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Supporting Information

Photoredox Allylation Reactions Mediated by Bismuth in Aqueous Conditions

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General Methods and Synthesis

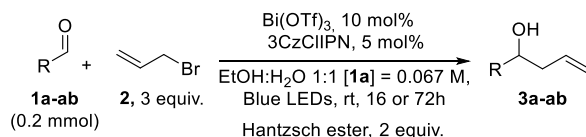
All commercial chemicals and dry solvents were purchased from Sigma Aldrich, Alfa Aesar or TCI Chemicals. ^1H and ^{13}C NMR spectra were recorded on a Varian Inova 400 NMR instrument with a 5 mm probe. All chemical shifts are referenced using deuterated solvent signals. GC-MS spectra were obtained by EI ionization at 70 eV on a Hewlett-Packard 5971 with GC injection; they are reported as: m/z (rel. intensity).

Flash chromatography purifications were carried out using VWR or Merck silica gel (40-63 μm particle size). Thin-layer chromatography was performed on Merck 60 F254 plates.

Reaction mixture was irradiated with Kessil® PR160L @ 456 nm.^[1]

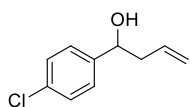
Aldehydes **1l**,^[2] **1n**,^[3] **1v**,^[4] **1w-x**,^[5] **1z**,^[6] photocatalyst **3CzCIIPN**^[7] and Hantzsch ester^[8] were prepared according to literature procedures.

General procedure for photoredox bismuth-catalyzed allylation of aldehydes.

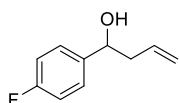


A dry 10 mL Schlenk tube, equipped with a Rotaflo stopcock, magnetic stirring bar and an argon supply tube, was subjected to three vacuum-argon cycles and then it was first charged with all the solids – i.e. $\text{Bi}(\text{OTf})_3$ (0.02 mmol, 13 mg, 10 mol%), 3CzClIPN (0.01 mmol, 6 mg, 5 mol%), Hantzsch ester (0.4 mmol, 100 mg, 2 equiv.) and, if solid, the aldehyde (0.2 mmol) – followed by EtOH (1.5 mL) and water (1.5 mL). Then, allyl bromide **2** (0.6 mmol, 73 mg, 52 μL , 3 equiv.) and, if liquid, the aldehyde (0.2 mmol) were added. The reaction was irradiated under vigorous stirring for 16 or 72 h. After that the reaction was quenched with water (approx. 4 mL) and extracted with AcOEt (4 x 5 mL). The combined organic layers were dried over anhydrous Na_2SO_4 and the solvent was removed under reduced pressure. The crude was subject of flash column chromatography (SiO_2) to afford the products **3** in the stated yields. For aldehydes **1k,o,q** if the reaction was conducted for 72 h, the major final product was the corresponding ethyl ether (**5k,o,q**, See Table S4).

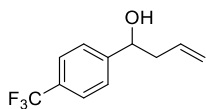
Preparative scale reaction: The reaction was performed on 1 mmol of aldehyde **1a** (140 mg) following the general procedure irradiating with Kessil® PR160L@456 nm for 72 hours. Reagent amounts: $\text{Bi}(\text{OTf})_3$ (0.08 mmol, 52.5 mg, 8 mol%), 3CzClIPN (0.03 mmol, 20 mg, 3 mol%), Hantzsch ester (2 mmol, 500 mg, 2 equiv.), allyl bromide (03 mmol, 260 μL , 3 equiv.) in EtOH (7.5 mL) and water (7.5 mL) mixture. Product **3a** was obtained in 77% yield (0.77 mmol, 140 mg) after flash chromatographic purification (DCM).



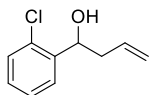
(3a): yellowish oil, 74% (0.15 mmol, 27 mg). The general procedure (16 h) was applied using **1a** (0.2 mmol, 28 mg) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



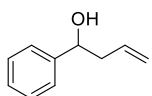
(3b): brown oil, 65% (0.13 mmol, 22 mg). The general procedure (72 h) was applied using freshly distilled **1b** (0.2 mmol, 21 μL) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[10]



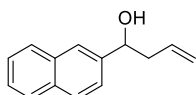
(3c): brown oil, 66% (0.13 mmol, 29 mg). The general procedure (72 h) was applied using freshly distilled **1c** (0.2 mmol, 27 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



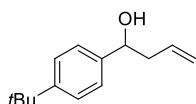
(3d): brown oil, 74% (0.15 mmol, 27 mg). The general procedure (16 h) was applied using freshly distilled **1d** (0.2 mmol, 22 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



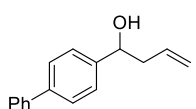
(3e): yellowish oil, 94% (0.19 mmol, 28 mg). The general procedure (72 h) was applied using freshly distilled **1e** (0.2 mmol, 20 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



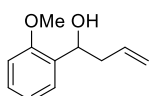
(3f): yellowish oil, 81% (0.16 mmol, 32 mg). The general procedure (16 h) was applied using **1f** (0.2 mmol, 31 mg) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



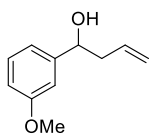
(3g): yellowish oil, 79% (0.16 mmol, 32 mg). The general procedure (72 h) was applied using freshly distilled **1g** (0.2 mmol, 33 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



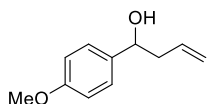
(3h): brown oil, 62% (0.12 mmol, 28 mg). The general procedure (16 h) was applied using **1h** (0.2 mmol, 36 mg) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



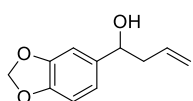
(3i): brown oil, 79% (0.16 mmol, 28 mg). The general procedure (16 h) was applied using freshly distilled **1i** (0.2 mmol, 24 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[11]



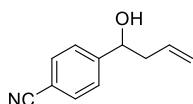
(3j): brown oil, 74% (0.15 mmol, 26 mg). The general procedure (16 h) was applied using freshly distilled **1j** (0.2 mmol, 24 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[11]



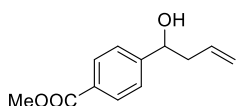
(3k): brown oil, 34% (0.07 mmol, 12 mg). The general procedure (16 h) was applied using freshly distilled **1k** (0.2 mmol, 24 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



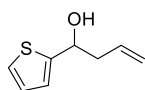
(3l): brown oil, 65% (0.13 mmol, 25 mg). The general procedure (16 h) was applied using previously synthesized **1l** (0.2 mmol, 30 mg) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



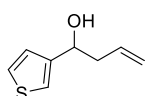
(3m): brown oil, 61% (0.12 mmol, 21 mg). The general procedure (16 h) was applied using **1m** (0.2 mmol, 26 mg) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



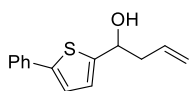
(3n): brown oil, 61% (0.12 mmol, 25 mg). The general procedure (16 h) was applied using previously synthesized **1n** (0.2 mmol, 33 mg) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



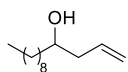
(3o): yellow oil, 33% (0.07 mmol, 10 mg). The general procedure (16 h) was applied using freshly distilled **1o** (0.2 mmol, 19 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[11]



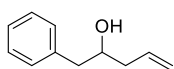
(3p): brown oil, 66% (0.13 mmol, 20 mg). The general procedure (16 h) was applied using freshly distilled **1p** (0.2 mmol, 18 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



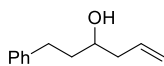
(3q): yellow oil, 60% (0.12 mmol, 28 mg). The general procedure (16 h) was applied using **1q** (0.2 mmol, 38 mg) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



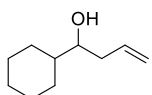
(3r): brown oil, 68% (0.14 mmol, 27 mg). The general procedure (72 h) was applied using freshly distilled **1r** (0.2 mmol, 38 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[12]



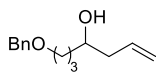
(3s): brown oil, 56% (0.11 mmol 18 mg). The general procedure (72 h) was applied using freshly distilled **1s** (0.2 mmol, 23 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[13]



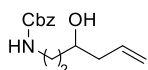
(3t): brown oil, 85% (0.17 mmol, 30 mg). The general procedure was applied using freshly distilled **1t** (0.2 mmol, 26 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



(3u): brown oil, 58% (0.12 mmol, 18 mg). The general procedure was applied using freshly distilled **1u** (0.2 mmol, 24 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]

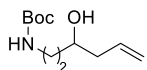


(3v): brown oil, 68% (0.14 mmol, 20 mg). The general procedure was applied using previously synthesized **1v** (0.2 mmol, 36 mg) as aldehyde. Flash chromatography (0–2 % EtOAc in DCM) afforded a mixture of Hantzsch ester's pyridine and **3v**. Starting from this mixture, the title compound was isolated by flash column chromatography (30 % Et₂O in CyH). Spectroscopic data were in agreement with those reported in literature.^[9]

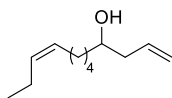


(3w): brown oil, 74% (0.15 mmol, 37 mg). The general procedure was applied using previously synthesized **1w** (0.2 mmol, 41 mg) as aldehyde. The title

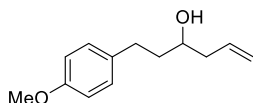
compound was isolated by flash column chromatography (0–5 % EtOAc in DCM until Hantzsch ester's pyridine was recovered, then 2 % MeOH in DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



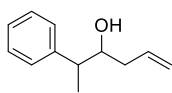
(3x): brown oil, 70% (0.14 mmol, 30 mg). The general procedure was applied using previously synthesized **1x** (0.2 mmol, 35 mg) as aldehyde. Flash chromatography (0–2 % EtOAc in DCM) afforded a mixture of Hantzsch ester's pyridine and **3x**. Starting from this mixture, the title compound was isolated by flash column chromatography (30–50 % Et₂O in CyH). Spectroscopic data were in agreement with those reported in literature.^[9]



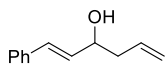
(3y): brown oil, 80% (0.16 mmol, 29 mg). The general procedure was applied using **1y** (0.2 mmol, 33 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9]



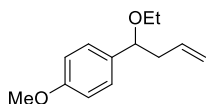
(3z): brown oil, 80% (0.16 mmol, 29 mg). The general procedure was applied using previously synthesized **1z** (0.2 mmol, 41 mg) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[14]



(3aa): (*syn:anti* dr of 2:1) yellow oil, 70% (0.14 mmol, 25 mg). The general procedure was applied using freshly distilled **1aa** (0.2 mmol, 27 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9,15]



(3ab): the product was isolated as mixture of *E:Z* isomers (3:2) as brown oil, 70% (0.14 mmol, 24 mg). The general procedure was applied using freshly distilled **1ab** (0.2 mmol, 25 μ L) as aldehyde. The title compound was isolated by flash column chromatography (DCM). Spectroscopic data were in agreement with those reported in literature.^[9,16]



(5k): yellow oil, 36% (0.07 mmol, 15 mg). The general procedure (72 h) was applied using freshly distilled **1k** (0.2 mmol, 24 μ L) as aldehyde. The title

compound was isolated by flash column chromatography (DCM). $^1\text{H-NMR}$ (400 MHz, CDCl_3 , 25°C): δ = 7.24 – 7.19 (m, 2H), 6.90 – 6.84 (m, 2H), 5.82 – 5.69 (m, 1H), 5.07 – 4.96 (m, 2H), 4.21 (t, J = 6.5 Hz, 1H), 3.81 (s, 3H), 3.41 – 3.25 (m, 2H), 2.62 – 2.52 (m, 1H), 2.42 – 2.32 (m, 1H), 1.16 (t, J = 6.9 Hz, 3H); $^{13}\text{C-NMR}$ (100 MHz, CDCl_3 , 25°C): δ = 159.1, 135.3, 134.6, 128.0 (2C), 116.7, 113.8 (2C), 81.5, 64.0, 55.4, 42.7, 15.4; ESI-MS m/z = 207.1 $[\text{M}+\text{H}]^+$.

Results and discussion

Screening of reaction conditions

Table S1. Screening of reaction solvent.

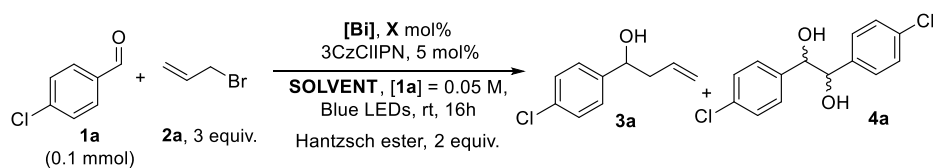
Entry ^[a]	R	Solvent	Conv. (%) ^[b]	3a,h (%) ^[c]	3a,h:4a,h (%) ^[c]
1	Cl	THF:H ₂ O (9:1)	96	30	31:69
2	Cl	THF:H ₂ O (1:1)	97	51	52:48
3	Cl	DMF:H ₂ O (1:1)	53	48	85:15
4	Cl	MeCN:H ₂ O (1:1)	81	45	56:44
5	Cl	MeOH:H ₂ O (1:1)	>99	79	79:21
6	Cl	DMSO:H ₂ O (1:1)	98	66	68:32
7	Cl	EtOH:H ₂ O (1:1)	>99	83(74)	83:17
8	Cl	EtOH	90	62	69:31
9	Cl	H ₂ O	92	50	55:45
10	Ph	MeOH:H ₂ O (1:1)	57	54	94:6
11	Ph	EtOH:H ₂ O (1:1)	94	88	94:6

[a] All the reactions were carried out under irradiation with Kessil® 40W blue LED. [b] Conversions were measured by ¹H-NMR. Isolated yields after chromatographic purification is reported in parenthesis. [c] Yield% of the allylated product (**3a,h**) determined by ¹H-NMR. [d] Ratio% of allylated product (**3a,h**) and pinacol coupling (**4a,h**). The d.r. for (**4a,h**) is ca 1:1 for all the reactions.

Table S2. Screening of allylating reagent.

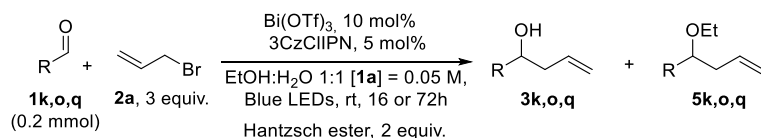
Entry ^[a]	X	Conv. (%) ^[b]	3a (%) ^[c]	3a:4a (%) ^[c]
1	Br	>99	83(74)	83:17
2	Cl	15	7	48:52
3	I	12	12	>99:1
4	OH	97	0	>1:99
5	OAc	100	0	>1:99

[a] All the reactions were carried out under irradiation with Kessil® 40W blue LED. [b] Conversions were measured by ¹H-NMR. Isolated yields after chromatographic purification is reported in parenthesis. [c] Yield% of the allylated product (**3a**) determined by ¹H-NMR. [d] Ratio% of allylated product (**3a**) and pinacol coupling (**4a**). The d.r. for (**4a**) is ca 1:1 for all the reactions.

Table S3. Screening of the type and amount of bismuth salt.

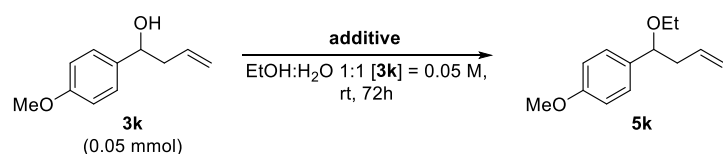
Entry ^[a]	Solvent	[Bi]	[Bi] mol%	Conv. (%) ^[b]	3a (%) ^[c]	3a:4a (%) ^[c]
1	EtOH:H ₂ O (1:1)	Bi(OTf) ₃	10	>99	83(74)	83:17
2	MeOH:H ₂ O (1:1)	Bi(OTf) ₃	10	>99	79	79:21
3	MeOH:H ₂ O (1:1)	Bi(OTf) ₃	5	>99	78	78:22
4	MeOH:H ₂ O (1:1)	Bi(OTf) ₃	2	>99	68	58:42
5	EtOH:H ₂ O (1:1)	BiCl ₃	10	50	50	>99:1
6	EtOH:H ₂ O (1:1)	BiBr ₃	10	>99	87	87:13
7	EtOH:H ₂ O (1:1)	BiBr ₃	5	82	77	87:13
8	EtOH:H ₂ O (1:1)	BiBr ₃	2	68	59	79:11

[a] All the reactions were carried out under irradiation with Kessil® 40W blue LED. [b] Conversions were measured by ¹H-NMR. Isolated yields after chromatographic purification is reported in parenthesis. [c] Yield% of the allylated product (**3a**) determined by ¹H-NMR. [d] Ratio% of allylated product (**3a**) and pinacol coupling (**4a**). The d.r. for (**4a**) is ca 1:1 for all the reactions.

Table S4. Reaction time influence on the reaction outcome for substrates **1k,o,p**.

Entry ^[a]	R	Time	Conv. (%) ^[b]	3:5 (%) ^[b]	3 (%) ^[c]	5 (%) ^[c]
1	1k	16 h	51	92:8	34	n.d. ^[d]
2	1k	72 h	51	21:79	n.d. ^[d]	36
3	1o	16 h	50	>99:1	33	n.d. ^[d]
4	1o	72 h	69	53:47	n.d. ^[d]	n.d. ^[d]
5	1q	16 h	70	86:14	60	n.d. ^[d]
6	1q	72 h	82	>1:99	n.d. ^[d]	n.d. ^[d]

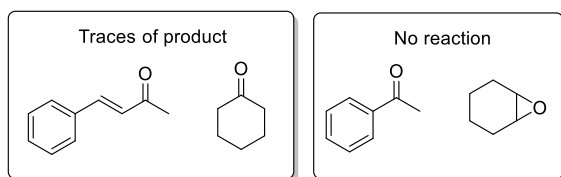
[a] All the reactions were carried out under irradiation with Kessil® 40W blue LED. [b] Determined by ¹H-NMR. [c] Isolated yields after chromatographic purification. [d] Not determined.

Table S5. Test of the species responsible for the generation of **5k** starting from **3k**.

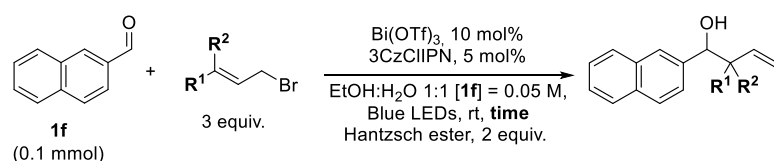
Entry	Additive ^[a]	Equiv.	Conv. (%) ^[b]
1		2	36
2	Bi(OTf) ₃	0.1	6

[a] Pyridinium was obtained by acidic treatment (HCl 1M in Et₂O) of oxidized Hantzsch ester (i.e. its pyridinic form, recovered after chromatographic purifications of compounds **3**), followed by solvent evaporation. [b] Determined by ¹H-NMR.

Unreactive substrates

Figure S1. Unreactive or unreactive substrates tested in the bismuth catalyzed photoredox allylation.

Photoredox reaction performed with substituted allyl bromides

Table S6. Result obtained with crotyl and prenyl bromides.

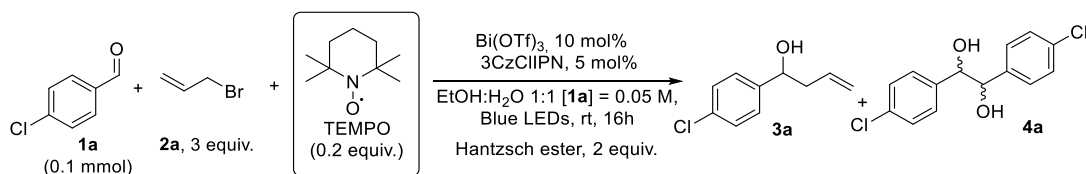
Entry ^[a]	R ¹	R ²	Time (h)	Conv. (%) ^[b]	<i>syn:anti</i> ^[b, c]
1	Me	H	16	20	74:26
2	Me	H	72	47	72:28
3	Me	Me	16	0	–
4	Me	Me	72	23	–

[a] All the reactions were carried out under irradiation with Kessil® 40W blue LED. [b] Determined by ¹H-NMR. [c] Relative configuration was assigned by comparison of ¹H-NMR signals with literature data, see ref. 17.

Different substituted allyl bromides were tested in the bismuth catalyzed photoredox allylation of aldehyde **1f**. Cinnamyl bromide gave a low conversion and a complex mixture of alcohol and ether isomers (result not reported). In the reaction with crotyl and prenyl

bromides branched products were exclusively formed with poor conversion and good diastereoselectivity in favour of the *syn* product.

Effect of radical inhibitor on reaction outcome



The reaction was performed following the general procedure but adding TEMPO (0.02 mmol, 3 mg). NMR analyses performed on the reaction mixture after work-up revealed the complete conversion of the aldehyde to afford mainly the allylated product **3a**, with almost negligible (5 %) amount of **4a**. As a matter of fact, TEMPO behaves as a radical scavenger, hampering radical pathways, including those involved in the generation of **4a** (pinacol coupling via ketyl radical).

Photochemical Investigations

Figure S2. Absorption (blue solid line) and emission spectrum (red line) recorded on a solution of 3CzCIIPN in air-equilibrated ethanol at r.t.; $\lambda_{\text{ex}} = 400$ nm. The excitation spectrum taken on a diluted solution is shown as the blue dotted line; $\lambda_{\text{em}} = 550$ nm.

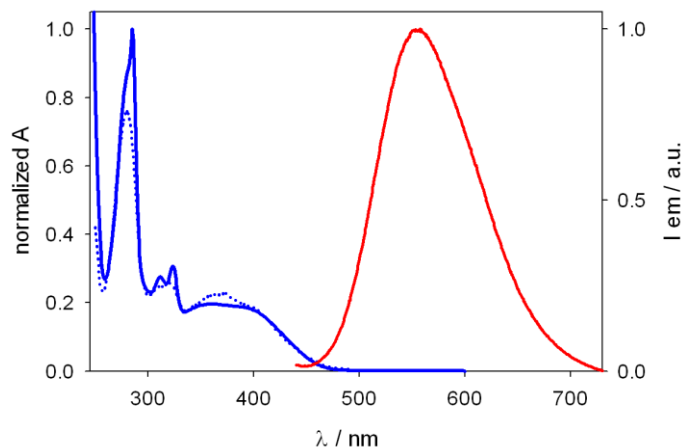


Figure S3. A: absorption spectra of solutions of 3CzCIIPN in air-equilibrated ethanol (blue line) obtained upon addition of increasing amounts of bismuth(III) triflate (up to ca. 14 mM, red line). **B:** fluorescence emission spectra of 3CzCIIPN obtained from the same solutions at $\lambda_{\text{ex}} = 400$ nm.

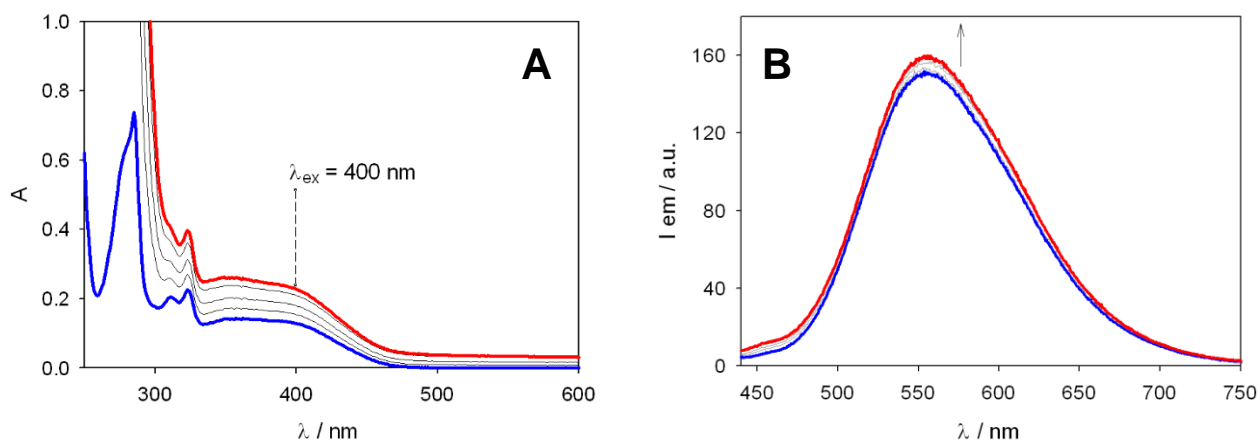


Figure S4. A: absorption spectra of solutions of 3CzCIIPN in air-equilibrated ethanol (blue line) obtained upon addition of increasing amounts of allyl bromide (up to ca. 95 mM, red line). **B:** fluorescence emission spectra of 3CzCIIPN obtained from the same solutions at $\lambda_{\text{ex}} = 400$ nm. Inset: Stern-Volmer diagram relative to the emission intensities at $\lambda_{\text{em}} = 550$ nm (since no quenching is detected, the quenching constant is not determined).

