

# Biocatalytic Syntheses of Antiplatelet Metabolites of the Thienopyridines Clopidogrel and Prasugrel Using Fungal Peroxygenases

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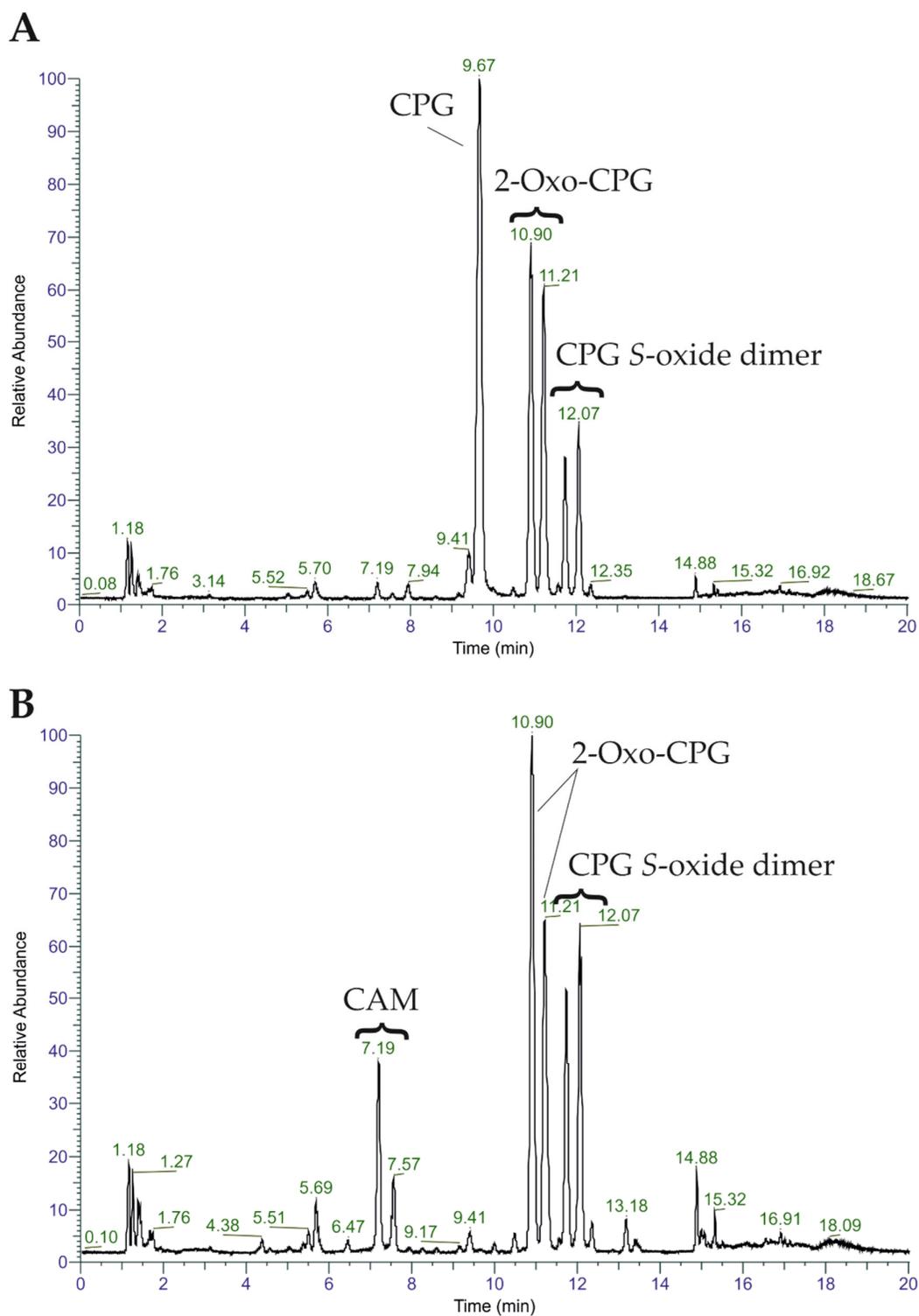
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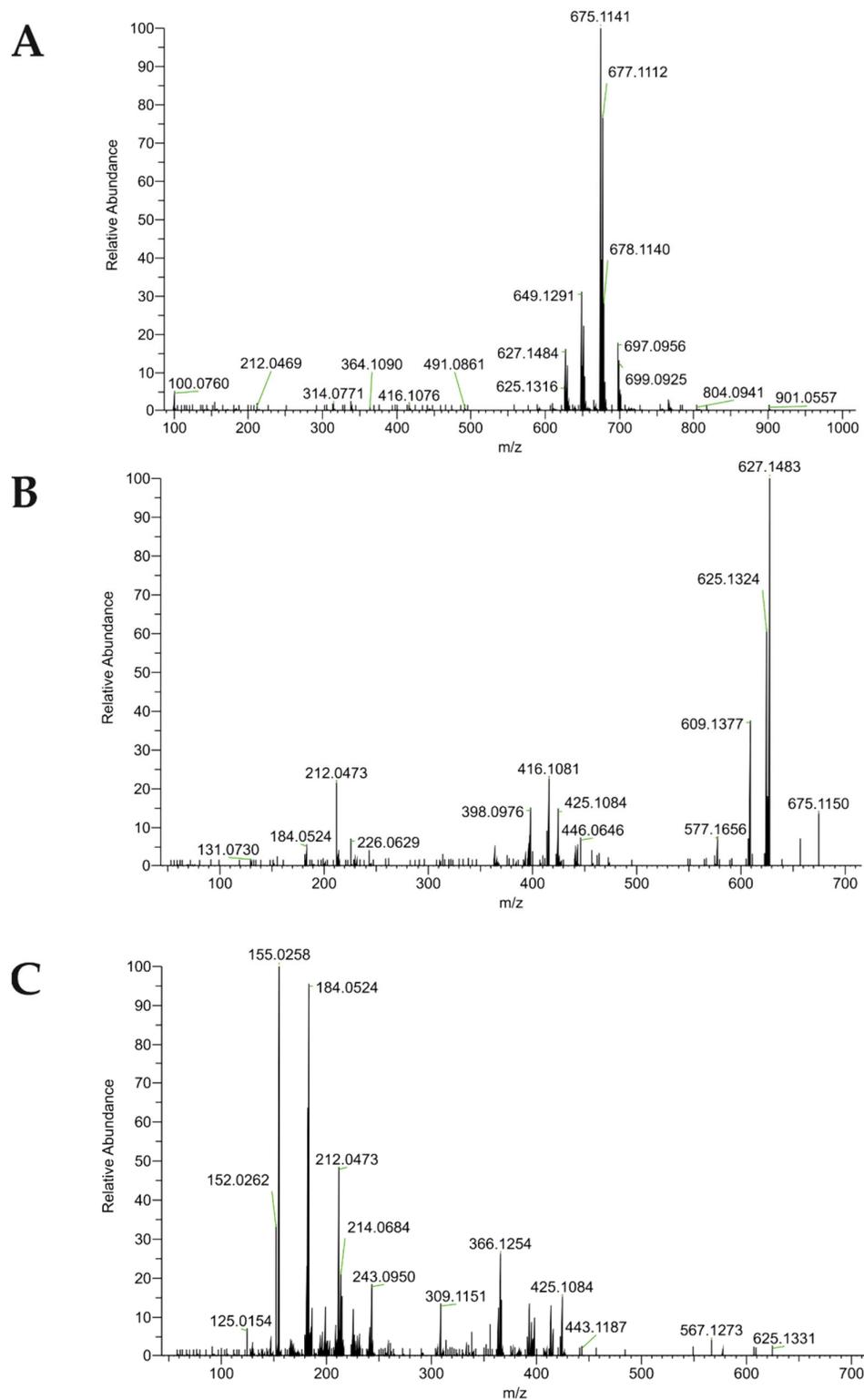
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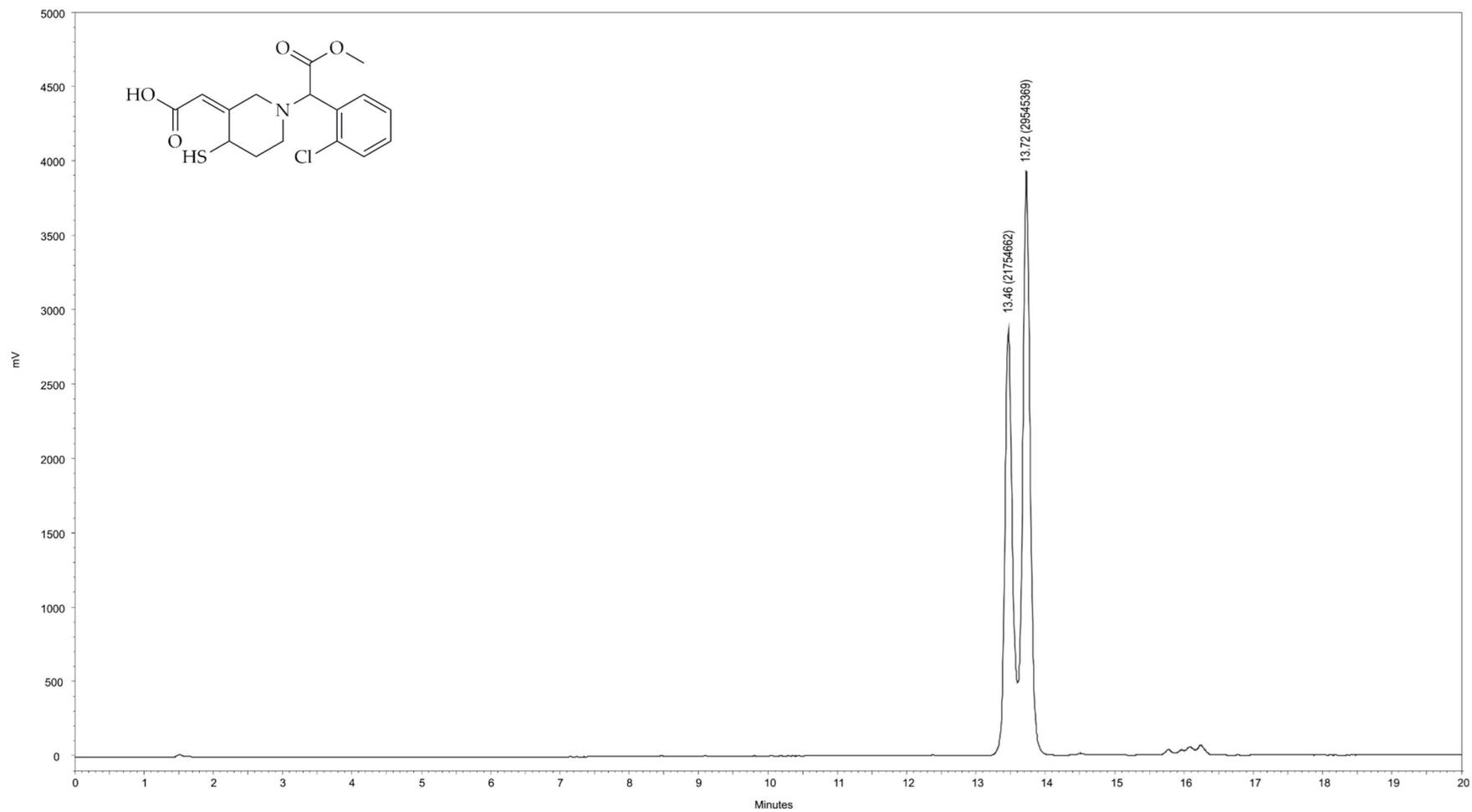
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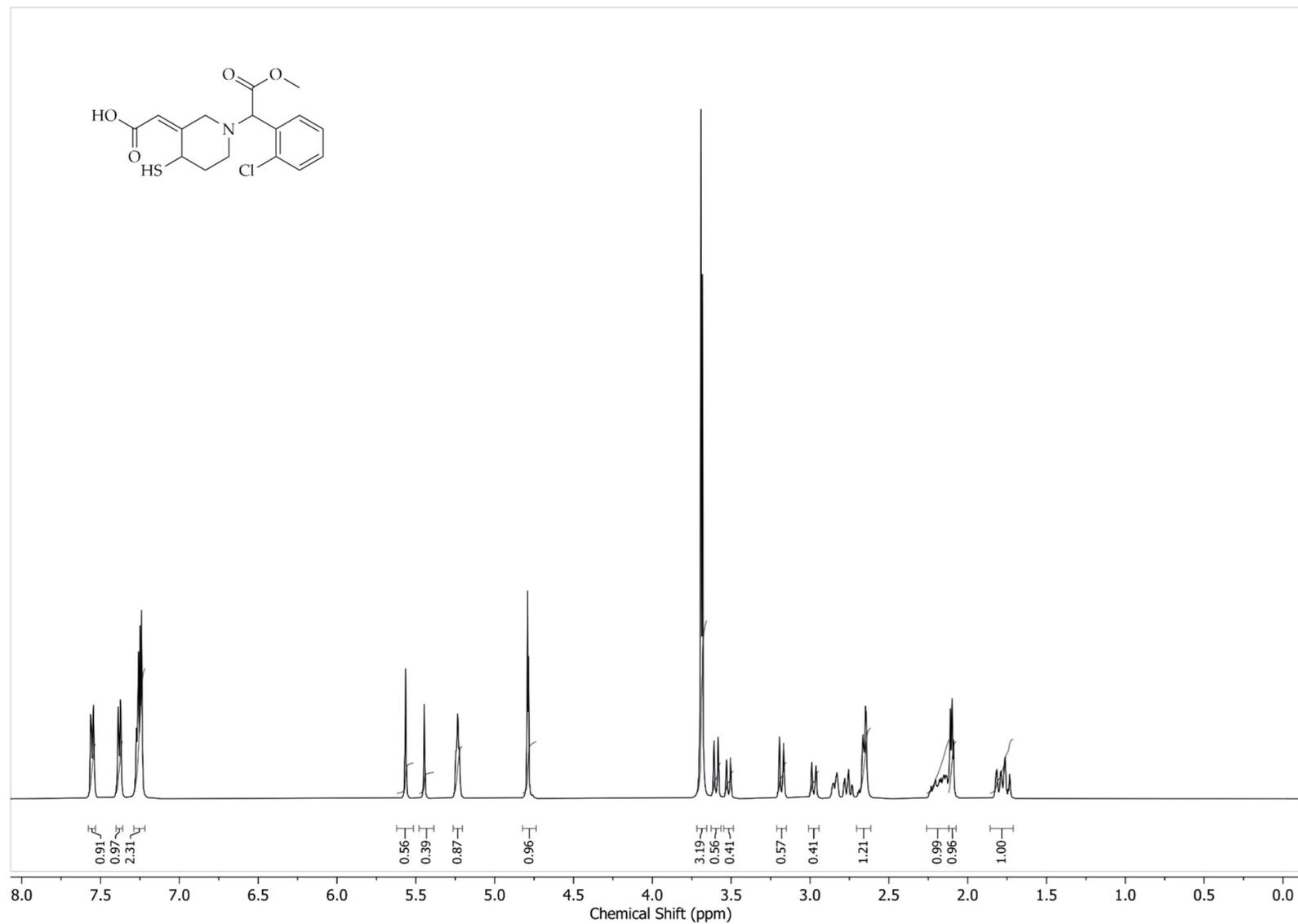
**Figure S1.** LC-MS chromatogram (FullMS) of clopidogrel conversion with *MroUPO* after 30 min (A) and 75 min (B).



