

SUPPLEMENTARY DATA

COPPER AND AMINE FREE SONOGASHIRA-HAGIHARA COUPLING REACTION CATALYZED BY Pd(0) NANOPARTICLES SUPPORTED ON MODIFIED CROSSLINKED POLYACRYLAMIDE

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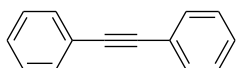
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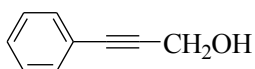
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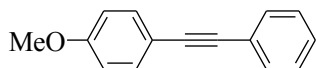
1. Characterization data of compounds



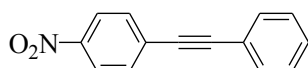
(1a)¹: ¹H-NMR (250 MHz, CDCl₃): δ 7.16-7.23 (m, 6H), 7.39-7.44 (m, 4H), ppm; ¹³C-NMR (60 MHz, CDCl₃): δ 131.2, 128.5, 128.2, 123.3, 89.5 ppm.



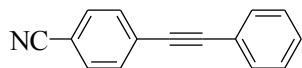
(1b)²: ¹H-NMR (250 MHz, CDCl₃): δ 7.46 (m, 2H), 7.26-7.35 (m, 3H), 5.5 (s, 1H) ppm; ¹³C-NMR (60 MHz, CDCl₃): δ 79.0, 86.1, 122.9, 128.5, 128.6, 133.2 ppm.



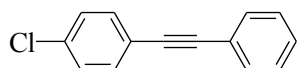
(1c)¹: ¹H-NMR (250 MHz, CDCl₃): δ 7.37-7.43 (m, 4H), 7.22-7.25 (m, 3 H), 6.79 (d, 2 H, J=8.2), 3.75 (s, 3H) ppm; ¹³C-NMR (60 MHz, CDCl₃): δ 159.6, 133.0, 131.4, 128.3, 127.9, 123.6, 115.3, 114.0, 89.3, 88.0, 55.2 ppm.



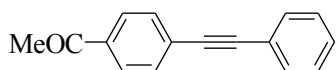
(1e)¹: ¹H-NMR (250 MHz, CDCl₃): δ 8.22 (d, 2H), 7.64-7.69 (d, 2H), 7.54-7.57 (m, 2H), 7.37-7.41 (m, 3H) ppm; ¹³C-NMR (60 MHz, CDCl₃): δ 146.9, 132.2, 131.8, 130.2, 129.2, 123.6, 122.0, 94.7 87.5 ppm.



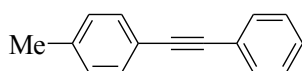
(1g)¹: ¹H-NMR (250 MHz, CDCl₃): δ 7.28-7.31 (m, 6H), 7.44-7.53 (m, 3H) ppm; ¹³C-NMR (60 MHz, CDCl₃): δ 132.0, 131.7, 129.1, 128.5, 128.2, 122.2, 118.5, 111.4, 93.7, 87.7 ppm.



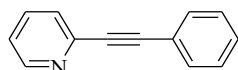
(1h)³: ¹H-NMR (250 MHz, CDCl₃): δ 7.13-7.25 (m, 3H), 7.33-7.43 (m, 6H) ppm; ¹³C-NMR (60 MHz, CDCl₃): δ 134.2, 132.8, 131.6, 128.7, 128.5, 128.4, 122.9, 121.8, 90.3, 88.2 ppm; Anal. Calc. for C₁₄H₉Cl: C, 79.06; H, 4.27. Found: C, 79.11; H, 4.25.



(1i)⁴: ¹H-NMR (250 MHz, CDCl₃): δ 7.91 (d, 2H), 7.58 (d, 2H), 7.54–7.52 (m, 2H), 7.36–7.33 (m, 3H), 2.57 (s, 3H) ppm; ¹³C-NMR (60 MHz, CDCl₃): δ 197.1, 136.1, 131.7, 131.6, 128.7, 128.4, 128.2, 128.1, 122.6, 92.6, 88.6, 26.5 ppm.