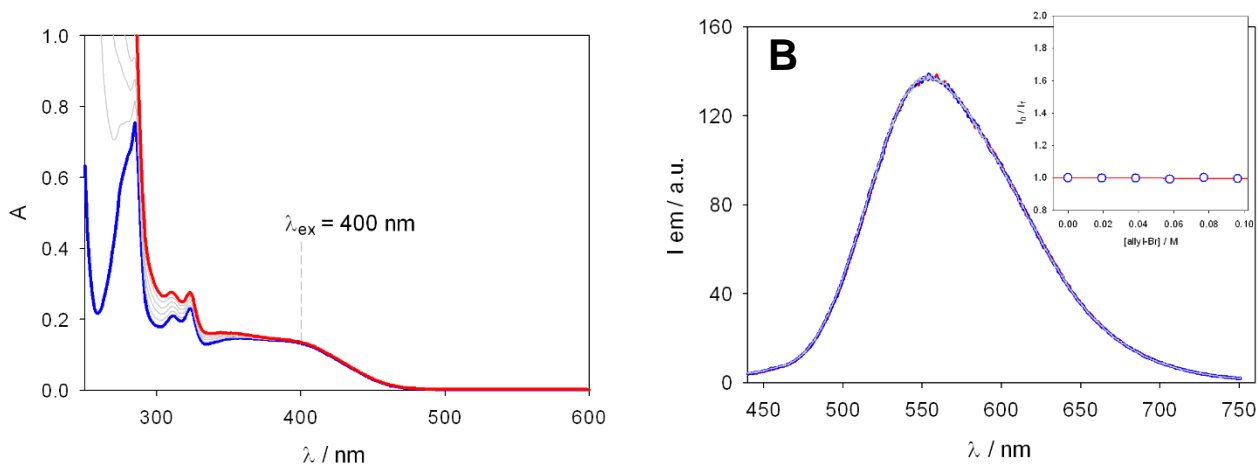


Figure S5. A: absorption spectra of solutions of 3CzCIIPN in air-equilibrated ethanol (blue line) obtained upon addition of increasing amounts of 4-chlorobenzaldehyde (Cl-BA, up to ca. 26 mM, red line). **B:** fluorescence emission spectra of 3CzCIIPN obtained from the same solutions at $\lambda_{ex}=400$ nm. Inset: Stern-Volmer diagram relative to the emission intensities at $\lambda_{em}=550$.

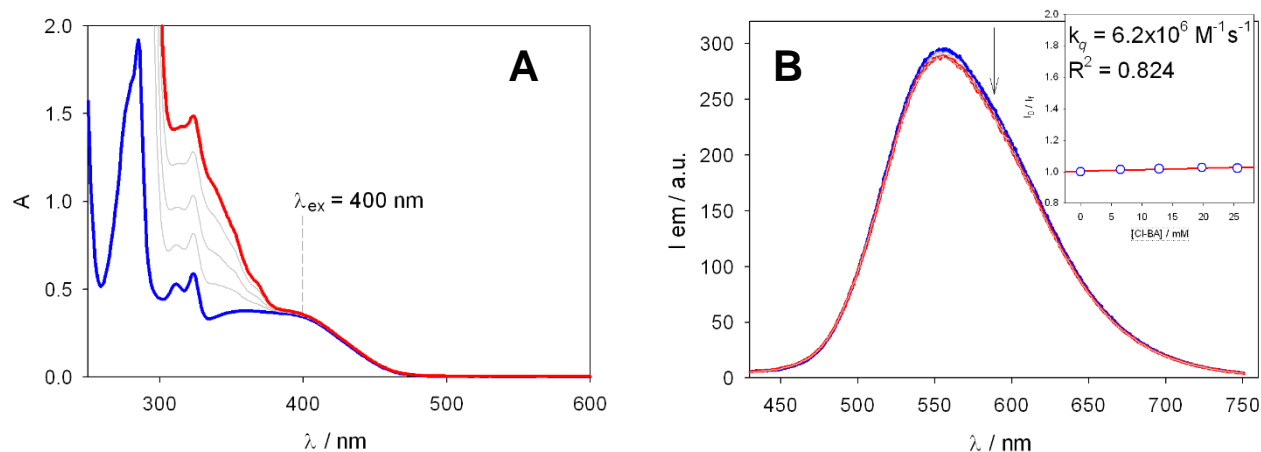


Figure S6. A: absorption spectra of solutions of 3CzCIIPN in air-equilibrated ethanol (blue line) obtained upon addition of increasing amounts of Hantzsch's ester (HE, up to ca. 10 mM, red line). **B:** fluorescence emission spectra of 3CzCIIPN obtained from the same solutions at $\lambda_{ex}=465$ nm. Inset: Stern-Volmer diagram relative to the emission intensities at $\lambda_{em}=550$ nm.

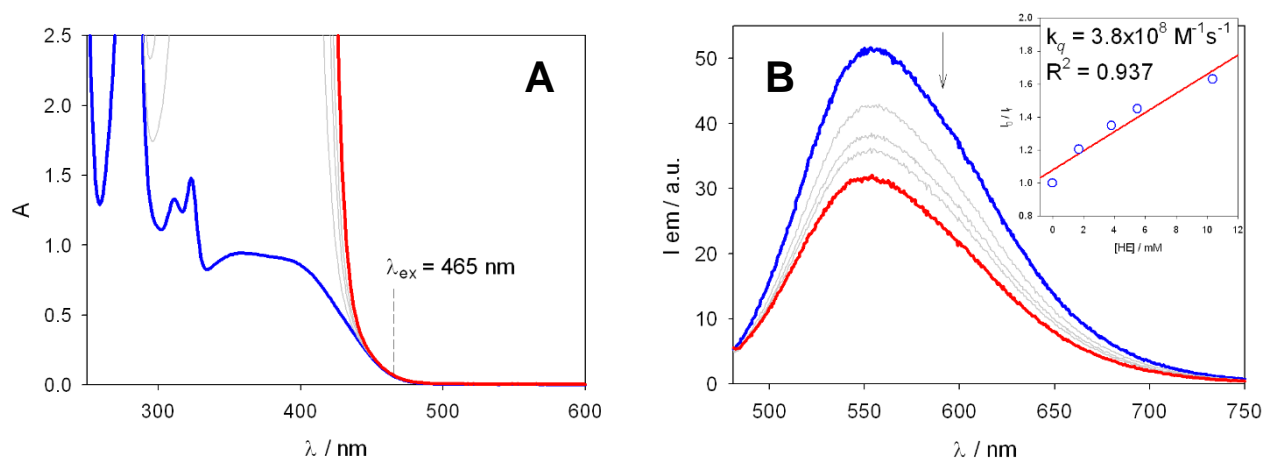
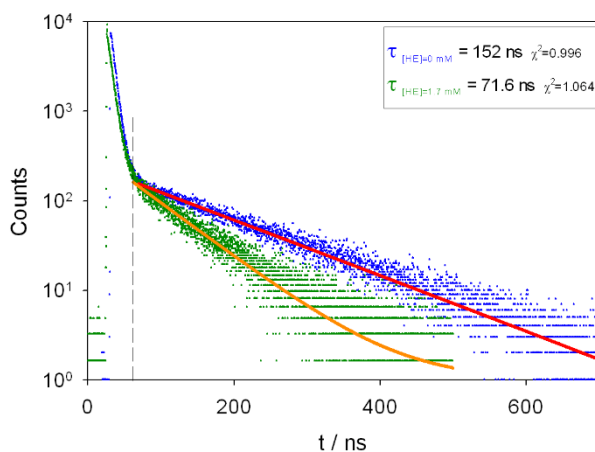
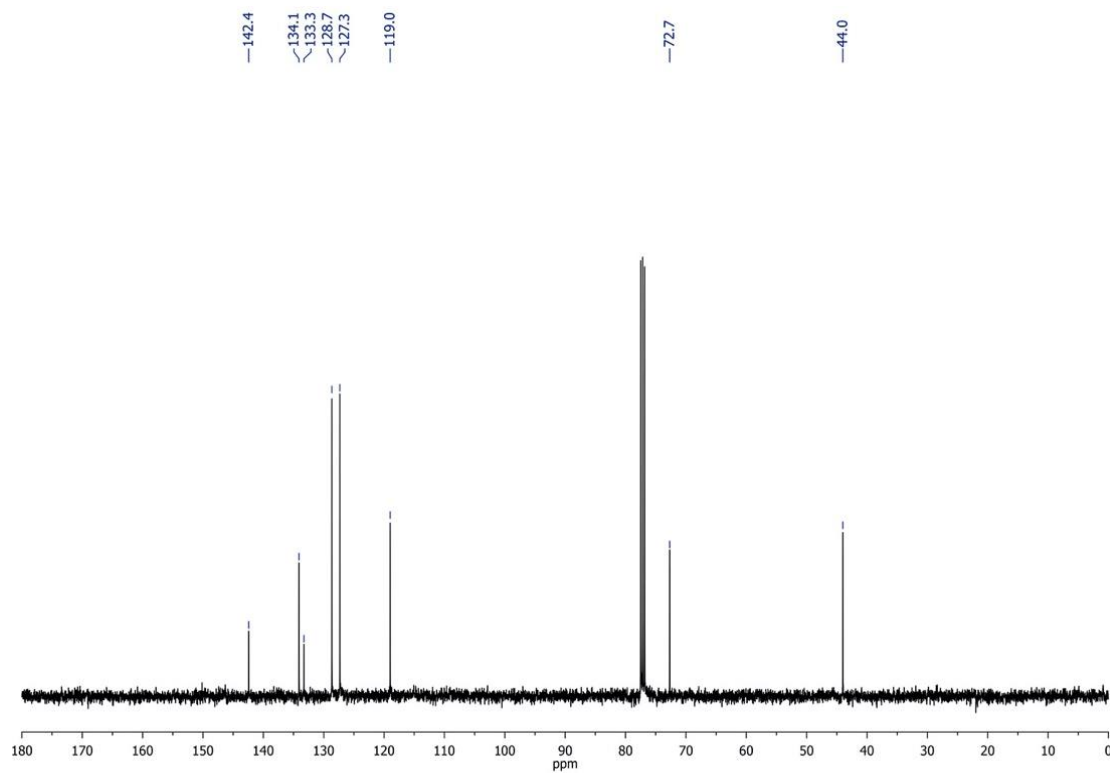
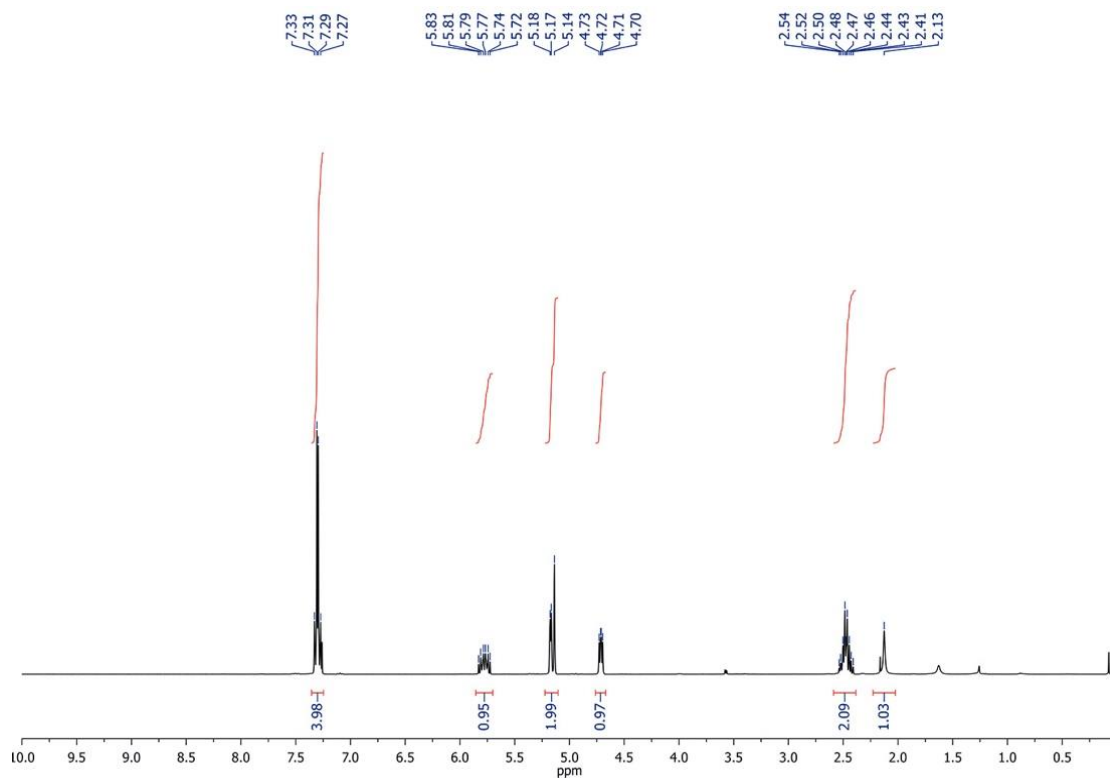
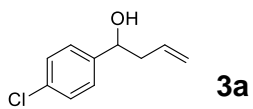
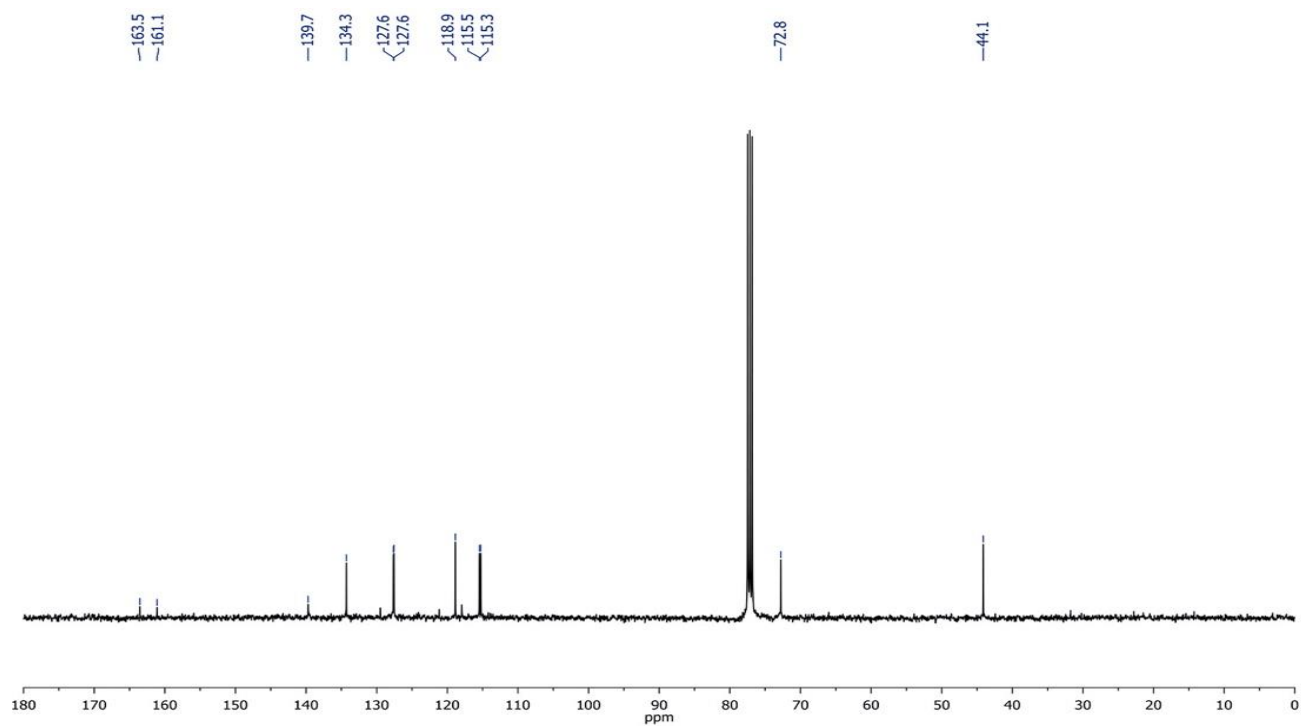
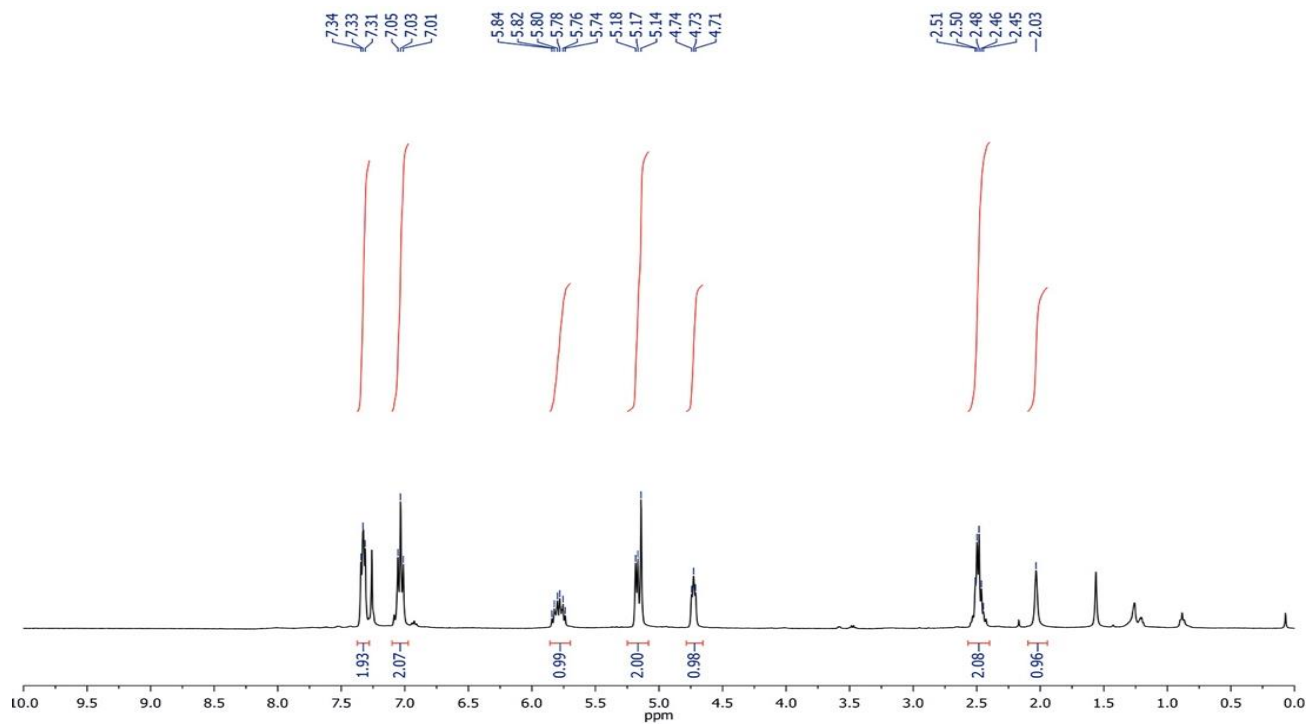
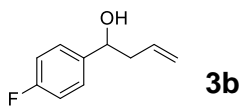


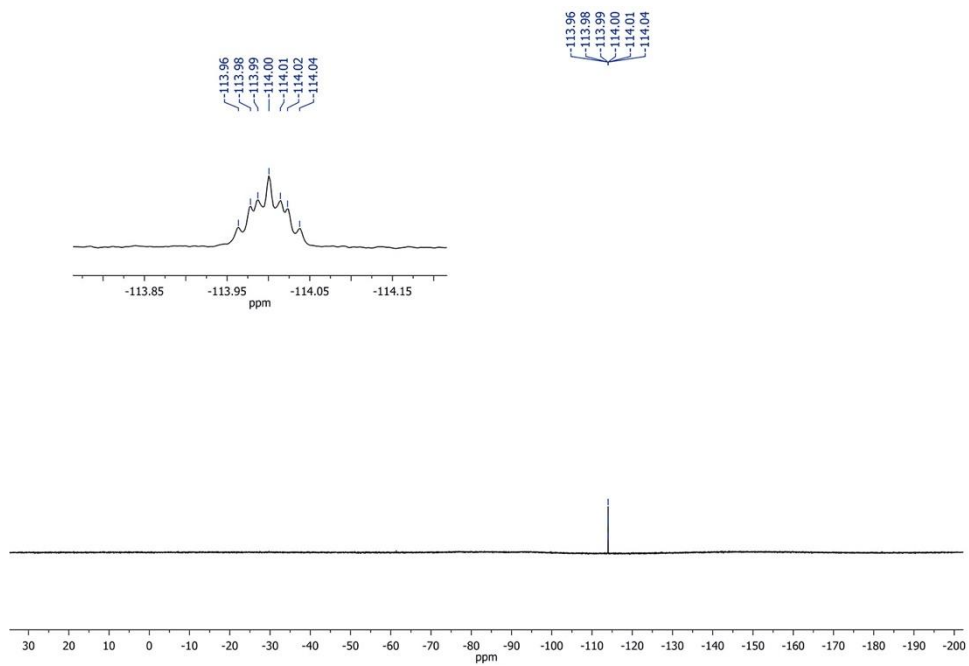
Figure S7. Emission decays obtained from 3CzCIIPN in air-equilibrated ethanol (blue dots) and from the same solution upon addition of Hantzsch's ester (HE, 1.7 mM, green dots). The monoexponential fitting curves are also shown (red and orange lines, respectively).

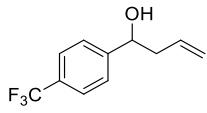


Copies of NMR spectra

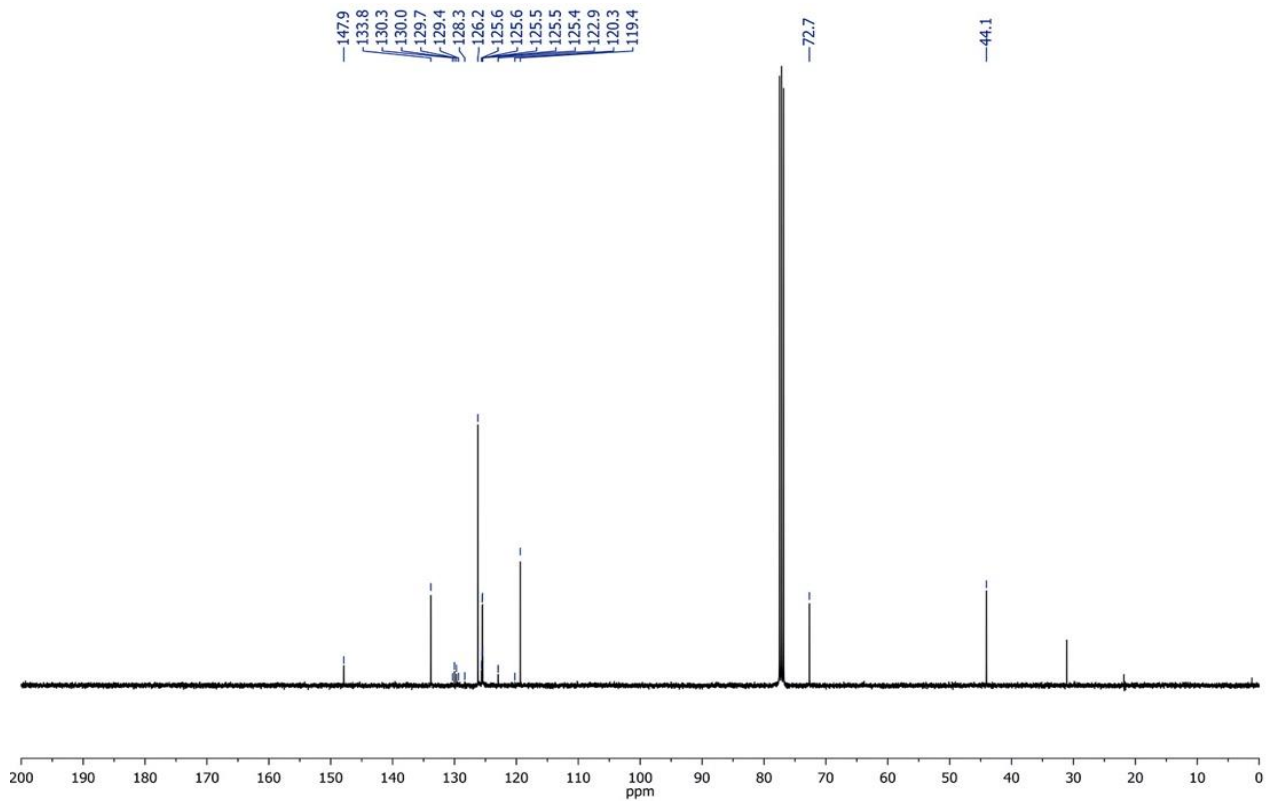
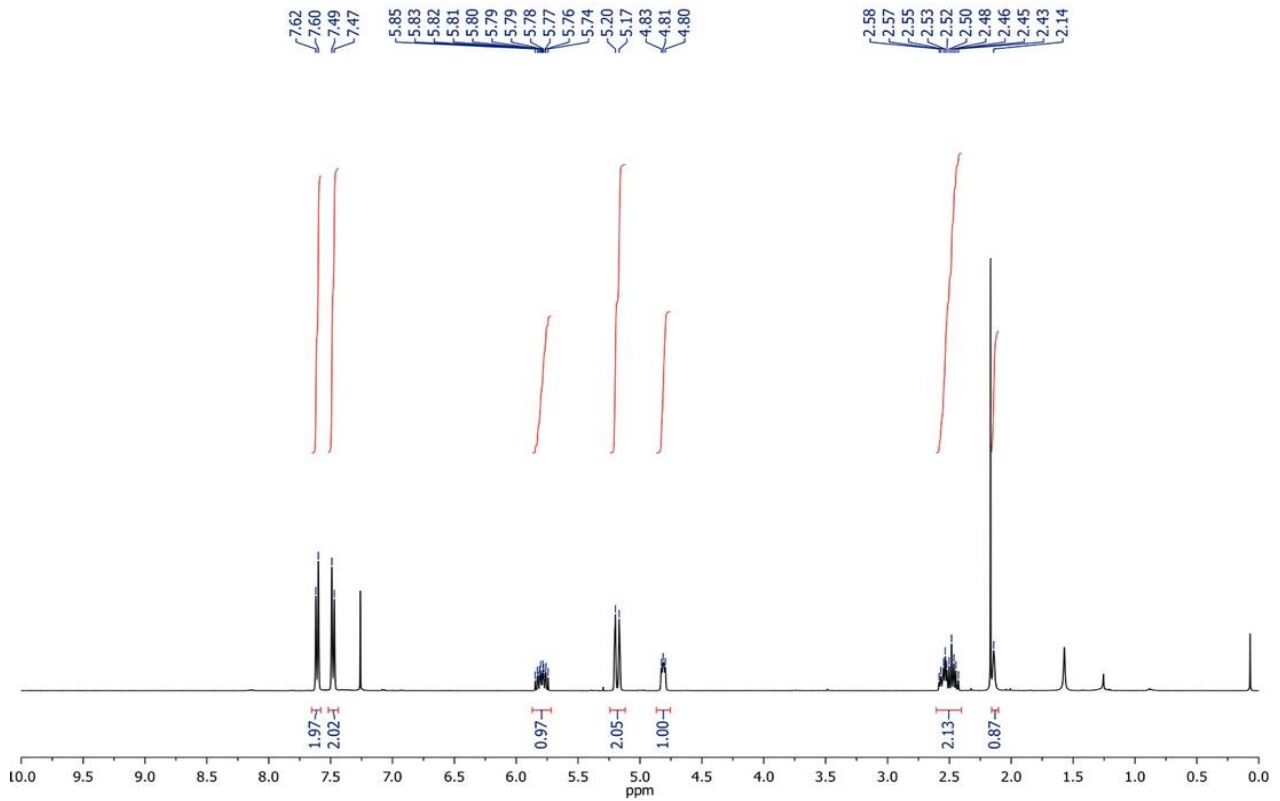


