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SUPPLEMENTARY MATERIAL TO

Palladium on carbon in PEG-400/cyclohexane: Recoverable and recyclable catalytic system for efficient decarbonylation of aldehydes

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SPECTRAL DATA OF THE SYNTHESIZED COMPOUNDS

*Biphenyl-4-carbaldehyde to biphenyl (**2a**)*. ^{1}H-NMR (500 MHz, $CDCl_3$, δ / ppm): 7.60–7.55 (*m*, 4H), 7.45–7.40 (*m*, 4H), 7.36–7.31 (*m*, 2H). ^{13}C-NMR (125 MHz, $CDCl_3$, δ / ppm): 141.2, 128.7, 127.2, 127.2. EI-MS (*m*/*z* (%)): 154.1 $[M]^+$ (100), 153.1 (38), 152.1 (26), 76.1 (7).

*2-Naphthaldehyde to naphthalene (**2b**)*. ^{1}H-NMR (500 MHz, $CDCl_3$, δ / ppm): 7.89 (*dd*, J_1 = 8.0 Hz, J_2 = 4.0 Hz, 4H), 7.53 (*dd*, J_1 = 8.0 Hz, J_2 = 4.0 Hz,4H). ^{13}C-NMR (125 MHz, $CDCl_3$, δ / ppm): 133.6, 128.0, 126.0. EI-MS (*m*/*z* (%)): 128.2 $[M]^+$ (100), 127.1 (16), 83.7 (11), 48.9 (16).

*Anthracene-9-carbaldehyde to anthracene (**2c**)*. ^{1}H-NMR (500 MHz, $CDCl_3$, δ / ppm): 8.42 (*s*, 2 H), 8.05–7.95 (*m*, 4 H), 7.50–7.45 (*m*, 4 H). ^{13}C-NMR (125 MHz, $CDCl_3$, δ / ppm): 131.7, 128.1, 126.2, 125.3. EI-MS (*m*/*z* (%)): 178.1 $[M]^+$ (100), 176.0 (18), 152.0 (7), 89.2 (8).

*4-Nitrobenzaldehyde to nitrobenzene (**2d**)*. EI-MS (*m*/*z* (%)): 123.0 $[M]^+$ (66), 93.1 (13), 77.0 (100), 51.1 (39).

*5-Fluoro-2-methoxybenzaldehyde to 4-fluoroanisol (**2e**)*. EI-MS(*m*/*z* (%)): 126.0 $[M]^+$ (100), 96.0 (71), 83.1 (40), 57.1 (14).

*Diphenylacetaldehyde to diphenylmethyl (**2h**)*. ^{1}H-NMR (400 MHz, $CDCl_3$, δ / ppm): 7.33-7.23 (*m*, 4H), 7.30–7.20 (*m*, 6H), 3.97 (*s*, 2H). ^{13}C-NMR (101 MHz, $CDCl_3$, δ / ppm): 140.9, 128.8, 128.3, 125.9, 41.8. EI-MS (*m*/*z* (%)): 168.1 $[M]^+$ (100). 152,1 (30), 91.1 (20).

*3-(1,3-Benzodioxol-5-yl)-2-methylpropanal to dihydrosafrole (**2i**)*. ^{1}H-NMR (400 MHz, $CDCl_3$, δ / ppm): 6.79–6.56 (*m*, 3H), 5.90 (*s*, 2H), 2.50 (*dd*, J_1 = 8.5 Hz, J_2 = 6.7 Hz, 2H), 1.59 (*d*, J = 7.5 Hz, 2H), 1.26 (*s*, 2H), 0.92 (*t*, J = 7.3 Hz, 3H). ^{13}C-NMR (101 MHz, $CDCl_3$, δ / ppm): 147.3, 145.2, 136.4, 120.9, 108.7, 107.8, 100.5, 37.6, 29.5, 24.6, 13.5. EI-MS (*m*/*z* (%)): 164.1 $[M]^+$ (40), 135,1 (100), 105,1 (10), 77,1 (20).

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*1-Adamantanecarboxaldehyde to adamantane (**2j**).* ^{1}H-NMR (400 MHz, $CDCl_3$, δ / ppm): 1.86 (*bs*, 4H), 1.74 (*bs*, 12H). ^{13}C-NMR (101 MHz, $CDCl_3$, δ / ppm): 38.2, 28.8. EI--MS (*m/z* (%)): 136.1 $[M]^+$ (100), 121.1 (10), 107,1 (10), 93,1 (40), 79,1 (40).

*1-Adamantaneacetaldehyde to 1-methyl adamantane (**2k**).* ^{1}H-NMR (400 MHz, $CDCl_3$, δ / ppm): 1.92 (*bs*, 3H), 1.56–1.72 (*m*, 6H), 1.45 (*d*, J = 2.8 Hz, 6H), 0.76 (*s*, 3H). ^{13}C--NMR (125 MHz, $CDCl_3$, δ / ppm): 44.8, 37.1, 31,6, 29,0, 27.1. EI-MS (*m/z* (%)): 150.1 $[M]^+$ (20), 135,1 (100), 107,1 (10), 93,1 (30), 79,1 (20).

*Benzo[*b*]thiophene-3-carboxaldehyde to benzo[*b*]thiophene (**2l**).* ^{1}H-NMR (500 MHz, $CDCl_3$, δ / ppm): 7.88 (*d*, J = 8.0 Hz, 1H), 7.80–7.84 (*m*, 1H), 7.43 (*d*, J = 5.5 Hz, H), 7.30–7.37 (*m*, 3H). ^{13}C-NMR (125 MHz, $CDCl_3$, δ / ppm): 139.7, 139.6, 126.3, 124.2, 124.1, 123.8, 123.6, 122.5. EI-MS (*m/z* (%)): 134.0 $[M]^+$ (100), 128.1 (14), 89.1 (10).

*1-Prop-2-yn-1-yl-1*H*-indole-3-carbaldehyde to 1-prop-2-yn-1-yl-1*H*-indole (**2m**).* ^{1}H-NMR (400 MHz, $CDCl_3$, δ / ppm): 7.68-7.60 (*m*, 1H), 7.29–7.06 (*m*, 9H), 6.54 (*dd*, J_1 = 3.2, Hz, J_2 = 0.8 Hz, 1H), 5.27 (*s*, 2H). ^{13}C-NMR (101 MHz, $CDCl_3$, δ / ppm): 137.7, 136.4, 128.9, 128.8, 128.0, 127.7, 121.8, 121.1, 119.6, 109.8, 101.8, 50.2. EI-MS (*m/z* (%)): 207.1 $[M]^+$ (70), 91,1 (100), 65,1 (20).

