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Supporting Information

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Highly Selective 1,6-Addition of Arylboronic Acids to □,□,□□-Unsaturated Carbonyl Compounds Catalyzed by an Iridium Complex

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Supporting Data

General. All anaerobic and moisture-sensitive manipulations were carried out with standard Schlenk techniques under predried nitrogen. NMR spectra were recorded on a JEOL JNM LA-500 spectrometer (500 MHz for ^{1}H, and 125 MHz for ^{13}C). Chemical shifts are reported in □ ppm referenced to an internal $SiMe_4$ standard for ^{1}H NMR and chloroform-*d* (□ 77.16) for ^{13}C NMR: The following abbreviations are used; s: singlet, d: doublet, t: triplet, q: quartet, quint: quintet, sext: sextet, m: multiplet.

Materials. Toluene was purified by passing through a neutral alumina column under nitrogen. Benzene was purchased from Wako Chemicals and used as received. $[Ir(OH)(cod)]_2$,[1] $[Rh(OH)(cod)]_2$,[2] and 3-penten-2-one (**5**)[3] were prepared according to the reported procedures. Dienone **8** was prepared by the modified procedure of reported one.[4]

Preparation of Dienones 1 and 7. (The yields have not been optimized.) To a solution of (acetylmethylene)triphenylphosphorane (36 mmol) in benzene (120 mL) was added the corresponding enals (30 mmol), and the mixture was refluxed overnight. After cooled to room temperature, the solution was concentrated with rotary evaporator, and the residue was extracted with pentane. Evaporation of the solvent followed by silica gel column chromatography (pentane/diethyl ether = 9/1) and bulb-to-bulb distillation under reduced pressure gave the product.

(3*E*,5*E*)-3,5-Heptadien-2-one (1) [CAS: 18402-90-9]**:** 42% yield (colorless oil). ^{1}H NMR ($CDCl_3$) □ 1.88 (d, *J* = 5.1 Hz, 3H), 2.26 (s, 3H), 6.05 (d, *J* = 15.4 Hz, 1H), 6.15–6.24 (m, 2H), 7.03–7.12 (m, 1H).

(*E*)-3-Penten-2-one (5) [CAS: 3102-33-8]: 66% yield (colorless oil). ^{1}H NMR ($CDCl_3$) □ 1.92 (dd, *J* = 6.8, 1.7 Hz, 3H), 2.24 (s, 3H), 6.11 (dq, *J* = 15.9, 1.7 Hz, 1H), 6.83 (dq, *J* = 15.9, 6.8 Hz, 1H).

(3*E*,5*E*)-3,5-Decadien-2-one (7) [CAS: 95416-58-3]: 15% yield (colorless oil). ^{1}H NMR

($CDCl_3$) δ 0.91 (t, *J* = 7.3 Hz, 3H), 1.28–1.47 (m, 4H), 2.14–2.23 (m, 2H), 2.26 (s, 3H), 6.05 (d, *J* = 15.5 Hz, 1H), 6.14–6.21 (m, 2H), 7.04–7.14 (m, 1H).

(4*E*,6*E*)-2,2-Dimethyl-4,6-octadien-3-one (8) [CAS: 109000-30-8]: 58% yield (colorless oil). ^{1}H NMR ($CDCl_3$) δ 1.16 (s, 9H), 1.86 (d, *J* = 5.2 Hz, 3H), 6.14–6.25 (m, 2H), 6.46 (d, *J* = 15.0 Hz, 1H), 7.22–7.30 (m, 1H).

Preparation of dienoate 9. To a solution of potassium *tert*-butoxide (2.6 g, 20 mmol) in *tert*-butyl alcohol (0.74 g, 10 mmol) and dichloromethane (50 mL) was added (2*E*,4*E*)-2,4-hexadienoyl chloride (2.6 g, 20 mmol) at 0 °C. Then, the solution was allowed to warm up to room temperature and stirred for 2 h. The resulting mixture was quenched with H_2O and extracted with Et_2O. The organic layer was washed with brine and dried over $MgSO_4$. Evaporation of the solvent followed by silica gel column chromatography (hexane/ethyl acetate = 98/2) and bulb-to-bulb distillation under reduced pressure gave the product **9** (1.6 g, 48% yield).

***tert*-Butyl (2*E*,4*E*)-2,4-hexadienoate (9)** [CAS: 81838-85-9]: (colorless oil). ^{1}H NMR ($CDCl_3$) δ 1.49 (s, 9H), 1.85 (d, *J* = 7.8 Hz, 3H), 5.70 (d, *J* = 15.4 Hz, 1H), 6.05–6.19 (m, 2H), 7.15 (dd, *J* = 15.4, 10.4 Hz, 1H).

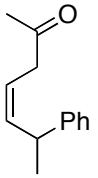
Preparation of amide 10. To a solution of pyrrolidine (2.6 g, 20 mmol) and $NaHCO_3$ aq (15 mL) in dichloromethane (50 mL) and was added (2*E*,4*E*)-2,4-hexadienoyl chloride (2.6 g, 20 mmol) at 0 °C. Then, the solution was allowed to warm up to room temperature and stirred for 2 h. The resulting mixture was quenched with H_2O and extracted with Et_2O. The organic layer was washed with brine and dried over $MgSO_4$. Evaporation of the solvent followed by silica gel column chromatography (hexane/ethyl acetate = 1/1) gave the product **10** (2.8 g, 84% yield).

1-((2*E*,4*E*)-2,4-hexadienoyl)pyrrolidine (10) [CAS: 221219-66-5]: (white solid). ^{1}H NMR ($CDCl_3$) δ 1.84 (d, *J* = 6.7 Hz, 3H), 1.83–1.89 (m, 2H), 1.93–1.99 (m, 2H), 3.50–3.56 (m, 4H), 6.07 (d, *J* = 14.9 Hz, 1H), 6.06–6.13 (m, 1H), 6.17–6.24 (m, 1H), 7.27 (dd, *J* = 14.9, 10.9 Hz, 1H).

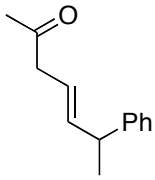
Procedure for iridium-catalyzed 1,6-addition of phenylboronic acid to dienone 1 (*Scheme 2*). To a solution of $[Ir(OH)(cod)]_2$ (8.3 mg, 0.025 mmol Ir), phenylboroxine (156 mg, 0.50 mmol) in toluene (1.0 mL) was added (3*E*,5*E*)-3,5-heptadien-2-one (**1**) (55.1 mg, 0.50 mmol) and H_2O (13.5 μL, 0.75 mmol) successively. After heating at 80 °C for 3 h, the resulting mixture was quenched with H_2O and extracted with Et_2O three times. The combined organic layer was washed with brine, dried over $MgSO_4$, filtered, and concentrated on a rotary evaporator. After short column chromatography on silica gel, the ratio of the product was measured by ^{1}H NMR spectroscopy.

Procedure for rhodium-catalyzed addition of phenylboronic acid to dienone 1 (*Scheme 3*). $[Rh(OH)(cod)]_2$ (5.7 mg, 0.025 mmol Rh) was used as a catalyst instead of $[Ir(OH)(cod)]_2$, and

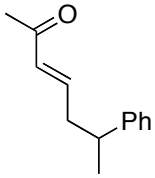
other manipulations were the same as those with the iridium catalyst.



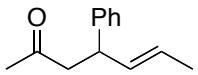
(*Z*)-6-Phenyl-4-hepten-2-one (2a)[5]**:** (colorless oil). ^{1}H NMR ($CDCl_3$) 1.35 (d, *J* = 7.0 Hz, 3H), 2.11 (s, 3H), 3.21 (dd, *J* = 17.1, 7.2 Hz, 1H), 3.25 (dd, *J* = 17.1, 7.2 Hz, 1H), 3.69 (quint d, *J* = 7.0, 2.1 Hz, 1H), 5.53–5.63 (m, 1H), 5.76 (ddt, *J* = 10.9, 7.2, 1.6 Hz, 1H), 7.16–7.24 (m, 3H), 7.27–7.32 (m, 2H). ^{13}C NMR ($CDCl_3$) 22.2, 29.4, 37.6, 42.5, 120.0, 126.1, 126.8, 128.4, 138.4, 145.7, 206.5.



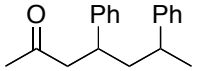
(*E*)-6-Phenyl-4-hepten-2-one (2b) [CAS: 864148-47-0]**:** (colorless oil). ^{1}H NMR ($CDCl_3$) 1.37 (d, *J* = 7.1 Hz, 3H), 2.14 (s, 3H), 3.14 (d, *J* = 6.8 Hz, 2H), 3.48 (quint, *J* = 6.9 Hz, 1H), 5.59 (dtd, *J* = 15.4, 6.8, 1.3 Hz, 1H), 5.73 (ddt, *J* = 15.4, 6.9, 1.2 Hz, 1H), 7.16–7.24 (m, 3H), 7.27–7.32 (m, 2H). ^{13}C NMR ($CDCl_3$) 21.1, 29.4, 42.3, 47.5, 120.8, 126.2, 127.2, 128.5, 139.6, 145.6, 207.2.



(*E*)-6-Phenyl-3-hepten-2-one (2c) [CAS: 344774-26-1]**:** (colorless oil). ^{1}H NMR ($CDCl_3$) 1.30 (d, *J* = 7.0 Hz, 3H), 2.18 (s, 3H), 2.46 (dtd, *J* = 14.4, 7.3, 1.2 Hz, 1H), 2.54 (dtd, *J* = 14.4, 7.3, 1.4 Hz, 1H), 2.91 (sext, *J* = 7.1 Hz, 1H), 6.03 (dt, *J* = 15.9, 1.3 Hz, 1H), 6.67 (dt, *J* = 15.9, 7.5 Hz, 1H), 7.16–7.23 (m, 3H), 7.31 (t, *J* = 7.6 Hz, 2H). ^{13}C NMR ($CDCl_3$) 21.7, 26.9, 39.3, 41.2, 126.4, 126.8, 128.6, 132.6, 145.9, 146.4, 198.6.



(*E*)-4-Phenyl-5-hepten-2-one (3) [CAS: 88343-87-7]**:** (colorless oil). ^{1}H NMR ($CDCl_3$) 1.63–1.66 (m, 3H), 2.07 (s, 3H), 2.78 (dd, *J* = 16.0, 6.8 Hz, 1H), 2.83 (dd, *J* = 16.0, 7.7 Hz, 1H), 3.84 (q, *J* = 7.3 Hz, 1H), 5.45 (dqd, *J* = 15.3, 6.3, 1.1 Hz, 1H), 5.57 (ddq, *J* = 15.3, 7.3, 1.3 Hz, 1H), 7.16–7.24 (m, 3H), 7.27–7.32 (m, 2H). ^{13}C NMR ($CDCl_3$) 17.9, 30.7, 44.0, 49.8, 125.5, 126.5, 127.5, 128.6, 133.4, 143.8, 207.4.

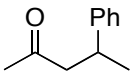


4,6-Diphenyl-2-heptanone (4): (colorless oil). The product was given as a mixture of two diastereomers. (*syn*:*anti* = 1:1) ^{1}H NMR ($CDCl_3$) 1.13 (d, *J* = 7.0 Hz, 3H), 1.24 (d, *J* = 7.0 Hz, 3H), 1.75–2.00 (m, 2H x 2), 1.89 (s, 3H), 1.95 (s, 3H), 2.34–2.53 (m, 1H x 2), 2.54–2.75 (m, 2H x 2), 2.80–2.91 (m, 1H), 3.15–3.28 (m, 1H), 7.03–7.36 (m, 10H x 2). ^{13}C NMR ($CDCl_3$) 20.9, 24.0, 30.4, 30.7, 36.9, 37.6, 39.2, 39.4, 44.3, 45.2, 51.2, 51.7, 126.1, 126.2, 126.6, 126.6, 126.9, 127.4, 127.6, 127.8, 128.5, 128.5, 128.6, 128.7, 144.1, 144.2, 146.5, 147.9, 207.8. Anal. Calcd for $C_{19}H_{22}O$: C, 85.67; H, 8.32. Found: C, 85.57; H, 8.42.

