Supporting Information

A straightforward and sustainable synthesis of 1,4-disubtituted 1,2,3-triazoles via visible-light-promoted copper-catalyzed azide-alkyne cycloaddition (CuAAC)

Willber D. Castro-Godoy, Adrián A. Heredia, Luciana C. Schmidt and Juan E. Argüello

Table of Contents

General procedures

Materials and methods

NaN_3, phenyl acetylene and alkyl halides were all high-purity commercial samples used without further purification. PEG 300, *iso*-propanol, *tert*-butanol and ethanol were used without further purification. Eosin Y disodium salt (EY), fluorescein (FL), rose bengal (RB), rhodamine 6G (R6G) and methylene blue (MB) were all high-purity commercial samples used without further purification. Terminal aryl acetylenes were synthesized according to known procedures,[1] from the geminal dibromo alkenes previously obtained by a Wittig-type reaction from the corresponding aldehydes employing CBr_4 and PPh_3.[2] Benzyl, alkyl and phenacyl azides were synthesized from the corresponding benzyl, alkyl and phenacyl halide by a bimolecular nucleophilic substitution reaction (S_N2), employing NaN_3 and DMF or acetone as nucleophile and solvent respectively. Aryl azides were synthesized according to known procedures,[3] from the corresponding aniline by its diazonium salt in the presence of $NaNO_2$ and the further addition of NaN_3. The

reaction products were isolated by flash column chromatography (silica gel, eluting with 1:1 pentane/dichloromethane (50 mL) and 1:1 dichloromethane/ethyl acetate (50 mL)) from the reaction mixture and characterized by ^{1}H and ^{13}C NMR and mass spectrometry. ^{1}H and ^{13}C NMR spectra were recorded at 400.16 and 100.62 MHz respectively on a Bruker 400 spectrometer with $CDCl_3$ as a solvent. All spectra were reported in δ (ppm) relative to residual solvent signal (δ_H ($CHCl_3$) = 7.26 ppm). Gas chromatographic analyses were performed on Agilent 5890 with a flame-ionization detector, on 30 m capillary column of a 0.32 mm x 0.25 μm film thickness, with a 5% phenylpolysiloxane phase. GC-MS analyses were conducted on Agilent 7890 employing a 30 m x 0.25 mm x 0.25 μm with a 5% phenylpolysiloxane phase column. HRMS spectra were recorded on a GCT Premie orthogonal acceleration time-of-flight (oa-TOF) GC mass spectrometer. Ionization was achieved by electronic impact (70eV) and detection set up positive mode. All the triazoles were isolated and their spectroscopic data are in good agreement with the reported in literature.

Synthetic procedures

Experimental procedure for the reusability of copper catalyst and solvent in CuAAC reaction. The reactions were carried out in a 10 mL glass vial, equipped with a rubber septum and a magnetic stirrer. Benzyl azide (**1a**, 0.25 mmol), phenyl acetylene (**2a**, 0.25 mmol) and 1.6 mL of water were added. 200 μL EY (5 mM) and 200 μL $CuCl_2$ (5 mM) were added and the mixture was irradiated with green-LED (530 nm) and stirred under air atmosphere for 2 h. Then, diethyl ether (5 mL) was added and stirred until the complete partition of **3a**. The organic layer was separated and dried over anhydrous Na_2SO_4 and **3a** was isolated by flash column chromatography. The remain diethyl ether in the aqueous layer was removed by rotary evaporation under reduced pressure. For next cycle, **1a** (0.25 mmol), **2a** (0.25 mmol) and 200 μL EY (5 mM) were added to the treated aqueous layer and the mixture was irradiated with green-LED (530 nm) and stirred under air atmosphere for 2 h. Successive separations and reuse cycles were carried out as described above.

Experimental procedure for the synthesis of 3a via one-step one-pot procedure on a grame scale. The reactions were carried out in a 10 mL glass vial, equipped with a rubber septum and a magnetic stirrer. Benzyl bromide (**4**, 5.5 mmol), NaN_3 (**5**, 5.0 mmol) and phenyl acetylene (**2a**, 5.5 mmol) were added and a suspension was observed when 4 mL EY (5 mM) and 4 mL $CuCl_2$ (5 mM) were added. The mixture was irradiated with green-LED (530 nm) and stirred under air atmosphere for 8 h. Ethyl acetate (30 mL) and a saturated solution of $NaHCO_3$ (30 mL) were added and the mixture was stirred. The organic layer was separated and the aqueous layer was extracted with ethyl acetate (2 × 30 mL). The combined organic extract was dried over anhydrous Na_2SO_4 and **3a** was isolated in 80% yield (0.914 g) from the crude reaction mixture by flash column chromatography.

Characterization data for all products

1-benzyl-4-phenyl-1*H*-1,2,3-triazole (3a):[4] Following the general procedure for the reaction in one step, benzyl azide (33.3 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 2 h. Purification was performed by flash column chromatography affording **3a** as a white solid (55.9 mg, 95% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 5.58 (s, 2H), 7.31 – 7.33 (m, 3H), 7.37 – 7.42 (m, 5H), 7.66 (s, 1H), 7.80 (d, *J* = 7.2 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 54.4, 119.6, 125.9, 128.2, 128.3, 128.9, 129.3, 130.7, 134.9, 148.4.

1-(4-methylbenzyl)-4-phenyl-1*H*-1,2,3-triazole (3b):[5] Following the general procedure for the reaction in one step, 4-methylbenzyl azide (36.8 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3b** as a white solid (53.0 mg, 85% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 2.36 (s, 3H), 5.53 (s, 2H), 7.18 – 7.23 (m, 4H), 7.31 (t, *J* = 7.4 Hz, 1H), 7.39 (t, *J* = 7.4 Hz, 2H), 7.63 (s, 1H), 7.79 (d, *J* = 7.4 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 21.3, 54.2, 119.5, 125.9, 128.26, 128.29, 128.9, 130.0, 130.8, 131.8, 138.9, 148.3.

1-(4-methoxybenzyl)-4-phenyl-1*H*-1,2,3-triazole (3c):[6] Following the general procedure for the reaction in one step, 4-methoxybenzyl azide (40.8 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3c** as a white solid (63.7 mg, 96% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 3.81 (s, 3H), 5.50 (s, 2H), 6.91 (d, *J* = 8.4 Hz, 2H), 7.26 – 7.32 (m, 3H), 7.39 (t, *J* = 7.4 Hz, 2H), 7.62 (s, 1H), 7.79 (d, *J* = 8.4 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 53.9, 55.5, 114.7,119.4, 125.8,126.8, 128.2, 128.9, 129.8, 130.8, 143.8, 160.2.

1-(4-iodobenzyl)-4-phenyl-1*H*-1,2,3-triazole (3d):[7] Following the general procedure for the reaction in one step, 4-iodobenzyl azide (64.8 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3d** as a white solid (46.0 mg, 51% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 5.52 (s, 2H), 7.05 (d, *J* = 8.2 Hz, 2H), 7.33 (t, *J* = 7.3 Hz, 1H), 7.41 (t, *J* = 7.5 Hz, 2H), 7.66 (s, 1H), 7.73 (d, *J* = 8.2 Hz, 2H), 7.80 (d, *J* = 7.3 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 53.8, 94.7, 119.5, 125.9, 128.4, 129.0, 130.0, 130.5, 134.5, 138.5, 148.6.

1-(4-nitrobenzyl)-4-phenyl-1*H*-1,2,3-triazole (3e):[8] Following the general procedure for the reaction in one step, 4-nitrobenzyl azide (44.8 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3e** as a white solid (51.2 mg, 73% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 5.69 (s, 2H), 7.34 (t, *J* = 7.4 Hz, 1H), 7.40 – 7.45 (m, 4H), 7.75 (s, 1H), 7.81 (d, *J* = 7.1 Hz, 2H), 8.23 (d, *J* = 8.7 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 53.3, 119.8, 124.5, 125.9, 128.6, 128.7, 129.0, 130.3, 141.9, 148.3, 148.9.

4-((4-phenyl-1*H*-1,2,3-triazol-1-yl)methyl)benzonitrile (3f):[9] Following the general procedure for the reaction in one step, 4-(azidomethyl)benzonitrile (39.5 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3f** as a white solid (65.1 mg, 100% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 5.65 (s, 2H), 7.32 – 7.44 (m, 6H), 7.68 (d, *J* = 8.3 Hz, 2H), 7.72 (s, 1H), 7,81 (d, *J* = 7.1 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 53.6, 113.0, 118.2, 119.8, 125.9, 128.5, 128.6, 129.0, 130.3, 133.1, 140.0, 148.8.

4-phenyl-1-(4-(trifluoromethyl)benzyl)-1*H*-1,2,3-triazole (3g):[10] Following the general procedure for the reaction in one step, 4-(trifluoromethyl)benzyl azide (50.3 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3g** as a white solid (37.2 mg, 49% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 5.65 (s, 2H), 7.33 (t, *J* = 7.4 Hz, 1H), 7.39 – 7.43 (m, 4H), 7.65 (d, *J* = 8.1 Hz, 2H), 7.70 (s, 1H), 7.81 (d, *J* = 7.2 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 53.7, 119.7, 123.9 (q, *J* = 270.6 Hz), 125.9, 126.3 (q, *J* = 3.6 Hz), 128.3, 128.5, 129.0, 130.5, 131.3 (q, *J* = 31.1 Hz), 138.8, 148.8. ^{19}F NMR (376 MHz, $CDCl_3$): δ = -62.8.

1-phenyl-2-(4-phenyl-1*H*-1,2,3-triazol-1-yl)ethan-1-one (3h):[11] Following the general procedure for the reaction in one step, 2-azido-1-phenylethan-1-one (40.3 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 2 h. Purification was performed by flash column chromatography affording **3h** as a white solid (46.1 mg, 70% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 8.02 (d, *J* = 7.4 Hz, 2H), 7.94 (s, 1H), 7.86 (d, *J* = 7.4 Hz, 2H), 7.68 (t, *J* = 7.4 Hz, 1H), 7.55 (t, *J* = 7.8 Hz, 2H), 7.43 (t, *J* = 7.5 Hz, 2H), 7.34 (t, *J* = 7.4 Hz, 1H), 5.89 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 55.5, 121.5, 125.8, 128.2, 128.8, 129.2, 130.6, 134.0, 134.6, 148.2, 190.3.

2-(4-phenyl-1*H*-1,2,3-triazol-1-yl)-1-(*p*-tolyl)ethan-1-one (3i):[12] Following the general procedure for the reaction in one step, 2-azido-1-(*p*-tolyl)ethan-1-one (43.8 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 2 h. Purification was performed by flash column chromatography affording **3i** as a white solid (63.1 mg, 91% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 2.45 (s, 3H), 5.86 (s, 2H), 7.33 – 7.35 (m. 3H), 7.43 (t, *J* = 7.3 Hz, 2H), 7.86 (d, *J* = 7.3 Hz, 2H), 7.92 (d, *J* = 7.3 Hz, 2H), 7.94 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 22.0, 55.5, 121.6, 126.0, 128.3, 128.5, 129.0, 130.0, 130.7, 131.7, 146.0, 148.4, 190.0.

1-(4-methoxyphenyl)-2-(4-phenyl-1*H*-1,2,3-triazol-1-yl)ethan-1-one (3j):[13] Following the general procedure for the reaction in one step, 2-azido-1-(4-methoxyphenyl)ethan-1-one (49.0 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3j** as a white solid (63.1 mg, 86% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 3.90 (s, 3H), 5.82 (s, 2H), 7.00 (d, *J* = 8.9 Hz, 2H), 7.33 (t, *J* = 7.4 Hz, 1H), 7.43 (t, *J* = 7.4 Hz, 2H), 7.86 (d, *J* = 7.2 Hz, 2H). 7.94 (s, 1H), 8.0 (d, *J* = 8.9 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 55.3, 55.8, 114.6, 121.6, 126.0, 127.1, 128.3, 129.0, 130.8, 148.3, 164.8, 188.8.

1-octyl-4-phenyl-1*H*-1,2,3-triazole (3k):[10] Following the general procedure for the reaction in one step, 1-octyl azide (38.8 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3k** as a white solid (62.4 mg, 97% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 0.87 (t, *J* = 6.9 Hz, 3H), 1.27 – 1.35 (m, 10H), 1,95 (q, *J* = 6.9 Hz, 2H), 4.39 (t, *J* = 7.4 Hz, 2H), 7.33 (t, *J* = 7.4 Hz, 1H), 7.42 (t, *J* = 7.4 Hz, 2H), 7.73 (s, 1H), 7.84 (d, *J* = 7.4 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 14.2, 22.7, 26.7, 29.1, 29.2, 30.5, 31.9, 50.6, 119.5, 125.9, 128.2, 129.0, 130.9, 147.9.

2-(3-(4-phenyl-1*H*-1,2,3-triazol-1-yl)propyl)isoindoline-1,3-dione (3l): Following the general procedure for the reaction in two step, 2-(3-azidopropyl)isoindoline-1,3-dione (57.5 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3l** as a light brown solid (62.3 mg, 75% yield). Melting point: 146.5 – 147.1 ºC. ^{1}H NMR (400 MHz, $CDCl_3$): δ = 2.38 (q, *J* = 6.6 Hz, 2H), 3.78 (t, *J* = 6.6 Hz, 2H), 4.45 (t, *J* = 6.6 Hz, 2H), 7.31 (t, *J* = 7.5 Hz, 1H), 7.40 (t, *J* = 7.5 Hz, 2H), 7.69 –

7.71 (m, 2H), 7.80 – 7.84 (m, 4H), 7.97 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 29.5, 35.2, 48.0, 120.4, 123.5, 125.9, 128.2, 128.9, 130.8, 132.0, 134.3, 147.8, 168.5. GC-MS HRMS EI [M^+] calcd for $C_{19}H_{16}N_4NaO_2$: 355.1165, found 355.1181.

1,4-diphenyl-1*H*-1,2,3-triazole (3m):[4] Following the general procedure for the reaction in one step, phenyl azide (29.8 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3m** as a white solid (47.0 mg, 85% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 7.38 (t, *J* = 7.4 Hz, 1H), 7.47 (t, *J* = 7.7 Hz, 3H), 7.56 (t, *J* = 7.7 Hz, 2H), 7.81 (d, *J* = 7.2 Hz, 2H), 7.92 (d, *J* = 7.2 Hz, 2H), 8.20 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 117.1, 120.7, 126.1, 128.6, 128.9, 129.1, 130.0, 130.5, 137.3, 148.6.

1-(4-methoxyphenyl)-4-phenyl-1*H*-1,2,3-triazole (3n):[4] Following the general procedure for the reaction in one step, 4-methoxyphenyl azide (37.3 mg, 0.25 mmol) and phenyl acetylene (25.5 mg, 0.25 mmol) were placed in a glass vial. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 4 h. Purification was performed by flash column chromatography affording **3n** as a white solid (55.3 mg, 88% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 3.88 (s, 3H), 7.04 (d, *J* = 9.0 Hz, 2H), 7.36 (t, *J* = 7.6 Hz, 1H), 7.46 (t, *J* = 7.6 Hz, 2H), 7.69 (d, *J* = 9.0 Hz, 2H), 7.90 (d, *J* = 7.6 Hz, 2H), 8.11 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 55.8, 115.0, 118.0, 122.4, 126.0, 128.5, 129.0, 130.6, 130.7, 148.4, 160.0.

1-benzyl-4-(2-methoxyphenyl)-1*H*-1,2,3-triazole (3o):[14] Following the general procedure for the reaction in one step, benzyl azide (33.3 mg, 0.25 mmol) and 2-methoxyphenyl acetylene (37.3 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 2 h. Purification was performed by flash column chromatography affording **3o** as a white solid (66.3 mg, 100% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 3.88 (s, 3H), 5,59 (s, 2H), 6.95 (d, *J* = 8.3 Hz, 1H), 7.08 (td, *J* = 7.6, 1.0 Hz, 1H), 7.27 – 7.41 (m, 5H), 7.98 (s, 1H), 8.36 (dd, *J* = 7.6, 1.7 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 54.1, 55.2, 110.9, 119.6, 121.2, 123.2, 127.8, 127.9, 128.6, 129.0, 129.2, 135.3, 143.8, 155.8.

1-benzyl-4-(4-methoxyphenyl)-1*H*-1,2,3-triazole (3p):[15] Following the general procedure for the reaction in one step, benzyl azide (33.3 mg, 0.25 mmol) and 4-methoxyphenyl acetylene (37.3 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 2 h. Purification was performed by flash column chromatography affording **3p** as a white solid (51.0 mg, 77%

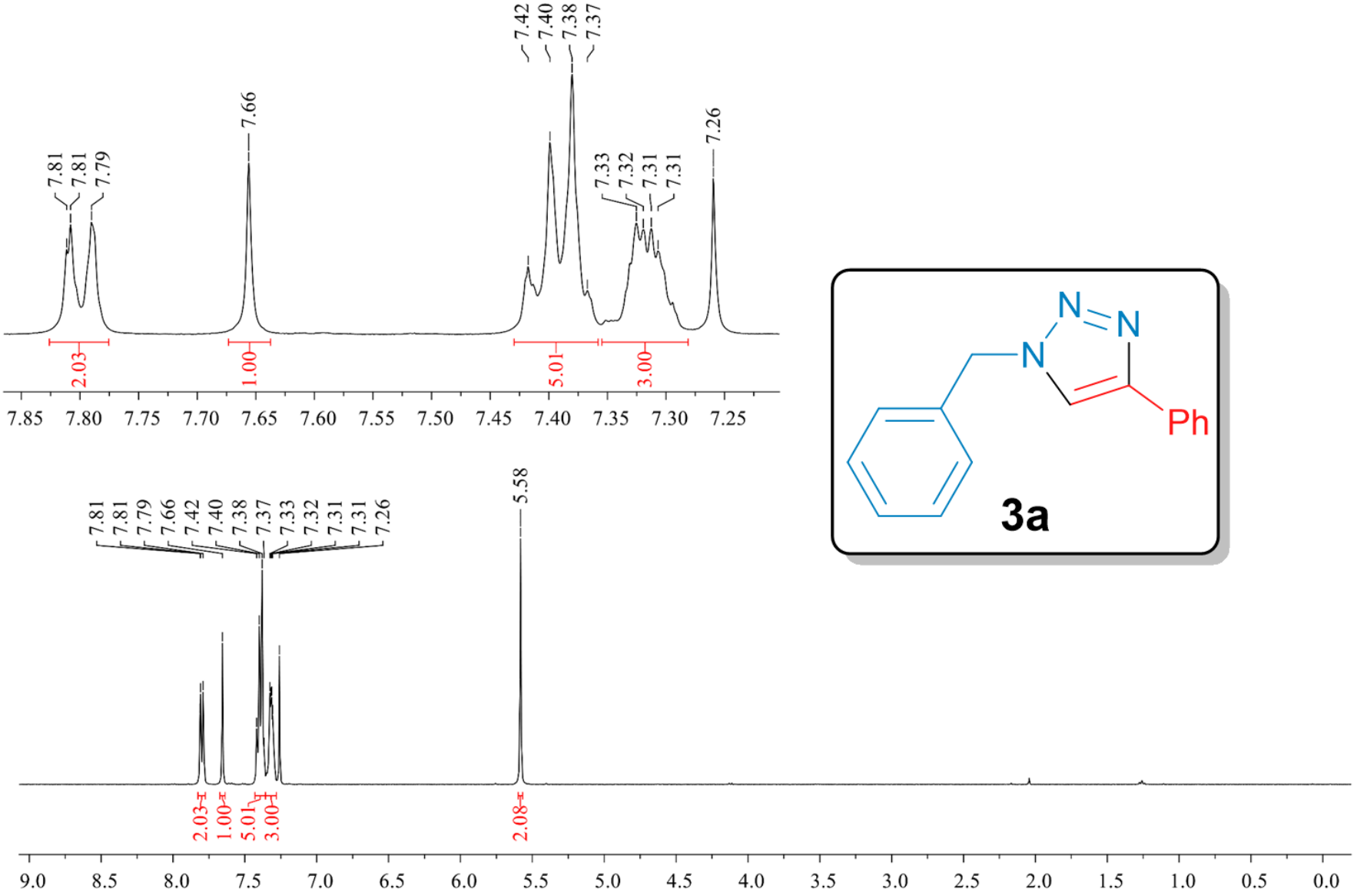
yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 3.83 (s, 3H), 5.56 (s, 2H), 6.93 (d, *J* = 8.9 Hz, 2H), 7.28 – 7.33 (m, 2H), 7.34 – 7.42 (m. 3H), 7.57 (s, 1H), 7.72 (d. *J* = 8.9 Hz, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 54.3, 55.5, 114.4, 118.8, 123.5, 127.2, 128.2, 128.9, 129.3, 134.9, 148.3, 159.8.

2-(1-benzyl-1*H*-1,2,3-triazol-4-yl)aniline (3q):[16] Following the general procedure for the reaction in one step, benzyl azide (33.3 mg, 0.25 mmol) and 2-ethynylaniline (29.3 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 2 h. Purification was performed by flash column chromatography affording **3q** as a white solid (55.7 mg, 89% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 5.50 (s, 2H), 5.58 (s, 2H), 6.68 (t, *J* = 7.5 Hz, 1H), 6.76 (d, *J* = 8.1 Hz, 1H), 7.10 (t, *J* = 7.7 Hz, 1H), 7.27 – 7.32 (m, 3H), 7.35 – 7.43 (m, 3H), 7.67 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 54.4, 113.7, 116.9, 117.4, 119.8, 127.8, 128.2, 129.0, 129.2, 129.3, 134.7, 145.3, 149.1.

