Electronic Supplementary Material (ESI) for Organic Chemistry Frontiers.

Supporting Information

Palladium Catalyzed Stereo-Convergent Aminocarbonylation of 1,3-Dienes with Nitroarenes: Synthesis of (*E*,*E*)-Dienamides

Jin-Liang Lu,[†] Yun Kang,[†] Zhi Zhang,[†] Yin-Ai Huang,[†] Lu-Qi Tan,[†] Xiang-Zhi Zhang,[†] and Jin-Bao Peng*,[†]

[†]School of Biotechnology and Health Sciences, Wuyi University, Jiangmen, Guangdong 529020, *P. R. China*; orcid.org/0000-0002-0568-7740; E-mail: pengjb_05@126.com

Table of Contents

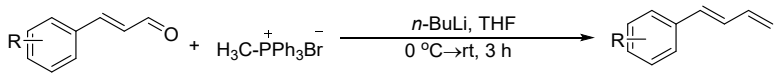
1. General Information

Reagents, solvents and analytical methods:

Unless otherwise noted, all reactions were carried out under a carbon monoxide or nitrogen atmosphere. All reagents were from commercial sources and used as received without further purification. All solvents were dried by standard techniques and distilled prior to use. Column chromatography was performed on silica gel (200-300 meshes) using petroleum ether (bp. 60~90 °C) and ethyl acetate as eluent. NMR spectra were recorded on a Bruker Avance operating at for ^{1}H NMR at 500 MHz, ^{13}C NMR at 126 MHz and ^{19}F NMR at 471 MHz and spectral data were reported in ppm relative to Dimethyl sulfoxiade-d6 (DMSO-d6) (^{1}H NMR δ 2.50, ^{13}C NMR δ 39.5) as solvent. High-resolution mass spectra (HRMS) is produced by Thermo Fisher Scientific. Its main body is composed of two parts: Thermo Scientific's UltiMate 3000 Series liquid system and Thermo Scientific Q-Exactive combined quadrupole Orbitrap mass spectrometer. All coupling constants (*J*) are reported in Hz. The following abbreviations were used to describe peak splitting patterns when appropriate: s = singlet, d = doublet, dd = double doublet, ddd = double doublet of doublets, t = triplet, dt = double triplet, q = quatriplet, m = multiplet, br = broad.

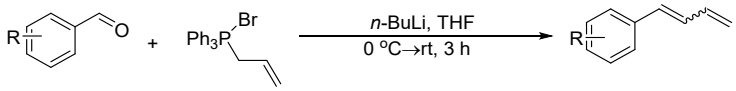
2. General Procedure for the Starting Materials

2.1 Typical Procedure A for the Synthesis of 1,3-Dienes (**1a, 1b, 1k, 1n, 1o, 1p，1r**)[S1].



To a suspension of Methyltriphenylphosphonium bromide (10.0 mmol, 1.25 equiv) in THF (25 mL) was added dropwise *n*-Butyllithium (2.5 M in Hexane, 4 mL, 10 mmol, 1.25 equiv) at 0 ℃. Then the reaction mixture was stirred for 2 hours and the solvent of Cinnamaldehyde compounds (8 mmol, 1.0 equiv) in THF (5 mL) was added. After stirring 30 minutes, the mixture was warmed to room temperature and stirred for additional 3 hours. Then the mixture was quenched with saturated solution of NH_4Cl (20 mL), extracted with Et_2O (3×10 mL) and dried over Na_2SO_4. The solvent was evaporated under reduced pressure and the residue was purified by flash column chromatography (eluted with low-boiling petroleum) on a silica gel to give the desired product.

2.2 Typical Procedure B for the Synthesis of 1,3-Dienes (**1c-1j, 1l, 1m, 1q, 1s-1z, 1a-1d**).



To a suspension of Allyltriphenylphosphonium bromide (12.5 mmol, 1.25 equiv) in THF (20 mL) was added dropwise *n*-Butyllithium (2.5 M in Hexane, 5 mL, 12.5 mmol, 1.25 equiv) at 0 ℃. Then the reaction mixture was stirred for 2 hours and the solvent of Aldehydes (10 mmol, 1.0 equiv) in THF (10 mL) was added. After stirring 30 minutes, the mixture was warmed to room temperature and stirred for additional 3 hours. Then the mixture was quenched with saturated solution of NH_4Cl (20 mL), extracted with Et_2O (3×10 mL) and dried over Na_2SO_4. The solvent was evaporated under reduced pressure and the residue was purified by flash column chromatography (eluted with low-boiling petroleum) on a silica gel to give the desired product.

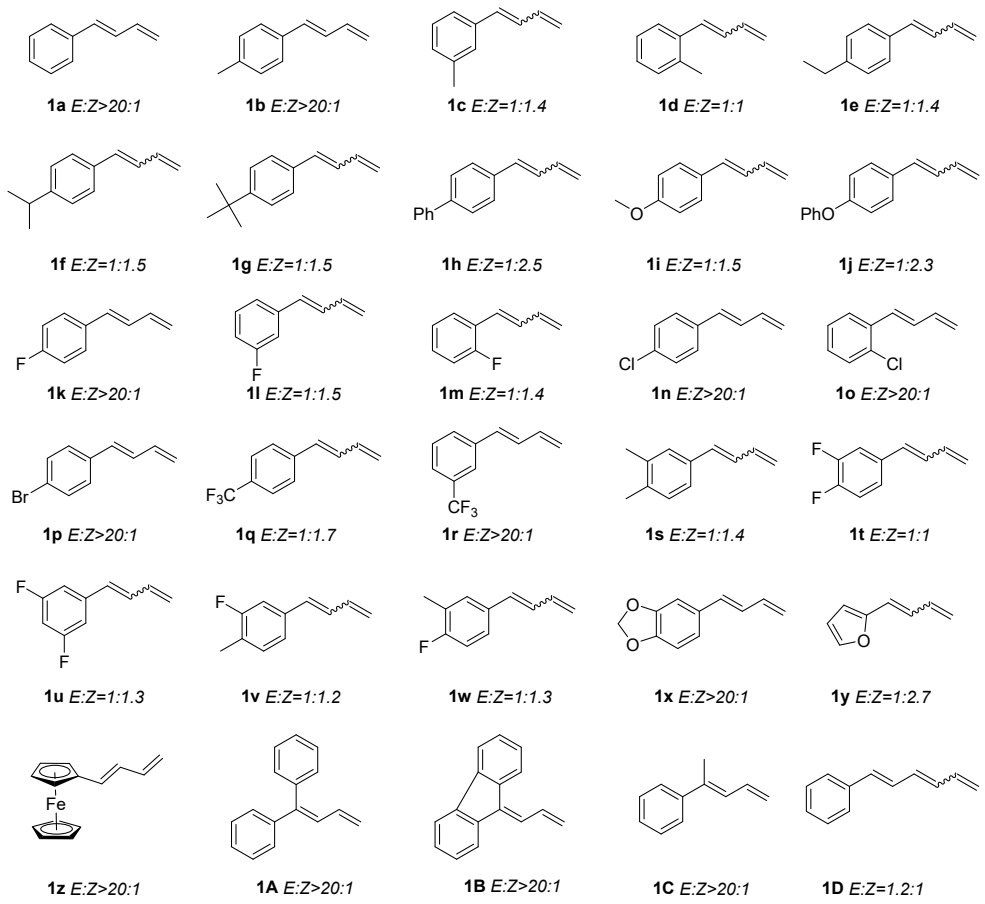


Figure S1 Substrates of 1,3-dienes

2.3 Substrates of Nitrocompound (**2a-2z,2A-2C**)[S2]

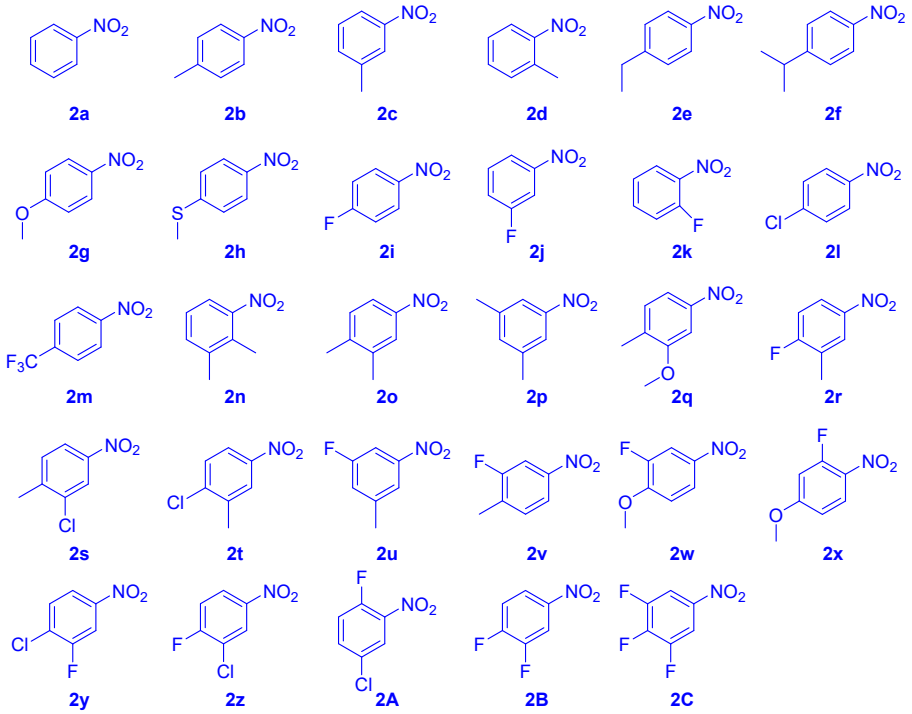
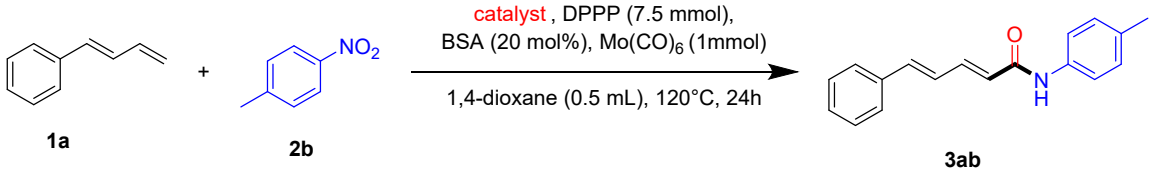


Figure S2 Substrates of nitro-compounds

3. Optimization of Reaction Conditions

Table S1. Optimization of catalyst.[a]

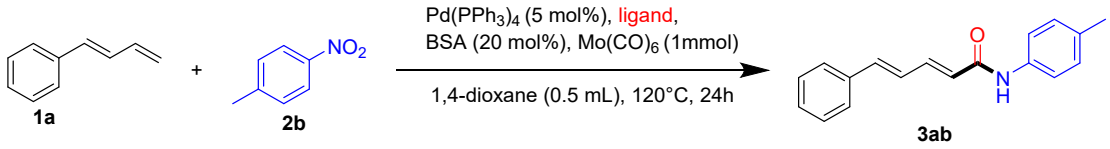


1a 2b 3ab

Entry	catalyst	Yield (%)[b]
1	$Pd(acac)_2$	36%
2	Pd/C	15%
3	$PdCl_2$	19%
4	$Pd(PPh_3)_4$	47%
5	$Pd(TFA)_2$	39%
6	$Pd(OAc)_2$	17%
7	$Pd_2(dba)_3$	13%
8	$Pd_2(PPh_3)_2Cl_2$	21%
9	No catalyst	ND

[a] Reaction conditions: **1a** (0.5 mmol), **2b** (1.5 mmol), catalyst (5 mol%), DPPP (7.5 mol%), BSA (20 mol%) , $Mo(CO)_6$ (1 mmol), 1,4-dioxane (0.5 mL), N_2 atmosphere, 120 ºC for 24 h. [b] Isolated yield.

Table S2. Optimization of ligand.[a]

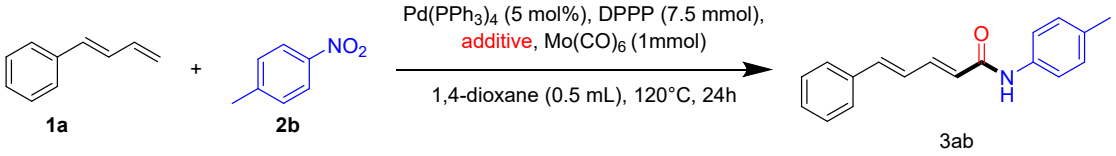


1a 2b 3ab

Entry	Ligand	Yield (%)[b]
1	DPPP	36%
2	PPh_3	20%
3	BINAP	trace
4	$BuPAd_2$	trace
5	DPEPhos	9%
6	DPPF	13%
7	DPPE	30%
8	DPPB	27%
9	no ligand	ND

[a] Reaction conditions: **1a** (0.5 mmol), **2b** (1.5 mmol), $Pd(acac)_2$ (5 mol%), ligand (bidentate ligand 7.5 mol% or monodentate ligand 15 mol%), BSA (20 mol%) , $Mo(CO)_6$ (1 mmol), 1,4-dioxane (0.5 mL), N_2 atmosphere, 120 ºC for 24 h. [b] Isolated yield.

Table S3. Optimization of the additivie.[a]

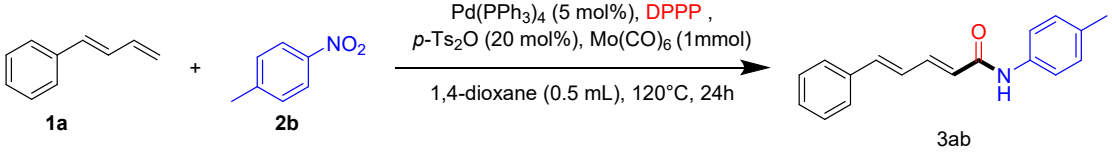


1a 2b 3ab

Entry	additive	Yield (%)[b]
1	BSA	47%
2	4Cl-BSA	39%
3	PTS	35%
4	PPTS	43%
5	*p*-Ts_2O	61%
6	no additive	41%
7	H_2O[c]	trace
8	K_2CO_3[d]	ND

[a] Reaction conditions: **1a** (0.5 mmol), **2b** (1.5 mmol), $Pd(PPh_3)_4$ (5 mol%), DPPP (7.5 mol%), additive (20 mol%), $Mo(CO)_6$ (1 mmol), 1,4-dioxane (0.5 mL), N_2 atmosphere, 120 ºC for 24 h. [b] Isolated yield. [c] 1 equiv. [d] 2 equiv.

Table S4. Optimization of the ratio of DPPP.[a]

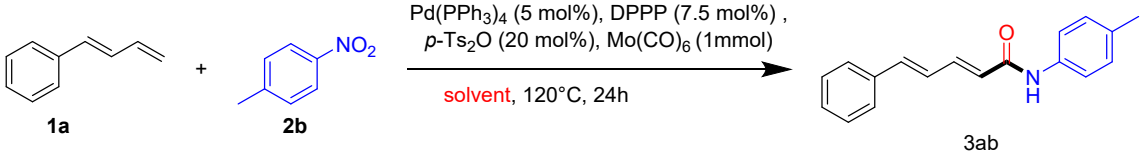


1a 2b 3ab

Entry	DPPP	Yield (%)[b]
1	5 mol%	55%
2	7.5 mol%	61%
3	10 mol%	52%

[a] Reaction conditions: **1a** (0.5 mmol), **2b** (1.5 mmol), $Pd(PPh_3)_4$ (5 mol%), DPPP , *p*-Ts_2O (20 mol%), $Mo(CO)_6$ (1 mmol), 1,4-dioxane (0.5 mL), N_2 atmosphere, 120 ºC for 24 h. [b] Isolated yield.

Table S5. Optimization of the solvent.[a]



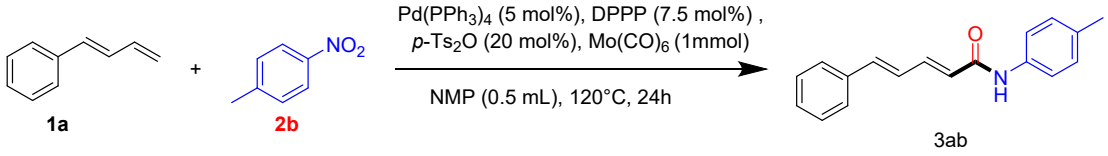
1a 2b 3ab

Entry	solvent	Yield (%)[b]
1	1,4-dioxane	61%

2	MeCN	12%
3	THF	41%
4	toluene	59%
5	DCE	ND
6	DMF	75%
7	DMSO	trace
8	NMP	91%
9	DMA	69%

[a] Reaction conditions: **1a** (0.5 mmol), **2b** (1.5 mmol), $Pd(PPh_3)_4$ (5 mol%), DPPP (7.5 mol%), *p*-Ts_2O (20 mol%), $Mo(CO)_6$ (1 mmol), solvent (0.5 mL), N_2 atmosphere, 120 ºC for 24 h. [b] Isolated yield.

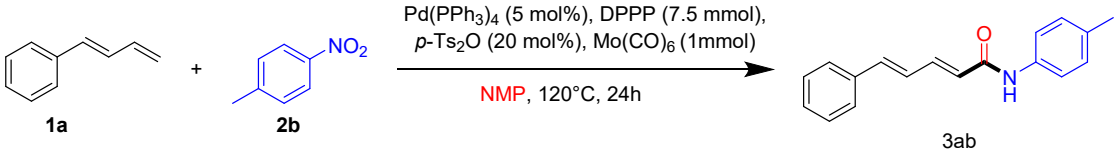
Table S6. Optimization of the equivalent of **2b**.[a]



Entry	the equivalent of **2b**	Yield (%)[b]
1	1.5 equiv.	39%
2	2 equiv.	42%
3	2.5 equiv	71%
4	3 equiv.	91%

[a] Reaction conditions: **1a** (0.5 mmol), **2b** , $Pd(PPh_3)_4$ (5 mol%), DPPP (7.5 mol%), *p*-Ts_2O (20 mol%), $Mo(CO)_6$ (1 mmol), NMP (0.5 mL), N_2 atmosphere, 120 ºC for 24 h. [b] Isolated yield.

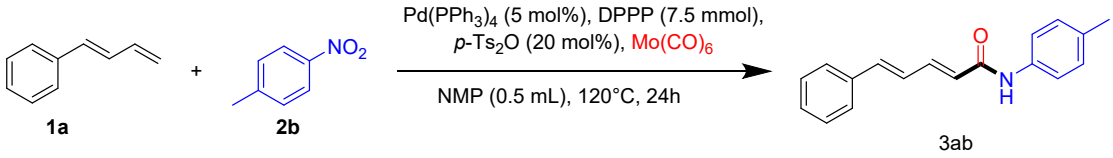
Table S7. Optimization of the amount of solvent.[a]



Entry	NMP	Yield (%)[b]
1	0.5 mL	91%
2	1 mL	81%
3	2 mL	81%

[a] Reaction conditions: **1a** (0.5 mmol), **2b** (1.5 mmol), $Pd(PPh_3)_4$ (5 mol%), DPPP (7.5 mol%), *p*-Ts_2O (20 mol%), $Mo(CO)_6$ (1 mmol), NMP, N_2 atmosphere, 120 ºC for 24 h. [b] Isolated yield.

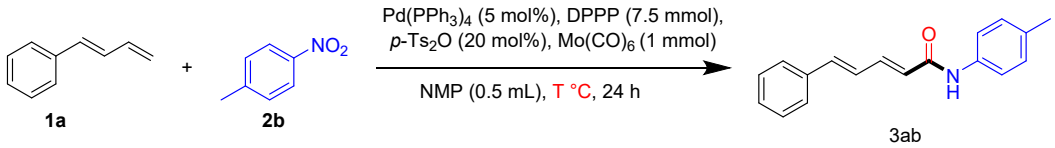
Table S8. Optimization of the amount of $Mo(CO)_6$.[a]



Entry	$Mo(CO)_6$	Yield (%)[b]
1	0.5 mmoL	71%
2	1 mmoL	91%

[a] Reaction conditions: **1a** (0.5 mmol), **2b** (1.5 mmol), $Pd(PPh_3)_4$ (5 mol%), DPPP (7.5 mol%), *p*-Ts_2O (20 mol%), $Mo(CO)_6$, NMP (0.5 mL), N_2 atmosphere, 120 ºC for 24 h. [b] Isolated yield.

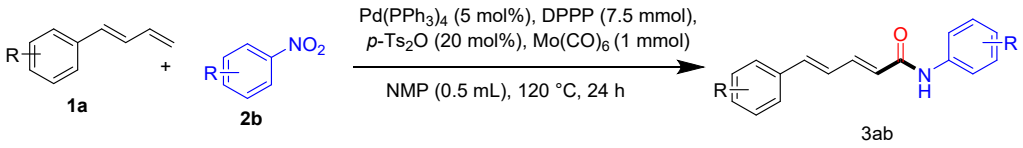
Table S9. Optimization of the equivalent of temperature. [a]



Entry	temperature	Yield (%)[b]
1	110 °C	83%
2	120 °C	91%
3	130 °C	60%

[a] Reaction conditions: **1a** (0.5 mmol), **2b** (1.5 mmol), $Pd(PPh_3)_4$ (5 mol%), DPPP (7.5 mol%), *p*-Ts_2O (20 mol%), $Mo(CO)_6$ (1 mmol) , NMP (0.5 mL), N_2 atmosphere, T ºC for 24 h. [b] Isolated yield.

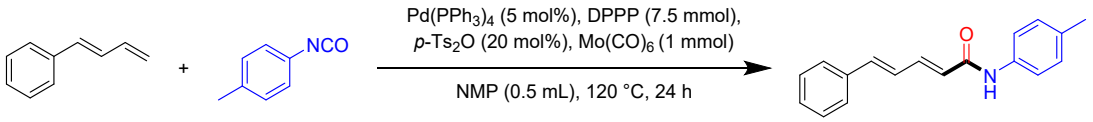
4. General Procedure



Nitrocompound (1.5 mmol), $Pd(PPh_3)_4$ (5 mol%), DPPP (7.5 mol%), $Mo(CO)_6$ (1 mmol) were transferred into an 15 mL tube which was filled with nitrogen. Then, 1,3-dienes (0.5 mmol, 1 equiv.), NMP (0.5 mL) and *p*-Ts_2O (20 mol%) were added to the reaction tube by syringe. The tube was sealed and the mixture was stirred at 120 °C for 24 h. After the reaction was completed, the reaction mixture was filtered and concentrated under vacuum. The crude product was purified by column chromatography on silica gel to afford the corresponding product.

5. Mechanistic Experiments

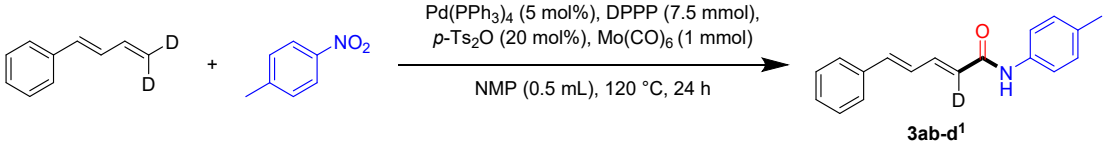
5.1 Control experiments



(*2E,4E*)-5-Phenyl-*N*-(*p*-tolyl)penta-2,4-dienamide (3ab)

The compound was from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Isocyanato-4-methylbenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (general procedure A:69.6 mg, 53%, *EE/EZ >20:1*).

5.2 Isotopic-labeling experiment



(2*E*,4*E*)-5-Phenyl-*N*-(*p*-tolyl)penta-2,4-dienamide (3ab-d^1)

The compound was from (*E*)-(Buta-1,3-dien-1-yl-4,4-d2)benzene (33.5 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (199.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a white solid (general procedure A:99.1 mg, 75%, *EE/EZ >20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.07 (s, 1H), 7.59 (t, *J* = 7.9 Hz, 4H), 7.38 (dd, *J* = 15.8, 8.1 Hz, 2H), 7.35 – 7.29 (m, 2H), 7.12 (d, *J* = 8.0 Hz, 3H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.36 (d, *J* = 14.9 Hz, 0.13H), 2.26 (s, 3H).

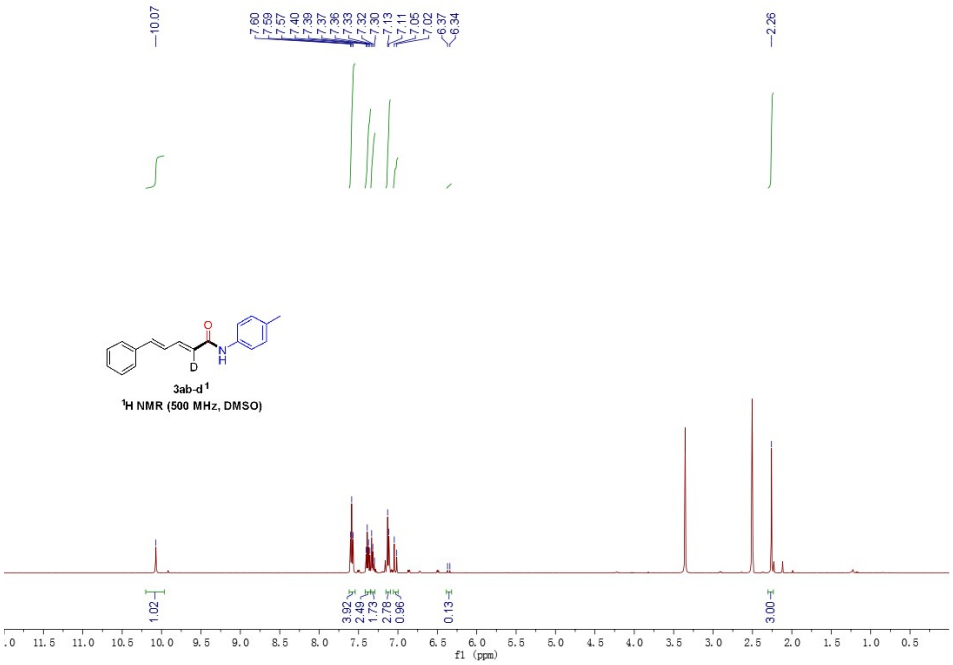
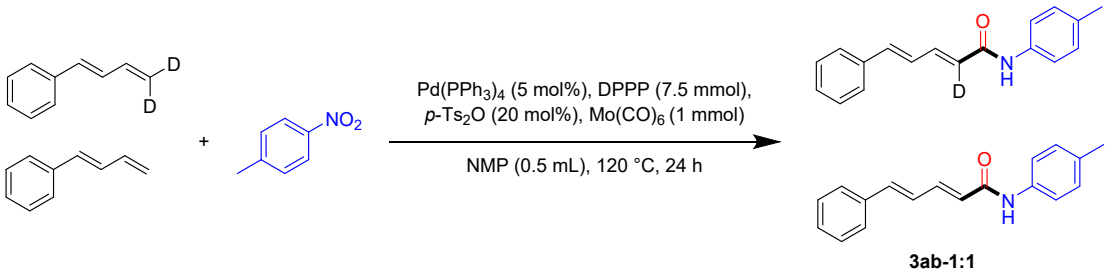


Figure S3. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ab-d^1

5.3 Intermolecular KIE experiment



(2*E*,4*E*)-5-Phenyl-*N*-(*p*-tolyl)penta-2,4-dienamide (3ab-1:1)

A mix of (*E*)-(Buta-1,3-dien-1-yl-4,4-d2)benzene (33.5 mg, 0.25 mmol, *E:Z>20:1*) and (*E*)-Buta-1,3-dien-1-ylbenzene (32.6 mg, 0.25 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol) was subjected to standard reaction conditions (**120 ℃, 4 h**).

The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a white solid (general procedure A:60.6 mg, 46%, *EE/EZ >20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.06 (s, 1H), 7.58 (t, *J* = 8.2 Hz, 4H), 7.38 (t, *J* = 7.5 Hz, 2H), 7.32 (dd, *J* = 16.3, 9.2 Hz, 2H), 7.12 (d, *J* = 8.4 Hz, 3H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.35 (d, *J* = 14.9 Hz, 0.49H), 2.25 (s, 3H).

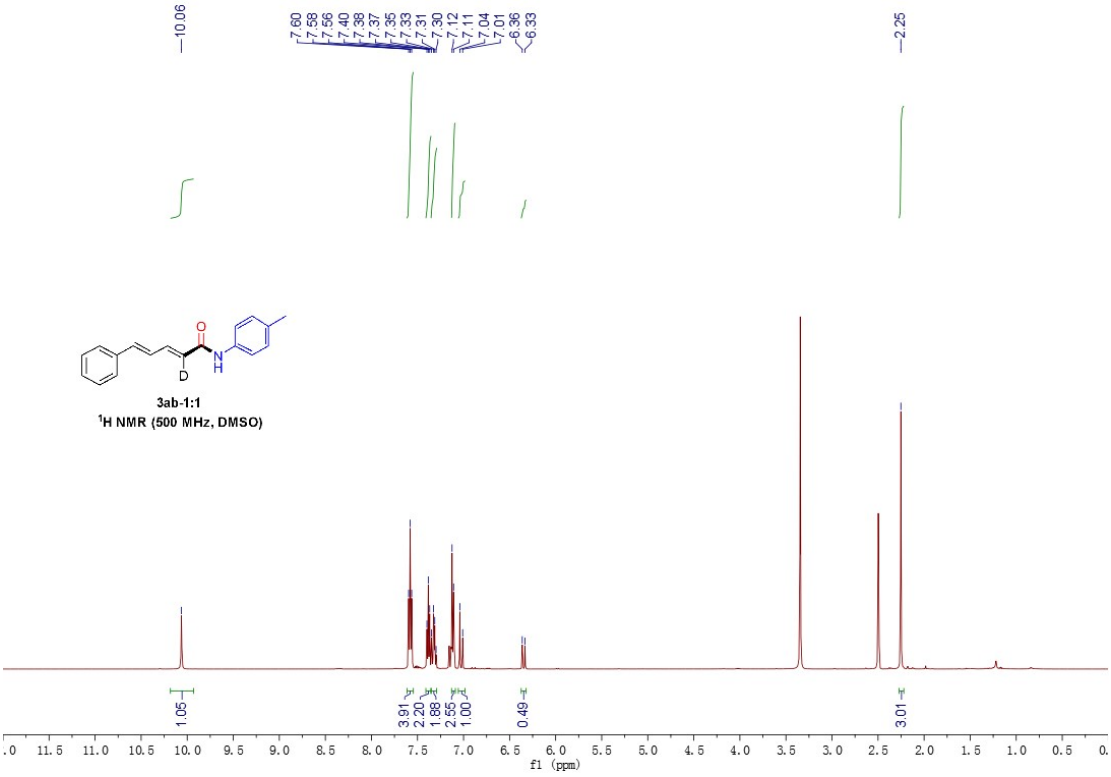
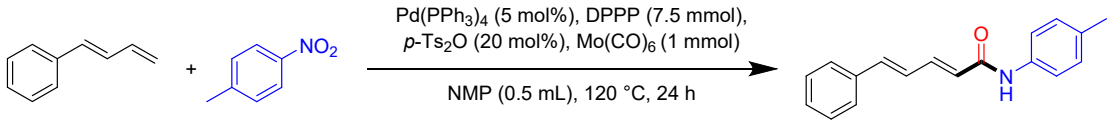


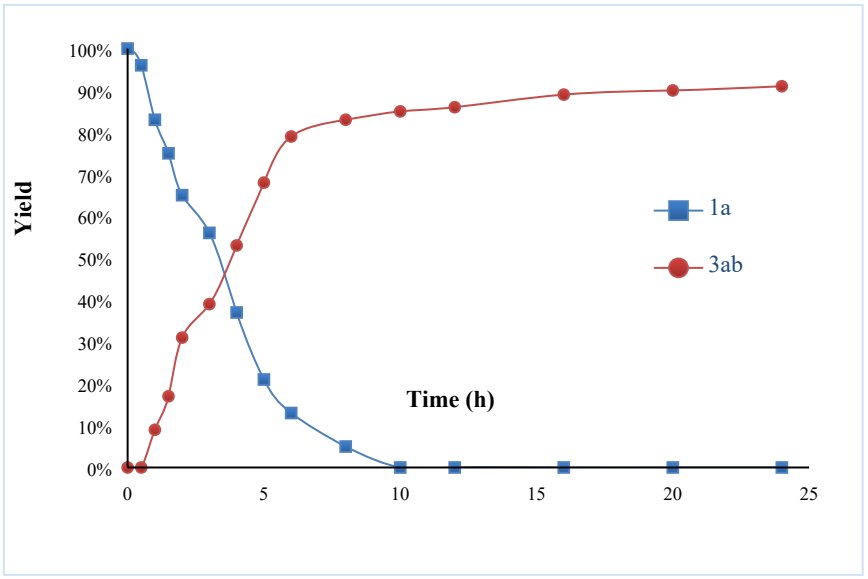
Figure S4. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ab-1:1

5.4 Kinetic data of aminocarbonylation of 1,3-diene 1a.

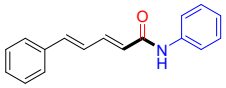


1a **2b** **3ab**

Kinetic data of cascade reaction was collected by carrying out 14 parallel reactions and quenching at different time. Following the general procedure, the 14 reaction tubes were stirred at room temperature and stopped at 0.5 h, 1 h, 1.5 h, 2 h, 3 h, 4 h, 5 h, 6 h, 8 h, 10 h, 12 h, 16 h, 20 h, 24 h respectively. The reaction mixture was concentrated under vacuum. The residue was chromatographed on silica gel.



6. Spectroscopic Data of Products



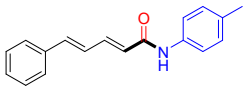
(*2E,4E*)-*N*,5-Diphenylpenta-2,4-dienamide (3aa)

The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and Nitrobenzene (184.6 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid. (115.7 mg, 93%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.18 (s, 1H), 7.72 (d, *J* = 7.8 Hz, 2H), 7.59 (d, *J* = 7.4 Hz, 2H), 7.44 – 7.28 (m, 7H), 7.15 (dd, *J* = 15.5, 10.9 Hz, 1H), 7.05 (dd, *J* = 15.0, 7.3 Hz, 2H), 6.40 (d, *J* = 14.9 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 163.9, 140.9, 139.6, 139.1, 136.4, 129.0, 128.9, 128.9, 127.3, 127.0, 125.6, 123.4, 119.4.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{16}NO^+$ 250.1226; Found 250.1224.



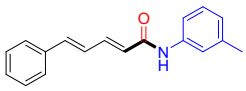
(*2E,4E*)-5-Phenyl-*N*-(*p*-tolyl)penta-2,4-dienamide (3ab)

The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (119.7 mg, 91%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.08 (s, 1H), 7.59 (dd, *J* = 7.8, 3.8 Hz, 4H), 7.41 – 7.35 (m, 3H), 7.34 – 7.29 (m, 1H), 7.14 (t, *J* = 12.5 Hz, 3H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.36 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 164.0, 141.0, 139.3, 137.4, 136.7, 132.7, 129.7, 129.3, 129.2, 127.6, 127.4, 126.0, 119.7, 20.6.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{18}NO^+$ 264.1383; Found 264.1382.

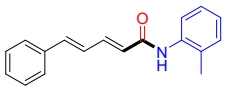


(*2E,4E*)-5-Phenyl-*N*-(*m*-tolyl)penta-2,4-dienamide (3ac)

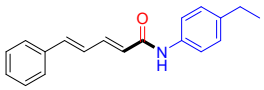
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*)and 1-Methyl-3-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (101.3 mg, 77%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 9.48 (s, 1H), 7.60 (d, *J* = 7.4 Hz, 2H), 7.54 (d, *J* = 7.7 Hz, 1H), 7.42 – 7.35 (m, 3H), 7.33 (dd, *J* = 11.9, 4.5 Hz, 1H), 7.23 (d, *J* = 7.5 Hz, 1H), 7.21 – 7.15 (m, 1H), 7.14 (d, *J* = 4.6 Hz, 1H), 7.10 (dd, *J* = 12.9, 5.4 Hz, 1H), 7.04 (d, *J* = 15.6 Hz, 1H), 6.50 (d, *J* = 15.0 Hz, 1H), 2.24 (s, 3H).

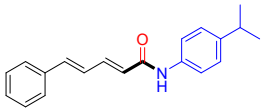
^{13}C NMR (126 MHz, DMSO) δ 164.3, 141.1, 139.3, 136.9, 136.7, 131.9, 130.8, 129.3, 129.2, 127.6, 127.3, 126.5, 125.9, 125.6, 125.3, 18.1.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{18}NO^+$ 264.1383; Found 264.1382.



(*2E,4E*)-5-Phenyl-*N*-(*o*-tolyl)penta-2,4-dienamide (3ad)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-2-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 8:1, Rf = 0.40) to give the product as a yellow solid (88.1 mg, 67%, *EE/EZ > 20:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.14 (s, 1H), 7.60 – 7.55 (m, 3H), 7.53 (d, *J* = 8.1 Hz, 1H), 7.38 (dd, *J* = 16.1, 9.2 Hz, 3H), 7.31 (t, *J* = 7.3 Hz, 1H), 7.19 (dd, *J* = 16.0, 8.2 Hz, 1H), 7.15 – 7.10 (m, 1H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.87 (d, *J* = 7.5 Hz, 1H), 6.41 (d, *J* = 14.9 Hz, 1H), 2.28 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 163.9, 140.8, 139.5, 139.1, 138.1, 136.4, 129.0, 128.9, 128.8, 127.3, 127.0, 125.7, 124.2, 119.9, 116.6, 21.4.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{18}NO^+$ 264.1383; Found 264.1381.

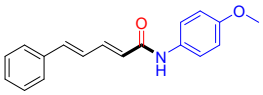


(*2E,4E*)-*N*-(4-Ethylphenyl)-5-phenylpenta-2,4-dienamide (3ae)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Ethyl-4-nitrobenzene (225.1 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (98.3 mg, 71%, *EE/EZ = 4.5:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.10 (s, 1H), 7.64 – 7.57 (m, 3H), 7.41 – 7.36 (m, 3H), 7.32 (dd, *J* = 15.0, 7.7 Hz, 2H), 7.19 – 7.09 (m, 3H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.37 (d, *J* = 14.9 Hz, 1H), 2.55 (q, *J* = 7.5 Hz, 2H), 1.16 (t, *J* = 7.6 Hz, 3H).
^{13}C NMR (126 MHz, DMSO) δ 164.1, 141.0, 139.3, 139.2, 137.6, 136.7, 129.3, 129.2, 128.5, 127.6, 127.5, 127.4, 126.1, 119.8, 28.2, 16.3.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO^+$ 278.1539; Found 278.1537.

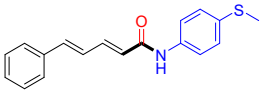


(*2E,4E*)-*N*-(4-Isopropylphenyl)-5-phenylpenta-2,4-dienamide (3af)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Isopropyl-4-nitrobenzene (247.6 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (117.9 mg, 81%, *EE/EZ = 2.5:1*).

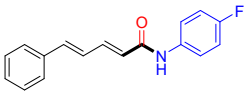
^{1}H NMR (500 MHz, DMSO) δ 10.09 (s, 1H), 7.60 (t, *J* = 7.4 Hz, 3H), 7.53 (d, *J* = 7.4 Hz, 1H), 7.45 – 7.28 (m, 4H), 7.19 (d, *J* = 8.5 Hz, 2H), 7.13 (d, *J* = 10.9 Hz, 1H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.37 (d, *J* = 14.9 Hz, 1H), 2.84 (dt, *J* = 13.8, 6.9 Hz, 1H), 1.18 (d, *J* = 6.9 Hz, 6H).
^{13}C NMR (126 MHz, DMSO) δ 164.0, 143.8, 141.6, 141.0, 139.7, 139.3, 137.6, 136.7, 129.4, 129.3, 127.6, 127.4, 127.3, 126.9, 126.0, 122.0, 119.7, 33.4, 24.4.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{20}H_{22}NO^+$ 292.1696; Found 292.1692



(*2E,4E*)-*N*-(4-Methoxyphenyl)-5-phenylpenta-2,4-dienamide (3ag)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methoxy-4-nitrobenzene (229.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a white solid (96.3 mg, 69%, *EE/EZ = 12.5:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.04 (s, 1H), 7.60 (t, *J* = 9.0 Hz, 4H), 7.40 – 7.27 (m, 4H), 7.17 – 7.08 (m, 1H), 7.02 (d, *J* = 15.6 Hz, 1H), 6.90 (d, *J* = 8.9 Hz, 2H), 6.33 (d, *J* = 14.9 Hz, 1H), 3.72 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 163.8, 155.7, 140.7, 139.1, 136.8, 133.1, 129.3, 129.2, 127.6, 127.4, 126.1, 121.1, 114.4, 55.7.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{18}NO_2^+$ 280.1332; Found 280.1330.



(*2E,4E*)-*N*-(4-(Methylthio)phenyl)-5-phenylpenta-2,4-dienamide (3ah)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and Methyl(4-nitrophenyl)sulfane (253.8 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (92.9 mg, 63%, *EE/EZ = 2.1:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.18 (s, 1H), 7.67 (d, *J* = 8.1 Hz, 2H), 7.59 (d, *J* = 7.6 Hz, 2H), 7.42 – 7.34 (m, 4H), 7.24 (d, *J* = 8.5 Hz, 3H), 7.04 (d, *J* = 15.6 Hz, 1H), 6.35 (d, *J* = 14.9 Hz, 1H), 2.45 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 163.8, 141.6, 140.9, 139.6, 139.2, 136.9, 136.4, 132.0, 129.1, 129.0, 128.9, 127.3, 127.2, 127.0, 125.4, 120.0, 119.9, 15.7.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{18}NOS^+$ 296.1104; Found 296.1101.



(*2E,4E*)-*N*-(4-Fluorophenyl)-5-phenylpenta-2,4-dienamide (3ai)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Fluoro-4-nitrobenzene (211.5 mg, 1.5 mmol). The crude residue was purified by

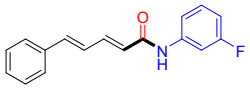
flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (97.5 mg, 73%, *EE/EZ = 4.7:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.22 (s, 1H), 7.75 – 7.68 (m, 2H), 7.60 (d, *J* = 7.3 Hz, 2H), 7.42 – 7.29 (m, 4H), 7.15 (dd, *J* = 19.5, 10.3 Hz, 3H), 7.05 (d, *J* = 15.6 Hz, 1H), 6.34 (d, *J* = 14.9 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 164.0, 159.4, 157.5, 141.3, 139.5, 136.7, 129.4, 129.3, 129.2, 127.6, 127.5, 127.3, 125.6 (d, *J* = 7.56 Hz), 121.4, 121.3, 121.2,115.8 (d, *J* = 21.42Hz).

^{19}F NMR (471 MHz, DMSO) δ -119.29 (s).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{15}FNO^+$ 268.1132; Found 268.1128.



(*2E,4E*)-*N*-(3-Fluorophenyl)-5-phenylpenta-2,4-dienamide (3aj)

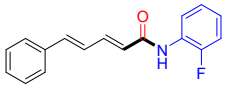
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Fluoro-3-nitrobenzene (211.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (118.9 mg, 89%, *EE/EZ = 3.7:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.38 (s, 1H), 7.75 (d, *J* = 11.8 Hz, 1H), 7.59 (d, *J* = 7.5 Hz, 2H), 7.43 – 7.27 (m, 6H), 7.15 (dd, *J* = 15.5, 10.9 Hz, 1H), 7.05 (d, *J* = 15.6 Hz, 1H), 6.97 – 6.84 (m, 1H), 6.37 (d, *J* = 14.9 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 165.0, 164.4, 163.5, 161.6, 141.7, 141.5 (d, *J* = 11.34 Hz), 139.7, 136.5, 130.7, 130.7, 129.2, 127.5, 127.1, 125.3, 115.3, 110.0 (d, *J* = 21.42 Hz), 106.4 (d, *J* = 26.46 Hz).

^{19}F NMR (471 MHz, DMSO) δ -111.75 – -112.12 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{15}FNO^+$ 268.1132; Found 268.1129.



(*2E,4E*)-*N*-(2-Fluorophenyl)-5-phenylpenta-2,4-dienamide (3ak)

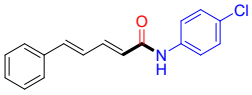
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Fluoro-2-nitrobenzene (211.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (44.1 mg, 33%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 9.93 (s, 1H), 8.02 (dd, *J* = 15.1, 7.5 Hz, 1H), 7.58 (d, *J* = 7.4 Hz, 2H), 7.36 (dd, *J* = 15.1, 7.4 Hz, 3H), 7.31 (t, *J* = 7.3 Hz, 1H), 7.27 – 7.21 (m, 1H), 7.14 (tt, *J* = 10.7, 6.2 Hz, 2H), 7.09 (d, *J* = 10.4 Hz, 1H), 7.04 (d, *J* = 15.6 Hz, 1H), 6.54 (d, *J* = 15.0 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 164.6, 141.8, 139.8, 136.6, 129.3, 127.6, 127.2, 126.8, 125.6, 125.2, 124.8, 124.4 (d, *J* = 17.64 Hz), 115.9 (d, *J* = 18.9 Hz).

^{19}F NMR (471 MHz, DMSO) δ -124.70 (d, *J* = 48.1 Hz).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{15}FNO^+$ 268.1132; Found 268.1129.



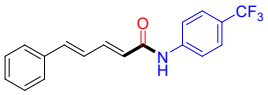
(*2E,4E*)-*N*-(4-Chlorophenyl)-5-phenylpenta-2,4-dienamide (3al)

The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Chloro-4-nitrobenzene (235.0 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (93.5 mg, 66%, *EE/EZ = 5.6:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.30 (s, 1H), 7.73 (d, *J* = 8.9 Hz, 2H), 7.59 (d, *J* = 7.4 Hz, 2H), 7.39 (dd, *J* = 15.9, 9.8 Hz, 5H), 7.32 (t, *J* = 7.3 Hz, 1H), 7.15 (dd, *J* = 15.5, 10.9 Hz, 1H), 7.05 (d, *J* = 15.6 Hz, 1H), 6.35 (d, *J* = 14.9 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 164.2, 141.6, 139.7, 138.8, 138.7, 136.6, 129.3, 129.1, 127.6, 127.2, 125.5, 121.2, 121.1.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{15}ClNO^+$ 284.0837; Found 284.0834.



(*2E,4E*)-5-Phenyl-*N*-(4-(trifluoromethyl)phenyl)penta-2,4-dienamide (3am)

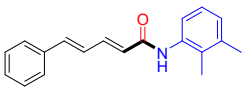
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Nitro-4-(trifluoromethyl)benzene (287.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (122.1 mg, 77%, *EE/EZ = 4.7:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.53 (s, 1H), 7.91 (d, *J* = 8.5 Hz, 2H), 7.69 (d, *J* = 8.6 Hz, 2H), 7.60 (d, *J* = 7.4 Hz, 2H), 7.49 – 7.43 (m, 1H), 7.40 (dd, *J* = 13.2, 5.8 Hz, 2H), 7.33 (t, *J* = 7.3 Hz, 1H), 7.17 (dd, *J* = 15.5, 10.8 Hz, 1H), 7.08 (d, *J* = 15.6 Hz, 1H), 6.39 (d, *J* = 14.9 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 164.6 (d, *J* = 11.34 Hz), 142.1, 140.0, 136.5, 129.2, 129.1, 127.6, 127.1, 126.4, 125.1 (d, *J* = 7.56 Hz), 119.4 (d, *J* = 10.08 Hz).

^{19}F NMR (471 MHz, DMSO) δ -60.30 (s).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{15}F_3NO^+$ 318.1022; Found 318.1019.



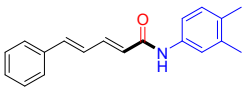
(*2E,4E*)-*N*-(2,3-Dimethylphenyl)-5-phenylpenta-2,4-dienamide (3an)

The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1,2-Dimethyl-3-nitrobenzene (226.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a white solid (92.9 mg, 67%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 9.56 (s, 1H), 7.60 (d, *J* = 7.5 Hz, 2H), 7.39 (dd, *J* = 13.6, 5.9 Hz, 2H), 7.36 – 7.29 (m, 2H), 7.25 (t, *J* = 7.0 Hz, 1H), 7.17 – 6.97 (m, 4H), 6.46 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H), 2.09 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 164.3, 140.8, 139.1, 137.4, 136.7, 136.6, 136.5, 129.3, 129.1, 127.5, 127.3, 125.6, 123.8, 20.7, 14.6.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO^+$ 278.1539; Found 278.1537.



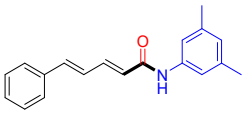
(*2E,4E*)-*N*-(3,4-Dimethylphenyl)-5-phenylpenta-2,4-dienamide (3ao)

The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1,2-Dimethyl-4-nitrobenzene (226.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a white solid (124.7 mg, 90%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.01 (s, 1H), 7.59 (d, *J* = 7.4 Hz, 2H), 7.51 – 7.41 (m, 2H), 7.41 – 7.24 (m, 4H), 7.14 (dd, *J* = 15.5, 10.9 Hz, 1H), 7.05 (dd, *J* = 20.8, 11.9 Hz, 2H), 6.37 (d, *J* = 14.9 Hz, 1H), 2.20 (s, 3H), 2.17 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.9, 140.8, 139.2, 137.6, 136.8, 136.7, 131.5, 130.0, 129.3, 129.1, 127.6, 127.3, 126.1, 120.9, 117.2, 20.1, 19.3.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO^+$ 278.1539; Found 278.1537.



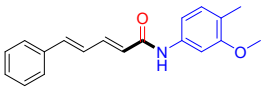
(*2E,4E*)-*N*-(3,5-Dimethylphenyl)-5-phenylpenta-2,4-dienamide (3ap)

The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1,3-Dimethyl-5-nitrobenzene (226.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a white solid (103.9 mg, 75%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.01 (s, 1H), 7.59 (d, *J* = 7.7 Hz, 2H), 7.35 (dq, *J* = 23.6, 7.3 Hz, 6H), 7.18 – 7.08 (m, 1H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.69 (s, 1H), 6.36 (d, *J* = 14.9 Hz, 1H), 2.24 (s, 6H).

^{13}C NMR (126 MHz, DMSO) δ 164.1, 141.1, 139.7, 139.4, 138.2, 136.7, 129.3, 129.2, 127.6, 127.3, 126.1, 125.4, 117.5, 21.7.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO^+$ 278.1539; Found 278.1536.

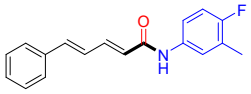


(*2E,4E*)-*N*-(3-Methoxy-4-methylphenyl)-5-phenylpenta-2,4-dienamide (3aq)

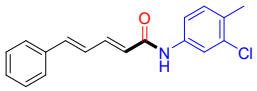
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 2-Methoxy-1-methyl-4-nitrobenzene (250.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (126.0 mg, 86%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.11 (s, 1H), 7.60 (d, *J* = 7.4 Hz, 2H), 7.43 – 7.35 (m, 4H), 7.32 (t, *J* = 7.4 Hz, 1H), 7.20 – 7.11 (m, 2H), 7.08 – 6.99 (m, 2H), 6.37 (d, *J* = 14.9 Hz, 1H), 3.77 (s, 3H), 2.10 (s, 3H).

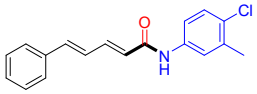
^{13}C NMR (126 MHz, DMSO) δ 163.8, 157.4, 140.7, 139.0, 138.7, 136.4, 130.4, 129.0, 128.9, 127.3, 127.1, 125.7, 120.5, 111.0, 102.1, 55.2, 15.8.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO_2^+$ 294.1489; Found 294.1482.



(*2E,4E*)-*N*-(4-Fluoro-3-methylphenyl)-5-phenylpenta-2,4-dienamide (3ar)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Fluoro-2-methyl-4-nitrobenzene (232.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (96.9 mg, 69%, *EE/EZ = 8.3:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.14 (s, 1H), 7.59 (d, *J* = 7.4 Hz, 3H), 7.52 (d, *J* = 7.5 Hz, 1H), 7.43 – 7.35 (m, 3H), 7.32 (dd, *J* = 14.3, 7.1 Hz, 1H), 7.20 – 6.99 (m,3H), 6.35 (d, *J* = 14.9 Hz, 1H), 2.22 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 163.3, 157.3, 155.4, 140.4, 138.7, 135.9, 128.5, 128.4, 126.8, 126.5, 124.9 (d, *J* = 7.56 Hz), 123.9 (d, *J* = 17.64 Hz), 121.7 (dd, *J* = 11.34 Hz), 118.0 (dd, *J* = 11.34 Hz), 114.7, 114.6, 14.1.
^{19}F NMR (471 MHz, DMSO) δ -123.62 (s).
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{17}FNO^+$ 282.1289; Found 282.1287.

