Supporting Information For:

Rhodium-catalyzed regio- and enantioselective allylic alkylation of pyrazol-5-ones with alkynes

Ding-Wei Ji[†,‡], Fan Yang [†], Bing-Zhi Chen [†], Xiang-Ting Min[†], Chang-Sheng Kuai[†], Yan-Cheng Hu[†] and Qing-An Chen[*,†]

[†]Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian 116023, China

[‡]University of Chinese Academy of Sciences, Beijing 100049, China

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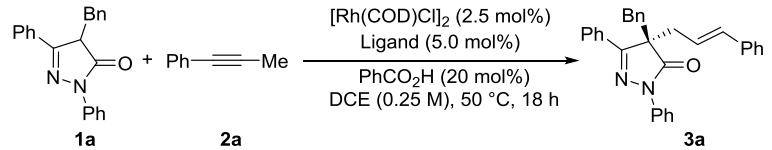
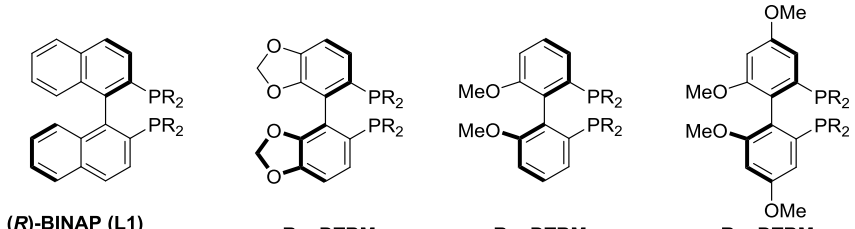
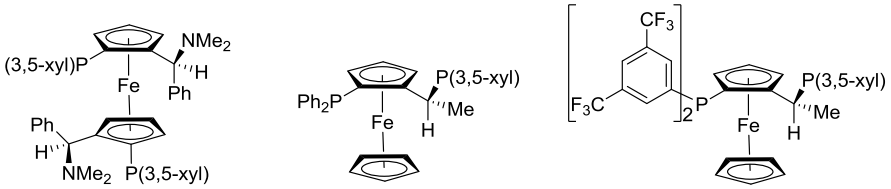
1. General experimental details: All the reagents were commercially available and were used without further purification unless otherwise stated. Solvents were treated prior to use according to the standard methods. 1-Phenyl-1-propyne was purchased from commercial suppliers. Other substituted 1-aryl-1-propyne were prepared by following the literature report.[1] Pyrazol-5-ones were prepared by following the literature report.[2] NMR spectra were recorded at room temperature in $CDCl_3$ on 400 MHz instrument with tetramethylsilane (TMS) as internal standard. Data are reported as follows: chemical shift in ppm (δ), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, brs = broad singlet, m = multiplet), coupling constant (Hz), and integration. Flash column chromatography was performed on commercially available silica gel (200-300 mesh). All reactions were monitored by TLC, GC-FID, GC-MS or NMR analysis. HRMS data was obtained with Micromass HPLC-Q-TOF mass spectrometer (ESI) or Agilent 6540 Accurate-MS spectrometer (Q-TOF).

2. Screening of reaction conditions for 3a

Table S1. Screening of chiral ligands[a]



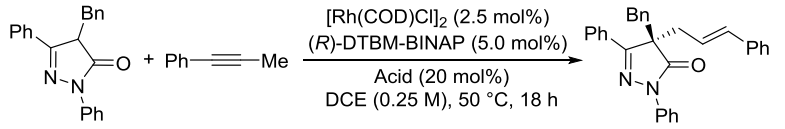




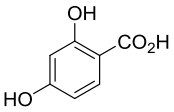
entry	ligand	yield(%)[b] **3a**/**4a**/**5a**	er[c]/**3a**
1	**L1**	28/3/6	55:45
2	**L2**	72/10/16	52:48
3	**L3**	68/20/11	84:16
4	**L4**	11/5/12	56:44
5	**L5**	29/12/8	79:21
6	**L6**	13/6/5	75:25
7[d]	**L7**	>95/<1/<1	57:43
8[d]	**L8**	trace	-
9[d]	**L9**	trace	-

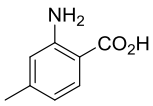
[a]Reaction conditions: **1a** (0.10 mmol), **2a** (0.20 mmol), $[Rh(COD)Cl]_2$ (2.5 mol%), ligand (5.0 mol%), $PhCO_2H$ (20 mol%), DCE (0.25 M), 50 ℃, 18 h. [b]Determined by ^1H NMR analysis with 1,3,5-trimethoxybenzene as the internal standard. [c]Determined by HPLC. [d]TsOH (20 mol%)

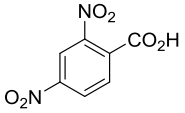
Table S2. Screening of acids[a]



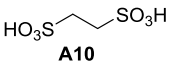
PhCO$_2$H (**A1**)
AdCO$_2$H (**A2**)
Citric acid (**A3**)


A4


A5


A6

(*D*)-CSA (**A7**)
(*L*)-CSA (**A8**)
TsOH (**A9**)

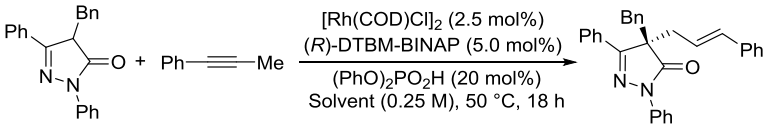

A10

(PhO)PO$_2$H (**A11**)
(^{n}BuO)PO$_2$H (**A12**)

entry	acid	yield(%)[b] **3a**/**4a**/**5a**	er[c]/**3a**
1	**A1**	68/20/11	84:16
2	**A2**	58/16/9	85:15
3	**A3**	57/12/25	87:13
4	**A4**	64/19/12	88:12
5	**A5**	66/18/13	85:15
6	**A6**	28/1/1	91:9
7	**A7**	51/1/2	90:10
8	**A8**	60/1/2	89:11
9	**A9**	43/1/2	90:10
10	**A10**	44/1/1	90:10
11	**A11**	87/3/2	90:10
12	**A12**	84/9/6	89:11

[a]Reaction conditions: **1a** (0.10 mmol), **2a** (0.20 mmol), [Rh(COD)Cl]$_2$ (2.5 mol%), (*R*)-DTBM-BINAP (5.0 mol%), acid (20 mol%), DCE (0.25 M), 50 ℃, 18 h. [b]Determined by ^{1}H NMR analysis with 1,3,5-trimethoxybenzene as the internal standard. [c]Determined by HPLC.

Table S3. Screening of solvents[a]

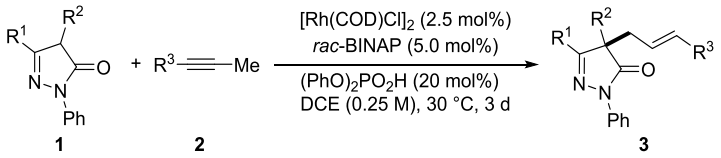


entry	solvent	yield(%)[b] **3a**/**4a**/**5a**	er[c]/**3a**
1	DCE	87/3/2	90:10

2	Et_2O	82/9/8	87:13
3	Toluene	62/7/6	87.5:12.5
4	EtOH	89/4/6	90:10
5	THF	80/6/5	89:11
6[d]	DCE	89/2/2	91:9

[a]Reaction conditions: **1a** (0.10 mmol), **2a** (0.20 mmol), $[Rh(COD)Cl]_2$ (2.5 mol%), (*R*)-DTBM-BINAP (5.0 mol%), $(PhO)_2PO_2H$ (20 mol%), solvent (0.25 M), 50 ℃, 18 h. [b]Determined by ^1H NMR analysis with 1,3,5-trimethoxybenzene as the internal standard. [c]Determined by HPLC. [d]35 ℃, 3 d.

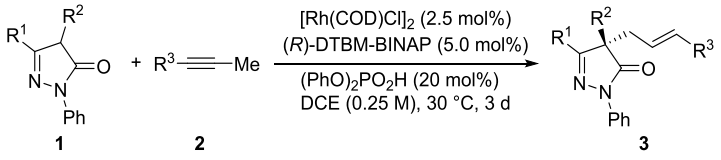
3. Typical procedure for the synthesis of racemic products 3



1 2 3

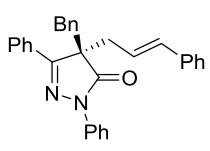
In glove box, a sealed tube was charged with pyrazol-5-one **1** (0.1 mmol, 1.0 equiv), $[Rh(COD)Cl]_2$ (0.0025 mmol, 2.5 mol%), *rac*-BINAP (0.005 mmol, 5 mol%), $(PhO)_2PO_2H$ (0.02 mmol, 20 mol%) and DCE (0.4 mL) at room temperature. Then alkyne **2** (0.20 mmol, 2.0 equiv) was added and the reaction tube was sealed with a teflon screw cap, removed from the glove box and stirred at 35 °C for 3 days. After cooling to room temperature, the reaction mixture was concentrated in vacuo and purified by column chromatography on silica gel using petroleum ether (PE) and ethyl acetate (EA) to afford the corresponding racemic product **3**.

4. Typical procedure for Rh-catalyzed allylic alkylation of pyrazolones



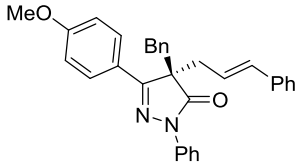
1 2 3

In glove box, a sealed tube was charged with pyrazol-5-one **1** (0.1 mmol, 1.0 equiv), $[Rh(COD)Cl]_2$ (0.0025 mmol, 2.5 mol%), (*R*)-DTBM-BINAP (0.005 mmol, 5 mol%), $(PhO)_2PO_2H$ (0.02 mmol, 20 mol%) and DCE (0.4 mL) at room temperature. Then alkyne **2** (0.20 mmol, 2.0 equiv) was added and the reaction tube was sealed with a teflon screw cap, removed from the glove box and stirred at 35 °C for 3 days. After cooling to room temperature, the reaction mixture was concentrated in vacuo and purified by column chromatography on silica gel using petroleum ether (PE) and ethyl acetate (EA) to afford the corresponding chiral product **3**. The enantioselectivity was determined by chiral HPLC.

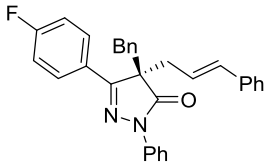


(*R*,*E*)-4-benzyl-4-cinnamyl-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (3a): Prepared according to the general procedure, colorless oil, 86% yield, known product,[3] 91:9 er , $[\alpha]^{20}_D$ = -21.9 (*c* 0.72, $CHCl_3$), R_f = 0.40 (PE/EA =

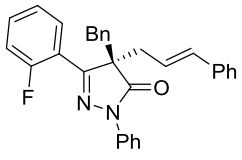
10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 – 7.94 (m, 2H), 7.65 – 7.62 (m, 2H), 7.51 – 7.48 (m, 3H), 7.31 (t, *J* = 7.9 Hz, 2H), 7.19 – 7.08 (m, 6H), 7.06 – 7.00 (m, 3H), 6.93 – 6.90 (m, 2H), 6.40 (d, *J* = 15.7 Hz, 1H), 5.85 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.41 (d, *J* = 1.9 Hz, 2H), 3.14 (d, *J* = 7.6 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.18, 158.48, 137.47, 136.68, 134.70, 134.63, 131.75, 130.33, 129.22, 128.97, 128.70, 128.36, 128.10, 127.47, 127.17, 126.51, 126.29, 125.54, 122.16, 119.99, 61.43, 42.48, 40.09; **HRMS** Calculated for $C_{31}H_{27}N_2O$ $[M+H]^+$ 443.2118, found 443.2114; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 6.8 min (maj) and 10.0 min.



(*R*,*E*)-4-benzyl-4-cinnamyl-5-(4-methoxyphenyl)-2-phenyl-2,4-dihydro-3H-pyrazol-3-one (**3b**)**:** Prepared according to the general procedure, yellow oil, 84% yield, 91:9 er, $[\alpha]^{20}_D$ = -28.8 (*c* 1.00, $CHCl_3$), R_f = 0.35 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.90 (d, *J* = 8.7 Hz, 2H), 7.68 – 7.60 (m, 2H), 7.30 (t, *J* = 7.8 Hz, 2H), 7.20 – 7.07 (m, 6H), 7.07 – 6.97 (m, 5H), 6.96 – 6.89 (m, 2H), 6.40 (d, *J* = 15.7 Hz, 1H), 5.85 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.90 (s, 3H), 3.39 (d, *J* = 7.7 Hz, 2H), 3.11 (d, *J* = 7.5 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.01, 161.17, 158.22, 137.57, 136.74, 134.74, 134.57, 129.25, 128.66, 128.35, 128.08, 127.43, 127.12, 126.30, 125.38, 124.45, 122.33, 119.94, 114.35, 61.36, 55.42, 42.53, 40.12; **HRMS** Calculated for $C_{32}H_{29}N_2O_2$ $[M+H]^+$ 473.2224, found 473.2223; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 9.1 min (maj) and 15.4 min.

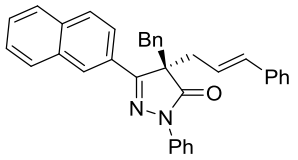


(*R*,*E*)-4-benzyl-4-cinnamyl-5-(4-fluorophenyl)-2-phenyl-2,4-dihydro-3H-pyrazol-3-one (**3c**)**:** Prepared according to the general procedure, yellow oil, 88% yield, 89:11 er, $[\alpha]^{20}_D$ = -13.0 (*c* 1.00, $CHCl_3$), R_f = 0.34 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.91 (td, *J* = 7.8, 1.7 Hz, 1H), 7.65 – 7.63 (m, 2H), 7.51 – 7.43 (m, 1H), 7.32 (t, *J* = 7.8 Hz, 2H), 7.28 – 7.20 (m, 2H), 7.19 – 7.00 (m, 9H), 6.95 – 6.92 (m, 2H), 6.36 (d, *J* = 15.7 Hz, 1H), 5.86 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.47 (d, *J* = 13.5 Hz, 1H), 3.34 (dd, *J* = 13.5, 2.2 Hz, 1H), 3.18 (dd, *J* = 13.8, 7.5 Hz, 1H), 3.04 – 2.97 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.36, 159.82 (d, *J* = 250.3 Hz), 156.29 (d, *J* = 3.1 Hz), 137.37, 136.81, 135.12, 134.51, 132.01 (d, *J* = 8.8 Hz), 129.82 (d, *J* = 3.8 Hz) 129.20, 128.74, 128.35, 128.10, 127.39, 127.06, 126.25, 125.65, 124.74 (d, *J* = 3.0 Hz), 122.69, 119.94, 119.82 (d, *J* = 12.3 Hz), 116.92 (d, *J* = 23.7 Hz), 62.15, 41.49 (d, *J* = 6.8 Hz), 39.23 (d, *J* = 7.8 Hz); **^{19}F NMR** (375 MHz, $CDCl_3$) δ -108.35; **HRMS** Calculated for $C_{31}H_{26}N_2FO$ $[M+H]^+$ 461.2024, found 461.2019; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 7.1 min (maj) and 11.6 min.

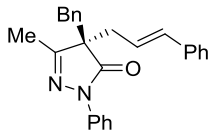


(*R*,*E*)-4-benzyl-4-cinnamyl-5-(2-fluorophenyl)-2-phenyl-2,4-dihydro-3H-pyrazol-3-one (**3d**)**:** Prepared according to the general procedure, yellow oil, 84% yield, 90:10 er, $[\alpha]^{20}_D$ = -13.2 (*c* 1.00, $CHCl_3$), R_f = 0.51 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.91 (td, *J* = 7.8, 1.7 Hz, 1H), 7.66 – 7.62 (m, 2H), 7.50 – 7.44 (m, 1H), 7.32 (t, *J* = 7.8 Hz, 2H), 7.28 – 7.08 (m, 8H), 7.06 – 7.00 (m, 3H), 6.93 (dd, *J* = 7.4, 2.0 Hz, 2H), 6.36 (d, *J* = 15.7 Hz, 1H), 5.86 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.47 (d, *J* = 13.5 Hz, 1H), 3.34 (dd, *J* = 13.5, 2.2 Hz, 1H), 3.18 (dd, *J* = 13.8, 7.5 Hz, 1H),

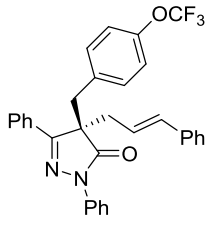
3.04 – 2.97 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.36, 159.82 (d, J = 252.0 Hz), 156.29 (d, J = 3.1 Hz), 137.37, 136.81, 135.12, 134.51, 132.01 (d, J = 8.9 Hz), 129.82 (d, J = 3.8 Hz), 129.20, 128.74, 128.35, 128.10, 127.39, 127.06, 126.25, 125.65, 124.74 (d, J = 3.0 Hz), 122.69, 119.94, 119.82 (d, J = 12.3 Hz), 116.92 (d, J = 23.7 Hz), 62.15, 41.49 (d, J = 6.8 Hz), 39.23 (d, J = 7.8 Hz); **^{19}F NMR** (375 MHz, $CDCl_3$) δ -108.35; **HRMS** Calculated for $C_{31}H_{26}N_2FO$ $[M+H]^+$ 461.2024, found 461.2026; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 6.8 min (maj) and 10.7 min.



(*R*,*E*)-4-benzyl-4-cinnamyl-5-(naphthalen-2-yl)-2-phenyl-2,4-dihydro-3H-pyrazol-3-one (**3e**)**:** Prepared according to the general procedure, white solid, melting point: 55 – 57 ℃, 63% yield, 91:9 er, $[\alpha]^{20}_D$ = -31.6 (*c* 0.50, $CHCl_3$), R_f = 0.37 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.38 (s, 1H), 8.11 (dd, J = 8.7, 1.8 Hz, 1H), 7.99 – 7.89 (m, 3H), 7.68 – 7.64 (m, 2H), 7.61 – 7.57 (m, 2H), 7.35 – 7.30 (m, 2H), 7.18 – 6.98 (m, 9H), 6.95 – 6.91 (m, 2H), 6.42 (d, J = 15.7 Hz, 1H), 5.88 (dt, J = 15.7, 7.7 Hz, 1H), 3.52 (d, J = 13.4 Hz, 2H), 3.29 (ddd, J = 13.8, 7.1, 1.3 Hz, 1H), 3.20 (ddd, J = 13.9, 8.0, 1.2 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.25, 158.28, 137.46, 136.64, 134.77, 134.63, 134.14, 133.07, 129.33, 129.26, 128.85, 128.79, 128.73, 128.34, 128.13, 127.92, 127.46, 127.19, 126.84, 126.29, 126.25, 125.63, 123.63, 122.20, 120.11, 61.54, 42.76, 40.29; **HRMS** Calculated for $C_{35}H_{29}N_2O$ $[M+H]^+$ 493.2274, found 493.2274; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 7.5 min (maj) and 12.3 min.

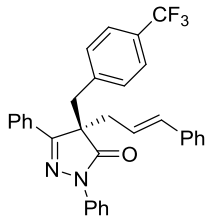


(*R*,*E*)-4-benzyl-4-cinnamyl-5-methyl-2-phenyl-2,4-dihydro-3H-pyrazol-3-one (**3f**)**:** Prepared according to the general procedure, yellow oil, known product,[4] 78% yield, 87:13 er, $[\alpha]^{20}_D$ = -3.4 (*c* 0.56, $CHCl_3$) [lit.[3a]: $[\alpha]^{20}_D$ = -5.2 (*c* 0.69, $CHCl_3$) for 94% ee], R_f = 0.41 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.61 – 7.57 (m, 2H), 7.32 – 7.28 (m, 2H), 7.25 – 7.21 (m, 4H), 7.20 – 7.10 (m, 7H), 6.52 (d, J = 15.7 Hz, 1H), 5.93 – 5.85 (m, 1H), 3.30 (d, J = 13.6 Hz, 1H), 2.97 – 2.88 (m, 2H), 2.66 (ddd, J = 13.9, 8.0, 1.2 Hz, 1H), 2.16 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 174.62, 161.38, 137.54, 136.59, 134.81, 134.50, 128.98, 128.71, 128.51, 128.43, 127.65, 127.31, 126.33, 125.23, 122.19, 119.60, 61.02, 40.99, 38.67, 14.80; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 6.3 min (maj) and 8.6 min. The absolute configuration was assigned by comparing the optical rotation with the literature value[3].

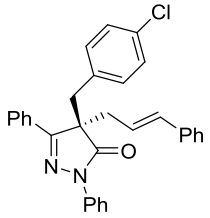


(*R*,*E*)-4-cinnamyl-2,5-diphenyl-4-(4-(trifluoromethoxy)benzyl)-2,4-dihydro-3H-pyrazol-3-one (**3g**)**:** Prepared according to the general procedure, yellow oil, 89% yield, 91:9 er, $[\alpha]^{20}_D$ = -17.6 (*c* 0.90, $CHCl_3$), R_f = 0.39 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.91 – 7.93 (m, 2H), 7.62 – 7.55 (m, 2H), 7.54 – 7.47 (m, 3H), 7.32 (t, J = 7.8 Hz, 2H), 7.22 – 7.07 (m, 6H), 6.90 (q, J = 8.6 Hz, 4H), 6.41 (d, J = 15.7 Hz, 1H), 5.85 (dt, J = 15.7, 7.5 Hz, 1H), 3.40 (s, 2H), 3.14 (d, J = 7.4 Hz, 2H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 174.90, 158.19, 148.33, 148.31, 137.25, 136.58, 134.89, 133.39, 131.55, 130.68, 130.53, 129.11, 128.77, 128.39, 127.56, 126.40, 126.30, 125.78, 121.88, 120.54, 120.32 (q, J = 255.5 Hz), 120.04, 61.31, 41.58, 39.95; **^{19}F NMR** (375 MHz, $CDCl_3$) δ -57.92; **HRMS** Calculated for $C_{32}H_{26}N_2F_3O_2$ $[M+H]^+$

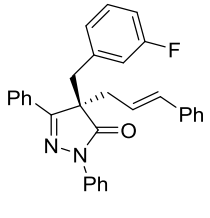
527.1941, found 527.1941; **HPLC**: Chiracel OD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 85/15, flow = 1.0 mL/min, retention time 6.8 min and 7.3 min (maj).



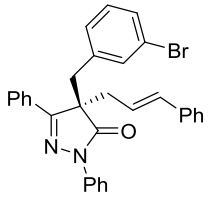
(*R*,*E*)-4-cinnamyl-2,5-diphenyl-4-(4-(trifluoromethyl)benzyl)-2,4-dihydro-3H-pyrazol-3-one (**3h**)**:** Prepared according to the general procedure, colorless oil, 85% yield, 91:9 er, $[\alpha]^{20}_D$ = -16.1 (*c* 0.98, $CHCl_3$), R_f = 0.43 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) 7.97 – 7.93 (m, 2H), 7.63 – 7.59 (m, 2H), 7.54 – 7.50 (m, 3H), 7.34 – 7.28 (m, 4H), 7.19 – 7.10 (m, 6H), 7.02 (d, *J* = 8.0 Hz, 2H), 6.42 (d, *J* = 15.7 Hz, 1H), 5.85 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.45 (s, 2H), 3.21 – 3.10 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 174.80, 158.09, 138.79, 138.77, 137.24, 136.54, 135.02, 131.45, 130.60, 129.63, 129.43 (q, *J* = 32.4 Hz), 129.14, 128.79, 128.40, 127.59, 126.40, 126.31, 125.80, 125.06 (q, *J* = 3.9, Hz), 123.99 (q, *J* = 270.5 Hz), 121.71, 119.95, 61.14, 41.92, 40.19; **^{19}F NMR** (375 MHz, $CDCl_3$) δ -62.61; **HRMS** Calculated for $C_{32}H_{26}N_2F_3O$ $[M+H]^+$ 511.1992, found 511.1992; **HPLC**: Chiracel OD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 85/15, flow = 1.0 mL/min, retention time 7.5 min and 8.2 min (maj).



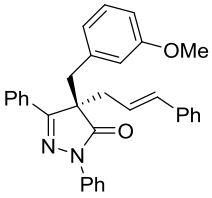
(*R*,*E*)-4-(4-chlorobenzyl)-4-cinnamyl-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3i**)**:** Prepared according to the general procedure, colorless oil, 70% yield, 91:9 er, $[\alpha]^{20}_D$ = -21.9 (*c* 0.72, $CHCl_3$), R_f = 0.44 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 – 7.92 (m, 2H), 7.68 – 7.64 (m, 2H), 7.52 – 7.49 (m, 3H), 7.33 (t, *J* = 7.8 Hz, 2H), 7.19 – 7.09 (m, 6H), 7.00 (d, *J* = 8.3 Hz, 2H), 6.83 (d, *J* = 8.3 Hz, 2H), 6.40 (d, *J* = 15.6 Hz, 1H), 5.84 (dt, *J* = 15.4, 7.5 Hz, 1H), 3.37 (d, *J* = 3.7 Hz, 2H), 3.18 – 3.07 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 174.98, 158.23, 137.35, 136.59, 134.86, 133.18, 133.07, 131.55, 130.58, 130.50, 129.07, 128.78, 128.38, 128.29, 127.53, 126.42, 126.30, 125.67, 121.88, 119.88, 61.30, 41.62, 40.14. **HRMS** Calculated for $C_{31}H_{26}N_2ClO$ $[M+H]^+$ 477.1728, found 477.1731; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 8.9 min (maj) and 11.8 min.



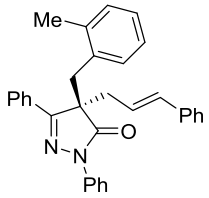
(*R*,*E*)-4-cinnamyl-4-(3-fluorobenzyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3j**)**:** Prepared according to the general procedure, colorless oil, 91% yield, 91:9 er, $[\alpha]^{20}_D$ = -18.4 (*c* 0.86, $CHCl_3$), R_f = 0.35 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.96 – 7.91 (m, 2H), 7.68 – 7.64 (m, 2H), 7.53 – 7.49 (m, 3H), 7.35 – 7.30 (m, 2H), 7.19 – 7.08 (m, 6H), 7.02-6.97 (m, 1H), 6.76 (tdd, *J* = 8.5, 2.6, 1.0 Hz, 1H), 6.71 (dt, *J* = 7.6, 1.2 Hz, 1H), 6.61 (dt, *J* = 9.9, 2.1 Hz, 1H), 6.41 (d, *J* = 15.7 Hz, 1H), 5.84 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.39 (d, *J* = 4.5 Hz, 2H), 3.13 (dt, *J* = 7.8, 1.5 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 174.92, 162.29 (d, *J* = 245.9 Hz), 158.28, 137.38, 137.11 (d, *J* = 7.4 Hz), 136.60, 134.90, 131.55, 130.51, 129.61 (d, *J* = 8.2 Hz), 129.08, 128.77, 128.38, 127.53, 126.43, 126.31, 125.65, 124.93 (d, *J* = 2.9 Hz), 121.86, 119.93, 116.19 (d, *J* = 21.6 Hz), 114.17 (d, *J* = 20.9 Hz), 61.19, 41.91 (d, *J* = 1.8 Hz), 40.15; **^{19}F NMR** (375 MHz, $CDCl_3$) δ -113.21; **HRMS** Calculated for $C_{31}H_{26}N_2FO$ $[M+H]^+$ 461.2024, found 461.2029; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 7.4 min (maj) and 9.8 min.



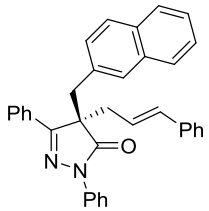
(*R*,*E*)-4-(3-bromobenzyl)-4-cinnamyl-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3k**)**:** Prepared according to the general procedure, colorless oil, 86% yield, 90:10 er, $[\alpha]^{20}_D$ = -12.8 (*c* 1.00, $CHCl_3$), R_f = 0.41 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.94 – 7.89 (m, 2H), 7.68 – 7.64 (m, 2H), 7.53 – 7.49 (m, 3H), 7.36 – 7.31 (m, 2H), 7.21 – 7.09 (m, 7H), 7.02 (t, *J* = 1.8 Hz, 1H), 6.90 (t, *J* = 7.8 Hz, 1H), 6.84 (dt, *J* = 7.7, 1.5 Hz, 1H), 6.42 (d, *J* = 15.7 Hz, 1H), 5.86 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.34 (d, *J* = 15.6 Hz, 2H), 3.18 – 3.09 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 174.90, 158.32, 137.30, 136.91, 136.59, 134.89, 132.37, 131.57, 130.53, 130.33, 129.66, 129.10, 128.78, 128.38, 127.79, 127.55, 126.46, 126.31, 125.73, 122.01, 121.86, 120.09, 61.20, 41.80, 40.04; **HRMS** Calculated for $C_{31}H_{26}N_2BrO$ $[M+H]^+$ 521.1223, found 521.1228; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 8.1 min (maj) and 9.9 min.



(*R*,*E*)-4-cinnamyl-4-(3-methoxybenzyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3l**)**:** Prepared according to the general procedure, colorless oil, 89% yield, 91:9 er, $[\alpha]^{20}_D$ = -11.2 (*c* 1.00, $CHCl_3$), R_f = 0.39 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 – 7.93 (m, 2H), 7.71 – 7.67 (m, 2H), 7.52 – 7.47 (m, 3H), 7.35 – 7.29 (m, 2H), 7.19 – 7.09 (m, 6H), 6.95 – 6.91 (m, 1H), 6.60 (ddd, *J* = 8.3, 2.6, 1.0 Hz, 1H), 6.52 (dt, *J* = 7.6, 1.2 Hz, 1H), 6.43 – 6.38 (m, 2H), 5.85 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.44 – 3.34 (m, 5H), 3.18 – 3.08 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.27, 159.15, 158.52, 137.55, 136.67, 136.11, 134.73, 131.80, 130.32, 129.10, 128.95, 128.72, 128.37, 127.48, 126.51, 126.30, 125.50, 122.11, 121.51, 119.85, 113.77, 61.38, 54.81, 42.57, 40.18; **HRMS** Calculated for $C_{32}H_{29}N_2O_2$ $[M+H]^+$ 473.2224, found 473.2228; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 9.4 min (maj) and 11.3 min.

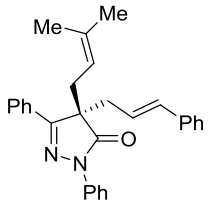


(*R*,*E*)-4-cinnamyl-4-(2-methylbenzyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3m**)**:** Prepared according to the general procedure, colorless oil, 85% yield, 90:10 er, $[\alpha]^{20}_D$ = -8.0 (*c* 0.74, $CHCl_3$), R_f = 0.51 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.91 – 7.86 (m, 2H), 7.71 – 7.67 (m, 2H), 7.48 – 7.44 (m, 3H), 7.35 – 7.29 (m, 2H), 7.18 – 7.08 (m, 6H), 7.01 – 6.96 (m, 2H), 6.93 – 6.86 (m, 2H), 6.42 (d, *J* = 15.7 Hz, 1H), 5.84 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.43 (d, *J* = 27.5 Hz, 2H), 3.22 – 3.11 (m, 2H), 2.12 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.31, 159.01, 137.61, 136.73, 136.69, 134.86, 133.36, 131.85, 130.50, 130.31, 129.16, 128.93, 128.74, 128.36, 127.47, 127.07, 126.65, 126.30, 125.60, 125.48, 122.09, 119.88, 60.76, 40.63, 38.04, 19.88; **HRMS** Calculated for $C_{32}H_{29}N_2O$ $[M+H]^+$ 457.2274, found 457.2274; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 6.8 min (maj) and 7.6 min.

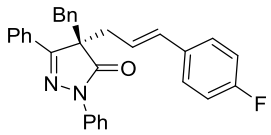


(*R*,*E*)-4-cinnamyl-4-(naphthalen-2-ylmethyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3n**)**:** Prepared according to the general procedure, colorless oil, 89% yield, 91:9 er, $[\alpha]^{20}_D$ = -15.8 (*c* 1.00, $CHCl_3$), R_f = 0.31 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.95 – 7.92 (m, 2H), 7.66 – 7.58 (m,

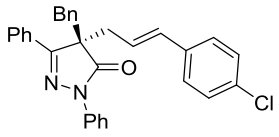
3H), 7.53 – 7.47 (m, 5H), 7.36 – 7.22 (m, 5H), 7.19 – 7.03 (m, 7H), 6.44 (d, *J* = 15.7 Hz, 1H), 5.88 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.56 (d, *J* = 16.4 Hz, 2H), 3.19 (d, *J* = 7.5 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.29, 158.64, 137.42, 136.69, 134.78, 133.07, 132.42, 132.29, 131.83, 130.37, 128.98, 128.67, 128.38, 128.22, 127.72, 127.66, 127.49, 127.46, 127.28, 126.61, 126.32, 125.82, 125.62, 125.53, 122.11, 120.00, 61.49, 42.52, 40.33; **HRMS** Calculated for $C_{35}H_{29}N_2O$ $[M+H]^+$ 493.2274, found 493.2279; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 8.6 min (maj) and 12.2 min.



(*R*,*E*)-4-cinnamyl-4-(3-methylbut-2-en-1-yl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3o**)**:** Prepared according to the general procedure, colorless oil, 52% yield, 92:8 er, $[\alpha]^{20}_D$ = -0.7 (*c* 0.42, $CHCl_3$), R_f = 0.62 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.93 – 7.90 (m, 4H), 7.49 – 7.45 (m, 3H), 7.42 – 7.36 (m, 2H), 7.21 – 7.08 (m, 6H), 6.34 (d, *J* = 15.7 Hz, 1H), 5.83 (dt, *J* = 15.7, 7.5 Hz, 1H), 4.83 – 4.79 (m, 1H), 2.96 (dd, *J* = 7.5, 1.5 Hz, 2H), 2.88 (dd, *J* = 14.6, 7.7 Hz, 1H), 2.76 (dd, *J* = 14.5, 7.1 Hz, 1H), 1.51 (d, *J* = 1.4 Hz, 3H), 1.47 (d, *J* = 1.3 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.67, 159.46, 137.92, 136.75, 136.52, 134.46, 131.58, 130.24, 128.86, 128.81, 128.34, 127.40, 126.54, 126.27, 125.27, 122.40, 119.49, 116.30, 60.09, 39.78, 35.24, 25.77, 18.04; **HRMS** Calculated for $C_{29}H_{29}N_2O$ $[M+H]^+$ 421.2274, found 421.2276; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 85/15, flow = 1.0 mL/min, retention time 7.5 min (maj) and 8.6 min.

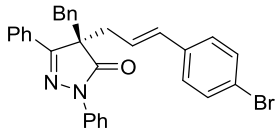


(*R*,*E*)-4-benzyl-4-(3-(4-fluorophenyl)allyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3p**)**:** Prepared according to the general procedure, colorless oil, 74% yield, 91:9 er, $[\alpha]^{20}_D$ = -14.4 (*c* 1.00, $CHCl_3$), R_f = 0.35 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 – 7.93 (m, 2H), 7.65 – 7.61 (m, 2H), 7.52 – 7.48 (m, 3H), 7.34 – 7.28 (m, 2H), 7.17 – 7.12 (m, 1H), 7.08 – 7.00 (m, 5H), 6.93 – 6.89 (m, 2H), 6.87 – 6.81 (m, 2H), 6.35 (d, *J* = 15.7 Hz, 1H), 5.76 (dt, J = 15.6, 7.5 Hz, 1H), 3.41 (d, *J* = 2.2 Hz, 2H), 3.13 – 3.10 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.15, 162.22 (d, *J* = 246.7 Hz), 158.45, 137.44, 134.59, 133.53, 132.81 (d, *J* = 3.3 Hz), 131.72, 130.37, 129.20, 129.00, 128.72, 128.11, 127.79 (d, *J* = 8.0 Hz), 127.19, 126.48, 125.57, 121.90 (d, *J* = 2.2 Hz), 119.94, 115.26 (d, *J* = 21.6 Hz), 61.44, 42.43, 40.00; **^{19}F NMR** (375 MHz, $CDCl_3$) δ -114.56; **HRMS** Calculated for $C_{31}H_{26}N_2FO$ $[M+H]^+$ 461.2024, found 461.2025; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 7.2 min (maj) and 13.5 min.

