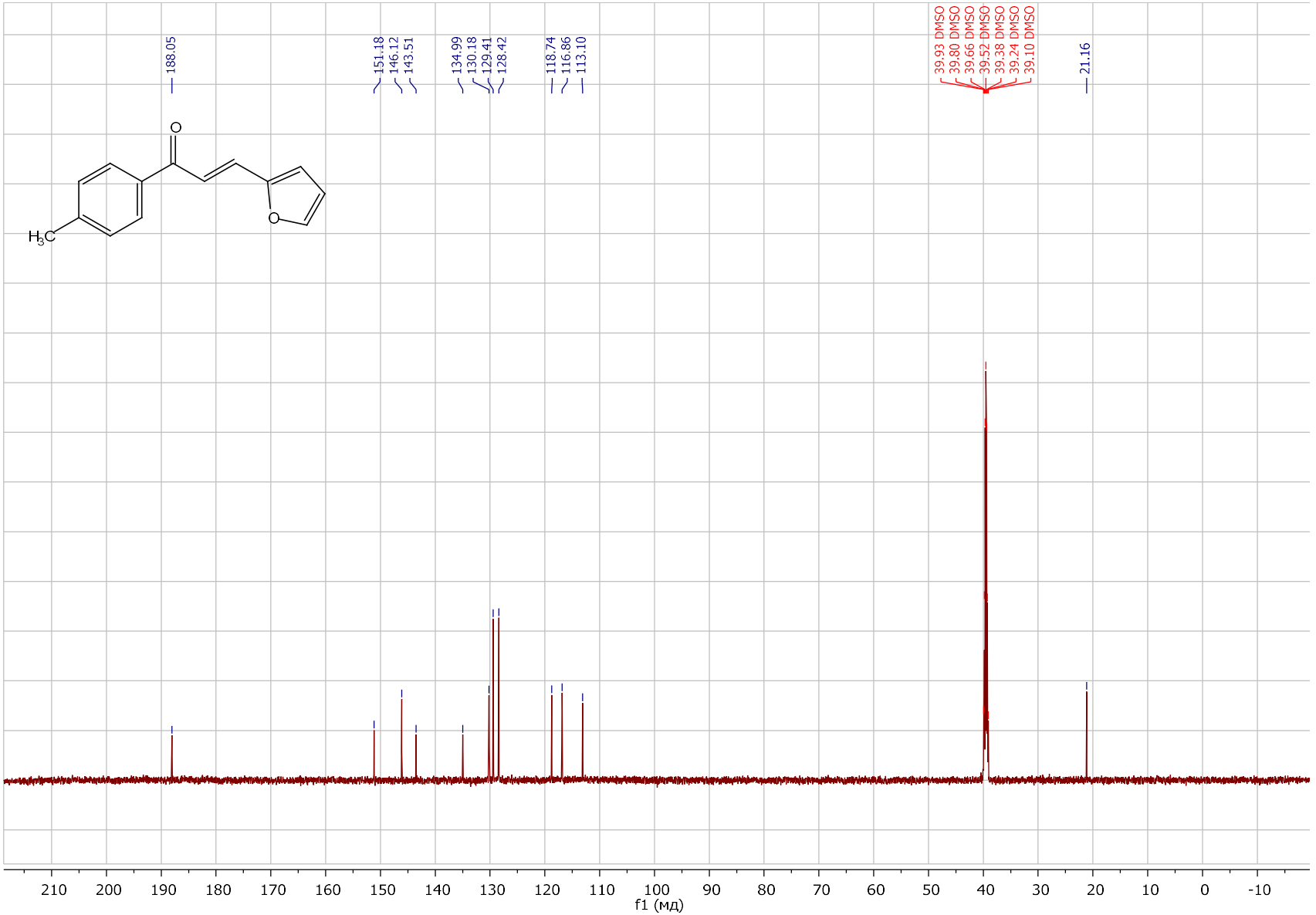
^{13}C NMR (151 MHz, Chloroform-*d*) of (E)-1-(furan-2-yl)-3-phenylprop-2-en-1-one (3t)



^{1}H NMR (600 MHz, DMSO-*d6*) of (E)-3-(furan-2-yl)-1-(p-tolyl)prop-2-en-1-one (3u)

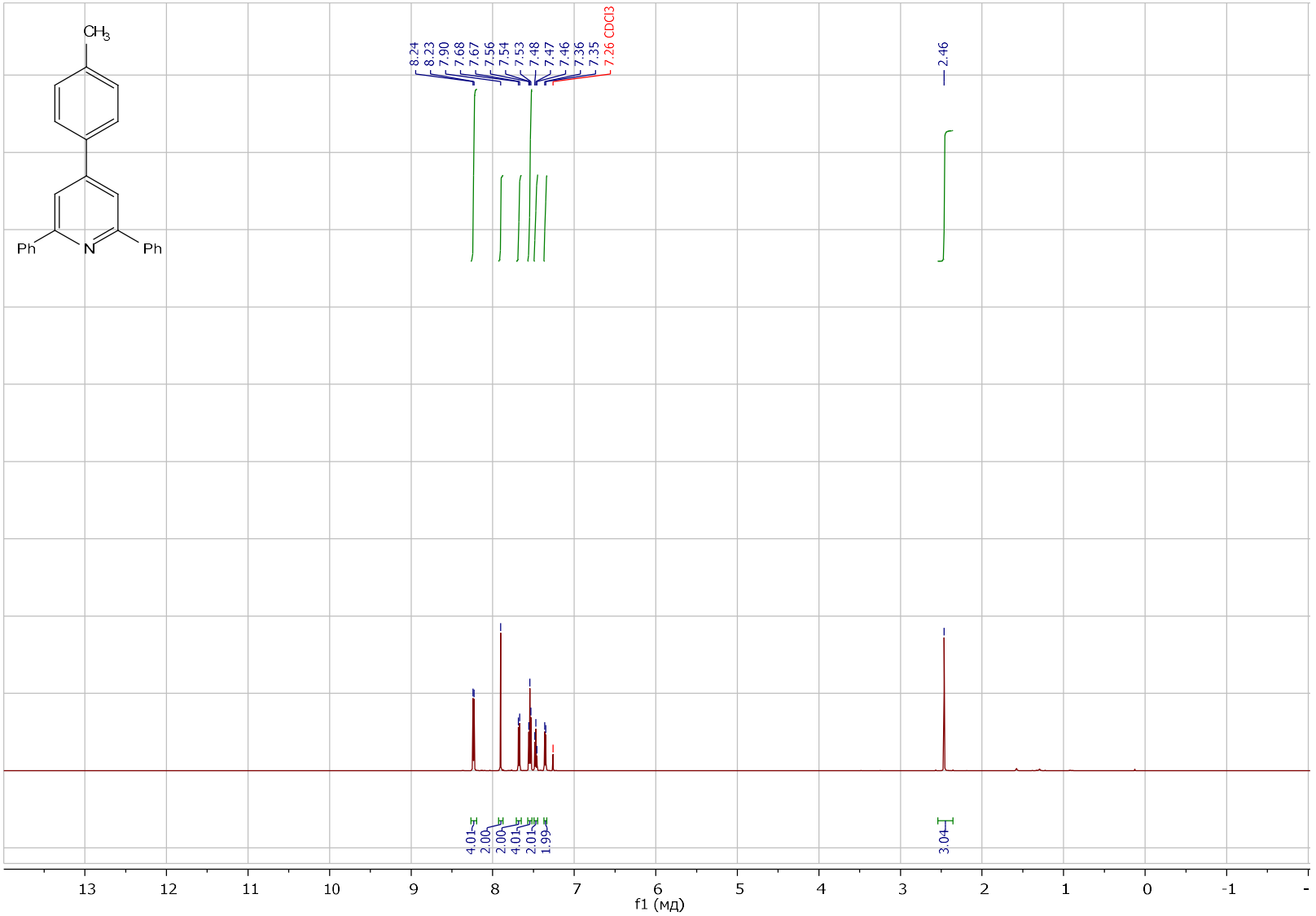


^{13}C NMR (151 MHz, DMSO-*d6*) of (E)-3-(furan-2-yl)-1-(p-tolyl)prop-2-en-1-one (3u)

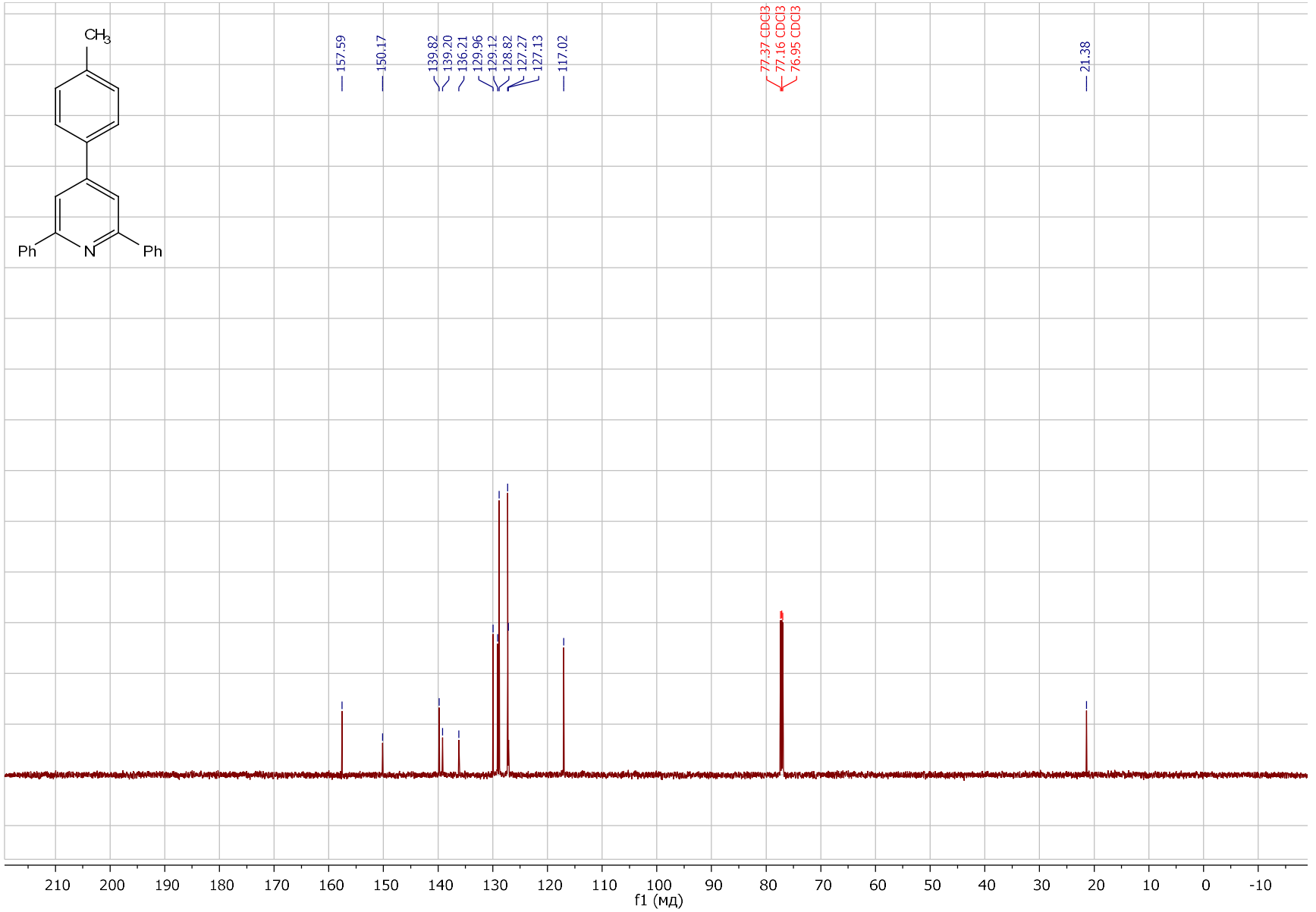


4.3 Pyridines

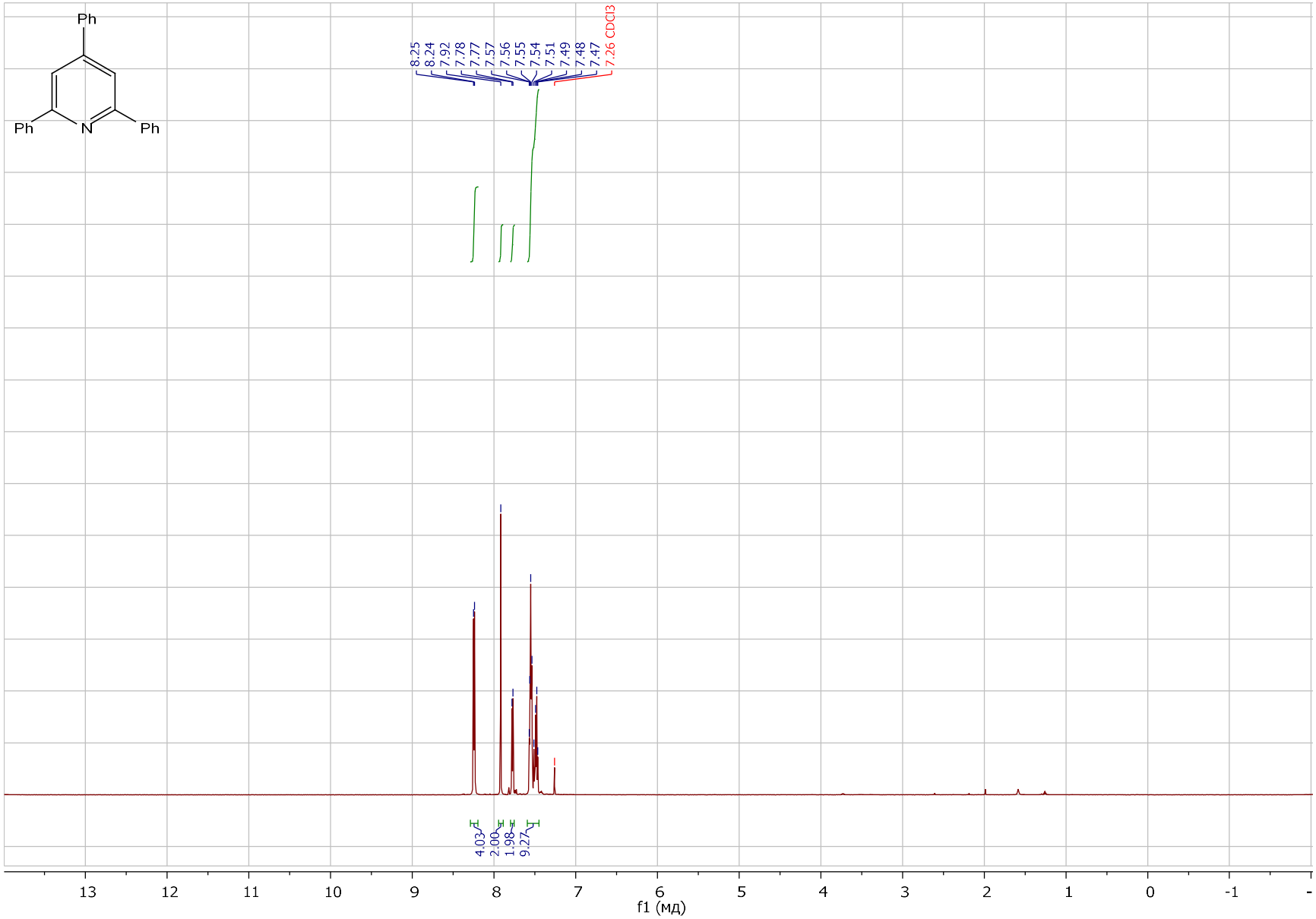
^{1}H NMR (600 MHz, Chloroform-*d*) of 2,6-diphenyl-4-(p-tolyl)pyridine (4a)



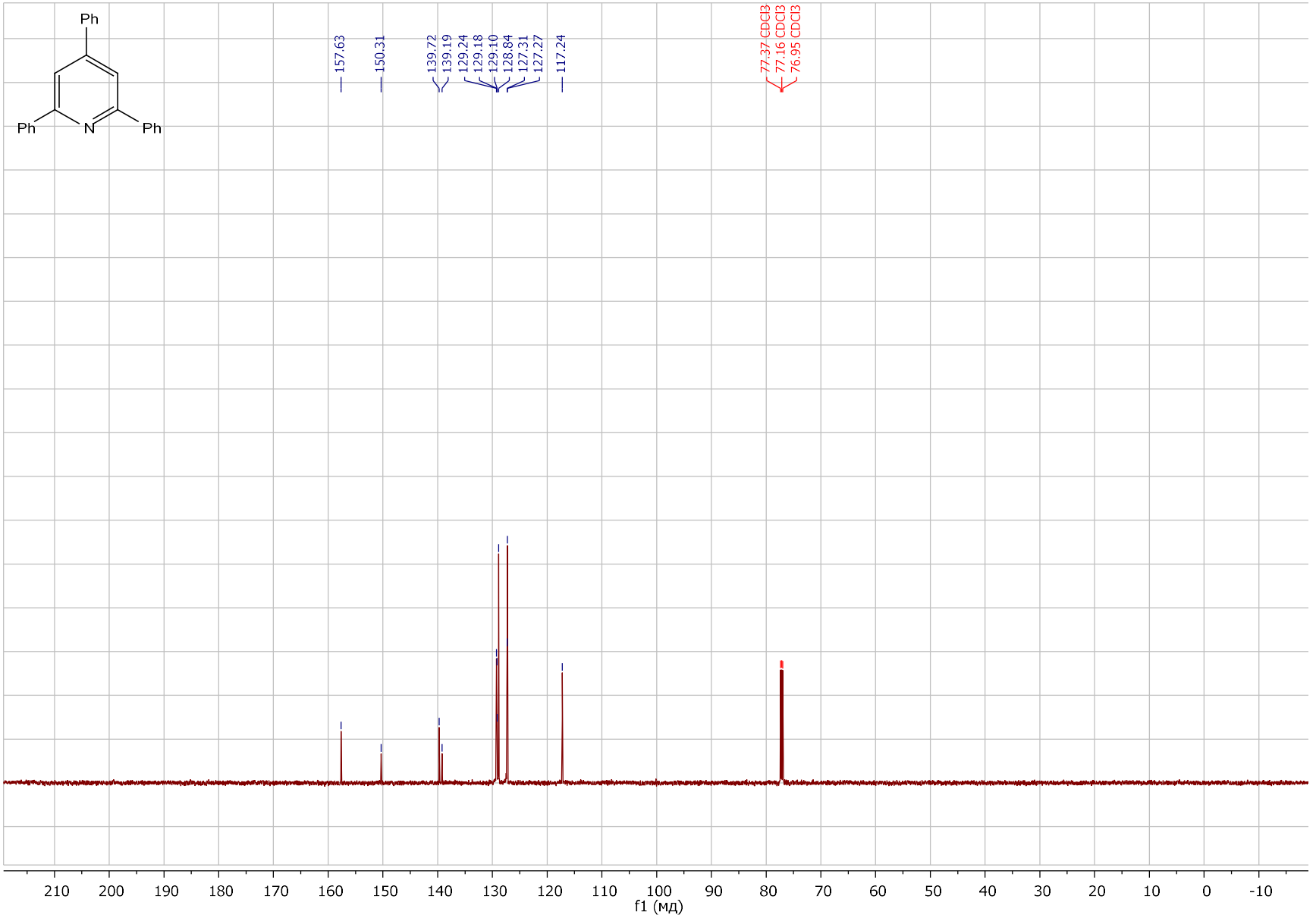
^{13}C NMR (151 MHz, Chloroform-*d*) of 2,6-diphenyl-4-(p-tolyl)pyridine (4a)



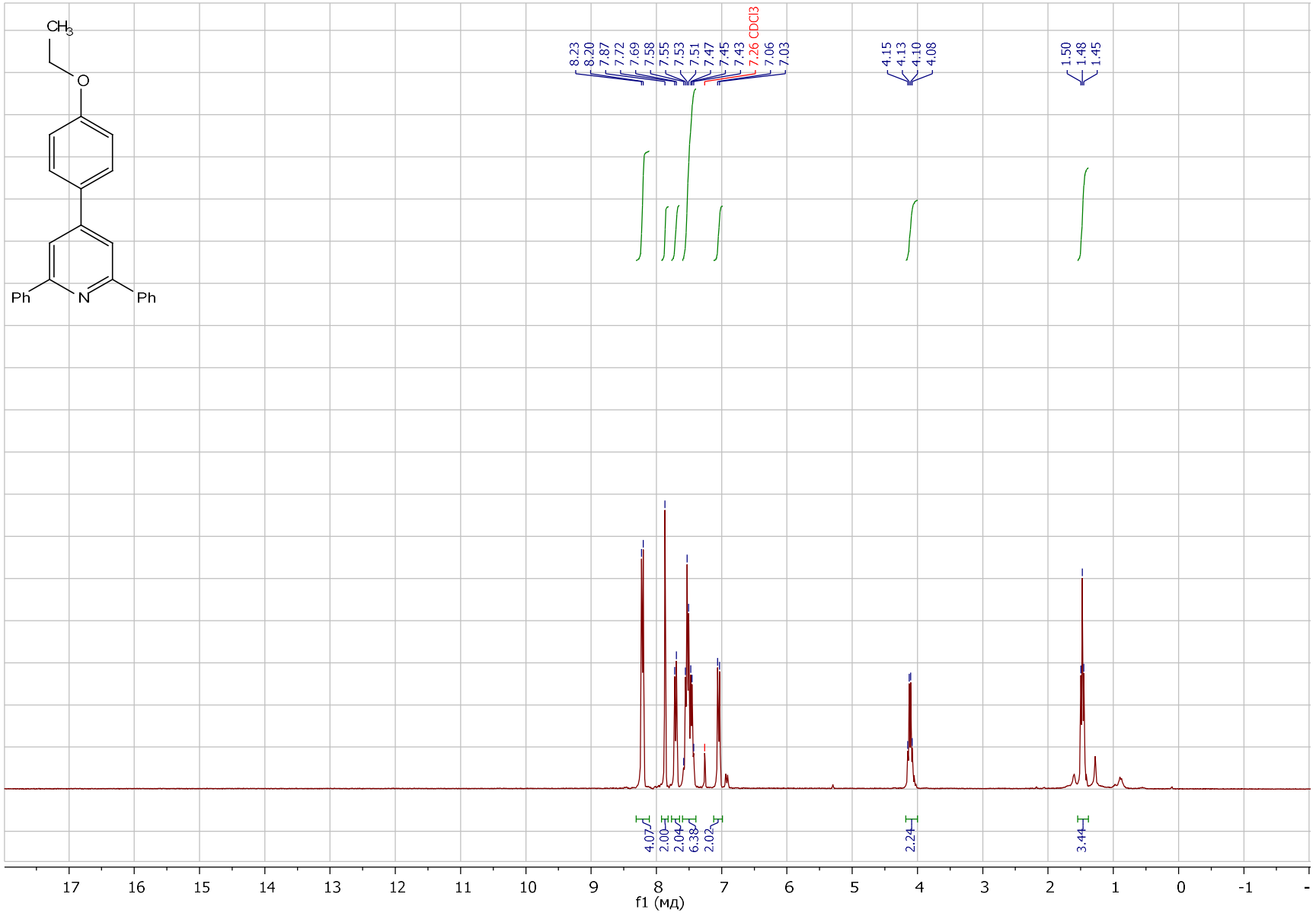
^{1}H NMR (600 MHz, Chloroform-*d*) of 2,4,6-triphenylpyridine (4b)



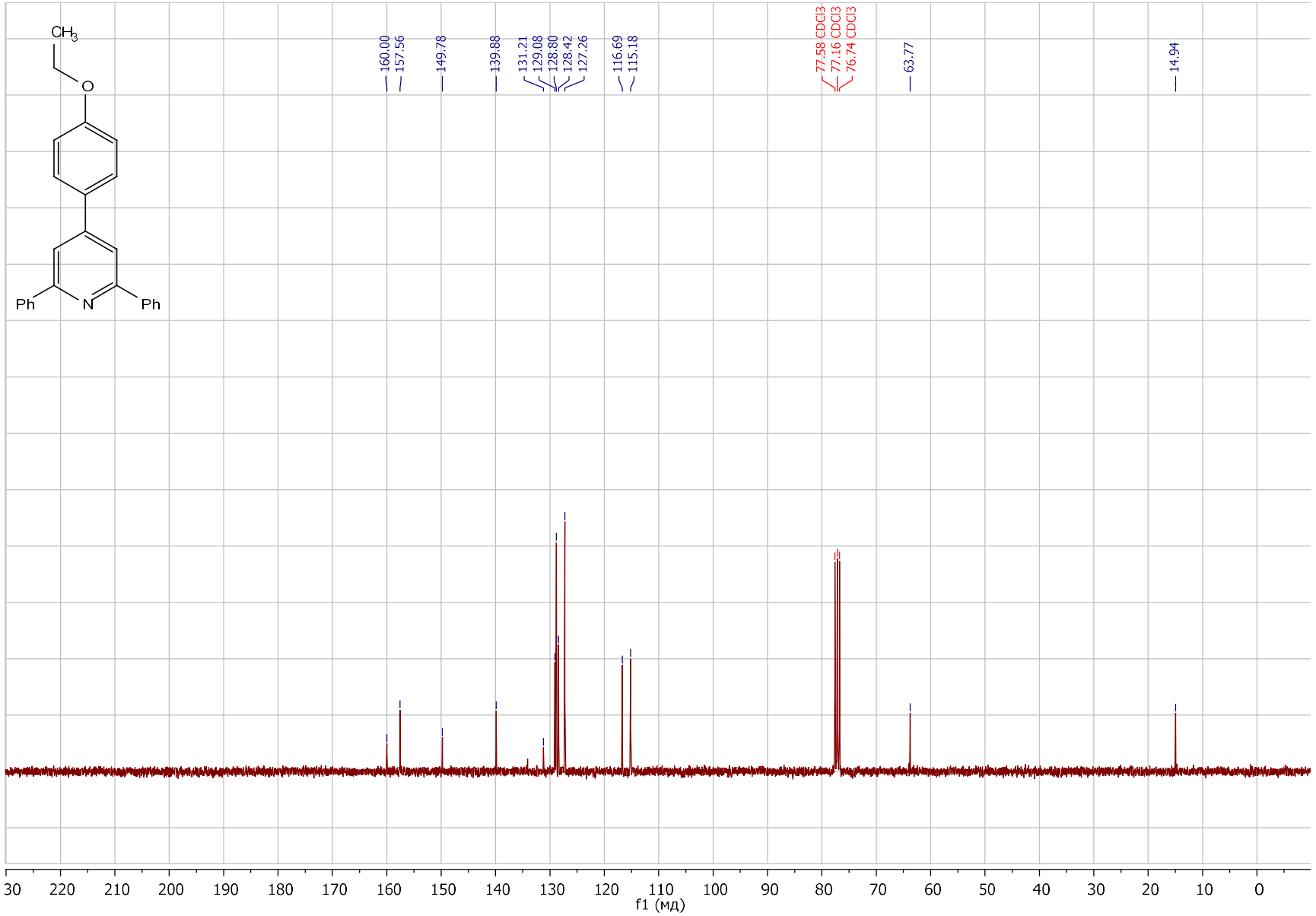
^{13}C NMR (151 MHz, Chloroform-*d*) of 2,4,6-triphenylpyridine (4b)



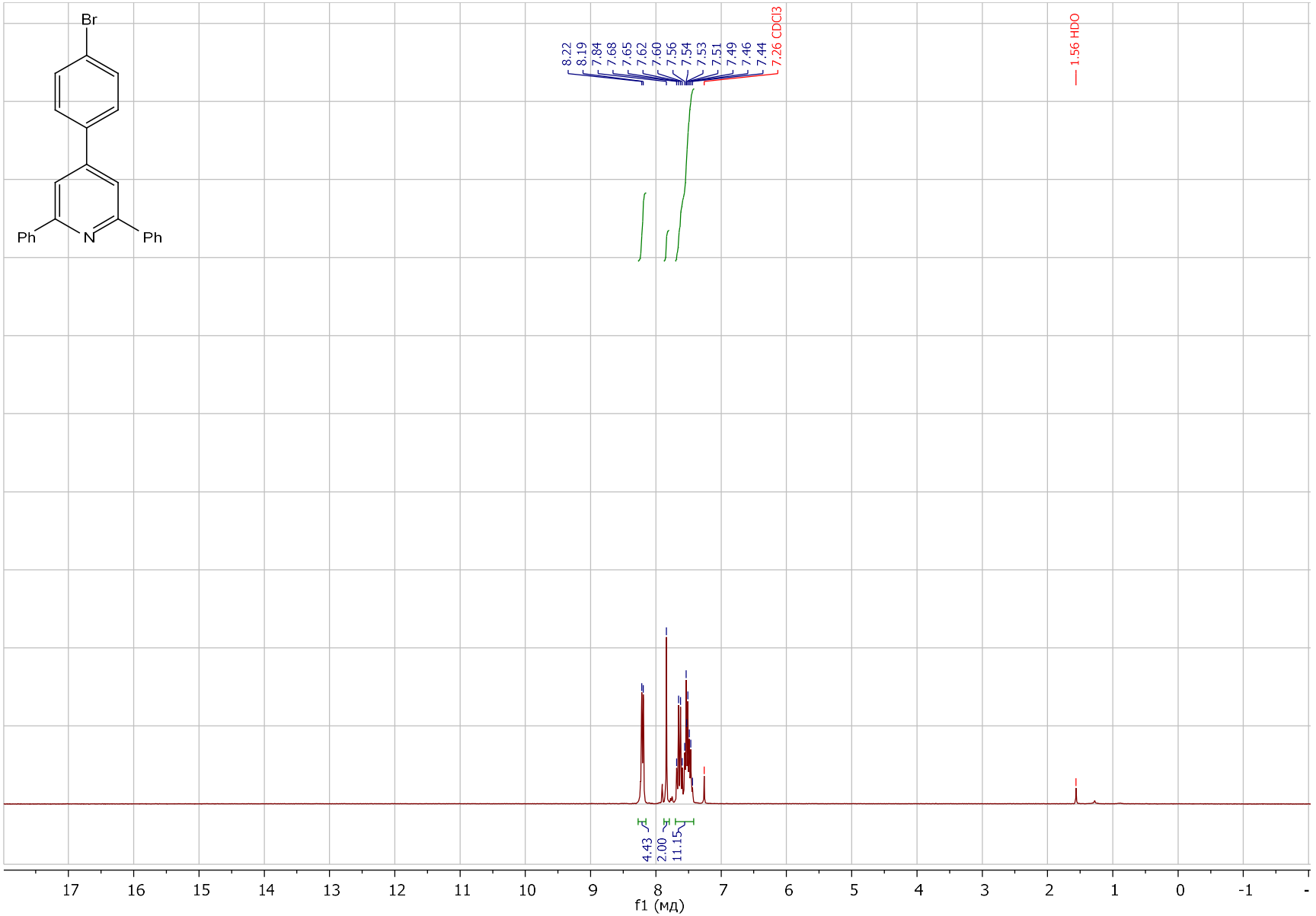
^{1}H NMR (300 MHz, Chloroform-*d*) of 4-(4-ethoxyphenyl)-2,6-diphenylpyridine (4c)



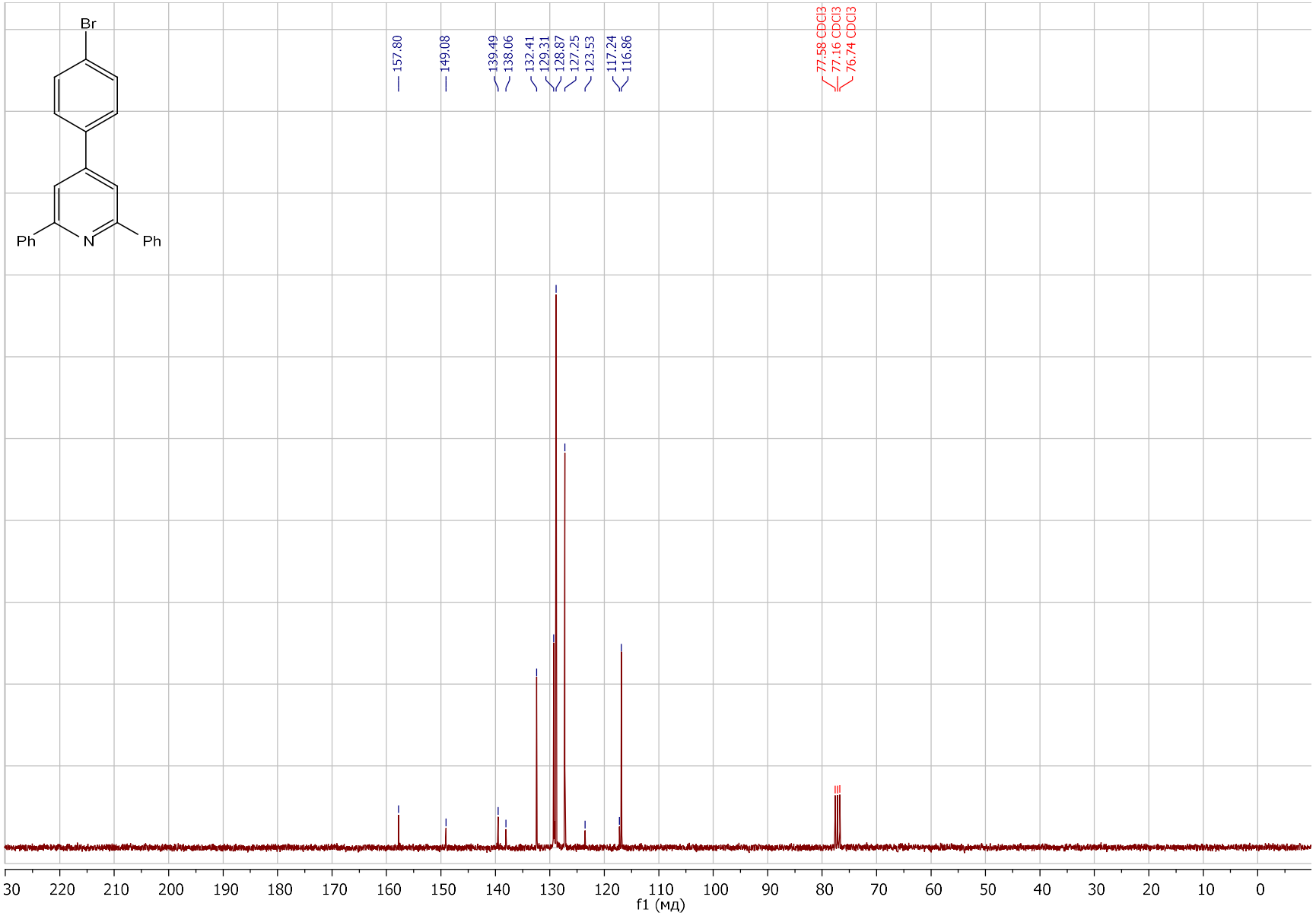
^{13}C NMR (75 MHz, Chloroform-*d*) of 4-(4-ethoxyphenyl)-2,6-diphenylpyridine (4c)



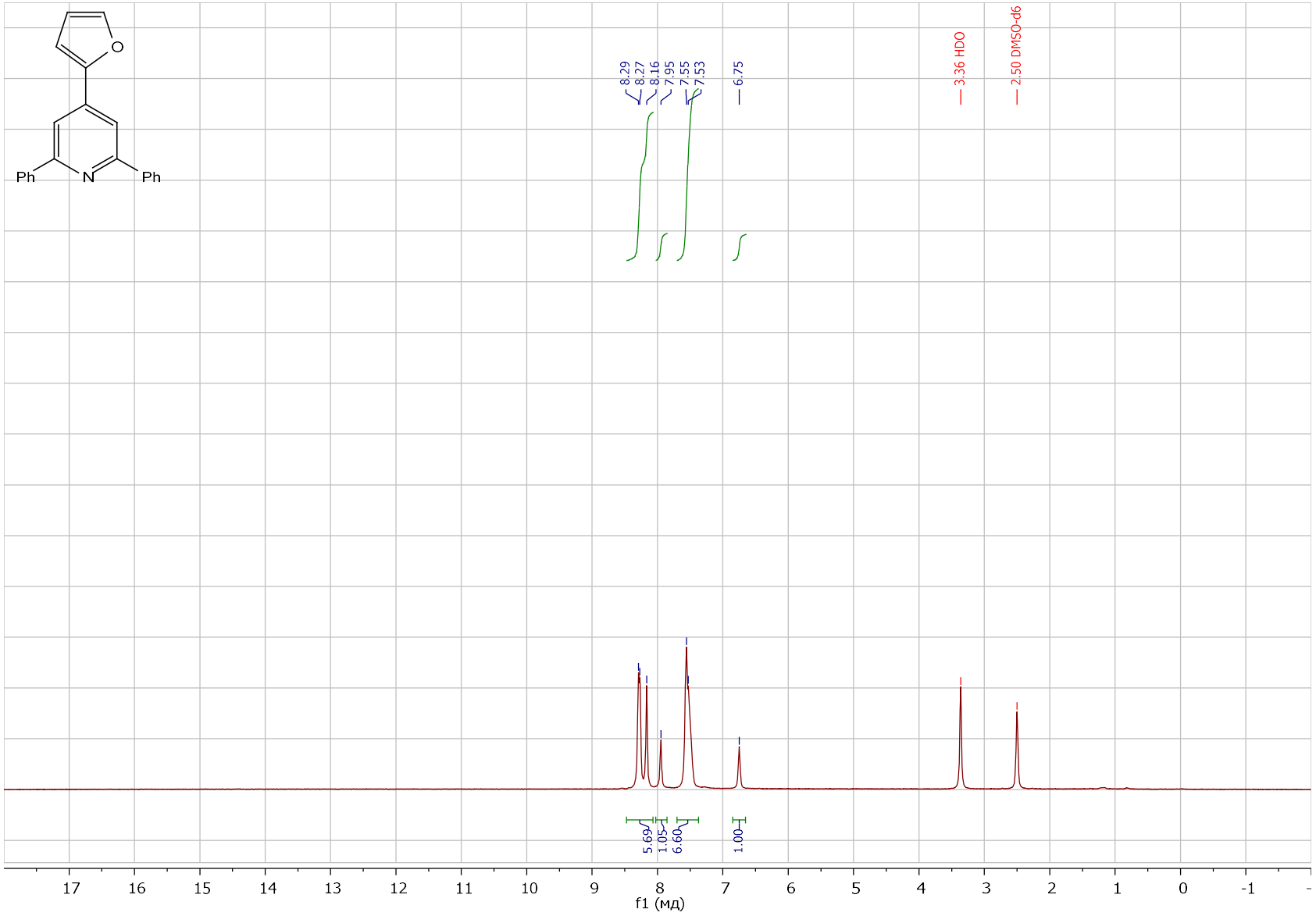
^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(4-bromophenyl)-2,6-diphenylpyridine (4d)



