

Controlled Growth of Cu and CuO_x Thin Films from Subvalent Copper Precursors

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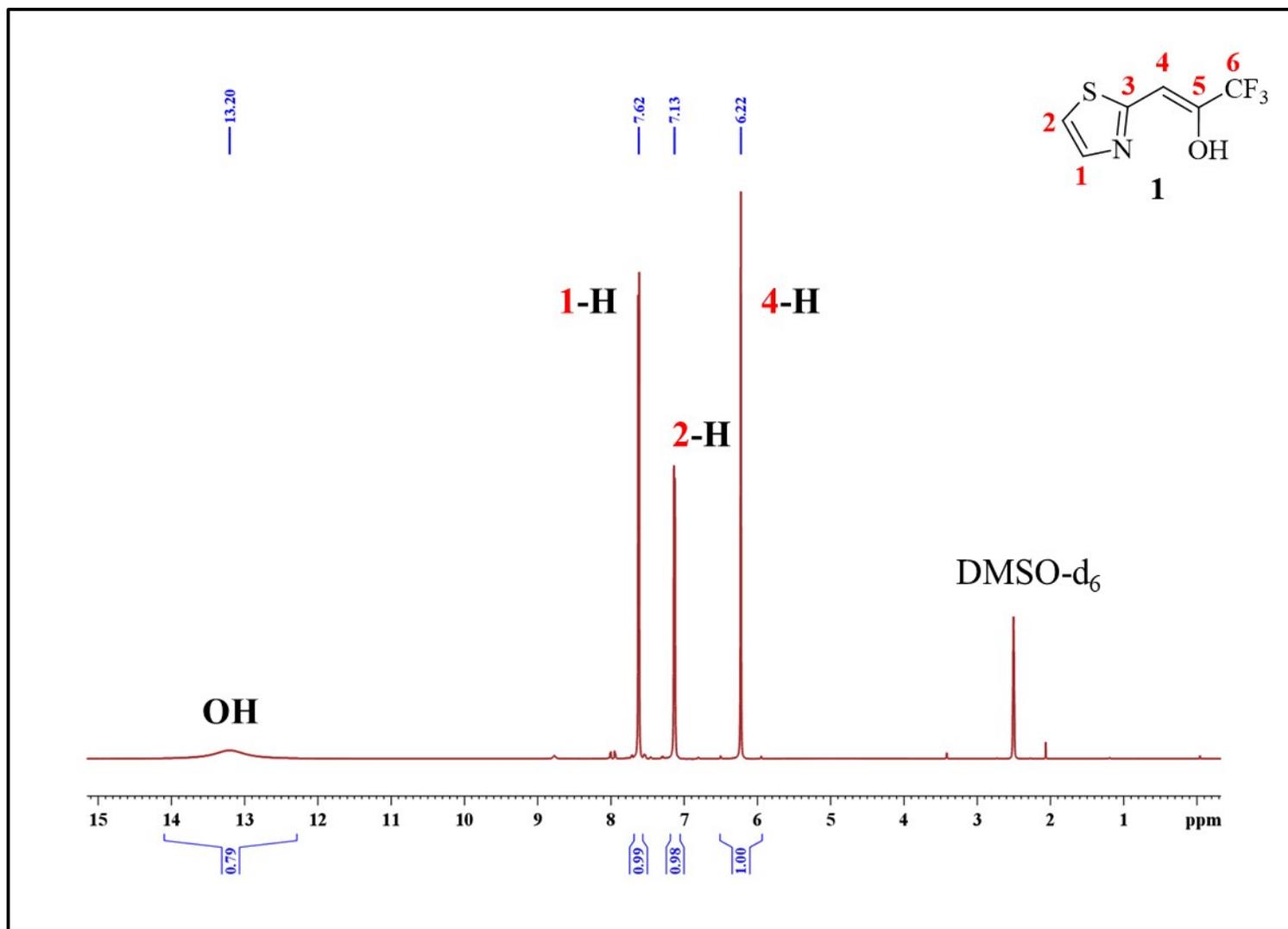


Figure 1: ¹H NMR Spectrum of (2) in DMSO-*d*₆ at RT with schematic and arbitrary numbering.

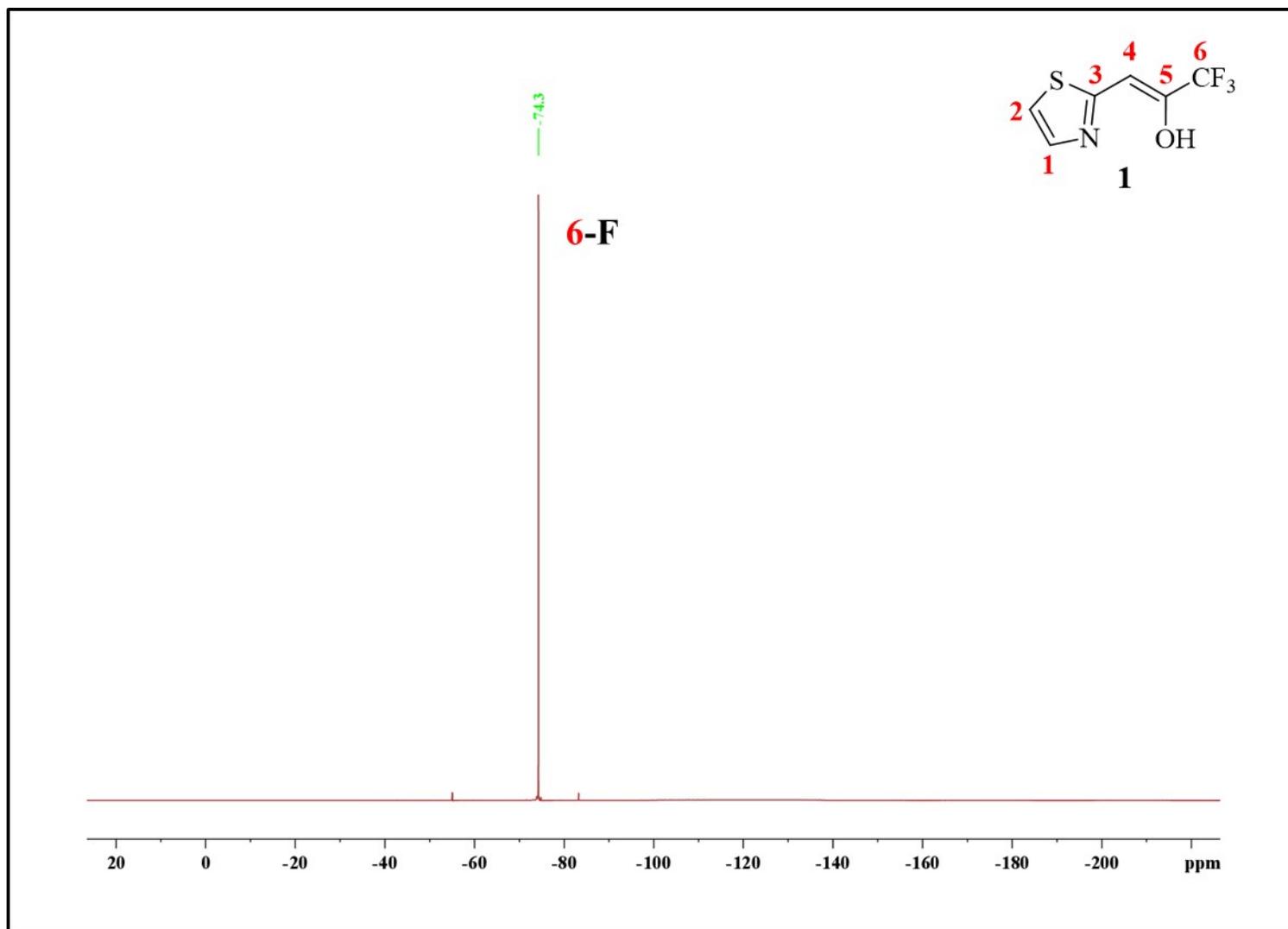


Figure 2: ^{19}F NMR Spectrum of (1) in $\text{DMSO-}d_6$ at RT with schematic and arbitrary numbering.

