

Supporting information for the article:

BF₃ bonded nano Fe₃O₄ (BF₃/MNPs): an efficient magnetically recyclable catalyst for the synthesis of 1,4-dihydropyrano[2,3-c]pyrazole derivatives

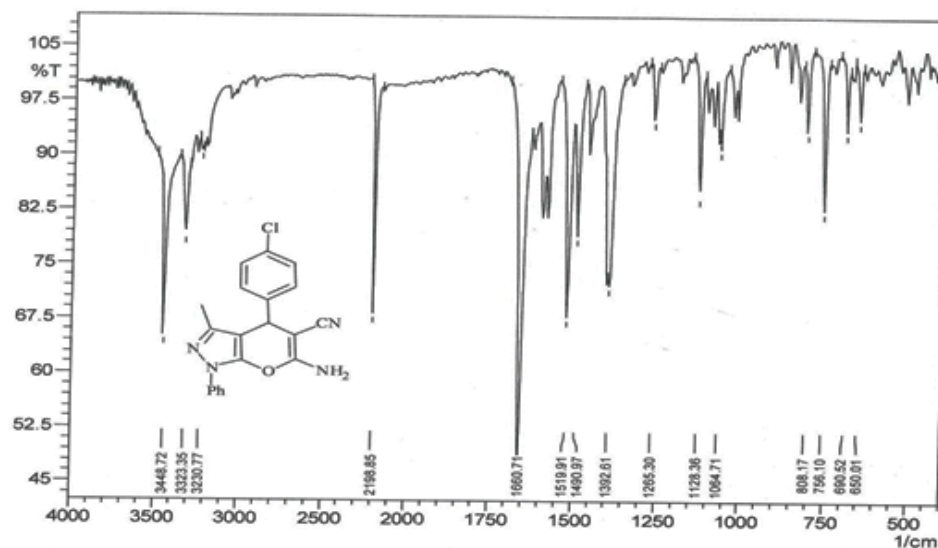
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Contents

- a) FTIR spectra of some compounds
- b) ¹HNMR and ¹³CNMR spectra of some compounds

a) FTIR spectra of some compounds

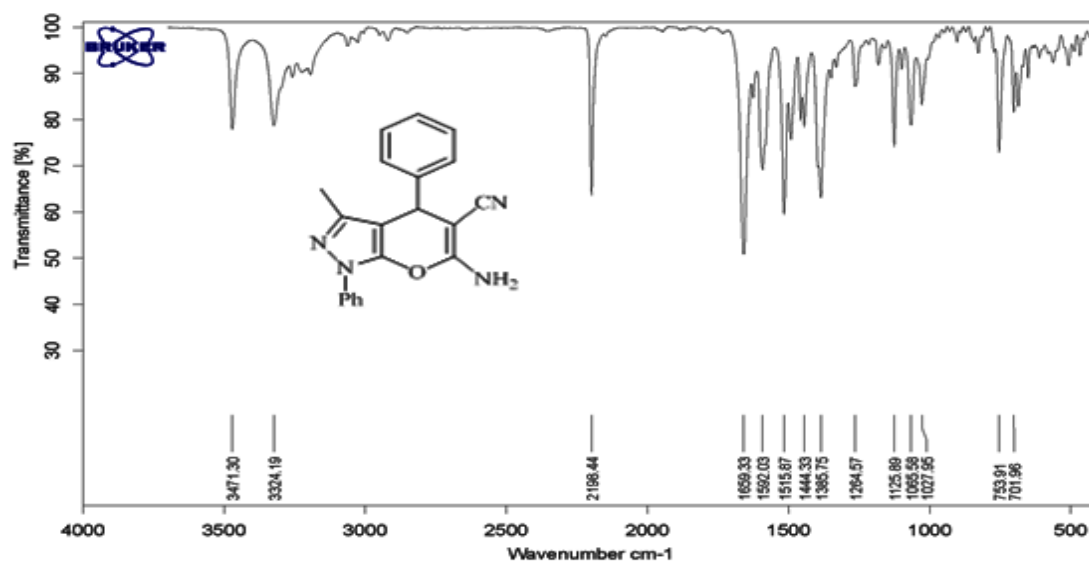


FT-IR (KBr disk) 6-amino-3-methyl-4-(4-chlorophenyl)-1-phenyl-1,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (4a)