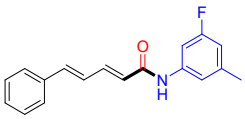


(*2E,4E*)-*N*-(3-Chloro-4-methylphenyl)-5-phenylpenta-2,4-dienamide (3as)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 2-Chloro-1-methyl-4-nitrobenzene (257.3 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (92.3 mg, 62%, *EE/EZ = 7.3:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.25 (s, 1H), 7.93 (s, 1H), 7.58 (d, *J* = 7.3 Hz, 2H), 7.45 (d, *J* = 10.1 Hz, 1H), 7.39 (dd, *J* = 16.8, 9.4 Hz, 3H), 7.32 (d, *J* = 7.3 Hz, 1H), 7.27 (d, *J* = 8.4 Hz, 1H), 7.20 – 7.08 (m, 1H), 7.04 (d, *J* = 15.6 Hz, 1H), 6.34 (d, *J* = 14.9 Hz, 1H), 2.27 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 163.7, 141.0, 139.1, 138.4, 136.0, 132.9, 131.0, 129.7, 128.6, 127.0, 126.6, 124.8, 119.0, 117.6, 18.8.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}ClNO^+$ 298.0993; Found 298.0991.

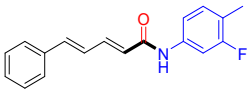


(*2E,4E*)-*N*-(4-Chloro-3-methylphenyl)-5-phenylpenta-2,4-dienamide (3at)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Chloro-2-methyl-4-nitrobenzene (257.3 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (89.3 mg, 60%, *EE/EZ = 5.7:1*).

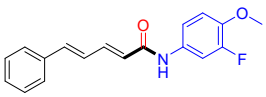
^{1}H NMR (500 MHz, DMSO) δ 10.26 (s, 1H), 7.93 (s, 1H), 7.59 (d, *J* = 7.3 Hz, 2H), 7.45 (d, *J* = 8.1 Hz, 1H), 7.42 – 7.35 (m, 3H), 7.32 (t, *J* = 6.8 Hz, 1H), 7.28 (d, *J* = 8.3 Hz, 1H), 7.15 (dd, *J* = 15.5, 10.9 Hz, 1H), 7.05 (d, *J* = 15.6 Hz, 1H), 6.33 (d, *J* = 14.9 Hz, 1H), 2.27 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 164.3, 141.6, 139.7, 139.0, 136.6, 133.5, 131.7, 130.3, 129.3, 127.6, 127.2, 125.4, 119.6, 118.2, 19.4.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}ClNO^+$ 298.0993; Found 298.0989.



(*2E,4E*)-*N*-(3-Fluoro-5-methylphenyl)-5-phenylpenta-2,4-dienamide (3au)
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Fluoro-3-methyl-5-nitrobenzene (232.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (115.3 mg, 82%, *EE/EZ = 14.7:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.29 (s, 1H), 7.56 (dd, *J* = 19.4, 9.4 Hz, 3H), 7.46 – 7.26 (m, 4H), 7.19 (d, *J* = 19.6 Hz, 1H), 7.13 (d, *J* = 10.9 Hz, 1H), 7.04 (d, *J* = 15.6 Hz, 1H), 6.71 (d, *J* = 9.5 Hz, 1H), 6.36 (d, *J* = 14.9 Hz, 1H), 2.29 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 164.5, 164.4, 163.6, 161.6, 141.7, 141.2 (d, *J* = 11.34 Hz), 140.7 (d, *J* =8.82 Hz) , 139.8, 136.6, 129.2, 127.6, 127.2, 125.5, 115.8, 110.8 (d, *J* = 21.42 Hz), 103.7 (dd, *J* = 26.46 Hz), 103.5, 21.6.
^{19}F NMR (471 MHz, DMSO) δ -112.91 – -113.19 (m).
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{17}FNO^+$ 282.1289; Found 282.1287.



***(2E,4E)*-*N*-(3-Fluoro-4-methylphenyl)-5-phenylpenta-2,4-dienamide (3av)**
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Fluoro-2-methyl-5-nitrobenzene (232.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (119.5 mg, 85%, *EE/EZ = 9.1:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.28 (s, 1H), 7.69 (d, *J* = 14.0 Hz, 1H), 7.58 (d, *J* = 7.4 Hz, 2H), 7.43 – 7.25 (m, 5H), 7.19 (dd, *J* = 15.2, 6.7 Hz, 1H), 7.15 – 7.10 (m, 1H), 7.04 (d, *J* = 15.6 Hz, 1H), 6.35 (d, *J* = 14.9 Hz, 1H), 2.18 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 164.2, 161.6, 159.7, 141.4, 139.5, 136.5, 131.8, 129.1, 127.5, 127.1, 125.4, 125.4, 118.8 (d, *J* = 16.38 Hz), 115.1 (d, *J* = 11.34 Hz), 106.2 (dd, *J* = 27.72Hz,), 14.0 (d, *J* = 2.52 Hz).
^{19}F NMR (471 MHz, DMSO) δ -115.94 – -116.22 (m).
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{17}FNO^+$ 282.1289; Found 282.1286.



(*2E,4E*)-*N*-(3-Fluoro-4-methoxyphenyl)-5-phenylpenta-2,4-dienamide (3aw)

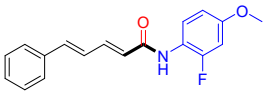
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 2-Fluoro-1-methoxy-4-nitrobenzene (256.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (111.5 mg, 75%, *EE/EZ = 10.3:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.20 (s, 1H), 7.73 (d, *J* = 13.7 Hz, 1H), 7.59 (d, *J* = 7.4 Hz, 2H), 7.44 – 7.28 (m, 5H), 7.13 (dt, *J* = 9.3, 7.2 Hz, 2H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.33 (d, *J* = 14.9 Hz, 1H), 3.81 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.6, 151.9, 149.9, 142.9 (d, *J* = 11.34 Hz), 140.8, 139.0, 136.2, 128.8, 128.8, 127.1, 126.8, 125.1(d, *J* = 7.56 Hz), 115.1 (d, *J* = 11.34 Hz), 114.1, 107.6 (dd, *J* = 22.68 Hz), 56.1.

^{19}F NMR (471 MHz, DMSO) δ -124.90 – -139.36 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}FNO_2^+$ 298.1238; Found 298.1233.



(*2E,4E*)-*N*-(2-Fluoro-4-methoxyphenyl)-5-phenylpenta-2,4-dienamide (3ax)

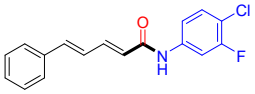
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 3-Fluoro-1-methoxy-4-nitrobenzene (256.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (105.5 mg, 71%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 9.78 (s, 1H), 8.61 (s, 1H), 7.92 (t, *J* = 9.2 Hz, 1H), 7.59 (d, *J* = 7.5 Hz, 2H), 7.44 – 7.34 (m, 2H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.94 – 6.83 (m, 2H), 6.76 (dd, *J* = 13.1, 9.1 Hz, 2H), 6.49 (d, *J* = 15.0 Hz, 1H), 3.73 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 164.4, 155.6 (d, *J* = 10.08 Hz), 154.5 (d, *J* = 11.34 Hz), 153.0 (d, *J* = 10.08 Hz), 152.6 (d, *J* = 11.34 Hz), 141.3, 139.4, 136.7, 129.3, 127.6, 127.2, 126.1, 125.4, 123.0, 120.6 (d, *J* = 12.6 Hz), 110.1, 102.2 (dd, *J* = 22.68 Hz), 56.0.

^{19}F NMR (471 MHz, DMSO) δ -116.46 – -138.98 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}FNO_2^+$ 298.1238; Found 298.1235.



(*2E,4E*)-*N*-(4-Chloro-3-fluorophenyl)-5-phenylpenta-2,4-dienamide (3ay)

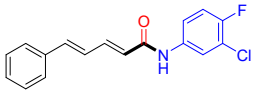
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Chloro-2-fluoro-4-nitrobenzene (263.3 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (82.7 mg, 55%, *EE/EZ = 6.5:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.49 (s, 1H), 7.91 (dd, *J* = 12.0, 2.3 Hz, 1H), 7.60 (d, *J* = 7.3 Hz, 2H), 7.53 (t, *J* = 8.7 Hz, 1H), 7.41 (dd, *J* = 18.4, 9.3 Hz, 4H), 7.33 (t, *J* = 7.3 Hz, 1H), 7.17 (dd, *J* = 15.5, 10.8 Hz, 1H), 7.08 (d, *J* = 15.6 Hz, 1H), 6.33 (d, *J* = 14.9 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 164.4, 158.3, 156.3, 142.1, 140.0, 136.5, 130.9, 129.2, 129.2, 127.6, 127.0, 125.0 (d, *J* = 8.82 Hz) ,116.4 (dd, *J* = 10.08 Hz), 113.2 (d, *J* = 15.12 Hz), 107.55 (dd, *J* = 25.2 Hz).

^{19}F NMR (471 MHz, DMSO) δ -114.14 – -115.11 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{14}ClFNO^+$ 302.0567; Found 302.0566.



(*2E,4E*)-*N*-(3-Chloro-4-fluorophenyl)-5-phenylpenta-2,4-dienamide (3az)

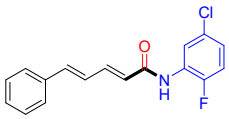
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmo, *E:Z>20:1*l) and 2-Chloro-1-fluoro-4-nitrobenzene (263.3 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (69.3 mg, 46%, *EE/EZ = 7.2:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.38 (s, 1H), 7.60 (d, *J* = 7.4 Hz, 2H), 7.54 (d, *J* = 7.0 Hz, 1H), 7.44 – 7.27 (m, 6H), 7.16 (dd, *J* = 15.5, 10.9 Hz, 1H), 7.06 (d, *J* = 15.6 Hz, 1H), 6.32 (d, *J* = 14.9 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 164.2, 154.4, 152.4, 141.8, 139.8, 136.5, 129.3, 129.2, 127.5, 127.4, 127.0, 125.0 (d, *J* = 8.82 Hz), 120.8 (d, *J* = 10.08 Hz), 119.7 (dd, *J* = 11.34 Hz), 119.5 (d, *J* = 17.64 Hz), 117.3 (d, *J* =21.42 Hz).

^{19}F NMR (471 MHz, DMSO) δ -110.06 – -135.63 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{14}ClFNO^+$ 302.0567; Found 302.0566.



(*2E,4E*)-*N*-(5-Chloro-2-fluorophenyl)-5-phenylpenta-2,4-dienamidecd (3aA)

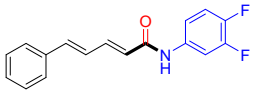
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 4-Chloro-1-fluoro-2-nitrobenzene (263.3 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (97.8 mg, 65%, *EE/EZ = 7.6:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.13 (s, 1H), 9.32 (dd, *J* = 7.1, 2.3 Hz, 1H), 8.28 (d, *J* = 7.0 Hz, 2H), 7.60 (d, *J* = 7.4 Hz, 1H), 7.45 – 7.35 (m, 2H), 7.35 – 7.28 (m, 2H), 7.22 – 7.16 (m, 1H), 7.08 (ddd, *J* = 11.5, 6.2, 2.9 Hz, 2H), 6.58 (d, *J* = 17.8 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 164.4, 151.6 (d, *J* = 10.08 Hz), 151.4 (d, *J* = 13.86 Hz), 149.5, 141.97, 139.8, 136.1, 128.8, 128.4, 128.0, 127.2, 126.6, 124.4, 122.0, 119.4, 117.0 (d, *J* = 21.42 Hz), 116.6(d, *J* = 21.42 Hz).

^{19}F NMR (471 MHz, DMSO) δ -117.45 – -139.66 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{14}ClFNO^+$ 302.0567; Found 302.0566.



(*2E,4E*)-*N*-(3,4-Difluorophenyl)-5-phenylpenta-2,4-dienamide (3aB)

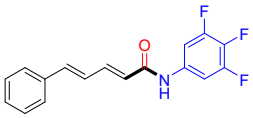
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1,2-Difluoro-4-nitrobenzene (238.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (139.7 mg, 98%, *EE/EZ = 8.1:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.39 (s, 1H), 7.58 (d, *J* = 7.6 Hz, 2H), 7.45 – 7.26 (m, 7H), 7.20 – 7.09 (m, 1H), 7.04 (d, *J* = 15.6 Hz, 1H), 6.33 (d, *J* = 14.9 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 164.0, 149.9 (d, *J* = 13.86 Hz), 148.0 (d, *J* = 13.86 Hz), 146.2 (d, *J* = 12.6 Hz), 144.3 (d, *J* = 12.6 Hz), 141.4, 139.4, 136.1, 128.8, 127.2, 126.7, 124.8, 117.5 (d, *J* = 17.64 Hz), 115.4, 108.1 (dd, *J* = 21.42 Hz).

^{19}F NMR (471 MHz, DMSO) δ -131.57 – -148.50 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{14}F_2NO^+$ 286.0960; Found 286.0956.



(*2E,4E*)-5-Phenyl-*N*-(3,4,5-trifluorophenyl)penta-2,4-dienamide (3aC)

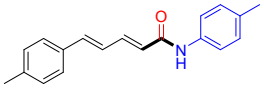
The title compound was prepared from (*E*)-Buta-1,3-dien-1-ylbenzene (65.1 mg, 0.5 mmol, *E:Z>20:1*) and 1,2,3-Trifluoro-5-nitrobenzene (265.7 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 10:1, Rf = 0.30) to give the product as a yellow solid (144.1 mg, 95%, *EE/EZ = 3.2:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.49 (s, 1H), 7.64 – 7.52 (m, 4H), 7.44 – 7.32 (m, 4H), 7.20 – 7.10 (m, 1H), 7.07 (d, *J* = 15.6 Hz, 1H), 6.27 (d, *J* = 14.9 Hz, 1H).

^{13}C NMR (126 MHz, DMSO) δ 164.3, 142.9, 142.1, 140.0, 136.2, 128.9, 127.3, 127.2, 126.7, 125.0, 124.3 (d, *J* = 10.08Hz), 103.6, 103.4.

^{19}F NMR (471 MHz, DMSO) δ -129.54 – -141.03 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{13}F_3NO^+$ 304.0865; Found 304.0864.



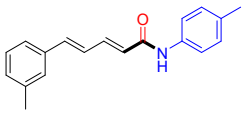
(*2E,4E*)-*N*,5-di-*p*-tolylpenta-2,4-dienamide (3bb)

The title compound was prepared from (*E*)-1-(Buta-1,3-dien-1-yl)-4-methylbenzene (72.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (109.5 mg, 79%, *EE/EZ = 9.3:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.06 (s, 1H), 7.58 (d, *J* = 8.4 Hz, 2H), 7.49 (d, *J* = 8.1 Hz, 2H), 7.34 (dd, *J* = 14.9, 10.7 Hz, 1H), 7.20 (d, *J* = 8.0 Hz, 2H), 7.12 (d, *J* = 8.4 Hz, 2H), 7.06 (d, *J* = 10.8 Hz, 1H), 6.99 (d, *J* = 15.6 Hz, 1H), 6.32 (d, *J* = 14.9 Hz, 1H), 2.32 (s, 3H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 164.0, 141.2, 139.3, 138.8, 137.3, 137.3, 134.0, 132.6, 129.9, 129.6, 127.5, 126.3, 125.3, 119.6, 21.4, 21.0.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO^+$ 278.1539; Found 278.1535.



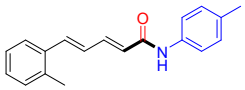
(*2E,4E*)-5-(*m*-Tolyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3cb)

The title compound was prepared from 1-(Buta-1,3-dien-1-yl)-3-methylbenzene (72.1 mg, 0.5 mmol, *E:Z=1:1.4*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (95.6 mg, 69%, *EE/EZ = 14.7:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.07 (s, 1H), 7.59 (d, *J* = 8.2 Hz, 2H), 7.43 – 7.30 (m, 3H), 7.26 (t, *J* = 7.5 Hz, 1H), 7.12 (d, *J* = 8.2 Hz, 4H), 6.98 (d, *J* = 15.6 Hz, 1H), 6.35 (d, *J* = 14.9 Hz, 1H), 2.31 (s, 3H), 2.25 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.4, 140.4, 138.8, 137.8, 136.7, 136.0, 132.0, 129.2, 129.0, 128.5, 127.5, 126.5, 125.2, 124.2, 119.0, 119.0, 20.8, 20.3.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO^+$ 278.1539; Found 278.1537.



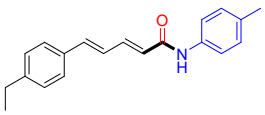
(*2E,4E*)-5-(*o*-Tolyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3db)

The title compound was prepared from 1-(Buta-1,3-dien-1-yl)-2-methylbenzene (72.1 mg, 0.5 mmol, *E:Z=1:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (76.2 mg, 55%, *EE/EZ = 15.6:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.08 (s, 1H), 7.68 (dd, *J* = 6.4, 3.1 Hz, 1H), 7.60 (d, *J* = 8.3 Hz, 2H), 7.45 (dd, *J* = 14.9, 11.1 Hz, 1H), 7.26 (d, *J* = 15.4 Hz, 1H), 7.20 (d, *J* = 3.1 Hz, 3H), 7.12 (d, *J* = 8.3 Hz, 2H), 7.03 (dd, *J* = 15.4, 11.1 Hz, 1H), 6.37 (d, *J* = 15.0 Hz, 1H), 2.36 (s, 3H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 164.1, 141.4, 137.4, 136.7, 136.6, 135.3, 132.6, 131.0, 129.6, 129.0, 128.2, 126.7, 125.8, 119.7, 21.0, 19.8.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO^+$ 278.1539; Found 278.1536.

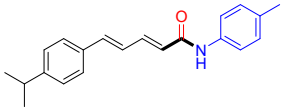


(*2E,4E*)-5-(4-Ethylphenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3eb)

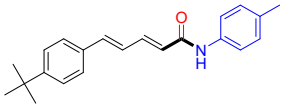
The title compound was prepared from 1-(Buta-1,3-dien-1-yl)-4-ethylbenzene (79.1 mg, 0.5 mmol, *E:Z=1:1.4*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (106.3 mg, 73%, *EE/EZ = 12.5:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.06 (s, 1H), 7.59 (d, *J* = 8.3 Hz, 2H), 7.50 (d, *J* = 8.1 Hz, 2H), 7.35 (dd, *J* = 14.9, 10.7 Hz, 1H), 7.22 (d, *J* = 8.1 Hz, 2H), 7.12 (d, *J* = 8.4 Hz, 2H), 7.06 (d, *J* = 10.7 Hz, 1H), 6.99 (d, *J* = 15.6 Hz, 1H), 6.34 (d, *J* = 14.9 Hz, 1H), 2.61 (q, *J* = 7.6 Hz, 2H), 2.26 (s, 3H), 1.18 (t, *J* = 7.6 Hz, 3H).

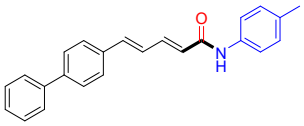
^{13}C NMR (126 MHz, DMSO) δ 164.1, 145.2, 141.2, 139.3, 137.4, 134.2, 132.6, 129.6, 128.7, 127.6, 126.4, 125.4, 119.6, 119.6, 28.5, 21.0, 15.9.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{20}H_{22}NO^+$ 292.1696; Found 292.1692.



(*2E,4E*)-5-(4-Isopropylphenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3fb)
The title compound was prepared from 1-(Buta-1,3-dien-1-yl)-4-isopropylbenzene (86.2 mg, 0.5 mmol, *E:Z=1:1.5*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (126.7 mg, 83%, *EE/EZ = 14.3:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.09 (s, 1H), 7.62 (d, *J* = 8.4 Hz, 2H), 7.55 (d, *J* = 8.2 Hz, 2H), 7.39 (dd, *J* = 14.9, 10.7 Hz, 1H), 7.29 (d, *J* = 8.3 Hz, 2H), 7.16 (d, *J* = 8.3 Hz, 2H), 7.09 (d, *J* = 10.7 Hz, 1H), 7.03 (d, *J* = 15.6 Hz, 1H), 6.37 (d, *J* = 14.9 Hz, 1H), 3.01 – 2.78 (m, 1H), 2.30 (s, 3H), 1.24 (d, *J* = 6.9 Hz, 6H).
^{13}C NMR (126 MHz, DMSO) δ 164.1, 149.7, 141.2, 139.3, 137.4, 134.4, 132.6, 129.6, 127.6, 127.2, 126.4, 125.4, 119.6, 119.5, 33.8, 24.2, 21.0.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{21}H_{24}NO^+$ 306.1852; Found 306.1849.

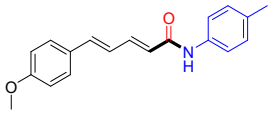


(*2E,4E*)-5-(4-(Tert-butyl)phenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3gb)
The title compound was prepared from 1-(Buta-1,3-dien-1-yl)-4-(tert-butyl)benzene (93.2 mg, 0.5 mmol, *E:Z=1:1.5*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (83.1 mg, 52%, *EE/EZ = 15.3:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.05 (s, 1H), 7.59 (d, *J* = 7.1 Hz, 2H), 7.51 (d, *J* = 8.4 Hz, 2H), 7.38 (ddd, *J* = 28.8, 17.9, 10.8 Hz, 3H), 7.12 (d, *J* = 8.3 Hz, 2H), 7.05 (d, *J* = 10.7 Hz, 1H), 6.99 (d, *J* = 15.6 Hz, 1H), 6.34 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H), 1.28 (s, 9H).
^{13}C NMR (126 MHz, DMSO) δ 163.8, 151.6, 140.8, 138.9, 137.1, 133.7, 132.3, 129.3, 127.1, 126.2, 125.7, 119.4, 34.6, 31.2, 20.7.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{22}H_{26}NO^+$ 320.2009; Found 320.2006.

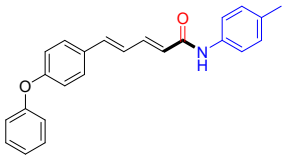


(*2E,4E*)-5-([1,1'-Biphenyl]-4-yl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3hb)
The title compound was prepared from 1-(Buta-1,3-dien-1-yl)-4-phenoxybenzene (102.6 mg, 0.5 mmol, *E:Z=1:2.5*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a white solid (95.0 mg, 56%, *EE/EZ = 15.1:1*).

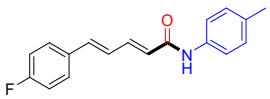
^{1}H NMR (500 MHz, DMSO) δ 10.09 (s, 1H), 8.49 (s, 1H), 7.71 (t, *J* = 5.5 Hz, 4H), 7.58 (d, *J* = 8.3 Hz, 2H), 7.48 (t, *J* = 7.7 Hz, 2H), 7.43 – 7.28 (m, 3H), 7.19 (dd, *J* = 15.5, 11.0 Hz, 1H), 7.15 – 7.03 (m, 3H), 6.37 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 152.7, 140.6, 140.2, 139.5, 138.4, 137.2, 137.1, 135.4, 130.5, 129.2, 129.0, 127.8, 127.0, 126.6, 119.2, 118.2, 118.1, 20.4.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{24}H_{22}NO^+$ 340.1696; Found 340.1692.



(*2E,4E*)-5-(4-Methoxyphenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3ib)
The title compound was prepared from 1-(Buta-1,3-dien-1-yl)-4-methoxybenzene (80.1 mg, 0.5 mmol, *E:Z=1:1.3*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (133.9 mg, 92%, *EE/EZ > 20:1*).
^{1}H NMR (500 MHz, DMSO) δ 8.50 (s, 1H), 7.56 (dd, *J* = 22.8, 8.5 Hz, 2H), 7.33 (d, *J* = 8.3 Hz, 3H), 7.10 (dd, *J* = 21.9, 8.3 Hz, 4H), 6.96 (dd, *J* = 14.4, 8.0 Hz, 2H), 6.29 (d, *J* = 14.9 Hz, 1H), 3.78 (s, 3H), 2.24 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 164.3, 160.3, 153.2, 141.5, 139.2, 137.8, 131.0, 129.7, 129.2, 125.1, 119.7, 118.7, 118.6, 114.8, 55.7, 20.7.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO_2^+$ 294.1489; Found 294.1484.



(*2E,4E*)-5-(4-Phenoxyphenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3jb)
The compound was from 1-(Buta-1,3-dien-1-yl)-4-phenoxybenzene (111.1 mg, 0.5 mmol, *E:Z=1:2.3*) and 1-methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (126.1 mg, 71%, *EE/EZ = 7.0:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.05 (s, 1H), 7.59 (dd, *J* = 17.4, 8.4 Hz, 4H), 7.42 (t, *J* = 7.9 Hz, 2H), 7.34 (dd, *J* = 15.0, 9.4 Hz, 1H), 7.18 (t, *J* = 7.4 Hz, 1H), 7.12 (d, *J* = 8.3 Hz, 2H), 7.08 – 6.95 (m, 6H), 6.33 (d, *J* = 14.9 Hz, 1H), 2.24 (d, *J* = 10.6 Hz, 3H).
^{13}C NMR (126 MHz, DMSO) δ 164.1, 157.7, 156.6, 141.1, 138.6, 137.3, 132.6, 132.0, 130.6, 129.6, 129.4, 126.4, 125.4, 124.4, 119.6, 119.5, 119.0, 21.0.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{24}H_{22}NO_2^+$ 356.1645; Found 356.1640.



(*2E,4E*)-5-(4-Fluorophenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3kb)
The compound was from (*E*)-1-(Buta-1,3-dien-1-yl)-4-fluorobenzene (74.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by

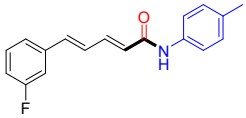
flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (102.7 mg, 73%, *EE/EZ = 17.5:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.08 (s, 1H), 7.72 – 7.52 (m, 4H), 7.34 (dd, *J* = 14.9, 10.5 Hz, 1H), 7.22 (t, *J* = 8.8 Hz, 2H), 7.15 – 6.98 (m, 4H), 6.35 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.9, 161.6, 140.8, 137.9, 137.2, 133.2, 132.5, 129.5, 129.5, 129.5, 127.1, 125.8, 119.5, 116.1 (d, *J* = 21.42 Hz), 20.8.

^{19}F NMR (471 MHz, DMSO) δ -110.06 – -114.10 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}FNO^+$ 282.1289; Found 282.1286.



(*2E,4E*)-5-(3-Fluorophenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3lb)

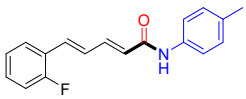
The compound was from 1-(Buta-1,3-dien-1-yl)-3-fluorobenzene (74.1 mg, 0.5 mmol, *E:Z=1:1.5*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (106.9 mg, 76%, *EE/EZ = 16.7:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.12 (s, 1H), 7.59 (d, *J* = 8.3 Hz, 2H), 7.48 (d, *J* = 11.7 Hz, 1H), 7.38 (ddd, *J* = 25.9, 15.1, 9.4 Hz, 3H), 7.20 (dd, *J* = 15.5, 11.1 Hz, 1H), 7.12 (d, *J* = 8.4 Hz, 3H), 7.02 (d, *J* = 15.5 Hz, 1H), 6.40 (d, *J* = 14.9 Hz, 1H), 2.25 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.4, 161.6, 140.1, 138.9 (d, *J* = 8.82 Hz), 137.3, 136.8, 132.3, 130.7 (d, *J* = 8.82 Hz), 129.2, 128.4, 126.4, 123.6, 119.2, 119.2, 115.3 (d, *J* = 21.42 Hz), 113.0 (d, *J* = 21.42 Hz), 20.5.

^{19}F NMR (471 MHz, DMSO) δ -112.87 – -113.28 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}FNO^+$ 282.1289; Found 282.1286.



(*2E,4E*)-5-(2-Fluorophenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3mb)

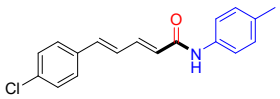
The compound was from 1-(Buta-1,3-dien-1-yl)-2-fluorobenzene (74.1 mg, 0.5 mmol, *E:Z=1:1.4*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (108.3 mg, 77%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.10 (s, 1H), 7.78 (t, *J* = 7.2 Hz, 1H), 7.59 (d, *J* = 8.3 Hz, 2H), 7.38 (dt, *J* = 12.3, 8.9 Hz, 2H), 7.30 – 7.05 (m, 6H), 6.40 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.7, 161.2, 159.2, 140.7, 137.1, 132.6, 130.8 (d, *J* = 8.82 Hz), 130.6, 129.8 (d, *J* = 5.04 Hz), 129.5, 128.3 (d, *J* = 2.52 Hz), 126.9 (d, *J* = 27.56 Hz), 125.2(d, *J* = 2.52
Hz), 124.2 (d, *J* = 12.6 Hz), 119.6, 116.3 (d, *J* = 21.42 Hz), 20.8.

^{19}F NMR (471 MHz, DMSO) δ -113.41 – -120.18 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}FNO^+$ 282.1289; Found 282.1286.



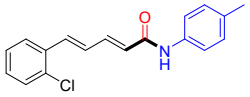
(*2E,4E*)-5-(4-Chlorophenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3nb)

The compound was from (*E*)-1-(Buta-1,3-dien-1-yl)-4-chlorobenzene (82.3 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (77.2 mg, 52%, *EE/EZ = 1.4:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.09 (s, 1H), 7.70 – 7.51 (m, 3H), 7.49 – 7.39 (m, 1H), 7.34 (dd, *J* = 15.1, 10.8 Hz, 1H), 7.12 (d, *J* = 7.8 Hz, 2H), 7.03 (d, *J* = 15.5 Hz, 1H), 6.89 (d, *J* = 15.9 Hz, 1H), 6.73 (t, *J* = 11.2 Hz, 1H), 6.37 (d, *J* = 14.9 Hz, 1H), 6.01 (d, *J* = 11.2 Hz, 1H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 164.5, 163.9, 141.3, 140.7, 138.2, 137.8, 135.8, 133.5, 132.7, 129.6, 129.4, 129.3, 129.1, 128.2, 126.5, 122.5, 119.6, 21.0.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}ClNO^+$ 298.0993; Found 298.0989.



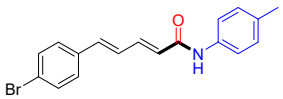
(*2E,4E*)-5-(2-Chlorophenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3ob)

The compound was from (*E*)-1-(Buta-1,3-dien-1-yl)-2-chlorobenzene (82.3 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (87.6 mg, 59%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.13 (s, 1H), 7.89 (d, *J* = 7.5 Hz, 1H), 7.59 (d, *J* = 8.1 Hz, 2H), 7.49 (d, *J* = 9.0 Hz, 1H), 7.38 (ddd, *J* = 24.1, 15.8, 9.9 Hz, 3H), 7.28 (d, *J* = 15.5 Hz, 1H), 7.19 (dd, *J* = 15.5, 10.8 Hz, 1H), 7.12 (d, *J* = 8.3 Hz, 2H), 6.42 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.2, 139.8, 136.6, 133.7, 133.2, 132.4, 132.1, 129.9, 129.7, 129.0, 127.4, 127.1, 126.8, 119.1, 119.0, 20.3.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}ClNO^+$ 298.0993; Found 298.0991.



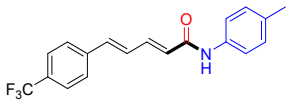
(*2E,4E*)-5-(4-Bromophenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3pb)

The compound was from (*E*)-1-Bromo-4-(buta-1,3-dien-1-yl)benzene (104.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (90.5 mg, 53%, *EE/EZ = 3.3:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.11 (s, 1H), 7.57 (q, *J* = 8.9 Hz, 5H), 7.33 (d, *J* = 8.5 Hz, 2H), 7.19 (d, *J* = 15.5 Hz, 1H), 7.13 (d, *J* = 8.3 Hz, 1H), 7.07 (d, *J* = 8.3 Hz, 1H), 7.01 (d, *J* = 15.5 Hz, 1H), 6.38 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.2, 140.1, 137.3, 137.1, 136.7, 135.4, 132.1, 131.6, 130.3, 129.0, 128.9, 127.6, 125.9, 121.6, 119.0, 118.0, 20.2.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}BrNO^+$ 342.0488; Found 342.0483.



(*2E,4E*)-*N*-(*p*-Tolyl)-5-(4-(trifluoromethyl)phenyl)penta-2,4-dienamide (3qb)

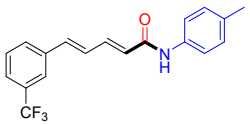
The compound was from 1-(Buta-1,3-dien-1-yl)-4-(trifluoromethyl)benzene (99.1 mg, 0.5 mmol, *E:Z=1:1.5*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (149.1 mg, 90%, *EE/EZ = 14.7:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.09 (s, 1H), 7.57 (d, *J* = 8.2 Hz, 2H), 7.43 (d, *J* = 11.4 Hz, 1H), 7.37 – 7.23 (m, 3H), 7.21 – 7.06 (m, 4H), 6.98 (d, *J* = 15.5 Hz, 1H), 6.35 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.5, 161.9, 160.0, 140.3, 137.6, 136.8, 136.3, 132.2, 131.9, 129.2, 127.4, 125.8, 124.7, 123.4, 119.2, 119.1, 112.7 (d, *J* = 22.68 Hz), 20.5, 14.1.

^{19}F NMR (471 MHz, DMSO) δ -111.05 – -125.21 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{17}F_3NO^+$ 332.1257; Found 332.1251.



(*2E,4E*)-*N*-(*p*-Tolyl)-5-(3-(trifluoromethyl)phenyl)penta-2,4-dienamide (3rb)

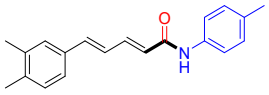
The compound was from 1-(Buta-1,3-dien-1-yl)-3-(trifluoromethyl)benzene (99.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (109.3 mg, 66%, *EE/EZ = 12.5:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.14 (s, 1H), 7.96 – 7.85 (m, 2H), 7.67 – 7.54 (m, 4H), 7.45 – 7.24 (m, 2H), 7.11 (dd, *J* = 11.7, 7.4 Hz, 3H), 6.44 (d, *J* = 14.4 Hz, 1H), 2.25 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.7, 140.4, 137.7, 137.2, 132.6, 131.0, 130.1, 129.5, 129.2, 127.1 (d, *J* = 7.56 Hz), 125.6, 125.1 (d, *J* = 3.78 Hz), 123.9 (d, *J* = 3.78 Hz), 119.6 (d, *J* = 11.34 Hz), 20.8.

^{19}F NMR (471 MHz, DMSO) δ -56.88 – -63.27 (m).

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{17}F_3NO^+$ 332.1257; Found 332.1253.

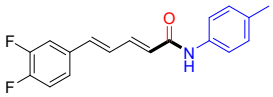


(*2E,4E*)-5-(3,4-Dimethylphenyl)-*N*-(*p*-tolyl)penta-2,4-dienamidee (3sb)

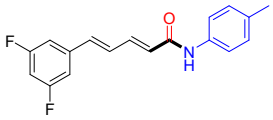
The compound was from 4-(Buta-1,3-dien-1-yl)-1,2-dimethylbenzene (79.1 mg, 0.5 mmol, *E:Z=1:1.4*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (119.3 mg, 82%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.04 (s, 1H), 7.58 (d, *J* = 7.1 Hz, 2H), 7.44 – 7.26 (m, 3H), 7.13 (dd, *J* = 11.2, 8.2 Hz, 3H), 7.06 (dd, *J* = 15.5, 10.9 Hz, 1H), 6.95 (d, *J* = 15.6 Hz, 1H), 6.31 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H), 2.23 (s, 3H), 2.22 (s, 3H).

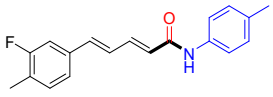
^{13}C NMR (126 MHz, DMSO) δ 164.0, 141.1, 139.4, 137.6, 137.2, 137.0, 134.2, 132.5, 130.3, 129.5, 128.5, 126.0, 125.0, 119.5, 20.8, 19.7, 19.7.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{20}H_{22}NO^+$ 292.1696; Found 292.1692.



(*2E,4E*)-5-(3,4-Difluorophenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3tb)
The compound was from 4-(Buta-1,3-dien-1-yl)-1,2-difluorobenzene (83.1 mg, 0.5 mmol, *E:Z=1:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (139.2 mg, 93%, *EE/EZ = 4.5:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.11 (s, 1H), 7.59 (d, *J* = 8.2 Hz, 3H), 7.37 – 7.30 (m, 3H), 7.12 (d, *J* = 8.1 Hz, 3H), 6.98 (d, *J* = 15.5 Hz, 1H), 6.38 (d, *J* = 14.9 Hz, 1H), 2.23 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 163.8, 140.4, 137.7, 136.9, 132.7, 131.0, 129.6, 128.7, 126.8, 125.0, 119.7, 118.7, 118.2 (d, *J* = 16.38 Hz), 115.7 (d, *J* = 17.64 Hz), 20.8.
^{19}F NMR (471 MHz, DMSO) δ -128.25 – -144.08 (m).
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{16}F_2NO^+$ 300.1194; Found 300.1192.

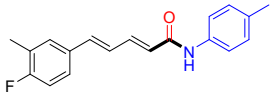


(*2E,4E*)-5-(3,5-Difluorophenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3ub)
The compound was from 4-(Buta-1,3-dien-1-yl)-1,3-difluorobenzene (83.1 mg, 0.5 mmol, *E:Z=1:1.3*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (127.2 mg, 85%, *EE/EZ > 20:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.09 (s, 1H), 7.85 (dd, *J* = 15.5, 8.7 Hz, 1H), 7.58 (d, *J* = 8.3 Hz, 2H), 7.47 – 7.23 (m, 2H), 7.21 – 6.97 (m, 5H), 6.38 (d, *J* = 14.9 Hz, 1H), 2.25 (s, 3H).
^{13}C NMR (126 MHz, DMSO) δ 163.8, 161.6 (d, *J* = 12.6 Hz), 161.4 (d, *J* = 12.6 Hz), 159.4 (d, *J* = 12.6 Hz), 140.7, 137.3, 132.7, 129.8, 129.6, 127.0, 119.7, 112. 7 (d, *J* = 21.42 Hz), 104.9 (t, *J* = 15.12 Hz), 21.0.
^{19}F NMR (471 MHz, DMSO) δ -104.97 – -114.78 (m).
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{16}F_2NO^+$ 300.1194; Found 300.1191.

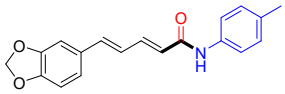


(*2E,4E*)-5-(3-Fluoro-4-methylphenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3vb)
The compound was from 4-(Buta-1,3-dien-1-yl)-2-fluoro-1-methylbenzene (81.1 mg, 0.5 mmol, *E:Z=1:1.5*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (119.6 mg, 81%, *EE/EZ = 3.3:1*).

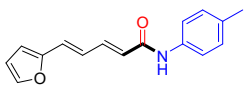
^{1}H NMR (500 MHz, DMSO) δ 10.13 (s, 1H), 7.90 – 7.66 (m, 3H), 7.56 (dd, *J* = 25.6, 8.4 Hz, 2H), 7.44 – 7.21 (m, 2H), 7.18 – 7.03 (m, 3H), 6.43 (d, *J* = 14.6 Hz, 1H), 3.36 (s, 3H), 2.26 (s, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 163.5, 140.5 (d, *J* = 27.56 Hz), 140.1, 137.0 (d, *J* = 16.38 Hz), 132.5, 129.8, 129.3, 127.8, 127.3, 125.8, 123.3, 119.4, 20.7.
^{19}F NMR (471 MHz, DMSO) δ -56.19 – -64.56 (m).
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{19}FNO^+$ 296.1445; Found 296.1440.



(*2E,4E*)-5-(4-Fluoro-3-methylphenyl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3wb)
The compound was from 4-(Buta-1,3-dien-1-yl)-1-fluoro-2-methylbenzene (81.1 mg, 0.5 mmol, *E:Z=1:1.3*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (119.6 mg, 81%, *EE/EZ = 13.2:1*).
^{1}H NMR (500 MHz, DMSO) δ 10.06 (s, 1H), 7.58 (d, *J* = 8.3 Hz, 2H), 7.53 (d, *J* = 7.5 Hz, 1H), 7.48 – 7.42 (m, 1H), 7.34 (dd, *J* = 14.9, 10.8 Hz, 1H), 7.10 (ddd, *J* = 37.5, 16.3, 10.1 Hz, 4H), 6.97 (d, *J* = 15.6 Hz, 1H), 6.33 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 6H).
^{13}C NMR (126 MHz, DMSO) δ 163.5, 161.9, 160.0, 140.6 137.9, 136.9, 132.6 (d, *J* = 3.78 Hz), 132.3, 130.3 (d, *J* = 6.3 Hz), 129.2, 126.7 (t, *J* = 8.82 Hz), 125.3 (d, *J* = 7.56 Hz), 124.8 (d, *J* = 17.64 Hz), 119.2 (d, *J* = 11.34 Hz), 115.5, 115.4, 20.6, 14.2.
^{19}F NMR (471 MHz, DMSO) δ -113.79 – -118.13 (m).
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{19}FNO^+$ 296.1445; Found 296.1442.



(*2E,4E*)-5-(Benzo[d][1,3]dioxol-5-yl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3xb)
The compound was from (*E*)-5-(Buta-1,3-dien-1-yl)benzo[d][1,3]dioxole (72.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (102.9 mg, 67%, *EE/EZ > 20:1*).
^{1}H NMR (500 MHz, DMSO) δ 8.50 (s, 1H), 7.58 (d, *J* = 8.3 Hz, 1H), 7.31 (dd, *J* = 21.7, 12.1 Hz, 3H), 7.15 – 6.91 (m, 5H), 6.29 (d, *J* = 14.9 Hz, 1H), 6.06 (s, 1H), 2.25 (d, *J* = 10.0 Hz, 5H).
^{13}C NMR (126 MHz, DMSO) δ 163.9, 152.8, 148.2, 148.1, 141.0, 139.0, 137.4, 132.3, 130.7, 129.4, 125.3, 123.1, 119.3, 118.4, 118.3, 108.7, 105.9, 101.5, 20.5.
HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{18}NO_3^+$ 308.1281; Found 308.1277.



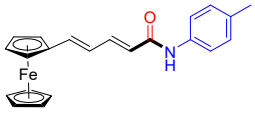
***(2E,4E)*-5-(Furan-2-yl)-*N*-(*p*-tolyl)penta-2,4-dienamide (3yb)**
The compound was from 2-(Buta-1,3-dien-1-yl)furan (60.2 mg, 0.5 mmol, *E:Z=1:2.7*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash

chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (84.9 mg, 67%, *EE/EZ = 10.0:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.04 (s, 1H), 7.75 (s, 1H), 7.56 (d, *J* = 8.3 Hz, 2H), 7.31 (dd, *J* = 14.9, 11.2 Hz, 1H), 7.12 (d, *J* = 8.3 Hz, 2H), 6.91 (d, *J* = 15.5 Hz, 1H), 6.81 (dd, *J* = 15.4, 11.2 Hz, 1H), 6.67 (d, *J* = 3.3 Hz, 1H), 6.58 (dd, *J* = 3.3, 1.8 Hz, 1H), 6.31 (d, *J* = 14.9 Hz, 1H), 2.25 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 164.0, 152.5, 144.7, 140.4, 137.3, 132.6, 129.6, 126.4, 125.8, 125.1, 119.5, 112.9, 112.1, 21.0.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{16}H_{16}NO_2^+$ 254.1176; Found 254.1173.



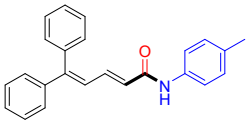
(*2E,4E*)-1--Ferrocene-*N*-(*p*-tolyl)penta-2,4-dienamide (3zb)

The compound was from 2-(Buta-1,3-dien-1-yl)Ferrocene(119.1 mg, 0.5 mmo, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (117.24 mg, 63%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 9.95 (s, 1H), 7.56 (d, *J* = 8.3 Hz, 2H), 7.23 (dd, *J* = 14.9, 11.2 Hz, 1H), 7.11 (d, *J* = 8.3 Hz, 2H), 6.81 (d, *J* = 15.3 Hz, 1H), 6.63 (dd, *J* = 15.3, 11.2 Hz, 1H), 6.17 (d, *J* = 14.9 Hz, 1H), 4.59 (s, 2H), 4.38 (s, 2H), 4.15 (s, 5H), 3.34 (s, 1H), 2.25 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 164.0, 141.1, 139.1, 136.9, 132.0, 129.1, 124.1, 122.2, 118.8, 81.5, 69.8, 69.3, 67.5, 20.5.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{22}H_{23}FeNO^+$ 373.1124; Found 373.1002.



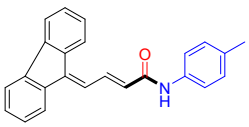
(*E*)-5,5-Diphenyl-*N*-(*p*-tolyl)penta-2,4-dienamide (3Ab)

The compound was from Buta-1,3-diene-1,1-diyldibenzene (103.2 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (56.0 mg, 33%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.08 (s, 1H), 7.61 – 7.41 (m, 5H), 7.34 (dt, *J* = 8.1, 6.8 Hz, 5H), 7.19 (d, *J* = 6.7 Hz, 2H), 7.16 – 6.97 (m, 5H), 6.43 (d, *J* = 14.4 Hz, 1H), 2.23 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.9, 148.8, 141.1, 139.0, 138.0, 137.2, 132.7, 130.4, 129.6, 129.0, 128.6, 128.0, 127.2, 125.8, 119.6, 119.5, 20.9.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{24}H_{22}NO^+$ 340.1617; Found 340.1653.



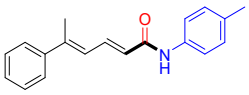
(*E*)-4-(9H-Fluoren-9-ylidene)-*N*-(*p*-tolyl)but-2-enamide (3Bb)

The compound was from 9-Allylidene-9H-fluorene (102.2 mg, 0.5 mmol, *E:Z>20:1*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (101.3 mg, 60%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 9.78 (d, *J* = 54.8 Hz, 1H), 7.88 (d, *J* = 7.4 Hz, 2H), 7.61 (d, *J* = 7.3 Hz, 2H), 7.47 (d, *J* = 8.2 Hz, 3H), 7.36 (dt, *J* = 24.9, 7.3 Hz, 4H), 7.07 (d, *J* = 8.3 Hz, 2H), 6.50 (dt, *J* = 14.9, 7.3 Hz, 1H), 6.06 (d, *J* = 15.2 Hz, 1H), 2.22 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 162.8, 146.1, 141.0, 140.5, 136.7, 132.2, 129.1, 127.3, 127.1, 126.6, 124.6, 120.1, 119.1, 45.9, 34.8, 20.5.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{24}H_{20}NO^+$ 338.1533; Found 338.1531.



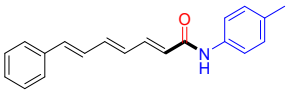
(*2E,4E*)-5-Phenyl-*N*-(*p*-tolyl)hexa-2,4-dienamide (3Cb)

The compound was from (*E*)-Penta-2,4-dien-2-ylbenzene (72.1 mg, 0.5 mmol, *E:Z>20:1*) and 1-methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (101.3 mg, 73%, *EE/EZ > 20:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.07 (s, 1H), 7.65 (d, *J* = 11.7 Hz, 1H), 7.62 – 7.55 (m, 4H), 7.39 (t, *J* = 7.5 Hz, 2H), 7.33 (t, *J* = 7.3 Hz, 1H), 7.12 (d, *J* = 8.2 Hz, 2H), 6.75 (d, *J* = 11.7 Hz, 1H), 6.37 (d, *J* = 14.7 Hz, 1H), 2.26 (s, 3H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 164.3, 143.4, 141.9, 137.3, 136.8, 132.7, 129.6, 129.0, 128.6, 126.4, 126.3, 125.0, 119.7, 20.9, 16.5.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{20}NO^+$ 278.1539; Found 278.1537.



(*2E,4E,6E*)-7-Phenyl-*N*-(*p*-tolyl)hepta-2,4,6-trienamide (3Db)

The compound was from ((*1E*)-Hexa-1,3,5-trien-1-yl)benzene (78.1 mg, 0.5 mmol, *E:Z=1:1.2*) and 1-Methyl-4-nitrobenzene (205.5 mg, 1.5 mmol). The crude residue was purified by flash chromatography (petroleum ether / ethyl acetate = 4:1, Rf = 0.30) to give the product as a yellow solid (52.1 mg, 36%, *EE/EZ = 10.0:1*).

^{1}H NMR (500 MHz, DMSO) δ 10.02 (s, 1H), 7.55 (dd, *J* = 21.7, 8.0 Hz, 4H), 7.33 (dt, *J* = 26.3, 9.3 Hz, 5H), 7.19 – 7.03 (m, 3H), 6.96 – 6.71 (m, 2H), 6.72 – 6.50 (m, 1H), 6.27 (d, *J* = 14.9 Hz, 1H), 2.26 (s, 3H).

^{13}C NMR (126 MHz, DMSO) δ 163.7, 140.4, 139.8, 136.8, 135.6, 132.4, 131.2, 129.3, 129.0, 128.9, 128.4, 126.9, 125.3, 119.3, 20.7.

HRMS (ESI) m/z: $[M+H]^+$ Calcd for $C_{20}H_{20}NO^+$ 290.1539; Found 290.1535.

7. References

S1. Liu Y., Xie Y.-J., Wang H.-L., Huang H.-M., *J. Am. Chem. Soc.* **2016**, 138, *13*, 4314–4317.
S2.Wang W, He S.-Y., Zhong Y.-Q., Chen J.-H., Cai C., Luo Y.-S., Xia Y.-Z., *J. Org. Chem.* **2022**, 87, *7*, 4712 – 4723.