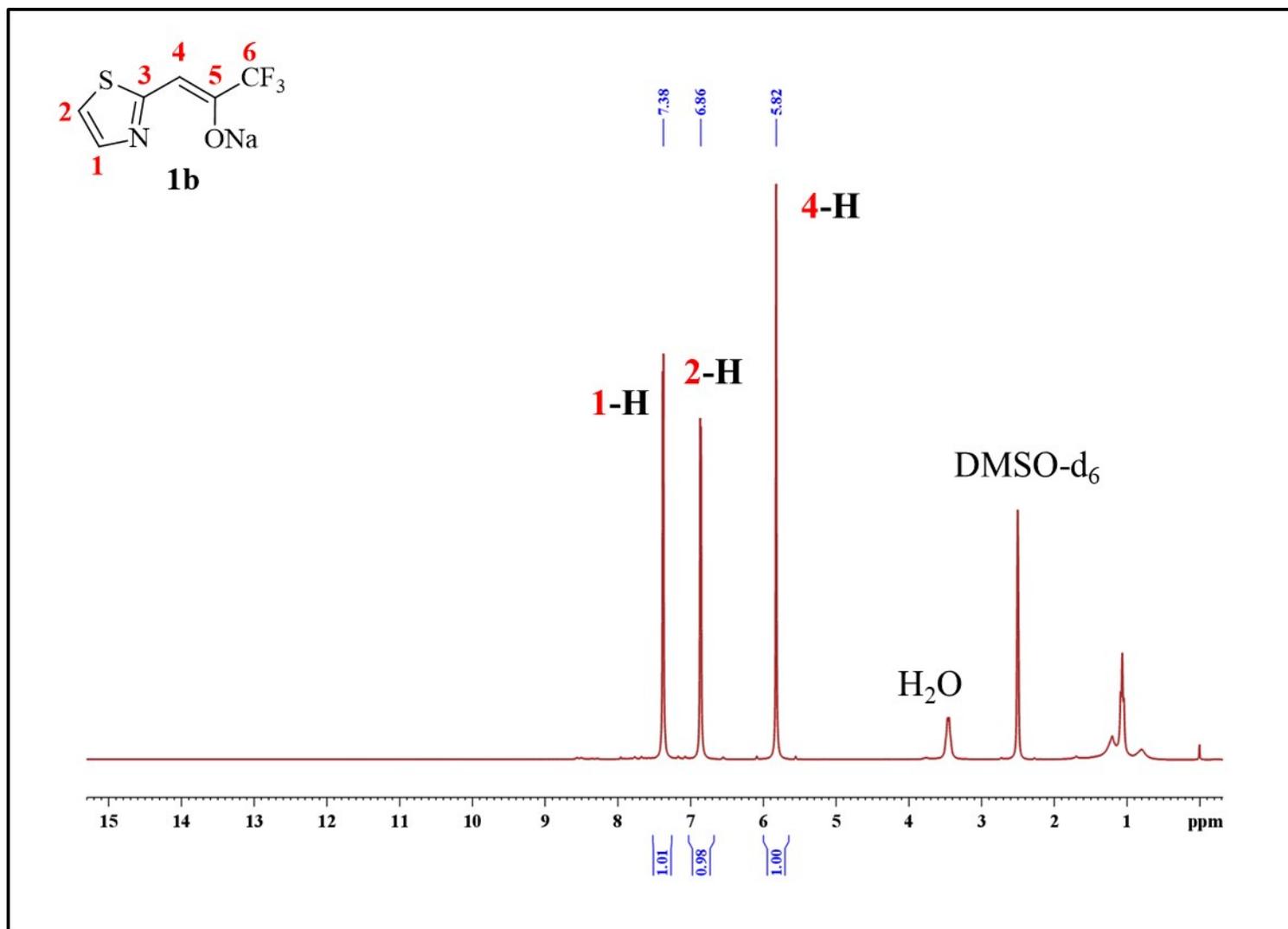


Figure 3: ^1H NMR Spectrum of (**1b**) in $\text{DMSO-}d_6$ at RT with schematic and arbitrary numbering.

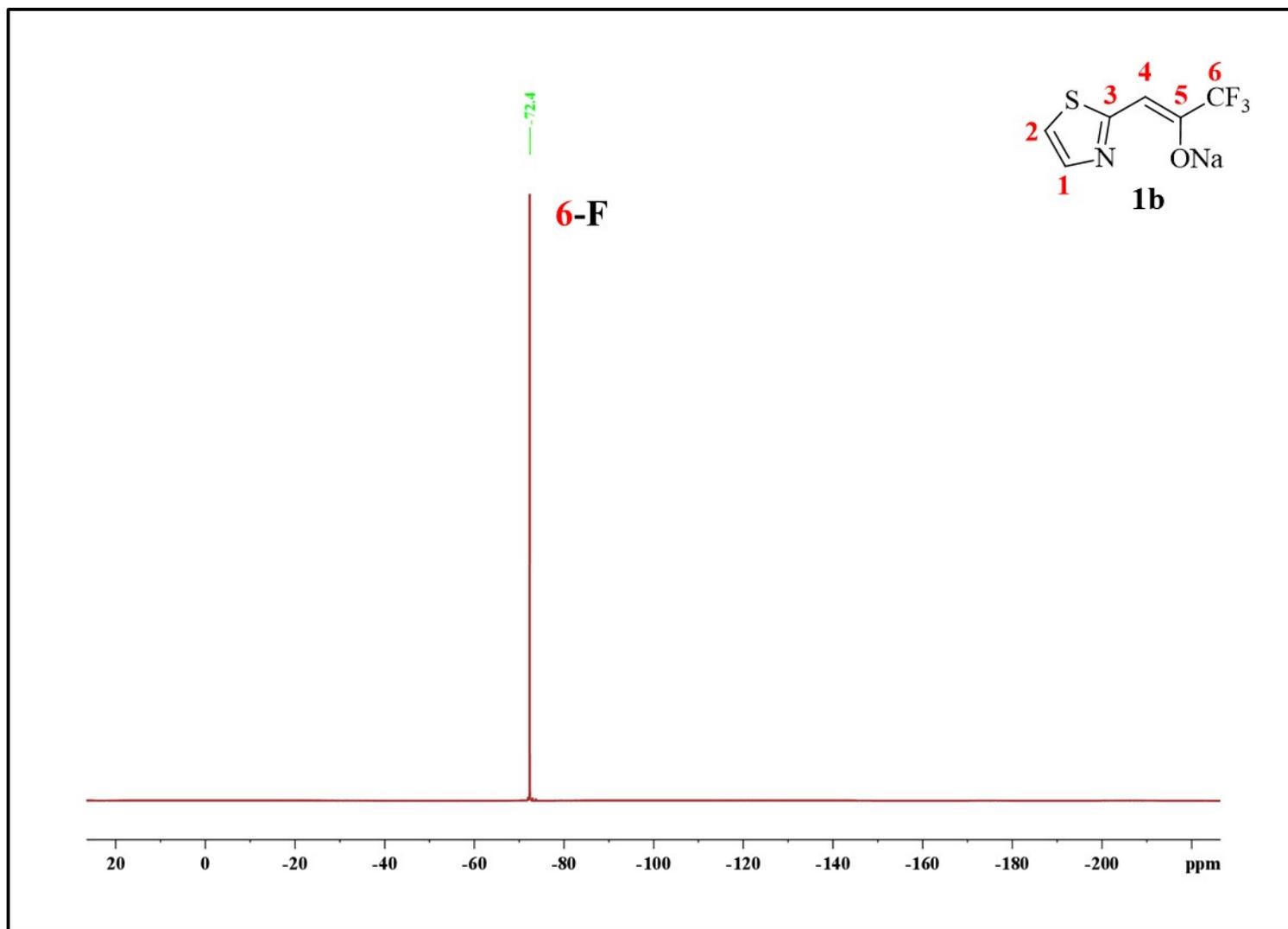


Figure 4: ^{19}F NMR Spectrum of (**1b**) in $\text{DMSO-}d_6$ at RT with schematic and arbitrary numbering.

