

Reaction of Papaverine with Baran Diversinates™

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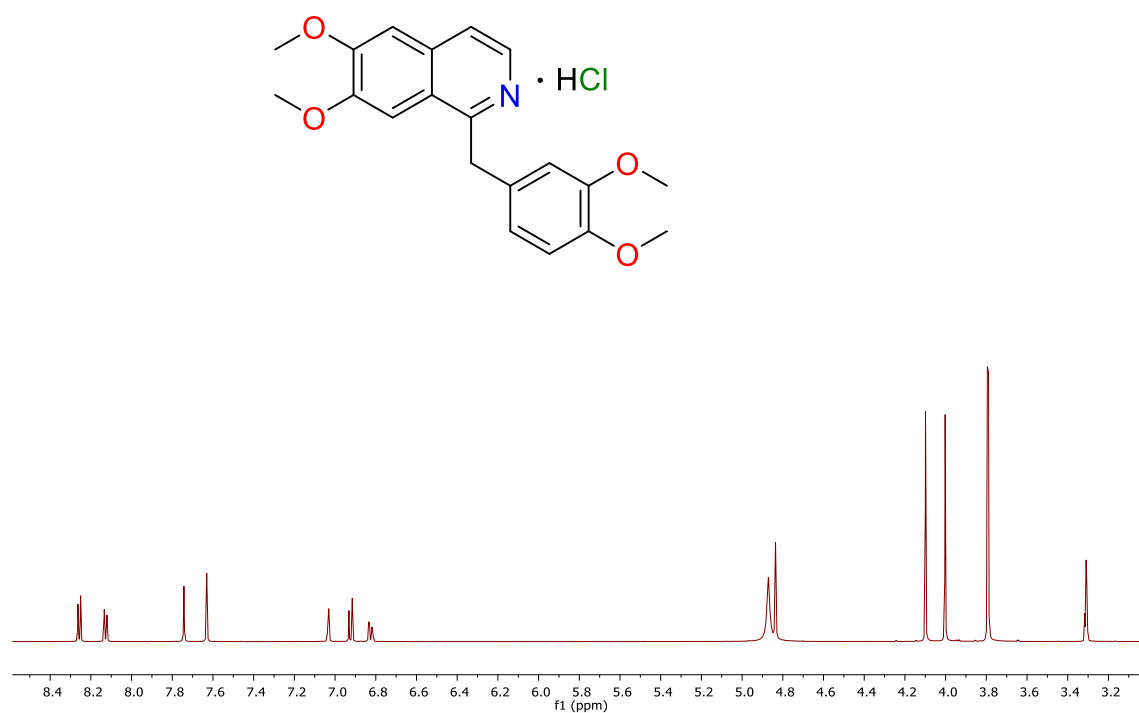
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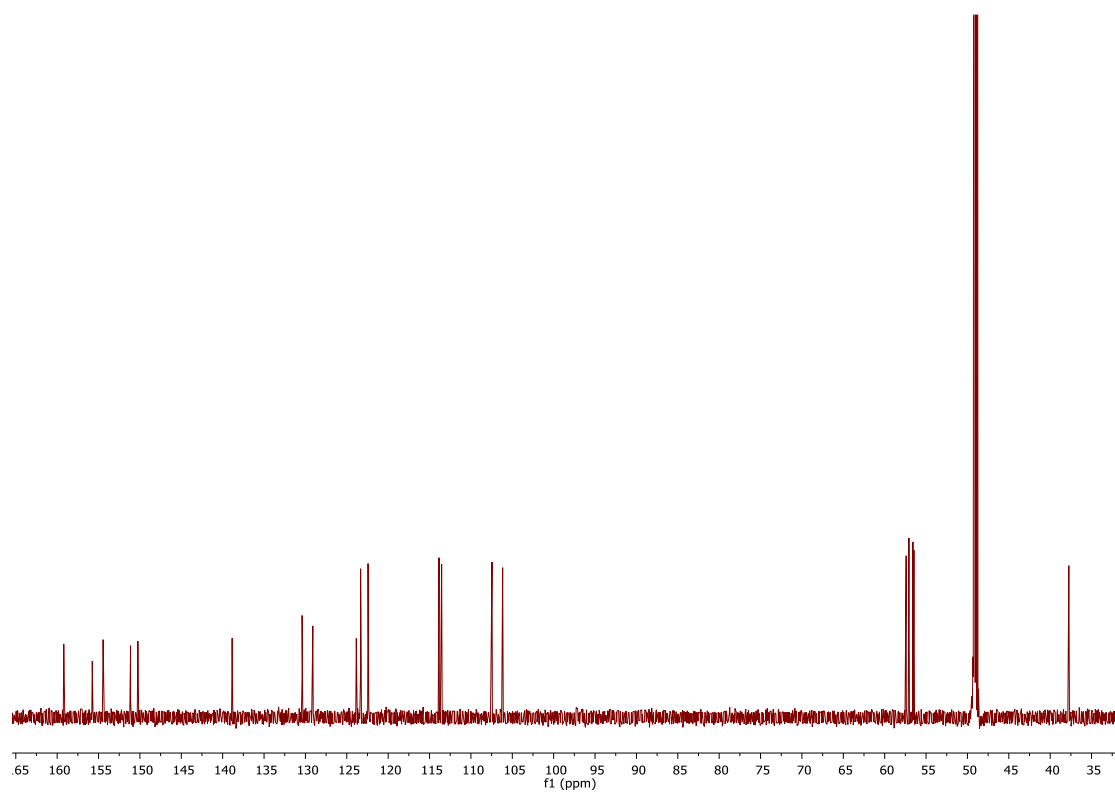
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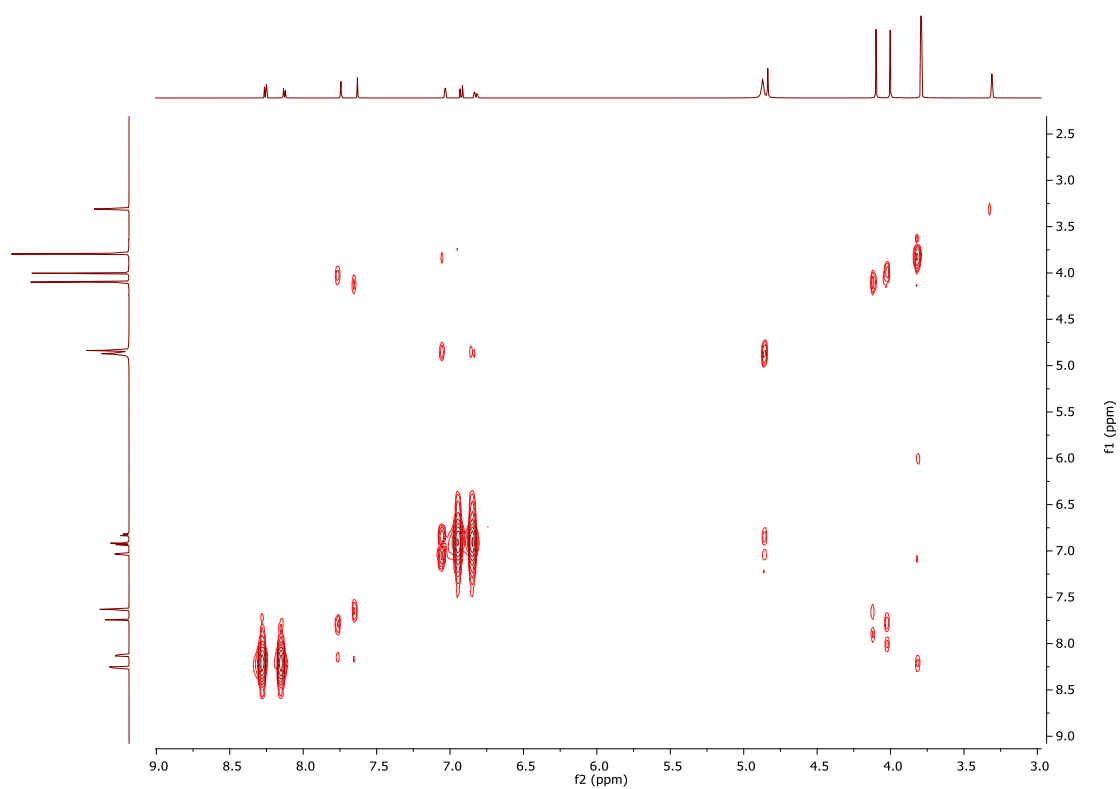
S1: ^1H NMR Spectrum for Compound **1a** in CD_3OD



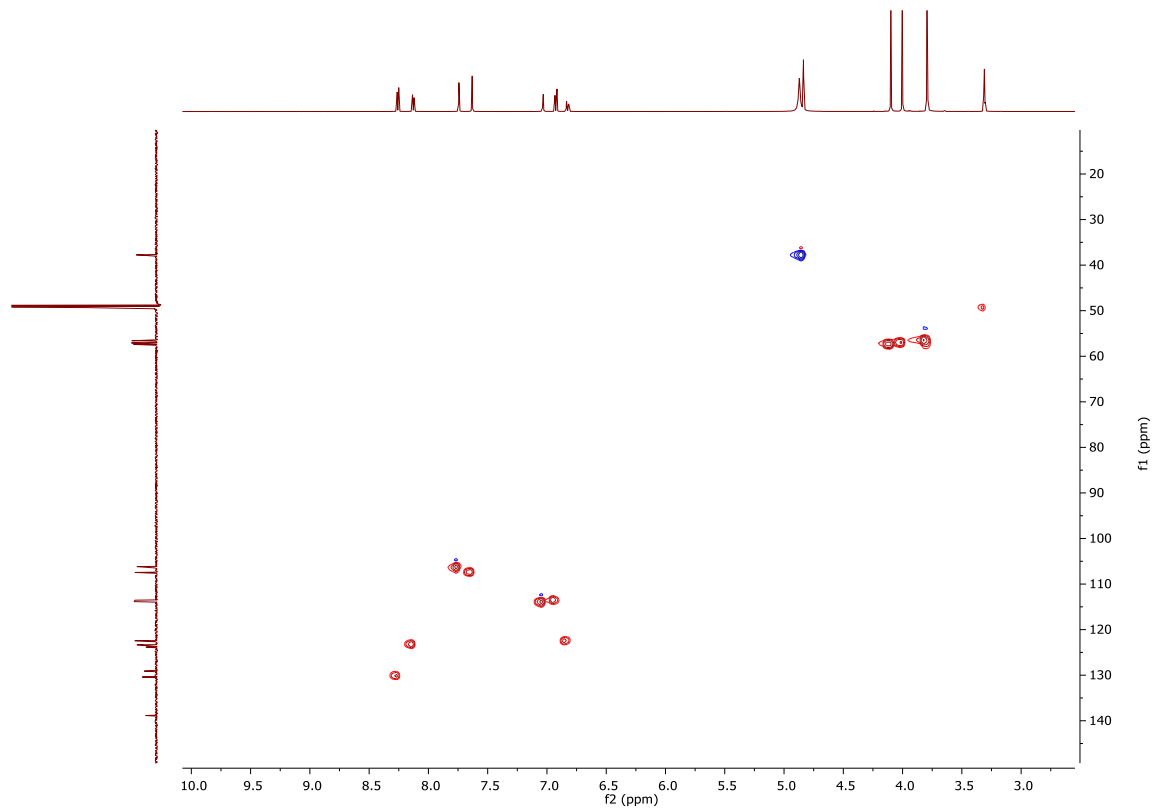
S2: ^{13}C NMR Spectrum for Compound **1a** in CD_3OD



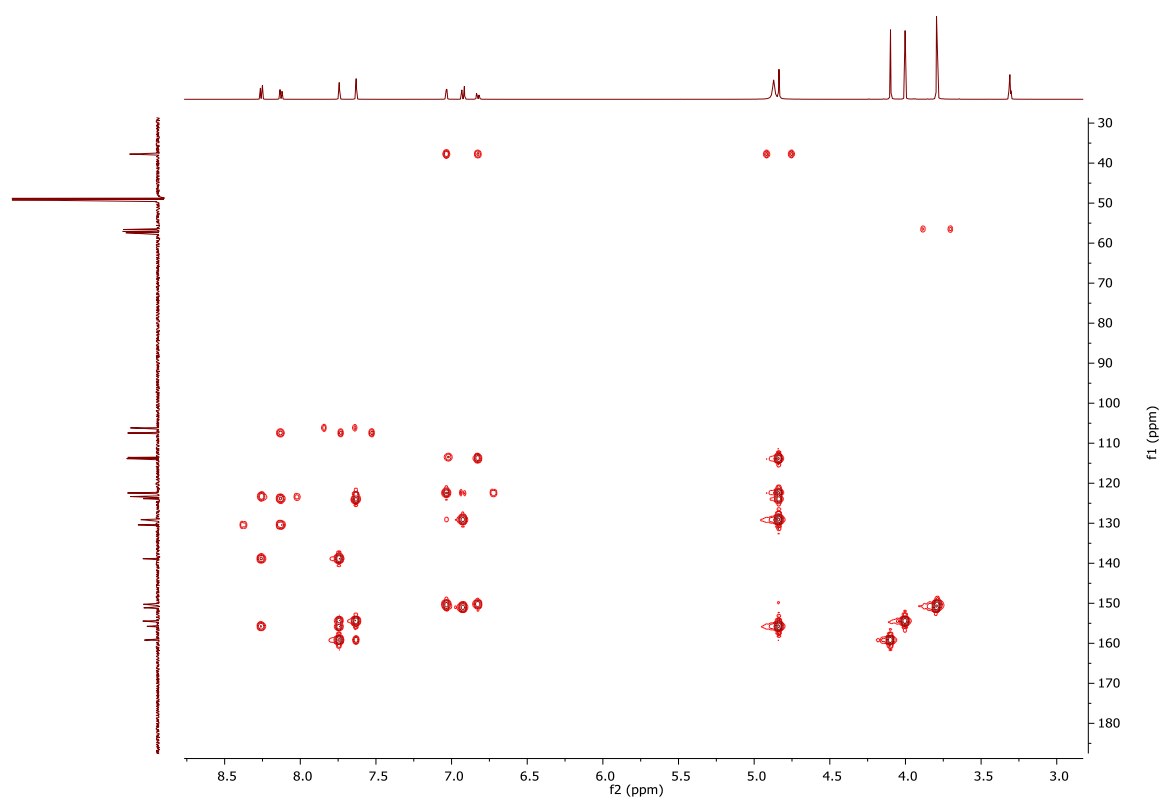
S3: COSY NMR Spectrum for Compound **1a** in CD₃OD



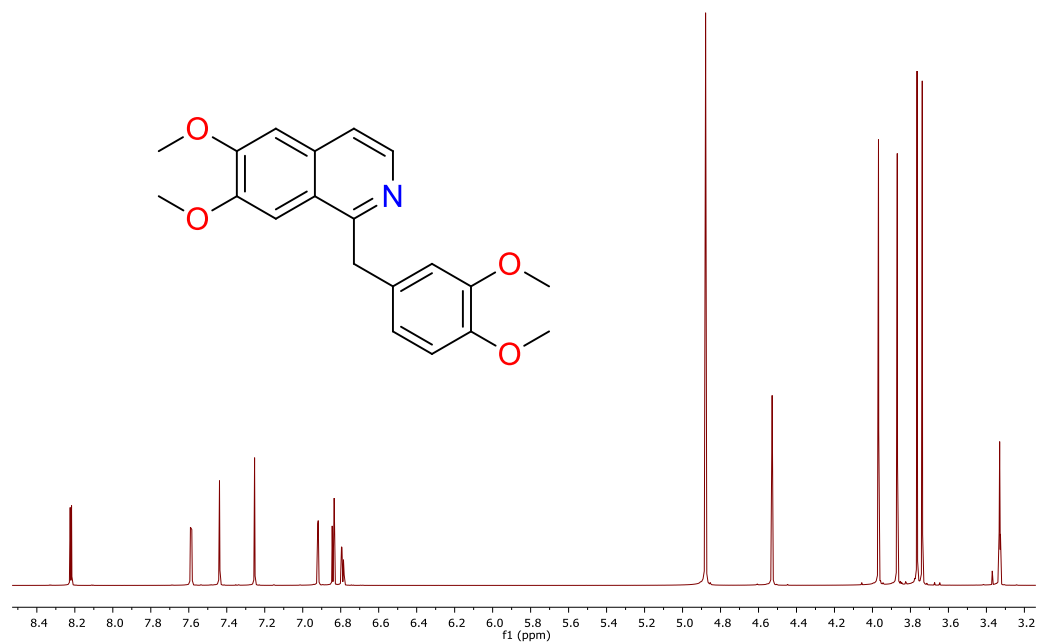
S4: HSQC NMR Spectrum for Compound **1a** in CD₃OD



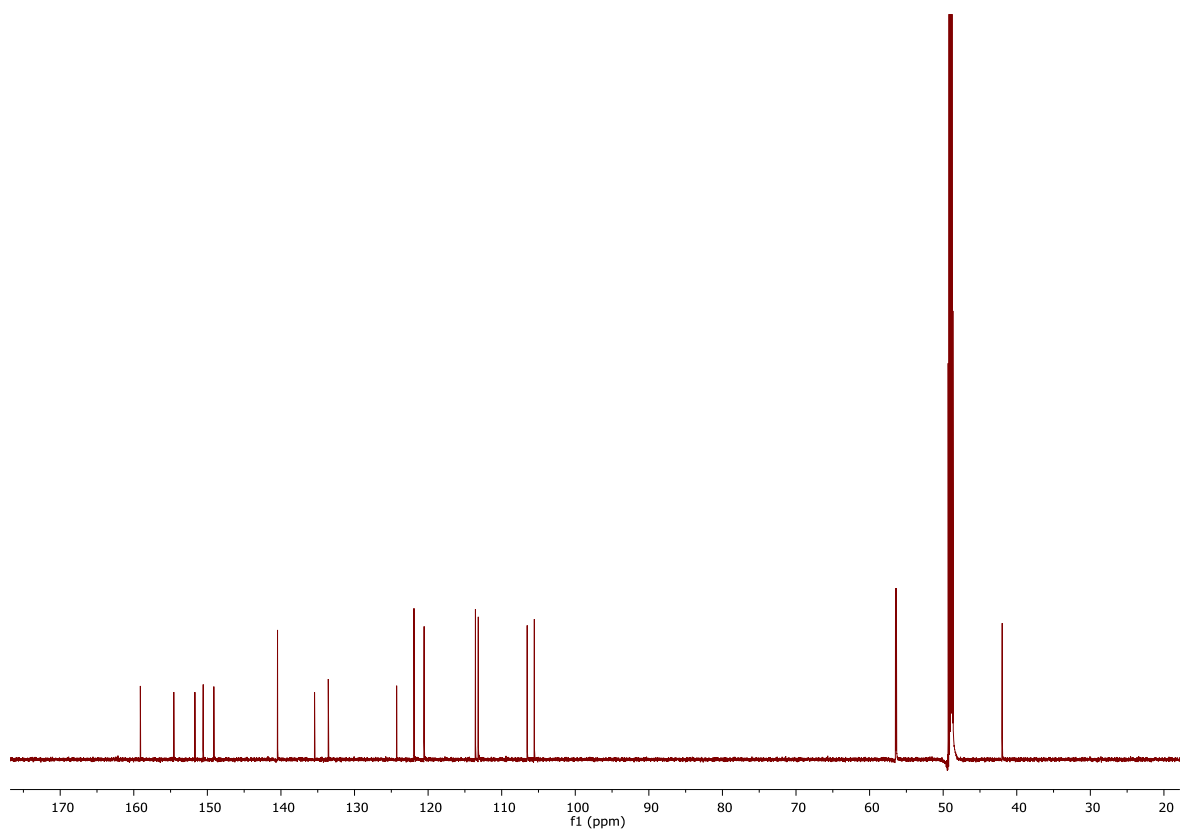
S5: HMBC NMR Spectrum for Compound **1a** in CD₃OD



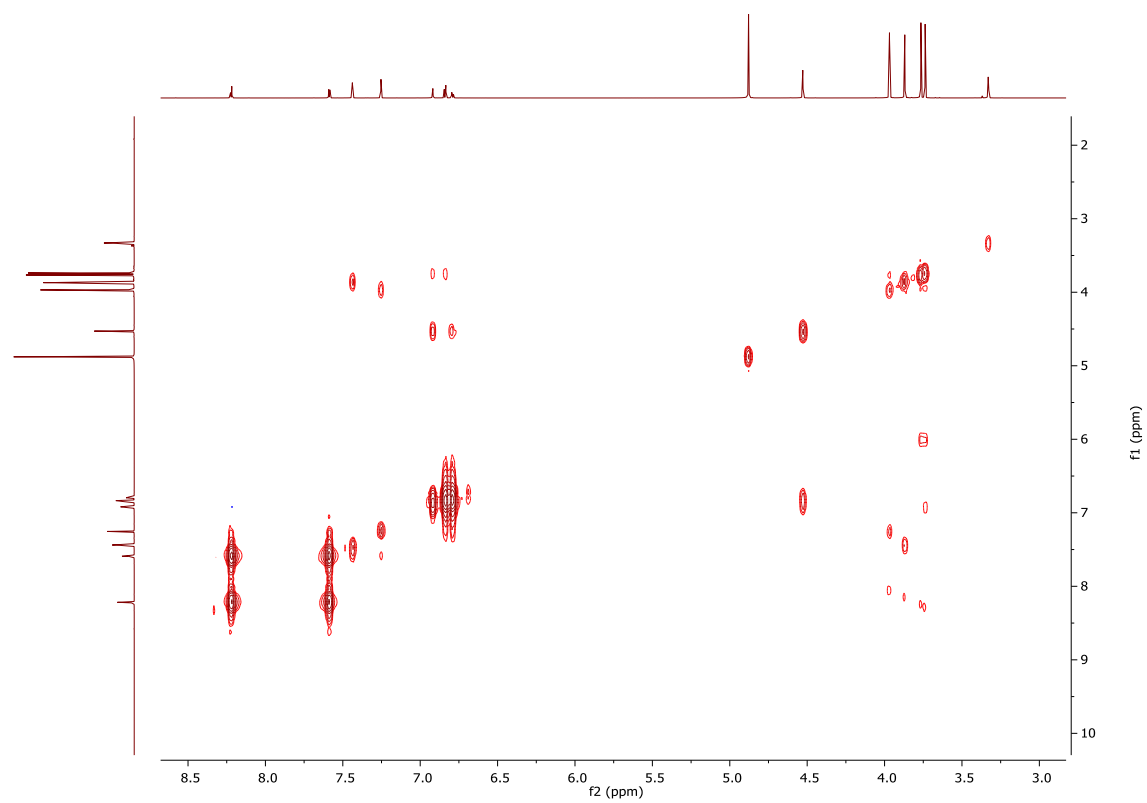
S6: ^1H NMR Spectrum for Compound **1b** in CD_3OD



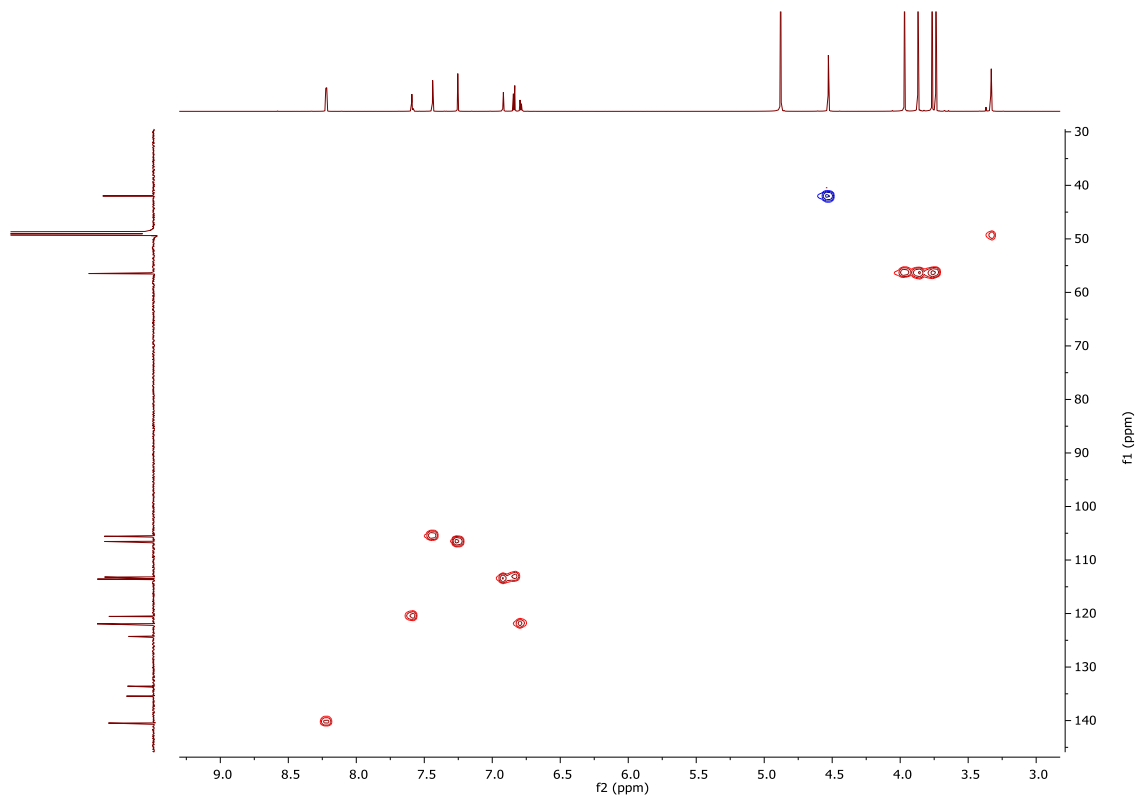
S7: ^{13}C NMR Spectrum for Compound **1b** in CD_3OD