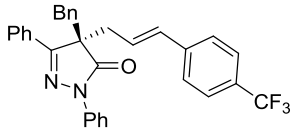


(*R*,*E*)-4-benzyl-4-(3-(4-chlorophenyl)allyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3q**)**:** Prepared according to the general procedure, white solid, melting point: 49 – 51 ℃, 79% yield, 91:9 er, $[\alpha]^{20}_D$ = -13.1 (*c* 1.00, $CHCl_3$), R_f = 0.50 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.95 (dd, *J* = 6.7, 3.0 Hz, 2H), 7.63 (d, *J* = 8.0 Hz, 2H), 7.51 – 7.49 (m, 3H), 7.31 (t, *J* = 7.8 Hz, 2H), 7.17 – 7.11 (m, 3H), 7.08 – 7.00 (m, 5H), 6.93 – 6.89 (m, 2H), 6.34 (d, *J* = 15.7 Hz, 1H), 5.82 (dt, J = 15.7, 7.5 Hz, 1H), 3.41 (s, 2H), 3.14 – 3.11 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.09, 158.40, 137.41, 135.11, 134.54, 133.52, 133.13, 131.68, 130.40, 129.20, 129.01, 128.73, 128.53, 128.12, 127.48, 127.21, 126.47, 125.60, 122.88, 119.93, 61.38, 42.43, 39.99;

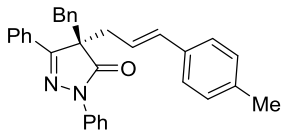
HRMS Calculated for $C_{31}H_{26}N_2ClO$ $[M+H]^+$ 477.1728, found 477.1725; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 7.6 min (maj) and 14.6 min.



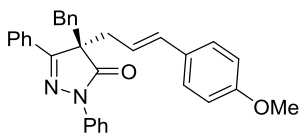
(*R*,*E*)-4-benzyl-4-(3-(4-bromophenyl)allyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3r**)**:** Prepared according to the general procedure, colorless oil, 77% yield, 92:8 er, $[\alpha]^{20}_D$ = -11.1 (*c* 1.00, $CHCl_3$), R_f = 0.45 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.95 – 7.93(m, 2H), 7.64 – 7.61 (m, 2H), 7.52 – 7.49 (m, 3H), 7.33 – 7.24 (m, 4H), 7.15 (t, *J* = 7.4 Hz, 1H), 7.08 – 7.00 (m, 3H), 6.97 – 6.90 (m, 4H), 6.32 (d, *J* = 15.7 Hz, 1H), 5.83 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.41 (s, 2H), 3.11 (d, *J* = 7.5 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.08, 158.39, 137.41, 135.55, 134.53, 133.58, 131.68, 131.47, 130.40, 129.20, 129.01, 128.74, 128.13, 127.81, 127.21, 126.46, 125.61, 123.03, 121.29, 119.93, 61.34, 42.43, 39.99; **HRMS** Calculated for $C_{31}H_{26}N_2BrO$ $[M+H]^+$ 521.1223, found 521.1229; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 8.0 min (maj) and 15.6 min.



(*R*,*E*)-4-benzyl-2,5-diphenyl-4-(3-(4-(trifluoromethyl)phenyl)allyl)-2,4-dihydro-3H-pyrazol-3-one (**3s**)**:** Prepared according to the general procedure, colorless oil, 53% yield, 92:8 er, $[\alpha]^{20}_D$ = -11.5 (*c* 1.00, $CHCl_3$), R_f = 0.48 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.98 – 7.93 (m, 2H), 7.65 – 7.61 (m, 2H), 7.53 – 7.49 (m, 3H), 7.41 (d, *J* = 8.1 Hz, 2H), 7.32 (t, *J* = 7.8 Hz, 2H), 7.19 – 7.13 (m, 3H), 7.09 – 7.02 (m, 3H), 6.93 – 6.90 (m, 2H), 6.42 (d, *J* = 15.7 Hz, 1H), 5.94 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.43 (s, 2H), 3.16 (d, *J* = 7.6 Hz, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.01, 158.31, 140.03, 137.37, 134.44, 133.45, 131.62, 130.46, 129.30 (q, *J* = 32.1 Hz), 129.20, 129.04, 128.74, 128.14, 127.25, 126.44, 126.42, 125.63, 125.34 (q, *J* = 3.8 Hz), 125.02, 123.91 (q, *J* = 234.5 Hz), 119.87, 61.29, 42.46, 39.92; **^{19}F NMR** (375 MHz, $CDCl_3$) δ -62.57; **HRMS** Calculated for $C_{32}H_{26}N_2F_3O$ $[M+H]^+$ 511.1992, found 511.1997; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 6.7 min (maj) and 13.0 min.

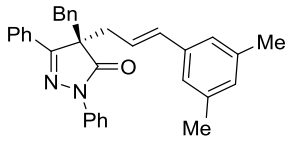


(*R*,*E*)-4-benzyl-2,5-diphenyl-4-(3-(p-tolyl)allyl)-2,4-dihydro-3H-pyrazol-3-one (**3t**)**:** Prepared according to the general procedure, colorless oil, 43% yield, 89:11 er, $[\alpha]^{20}_D$ = -17.9 (*c* 1.00, $CHCl_3$), R_f = 0.42 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 – 7.92 (m, 2H), 7.65 – 7.61 (m, 2H), 7.53 – 7.47 (m, 3H), 7.33 – 7.28 (m, 2H), 7.17 – 7.12 (m, 1H), 7.08 – 6.95 (m, 7H), 6.93 – 6.89 (m, 2H), 6.36 (d, *J* = 15.7 Hz, 1H), 5.79 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.41 (d, *J* = 1.8 Hz, 2H), 3.12 (d, *J* = 7.7 Hz, 2H), 2.24 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.21, 158.51, 137.48, 137.28, 134.67, 134.54, 133.91, 131.78, 130.28, 129.21, 129.04, 128.93, 128.68, 128.08, 127.13, 126.52, 126.19, 125.49, 121.06, 119.99, 61.48, 42.46, 40.14, 21.12; **HRMS** Calculated for $C_{32}H_{29}N_2O$ $[M+H]^+$ 457.2274, found 457.2277; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 6.8 min (maj) and 10.5 min.

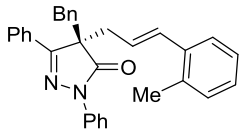


(*R*,*E*)-4-benzyl-4-(3-(4-methoxyphenyl)allyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3u**)**:** Prepared according to the general

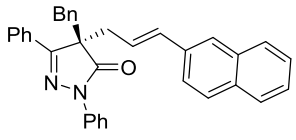
procedure, colorless oil, 39% yield, 88:12 er, $[\alpha]^{15}_D$ = -10.0 (*c* 1.00, $CHCl_3$), R_f = 0.38 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 – 7.93 (m, 2H), 7.65 – 7.62 (m, 2H), 7.51 – 7.49 (m, 3H), 7.31 (t, *J* = 7.8 Hz, 2H), 7.17 – 7.12 (m, 1H), 7.08 – 7.00 (m, 5H), 6.91 (d, *J* = 7.2 Hz, 2H), 6.70 (d, *J* = 8.6 Hz, 2H), 6.34 (d, *J* = 15.6 Hz, 1H), 5.71 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.72 (s, 2H), 3.40 (d, *J* = 2.2 Hz, 2H), 3.11 (d, *J* = 7.3 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.24, 159.08, 158.54, 137.49, 134.70, 134.06, 131.80, 130.27, 129.51, 129.20, 128.93, 128.68, 128.08, 127.44, 127.12, 126.52, 125.49, 119.99, 119.86, 113.76, 61.55, 55.23, 42.42, 40.16; **HRMS** Calculated for $C_{32}H_{29}N_2O_2$ $[M+H]^+$ 473.2224, found 473.2222; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 9.2 min (maj) and 14.1 min.



(*R*,*E*)-4-benzyl-4-(3-(3,5-dimethylphenyl)allyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3v**)**:** Prepared according to the general procedure, colorless oil, 87% yield, 89:11 er, $[\alpha]^{20}_D$ = -19.3 (*c* 0.82, $CHCl_3$), R_f = 0.57 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 – 7.92 (m, 2H), 7.67 – 7.63 (m, 2H), 7.53 – 7.48 (m, 3H), 7.34 – 7.29 (m, 2H), 7.17 – 7.12 (m, 1H), 7.08 – 7.00 (m, 3H), 6.93 – 6.89 (m, 2H), 6.77 (s, 1H), 6.72 (s, 2H), 6.34 (d, *J* = 15.7 Hz, 1H), 5.82 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.40 (d, *J* = 3.8 Hz, 2H), 3.12 (d, *J* = 7.5 Hz, 2H), 2.17 (s, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.22, 158.53, 137.81, 137.52, 136.62, 134.92, 134.69, 131.80, 130.29, 129.23, 129.21, 128.94, 128.68, 128.09, 127.14, 126.56, 125.50, 124.21, 121.67, 120.00, 61.47, 42.43, 40.21, 21.14; **HRMS** Calculated for $C_{33}H_{31}N_2O$ $[M+H]^+$ 471.2431, found 471.2426; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 6.2 min (maj) and 9.3 min.

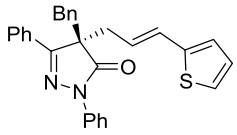


(*R*,*E*)-4-benzyl-2,5-diphenyl-4-(3-(o-tolyl)allyl)-2,4-dihydro-3H-pyrazol-3-one (**3w**)**:** Prepared according to the general procedure, colorless oil, 30% yield, 87:13 er, $[\alpha]^{20}_D$ = -28.2 (*c* 0.56, $CHCl_3$), R_f = 0.55 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.99 – 7.95 (m, 2H), 7.68 – 7.64 (m, 2H), 7.51 – 7.48 (m, 3H), 7.34 – 7.28 (m, 2H), 7.16 – 7.12 (m, 1H), 7.10 – 6.96 (m, 7H), 6.94 – 6.91 (m, 2H), 6.56 (d, *J* = 15.6 Hz, 1H), 5.68 (dt, *J* = 15.6, 7.5 Hz, 1H), 3.42 (s, 2H), 3.16 (dd, *J* = 7.6, 1.2 Hz, 2H), 2.00 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.19, 158.42, 137.49, 136.12, 135.30, 134.62, 133.05, 131.75, 130.30, 129.90, 129.22, 128.94, 128.66, 128.10, 127.36, 127.16, 126.45, 125.98, 125.87, 125.43, 123.71, 119.77, 61.60, 42.58, 40.42, 19.43; **HRMS** Calculated for $C_{32}H_{29}N_2O$ $[M+H]^+$ 457.2274, found 457.2273; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 6.1 min (maj) and 8.1 min.

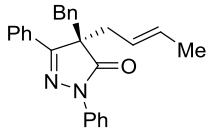


(*R*,*E*)-4-benzyl-4-(3-(naphthalen-2-yl)allyl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3x**)**:** Prepared according to the general procedure, colorless oil, 92% yield, 89:11 er, $[\alpha]^{20}_D$ = -28.2 (*c* 1.00, $CHCl_3$), R_f = 0.51 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.00 – 7.95 (m, 2H), 7.71 – 7.59 (m, 5H), 7.54 – 7.46 (m, 4H), 7.40 – 7.33 (m, 2H), 7.32 – 7.27 (m, 3H), 7.15 – 7.10 (m, 1H), 7.08 – 7.01 (m, 3H), 6.95 – 6.91 (m, 2H), 6.55 (d, *J* = 15.6 Hz, 1H), 5.97 (dt, *J* = 15.6, 7.5 Hz, 1H), 3.44 (d, *J* = 3.2 Hz, 2H), 3.20 – 3.17 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.22, 158.52, 137.46, 134.83, 134.66, 134.11, 133.40, 132.89, 131.78, 130.37, 129.24, 129.01, 128.72, 128.13, 128.00, 127.91, 127.57, 127.19, 126.55, 126.15, 125.79, 125.58, 123.53,

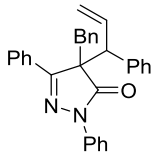
122.52, 120.04, 61.50, 42.45, 40.24; **HRMS** Calculated for $C_{35}H_{29}N_2O$ $[M+H]^+$ 493.2274, found 493.2270; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 9.0 min (maj) and 13.7 min.



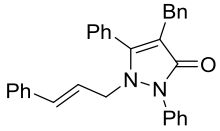
(*R*,*E*)-4-benzyl-2,5-diphenyl-4-(3-(thiophen-2-yl)allyl)-2,4-dihydro-3H-pyrazol-3-one (**3y**)**:** Prepared according to the general procedure, colorless oil, 25% yield, 90:10 er, $[\alpha]^{20}_D$ = -37.6 (*c* 0.42, $CHCl_3$), R_f = 0.48 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 – 7.92 (m, 2H), 7.65 – 7.61 (m, 2H), 7.52 – 7.48 (m, 3H), 7.34 – 7.29 (m, 2H), 7.17 – 7.13 (m, 1H), 7.12 – 7.09 (m, 1H), 7.07 – 7.00 (m, 3H), 6.93 – 6.89 (m, 4H), 6.40 (d, *J* = 15.7 Hz, 1H), 5.70 (dt, *J* = 15.7, 7.5 Hz, 1H), 3.40 (d, *J* = 2.1 Hz, 2H), 3.11 – 3.09 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.18, 158.45, 139.21, 137.45, 134.62, 131.73, 130.31, 129.20, 128.95, 128.78, 128.70, 128.08, 127.15, 126.49, 125.72, 125.54, 124.99, 121.97, 121.90, 119.99, 61.42, 42.44, 40.04; **HRMS** Calculated for $C_{29}H_{25}N_2OS$ $[M+H]^+$ 449.1682, found 449.1677; **HPLC**: Chiracel AD-H column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 1.0 mL/min, retention time 8.1 min (maj) and 11.8 min.



(*R*,*E*)-4-benzyl-4-(but-2-en-1-yl)-2,5-diphenyl-2,4-dihydro-3H-pyrazol-3-one (**3z**)**:** Prepared according to the general procedure, colorless oil, 15% yield, 54:46 er, R_f = 0.52 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.94 – 7.90 (m, 2H), 7.71 – 7.67 (m, 2H), 7.50 – 7.46 (m, 3H), 7.37 – 7.32 (m, 2H), 7.19 – 7.14 (m, 1H), 7.07 – 6.99 (m, 3H), 6.89 – 6.86 (m, 2H), 5.55 – 5.46 (m, 1H), 5.16 – 5.07 (m, 1H), 3.33 (d, *J* = 6.4 Hz, 2H), 2.97 – 2.87 (m, 2H), 1.45 (dd, *J* = 6.5, 1.6 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 175.36, 158.63, 137.62, 134.83, 131.85, 130.67, 130.19, 129.19, 128.88, 128.71, 128.04, 127.05, 126.47, 125.40, 123.13, 119.82, 61.61, 42.32, 39.98, 17.82; **HRMS** Calculated for $C_{26}H_{25}N_2O$ $[M+H]^+$ 381.1961, found 381.1964; **HPLC**: Chiracel IE column, 254 nm, 30 °C, *n*-hexane/*i*-propanol = 80/20, flow = 1.0 mL/min, retention time 5.4 min (maj) and 5.8 min.



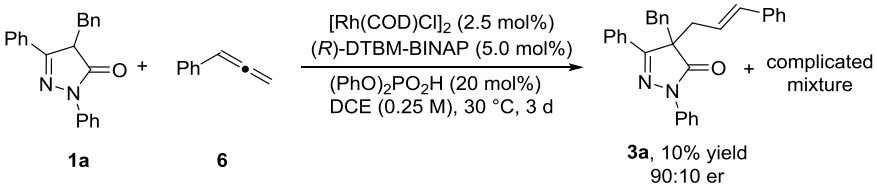
4-benzyl-2,5-diphenyl-4-(1-phenylallyl)-2,4-dihydro-3H-pyrazol-3-one (4a): white solid, melting point: 50 – 52 ℃, R_f = 0.71 (PE/EA = 10:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ ^{1}H NMR (400 MHz, Chloroform-d) δ 7.92 – 7.87 (m, 2H), 7.50 – 7.46 (m, 3H), 7.43 – 7.39 (m, 2H), 7.32 – 7.27 (m, 2H), 7.17 – 7.12 (m, 1H), 7.05 – 6.97 (m, 7H), 6.91 – 6.86 (m, 2H), 5.40 – 5.35 (m, 2H), 4.14 (d, *J* = 10.0 Hz, 1H), 3.69 (d, *J* = 13.8 Hz, 1H), 3.44 (d, *J* = 13.8 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 174.50, 157.91, 138.49, 137.24, 134.97, 134.88, 132.00, 130.09, 129.26, 128.74, 128.60, 128.12, 128.10, 127.81, 127.31, 127.00, 126.76, 125.66, 120.40, 118.48, 63.88, 56.15, 41.54; **HRMS** Calculated for $C_{31}H_{27}N_2O$ $[M+H]^+$ 443.2118, found 443.2118.



4-benzyl-1-cinnamyl-2,5-diphenyl-1,2-dihydro-3H-pyrazol-3-one (5a): melting point: 78 – 80 ℃, R_f = 0.25 (PE/EA = 5:1). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.67 – 7.63 (m, 2H), 7.52 – 7.46 (m, 7H), 7.31 – 7.23 (m, 4H), 7.19 (dd, *J* = 6.7, 2.8 Hz, 2H), 7.14 – 7.09 (m, 5H), 5.97 (d, *J* = 15.8 Hz, 1H), 5.73 (dt, *J* = 15.8, 6.9 Hz, 1H), 4.06 (dd, *J* = 6.9, 1.0 Hz, 2H), 3.74 (s, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 166.27, 156.53, 140.08, 136.10, 135.87, 135.43, 130.16, 129.65,

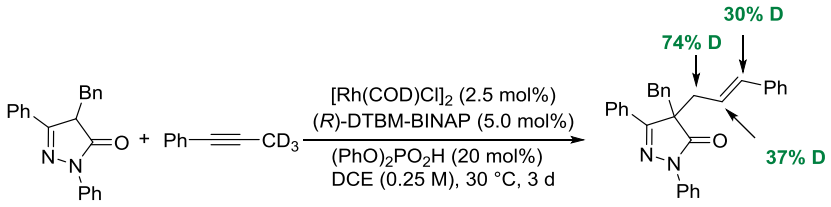
129.18, 129.07, 129.06, 128.60, 128.45, 128.16, 128.08, 126.46, 126.12, 125.92, 123.22, 119.74, 114.50, 52.17, 28.54; **HRMS** Calculated for $C_{31}H_{27}N_2O$ $[M+H]^+$ 443.2118, found 443.2123.

5. Deuterium labeling and control experiments



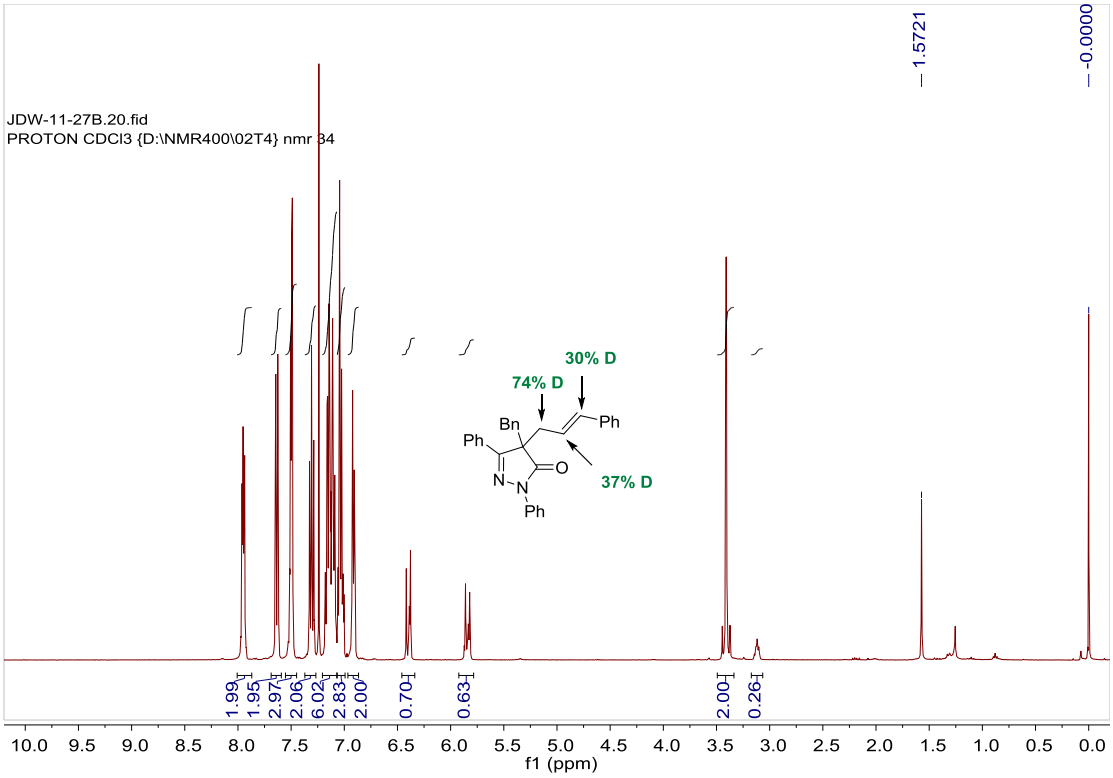
1a **6** **3a**, 10% yield
90:10 er

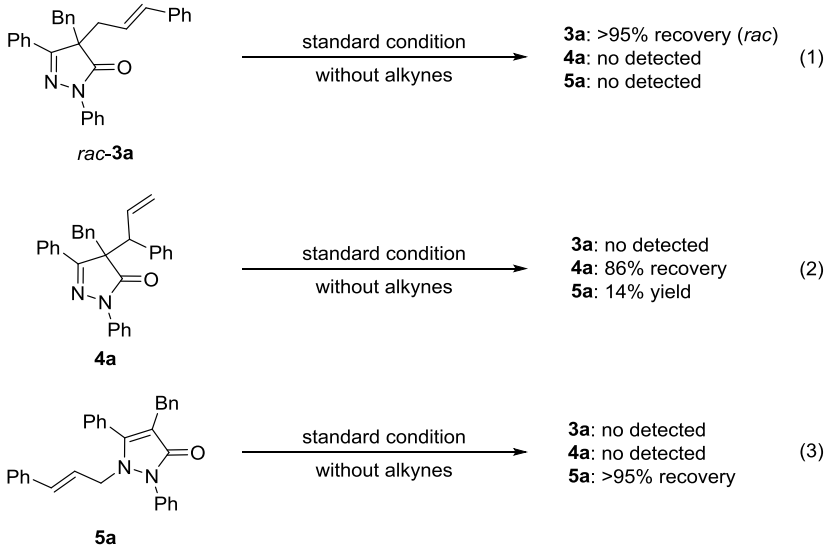
In glove box, a sealed tube was charged with **1a** (0.1 mmol, 1.0 equiv), $[Rh(COD)Cl]_2$ (0.0025 mmol, 2.5 mol%), (*R*)-DTBM-BINAP (0.005 mmol, 5 mol%), $(PhO)_2PO_2H$ (0.02 mmol, 20 mol%) and DCE (0.4 mL) at room temperature. Then allene **6** (0.20 mmol, 2.0 equiv) was added and the reaction tube was sealed with a teflon screw cap, removed from the glove box and stirred at 35 °C for 3 days. After cooling to room temperature, the reaction mixture was concentrated in vacuo and detected with ^{1}HNMR analysis (with 1,3,5-trimethoxybenzene as internal standard) to determined product **3a** in 10% yield and 90:10 er. The enantioselectivity was determined by chiral HPLC.



1a **2-*d*$_3$** **3a-*d*$_n$**, 84% yield
>19:1 rr, 91:9 er

In glove box, a sealed tube was charged with **1a** (0.1 mmol, 1.0 equiv), $[Rh(COD)Cl]_2$ (0.0025 mmol, 2.5 mol%), (*R*)-DTBM-BINAP (0.005 mmol, 5 mol%), $(PhO)_2PO_2H$ (0.02 mmol, 20 mol%) and DCE (0.4 mL) at room temperature. Then **2-*d*$_3$** (0.20 mmol, 2.0 equiv) was added and the reaction tube was sealed with a teflon screw cap, removed from the glove box and stirred at 35 °C for 3 days. After cooling to room temperature, the reaction mixture was concentrated in vacuo and purified by flash chromatography on silica gel with petroleum ether and ethyl acetate (PE/EA = 20 :1) to afford **3a-*d*$_n$** in 84% yield and 91:9 er. The enantioselectivity was determined by chiral HPLC.





(1) In glove box, a sealed tube was charged with *rac*-**3a** (0.1 mmol, 1.0 equiv), $[Rh(COD)Cl]_2$ (0.0025 mmol, 2.5 mol%), (*R*)-DTBM-BINAP (0.005 mmol, 5 mol%), $(PhO)_2PO_2H$ (0.02 mmol, 20 mol%) and DCE (0.4 mL) at room temperature. Then the reaction tube was sealed with a teflon screw cap, removed from the glove box and stirred at 35 °C for 3 days. After cooling to room temperature, the reaction mixture was concentrated in vacuo and detected with ^{1}HNMR analysis (with 1,3,5-trimethoxybenzene as internal standard) to determined racemate **3a** in more than 95% recovery yield. No **4a** or **5a** was detected.

(2) In glove box, a sealed tube was charged with **4a** (0.1 mmol, 1.0 equiv), $[Rh(COD)Cl]_2$ (0.0025 mmol, 2.5 mol%), (*R*)-DTBM-BINAP (0.005 mmol, 5 mol%), $(PhO)_2PO_2H$ (0.02 mmol, 20 mol%) and DCE (0.4 mL) at room temperature. Then the reaction tube was sealed with a teflon

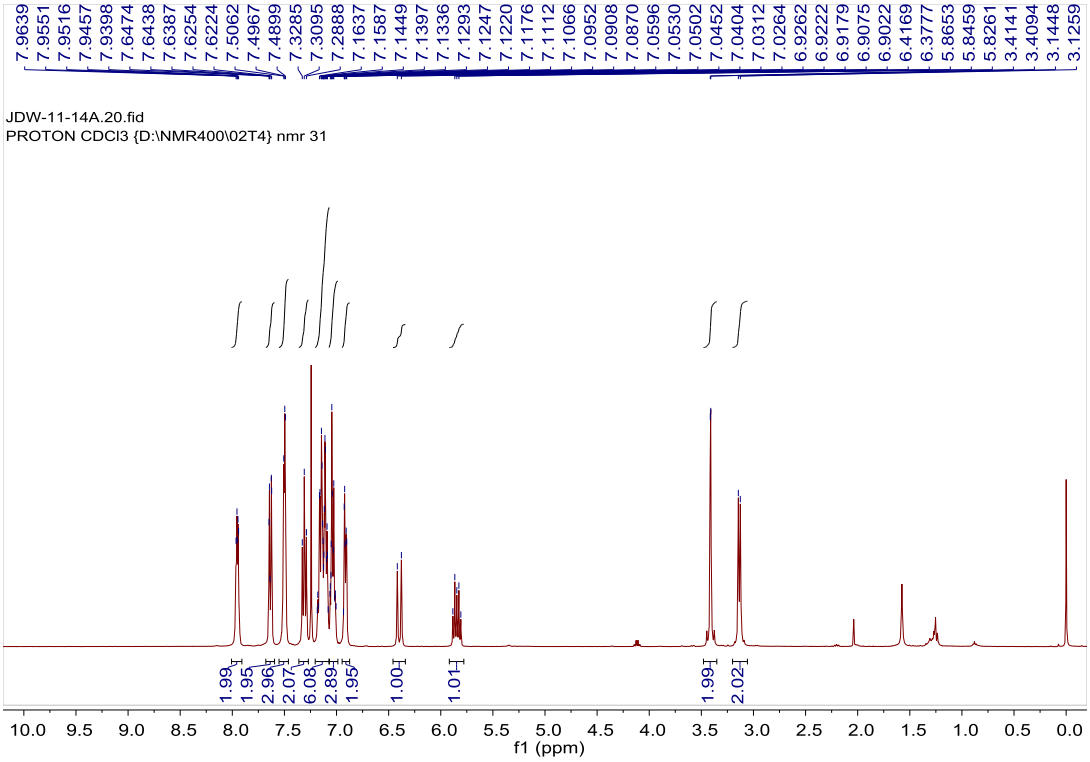
screw cap, removed from the glove box and stirred at 35 °C for 3 days. After cooling to room temperature, the reaction mixture was concentrated in vacuo and detected with ^{1}HNMR analysis (with 1,3,5-trimethoxybenzene as internal standard) to determined racemate **4a** and **5a** in recovery 86% and 14% yield, respectively. No **3a** was detected.

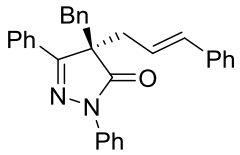
(3) In glove box, a sealed tube was charged with **5a** (0.1 mmol, 1.0 equiv), $[Rh(COD)Cl]_2$ (0.0025 mmol, 2.5 mol%), (*R*)-DTBM-BINAP (0.005 mmol, 5 mol%), $(PhO)_2PO_2H$ (0.02 mmol, 20 mol%) and DCE (0.4 mL) at room temperature. Then the reaction tube was sealed with a teflon screw cap, removed from the glove box and stirred at 35 °C for 3 days. After cooling to room temperature, the reaction mixture was concentrated in vacuo and detected with ^{1}HNMR analysis (with 1,3,5-trimethoxybenzene as internal standard) to determined racemate **5a** in more than 95% recovery yield. No **3a** or **4a** was detected.

6. References

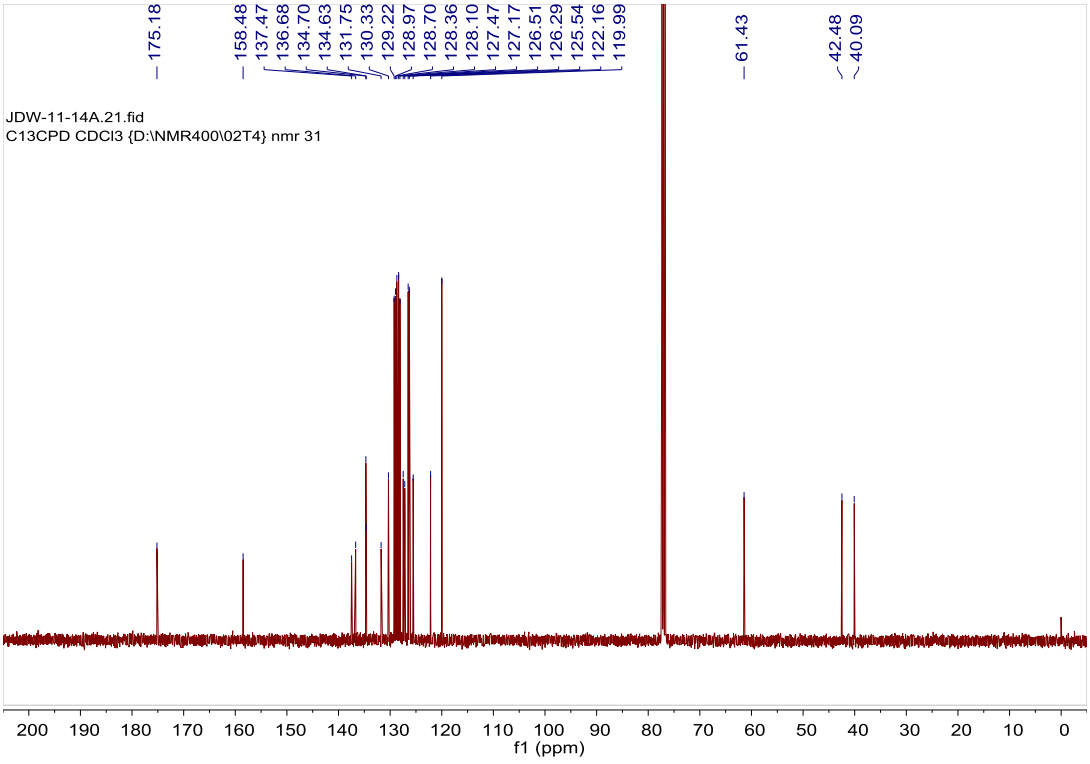
1. (a) Briones, J. F.; Davies, H. M. L. *Org. Lett.* **2011**, *13*, 3984. (b) Gao, S.; Wu, Z.; Fang, X.; Lin, A.; Yao, H. *Org. Lett.* **2016**, *18*, 3906.
2. (a) Kamlar, M.; Cisarova, I.; Vesely, J. *Org. Biomol. Chem.* **2015**, *13*, 2884. (b) Mao, S.; Geng, X.; Yang, Y.; Qian, X.; Wu, S.; Han, J.; Wang, L. *RSC Adv.* **2015**, *46*, 36390.
3. Hu, R.-B., Wang, C. H.; Ren, W.; Liu, Z.; Yang, S. D. *ACS Catal.* **2017**, *7*, 7400.
4. (a) Tao, Z.-L.; Zhang, W.-Q.; Chen, D.-F.; Adele, A.; Gong, L.-Z. *J. Am. Chem. Soc.* **2013**, *135*, 9255. (b) Lin, H.-C.; Wang, P.-S.; Tao, Z.-L.; Chen, Y.-G.; Han, Z.-Y.; Gong, L.-Z. *J. Am. Chem. Soc.* **2016**, *138*, 14354.

