

Supplementary Material

for

Synthesis, structures, DFT calculations, and catalytic application in the direct arylation of five-membered heteroarenes with aryl bromides of novel Palladium-*N*-Heterocyclic carbene complexes PEPPSI-Type

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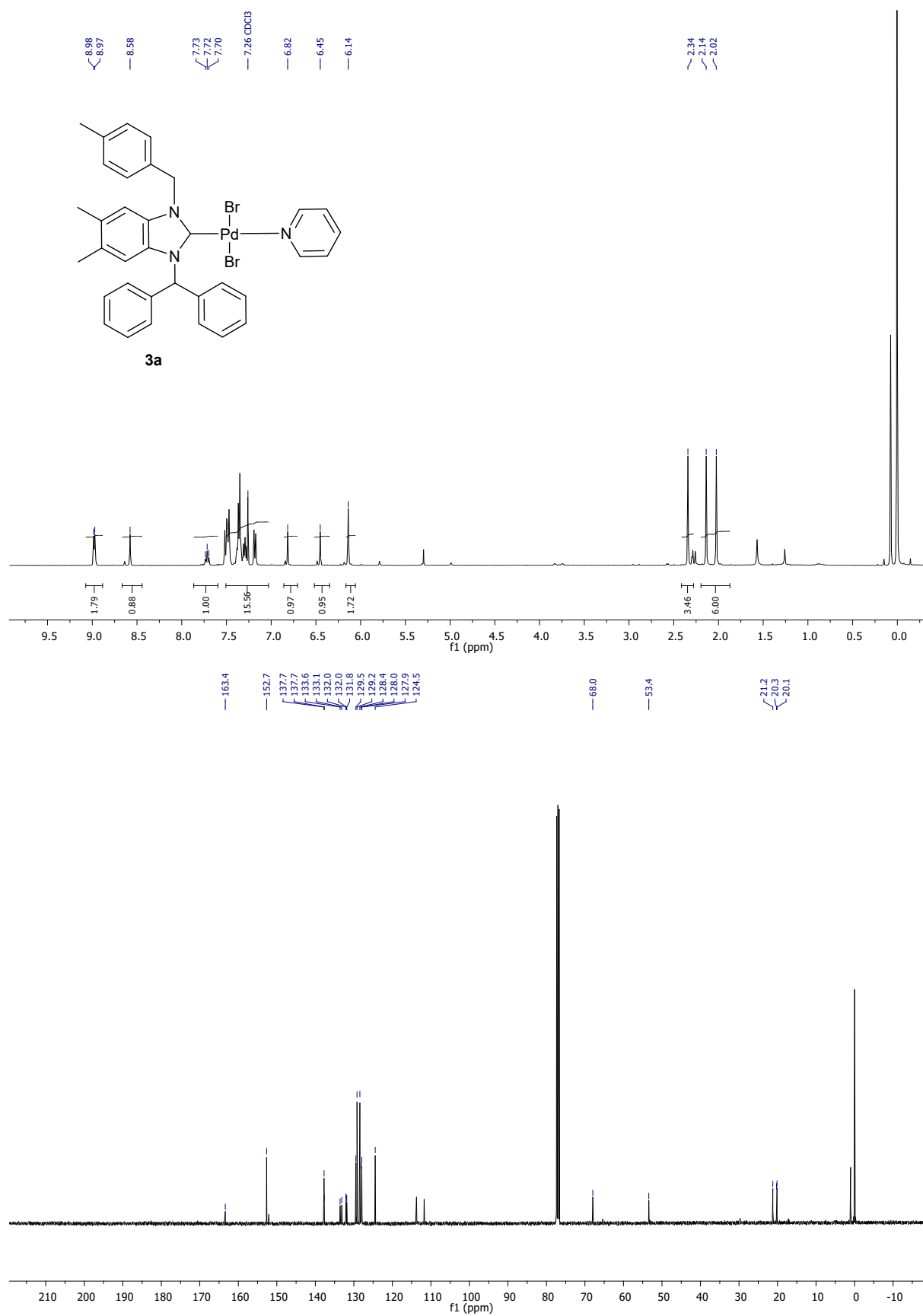