Procedure of competitive reaction of dienone 1 and enone 5 with phenylboronic acid in the presence of [Ir(OH)(cod)]$_2$ (*Scheme 4*). To a solution of [Ir(OH)(cod)]$_2$ (8.3 mg, 0.025 mmol Ir), phenylboroxine (311 mg, 1.0 mmol) in toluene (2.0 mL) was added (3*E*,5*E*)-3,5-heptadien-2-one (**1**) (55.1 mg, 0.50 mmol), (*E*)-3-penten-2-one (**5**) (42.1 mg, 0.50 mmol), and H_2O (27.0 L, 1.5 mmol) successively. After heating at 80 °C for 0.5 h, the resulting mixture was quenched with H_2O

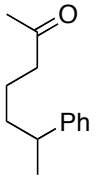
and extracted with Et_2O three times. The combined organic layer was washed with brine, dried over $MgSO_4$, filtered, and concentrated on a rotary evaporator. After short column chromatography on silica gel, the ratio of the product was measured by ^1H NMR spectroscopy.

Procedure of competitive reaction of dienone 1 and enone 5 with phenylboronic acid in the presence of [Rh(OH)(cod)]$_2$ (*Scheme 4*). [Rh(OH)(cod)]$_2$ (5.7 mg, 0.025 mmol Rh) was used as a catalyst instead of [Ir(OH)(cod)]$_2$ and other manipulations were the same as those with the iridium catalyst.

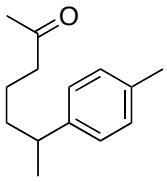


4-Phenyl-2-pentanone (6) [CAS: 17913-10-9]**:** (colorless oil). ^1H NMR ($CDCl_3$) δ 1.27 (d, J = 6.9 Hz, 3H), 2.06 (s, 3H), 2.66 (dd, J = 16.2, 7.2 Hz, 1H), 2.75 (dd, J = 16.2, 6.5 Hz, 1H), 3.25–3.36 (m, 1H), 7.15–7.24 (m, 3H), 7.26–7.32 (m, 2H). ^{13}C NMR ($CDCl_3$) δ 22.2, 30.7, 35.6, 52.1, 126.5, 126.9, 128.7, 146.3, 208.0.

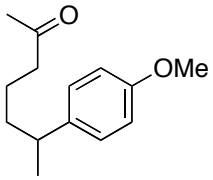
General procedure for iridium-catalyzed 1,6-addition of arylboronic acids to $\alpha,\beta,\gamma,\delta$-unsaturated carbonyl compounds. To a solution of [Ir(OH)(cod)]$_2$ (8.3 mg, 0.025 mmol Ir), an arylboroxine (0.50 mmol) in toluene (1.0 mL) was added an $\alpha,\beta,\gamma,\delta$-unsaturated carbonyl compound (0.50 mmol) and H_2O (13.5 mL, 0.75 mmol) successively. After heating at 80 °C for 3 h, the resulting mixture was quenched with H_2O and extracted with Et_2O three times. The combined organic layer was washed with brine, dried over $MgSO_4$, filtered, and concentrated on a rotary evaporator. The residue was purified by silica gel column chromatography (hexane/ethyl acetate = 9/1~3/1) to give a mixture of the 1,6-addition products. Pd on carbon (10%) (59.2 mg, 0.050 mmol Pd) was placed in a Schlenk tube fitted with a dihydrogen balloon and a solution of the 1,6-addition products in ethyl acetate (2.0 mL) was added. The Schlenk tube was purged with dihydrogen (1.0 atm) and stirred at room temperature for 3 h. The reaction mixture was then filtered through Celite and the solvent was removed in vacuo to give the crude product, which was purified by a short column chromatography on silica gel. The results are summarized in ***Table 1***.



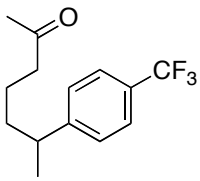
6-Phenyl-2-heptanone (11) [CAS: 51193-71-6]: 86% yield (colorless oil). ^1H NMR ($CDCl_3$) δ 1.23 (d, J = 7.0 Hz, 3H), 1.35–1.63 (m, 4H), 2.06 (s, 3H), 2.36 (t, J = 6.6 Hz, 2H), 2.63–2.73 (m, 1H), 7.14–7.21 (m, 3H), 7.24–7.33 (m, 2H). ^{13}C NMR ($CDCl_3$) δ 22.1, 22.3, 29.9, 37.8, 39.9, 43.8, 126.0, 127.0, 128.4, 147.3, 209.0.



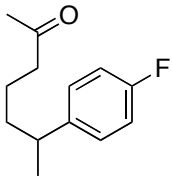
6-(4-Methylphenyl)-2-heptanone (12) [CAS: 75207-34-0]: 82% yield (colorless oil). ^1H NMR ($CDCl_3$) δ 1.22 (d, J = 6.9 Hz, 3H), 1.37–1.60 (m, 4H), 2.08 (s, 3H), 2.31 (s, 3H), 2.37 (t, J = 6.2 Hz, 2H), 2.61–2.69 (m, 1H), 7.03–7.13 (m, 4H). ^{13}C NMR ($CDCl_3$) δ 21.1, 22.2, 22.5, 30.0, 38.0, 40.0, 43.9, 126.9, 129.2, 135.5, 144.3, 209.2.



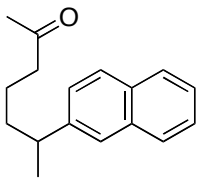
6-(4-Methoxyphenyl)-2-heptanone (13): 88% yield (colorless oil). ^{1}H NMR ($CDCl_3$) 1.21 (d, J = 7.0 Hz, 3H), 1.35–1.59 (m, 4H), 2.08 (s, 3H), 2.36 (t, J = 6.0 Hz, 2H), 2.59–2.69 (m, 1H), 3.78 (s, 3H), 6.80–6.86 (m, 2H), 7.05–7.11 (m, 2H). ^{13}C NMR ($CDCl_3$) 22.1, 22.6, 29.9, 38.1, 39.1, 43.9, 55.3, 113.9, 127.9, 139.4, 157.9, 209.2. Anal. Calcd for $C_{14}H_{20}O_2$: C, 76.33; H, 9.15. Found: C, 76.57; H, 9.18.



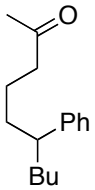
6-(4-Trifluoromethylphenyl)-2-heptanone (14): 75% yield (colorless oil). ^{1}H NMR ($CDCl_3$) 1.25 (d, J = 6.9 Hz, 3H), 1.34–1.63 (m, 4H), 2.09 (s, 3H), 2.39 (t, J = 7.0 Hz, 2H), 2.76 (sext, J = 7.0 Hz, 1H), 7.28 (d, J = 8.1 Hz, 2H), 7.54 (d, J = 8.1 Hz, 2H). ^{13}C NMR ($CDCl_3$) 21.9, 22.1, 29.9, 37.6, 40.0, 43.6, 124.5 (q, $J_{F\text{-}C}$ = 271 Hz), 125.4 (q, $J_{F\text{-}C}$ = 3.8 Hz), 127.4, 128.4 (q, $J_{F\text{-}C}$ = 32.4 Hz), 151.5, 208.8. Anal. Calcd for $C_{14}H_{17}F_3O$: C, 65.10; H, 6.63. Found: C, 65.09; H, 6.58.



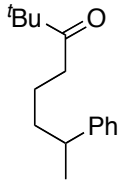
6-(4-Fluorophenyl)-2-heptanone (15): 84% yield (colorless oil). ^{1}H NMR ($CDCl_3$) 1.21 (d, J = 7.0 Hz, 3H), 1.32–1.60 (m, 4H), 2.08 (s, 3H), 2.37 (t, J = 6.3 Hz, 2H), 2.61–2.73 (m, 1H), 6.90–7.00 (m, 2H), 7.07–7.15 (m, 2H). ^{13}C NMR ($CDCl_3$) 21.8, 22.3, 29.7, 37.8, 39.1, 43.5, 115.0 (d, $J_{F\text{-}C}$ = 21.2 Hz), 128.1 (d, $J_{F\text{-}C}$ = 7.8 Hz), 142.7 (d, $J_{F\text{-}C}$ = 3.1 Hz), 161.1 (d, $J_{F\text{-}C}$ = 243 Hz) 208.8. Anal. Calcd for $C_{13}H_{17}FO$: C, 74.97; H, 8.23. Found: C, 75.02; H, 8.30.



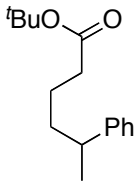
6-(2-Naphthyl)-2-heptanone (16): 86% yield (colorless oil). ^{1}H NMR ($CDCl_3$) 1.31 (d, J = 7.0 Hz, 3H), 1.38–1.72 (m, 4H), 2.03 (s, 3H), 2.35 (t, J = 7.4 Hz, 2H), 2.79–2.89 (m, 1H), 7.32 (dd, J = 8.4, 1.7 Hz, 1H), 7.36–7.46 (m, 2H), 7.59 (s, 1H), 7.73–7.82 (m, 3H). ^{13}C NMR ($CDCl_3$) 22.1, 22.4, 29.9, 37.7, 40.1, 43.8, 125.2, 125.3, 125.7, 125.9, 127.6, 127.7, 128.1, 132.3, 133.7, 144.7, 209.0. Anal. Calcd for $C_{17}H_{20}O$: C, 84.96; H, 8.39. Found: C, 85.05; H, 8.31.



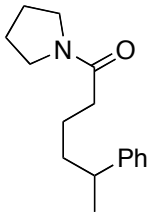
6-Phenyl-2-decanone (17): 86% yield (colorless oil). ^{1}H NMR ($CDCl_3$) 0.82 (t, J = 7.3 Hz, 3H), 1.00–1.68 (m, 10H), 2.05 (s, 3H), 2.26–2.41 (m, 2H), 2.42–2.52 (m, 1H), 7.10–7.20 (m, 3H), 7.23–7.30 (m, 2H). ^{13}C NMR ($CDCl_3$) 14.1, 22.1, 22.9, 29.9, 29.9, 36.4, 36.7, 43.9, 46.1, 126.0, 127.7, 128.4, 145.8, 209.2. Anal. Calcd for $C_{16}H_{24}O$: C, 82.70; H, 10.41. Found: C, 82.61; H, 10.66.



2,2-Dimethyl-7-phenyl-3-octanone (18): 94% yield (colorless oil). ^{1}H NMR ($CDCl_3$) 1.10 (s, 9H), 1.24 (d, J = 6.8 Hz, 3H), 1.37–1.62 (m, 4H), 2.38–2.46 (m, 2H), 2.62–2.73 (m, 1H), 7.13–7.21 (m, 3H), 7.24–7.32 (m, 2H). ^{13}C NMR ($CDCl_3$) 22.2, 22.4, 26.5, 36.5, 38.1, 40.1, 44.2, 126.0, 127.1, 128.5, 147.6, 216.0. Anal. Calcd for $C_{16}H_{24}O$: C, 82.70; H, 10.41. Found: C, 82.46; H, 10.18.



***tert*-Butyl 5-phenylhexanoate (19):** 82% yield (colorless oil). ^{1}H NMR ($CDCl_3$) 1.24 (d, *J* = 7.0 Hz, 3H), 1.34–1.66 (m, 4H), 1.42 (s, 9H), 2.17 (t, *J* = 7.1 Hz, 2H), 2.69 (sext, *J* = 6.9 Hz, 1H), 7.10–7.23 (m, 3H), 7.23–7.35 (m, 2H). ^{13}C NMR ($CDCl_3$) 22.3, 23.4, 28.2, 35.7, 37.9, 39.9, 80.1, 126.6, 127.1, 128.5, 147.5, 173.2. Anal. Calcd for $C_{16}H_{24}O_2$: C,77.38; H, 9.74. Found: C, 76.71; H, 9.51. HRMS (ESI) calcd for $C_{16}H_{24}O_2Na$ (M+Na$^+$) 271.1669, found 271.1674.



1-(5-Phenylhexanoyl)pyrrolidine (20): 90% yield (colorless oil). ^{1}H NMR ($CDCl_3$) 1.25 (d, 7.0 Hz, 3H), 1.44–1.71 (m, 4H), 1.76–1.86 (m, 2H), 1.86–1.95 (m, 2H), 2.20 (t, *J* = 6.7 Hz, 2H), 2.64–2.77 (m, 1H), 3.32 (t, *J* = 6.8 Hz, 2H), 3.43 (t, *J* = 6.8 Hz, 2H), 7.13–7.22 (m, 3H), 7.22–7.31 (m, 2H). ^{13}C NMR ($CDCl_3$) 22.4, 23.2, 24.5, 26.2, 34.9, 38.2, 40.0, 45.6, 46.6, 125.9, 127.1, 128.4, 147.6, 171.6. Anal. Calcd for $C_{16}H_{23}NO$: C, 78.32; H, 9.45. Found: C, 78.30; H, 9.41.