*1-Benzyl-1*H*-indole-3-carbaldehyde to 1-benzyl-1*H*-indole (**2n**).* ^{1}H-NMR (400 MHz, $CDCl_3$, δ / ppm): 7.62 (*dt*, J_1 = 7.9 Hz, J_2 = 1.0 Hz, 1H), 7.36 (*dd*, J_1 = 8.2 Hz, J_2 = 0.9 Hz, 1H), 7.23 (*d*, J = 1.2 Hz, 1H), 7.18-7.08 (*m*, 2H), 6.51 (*dd*, J_1 = 3.2 Hz, J_2 = 0.9 Hz, 2H), 4.79 (*d*, J = 2.5 Hz, 2H), 2.37 (*t*, J = 2.6 Hz, 1H). ^{13}C-NMR (125 MHz, $CDCl_3$, δ / ppm): 135.6, 128.7, 127.0, 121.7, 121.0, 120.9; 119.7, 109.1, 101.9, 73.3, 35.5. EI-MS (*m/z* (%)): 154.1 $[M]^+$ (100), 127,1 (10), 116,1 (30), 89,1 (20).

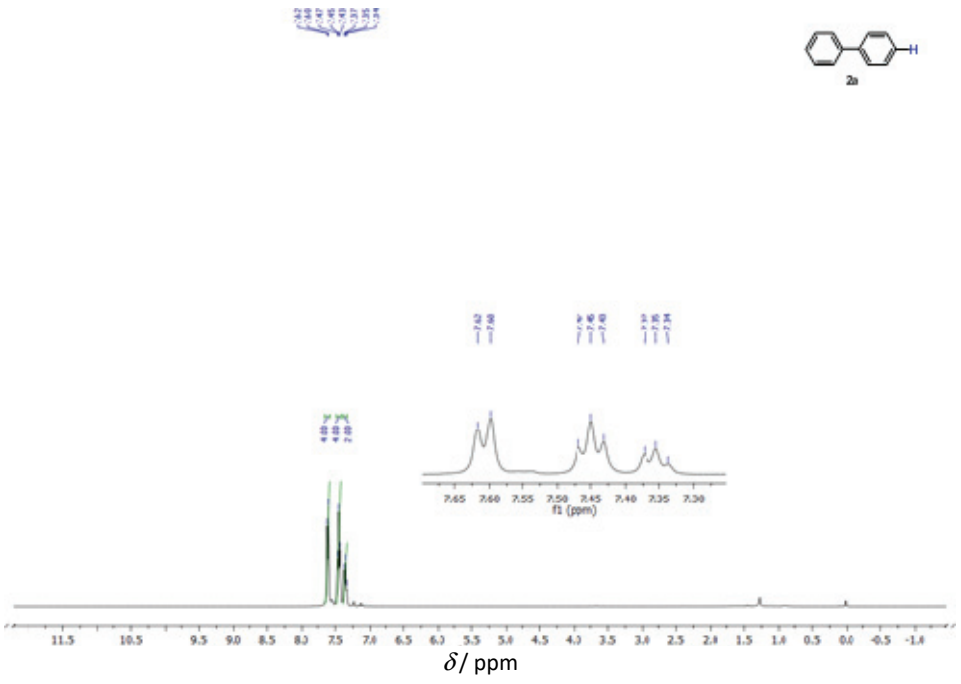


Fig. S-1. ^{1}H-NMR spectra of compound **2a**.

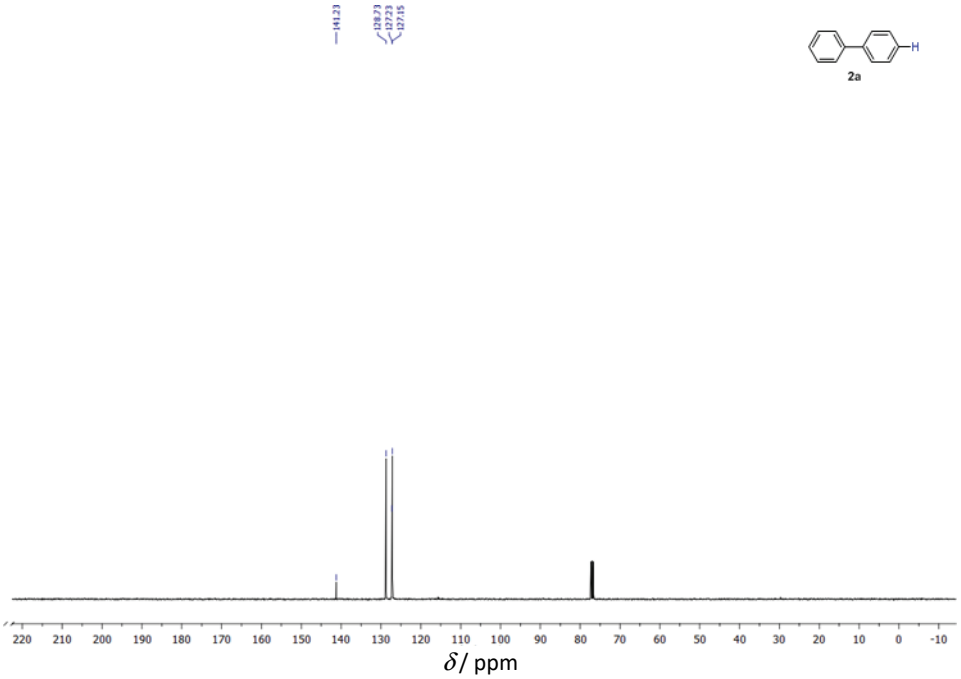


Fig. S-2. ^{13}C-NMR spectra of compound **2a**.