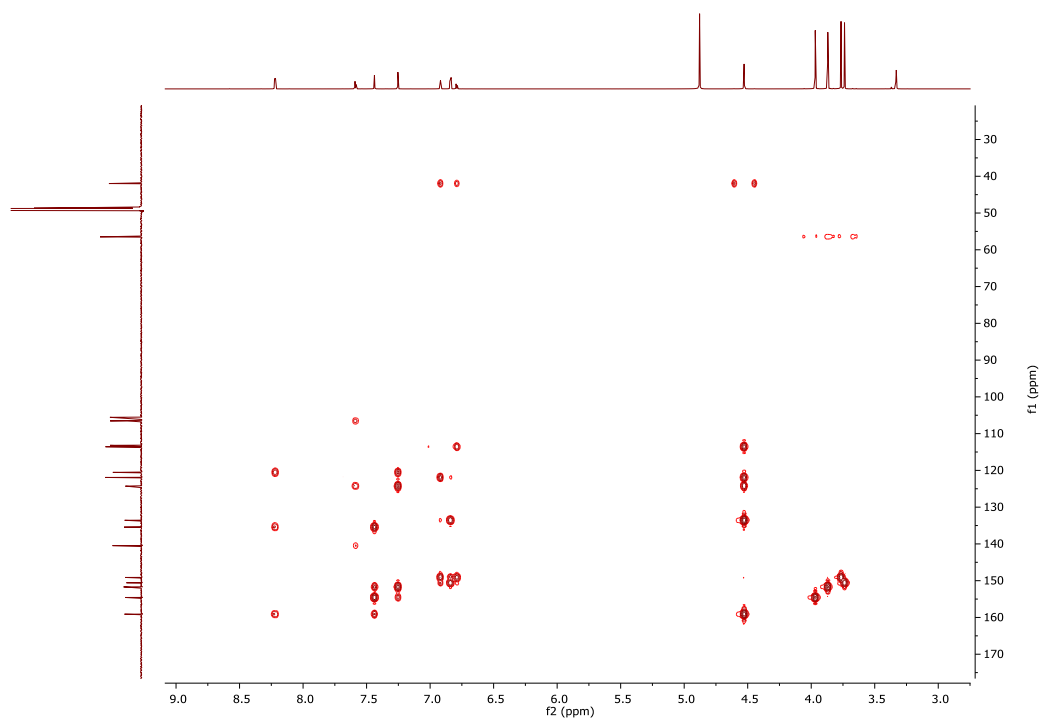
S8: COSY NMR Spectrum for Compound **1b** in CD₃OD



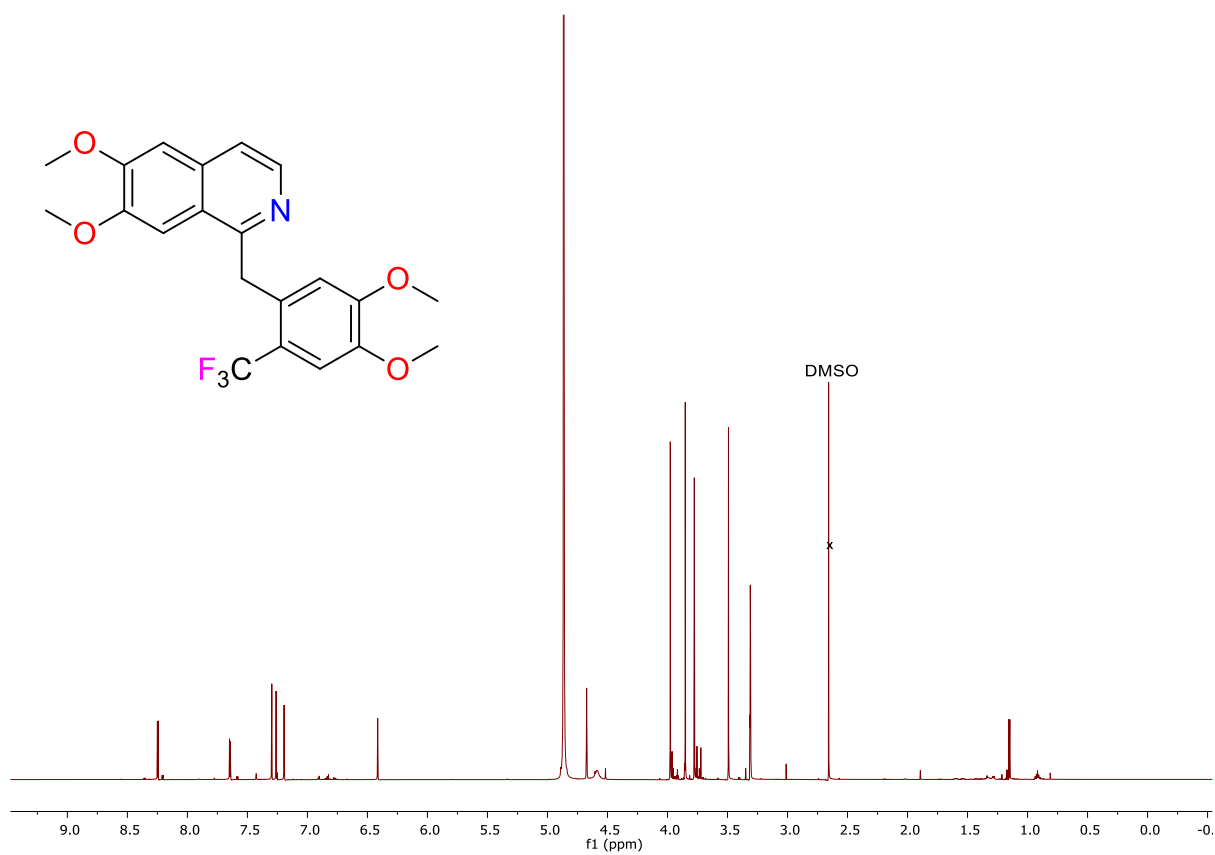
S9: HSQC NMR Spectrum for Compound **1b** in CD₃OD



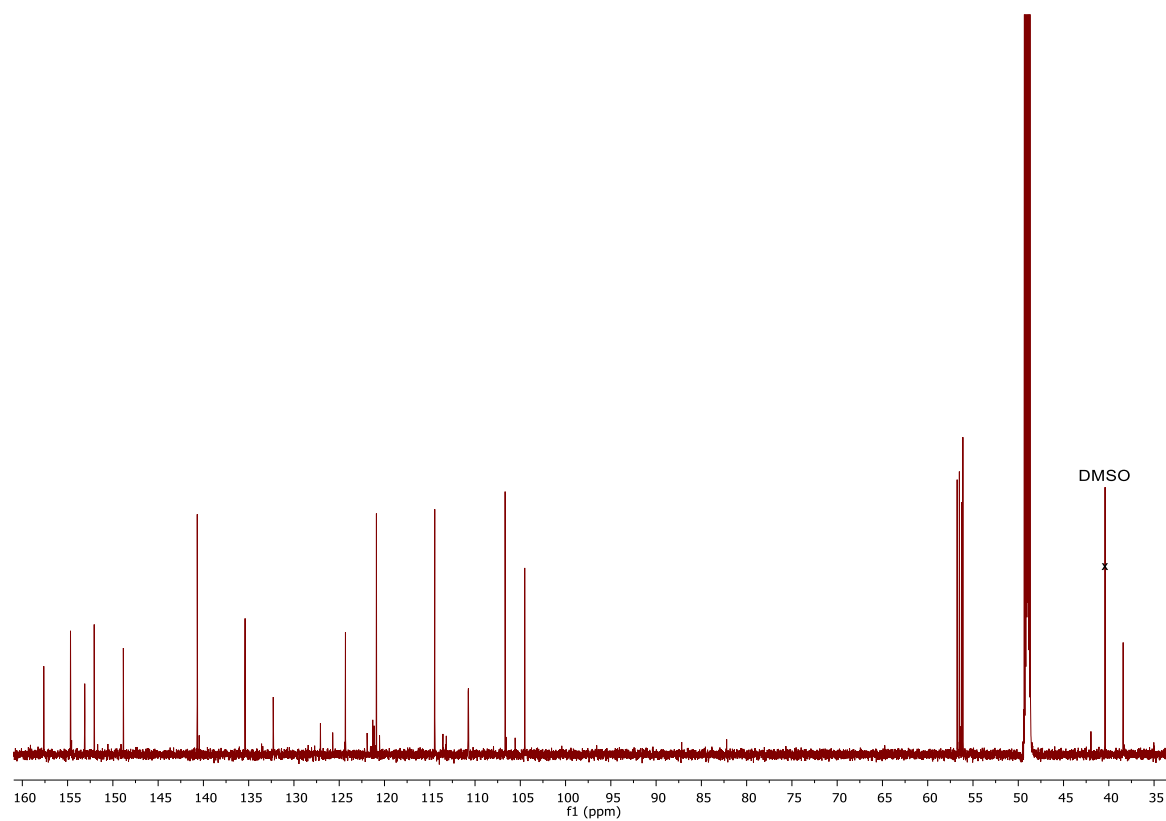
S10: HMBC NMR Spectrum for Compound **1b** in CD₃OD



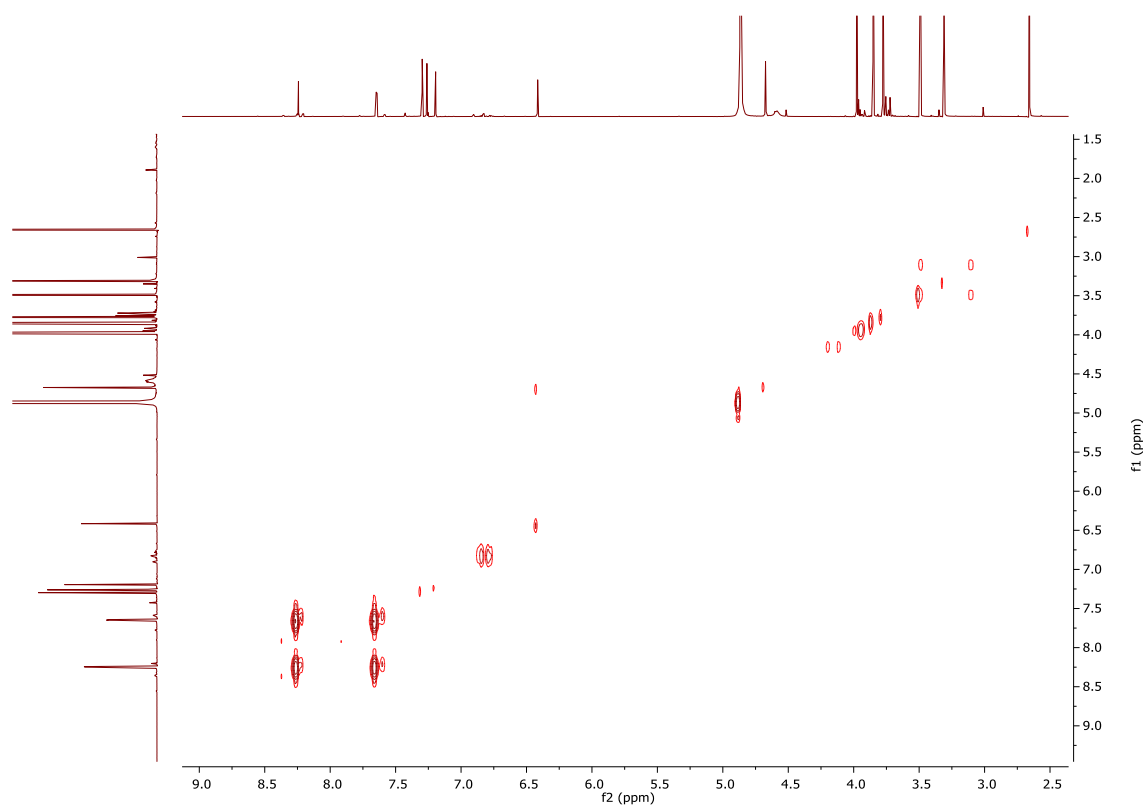
S11: ^1H NMR Spectrum for Compound **2** in CD_3OD



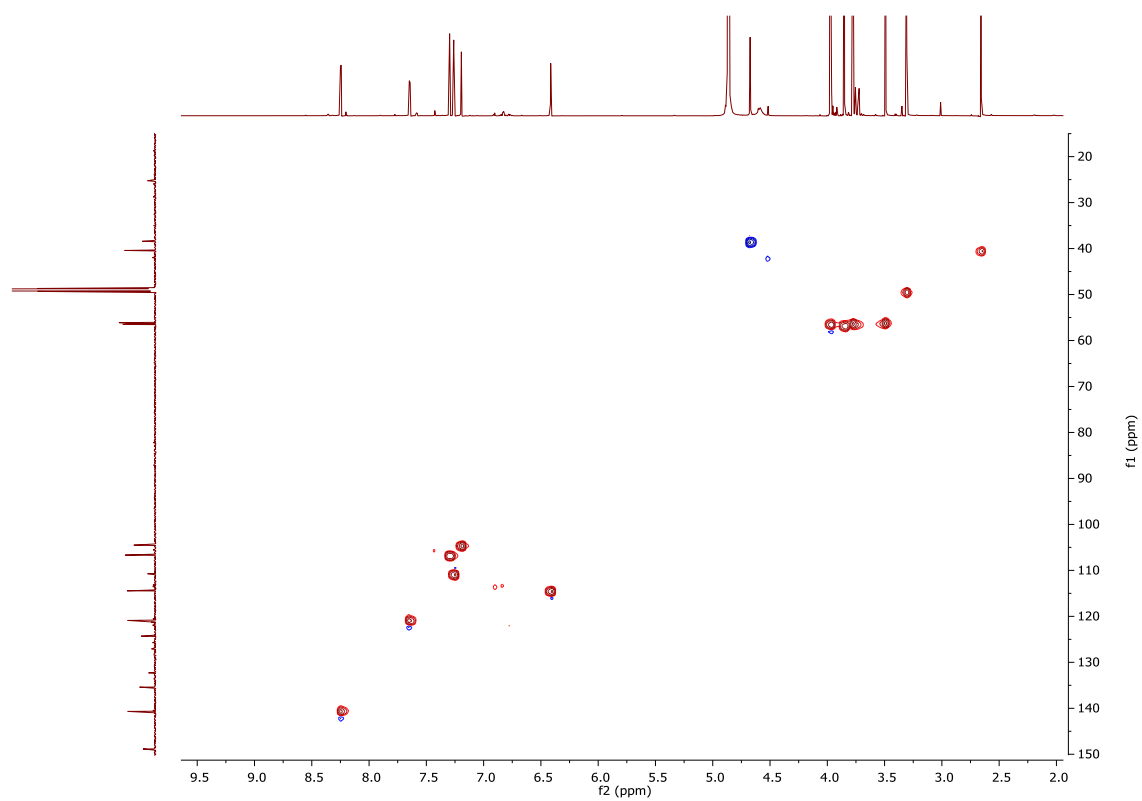
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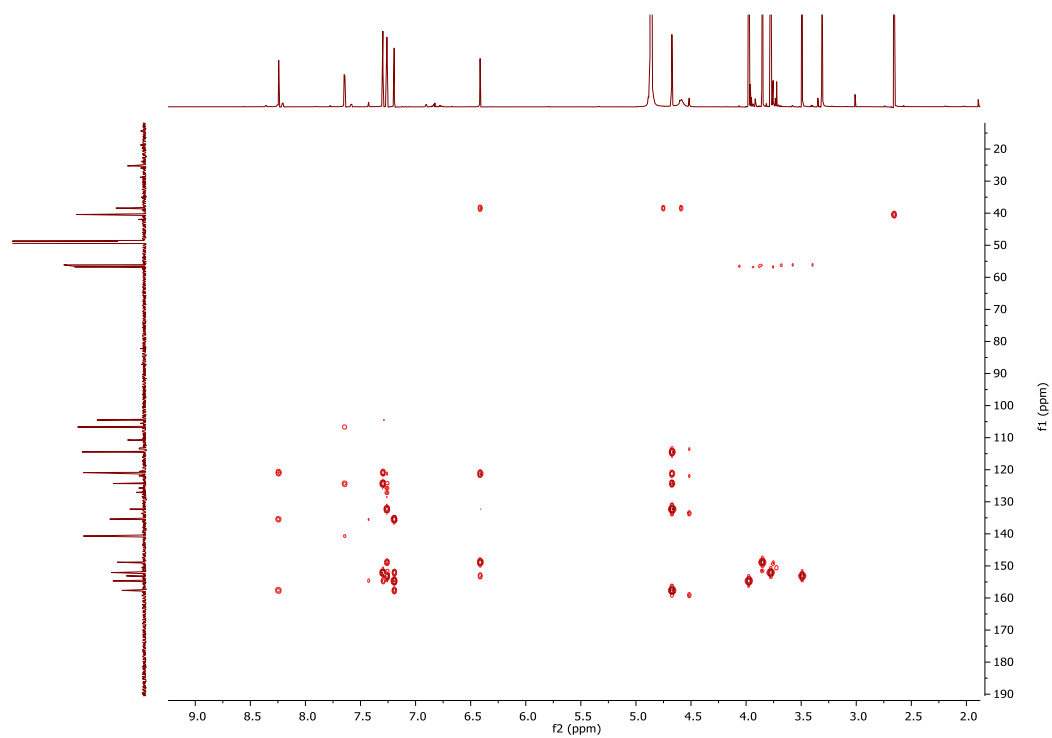
S13: COSY NMR Spectrum for Compound **2** in CD₃OD



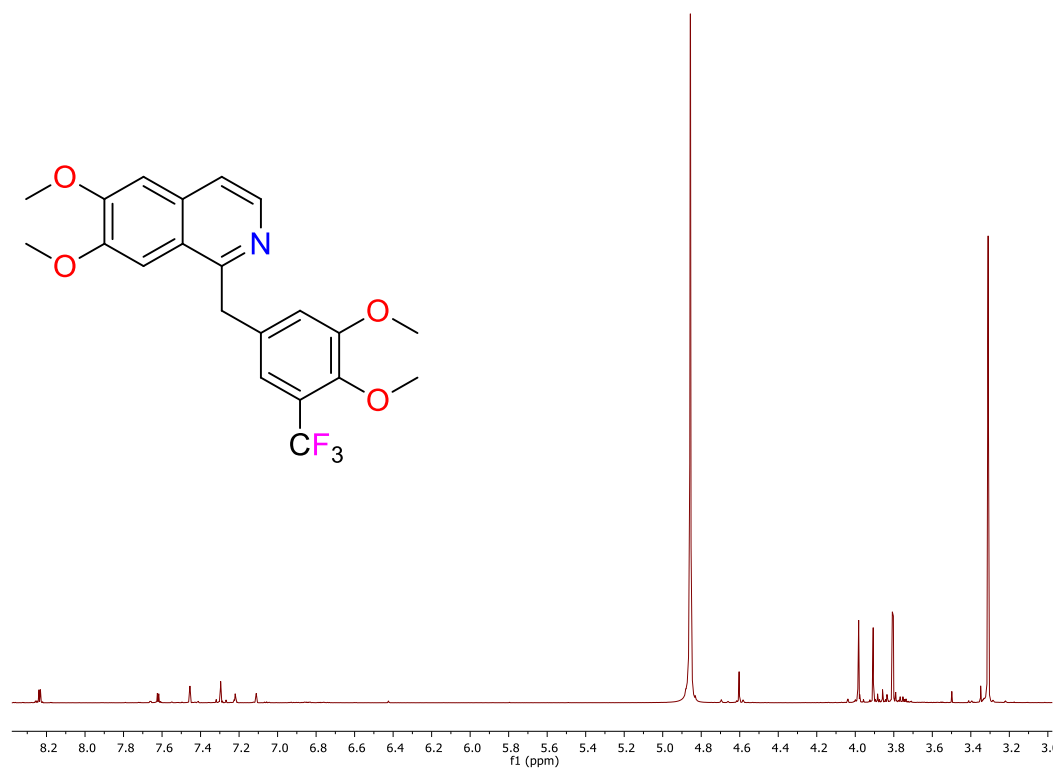
S14: HSQC NMR Spectrum for Compound **2** in CD₃OD



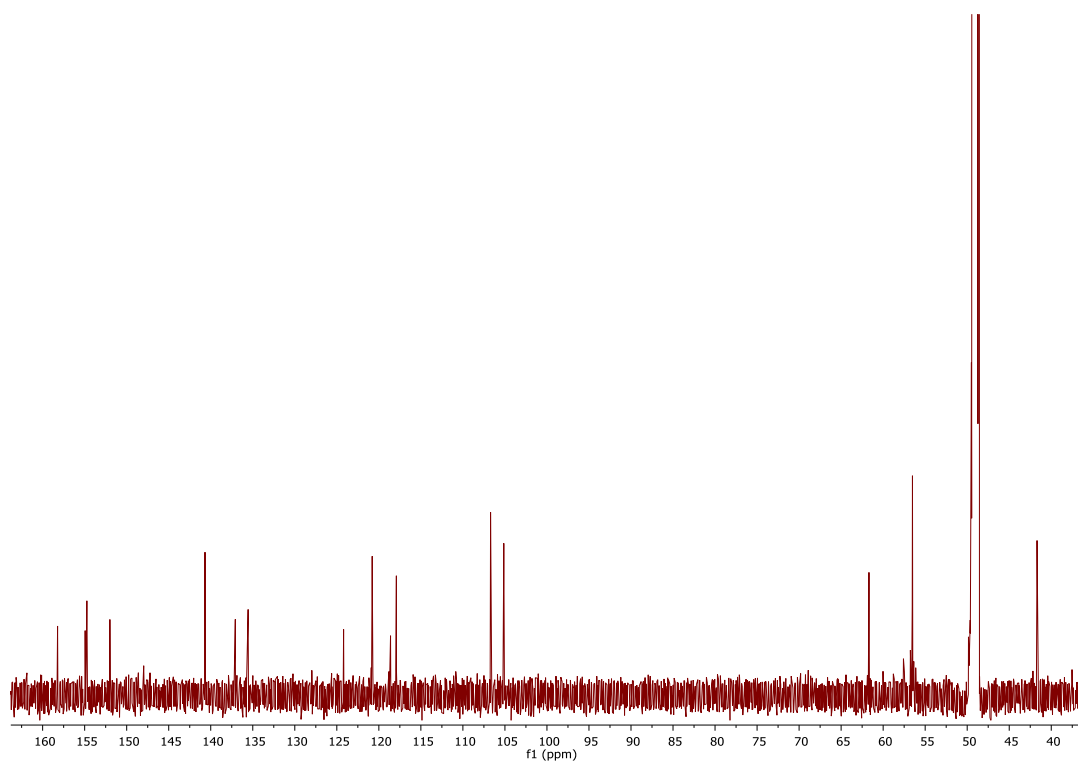
S15: HMBC NMR Spectrum for Compound **2** in CD₃OD



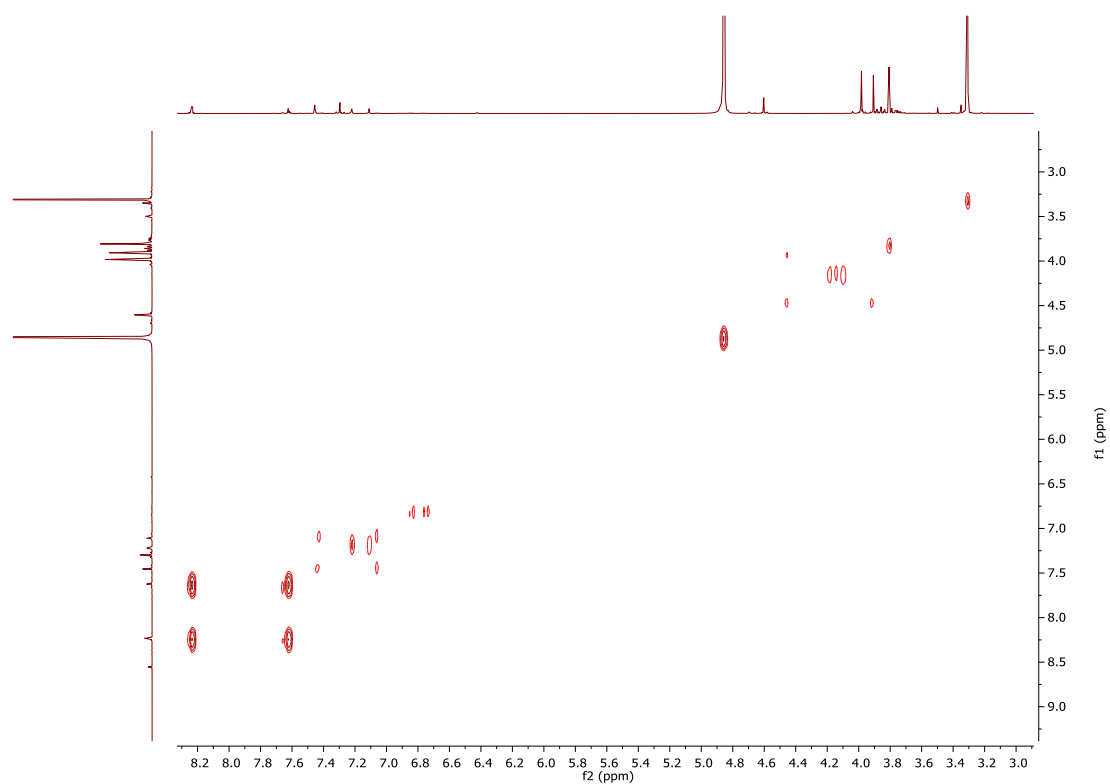
S16: ^1H NMR Spectrum for Compound **3** in CD_3OD



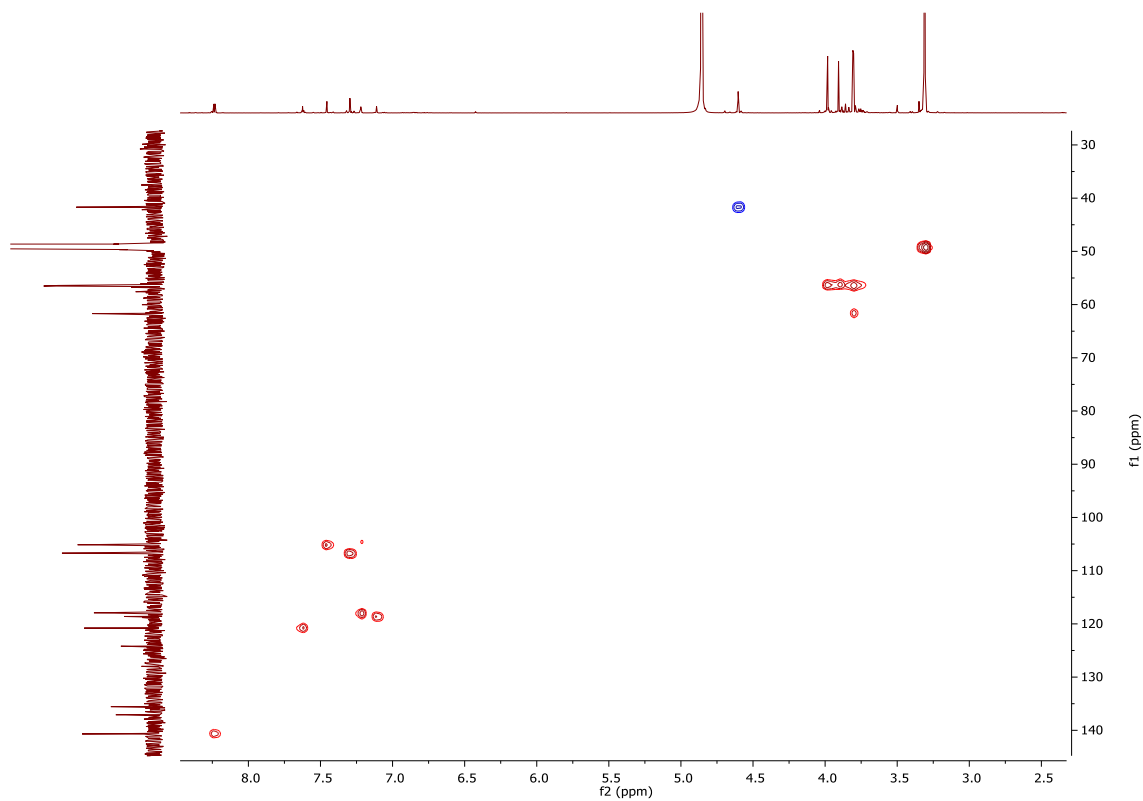
S17: ^{13}C NMR Spectrum for Compound **3** in CD_3OD



