Supporting Information

Experimental and Theoretical Insights for Designing Zn^{2+} Complexes to Trigger Chemo-selective Hetero-Coupling of Alcohols

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1. General considerations:

Unless otherwise stated, all chemicals were purchased from common commercial sources and used as received. All solvents were dried by using standard protocol. The synthesis of catalyst was performed under argon atmosphere with freshly distilled dry THF. All catalytic reactions were carried out under argon atmosphere using dried glassware and standard syringe/septa techniques. DRX-400 Varian spectrometer and Bruker Avance III 600, 500 and 400 spectrometers were used to record ^{1}H and ^{13}C NMR spectra using $CDCl_3$ and DMSO-d_6 as solvent and TMS as an internal standard. Chemical shifts (δ) are reported in ppm and spin-spin coupling constant (*J*) are expressed in Hz, and other data are reported as follows: s = singlet, d = doublet, dd = doublet of doublet, dt = doublet of triplet, t = triplet, m = multiplet, q = quartet, and brs = broad singlet. X-ray crystallographic data were collected using Agilent Super Nova (Single source at offset, Eos) diffractometer. FTIR were collected on PerkinElmer IR spectrometer. Q-Tof ESIMS instrument (model HAB 273) was used for recording mass spectra. SRL silica gel (100- 200 mesh) was used for column chromatography.

2. Synthesis and characterization of Ligands:

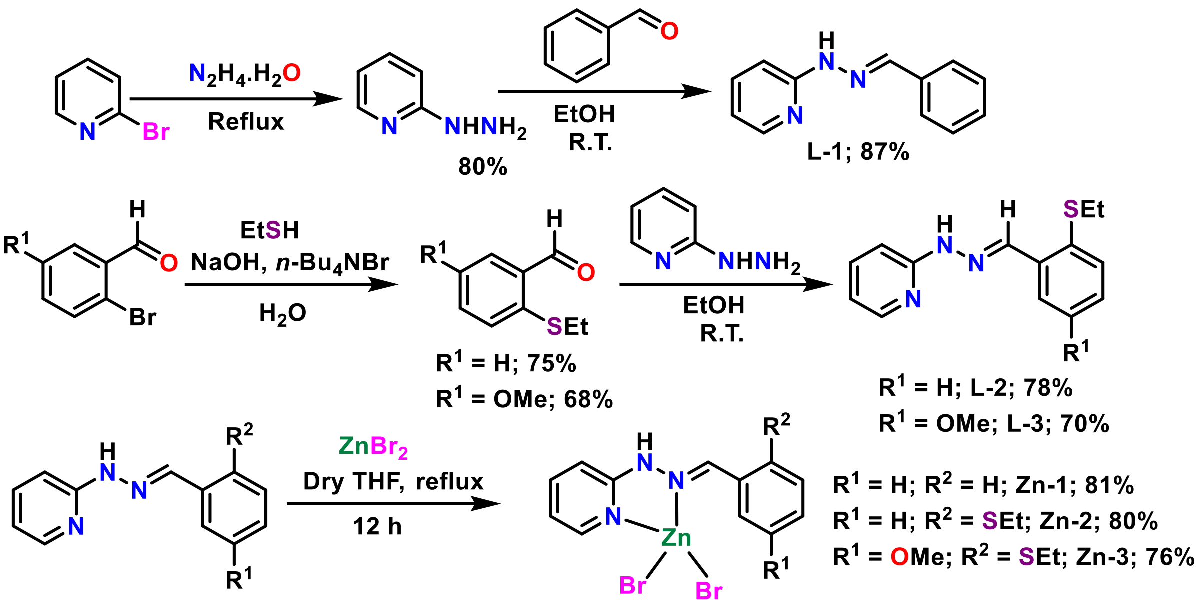


Figure S1. Ligand synthesis and Zn-NN complex preparation.

2-hydrazinopyridine was prepared according to previous reported literature method.[1] An oven dried two-neck 50 mL round bottom flask was charged with 2-bromopyridine (5.0 mmol) and ethanol (6 mL). To this solution, hydrazine hydrate (98% in water) (10.0 equiv.) was added. Then the reaction mixture was stirred at 110 °C for 24 h. After completion (monitored by TLC), reaction mixture was allowed to cool at room temperature and ethanol was evaporated. After that the reaction mixture was extracted with ethyl acetate (15 mL x 5) and whole ethyl acetate part was washed with water (15 mL x 2). The ethyl acetate layer was dried over Na_2SO_4, evaporated under reduced pressure and without any further purification the crude product was used for the next step.

A mixture of NaOH (7.0 mmol, 1.4 equiv.), H_2O (5.0 mL) and ethanethiol (7.0 mmol, 1.4 equiv.) was stirred at room temperature for 30 min, the corresponding 2-bromobenzaldehyde (5.0 mmol, 1.0 equiv.) and tetrabutylammonium bromide (50.0 mg) were added, and the reaction mixture was stirred at 82 °C for a period of 12 h. After being cooled to room temperature, the reaction mixture was poured into 30 mL of water and extracted three times with EtOAc (3 × 20 mL). The combined organic layers were dried over anhydrous Na_2SO_4, filtered and concentrated in vacuo. The product was purified by flash chromatography using a mixture of ethyl acetate and hexane as the elutent to afford the corresponding 2-(ethylthio)-benzaldehyde.[2]

2-hydrazinopyridine (2.0 mmol) and substituted Benzaldehyde compound (2.2 mmol) were dissolved in ethanol (10 mL). The resulting solution was stirred for 12 h at room temperature. Then, it was filtered and the filter residue was washed thoroughly with ethanol. After that, residue was dissolved by CH_2Cl_2 and the combined organic phase was dried over Na_2SO_4. Then the solvent was evaporated to get the crude product, which was further purified by silica gel column chromatography using 10-20 % ethyl acetate in hexane to get the desired compound.

3. Synthesis and Characterization of Zn-NN Complexes:

In an oven dried two-neck round bottom flask ligand [(PyNH)N(CHAr) Ar = Ph, Ph-2-SEt and Ph-2-SEt-5-OMe] (1 mmol) was taken in 4 mL of dry THF and was added dropwise to the suspension of $ZnBr_2$ (0.225g, 1 mmol) in 8 mL degassed dry THF. Then, the suspension was refluxed overnight under argon atmosphere. After being cooled to room temperature, the solvent was evaporated to obtain the residue, which was further washed with ether and dried under vacuum to get light yellow solid of Zn-complex. The single crystal was grown by slow diffusion of ether in the methanol solution of the complex.

3.1. HRMS of Zn-1:

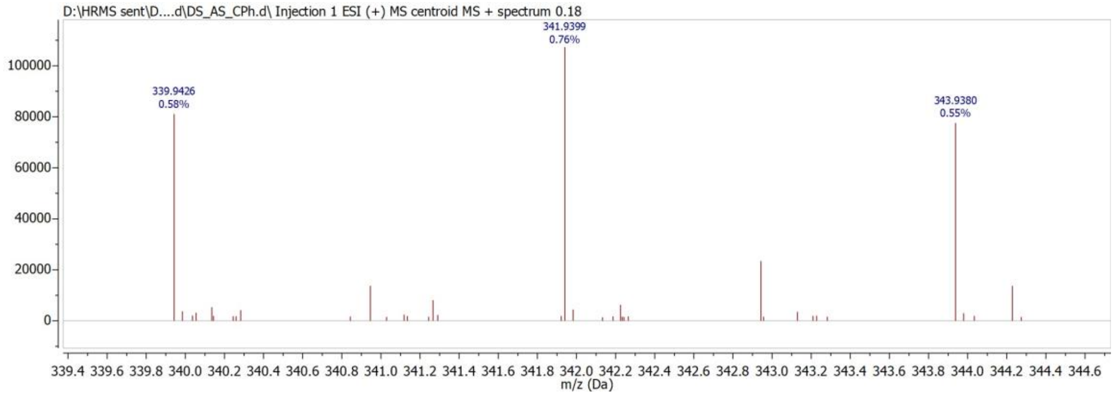
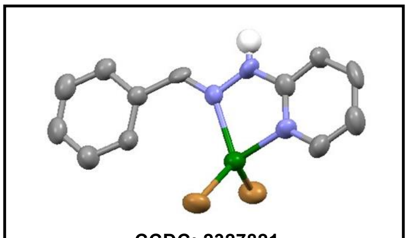


Figure S2. HRMS of Zn-1 complex.

3.2. Single crystal data of Zn-1:



	Zn-1
Empirical formula	$C_{12}H_{11}Br_2N_3Zn$
Formula weight	422.43
Temperature, T	293K
Crystal system	triclinic
Space group	P -1
Unit cell dimensions	a=7.8069(14) Å α=77.783(10)° b=7.8757(8) Å β=85.879(13)° c=11.9902(16) Å γ=77.735(11)°
Volume, V ($Å^3$)	703.79(18)
Z	2
Density (calculated), g cm^{-3}	1.993
Absorption coefficient, μ (mm^{-1})	7.407
F (000)	408.0
Crystal size, mm^3	0.36 × 0.34 × 0.30
Theta range for data collection	2.671 to 28.679
Index ranges	$-10 \leq h \leq 9$ $-10 \leq k \leq 10$ $-16 \leq l \leq 15$
Reflections collected	3204
Independent reflections	1409
Completeness to theta	0.879
Absorption correction	Multi-scan
Max. and min. transmission	1.00000 and 0.28469
Refinement method	'XL (Sheldrick, 2008)'
Data / restraints / parameters	3204/116/163
Goodness-of-fit on F^2	0.976
Final R indices [I>2sigma(I)]	R1 = 0.0817, wR2 = 0.1732
R indices (all data)	R1 = 0.1565, wR2 = 0.2279
Extinction coefficient	7.407
Largest diff. peak and hole	1.238 and -0.920 e·$Å^{-3}$

Bond Distances [Å]	Bond angles [°]
Br1 Zn1 2.328(2) Br2 Zn1 2.3417(17) Zn1 N3 2.021(8)	Br1 Zn1 Br2 119.56(6) N3 Zn1 Br1 113.5(3) N3 Zn1 Br2 110.6(2)

Zn1 N1 2.120(8)	N3 Zn1 N1 80.3(3)
N3 C8 1.331(12)	N1 Zn1 Br1 108.8(2)
N3 C12 1.318(12)	N1 Zn1 Br2 117.7(2)
N1 N2 1.358(10)	C8 N3 Zn1 112.5(6)
N1 C7 1.272(11)	C12 N3 Zn1 127.0(7)
N2 H2 0.8600	C12 N3 C8 120.4(9)
N2 C8 1.360(12)	N2 N1 Zn1 107.0(5)
C8 C9 1.402(13)	C7 N1 Zn1 137.6(6)
C7 H7 0.9300	C7 N1 N2 115.1(7)
C7 C6 1.463(12)	N1 N2 H2 120.0
C9 H9 0.9300	N1 N2 C8 119.9(7)
C9 C10 1.341(14)	C8 N2 H2 120.0
C10 H10 0.9300	N3 C8 N2 118.3(8)
C10 C11 1.418(16)	N3 C8 C9 121.2(9)
C11 H11 0.9300	N2 C8 C9 120.5(9)
C11 C12 1.380(14)	N1 C7 H7 117.1
C12 H12 0.9300	N1 C7 C6 125.8(8)
C1 H1 0.9300	C6 C7 H7 117.1
C1 C2 1.372(9)	C8 C9 H9 120.2
C1 C6 1.374(8)	C10 C9 C8 119.5(9)
C2 H2A 0.9300	C10 C9 H9 120.2
C2 C3 1.363(9)	C9 C10 H10 120.7
C3 H3 0.9300	C9 C10 C11 118.6(9)
C3 C4 1.350(9)	C11 C10 H10 120.7
C4 H4 0.9300	C10 C11 H11 120.6
C4 C5 1.376(9)	C12 C11 C10 118.7(10)
C5 H5 0.9300	C12 C11 H11 120.6
C5 C6 1.390(9)	N3 C12 C11 121.5(10)
	N3 C12 H12 119.3
	C11 C12 H12 119.3
	C2 C1 H1 119.6
	C2 C1 C6 120.9(8)
	C6 C1 H1 119.6
	C1 C2 H2A 120.1
	C3 C2 C1 119.8(8)
	C3 C2 H2A 120.1
	C2 C3 H3 119.7
	C4 C3 C2 120.7(8)
	C4 C3 H3 119.7
	C3 C4 H4 119.9
	C3 C4 C5 120.2(8)
	C5 C4 H4 119.9
	C4 C5 H5 119.9
	C4 C5 C6 120.2(8)
	C6 C5 H5 119.9
	C1 C6 C7 124.2(8)
	C1 C6 C5 118.3(8)
	C5 C6 C7 117.4(7)

3.3. HRMS of Zn-2:

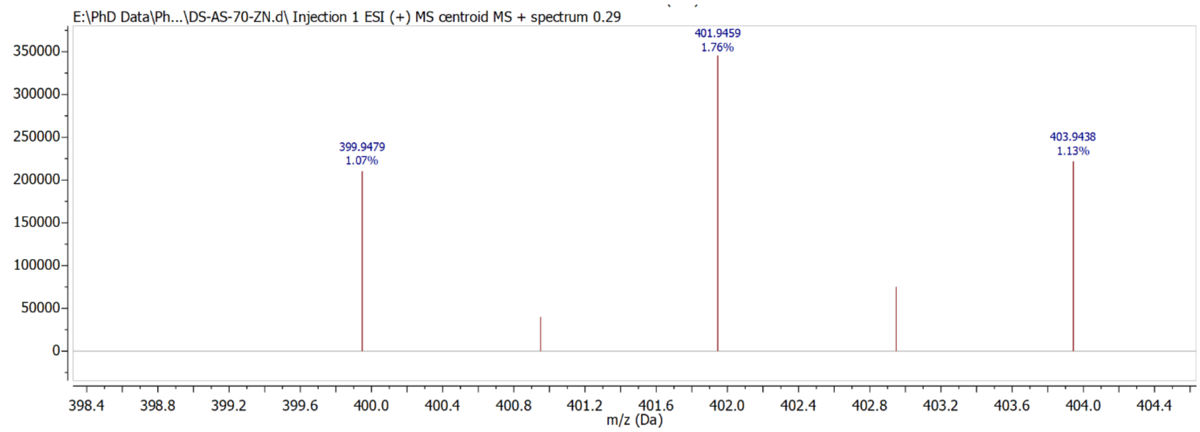
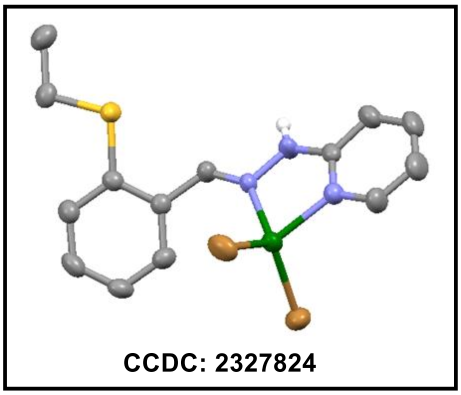


Figure S3. HRMS of Zn-2 complex.

3.4. Single Crystal data of Zn-2:



	Zn-2	
Empirical formula	$C_{15}H_{19}Br_2N_3OSZn$	
Formula weight	514.58	
Temperature, T	296K	
Crystal system	triclinic	
Space group	P -1	
Unit cell dimensions	a= 7.5172(17) Å b= 10.647(2) Å c= 13.487(3) Å	α= 105.076(7)° β= 92.008(7)° γ= 109.849(7)°
Volume, V ($Å^3$)	971.3(4)	
Z	2	
Density (calculated), g cm^{-3}	1.759	
Absorption coefficient, μ (mm^{-1})	5.491	
F (000)	508.0	
Crystal size, mm^3	0.38 × 0.34 × 0.31	
Theta range for data collection	2.125 to 24.999	

Index ranges	$-8 \le h \le 8$ $-12 \le k \le 12$ $-16 \le l \le 16$
Reflections collected	3412
Independent reflections	2872
Completeness to theta	1.000
Absorption correction	none
Refinement method	'SHELXL-2019/1 (Sheldrick, 2019)'
Data / restraints / parameters	3412/0/214
Goodness-of-fit on F^2	0.931
Final R indices [I>2sigma(I)]	R1= 0.0432, wR2= 0.1247
R indices (all data)	R1= 0.0529, wR2= 0.1376
Extinction coefficient	5.491
Largest diff. peak and hole	1.013 and -0.781 e·Å^{-3}

Bond Distances [Å]	Bond angles [°]
Zn01 N3 2.043(4)	N3 Zn01 N1 79.23(14)
Zn01 N1 2.123(4)	N3 Zn01 Br2 116.82(12)
Zn01 Br2 2.3108(9)	N1 Zn01 Br2 114.10(11)
Zn01 Br1 2.3610(9)	N3 Zn01 Br1 107.67(12)
S1 C12 1.762(5)	N1 Zn01 Br1 113.12(11)
S1 C13 1.787(5)	Br2 Zn01 Br1 119.19(3)
N1 C6 1.274(6)	C12 S1 C13 105.9(2)
N1 N2 1.388(5)	C6 N1 N2 116.5(4)
N3 C5 1.325(6)	C6 N1 Zn01 134.8(3)
N3 C1 1.354(6)	N2 N1 Zn01 108.4(3)
N2 C5 1.362(6)	C5 N3 C1 118.4(4)
N2 H2N 0.77(5)	C5 N3 Zn01 115.1(3)
C7 C12 1.399(6)	C1 N3 Zn01 126.5(3)
C7 C8 1.397(7)	C5 N2 N1 119.9(4)
C7 C6 1.455(6)	C5 N2 H2N 123(3)
C6 H6 0.9300	N1 N2 H2N 117(3)
C5 C4 1.381(7)	C12 C7 C8 119.2(4)
C12 C11 1.404(6)	C12 C7 C6 119.0(4)
O1 C15 1.387(8)	C8 C7 C6 121.8(4)
C13 C14 1.503(8)	N1 C6 C7 124.5(4)
C13 H13A 0.9700	N1 C6 H6 117.7
C13 H13B 0.9700	C7 C6 H6 117.7
C11 C10 1.382(7)	N3 C5 N2 117.0(4)
C11 H11 0.9300	N3 C5 C4 123.0(4)
C8 C9 1.380(7)	N2 C5 C4 120.0(5)
C8 H8 0.9300	C7 C12 C11 119.3(4)
C4 C3 1.380(8)	C7 C12 S1 117.6(3)
C4 H4 0.9300	C11 C12 S1 123.0(4)
C10 C9 1.377(7)	C14 C13 S1 108.1(4)
C10 H10 0.9300	C14 C13 H13A 110.1
C9 H9 0.9300	S1 C13 H13A 110.1

C1 C2 1.367(8) C1 H1A 0.9300 C3 C2 1.360(9) C3 H3 0.9300 C14 H14A 0.9600 C14 H14B 0.9600 C14 H14C 0.9600 C2 H2 0.9300 C15 H15A 0.9600 C15 H15B 0.9600 C15 H15C 0.9600	C14 C13 H13B 110.1 S1 C13 H13B 110.1 H13A C13 H13B 108.4 C10 C11 C12 119.8(5) C10 C11 H11 120.1 C12 C11 H11 120.1 C9 C8 C7 121.3(4) C9 C8 H8 119.4 C7 C8 H8 119.4 C3 C4 C5 117.2(5) C3 C4 H4 121.4 C5 C4 H4 121.4 C9 C10 C11 121.3(4) C9 C10 H10 119.3 C11 C10 H10 119.3 C8 C9 C10 119.1(5) C8 C9 H9 120.4 C10 C9 H9 120.4 N3 C1 C2 121.9(5) N3 C1 H1A 119.0 C2 C1 H1A 119.0 C2 C3 C4 120.7(5) C2 C3 H3 119.7 C4 C3 H3 119.7 C13 C14 H14A 109.5 C13 C14 H14B 109.5 H14A C14 H14B 109.5 C13 C14 H14C 109.5 H14A C14 H14C 109.5 H14B C14 H14C 109.5 C3 C2 C1 118.8(5) C3 C2 H2 120.6 C1 C2 H2 120.6 O1 C15 H15A 109.5 O1 C15 H15B 109.5 H15A C15 H15B 109.5 O1 C15 H15C 109.5 H15A C15 H15C 109.5 H15B C15 H15C 109.5

3.5. HRMS of Zn-3:

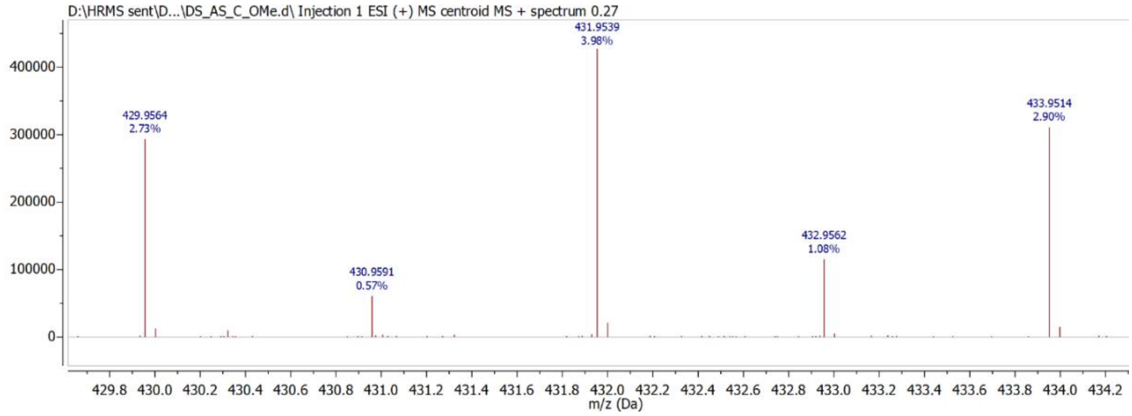
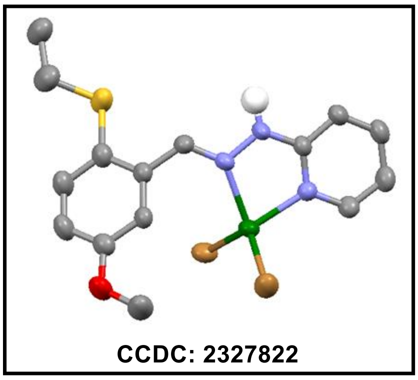


Figure S4. HRMS of Zn-3 complex.

3.6. Single crystal data of Zn-3:



	Zn-3
Empirical formula	$C_{15}H_{17}Br_2N_3OSZn$
Formula weight	512.57
Temperature, T	296K
Crystal system	monoclinic
Space group	P 21/c
Unit cell dimensions	a= 7.3412(13) Å α= 90° b= 19.033(3) Å β= 98.398(5)° c= 13.475(2) Å γ= 90°
Volume, V (Å^3)	1862.6(6)
Z	4
Density (calculated), g cm^{-3}	1.828
Absorption coefficient, μ (mm^{-1})	5.727
F (000)	1008.0
Crystal size, mm^3	0.34 × 0.30 × 0.27
Theta range for data collection	1.865 to 24.999
Index ranges	$-8 \leq h \leq 8$

	-22 ≤ k ≤ 22 -16 ≤ l ≤ 16
Reflections collected	3283
Independent reflections	2565
Completeness to theta	1.000
Absorption correction	none
Refinement method	'SHELXL-2019/1 (Sheldrick, 2019)'
Data / restraints / parameters	3283/1/214
Goodness-of-fit on F^2	1.104
Final R indices [I>2sigma(I)]	R1 = 0.0414, wR2 = 0.0921
R indices (all data)	R1 = 0.0630, wR2 = 0.1133
Extinction coefficient	5.727
Largest diff. peak and hole	0.623 and -0.697 e·Å^{-3}

Bond Distances [Å]	Bond angles [°]
Br1 Zn1 2.3465(10)	N3 Zn1 N1 79.77(17)
Zn1 N3 2.025(4)	N3 Zn1 Br2 106.65(13)
Zn1 N1 2.120(4)	N1 Zn1 Br2 124.89(13)
Zn1 Br2 2.3273(10)	N3 Zn1 Br1 120.79(13)
S1 C12 1.765(6)	N1 Zn1 Br1 105.43(13)
S1 C13 1.779(7)	Br2 Zn1 Br1 115.48(4)
N1 C6 1.284(7)	C12 S1 C13 102.6(3)
N1 N2 1.381(6)	C6 N1 N2 117.5(5)
N3 C5 1.338(7)	C6 N1 Zn1 133.1(4)
N3 C1 1.347(7)	N2 N1 Zn1 108.8(3)
O1 C9 1.366(7)	C5 N3 C1 118.0(5)
O1 C15 1.416(9)	C5 N3 Zn1 114.4(3)
N2 C5 1.366(7)	C1 N3 Zn1 127.5(4)
C5 C4 1.392(8)	C9 O1 C15 118.0(5)
C6 C7 1.453(8)	C5 N2 N1 118.9(4)
C8 C9 1.385(8)	N3 C5 N2 117.4(5)
C8 C7 1.404(8)	N3 C5 C4 121.7(5)
C7 C12 1.395(8)	N2 C5 C4 120.9(5)
C4 C3 1.366(8)	N1 C6 C7 122.6(5)
C1 C2 1.353(8)	C9 C8 C7 120.0(5)
C9 C10 1.389(9)	C12 C7 C8 119.9(5)
C12 C11 1.398(9)	C12 C7 C6 118.9(5)
C3 C2 1.387(9)	C8 C7 C6 121.2(5)
C10 C11 1.367(9)	C3 C4 C5 118.8(5)
C13 C14 1.488(10)	N3 C1 C2 123.5(6)
	O1 C9 C8 124.7(6)
	O1 C9 C10 115.5(5)
	C8 C9 C10 119.8(6)
	C7 C12 C11 118.7(6)
	C7 C12 S1 120.4(5)
	C11 C12 S1 120.6(5)
	C4 C3 C2 119.7(6)
	C1 C2 C3 118.2(6)
	C11 C10 C9 120.3(6)

	C10 C11 C12 121.2(6) C14 C13 S1 110.3(5)

3.7. HRMS and Single crystal data of Zn-4:

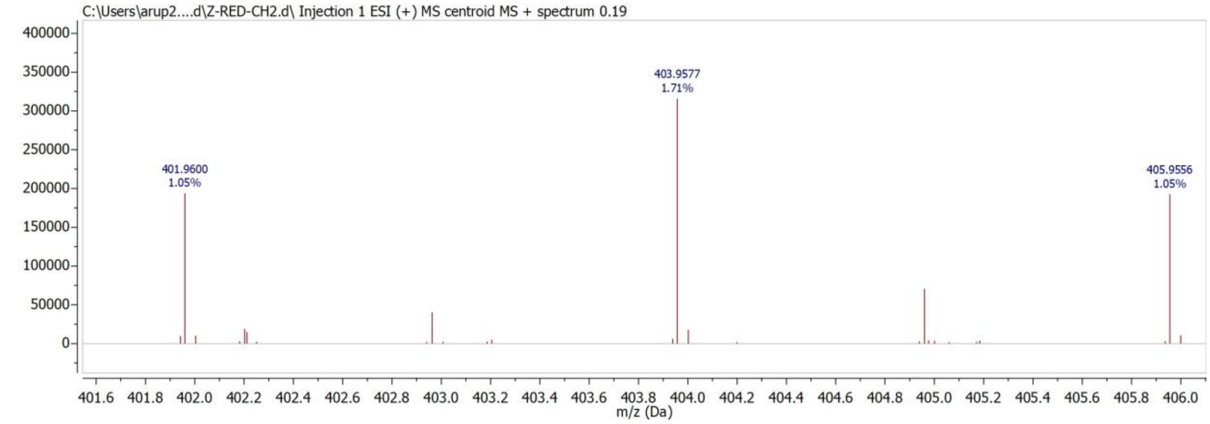
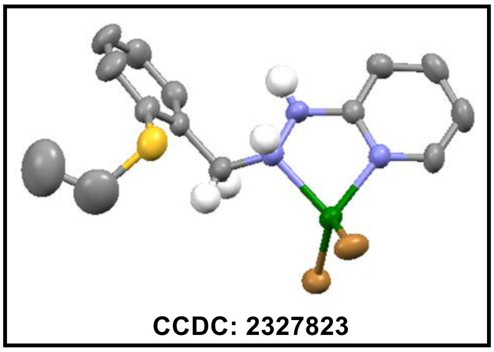


Figure S5. HRMS of Zn-4 complex.

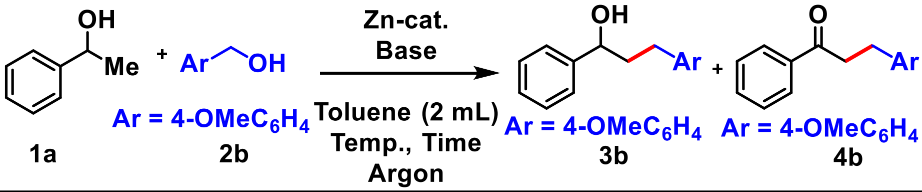


	Zn-4
Empirical formula	$C_{14}H_{17}Br_2N_3SZn$
Formula weight	484.55
Temperature, T	299K
Crystal system	triclinic
Space group	P -1
Unit cell dimensions	a= 7.8520(4)Å α=75.796(2)° b= 10.8828(6)Å β= 74.568(2)° c= 11.3769(6)Å γ= 76.283(2)°
Volume, V (Å^3)	892.99(8)
Z	2
Density (calculated), g cm^{-3}	1.802
Absorption coefficient, μ (mm^{-1})	5.963
F (000)	476.0
Crystal size, mm^3	0.32 × 0.28 × 0.19
Theta range for data collection	1.964 to 25.000
Index ranges	$-9 \leq h \leq 9$ $-12 \leq k \leq 12$ $-13 \leq l \leq 13$

Reflections collected	3126
Independent reflections	2831
Completeness to theta	0.995
Absorption correction	none
Refinement method	'SHELXL-2019/1 (Sheldrick, 2019)'
Data / restraints / parameters	3126/5/198
Goodness-of-fit on F^2	1.094
Final R indices [I>2sigma(I)]	R1 = 0.0336, wR2 = 0.0851
R indices (all data)	R1 = 0.0377, wR2 = 0.0877
Extinction coefficient	5.936
Largest diff. peak and hole	0.933 and -0.486 e·Å^{-3}

Bond Distances [Å]	Bond angles [°]
Br1 Zn1 2.3436(6)	N1 Zn1 N3 80.53(12)
Br2 Zn1 2.3332(6)	N1 Zn1 Br2 111.97(10)
Zn1 N1 2.022(3)	N3 Zn1 Br2 114.96(10)
Zn1 N3 2.128(3)	N1 Zn1 Br1 112.02(10)
S1 C12 1.780(5)	N3 Zn1 Br1 110.17(10)
S1 C13 1.823(8)	Br2 Zn1 Br1 120.41(2)
N3 N2 1.419(5)	C12 S1 C13 100.5(3)
N3 C6 1.444(5)	N2 N3 C6 111.6(3)
N2 C5 1.380(5)	N2 N3 Zn1 106.2(2)
N1 C5 1.331(5)	C6 N3 Zn1 116.0(2)
N1 C1 1.352(5)	C5 N2 N3 118.0(3)
C5 C4 1.398(6)	C5 N1 C1 119.0(3)
C7 C8 1.384(6)	C5 N1 Zn1 114.1(3)
C7 C12 1.394(6)	C1 N1 Zn1 126.8(3)
C7 C6 1.509(5)	N1 C5 N2 117.7(3)
C4 C3 1.363(6)	N1 C5 C4 121.6(4)
C12 C11 1.394(6)	N2 C5 C4 120.6(4)
C8 C9 1.376(7)	C8 C7 C12 118.5(4)
C1 C2 1.355(6)	C8 C7 C6 119.2(4)
C3 C2 1.383(7)	C12 C7 C6 122.3(4)
C9 C10 1.370(8)	N3 C6 C7 115.6(3)
C11 C10 1.368(7)	C3 C4 C5 118.2(4)
C13 C14 1.437(8)	C7 C12 C11 119.4(4)
	C7 C12 S1 121.2(3)
	C11 C12 S1 119.3(4)
	C9 C8 C7 121.5(4)
	N1 C1 C2 122.3(4)
	C4 C3 C2 120.4(4)
	C10 C9 C8 119.6(5)
	C1 C2 C3 118.5(4)
	C10 C11 C12 120.7(5)
	C11 C10 C9 120.2(4)
	C14 C13 S1 114.8(7)

4. Optimization table:[a]



Entry	1a (mmol)	2b (mmol)	Zn-Cat. (mol%)	Base (equiv.)	Time (h)	3b(%)[b]	4b(%)[b]
1.	0.5	0.6	2(7.5)	NaO^{t}Bu(1.0)	36	41	15
2	0.5	0.6	2(7.5)	KO^{t}Bu (1.0)	36	93	-
3	0.5	0.6	2(7.5)	KO^{t}Bu (0.75)	36	92	-
4	0.5	0.6	2(7.5)	KO^{t}Bu (0.75)	24	81	14
5	0.5	0.6	2(7.5)	KO^{t}Bu (0.75)	30	90	-
6	0.5	0.6	2(7.5)	KO^{t}Bu (0.5)	30	52	30
7	0.5	0.6	2(5.0)	KO^{t}Bu (0.75)	30	53	27
8[c]	0.5	0.6	2(7.5)	KO^{t}Bu (0.75)	30	61	29
9	0.5	0.6	2(7.5)	KOH (0.75)	30	41	25
10	0.5	0.5	2(7.5)	KO^{t}Bu (0.75)	30	55	32
11[d]	0.5	0.6	2(7.5)	KO^{t}Bu (0.75)	30	42	31
12	0.5	0.55	2(7.5)	KO^{t}Bu (0.75)	30	59	29
13	0.5	0.6	$ZnBr_2$ (7.5)	KO^{t}Bu (0.75)	30	<10	29
14	0.5	0.6	-	KO^{t}Bu (0.75)	30	trace	20
15	0.5	0.6	2(7.5)	-	30	ND	
16	0.5	0.6	1(7.5)	KO^{t}Bu (0.75)	30	63	25
17	0.5	0.6	3(7.5)	KO^{t}Bu (0.75)	30	69	28
18	0.5	0.6	2(7.5)	K_2CO_3(0.75)	30	33	25
19	0.5	0.6	2(7.5)	Cs_2CO_3(0.75)	30	35	18
20	0.5	0.6	2(7.5)	NaOH(0.75)	30	41	23
21[e]	0.5	0.6	2(7.5)	KO^{t}Bu (0.75)	30	24	15

[a]**Conditions: 1a** (0.5 mmol), **2b** (0.5-0.6 mmol), KO^{t}Bu (0.5-1.0 equiv.), Zn-catalyst (5.0-7.5 mol %), 130 °C, under argon. [b]Isolated yield, ND = not detected. [c]temperature 120 °C. [d]Solvent: Xylene. [e]Solvent: 1,4-dioxane.

5. UV−visible spectroscopy study of Zn-2 and Zn-2 with KO^{t}Bu in THF at RT:

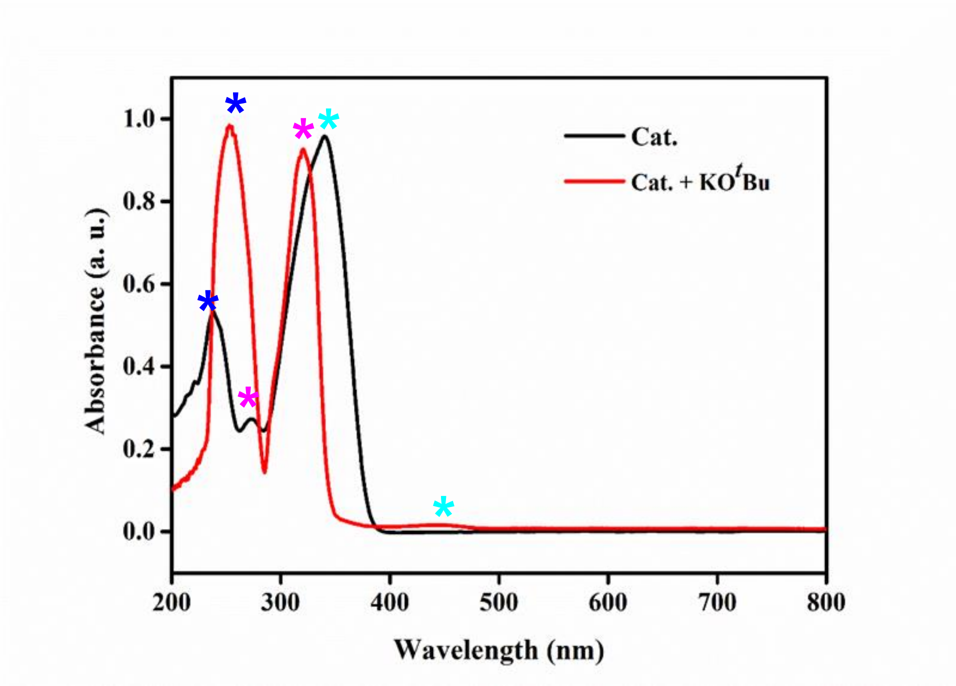
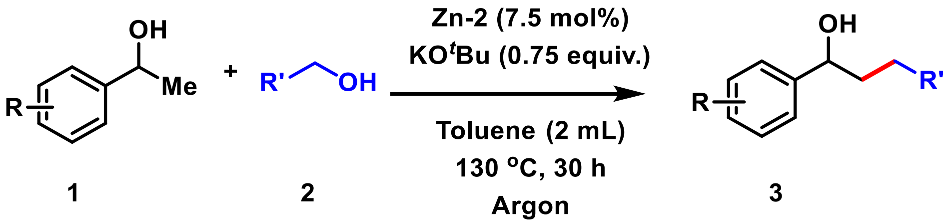


Figure S6. UV-vis. spectra of Zn-2 complex and (Zn-2+KO^{t}Bu) in THF.

6. General experimental procedure for the Zinc catalyzed β-alkylation of secondary alcohols with primary alcohols:



In an oven dried round bottom flask (10 mL), secondary alcohol (0.5 mmol), primary alcohol (0.6 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130°C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate as an eluent to give the β-alkylated secondary alcohols.

7. Kinetic Experiments:

7.1. Experimental procedure: To an oven dried 25 ml two-neck round bottomed flask, 1-Phenylethanol 1a (1.0 mmol, 1equiv.), 4-methoxybenzyl alcohol 2b (1.2 mmol, 1.2equiv.), KO^{t}Bu (0.75 mmol, 75 mol%) and Zn-2 (0.075mmol, 7.5 mol%), mesitylene (1.0 mmol, 1 equiv.) as an internal standard and toluene as a solvent were added under argon to make up the total volume of the reaction mixture to 5 ml. Afterwards, the reaction mixture was kept in a preheated oil bath for stirring at 130 °C. At regular intervals (1 h, 2 h, 3 h, 4 h, 5 h, 6h, 9h, 12 h, 15 h, 18 h, 21 h, 24 h, 27 h, 30 h) the reaction mixture was cooled to ambient temperature and an aliquot of mixture was taken in a GC vial. The GC sample was diluted with toluene and subjected to gas chromatographic analysis. The concentration of the product was determined with respect to mesitylene internal standard. The data was accomplished to draw the concentration of the product (mmol) vs time (h) plot.

Time (h)	Conc. of 1a (mmolar)	Conc. of 2b (mmolar)	Conc. of 1a′ (mmolar)	Conc. of 2b′ (mmolar)	Conc. Of 4b″ (mmolar)	Conc. Of 4b (mmolar)	Conc. Of 3b (mmolar)
0	1	1.2	0	0	0	0	0
1	0.92	0.96	0.065	0.035	0	0	0
2	0.83	0.87	0.08	0.045	0	0	0
3	0.73	0.76	0.095	0.054	0.005	0.054	0.073
4	0.61	0.683	0.124	0.085	0.01	0.095	0.125
5	0.53	0.605	0.176	0.096	0.015	0.125	0.164
6	0.45	0.524	0.189	0.145	0.02	0.164	0.278
9	0.36	0.453	0.151	0.228	0.025	0.184	0.32
12	0.21	0.35	0.142	0.175	0.0325	0.194	0.425
15	0.11	0.25	0.124	0.058	0.0285	0.2	0.53
18	0.07	0.175	0.085	0.032	0.0176	0.225	0.62
21	0.03	0.096	0.042	0.018	0.0134	0.254	0.734
24	--	0.084	0.015	0.0095	0.007	0.251	0.84
27	--	0.072	0.013	0.0043	0.0035	0.121	0.902
30	--	0.061	0.006	0.0021	0	0.054	0.956

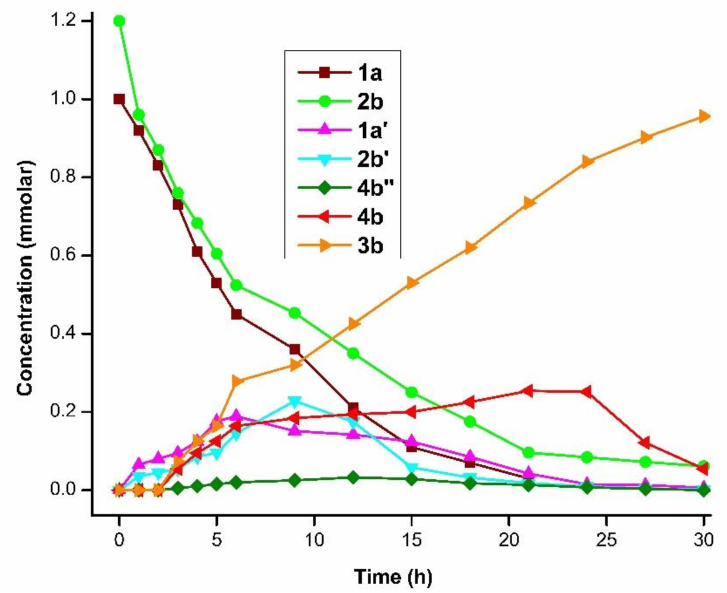


Figure S7. Overall reaction kinetics.

Kinetic experiments were carried out to monitor the formation of the intermediates and progress of the reaction throughout the entire reaction period. The reaction kinetics between 1-phenylethanol and 4-methoxybenzyl alcohol was studied by GC. This suggests the formation of acetophenone and 4-methoxy benzaldehyde that undergoes condensation reaction in basic medium to form α, β-unsaturated ketone, which via transfer hydrogenation forms the desired product. The concentration of α, β-unsaturated ketone remained low throughout the reaction whereas appreciable concentration of **4a** was observed which indicates that the α, β-unsaturated ketone **4a″** quickly transfers to the **4a** whereas the conversion of **4a** to the **3a** much slower compared to **4a″** to **4a**. Furthermore, to understand the role of secondary alcohol in this catalytic cycle initial rate technique was acclaimed. The reaction order with respect to 1-phenylethanol is 1.14, manifest that reaction followed first order with respect to secondary alcohol **1a**.

7.2. Rate order determination:

The initial rate method was used to determine the rate order of the 3b, reaction with respect to various components of the reaction. The data of the concentration (mM) vs time (h) plot was fitted to linear using origin pro 9. The slope of the linear fitted curve represents the initial rate of the reaction. The order of the reaction was determined by plotting initial rate (mM/h) vs concentration (mM) of that particular component.

Rate order determination with respect to 1-phenylethanol (1a):

To determine the order of the **3b** synthesis reaction, initial rates at different initial concentration of 1-phenylethanol 1a were recorded.

Experimental procedure: To an oven dried 10 ml two-neck round bottomed flask, 4-methoxybenzyl alcohol (0.6 mmol, 1.2 equiv.), KO^{t}Bu (0.45 mmol, 75 mol%) and Cat-2 (0.045 mmol, 7.5 mol%), mesitylene (0.6 mmol, 1.2 equiv.) as an internal standard, specific amount of 1-phenylethanol 1a and toluene as a solvent were added under argon to make up the total volume of the reaction mixture 5 ml. Afterwards, the reaction mixture was kept in an oil bath of 130 °C for stirring. At regular intervals (9 h, 10 h, 11 h, 12 h, 13 h, 14 h) the reaction mixture was cooled to ambient temperature and an aliquot of mixture was taken in a GC vial. The GC sample was diluted with toluene and subjected to gas chromatographic analysis. The concentration of the product was determined with respect to mesitylene internal standard. The data was accomplished to draw the concentration of the product (mM) vs time (h) plot (Figure). The rate of the reaction at different initial concentration of 1-phenylethanol 1a was given below and used to plot the initial rate (mM/h) vs concentration of 1-phenylethanol **1a** (mM) to determine the order of the reaction with respect to 1-phenylethanol 1a.

Time (h)	Conc. of product 3a formed at initial conc. of **1a** 0.12 mM	Conc. of product 3a formed at initial conc. of **1a** 0.16 mM	Conc. of product 3a formed at initial conc. of **1a** 0.20 mM	Conc. of product 3a formed at initial conc. of **1a** 0.24 mM
9	0.036	0.0496	0.064	0.0792
10	0.0402	0.056	0.072	0.0888
11	0.0438	0.0608	0.078	0.096
12	0.048	0.0664	0.085	0.1056
13	0.054	0.0752	0.097	0.12
14	0.06	0.0832	0.107	0.132

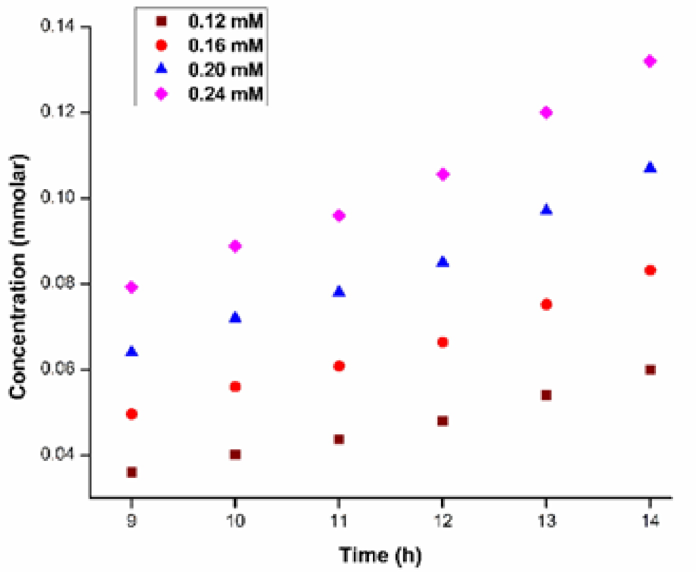


Figure S8. Concentration versus time plot at various concentration of 1-phenylethanol (**1a**).

Initial conc. of 1a (mM)	Initial rate of the reaction (mM/h)
0.12	0.00473

0.16	0.00661
0.2	0.00849
0.24	0.01049

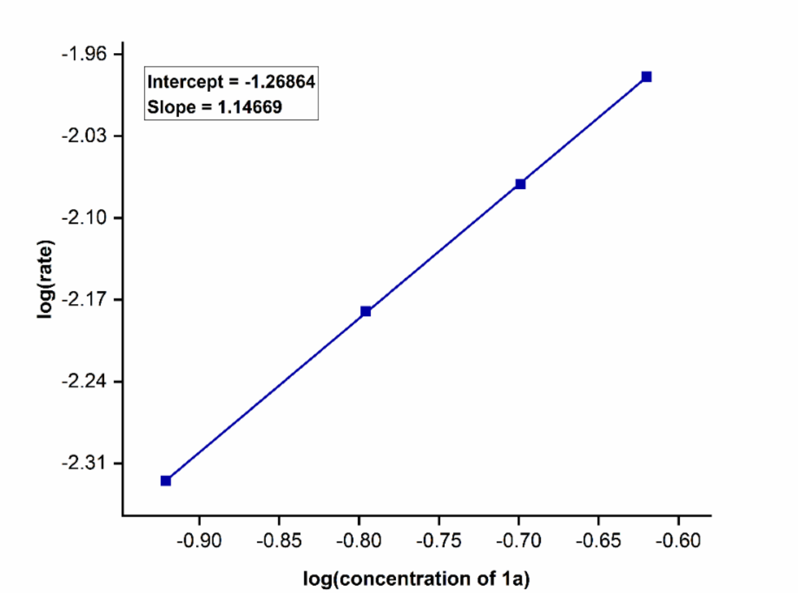
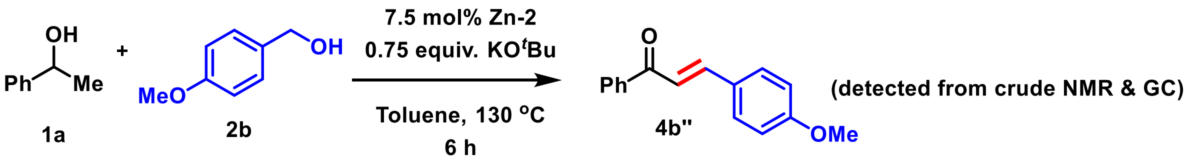


Figure S9. Plot for determining the order of the reaction with respect to log (1-phenylethanol **1a**).

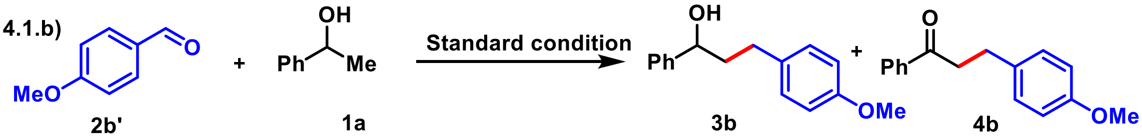
8. Control experiments for mechanistic investigation:

Several control experiments were carried out to acquire preliminary understanding of the zinc catalyzed β-alkylation of secondary alcohols with primary alcohols. Initially, two different set of reactions were performed to identify the intermediates. First an equimolar mixture of 4-methoxybenzaldehyde (**2b′**) and 1-phenylethanol (**1a**) was treated under the standard reaction conditions [4.1.(b)]. Thereafter, acetophenone (**1a′**) is reacted 4-methoxybenzyl alcohol (**2b**) [4.1.(c)]. For both the cases alkylated ketones (**4b**) was formed as the major product due to lack of sufficient quantity of alcohol, which act as the hydrogen source to carry out transfer hydrogenation from **4b** to **3b**. Expectedly, on increasing the quantity of alcohol the β-alkylated alcohol (**3b**) was isolated as major product. This proves that the reaction is going via alkylated ketones (**4b**). When the reaction of 1-phenyl ethanol (**1a**) and 4-methoxybenzyl alcohol (**2b**) was stopped after short progress of the reaction α, β-unsaturated ketone (**4b′′**) intermediate was detected from the analysis of crude reaction mixture by ^{1}H NMR [4.1.(a)] (See Figure S10). The reaction of (E)-chalcone (**4b′′**) in presence of 4-methoxybenzyl alcohol (**2b**) resulted **4b** as a major product and **3b** as a minor product [4.2.(a)]. This experiment supported that hydrogen auto-transfer is more feasible at the C=C bond of **4b′′** than C=O. Nevertheless, increase of alcohol amount (**2b**) resulted formation β-alkylated product (**3b**) major quantity [4.2.(b)]. Under the reaction conditions, the transfer hydrogenation of ketones is supported by the formation of **3b** in 68% yield by reacting **4b** with **1a** [4.2.(c)]. A deuterium labelling experiment showed that, deuterium was incorporated in 65%, 18% and 27% respectively at α, β and γ position of the **3b-D**. This deuterium scrambling experiment proved that the source of deuterium in the C-alkylated product was from the deuterated primary alcohol [4.3].

4.1.a) **Intermediate detection:**

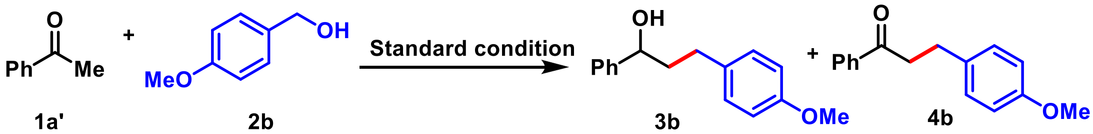


4.1.b)



2b'	:	1a	3b	4b
1	:	1	20%	64%
1	:	2	70%	23%

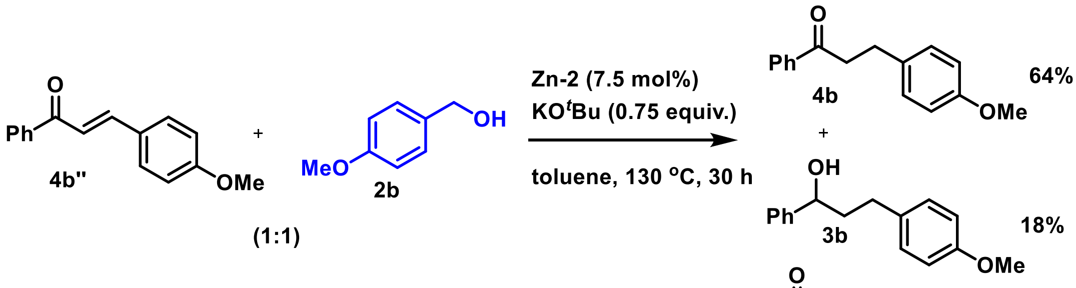
4.1.c)



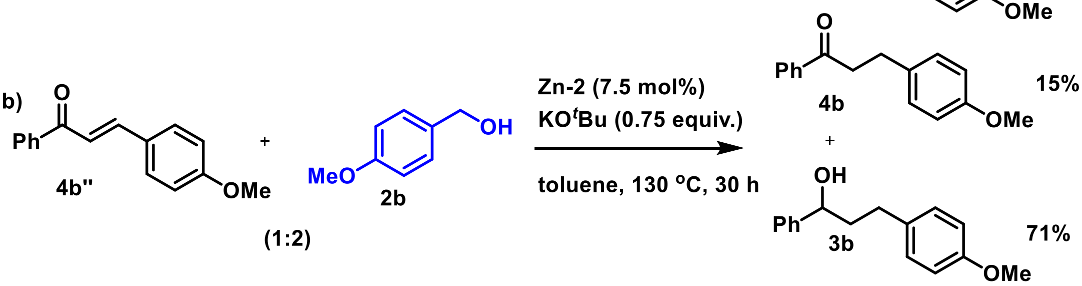
1a'	:	2b	3b	4b
1	:	1	28%	65%
1	:	2	75%	20%

4.2) **Transfer hydrogenation of Intermediate:**

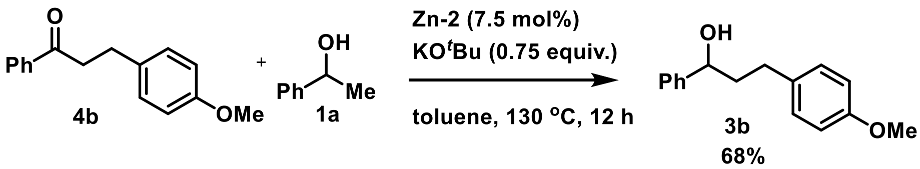
4.2.a)



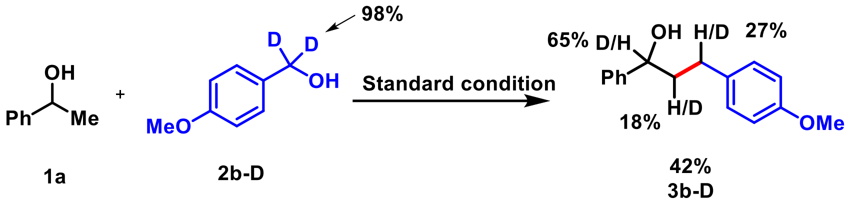
4.2.b)



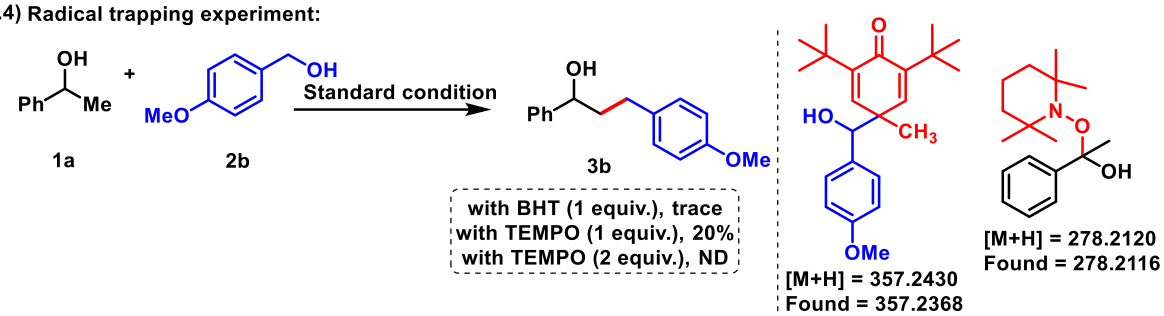
4.2.c)



4.3) Deuterium Scrambling experiment:

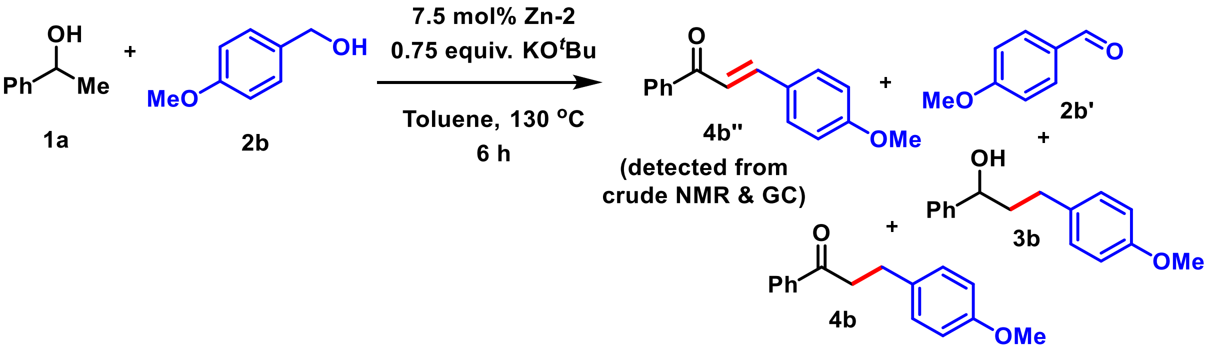


4.4) Radical trapping experiment:



The reaction was completely quenched in the presence of BHT and TEMPO, supporting the involvement of radical pathway in catalytic system. Moreover, radical adduct of BHT with primary alcohol and TEMPO with secondary alcohol further confirms the involvement of radical mechanism under the catalytic protocol [4.4].

Intermediate detection:



In an oven dried round bottom flask (10 mL), secondary alcohol (0.5 mmol), primary alcohol (0.6 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 6 h. The crude reaction mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and ^{1}H NMR spectrum was recorded.

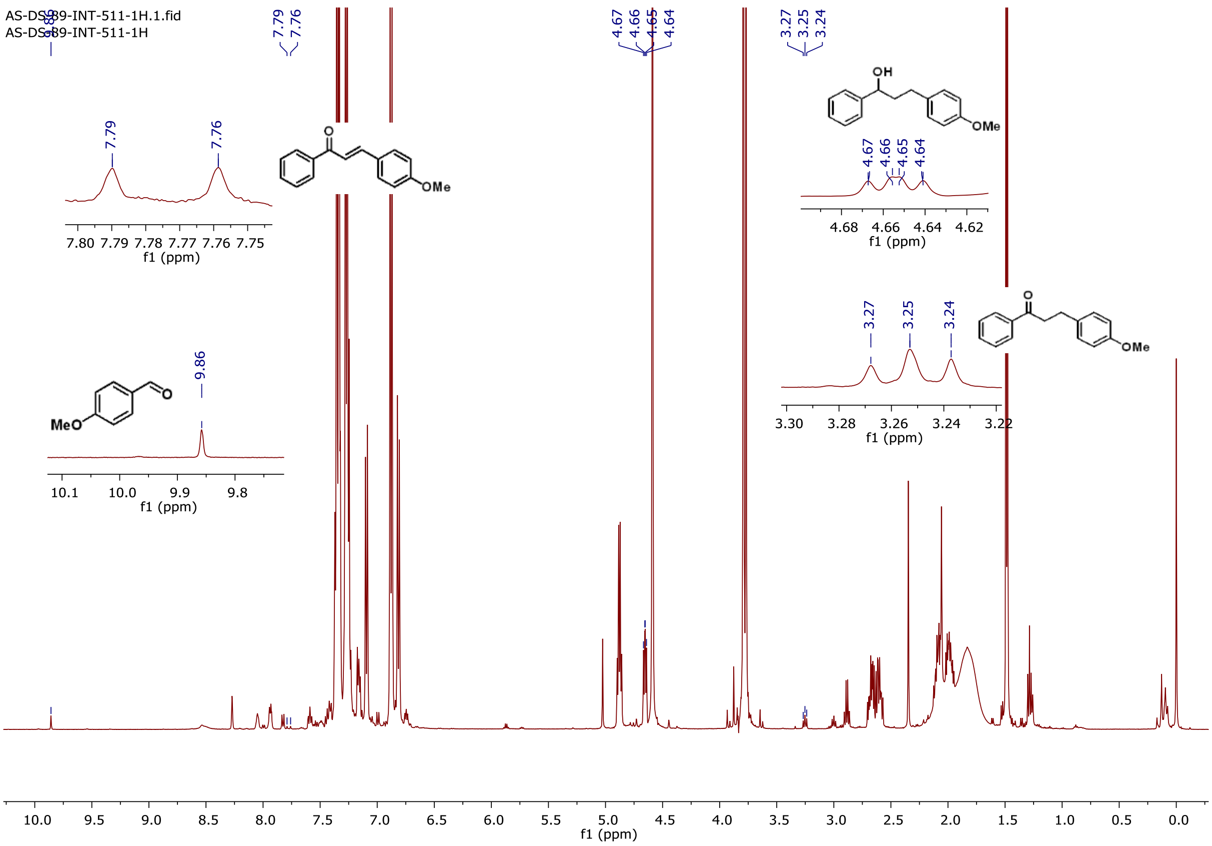
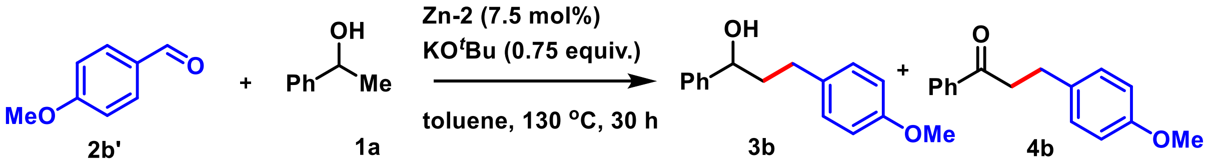
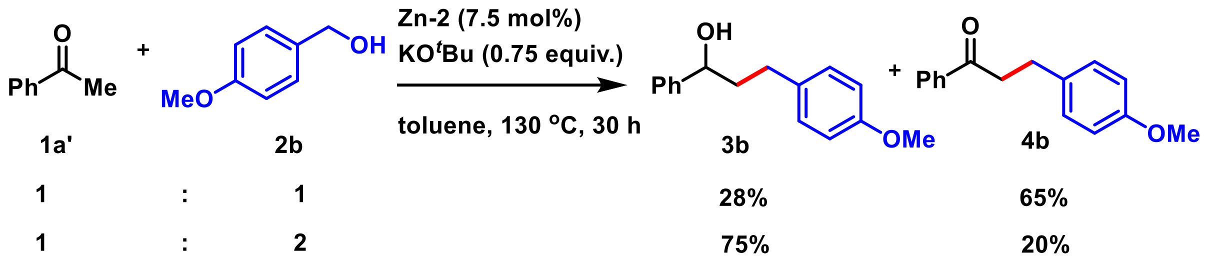


Figure S10. ^{1}H NMR (500 MHz) spectrum for detecting the intermediates in $CDCl_3$.

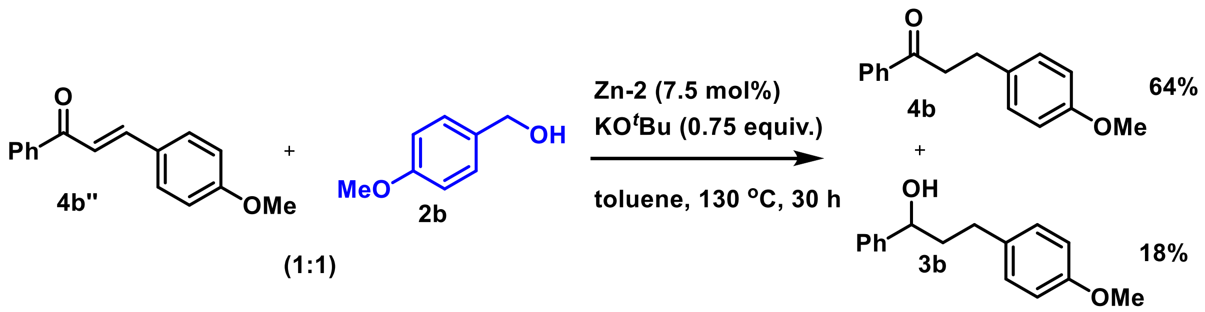


2b'		1a	3b	4b
1	:	1	20%	64%
1	:	2	70%	23%

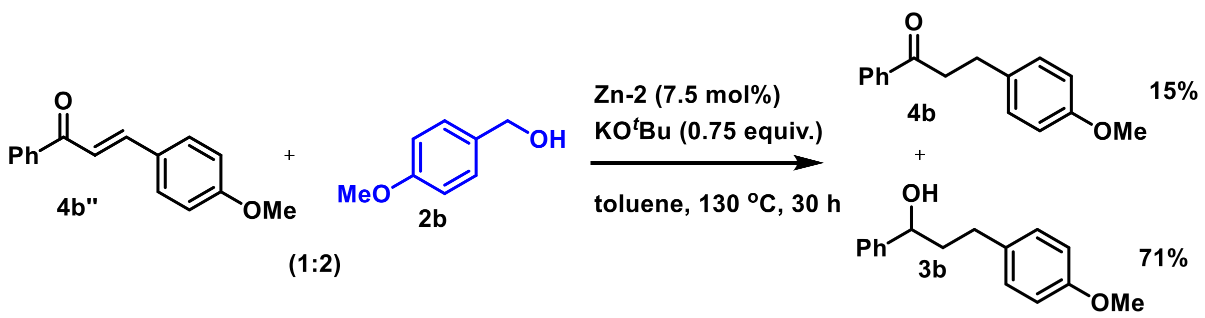
In an oven dried round bottom flask (10 mL), secondary alcohol (1-2 equiv.), 4-methoxybenzaldehyde (1 equiv.), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate as an eluent.



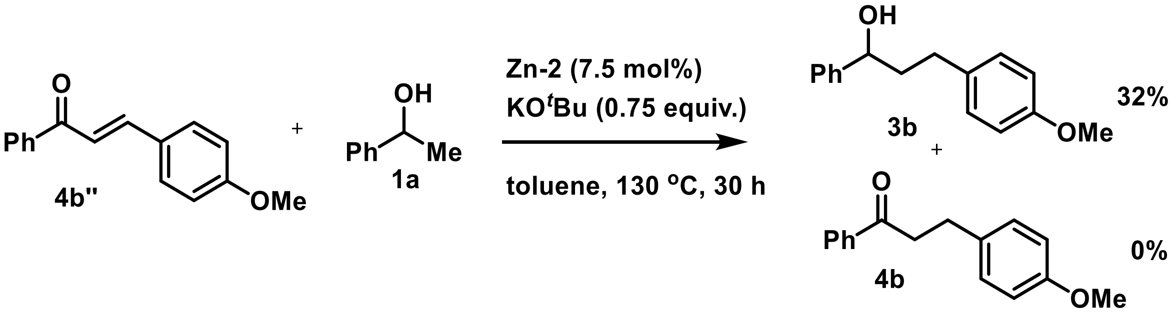
In an oven dried round bottom flask (10 mL), acetophenone (1 equiv.), 4-methoxybenzyl alcohol (1-2 equiv.), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate as an eluent.



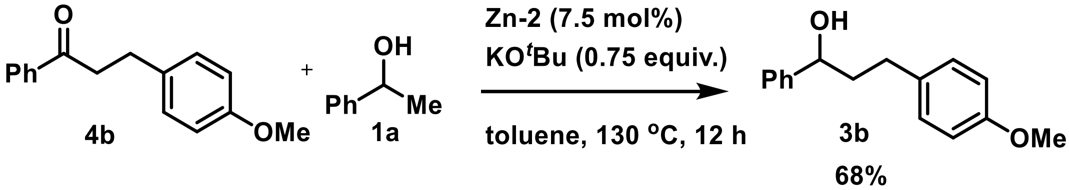
In an oven dried round bottom flask (10 mL), (*E*)-chalcone (0.5 mmol), 4-methoxybenzyl alcohol (0.5 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate as an eluent.



In an oven dried round bottom flask (10 mL), (*E*)-chalcone (0.5 mmol), 4-methoxybenzyl alcohol (1.0 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate as an eluent.



In an oven dried round bottom flask (10 mL), (*E*)-chalcone (0.5 mmol), 1-Phenylethanol (1.1 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate as an eluent.



In an oven dried round bottom flask (10 mL), **4a** (0.5 mmol), 1-Phenylethanol (0.5 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 12 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate as an eluent.

8.1. Synthesis of deuterated 4-methoxybenzyl alcohol 2b-D:

Deuterated 4-methoxybenzyl alcohol (2b-D) was prepared according to previous reported literature method.[3] To an oven-dried 10 mL screw-capped vial, Ru-MACHO (0.2 mol%), 4-methoxybenzyl alcohol (1 mmol), KO^{t}Bu (0.5 mol%), and deuterium oxide (20 mmol) were added under a gentle stream of argon. The reaction mixture was kept for stirring at 60 °C (oil-bath temperature) for 3 h. Then, the reaction mixture was diluted with water (4 mL) and extracted with dichloromethane (3×5 mL). The resultant organic layer was dried over anhydrous Na_2SO_4 and the solvent was evaporated under reduced pressure to give the deuterated product 2b-D (98% deuterated).

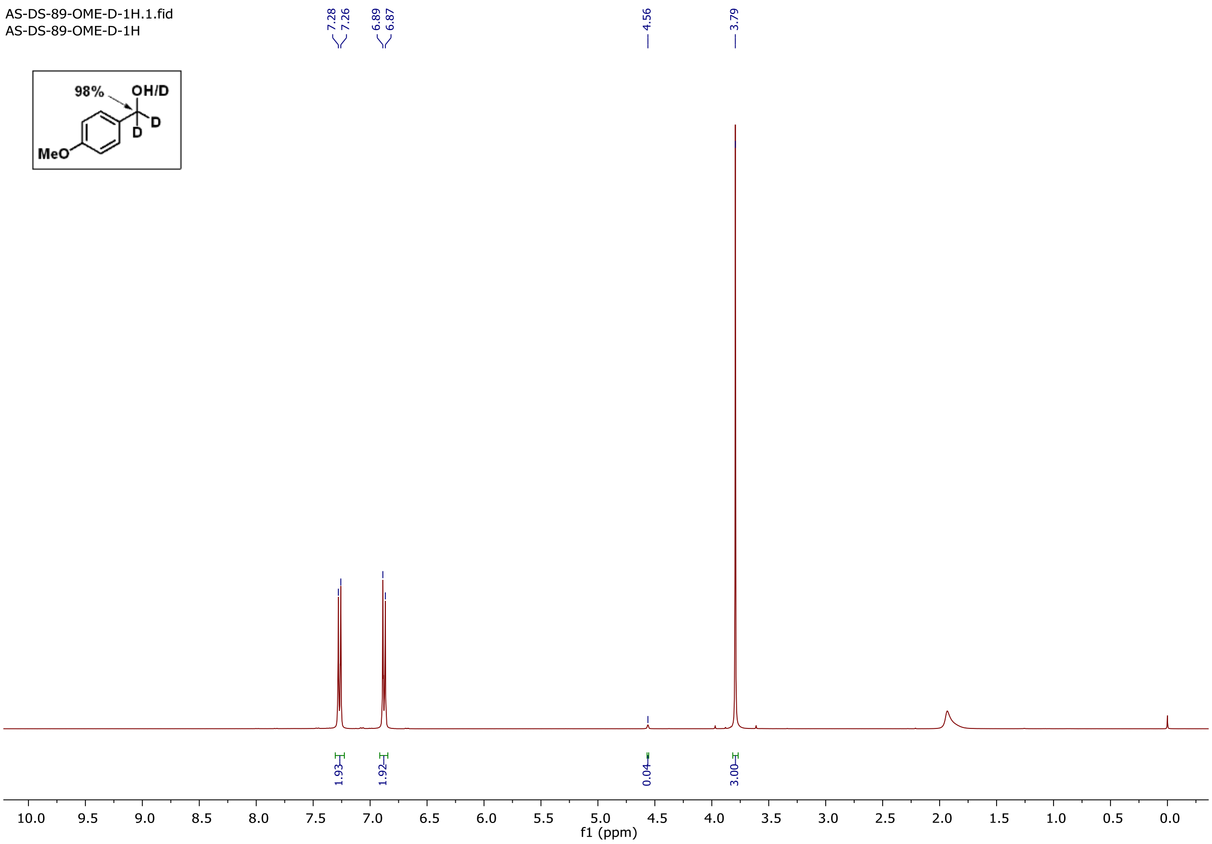
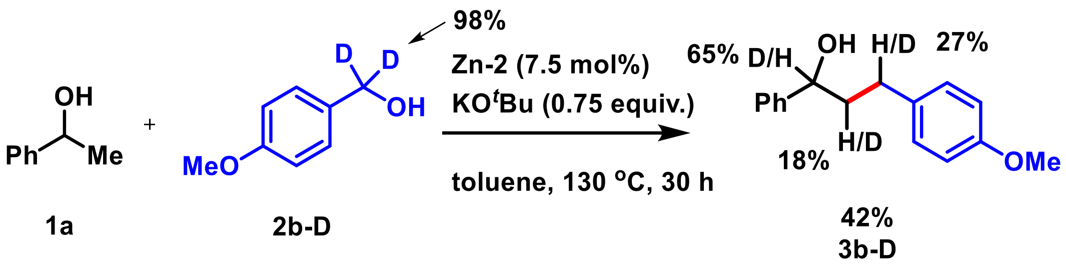


Figure S11. ^{1}H NMR (400 MHz) spectrum for **2b-D** in $CDCl_3$.



The deuterated 4-methoxybenzyl alcohol (2b-D) was prepared by following literature method. In an oven dried round bottom flask (10 mL), 1-phenylethanol (0.5 mmol), 4-methoxybenzyl alcohol-D (0.5 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate as an eluent. The product was characterized through ^{1}H NMR spectroscopy.

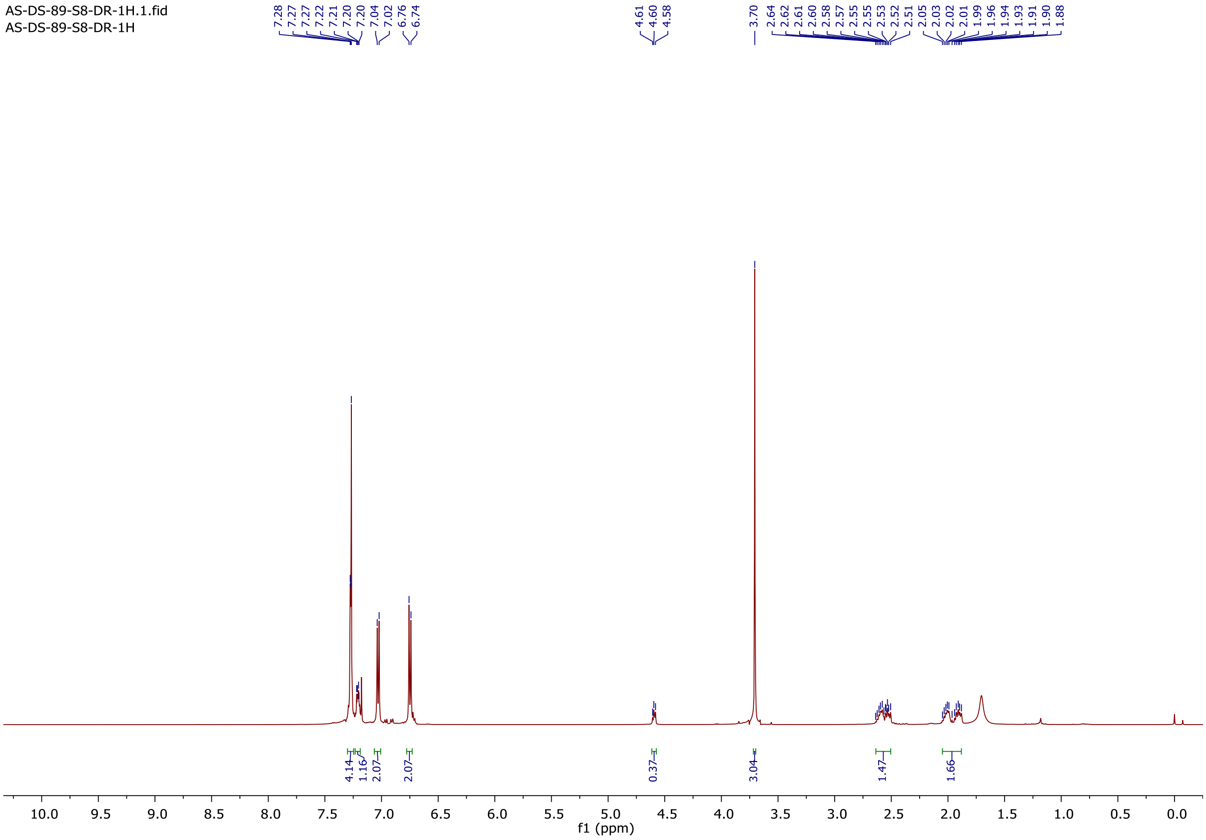
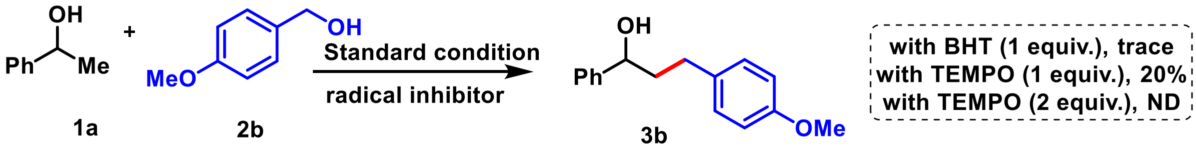
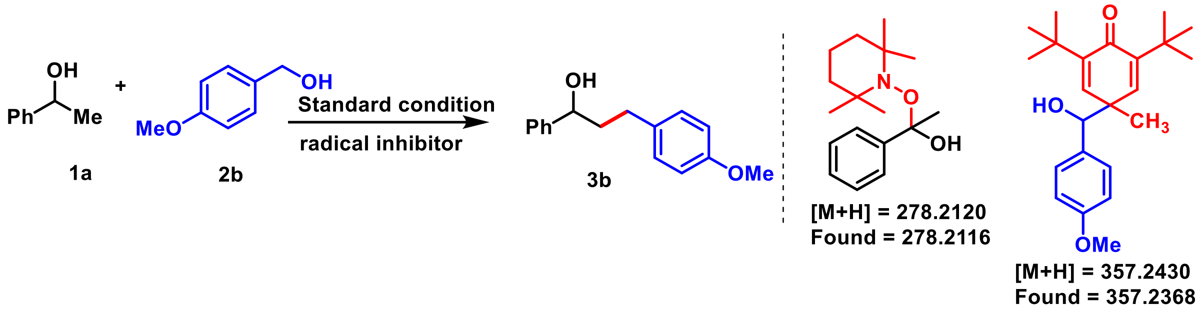


Figure S12. ^{1}H NMR (500 MHz) spectrum for **3b-D** in $CDCl_3$.

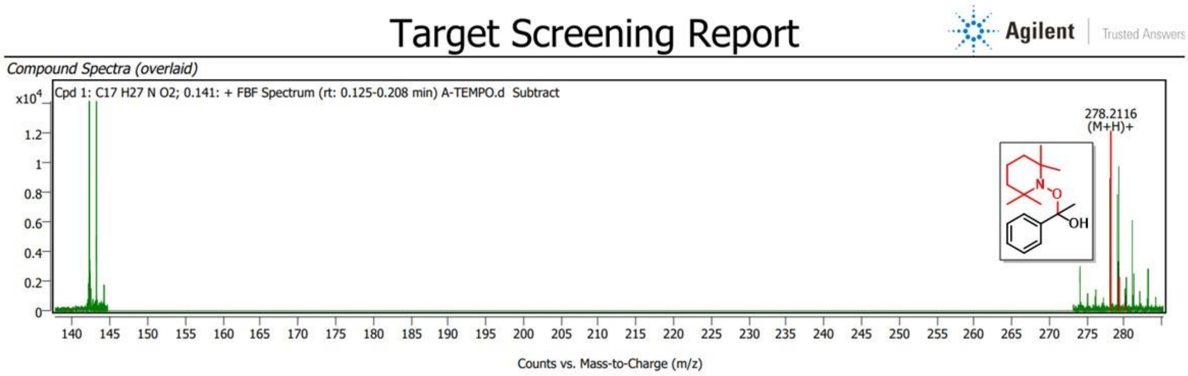
8.2. Radical trapping Experiment:



In an oven dried round bottom flask (10 mL), secondary alcohol (0.5 mmol), primary alcohol (0.6 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%), radical inhibitor (BHT or TEMPO) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100-200 mesh size) using petroleum-ether and ethyl acetate as an eluent.



In an oven dried round bottom flask (10 mL), secondary alcohol (0.5 mmol), primary alcohol (0.6 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%), radical inhibitor (BHT or TEMPO) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was cooled down. Next, the crude reaction mixture was characterized through HRMS spectrometry in acetonitrile and the corresponding mass of TEMPO trapped benzyl radical and BHT trapped ketyl radical were found.



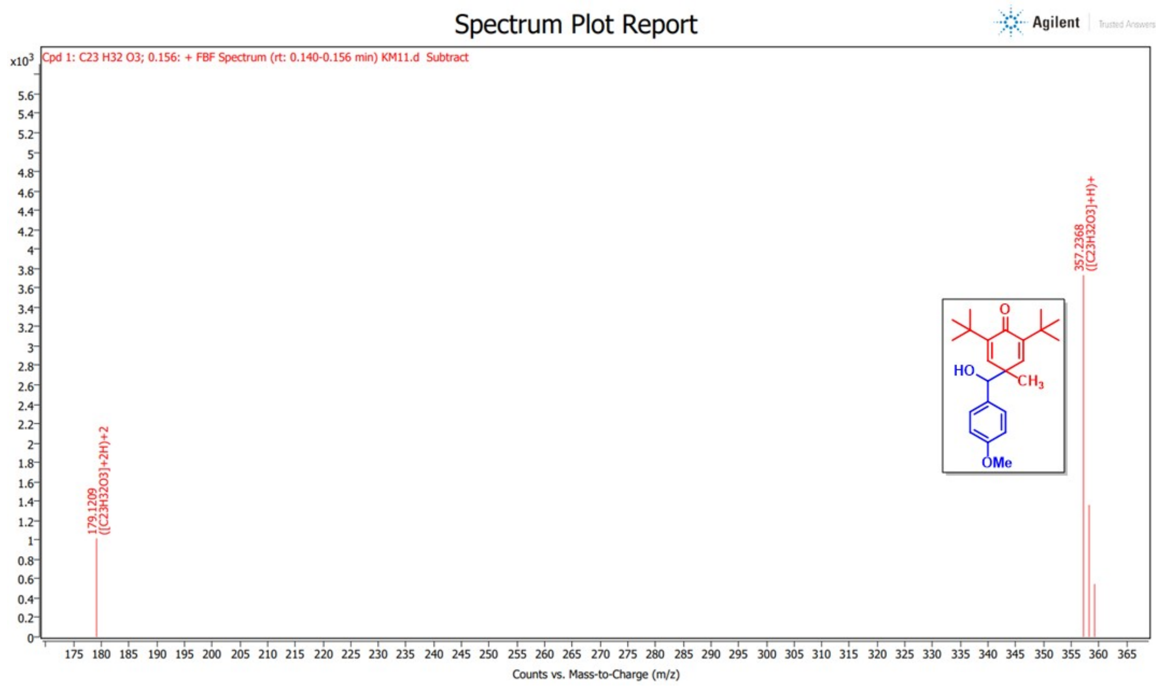


Figure S13. HRMS of TEMPO trapped benzyl radical and BHT trapped ketyl radical.

9. Procedure for preparation of I from Zn-2:

An oven dried 10 mL round bottom flask was taken and charged with Zn-2 complex (0.2 mmol), KOH (0.2 mmol) and 0.5 mL DMSO-d_6 was added inside a nitrogen-filled glovebox and stirred for 6 h at RT. After that, reaction was stopped to settle down and some solid portion precipitated. Next, the solution part was taken and analysed with ^{1}H NMR.

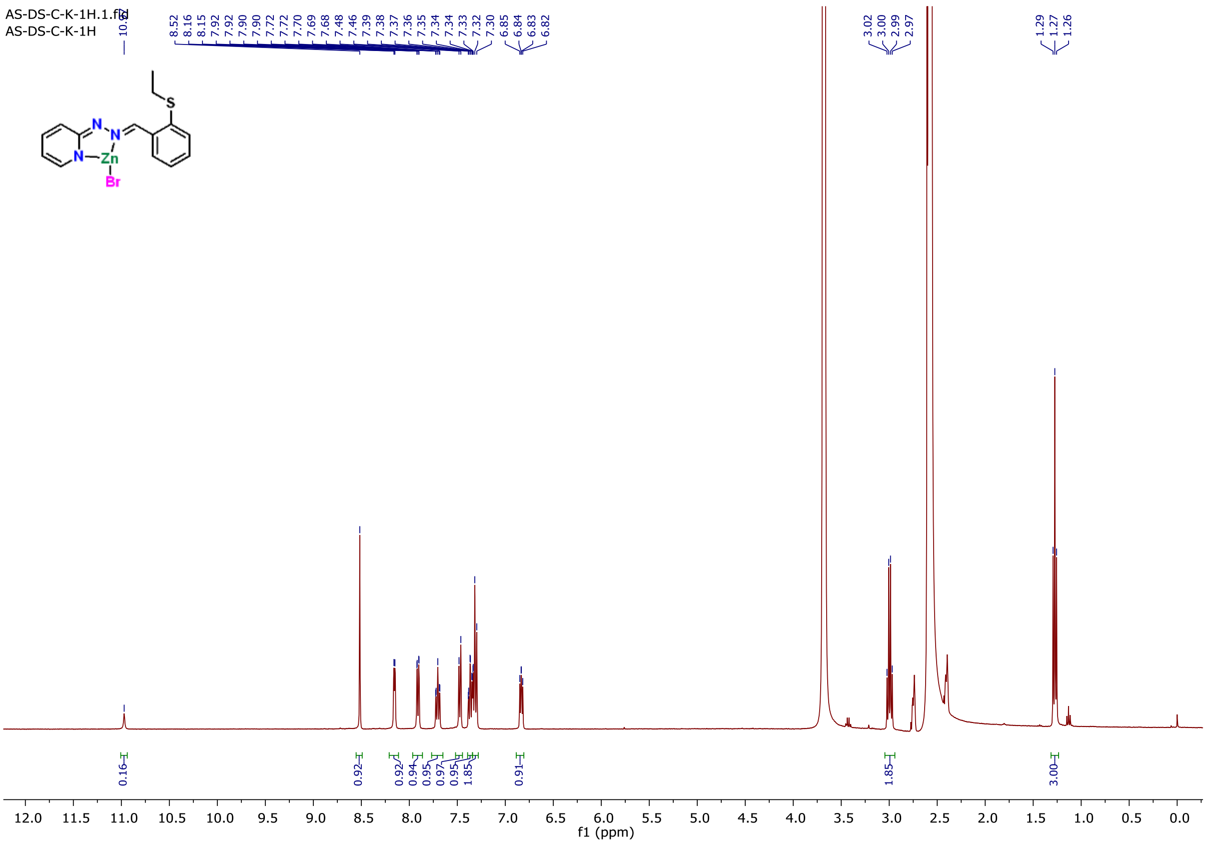
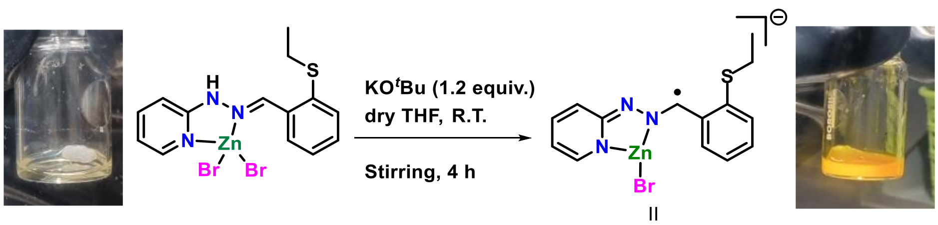


Figure S14. ^{1}H NMR (400 MHz) Spectrum for **I** in DMSO-d_6.

