

## Supplementary Material

### Three-component reaction of triphenylphosphine, dialkyl acetylenedicarboxylates, and 2-nitrocyclohexanone

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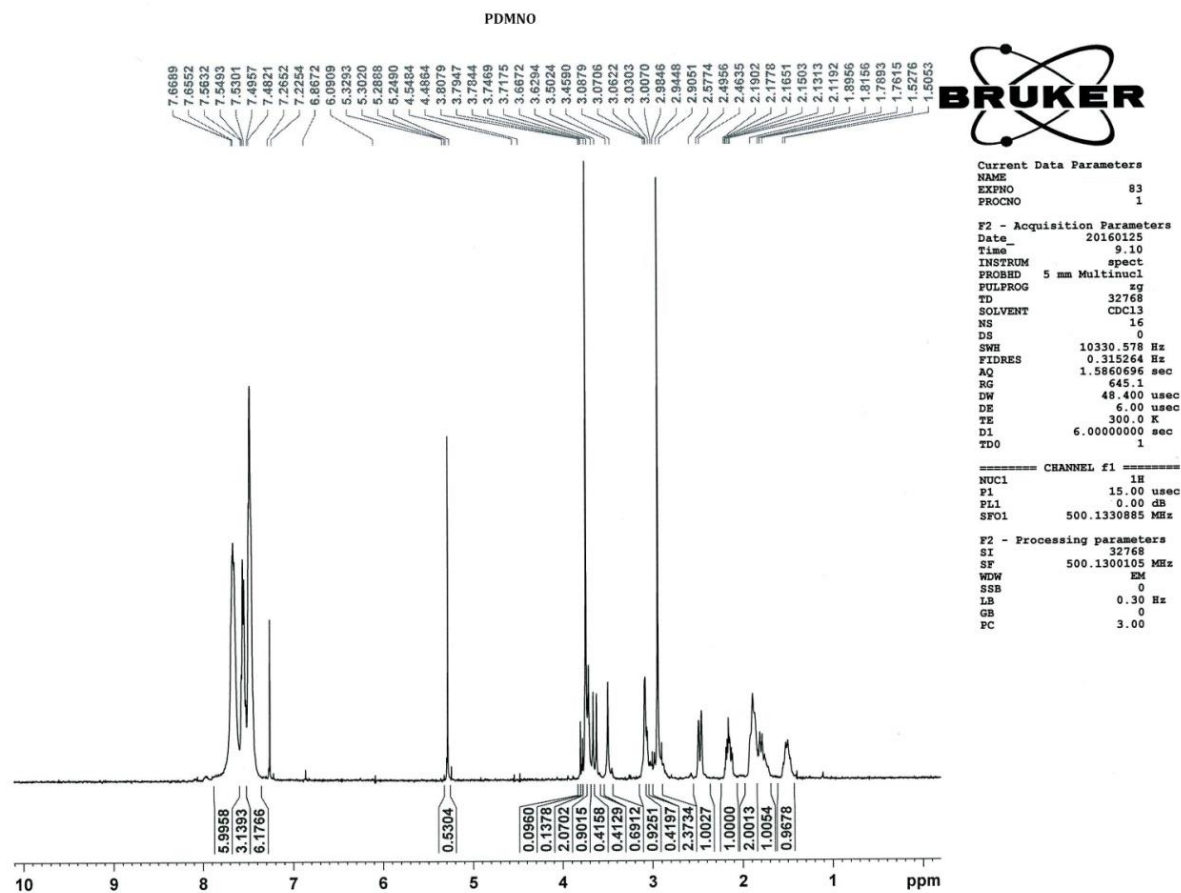
Figure S1.  $^1\text{H}$  NMR spectrum of compound 3a.

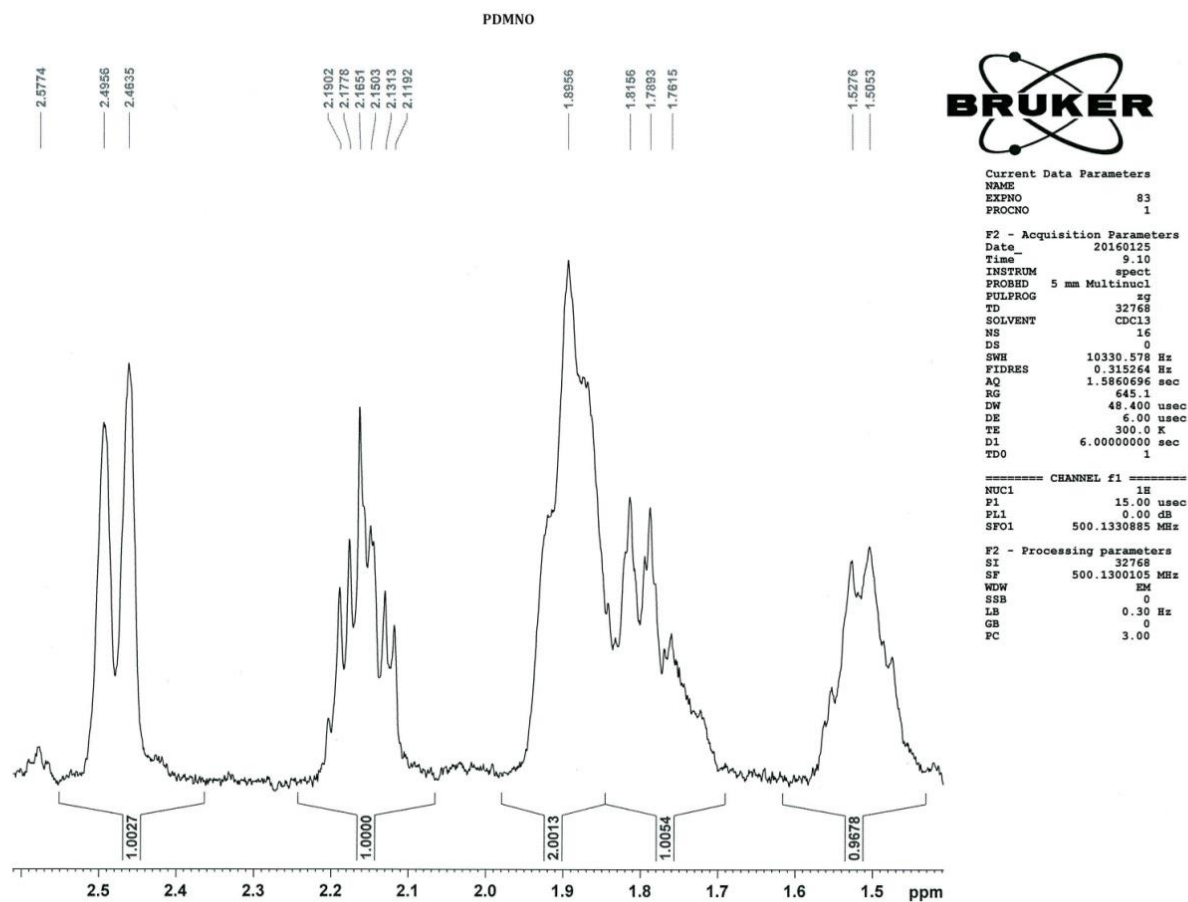
Figure S2. Expanded  $^1\text{H}$  NMR spectrum of compound 3a.