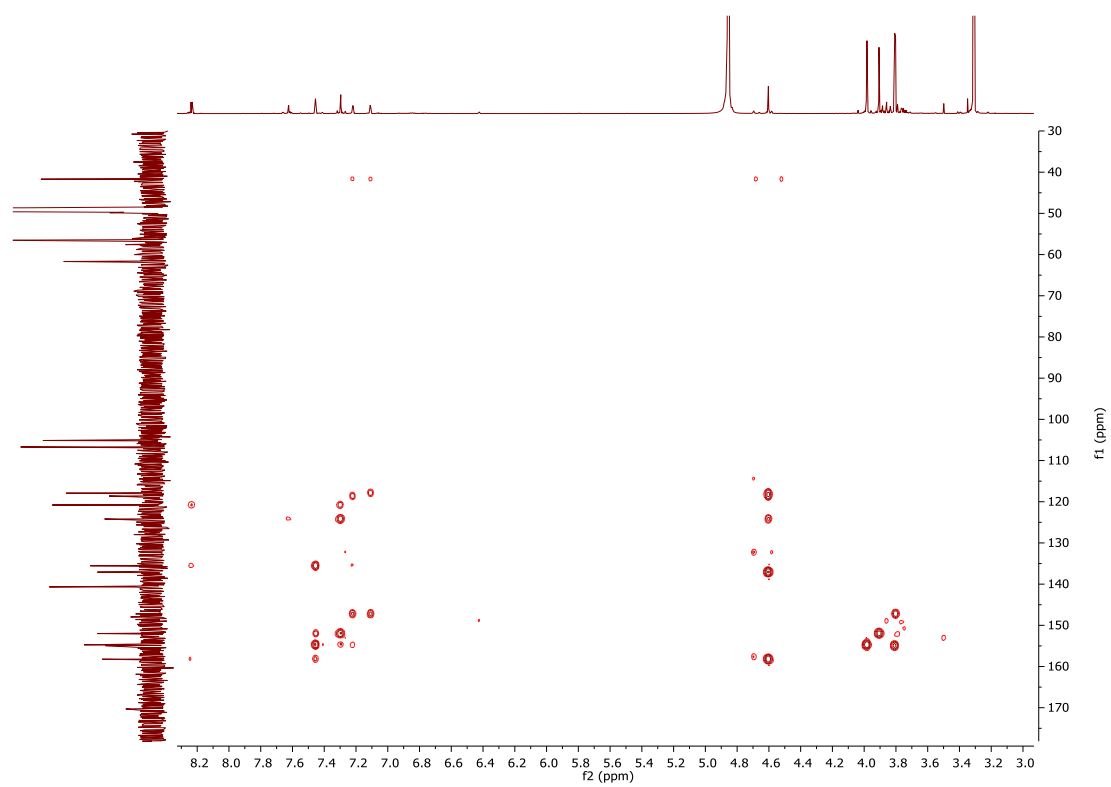
S18: COSY NMR Spectrum for Compound **3** in CD₃OD



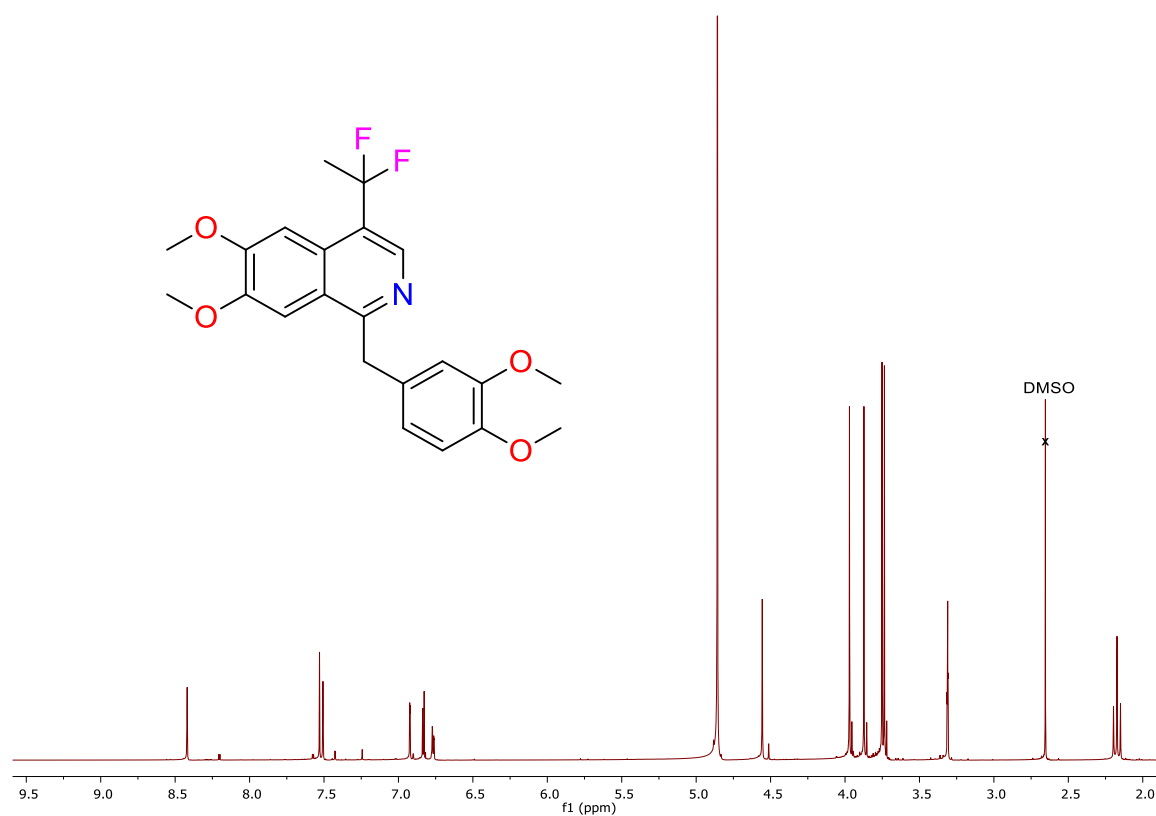
S19: HSQC NMR Spectrum for Compound **3** in CD₃OD



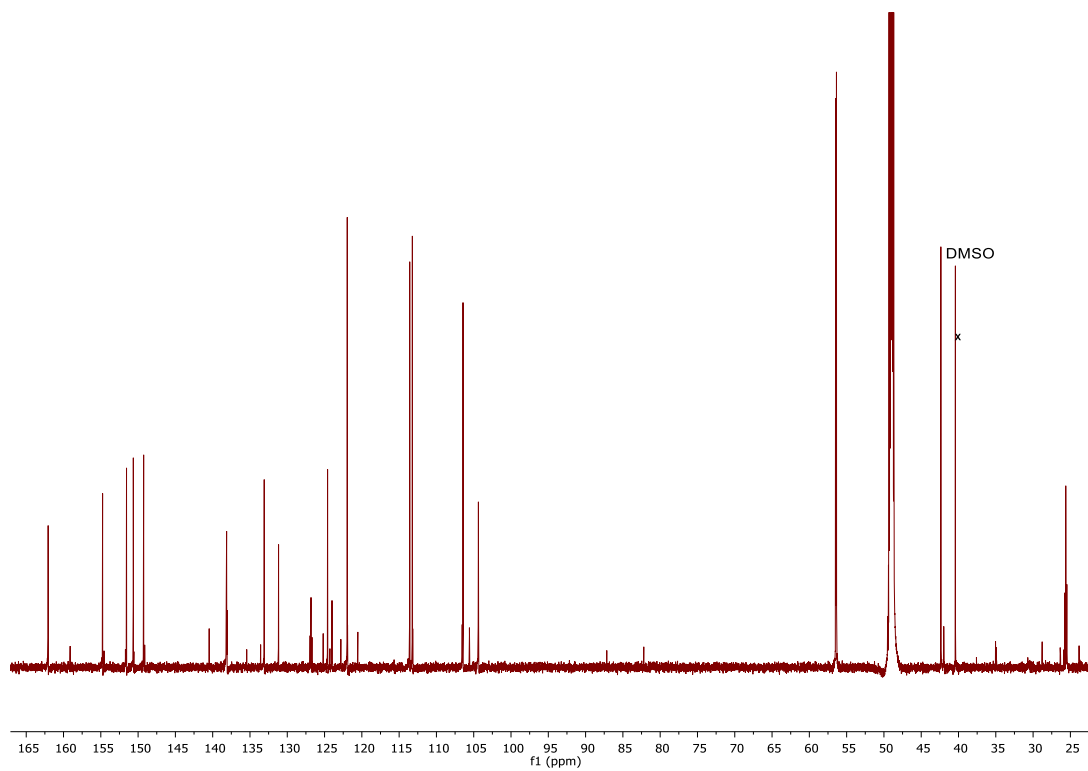
S20: HMBC NMR Spectrum for Compound **3** in CD₃OD



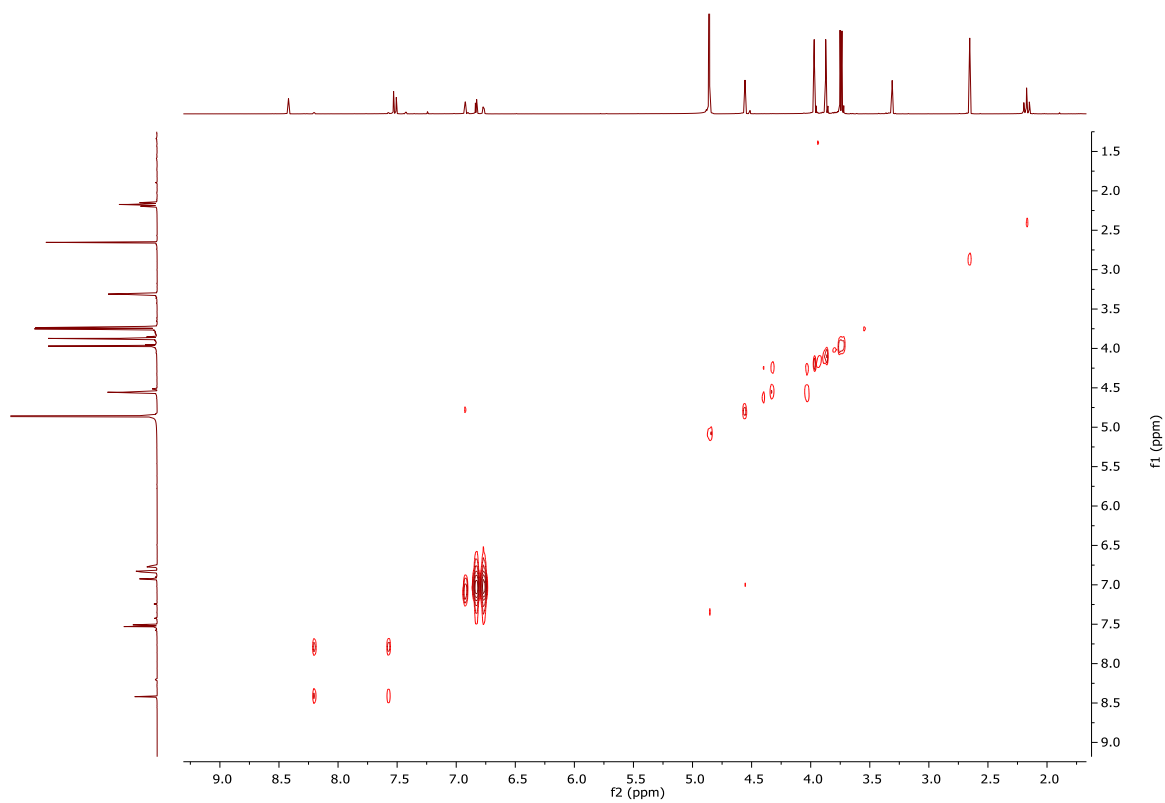
S21: ^1H NMR Spectrum for Compound **4** in CD_3OD



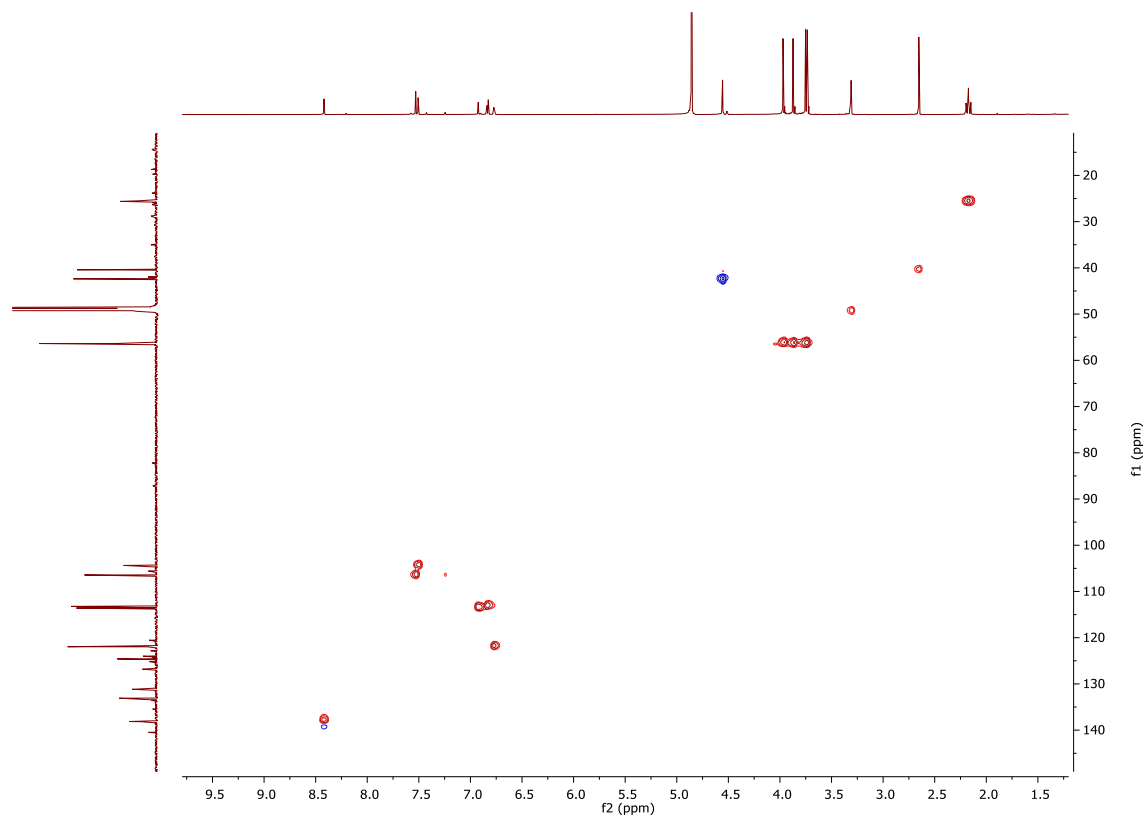
S22: ^{13}C NMR Spectrum for Compound **4** in CD_3OD



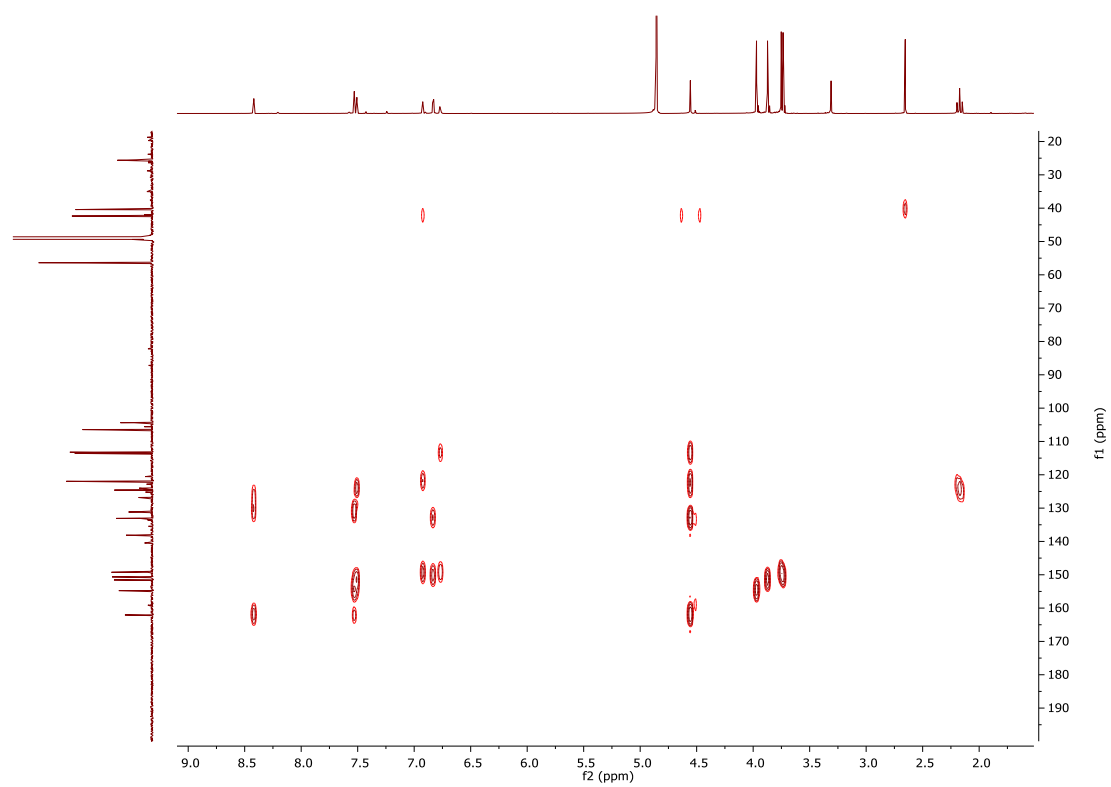
S23: COSY NMR Spectrum for Compound **4** in CD₃OD



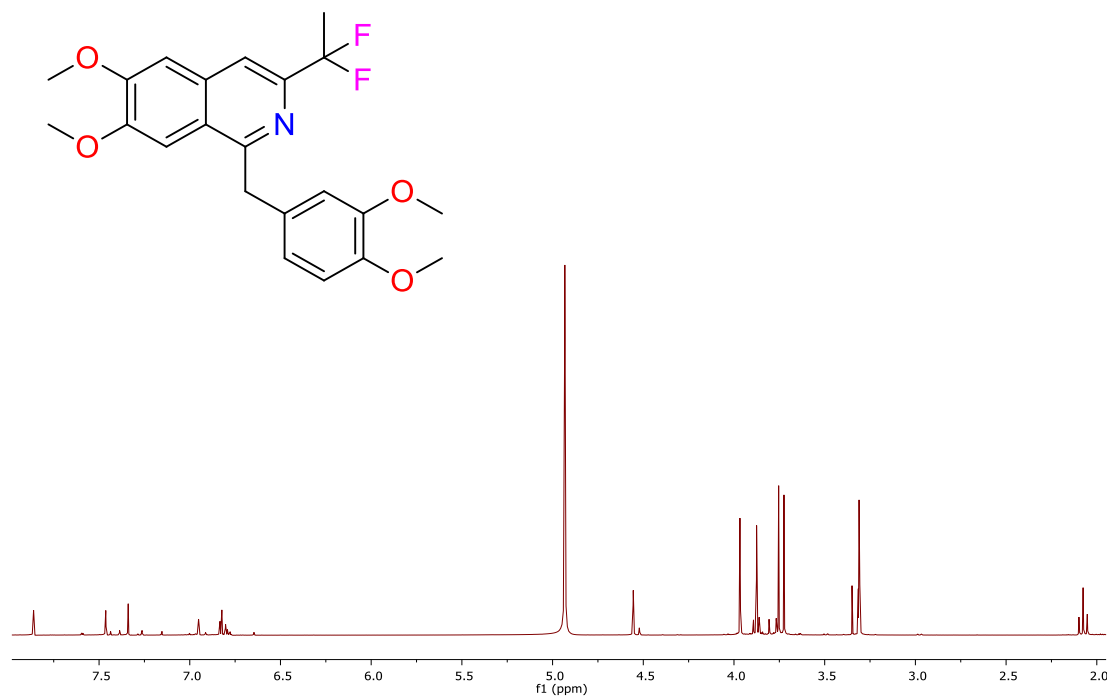
S24: HSQC NMR Spectrum for Compound **4** in CD₃OD



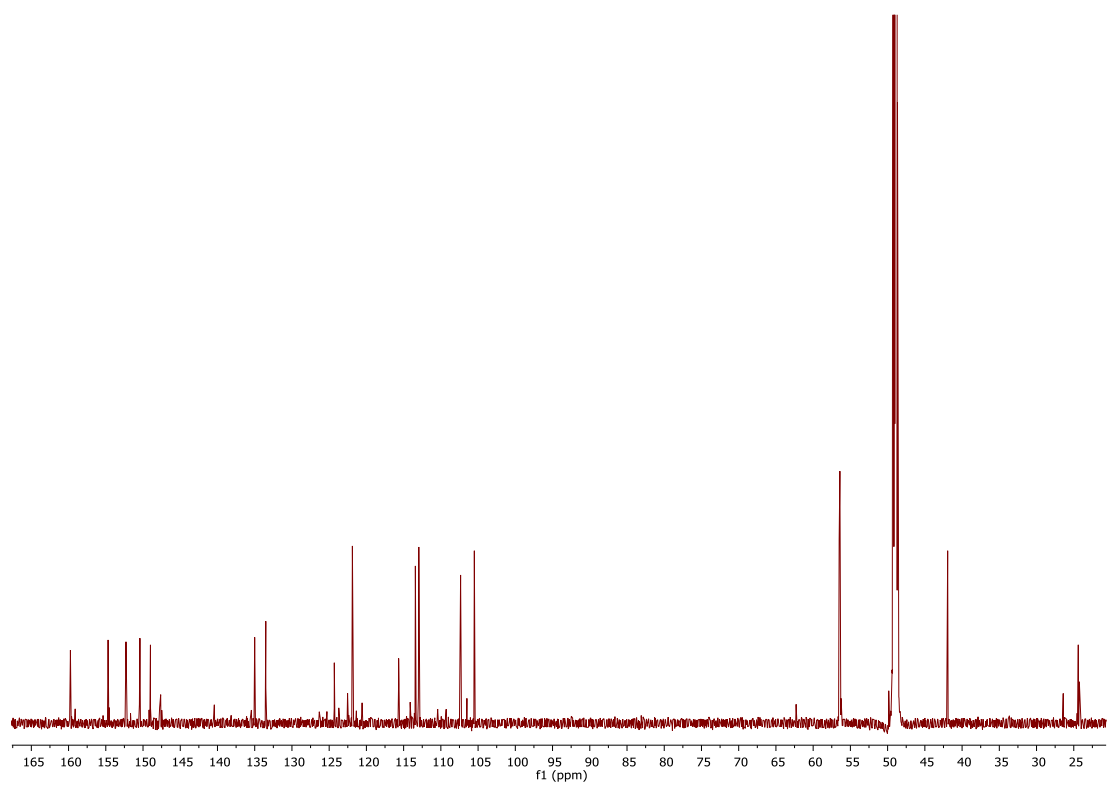
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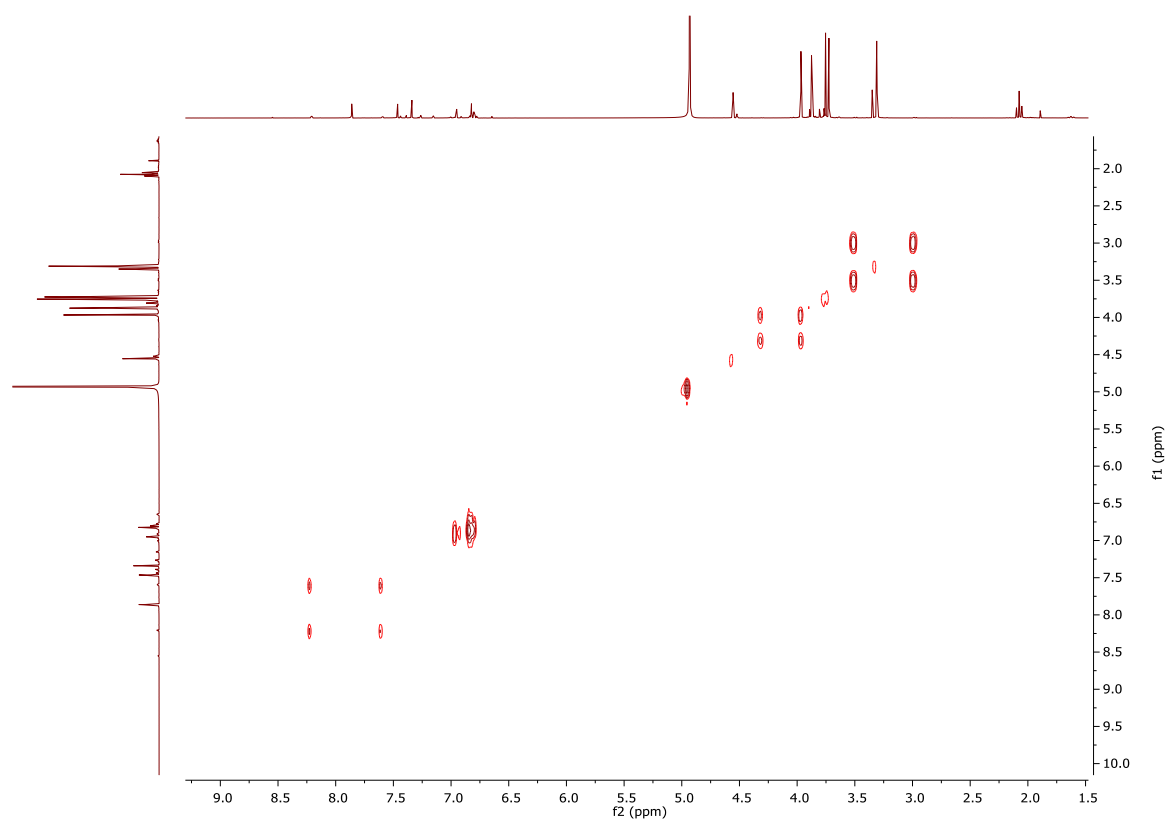
S26: ^1H NMR Spectrum for Compound **5** in CD_3OD