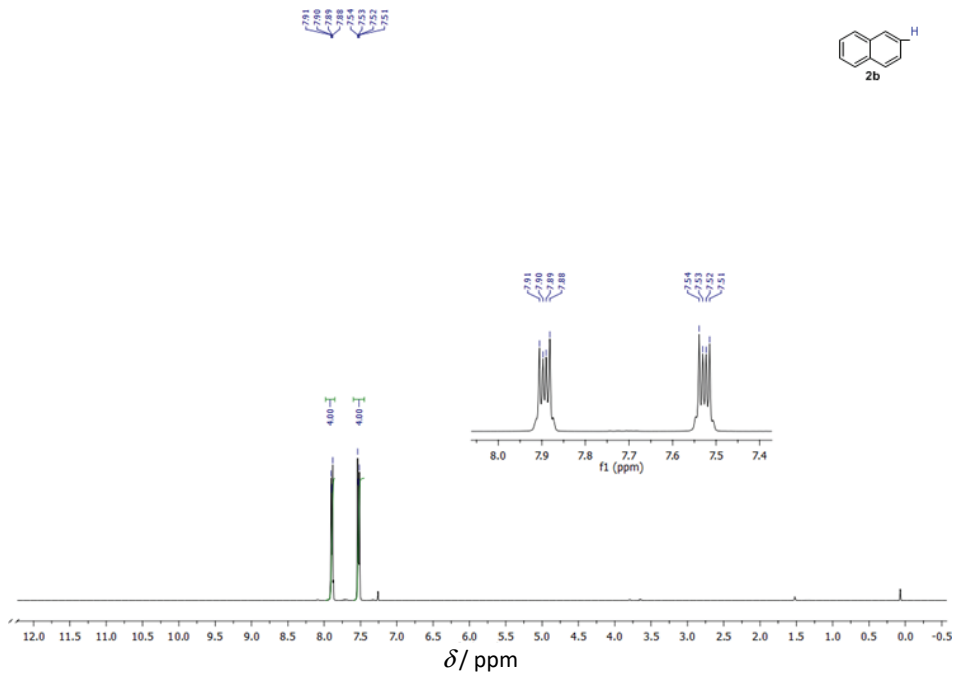


Fig. S-3. ^{1}H-NMR spectra of compound **2b**.

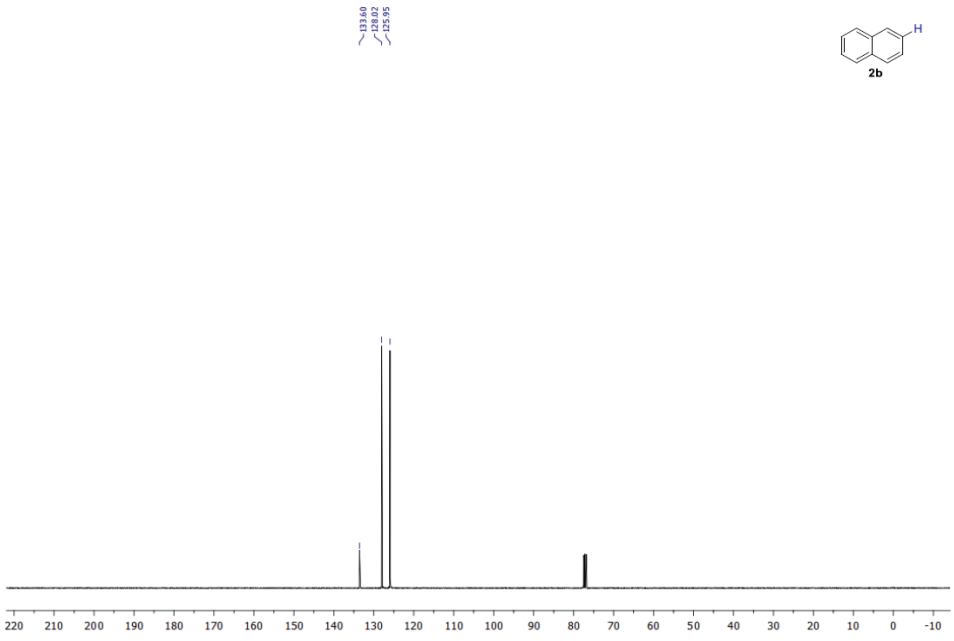


Fig. S-4. ^{13}C-NMR spectra of compound **2b**.

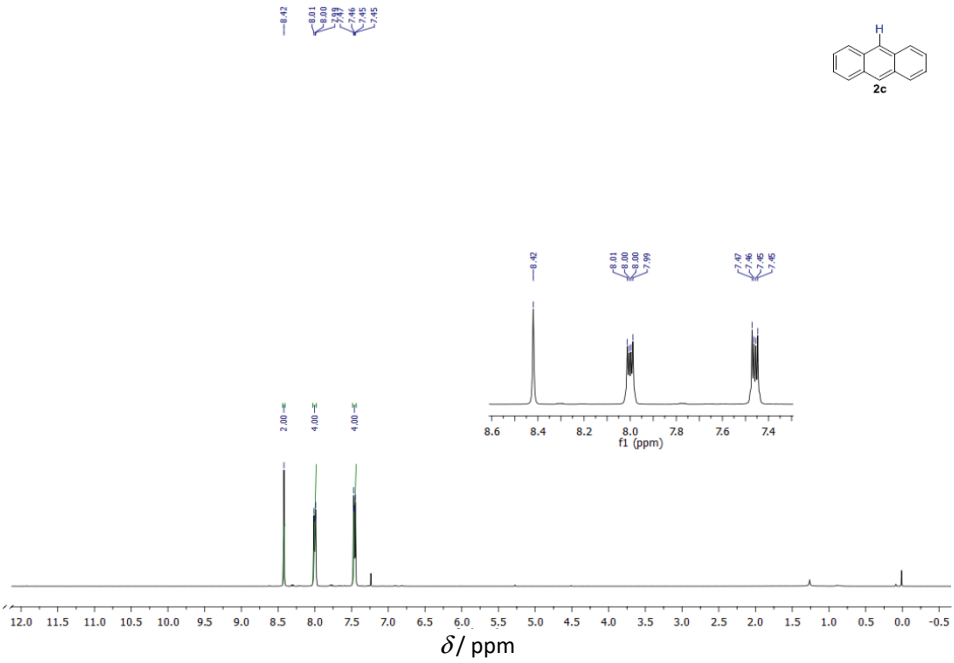


Fig. S-5. ^{1}H-NMR spectra of compound **2c**.

