

# **Synthesis of new thiourea-metal complexes with promising anticancer properties**

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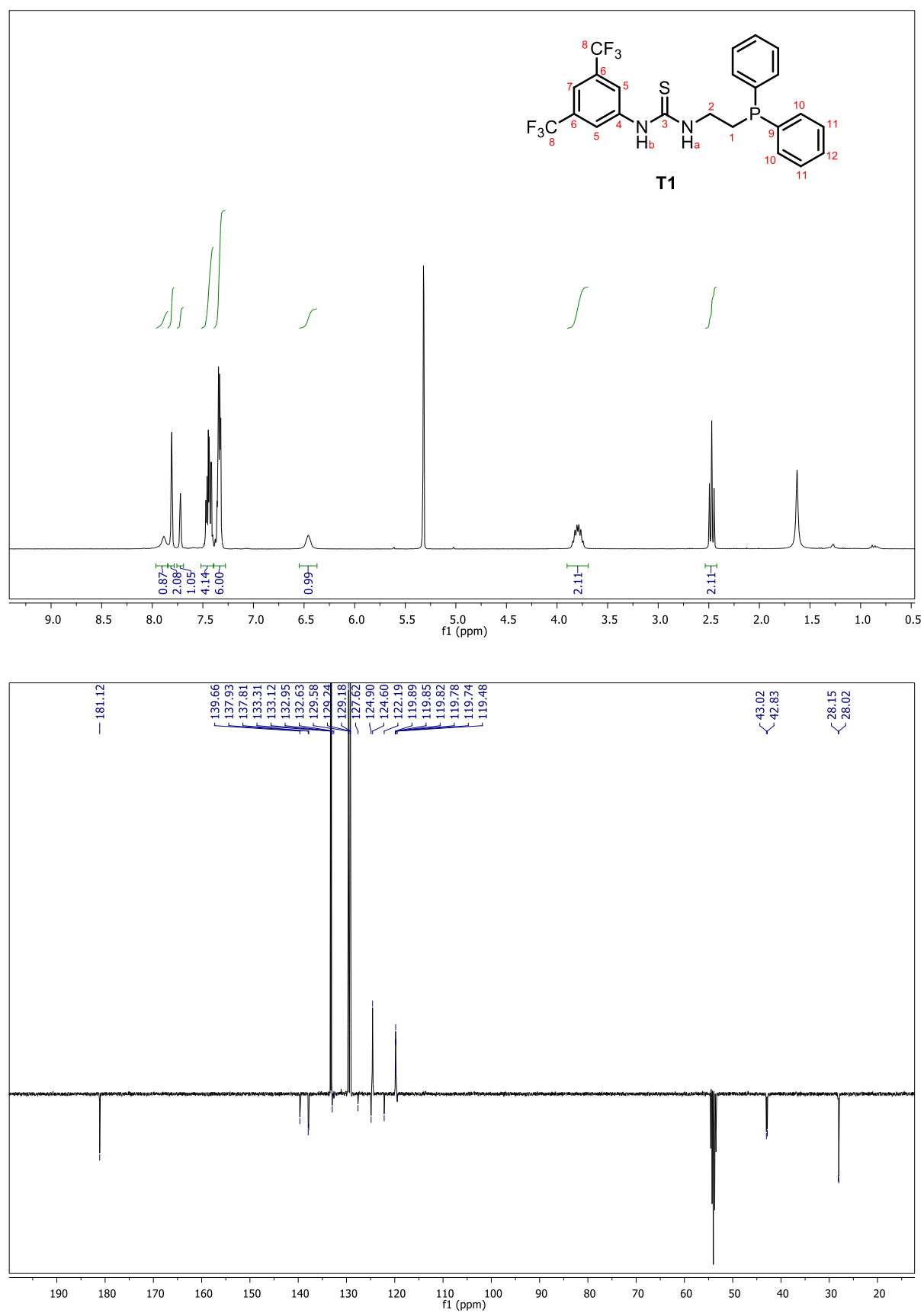
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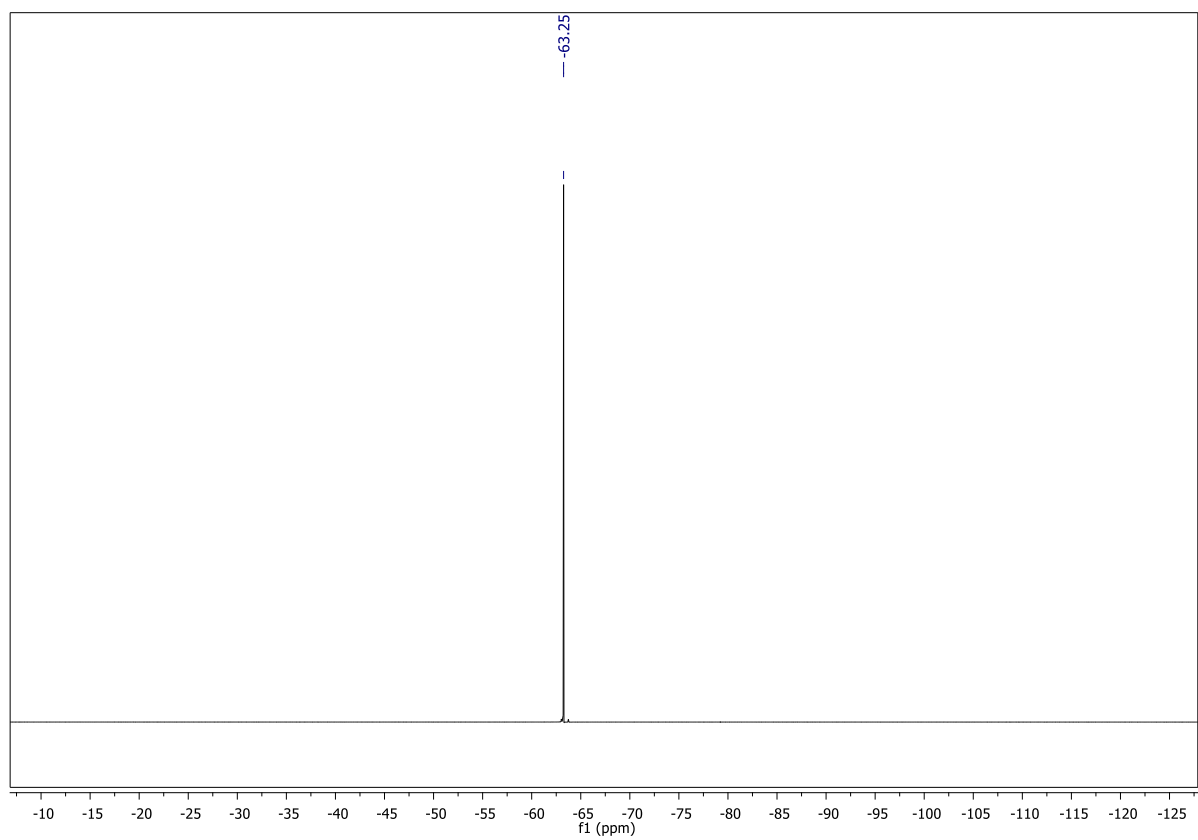
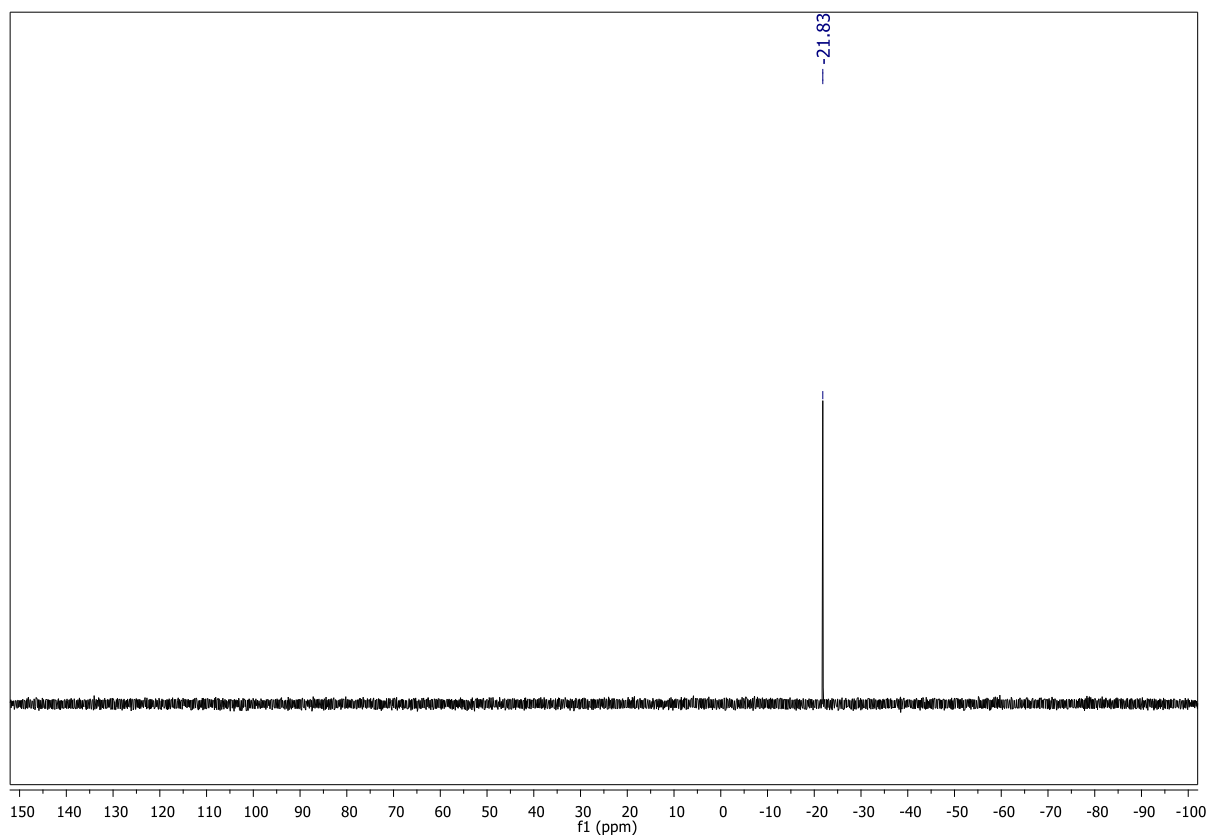
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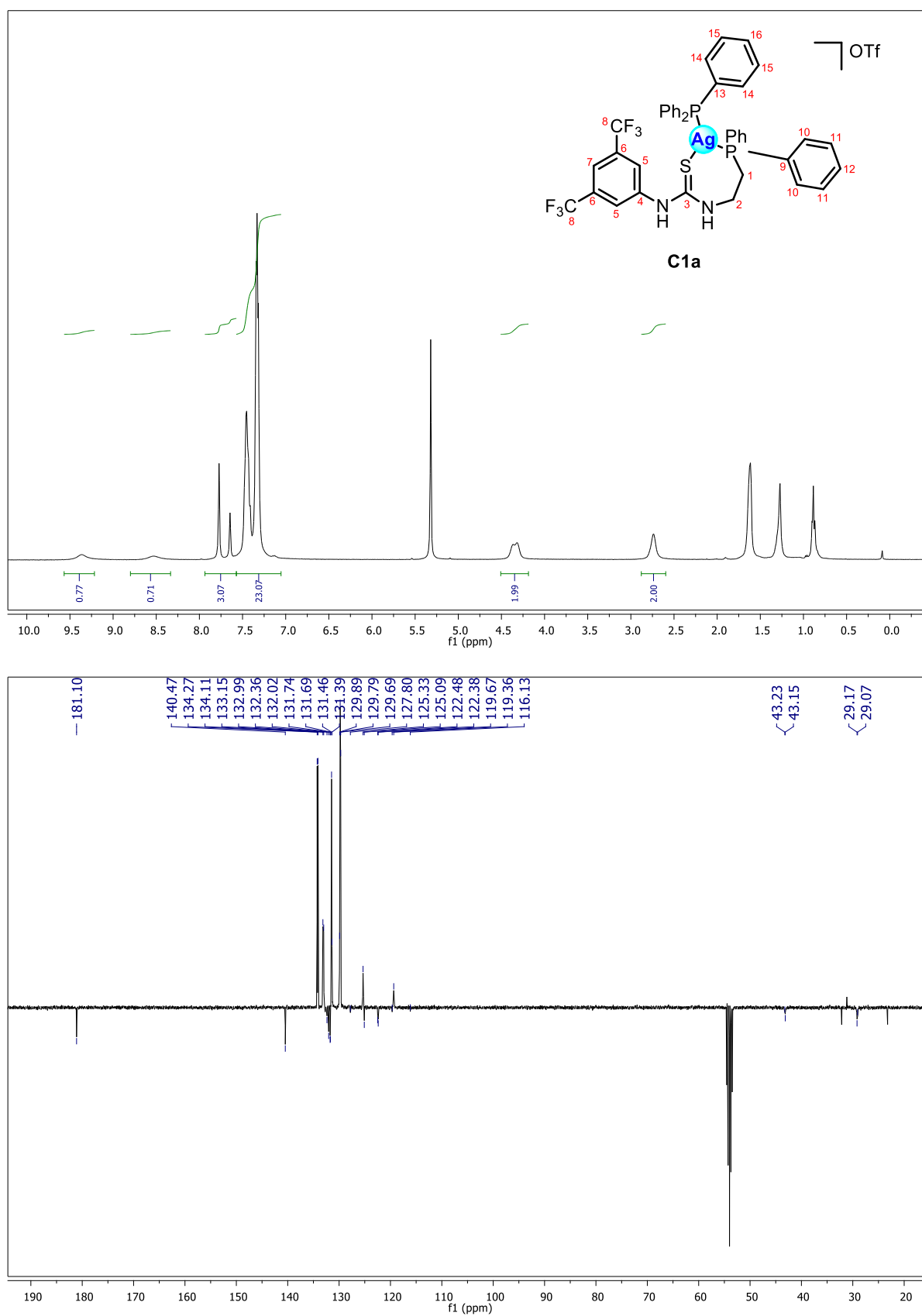
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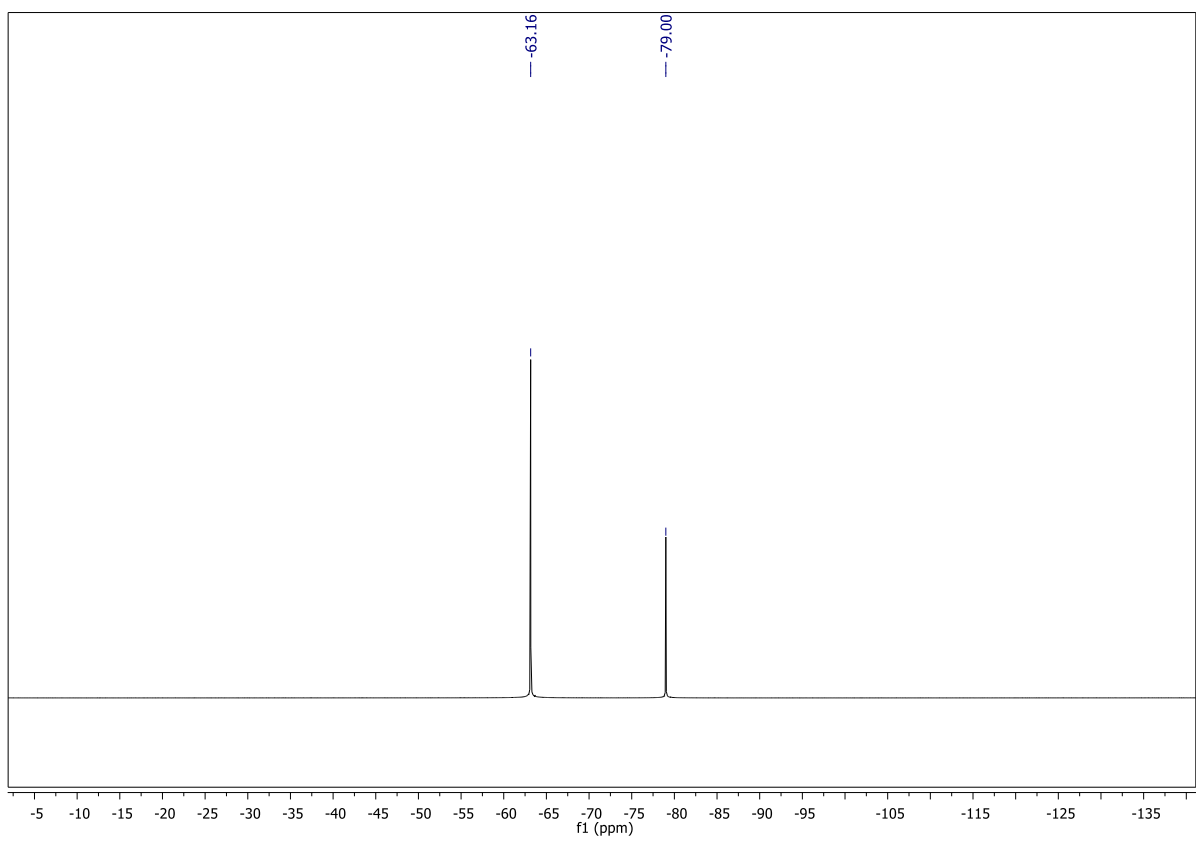
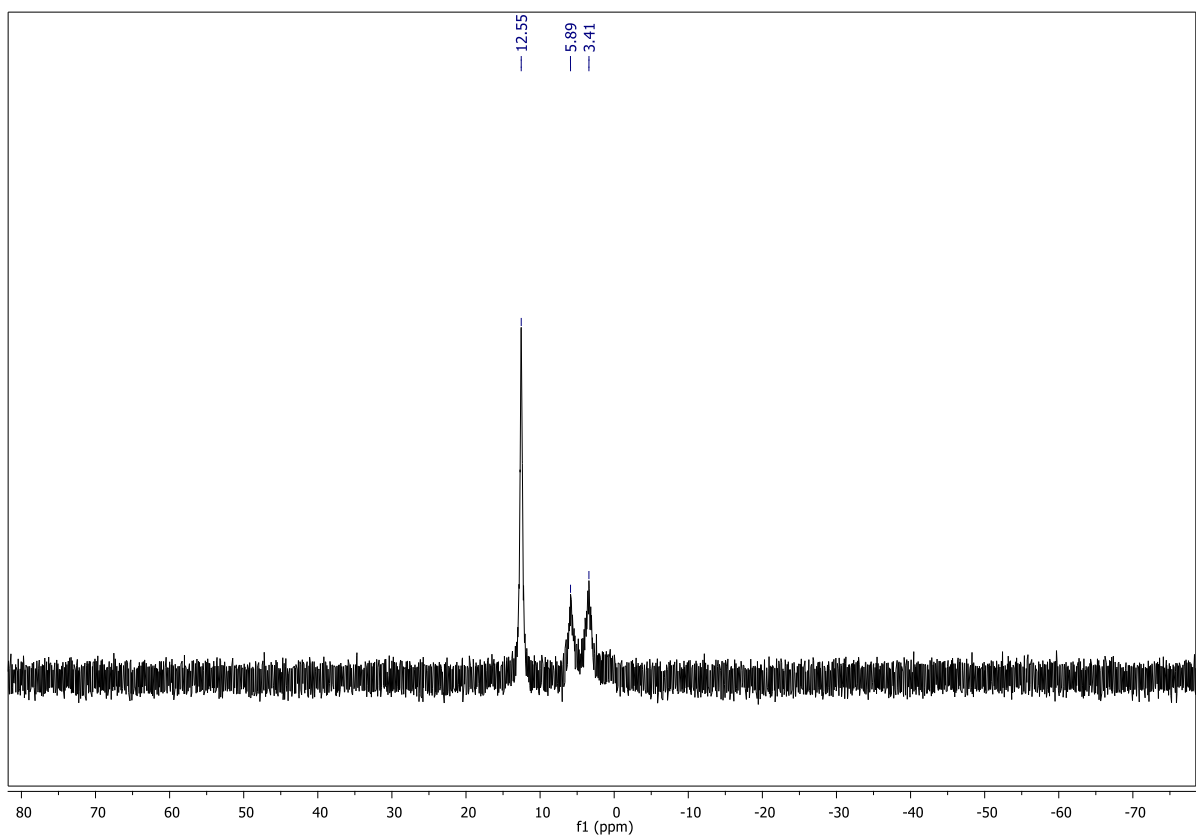
**Figure S1.**  $^1\text{H}$ ,  $^{13}\text{C}$ -APT,  $^{31}\text{P}\{^1\text{H}\}$  and  $^{19}\text{F}$  NMR spectra ( $\text{CD}_2\text{Cl}_2$ ) of **T1**.