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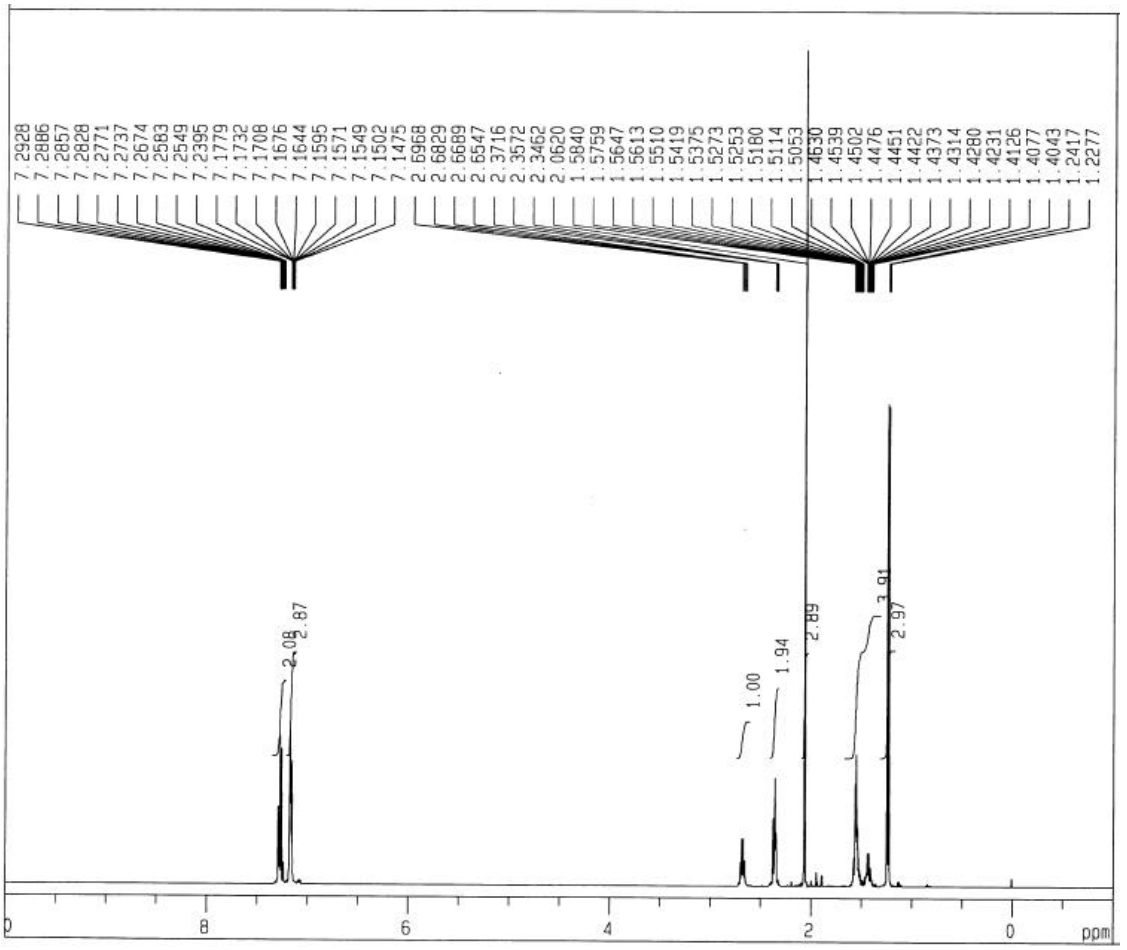
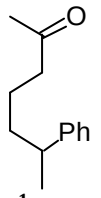
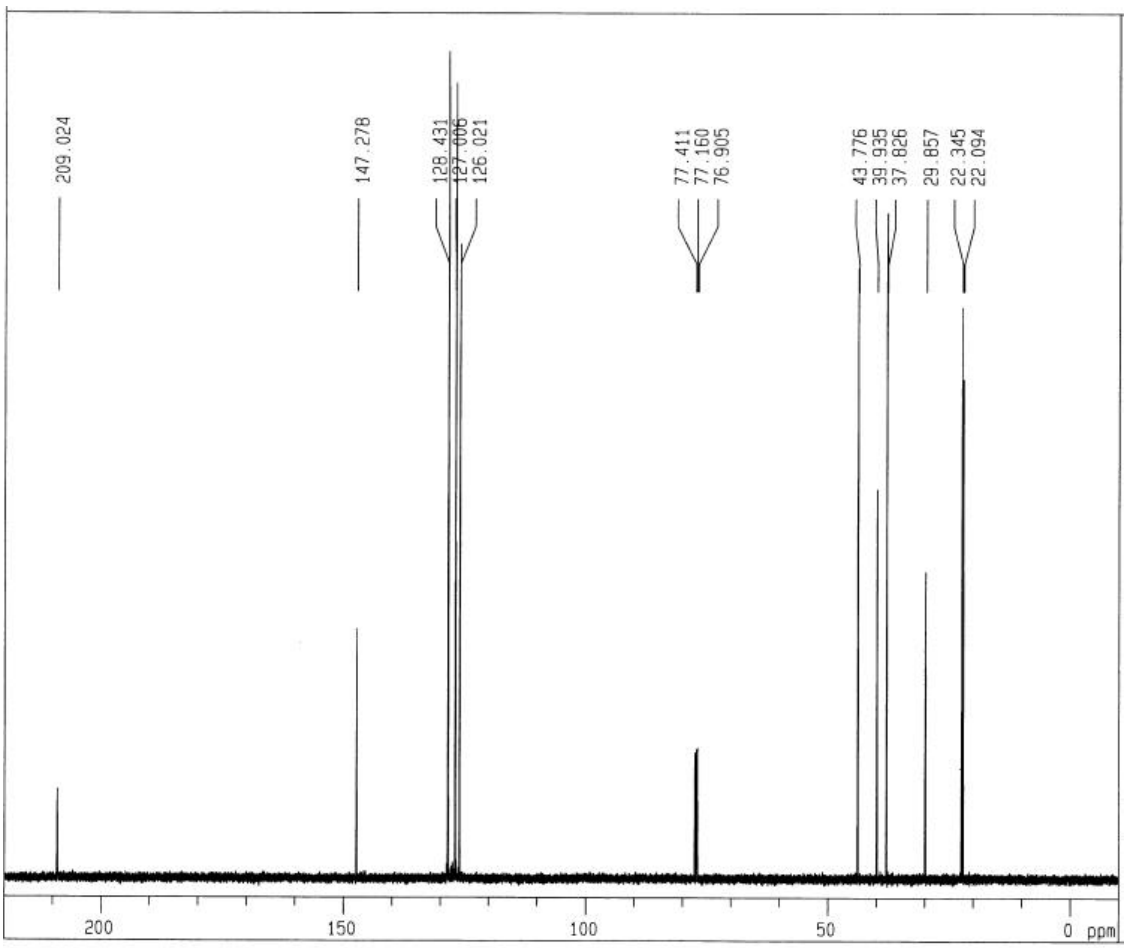
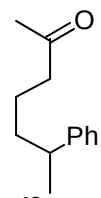




11 (^{1}H NMR)





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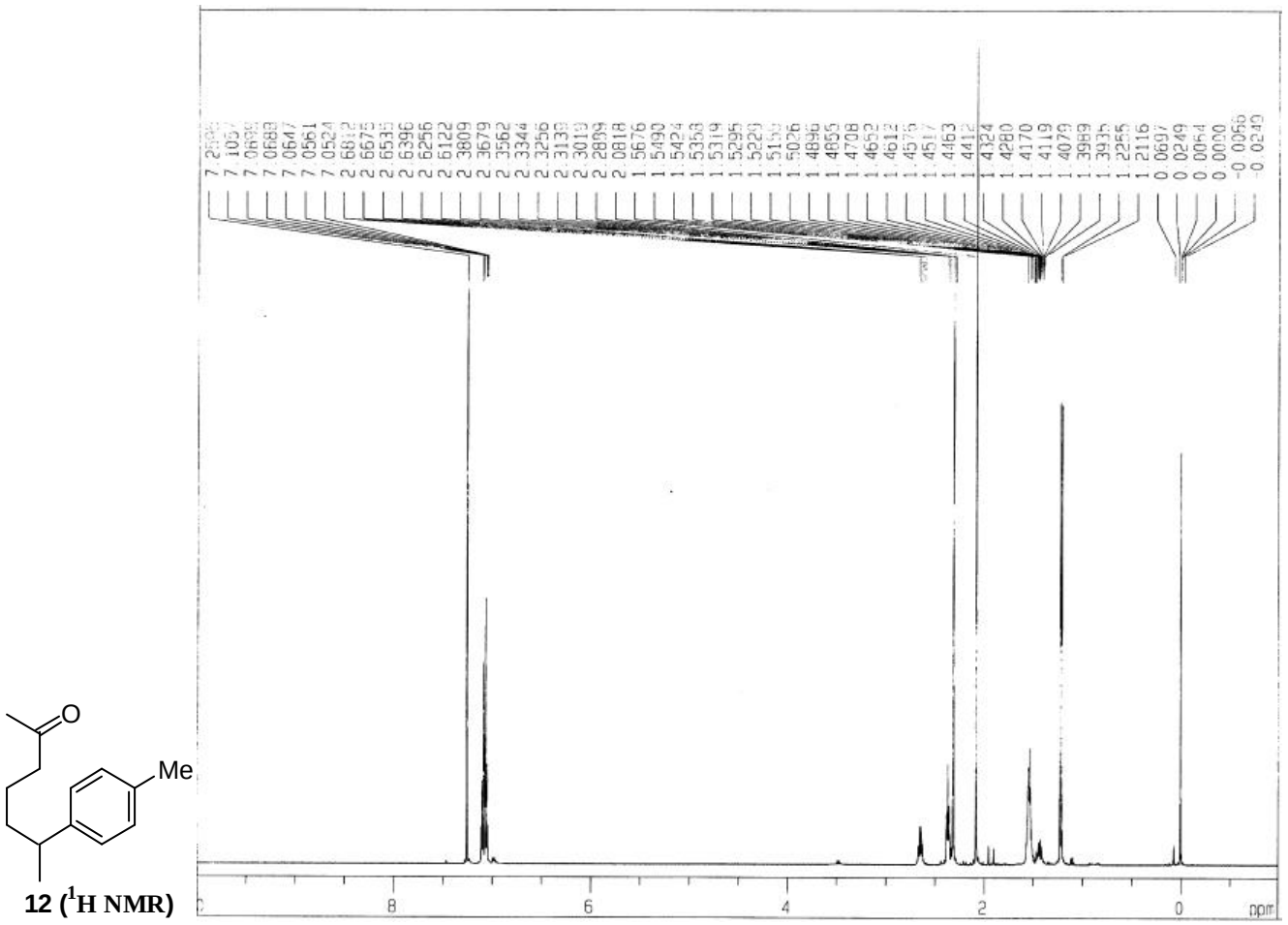

