

Synthesis and study of electrochemical behavior of new 4-ferrocenylbutylamine derivatives

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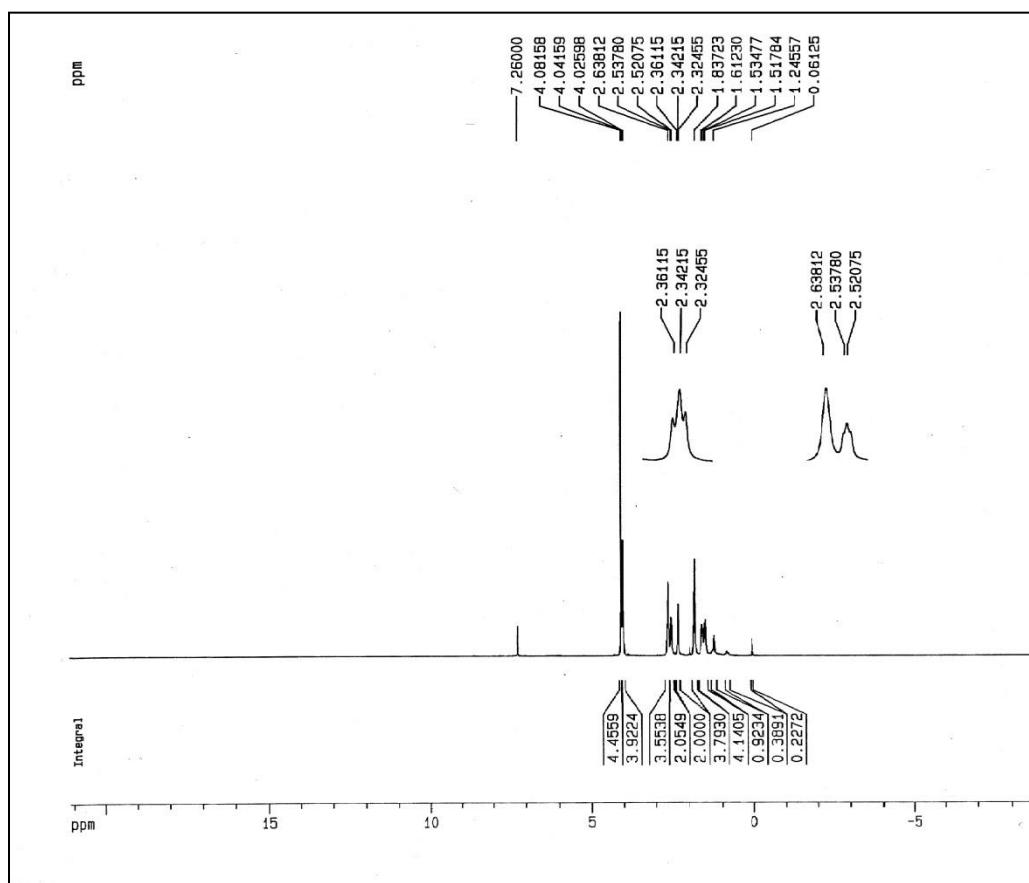
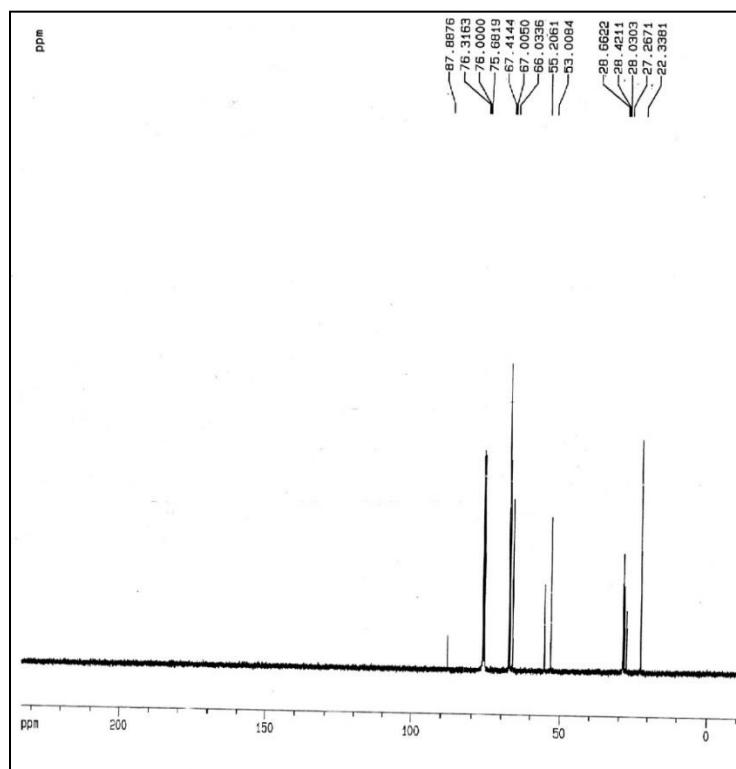