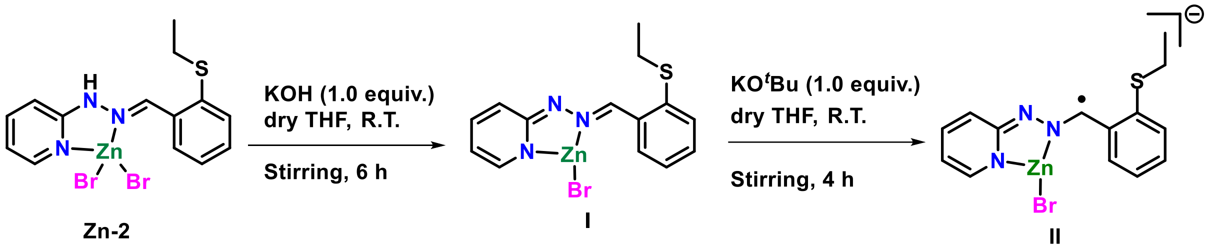
10. EPR analysis:

10.1. Procedure for direct preparation of singly reduced complex II:



In 25 mL glass vial Zn-2 (0.5 mmol) in dry THF solution, KO^{t}Bu (0.6 mmol) in 5 mL dry THF were added dropwise inside a nitrogen-filled glovebox. The reaction mixture was stirred for 4 h at RT. The color of the solution changed to bright yellow. Then, it was filtered and dried in vacuo.

10.2. Stepwise preparation of singly reduced complex II:



An oven dried 10 mL round bottom flask was taken and charged with Zn-2 complex (0.2 mmol), KOH (0.2 mmol) and 1.0 mL dry THF was added inside a nitrogen-filled glovebox and stirred for 6 h at R.T. Then reaction mixture passed through celite pad and KO^{t}Bu (0.2 mmol) was added to the solution with stirring condition for another 4 h at R.T. After adding KO^{t}Bu the solution colour turns to bright yellow then filtered and dried in vacuo.

10.3. EPR Details:

The one-electron reduced paramagnetic product II was analysed by X-band EPR on solid state at room temperature. The parameters during the data collection were following. Microwave frequency 9.43 GHz; Microwave Power 0.9950 MW; Modulation frequency 100 kHz; Modulation amplitude 1.0 mT.

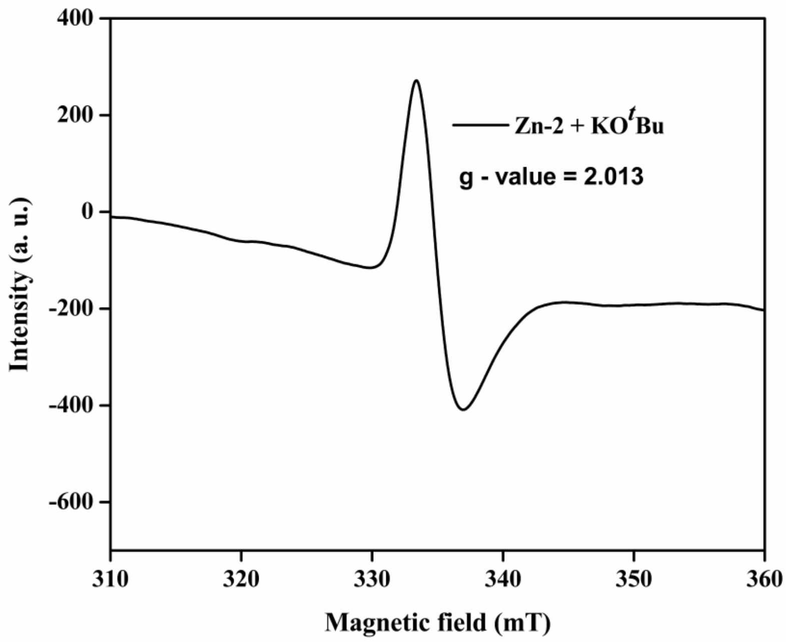


Figure S15. EPR Spectrum for **II**.

11. Preparation of Ligand 4 (L-4) and Zn-4 Complex:

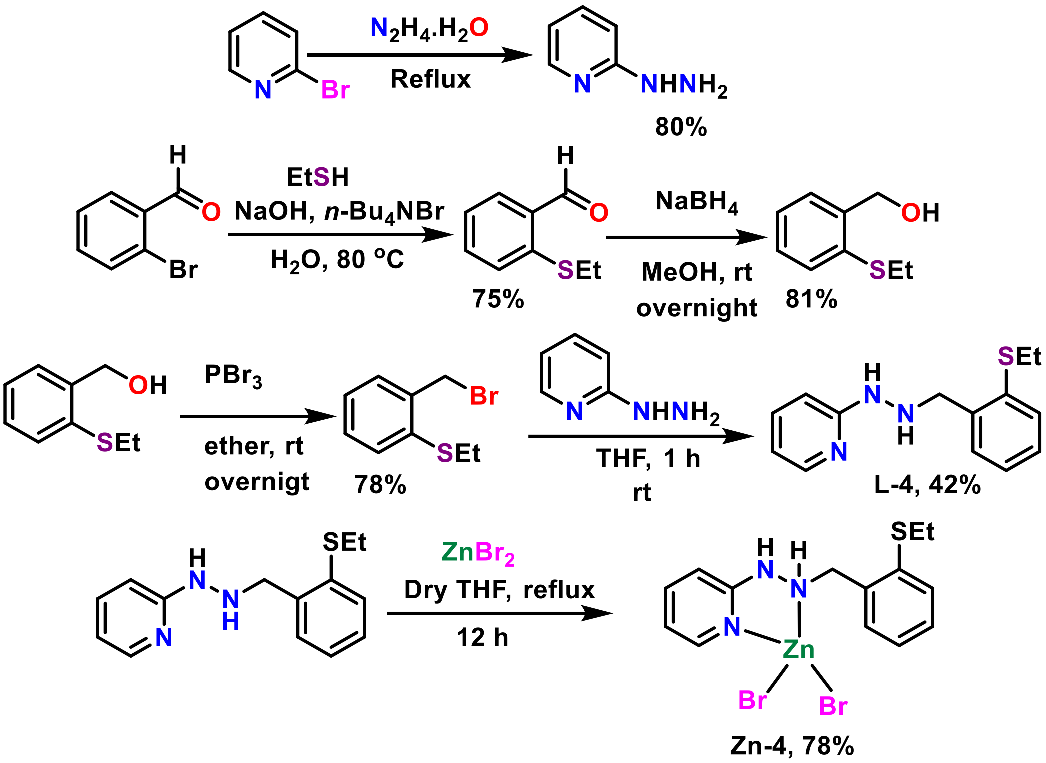


Figure S16. Synthesis of L-4 and Zn-4 complex.

2-hydrazinopyridine[1] and 2-(ethylthio)-benzaldehyde[2] was prepared according to previous reported literature method.

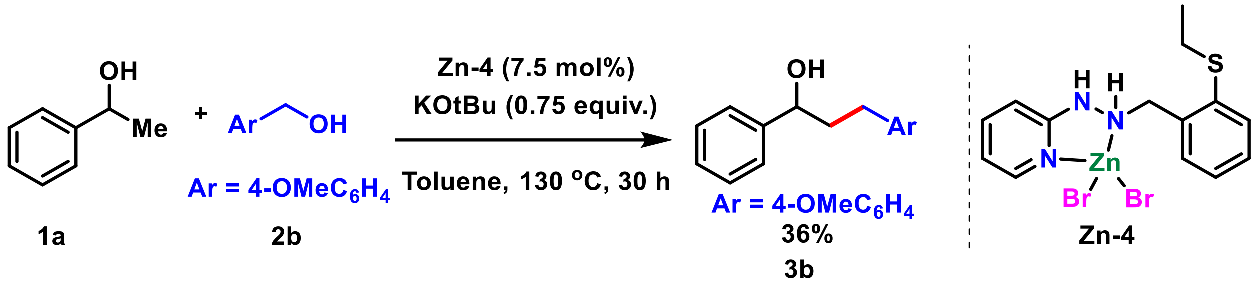
2-(ethylthio)-benzaldehyde (5.0 mmol, 1.0 equiv) was dissolved in MeOH (10 mL), and $NaBH_4$ (6.25 mmol, 1.25 equiv) was added in portions at 0 °C. After stirring at the same temperature for 30 min, brine (20 mL) was added, and the mixture was extracted three times with EtOAc (3 × 20 mL). The combined extracts were dried over anhydrous $MgSO_4$, filtered and concentrated in vacuo. The resulting 2-(ethylthio)-arylmethanol was used in the next step without further purification.

To a solution of the aforementioned 2-(ethylthio)-arylmethanol (3.0 mmol, 1.0 equiv) in Et_2O (6 mL), PBr_3 (5.4 mmol, 1.8 equiv) was added dropwise at 0 °C. The solution was stirred for 1 h at ambient temperature, and methanol (1.0 mL) was then added. The mixture was diluted with H_2O (20 mL) and extracted three times with Et_2O (3 × 20 mL). The combined organic layers were dried over $MgSO_4$ and filtered. Removal of the solvent in vacuo yielded the corresponding 2-(ethylthio) aryl bromide, after column chromatography.

To a THF solution of 2-(ethylthio) aryl bromide (1 mmol), 2-hydrazinopyridine (2 mmol) and K_2CO_3 (1 mmol) were mixed and stirred at room temp. for 1 h. Then the solution was filtered through celite and solvent was removed under vacuo and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate (70:30) as an eluent.

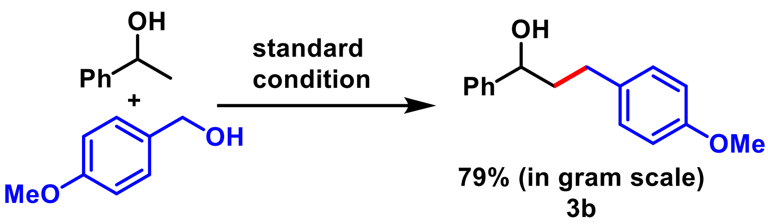
In an oven dried two-neck round bottom flask ligand L-4 (0.259g, 1 mmol) was taken in 4 mL of dry THF and was added dropwise to the suspension of $ZnBr_2$ (0.225g, 1 mmol) in 8 mL degassed dry THF. Then, the suspension was refluxed overnight under argon atmosphere. After being cooled to room temperature, the solvent was evaporated to obtain the residue, which was further washed with ether and dried under vacuum to get white solid of Zn-4 complex. The single crystal was grown by slow diffusion of ether in the methanol solution of the complex.

11.1. Testing of catalytic reaction using Zn-4 catalyst:

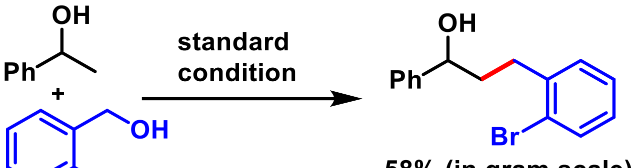


In an oven dried round bottom flask (10 mL), secondary alcohol (0.5 mmol), primary alcohol (0.6 mmol), KO^{t}Bu (0.75 equiv.), Zn-4 catalyst (7.5 mol%) and toluene (2 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate as an eluent to give 36% of β-alkylated secondary alcohols.

12. Experimental procedure for gram scale synthesis of compound 3b and 3h:



In an oven dried round bottom flask (50 mL), 1-Phenylethanol (0.732 g, 6.0 mmol), 4-Methoxybenzyl alcohol (0.994 g, 7.2 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (24 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate (9:1) as an eluent to give **3b** in 79% yield (1.147 g).

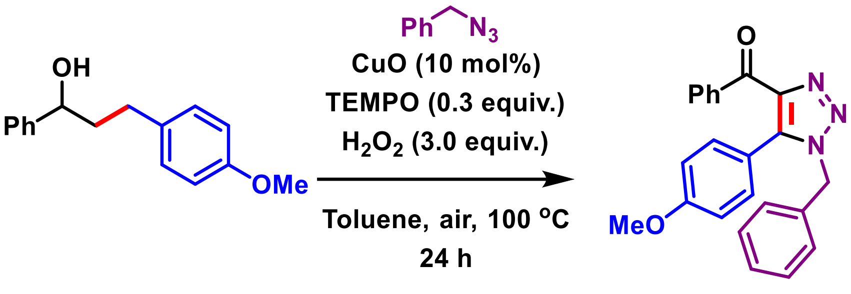


58% (in gram scale)
3i

In an oven dried round bottom flask (50 mL), 1-Phenylethanol (0.732 g, 6.0 mmol), 2-Bromobenzyl alcohol (1.346 g, 7.2 mmol), KO^{t}Bu (0.75 equiv.), Zn-2 catalyst (7.5 mol%) and toluene (24 mL) were added in a gentle stream of argon. Then the reaction mixture was refluxed and stirred with a magnetic stirring bar at 130 °C (oil-bath temperature) for 30 h. After completion of the reaction the crude mixture was filtered through celite filter and washed with ethyl acetate (3×5 mL), followed by the solvent was removed under vacuum and finally the residue was purified by silica gel column chromatography (100- 200 mesh size) using petroleum-ether and ethyl acetate (19:1-9:1) as an eluent to give **3i** in 58% yield (1.013 g).

13. Post synthetic modification:

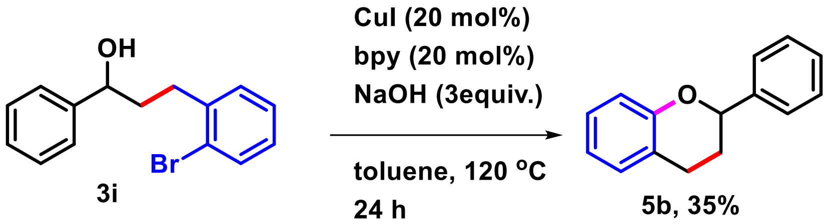
13.1. Synthesis of compound 5a:



5a, 38%

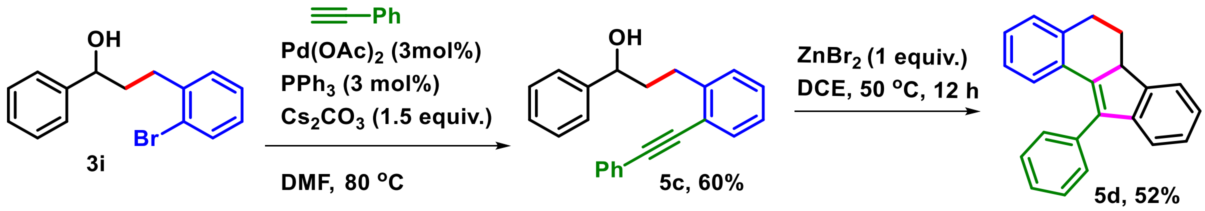
The triazole was prepared by following literature procedure.[4] To a solution of alkylated alcohol (0.5 mmol) and benzyl azide (0.75 mmol) in toluene (1 mL) were added CuO (10 mol%), TEMPO (0.15 mmol) and H_2O_2 (1.5 mmol) the mixture was stirred at 100 °C in oil bath under air atmosphere for 24 h. The reaction was checked by TLC. After completion of the reaction, the mixture was poured into water, extracted by ethyl acetate, and dried with anhydrous Na_2SO_4. The solvent was removed under reduced pressure to obtain crude product. Further purification by column chromatography on silica gel gave the triazole.

13.2. Synthesis of compound 5b:



The flavan was prepared by following literature procedure.[5] Compound **3i** (0.5 mmol), CuI (20 mol%), 2,2′-bipyridine (20 mol%), NaOH (1.5 mmol) and another 2 mL toluene were added to the oven dried round bottom flask and refluxed further for 24 h (oil bath temperature: 120 °C). Then reaction mixture was cooled and quenched with aqueous NH_4Cl solution. Next, dichloromethane was added to the reaction mixture and the organic layer was separated. This process was repeated three times (3×10 mL) and the combined organic phase was dried over anhydrous Na_2SO_4. Then the solvent was removed under reduced pressure. The corresponding flavan derivatives were isolated through silica gel column chromatography using hexane/ethyl acetate as eluent.

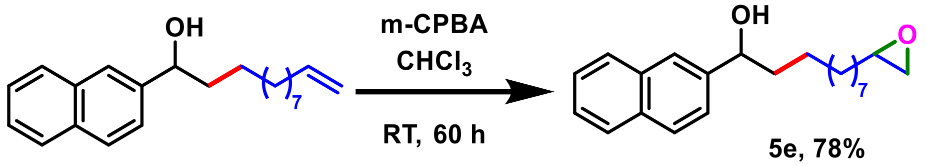
13.3. Synthesis of compound 5d:



The alkynols was prepared by following literature method.[6] The Phenylacetylene (0.45 mmol, 1.5 equiv) was added to a solution of bromo-secondary alcohol **3i** (0.3mmol), Cs_2CO_3(1.5 equiv), $Pd(OAc)_2$(0.03 mmol, 3 mol %), and triphenylphosphine (0.06 mmol, 6 mol %) in DMF (2 mL). The resulting mixture was heated in a 100 °C oil bath with rapid stirring until bromo-secondary alcohol was consumed as determined by TLC. The crude mixture was partitioned between water and ethyl acetate (3×30 mL). The organic layers were washed with saturated NaCl solution, dried with Na_2SO_4 and filtered, and the solvents were removed under reduced pressure. Purification of the residue over silica gel column using petroleum ether/ethyl acetate as eluent furnished the corresponding alkynols in 60% yield.

Dihydrobenzo-[*a*]fluorene was prepared by modified literature method.[6] In oven dried 10 mL round bottom flask a cold solution (0°C) of secondary alkynols (0.24 mmol) in in dry DCE (2 mL) was taken and $ZnBr_2$ (1 equiv.) was added. Then the reaction mixture stirred at 0°C to room temperature. Completion of the reaction was monitored by TLC for 12 h. The reaction mixture was quenched with aqueous ammonium chloride and extracted with ethyl acetate (3×30 mL). The combined organic layers were washed with brine, dried over (Na_2SO_4), and evaporated under reduced pressure. Purification of the crude residue by column chromatography on silica gel (100−200 mesh) by using a hexane/ethyl acetate solvent system as eluent afforded the cyclized product.

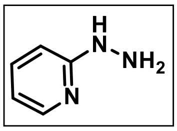
13.4. Synthesis of compound 5e:



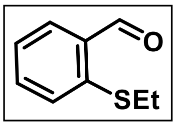
The epoxide was prepared by following literature method.[7] A mixture of allyl alcohol (0.16 mmol) and *m*-CPBA (0.32 mmol) in $CHCl_3$ (2 mL) was stirred at room tem-perature for 60 h. After that, the reaction mixture was further stirred with a saturated Na_2SO_3 solution (1 mL) for 0.5 h and then the reaction mixture was transferred to a separating funnel and the chloroform layer was successively washed with saturated aqueous $NaHCO_3$(2×20 mL) and brine (15 mL) and dried (Na_2SO_4). After removal of the solvent under reduced pressure, the residue obtained was purified by column chromatography on silica gel to furnish epoxy alcohol as a colourless oil.

14. Characterization data:

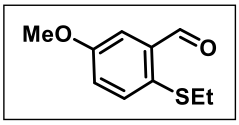
2-hydrazineylpyridine (AA): Grey solid, Yield: (436 mg, 80%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 8.11 (d, *J* = 4.8 Hz, 1H), 7.46 (t, *J* = 7.8 Hz, 1H), 6.69 (d, *J* = 8.4 Hz, 1H), 6.65 (t, 1H), 6.25 (brs, 1H), 3.73 (brs, 2H).



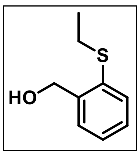
2-(ethylthio)benzaldehyde (AB): Light yellow liquid, Yield: (623 mg, 75%); ^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.38 (s, 1H), 7.84 – 7.82 (m, 1H), 7.53 – 7.49 (m, 1H), 7.43 – 7.41 (m, 1H), 7.30 (t, *J* = 7.9 Hz, 1H), 2.98 (q, *J* = 7.4 Hz, 2H), 1.37 (t, *J* = 7.4 Hz, 3H).



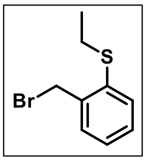
2-(ethylthio)-5-methoxybenzaldehyde (AC): Light yellow liquid, Yield: (623 mg, 68%); ^{1}H NMR (600 MHz, Chloroform-*d*) δ 10.51 (s, 1H), 7.39 (d, *J* = 8.6 Hz, 1H), 7.33 (d, *J* = 3.0 Hz, 1H), 7.04 (dd, *J* = 8.6, 3.0 Hz, 1H), 3.78 (s, 3H), 2.79 (q, *J* = 7.3 Hz, 2H), 1.19 (t, *J* = 7.4 Hz, 3H). $^{13}C\{^1H\}$ NMR (150 MHz, $CDCl_3$) δ 192.1, 159.2, 137.2, 134.8, 131.7, 121.9, 112.4, 55.7, 30.6, 14.5.



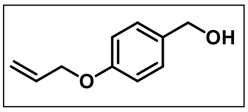
(2-(ethylthio)phenyl)methanol (AD): Colourless liquid, Yield: (680 mg, 81%); ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.43 – 7.36 (m, 2H), 7.25 (dtd, *J* = 20.9, 7.3, 1.4 Hz, 2H), 4.78 (s, 2H), 2.96 (q, *J* = 7.4 Hz, 2H), 2.46 (s, 1H), 1.33 (t, *J* = 7.4 Hz, 3H).



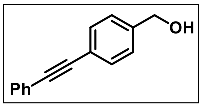
(2-(bromomethyl)phenyl)(ethyl)sulfane (AE): Colourless liquid, Yield: (541 mg, 78%); ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.32 – 7.27 (m, 2H), 7.20 – 7.15 (m, 1H), 7.12 – 7.06 (m, 1H), 4.61 (s, 2H), 2.90 (q, *J* = 7.4 Hz, 2H), 1.25 (t, *J* = 7.4 Hz, 3H).



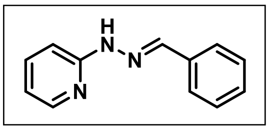
(4-(allyloxy)phenyl)methanol (AF): ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.26 (d, *J* = 8.4 Hz, 2H), 6.89 (d, *J* = 8.5 Hz, 2H), 6.09 – 6.00 (m, 1H), 5.40 (d, *J* = 17.3 Hz, 1H), 5.28 (d, *J* = 10.5 Hz, 1H), 4.59 (s, 2H), 4.53 (d, *J* = 5.1 Hz, 2H), 1.79 (s, 1H).



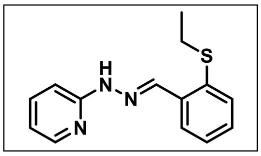
(4-(phenylethynyl)phenyl)methanol (AG): ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.54 – 7.52 (m, 4H), 7.35 – 7.33 (m, 5H), 4.71 (d, *J* = 5.4 Hz, 2H), 1.70 (t, *J* = 5.6 Hz, 1H).



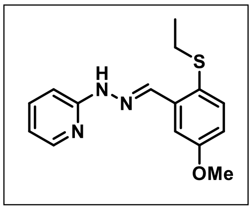
(E)-2-(2-benzylidenehydrazineyl)pyridine (L-1):[8] White solid, Yield: (343 mg, 87%); ^{1}H NMR (600 MHz, Chloroform-*d*) δ 8.91 (s, 1H), 8.15 (d, *J* = 4.7 Hz, 1H), 7.77 (s, 1H), 7.67 (d, *J* = 7.4 Hz, 2H), 7.64 – 7.59 (m, 1H), 7.38 (t, *J* = 7.3 Hz, 3H), 7.32 (t, *J* = 7.3 Hz, 1H), 6.82 – 6.75 (m, 1H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 156.9, 147.6, 139.2, 138.3, 135.1, 129.0, 128.8, 126.5, 115.9, 107.7.



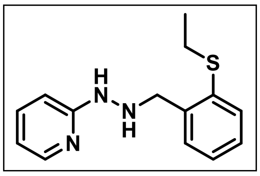
(E)-2-(2-(2-(ethylthio)benzylidene)hydrazineyl)pyridine (L-2): White solid, Yield: (401 mg, 78%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 9.46 (s, 1H), 8.42 (s, 1H), 8.23 (d, *J* = 4.9 Hz, 1H), 7.98 (dq, *J* = 7.1, 3.6 Hz, 1H), 7.61 (ddd, *J* = 8.7, 7.3, 1.8 Hz, 2H), 7.46 – 7.39 (m, 2H), 7.28 – 7.24 (m, 2H), 6.83 – 6.74 (m, 1H), 2.88 (q, *J* = 7.3 Hz, 2H), 1.28 (t, *J* = 7.3 Hz, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 157.1, 147.6, 138.3, 137.8, 135.6, 135.0, 131.9, 128.9, 127.0, 126.6, 115.8, 107.8, 29.4, 14.5. HRMS (ESI+): m/z calcd. for $C_{14}H_{16}N_3S$ $[M+H]^+$: 258.1065; Found: 258.1085.



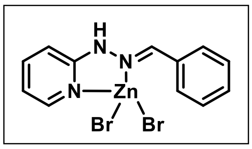
(E)-2-(2-(2-(ethylthio)-5-methoxybenzylidene)hydrazineyl)pyridine (L-3): White solid, Yield: (402 mg, 70%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 9.17 (s, 1H), 8.41 (s, 1H), 8.14 (d, *J* = 4.4 Hz, 1H), 7.59 – 7.53 (m, 1H), 7.51 (d, *J* = 2.8 Hz, 1H), 7.35 (dd, *J* = 16.2, 8.5 Hz, 2H), 6.79 (dd, *J* = 8.6, 2.9 Hz, 1H), 6.75 – 6.70 (m, 1H), 3.81 (s, 3H), 2.68 (q, *J* = 7.3 Hz, 2H), 1.13 (t, *J* = 7.3 Hz, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 159.6, 156.8, 147.4, 138.4, 138.3, 138.2, 136.5, 125.6, 116.1, 115.9, 110.2, 107.8, 55.6, 31.2, 14.7. HRMS (ESI+): m/z calcd. for $C_{15}H_{17}N_3OS$ $[M+H]^+$: 288.1171; Found: 288.1176.



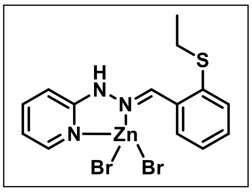
2-(2-(2-(ethylthio)benzyl)hydrazineyl)pyridine (L-4): Oily liquid, Yield: (109 mg, 42%); ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.98 (d, *J* = 4.8 Hz, 1H), 7.44 – 7.40 (m, 1H), 7.29 – 7.28 (m, 1H), 7.22 – 7.17 (m, 2H), 7.10 – 7.06 (m, 1H), 6.94 (d, *J* = 8.4 Hz, 1H), 6.58 – 6.55 (m, 1H), 5.80 (s, 1H), 4.03 (s, 2H), 2.89 (q, *J* = 7.4 Hz, 2H), 1.25 (t, *J* = 7.4 Hz, 3H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 160.6, 147.8, 137.9, 136.7, 136.4, 130.7, 129.0, 128.5, 126.0, 114.6, 107.4, 54.3, 27.8, 14.3. HRMS (ESI+): m/z calcd. for $C_{14}H_{17}N_3S$ [M+Na]$^{+}$: 282.1041; Found: 282.1028.



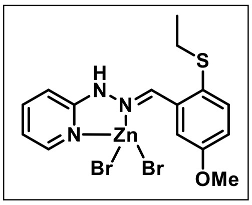
Zn-1 Complex: White solid, Yield: (342 mg, 81%); ^{1}H NMR (600 MHz, DMSO-d_6) δ 10.86 (s, 1H), 8.11 (d, *J* = 6.8 Hz, 1H), 8.03 (s, 1H), 7.67 – 7.63 (m, 3H), 7.41 (t, *J* = 7.6 Hz, 2H), 7.33 (t, *J* = 7.3 Hz, 1H), 7.24 (d, *J* = 8.4 Hz, 1H), 6.78 – 6.76 (m, 1H). ^{13}C{^{1}H} NMR (150 MHz, DMSO-d_6) δ 157.0, 147.8, 138.8, 138.0, 135.4, 128.7, 128.5, 126.0, 115.0, 106.4. HRMS (ESI+): m/z calcd. for $C_{12}H_{11}BrN_3Zn$ [M-Br]$^{+}$: 339.9428; Found: 339.9426.



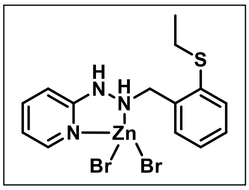
Zn-2 Complex: Yellow solid, Yield: (386 mg, 80%); ^{1}H NMR (600 MHz, DMSO-d_6) δ 10.93 (s, 1H), 8.41 (s, 1H), 8.05 (d, *J* = 5.6 Hz, 1H), 7.81 (d, *J* = 8.7 Hz, 1H), 7.59 – 7.56 (m, 1H), 7.36 (d, *J* = 7.7 Hz, 1H), 7.24 (td, *J* = 7.6, 1.4 Hz, 1H), 7.21 – 7.19 (m, 2H), 6.72 – 6.70 (m, 1H), 2.89 (q, *J* = 7.3 Hz, 2H), 1.16 (t, *J* = 7.3 Hz, 3H). ^{13}C{^{1}H} NMR (150 MHz, DMSO-d_6) δ 156.9, 147.8, 138.0, 136.9, 134.5, 134.4, 129.7, 128.8, 126.2, 126.0, 115.1, 106.5, 27.3, 14.0. HRMS (ESI+): m/z calcd. for $C_{14}H_{15}BrN_3SZn$ [M-Br]$^{+}$: 399.9462; Found: 399.9479.



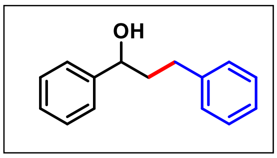
Zn-3 Complex: Yellow solid, Yield: (389 mg, 76%); ^{1}H NMR (600 MHz, DMSO-d_6) δ 11.11 (s, 1H), 8.62 (s, 1H), 8.18 (d, *J* = 4.4 Hz, 1H), 7.71 (t, *J* = 7.7 Hz, 1H), 7.54 – 7.53 (m, 1H), 7.48 (d, *J* = 8.6 Hz, 1H), 7.33 (d, *J* = 8.3 Hz, 1H), 6.98 (dd, *J* = 8.6, 2.7 Hz, 1H), 6.85 – 6.83 (m, 1H), 3.88 (s, 3H), 2.85 (q, *J* = 7.3 Hz, 2H), 1.20 (t, *J* = 7.3 Hz, 3H). ^{13}C{^{1}H} NMR (150 MHz, DMSO-d_6) δ 158.8, 156.8, 147.8, 138.1, 137.8, 137.2, 135.1, 124.6, 115.5, 115.2, 109.7, 106.6, 55.3, 29.5, 14.3. HRMS (ESI+): m/z calcd. for $C_{15}H_{17}BrN_3OSZn$ [M-Br]$^{+}$: 429.9567; Found: 429.9564.



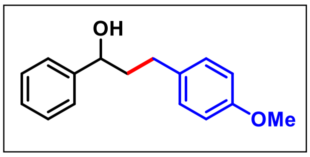
Zn-4 Complex: White solid, Yield: (377 mg, 78%); ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.42 (brs, 1H), 8.10 (s, 1H), 7.62 – 7.61 (m, 1H), 7.42 (d, *J* = 7.3 Hz, 1H), 7.38 (d, *J* = 7.7 Hz, 1H), 7.30 (t, *J* = 7.4 Hz, 1H), 7.21 (t, *J* = 7.3 Hz, 1H), 6.80 – 6.74 (m, 2H), 6.03 (brs, 1H), 4.00 (s, 2H), 2.87 (q, *J* = 6.2, 5.5 Hz, 2H), 1.14 (t, *J* = 7.2 Hz, 3H). ^{13}C{^{1}H} NMR (125 MHz, DMSO-d_6) δ 157.3, 144.8, 139.6, 136.0, 135.5, 130.2, 129.0, 128.5, 125.9, 114.0, 109.5, 53.2, 27.0, 14.0. HRMS (ESI+): m/z calcd. for $C_{14}H_{17}BrN_3SZn$ [M-Br]$^{+}$: 401.9618; Found: 401.9600.



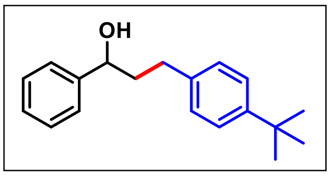
1,3-diphenylpropan-1-ol (3a):[9] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (91 mg, 86%); ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.34 – 7.33 (m, 4H), 7.27 (t, *J* = 7.4 Hz, 3H), 7.19 – 7.18 (m, 3H), 4.67 – 4.65 (m, 1H), 2.76 – 2.62 (m, 2H), 2.14 – 1.98 (m, 3H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 144.6, 141.8, 128.6, 128.5, 128.4, 127.7, 126.0, 125.9, 73.9, 40.5, 32.1.



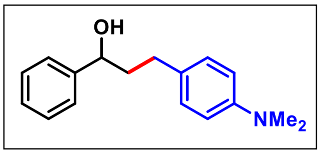
3-(4-methoxyphenyl)-1-phenylpropan-1-ol (3b):[9] White solid (10% ethyl acetate in petroleum ether), Yield: (109 mg, 90%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.34 – 7.33 (m, 4H), 7.29-7.25 (m, 1H), 7.09 (d, *J* = 8.4 Hz, 2H), 6.81 (d, *J* = 8.5 Hz, 2H), 4.67 – 4.65 (m, 1H), 3.77 (s, 3H), 2.71 – 2.57 (m, 2H), 2.13 – 1.94 (m, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 158.0, 144.8, 134.0, 129.4, 128.6, 127.7, 126.1, 114.0, 74.0, 55.4, 40.8, 31.3.



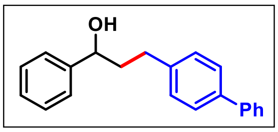
3-(4-(tert-butyl)phenyl)-1-phenylpropan-1-ol (3c):[10] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (87 mg, 65%); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.35 – 7.34 (m, 4H), 7.30 – 7.29 (m, 2H), 7.28 – 7.26 (m, 1H), 7.12 (d, *J* = 8.4 Hz, 2H), 4.70 – 4.68 (m, 1H), 2.75 – 2.61 (m, 2H), 2.15 – 2.00 (m, 2H), 1.89 (d, *J* = 3.4 Hz, 1H), 1.30 (s, 9H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 148.8, 144.7, 138.8, 128.6, 128.2, 127.7, 126.1, 125.4, 74.1, 40.5, 34.5, 31.6, 31.5.



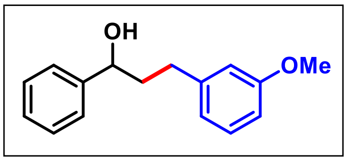
3-(4-(dimethylamino)phenyl)-1-phenylpropan-1-ol (3d):[11] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (107 mg, 84%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.28 – 7.27 (m, 4H), 7.21- 7.19 (m, 1H), 7.00 (d, *J* = 8.8 Hz, 2H), 6.64 (d, *J* = 8.6 Hz, 2H), 4.62 – 4.59 (m, 1H), 2.83 (s, 6H), 2.61 – 2.48 (m, 2H), 2.06 – 1.89 (m, 2H), 1.84 – 1.82 (m, 1H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 148.9, 144.8, 129.2, 128.6, 127.7, 126.1, 113.5, 74.1, 41.3, 40.8, 31.1.



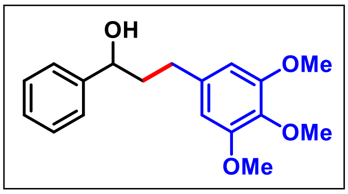
3-([1,1'-biphenyl]-4-yl)-1-phenylpropan-1-ol (3e):[14] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (121 mg, 84%); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.51 – 7.50 (m, 2H), 7.44 (d, *J* = 8.3 Hz, 2H), 7.35 (t, *J* = 7.8 Hz, 2H), 7.30 – 7.28 (m, 4H), 7.26 – 7.25 (m, 1H), 7.24 -7.22 (m, 1H), 7.20 – 7.18 (m, 2H), 4.66 (dd, *J* = 7.9, 5.3 Hz, 1H), 2.75 – 2.62 (m, 2H), 2.13 – 1.97 (m, 2H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 144.7, 141.2, 141.0, 139.0, 129.0, 128.9, 128.7, 127.8, 127.3, 127.2, 127.1, 126.1, 74.0, 40.6, 31.8.



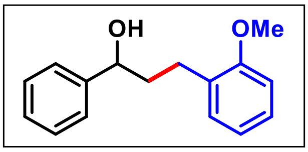
3-(3-methoxyphenyl)-1-phenylpropan-1-ol (3f):[10] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (87 mg, 72%). ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.34 – 7.33 (m, 4H), 7.29 – 7.25 (m, 1H), 7.18 (t, *J* = 7.9 Hz, 1H), 6.78 (d, *J* = 7.6 Hz, 1H), 6.73 – 6.72 (m, 2H), 4.67 (t, *J* = 6.3 Hz, 1H), 3.77 (s, 3H), 2.74 – 2.61 (m, 2H), 2.14 – 1.98 (m, 3H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 159.8, 144.7, 143.5, 129.5, 128.6, 127.7, 126.0, 121.0, 114.3, 111.3, 74.0, 55.2, 40.4, 32.2.



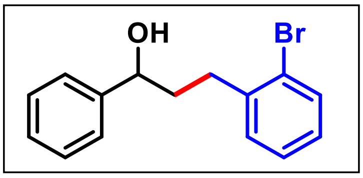
1-phenyl-3-(3,4,5-trimethoxyphenyl)propan-1-ol (3g): White solid (15% ethyl acetate in petroleum ether), Yield: (98 mg, 65%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.36 – 7.35 (m, 4H), 7.31 – 7.27 (m, 1H), 6.40 (s, 2H), 4.71 – 4.69 (m, 1H), 3.83 (s, 6H), 3.81 (s, 3H), 2.74 – 2.58 (m, 2H), 2.16 – 2.08 (m, 2H), 2.06 – 1.99 (m, 1H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 153.2, 144.7, 137.7, 136.3, 128.6, 127.8, 126.0, 105.5, 74.0, 60.9, 56.2, 40.6, 32.6. HRMS (ESI+): m/z calcd. for $C_{18}H_{22}O_4$ [M+Na] $^{+}$: 325.1416; Found: 325.1424.



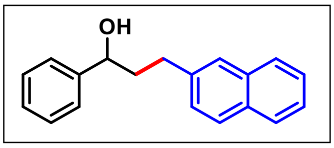
3-(2-methoxyphenyl)-1-phenylpropan-1-ol (3h):[10] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (91 mg, 75%); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.29 – 7.24 (m, 4H), 7.20 – 7.17 (m, 1H), 7.13 – 7.10 (m, 1H), 7.7 (dd, J = 7.4, 1.9 Hz, 1H), 6.83 (td, J = 7.4, 1.1 Hz, 1H), 6.78 (d, J = 8.1 Hz, 1H), 4.55 (dd, J = 8.6, 4.7 Hz, 1H), 3.75 (s, 3H), 2.72 – 2.64 (m, 2H), 2.30 (brs, 1H), 2.03 – 1.89 (m, 2H). $^{13}C\{^{1}H\}$ NMR (150 MHz, $CDCl_3$) δ 157.5, 144.7, 130.2, 130.1, 128.5, 127.5, 127.3, 126.0, 120.8, 110.4, 73.7, 55.5, 39.5, 26.5.



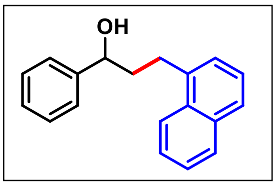
3-(2-bromophenyl)-1-phenylpropan-1-ol (3i):[12] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (90 mg, 62%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.44 (d, J = 8.2 Hz, 1H), 7.31 – 7.26 (m, 4H), 7.22 – 7.19 (m, 1H), 7.15 – 7.10 (m, 2H), 6.98- 6.95 (m, 1H), 4.67 – 4.64 (m, 1H), 2.85 – 2.67 (m, 2H), 2.05 – 1.93 (m, 2H), 1.73 (s, 1H). $^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$) δ 144.5, 141.3, 133.0, 130.5, 128.7, 127.8, 127.7, 127.6, 126.0, 124.6, 74.1, 39.0, 32.7.



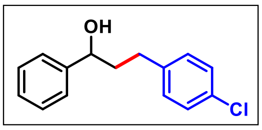
3-(naphthalen-2-yl)-1-phenylpropan-1-ol (3j):[14] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (97 mg, 74%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.72 (d, J = 8.0 Hz, 1H), 7.69 (d, J = 8.2 Hz, 2H), 7.55 (s, 1H), 7.38 – 7.32 (m, 2H), 7.29 – 7.25 (m, 5H), 7.23 – 7.19 (m, 1H), 4.64 (dd, J = 7.9, 5.3 Hz, 1H), 2.86 – 2.73 (m, 2H), 2.18 – 2.00 (m, 2H), 1.72 (s, 1H). $^{13}C\{^{1}H\}$ NMR (150 MHz, $CDCl_3$) δ 144.7, 139.4, 133.8, 132.1, 128.7, 128.1, 127.8, 127.7, 127.5, 127.4, 126.6, 126.1, 126.0, 125.3, 74.0, 40.4, 32.3.



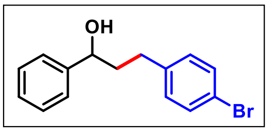
3-(naphthalen-1-yl)-1-phenylpropan-1-ol (3k):[13] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (94 mg, 72%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.89 (d, J = 7.4 Hz, 1H), 7.77 – 7.75 (m, 1H), 7.62 (d, J = 8.0 Hz, 1H), 7.41 – 7.36 (m, 2H), 7.31 – 7.24 (m, 6H), 7.20 (t, J = 6.8 Hz, 1H), 4.72 – 4.69 (m, 1H), 3.19 – 2.99 (m, 2H), 2.20 – 2.04 (m, 2H), 1.70 (s, 1H). $^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$) δ 144.7, 138.2, 134.1, 132.0, 128.9, 128.7, 127.8, 126.8, 126.1, 125.9, 125.7, 125.6, 123.9, 74.3, 40.0, 29.3.



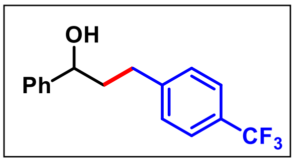
3-(4-chlorophenyl)-1-phenylpropan-1-ol (3l):[10] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (87 mg, 71%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.35 – 7.25 (m, 5H), 7.22 (d, J = 8.4 Hz, 2H), 7.09 (d, J = 8.3 Hz, 2H), 4.62 (t, J = 7.0 Hz, 1H), 2.72 – 2.58 (m, 2H), 2.11 – 1.92 (m, 3H). $^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$) δ 144.5, 140.3, 131.6, 129.9, 128.7, 128.6, 127.8, 126.0, 73.8, 40.4, 31.5.



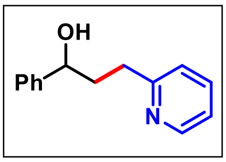
3-(4-bromophenyl)-1-phenylpropan-1-ol (3m):[15] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (93 mg, 64%); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.38 (d, J = 8.4 Hz, 2H), 7.36 – 7.32 (m, 4H), 7.29 – 7.27 (m, 1H), 7.05 (d, J = 8.3 Hz, 2H), 4.66 – 4.64 (m, 1H), 2.71 – 2.59 (m, 2H), 2.12 – 1.93 (m, 3H). $^{13}C\{^{1}H\}$ NMR (150 MHz, $CDCl_3$) δ 144.5, 140.9, 131.5, 130.3, 128.7, 127.9, 126.0, 119.7, 73.8, 40.3, 31.6.



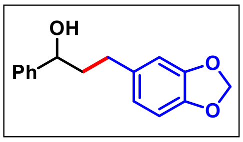
1-phenyl-3-(4-(trifluoromethyl)phenyl)propan-1-ol (3n):[9] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (87 mg, 62%); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.44 (d, J = 8.2 Hz, 2H), 7.28 – 7.24 (m, 5H), 7.20 (d, J = 8.3 Hz, 2H), 4.59 – 4.57 (m, 1H), 2.74 – 2.61 (m, 2H), 2.07 – 1.85 (m, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 146.1, 144.4, 128.9, 128.8, 128.3 (q, J = 32.3 Hz), 126.0, 125.5 (t, J = 267.2 Hz), 125.4 (q, J = 3.9 Hz), 73.8, 40.2, 32.0. ^{19}F NMR (470 MHz, $CDCl_3$) δ -62.30.



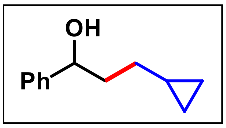
1-phenyl-3-(pyridin-2-yl)propan-1-ol (3o):[13] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (55 mg, 52%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.45 (d, J = 5.1 Hz, 1H), 7.56 (t, J = 7.7 Hz, 1H), 7.33 (d, J = 7.6 Hz, 2H), 7.26 (t, J = 7.6 Hz, 2H), 7.19 – 7.16 (m, 2H), 7.12 – 7.07 (m, 2H), 4.77 – 4.75 (m, 1H), 2.93 (t, J = 6.6 Hz, 2H), 2.19 – 2.06 (m, 2H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 161.4, 148.5, 145.3, 137.2, 128.4, 127.2, 126.0, 123.5, 121.4, 73.8, 38.0, 34.5.



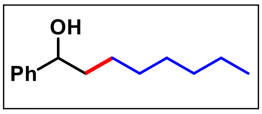
3-(benzo[d][1,3]dioxol-5-yl)-1-phenylpropan-1-ol (3p):[13] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (81 mg, 63%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.30 – 7.27 (m, 4H), 7.23 – 7.20 (m, 1H), 6.65 (d, J = 7.9 Hz, 1H), 6.62 (s, 1H), 6.57 (d, J = 7.8 Hz, 1H), 5.85 (s, 2H), 4.61 (m, 1H), 2.63 – 2.50 (m, 2H), 2.05 – 1.87 (m, 3H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 147.7, 145.8, 144.7, 135.7, 128.7, 127.8, 126.0, 121.3, 109.0, 108.3, 100.9, 73.9, 40.8, 31.9.



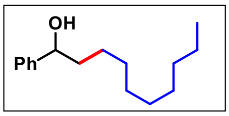
3-cyclopropyl-1-phenylpropan-1-ol (3q):[15] Colourless oil (5% ethyl acetate in petroleum ether), Yield: (51 mg, 58%); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.38 – 7.37 (m, 4H), 7.32 – 7.28 (m, 1H), 4.74 – 4.72 (m, 1H), 1.97 – 1.82 (m, 3H), 1.36 – 1.22 (m, 2H), 0.74 – 0.67 (m, 1H), 0.46 – 0.41 (m, 2H), 0.05 – 0.02 (m, 2H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 145.0, 128.6, 127.6, 126.0, 74.6, 39.1, 31.0, 10.8, 4.6, 4.5.



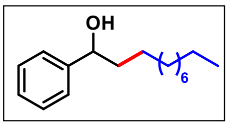
1-phenyloctan-1-ol (3r):[13] Colourless oil (5% ethyl acetate in petroleum ether), Yield: (48 mg, 39%); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.27 – 7.26 (m, 4H), 7.21 – 7.18 (m, 1H), 4.59 – 4.57 (m, 1H), 1.75 – 1.60 (m, 3H), 1.36 – 1.30 (m, 1H), 1.21 – 1.17 (m, 9H) 0.80 (t, J = 7.1 Hz, 3H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 145.1, 128.6, 127.6, 126.0, 74.9, 39.3, 31.9, 29.6, 29.3, 26.0, 22.8, 14.2.



1-phenyldecan-1-ol (3s):[9] Colourless oil (5% ethyl acetate in petroleum ether), Yield: (59 mg, 42%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.28 – 7.27 (m, 4H), 7.22 – 7.20 (m, 1H), 4.61 – 4.58 (m, 1H), 1.76 – 1.62 (m, 3H), 1.37 – 1.17 (m, 14H), 0.80 (t, J = 7.0 Hz, 3H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 145.1, 128.6, 127.6, 126.0, 74.9, 39.3, 32.0, 29.7, 29.6, 29.4, 26.0, 22.8, 14.2.

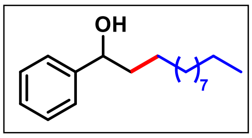


1-phenylundecan-1-ol (3t): Colourless oil (5% ethyl acetate in petroleum ether), Yield: (64 mg, 43%); ^{1}H NMR (400 MHz, Chloroform-d) δ 7.28 – 7.27 (m, 4H), 7.23 – 7.19 (m, 1H), 4.61 – 4.58 (m, 1H), 1.77 – 1.58 (m, 4H), 1.38 – 1.32 (m, 1H), 1.21 – 1.17 (m, 14H), 0.80 (t, J = 6.9 Hz, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 145.1, 128.6, 127.6, 126.0, 74.9, 39.3, 32.0, 29.8, 29.7,

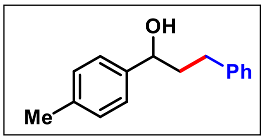


29.6, 29.4, 26.0, 22.8, 14.3. HRMS (ESI+): m/z calcd. for $C_{17}H_{28}O$ $[M+CH_3OH+Na]^+$: 303.2300; Found: 303.2319.

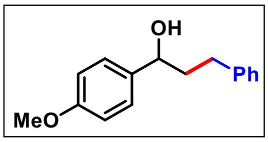
1-phenyldodecan-1-ol (3u):[16] Colourless oil (5% ethyl acetate in petroleum ether), Yield: (82 mg, 52%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.27 – 7.26 (m, 4H), 7.21 – 7.18 (m, 1H), 4.59 – 4.57 (m, 1H), 1.76 – 1.60 (m, 3H), 1.35 – 1.31 (m, 2H), 1.22 – 1.17 (m, 16H), 0.80 (t, *J* = 6.9 Hz, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 145.1, 128.6, 127.6, 126.0, 74.9, 39.2, 32.0, 29.7, 29.6 (2C), 29.5, 26.0, 22.8, 14.2.



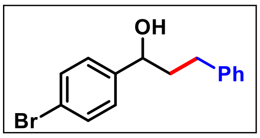
3-phenyl-1-(p-tolyl)propan-1-ol (3v):[11] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (80 mg, 71%); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.19 (t, *J* = 7.7 Hz, 2H), 7.16 (d, J = 8.5 Hz, 2H), 7.11 (d, *J* = 7.9 Hz, 2H), 7.08 (d, *J* = 7.9 Hz, 2H), 4.58 – 4.56 (m, 1H), 2.68 – 2.55 (m, 2H), 2.27 (s, 3H), 2.08 – 1.90 (m, 2H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 142.0, 141.7, 137.5, 129.3, 128.6, 128.5, 126.0, 125.9, 73.9, 40.5, 32.2, 21.2.



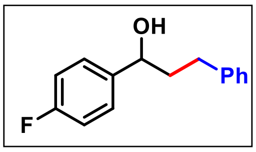
1-(4-methoxyphenyl)-3-phenylpropan-1-ol (3w):[11] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (95 mg, 79%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.30 – 7.25 (m, 4H), 7.19 – 7.16 (m, 3H), 6.88 (d, *J* = 8.7 Hz, 2H), 4.64 – 4.61 (m, 1H), 3.80 (s, 3H), 2.75 – 2.60 (m, 2H), 2.17 – 2.09 (m, 2H), 1.85 (brs, 1H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 159.2, 142.0, 136.8, 128.6, 128.5, 127.3, 126.0, 114.0, 73.6, 55.4, 40.5, 32.3.



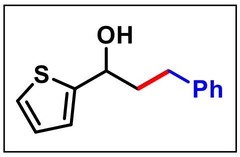
1-(4-bromophenyl)-3-phenylpropan-1-ol (3x):[11] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (86 mg, 59%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.45 (d, *J* = 8.6 Hz, 2H), 7.27 (t, *J* = 7.6 Hz, 2H), 7.20 – 7.15 (m, 5H), 4.63 – 4.60 (m, 1H), 2.73 – 2.61 (m, 2H), 2.10 – 1.93 (m, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 143.7, 141.6, 131.7, 128.6, 128.5, 127.8, 126.1, 121.4, 73.3, 40.5, 32.0.



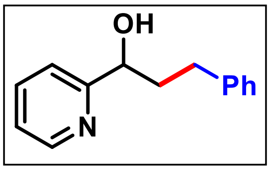
1-(4-fluorophenyl)-3-phenylpropan-1-ol (3y):[11] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (75 mg, 65%); ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.26 – 7.18 (m, 4H), 7.13 – 7.10 (m, 3H), 6.96 (t, *J* = 8.7 Hz, 2H), 4.62 – 4.59 (m, 1H), 2.70 – 2.54 (m, 2H), 2.09 – 1.81 (m, 2H), 1.81 (s, 1H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 162.4 (*J* = 243.9 Hz), 141.7, 140.5, 140.4, 128.5 (*J* = 3.3 Hz), 127.7 (*J* = 8.2 Hz), 126.1, 115.5 (J = 21.1 Hz), 73.4, 40.7, 32.1. ^{19}F NMR (470 MHz, $CDCl_3$) δ -115.0.



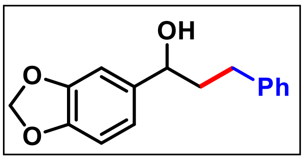
3-phenyl-1-(thiophen-2-yl)propan-1-ol (3ab):[15] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (74 mg, 68%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.30 – 7.25 (m, 3H), 7.21 – 7.18 (m, 3H), 6.99 – 6.96 (m, 2H), 4.95 – 4.91 (m, 1H), 2.81 – 2.68 (m, 2H), 2.26 – 2.11 (m, 2H), 2.01 (s, 1H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 148.6, 141.6, 128.6, 128.5, 126.8, 126.1, 124.8, 124.1, 69.7, 40.8, 32.2.



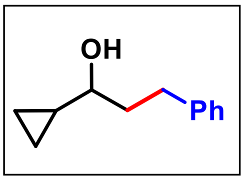
3-phenyl-1-(pyridin-2-yl)propan-1-ol (3ac):[13] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (62 mg, 58%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 8.54 (d, *J* = 4.8 Hz, 1H), 7.68 – 7.64 (m, 1H), 7.28 – 7.15 (m, 7H), 4.78 – 4.76 (m, 1H), 4.38 (s, 1H), 2.83 – 2.73 (m, 2H), 2.17 – 1.94 (m, 2H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 162.0, 148.3, 142.1, 136.8, 128.6, 128.5, 125.9, 122.4, 120.4, 72.1, 40.4, 31.7.



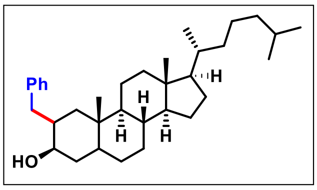
1-(benzo[d][1,3]dioxol-5-yl)-3-phenylpropan-1-ol (3ad):[12] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (77 mg, 60%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.35 – 7.35 (m, 1H), 7.28 – 7.24 (m, 2H), 7.18 – 7.16 (m, 2H), 6.86 (s, 1H), 6.76 (s, 2H), 5.93 (s, 2H), 4.57 (t, J = 6.6 Hz, 1H), 2.73 – 2.59 (m, 2H), 2.12 – 1.93 (m, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 147.9, 147.1, 141.8, 138.8, 128.5, 128.4, 126.0, 119.5, 108.2, 106.5, 101.1, 73.8, 40.5, 32.2.



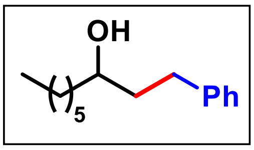
1-cyclopropyl-3-phenylpropan-1-ol (3ae):[15] Colourless oil (5% ethyl acetate in petroleum ether), Yield: (49 mg, 56%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.27 (t, J = 7.5 Hz, 2H), 7.22 – 7.16 (m, 3H), 2.92 – 2.69 (m, 3H), 1.95 – 1.90 (m, 2H), 1.65 – 1.58 (m, 1H), 0.97 – 0.90 (m, 1H), 0.56 – 0.46 (m, 2H), 0.29 – 0.18 (m, 2H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 142.4, 128.5, 128.4, 125.9, 76.2, 38.8, 32.2, 18.1, 2.8, 2.6.



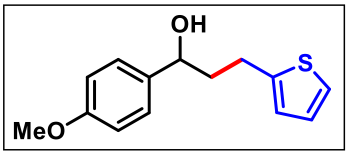
(3R,8R,9S,10S,13R,14S,17R)-2-benzyl-10,13-dimethyl-17-((R)-6-methylheptan-2-yl)hexadecahydro-1H-cyclopenta[a]phenanthren-3-ol (3af):[13] White solid (5% ethyl acetate in petroleum ether), Yield: (81 mg, 34%); ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.21 – 7.18 (m, 2H), 7.12 – 7.09 (m, 3H), 3.28 – 3.21 (m, 1H), 3.03 – 2.99 (m, 1H), 1.86 – 1.82 (m, 1H), 1.74 – 1.61 (m, 2H), 1.57 – 1.41 (m, 8H), 1.31 – 1.12 (m, 10H), 1.05 – 0.89 (m, 11H), 0.81 – 0.78 (m, 9H), 0.66 (s, 3H), 0,53 (s, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 140.9, 129.5, 128.3, 125.9, 75.2, 56.6, 56.5, 54.5, 45.1, 43.0, 42.7, 42.5, 40.2, 39.7, 39.6, 38.4, 36.3, 36.2, 35.9, 35.5, 32.2, 28.5, 28.4, 28.1, 24.3, 24.0, 23.0, 22.7, 21.4, 18.8, 13.1, 12.2.



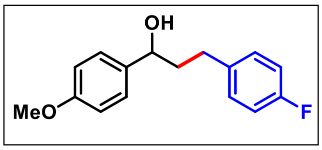
1-phenylnonan-3-ol (3ag):[13] Colourless oil (5% ethyl acetate in petroleum ether), Yield: (26 mg, 12%); ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.31 (t, *J* = 7.5 Hz, 2H), 7.24- 7.20 (m, 3H), 3.67 – 3.63 (m, 1H), 2.85 – 2.67 (m, 2H), 1.84 – 1.75 (m, 2H), 1.65 (s, 1H), 1.52 – 1.44 (m, 3H), 1.33 – 1.31 (m, 7H), 0.91 (t, *J* = 6.6 Hz, 3H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 142.4, 128.6, 128.5, 125.9, 71.6, 39.2, 37.7, 32.2, 32.0, 29.5, 25.7, 22.7, 14.2.



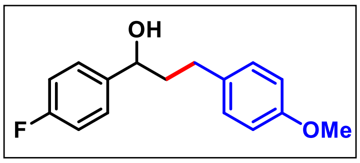
1-(4-methoxyphenyl)-3-(thiophen-2-yl)propan-1-ol (3ah): Colourless oil (10% ethyl acetate in petroleum ether), Yield: (71 mg, 57%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.20 (d, *J* = 8.7 Hz, 2H), 7.04 – 7.03 (m, 1H), 6.84 – 6.82 (m, 1H), 6.81 (d, *J* = 8.7 Hz, 2H), 6.72 – 6.71 (m, 1H), 4.60 – 4.58 (m, 1H), 3.73 (s, 3H), 2.88 – 2.76 (m, 2H), 2.14 – 1.93 (m, 2H), 1.85 (s, 1H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 159.3, 144.8, 136.6, 127.3, 126.9, 124.4, 123.2, 114.0, 73.2, 55.4, 40.7, 26.4. HRMS (ESI+): m/z calcd. for $C_{14}H_{16}O_2S$ $[M+Na]^+$: 271.0769; Found: 271.0767.



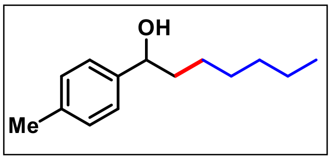
3-(4-fluorophenyl)-1-(4-methoxyphenyl)propan-1-ol (3ai): Colourless oil (10% ethyl acetate in petroleum ether), Yield: (85 mg, 65%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.19 (d, *J* = 8.3 Hz, 2H), 7.07 – 7.04 (m, 2H), 6.88 (t, *J* = 8.7 Hz, 2H), 6.81 (d, *J* = 8.3 Hz, 2H), 4.55 – 4.53 (m, 1H), 3.73 (s, 3H), 2.65 – 2.51 (m, 2H), 2.07 – 1.85 (m, 2H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 161.4 (*J* = 241.8 Hz), 159.3, 137.5 (*J* = 3.2 Hz), 136.7, 129.8 (*J* = 7.8 Hz), 127.3, 115.2 (J = 21.0 Hz), 114.1, 73.5, 55.4, 40.6, 31.4. HRMS (ESI+): m/z calcd. for $C_{16}H_{17}FO_2$ $[M+H]^+$: 261.1291; Found: 261.1267.



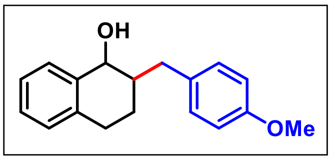
1-(4-fluorophenyl)-3-(4-methoxyphenyl)propan-1-ol (3aj): Colourless oil (10% ethyl acetate in petroleum ether), Yield: (88 mg, 68%); ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.25 – 7.22 (m, 2H), 7.02 (d, *J* = 8.4 Hz, 2H), 6.96 (t, *J* = 8.7 Hz, 2H), 6.75 (d, *J* = 8.5 Hz, 2H), 4.60 – 4.57 (m, 1H), 3.71 (s, 3H), 2.63 – 2.49 (m, 2H), 2.05 – 1.84 (m, 2H), 1.79 (s, 1H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 162.3 (*J* = 244.1 Hz), 158.0, 140.5 (*J* = 3.0 Hz), 133.7, 129.4, 127.7 (*J* = 8.1 Hz), 115.4 (*J* = 21.3 Hz), 114.0, 73.3, 55.4, 40.9, 31.2. ^{19}F NMR (564 MHz, $CDCl_3$) δ -115.0. HRMS (ESI+): m/z calcd. for $C_{16}H_{17}FO_2$ $[M+Na]^+$: 283.1110; Found: 283.1104.



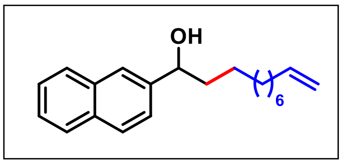
1-(p-tolyl)heptan-1-ol (3ak):[10] Colourless oil (5% ethyl acetate in petroleum ether), Yield: (62 mg, 30%); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.16 (d, *J* = 8.0 Hz, 2H), 7.08 (d, *J* = 8.1 Hz, 2H), 4.55 (t, *J* = 6.7 Hz, 1H), 2.27 (s, 3H), 1.75 – 1.69 (m, 2H), 1.64 – 1.58 (m, 1H), 1.35 – 1.29 (m, 1H), 1.26 – 1.16 (m, 7H), 0.79 (t, *J* = 7.0 Hz, 3H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 142.1, 137.3, 129.2, 126.0, 74.7, 39.2, 31.9, 29.3, 26.0, 22.7, 21.2, 14.2.



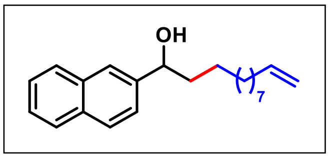
2-(4-methoxybenzyl)-1,2,3,4-tetrahydronaphthalen-1-ol (3al):[17] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (96 mg, 72%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.49 (d, *J* = 7.1 Hz, 1H), 7.23 – 7.17 (m, 2H), 7.13 (d, *J* = 8.6 Hz, 2H), 7.08 (d, *J* = 7.1 Hz, 1H), 6.85 (d, *J* = 8.6 Hz, 2H), 4.48 (t, *J* = 6.6 Hz, 1H), 3.79 (s, 3H), 3.01 – 2.97 (m, 1H), 2.76 – 2.73 (m, 2H), 2.50 – 2.45 (m, 1H), 2.02 – 1.95 (m, 2H), 1.72 – 1.71 (m, 1H), 1.52 – 1.45 (m, 1H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 158.1, 138.8, 137.0, 132.5, 130.3, 128.8, 128.4, 127.5, 126.4, 114.0, 73.1, 55.4, 44.2, 37.6, 27.8, 24.7.



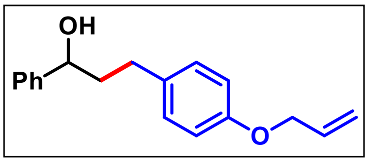
1-(naphthalen-2-yl)undec-10-en-1-ol (3am): Colourless oil (5% ethyl acetate in petroleum ether), Yield: (58 mg, 39%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.83 – 7.81 (m, 3H), 7.76 (s, 1H), 7.48 – 7.44 (m, 3H), 5.84 – 5.75 (m, 1H), 4.98 (d, *J* = 17.1 Hz, 1H), 4.92 (d, *J* = 10.1 Hz, 1H), 4.82 (t, *J* = 6.6 Hz, 1H), 2.02 (q, *J* = 6.9 Hz, 2H), 1.89 – 1.80 (m, 3H), 1.46 – 1.38 (m, 1H), 1.35 – 1.25 (m, 11H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 142.4, 139.4, 133.4, 133.1, 128.4, 128.0, 127.8, 126.2, 125.9, 124.7, 124.2, 114.2, 75.0, 39.1, 33.9, 29.7, 29.6, 29.25, 29.02, 29.0, 26.0. HRMS (ESI+): m/z calcd. for $C_{21}H_{28}O$ $[M+Na]^+$: 319.2038; Found: 319.2029.



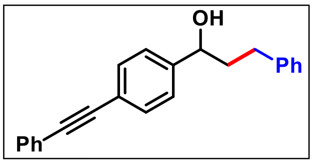
1-(naphthalen-2-yl)dodec-11-en-1-ol (3an): Colourless oil (5% ethyl acetate in petroleum ether), Yield: (68 mg, 44%); ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.87 (d, *J* = 7.8 Hz, 3H), 7.81 (s, 1H), 7.52 – 7.49 (m, 3H), 5.88 – 5.81 (m, 1H), 5.03 (d, *J* = 17.1 Hz, 1H), 4.97 (d, *J* = 10.1 Hz, 1H), 4.86 (t, *J* = 6.4 Hz, 1H), 2.08 – 2.03 (m, 3H), 1.94 – 1.83 (m, 2H), 1.49 – 1.45 (m, 1H), 1.40 – 1.39 (m, 2H), 1.34 – 1.29 (m, 11 H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 142.4, 139.4, 133.4, 133.1, 128.4, 128.0, 127.8, 126.2, 125.9, 124.7, 124.2, 74.9, 39.1, 33.9, 29.7, 29.6, 29.5, 29.2, 29.1, 26.0. HRMS (ESI+): m/z calcd. For $C_{22}H_{30}O$ [M+H] $^+$:311.2375; Found: 311.2363.



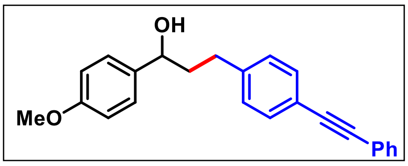
3-(4-(allyloxy)phenyl)-1-phenylpropan-1-ol (3ao): Colourless oil (10% ethyl acetate in petroleum ether), Yield: (103 mg, 77%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.35 – 7.33 (m, 4H), 7.28 – 7.25 (m, 1H), 7.09 – 7.07 (m, 2H), 6.84 – 6.81 (m, 2H), 6.08 – 6.00 (m, 1H), 5.42 – 5.37 (m, 1H), 5.28 – 5.25 (m, 1H), 4.67 – 4.64 (m, 1H), 4.50 – 4.49 (m, 2H), 2.70 – 2.57 (m, 2H), 2.12 – 1.94 (m, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 156.9, 144.7, 134.1, 133.6, 129.4, 128.6, 127.7, 126.0, 117.7, 114.8, 74.0, 69.0, 40.8, 31.3. HRMS (ESI+): m/z calcd. for $C_{18}H_{20}O_2$ [M+Na] $^+$: 291.1361; Found: 291.1338.



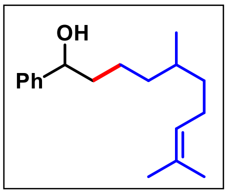
3-phenyl-1-(4-(phenylethynyl)phenyl)propan-1-ol (3ap):[18] Colourless oil (10% ethyl acetate in petroleum ether), Yield: (117 mg, 75%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.53 – 7.50 (m, 4H), 7.36 – 7.31 (m, 5H), 7.28 (t, *J* = 7.6 Hz, 2H), 7.19 – 7.17 (m, 3H), 4.70 – 4.67 (m, 1H), 2.76 – 2.63 (m, 2H), 2.14 – 1.98 (m, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 144.8, 141.7, 131.9, 131.7,128.7, 128.6, 128.5, 128.4, 127.1, 126.1, 123.4, 122.6, 89.6, 89.3, 73.6, 40.5, 32.1.



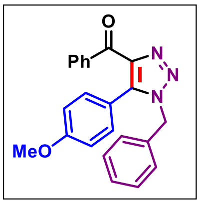
1-(4-methoxyphenyl)-3-(4-(phenylethynyl)phenyl)propan-1-ol (3aq): Colourless oil (10% ethyl acetate in petroleum ether), Yield: (89 mg, 52%); ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.52 – 7.48 (m, 2H), 7.44 (d, *J* = 8.2 Hz, 2H), 7.34 – 7.29 (m, 3H), 7.25 (d, *J* = 8.7 Hz, 2H), 7.15 (d, *J* = 8.1 Hz, 2H), 6.87 (d, *J* = 8.7 Hz, 2H), 4.60 (t, *J* = 6.7 Hz, 1H), 3.79 (s, 3H), 2.74 – 2.61 (m, 2H), 2.15 – 1.92 (m, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 159.3, 142.5, 136.7, 131.8, 131.7, 128.6, 128.4, 128.2, 127.3, 123.6, 120.8, 114.1, 89.6, 89.0, 73.5, 55.4, 40.2, 32.2. HRMS (ESI+): m/z calcd. for $C_{24}H_{22}O_2$ [M+Na] $^+$: 365.1517; Found: 365.1509.



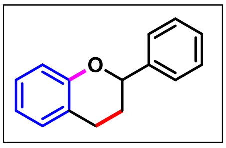
5,9-dimethyl-1-phenyldec-8-en-1-ol (3ar):[14] Colourless oil (5% ethyl acetate in petroleum ether), Yield: (46 mg, 35%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.27 – 7.26 (m, 4H), 7.22 – 7.19 (m, 1H), 5.02 – 4.99 (m, 1H), 4.60 – 4.58 (m, 1H), 1.94 – 1.80 (m, 2H), 1.75 – 1.64 (m, 2H), 1.60 (s, 3H), 1.51 (s, 3H), 1.43 – 1.14 (m, 6H), 1.08 – 1.00 (m, 2H), 0.77 (dd, *J* = 6.6, 3.7 Hz, 3H). ^{13}C{^{1}H} NMR (150 MHz, $CDCl_3$) δ 145.1, 145.0, 131.2, 128.6, 127.7, 127.6, 126.0 (2C), 125.1, 74.9, 74.8, 39.6, 39.5, 37.2, 37.1, 37.0, 36.9, 32.5, 32.4, 25.9, 25.7, 23.5, 23.4, 19.7, 19.6, 17.8.



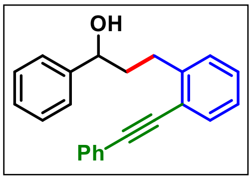
(1-benzyl-5-(4-methoxyphenyl)-1H-1,2,3-triazol-4-yl)(phenyl)methanone (5a):[19] White solid (20% ethyl acetate in petroleum ether), Yield: (70 mg, 38%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.20 (d, *J* = 7.6 Hz, 2H), 7.49 (t, *J* = 7.3 Hz, 1H), 7.39 (t, *J* = 7.6 Hz, 2H), 7.22 – 7.21 (m, 3H), 7.13 (d, *J* = 8.8 Hz, 2H), 7.03 – 7.01 (m, 2H), 6.88 (d, *J* = 8.8 Hz, 2H), 5.39 (s, 2H), 3.77 (s, 3H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 186.6, 161.0, 143.8, 141.9, 137.4, 135.0, 133.0, 131.4, 130.8, 129.0, 128.5, 128.3, 127.7, 118.2, 114.3, 55.5, 52.0.



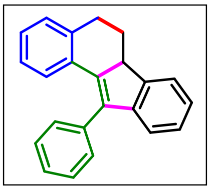
2-phenylchromane (5b):[5] Colourless oil (5% ethyl acetate in petroleum ether), Yield: (37 mg, 35%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.42 – 7.40 (m, 2H), 7.36 (t, *J* = 7.5 Hz, 2H), 7.29 (t, *J* = 7.2 Hz, 1H), 7.11 (t, *J* = 7.7 Hz, 1H), 7.06 (d, *J* = 7.5 Hz, 1H), 6.90 (d, *J* = 8.2 Hz, 1H), 6.86 (t, *J* = 7.4 Hz, 1H), 5.05 – 5.03 (m, 1H), 3.00 – 2.74 (m, 2H), 2.21 – 2.03 (m, 2H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 155.3, 141.9, 129.6, 128.6, 127.9, 127.5, 126.1, 121.9, 120.4, 117.1, 77.8, 30.1, 25.2.



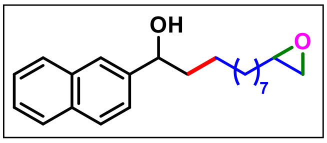
1-phenyl-3-(2-(phenylethynyl)phenyl)propan-1-ol (5c):[6] Brown liquid (10% ethyl acetate in petroleum ether), Yield: (56 mg, 60%) ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.51 – 7.46 (m, 3H), 7.34 – 7.30 (m, 5H), 7.29 (t, *J* = 7.4 Hz, 2H), 7.25 – 7.22 (m, 3H), 7.19 – 7.16 (m, 1H), 4.73 – 4.71 (m, 1H), 3.02 – 2.90 (m, 2H), 2.22 – 2.09 (m, 2H), 2.02 (s, 1H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 144.6, 144.1, 132.4, 131.7, 129.0, 128.7, 128.6, 128.5, 128.4, 127.6, 126.1, 126.0, 123.5, 122.8, 93.2, 88.3, 74.2, 39.9, 31.1.



11-phenyl-6,6a-dihydro-5H-benzo[a]fluorene (5d):[6] Colourless oil (1% ethyl acetate in petroleum ether), Yield: (37 mg, 52%); ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.52 (d, *J* = 6.8 Hz, 1H), 7.48 – 7.45 (m, 2H), 7.41 – 7.38 (m, 3H), 7.26 – 7.19 (m, 3H), 7.15 (d, *J* = 7.9 Hz, 1H), 7.10 – 7.07 (m, 2H), 6.88 (t, *J* = 7.6 Hz, 1H), 3.64 – 3.60 (m, 1H), 3.24 – 3.11 (m, 2H), 2.73 – 2.68 (m, 1H), 1.67 – 1.58 (m, 1H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 147.2, 146.0, 142.3, 137.8, 136.6, 136.4, 132.3, 129.5, 129.2, 129.1, 127.6, 127.3, 127.1, 125.6, 125.0, 122.6, 120.4, 49.4, 30.8, 28.6.



1-(naphthalen-2-yl)-10-(oxiran-2-yl)decan-1-ol (5e): Colourless oil (10% ethyl acetate in petroleum ether), Yield: (41 mg, 78%); ^{1}H NMR (600 MHz, Chloroform-*d*) δ 7.76 – 7.74 (m, 3H), 7.69 (s, 1H), 7.41 – 7.37 (m, 3H), 4.75 (t, *J* = 6.7 Hz, 1H), 2.82 – 2.79 (m, 1H), 2.65 (t, *J* = 4.5 Hz, 1H), 2.37 (dd, *J* = 5.0, 2.8 Hz, 1H), 2.00 (s, 1H), 1.83 – 1.70 (m, 2H), 1.44 – 1.41 (m, 2H), 1.39 – 1.29 (m, 4H), 1.22 – 1.18 (m, 10H). ^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$) δ 142.4, 133.4, 133.1, 128.4, 128.0, 127.8, 126.2, 125.9, 124.7, 124.2, 74.9, 52.5, 47.3, 39.1, 32.6, 29.7, 29.6, 29.5, 29.4, 26.0, 25.9. HRMS Calcd for $C_{22}H_{30}O_2$ $[M+Na]^+$: 349.2143; Found: 349.2136.



15. Copy of NMR spectra of substrates and products:

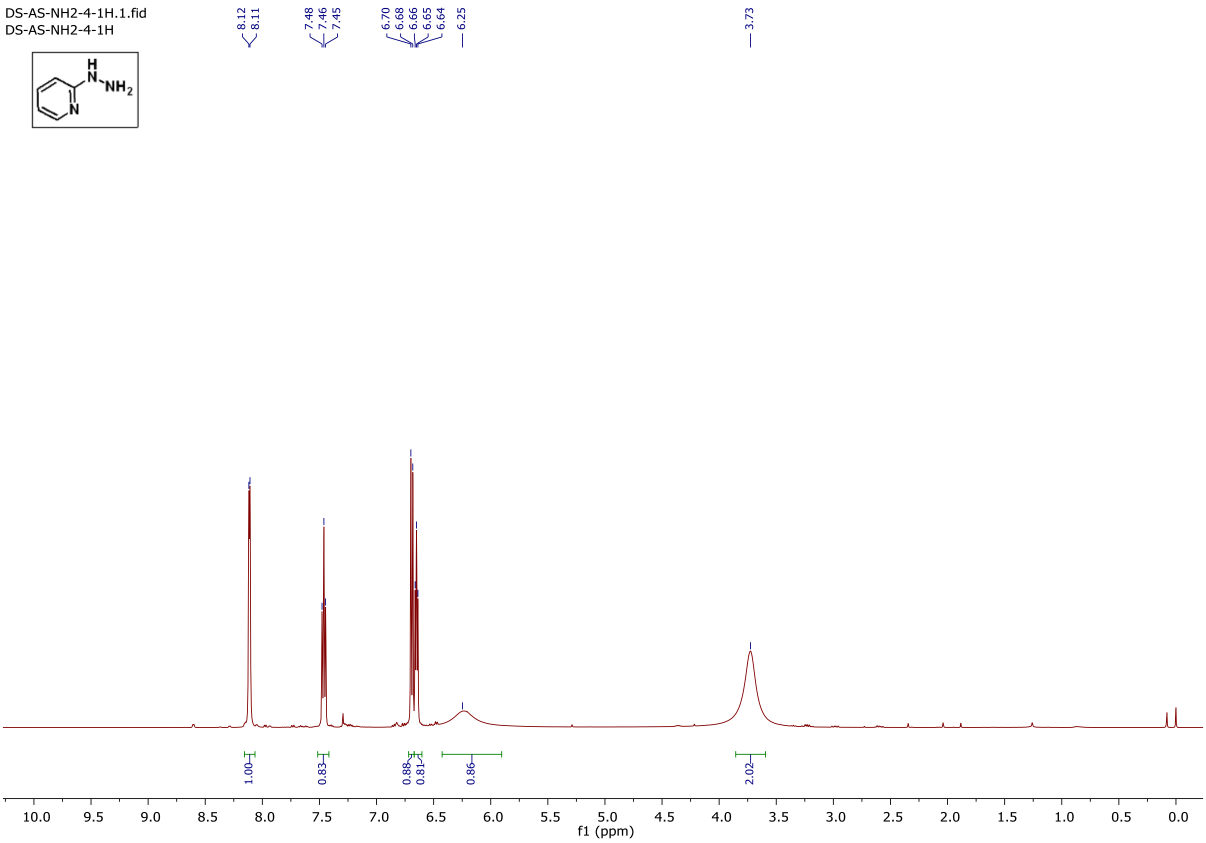


Figure S17. ^{1}H NMR (600 MHz) spectrum of Compound **AA** and in $CDCl_3$.

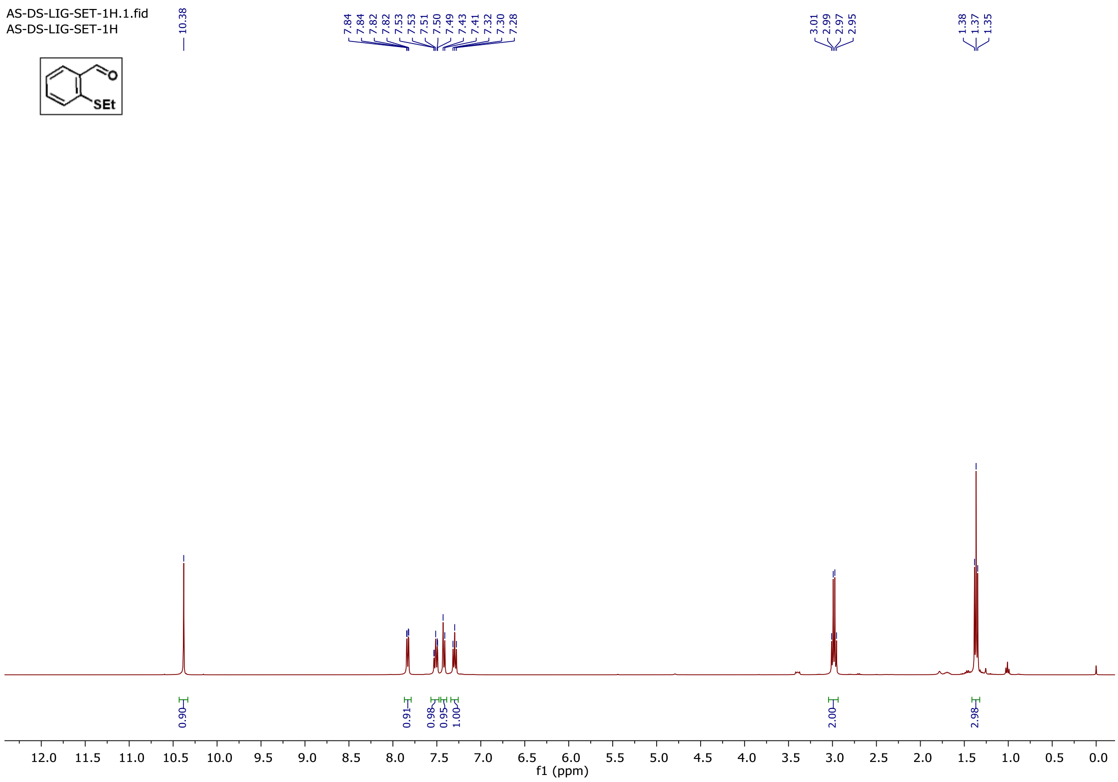
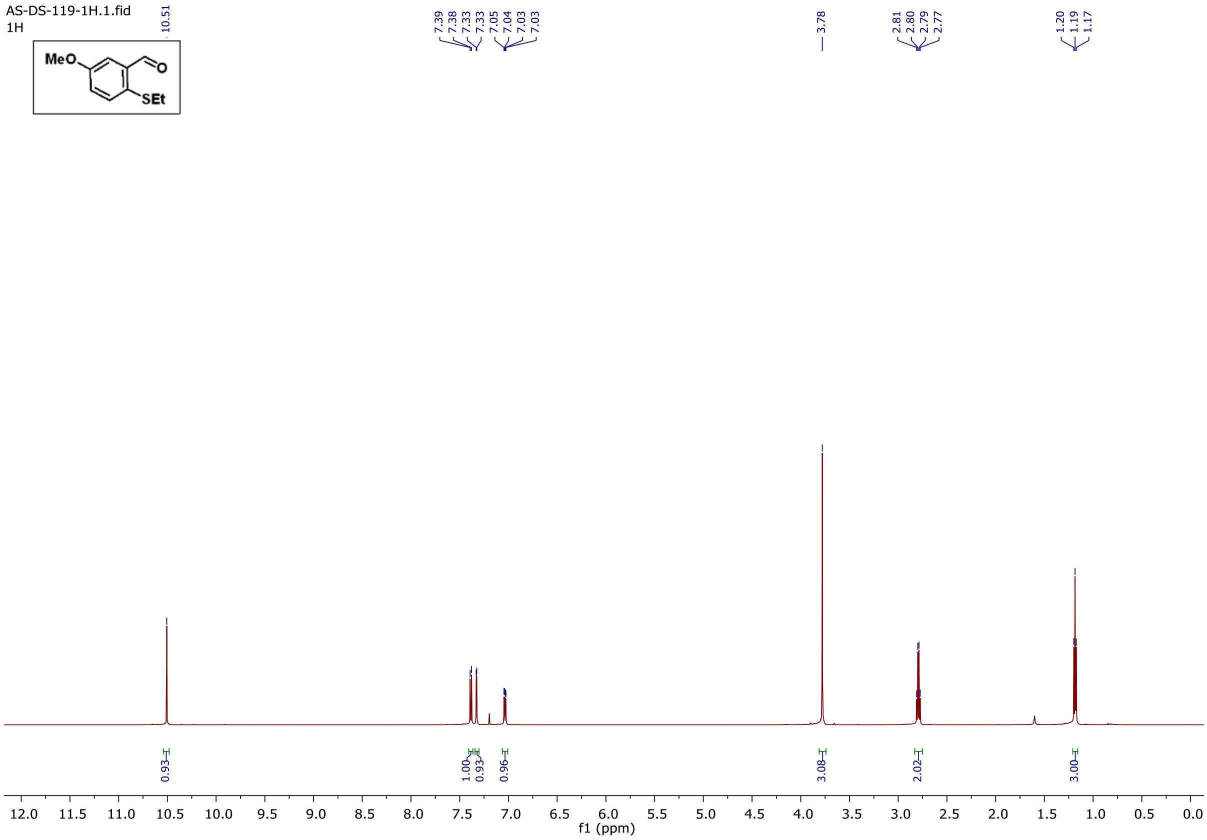


Figure S18. ^{1}H NMR (600 MHz) spectrum of Compound **AB** in $CDCl_3$.



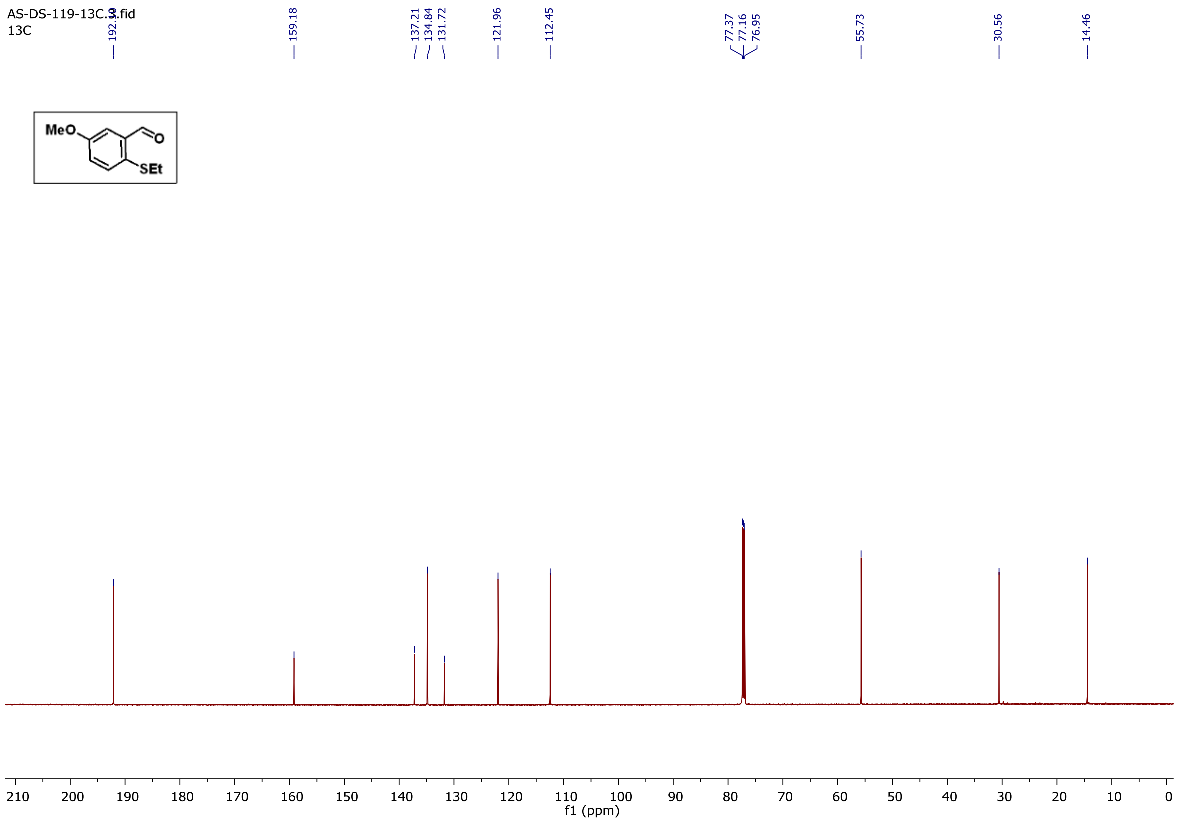


Figure S19. ^{1}H NMR (600 MHz) and ^{13}C {^{1}H} NMR (150 MHz) spectrum of Compound **AC** in $CDCl_3$.