Figure S3. Expanded 1H NMR spectrum of compound 3a.

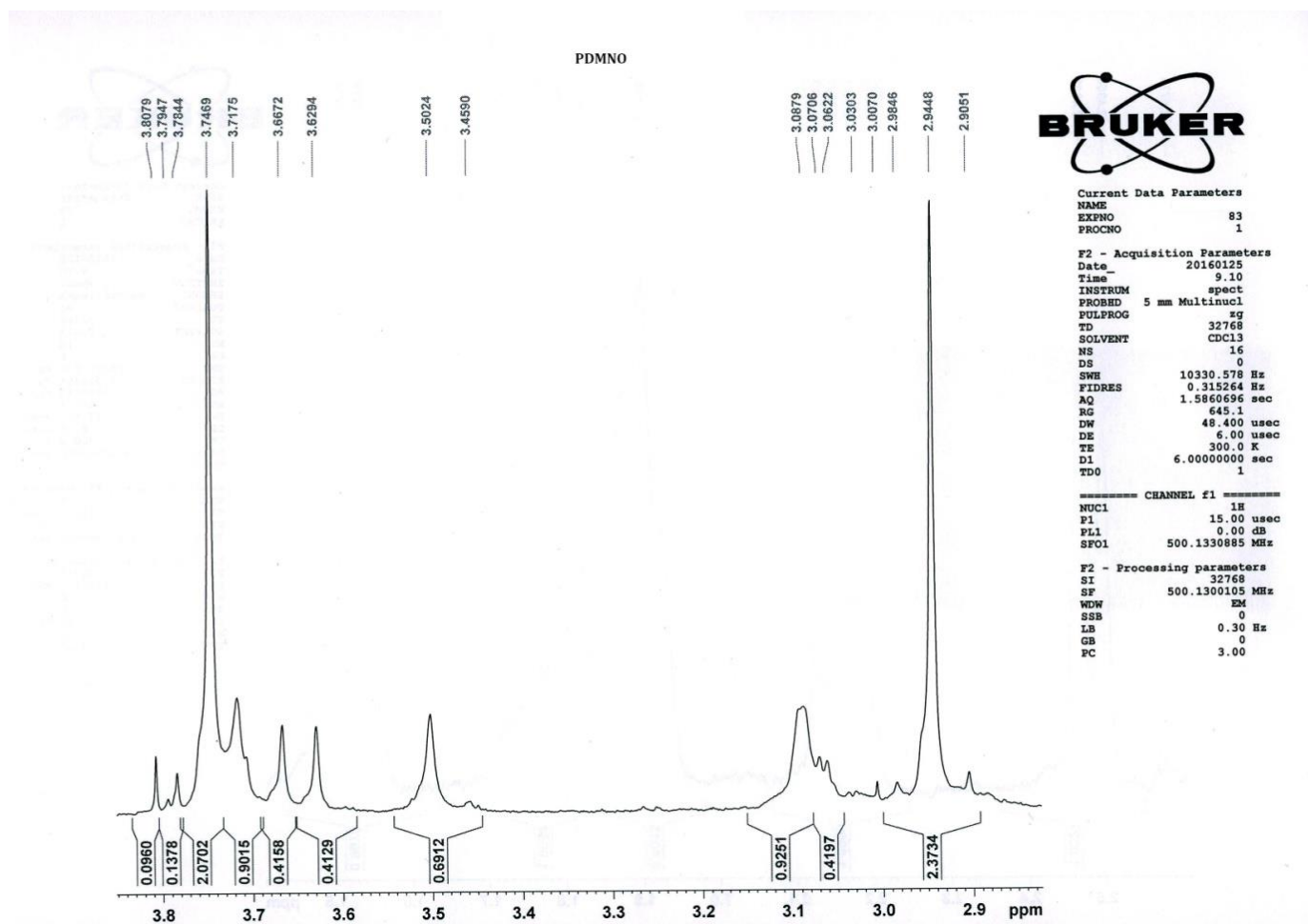


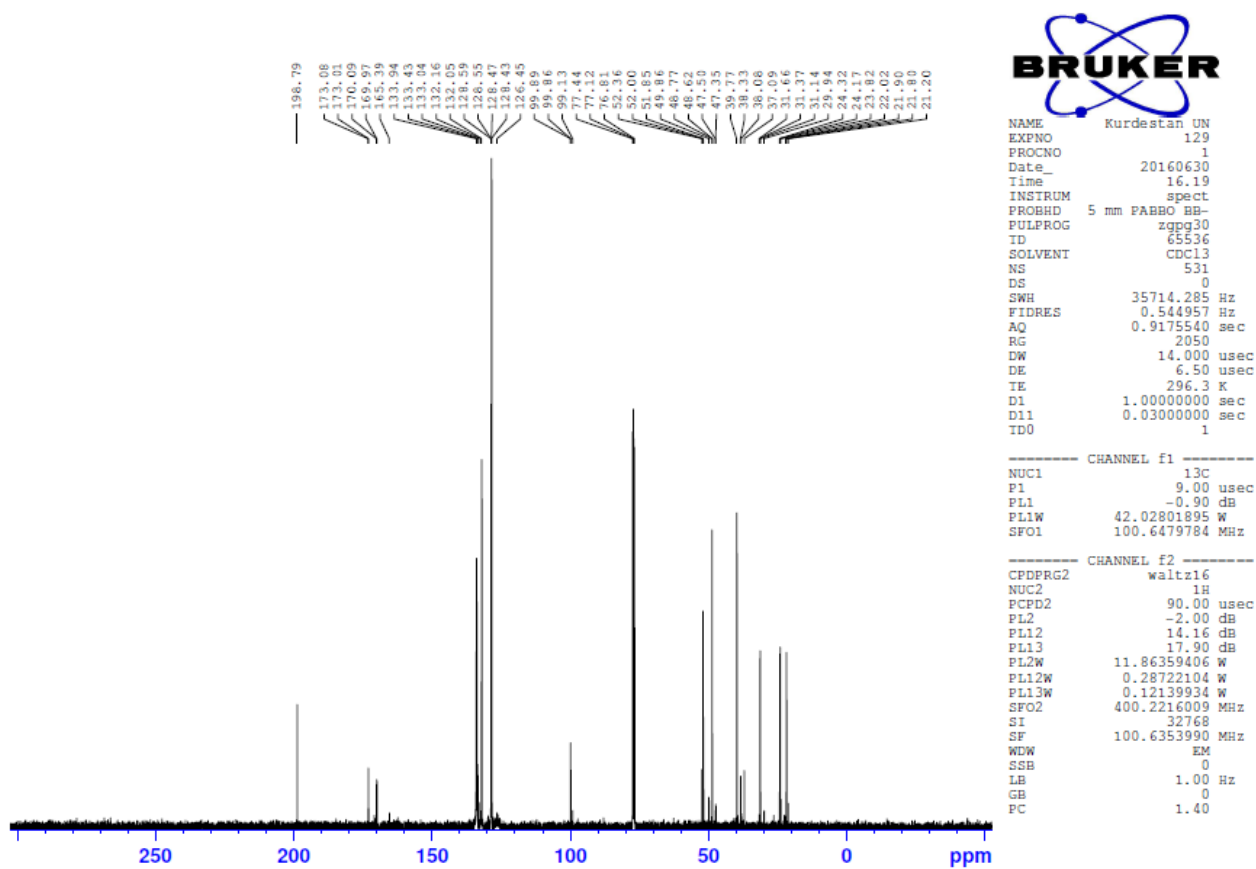