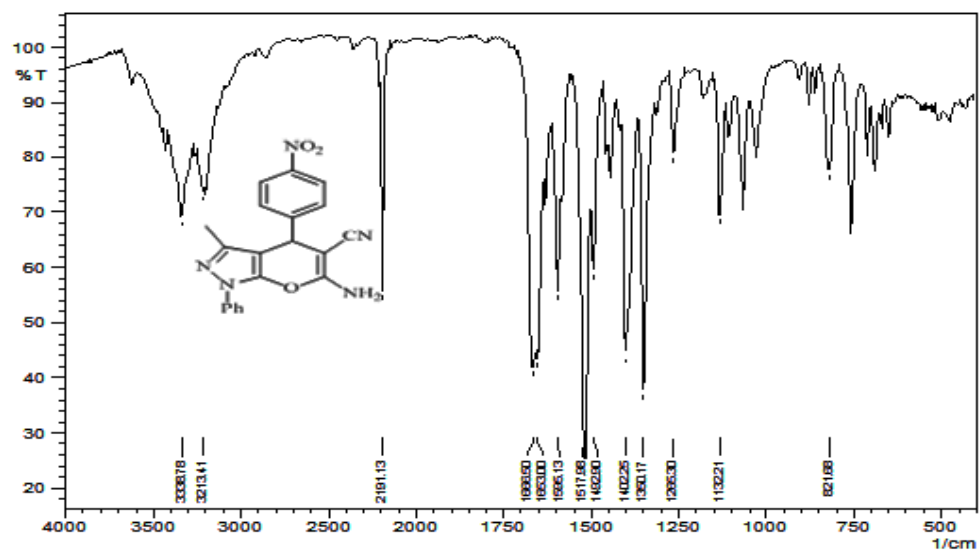
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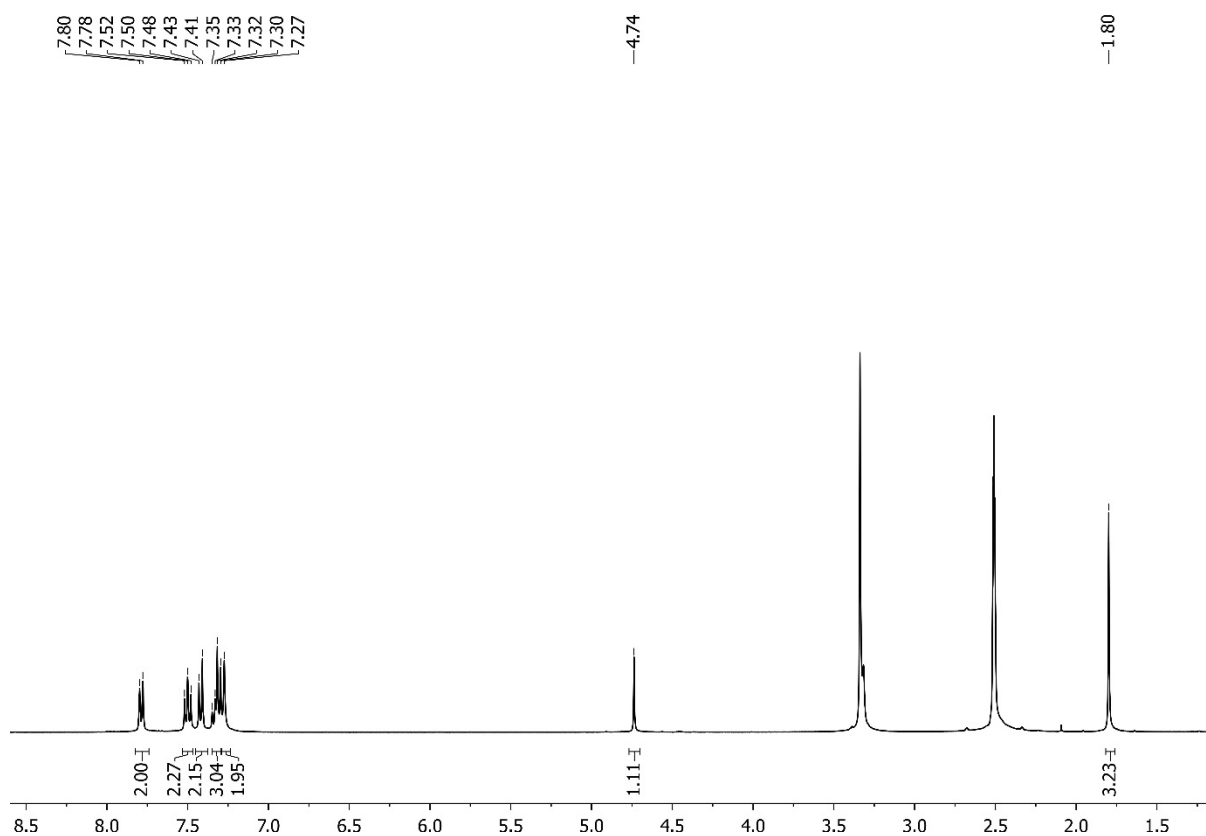