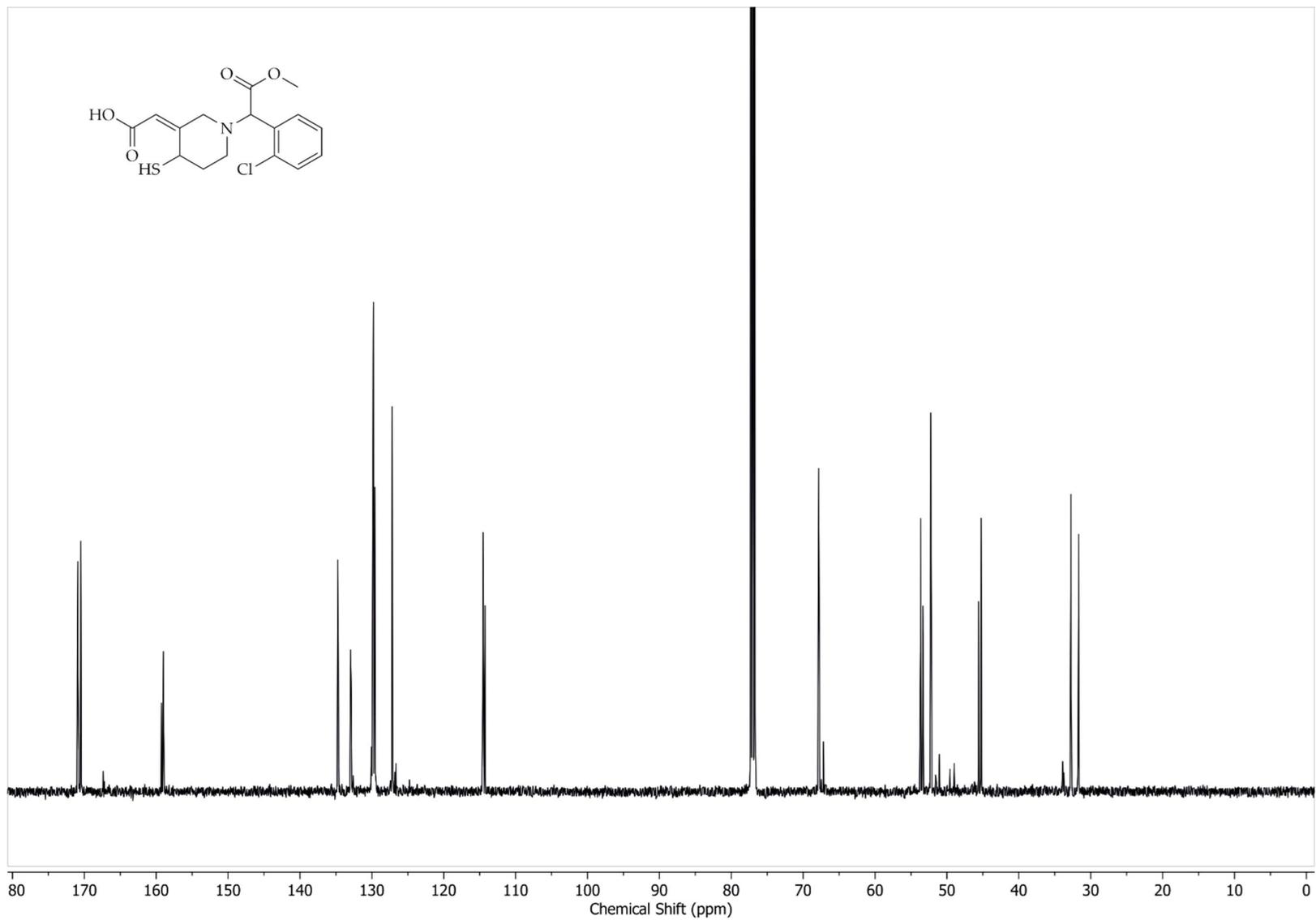
**Figure S2.** MS<sup>1</sup> and MS<sup>2</sup> spectra of CPG S-oxide dimer. (A) MS<sup>1</sup> spectra (B) MS<sup>2</sup> spectra of C<sub>32</sub>H<sub>33</sub>Cl<sub>2</sub>N<sub>2</sub>O<sub>6</sub>S<sub>2</sub><sup>+</sup> (*m/z* 675.1152) with collision energy CE25 and (C) MS<sup>2</sup> spectra of C<sub>32</sub>H<sub>33</sub>Cl<sub>2</sub>N<sub>2</sub>O<sub>6</sub>S<sub>2</sub><sup>+</sup> (*m/z* 675.1152) with collision energy CE50.