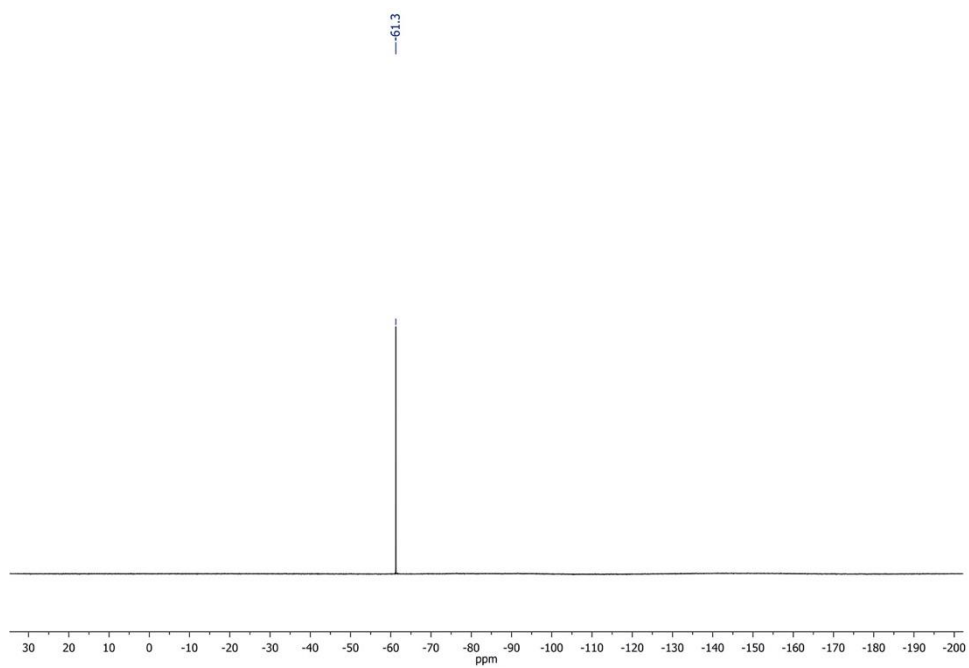


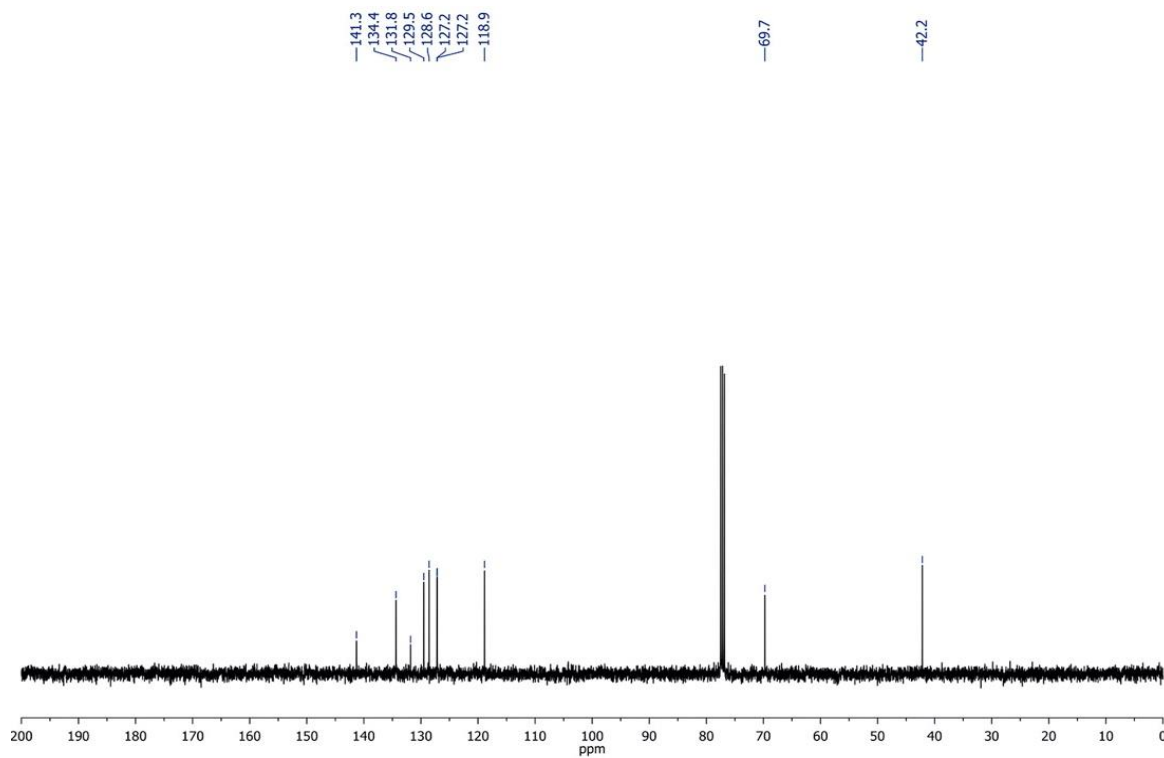
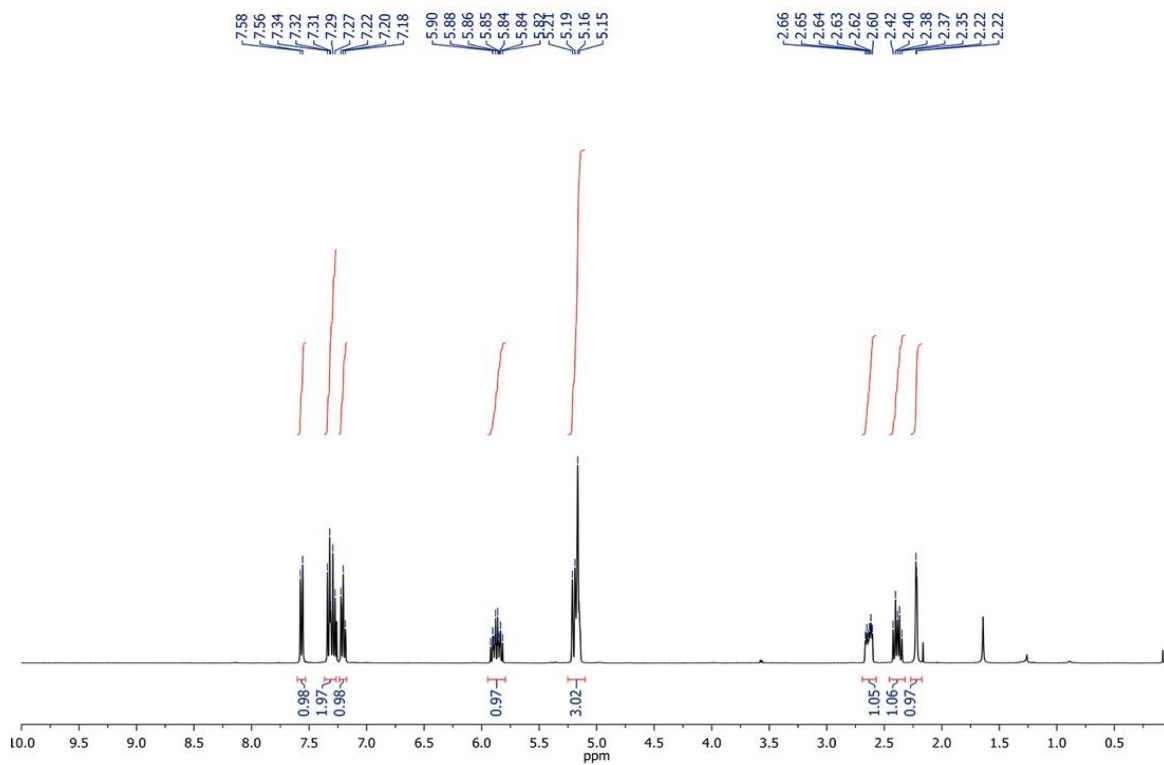
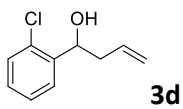


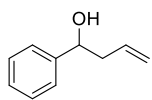


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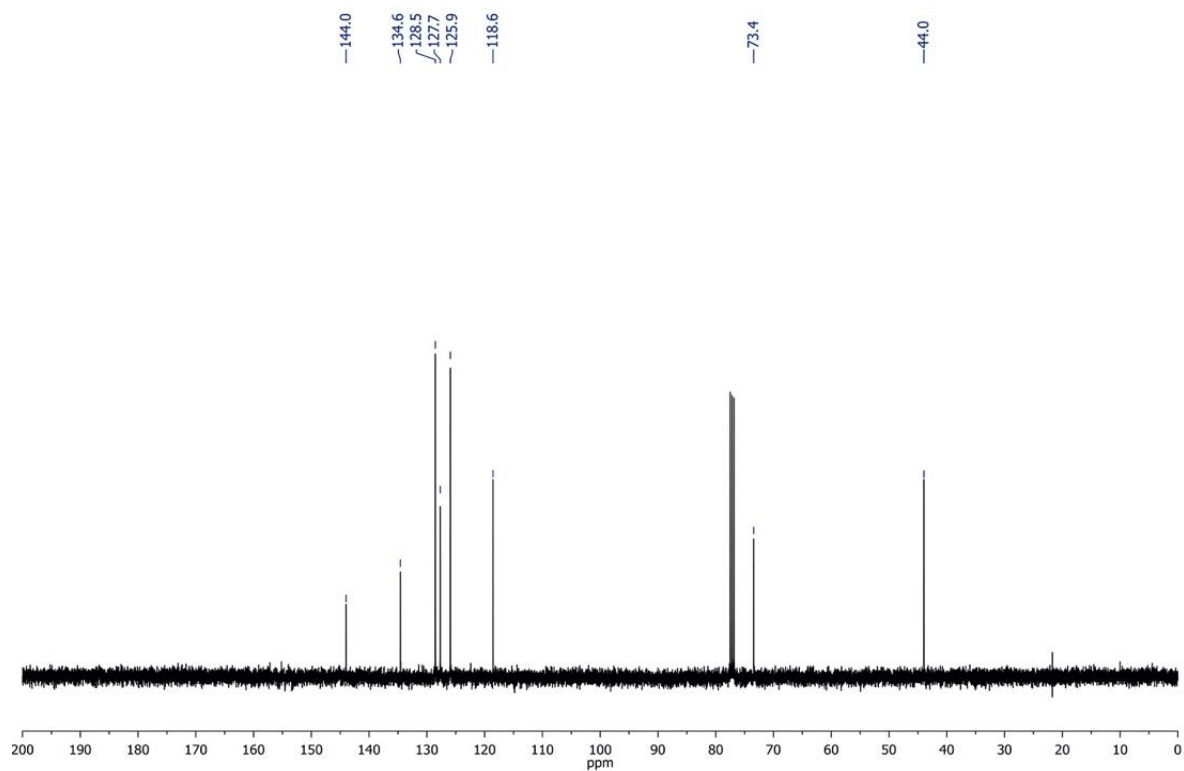
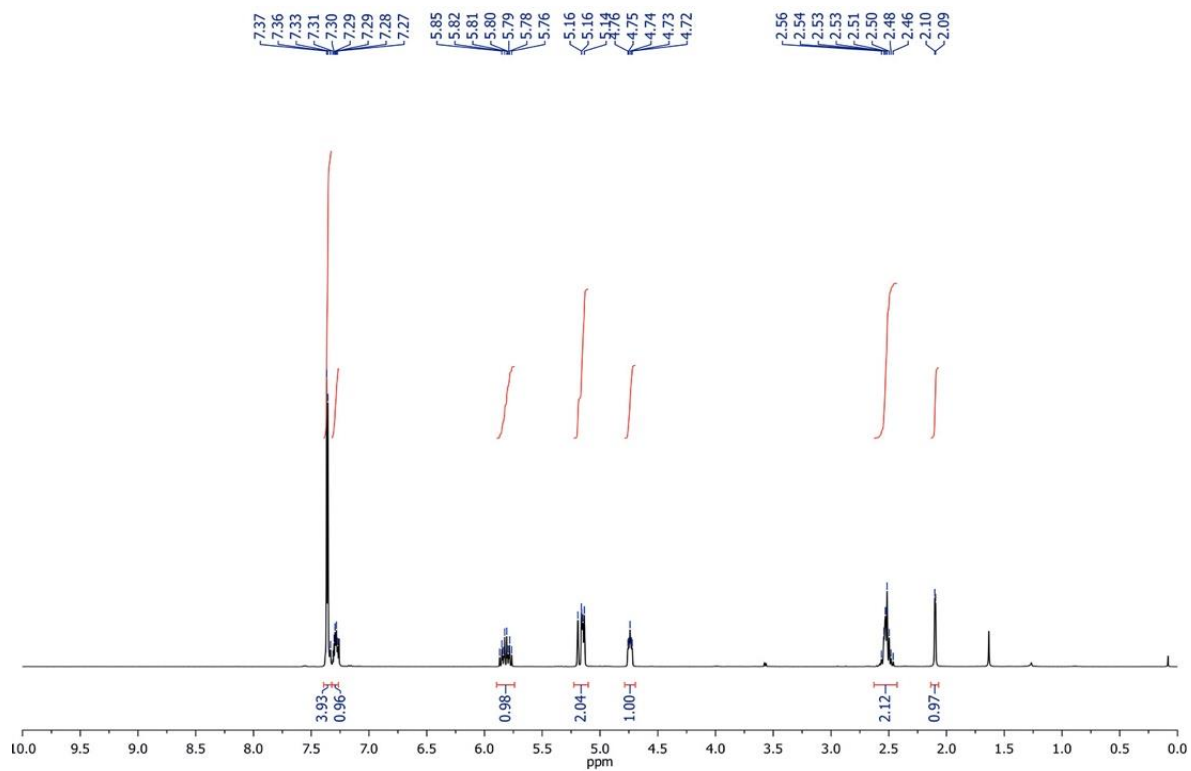


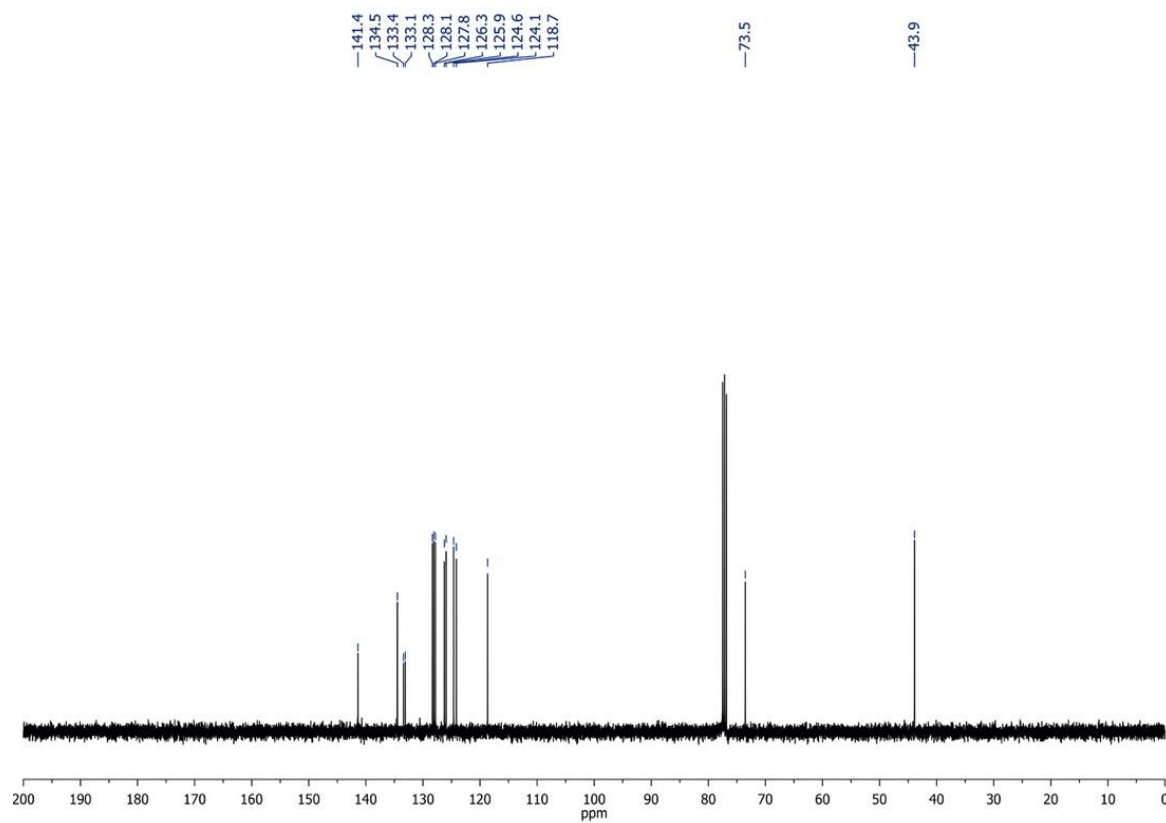
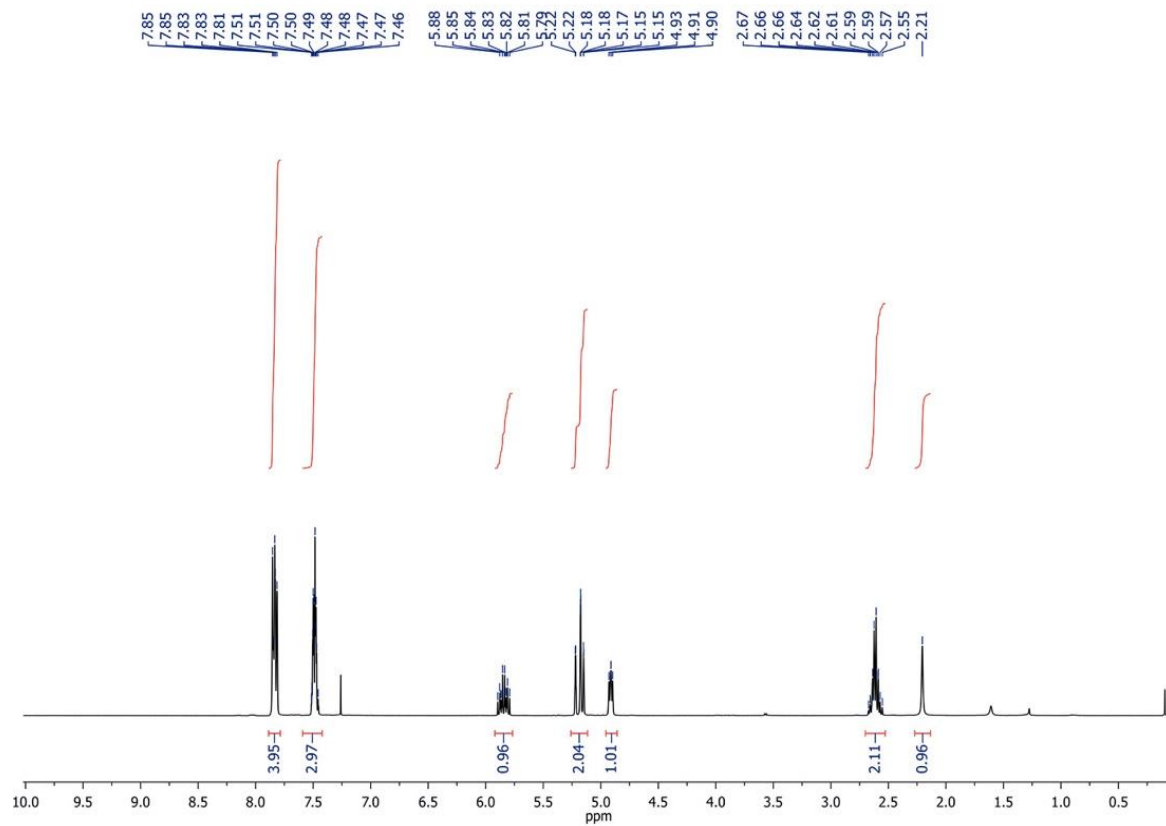
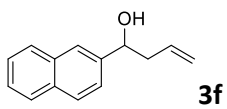


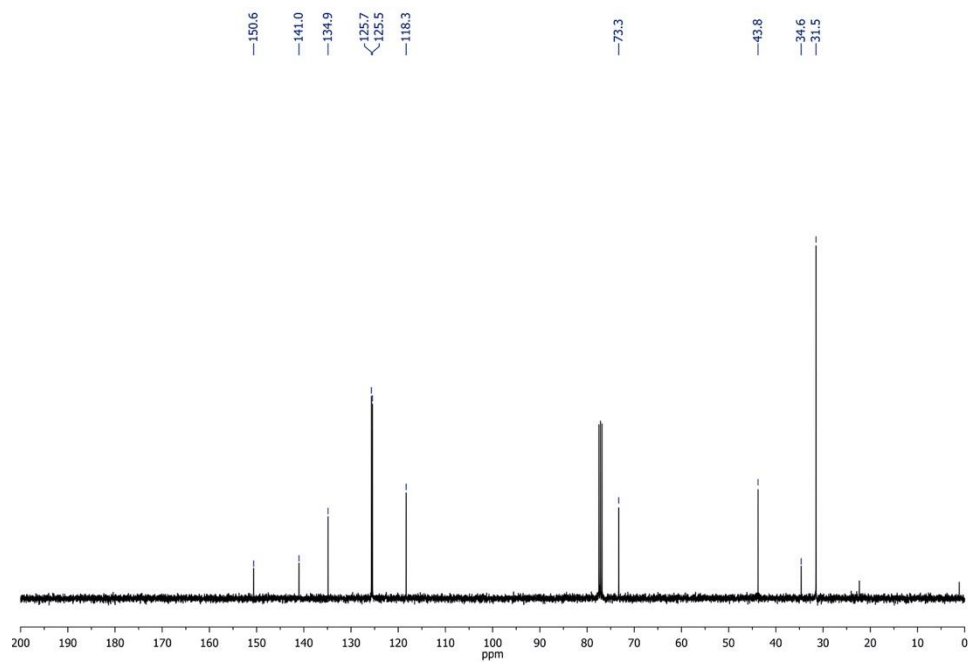
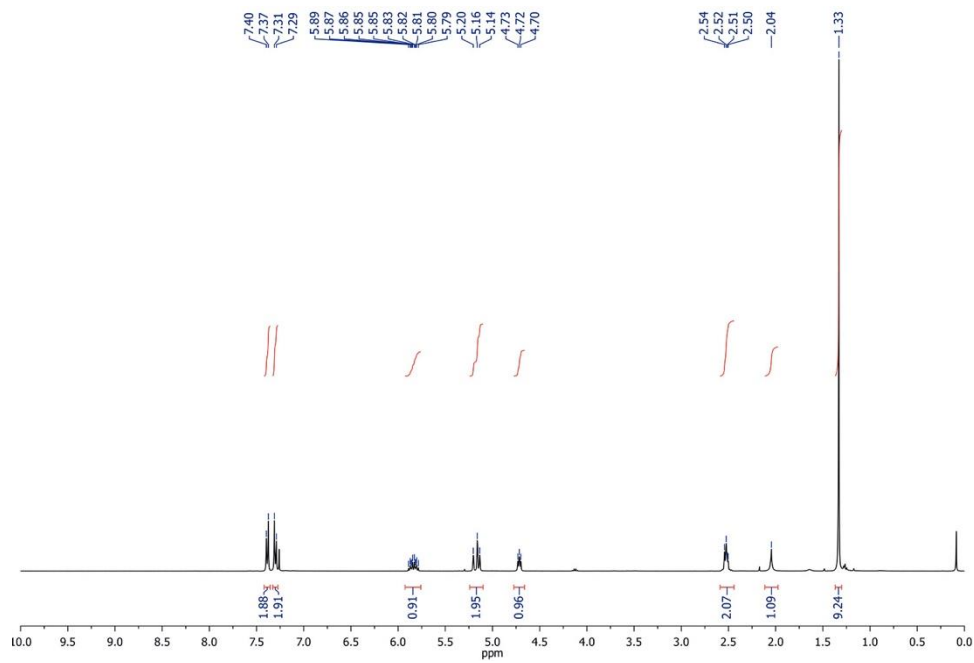
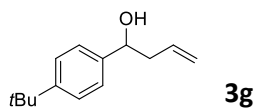