FT-IR (KBr disk) 6-amino-3-methyl-1,4-diphenyl-1,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile (4b)

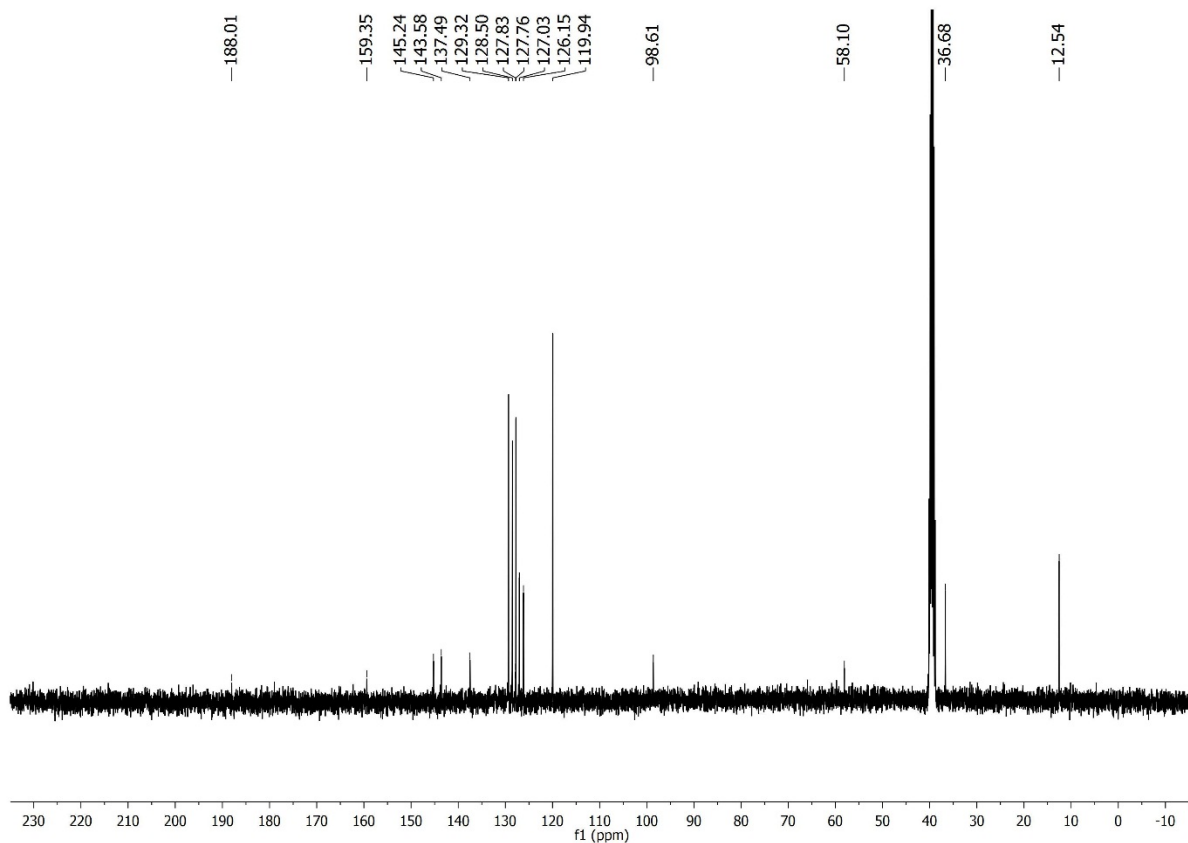


FT-IR (KBr disk) 