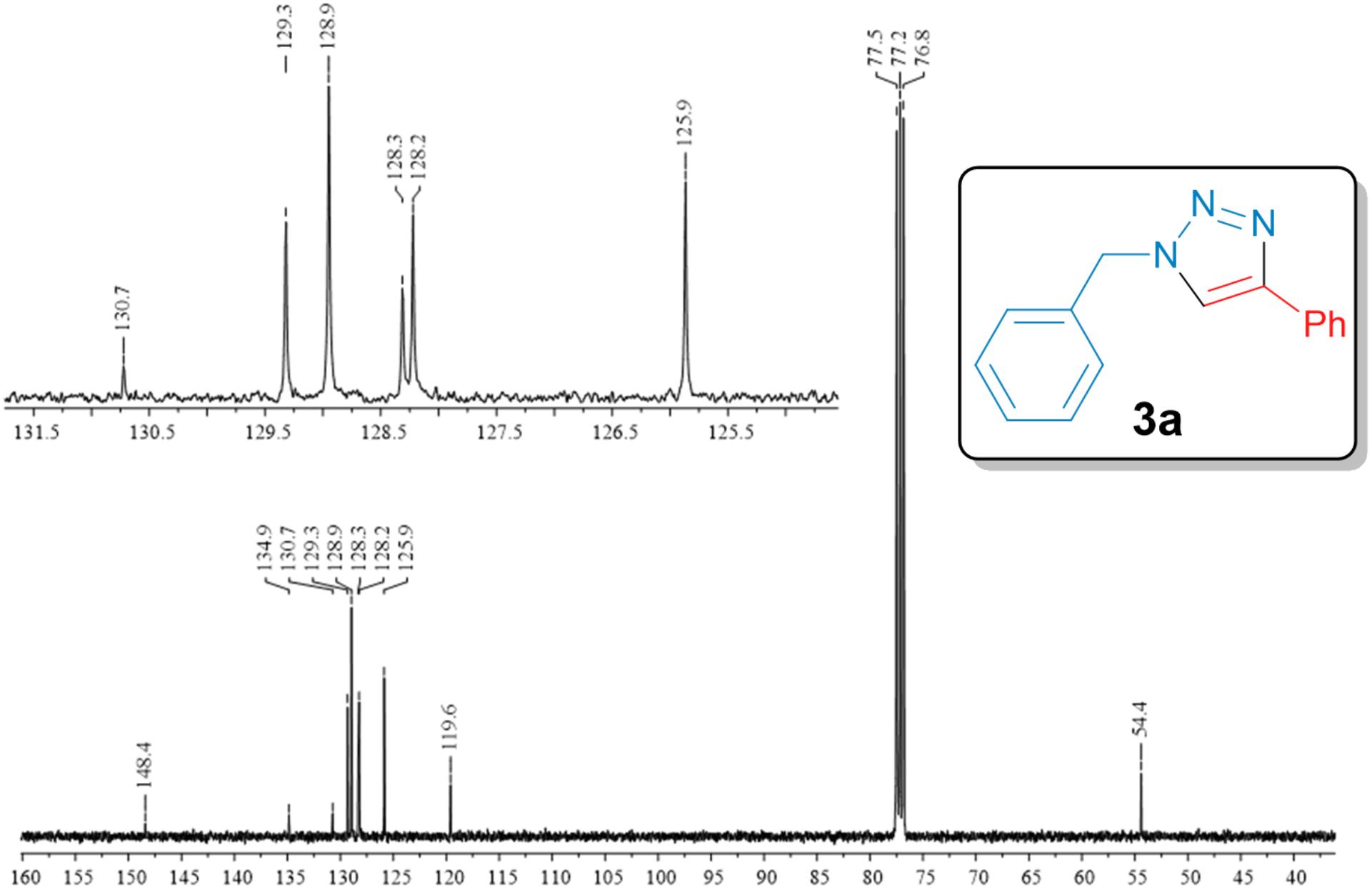
1-benzyl-4-(phenoxymethyl)-1*H*-1,2,3-triazole (3r):[17] Following the general procedure for the reaction in one step, benzyl azide (33.3 mg, 0.25 mmol) and (prop-2-yn-1-yloxy)benzene (33.0 mg, 0.25 mmol) were placed in a glass vial with 1.6 mL of water. Then, 200 μL of both solutions of EY (5 mM) and $CuCl_2$ (5mM) were added and the mixture were irradiated with green-LED (530 nm), stirring for 2 h. Purification was performed by flash column chromatography affording **3r** as a white solid (66.3 mg, 100% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ = 5.21 (s, 2H), 5.55 (s, 2H), 6.96 – 6.99 (m, 3H), 7.28 – 7.31 (m, 4H), 7.38 – 7.40 (m, 3H), 7.54 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ = 54.4, 62.3, 115.0, 121.4, 122.7, 128.3, 129.0, 129.3, 129.7, 134.7, 144.9, 158.4.

^{1}H and ^{13}C NMR Spectra of Products

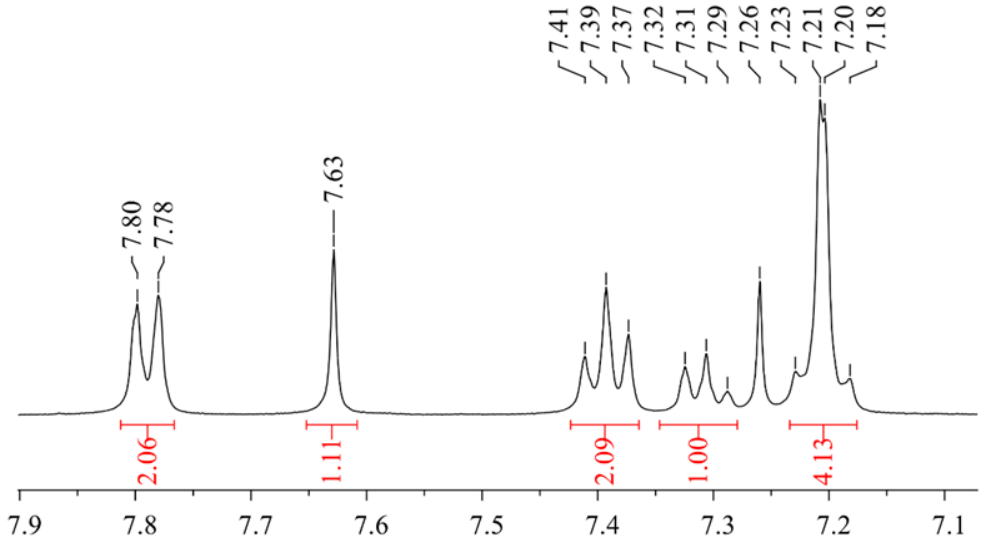
^{1}H NMR. 1-benzyl-4-phenyl-1H-1,2,3-triazole (3a)

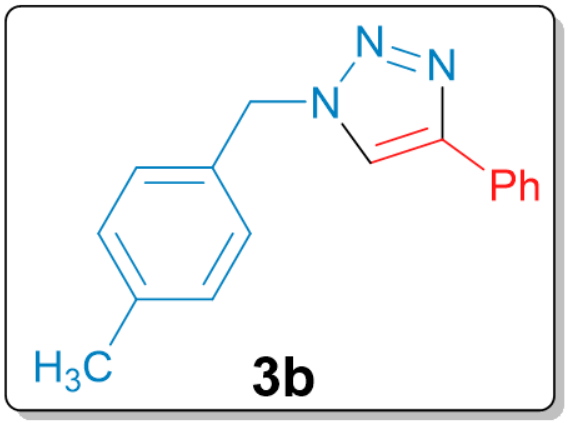


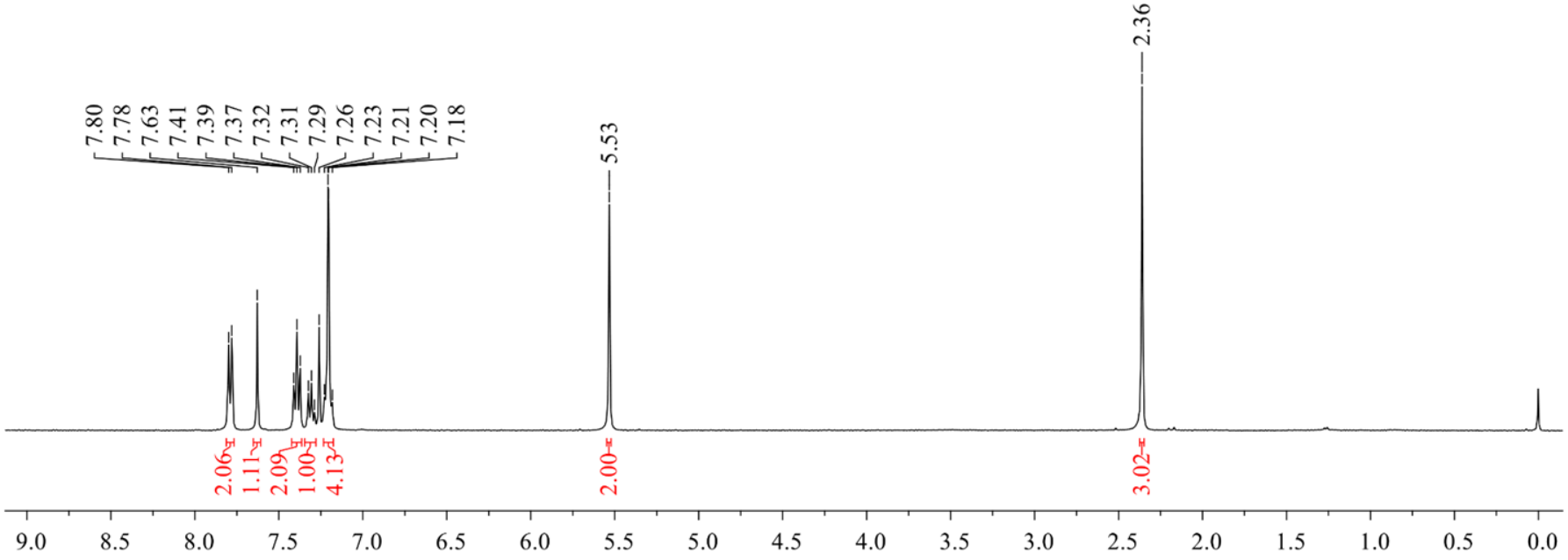
^{13}C NMR. 1-benzyl-4-phenyl-1H-1,2,3-triazole (3a)



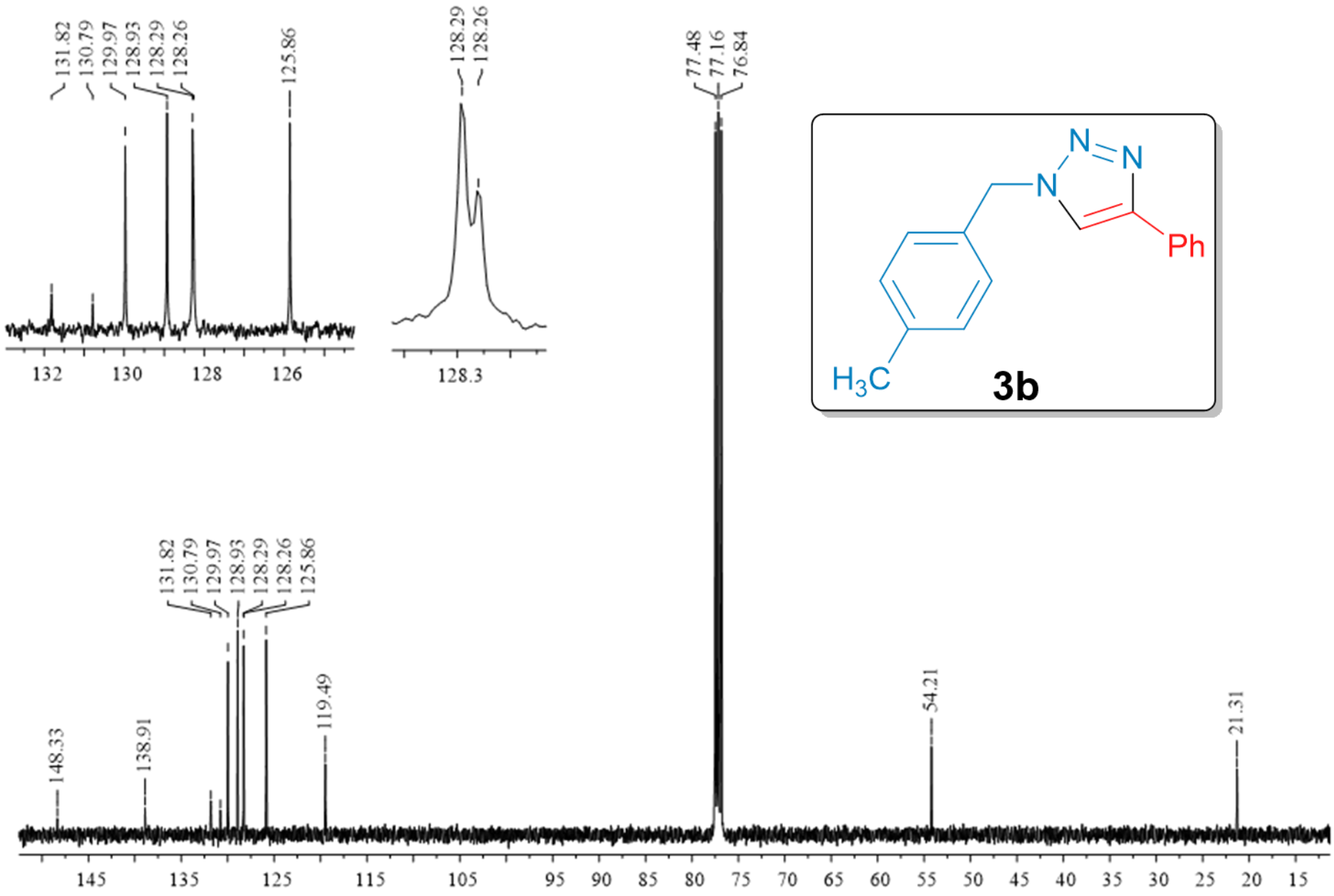
^{1}H NMR. 1-(4-methylbenzyl)-4-phenyl-1*H*-1,2,3-triazole (3b)



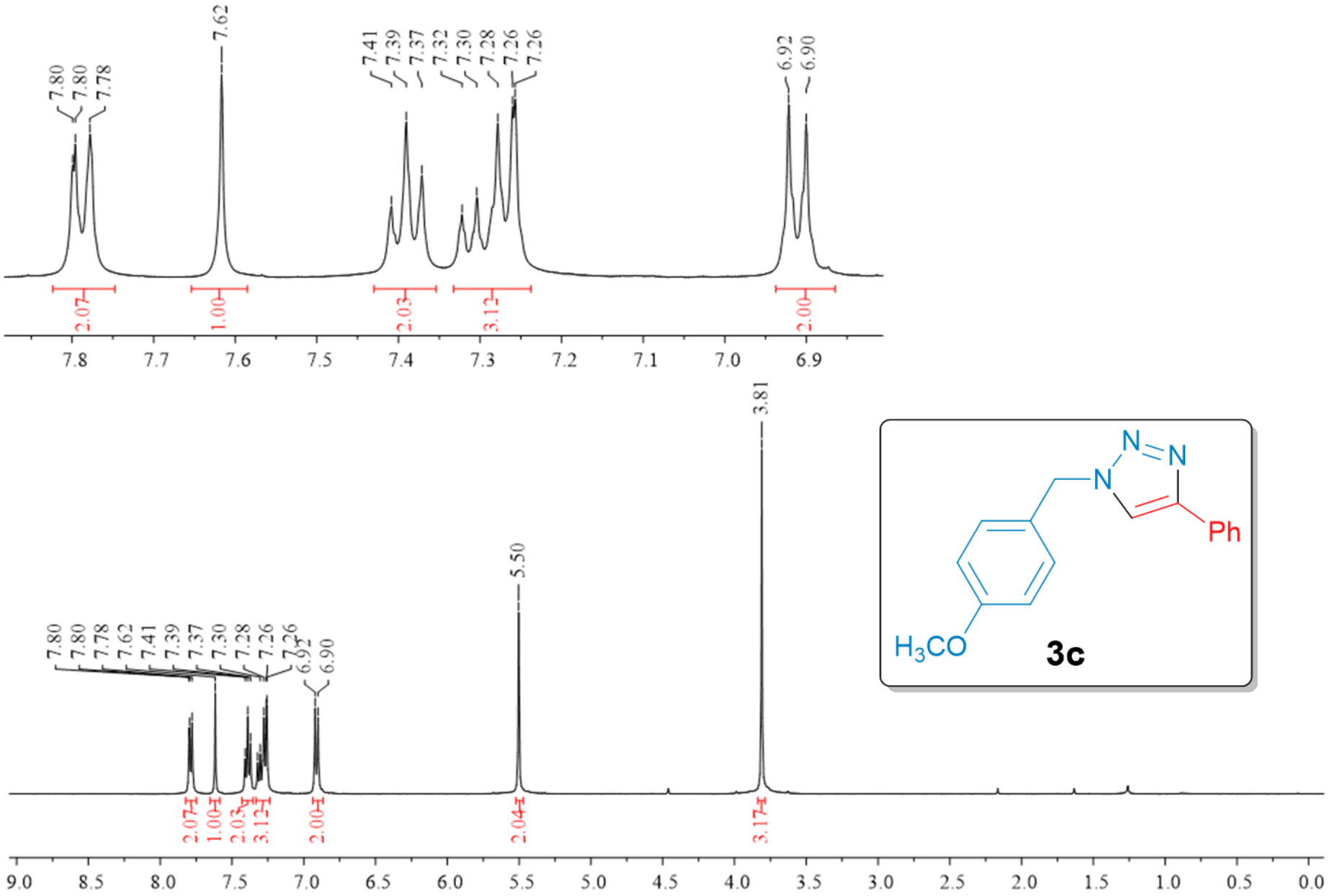




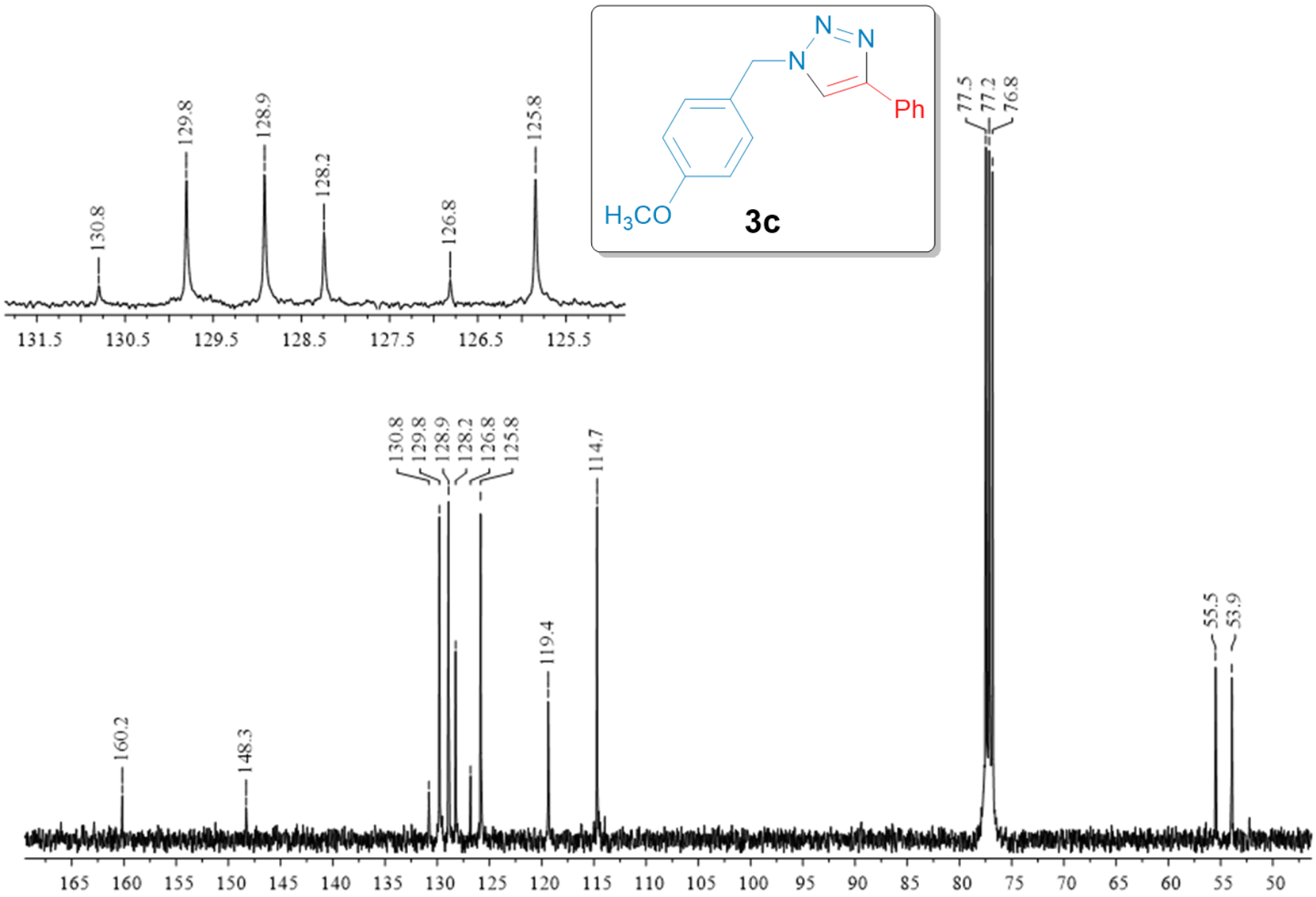
^{13}C NMR. 1-(4-methylbenzyl)-4-phenyl-1*H*-1,2,3-triazole (3b)