Figure S4. <sup>13</sup>C NMR spectrum of compound 3a.

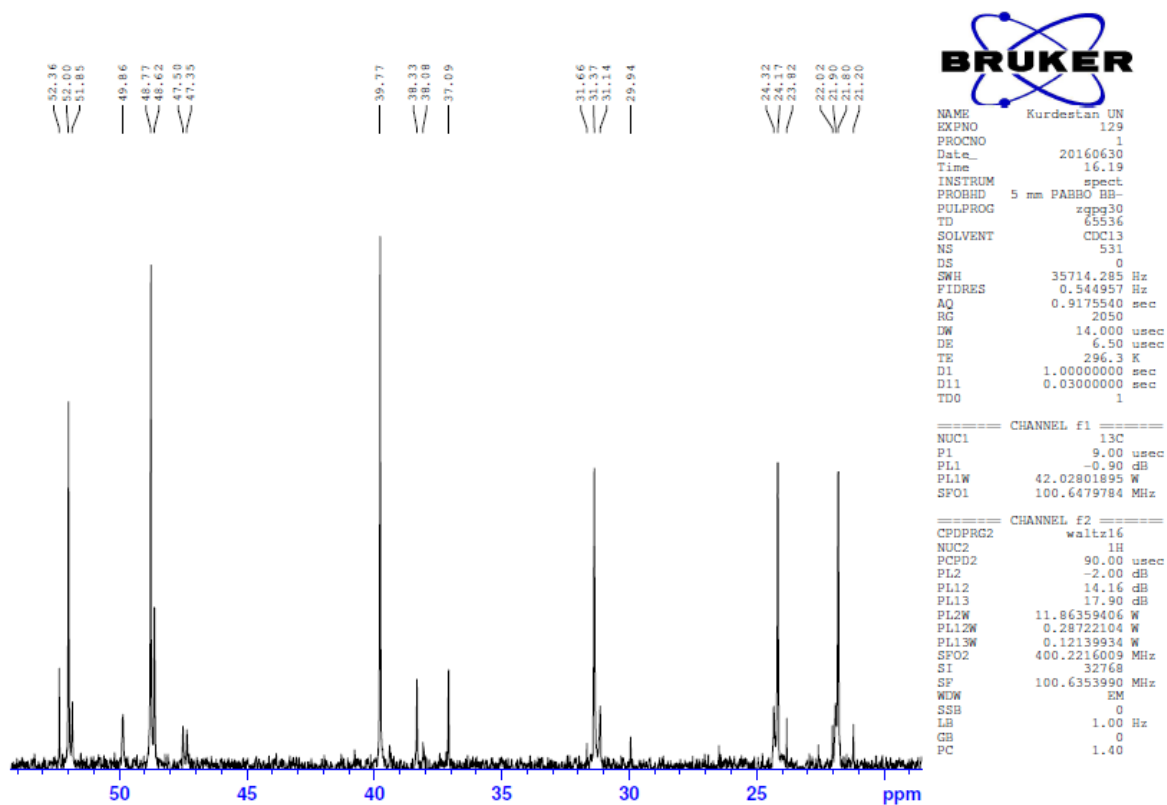
Figure S5. Expanded  $^{13}\text{C}$  NMR spectrum of compound **3a**.