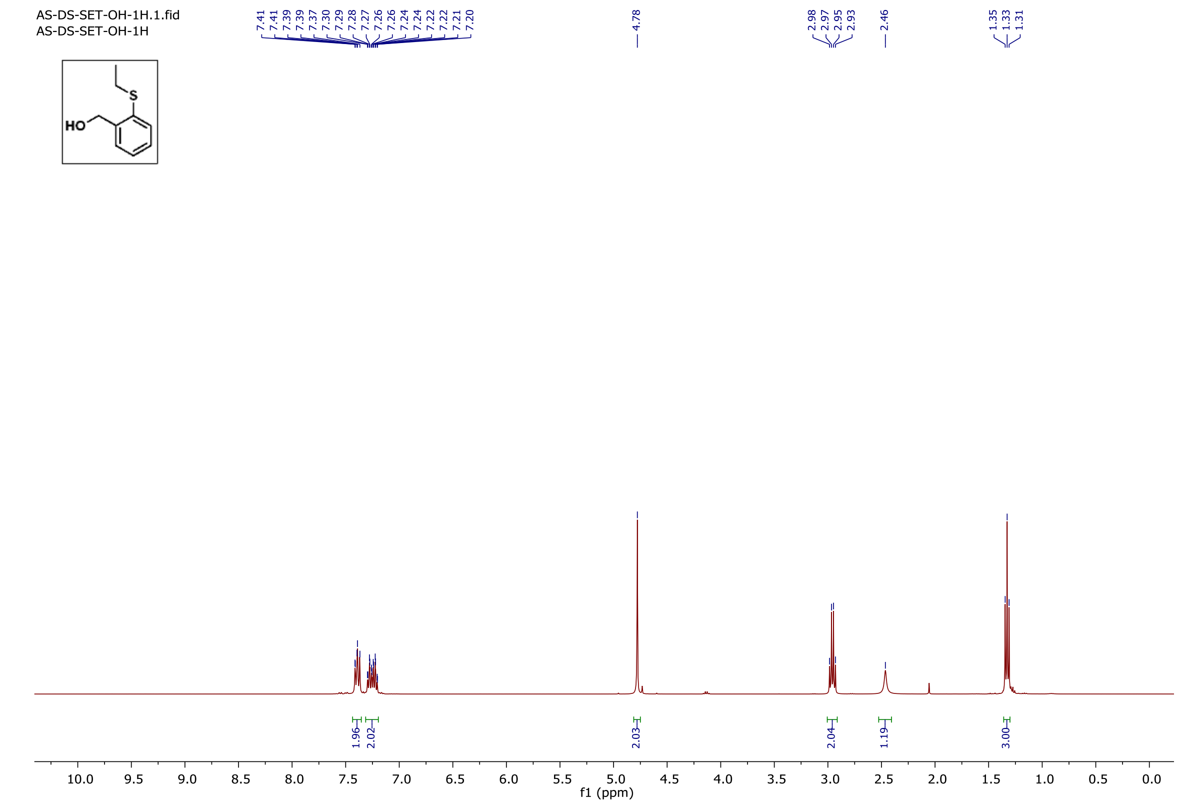


Figure S20. ^{1}H NMR (600 MHz) spectrum of Compound **AD** in $CDCl_3$.

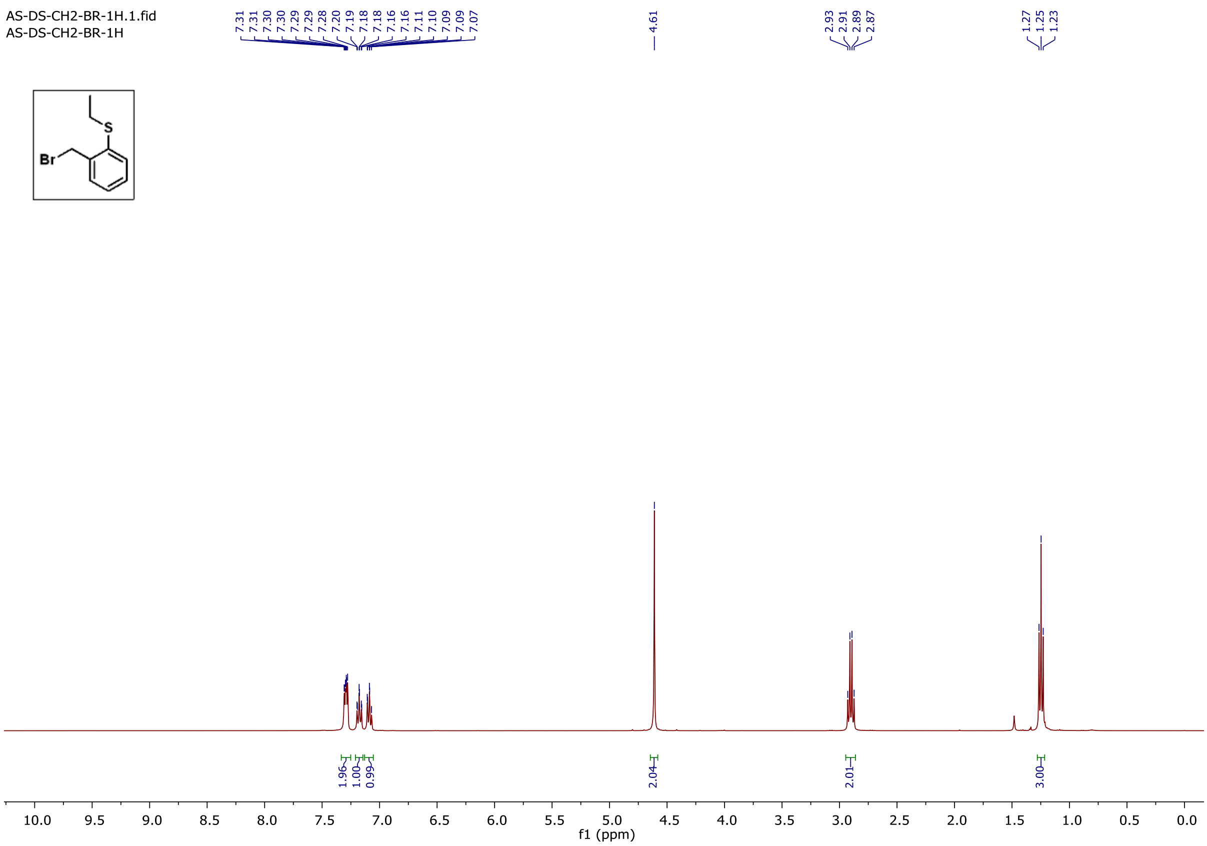


Figure S21. ^{1}H NMR (600 MHz) spectrum of Compound **AE** in $CDCl_3$.

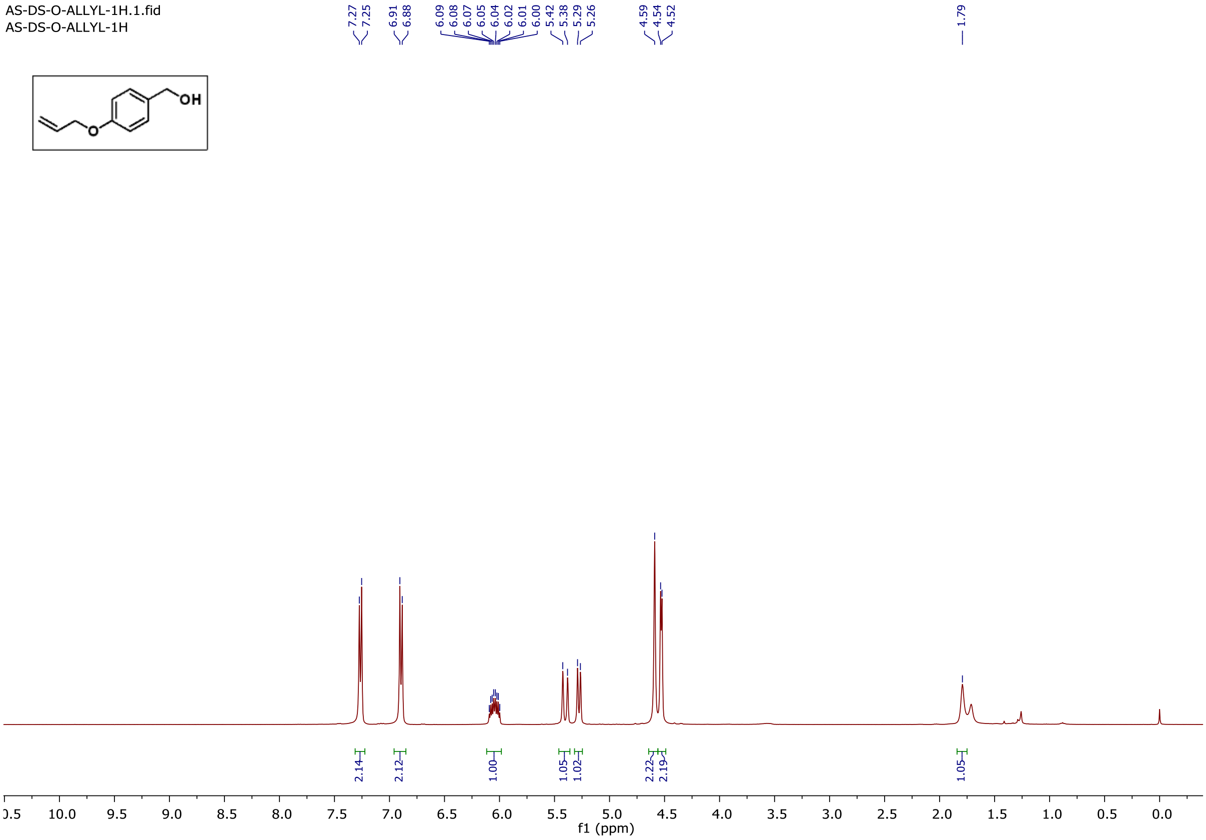


Figure S22. ^{1}H NMR (400 MHz) spectrum of Compound **AF** in $CDCl_3$.

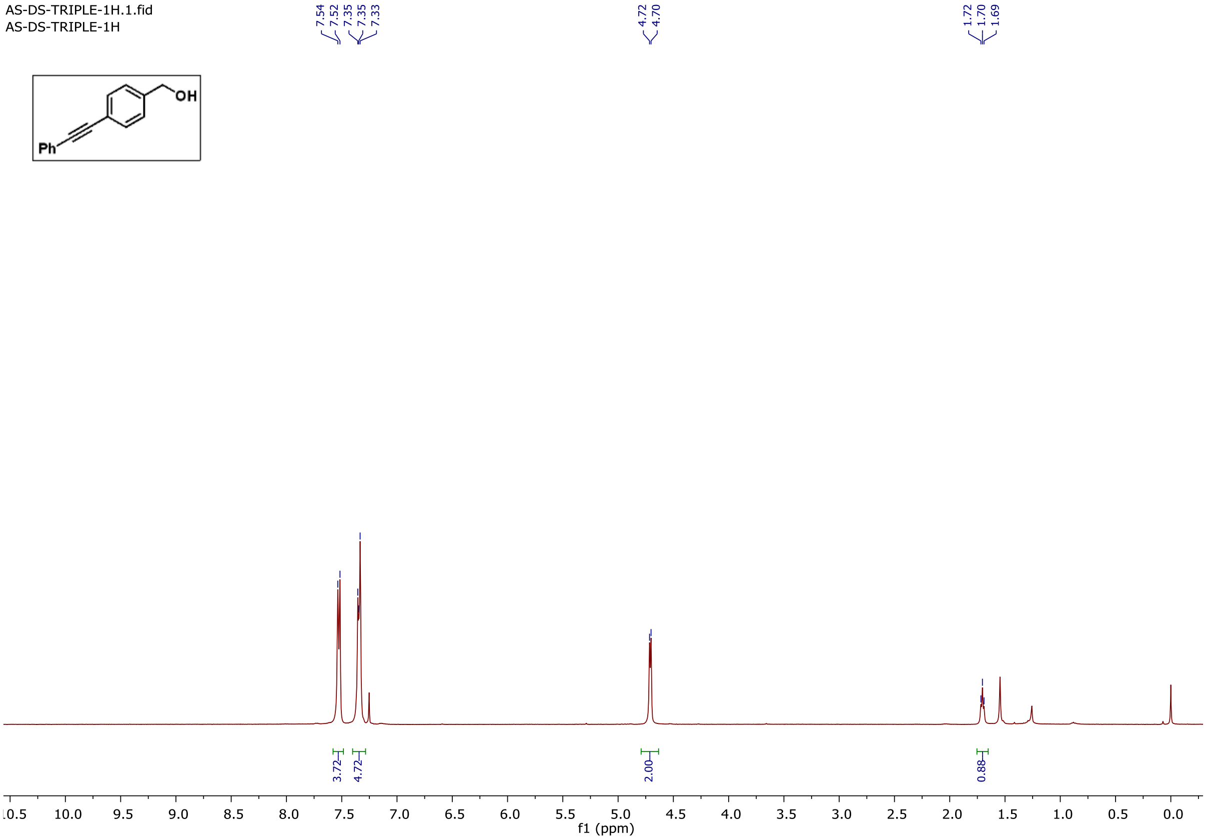
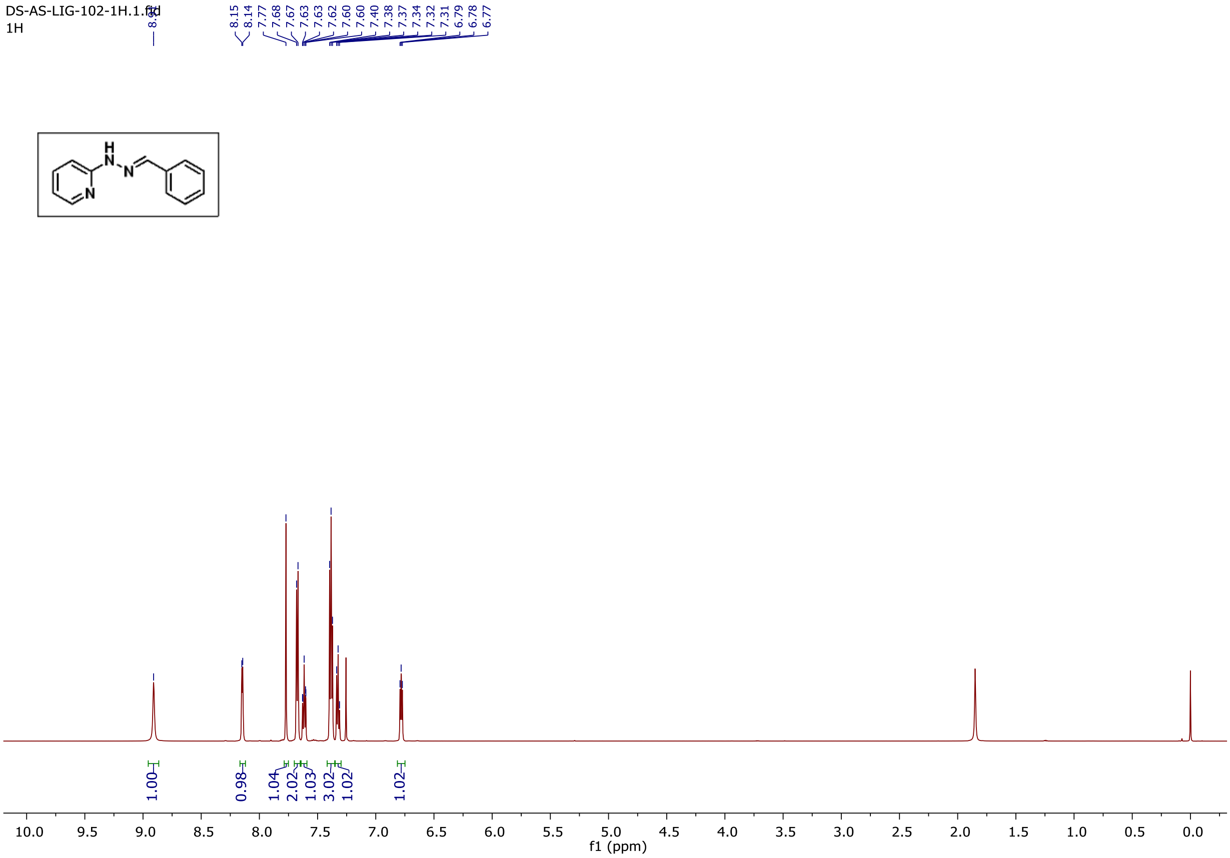


Figure S23. ^{1}H NMR (400 MHz) spectrum of Compound **AG** in $CDCl_3$.



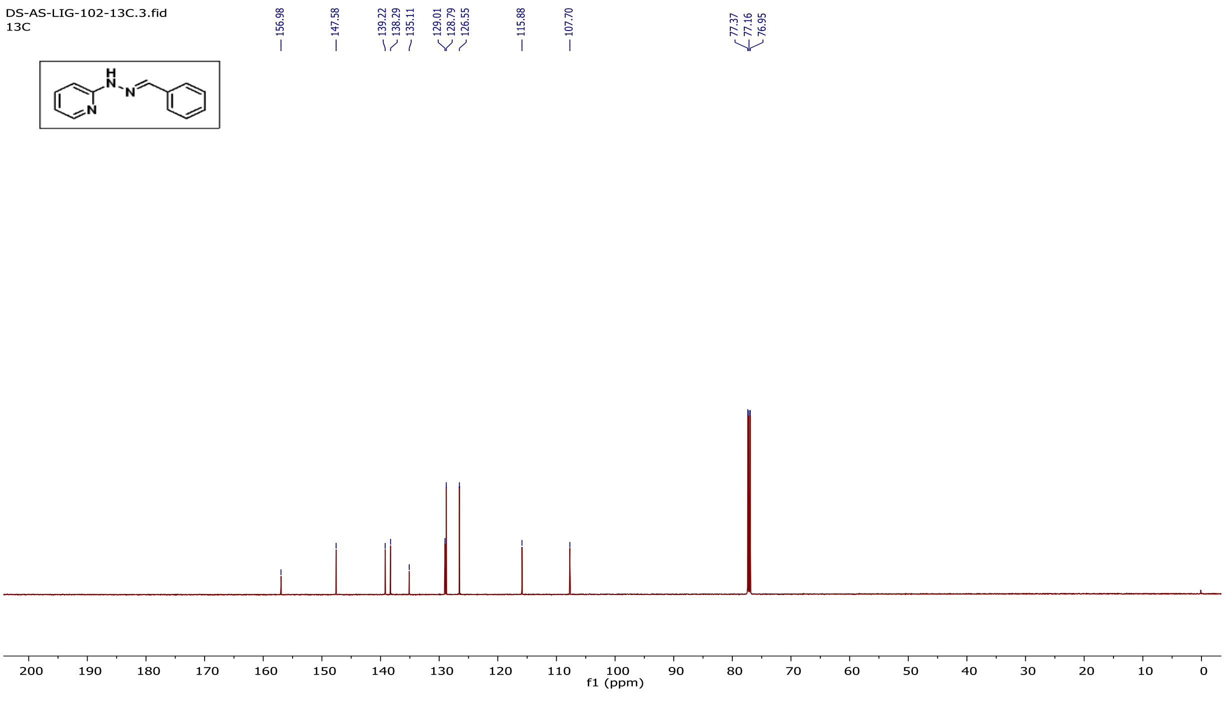
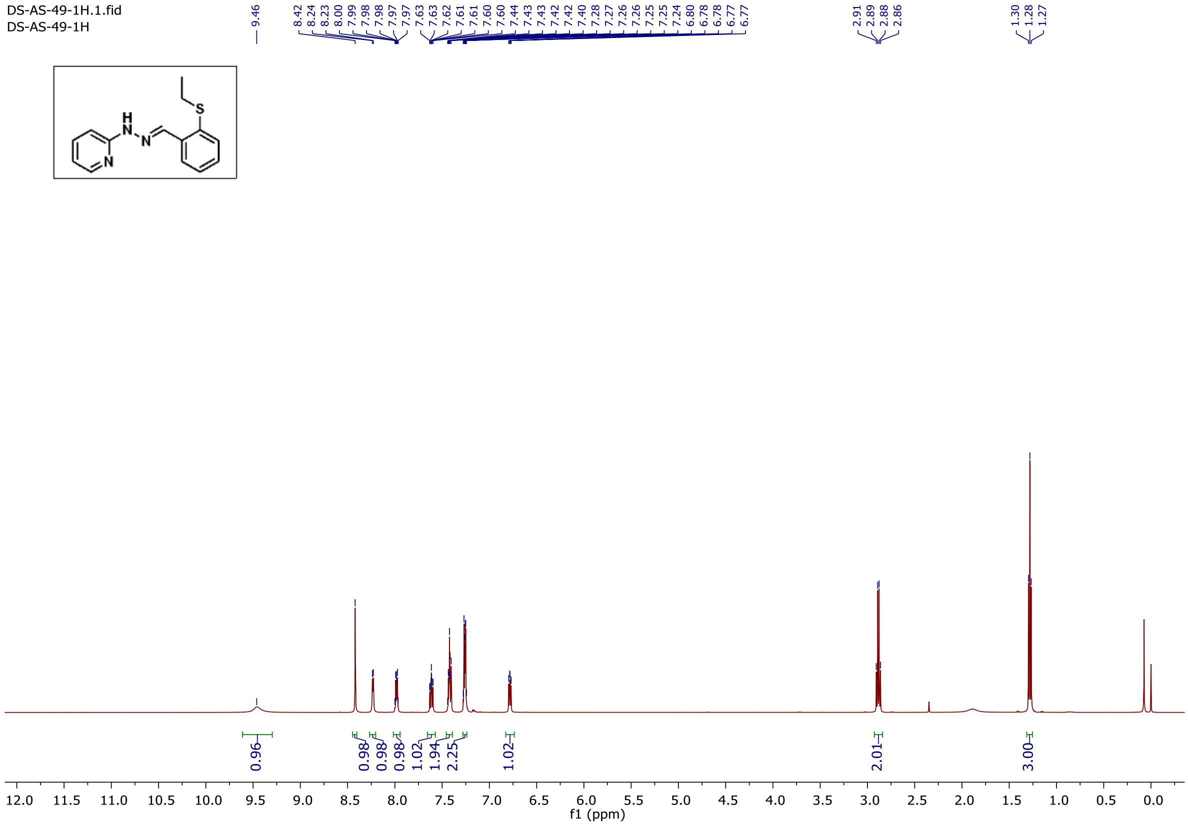


Figure S24. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **L-1** in $CDCl_3$.



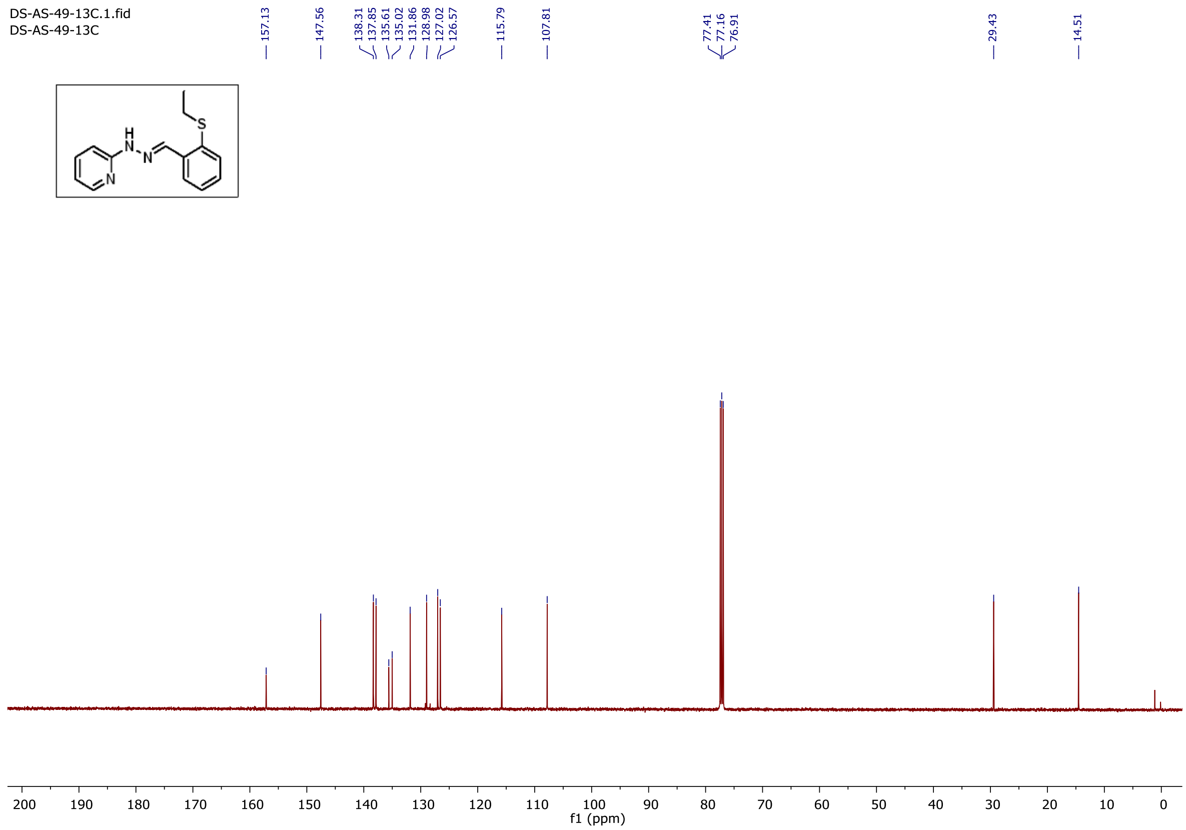
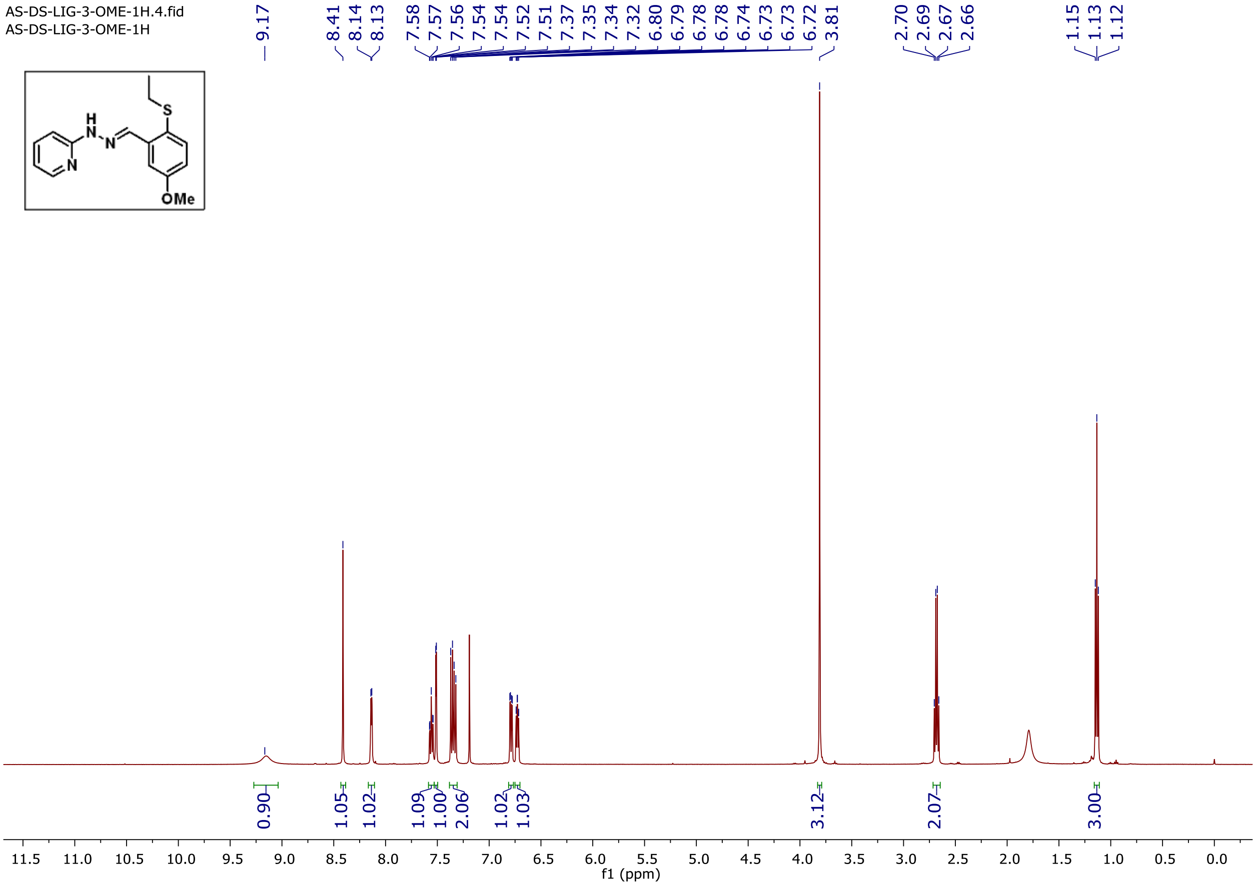


Figure S25. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **L-2** in $CDCl_3$.



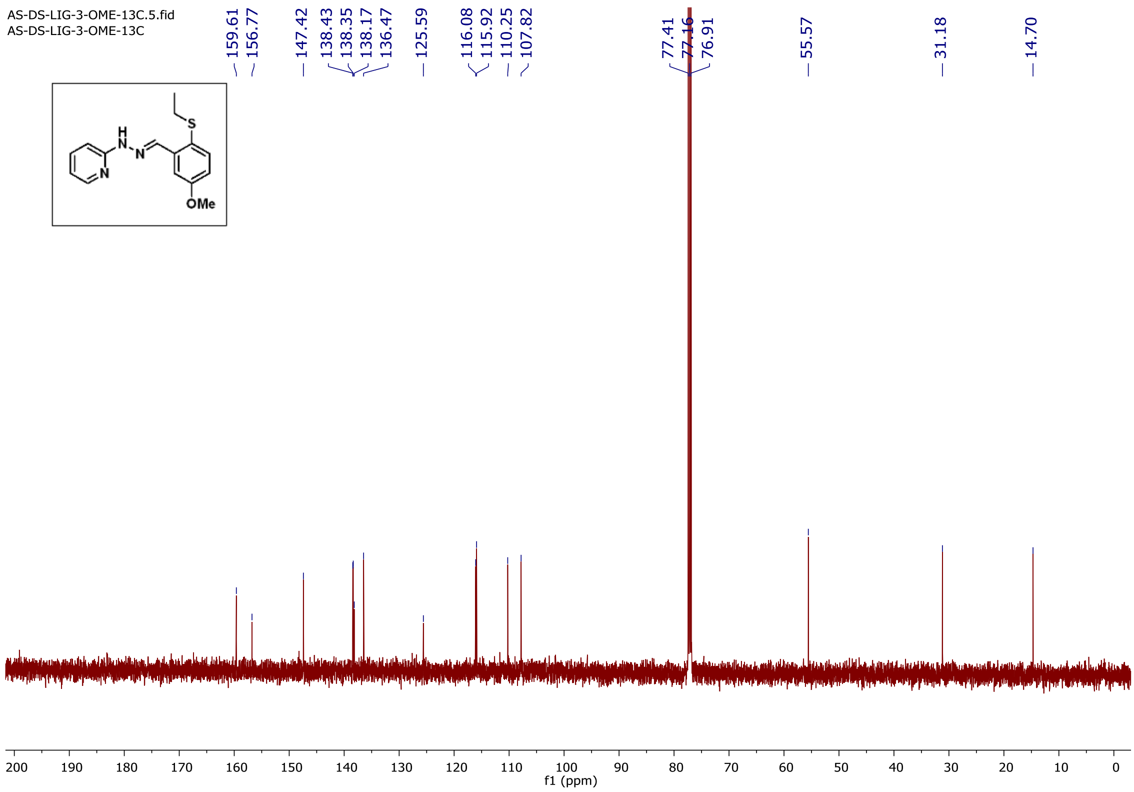
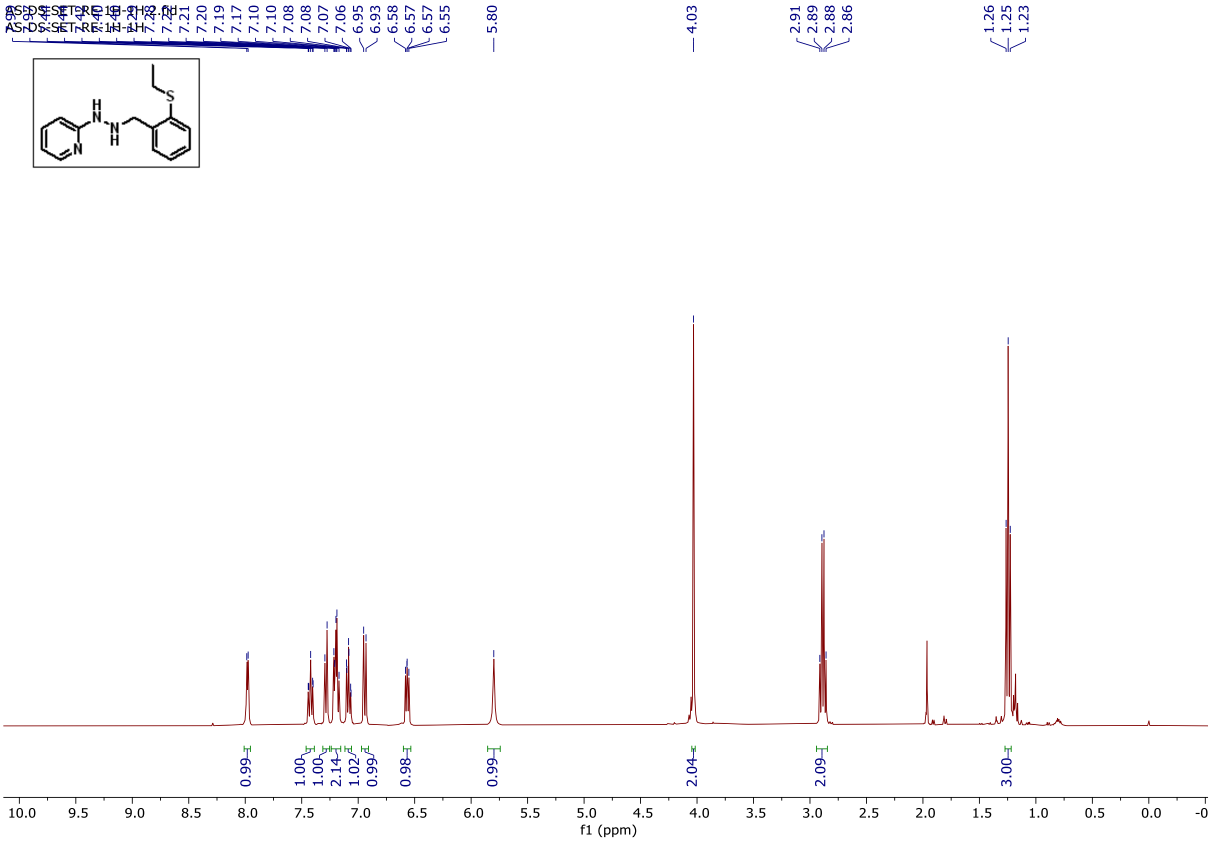


Figure S26. ^{1}H NMR (500 MHz) and ^{13}C{^{1}H} NMR (125 MHz) spectrum of Compound **L-3** in $CDCl_3$.



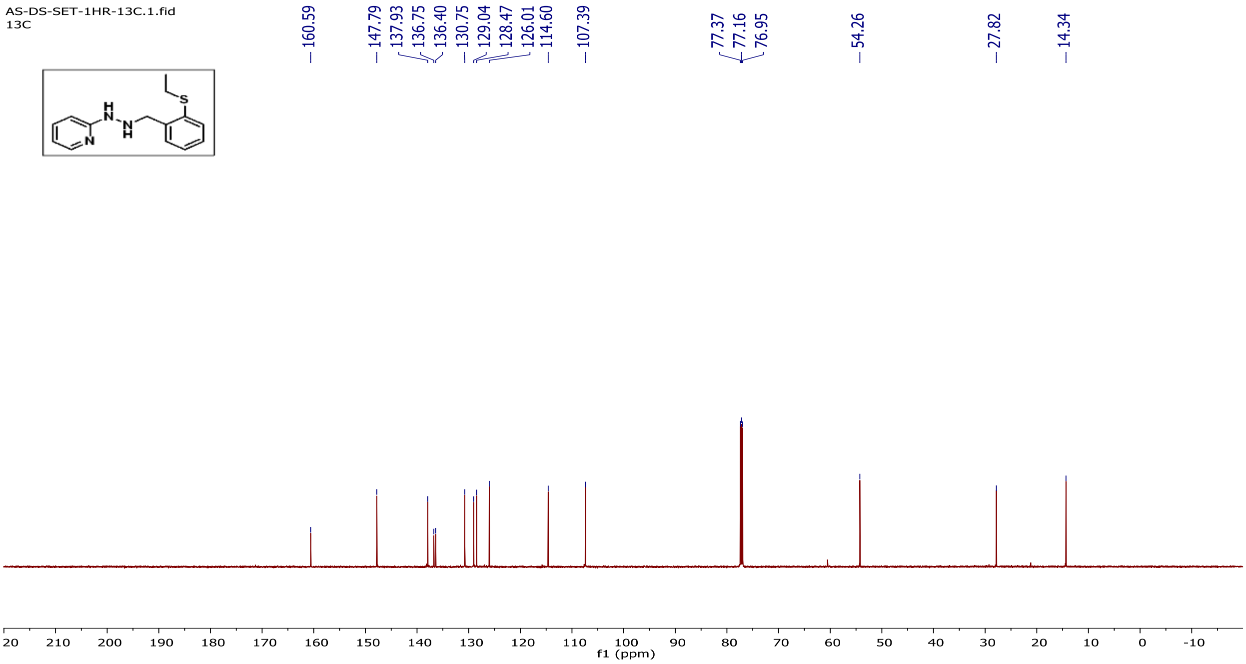
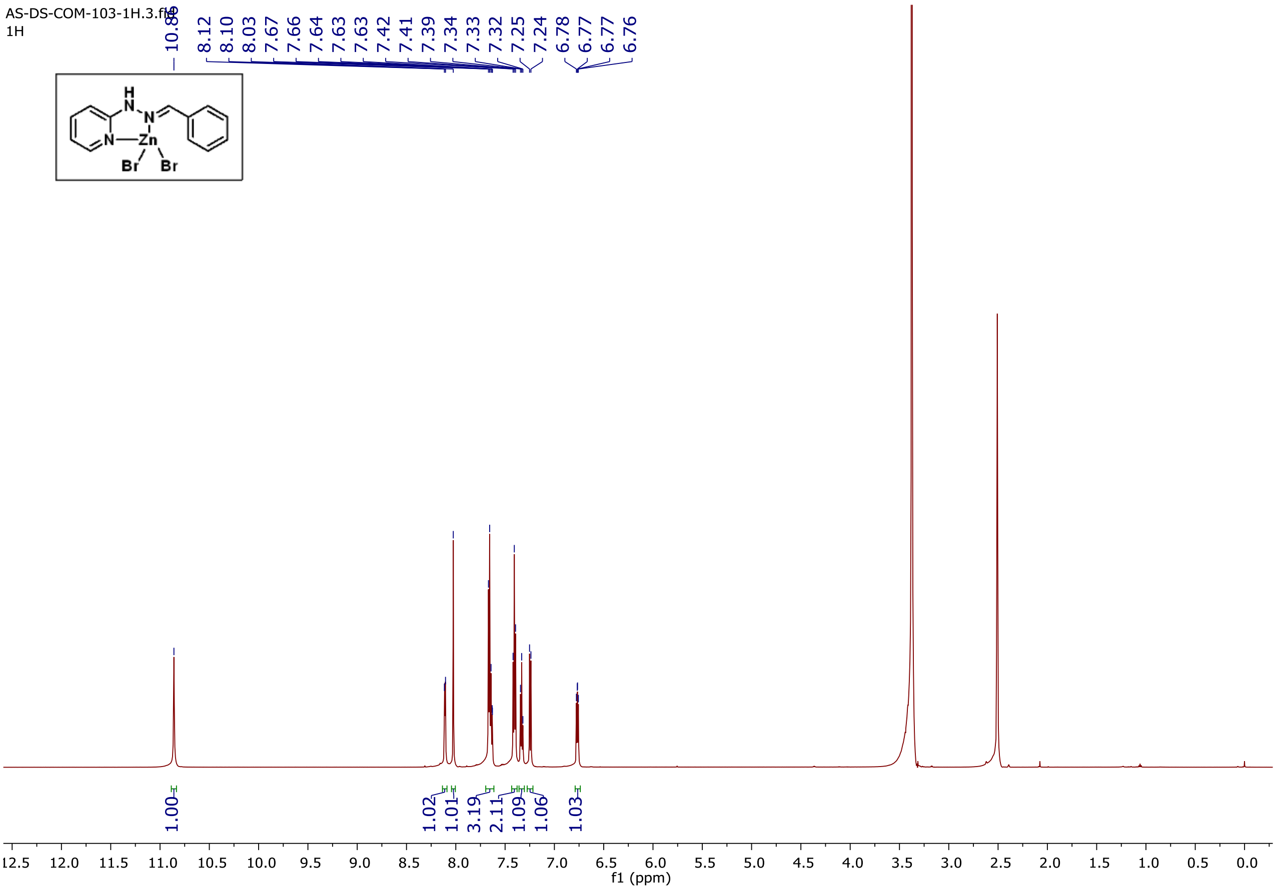


Figure S27. ^{1}H NMR (600 MHz) and $^{13}C\{^{1}H\}$ NMR (150 MHz) spectrum of Compound **L-4** in $CDCl_3$.



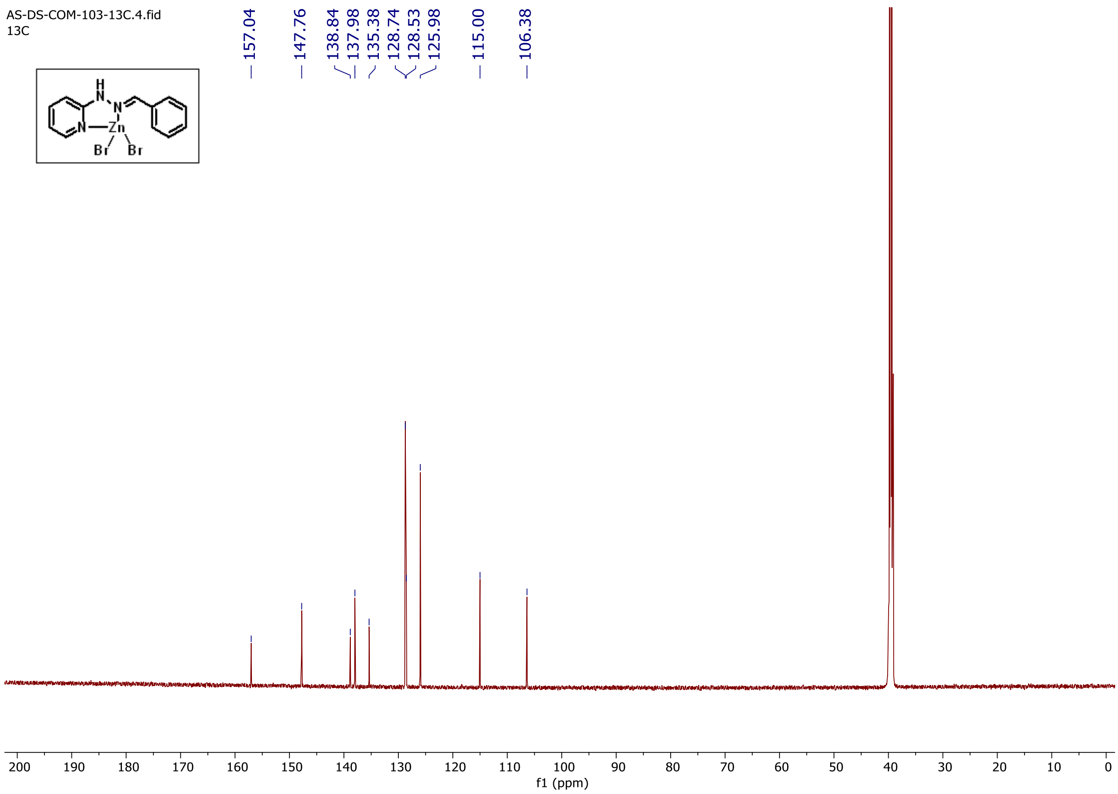
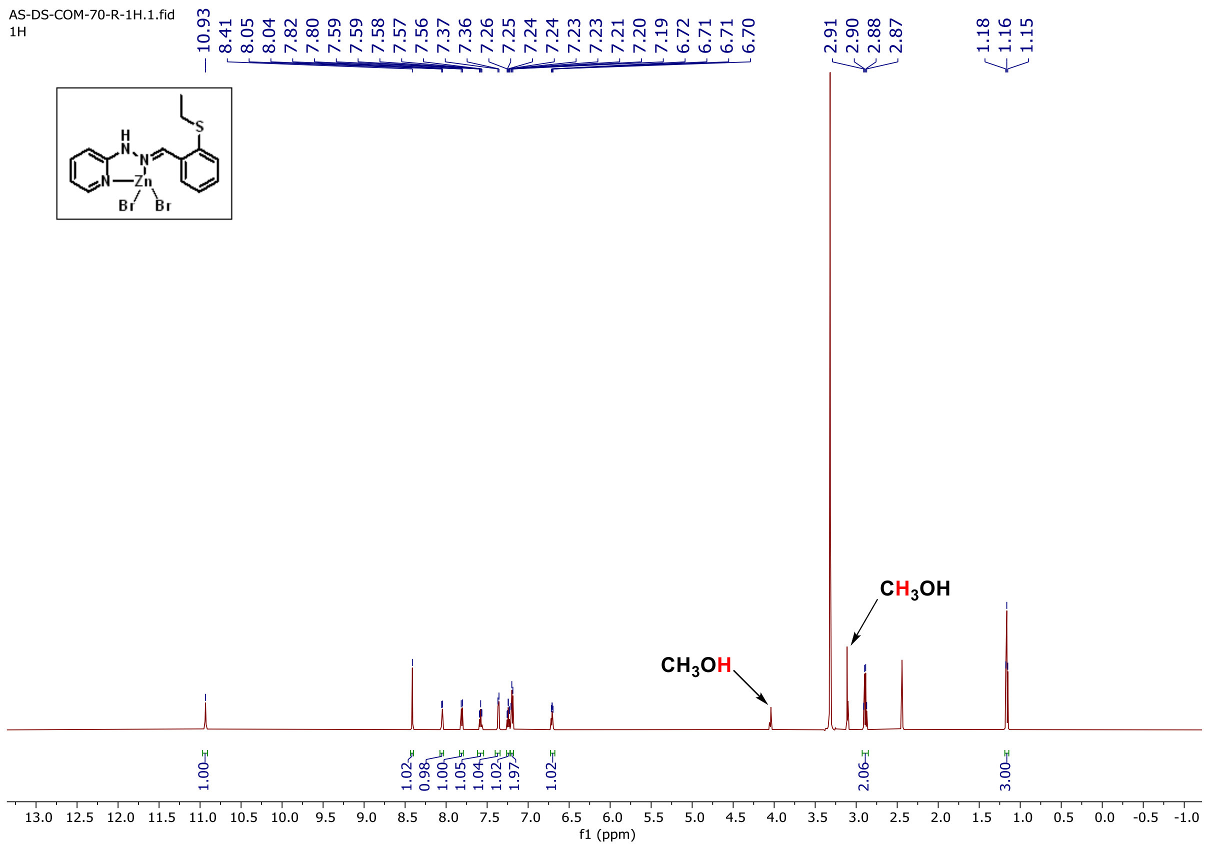


Figure S28. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Complex **Zn-1** in DMSO-d_6.



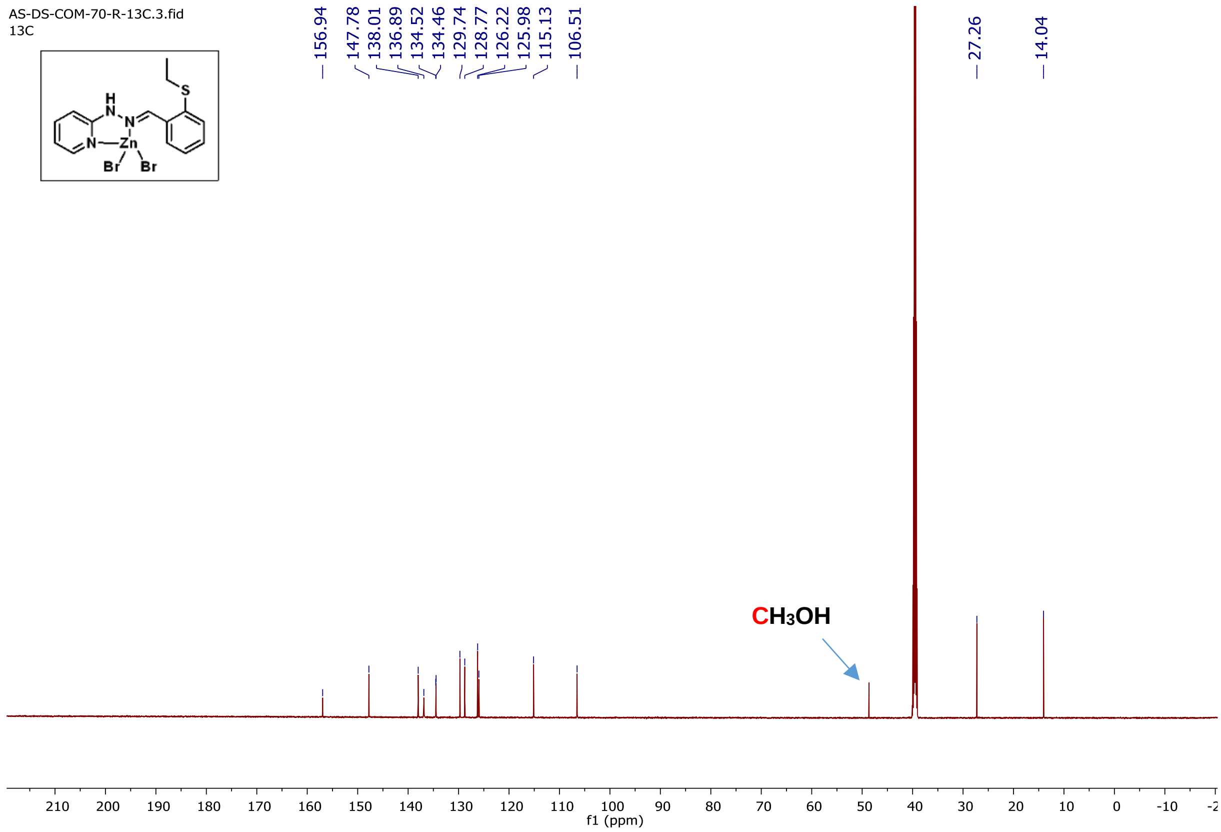
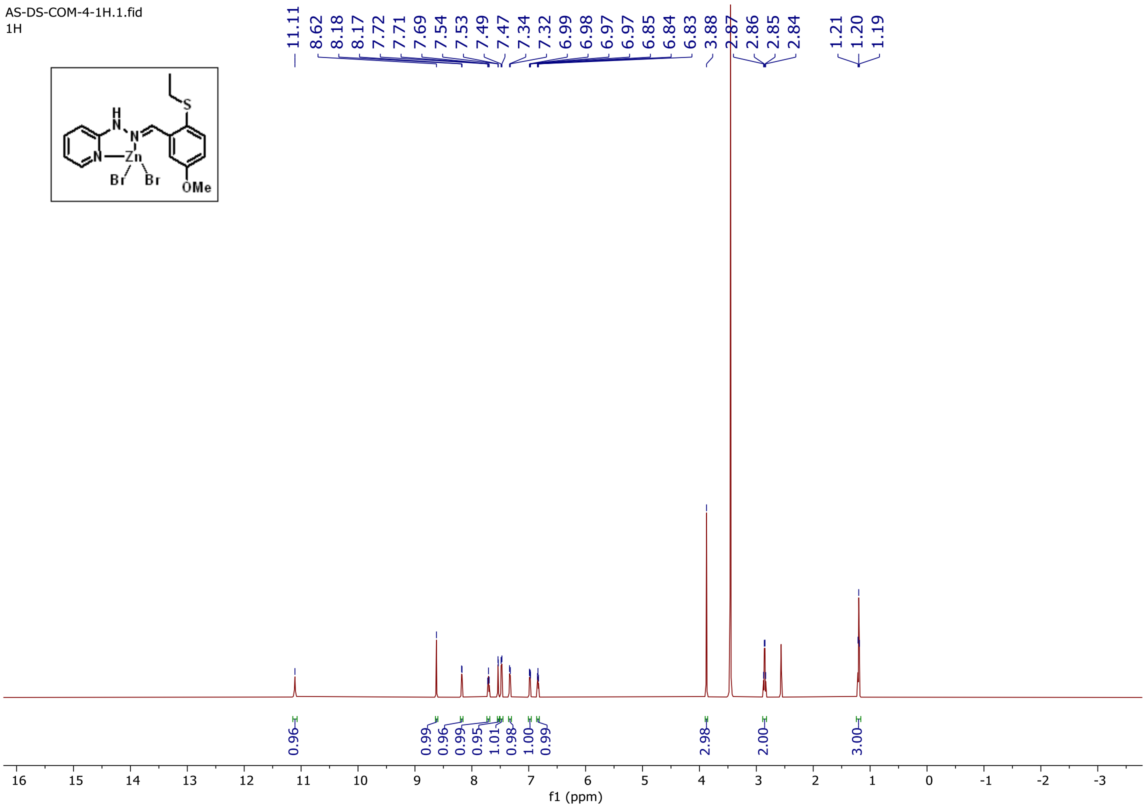


Figure S29. ^{1}H NMR (600 MHz) and $^{13}C\{^{1}H\}$ NMR (150 MHz) spectrum of Complex **Zn-2** in DMSO-d_6.



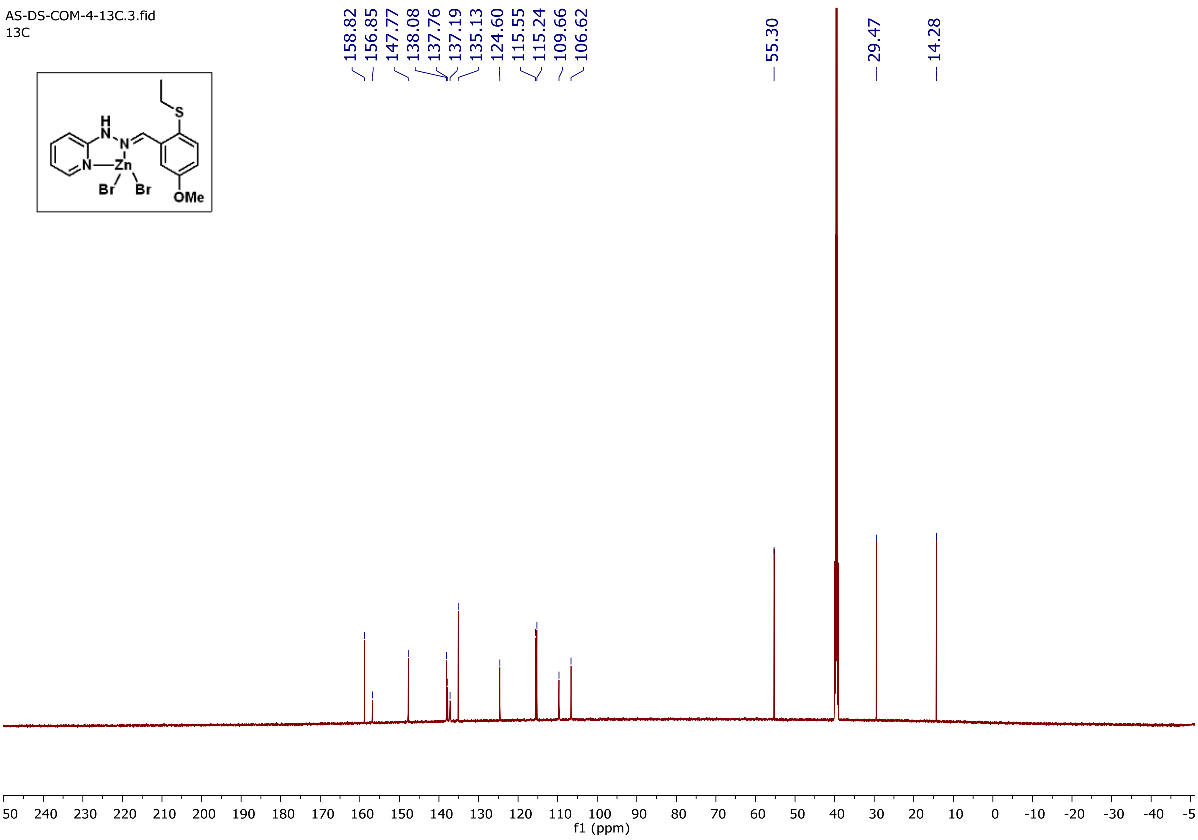
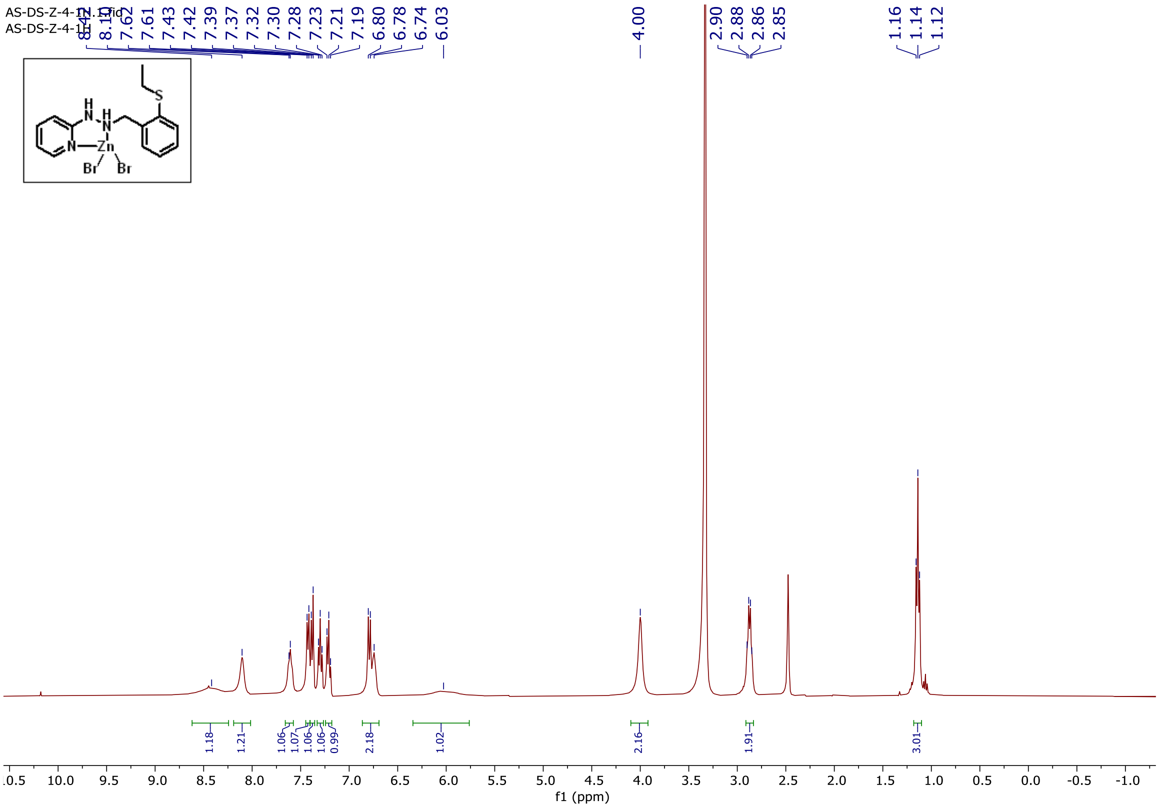


Figure S30. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Complex **Zn-3** in DMSO-d_6.



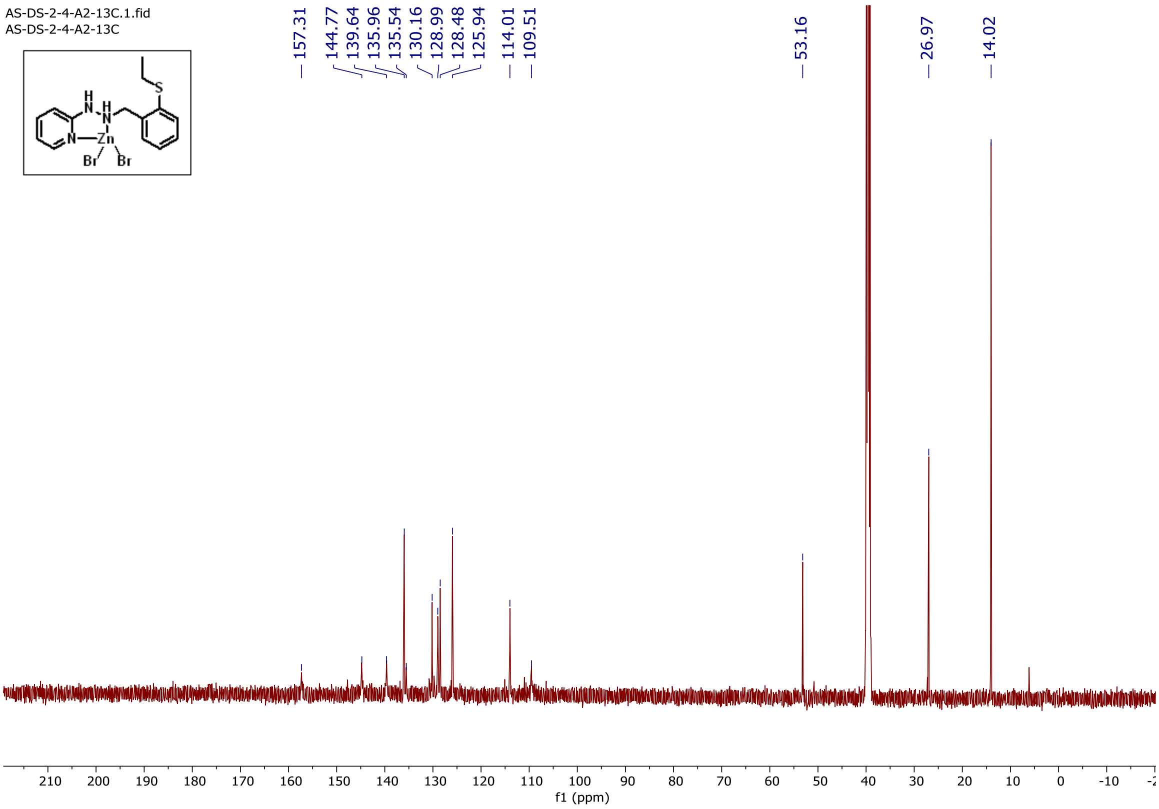
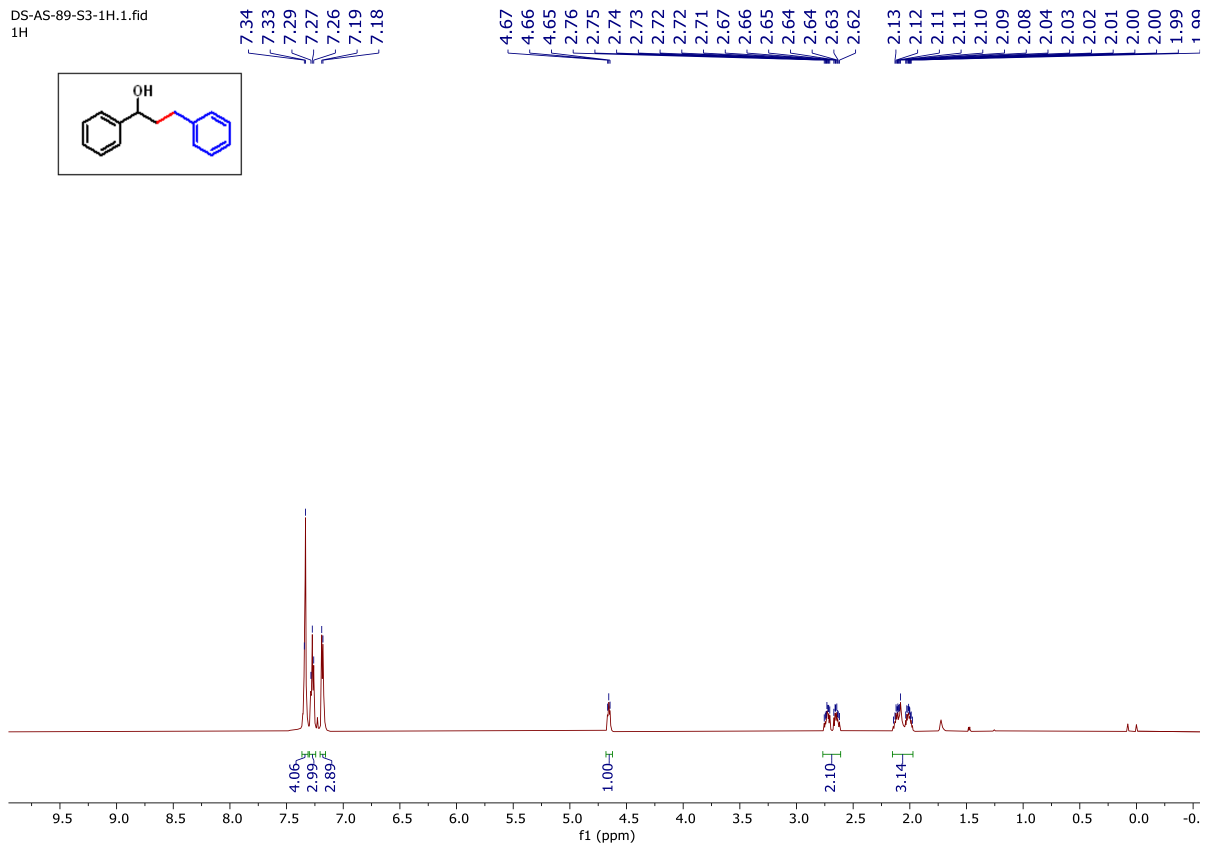


Figure S31. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Complex **Zn-4** in DMSO-d_6.



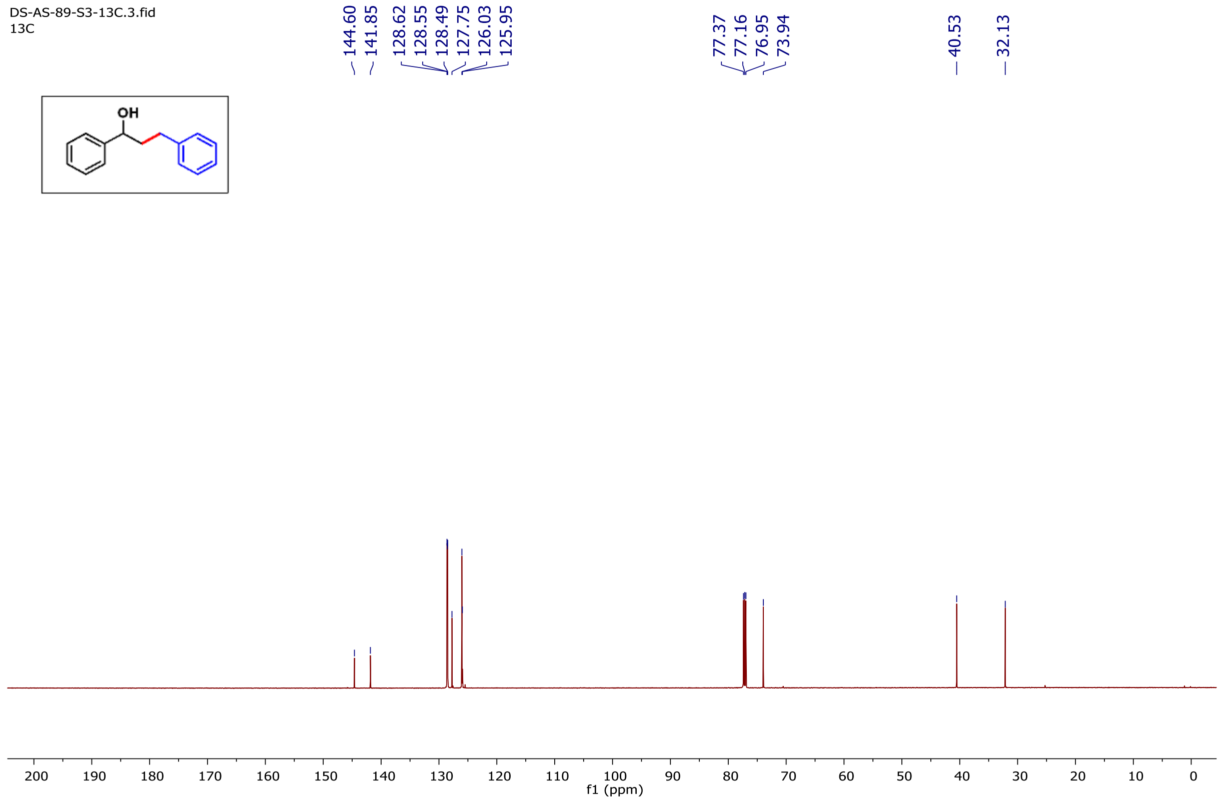
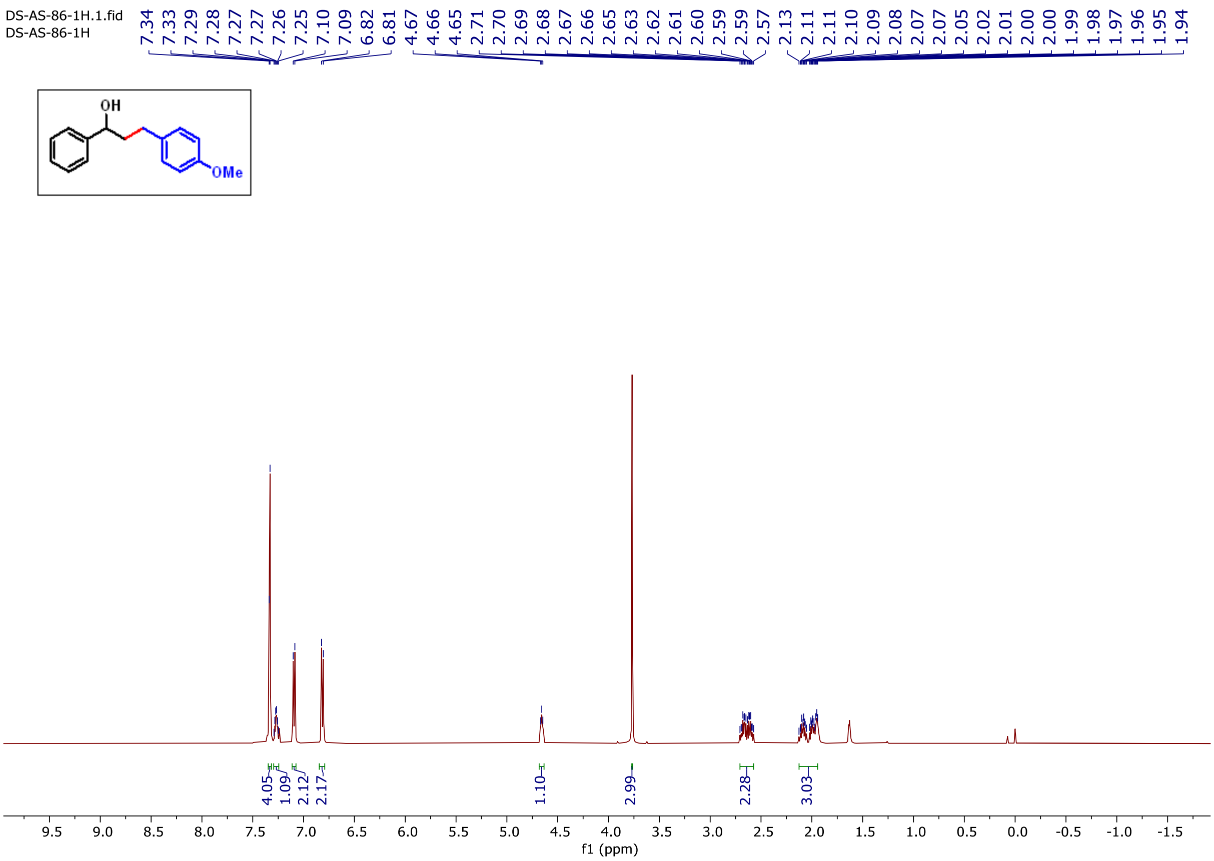


Figure S32. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3a** in $CDCl_3$.



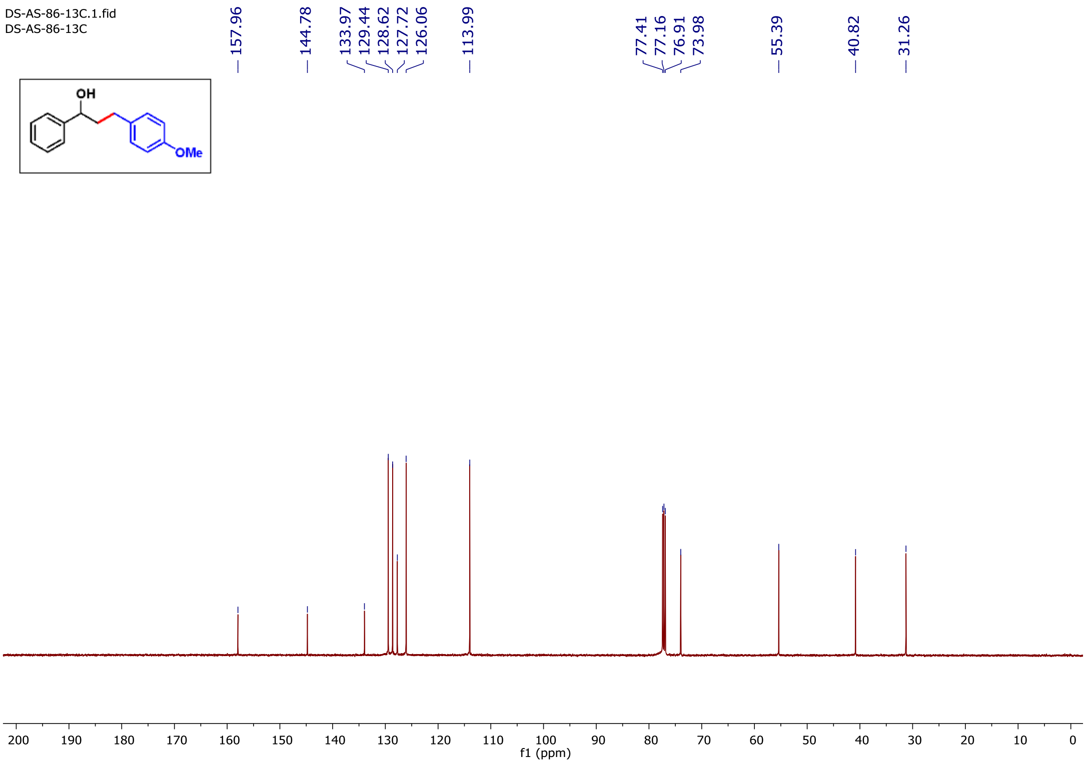
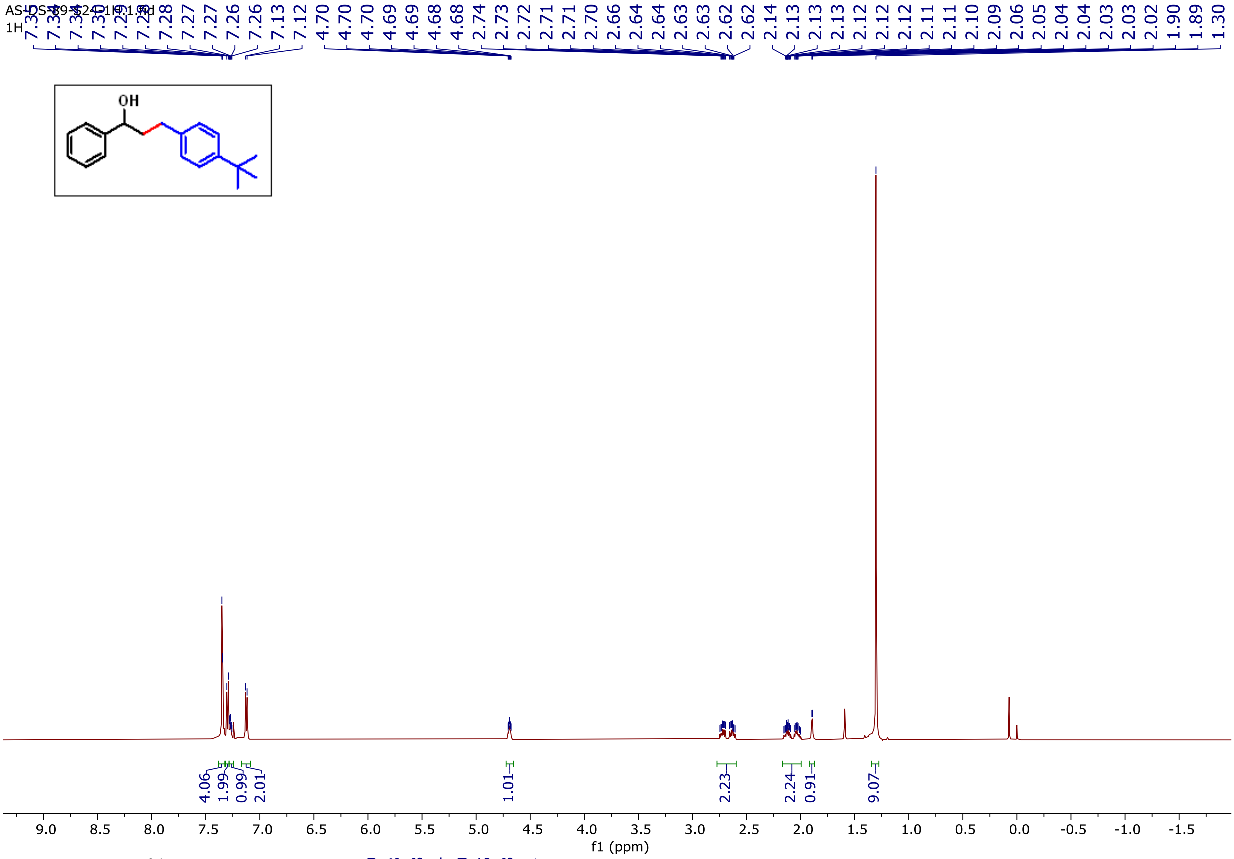


Figure S33. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **3b** in $CDCl_3$.



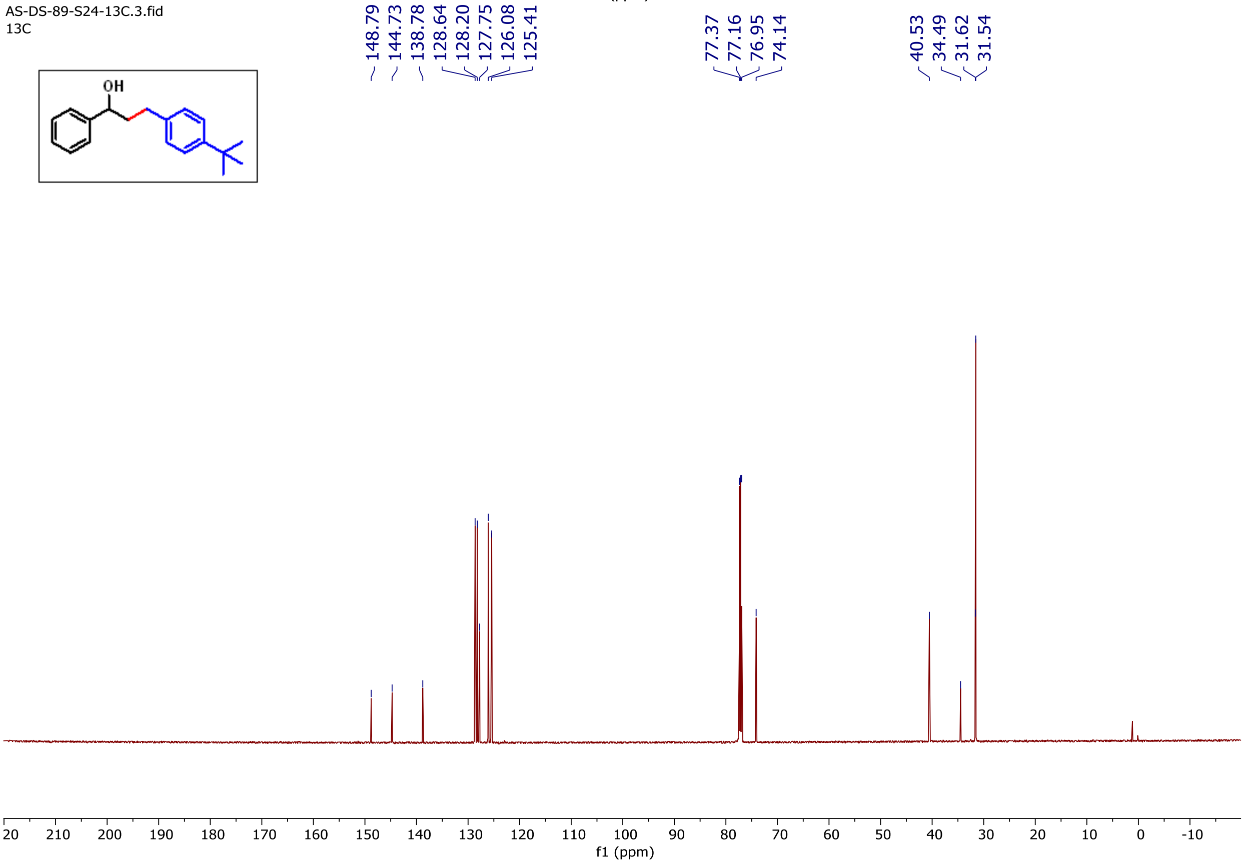
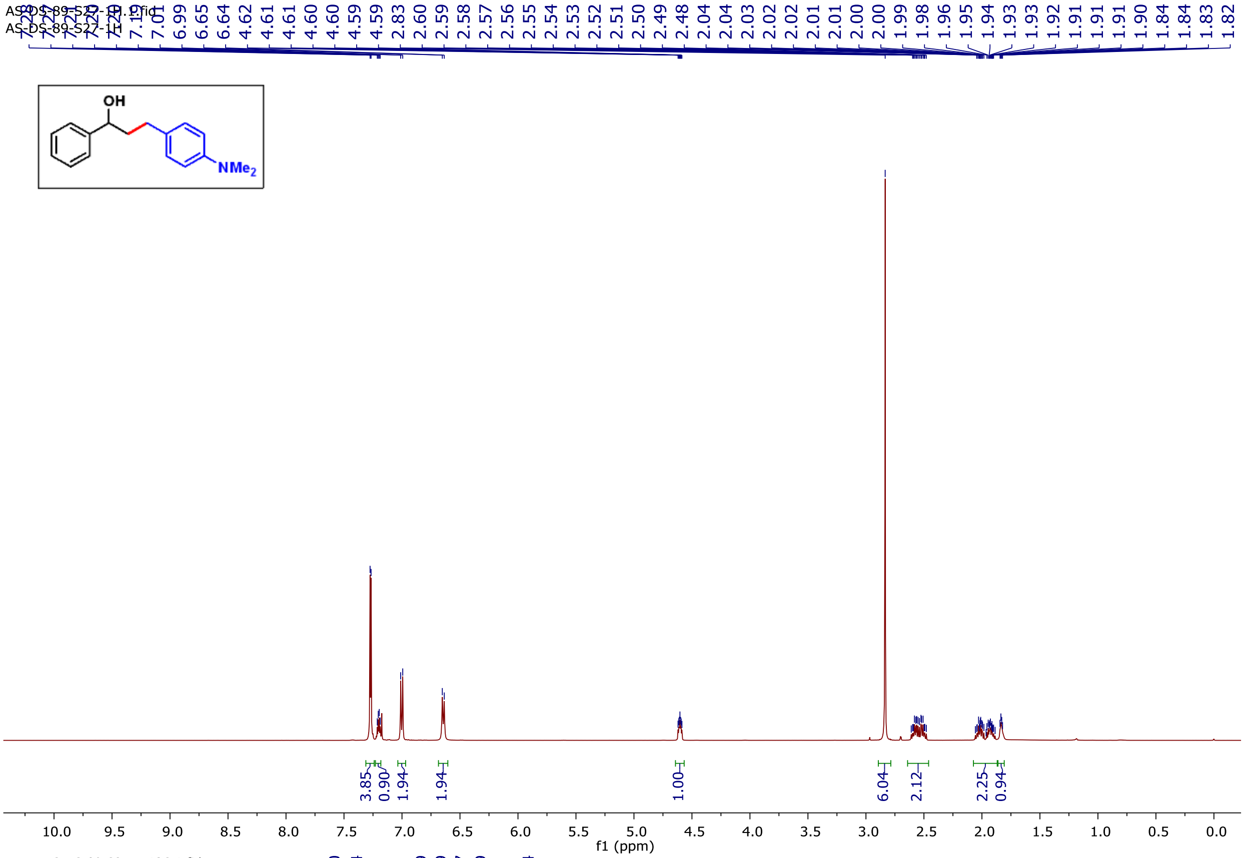


Figure S34. 1H NMR (600 MHz) and 13C{1H} NMR (150 MHz) spectrum of Compound **3c** in CDCl3.



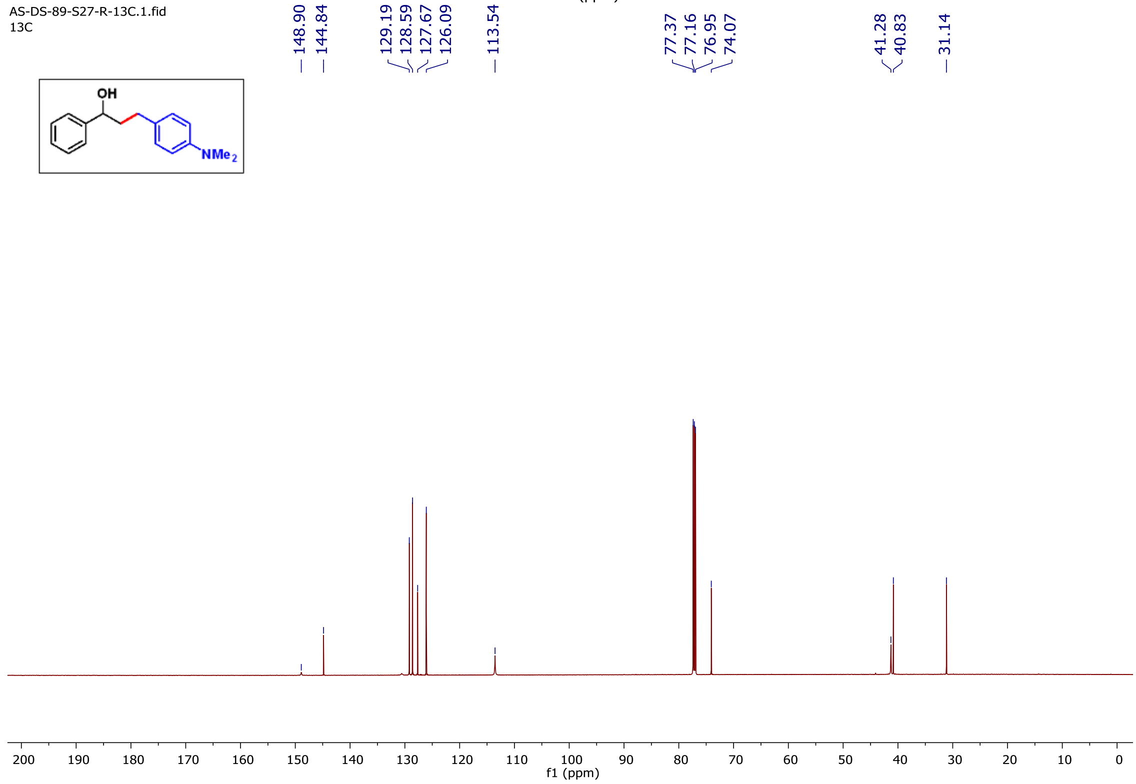
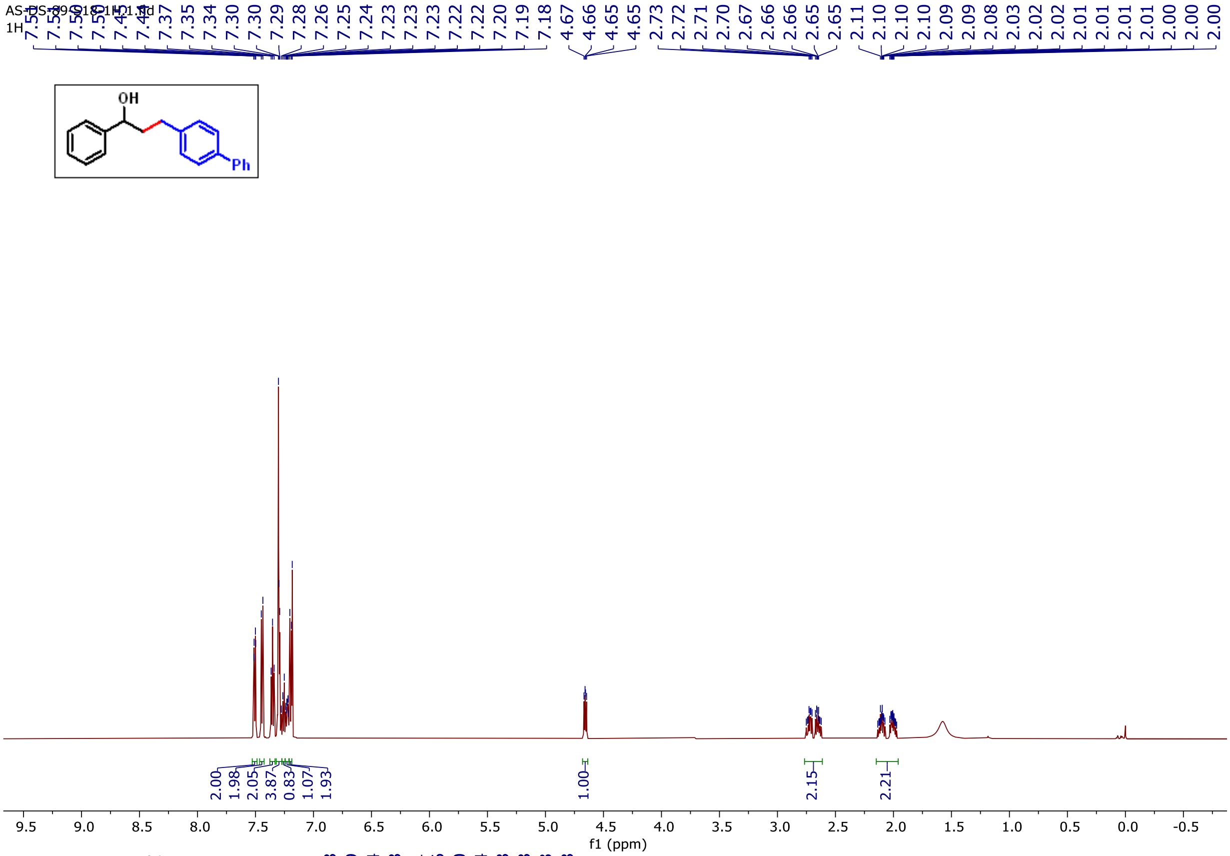


Figure S35. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (150 MHz) spectrum of Compound **3d** in $CDCl_3$.