Figure 1. ¹H and ¹³C NMR spectra of **3a**

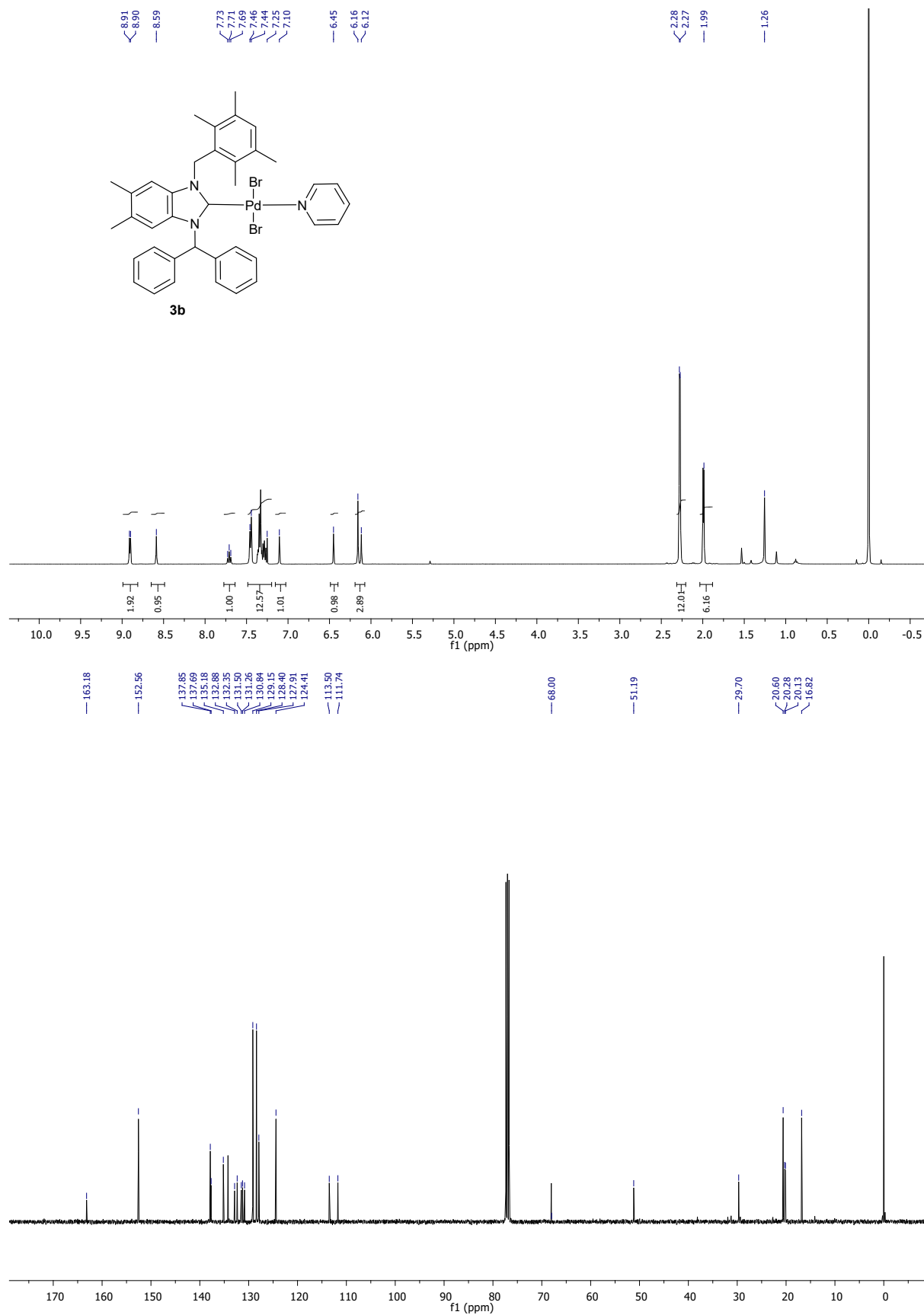