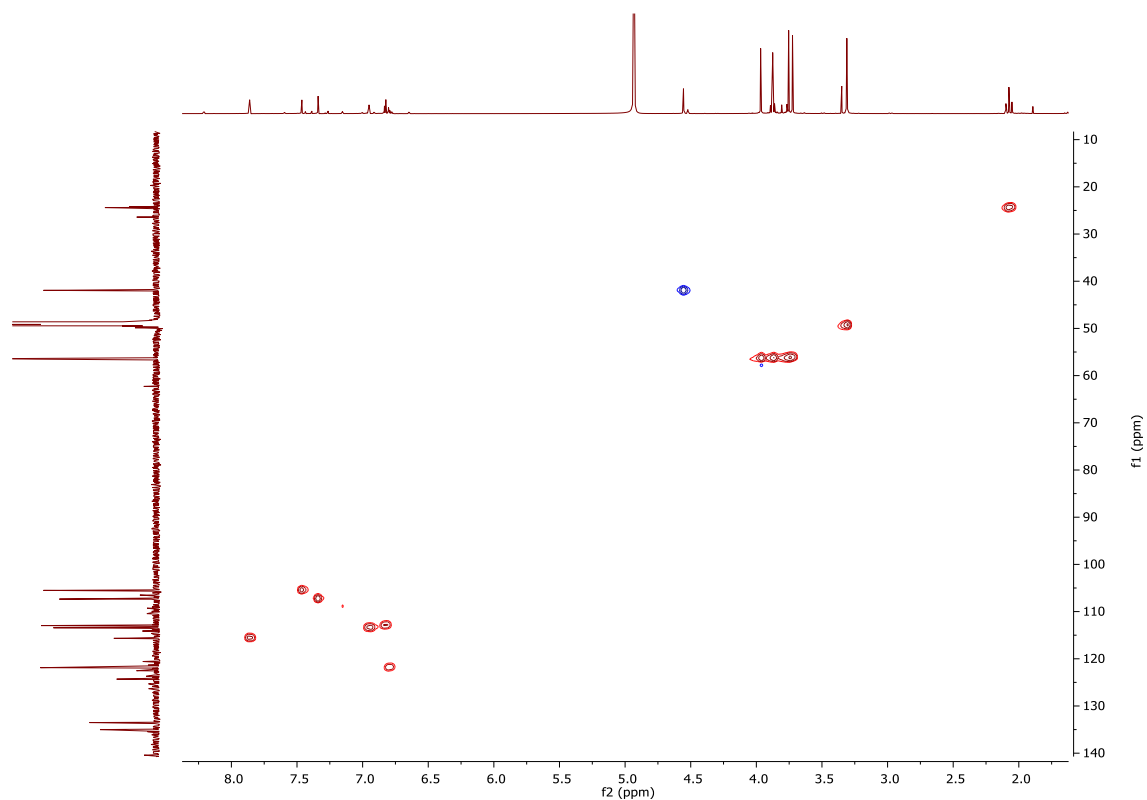
S27: ^{13}C NMR Spectrum for Compound **5** in CD_3OD



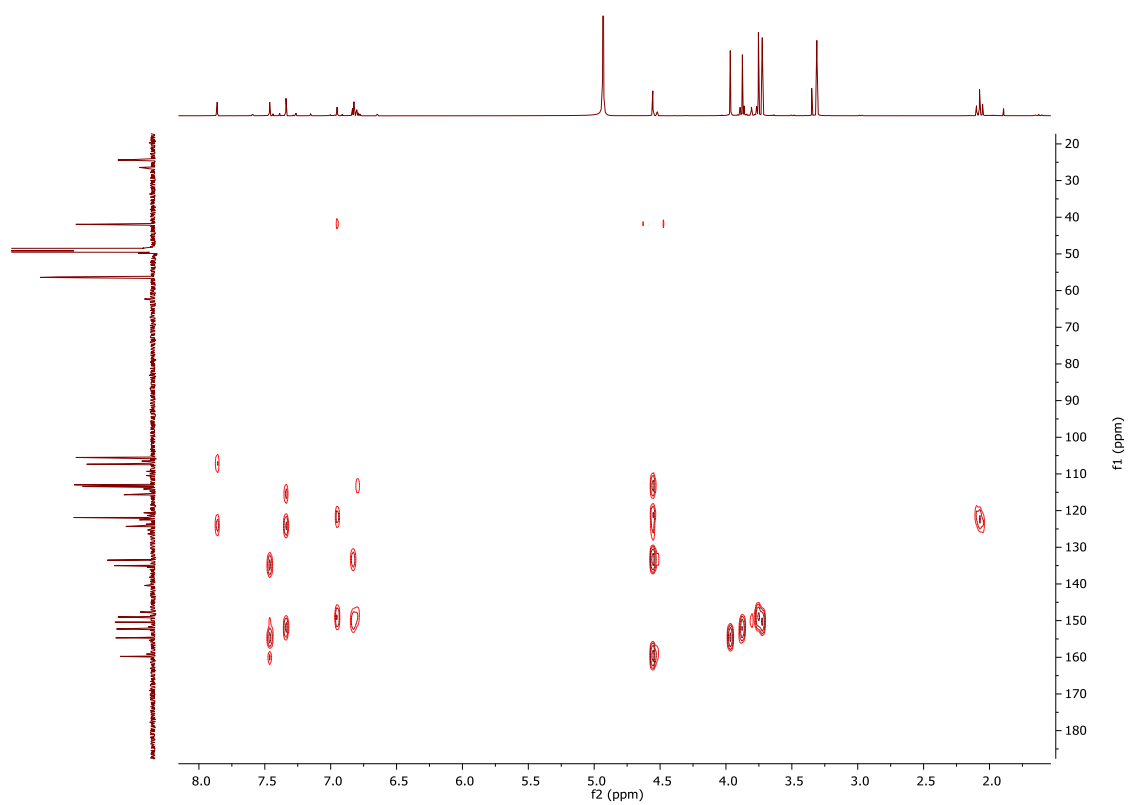
S28: COSY NMR Spectrum for Compound 5 in CD₃OD



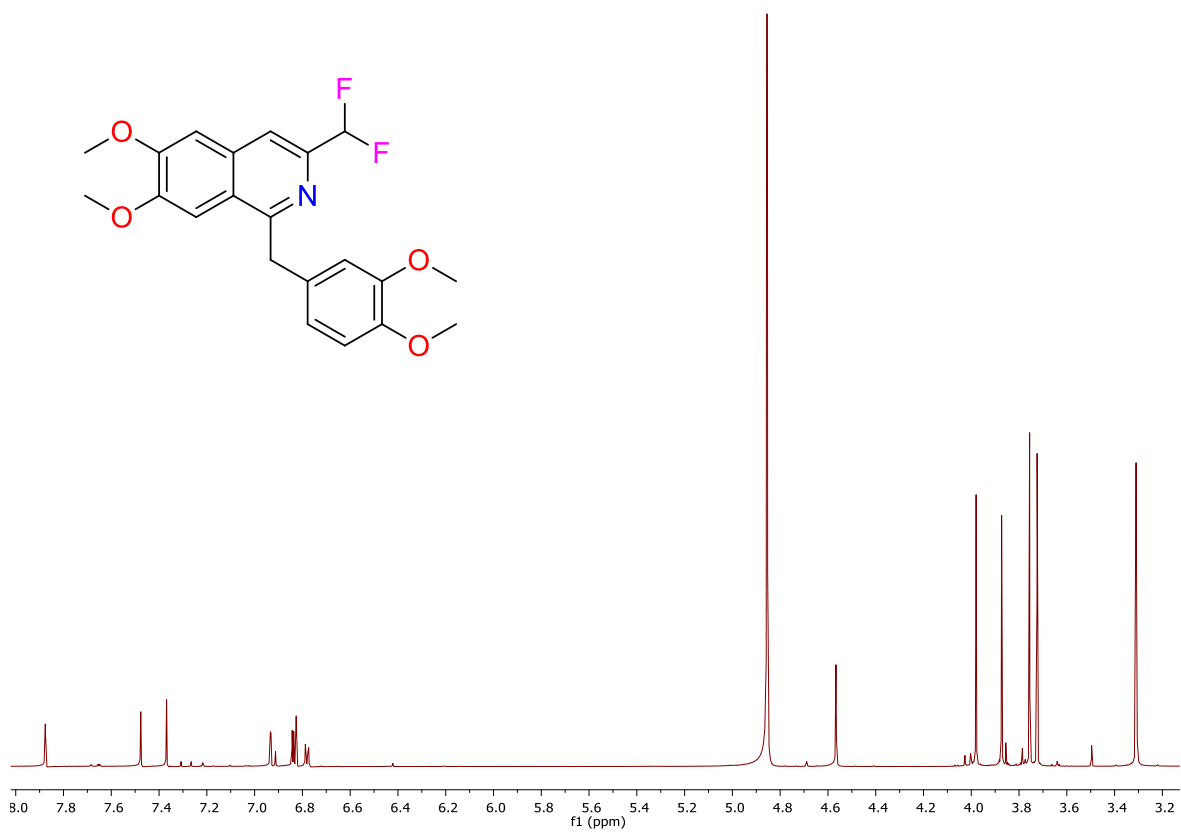
S29: HSQC NMR Spectrum for Compound 5 in CD₃OD



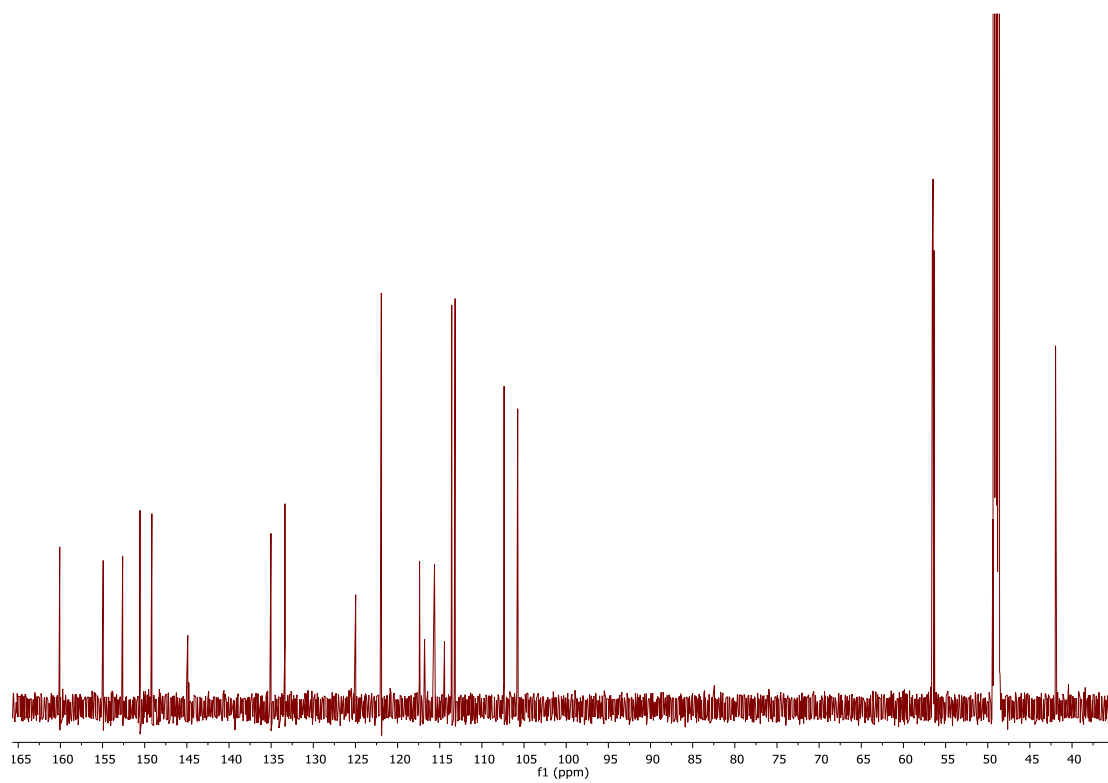
S30: HMBC NMR Spectrum for Compound **5** in CD₃OD



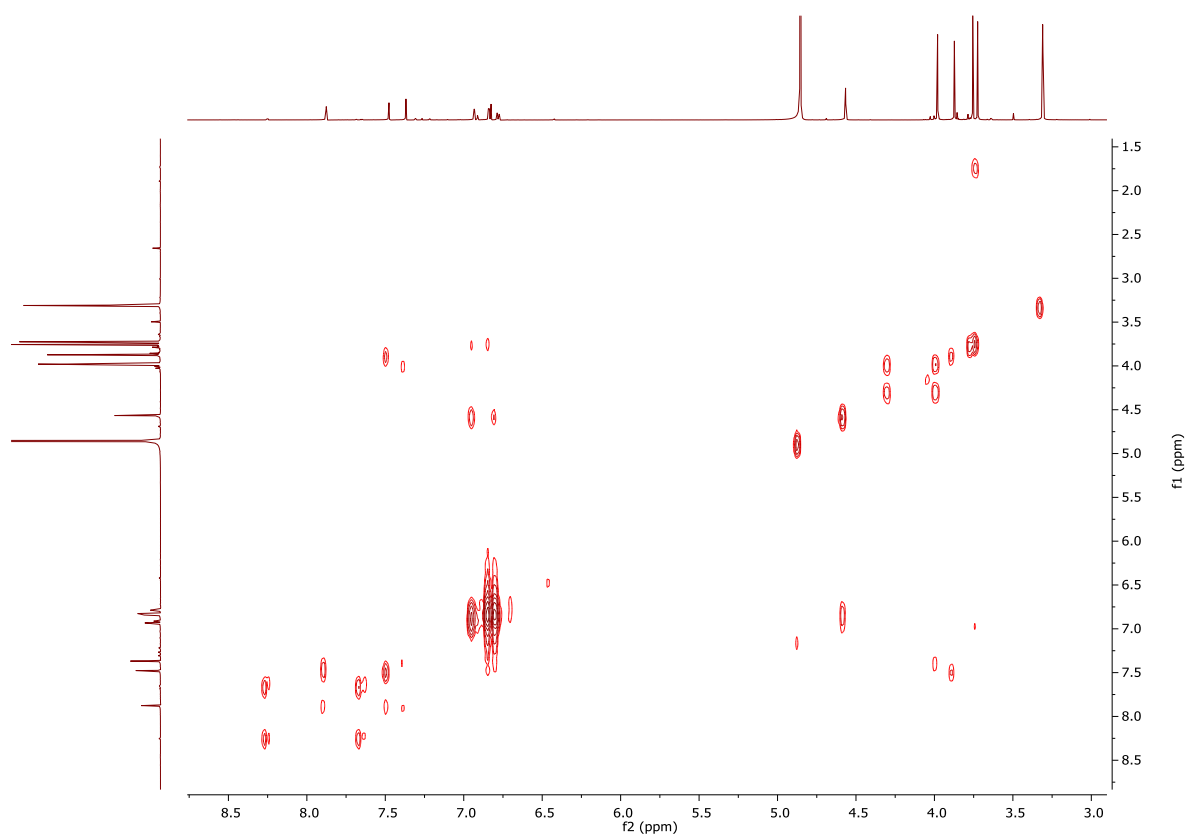
S31: ^1H NMR Spectrum for Compound **6** in CD_3OD



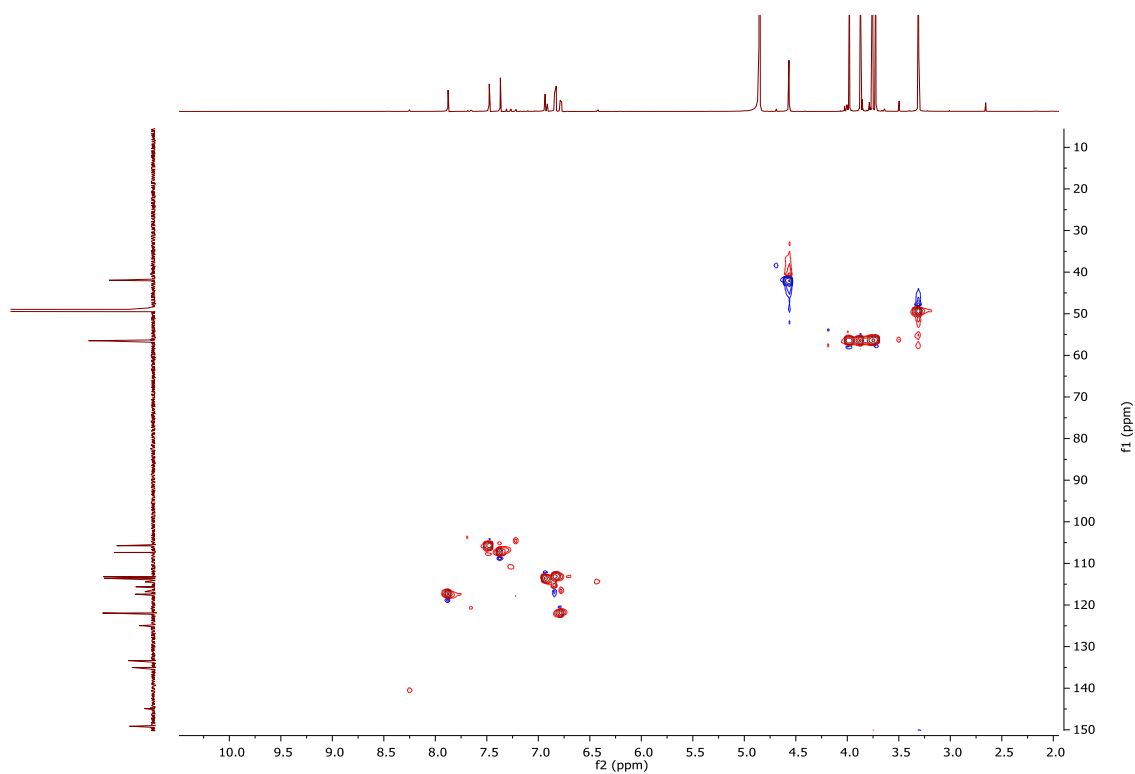
S32: ^{13}C NMR Spectrum for Compound **6** in CD_3OD



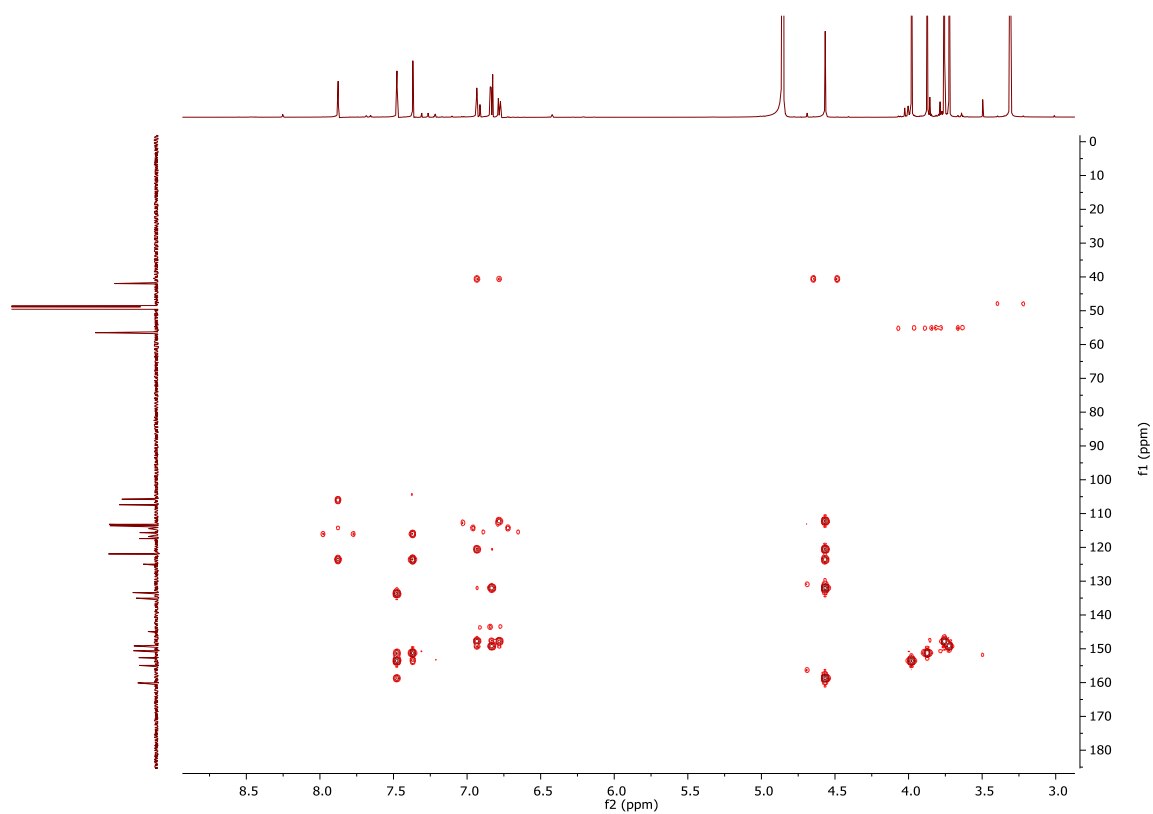
S33: COSY NMR Spectrum for Compound **6** in CD₃OD



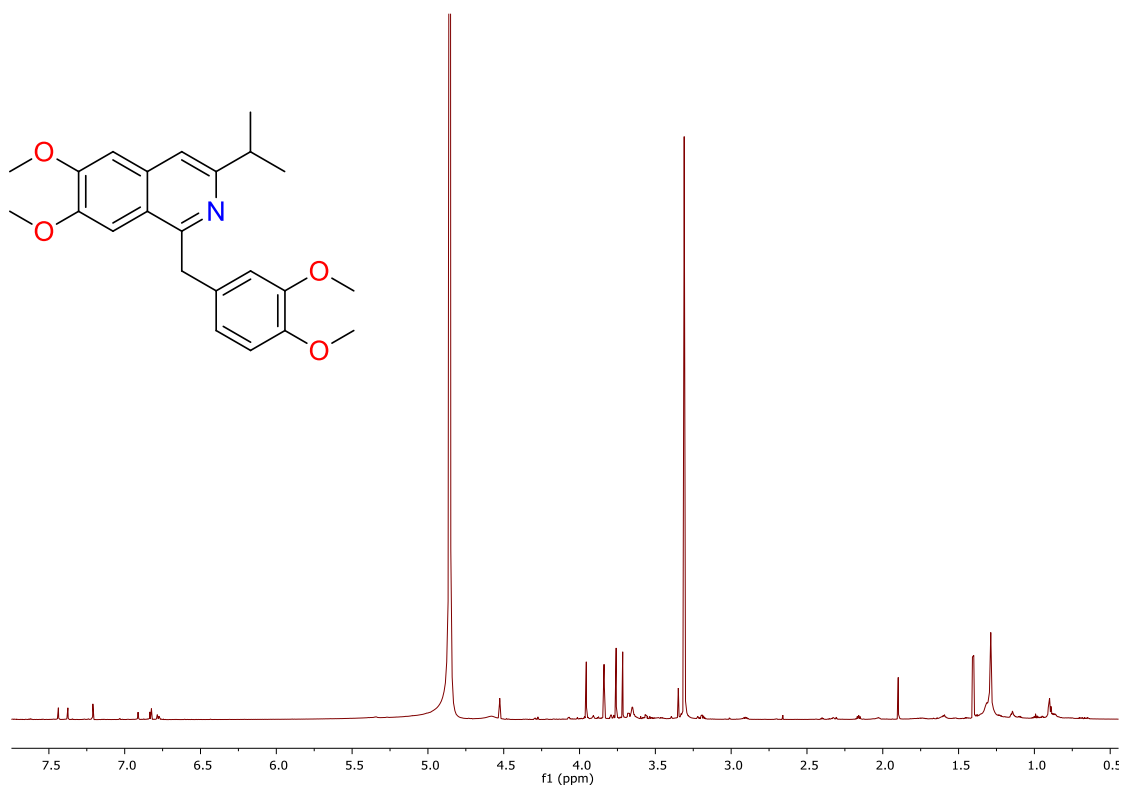
S34: HSQC NMR Spectrum for Compound **6** in CD₃OD