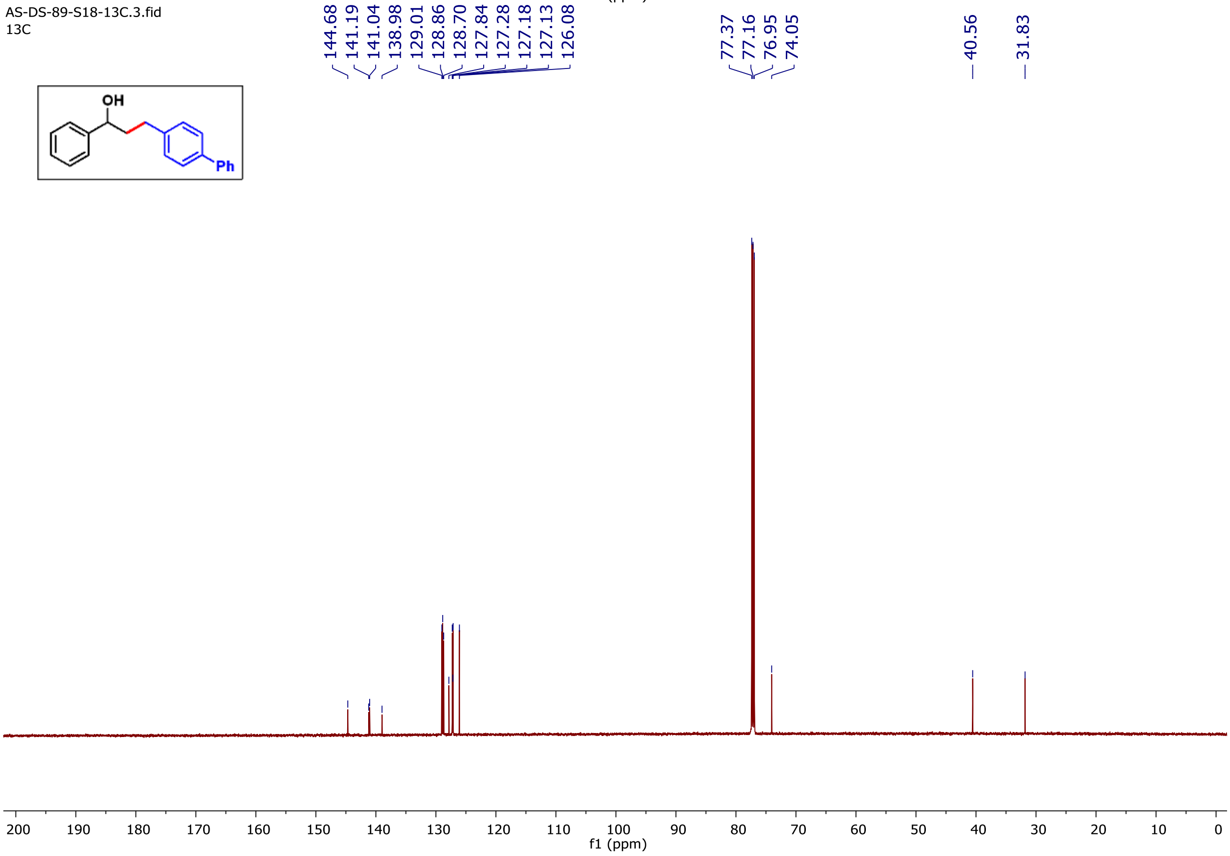
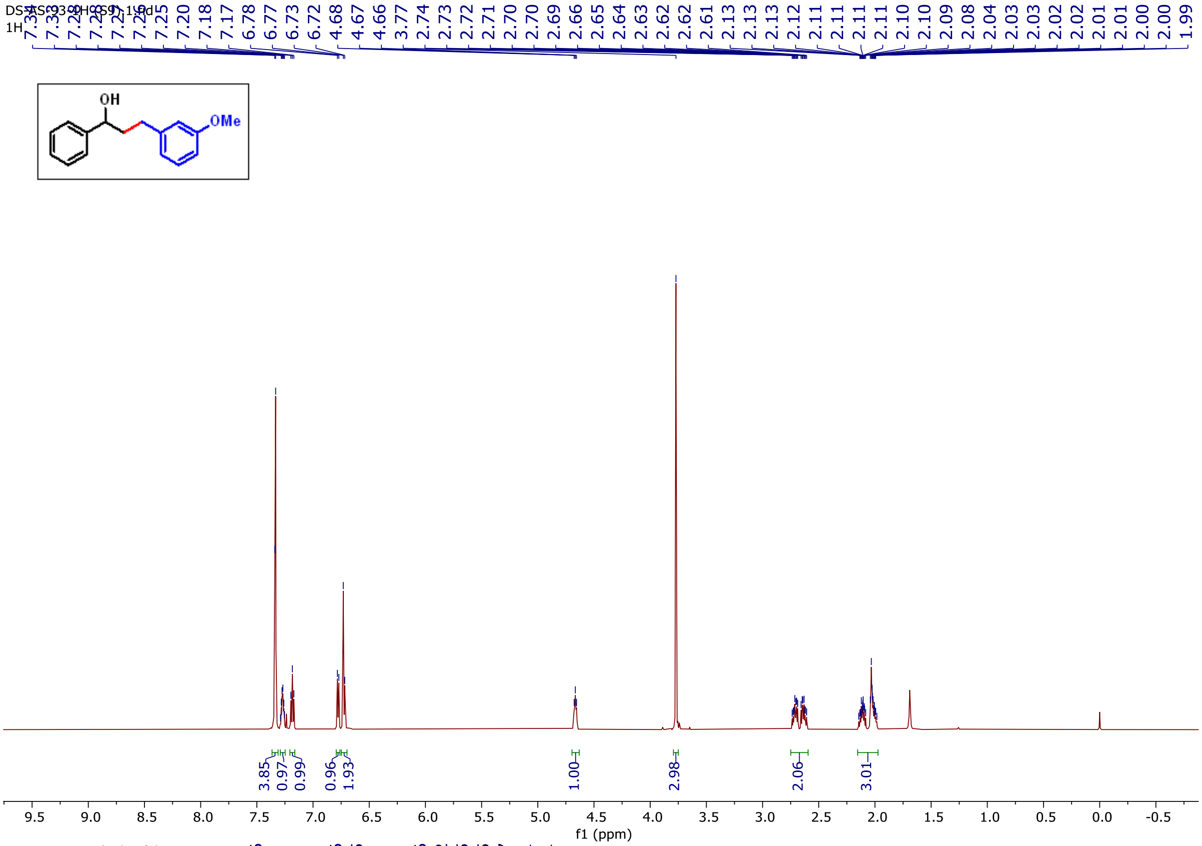


Figure S36. ¹H NMR (600 MHz) and $^{13}C\{^1H\}$ NMR (150 MHz) spectrum of Compound **3e** in $CDCl_3$.



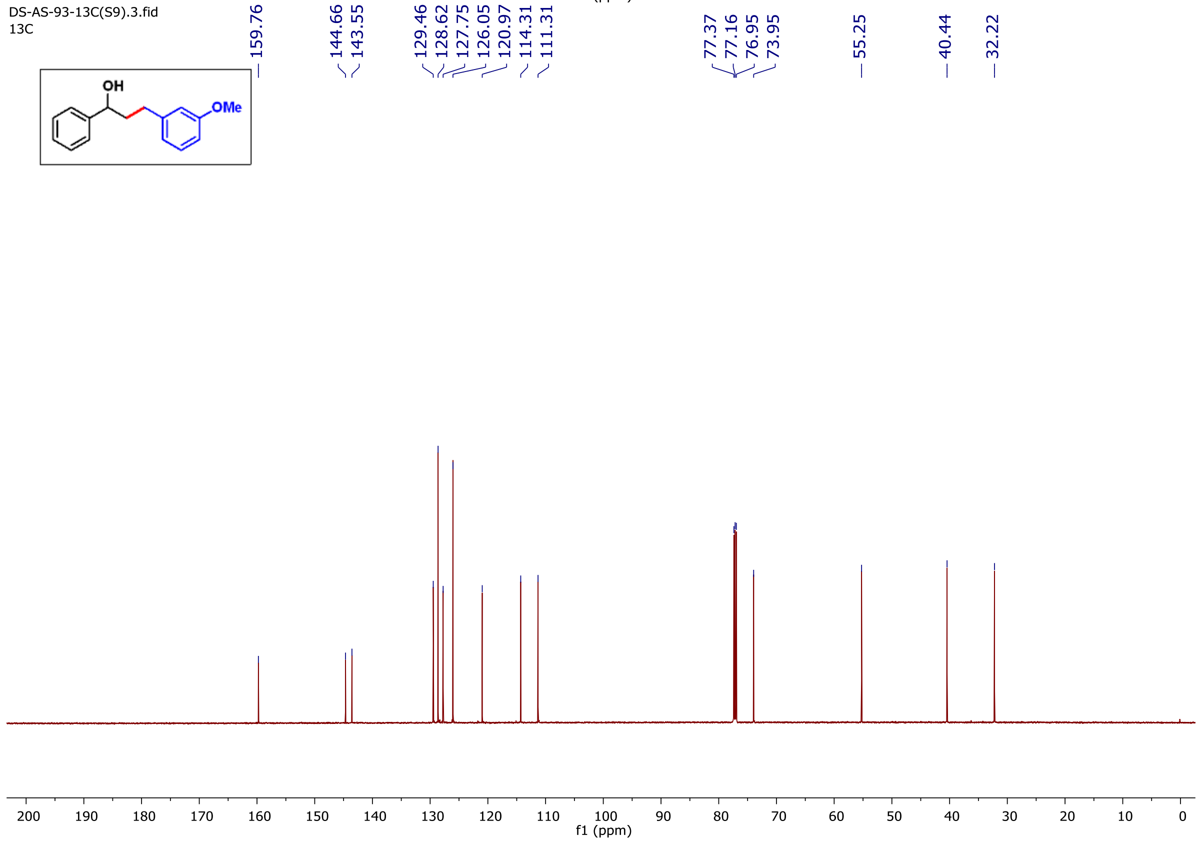
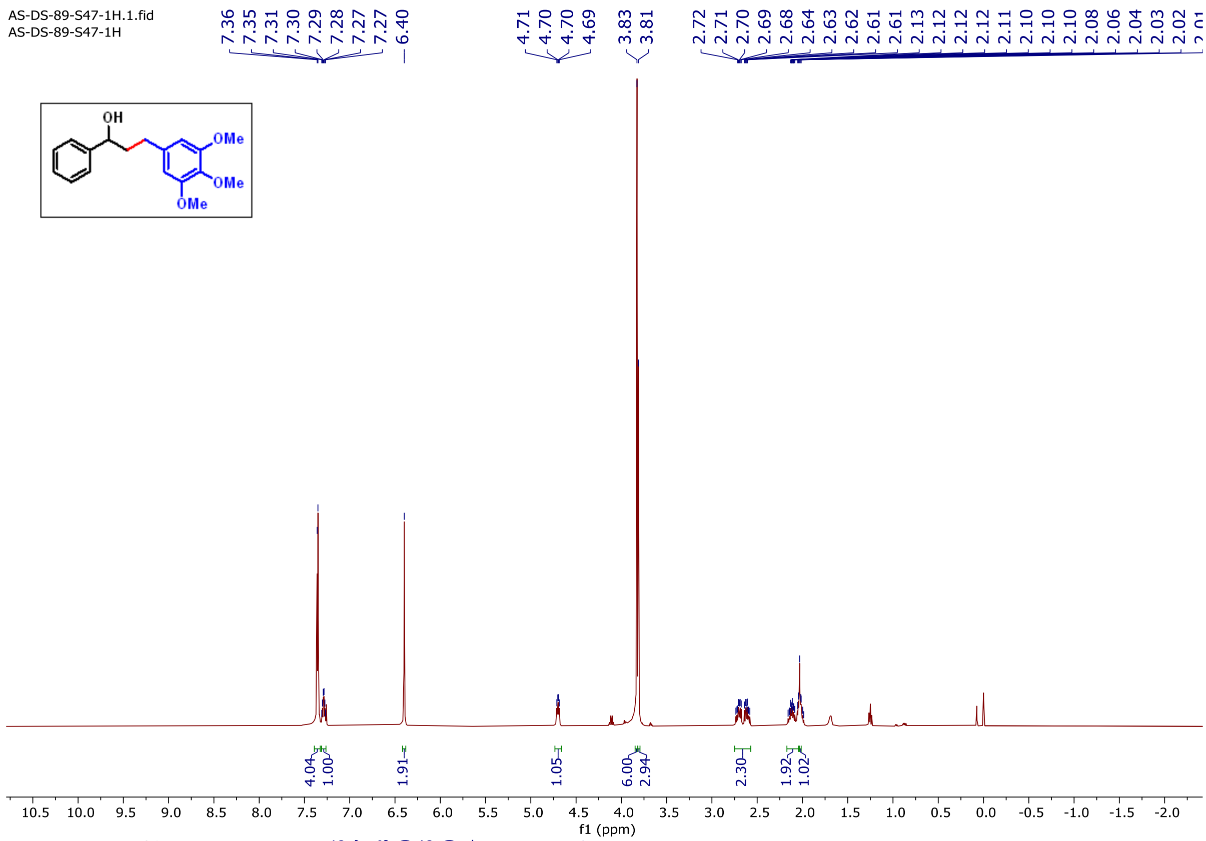


Figure S37. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3f** in $CDCl_3$.



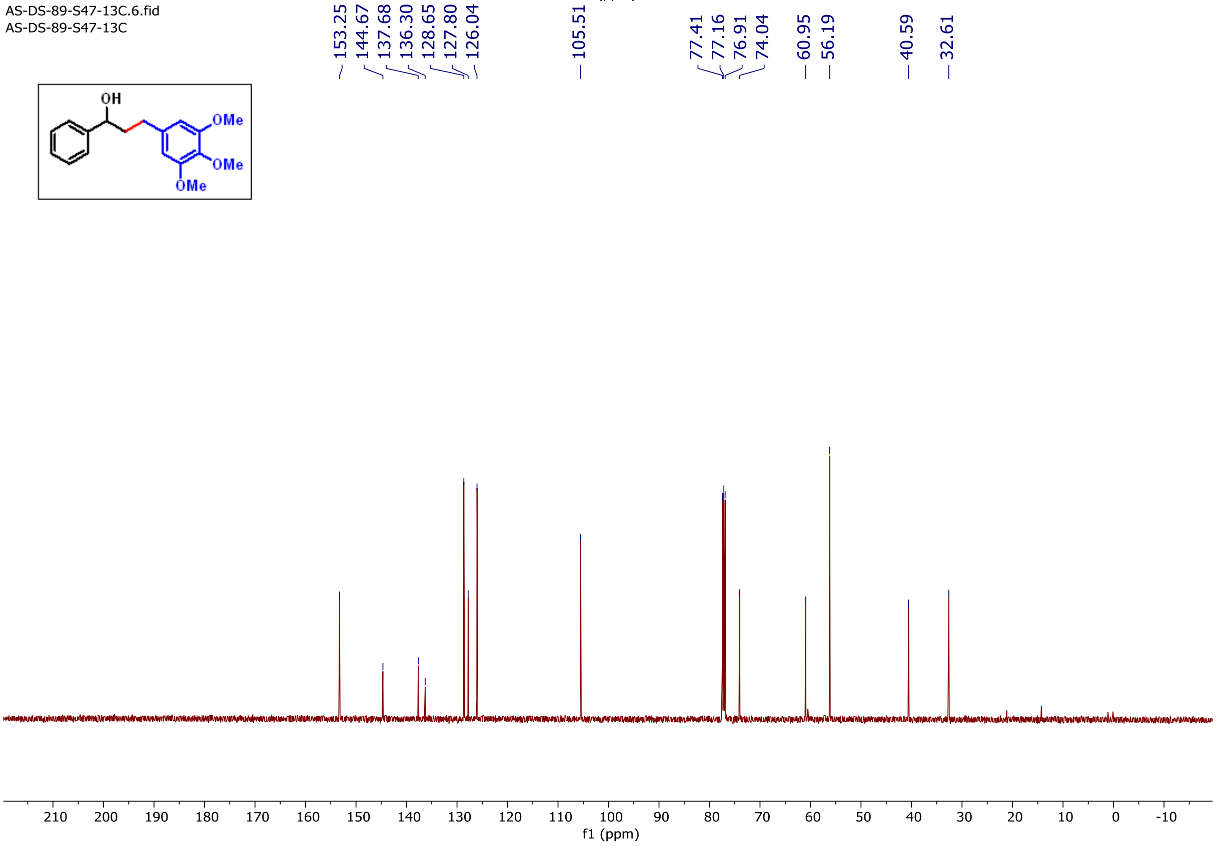
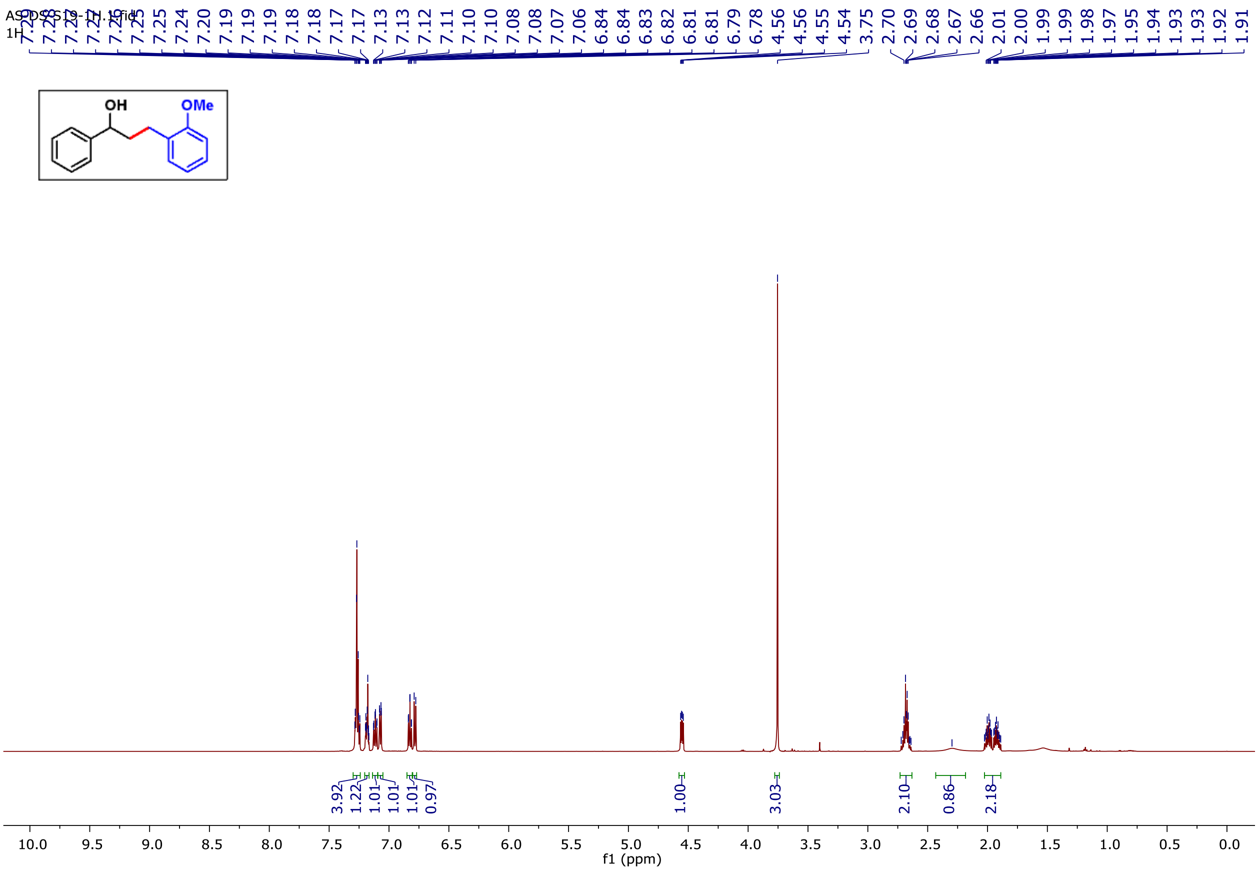


Figure S38. ^{1}H NMR (500 MHz) and ^{13}C{^{1}H} NMR (125 MHz) spectrum of Compound **3g** in $CDCl_3$.



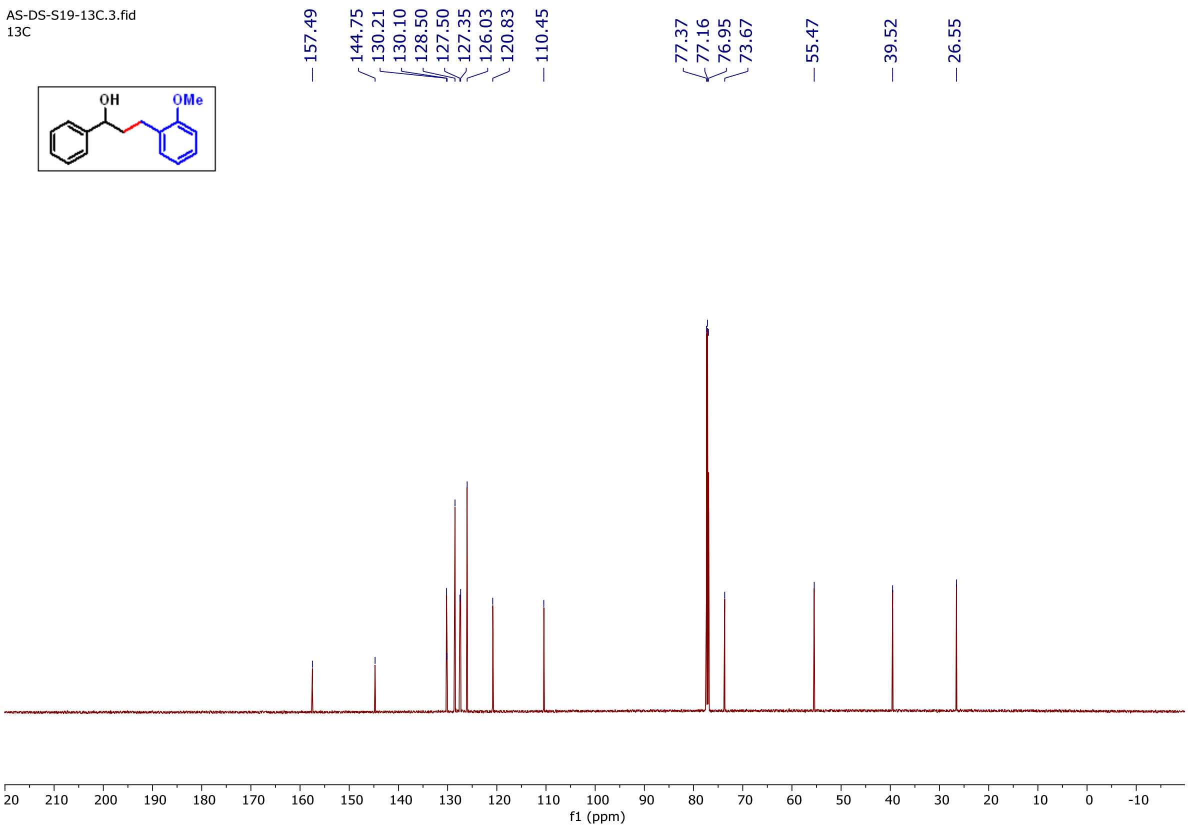
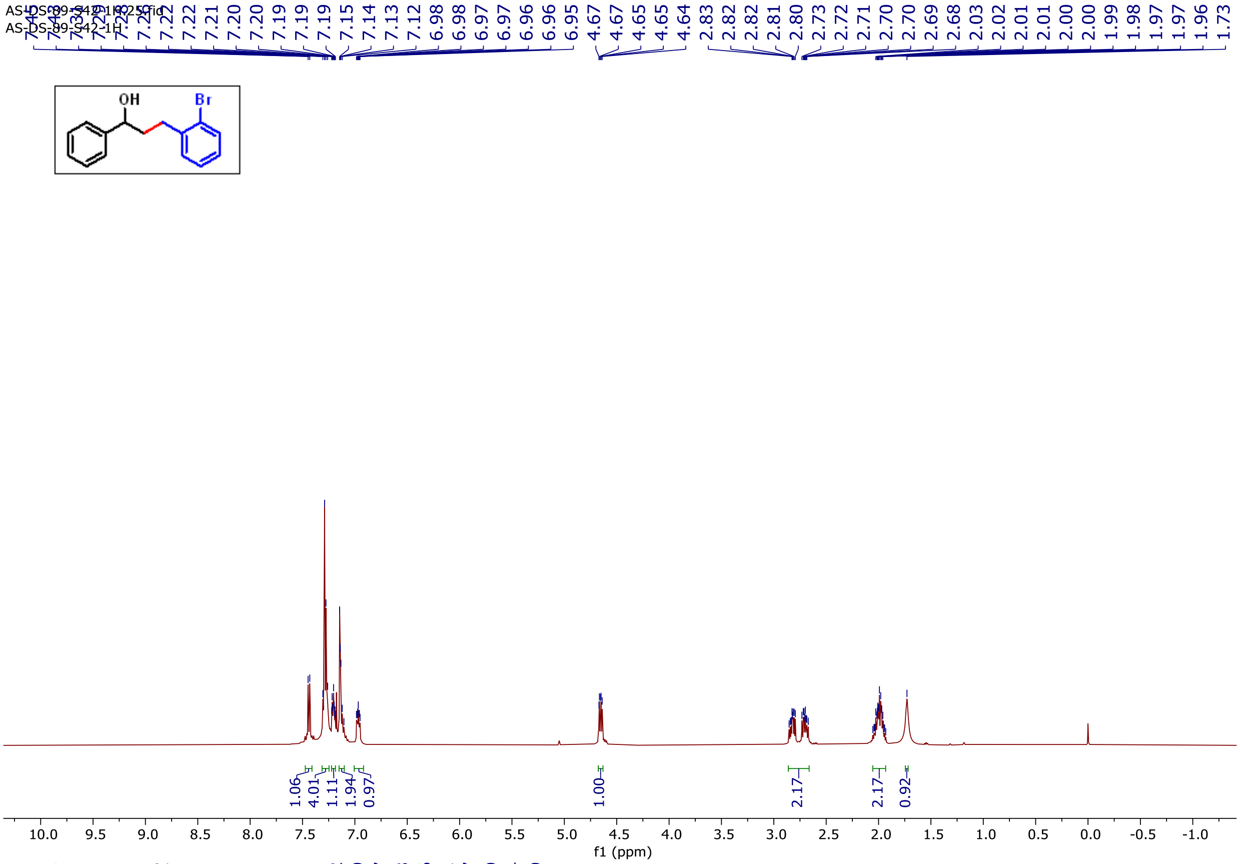


Figure S39. ^{1}H NMR (600 MHz) and $^{13}C\{^{1}H\}$ NMR (150 MHz) spectrum of Compound **3h** in $CDCl_3$.



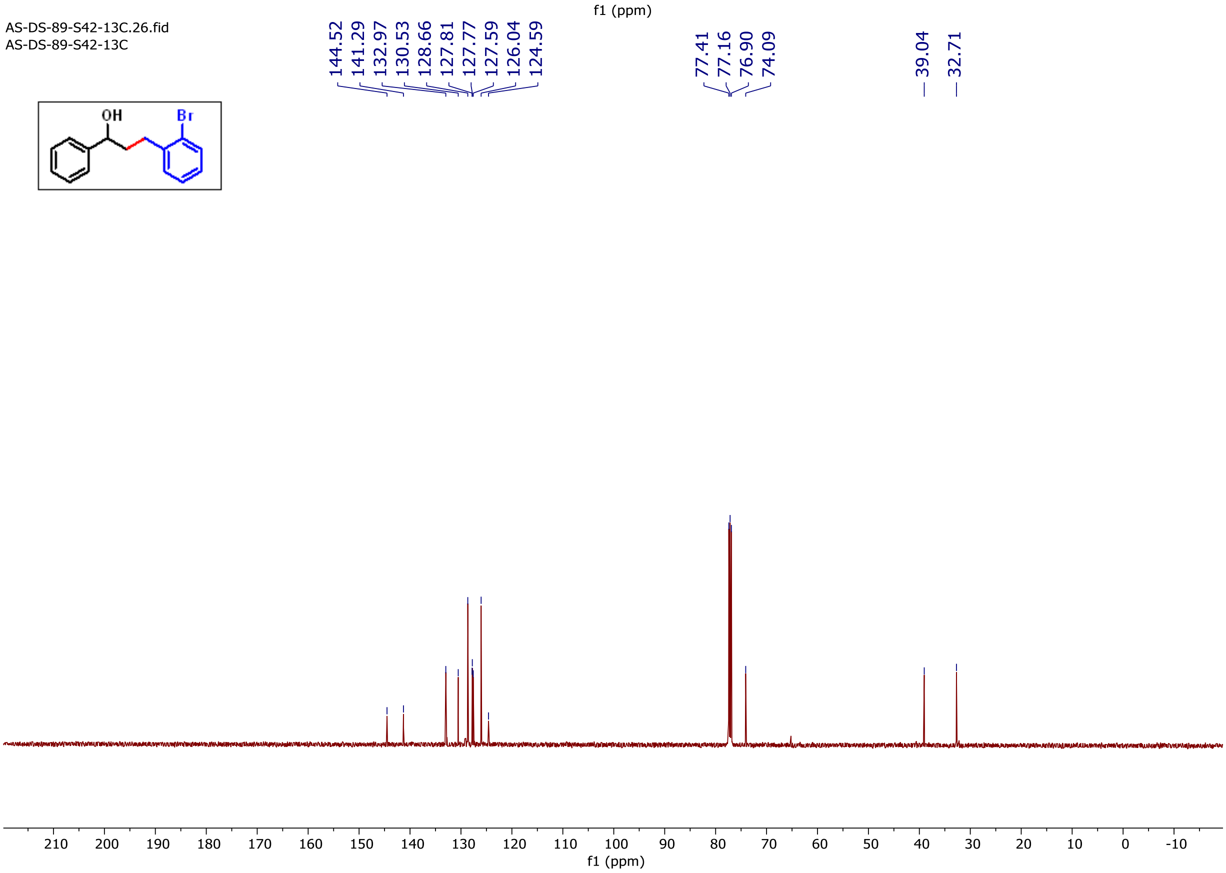
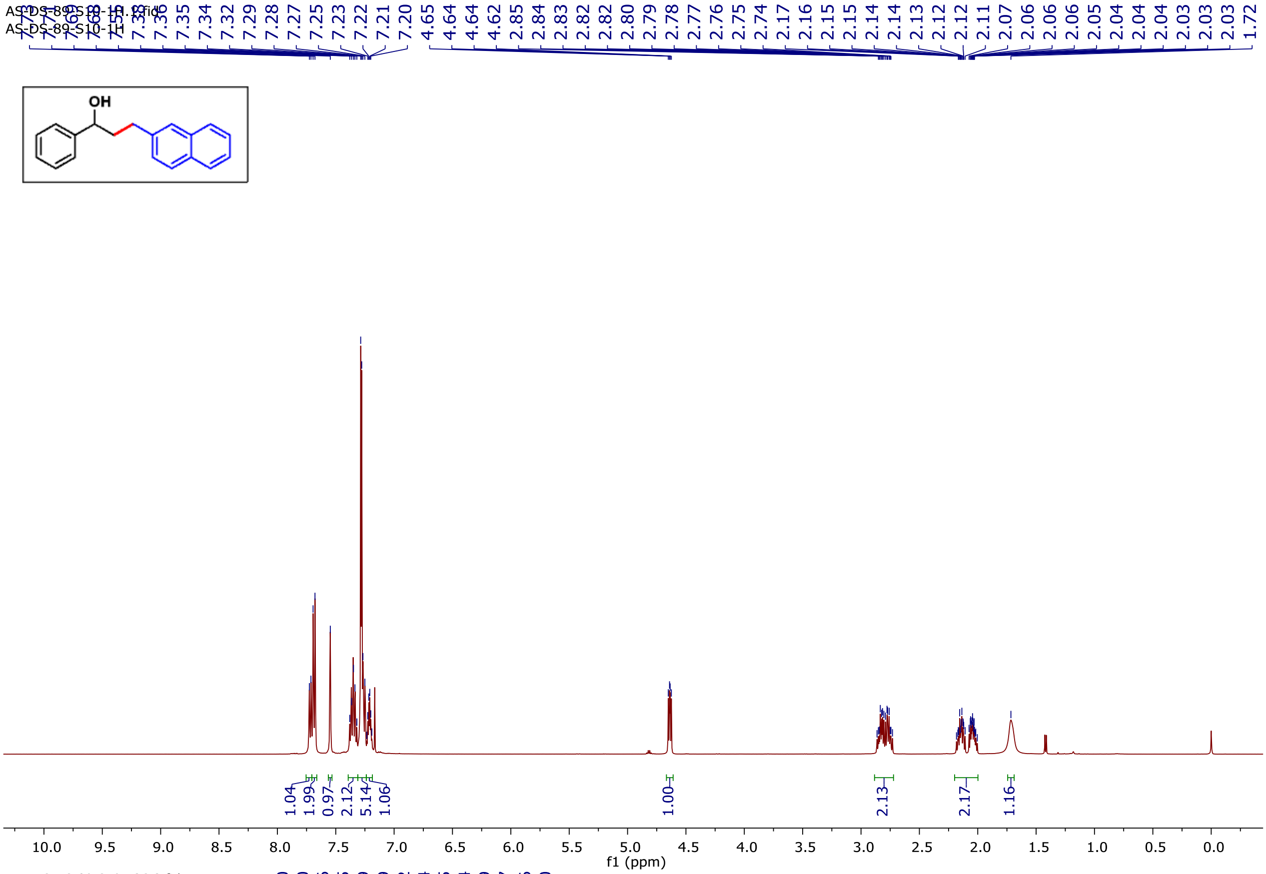


Figure S40. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **3i** in $CDCl_3$.



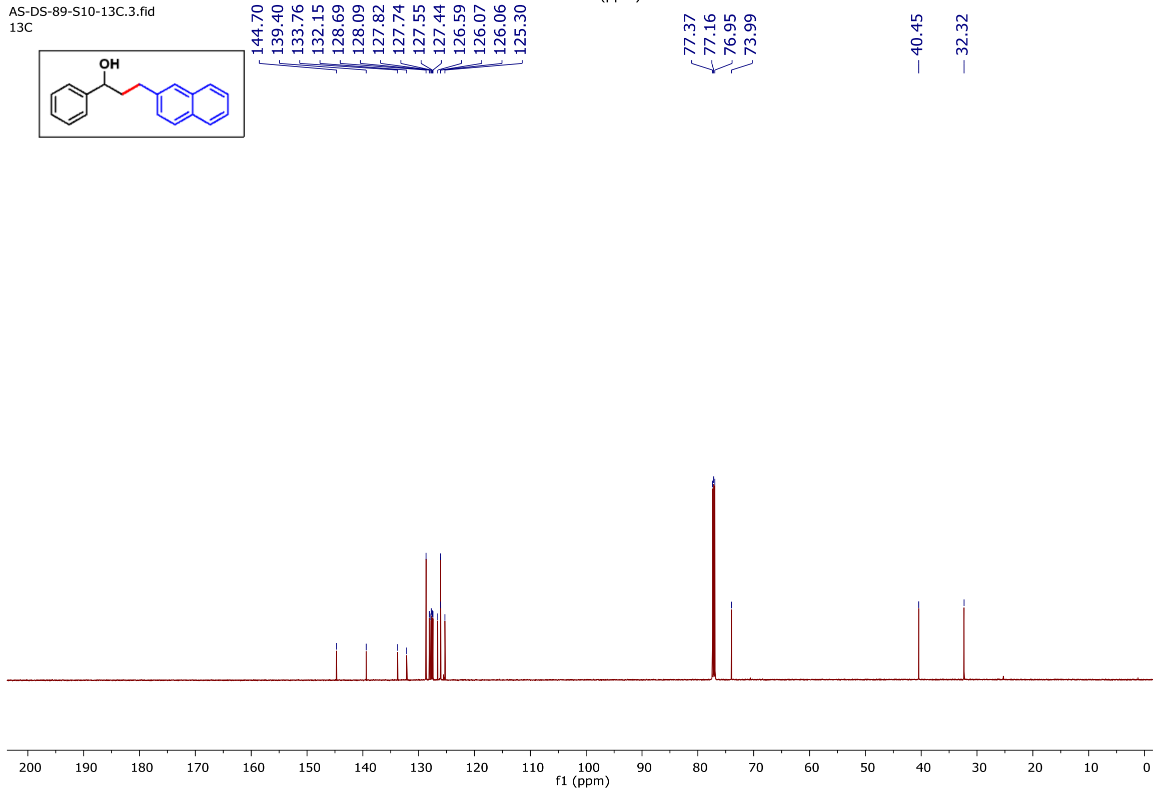
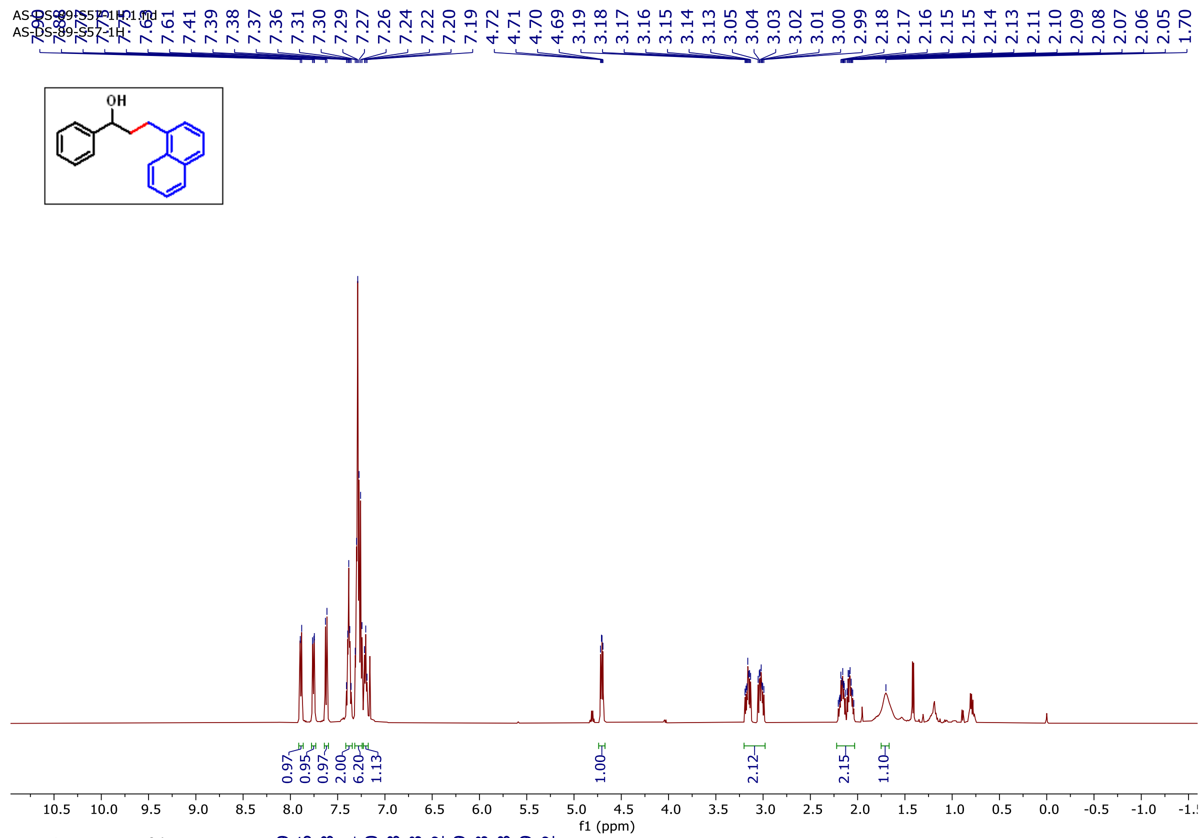


Figure S41. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (150 MHz) spectrum of Compound **3j** in $CDCl_3$.



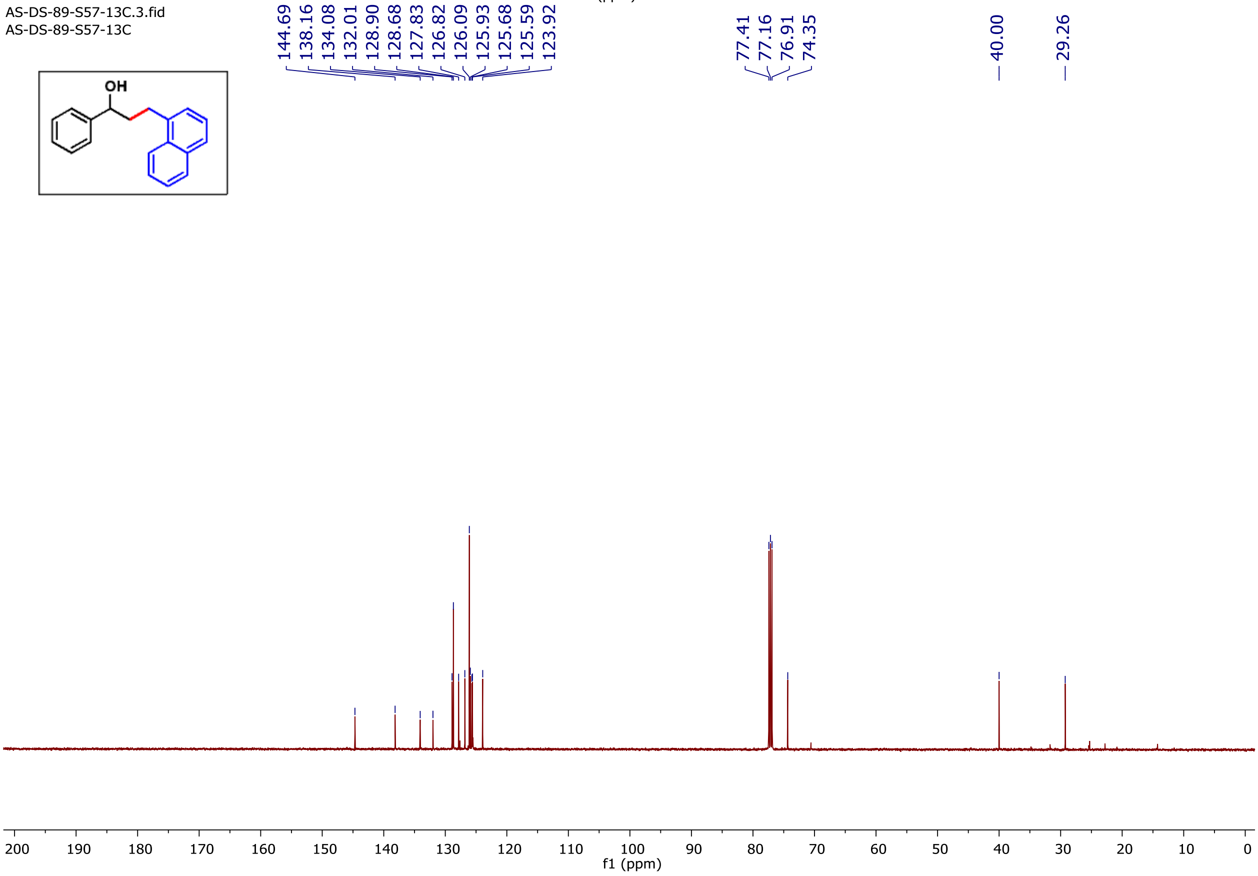
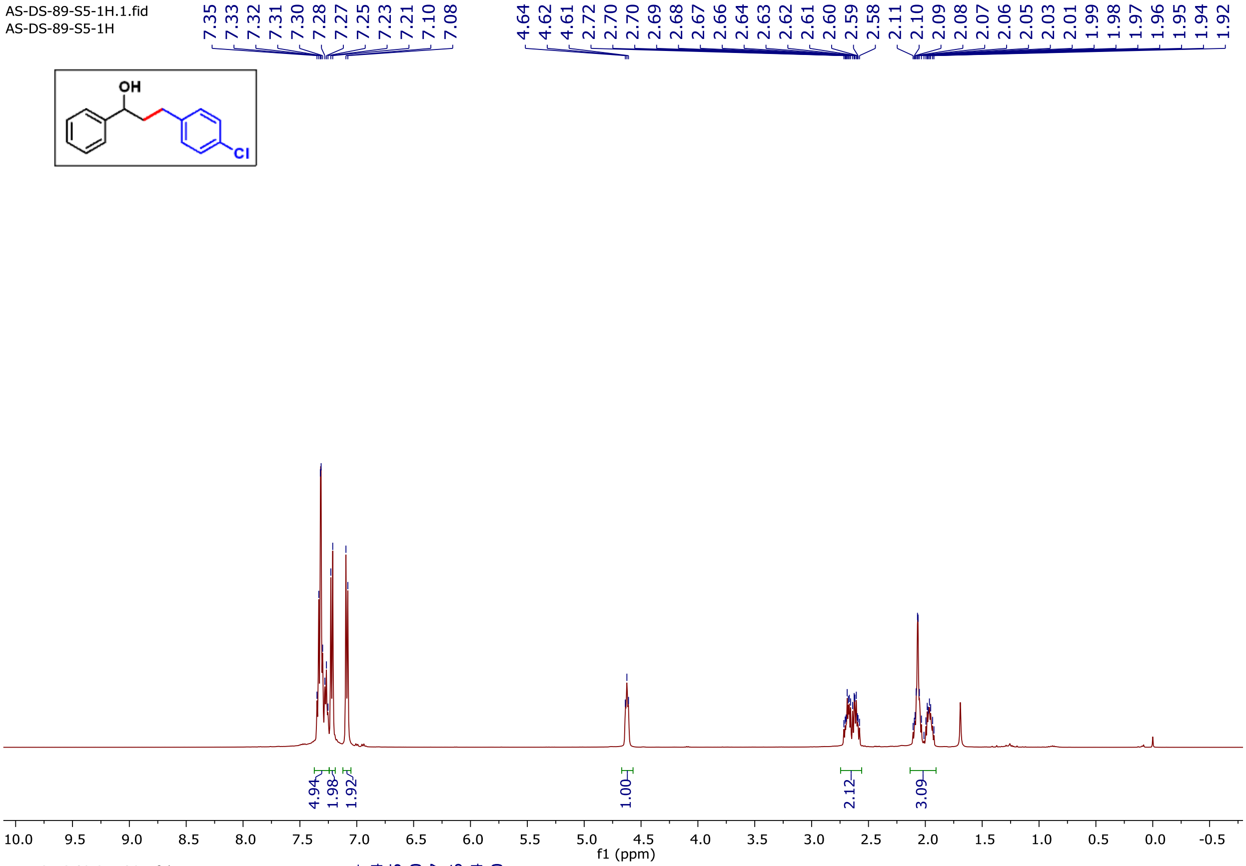


Figure S42. ^{1}H NMR (500 MHz) and ^{13}C{^{1}H} NMR (125 MHz) spectrum of Compound **3k** in $CDCl_3$.



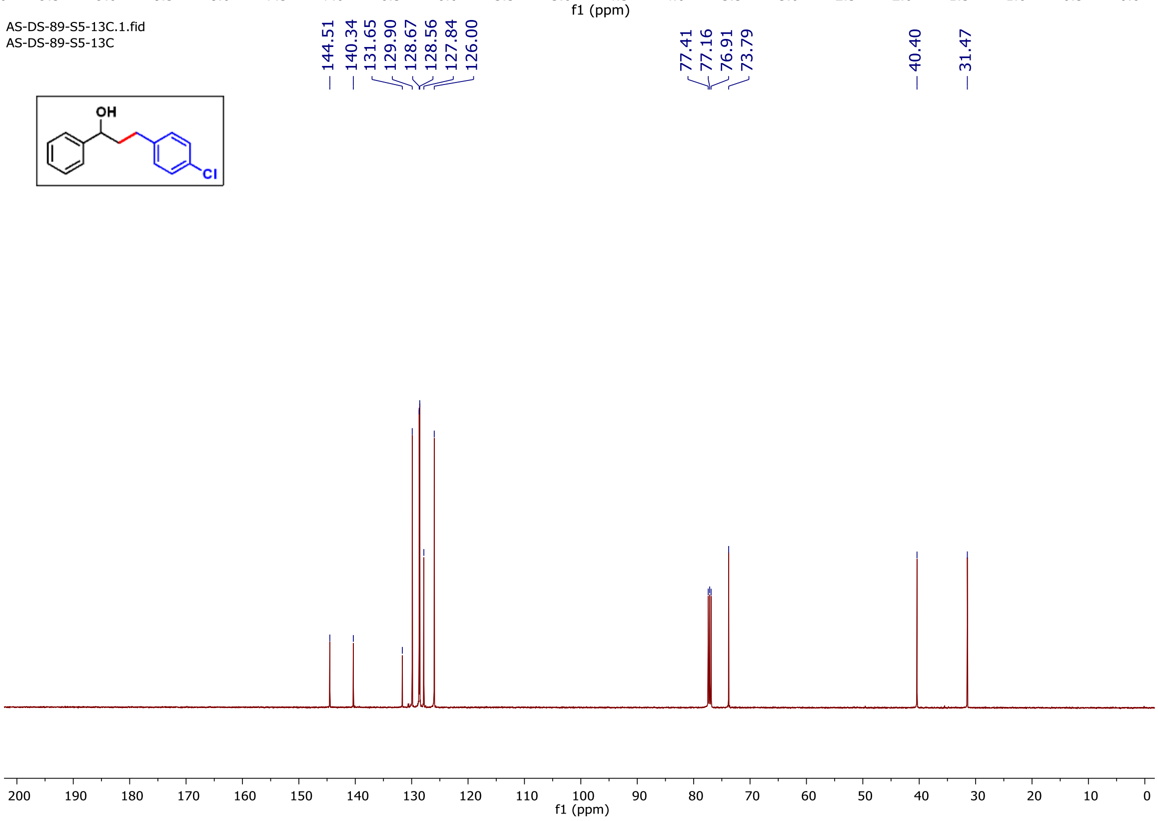
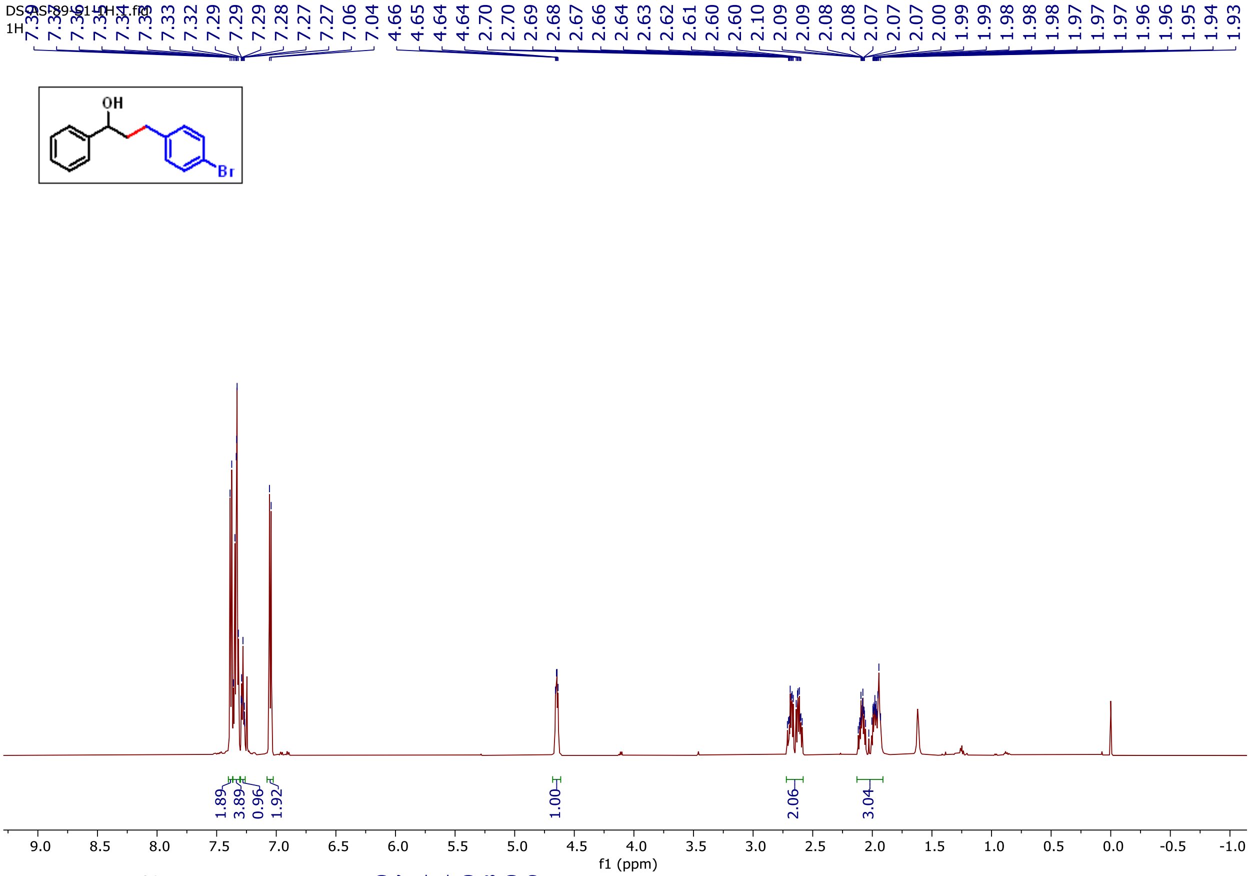


Figure S43. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **3l** in $CDCl_3$.



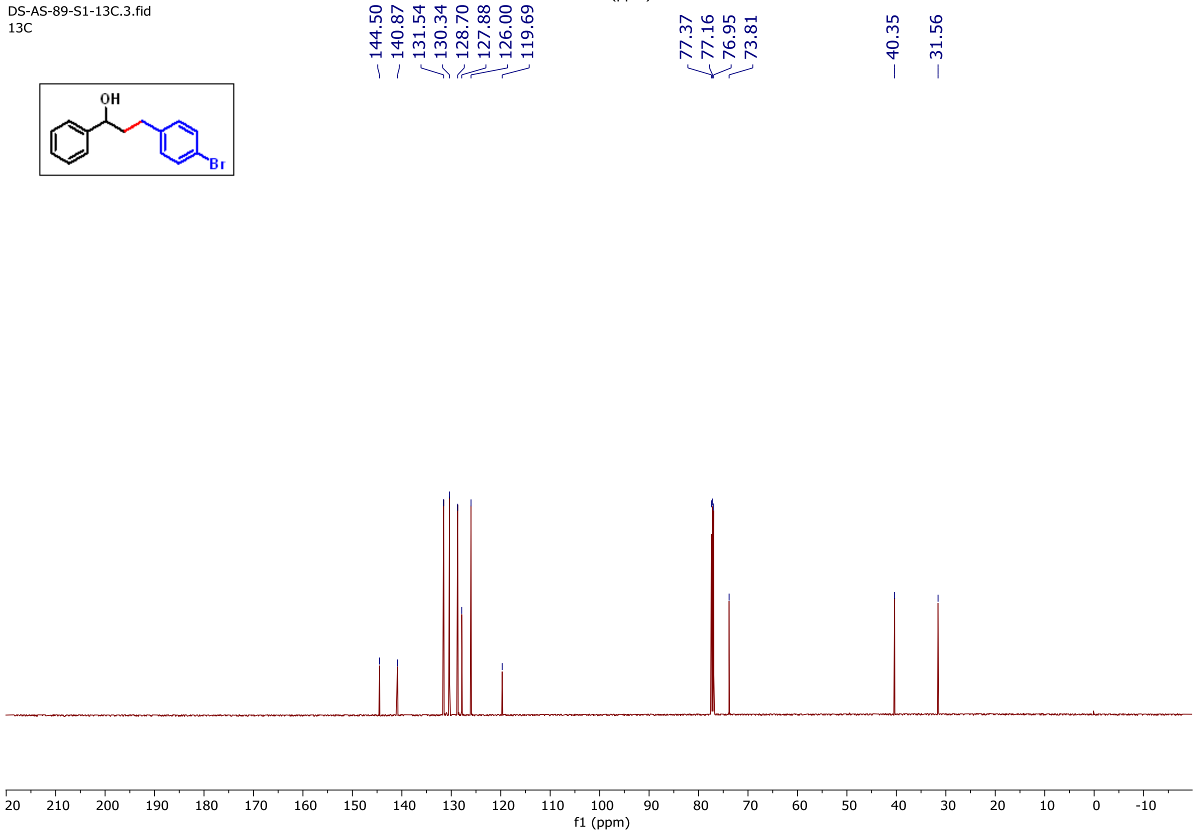
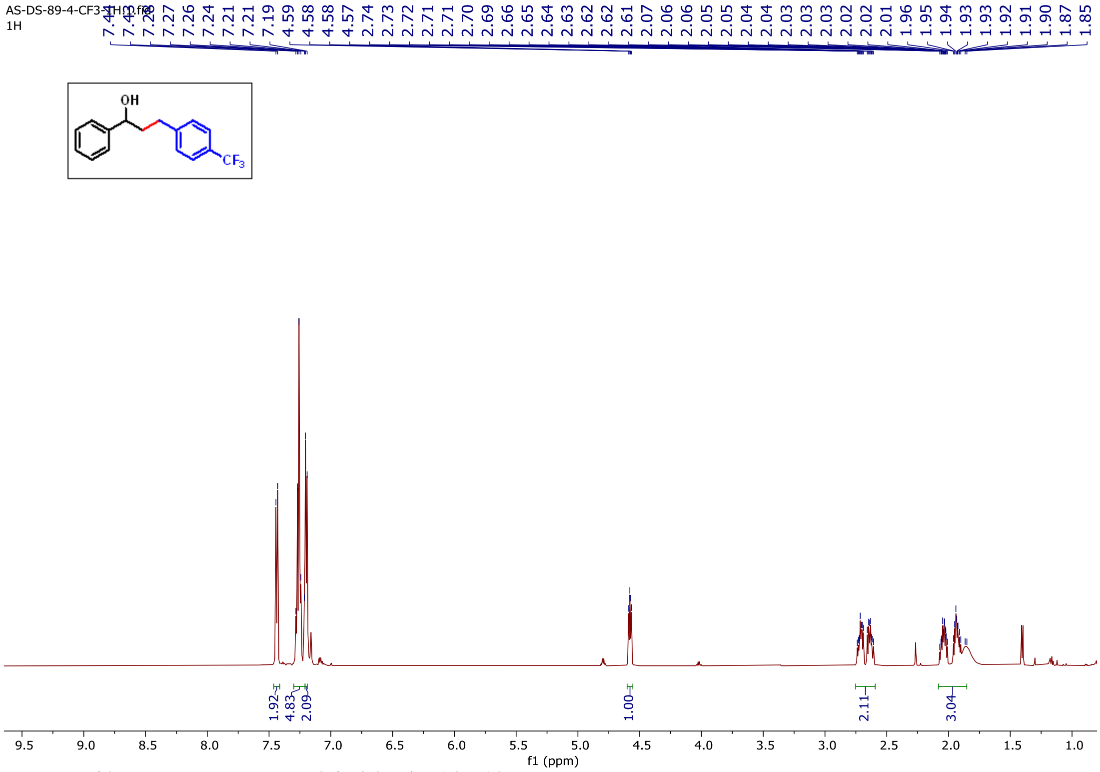
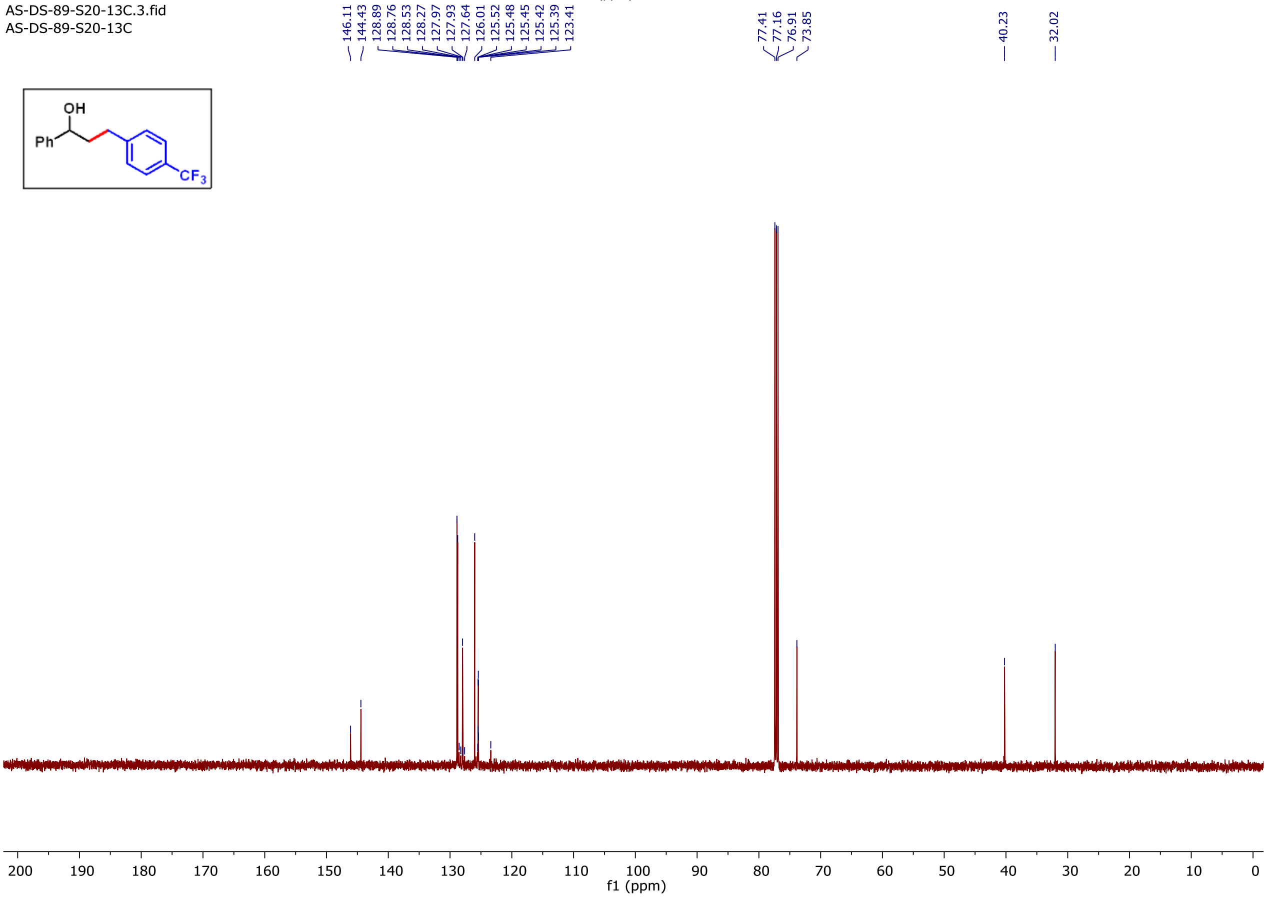


Figure S44. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3m** in $CDCl_3$.


AS-DS-89-4-CF3-1H.10.fid
1H
7.44 7.42 7.29 7.27 7.26 7.24 7.21 7.21 7.19 4.59 4.58 4.58 4.57 2.74 2.73 2.72 2.71 2.71 2.70 2.69 2.66 2.65 2.64 2.63 2.62 2.62 2.61 2.07 2.06 2.06 2.05 2.05 2.04 2.04 2.03 2.03 2.03 2.02 2.02 2.01 1.96 1.95 1.94 1.93 1.93 1.92 1.91 1.90 1.87 1.85
OH
CF3
1.92
4.83
2.09
1.00
2.11
3.04
f1 (ppm)


AS-DS-89-S20-13C.3.fid
AS-DS-89-S20-13C
146.11 144.43 128.89 128.76 128.53 128.27 127.97 127.93 127.64 126.01 125.52 125.48 125.45 125.42 125.39 123.41
77.41 77.16 76.91 73.85
40.23
32.02
OH
Ph
CF3
f1 (ppm)

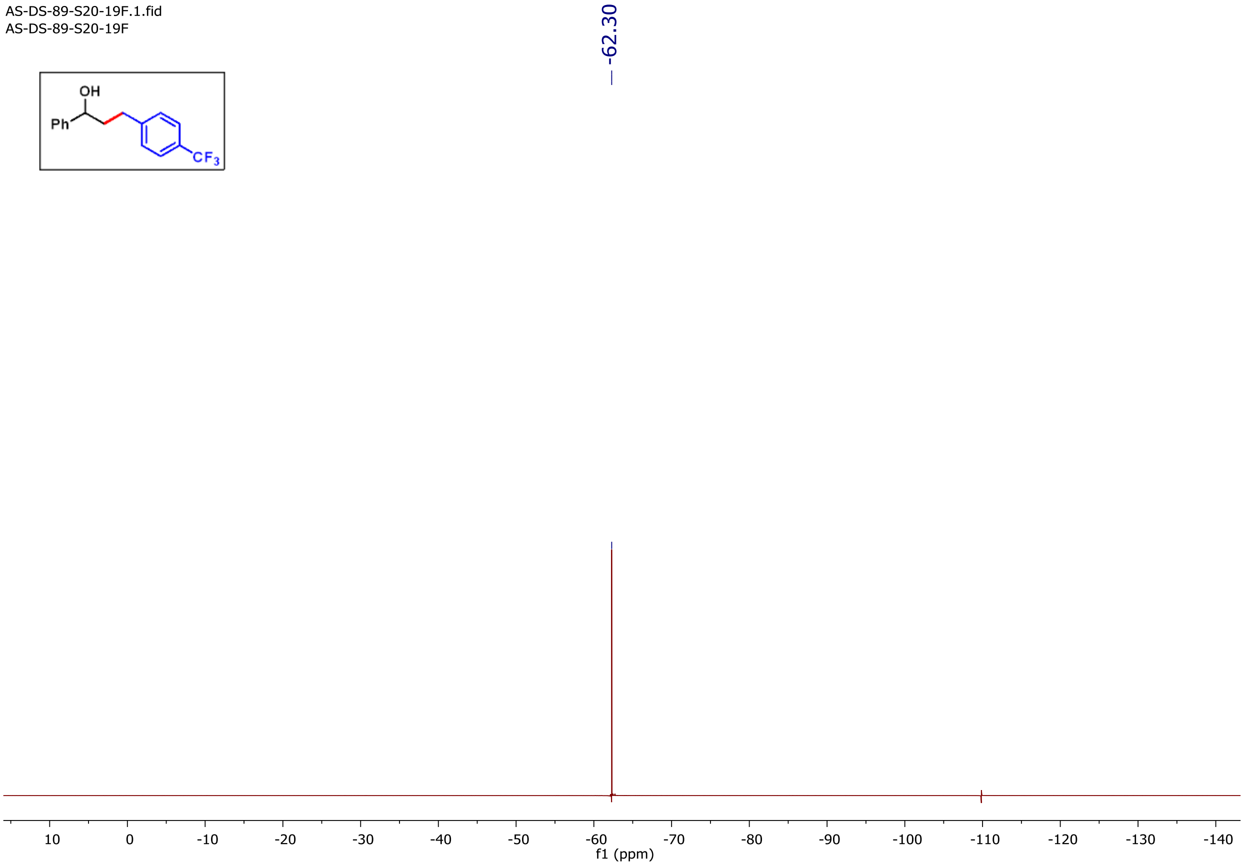
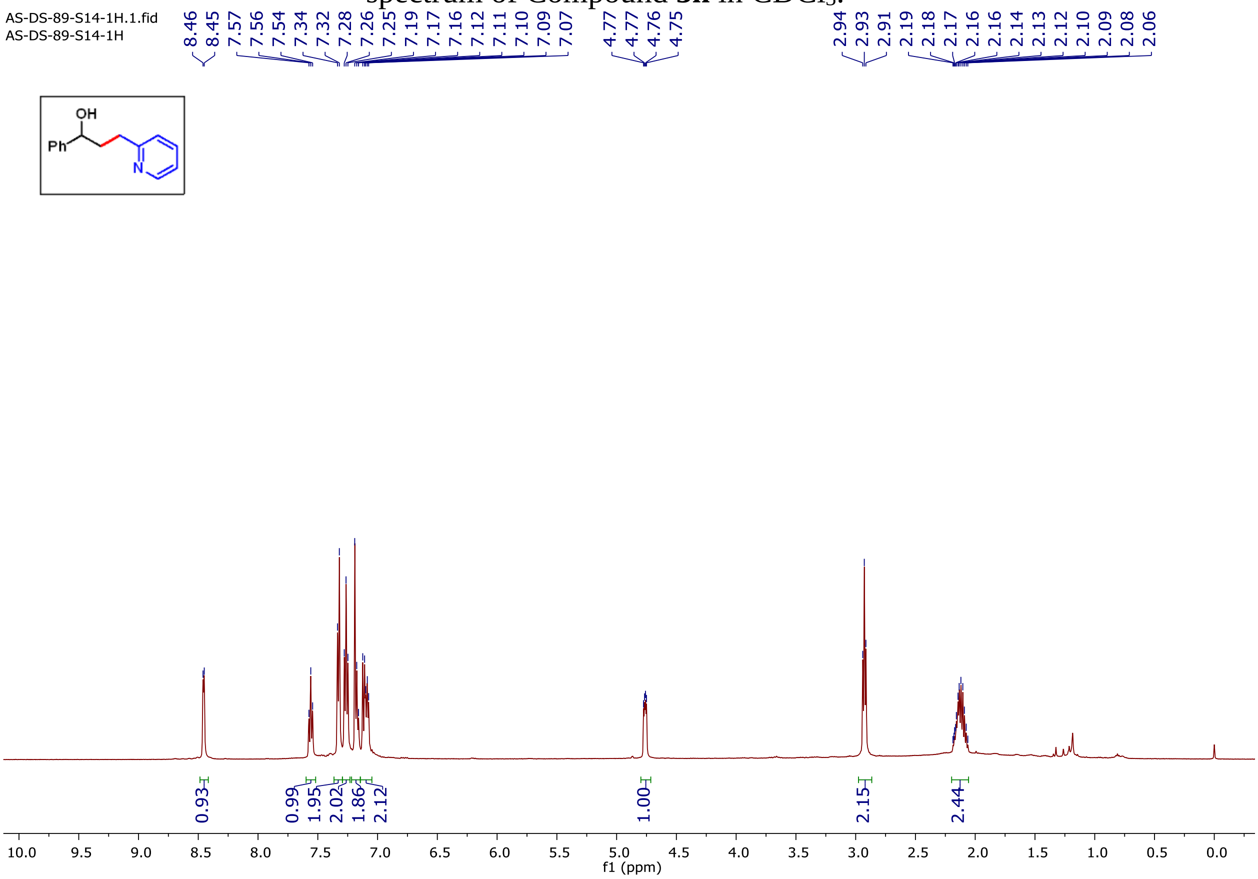


Figure S45. ¹H NMR (600 MHz), ¹³C{¹H} NMR (150 MHz) and ¹⁹F {¹H} NMR (470 MHz) spectrum of Compound **3n** in $CDCl_3$.



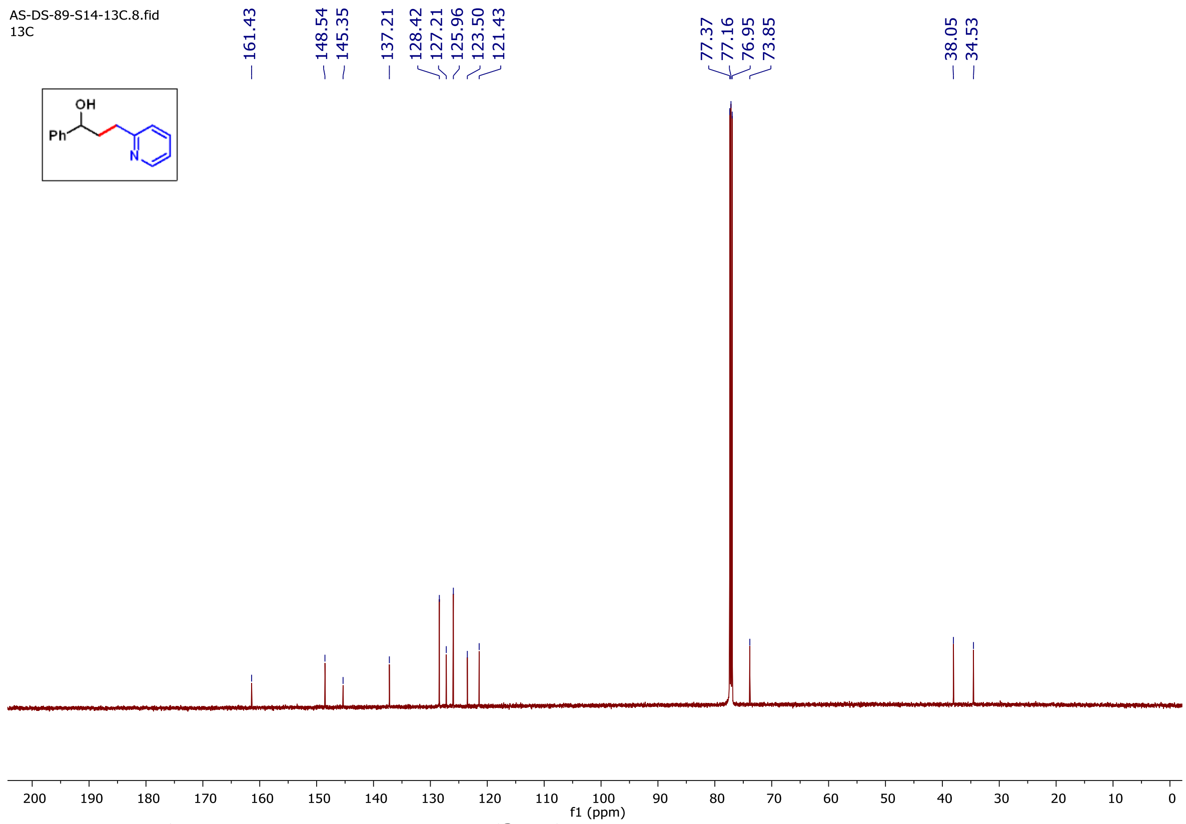
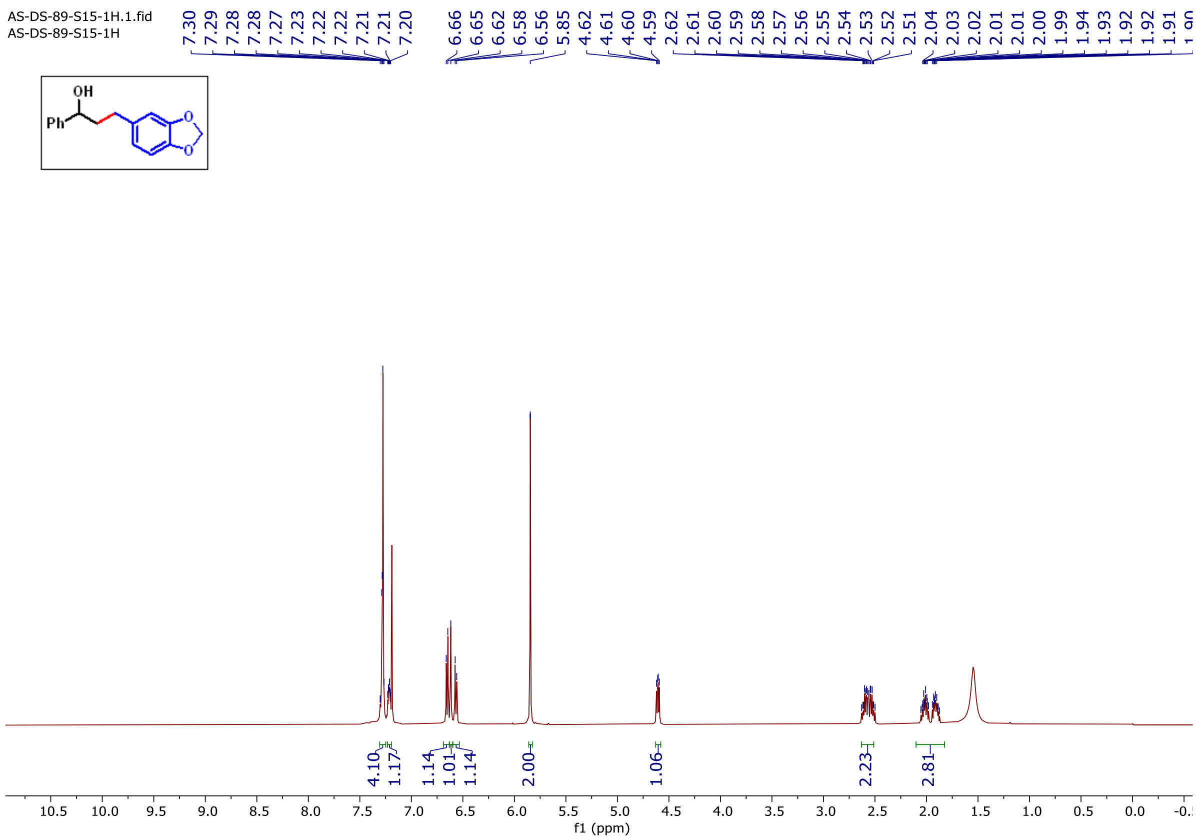


Figure S46. ^{1}H NMR (500 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3o** in $CDCl_3$.



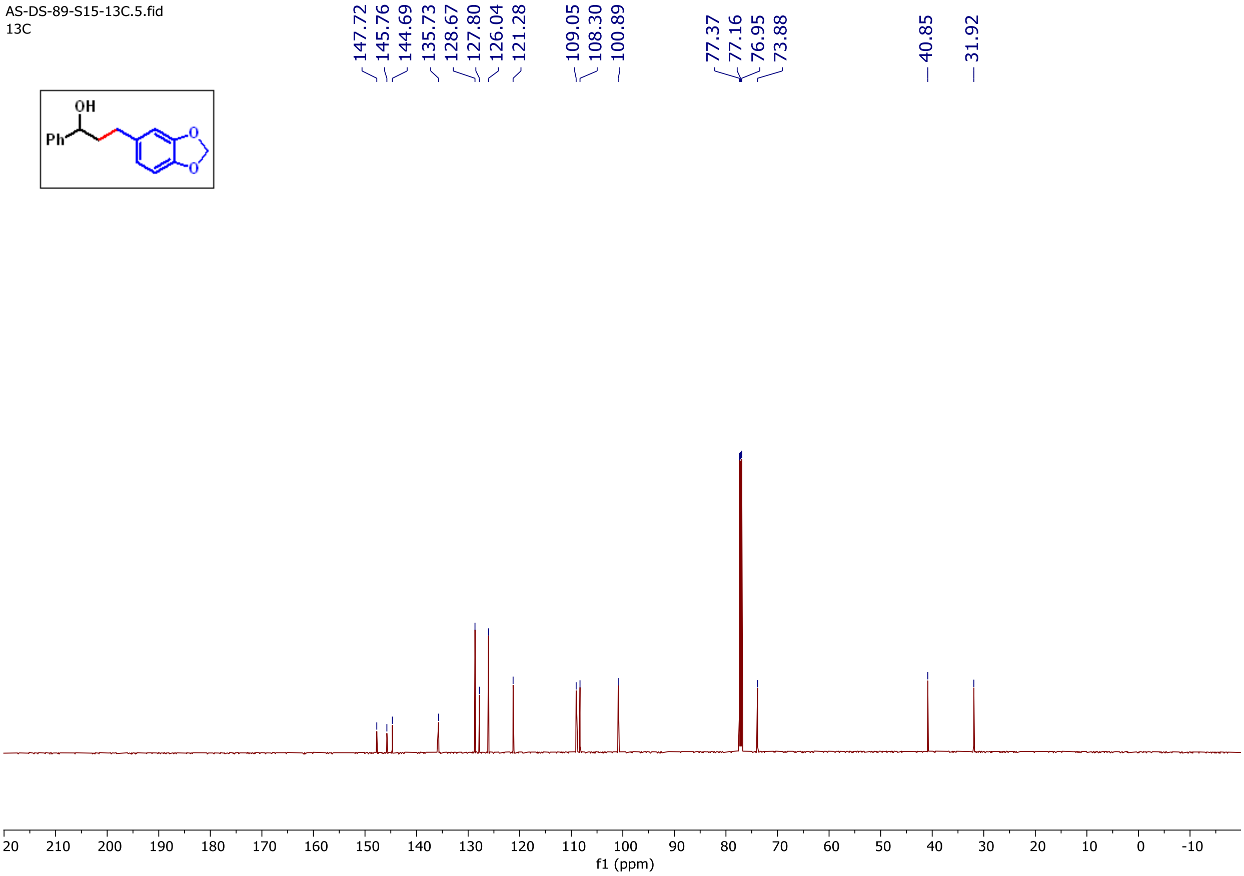
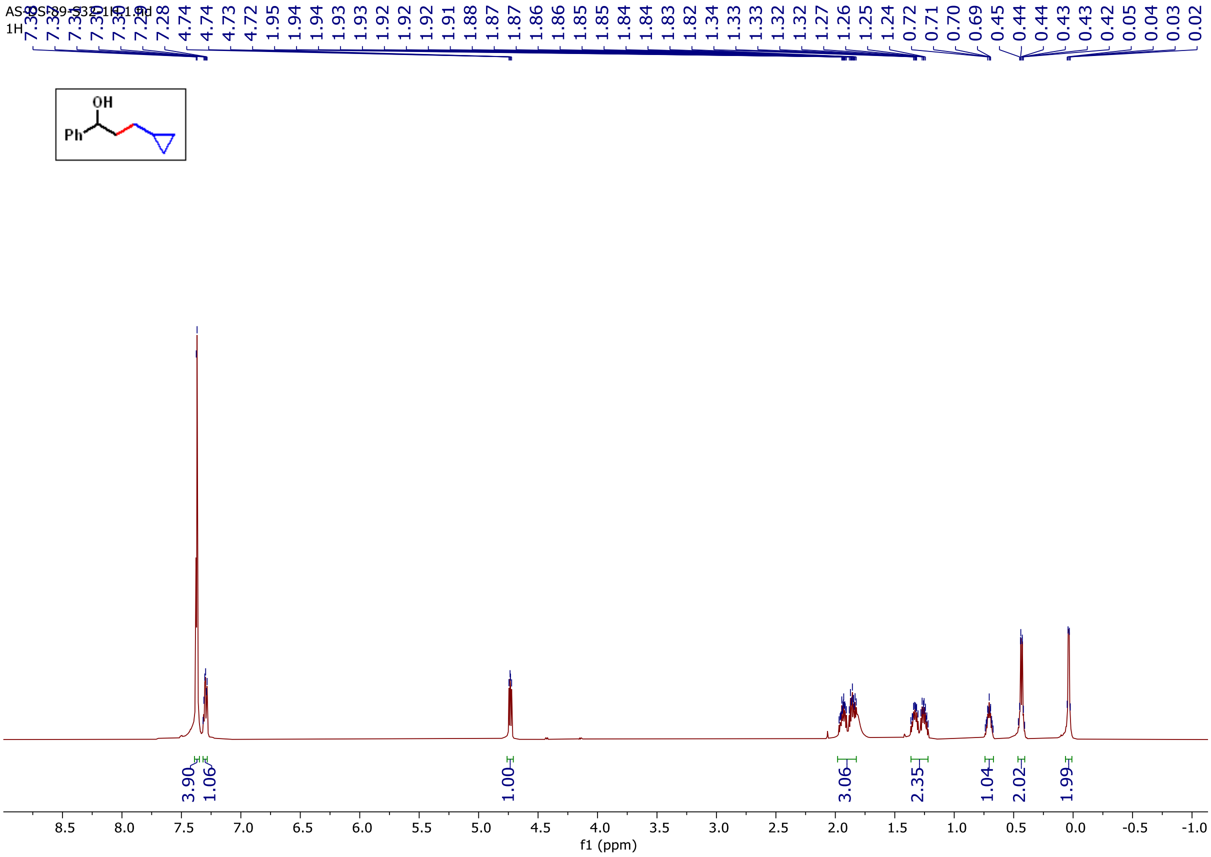


Figure S47. ^{1}H NMR (500 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3p** in $CDCl_3$.



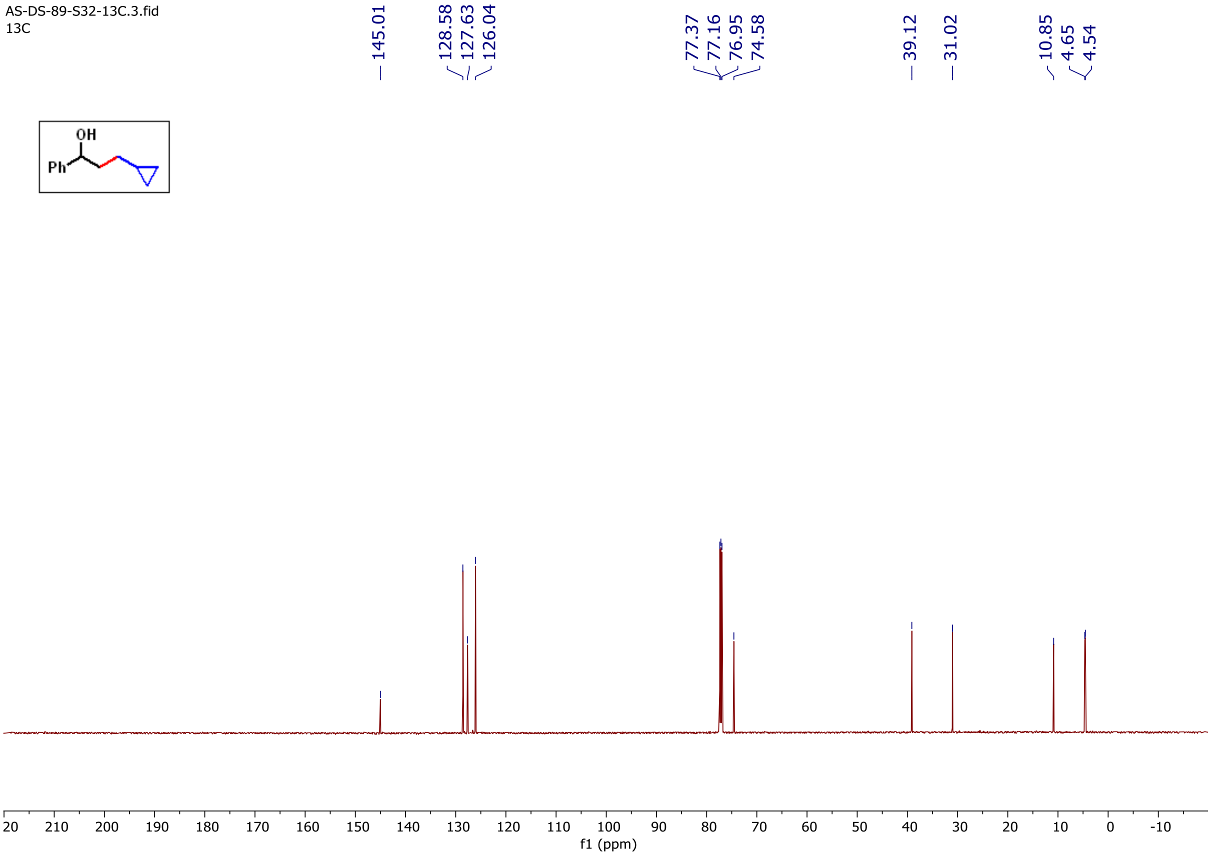
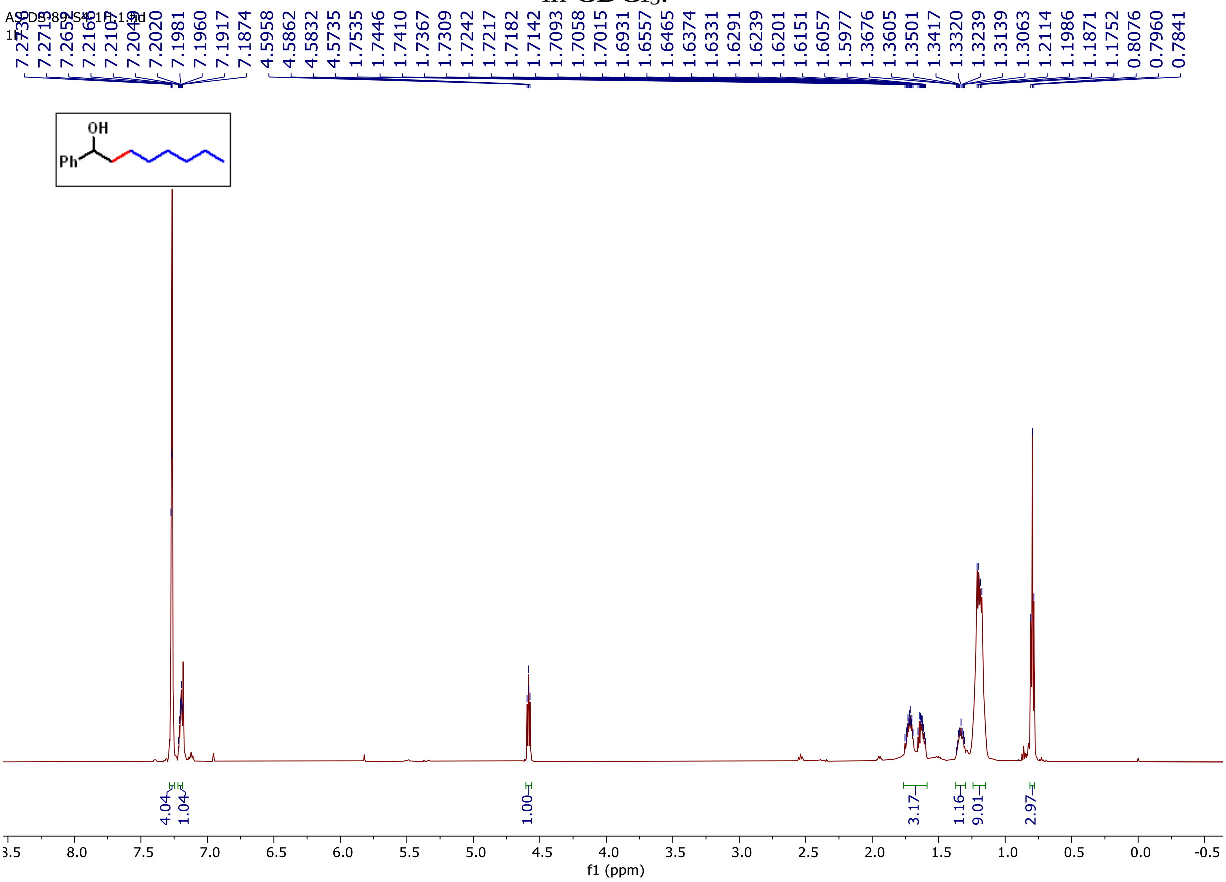


Figure S48. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3q** in $CDCl_3$.