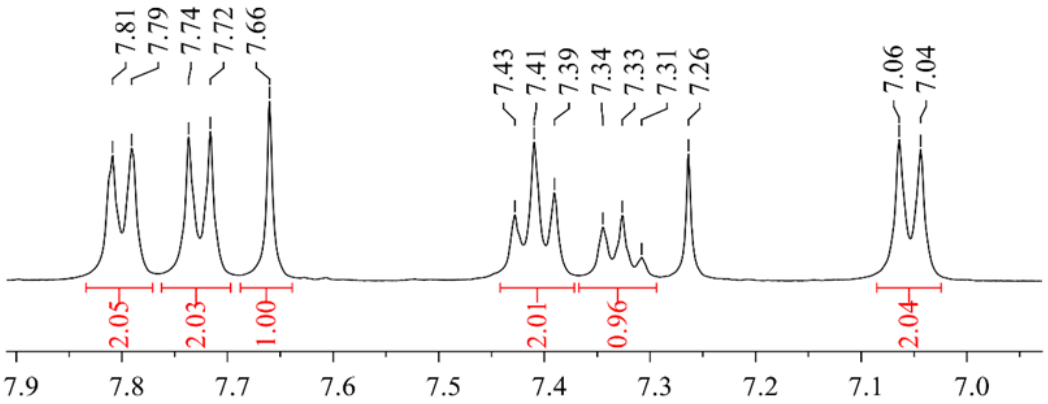
[1]H NMR. 1-(4-methoxybenzyl)-4-phenyl-1*H*-1,2,3-triazole (3c)

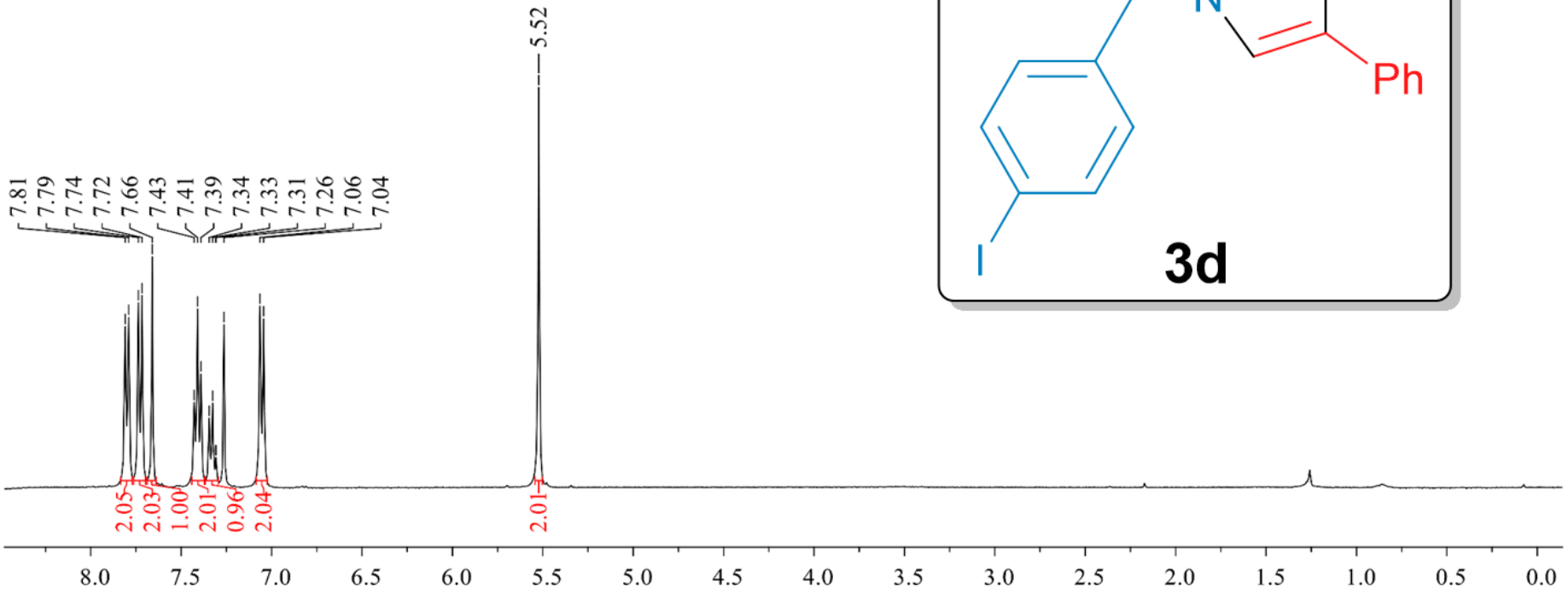


^{13}C NMR. 1-(4-methoxybenzyl)-4-phenyl-1*H*-1,2,3-triazole (3c)

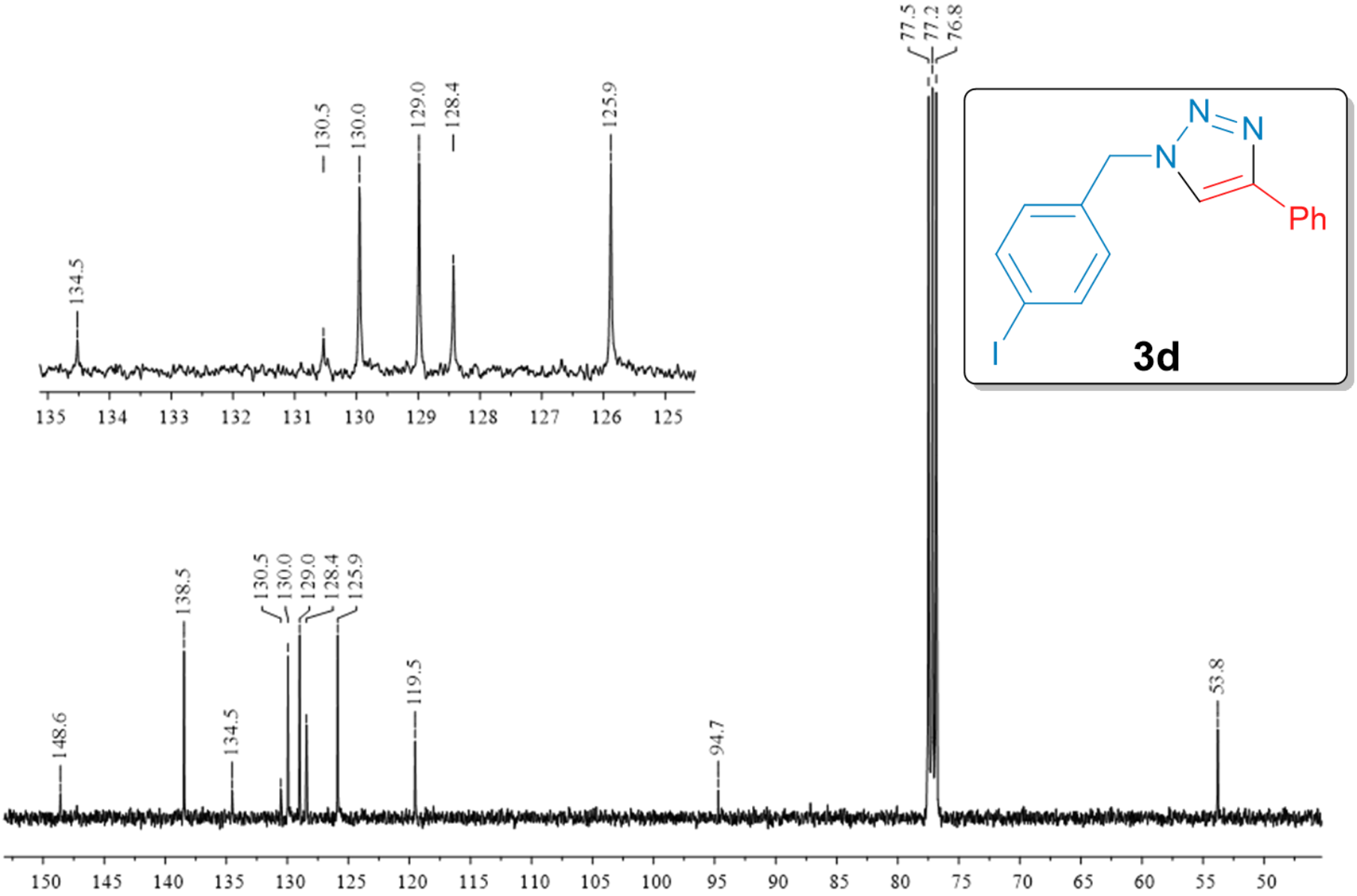


^{1}H NMR. 1-(4-iodobenzyl)-4-phenyl-1*H*-1,2,3-triazole (3d)

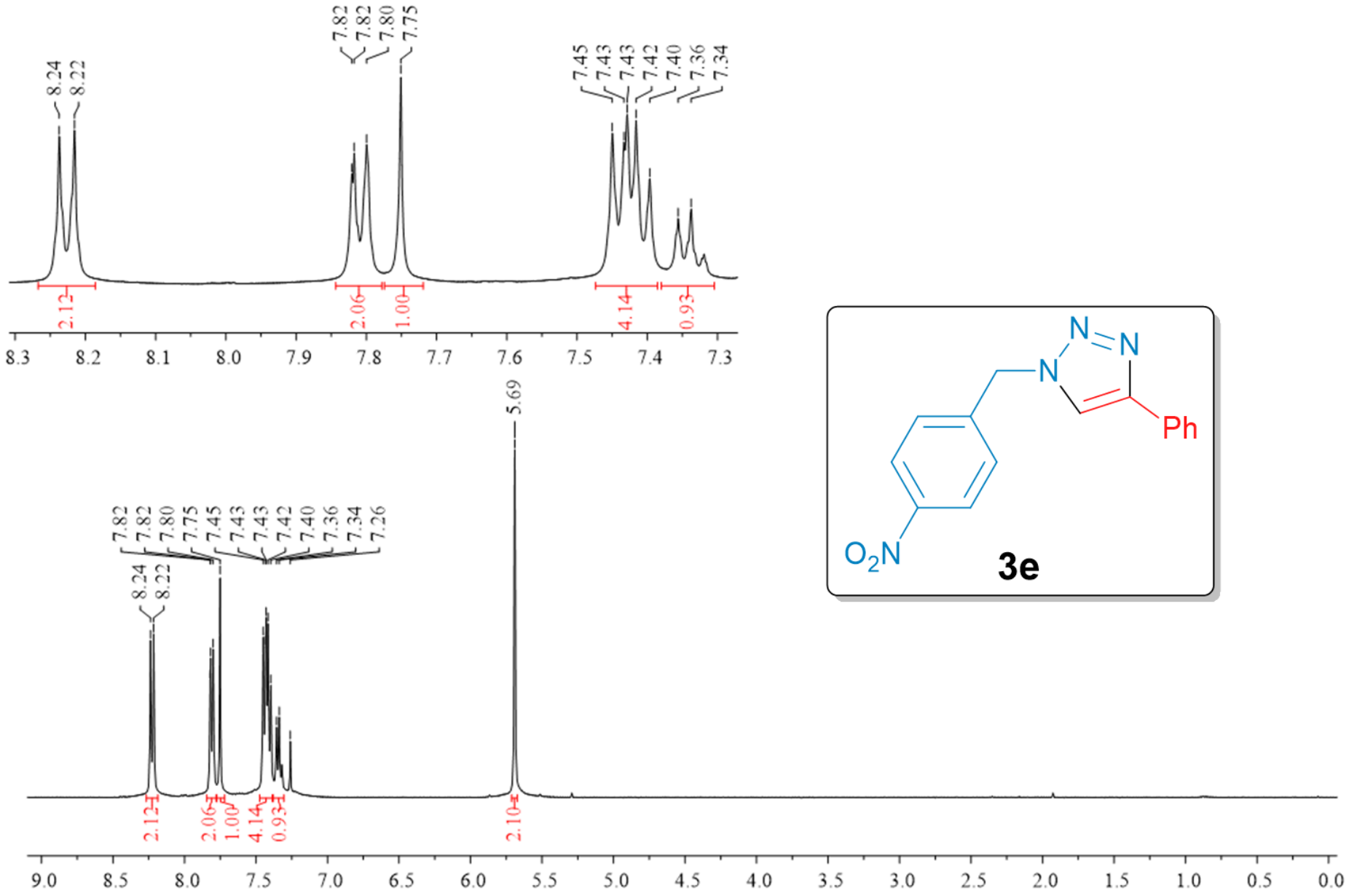




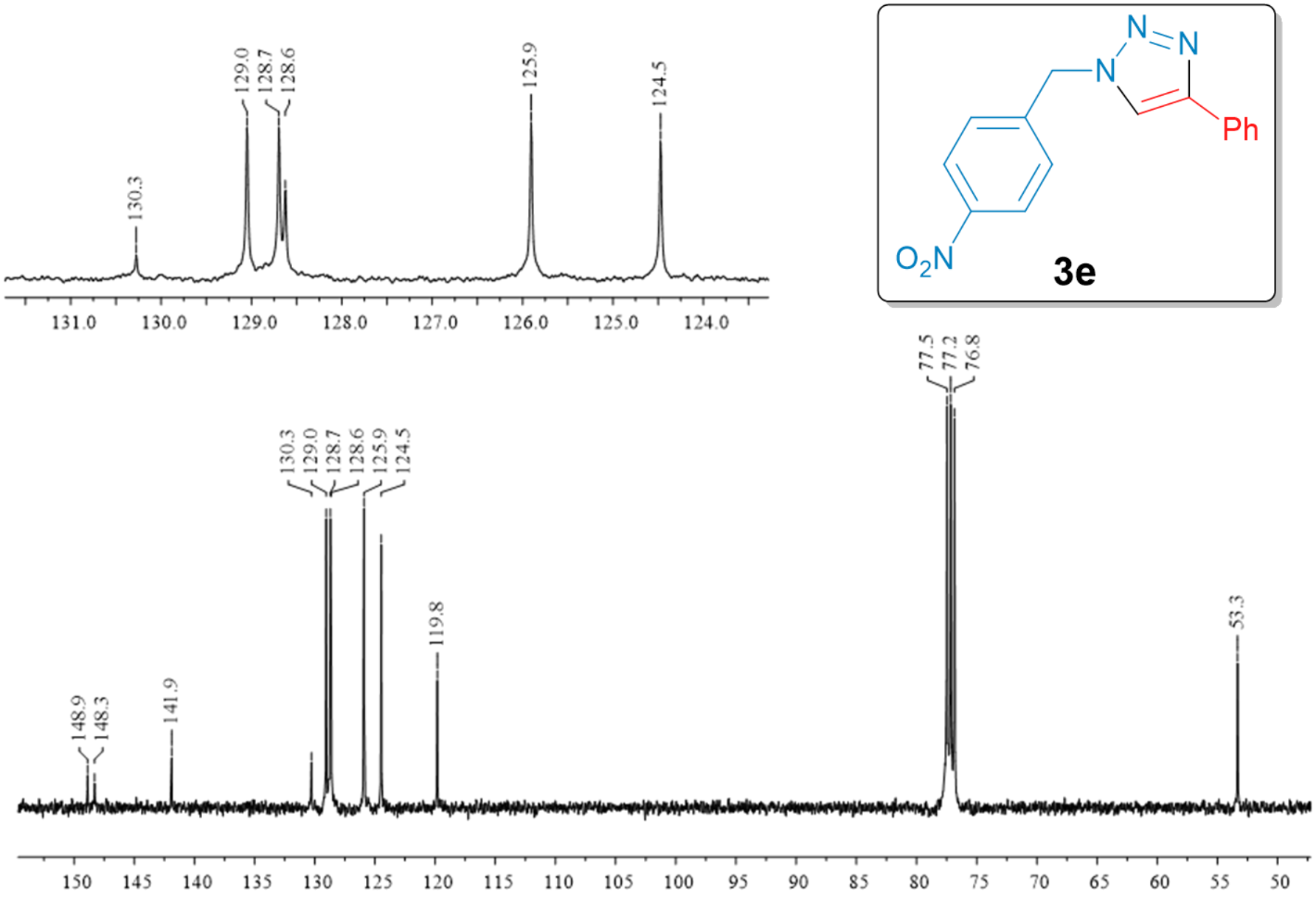
^{13}C NMR. 1-(4-iodobenzyl)-4-phenyl-1*H*-1,2,3-triazole (3d)



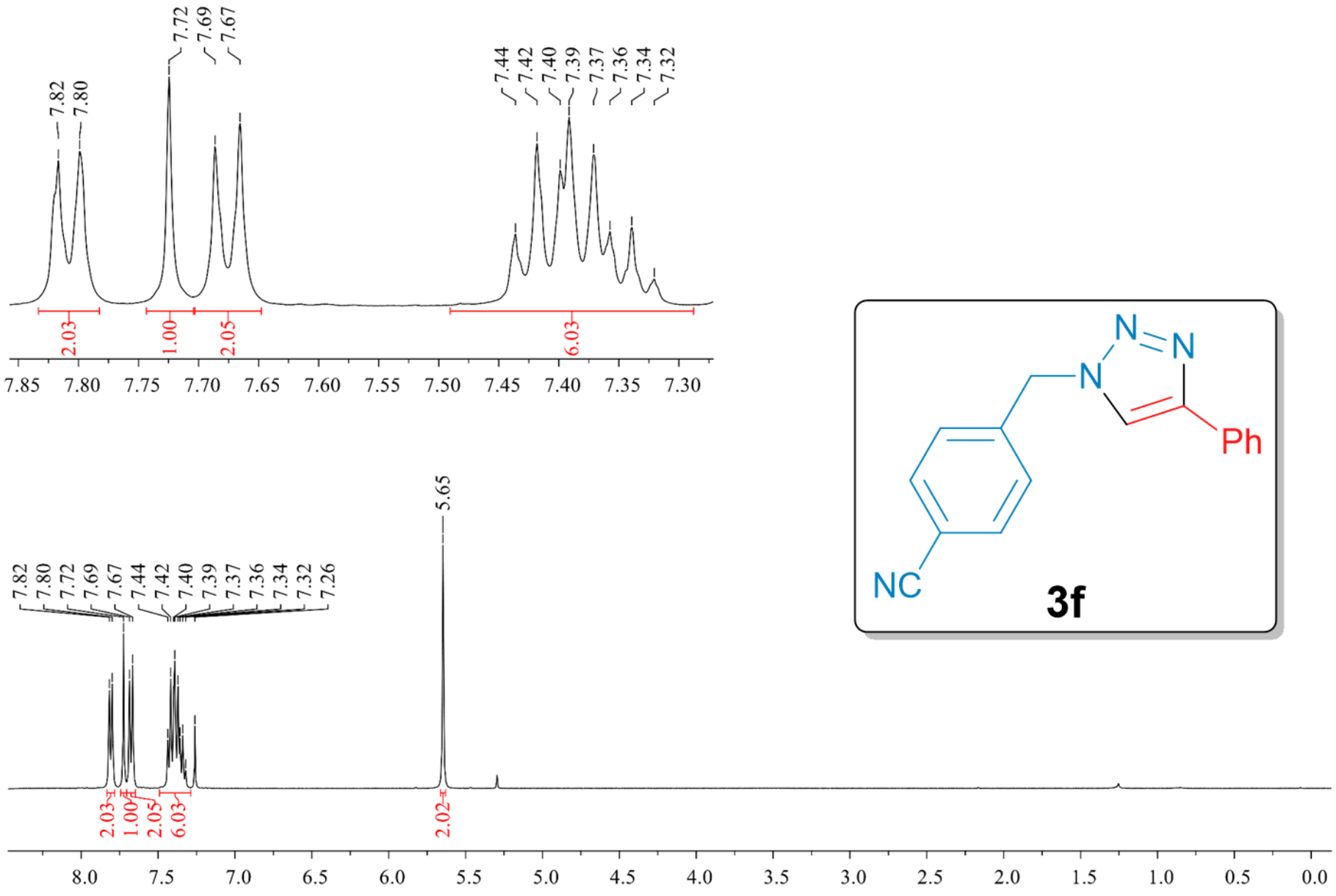
^{1}H NMR. 1-(4-nitrobenzyl)-4-phenyl-1*H*-1,2,3-triazole (3e)