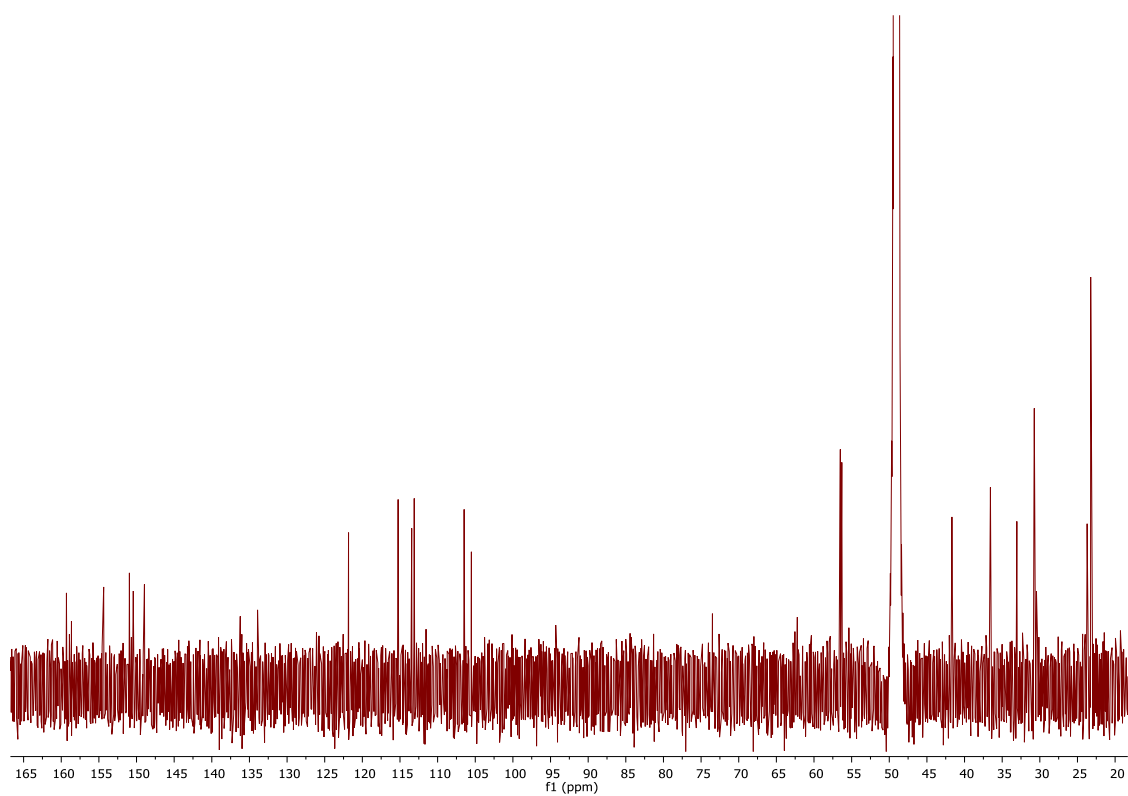
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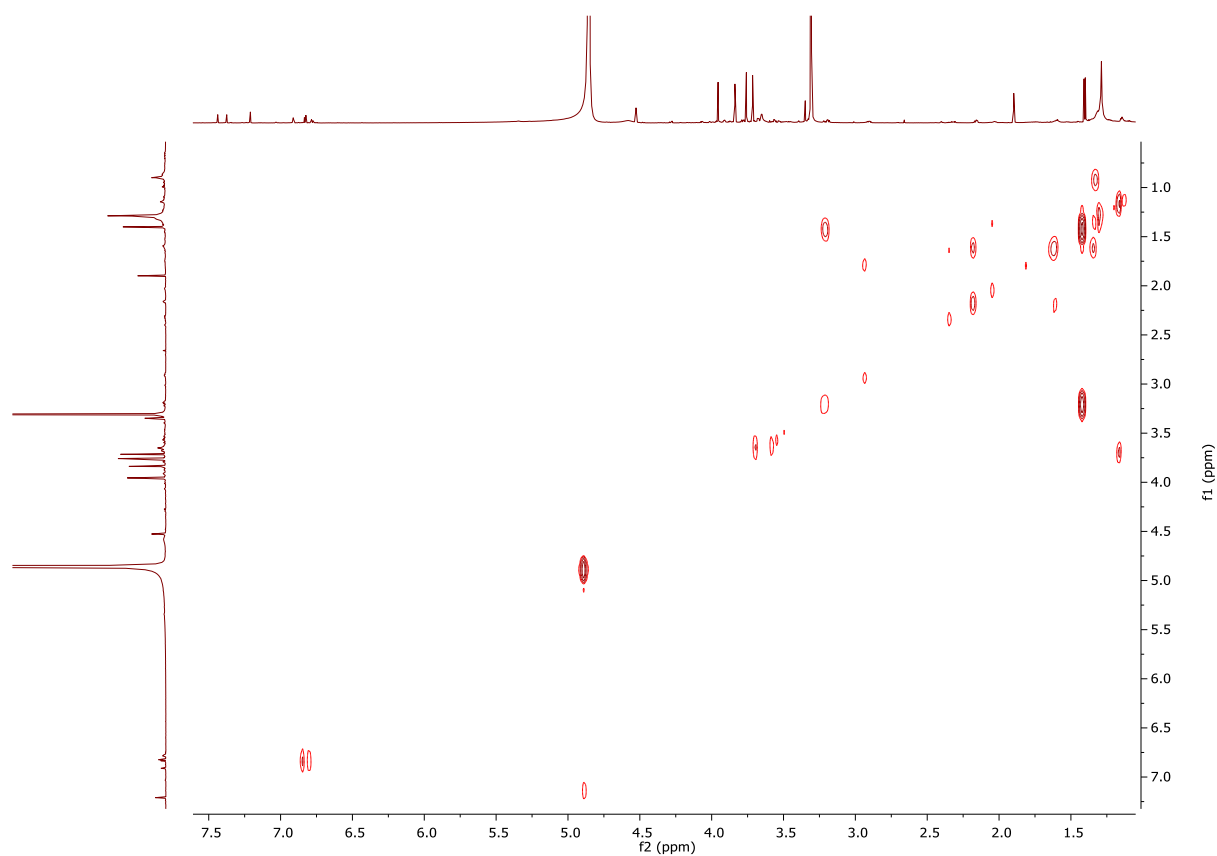
S36: ^1H NMR Spectrum for Compound 7 in CD_3OD



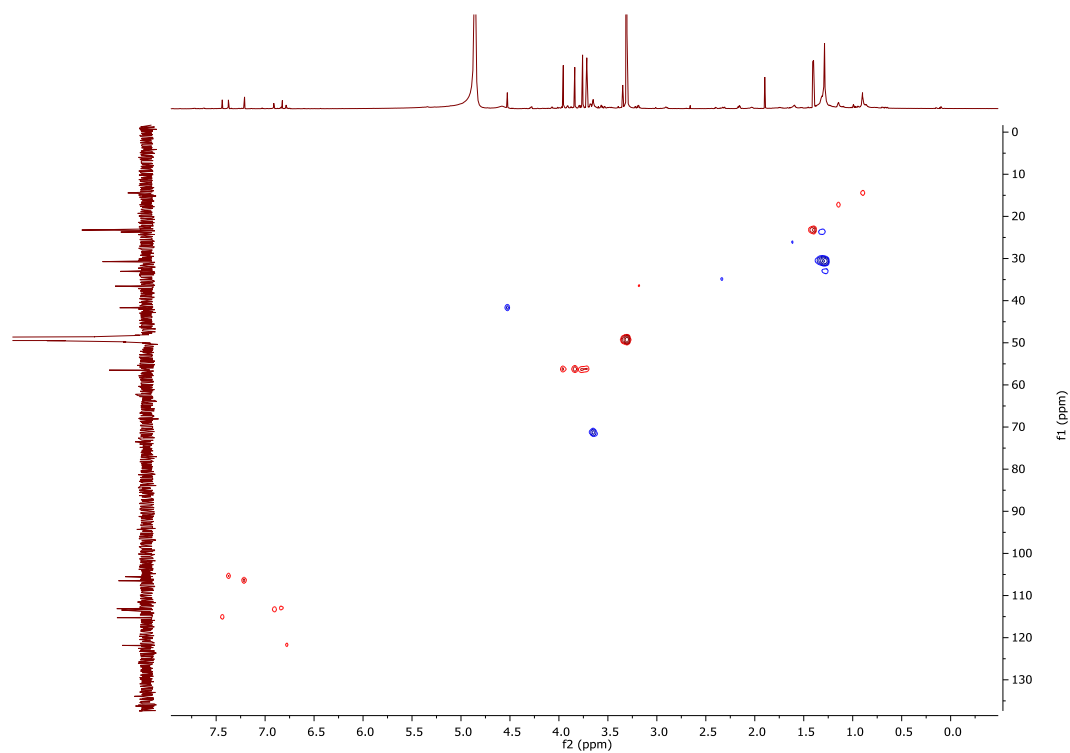
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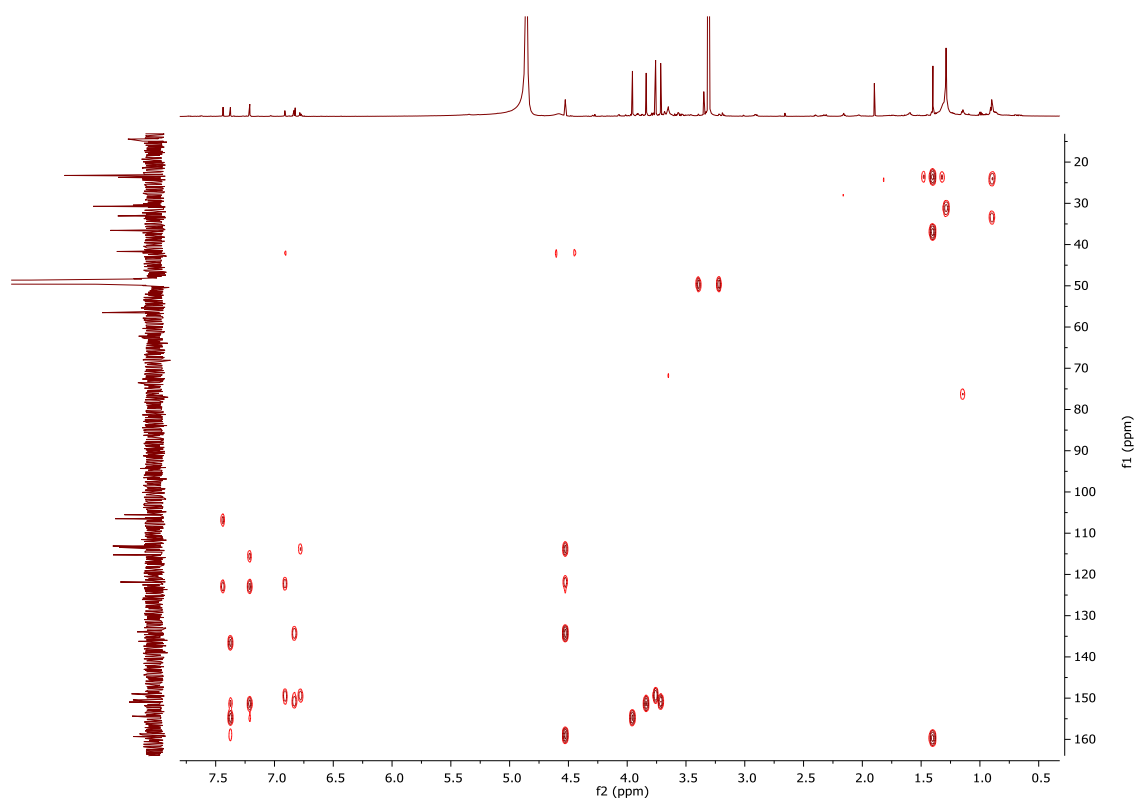
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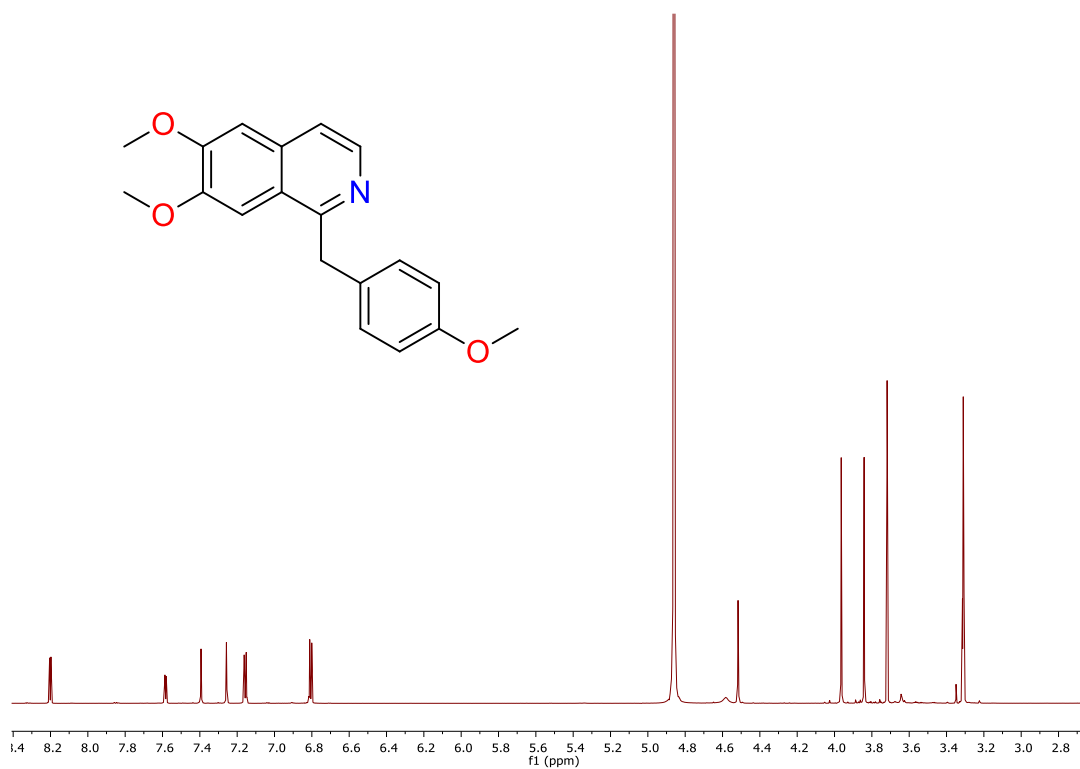
S39: HSQC NMR Spectrum for Compound 7 in CD₃OD



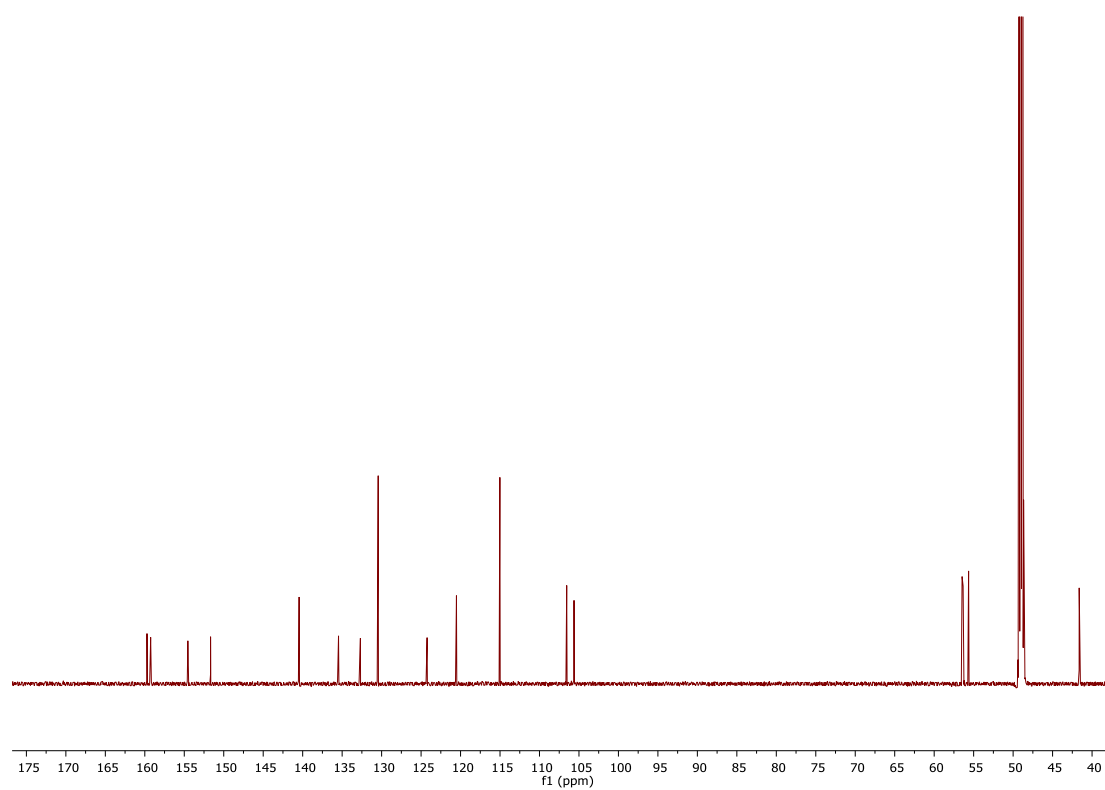
S40: HMBC NMR Spectrum for Compound **7** in CD₃OD



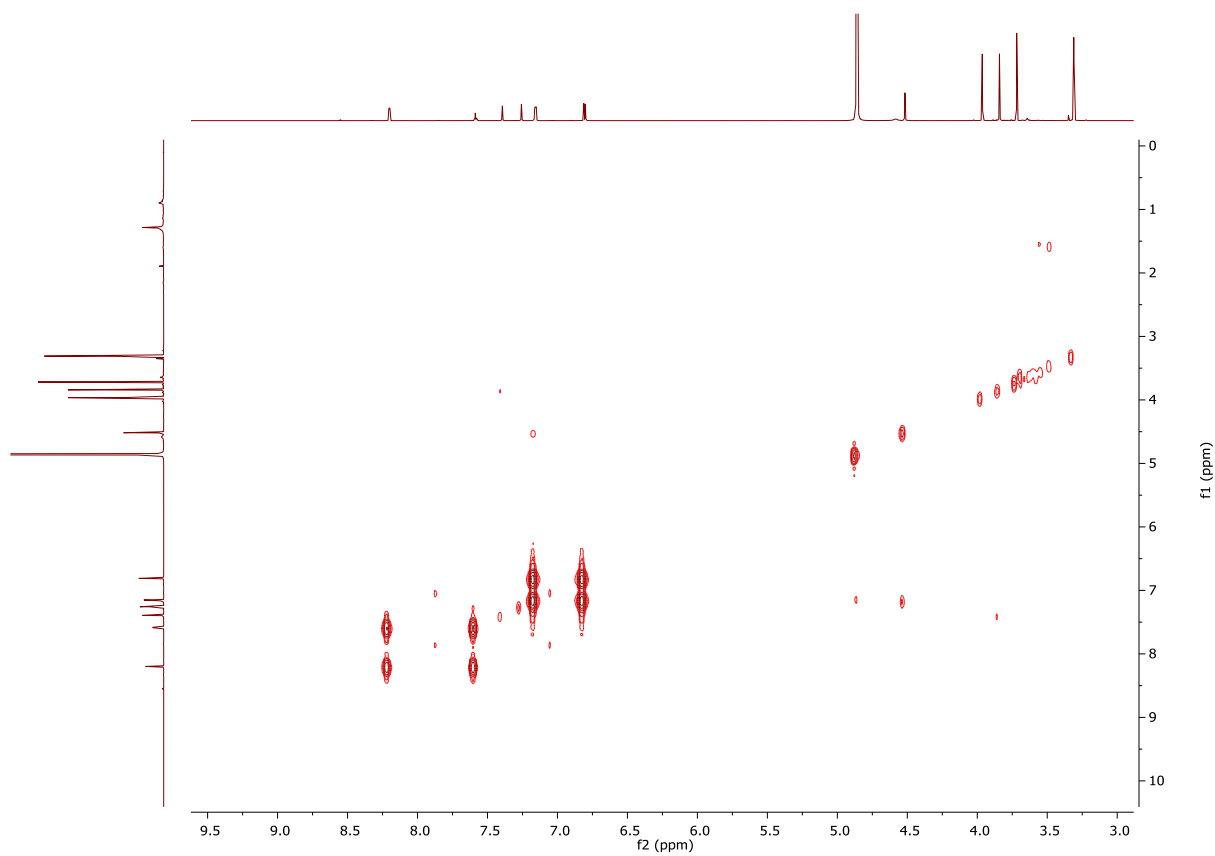
S41: ^1H NMR Spectrum for Compound **8** in CD_3OD



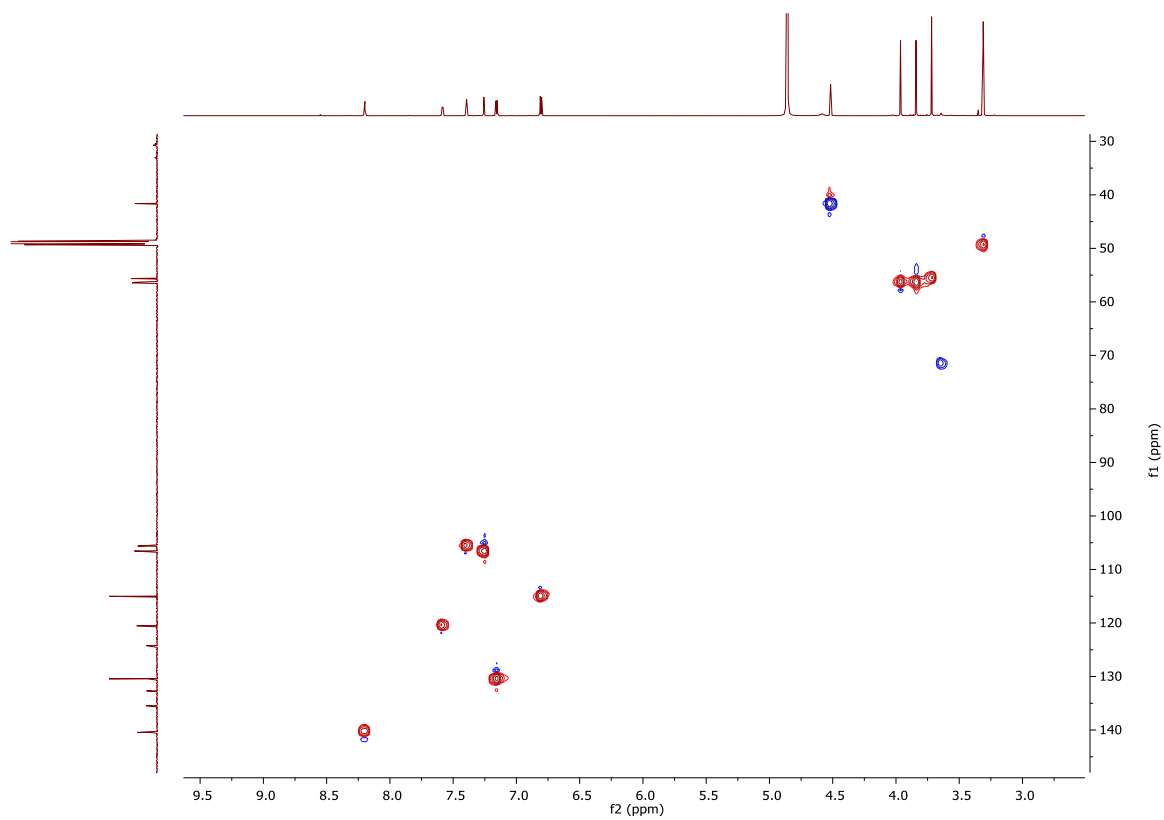
S42: ^{13}C NMR Spectrum for Compound **8** in CD_3OD



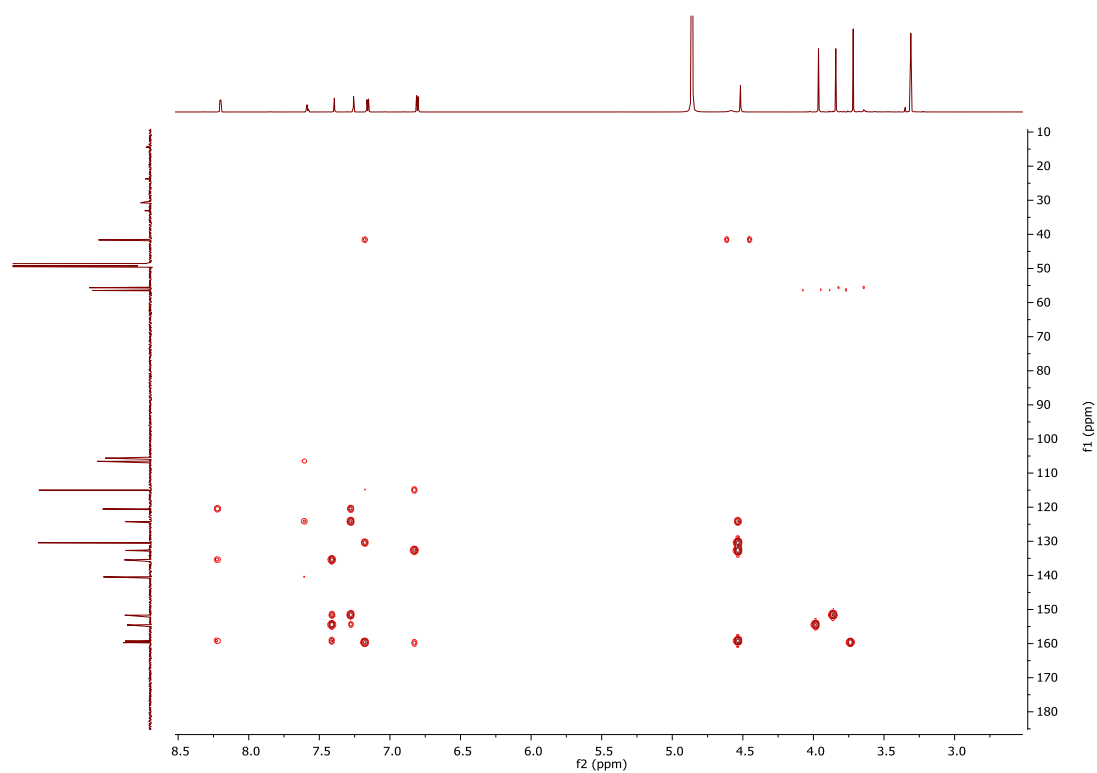
S43: COSY NMR Spectrum for Compound **8** in CD₃OD