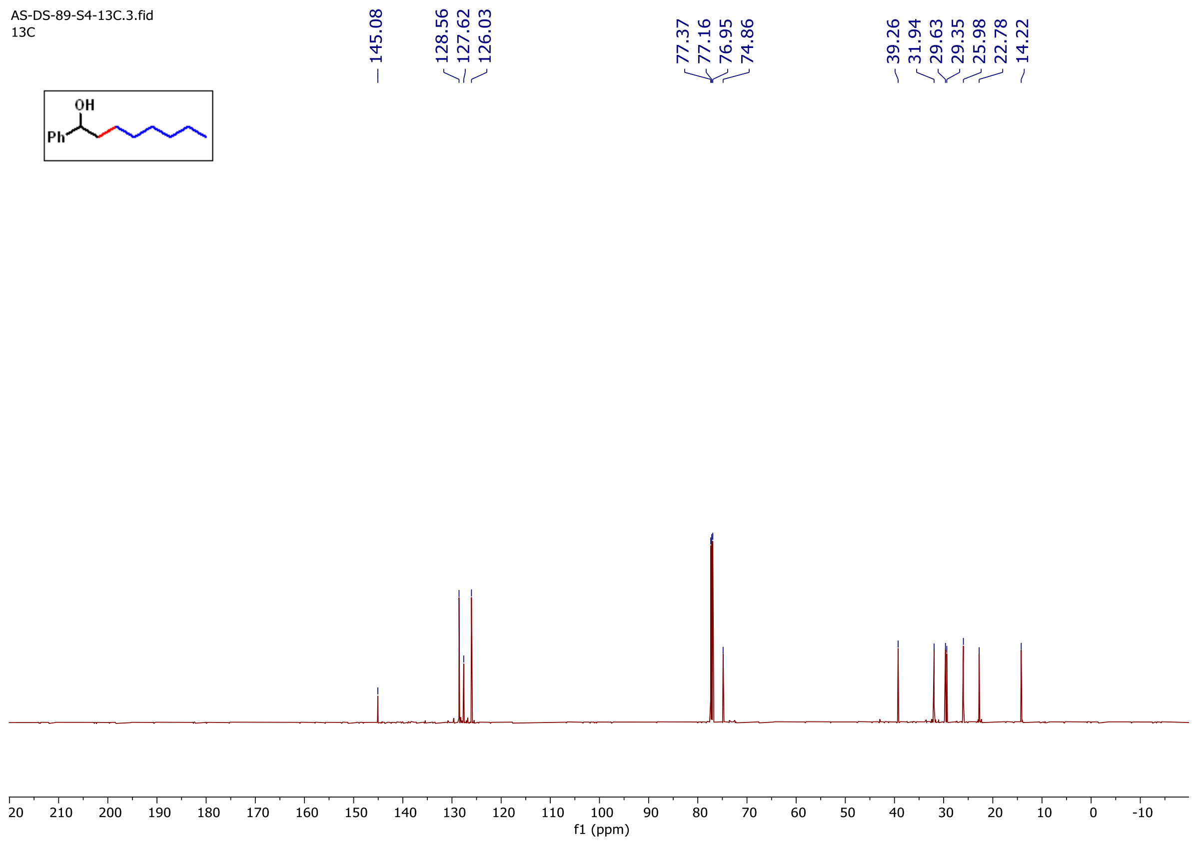
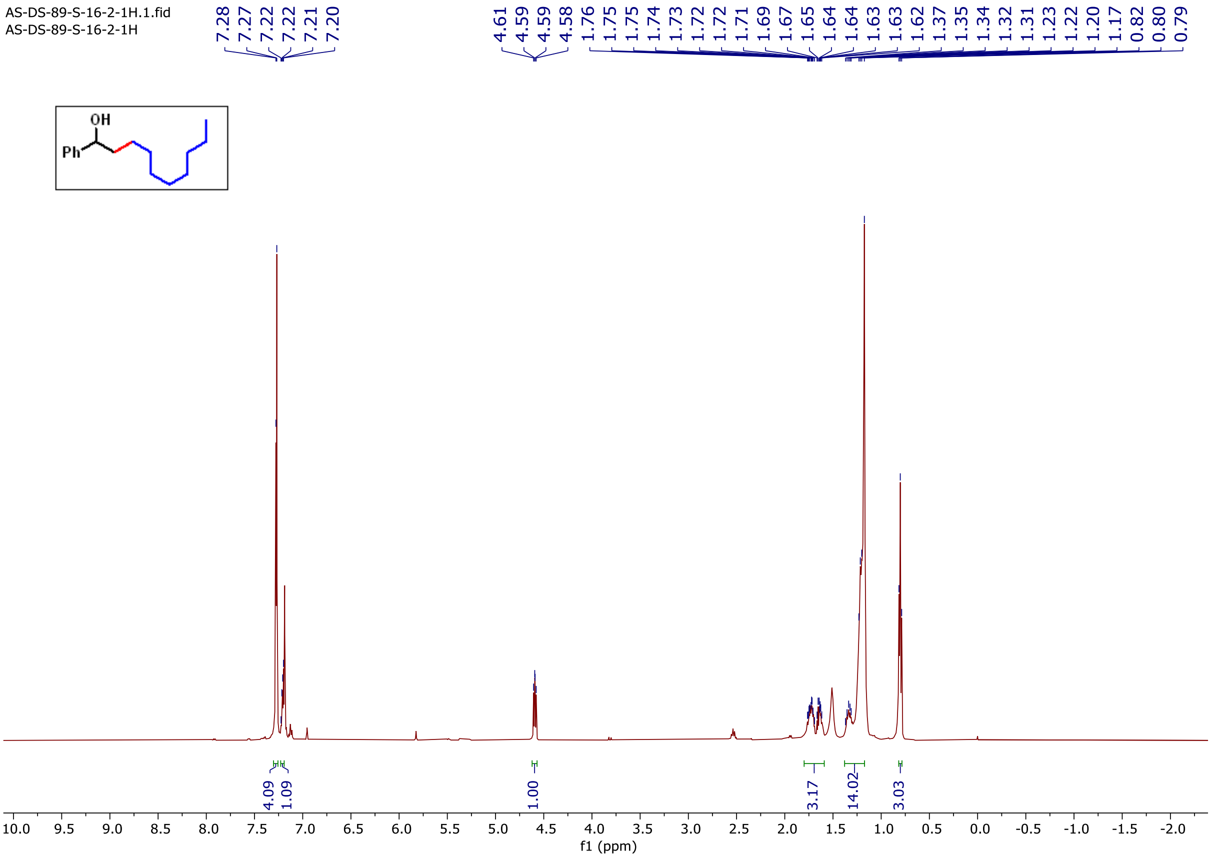


Figure S49. ^{1}H NMR (600 MHz) and $^{13}C\{^1H\}$ NMR (150 MHz) spectrum of Compound **3r** in $CDCl_3$.



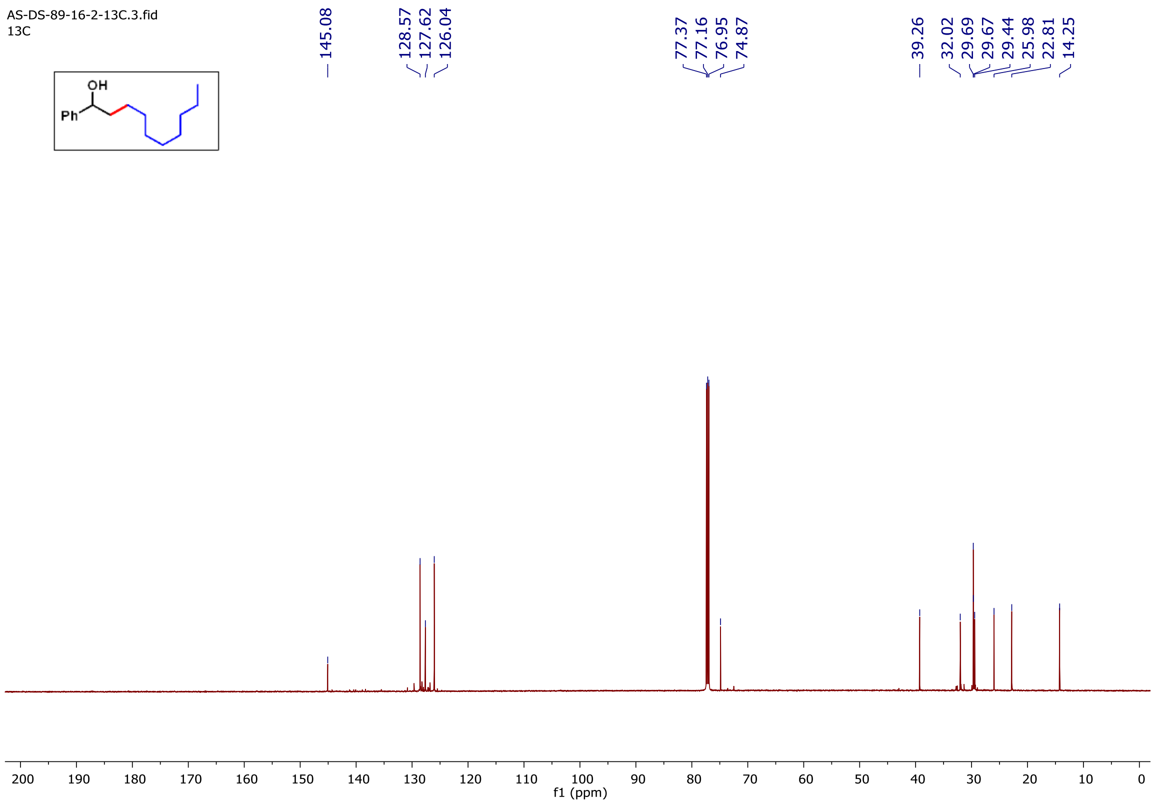
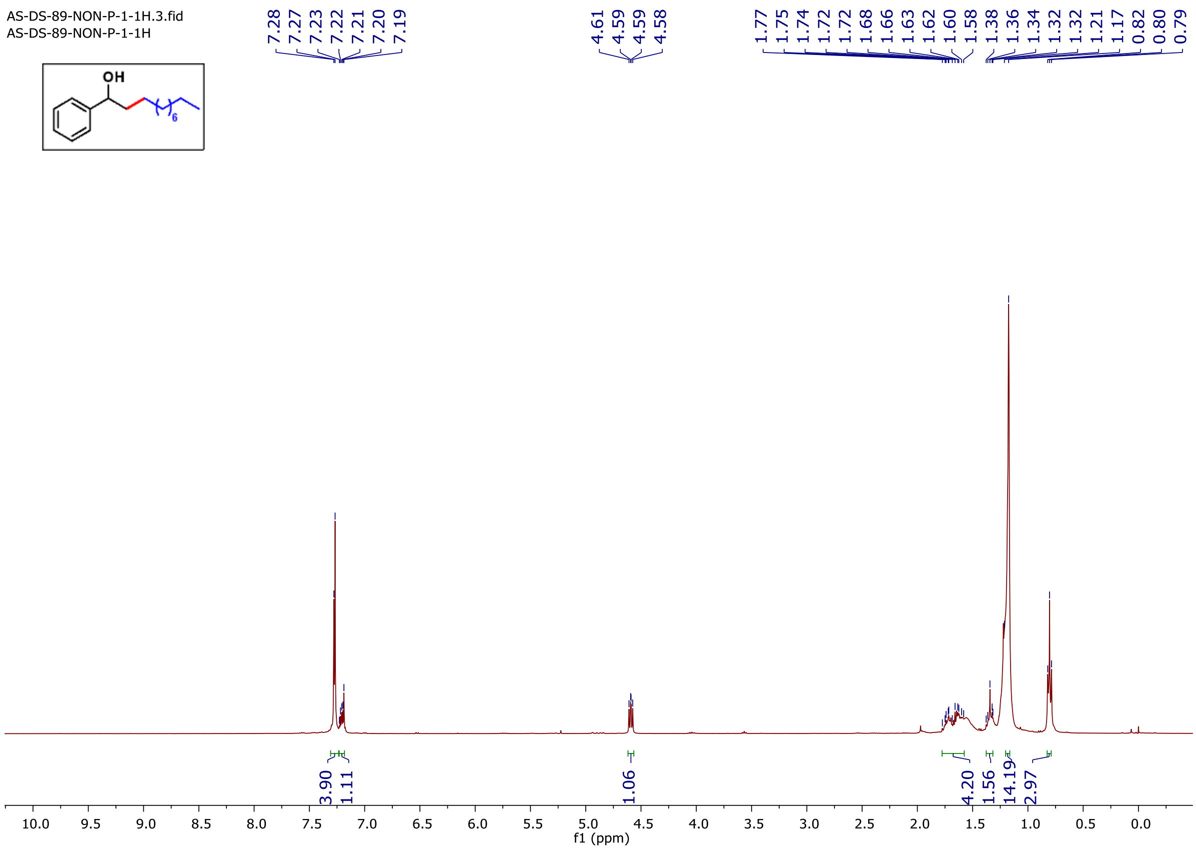


Figure S50. [1]H NMR (500 MHz) and [13]C{[1]H} NMR (150 MHz) spectrum of Compound **3s** in $CDCl_3$.



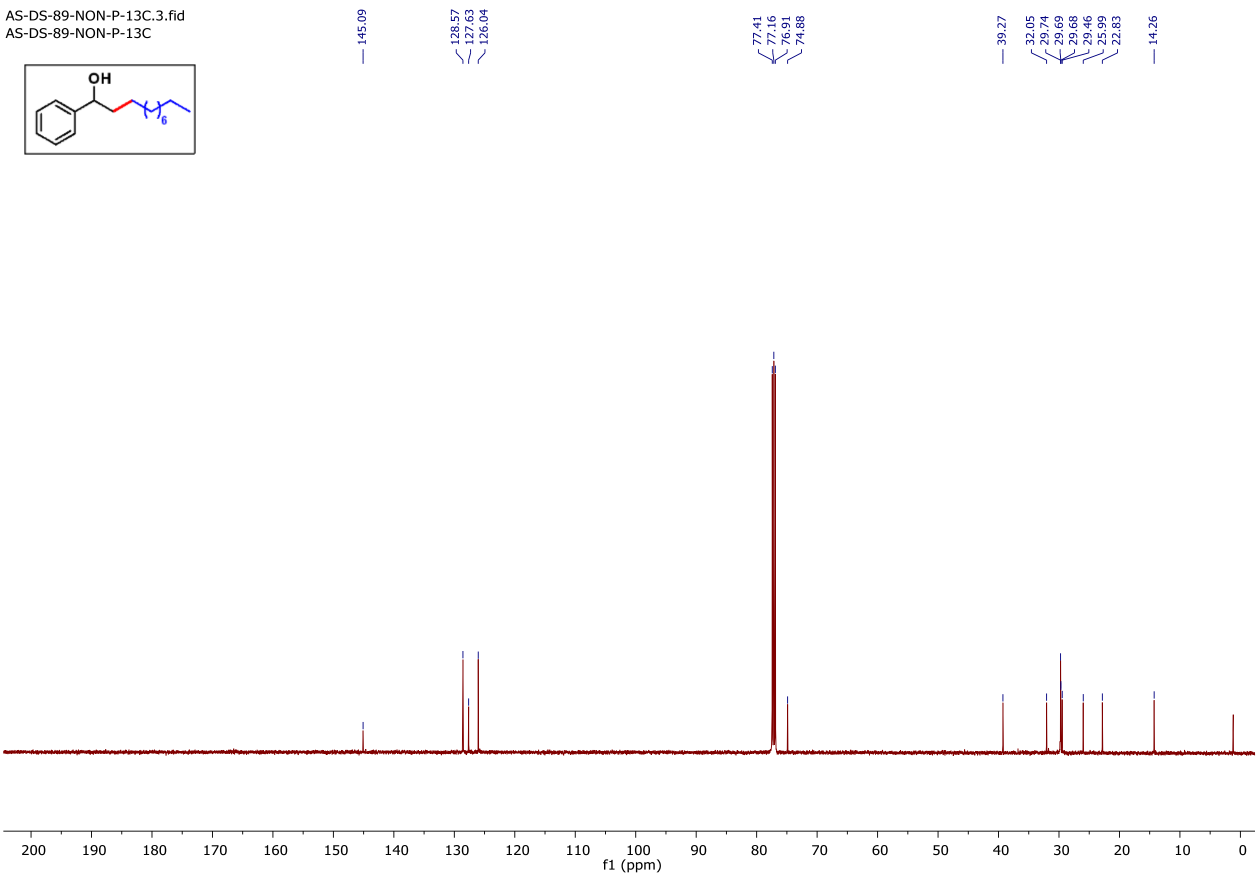
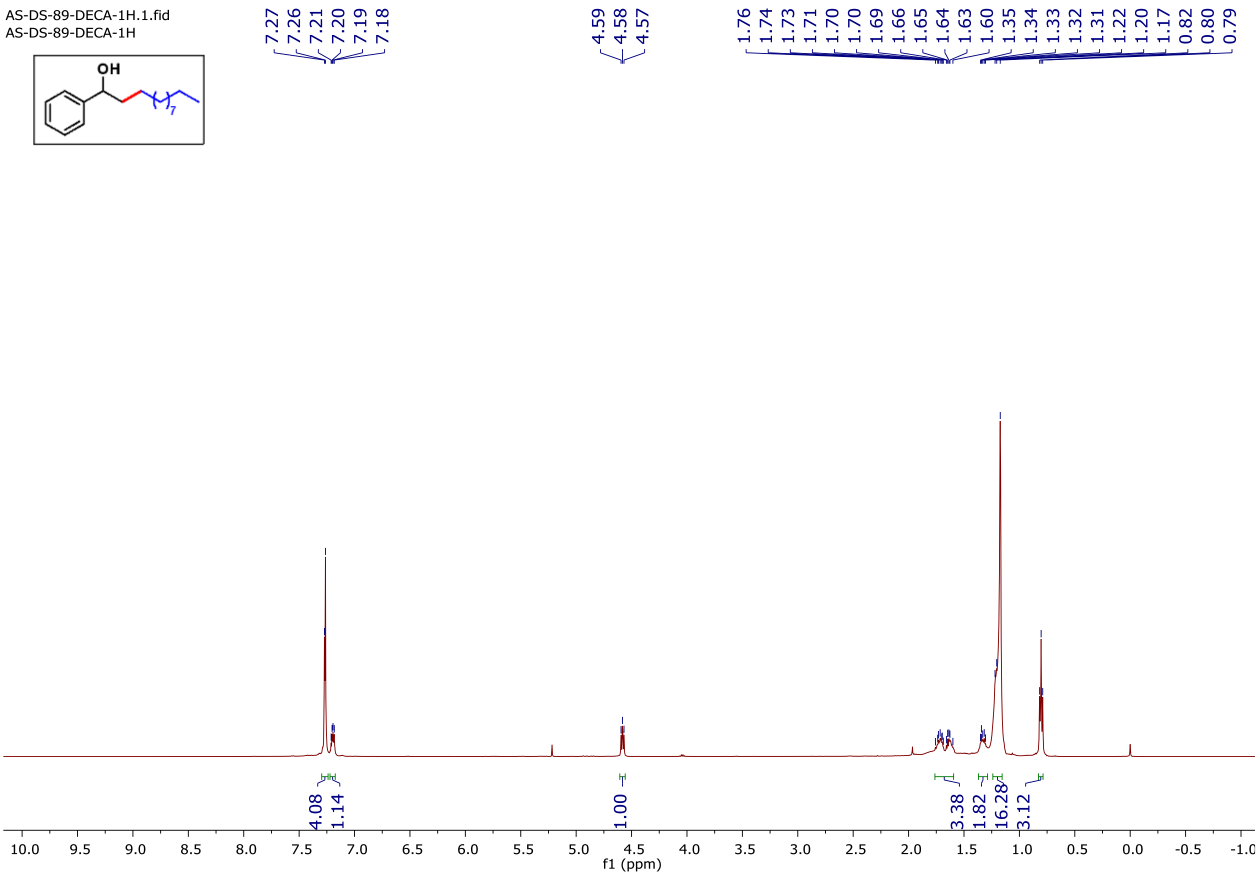


Figure S51. ^{1}H NMR (400 MHz) and ^{13}C{^{1}H} NMR (125 MHz) spectrum of Compound **3t** in $CDCl_3$.



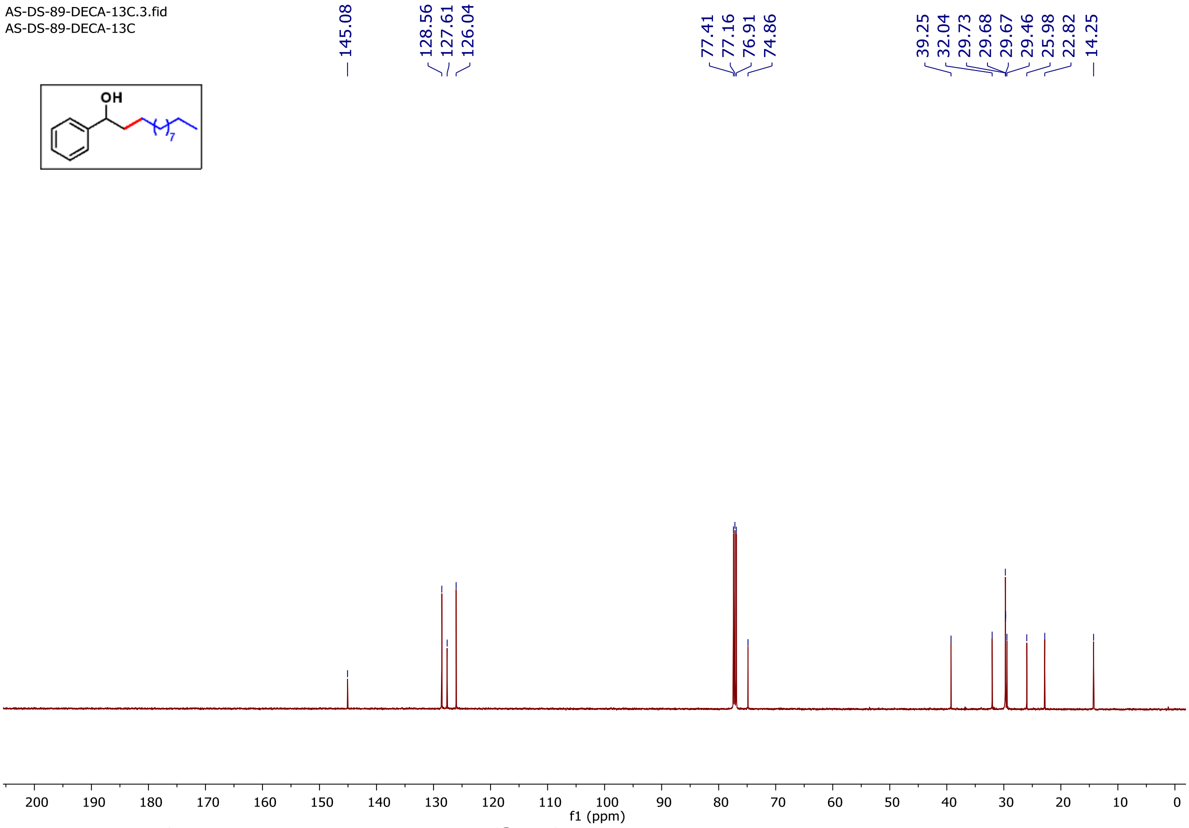
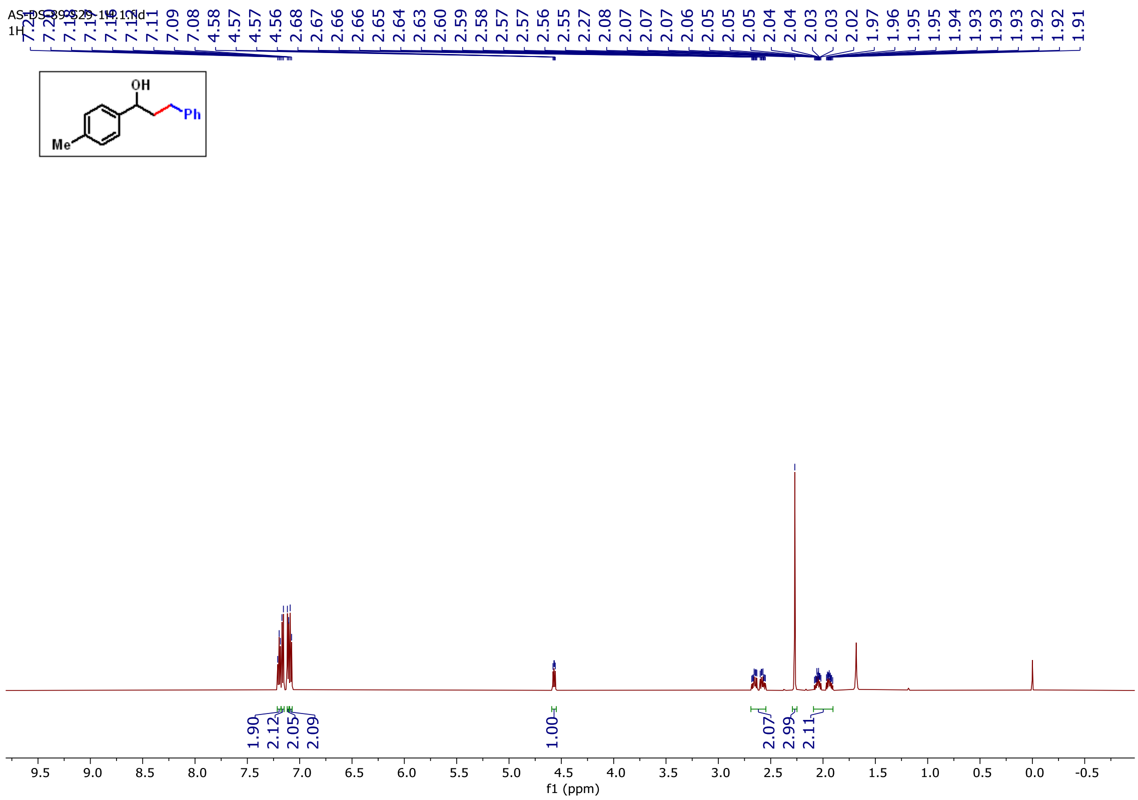


Figure S52. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **3u** in $CDCl_3$.



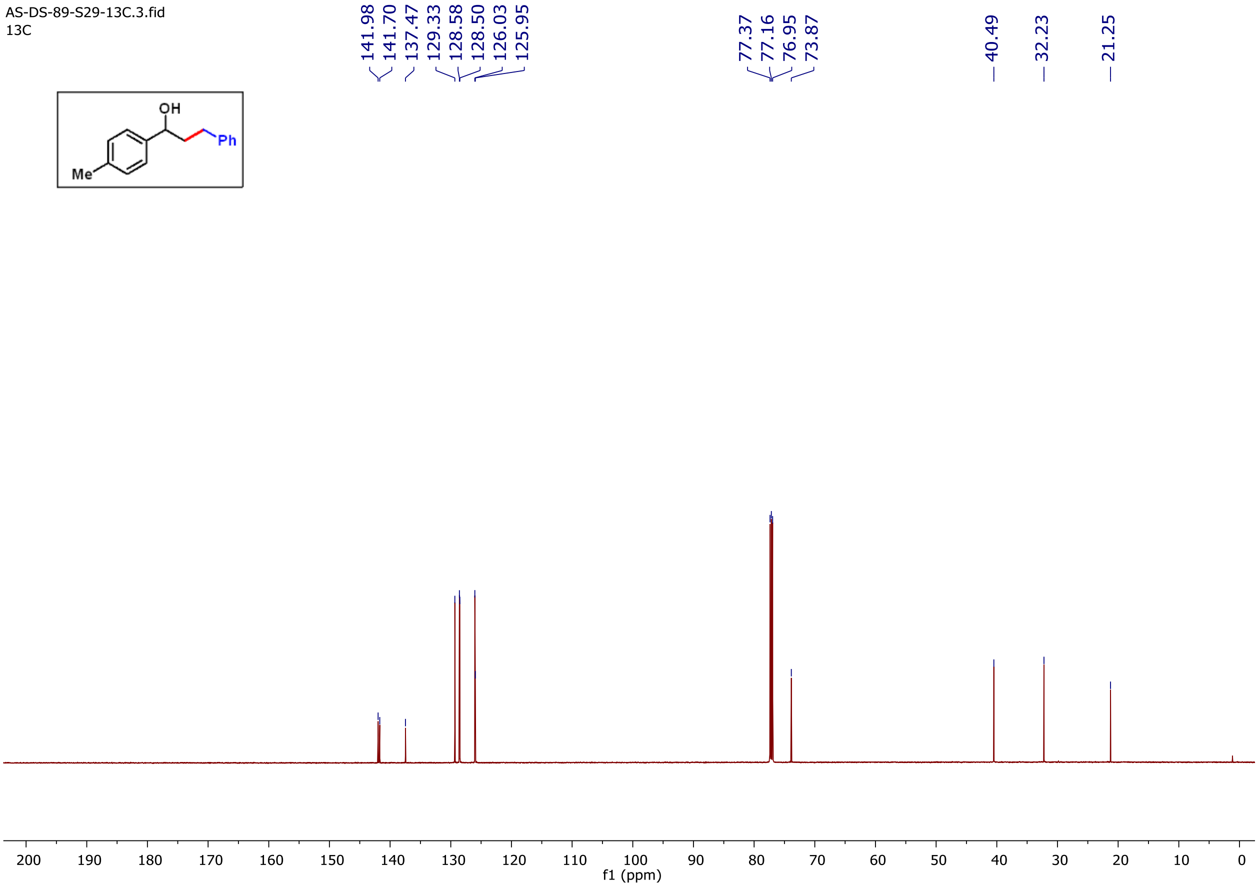
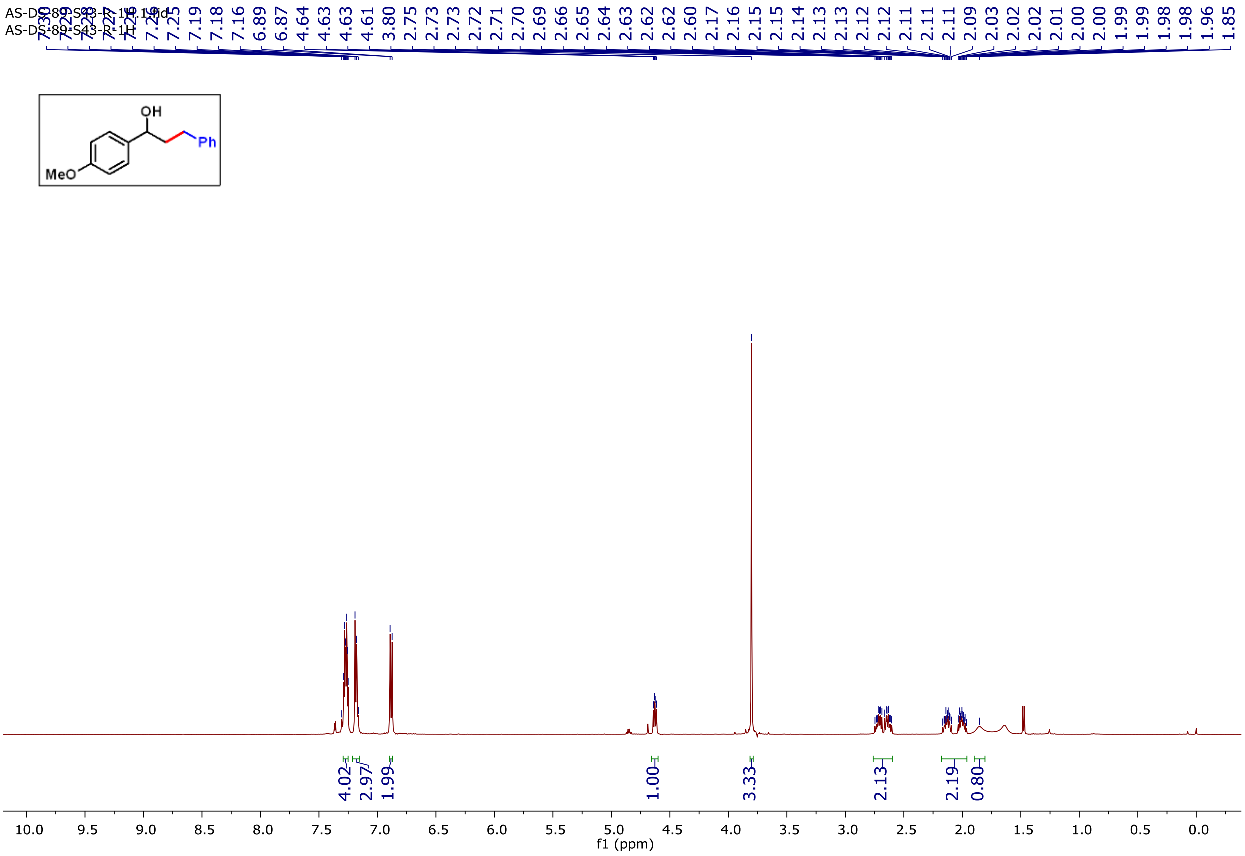


Figure S53. [1]H NMR (600 MHz) and [13]C{[1]H} NMR (150 MHz) spectrum of Compound **3v** in $CDCl_3$.



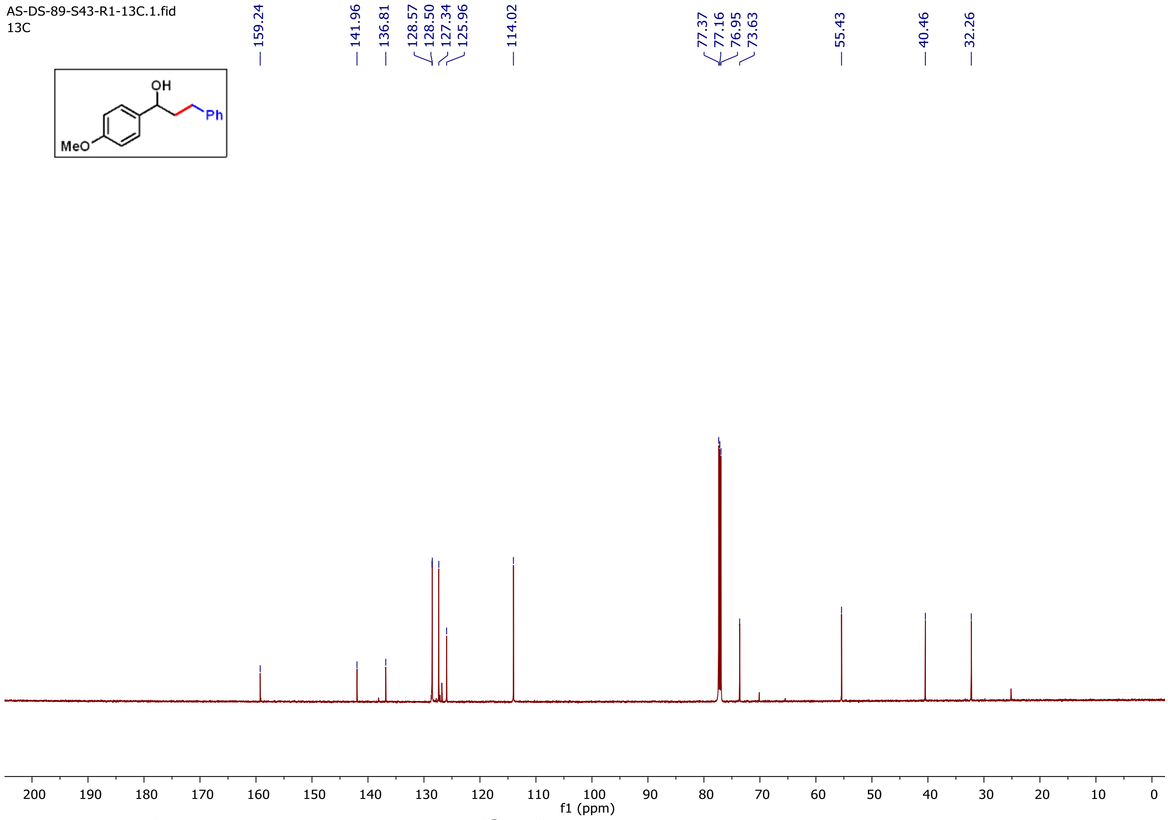
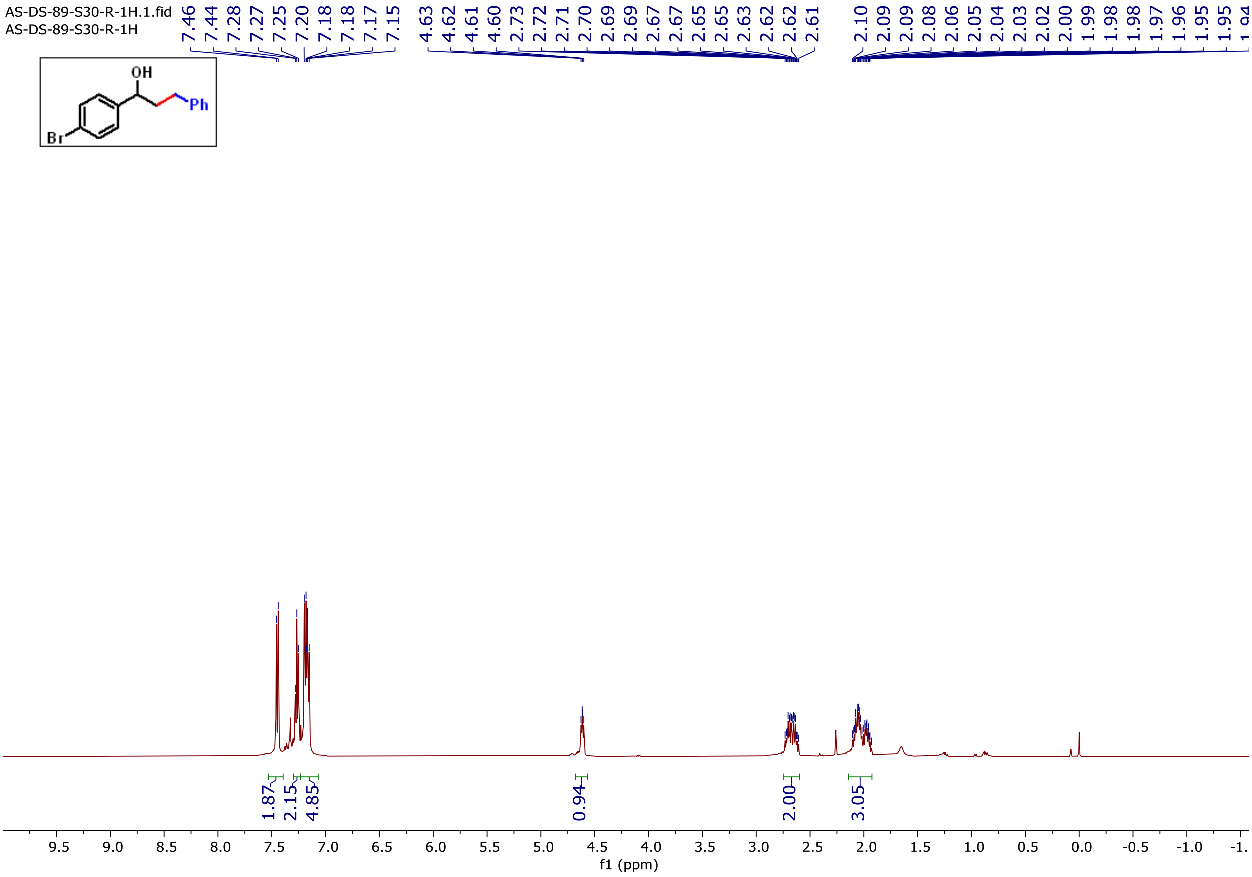


Figure S54. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (150 MHz) spectrum of Compound **3w** in $CDCl_3$.



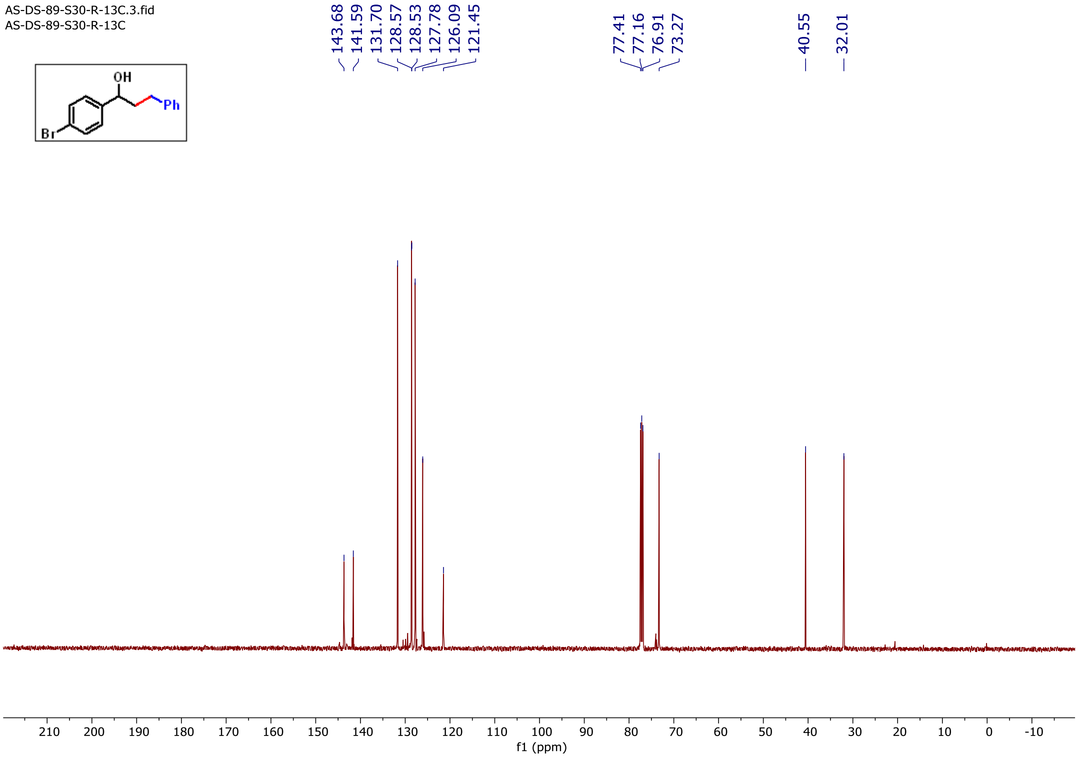
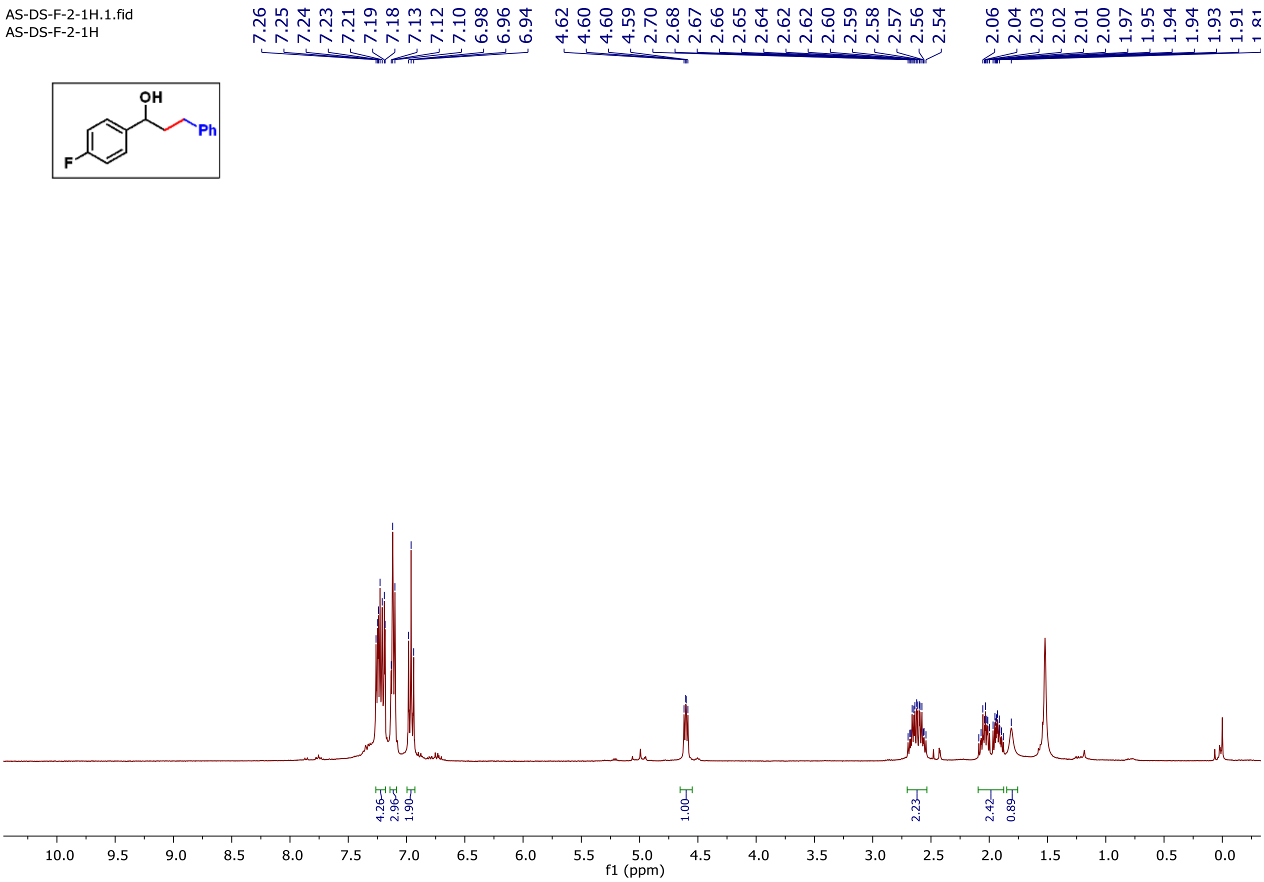
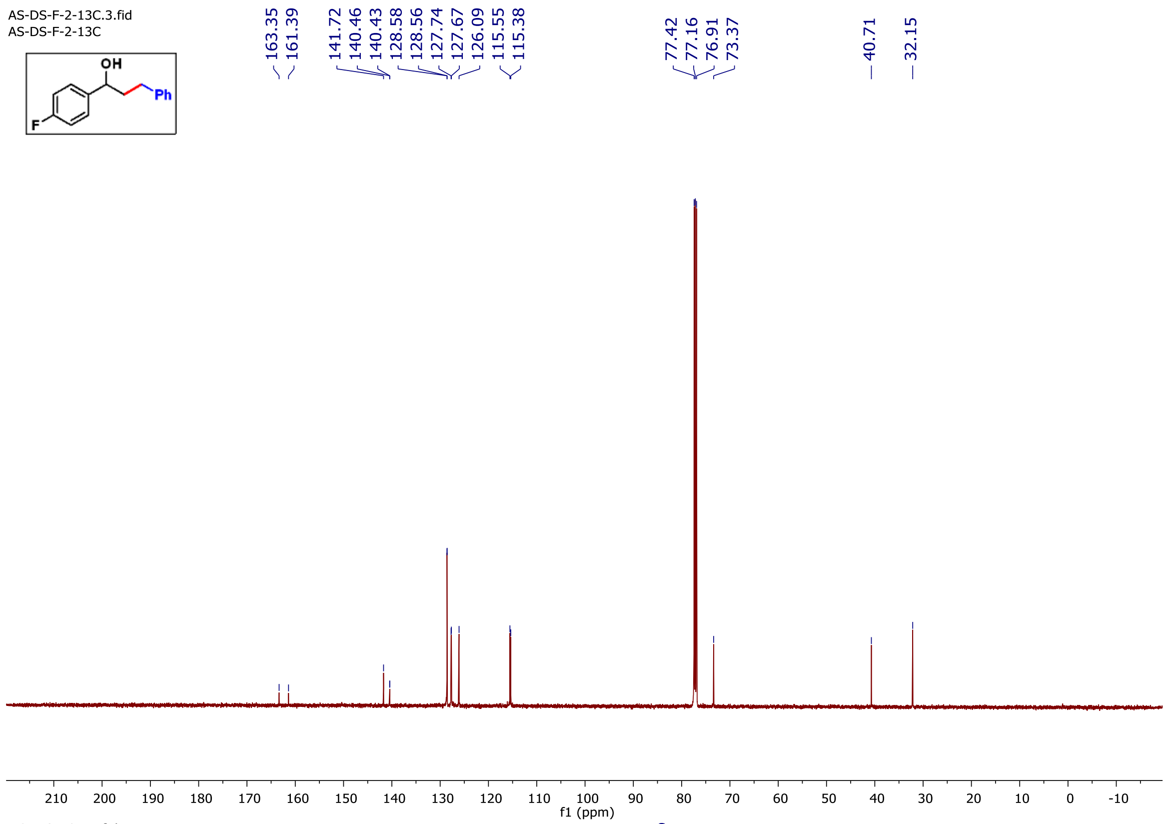


Figure S55. [1]H NMR (500 MHz) and [13]C{[1]H} NMR (125 MHz) spectrum of Compound **3x** in $CDCl_3$.





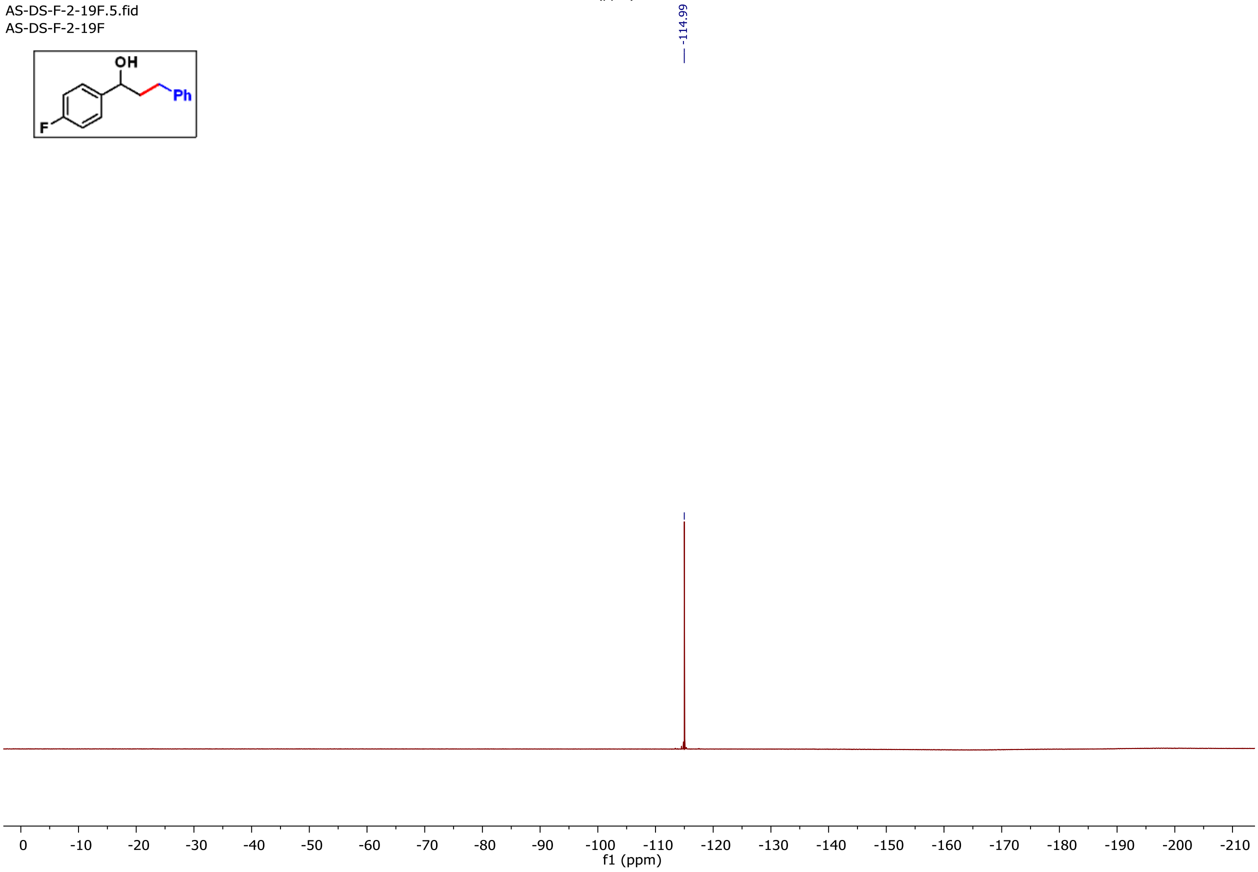
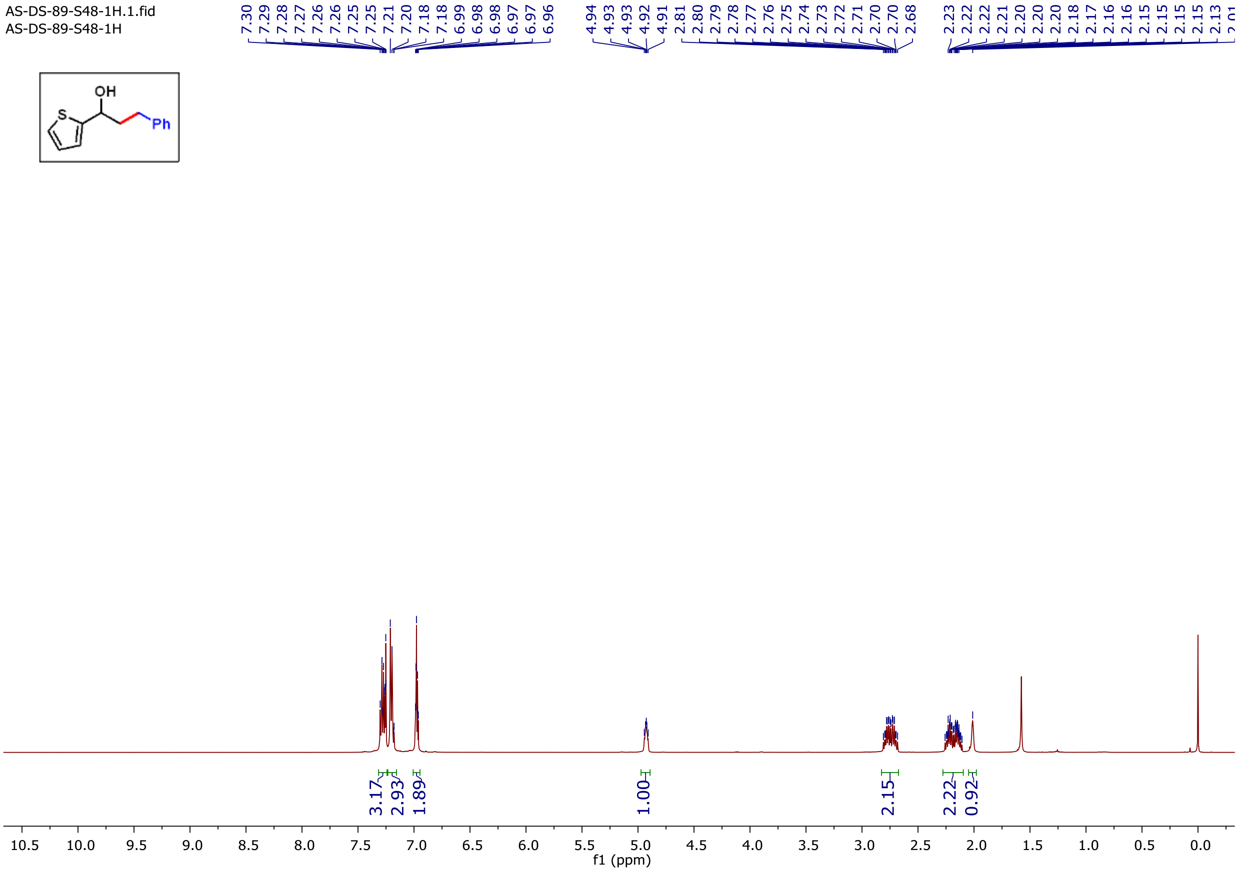


Figure S56. [1]H NMR (400 MHz),[13]C{[1]H} NMR (125 MHz) and [19]F {[1]H} NMR (470 MHz) spectrum of Compound **3y** in $CDCl_3$.



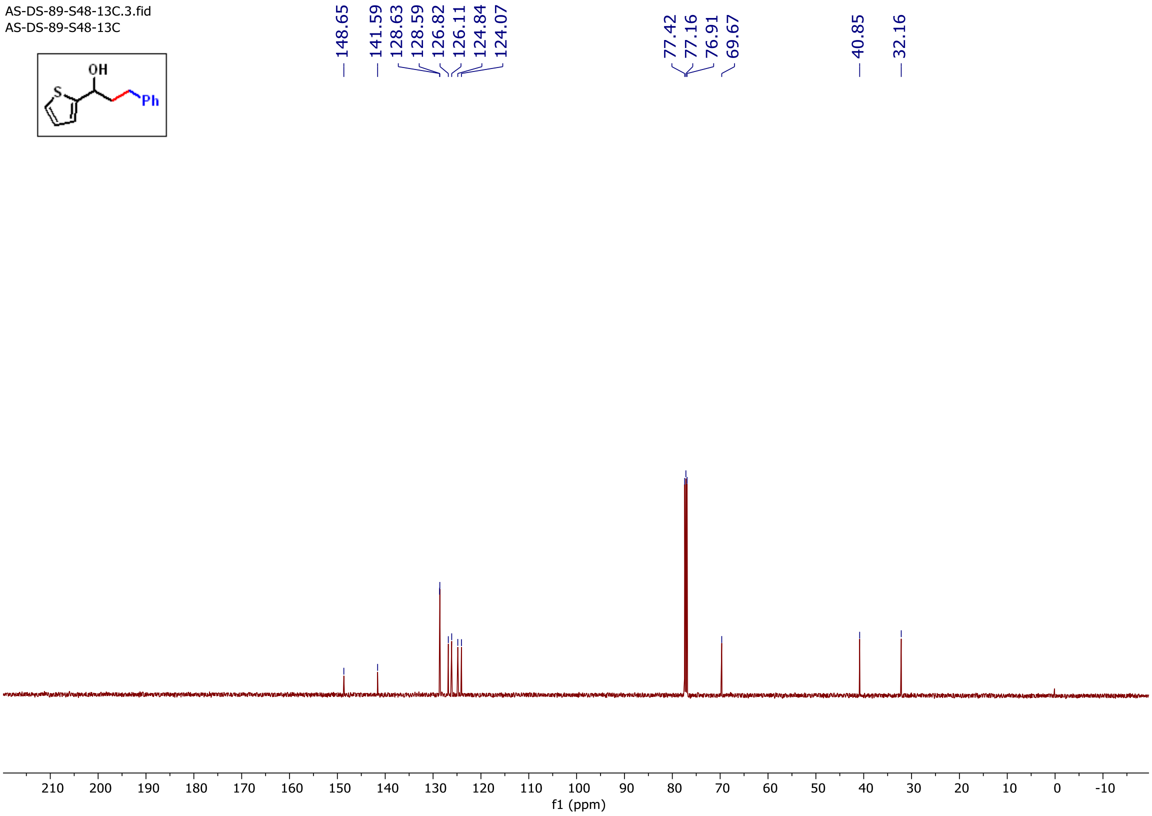
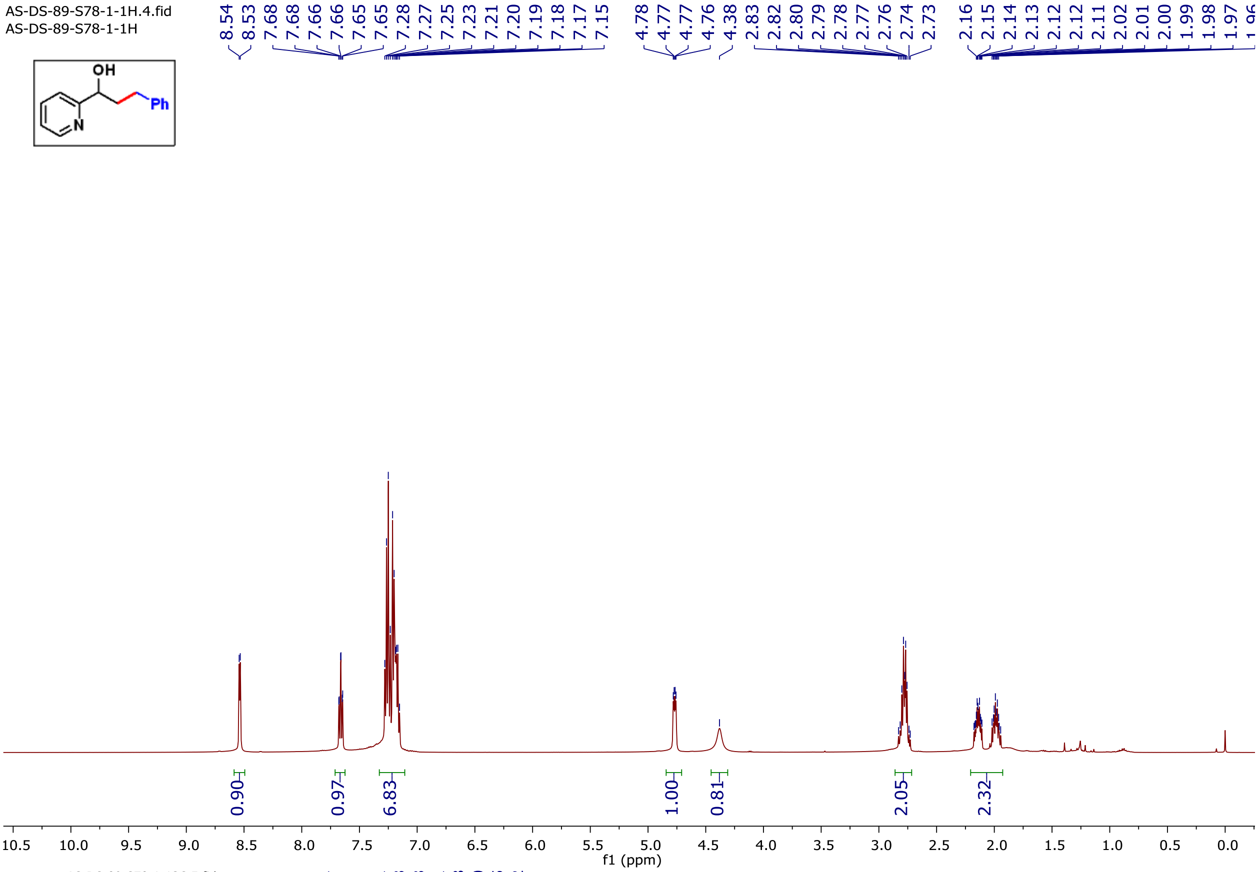


Figure S57. [1]H NMR (500 MHz) and [13]C{[1]H} NMR (125 MHz) spectrum of Compound **3ab** in $CDCl_3$.



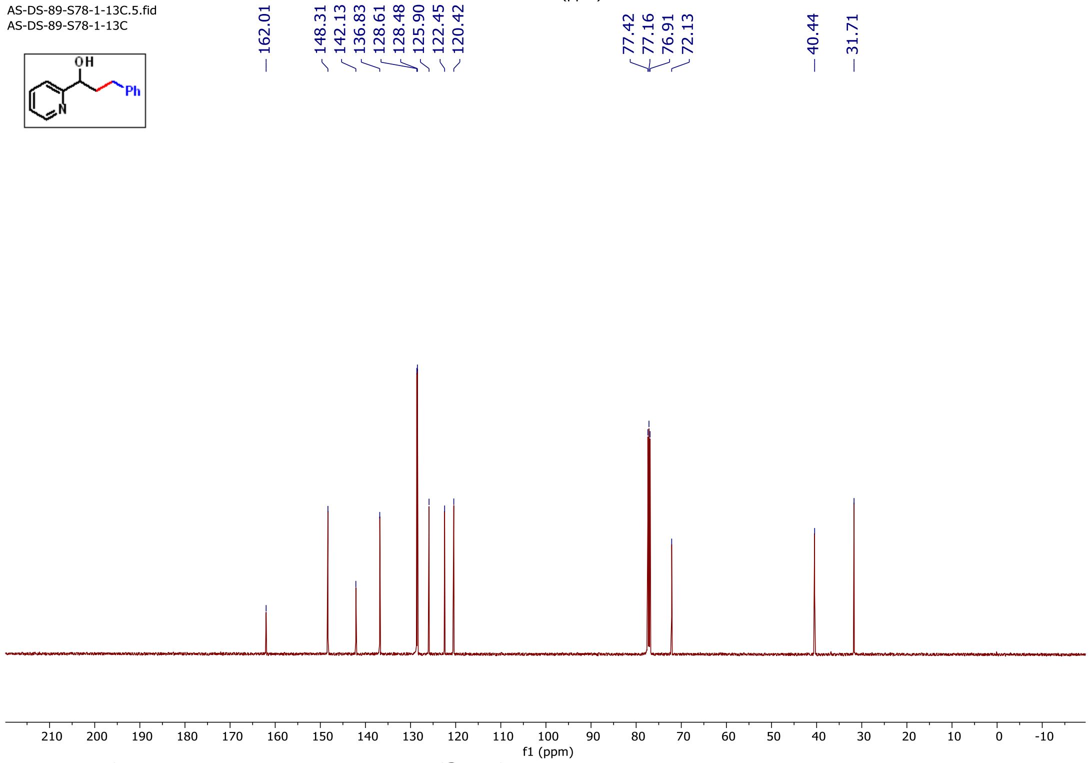
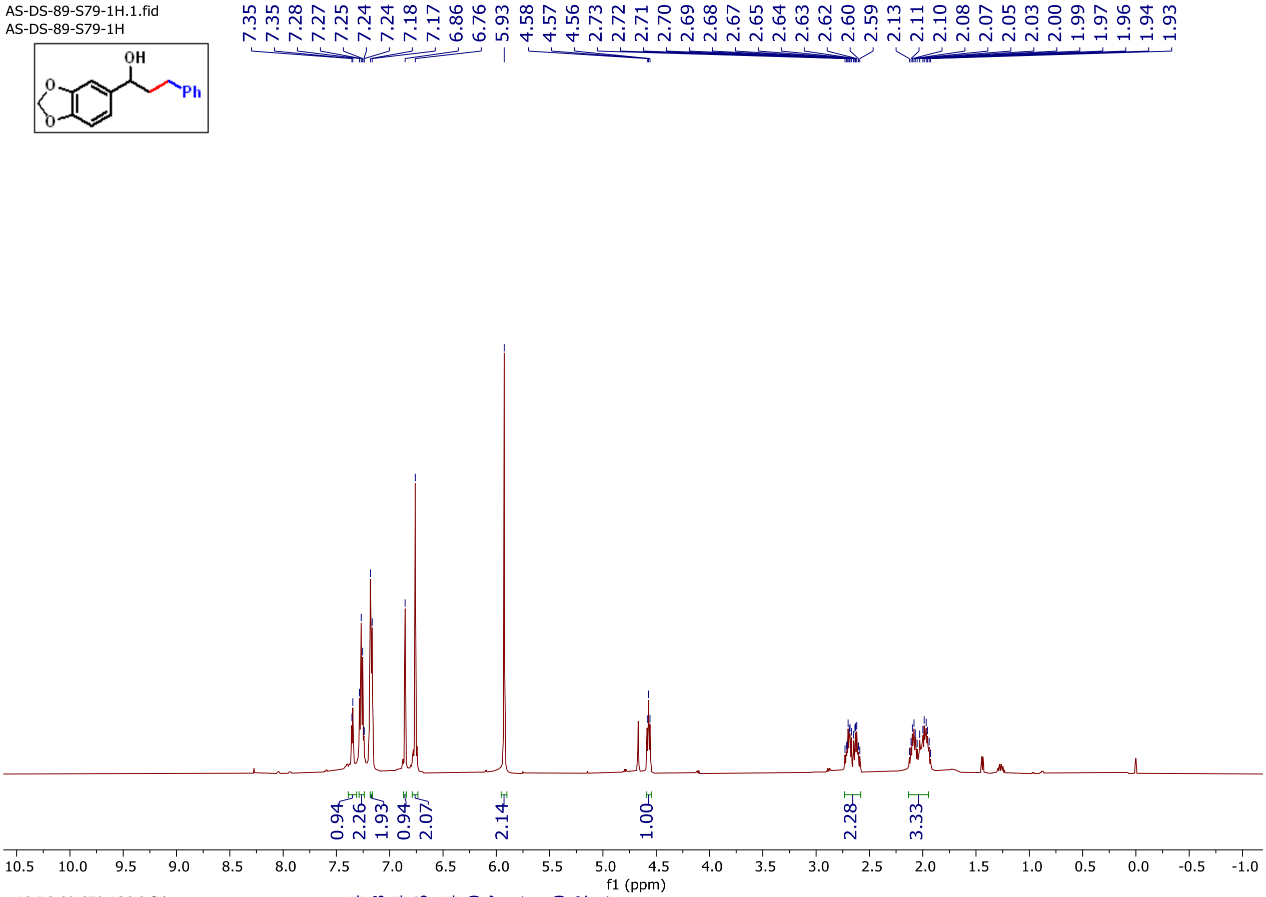


Figure S58. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **3ac** in $CDCl_3$.



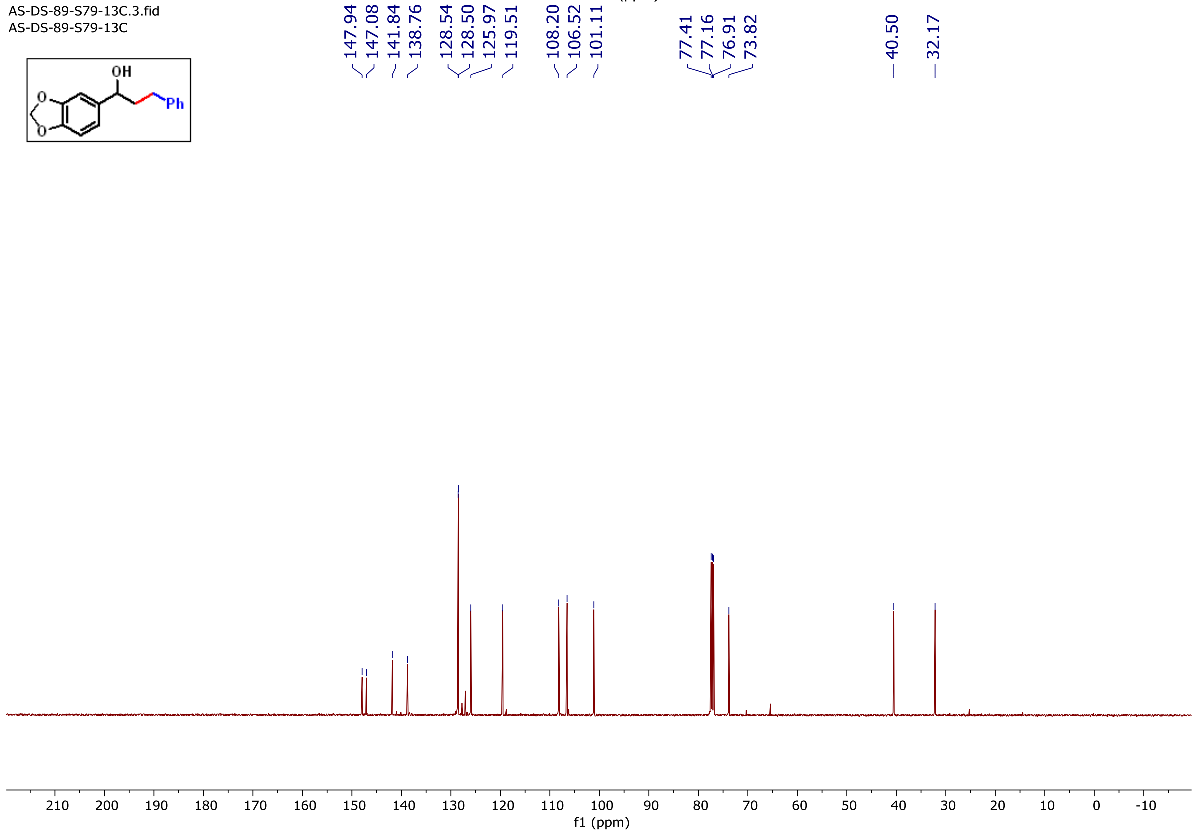
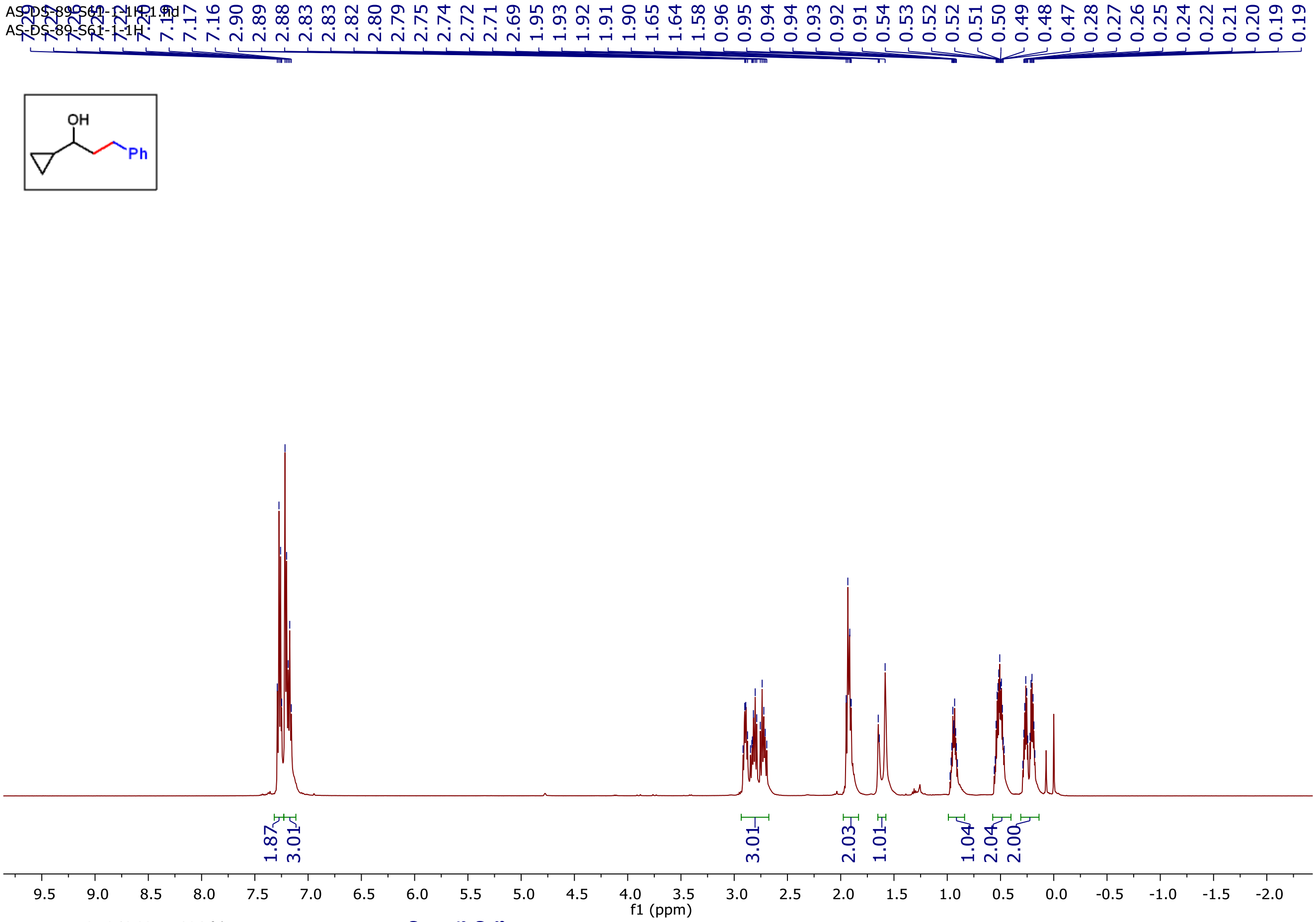


Figure S59. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **3ad** in $CDCl_3$.



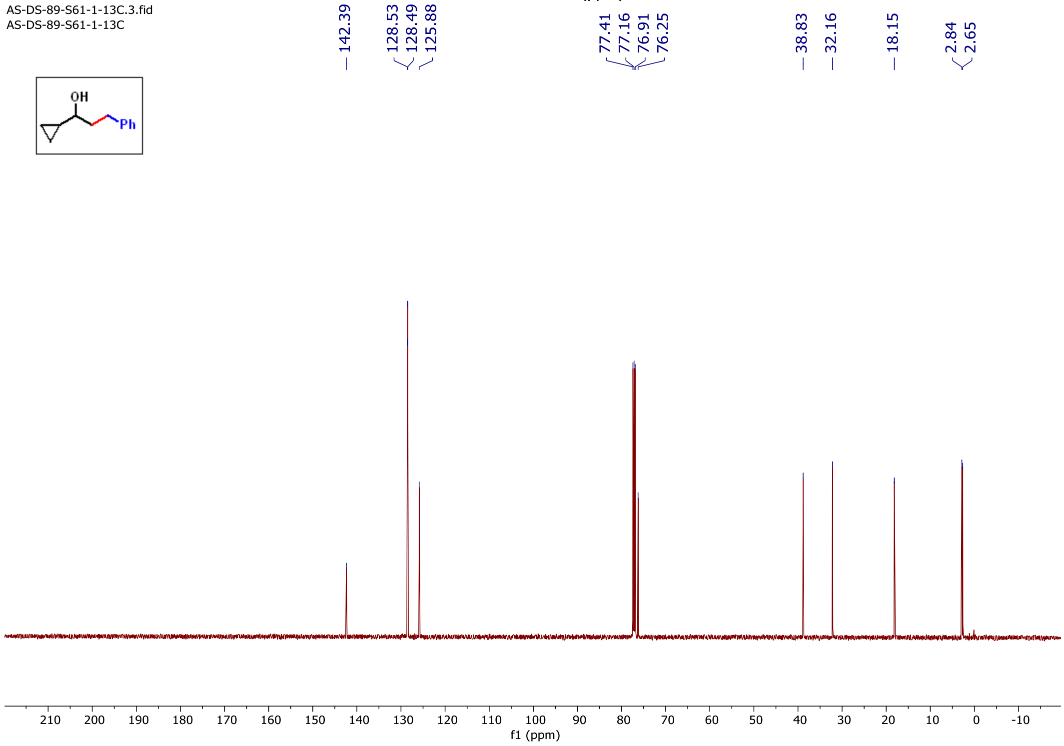
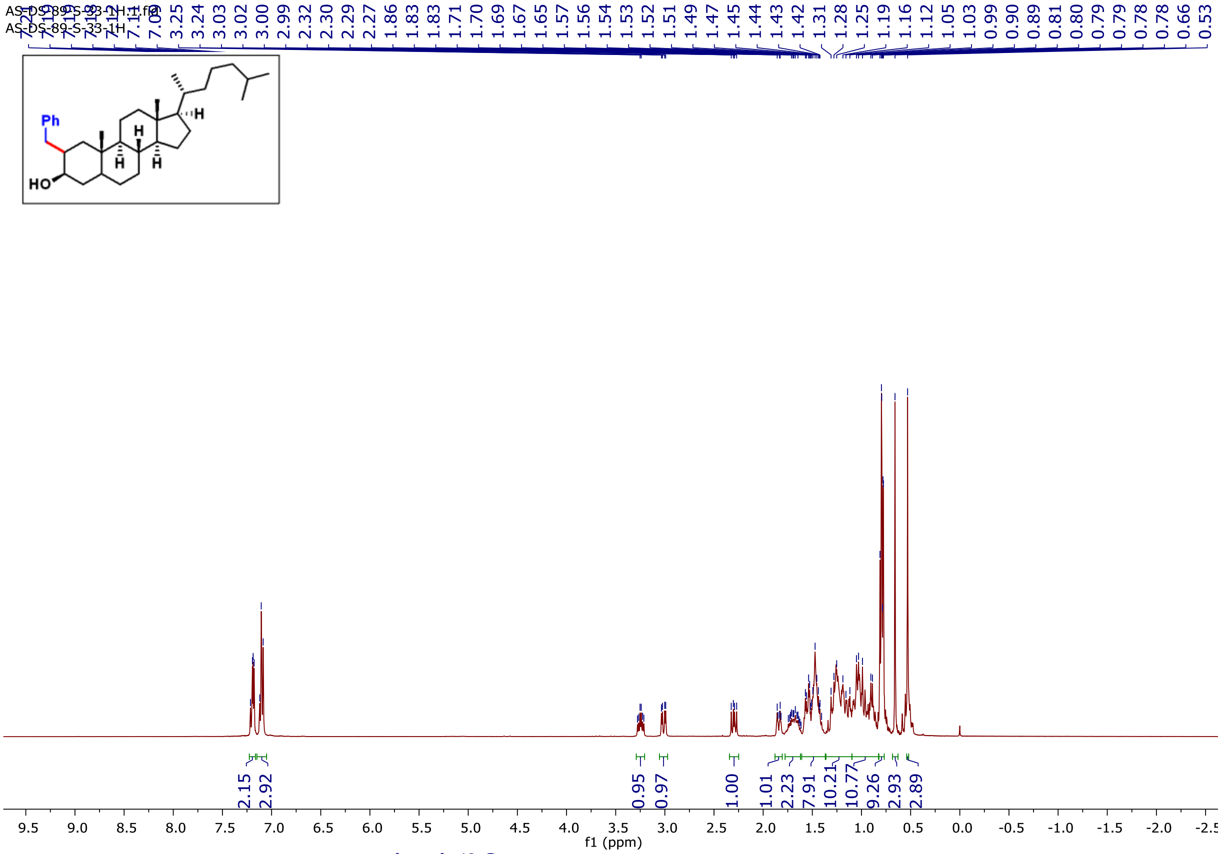


Figure S60. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **3ae** in $CDCl_3$.



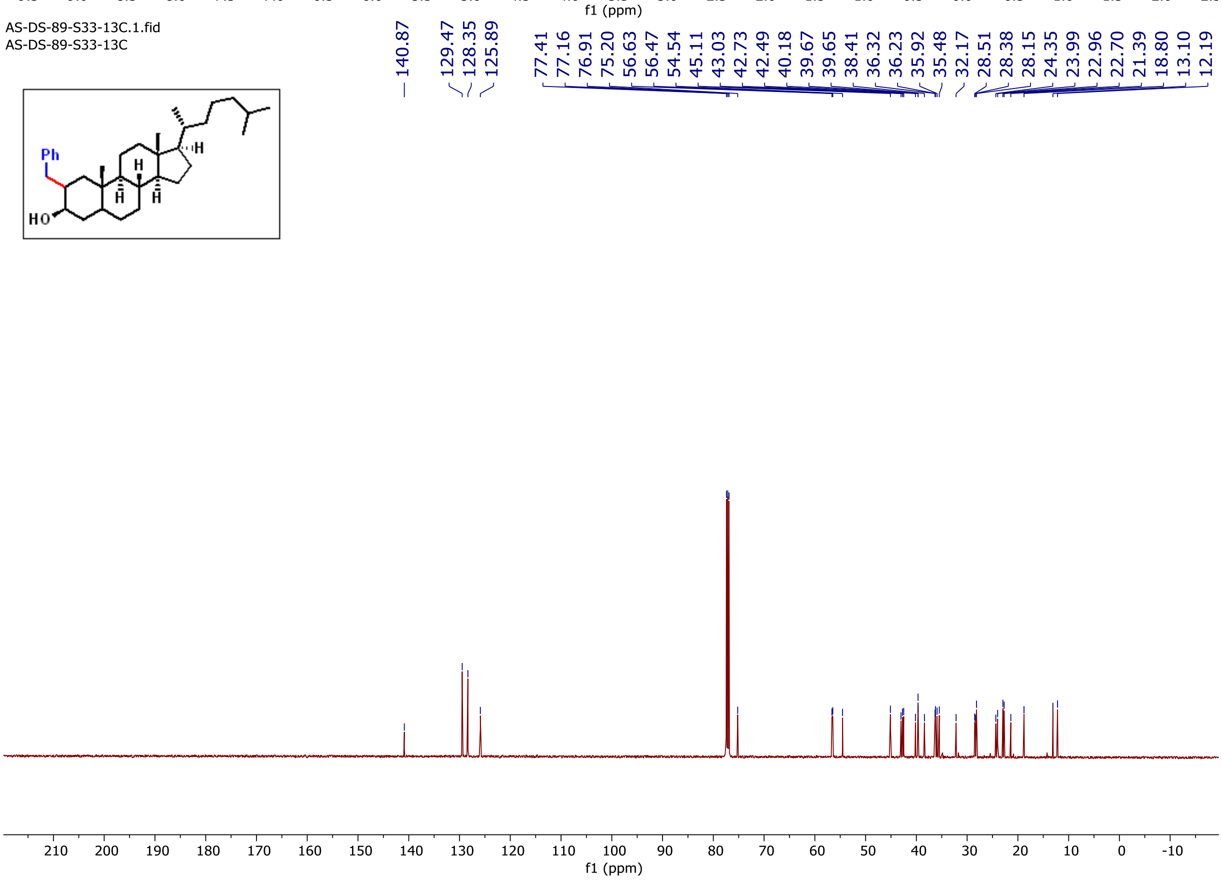
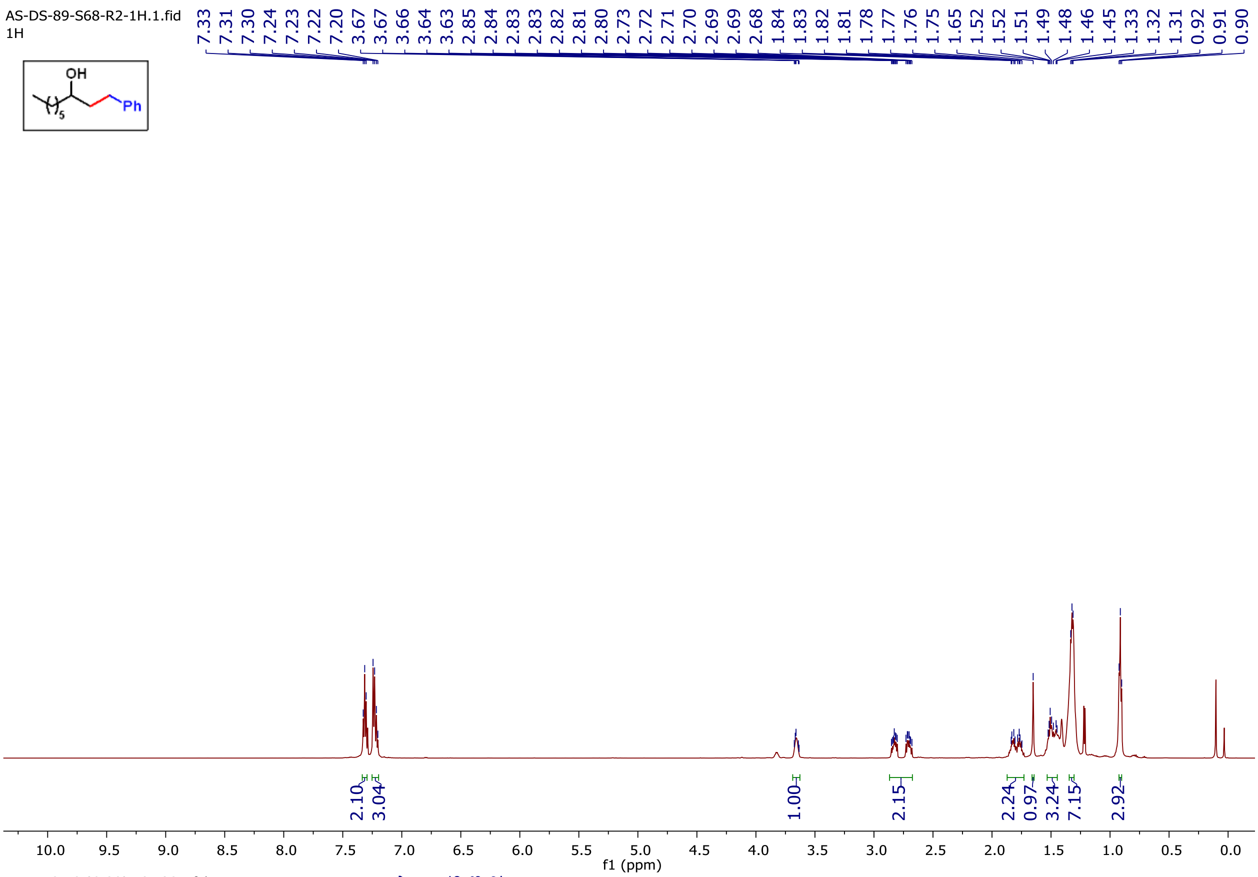


Figure S61. ^{1}H NMR (400 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **3af** in $CDCl_3$.