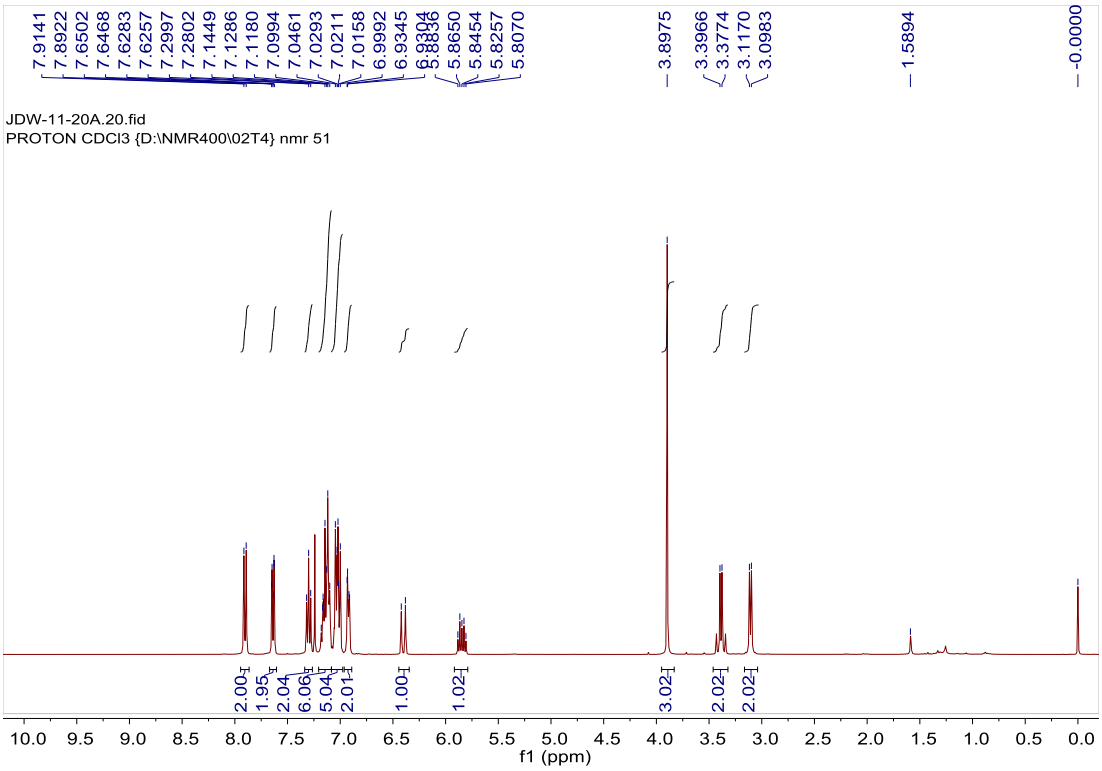
7. Copy of NMR and HPLC for products

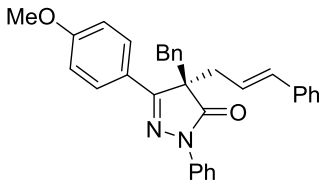




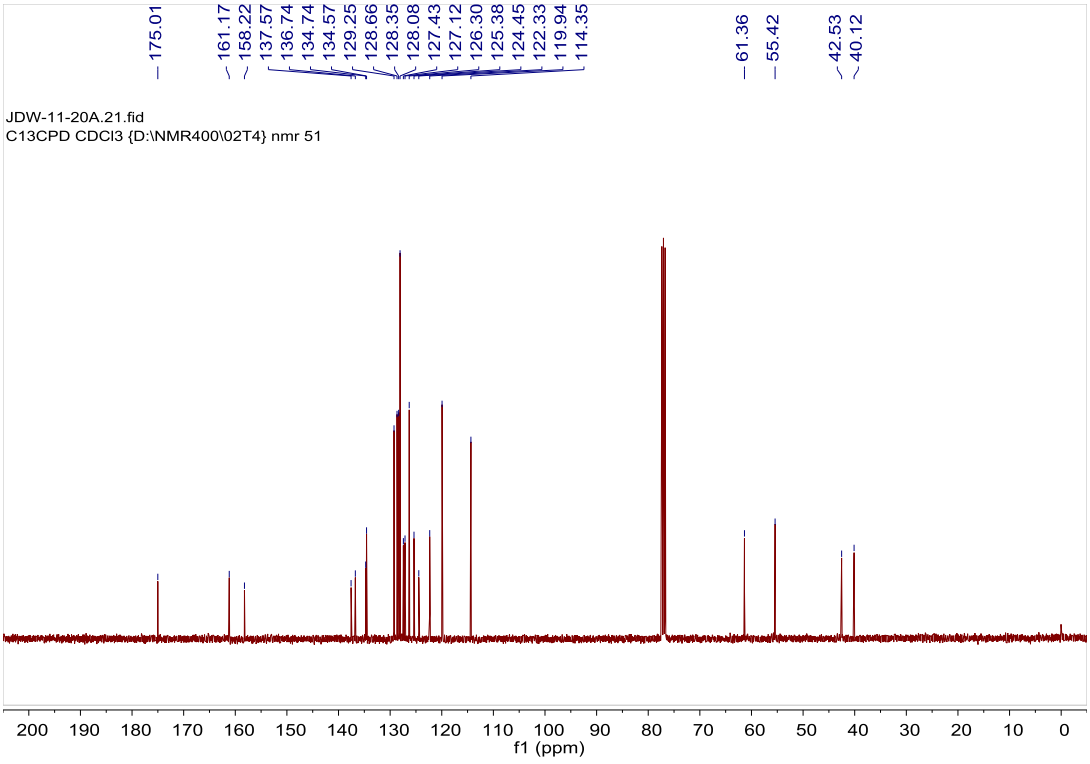
3a ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

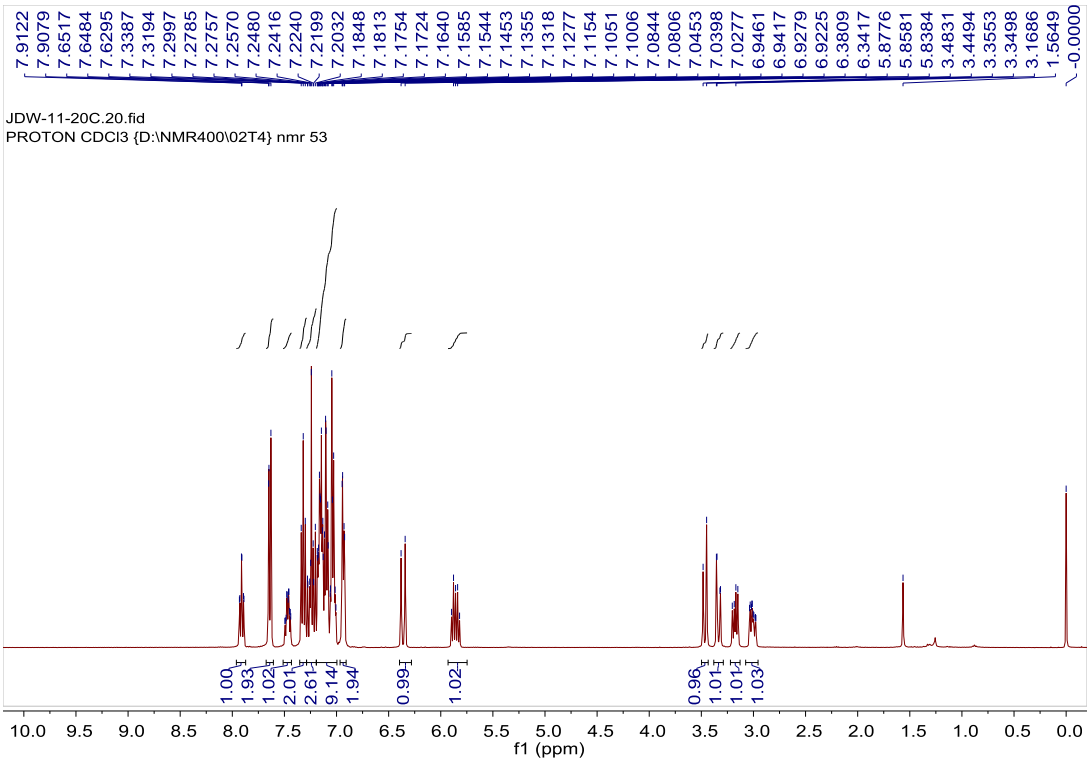


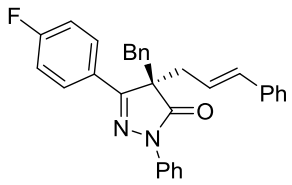




3b ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

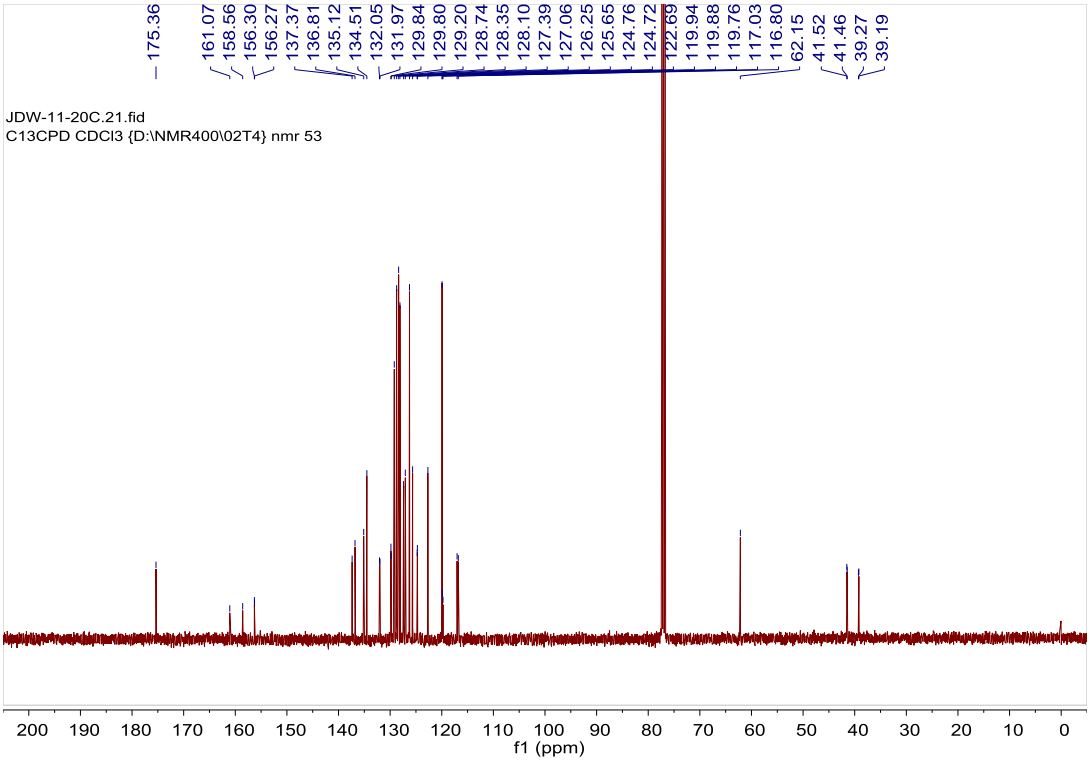


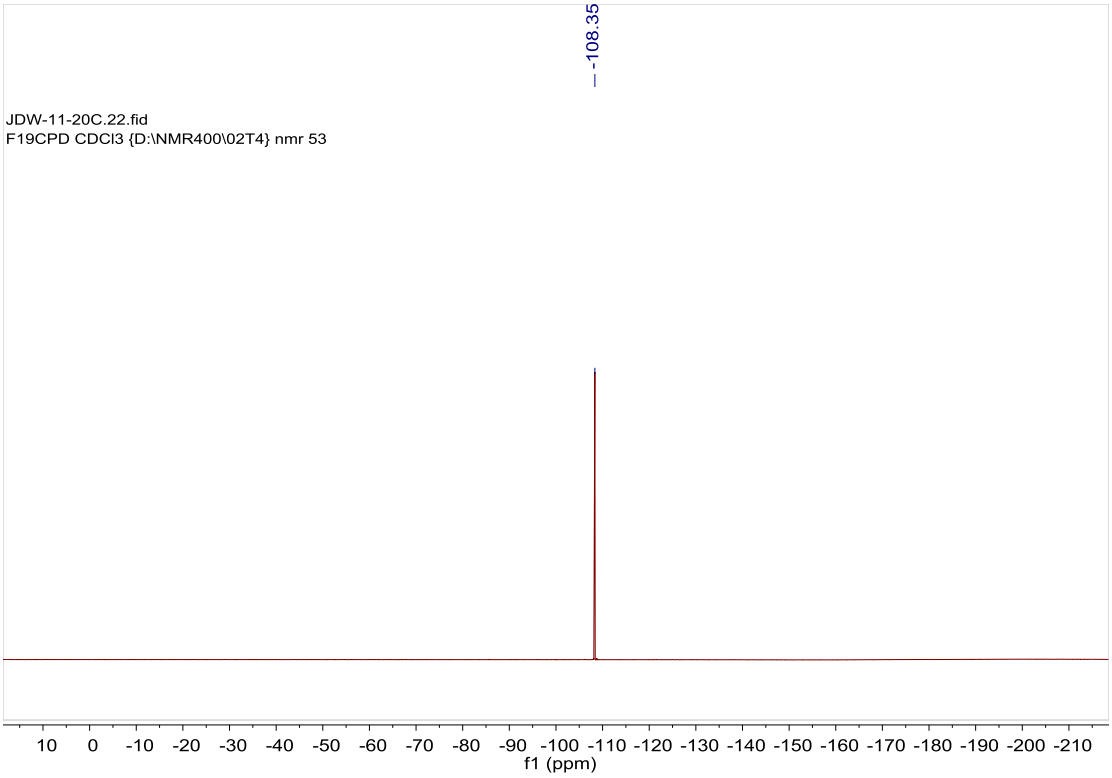


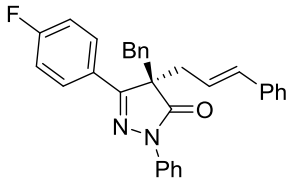


3c ^{1}H NMR (400 MHz, $CDCl_3$)

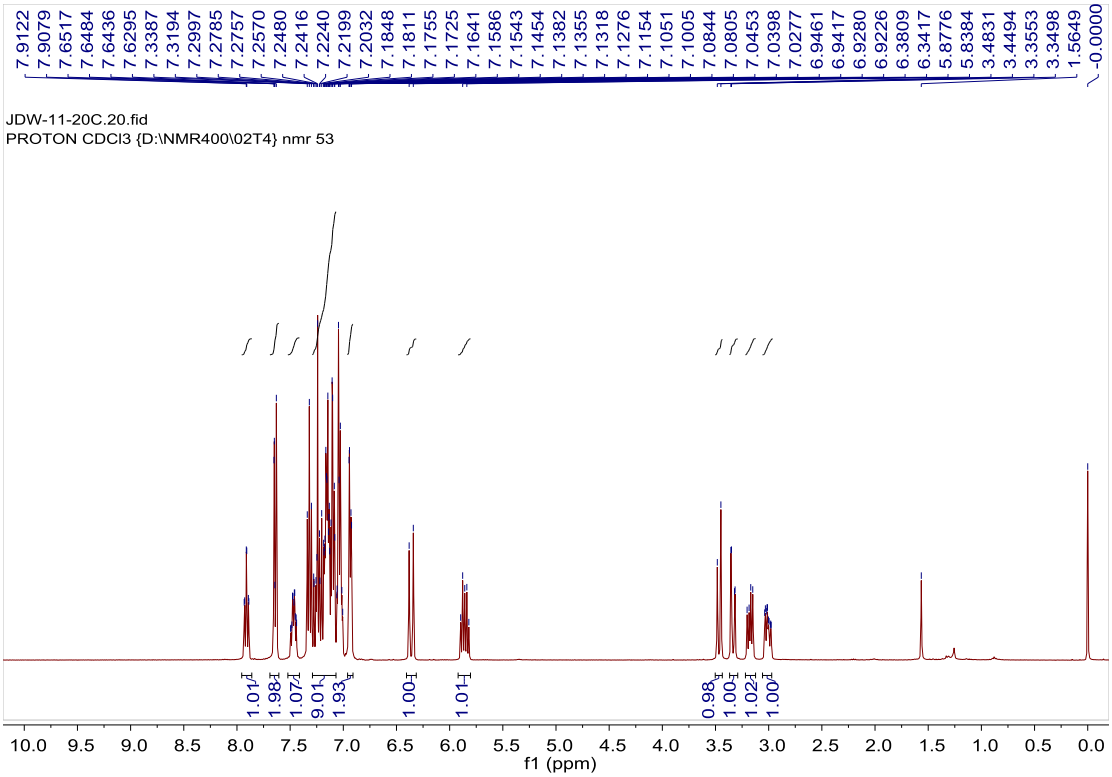
^{13}C NMR (100 MHz, $CDCl_3$)

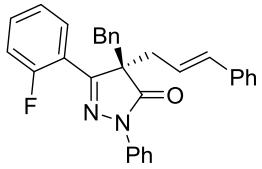




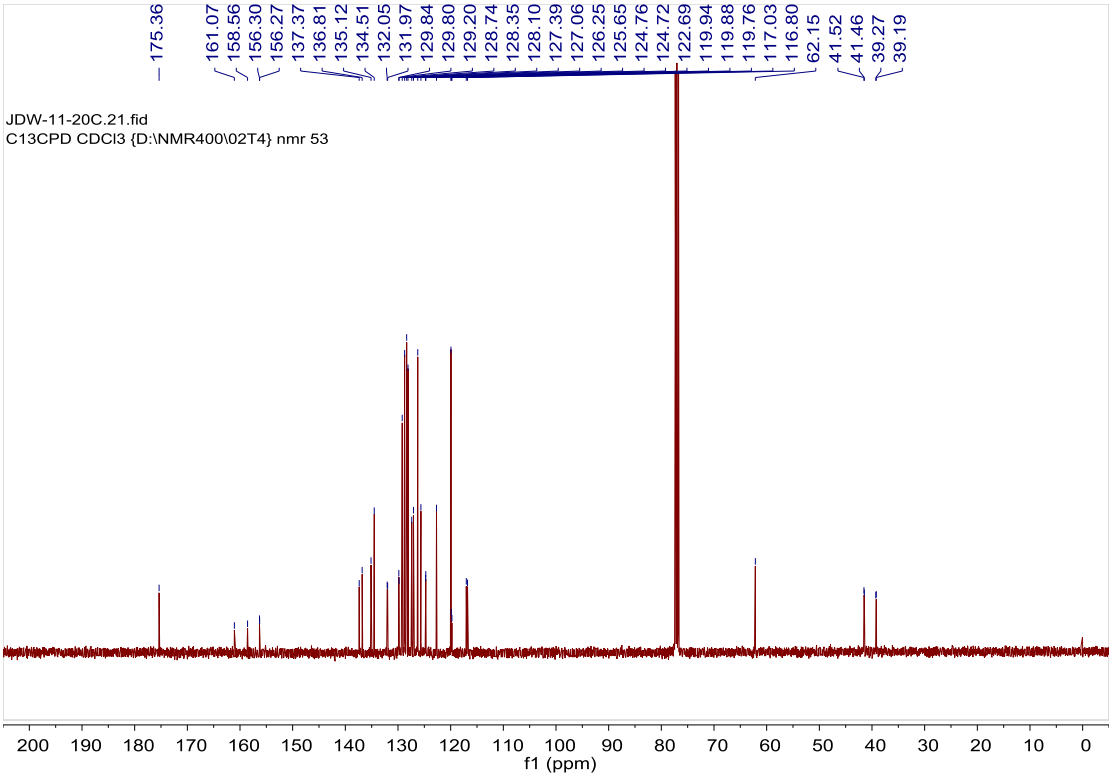


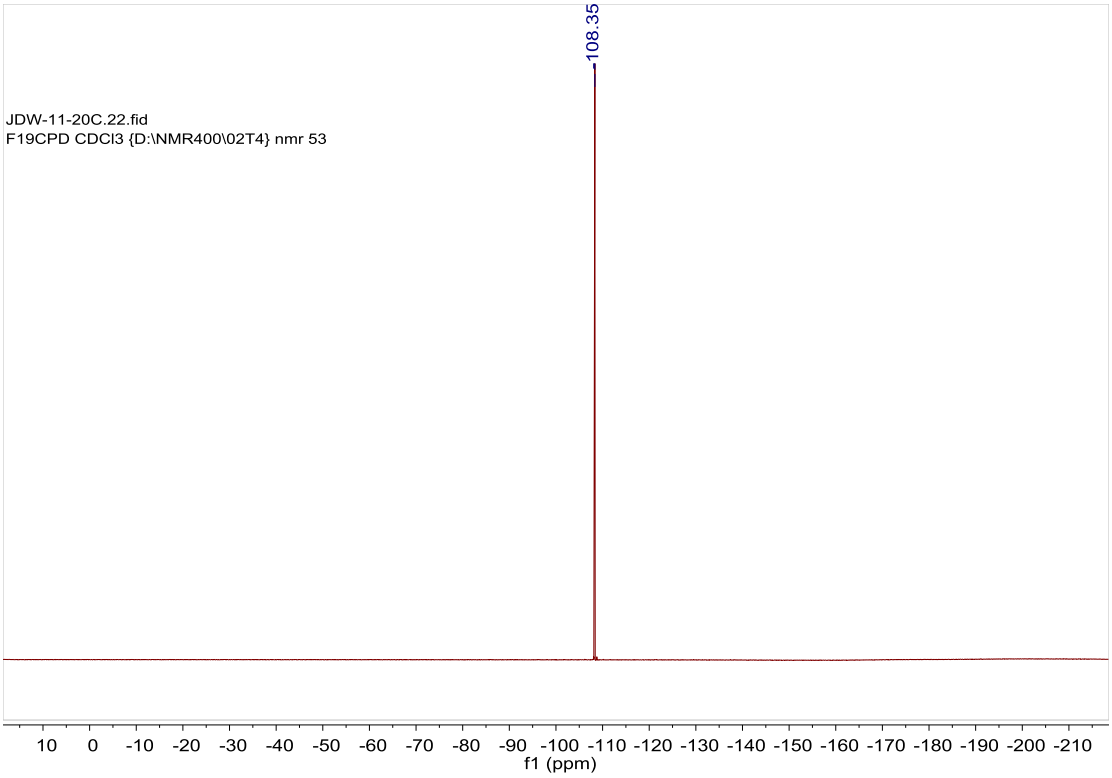
3c ^{19}F NMR (375 MHz, $CDCl_3$)

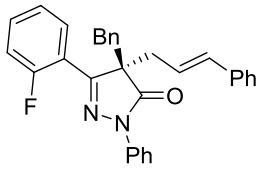




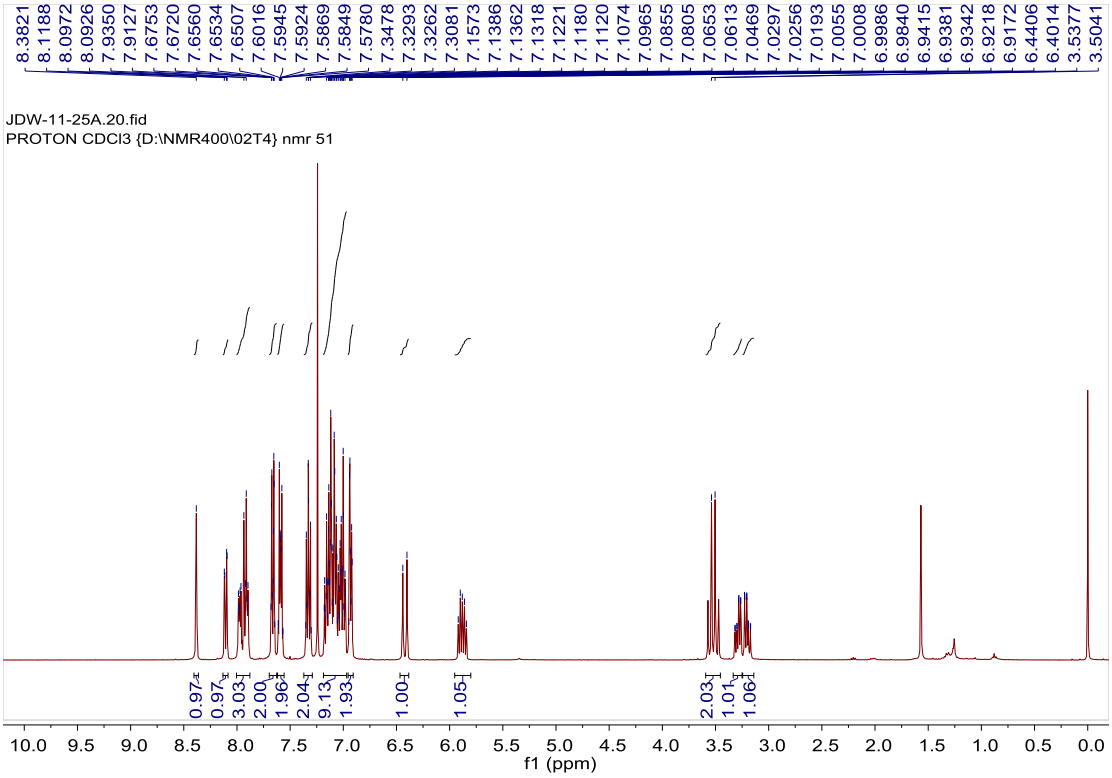
3d ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

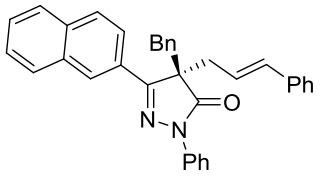






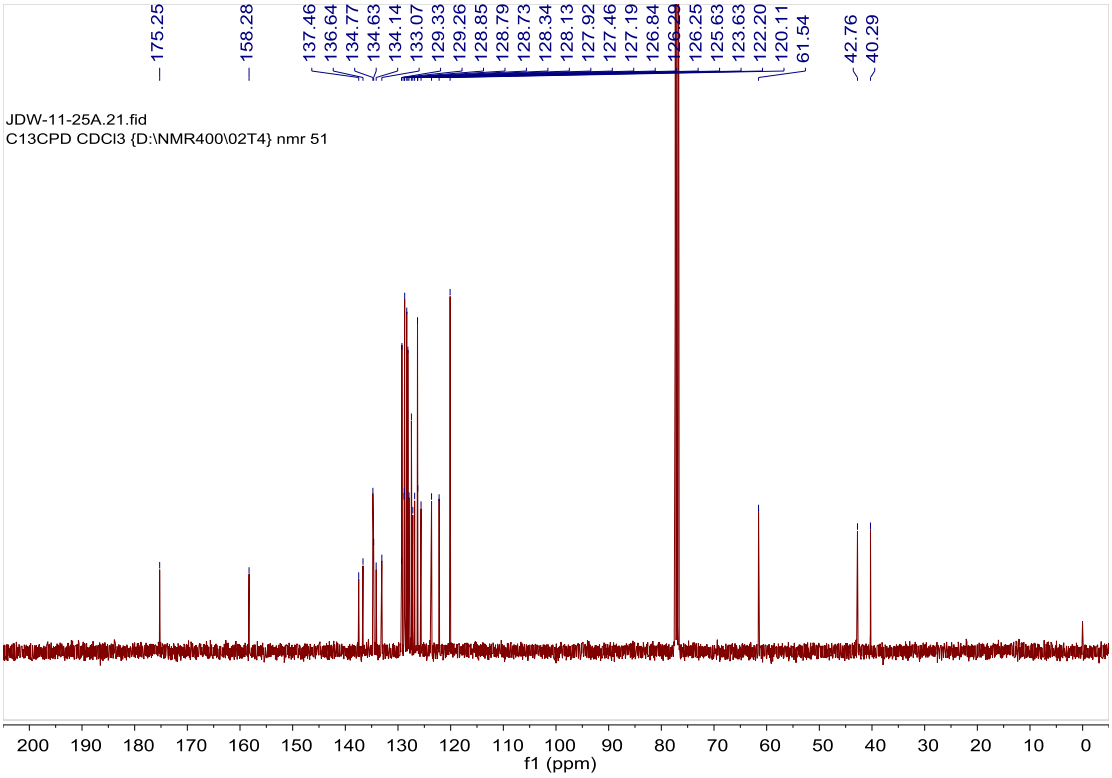
3d ^{19}F NMR (375 MHz, $CDCl_3$)

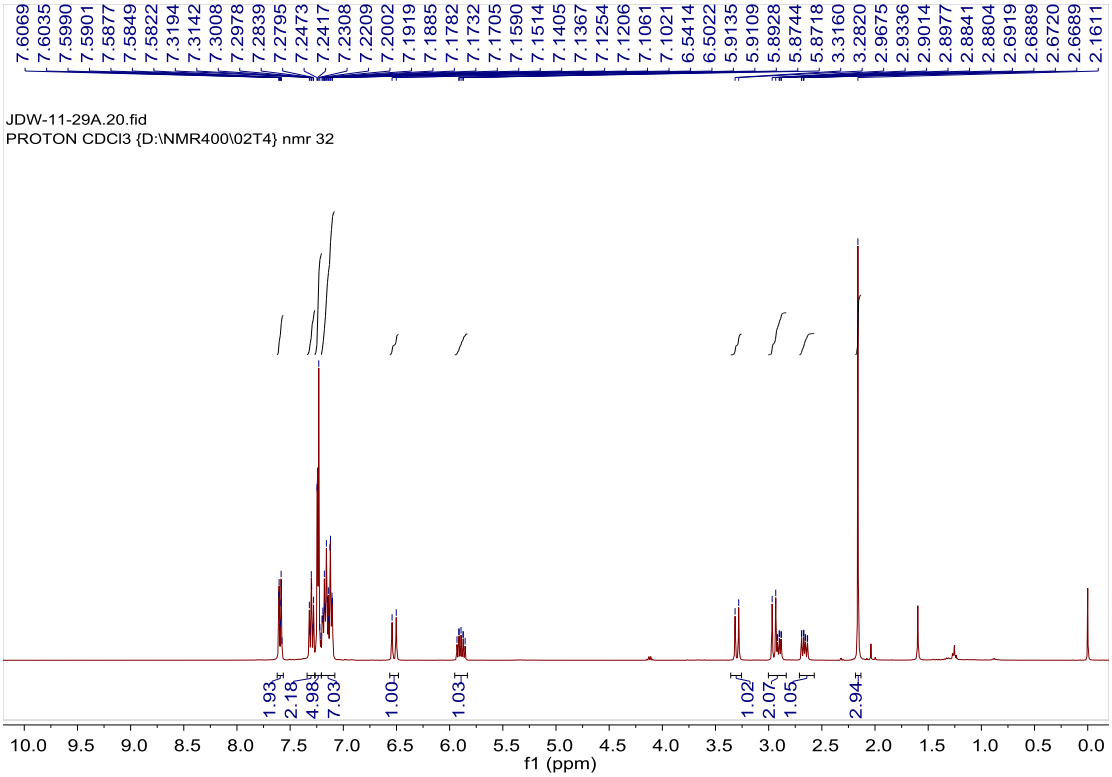


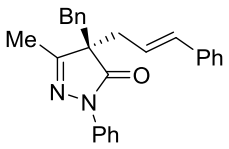


3e ^{1}H NMR (400 MHz, $CDCl_3$)

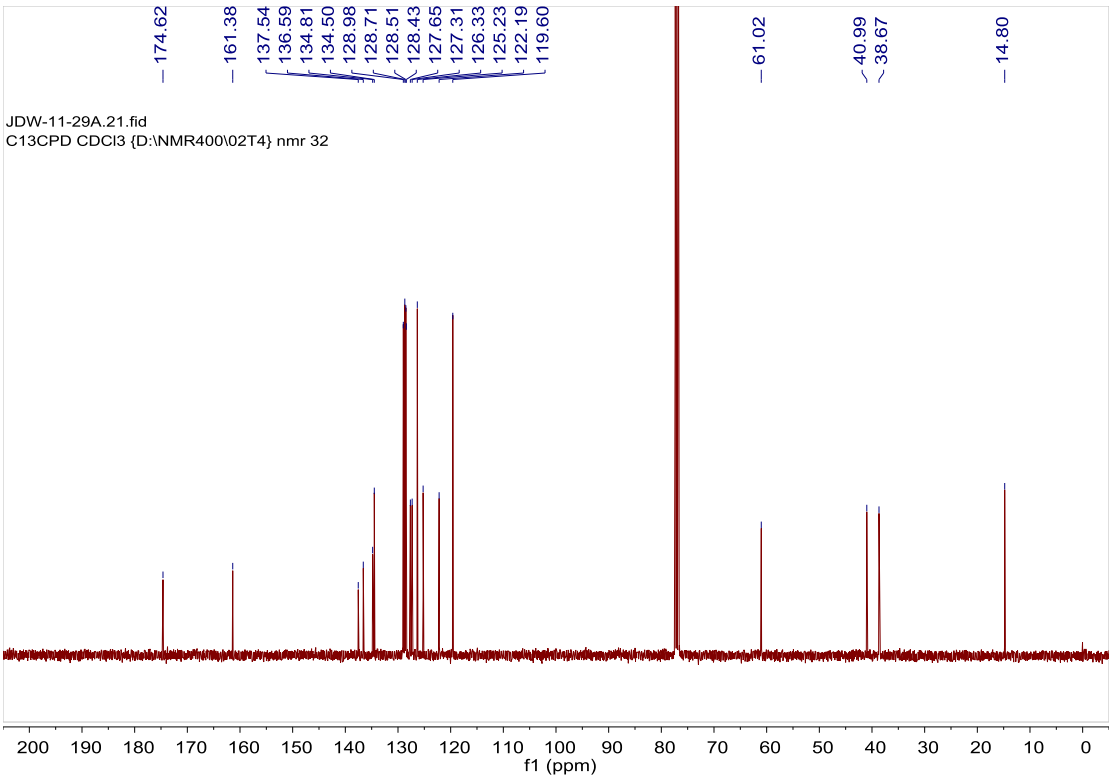
^{13}C NMR (100 MHz, $CDCl_3$)

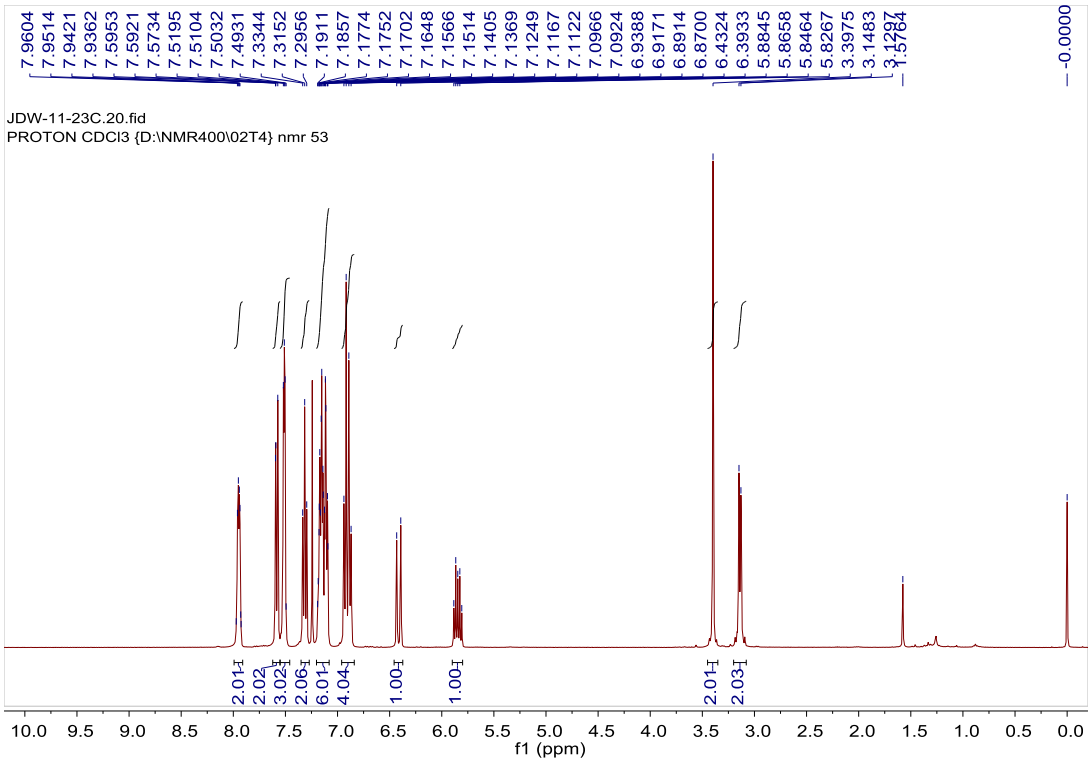


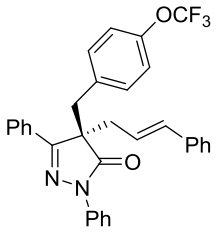




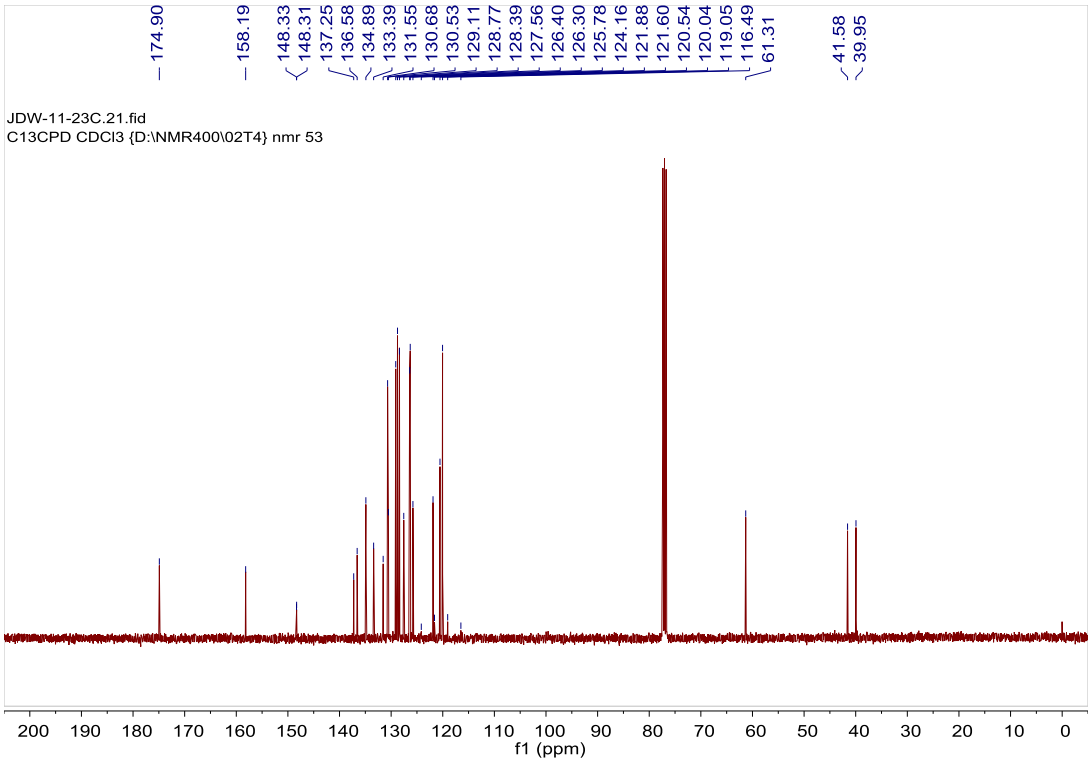
3f ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