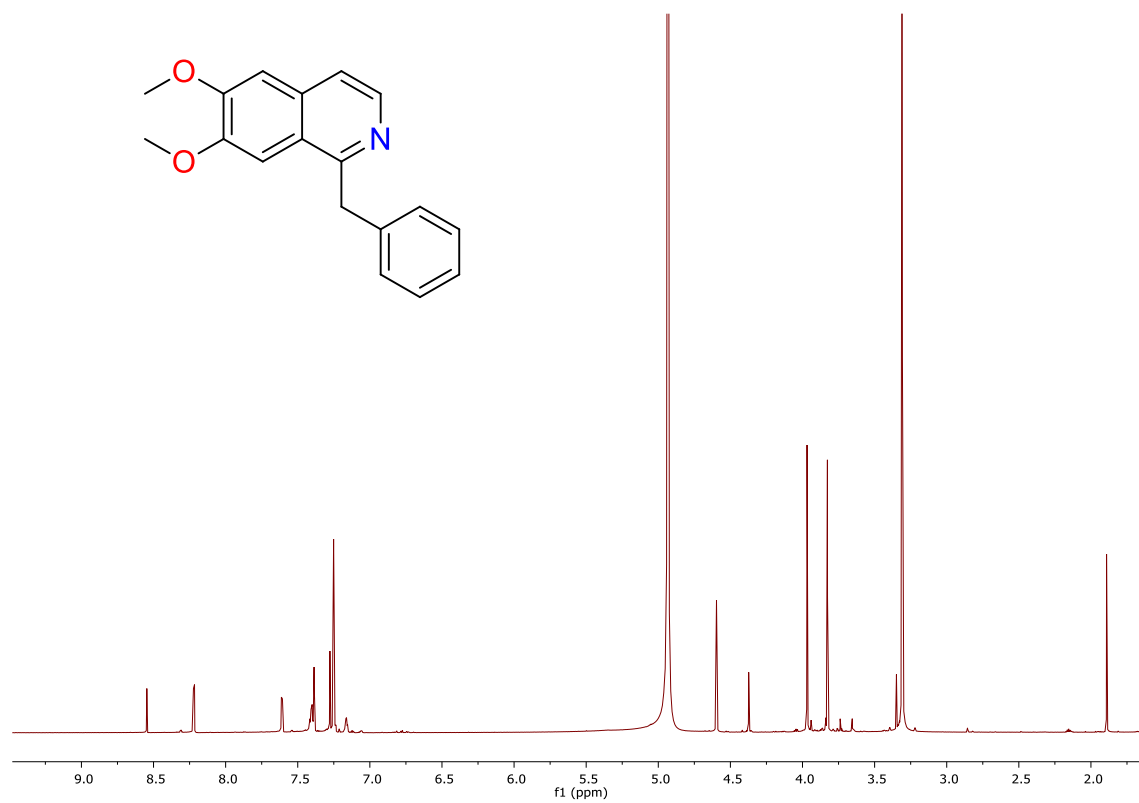
S44: HSQC NMR Spectrum for Compound **8** in CD₃OD



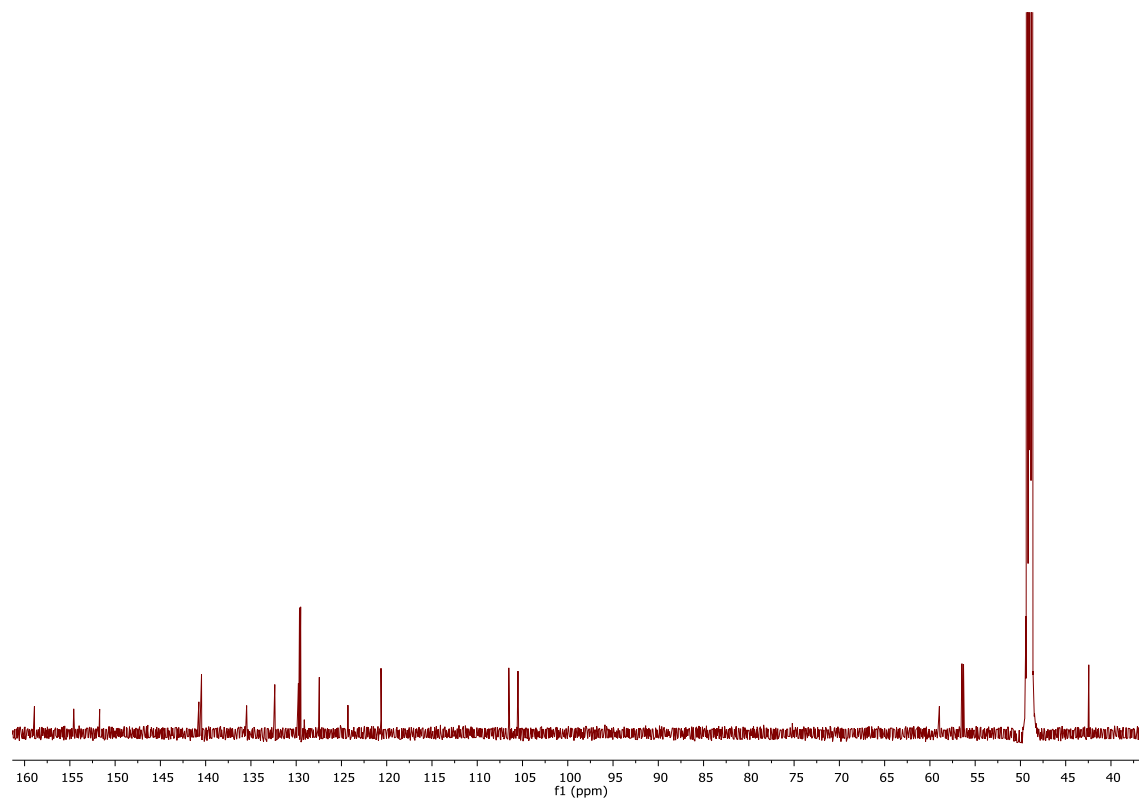
S45: HMBC NMR Spectrum for Compound **8 in CD₃OD**



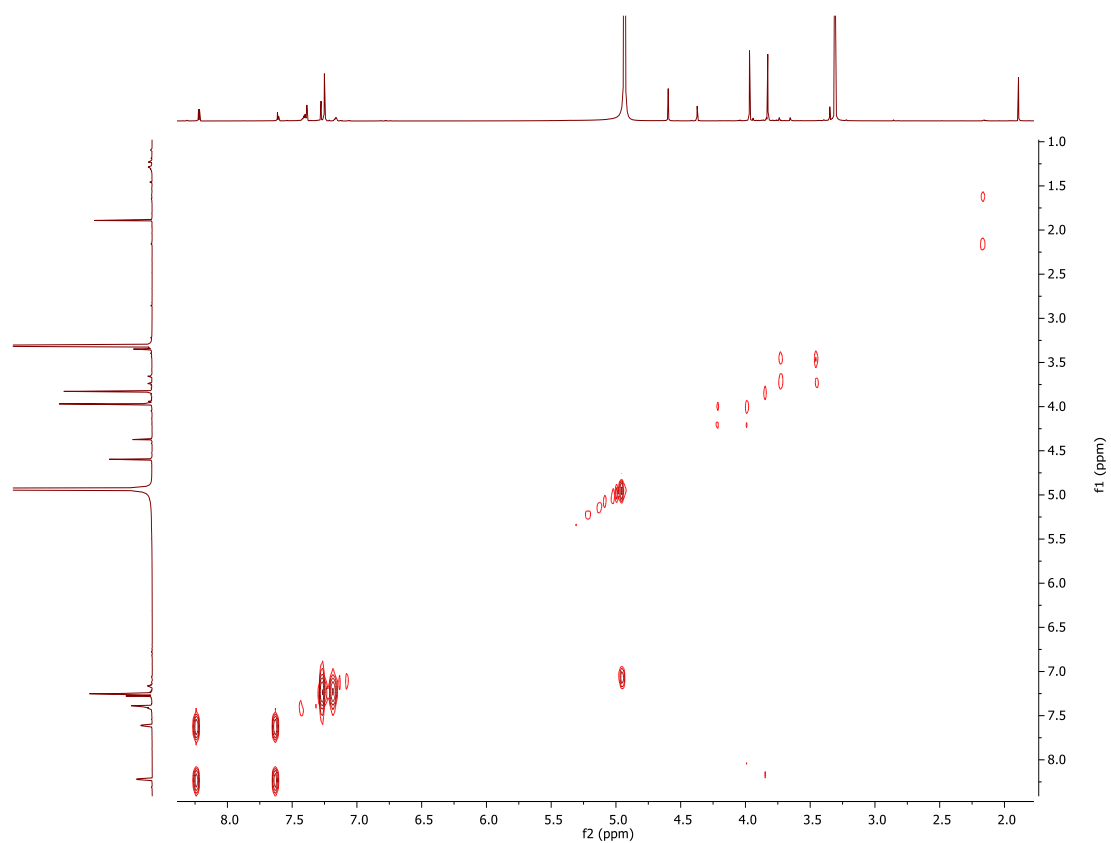
S46: ^1H NMR Spectrum for Compound **9** in CD_3OD



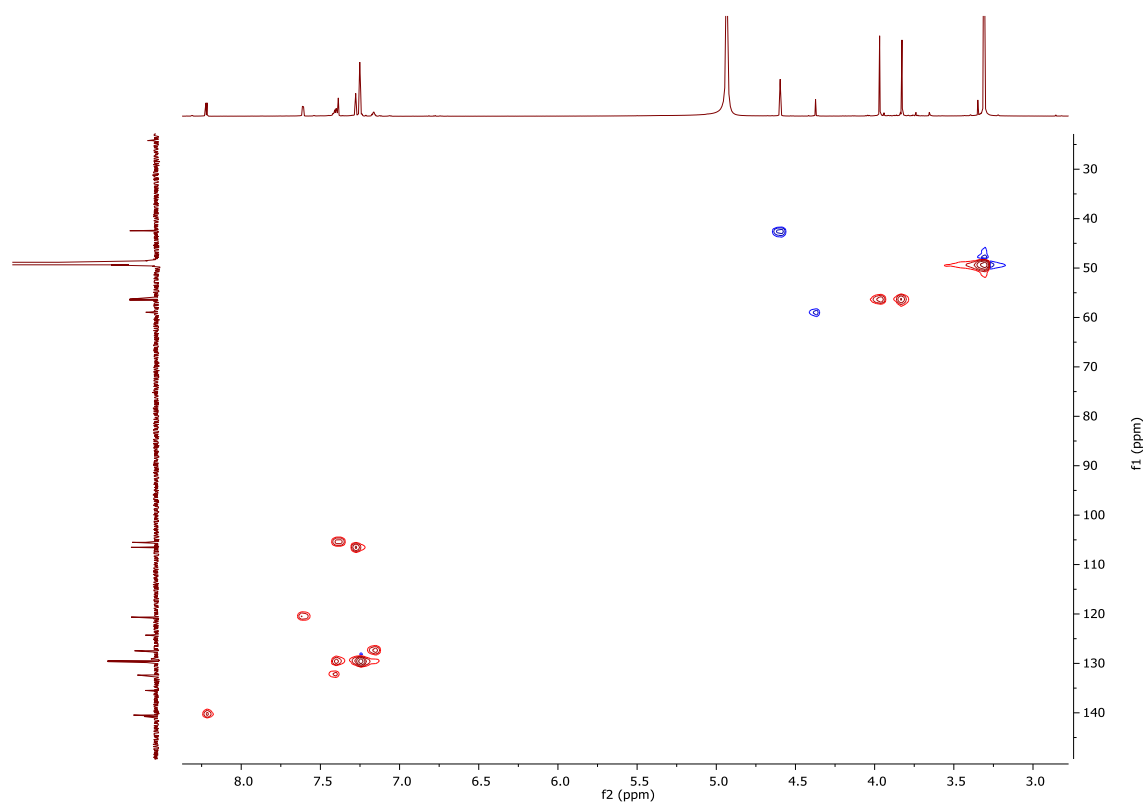
S47: ^{13}C NMR Spectrum for Compound **9** in CD_3OD



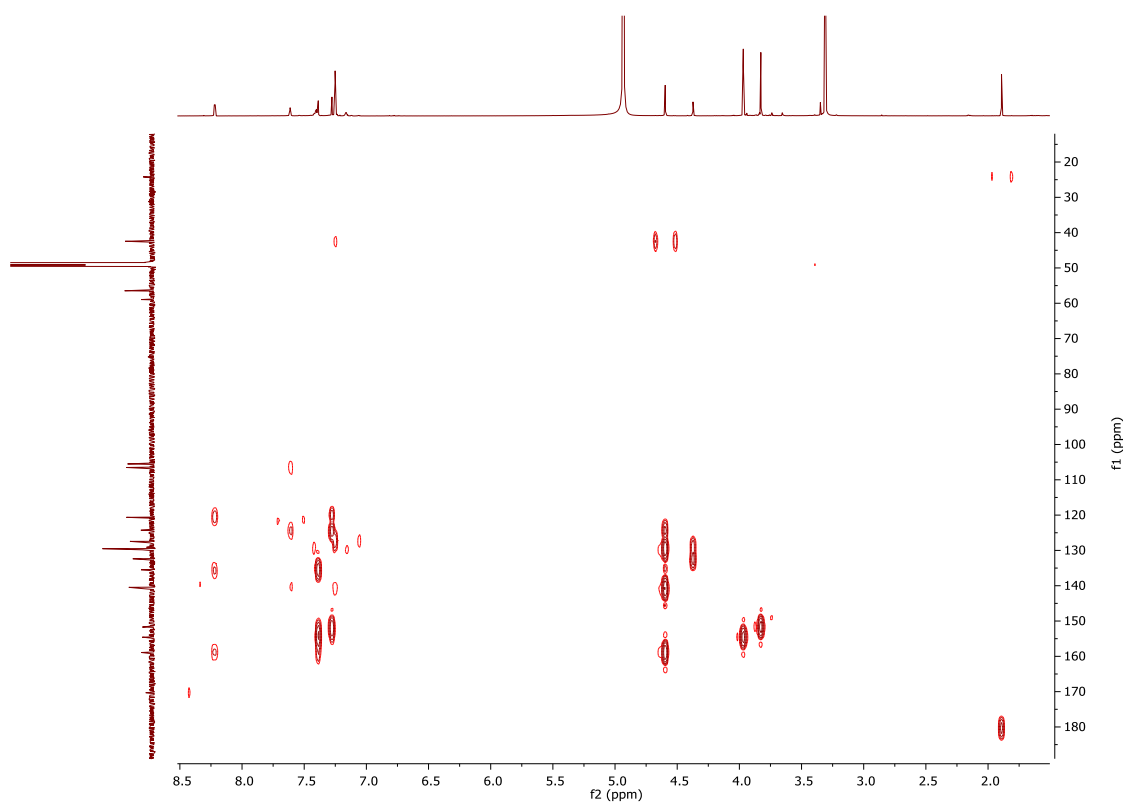
S48: COSY NMR Spectrum for Compound **9** in CD₃OD



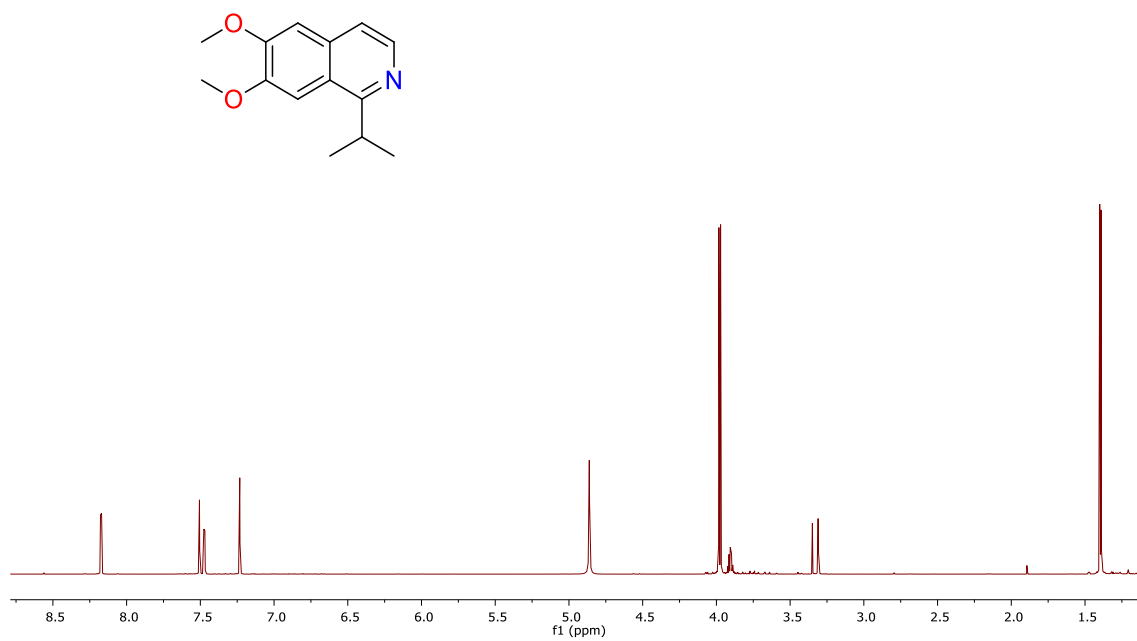
S49: HSQC NMR Spectrum for Compound **9** in CD₃OD



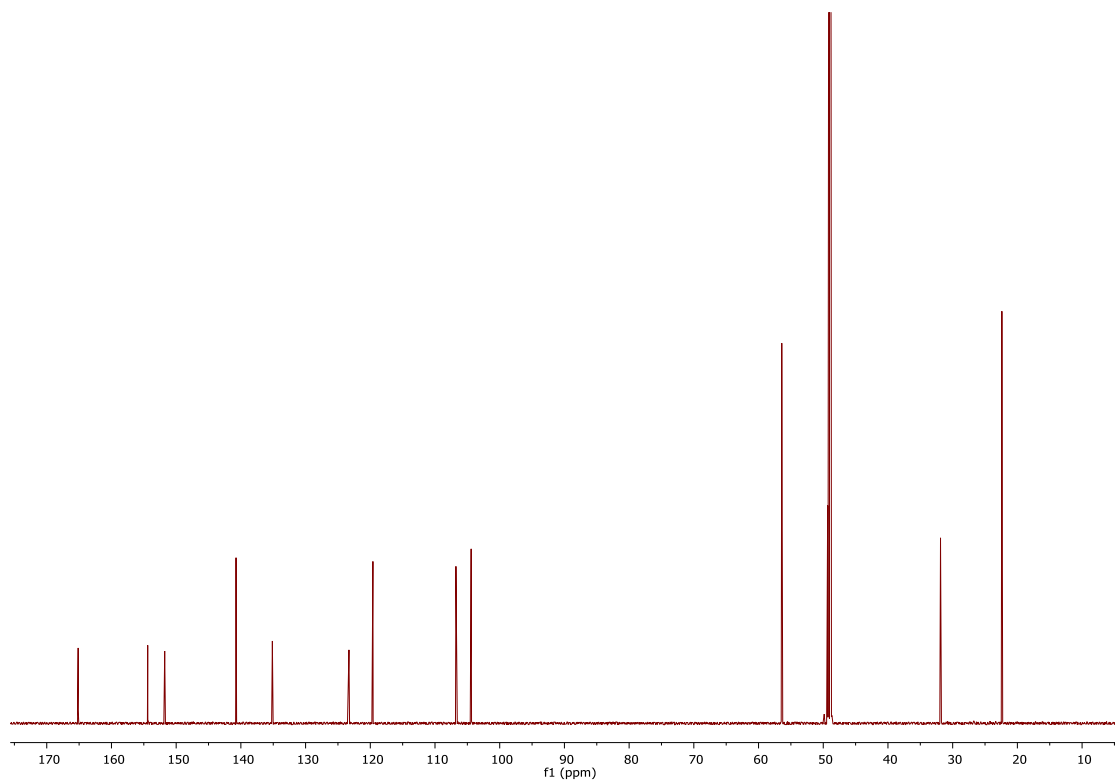
S50: HMBC NMR Spectrum for Compound **9** in CD₃OD



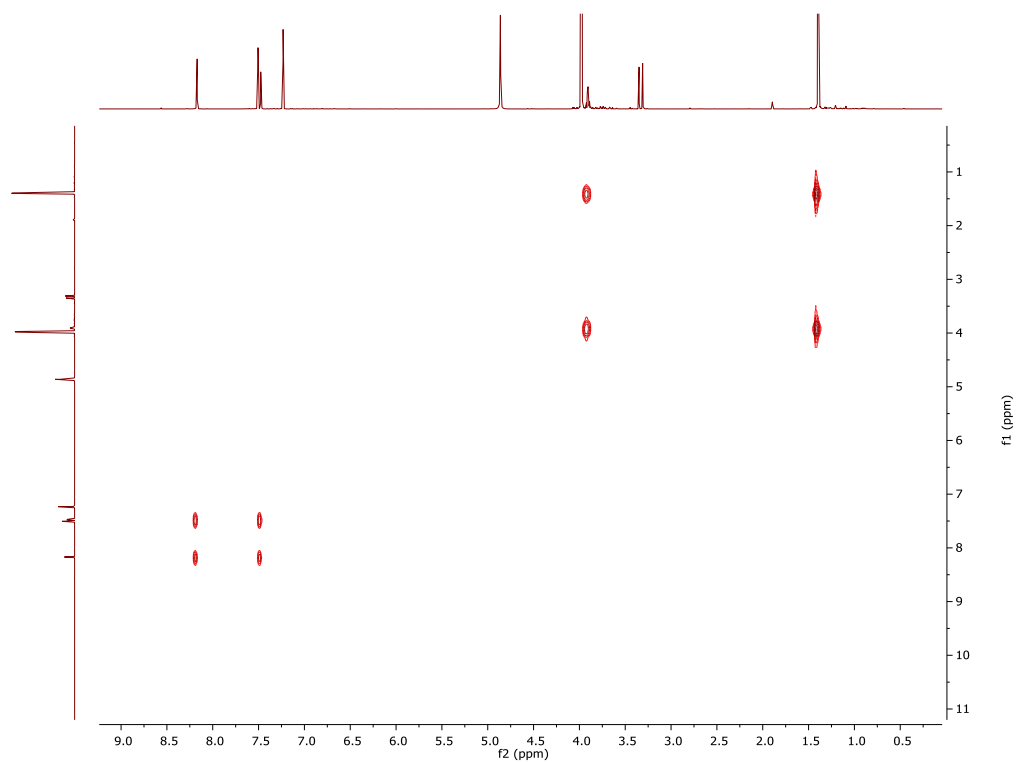
S51: ^1H NMR Spectrum for Compound **10** in CD_3OD



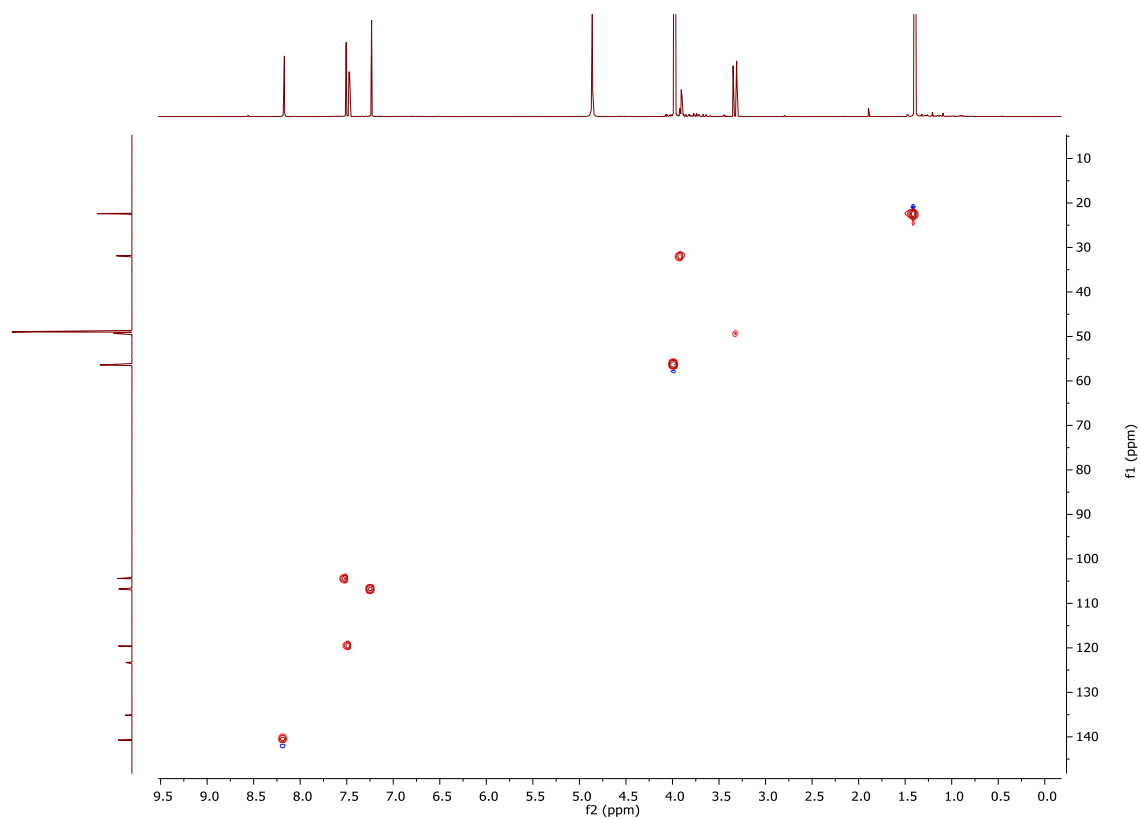
S52: ^{13}C NMR Spectrum for Compound **10** in CD_3OD



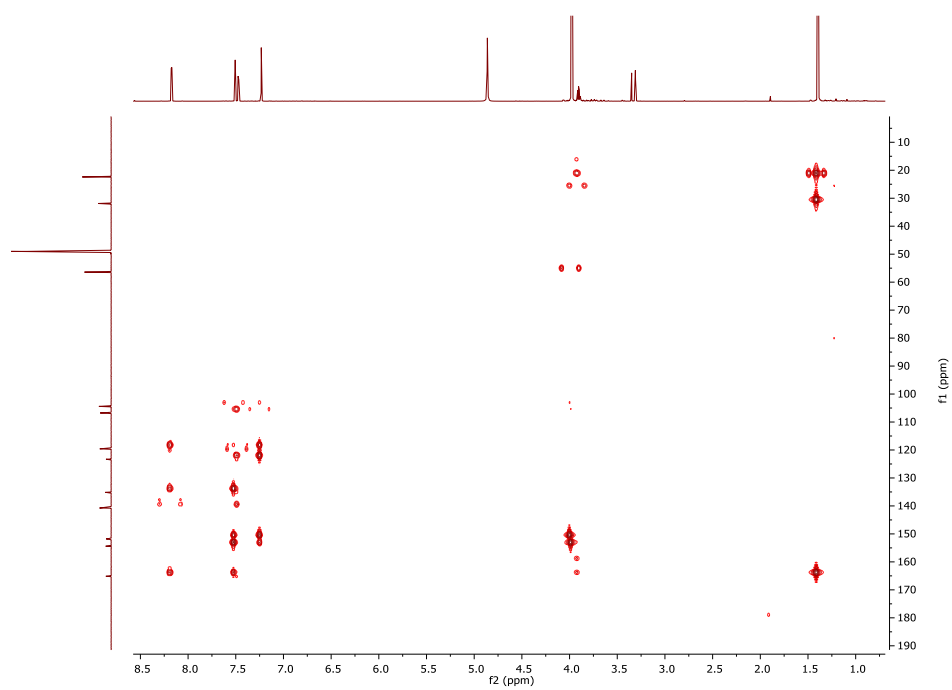
S53: COSY NMR Spectrum for Compound **10** in CD₃OD