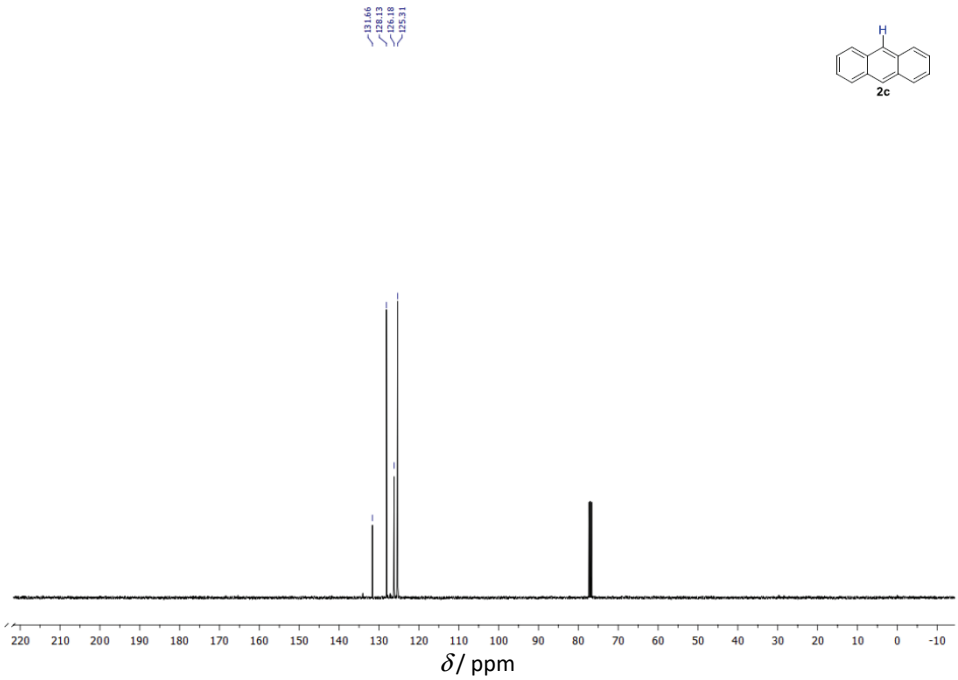
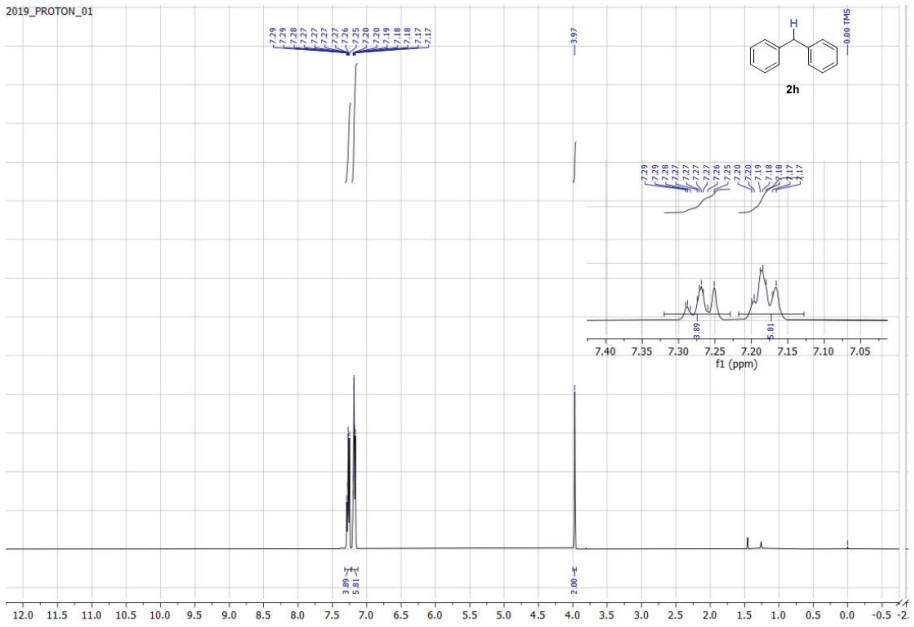
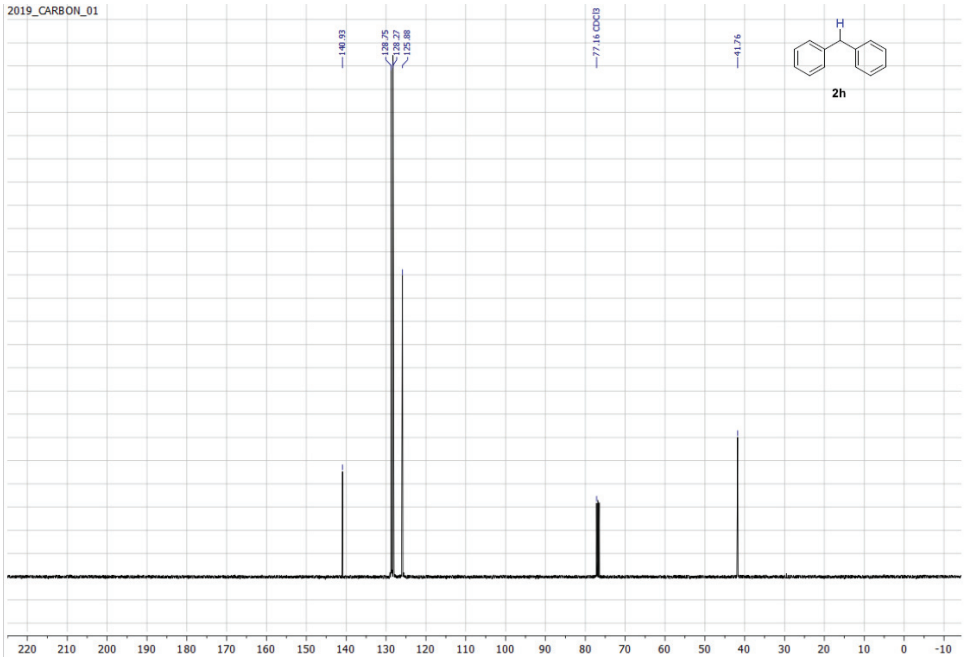


Fig. S-6. ^{13}C-NMR spectra of compound **2c**.



δ/ ppm

Fig. S-7. ^{1}H-NMR spectra of compound **2h**.



δ/ ppm

Fig. S-8. ^{13}C-NMR spectra of compound **2h**.

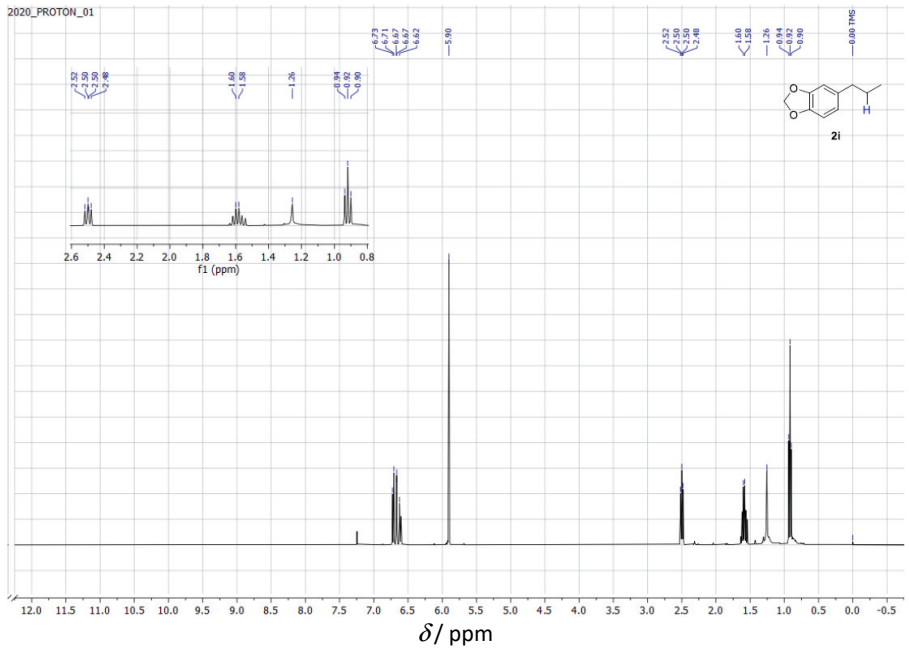


Fig. S-9. ^{1}H-NMR spectra of compound **2i**.