Figure S1. ^1H NMR spectrum of 1-(4-ferrocenylbutyl)pyrrolidine (**6a**) (400 MHz, CDCl_3)**Figure S2.** ^{13}C NMR spectrum of 1-(4-ferrocenylbutyl)pyrrolidine (**6a**) (100 MHz, CDCl_3)

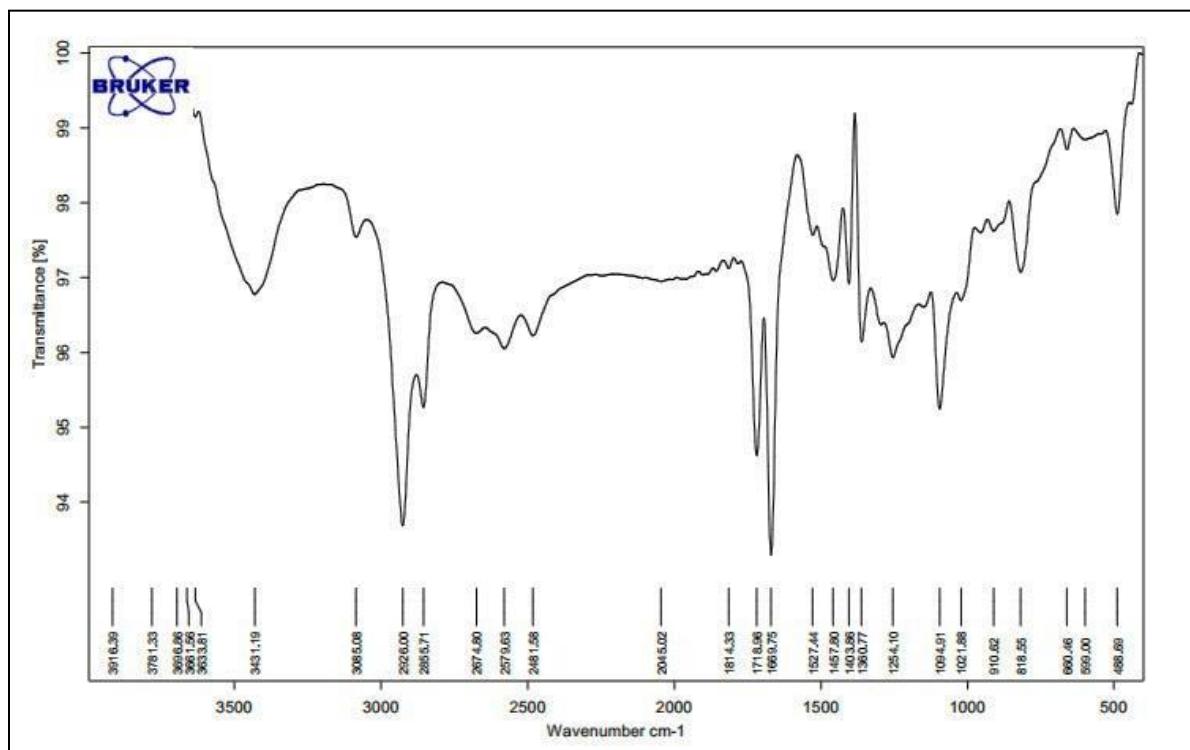
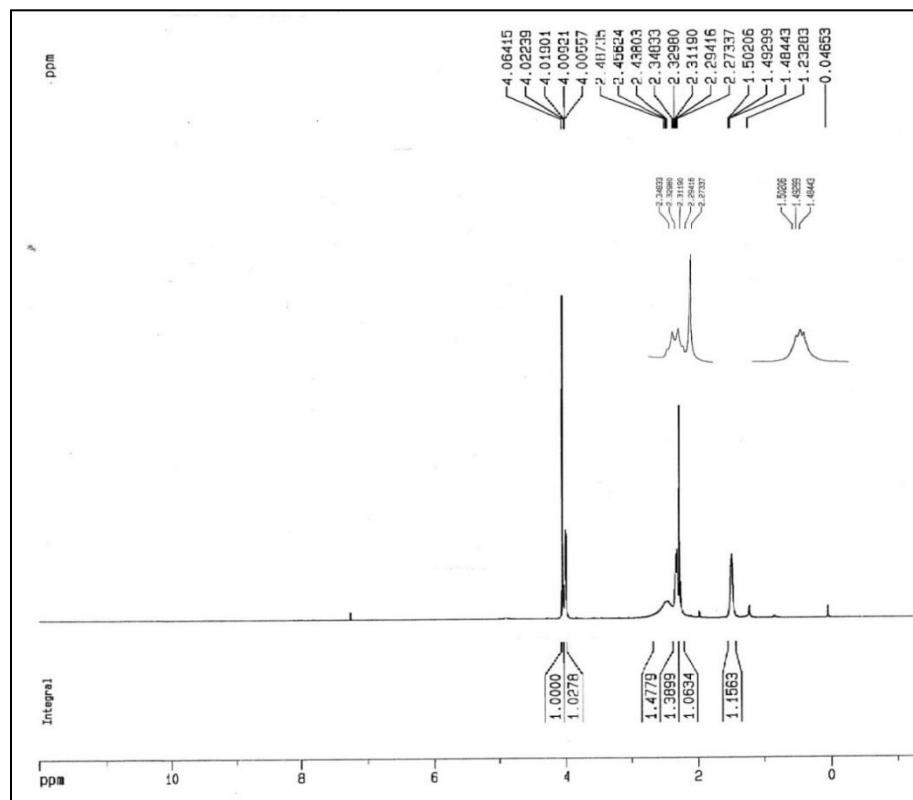
Figure S3. FT-IR spectrum of 1-(4-ferrocenylbutyl)pyrrolidine (**6a**) (KBr, cm^{-1})**Figure S4.** ^1H NMR spectrum of 1-methyl-4-(ferrocenylbutyl)piperazine (**6b**) (400 MHz, CDCl_3)

Figure S5. ^{13}C NMR spectrum of 1-methyl-4-(ferrocenylbutyl)piperazine (**6b**) (100 MHz, CDCl_3)

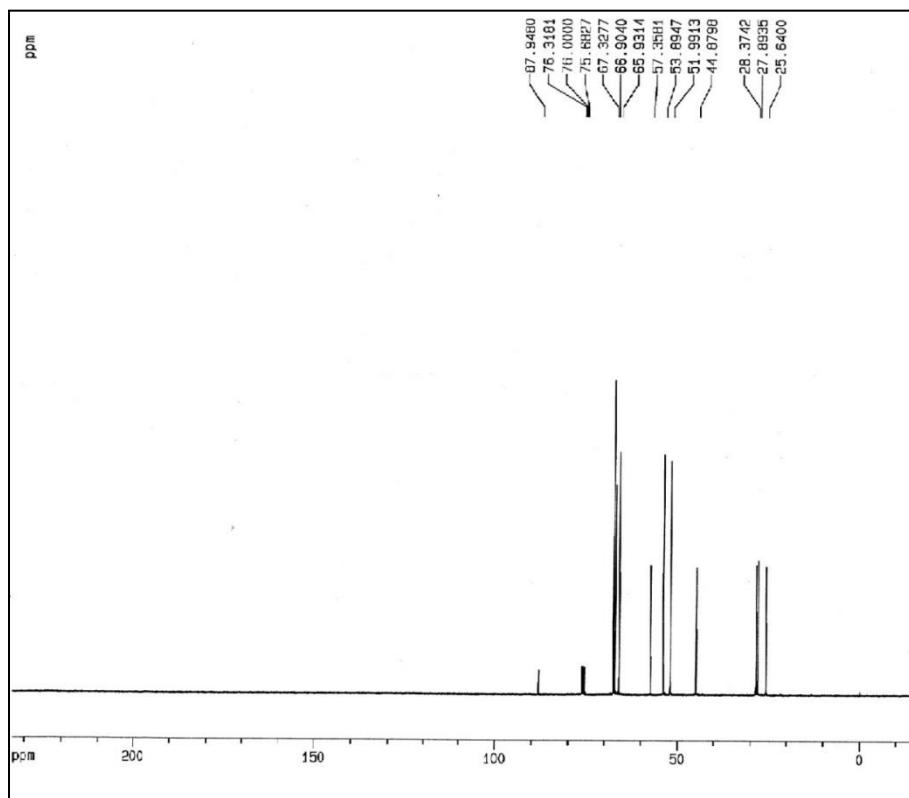