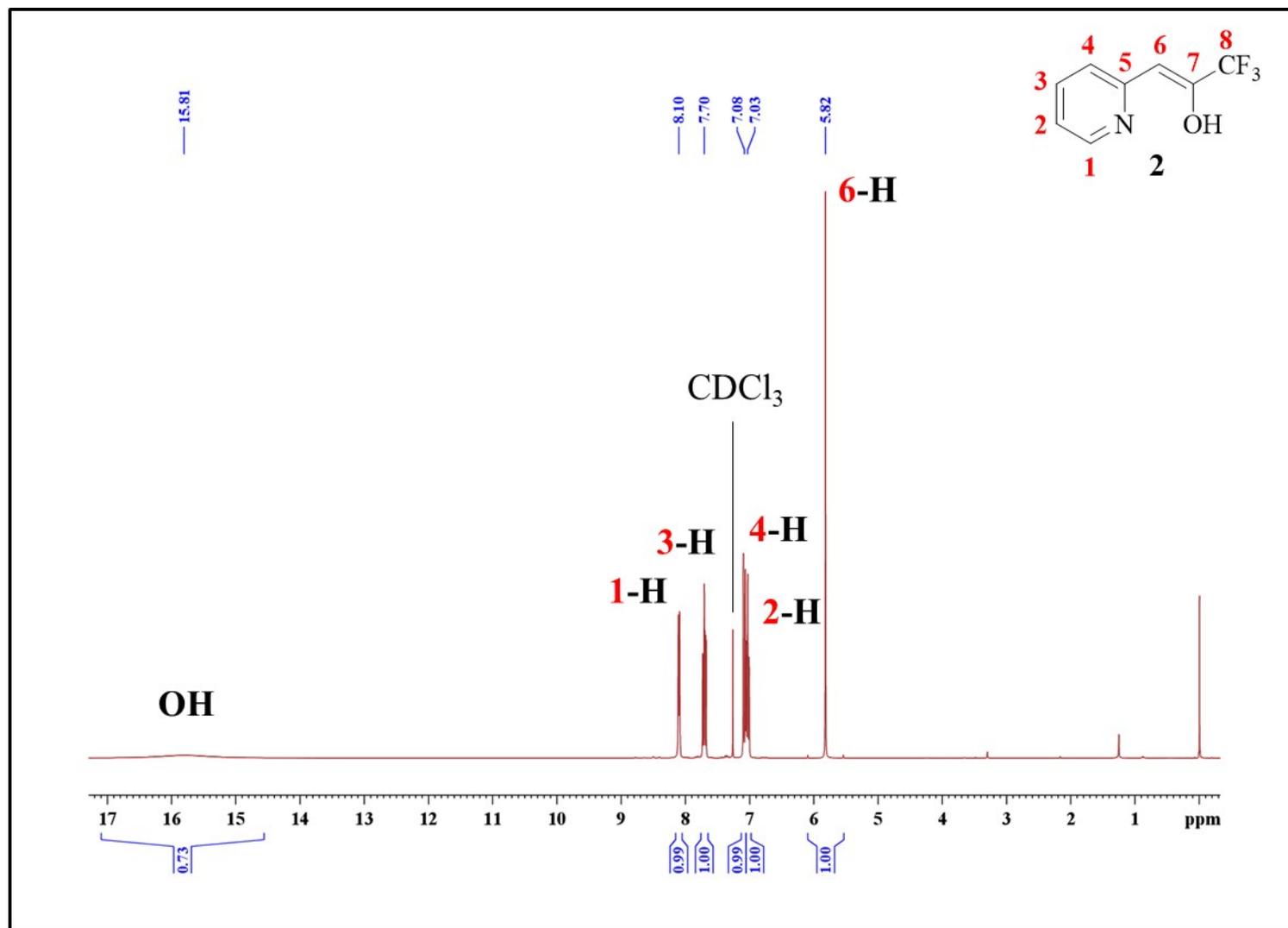


Figure 5: ^1H NMR Spectrum of (2) in CDCl_3 at RT with schematic and arbitrary numbering.

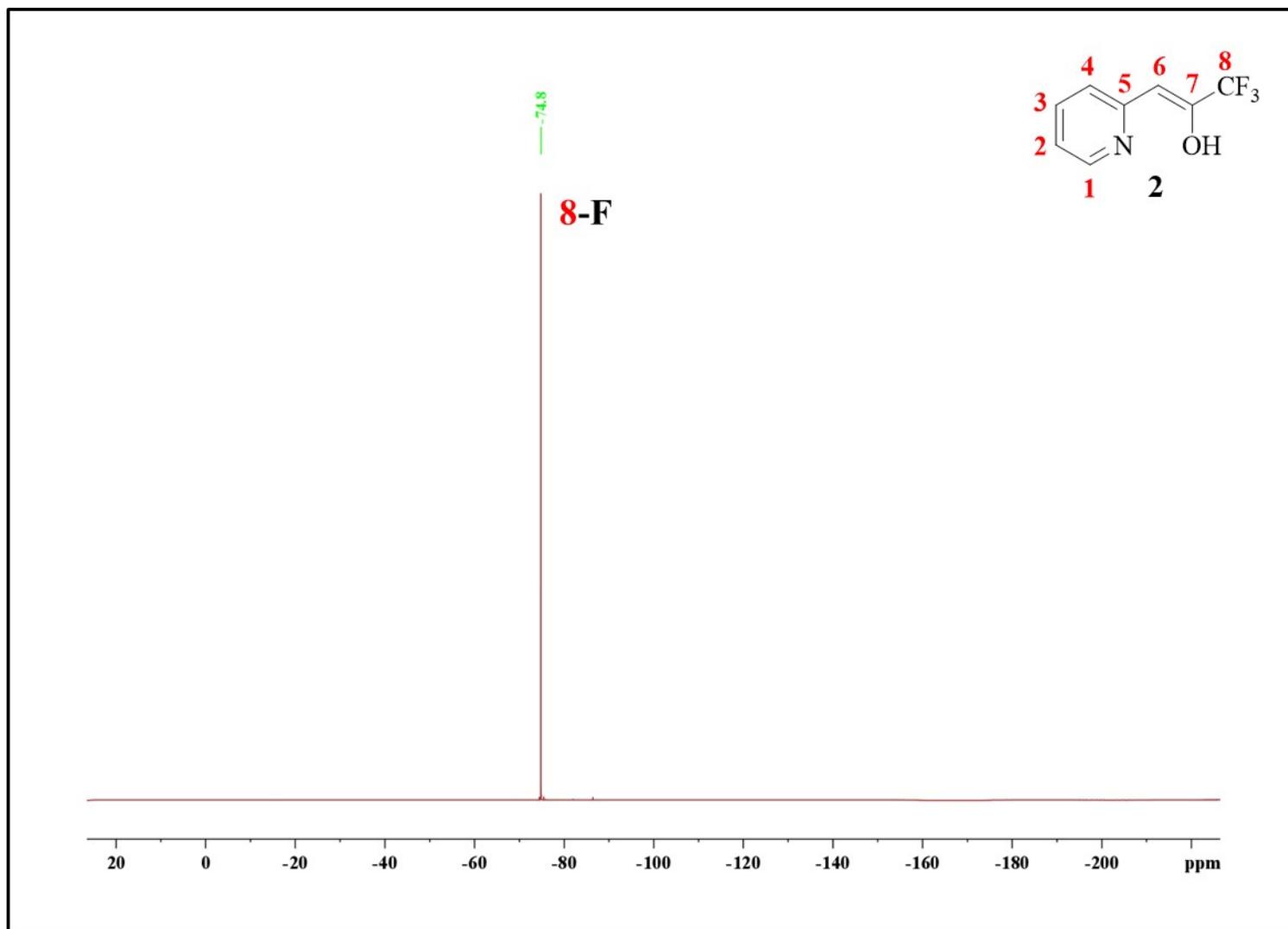


Figure 6: ^{19}F NMR Spectrum of (2) in CDCl_3 at RT with schematic and arbitrary numbering.

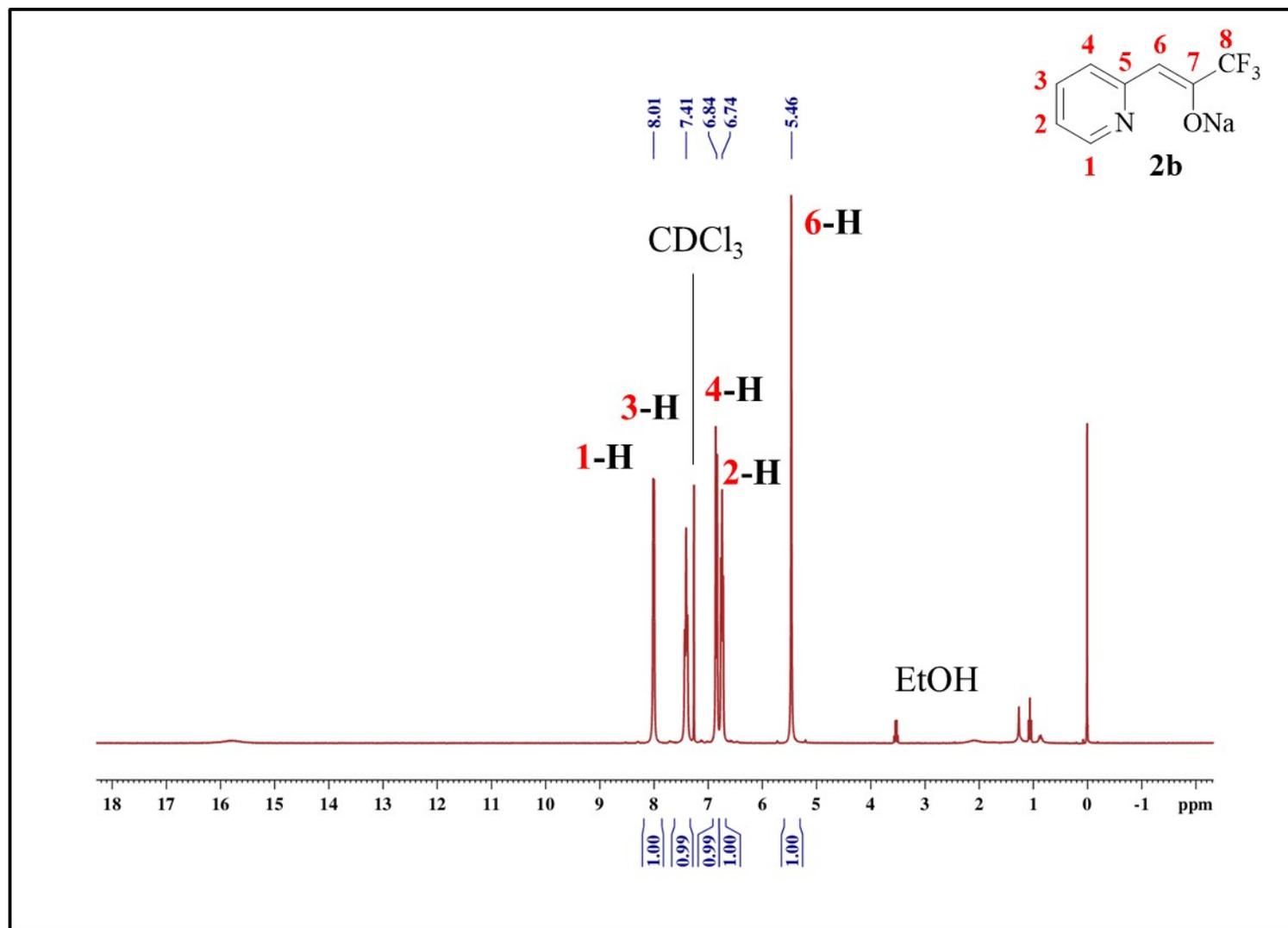


Figure 7: ¹H NMR Spectrum of (**2b**) in CDCl₃ at RT with schematic and arbitrary numbering.