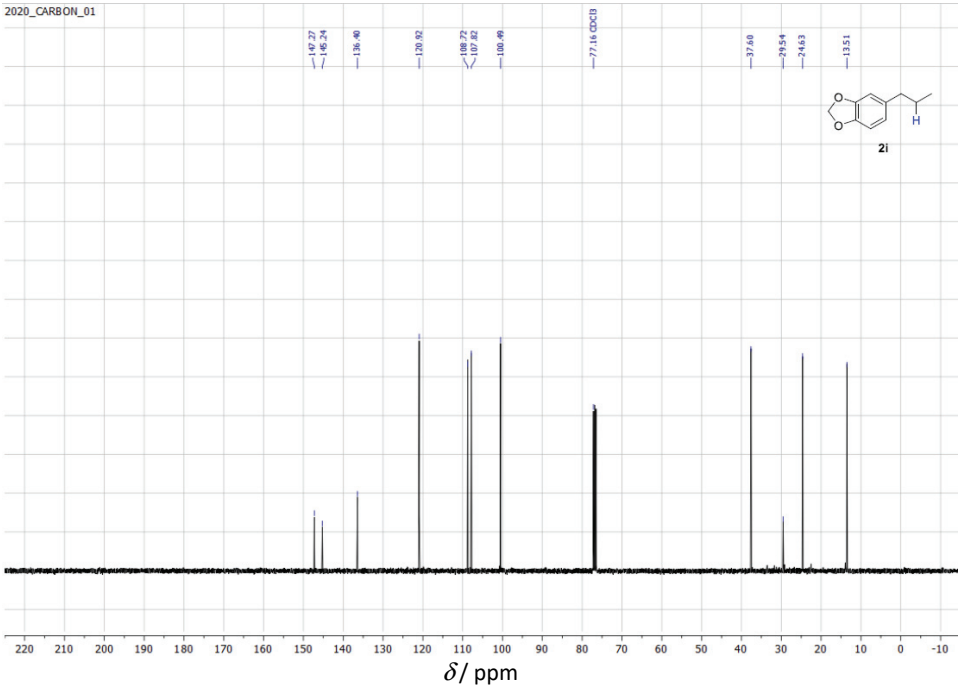


Fig. S-10. ^{13}C-NMR spectra of compound **2i**.

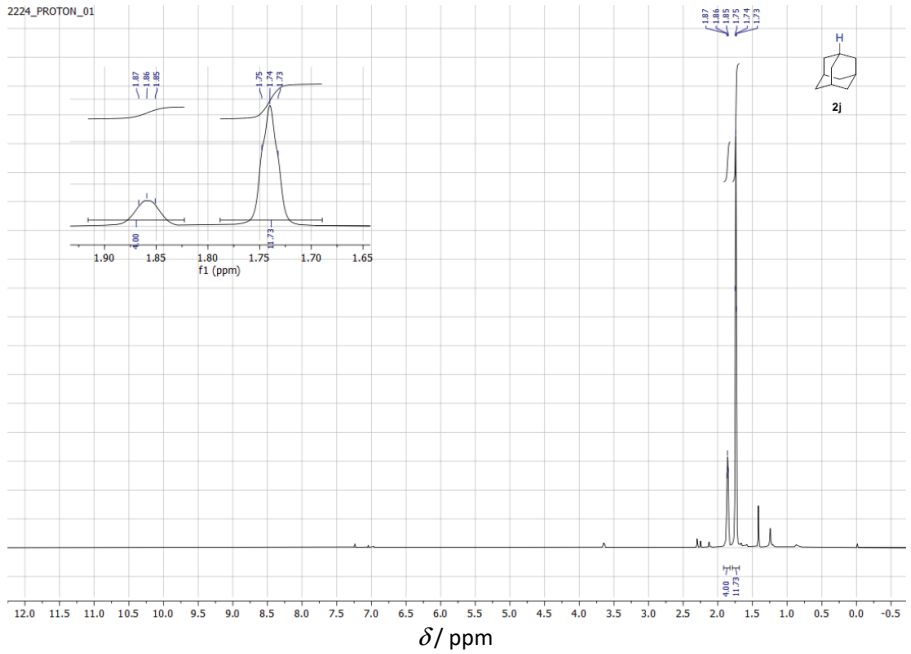


Fig. S-11. ^{1}H-NMR spectra of compound **2j**.

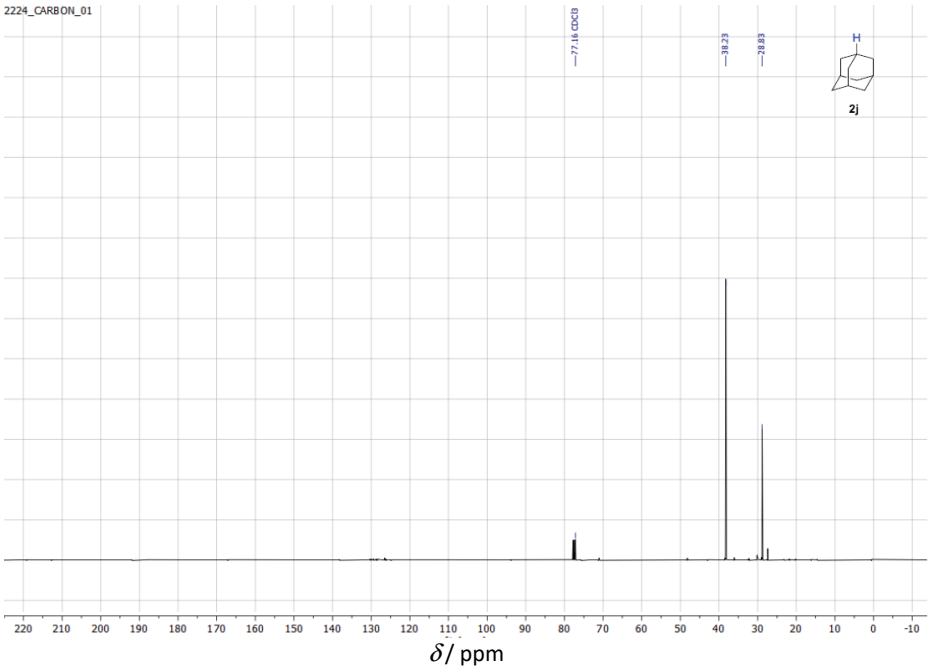


Fig. S-12. ^{13}C-NMR spectra of compound **2j**.