**Figure S3.** HPLC-ELSD chromatogram of isolated isomers of clopidogrel active metabolite (CAM).



**Figure S4.** <sup>1</sup>H NMR spectrum of isolated isomers of clopidogrel active metabolite (CAM).



**Figure S5.** <sup>13</sup>C NMR spectrum of isolated isomers of clopidogrel active metabolite (CAM).

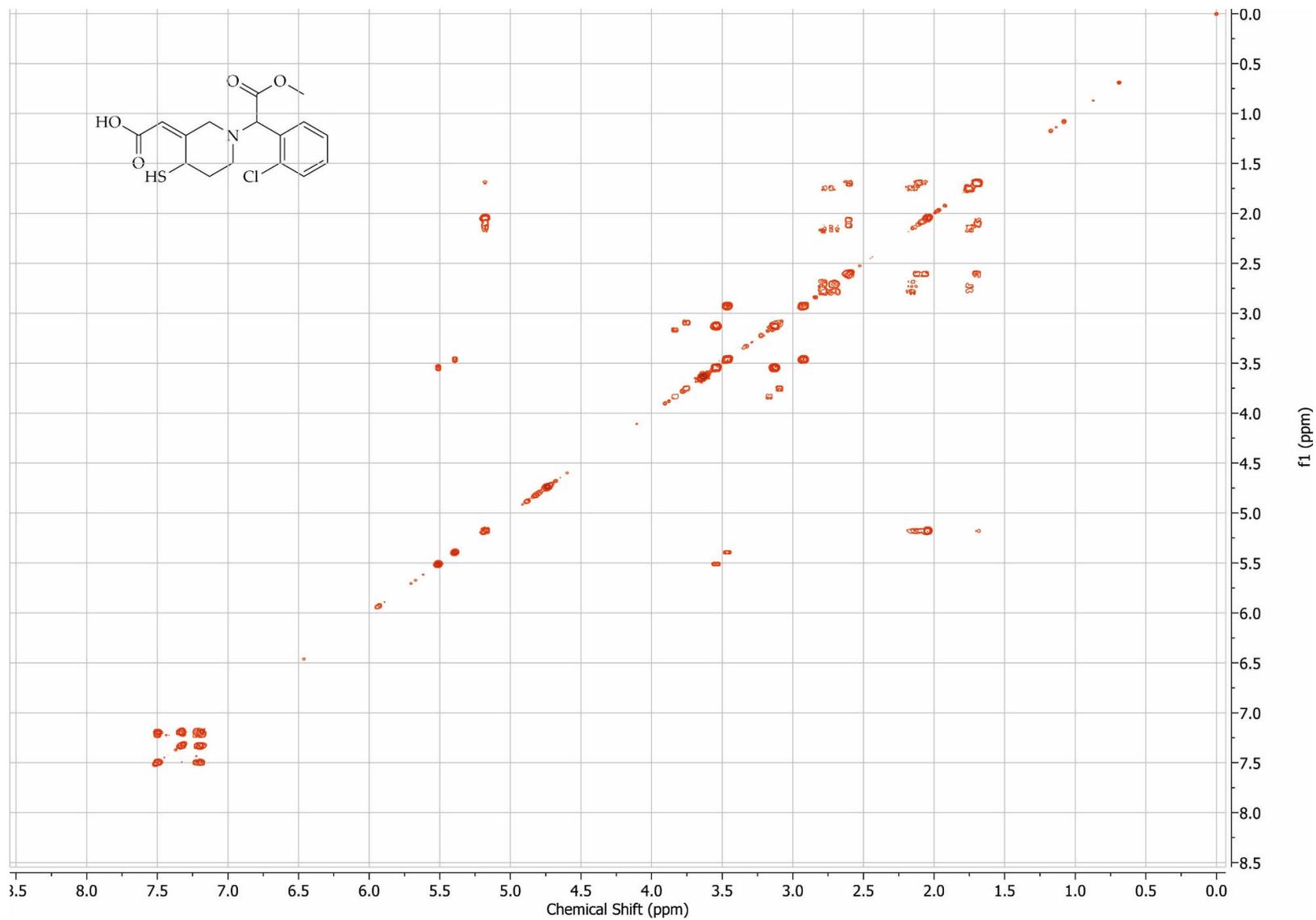


Figure S6. COSY spectrum of isolated isomers of clopidogrel active metabolite (CAM).

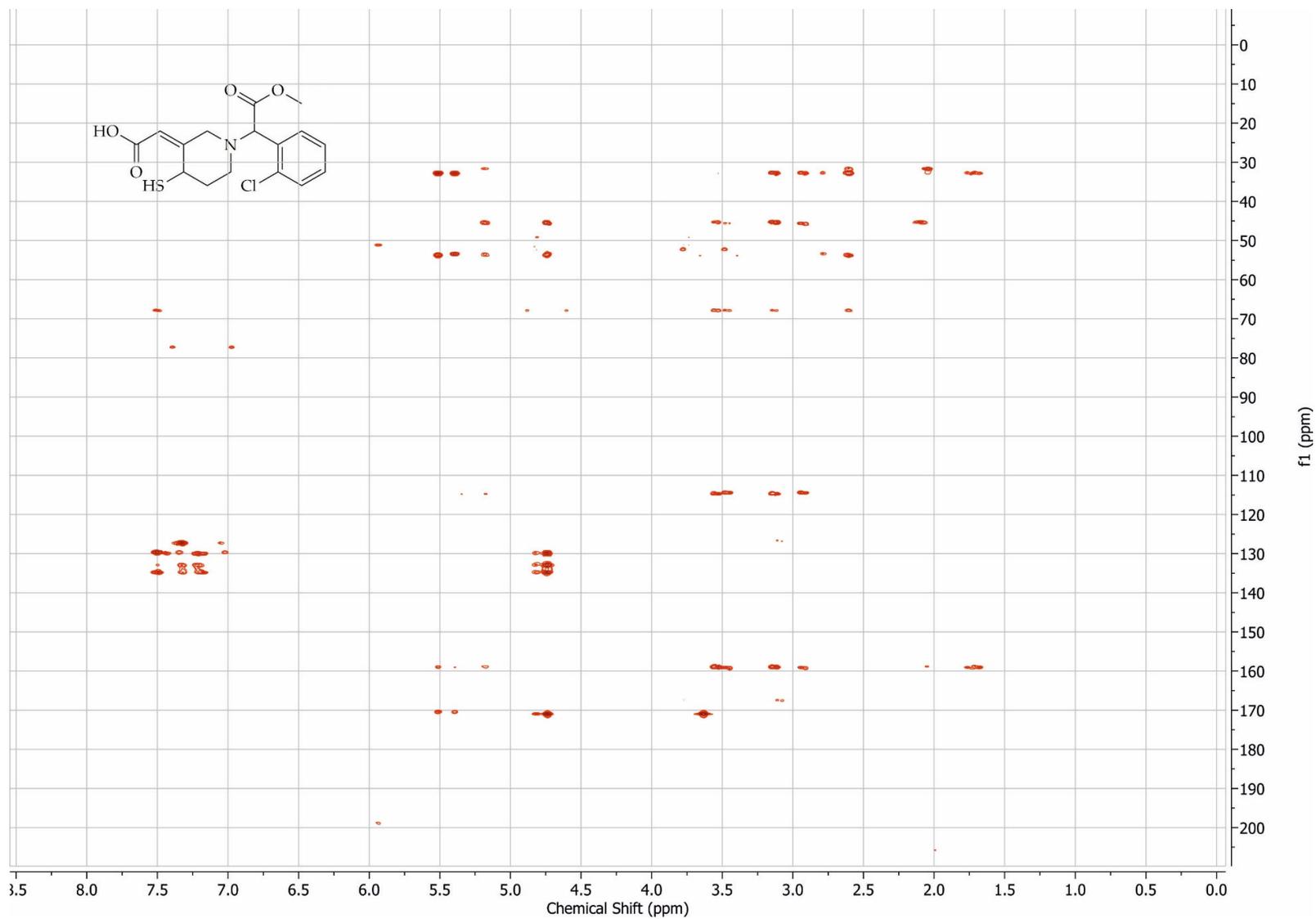


Figure S7. HMBC spectrum of isolated isomers of clopidogrel active metabolite (CAM).

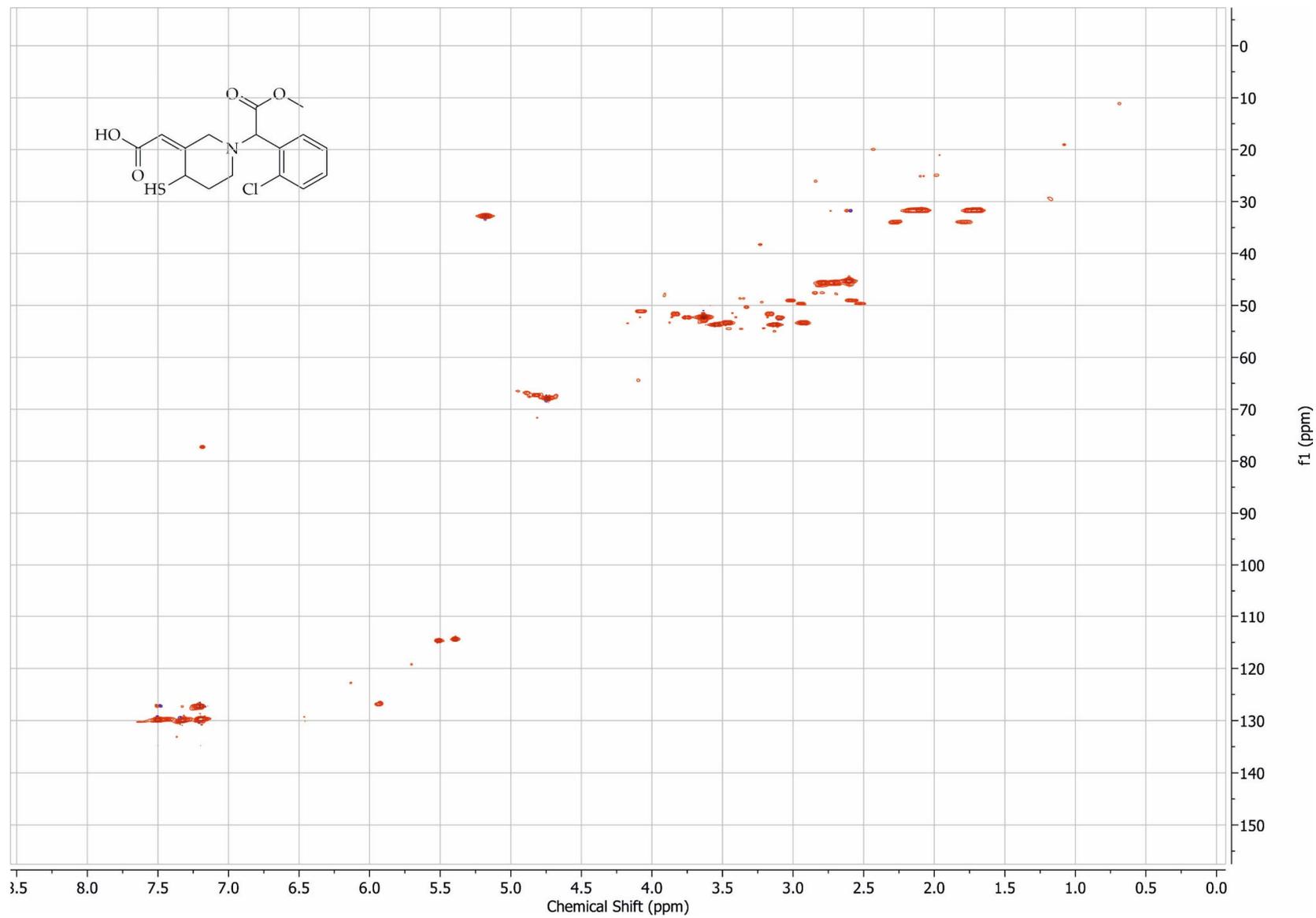
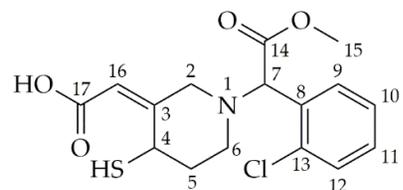


Figure S8. HSQC spectrum of isolated isomers of clopidogrel active metabolite (CAM).