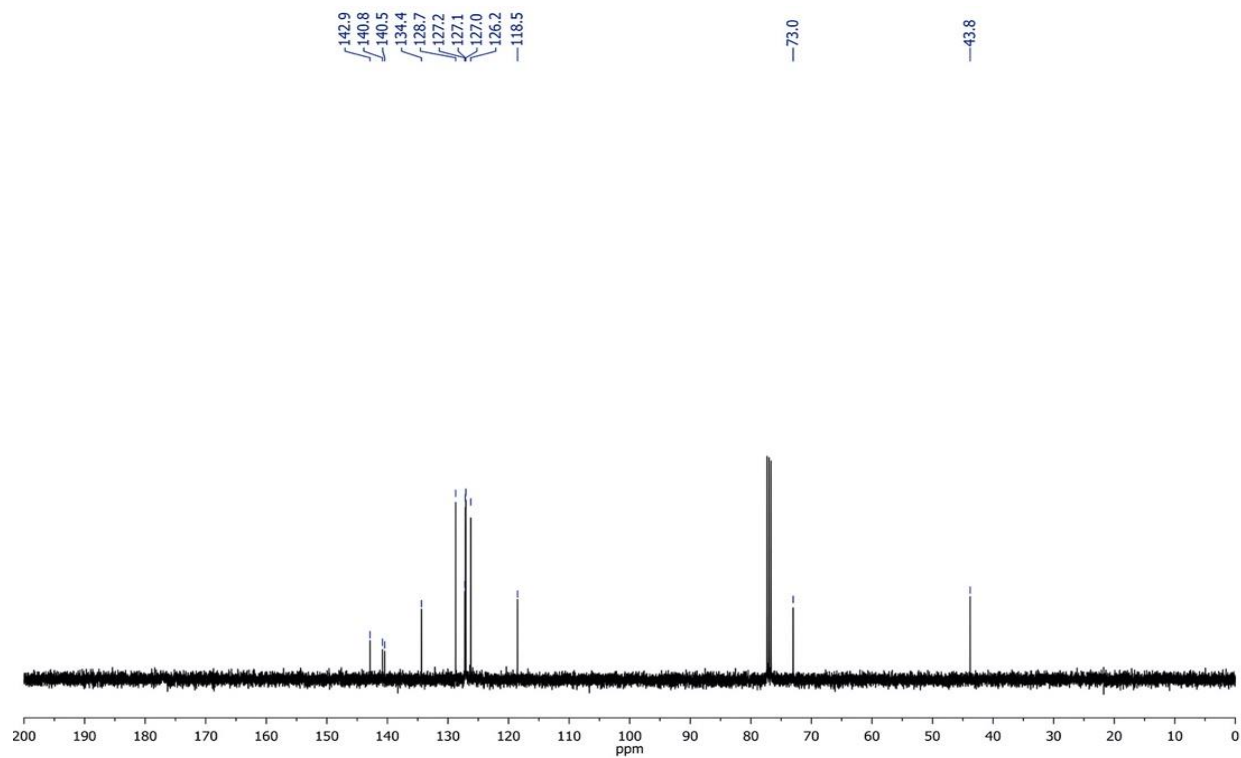
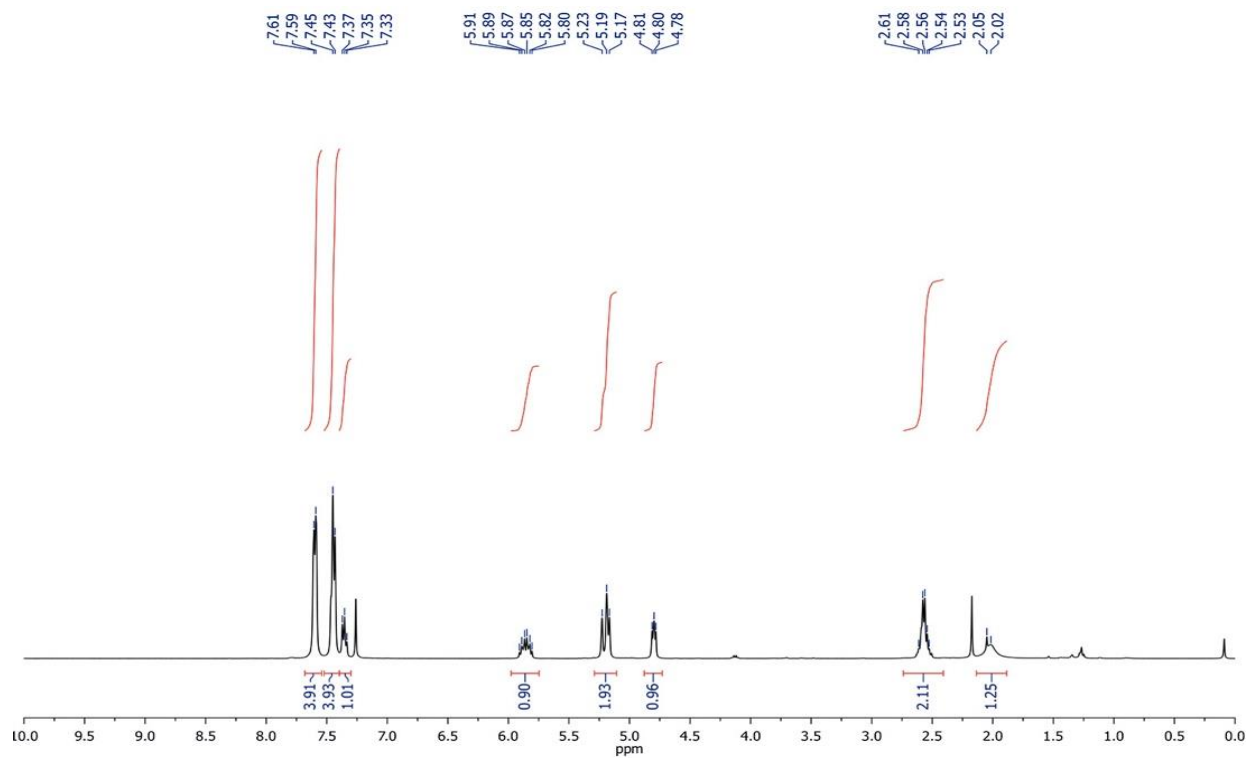
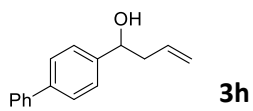


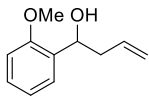
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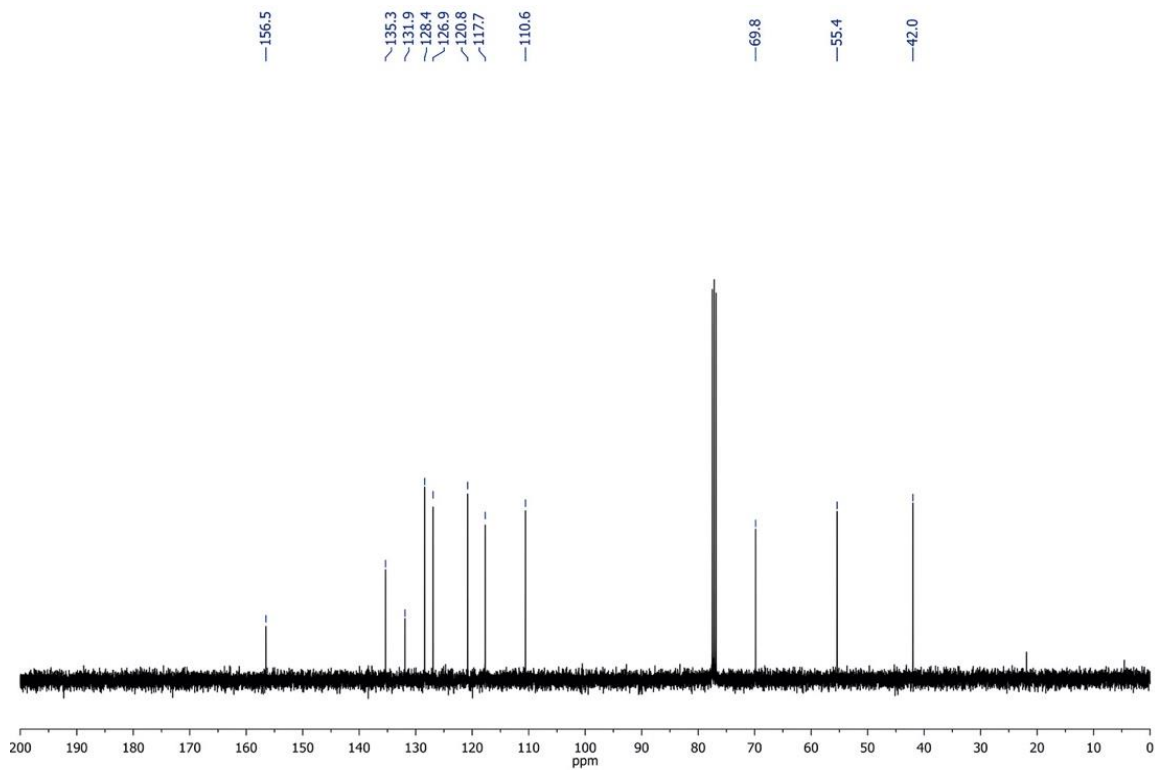
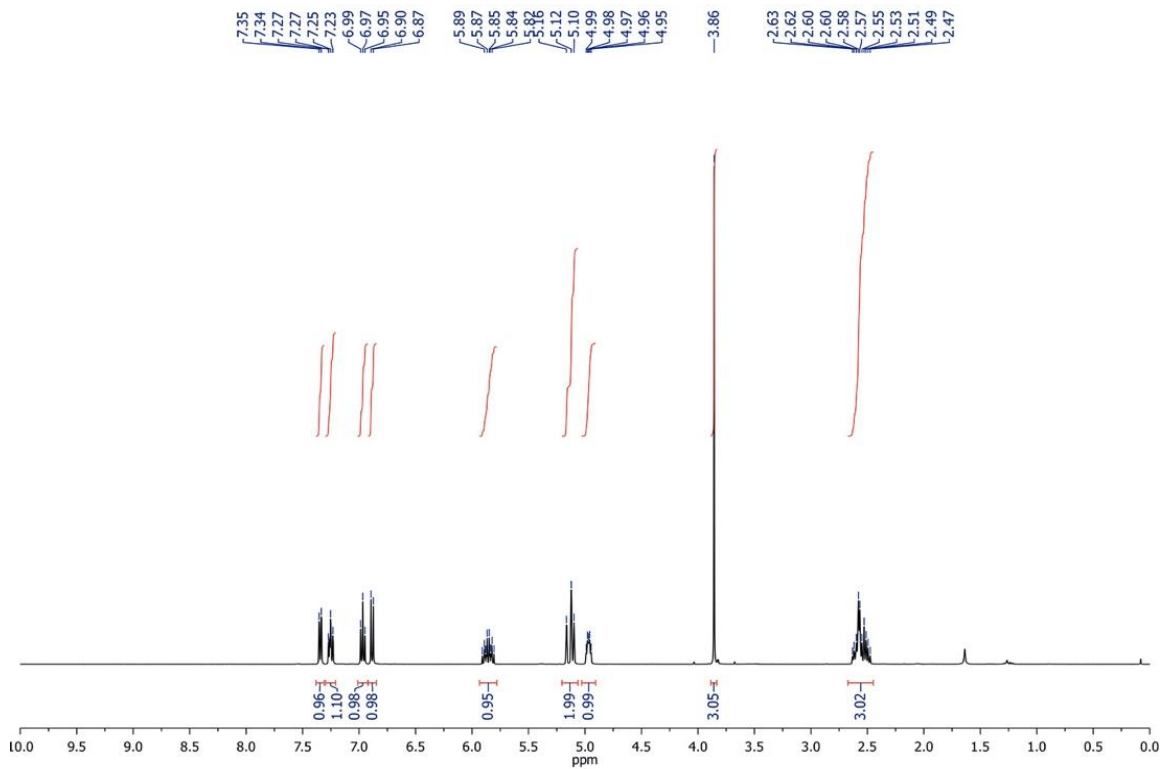


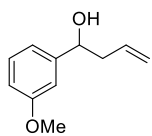




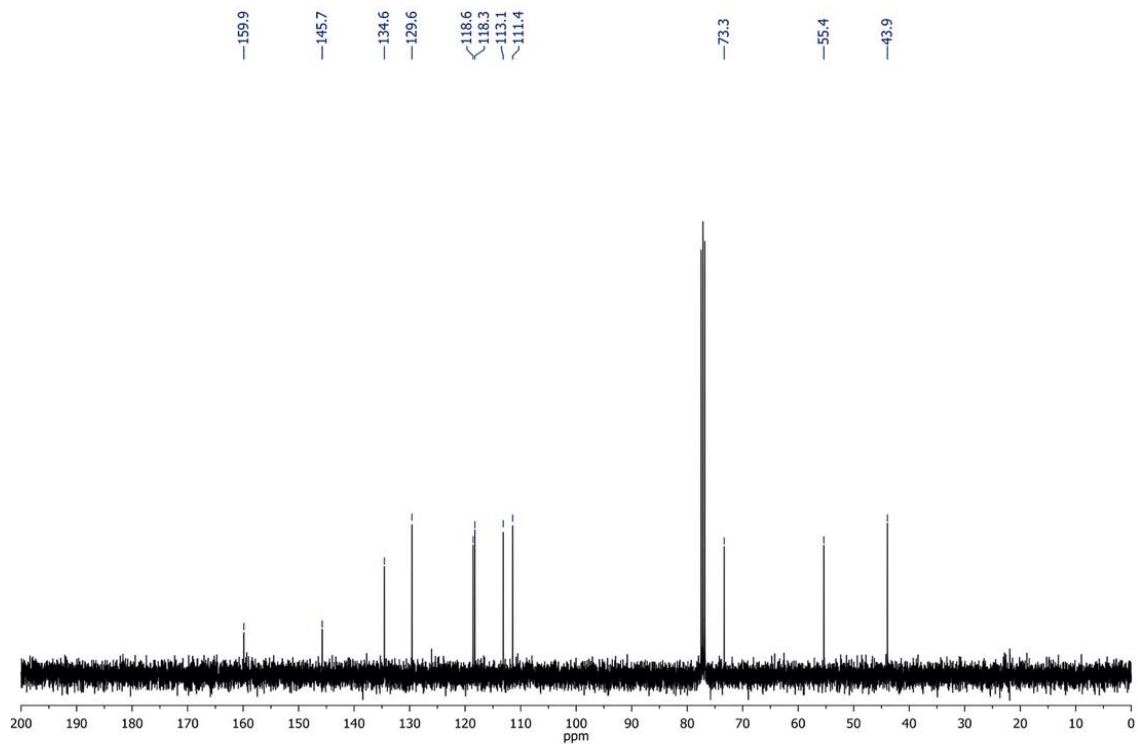
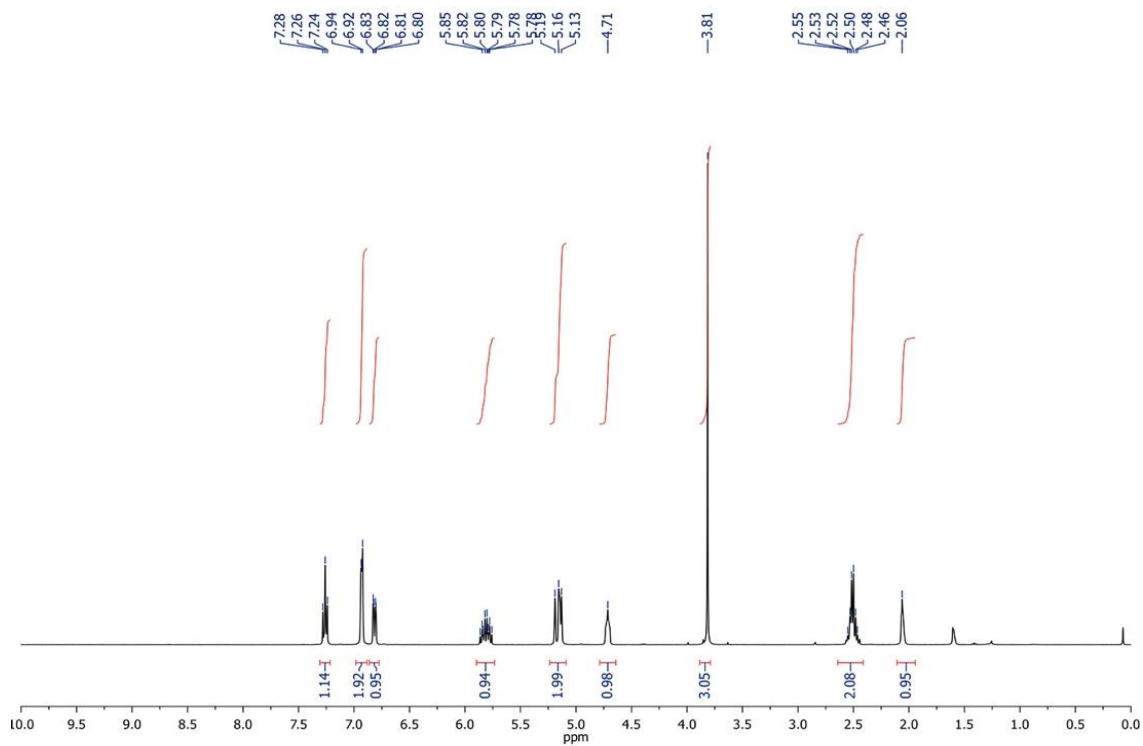


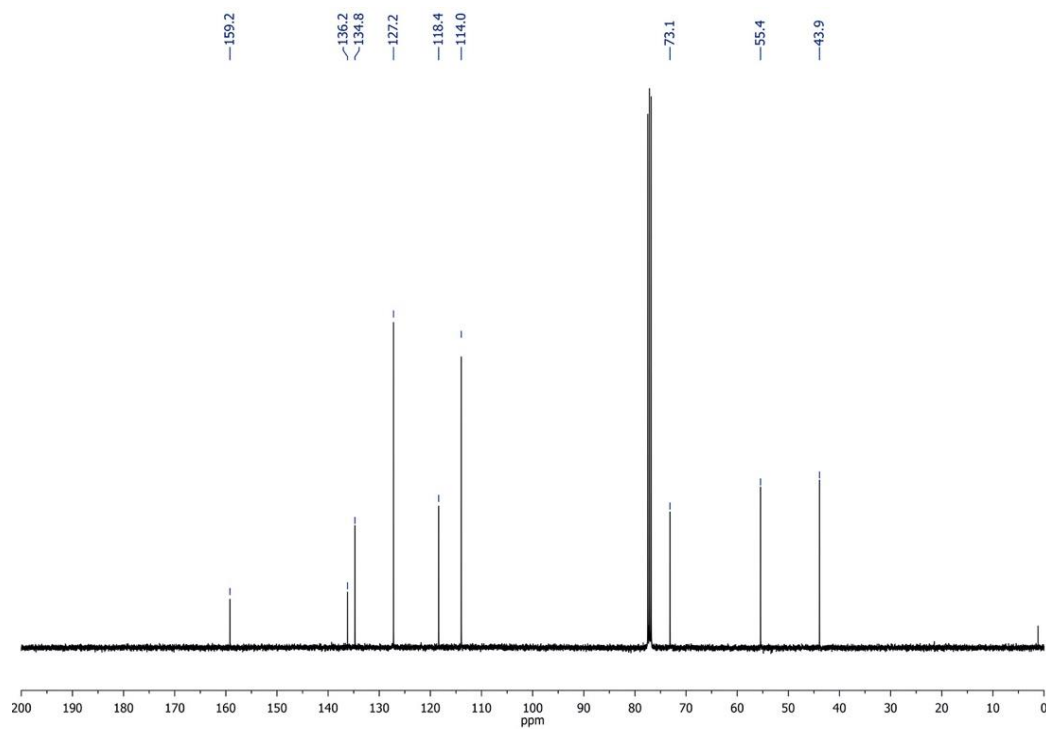
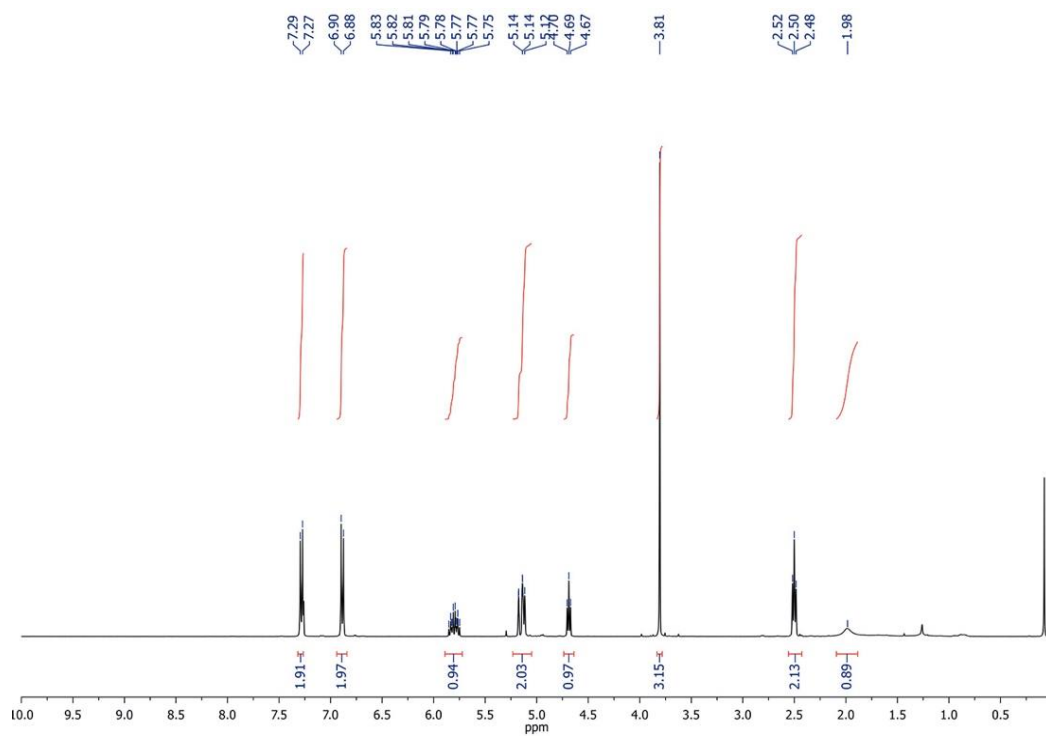
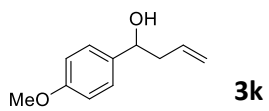
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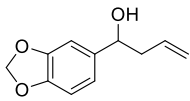