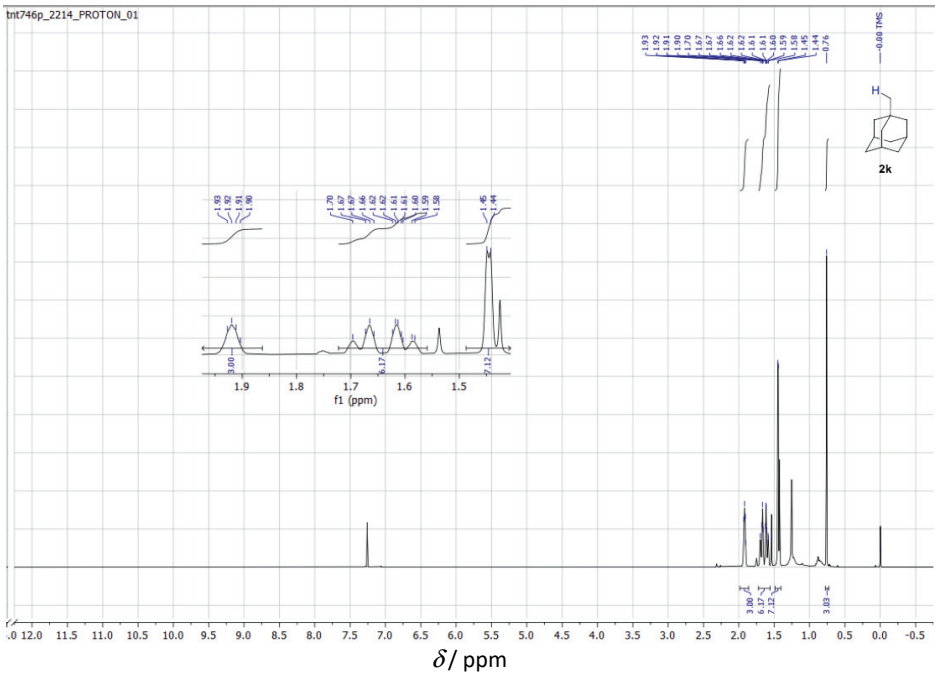


Fig. S-13. ^{1}H-NMR spectra of compound **2k**.

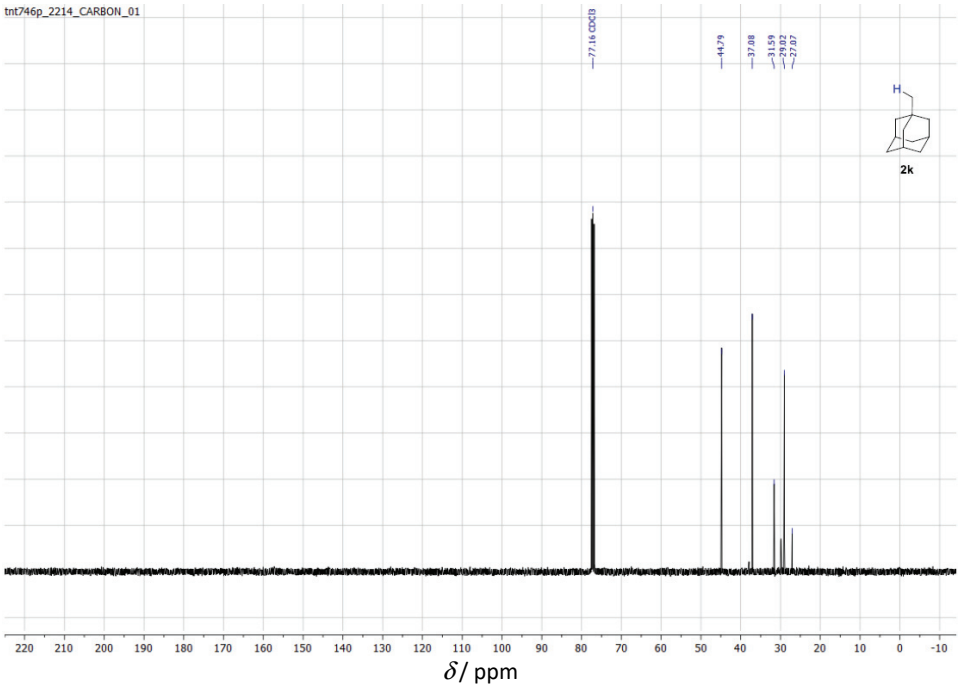


Fig. S-14. ^{13}C-NMR spectra of compound **2k**.