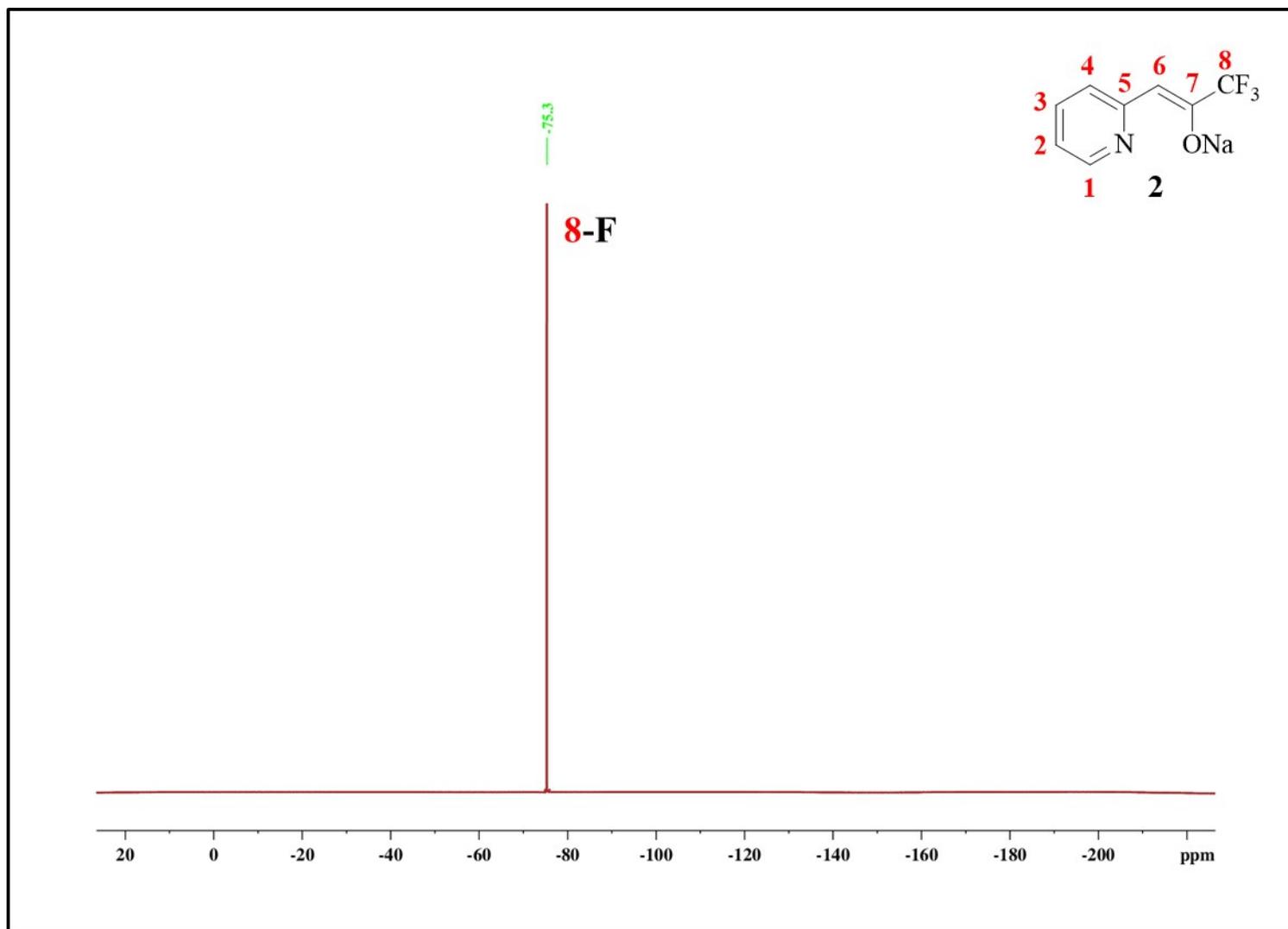


Figure 8: ^{19}F NMR Spectrum of **(2b)** in CDCl_3 at RT with schematic and arbitrary numbering.

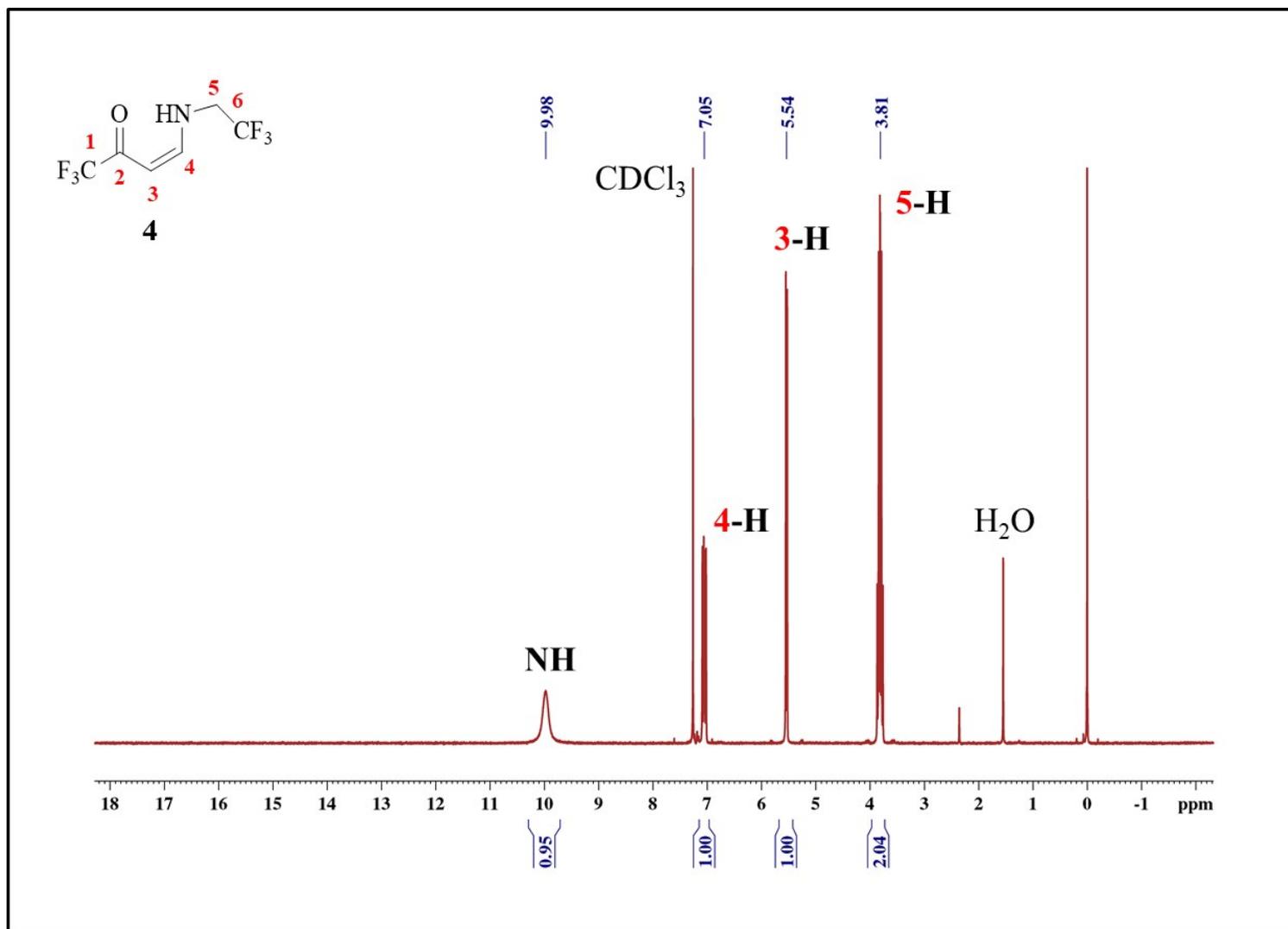


Figure 9: ^1H NMR Spectrum of (4) in CDCl_3 at RT with schematic and arbitrary numbering.