6-amino-3-methyl-4-(4-nitrophenyl)-1-phenyl-1,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile

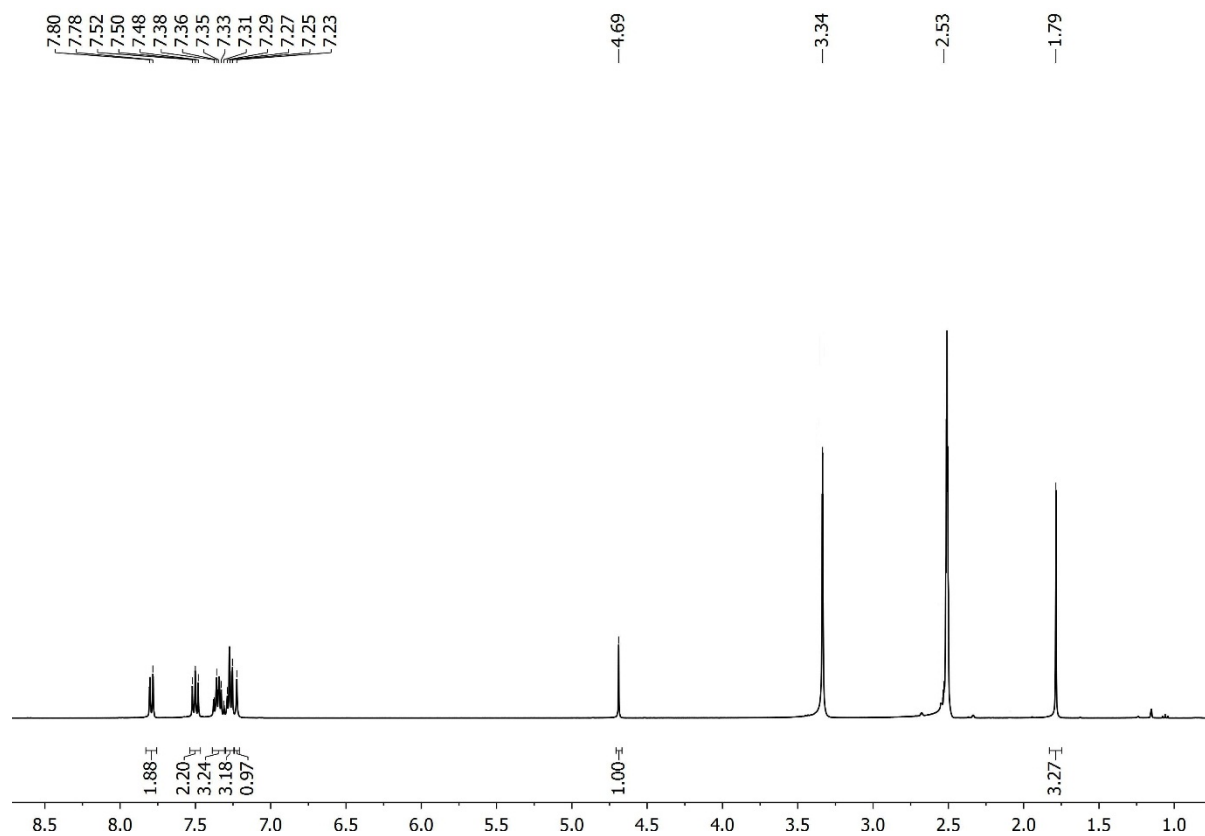
b) ^1H NMR and ^{13}C NMR spectra of some compounds