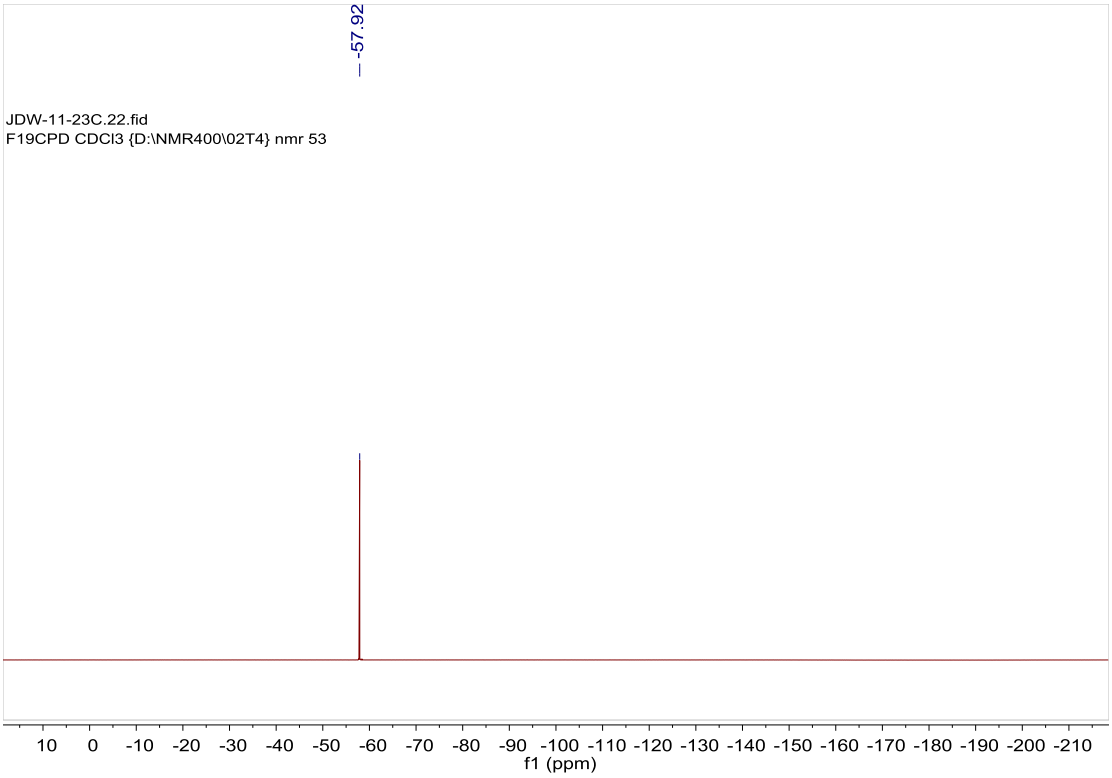


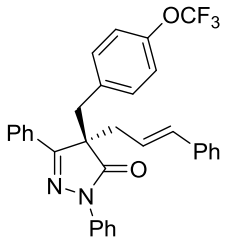




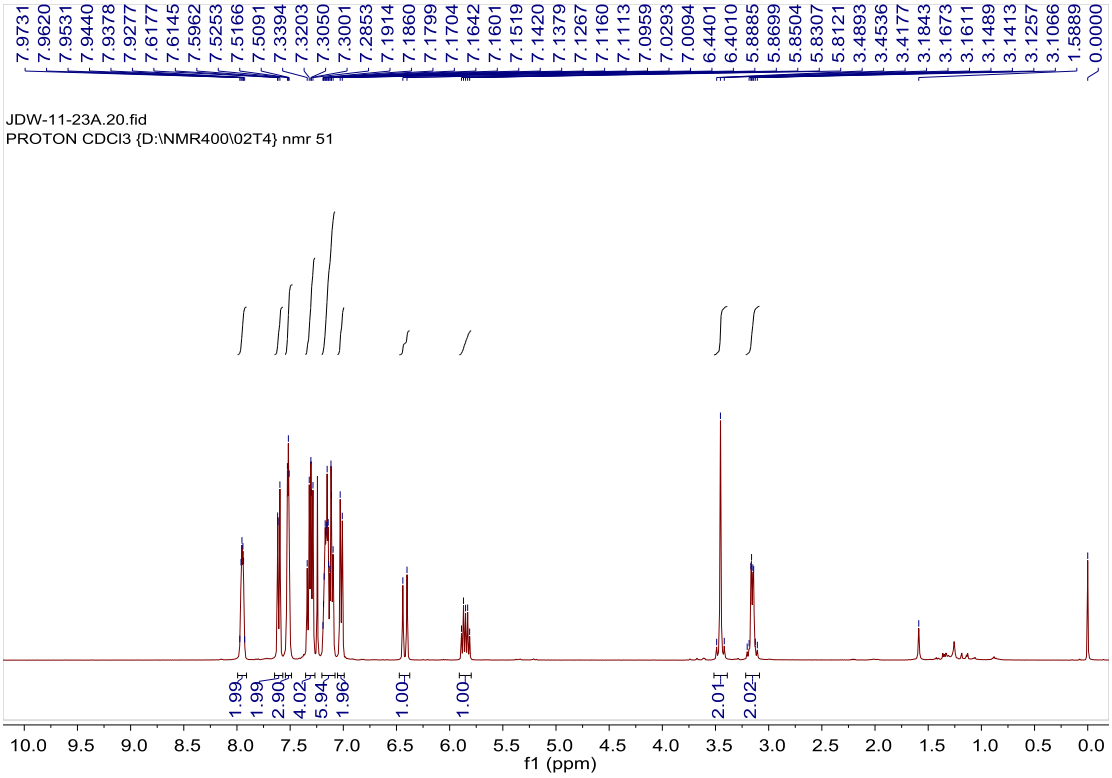
3g ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

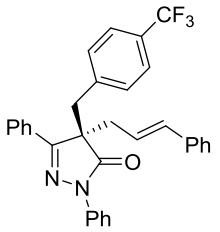




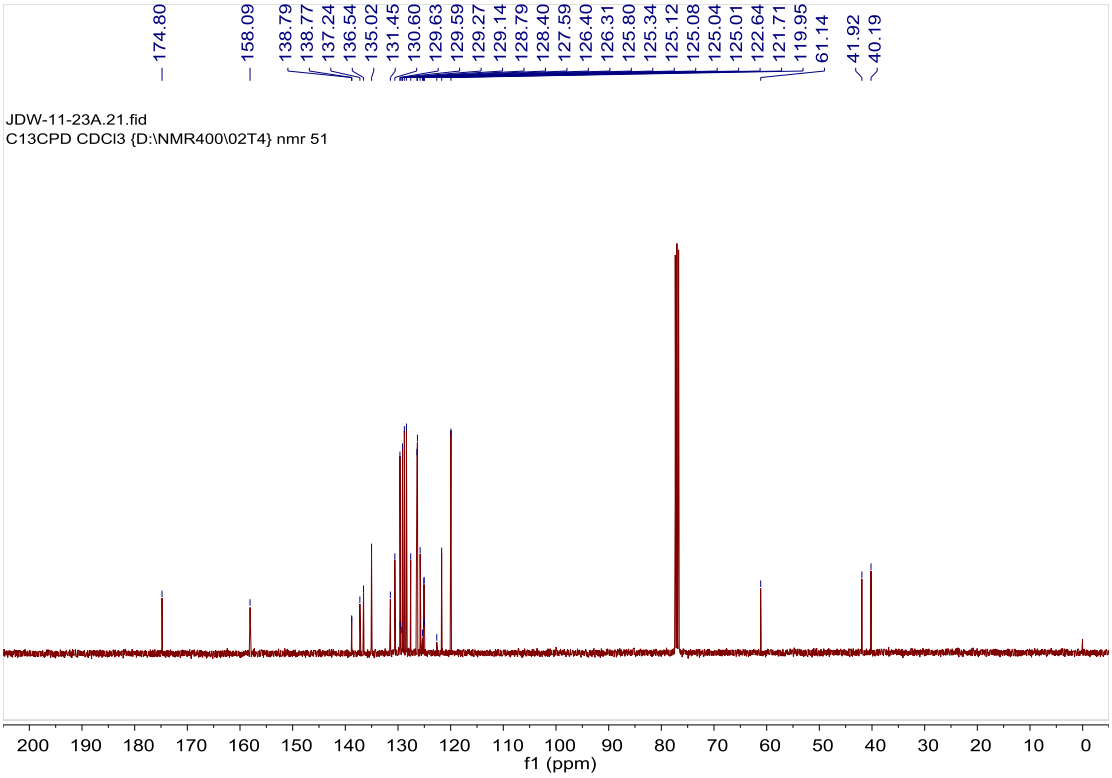


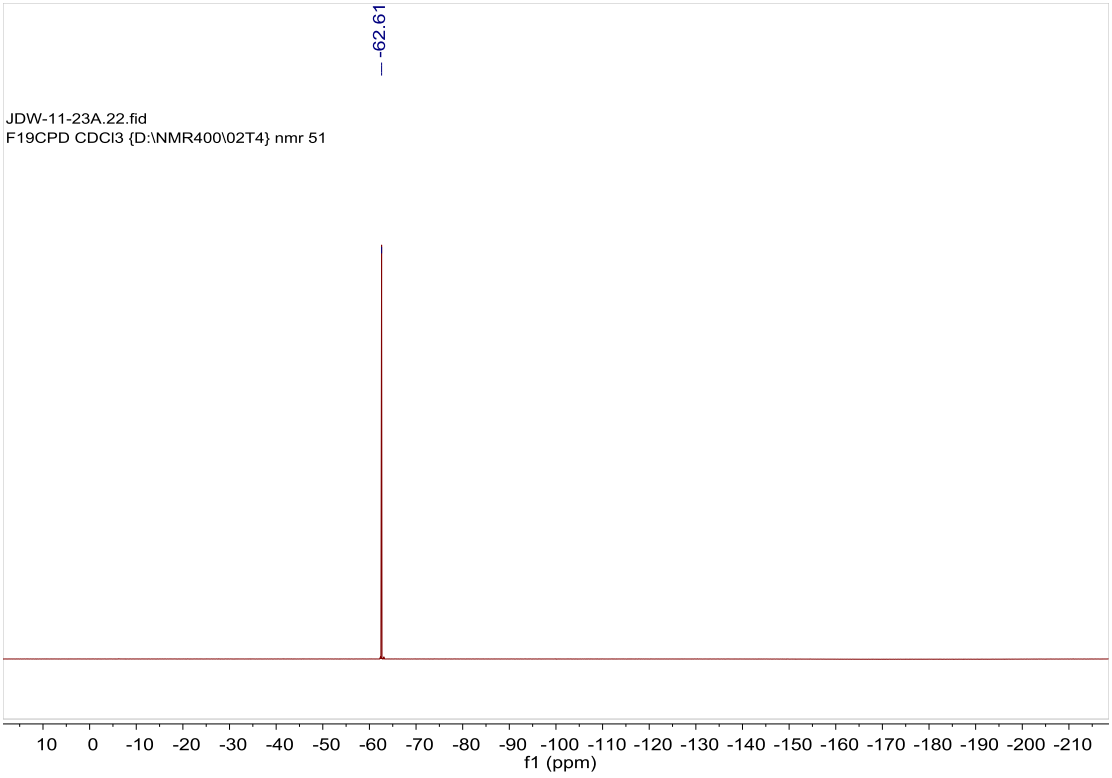
3g ^{19}F NMR (375 MHz, $CDCl_3$)

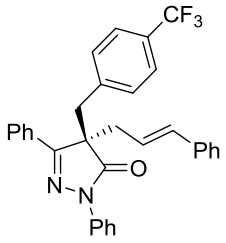




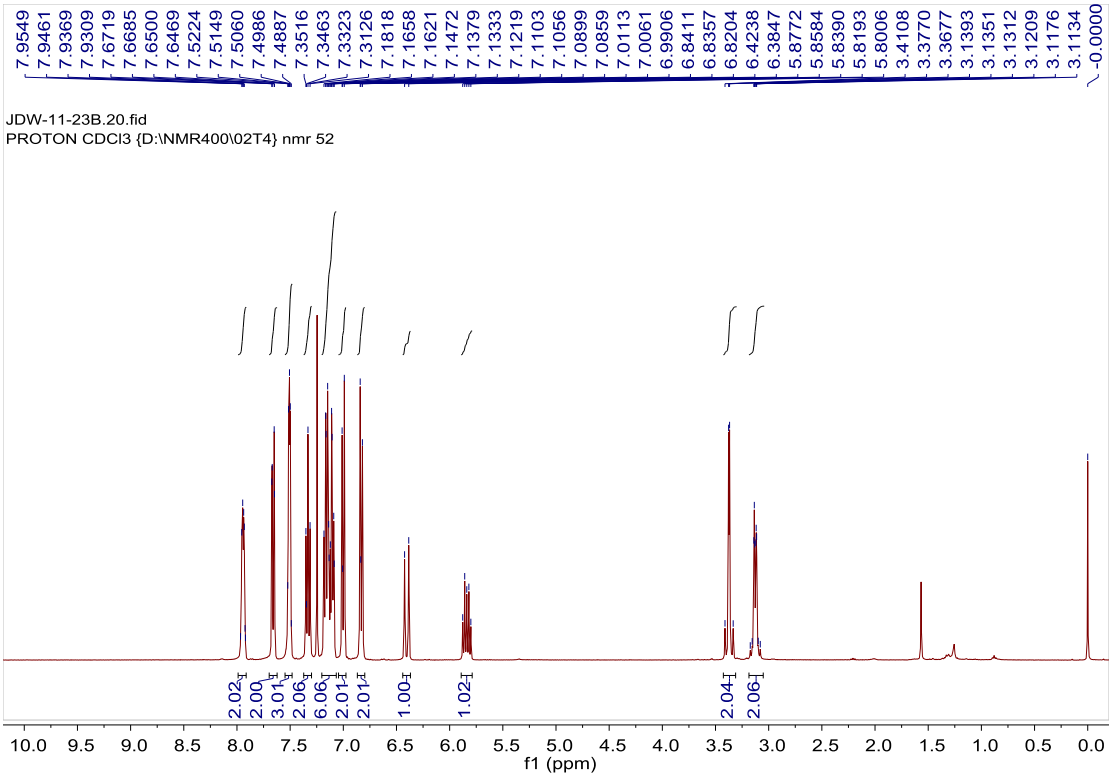
3h ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

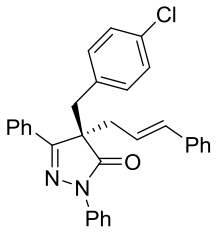




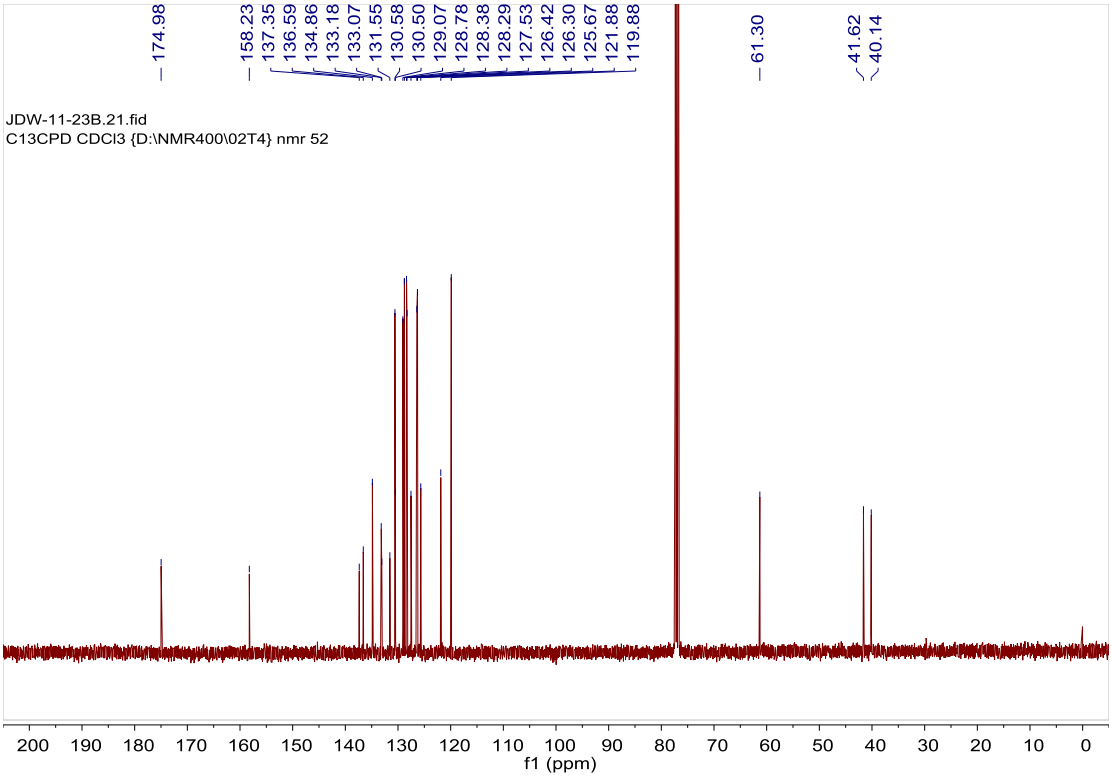


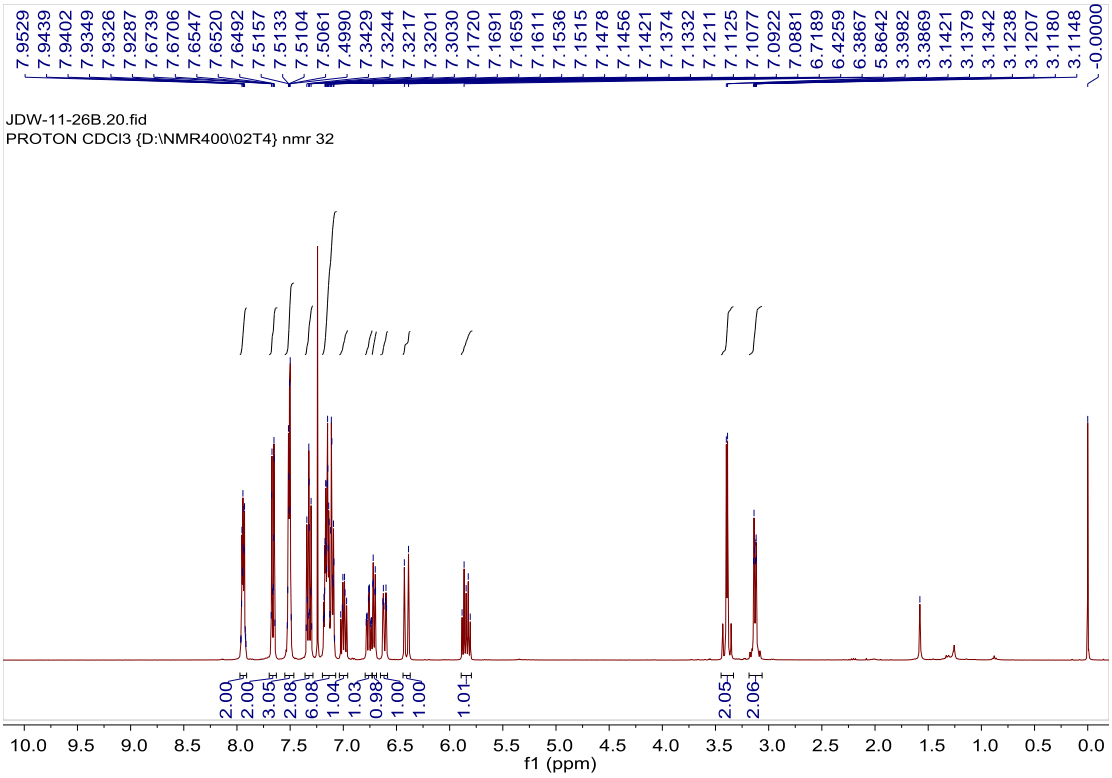
3h ^{19}F NMR (375 MHz, $CDCl_3$)

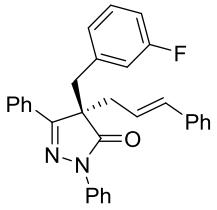




3i ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)







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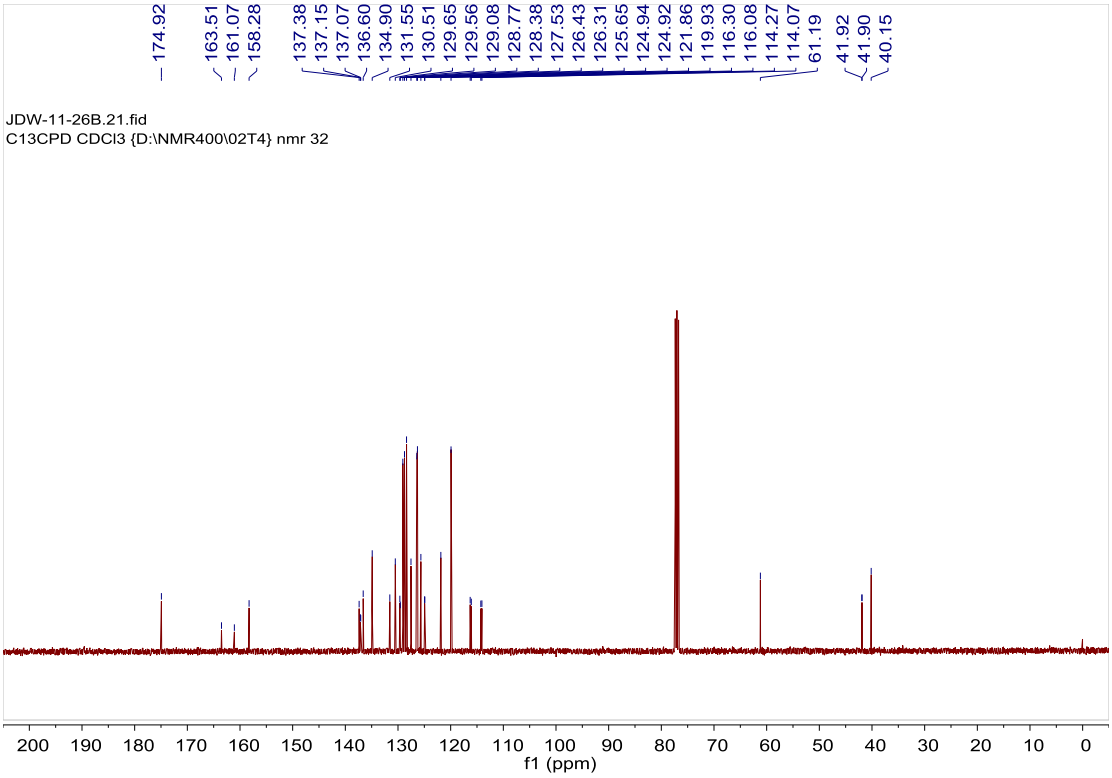
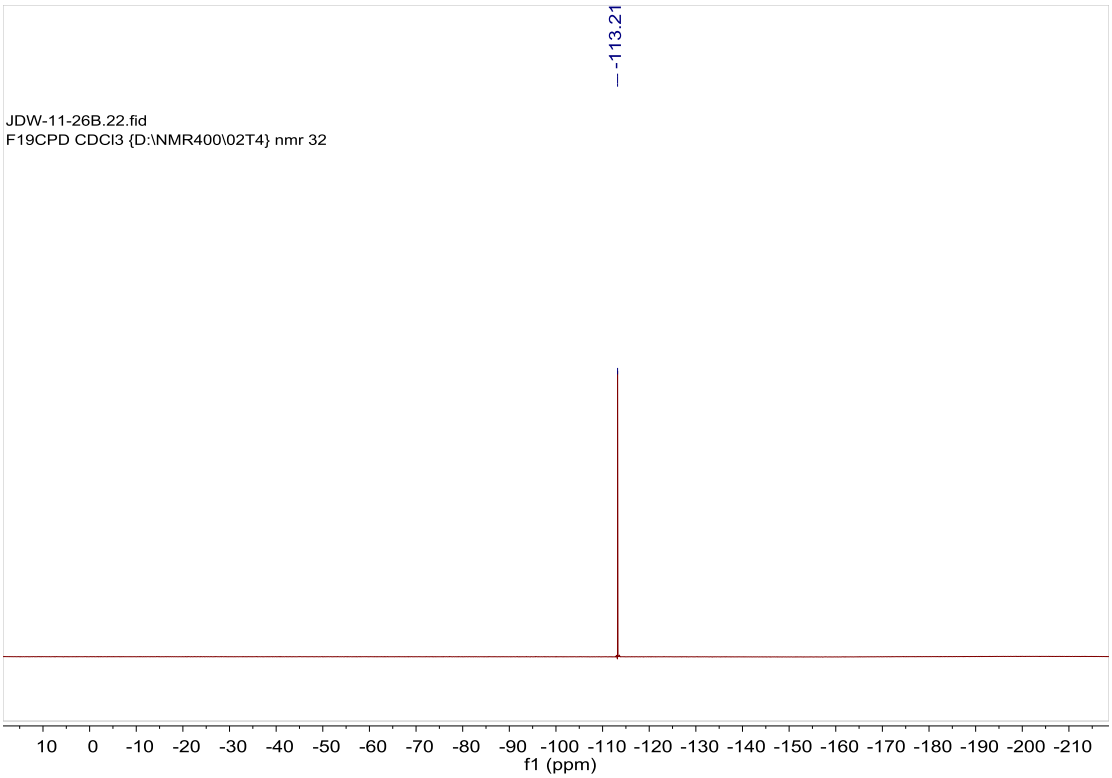
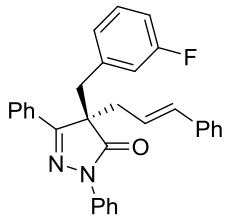
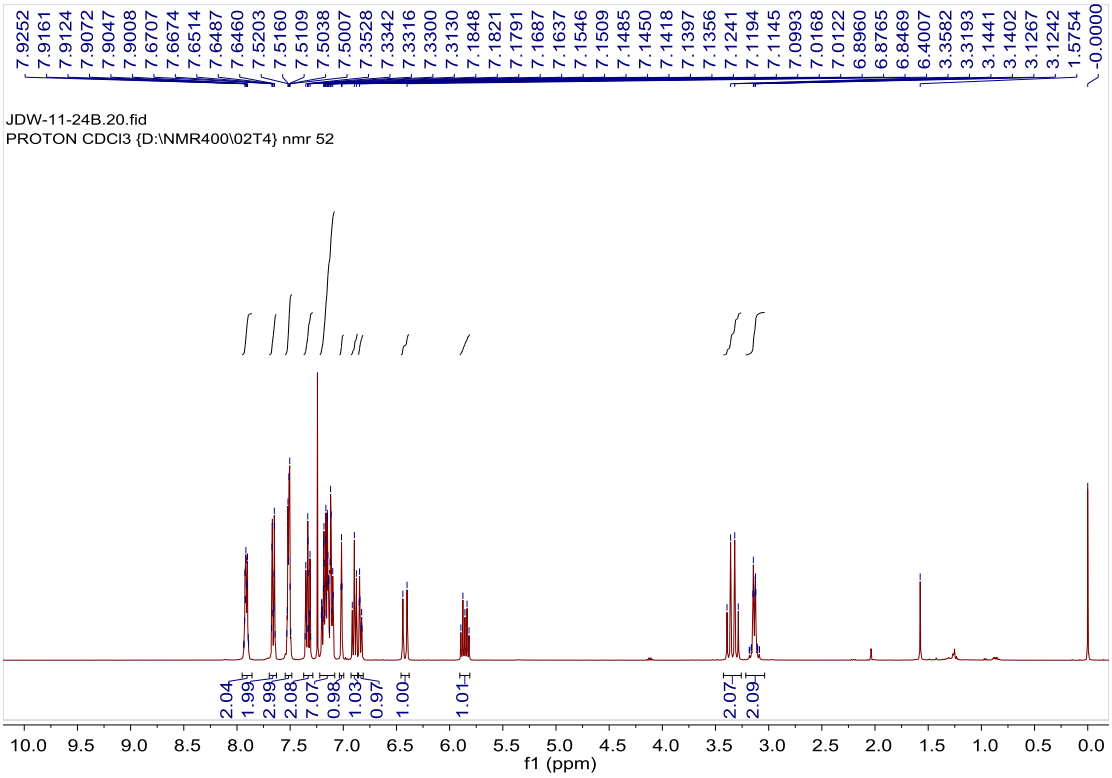
^{13}C NMR (100 MHz, $CDCl_3$)

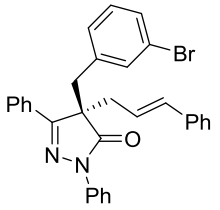




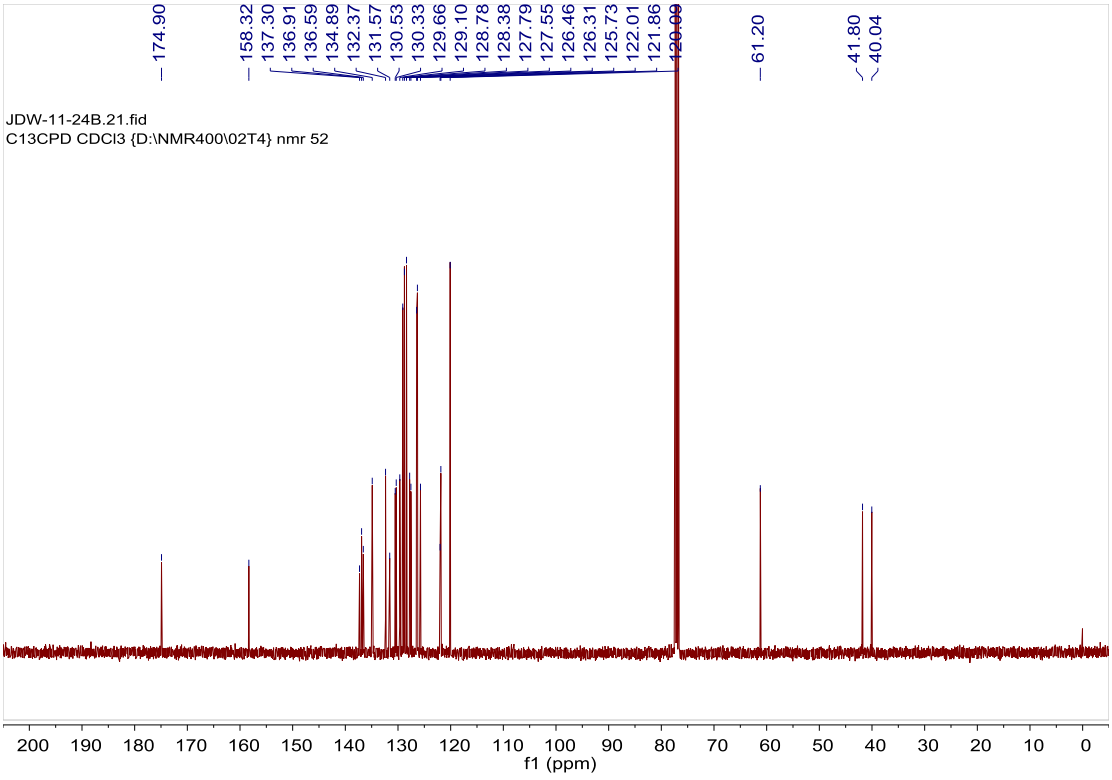


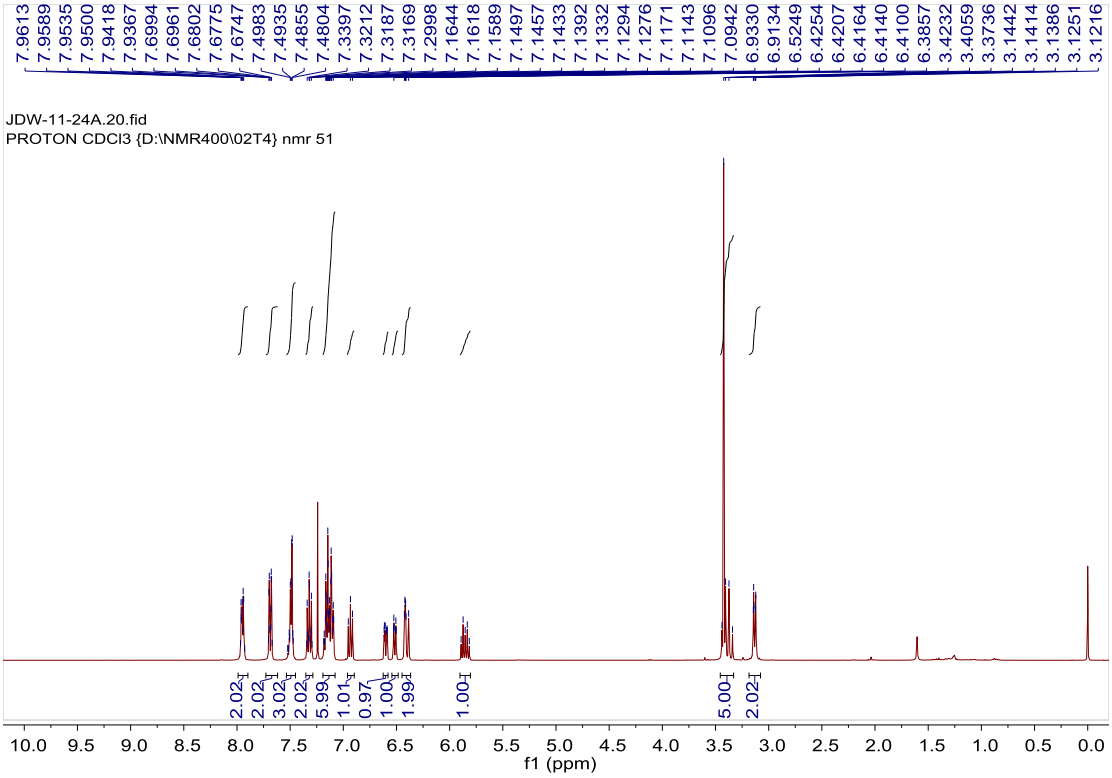
3j ^{19}F NMR (375 MHz, $CDCl_3$)

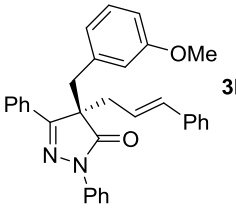




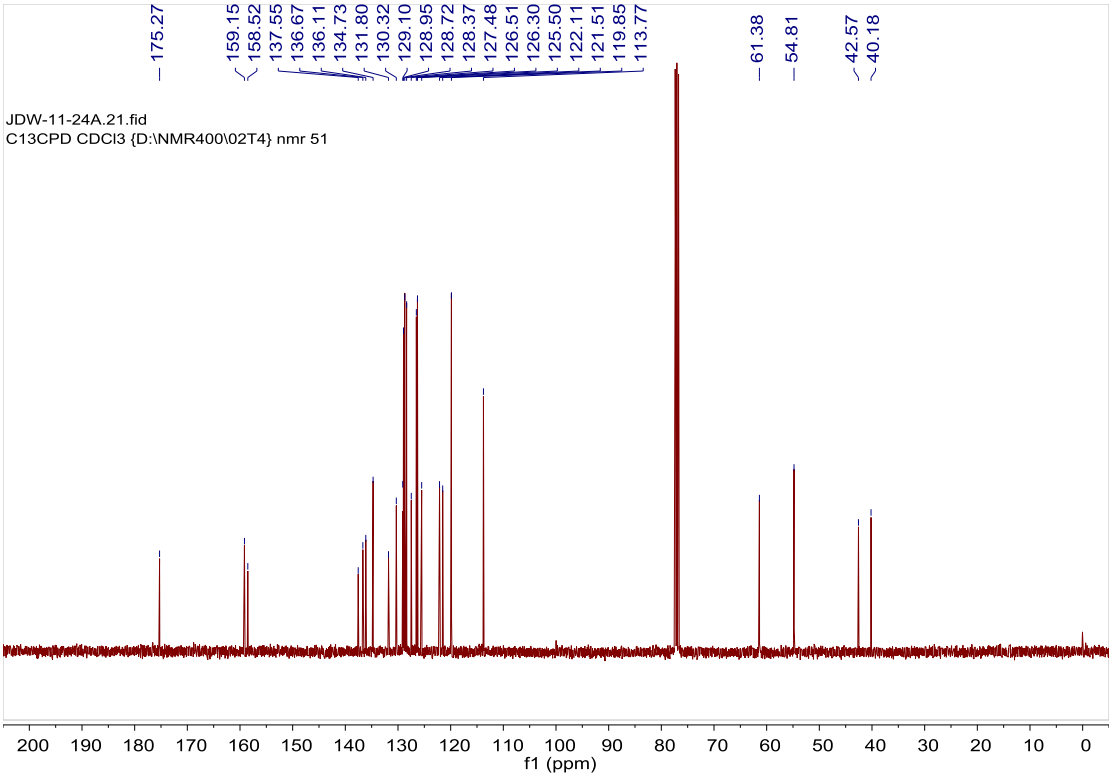
3k ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