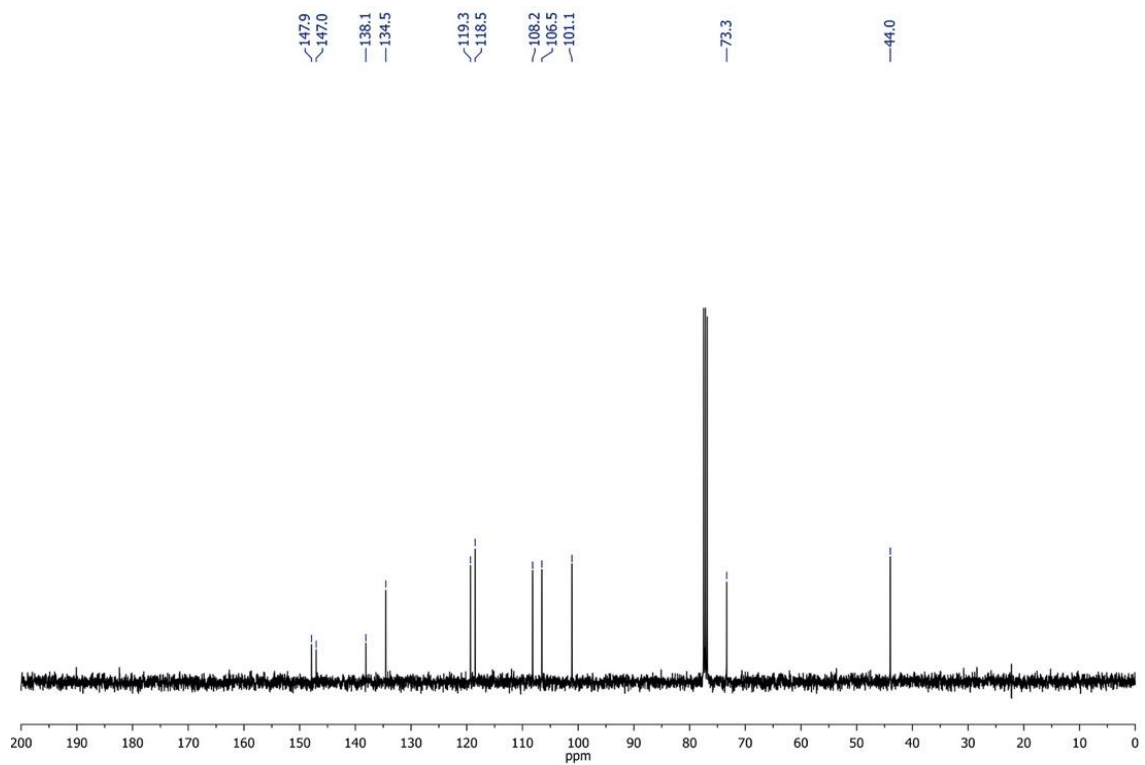
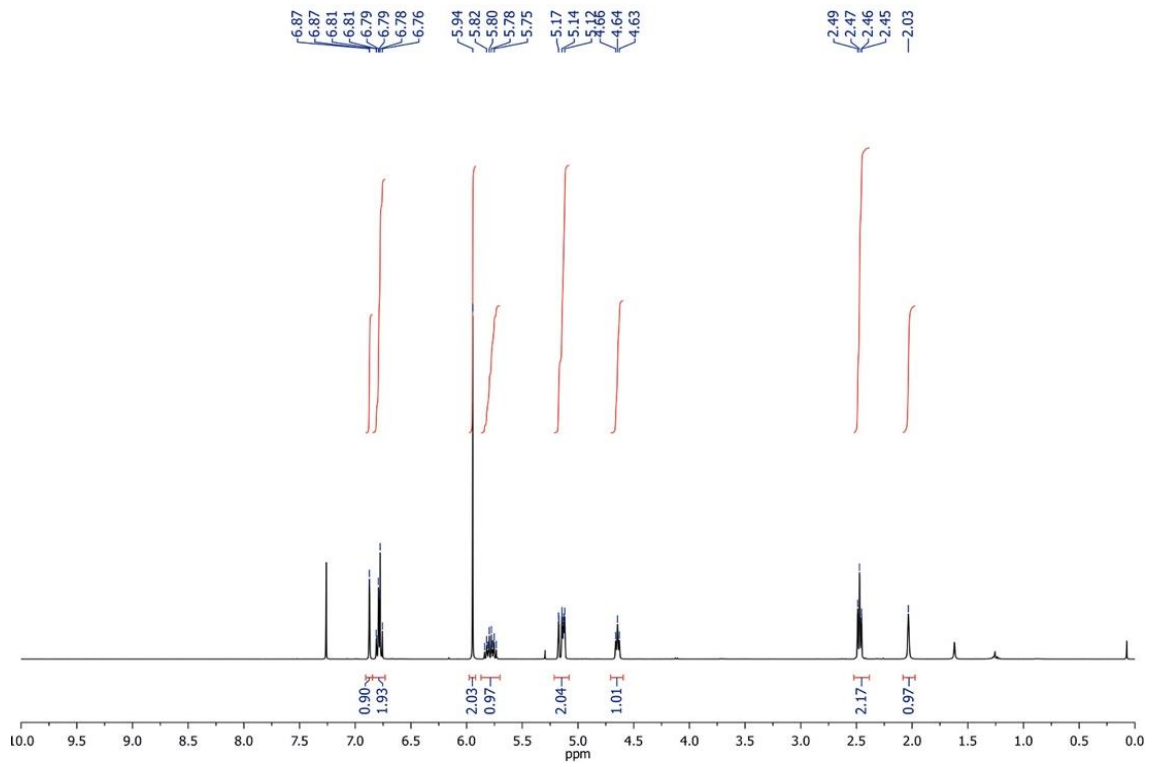
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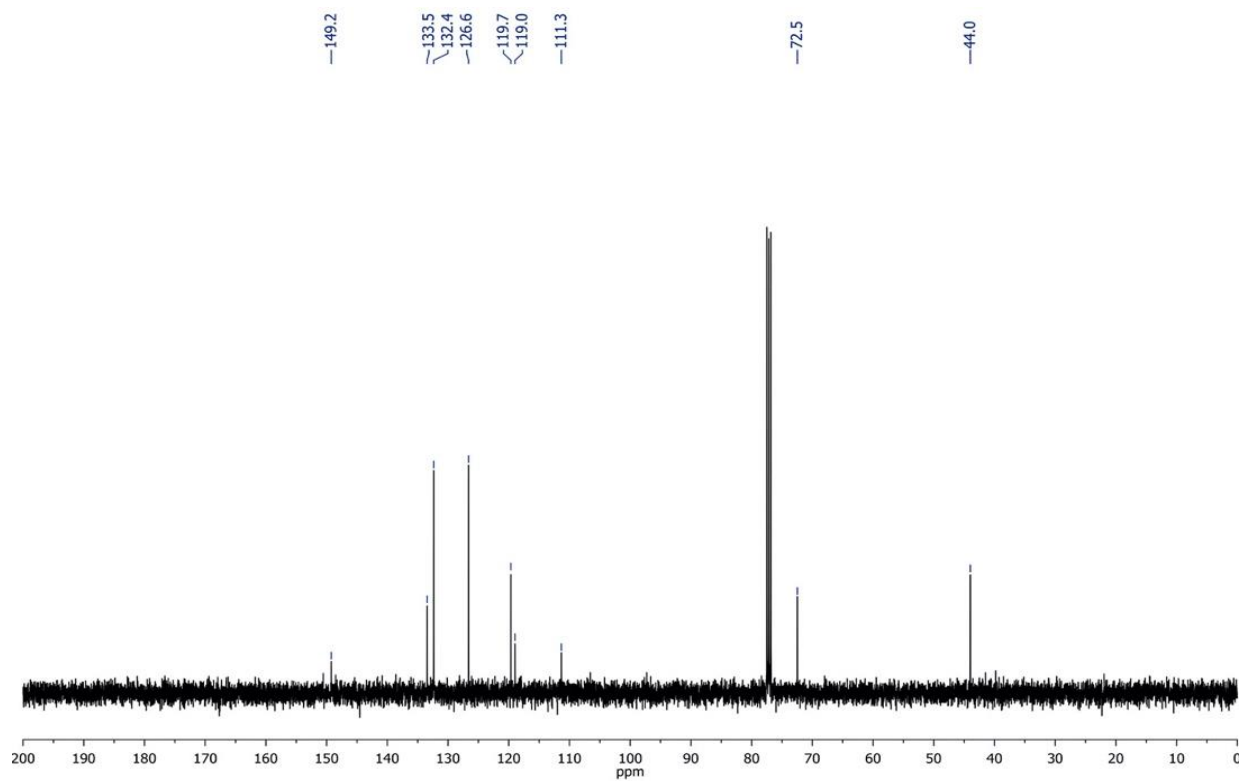
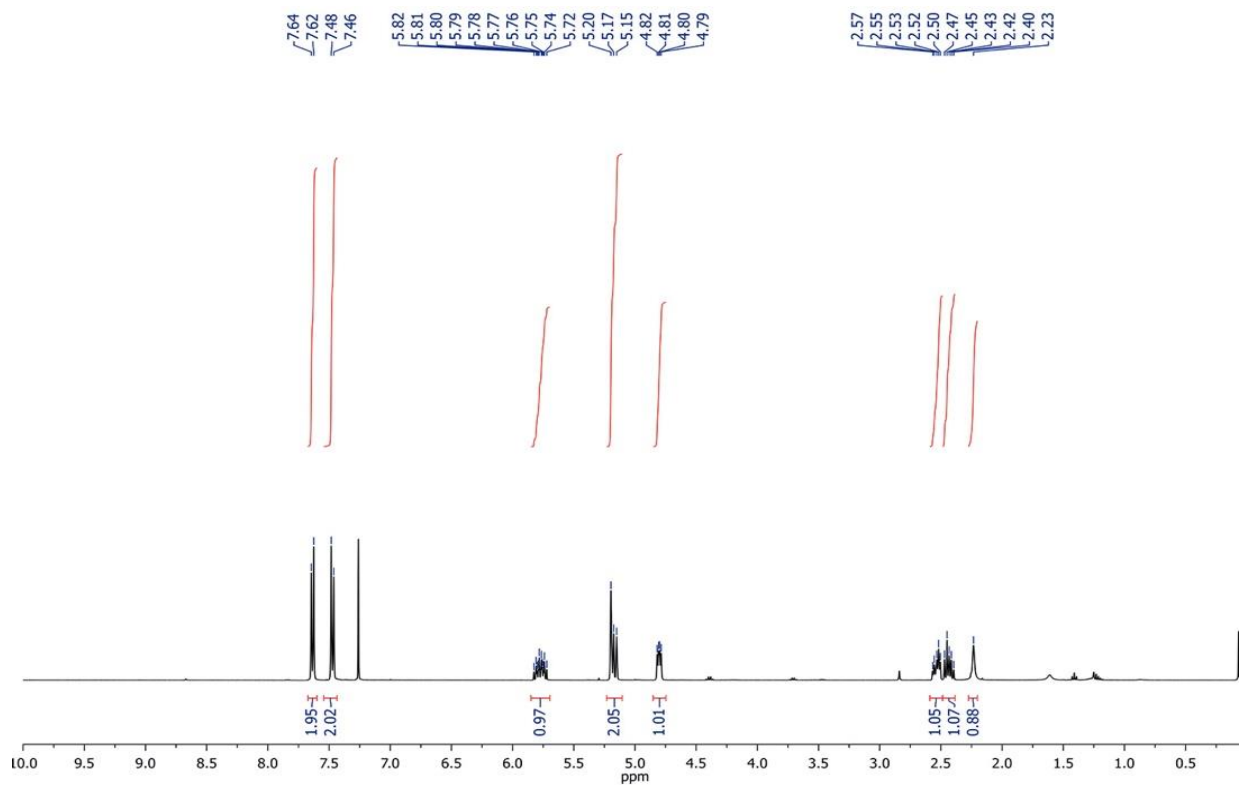
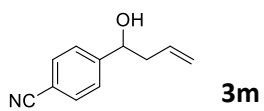


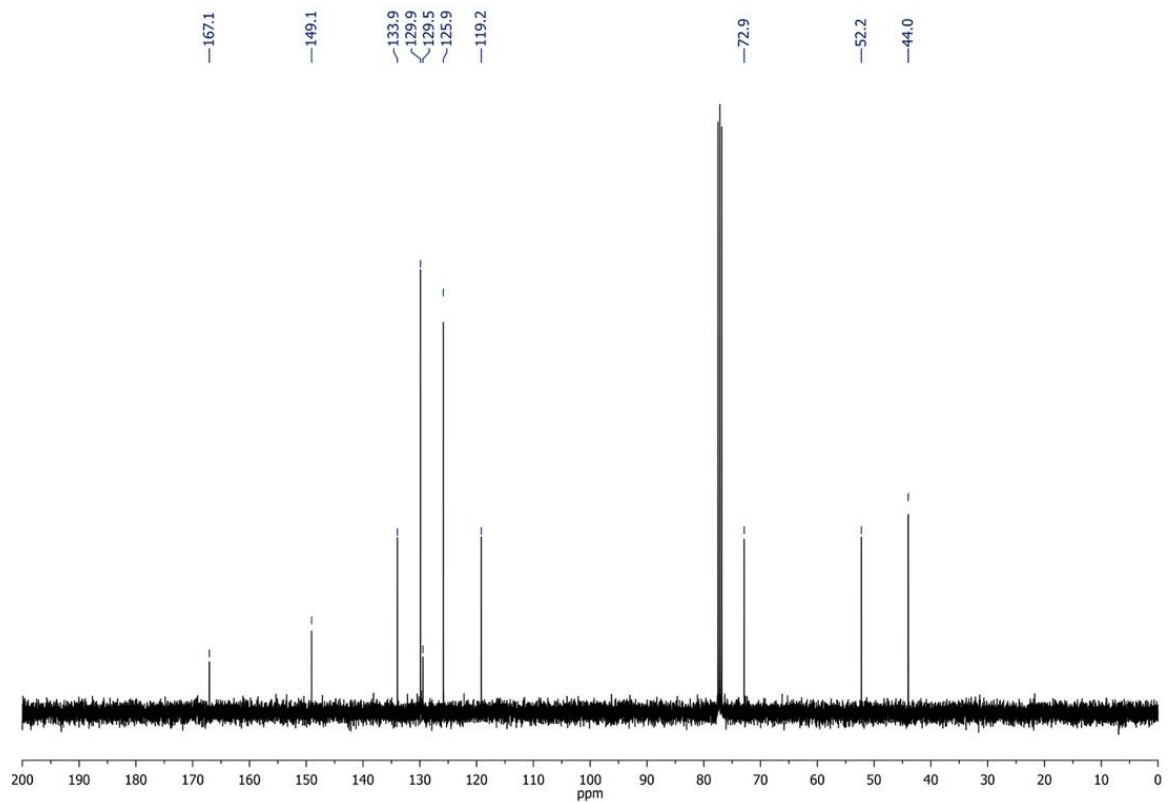
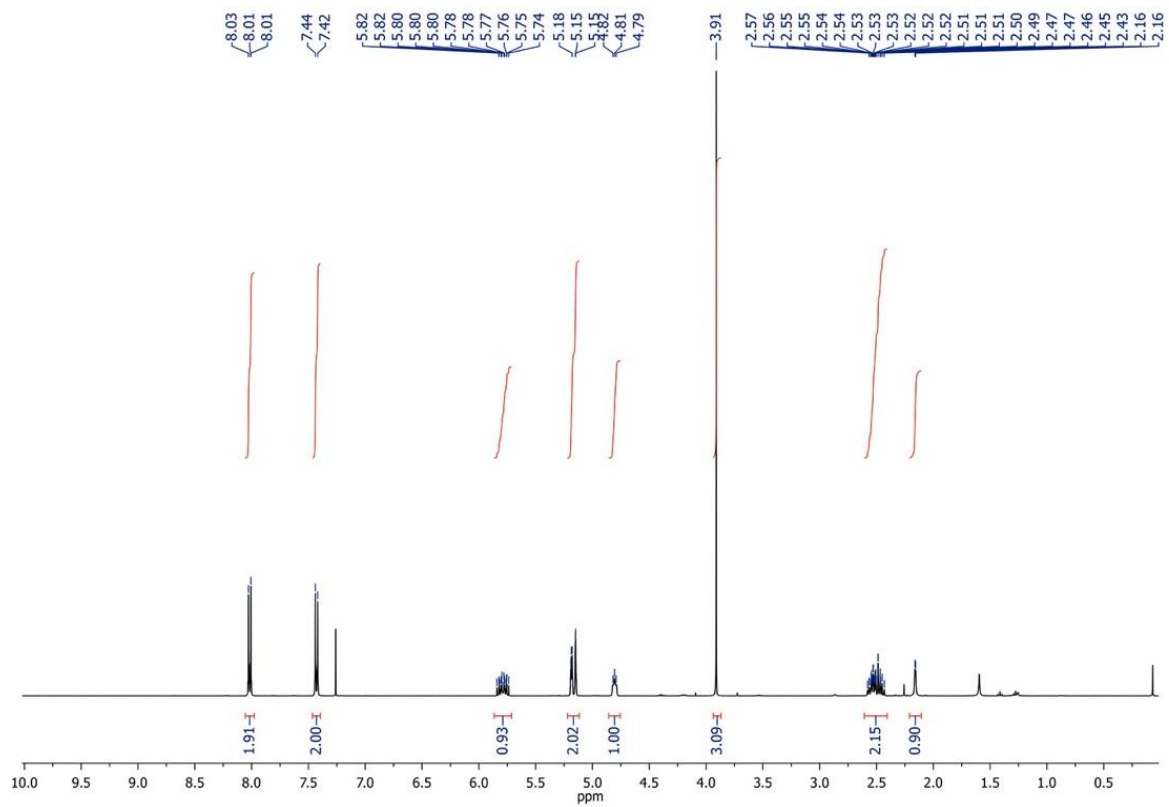
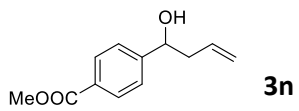


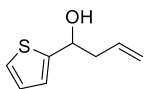


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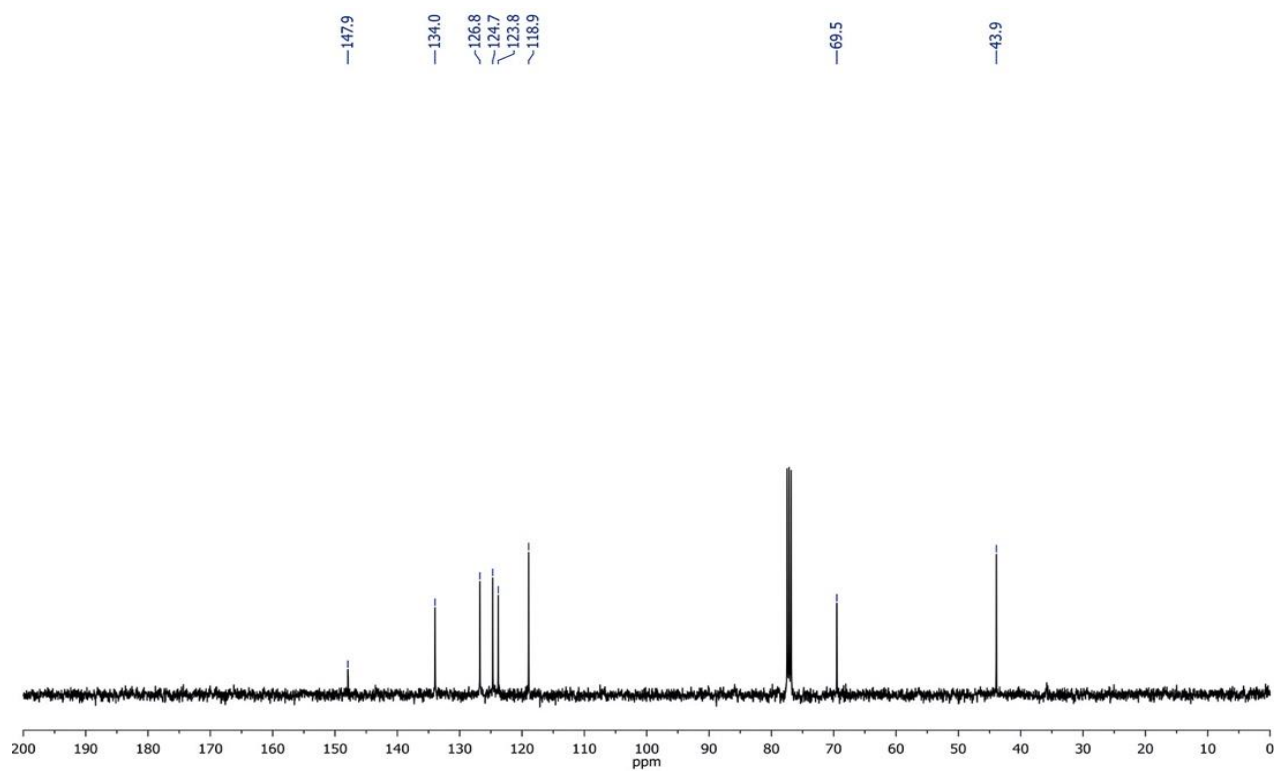
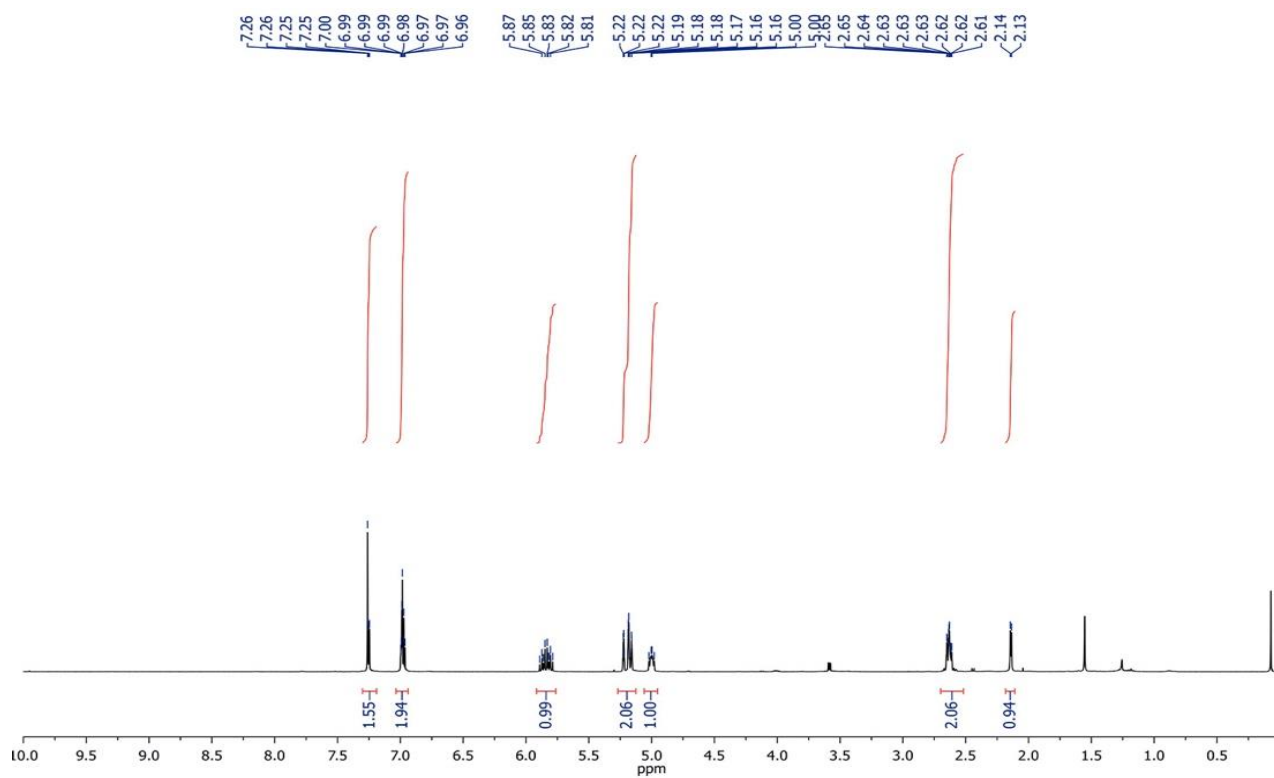


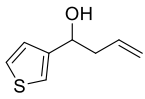




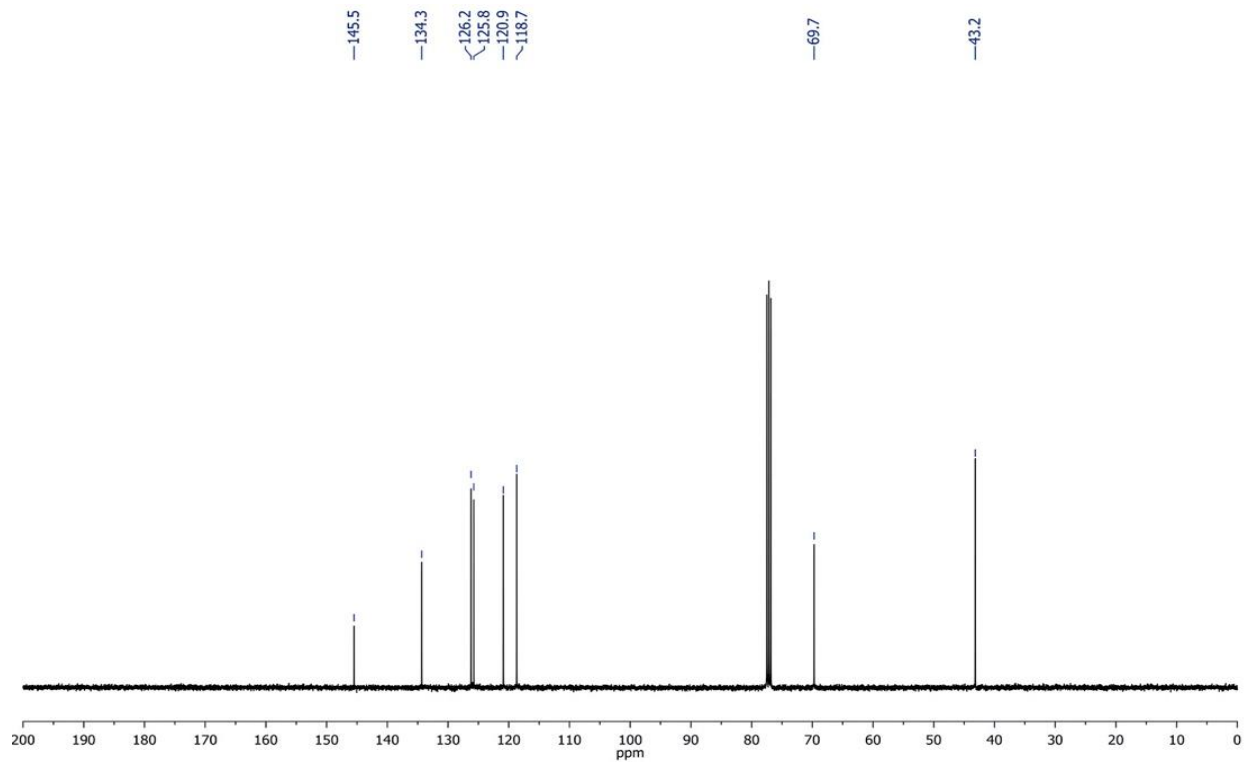
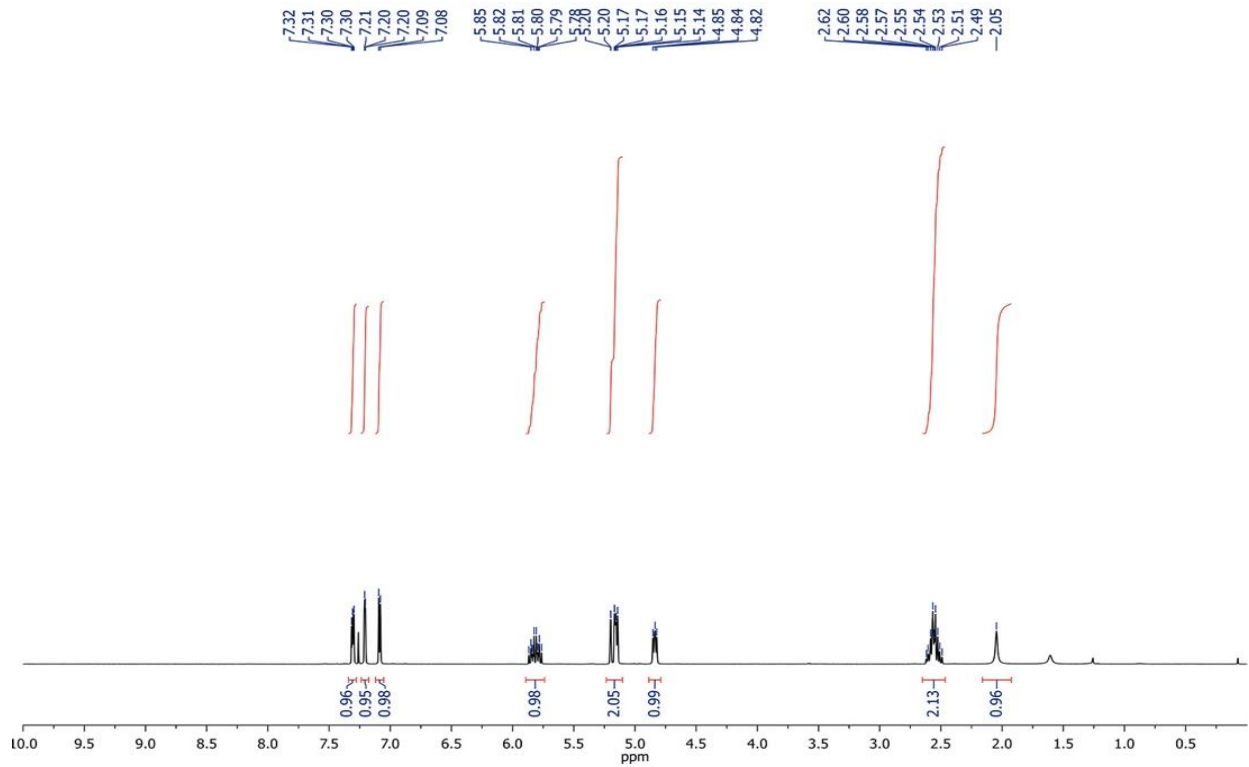