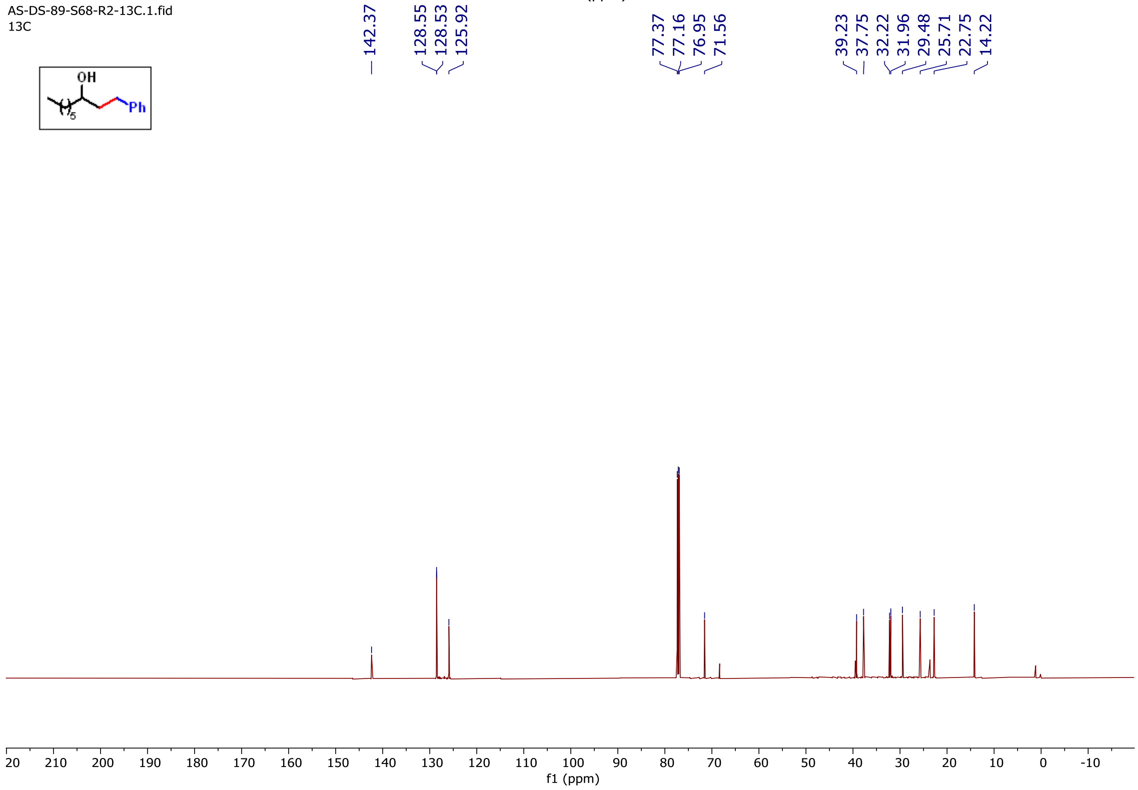
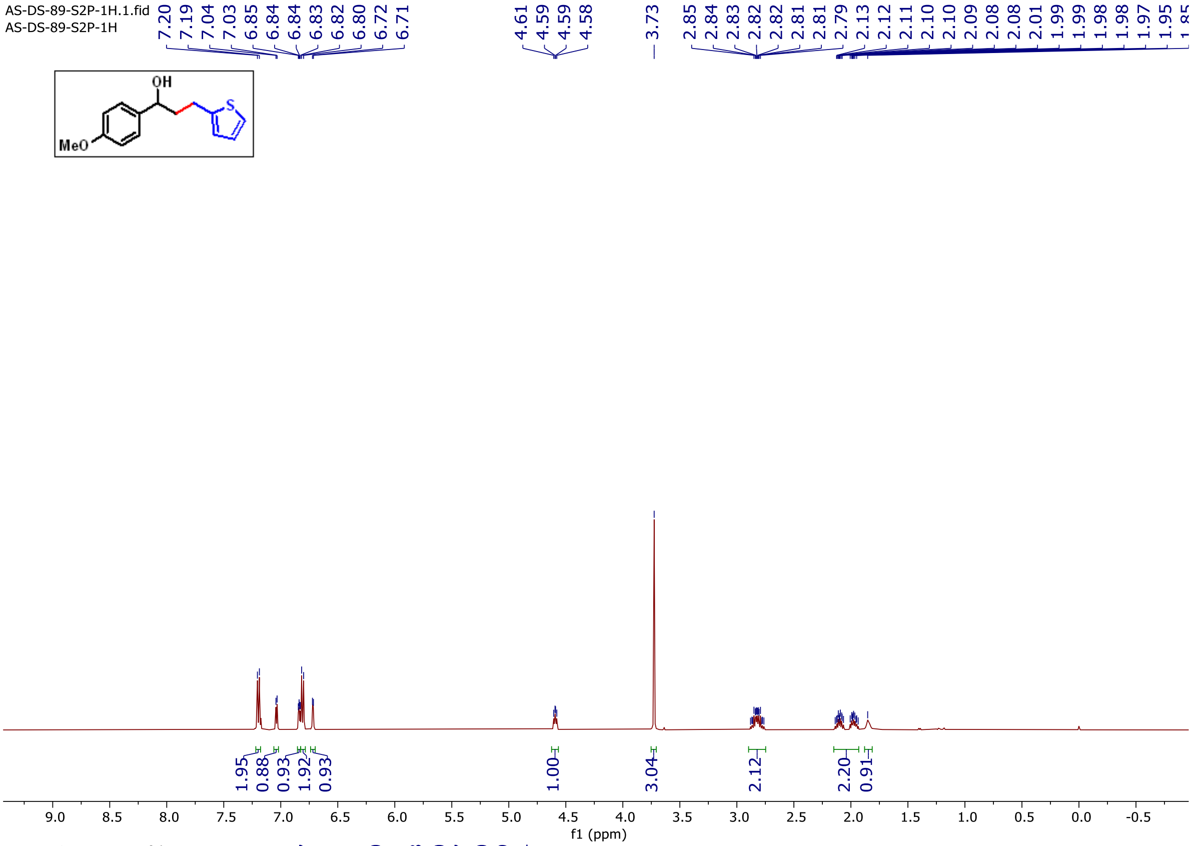


Figure S62. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3ag** in $CDCl_3$.



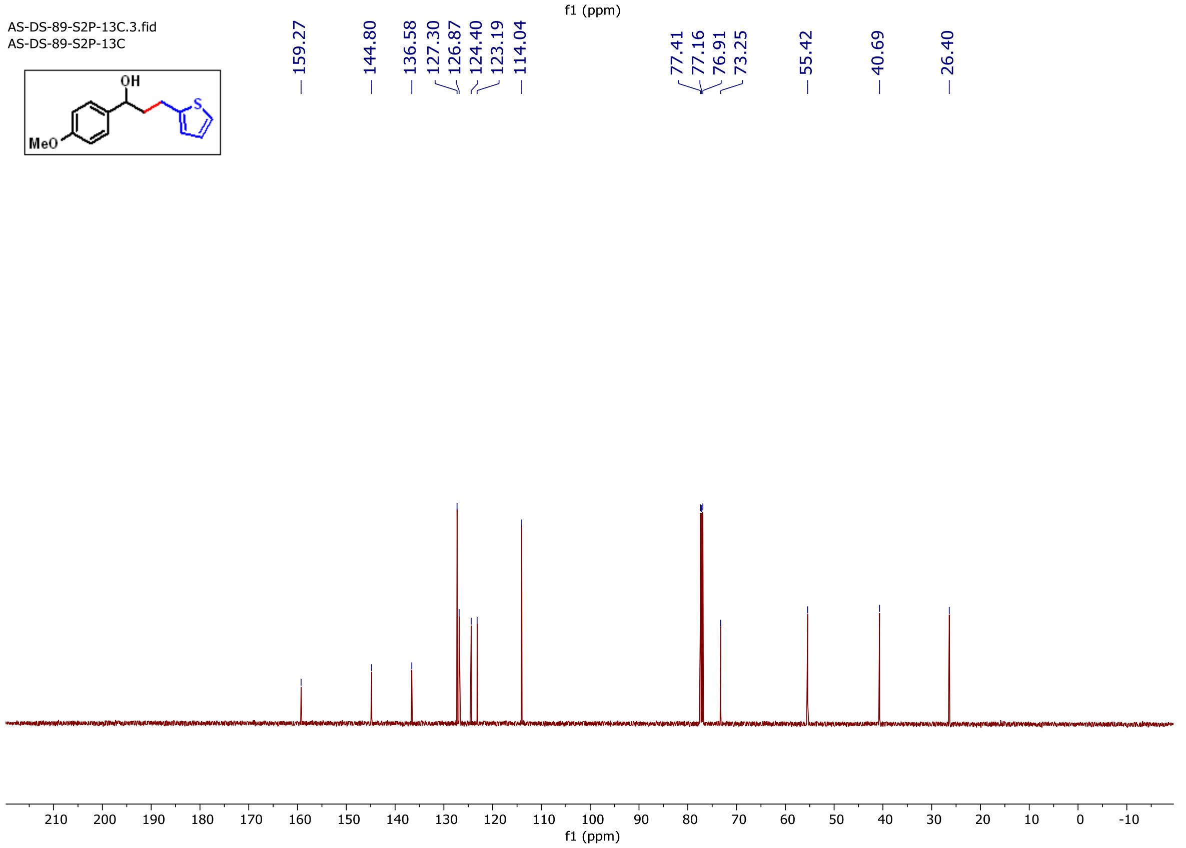
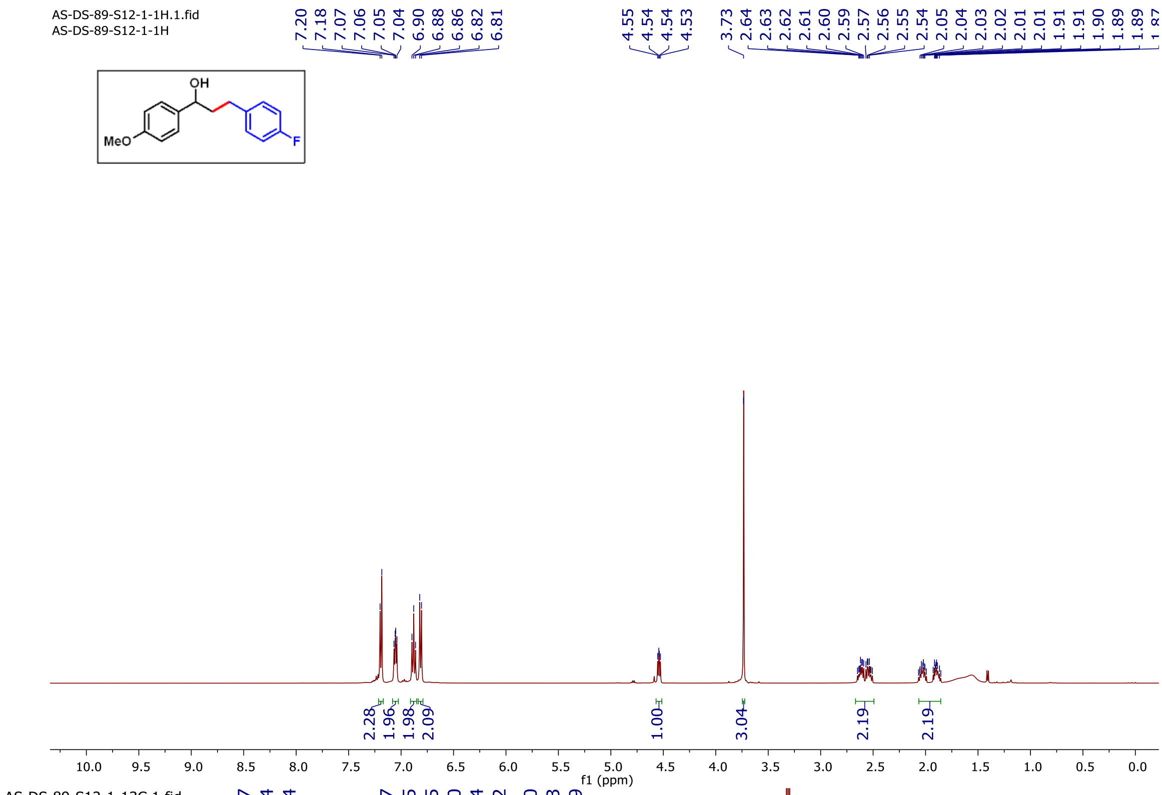


Figure S63. ^{1}H NMR (500 MHz) and $^{13}C\{^{1}H\}$ NMR (125 MHz) spectrum of Compound **3ah** in $CDCl_3$.



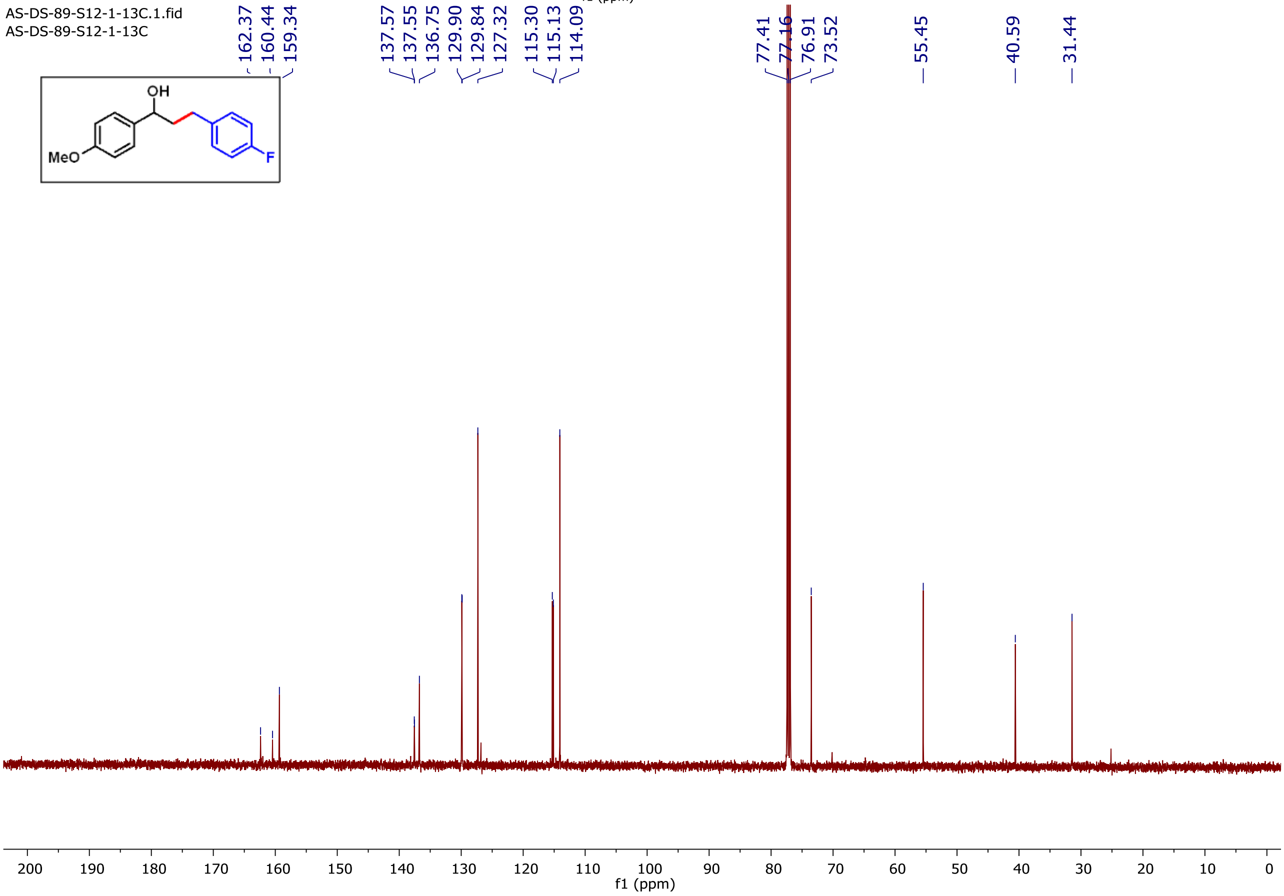
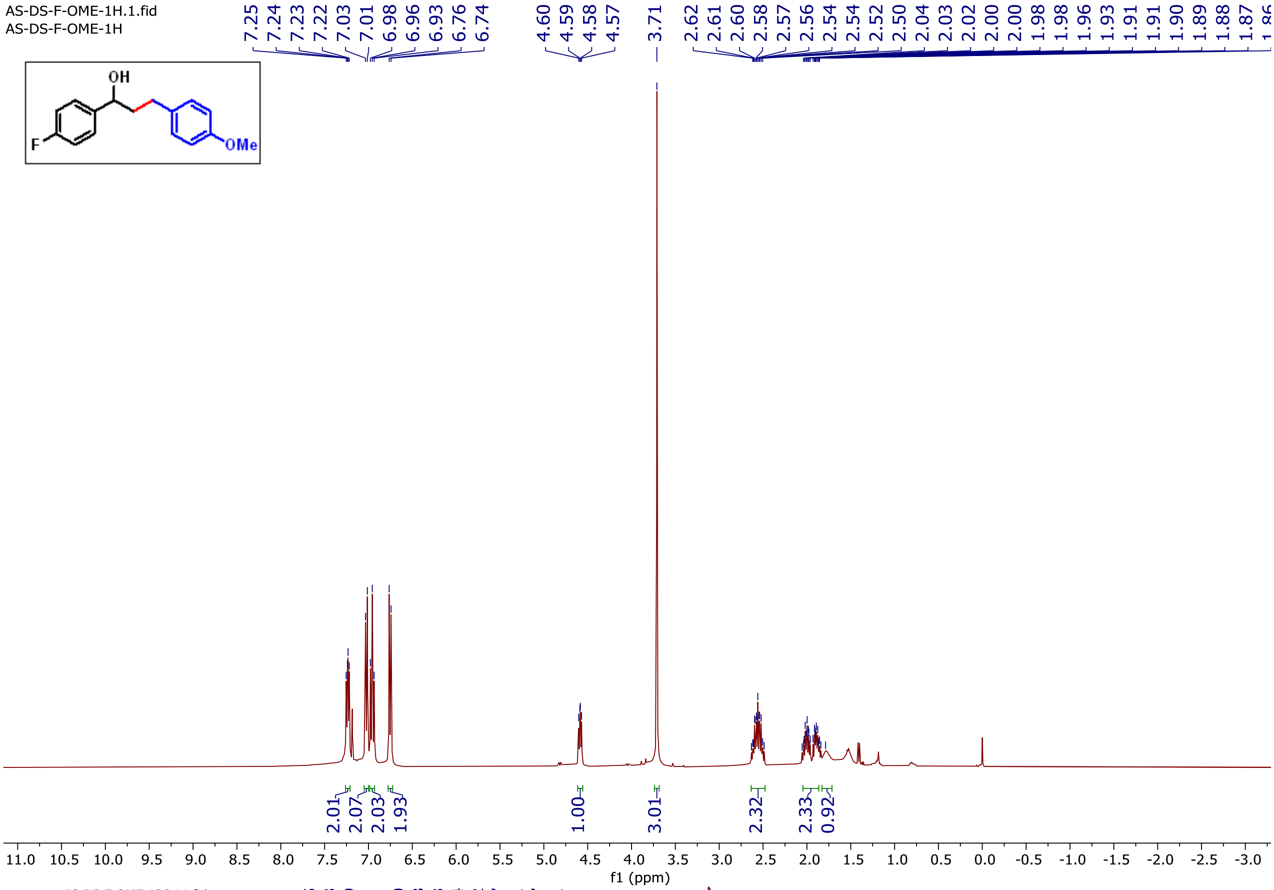
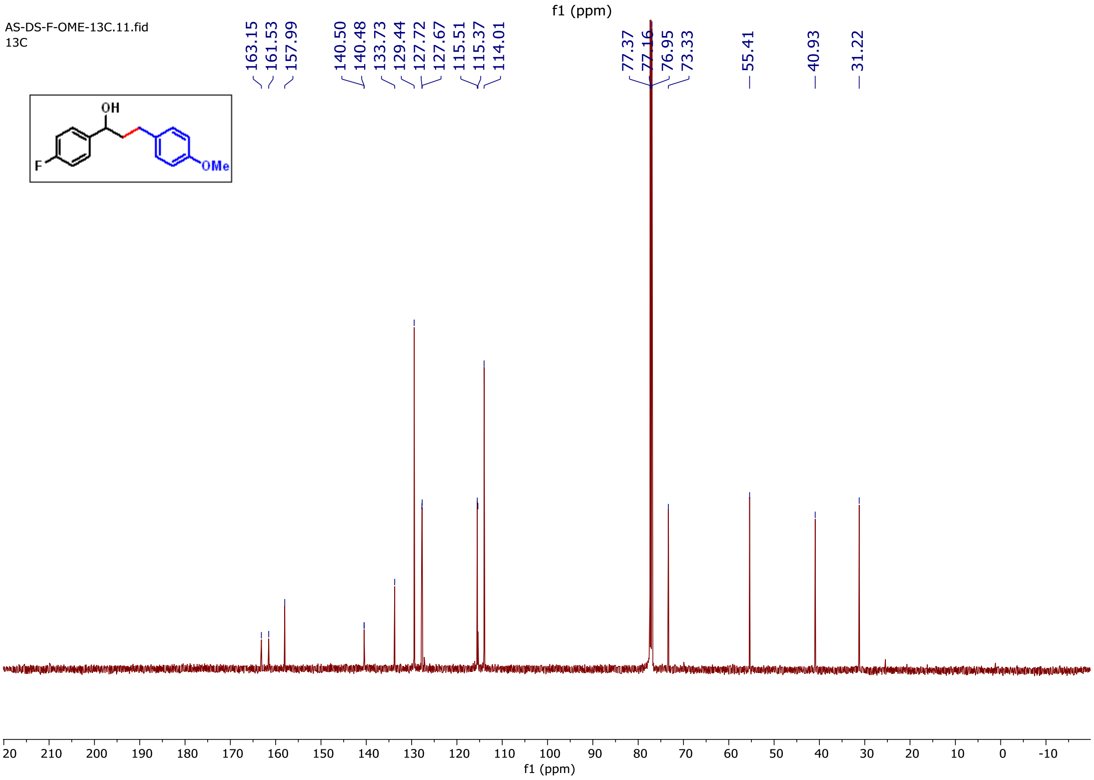


Figure S64. ^{1}H NMR (400 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3ai** in $CDCl_3$.


AS-DS-F-OME-1H.1.fid
AS-DS-F-OME-1H
7.25
7.24
7.23
7.22
7.03
7.01
6.98
6.96
6.93
6.76
6.74
4.60
4.59
4.58
4.57
3.71
2.62
2.61
2.60
2.58
2.57
2.56
2.54
2.54
2.52
2.50
2.04
2.03
2.02
2.00
2.00
1.98
1.98
1.96
1.93
1.91
1.91
1.90
1.89
1.88
1.87
OH
F
OMe
2.01
2.07
2.03
1.93
1.00
3.01
2.32
2.33
0.92
f1 (ppm)


AS-DS-F-OME-13C.11.fid
13C
163.15
161.53
157.99
140.50
140.48
133.73
129.44
127.72
127.67
115.51
115.37
114.01
77.37
77.16
76.95
73.33
55.41
40.93
31.22
OH
F
OMe
f1 (ppm)

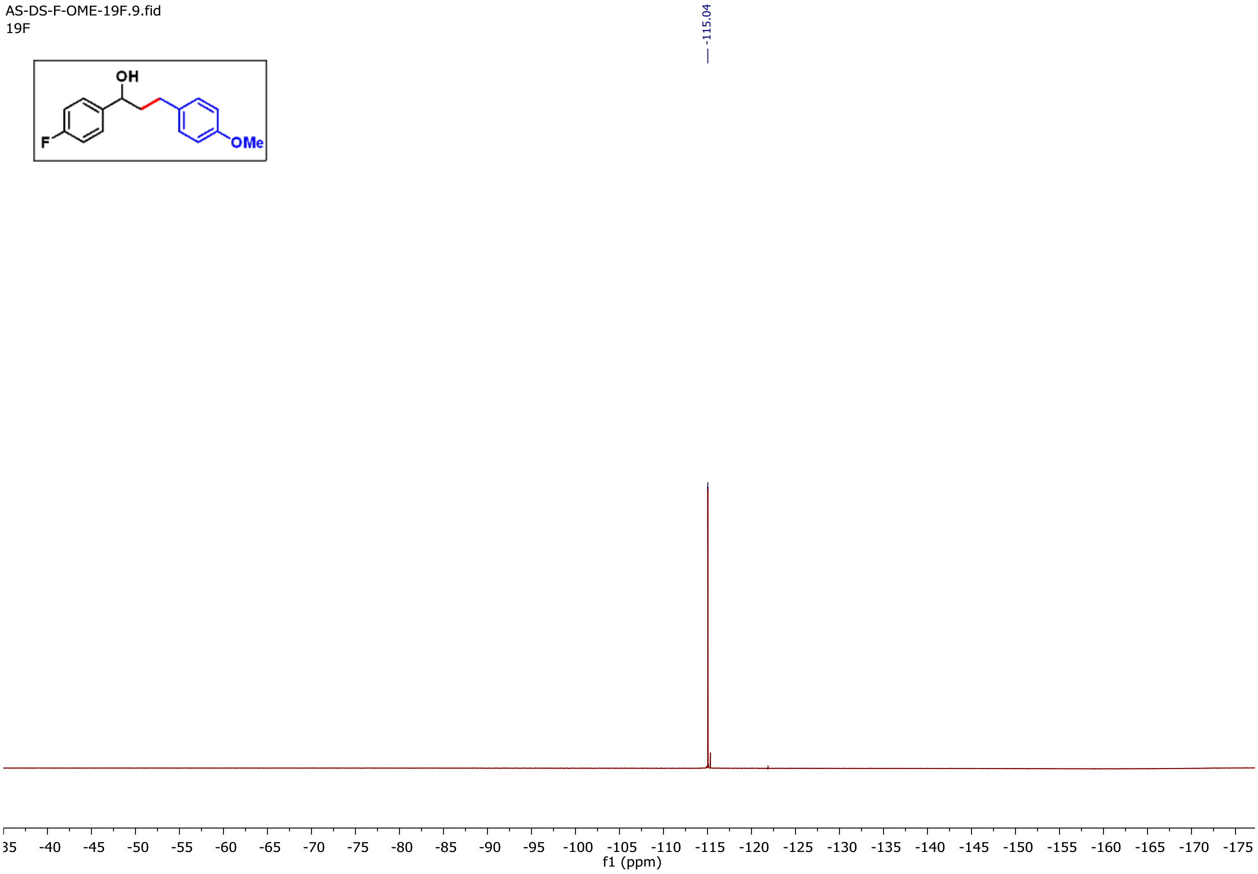
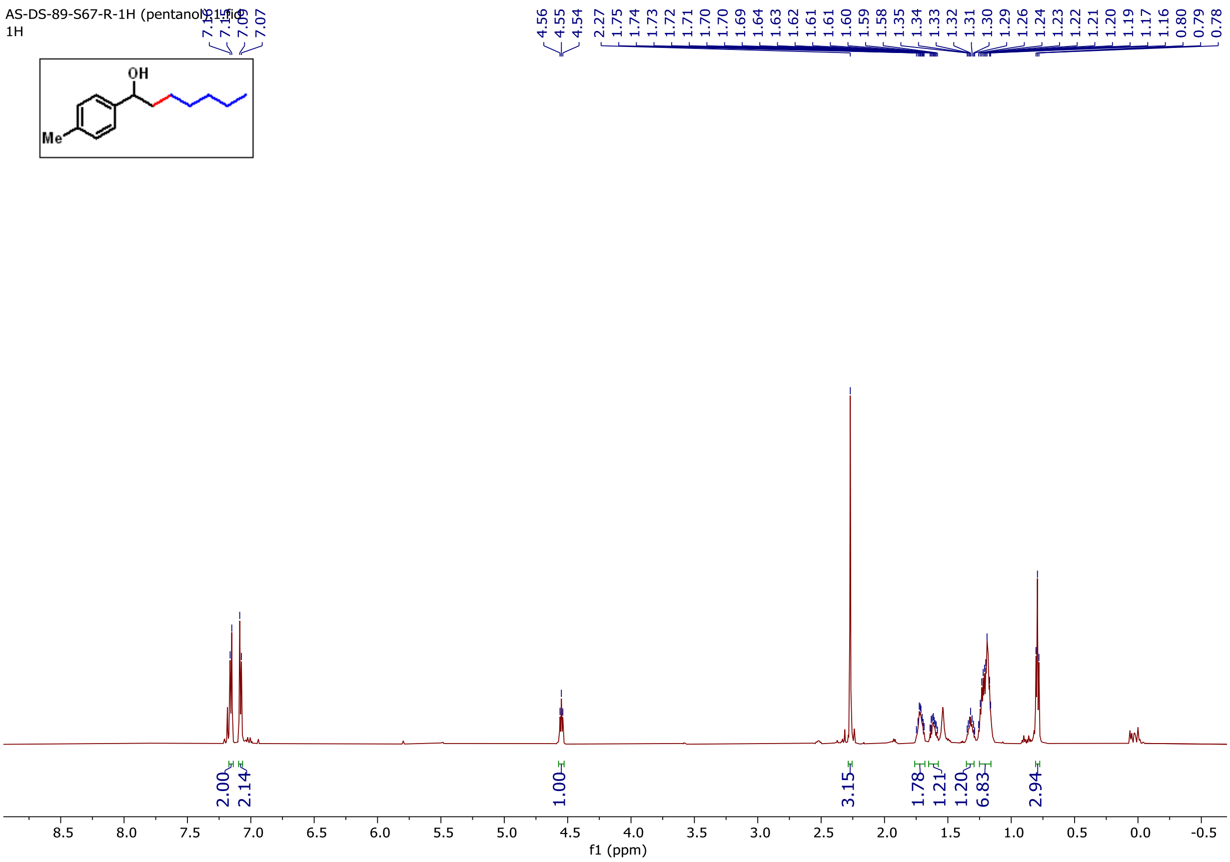


Figure S65. ^{1}H NMR (400 MHz), $^{13}C\{^{1}H\}$ NMR (150 MHz) and ^{19}F {^{1}H) NMR (564 MHz) spectrum of Compound **3aj** in $CDCl_3$.



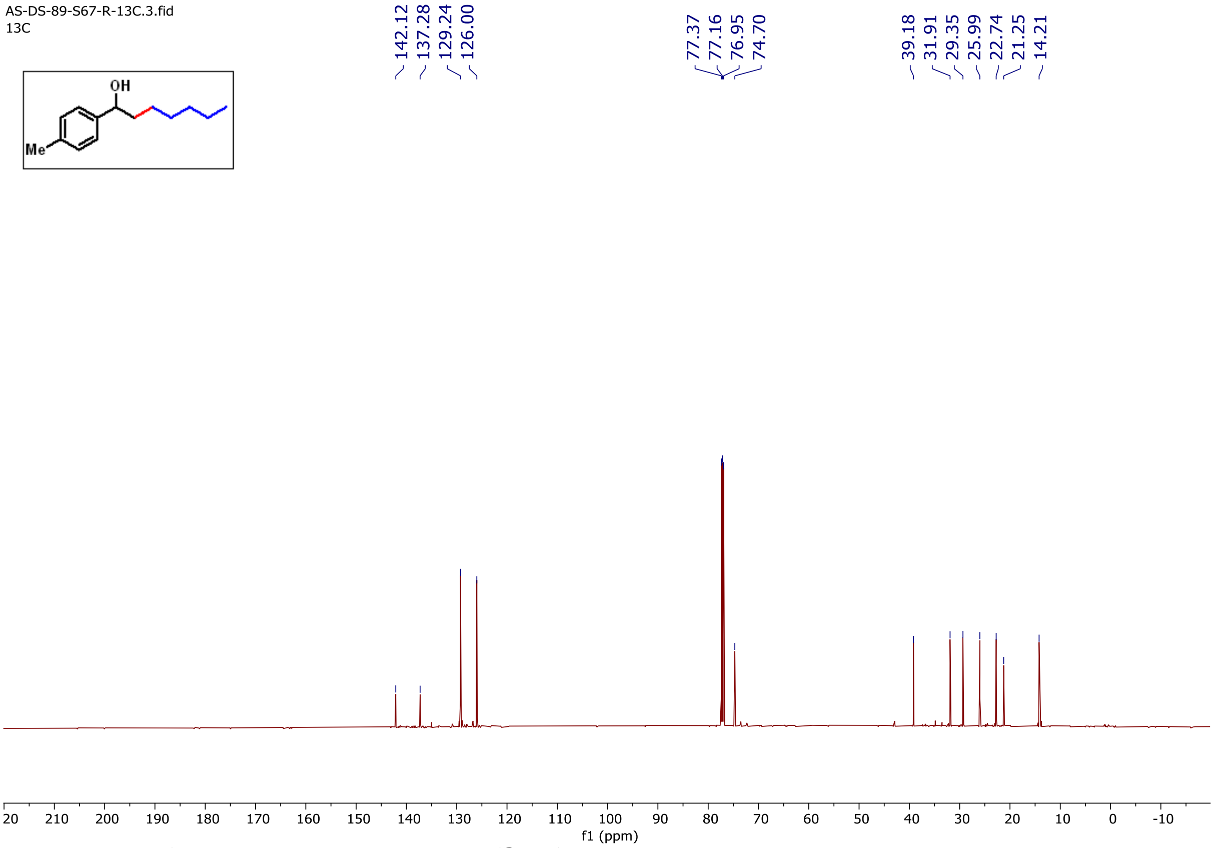
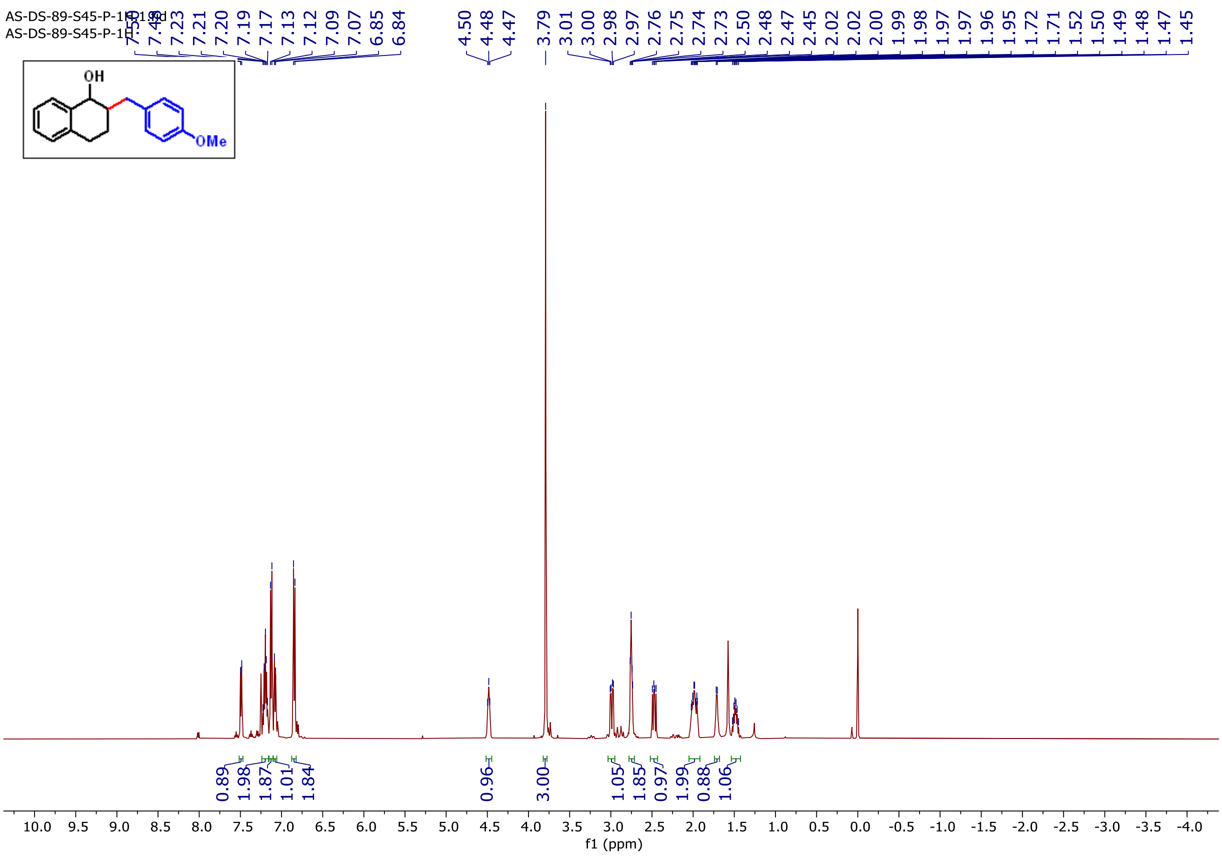


Figure S66. [1]H NMR (600 MHz) and [13]C{[1]H} NMR (150 MHz) spectrum of Compound **3ak** in $CDCl_3$.



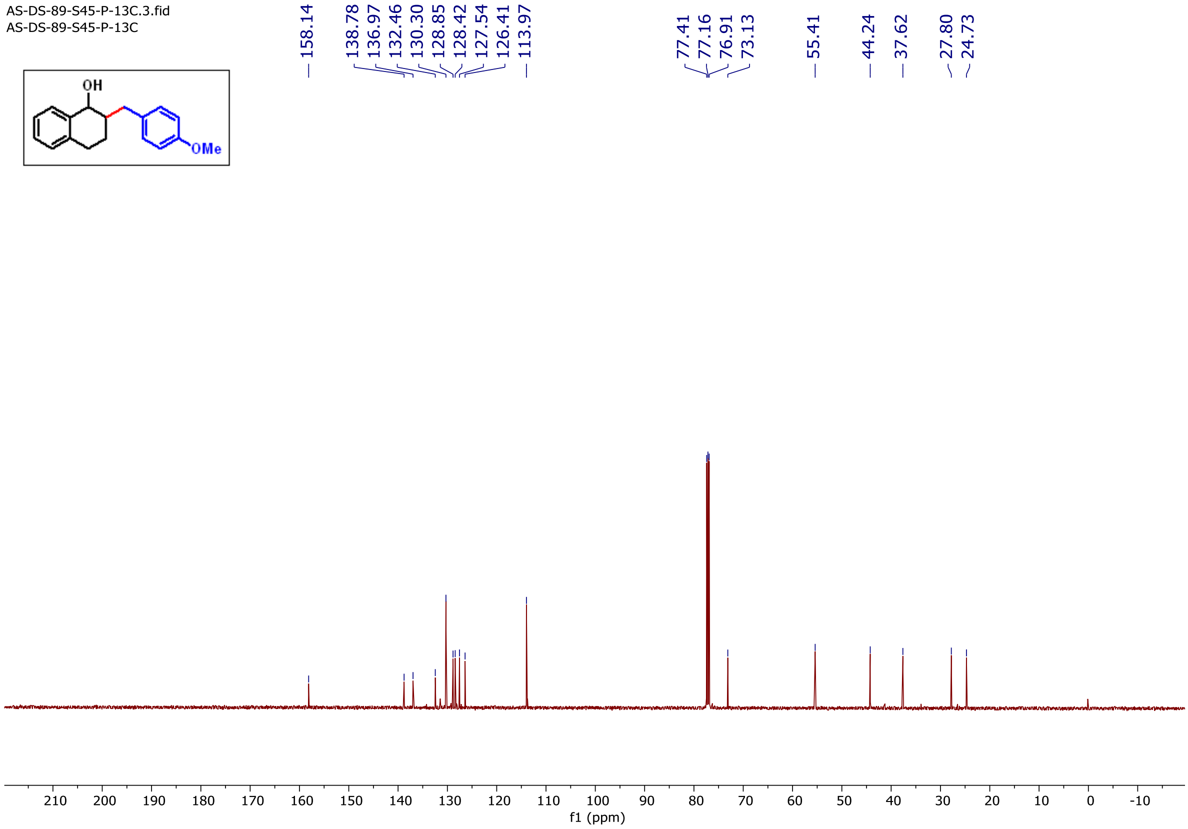
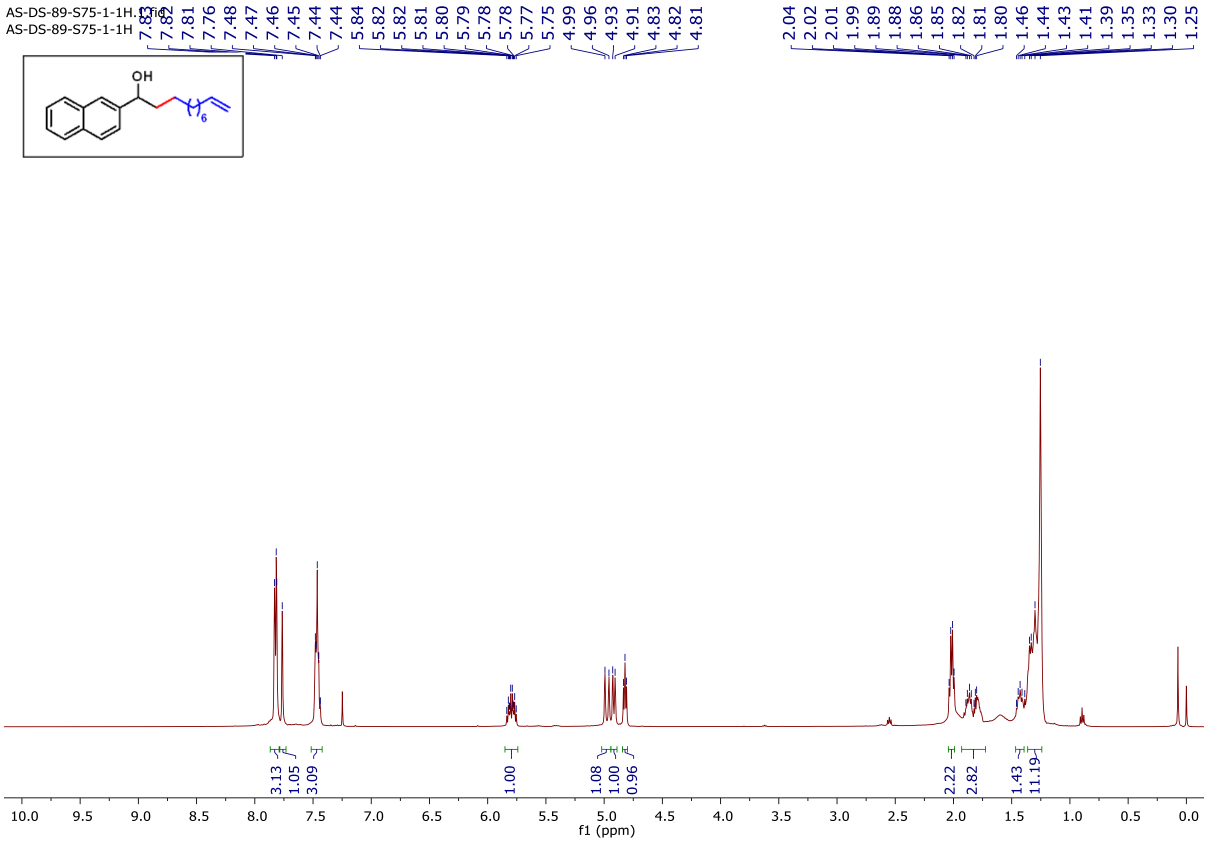


Figure S67. ^{1}H NMR (500 MHz) and ^{13}C{^{1}H} NMR (125 MHz) spectrum of Compound **3al** in $CDCl_3$.



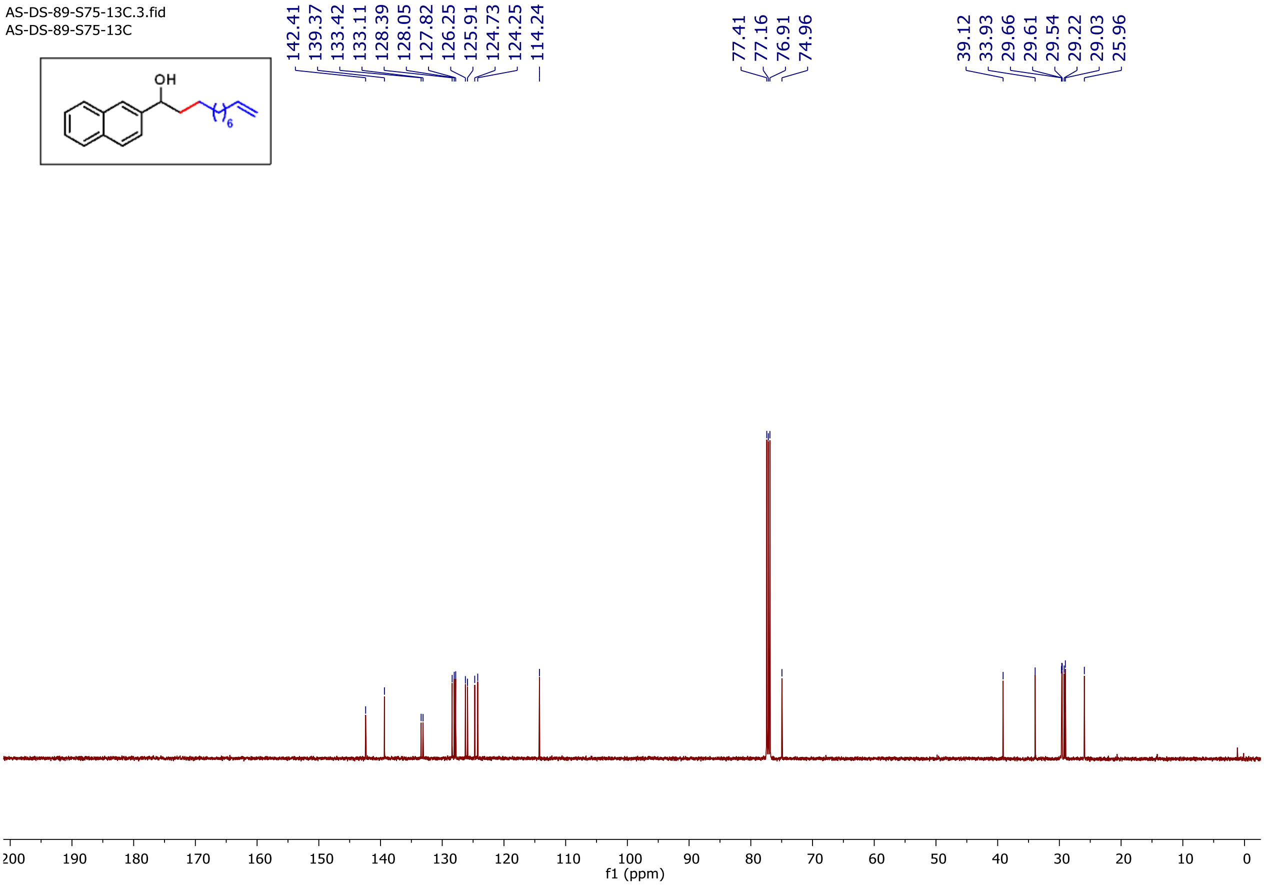
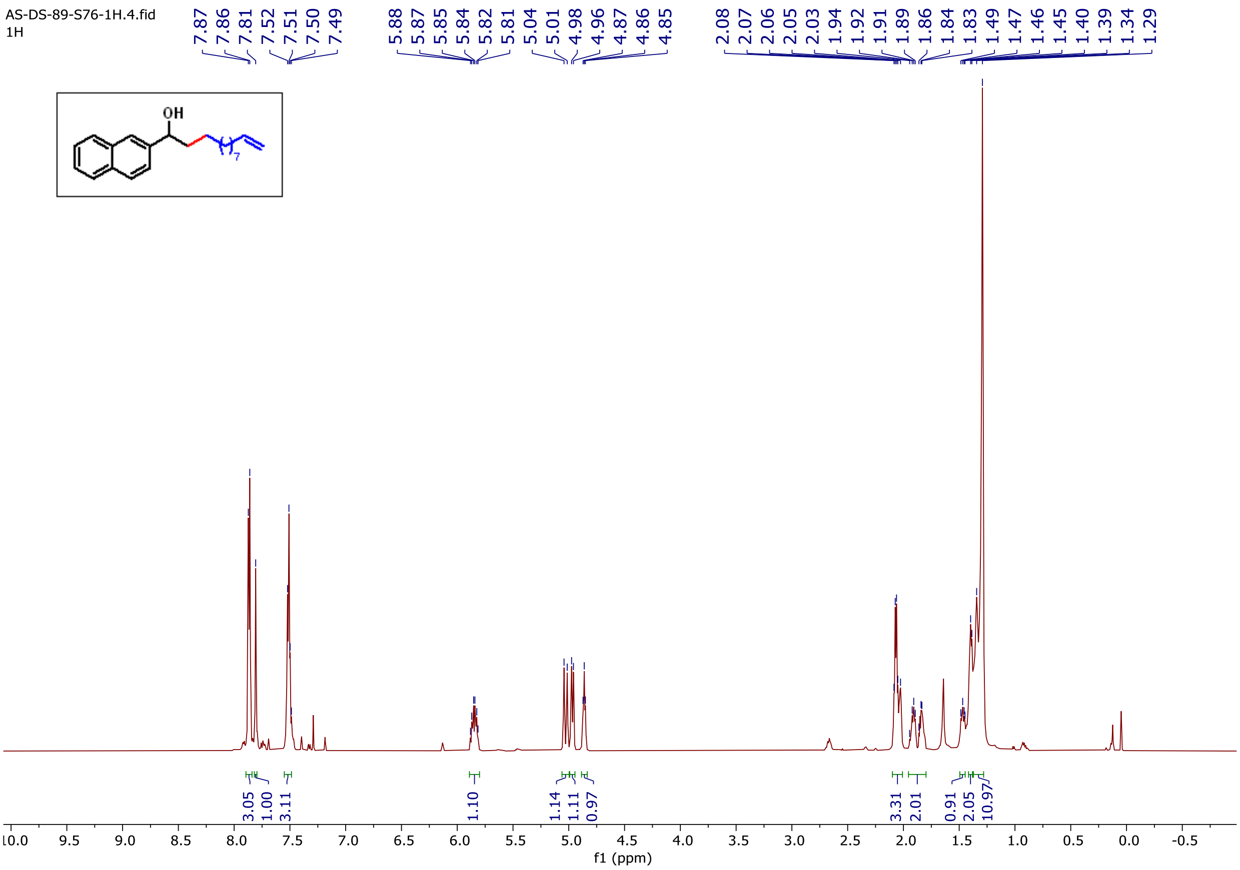


Figure S68. ^{1}H NMR (500 MHz) and ^{13}C{^{1}H} NMR (125 MHz) spectrum of Compound **3am** in $CDCl_3$.



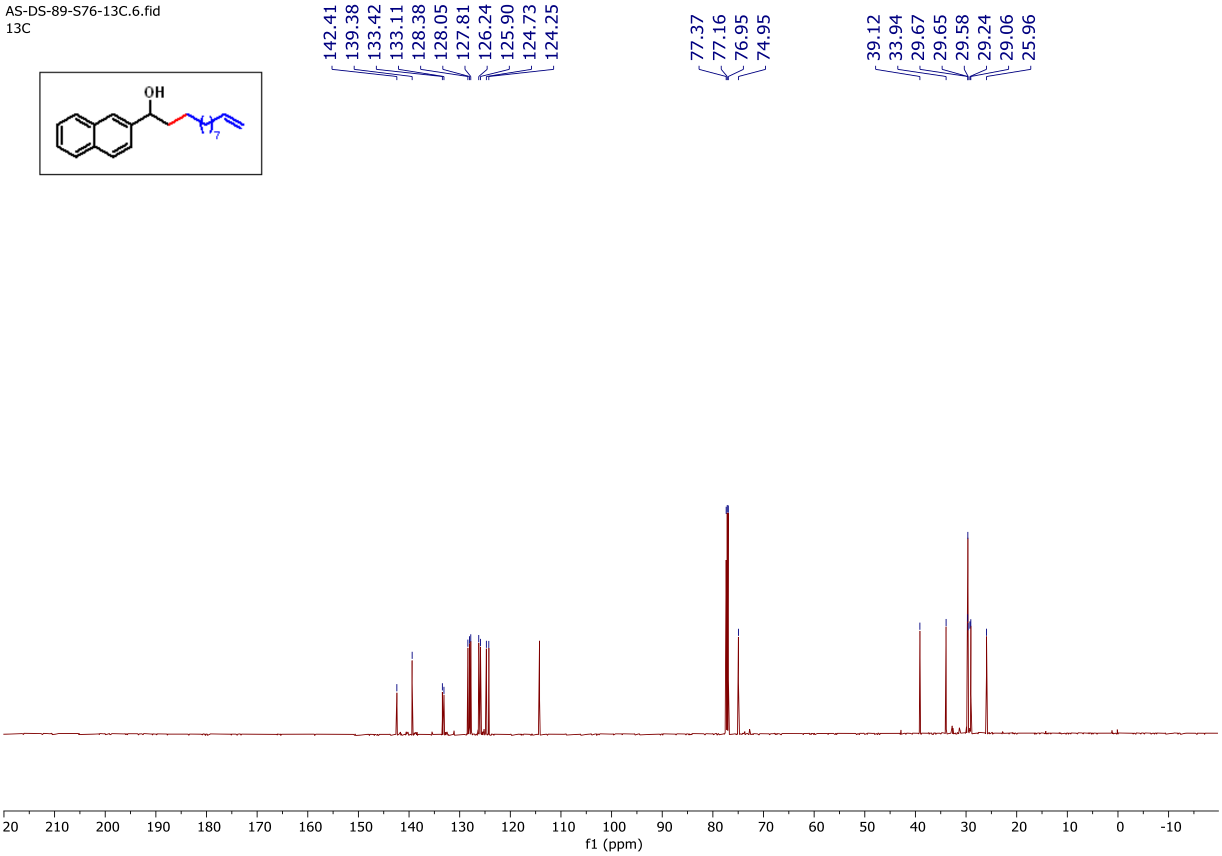
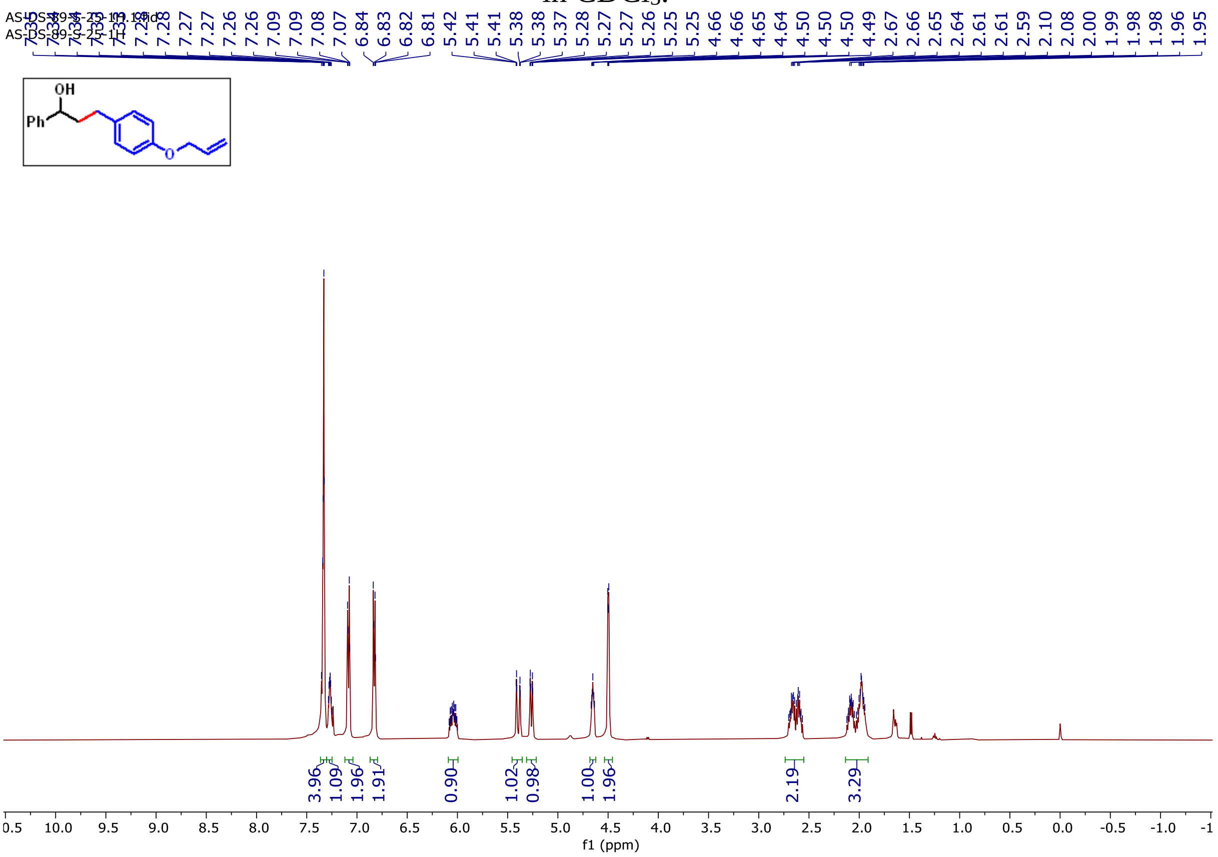


Figure S69. ^{1}H NMR (600 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3an** in $CDCl_3$.



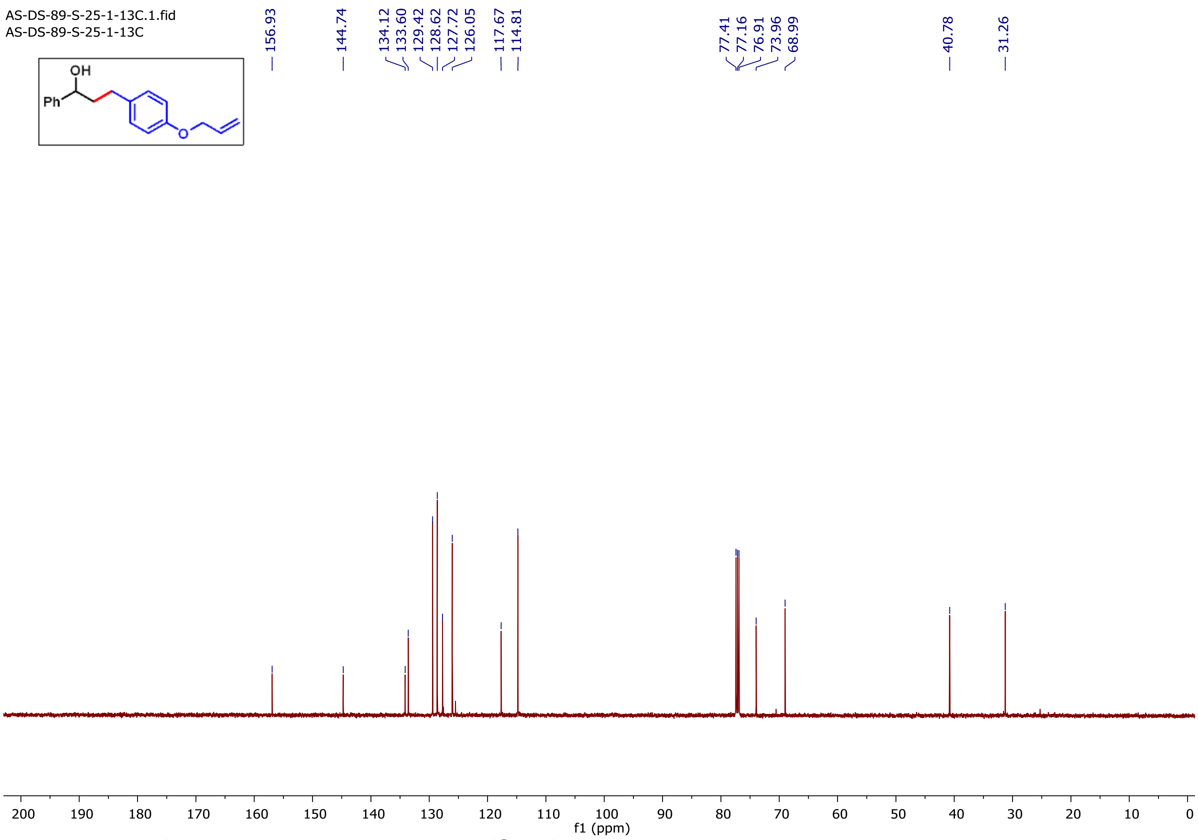
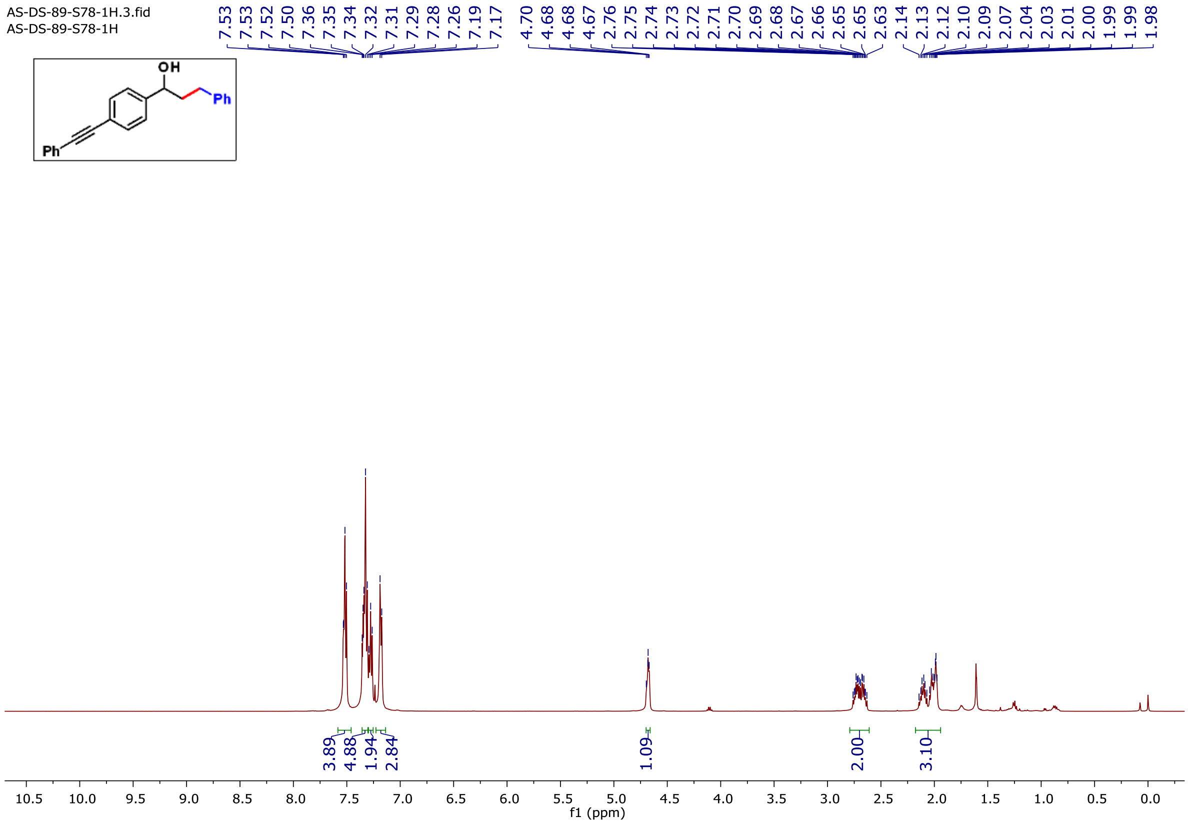


Figure S70. [1]H NMR (500 MHz) and [13]C{[1]H} NMR (125 MHz) spectrum of Compound **3ao** in $CDCl_3$.



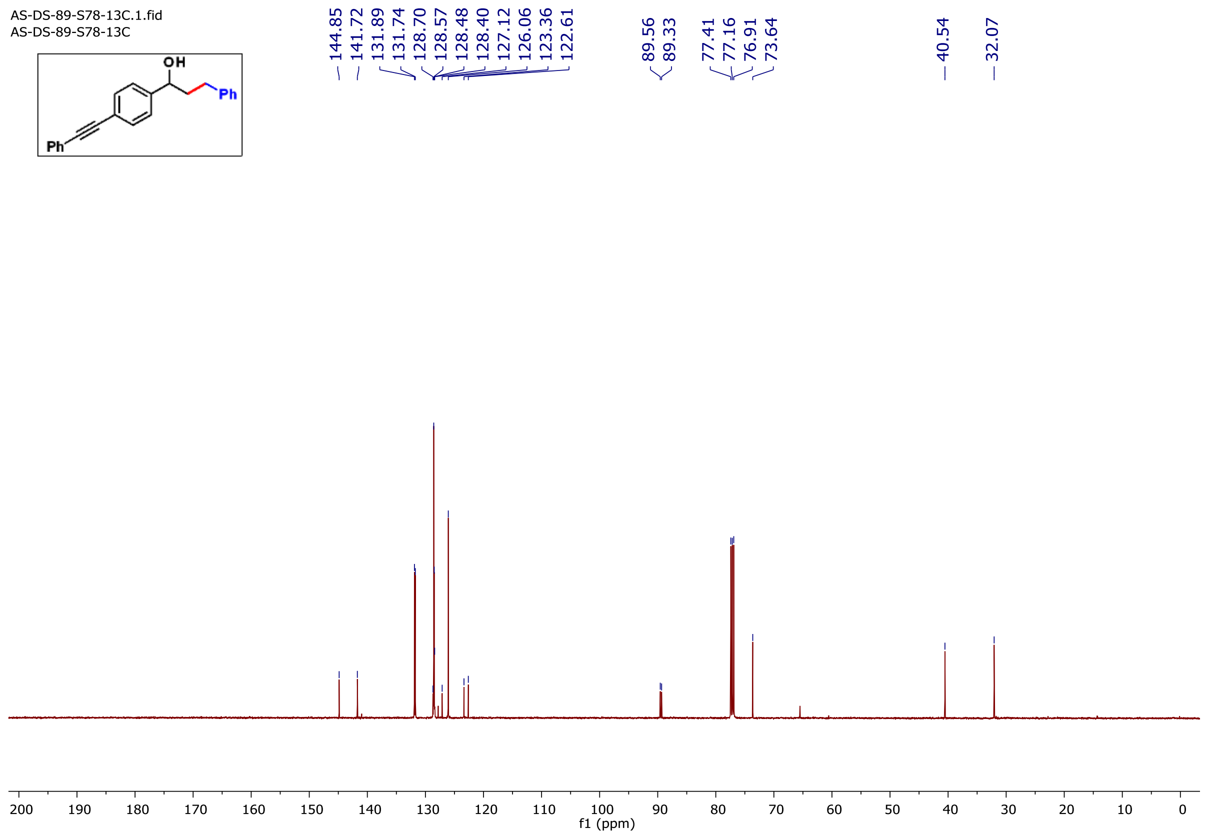
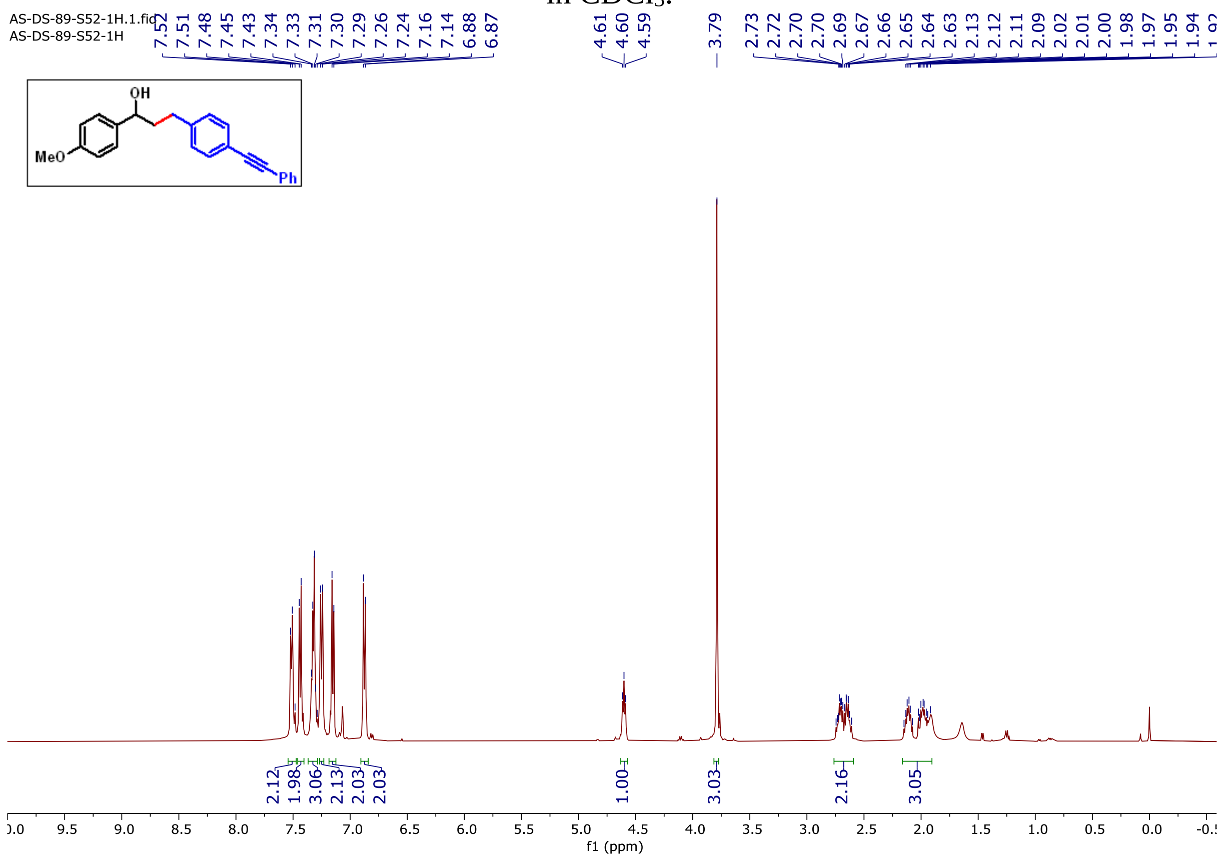


Figure S71. [1]H NMR (500 MHz) and [13]C{[1]H} NMR (125 MHz) spectrum of Compound **3ap** in $CDCl_3$.



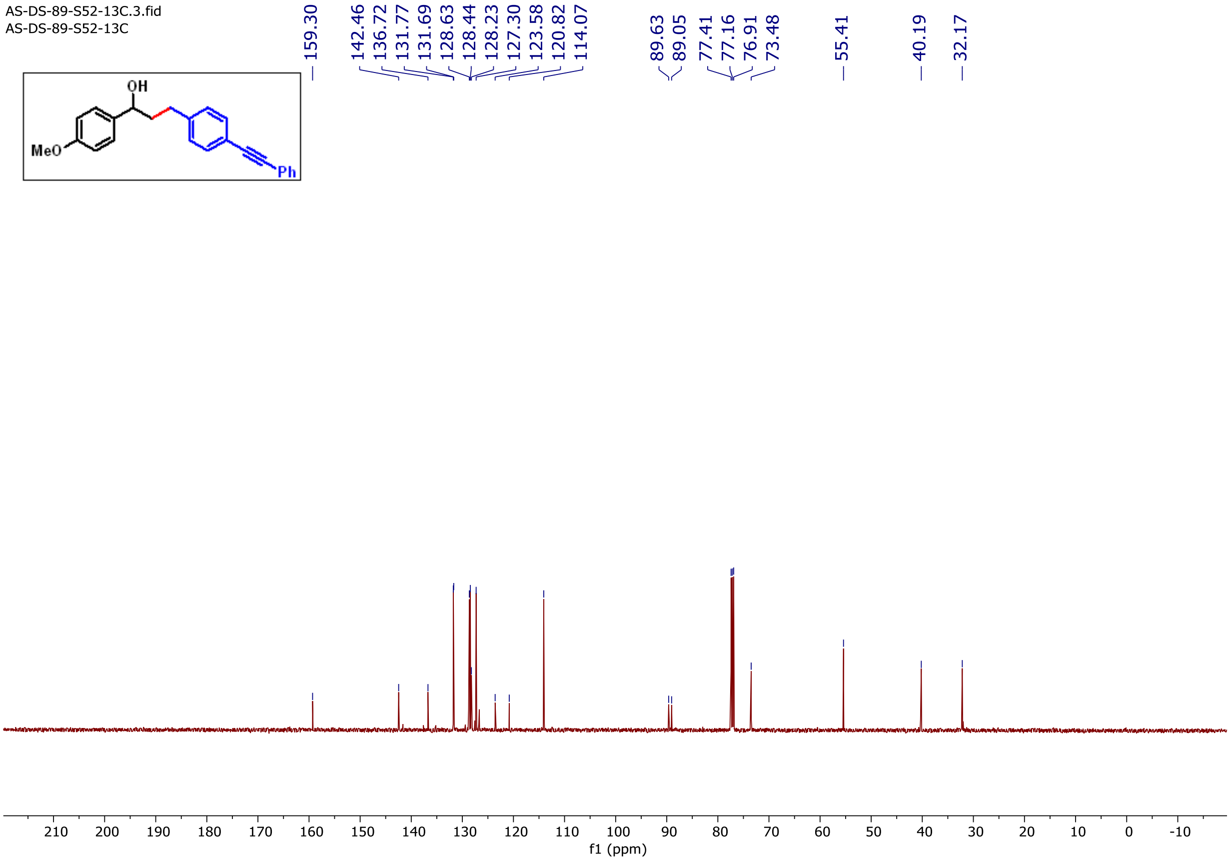
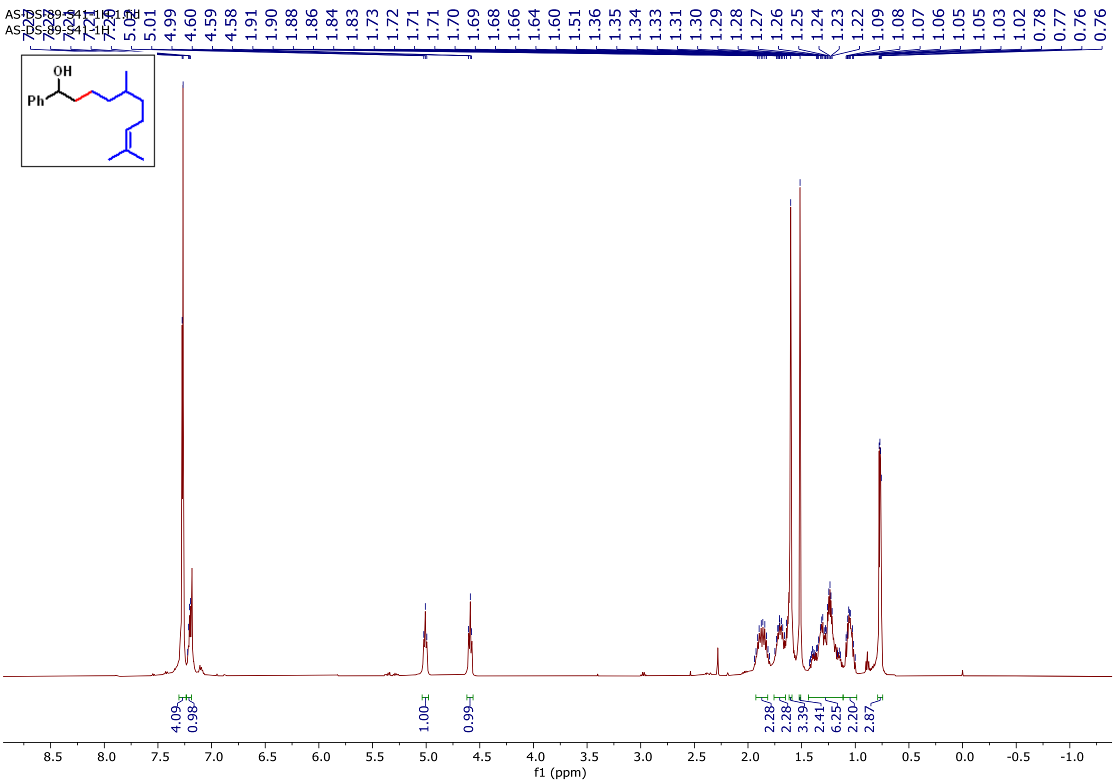


Figure S72. ^{1}H NMR (500 MHz) and ^{13}C{^{1}H} NMR (125 MHz) spectrum of Compound **3aq** in $CDCl_3$.



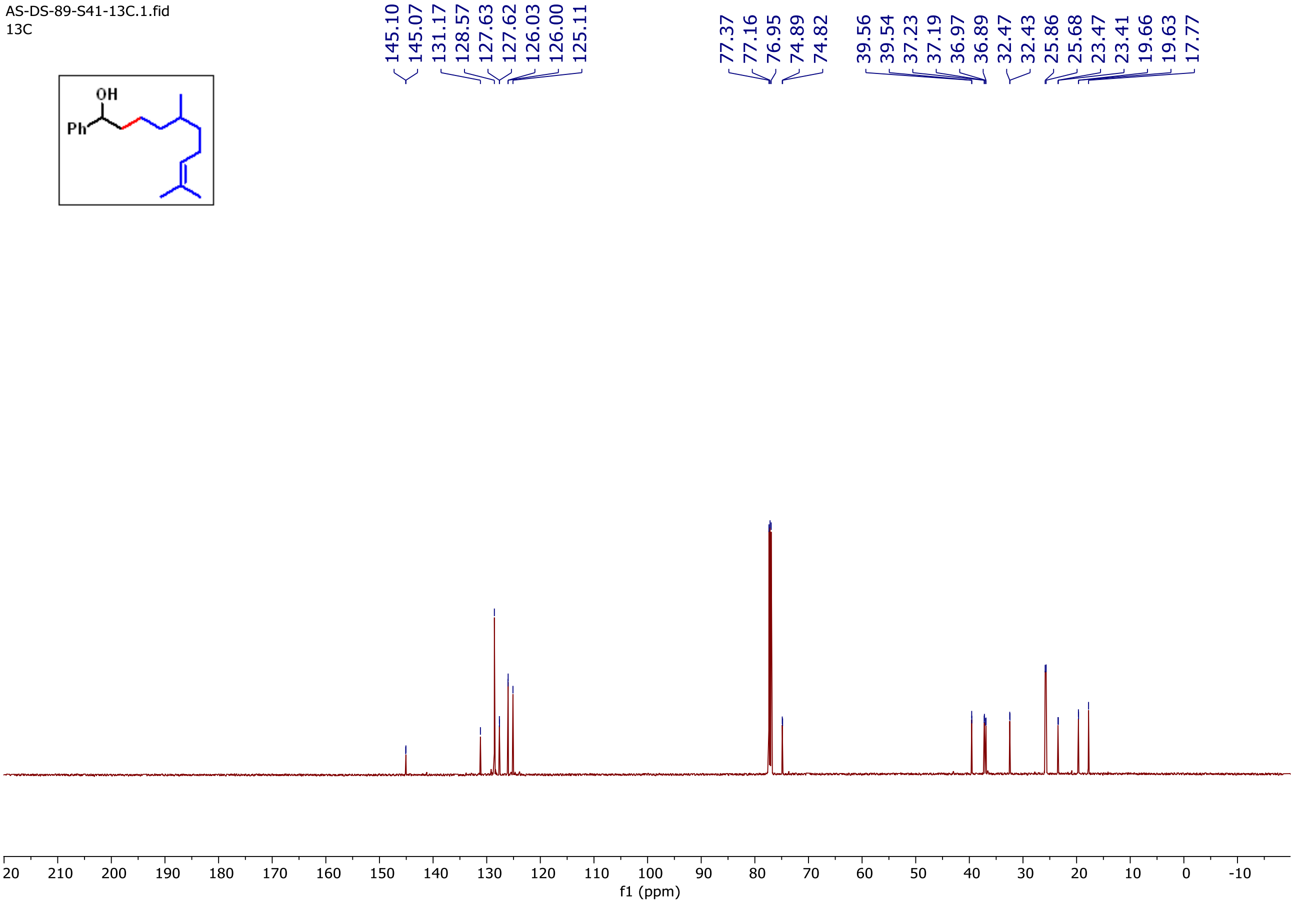
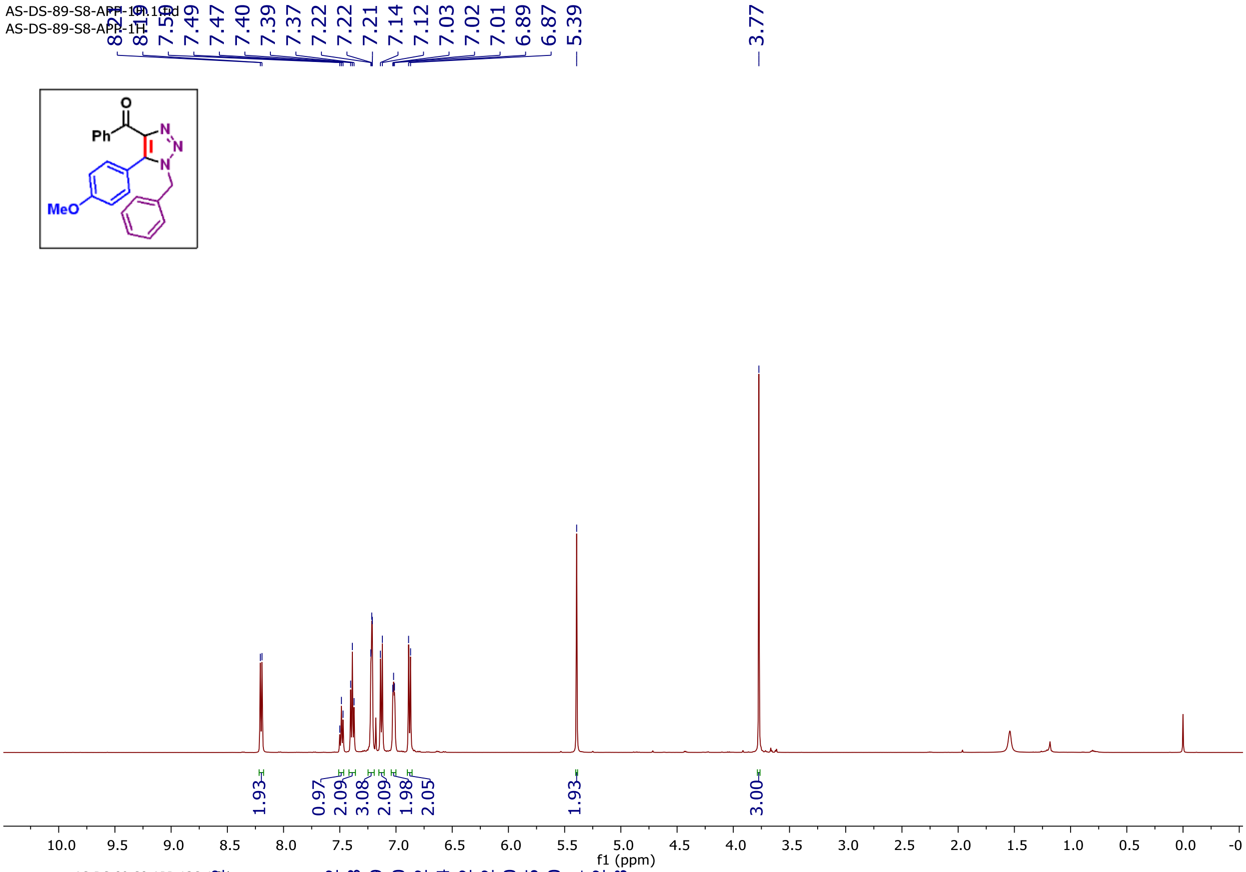


Figure S73. ^{1}H NMR (500 MHz) and ^{13}C{^{1}H} NMR (150 MHz) spectrum of Compound **3ar** in $CDCl_3$.