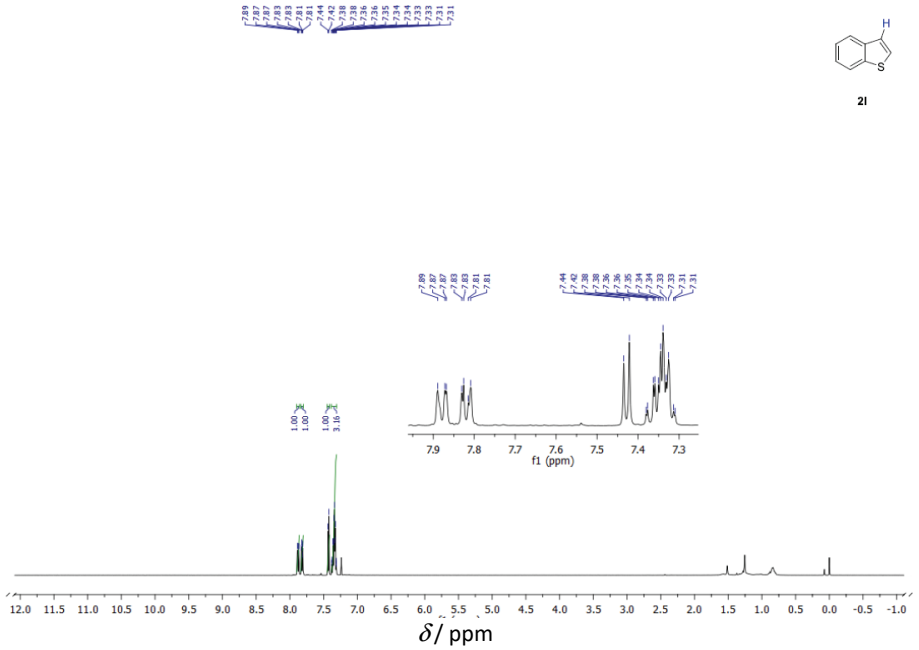
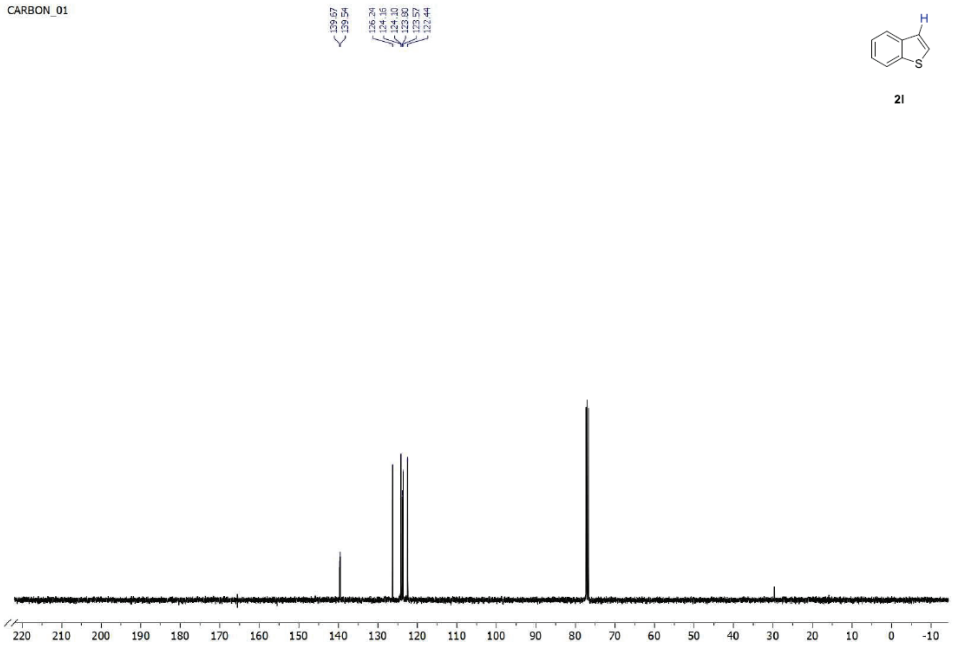
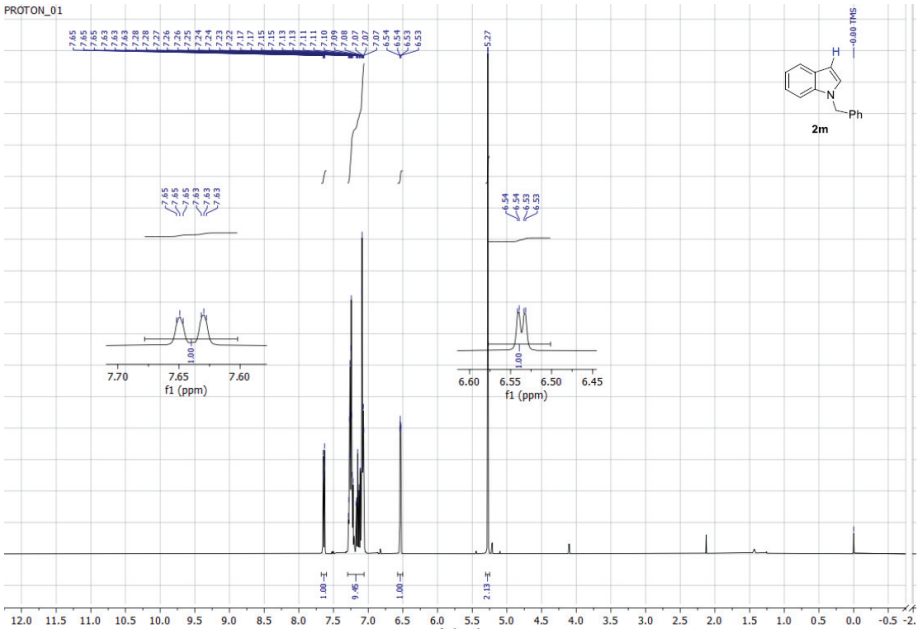


Fig. S-15. ^{1}H-NMR spectra of compound **2l**.



δ/ ppm

Fig. S-16. ^{13}C-NMR spectra of compound **2l**.



δ/ ppm

Fig. S-17. ^{1}H-NMR spectra of compound **2m**.

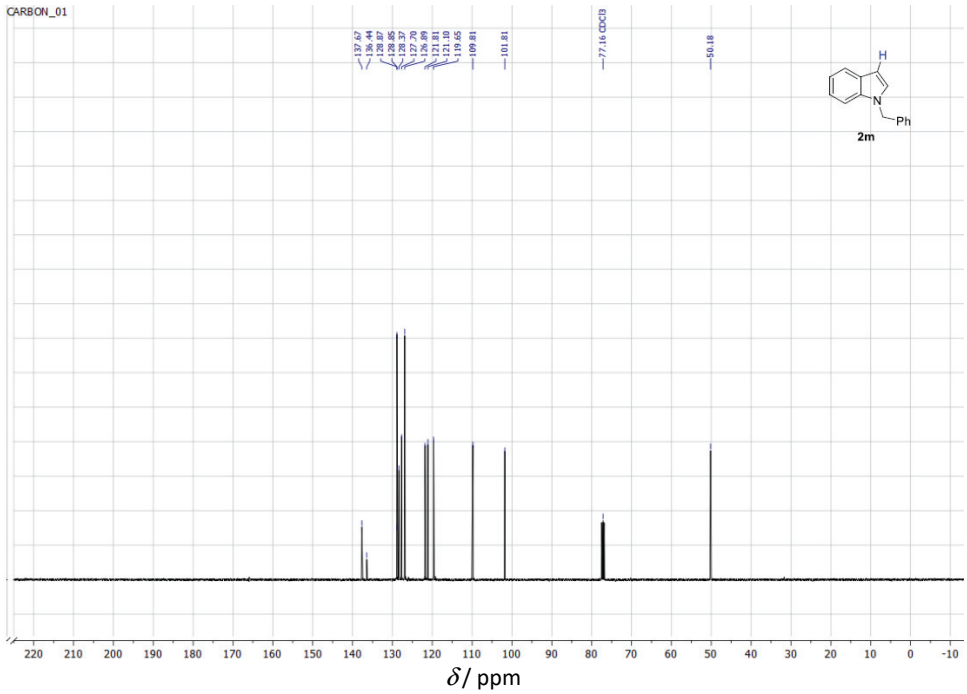


Fig. S-18. ^{13}C-NMR spectra of compound **2m**.