Figure 2. ¹H and ¹³C NMR spectrums of **1b**

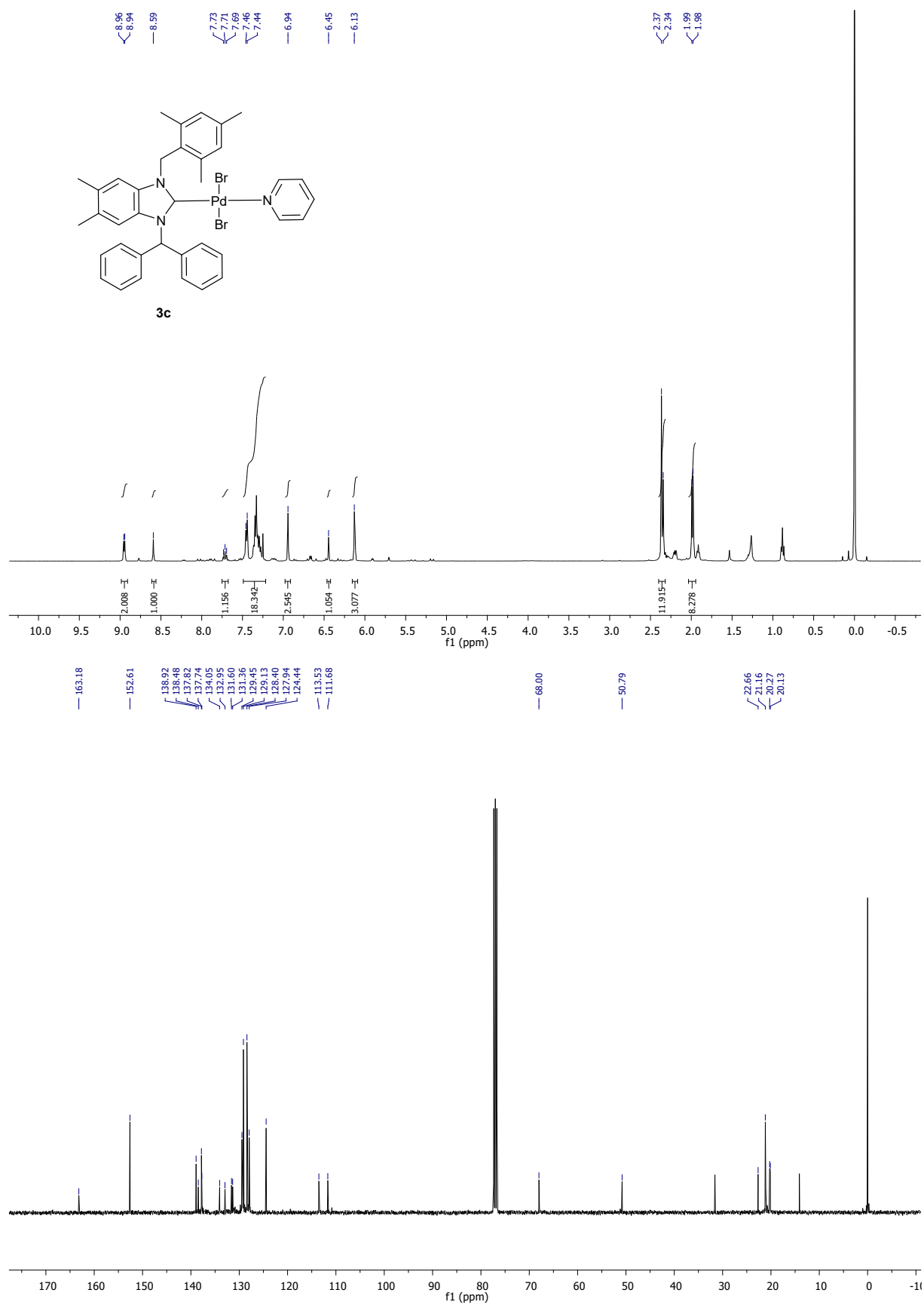


Figure 3. ¹H and ¹³C NMR