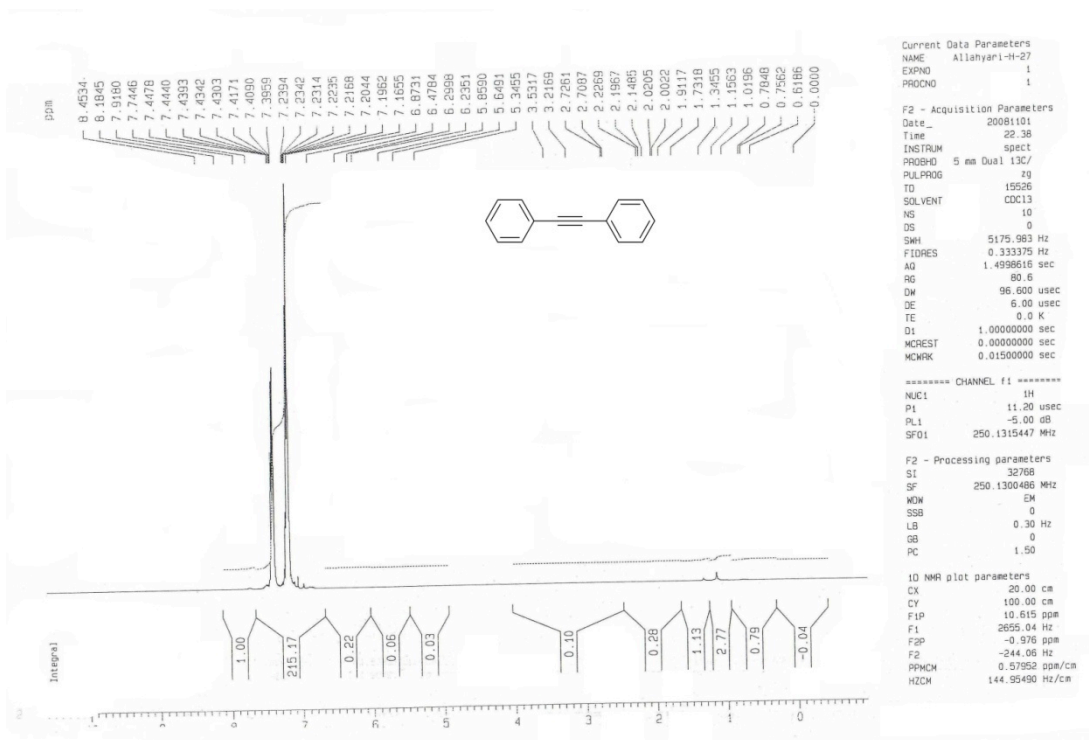


(1j)¹: ¹H-NMR (CDCl₃, 250 MHz): δ 7.52-7.48 (m, 2H), 7.41 (d, 2H), 7.29–7.26 (m, 3H), 7.10 (d, 2H), 2.30 (s, 3H) ppm; ¹³C-NMR (60 MHz, CDCl₃): δ 138.3, 131.5, 129.0, 128.2, 128.0, 123.4, 120.2, 89.6, 88.7, 21.4 ppm.

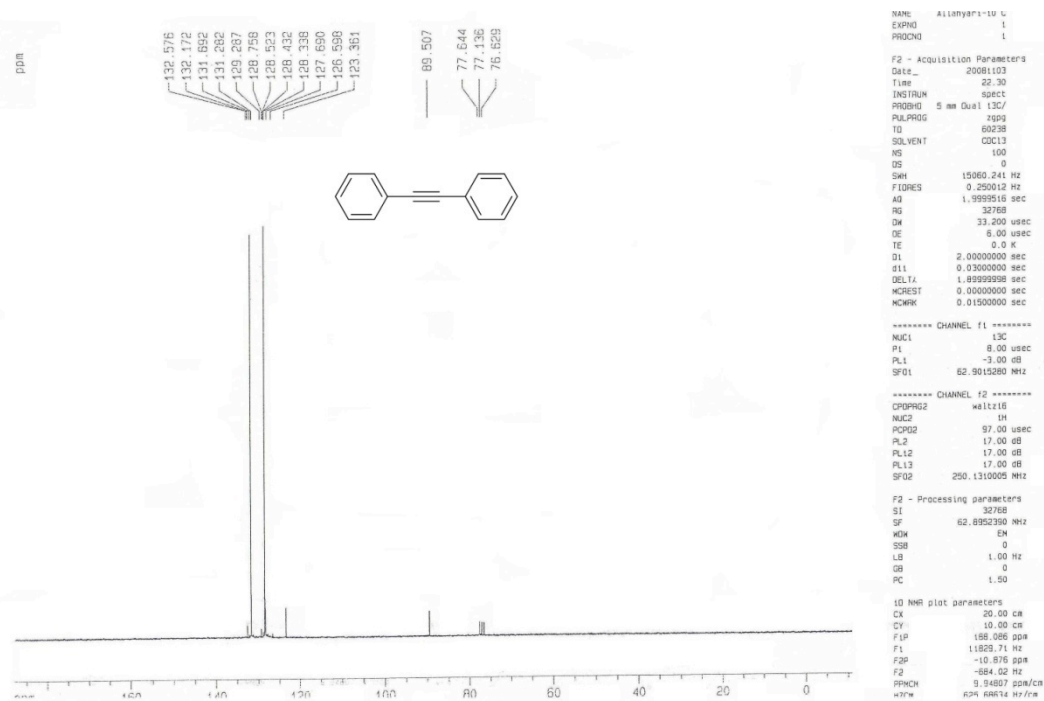


(1k)¹: ¹H-NMR (250 MHz, CDCl₃): δ 8.69 (s, 1H), 8.46-8.47 (m, 1H), 7.71–7.74 (m, 1H), 7.45-7.51 (m, 2H), 7.28-7.31 (m, 4H) ppm; ¹³C-NMR (60 MHz, CDCl₃): δ (ppm): 152.2, 148.5, 138.4, 131.6, 128.8, 128.4, 126.4, 123.0 ppm.