Figure S6. FT-IR spectrum of 1-methyl-4-(ferrocenylbutyl)piperazine (**6b**) (KBr, cm^{-1})

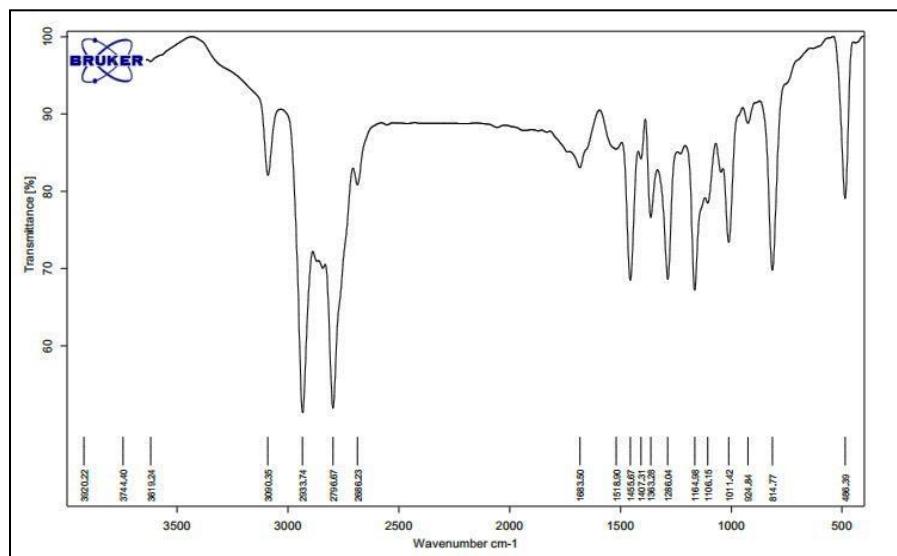


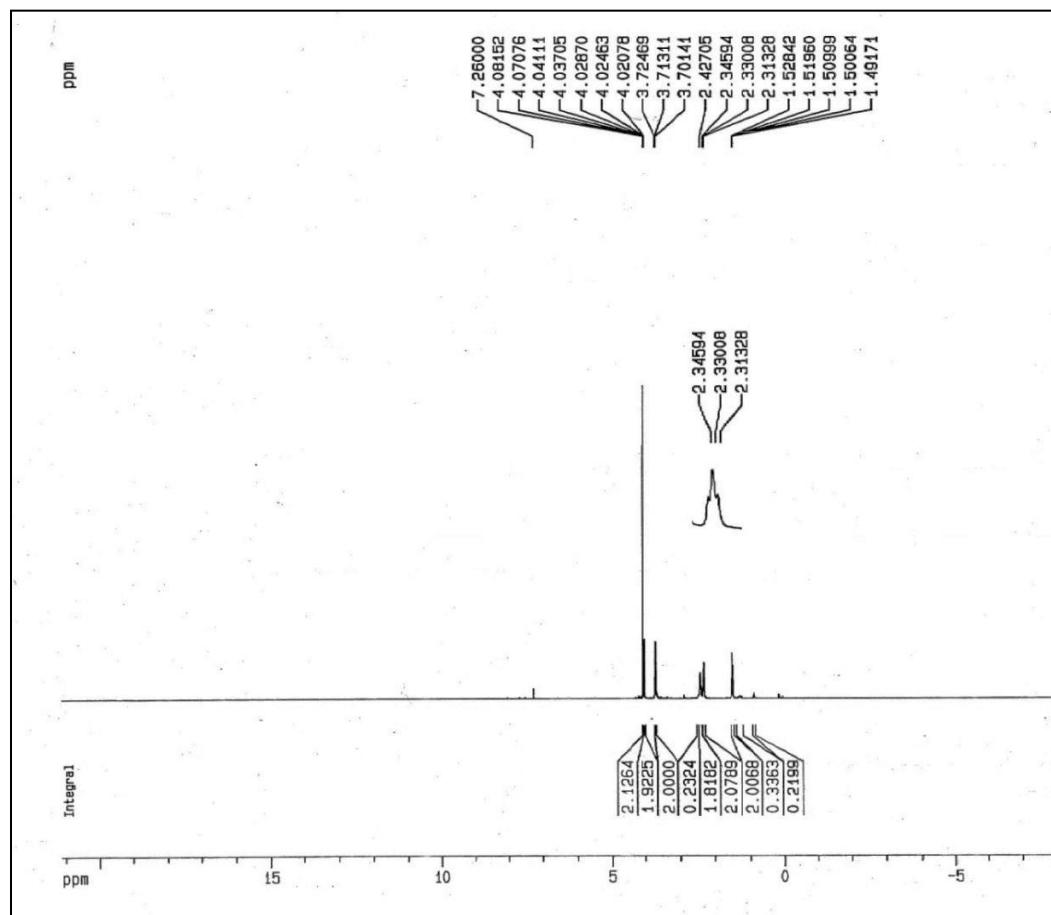
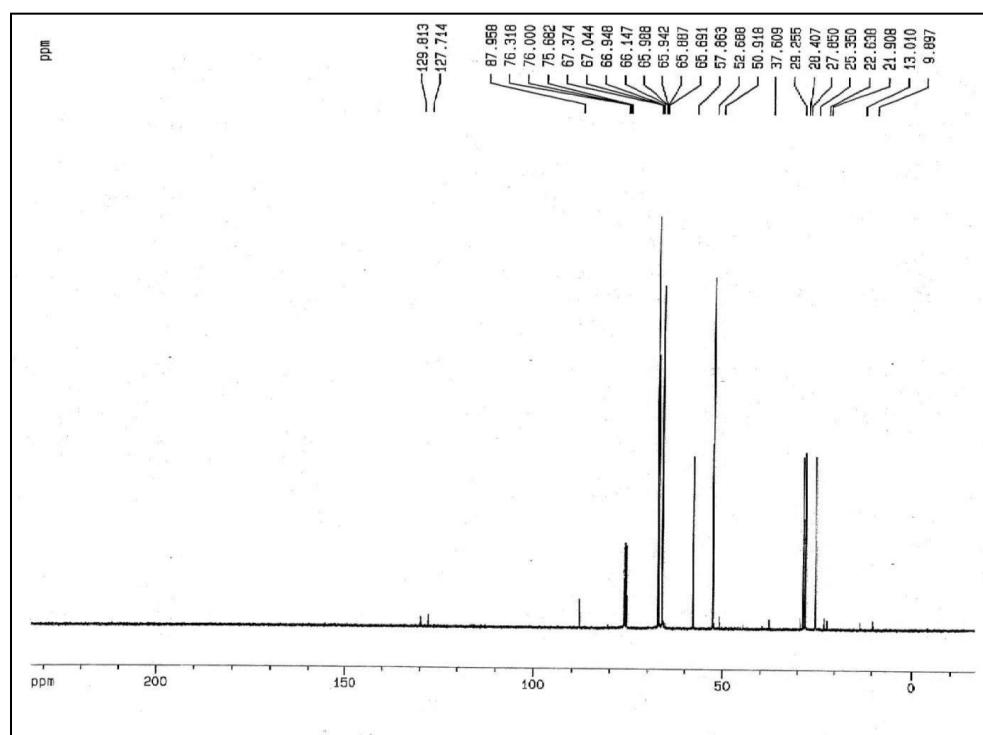