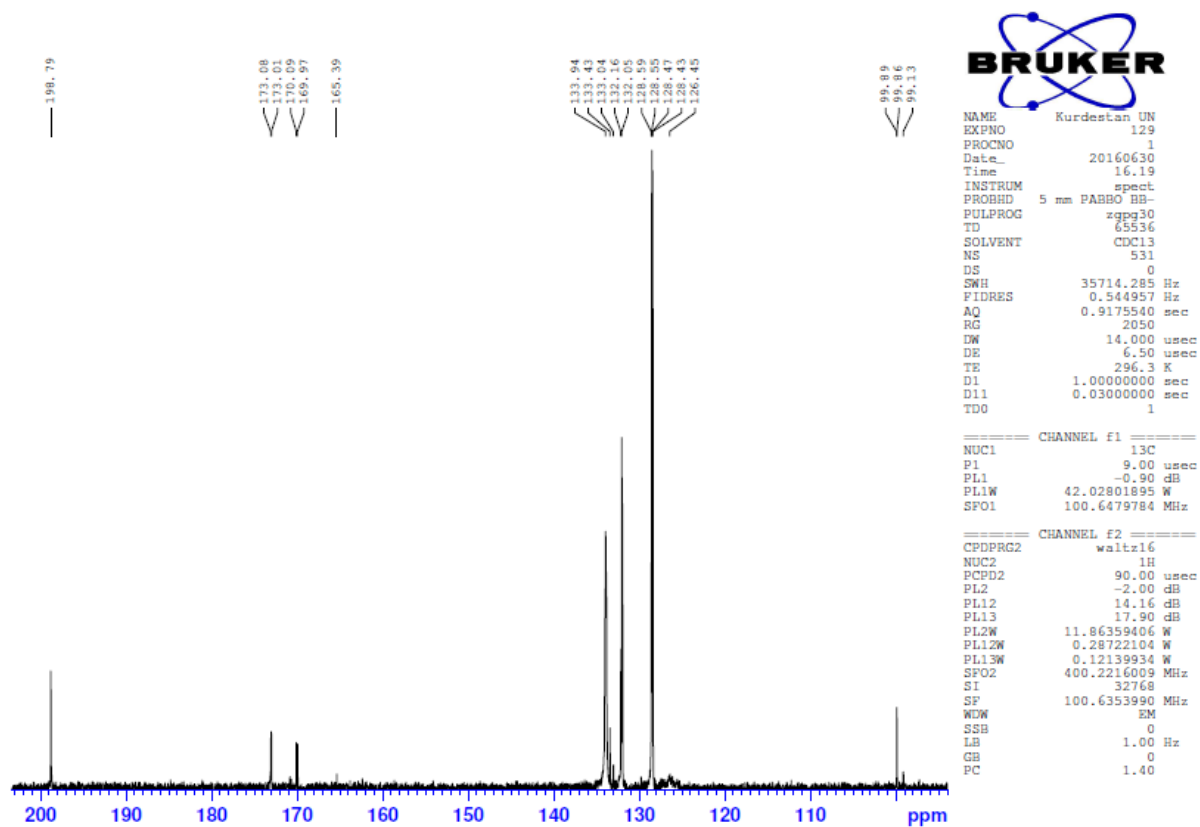
Figure S6. Expanded <sup>13</sup>C NMR spectrum of compound 3a.

Figure S7. <sup>1</sup>H NMR spectrum of compound 3b.