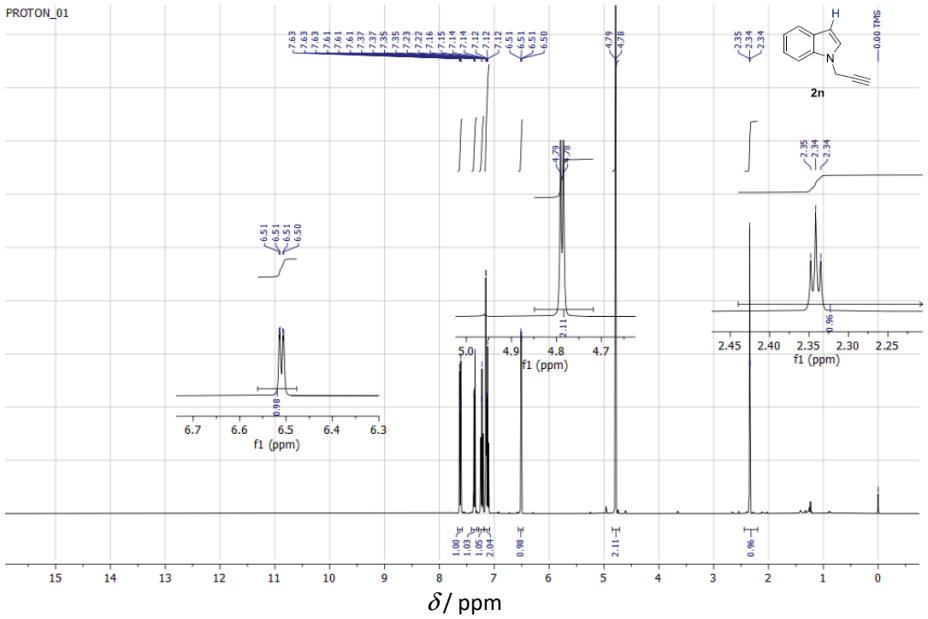


Fig. S-19. ^{1}H-NMR spectra of compound **2n**.

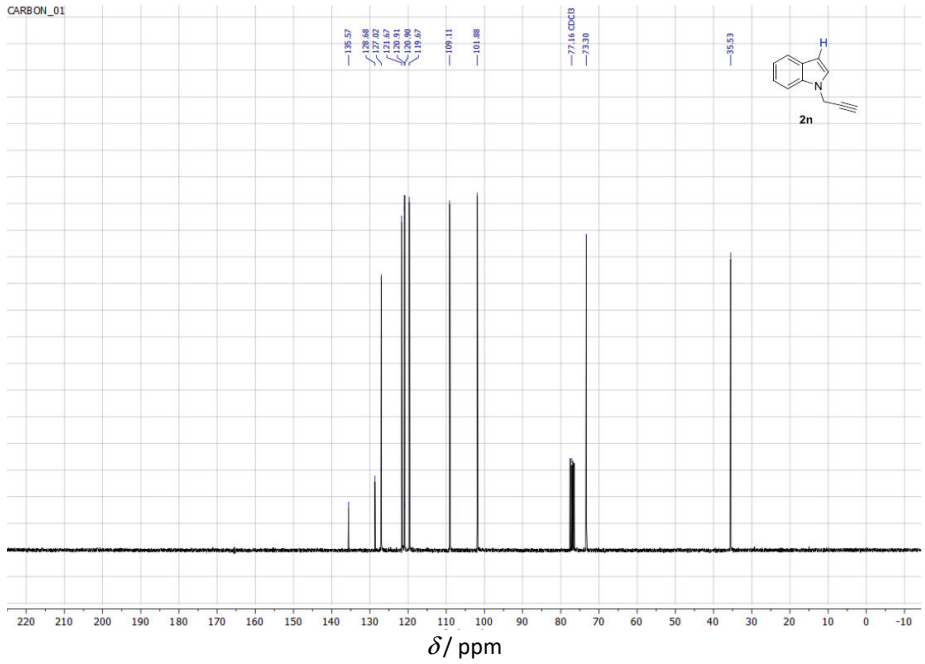


Fig. S-20. ^{13}C-NMR spectra of compound **2m**.

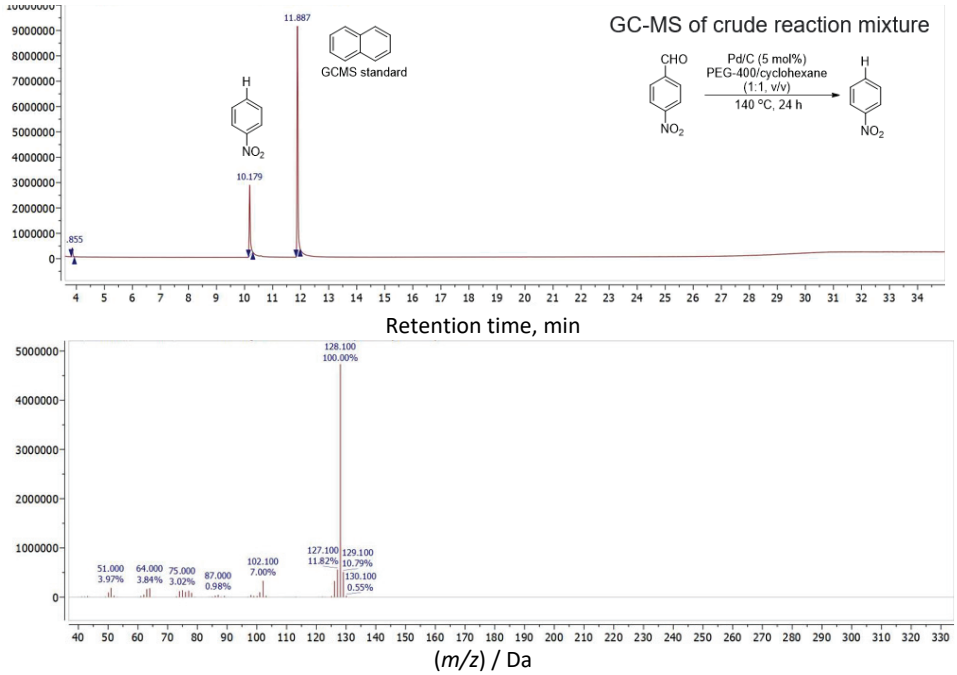


Fig. S-21. GC–MS Analysis.