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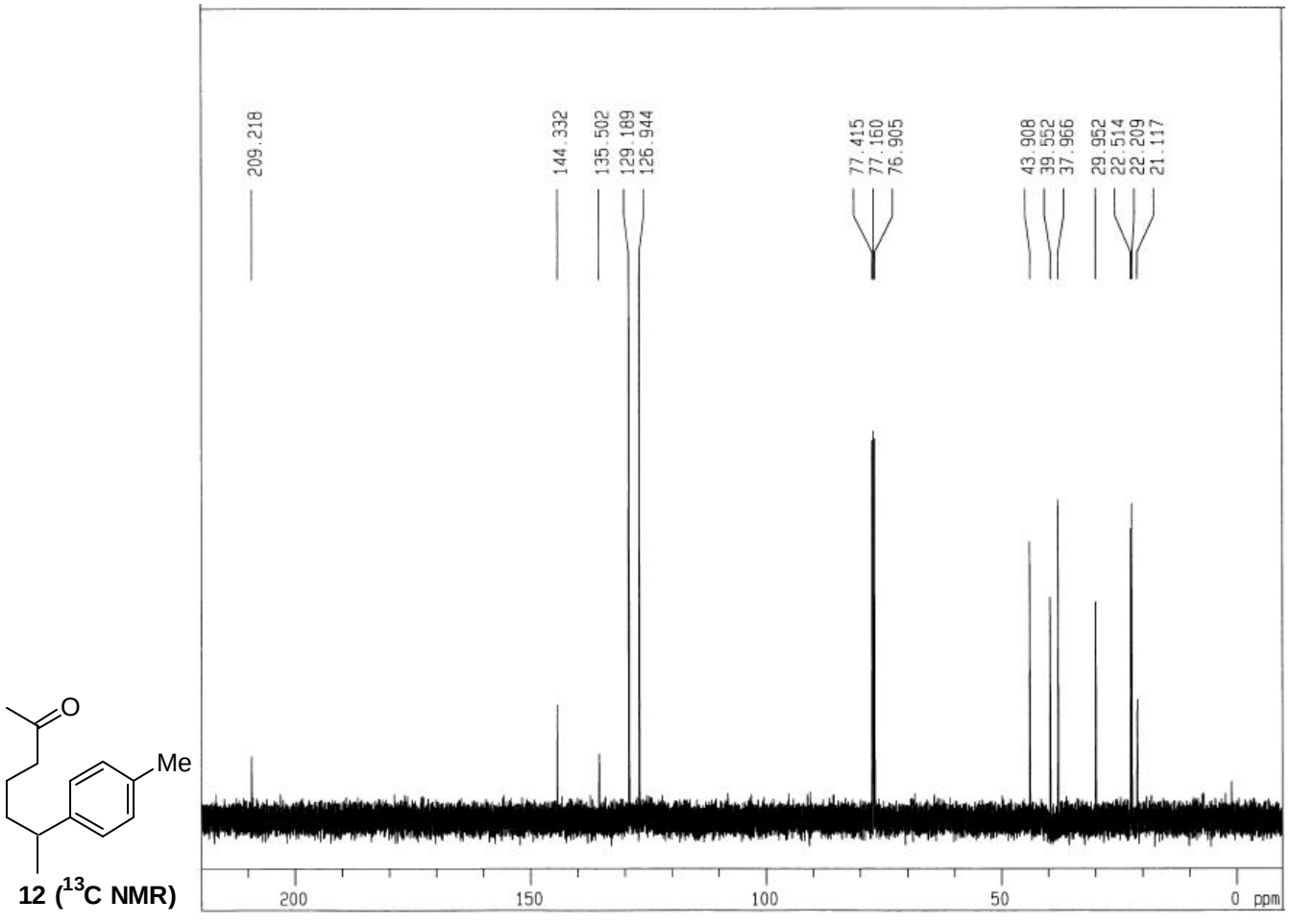

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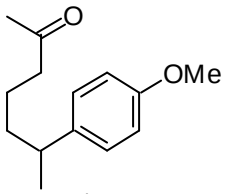

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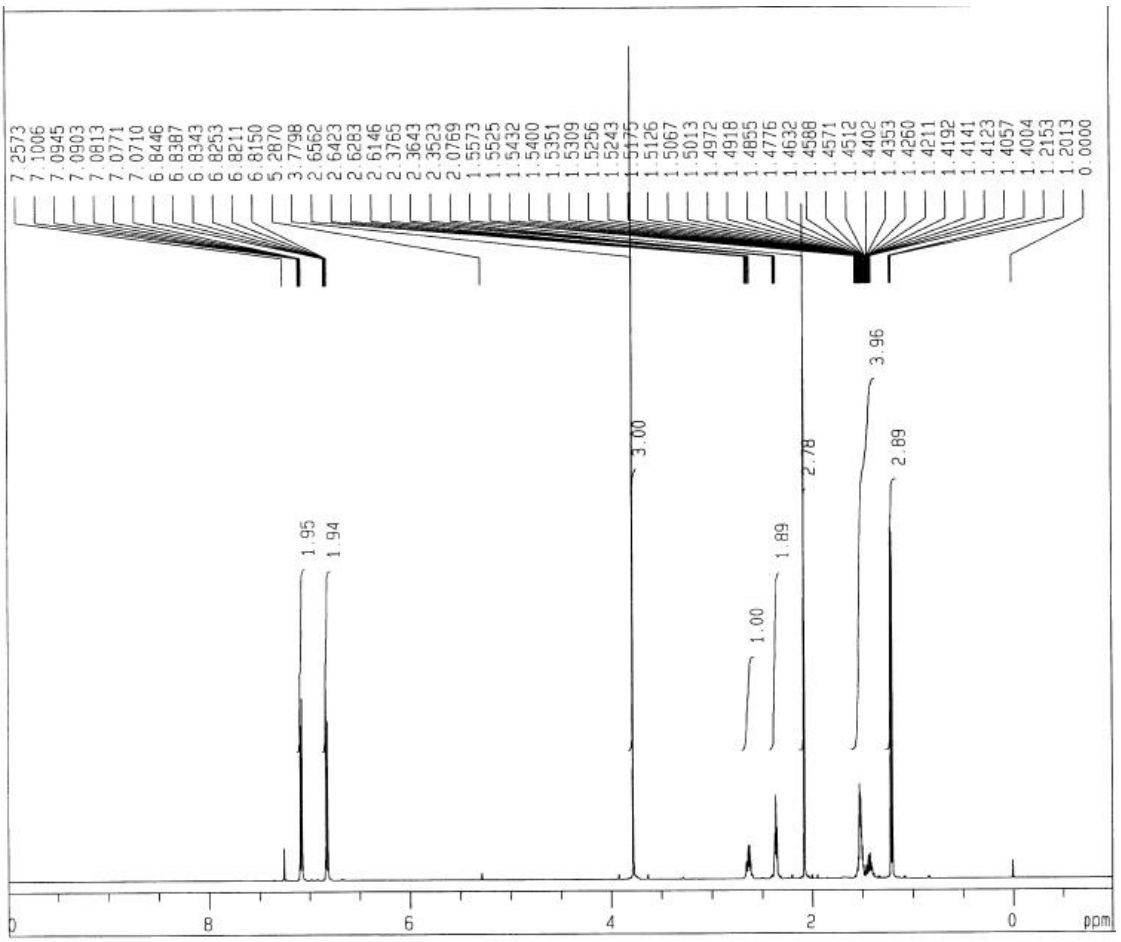

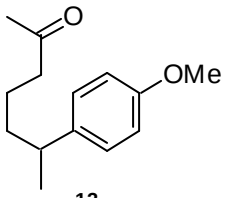

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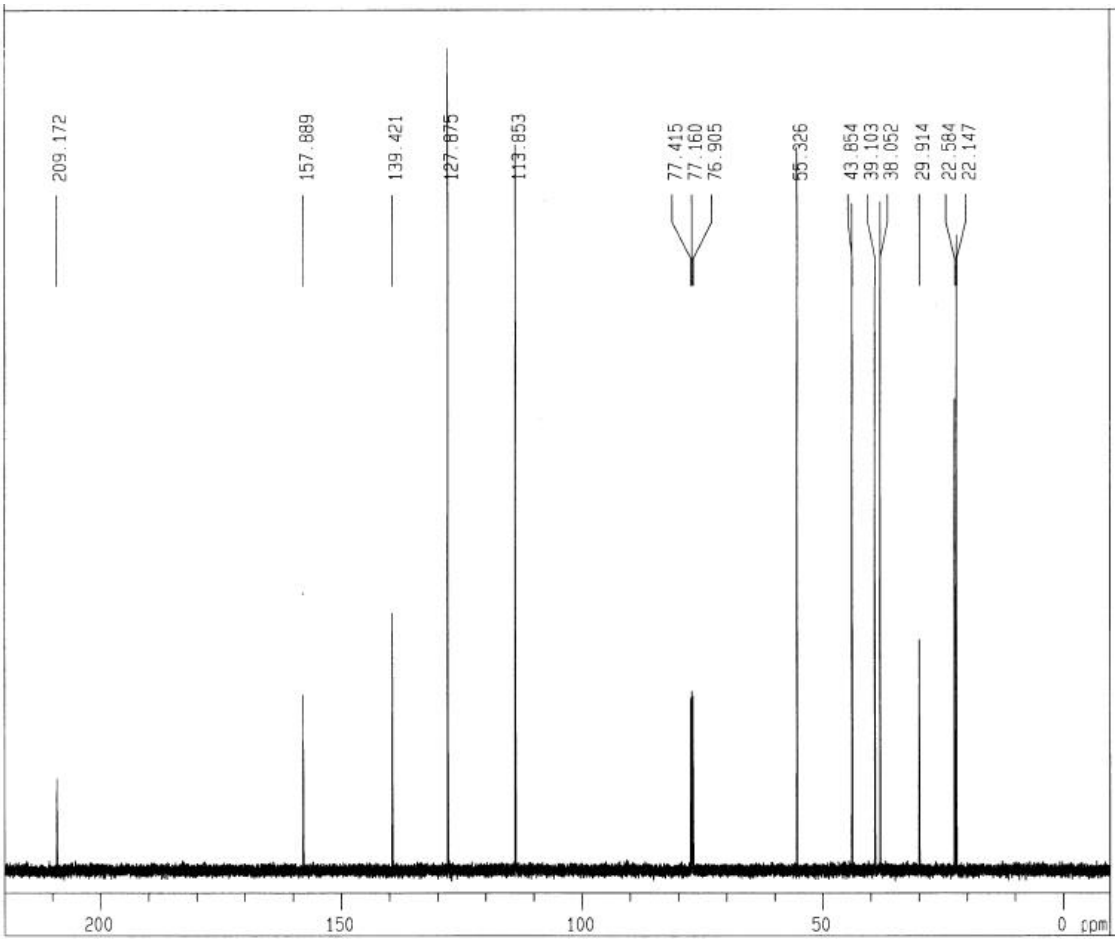