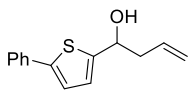
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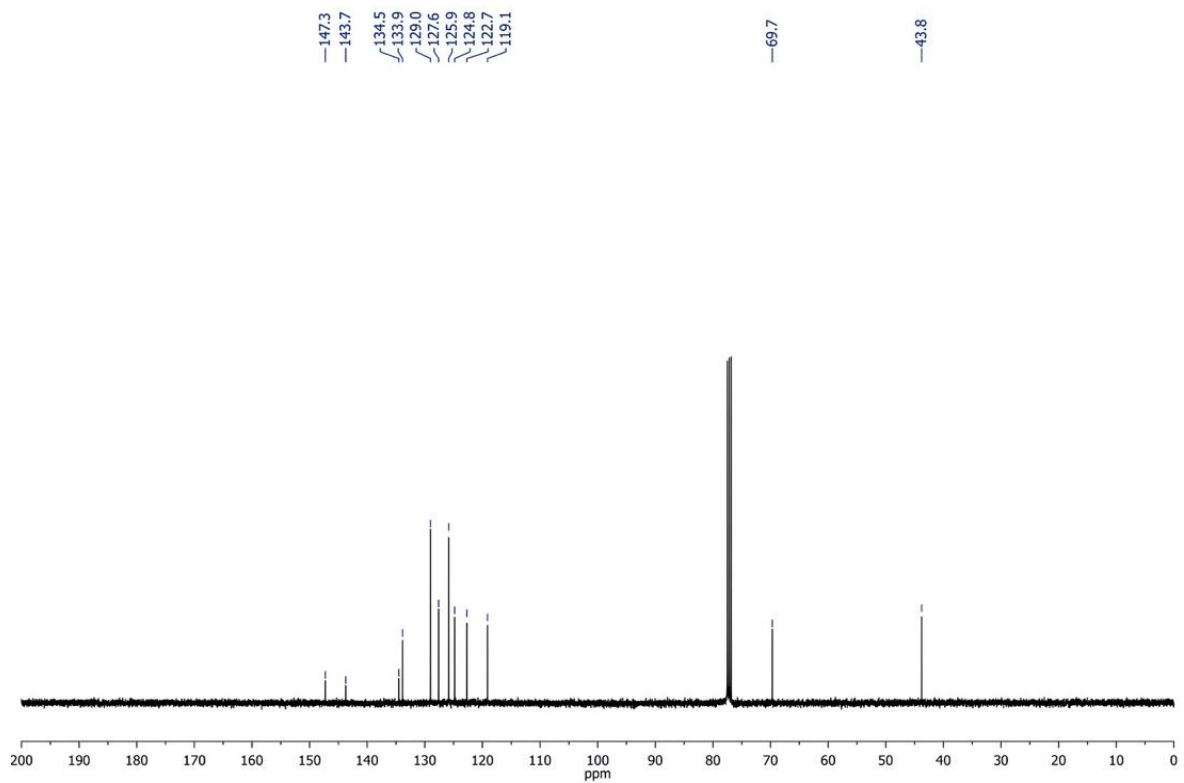
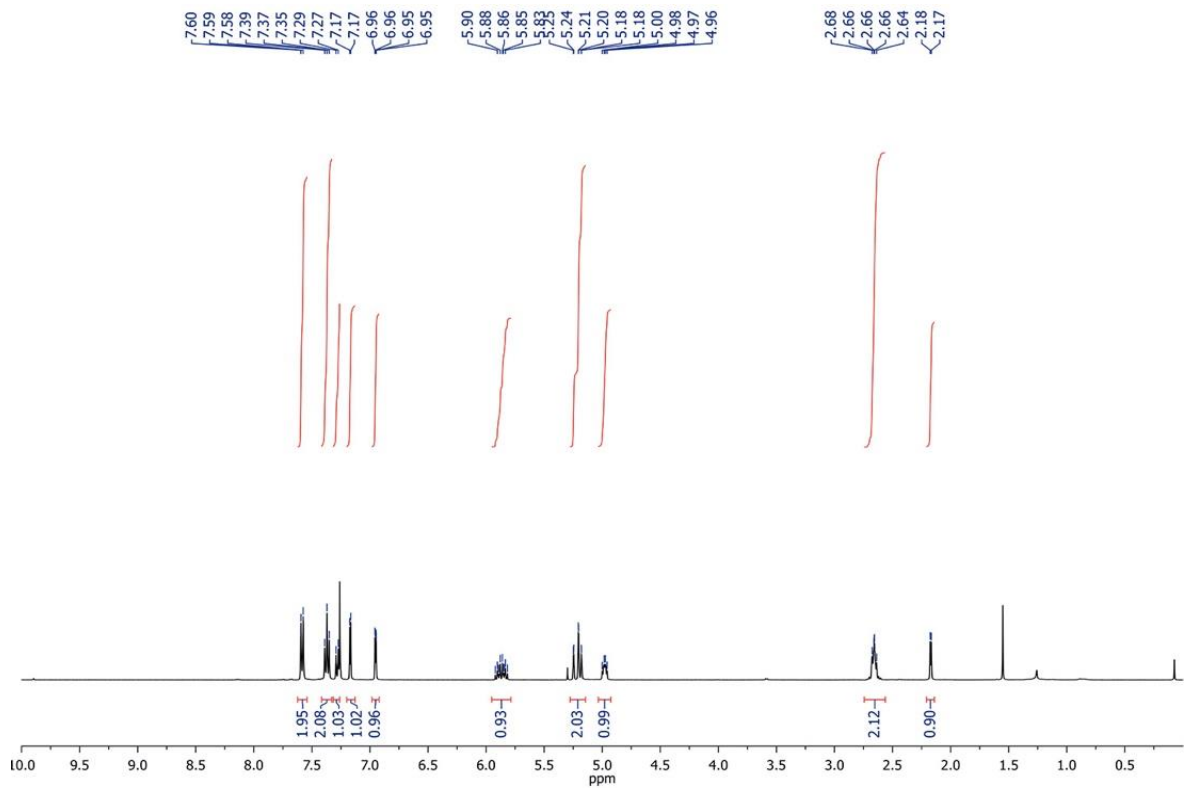


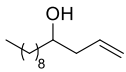
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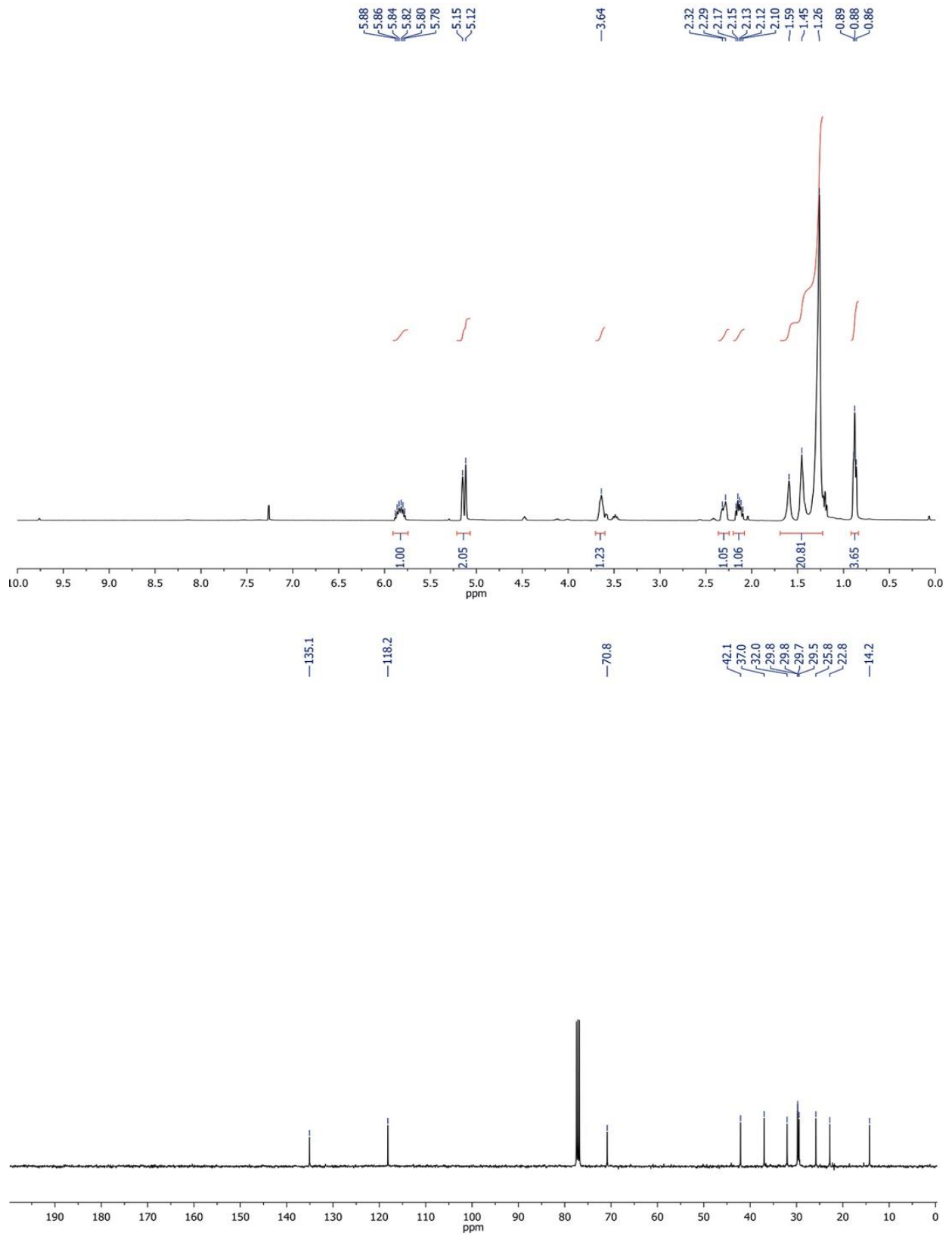


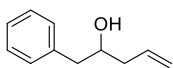
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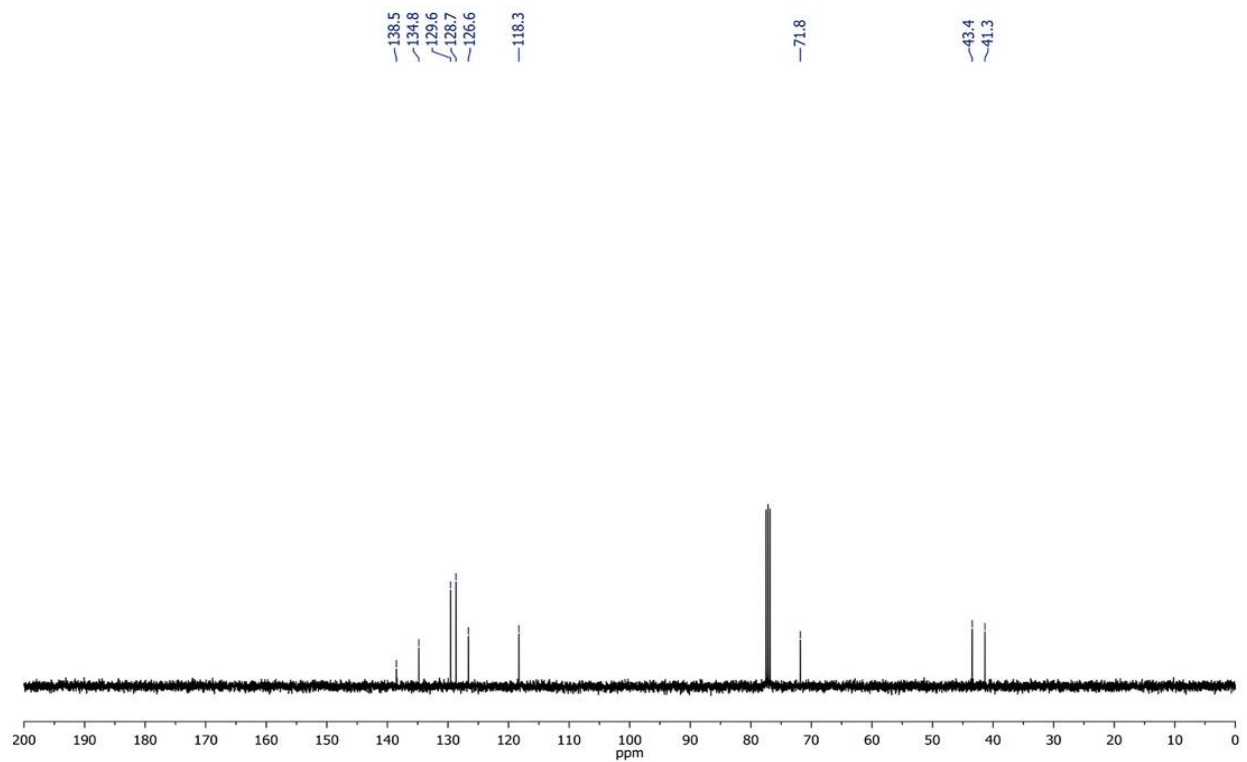
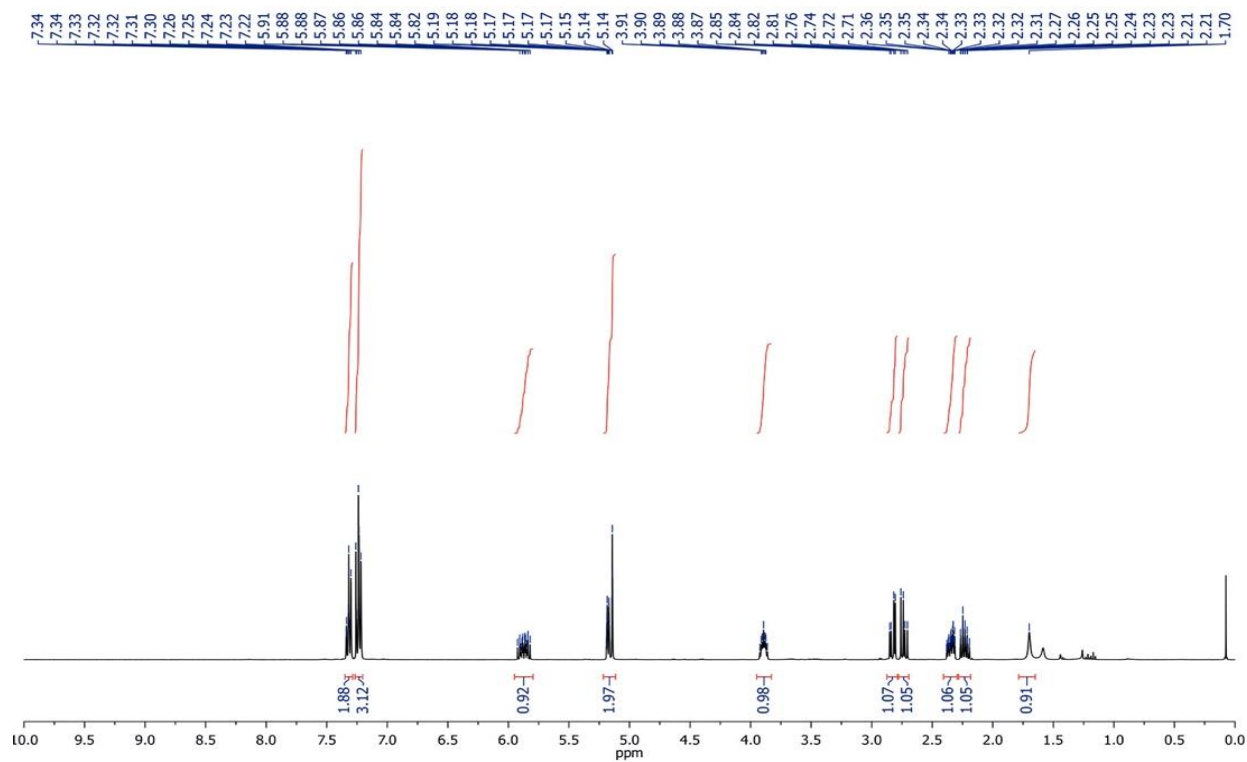


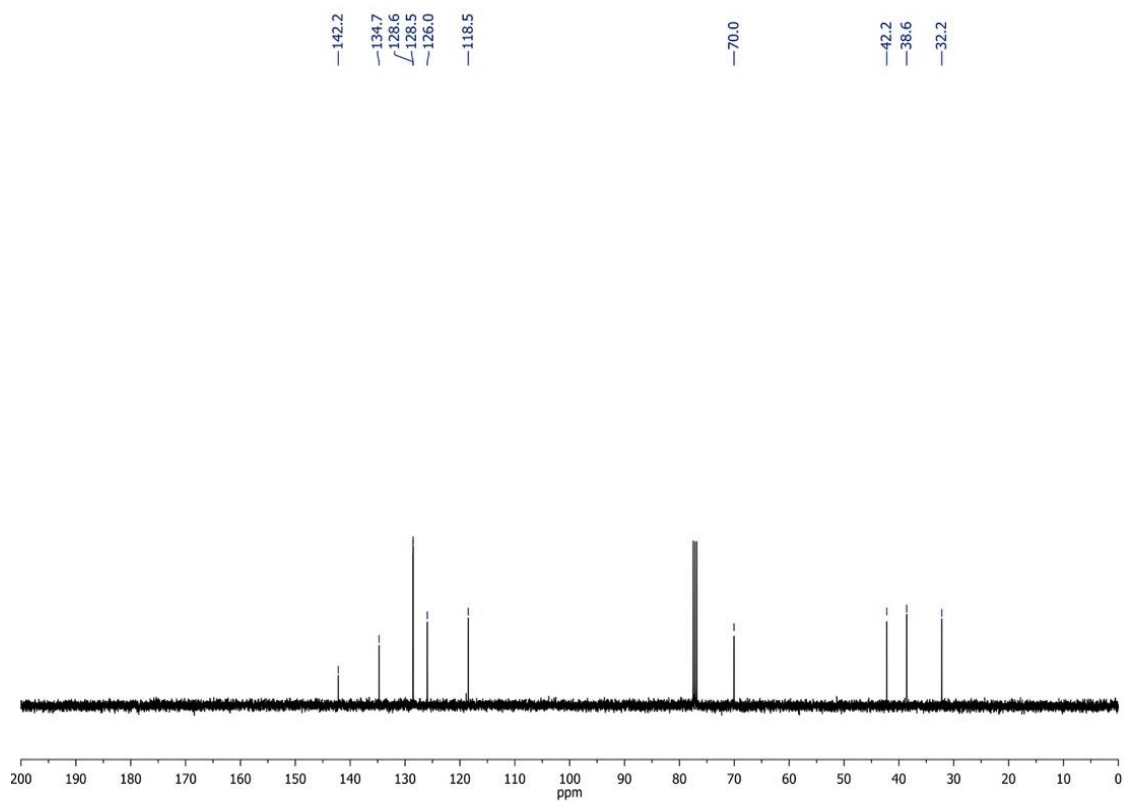
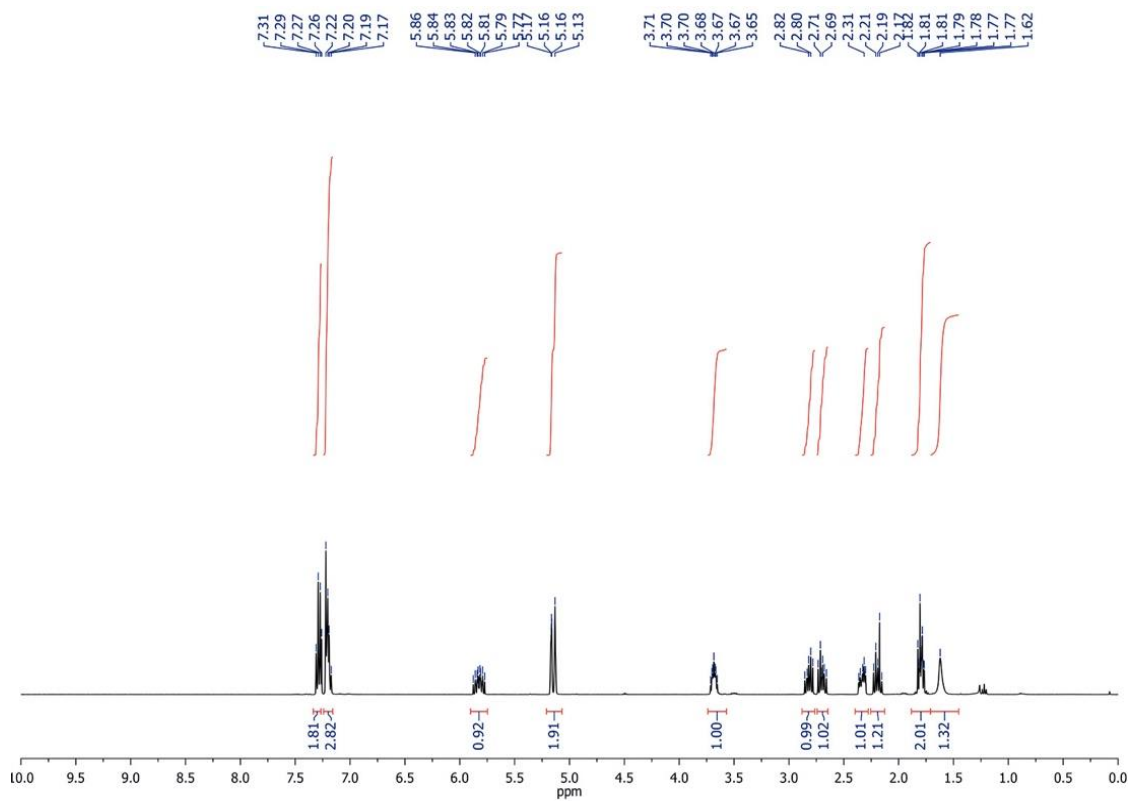
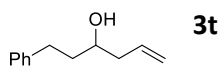
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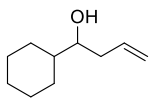