**Table S1.** Assignment of  $^1\text{H}$  and  $^{13}\text{C}$  NMR signals to the isomers of clopidogrel active metabolite (CAM).



Carbon	$\delta$ $^1\text{H}$ $\text{CDCl}_3$ Isomer a (H4)	$\delta$ $^{13}\text{C}$ $\text{CDCl}_3$ Isomer a (H4)	$\delta$ $^1\text{H}$ $\text{CDCl}_3$ Isomer b (H3)	$\delta$ $^{13}\text{C}$ $\text{CDCl}_3$ Isomer b (H3)
2	3.60 ; 3.18	53.67	3.52 ; 2.98	53.35
3	-	159.00	-	159.26
4	5.23	32.75	5.23	32.78
5	2.15 ; 1.75	31.68	2.20 ; 1.80	31.74
6	2.66 ; 2.65	45.24	2.84 ; 2.76	45.59
7	4.79	67.84	4.79	67.80
8	-	134.67	-	134.75
9	7.38	129.89	7.38	130.07
10	7.26	127.17	7.26	127.21
11	7.24	129.58	7.24	129.61
12	7.55	129.74	7.55	129.74
13	-	132.95	-	132.84
14	-	170.90	-	170.94
15	3.69	52.26	3.69	52.21
16	5.56	114.53	5.45	114.24
17	-	170.49	-	170.49
-SH	2.10	-	2.10	-

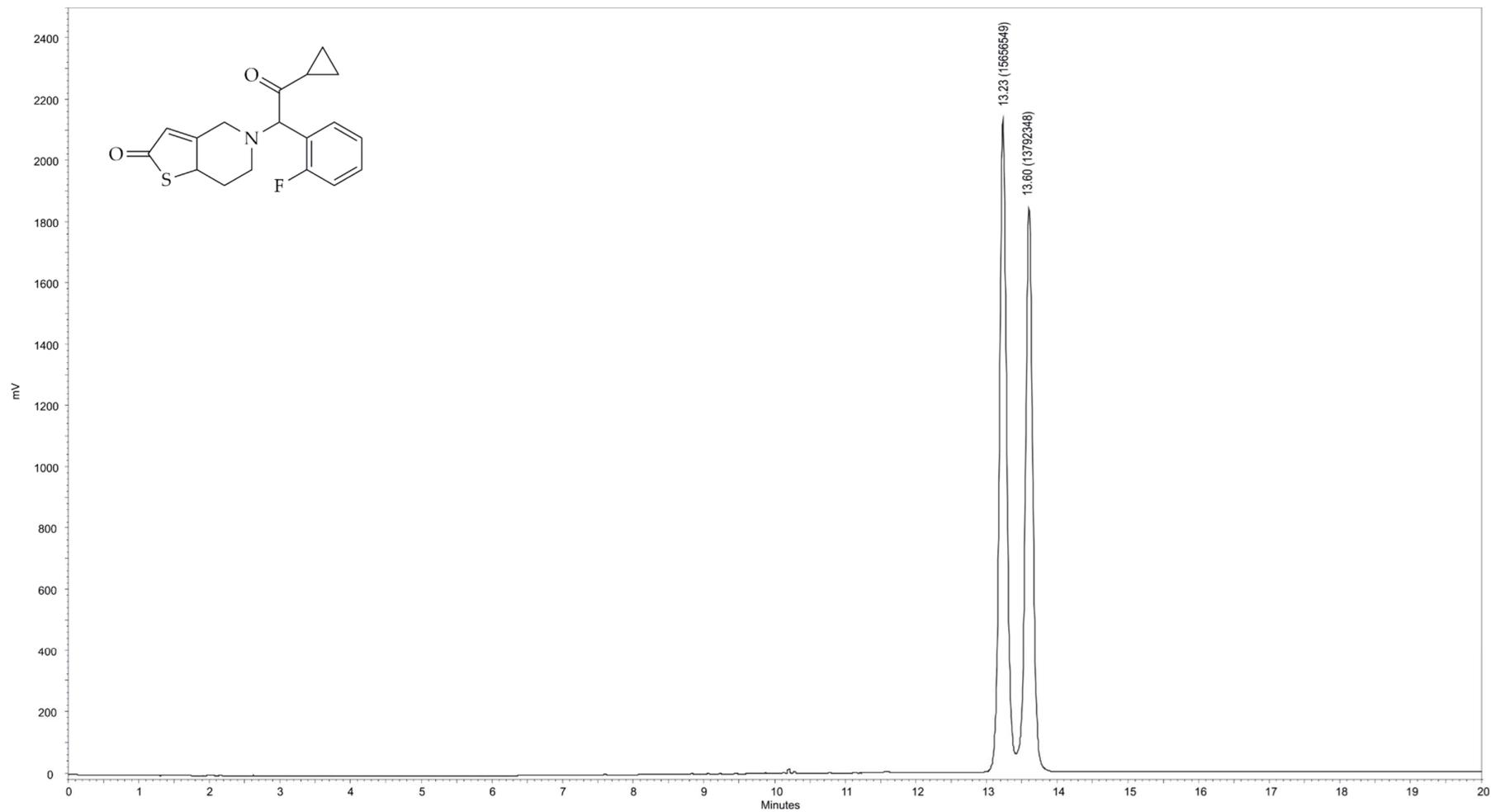
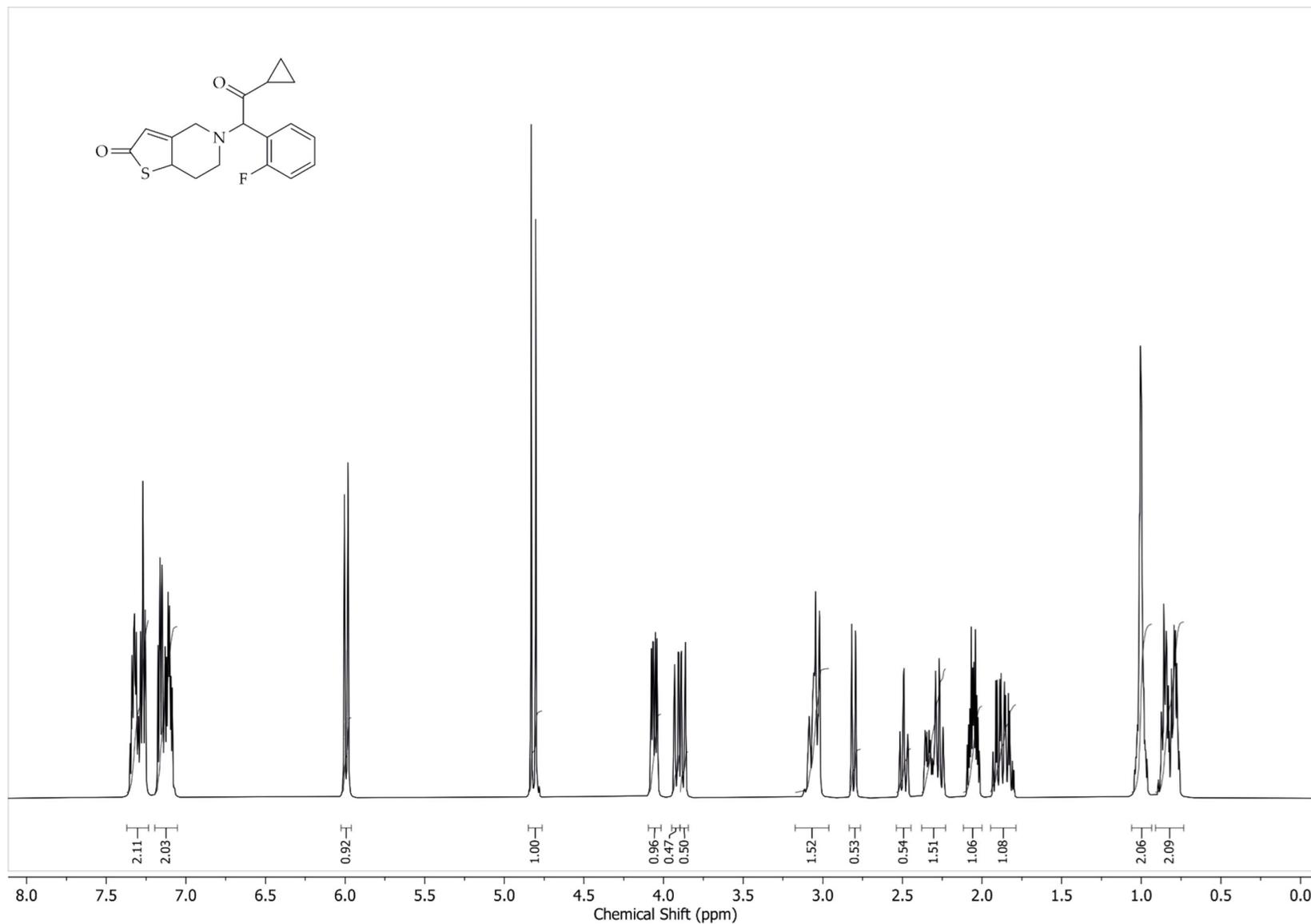


Figure S9. HPLC-ELSD chromatogram of isolated isomers of 2-oxo-prasugrel.