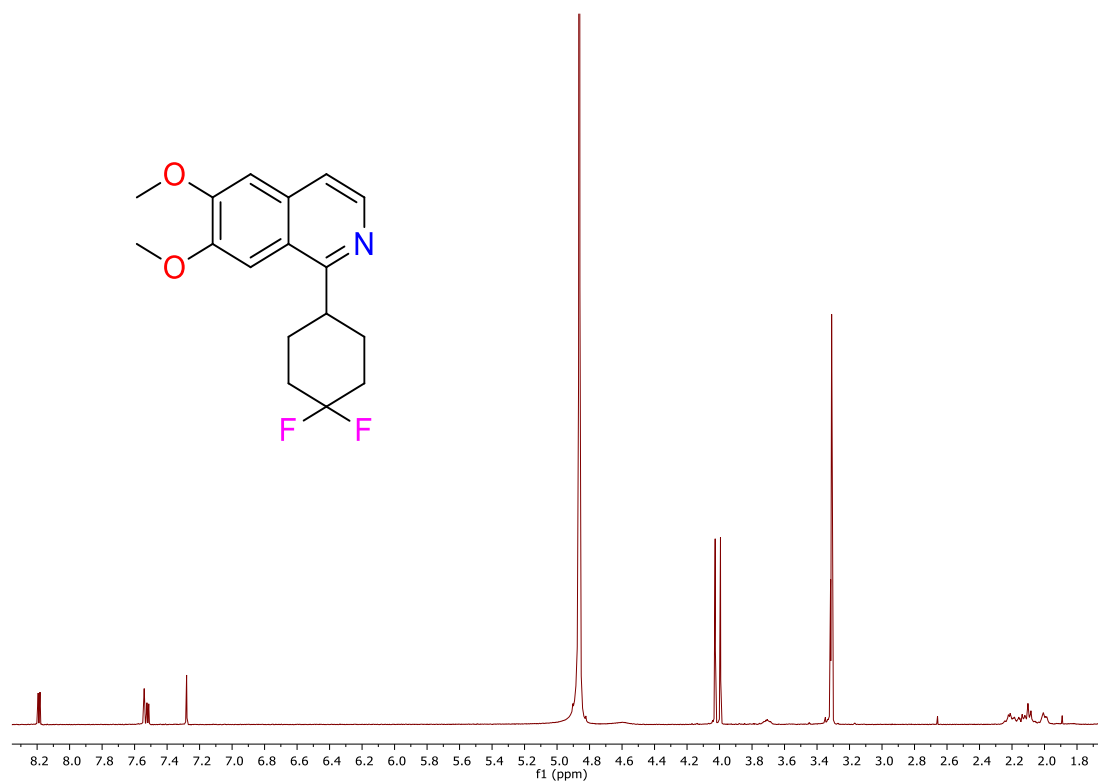
S54: HSQC NMR Spectrum for Compound **10** in CD₃OD



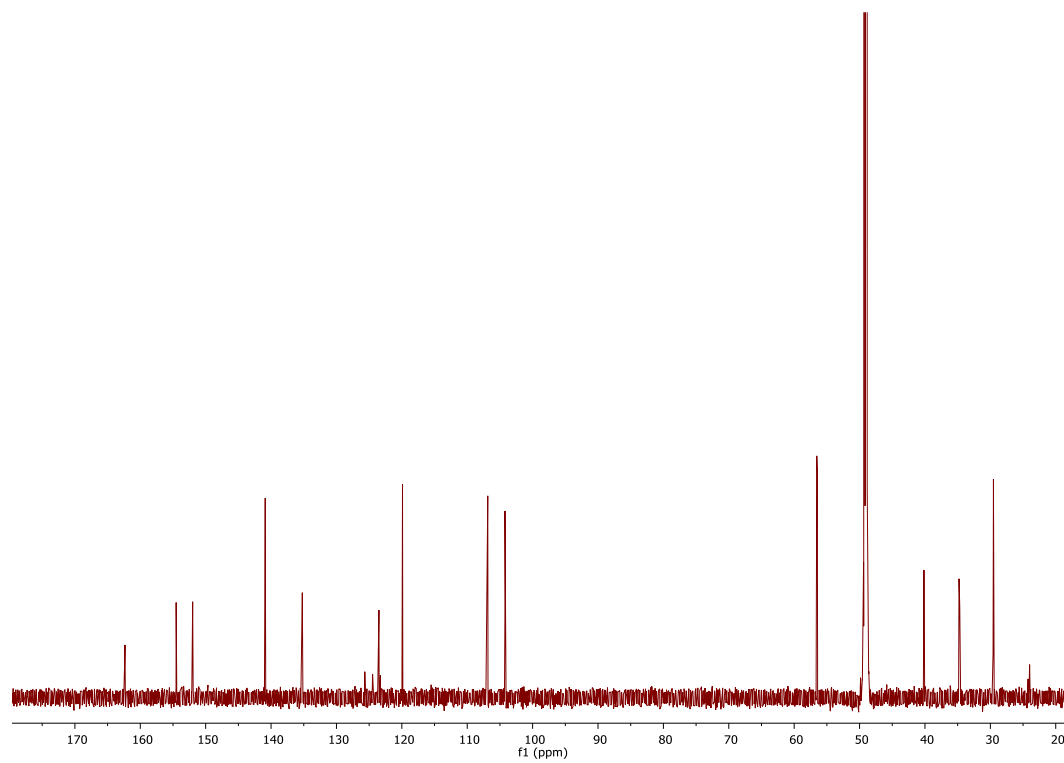
S55: HMBC NMR Spectrum for Compound **10** in CD₃OD



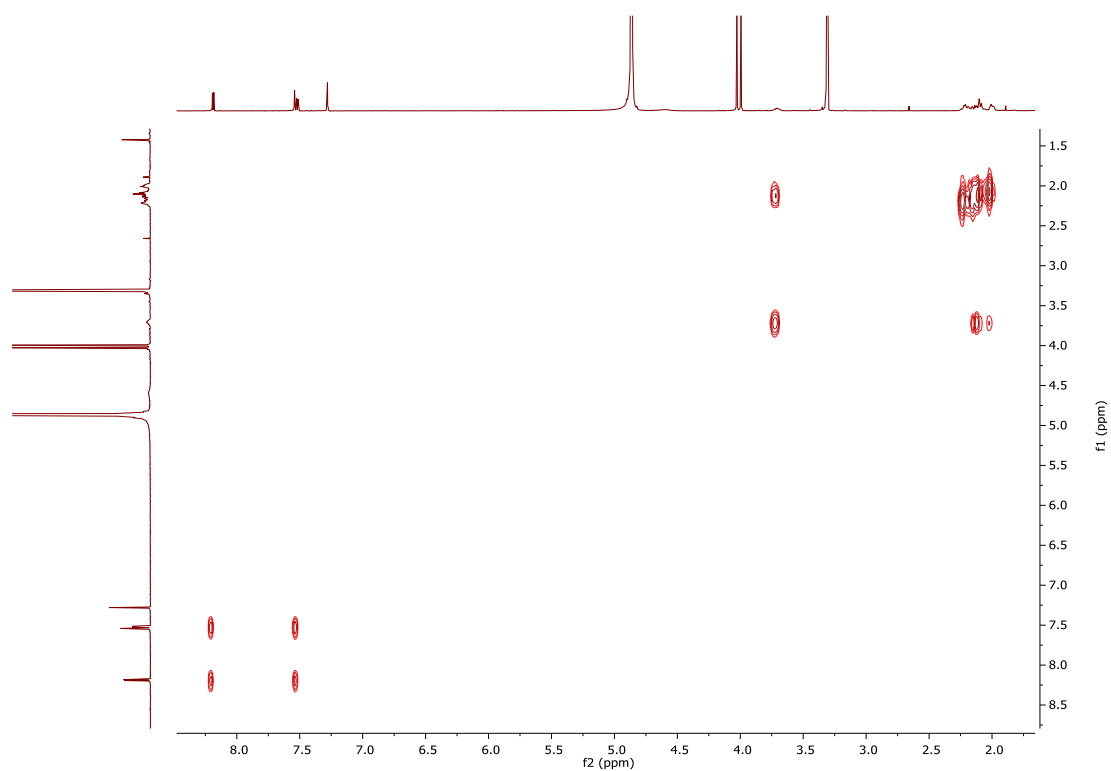
S56: ^1H NMR Spectrum for Compound **11** in CD_3OD



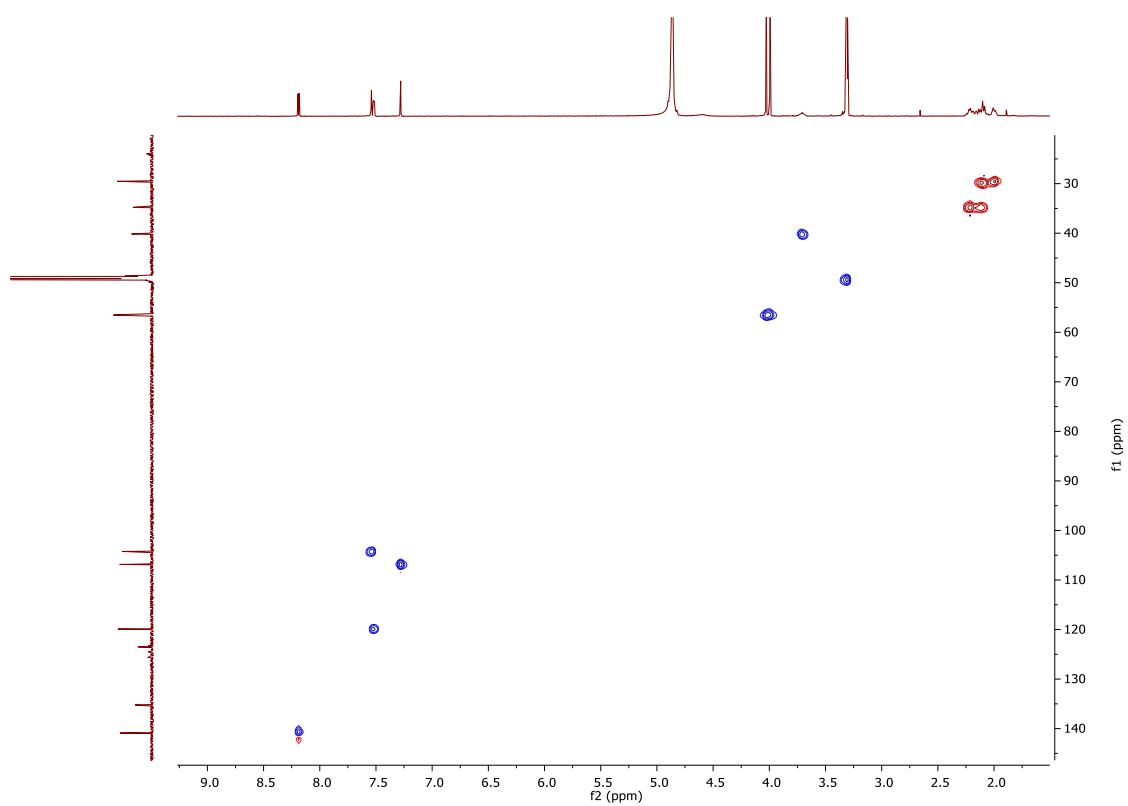
S57: ^{13}C NMR Spectrum for Compound **11** in CD_3OD



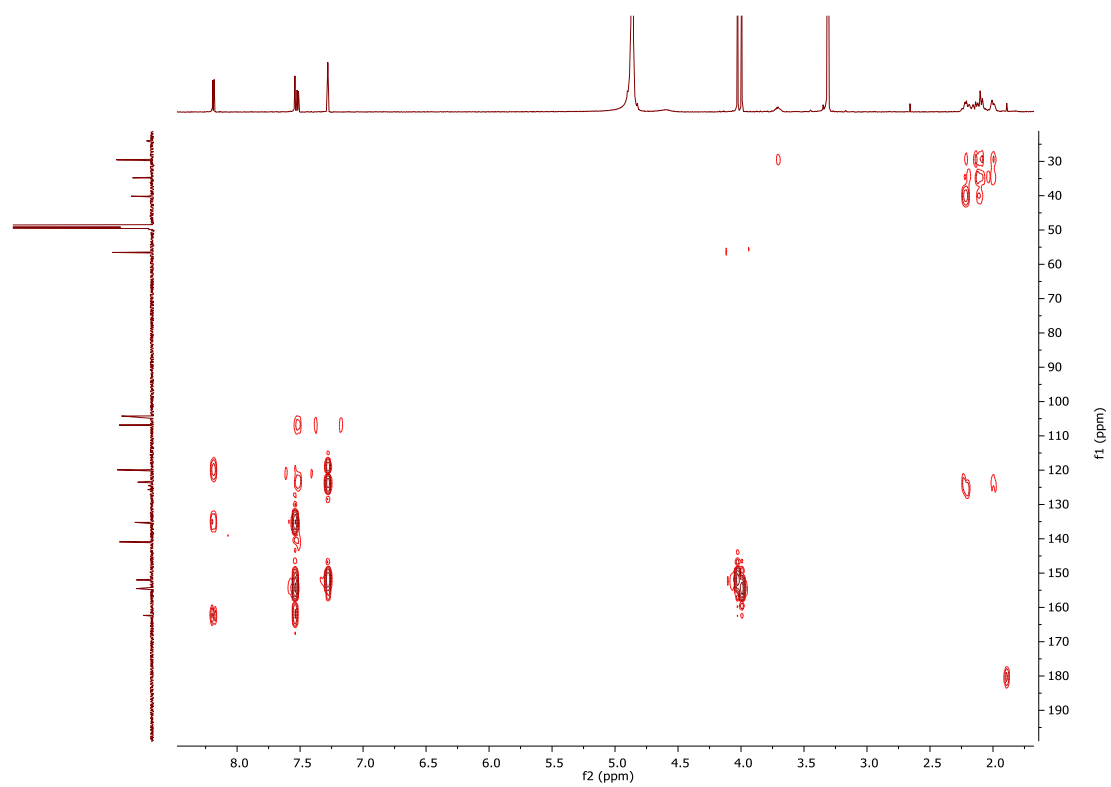
S58: COSY NMR Spectrum for Compound **11** in CD₃OD



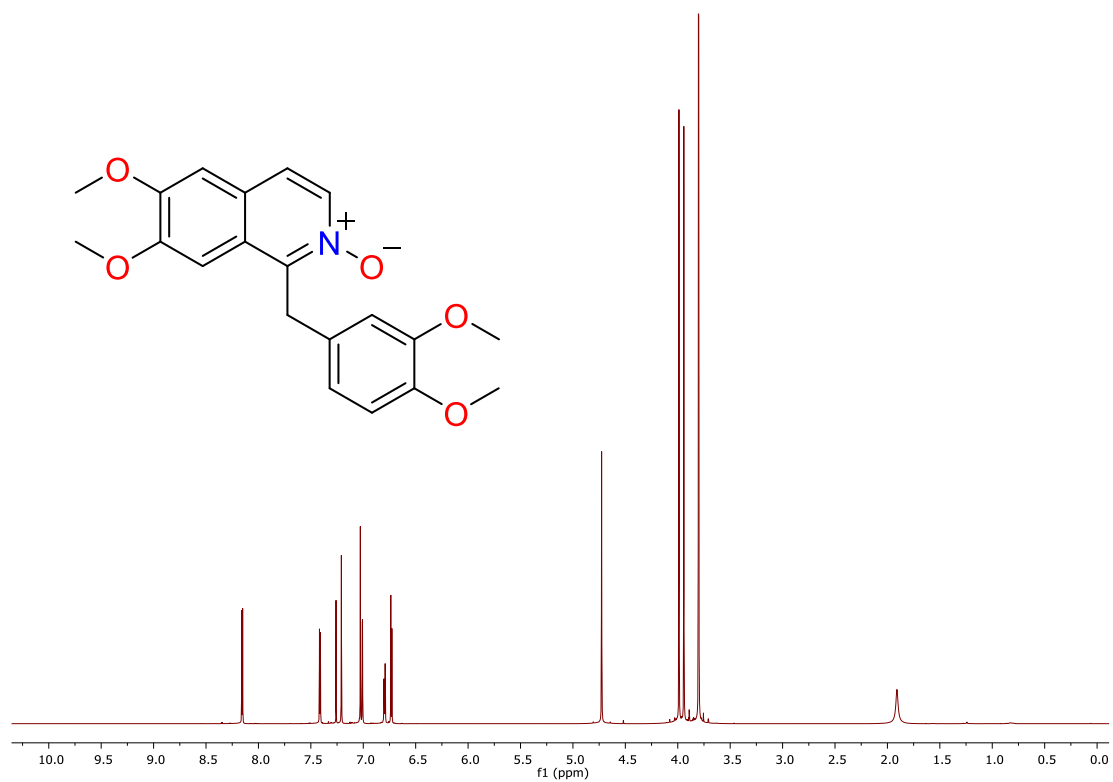
S59: HSQC NMR Spectrum for Compound **11** in CD₃OD



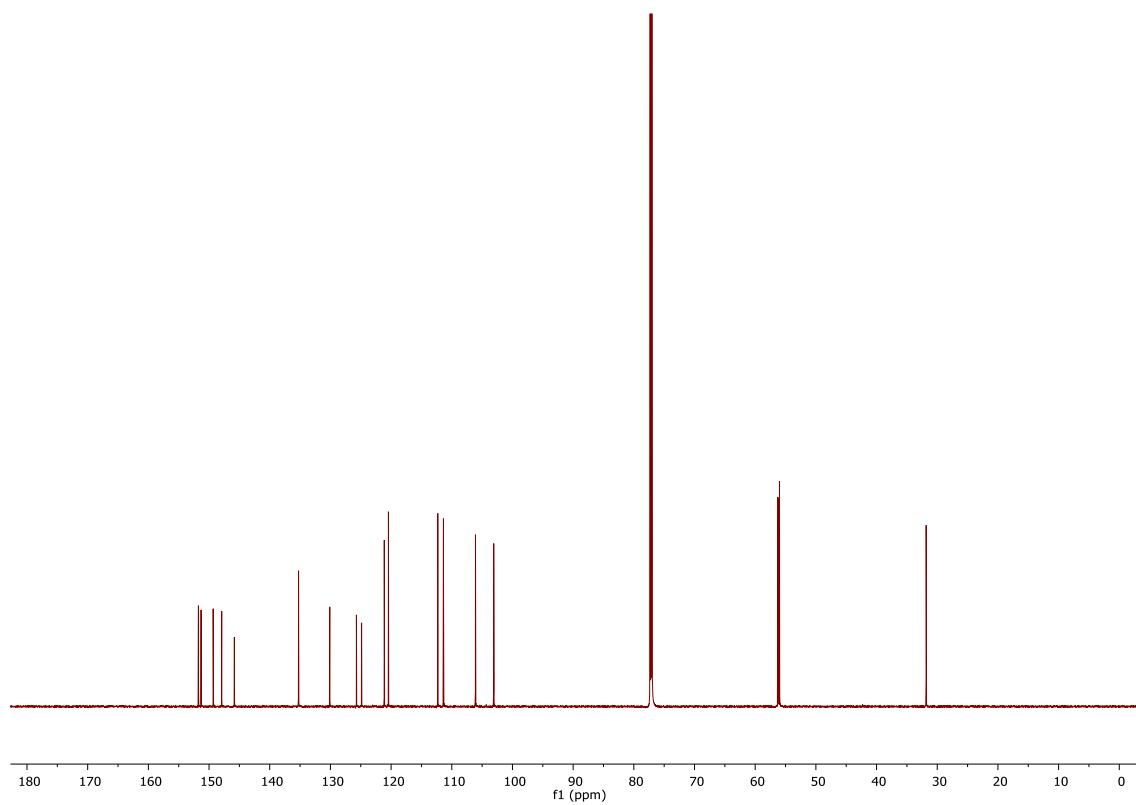
S60: HMBC NMR Spectrum for Compound **11** in CD₃OD



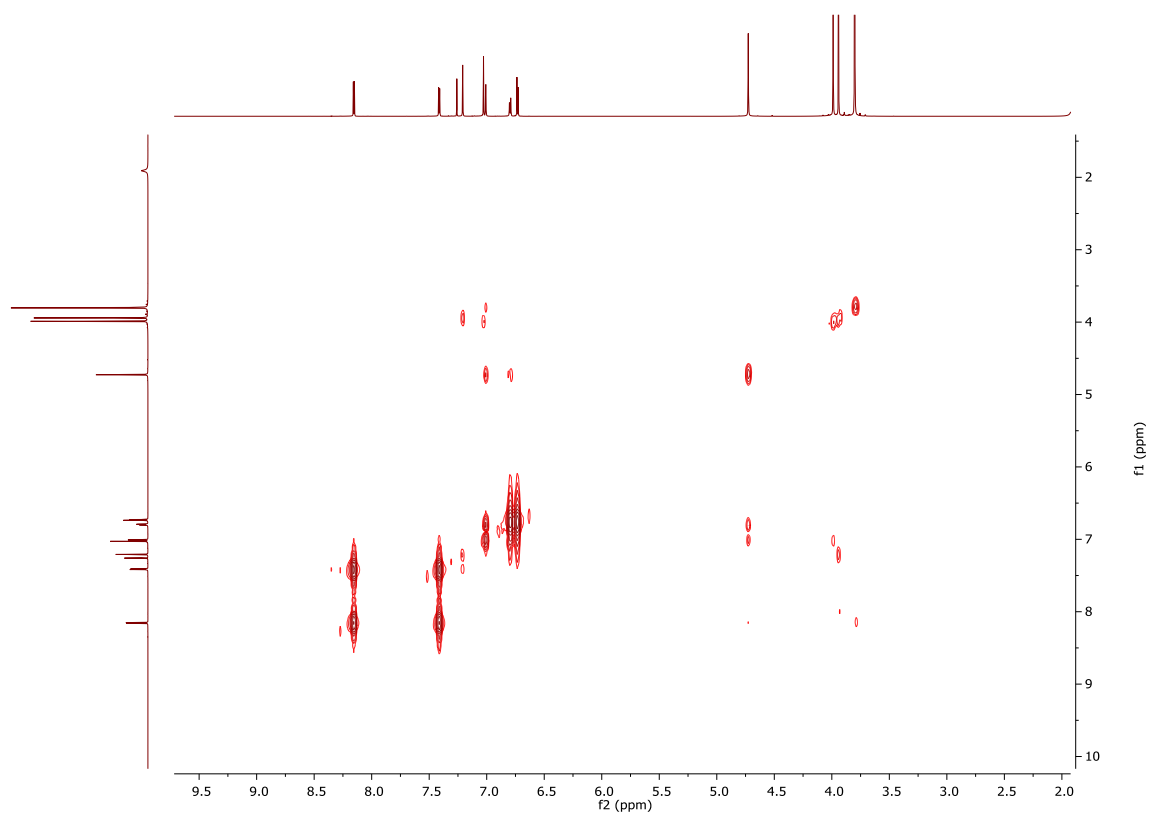
S61: ^1H NMR Spectrum for Compound **12** in CDCl_3



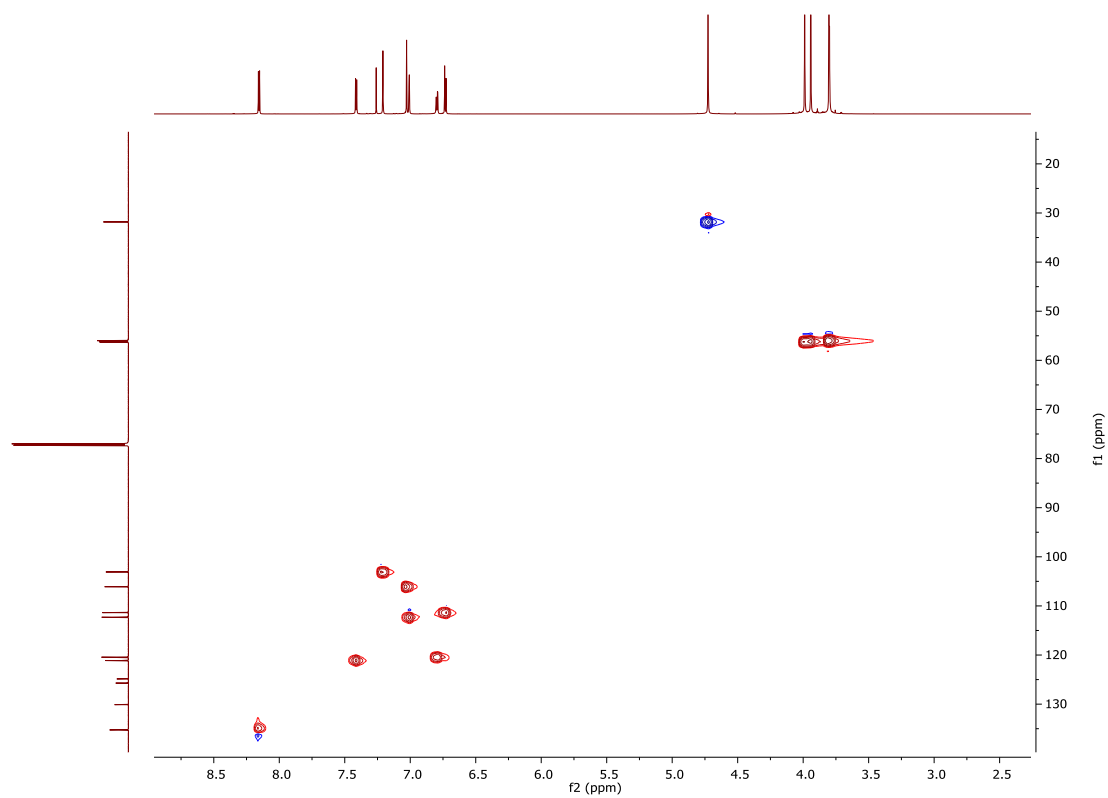
S62: ^{13}C NMR Spectrum for Compound **12** in CDCl_3