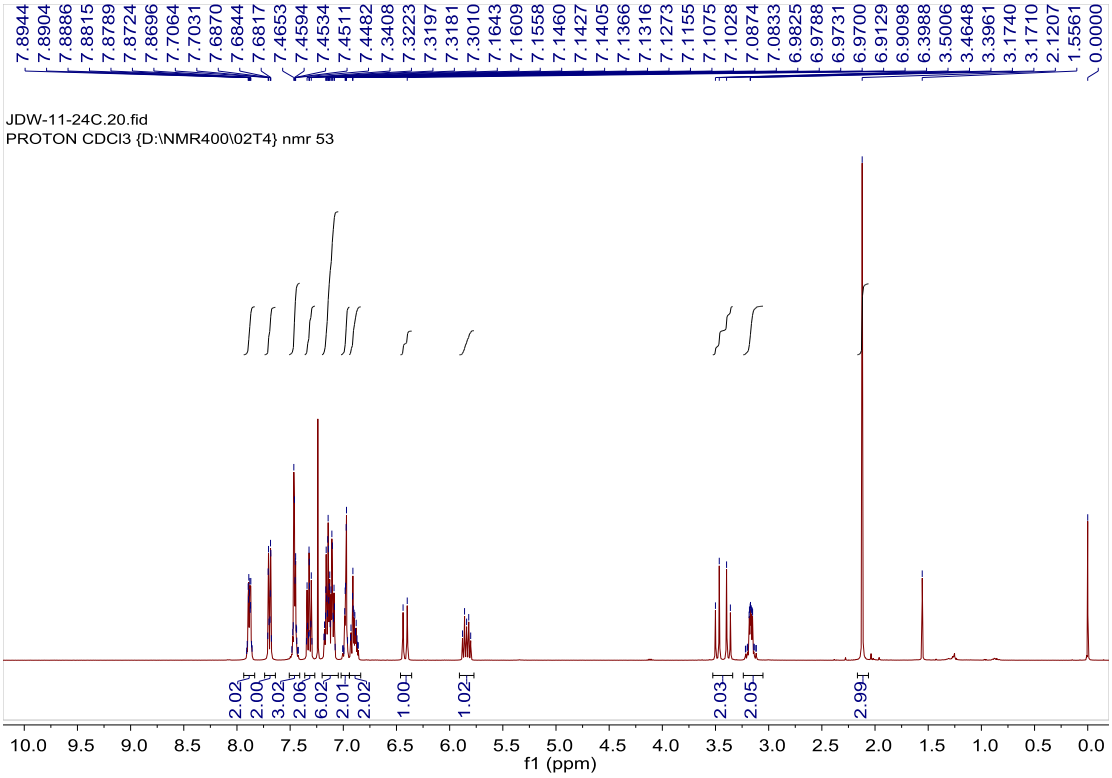


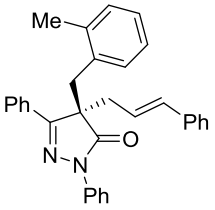




3l ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)







3m ^{1}H NMR (400 MHz, $CDCl_3$)
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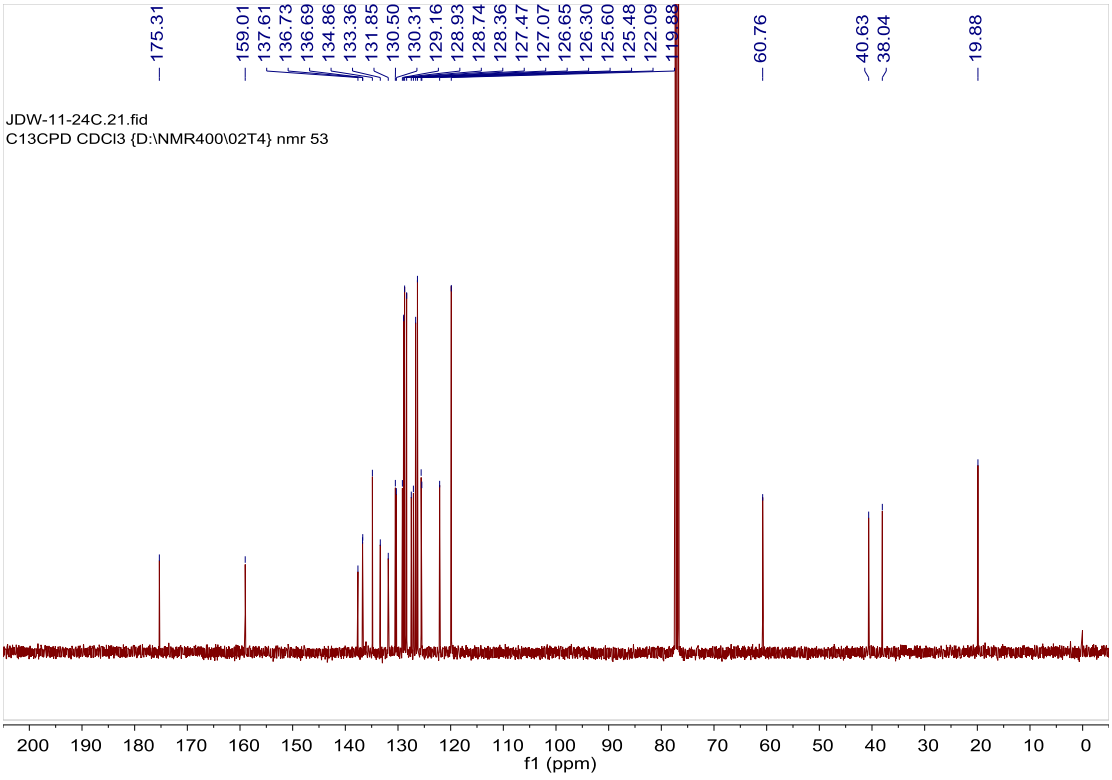
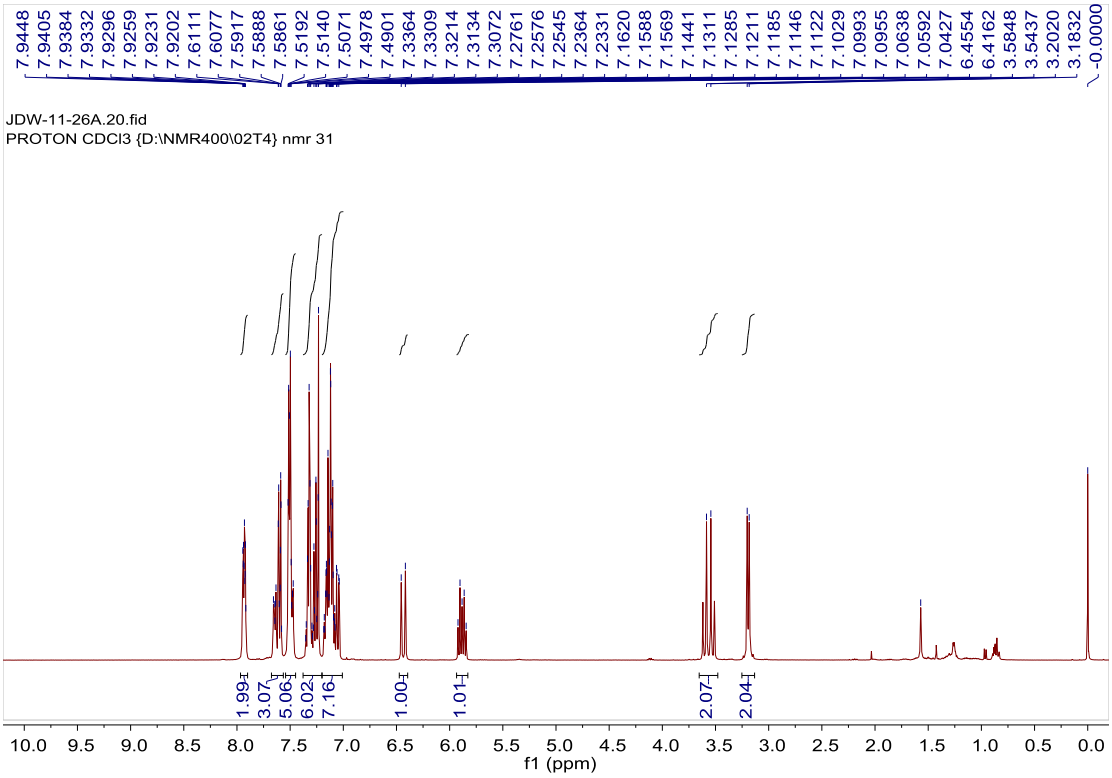
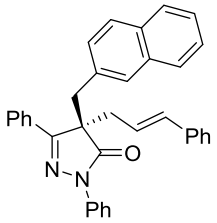
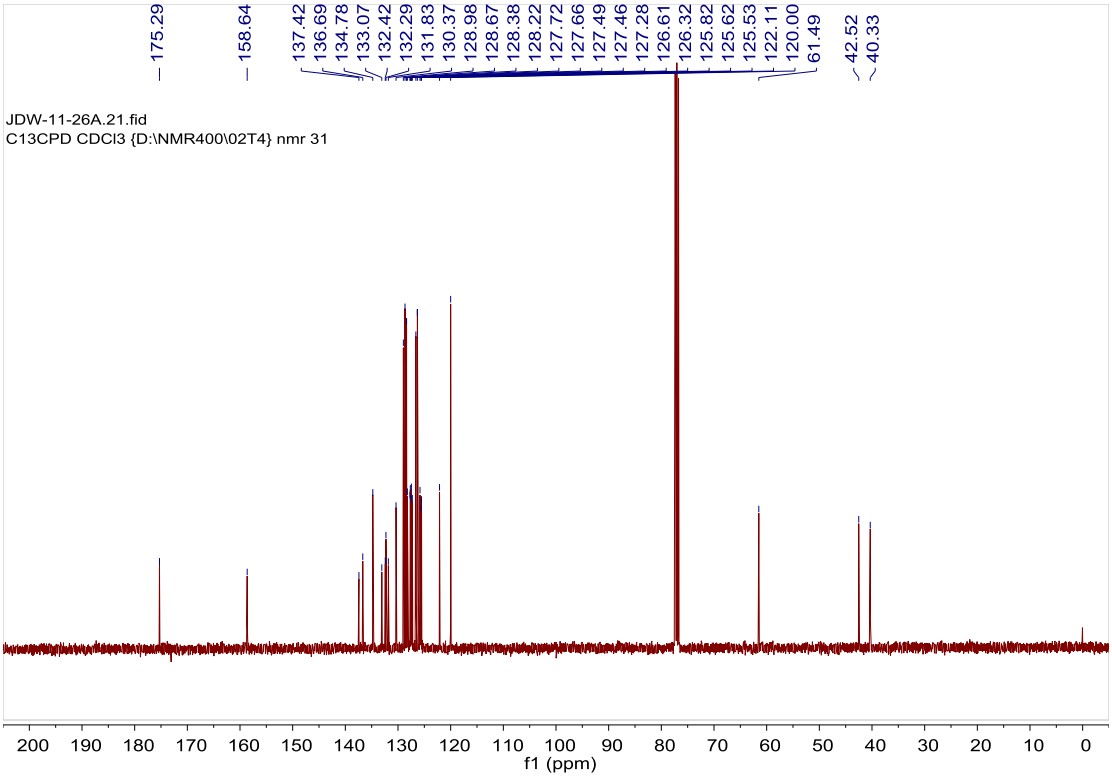
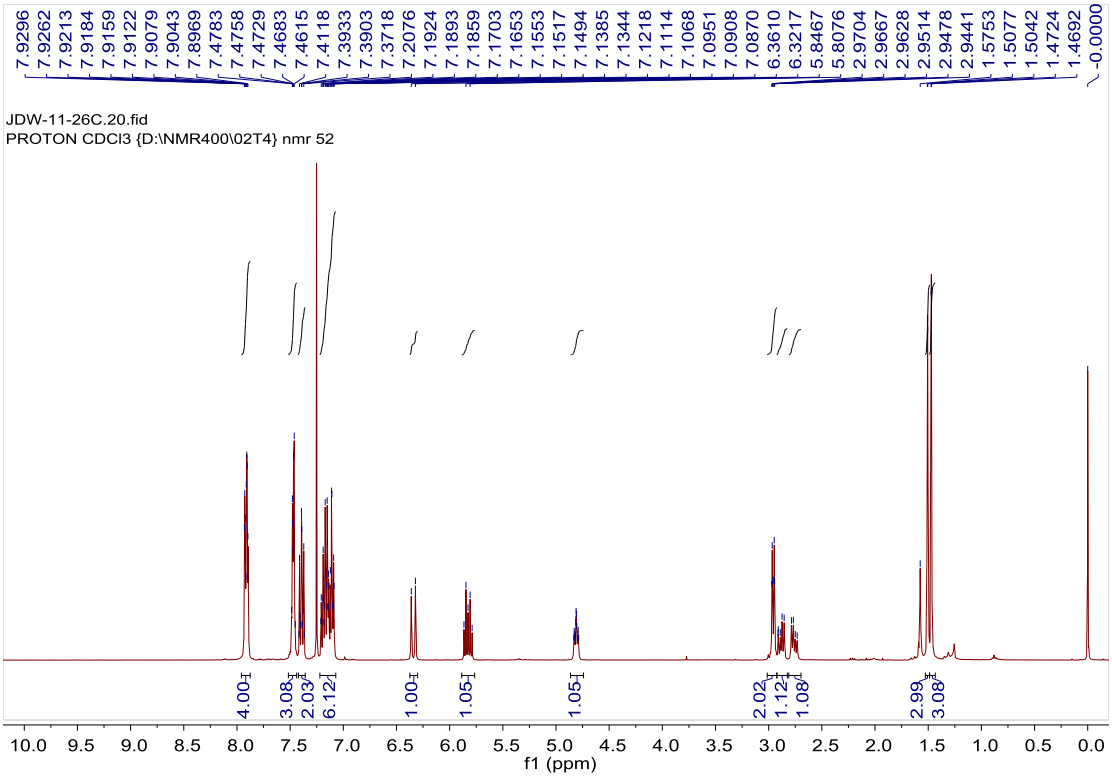


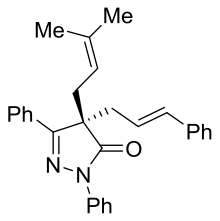




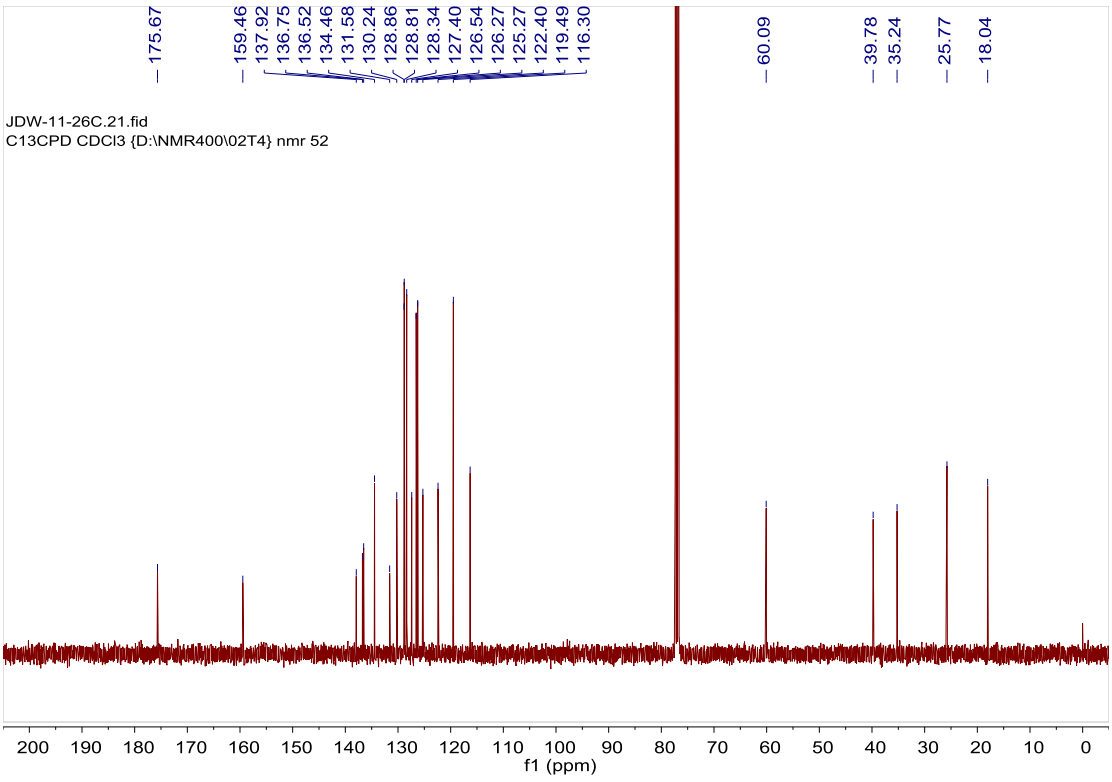
3n ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

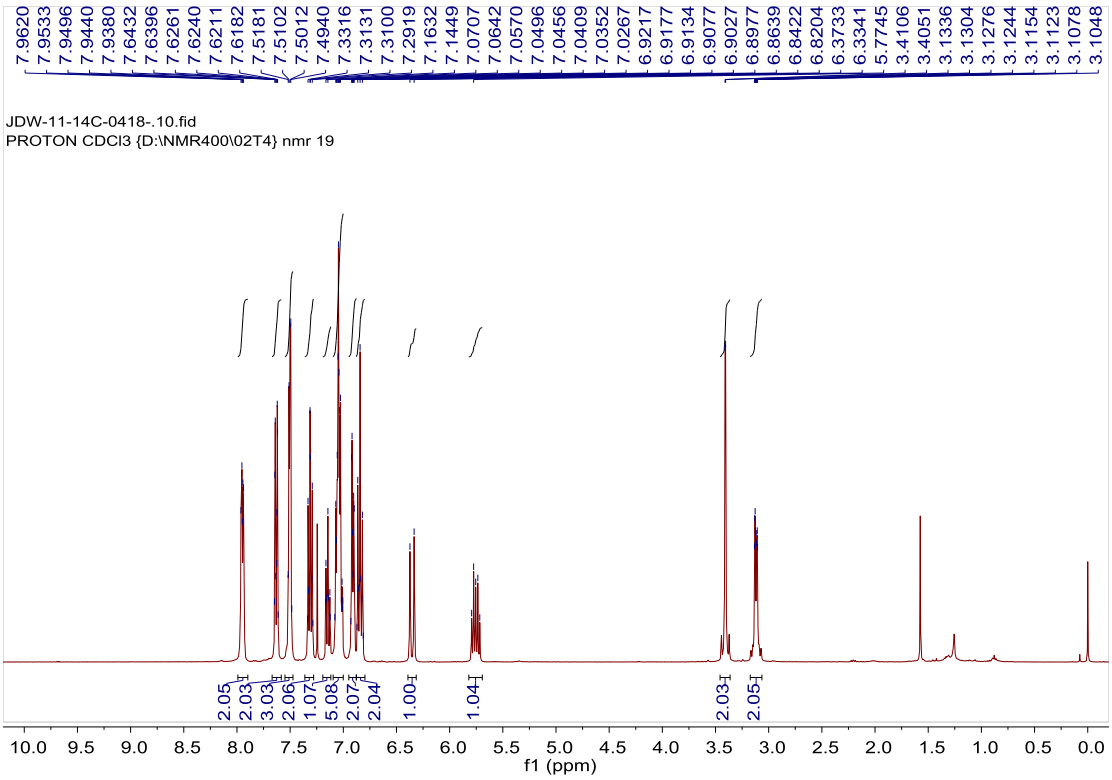


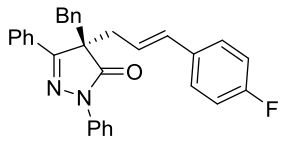




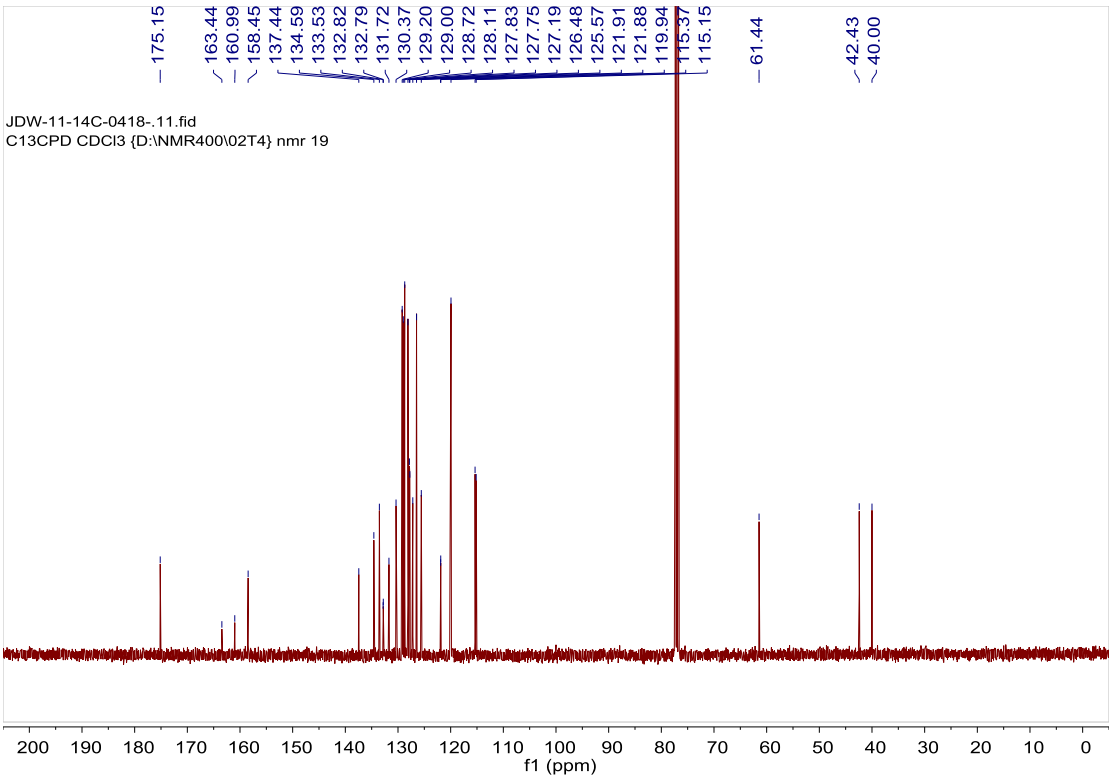
3o ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

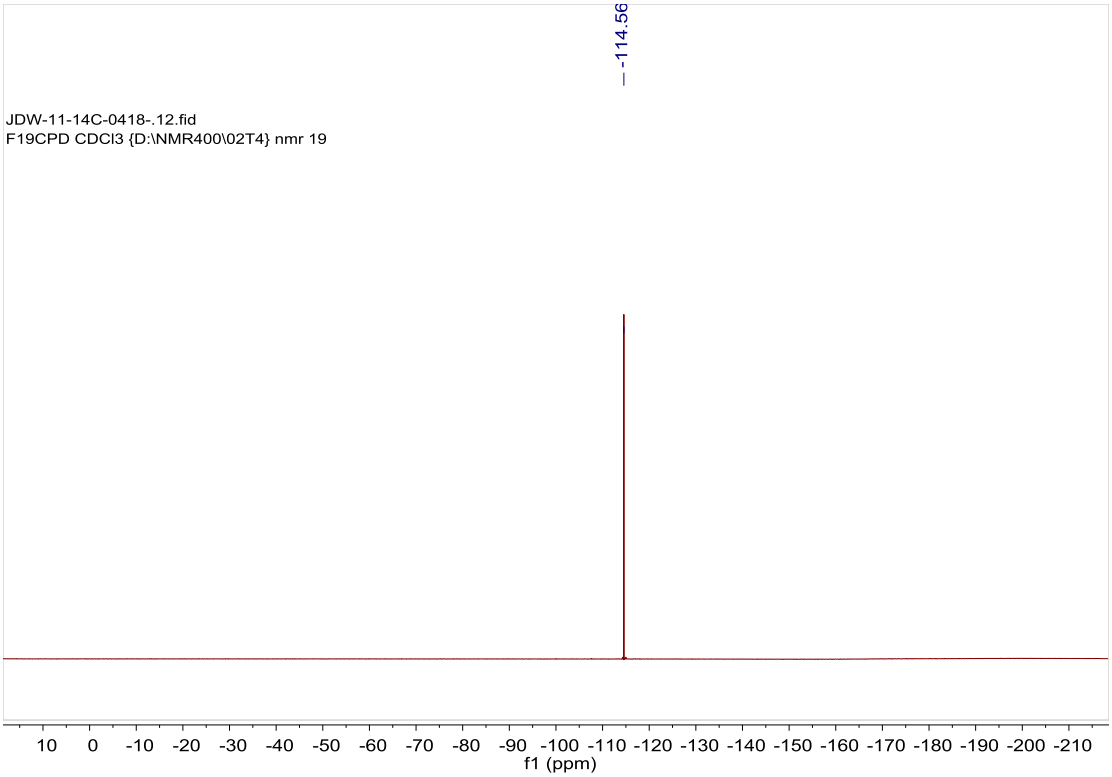


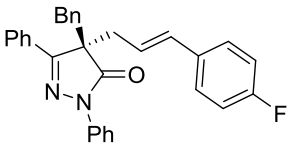




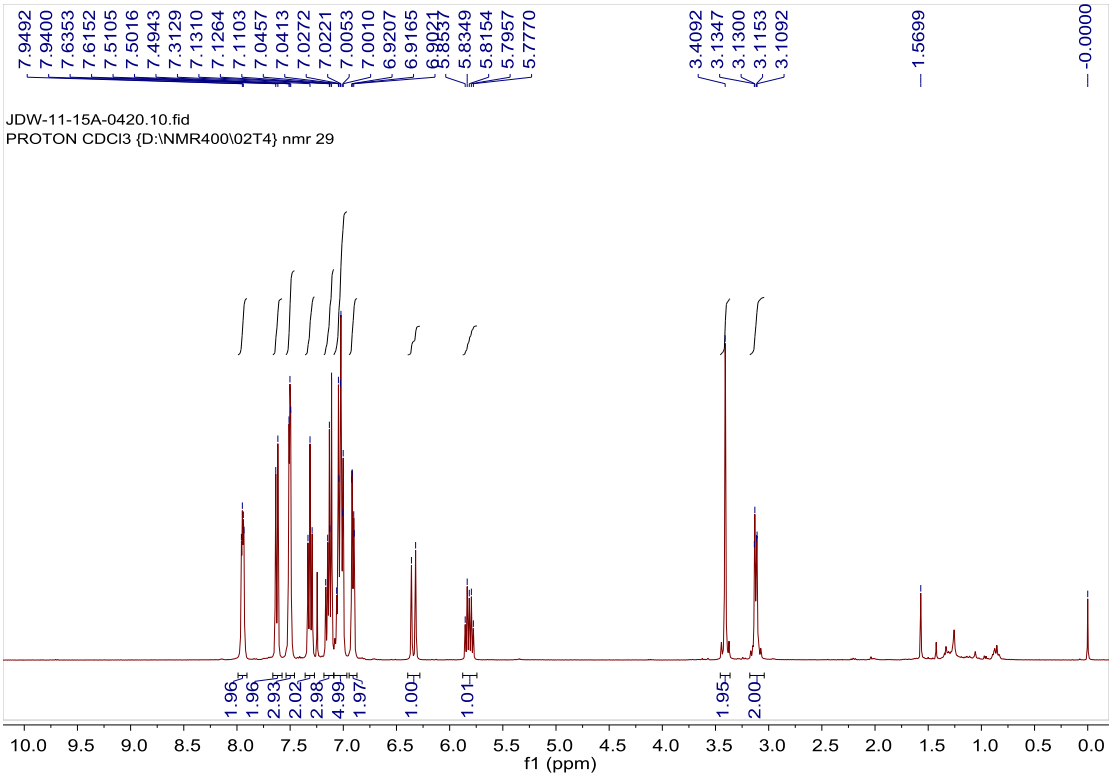
3p ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

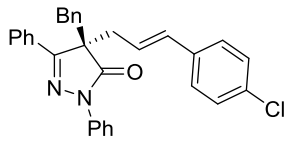




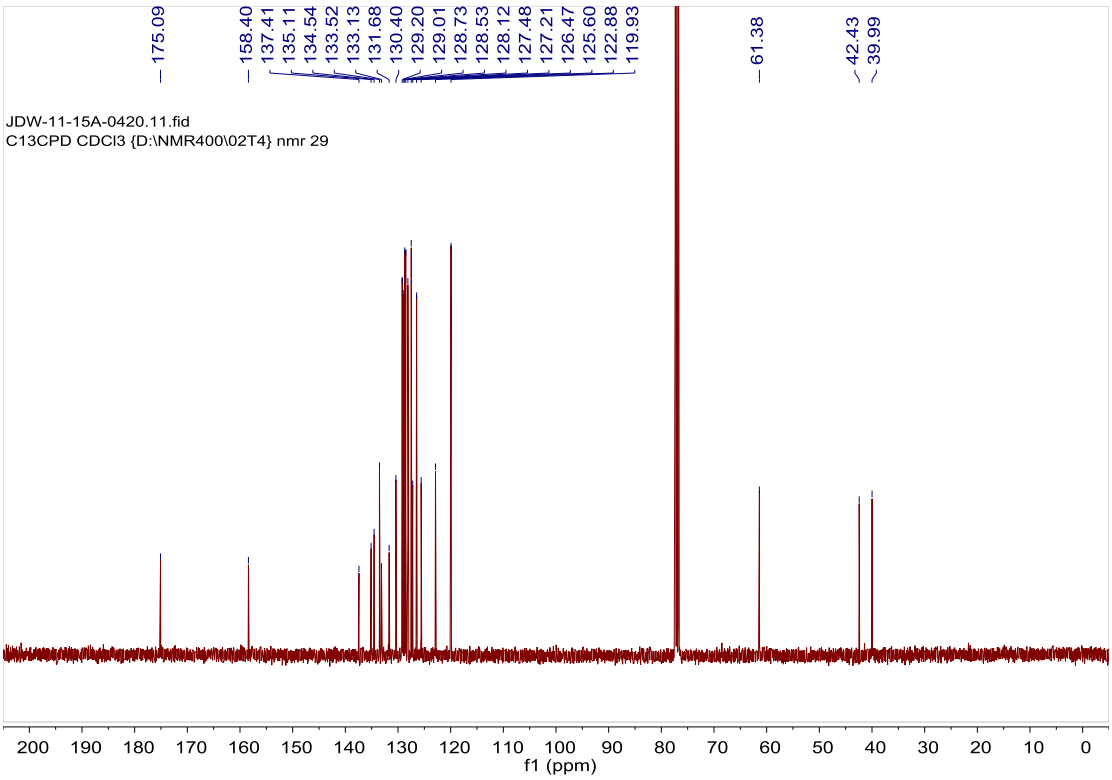


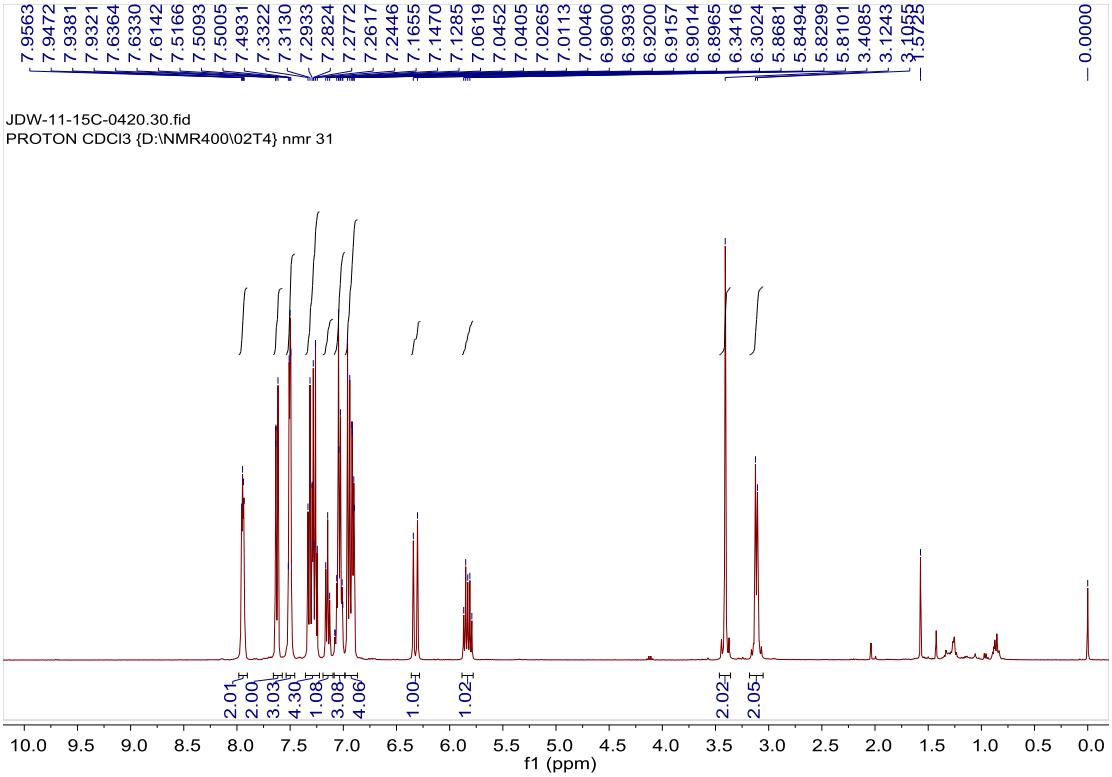
3p ^{19}F NMR (375 MHz, $CDCl_3$)

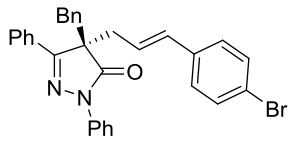




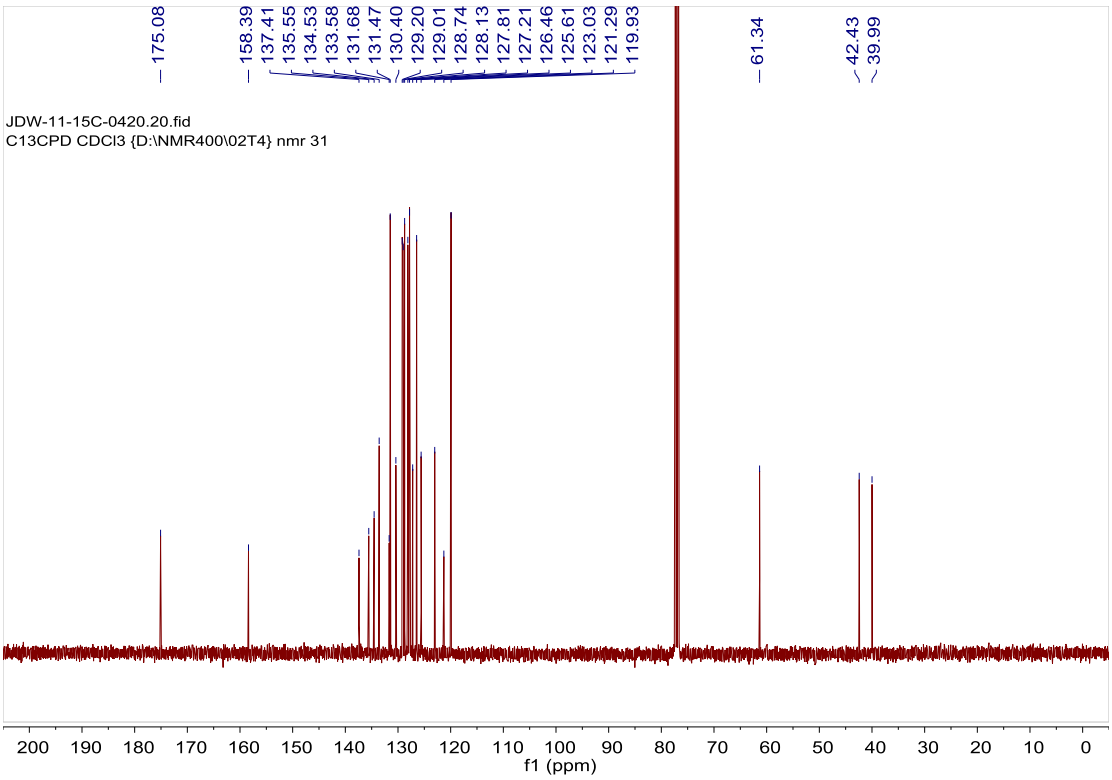
3q ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