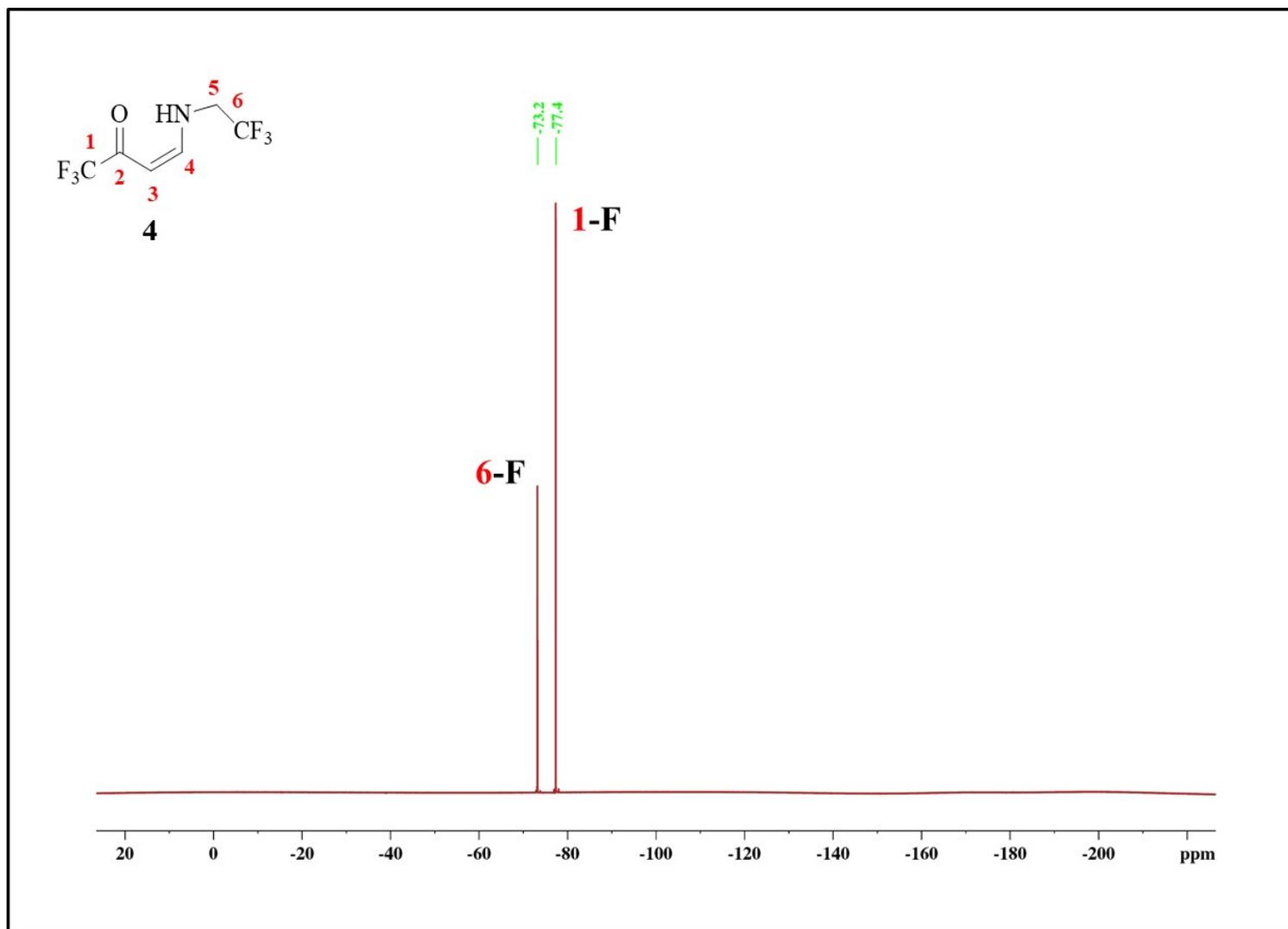


Figure 10: ^{19}F NMR Spectrum of (4) in CDCl_3 at RT with schematic and arbitrary numbering.

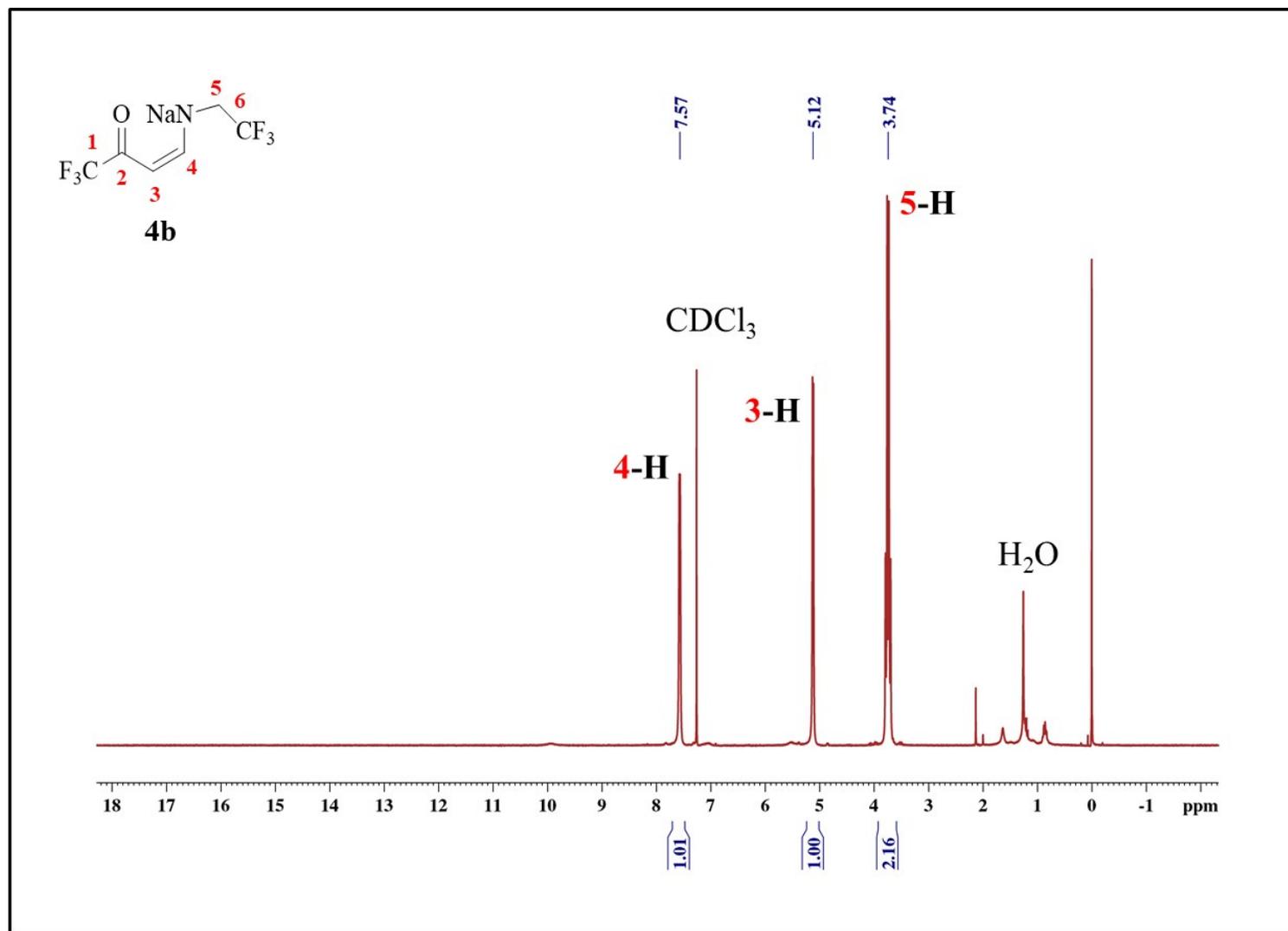


Figure 11: ^1H NMR Spectrum of (**4b**) in CDCl_3 at RT with schematic and arbitrary numbering.