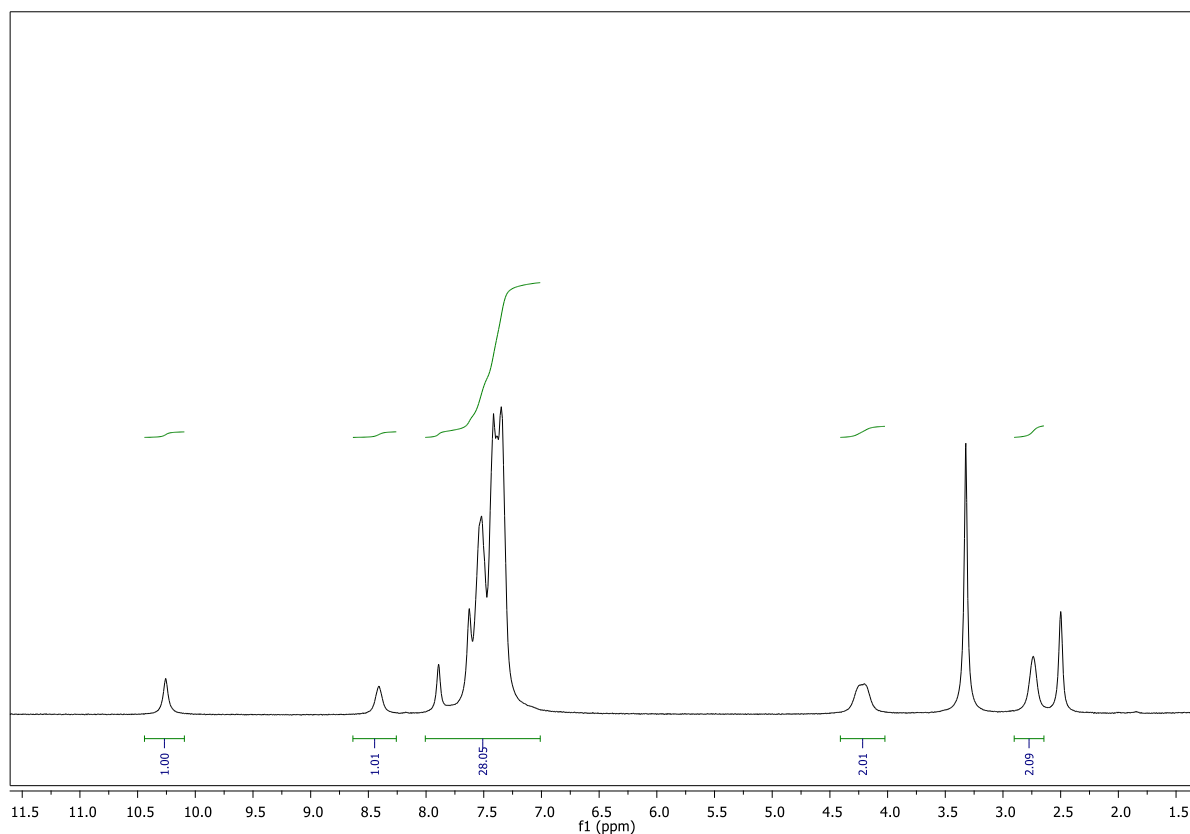


**Figure S2.**  $^1\text{H}$ ,  $^{13}\text{C}$ -APT,  $^{31}\text{P}\{^1\text{H}\}$  and  $^{19}\text{F}$  NMR spectra ( $\text{CD}_2\text{Cl}_2$ ) for complex **C1a**.

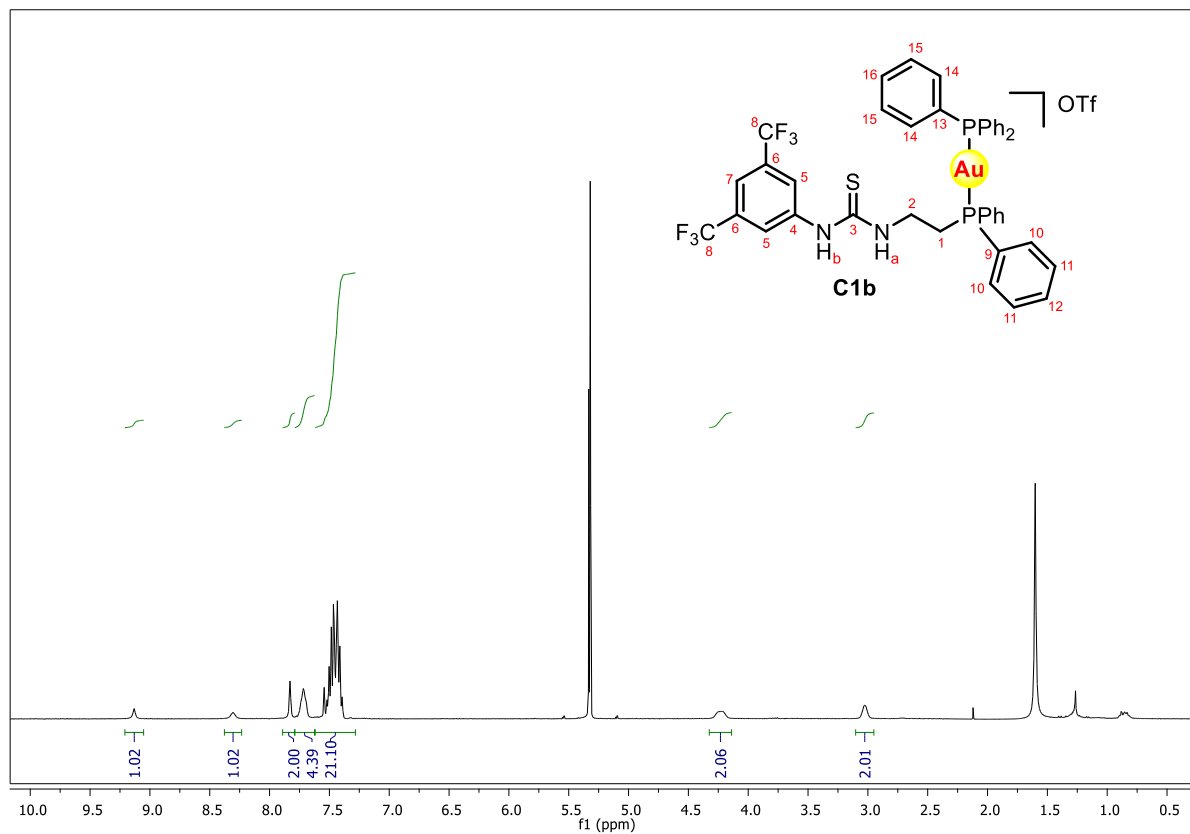


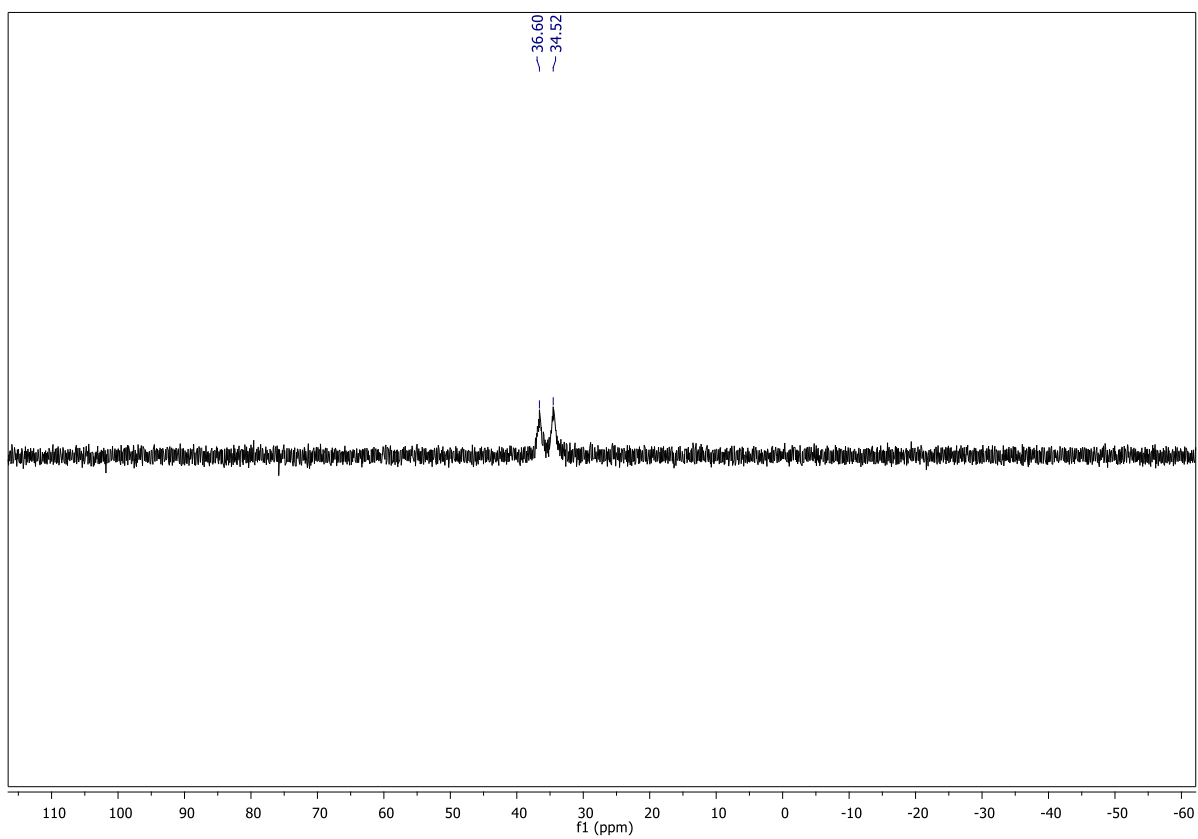
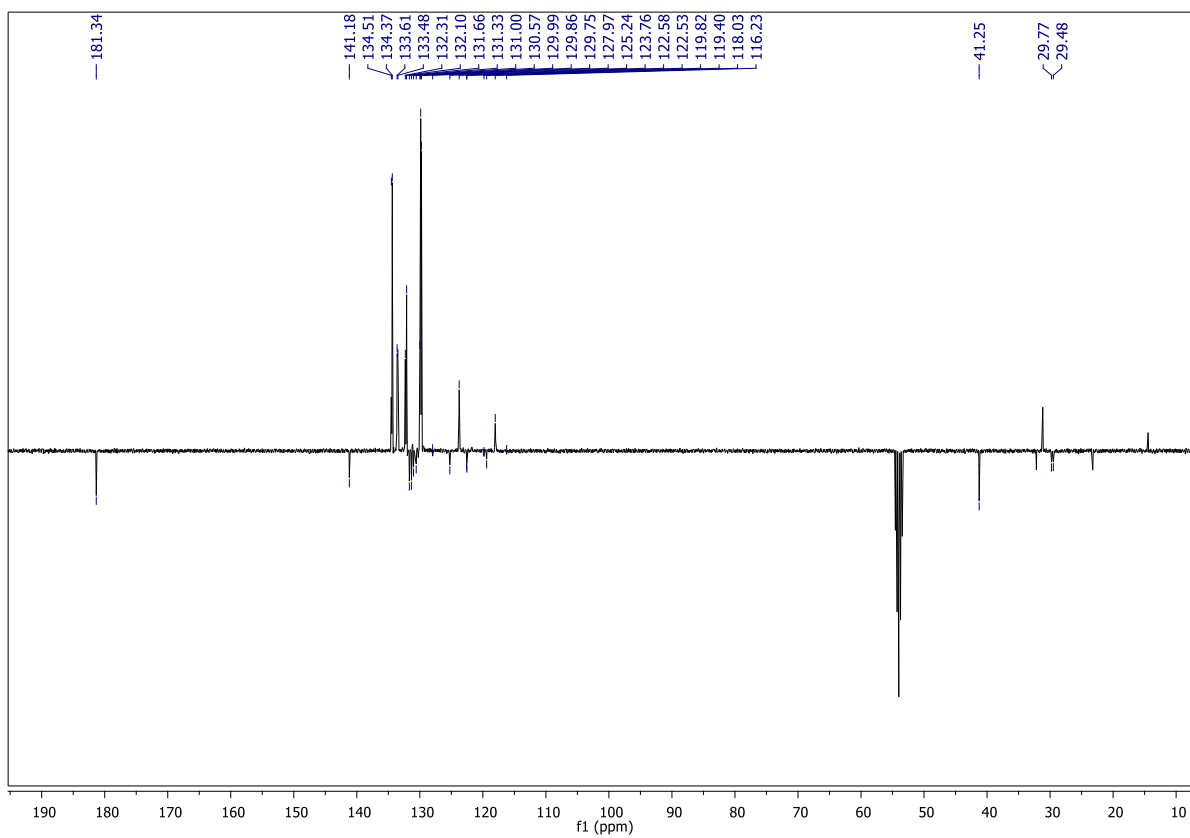


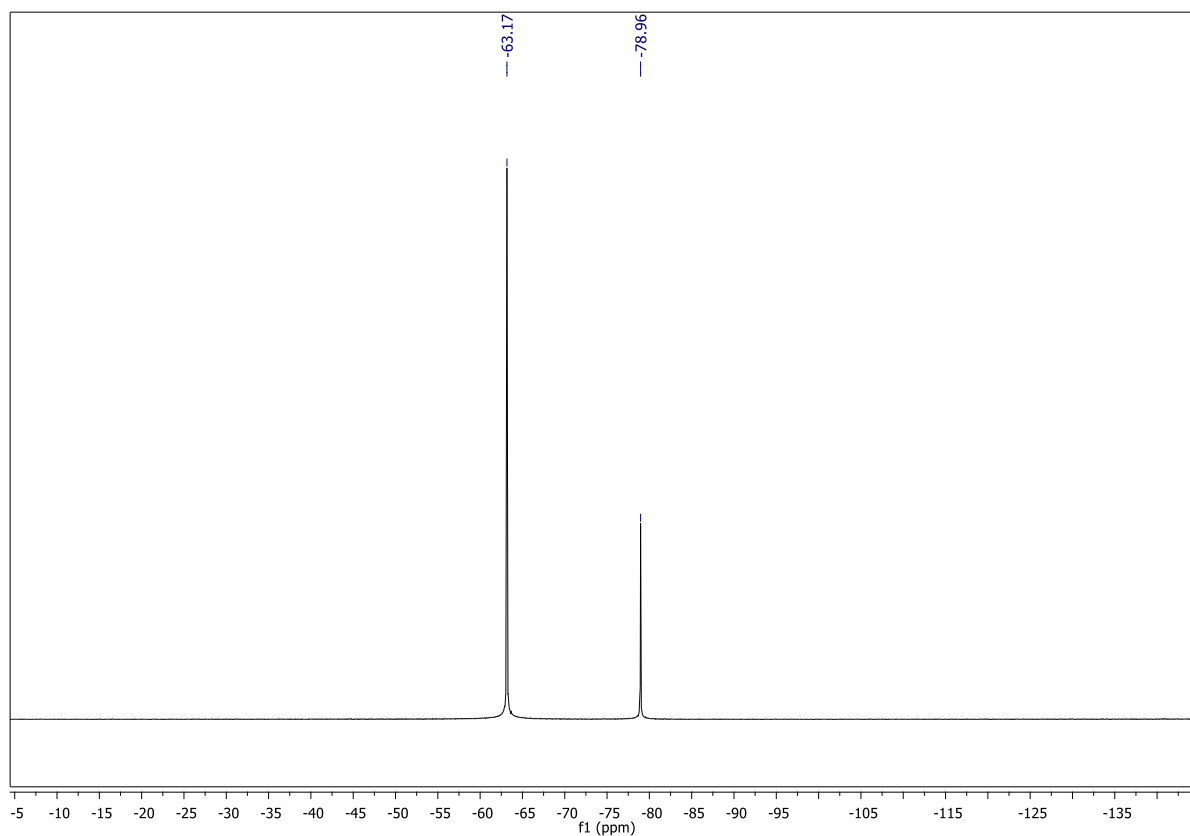
**Figure S3.**  $^1\text{H}$  NMR spectrum ( $\text{DMSO}-d_6$ ) for complex **C1a**.



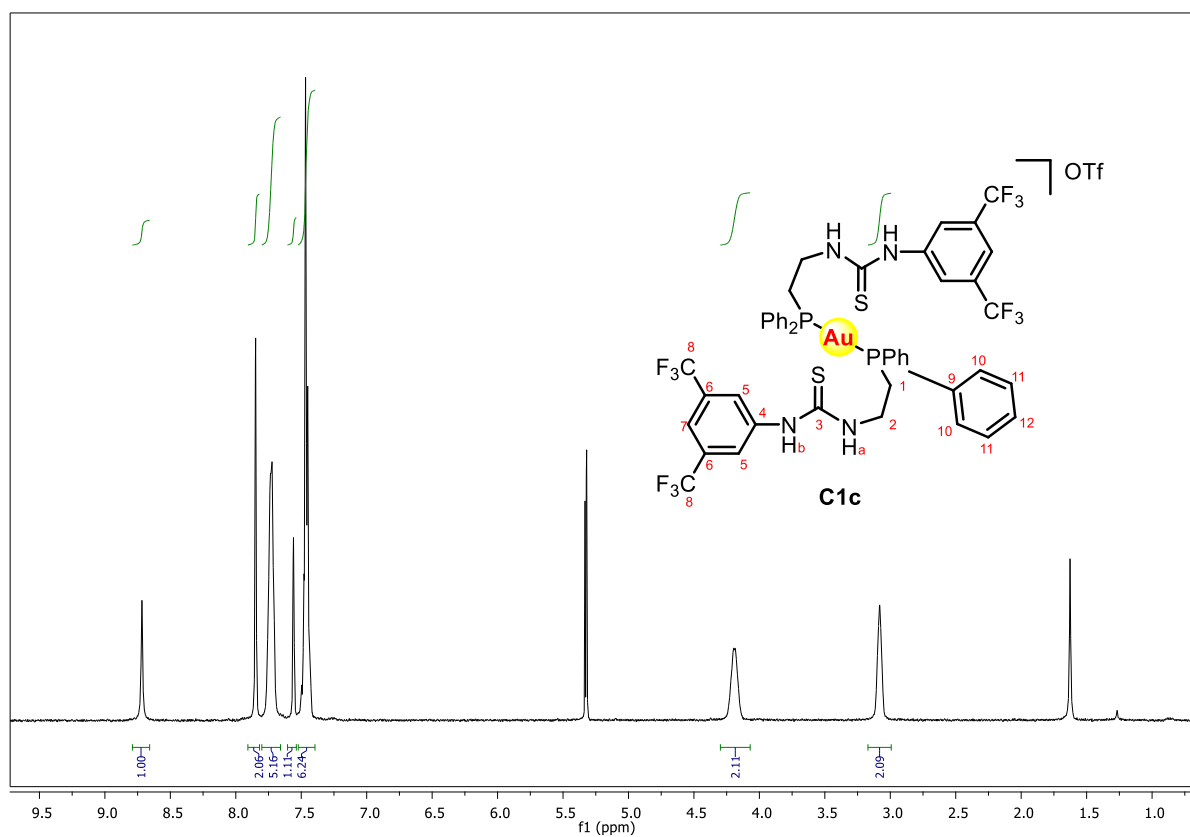
**Figure S4.** Spectra of  $^1\text{H}$ ,  $^{13}\text{C}$ -APT,  $^{31}\text{P}\{^1\text{H}\}$  and  $^{19}\text{F}$  NMR spectra ( $\text{CD}_2\text{Cl}_2$ ) for complex **C1b**.