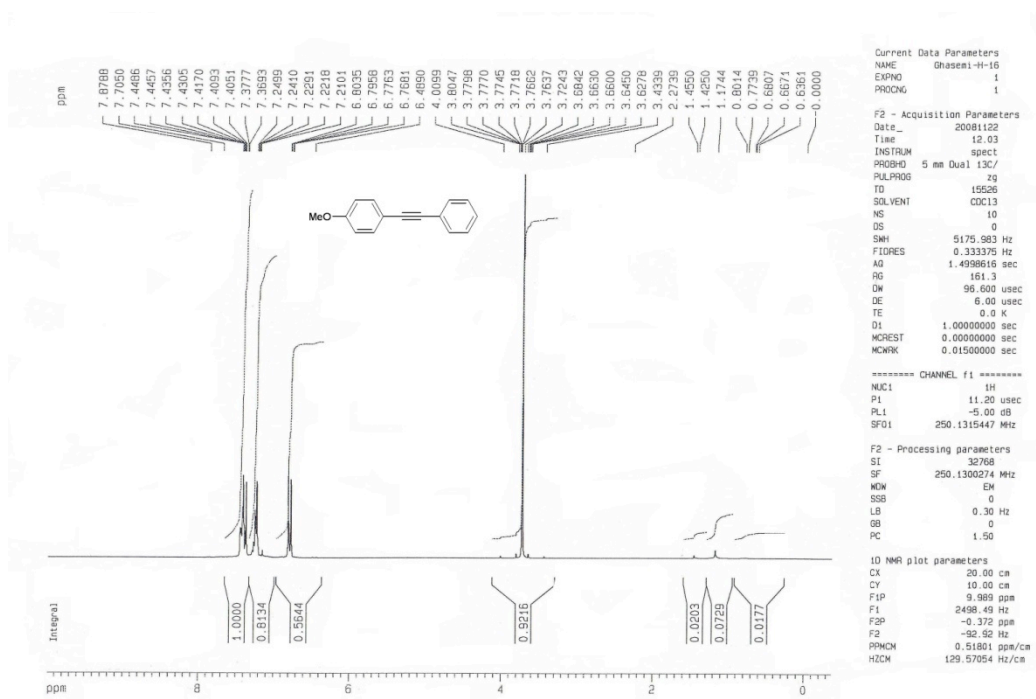
Original ¹H- and ¹³C-NMR spectra of the compounds