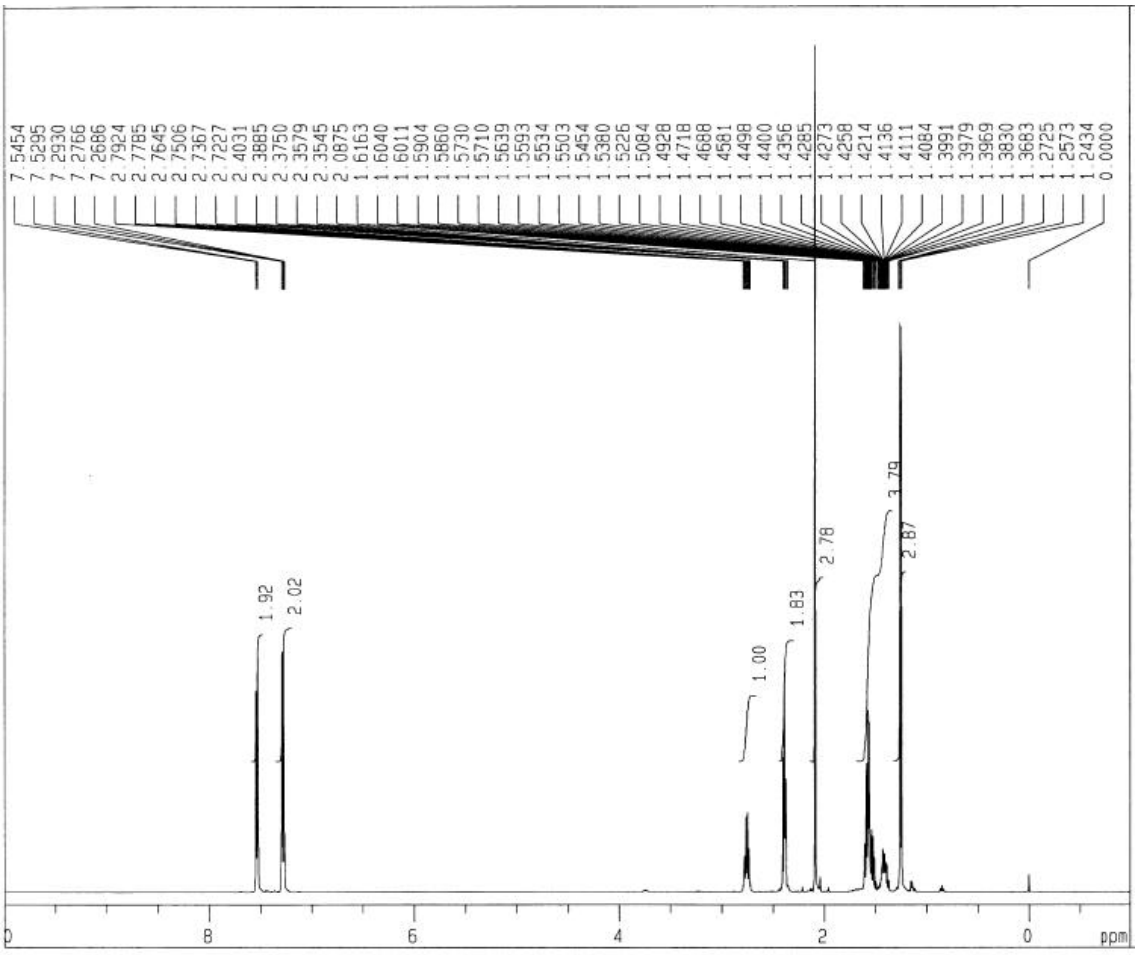

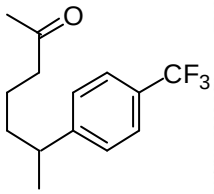

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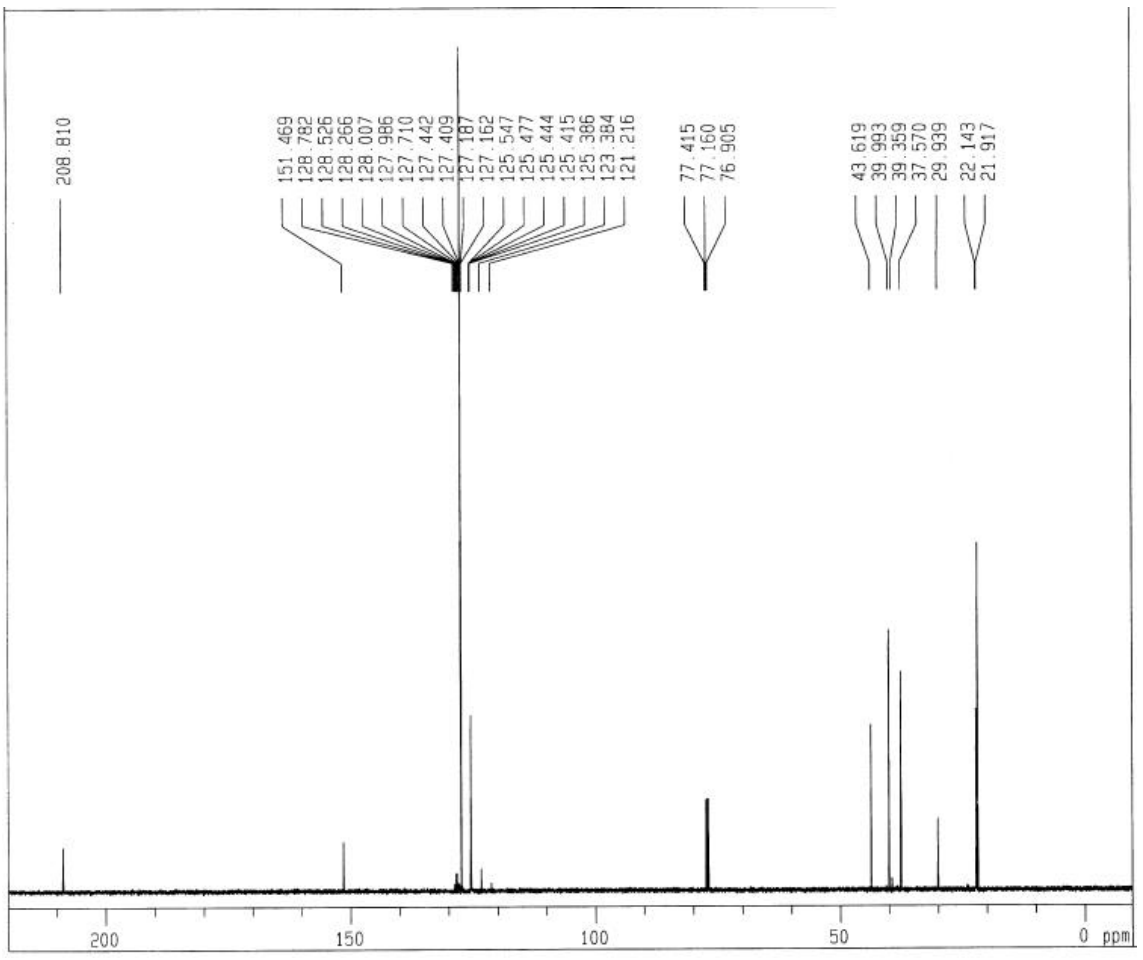

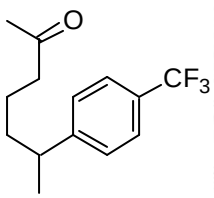

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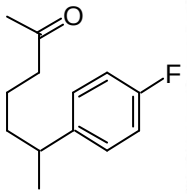

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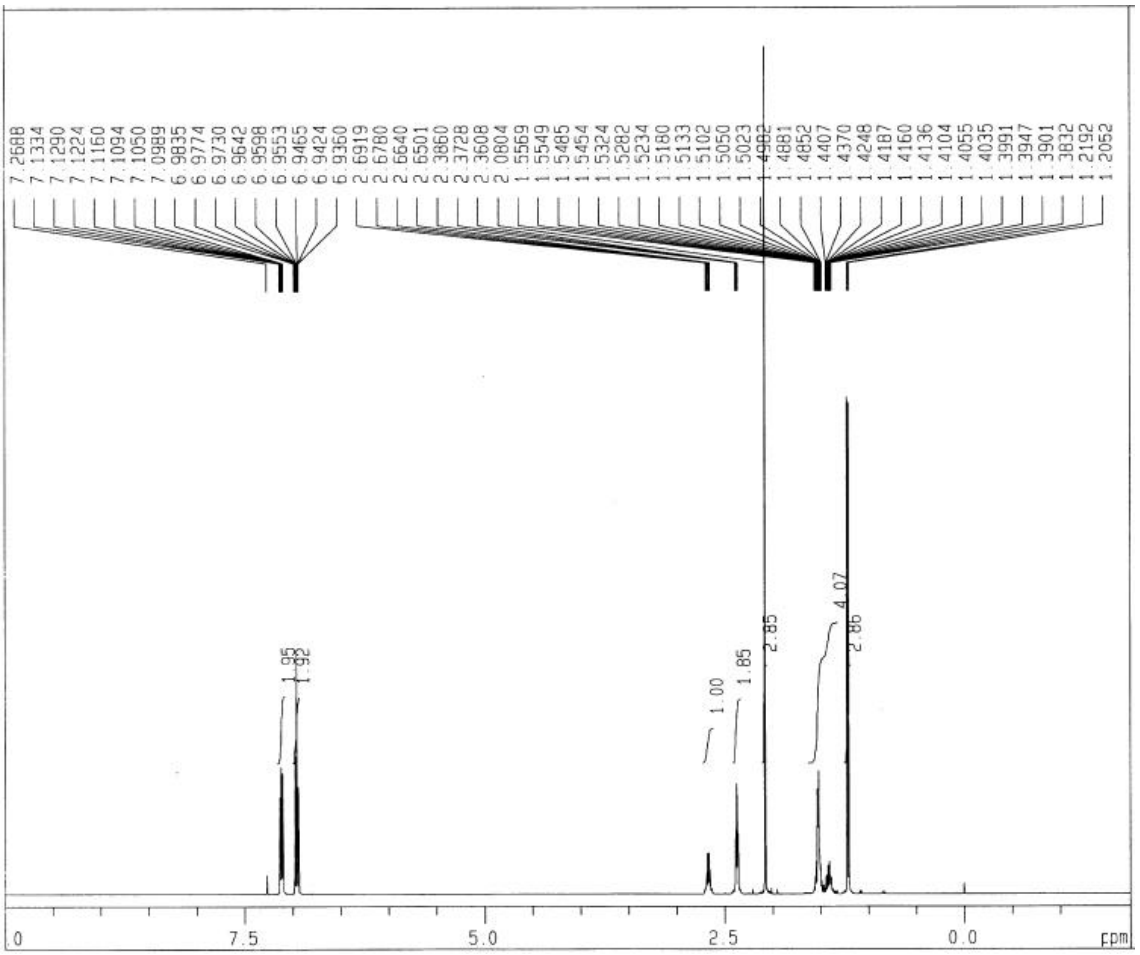

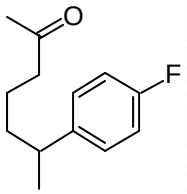

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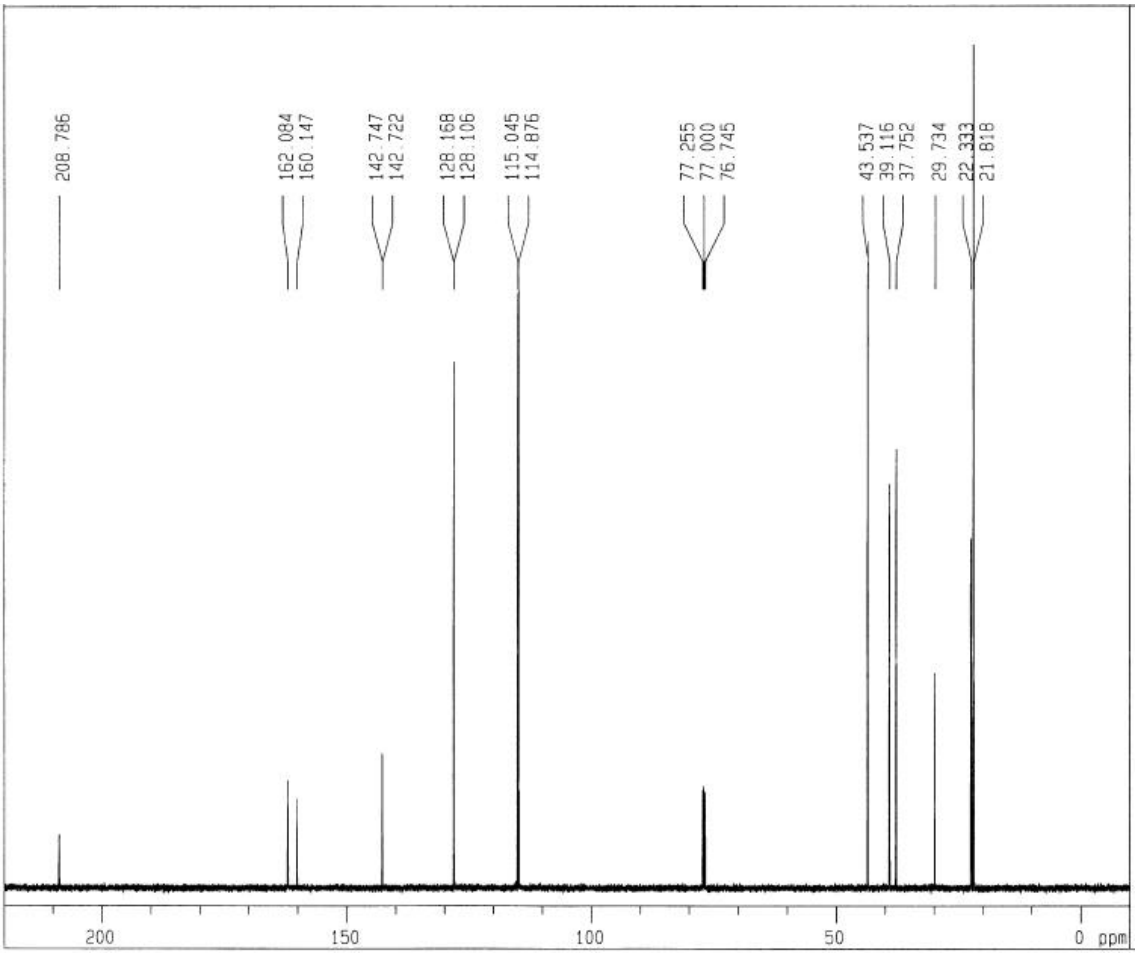