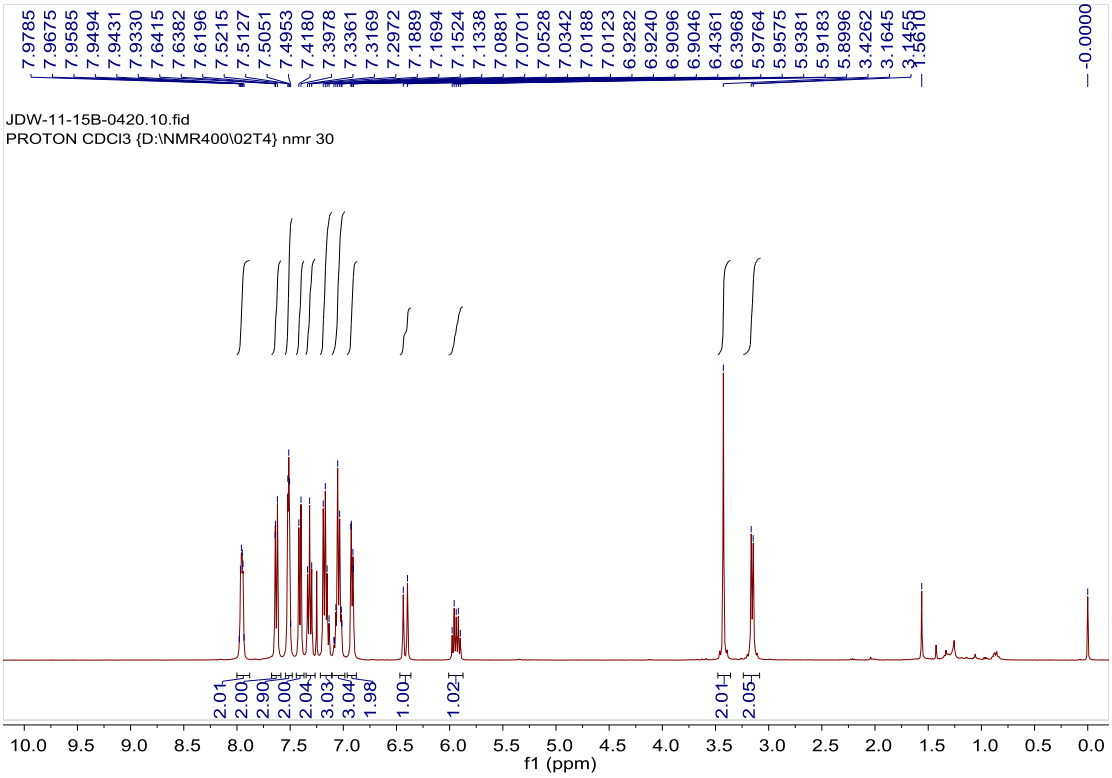


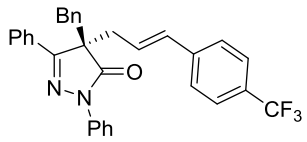




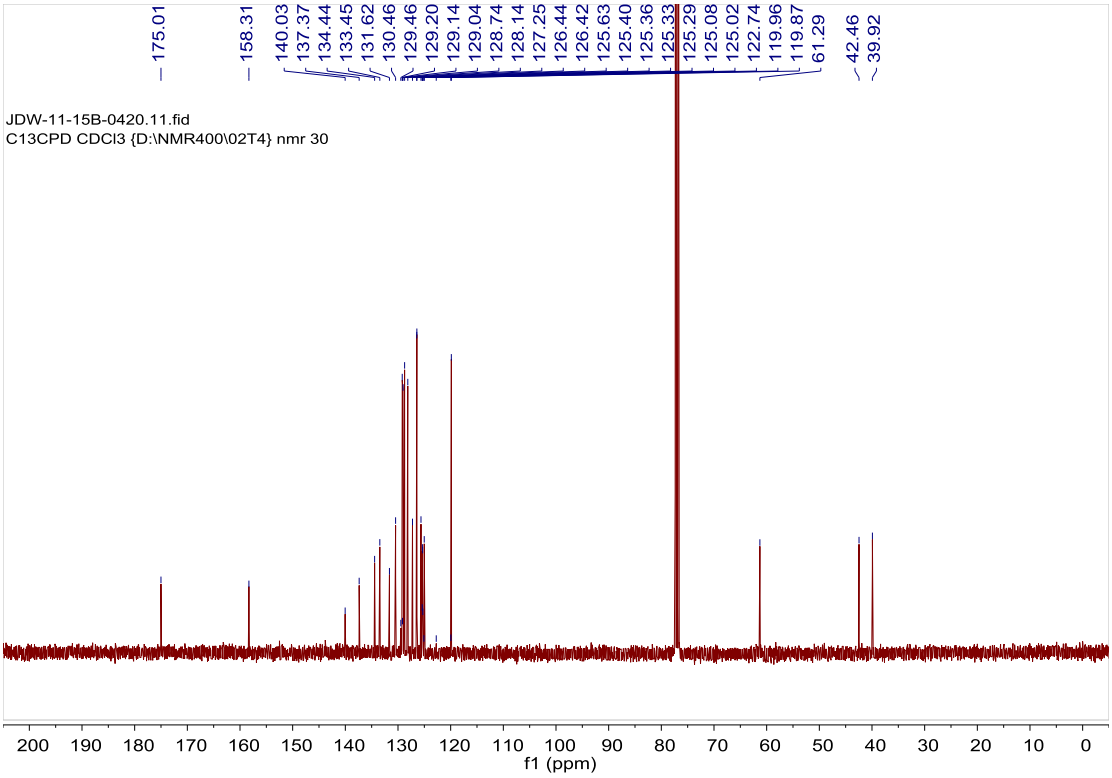
3r ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

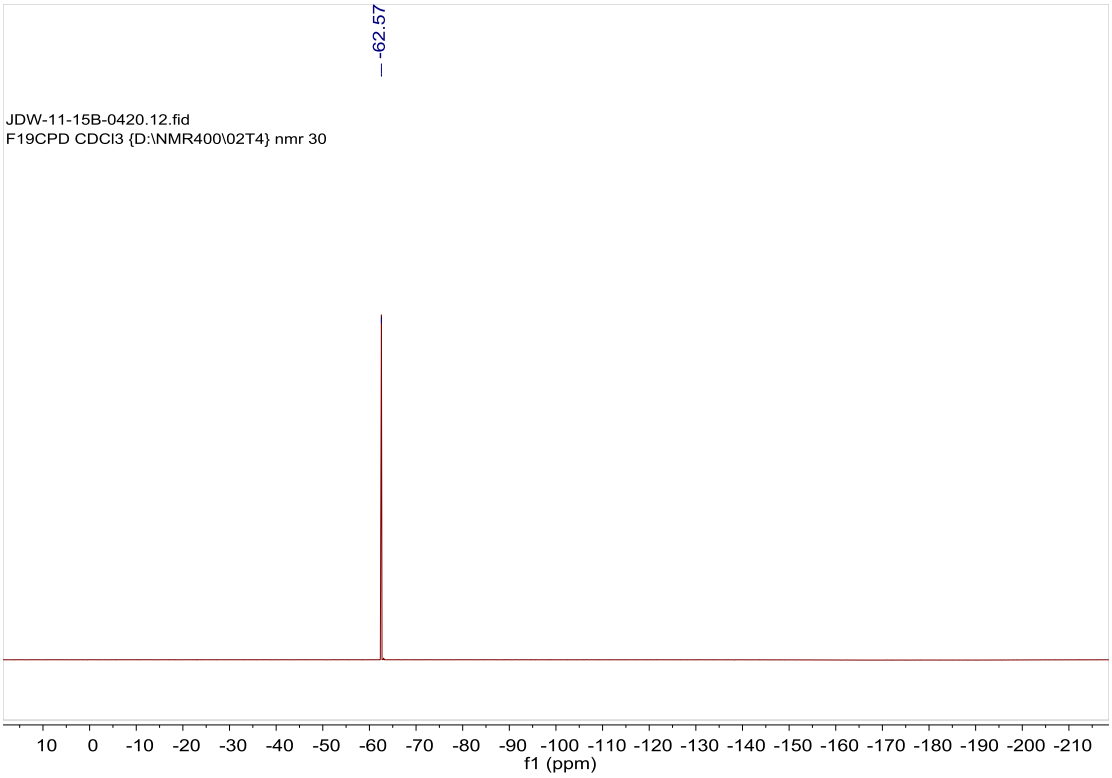


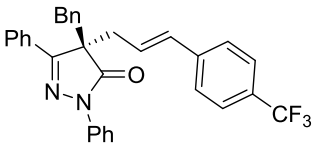




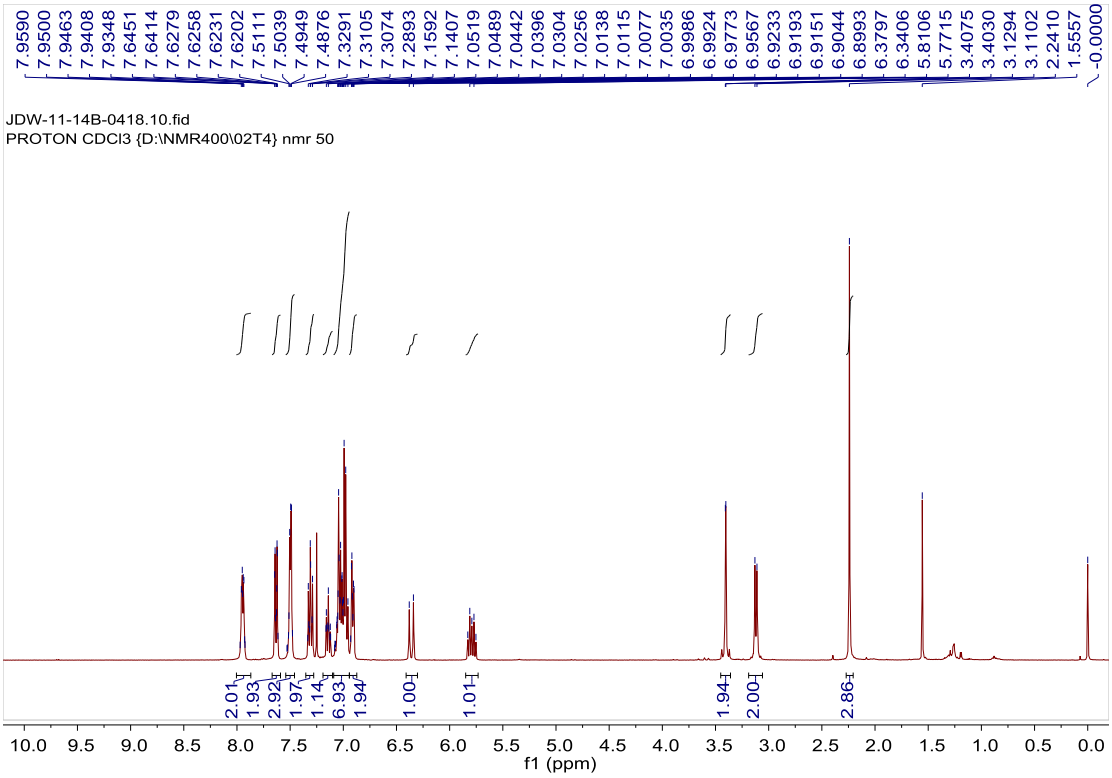
3s ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

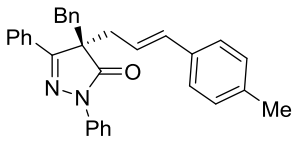






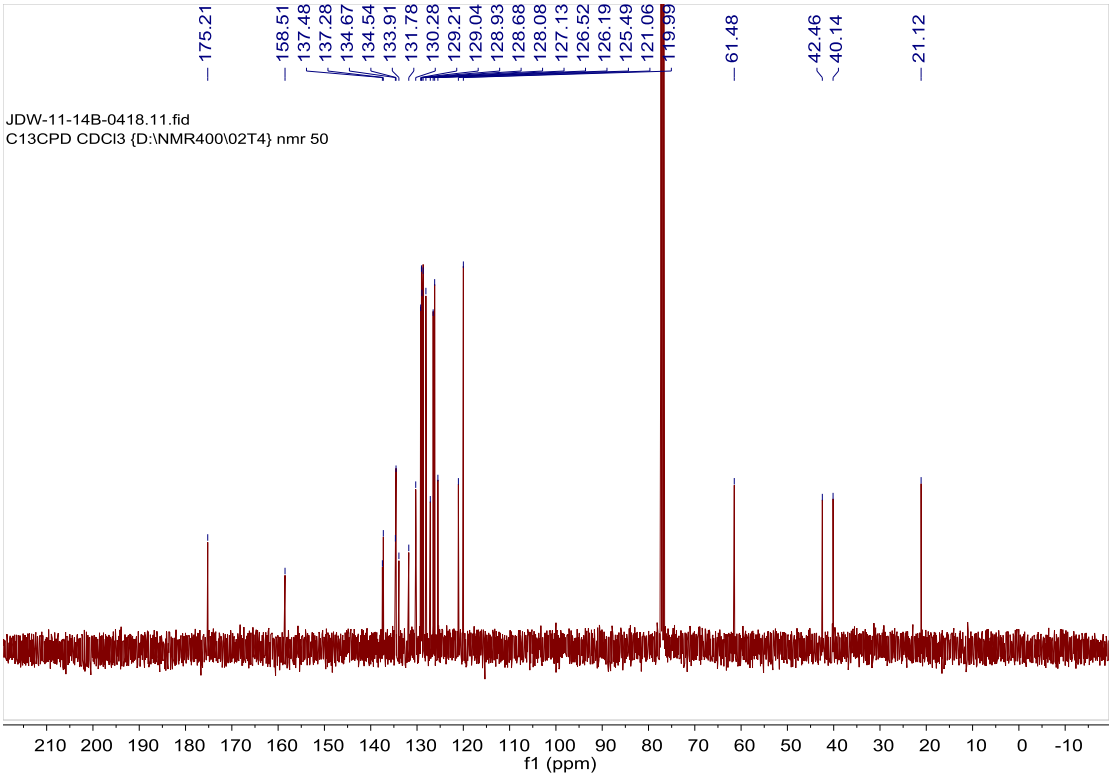
3s ^{19}F NMR (375 MHz, $CDCl_3$)

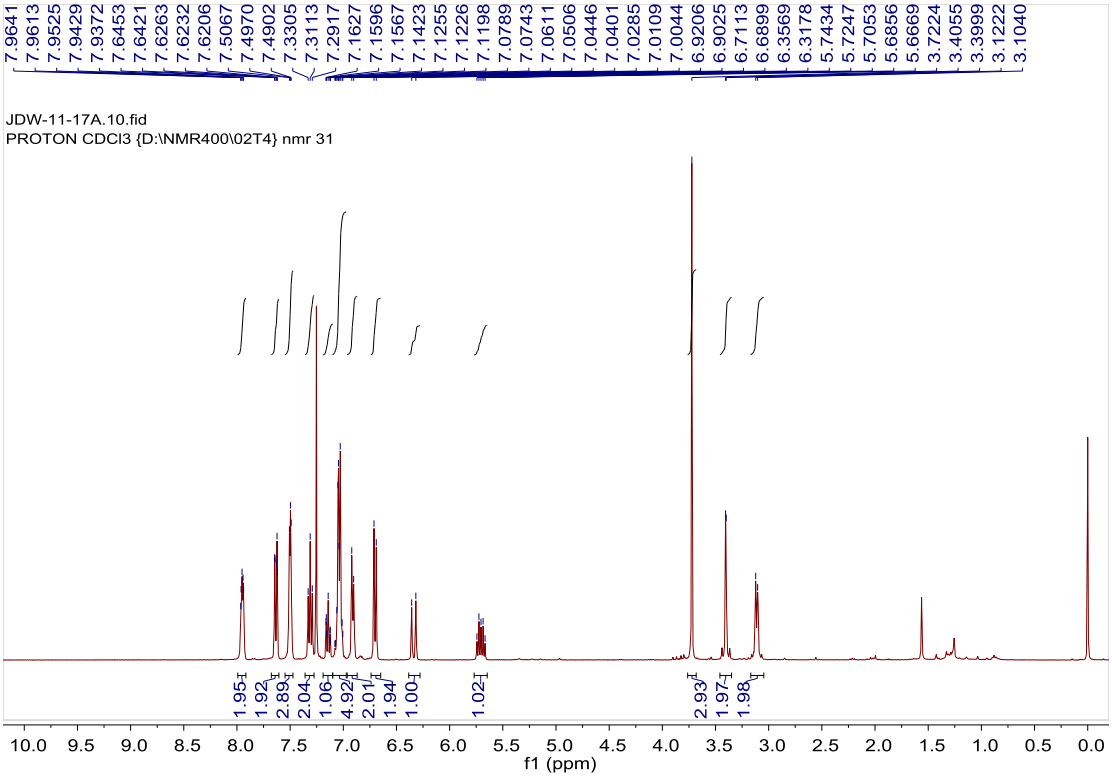


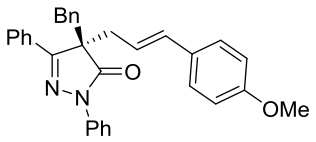


3t ^{1}H NMR (400 MHz, $CDCl_3$)

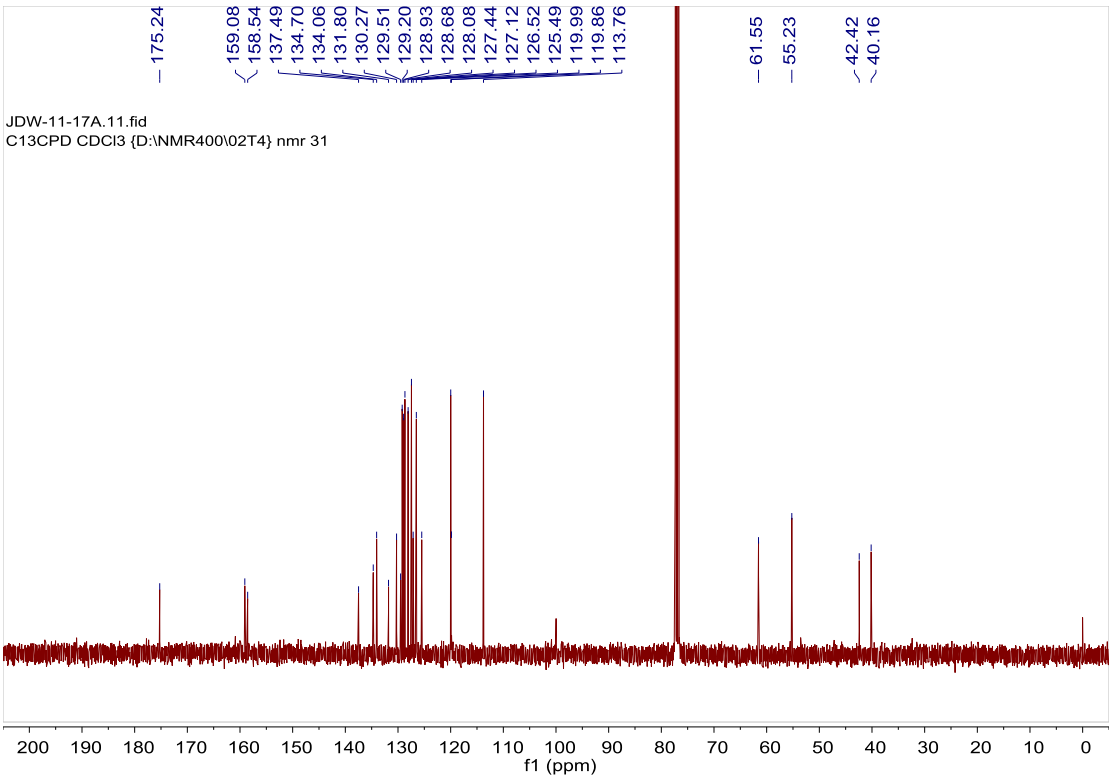
^{13}C NMR (100 MHz, $CDCl_3$)

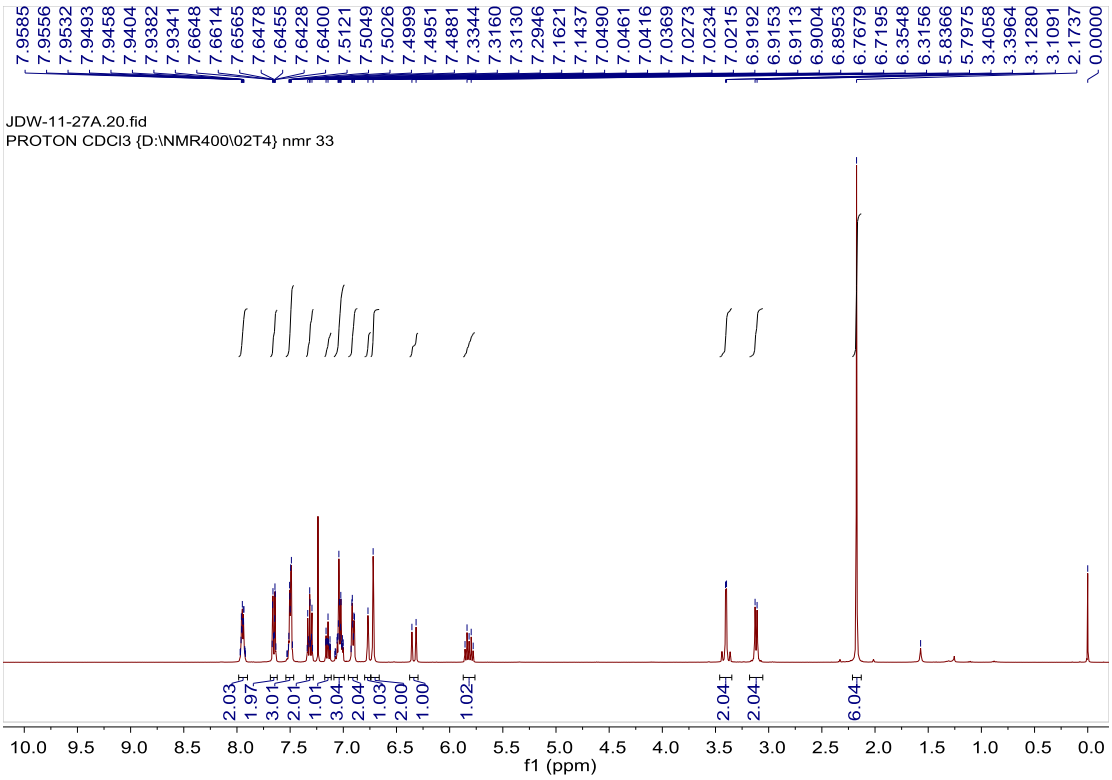


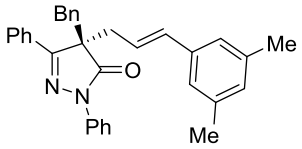




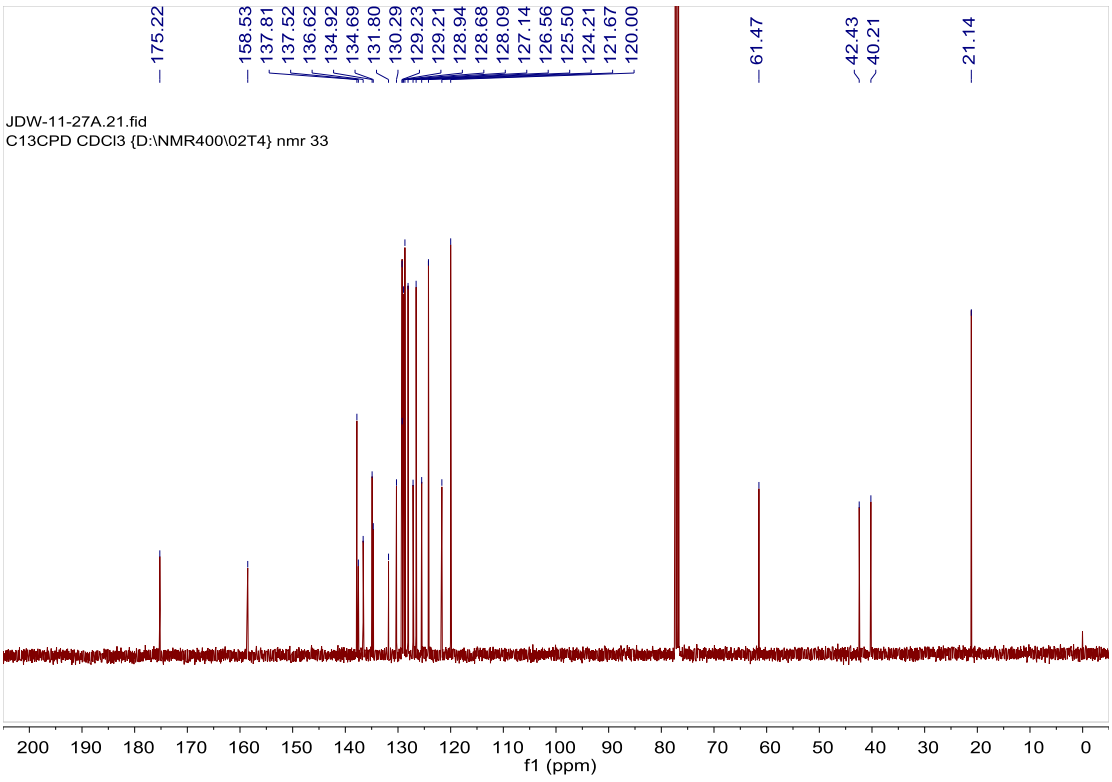
3u ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

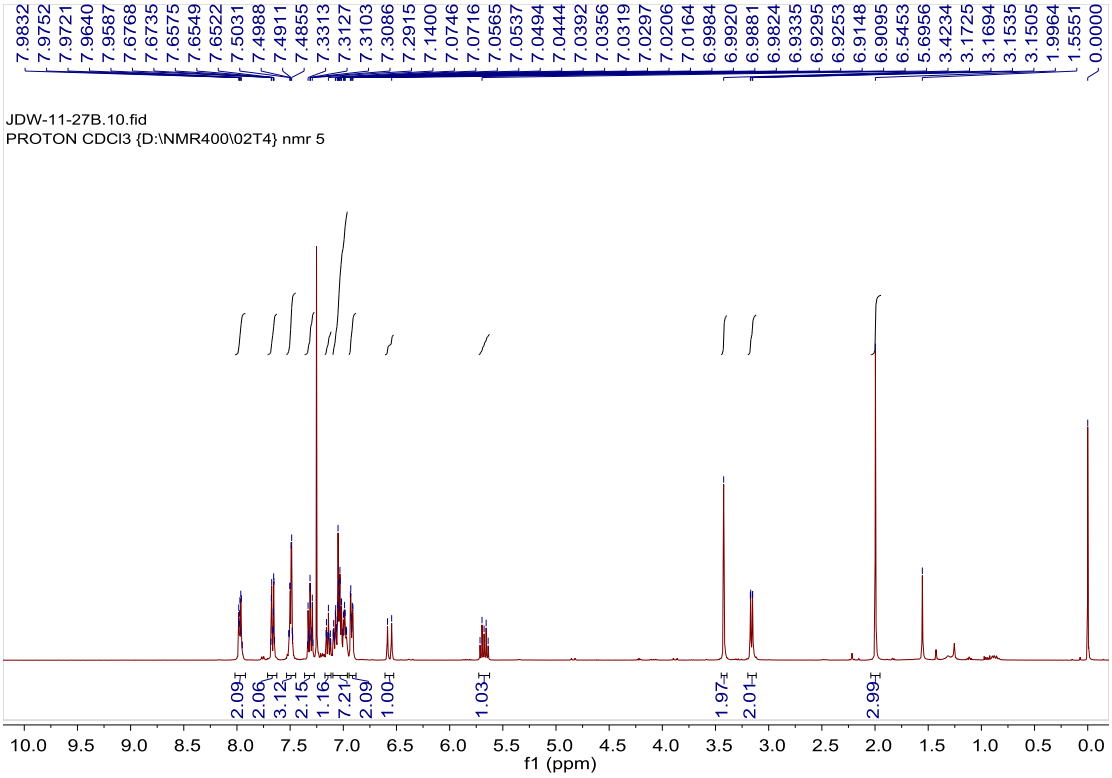


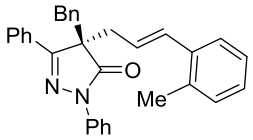




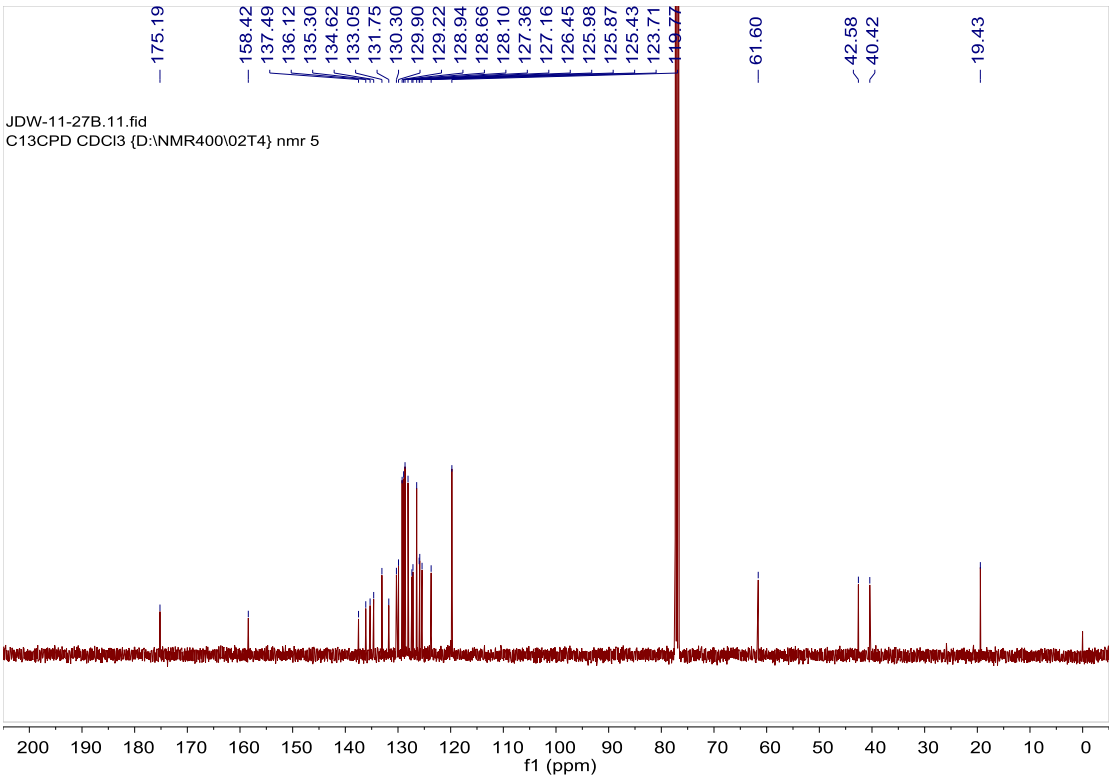
3v ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

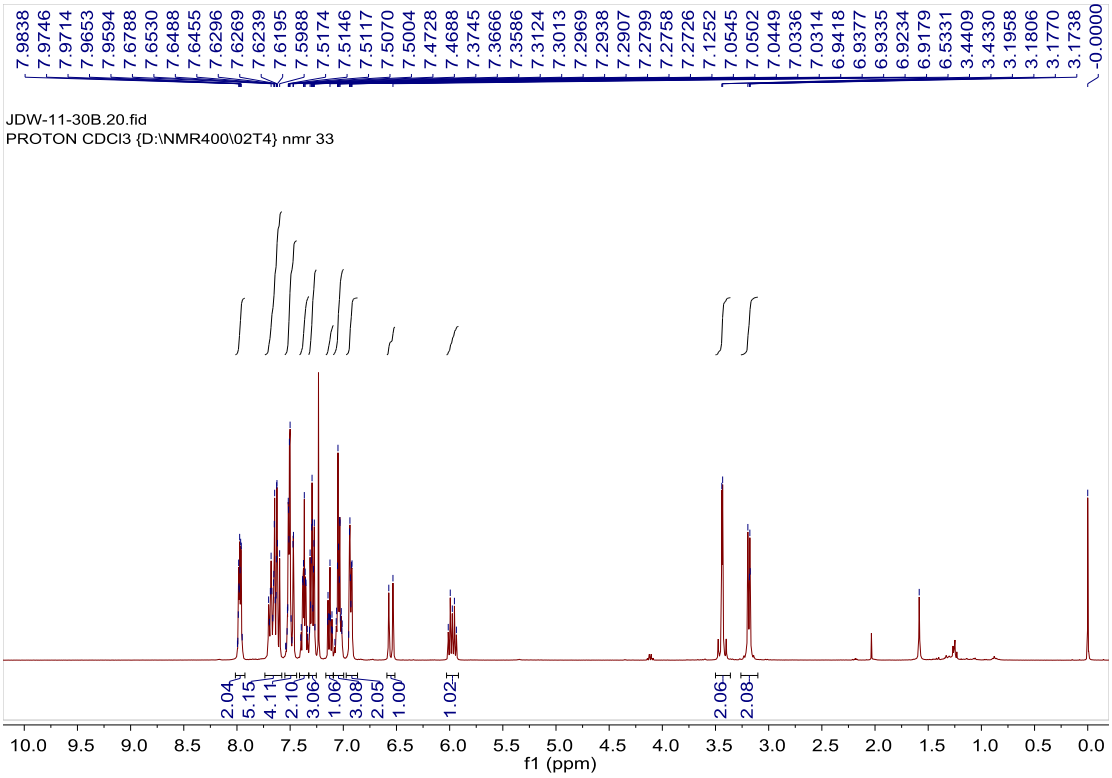


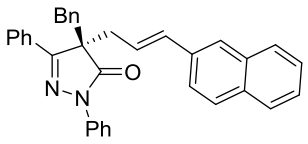




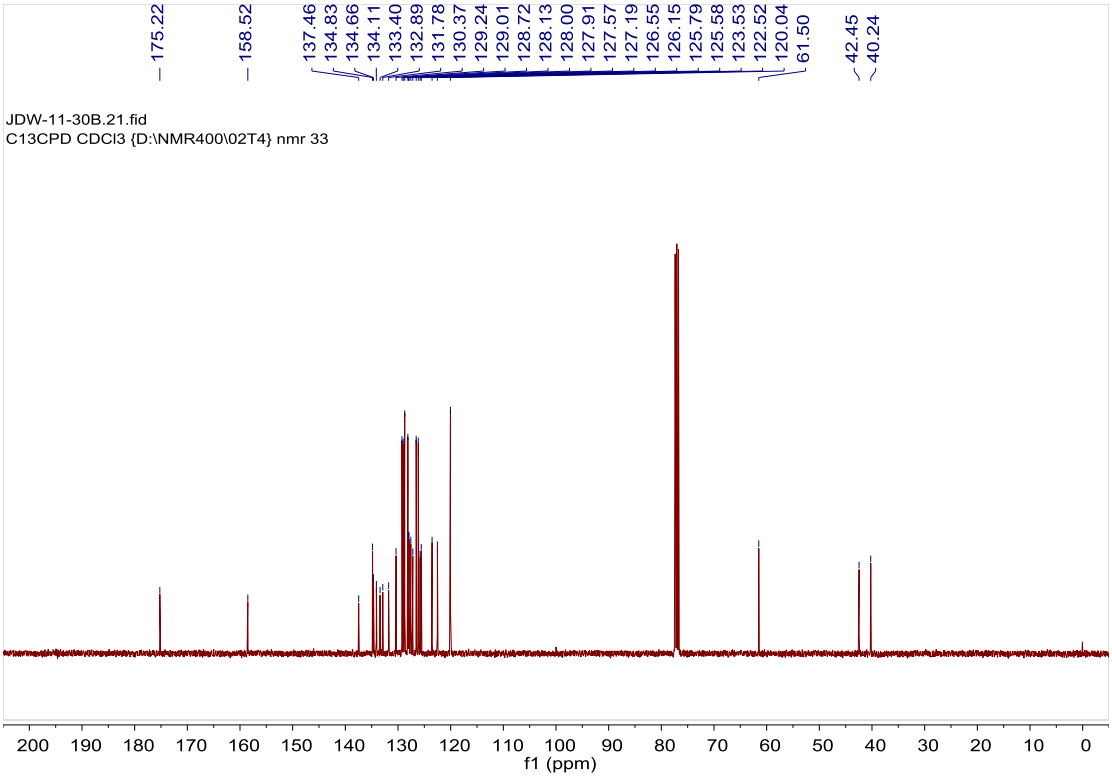
3w ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