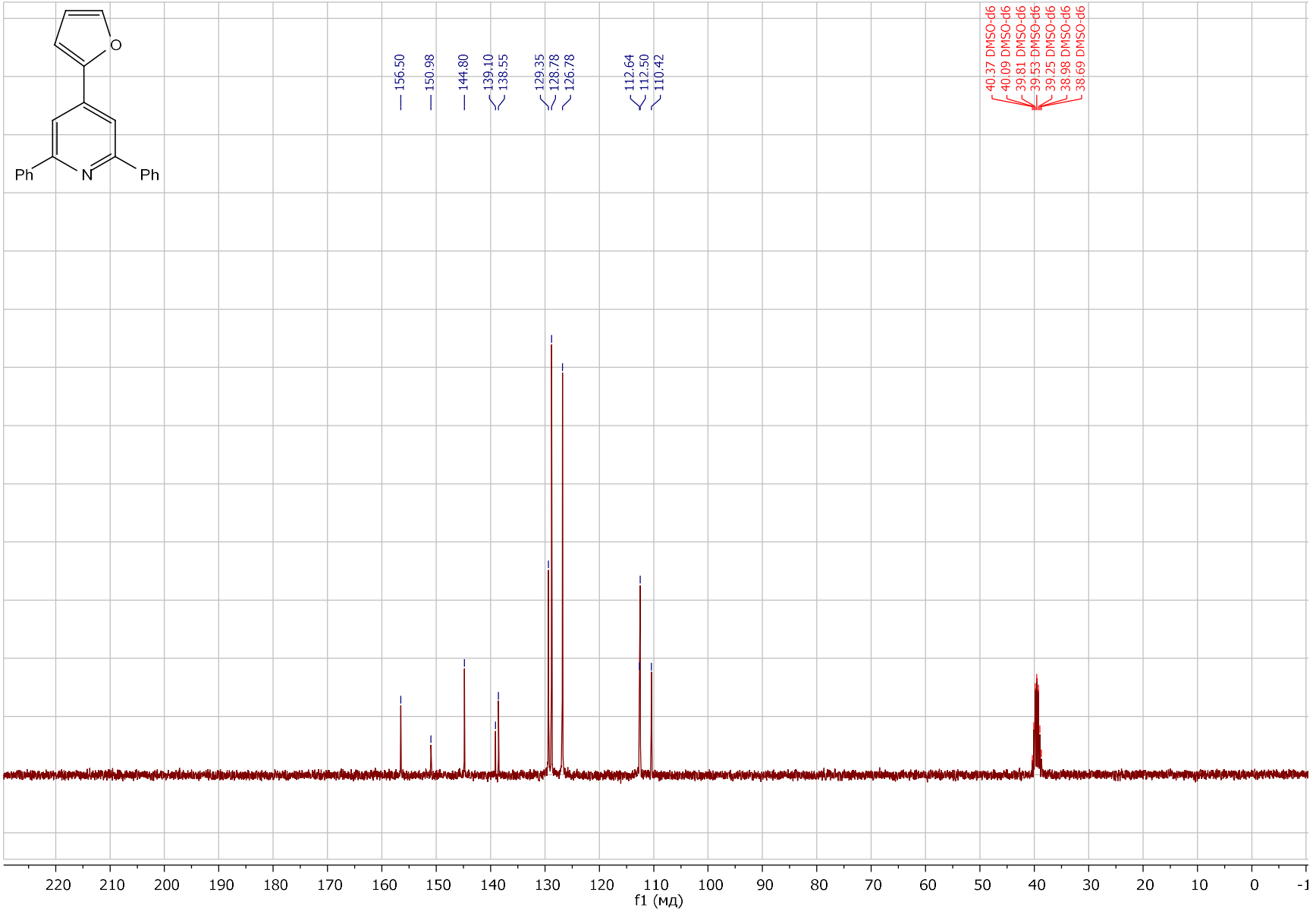
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(4-bromophenyl)-2,6-diphenylpyridine (4d)



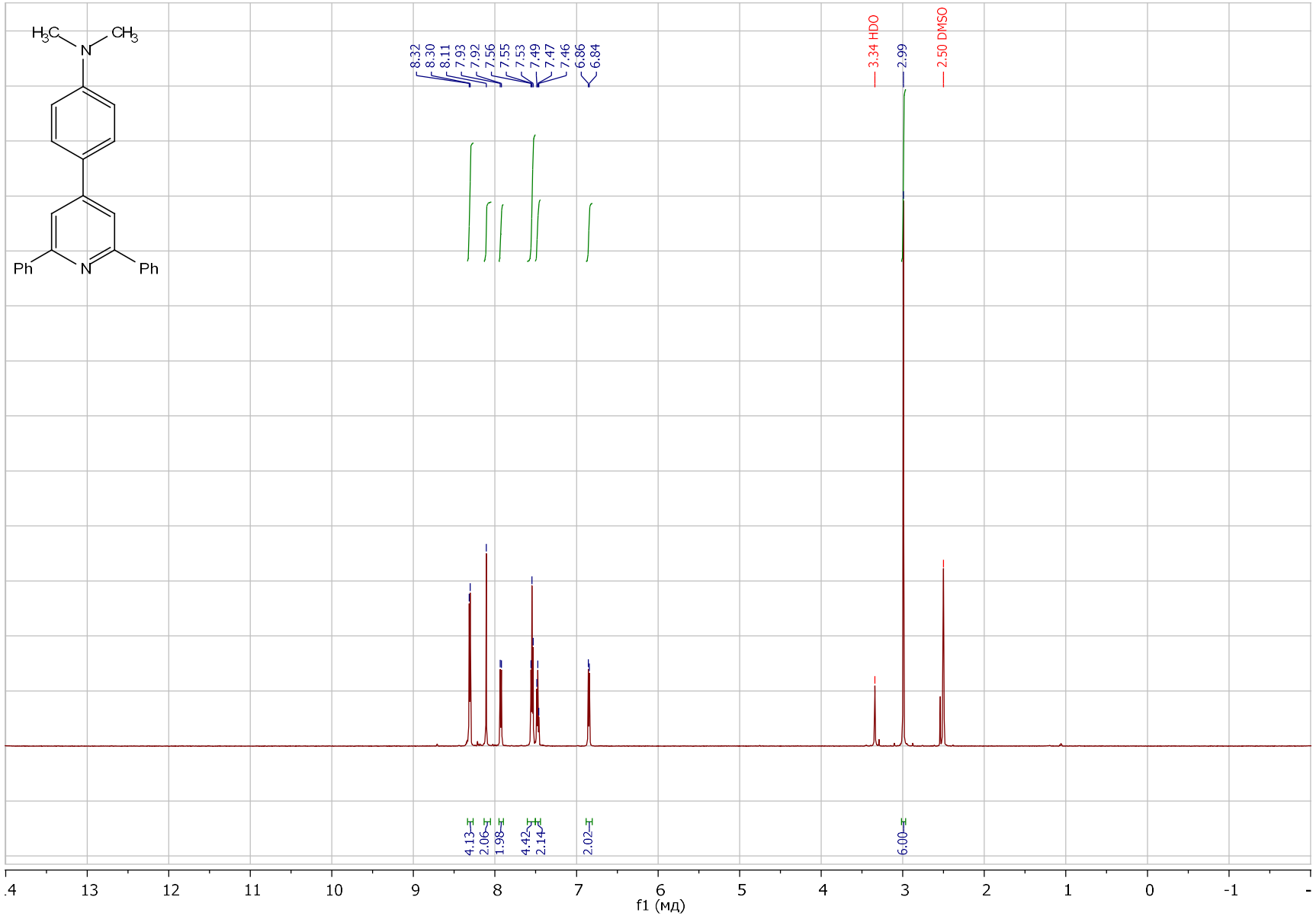
^{1}H NMR (300 MHz, DMSO-*d6*) and ^{13}C NMR (75 MHz, DMSO-*d6*) of 4-(furan-2-yl)-2,6-diphenylpyridine (4e)



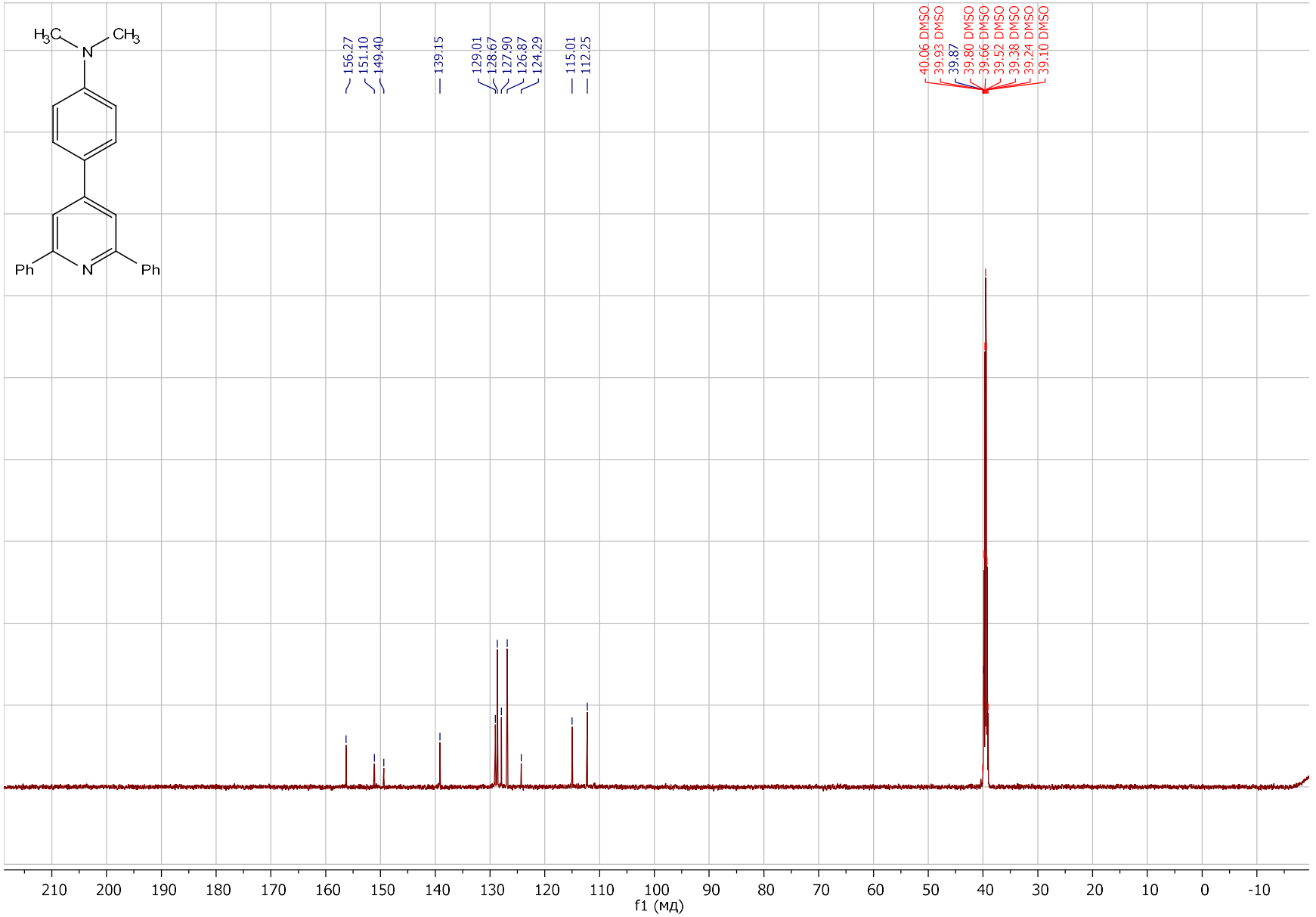
^{13}C NMR (75 MHz, DMSO-*d6*) of 4-(furan-2-yl)-2,6-diphenylpyridine (4e)



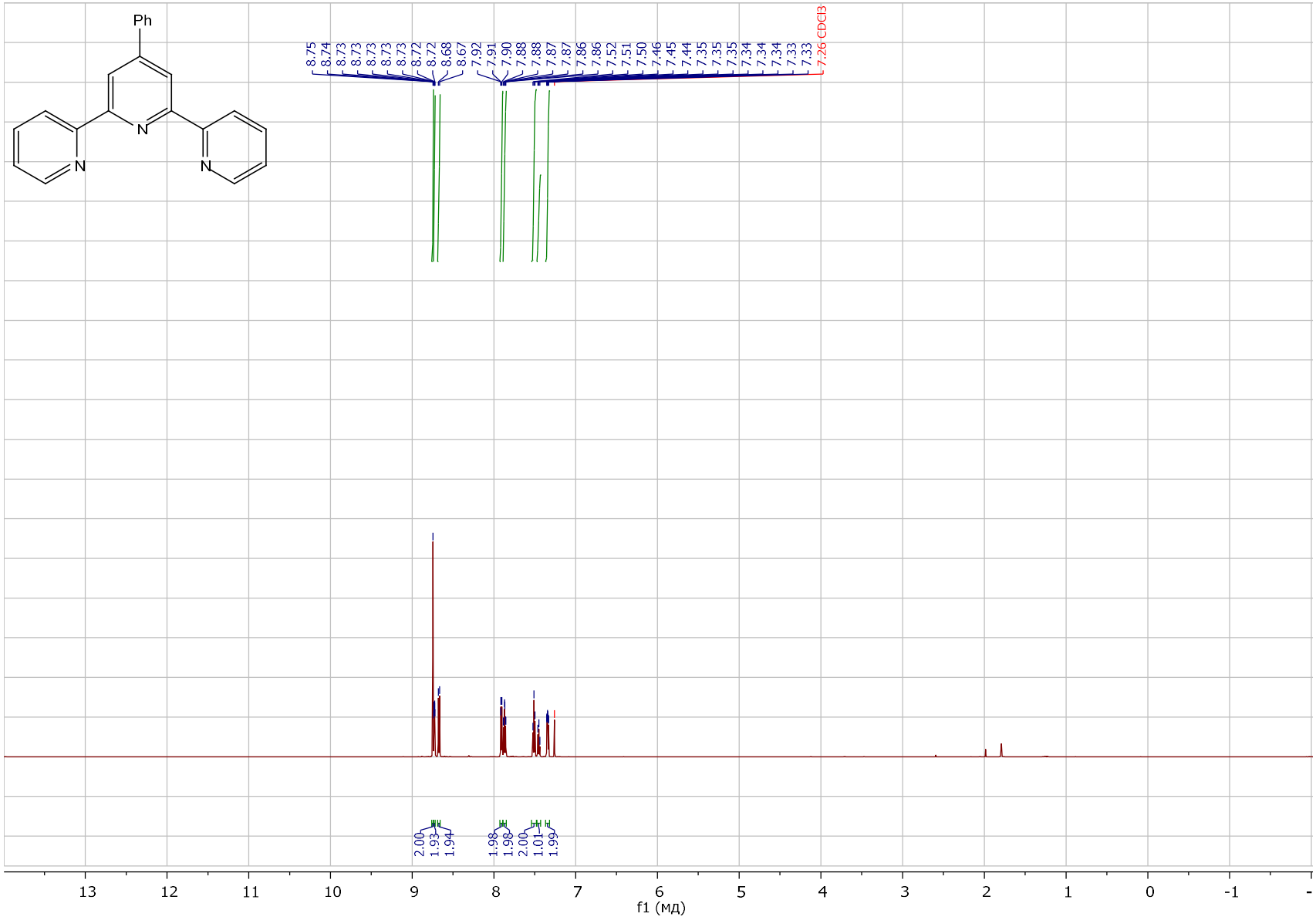
^{1}H NMR (600 MHz, DMSO-*d6*) of 4-(2,6-diphenylpyridin-4-yl)-N,N-dimethylaniline (4f)



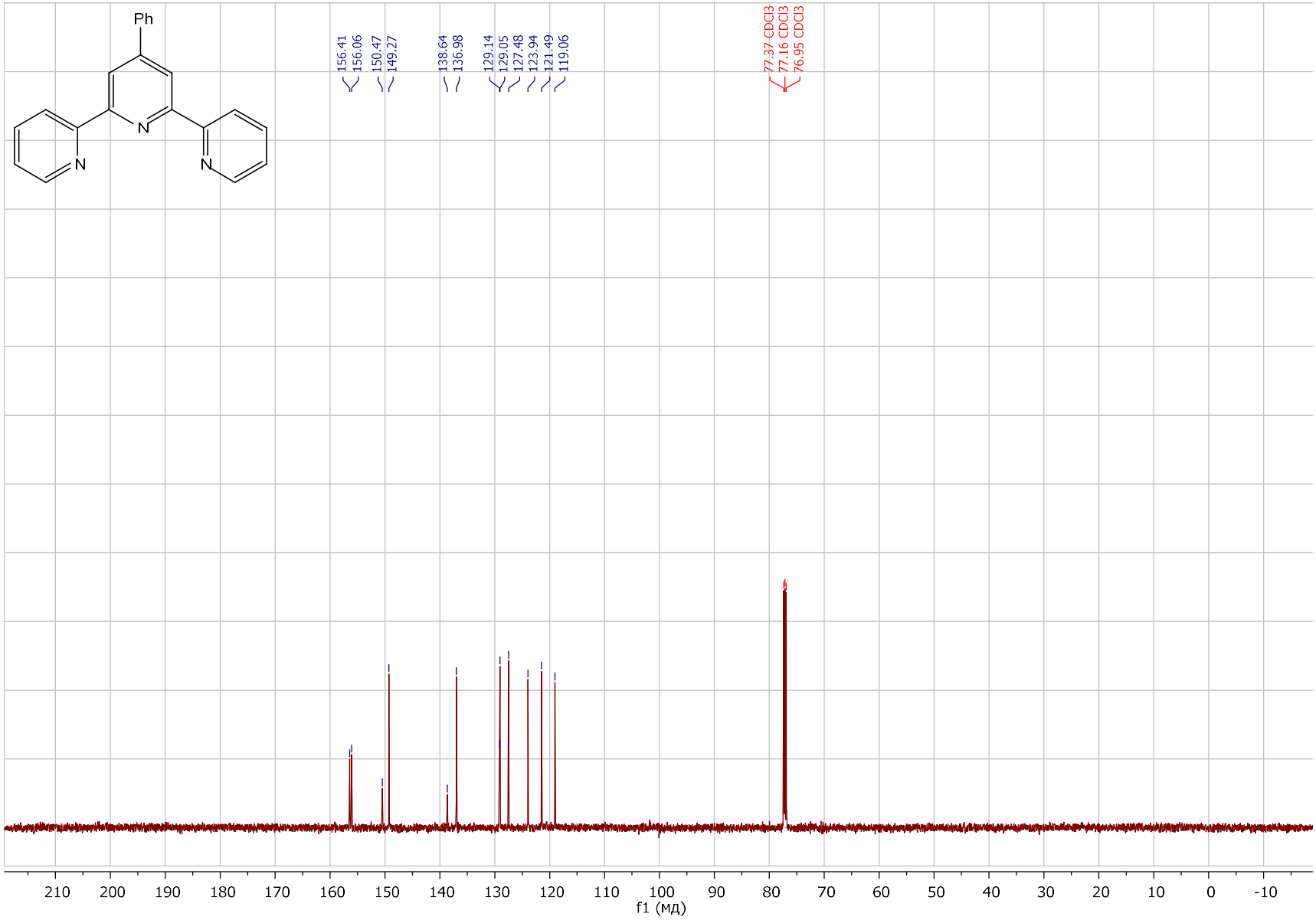
^{13}C NMR (151 MHz, DMSO-*d6*) of 4-(2,6-diphenylpyridin-4-yl)-N,N-dimethylaniline (4f)



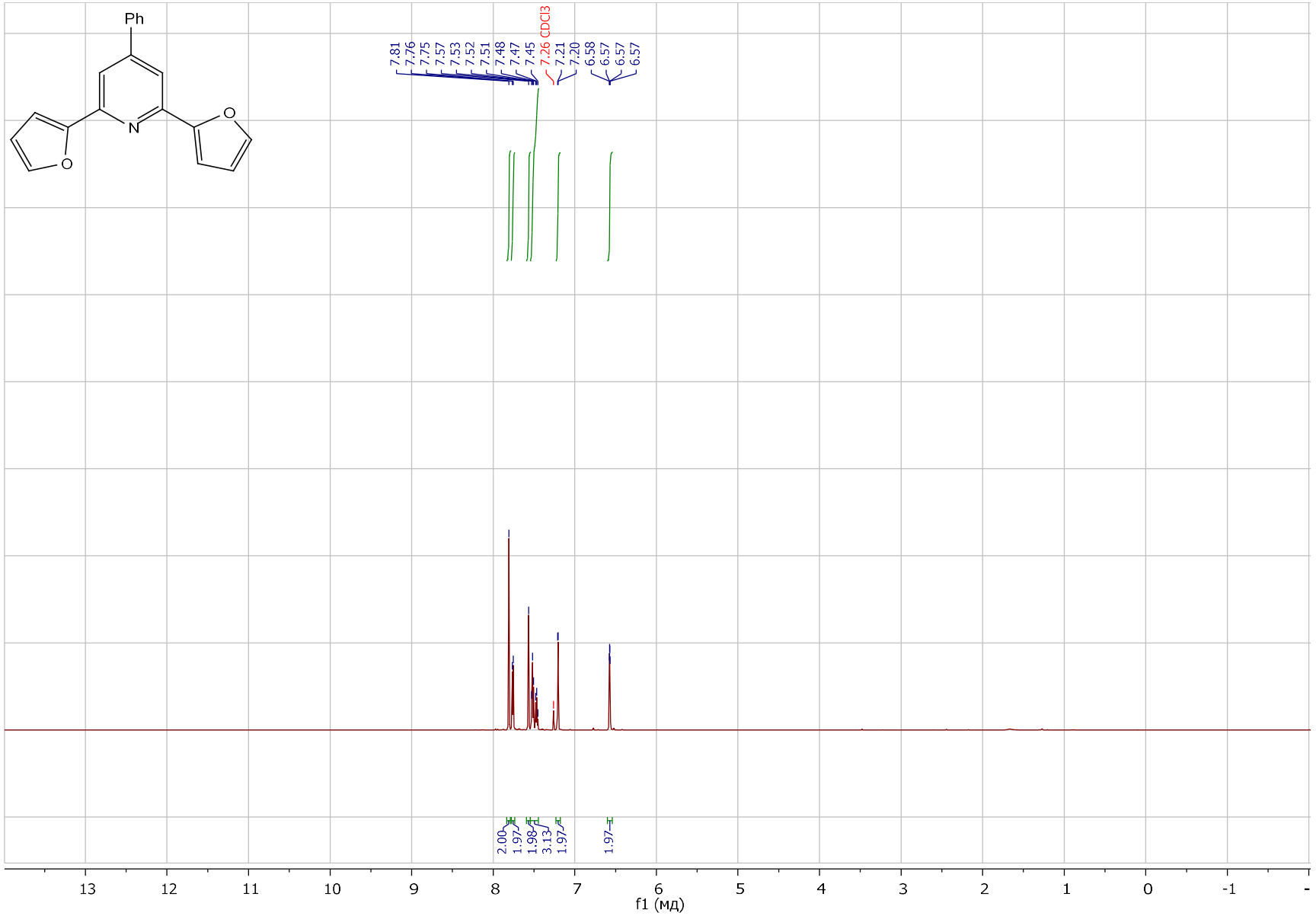
^{1}H NMR (600 MHz, Chloroform-*d*) of 4'-phenyl-2,2':6',2''-terpyridine (4g)



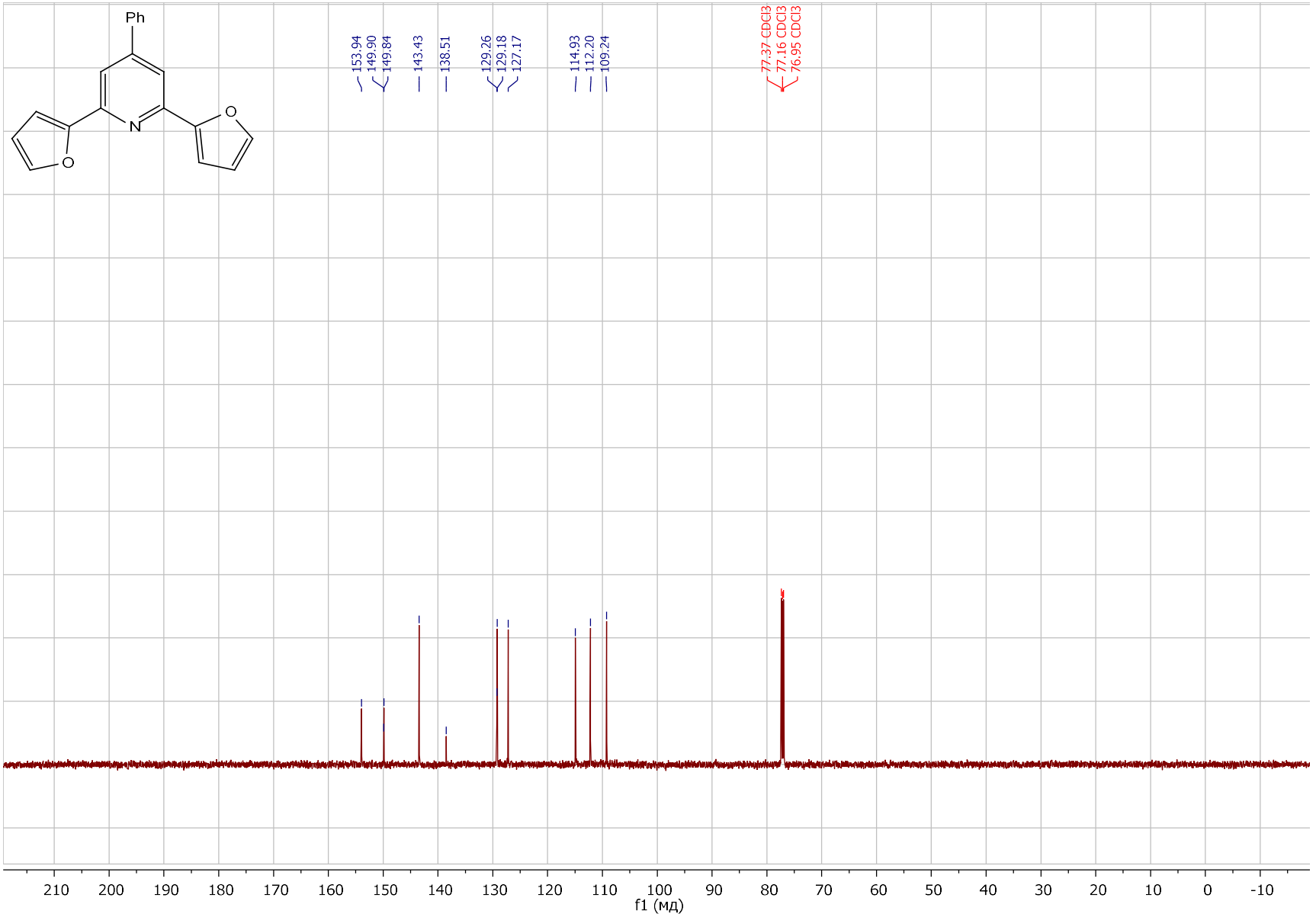
^{13}C NMR (151 MHz, Chloroform-*d*) of 4'-phenyl-2,2':6',2''-terpyridine (4g)



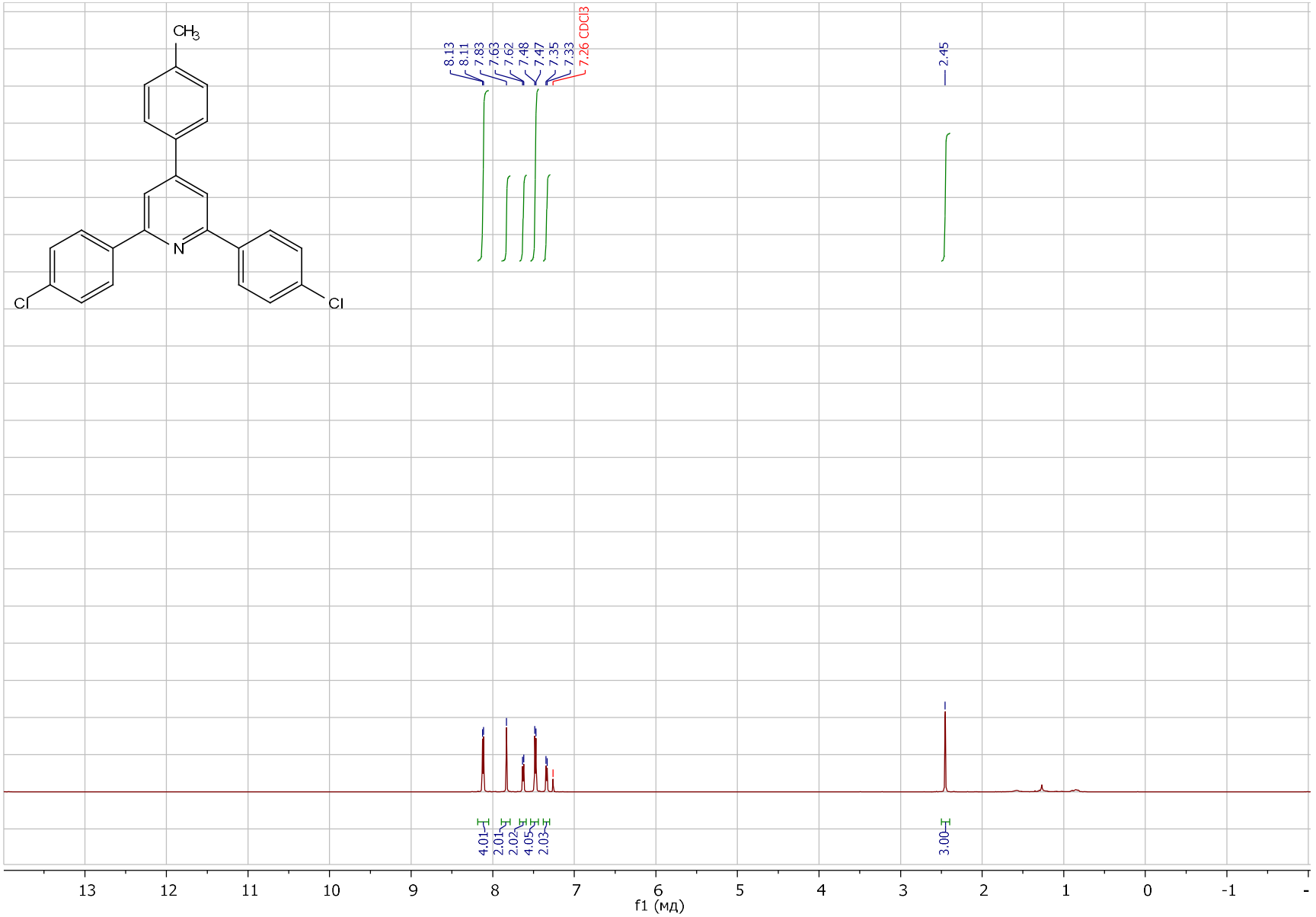
^{1}H NMR (600 MHz, Chloroform-*d*) of 2,6-di(furan-2-yl)-4-phenylpyridine (4h)



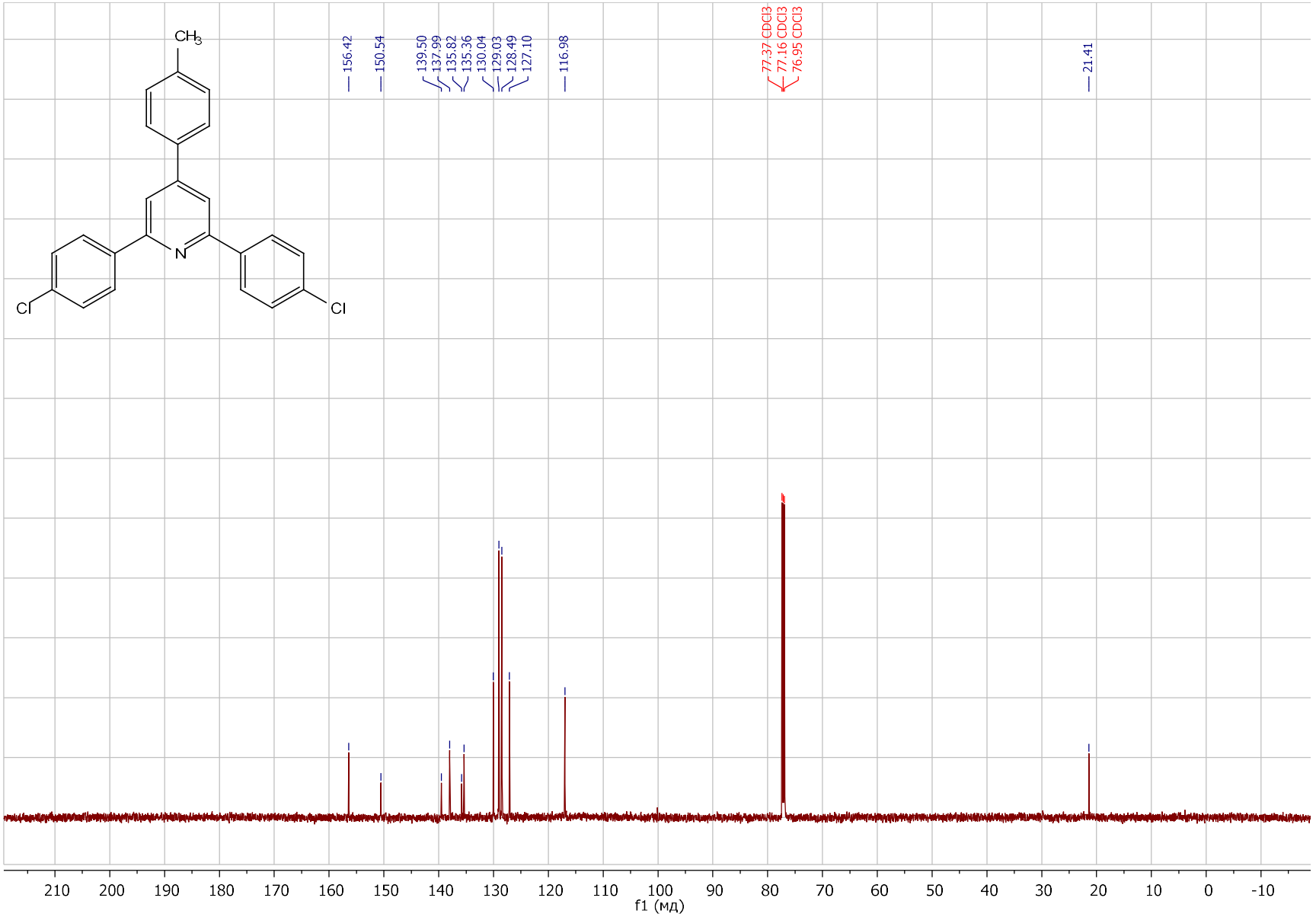
^{13}C NMR (151 MHz, Chloroform-*d*) of 2,6-di(furan-2-yl)-4-phenylpyridine (4h)



^{1}H NMR (600 MHz, Chloroform-*d*) of 2,6-bis(4-chlorophenyl)-4-(p-tolyl)pyridine (4i)

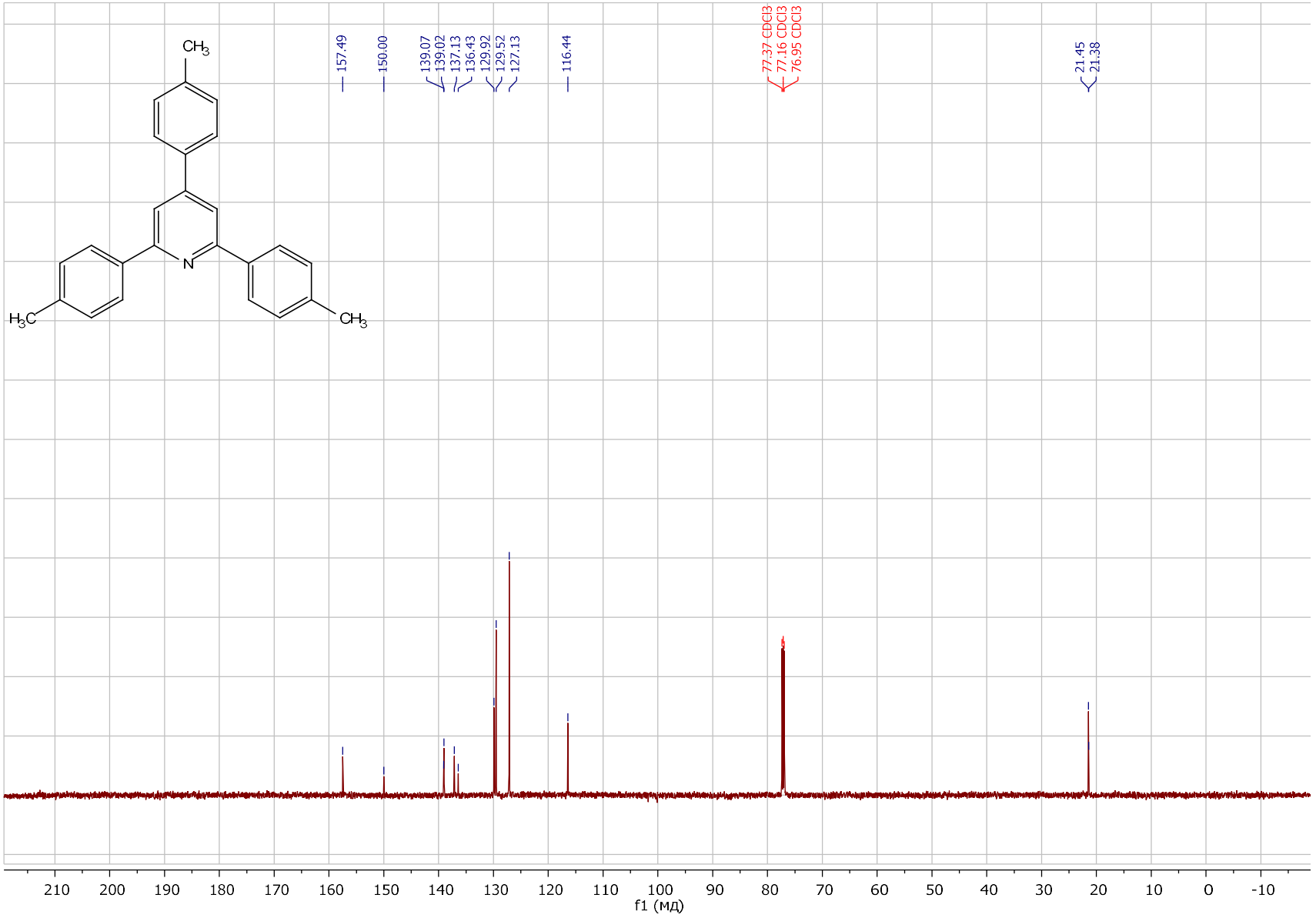


^{13}C NMR (151 MHz, Chloroform-*d*) of 2,6-bis(4-chlorophenyl)-4-(p-tolyl)pyridine (4i)