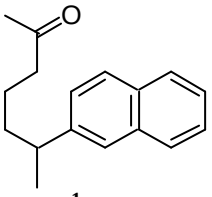

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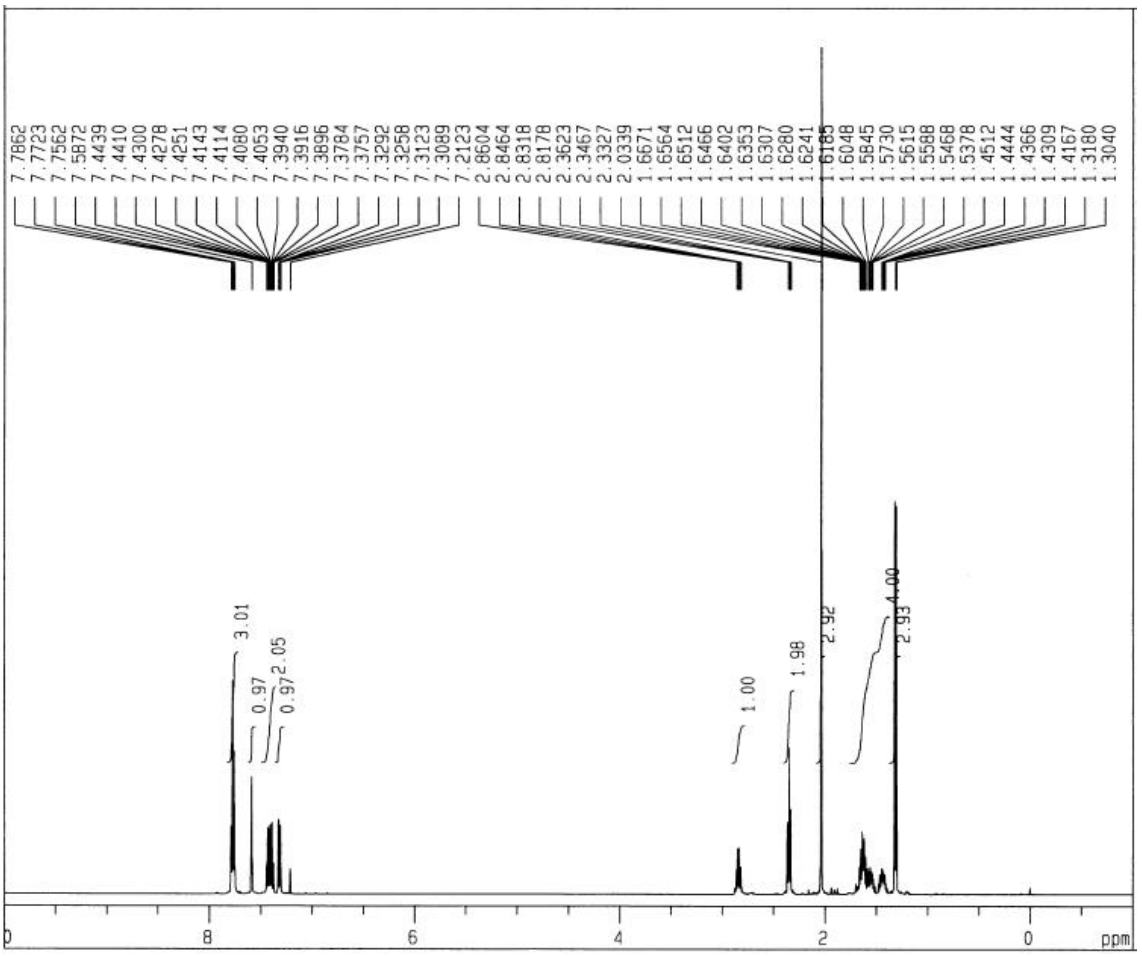

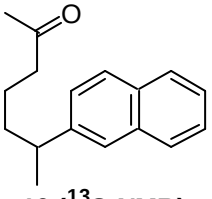

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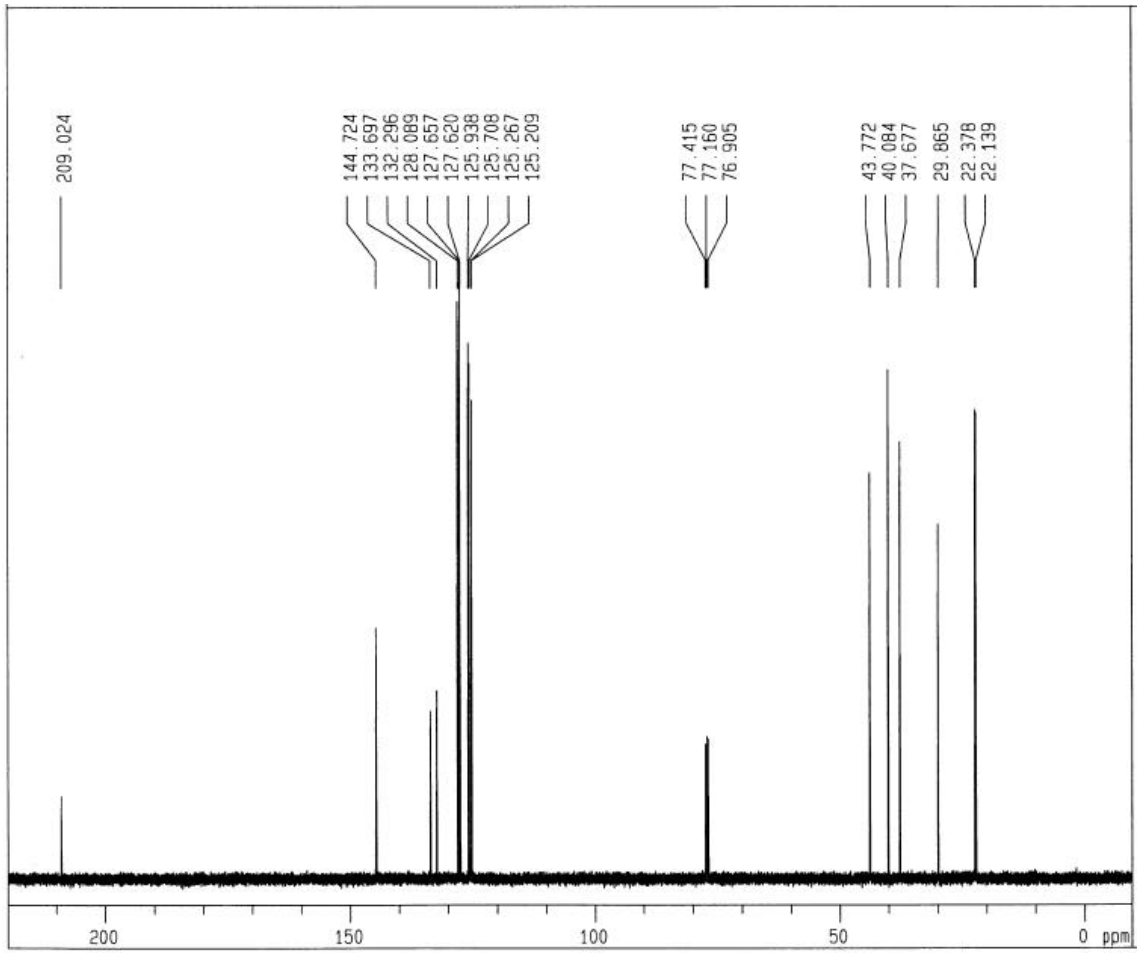