**Figure S10.** <sup>1</sup>H NMR spectrum of isolated isomers of 2-oxo-prasugrel.

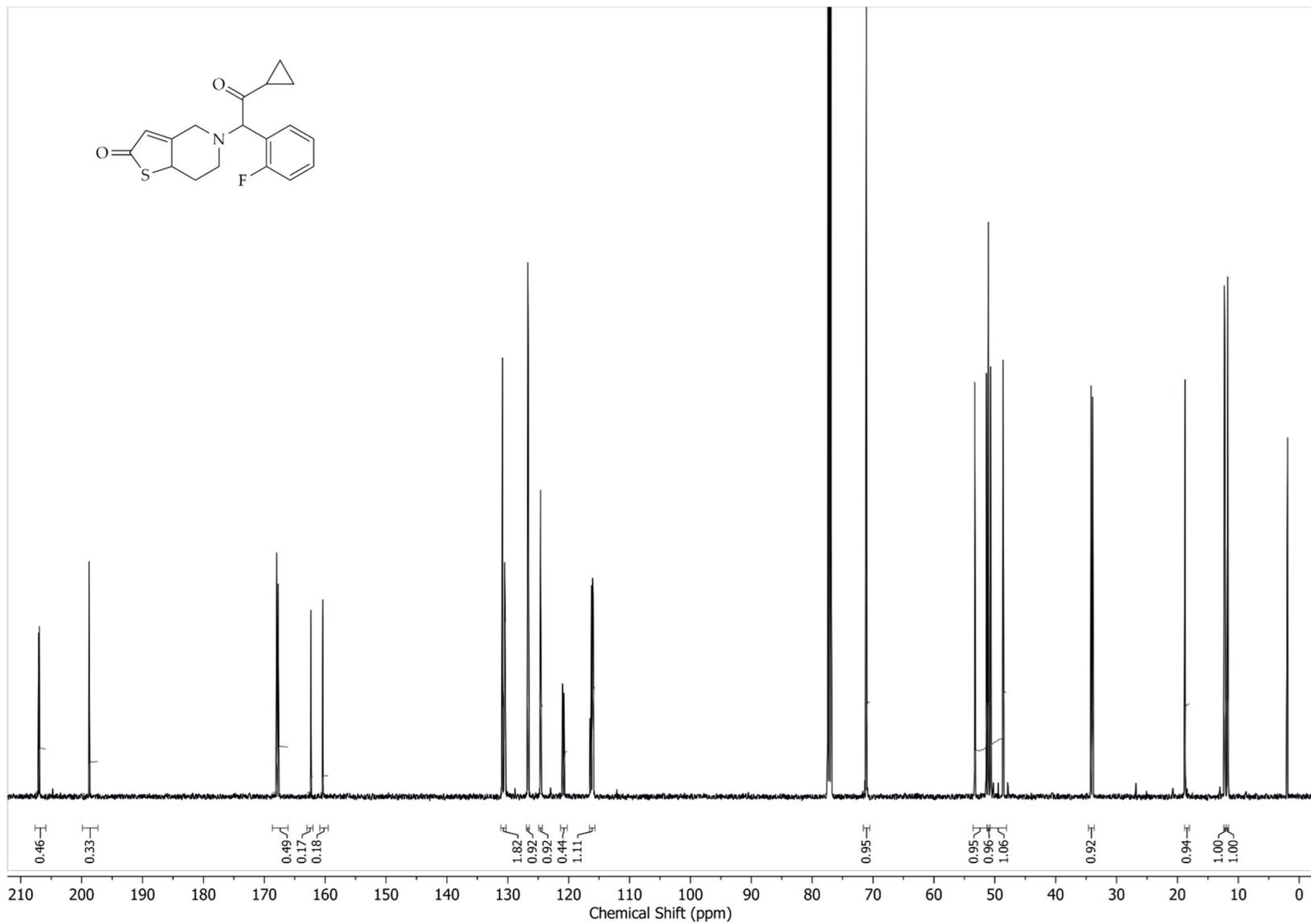


Figure S11. <sup>13</sup>C NMR spectrum of isolated isomers of 2-oxo-prasugrel.

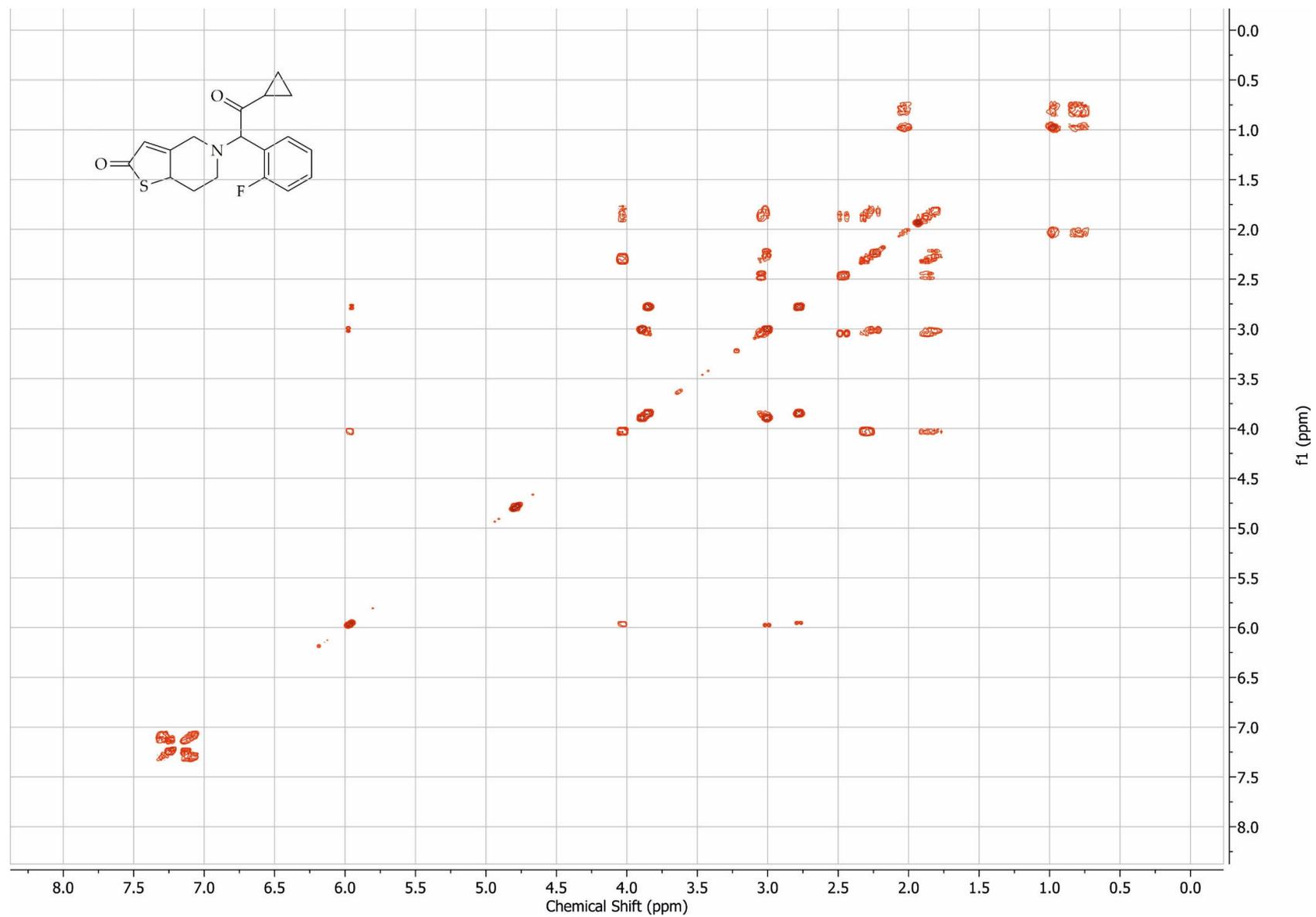


Figure S12. COSY spectrum of isolated isomers of 2-oxo-prasugrel.

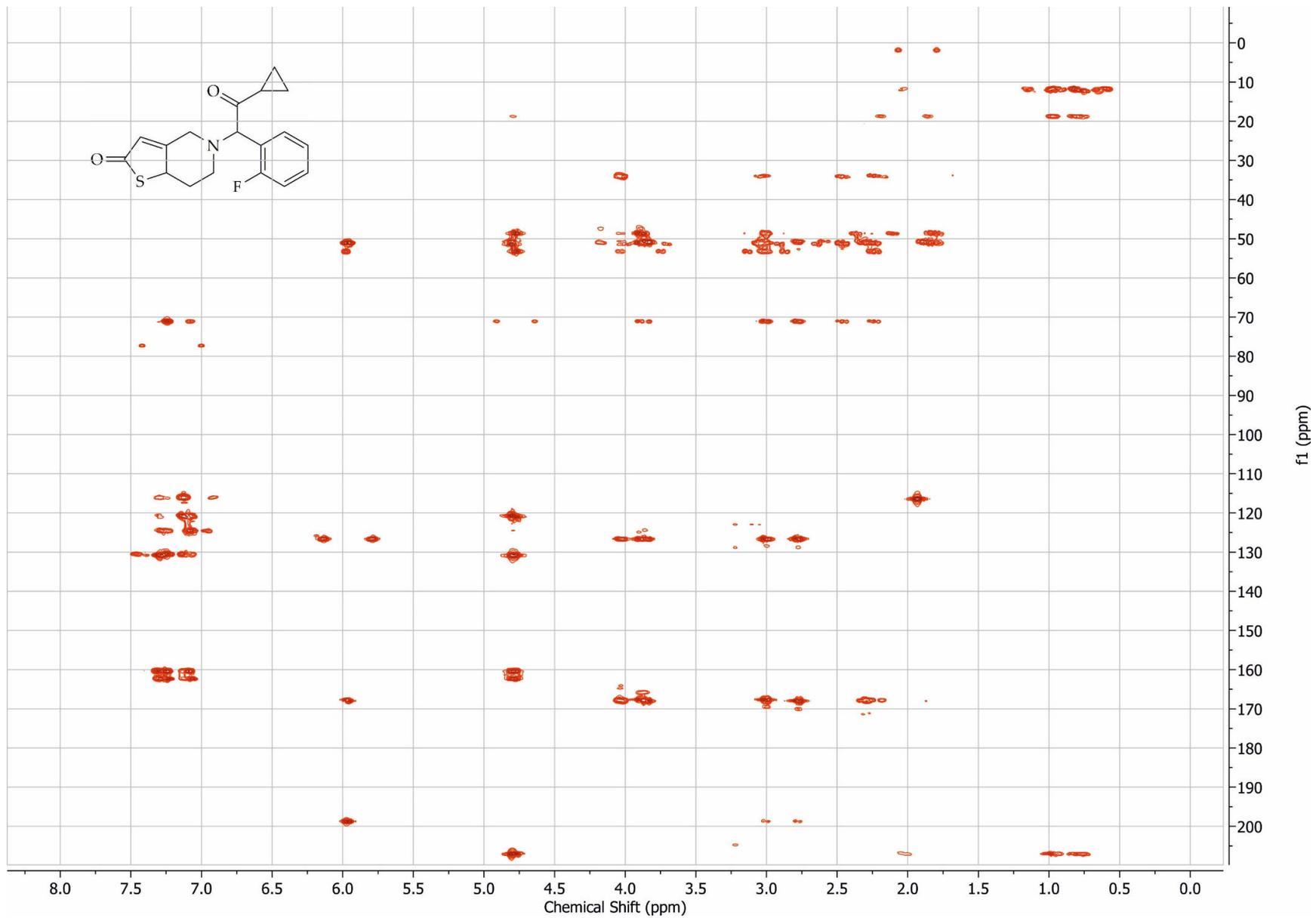


Figure S13. HMBC spectrum of isolated isomers of 2-oxo-prasugrel.