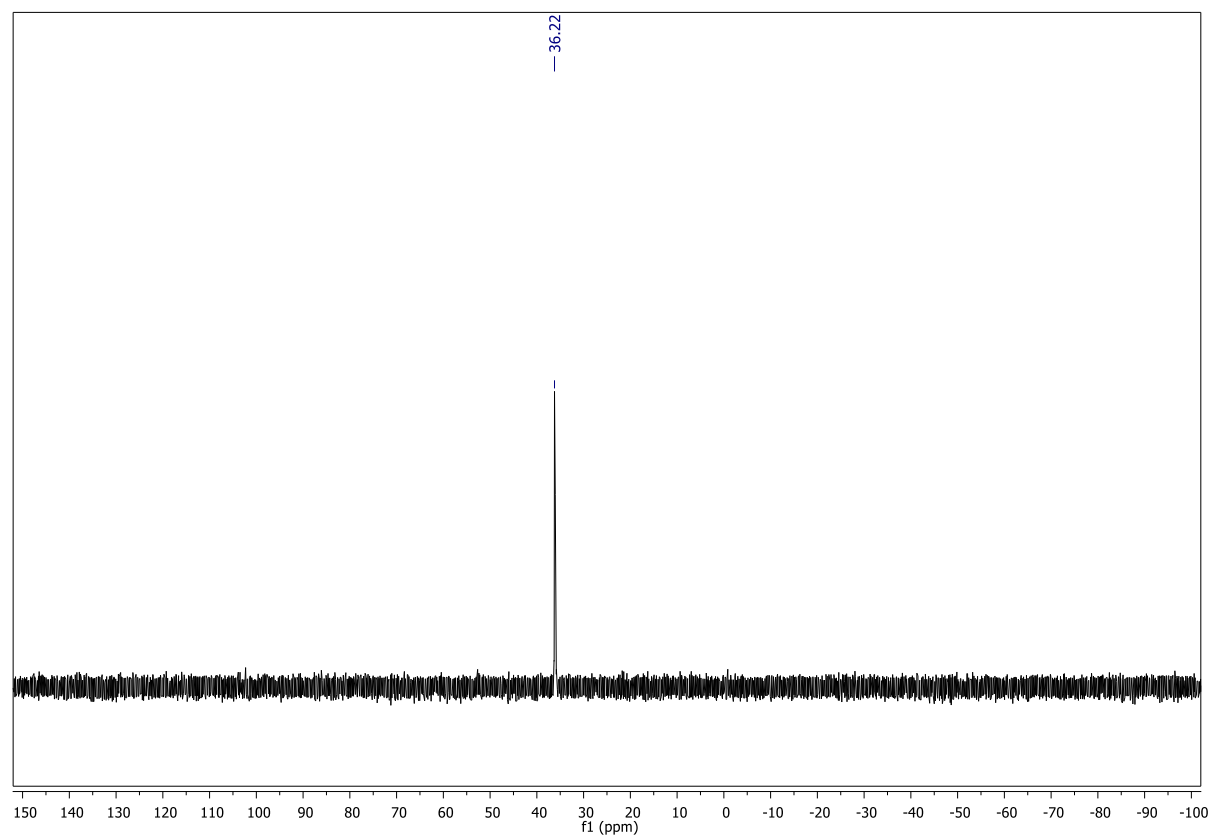
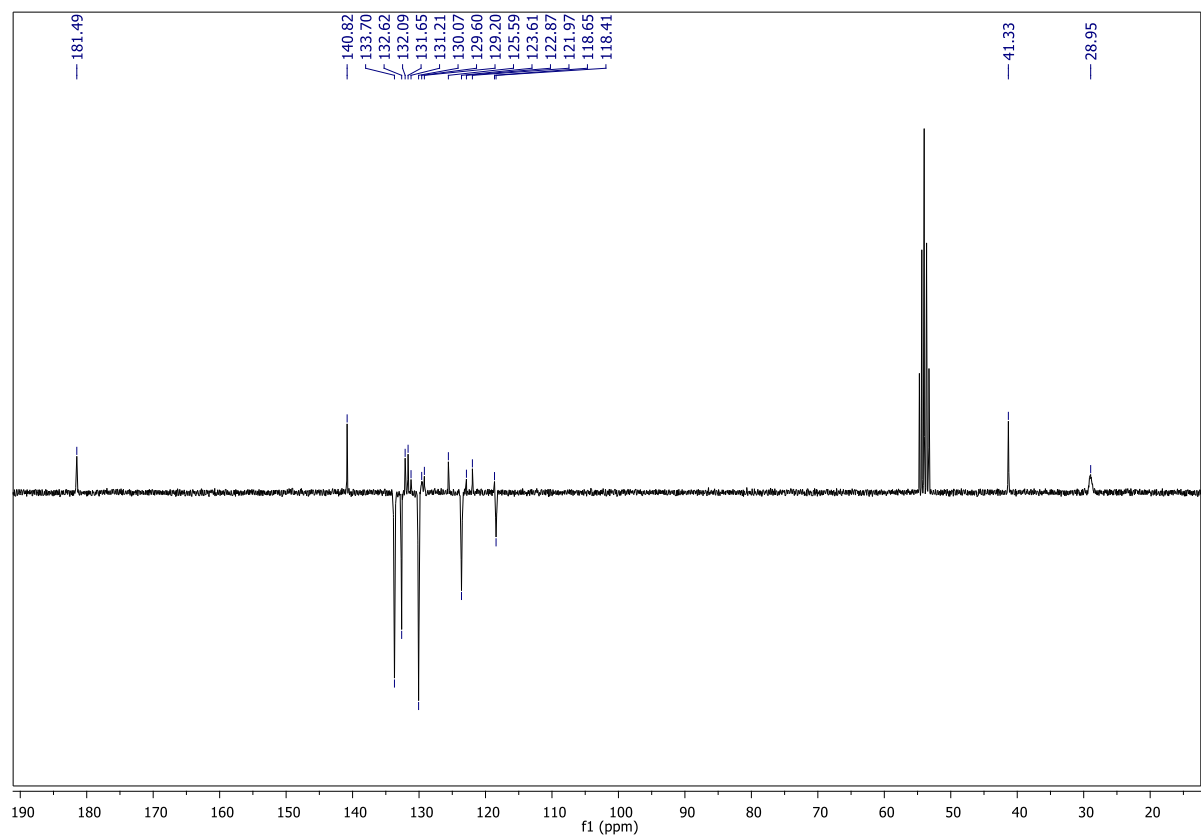


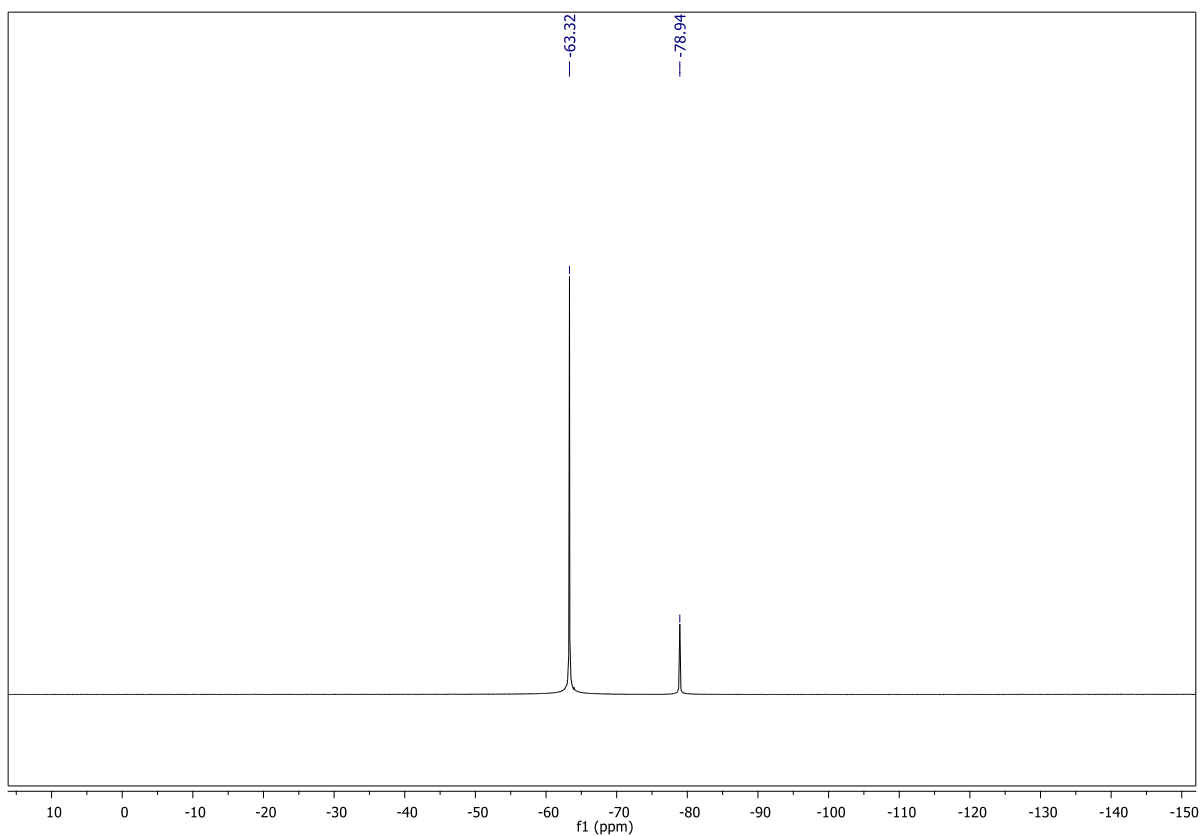


**Figure S5.** Spectra of  $^1\text{H}$ ,  $^{13}\text{C}$ -APT,  $^{31}\text{P}\{^1\text{H}\}$  and  $^{19}\text{F}$  NMR spectra ( $\text{CD}_2\text{Cl}_2$ ) for complex **C1c**.

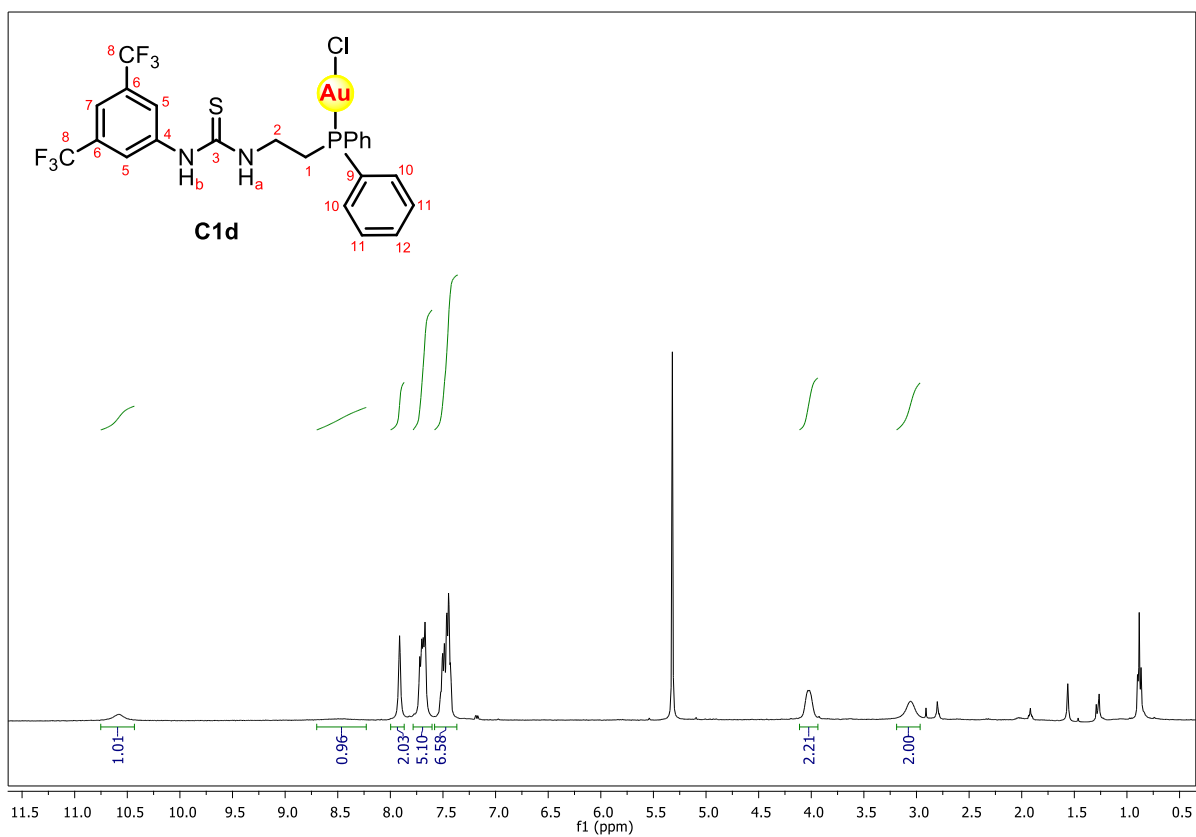


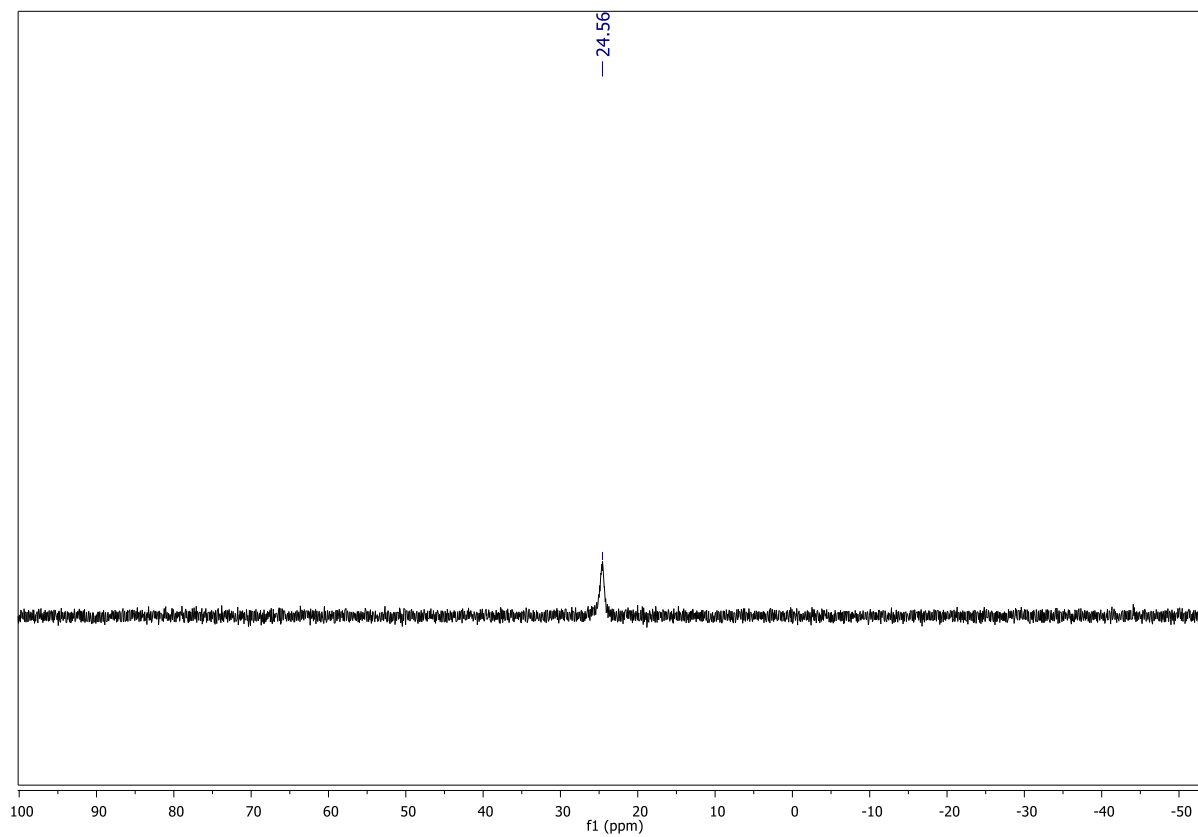
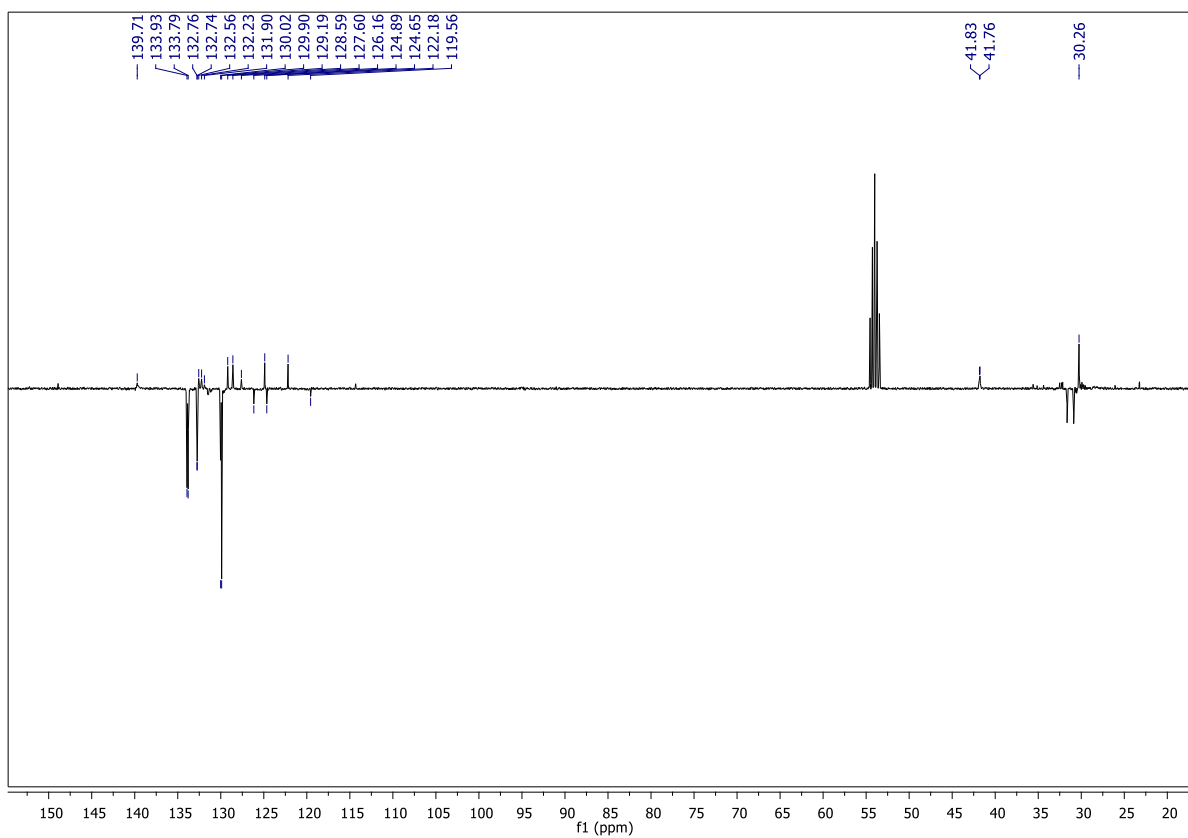


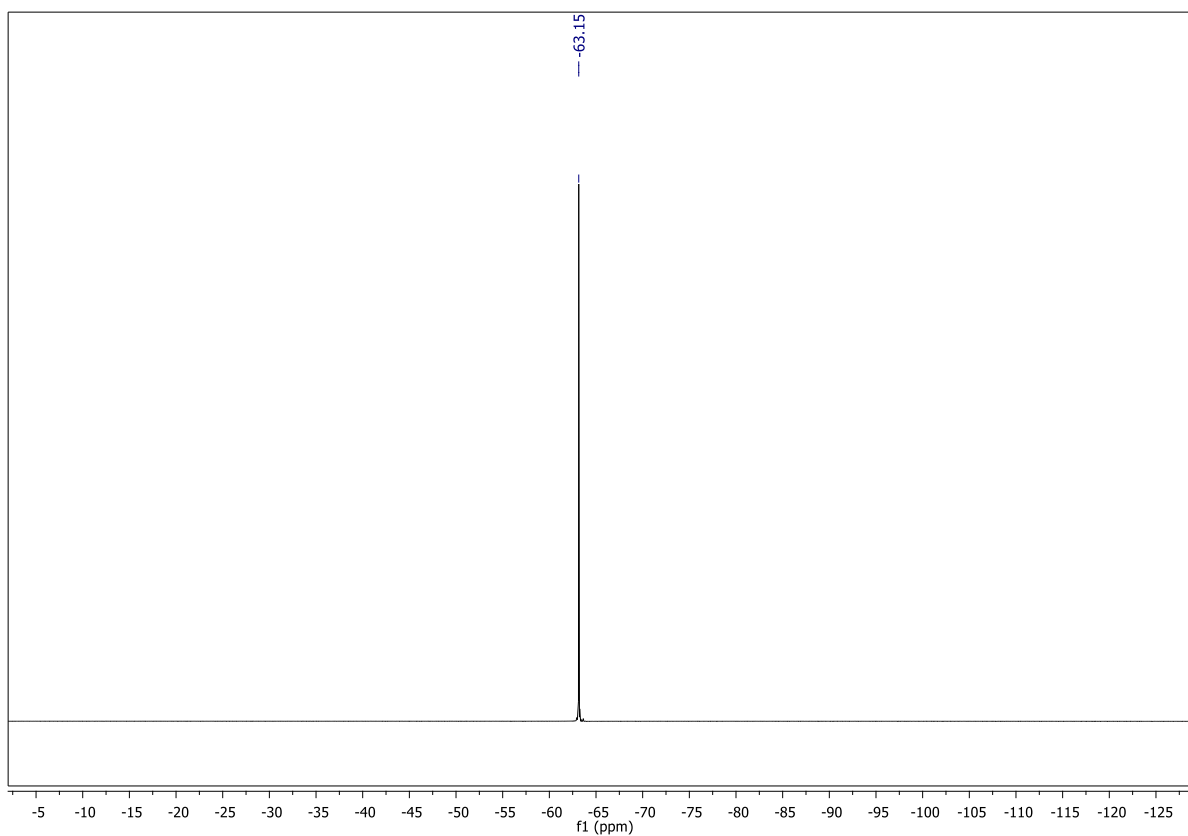




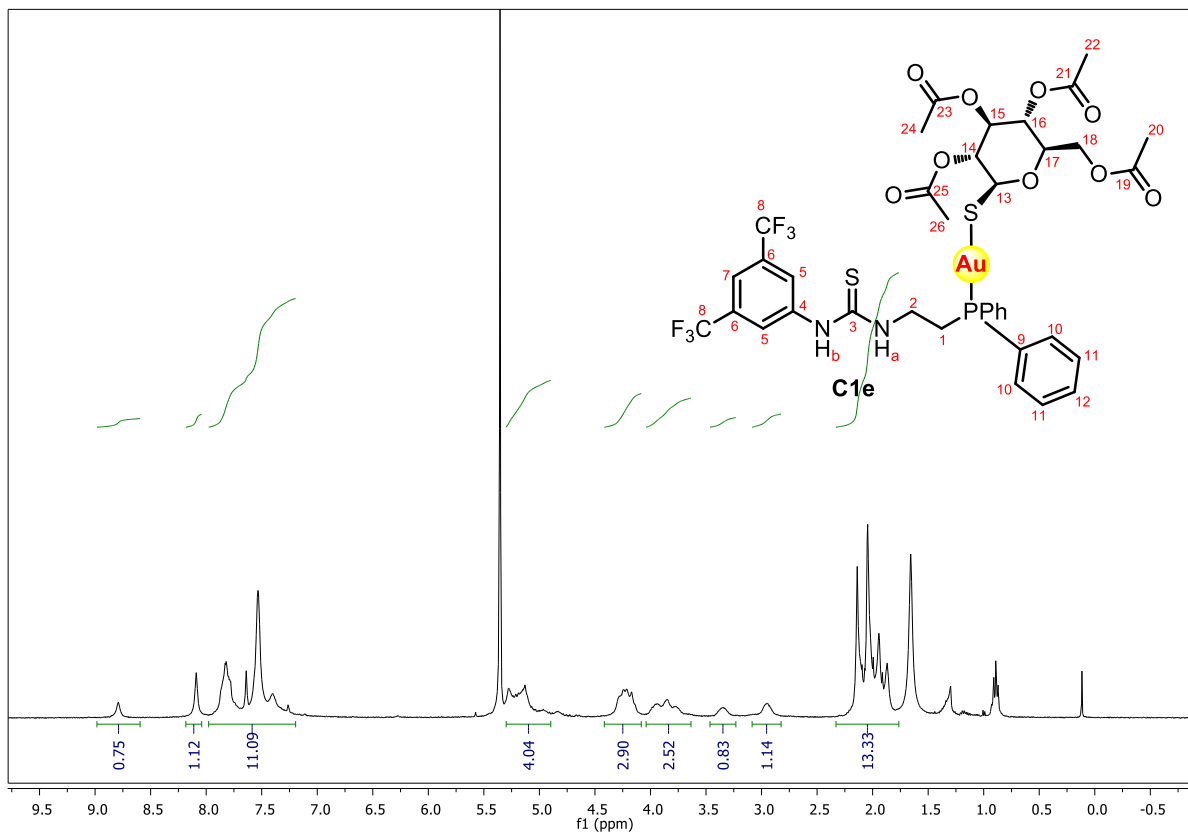
**Figure S6.**  $^1\text{H}$ ,  $^{13}\text{C}$ -APT,  $^{31}\text{P}\{^1\text{H}\}$  and  $^{19}\text{F}$  NMR spectra ( $\text{CD}_2\text{Cl}_2$ ) for complex **C1d**.