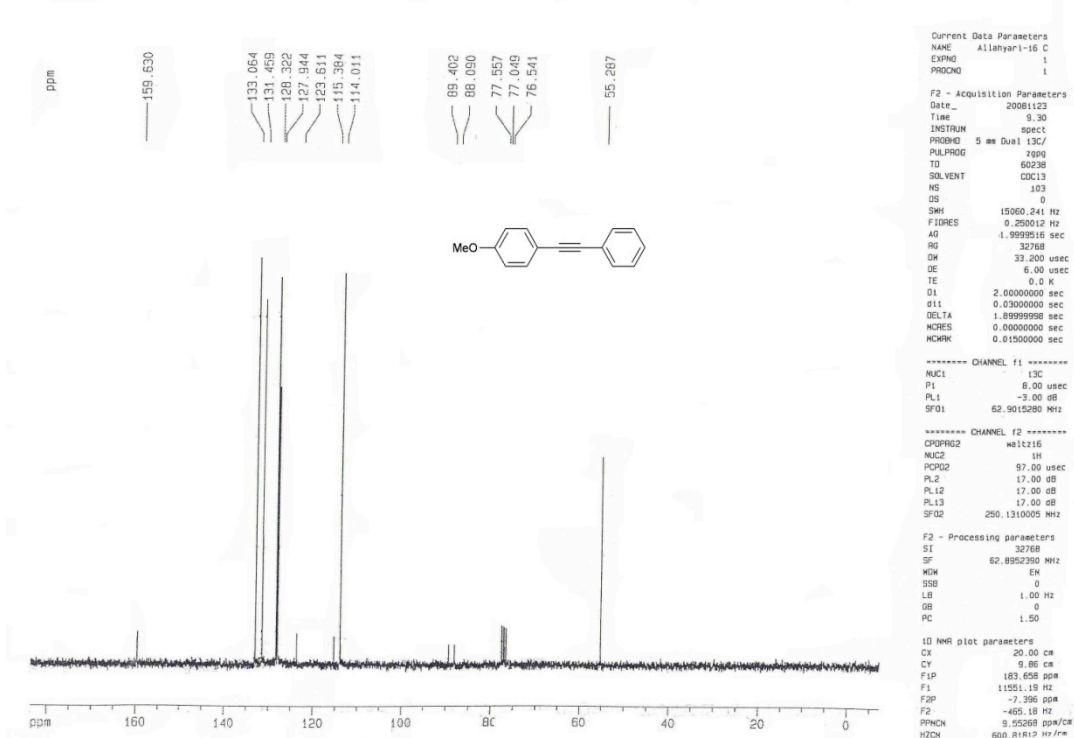
The ¹H NMR spectrum of compound **1a**



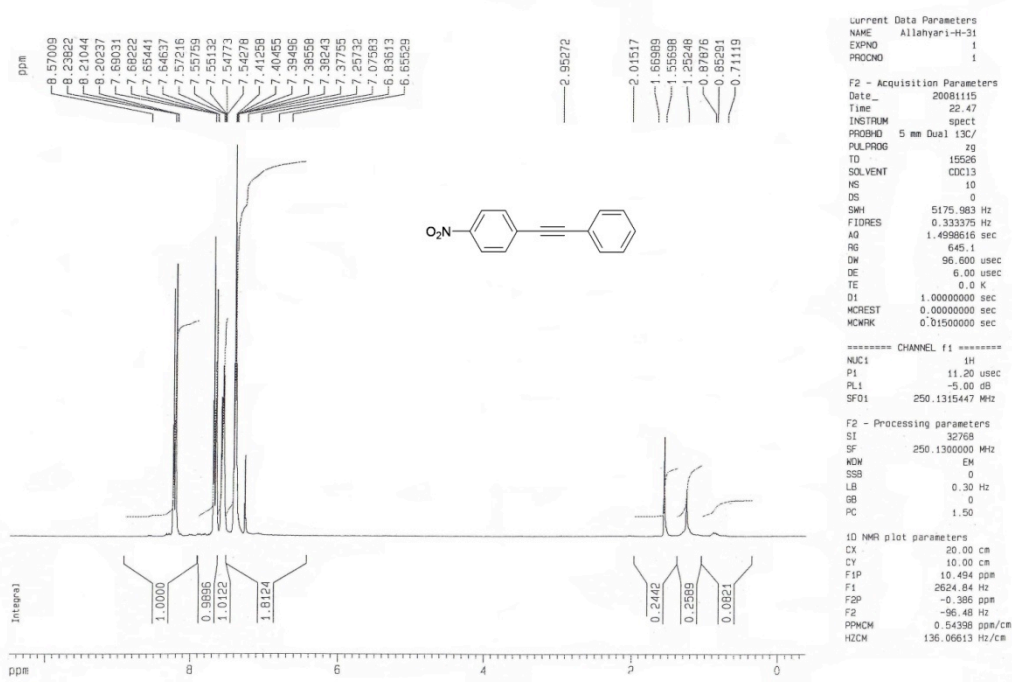
The ¹³C NMR spectrum of compound **1a**



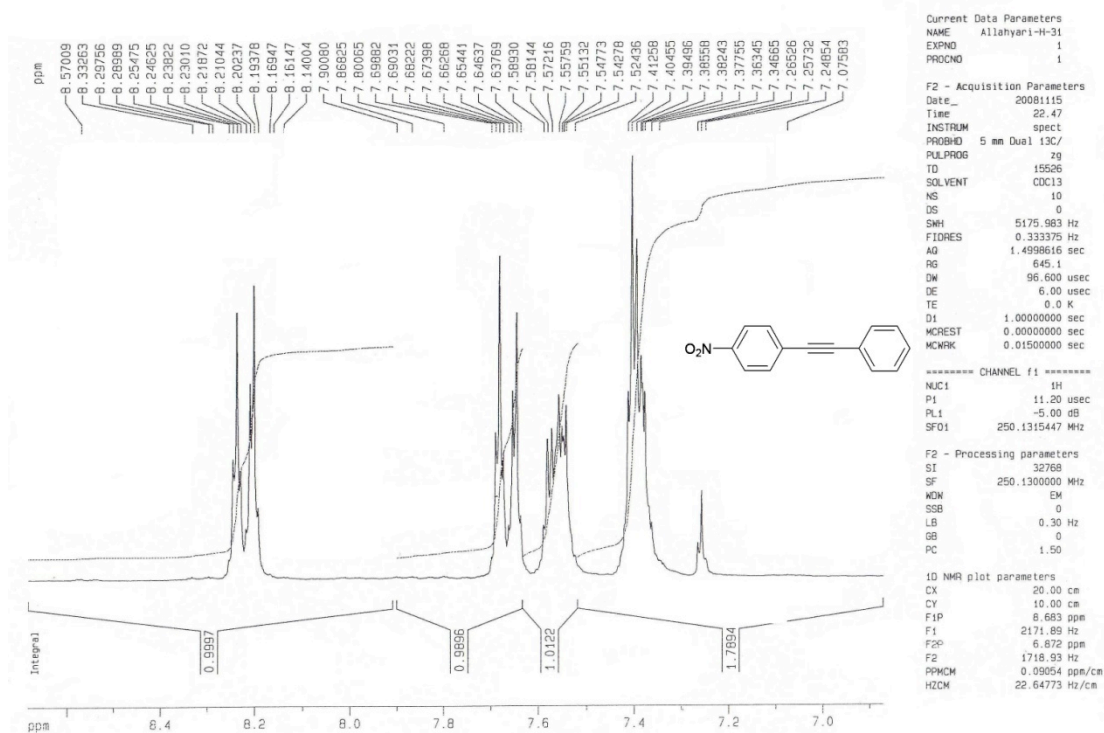