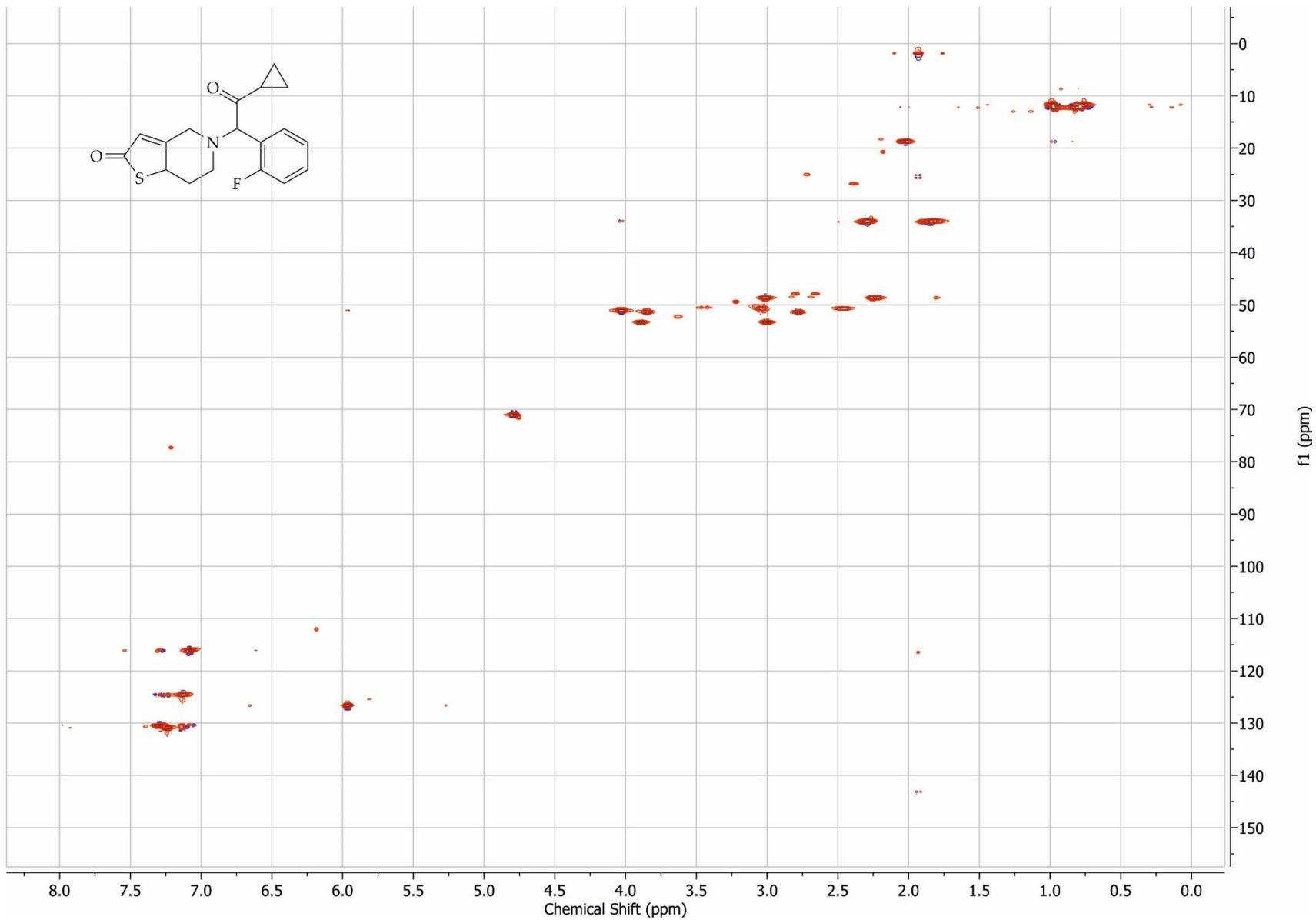
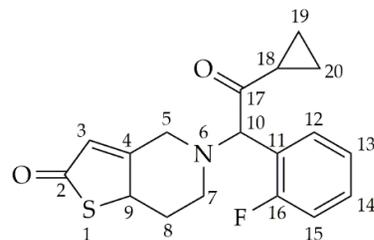
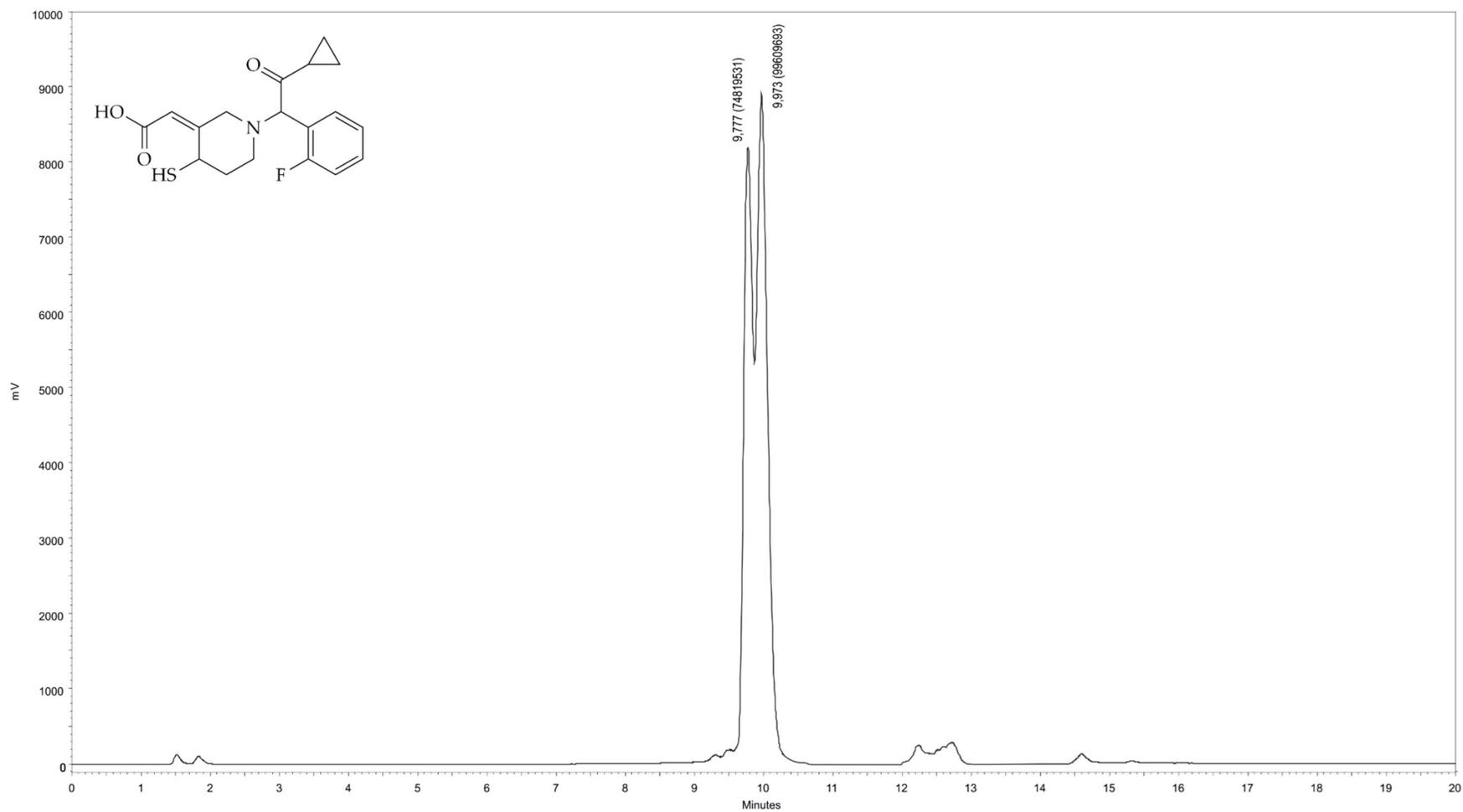


Figure S14. HSQC spectrum of isolated isomers of 2-oxo-prasugrel.