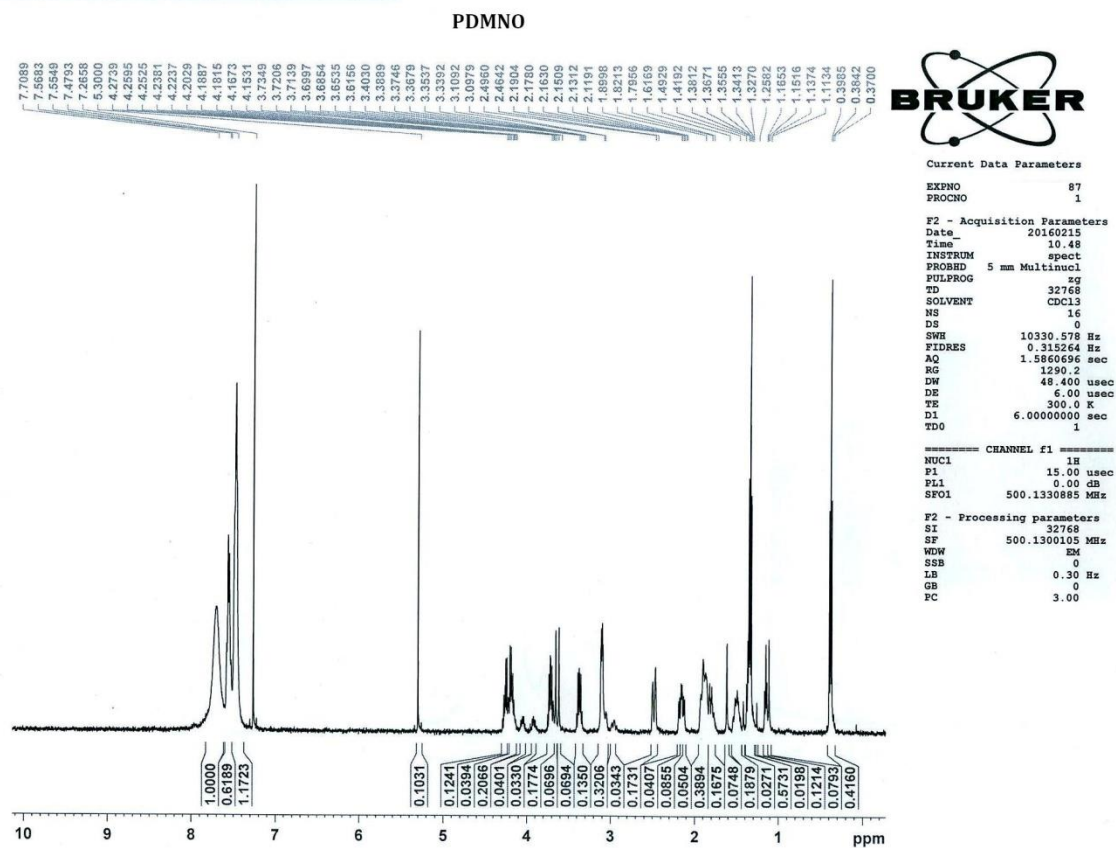




Figure S8. Expanded 1H NMR spectrum of compound 3b.

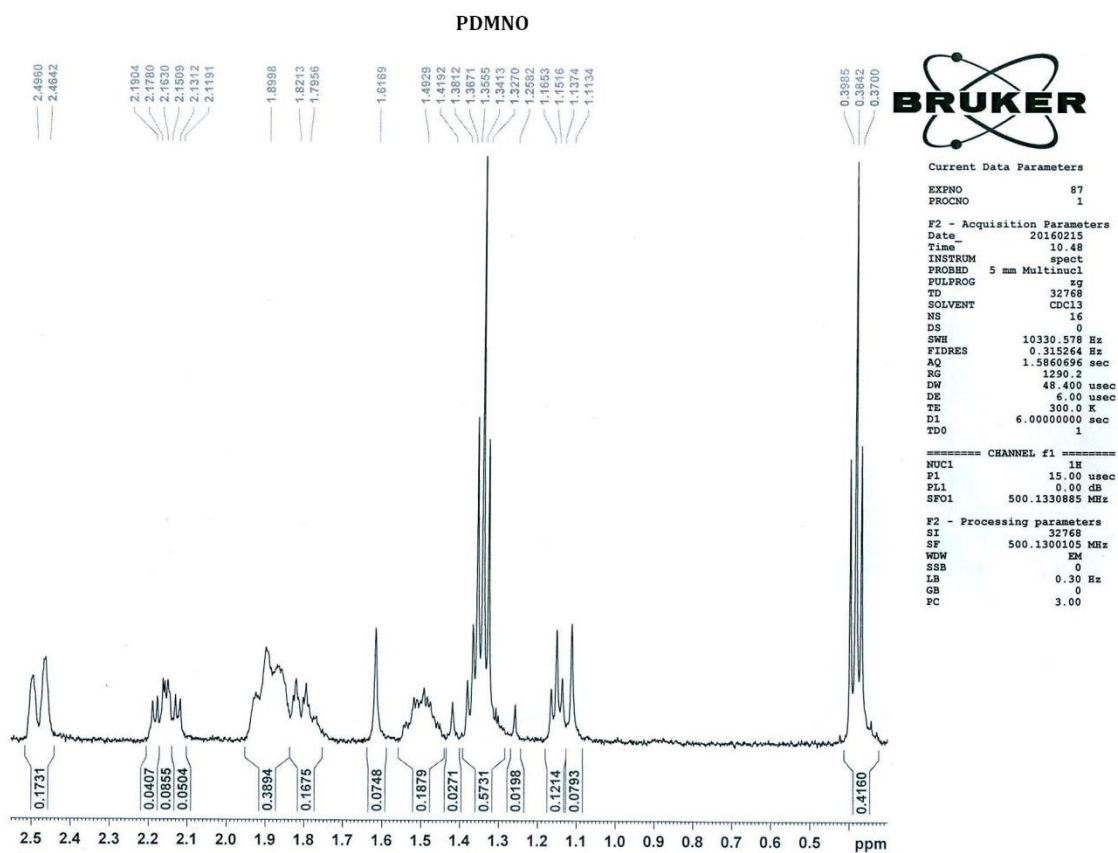


Figure S9. Expanded 1H NMR spectrum of compound 3b.