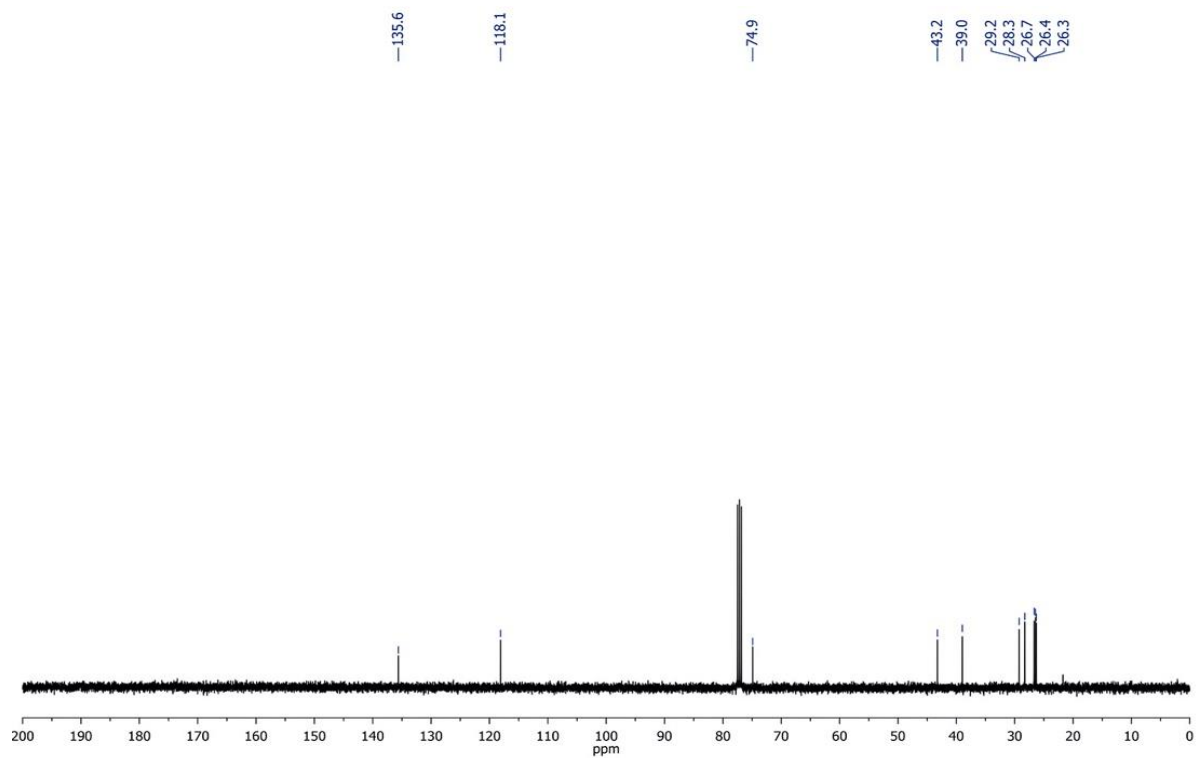
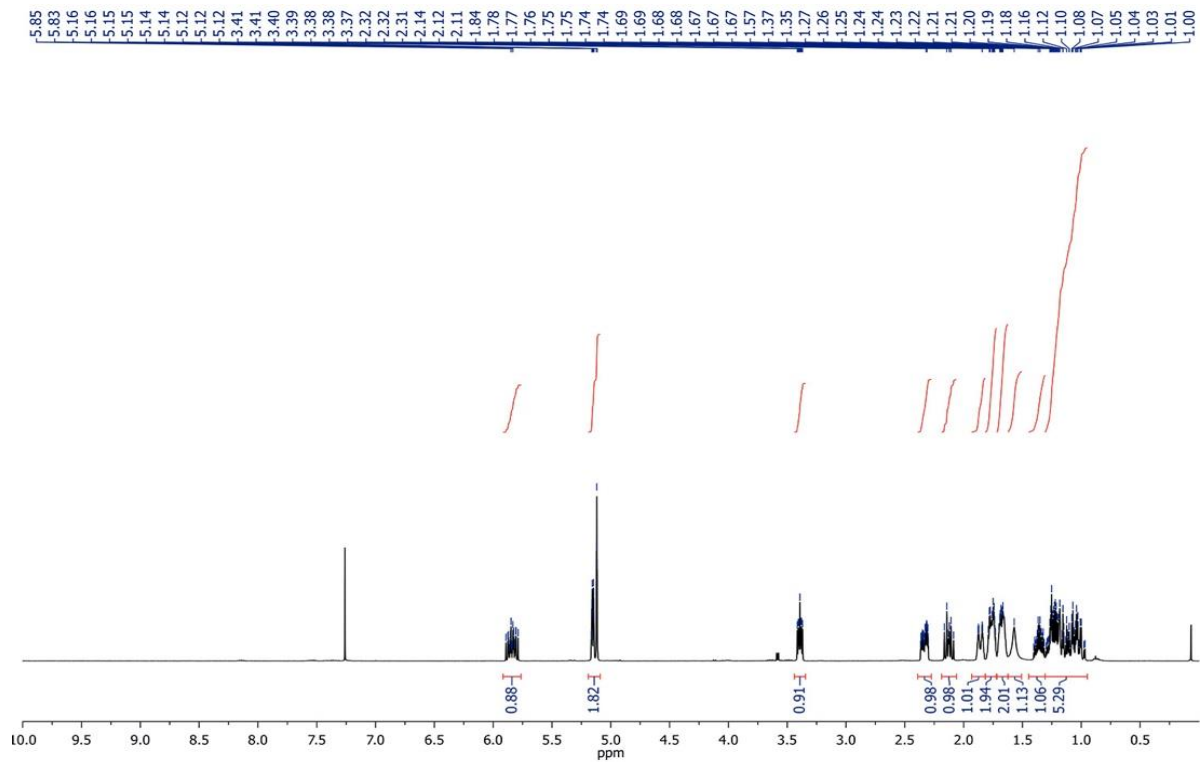
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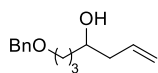




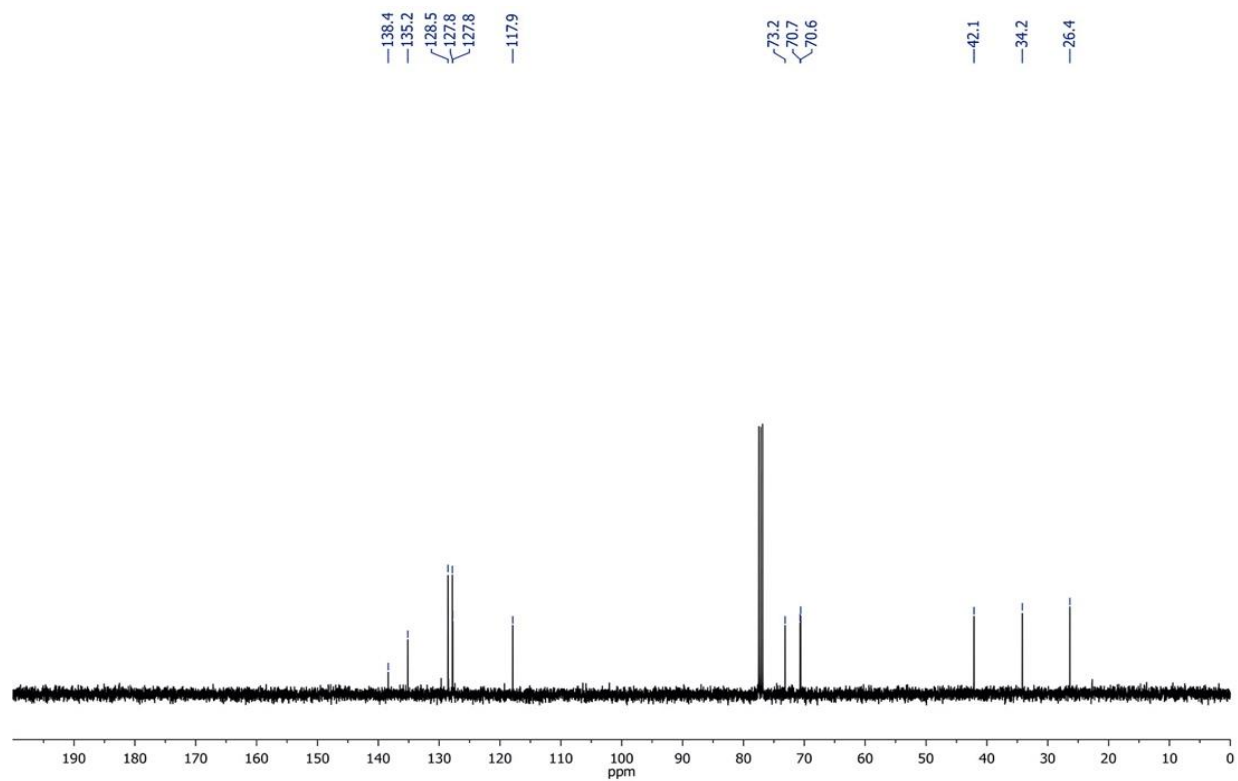
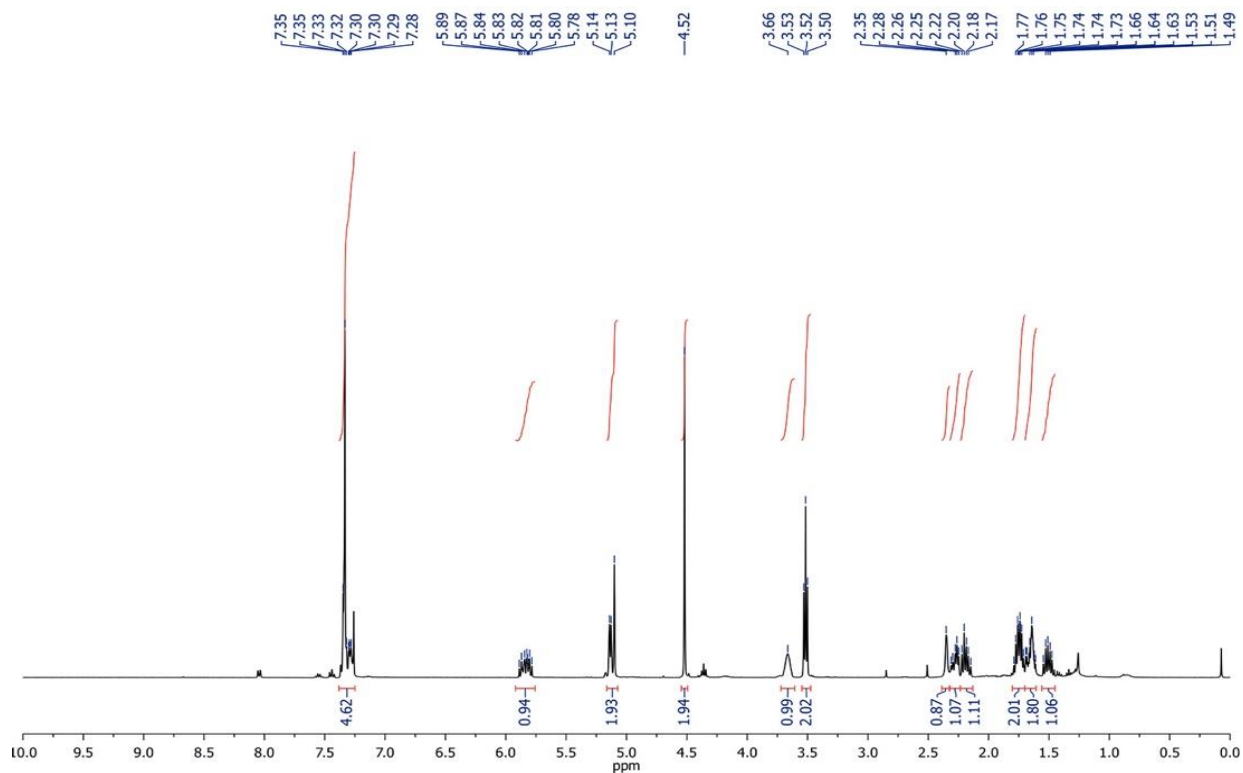


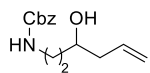
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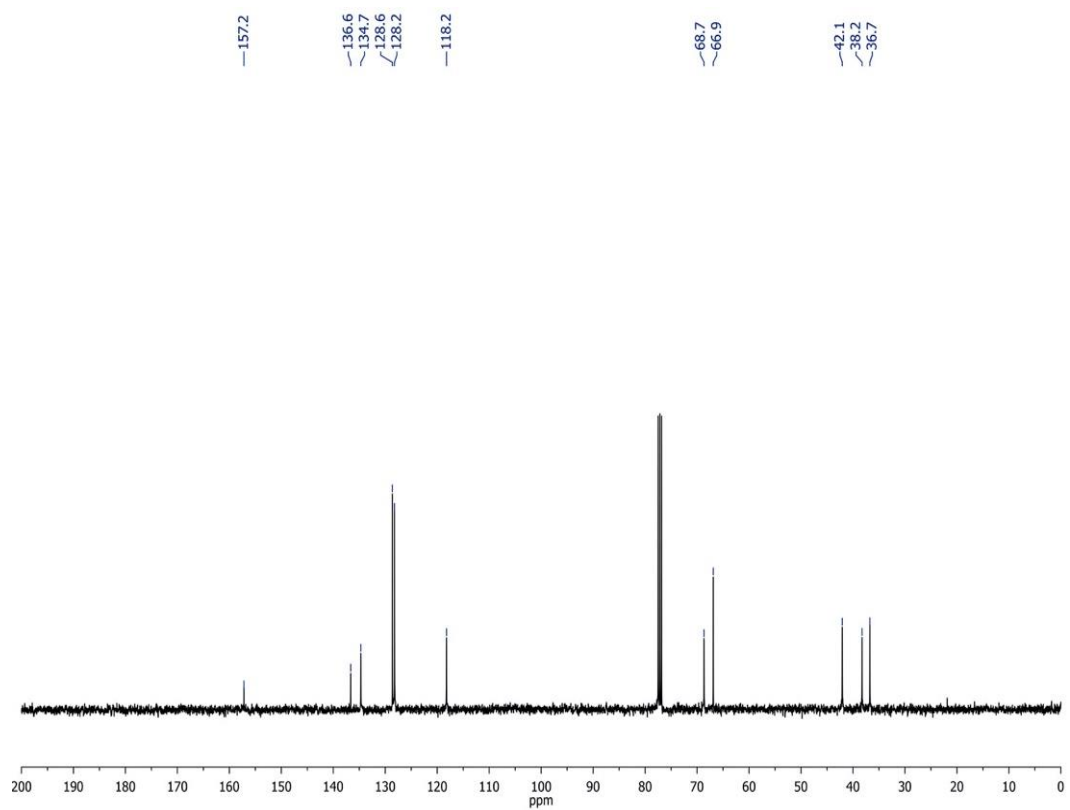
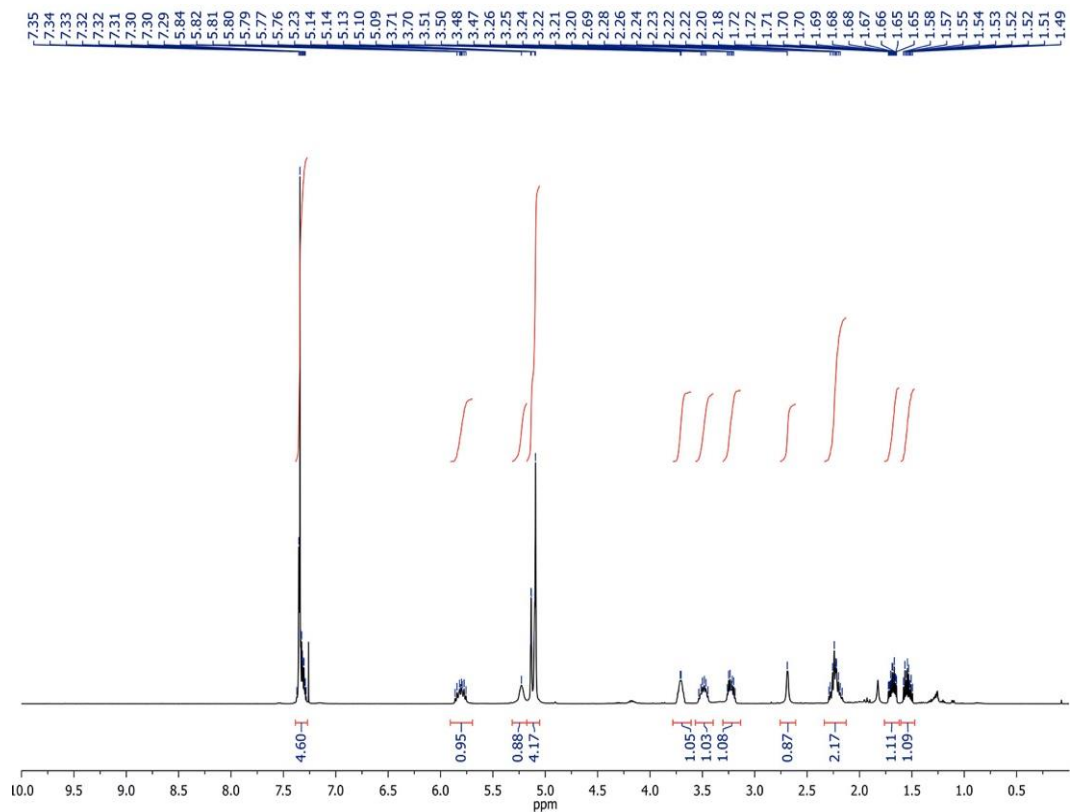


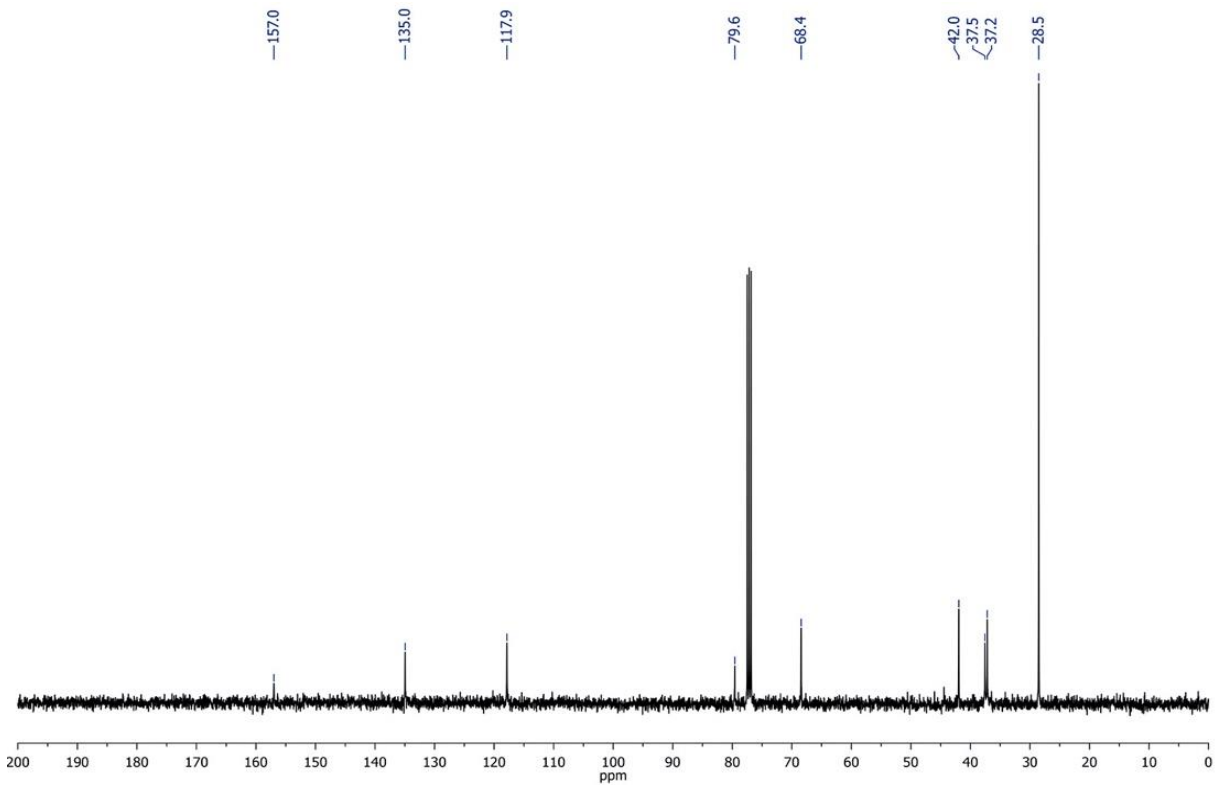
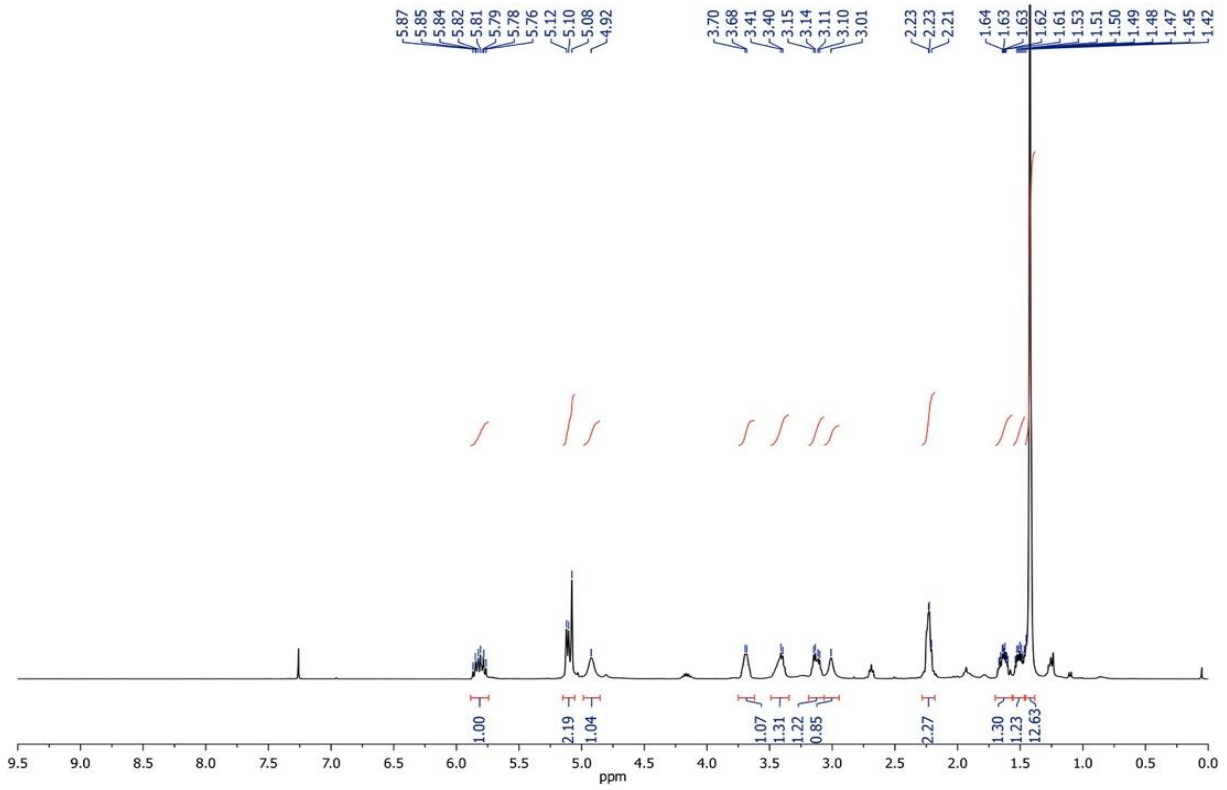
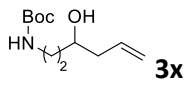
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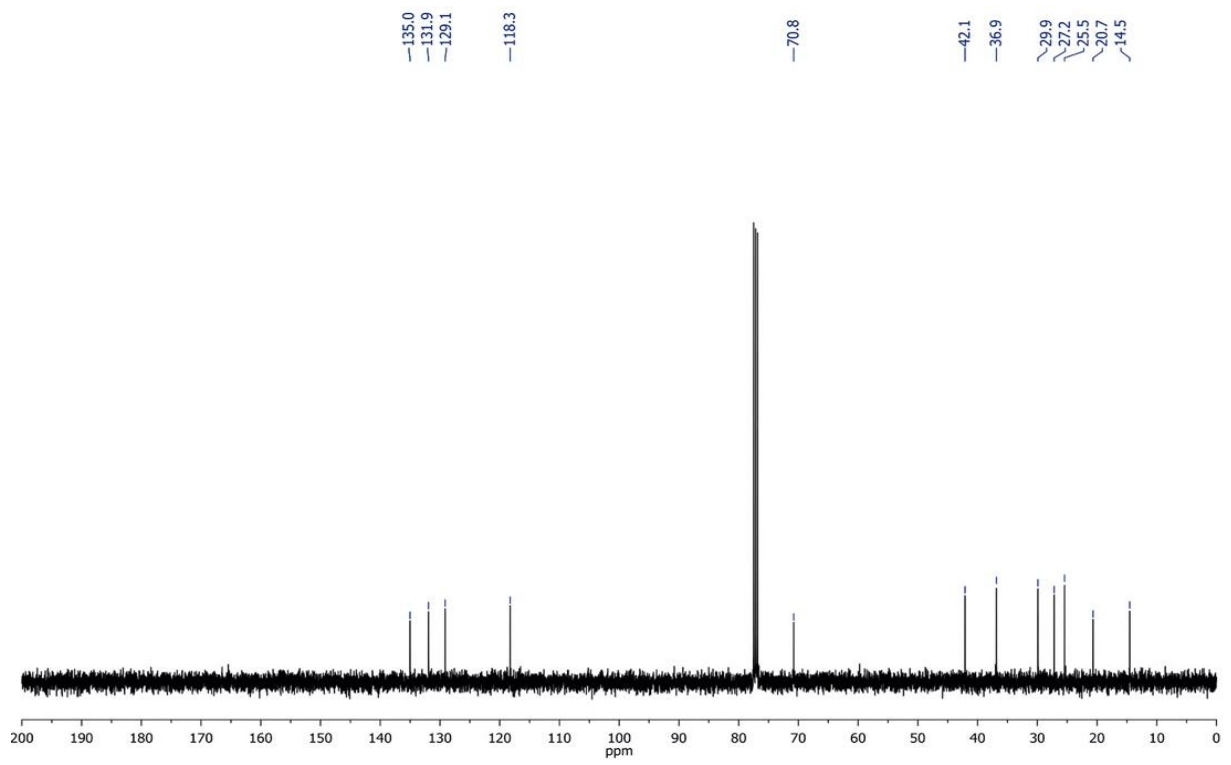
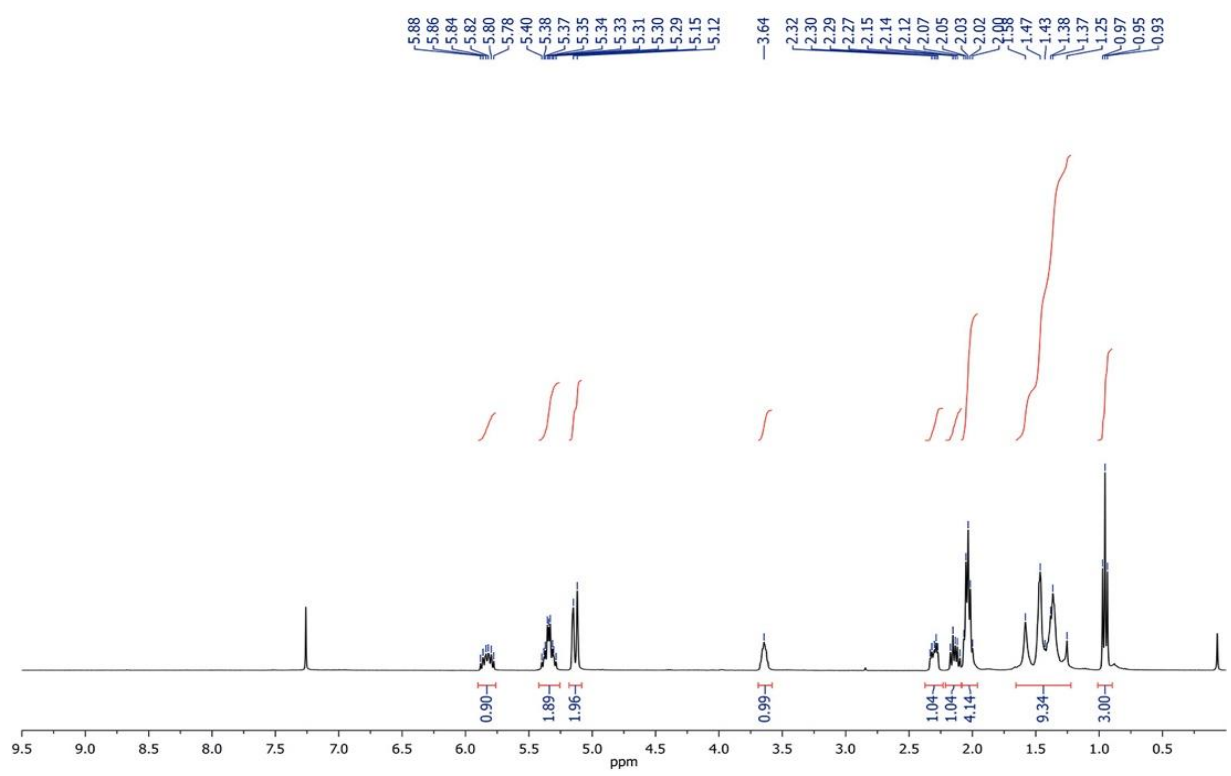
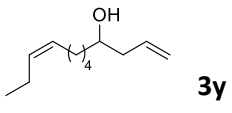