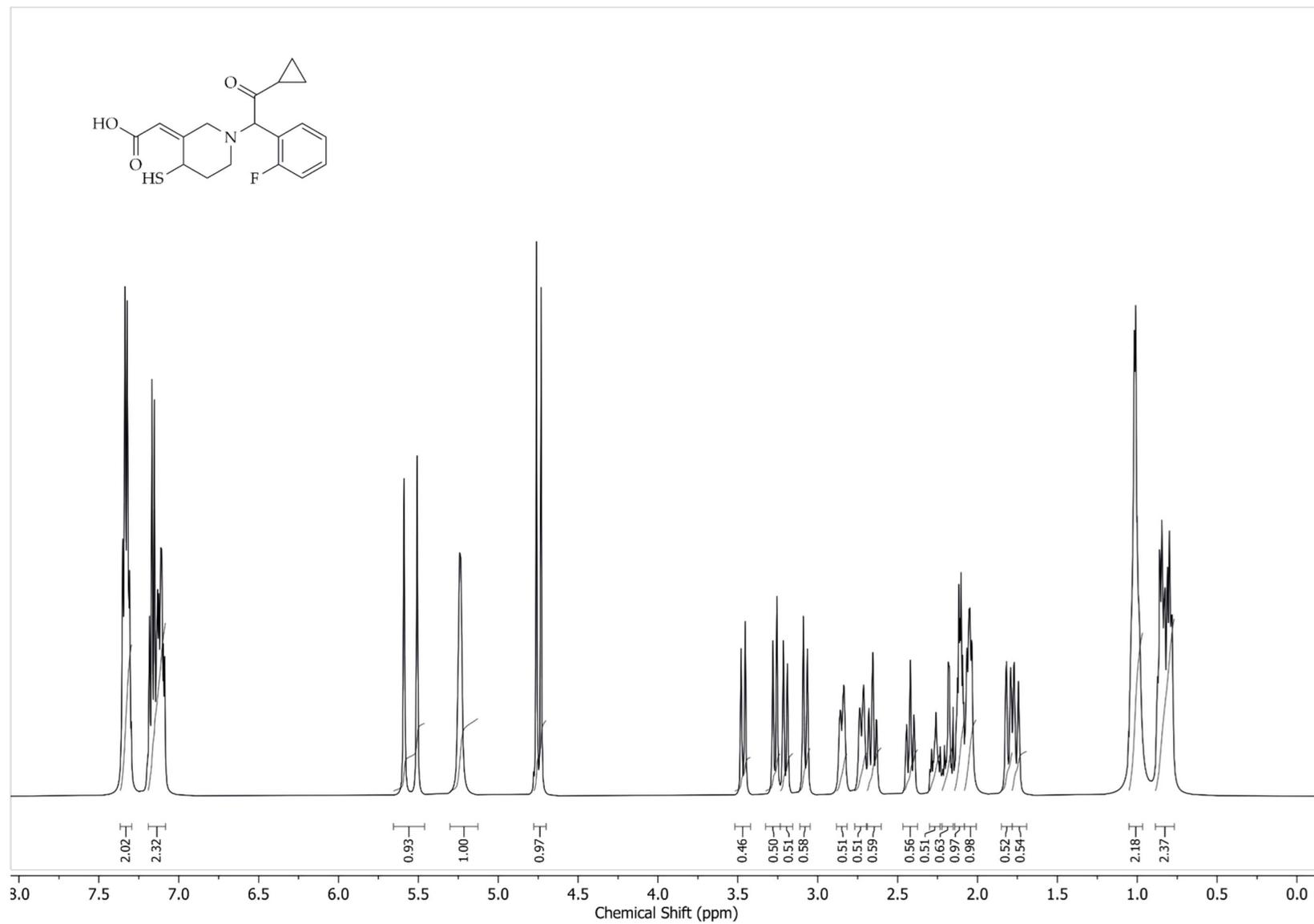
**Table S2.** Assignment of  $^1\text{H}$  and  $^{13}\text{C}$  NMR signals to the isomers of 2-oxo-prasugrel.

Carbon	$\delta$ $^1\text{H}$ $\text{CDCl}_3$ Isomer a	$\delta$ $^{13}\text{C}$ $\text{CDCl}_3$ Isomer a	$\delta$ $^1\text{H}$ $\text{CDCl}_3$ Isomer b	$\delta$ $^{13}\text{C}$ $\text{CDCl}_3$ Isomer b
2	-	198.80	-	198.76
3	5.98	126.70	6.00	126.64
4	-	167.97	-	167.73
5	3.88 ; 2.81	51.40	3.92 ; 3.03	53.30
7	3.04 ; 2.27	48.66	3.08 ; 2.49	50.71
8	2.34 ; 1.87	34.19	2.34 ; 1.87	33.94
9	4.06	51.07	4.06	51.08
10	4.83	71.08	4.80	71.08
11	-	120.84	-	120.84
12	7.27	130.86	7.27	130.89
13	7.16	124.62	7.16	124.62
14	7.11	116.11	7.11	116.11
15	7.33	130.51	7.33	130.51
16	-	162.33 ; 160.38	-	162.33 ; 160.38
17	-	206.96	-	207.08
18	2.06	18.76	2.06	18.81
19, 20	1.00 ; 0.82	12.29 ; 11.74	1.00 ; 0.82	12.20 ; 11.80

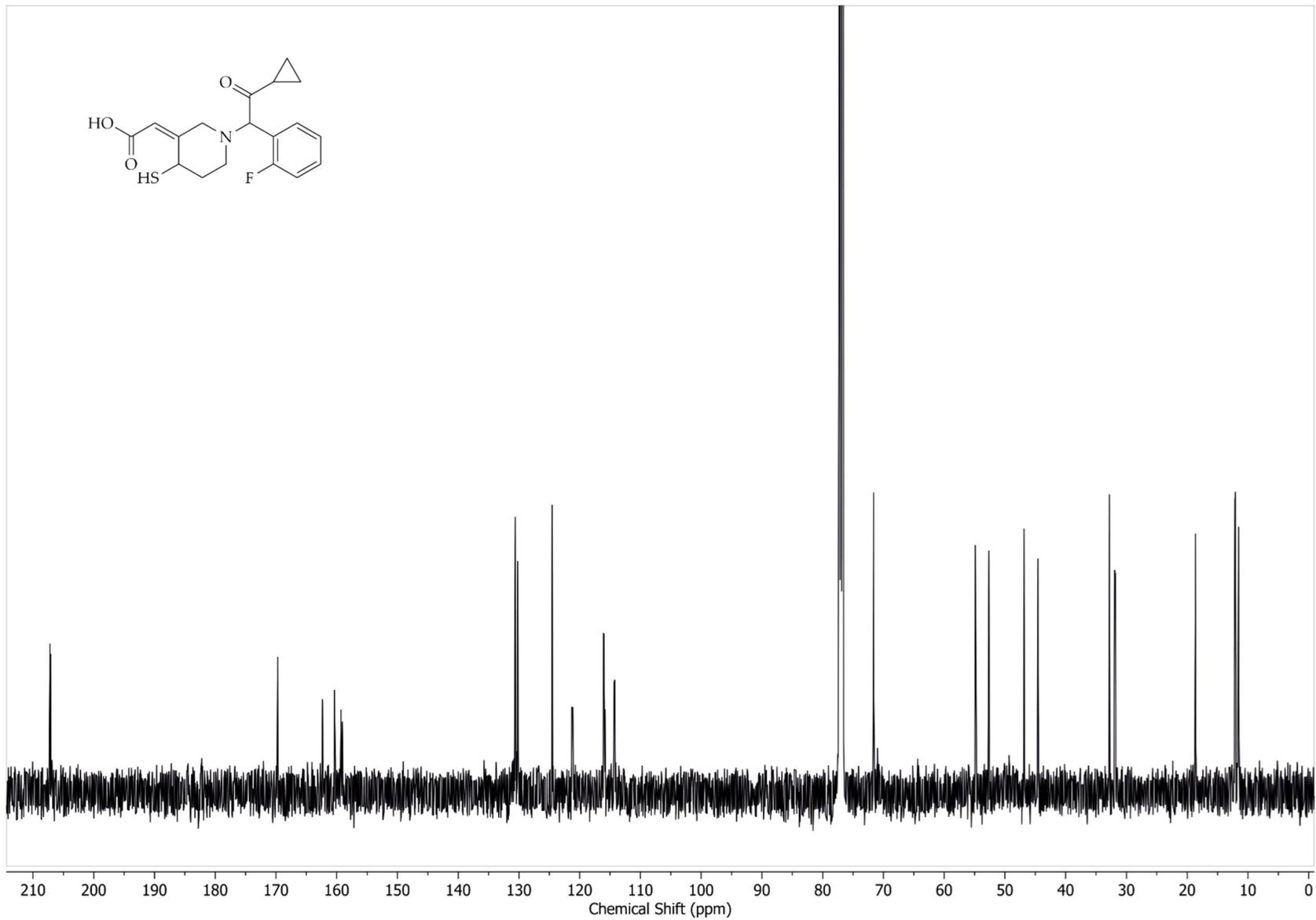




**Figure S15.** HPLC-ELSD chromatogram of isolated isomers of prasugrel active metabolite (PAM).



**Figure S16.** <sup>1</sup>H NMR spectrum of isolated isomers of prasugrel active metabolite (PAM).



**Figure S17.** <sup>13</sup>C NMR spectrum of isolated isomers of prasugrel active metabolite (PAM).

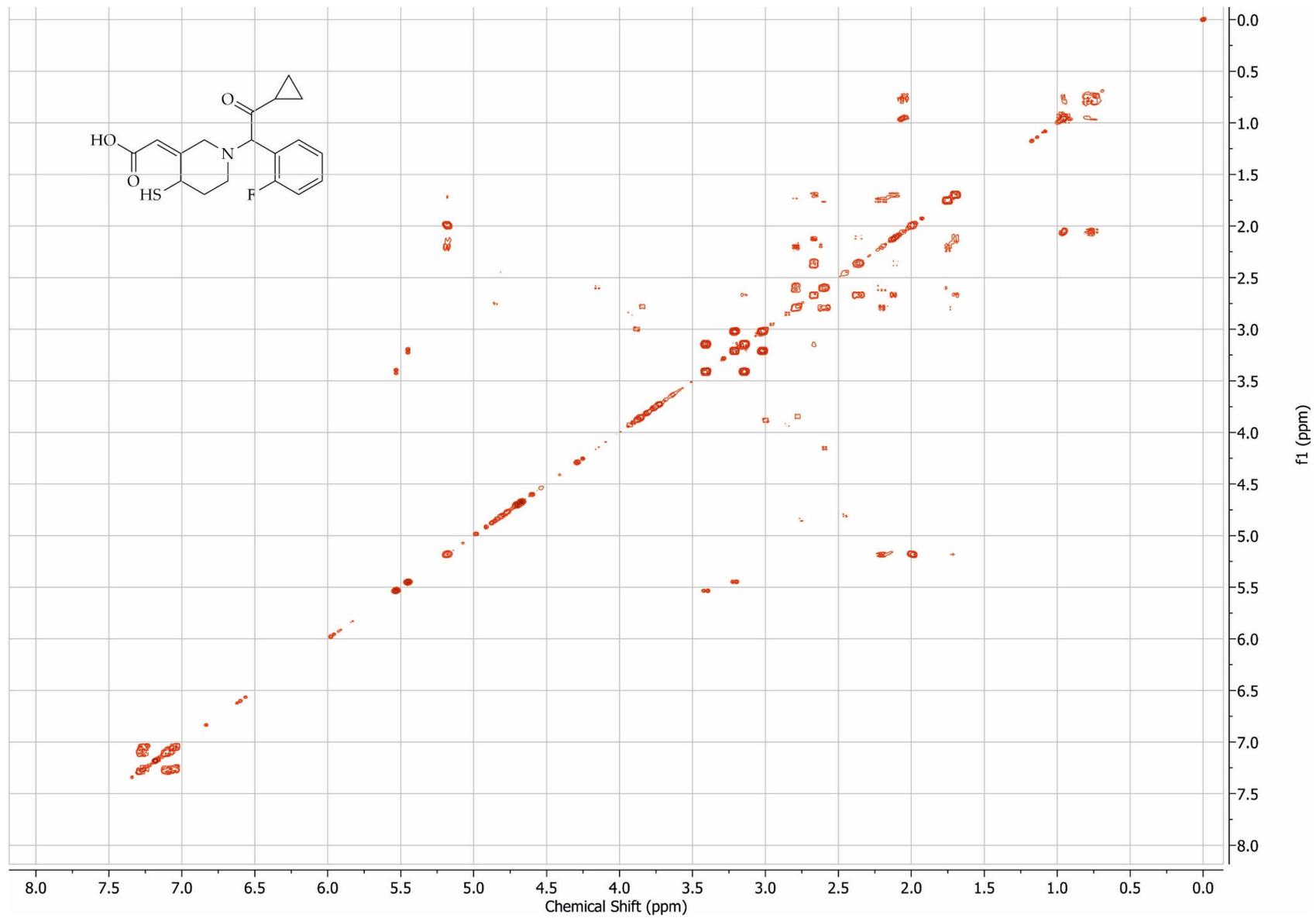


Figure S18. COSY spectrum of isolated isomers of prasugrel active metabolite (PAM).