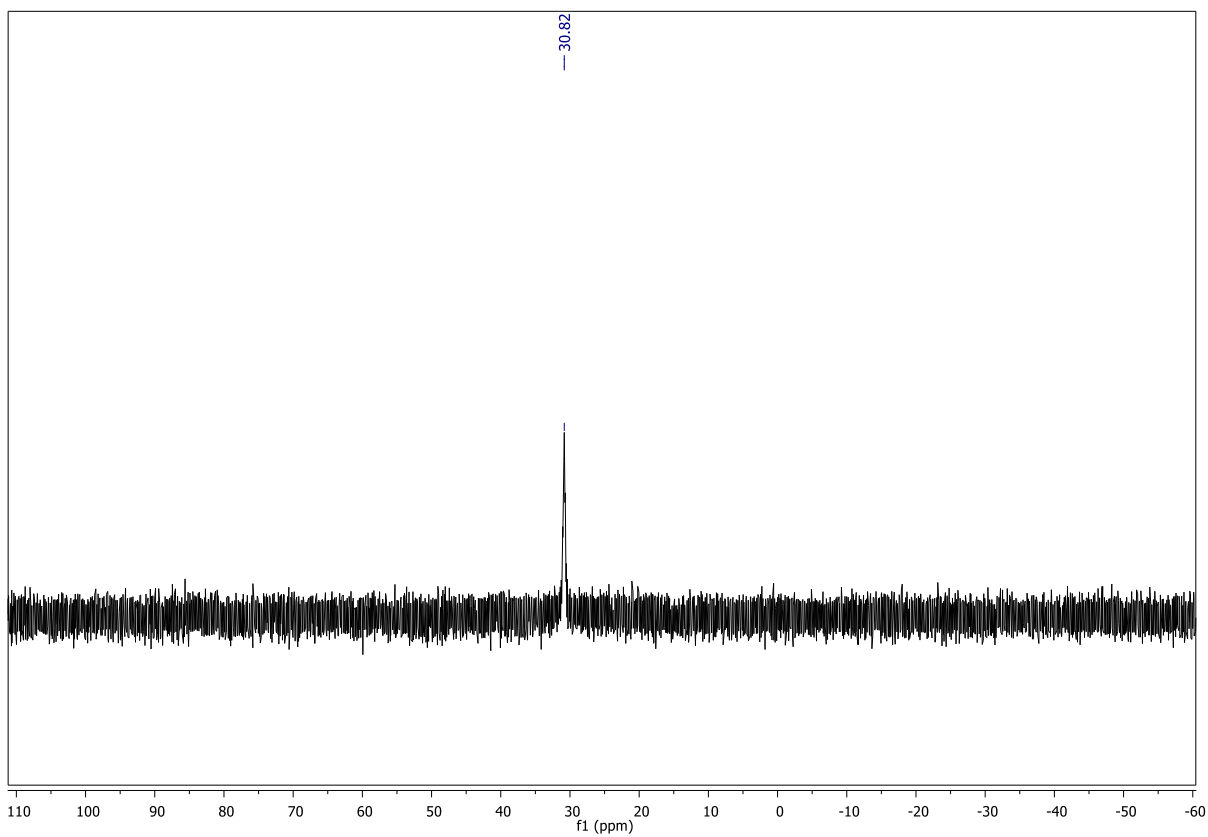
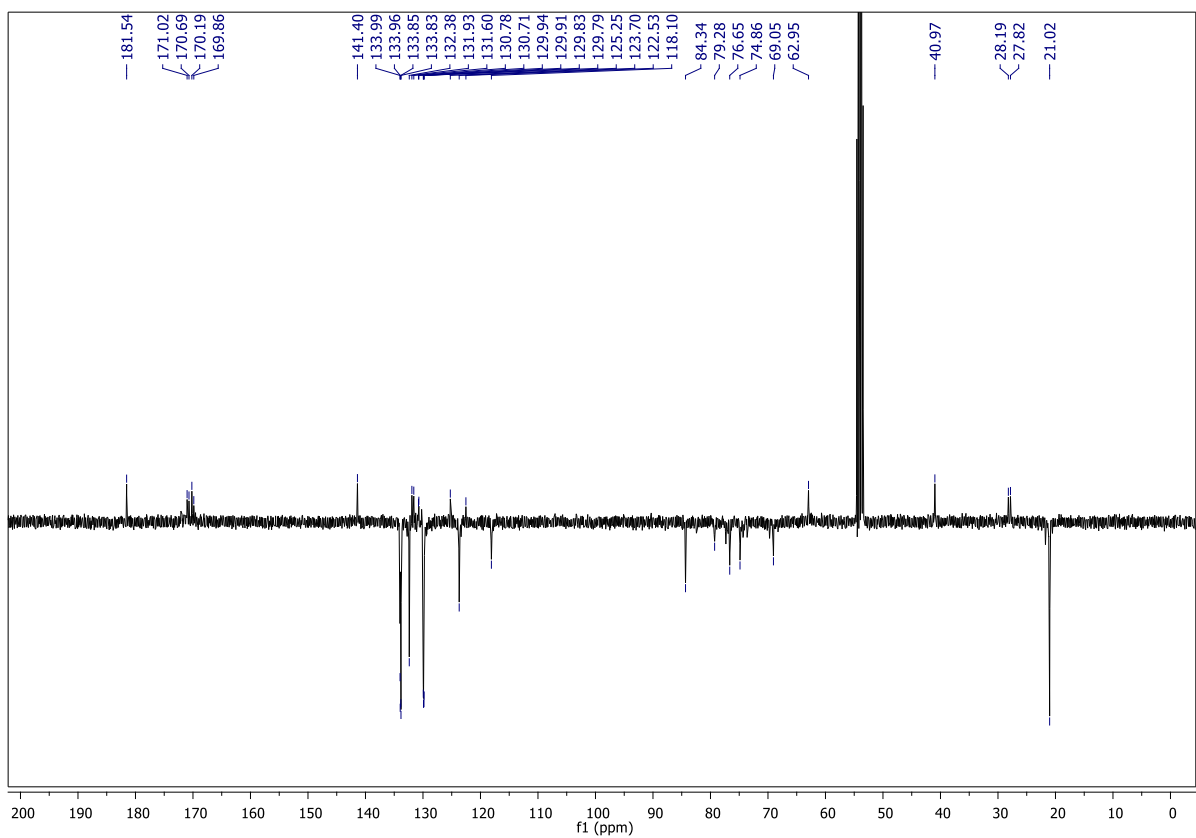


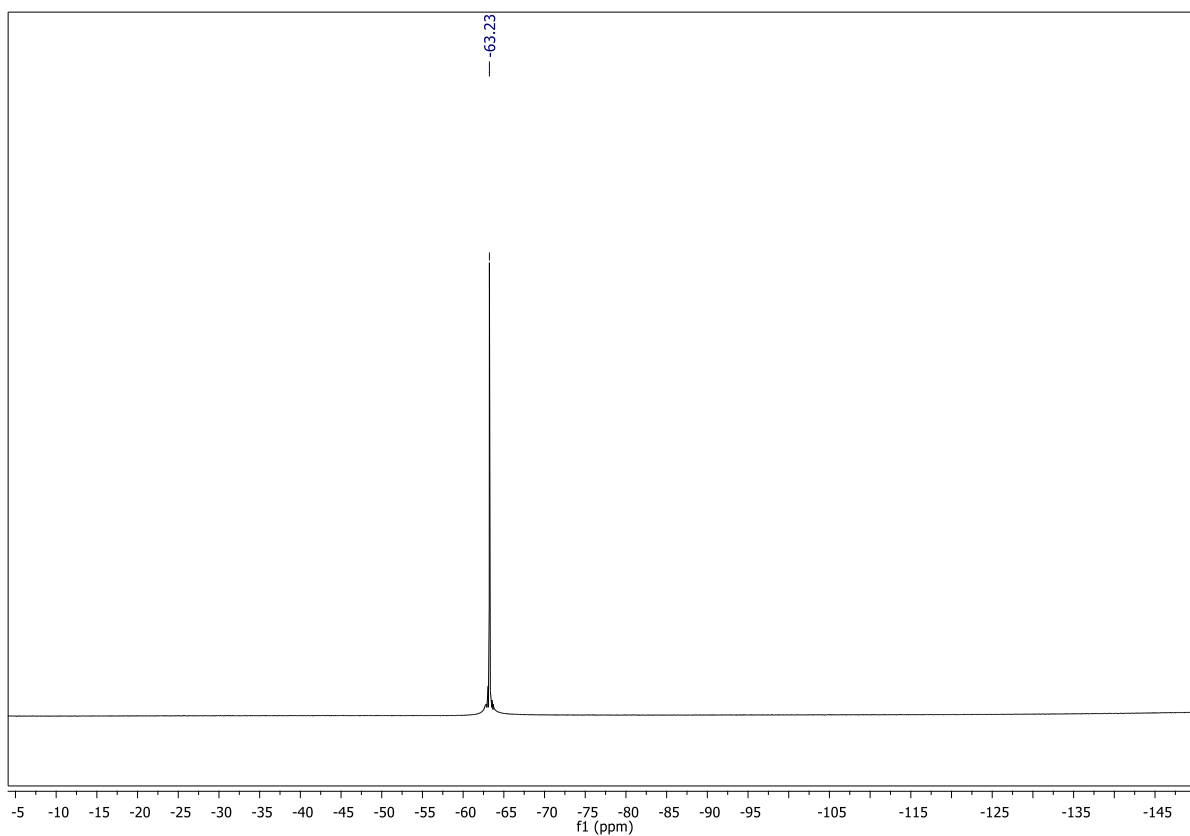




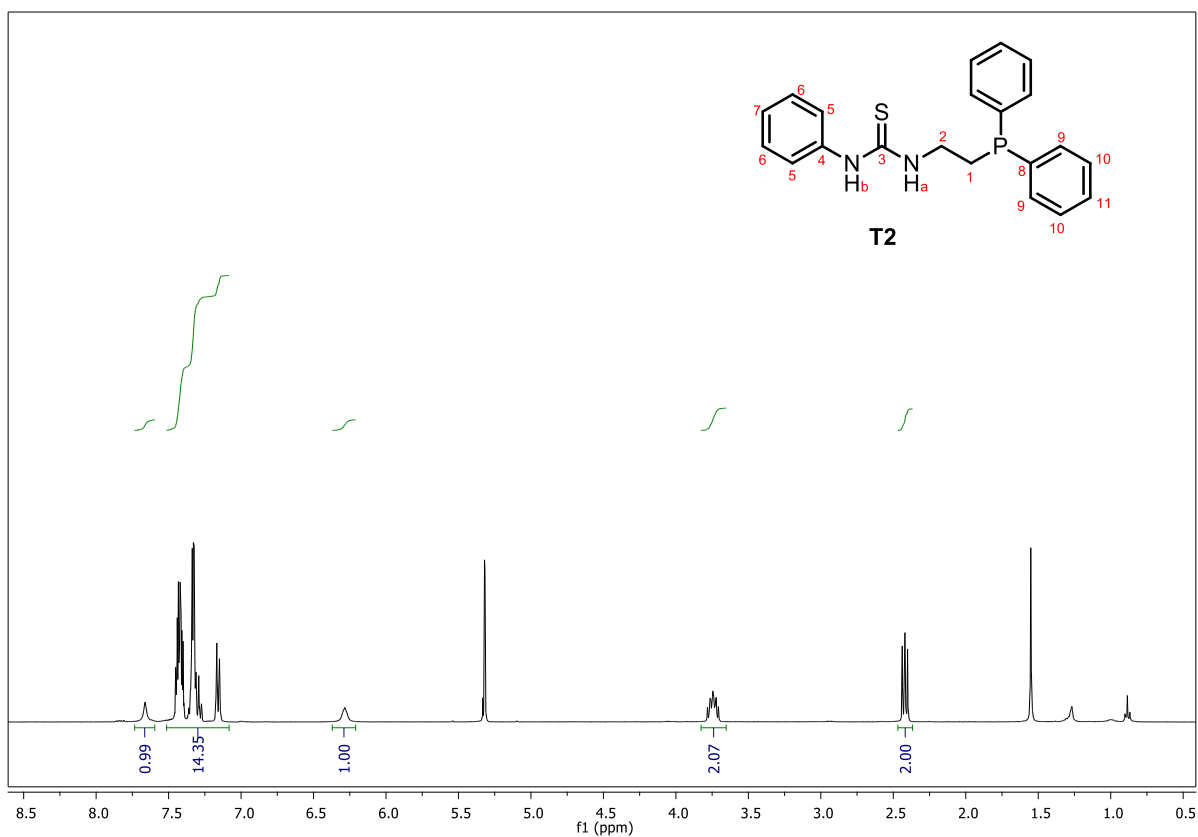
**Figure S7.**  $^1\text{H}$ ,  $^{13}\text{C}$ -APT,  $^{31}\text{P}\{^1\text{H}\}$  and  $^{19}\text{F}$  NMR spectra ( $\text{CD}_2\text{Cl}_2$ ) of complex **C1e**.

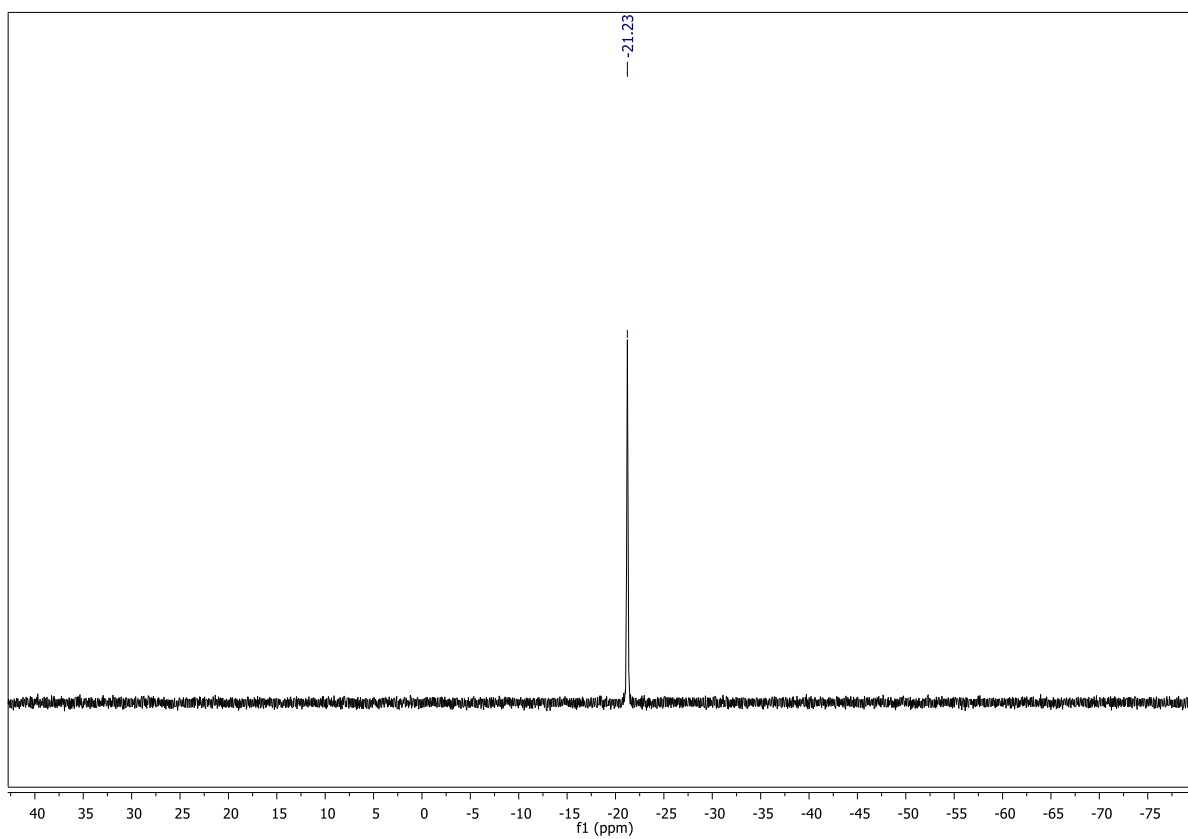
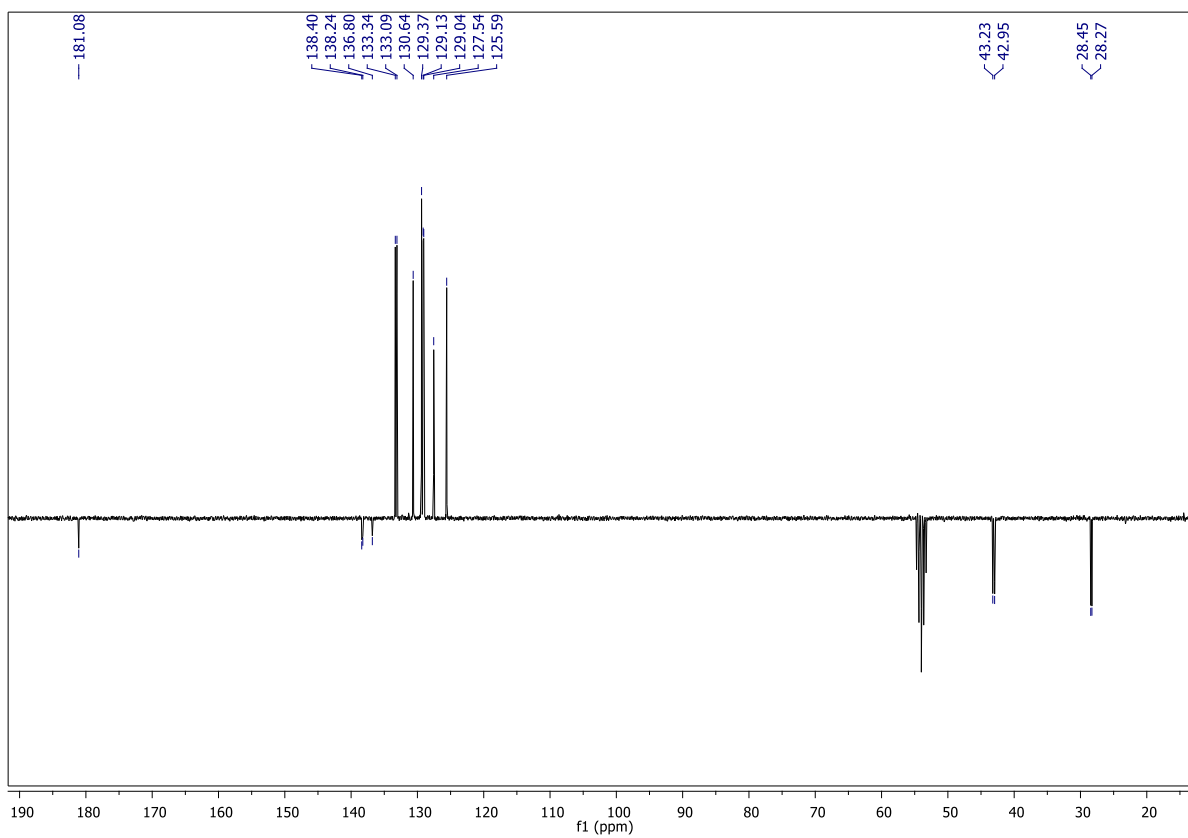




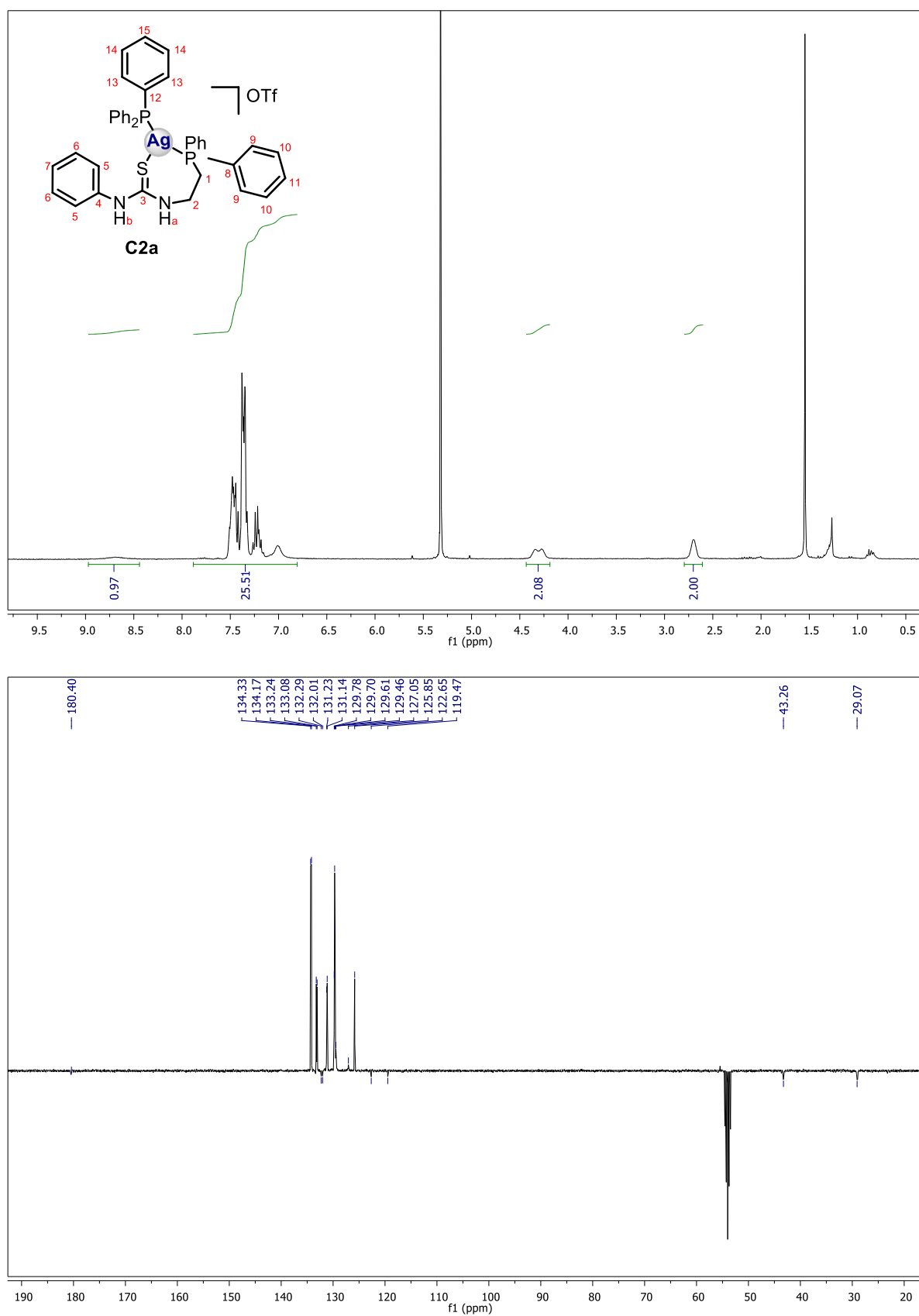


**Figure S8.** <sup>1</sup>H, <sup>13</sup>C-APT and <sup>31</sup>P{<sup>1</sup>H} NMR spectra (CD<sub>2</sub>Cl<sub>2</sub>) of **T2**.