spectra of **3c**

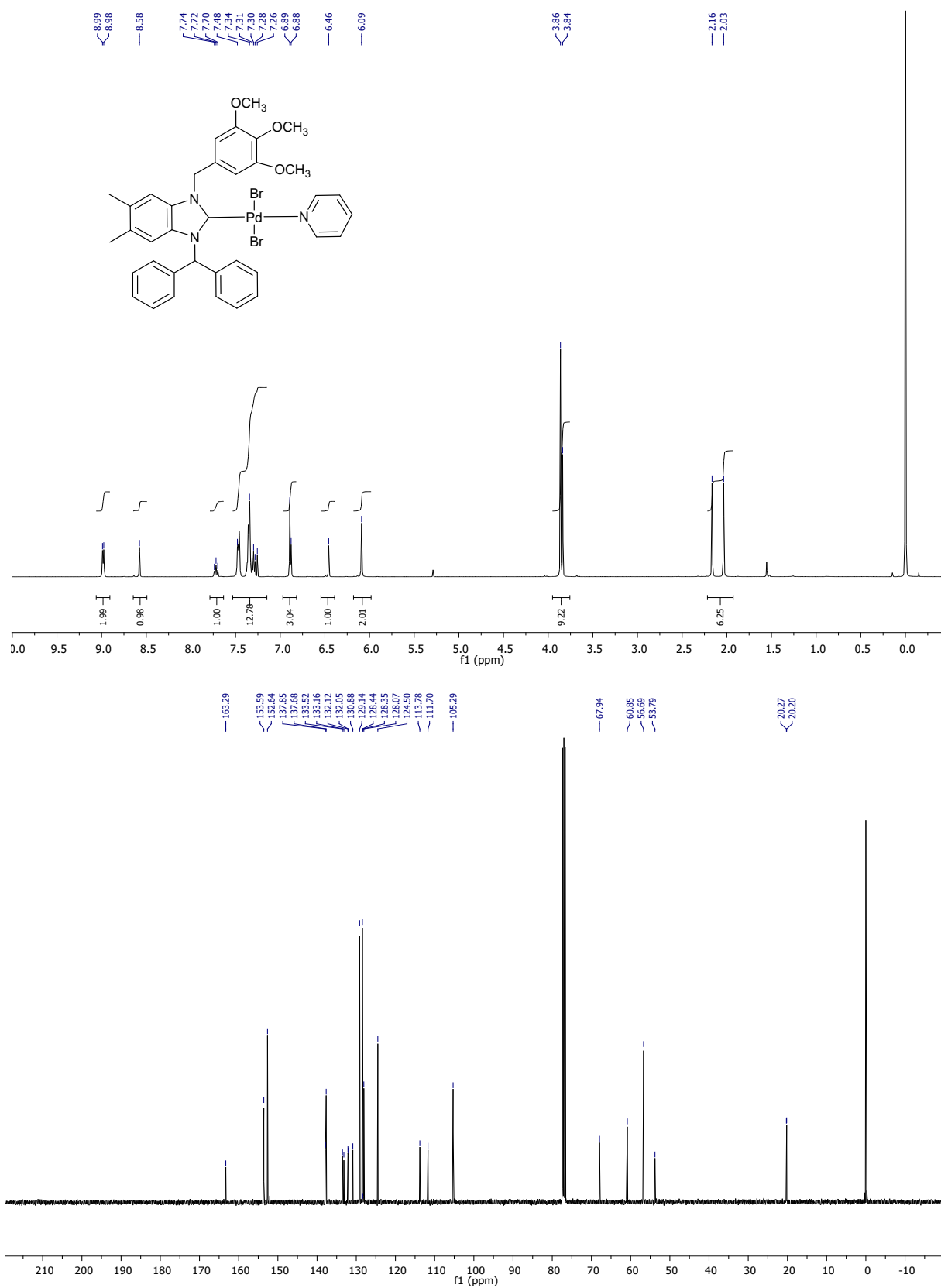


Figure 4. ¹H and ¹³C NMR spectra of **3d**