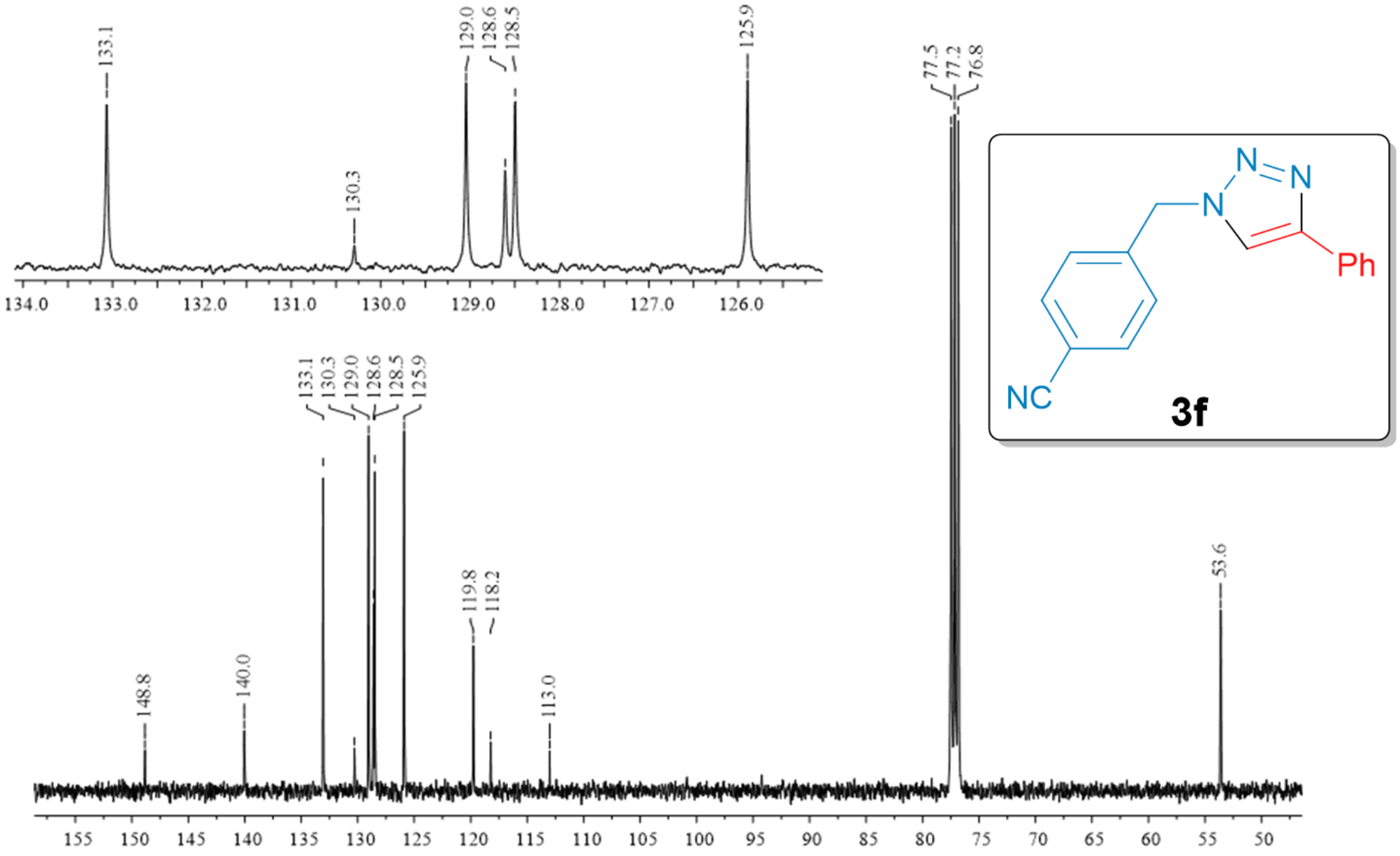
^{13}C NMR. 1-(4-nitrobenzyl)-4-phenyl-1*H*-1,2,3-triazole (3e)



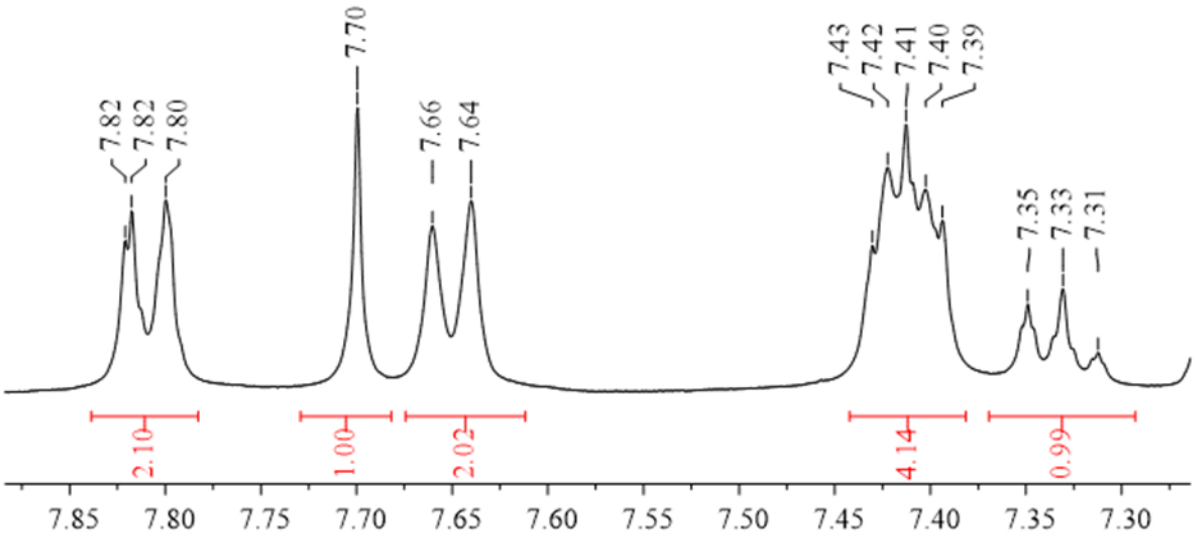
^{1}H NMR. 4-((4-phenyl-1*H*-1,2,3-triazol-1-yl)methyl)benzonitrile (3f)

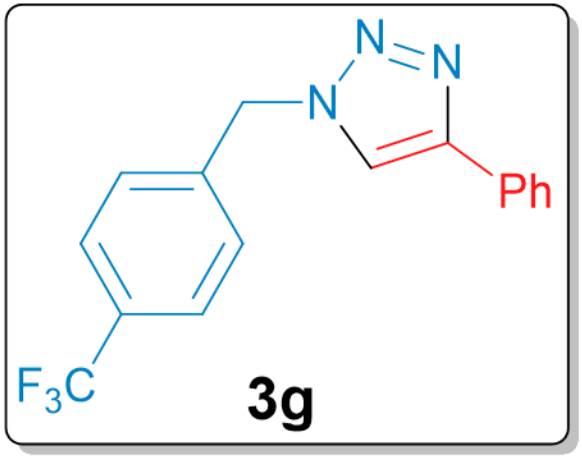


^{13}C NMR. 4-((4-phenyl-1*H*-1,2,3-triazol-1-yl)methyl)benzonitrile (3f)

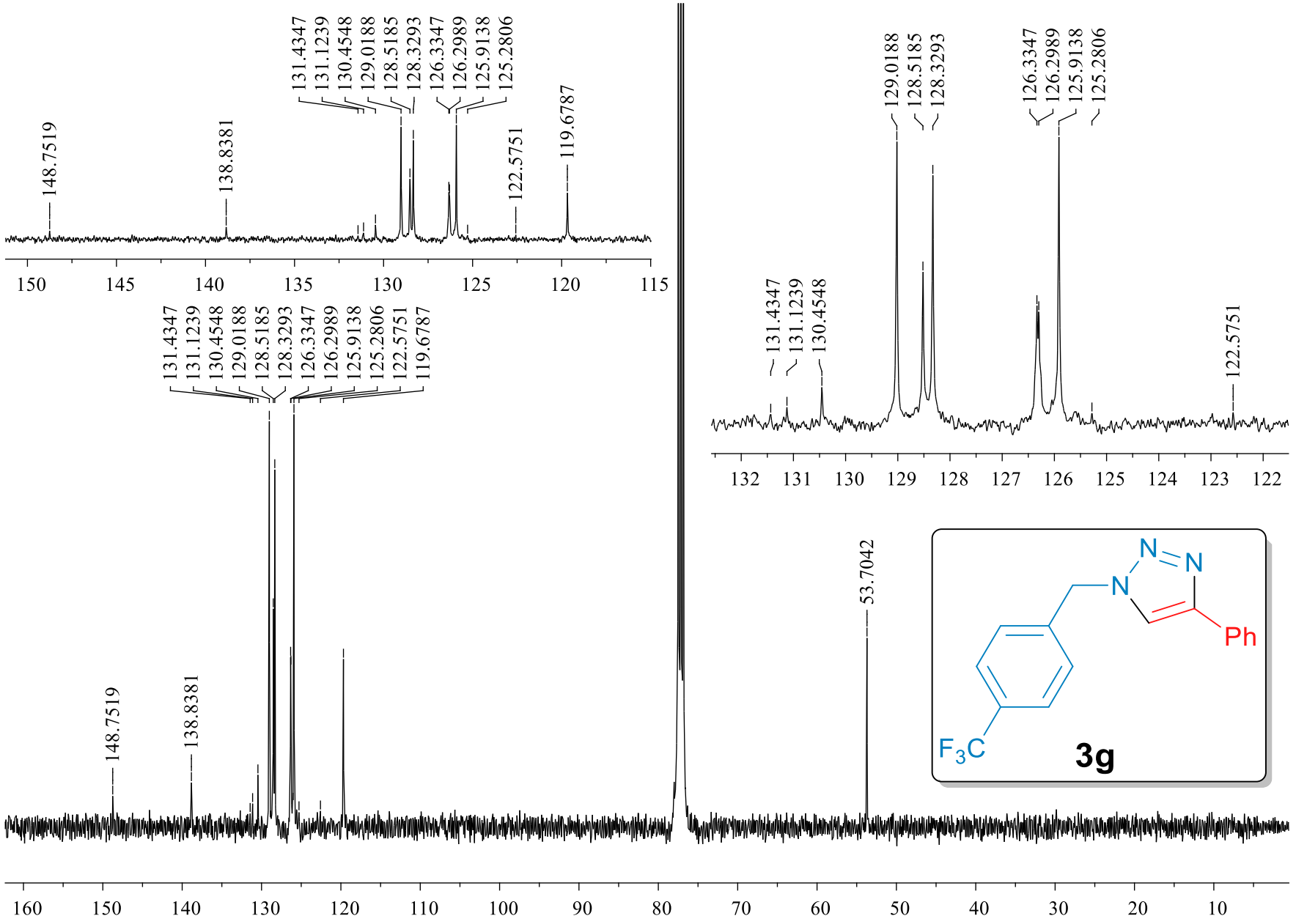


^{1}H NMR. 4-phenyl-1-(4-(trifluoromethyl)benzyl)-1*H*-1,2,3-triazole (3g)

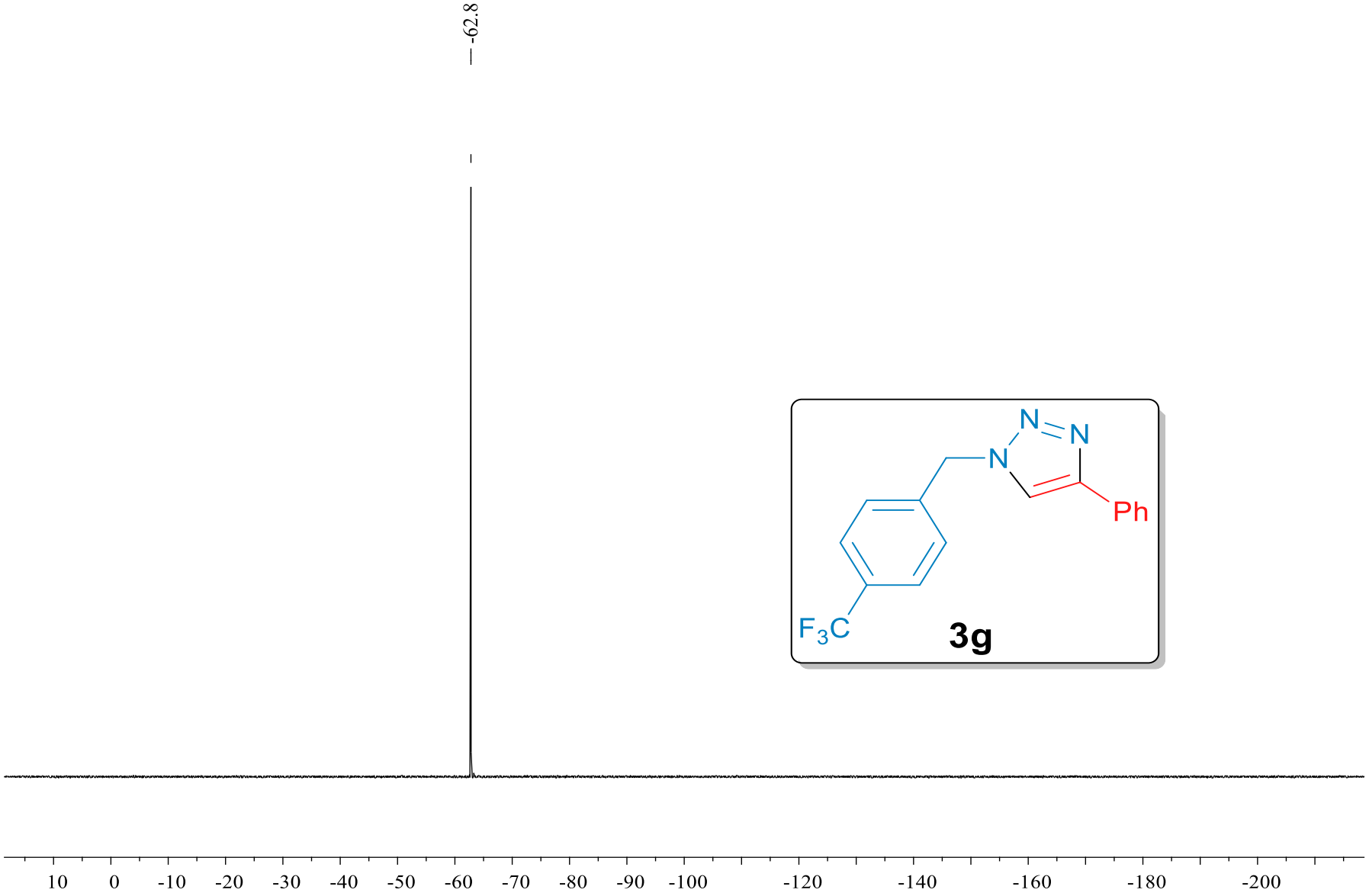




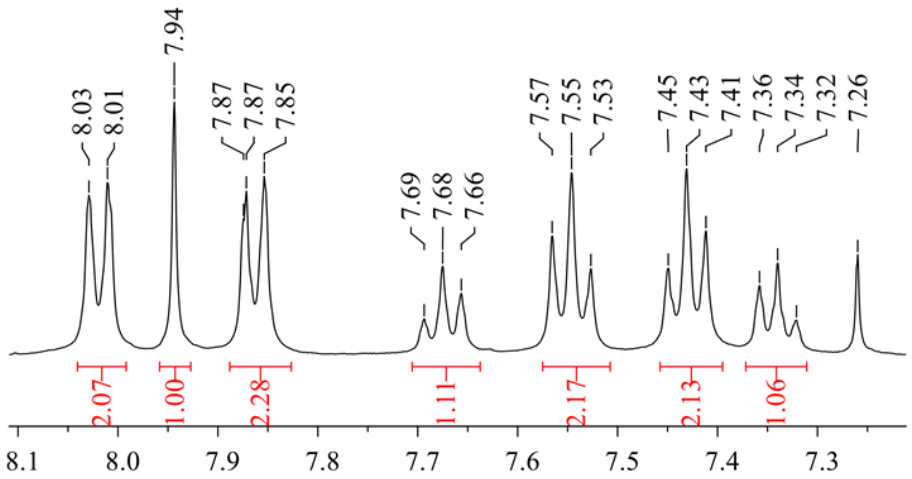
^{13}C NMR. 4-phenyl-1-(4-(trifluoromethyl)benzyl)-1*H*-1,2,3-triazole (3g)

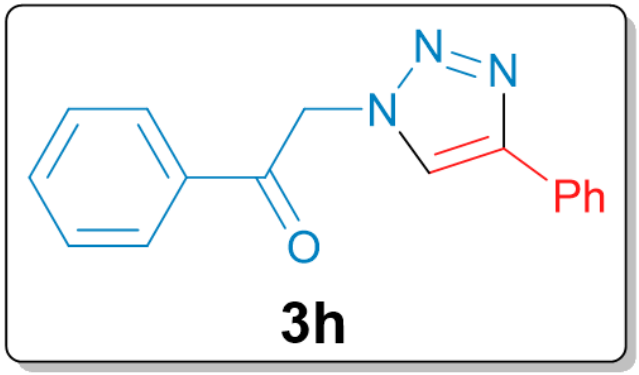


^{13}F NMR. 4-phenyl-1-(4-(trifluoromethyl)benzyl)-1*H*-1,2,3-triazole (3g)

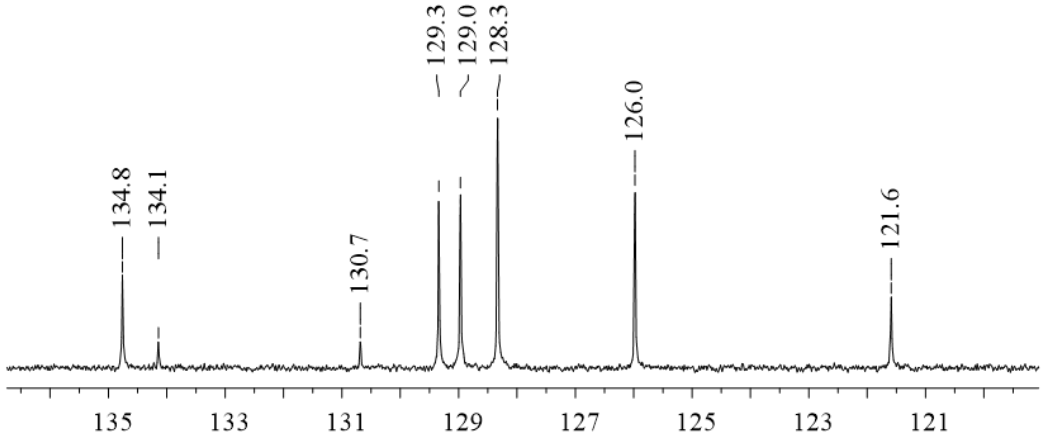


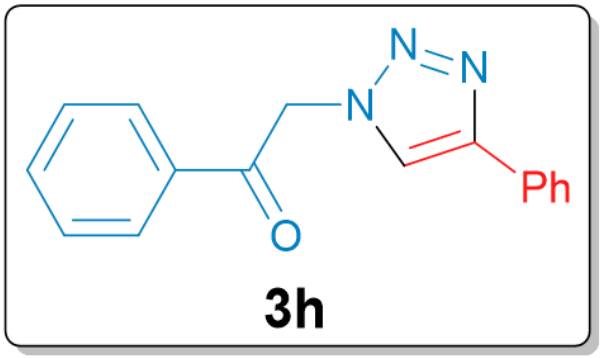
^{1}H NMR. 1-phenyl-2-(4-phenyl-1*H*-1,2,3-triazol-1-yl)ethan-1-one (3h)