8. Copies of NMR Spectra for Compounds

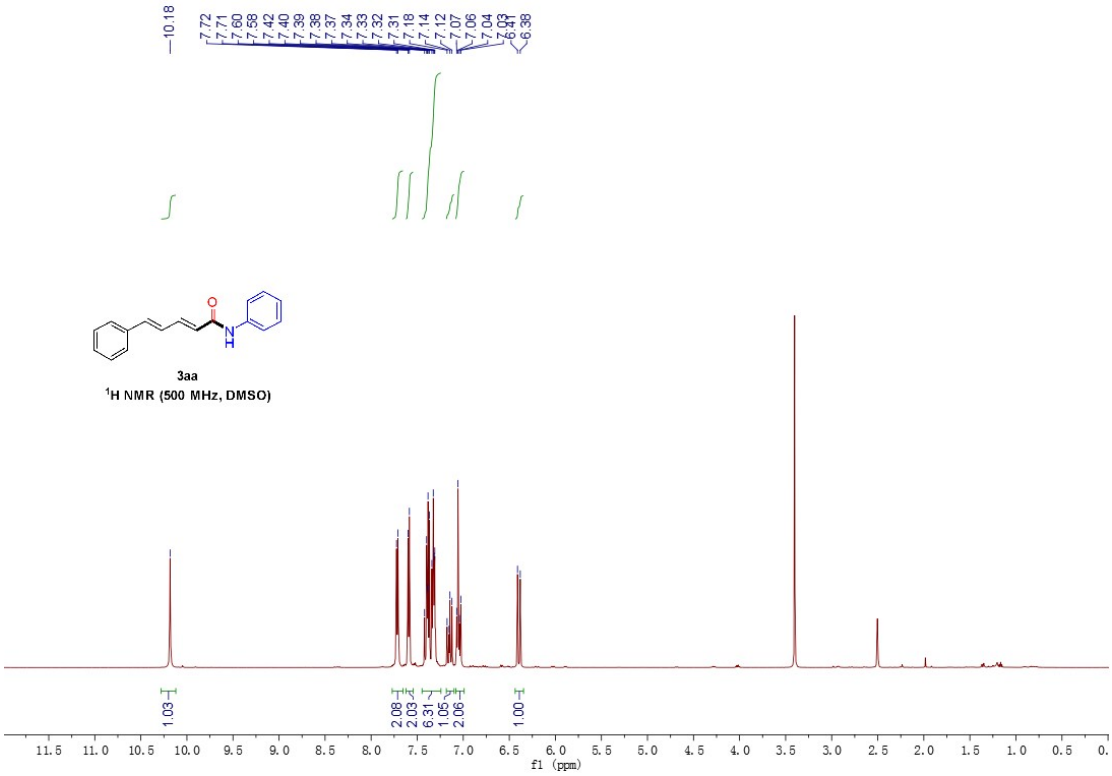


Figure S5. ^{1}H NMR (500 MHz, DMSO) spectrum of 3aa

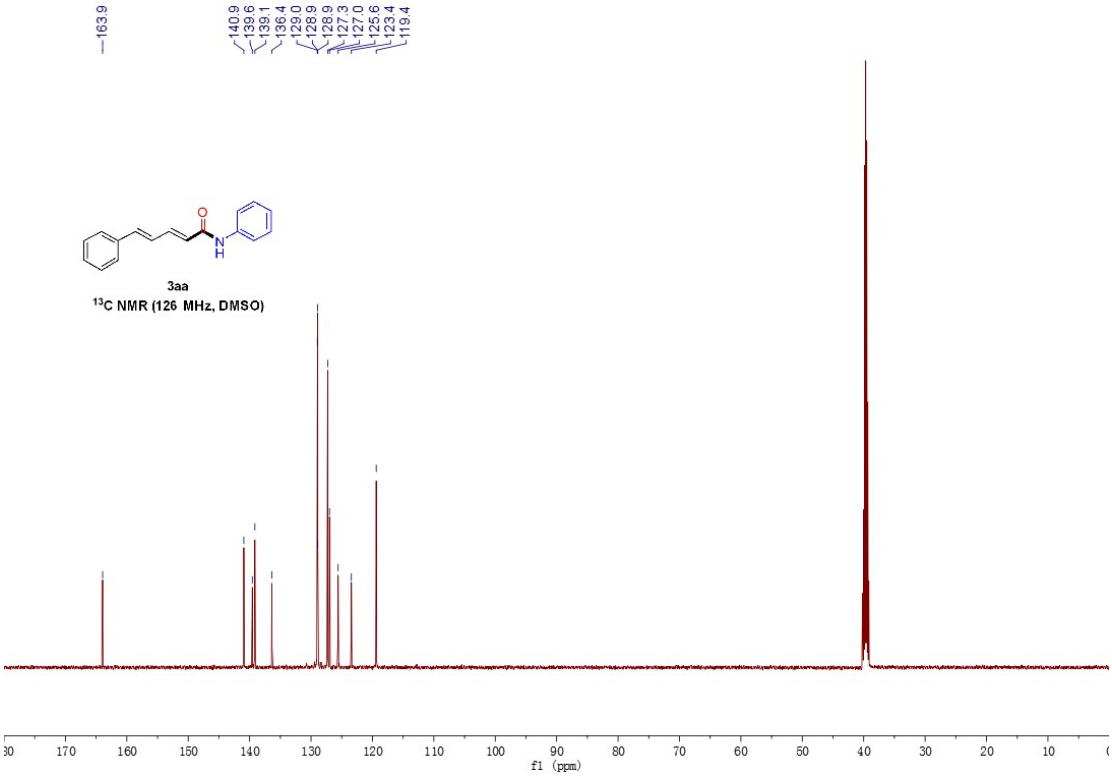


Figure S6. ^{13}C NMR (126 MHz, DMSO) spectrum of 3aa

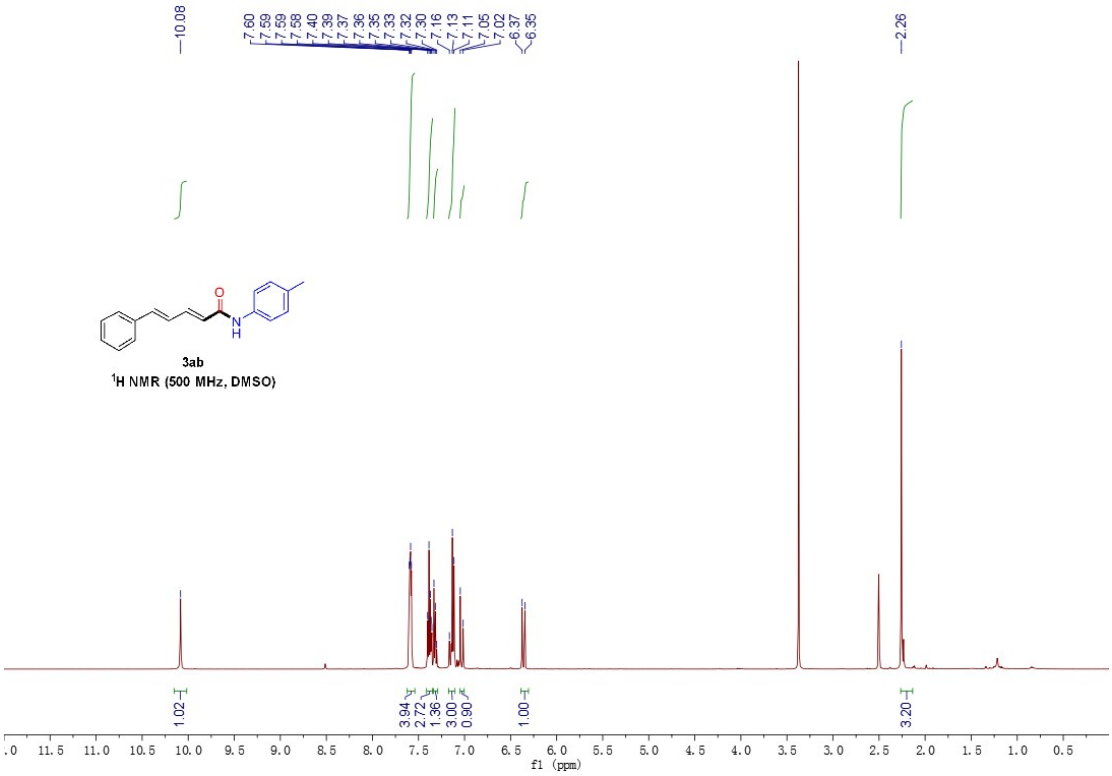


Figure S7. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ab

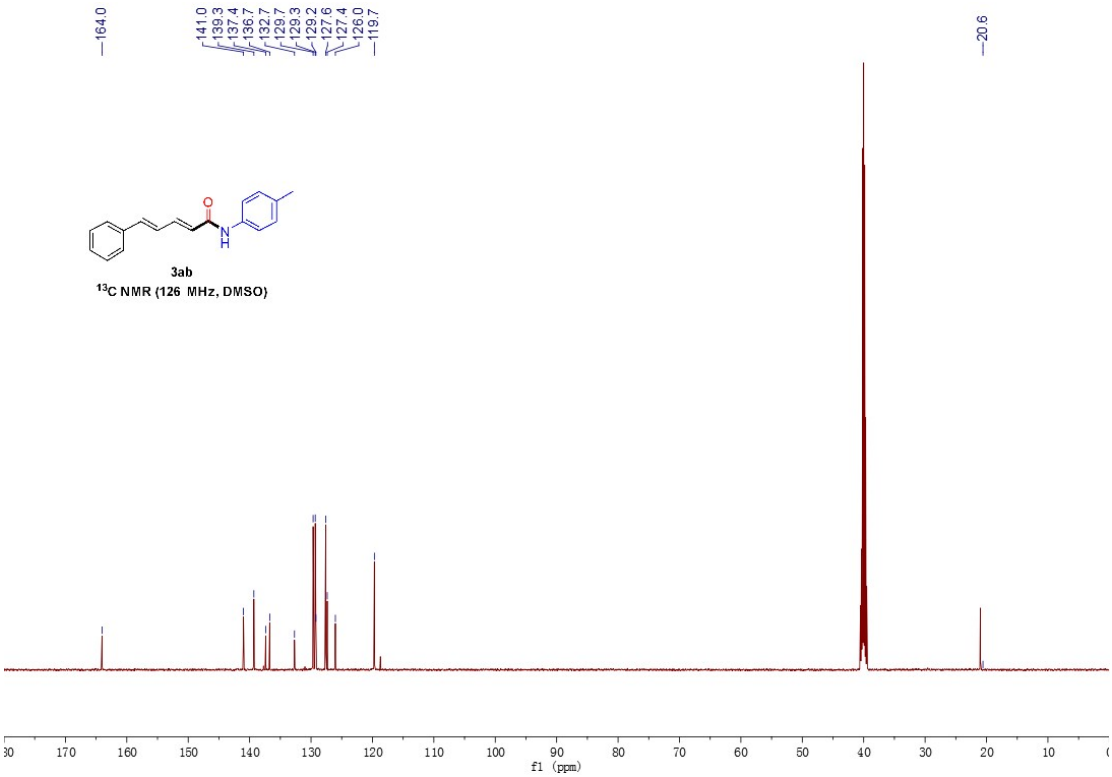


Figure S8. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ab

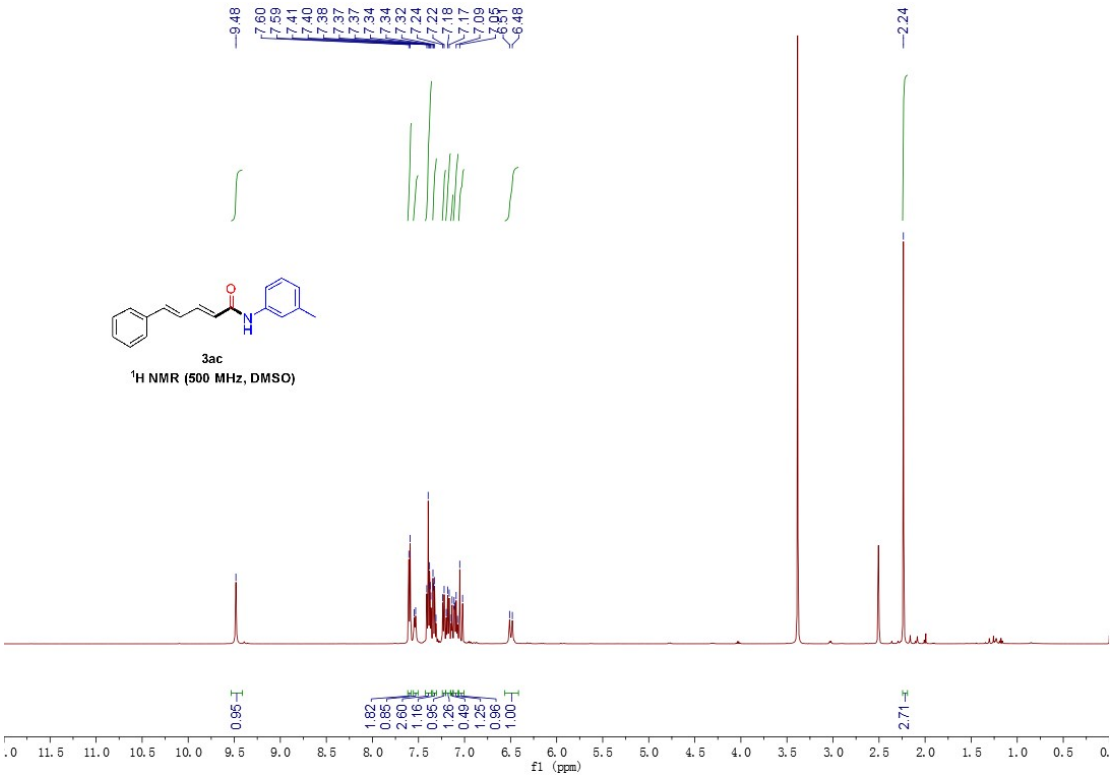


Figure S9. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ac

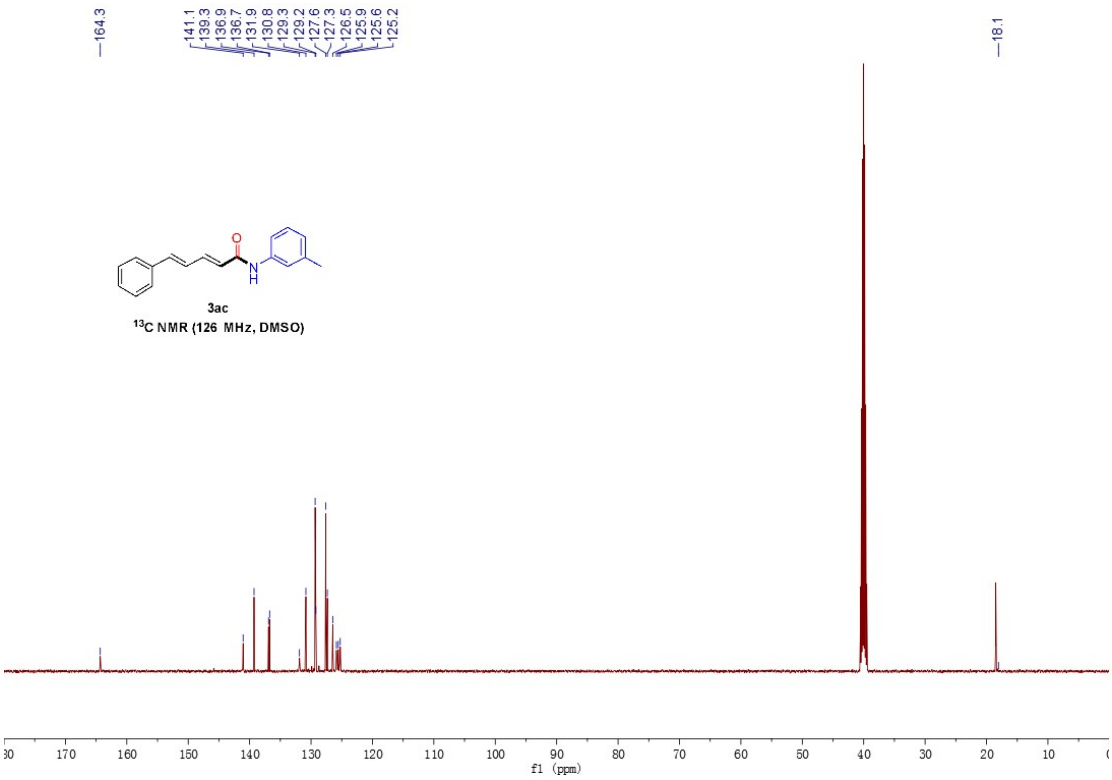


Figure S10. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ac

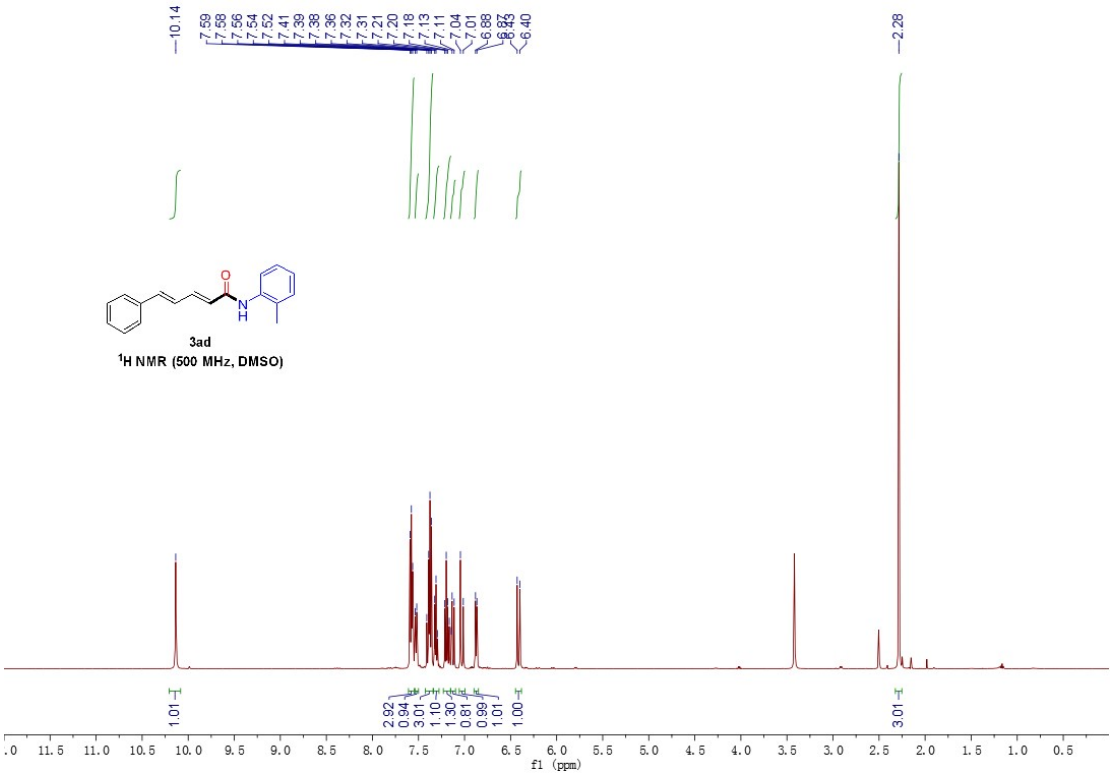


Figure S11. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ad

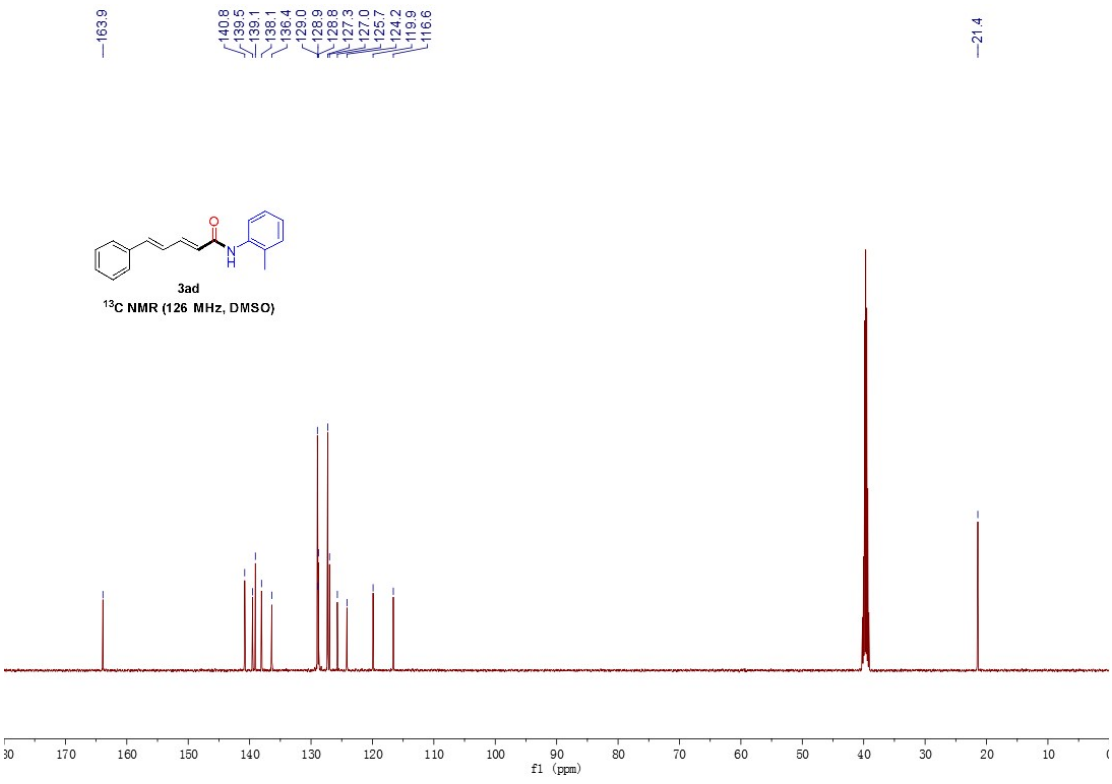


Figure S12. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ad

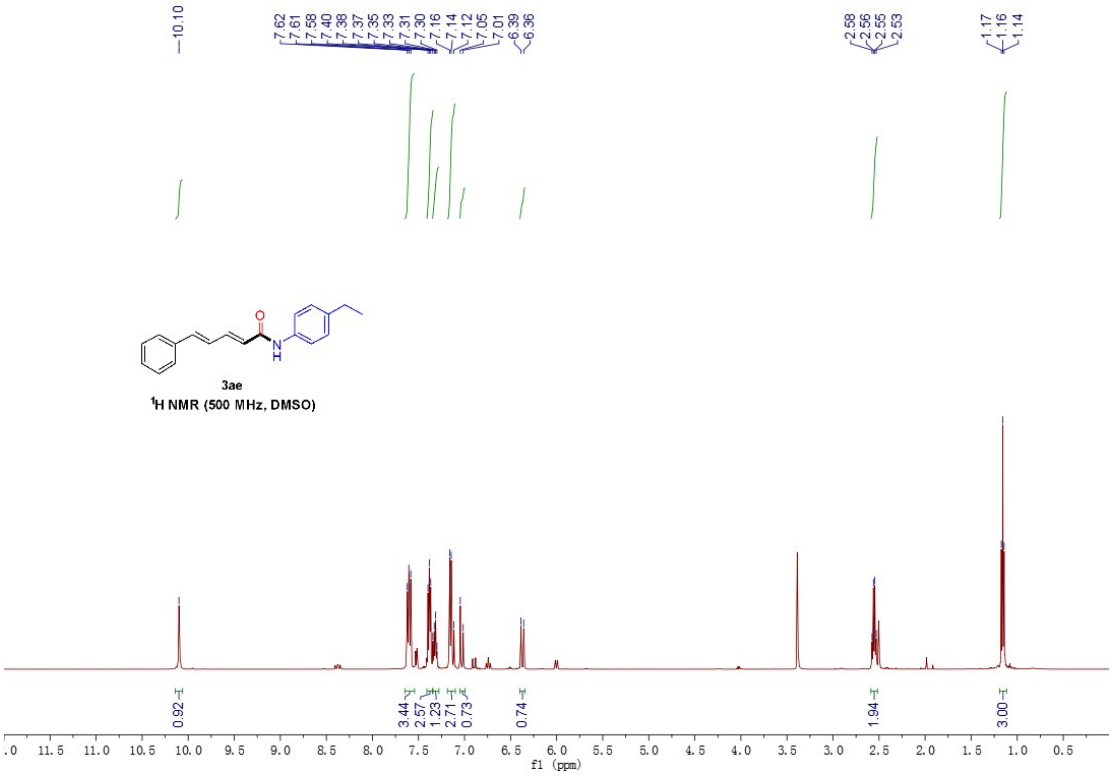


Figure S13. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ae

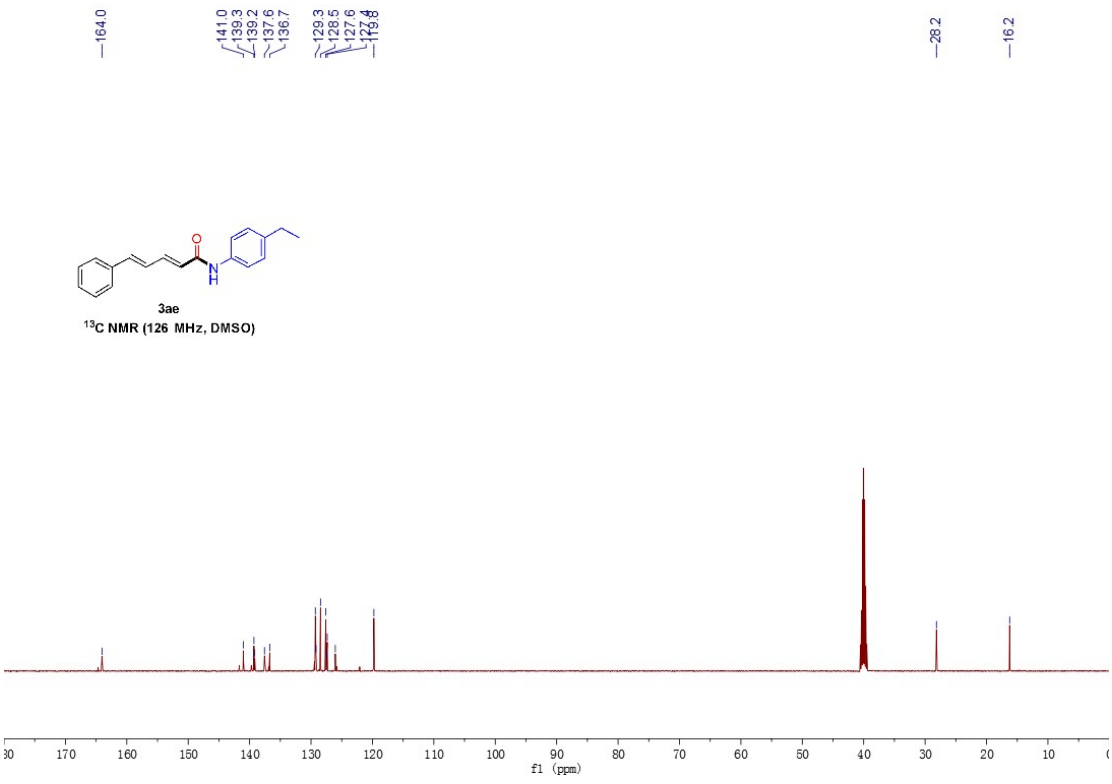


Figure S14. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ae

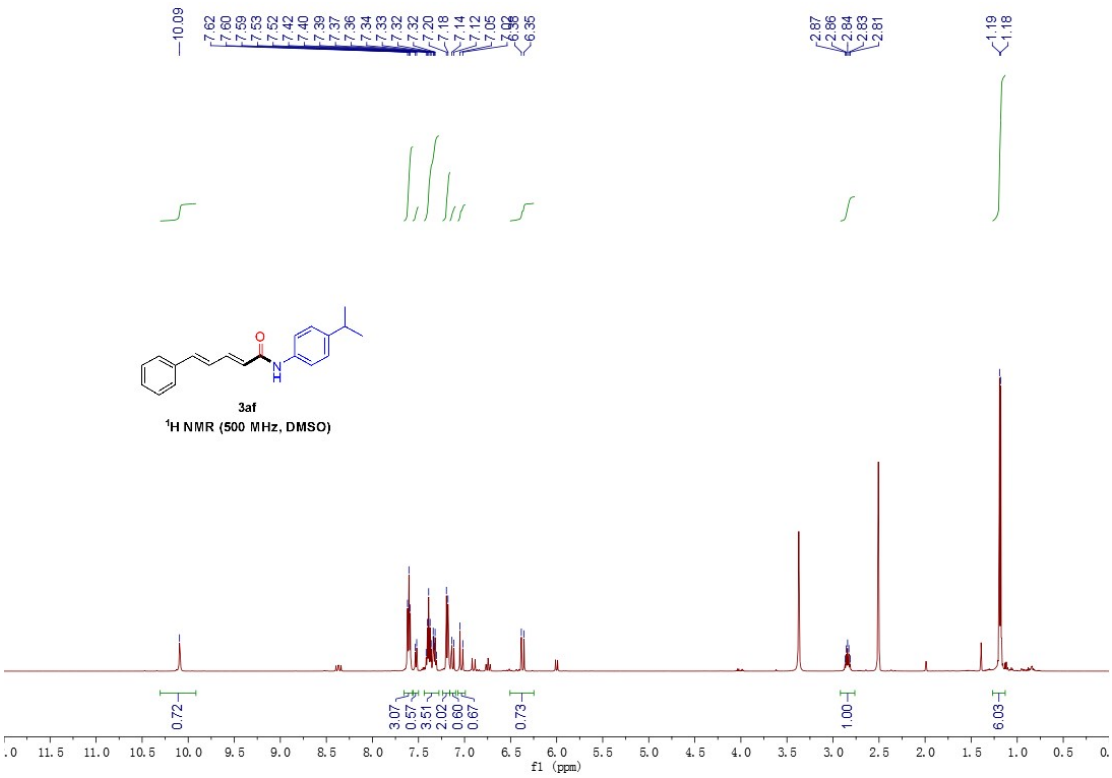


Figure S15. ^{1}H NMR (500 MHz, DMSO) spectrum of 3af

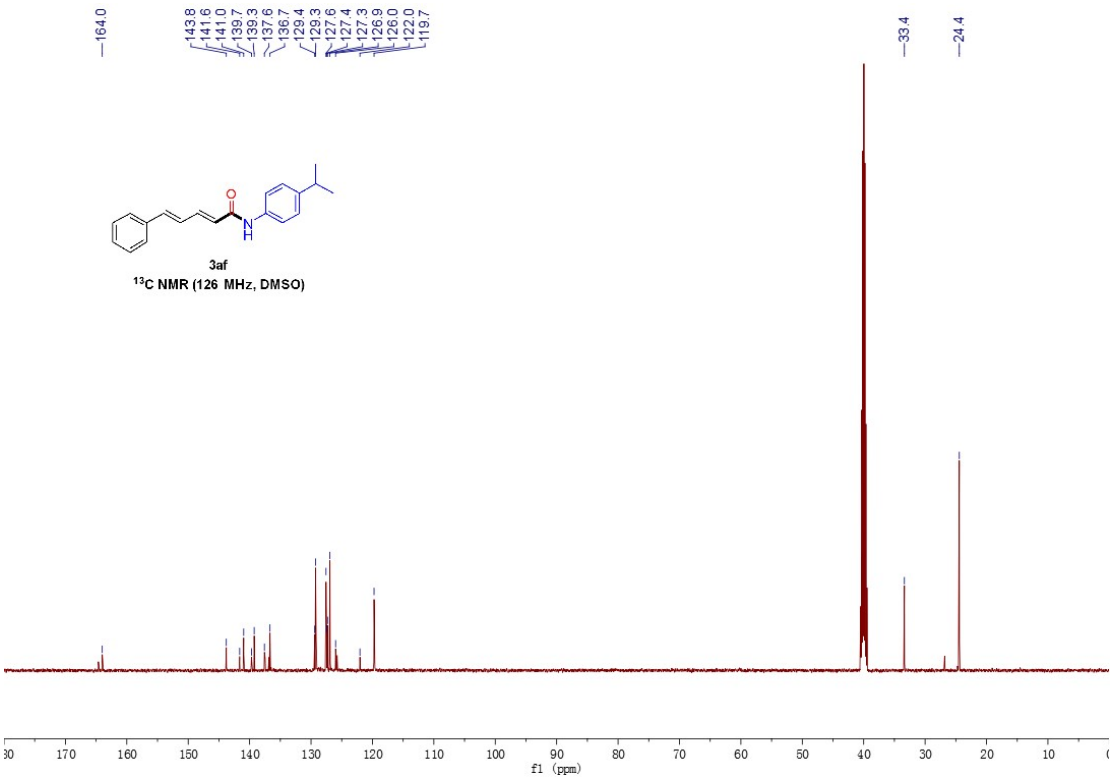


Figure S16. ^{13}C NMR (126 MHz, DMSO) spectrum of 3af

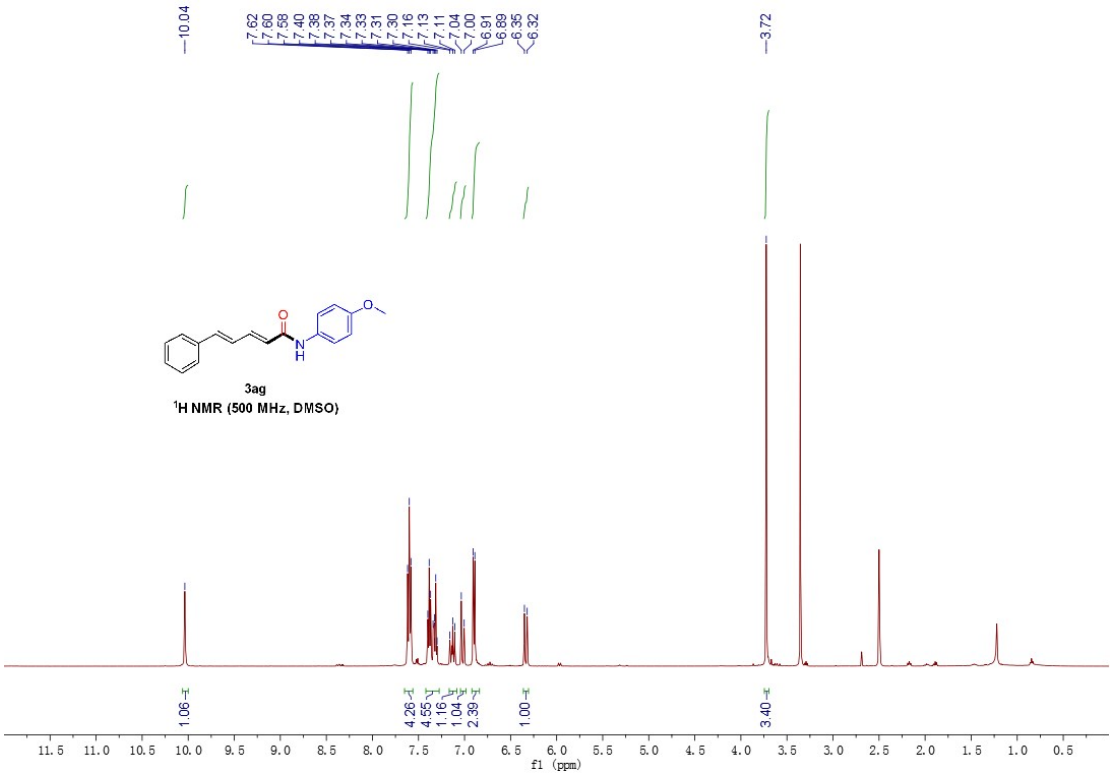


Figure S17. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ag

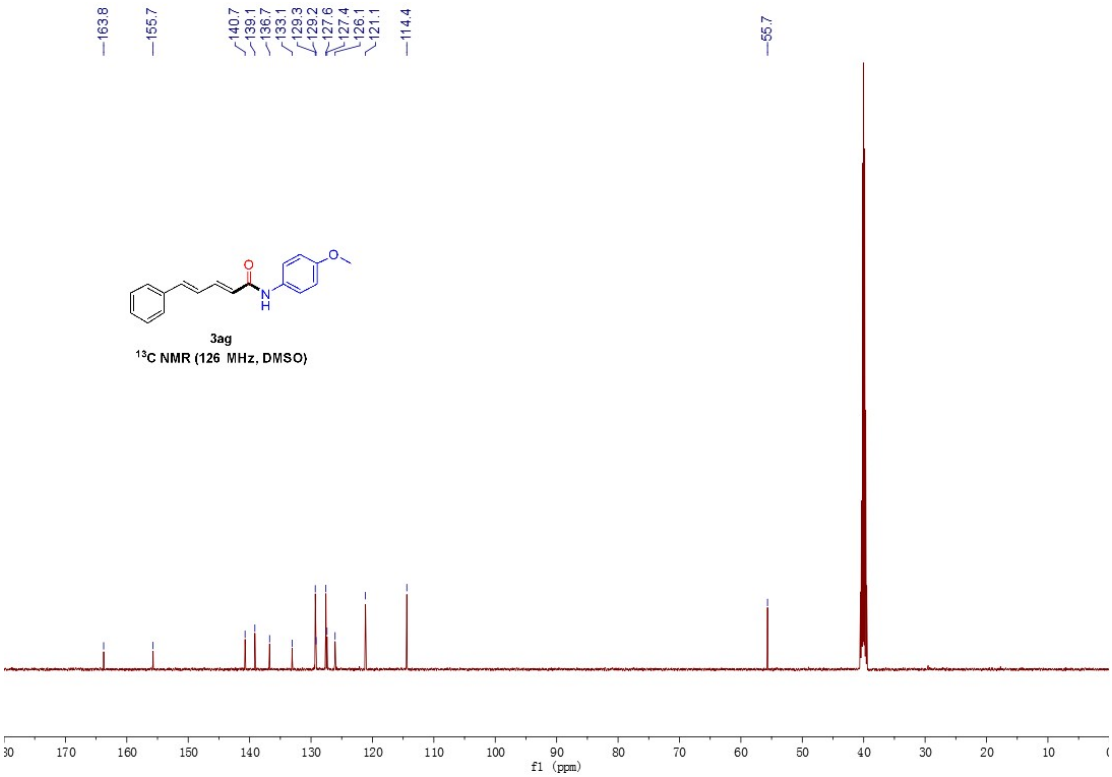


Figure S18. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ag

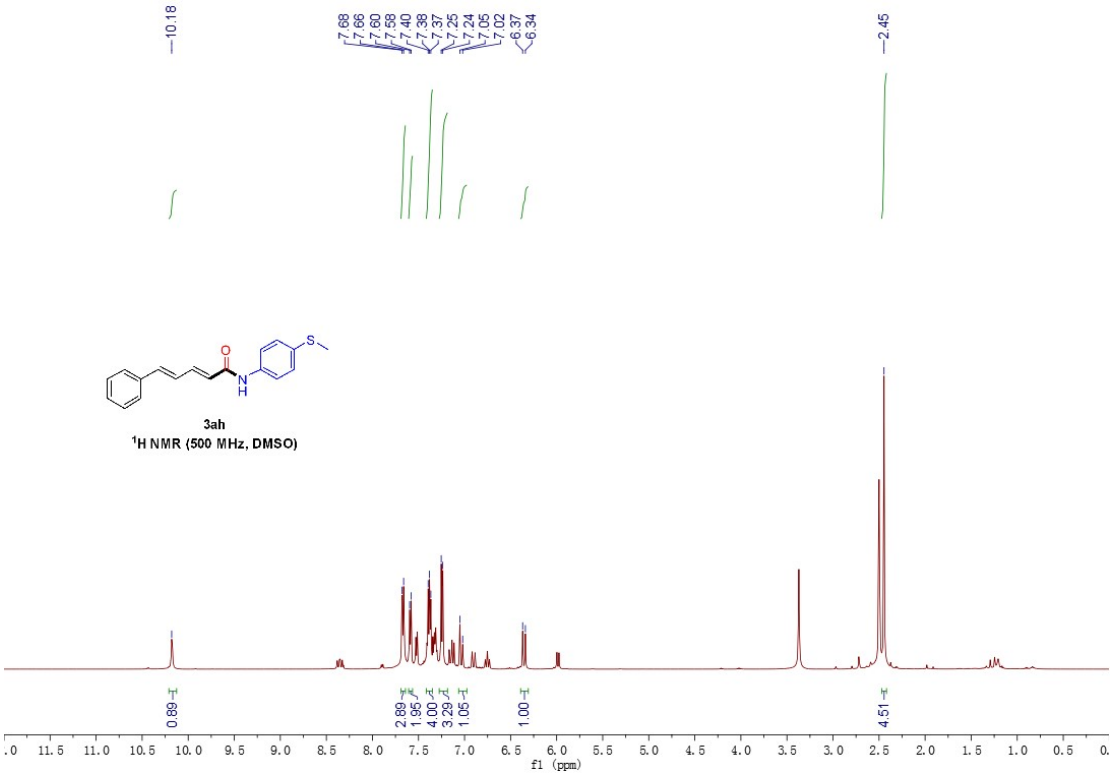


Figure S19. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ah

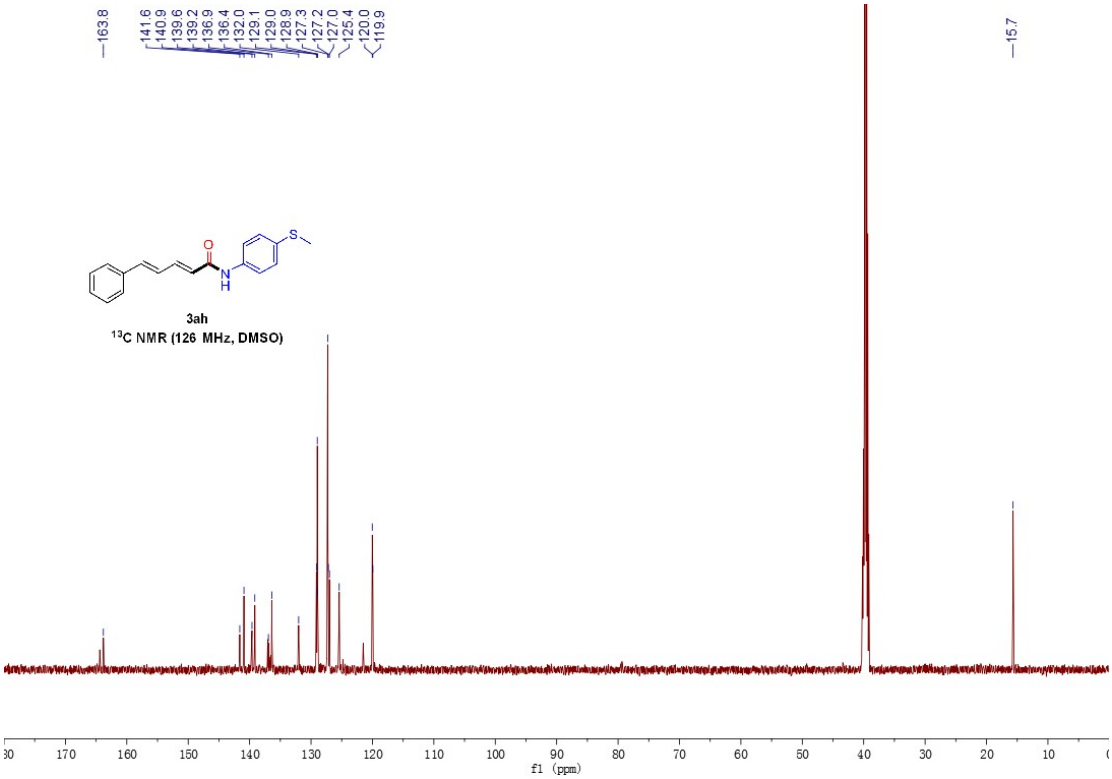


Figure S20. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ah

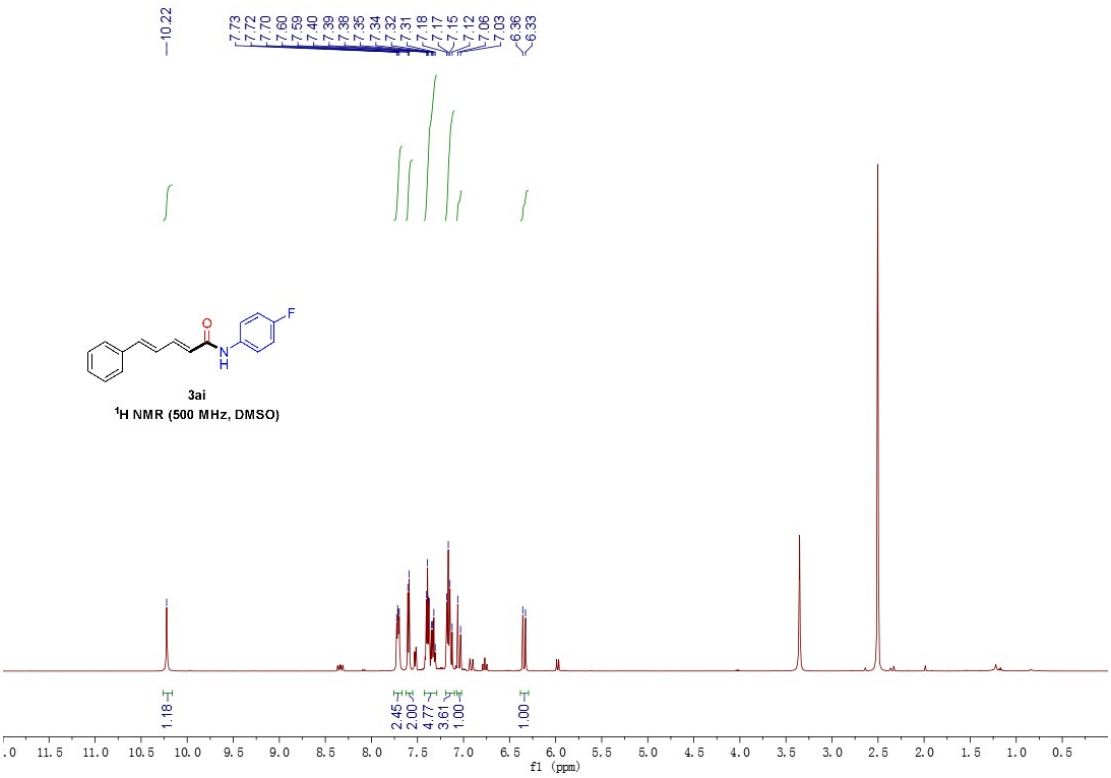


Figure S21. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ai

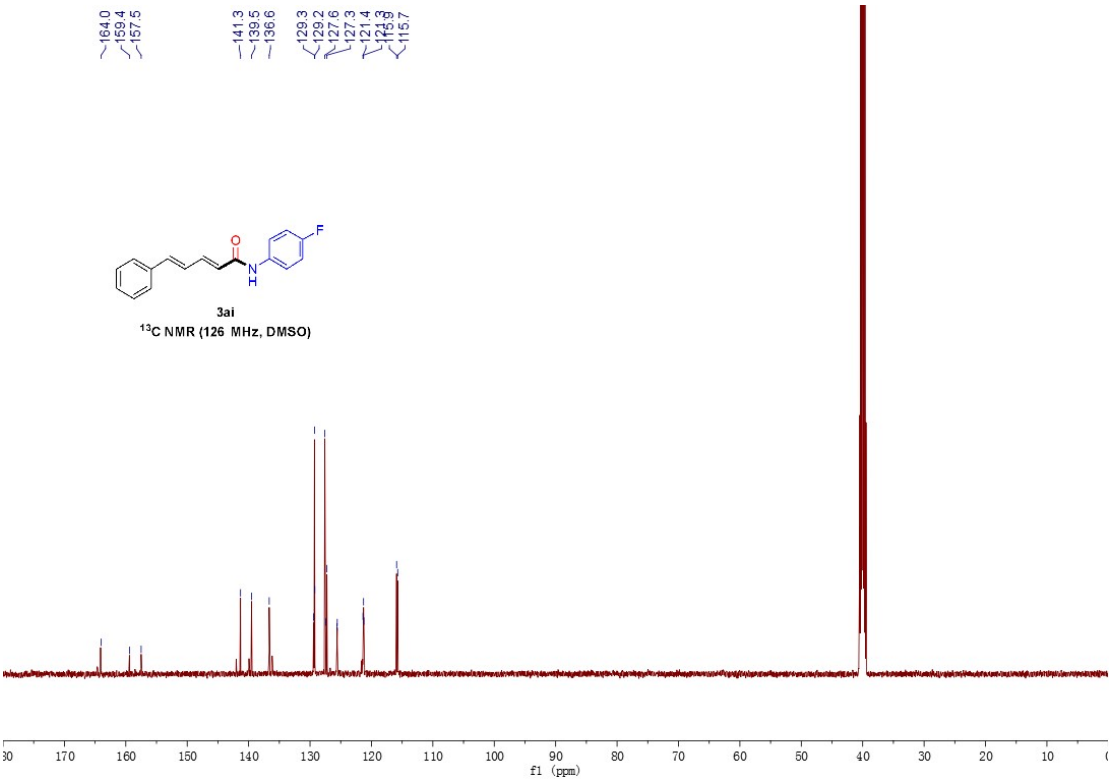


Figure S22. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ai