The ¹H NMR spectrum of compound **1c**



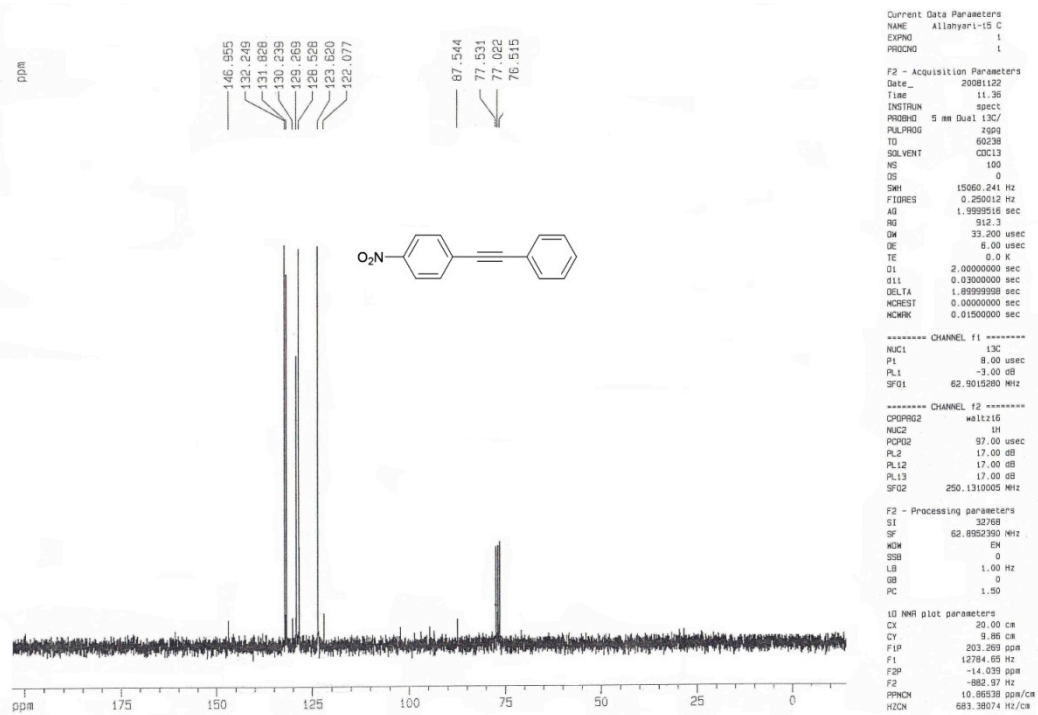
The ¹³C NMR spectrum of compound **1c**



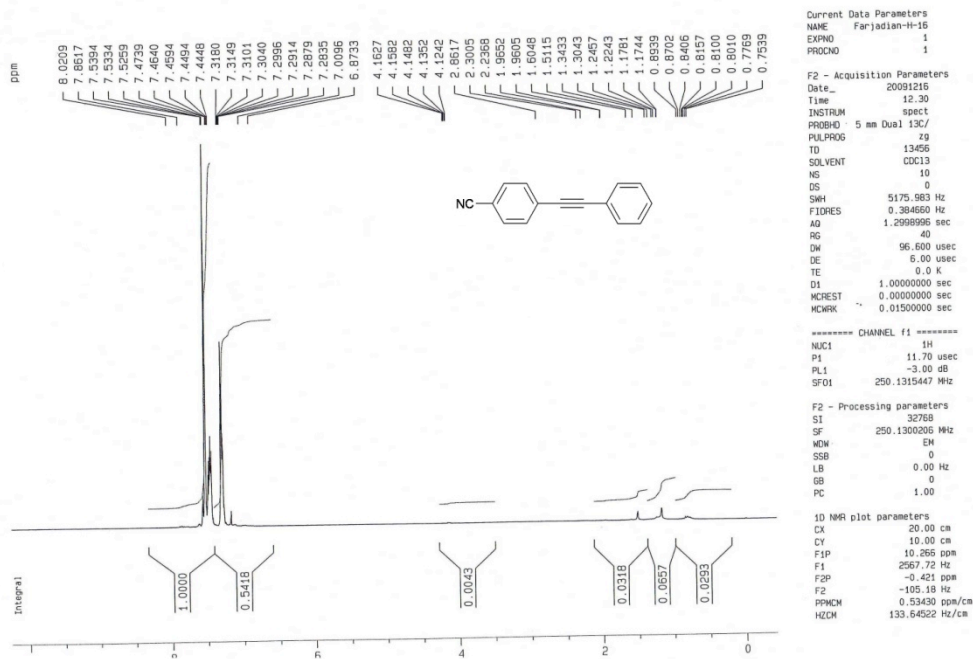