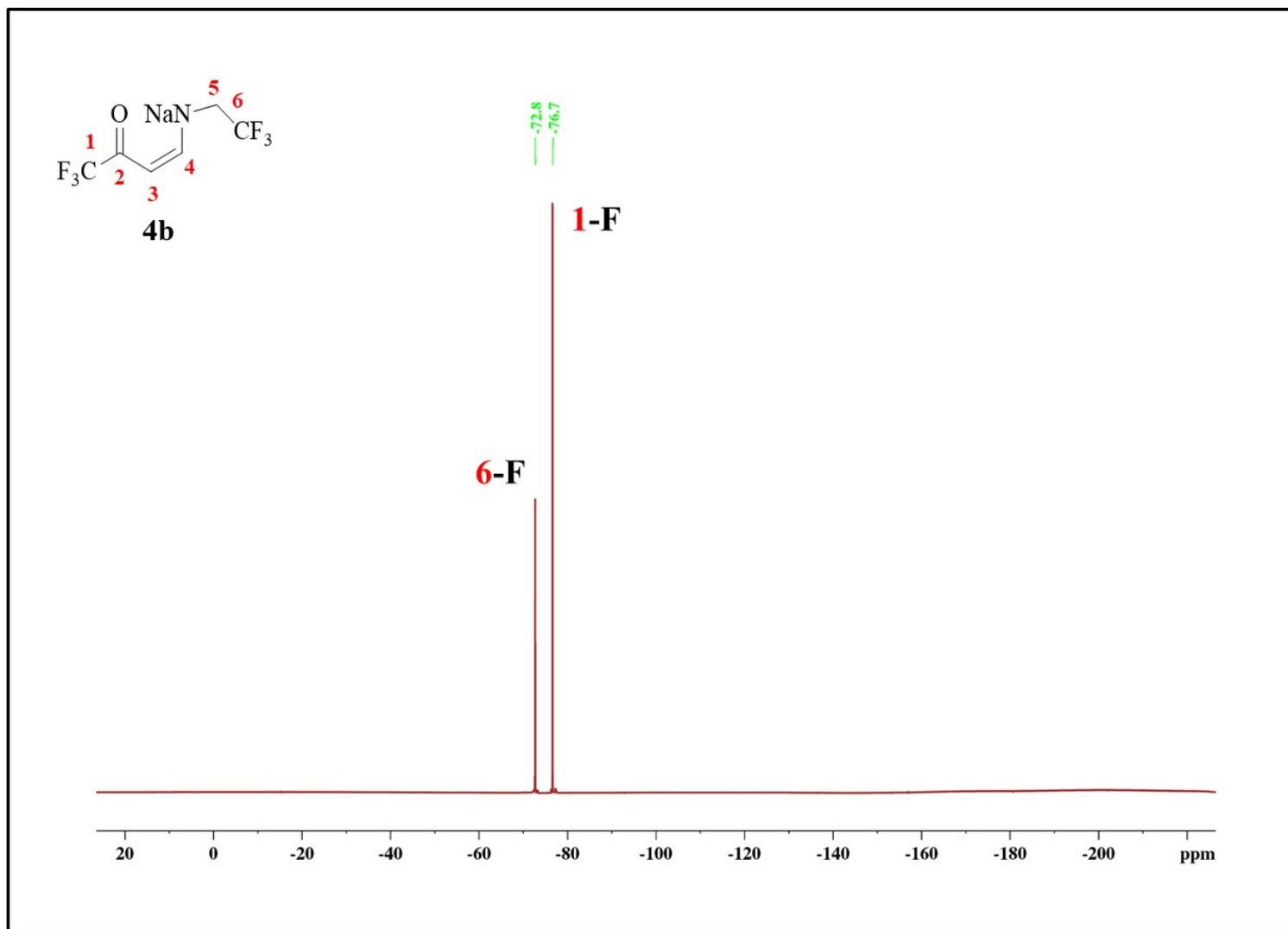


Figure 12: ^{19}F NMR Spectrum of (**4b**) in CDCl_3 at RT with schematic and arbitrary numbering.

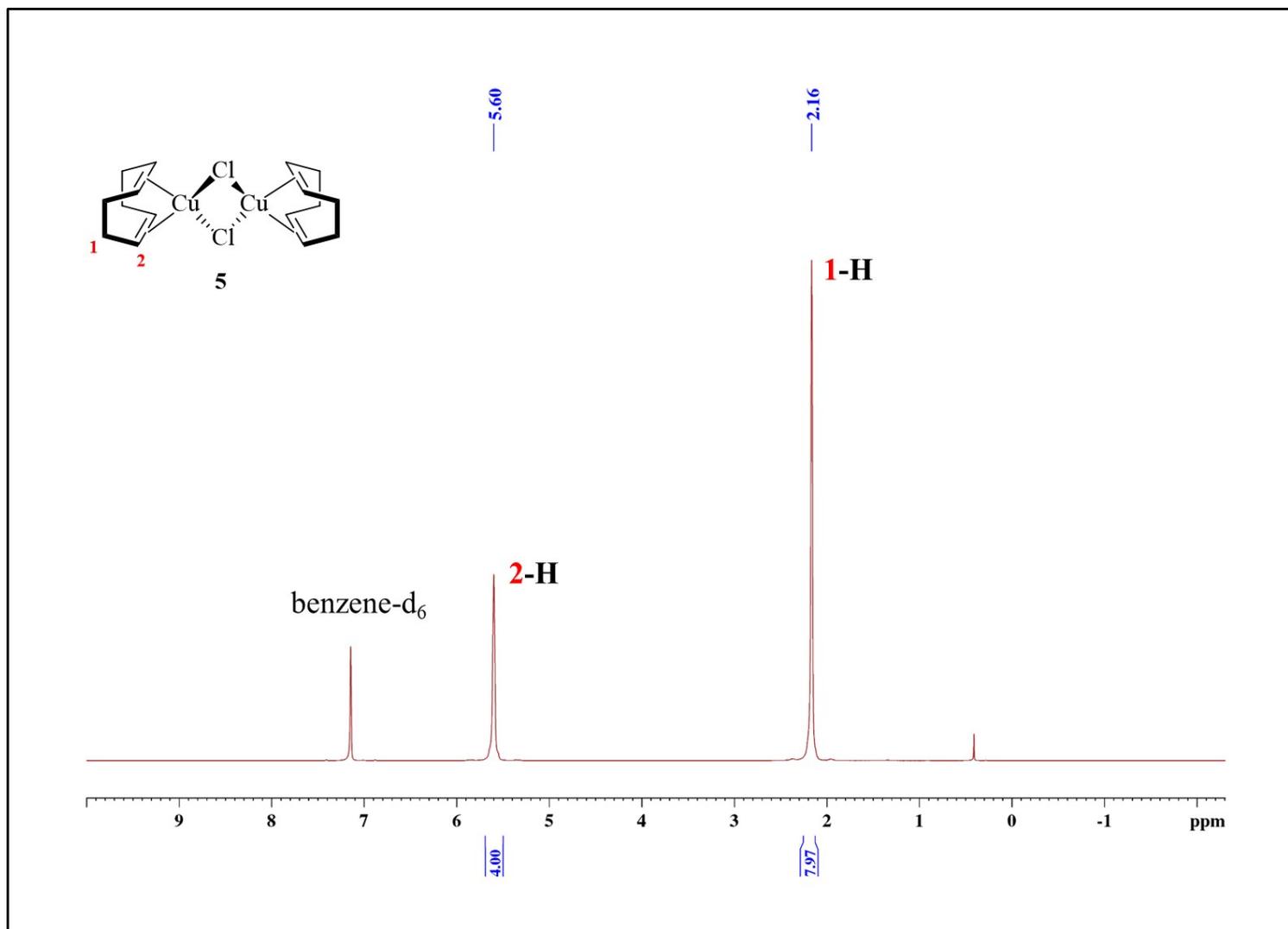


Figure 13: ^1H NMR Spectrum of (5) in C_6D_6 at RT with schematic and arbitrary numbering.