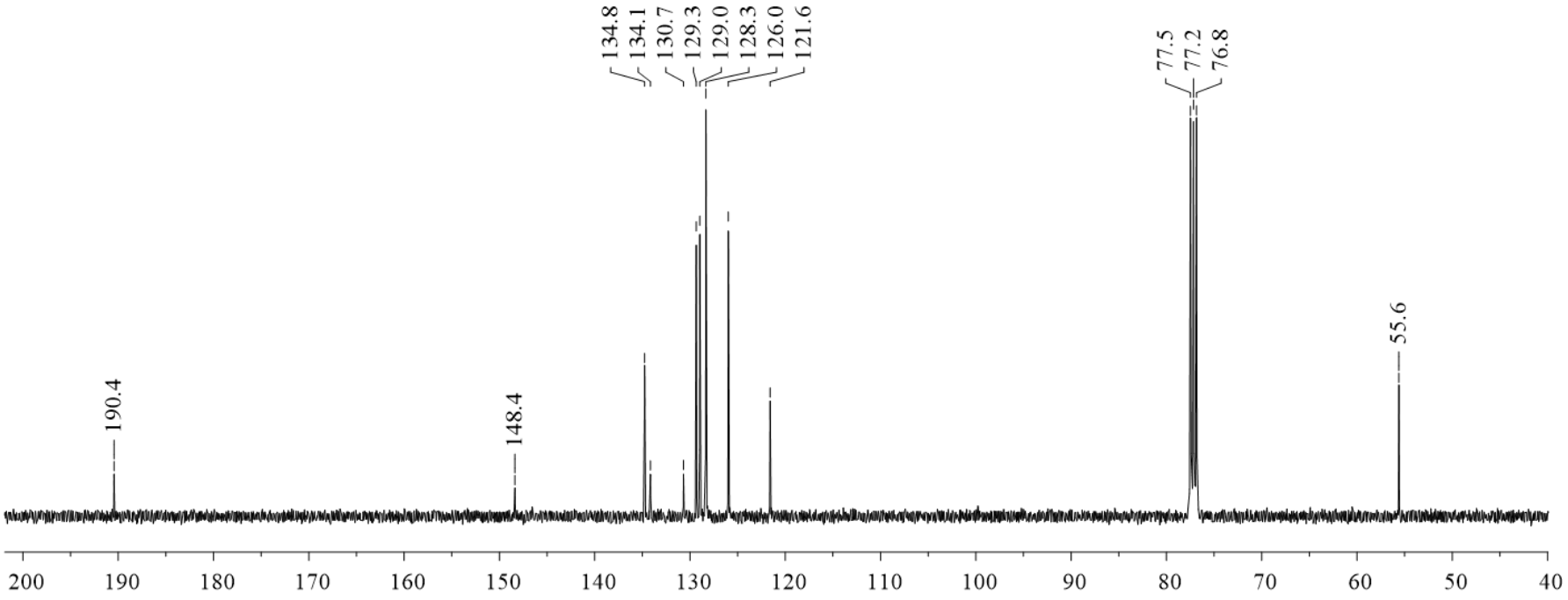




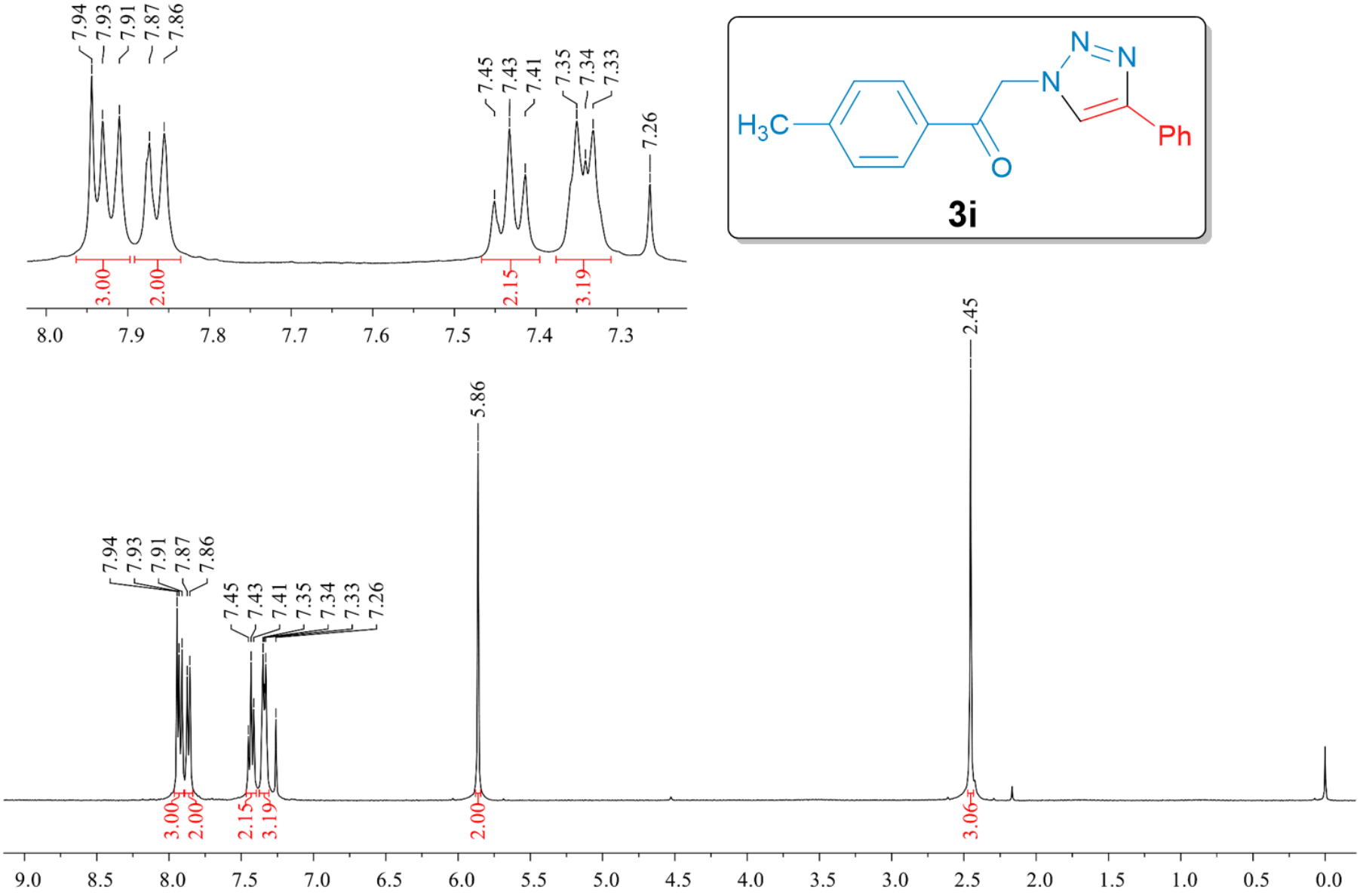
^{13}C NMR. 1-phenyl-2-(4-phenyl-1*H*-1,2,3-triazol-1-yl)ethan-1-one (3h)



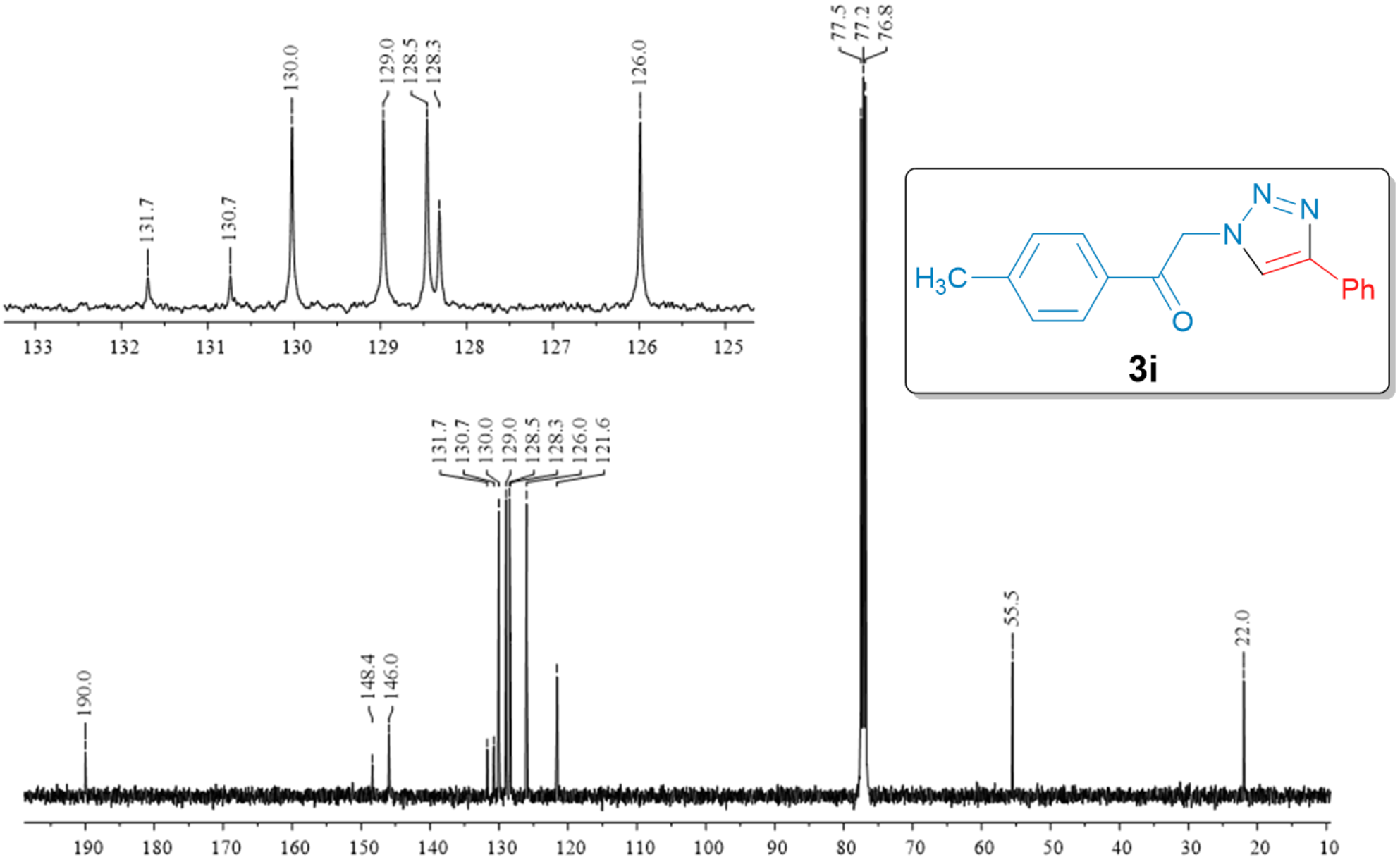




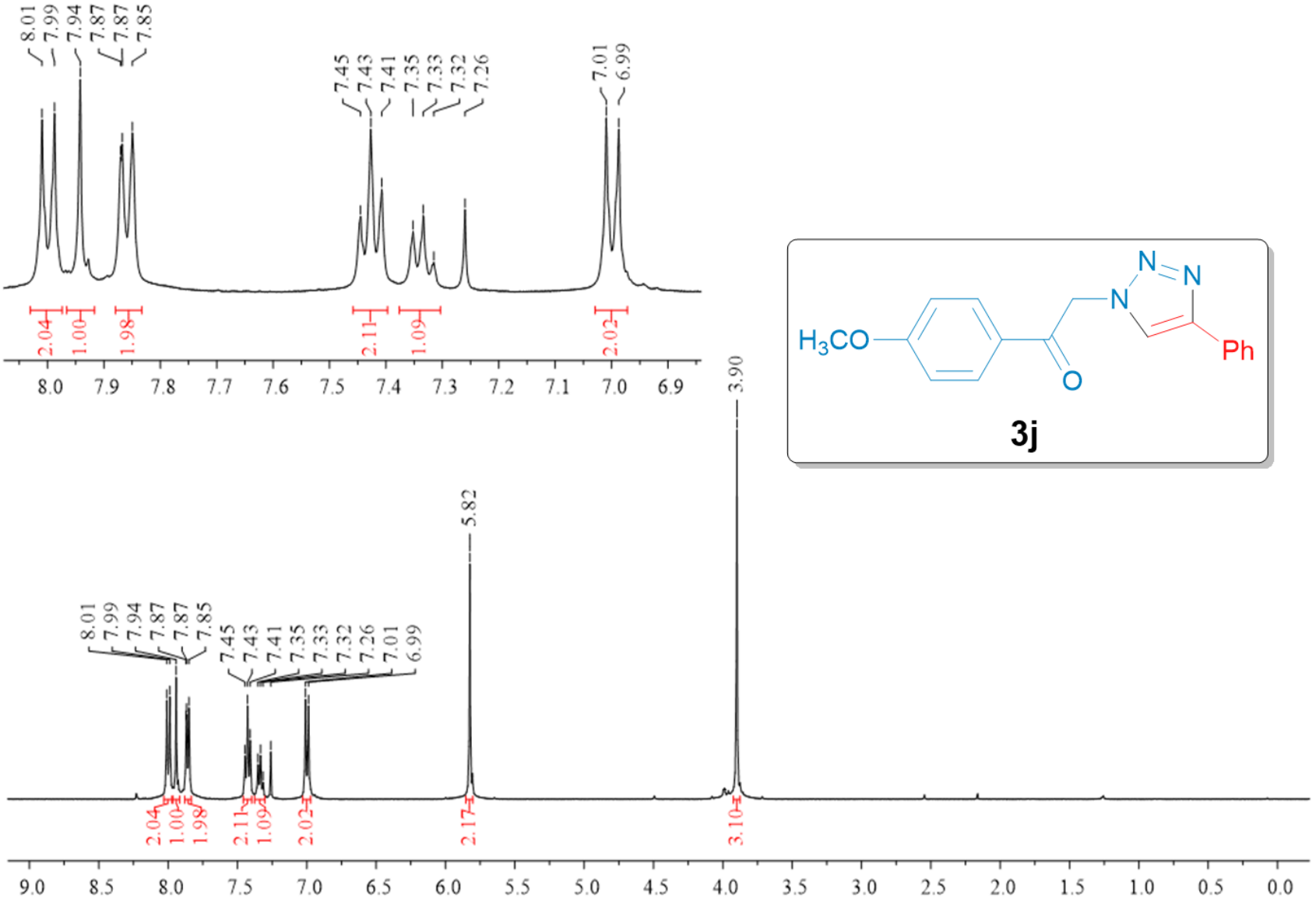
^{1}H NMR. 2-(4-phenyl-1*H*-1,2,3-triazol-1-yl)-1-(*p*-tolyl)ethan-1-one (3i)



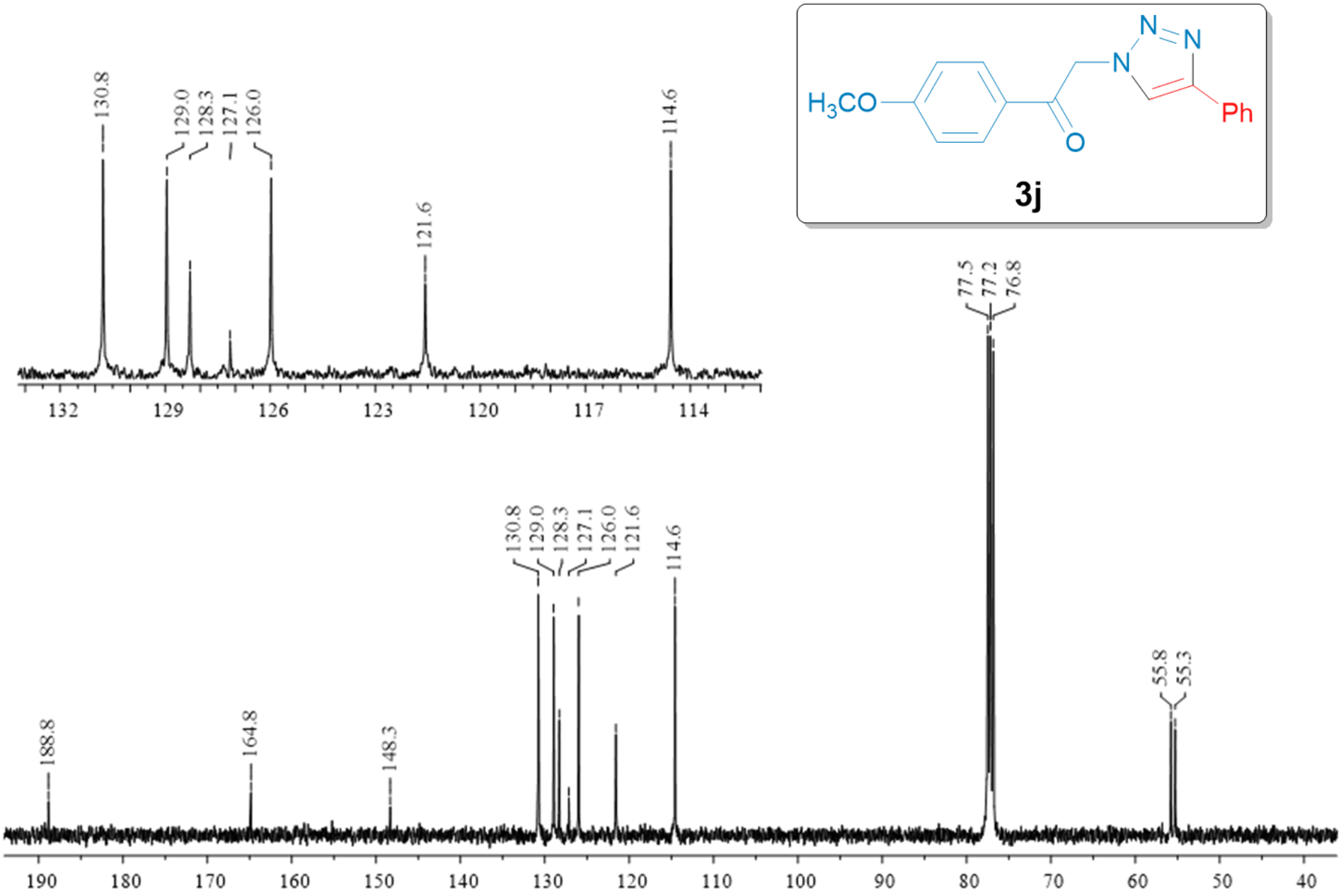
^{13}C NMR. 2-(4-phenyl-1*H*-1,2,3-triazol-1-yl)-1-(*p*-tolyl)ethan-1-one (3i)



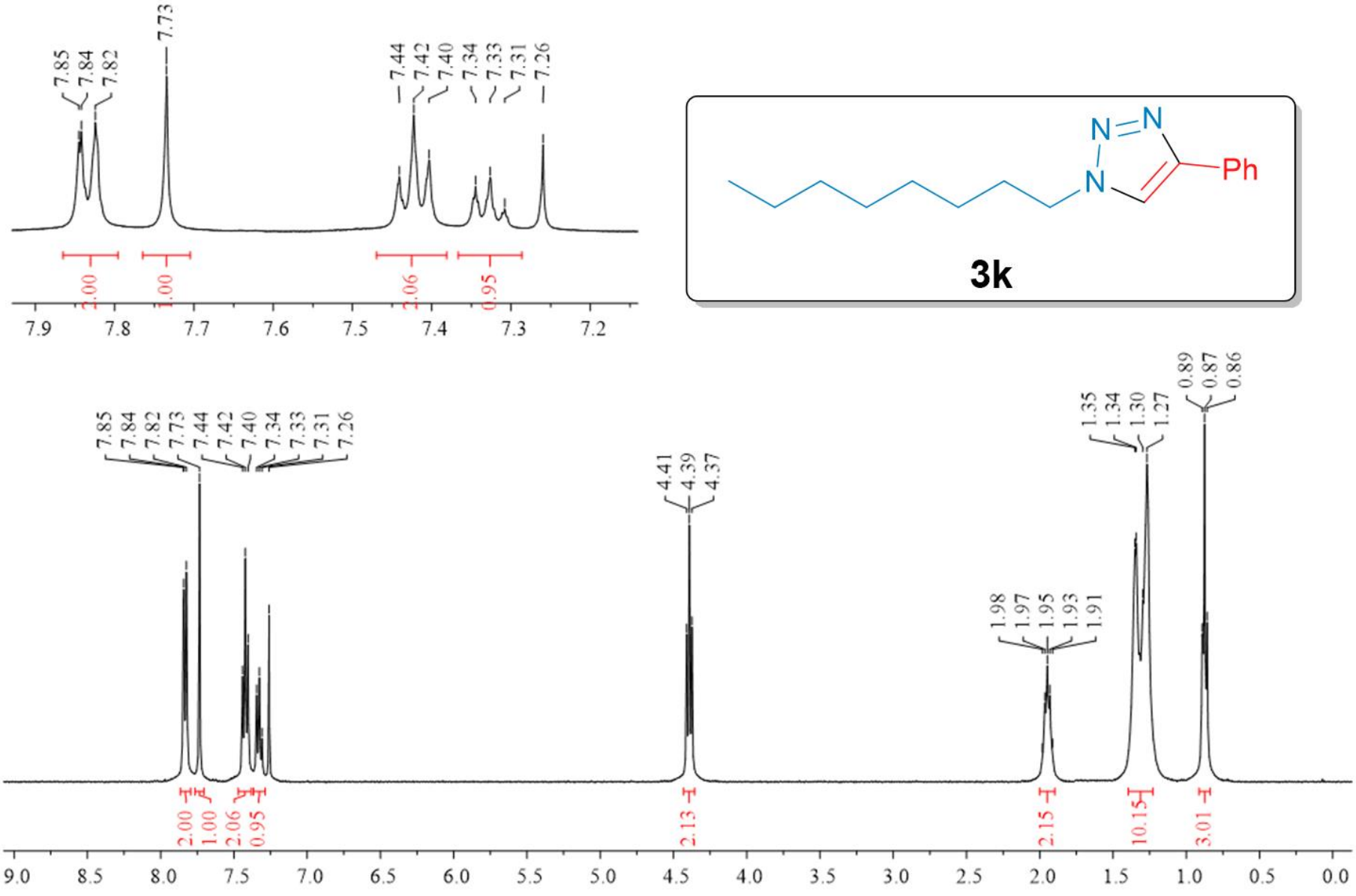
^{1}H NMR. 1-(4-methoxyphenyl)-2-(4-phenyl-1*H*-1,2,3-triazol-1-yl)ethan-1-one (3j)