The ¹H NMR spectrum of compound **1e**



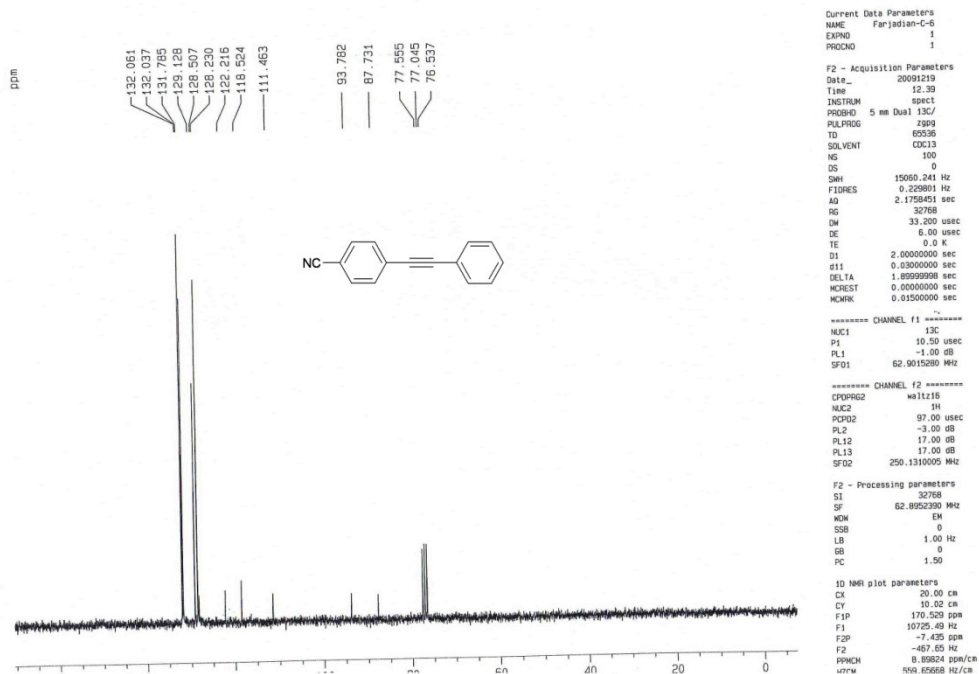
Expanded of aromatic area for compound **1e**



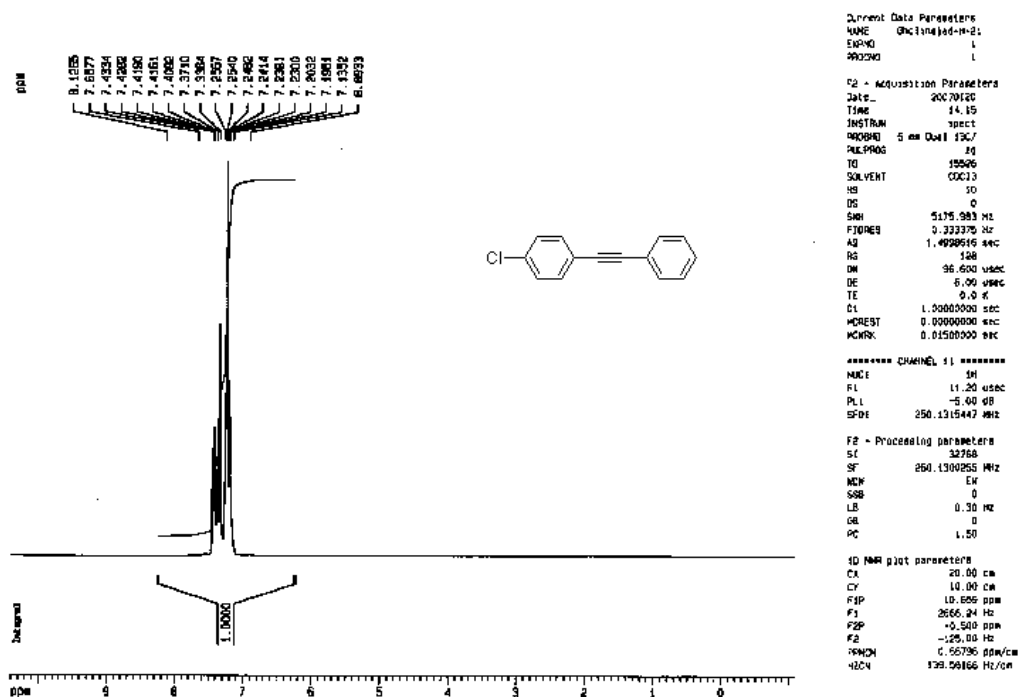
The ^{13}C NMR spectrum of compound **1e**