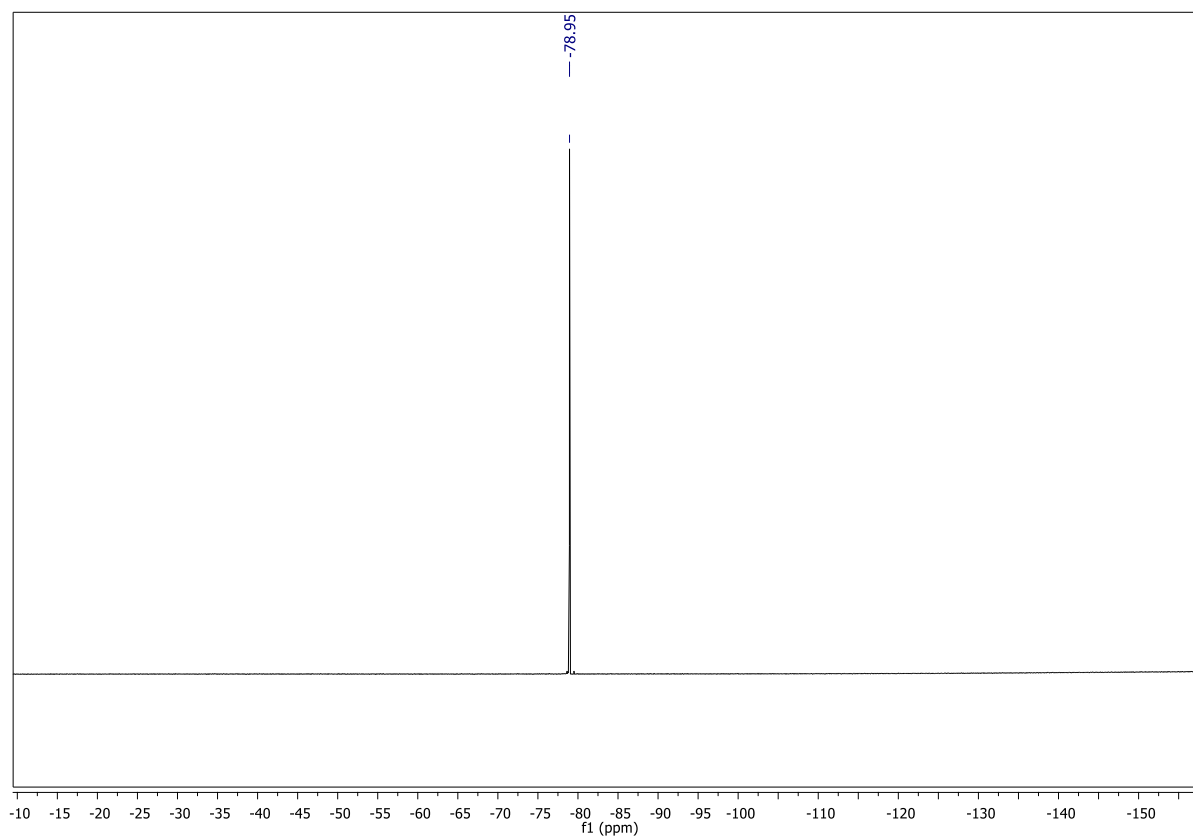
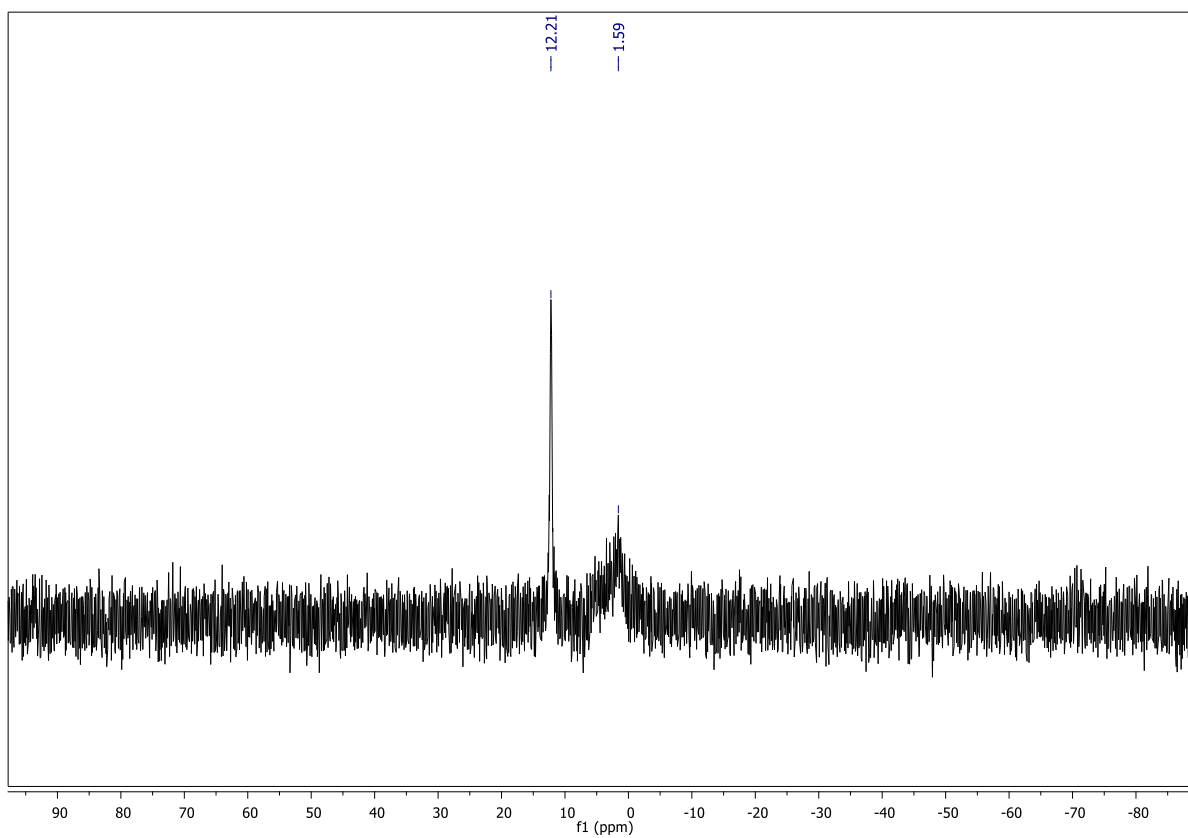




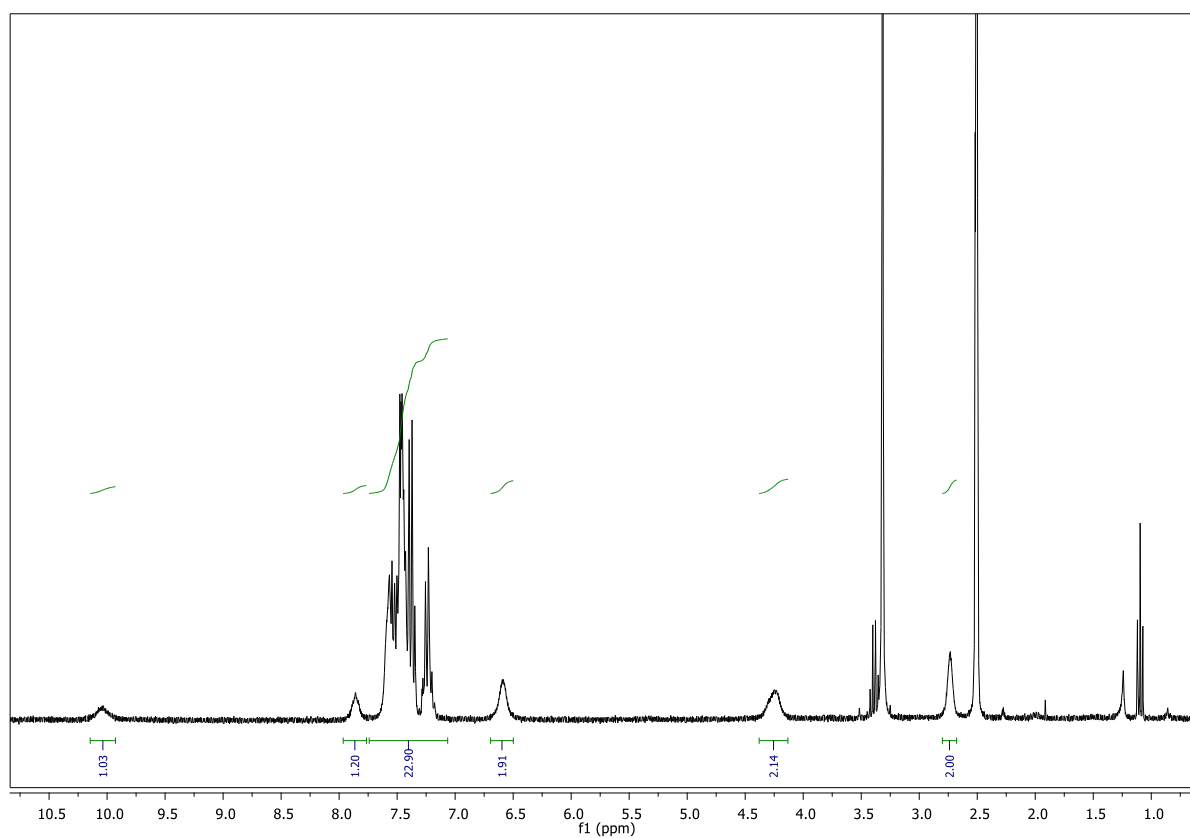
**Figure S9.**  $^1\text{H}$ ,  $^{13}\text{C}$ -APT,  $^{31}\text{P}\{^1\text{H}\}$  and  $^{19}\text{F}$  NMR spectra ( $\text{CD}_2\text{Cl}_2$ ) for complex **C2a**.



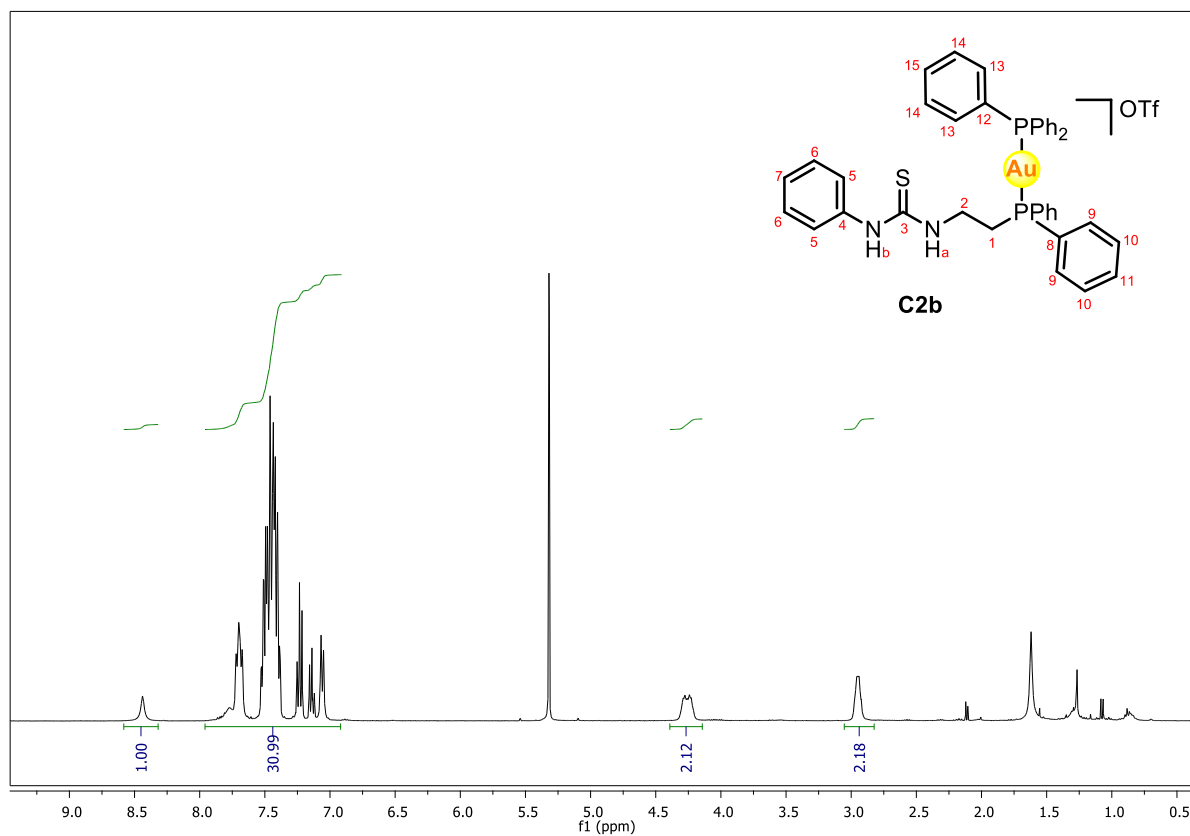


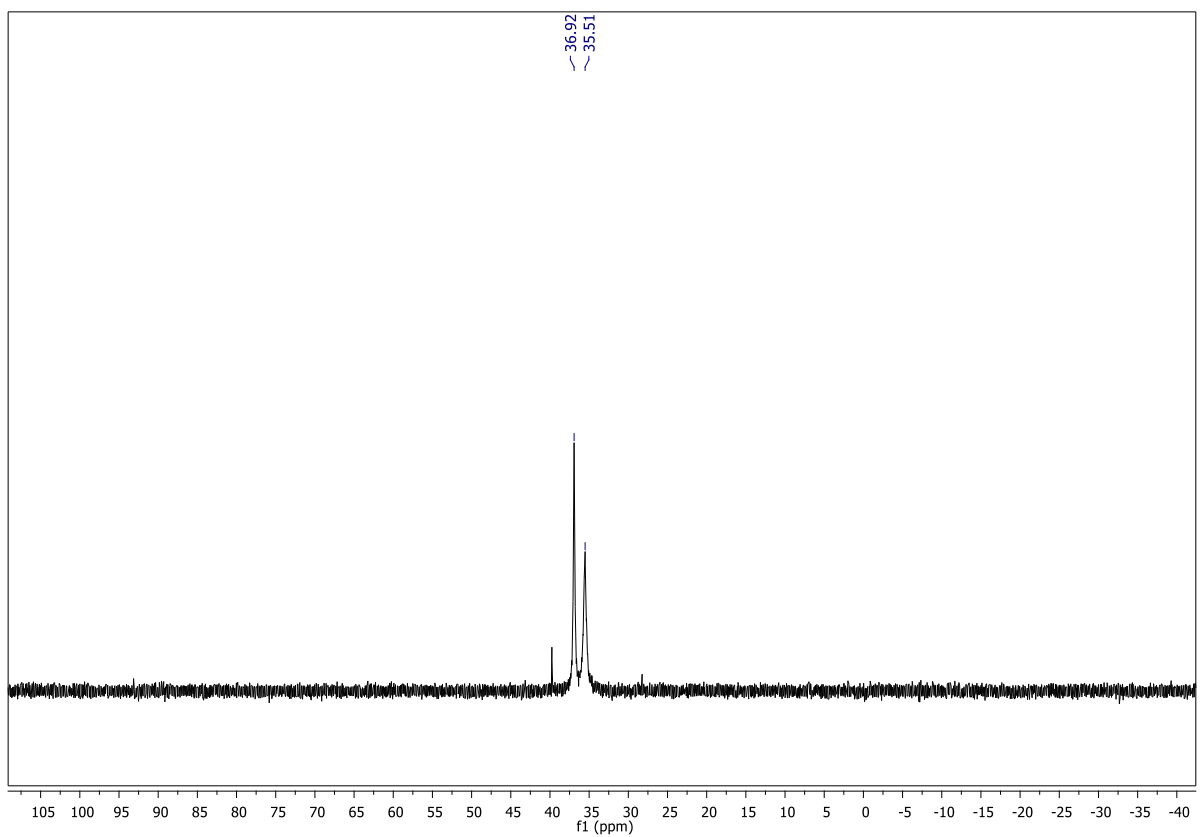
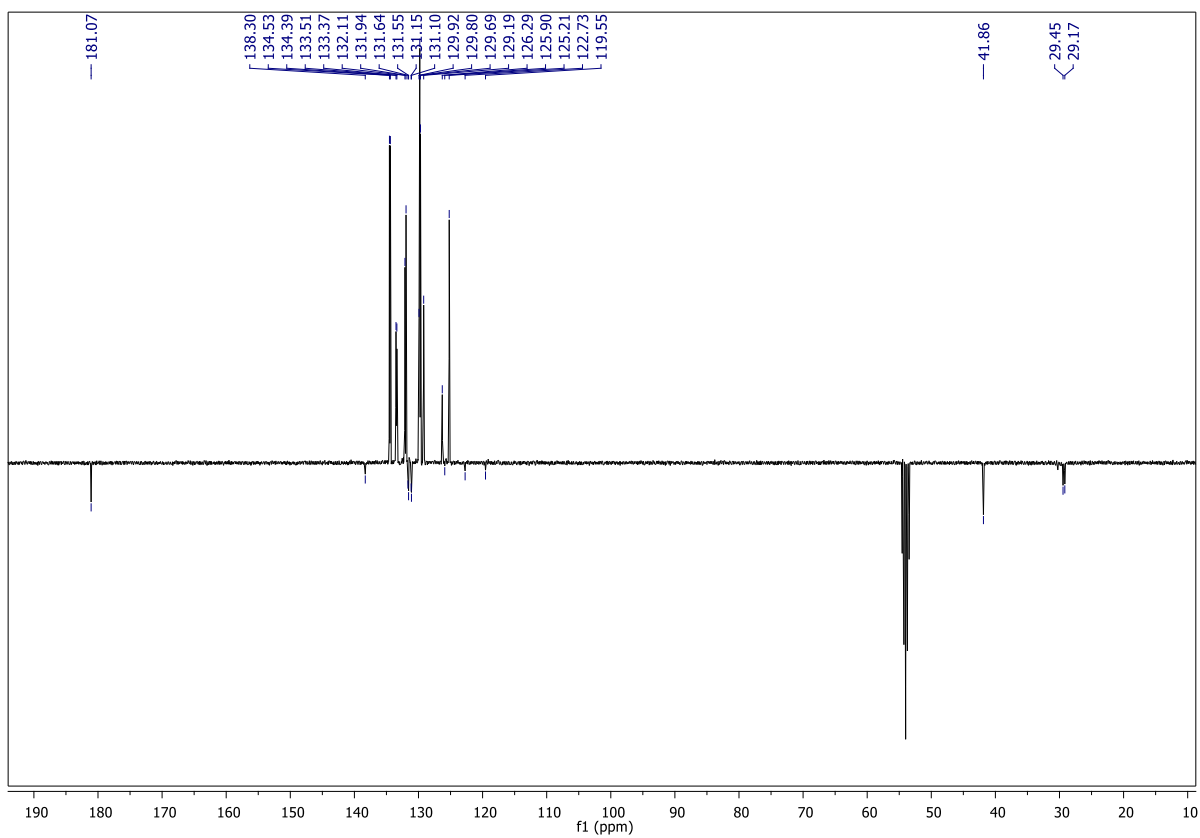