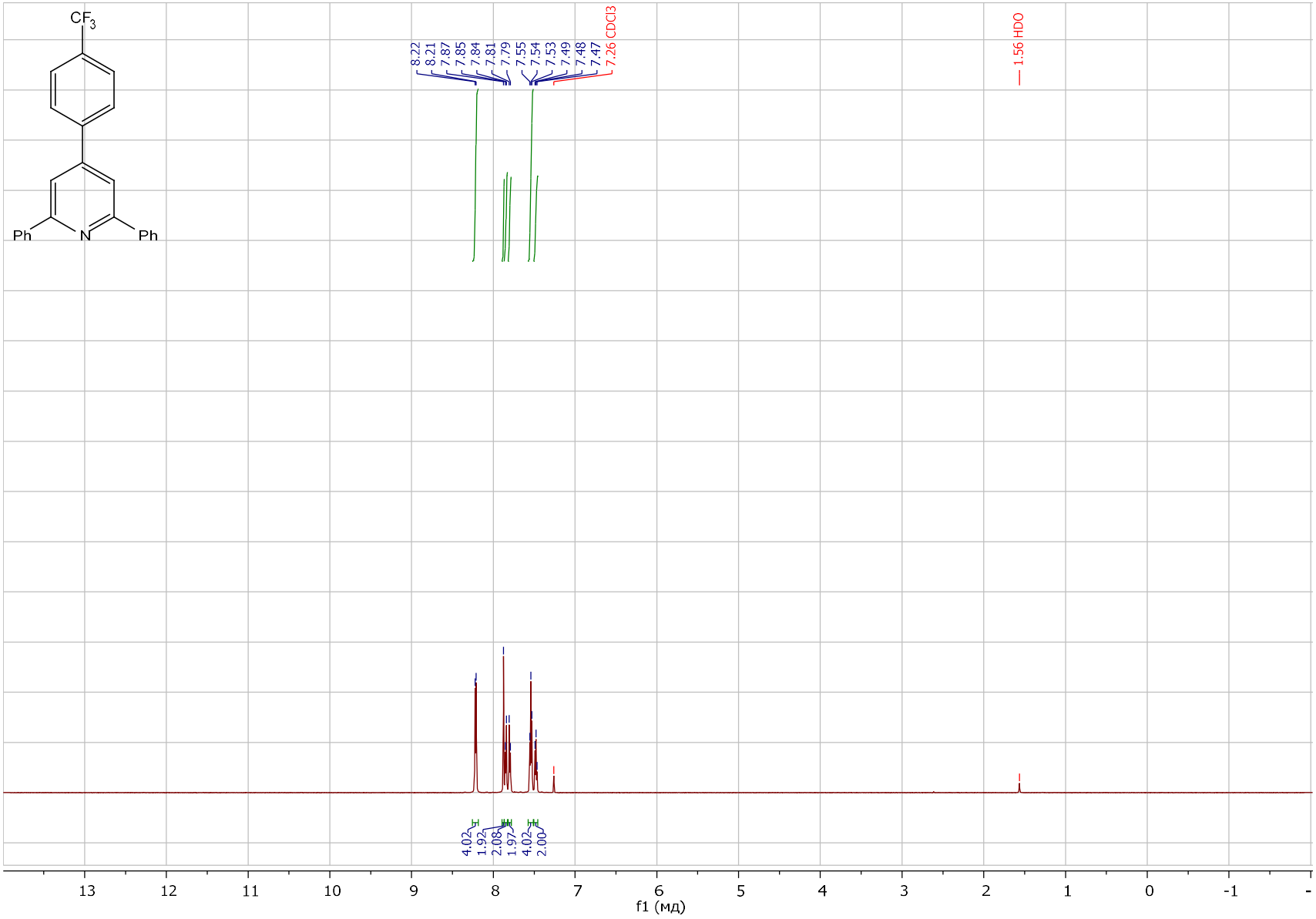


^{1}H NMR (600 MHz, Chloroform-*d*) of 2,4,6-tri-p-tolylpyridine (4j)

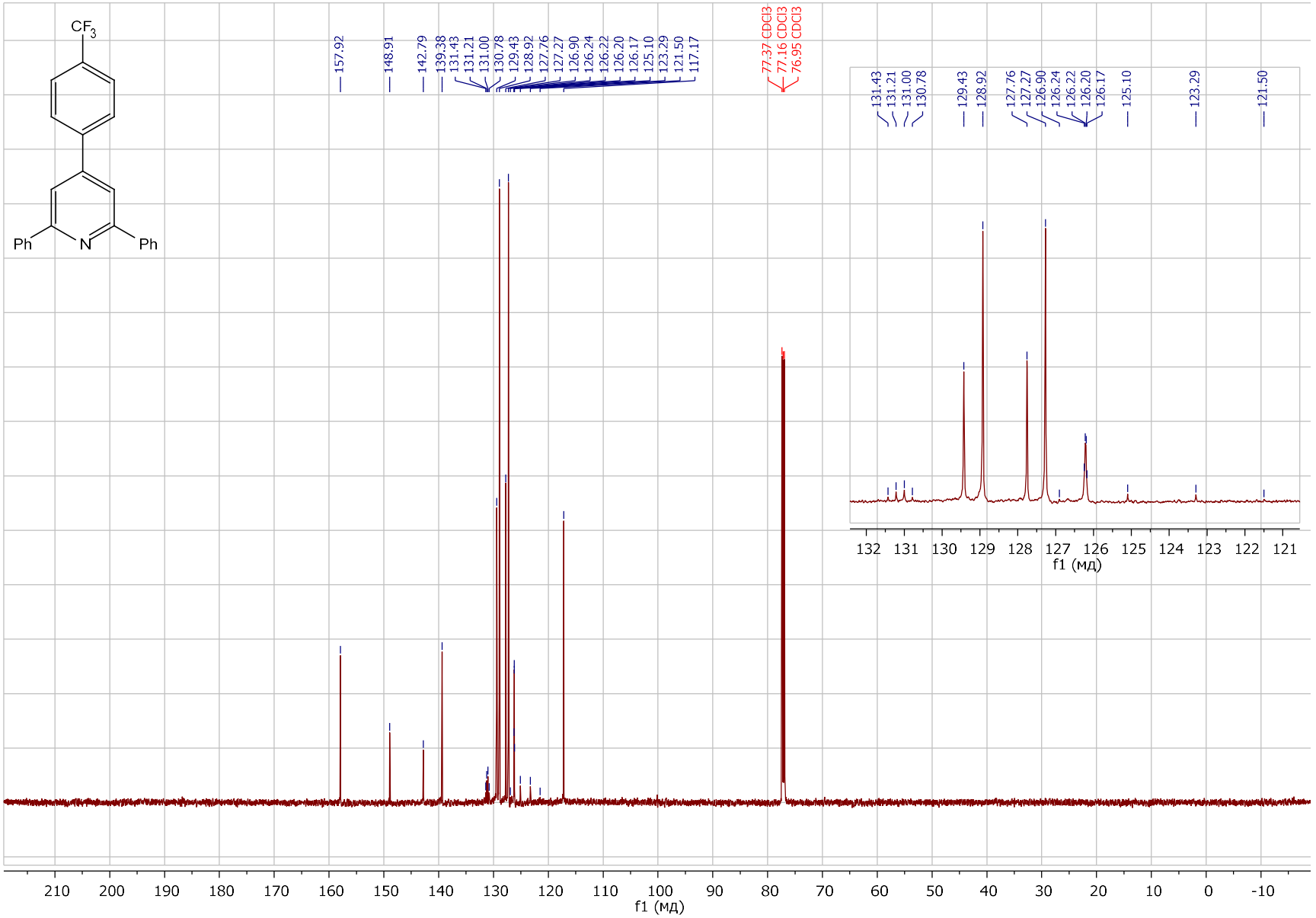
^{13}C NMR (151 MHz, Chloroform-*d*) of 2,4,6-tri-p-tolylpyridine (4j)



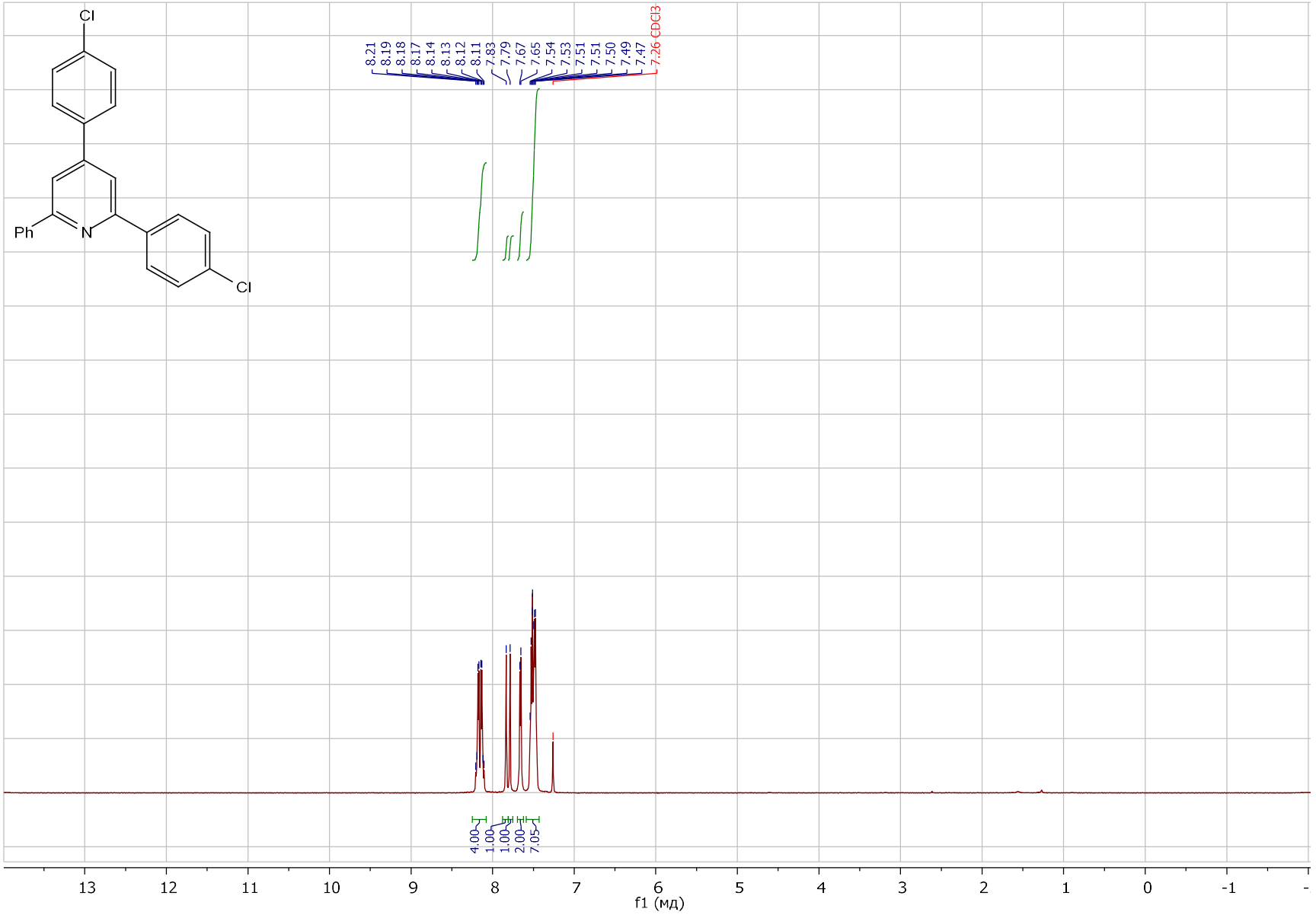
^{1}H NMR (600 MHz, Chloroform-*d*) of 2,6-diphenyl-4-(4-(trifluoromethyl)phenyl)pyridine (5a)



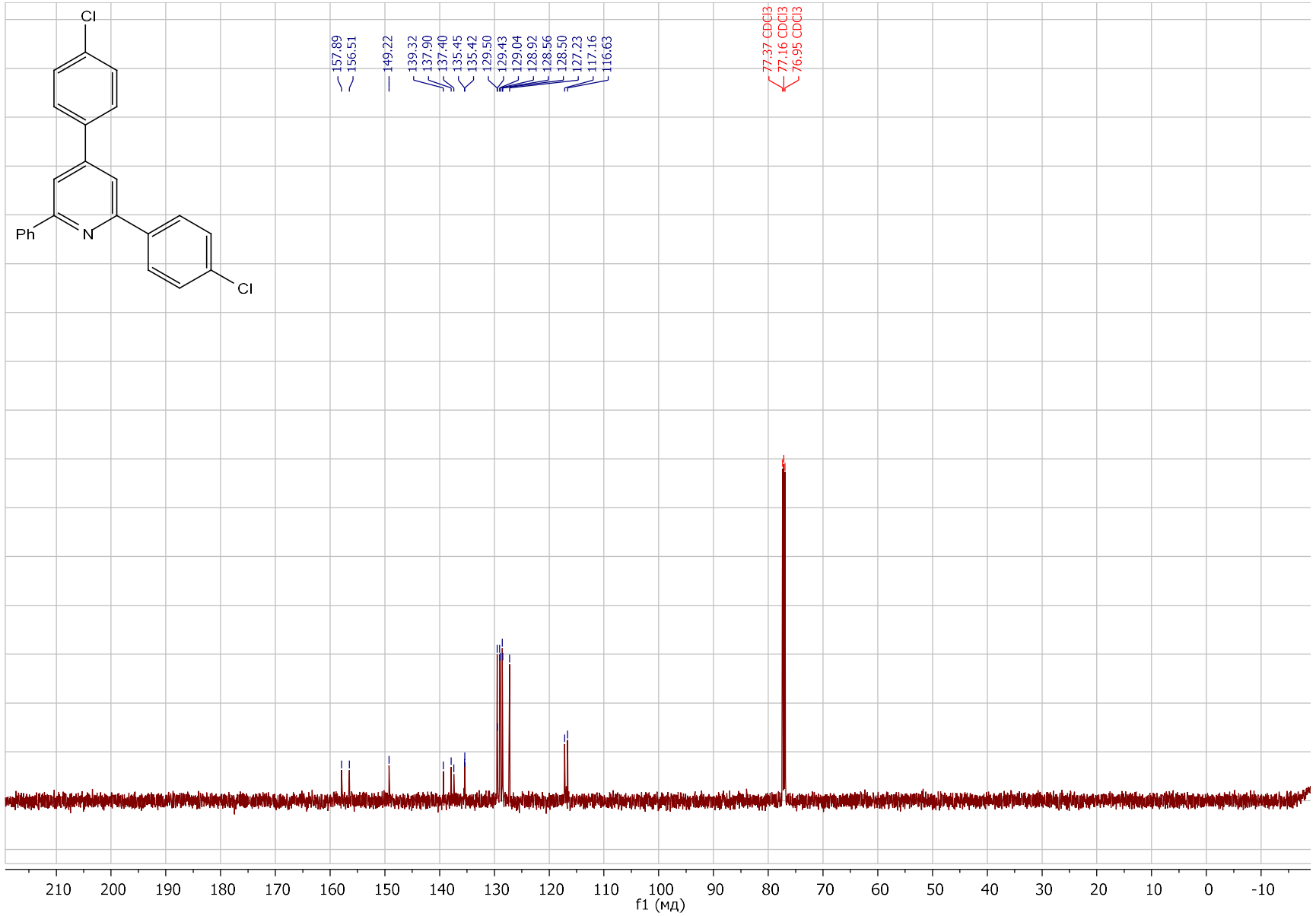
^{13}C NMR (151 MHz, Chloroform-*d*) of 2,6-diphenyl-4-(4-(trifluoromethyl)phenyl)pyridine (5a)



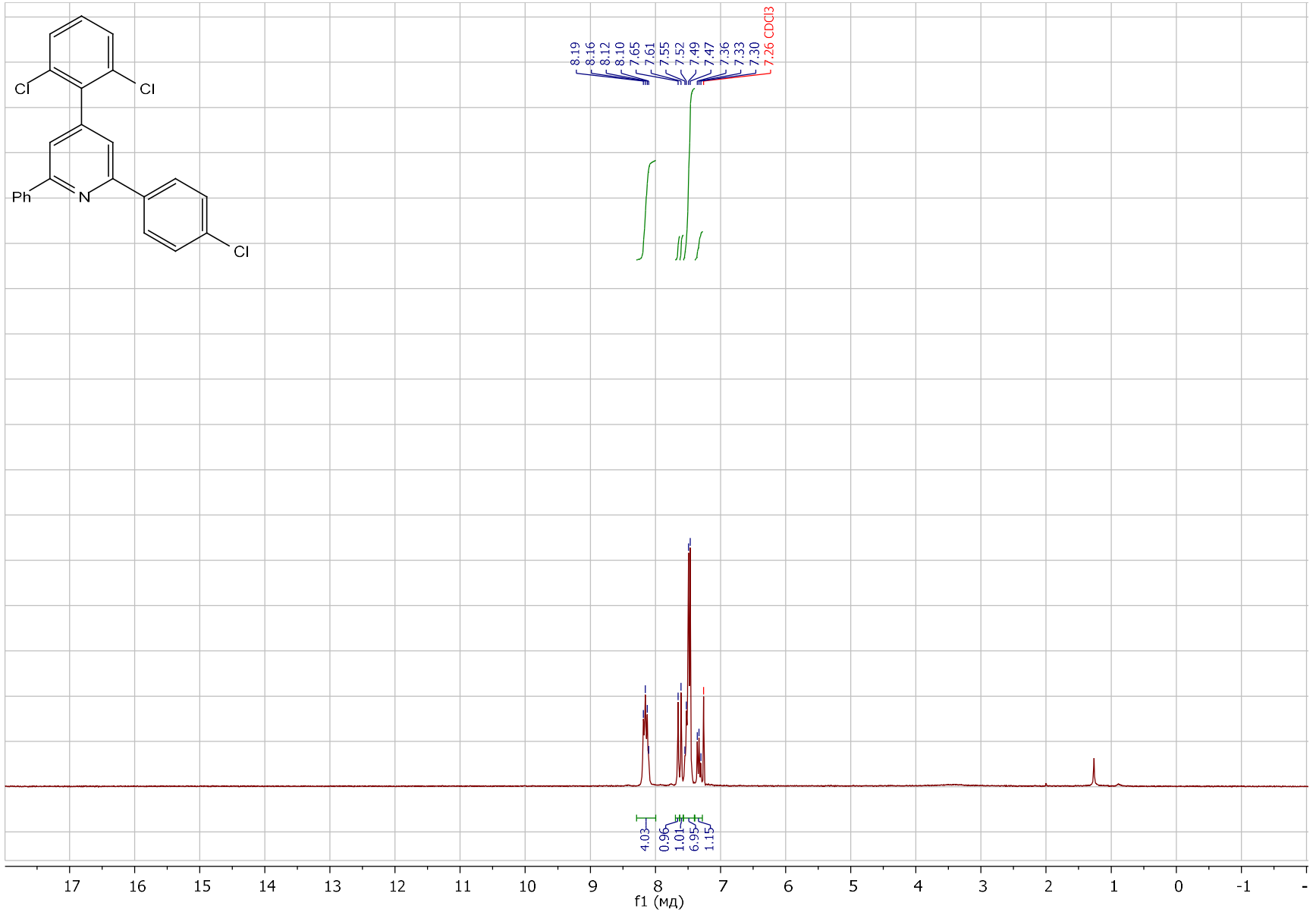
^{1}H NMR (600 MHz, Chloroform-*d*) of 2,4-bis(4-chlorophenyl)-6-phenylpyridine (5b)



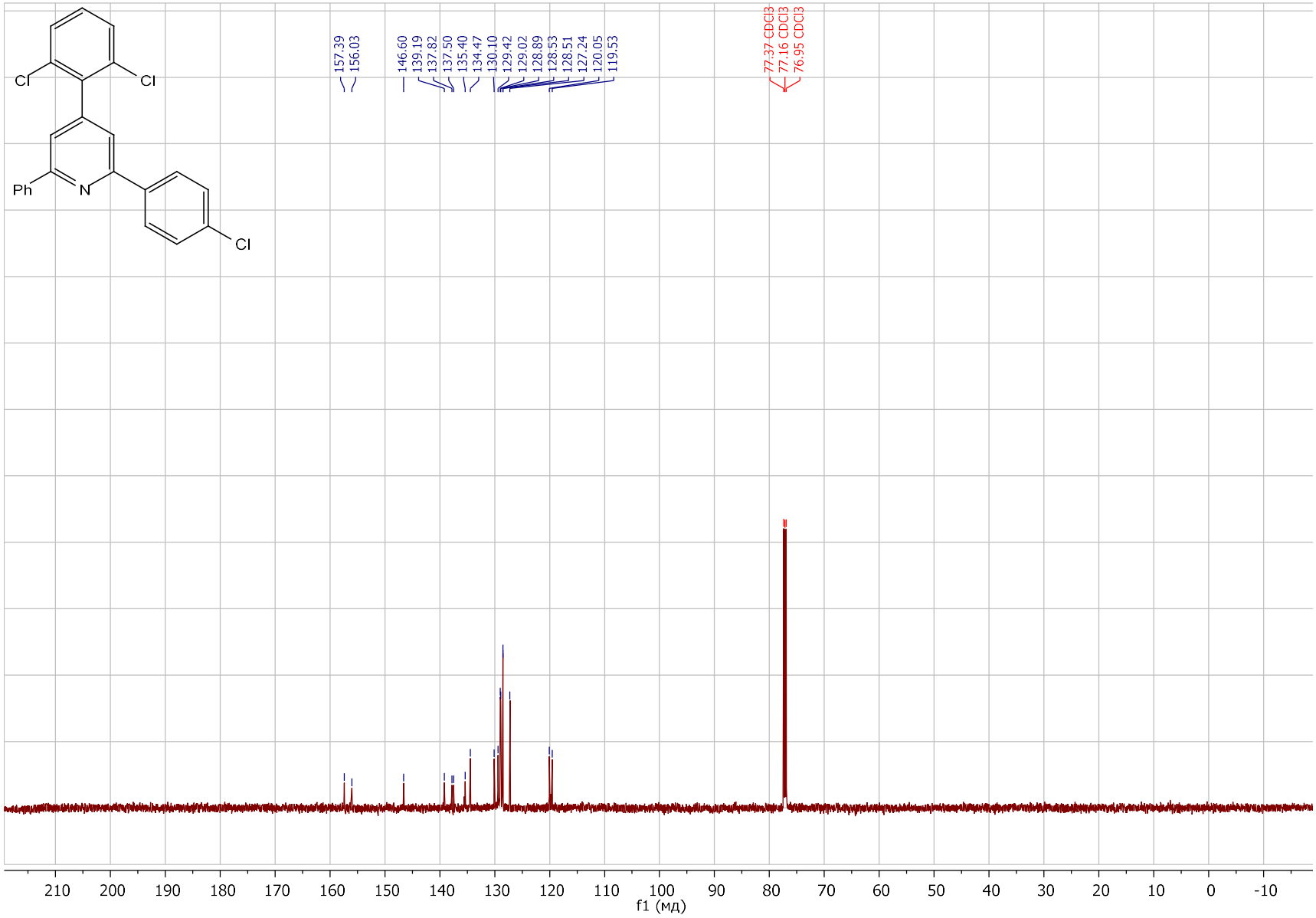
^{13}C NMR (151 MHz, Chloroform-*d*) of 2,4-bis(4-chlorophenyl)-6-phenylpyridine (5b)



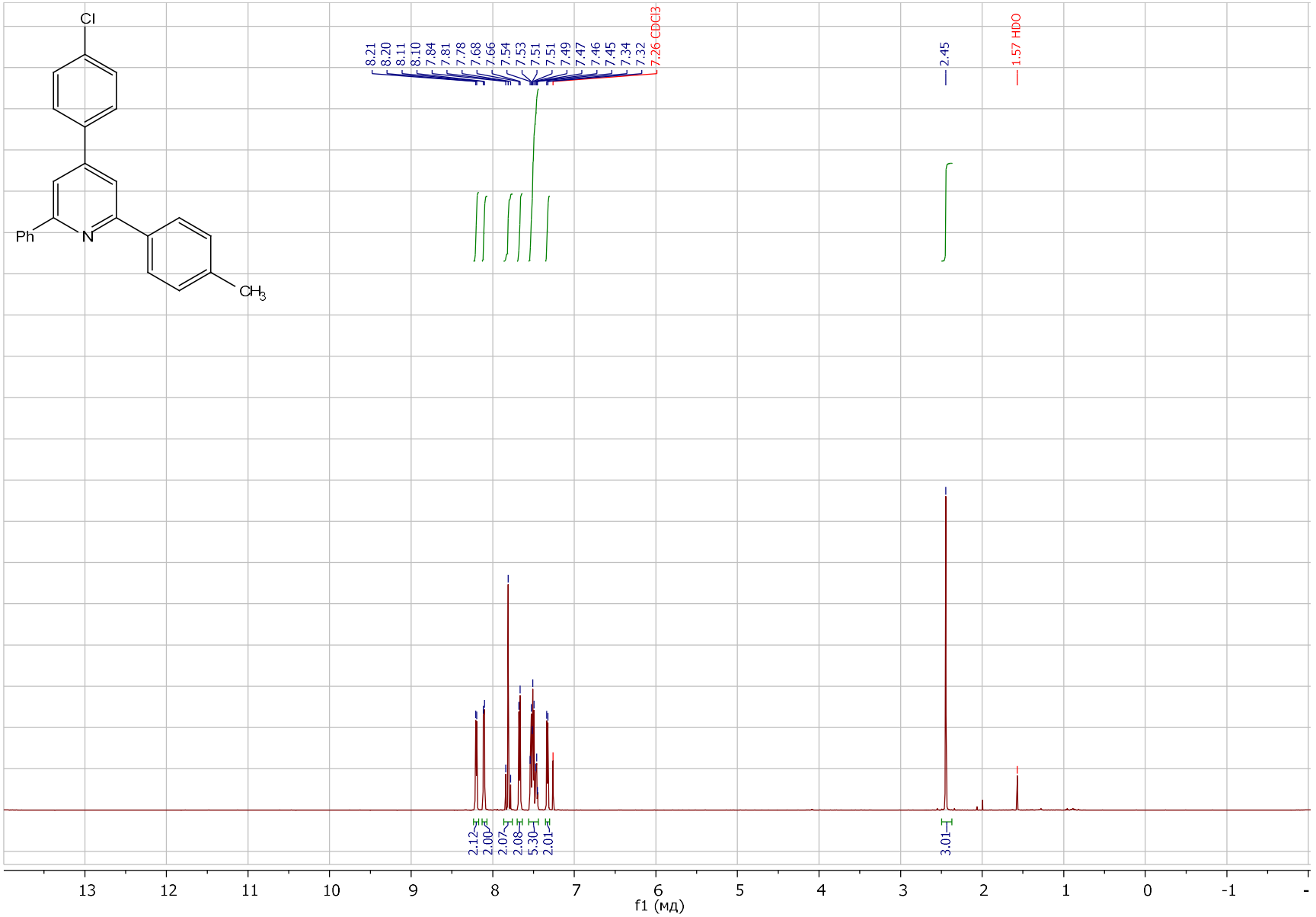
^{1}H NMR (600 MHz, Chloroform-*d*) of 2-(4-chlorophenyl)-4-(2,6-dichlorophenyl)-6-phenylpyridine (5c)



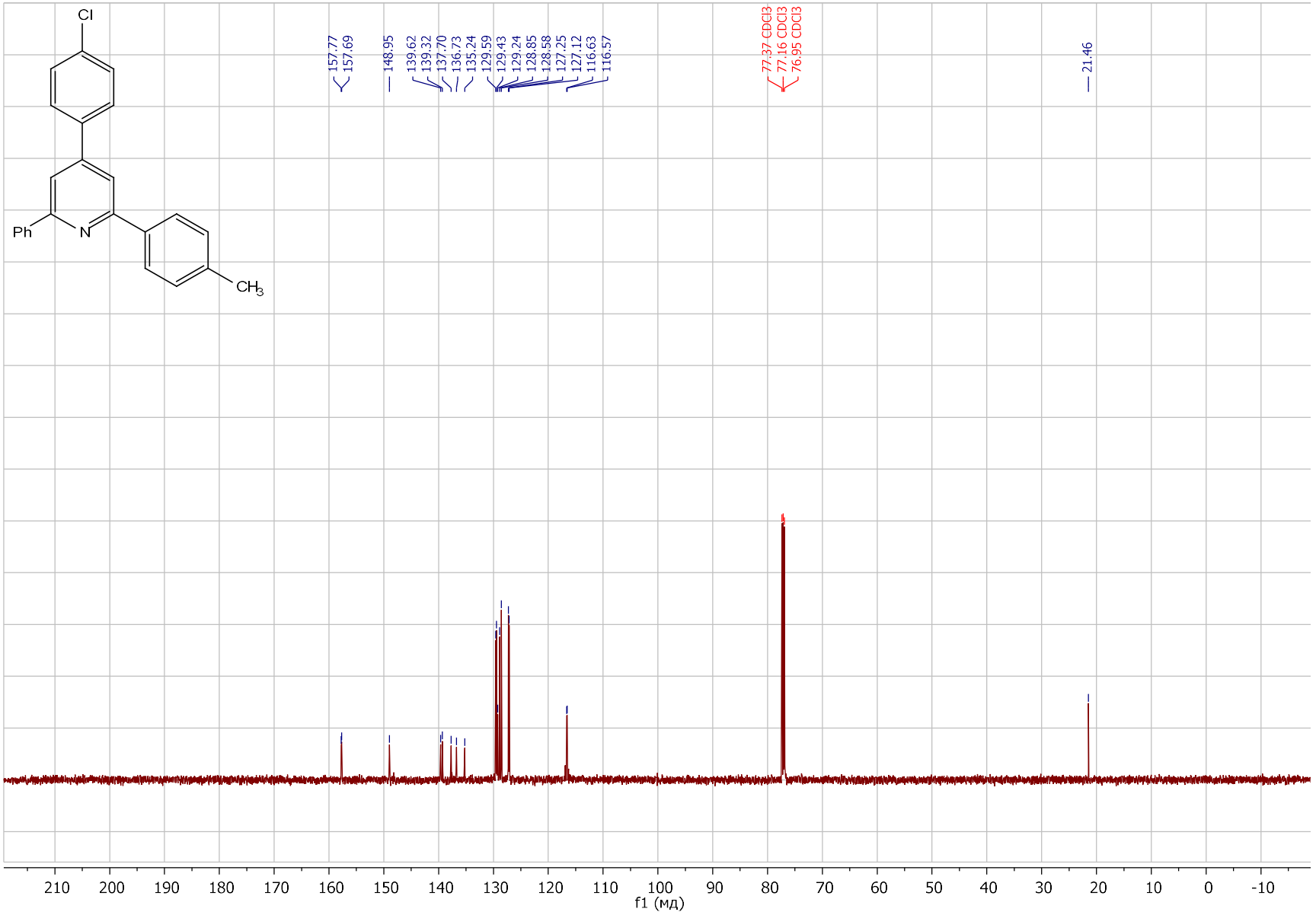
^{13}C NMR (151 MHz, Chloroform-*d*) of 2-(4-chlorophenyl)-4-(2,6-dichlorophenyl)-6-phenylpyridine (5c)



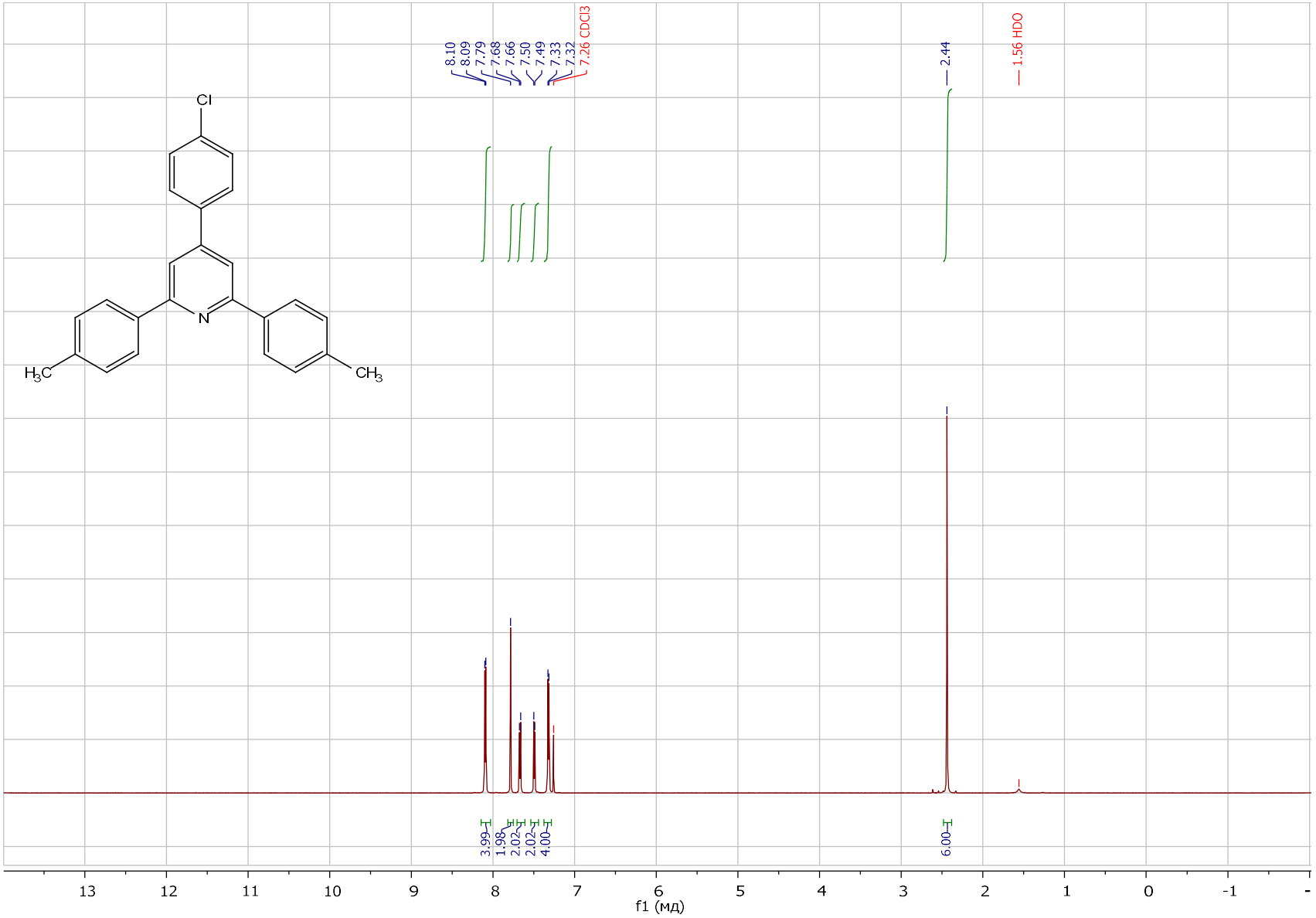
^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(4-chlorophenyl)-2-phenyl-6-(p-tolyl)pyridine (5d)



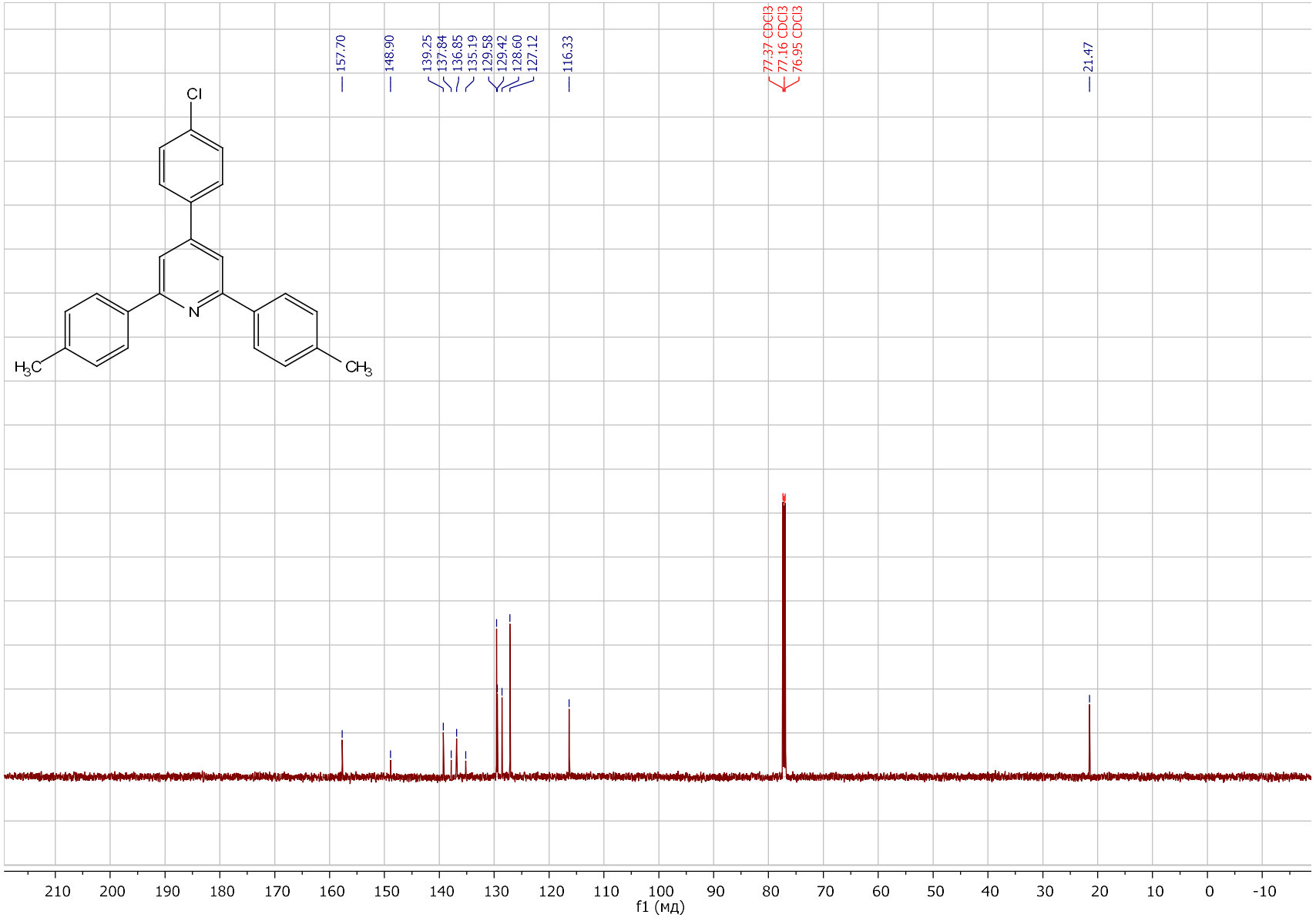
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(4-chlorophenyl)-2-phenyl-6-(p-tolyl)pyridine (5d)