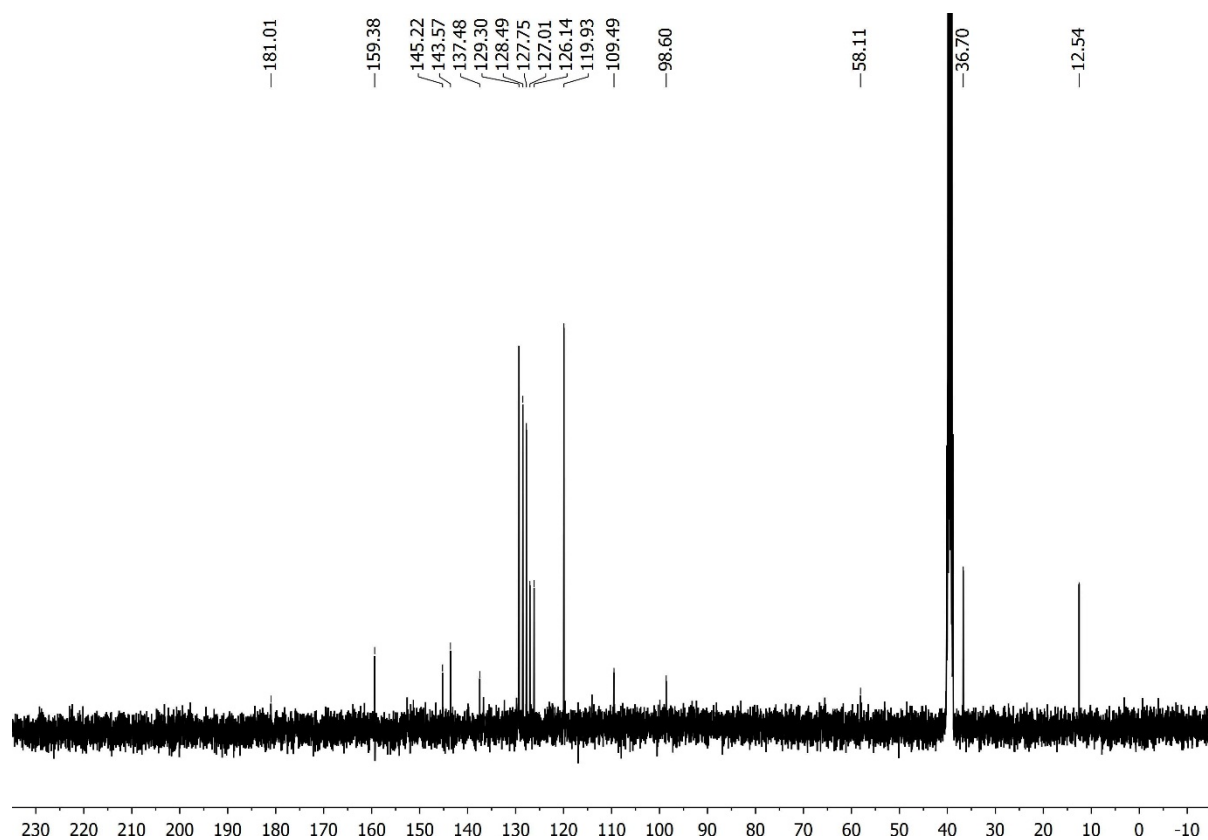
¹H NMR (400 MHz) 6-amino-3-methyl-4-(4-chlorophenyl)-1-phenyl-1,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile