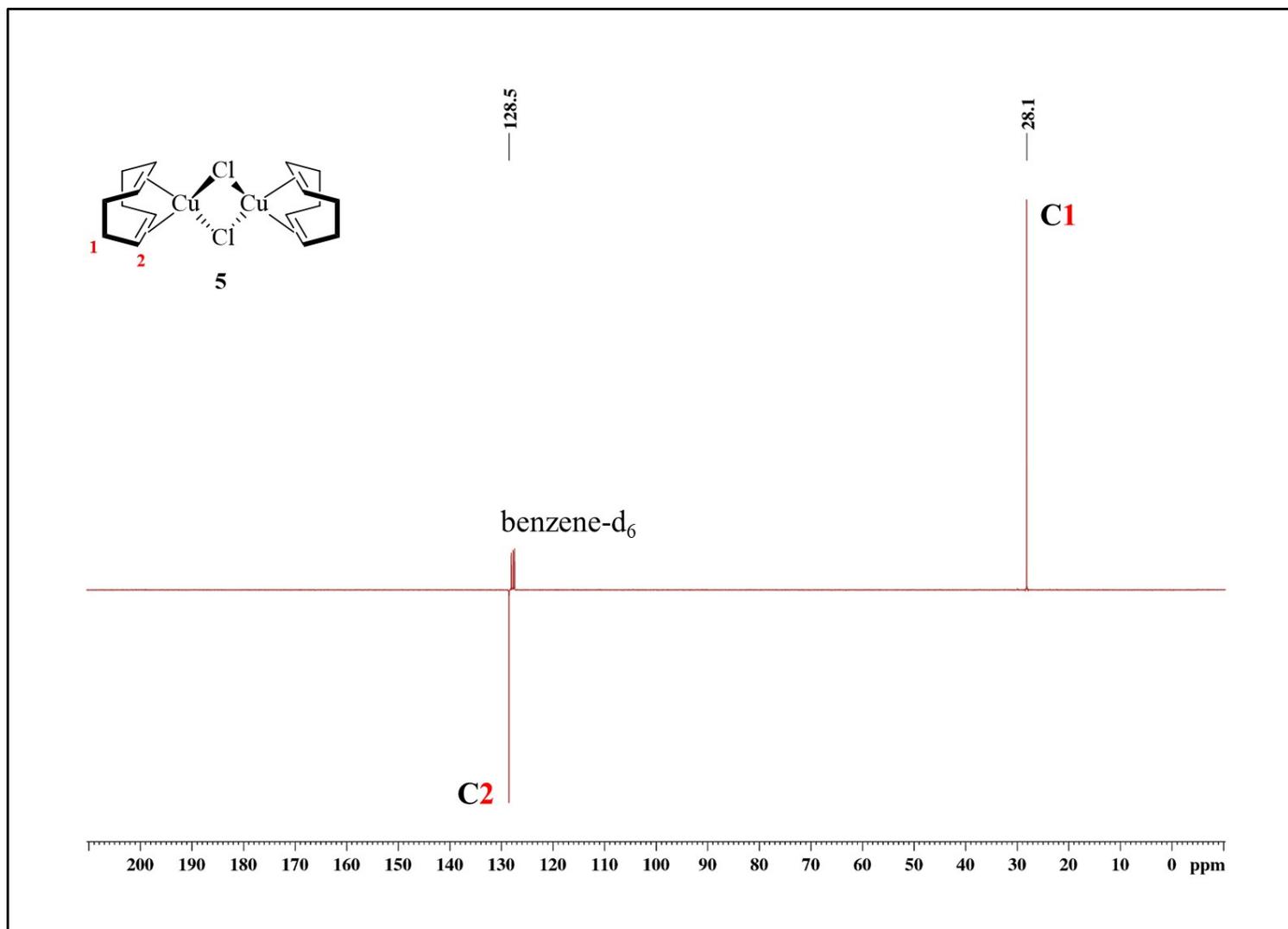


Figure 14: ¹³C APT Spectrum of (5) in C₆D₆ at RT with schematic and arbitrary numbering.

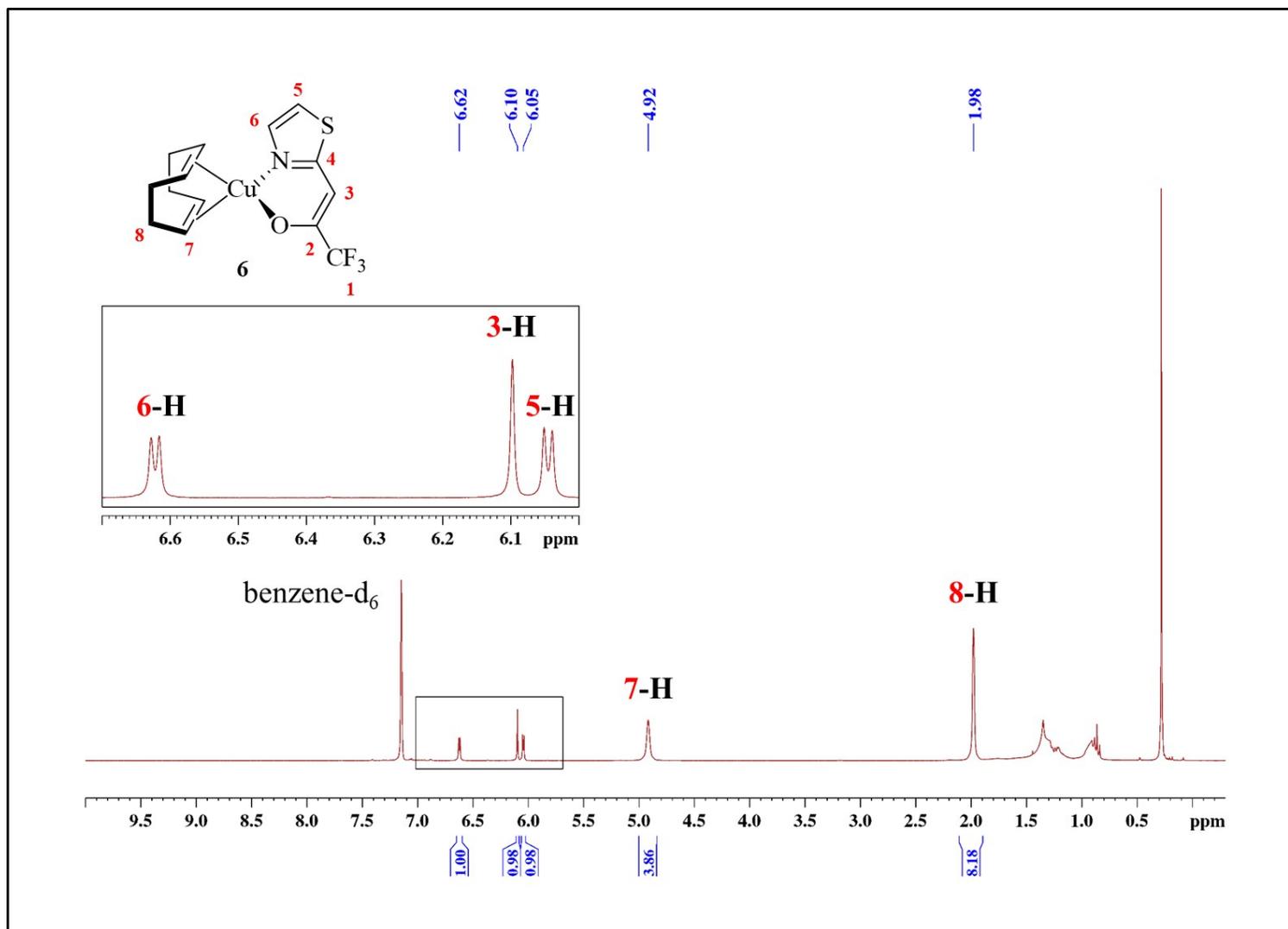


Figure 15: ^1H NMR Spectrum of (**6**) in C_6D_6 at RT with schematic and arbitrary numbering

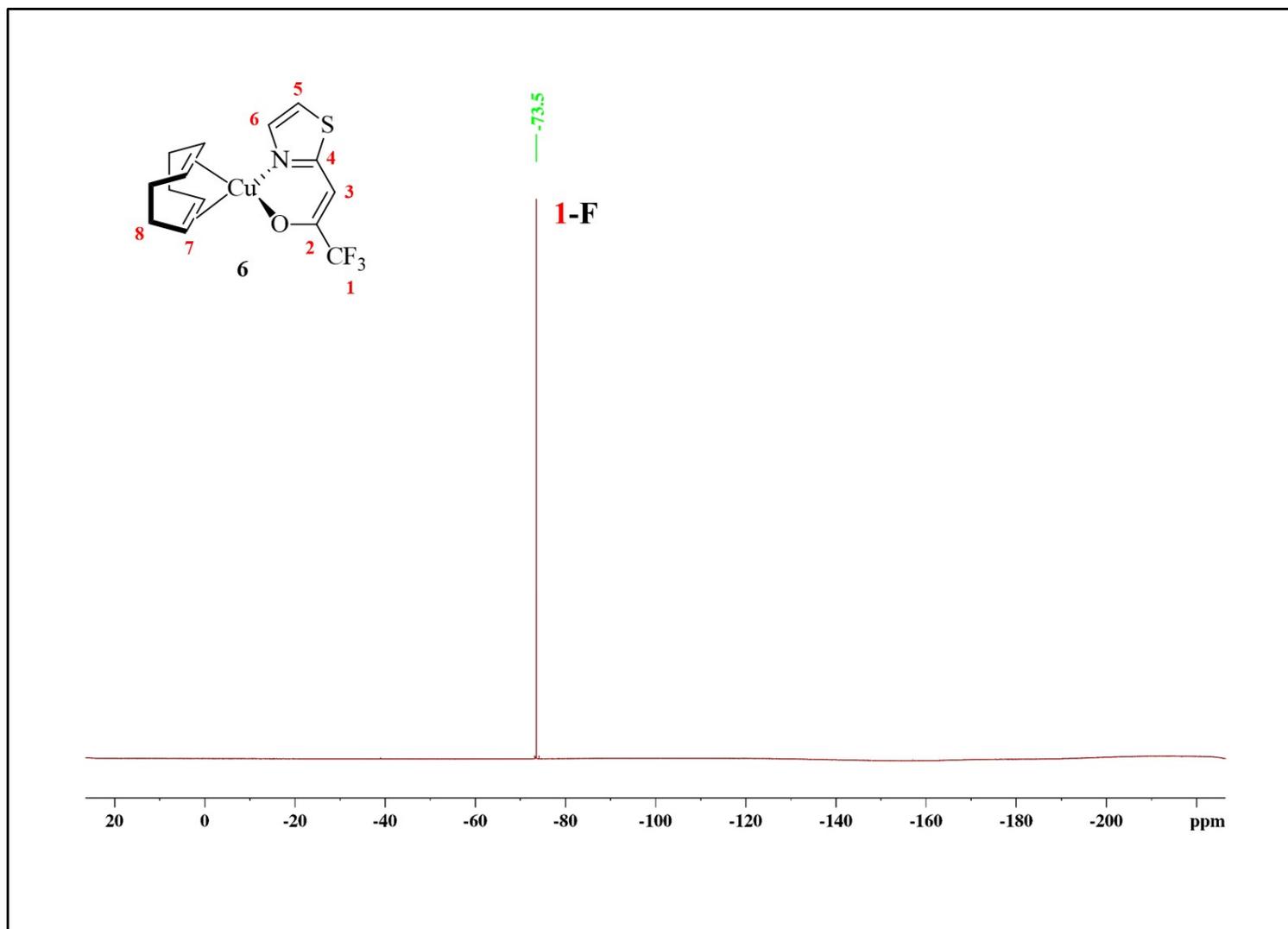


Figure 16: ^{19}F NMR Spectrum of **(6)** in C_6D_6 at RT with schematic and arbitrary numbering.