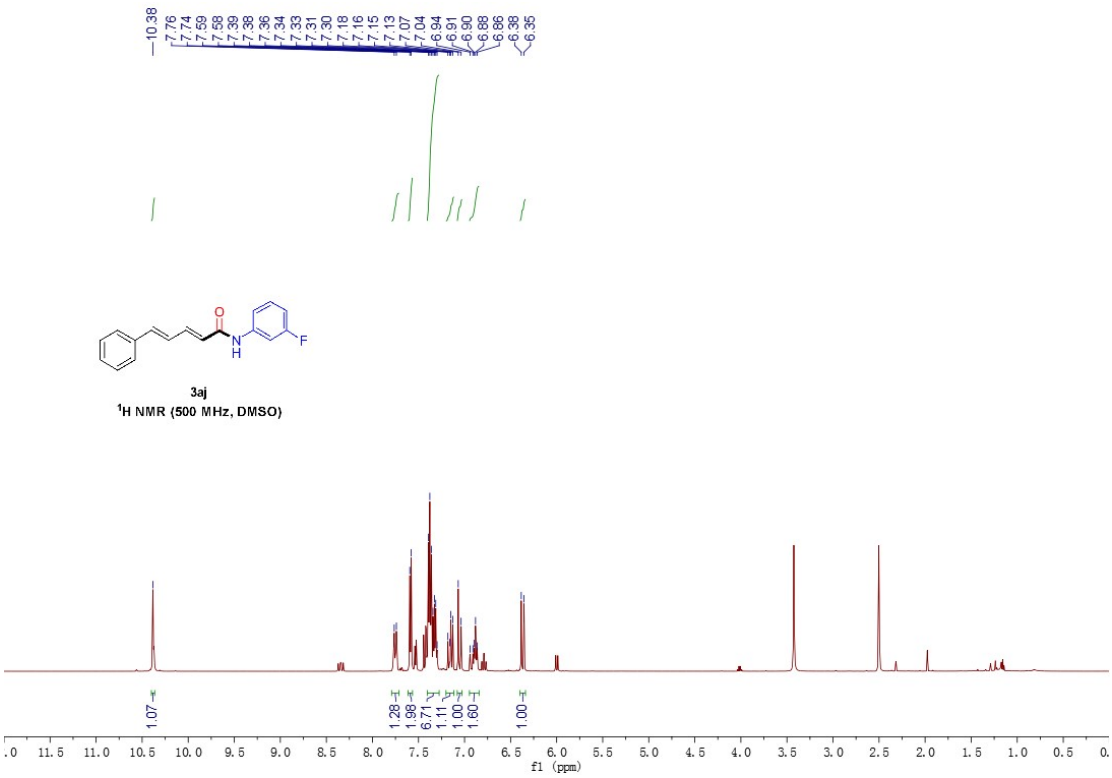


Figure S23. ^{1}H NMR (500 MHz, DMSO) spectrum of 3aj

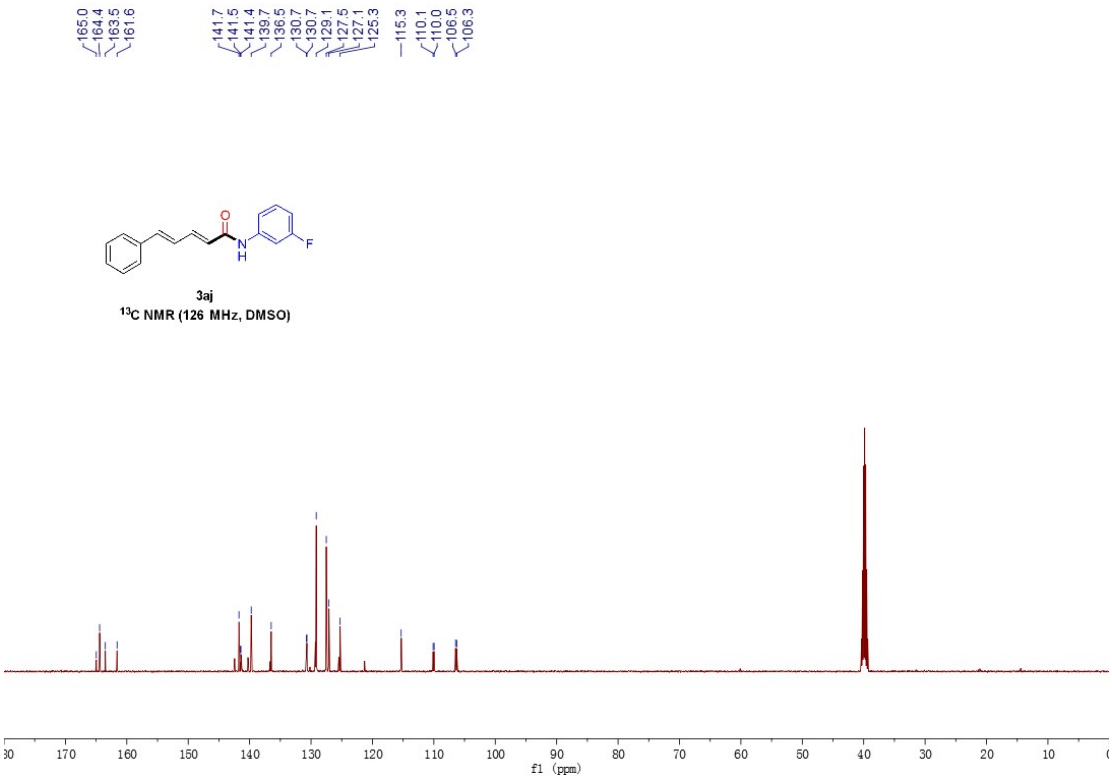


Figure S24. ^{13}C NMR (126 MHz, DMSO) spectrum of 3aj

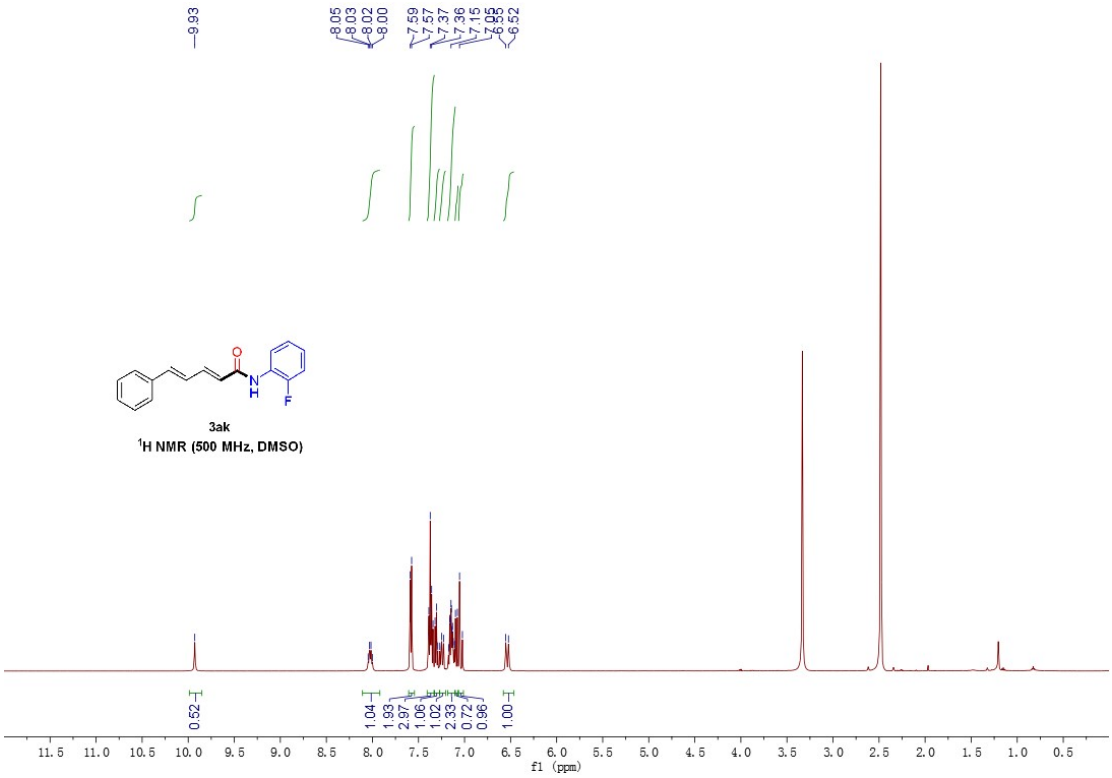


Figure S25. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ak

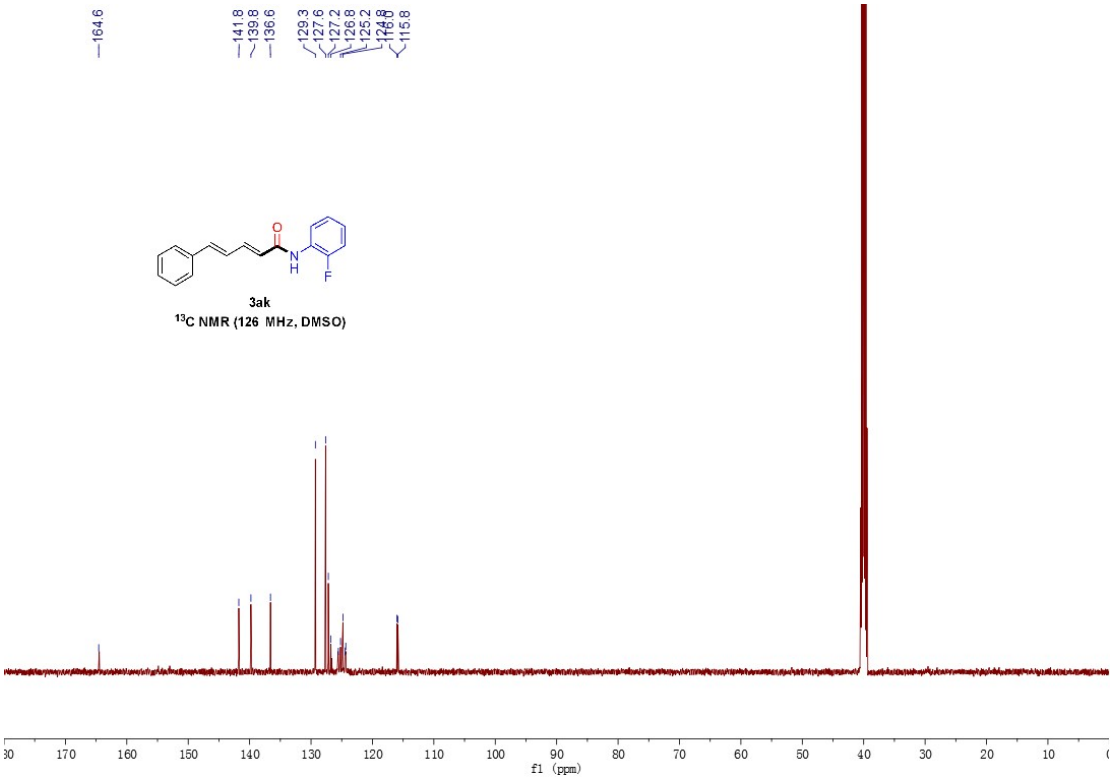


Figure S26. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ak

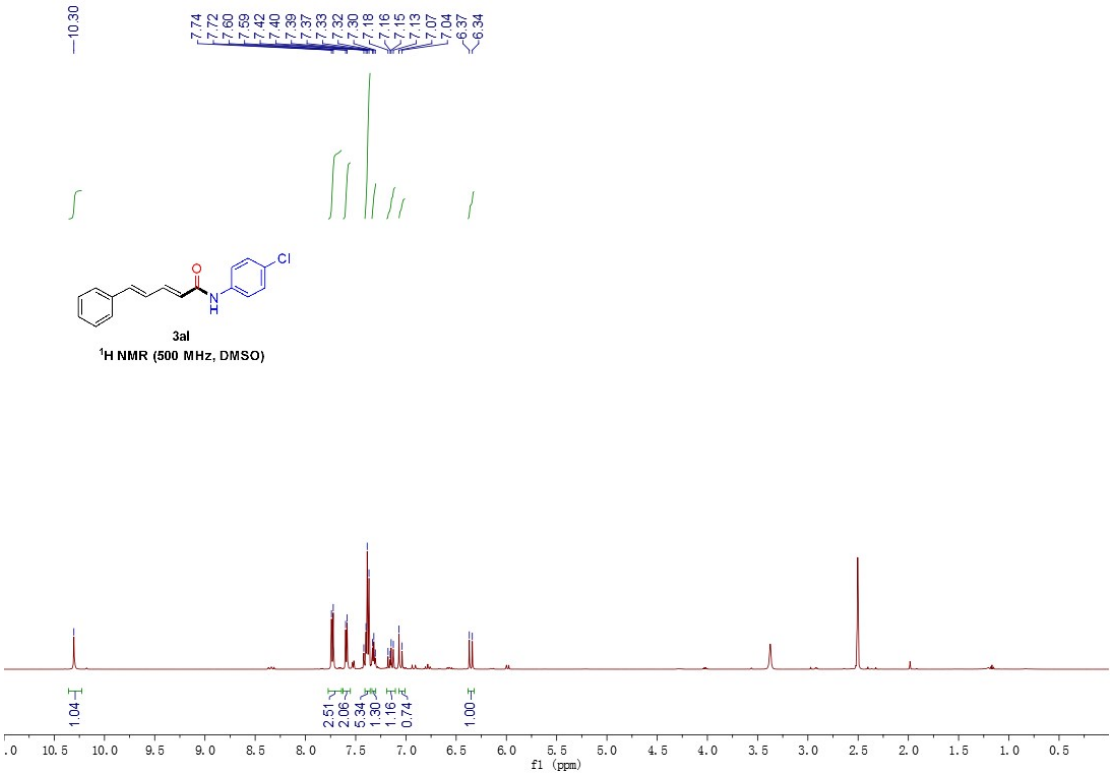


Figure S27. ^{1}H NMR (500 MHz, DMSO) spectrum of 3al

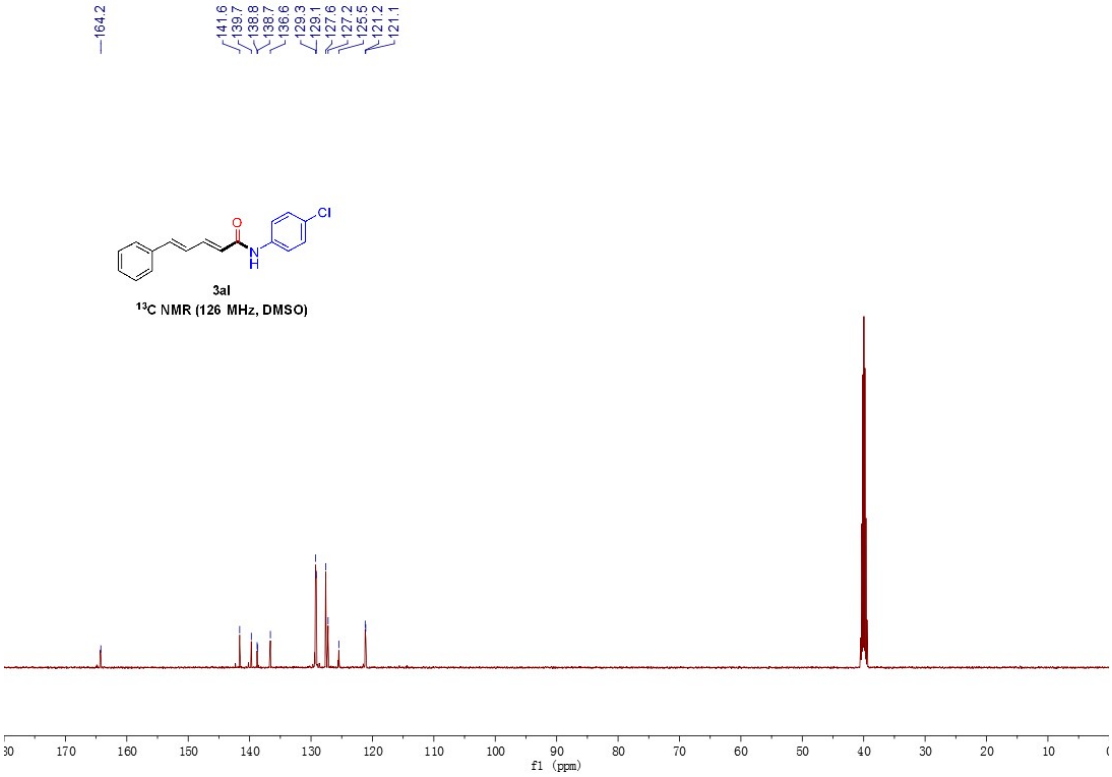


Figure S28. ^{13}C NMR (126 MHz, DMSO) spectrum of 3al

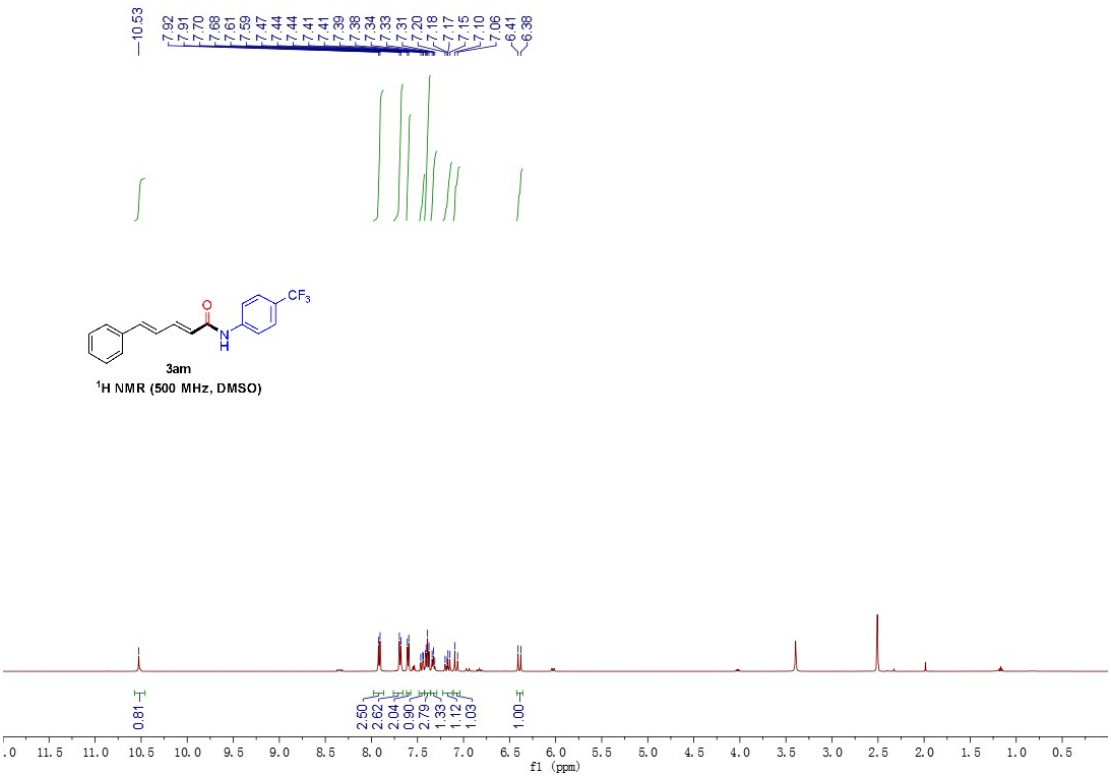


Figure S29. ^{1}H NMR (500 MHz, DMSO) spectrum of 3am

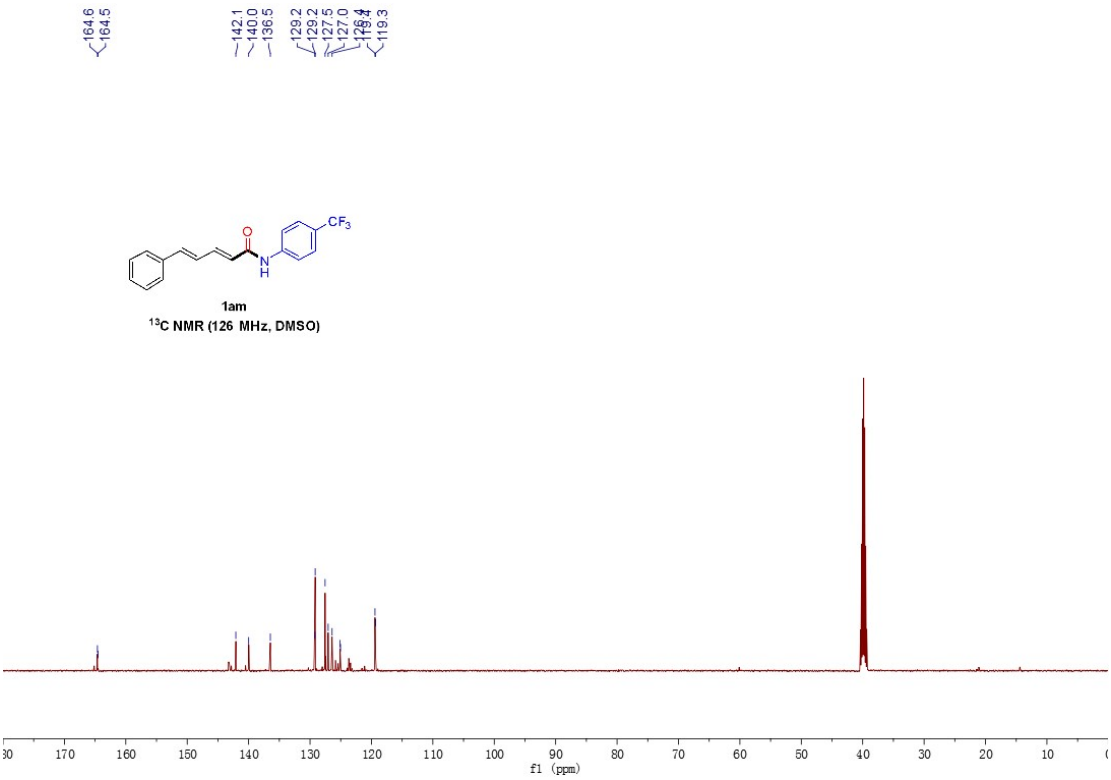


Figure S30. ^{13}C NMR (126 MHz, DMSO) spectrum of 3am

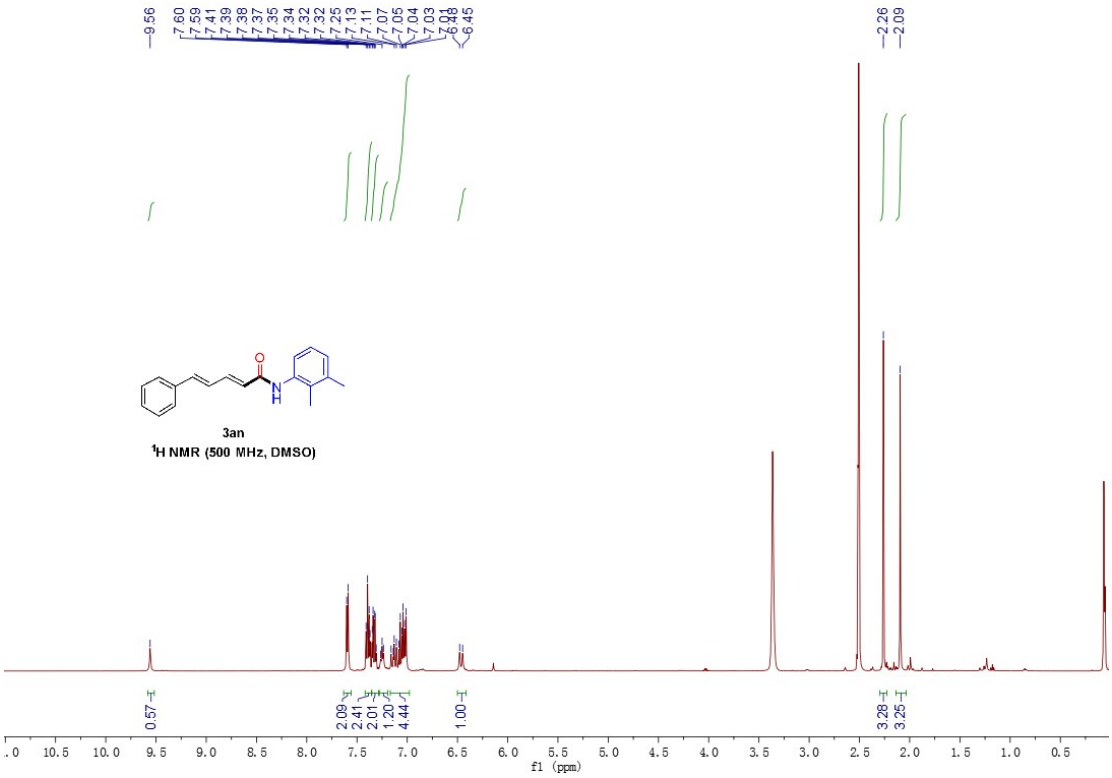


Figure S31. ^{1}H NMR (500 MHz, DMSO) spectrum of 3an

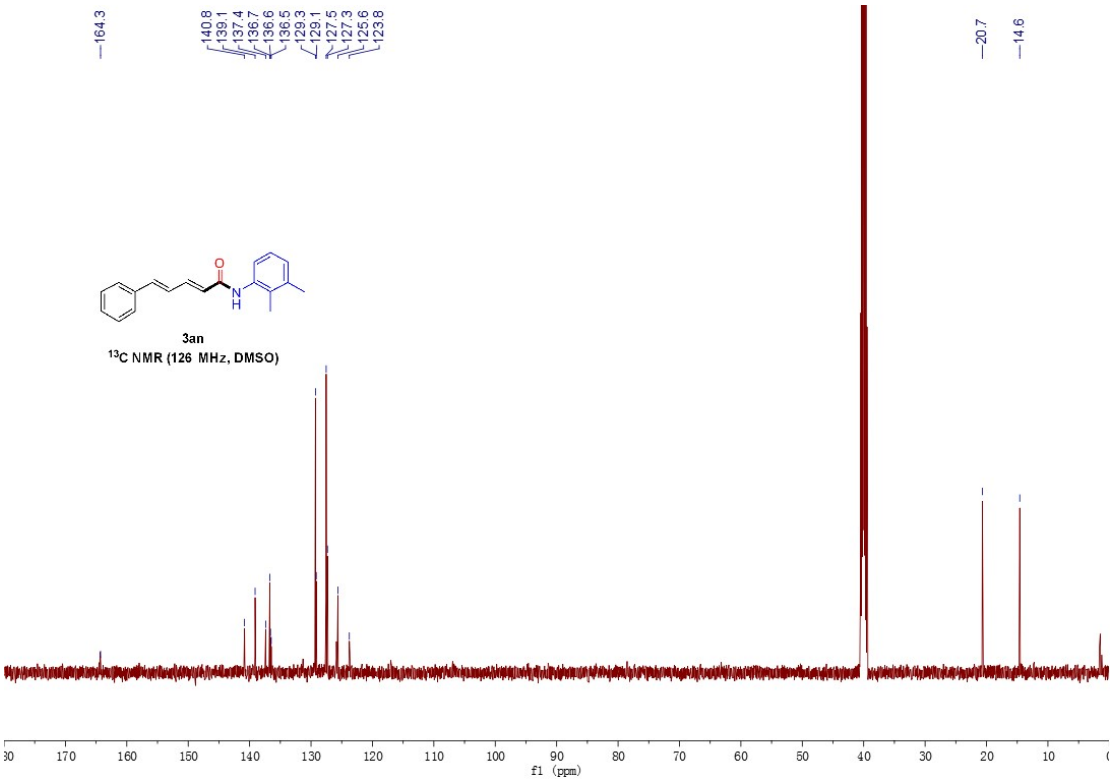


Figure S32. ^{13}C NMR (126 MHz, DMSO) spectrum of 3an

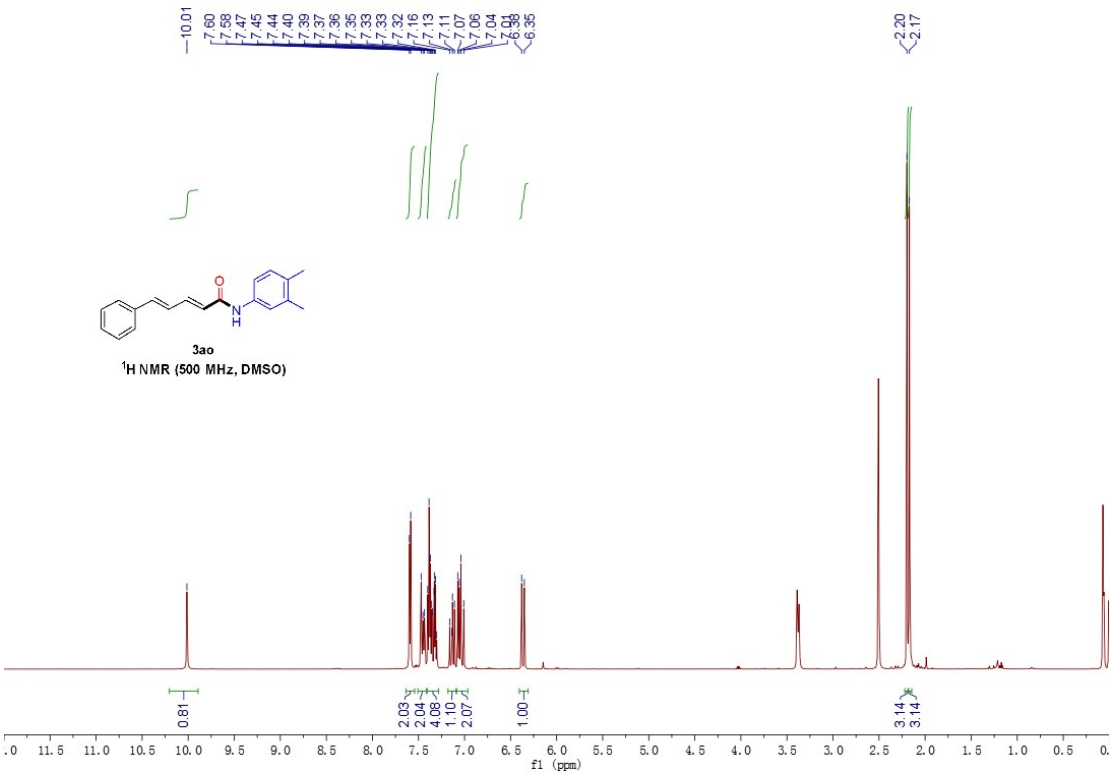


Figure S33. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ao

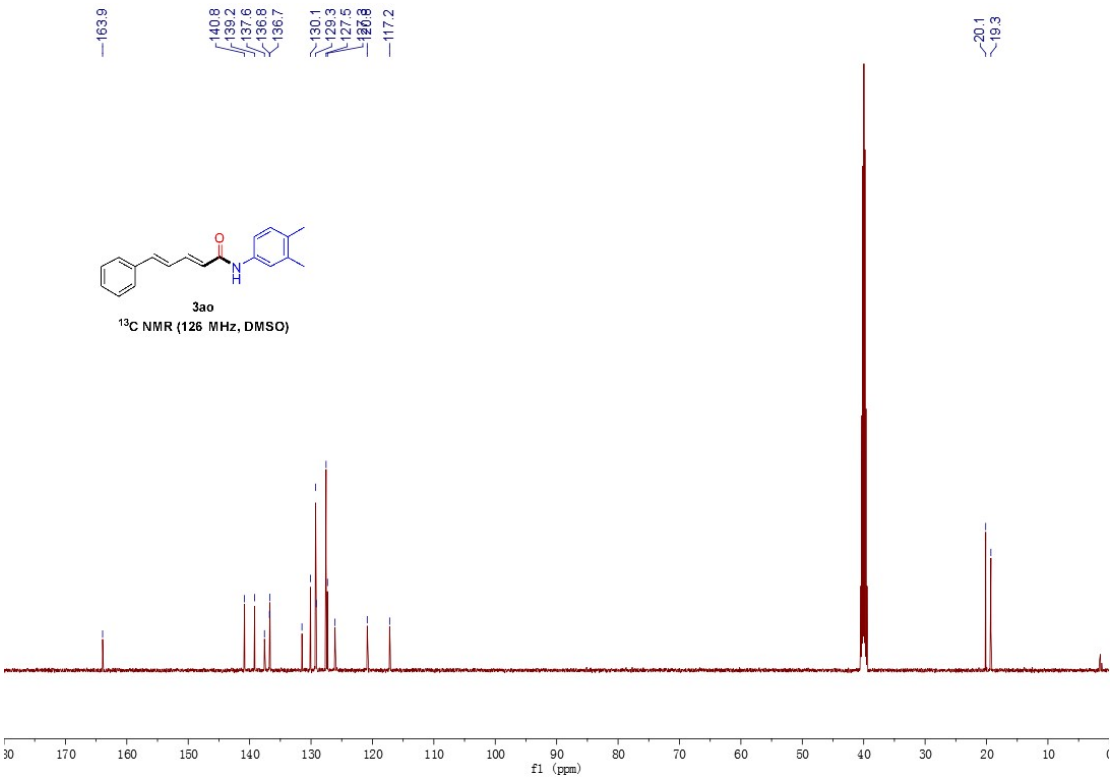


Figure S34. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ao

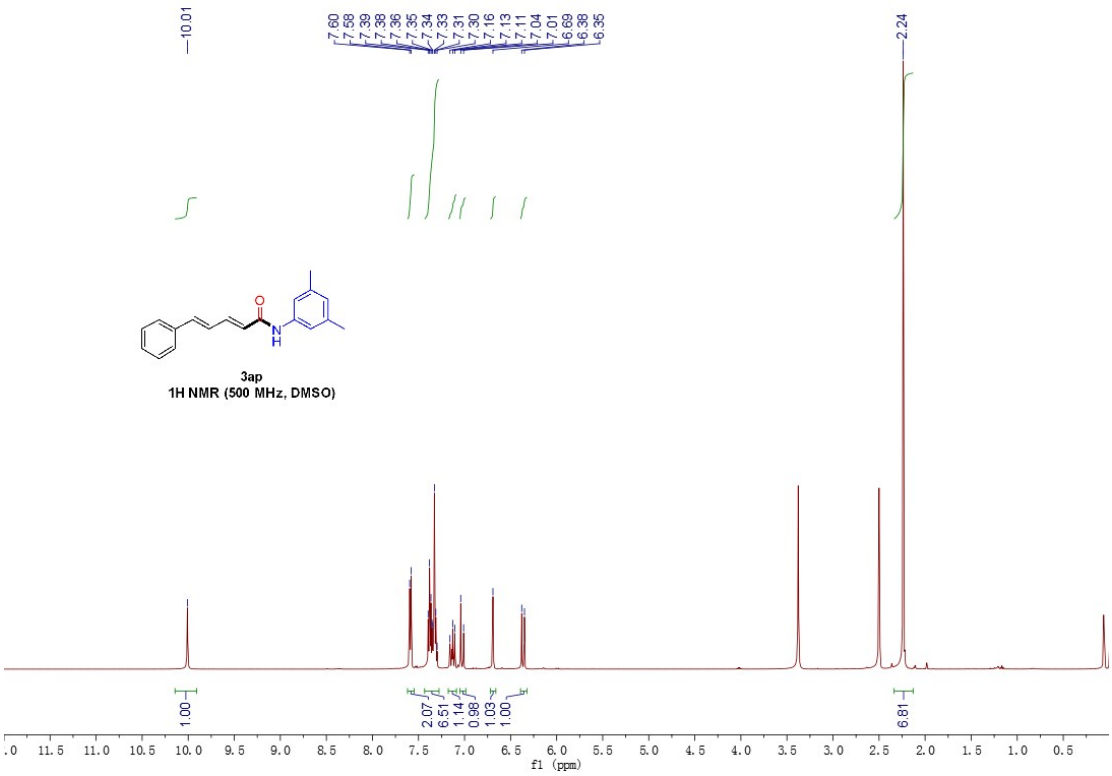


Figure S35. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ap

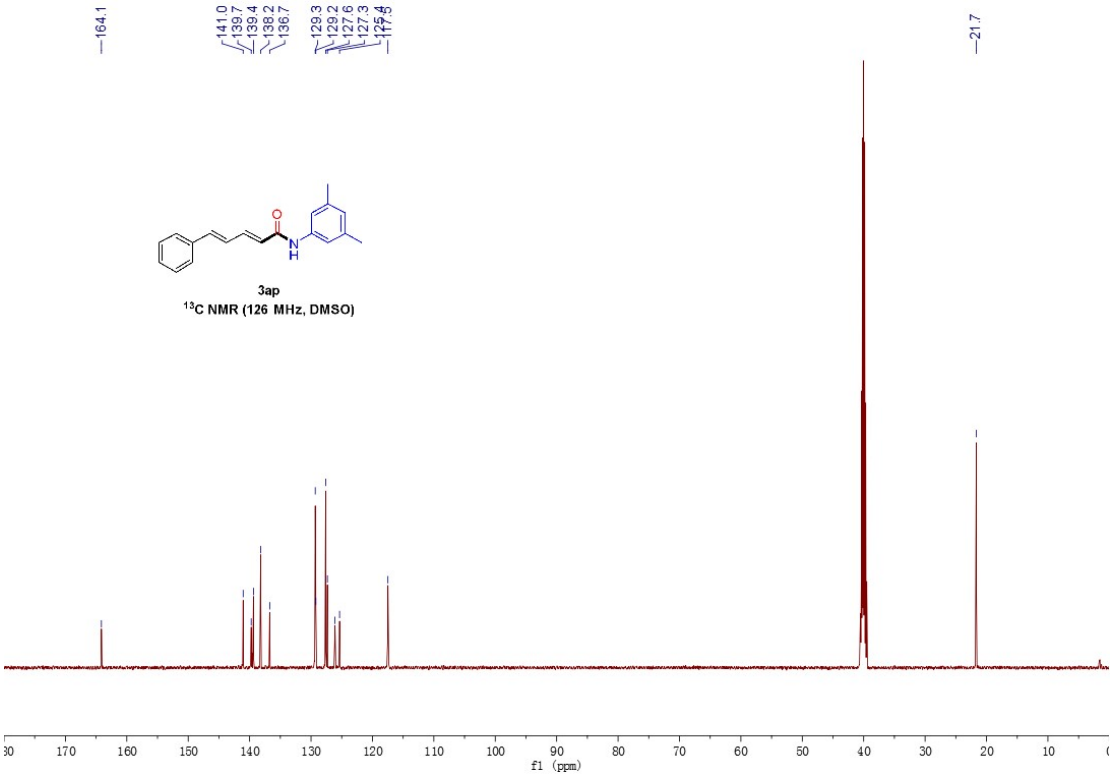


Figure S36. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ap

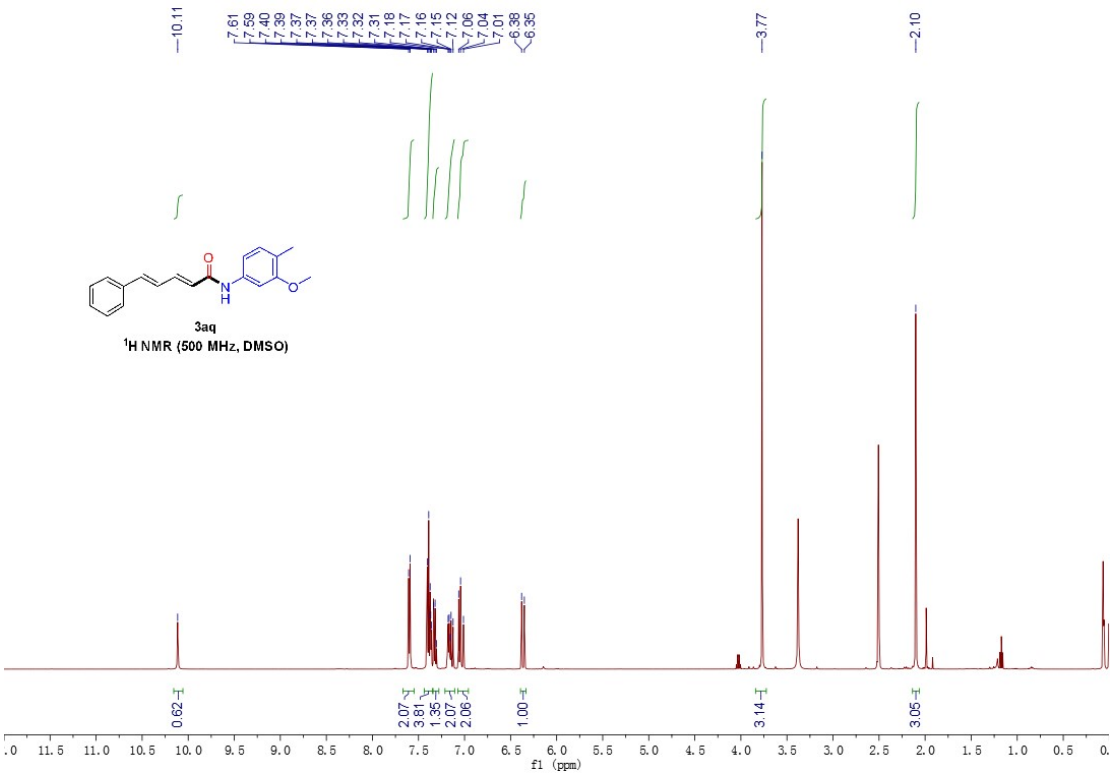


Figure S37. ^{1}H NMR (500 MHz, DMSO) spectrum of 3aq

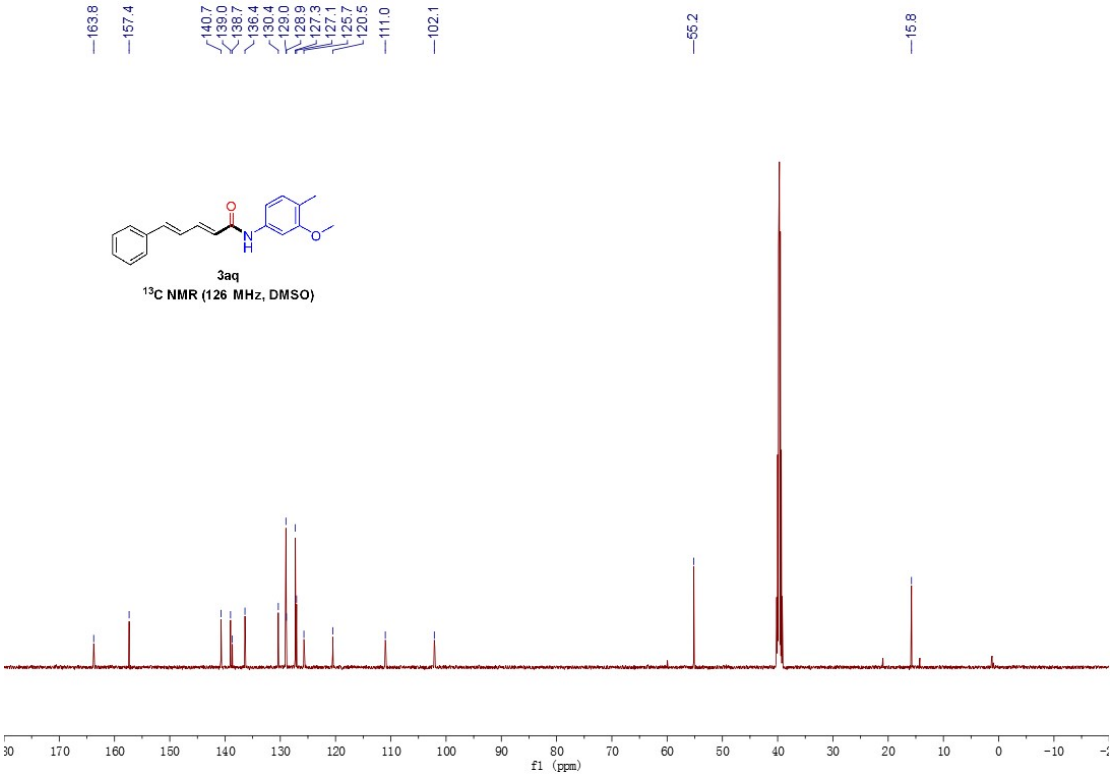


Figure S38. ^{13}C NMR (126 MHz, DMSO) spectrum of 3aq

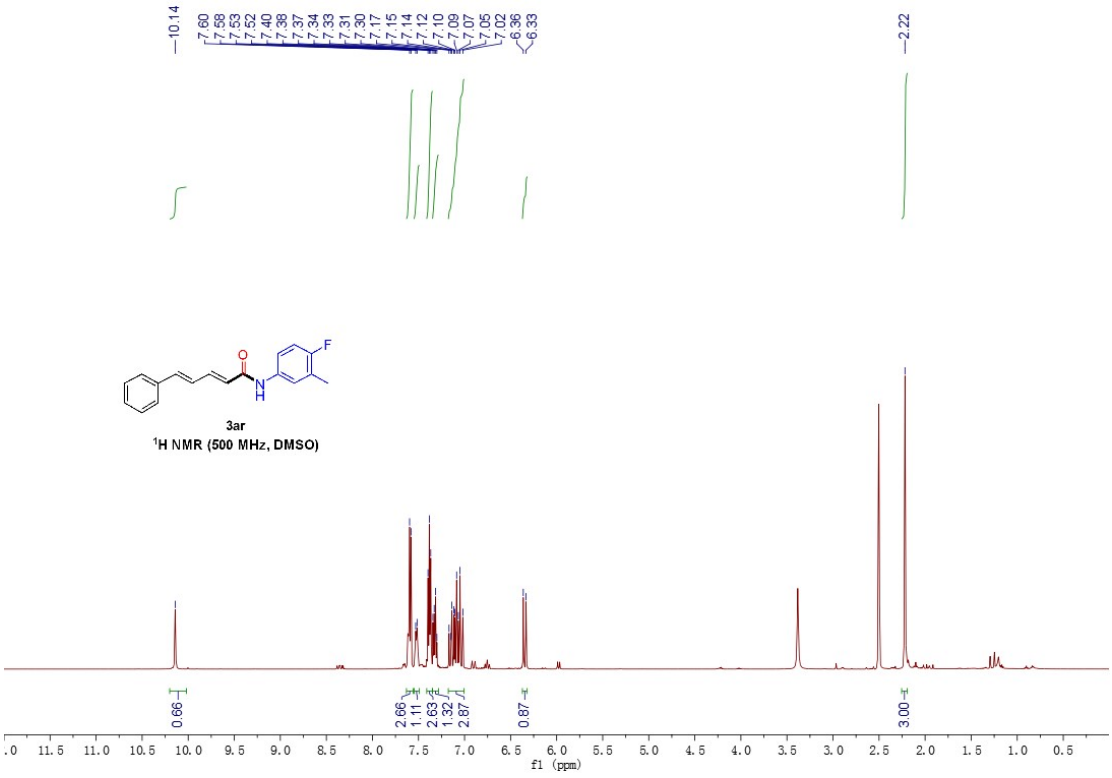


Figure S39. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ar

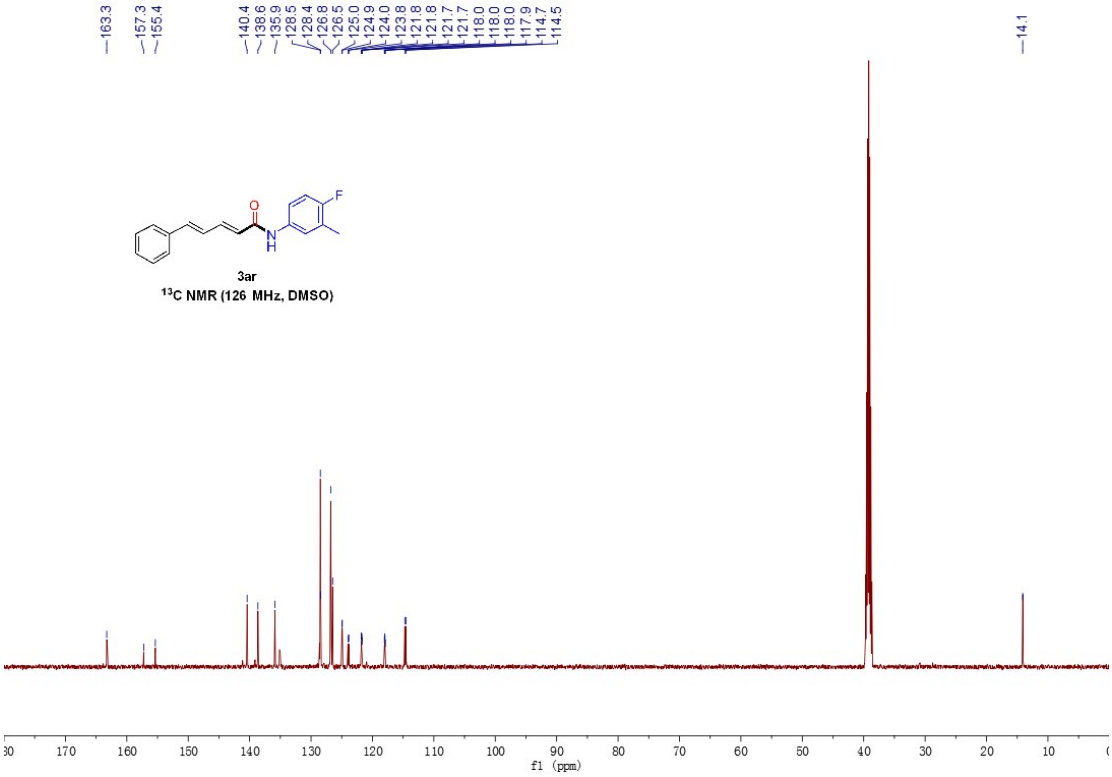


Figure S40. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ar

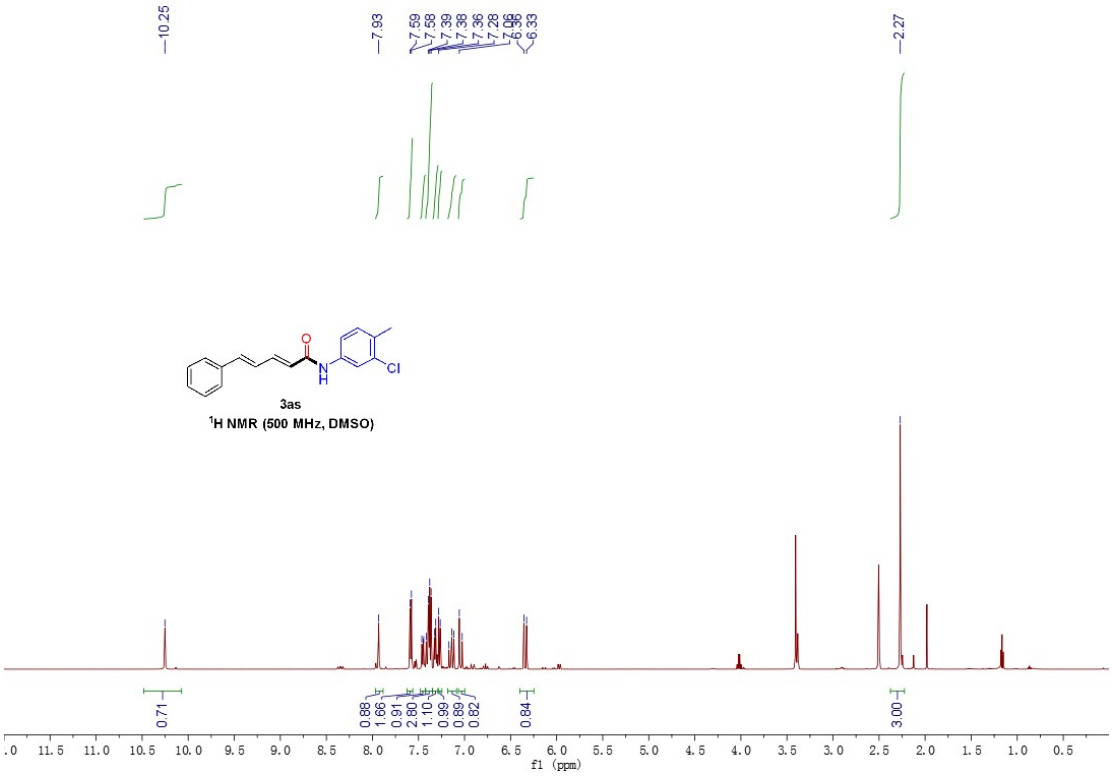


Figure S41. ^{1}H NMR (500 MHz, DMSO) spectrum of 3as