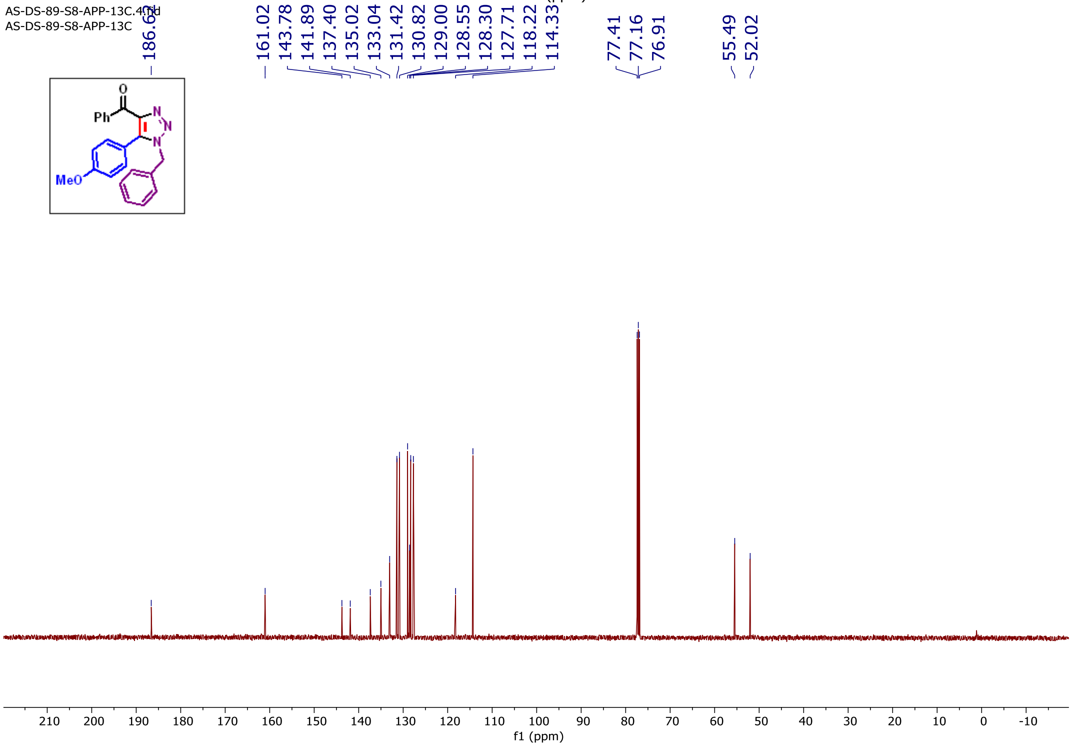
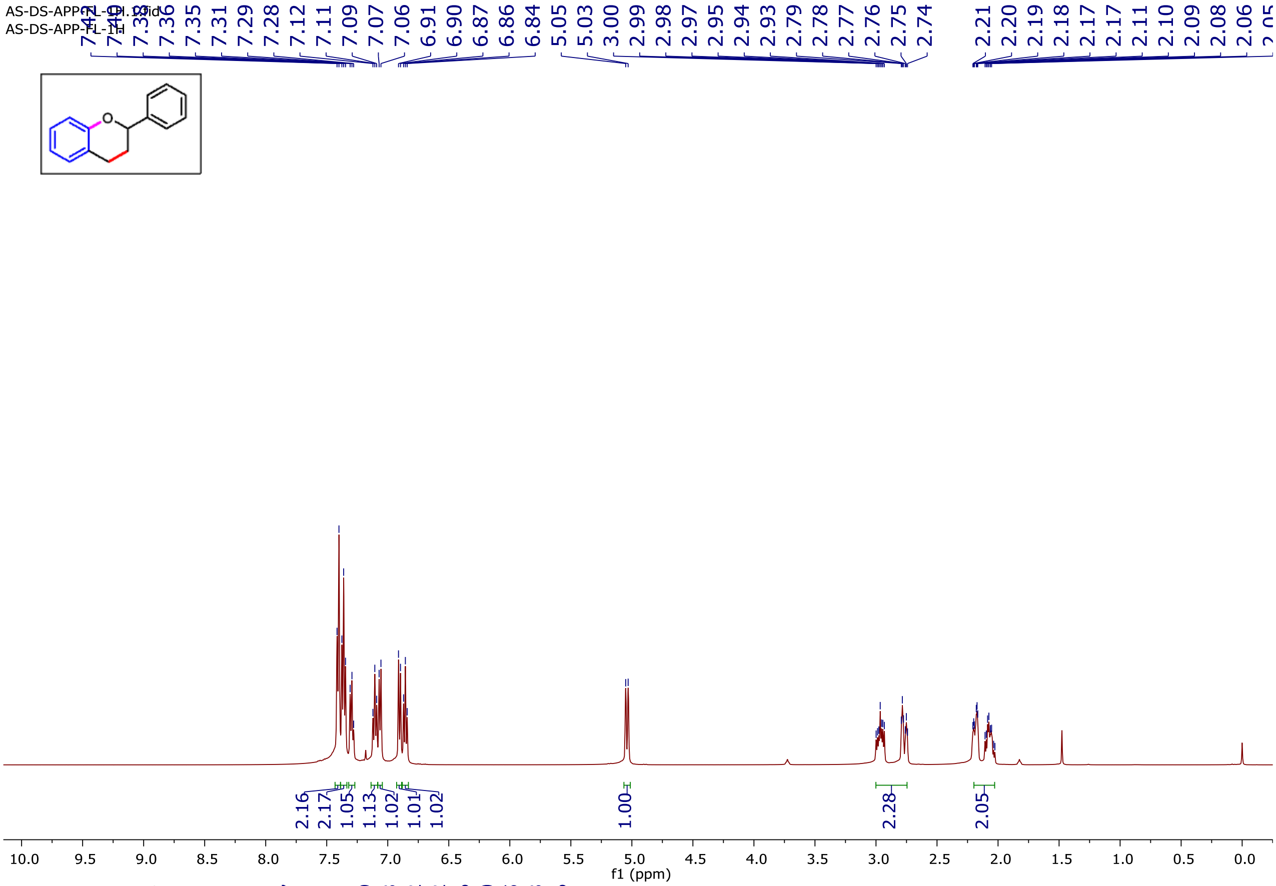


Figure S74. ^{1}H NMR (600 MHz) and $^{13}C\{^{1}H\}$ NMR (150 MHz) spectrum of Compound **5a** in $CDCl_3$.



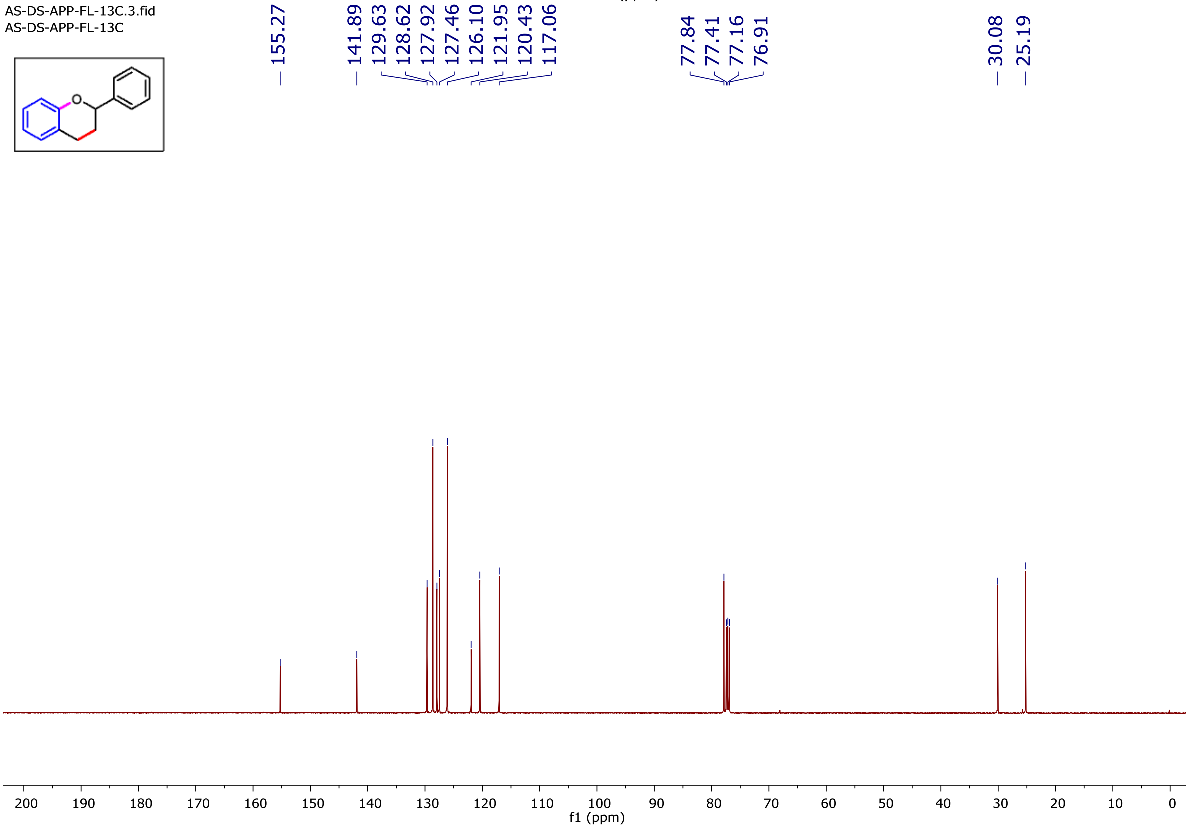
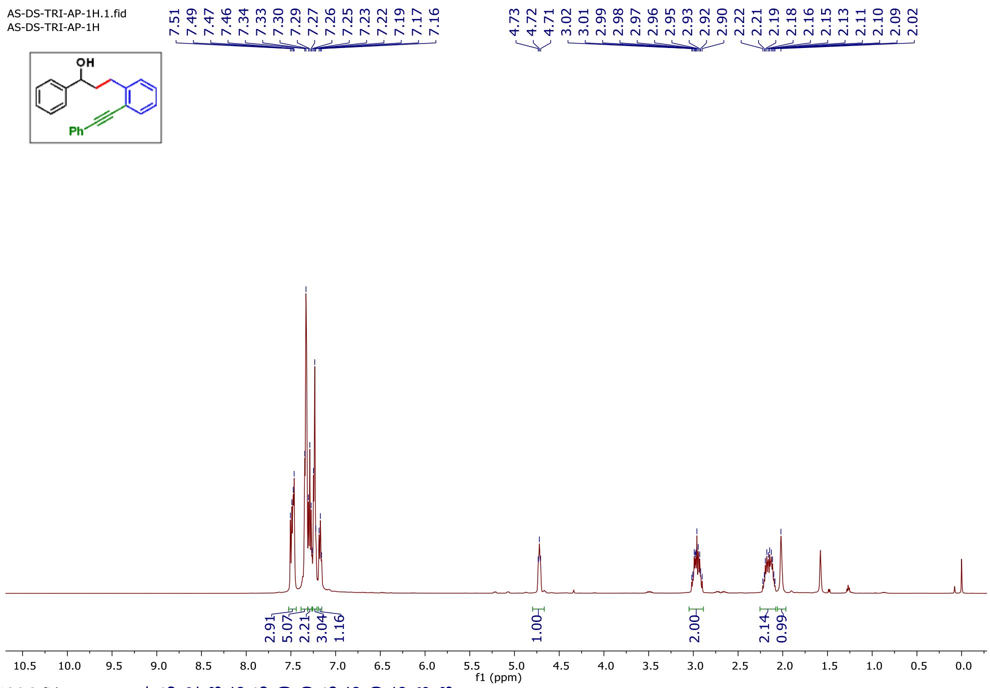


Figure S75. ^{1}H NMR (600 MHz) and $^{13}C\{^{1}H\}$ NMR (150 MHz) spectrum of Compound **5b** in $CDCl_3$.



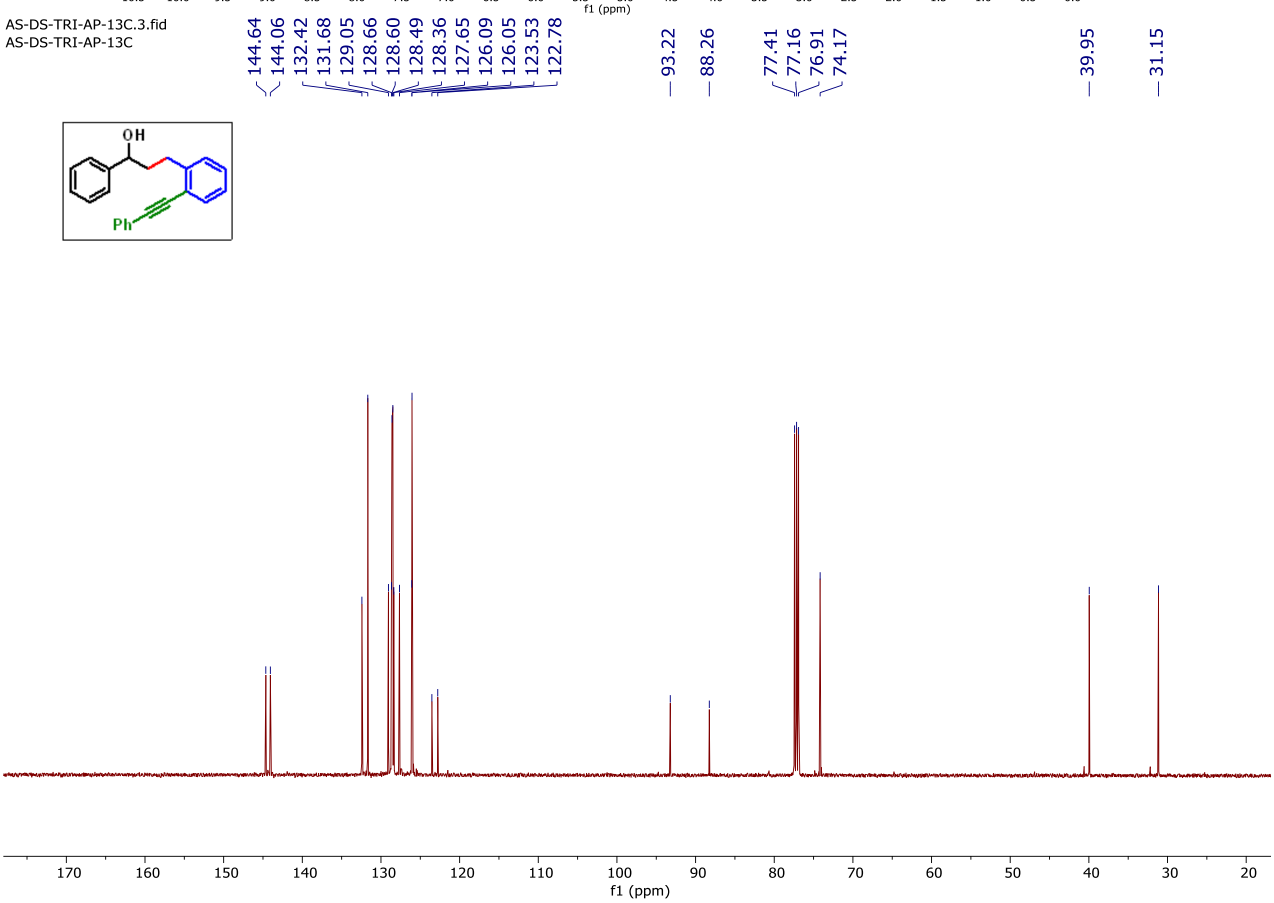
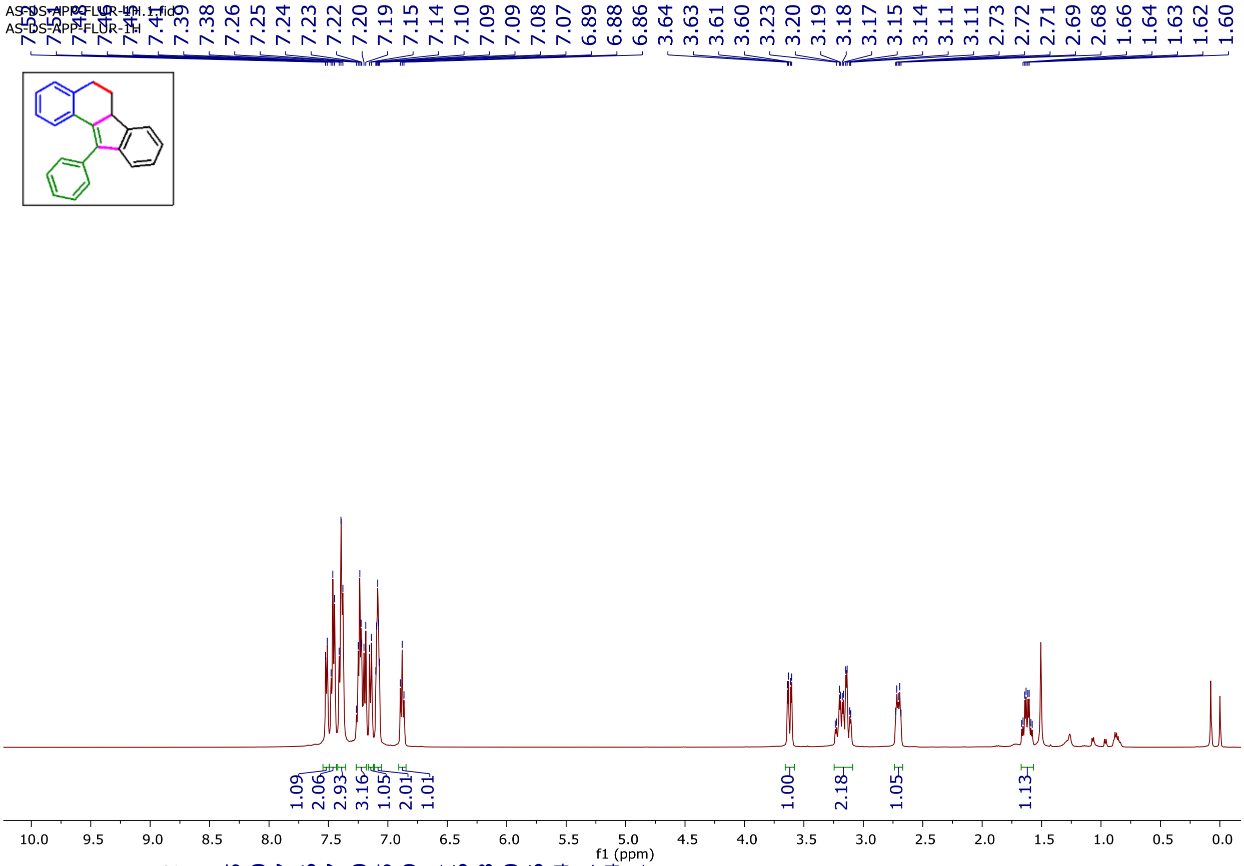


Figure S76. [1]H NMR (600 MHz) and [13]C{[1]H} NMR (150 MHz) spectrum of Compound **5c** in $CDCl_3$.



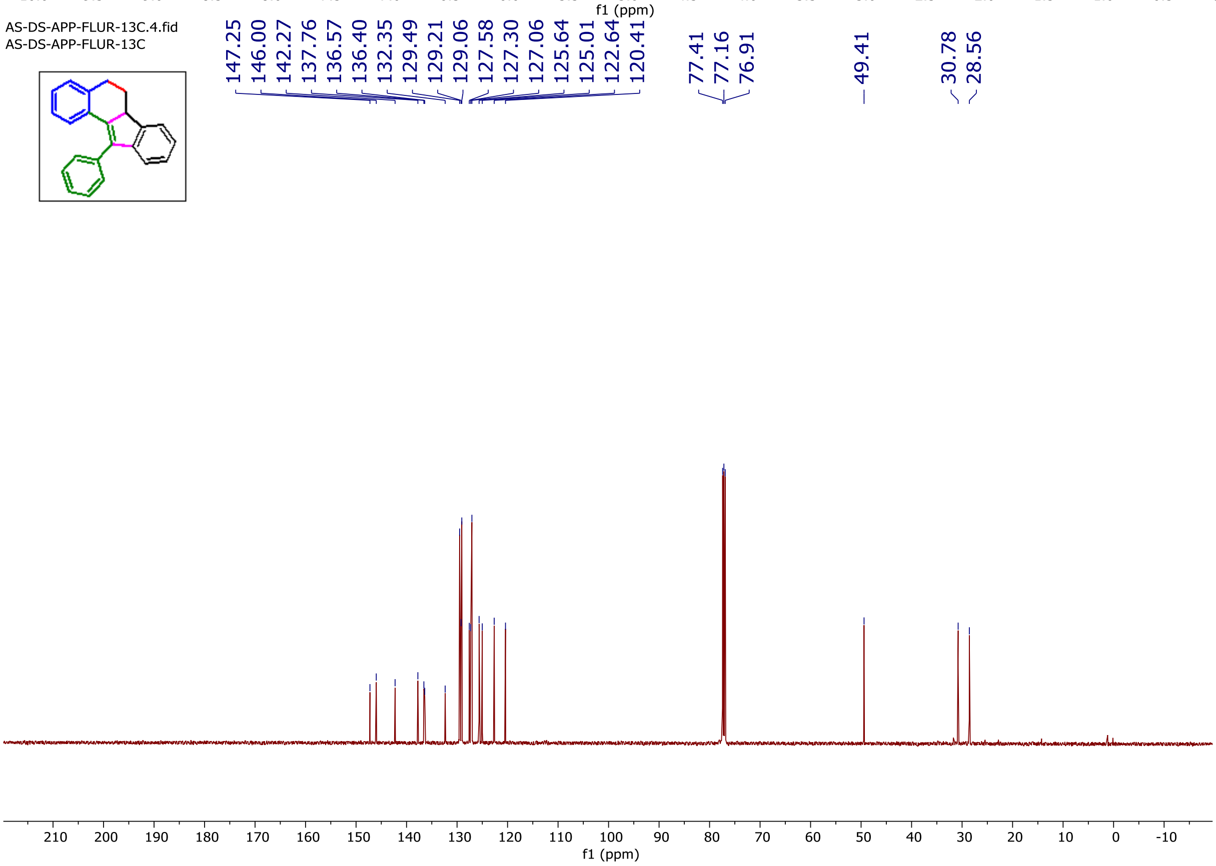
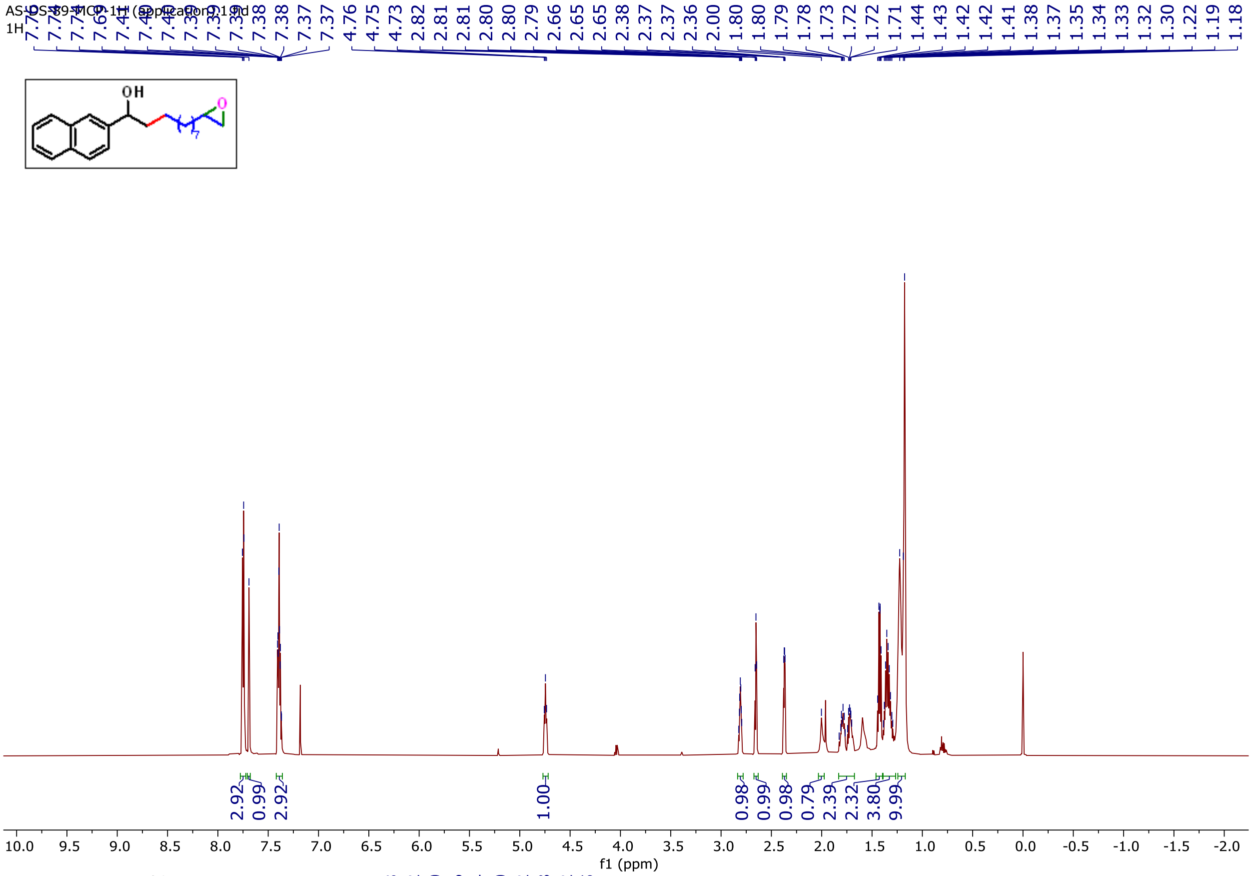


Figure S77. ^{1}H NMR (600 MHz) and $^{13}C\{^{1}H\}$ NMR (150 MHz) spectrum of Compound **5d** in $CDCl_3$.



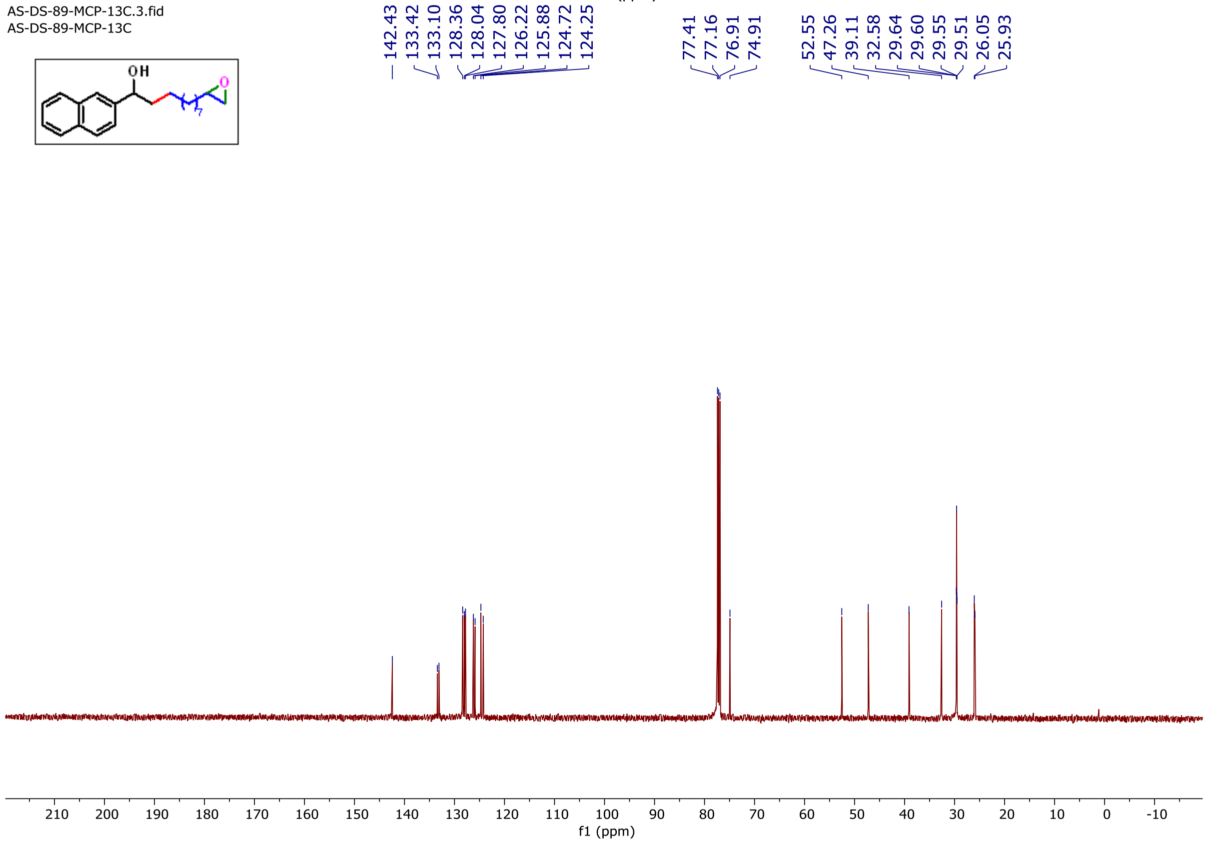


Figure S78. [1]H NMR (600 MHz) and [13]C{[1]H} NMR (150 MHz) spectrum of Compound **5e** in $CDCl_3$.

16. Computational Details

All reported calculations were performed using the ORCA 5.0.3 software.[20] Images of the 3D structures were rendered using Chimera.[21] The geometry of all reactants, intermediates and transition states were optimized using the B3LYP functional in the gas phase and frequencies are also reported in the same level of theory.[22] In these geometry optimizations, a mixed basis set of def2-TZVPP for Zn, Br and def2-svp for all other atoms was used.[23] Ground and transition state geometries were validated by vibrational analysis at the same level, showing zero and one imaginary frequencies respectively. Single point energies were calculated using the B3LYP functional on basis set of def2-TZVPP for all atoms. In single point energy calculations, the CPCM solvation model with tetrahydrofuran (dilectric constant = 7.25, refractive index = 1.407) as solvent was employed.[24] Grimme's D3BJ dispersion correction was utilized all through.[25] The reported Gibbs free energies and enthalpies include zero-point and thermal corrections calculated at 297 K.[26]

S16.1. Schematic representation of reaction mechanism and corresponding energy profile for Path-A

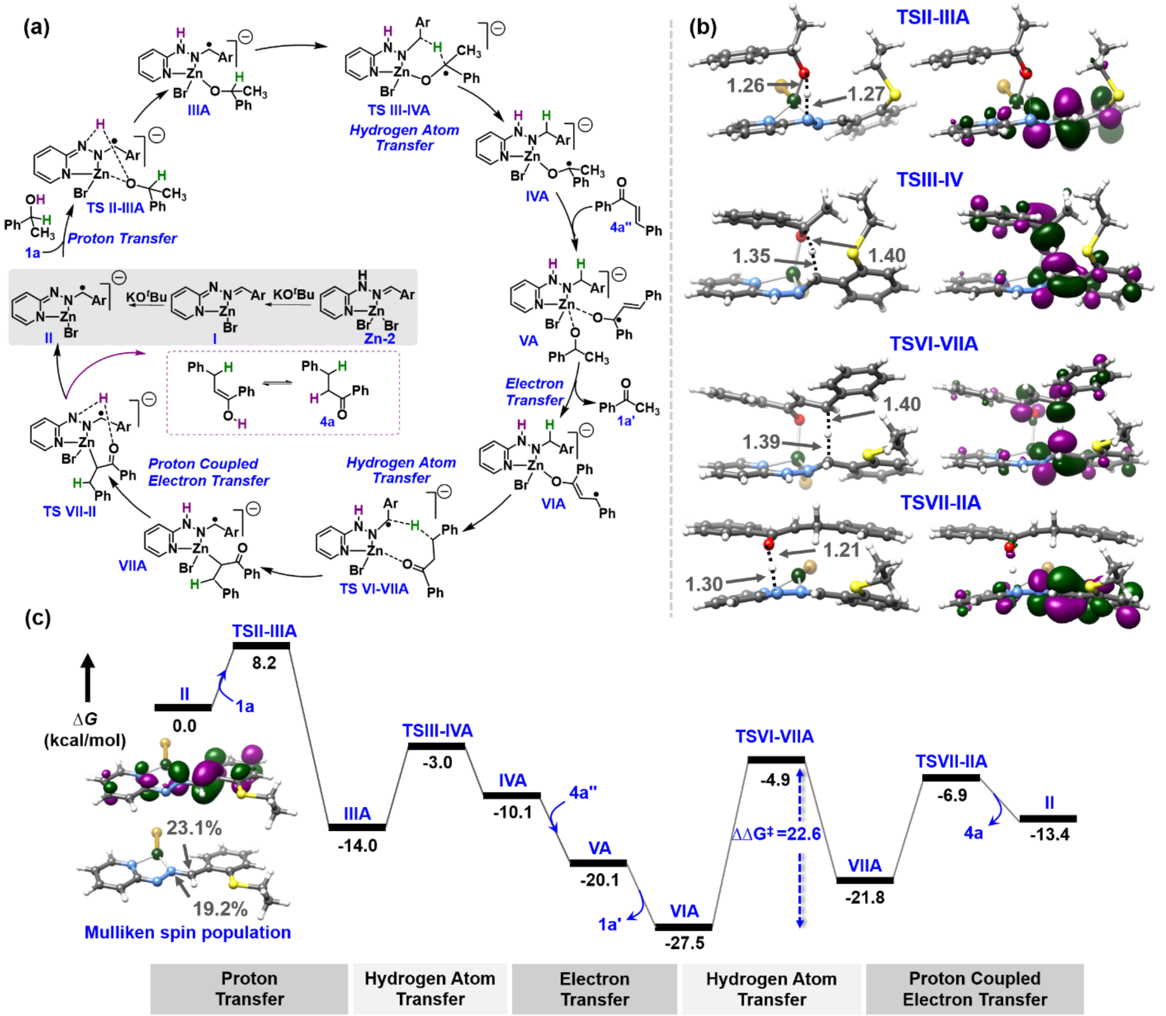


Figure S79. (a) Proposed reaction mechanism for inner-sphere BH from secondary alcohol (**1a**) (through hydrazenyl N-(N)-C 1,3 moiety) and transfer hydrogenation to α,β-unsaturated ketone (**4a′′**) to generate hetero-coupled alkylated ketone (**4a**) (path **A**). **(b)** Optimized geometries of transition states with bond lengths in unit of Å and their respective singly occupied molecular orbital (SOMO) plot. Color codes: Zn (green), C (dark grey), H (white), Br (brown), N (blue), O (red), S (yellow). **(c)** Relative Gibbs free energy profile at B3LYP/D3BJ/CPCM(Toluene)/def2-TZVPP in units of kcal/mol for path A.

S16.2. Schematic representation of reaction mechanism and corresponding energy profile for Path-B

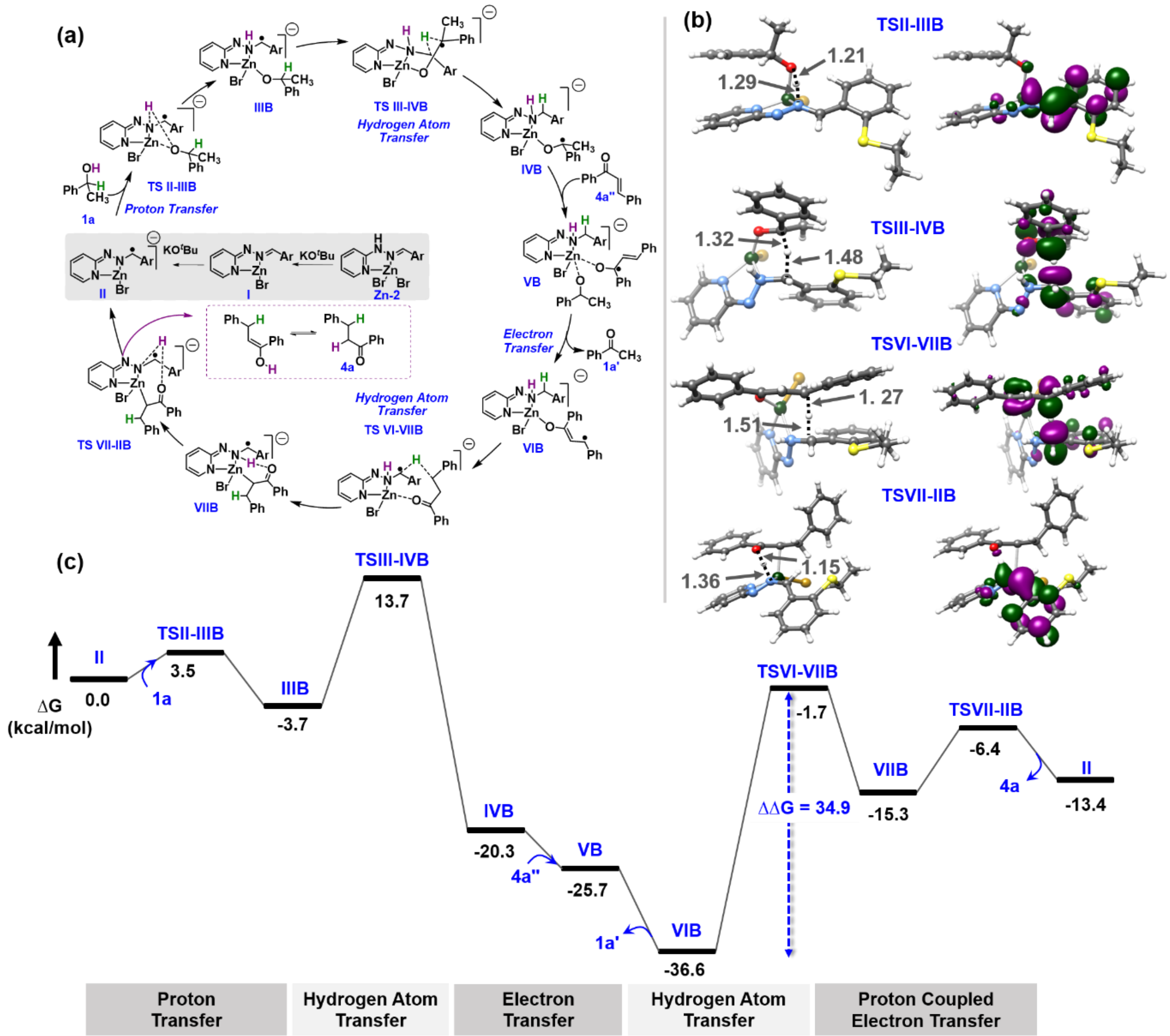


Figure S80. **(a)** Proposed reaction mechanism for inner-sphere BH from secondary alcohol (**1a**) (through hydrazenyl N-C moeity) and transfer hydrogenation to α,β-unsaturated ketone (**4a”)** to generate hetero-coupled alkylated ketone (**4a**) (path B). **(b)** Optimized transition state structures with bond lengths in unit of Å and their respective singly occupied molecular orbital (SOMO) plot for path B. Color codes: Zn (green), C (dark grey), H (white), Br (brown), N (blue), O (red), S (yellow). **(c)** Relative Gibbs free energy profile for path B at B3LYP/D3BJ/CPCM(Toluene)/def2-TZVPP in units of kcal/mol.

An alternative avenue of imine mediated BH process, path **B** can also compete with path **A** (**Figure S80**). The dehydrogenation of alcohol via proton transfer **TSII-IIIB** and hydrogen atom transfer **TSIII-IVB** may seem more feasible than that of path **A**. Yet a closer look at the free energy profile indicates that in path **B**, intermediate **IIIB** can chose to go back to **II** reversibly via **TSII-IIIB** at an energetic cost of 7.2 kcal/mol, whereas deprotonation in case of path **A** is rather irreversible. The intermediate **IVB** exergonically falls into an ultimate thermodynamic sink **VIB** at -36.6 kcal/mol. This results into an energetically demanding HAT process through **TSVI-VII** with a rate determining barrier of 34.9 kcal/mol. This suggests thermodynamic and kinetic preference for path **A** over **B**.

S16.3. Schematic representation of reaction mechanism and corresponding energy profile for Path C

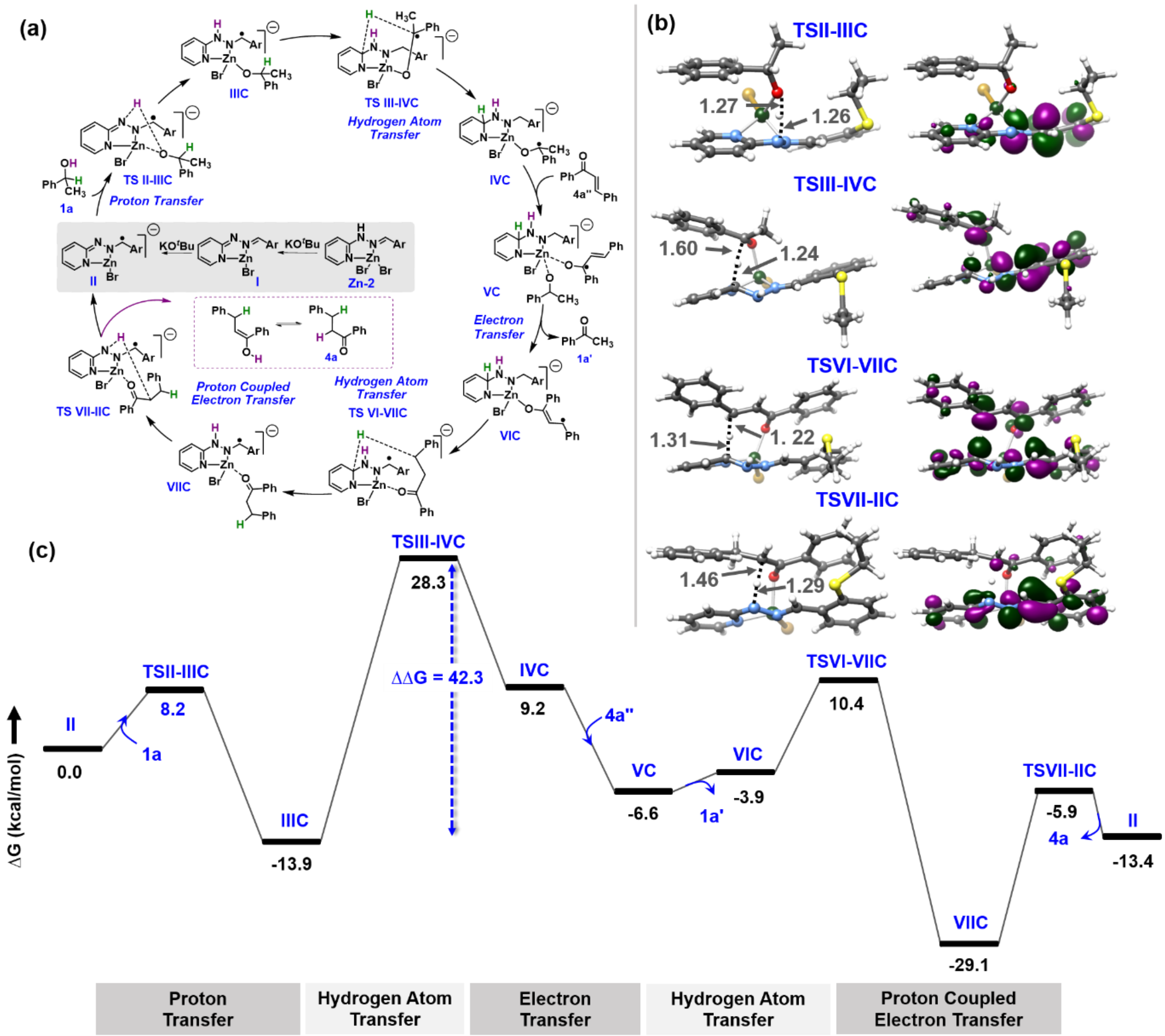


Figure S81. **(a)** Proposed reaction mechanism for inner-sphere BH from secondary alcohol **1a** (through pyridyl C=N moiety) and transfer hydrogenation to α,β-unsaturated ketone (**4a"**) to generate hetero-coupled alkylated ketone (**4a**) (path C). **(b)** Optimized transition state structures with bond lengths in unit of Å and their respective singly occupied molecular orbital (SOMO) plot for path C. Color codes: Zn (green), C (dark grey), H (white), Br (brown), N (blue), O (red), S (yellow). **(c)** Relative Gibbs free energy profile for path C at B3LYP/D3BJ/CPCM(Toluene)/def2-TZVPP in units of kcal/mol.

The BH catalysis at pyridyl arm C=N has been designated as path C. The first transition state step (TS II-IIIC) of proton transfer from 1a remains the same as that of path A. In the next step the hydrogen atom gets transferred to the pyridyl arm carbon at an energetic expense of 42.3 kcal/mol (TSIII-IVC). This is the rate determining transition state for catalytic cycle in path C and much more energy requirement compared to path A and path B. Hence, path C is the most unfavourable path for β-alkylation.

S16.4. Schematic representation of reaction mechanism and corresponding energy profile for Primary alcohol mediated alkylation

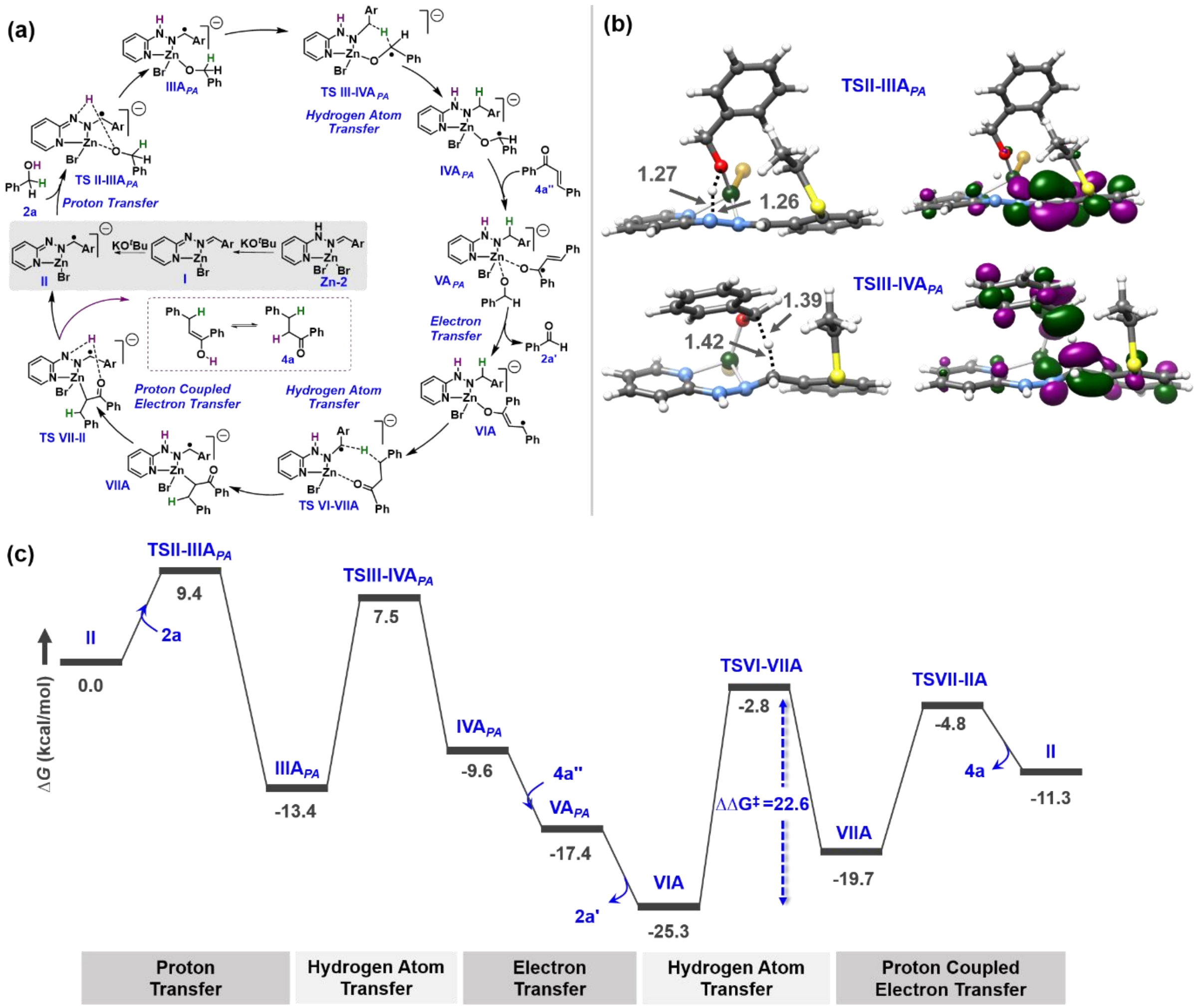


Figure S82. **(a)** Proposed reaction mechanism for inner-sphere BH from primary alcohol **2a** (through hydrazenyl N-(N)-C 1,3 moiety) and transfer hydrogenation to α,β-unsaturated ketone (**4a”**) to generate hetero-coupled alkylated ketone (**4a**) (path A$_{PA}$). **(b)** Optimized transition state structures with bond lengths in unit of Å and their respective singly occupied molecular orbital (SOMO) plot for path A. Color codes: Zn (green), C (dark grey), H (white), Br (brown), N (blue), O (red), S (yellow). **(c)** Relative Gibbs free energy profile for path A_{PA} at B3LYP/D3BJ/CPCM(Toluene)/def2-TZVPP in units of kcal/mol.

S16.5. Schematic representation of reaction mechanism and corresponding energy profile for Path A_{TH}

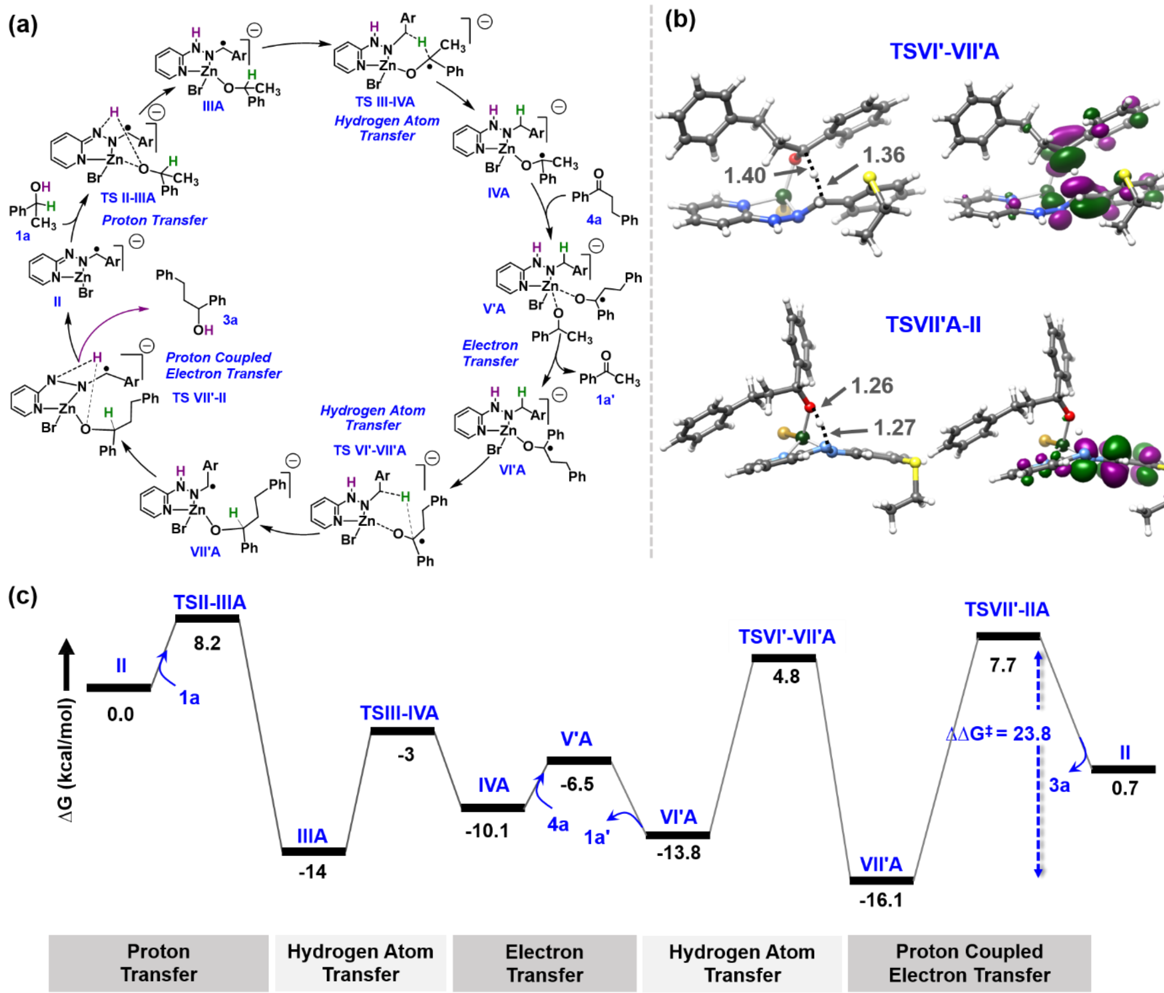


Figure S83. (a) Proposed reaction mechanism for hydrogenation of **4a** (path A_{TH}). **(b)** Optimized geometries of transition states with bond lengths in unit of Å and their respective singly occupied molecular orbital (SOMO) plot for path A_{TH}. Color codes: Zn (green), C (dark grey), H (white), Br (brown), N (blue), O (red), S (yellow). **(c)** Relative Gibbs free energy profile for path A_{TH} at B3LYP/D3BJ/CPCM(Toluene)/def2-TZVPP in units of kcal/mol.

S16.6 Singly occupied molecular orbital and Mulliken spin population data supporting electron transfer from IVA→VA→VIA for path A, B and C.

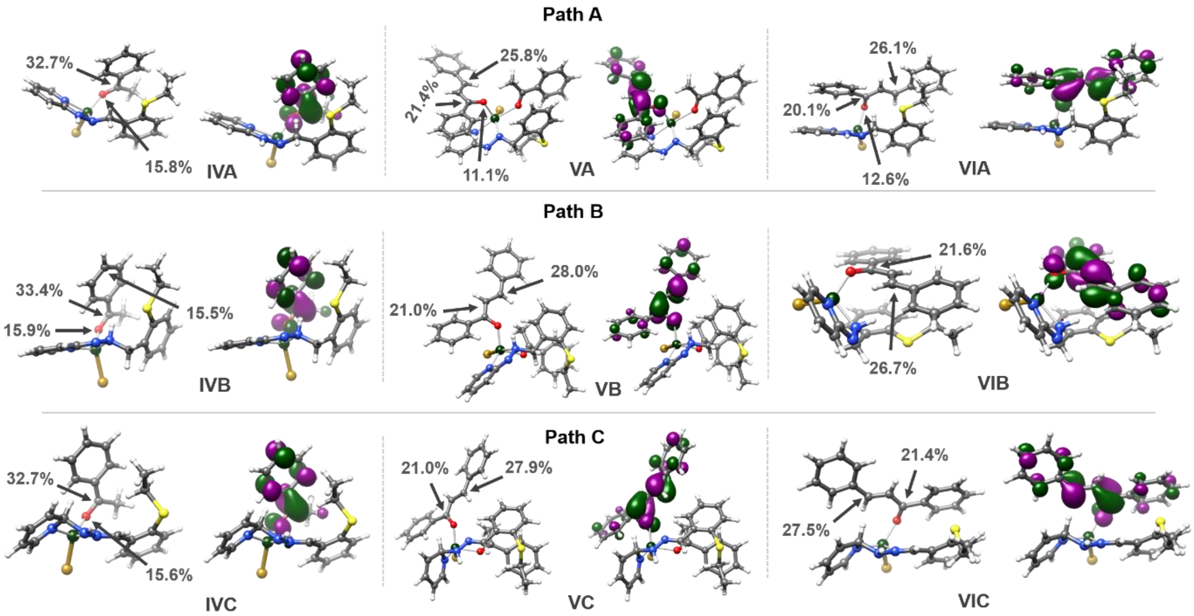


Figure S84. Optimized structures of intermediate V, V and VI for path A, B and C and their respective singly occupied molecular orbital (SOMO) plot along with % Mulliken spin population. Color codes: Zn (green), C (dark grey), H (white), Br (brown), N (blue), O (red), S (yellow).

S16.7 Energetic span model for turn over frequency (TOF) determination

The energetic span model developed by Kozuch and Shaik has been utilized to calculate the turnover frequency (TOF) of a catalytic cycle from computationally obtained energy profile. This model correlates the rate constant calculated through Eyring-Polanyi equation with turn over frequency of a catalytic cycle.

$$\boldsymbol{k} = \frac{k_B T}{h} e^{-\Delta G^{\ddagger}/RT} \quad \ldots\ldots\ldots\ldots\ldots (1)$$

Equation (1) is known as Eyring-Polanyi equation. Here,

k = Rate constant,

k_B = Boltzmann constant,

h= Planck's constant

$\Delta G^{\ddagger}$ = Gibbs free energy of activation

R = Molar gas constant

T = Temperature (273.15 K)

$$TOF^0 = \frac{k_B T}{h} e^{-\delta E/RT} \quad \ldots\ldots\ldots\ldots. (2)$$

The turn over frequency in energetic span model is expressed as equation (2).

$\delta E = T_{TDTS} - I_{TDI}$ when TDTS appears after TDI

TDTS = turnover frequency-determining transition state) and

TDI = turnover frequency-determining intermediate

Here, δE serves as the apparent activation energy if the catalytic cycle. TDI is known as resting state as it is the most populated intermediate in the cycle. TDTS is the rate limiting transition state. TDTS and TDI are the transition state and the intermediate which maximize the energetic span of the respective catalytic cycle and thus determines the TOF. T and I are the standard Gibbs free energy of the respective species.[27-28]

Table S1. The Eyring-Polanyi rate constants and the energetic span model data of the catalytic cycles.

Systems	**Eyring – Polanyi data**					**ESM calculation Data**	
		1st PT	1st HAT	2nd HAT	2nd PCET		
Path A	ΔG‡ (kcal/mol)	8.2	11.0	22.6	20.6	δE (kcal/mol)	22.7
	K (min^{-1})	3.36 × 10^{14}	3.34 × 10^{14}	3.27 × 10^{14}	3.29 × 10^{14}	TOF (min^{-1})	3.27 × 10^{14}
Path B	ΔG‡ (kcal/mol)	3.5	17.4	34.9	30.2	δE (kcal/mol)	34.9
	K (min^{-1})	3.39 × 10^{14}	3.30 × 10^{14}	3.20 × 10^{14}	3.22 × 10^{14}	TOF (min^{-1})	3.20 × 10^{14}
Path C	ΔG‡ (kcal/mol)	8.2	42.2	24.4	23.2	δE (kcal/mol)	41.6
	K (min^{-1})	3.36 × 10^{14}	3.16 × 10^{14}	3.26 × 10^{14}	3.27 × 10^{14}	TOF (min^{-1})	3.16 × 10^{14}
Path A_{PA}	ΔG‡ (kcal/mol)	9.4	20.9	22.6	20.6	δE (kcal/mol)	22.7
	K (min^{-1})	3.35 × 10^{14}	3.28 × 10^{14}	3.27 × 10^{14}	3.29 × 10^{14}	TOF (min^{-1})	3.27 × 10^{14}
Path A_{TH}	ΔG‡ (kcal/mol)	8.2	11.0	18.7	23.8	δE (kcal/mol)	23.8
	K (min^{-1})	3.36 × 10^{14}	3.34 × 10^{14}	3.29 × 10^{14}	3.26 × 10^{14}	TOF (min^{-1})	3.26 × 10^{14}

S16.7 XYZ Coordinates

II

30	3.438510000	0.678651000	4.406870000
35	3.466372000	-1.488051000	3.542391000
16	3.479840000	5.854770000	1.372649000
7	3.541432000	2.625022000	4.240542000
7	3.227743000	1.040091000	6.329005000
7	3.391757000	3.240009000	5.462819000
6	3.655079000	3.488181000	3.204783000
1	3.549280000	4.536828000	3.496387000
6	3.241306000	2.430517000	6.491127000
6	3.704989000	6.862169000	-0.130500000
6	3.084881000	2.954438000	7.824358000
1	3.095230000	4.040862000	7.932675000
6	3.076812000	0.226773000	7.402216000
1	3.079501000	-0.846259000	7.179254000
6	2.934096000	2.109183000	8.891030000
1	2.817219000	2.515918000	9.900446000
6	3.449111000	8.327042000	0.212941000
1	2.426720000	8.470589000	0.598479000
1	4.150479000	8.680867000	0.985436000
6	2.928822000	0.689304000	8.687963000
1	2.810615000	-0.008279000	9.519035000
1	3.570442000	8.962655000	-0.679917000
1	4.729150000	6.723441000	-0.514117000
1	3.007286000	6.522642000	-0.913765000
6	3.913056000	3.168617000	1.849241000
6	4.213161000	1.847266000	1.391024000
6	3.891786000	4.198812000	0.831887000
6	4.470320000	1.560399000	0.057015000
6	4.155897000	3.892612000	-0.500138000
6	4.448091000	2.576354000	-0.906739000
1	4.266863000	1.029952000	2.110556000
1	4.697220000	0.529537000	-0.230972000
1	4.130572000	4.675487000	-1.258939000
1	4.648706000	2.361994000	-1.959799000

1a

6	-0.596119000	-0.024989000	-0.538298000
1	0.301556000	0.624317000	-0.608429000
6	-0.128608000	-1.453999000	-0.274371000
1	0.410449000	-1.501652000	0.684363000
1	-0.997313000	-2.128580000	-0.222427000
1	0.536510000	-1.801526000	-1.078824000
8	-1.391918000	0.354483000	0.572300000
1	-1.724440000	1.247271000	0.407928000
6	-1.353182000	0.085219000	-1.852764000
6	-0.673313000	0.346960000	-3.050190000
6	-2.740265000	-0.114802000	-1.890625000
6	-1.362800000	0.402978000	-4.263918000
6	-3.432978000	-0.055457000	-3.102943000
6	-2.746429000	0.201348000	-4.293275000
1	0.408345000	0.512753000	-3.029937000
1	-3.268960000	-0.311480000	-0.955352000
1	-0.819994000	0.611002000	-5.189728000
1	-4.515049000	-0.211122000	-3.118470000
1	-3.288195000	0.248720000	-5.241357000

TSII-IIIA

30	2.966729000	3.956560000	4.132113000
35	2.232513000	2.014948000	3.025115000
16	4.723168000	8.311408000	1.038313000
7	4.380760000	5.375243000	4.324825000
7	3.247263000	3.969347000	6.235269000
7	3.851746000	6.105038000	5.433804000
6	4.765708000	6.187460000	3.322131000
1	4.723507000	7.266135000	3.503561000
6	3.527137000	5.283550000	6.483330000
6	2.913264000	8.031353000	1.287125000
6	3.352093000	5.806278000	7.787832000
1	3.568462000	6.863938000	7.947805000
6	2.844816000	3.164704000	7.231407000
1	2.611258000	2.133889000	6.946237000
6	2.951272000	4.964606000	8.810393000
1	2.832335000	5.353654000	9.825980000
6	2.220063000	9.336989000	1.651461000
1	2.621949000	9.745772000	2.592809000
1	2.350957000	10.102477000	0.867377000
6	2.699754000	3.601519000	8.538192000
1	2.372404000	2.912680000	9.318392000
1	1.137733000	9.172211000	1.787950000
1	2.502827000	7.604125000	0.358349000
1	2.784811000	7.288414000	2.089508000

6	5.195174000	5.730353000	2.051548000
6	5.535492000	4.359179000	1.812867000
6	5.280932000	6.616662000	0.916868000
6	5.987902000	3.923667000	0.577857000
6	5.740319000	6.155149000	-0.316488000
6	6.118677000	4.817000000	-0.502484000
1	5.470147000	3.655565000	2.645016000
1	6.249437000	2.868734000	0.447484000
1	5.773613000	6.859689000	-1.152477000
1	6.477373000	4.472496000	-1.475976000
6	0.438638000	5.938524000	4.553138000
1	0.350514000	6.953789000	4.995034000
6	-0.425279000	5.900316000	3.290500000
1	-0.074197000	6.670744000	2.586474000
1	-0.325204000	4.924140000	2.790576000
1	-1.490389000	6.074981000	3.517378000
8	1.777548000	5.719056000	4.198076000
1	2.693893000	6.217503000	4.924381000
6	-0.036218000	4.957094000	5.621081000
6	-0.192182000	5.372468000	6.949626000
6	-0.266480000	3.606585000	5.314370000
6	-0.578267000	4.472473000	7.946766000
6	-0.648228000	2.702605000	6.307465000
6	-0.811284000	3.133015000	7.627973000
1	0.007482000	6.416369000	7.208177000
1	-0.121136000	3.246376000	4.294859000
1	-0.680227000	4.816880000	8.979625000
1	-0.807912000	1.653029000	6.045918000
1	-1.103220000	2.423822000	8.407774000

TSII-IIIA$_{HAT}$

30	3.003090000	2.406806000	4.227225000
35	2.876807000	0.633555000	2.666832000
16	3.981713000	7.731753000	2.580412000
7	4.093268000	3.960561000	4.803097000
7	2.988391000	2.032880000	6.207060000
7	4.114164000	4.121890000	6.140512000
6	4.099863000	5.145881000	4.051871000
1	2.897429000	5.286965000	3.651189000
6	3.611903000	3.105444000	6.838975000
6	3.643595000	8.736008000	1.093427000
6	3.688147000	3.098591000	8.273119000
1	4.169049000	3.954569000	8.750254000
6	2.498986000	1.007857000	6.930380000
1	2.036465000	0.201003000	6.350268000
6	3.174648000	2.046603000	8.988242000
1	3.236461000	2.045483000	10.080972000
6	2.768483000	9.920321000	1.495583000
1	1.824630000	9.577805000	1.946684000
1	3.280764000	10.556267000	2.235608000
6	2.559550000	0.951820000	8.308508000
1	2.145754000	0.098748000	8.848786000
1	2.532839000	10.542172000	0.616344000
1	4.587390000	9.088360000	0.646092000
1	3.135210000	8.100497000	0.350028000
6	4.845578000	5.142342000	2.764193000
6	5.493079000	3.995091000	2.275918000
6	4.810300000	6.292471000	1.927959000
6	6.058591000	3.959553000	0.999552000
6	5.394557000	6.259031000	0.656570000
6	6.006078000	5.091401000	0.183919000
1	5.534905000	3.114228000	2.917966000
1	6.536904000	3.042729000	0.644641000
1	5.374296000	7.142327000	0.016770000
1	6.442754000	5.077389000	-0.818731000
6	1.453334000	4.951015000	3.068108000
6	1.693005000	4.845962000	1.587017000
1	1.947170000	5.823517000	1.154907000
1	2.538036000	4.172658000	1.376485000
1	0.807196000	4.455758000	1.034845000
8	1.335282000	3.642042000	3.662262000
1	0.668037000	3.117976000	3.186445000
6	0.532362000	5.923144000	3.612147000
6	0.251874000	7.145374000	2.939085000
6	-0.082566000	5.742465000	4.881846000
6	-0.567529000	8.117927000	3.505944000
6	-0.902731000	6.720824000	5.436979000
6	-1.157012000	7.923492000	4.762435000
1	0.692744000	7.329533000	1.958290000
1	0.111603000	4.818706000	5.429310000
1	-0.755341000	9.044718000	2.952879000
1	-1.352160000	6.543523000	6.419657000
1	-1.799053000	8.689989000	5.204706000
1	4.289918000	6.031788000	4.679911000

IIIA

30	3.381107000	2.543587000	4.451394000
35	5.131749000	0.952313000	3.985396000
16	3.224418000	8.179831000	2.470268000
7	3.798254000	4.580642000	4.797682000
7	3.189276000	2.644705000	6.558458000
7	3.509693000	4.884647000	6.103626000
6	3.847537000	5.643363000	3.975008000
1	3.590693000	6.618997000	4.405517000
6	3.176931000	3.927481000	6.998069000
6	2.861118000	9.258647000	1.045243000
6	2.832847000	4.241915000	8.338617000
1	2.812980000	5.285727000	8.659888000
6	2.885800000	1.654056000	7.413528000
1	2.924973000	0.645619000	6.989915000
6	2.514455000	3.211852000	9.199924000
1	2.238881000	3.433813000	10.234668000
6	2.164244000	10.521517000	1.542516000
1	1.217399000	10.277024000	2.049916000
1	2.798069000	11.069333000	2.258611000
6	2.541765000	1.872058000	8.737153000
1	2.300326000	1.034992000	9.393833000
1	1.939190000	11.196233000	0.700193000
1	3.798082000	9.512980000	0.523409000
1	2.220521000	8.710140000	0.336278000
6	4.140040000	5.576173000	2.587450000
6	4.652282000	4.392365000	1.975310000
6	3.906769000	6.703023000	1.718304000
6	4.902780000	4.319398000	0.612911000
6	4.181580000	6.615713000	0.354811000
6	4.674088000	5.428513000	-0.213905000
1	4.879921000	3.526529000	2.598687000
1	5.291191000	3.386709000	0.194577000
1	4.006445000	7.471597000	-0.297801000
1	4.870787000	5.381207000	-1.288103000
6	1.013161000	3.504109000	3.155774000
1	1.617815000	4.093918000	2.429470000
6	-0.266321000	3.068627000	2.419490000
1	0.004163000	2.398451000	1.588123000
1	-0.920539000	2.511481000	3.110922000
1	-0.827801000	3.931442000	2.020986000
8	1.687745000	2.382027000	3.603215000
1	3.289477000	5.852319000	6.325977000
6	0.650246000	4.478770000	4.280824000
6	0.710381000	5.866388000	4.088777000
6	0.277940000	3.994889000	5.542322000
6	0.429046000	6.749149000	5.135789000
6	-0.016990000	4.870985000	6.589919000
6	0.063681000	6.255143000	6.393638000
1	1.027157000	6.263112000	3.121487000
1	0.265338000	2.913841000	5.696515000
1	0.515212000	7.827048000	4.967253000
1	-0.287349000	4.472133000	7.571609000
1	-0.150572000	6.943133000	7.217458000

TSIII-IVA

30	3.067997000	2.598923000	3.964022000
35	3.719893000	0.392106000	3.323698000
16	4.403762000	7.940275000	2.145770000
7	4.224131000	4.181945000	4.596367000
7	2.519181000	2.590101000	6.000280000
7	3.768856000	4.519434000	5.866032000
6	4.203714000	5.299372000	3.741479000
1	2.945011000	5.338289000	3.252157000
6	2.968908000	3.726655000	6.594800000
6	3.573490000	8.417439000	0.577412000
6	2.599117000	4.038312000	7.936317000
1	2.960850000	4.961431000	8.395231000
6	1.712542000	1.760124000	6.677299000
1	1.399272000	0.866191000	6.128144000
6	1.762637000	3.176778000	8.609104000
1	1.453386000	3.411260000	9.631803000
6	2.530714000	9.493689000	0.856248000
1	1.740389000	9.116056000	1.523700000
1	2.984786000	10.376901000	1.335801000
6	1.297839000	1.995820000	7.977875000
1	0.643834000	1.290015000	8.491625000
1	2.057524000	9.825325000	-0.083122000
1	4.321496000	8.782549000	-0.144199000
1	3.109578000	7.512443000	0.160101000
6	5.046190000	5.258259000	2.542575000
6	5.683431000	4.059720000	2.139386000
6	5.182419000	6.390049000	1.687345000
6	6.396010000	3.977877000	0.947373000
6	5.930044000	6.305667000	0.508595000
6	6.524503000	5.100391000	0.117831000
1	5.601017000	3.185379000	2.786542000
1	6.859462000	3.028378000	0.664999000

1	6.049595000	7.195533000	-0.114590000
1	7.088898000	5.045323000	-0.817047000
6	1.661177000	4.877058000	2.914276000
6	1.489953000	5.509546000	1.539912000
1	1.417993000	6.605622000	1.586986000
1	2.341165000	5.234739000	0.897137000
1	0.569942000	5.118680000	1.066401000
8	1.758603000	3.543509000	2.876604000
1	4.108263000	5.383982000	6.278875000
6	0.905080000	5.477079000	4.044857000
6	0.945788000	6.866218000	4.315643000
6	0.217923000	4.652743000	4.961580000
6	0.332826000	7.396474000	5.448942000
6	-0.390734000	5.185495000	6.096981000
6	-0.339813000	6.561576000	6.354615000
1	1.509105000	7.522835000	3.647017000
1	0.184131000	3.582393000	4.758556000
1	0.390012000	8.473406000	5.639377000
1	-0.905151000	4.516863000	6.794165000
1	-0.809397000	6.978192000	7.250412000
1	4.191886000	6.274416000	4.254838000

IVA

30	3.392797000	2.475370000	4.646887000
35	4.496953000	0.358024000	4.227538000
16	3.333467000	7.727611000	2.863279000
7	4.483465000	4.104553000	5.107418000
7	2.931685000	2.544440000	6.715961000
7	4.358515000	4.339491000	6.474766000
6	4.312339000	5.356871000	4.405460000
1	5.090625000	6.099207000	4.721015000
6	3.647594000	3.547271000	7.291749000
6	2.414224000	8.587082000	1.544204000
6	3.640570000	3.714446000	8.710239000
1	4.234131000	4.513144000	9.162425000
6	2.191466000	1.729316000	7.479925000
1	1.653369000	0.944610000	6.938943000
6	2.866639000	2.868428000	9.474299000
1	2.841307000	2.993003000	10.561029000
6	1.750687000	9.822652000	2.144150000
1	1.072063000	9.536622000	2.961689000
1	2.501546000	10.521491000	2.548358000
6	2.111014000	1.841976000	8.859345000
1	1.498807000	1.151916000	9.441286000
1	1.166422000	10.356240000	1.376266000
1	3.096910000	8.870815000	0.726693000
1	1.659692000	7.889270000	1.150006000
6	4.401085000	5.212038000	2.906816000
6	4.928887000	4.060084000	2.313164000
6	3.925785000	6.250620000	2.067892000
6	4.965402000	3.907862000	0.923731000
6	3.967133000	6.096918000	0.674002000
6	4.480006000	4.926999000	0.105533000
1	5.309632000	3.266000000	2.957543000
1	5.362656000	2.986319000	0.491580000
1	3.596667000	6.887194000	0.020720000
1	4.490884000	4.818018000	-0.982896000
6	1.279626000	3.652102000	2.839554000
1	3.343102000	5.845930000	4.638979000
6	1.215887000	3.434326000	1.345240000
1	1.808088000	4.190002000	0.799616000
1	1.628234000	2.442313000	1.117448000
1	0.182473000	3.487024000	0.953992000
8	1.803508000	2.696355000	3.552283000
1	5.001055000	5.005148000	6.901755000
6	0.765940000	4.850769000	3.416318000
6	0.152904000	5.879894000	2.628888000
6	0.830396000	5.081275000	4.829404000
6	-0.347281000	7.035899000	3.212064000
6	0.343063000	6.249984000	5.392590000
6	-0.254581000	7.249840000	4.599102000
1	0.071739000	5.751935000	1.547531000
1	1.275377000	4.311152000	5.460443000
1	-0.815928000	7.795743000	2.576852000
1	0.421567000	6.393128000	6.475591000
1	-0.642946000	8.166784000	5.050803000

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6	-1.164005000	0.892691000	-0.063210000
6	-2.135221000	1.867573000	-0.556240000
6	-1.771100000	3.011276000	-1.297440000
6	-3.501398000	1.660314000	-0.281095000
6	-2.737490000	3.909168000	-1.742554000
6	-4.470277000	2.560705000	-0.725417000
6	-4.091543000	3.688454000	-1.458352000
1	-0.720194000	3.196607000	-1.528832000

1	-3.797230000	0.777601000	0.291882000
1	-2.436930000	4.789023000	-2.316876000
1	-5.524405000	2.381858000	-0.499667000
1	-4.847331000	4.395495000	-1.809211000
6	0.179053000	0.923971000	-0.191710000
6	1.004537000	-0.166731000	0.386973000
8	0.486493000	-1.102283000	0.981576000
6	2.500095000	-0.107434000	0.239852000
6	3.248600000	-1.127033000	0.854973000
6	3.179630000	0.896457000	-0.470608000
1	2.703075000	-1.899222000	1.399939000
1	2.631376000	1.699115000	-0.964554000
6	4.638401000	-1.141813000	0.766462000
6	4.573620000	0.881011000	-0.561792000
1	5.207954000	-1.938830000	1.251189000
1	5.089615000	1.667048000	-1.118635000
6	5.305418000	-0.135890000	0.056867000
1	6.396136000	-0.145803000	-0.014170000
1	0.671120000	1.747514000	-0.708747000
1	-1.571685000	0.032374000	0.479232000

VA

30	-0.251939000	0.659261000	1.116230000
35	-2.719235000	0.642606000	1.199185000
16	-0.240666000	5.064947000	3.121552000
7	1.251323000	1.973350000	0.859671000
7	-0.002302000	0.521085000	-1.009037000
7	1.667311000	2.014203000	-0.480977000
6	1.804677000	3.114421000	1.537869000
1	2.901179000	3.187252000	1.314702000
6	1.114336000	1.178286000	-1.389261000
6	-1.500526000	4.088955000	2.173538000
6	1.673160000	0.978342000	-2.681953000
1	2.598056000	1.488352000	-2.959387000
6	-0.615464000	-0.312915000	-1.861547000
1	-1.508792000	-0.806250000	-1.467602000
6	1.036411000	0.111667000	-3.544959000
1	1.457556000	-0.067579000	-4.538496000
6	-1.428702000	4.247111000	0.662243000
1	-1.493947000	5.305854000	0.360759000
1	-0.500471000	3.816943000	0.263112000
6	-0.143042000	-0.555315000	-3.142536000
1	-0.660902000	-1.252072000	-3.803017000
1	-2.265026000	3.692114000	0.207891000
1	-1.387561000	3.037906000	2.465186000
1	-2.475923000	4.429679000	2.555488000
6	1.685891000	2.996325000	3.036408000
6	2.473033000	2.034721000	3.687552000
6	0.825545000	3.798001000	3.814545000
6	2.441239000	1.876396000	5.072141000
6	0.804439000	3.643934000	5.211423000
6	1.605759000	2.693093000	5.841054000
1	3.114544000	1.394976000	3.076281000
1	3.065469000	1.116538000	5.550847000
1	0.120667000	4.263008000	5.794678000
1	1.557112000	2.574579000	6.926751000
6	-0.572707000	0.382602000	4.463833000
1	1.378496000	4.088065000	1.216590000
6	0.076211000	-0.972042000	4.565985000
1	-0.583347000	-1.692744000	5.072955000
1	0.327123000	-1.319569000	3.552240000
1	0.999432000	-0.880512000	5.163498000
8	-0.506038000	1.048073000	3.441909000
1	2.665419000	2.189678000	-0.614199000
6	-1.310570000	0.947496000	5.638321000
6	-2.129934000	2.069337000	5.433553000
6	-1.176500000	0.421144000	6.931682000
6	-2.795286000	2.659531000	6.505867000
6	-1.832784000	1.021178000	8.009049000
6	-2.642929000	2.141091000	7.797589000
1	-2.224922000	2.461614000	4.421428000
1	-0.540579000	-0.449216000	7.102982000
1	-3.431519000	3.531823000	6.336041000
1	-1.712680000	0.613470000	9.016394000
1	-3.159412000	2.608909000	8.640449000
6	-1.270613000	-3.280259000	0.703750000
6	-2.176312000	-4.361644000	0.407630000
6	-1.819747000	-5.503286000	-0.360418000
6	-3.509039000	-4.310678000	0.897309000
6	-2.737091000	-6.517057000	-0.620278000
6	-4.422011000	-5.327468000	0.635254000
6	-4.047975000	-6.444010000	-0.126932000
1	-0.802469000	-5.589986000	-0.748804000
1	-3.812171000	-3.438135000	1.482677000
1	-2.427437000	-7.382485000	-1.215006000
1	-5.441498000	-5.250390000	1.025761000
1	-4.764942000	-7.243398000	-0.333221000

6	0.015098000	-3.114393000	0.213777000
6	0.833601000	-2.018894000	0.585094000
8	0.454144000	-1.191000000	1.514646000
6	2.118276000	-1.755830000	-0.090339000
6	2.991121000	-0.792656000	0.466178000
6	2.502107000	-2.360862000	-1.309136000
1	2.681623000	-0.301733000	1.388126000
1	1.836612000	-3.079770000	-1.789104000
6	4.178484000	-0.442470000	-0.171894000
6	3.691966000	-2.010607000	-1.942587000
1	4.830975000	0.312440000	0.278846000
1	3.952092000	-2.479568000	-2.896407000
6	4.539791000	-1.044287000	-1.384633000
1	5.467231000	-0.762754000	-1.891516000
1	0.423581000	-3.841045000	-0.491589000
1	-1.647492000	-2.487873000	1.356524000

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6	-0.093998000	-0.312829000	-0.878316000
6	-0.623515000	-1.344393000	0.100322000
1	0.038901000	-1.374672000	0.974554000
1	-1.646685000	-1.091533000	0.422692000
1	-0.665314000	-2.342847000	-0.364384000
8	0.911102000	0.324392000	-0.630006000
6	-0.841073000	-0.094618000	-2.163432000
6	-2.006862000	-0.803531000	-2.496520000
6	-0.342228000	0.863302000	-3.062799000
6	-2.661173000	-0.558155000	-3.705960000
6	-0.994667000	1.108089000	-4.269075000
6	-2.156535000	0.396819000	-4.593072000
1	-2.412381000	-1.552432000	-1.813965000
1	0.565075000	1.402542000	-2.783805000
1	-3.567705000	-1.114300000	-3.957162000
1	-0.599981000	1.855062000	-4.962434000
1	-2.669258000	0.587711000	-5.539394000

VIA

30	3.493906000	2.149823000	4.429724000
35	5.285605000	0.693913000	3.787164000
16	2.039705000	7.086602000	2.240331000
7	3.660433000	4.064906000	5.049341000
7	2.983353000	1.861218000	6.457648000
7	3.070717000	4.155032000	6.308830000
6	3.241040000	5.181880000	4.242522000
1	3.441827000	6.149849000	4.769965000
6	2.804061000	3.073412000	7.051414000
6	1.748678000	7.979332000	0.674457000
6	2.355555000	3.157518000	8.404621000
1	2.215092000	4.138086000	8.865523000
6	2.716916000	0.740366000	7.144391000
1	2.887574000	-0.192390000	6.597018000
6	2.083252000	1.993897000	9.085466000
1	1.723052000	2.042117000	10.117258000
6	0.445231000	8.761219000	0.783658000
1	-0.401197000	8.079870000	0.959681000
1	0.477130000	9.493635000	1.607193000
6	2.262182000	0.738002000	8.452181000
1	2.064786000	-0.199966000	8.972793000
1	0.251549000	9.304531000	-0.155322000
1	2.597807000	8.653353000	0.474627000
1	1.680566000	7.248206000	-0.141925000
6	3.947728000	5.237153000	2.909372000
6	5.075145000	4.449670000	2.657022000
6	3.472725000	6.090836000	1.883629000
6	5.720096000	4.473932000	1.416848000
6	4.131703000	6.127884000	0.647088000
6	5.246130000	5.316782000	0.413634000
1	5.444663000	3.799219000	3.449413000
1	6.582685000	3.825811000	1.244903000
1	3.767081000	6.764550000	-0.156311000
1	5.732574000	5.345103000	-0.565820000
1	2.146145000	5.191878000	4.050289000
1	3.065445000	5.065126000	6.764577000
6	1.336087000	3.657972000	0.967845000
6	1.040754000	4.438796000	-0.202275000
6	-0.147514000	5.207469000	-0.355904000
6	1.974564000	4.492295000	-1.272912000
6	-0.368999000	5.984107000	-1.488909000
6	1.749800000	5.273033000	-2.401977000
6	0.577037000	6.035013000	-2.524083000
1	-0.901042000	5.187386000	0.433486000
1	2.899719000	3.918739000	-1.180076000
1	-1.293109000	6.565401000	-1.568709000
1	2.500006000	5.295778000	-3.198687000
1	0.400821000	6.650219000	-3.410432000
6	0.605555000	3.659362000	2.146732000
6	0.931480000	2.883269000	3.281596000

8	1.893439000	2.007636000	3.262708000
6	0.155062000	3.056107000	4.530607000
6	0.044592000	1.980240000	5.435986000
6	-0.443549000	4.283728000	4.890905000
1	0.510075000	1.032042000	5.165983000
1	-0.340637000	5.144525000	4.226716000
6	-0.634591000	2.119829000	6.643759000
6	-1.117587000	4.424367000	6.103812000
1	-0.693199000	1.270982000	7.330087000
1	-1.555954000	5.391649000	6.368452000
6	-1.216629000	3.345133000	6.990821000
1	-1.733883000	3.460636000	7.947443000
1	-0.270618000	4.304878000	2.229062000
1	2.242788000	3.047457000	0.946583000

TSVI-VIIA

30	-0.955311000	-3.094279000	-0.153331000
35	-2.356069000	-3.826782000	-1.946705000
16	-2.461250000	-3.493638000	5.695626000
7	-1.645973000	-2.242343000	1.599016000
7	-0.222987000	-1.134143000	-0.415715000
7	-1.103858000	-0.973613000	1.703981000
6	-1.795062000	-2.848265000	2.842809000
6	-0.411803000	-0.396270000	0.706687000
6	-2.865913000	-4.538616000	7.132175000
6	0.113052000	0.923574000	0.808160000
1	-0.053128000	1.505103000	1.718341000
6	0.492334000	-0.626601000	-1.430960000
1	0.615531000	-1.286208000	-2.293235000
6	0.849283000	1.422213000	-0.245658000
1	1.280416000	2.425079000	-0.177223000
6	-2.256405000	-3.911923000	8.381871000
1	-1.161145000	-3.858039000	8.290243000
1	-2.643312000	-2.893151000	8.548080000
6	1.054166000	0.638606000	-1.404073000
1	1.646035000	1.000265000	-2.244704000
1	-2.499882000	-4.517887000	9.270195000
1	-3.959870000	-4.631259000	7.232036000
1	-2.444248000	-5.540326000	6.958719000
6	-2.757172000	-3.951405000	3.003599000
6	-3.278218000	-4.648007000	1.897870000
6	-3.090294000	-4.421927000	4.307998000
6	-4.069885000	-5.786263000	2.057791000
6	-3.889467000	-5.560729000	4.459009000
6	-4.371482000	-6.250506000	3.338892000
1	-3.065683000	-4.288861000	0.890159000
1	-4.446917000	-6.304984000	1.172737000
1	-4.148352000	-5.924364000	5.453368000
1	-4.986819000	-7.143732000	3.479047000
1	-1.311802000	-0.436137000	2.540902000
1	-1.801686000	-2.134894000	3.686608000
6	0.550116000	-4.289836000	3.136433000
6	0.747937000	-4.644197000	4.546813000
6	1.491209000	-3.845444000	5.444932000
6	0.123933000	-5.797382000	5.077544000
6	1.607046000	-4.184850000	6.792793000
6	0.246122000	-6.140654000	6.421032000
6	0.990181000	-5.336553000	7.296530000
1	1.973390000	-2.936262000	5.078287000
1	-0.473946000	-6.421347000	4.407923000
1	2.188624000	-3.542326000	7.461652000
1	-0.240613000	-7.047938000	6.792608000
1	1.088800000	-5.605434000	8.351827000
6	1.523252000	-3.519847000	2.386563000
6	1.518920000	-3.478353000	1.007127000
8	0.635358000	-4.141757000	0.277623000
6	2.533333000	-2.691329000	0.256568000
6	2.773574000	-3.008156000	-1.096395000
6	3.228766000	-1.594763000	0.806038000
1	2.211077000	-3.837812000	-1.527873000
1	3.024553000	-1.292477000	1.835099000
6	3.687437000	-2.278598000	-1.857252000
6	4.132967000	-0.858802000	0.041696000
1	3.858262000	-2.550382000	-2.903693000
1	4.643164000	0.000060000	0.488582000
6	4.374841000	-1.197063000	-1.295877000
1	5.079669000	-0.614252000	-1.895782000
1	2.299213000	-2.971631000	2.923891000
1	0.091239000	-5.089926000	2.539321000
1	-0.617257000	-3.516012000	3.141457000

VIIA

30	3.009398000	9.340177000	5.235420000
35	2.548463000	7.288246000	4.041436000
16	-0.080536000	11.254892000	9.484540000
7	1.649823000	10.866287000	5.544233000

7	3.733652000	10.794679000	3.871483000
7	2.184097000	12.032412000	5.040184000
6	0.834432000	11.023942000	6.615338000
1	0.890156000	11.966194000	7.176678000
6	3.193981000	12.009566000	4.145517000
6	-0.608789000	10.613318000	11.110634000
6	3.671507000	13.184677000	3.506489000
1	3.233476000	14.154385000	3.754947000
6	4.715962000	10.699036000	2.960922000
1	5.102270000	9.691125000	2.791083000
6	4.686516000	13.064572000	2.578433000
1	5.069278000	13.957813000	2.076724000
6	0.110137000	11.382868000	12.213393000
1	1.200124000	11.246706000	12.134811000
1	-0.100623000	12.463736000	12.157435000
6	5.225279000	11.792396000	2.279417000
1	6.029747000	11.663366000	1.555014000
1	-0.212747000	11.025745000	13.205644000
1	-1.702342000	10.705118000	11.218125000
1	-0.343565000	9.546504000	11.148006000
6	-0.056616000	9.998944000	7.036987000
6	-0.404610000	8.919909000	6.172183000
6	-0.634207000	9.990256000	8.353874000
6	-1.290063000	7.925637000	6.562988000
6	-1.543792000	8.998660000	8.717861000
6	-1.879399000	7.961777000	7.834136000
1	0.038186000	8.892115000	5.175850000
1	-1.524442000	7.114770000	5.867493000
1	-1.986240000	9.000182000	9.714454000
1	-2.578548000	7.183690000	8.151792000
1	1.724552000	12.909331000	5.263667000
6	3.546562000	9.571882000	8.236356000
6	2.642291000	8.558427000	8.899455000
6	1.979234000	7.548484000	8.185355000
6	2.417822000	8.635346000	10.284784000
6	1.115799000	6.658387000	8.829875000
6	1.564074000	7.741913000	10.935572000
6	0.903919000	6.747046000	10.206810000
1	2.125081000	7.450946000	7.108811000
1	2.927424000	9.414712000	10.859285000
1	0.596651000	5.899542000	8.240353000
1	1.416678000	7.820826000	12.017367000
1	0.225169000	6.051173000	10.708356000
6	4.234417000	9.120369000	6.952820000
6	5.337067000	9.966327000	6.536020000
8	5.495783000	11.127272000	6.936357000
6	6.303986000	9.438512000	5.483669000
6	7.309055000	10.310171000	5.038607000
6	6.206283000	8.167257000	4.894766000
1	7.347467000	11.298222000	5.500920000
1	5.415652000	7.478085000	5.191987000
6	8.192548000	9.930860000	4.027998000
6	7.085793000	7.786711000	3.877254000
1	8.963616000	10.627730000	3.685765000
1	6.978859000	6.801434000	3.415439000
6	8.081068000	8.666267000	3.438828000
1	8.763294000	8.368899000	2.636868000
1	4.467334000	8.048624000	6.933486000
1	2.947164000	10.480573000	8.049033000
1	4.306347000	9.901417000	8.969568000

TSVII-IIA

30	2.754909000	8.945908000	5.145776000
35	2.689616000	6.738014000	4.330200000
16	0.097724000	11.644053000	9.670736000
7	2.017346000	10.608140000	5.923442000
7	3.405384000	10.283662000	3.719749000
7	2.870332000	11.656343000	5.555578000
6	1.240796000	10.867719000	6.991500000
1	1.408201000	11.832711000	7.480032000
6	3.461555000	11.497296000	4.347957000
6	-0.748407000	11.390333000	11.268797000
6	4.228512000	12.550922000	3.774925000
1	4.271847000	13.502938000	4.306069000
6	4.055340000	10.089624000	2.557278000
1	3.979787000	9.080206000	2.140429000
6	4.881148000	12.339762000	2.580812000
1	5.470930000	13.143904000	2.131397000
6	-0.145375000	12.331055000	12.307823000
1	0.929879000	12.133513000	12.442602000
1	-0.257288000	13.384476000	12.003756000
6	4.793234000	11.078950000	1.936636000
1	5.310067000	10.878648000	0.997329000
1	-0.645050000	12.202932000	13.282300000
1	-1.828750000	11.579640000	11.158716000
1	-0.622007000	10.337761000	11.569333000
6	0.187829000	10.027802000	7.439683000
6	-0.236111000	8.875802000	6.709121000