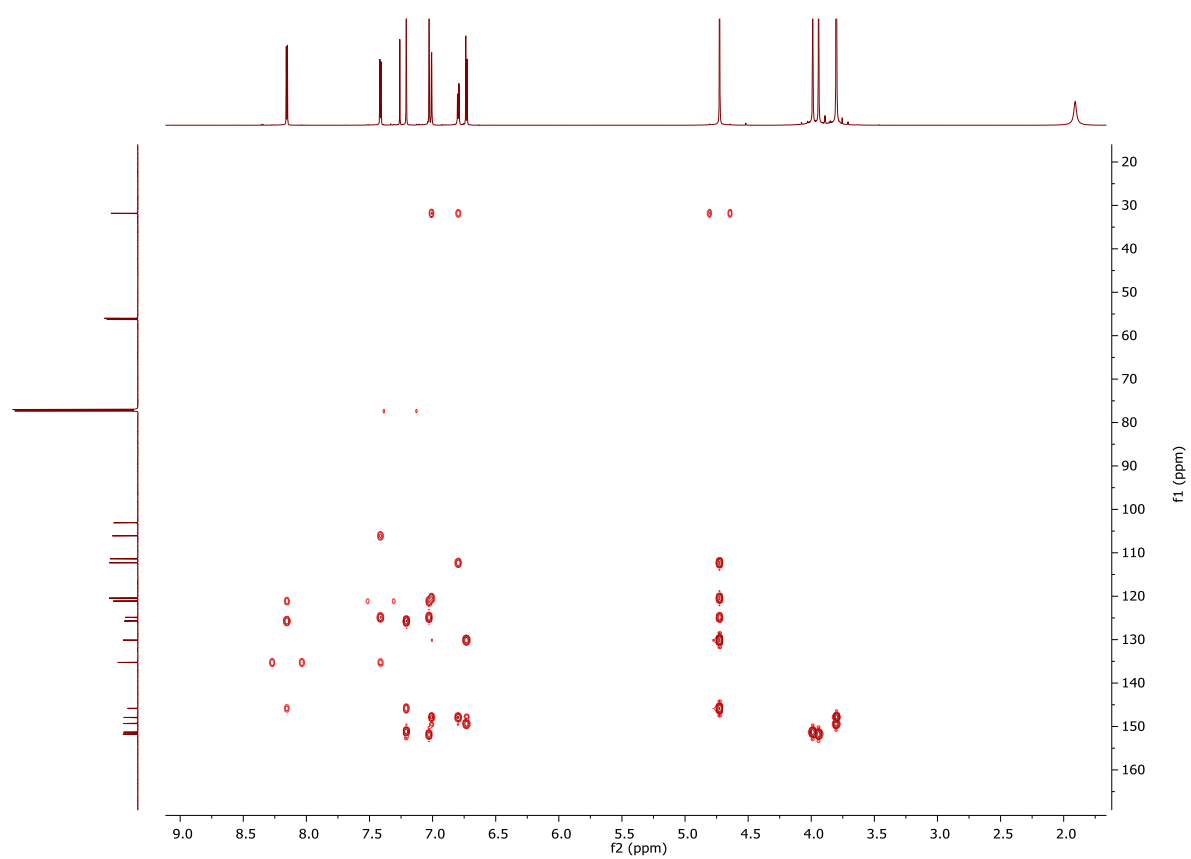
S63: COSY NMR Spectrum for Compound **12** in CDCl₃



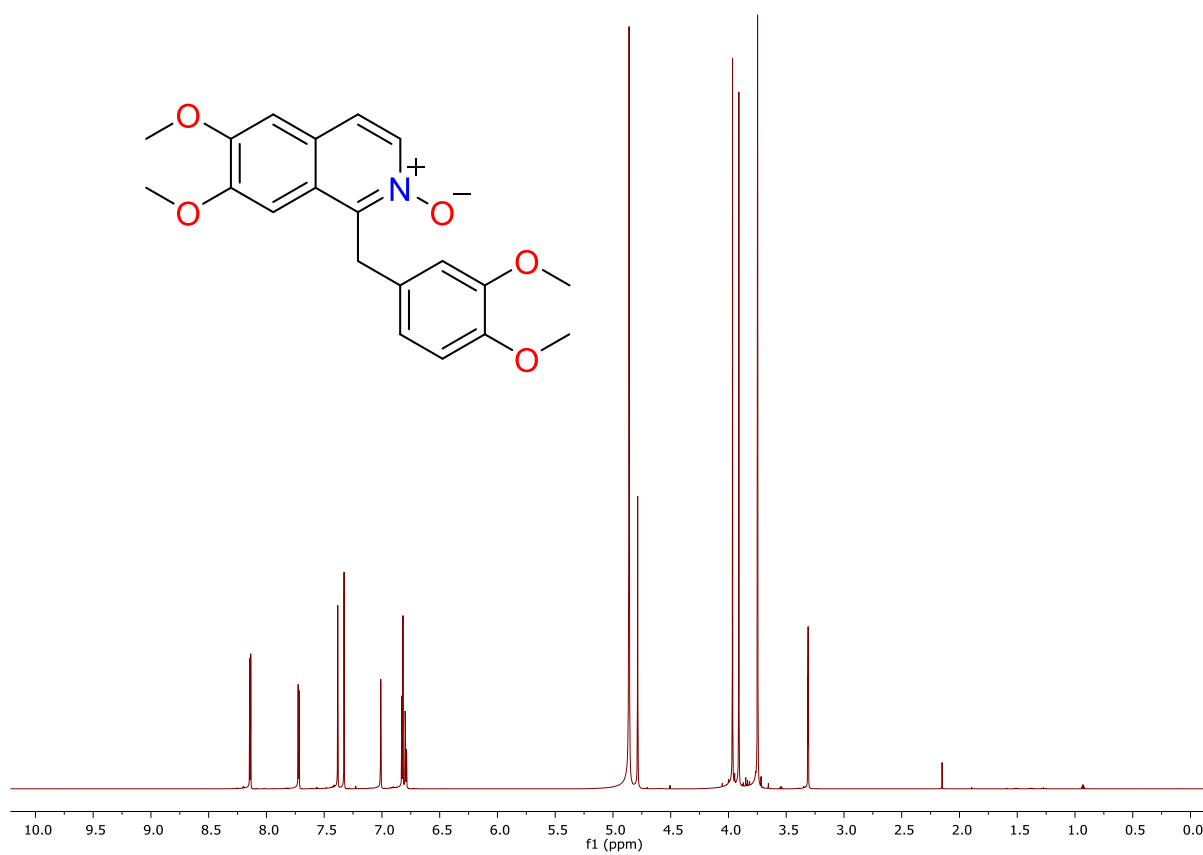
S64: HSQC NMR Spectrum for Compound **12** in CDCl₃



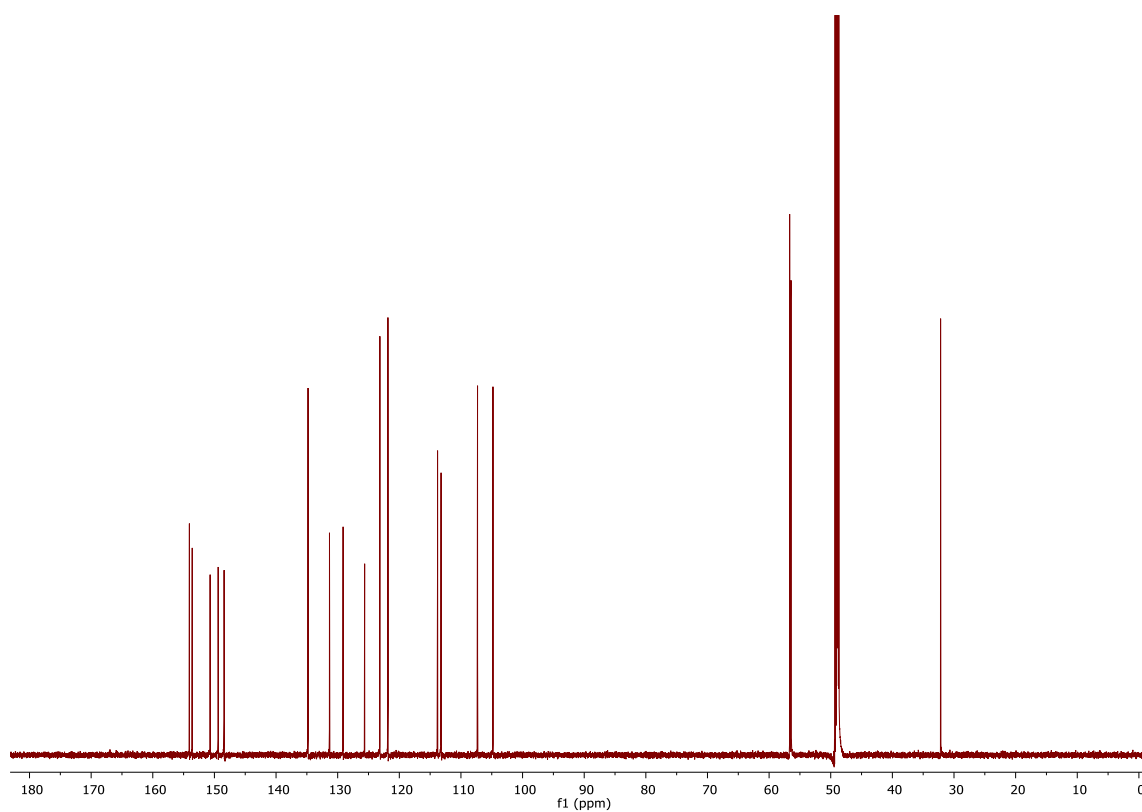
S65: HMBC NMR Spectrum for Compound **12** in CDCl₃



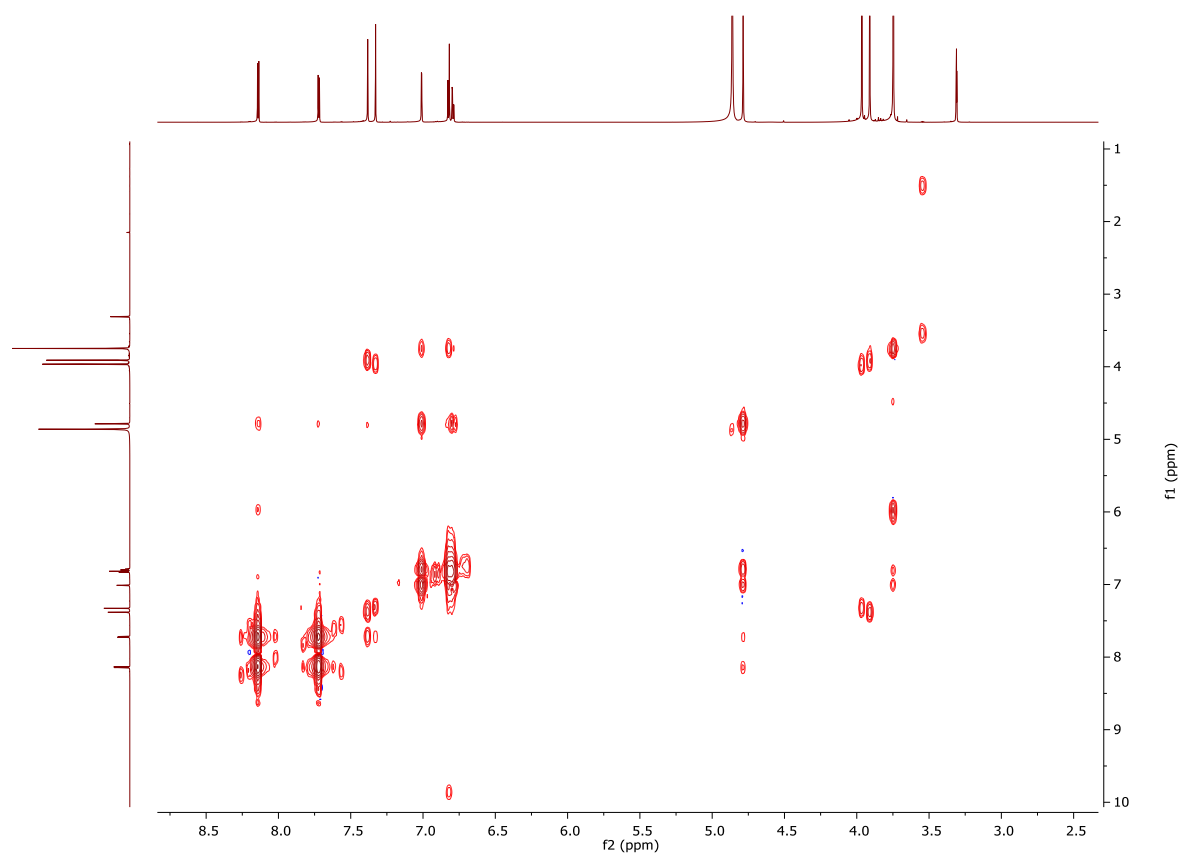
S66: ^1H NMR Spectrum for Compound **12** in CD_3OD



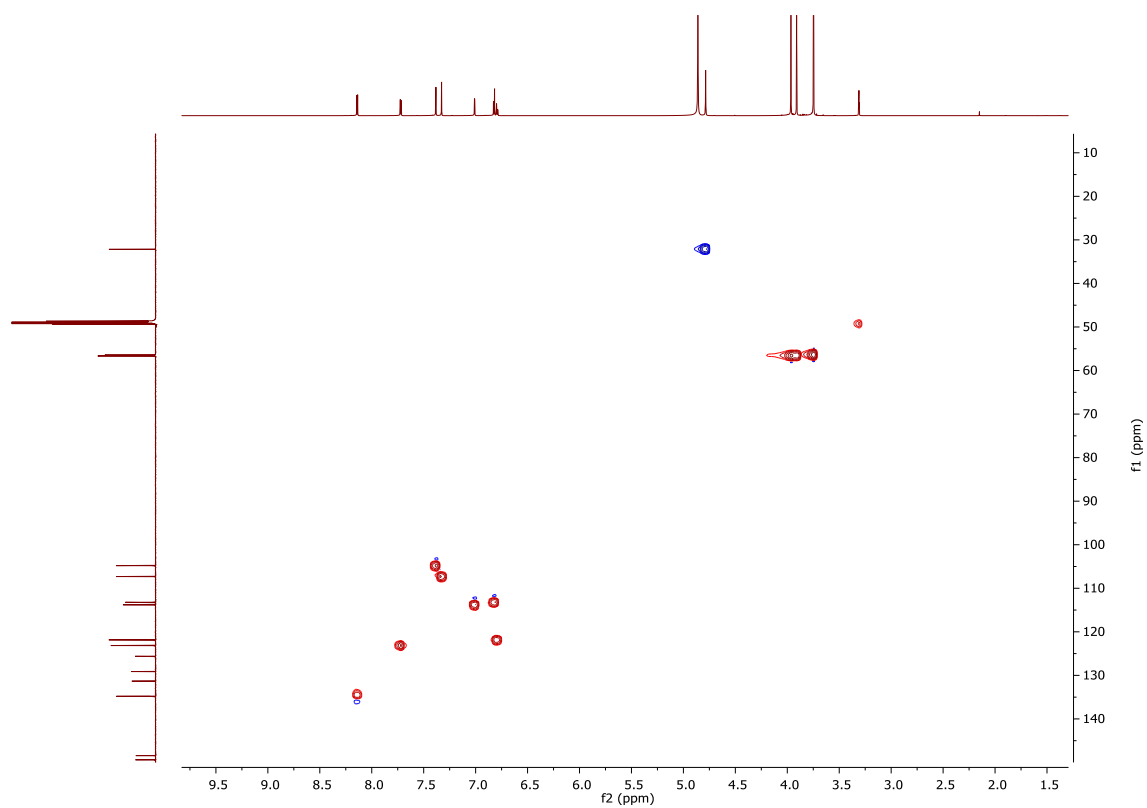
S67: ^{13}C NMR Spectrum for Compound **12** in CD_3OD



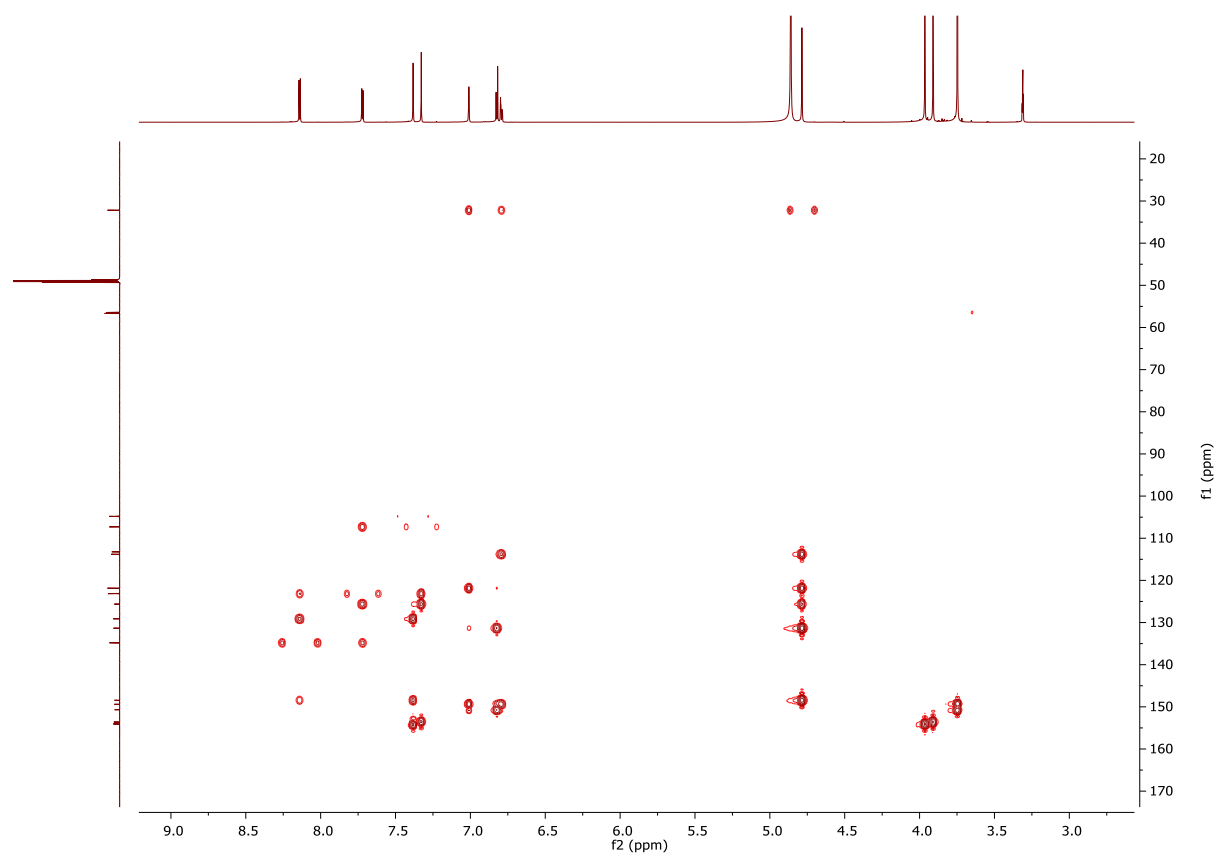
S68: COSY NMR Spectrum for Compound **12** in CD₃OD



S69: HSQC NMR Spectrum for Compound **12** in CD₃OD



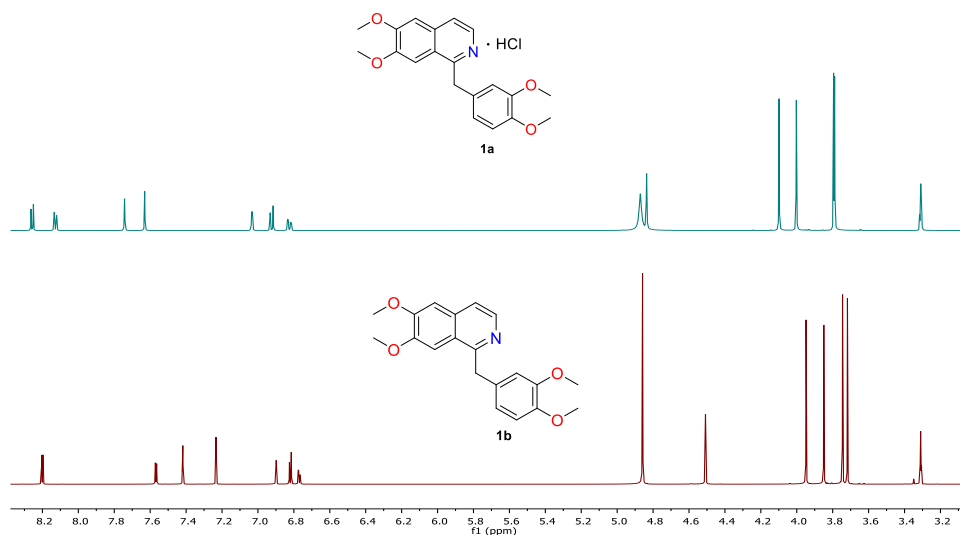
S70: HMBC NMR Spectrum for Compound **12** in CD₃OD



S71: Diversinate optimisation reactions with papaverine HCl (**1**) and the free-base of papaverine (**1b**)

Cmpd	Solvent	Eq. diversinate	Eq. TBHP	Time	% yield of 2	% of recovered starting material
1a	CH ₂ Cl ₂ /H ₂ O	3	3	16 h	15%	8%
1a	CH ₂ Cl ₂ /H ₂ O	6	6	16 h	24%	7%
1a	DMSO/H ₂ O	3	3	16 h	10%	5%
1a	DMSO/H ₂ O	6	6	16 h	11%	8%
1b	CH ₂ Cl ₂ /H ₂ O	6	6	16 h	15%	5%
1b	DMSO/H ₂ O	6	6	16 h	12%	7%
1b	CH ₂ Cl ₂ /TFA/H ₂ O	6	6	16 h	10%	9%
1b	DMSO/TFA/H ₂ O	6	6	16 h	9%	8%

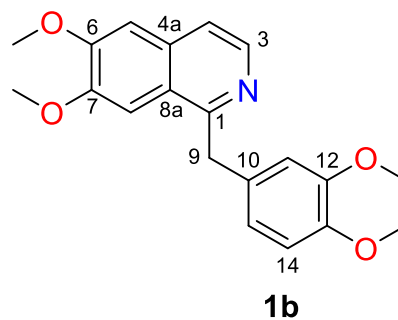
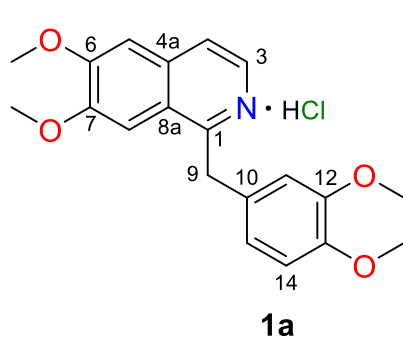
S72: Stacked ¹H NMR (800 MHz) spectra of the HCl salt (top) and free base (bottom) of papaverine in CD₃OD.



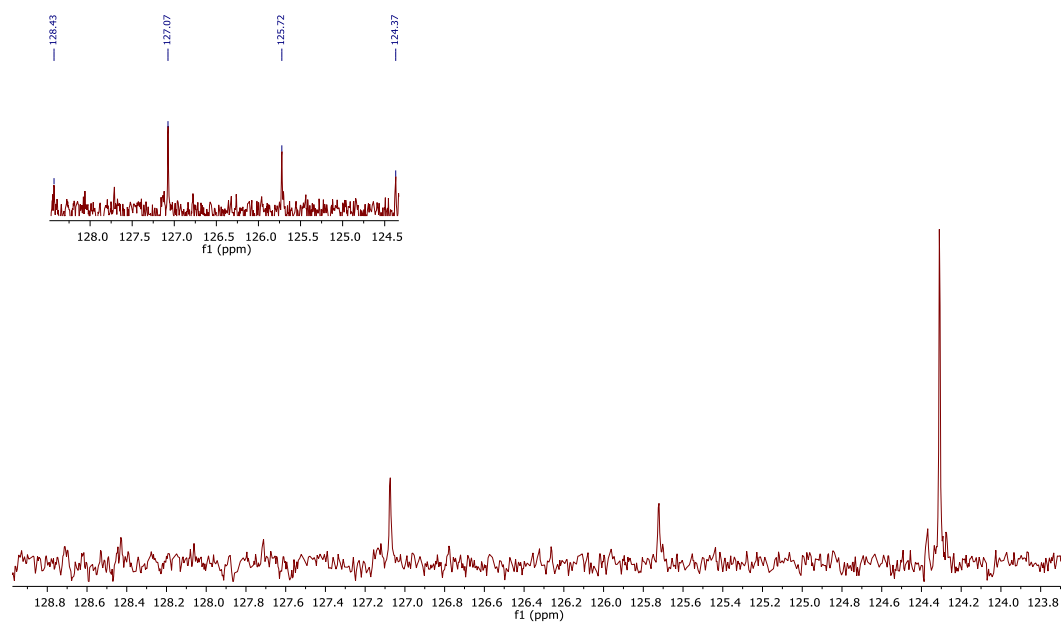
S73: ^1H (800 MHz) and ^{13}C (200 MHz) NMR data for papaverine HCl (**1a**) and the free base of papaverine (**1b**) in CD_3OD at 25 °C.

Position	HCl salt of papaverine (1a)		Free base of papaverine (1b)	
	δ_{C} , type	δ_{H} , mult. (J in Hz)	δ_{C} , type	δ_{H} , mult. (J in Hz)
1	155.8, C		159.1, C	
2				
3	130.4, CH	8.26, d, $J = 6.5$ Hz	140.5, CH	8.22, d, $J = 5.8$ Hz
4	123.3, CH	8.13, d, $J = 6.5$ Hz	120.5, CH	7.59, d, $J = 5.8$ Hz
4a	138.9, C		135.4, C	
5	107.5, CH	7.63, s	106.5, CH	7.25, s
6	159.2, C		154.6, C	
7	154.5, C		151.7, C	
8	106.2, CH	7.74, s	105.6, CH	7.44, s
8a	123.9, C		124.3, C	
9	37.8, CH_2	4.84, s	42.0, CH_2	4.53, s
6-OMe	57.4, CH_3	4.10, s	56.48, CH_3	3.97, s
7-OMe	57.1, CH_3	4.00, s	56.45, CH_3	3.87, s
12-OMe	56.5*, CH_3	3.79, s	56.36, CH_3	3.74, s
13-OMe	56.6*, CH_3	3.79, s	56.39, CH_3	3.77, s
10	129.1, C		133.6, C	
11	113.9, CH	7.03, d, $J = 2.1$ Hz	113.6, CH	6.92, d, $J = 2.0$ Hz
12	151.1, C		150.6, C	
13	150.3, C		149.1, C	
14	113.5, CH	6.92, d, $J = 8.3$ Hz	113.2, CH	6.84, d, $J = 8.3$ Hz
15	122.4, CH	6.83, dd, $J = 8.3, 2.1$ Hz	121.9, CH	6.79, dd, $J = 8.3, 2.0$ Hz

*interchangeable signals.



S74: Expansion of ^{13}C NMR spectrum of compound **2** showing the quartet of the CF_3 group.



S75: Expansion of HMBC spectrum of compound **3**.