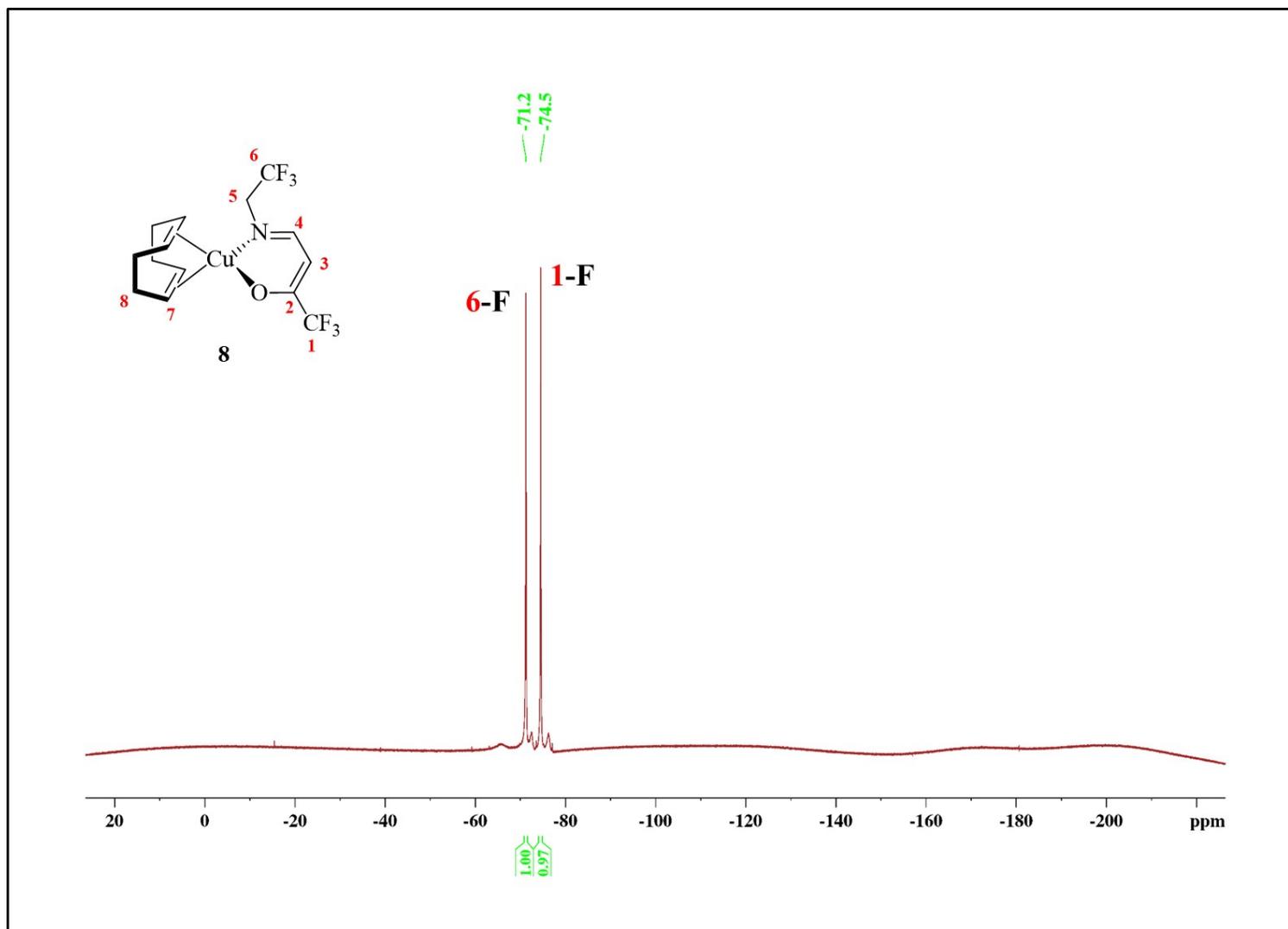


Figure 17: ^{19}F NMR Spectrum of **(8)** in C_6D_6 at RT with schematic and arbitrary numbering.

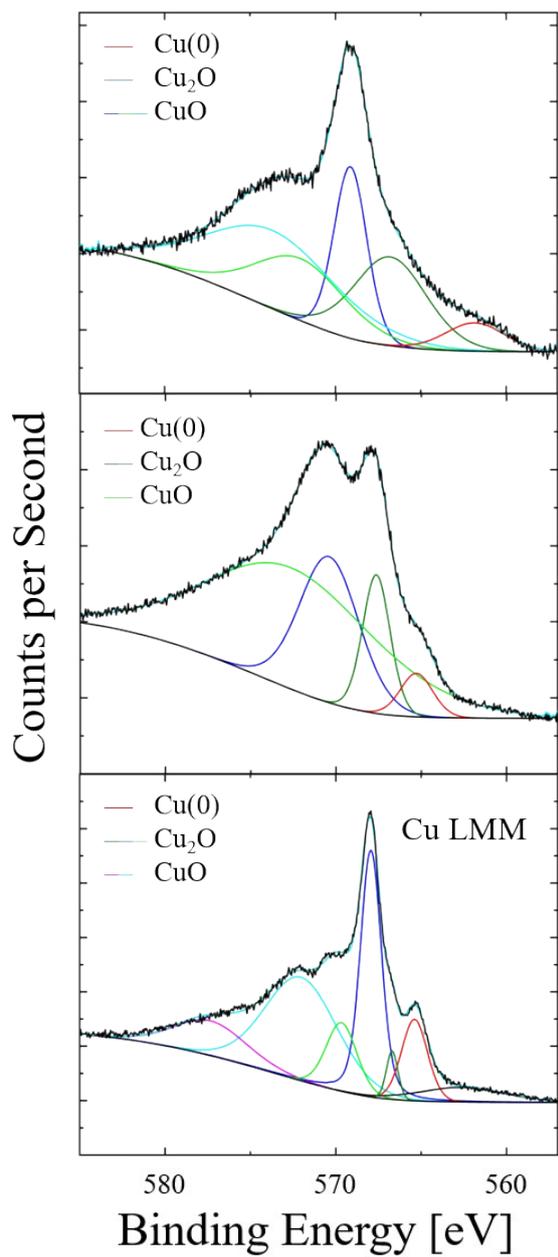


Figure 18: High resolution XPS spectra of Cu LMM Auger peaks of copper-based thin films.

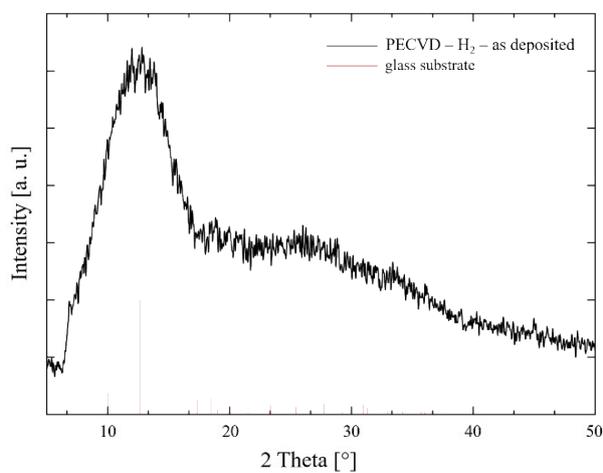


Figure 19: XRD pattern of as deposited copper film using H_2 as reactive gas and glass substrates (red line, ICSD: 79-1912).

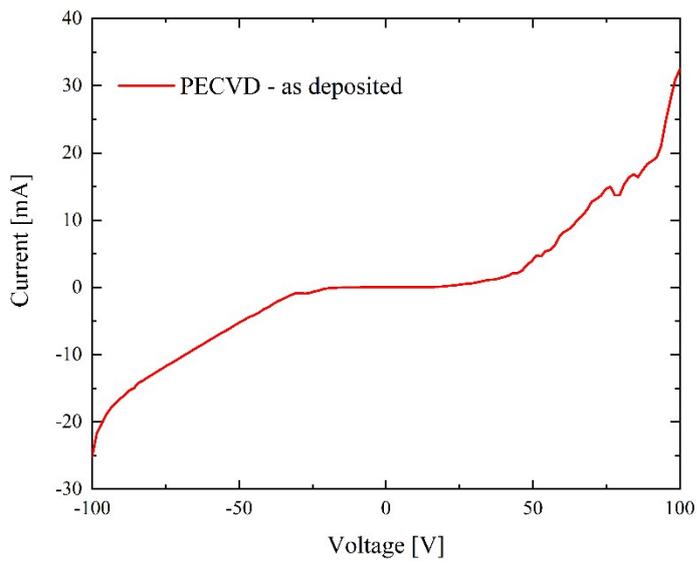


Figure 20: *I-V* curves of as deposited copper film using H₂ as reactive gas and glass substrates.