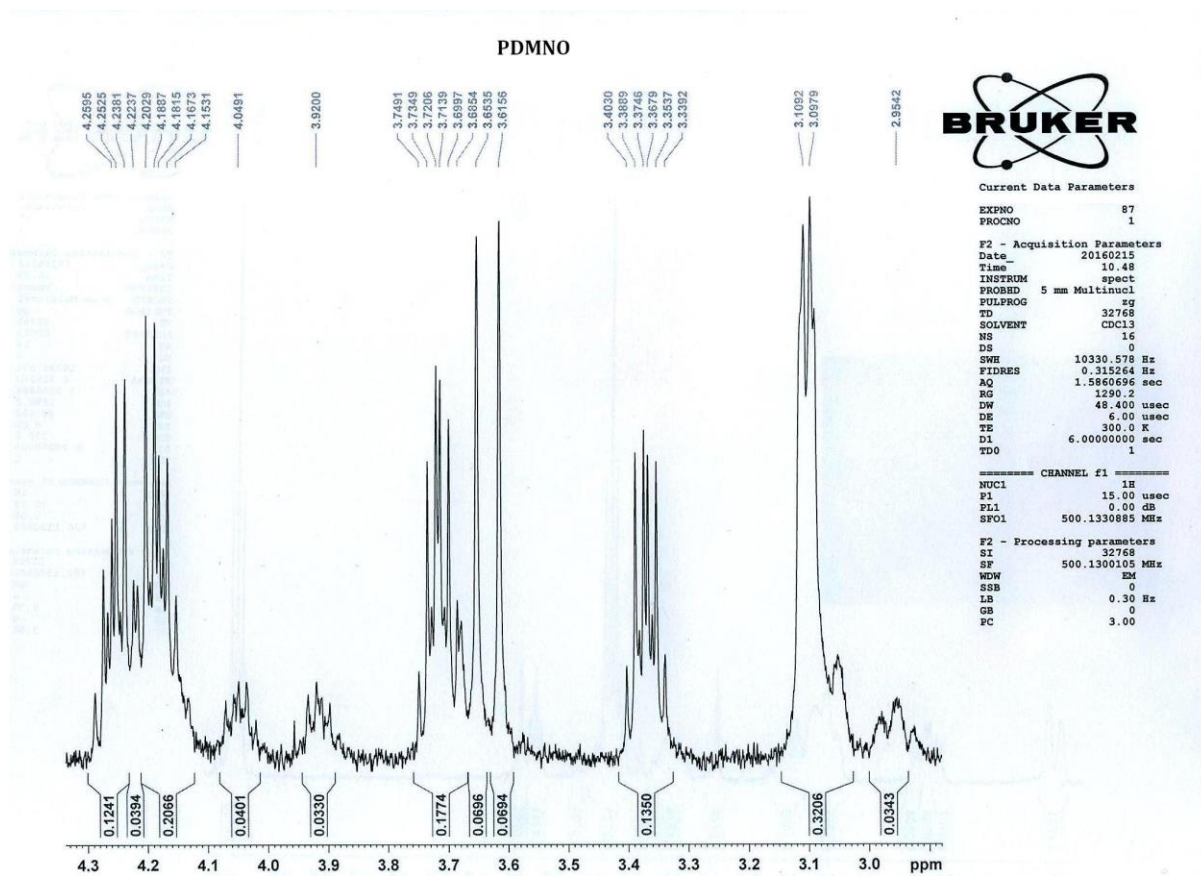


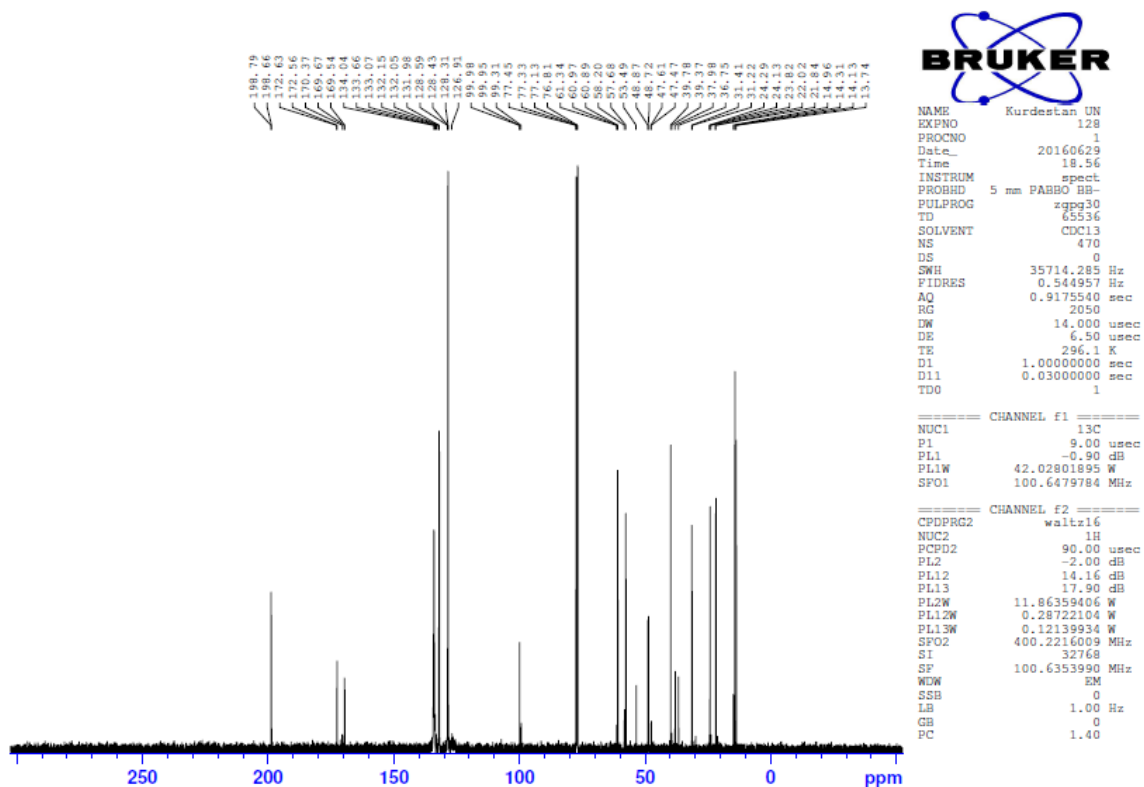
Figure S10. <sup>13</sup>C NMR spectrum of compound **3b**.