6	-0.526501000	10.305612000	8.660894000
6	-1.296855000	8.085375000	7.125435000
6	-1.614516000	9.525504000	9.042913000
6	-2.012772000	8.410022000	8.285522000
1	0.276677000	8.618868000	5.780881000
1	-1.574287000	7.208990000	6.533176000
1	-2.163582000	9.758058000	9.956411000
1	-2.857216000	7.799570000	8.615359000
1	3.881850000	11.632104000	6.375176000
6	3.736277000	9.020878000	8.360750000
6	2.721628000	7.934995000	8.652903000
6	2.699838000	6.701809000	7.990547000
6	1.747848000	8.173316000	9.638076000
6	1.730710000	5.738477000	8.293692000
6	0.786169000	7.214965000	9.948142000
6	0.771447000	5.988991000	9.273864000
1	3.420422000	6.487063000	7.202456000
1	1.725901000	9.147123000	10.134102000
1	1.720727000	4.797219000	7.737349000
1	0.019027000	7.439899000	10.692753000
1	-0.000989000	5.247525000	9.496228000
6	4.545054000	8.909409000	7.097821000
6	5.143559000	10.020706000	6.540710000
8	4.868393000	11.244504000	6.954689000
6	6.149691000	9.888029000	5.438729000
6	6.936784000	11.004808000	5.114334000
6	6.336959000	8.703944000	4.698042000
1	6.764567000	11.923471000	5.676030000
1	5.709496000	7.831658000	4.889207000
6	7.892628000	10.940022000	4.099308000
6	7.288496000	8.640824000	3.681538000
1	8.491351000	11.824309000	3.861697000
1	7.402432000	7.715722000	3.109500000
6	8.075372000	9.757739000	3.377208000
1	8.815537000	9.708658000	2.573375000
1	4.916477000	7.924701000	6.810303000
1	3.228106000	9.995911000	8.378120000
1	4.442036000	9.061182000	9.217380000

4a

6	-0.995094000	1.638886000	0.859997000
6	-1.795171000	2.716472000	0.169095000
6	-1.705426000	4.055269000	0.579628000
6	-2.610445000	2.411191000	-0.931814000
6	-2.407532000	5.061158000	-0.089600000
6	-3.315122000	3.412834000	-1.604266000
6	-3.214970000	4.742920000	-1.185459000
1	-1.079352000	4.309949000	1.440134000
1	-2.697184000	1.371267000	-1.261181000
1	-2.327239000	6.097571000	0.248872000
1	-3.949180000	3.153258000	-2.456185000
1	-3.768016000	5.527502000	-1.708035000
6	0.379216000	1.441310000	0.213337000
6	1.200657000	0.347175000	0.878243000
8	0.767440000	-0.261859000	1.838365000
6	2.558347000	0.031182000	0.319494000
6	3.295780000	-1.000168000	0.926001000
6	3.112771000	0.716192000	-0.774639000
1	2.847018000	-1.519255000	1.775012000
1	2.559880000	1.520939000	-1.261953000
6	4.559392000	-1.341610000	0.448706000
6	4.380193000	0.374855000	-1.251898000
1	5.125042000	-2.145935000	0.925702000
1	4.803946000	0.913402000	-2.103093000
6	5.104144000	-0.654008000	-0.642450000
1	6.095200000	-0.920885000	-1.018546000
1	0.956236000	2.382848000	0.238282000
1	-1.538147000	0.681599000	0.837154000
1	0.268669000	1.201053000	-0.858913000
1	-0.856665000	1.883205000	1.924325000

TSII-IIIB

30	2.518599000	3.511341000	4.700415000
35	3.298031000	1.521463000	3.742622000
16	5.659105000	8.232295000	2.481259000
7	2.791992000	5.689758000	4.555204000
7	2.256681000	4.006141000	6.597893000
7	2.666200000	6.235966000	5.846547000
6	3.601580000	6.436235000	3.736430000
1	4.156317000	7.224795000	4.250225000
6	2.374847000	5.381539000	6.801474000
6	6.640683000	9.048160000	1.178838000
6	2.160754000	5.872024000	8.147310000
1	2.261928000	6.948277000	8.298265000
6	1.940606000	3.179698000	7.620272000
1	1.844603000	2.121593000	7.355850000
6	1.842365000	5.011972000	9.161571000

1	1.678426000	5.399478000	10.172562000
6	7.471457000	10.163108000	1.807372000
1	6.825683000	10.915013000	2.288590000
1	8.153030000	9.765315000	2.576428000
6	1.721114000	3.610528000	8.908221000
1	1.450839000	2.902574000	9.692627000
1	8.079826000	10.671555000	1.041169000
1	7.294159000	8.307253000	0.689521000
1	5.962335000	9.453816000	0.410539000
6	3.750605000	6.242042000	2.343661000
6	2.989061000	5.275545000	1.613229000
6	4.701635000	7.019942000	1.581479000
6	3.162229000	5.079980000	0.249725000
6	4.855057000	6.808848000	0.213034000
6	4.094917000	5.840503000	-0.466432000
1	2.224771000	4.698229000	2.132198000
1	2.556769000	4.325784000	-0.261228000
1	5.578666000	7.392766000	-0.356250000
1	4.238494000	5.691734000	-1.539957000
6	-0.373434000	4.635548000	4.615892000
1	-0.224443000	5.471147000	5.328639000
6	-1.513456000	5.020795000	3.665958000
1	-1.231018000	5.917423000	3.092043000
1	-1.699710000	4.200200000	2.954583000
1	-2.445949000	5.226306000	4.217505000
8	0.805632000	4.435978000	3.871608000
1	1.655014000	5.273823000	4.097945000
6	-0.732226000	3.407683000	5.437135000
6	-1.297195000	3.538741000	6.711670000
6	-0.488872000	2.120759000	4.935465000
6	-1.618400000	2.411555000	7.471618000
6	-0.800252000	0.991417000	5.696467000
6	-1.370932000	1.131898000	6.966146000
1	-1.450061000	4.538486000	7.128037000
1	-0.020544000	2.009849000	3.955429000
1	-2.038773000	2.534432000	8.473675000
1	-0.582923000	-0.003371000	5.298233000
1	-1.605705000	0.247843000	7.565770000

IIIB

30	3.515589000	3.332115000	4.515806000
35	5.863725000	3.076249000	4.202153000
16	4.235349000	8.975393000	2.550078000
7	2.634995000	5.421620000	4.540201000
7	2.995560000	3.593632000	6.457499000
7	2.355247000	5.818981000	5.883605000
6	3.243241000	6.415161000	3.776034000
1	3.733435000	7.190470000	4.363367000
6	2.516785000	4.849848000	6.766460000
6	5.113417000	9.996122000	1.316957000
6	2.164125000	5.112625000	8.143323000
1	1.794149000	6.112036000	8.377031000
6	3.111587000	2.647727000	7.407489000
1	3.510877000	1.686245000	7.065874000
6	2.279984000	4.128641000	9.089191000
1	1.999541000	4.336775000	10.127059000
6	5.748076000	11.191675000	2.020958000
1	4.985632000	11.805920000	2.527045000
1	6.475040000	10.864126000	2.780707000
6	2.762865000	2.839802000	8.729262000
1	2.874123000	2.037305000	9.459793000
1	6.273569000	11.832234000	1.293682000
1	5.878677000	9.376366000	0.822895000
1	4.405850000	10.337886000	0.543905000
6	3.275190000	6.397788000	2.363908000
6	2.848440000	5.258297000	1.615200000
6	3.745950000	7.537312000	1.615998000
6	2.876043000	5.247858000	0.226632000
6	3.761717000	7.502873000	0.222019000
6	3.328816000	6.367634000	-0.481411000
1	2.562648000	4.344804000	2.141109000
1	2.560841000	4.346661000	-0.305874000
1	4.102659000	8.369755000	-0.344776000
1	3.355402000	6.365959000	-1.574311000
6	1.012587000	2.382431000	3.112856000
1	0.778498000	3.002520000	2.211649000
6	0.510057000	0.965312000	2.799926000
1	1.084698000	0.562093000	1.951485000
1	0.675738000	0.299833000	3.662818000
1	-0.564530000	0.956316000	2.546893000
8	2.376543000	2.358001000	3.343321000
1	1.766562000	5.089526000	4.101992000
6	0.228468000	3.020979000	4.259645000
6	-0.413645000	4.256183000	4.089744000
6	0.223784000	2.441434000	5.537556000
6	-1.022881000	4.908054000	5.168701000
6	-0.390470000	3.079688000	6.613758000

6	-1.011429000	4.320706000	6.434279000
1	-0.414989000	4.721185000	3.098324000
1	0.747901000	1.496225000	5.695121000
1	-1.488128000	5.886448000	5.021455000
1	-0.345805000	2.628669000	7.608171000
1	-1.461079000	4.837295000	7.286184000

TSIII-IVB

30	2.249681000	2.650559000	4.456111000
35	2.877236000	0.852057000	3.000566000
16	3.647288000	7.864791000	2.376644000
7	3.096224000	4.510567000	5.181099000
7	2.950037000	2.209189000	6.340110000
7	4.099948000	4.290738000	6.183957000
6	3.327853000	5.549196000	4.223860000
1	2.011044000	5.381190000	3.577057000
6	3.929827000	3.109500000	6.748498000
6	4.245654000	8.888158000	0.990006000
6	4.797207000	2.719128000	7.838583000
1	5.564963000	3.434538000	8.138541000
6	2.843570000	1.006122000	6.946842000
1	2.077851000	0.340370000	6.534293000
6	4.640331000	1.504831000	8.448686000
1	5.300217000	1.221149000	9.275255000
6	3.470424000	10.202541000	0.978127000
1	2.390017000	10.025414000	0.855291000
1	3.614561000	10.756786000	1.919226000
6	3.630194000	0.603000000	8.003868000
1	3.489084000	-0.376688000	8.462743000
1	3.809498000	10.842505000	0.147183000
1	5.325651000	9.072638000	1.109690000
1	4.100024000	8.341072000	0.044738000
6	4.363660000	5.359427000	3.221862000
6	5.085956000	4.150987000	3.112451000
6	4.627639000	6.378241000	2.255305000
6	6.024246000	3.948671000	2.103383000
6	5.583040000	6.171745000	1.255201000
6	6.281278000	4.960107000	1.174452000
1	4.912744000	3.365381000	3.846213000
1	6.553357000	2.994396000	2.047021000
1	5.788365000	6.946017000	0.515788000
1	7.018195000	4.813970000	0.379888000
6	0.872683000	4.817046000	3.206694000
6	1.203030000	4.549072000	1.738820000
1	1.502258000	5.461924000	1.202686000
1	2.032346000	3.828320000	1.677066000
1	0.329163000	4.103632000	1.231433000
8	0.692872000	3.716279000	3.958775000
1	2.214700000	4.739270000	5.654957000
6	-0.098549000	5.924047000	3.487355000
6	-0.068751000	7.147391000	2.786847000
6	-1.034190000	5.781081000	4.529926000
6	-0.944899000	8.182297000	3.114812000
6	-1.911589000	6.817099000	4.854681000
6	-1.875126000	8.025614000	4.149992000
1	0.671217000	7.299083000	1.998968000
1	-1.050263000	4.831510000	5.066908000
1	-0.897462000	9.125228000	2.561010000
1	-2.633713000	6.680317000	5.665924000
1	-2.560620000	8.838560000	4.406416000
1	3.210566000	6.575284000	4.604288000

IVB

30	3.159079000	2.650878000	4.635149000
35	5.234946000	1.464695000	4.294130000
16	2.780570000	7.547446000	3.350187000
7	3.396937000	4.708908000	4.989331000
7	2.605563000	2.731140000	6.586605000
7	3.370570000	4.982962000	6.403973000
6	4.573450000	5.347211000	4.369493000
1	4.694093000	6.356473000	4.801773000
6	2.940126000	3.964833000	7.123660000
6	1.728703000	8.522644000	2.226507000
6	2.802304000	4.130114000	8.555216000
1	3.072846000	5.102784000	8.969517000
6	2.170019000	1.731616000	7.378213000
1	1.944400000	0.790963000	6.863642000
6	2.345178000	3.099214000	9.331819000
1	2.240387000	3.239191000	10.412979000
6	0.921173000	9.516155000	3.054234000
1	0.278597000	8.982845000	3.770713000
1	1.578053000	10.200291000	3.615799000
6	2.007176000	1.847476000	8.743397000
1	1.640396000	1.008782000	9.336824000
1	0.276958000	10.122156000	2.396218000
1	2.364373000	9.041569000	1.490392000
1	1.059391000	7.828777000	1.698125000

6	4.409022000	5.405968000	2.869191000
6	5.034680000	4.457066000	2.053769000
6	3.567908000	6.375483000	2.268450000
6	4.858571000	4.457859000	0.667252000
6	3.389887000	6.372961000	0.876324000
6	4.035071000	5.419996000	0.083549000
1	5.645136000	3.685200000	2.527897000
1	5.348891000	3.697481000	0.054904000
1	2.739774000	7.105527000	0.399885000
1	3.876574000	5.429325000	-0.998719000
6	1.144538000	3.174605000	2.542204000
6	1.253536000	2.922385000	1.057526000
1	1.995978000	3.593742000	0.588033000
1	1.594922000	1.888424000	0.905525000
1	0.297059000	3.065483000	0.526092000
8	1.775378000	2.331947000	3.317102000
1	2.560083000	5.158737000	4.596990000
6	0.401108000	4.279654000	3.052958000
6	-0.202031000	5.262808000	2.201224000
6	0.216784000	4.460587000	4.464390000
6	-0.919946000	6.329486000	2.724062000
6	-0.483100000	5.545435000	4.969904000
6	-1.064896000	6.499391000	4.113691000
1	-0.089564000	5.175954000	1.118667000
1	0.622028000	3.714514000	5.148540000
1	-1.372539000	7.056285000	2.040435000
1	-0.587891000	5.650503000	6.054032000
1	-1.628874000	7.344297000	4.517409000
1	5.459250000	4.755077000	4.637526000

VB

30	0.278692000	0.596763000	0.064632000
35	-1.835074000	0.073282000	-1.168708000
16	0.929466000	3.851723000	4.956069000
7	1.991114000	1.342759000	1.294034000
7	1.305493000	1.739055000	-1.258707000
7	2.937035000	2.039576000	0.454185000
6	1.813785000	2.124116000	2.519141000
1	2.789890000	2.552015000	2.817711000
6	2.515216000	2.207907000	-0.786117000
6	-0.616951000	4.319315000	4.069505000
6	3.375579000	2.904181000	-1.719038000
1	4.330693000	3.267027000	-1.335344000
6	0.944053000	1.927337000	-2.544851000
1	-0.028007000	1.501663000	-2.812493000
6	2.986180000	3.080130000	-3.020877000
1	3.647480000	3.604549000	-3.719053000
6	-0.673951000	5.825600000	3.863877000
1	-0.636032000	6.365433000	4.824632000
1	0.166314000	6.175103000	3.243169000
6	1.729829000	2.585236000	-3.468534000
1	1.395022000	2.704210000	-4.499868000
1	-1.613361000	6.099998000	3.356714000
1	-0.635970000	3.789152000	3.107299000
1	-1.472683000	3.966025000	4.662113000
6	1.232010000	1.365812000	3.690442000
6	1.123521000	-0.033397000	3.691841000
6	0.807517000	2.063357000	4.846300000
6	0.628921000	-0.722802000	4.803589000
6	0.304075000	1.367867000	5.953517000
6	0.215893000	-0.026486000	5.940309000
1	1.382728000	-0.607438000	2.799898000
1	0.565032000	-1.813132000	4.767902000
1	-0.017600000	1.940936000	6.826121000
1	-0.172277000	-0.561615000	6.811311000
6	-1.840366000	0.972287000	2.340287000
1	1.180364000	2.987552000	2.275123000
6	-1.948721000	-0.517468000	2.382080000
1	-2.738135000	-0.785036000	1.656837000
1	-1.021832000	-0.984438000	2.029568000
1	-2.238391000	-0.895440000	3.371195000
8	-1.042359000	1.555492000	1.611892000
1	2.434363000	0.454448000	1.536970000
6	-2.788492000	1.801823000	3.142865000
6	-3.289814000	2.982287000	2.570343000
6	-3.141625000	1.463340000	4.456669000
6	-4.142285000	3.807887000	3.301238000
6	-3.971056000	2.308808000	5.197857000
6	-4.477474000	3.476707000	4.619812000
1	-2.997166000	3.231738000	1.548513000
1	-2.730617000	0.562685000	4.915864000
1	-4.541367000	4.718169000	2.846521000
1	-4.221137000	2.055151000	6.231113000
1	-5.133921000	4.132407000	5.198156000
6	0.091308000	-3.664449000	2.027591000
6	-0.253076000	-4.863308000	2.741737000
6	-0.157449000	-6.169960000	2.186078000

6	-0.720660000	-4.776931000	4.082600000
6	-0.503027000	-7.297821000	2.923039000
6	-1.064268000	-5.908118000	4.815261000
6	-0.960004000	-7.185473000	4.245053000
1	0.198816000	-6.289915000	1.160792000
1	-0.814338000	-3.786327000	4.537751000
1	-0.414531000	-8.286644000	2.461990000
1	-1.420053000	-5.797121000	5.844339000
1	-1.229718000	-8.076067000	4.818691000
6	0.520392000	-3.560329000	0.707827000
6	0.875129000	-2.341572000	0.091885000
8	0.863945000	-1.217684000	0.754272000
6	1.328958000	-2.313488000	-1.316214000
6	2.244648000	-1.323573000	-1.727075000
6	0.851703000	-3.218075000	-2.286456000
1	2.642144000	-0.628395000	-0.988204000
1	0.111099000	-3.967855000	-2.000610000
6	2.654293000	-1.227319000	-3.055838000
6	1.267814000	-3.126879000	-3.613826000
1	3.348475000	-0.434538000	-3.345894000
1	0.867716000	-3.825953000	-4.354286000
6	2.167893000	-2.128849000	-4.008459000
1	2.477964000	-2.047942000	-5.054068000
1	0.626980000	-4.464422000	0.104575000
1	0.003457000	-2.732161000	2.588396000

VIB

30	3.234532000	2.634624000	4.597021000
35	5.354506000	1.543244000	4.282921000
16	2.376399000	7.483098000	3.456249000
7	3.195323000	4.684331000	5.050857000
7	2.480873000	2.560392000	6.479683000
7	2.960784000	4.896611000	6.455758000
6	4.342290000	5.482778000	4.574357000
1	4.297374000	6.479907000	5.045679000
6	2.585901000	3.799519000	7.089804000
6	0.931446000	7.911328000	2.427713000
6	2.253368000	3.885331000	8.495394000
1	2.345572000	4.864336000	8.968670000
6	2.080149000	1.480430000	7.180292000
1	2.040334000	0.543519000	6.614220000
6	1.838217000	2.772984000	9.177738000
1	1.583784000	2.851670000	10.239909000
6	0.020445000	8.824351000	3.240324000
1	-0.303788000	8.334547000	4.169009000
1	0.532901000	9.765114000	3.500347000
6	1.736553000	1.516938000	8.515641000
1	1.406623000	0.615374000	9.033478000
1	-0.883659000	9.069901000	2.661519000
1	1.265857000	8.414850000	1.507092000
1	0.417160000	6.978289000	2.153976000
6	4.281162000	5.557536000	3.065817000
6	5.070241000	4.706308000	2.284567000
6	3.334539000	6.390570000	2.421836000
6	4.933127000	4.659518000	0.895252000
6	3.194210000	6.335958000	1.028148000
6	3.986478000	5.469982000	0.271445000
1	5.766723000	4.031760000	2.787071000
1	5.534007000	3.961334000	0.309794000
1	2.453534000	6.955780000	0.522955000
1	3.837141000	5.409004000	-0.808785000
1	2.369487000	5.060663000	4.568945000
1	5.268287000	4.992293000	4.905306000
6	0.105631000	4.298096000	3.989939000
6	-0.839309000	5.300953000	4.427175000
6	-1.851593000	5.831812000	3.586557000
6	-0.774166000	5.794784000	5.756038000
6	-2.746839000	6.792316000	4.051071000
6	-1.668580000	6.759393000	6.212086000
6	-2.666494000	7.267020000	5.366894000
1	-1.948080000	5.455794000	2.565360000
1	0.021230000	5.428795000	6.411094000
1	-3.522864000	7.174492000	3.380490000
1	-1.584438000	7.127336000	7.238904000
1	-3.369720000	8.022132000	5.728100000
6	0.438624000	4.011538000	2.676275000
6	1.392441000	3.037339000	2.286309000
8	1.986545000	2.271607000	3.152848000
6	1.772617000	2.865461000	0.870756000
6	2.844120000	1.994827000	0.567074000
6	1.152523000	3.540180000	-0.205300000
1	3.331924000	1.478259000	1.394553000
1	0.316339000	4.215658000	-0.018355000
6	3.284656000	1.826363000	-0.743511000
6	1.593230000	3.366230000	-1.515279000
1	4.125623000	1.156276000	-0.945542000
1	1.095157000	3.904930000	-2.327312000
6	2.667391000	2.511418000	-1.797518000

1	3.014635000	2.379675000	-2.826163000
1	-0.023064000	4.605439000	1.885782000
1	0.608546000	3.736194000	4.780532000

TSVI-VIIB

30	-2.222610000	-4.483056000	8.351214000
35	-2.675088000	-6.576117000	7.279127000
16	-4.635741000	-5.258555000	13.773150000
7	-3.141897000	-3.465372000	10.014371000
7	-3.116028000	-2.918048000	7.429267000
7	-4.034131000	-2.412136000	9.573270000
6	-3.631340000	-4.178974000	11.164006000
6	-3.948613000	-2.199947000	8.273826000
6	-5.309087000	-6.549015000	14.874845000
6	-4.769638000	-1.163020000	7.685098000
1	-5.421042000	-0.606187000	8.360618000
6	-3.101507000	-2.666158000	6.102519000
1	-2.438320000	-3.307749000	5.512541000
6	-4.716938000	-0.917121000	6.339913000
1	-5.343614000	-0.130774000	5.906291000
6	-4.553080000	-6.508531000	16.198544000
1	-3.484187000	-6.714666000	16.038352000
1	-4.646721000	-5.524283000	16.686145000
6	-3.858996000	-1.684757000	5.500617000
1	-3.803189000	-1.517397000	4.424161000
1	-4.951981000	-7.269427000	16.889575000
1	-6.387319000	-6.383729000	15.034475000
1	-5.171236000	-7.521821000	14.380580000
6	-4.805445000	-5.018505000	11.039989000
6	-5.358902000	-5.341022000	9.781959000
6	-5.376368000	-5.633909000	12.197369000
6	-6.420387000	-6.233390000	9.658082000
6	-6.453846000	-6.514900000	12.061701000
6	-6.972942000	-6.822079000	10.798529000
1	-4.940403000	-4.885116000	8.886690000
1	-6.810572000	-6.468643000	8.665157000
1	-6.896567000	-6.981033000	12.941852000
1	-7.809216000	-7.521668000	10.714648000
1	-2.268355000	-3.016113000	10.307148000
1	-3.502950000	-3.652803000	12.119444000
6	-1.521675000	-5.971637000	11.093731000
6	-1.851219000	-7.029639000	12.084094000
6	-1.227681000	-7.141236000	13.339951000
6	-2.904274000	-7.919849000	11.789689000
6	-1.638681000	-8.104064000	14.264018000
6	-3.318186000	-8.877966000	12.713151000
6	-2.687325000	-8.978190000	13.959174000
1	-0.415918000	-6.460441000	13.602671000
1	-3.408848000	-7.838069000	10.823803000
1	-1.135255000	-8.172099000	15.233288000
1	-4.143939000	-9.548442000	12.459060000
1	-3.009385000	-9.729491000	14.685684000
6	-0.262714000	-5.242170000	11.139755000
6	0.229418000	-4.472644000	10.098944000
8	-0.380246000	-4.241819000	8.967095000
6	1.557154000	-3.795826000	10.237674000
6	1.868307000	-2.732273000	9.369538000
6	2.527366000	-4.178929000	11.184276000
1	1.124486000	-2.453249000	8.622275000
1	2.333264000	-5.030094000	11.839257000
6	3.087525000	-2.059214000	9.463010000
6	3.746792000	-3.507783000	11.277158000
1	3.302089000	-1.230703000	8.781336000
1	4.484936000	-3.828659000	12.018309000
6	4.034481000	-2.439675000	10.419271000
1	4.992208000	-1.916180000	10.490090000
1	0.306046000	-5.249414000	12.069052000
1	-1.804625000	-6.291327000	10.078900000
1	-2.483987000	-5.156953000	11.282004000

VIIB

30	-2.808050000	-4.807059000	8.536884000
35	-4.685775000	-6.278724000	8.559856000
16	-5.139222000	-4.107275000	13.326080000
7	-2.894181000	-2.910948000	9.681787000
7	-2.636013000	-3.432573000	7.074517000
7	-3.031605000	-1.811482000	8.781561000
6	-3.756924000	-3.046018000	10.767764000
6	-2.815148000	-2.135077000	7.517875000
6	-4.859865000	-5.762151000	12.552976000
6	-2.768446000	-1.078613000	6.533097000
1	-2.928876000	-0.060446000	6.890711000
6	-2.376672000	-3.687634000	5.775058000
1	-2.227499000	-4.742201000	5.522334000
6	-2.505293000	-1.366403000	5.220169000
1	-2.456036000	-0.555586000	4.486142000

6	-3.883153000	-6.577072000	13.389095000
1	-2.904102000	-6.078140000	13.458800000
1	-4.257901000	-6.734276000	14.414709000
6	-2.291073000	-2.710830000	4.807337000
1	-2.066161000	-2.969986000	3.772341000
1	-3.721993000	-7.566144000	12.930189000
1	-5.833031000	-6.268689000	12.461487000
1	-4.478585000	-5.607343000	11.533520000
6	-5.146253000	-2.811658000	10.815172000
6	-5.871239000	-2.168482000	9.763761000
6	-5.909644000	-3.238892000	11.964010000
6	-7.235421000	-1.941688000	9.858224000
6	-7.279937000	-2.990350000	12.034493000
6	-7.956605000	-2.336311000	10.997083000
1	-5.309004000	-1.831724000	8.894609000
1	-7.751547000	-1.444387000	9.031515000
1	-7.822970000	-3.336553000	12.917568000
1	-9.031971000	-2.153855000	11.070081000
1	-1.912456000	-2.963045000	10.011932000
1	-3.282757000	-3.498681000	11.638930000
6	-1.412565000	-6.116185000	10.794014000
6	-0.275592000	-6.792705000	11.528900000
6	-0.235415000	-8.187239000	11.674465000
6	0.786065000	-6.035380000	12.057501000
6	0.830900000	-8.814898000	12.327161000
6	1.850596000	-6.659720000	12.710074000
6	1.879191000	-8.052587000	12.848665000
1	-1.056400000	-8.787055000	11.269958000
1	0.763854000	-4.950561000	11.932613000
1	0.840471000	-9.904082000	12.430779000
1	2.666324000	-6.053977000	13.116014000
1	2.713770000	-8.539311000	13.361563000
6	-1.040820000	-5.665514000	9.382748000
6	-0.229200000	-4.487353000	9.233511000
8	-0.156854000	-3.589130000	10.103862000
6	0.408667000	-4.213301000	7.890358000
6	0.772458000	-5.218383000	6.982502000
6	0.594925000	-2.870904000	7.524363000
1	0.649889000	-6.268061000	7.256472000
1	0.302893000	-2.103308000	8.242490000
6	1.298831000	-4.887886000	5.730623000
6	1.098800000	-2.538819000	6.268248000
1	1.582488000	-5.681701000	5.033713000
1	1.201028000	-1.488218000	5.984315000
6	1.454113000	-3.547400000	5.366330000
1	1.845849000	-3.288729000	4.378545000
1	-0.821056000	-6.491019000	8.696420000
1	-2.271963000	-6.800840000	10.742361000
1	-1.735245000	-5.239677000	11.375635000

TSVII-IIB

30	-2.460195000	-5.037915000	8.426076000
35	-3.217431000	-7.277960000	8.512104000
16	-4.857065000	-4.479064000	13.194711000
7	-3.067193000	-3.267332000	9.344294000
7	-2.469770000	-3.853493000	6.830910000
7	-3.423886000	-2.318400000	8.378510000
6	-3.808726000	-3.379639000	10.500900000
6	-3.026769000	-2.617641000	7.158895000
6	-5.030726000	-6.032244000	12.211446000
6	-3.164272000	-1.646785000	6.096646000
1	-3.607300000	-0.684424000	6.358642000
6	-2.055144000	-4.111172000	5.570852000
1	-1.619152000	-5.103122000	5.411964000
6	-2.735068000	-1.936644000	4.830211000
1	-2.836682000	-1.188660000	4.037275000
6	-4.233558000	-7.154720000	12.861919000
1	-3.163441000	-6.901426000	12.922595000
1	-4.588981000	-7.362849000	13.885157000
6	-2.152591000	-3.207914000	4.537802000
1	-1.794464000	-3.463033000	3.539778000
1	-4.325453000	-8.078946000	12.268706000
1	-6.101431000	-6.282699000	12.150298000
1	-4.672587000	-5.842755000	11.188332000
6	-5.071669000	-2.872408000	10.871092000
6	-5.834100000	-1.945760000	10.085502000
6	-5.669317000	-3.298896000	12.121302000
6	-7.056762000	-1.460370000	10.519681000
6	-6.901421000	-2.789901000	12.530855000
6	-7.606285000	-1.862825000	11.751504000
1	-5.394509000	-1.619596000	9.144091000
1	-7.598983000	-0.746289000	9.891138000
1	-7.316710000	-3.143507000	13.478548000
1	-8.569381000	-1.473216000	12.092057000
1	-1.774380000	-3.002447000	9.678342000
1	-3.307155000	-3.995075000	11.247607000
6	-0.996818000	-5.465745000	11.058733000

6	-0.169580000	-6.486437000	11.805912000
6	-0.498558000	-7.849390000	11.737489000
6	0.961448000	-6.105678000	12.543406000
6	0.280442000	-8.806051000	12.394237000
6	1.740453000	-7.059455000	13.203656000
6	1.402602000	-8.414921000	13.131119000
1	-1.374199000	-8.153130000	11.156860000
1	1.228500000	-5.046355000	12.598386000
1	0.007424000	-9.863250000	12.330974000
1	2.614876000	-6.743285000	13.779894000
1	2.010567000	-9.162460000	13.648449000
6	-0.443370000	-5.227158000	9.661990000
6	-0.120579000	-3.961757000	9.196171000
8	-0.631234000	-2.878370000	9.730682000
6	0.693552000	-3.766018000	7.961829000
6	1.587778000	-4.735885000	7.478767000
6	0.521113000	-2.578462000	7.230937000
1	1.752455000	-5.651546000	8.050399000
1	-0.179289000	-1.835568000	7.612873000
6	2.273921000	-4.533202000	6.280250000
6	1.201046000	-2.379978000	6.030304000
1	2.966271000	-5.297268000	5.915747000
1	1.031802000	-1.463957000	5.458840000
6	2.078027000	-3.356931000	5.548563000
1	2.607794000	-3.203764000	4.604155000
1	-0.012305000	-6.095185000	9.159052000
1	-2.035299000	-5.830498000	11.032913000
1	-1.009445000	-4.505888000	11.595686000

TSIII-IVC

30	3.899681000	2.628024000	4.600158000
35	5.649023000	1.297707000	3.733152000
16	2.126704000	7.868246000	1.675064000
7	3.403700000	4.669199000	4.485353000
7	3.586951000	2.917867000	6.573331000
7	3.035591000	5.056157000	5.767291000
6	3.146342000	5.553307000	3.520453000
1	2.584307000	6.452941000	3.805635000
6	2.624015000	3.955963000	6.620010000
6	3.455505000	8.897514000	2.435206000
6	2.129770000	4.333424000	7.957374000
1	1.469119000	5.201145000	8.043183000
6	3.818929000	2.164083000	7.655994000
1	4.517142000	1.333250000	7.500719000
6	2.419654000	3.545124000	9.032464000
1	1.999592000	3.796489000	10.012090000
6	2.853885000	10.144637000	3.070312000
1	2.310236000	10.749697000	2.325357000
1	2.141747000	9.878584000	3.868491000
6	3.271580000	2.406600000	8.902170000
1	3.512349000	1.769312000	9.753252000
1	3.641110000	10.778003000	3.512653000
1	3.978526000	8.282391000	3.184139000
1	4.181706000	9.158702000	1.649254000
6	3.474493000	5.428775000	2.141209000
6	4.222943000	4.327646000	1.621704000
6	3.061849000	6.425076000	1.182875000
6	4.507006000	4.204517000	0.272124000
6	3.361989000	6.280039000	-0.173713000
6	4.075009000	5.174557000	-0.651915000
1	4.594172000	3.560133000	2.301131000
1	5.080827000	3.337314000	-0.067553000
1	3.025669000	7.061156000	-0.861030000
1	4.297590000	5.076649000	-1.717431000
6	1.025739000	2.496959000	4.901874000
1	1.664451000	3.480916000	5.992621000
6	0.276727000	3.534698000	4.085973000
1	0.984631000	4.106770000	3.471462000
1	-0.428721000	3.020905000	3.406632000
1	-0.303985000	4.237197000	4.703143000
8	2.027672000	1.900083000	4.347328000
1	2.334040000	5.801982000	5.749597000
6	0.321445000	1.777977000	5.997288000
6	-0.818651000	2.289611000	6.651757000
6	0.872089000	0.567408000	6.466748000
6	-1.374906000	1.622468000	7.743022000
6	0.315809000	-0.094181000	7.557409000
6	-0.809357000	0.429311000	8.207452000
1	-1.265072000	3.226952000	6.314286000
1	1.753787000	0.179840000	5.955634000
1	-2.254314000	2.041084000	8.241590000
1	0.767119000	-1.025437000	7.912233000
1	-1.241211000	-0.087522000	9.069029000

IVC

30	3.223599000	2.217347000	4.754903000
35	5.110913000	0.859556000	4.119520000

16	2.854781000	7.872586000	2.839548000
7	3.656712000	4.375584000	5.167698000
7	2.848185000	2.225431000	6.715092000
7	3.565334000	4.506543000	6.502115000
6	3.845221000	5.404440000	4.409472000
1	3.843232000	6.411812000	4.855858000
6	2.532791000	3.565577000	7.139512000
6	1.244741000	7.128155000	3.361952000
6	2.488732000	3.759068000	8.621803000
1	1.922904000	4.606078000	9.021196000
6	3.550967000	1.438453000	7.559168000
1	3.920559000	0.505462000	7.118597000
6	3.142300000	2.883173000	9.431092000
1	3.136645000	3.039561000	10.516545000
6	0.589282000	7.944575000	4.463812000
1	1.225982000	7.979135000	5.362541000
1	0.394466000	8.982848000	4.145922000
6	3.770340000	1.713701000	8.892165000
1	4.307914000	1.006231000	9.524746000
1	-0.369800000	7.477787000	4.739064000
1	0.596787000	7.059965000	2.476748000
1	1.437006000	6.102308000	3.703027000
6	4.041137000	5.334325000	2.963231000
6	4.622653000	4.209553000	2.348054000
6	3.653646000	6.427897000	2.144005000
6	4.827978000	4.172276000	0.970975000
6	3.877217000	6.383114000	0.762185000
6	4.468960000	5.263240000	0.173053000
1	4.939603000	3.362032000	2.958183000
1	5.277082000	3.281474000	0.525015000
1	3.557783000	7.231640000	0.152858000
1	4.632278000	5.237719000	-0.907775000
6	1.035818000	3.182889000	2.889786000
1	1.574535000	3.873010000	6.681957000
6	1.178428000	3.605853000	1.446038000
1	1.567475000	4.636401000	1.352284000
1	1.898765000	2.937690000	0.955967000
1	0.221754000	3.568545000	0.896787000
8	1.919646000	2.335443000	3.333331000
1	3.463480000	5.477333000	6.821563000
6	-0.031226000	3.678152000	3.698534000
6	-0.216394000	3.214569000	5.041354000
6	-0.967563000	4.654845000	3.225358000
6	-1.218990000	3.728590000	5.851126000
6	-1.967963000	5.155961000	4.047606000
6	-2.105279000	4.714172000	5.376685000
1	0.441152000	2.432518000	5.423732000
1	-0.886247000	5.025096000	2.201736000
1	-1.317747000	3.354342000	6.875143000
1	-2.658416000	5.908514000	3.651879000
1	-2.890738000	5.117462000	6.021101000

VC

30	0.103976000	0.395139000	-0.642757000
35	-1.836875000	0.173284000	-2.052996000
16	0.587974000	3.709101000	5.524831000
7	1.977115000	1.520236000	1.914374000
7	1.537897000	1.661308000	-1.066326000
7	2.697754000	2.148401000	1.013152000
6	1.574694000	2.105258000	2.993951000
1	1.807769000	3.162135000	3.199920000
6	2.798871000	1.550443000	-0.345351000
6	-0.645068000	4.441018000	4.369771000
6	3.934142000	2.207211000	-1.076802000
1	4.951240000	1.851731000	-0.893813000
6	1.328888000	2.760053000	-1.823450000
1	0.305886000	2.879310000	-2.200740000
6	3.670271000	3.274585000	-1.878630000
1	4.498049000	3.814941000	-2.353283000
6	-0.584414000	5.960678000	4.416747000
1	-0.786121000	6.339682000	5.432369000
1	0.405416000	6.333183000	4.106901000
6	2.319741000	3.647633000	-2.190608000
1	2.093572000	4.498771000	-2.834321000
1	-1.338458000	6.390774000	3.737255000
1	-0.435598000	4.065956000	3.356690000
1	-1.637834000	4.072209000	4.658898000
6	0.801858000	1.365836000	3.987182000
6	0.501689000	0.000596000	3.774612000
6	0.310730000	1.972923000	5.171833000
6	-0.228054000	-0.734667000	4.702405000
6	-0.416995000	1.219336000	6.104348000
6	-0.683674000	-0.132049000	5.883503000
1	0.862605000	-0.455308000	2.850079000
1	-0.449113000	-1.785352000	4.502199000
1	-0.780824000	1.719765000	7.004735000
1	-1.251588000	-0.708611000	6.618439000

6	-1.796498000	0.812319000	1.727613000
1	2.989278000	0.485364000	-0.139211000
6	-2.064934000	-0.661025000	1.709032000
1	-2.682024000	-0.841057000	0.809282000
1	-1.128633000	-1.213874000	1.557840000
1	-2.603666000	-1.021739000	2.592392000
8	-0.958937000	1.319512000	0.983860000
1	2.758458000	3.171785000	1.052338000
6	-2.636936000	1.723474000	2.559577000
6	-2.905771000	3.010966000	2.062610000
6	-3.164427000	1.337897000	3.800384000
6	-3.718128000	3.885044000	2.782171000
6	-3.949881000	2.228272000	4.535542000
6	-4.239180000	3.496072000	4.022390000
1	-2.477096000	3.296166000	1.100273000
1	-2.927186000	0.356299000	4.210255000
1	-3.940597000	4.877272000	2.381349000
1	-4.335239000	1.930679000	5.513859000
1	-4.865899000	4.186831000	4.592931000
6	0.581155000	-3.540233000	1.940291000
6	0.451119000	-4.651056000	2.847187000
6	0.071121000	-5.958123000	2.433696000
6	0.701409000	-4.471334000	4.235517000
6	-0.048853000	-7.001363000	3.346081000
6	0.576475000	-5.517843000	5.144112000
6	0.199359000	-6.797342000	4.711685000
1	-0.145083000	-6.142973000	1.379314000
1	1.014026000	-3.484580000	4.586612000
1	-0.347193000	-7.992644000	2.990355000
1	0.779429000	-5.337334000	6.204252000
1	0.100086000	-7.620236000	5.424475000
6	0.537853000	-3.596506000	0.550884000
6	0.659821000	-2.471070000	-0.293523000
8	0.740579000	-1.267747000	0.203822000
6	0.761005000	-2.651676000	-1.759445000
6	1.473873000	-1.712024000	-2.533580000
6	0.147435000	-3.728777000	-2.433270000
1	1.966400000	-0.871293000	-2.042858000
1	-0.442843000	-4.450417000	-1.865058000
6	1.567223000	-1.842943000	-3.918128000
6	0.239370000	-3.856366000	-3.817678000
1	2.122395000	-1.094594000	-4.490071000
1	-0.264170000	-4.689214000	-4.317492000
6	0.950535000	-2.914392000	-4.571311000
1	1.012320000	-3.009937000	-5.658831000
1	0.474445000	-4.570999000	0.062999000
1	0.772484000	-2.562753000	2.388162000

VIC

30	-3.524416000	0.035450000	-3.245420000
35	-4.636386000	0.946508000	-5.171533000
16	-5.585737000	1.351216000	2.254169000
7	-3.224618000	1.308013000	-1.394868000
7	-1.544680000	0.242113000	-3.305437000
7	-1.903272000	1.498274000	-1.287770000
6	-4.022890000	1.631844000	-0.430285000
1	-3.593582000	1.951254000	0.530990000
6	-1.028147000	0.443548000	-1.977813000
6	-5.376129000	3.128899000	2.696706000
6	0.412676000	0.841404000	-1.923707000
1	0.973858000	0.646407000	-1.005576000
6	-0.949371000	0.897919000	-4.328629000
1	-1.493571000	0.857088000	-5.278914000
6	0.989520000	1.414759000	-3.012737000
1	2.038036000	1.732564000	-2.967658000
6	-4.767587000	3.250646000	4.088244000
1	-5.408491000	2.769497000	4.844996000
1	-3.777228000	2.769240000	4.131415000
6	0.270555000	1.532654000	-4.247603000
1	0.712538000	2.000861000	-5.128086000
1	-4.644380000	4.309954000	4.367977000
1	-4.732031000	3.606380000	1.940379000
1	-6.362741000	3.616427000	2.647951000
6	-5.480102000	1.616792000	-0.539957000
6	-6.116206000	1.728913000	-1.791274000
6	-6.295630000	1.541277000	0.618084000
6	-7.504198000	1.753916000	-1.895539000
6	-7.689447000	1.574120000	0.502051000
6	-8.299166000	1.685560000	-0.748259000
1	-5.516246000	1.814412000	-2.697843000
1	-7.959772000	1.831941000	-2.885822000
1	-8.290015000	1.486309000	1.409473000
1	-9.389595000	1.700670000	-0.824980000
1	-1.196323000	-0.471673000	-1.384722000
1	-1.580740000	1.725448000	-0.340035000
6	-2.072173000	-2.632445000	-1.428298000
6	-0.814311000	-3.178012000	-0.979351000

6	-0.638626000	-3.842693000	0.262908000
6	0.335815000	-3.024467000	-1.798165000
6	0.608412000	-4.321240000	0.654809000
6	1.580701000	-3.500355000	-1.398399000
6	1.731657000	-4.156324000	-0.168407000
1	-1.499371000	-3.987511000	0.919714000
1	0.231377000	-2.492261000	-2.747135000
1	0.709840000	-4.833357000	1.616914000
1	2.447249000	-3.351739000	-2.049552000
1	2.709604000	-4.531088000	0.145744000
6	-3.238500000	-2.503287000	-0.689161000
6	-4.416165000	-1.894995000	-1.183564000
8	-4.502383000	-1.408061000	-2.390382000
6	-5.640636000	-1.851370000	-0.359049000
6	-6.885040000	-1.662813000	-0.998914000
6	-5.636030000	-1.974866000	1.048471000
1	-6.885679000	-1.529167000	-2.081008000
1	-4.687394000	-2.061414000	1.580750000
6	-8.070241000	-1.644014000	-0.268514000
6	-6.823653000	-1.938282000	1.777144000
1	-9.020869000	-1.497789000	-0.789045000
1	-6.788815000	-2.010901000	2.867694000
6	-8.052347000	-1.785958000	1.123809000
1	-8.983001000	-1.754431000	1.697179000
1	-3.269040000	-2.896040000	0.328703000
1	-2.079336000	-2.245575000	-2.450278000

TSVI-VIIC

30	-3.749394000	0.454064000	-3.309986000
35	-4.793126000	1.372998000	-5.247047000
16	-5.638324000	1.054915000	2.336906000
7	-3.340928000	1.408481000	-1.422238000
7	-1.731320000	0.513282000	-3.405642000
7	-2.000288000	1.372281000	-1.207815000
6	-4.125659000	1.451701000	-0.370607000
1	-3.676229000	1.336014000	0.625200000
6	-1.195240000	0.559868000	-2.103467000
6	-5.154241000	2.764184000	2.831063000
6	0.257011000	0.739382000	-1.990316000
1	0.686611000	0.928130000	-1.002860000
6	-0.920270000	0.351113000	-4.458916000
1	-1.430369000	0.263318000	-5.424999000
6	1.044209000	0.565647000	-3.091609000
1	2.132564000	0.625615000	-2.991692000
6	-4.463056000	2.740467000	4.188478000
1	-5.124529000	2.320010000	4.963821000
1	-3.548947000	2.125251000	4.158255000
6	0.461277000	0.326112000	-4.375633000
1	1.071795000	0.203075000	-5.270574000
1	-4.178067000	3.759312000	4.499604000
1	-4.489608000	3.176221000	2.054617000
1	-6.062521000	3.387057000	2.856490000
6	-5.560346000	1.581111000	-0.430632000
6	-6.232458000	1.870320000	-1.642785000
6	-6.363866000	1.405914000	0.736671000
6	-7.618434000	1.939338000	-1.708308000
6	-7.756437000	1.483097000	0.654915000
6	-8.395272000	1.744144000	-0.559582000
1	-5.654063000	2.052171000	-2.549028000
1	-8.092992000	2.148073000	-2.670719000
1	-8.338256000	1.318845000	1.564243000
1	-9.486383000	1.785623000	-0.608080000
1	-1.472291000	-0.631423000	-1.632764000
1	-1.750976000	1.219874000	-0.226286000
6	-1.959641000	-1.997929000	-1.451707000
6	-0.711729000	-2.556696000	-0.915094000
6	-0.509113000	-2.817424000	0.458985000
6	0.387405000	-2.762609000	-1.781055000
6	0.719621000	-3.275992000	0.934908000
6	1.612902000	-3.222131000	-1.304673000
6	1.791333000	-3.485961000	0.059581000
1	-1.327152000	-2.652689000	1.163115000
1	0.267531000	-2.534768000	-2.843794000
1	0.842974000	-3.470450000	2.004896000
1	2.441972000	-3.368376000	-2.003527000
1	2.753661000	-3.843937000	0.435705000
6	-3.195954000	-2.001258000	-0.724428000
6	-4.405626000	-1.609251000	-1.285223000
8	-4.508219000	-1.150111000	-2.507352000
6	-5.680582000	-1.736843000	-0.528272000
6	-6.895280000	-1.584872000	-1.226293000
6	-5.747832000	-1.991413000	0.857032000
1	-6.842697000	-1.357705000	-2.290974000
1	-4.829930000	-2.067678000	1.440933000
6	-8.120734000	-1.706507000	-0.572761000
6	-6.974018000	-2.104997000	1.510491000
1	-9.047681000	-1.574879000	-1.138224000
1	-6.993767000	-2.280411000	2.589827000

6	-8.172037000	-1.972497000	0.798602000
1	-9.133411000	-2.054435000	1.313592000
1	-3.196006000	-2.349772000	0.307846000
1	-2.065641000	-2.086471000	-2.541631000

VIIC

30	2.929785000	2.968760000	4.526932000
35	3.933875000	1.025880000	3.570847000
16	3.805644000	8.615813000	2.997580000
7	3.875090000	4.715445000	5.114631000
7	2.834501000	2.749464000	6.616038000
7	3.712638000	4.875758000	6.469368000
6	4.095903000	5.858221000	4.430178000
1	3.947218000	6.816370000	4.942982000
6	3.173869000	3.906549000	7.239790000
6	2.011088000	8.191952000	2.922872000
6	2.958778000	4.081934000	8.631288000
1	3.189811000	5.041802000	9.096792000
6	2.330288000	1.732972000	7.338311000
1	2.096560000	0.828290000	6.768644000
6	2.425622000	3.033911000	9.351771000
1	2.239172000	3.153204000	10.422395000
6	1.171798000	9.257917000	3.610115000
1	1.431208000	9.349928000	4.677161000
1	1.306924000	10.247034000	3.140842000
6	2.110878000	1.813554000	8.702120000
1	1.698134000	0.964676000	9.248884000
1	0.103931000	8.992118000	3.545790000
1	1.730671000	8.079157000	1.866252000
1	1.872296000	7.213319000	3.402616000
6	4.529868000	5.896042000	3.080334000
6	5.024739000	4.730914000	2.415816000
6	4.482761000	7.109068000	2.307480000
6	5.449293000	4.770540000	1.097043000
6	4.922645000	7.125024000	0.984130000
6	5.413446000	5.969062000	0.362275000
1	5.092456000	3.793200000	2.970047000
1	5.822258000	3.852509000	0.633345000
1	4.853353000	8.064487000	0.429575000
1	5.748235000	6.000509000	-0.677722000
1	0.507307000	3.953033000	6.188283000
1	3.828211000	5.806253000	6.859950000
6	-0.089344000	4.874090000	6.081721000
6	0.443931000	5.910426000	7.056484000
6	1.345120000	6.902009000	6.640326000
6	0.079037000	5.882413000	8.411851000
6	1.882385000	7.819605000	7.547656000
6	0.607384000	6.798585000	9.324934000
6	1.519132000	7.770096000	8.898449000
1	1.628743000	6.933556000	5.587772000
1	-0.623253000	5.116695000	8.755480000
1	2.584844000	8.579762000	7.192511000
1	0.309253000	6.751235000	10.376583000
1	1.933663000	8.489883000	9.609938000
6	-0.065569000	5.286092000	4.642192000
6	0.564557000	4.578852000	3.656219000
8	1.191464000	3.438345000	3.836924000
6	0.582402000	5.123241000	2.257831000
6	1.667924000	4.815344000	1.421460000
6	-0.420363000	5.971906000	1.754401000
1	2.442043000	4.142935000	1.786948000
1	-1.295160000	6.189955000	2.370693000
6	1.784945000	5.386481000	0.153630000
6	-0.317481000	6.528255000	0.478002000
1	2.667301000	5.165194000	-0.450843000
1	-1.110805000	7.184687000	0.107223000
6	0.794192000	6.248975000	-0.325387000
1	0.883867000	6.696704000	-1.319364000
1	-0.552713000	6.229712000	4.386244000
1	-1.111811000	4.600252000	6.411090000

TSVII-IIC

30	3.183239000	2.935551000	4.819330000
35	3.582923000	0.866646000	3.746816000
16	3.770563000	8.336403000	2.398568000
7	3.901562000	4.842066000	4.968094000
7	3.395262000	3.051919000	6.858588000
7	3.471755000	5.320198000	6.202907000
6	3.938634000	5.805472000	4.038053000
1	3.735296000	6.819429000	4.394380000
6	3.372020000	4.384737000	7.187471000
6	3.163874000	9.239011000	0.932449000
6	3.217606000	4.775762000	8.543916000
1	3.200156000	5.839280000	8.780016000
6	3.292102000	2.118624000	7.824360000
1	3.323622000	1.079542000	7.479696000

6	3.099499000	3.808698000	9.520827000
1	2.980334000	4.104885000	10.566445000
6	2.402313000	10.480053000	1.386027000
1	1.525950000	10.200813000	1.991920000
1	3.037480000	11.141400000	1.998331000
6	3.144658000	2.433429000	9.162315000
1	3.067887000	1.643404000	9.911469000
1	2.051906000	11.059479000	0.515456000
1	4.007980000	9.519211000	0.280829000
1	2.506356000	8.560026000	0.369882000
6	4.242750000	5.621582000	2.659891000
6	4.576533000	4.351256000	2.110543000
6	4.173181000	6.723723000	1.736789000
6	4.803684000	4.170202000	0.751675000
6	4.420095000	6.528047000	0.380524000
6	4.722468000	5.254073000	-0.129543000
1	4.665397000	3.490636000	2.773760000
1	5.045510000	3.170118000	0.381104000
1	4.374826000	7.371016000	-0.310168000
1	4.896853000	5.123688000	-1.200791000
1	0.589491000	4.348145000	6.829048000
1	2.322362000	5.816586000	5.895420000
6	0.246800000	5.373032000	6.616251000
6	0.414411000	6.206770000	7.869058000
6	1.057907000	7.452255000	7.872362000
6	-0.073867000	5.716121000	9.092329000
6	1.215987000	8.179271000	9.057759000
6	0.081465000	6.434875000	10.276939000
6	0.730486000	7.675557000	10.266076000
1	1.471665000	7.844966000	6.942853000
1	-0.562112000	4.737254000	9.111587000
1	1.731947000	9.143523000	9.034206000
1	-0.296755000	6.022487000	11.217013000
1	0.859648000	8.240243000	11.193658000
6	0.961736000	5.879954000	5.373389000
6	1.093043000	4.963477000	4.275844000
8	1.312940000	3.724994000	4.495139000
6	1.014471000	5.396504000	2.851023000
6	1.337805000	4.460056000	1.846556000
6	0.566072000	6.669738000	2.450869000
1	1.675385000	3.468593000	2.146201000
1	0.303234000	7.414760000	3.202423000
6	1.235522000	4.792454000	0.497773000
6	0.442971000	6.993131000	1.100347000
1	1.523172000	4.059822000	-0.259812000
1	0.080344000	7.984908000	0.814537000
6	0.781469000	6.057487000	0.114527000
1	0.699183000	6.317642000	-0.944516000
1	0.697350000	6.904438000	5.090136000
1	-0.841192000	5.275724000	6.422247000

V'A

30	-0.077002000	0.406663000	1.268113000
35	-2.557611000	0.077041000	1.318004000
16	-0.594236000	4.932029000	2.814855000
7	1.341626000	1.797442000	0.948718000
7	0.127155000	0.241139000	-0.870623000
7	1.806440000	1.735980000	-0.374228000
6	1.716755000	3.071393000	1.506567000
1	2.801674000	3.263886000	1.308304000
6	1.273328000	0.848320000	-1.244634000
6	-1.713591000	3.730881000	1.953672000
6	1.886572000	0.541539000	-2.491390000
1	2.852671000	0.982391000	-2.743796000
6	-0.489591000	-0.600745000	-1.713072000
1	-1.424006000	-1.027943000	-1.335532000
6	1.253943000	-0.345674000	-3.334370000
1	1.718870000	-0.609278000	-4.288455000
6	-1.597796000	3.726088000	0.436249000
1	-1.750137000	4.733616000	0.014901000
1	-0.617287000	3.348867000	0.116268000
6	0.020488000	-0.926826000	-2.958920000
1	-0.501682000	-1.631445000	-3.607825000
1	-2.358374000	3.045227000	0.021786000
1	-1.505014000	2.737406000	2.368441000
1	-2.732433000	4.007981000	2.267449000
6	1.547600000	3.094685000	3.005108000
6	2.405773000	2.296134000	3.776402000
6	0.570579000	3.864776000	3.668755000
6	2.329553000	2.270895000	5.167907000
6	0.501376000	3.842791000	5.072528000
6	1.373568000	3.055239000	5.821945000
1	3.136228000	1.674405000	3.252725000
1	3.012372000	1.638380000	5.742412000
1	-0.272770000	4.433080000	5.565941000
1	1.289184000	3.036432000	6.911747000
6	-0.421665000	0.368348000	4.589737000

1	1.182643000	3.939003000	1.066466000
6	0.423241000	-0.859056000	4.802137000
1	-0.162485000	-1.653607000	5.290761000
1	0.798643000	-1.204559000	3.827098000
1	1.267427000	-0.608532000	5.466439000
8	-0.447532000	0.950754000	3.516116000
1	2.812208000	1.882787000	-0.484129000
6	-1.256393000	0.903936000	5.711005000
6	-2.229846000	1.871289000	5.412348000
6	-1.075552000	0.498558000	7.041707000
6	-2.999725000	2.431189000	6.429591000
6	-1.838786000	1.069308000	8.062960000
6	-2.801254000	2.036894000	7.758368000
1	-2.361699000	2.167954000	4.371804000
1	-0.322478000	-0.252995000	7.285563000
1	-3.755559000	3.182562000	6.187255000
1	-1.683296000	0.757601000	9.099312000
1	-3.401034000	2.481685000	8.557369000
6	-0.795741000	-3.604905000	1.722977000
6	-1.937706000	-4.495093000	1.306621000
6	-3.096976000	-3.932372000	0.744025000
6	-1.862209000	-5.892206000	1.415300000
6	-4.144543000	-4.745563000	0.304872000
6	-2.909790000	-6.709073000	0.978384000
6	-4.056363000	-6.137533000	0.418961000
1	-3.169227000	-2.842939000	0.666347000
1	-0.965219000	-6.343468000	1.851293000
1	-5.039959000	-4.287636000	-0.125486000
1	-2.830543000	-7.796130000	1.075928000
1	-4.878590000	-6.772938000	0.077048000
6	0.155929000	-3.299502000	0.554100000
6	1.151653000	-2.203671000	0.874963000
8	0.803673000	-1.328954000	1.782482000
6	2.361192000	-2.045322000	0.131549000
6	3.271604000	-0.994112000	0.474886000
6	2.712867000	-2.855924000	-0.993430000
1	3.006243000	-0.349199000	1.313880000
1	2.042771000	-3.656637000	-1.311802000
6	4.427010000	-0.772591000	-0.258533000
6	3.872250000	-2.617765000	-1.719945000
1	5.098348000	0.043688000	0.032208000
1	4.098261000	-3.248272000	-2.586559000
6	4.748325000	-1.574608000	-1.371045000
1	5.657482000	-1.391835000	-1.950461000

1	-0.458357000	-2.986895000	-0.314103000
1	-0.226698000	-4.070813000	2.545319000
1	0.663259000	-4.225031000	0.232973000
1	-1.184317000	-2.648266000	2.098658000

VI'A

30	-0.082643000	0.290662000	1.043857000
35	-2.452338000	0.556782000	1.416510000
16	3.492073000	2.824594000	1.706164000
7	1.031482000	1.818720000	0.354562000
7	0.174997000	-0.378197000	-0.961277000
7	1.203842000	1.689535000	-1.025449000
6	0.643669000	3.161328000	0.739650000
1	1.313546000	3.913106000	0.262599000
6	0.886584000	0.542495000	-1.659232000
6	4.878715000	3.511155000	2.691801000
6	1.283374000	0.277582000	-3.003190000
1	1.908198000	0.998499000	-3.534108000
6	-0.221092000	-1.510994000	-1.561927000
1	-0.807052000	-2.191322000	-0.935733000
6	0.884160000	-0.899374000	-3.594050000
1	1.193515000	-1.121114000	-4.618598000
6	4.758886000	4.994497000	3.020686000
1	4.674565000	5.592523000	2.099406000
1	3.864526000	5.189478000	3.631697000
6	0.097293000	-1.826961000	-2.871306000
1	-0.230110000	-2.768624000	-3.313731000
1	5.639559000	5.345846000	3.587191000
1	5.025206000	2.898809000	3.595512000
1	5.750916000	3.321441000	2.044127000
6	0.817461000	3.235948000	2.236485000
6	-0.287237000	3.351257000	3.086881000
6	2.099785000	3.053770000	2.805095000
6	-0.138462000	3.322649000	4.476981000
6	2.244259000	3.007600000	4.196866000
6	1.131101000	3.149114000	5.026872000
1	-1.281940000	3.427560000	2.641846000
1	-1.016239000	3.394334000	5.123877000
1	3.215025000	2.805146000	4.647655000
1	1.265569000	3.074593000	6.108424000
1	-0.399111000	3.430338000	0.465900000
1	1.940084000	2.257276000	-1.445658000
6	2.939591000	-1.849983000	0.436021000

6	3.525280000	-1.701843000	-0.952400000
6	3.357534000	-2.735255000	-1.890401000
6	4.224042000	-0.555401000	-1.363973000
6	3.859829000	-2.630882000	-3.187322000
6	4.729501000	-0.445176000	-2.663649000
6	4.549694000	-1.480089000	-3.583289000
1	2.801519000	-3.629954000	-1.595307000
1	4.362980000	0.269582000	-0.663918000
1	3.701751000	-3.447203000	-3.898288000
1	5.266220000	0.461739000	-2.958008000
1	4.939366000	-1.391564000	-4.601375000
6	3.093395000	-0.633445000	1.348493000
6	2.173540000	-0.647047000	2.545167000
8	0.898903000	-0.838718000	2.299238000
6	2.613060000	-0.351232000	3.870149000
6	1.649613000	-0.269738000	4.927412000
6	3.973889000	-0.081789000	4.226679000
1	0.605917000	-0.457780000	4.673634000
1	4.752458000	-0.126496000	3.463491000
6	2.019630000	0.067568000	6.219156000
6	4.327843000	0.260468000	5.525343000
1	1.248090000	0.135324000	6.993676000
1	5.378819000	0.468369000	5.754901000
6	3.361199000	0.346064000	6.545262000
1	3.647783000	0.615219000	7.565589000
1	2.822442000	0.274127000	0.782346000
1	3.372873000	-2.745493000	0.918890000
1	4.145148000	-0.502486000	1.636818000
1	1.865016000	-2.067526000	0.332446000

TSVI'-VII'A

30	0.150752000	0.605548000	1.246270000
35	-1.941199000	-0.490381000	1.605689000
16	3.469107000	4.481602000	4.106677000
7	0.555203000	2.619900000	1.164177000
7	0.479710000	0.770350000	-0.838932000
7	1.003526000	2.899131000	-0.120801000
6	1.485162000	3.054752000	2.128410000
1	2.375613000	2.035905000	2.291175000
6	0.921664000	2.022237000	-1.135723000
6	2.945822000	6.247457000	4.105599000
6	1.269032000	2.365803000	-2.476367000
1	1.633007000	3.371806000	-2.699582000
6	0.353874000	-0.141194000	-1.814554000
1	-0.023412000	-1.117247000	-1.493255000
6	1.148773000	1.408151000	-3.459699000
1	1.424522000	1.653261000	-4.489307000
6	1.988873000	6.630323000	2.983415000
1	2.454772000	6.475561000	1.997097000
1	1.073820000	6.019309000	3.024888000
6	0.672015000	0.113187000	-3.139539000
1	0.555210000	-0.659853000	-3.899710000
1	1.694889000	7.692222000	3.063930000
1	2.503101000	6.469008000	5.090475000
1	3.889117000	6.815586000	4.034466000
6	1.044227000	3.174855000	3.518839000
6	-0.181944000	2.609692000	3.945007000
6	1.901952000	3.709012000	4.523901000
6	-0.516849000	2.532858000	5.292624000
6	1.558224000	3.615172000	5.874923000
6	0.356125000	3.022862000	6.273226000
1	-0.871661000	2.221364000	3.194176000
1	-1.466045000	2.072051000	5.580763000
1	2.261554000	3.998277000	6.618131000
1	0.108454000	2.941141000	7.334825000
1	2.181522000	3.840446000	1.801180000
1	1.305706000	3.849485000	-0.322495000
6	4.236461000	-0.686550000	0.733309000
6	4.890761000	-0.705284000	-0.622784000
6	6.276025000	-0.864777000	-0.780032000
6	4.115567000	-0.500455000	-1.779134000
6	6.869928000	-0.825855000	-2.046187000
6	4.702813000	-0.457527000	-3.043748000
6	6.085953000	-0.620515000	-3.185199000
1	6.896426000	-1.021525000	0.107689000
1	3.035973000	-0.369933000	-1.683082000
1	7.952216000	-0.955054000	-2.142596000
1	4.071793000	-0.295327000	-3.922377000
1	6.548890000	-0.587623000	-4.175610000
6	3.759819000	0.724849000	1.130788000
6	2.829364000	0.716148000	2.339157000
8	1.724725000	-0.028426000	2.178059000
6	3.404075000	0.724558000	3.704980000
6	2.617466000	0.246681000	4.778125000
6	4.657297000	1.300693000	4.016468000
1	1.649453000	-0.193266000	4.537673000
1	5.288493000	1.694059000	3.217237000

6	3.050493000	0.365578000	6.095077000
6	5.087275000	1.415642000	5.337634000
1	2.409988000	0.005541000	6.905916000
1	6.053220000	1.884563000	5.549208000
6	4.287262000	0.955869000	6.390863000
1	4.621560000	1.059479000	7.427123000
1	3.198945000	1.147377000	0.281442000
1	4.925425000	-1.075696000	1.500555000
1	4.625614000	1.388074000	1.284182000
1	3.345194000	-1.334759000	0.735632000

VII'A

30	-0.089380000	0.610872000	1.543191000
35	-2.460553000	0.314848000	1.820426000
16	2.751615000	5.890763000	3.114332000
7	0.640760000	2.516313000	1.053671000
7	0.270650000	0.374136000	-0.533255000
7	0.949659000	2.563228000	-0.282485000
6	1.148829000	3.532695000	1.778787000
1	2.134236000	1.155531000	3.600357000
6	0.762740000	1.505178000	-1.100049000
6	1.646633000	7.334055000	2.812621000
6	1.057616000	1.562305000	-2.488622000
1	1.464142000	2.480243000	-2.919590000
6	0.044518000	-0.702614000	-1.303645000
1	-0.367903000	-1.571452000	-0.781990000
6	0.830008000	0.441030000	-3.260295000
1	1.057376000	0.462249000	-4.329428000
6	0.549495000	7.090009000	1.784441000
1	0.977416000	6.844179000	0.799499000
1	-0.093035000	6.250075000	2.089421000
6	0.307863000	-0.732996000	-2.663269000
1	0.113997000	-1.633838000	-3.246455000
1	-0.086313000	7.986407000	1.671948000
1	1.216670000	7.633108000	3.782332000
1	2.326324000	8.141381000	2.489754000
6	0.915396000	3.735808000	3.161684000
6	-0.003573000	2.927275000	3.906153000
6	1.605987000	4.760519000	3.905576000
6	-0.178130000	3.081785000	5.269817000
6	1.417530000	4.890153000	5.283892000
6	0.536024000	4.060800000	5.986091000
1	-0.605495000	2.181105000	3.386035000
1	-0.887019000	2.429261000	5.787334000
1	1.984509000	5.663293000	5.810308000
1	0.407453000	4.174303000	7.065266000
1	1.832678000	4.229732000	1.279638000
1	1.350642000	3.419400000	-0.653595000
6	3.664250000	-0.847900000	1.187350000
6	4.483852000	-0.554963000	-0.042016000
6	5.876703000	-0.388189000	0.033654000
6	3.866598000	-0.379188000	-1.290627000
6	6.627320000	-0.056010000	-1.097279000
6	4.611048000	-0.044506000	-2.424396000
6	5.996596000	0.119765000	-2.333648000
1	6.374878000	-0.520174000	0.999068000
1	2.787037000	-0.510128000	-1.371104000
1	7.711256000	0.067426000	-1.013422000
1	4.099879000	0.089163000	-3.382009000
1	6.582235000	0.381646000	-3.219548000
6	3.306241000	0.425391000	1.965460000
6	2.287761000	0.168332000	3.109452000
8	1.105266000	-0.368980000	2.640561000
6	2.914969000	-0.735942000	4.169980000
6	2.405521000	-2.021442000	4.390047000
6	4.017211000	-0.312343000	4.928882000
1	1.534604000	-2.318832000	3.803651000
1	4.412403000	0.697945000	4.783345000
6	2.992958000	-2.870662000	5.333161000
6	4.606257000	-1.156735000	5.873246000
1	2.582280000	-3.872889000	5.491747000
1	5.462808000	-0.806837000	6.457822000
6	4.097800000	-2.444949000	6.077105000
1	4.556141000	-3.107980000	6.817038000
1	2.855330000	1.157769000	1.278484000
1	4.210629000	-1.539144000	1.850573000
1	4.222742000	0.896293000	2.362230000
1	2.722725000	-1.344760000	0.908606000

TSVII'-IIA

30	1.529432000	0.947383000	1.411317000
35	0.031236000	-0.366403000	2.658547000
16	2.170605000	7.125862000	1.838056000
7	1.955239000	2.778744000	0.770736000
7	1.809455000	0.582612000	-0.653889000
7	3.070110000	2.497885000	-0.085097000

6	1.954848000	4.033862000	1.241736000
1	5.603971000	0.535723000	1.400245000
6	2.792238000	1.479988000	-0.965345000
6	1.061549000	7.769255000	0.514736000
6	3.603112000	1.264605000	-2.105172000
1	4.392401000	1.988318000	-2.315530000
6	1.574593000	-0.471093000	-1.454308000
1	0.782681000	-1.152492000	-1.132328000
6	3.357574000	0.171083000	-2.920444000
1	3.969002000	0.004850000	-3.812246000
6	0.680363000	6.752562000	-0.553815000
1	1.571234000	6.364299000	-1.071122000
1	0.156767000	5.893264000	-0.108818000
6	2.309730000	-0.720437000	-2.602109000
1	2.093699000	-1.598312000	-3.212235000
1	0.011864000	7.211783000	-1.304616000
1	0.163253000	8.182112000	1.003001000
1	1.619200000	8.616586000	0.079079000
6	1.090385000	4.537510000	2.245516000
6	0.151757000	3.702469000	2.941096000
6	1.091492000	5.932163000	2.628641000
6	-0.679008000	4.190512000	3.933488000
6	0.250031000	6.397293000	3.640623000
6	-0.644170000	5.548587000	4.307728000
1	0.086332000	2.644925000	2.684139000
1	-1.368035000	3.501565000	4.432207000
1	0.302929000	7.457642000	3.904548000
1	-1.294559000	5.934185000	5.096970000
1	2.675279000	4.719291000	0.788081000
1	3.674204000	1.796351000	0.791527000
6	3.356366000	-2.127026000	1.340851000
6	2.804578000	-3.086868000	0.311969000
6	3.596905000	-3.621296000	-0.715305000
6	1.450581000	-3.459715000	0.363730000
6	3.057802000	-4.498200000	-1.660898000
6	0.907186000	-4.334532000	-0.579754000
6	1.708691000	-4.857878000	-1.599762000
1	4.648831000	-3.337026000	-0.789452000
1	0.814825000	-3.029168000	1.142304000
1	3.695002000	-4.895907000	-2.456315000
1	-0.152399000	-4.599979000	-0.524209000
1	1.283557000	-5.537610000	-2.343553000
6	4.460199000	-1.189459000	0.846356000
6	4.685352000	0.032136000	1.771336000
8	3.630173000	0.940469000	1.724643000
6	4.976396000	-0.418339000	3.198742000
6	6.164198000	-1.102721000	3.499176000
6	4.053479000	-0.193189000	4.227000000
1	6.900564000	-1.275962000	2.707731000
1	3.132530000	0.343781000	3.998897000
6	6.421923000	-1.560631000	4.793134000
6	4.307052000	-0.652587000	5.523367000
1	7.355174000	-2.089604000	5.008476000
1	3.571215000	-0.470762000	6.311541000
6	5.489668000	-1.338541000	5.812751000
1	5.687844000	-1.695113000	6.827568000
1	4.214221000	-0.806373000	-0.156065000
1	3.731665000	-2.701166000	2.207031000
1	5.411711000	-1.740013000	0.746635000
1	2.518043000	-1.538419000	1.741034000

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6	-0.350937000	3.641732000	-3.174131000
6	-1.746482000	3.899335000	-3.689981000
6	-2.240290000	5.206485000	-3.812270000
6	-2.561865000	2.835984000	-4.107070000
6	-3.514318000	5.446582000	-4.334240000
6	-3.835517000	3.070778000	-4.630049000
6	-4.316527000	4.378628000	-4.745407000
1	-1.618450000	6.047064000	-3.490052000
1	-2.192161000	1.810067000	-4.017537000
1	-3.882933000	6.472361000	-4.417590000
1	-4.456817000	2.228812000	-4.946329000
1	-5.313939000	4.564084000	-5.151830000
6	0.681537000	3.503509000	-4.303023000
6	2.119752000	3.289274000	-3.799434000
6	3.087282000	3.180552000	-4.960133000
6	3.589529000	1.937839000	-5.365190000
6	3.459622000	4.329769000	-5.672334000
1	3.309265000	1.048526000	-4.799928000
1	3.082716000	5.307836000	-5.357544000
6	4.445226000	1.847050000	-6.467059000
6	4.312224000	4.239801000	-6.774302000
1	4.833159000	0.871320000	-6.771735000
1	4.595554000	5.144698000	-7.318202000
6	4.807504000	2.995115000	-7.176485000
1	5.477599000	2.922712000	-8.036972000

1	0.653977000	4.407435000	-4.933332000
1	-0.356887000	2.715429000	-2.573629000
1	0.411454000	2.655760000	-4.954457000
1	-0.047203000	4.461917000	-2.500101000
1	2.407029000	4.177309000	-3.197227000
8	2.222530000	2.115706000	-3.011203000
1	1.670956000	2.226856000	-2.228153000

TSII-IIIA*PA*

30	3.154021000	3.679875000	4.386905000
35	2.559709000	1.507934000	3.734964000
16	4.367010000	7.884402000	0.740837000
7	4.314553000	5.320406000	4.345567000
7	3.407707000	4.054679000	6.461993000
7	3.653065000	6.112526000	5.333903000
6	4.598143000	6.036917000	3.241414000
1	4.419191000	7.115464000	3.286982000
6	3.434083000	5.420817000	6.496115000
6	2.590994000	7.451445000	1.009463000
6	3.110588000	6.100924000	7.697238000
1	3.124428000	7.192233000	7.687418000
6	3.122248000	3.355361000	7.572921000
1	3.107757000	2.265917000	7.457094000
6	2.825201000	5.371372000	8.837473000
1	2.597865000	5.886912000	9.775244000
6	1.761269000	8.690337000	1.311304000
1	2.111249000	9.181030000	2.233985000
1	1.815583000	9.428816000	0.492806000
6	2.840249000	3.956905000	8.788937000
1	2.626609000	3.351356000	9.671681000
1	0.705209000	8.408582000	1.450524000
1	2.222800000	6.934237000	0.110133000
1	2.538554000	6.744104000	1.849473000
6	5.082960000	5.485181000	2.029783000
6	5.565493000	4.139157000	1.943693000
6	5.085171000	6.246029000	0.803489000
6	6.065221000	3.616869000	0.760700000
6	5.595370000	5.699047000	-0.372928000
6	6.107770000	4.392868000	-0.412283000
1	5.574836000	3.528500000	2.848993000
1	6.435329000	2.586786000	0.746655000
1	5.563363000	6.307085000	-1.281490000
1	6.504656000	3.981231000	-1.343995000
1	2.506141000	5.975585000	4.803401000
6	-0.348610000	5.776539000	3.062359000
6	-1.394126000	6.708025000	3.077593000
6	0.071607000	5.256334000	1.828738000
6	-2.015942000	7.110076000	1.890018000
6	-0.545234000	5.654717000	0.641971000
6	-1.591717000	6.584358000	0.666882000
1	-1.717233000	7.134449000	4.032737000
1	0.904514000	4.550382000	1.812403000
1	-2.824411000	7.846539000	1.919855000
1	-0.199521000	5.245466000	-0.311257000
1	-2.067156000	6.903532000	-0.264824000
6	0.338427000	5.323378000	4.339624000
1	0.080022000	6.032547000	5.154861000
1	-0.094402000	4.344036000	4.638209000
8	1.713677000	5.213550000	4.177382000

TSII-IIIA*PA*-HAT

30	3.237939000	2.542051000	4.047372000
35	3.409399000	0.472453000	2.909635000
16	5.161536000	7.951050000	2.160891000
7	4.190135000	4.219556000	4.545153000
7	2.778541000	2.547259000	6.013794000
7	3.957497000	4.595807000	5.813301000
6	4.301966000	5.297871000	3.643422000
1	3.134125000	5.400005000	3.184557000
6	3.298902000	3.712083000	6.563280000
6	3.326870000	8.073945000	2.066512000
6	3.076324000	3.968239000	7.956742000
1	3.476948000	4.898826000	8.362408000
6	2.111000000	1.669044000	6.786547000
1	1.749028000	0.770552000	6.274171000
6	2.381564000	3.065615000	8.722261000
1	2.209876000	3.265925000	9.784257000
6	2.902108000	9.513502000	2.324023000
1	3.241412000	9.851836000	3.316705000
1	3.316608000	10.202251000	1.569394000
6	1.880498000	1.866501000	8.133431000
1	1.328548000	1.127508000	8.716491000
1	1.802983000	9.590712000	2.304817000
1	3.010694000	7.733381000	1.068195000
1	2.876470000	7.403360000	2.808241000
6	5.142261000	5.137964000	2.432885000

6	5.544526000	3.872153000	1.960718000
6	5.488574000	6.267347000	1.640381000
6	6.250260000	3.719195000	0.768913000
6	6.202267000	6.103978000	0.443802000
6	6.586973000	4.837332000	-0.000693000
1	5.310307000	2.984017000	2.548143000
1	6.536221000	2.715158000	0.443220000
1	6.450864000	6.995758000	-0.136892000
1	7.138788000	4.726666000	-0.938282000
6	1.634809000	5.001829000	2.685687000
8	1.827309000	3.594104000	2.858054000
1	1.039839000	3.086245000	2.607519000
6	0.645828000	5.621085000	3.525291000
6	0.074915000	6.876014000	3.169529000
6	0.251337000	5.069187000	4.775870000
6	-0.808127000	7.539137000	4.015264000
6	-0.636526000	5.741952000	5.611753000
6	-1.177479000	6.983364000	5.249910000
1	0.337961000	7.319379000	2.204270000
1	0.678437000	4.117934000	5.098233000
1	-1.225386000	8.503203000	3.705216000
1	-0.903770000	5.289902000	6.572218000
1	-1.870557000	7.507068000	5.913609000
1	4.480916000	6.251915000	4.162691000
1	1.647918000	5.278846000	1.623635000

IIIA*PA*

30	2.535929000	4.149542000	4.808235000
35	2.237228000	1.785664000	4.519749000
16	3.941357000	8.044531000	1.190179000
7	4.303966000	5.195498000	4.521409000
7	3.092920000	4.546883000	6.823024000
7	4.687000000	5.780385000	5.706568000
6	4.501856000	5.959858000	3.422850000
1	4.689656000	7.034246000	3.543270000
6	4.125280000	5.428267000	6.881879000
6	2.240735000	7.959067000	1.918020000
6	4.584848000	5.932504000	8.129455000
1	5.417206000	6.640462000	8.154954000
6	2.504652000	4.142963000	7.958315000
1	1.689019000	3.424254000	7.829215000
6	3.958942000	5.510796000	9.285243000
1	4.294882000	5.891670000	10.253855000
6	1.858113000	9.287908000	2.550917000
1	2.536534000	9.546416000	3.380793000
1	1.884573000	10.116172000	1.821426000
6	2.889329000	4.585709000	9.214489000
1	2.382071000	4.226890000	10.111008000
1	0.834482000	9.223444000	2.955413000
1	1.544550000	7.687378000	1.112624000
1	2.217258000	7.150190000	2.664415000
6	4.402903000	5.436161000	2.108124000
6	4.442586000	4.029846000	1.855812000
6	4.235001000	6.294631000	0.966703000
6	4.404374000	3.524495000	0.564887000
6	4.215245000	5.764937000	-0.322534000
6	4.319784000	4.384547000	-0.545014000
1	4.528743000	3.348970000	2.704508000
1	4.445629000	2.441271000	0.416052000
1	4.070585000	6.451170000	-1.161082000
1	4.296729000	3.985304000	-1.562511000
1	5.456350000	6.443400000	5.691947000
6	-0.093568000	5.335991000	2.196264000
6	-1.003247000	6.268920000	1.683371000
6	0.805291000	4.722196000	1.308606000
6	-1.024460000	6.584718000	0.319073000
6	0.788859000	5.030029000	-0.051585000
6	-0.126322000	5.965082000	-0.553000000
1	-1.697282000	6.765596000	2.369468000
1	1.538281000	4.010122000	1.694091000
1	-1.736754000	7.324462000	-0.060025000
1	1.509690000	4.550459000	-0.716601000
1	-0.130333000	6.215638000	-1.618001000
6	-0.019437000	5.023021000	3.683930000
1	-0.851660000	5.573552000	4.183652000
1	-0.259049000	3.941124000	3.808931000
8	1.205269000	5.365370000	4.225283000

TSIII-IVA*PA*

30	3.118707000	2.561140000	3.911535000
35	3.777770000	0.360659000	3.268914000
16	5.020139000	8.012569000	2.174259000
7	4.221552000	4.204429000	4.469655000
7	2.668465000	2.561772000	5.969703000
7	3.760046000	4.573572000	5.724178000
6	4.224812000	5.291949000	3.582398000

1	2.931437000	5.329223000	3.083379000
6	3.043059000	3.754160000	6.508133000
6	3.331796000	8.140390000	1.450125000
6	2.677631000	4.092829000	7.843736000
1	2.970154000	5.062213000	8.254100000
6	1.960926000	1.691549000	6.706592000
1	1.708322000	0.753792000	6.200998000
6	1.941775000	3.189416000	8.577818000
1	1.642038000	3.439182000	9.599629000
6	2.633273000	9.392467000	1.963120000
1	2.488831000	9.341922000	3.053635000
1	3.216546000	10.300147000	1.733890000
6	1.570805000	1.942963000	8.011263000
1	0.999116000	1.204407000	8.574620000
1	1.640800000	9.500937000	1.494788000
1	3.426474000	8.154035000	0.352472000
1	2.777483000	7.234450000	1.729778000
6	5.100680000	5.206141000	2.409524000
6	5.570096000	3.953211000	1.943202000
6	5.476703000	6.358305000	1.656848000
6	6.349938000	3.843390000	0.797658000
6	6.273295000	6.234059000	0.511031000
6	6.710911000	4.984245000	0.066191000
1	5.324972000	3.051549000	2.505682000
1	6.684675000	2.853187000	0.475624000
1	6.550107000	7.144435000	-0.027125000
1	7.327132000	4.902663000	-0.833296000
6	1.640453000	4.806816000	2.799597000
8	1.766465000	3.484842000	2.866451000
1	4.024573000	5.489235000	6.077780000
6	0.803276000	5.518019000	3.784876000
6	0.479109000	6.885763000	3.622195000
6	0.367835000	4.882294000	4.969606000
6	-0.206014000	7.590718000	4.608292000
6	-0.314112000	5.590855000	5.957632000
6	-0.601976000	6.952847000	5.794987000
1	0.773772000	7.394047000	2.700756000
1	0.576632000	3.820601000	5.093855000
1	-0.440256000	8.648843000	4.451665000
1	-0.626289000	5.070536000	6.868609000
1	-1.135169000	7.506995000	6.572633000
1	4.240354000	6.287246000	4.056649000
1	1.555196000	5.223255000	1.771895000

IVA*PA*

30	3.463010000	2.493552000	4.638043000
35	4.570381000	0.368309000	4.269332000
16	3.330754000	7.726860000	2.919339000
7	4.542482000	4.116827000	5.138780000
7	2.935138000	2.567596000	6.694434000
7	4.398075000	4.339836000	6.505425000
6	4.410840000	5.378340000	4.443188000
1	5.234177000	6.083363000	4.728903000
6	3.654593000	3.551522000	7.297714000
6	2.410443000	8.599996000	1.610562000
6	3.616769000	3.704766000	8.717063000
1	4.212356000	4.489147000	9.191160000
6	2.164342000	1.756944000	7.432772000
1	1.626559000	0.986399000	6.871510000
6	2.811093000	2.864409000	9.454164000
1	2.761726000	2.978877000	10.541169000
6	1.750321000	9.832120000	2.220826000
1	1.065206000	9.539478000	3.030708000
1	2.501639000	10.523017000	2.637792000
6	2.053375000	1.857051000	8.810931000
1	1.416527000	1.171377000	9.371206000
1	1.173306000	10.377323000	1.455524000
1	3.093135000	8.886056000	0.793572000
1	1.651490000	7.909573000	1.212881000
6	4.428388000	5.223114000	2.942416000
6	4.932149000	4.066208000	2.338101000
6	3.893881000	6.242591000	2.116250000
6	4.871786000	3.881474000	0.953969000
6	3.840744000	6.058548000	0.726923000
6	4.315702000	4.876366000	0.151142000
1	5.362932000	3.288388000	2.970787000
1	5.246816000	2.953525000	0.515806000
1	3.419229000	6.830248000	0.082805000
1	4.249448000	4.742510000	-0.932666000
6	1.358185000	3.658453000	2.818576000
1	3.474348000	5.909709000	4.714804000
8	1.935446000	2.685939000	3.447608000
1	5.047317000	4.984375000	6.954044000
6	0.837645000	4.845403000	3.392413000
6	0.181151000	5.818687000	2.572614000
6	0.919382000	5.130175000	4.794446000
6	-0.351088000	6.978512000	3.111532000

6	0.396022000	6.304559000	5.315102000
6	-0.246818000	7.248583000	4.491592000
1	0.099767000	5.625283000	1.497890000
1	1.400860000	4.403648000	5.450558000
1	-0.853059000	7.697860000	2.455080000
1	0.483748000	6.496342000	6.389861000
1	-0.662595000	8.167798000	4.913228000
1	1.237190000	3.543259000	1.723715000

VA*PA*

30	-0.414415000	0.914148000	0.841074000
35	-2.871058000	0.925368000	0.680671000
16	-0.407171000	5.372957000	2.679856000
7	1.158573000	2.149258000	0.597534000
7	0.059214000	0.504696000	-1.201525000
7	1.700103000	2.036359000	-0.692261000
6	1.671683000	3.340628000	1.219933000
1	2.772539000	3.415829000	1.029985000
6	1.220925000	1.102867000	-1.545276000
6	-1.702890000	4.413213000	1.763775000
6	1.896271000	0.746757000	-2.745752000
1	2.854087000	1.211682000	-2.988718000
6	-0.488500000	-0.415790000	-2.008678000
1	-1.426411000	-0.849157000	-1.649657000
6	1.325854000	-0.207594000	-3.561121000
1	1.835300000	-0.505582000	-4.482169000
6	-1.556532000	4.440241000	0.249230000
1	-1.504653000	5.473790000	-0.131877000
1	-0.658145000	3.895026000	-0.071805000
6	0.098678000	-0.810367000	-3.201151000
1	-0.369770000	-1.572697000	-3.825025000
1	-2.421281000	3.930757000	-0.204441000
1	-1.692369000	3.386855000	2.151722000
1	-2.657325000	4.868344000	2.072568000
6	1.502850000	3.285803000	2.718886000
6	2.267339000	2.346970000	3.428940000
6	0.607126000	4.100992000	3.439118000
6	2.167631000	2.211462000	4.812198000
6	0.518667000	3.970310000	4.837624000
6	1.288793000	3.035035000	5.524156000
1	2.945307000	1.702242000	2.864919000
1	2.769936000	1.463178000	5.334670000
1	-0.189014000	4.605692000	5.373865000
1	1.183853000	2.930418000	6.607178000
6	-0.572365000	0.603893000	3.971851000
1	1.243501000	4.290084000	0.835388000
8	-0.823979000	1.437869000	3.120753000
1	2.709269000	2.188302000	-0.748118000
6	-1.104038000	0.691327000	5.348584000
6	-1.982577000	1.728039000	5.703155000
6	-0.710351000	-0.251911000	6.306772000
6	-2.452958000	1.821471000	7.010313000
6	-1.178575000	-0.154915000	7.619210000
6	-2.048223000	0.882595000	7.970153000
1	-2.270947000	2.445966000	4.933145000
1	-0.029841000	-1.056777000	6.014682000
1	-3.137186000	2.626955000	7.289691000
1	-0.869177000	-0.888359000	8.368353000
1	-2.417763000	0.959521000	8.996603000
6	-1.511365000	-2.977809000	0.798811000
6	-2.426595000	-4.045266000	0.481167000
6	-2.032568000	-5.270994000	-0.120876000
6	-3.808988000	-3.888471000	0.769029000
6	-2.961548000	-6.264127000	-0.416809000
6	-4.733549000	-4.884659000	0.470821000
6	-4.321878000	-6.085561000	-0.125799000
1	-0.977837000	-5.439617000	-0.349888000
1	-4.139751000	-2.949628000	1.221774000
1	-2.622530000	-7.196386000	-0.880017000
1	-5.791457000	-4.724711000	0.701174000
1	-5.048005000	-6.868688000	-0.360566000
6	-0.170857000	-2.905754000	0.456310000
6	0.648175000	-1.804166000	0.810037000
8	0.204350000	-0.868265000	1.597216000
6	2.003818000	-1.648332000	0.247780000
6	2.843873000	-0.644589000	0.781473000
6	2.489200000	-2.389094000	-0.854538000
1	2.457066000	-0.054782000	1.610149000
1	1.855618000	-3.145549000	-1.319604000
6	4.095169000	-0.380803000	0.230340000
6	3.743028000	-2.125999000	-1.401145000
1	4.718290000	0.410976000	0.659365000
1	4.082364000	-2.698916000	-2.269390000
6	4.556510000	-1.115916000	-0.869860000
1	5.534408000	-0.903496000	-1.311371000
1	0.281750000	-3.711173000	-0.125828000
1	-1.927545000	-2.113719000	1.324238000

1	0.063667000	-0.268378000	3.715990000

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