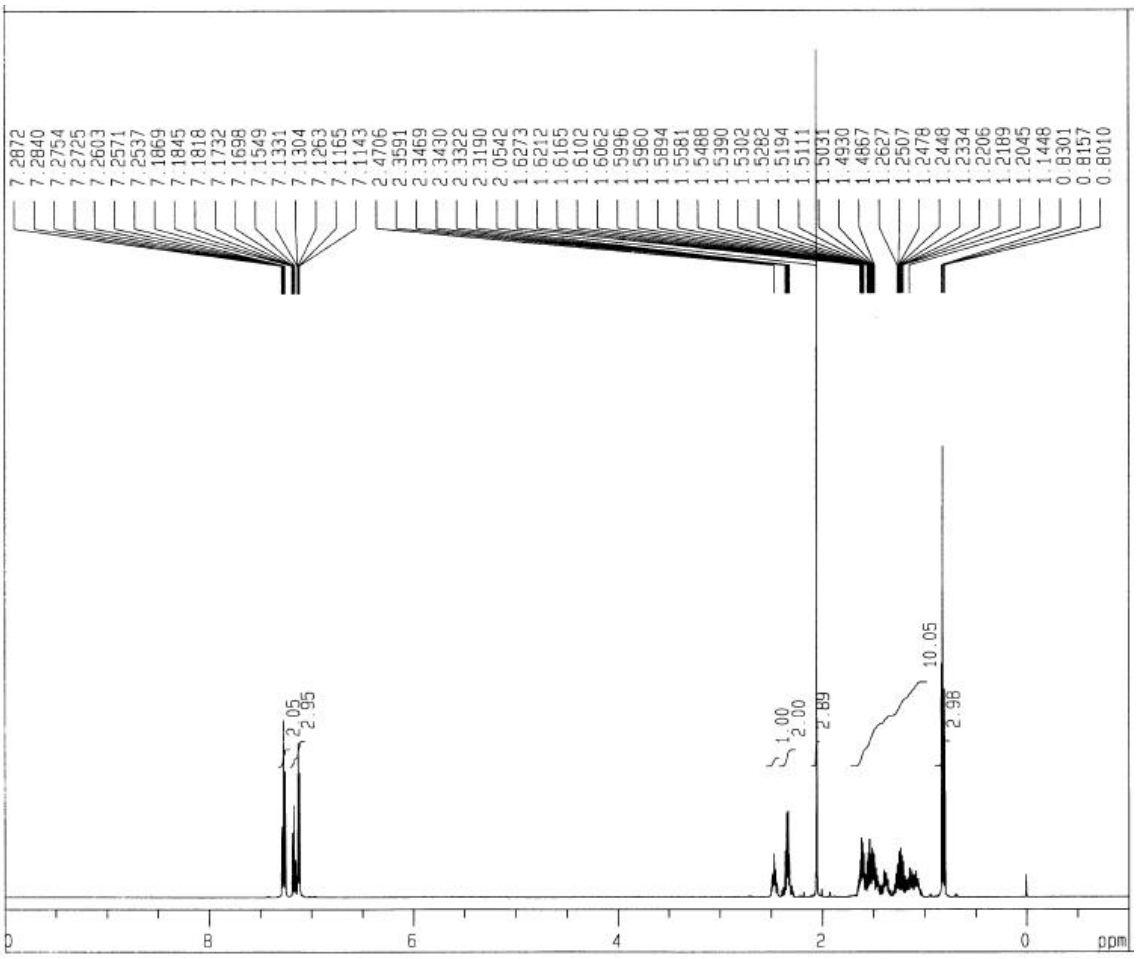

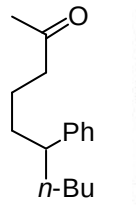

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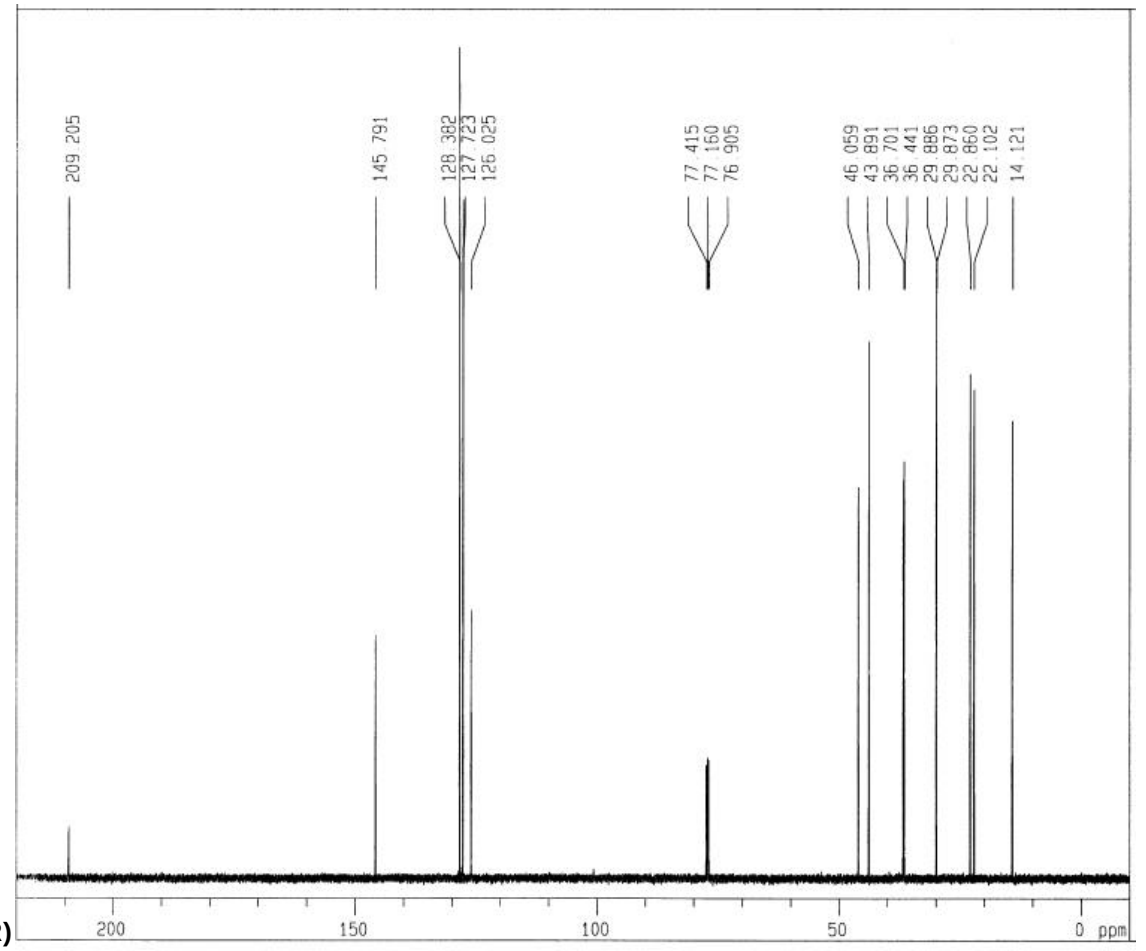

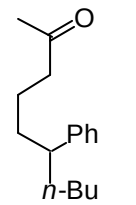

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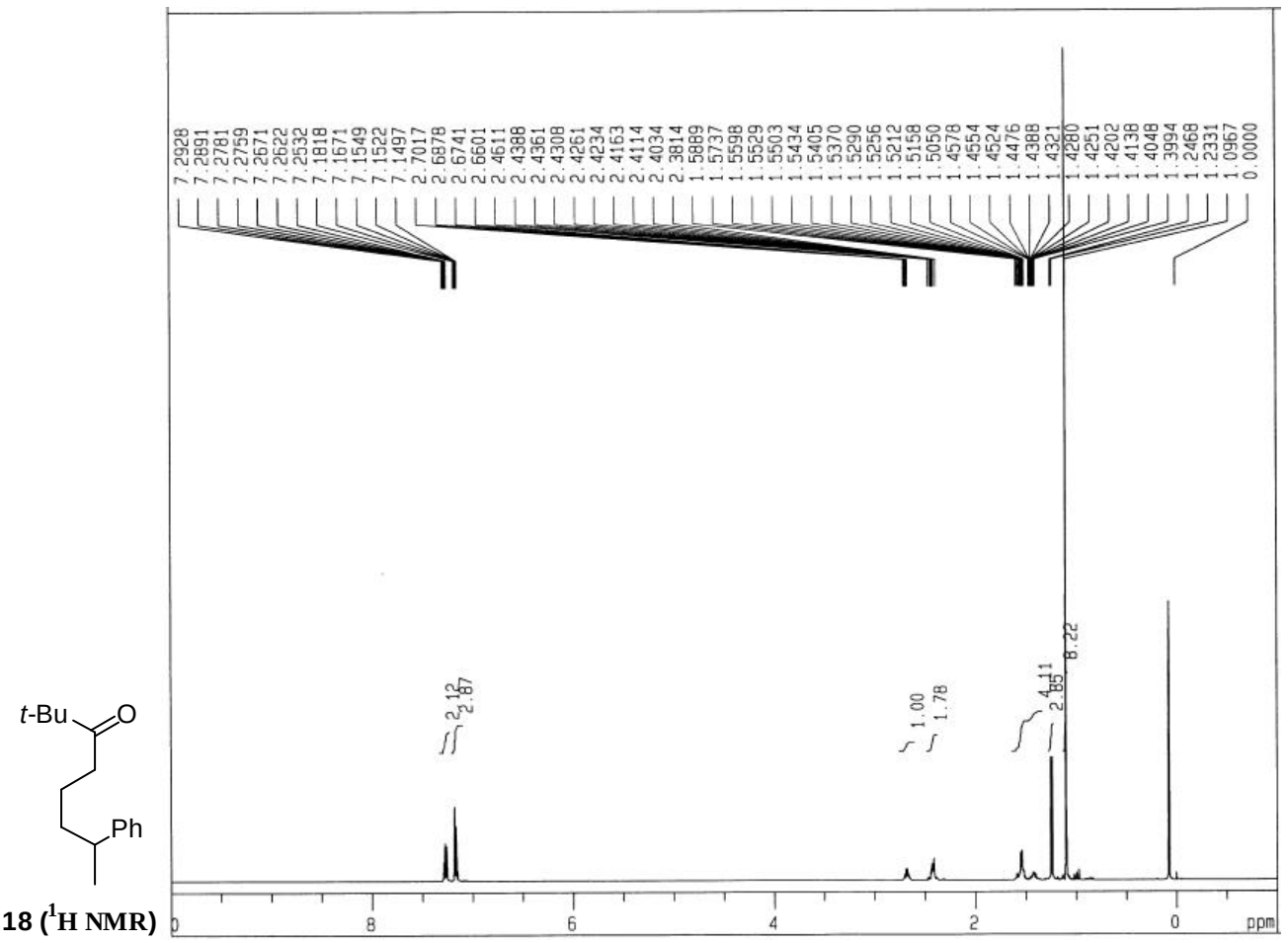

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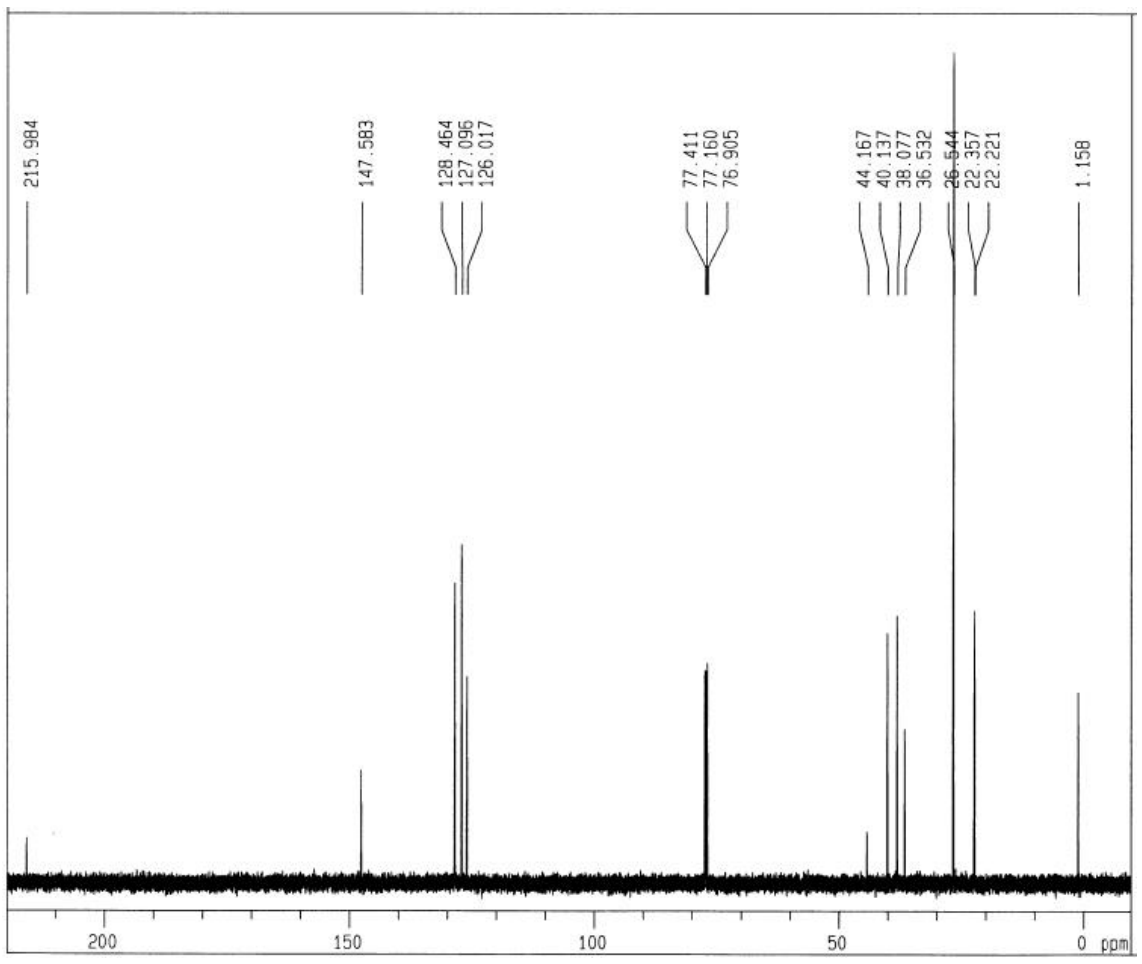

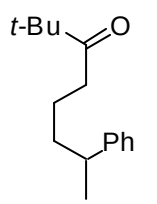

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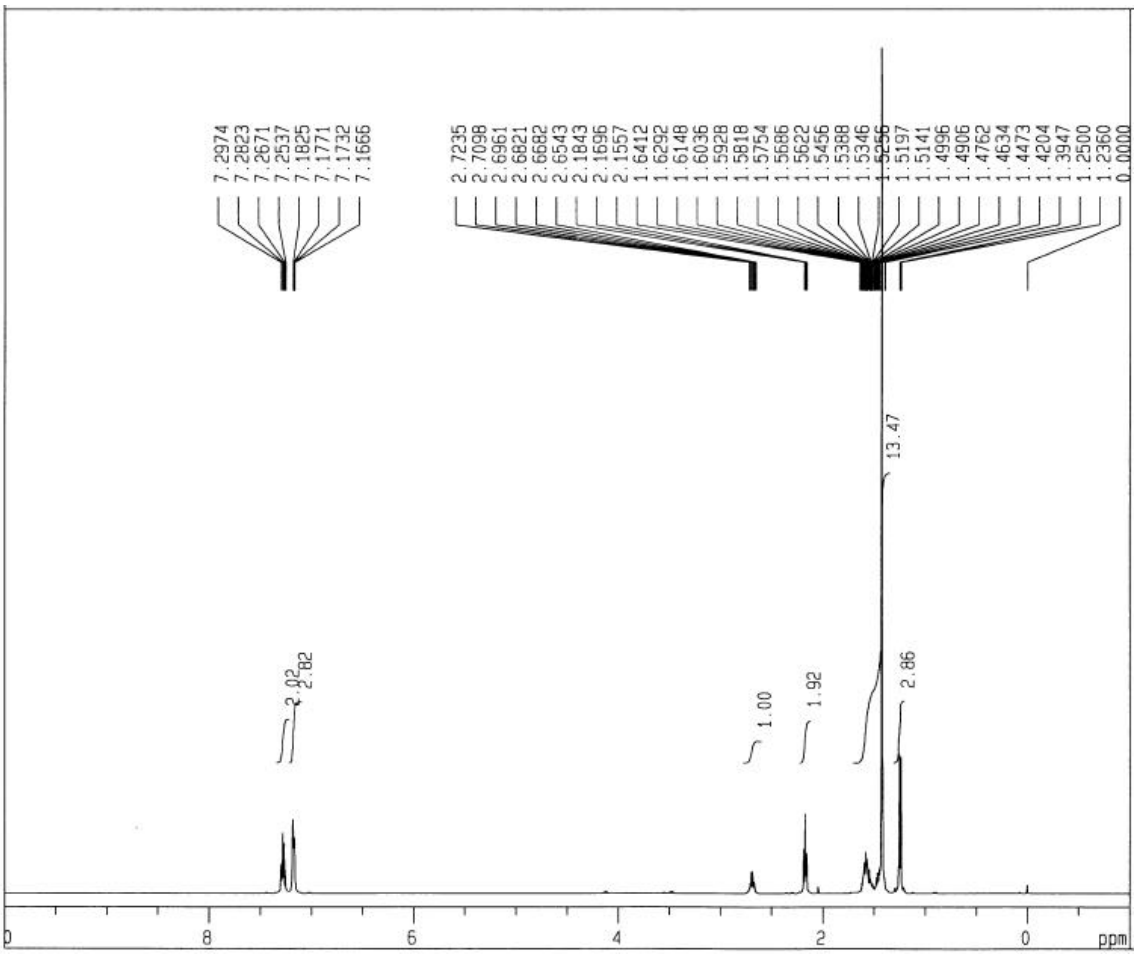