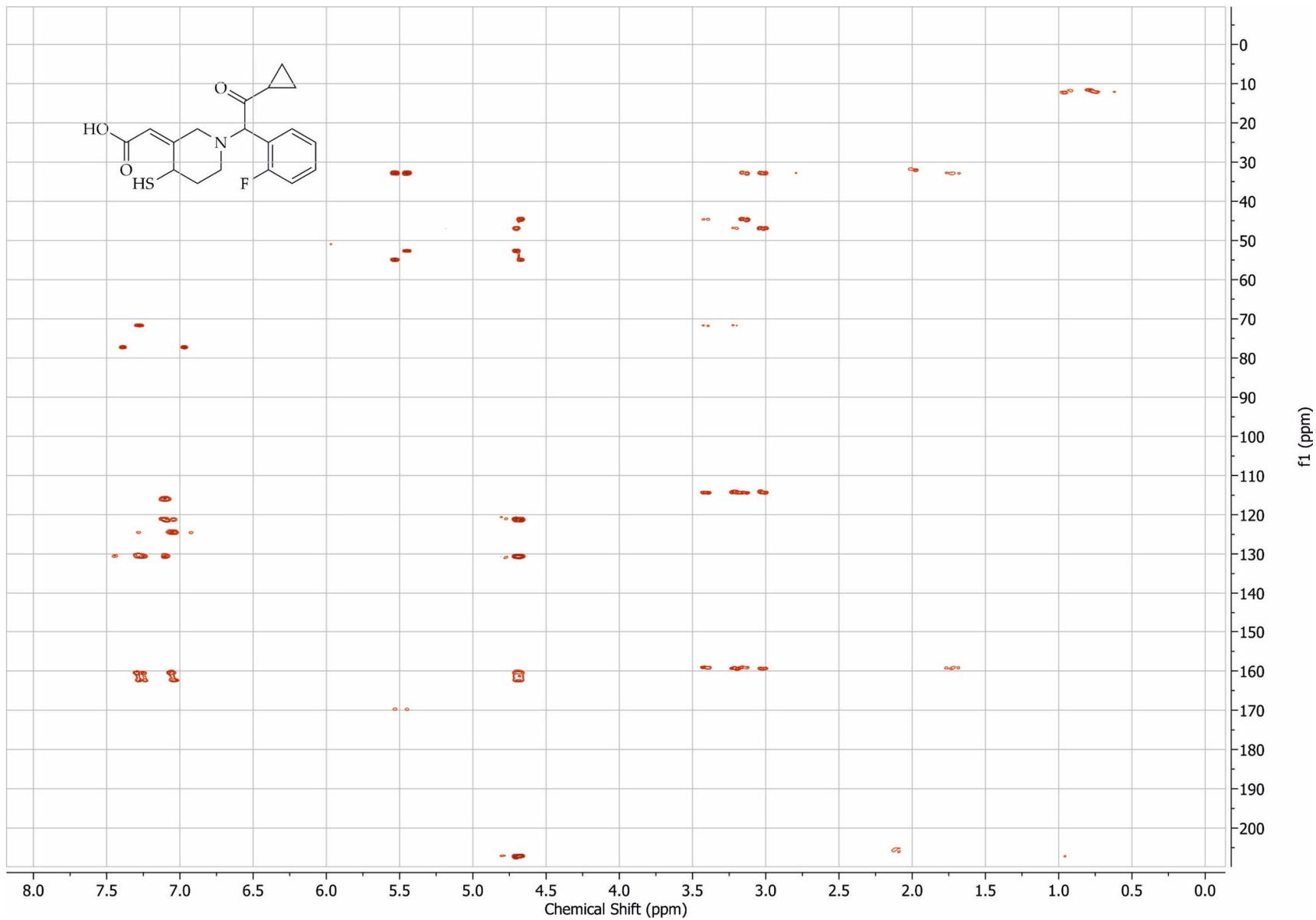


Figure S19. HMBC spectrum of isolated isomers of prasugrel active metabolite (PAM).

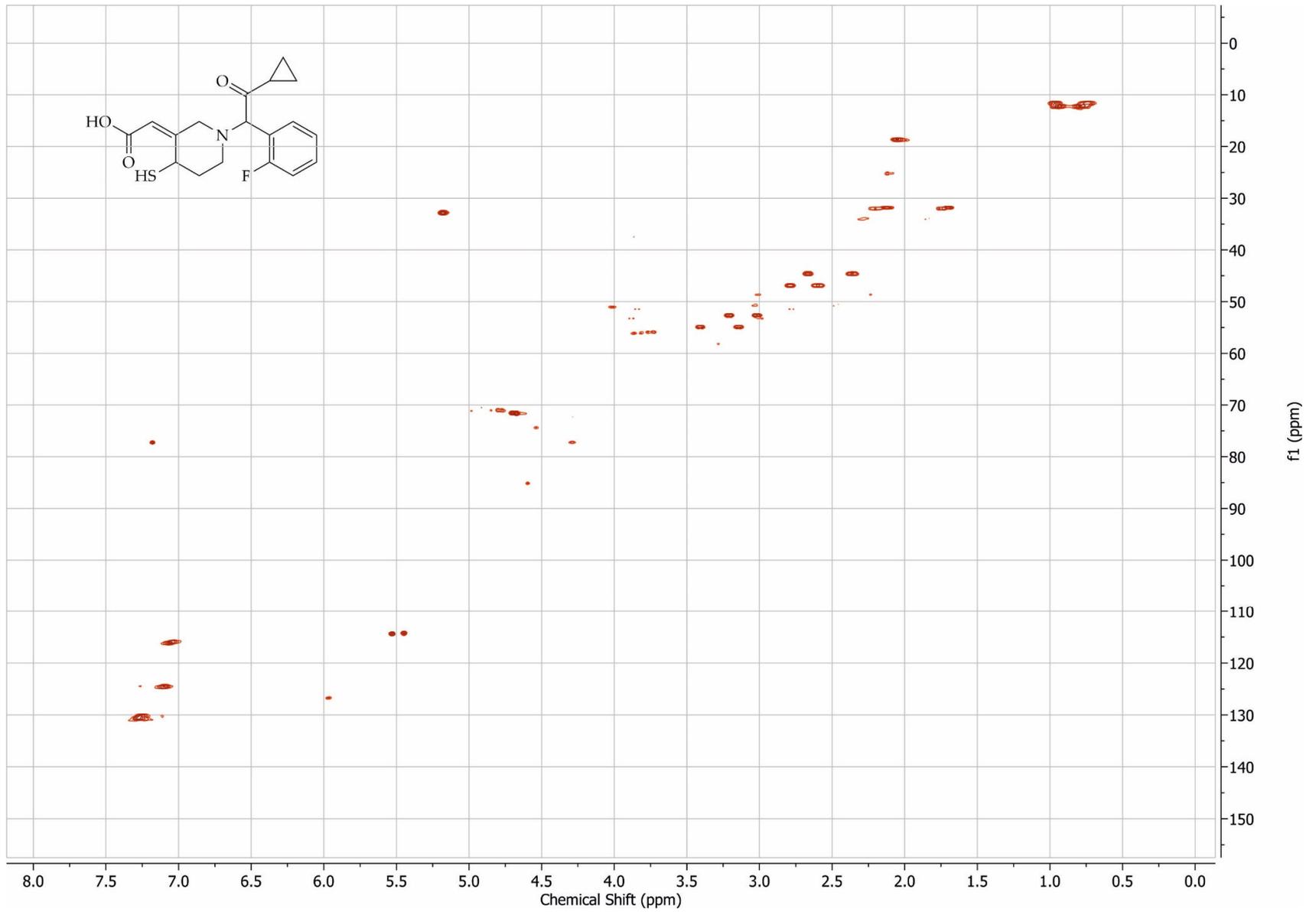


Figure S20. HSQC spectrum of isolated isomers of prasugrel active metabolite (PAM).

**Table S3.** Assignment of  $^1\text{H}$  and  $^{13}\text{C}$  NMR signals to the isomers of prasugrel active metabolite (PAM).

Carbon	$\delta$ $^1\text{H}$ $\text{CDCl}_3$ Isomer a	$\delta$ $^{13}\text{C}$ $\text{CDCl}_3$ Isomer a	$\delta$ $^1\text{H}$ $\text{CDCl}_3$ Isomer b	$\delta$ $^{13}\text{C}$ $\text{CDCl}_3$ Isomer b
2	3.27 ; 3.08	52.63	3.47 ; 3.20	54.87
3	-	159.30	-	159.08
4	5.24	32.82	5.24	32.82
5	2.18 ; 1.76	31.94	2.26 ; 1.81	31.81
6	2.85 ; 2.65	44.56	2.72 ; 2.42	46.83
7	4.76	71.59	4.73	71.64
8	-	121.16	-	121.16
9	7.32	130.20	7.32	130.20
10	7.17	124.54	7.17	124.54
11	7.11	115.96	7.11	115.96
12	7.34	130.62	7.34	130.62
13	-	162.33 ; 160.36	-	162.33 ; 160.36
14	-	207.21	-	207.10
15	2.11	18.61	2.11	18.61
16, 17	1.01 ; 0.82	12.11 ; 11.59	1.01 ; 0.82	12.11 ; 11.59
18	5.51	114.29	5.59	114.29
19	-	169.73	-	169.73
-SH	2.05	-	2.05	-