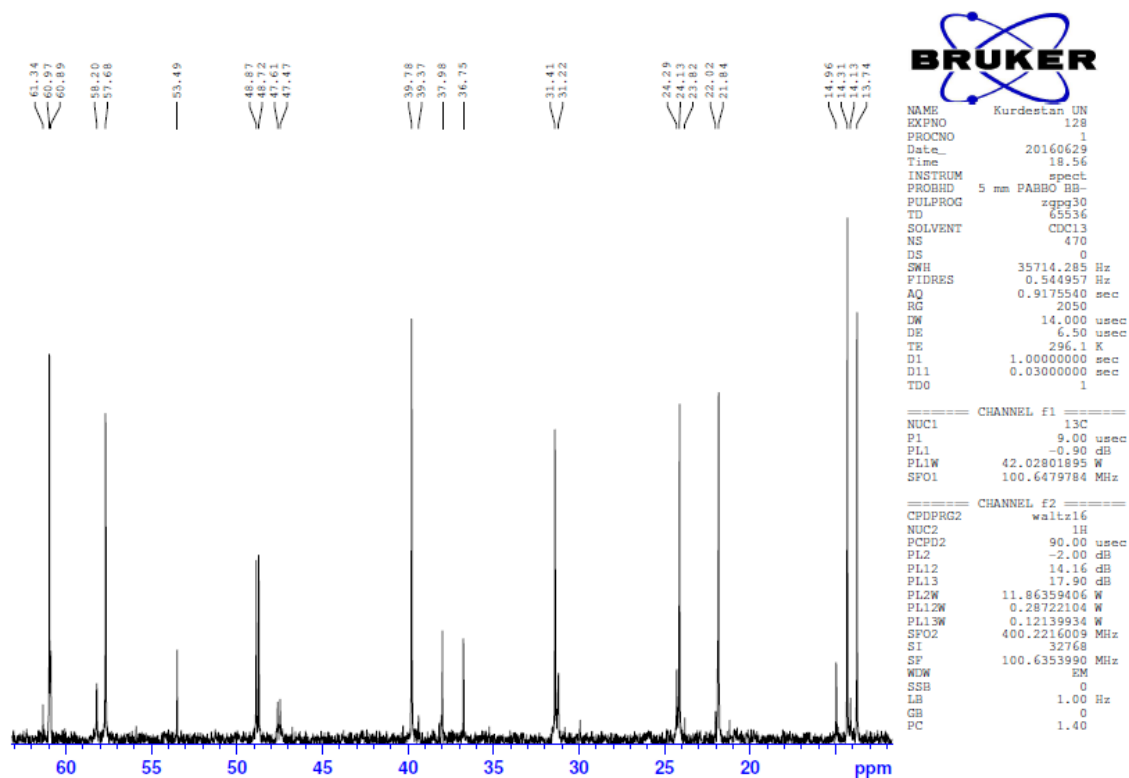
Figure S11. Expanded  $^{13}\text{C}$  NMR spectrum of compound **3b**.

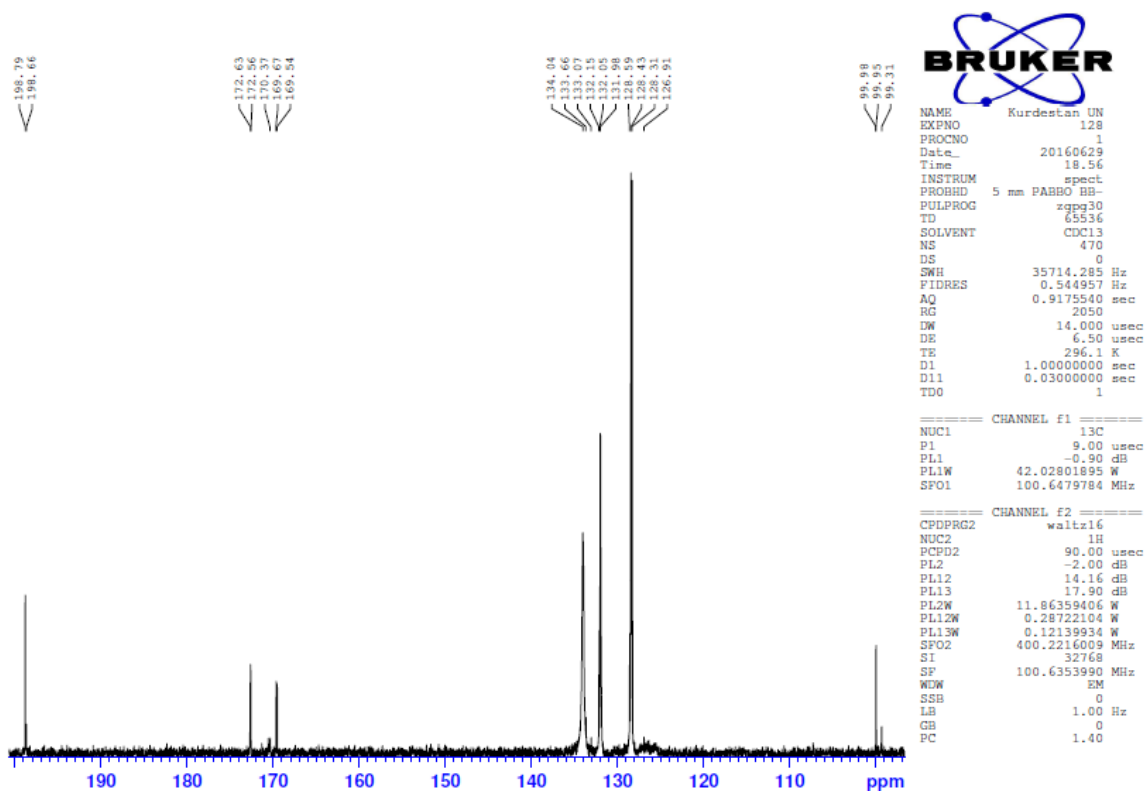
Figure S12. Expanded  $^{13}\text{C}$  NMR spectrum of compound **3b**.