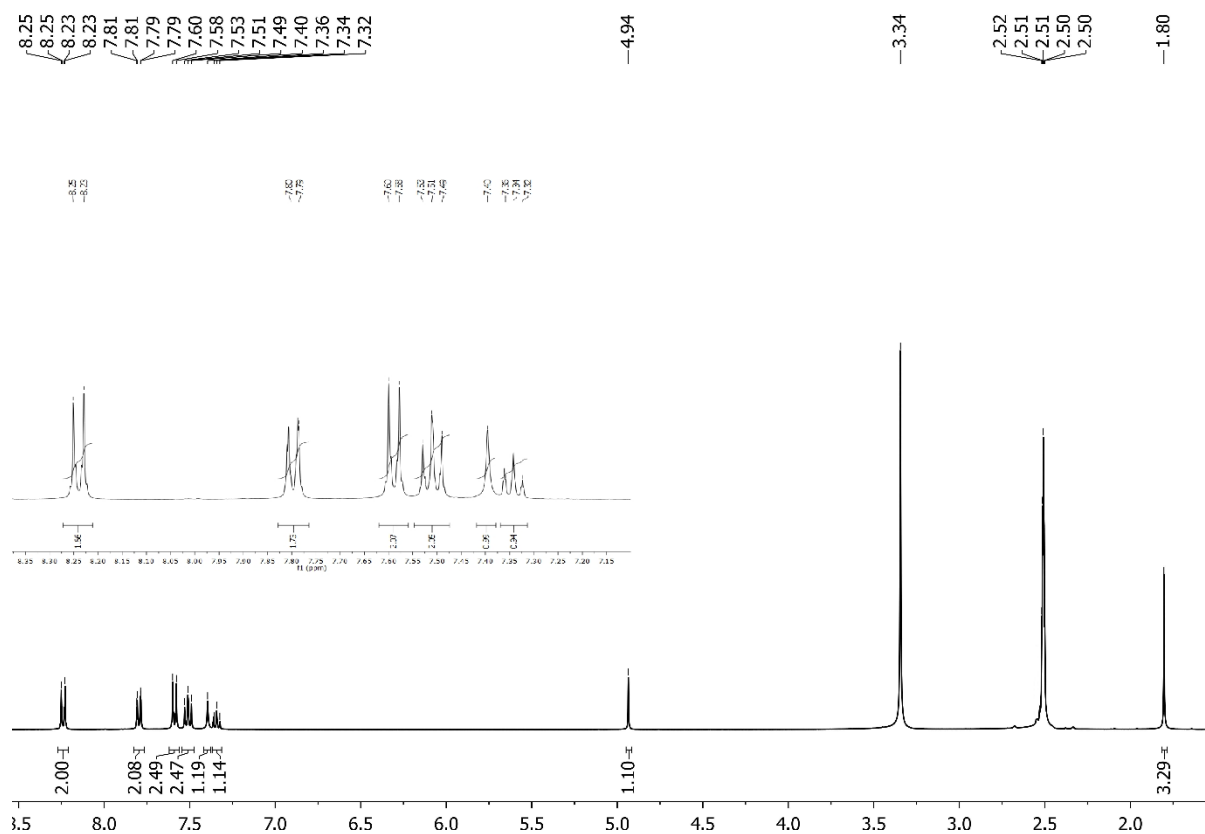
^{13}C NMR (100 MHz) spectra of 6-amino-3-methyl-4-(4-chlorophenyl)-1-phenyl-1,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile