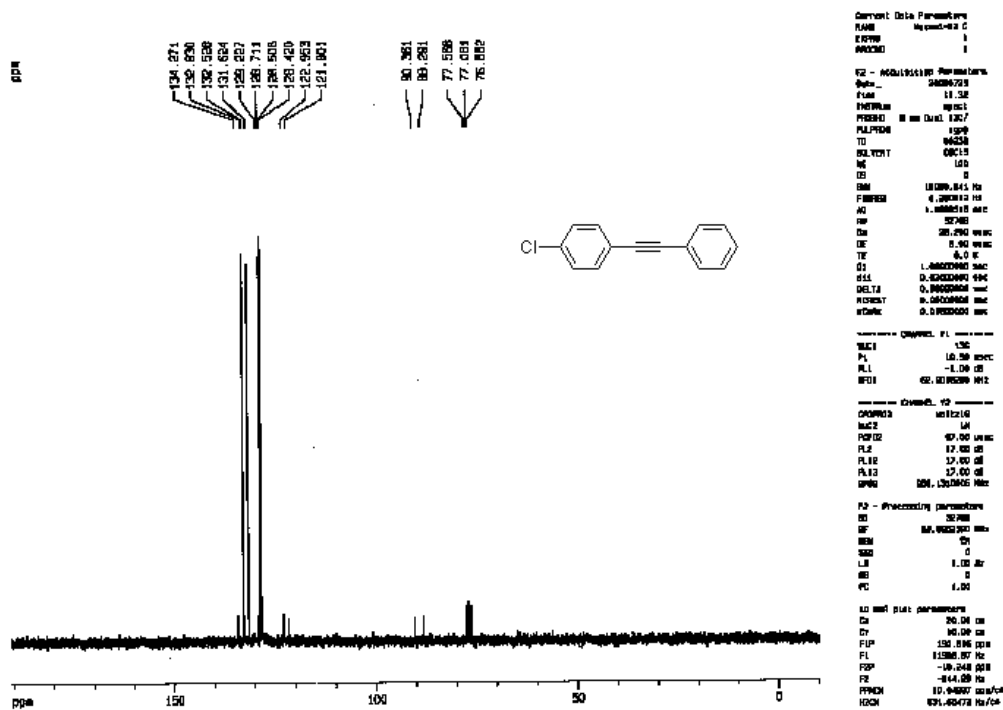
The ¹H NMR spectrum of compound **1g**

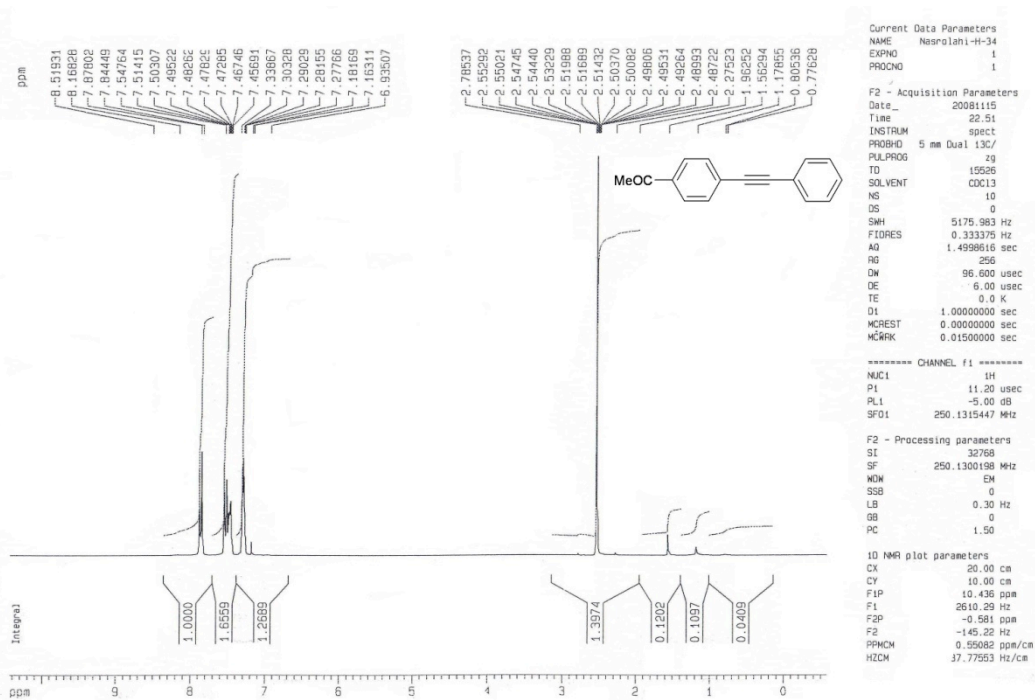
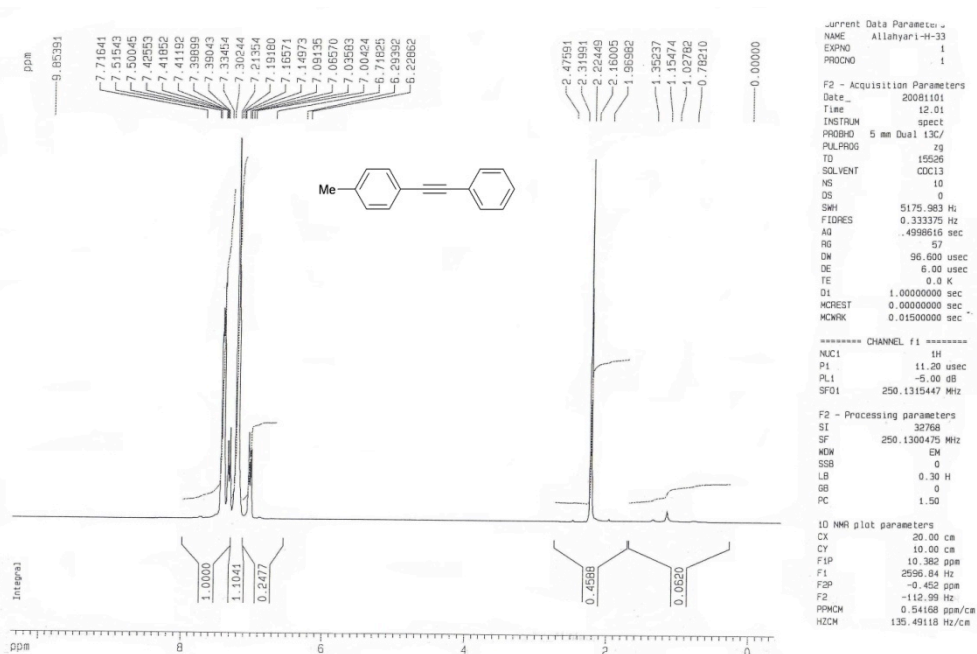