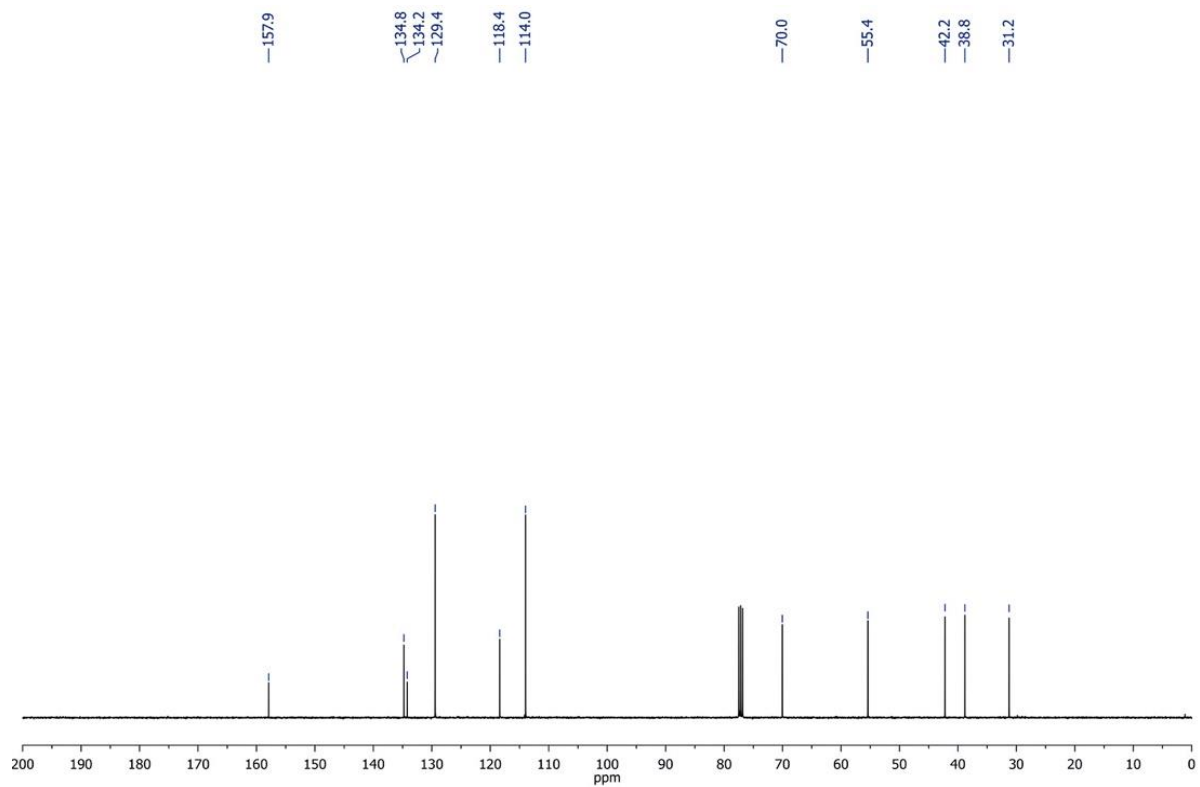
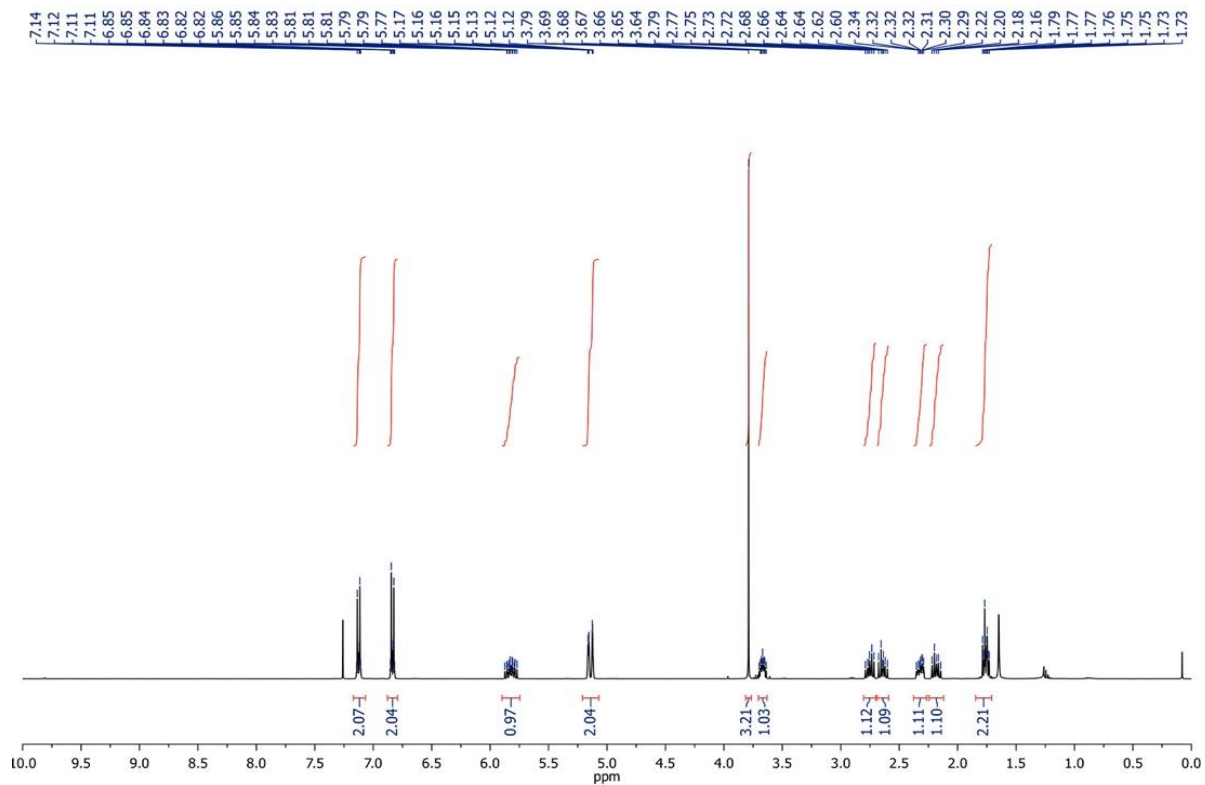
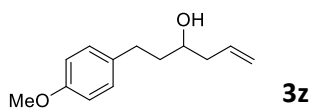


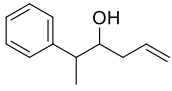
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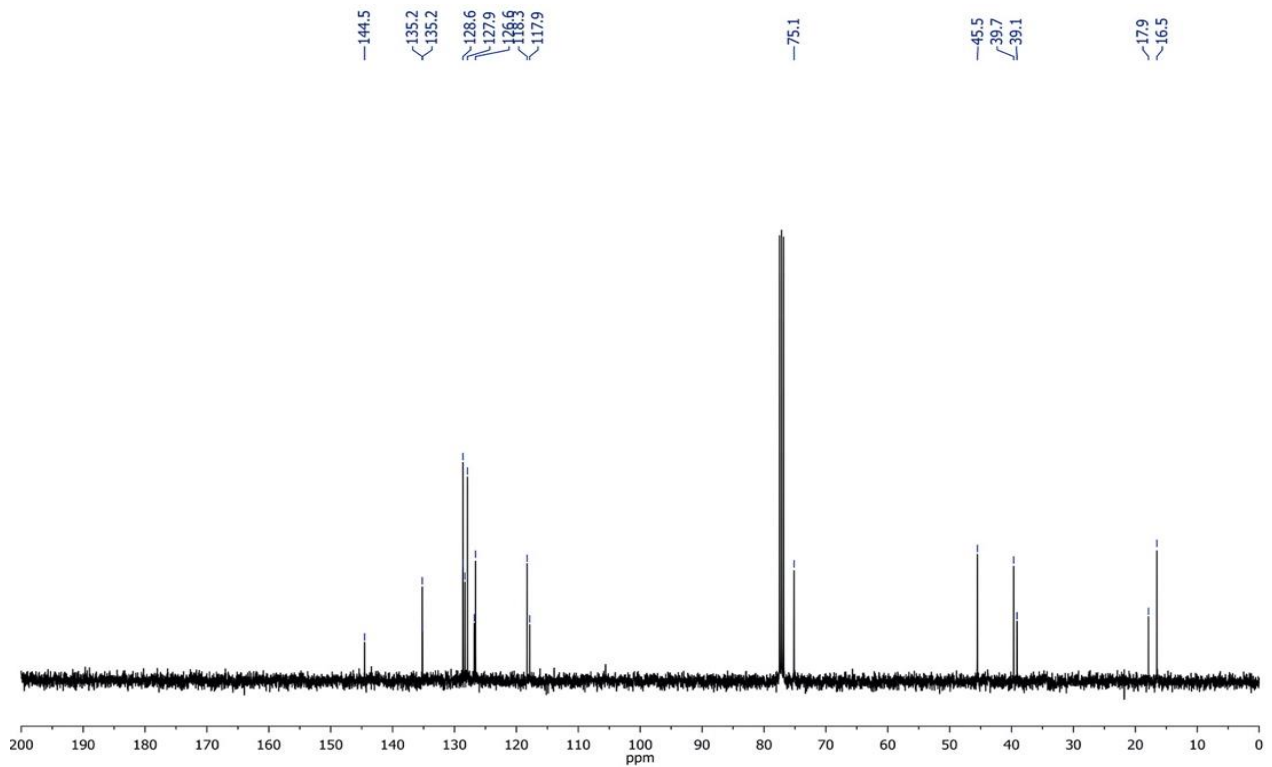
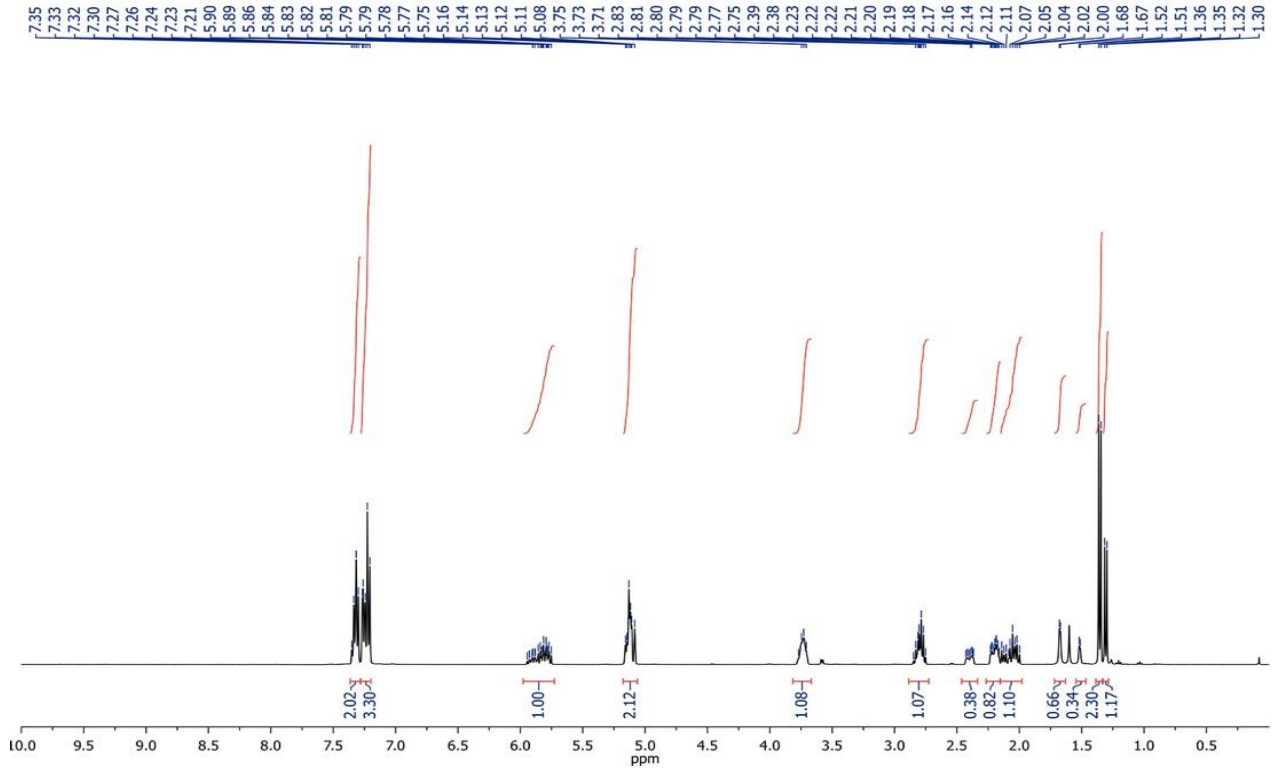


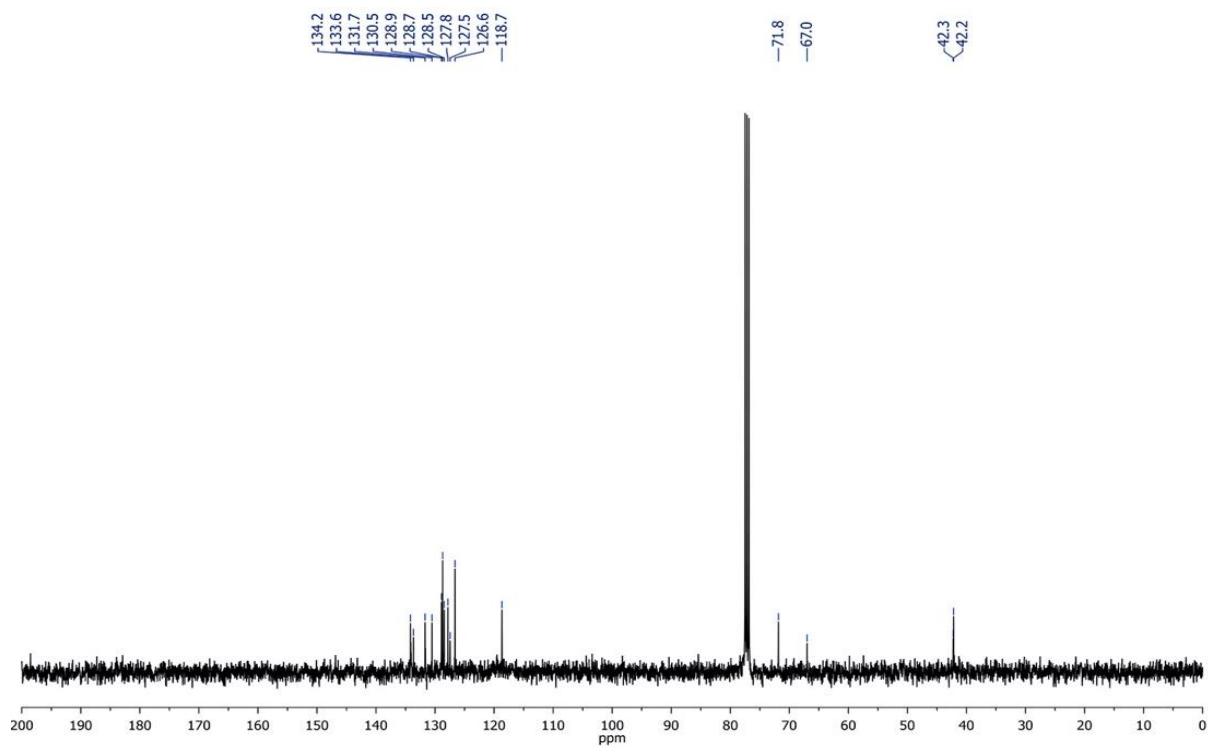
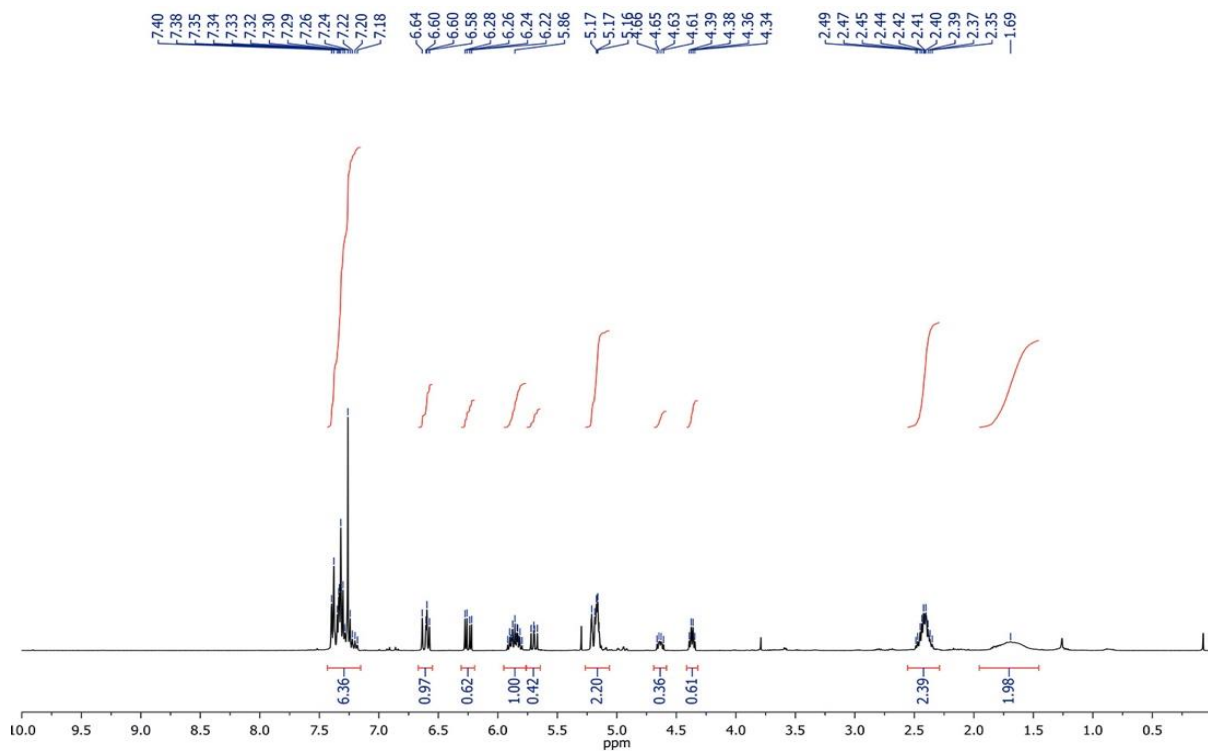
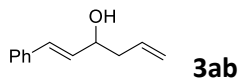


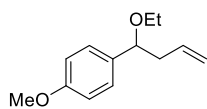




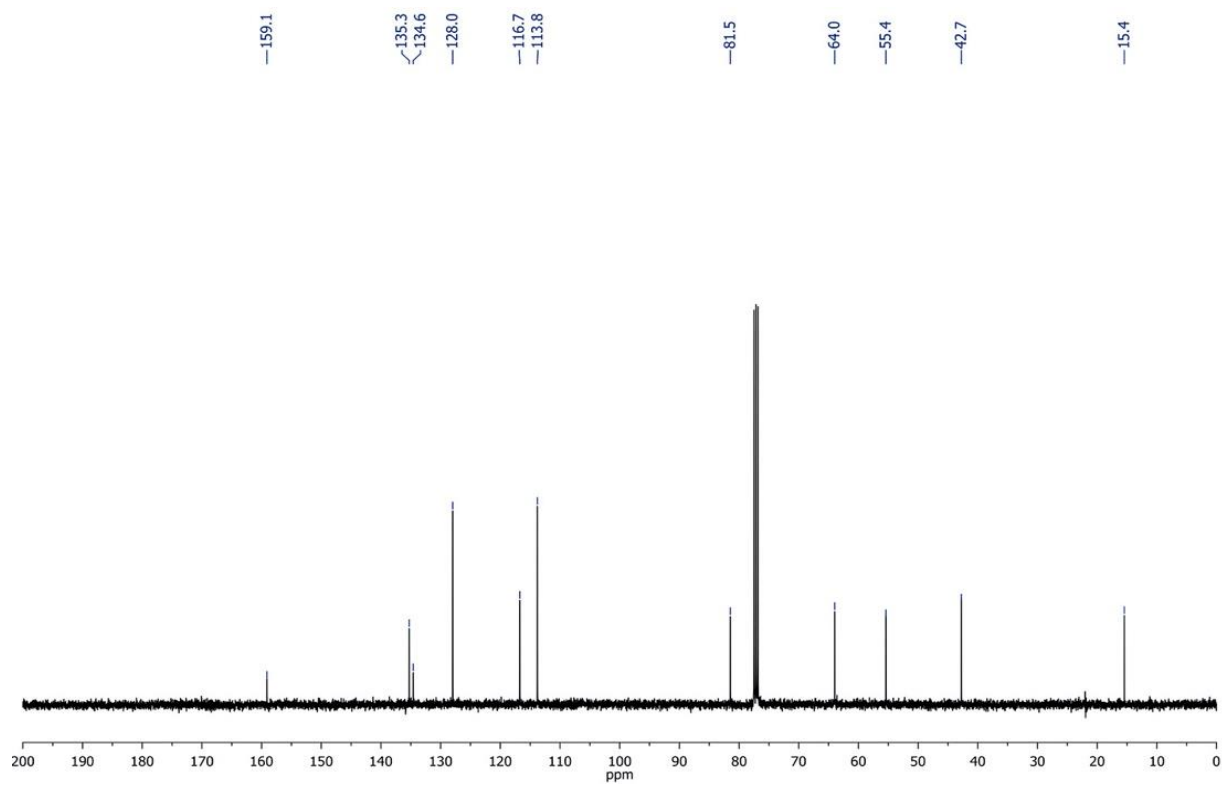
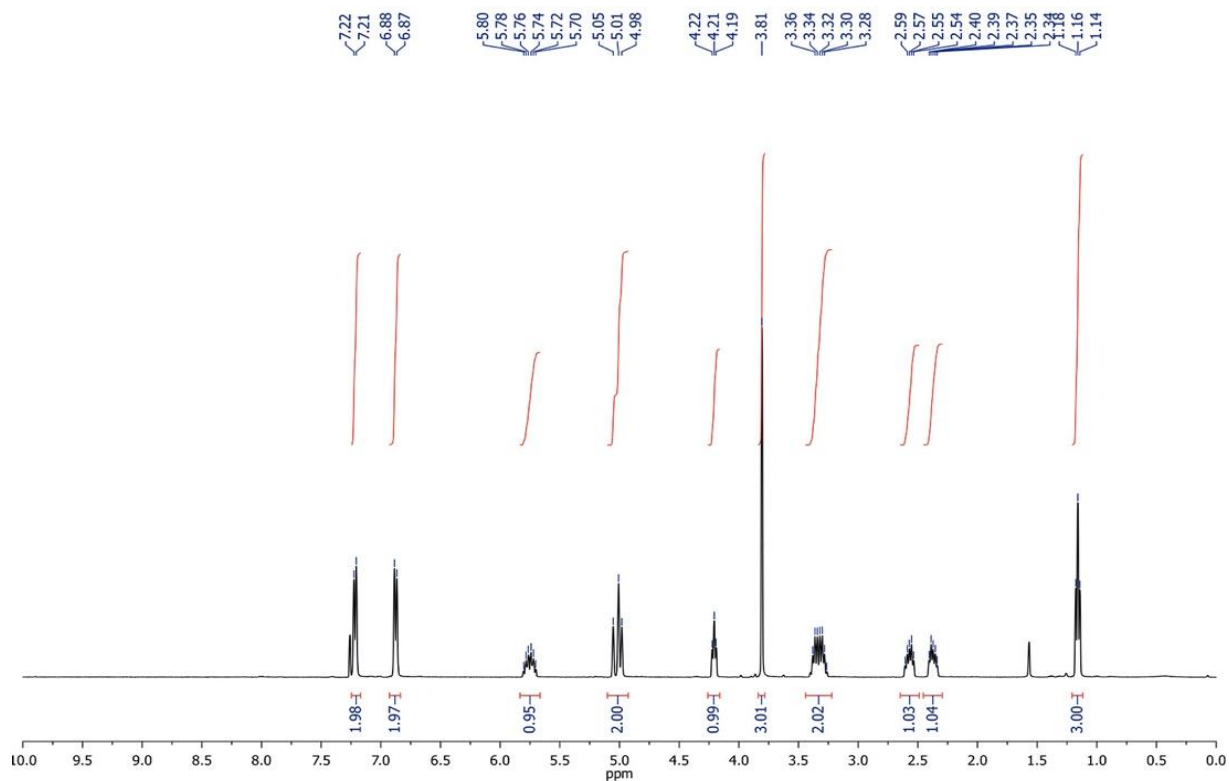
3aa







5k



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