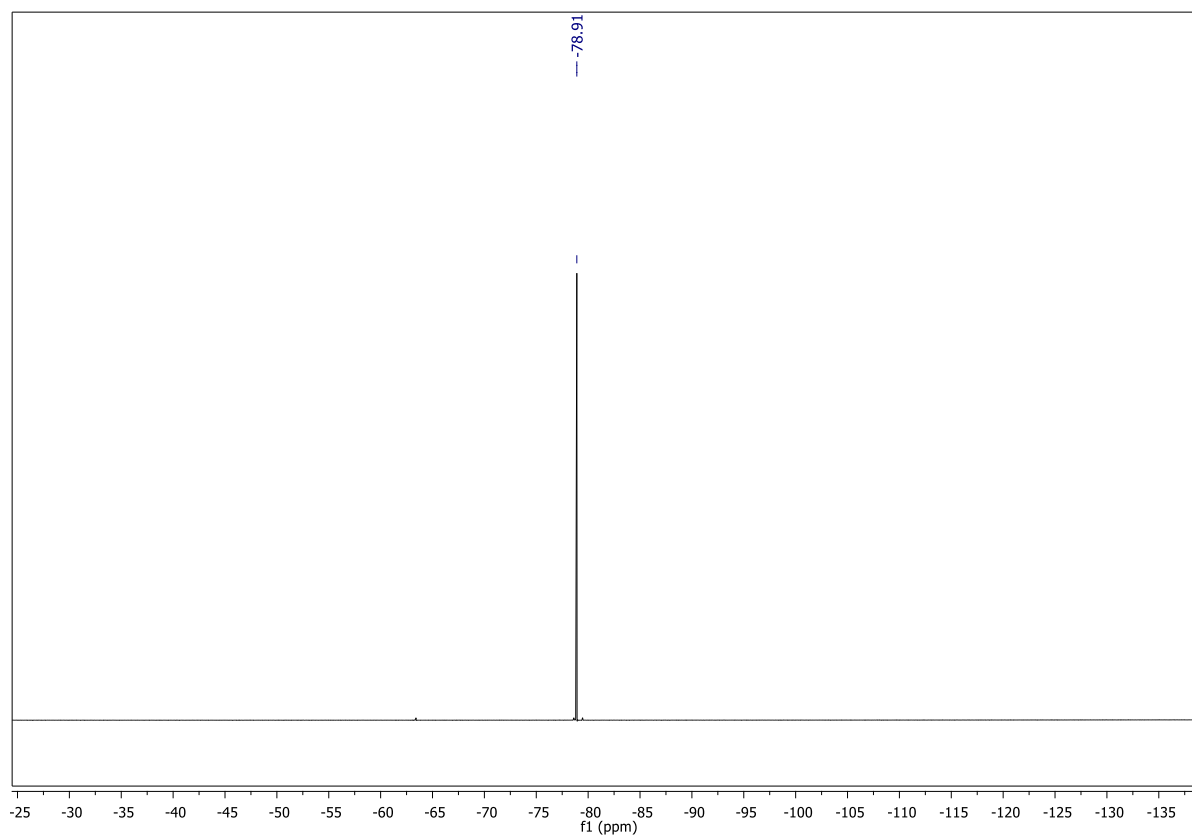
**Figure S10.**  $^1\text{H}$  NMR spectrum ( $\text{DMSO}-d_6$ ) for complex **C2a**.



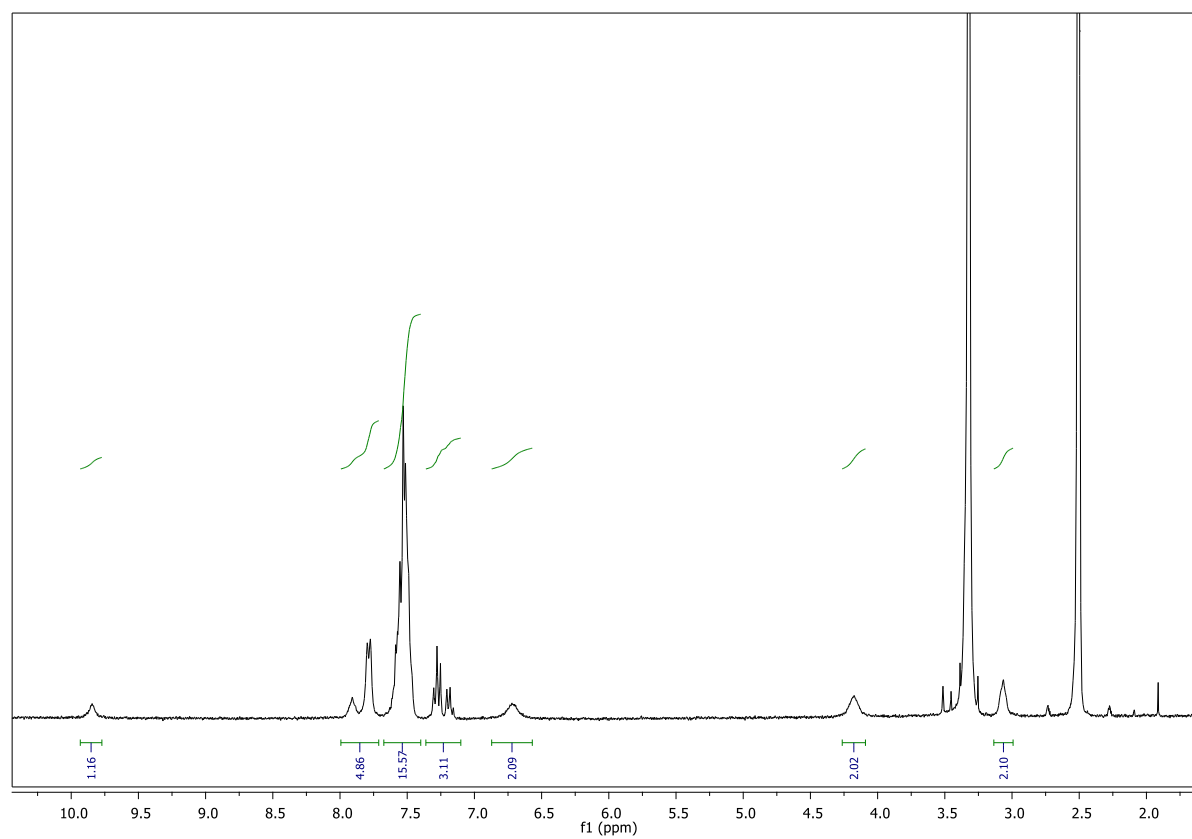
**Figure S11.**  $^1\text{H}$ ,  $^{13}\text{C}$ -APT,  $^{31}\text{P}\{^1\text{H}\}$  and  $^{19}\text{F}$  NMR spectra ( $\text{CD}_2\text{Cl}_2$ ) for complex **C2b**.



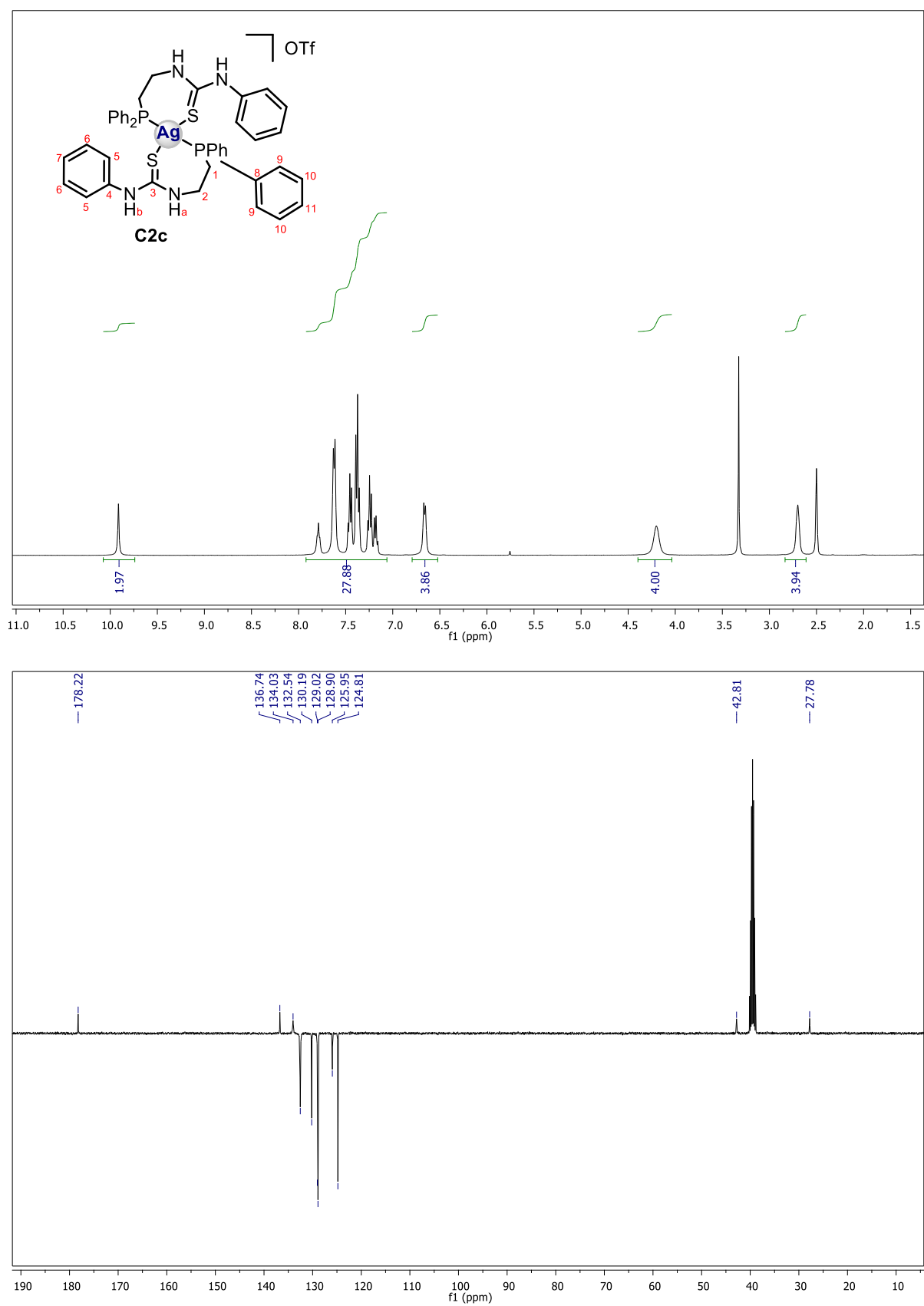


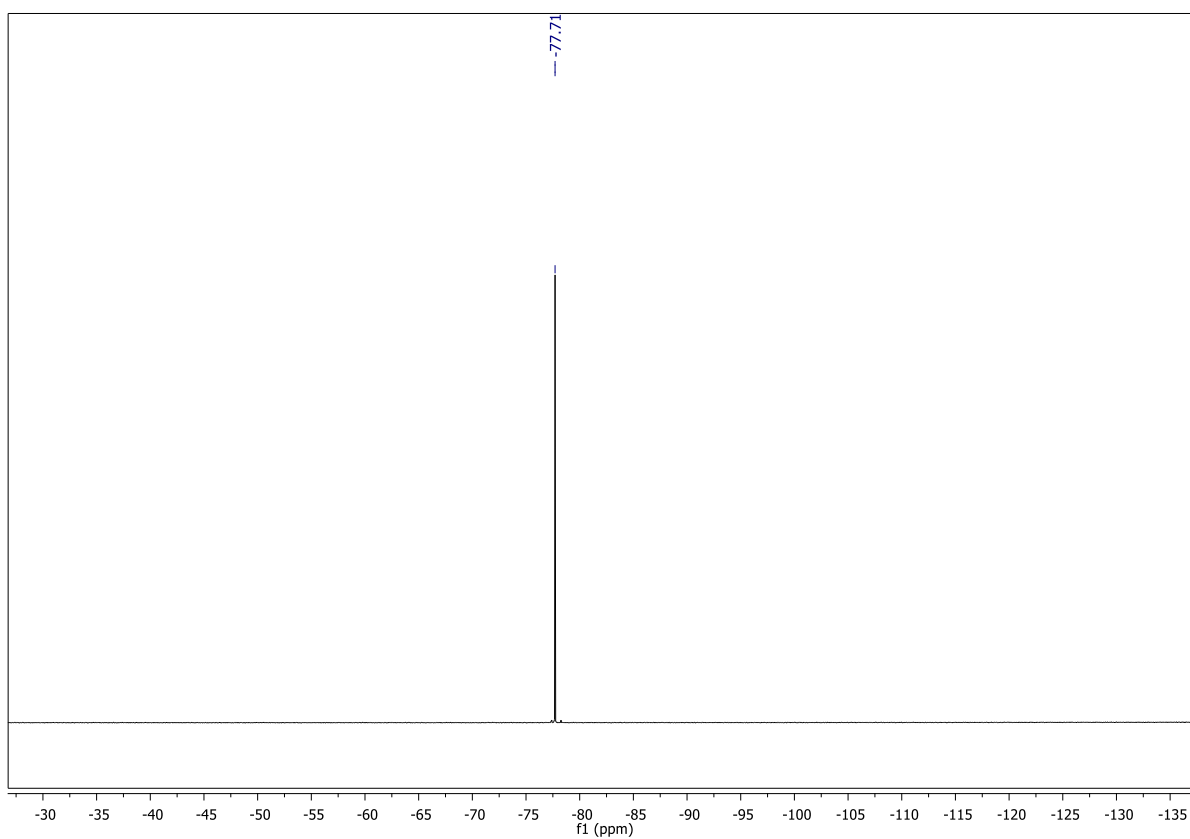
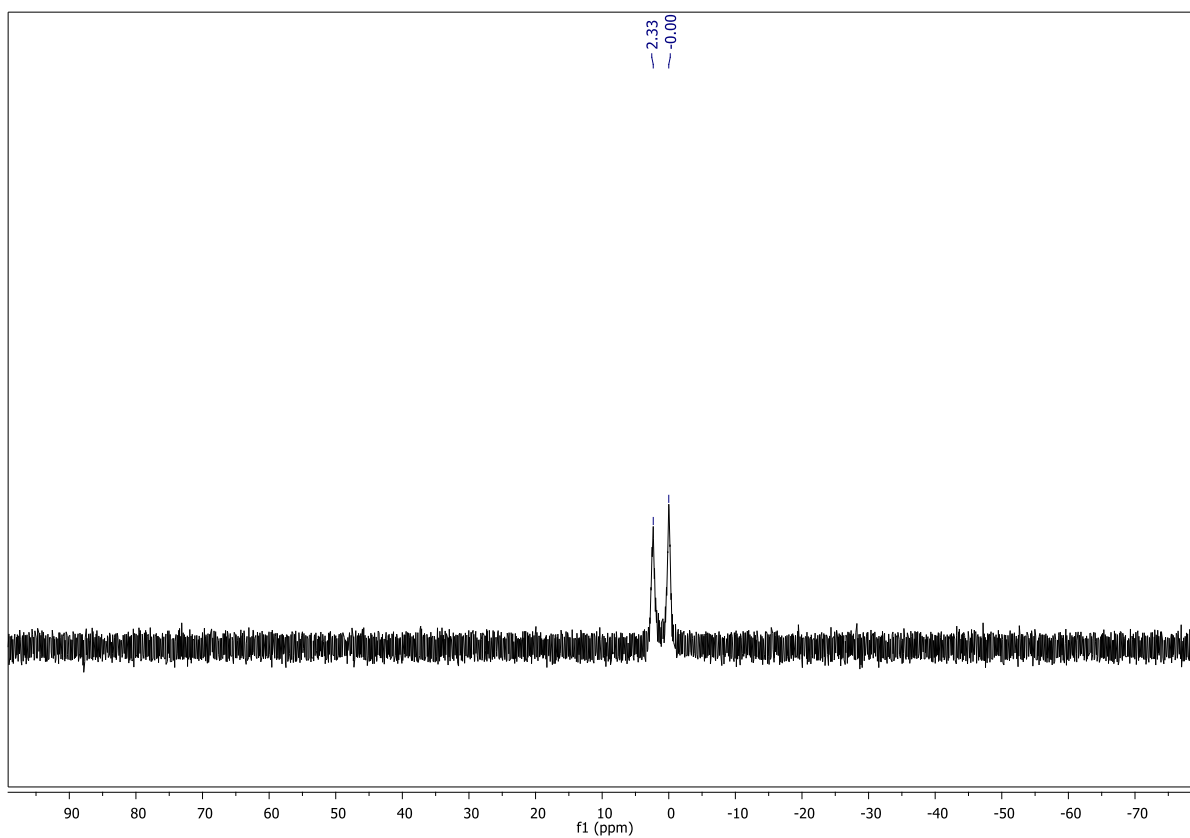


**Figure S12.**  $^1\text{H}$  NMR spectrum ( $\text{DMSO-}d_6$ ) for complex **C2b**.

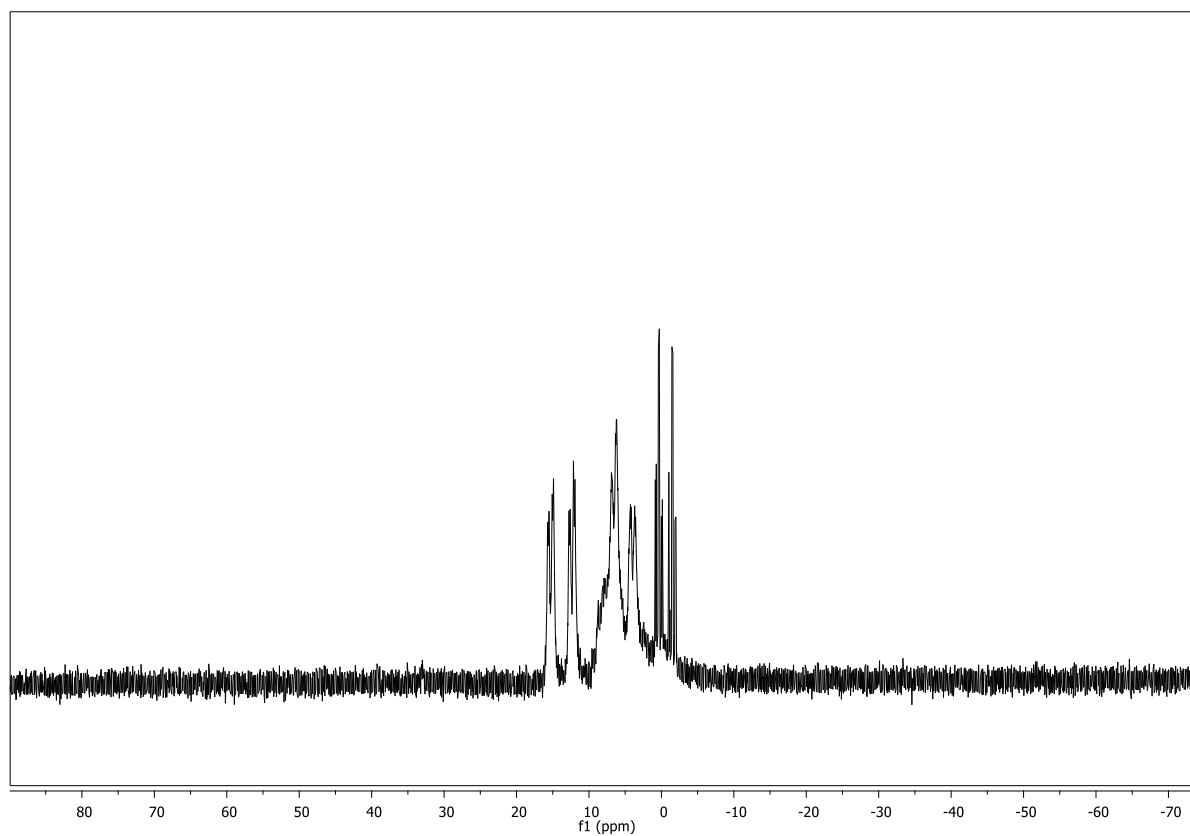


**Figure S13.**  $^1\text{H}$ ,  $^{13}\text{C}$ -APT,  $^{31}\text{P}\{^1\text{H}\}$  and  $^{19}\text{F}$  NMR spectra (DMSO- $d_6$ ) for complex **C2c**.