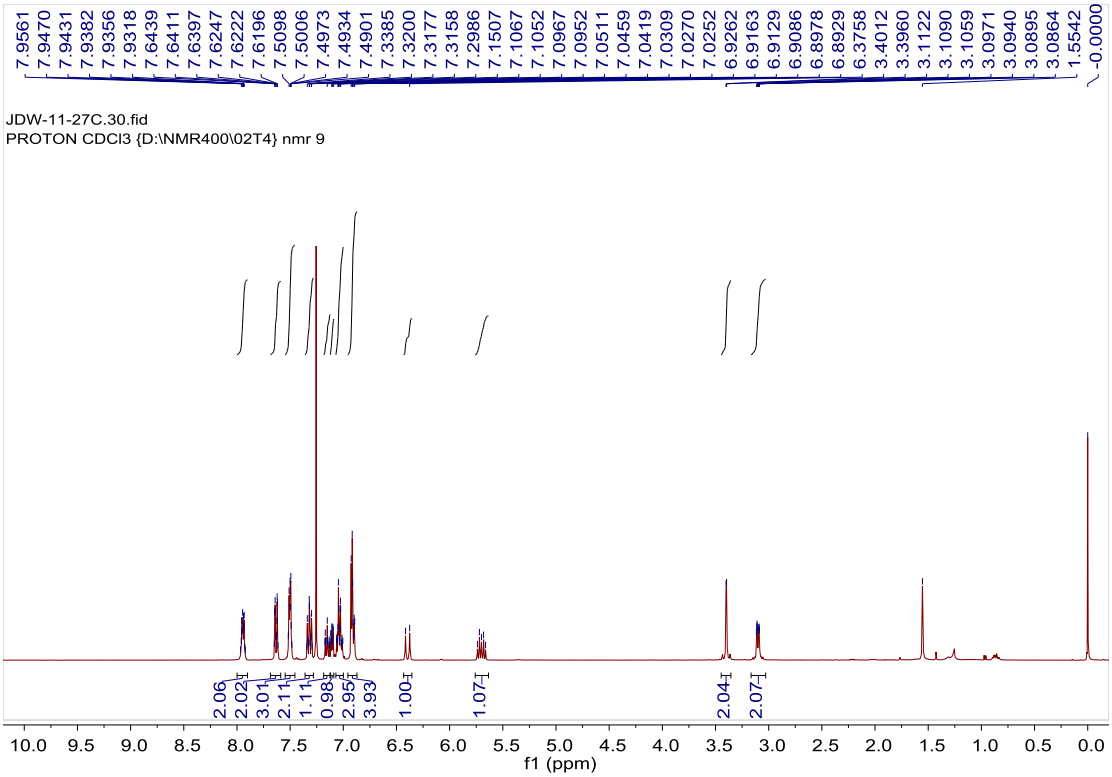


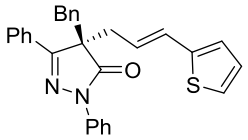




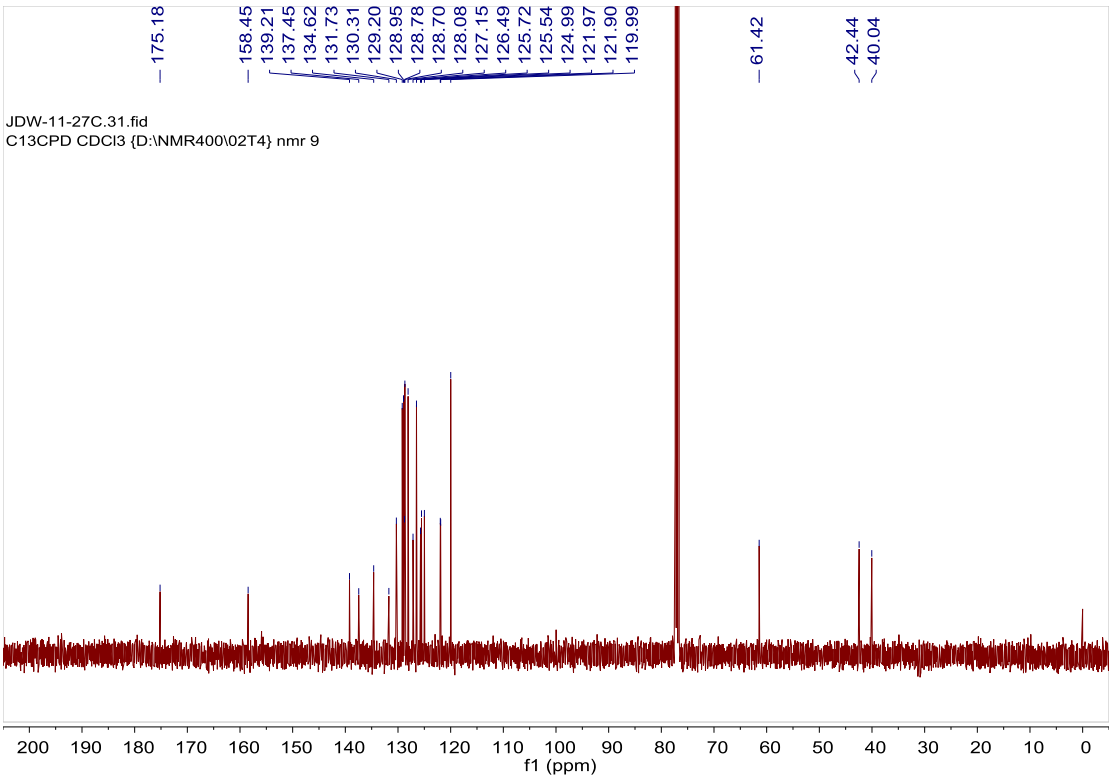
3x ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

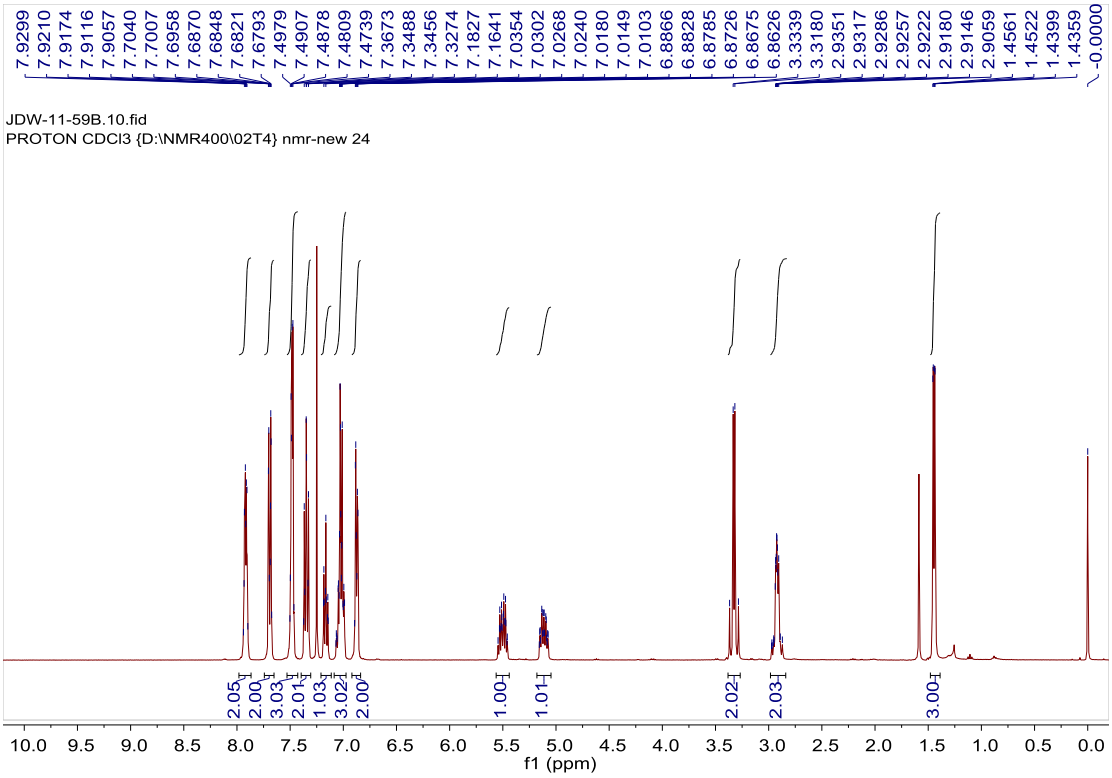


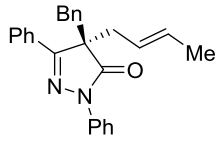




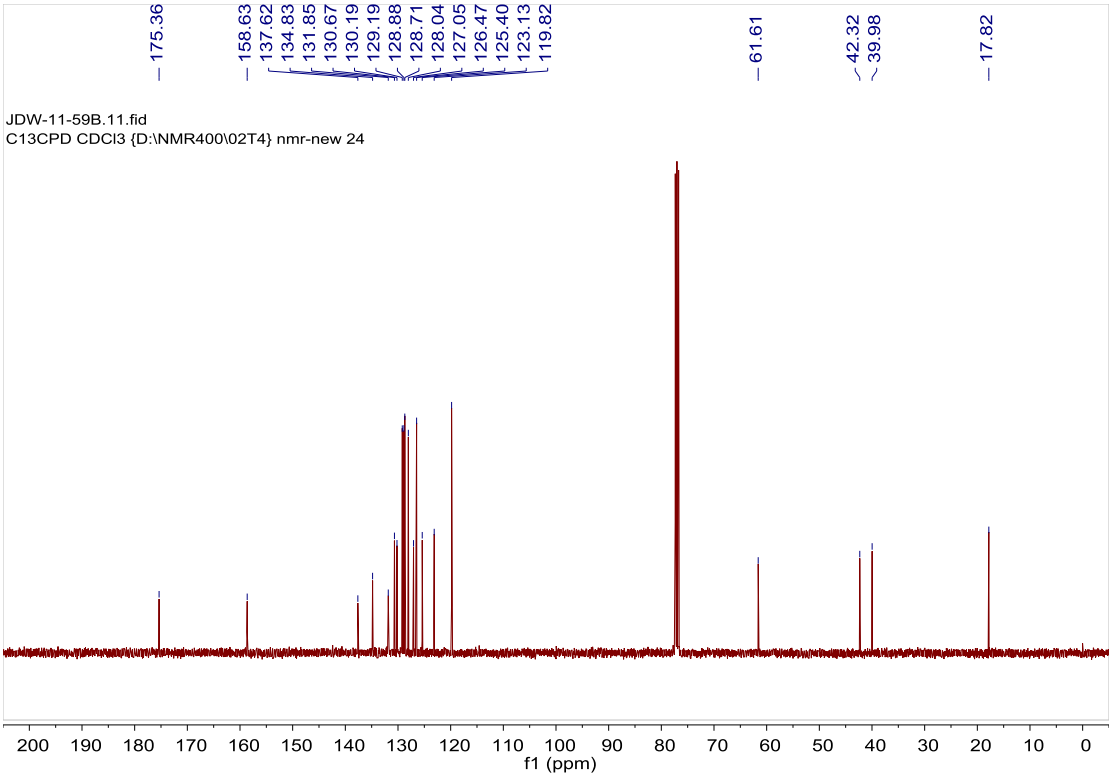
3y ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

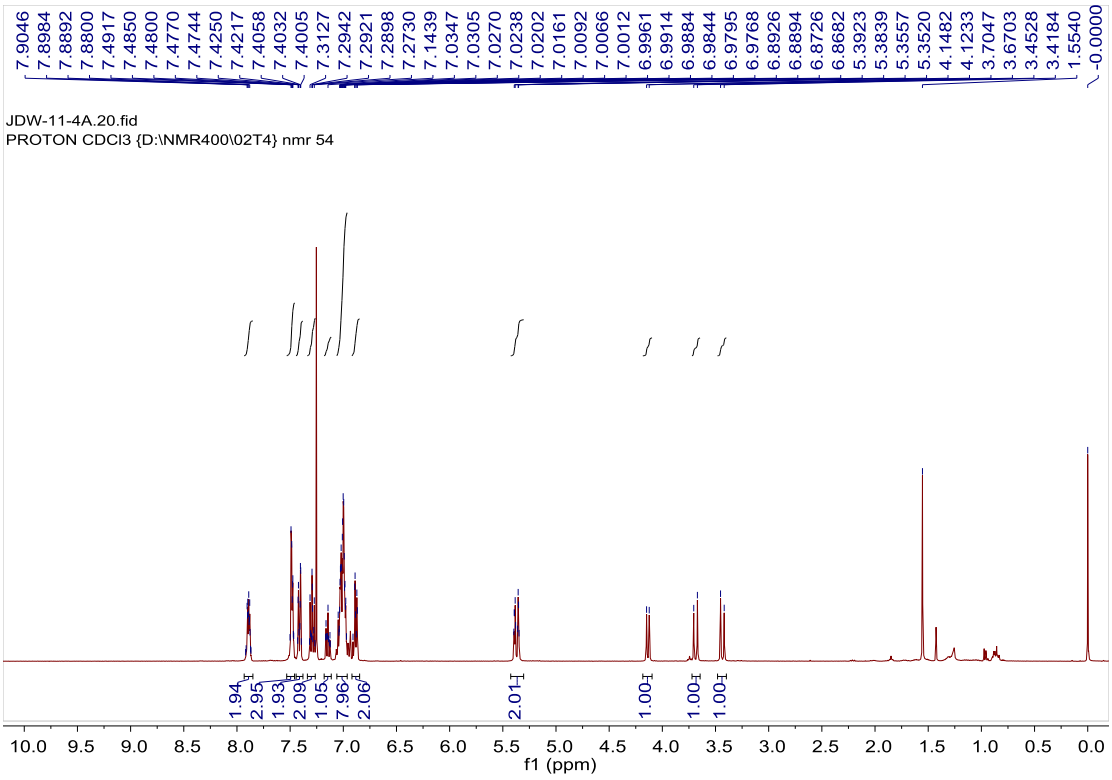


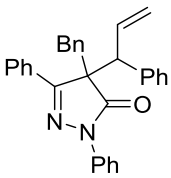




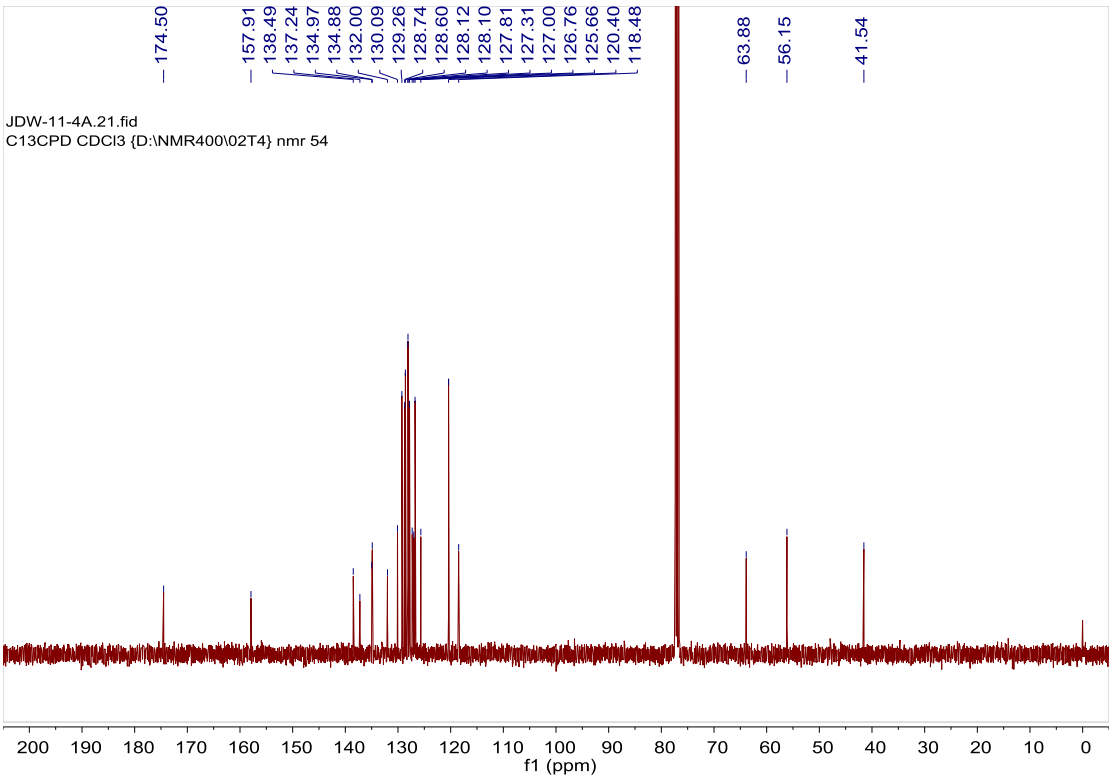
3z ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)

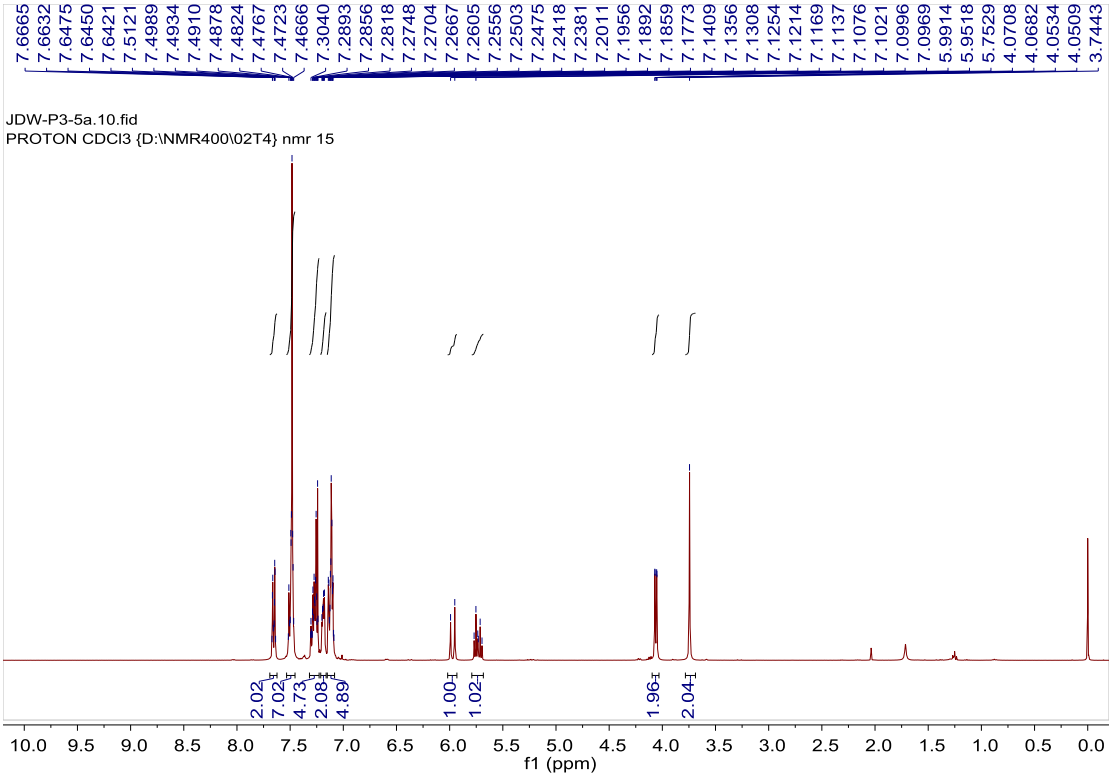


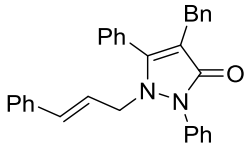




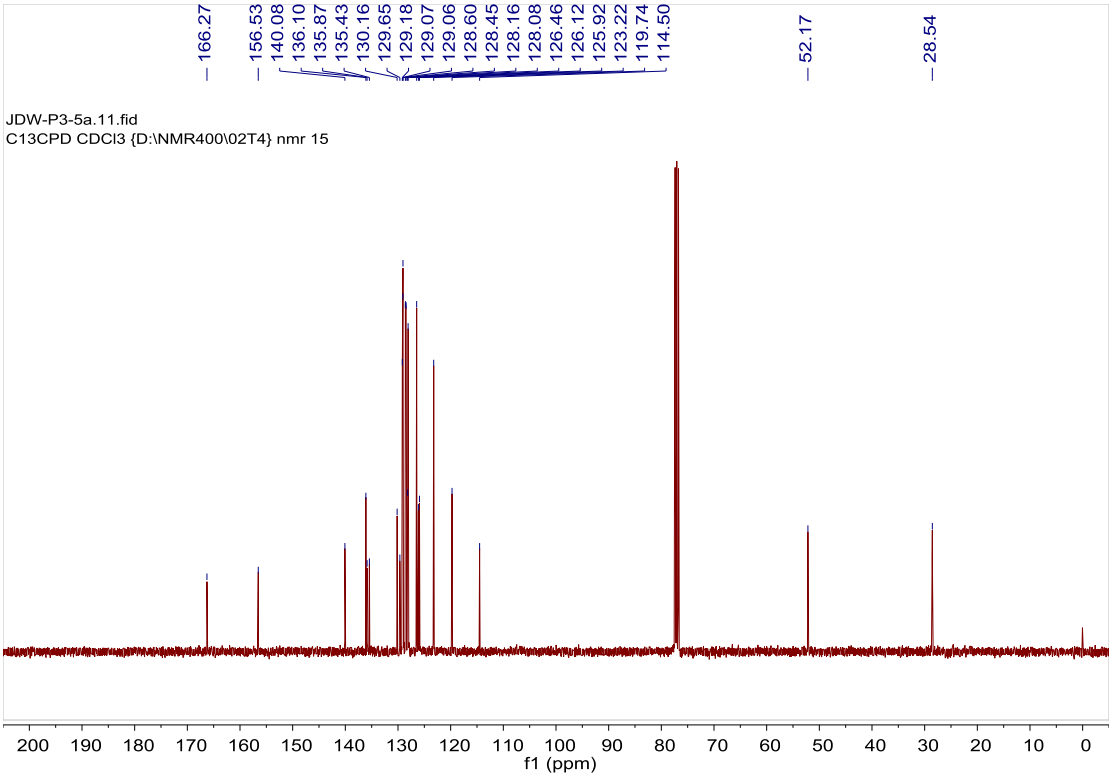
4a ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)







5a ^{1}H NMR (400 MHz, $CDCl_3$)
^{13}C NMR (100 MHz, $CDCl_3$)



Data File D:\CHEM32\1\DATA\2020\2019001466.D
Sample Name: JDW-11-14A-rac

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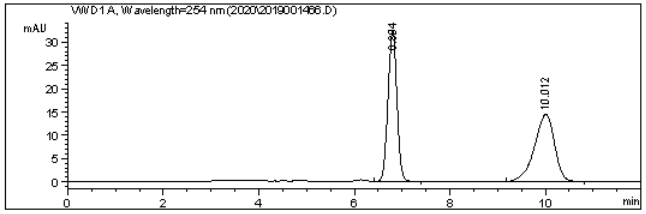
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/7/2020 7:45:01 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 5/7/2020 7:59:47 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:14:47 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```




```
                        Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   6.804 VB    0.2025  417.47696   32.44875  50.0775
   2  10.012 BB    0.4388  416.18509   14.41494  49.9225
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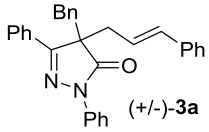

Data File D:\CHEM32\1\DATA\2020\2019001467.D
Sample Name: JDW-11-14A

```
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/7/2020 8:01:05 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 5/7/2020 8:00:17 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:14:47 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
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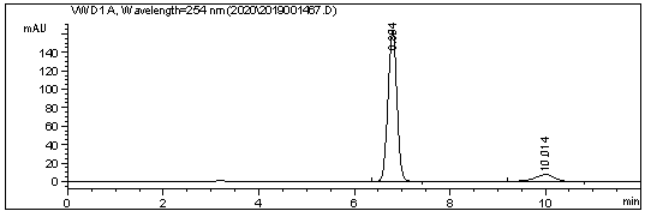


```
                        Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
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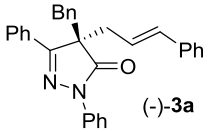
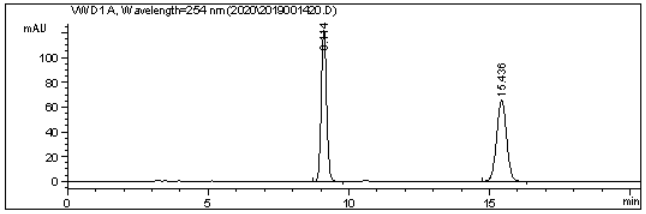
   2  10.014 BB    0.4422  209.02319    7.22886   8.9945
```



Data File D:\CHEM32\1\DATA\2020\2019001420.D
Sample Name: JDW-11-20A-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/23/2020 2:57:36 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/23/2020 3:08:00 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:44:11 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

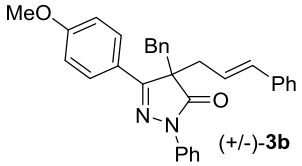



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   9.114 VB    0.2055 1597.47607  121.77871  50.0715
       2  15.436 BB    0.3807 1592.91614   65.30258  49.9285
```

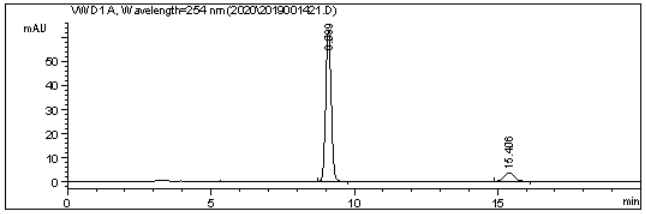


(+/-)-**3b**

Data File D:\CHEM32\1\DATA\2020\2019001421.D
Sample Name: JDW-11-20A

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/23/2020 3:19:37 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/23/2020 3:17:59 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:44:11 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

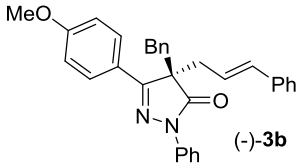



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   9.099 VB    0.2022  820.10297   62.66747  90.8457
       2  15.406 BB    0.3788   82.63938    3.41017   9.1543
```

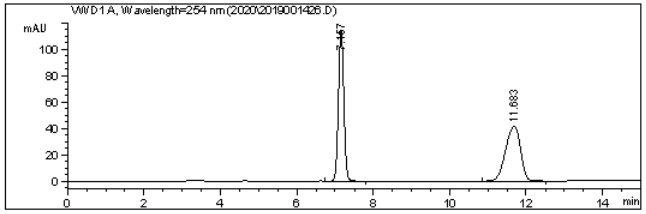


(-)-**3b**

Data File D:\CHEM32\1\DATA\2020\2019001426.D
Sample Name: JDW-11-20B-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/24/2020 4:34:33 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/24/2020 11:22:38 AM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:51:15 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

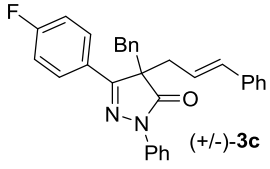



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.157 VB    0.1529 1128.05884  114.44363  50.2096
       2  11.683 BB    0.4374 1118.64270   41.41285  49.7904
```

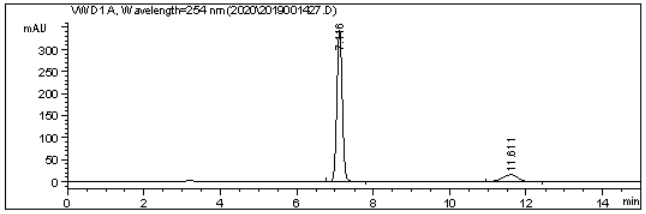


(+/-)-**3c**

Data File D:\CHEM32\1\DATA\2020\2019001427.D
Sample Name: JDW-11-20B

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/24/2020 5:42:04 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/24/2020 4:51:49 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:51:15 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

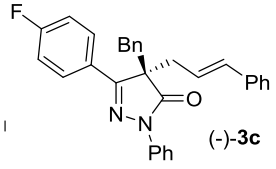



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.116 BB    0.1514 3337.09277  342.73923  89.4173
       2  11.611 BB    0.4373  394.95132   14.62926  10.5827
```

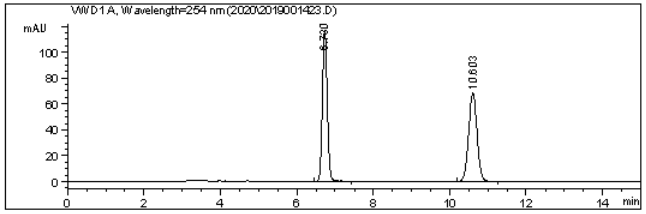


(-)-**3c**

Data File D:\CHEM32\1\DATA\2020\2019001423.D
Sample Name: JDW-11-20C-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/23/2020 4:11:31 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/23/2020 4:10:16 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:51:15 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

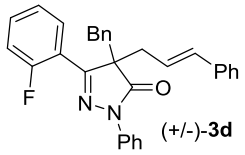



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.730 VB    0.1416 1037.06750  116.60235  50.1194
       2  10.603 BB    0.2379 1032.12622   68.11770  49.8806
```

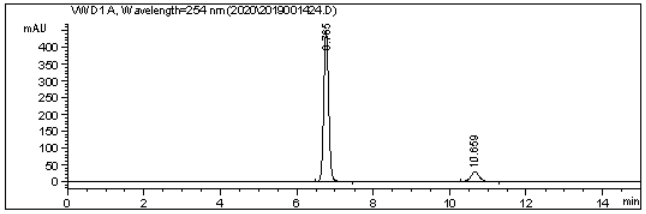


(+/-)-**3d**

Data File D:\CHEM32\1\DATA\2020\2019001424.D
Sample Name: JDW-11-20C

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/23/2020 4:31:23 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/23/2020 4:26:30 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:51:15 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

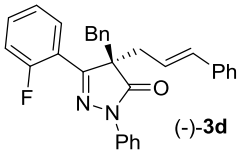



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.765 VV    0.1385 3996.94043  450.10538  90.3073
       2  10.659 BB    0.2387  428.99088   28.18797   9.6927
```

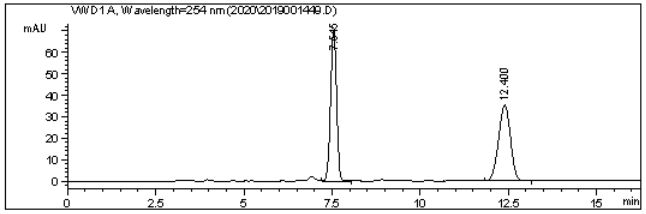


(-)-**3d**

Data File D:\CHEM32\1\DATA\2020\2019001449.D
Sample Name: JDW-11-25A-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/28/2020 10:25:34 AM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/28/2020 10:41:40 AM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:05:53 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

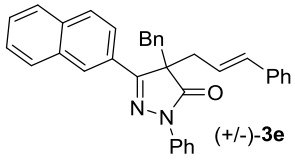



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :     1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.545 VV    0.1877  833.30817   70.37051  50.1716
       2  12.400 BB    0.3679  827.60632   35.52230  49.8284
```

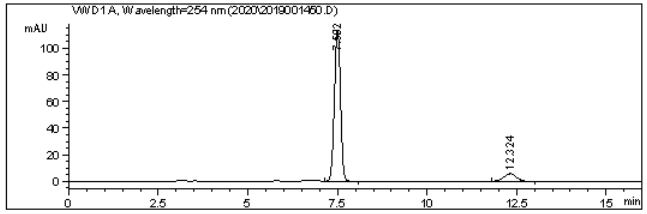


(+/-)-**3e**

Data File D:\CHEM32\1\DATA\2020\2019001450.D
Sample Name: JDW-11-25A

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/28/2020 10:43:01 AM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/28/2020 10:41:56 AM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:05:53 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

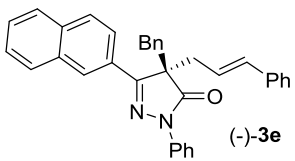



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :     1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.502 VB    0.1832 1326.53796  113.25499  90.9522
       2  12.324 BB    0.3683  131.96228    5.65641   9.0478
```

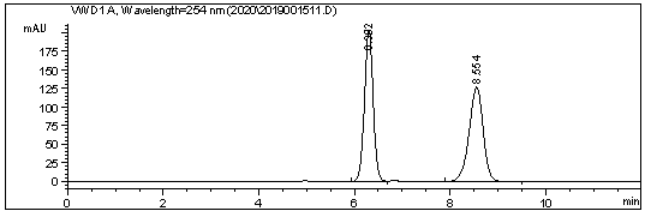


(-)-**3e**

Data File D:\CHEM32\1\DATA\2020\2019001511.D
Sample Name: JDW-11-29A-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/18/2020 8:24:48 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/18/2020 8:33:33 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:37:11 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

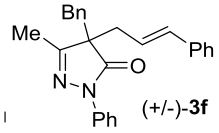



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.302 VV    0.1972 2576.02100  203.44957  49.9312
       2   8.554 VB    0.3132 2583.12402  126.87862  50.0688
```

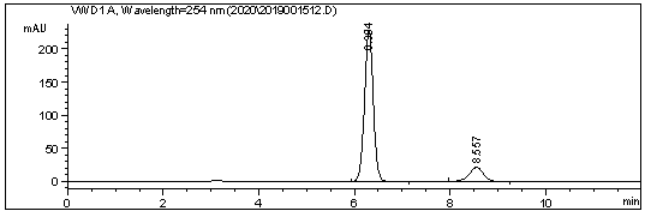


(+/-)-**3f**

Data File D:\CHEM32\1\DATA\2020\2019001512.D
Sample Name: JDW-11-29A

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/18/2020 8:47:48 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/18/2020 8:36:52 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:37:11 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

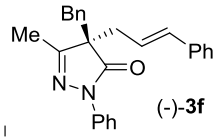



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.304 BB    0.1974 2893.93213  228.27159  87.0551
       2   8.557 BB    0.3156  430.32187   21.18283  12.9449
```

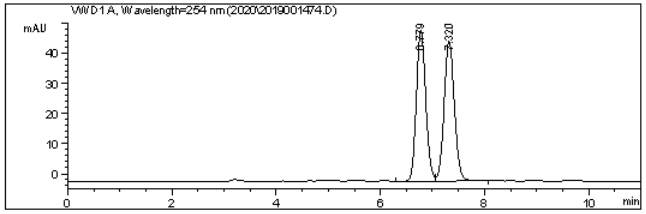


(-)-**3f**

Data File D:\CHEM32\1\DATA\2020\2019001474.D
Sample Name: JDW-11-23C-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/9/2020 4:39:40 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/9/2020 4:44:53 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:22:46 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : OD-H, Hexane/iPrOH=85/15, 1.0 mL/min, 254nm, 30 oC
```

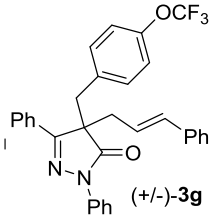



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.779 VV    0.1959  626.76605   49.95442  49.6145
       2   7.320 VB    0.2158  636.50562   46.28252  50.3855
```

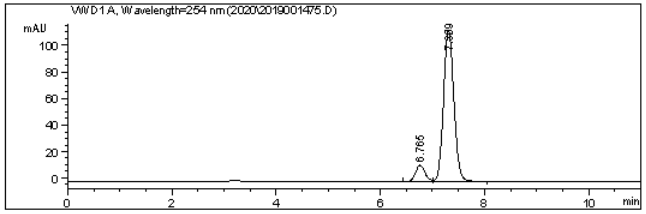


(+/-)-**3g**

Data File D:\CHEM32\1\DATA\2020\2019001475.D
Sample Name: JDW-11-23C

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/9/2020 4:55:23 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/9/2020 4:54:23 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:22:46 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : OD-H, Hexane/iPrOH=85/15, 1.0 mL/min, 254nm, 30 oC
```

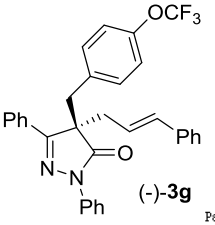



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.765 VV    0.1959  151.98193   12.11373   8.8203
       2   7.309 VB    0.2161 1571.10474  114.01720  91.1797
```

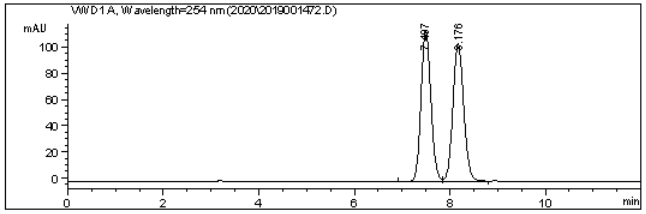


(-)-**3g**

Data File D:\CHEM32\1\DATA\2020\2019001472.D
Sample Name: JDW-11-23A-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/9/2020 3:33:26 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 5/9/2020 3:42:49 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:14:47 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : OD-H, Hexane/iPrOH=85/15, 1.0 mL/min, 254nm, 30 oC
```

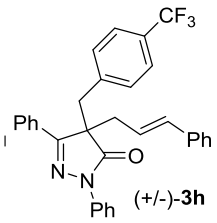



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   7.497 VV    0.2232 1660.31873  115.42051  49.9103
   2   8.176 VV    0.2459 1666.28894  105.20586  50.0897
```

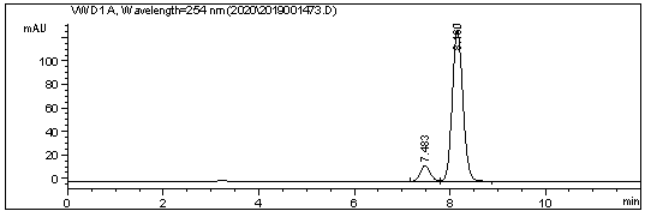


(+/-)-**3h**

Data File D:\CHEM32\1\DATA\2020\2019001473.D
Sample Name: JDW-11-23A

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/9/2020 3:51:29 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 5/9/2020 3:47:36 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:14:47 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : OD-H, Hexane/iPrOH=85/15, 1.0 mL/min, 254nm, 30 oC
```

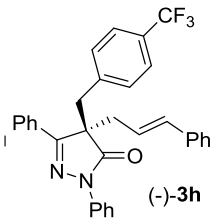



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   7.483 BV    0.2255  191.43976   13.35133   8.7295
   2   8.160 VB    0.2430 2001.58899  128.41409  91.2705
```