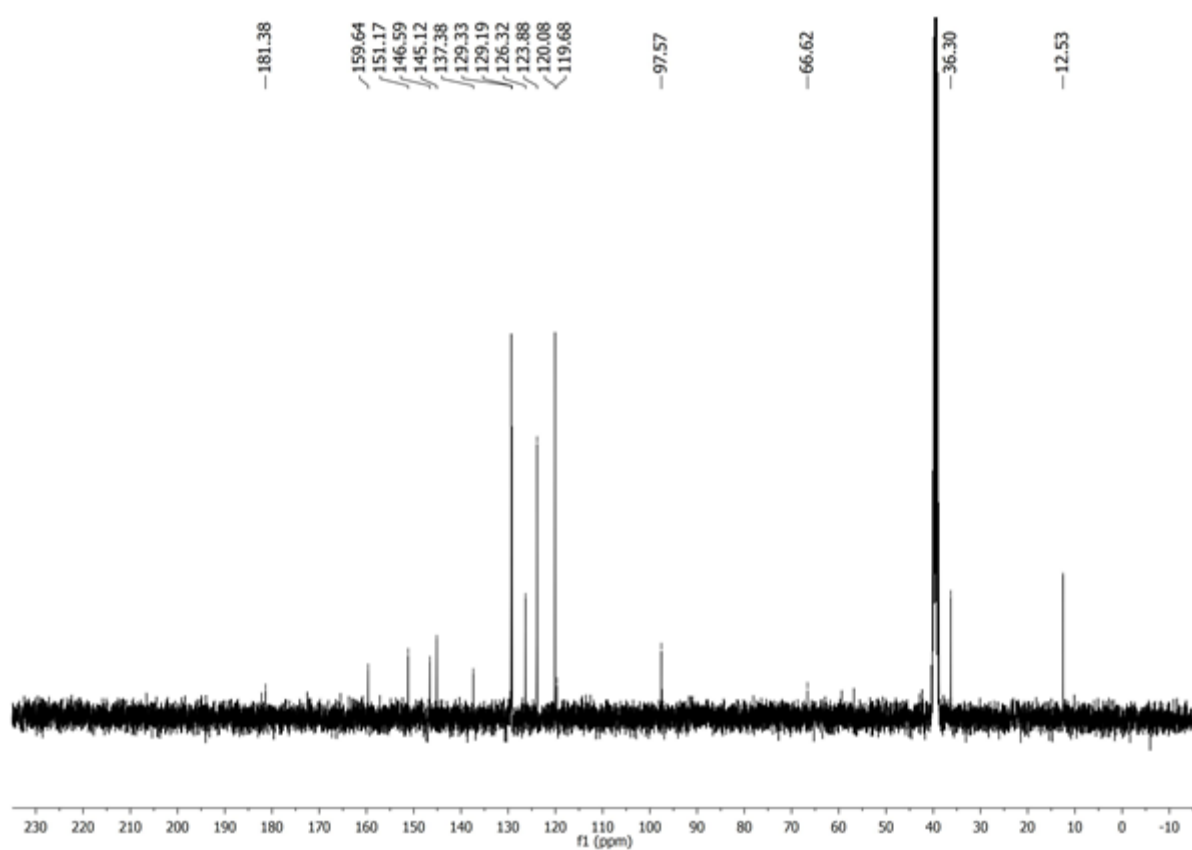
^1H NMR (400 MHz) 6-amino-3-methyl-1,4-diphenyl-1,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile



^{13}C NMR (100 MHz) spectra 6-amino-3-methyl-1,4-diphenyl-1,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile



¹H NMR (400 MHz) spectra of 6-amino-3-methyl-4-(4-nitrophenyl)-1-phenyl-1,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile



¹³CNMR (100 MHz) spectra of 6-amino-3-methyl-4-(4-nitrophenyl)-1-phenyl-1,4-dihydropyrano[2,3-c]pyrazole-5-carbonitrile