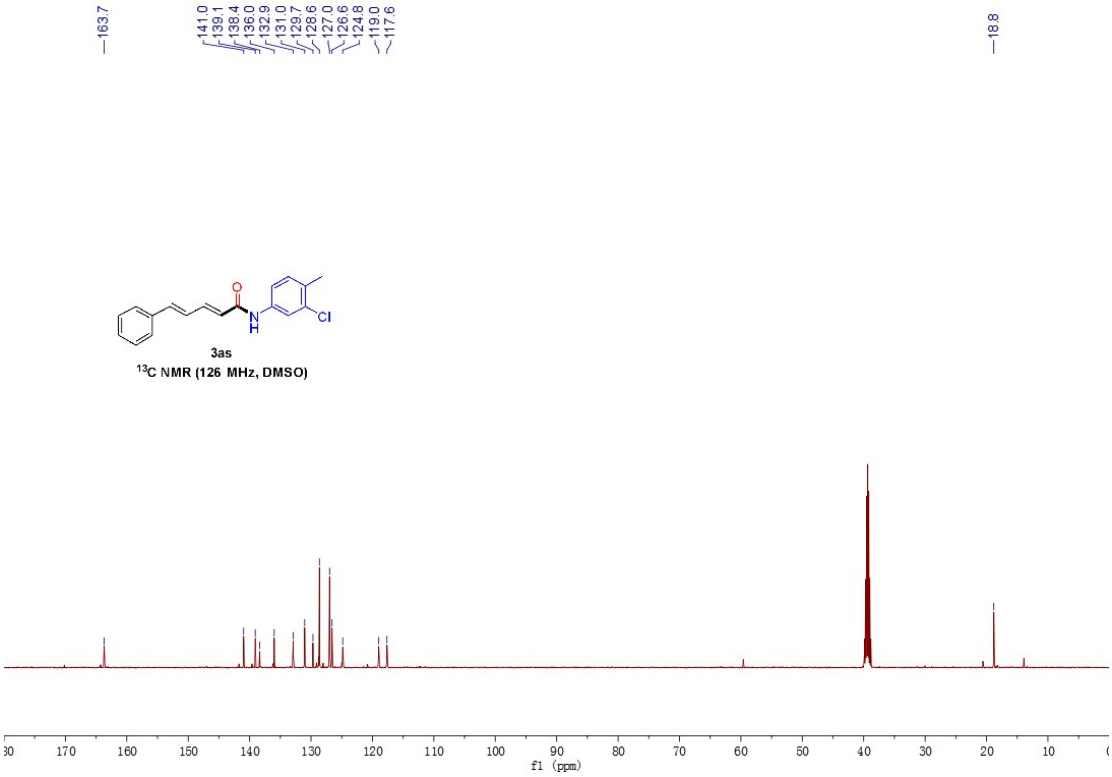


Figure S42. ^{13}C NMR (126 MHz, DMSO) spectrum of 3as

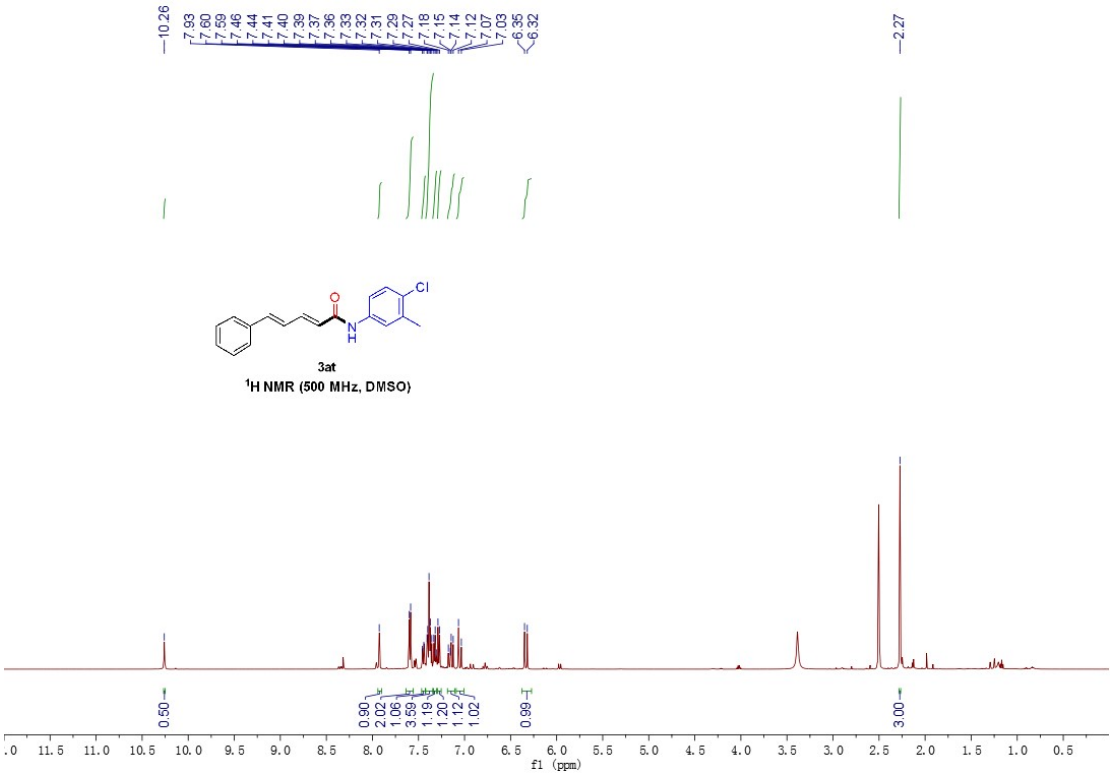


Figure S43. ^{1}H NMR (500 MHz, DMSO) spectrum of 3at

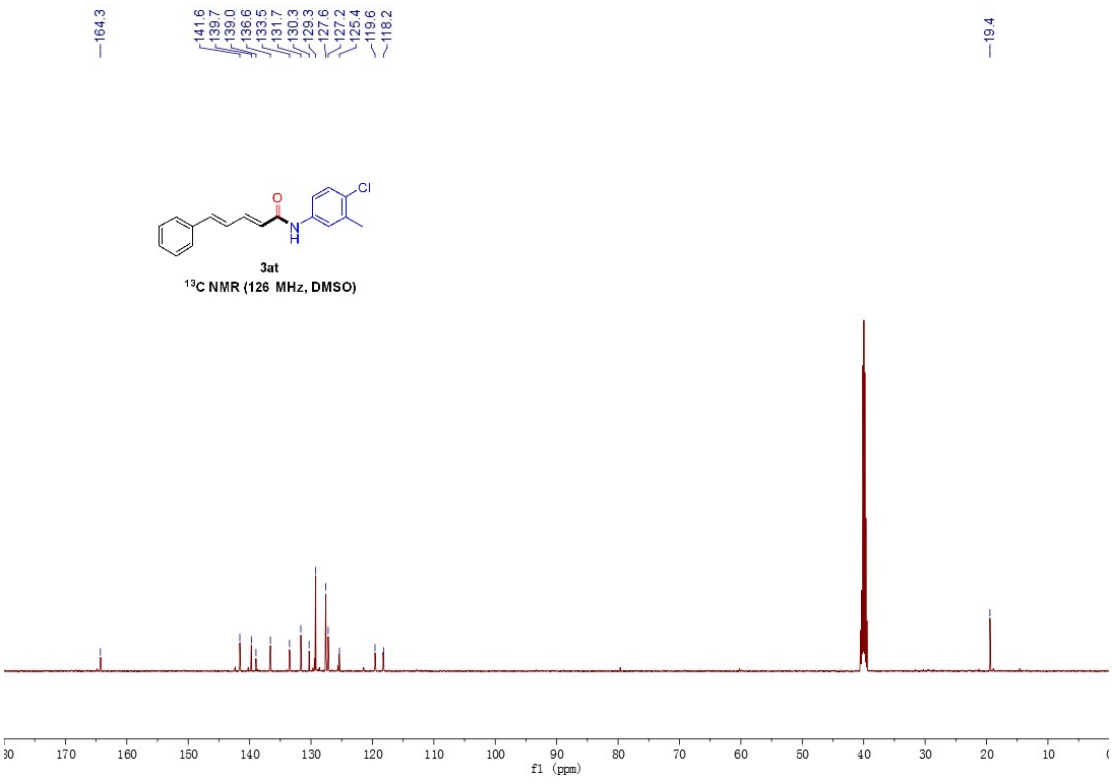


Figure S44. ^{13}C NMR (126 MHz, DMSO) spectrum of 3at

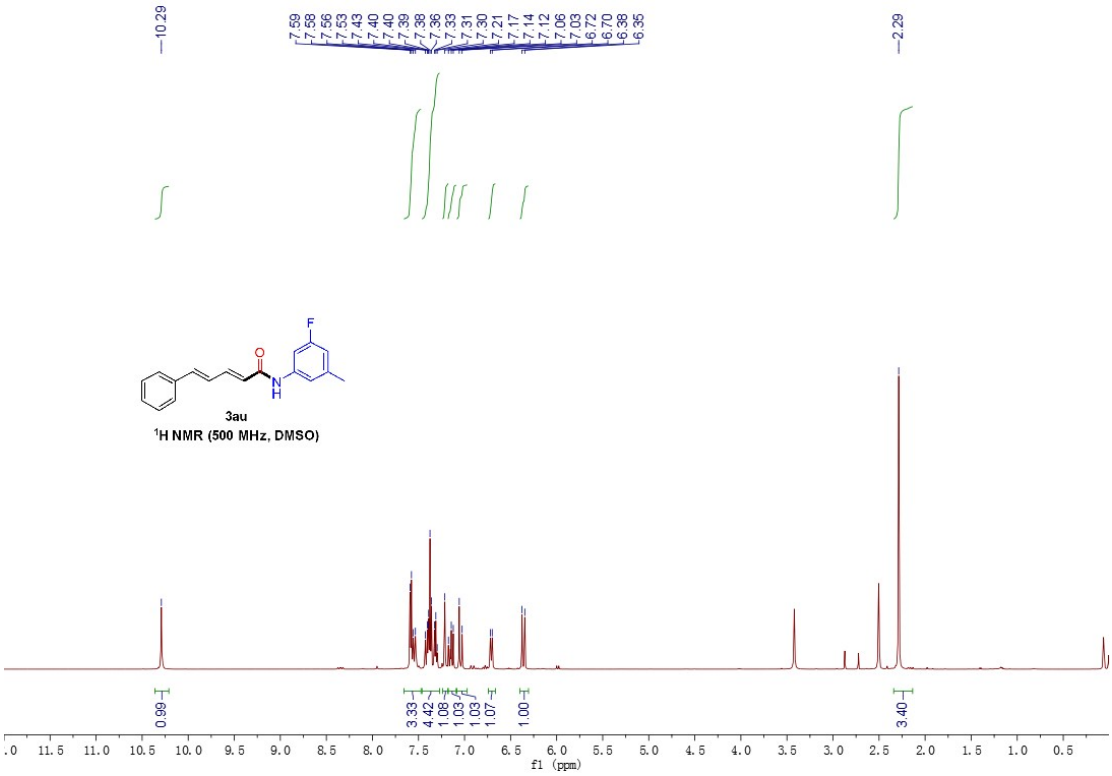


Figure S45. ^{1}H NMR (500 MHz, DMSO) spectrum of 3au

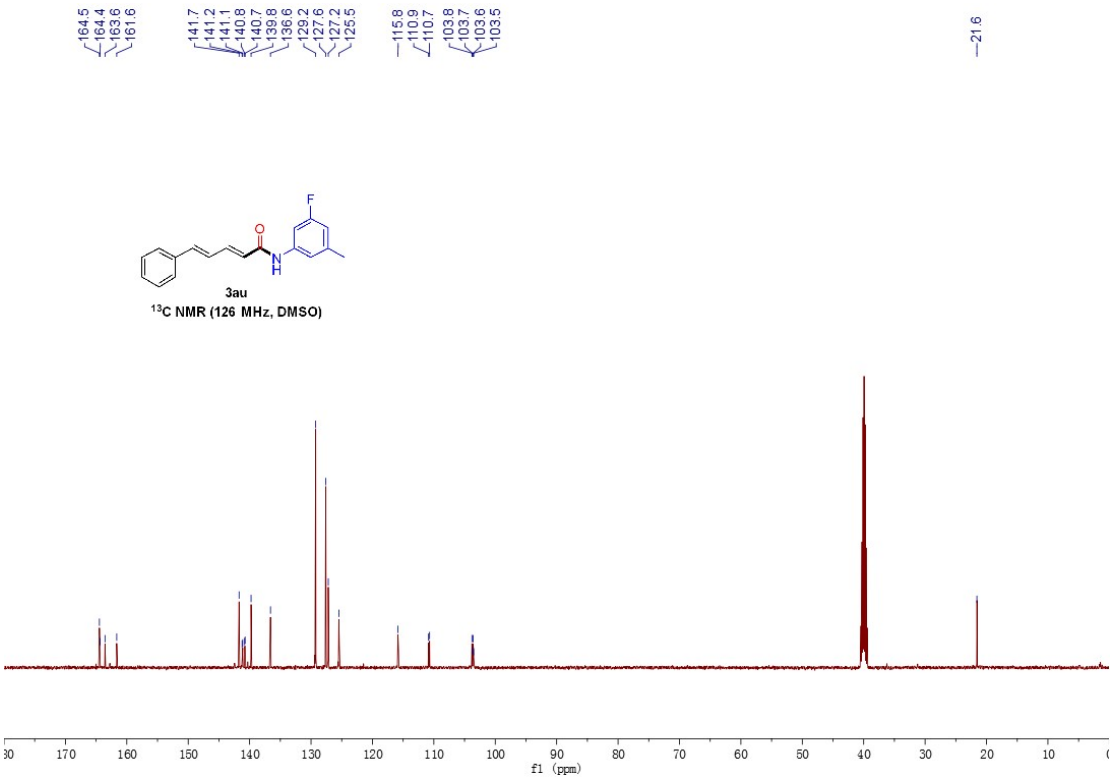


Figure S46. ^{13}C NMR (126 MHz, DMSO) spectrum of 3au

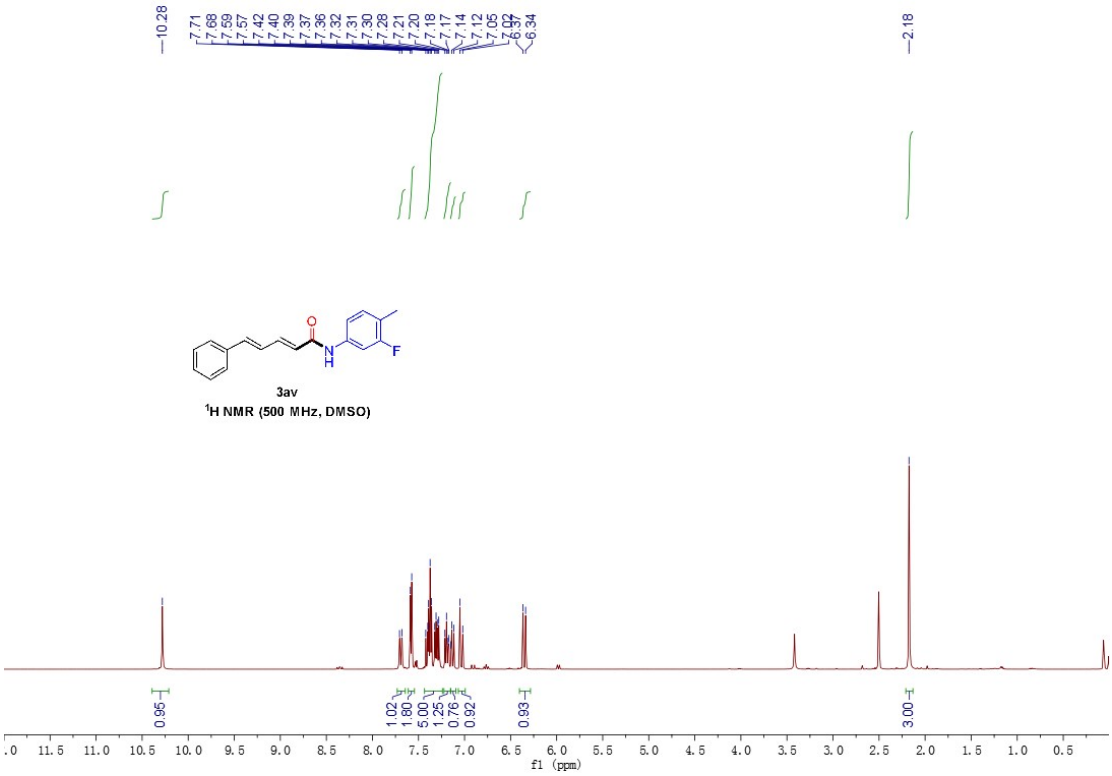


Figure S47. ^{1}H NMR (500 MHz, DMSO) spectrum of 3av

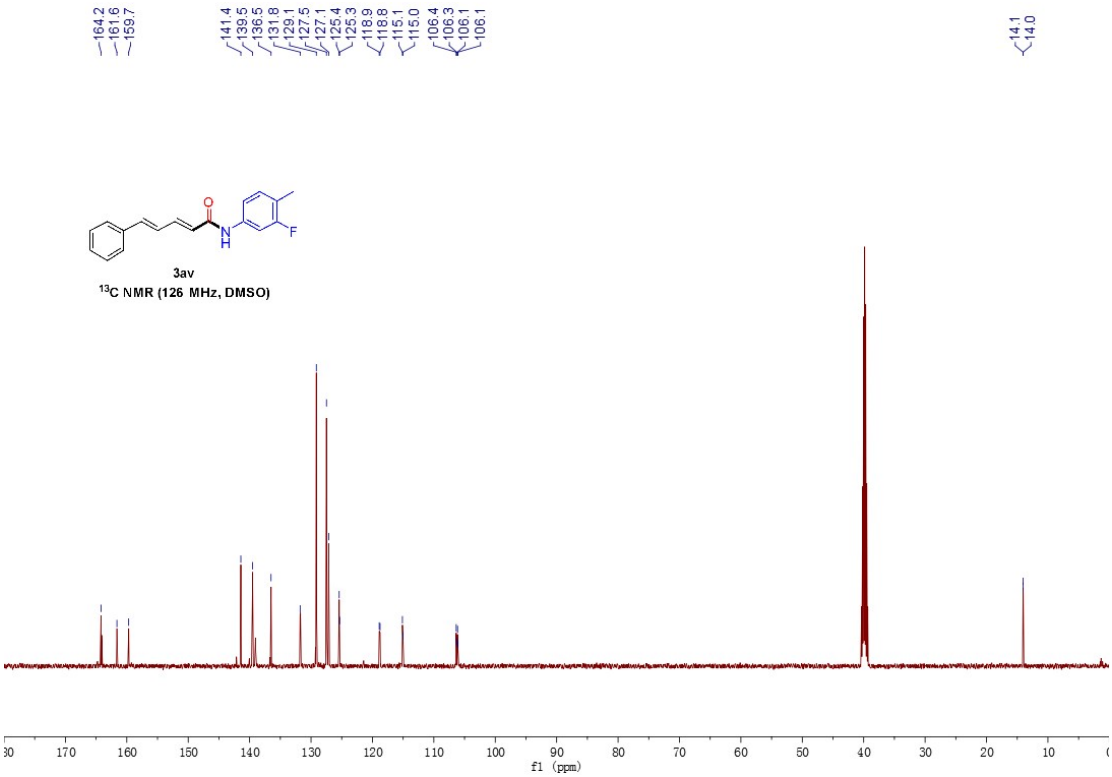


Figure S48. ^{13}C NMR (126 MHz, DMSO) spectrum of 3av

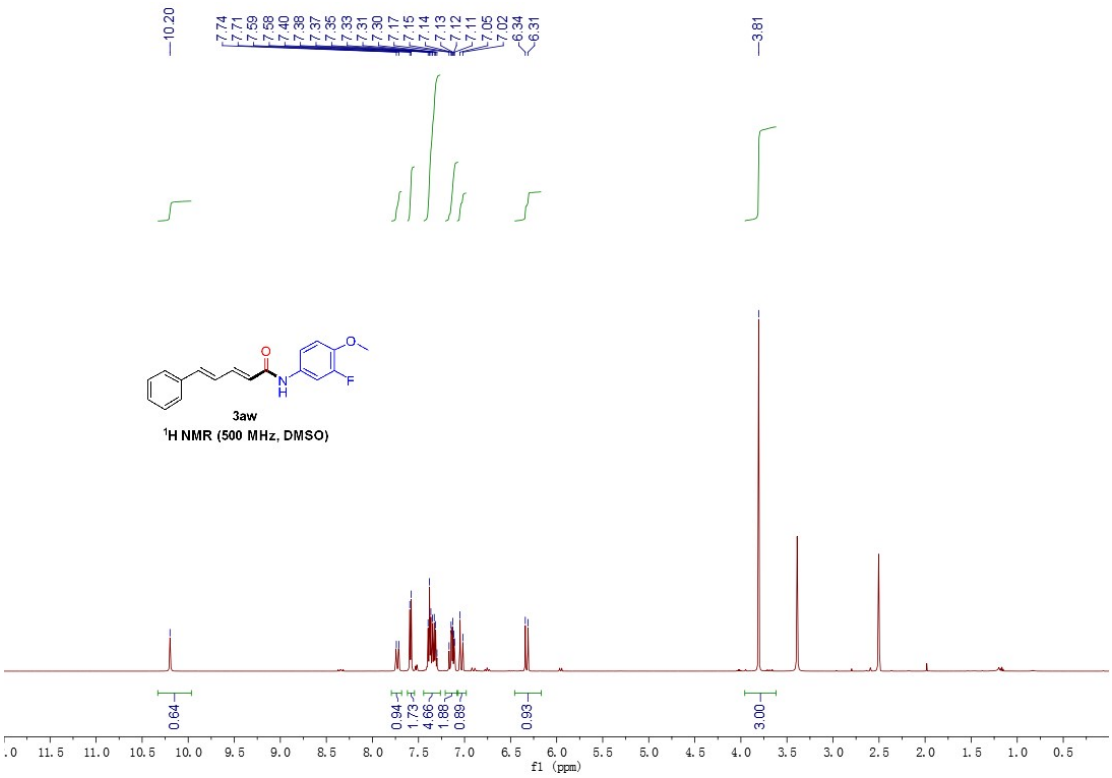


Figure S49. ^{1}H NMR (500 MHz, DMSO) spectrum of 3aw

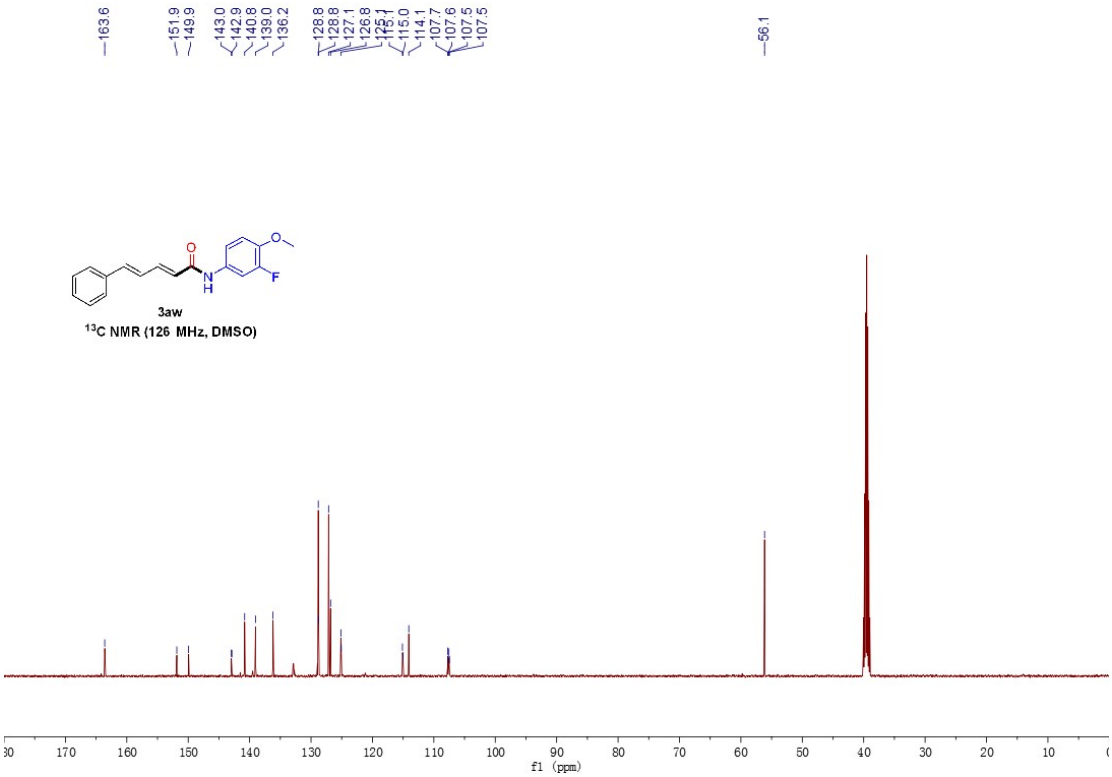


Figure S50. ^{13}C NMR (126 MHz, DMSO) spectrum of 3aw

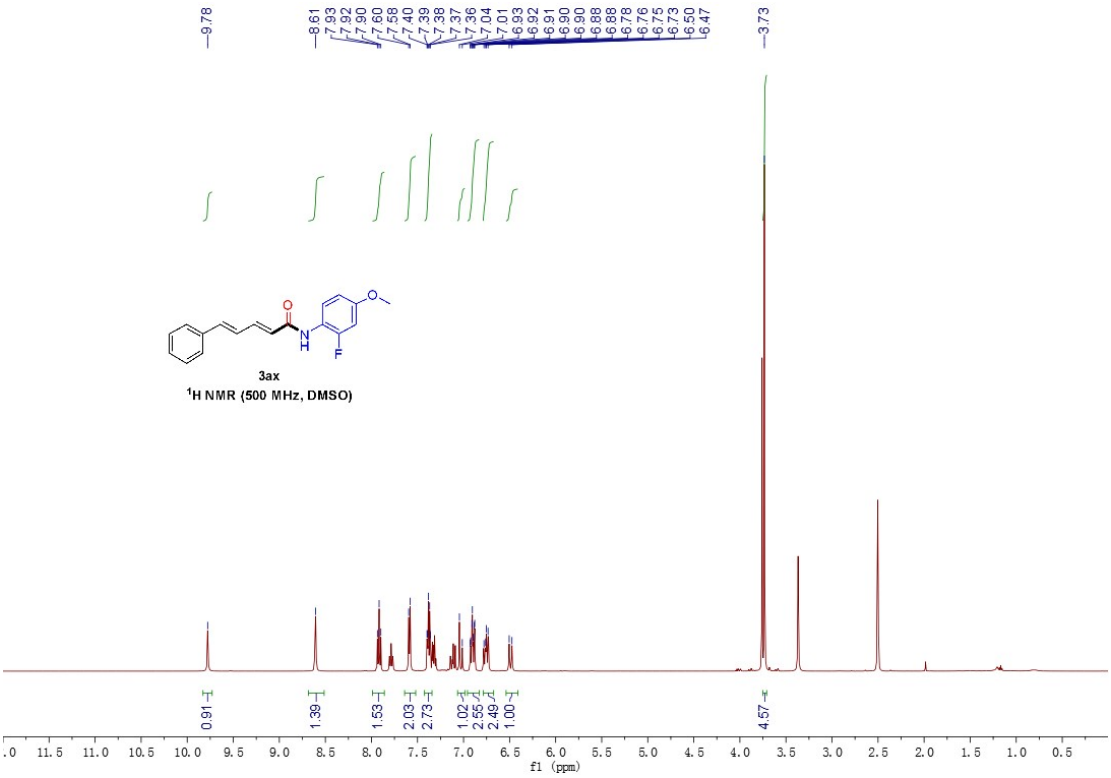


Figure S51. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ax

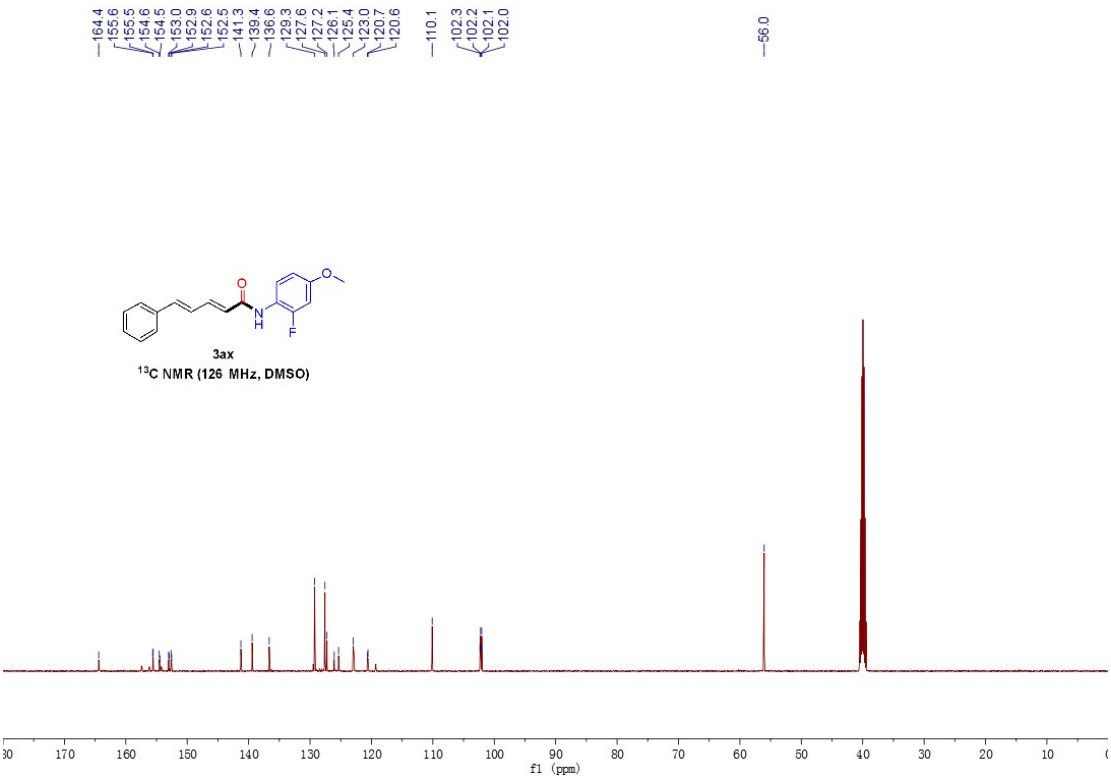


Figure S52. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ax

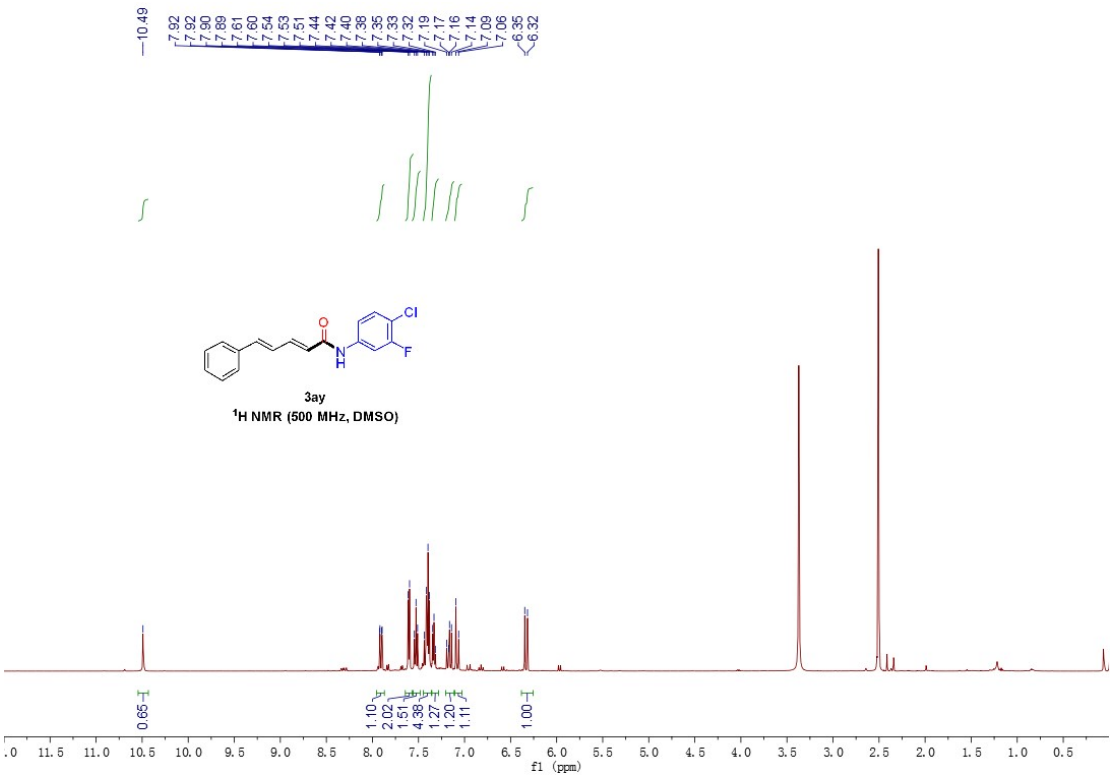


Figure S53. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ay

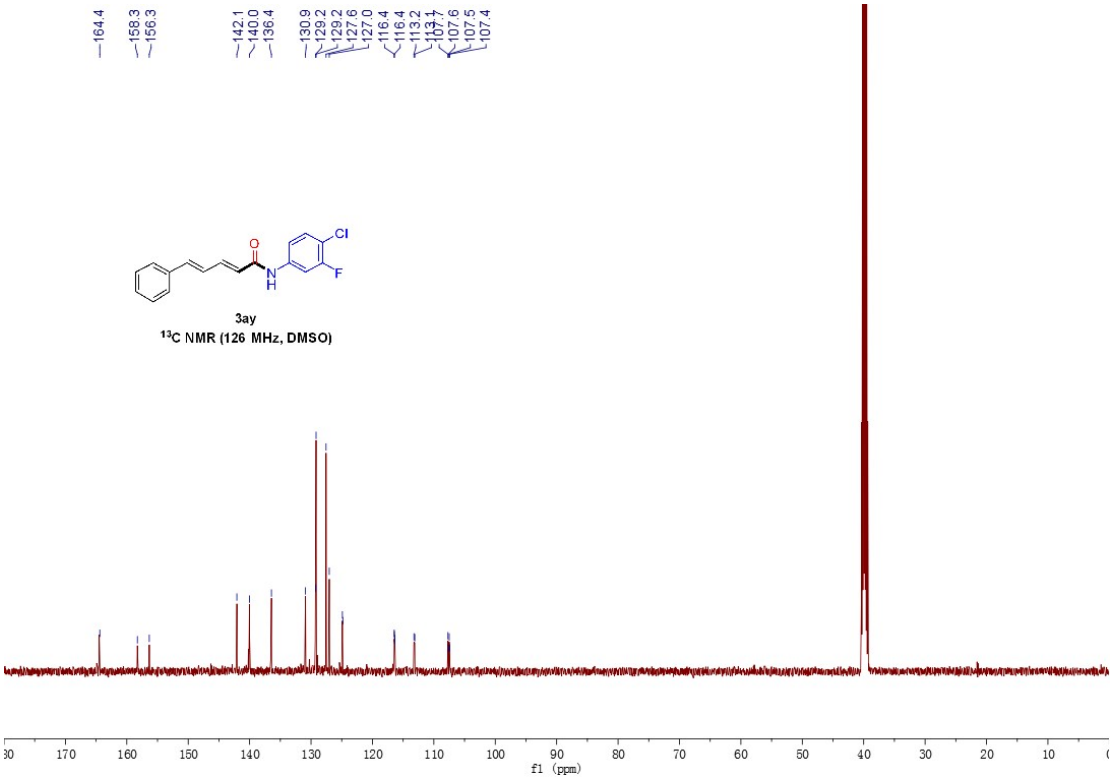


Figure S54. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ay

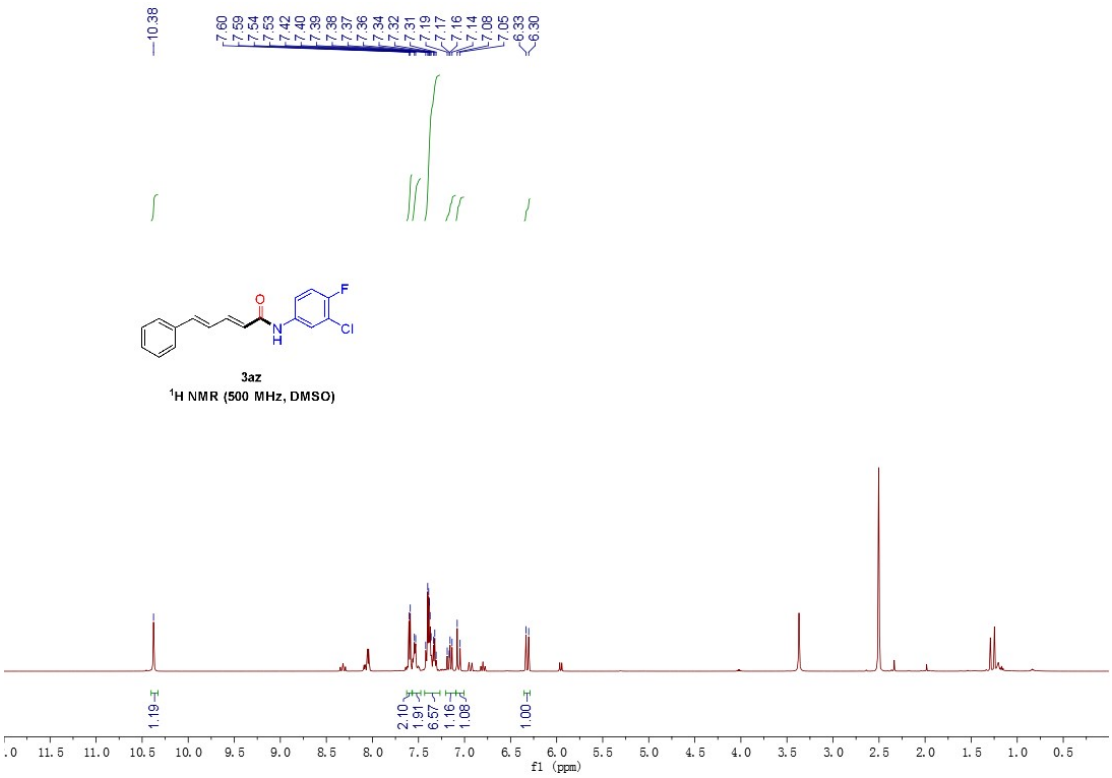


Figure S55. ^{1}H NMR (500 MHz, DMSO) spectrum of 3az

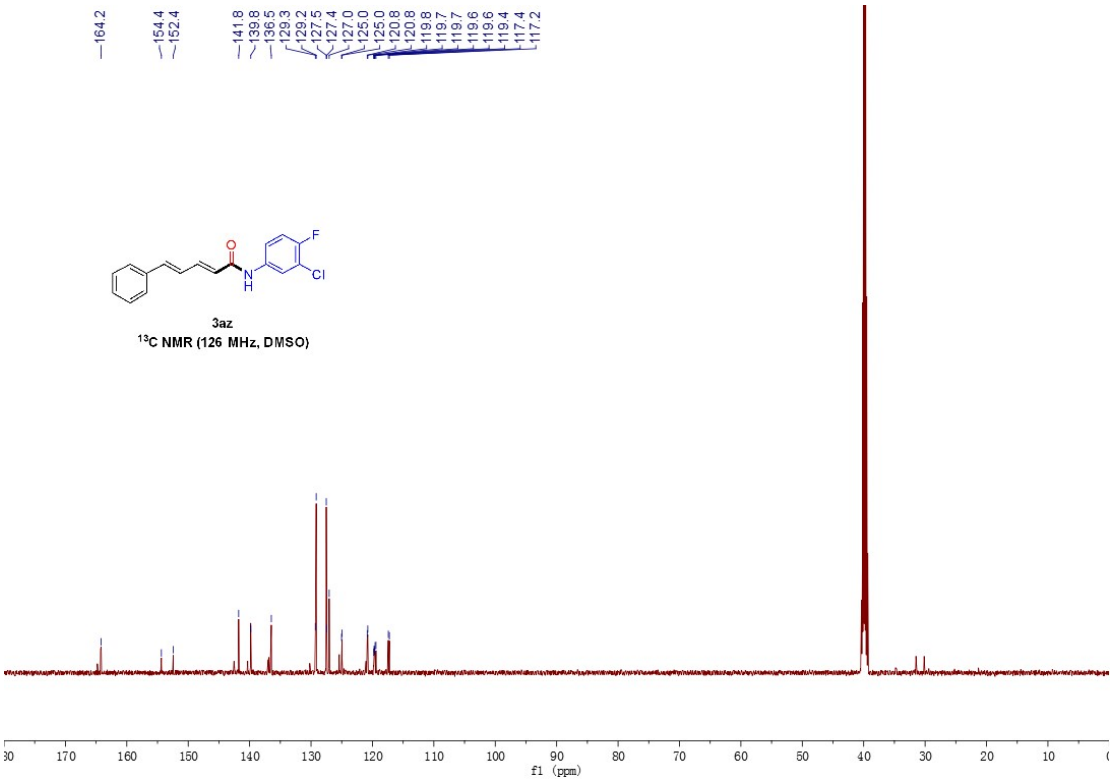


Figure S56. ^{13}C NMR (126 MHz, DMSO) spectrum of 3az

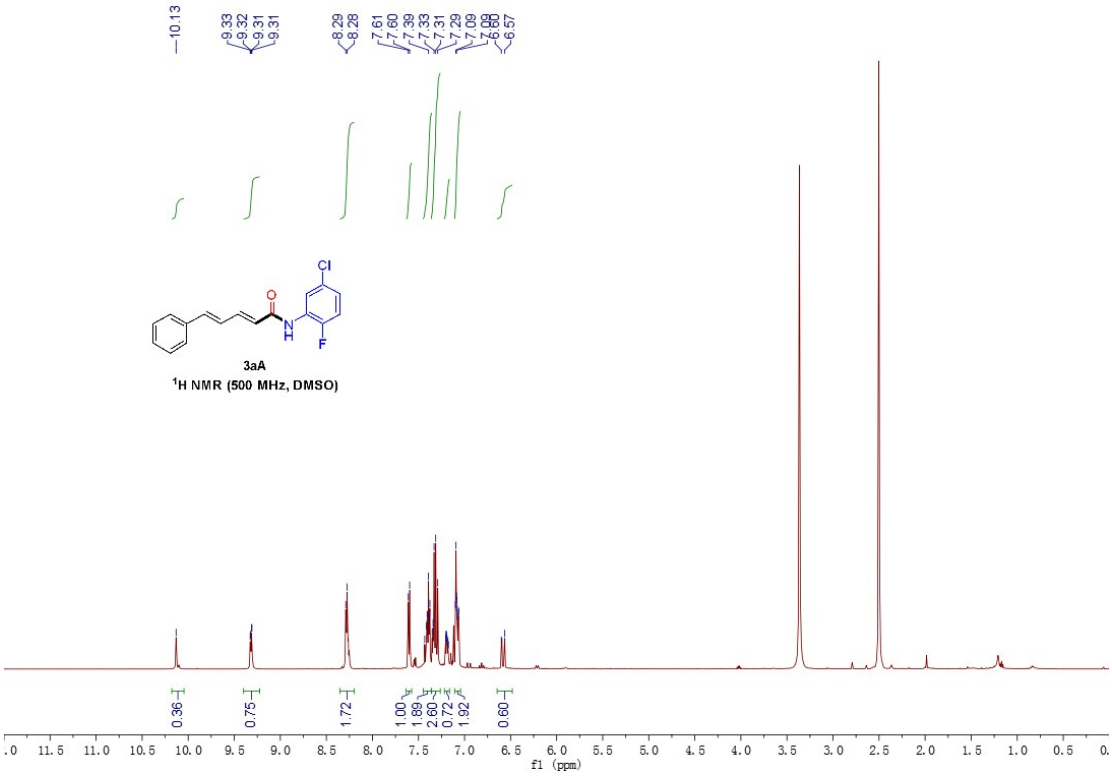


Figure S57. ^{1}H NMR (500 MHz, DMSO) spectrum of 3aA

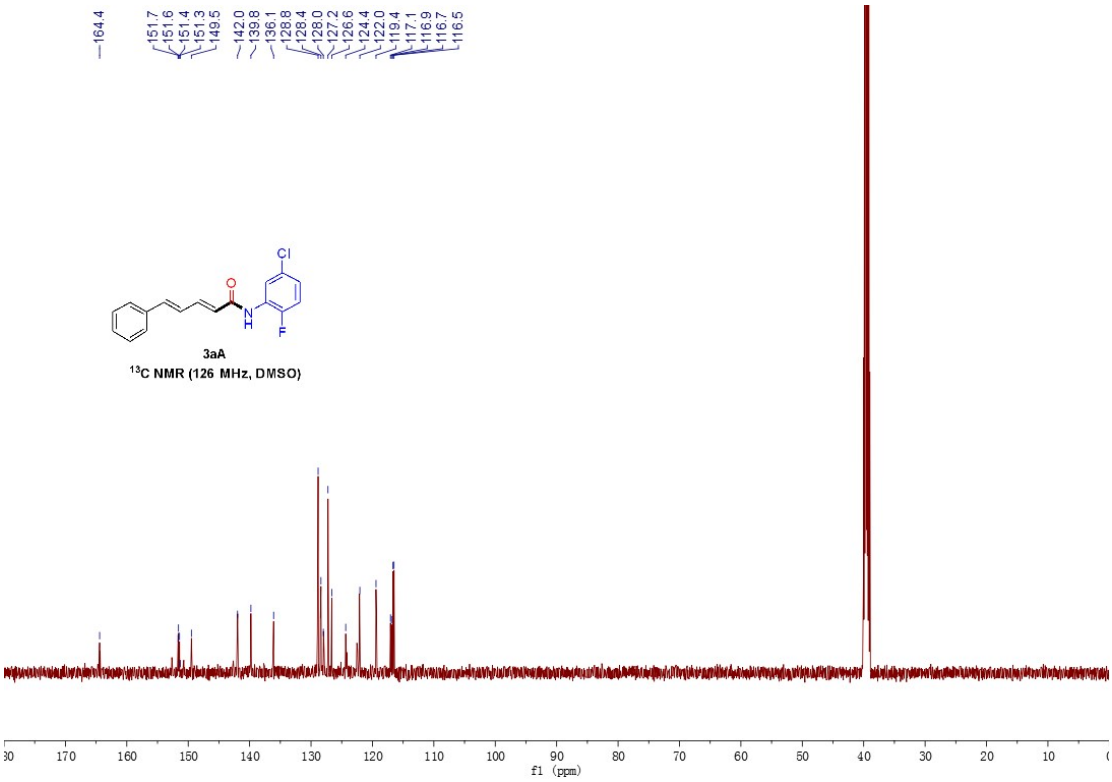


Figure S58. ^{13}C NMR (126 MHz, DMSO) spectrum of 3aA

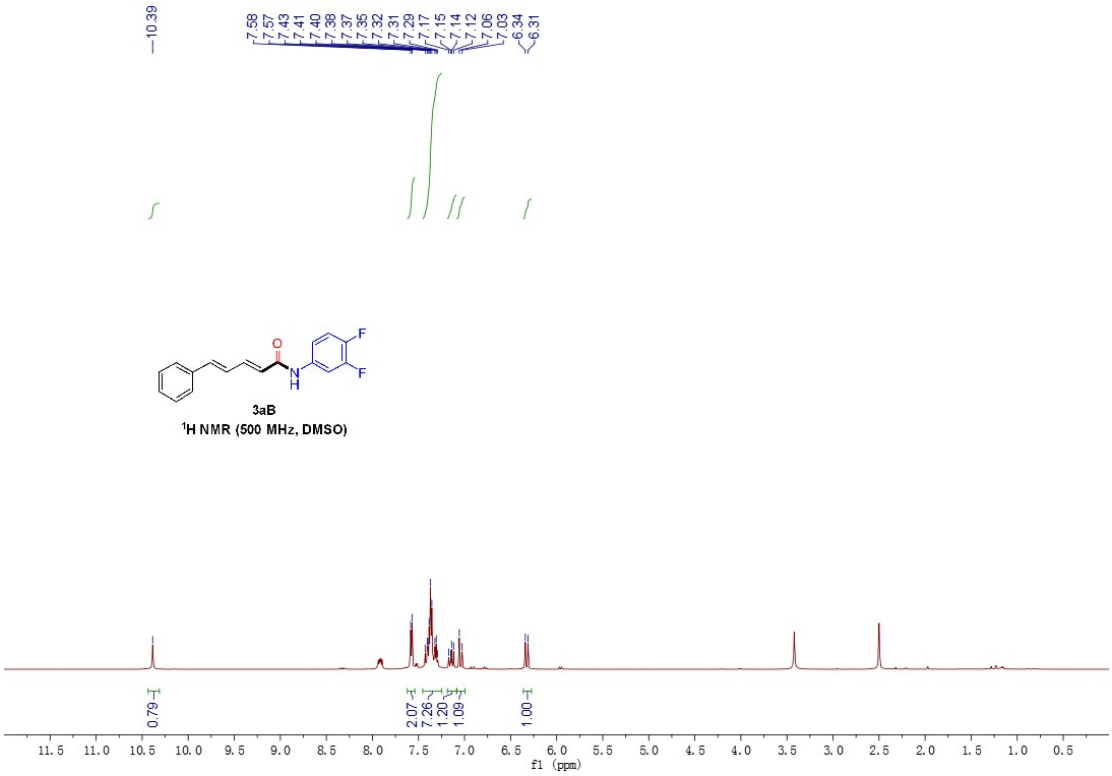


Figure S59. ^{1}H NMR (500 MHz, DMSO) spectrum of 3aB

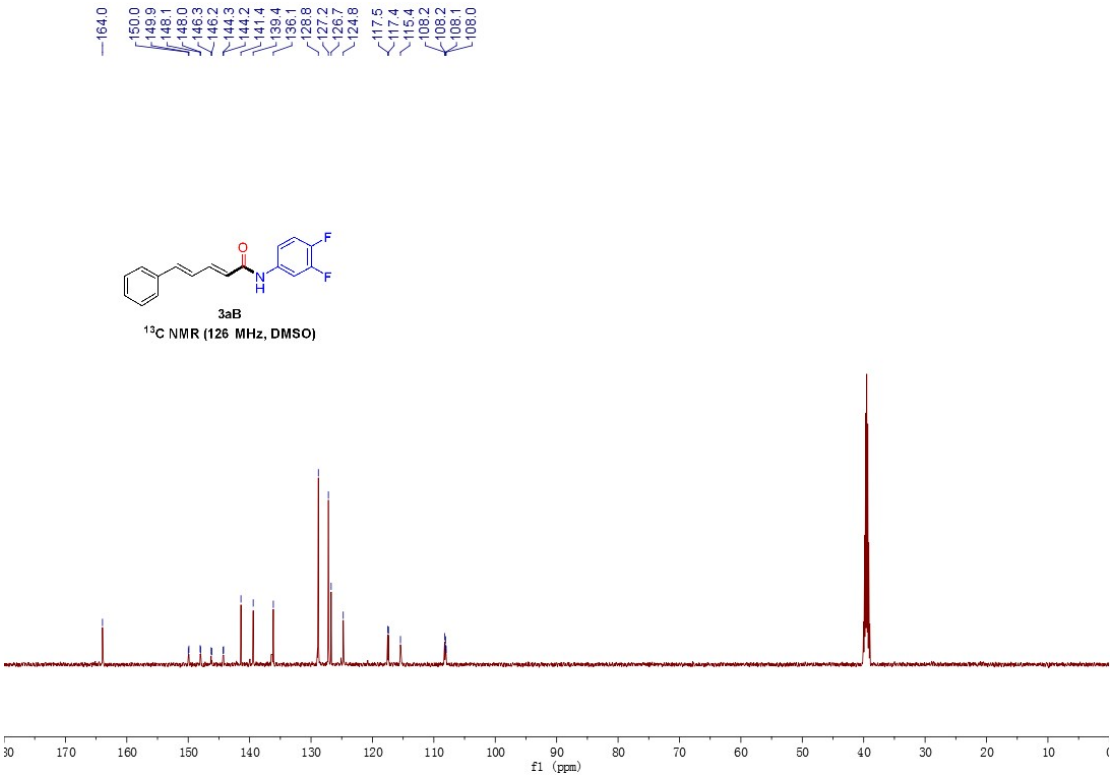


Figure S60. ^{13}C NMR (126 MHz, DMSO) spectrum of 3aB

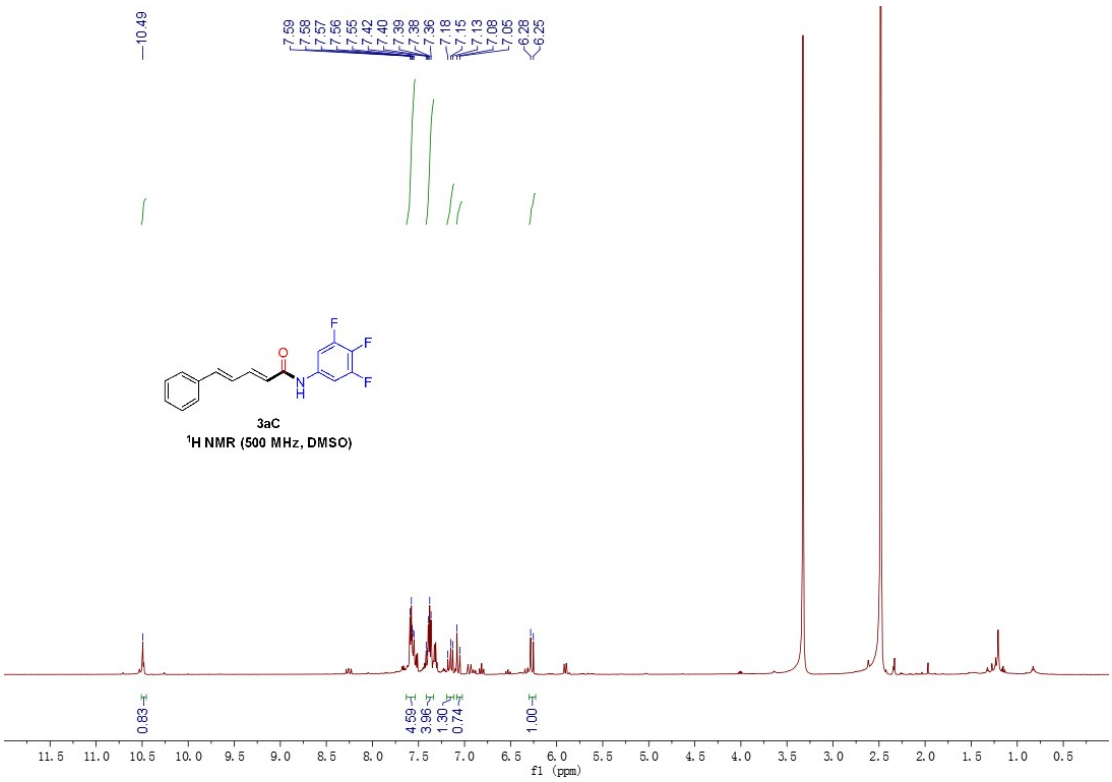