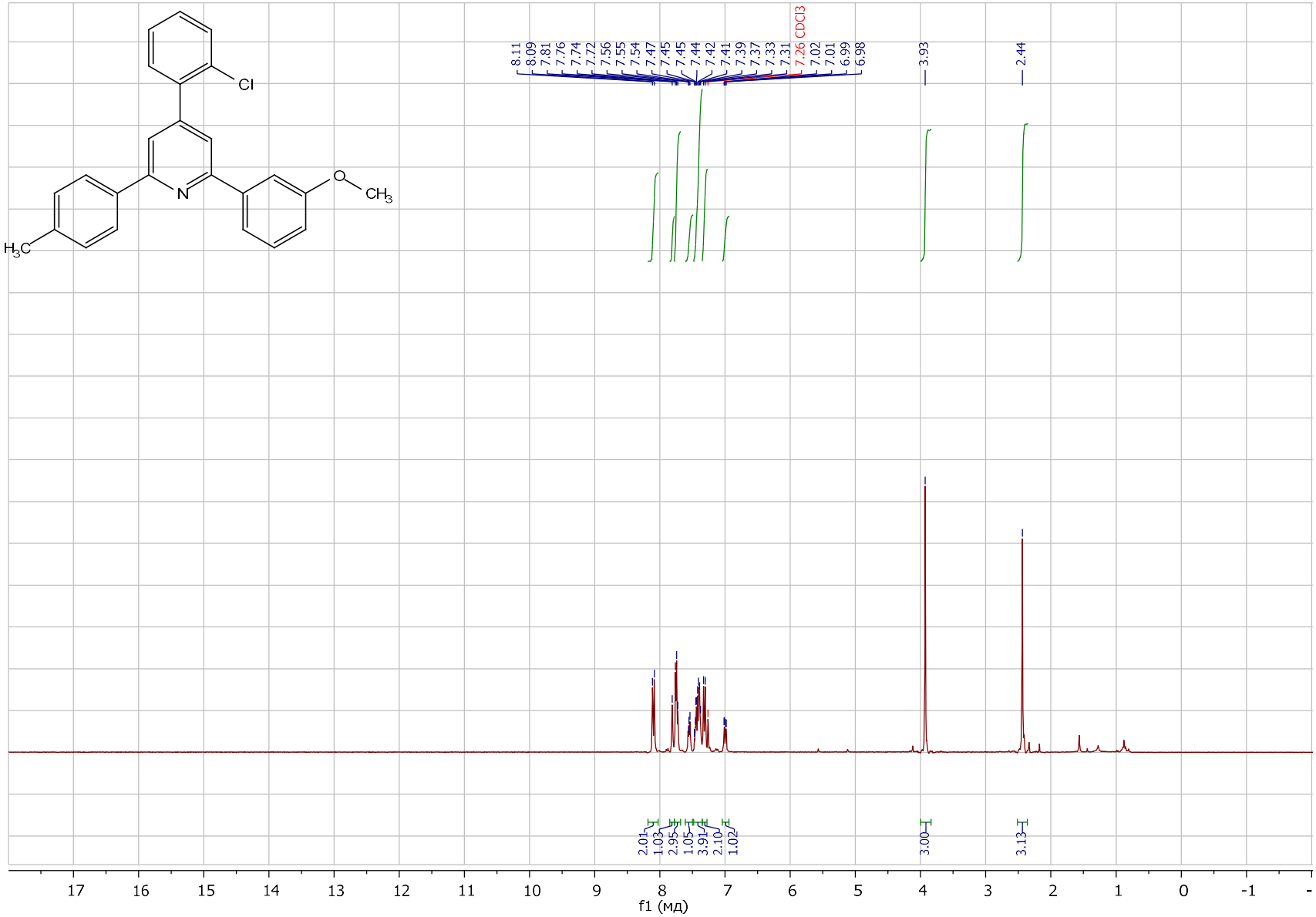
^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(4-chlorophenyl)-2,6-di-p-tolylpyridine (5e)



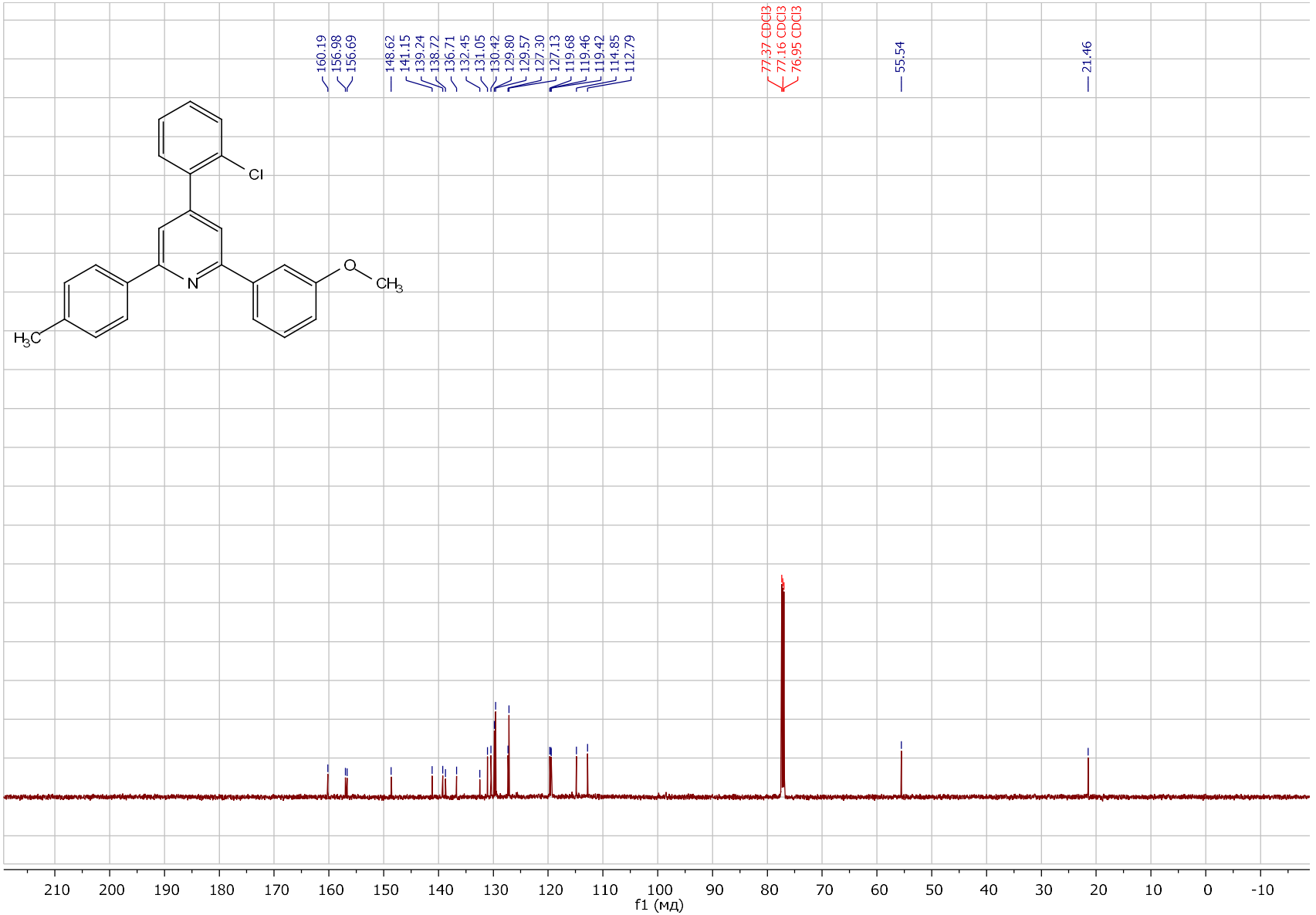
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(4-chlorophenyl)-2,6-di-p-tolylpyridine (5e)



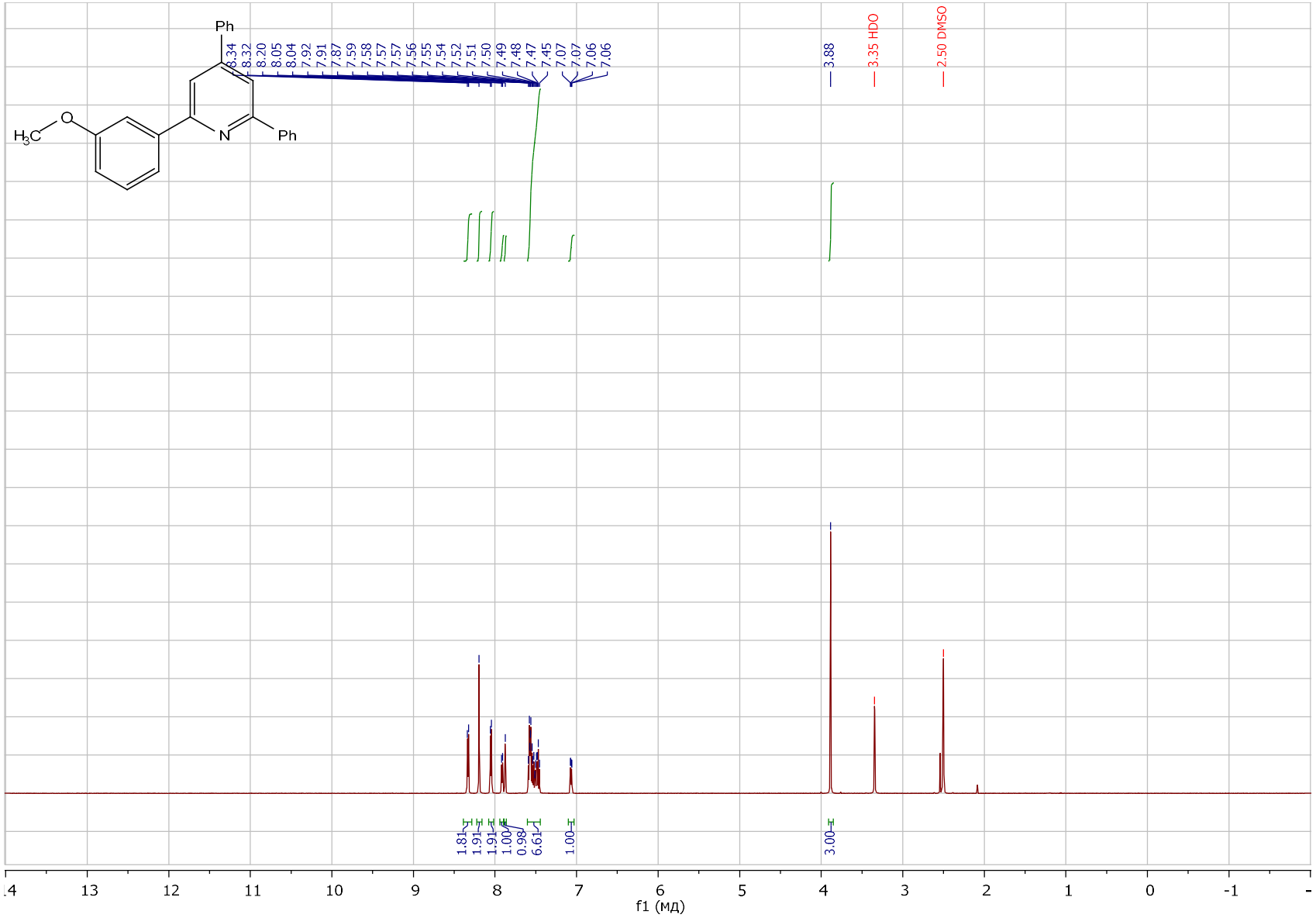
^{1}H NMR (300 MHz, Chloroform-*d*) of 4-(2-chlorophenyl)-2-(3-methoxyphenyl)-6-(p-tolyl)pyridine (5f)



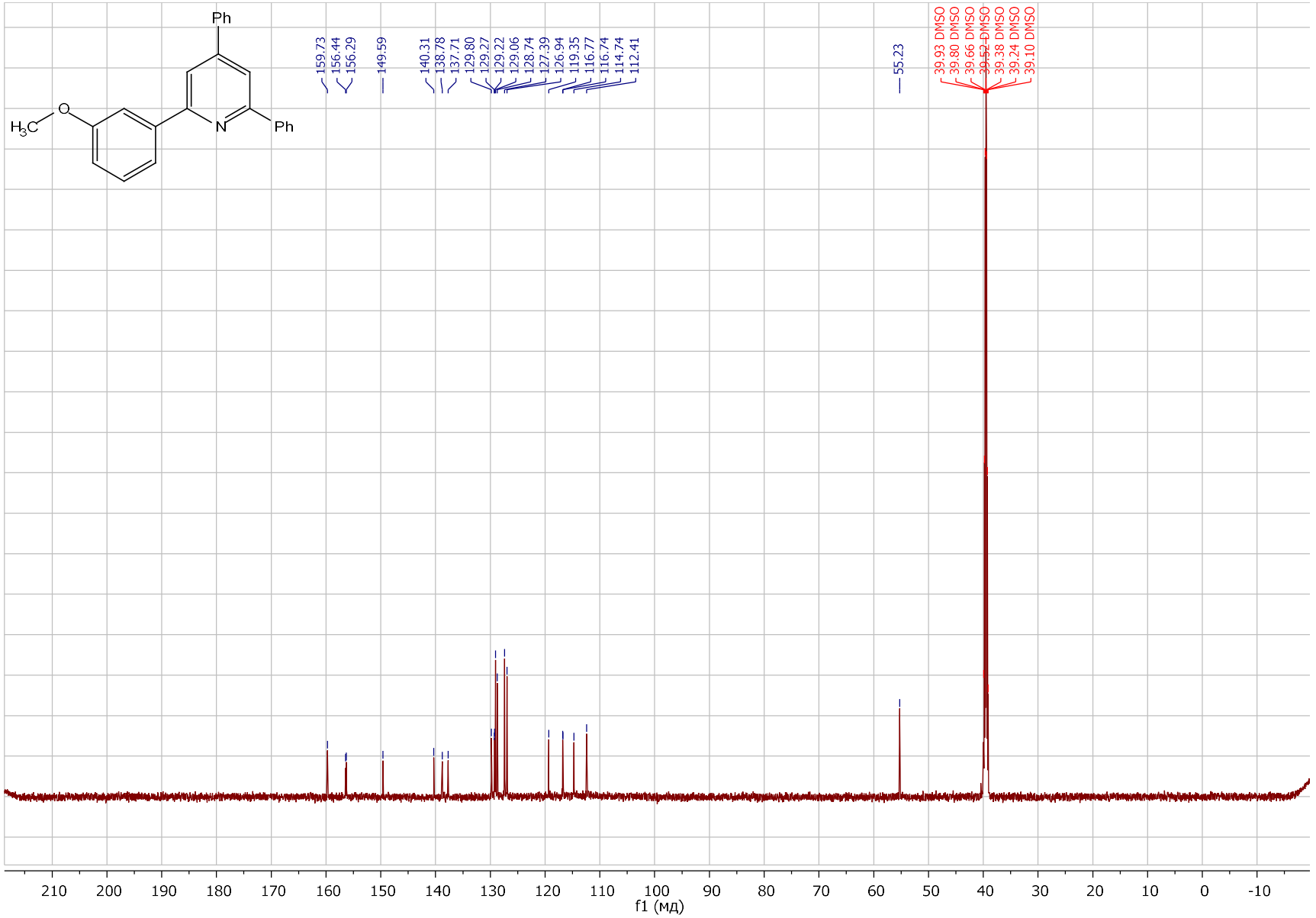
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(2-chlorophenyl)-2-(3-methoxyphenyl)-6-(p-tolyl)pyridine (5f)



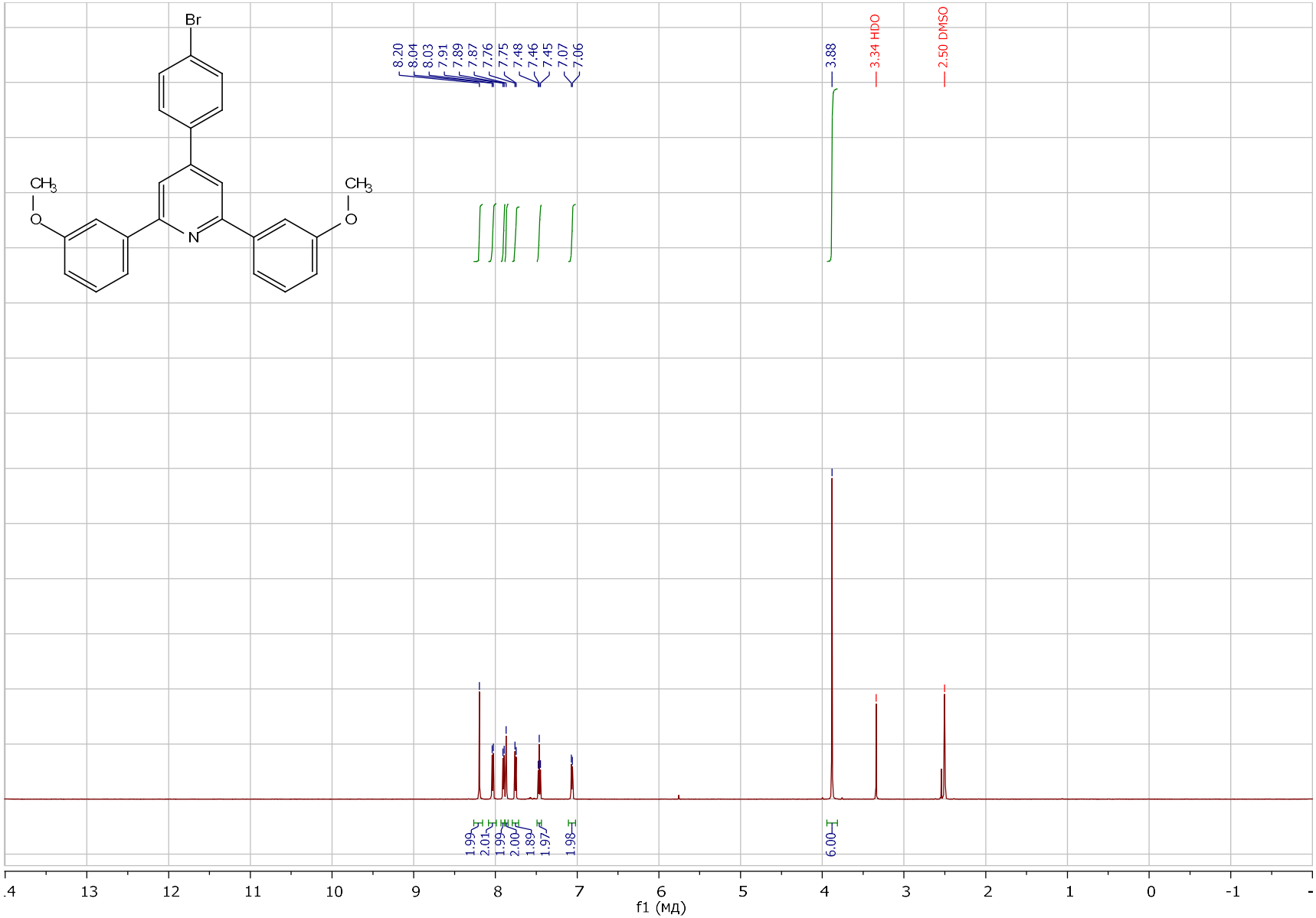
^{1}H NMR (600 MHz, DMSO-*d6*) of 2-(3-methoxyphenyl)-4,6-diphenylpyridine (5g)



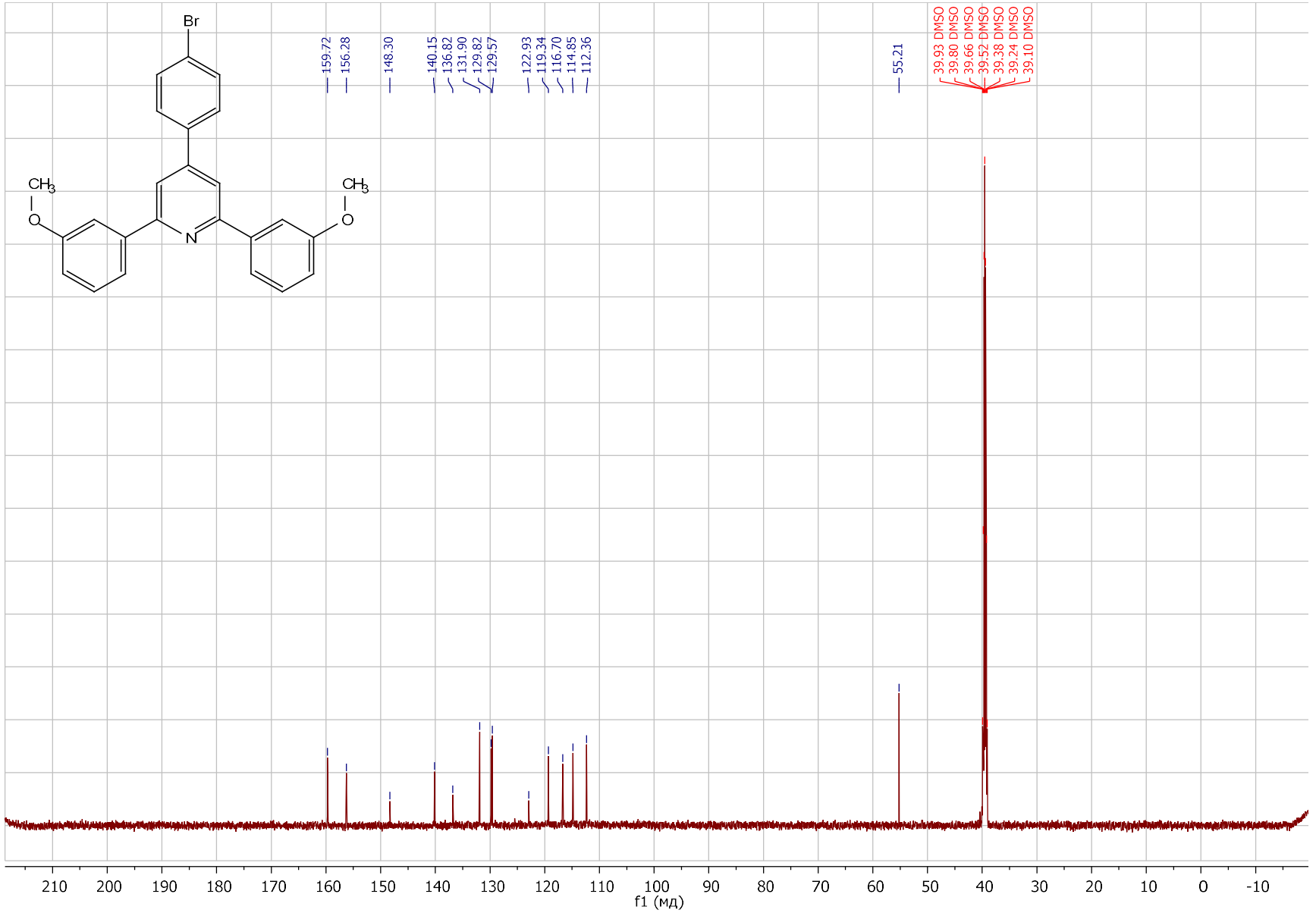
^{13}C NMR (151 MHz, DMSO-*d6*) of 2-(3-methoxyphenyl)-4,6-diphenylpyridine (5g)



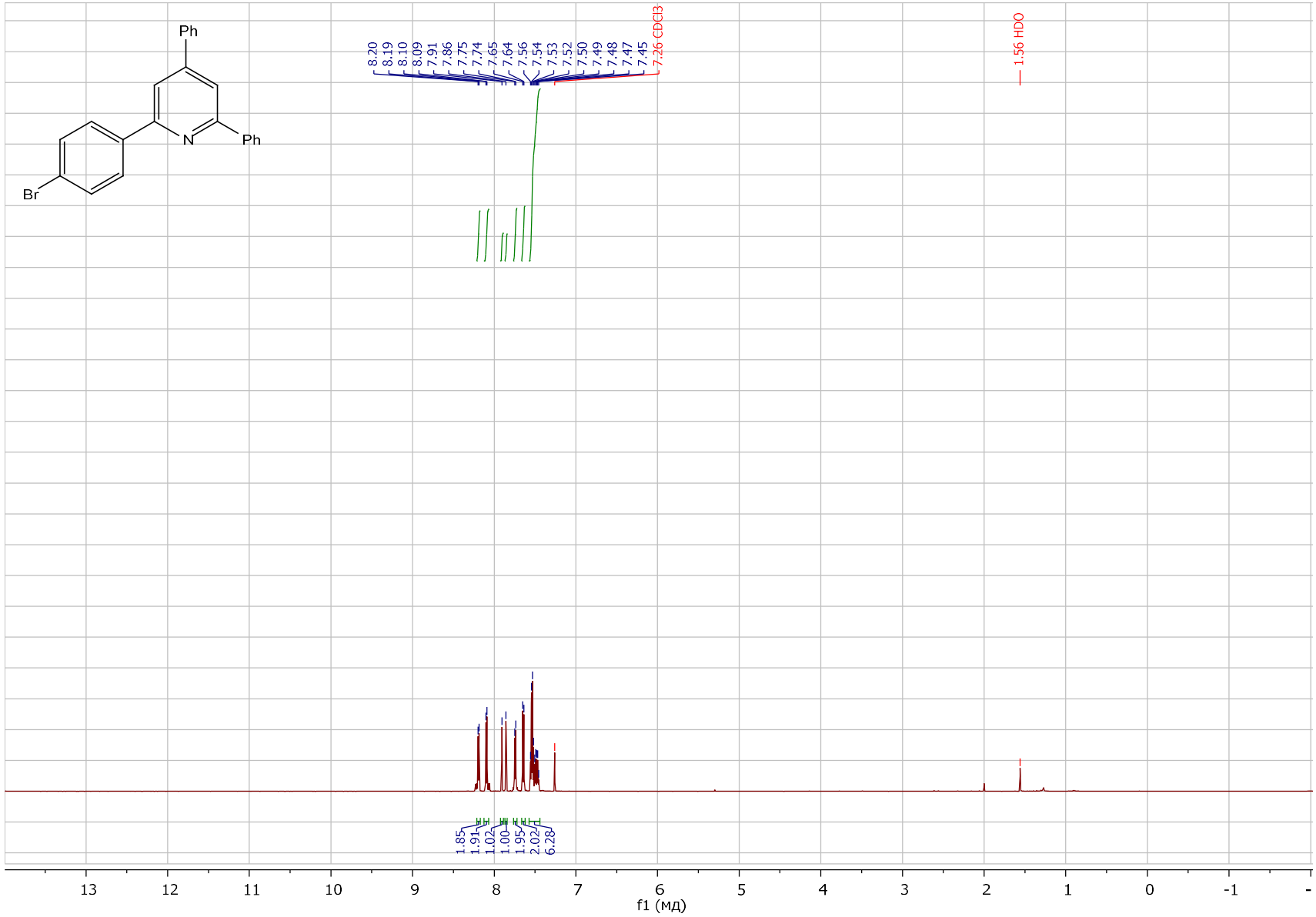
^{1}H NMR (600 MHz, DMSO-*d6*) of 4-(4-bromophenyl)-2,6-bis(3-methoxyphenyl)pyridine (5h)



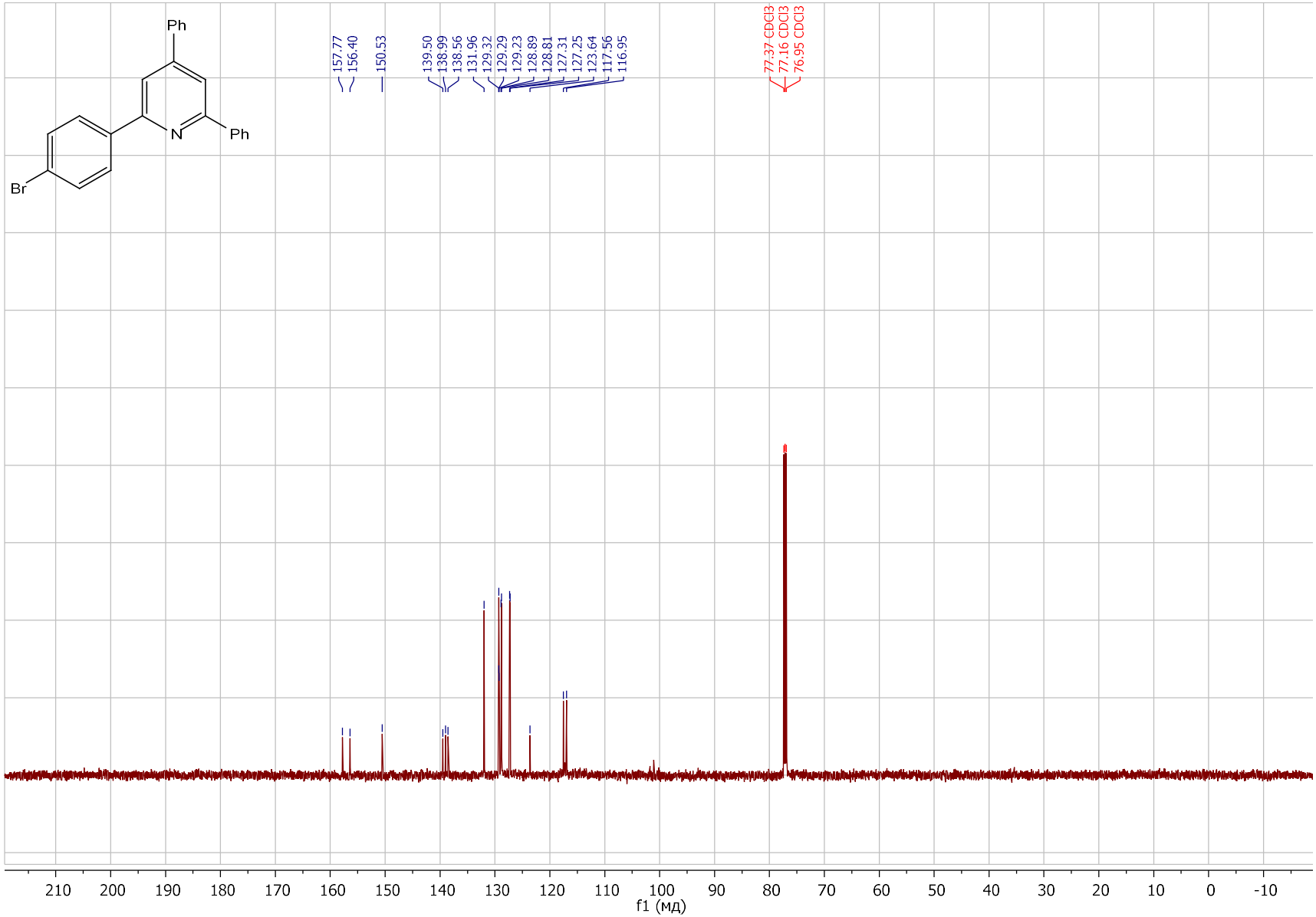
^{13}C NMR (151 MHz, DMSO-*d6*) of 4-(4-bromophenyl)-2,6-bis(3-methoxyphenyl)pyridine (5h)



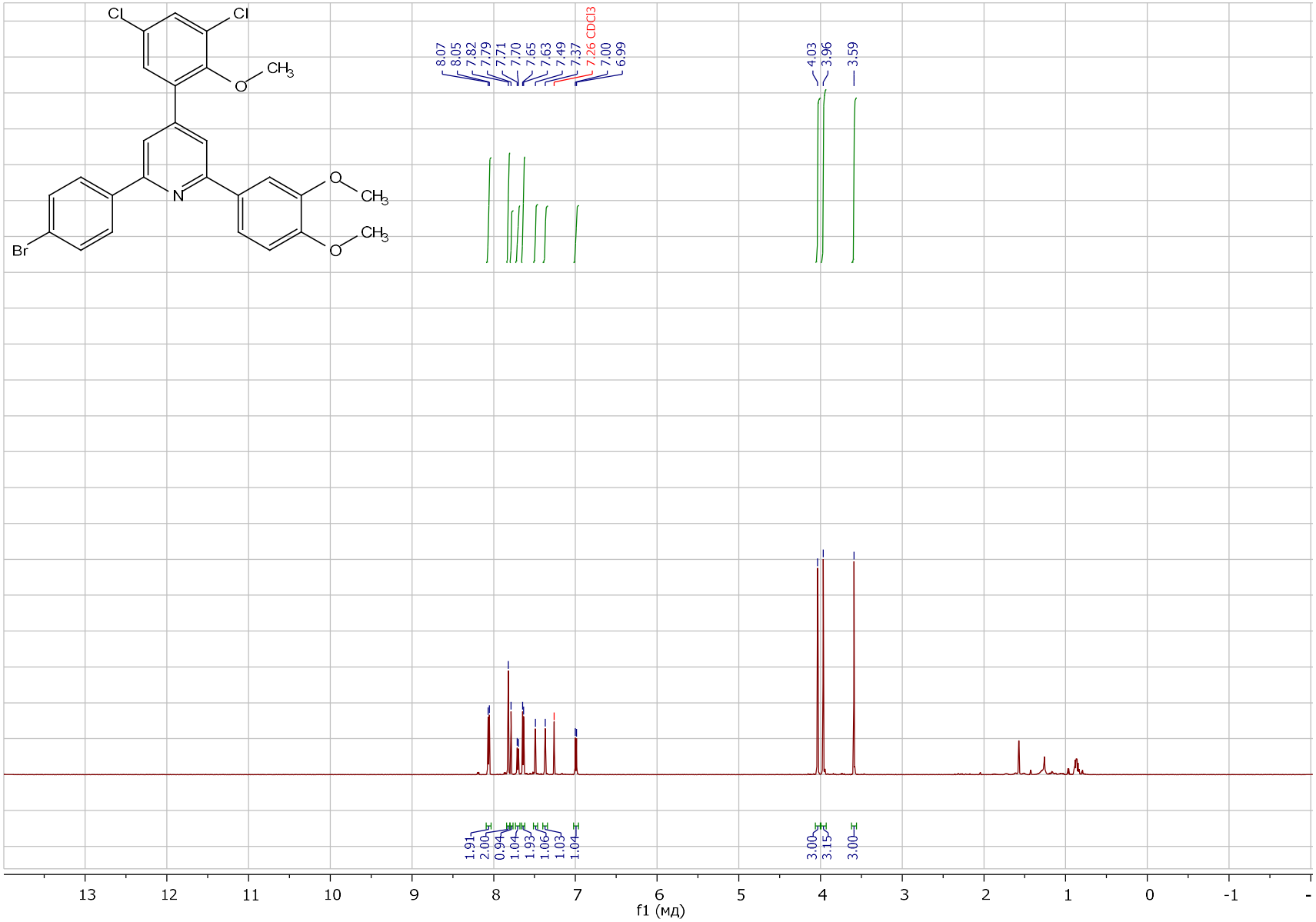
^{1}H NMR (600 MHz, Chloroform-*d*) of 2-(4-bromophenyl)-4,6-diphenylpyridine (5i)



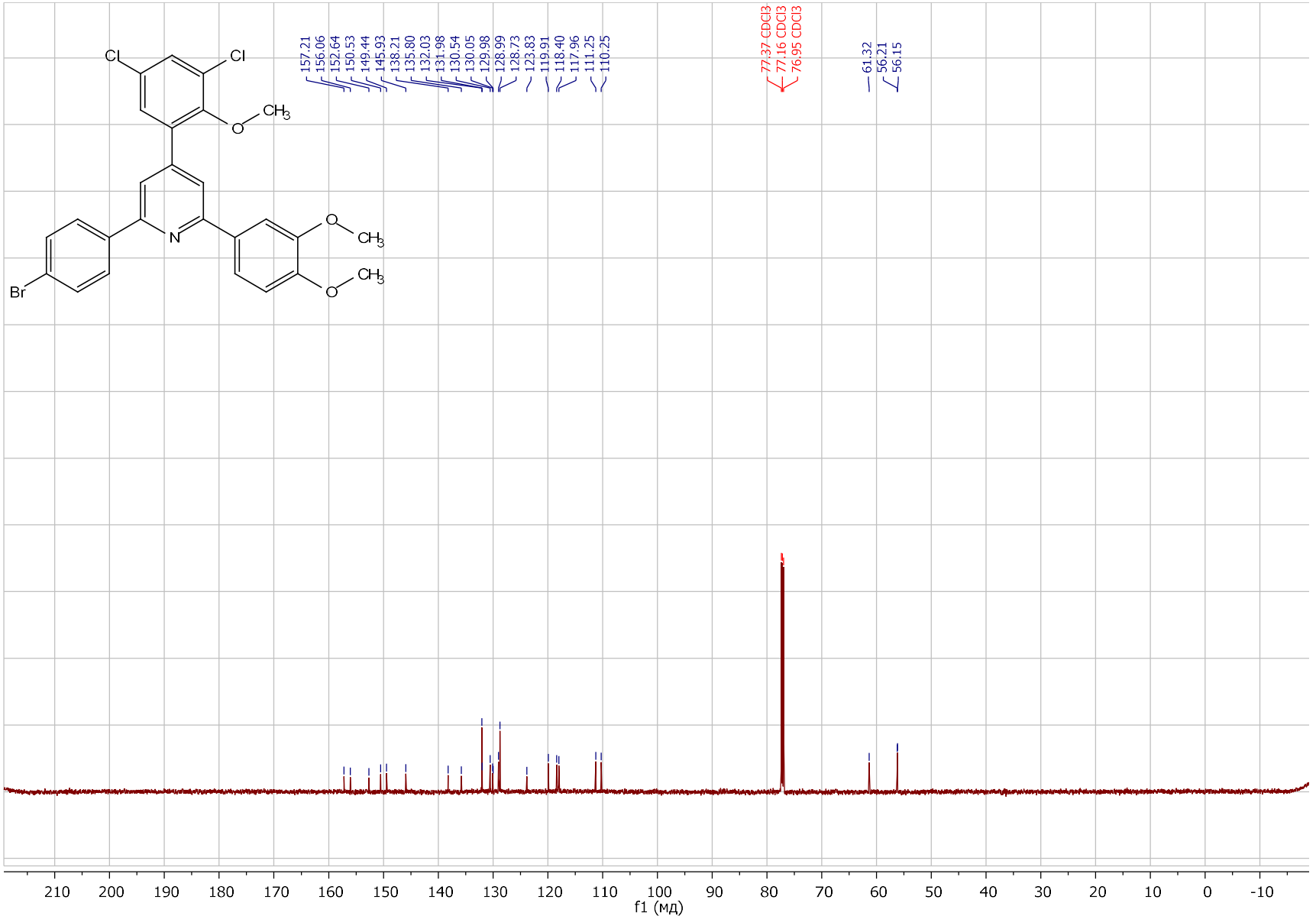
^{13}C NMR (151 MHz, Chloroform-*d*) of 2-(4-bromophenyl)-4,6-diphenylpyridine (5i)