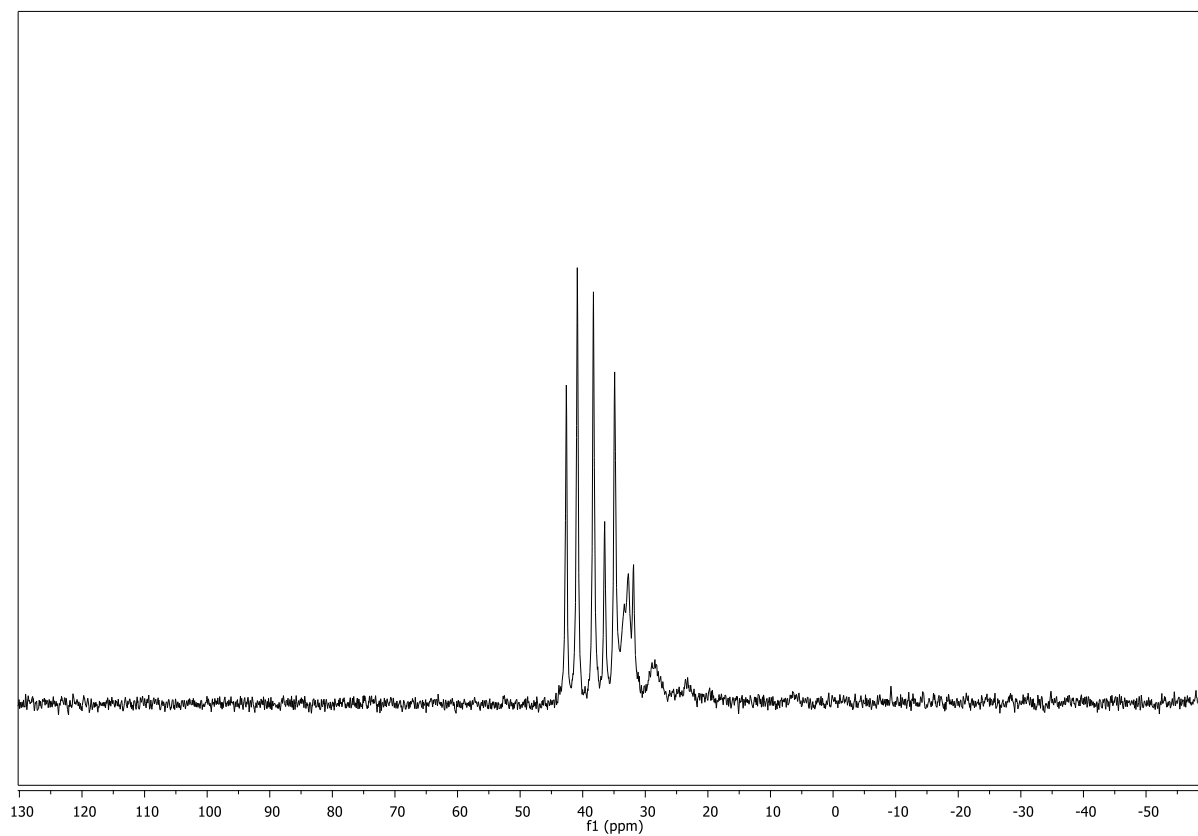




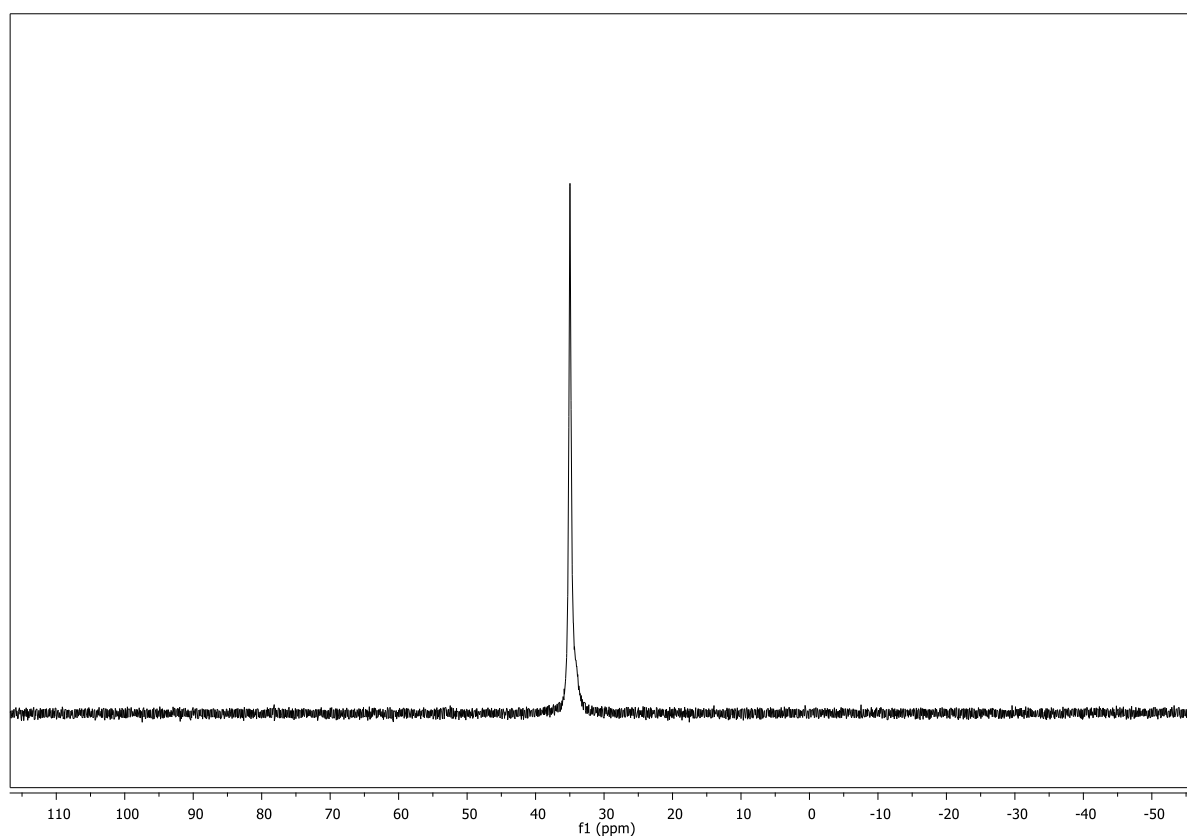
**Figure S14.**  $^{31}\text{P}\{^1\text{H}\}$  NMR spectrum ( $\text{CD}_2\text{Cl}_2$ ) at 193 K for complex **C1a**.



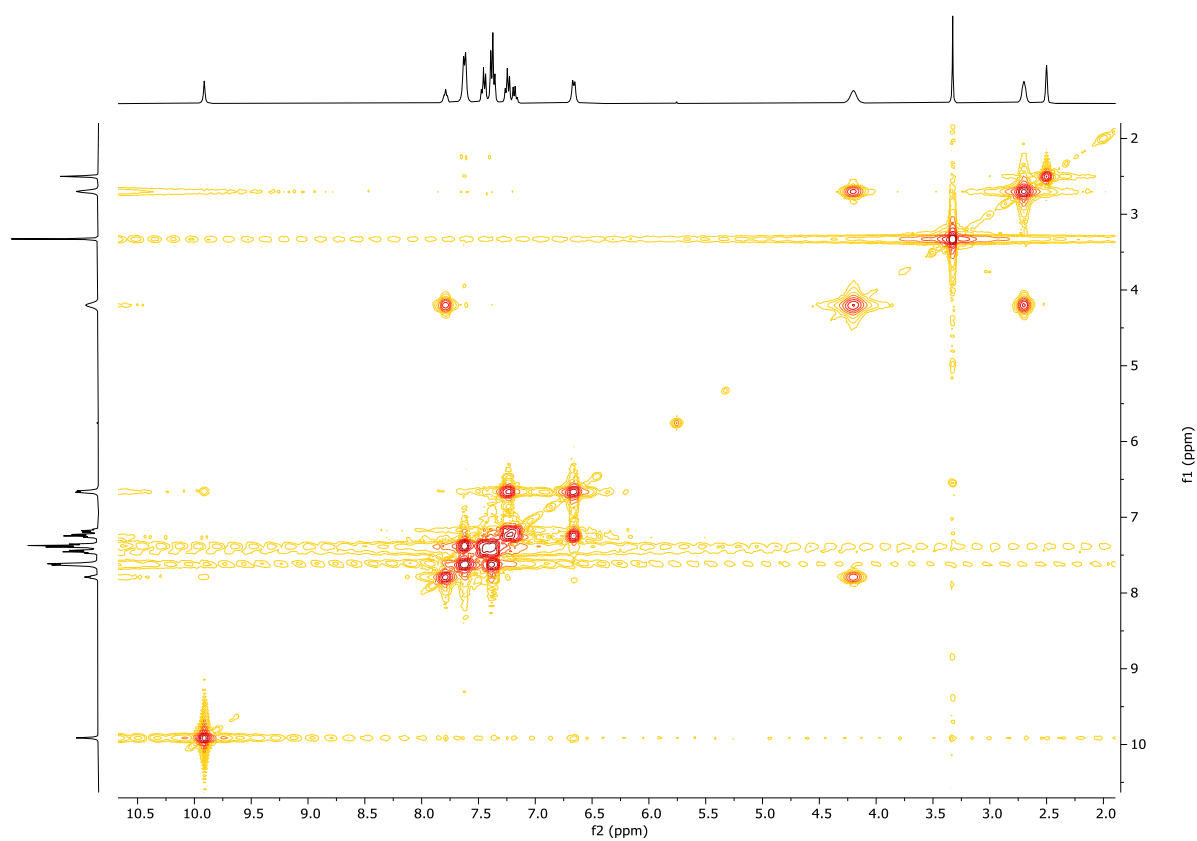
**Figure S15.**  $^{31}\text{P}\{^1\text{H}\}$  NMR spectrum ( $\text{CD}_2\text{Cl}_2$ ) at 193 K for complex **C1b**.



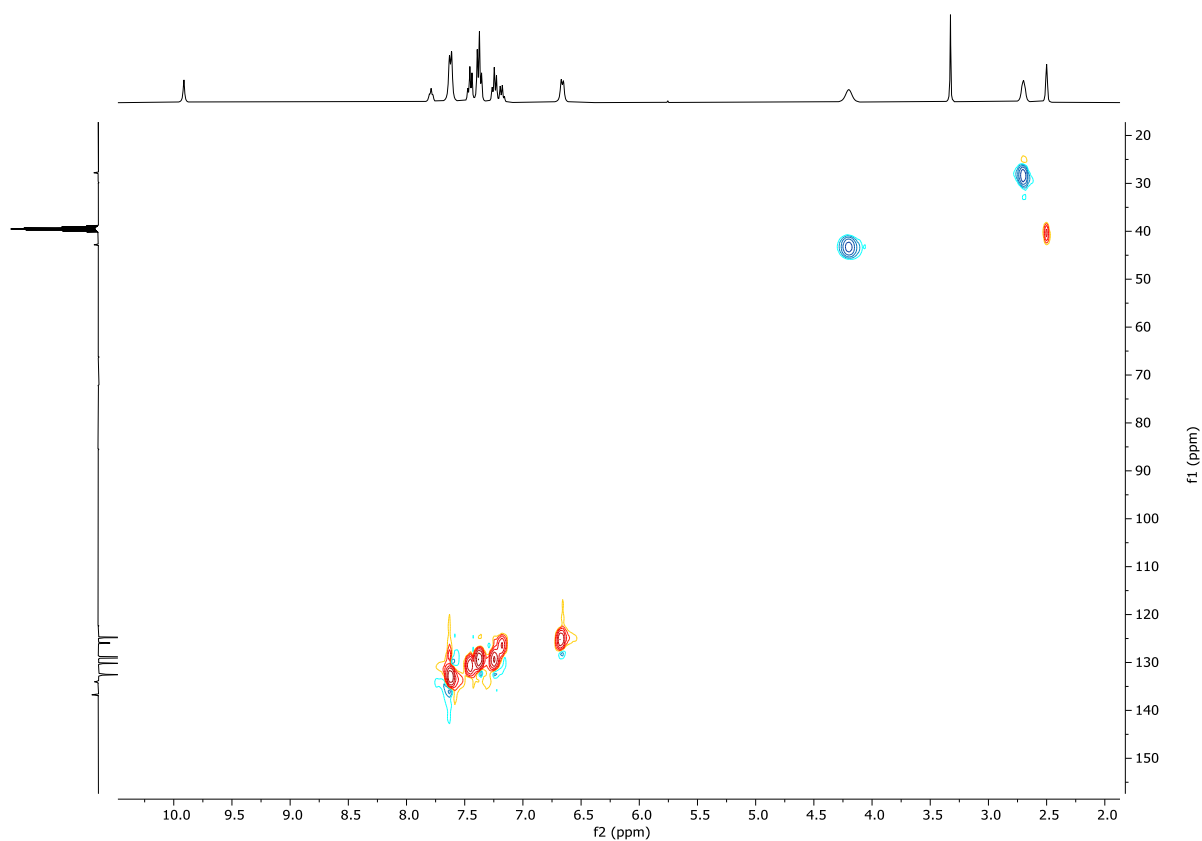
**Figure S16.**  $^{31}\text{P}\{^1\text{H}\}$  NMR spectrum ( $\text{CD}_2\text{Cl}_2$ ) at 193 K for complex **C1c**.



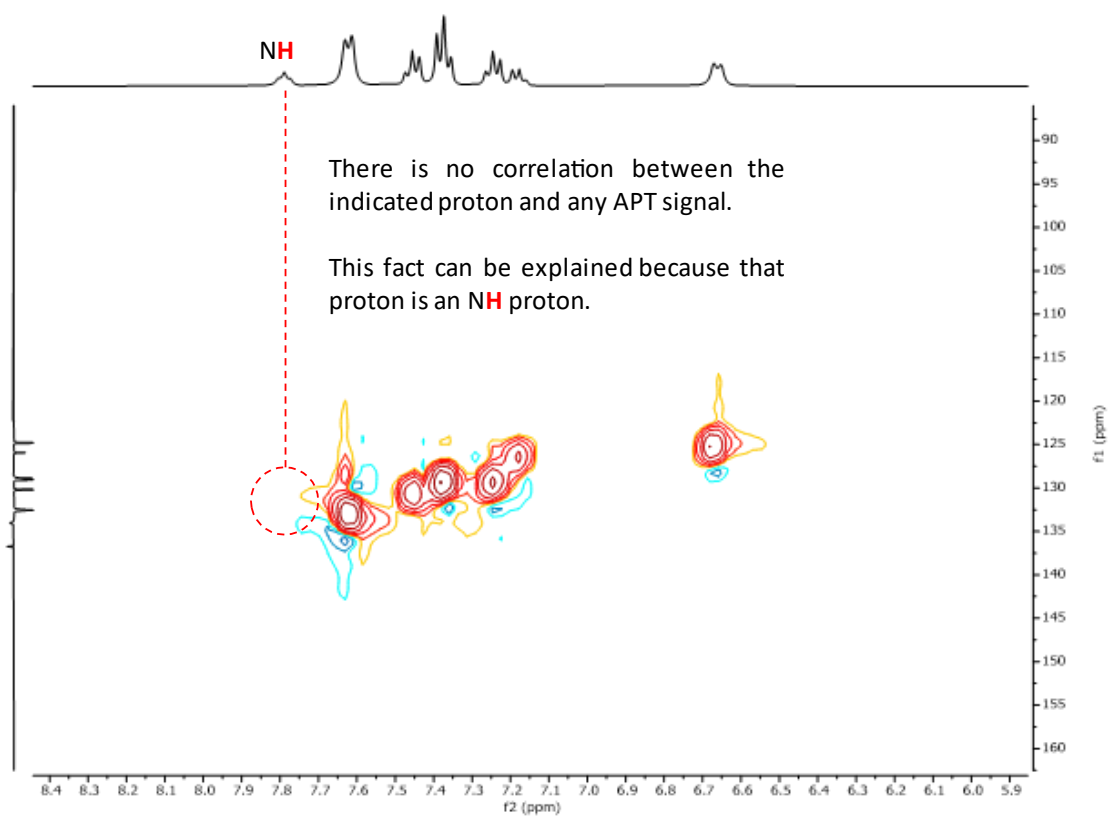
**Figure S17.** HSQC and COSY NMR spectra of **C2c** to explain the correlation among protons and proton-carbon on C1 and C2.

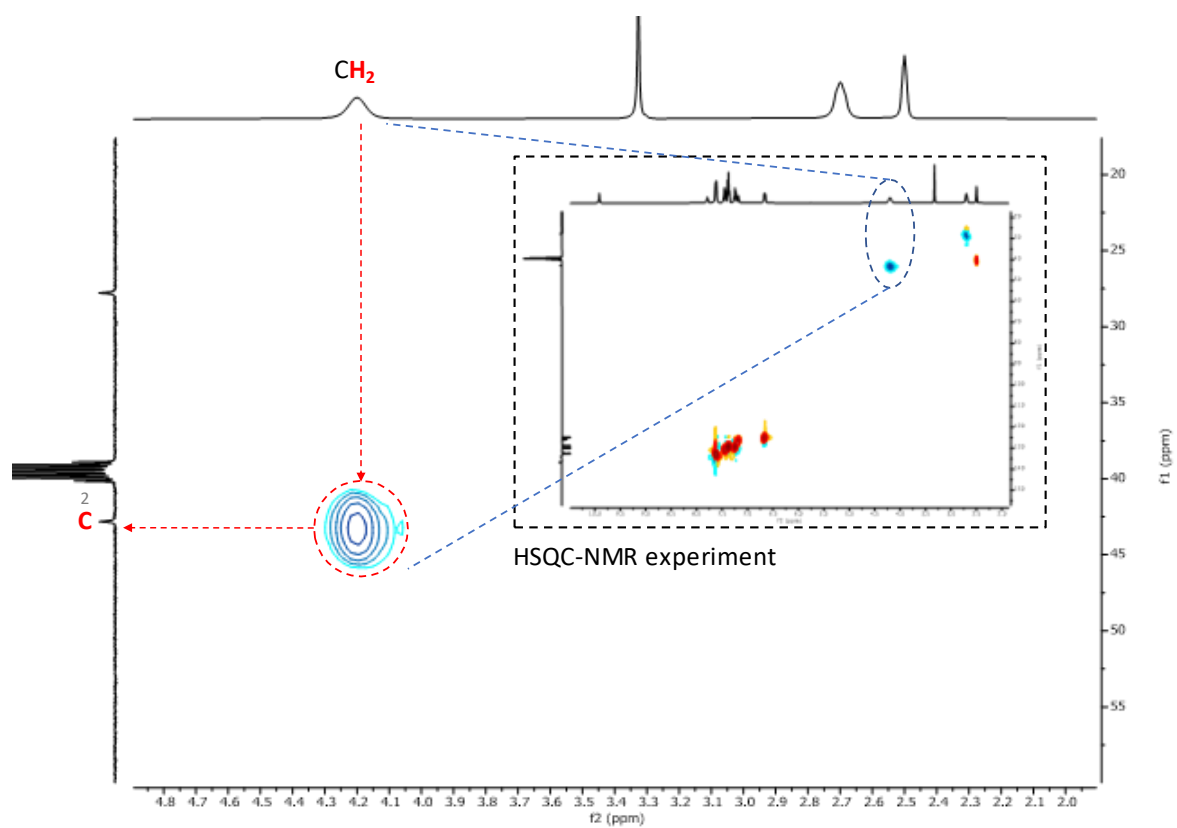
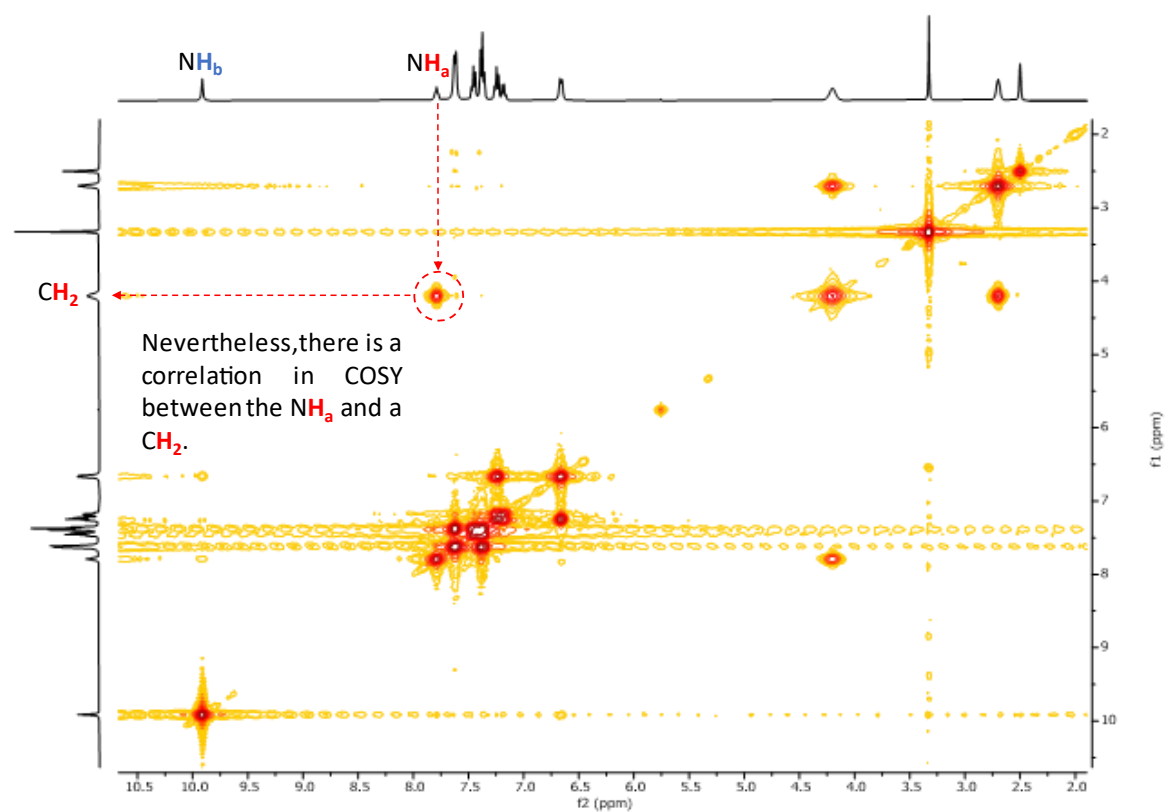