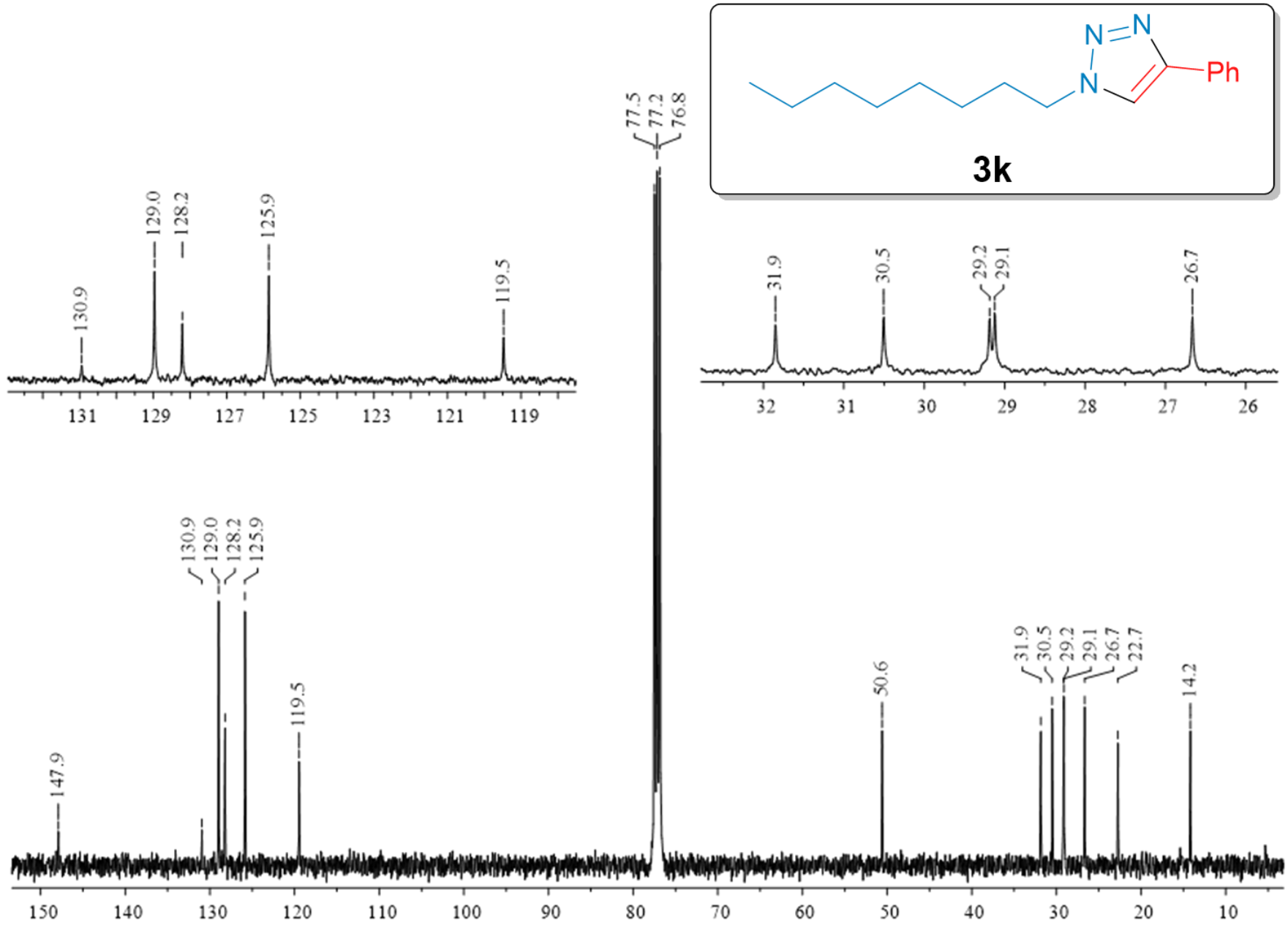
^{13}C NMR. 1-(4-methoxyphenyl)-2-(4-phenyl-1*H*-1,2,3-triazol-1-yl)ethan-1-one (3j)



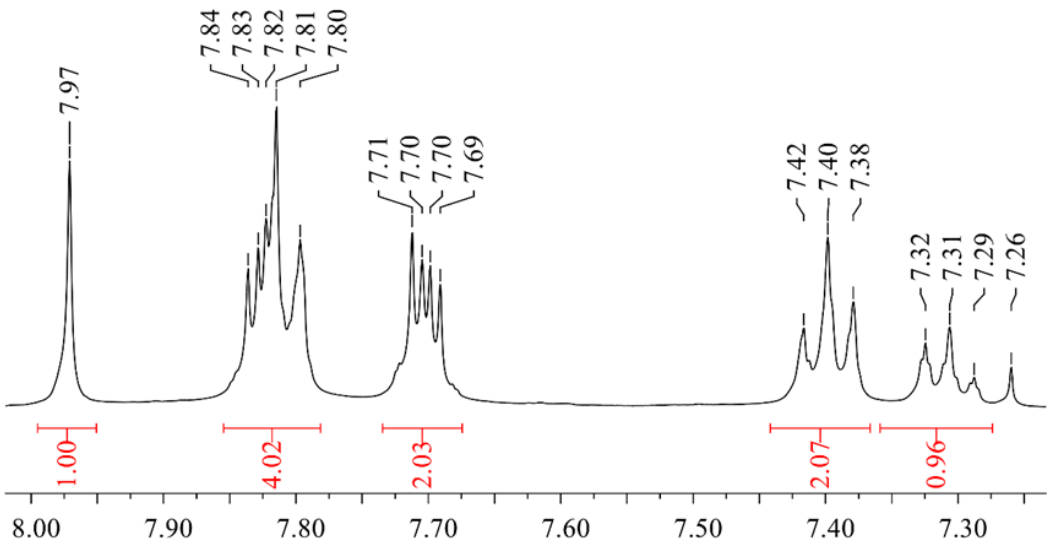
^{1}H NMR. 1-octyl-4-phenyl-1*H*-1,2,3-triazole (3k)

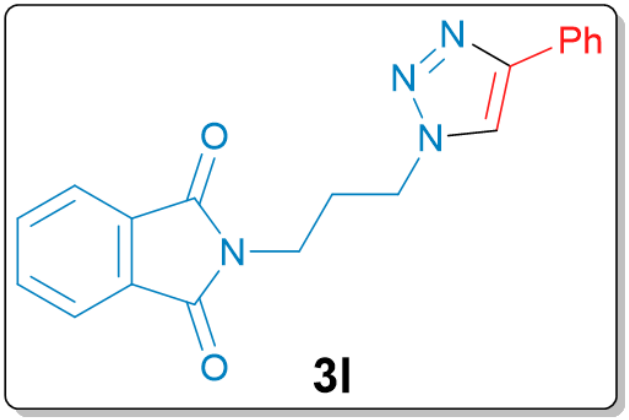


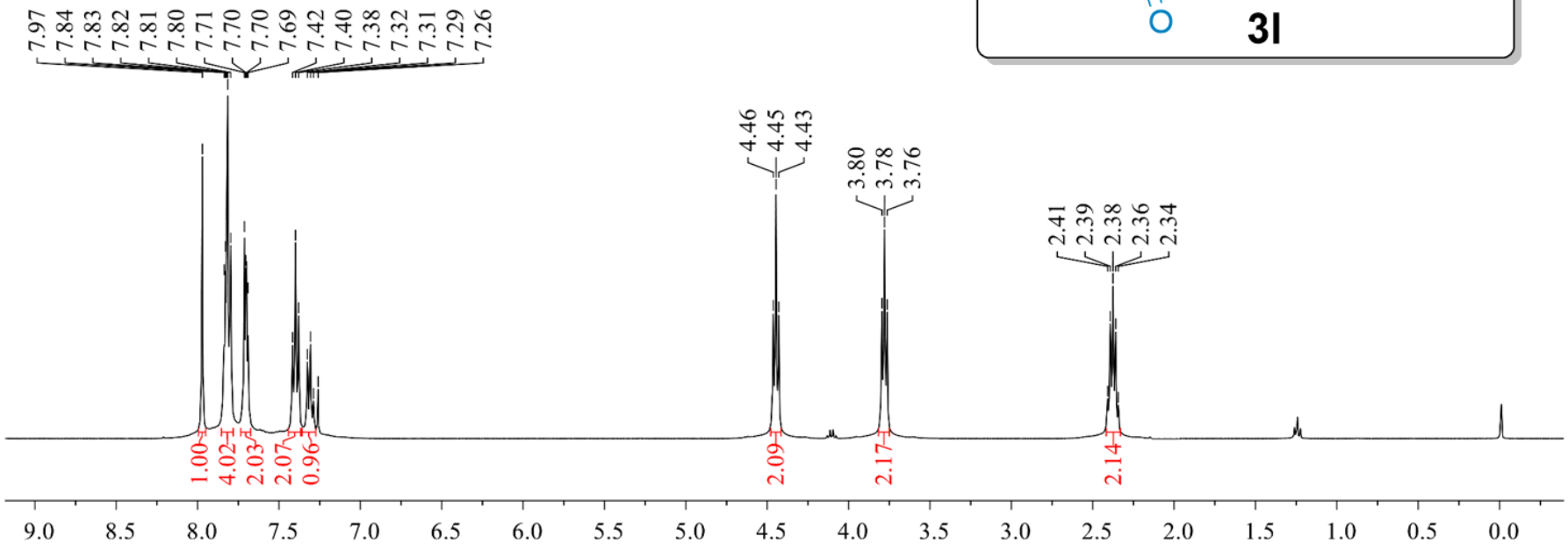
^{13}C NMR. 1-octyl-4-phenyl-1*H*-1,2,3-triazole (3k)



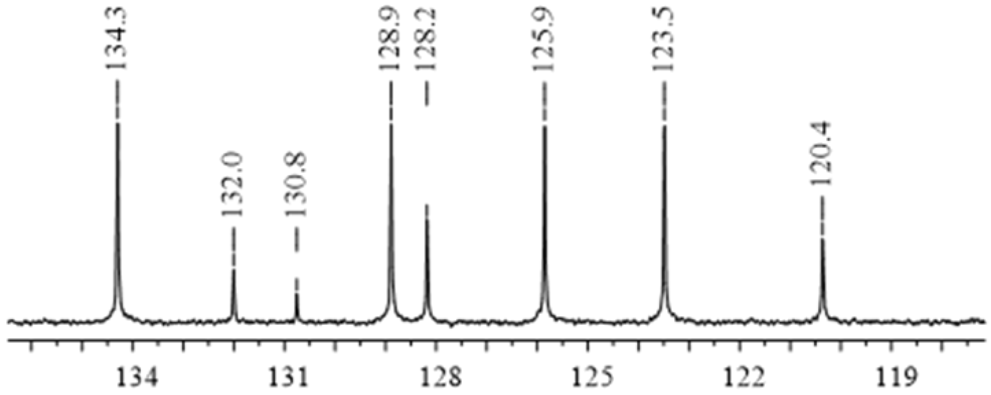
^{1}H NMR. 2-(3-(4-phenyl-1*H*-1,2,3-triazol-1-yl)propyl)isoindoline-1,3-dione (3l)

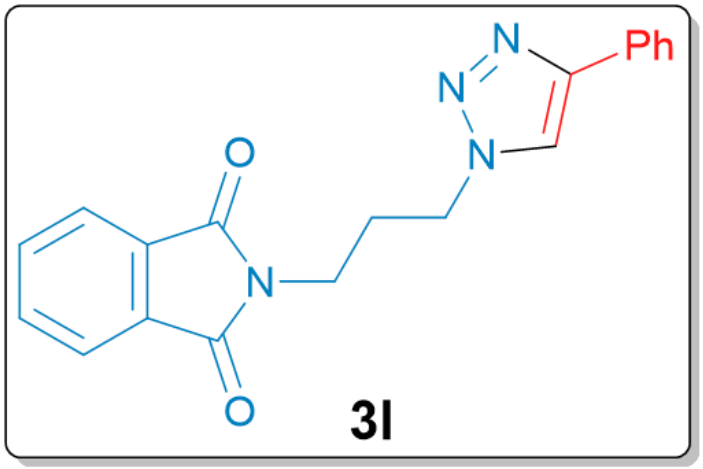


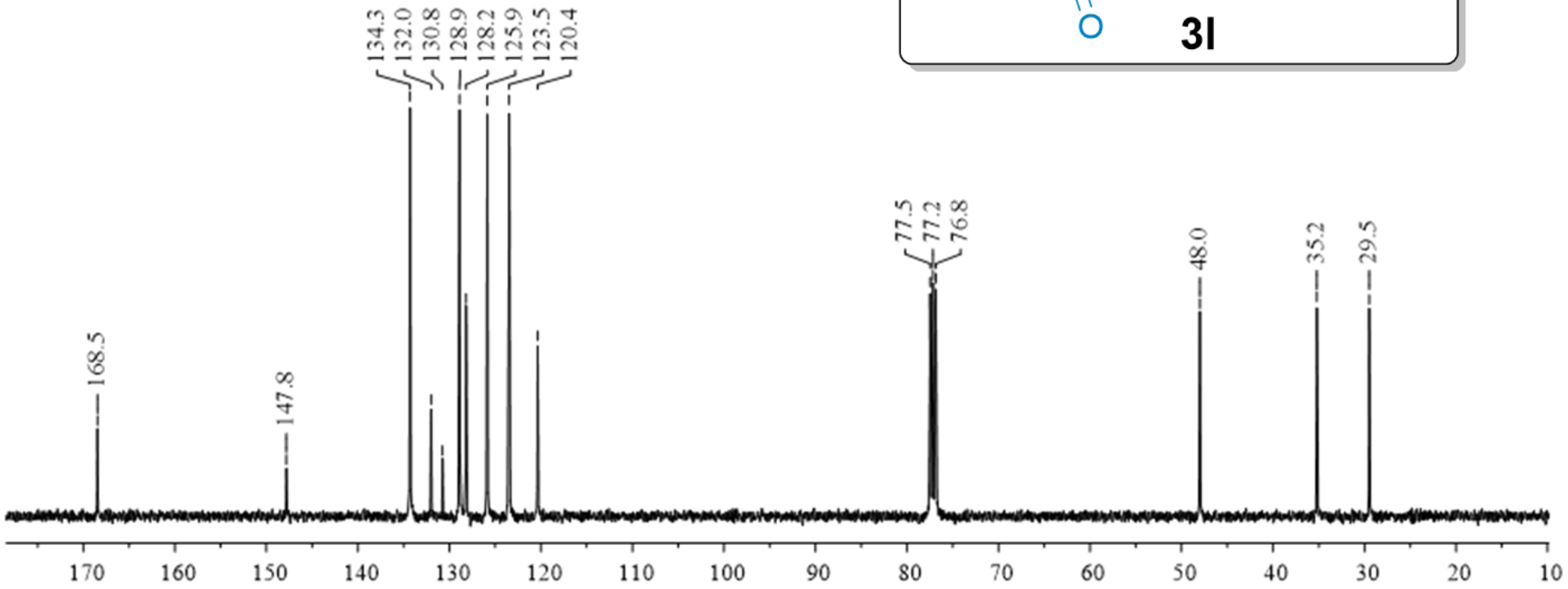




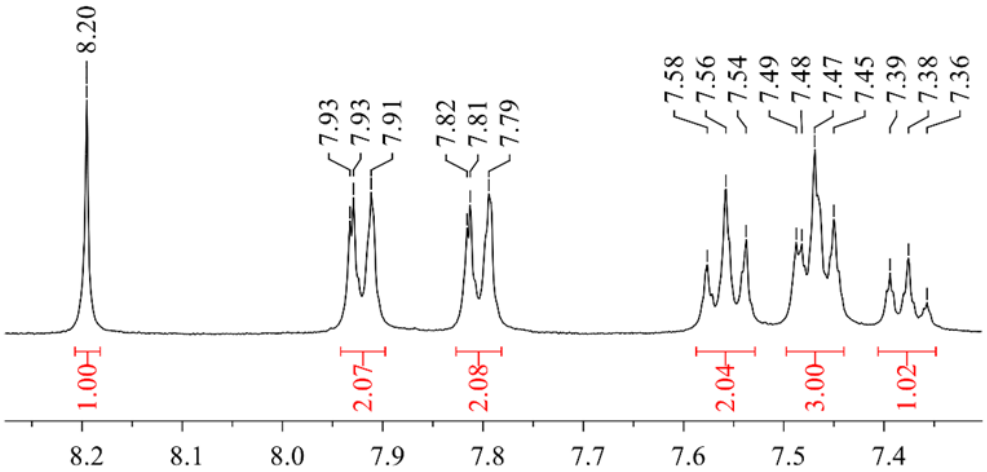
^{13}C NMR. 2-(3-(4-phenyl-1*H*-1,2,3-triazol-1-yl)propyl)isoindoline-1,3-dione (3l)

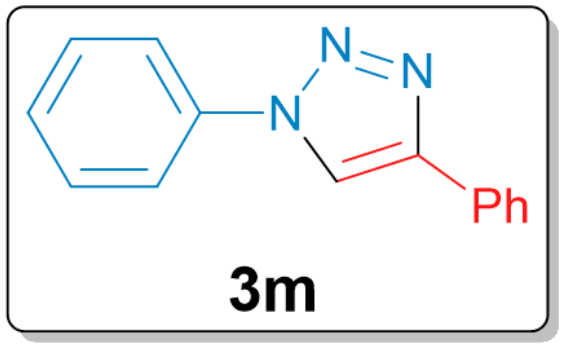


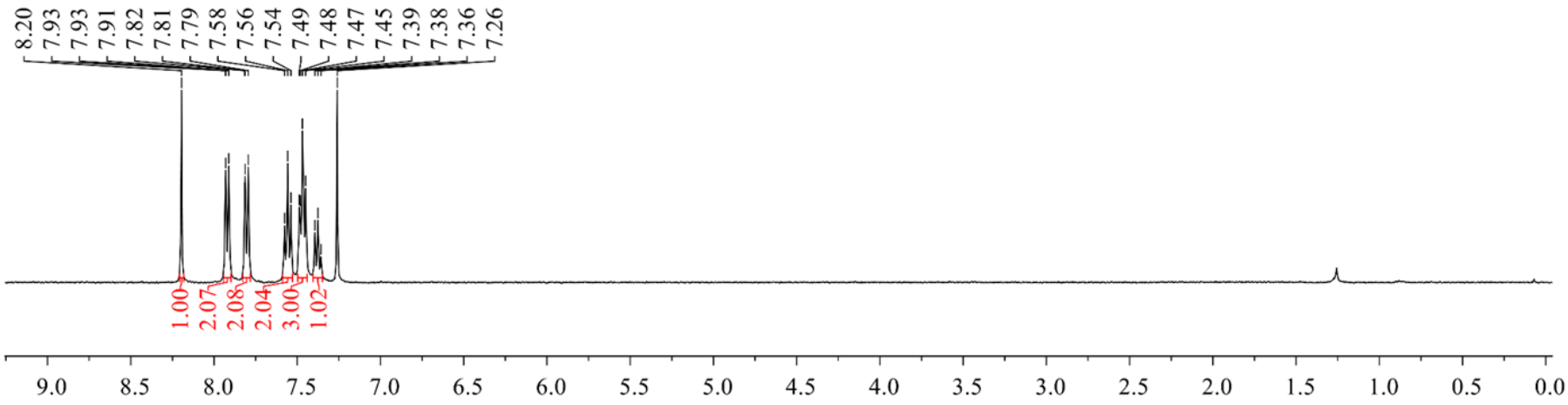




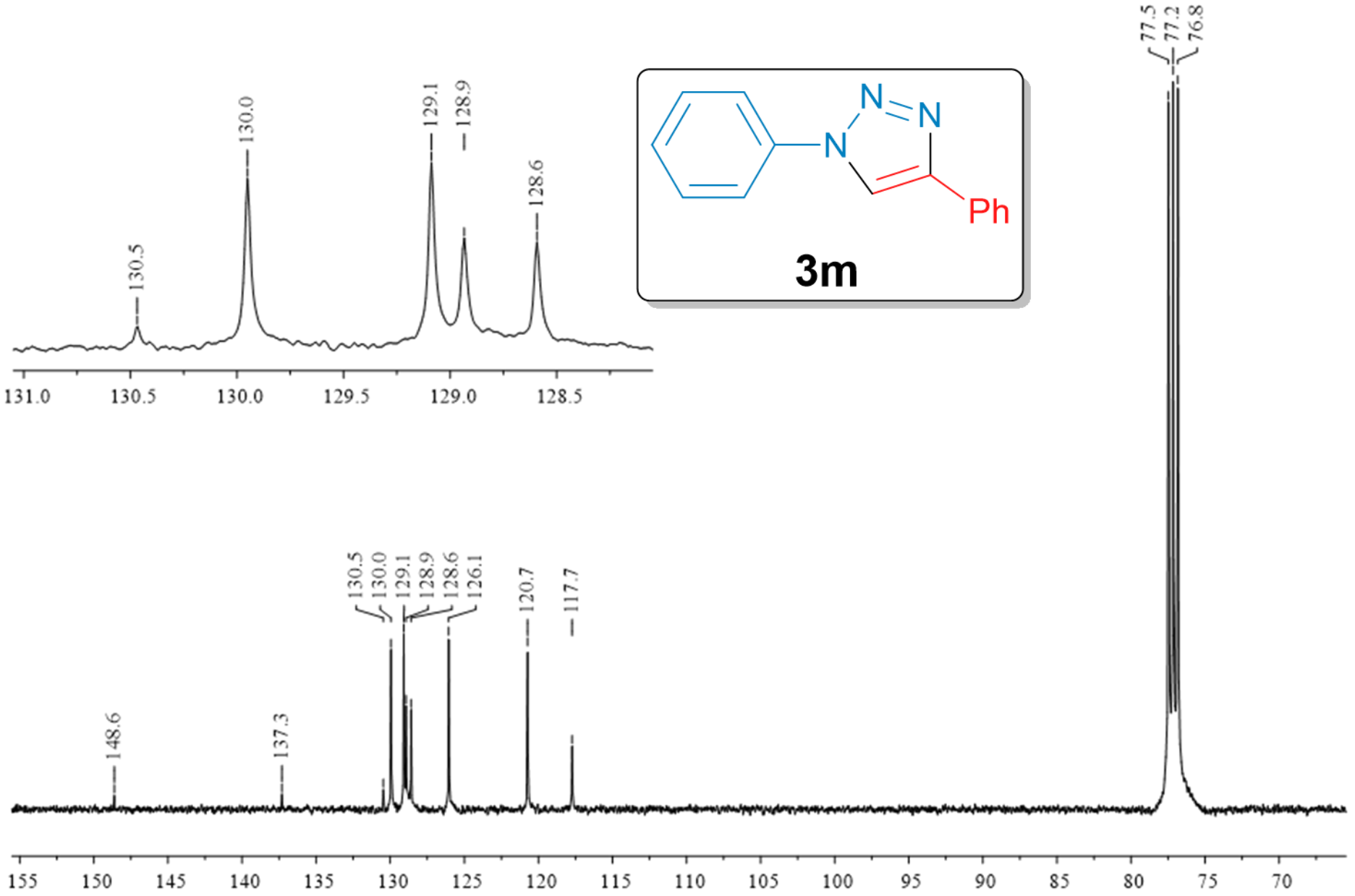
^{1}H NMR. 1,4-diphenyl-1*H*-1,2,3-triazole (3m)