Figure S61. ^{1}H NMR (500 MHz, DMSO) spectrum of 3aC

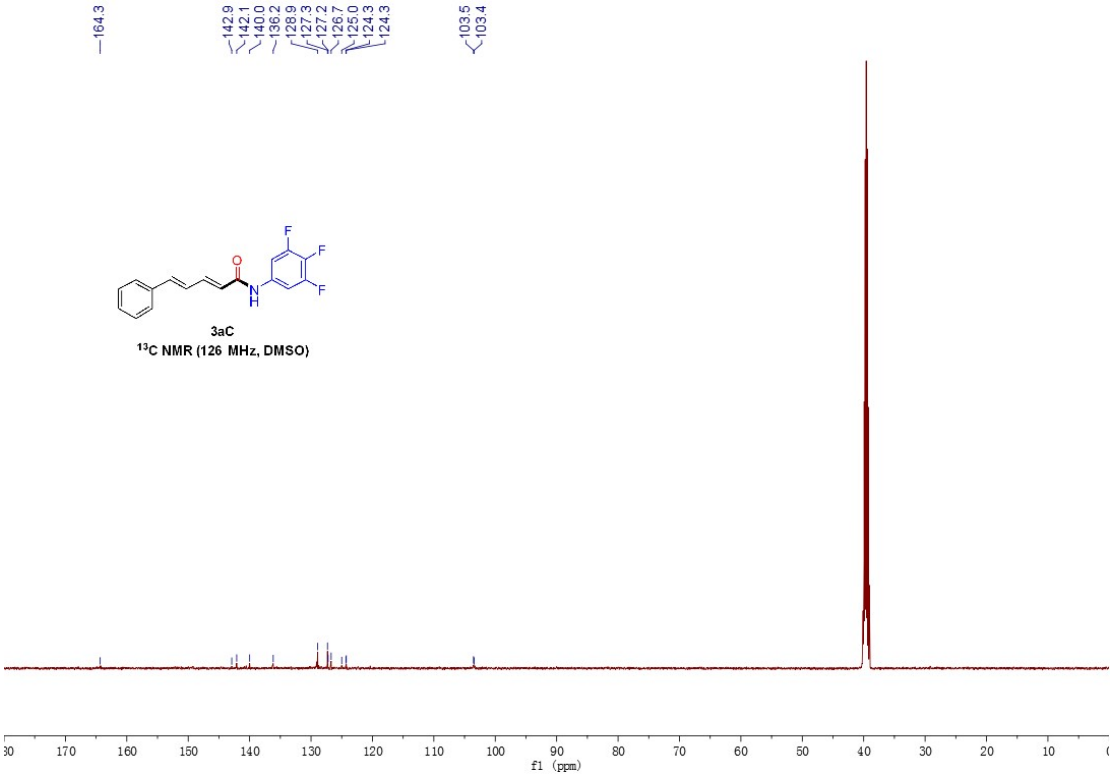


Figure S62. ^{13}C NMR (126 MHz, DMSO) spectrum of 3aC

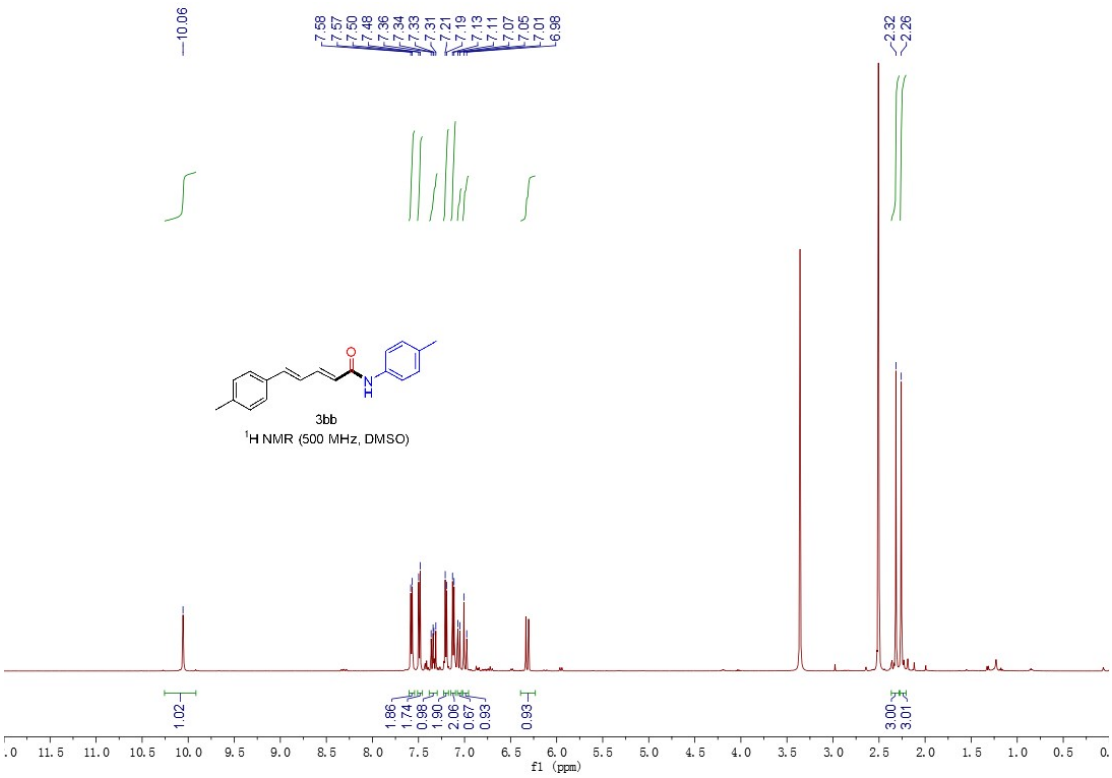


Figure S63. ^{1}H NMR (500 MHz, DMSO) spectrum of 3bb

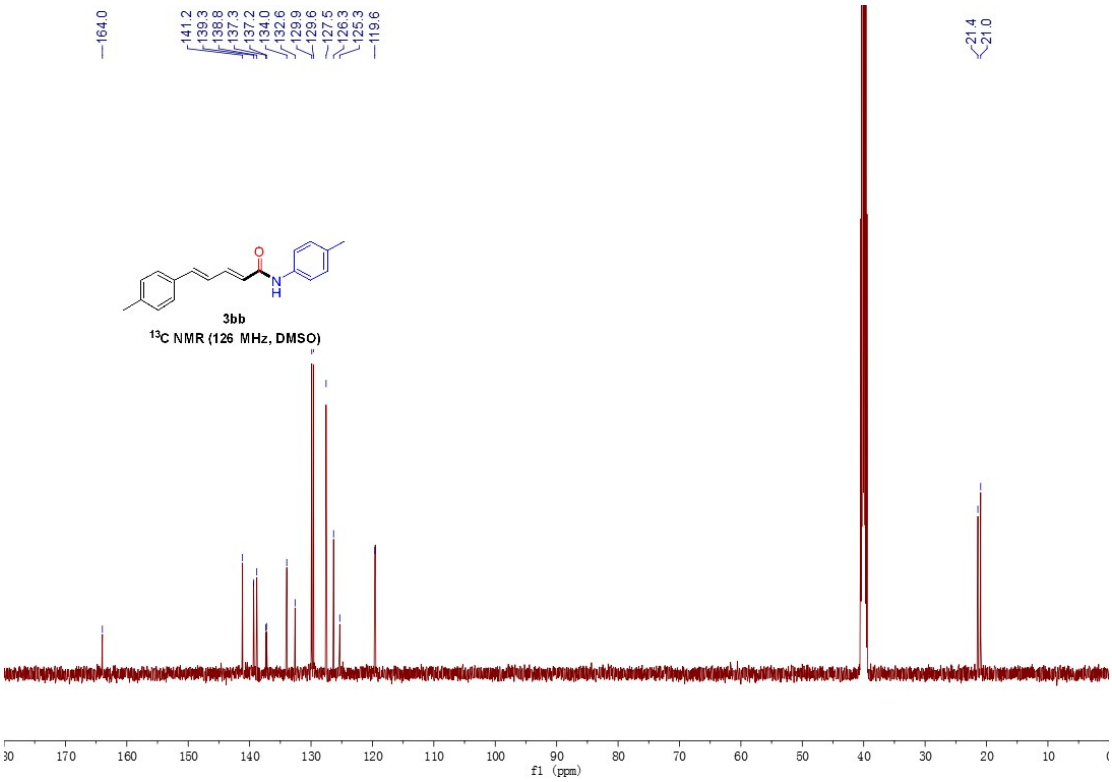


Figure S64. ^{13}C NMR (126 MHz, DMSO) spectrum of 3bb

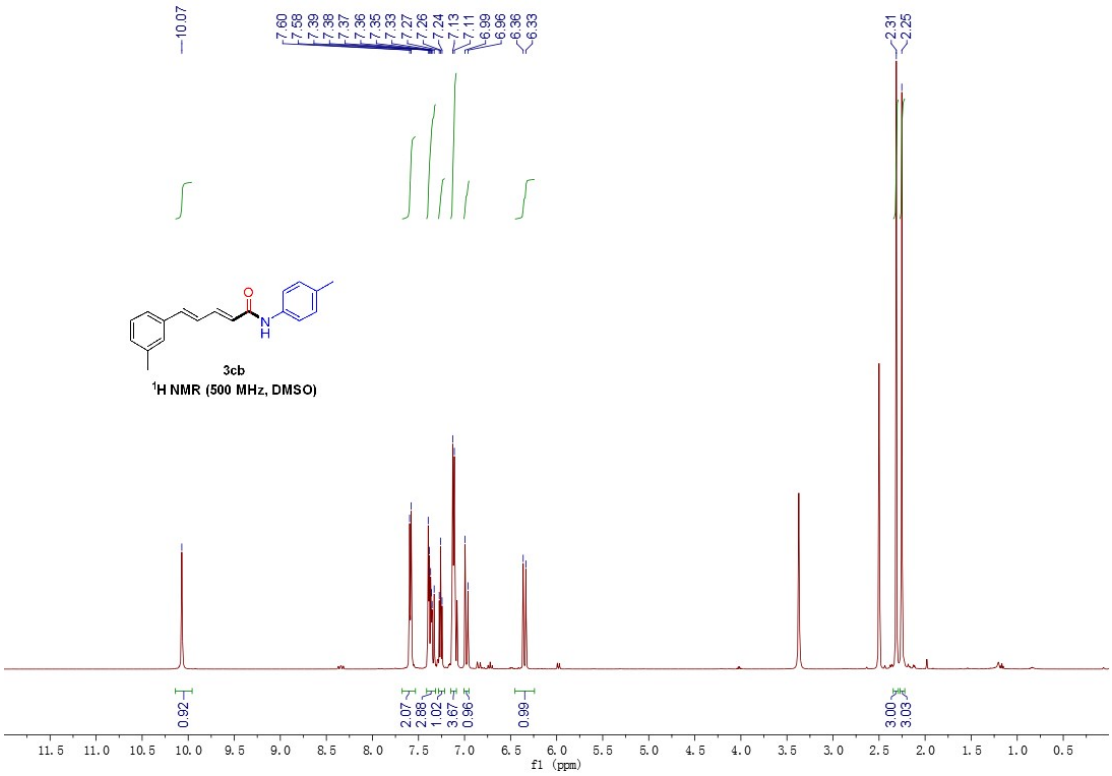


Figure S65. ^{1}H NMR (500 MHz, DMSO) spectrum of 3cb

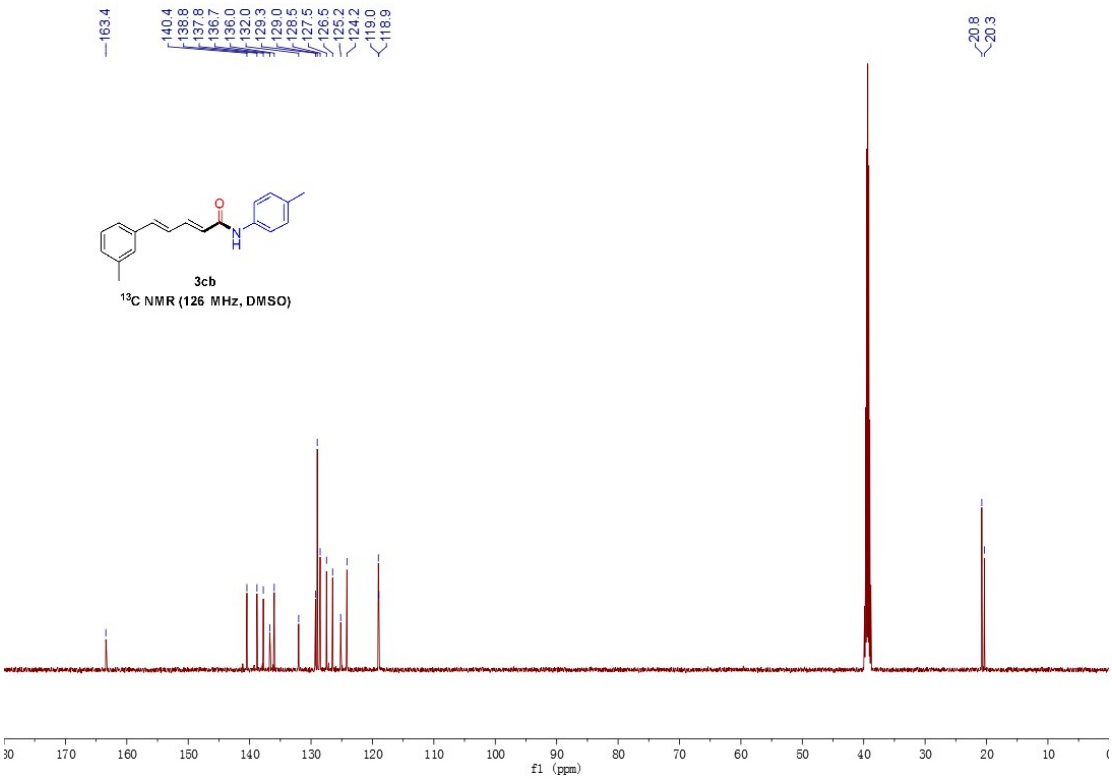


Figure S66. ^{13}C NMR (126 MHz, DMSO) spectrum of 3cb

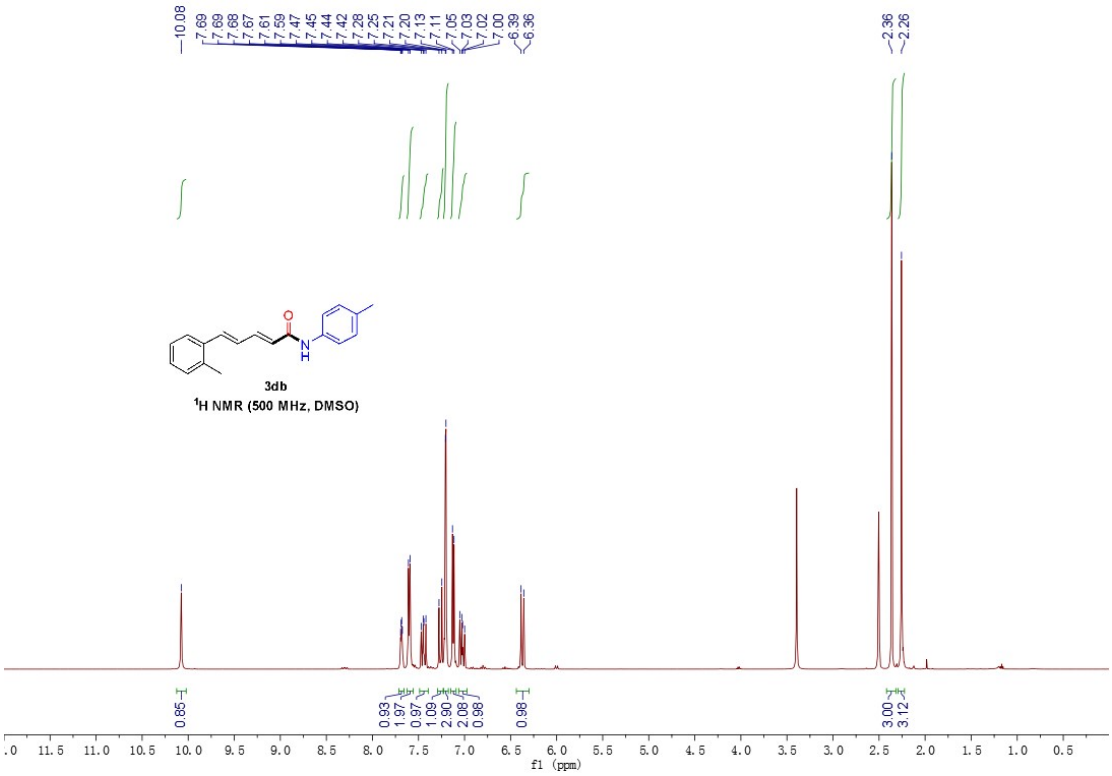


Figure S67. ^{1}H NMR (500 MHz, DMSO) spectrum of 3db

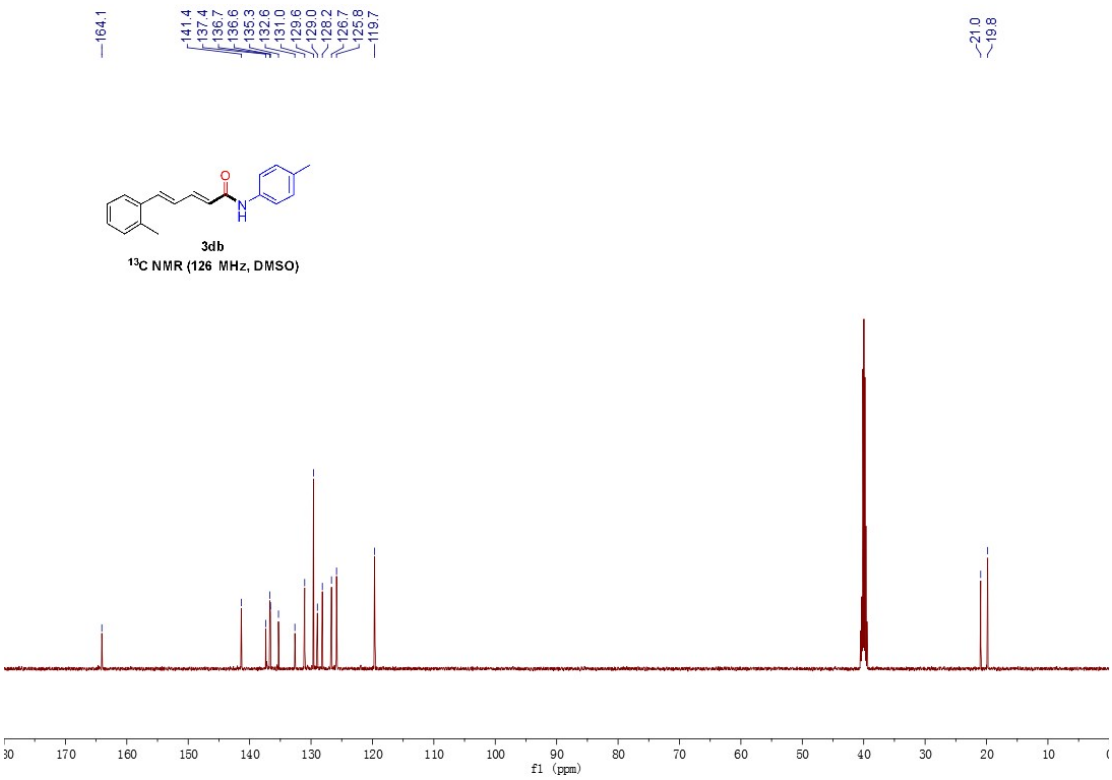


Figure S68. ^{13}C NMR (126 MHz, DMSO) spectrum of 3db

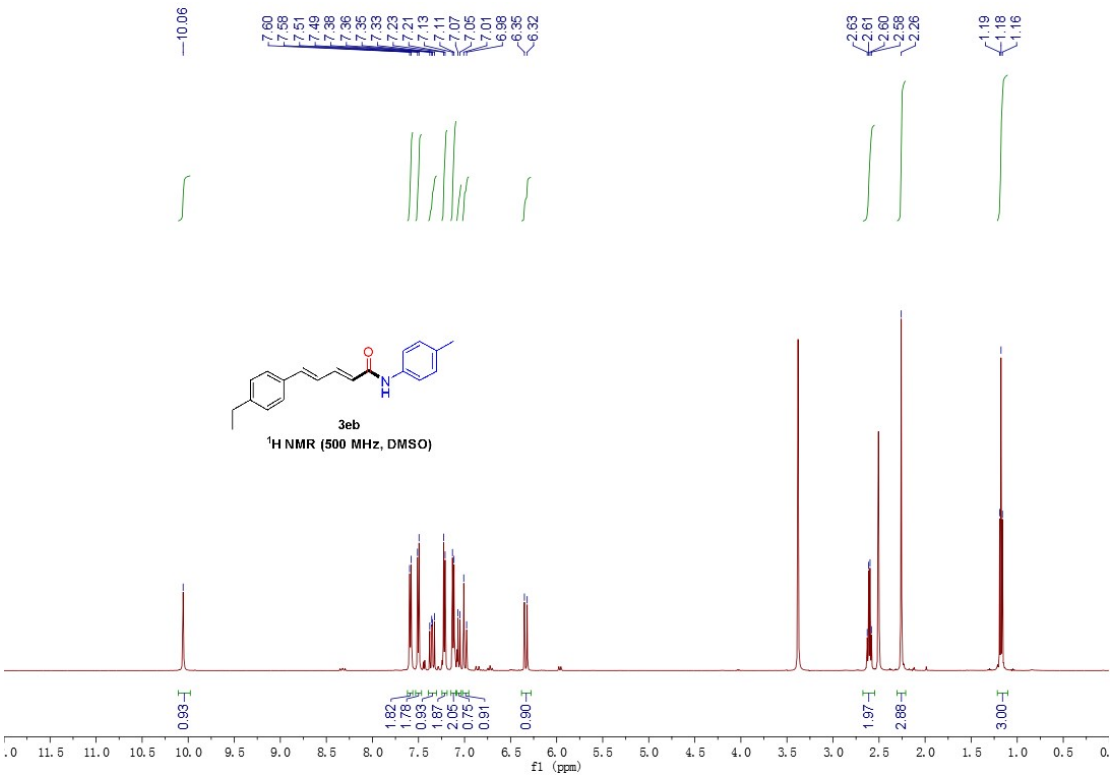


Figure S69. ^{1}H NMR (500 MHz, DMSO) spectrum of 3eb

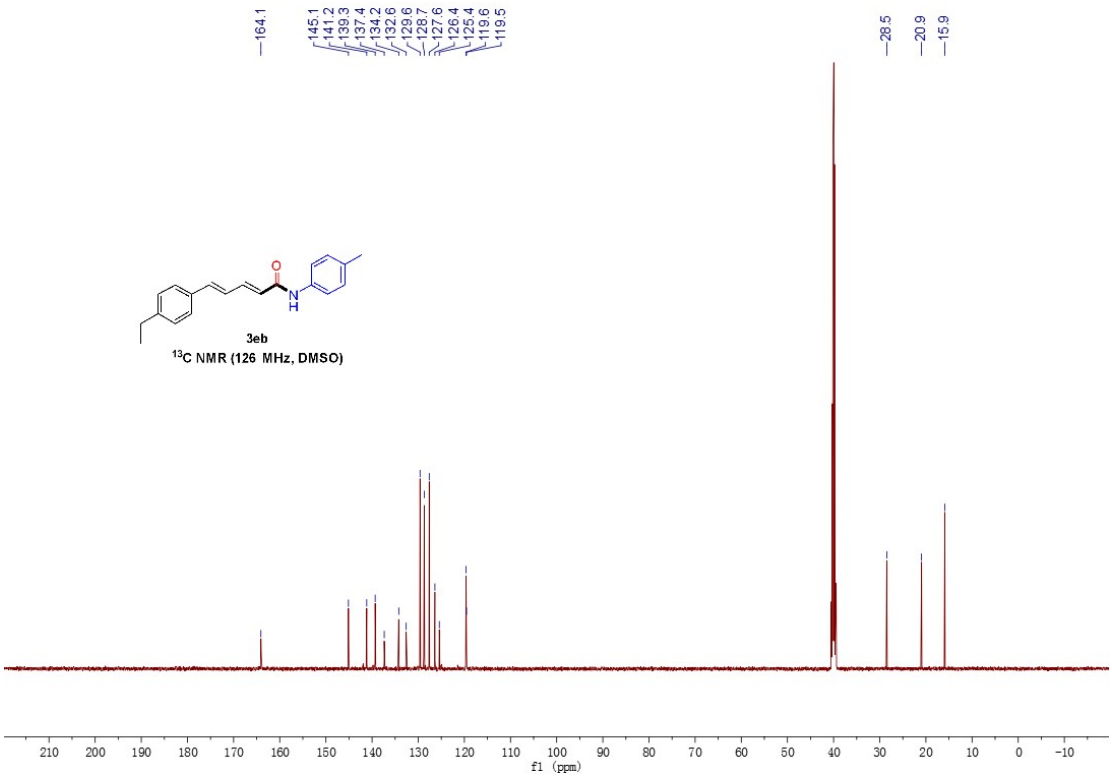


Figure S70. ^{13}C NMR (126 MHz, DMSO) spectrum of 3eb

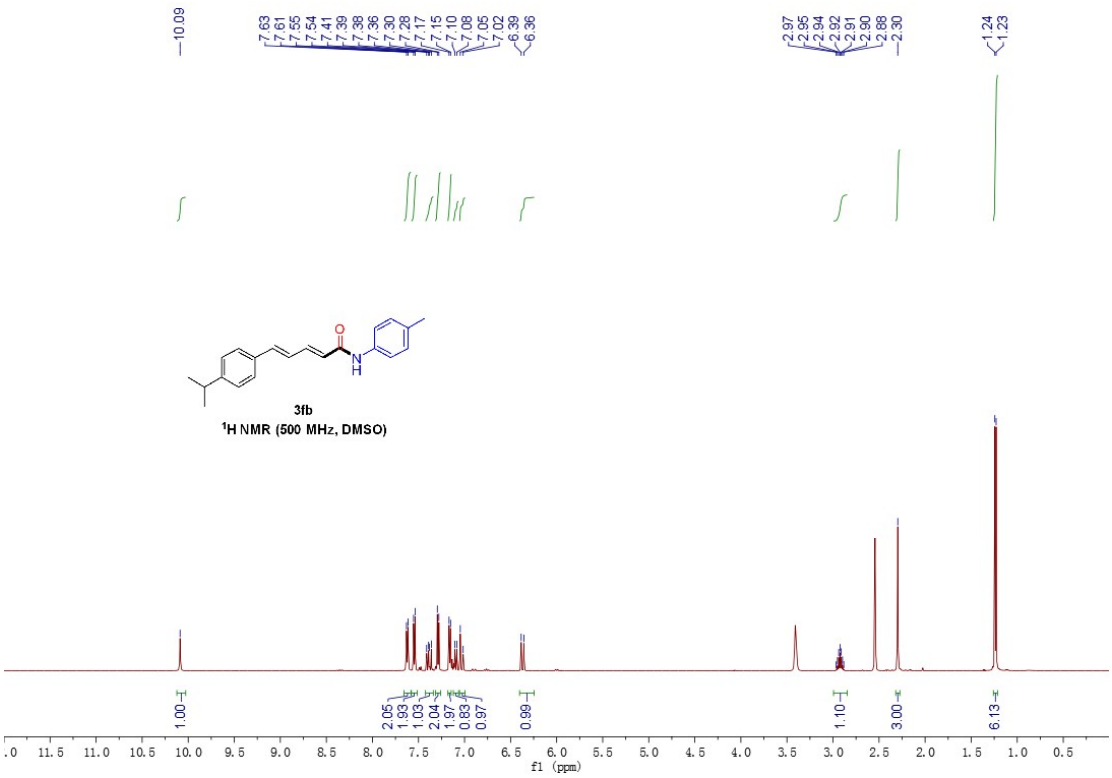


Figure S71. ^{1}H NMR (500 MHz, DMSO) spectrum of 3fb

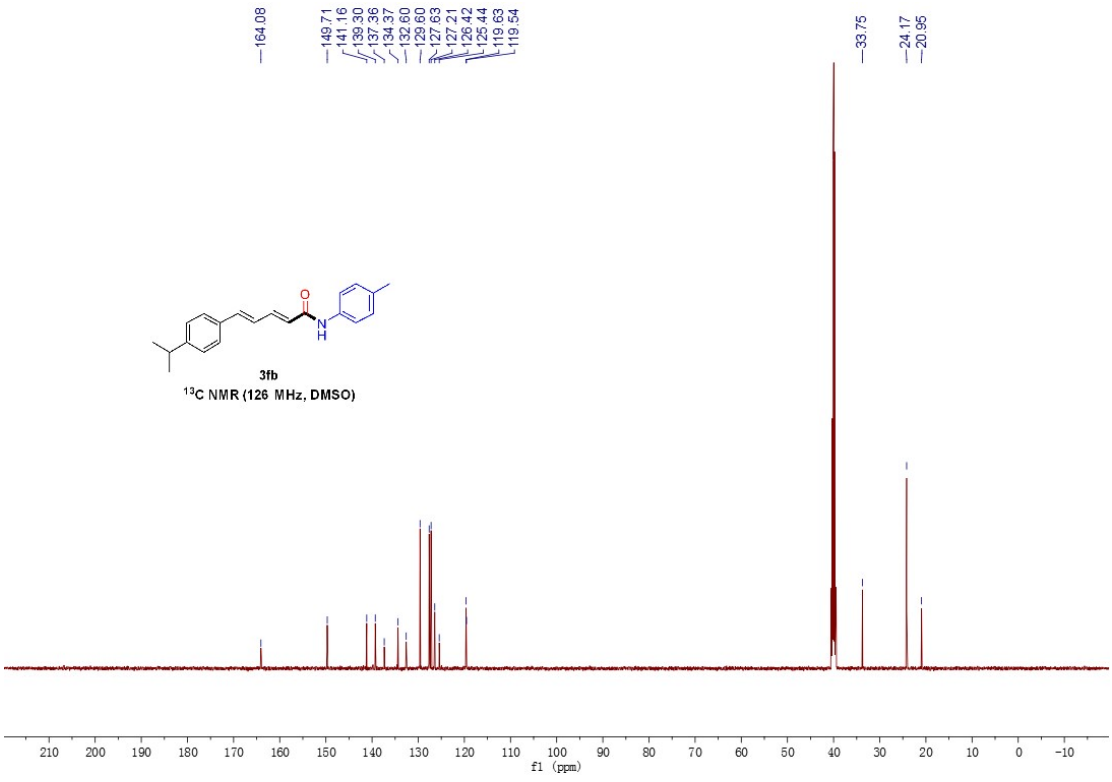


Figure S72. ^{13}C NMR (126 MHz, DMSO) spectrum of 3fb

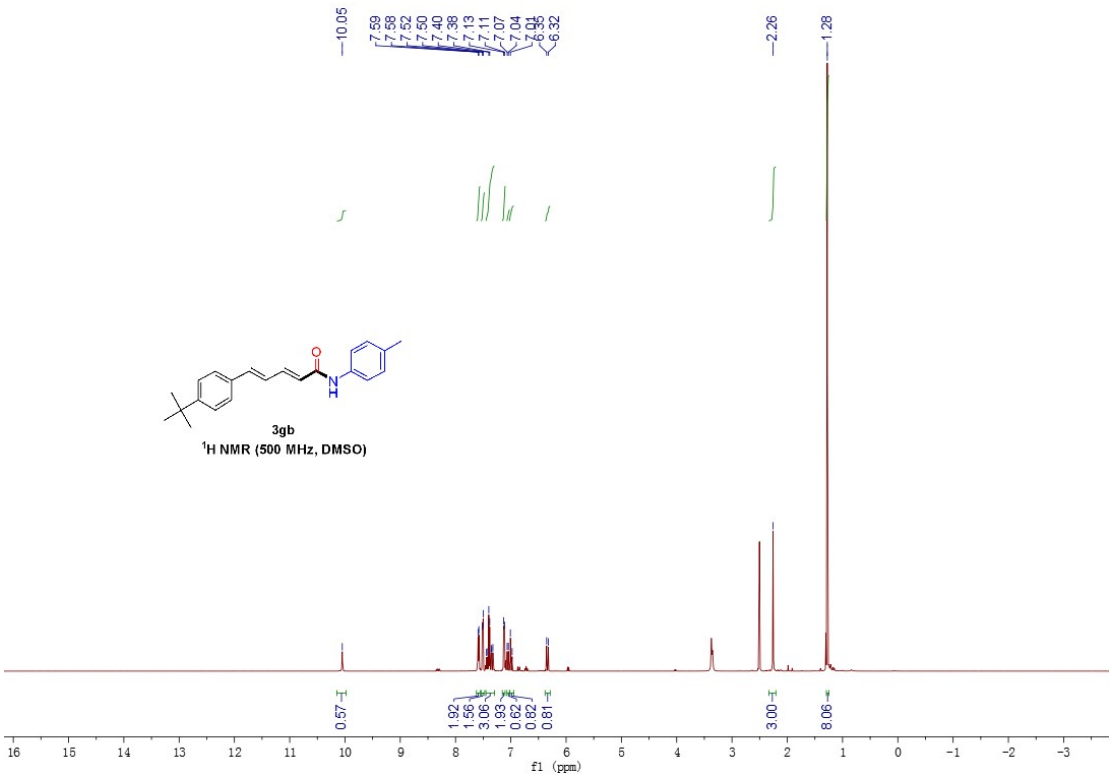


Figure S73. ^{1}H NMR (500 MHz, DMSO) spectrum of 3gb

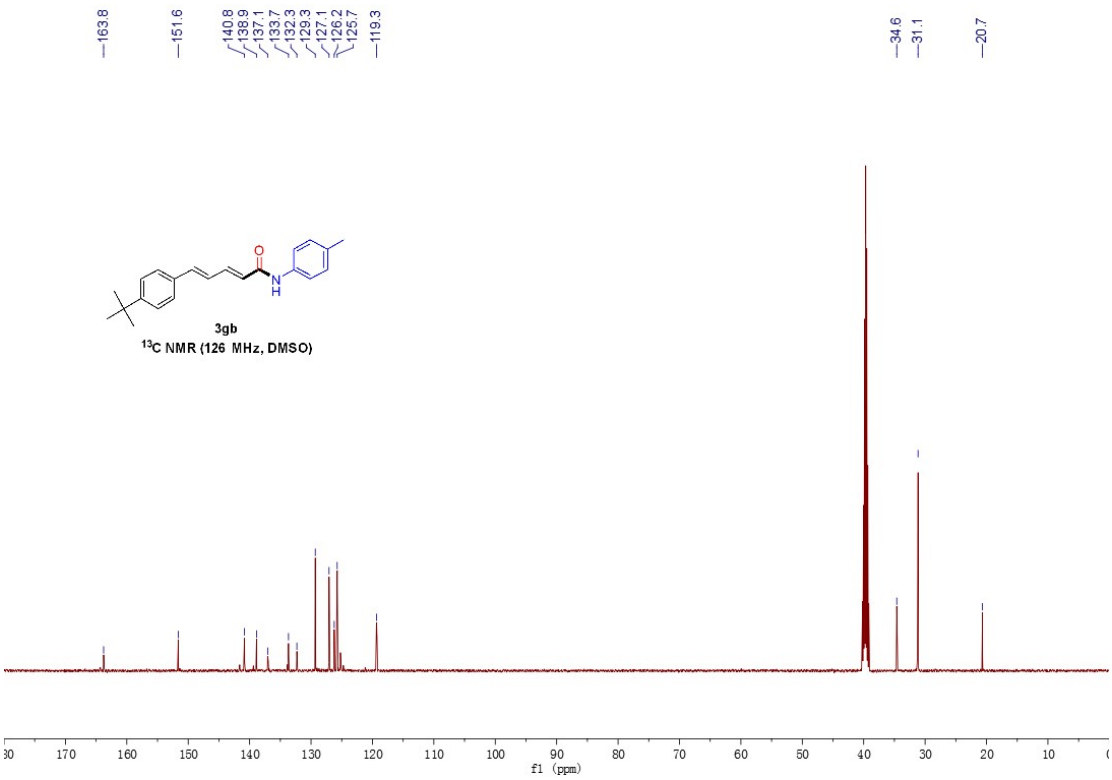


Figure S74. ^{13}C NMR (126 MHz, DMSO) spectrum of 3gb

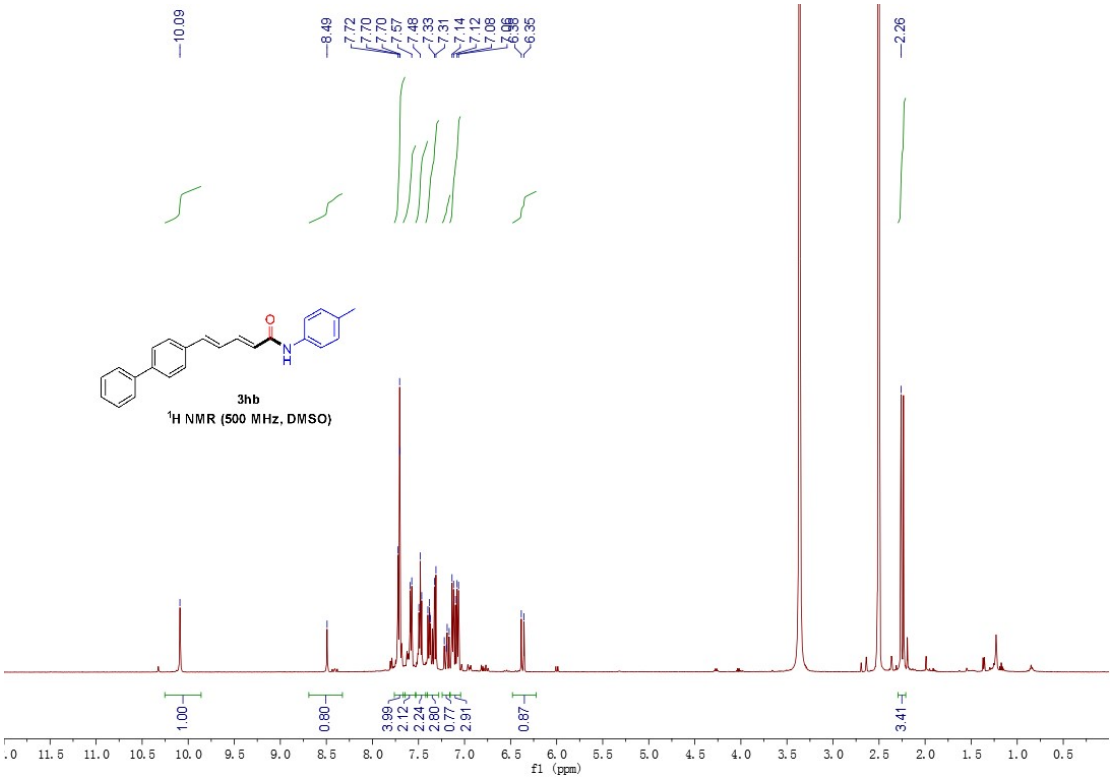


Figure S75. ^{1}H NMR (500 MHz, DMSO) spectrum of 3hb

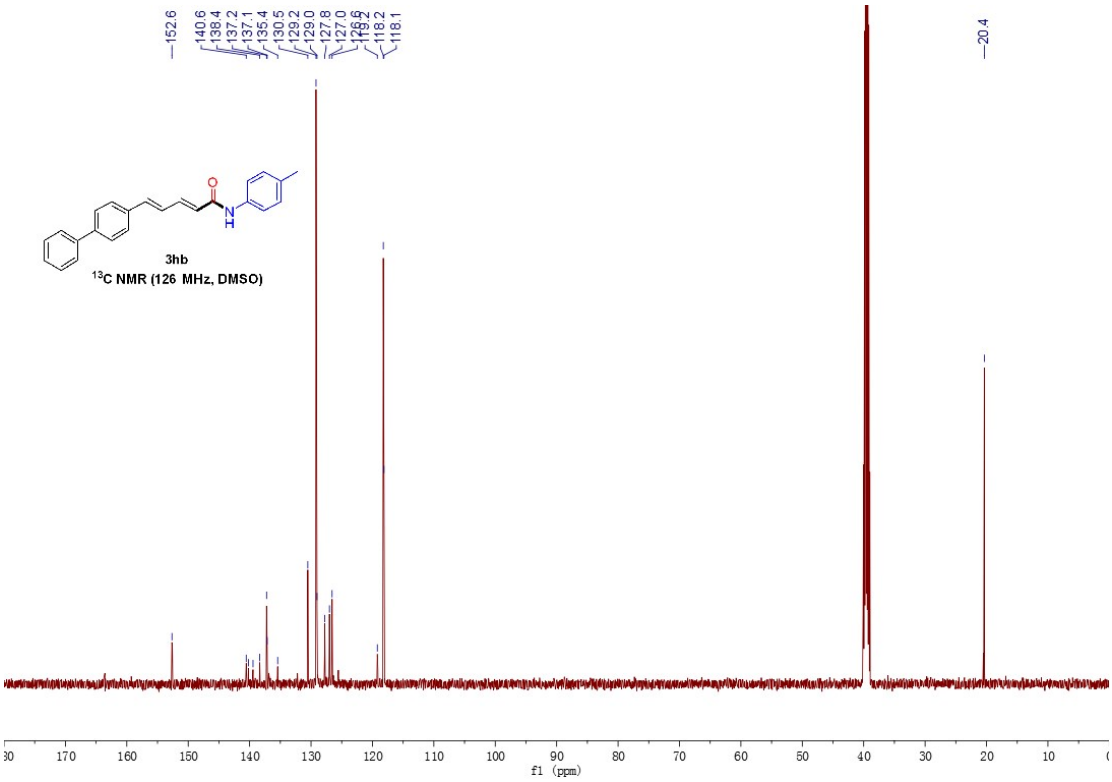


Figure S76. ^{13}C NMR (126 MHz, DMSO) spectrum of 3hb

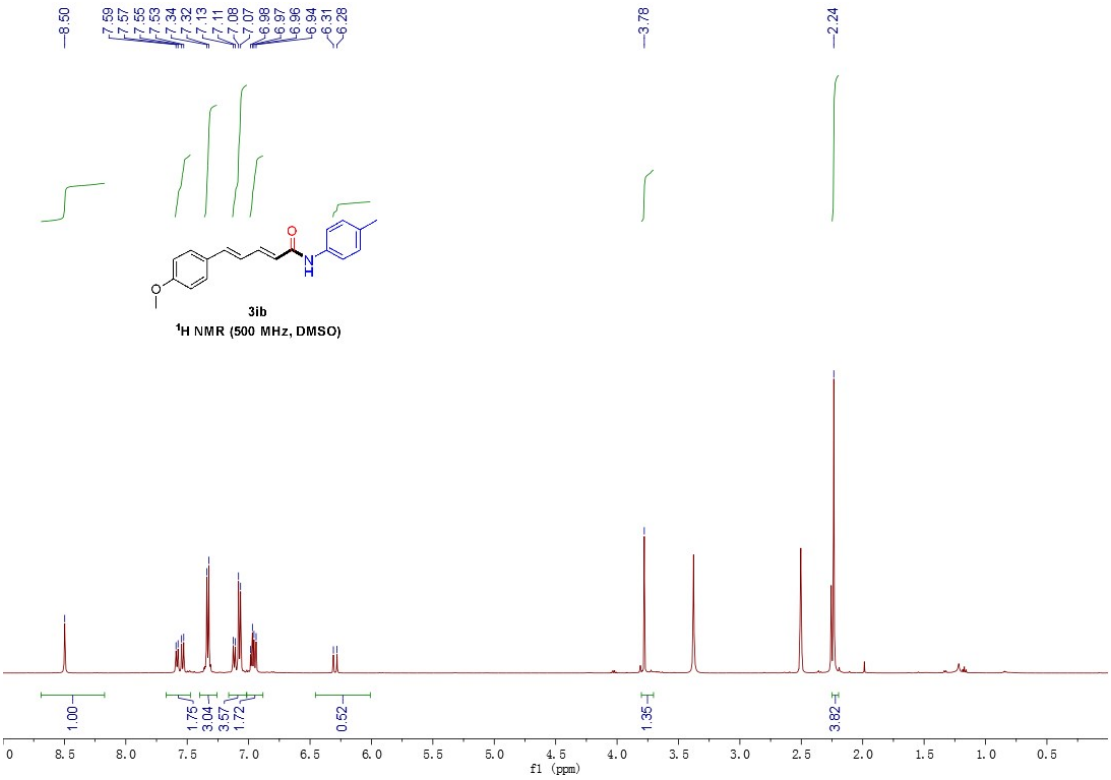


Figure S77. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ib

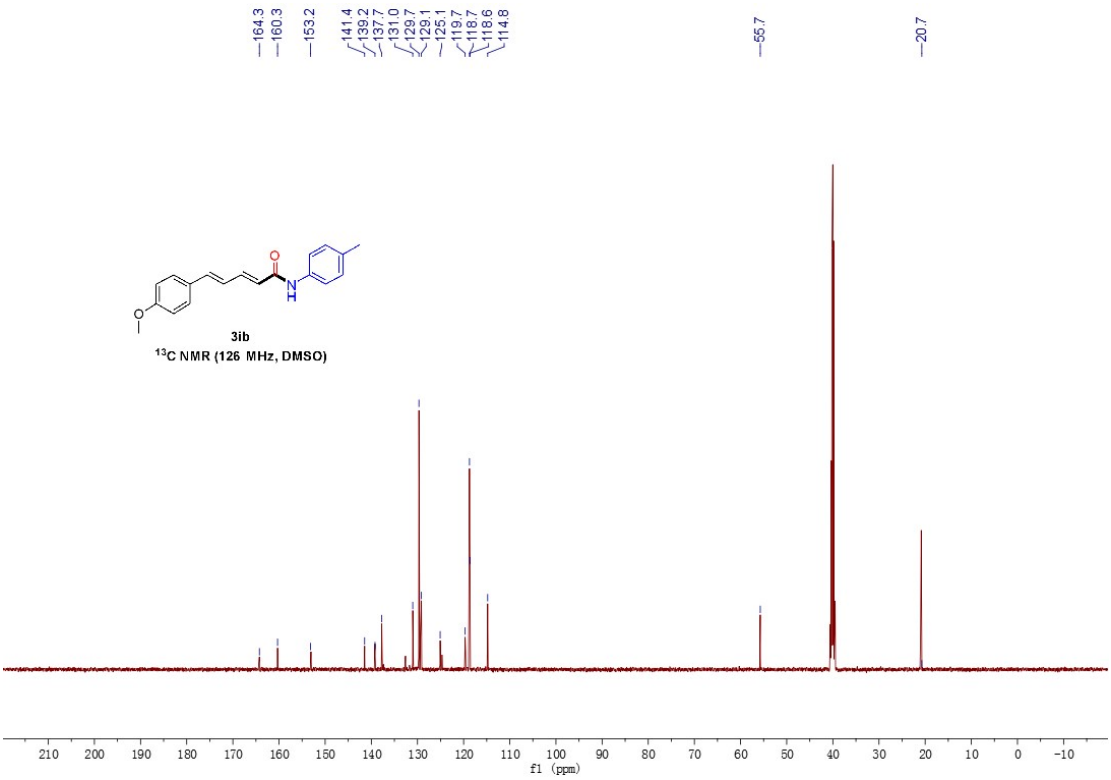


Figure S78. ^{13}C NMR (126 MHz, $CDCl_3$) spectrum of 3ib

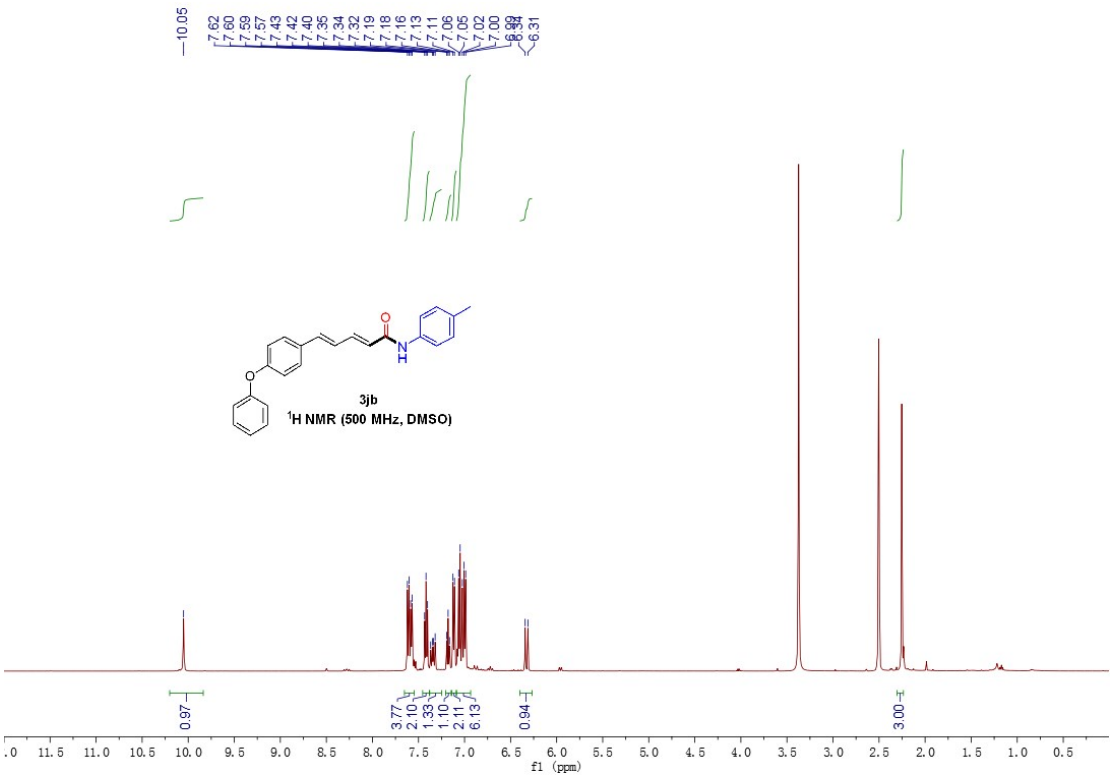


Figure S79. ^{1}H NMR (500 MHz, DMSO) spectrum of 3jb

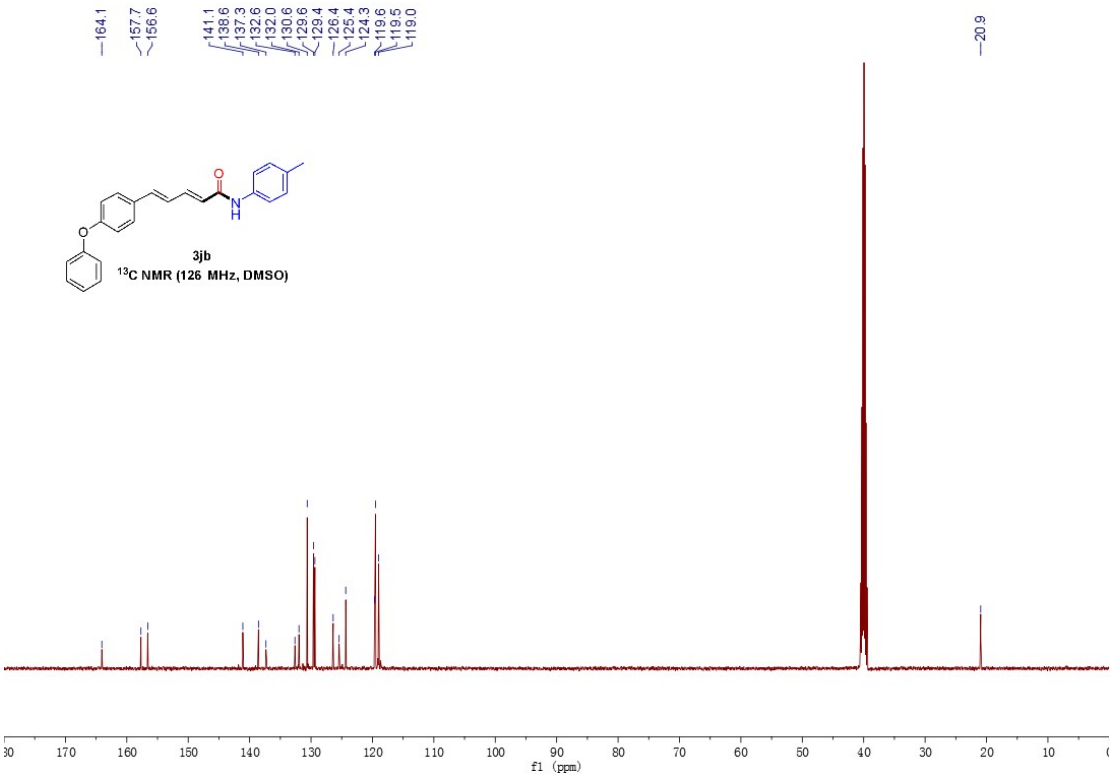


Figure S80. ^{13}C NMR (126 MHz, DMSO) spectrum of 3jb

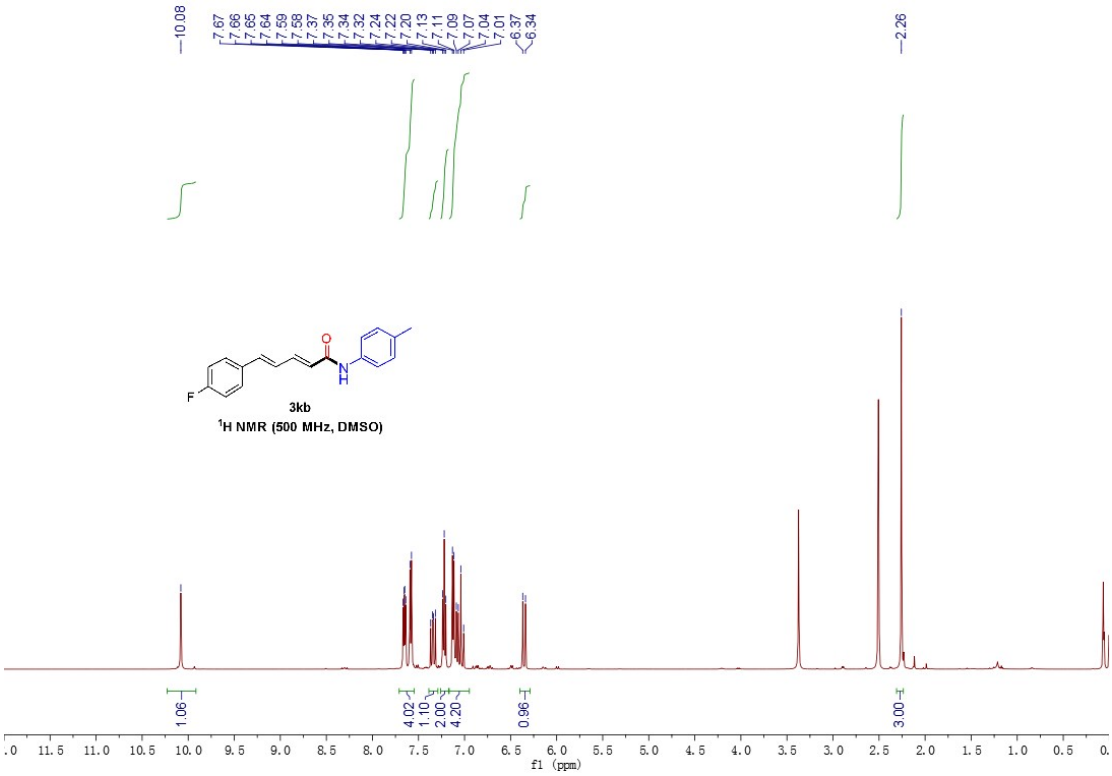