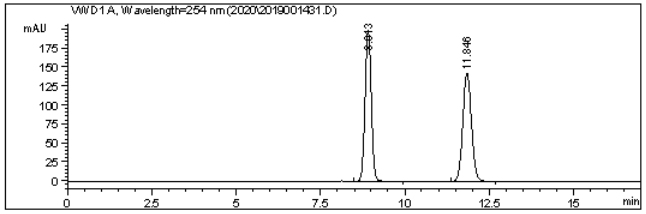


(-)-**3h**

Data File D:\CHEM32\1\DATA\2020\2019001431.D
Sample Name: JDW-11-23B-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/24/2020 9:51:16 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/24/2020 10:14:32 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 4:55:50 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

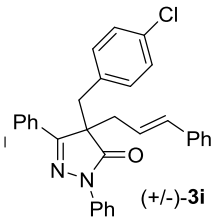



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   8.913 VB    0.1983 2542.11646  199.29805  50.0975
   2  11.846 BB    0.2738 2532.21997  142.81018  49.9025
```

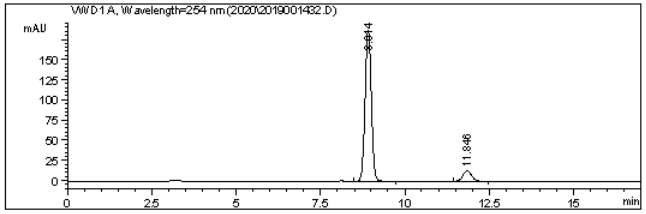


(+/-)-**3i**

Data File D:\CHEM32\1\DATA\2020\2019001432.D
Sample Name: JDW-11-23B

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/24/2020 10:15:47 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/24/2020 10:14:48 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 4:55:50 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

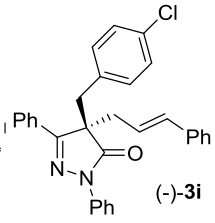



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   8.914 VB    0.1980 2381.44482  187.04178  91.1274
   2  11.846 BB    0.2766  231.86928   13.08733   8.8726
```

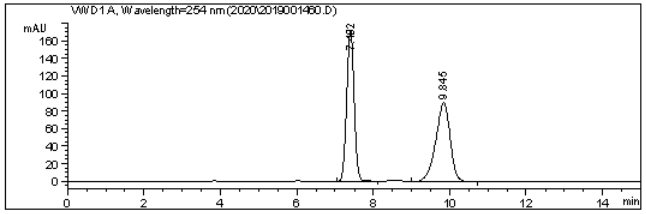


(-)-**3i**

Data File D:\CHEM32\1\DATA\2020\2019001460.D
Sample Name: JDW-11-26B-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/7/2020 4:35:10 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 5/7/2020 4:46:24 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:13:12 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

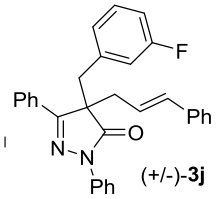



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   7.402 VV    0.2133 2334.07910  172.39056  50.1113
   2   9.845 VB    0.3922 2323.71240   89.78840  49.8887
```

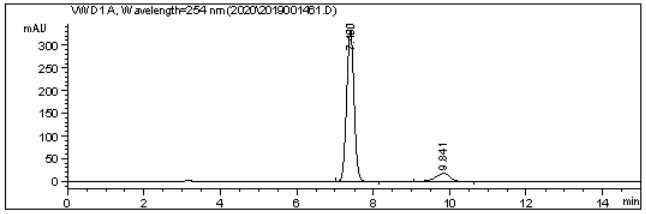


(+/-)-**3j**

Data File D:\CHEM32\1\DATA\2020\2019001461.D
Sample Name: JDW-11-26B

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/7/2020 4:52:09 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 5/7/2020 4:50:27 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:13:12 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

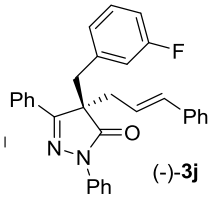



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   7.400 VV    0.2095 4482.69434  333.01968  90.7632
   2   9.841 VB    0.3967  456.19427   17.53584   9.2368
```

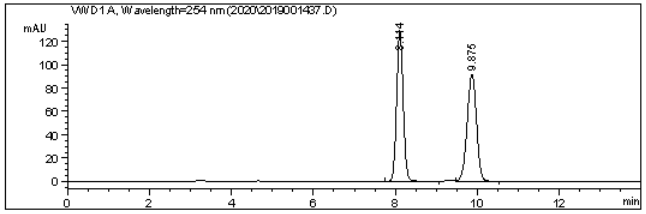


(-)-**3j**

Data File D:\CHEM32\1\DATA\2020\2019001437.D
Sample Name: JDW-11-24B-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/25/2020 5:21:37 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/25/2020 5:20:28 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:00:06 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

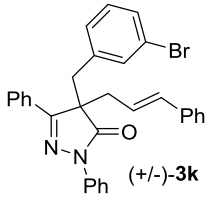



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   8.114 BB    0.1752 1455.30786  129.13887  50.0795
   2   9.875 VB    0.2462 1450.68701   91.48318  49.9205
```

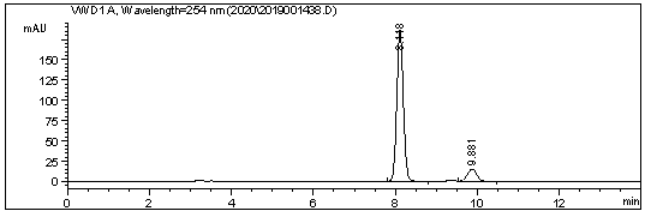


(+/-)-**3k**

Data File D:\CHEM32\1\DATA\2020\2019001438.D
Sample Name: JDW-11-24B

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/25/2020 5:41:12 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/25/2020 5:40:21 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:00:06 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

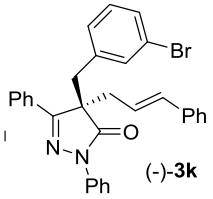



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   8.118 BB    0.1743 2082.42017  185.97321  89.7598
   2   9.881 VB    0.2489  237.57143   14.99347  10.2402
```

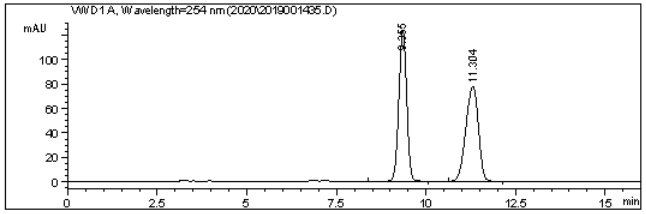


(-)-**3k**

Data File D:\CHEM32\1\DATA\2020\2019001435.D
Sample Name: JDW-11-24A-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/25/2020 4:45:11 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/25/2020 4:56:28 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:58:06 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

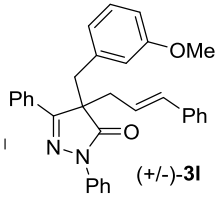



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :     1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   9.355 VB    0.2347 1870.32056  123.62847  50.0370
       2  11.304 BB    0.3858 1867.55505   77.55623  49.9630
```

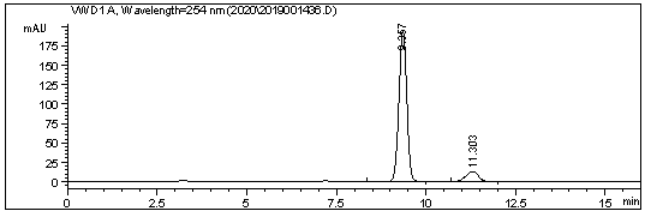


(+/-)-**3l**

Data File D:\CHEM32\1\DATA\2020\2019001436.D
Sample Name: JDW-11-24A

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/25/2020 5:03:13 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/25/2020 5:01:25 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:58:06 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

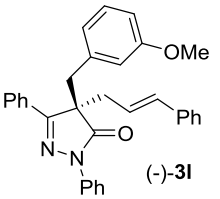



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :     1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   9.357 VB    0.2368 2929.89966  194.64575  90.8308
       2  11.303 BB    0.3850  295.76746   12.31422   9.1692
```

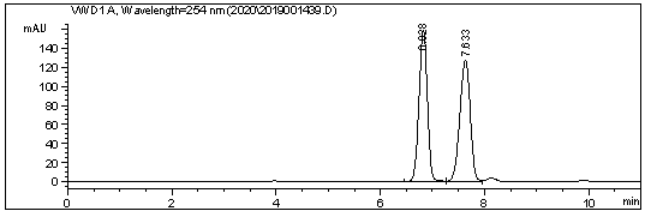


(-)-**3l**

Data File D:\CHEM32\1\DATA\2020\2019001439.D
Sample Name: JDW-11-24C-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/25/2020 6:05:19 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/25/2020 6:04:45 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:03:40 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

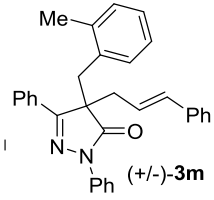



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

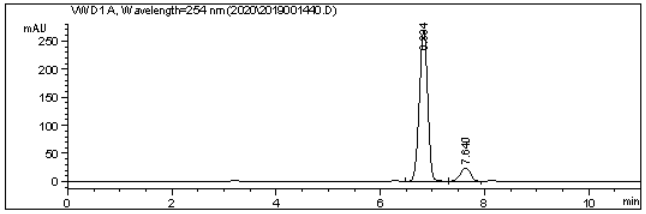
Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   6.828 VV    0.1734 1761.79199  158.40857  50.1071
   2   7.633 VV    0.2195 1754.26160  126.90518  49.8929
```



Data File D:\CHEM32\1\DATA\2020\2019001440.D
Sample Name: JDW-11-24C

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/25/2020 6:22:14 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/25/2020 6:21:03 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:03:40 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

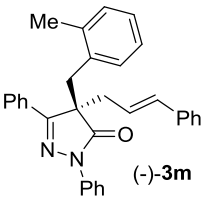



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

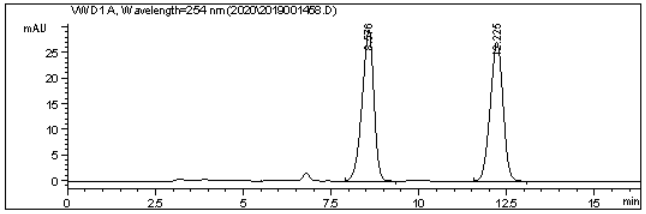
Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   6.834 VV    0.1763 2990.54663  268.88370  90.0001
   2   7.640 VV    0.2213  332.27780   23.76890   9.9999
```



Data File D:\CHEM32\1\DATA\2020\2019001458.D
Sample Name: JDW-11-26A-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/7/2020 3:54:08 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/7/2020 4:10:28 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:11:40 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

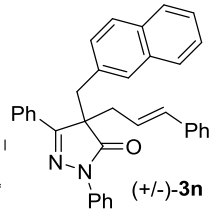



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   8.576 BB    0.3546  690.20905   29.48875  50.0576
       2  12.225 BB    0.3952  688.62183   27.12108  49.9424
```

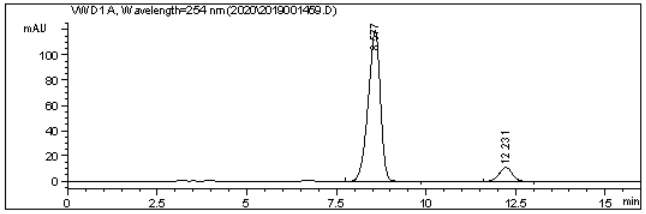


(+/-)-**3n**

Data File D:\CHEM32\1\DATA\2020\2019001459.D
Sample Name: JDW-11-26A

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/7/2020 4:11:43 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/7/2020 4:10:45 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:11:40 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

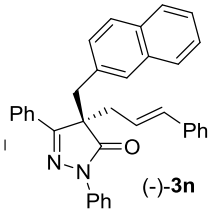



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   8.577 VB    0.3554 2808.71777  119.63621  91.0242
       2  12.231 BB    0.3945  276.96320   10.93645   8.9758
```

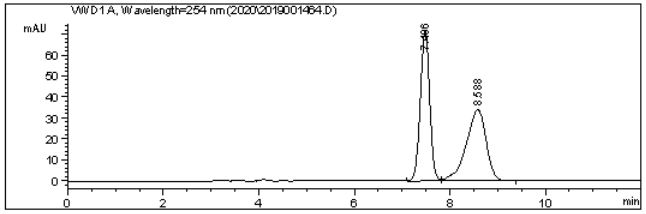


(-)-**3n**

Data File D:\CHEM32\1\DATA\2020\2019001464.D
Sample Name: JDW-11-26C-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/7/2020 6:22:03 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/7/2020 6:32:50 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:14:47 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=85/15, 1.0 mL/min, 254nm, 30 oC
```

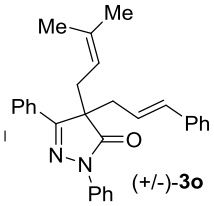



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.486 BV    0.2115  982.67633   72.06633  49.8378
       2   8.588 VB    0.4441  989.07385   34.01458  50.1622
```

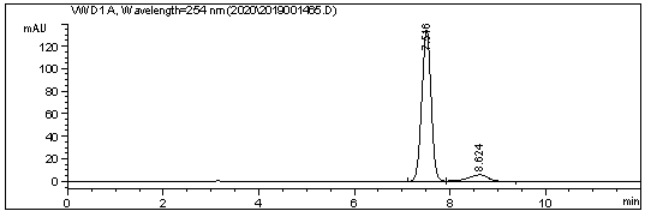


(+/-)-**3o**

Data File D:\CHEM32\1\DATA\2020\2019001465.D
Sample Name: JDW-11-26C

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/7/2020 7:13:54 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/7/2020 6:34:21 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:14:47 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=85/15, 1.0 mL/min, 254nm, 30 oC
```

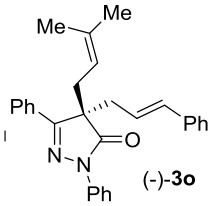



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.516 BV    0.2114 1829.46240  134.29042  91.5815
       2   8.624 VB    0.4422  168.17064    5.71650   8.4185
```

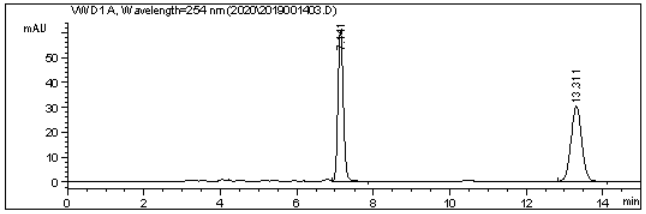


(-)-**3o**

Data File D:\CHEM32\1\DATA\2020\2019001403.D
Sample Name: JDW-11-14C-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/17/2020 4:01:11 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/17/2020 3:59:52 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:00:36 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

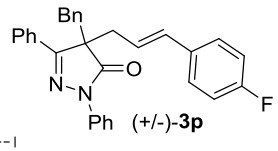



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

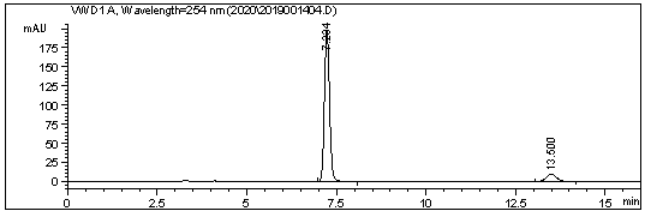
    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.141 VB    0.1517  592.48999   60.71050  50.3027
       2  13.311 BB    0.3055  585.35980   30.09686  49.6973
```



Data File D:\CHEM32\1\DATA\2020\2019001404.D
Sample Name: JDW-11-14C

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/17/2020 6:16:25 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/17/2020 6:15:44 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:00:36 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

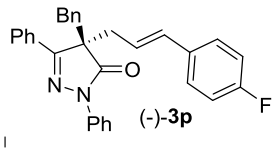



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

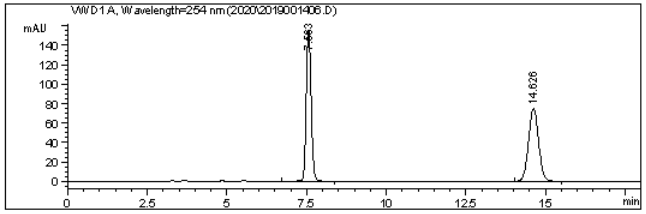
    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.234 VB    0.1527 1952.59485  198.28496  91.3421
       2  13.500 BB    0.3066  185.07805    9.35041   8.6579
```



Data File D:\CHEM32\1\DATA\2020\2019001406.D
Sample Name: JDW-11-15-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/18/2020 3:04:36 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/18/2020 2:40:36 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:00:36 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

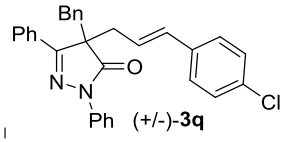



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.563 VB    0.1646 1651.27161  155.53435  50.2073
       2  14.626 BB    0.3422 1637.63342   74.96562  49.7927
```

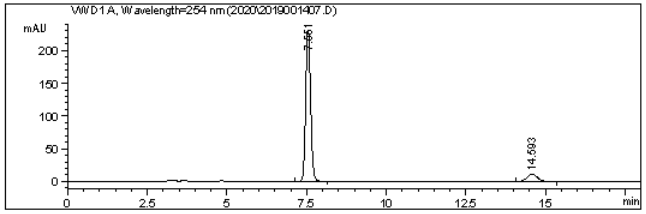


(+/-)-**3q**

Data File D:\CHEM32\1\DATA\2020\2019001407.D
Sample Name: JDW-11-15A

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/18/2020 3:28:16 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/18/2020 3:22:51 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:24:50 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

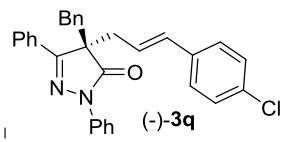



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   7.551 VB    0.1641 2436.01196  230.36661  91.2665
       2  14.593 BB    0.3389  233.10641   10.68843   8.7335
```

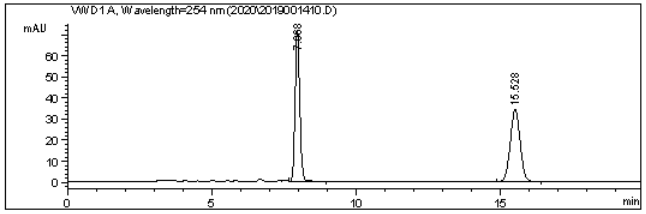


(-)-**3q**

Data File D:\CHEM32\1\DATA\2020\2019001410.D
Sample Name: JDW-11-15C-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/18/2020 4:26:34 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/18/2020 4:27:04 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 4:30:29 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

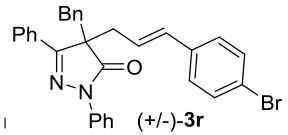



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

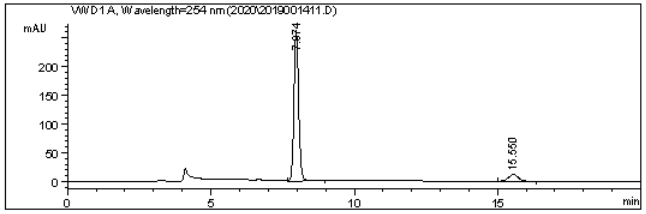
Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   7.968 VB    0.1753  806.06500   71.44373  50.1973
   2  15.528 VB    0.3677  799.72906   33.98632  49.8027
```



Data File D:\CHEM32\1\DATA\2020\2019001411.D
Sample Name: JDW-11-15C

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/18/2020 4:47:36 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/18/2020 4:46:51 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 4:30:29 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

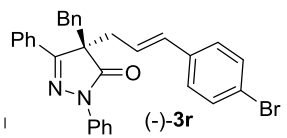



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

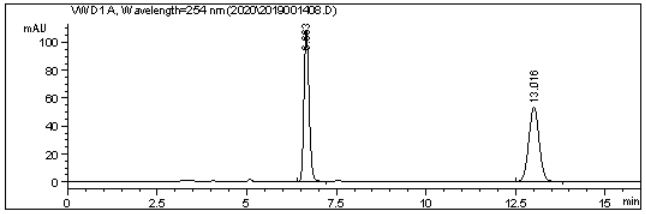
Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   7.974 VV    0.1774 2998.23755  261.60059  91.5637
   2  15.550 BB    0.3673  276.24475   11.75653   8.4363
```



Data File D:\CHEM32\1\DATA\2020\2019001408.D
Sample Name: JDW-11-15B-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/18/2020 3:48:56 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/18/2020 4:02:51 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 4:27:39 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

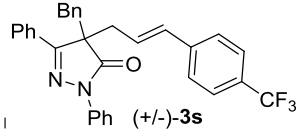



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

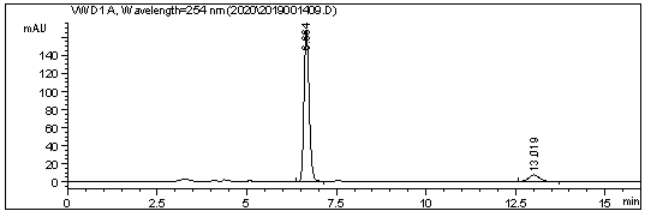
Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   6.663 VB    0.1535 1072.36145  108.19653  50.0769
   2  13.016 BB    0.3128 1069.06848   53.26414  49.9231
```



Data File D:\CHEM32\1\DATA\2020\2019001409.D
Sample Name: JDW-11-15B

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 4/18/2020 4:07:47 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/18/2020 4:05:10 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 4:27:39 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

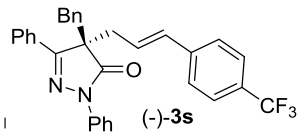



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

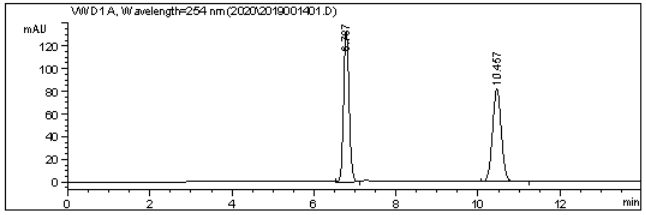
Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   6.664 VV    0.1540 1663.79041  167.10034  92.1389
   2  13.019 BB    0.3134  141.95082    7.05311   7.8611
```



Data File D:\CHEM32\1\DATA\2020\2019001401.D
Sample Name: JDW-11-14B-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/17/2020 3:29:11 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/17/2020 11:34:48 AM by QLL
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:00:36 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

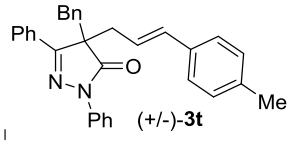



```
    ======================================================================
                               Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

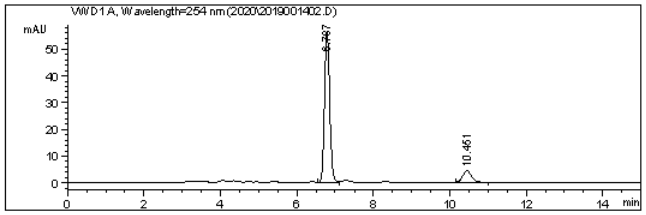
    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.787 VV    0.1459 1234.00903  133.20863  49.9910
       2  10.457 BV    0.2371 1234.45264   81.84406  50.0090
```



Data File D:\CHEM32\1\DATA\2020\2019001402.D
Sample Name: JDW-11-14B

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/17/2020 3:44:35 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/17/2020 3:45:12 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:00:36 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

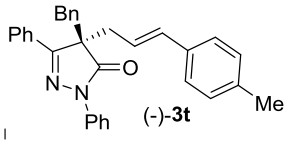



```
    ======================================================================
                               Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

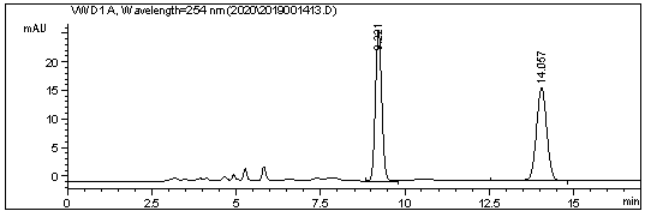
    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.787 VV    0.1460  523.84113   56.53329  89.0262
       2  10.451 BB    0.2354   64.57127    4.25287  10.9738
```



Data File D:\CHEM32\1\DATA\2020\2019001413.D
Sample Name: JDW-11-17A-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/21/2020 10:04:30 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/21/2020 10:03:48 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:34:08 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

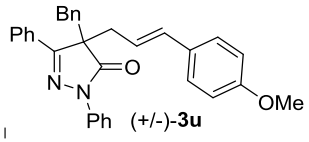



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   9.221 BB    0.2061  347.93375   26.41357  49.6460
       2  14.057 BB    0.3372  352.89612   16.28989  50.3540
```

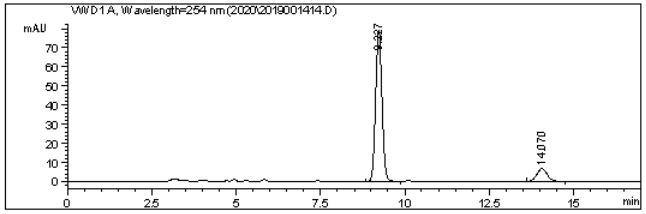


(+/-)-**3u**

Data File D:\CHEM32\1\DATA\2020\2019001414.D
Sample Name: JDW-11-17A

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 4/21/2020 10:23:38 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 4/21/2020 10:21:33 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 4:34:08 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC
```

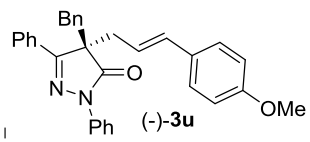



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   9.227 BV    0.2056 1038.68176   79.10696  88.1729
       2  14.070 BB    0.3318  139.32346    6.57264  11.8271
```

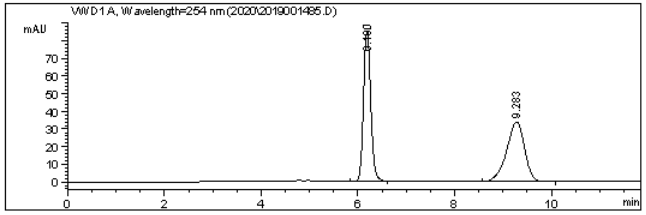


(-)-**3u**

Data File D:\CHEM32\1\DATA\2020\2019001485.D
Sample Name: JDW-10-27A-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/11/2020 10:42:14 AM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 4/2/2020 9:16:53 AM by QLL
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:30:50 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

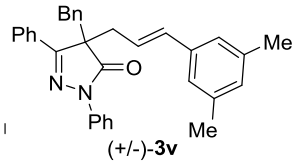



```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :     1.00000  [ng/ul]    (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   6.190 VV    0.1628  895.35950   85.60767  50.5598
   2   9.283 BB    0.3966  875.53125   33.98829  49.4402
```

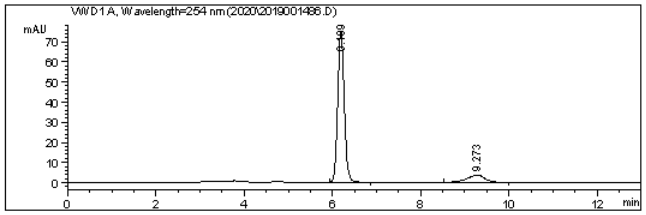


(+/-)-**3v**

Data File D:\CHEM32\1\DATA\2020\2019001486.D
Sample Name: JDW-10-27A

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/11/2020 10:55:38 AM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 5/11/2020 10:54:22 AM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:30:50 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

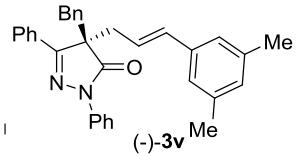



```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :     1.00000  [ng/ul]    (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   6.189 BB    0.1611  773.67755   74.98215  88.8045
   2   9.273 VB    0.4102   97.53674    3.62274  11.1955
```

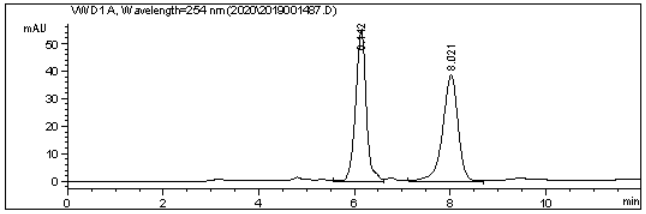


(-)-**3v**

Data File D:\CHEM32\1\DATA\2020\2019001487.D
Sample Name: JDW-10-27B-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/11/2020 3:23:24 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/11/2020 3:34:54 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:30:50 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

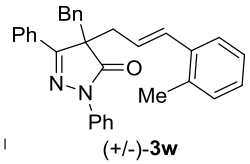



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.142 VV    0.2340  853.19476   54.80981  49.7292
       2   8.021 VV    0.3383  862.48773   38.74603  50.2708
```

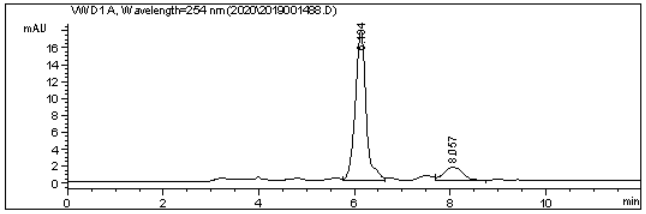


(+/-)-**3w**

Data File D:\CHEM32\1\DATA\2020\2019001488.D
Sample Name: JDW-10-27B

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/11/2020 3:36:59 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/11/2020 3:35:29 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:30:50 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

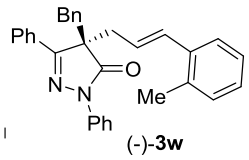



```
    ======================================================================
                           Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   6.134 VV    0.2362  280.77866   17.82407  86.5796
       2   8.057 VV    0.4418   43.52259    1.56078  13.4204
```

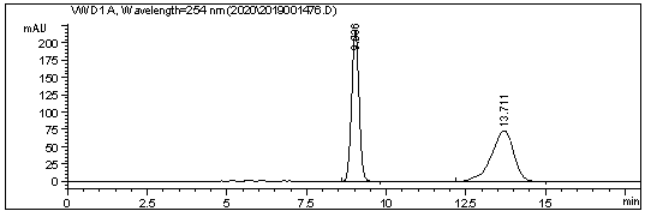


(-)-**3w**

Data File D:\CHEM32\1\DATA\2020\2019001476.D
Sample Name: JDW-11-30B-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/9/2020 6:21:47 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 5/9/2020 6:09:19 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:26:52 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

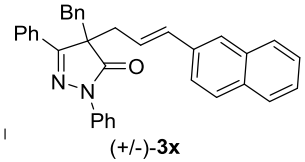



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   9.036 BB    0.2537 3545.67920  218.10135  49.9659
   2  13.711 BB    0.7481 3550.51660   72.98550  50.0341
```

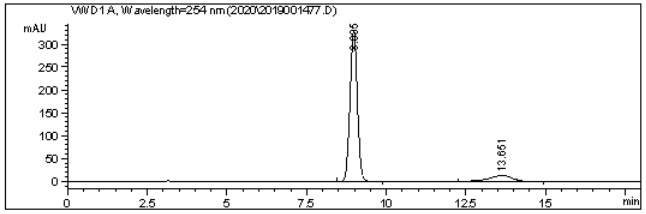


(+/-)-**3x**

Data File D:\CHEM32\1\DATA\2020\2019001477.D
Sample Name: JDW-11-30B-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 5/9/2020 6:43:09 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 5/9/2020 6:41:47 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/2/2020 5:26:52 PM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

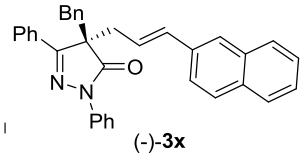



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Do not use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   8.985 VB    0.2517 5312.62646  330.37787  89.4225
   2  13.651 BB    0.7515  628.41156   12.97366  10.5775
```

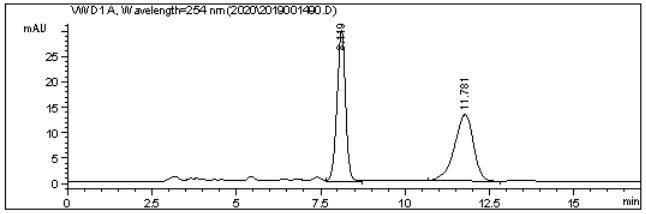


(-)-**3x**

Data File D:\CHEM32\1\DATA\2020\2019001490.D
Sample Name: JDW-10-27C-rac

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/11/2020 4:14:10 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/11/2020 4:13:19 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:30:50 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

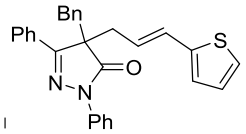



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   8.119 VV    0.2707  518.17963   29.67385  50.3103
       2  11.781 BB    0.6014  511.78732   13.09909  49.6897
```

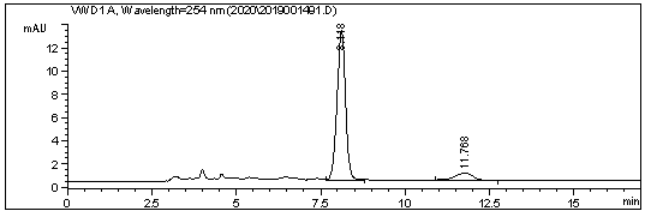


(+/-)-**3y**

Data File D:\CHEM32\1\DATA\2020\2019001491.D
Sample Name: JDW-10-27C

```
    ======================================================================
    Acq. Operator   : QLL
    Acq. Instrument : Instrument 1                    Location : Vial 66
    Injection Date  : 5/11/2020 4:36:12 PM
                                                     Inj Volume : 5.0 µl
    Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 5/11/2020 4:31:07 PM by QLL
                      (modified after loading)
    Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
    Last changed    : 6/2/2020 5:30:50 PM by QLL
                      (modified after loading)
    Method Info     : AD-H, Hexane/iPrOH=90/10, 0.8mL/min, 254nm, 30 oC


    Sample Info     : AD-H, Hexane/iPrOH=70/30, 1.0 mL/min, 254nm, 30 oC
```

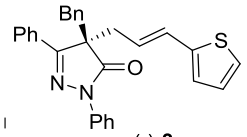



```
    ======================================================================
                            Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
    Do not use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]       [min] mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1   8.118 VB    0.2692  227.97473   12.96466  90.2717
       2  11.768 BB    0.5788   24.56808 6.35961e-1   9.7283
```

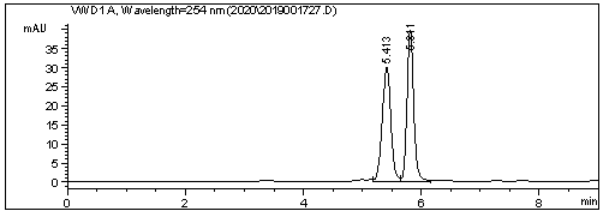


(-)-**3y**

Data File D:\CHEM32\1\DATA\2020\2019001727.D
Sample Name: JDW-11-59B-rac

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 6/16/2020 10:52:44 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/16/2020 10:50:37 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/17/2020 10:06:03 AM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC


Sample Info     : IE, Hexane/iPrOH=80/20, 1.0 mL/min, 254nm, 30 oC
```

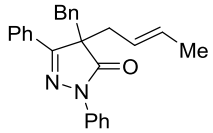



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   5.413 VV    0.1566  303.78058   29.84245  49.4324
   2   5.811 VV    0.1210  310.75732   39.45861  50.5676
```

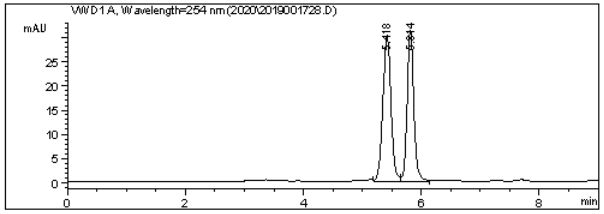


(+/-)-**3z**

Data File D:\CHEM32\1\DATA\2020\2019001728.D
Sample Name: JDW-11-59B

```
==========================================================================
Acq. Operator   : QLL
Acq. Instrument : Instrument 1                    Location : Vial 66
Injection Date  : 6/16/2020 11:09:41 PM
                                                  Inj Volume : 5.0 µl
Acq. Method     : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/16/2020 11:08:38 PM by QLL
                  (modified after loading)
Analysis Method : D:\CHEM32\1\METHODS\ZCY-0D.M
Last changed    : 6/17/2020 10:06:03 AM by QLL
                  (modified after loading)
Method Info     : AD-H, Hexane/iPrOH=70/30, 1.0mL/min, 254nm, 30 oC


Sample Info     : IE, Hexane/iPrOH=80/20, 1.0 mL/min, 254nm, 30 oC
```

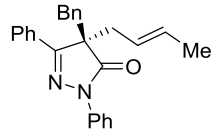



```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   5.418 VV    0.1497  288.13882   30.05034  54.2410
   2   5.814 VV    0.1204  243.08031   31.08305  45.7590
```



(-)-**3z**