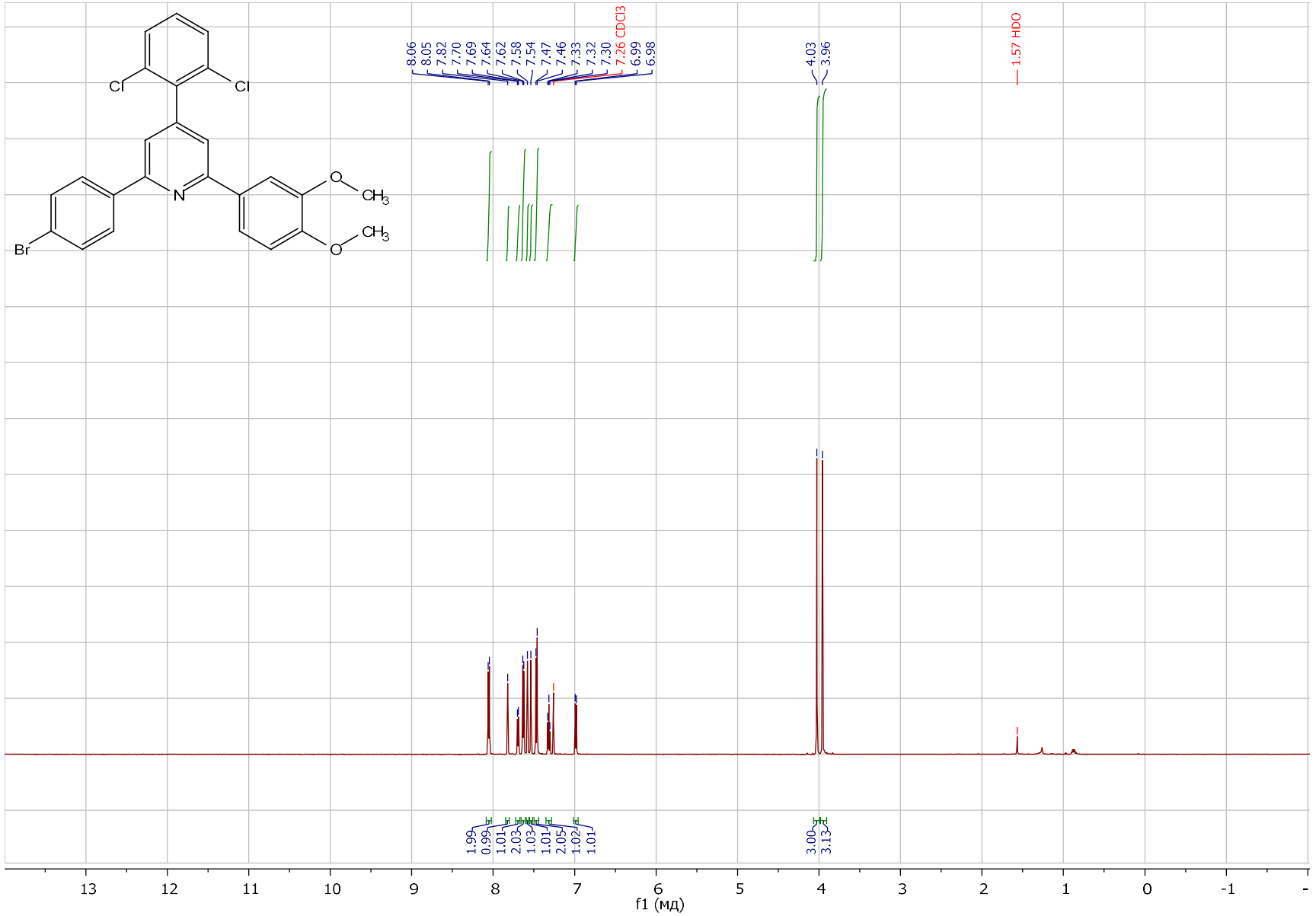
^{1}H NMR (600 MHz, Chloroform-*d*) of 2-(4-bromophenyl)-4-(3,5-dichloro-2-methoxyphenyl)-6-(3,4-dimethoxyphenyl)pyridine (5j)



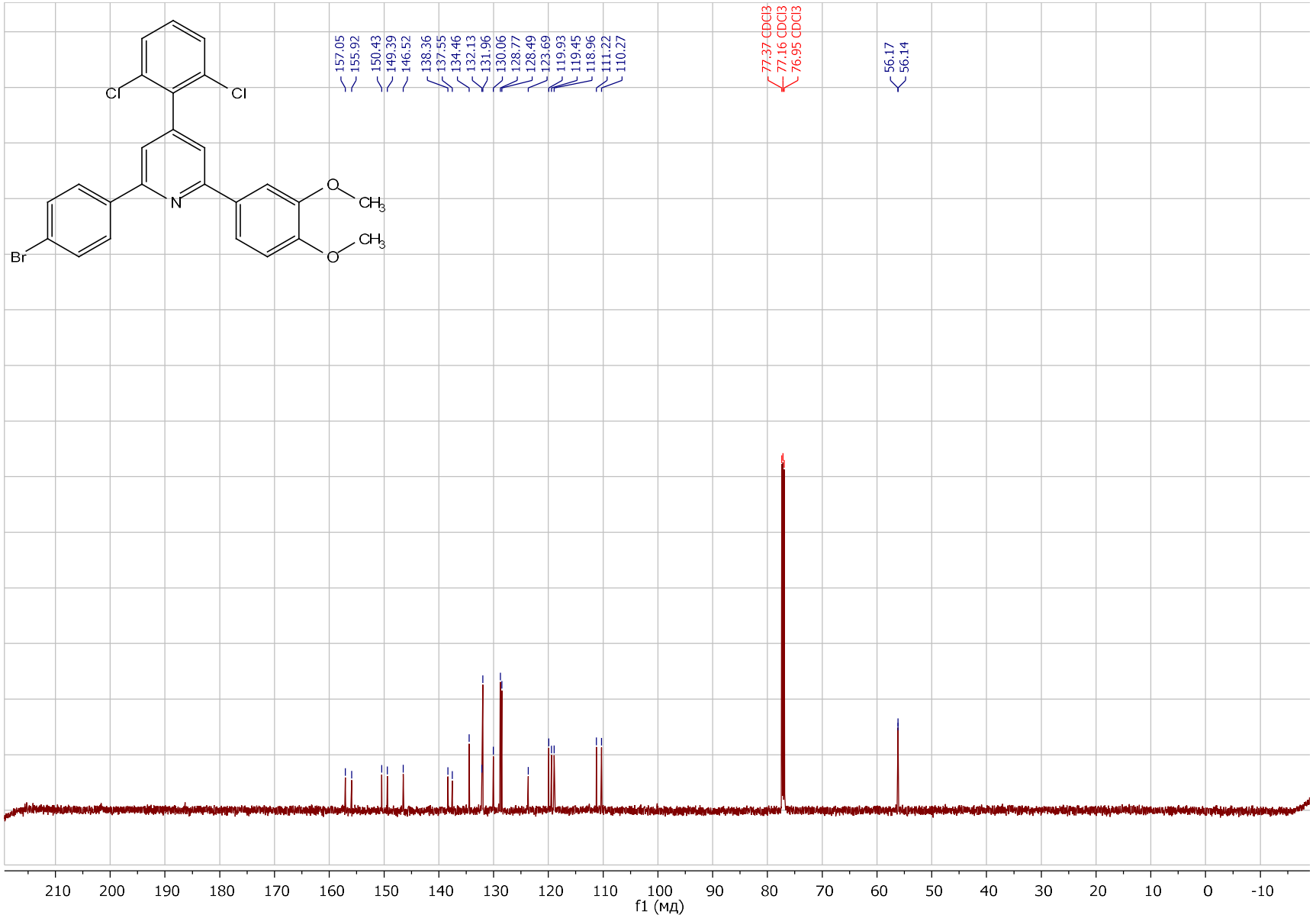
^{13}C NMR (151 MHz, Chloroform-*d*) of 2-(4-bromophenyl)-4-(3,5-dichloro-2-methoxyphenyl)-6-(3,4-dimethoxyphenyl)pyridine (5j)



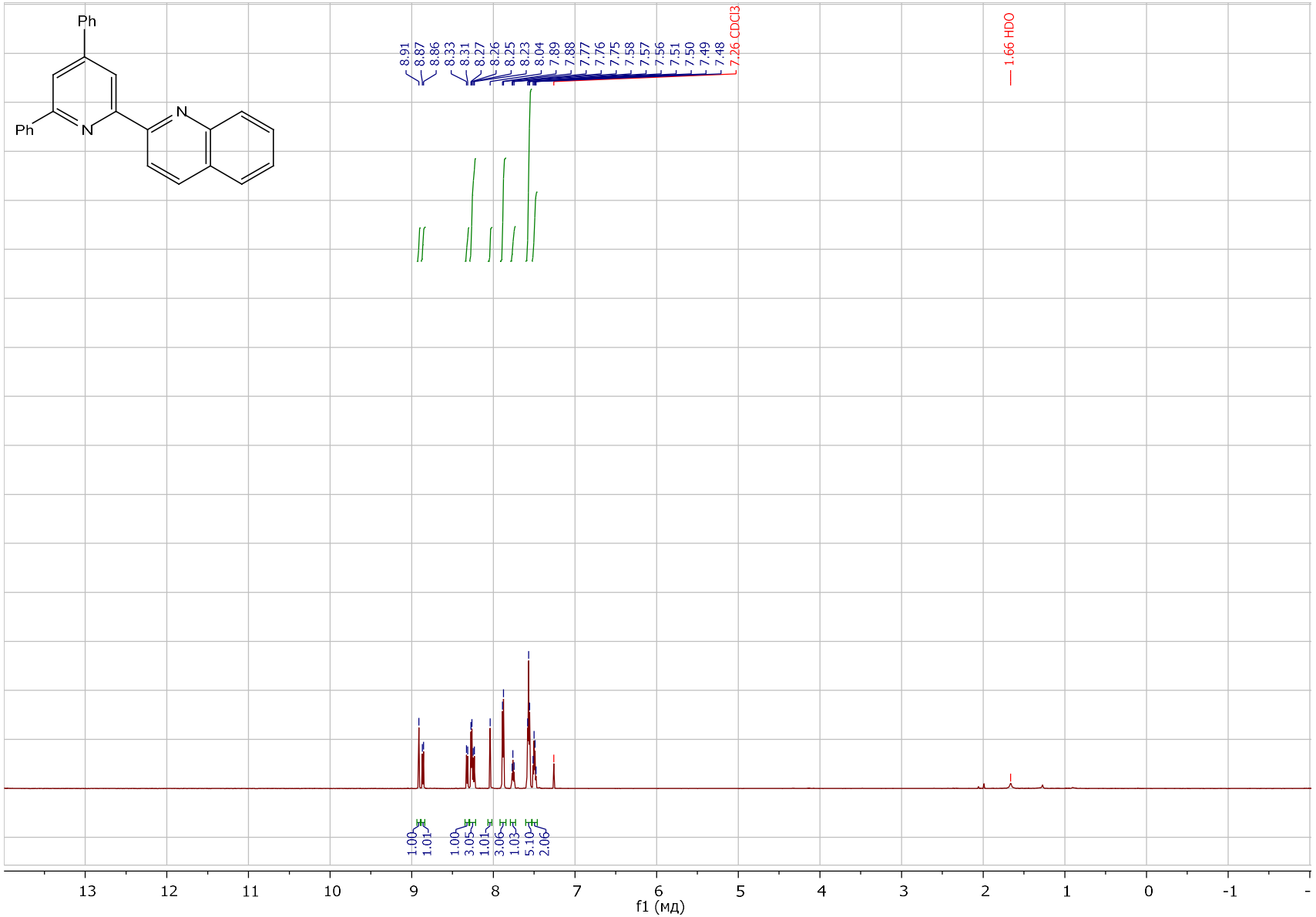
^{1}H NMR (600 MHz, Chloroform-*d*) of 2-(4-bromophenyl)-4-(2,6-dichlorophenyl)-6-(3,4-dimethoxyphenyl)pyridine (5k)



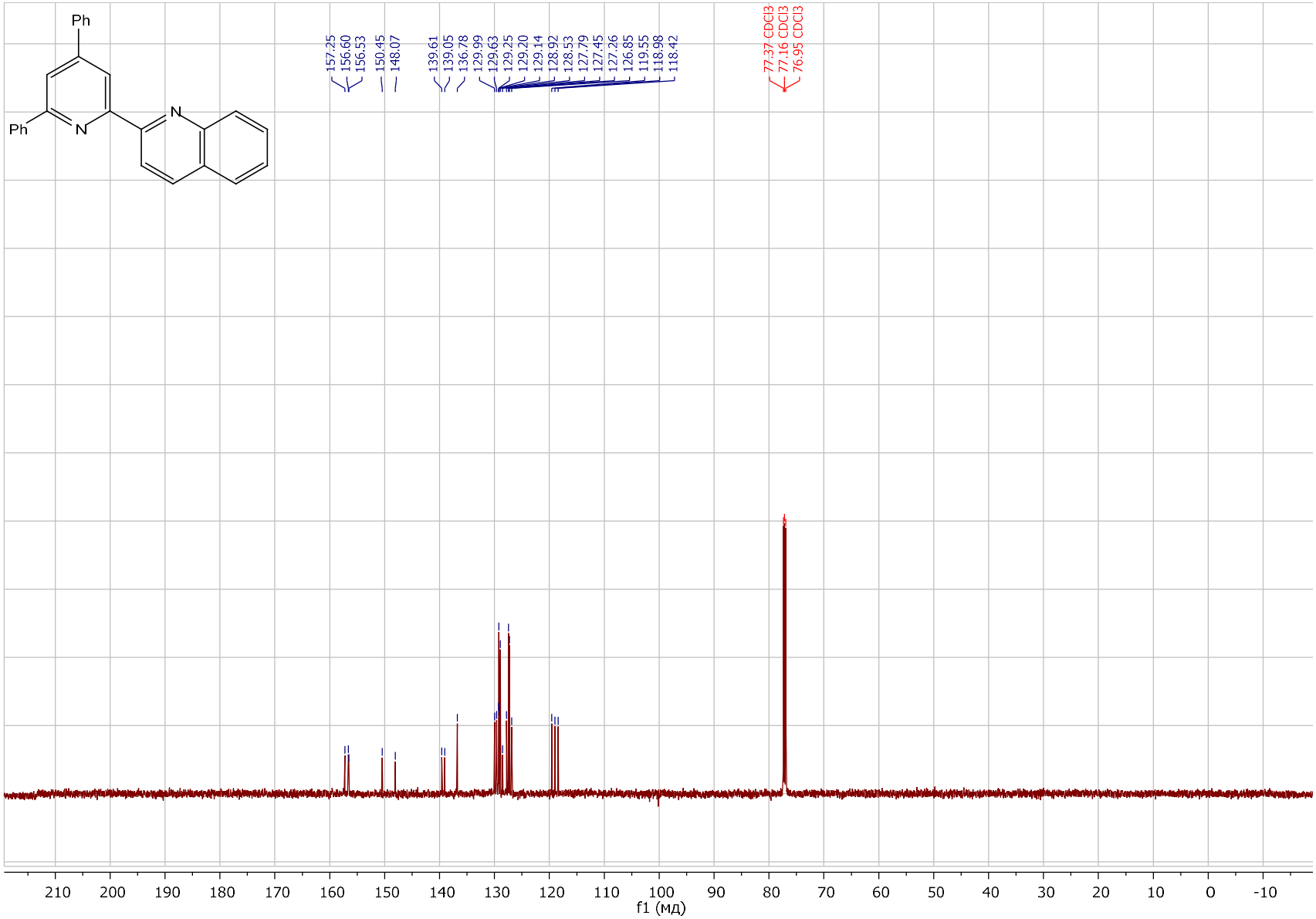
^{13}C NMR (151 MHz, Chloroform-*d*) of 2-(4-bromophenyl)-4-(2,6-dichlorophenyl)-6-(3,4-dimethoxyphenyl)pyridine (5k)



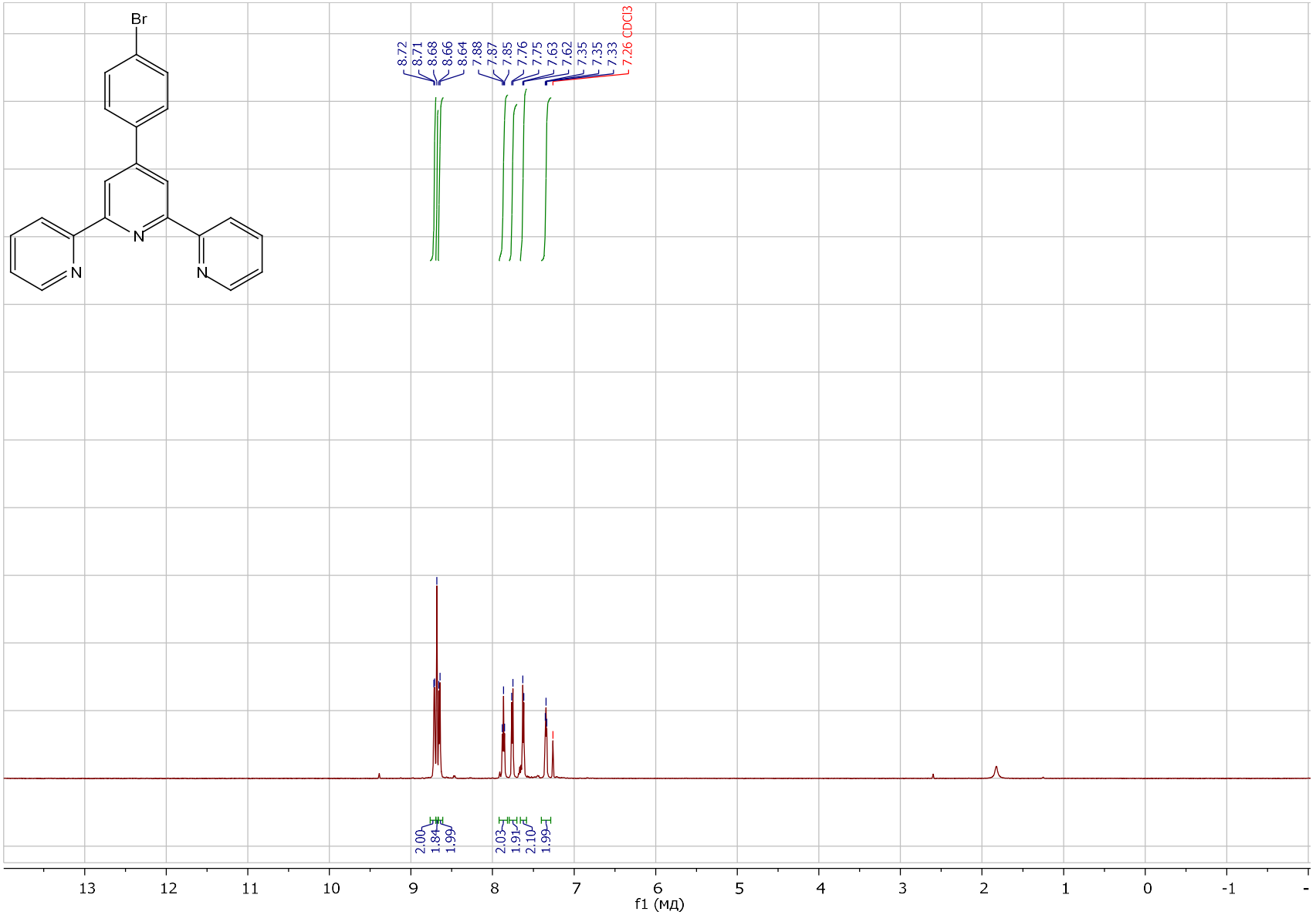
^{1}H NMR (600 MHz, Chloroform-*d*) of 2-(4,6-diphenylpyridin-2-yl)quinolone (5n)



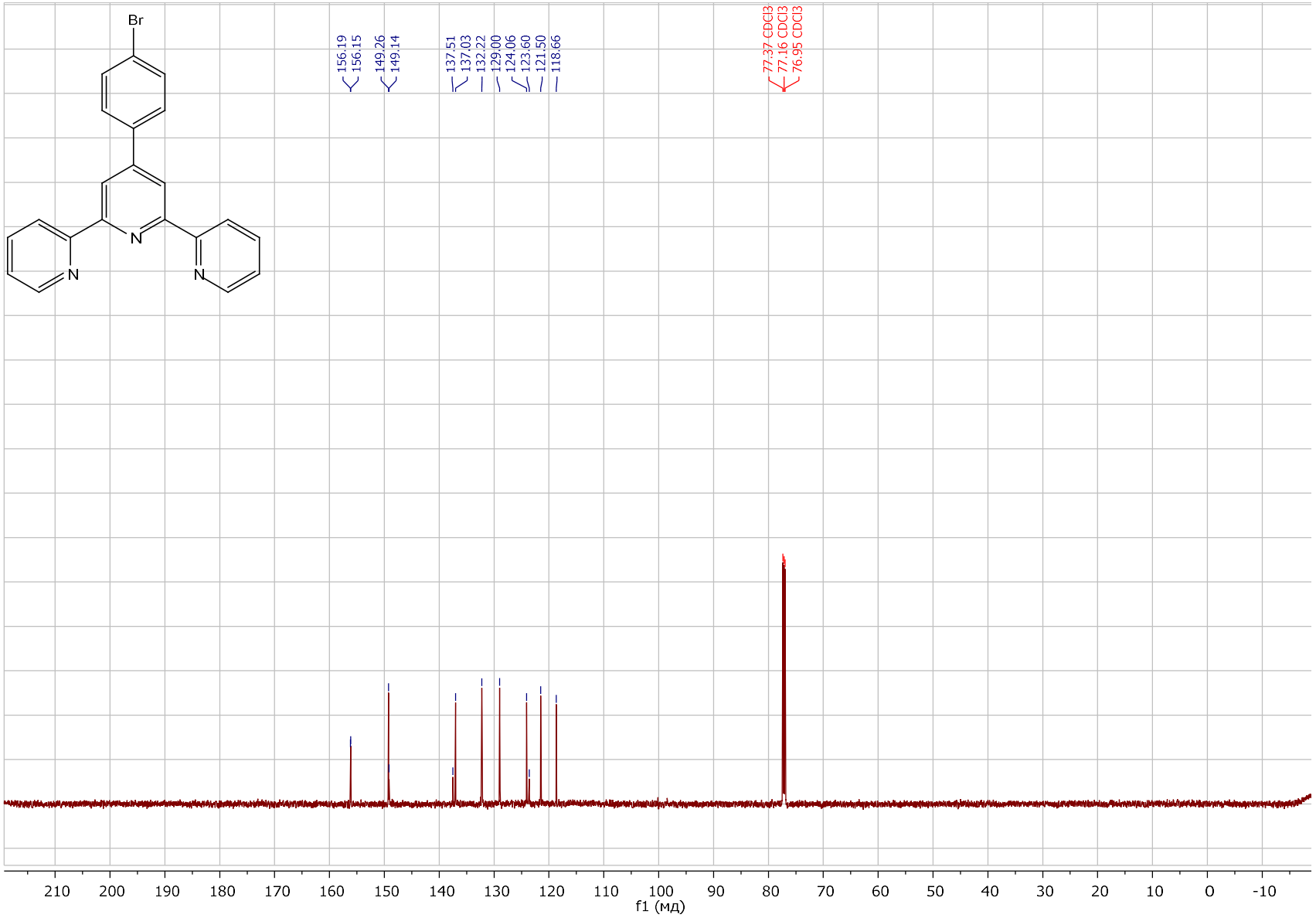
^{13}C NMR (151 MHz, Chloroform-*d*) of 2-(4,6-diphenylpyridin-2-yl)quinolone (5n)



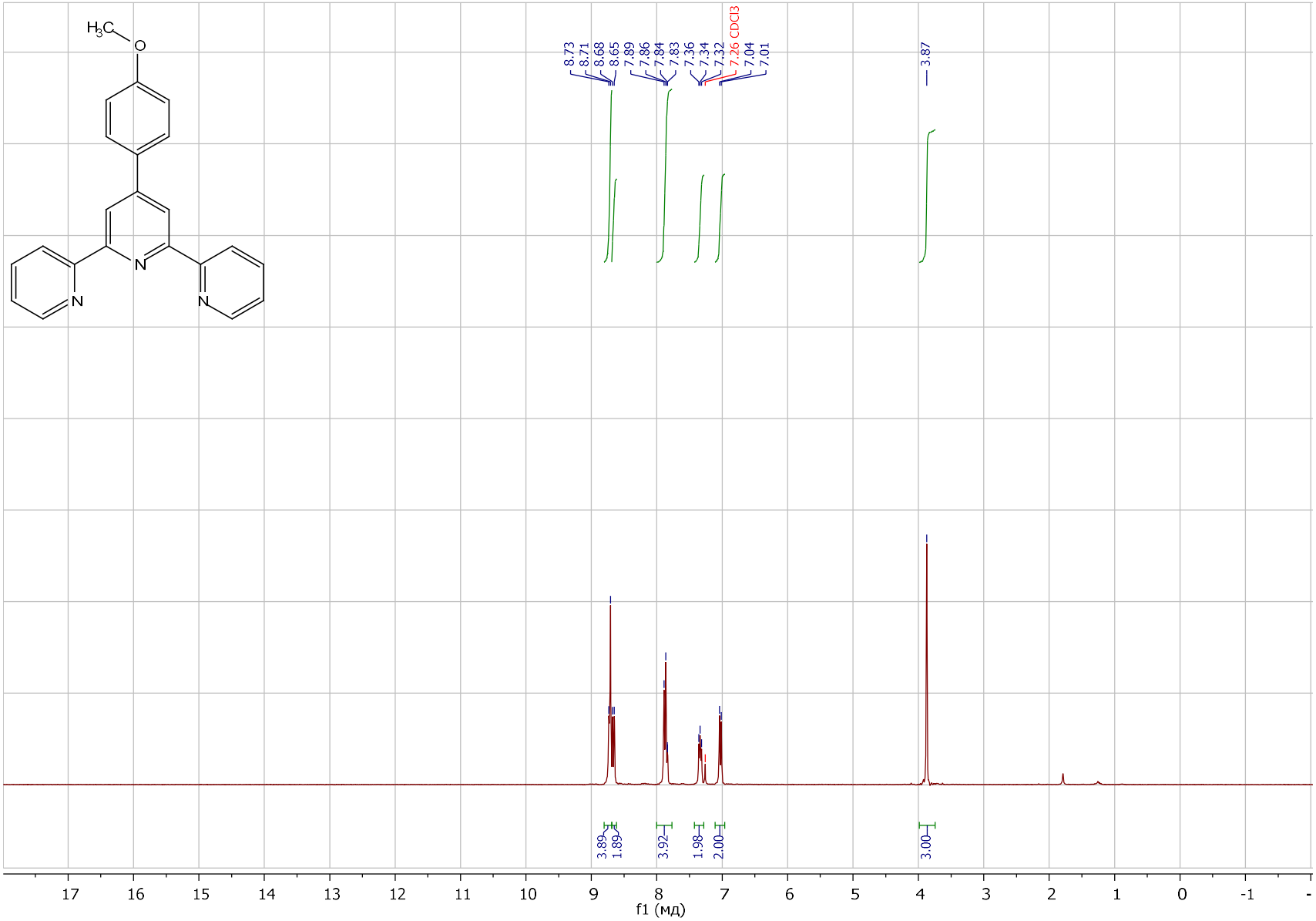
^{1}H NMR (600 MHz, Chloroform-*d*) of 4'-(4-bromophenyl)-2,2':6',2''-terpyridine (5o)



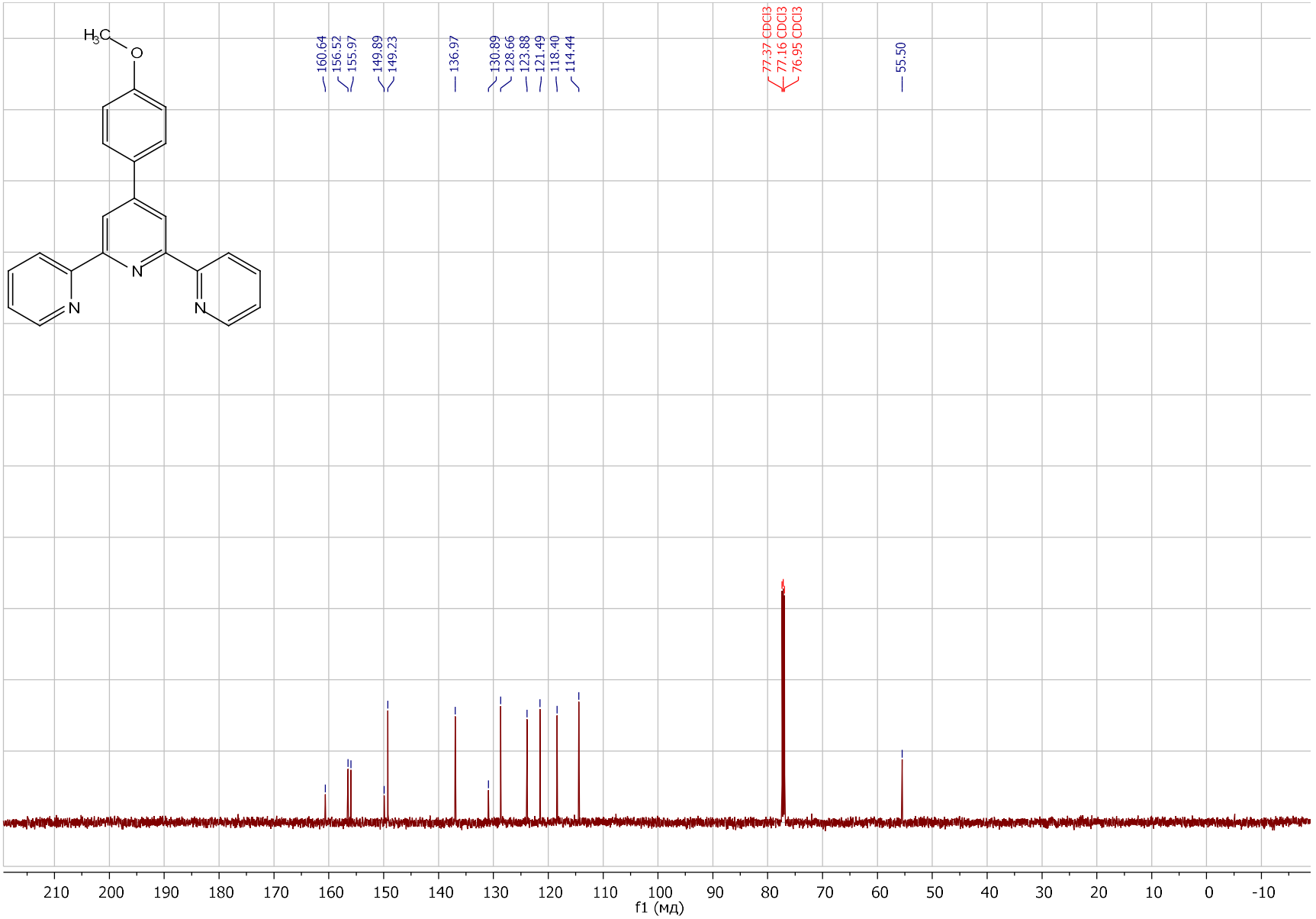
^{13}C NMR (151 MHz, Chloroform-*d*) of 4'-(4-bromophenyl)-2,2':6',2''-terpyridine (5o)



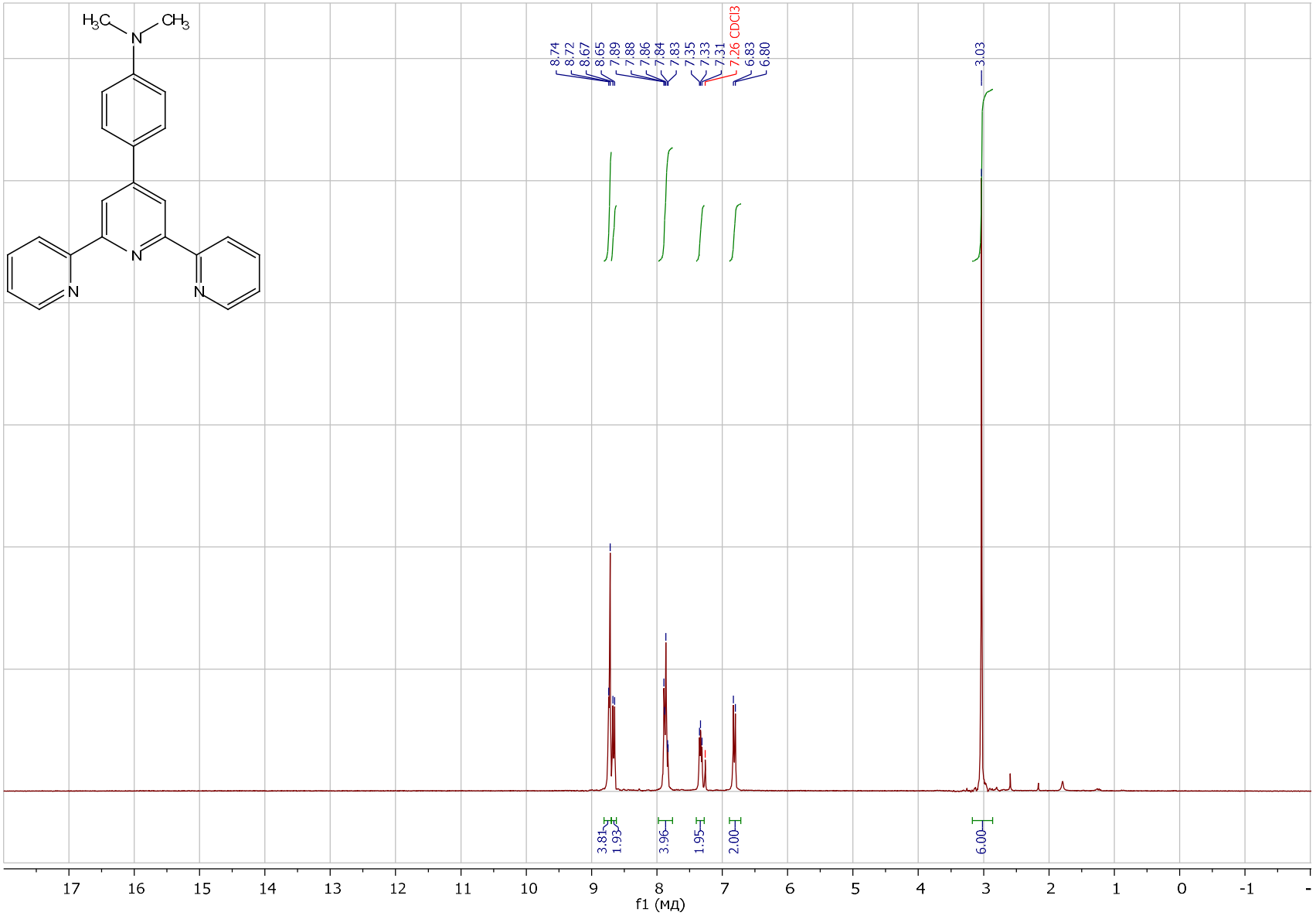
^{1}H NMR (300 MHz, Chloroform-*d*) of 4'-(4-methoxyphenyl)-2,2':6',2''-terpyridine (5p)



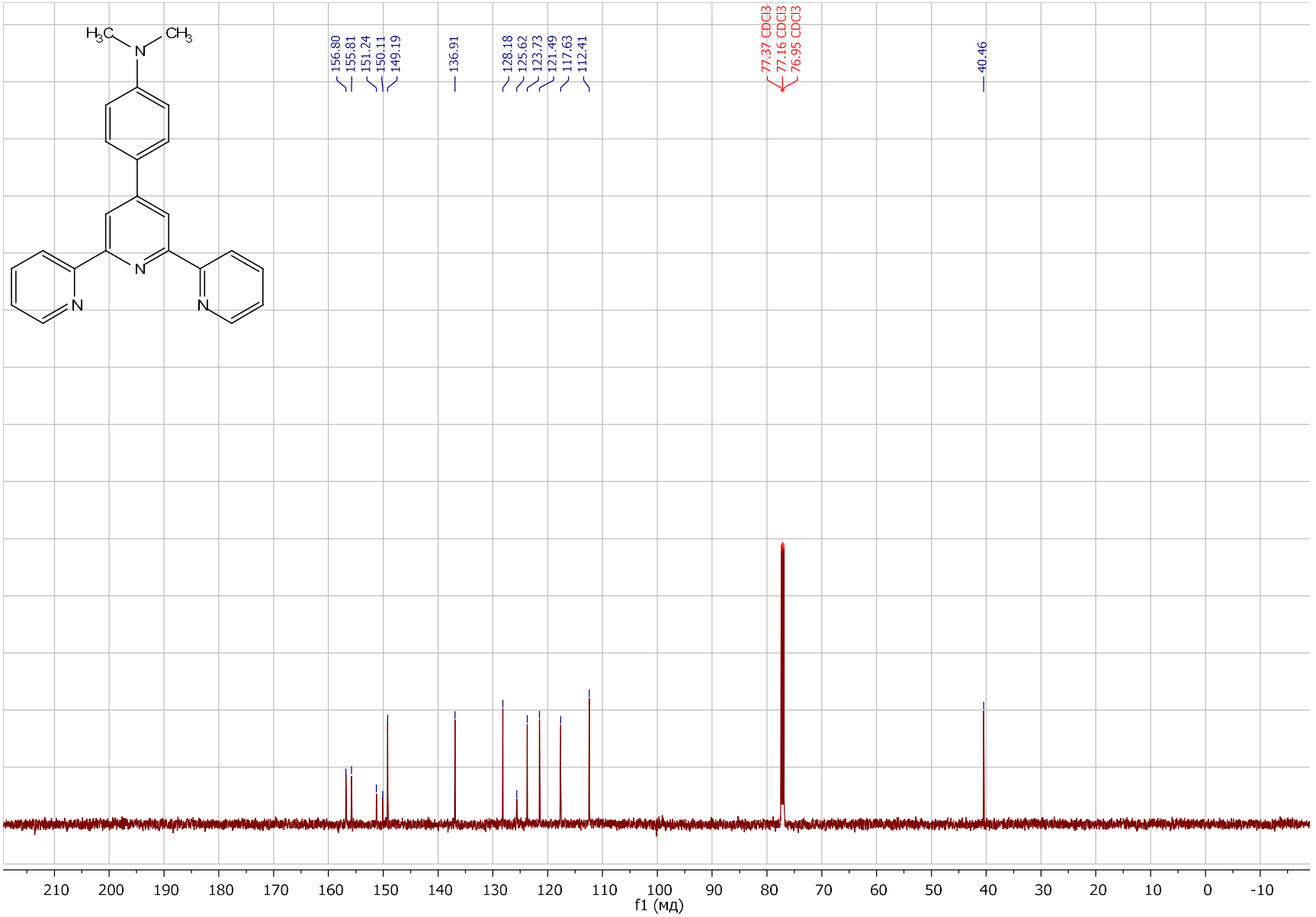
^{13}C NMR (151 MHz, Chloroform-*d*) of 4'-(4-methoxyphenyl)-2,2':6',2''-terpyridine (5p)