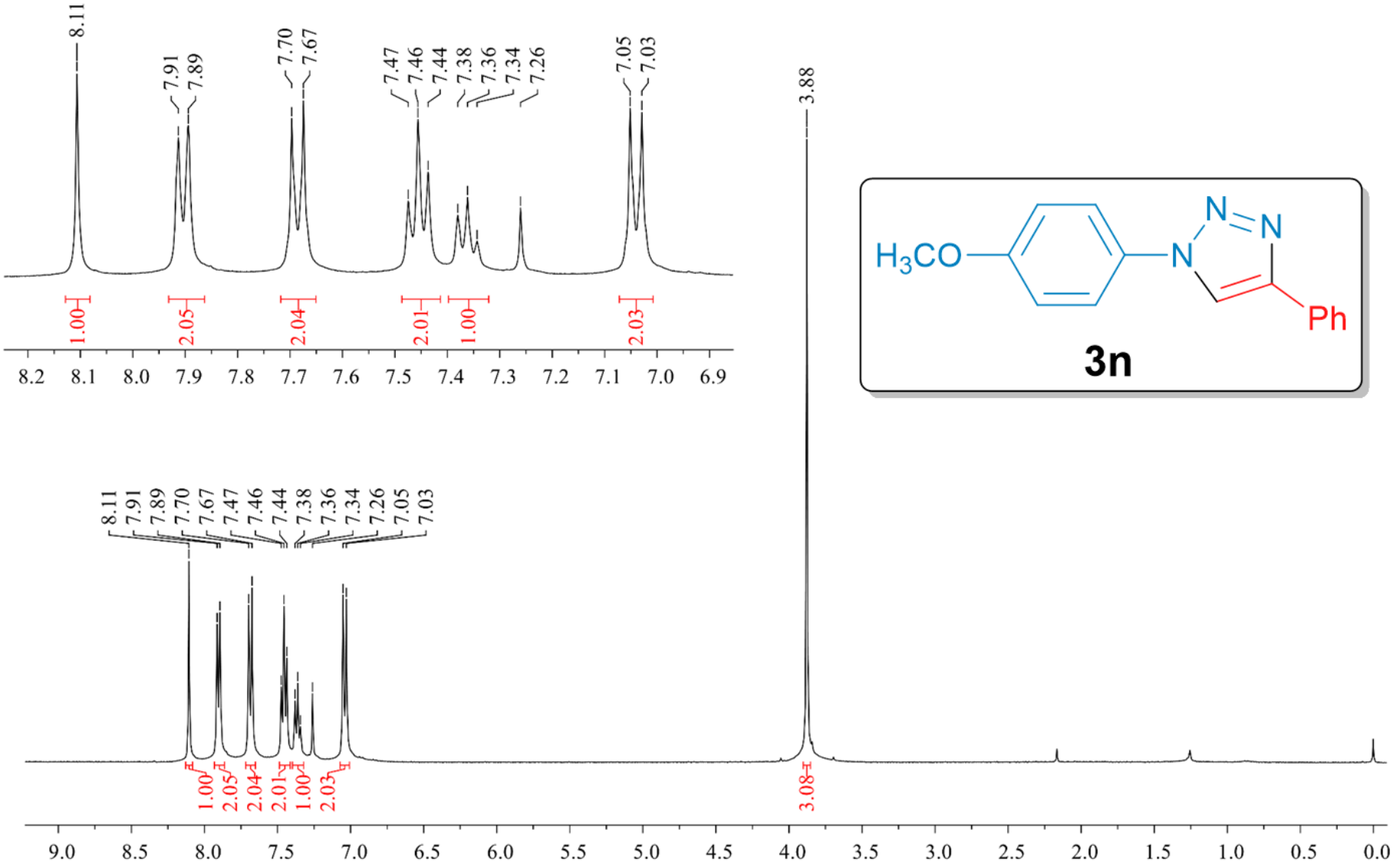




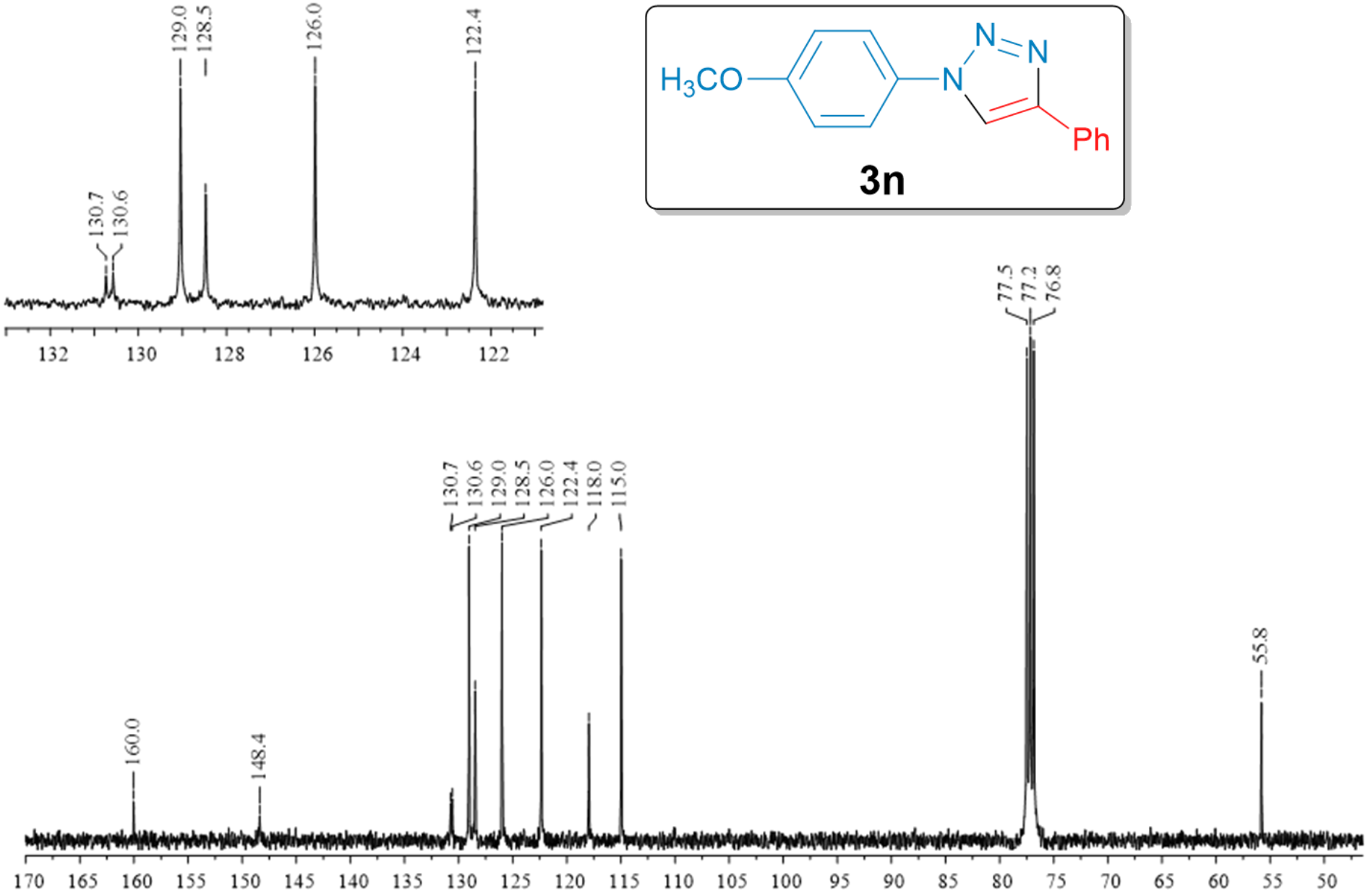
^{13}C NMR. 1,4-diphenyl-1*H*-1,2,3-triazole (3m)



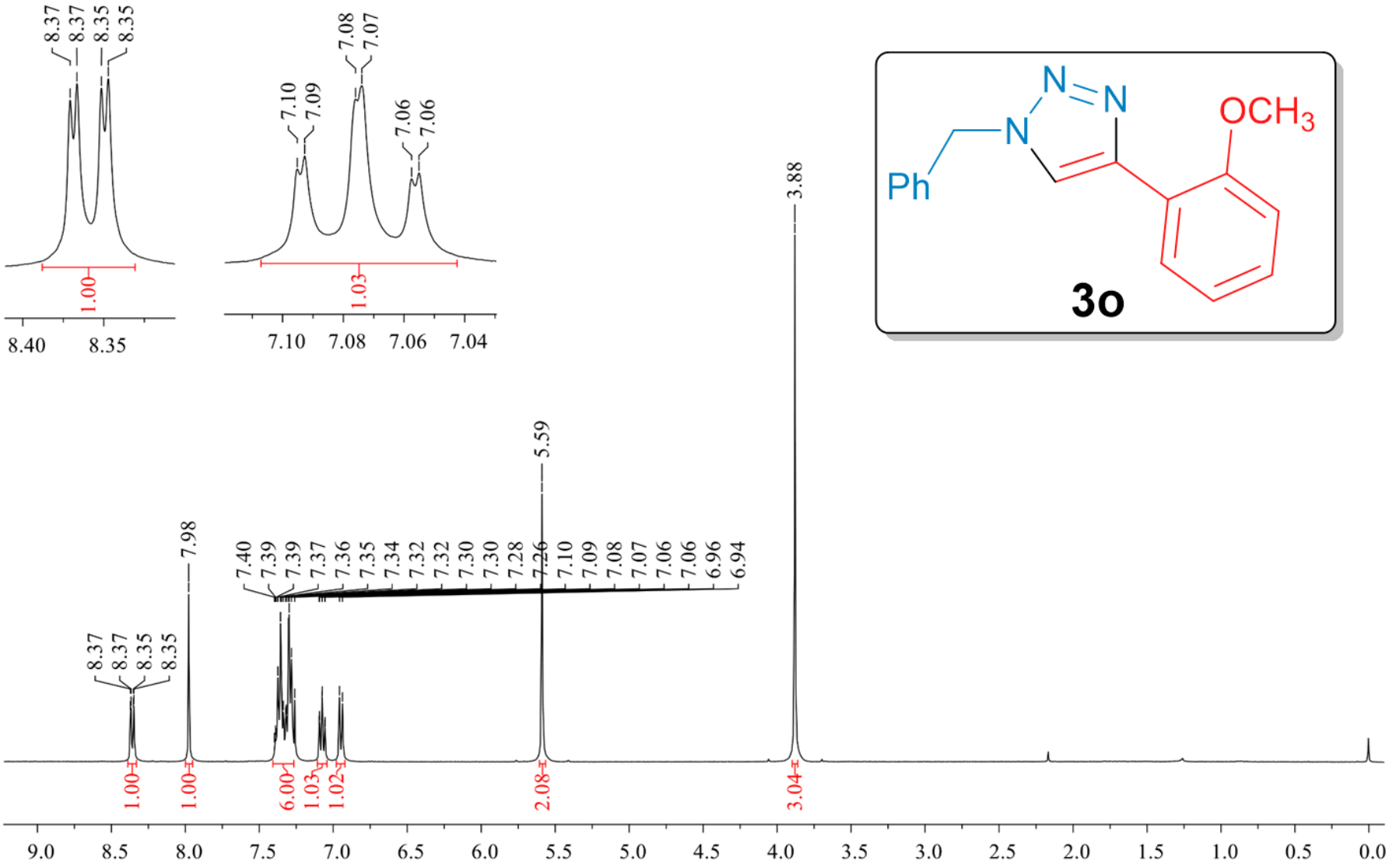
[1]H NMR. 1-(4-methoxyphenyl)-4-phenyl-1*H*-1,2,3-triazole (3n)



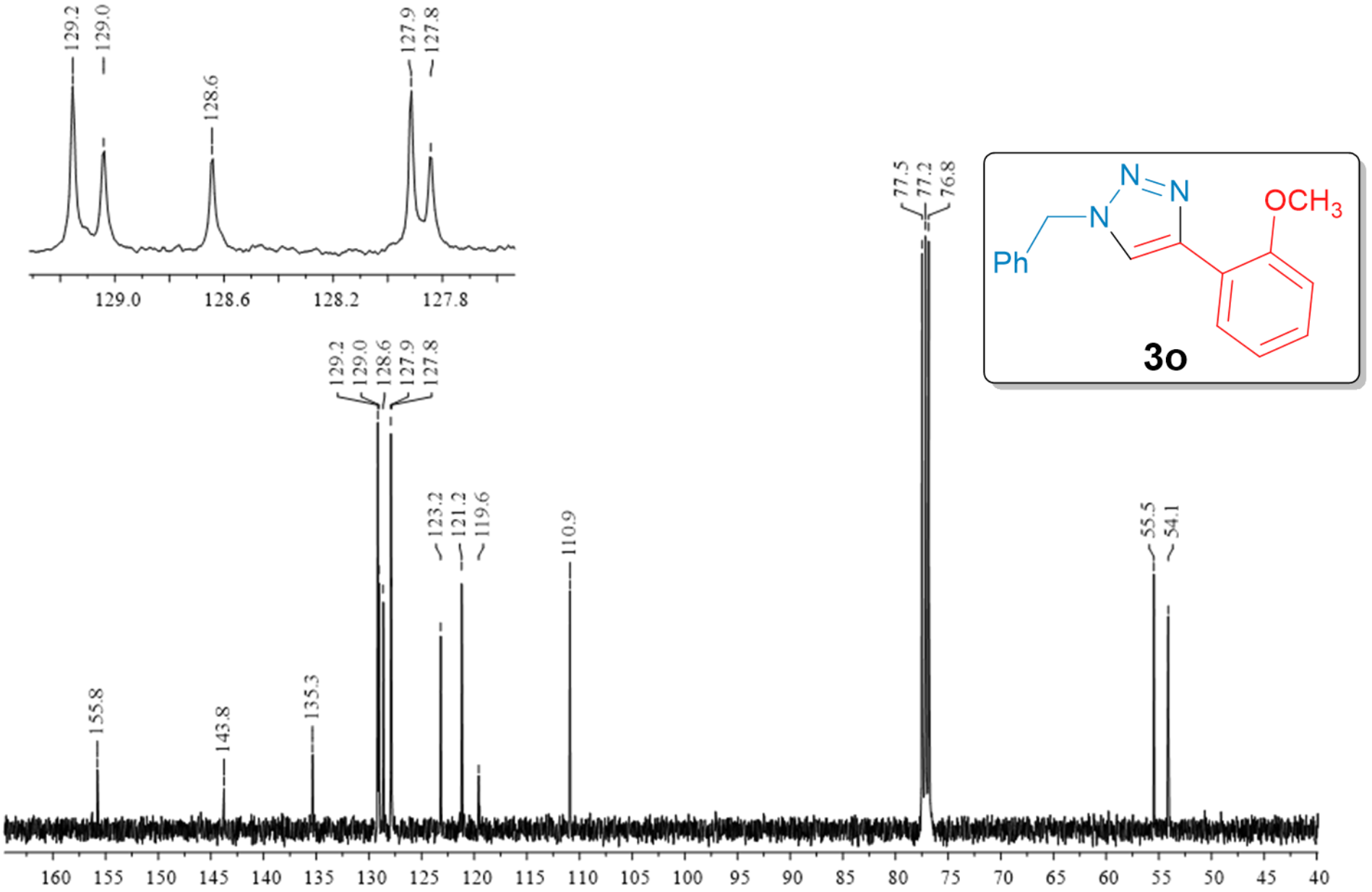
^{13}C NMR. 1-(4-methoxyphenyl)-4-phenyl-1*H*-1,2,3-triazole (3n)



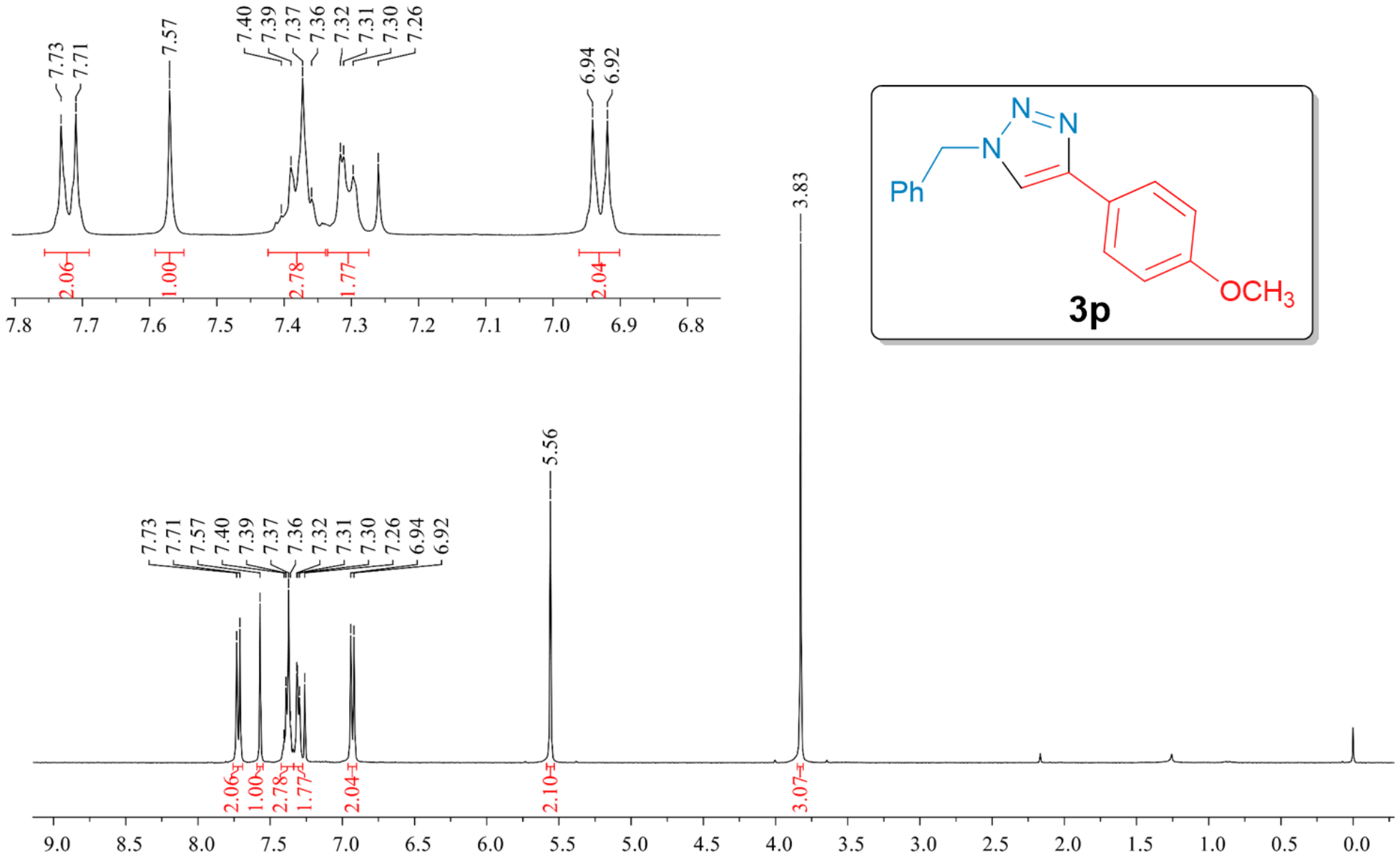
^{1}H NMR. 1-benzyl-4-(2-methoxyphenyl)-1*H*-1,2,3-triazole (3o)