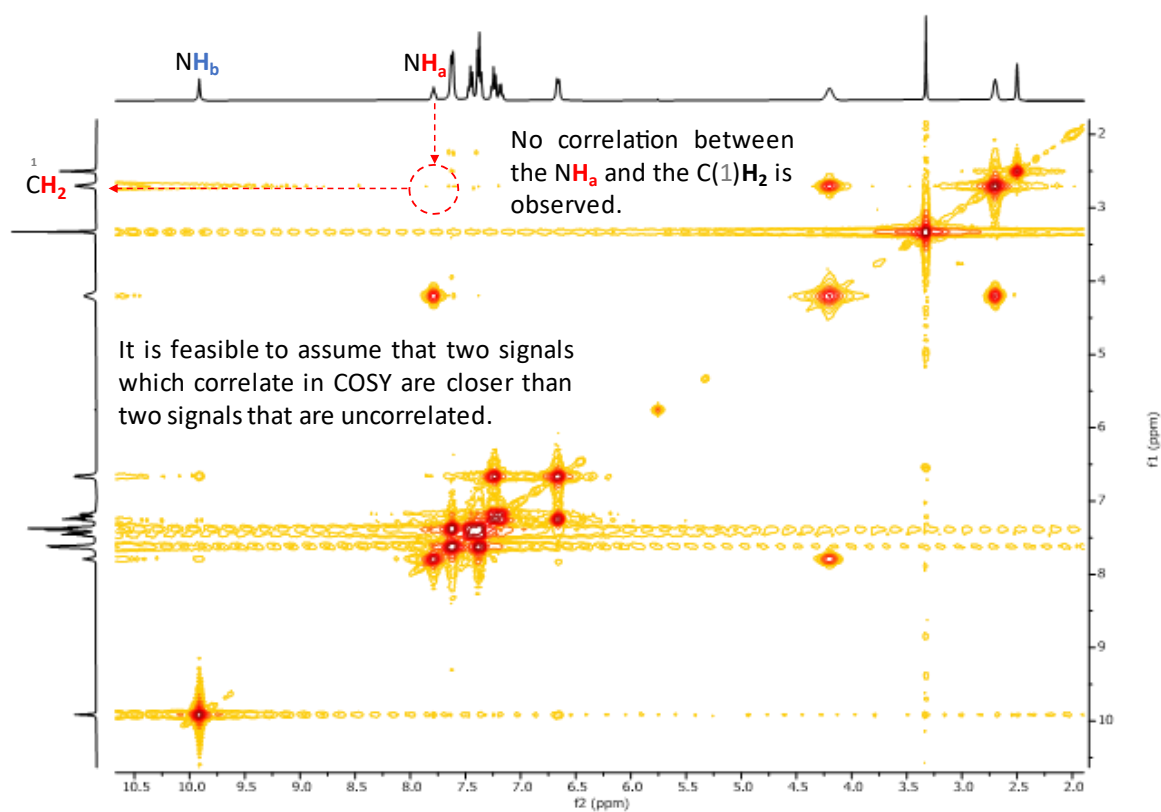




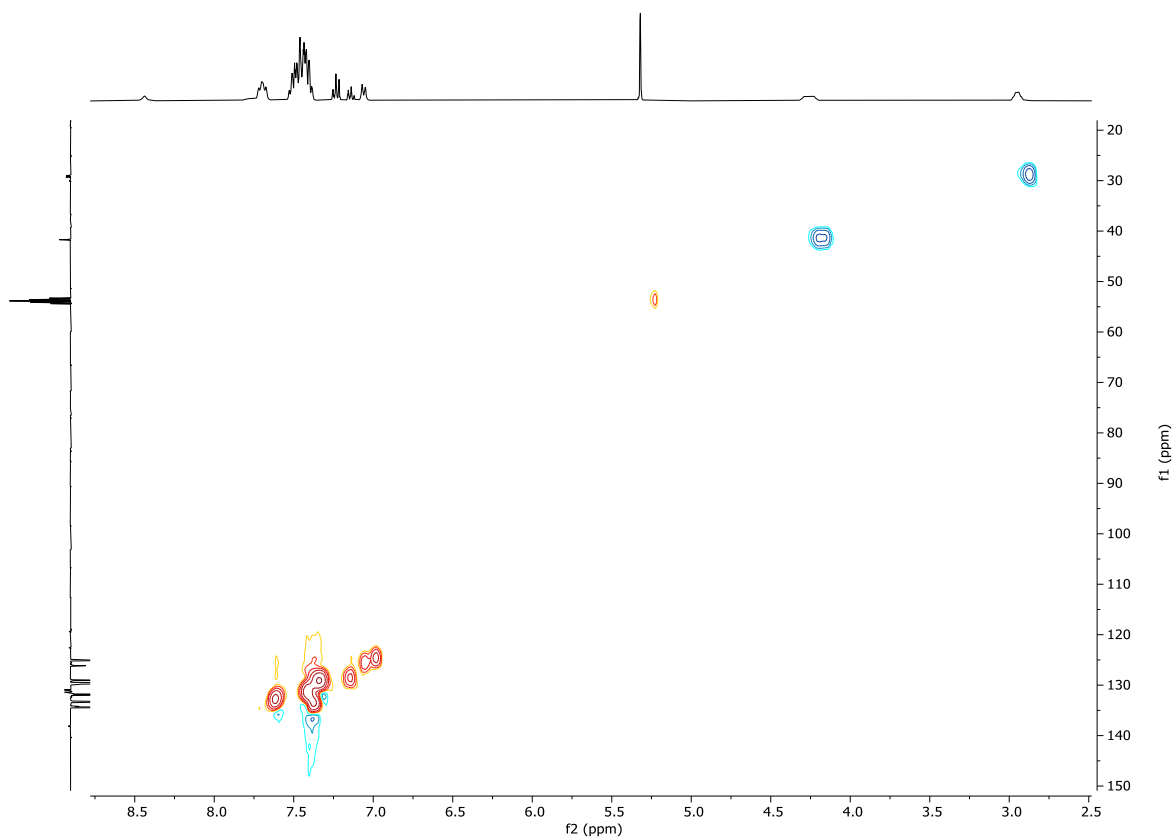
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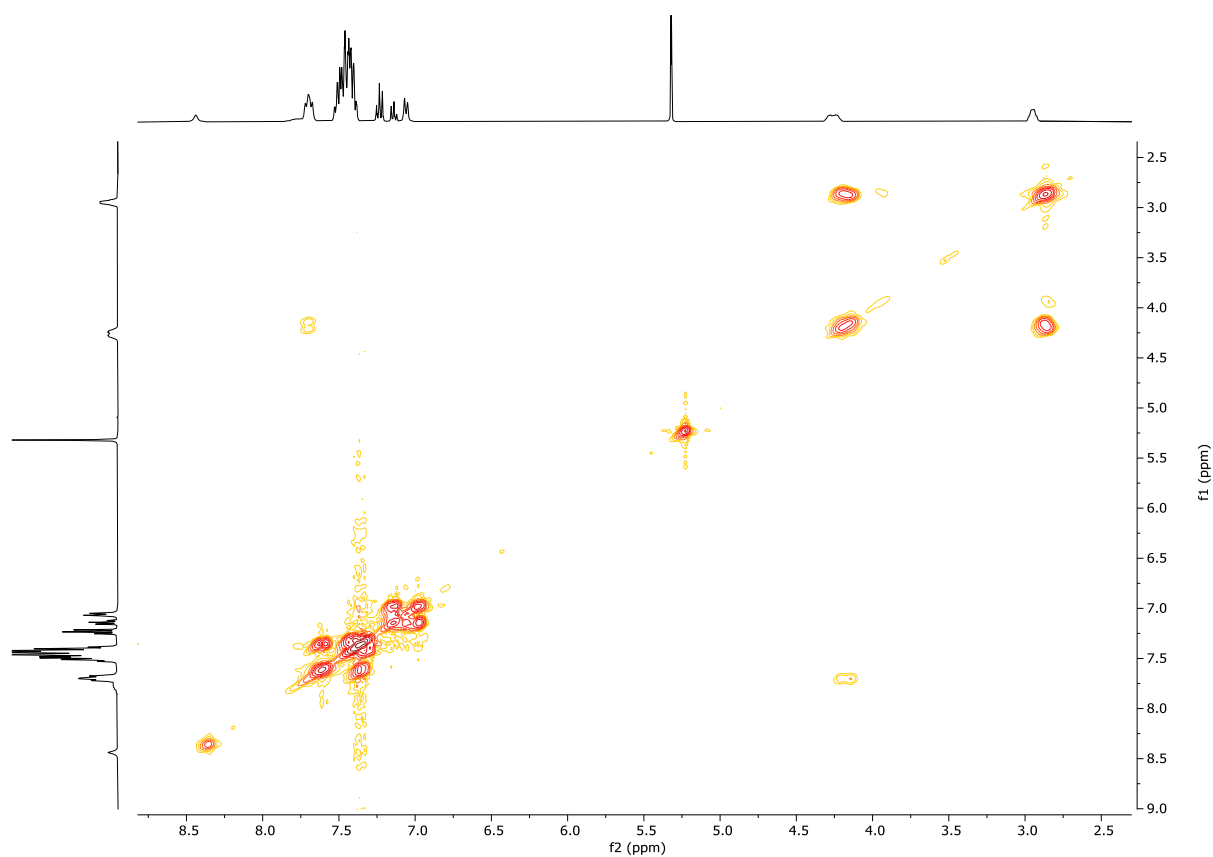






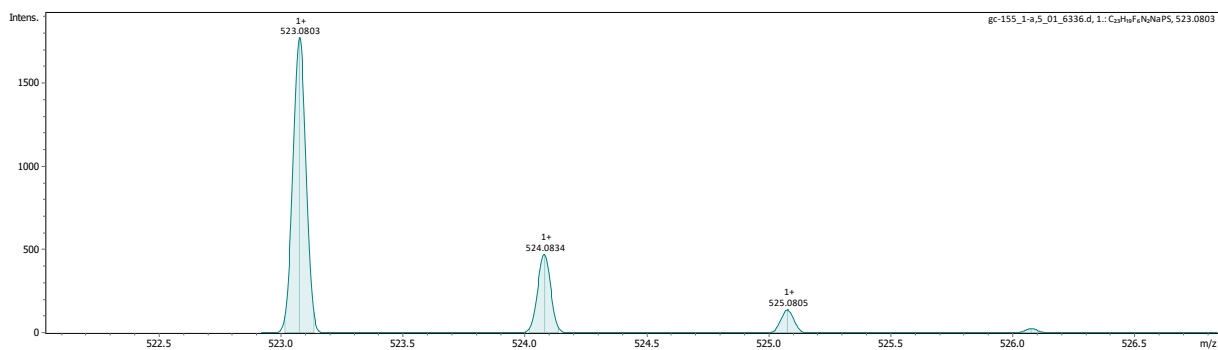
**Figure S18.** HSQC and COSY NMR spectra of **C2b** to explain the correlation among protons and proton-carbon on C1 and C2.



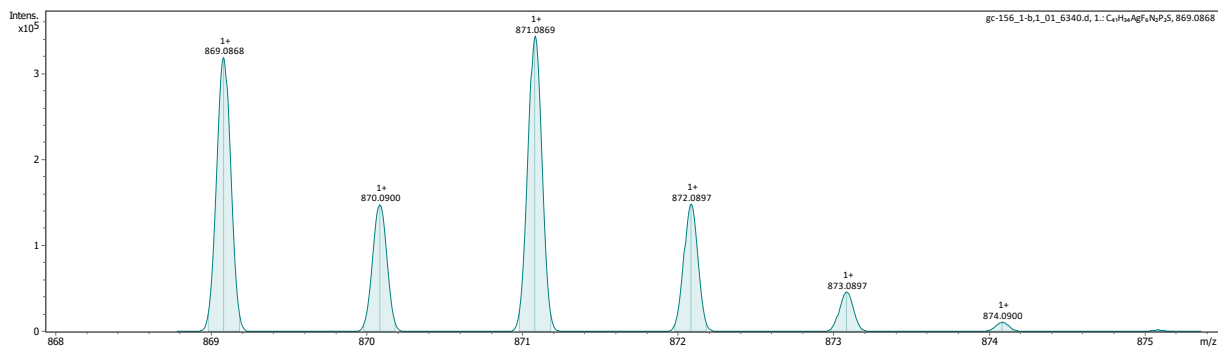


**Figure S19.** ESI-mass for all compounds

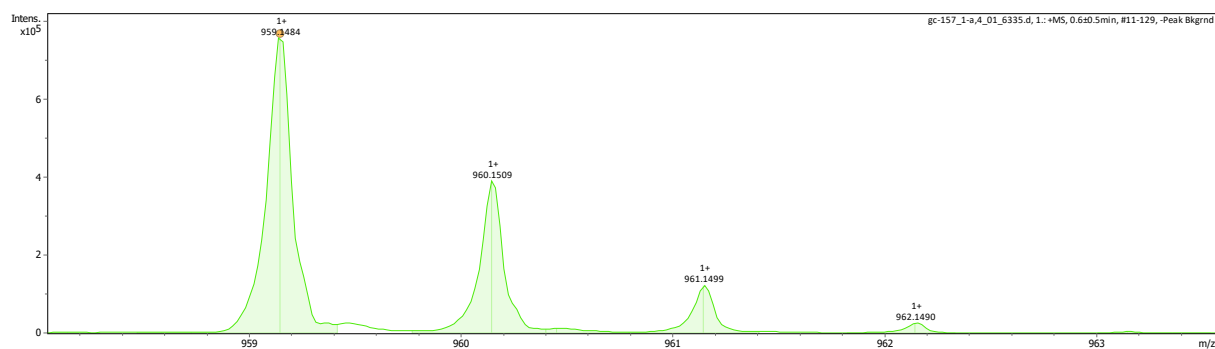
**T1**



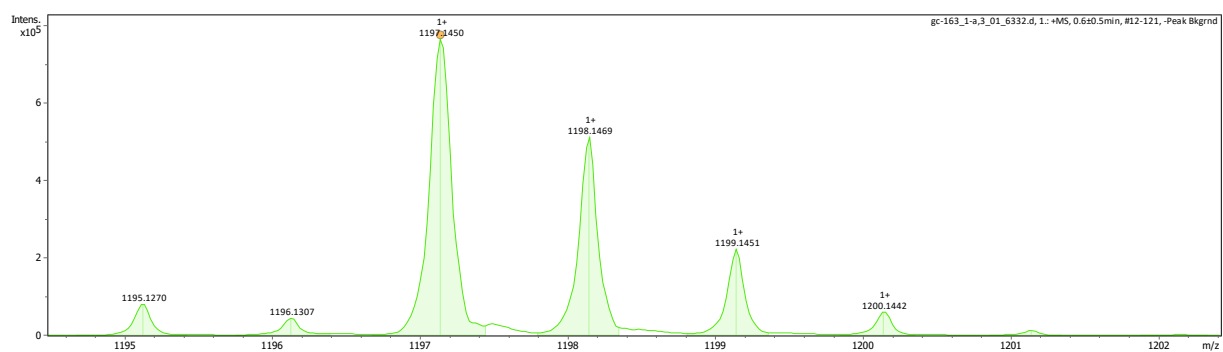
**C1a**



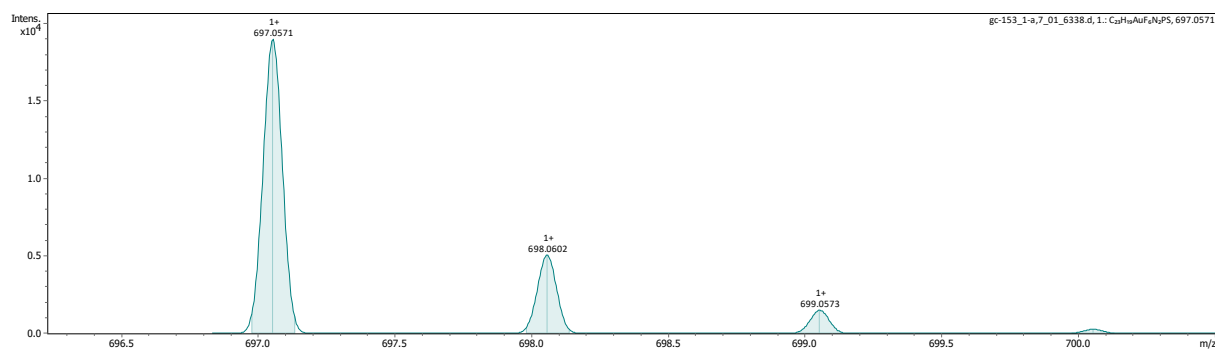
## C1b



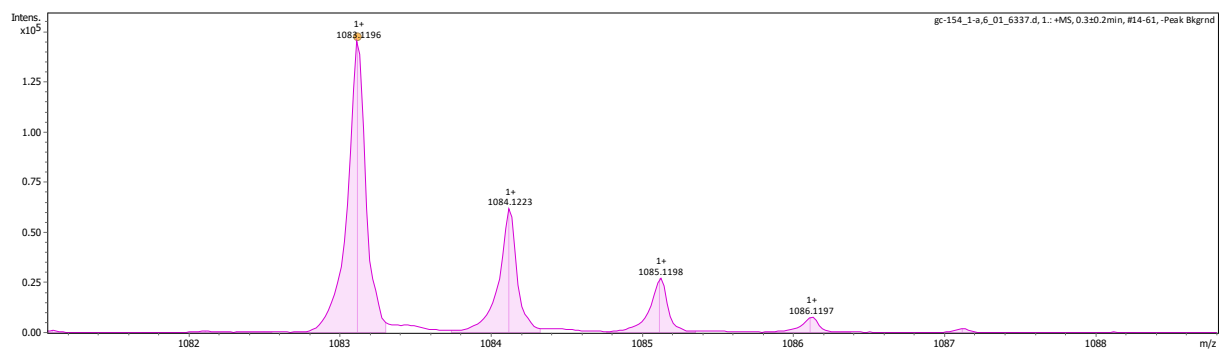
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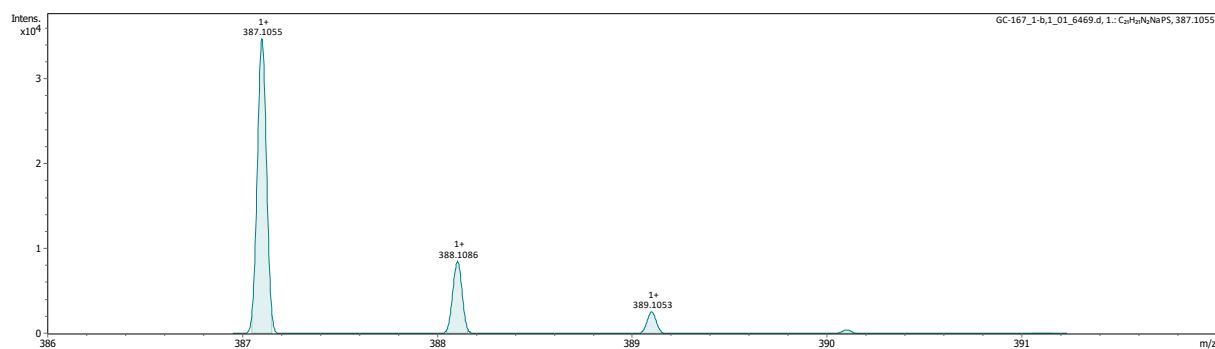
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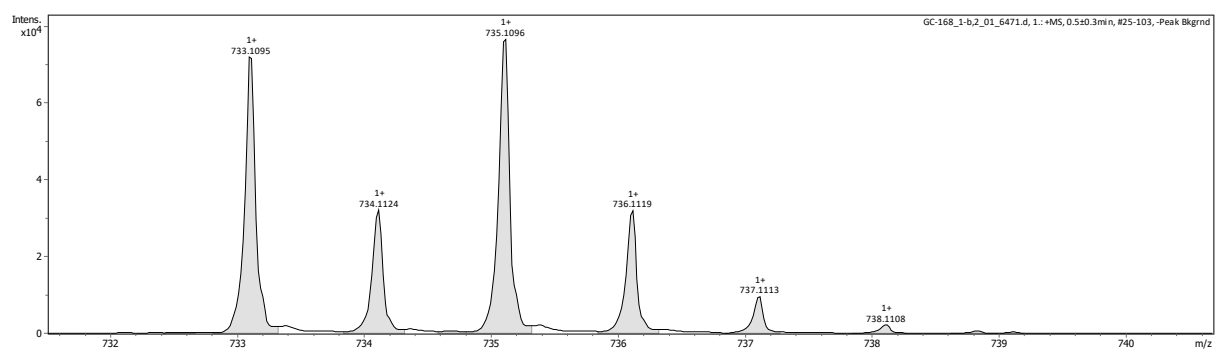
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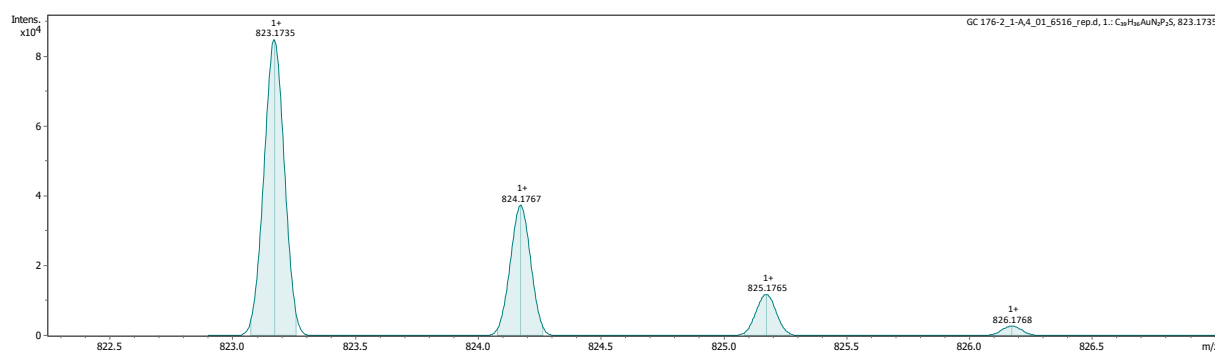
**T2**



**C2a**



**C2b**



**C2c**