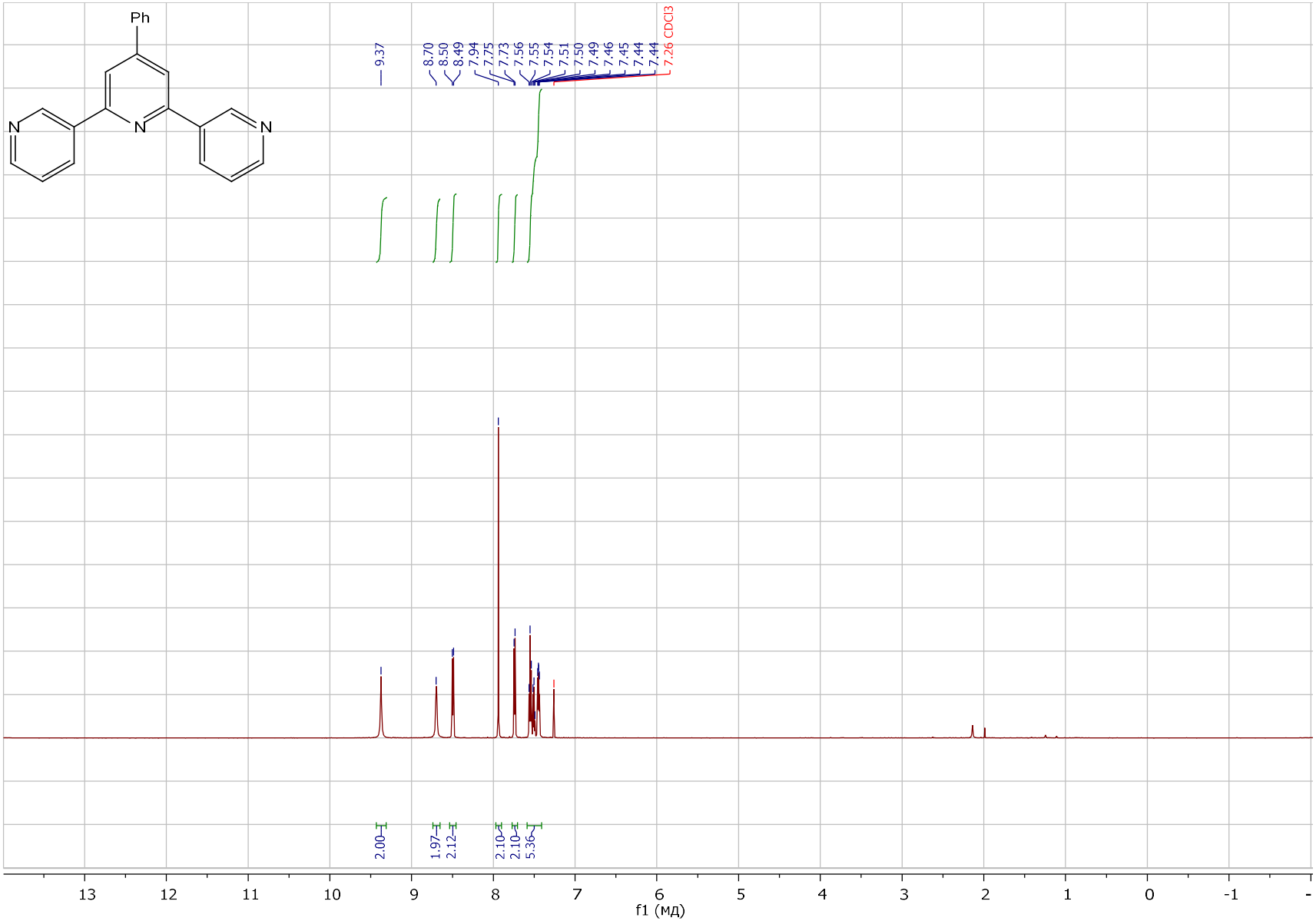
^{1}H NMR (300 MHz, Chloroform-*d*) of 4-([2,2':6',2''-terpyridin]-4'-yl)-N,N-dimethylaniline (5q)



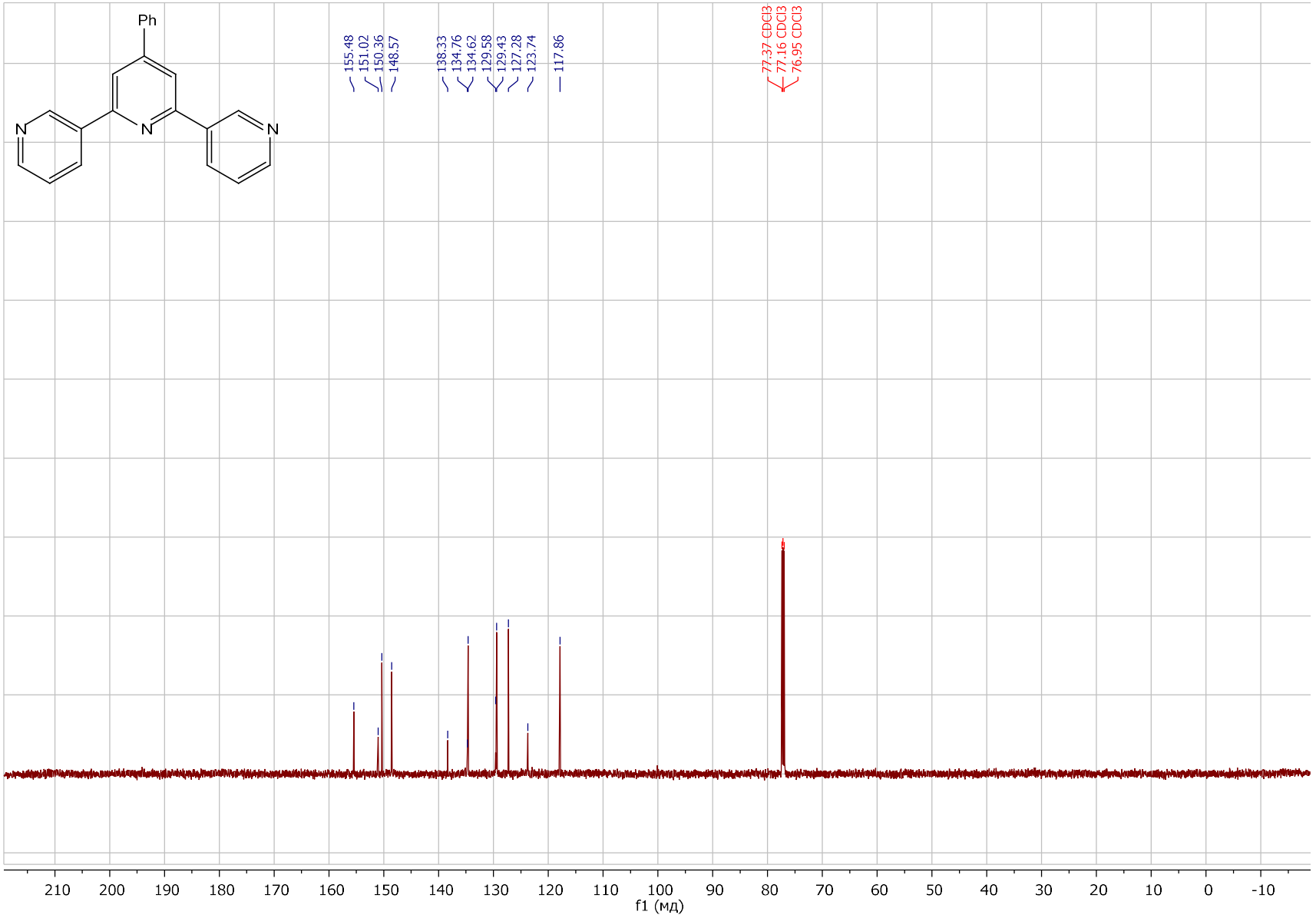
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-([2,2':6',2''-terpyridin]-4'-yl)-N,N-dimethylaniline (5q)



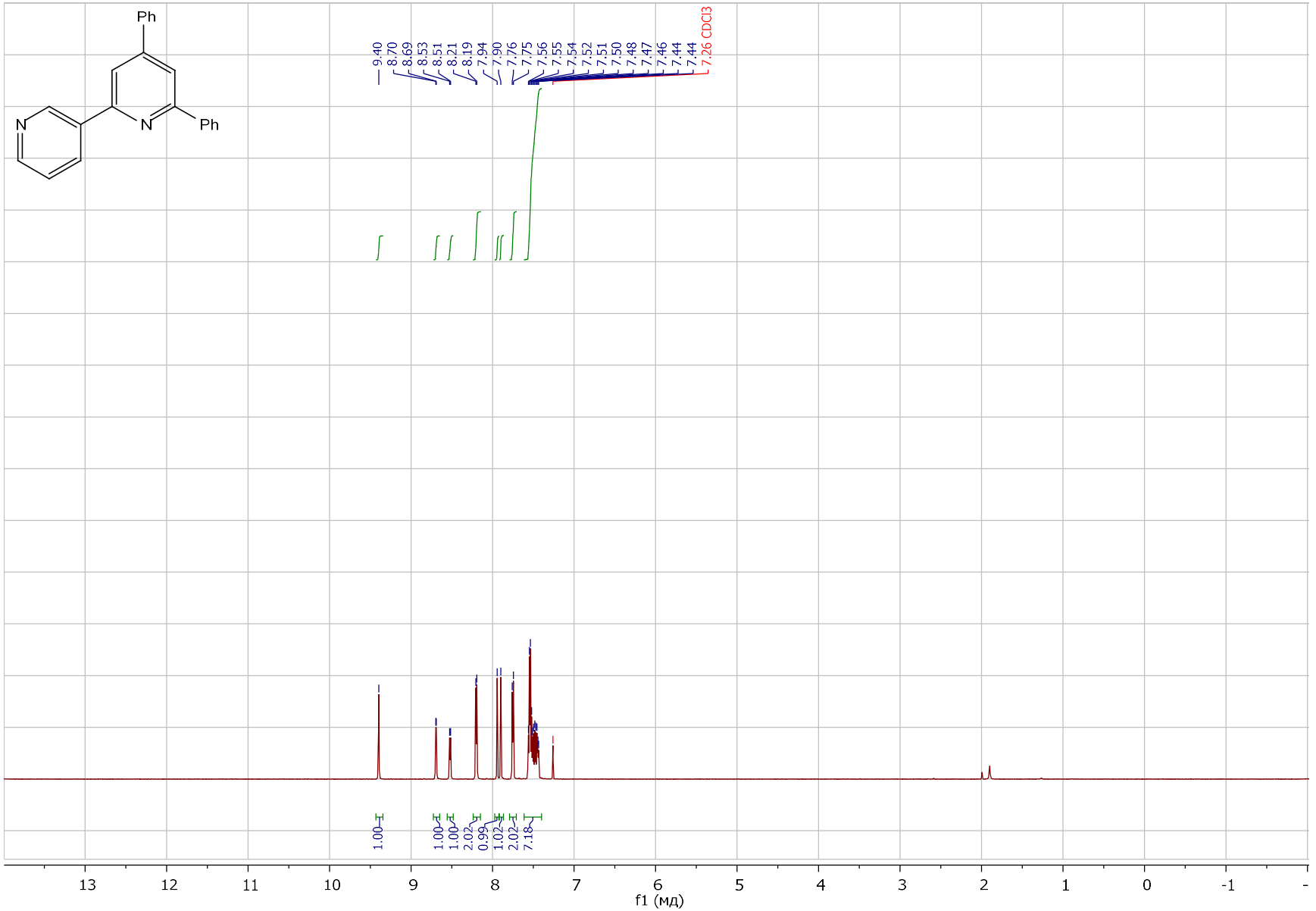
^{1}H NMR (600 MHz, Chloroform-*d*) of 4'-phenyl-3,2':6',3''-terpyridine (5r)



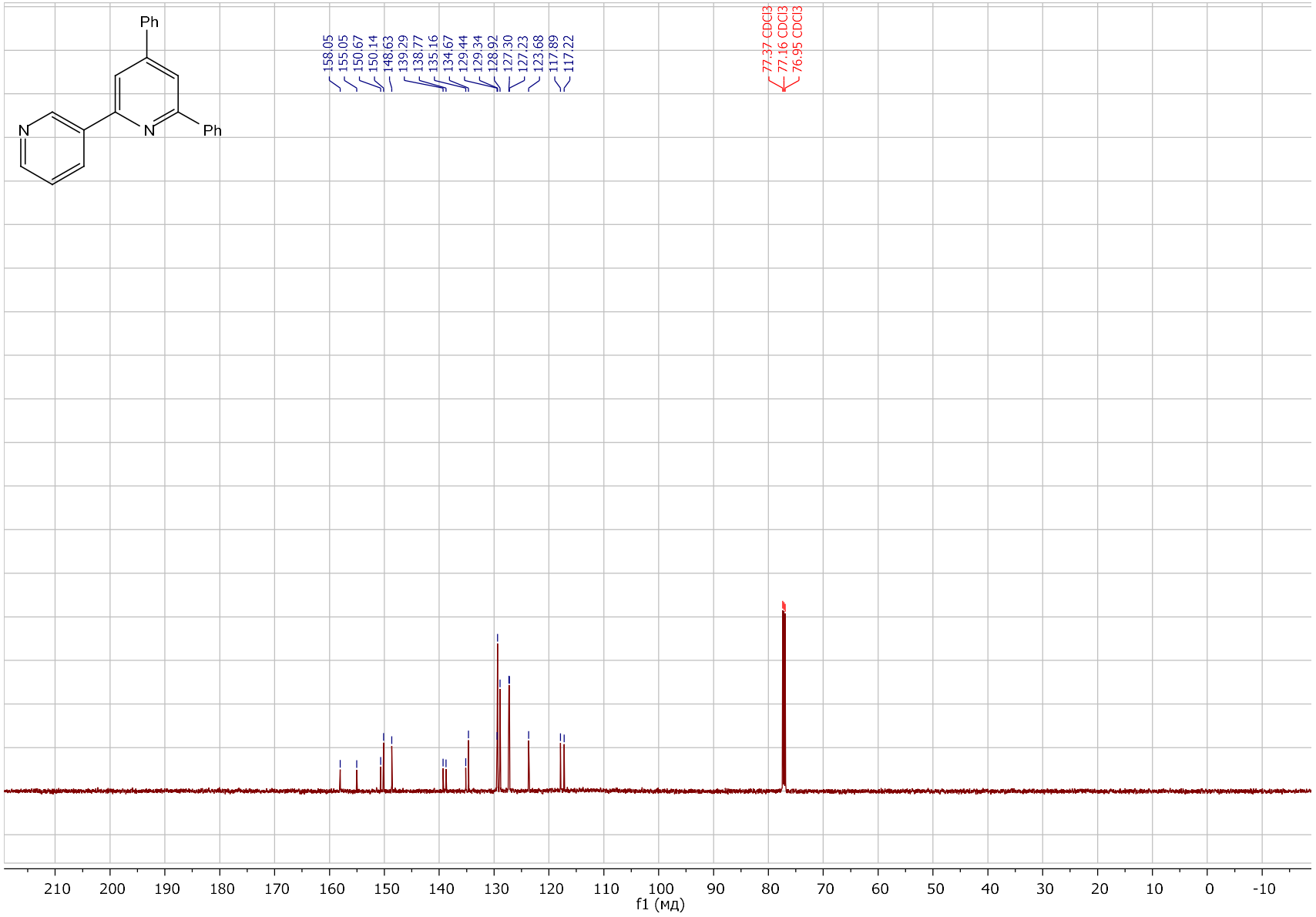
^{13}C NMR (151 MHz, Chloroform-*d*) of 4'-phenyl-3,2':6',3''-terpyridine (5r)



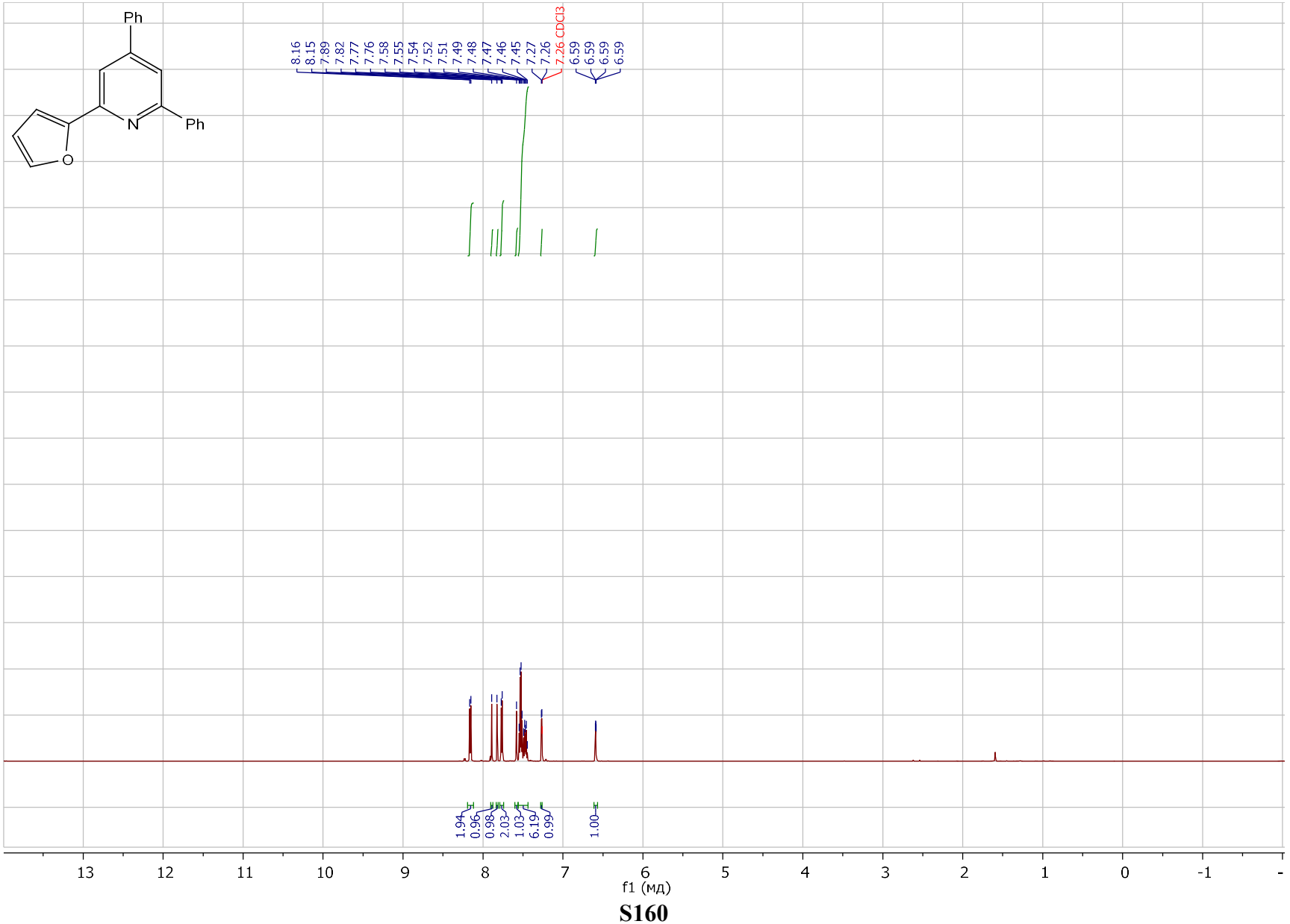
^{1}H NMR (600 MHz, Chloroform-*d*) of 4,6-diphenyl-2,3'-bipyridine (5s)



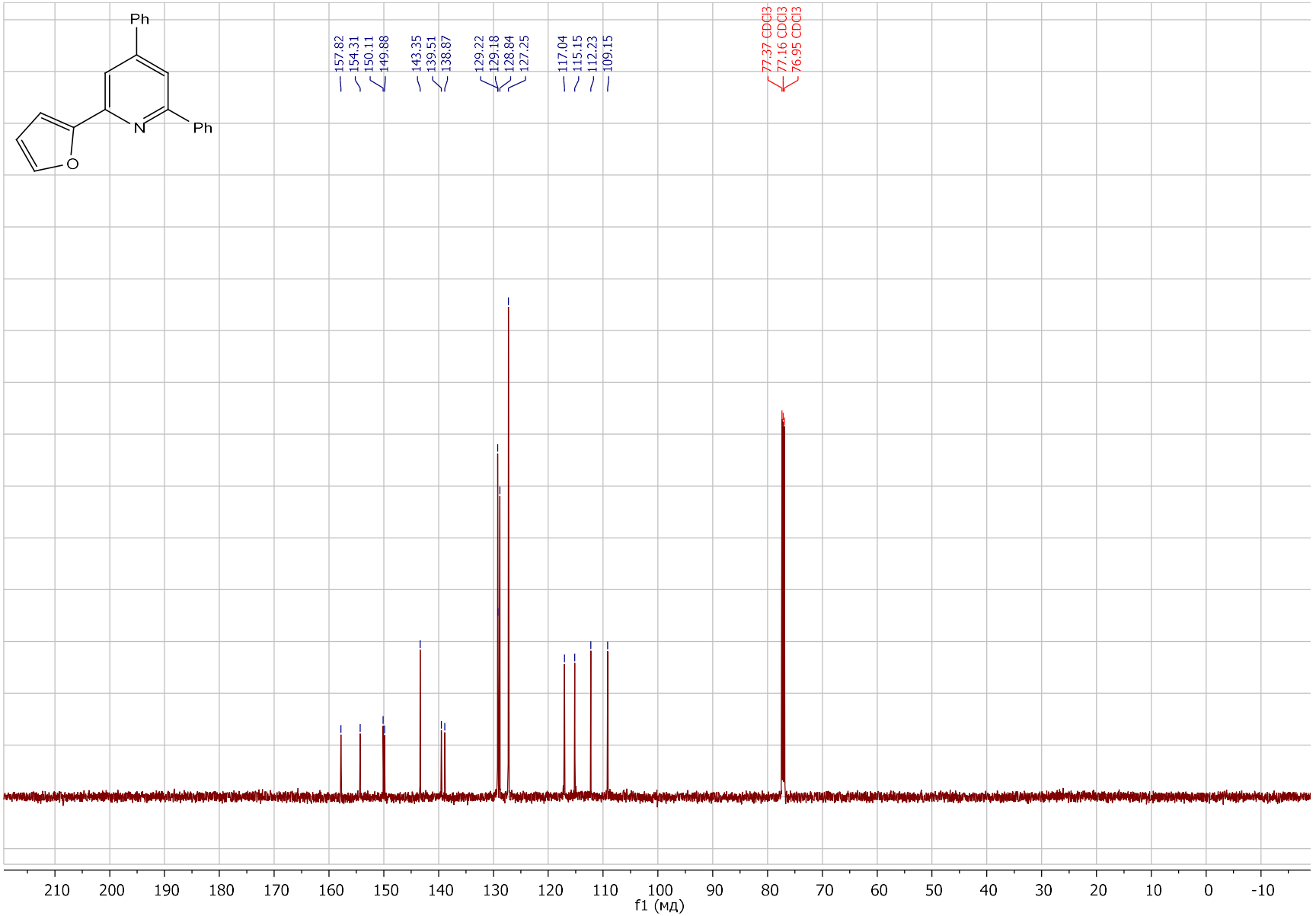
^{13}C NMR (151 MHz, Chloroform-*d*) of 4,6-diphenyl-2,3'-bipyridine (5s)



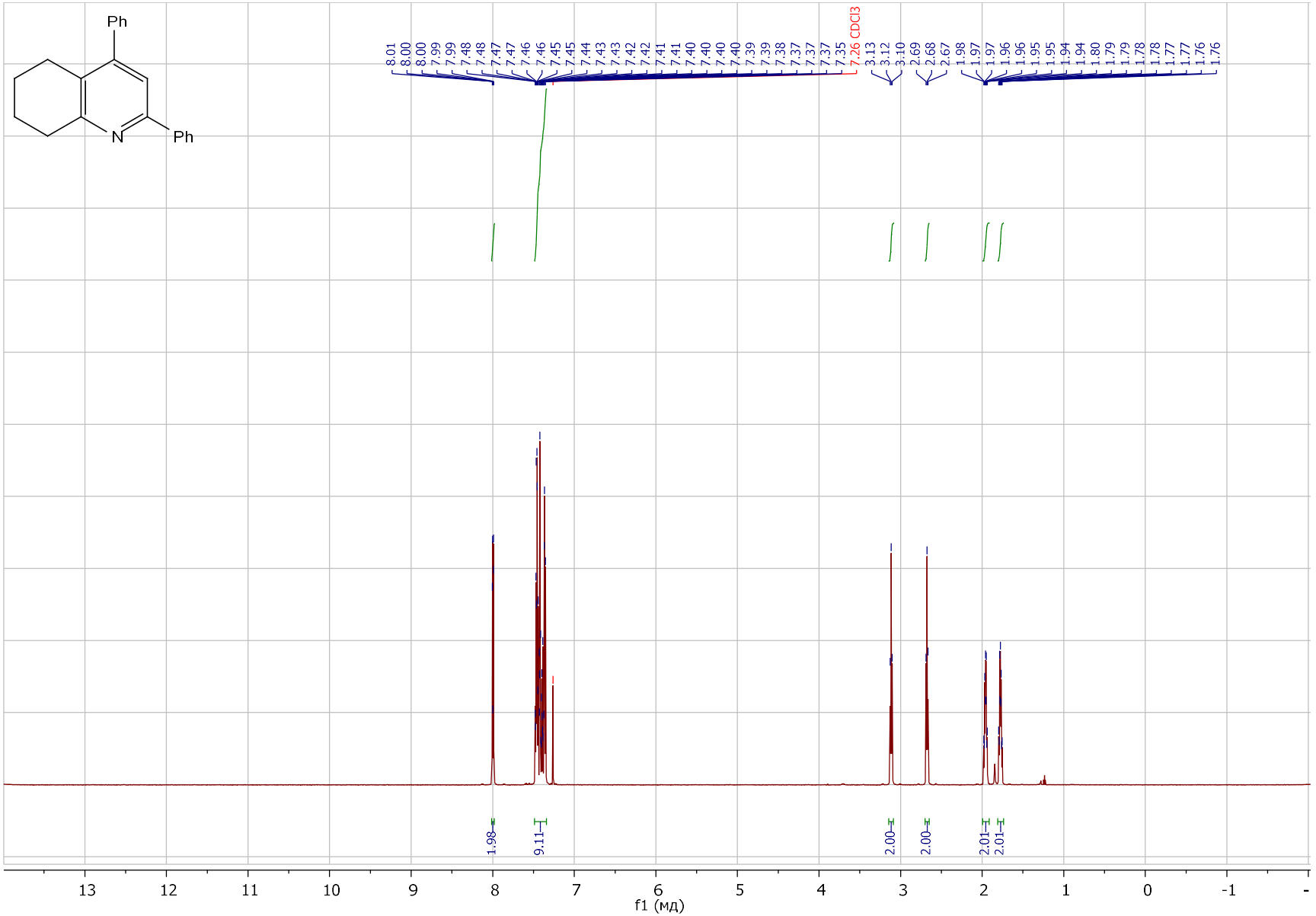
^{1}H NMR (600 MHz, Chloroform-*d*) of 2-(furan-2-yl)-4,6-diphenylpyridine (5t)



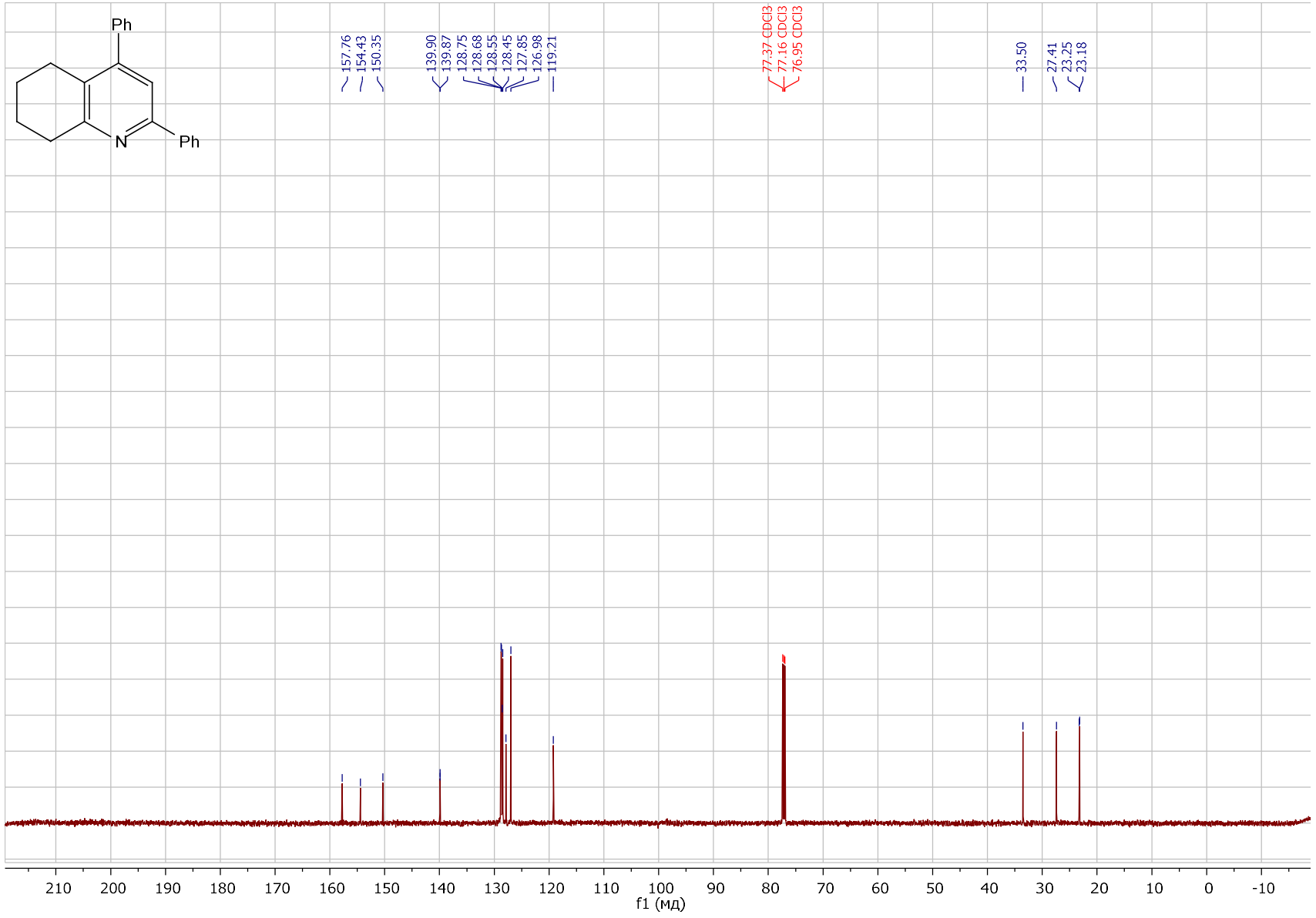
^{13}C NMR (151 MHz, Chloroform-*d*) of 2-(furan-2-yl)-4,6-diphenylpyridine (5t)



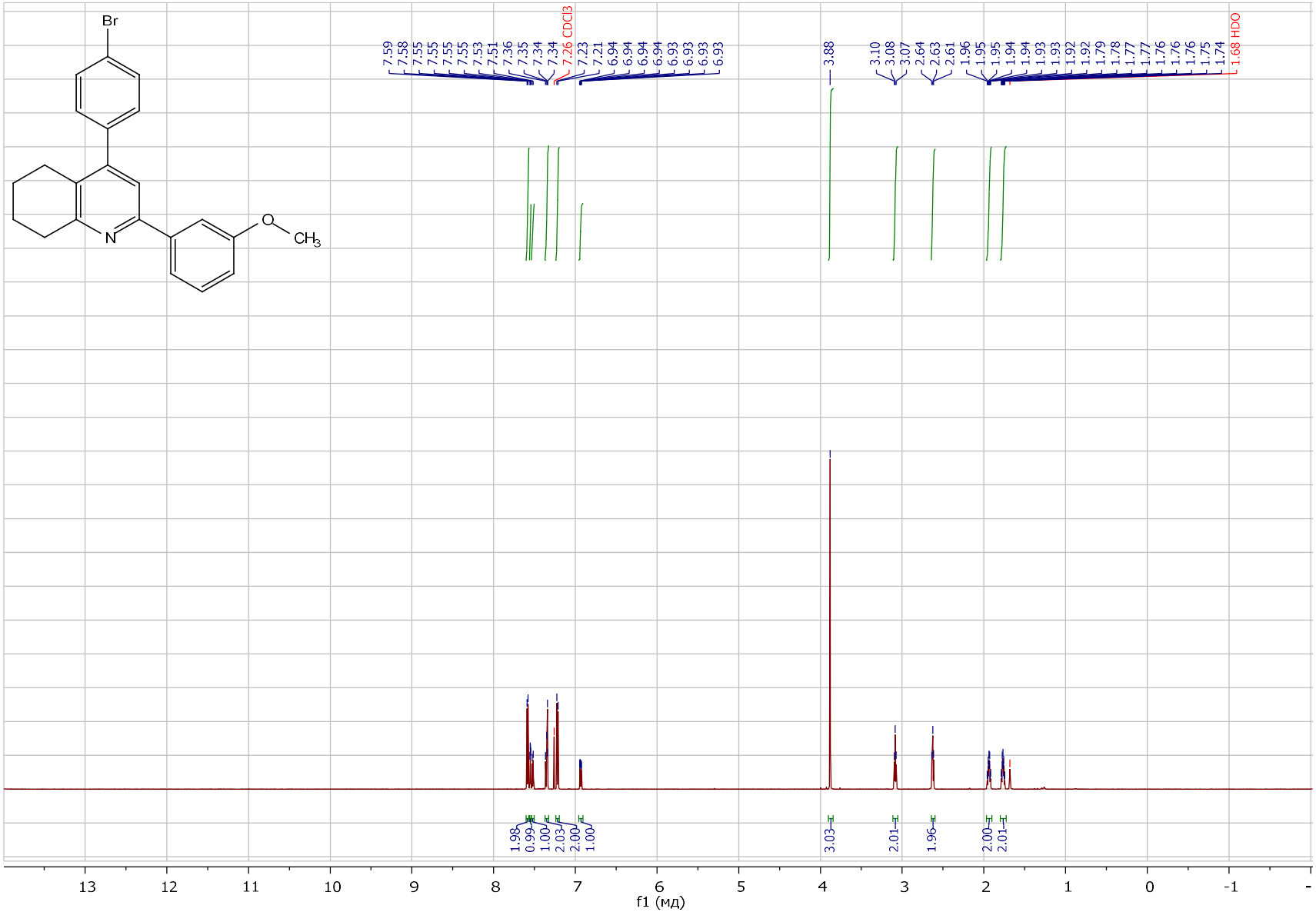
^{1}H NMR (600 MHz, Chloroform-*d*) of 2,4-diphenyl-5,6,7,8-tetrahydroquinoline (6a)



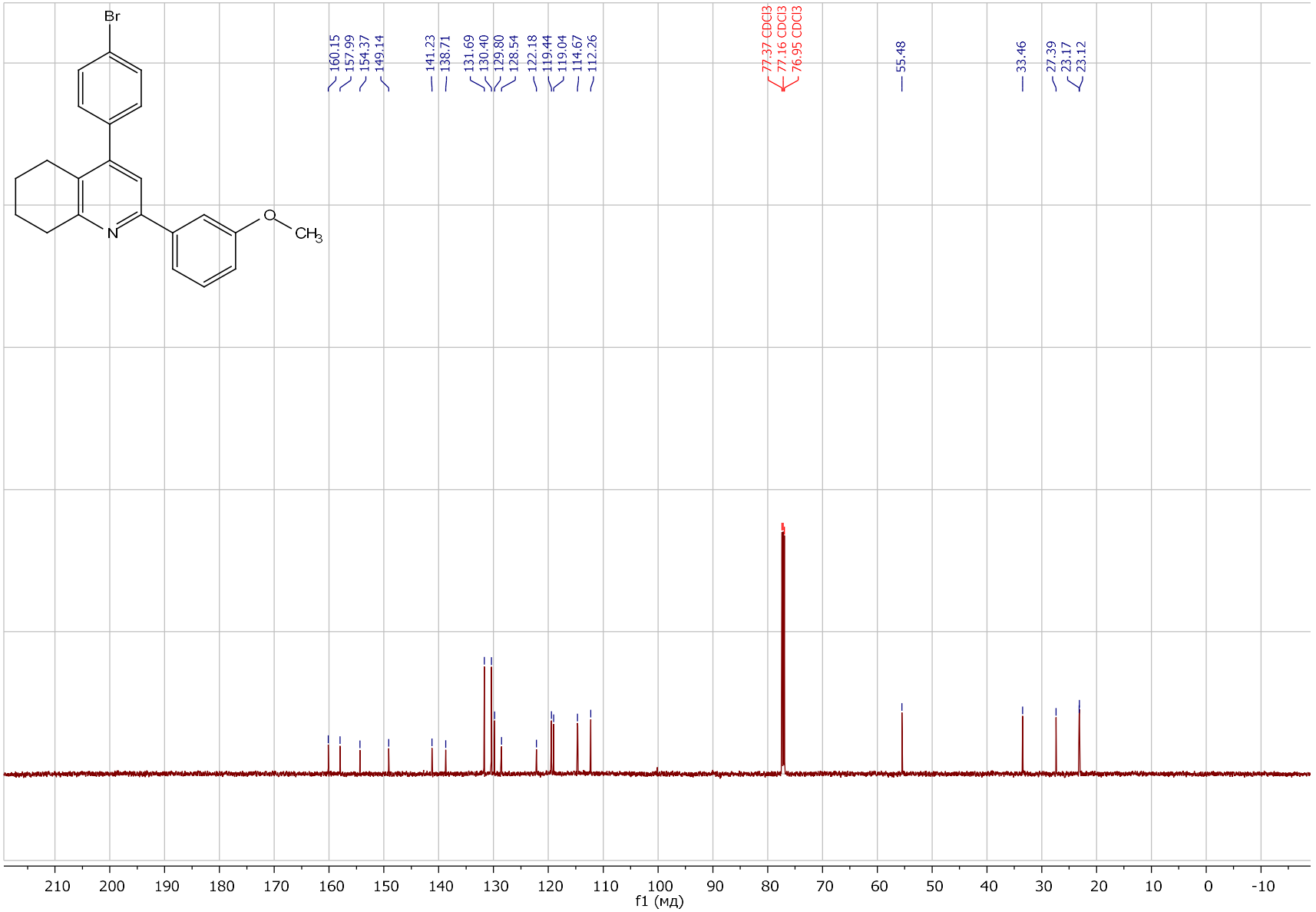
^{13}C NMR (151 MHz, Chloroform-*d*) of 2,4-diphenyl-5,6,7,8-tetrahydroquinoline (6a)