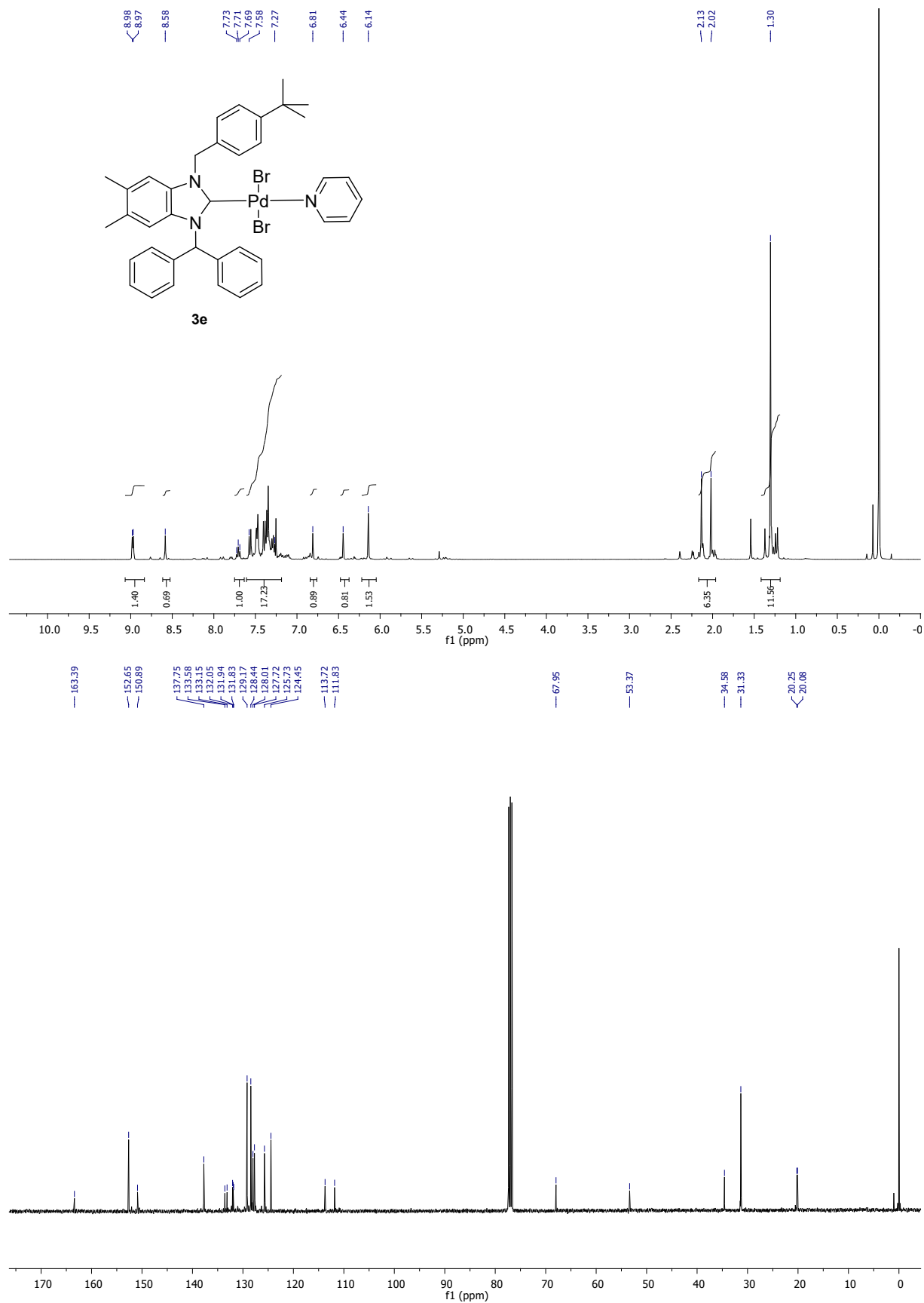


Figure 5. ^1H and ^{13}C NMR spectrums of **3e**.