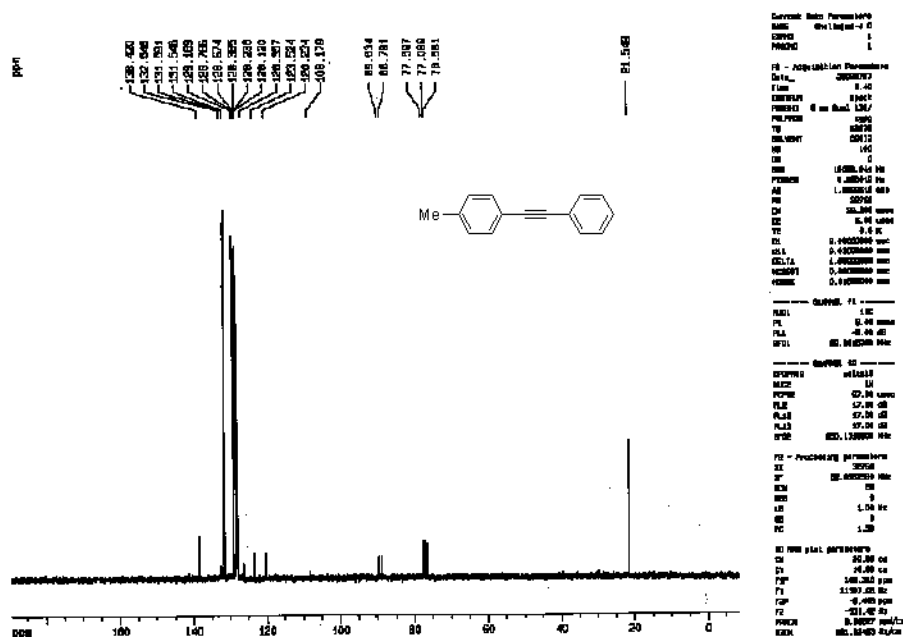
The ¹³C NMR spectrum of compound **1g**



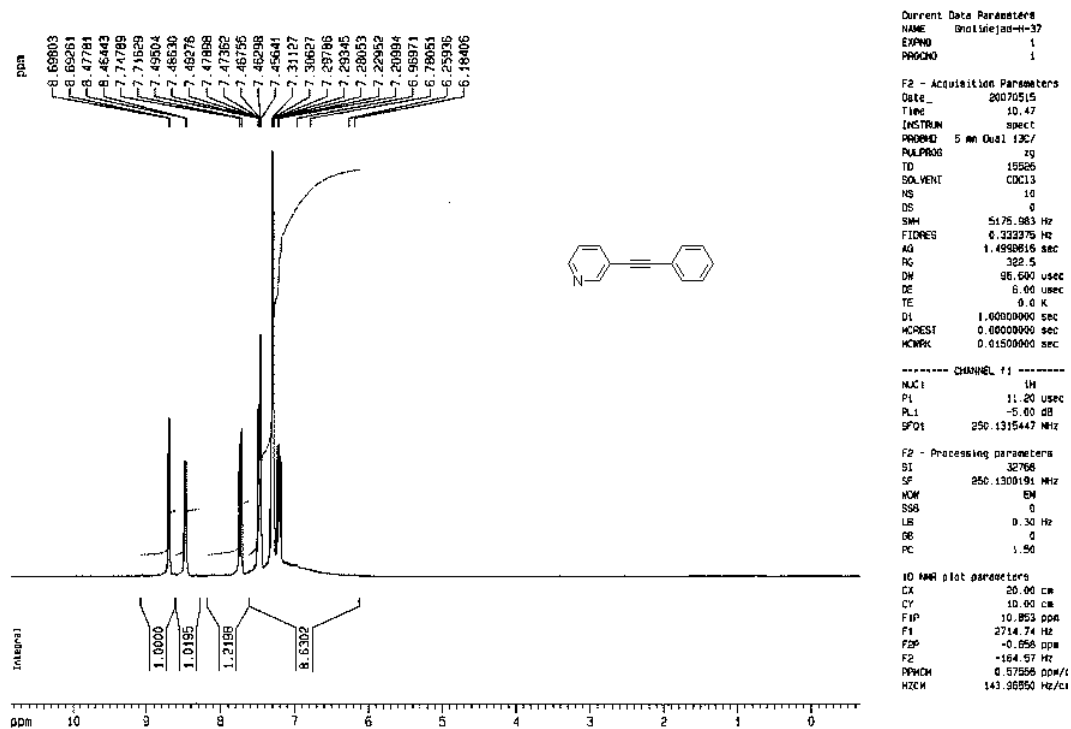
The ¹H NMR spectrum of compound **1h**



The ^{13}C NMR spectrum of compound **1h**The ^1H NMR spectrum of compound **1i**The ^1H NMR spectrum of compound **1j**



The ¹³C NMR spectrum of compound **1j**



The ¹H NMR spectrum of compound **1k**

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1. Liang B., Dai M., Chen J., Yang Z.: *J. Org. Chem.* **2005**, *70*, 391.
2. Bakherad M., Keivanloo A., Bahramian B., Mihanparast S.: *Tetrahedron Lett.* **2009**, *50*, 6418.
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