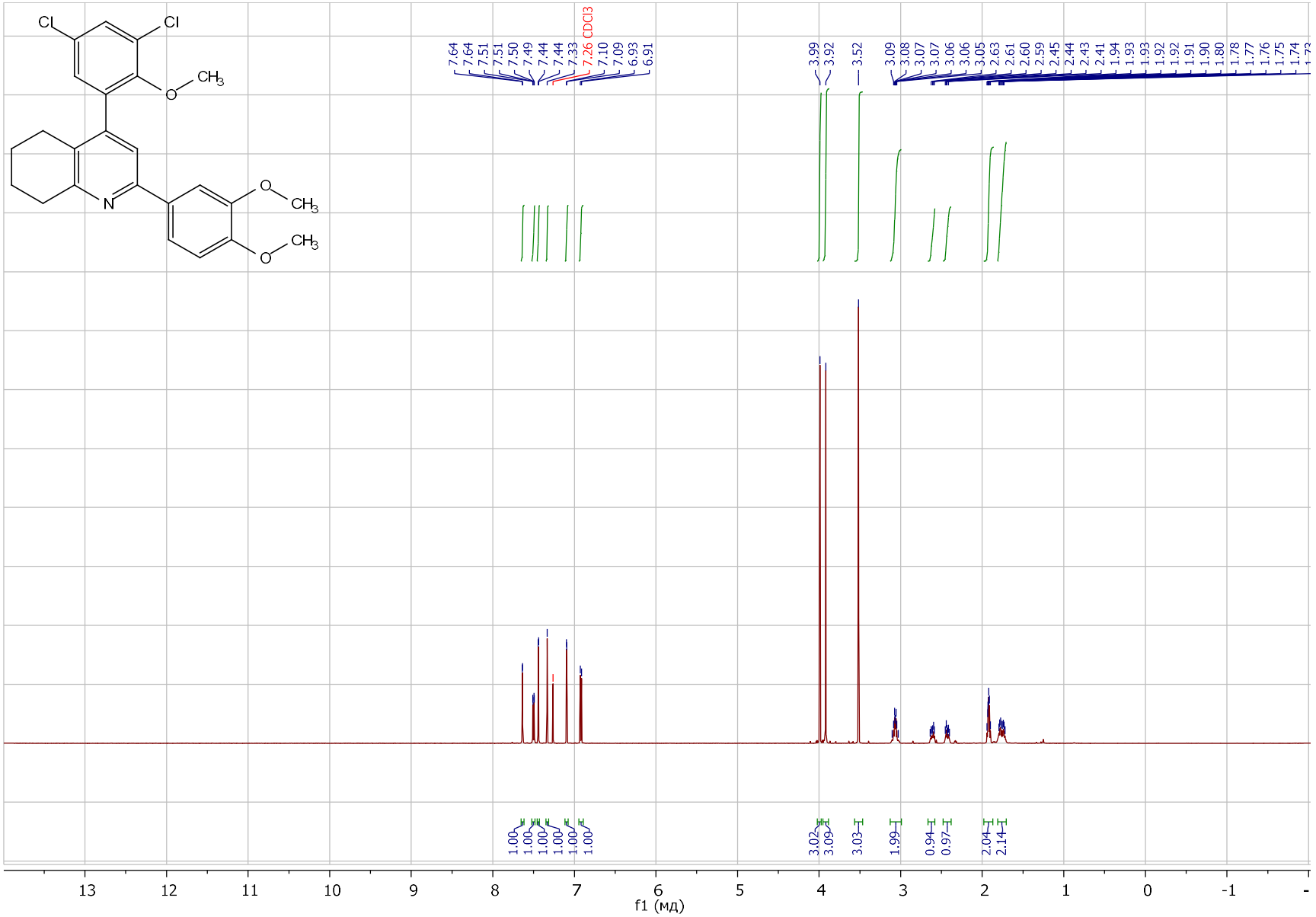
^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(4-bromophenyl)-2-(3-methoxyphenyl)-5,6,7,8-tetrahydroquinoline (6b)



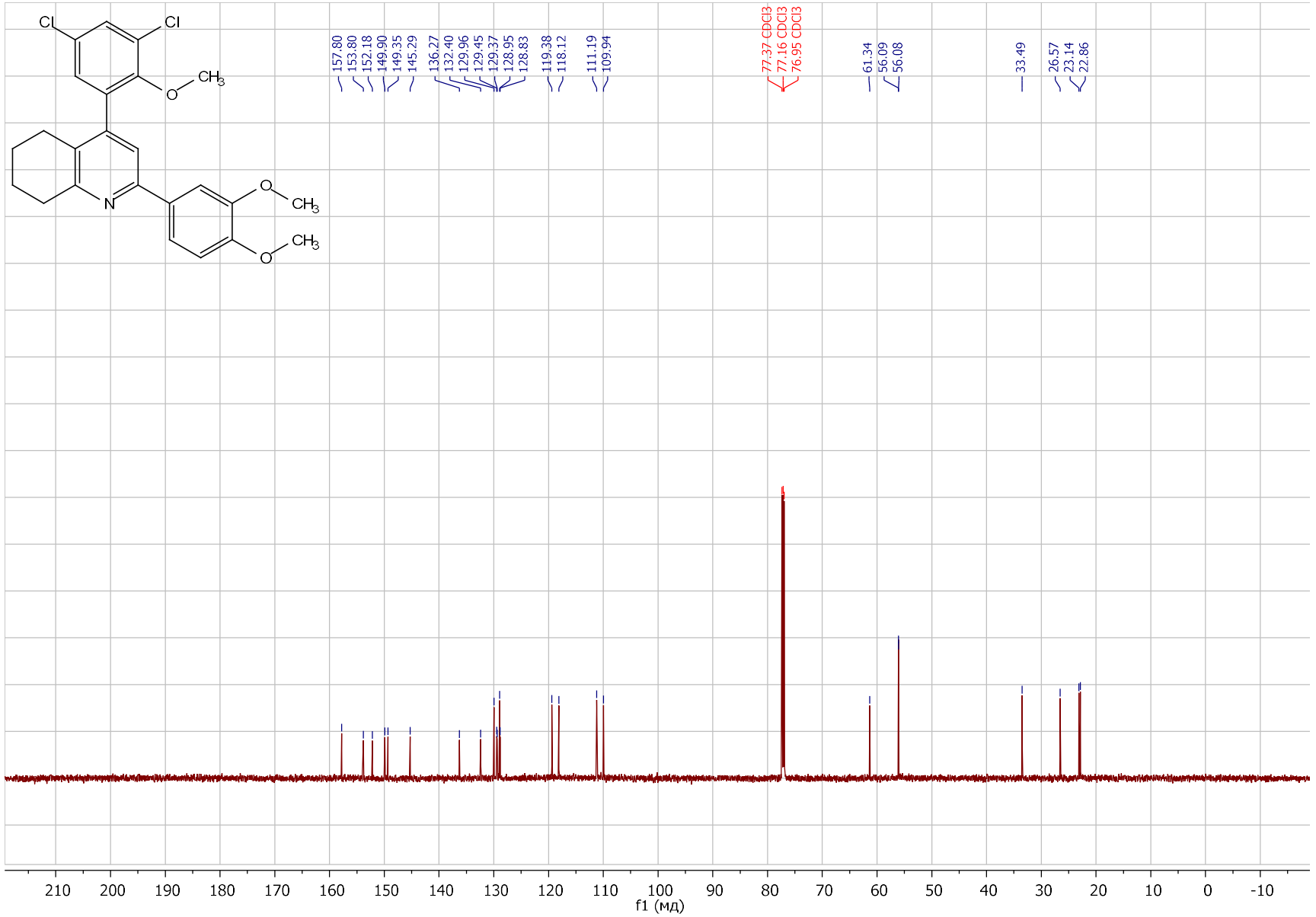
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(4-bromophenyl)-2-(3-methoxyphenyl)-5,6,7,8-tetrahydroquinoline (6b)



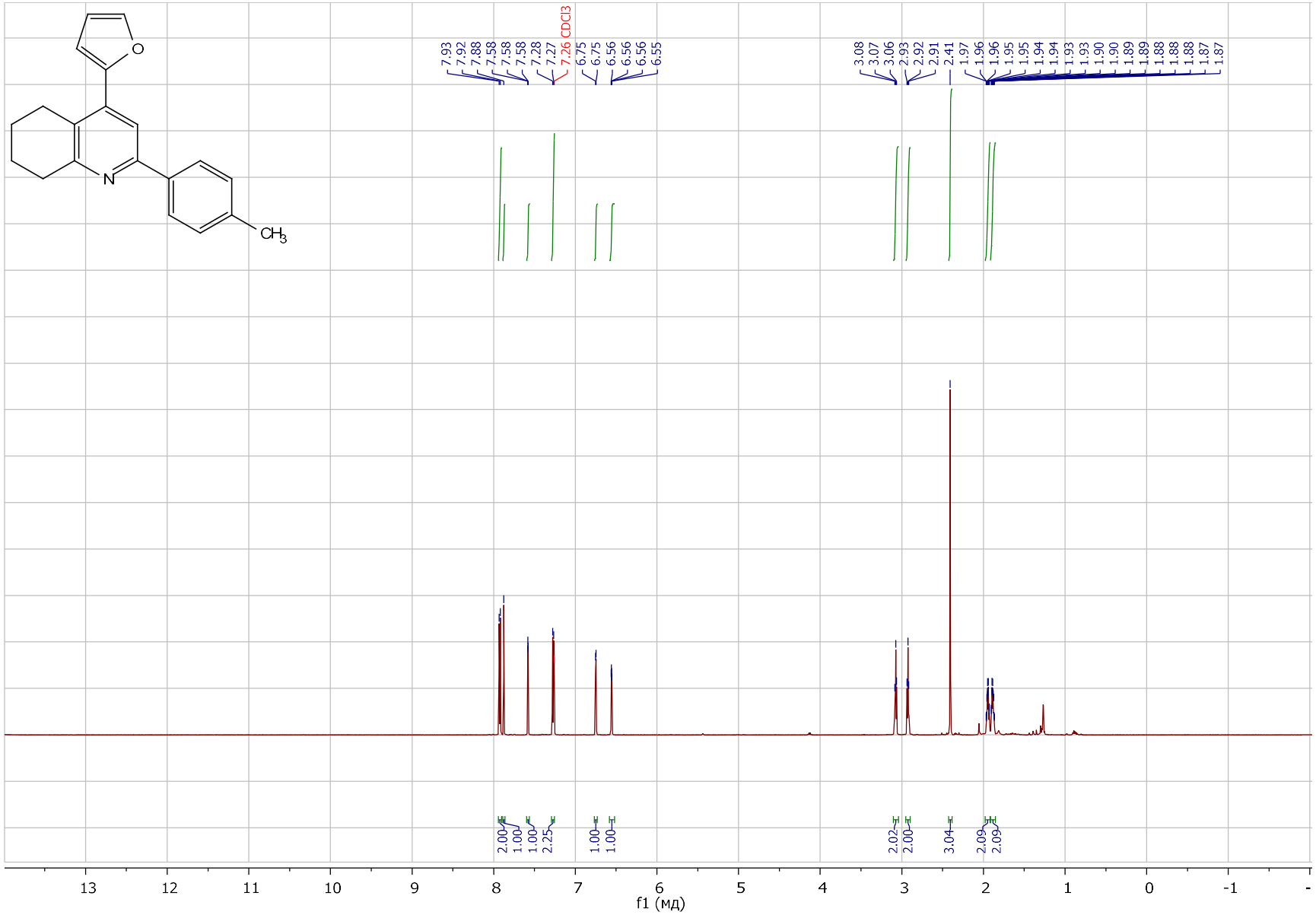
^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(3,5-dichloro-2-methoxyphenyl)-2-(3,4-dimethoxyphenyl)-5,6,7,8-tetrahydroquinoline (6c)



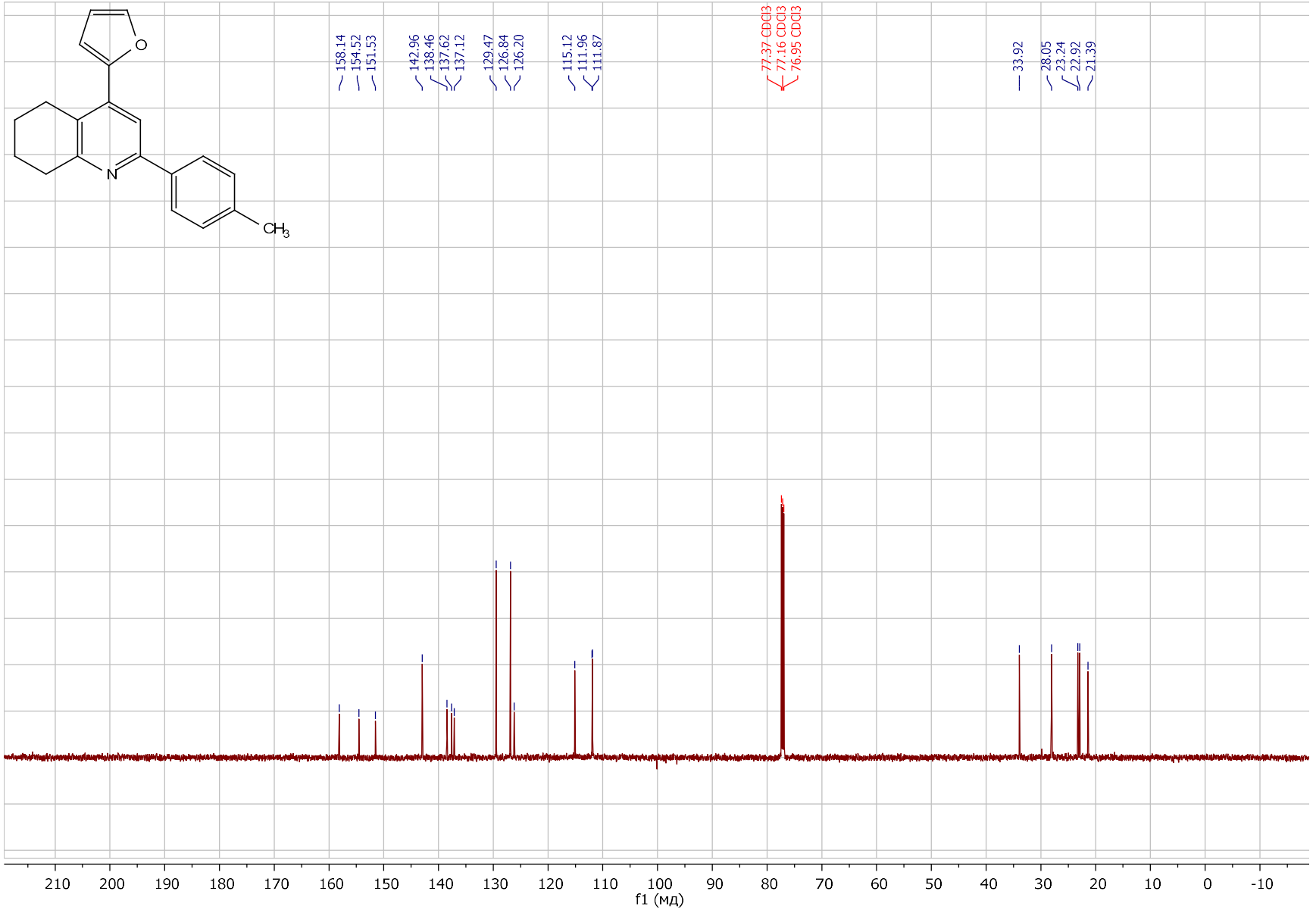
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(3,5-dichloro-2-methoxyphenyl)-2-(3,4-dimethoxyphenyl)-5,6,7,8-tetrahydroquinoline (6c)



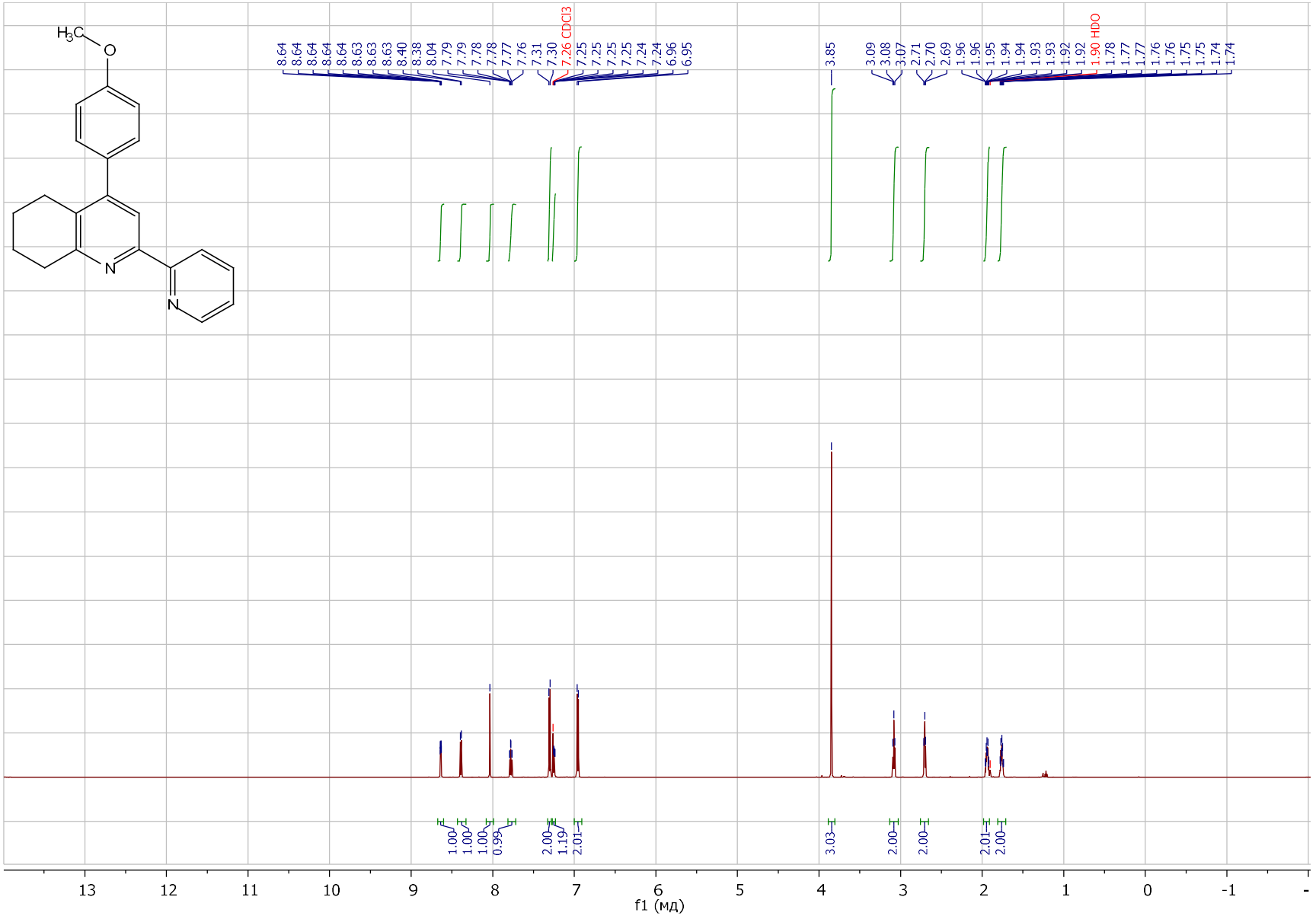
^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(furan-2-yl)-2-(p-tolyl)-5,6,7,8-tetrahydroquinoline (6d)



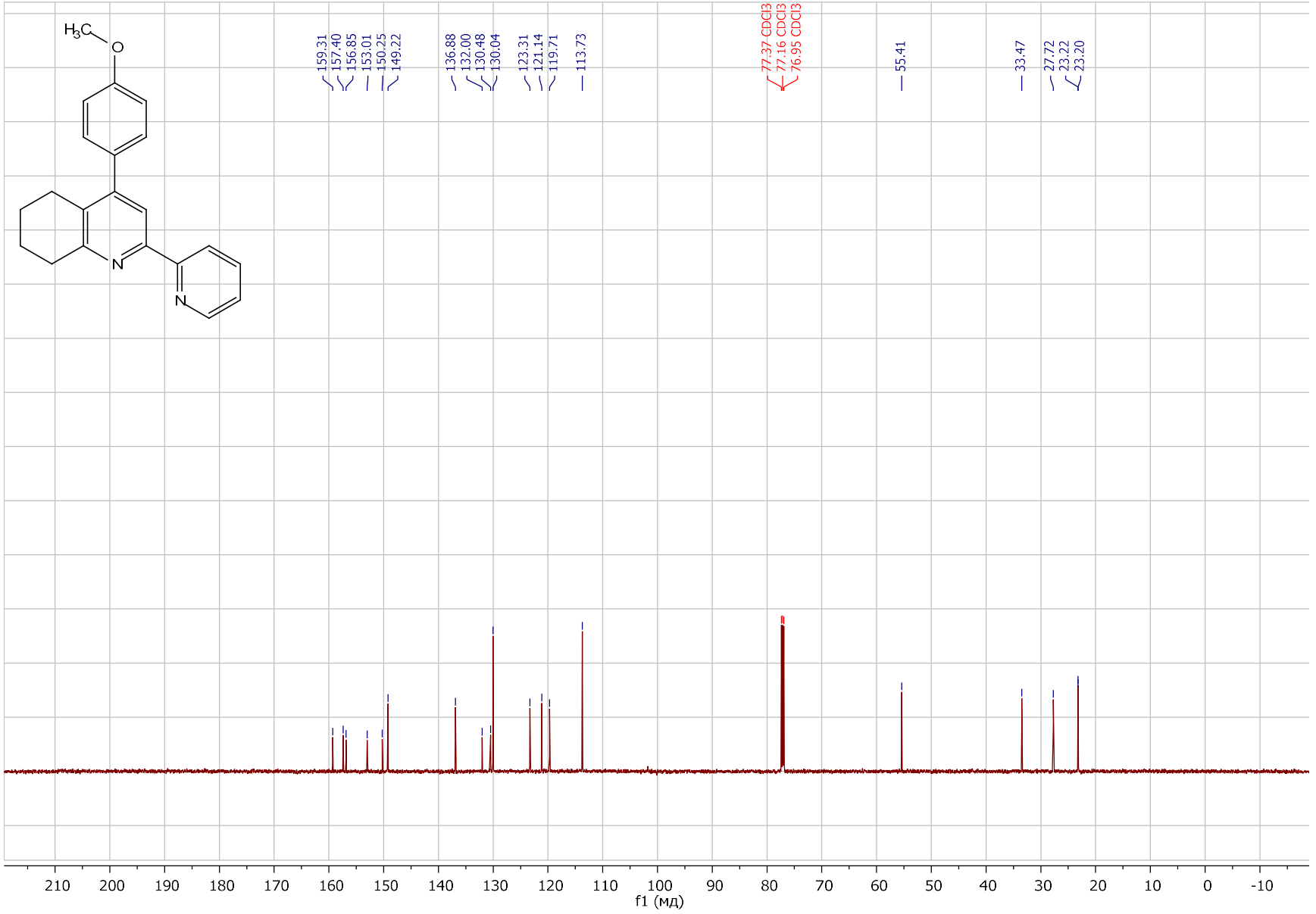
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(furan-2-yl)-2-(p-tolyl)-5,6,7,8-tetrahydroquinoline (6d)



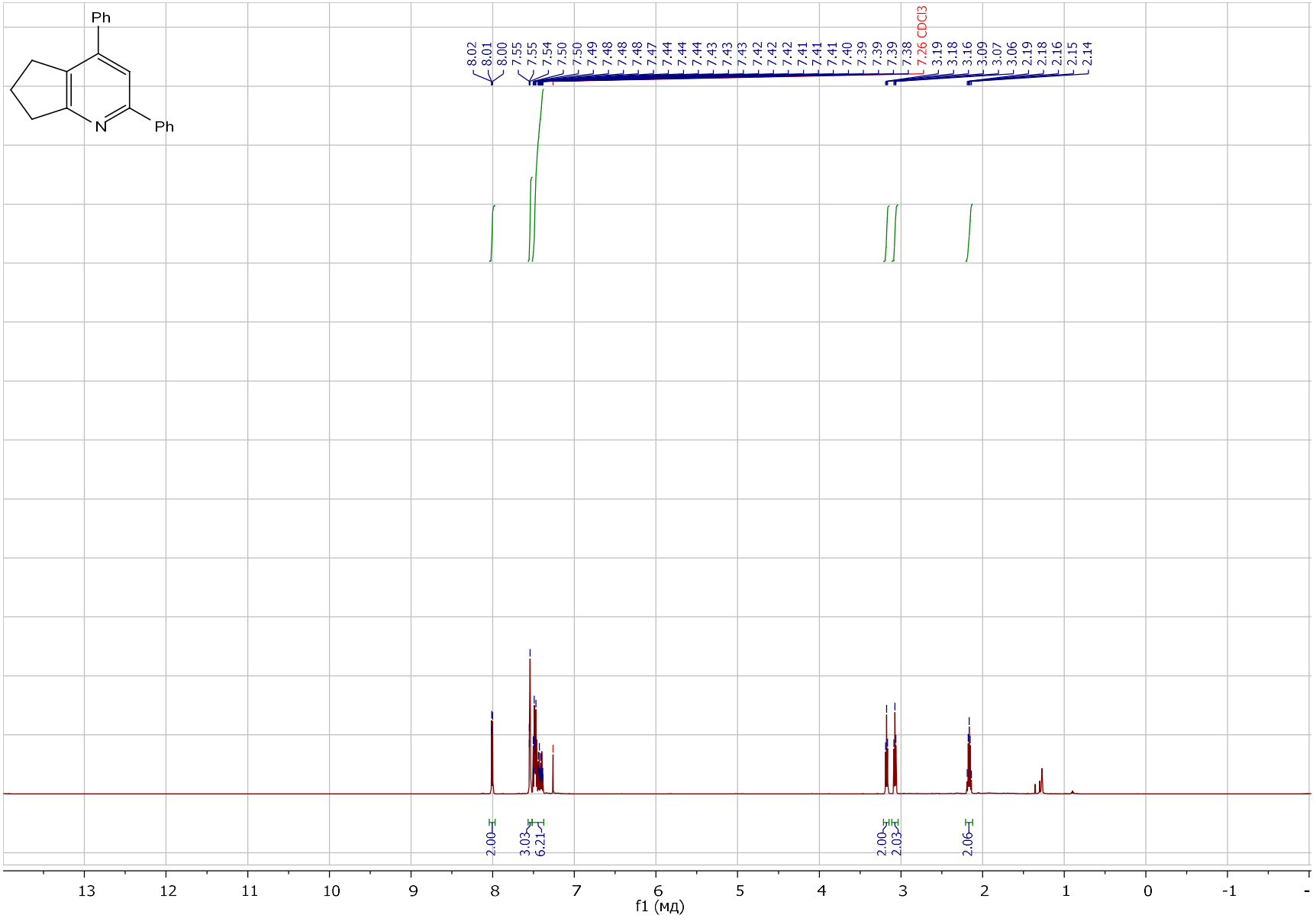
^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(4-methoxyphenyl)-2-(pyridin-2-yl)-5,6,7,8-tetrahydroquinoline (6e)



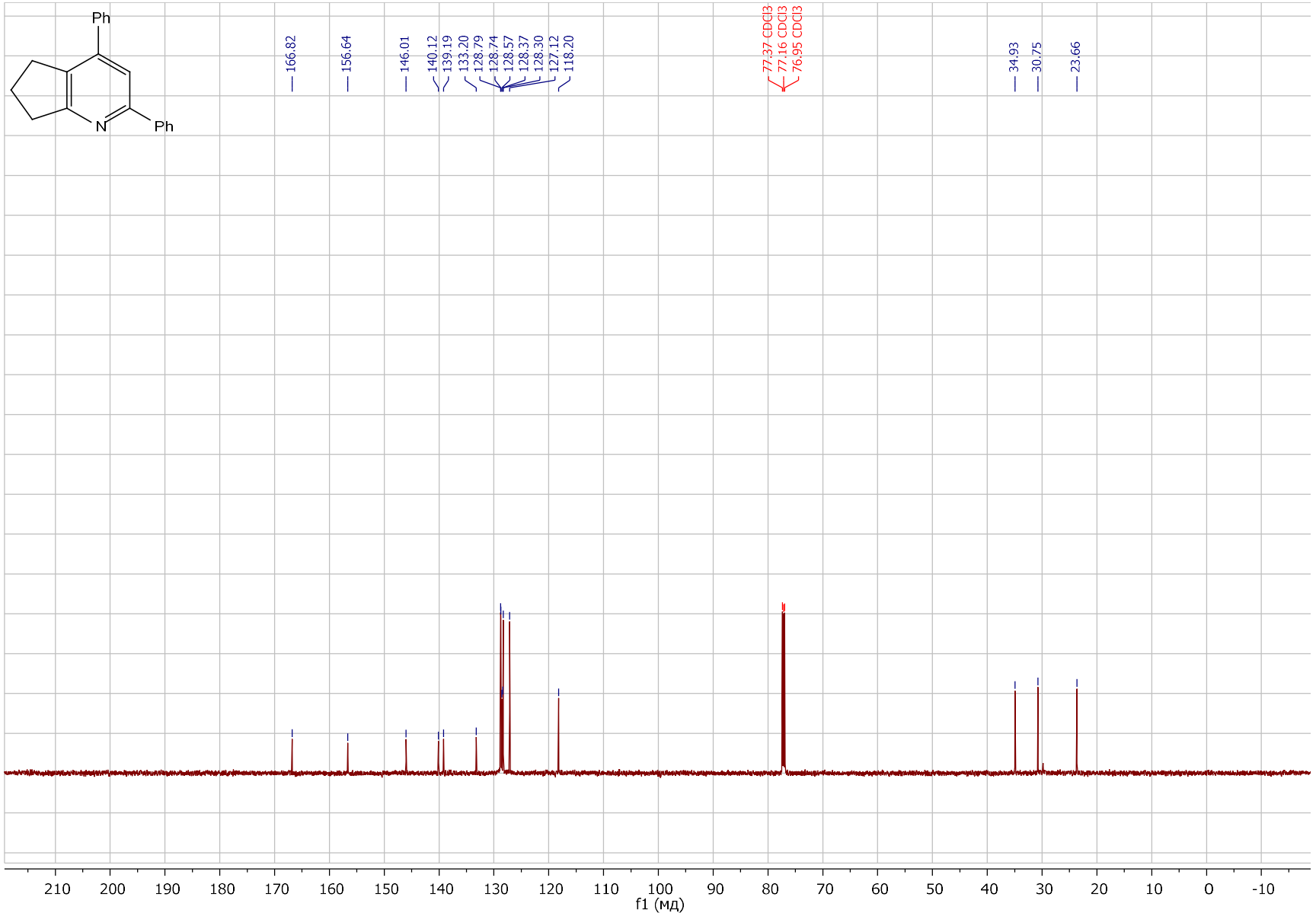
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(4-methoxyphenyl)-2-(pyridin-2-yl)-5,6,7,8-tetrahydroquinoline (6e)



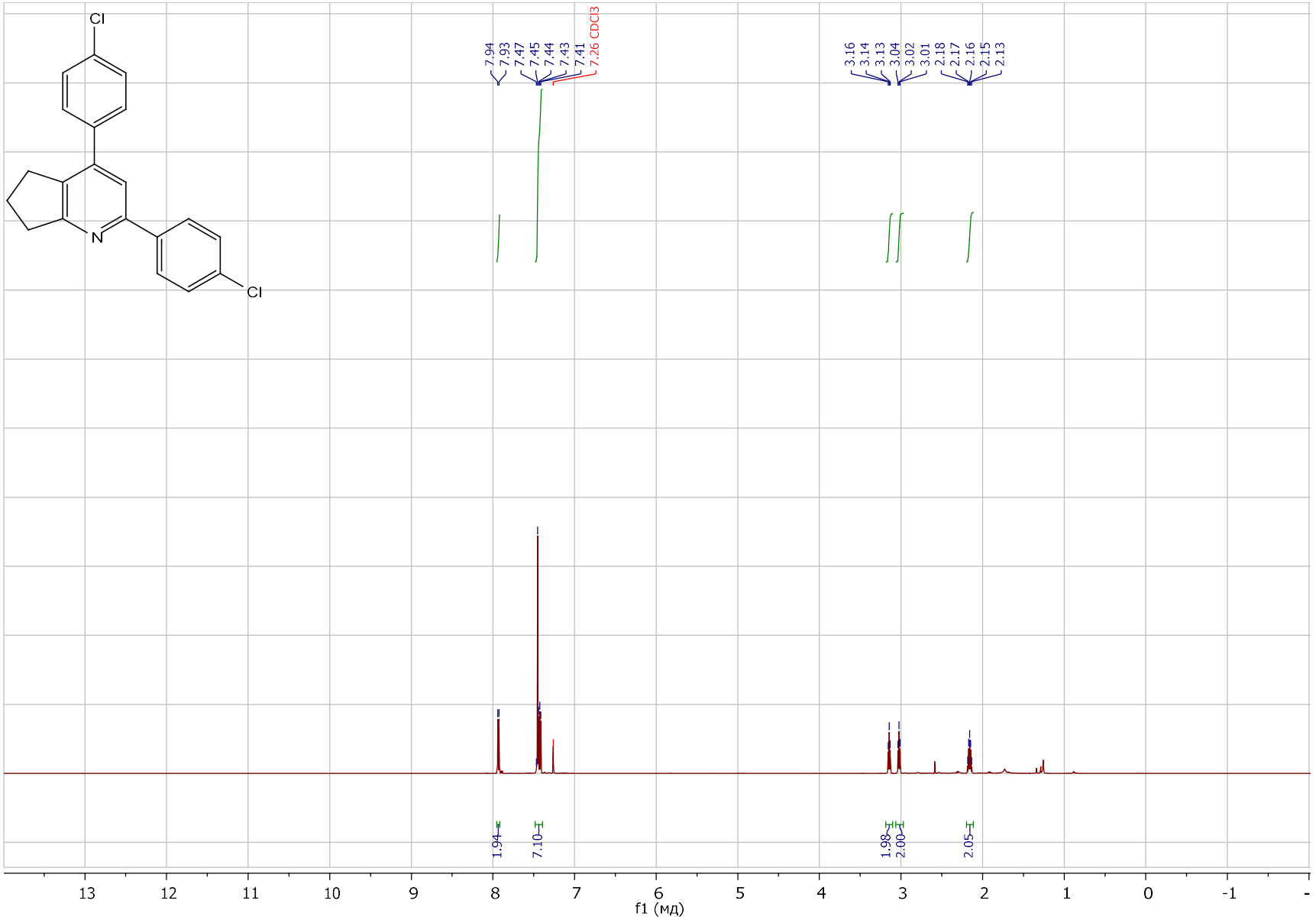
^{1}H NMR (600 MHz, Chloroform-*d*) of 2,4-diphenyl-6,7-dihydro-5H-cyclopenta[b]pyridine (6f)



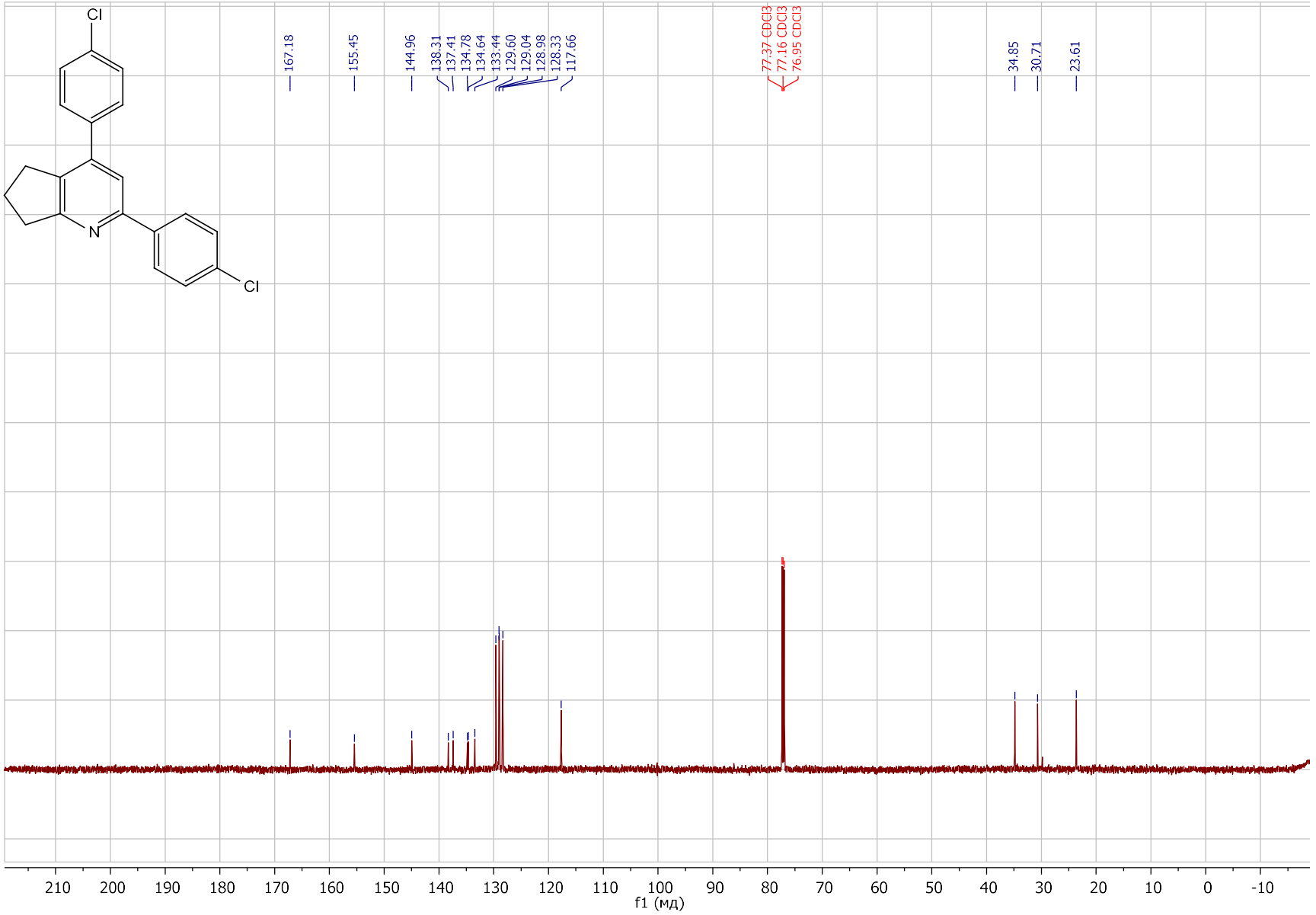
^{13}C NMR (151 MHz, Chloroform-*d*) of 2,4-diphenyl-6,7-dihydro-5H-cyclopenta[b]pyridine (6f)