Figure S81. ^{1}H NMR (500 MHz, DMSO) spectrum of 3kb

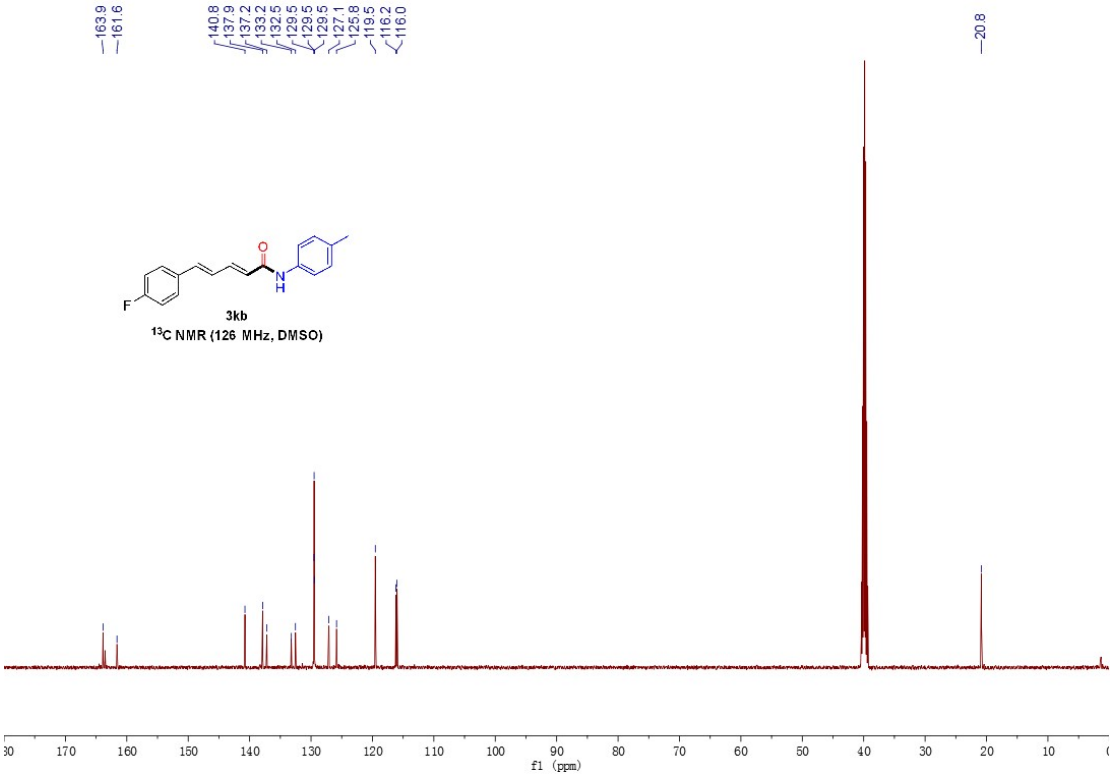


Figure S82. ^{13}C NMR (126 MHz, DMSO) spectrum of 3kb

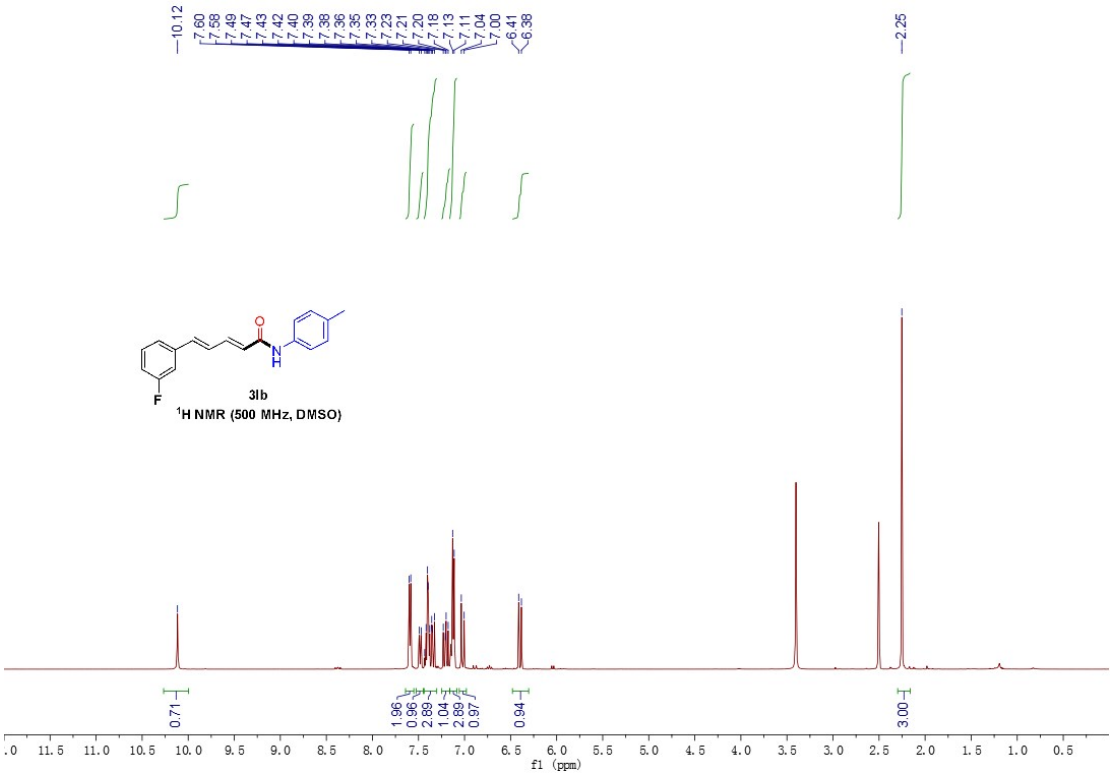


Figure S83. ^{1}H NMR (500 MHz, DMSO) spectrum of 3lb

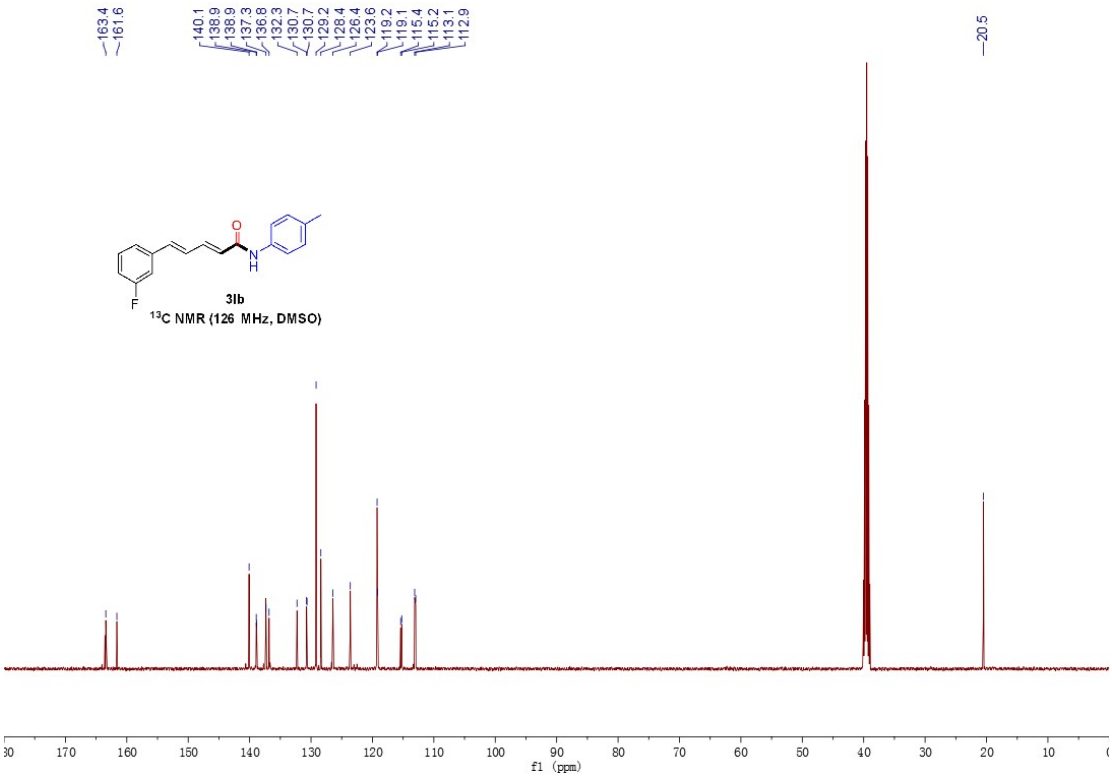


Figure S84. ^{13}C NMR (126 MHz, DMSO) spectrum of 3lb

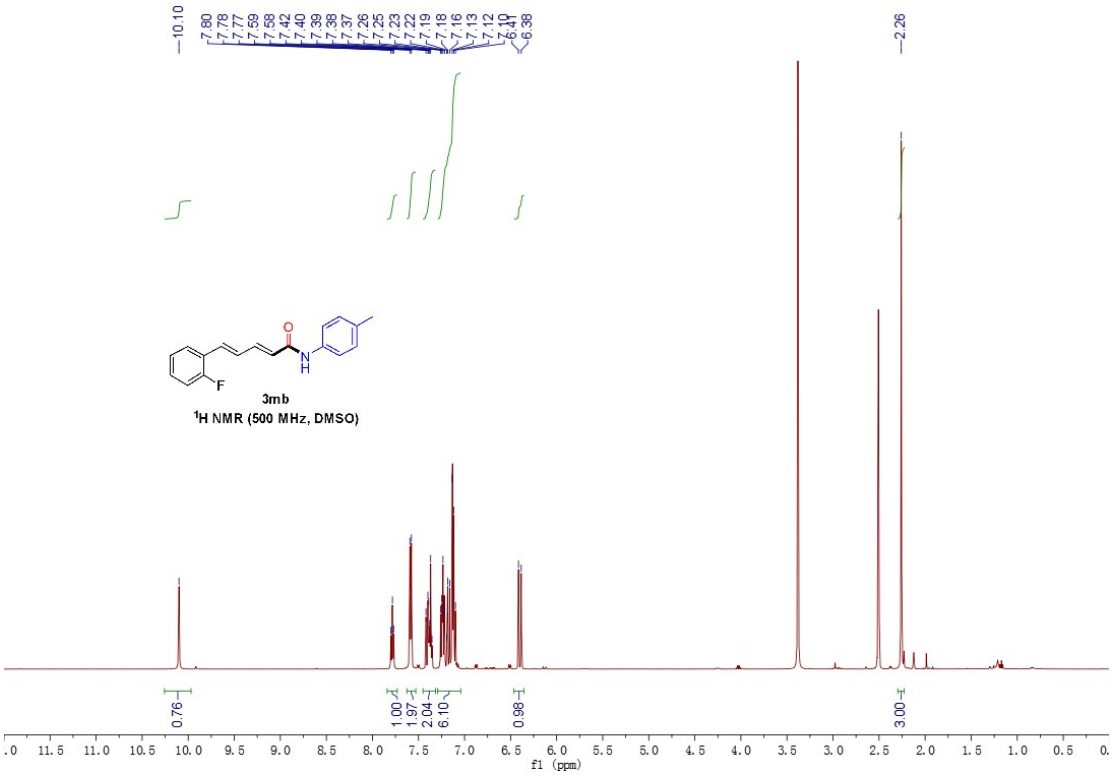


Figure S85. ^{1}H NMR (500 MHz, DMSO) spectrum of 3mb

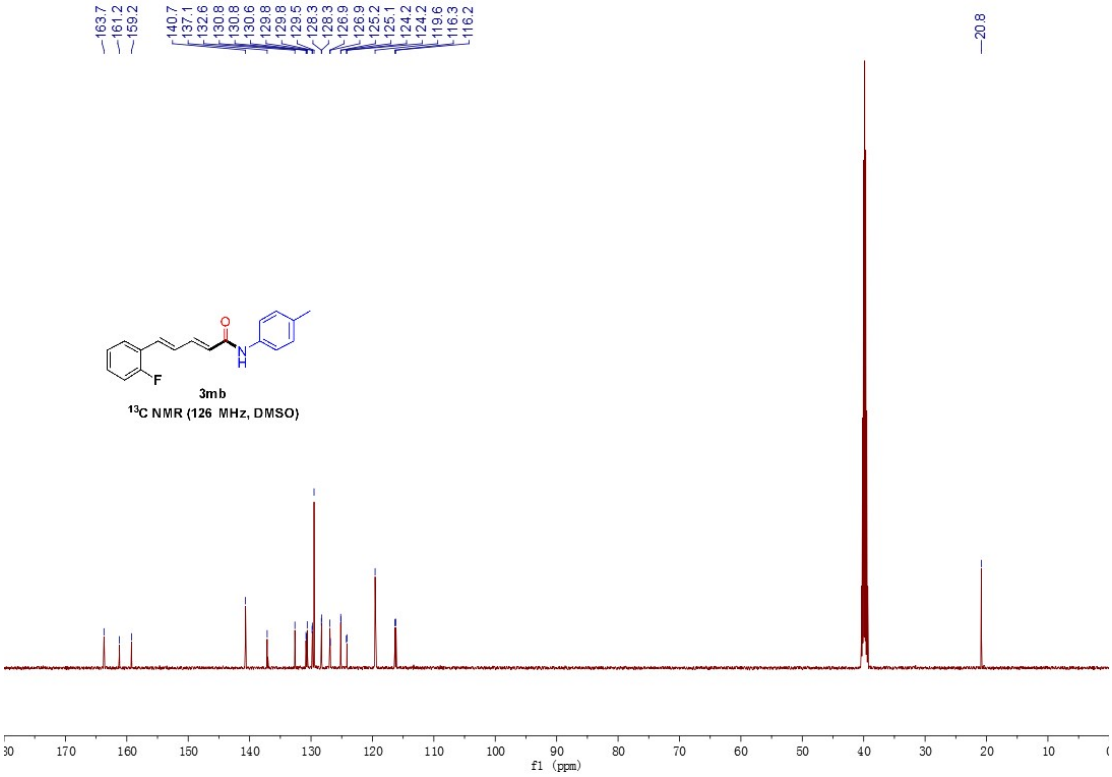


Figure S86. ^{13}C NMR (126 MHz, DMSO) spectrum of 3mb

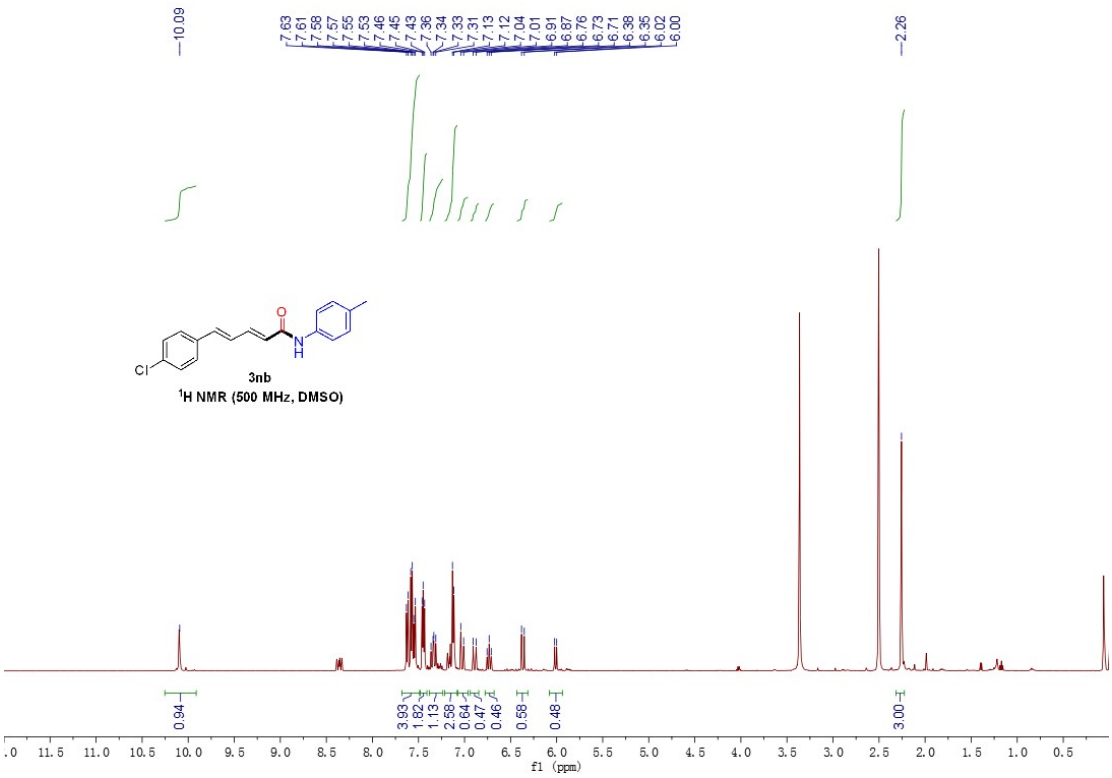


Figure S87. ^{1}H NMR (500 MHz, DMSO) spectrum of 3nb

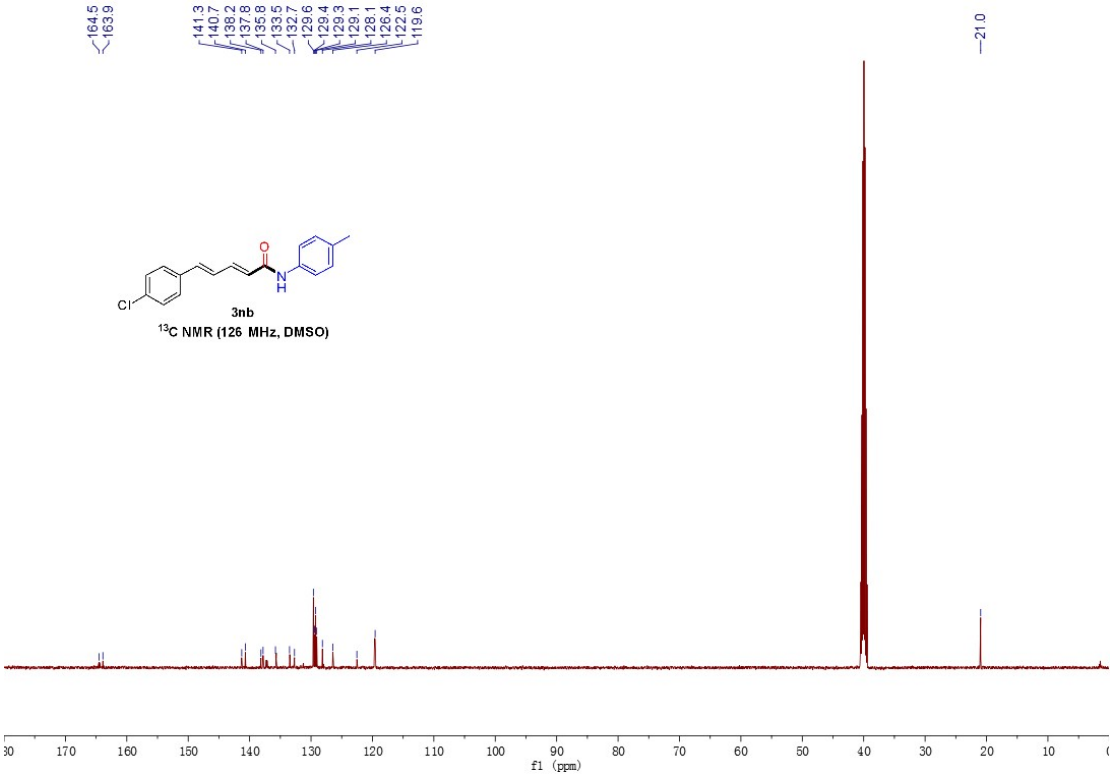


Figure S88. ^{13}C NMR (126 MHz, DMSO) spectrum of 3nb

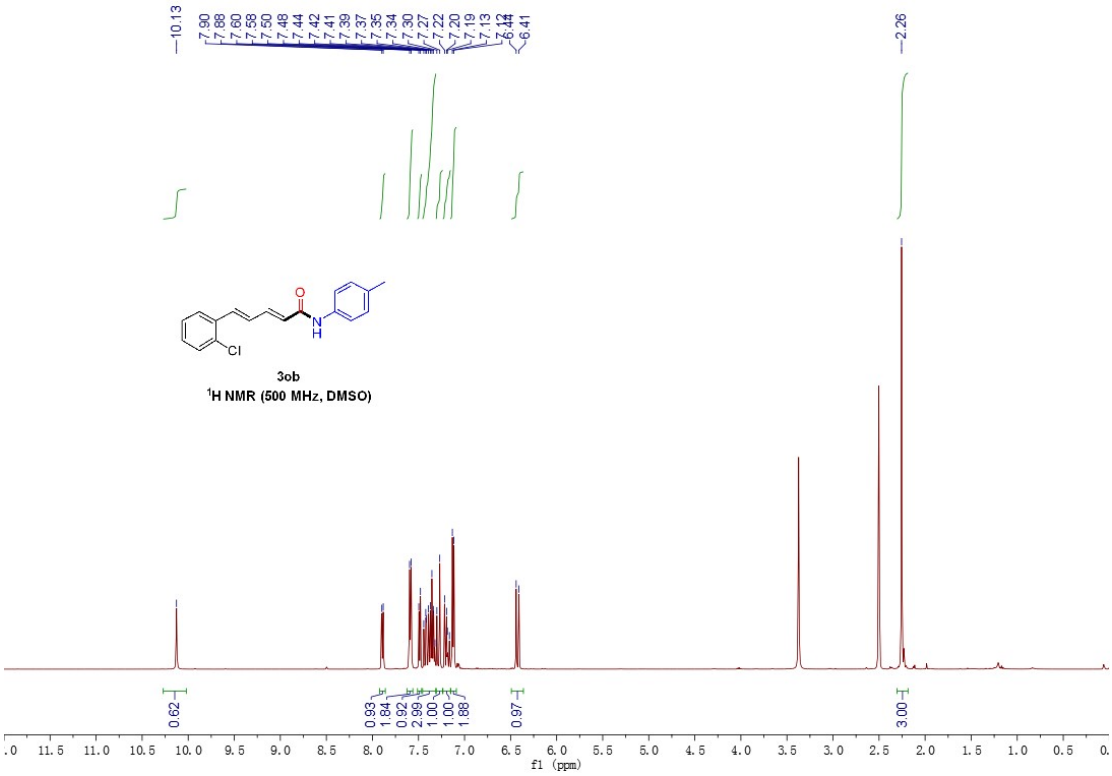


Figure S89. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ob

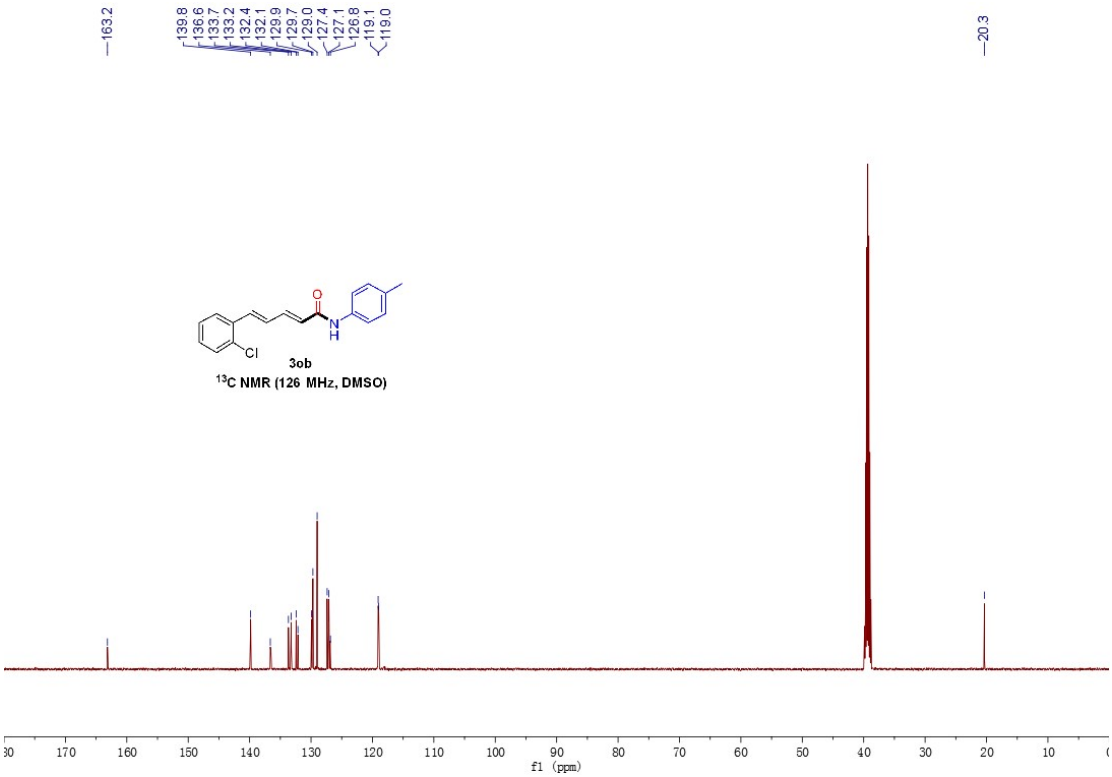


Figure S90. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ob

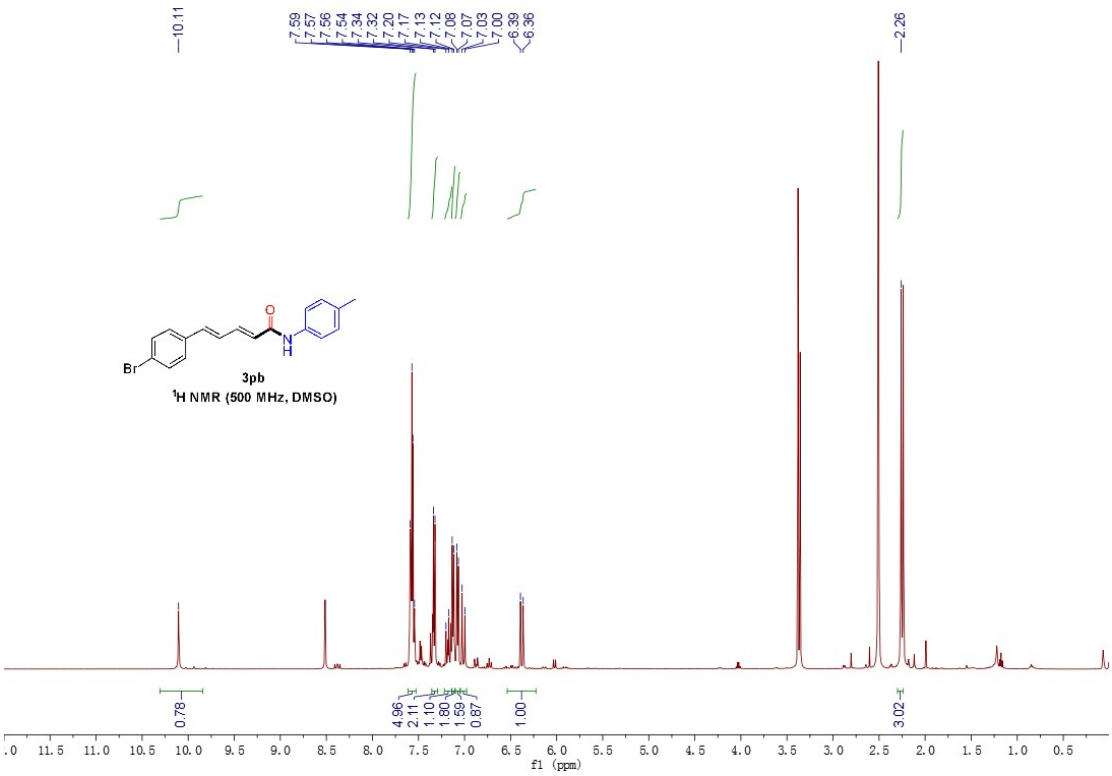


Figure S91. ^{1}H NMR (500 MHz, DMSO) spectrum of 3pb

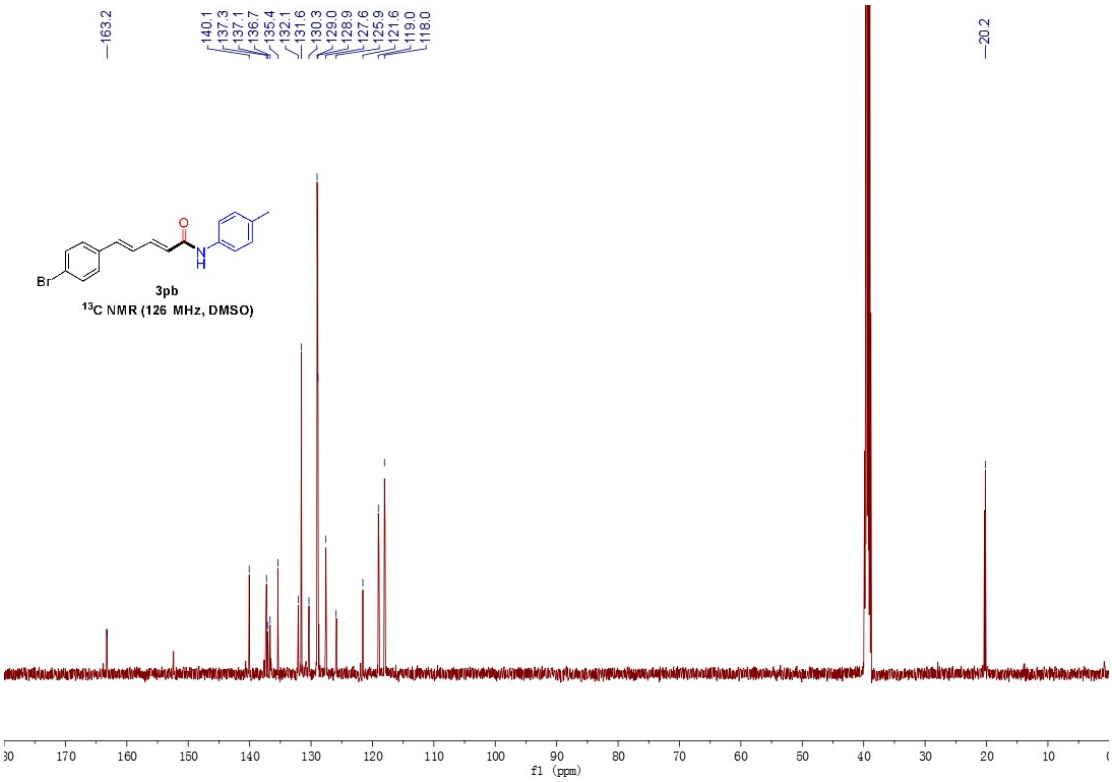


Figure S92. ^{13}C NMR (126 MHz, DMSO) spectrum of 3pb

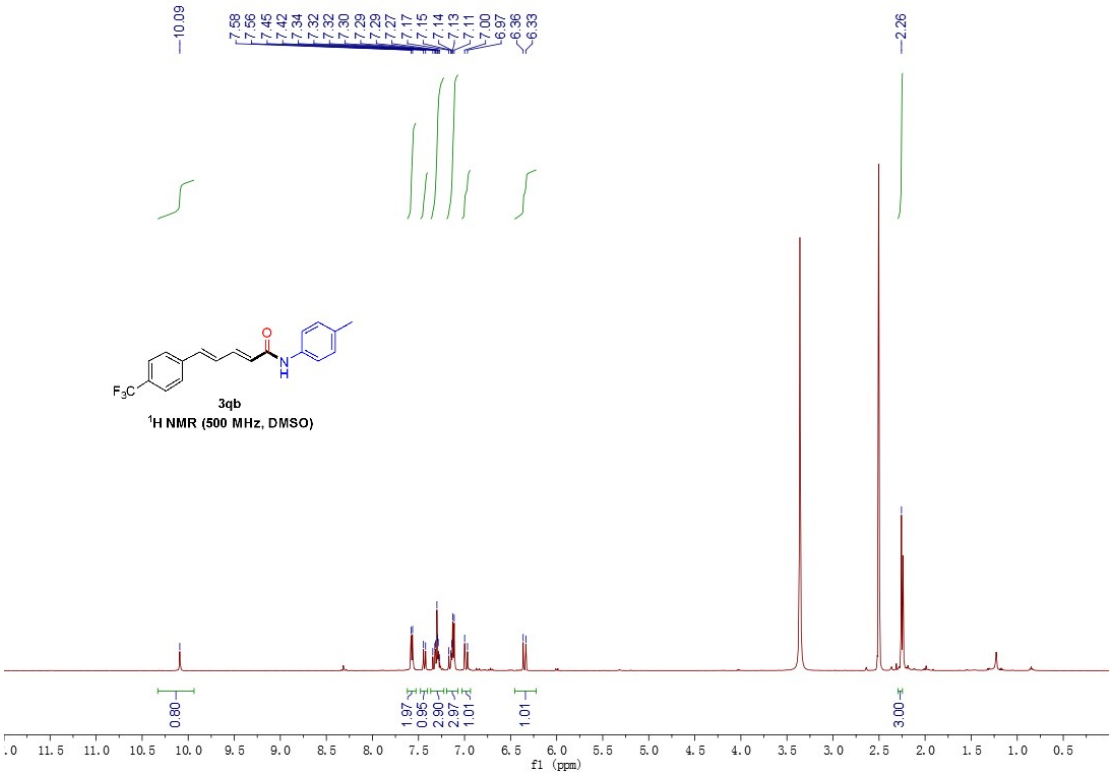


Figure S93. ^{1}H NMR (500 MHz, DMSO) spectrum of 3qb

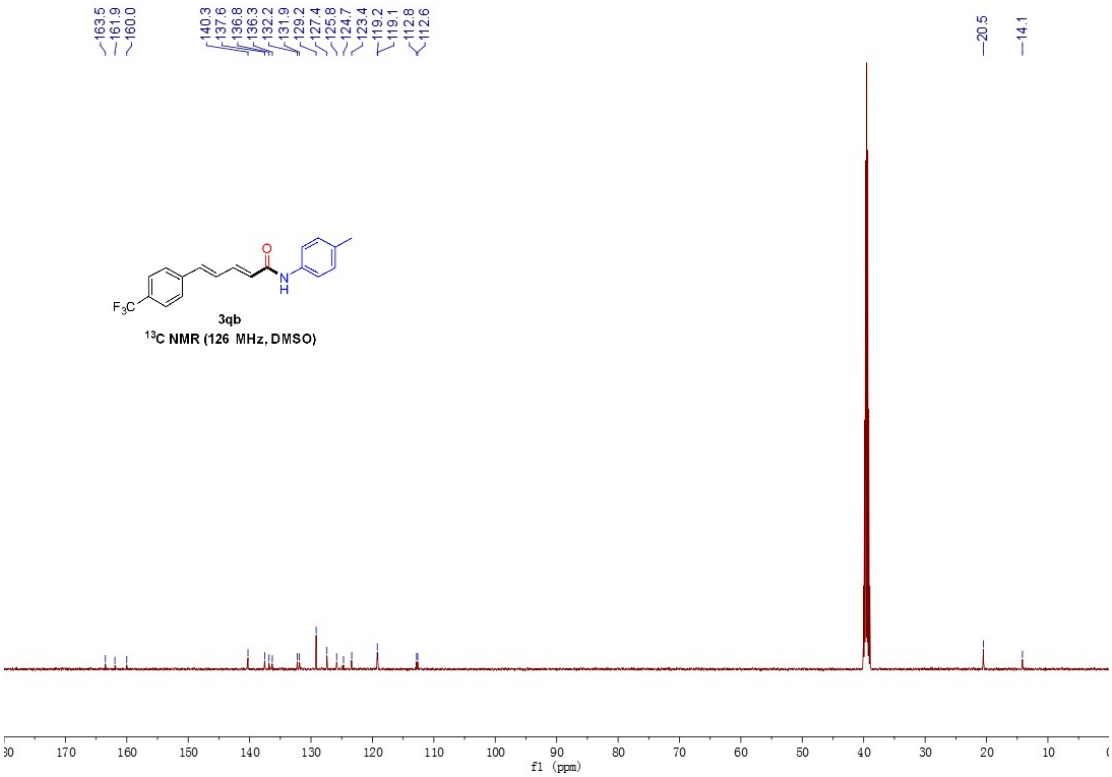


Figure S94. ^{13}C NMR (126 MHz, DMSO) spectrum of 3qb

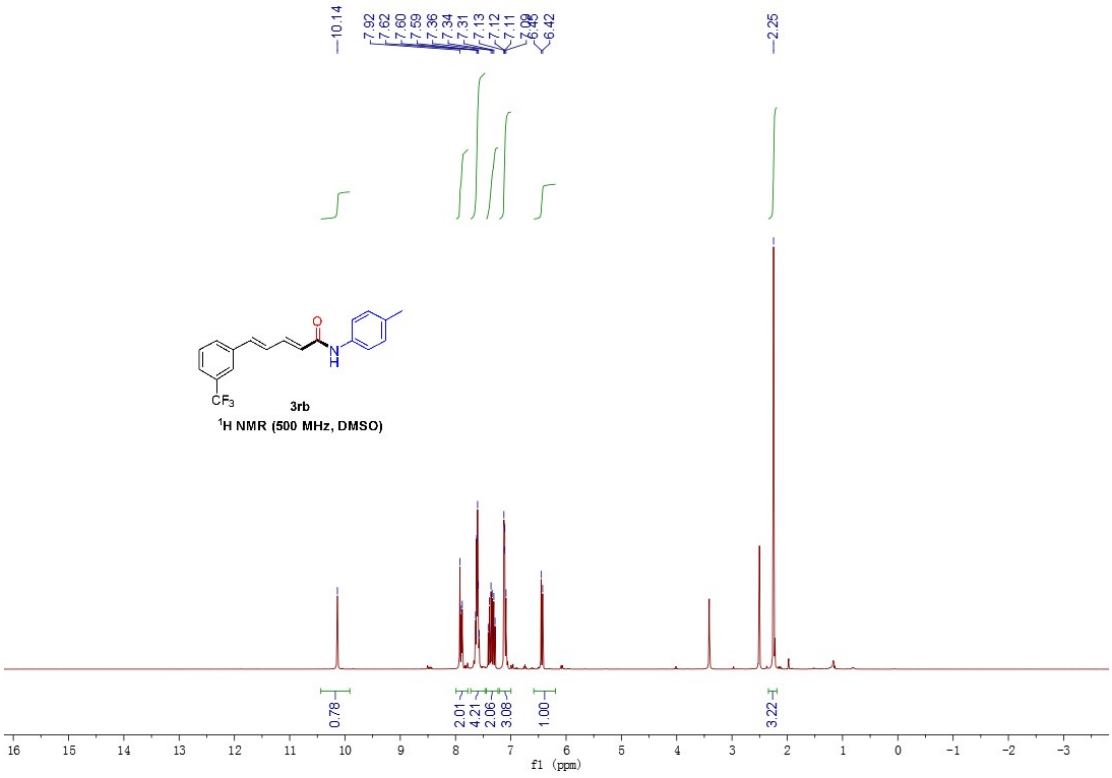


Figure S95. ^{1}H NMR (500 MHz, DMSO) spectrum of 3rb

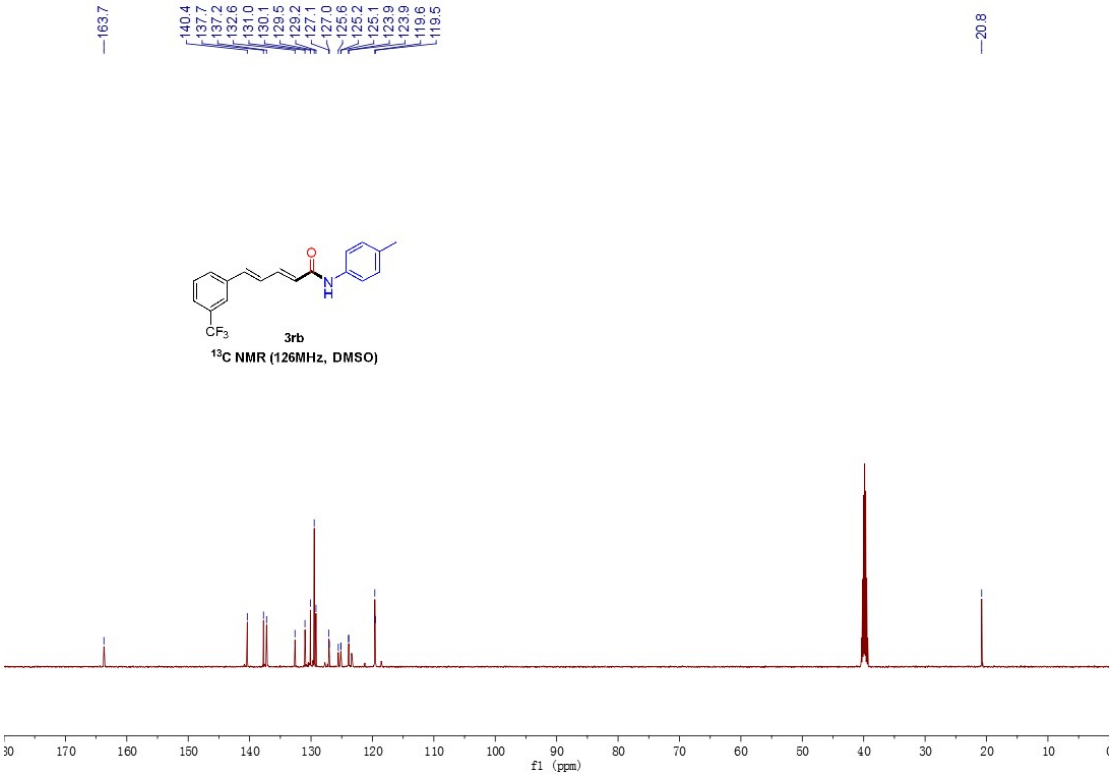


Figure S96. ^{13}C NMR (126 MHz, DMSO) spectrum of 3rb

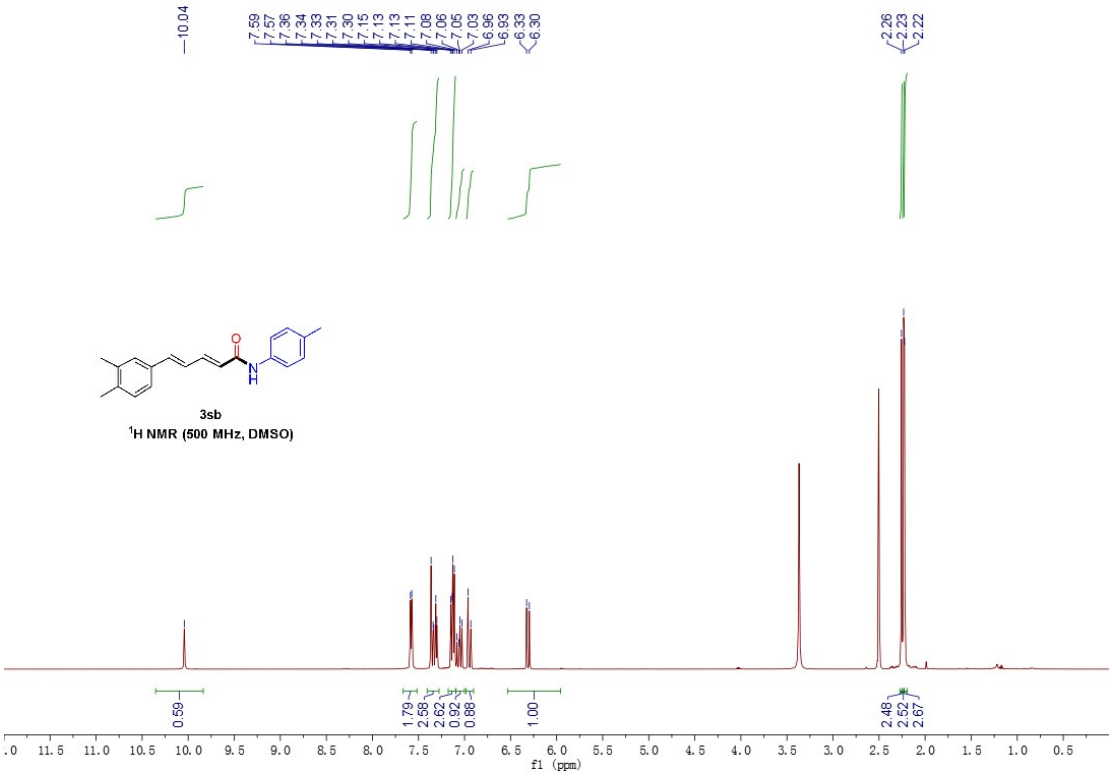


Figure S97. ^{1}H NMR (500 MHz, DMSO) spectrum of 3sb

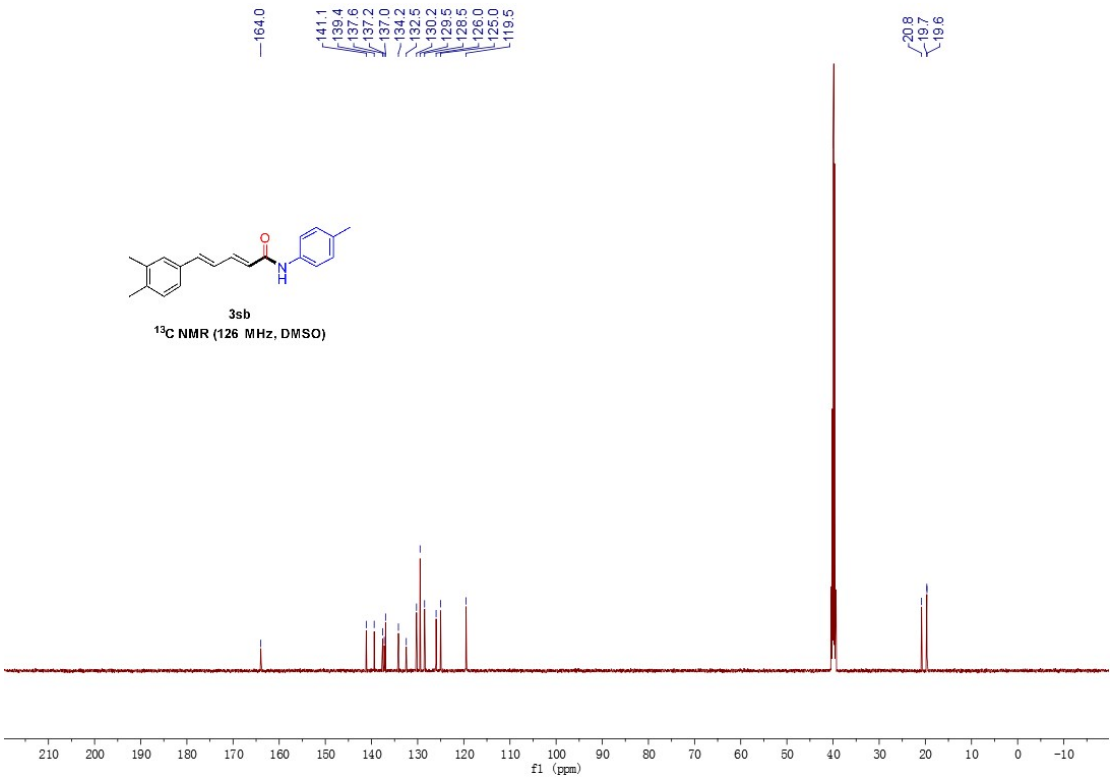


Figure S98. ^{13}C NMR (126 MHz, DMSO) spectrum of 3sb

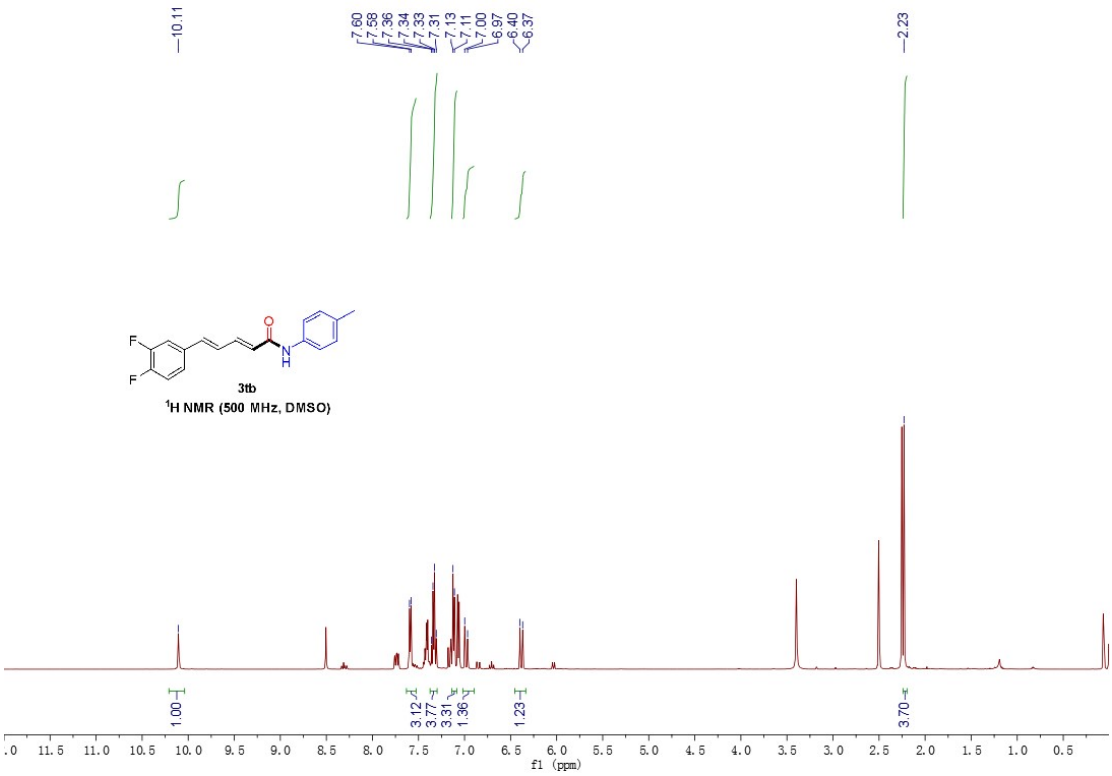


Figure S99. ^{1}H NMR (500 MHz, DMSO) spectrum of 3tb

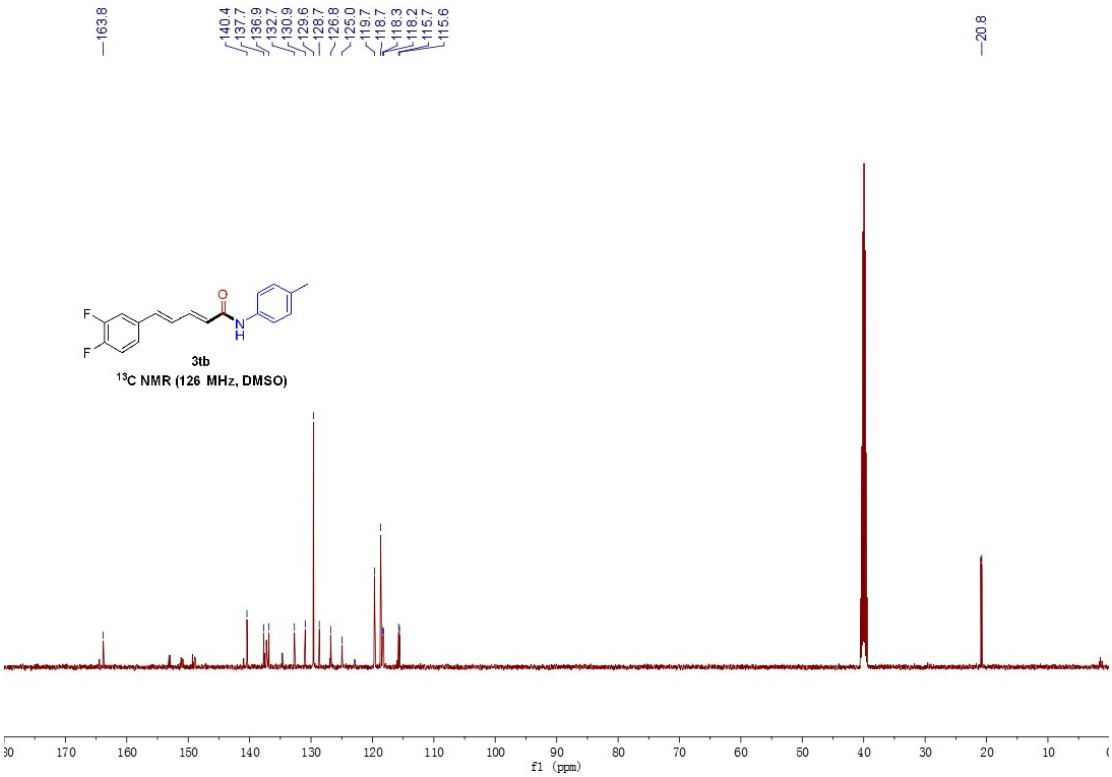


Figure S100. ^{13}C NMR (126 MHz, DMSO) spectrum of 3tb