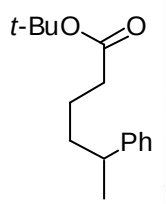

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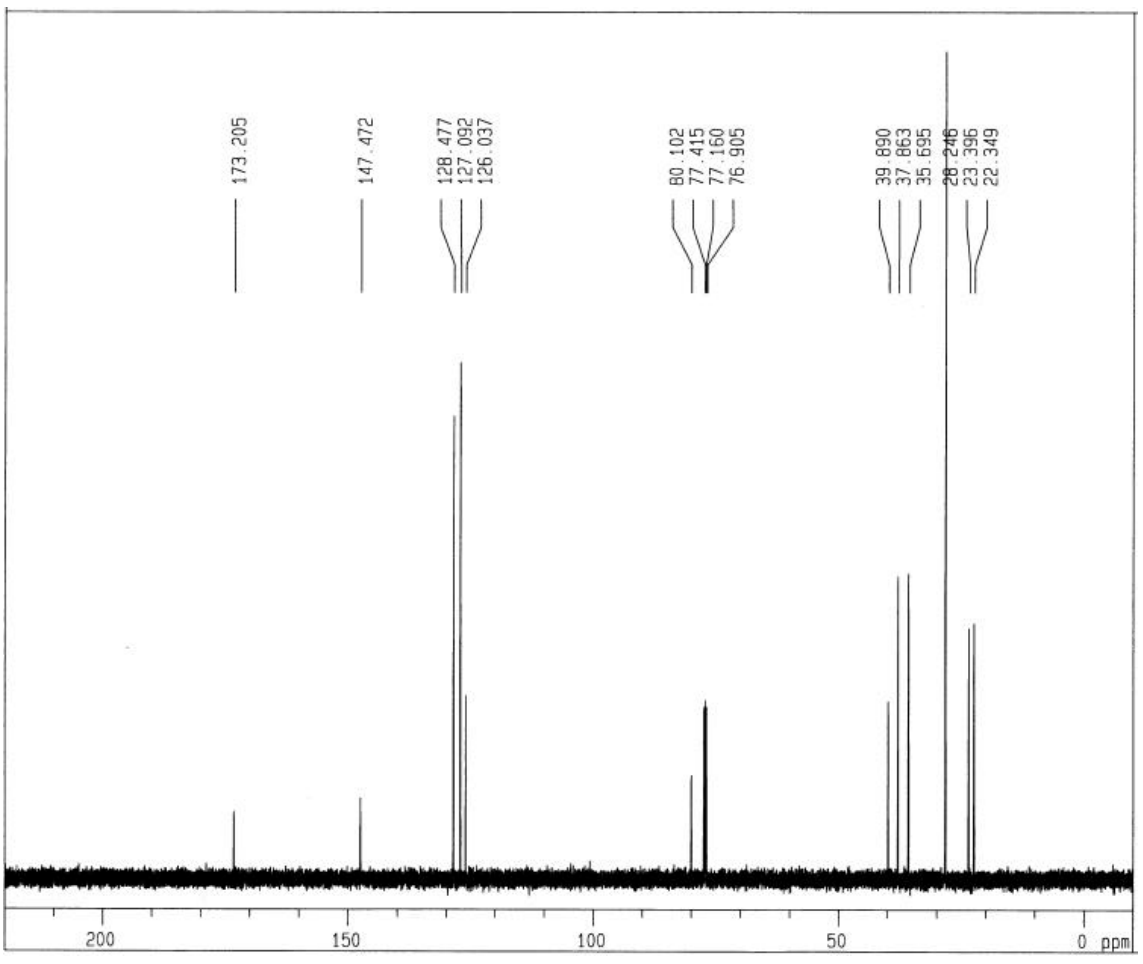

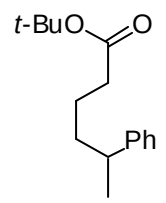

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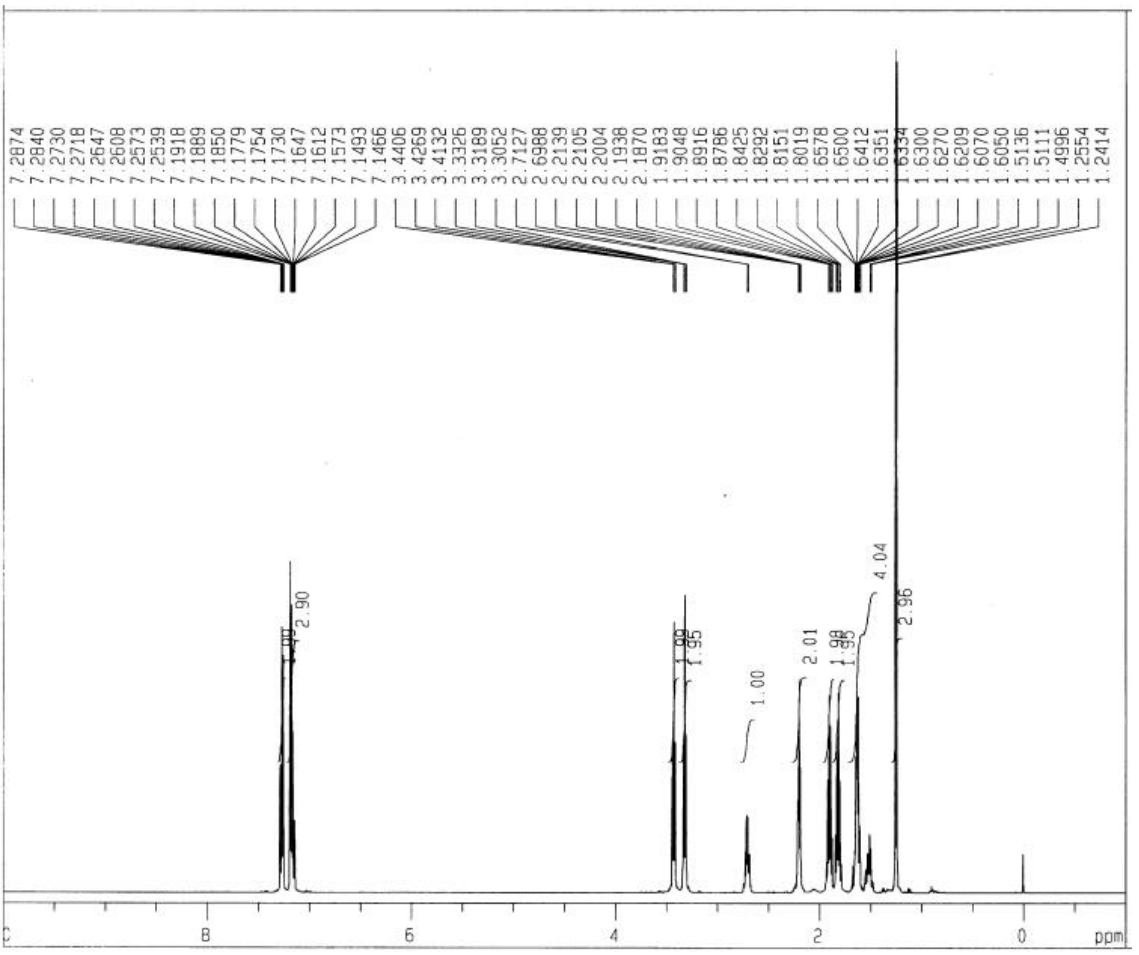

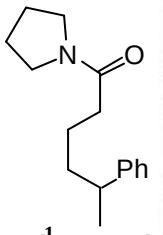

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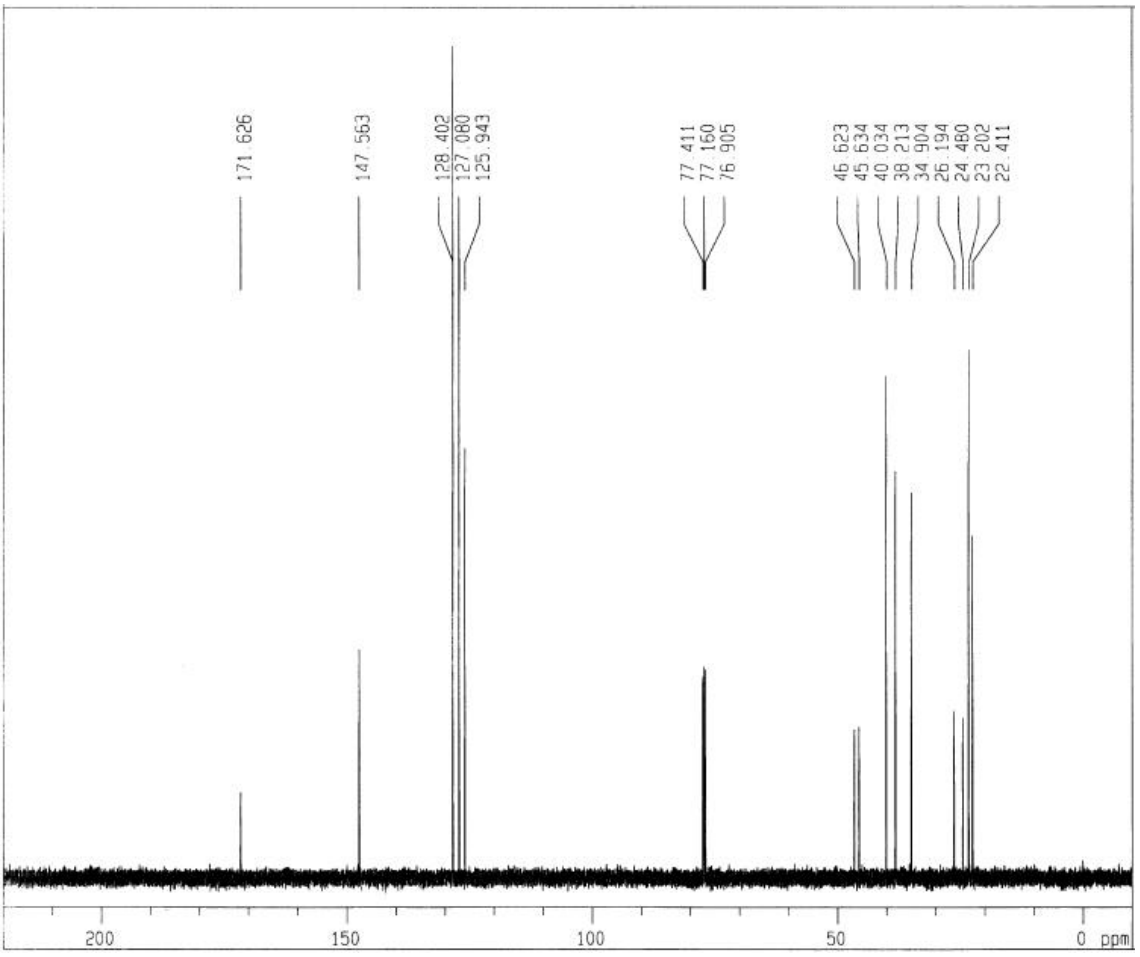

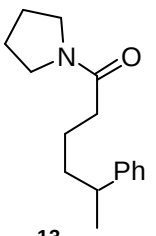

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