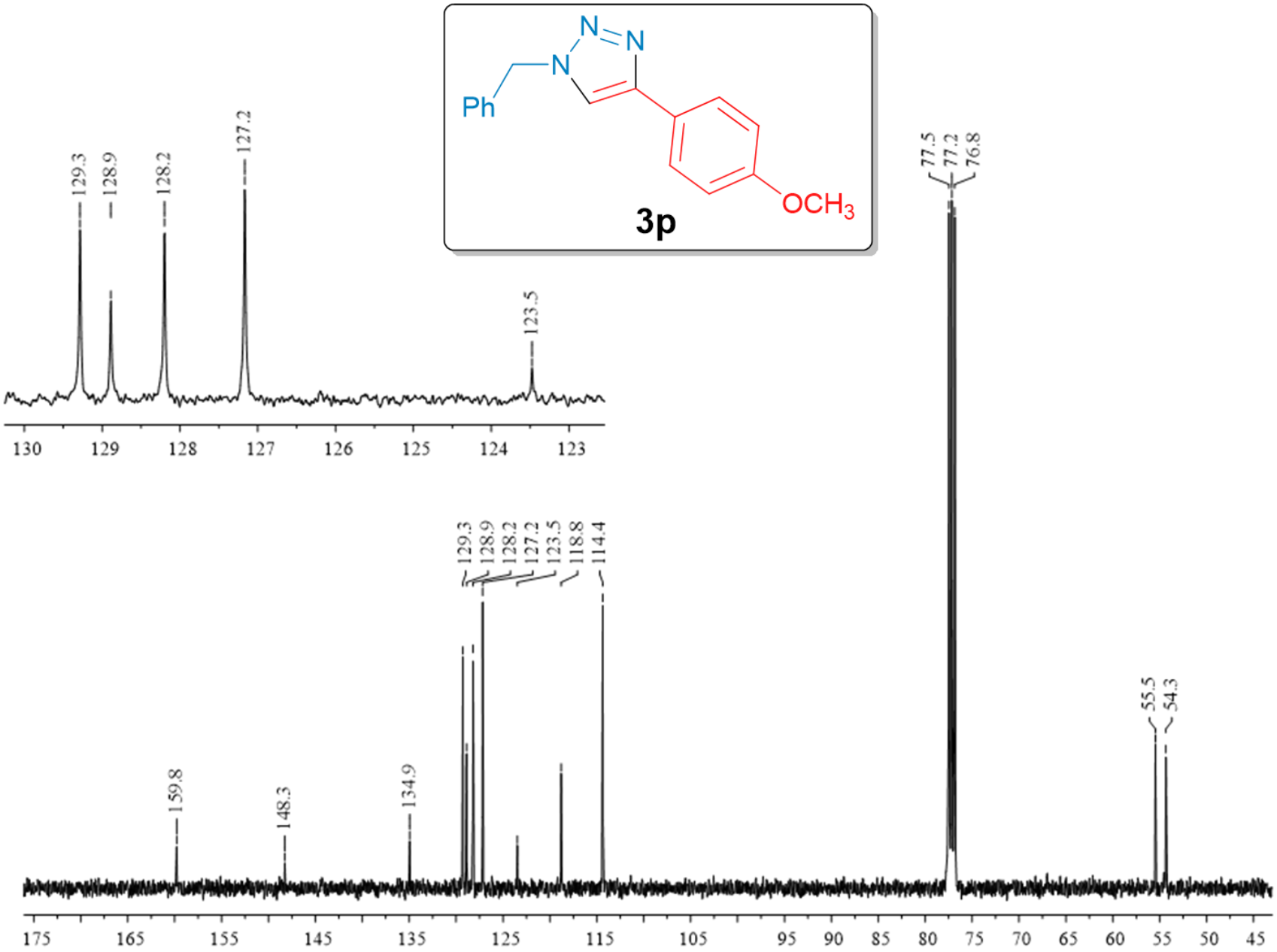
^{13}C NMR. 1-benzyl-4-(2-methoxyphenyl)-1*H*-1,2,3-triazole (3o)



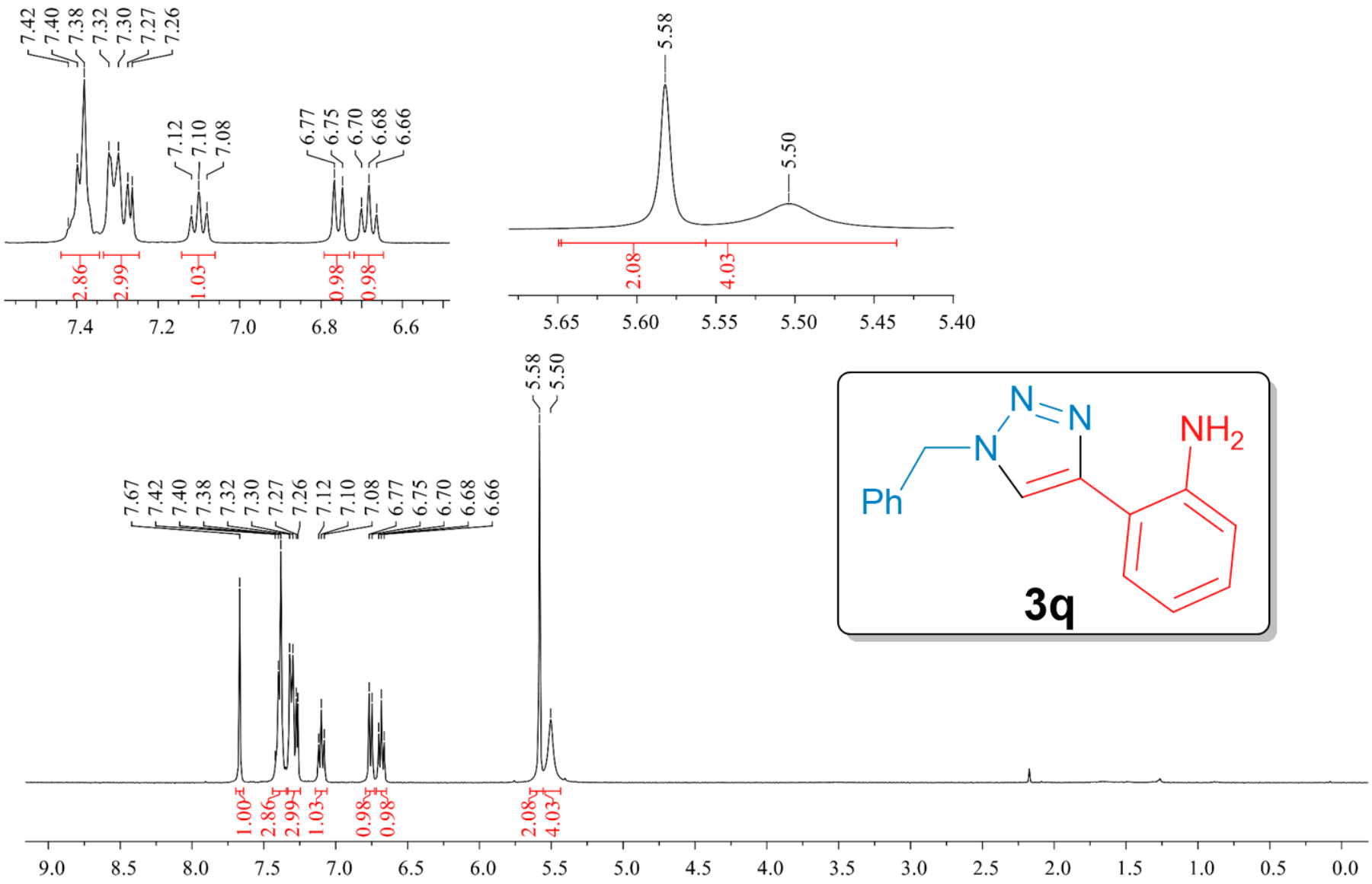
^{1}H NMR. 1-benzyl-4-(4-methoxyphenyl)-1*H*-1,2,3-triazole (3p)



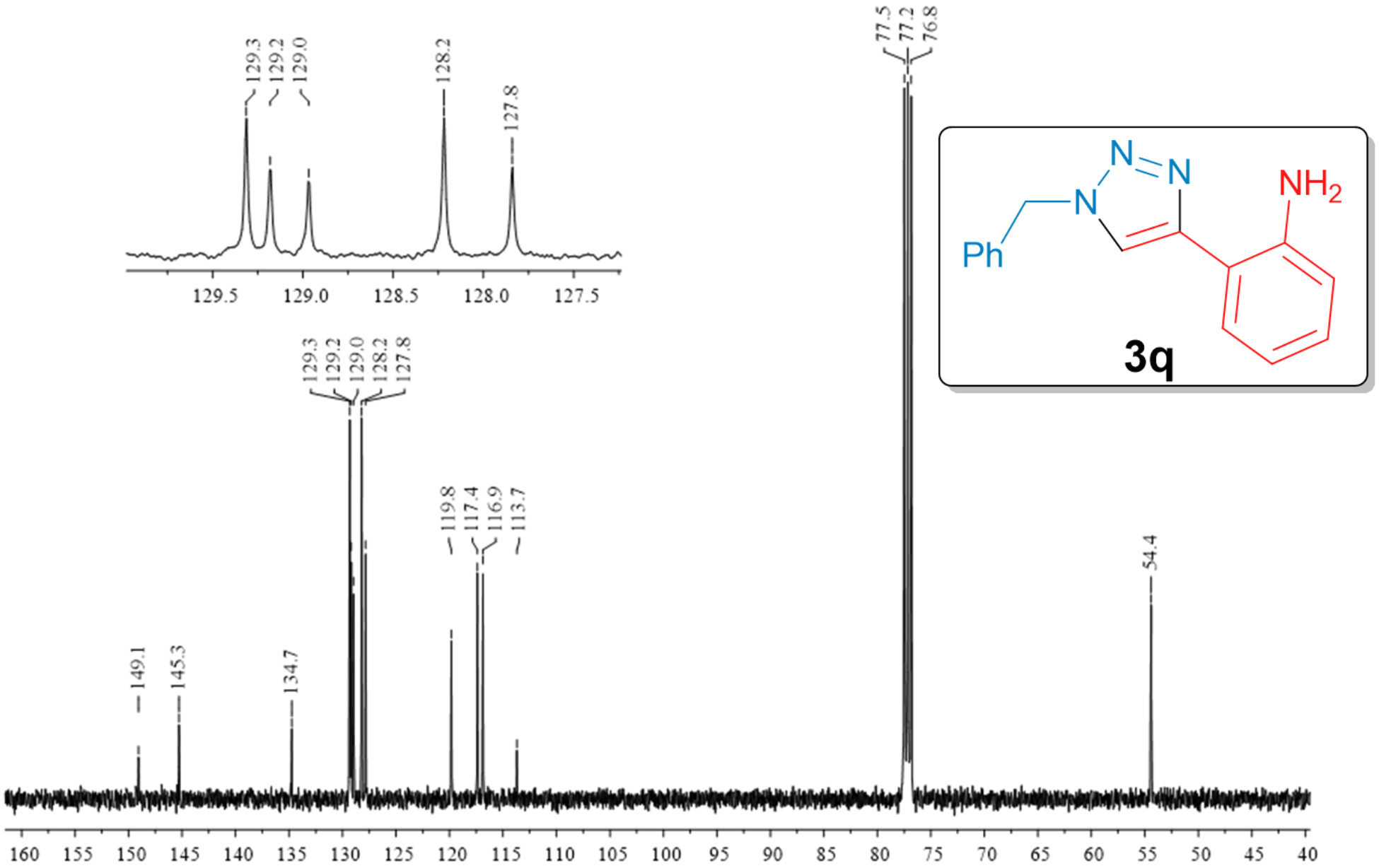
^{13}C NMR. 1-benzyl-4-(4-methoxyphenyl)-1*H*-1,2,3-triazole (3p)



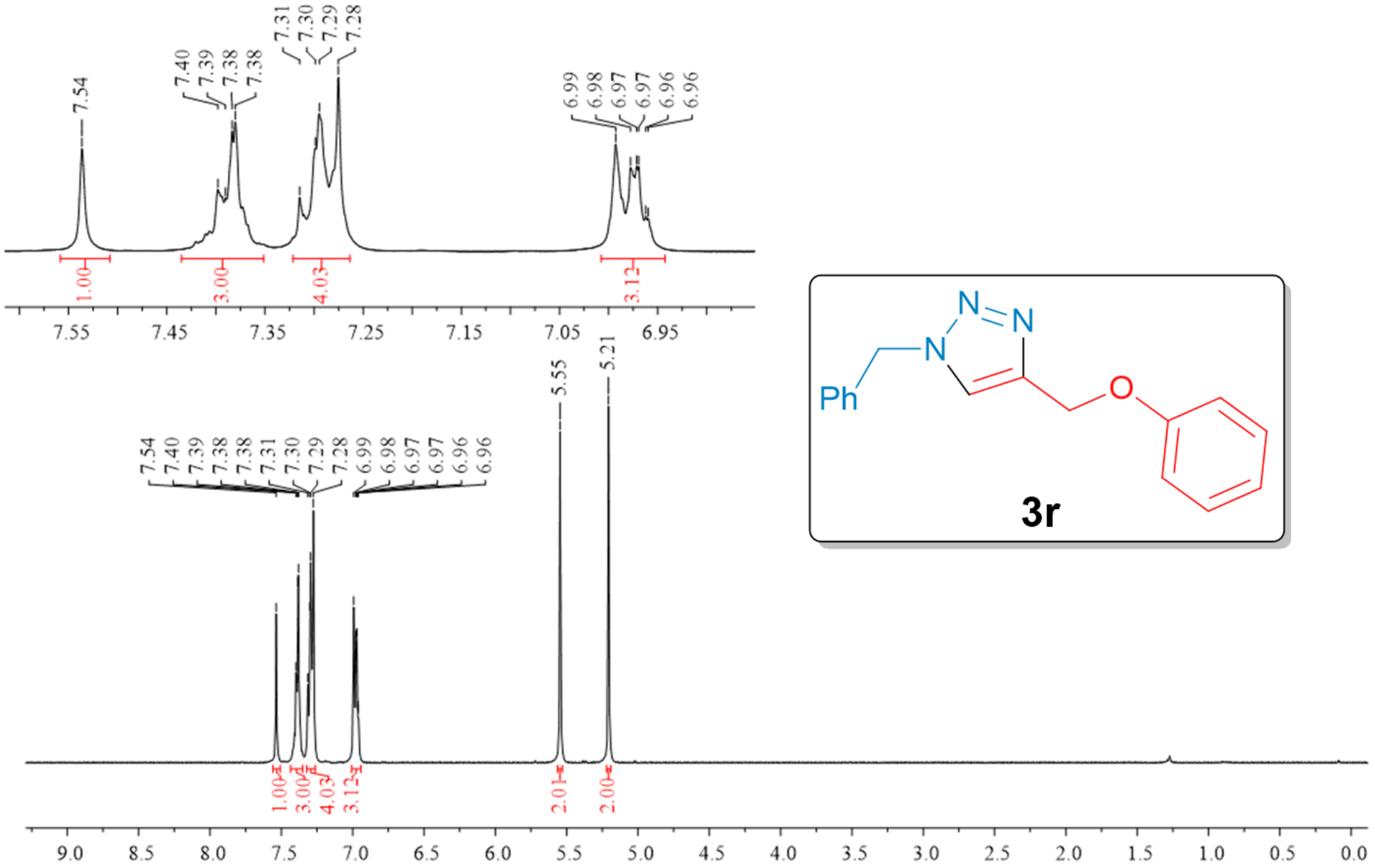
^{1}H NMR. 2-(1-benzyl-1*H*-1,2,3-triazol-4-yl)aniline (3q)



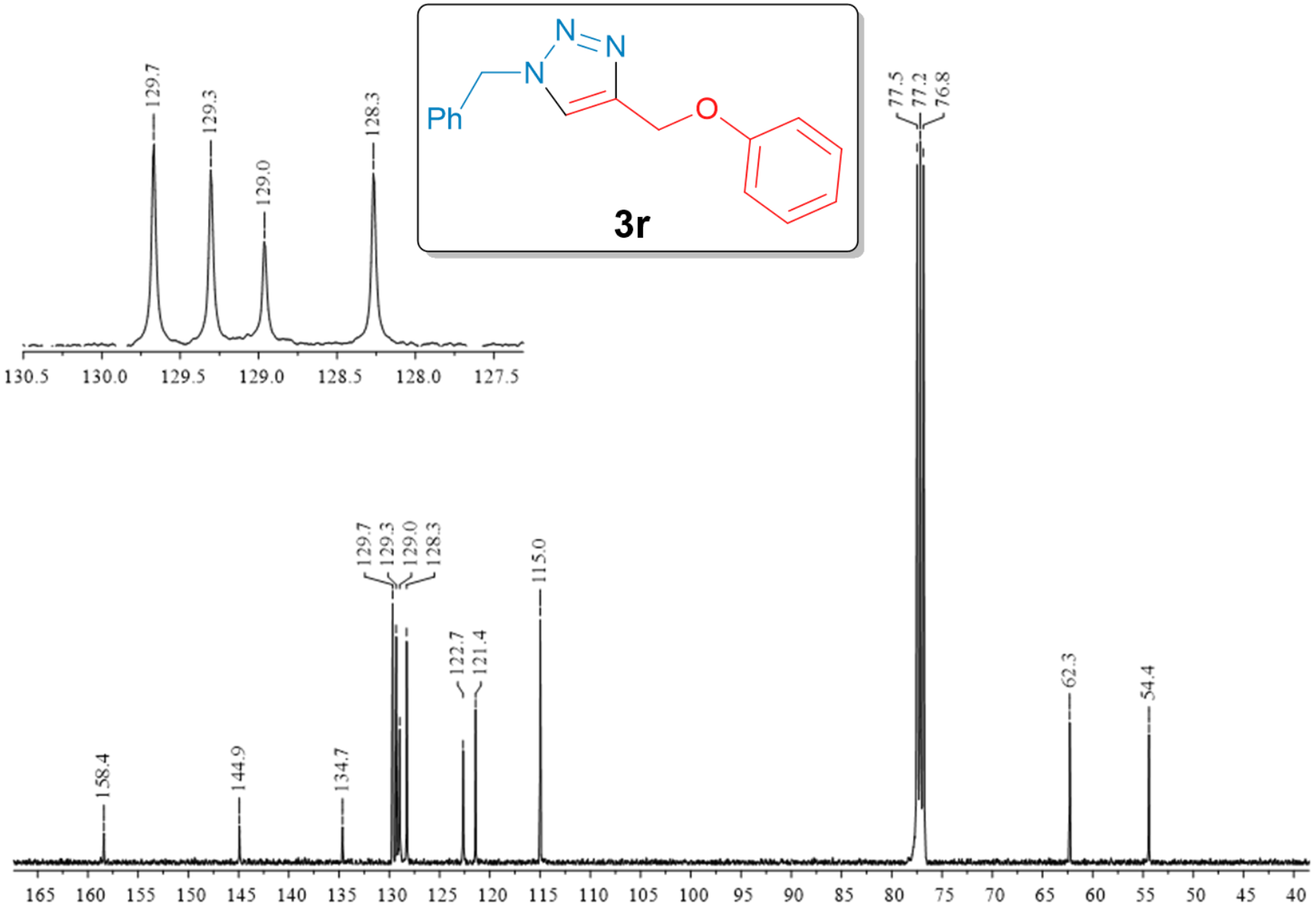
^{13}C NMR. 2-(1-benzyl-1*H*-1,2,3-triazol-4-yl)aniline (3q)



^{1}H NMR. 1-benzyl-4-(phenoxymethyl)-1*H*-1,2,3-triazole (3r)



^{13}C NMR. 1-benzyl-4-(phenoxymethyl)-1*H*-1,2,3-triazole (3r)



References

[1] a) P. Michel, D. Gennet and A. Rassat, *Tetrahedron Lett.*, 1999, **40**, 8575-8578. b) L. V. Hijfte, M. Kolb and P. Witz, *Tetrahedron Lett.*, 1989, **30**, 3655-3656.

[2] E. J. Corey and P. L. Fuchs, *Tetrahedron Lett.*, 1972, **13**, 3769-3772.

[3] P. Iniyavan, G. L. Balaji, S. Sarveswari and V. Vijayakumar, *Tetrahedron Lett*., 2015, **56**, 5002.

[4] B. Kaboudin, R. Mostafalu and T. Yokomatsu, *Green Chem*., 2013, **15**, 2266-2274.

[5] W. Jiang, J. Yang, Y.-Y. Liu and J.-F. Ma, *Chem. Commun.*, 2016, **52**, 1373-1376.

[6] P. V. Chavan, K. S. Pandit, U. V. Desai, M. A. Kulkarni and P. P. Wadgaonkar, *RSC Adv.*, 2014, **4**, 42137-42146.

[7] L. Rinaldi, K. Martina, F. Baricco, L. Rotolo and G. Cravotto, *Molecules*, 2015, **20**, 2837-2849.

[8] F. Friscourt and G.-J. Boons, *Org. Lett.*, 2010, **12**, 4936-4939.

[9] Rajesh H. Tale, Venkatesh B. Gopula and Gopal K. Toradmal, *Tetrahedron Lett.*, 2015, **56**, 5864–5869.

[10] K. Asano and S. Matsubara, *Org. Lett.*, 2010, **12**, 4988-4891.

[11] C. Shao, X. Wang, J. Xu, J. Zhao, Q. Zhang and Y. Hu, *J. Org. Chem.*, 2010, **75**, 7002-7005.

[12] D. Kumar, V. B. Reddy and R. S. Varma, *Tetrahedron Lett*., 2009, **50**, 2065–2068.

[13] J. Albadi and M. Keshavarz, *Synth. Commun.*, 2013, **43**, 2019–2030.

[14] H. Hiroki, K. Ogata and S. Fukuzawa, *Synlett*, 2013, **24**, 843–846.

[15] H.-B. Chen, N. Abeyrathna and Y. Liao, *Tetrahedron Lett*., 2014, **55**, 6575–6576.

[16] R. B. Nasir Baig, B. Reddy Vaddula, M. N. Nadagouda and R. S. Varma, *Green Chem.*, 2015,**17**, 1243-1248.

[17] B. R. Buckley, S. E. Dann, D. P. Harris, H. Heaney and E. C. Stubbs, *Chem. Commun*., 2010, **46**, 2274–2276.