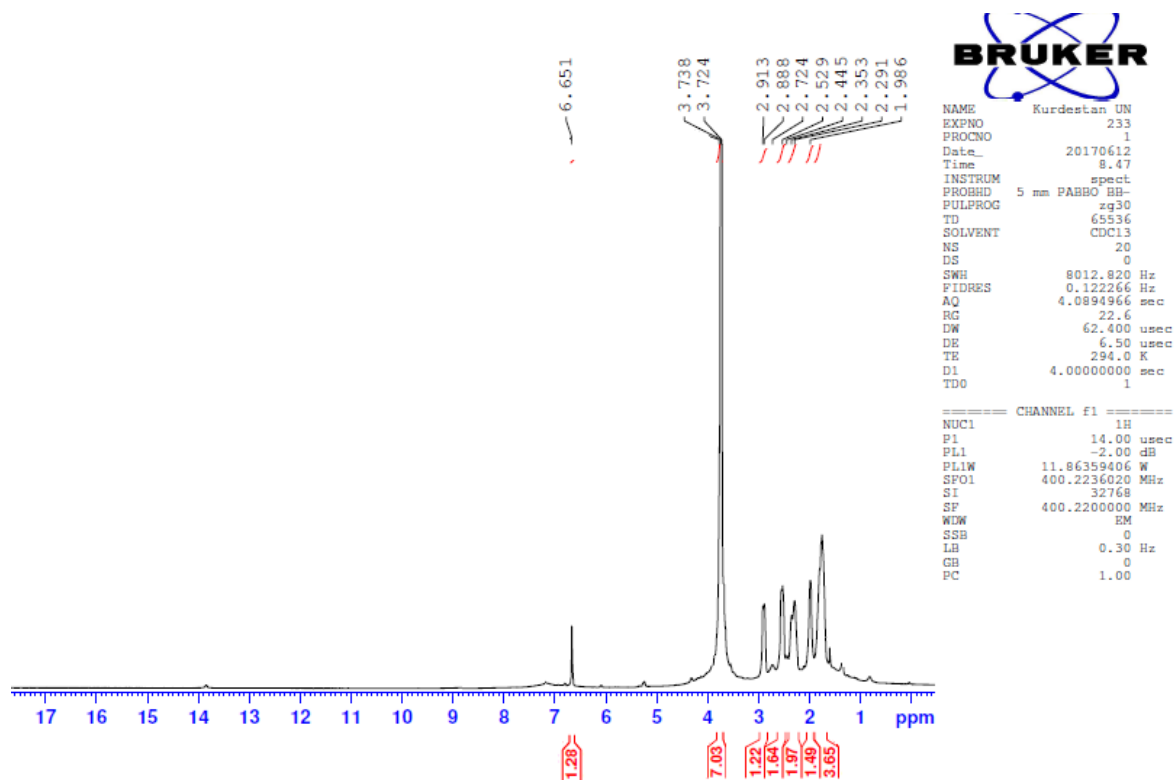
Figure S13. <sup>1</sup>H NMR spectrum of compound 4a.

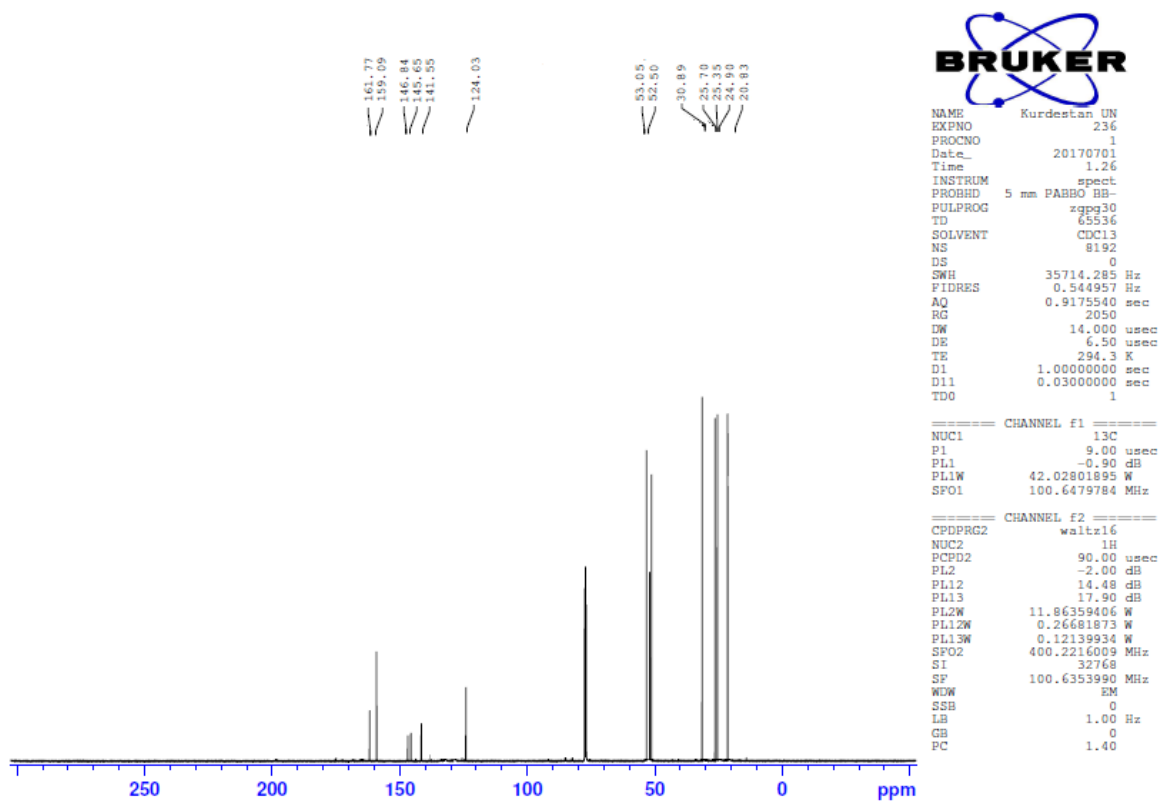
Figure S14. <sup>13</sup>C NMR spectrum of compound 4a.

Figure S15. <sup>1</sup>H NMR spectrum of compound 4c.