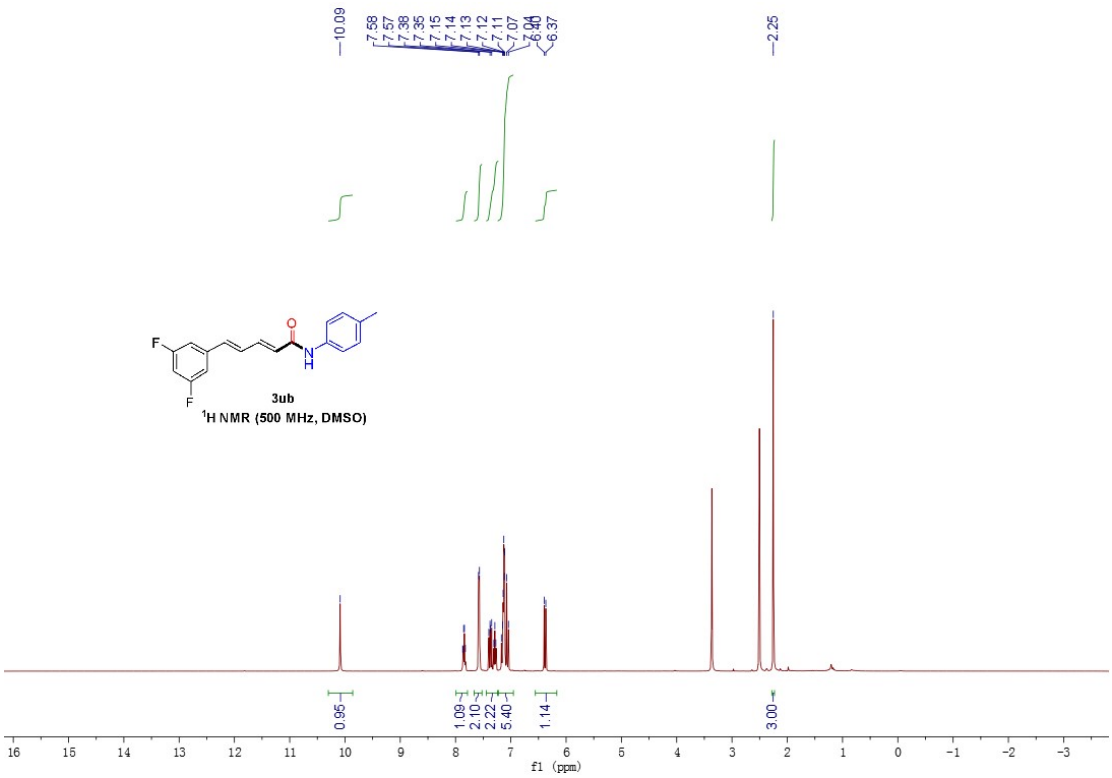


Figure S101. ^{1}H NMR (500 MHz, DMSO) spectrum of 3ub

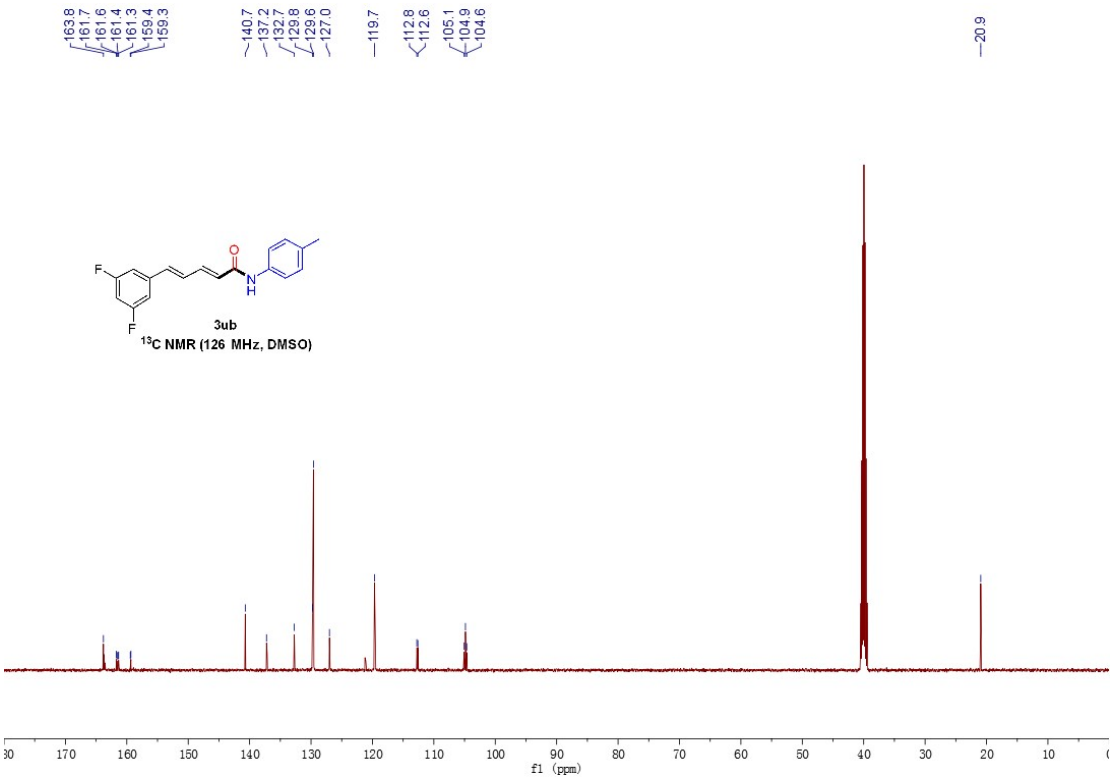


Figure S102. ^{13}C NMR (126 MHz, DMSO) spectrum of 3ub

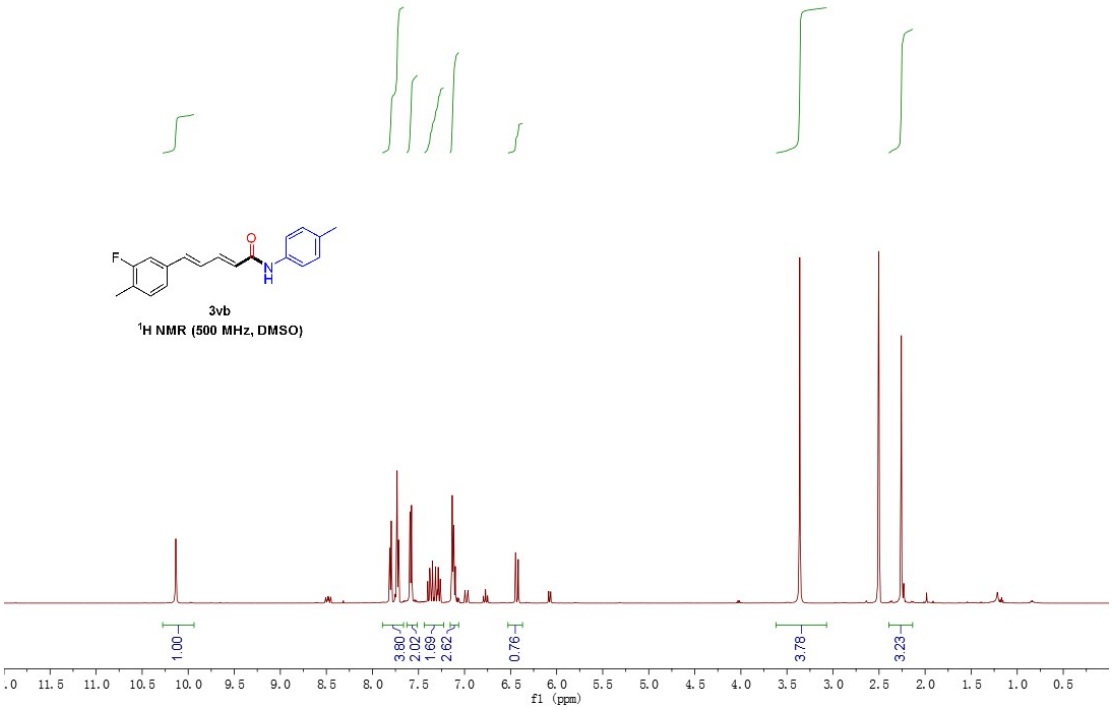


Figure S103. ^{1}H NMR (500 MHz, DMSO) spectrum of 3vb

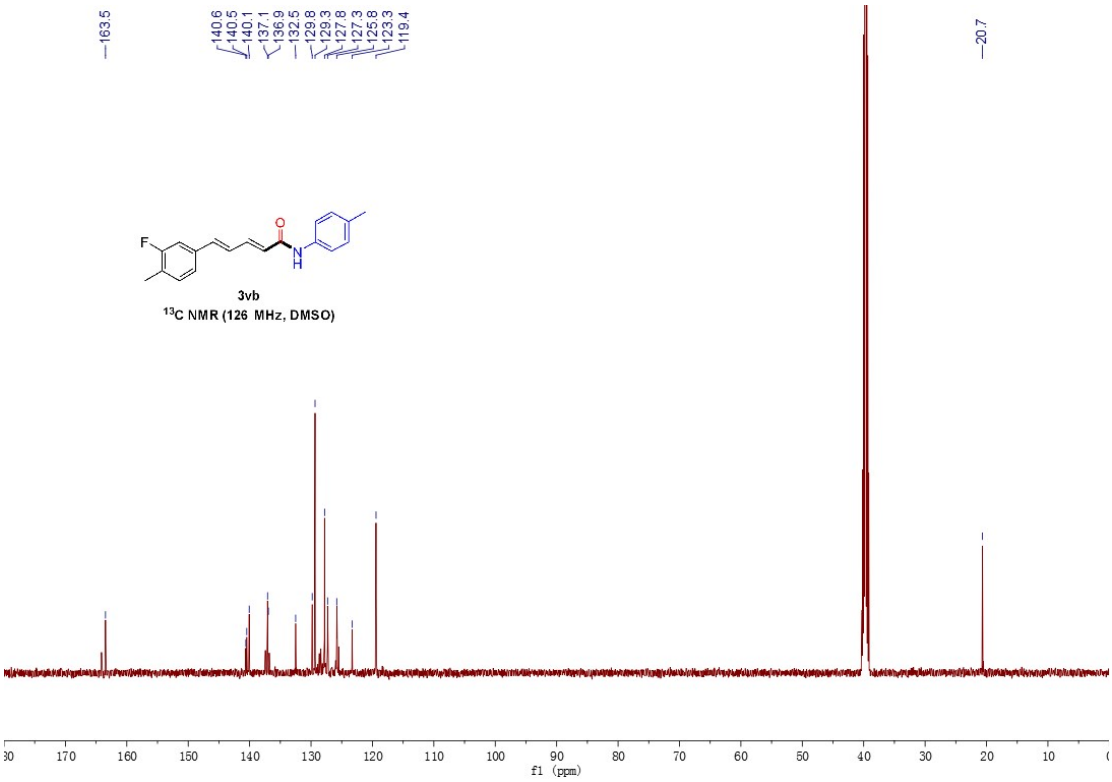


Figure S104. ^{13}C NMR (126 MHz, DMSO) spectrum of 3vb

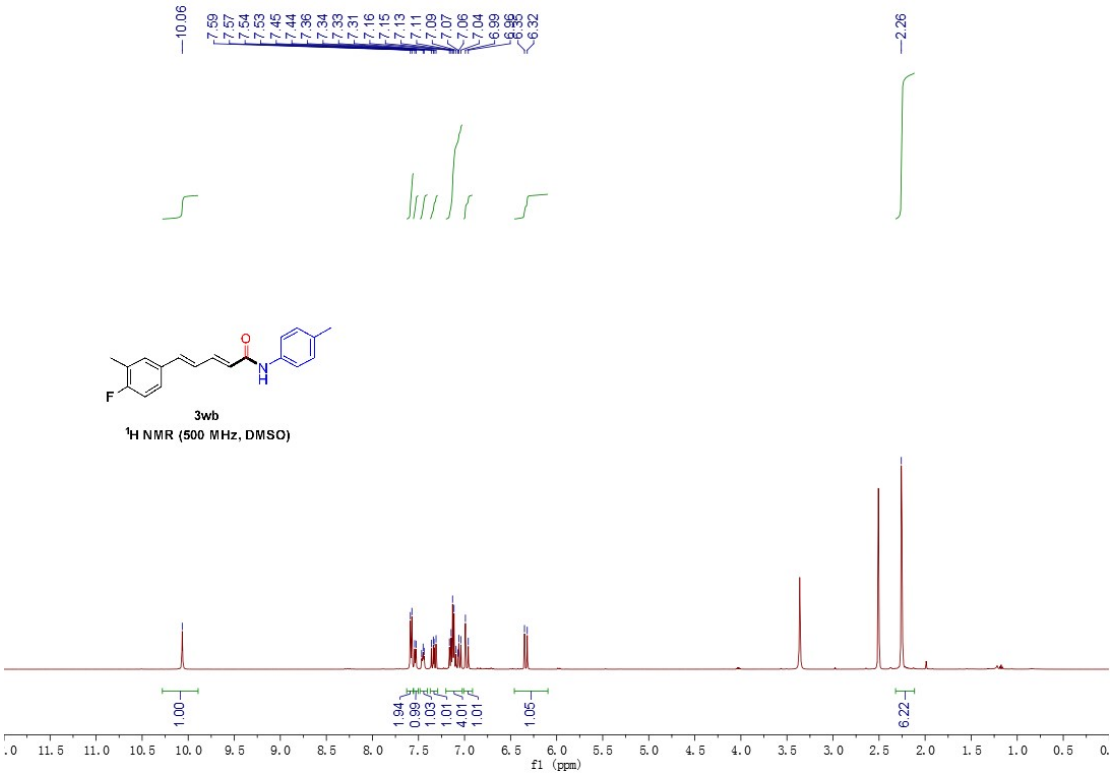


Figure S105. ^{1}H NMR (500 MHz, DMSO) spectrum of 3wb

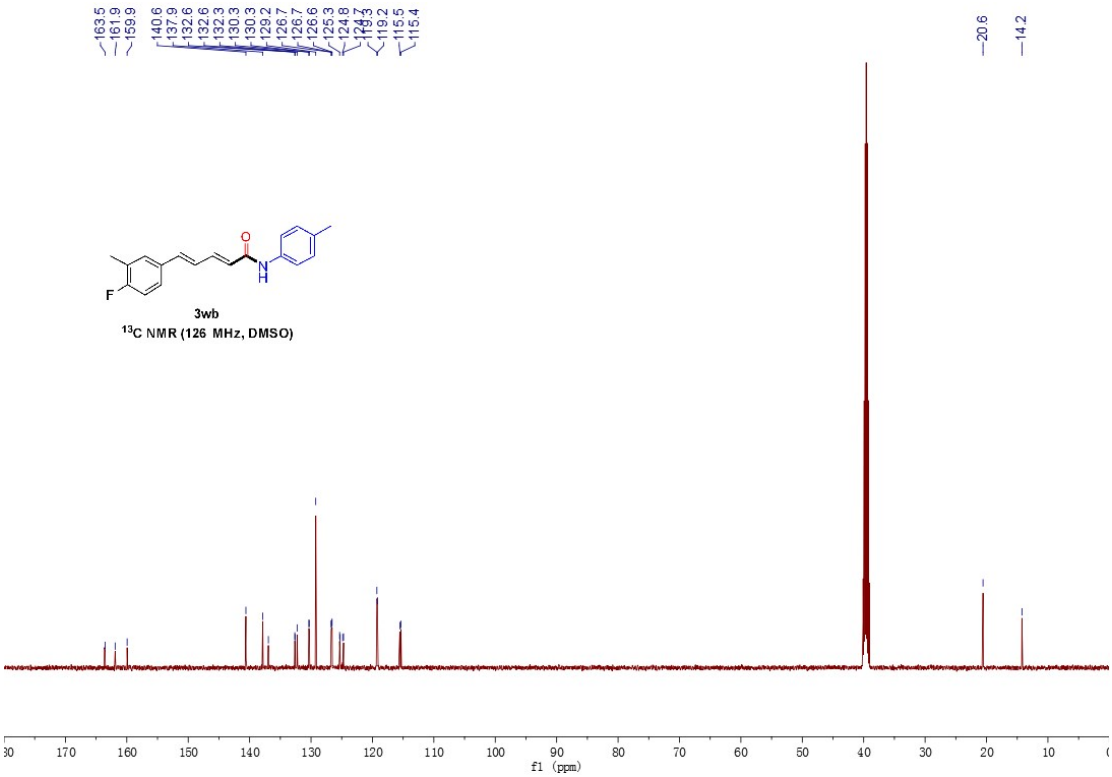


Figure S106. ^{13}C NMR (126 MHz, DMSO) spectrum of 3wb

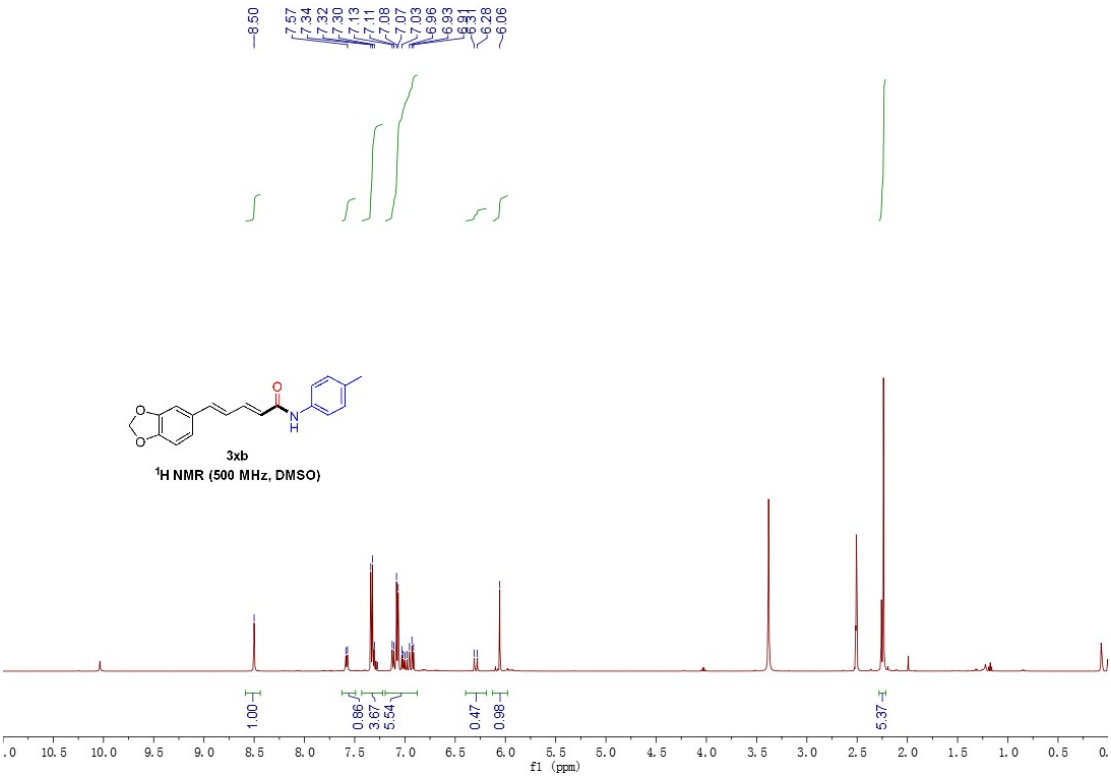


Figure S107. ^{1}H NMR (500 MHz, DMSO) spectrum of 3xb

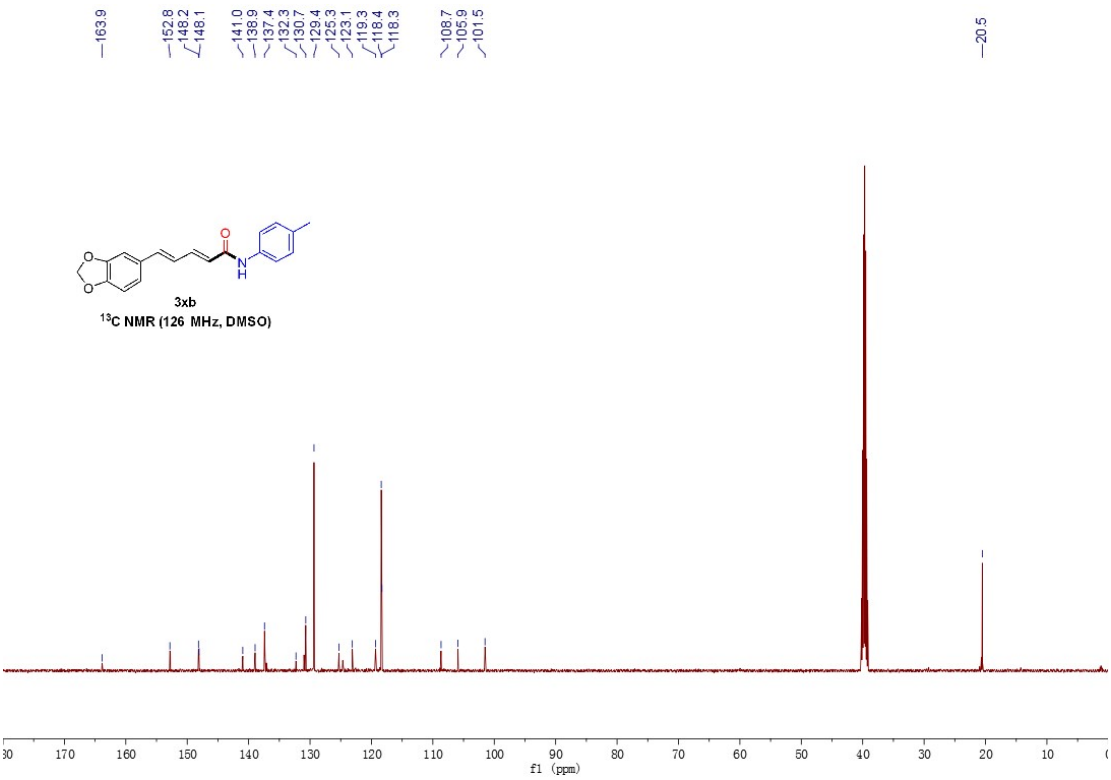


Figure S108. ^{13}C NMR (126 MHz, DMSO) spectrum of 3xb

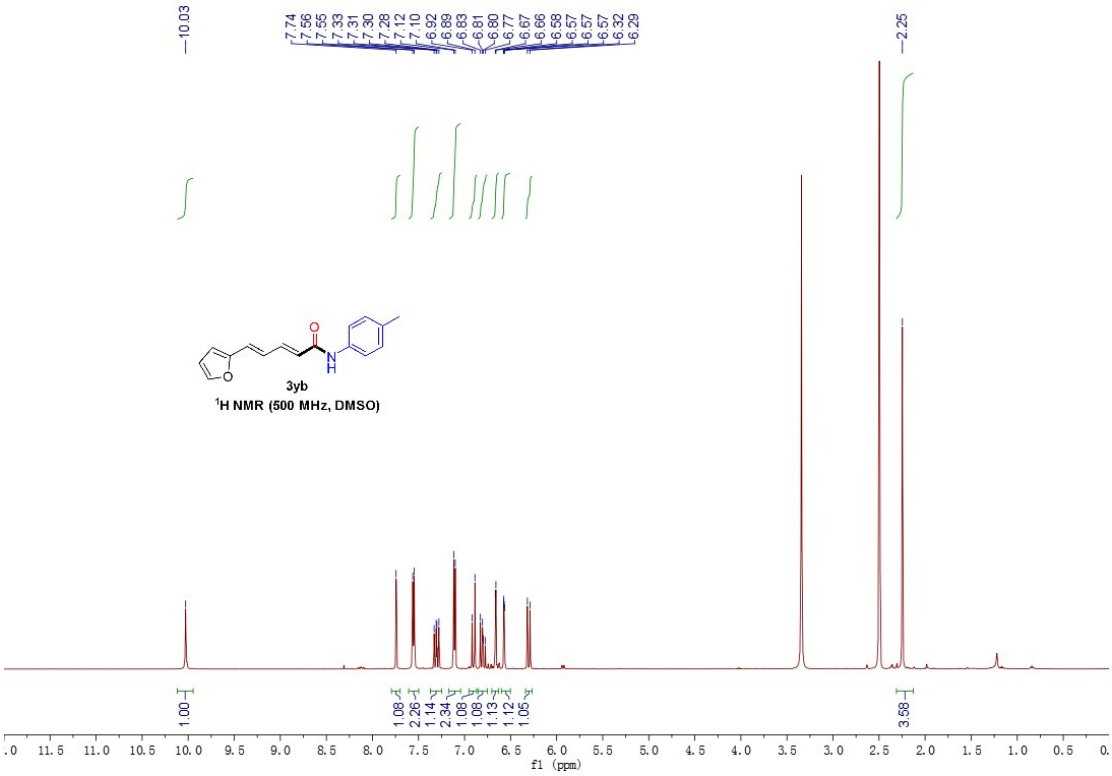


Figure S109. ^{1}H NMR (500 MHz, DMSO) spectrum of 3yb

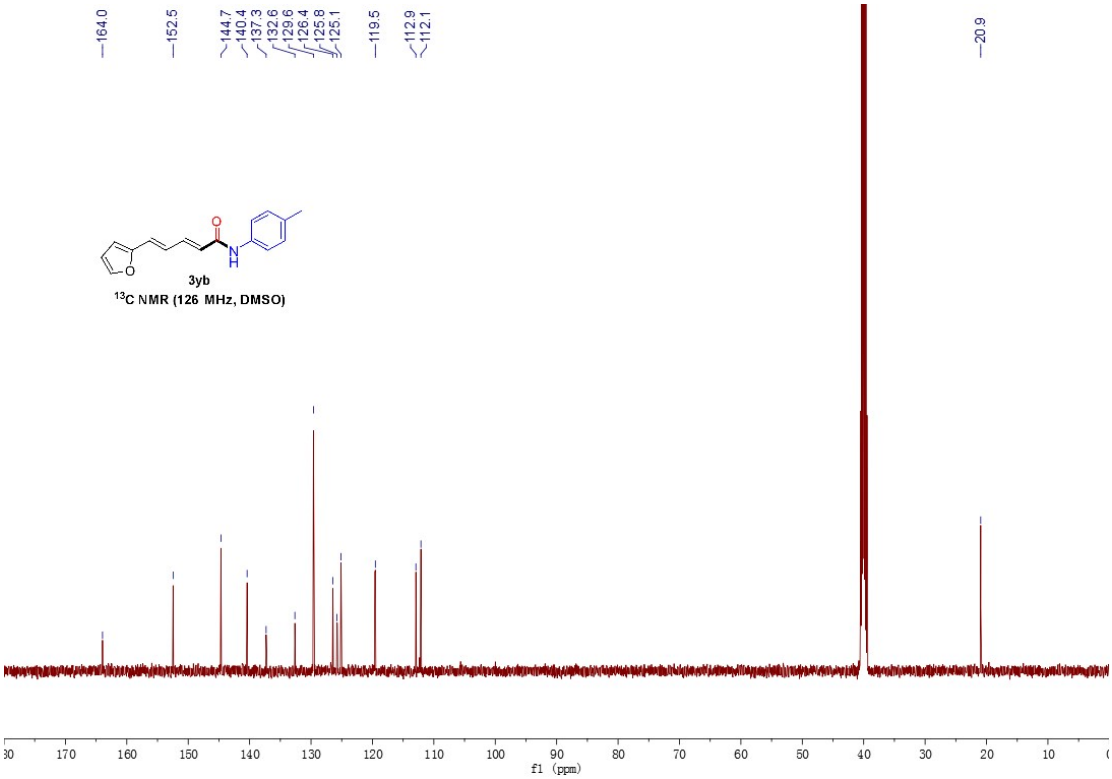


Figure S110. ^{13}C NMR (126 MHz, DMSO) spectrum of 3yb

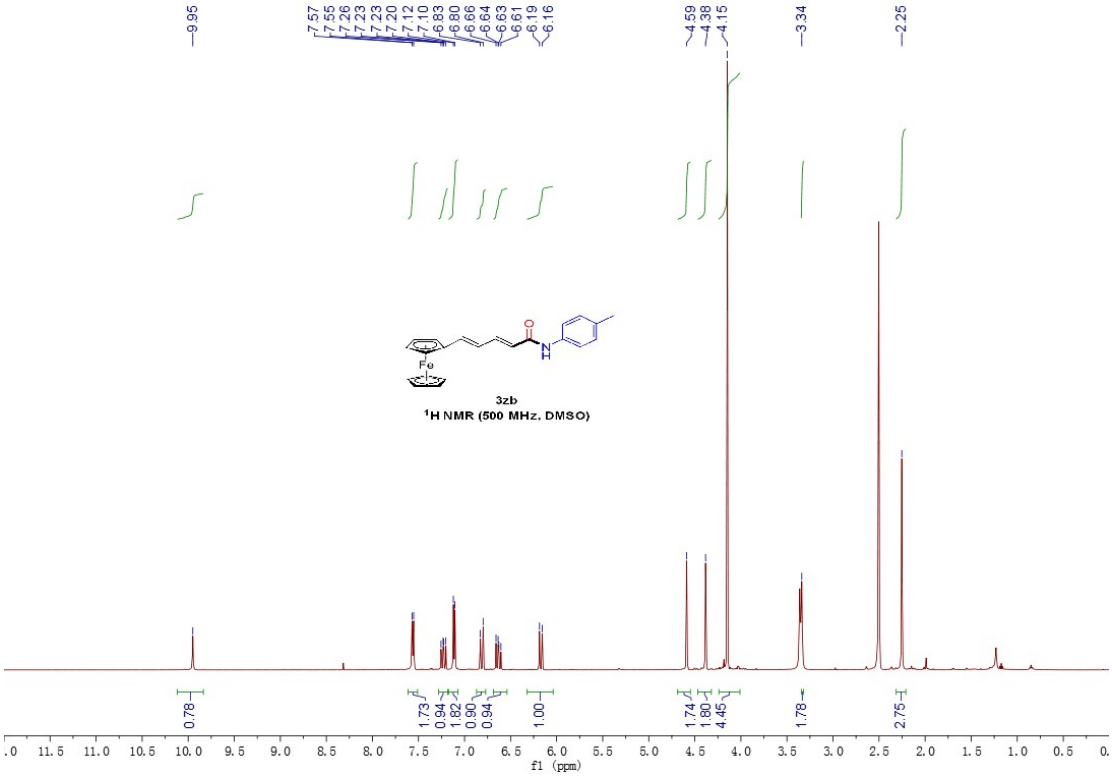


Figure S111. ^{1}H NMR (500 MHz, DMSO) spectrum of 3zb

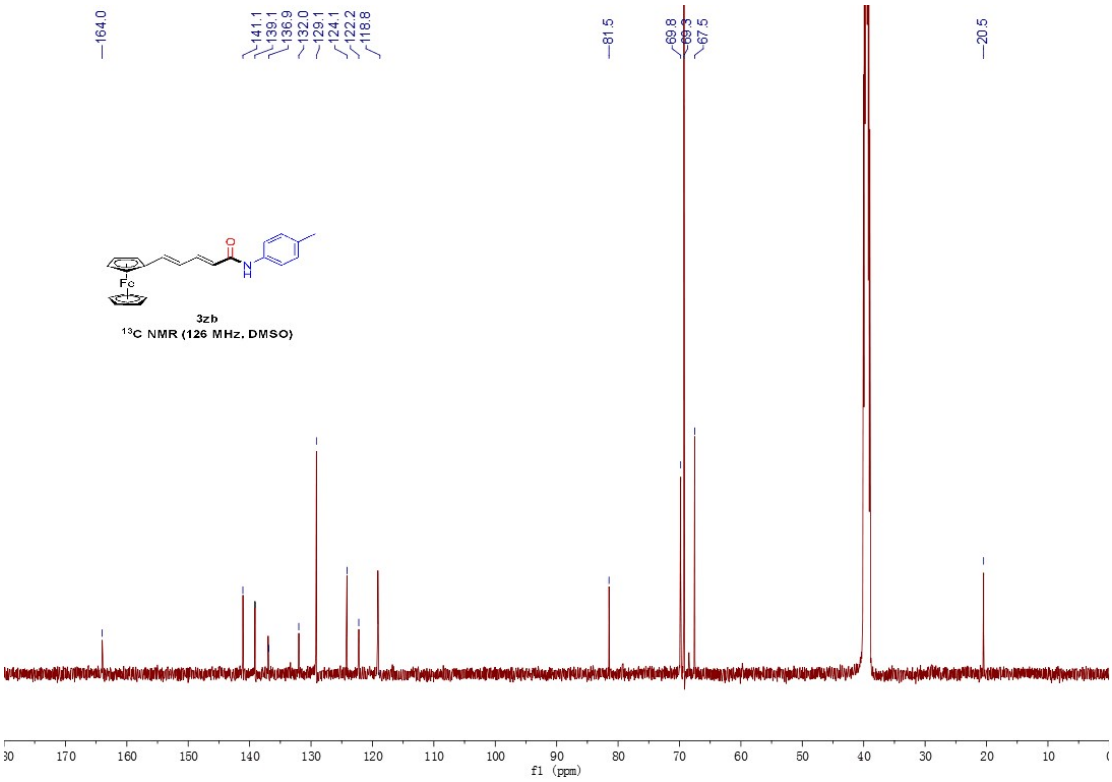


Figure S112. ^{13}C NMR (126 MHz, DMSO) spectrum of 3zb

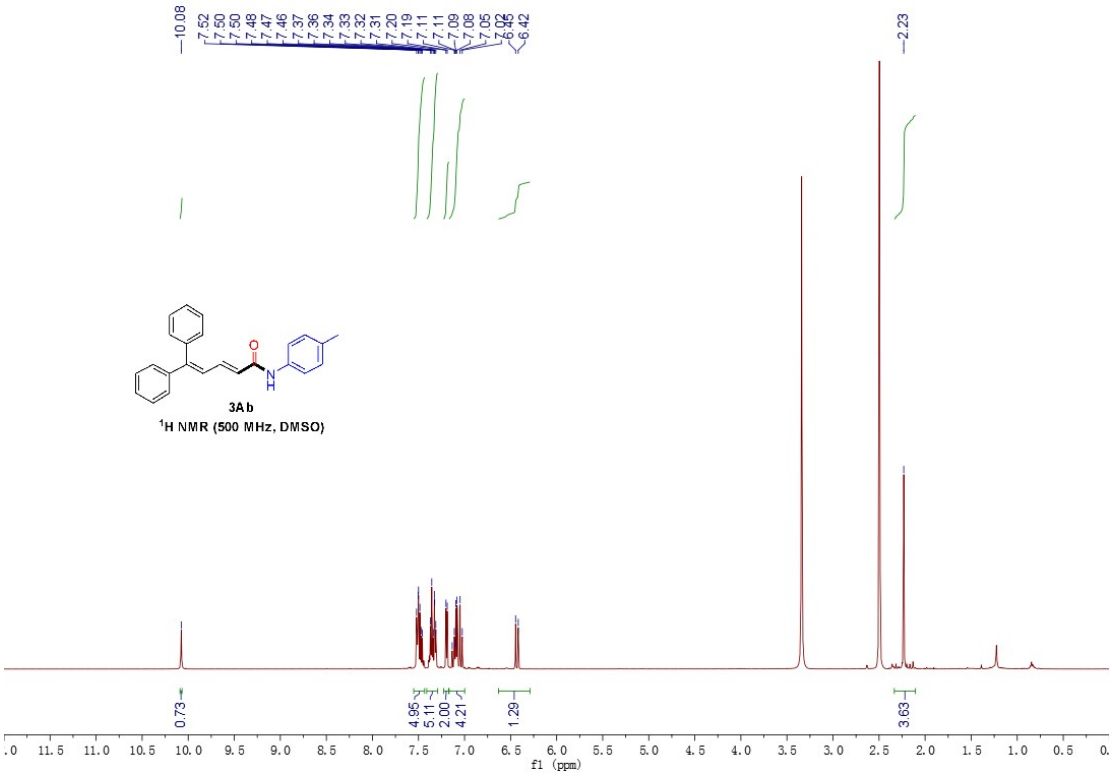


Figure S113. ^{1}H NMR (500 MHz, DMSO) spectrum of 3Ab

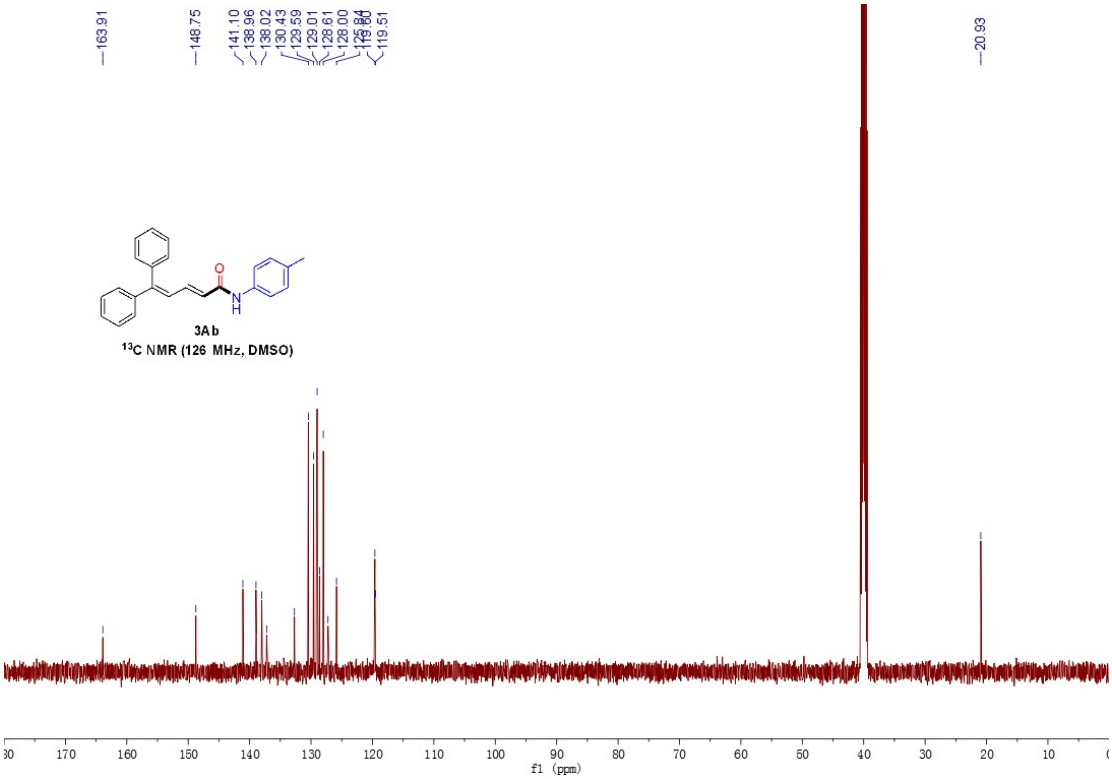


Figure S114. ^{13}C NMR (126 MHz, DMSO) spectrum of 3Ab

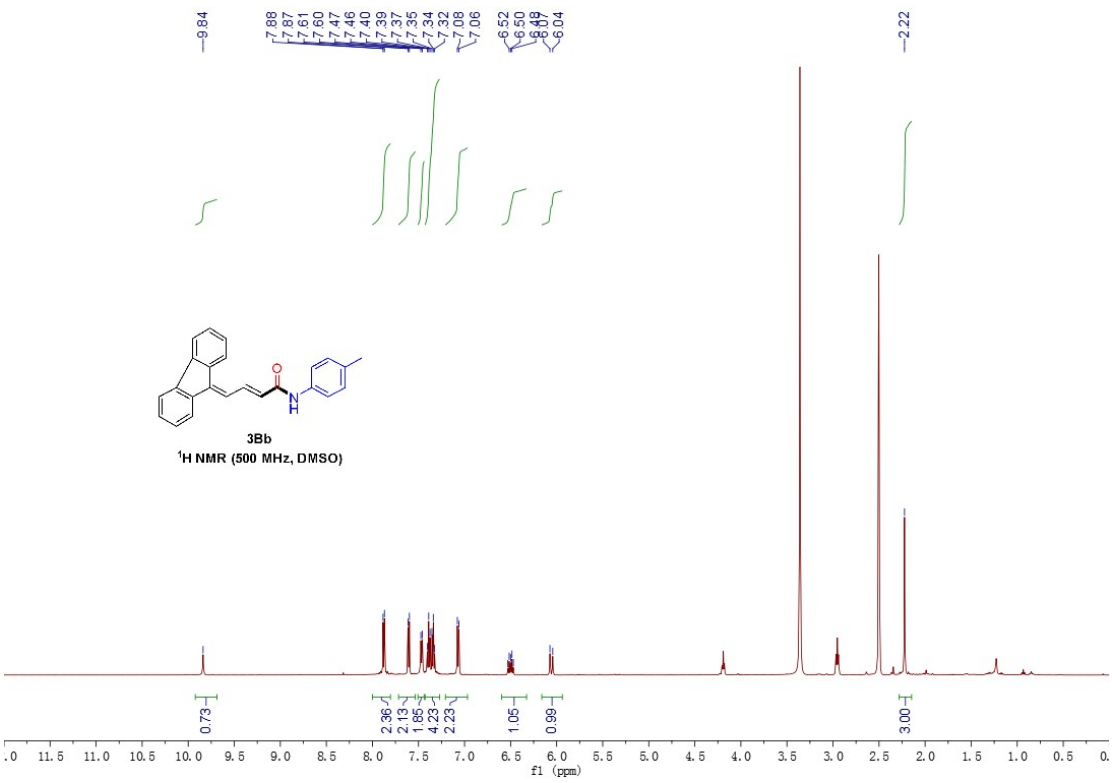


Figure S115. ^{1}H NMR (500 MHz, DMSO) spectrum of 3Bb

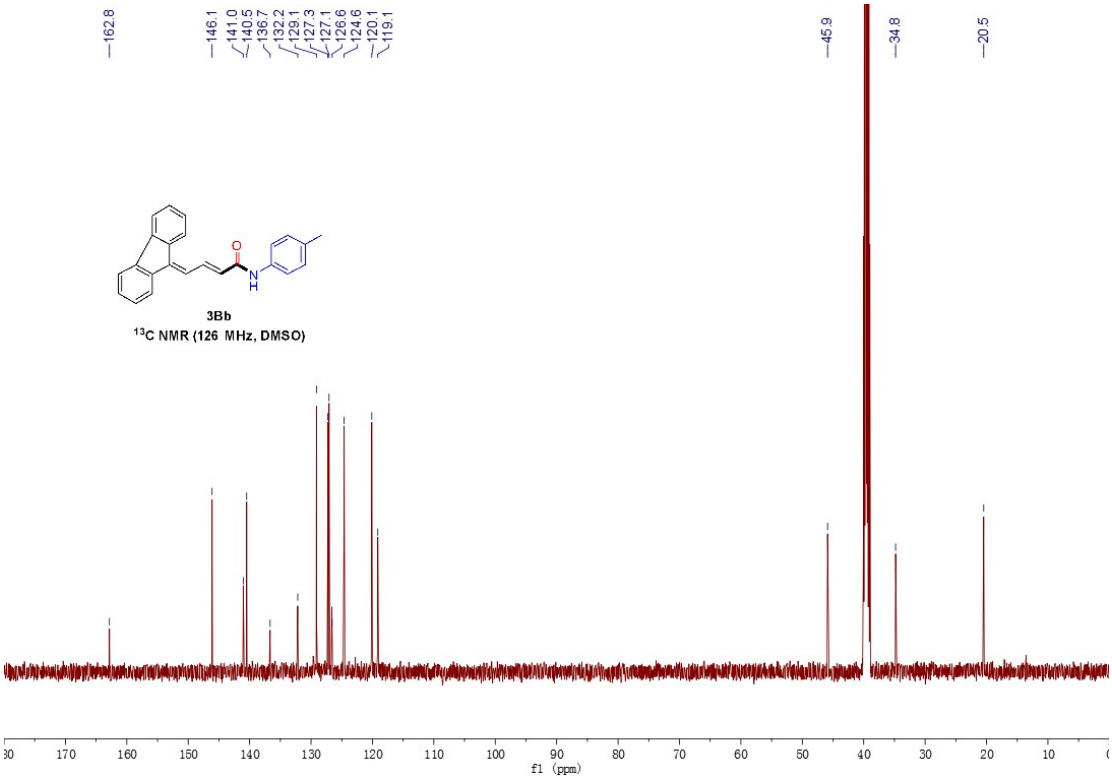


Figure S116. ^{13}C NMR (126 MHz, DMSO) spectrum of 3Bb

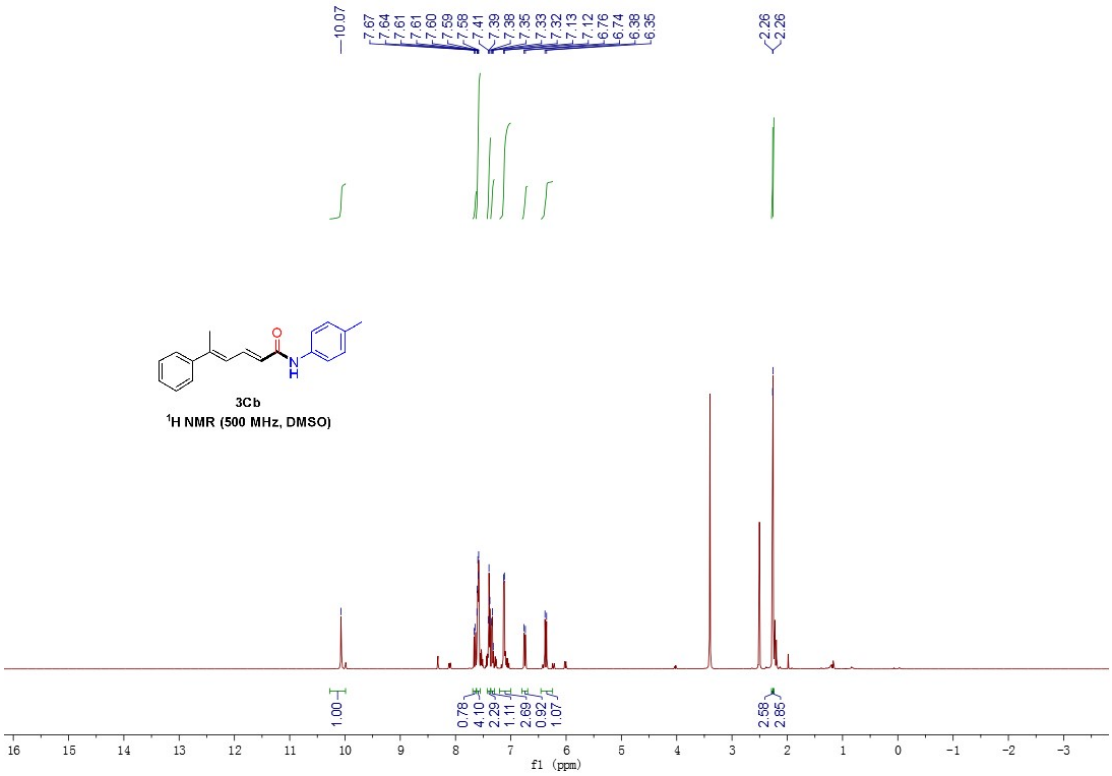


Figure S117. ^{1}H NMR (500 MHz, DMSO) spectrum of 3Cb

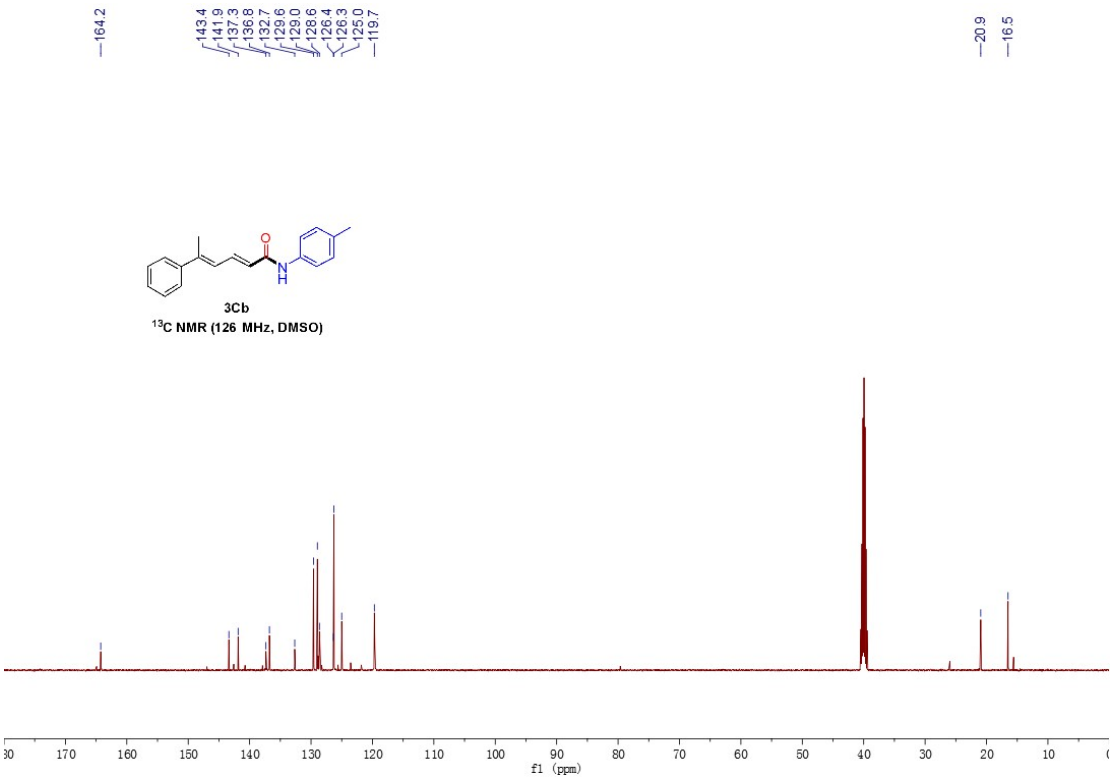


Figure S118. ^{13}C NMR (126 MHz, DMSO) spectrum of 3Cb

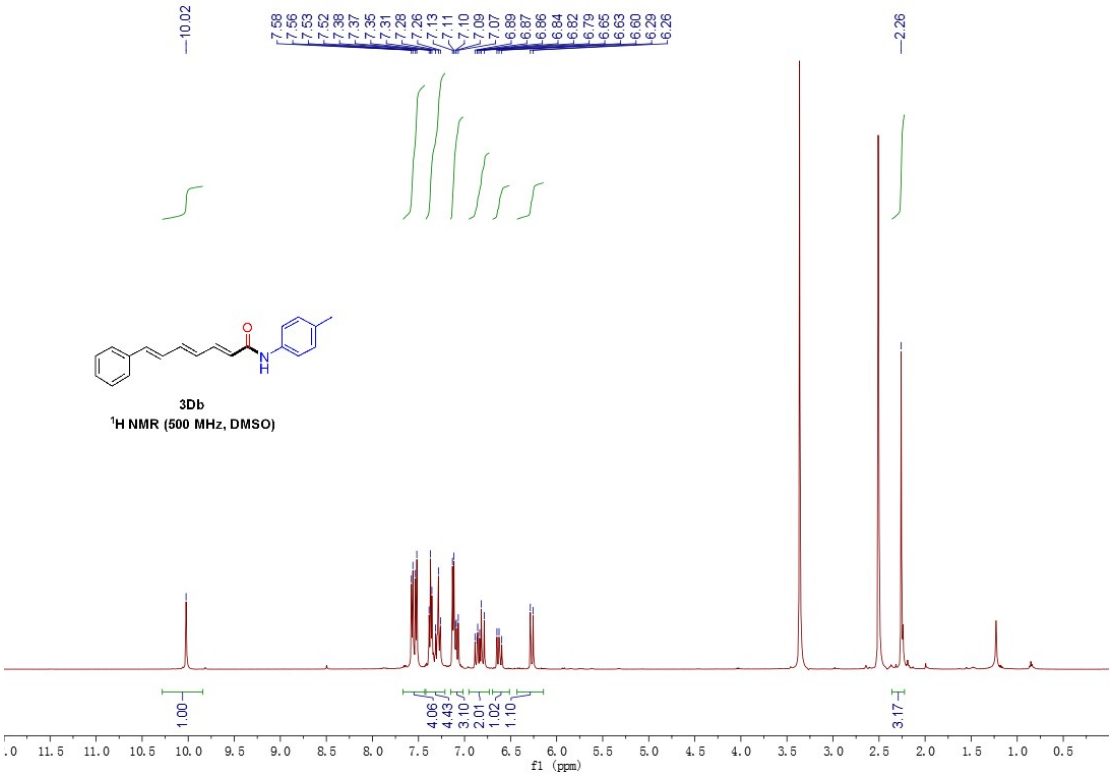


Figure S119. ^{1}H NMR (500 MHz, DMSO) spectrum of 3Db

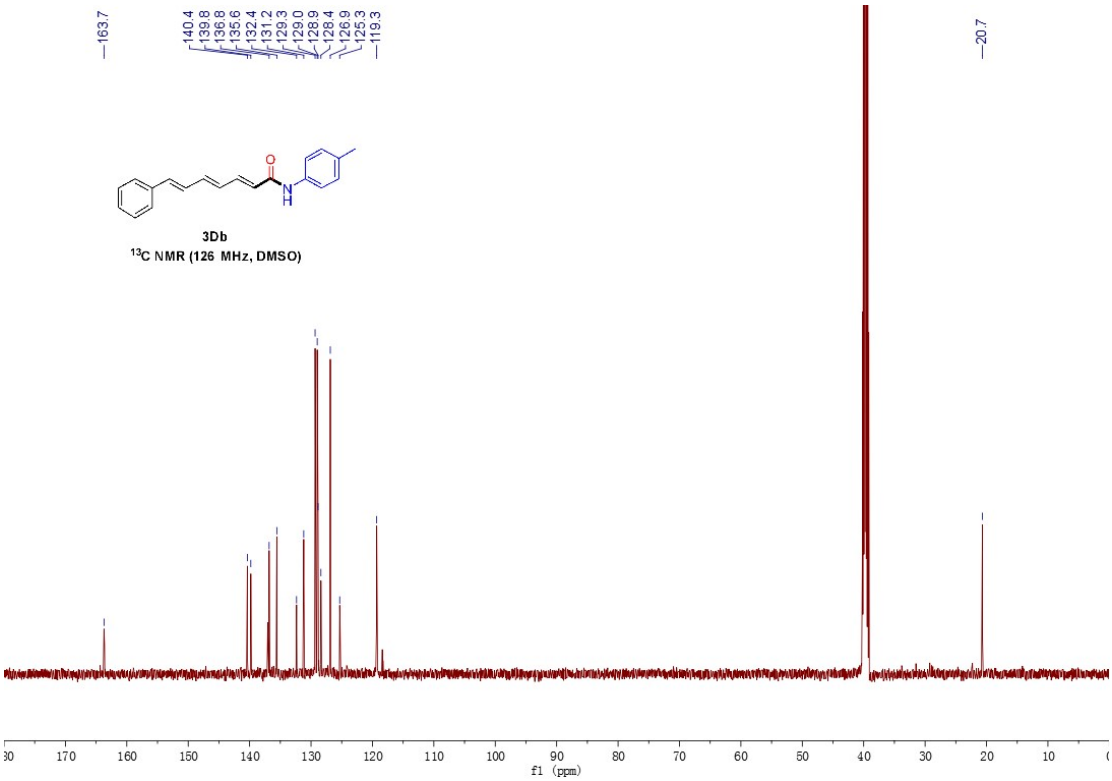


Figure S120. ^{13}C NMR (126 MHz, DMSO) spectrum of 3Db