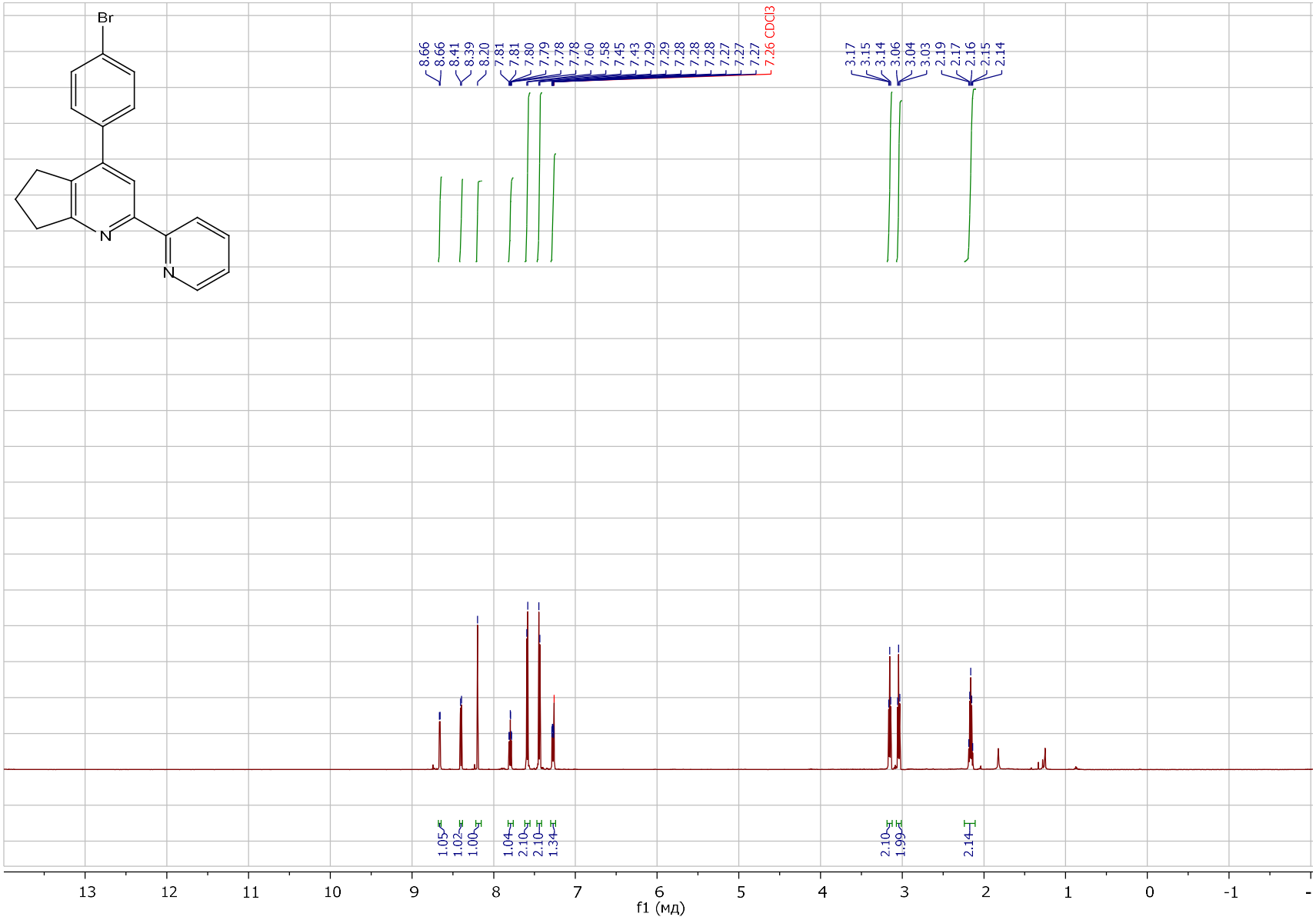
^{1}H NMR (600 MHz, Chloroform-*d*) of 2,4-bis(4-chlorophenyl)-6,7-dihydro-5H-cyclopenta[b]pyridine (6g)



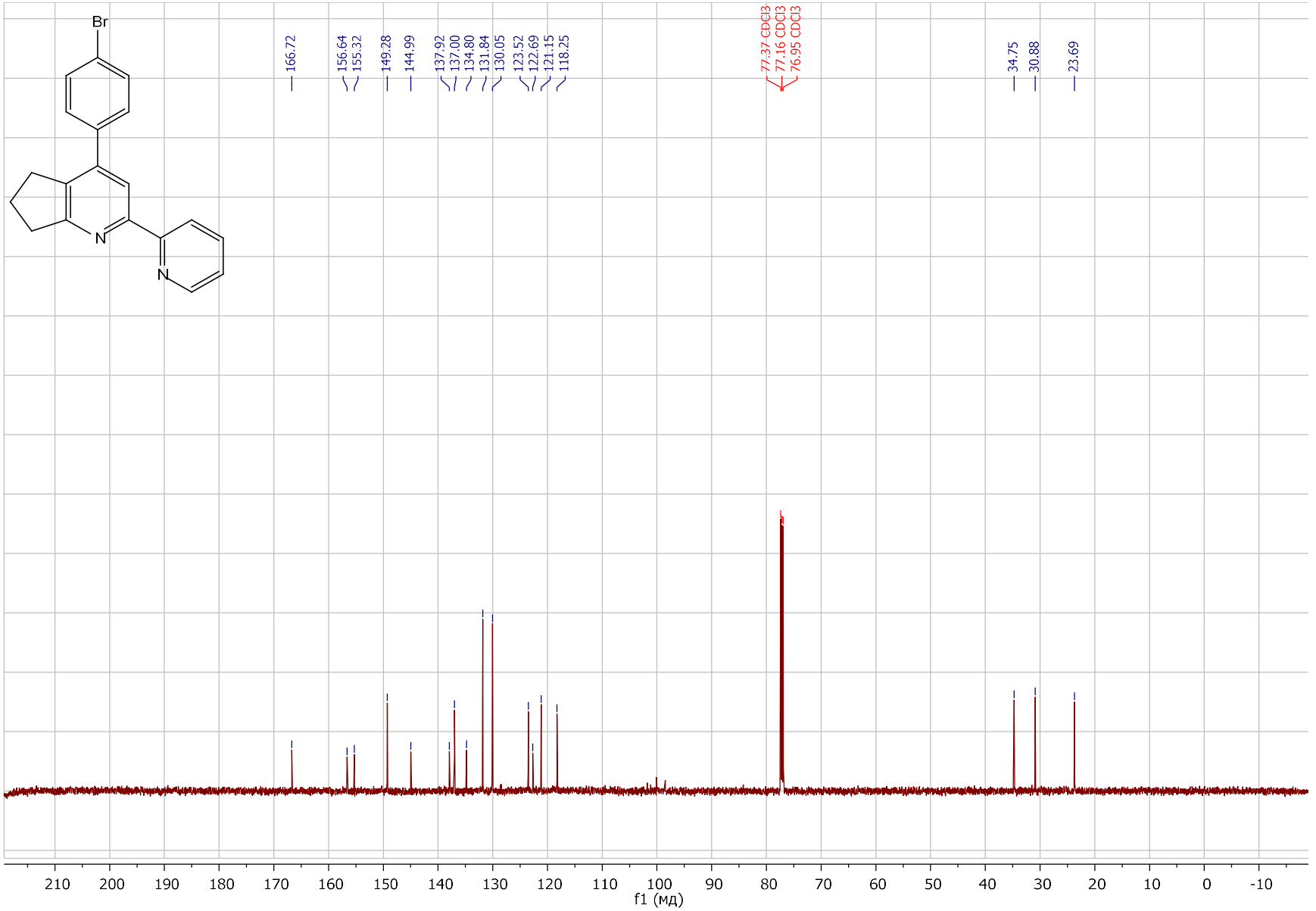
^{13}C NMR (151 MHz, Chloroform-*d*) of 2,4-bis(4-chlorophenyl)-6,7-dihydro-5H-cyclopenta[b]pyridine (6g)



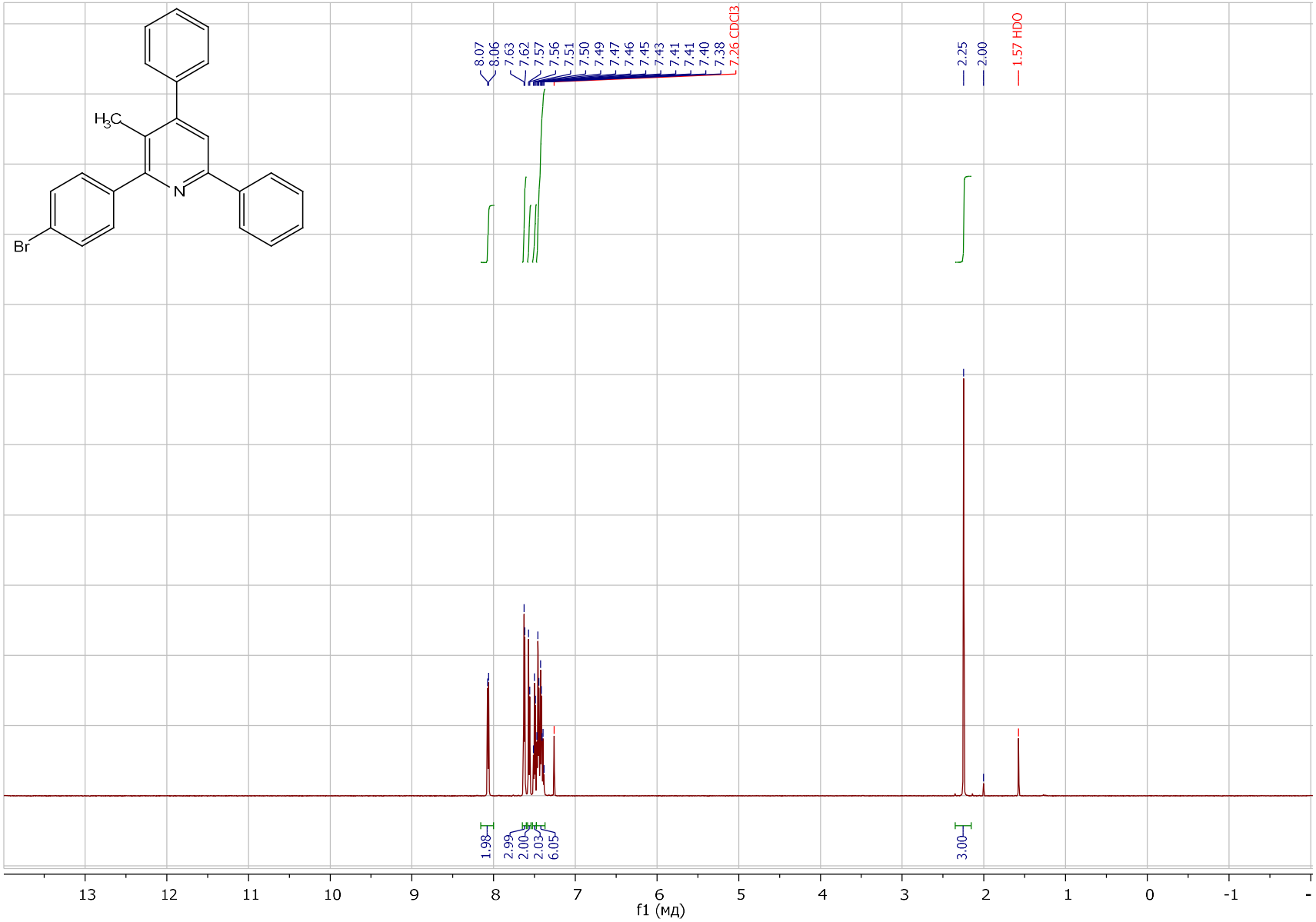
^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(4-bromophenyl)-2-(pyridin-2-yl)-6,7-dihydro-5H-cyclopenta[b]pyridine (6h)



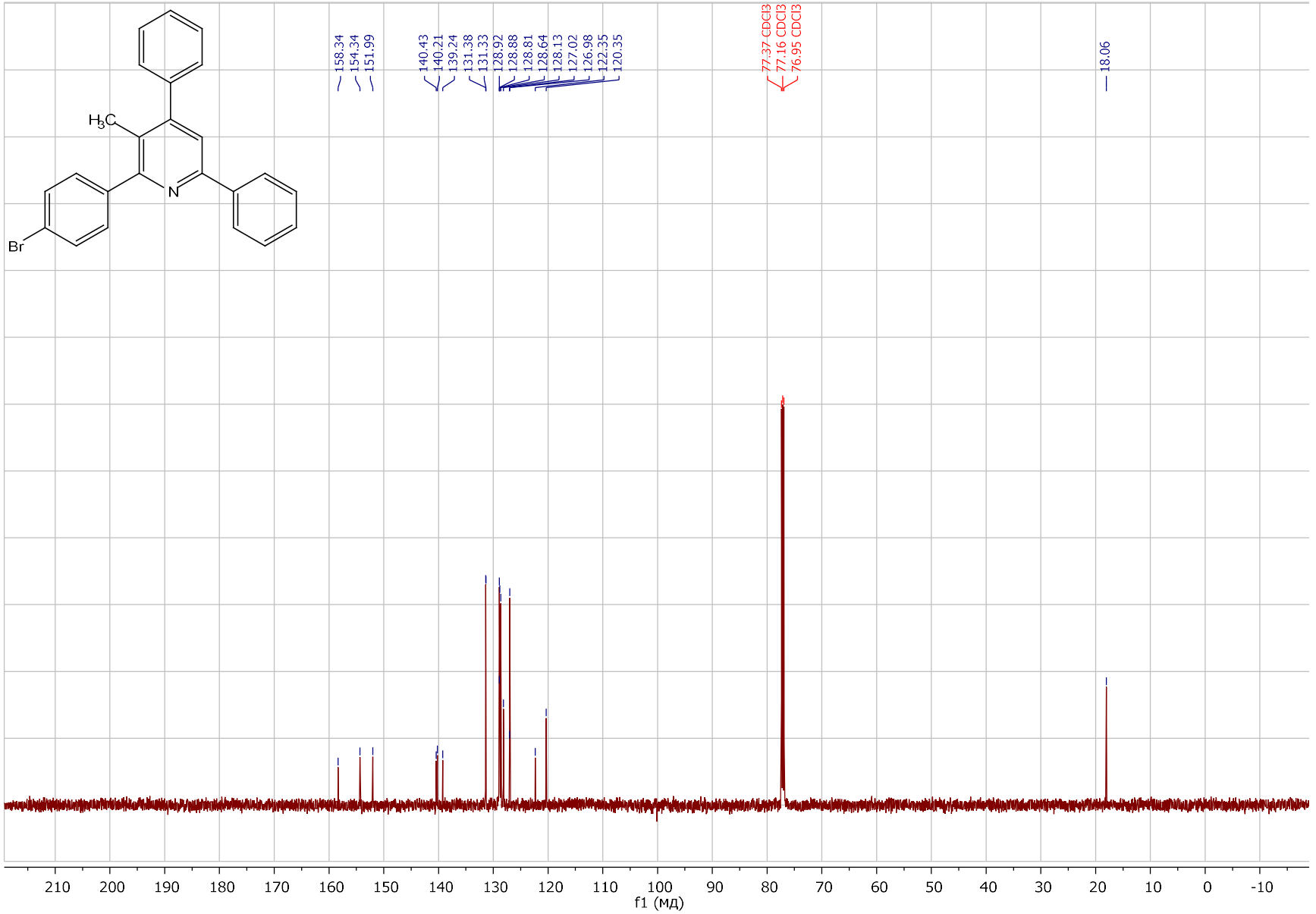
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(4-bromophenyl)-2-(pyridin-2-yl)-6,7-dihydro-5H-cyclopenta[b]pyridine (6h)



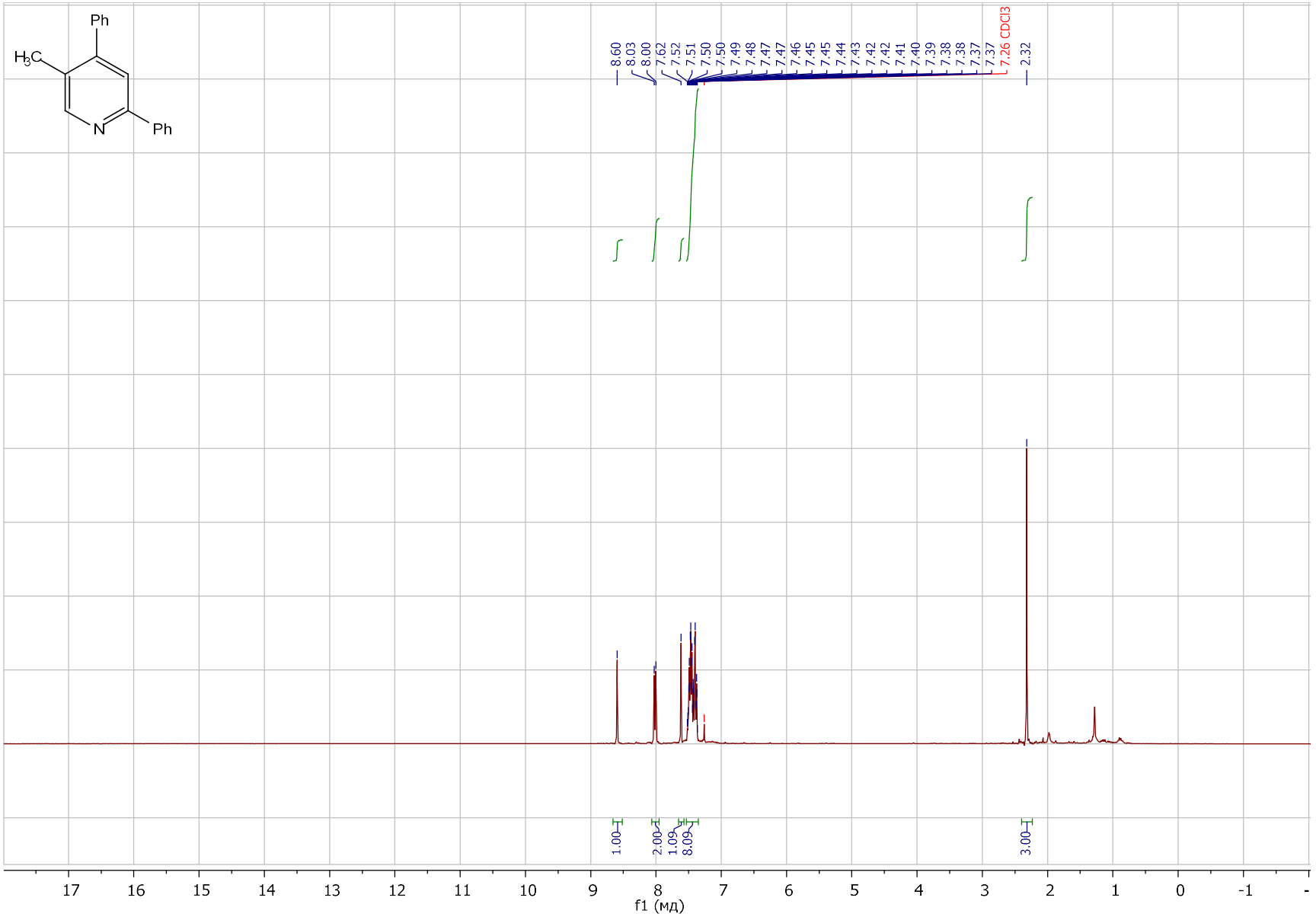
^{1}H NMR (600 MHz, Chloroform-*d*) of 2-(4-bromophenyl)-3-methyl-4,6-diphenylpyridine (6i)



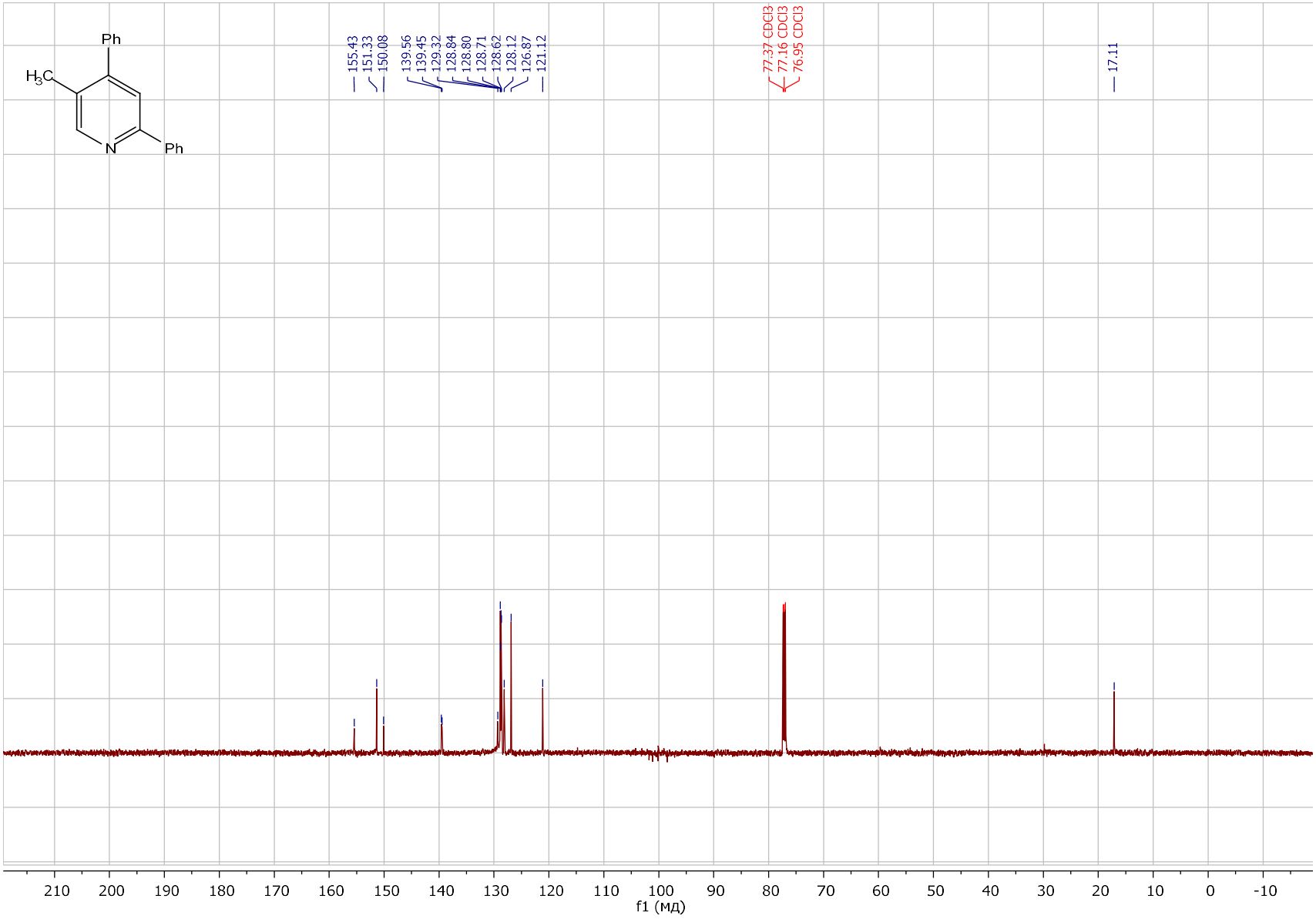
^{13}C NMR (151 MHz, Chloroform-*d*) of 2-(4-bromophenyl)-3-methyl-4,6-diphenylpyridine (6i)



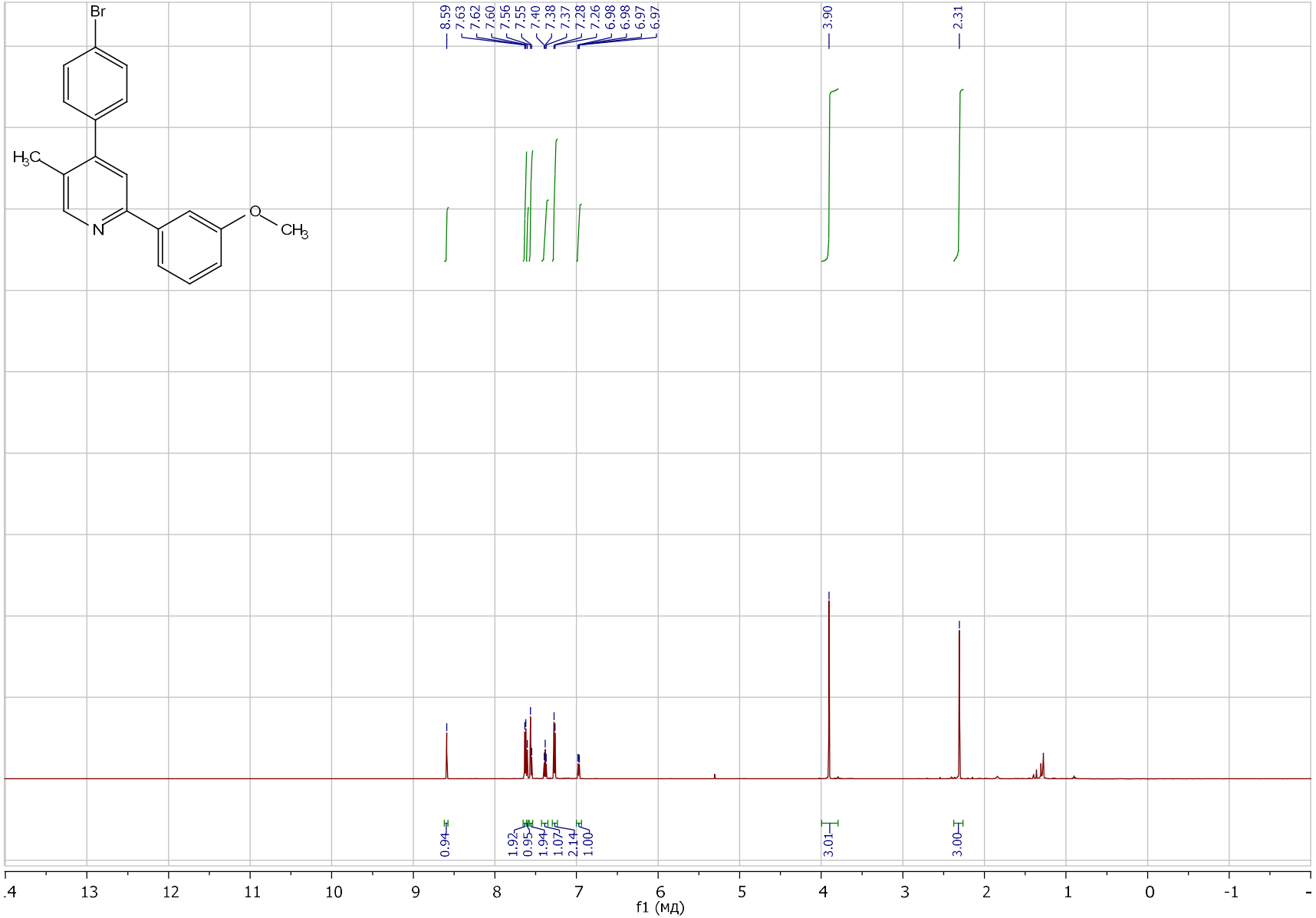
^{1}H NMR (300 MHz, Chloroform-*d*) of 5-methyl-2,4-diphenylpyridine (6j)



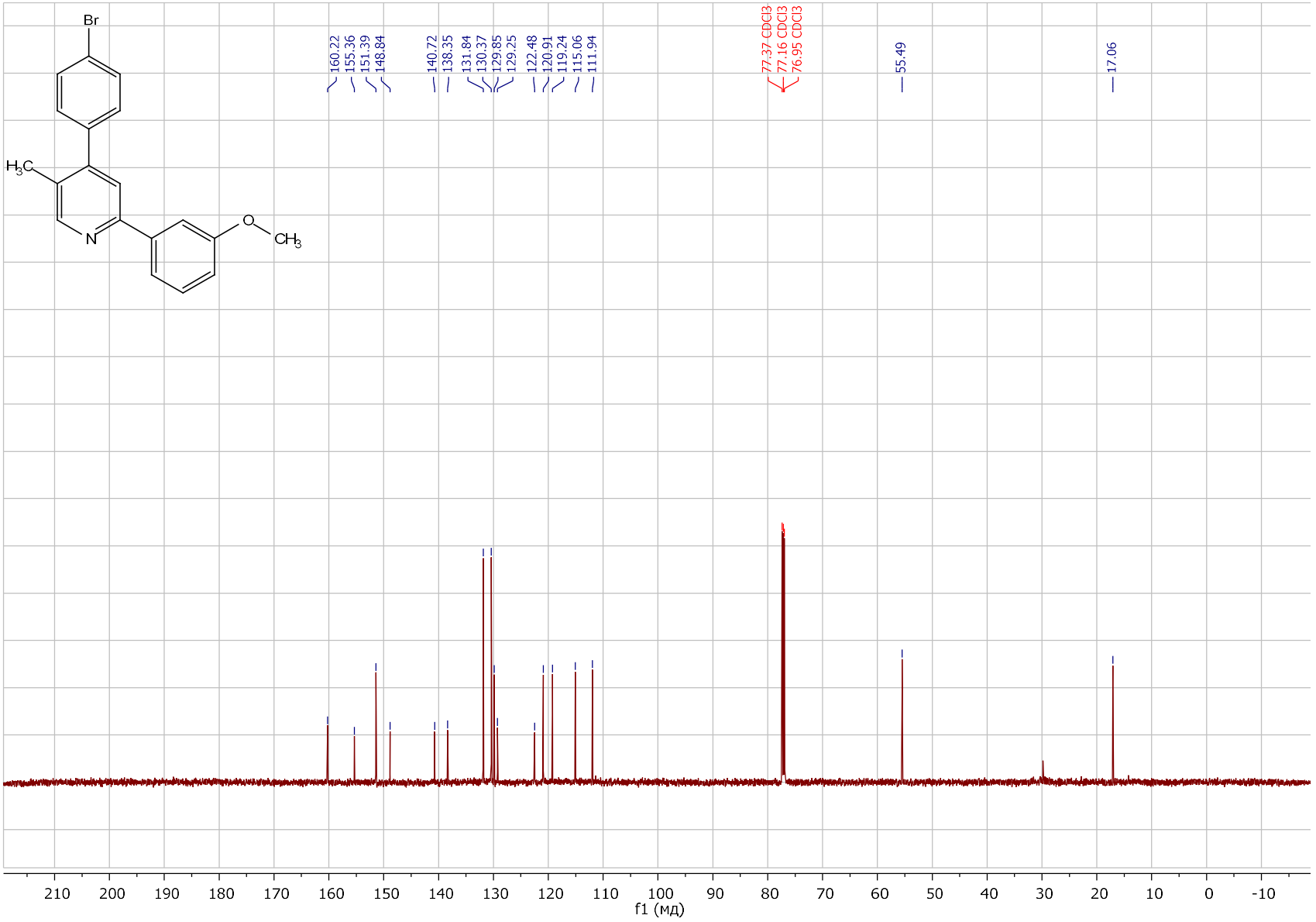
^{13}C NMR (151 MHz, Chloroform-*d*) of 5-methyl-2,4-diphenylpyridine (6j)



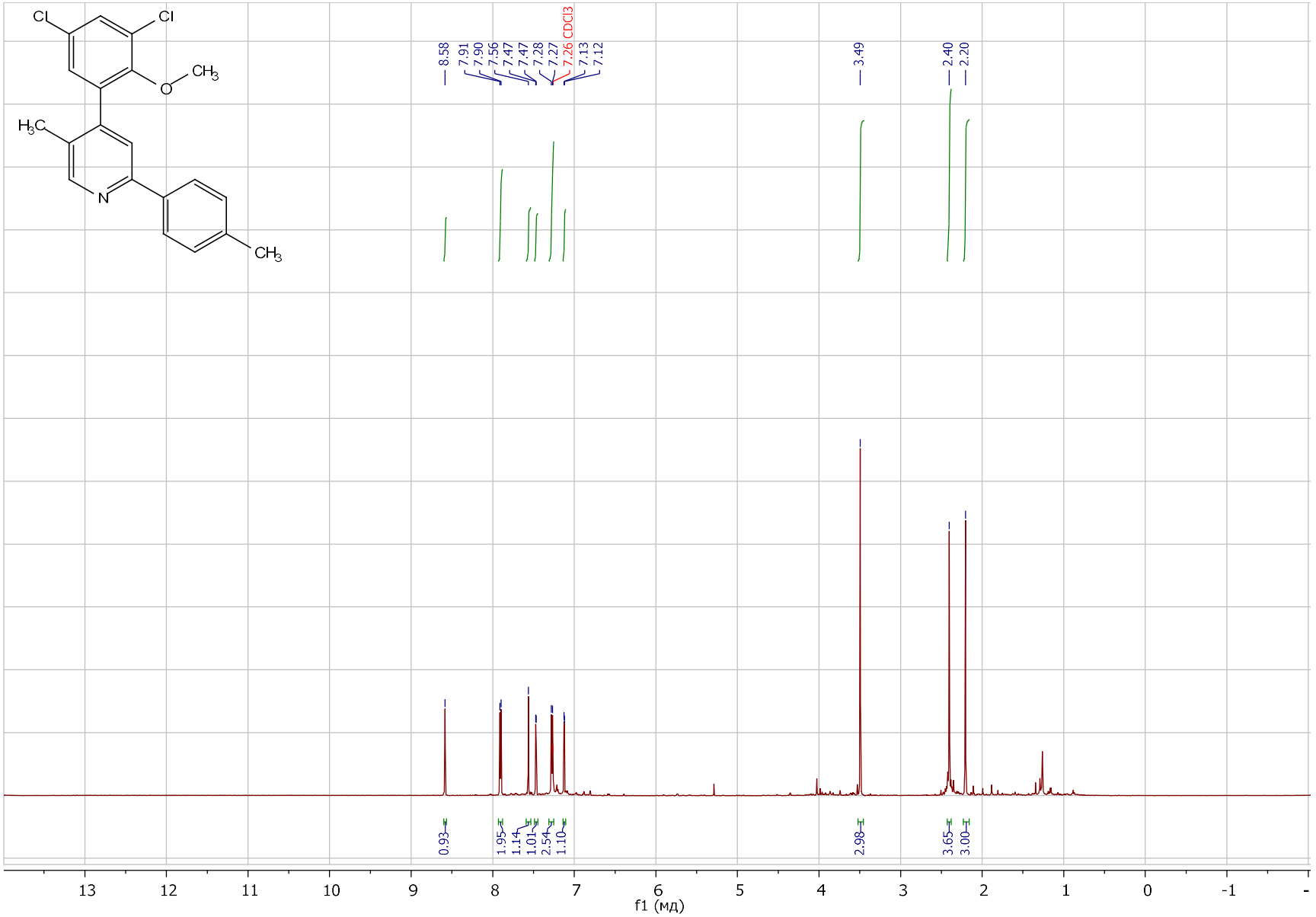
^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(4-bromophenyl)-2-(3-methoxyphenyl)-5-methylpyridine (6k)



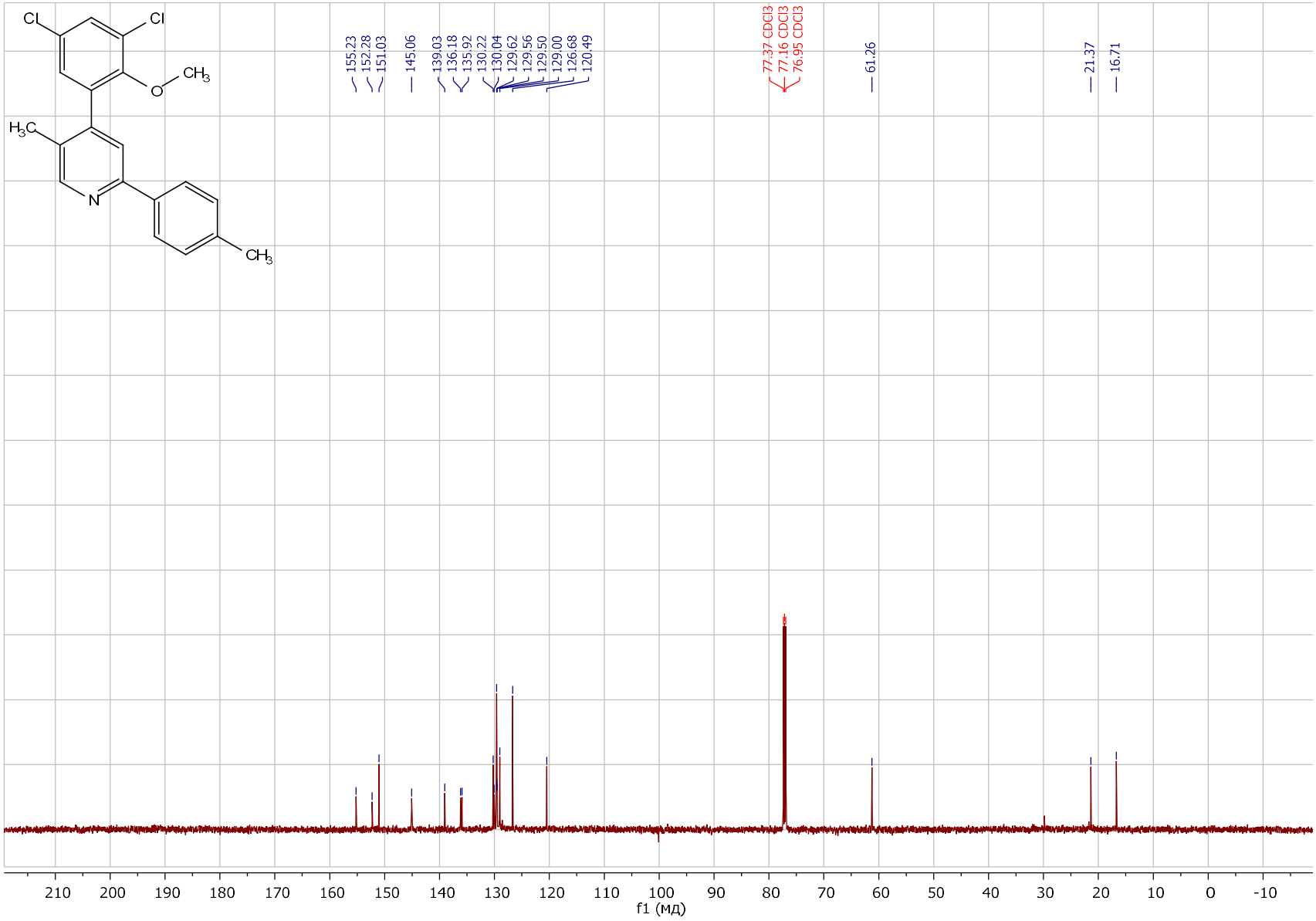
^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(4-bromophenyl)-2-(3-methoxyphenyl)-5-methylpyridine (6k)



^{1}H NMR (600 MHz, Chloroform-*d*) of 4-(3,5-dichloro-2-methoxyphenyl)-5-methyl-2-(p-tolyl)pyridine (6l)



^{13}C NMR (151 MHz, Chloroform-*d*) of 4-(3,5-dichloro-2-methoxyphenyl)-5-methyl-2-(p-tolyl)pyridine (6l)



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