Figure S7. ^1H NMR spectrum of 1-(4-ferrocenylbutyl)morpholine (**6c**) (400 MHz, CDCl_3)**Figure S8.** ^{13}C NMR spectrum of 1-(4-ferrocenylbutyl)morpholine (**6c**) (100 MHz, CDCl_3)

Figure S9. FT-IR spectrum of 1-(4-ferrocenylbutyl)morpholine (**6c**) (KBr, cm^{-1})

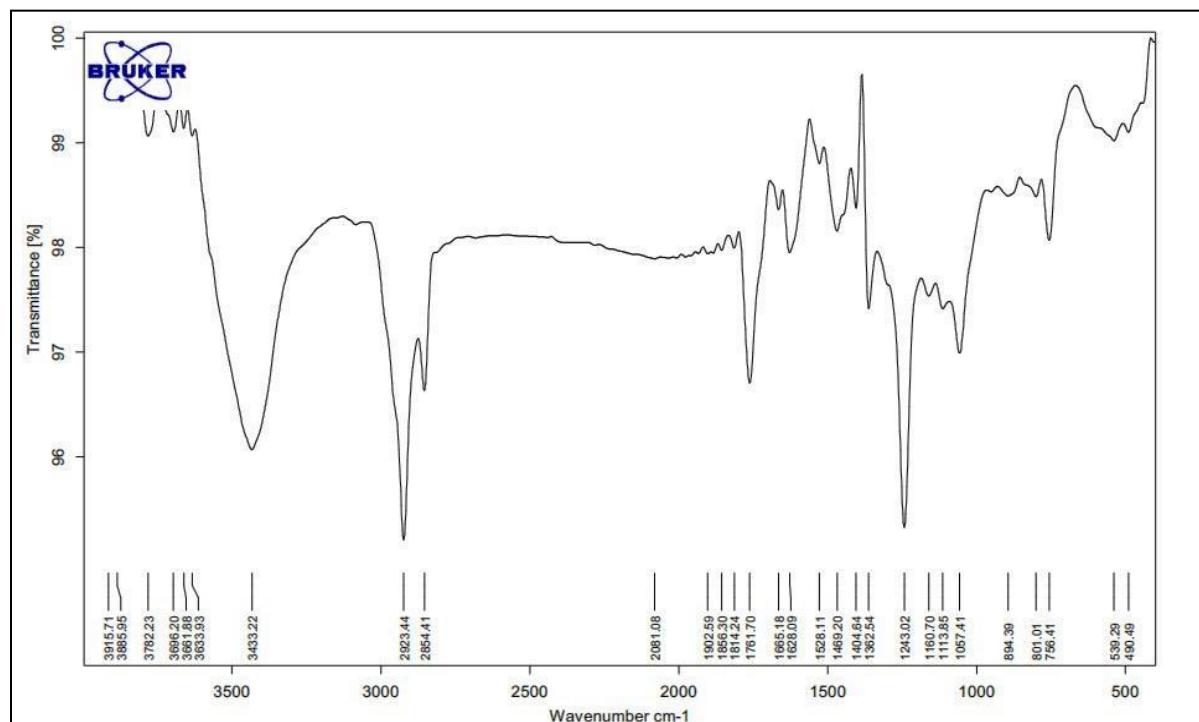


Figure S10. ^1H NMR spectrum of 1-(4-ferrocenylbutyl)piperidine (**6d**) (400 MHz, CDCl_3)

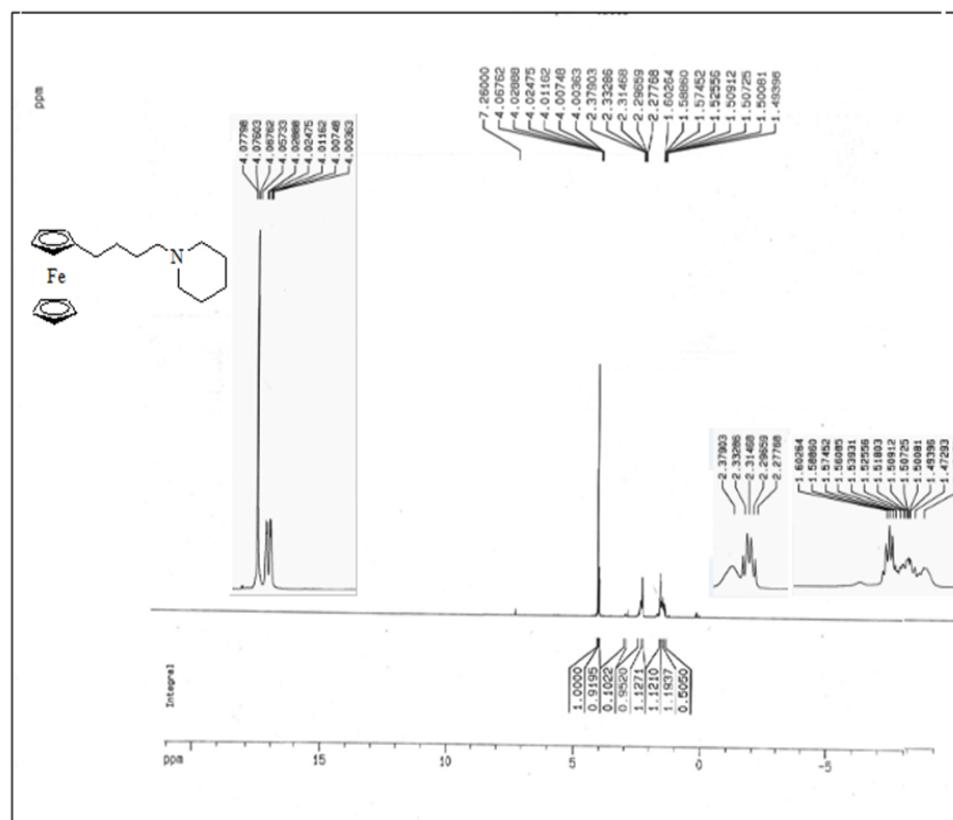


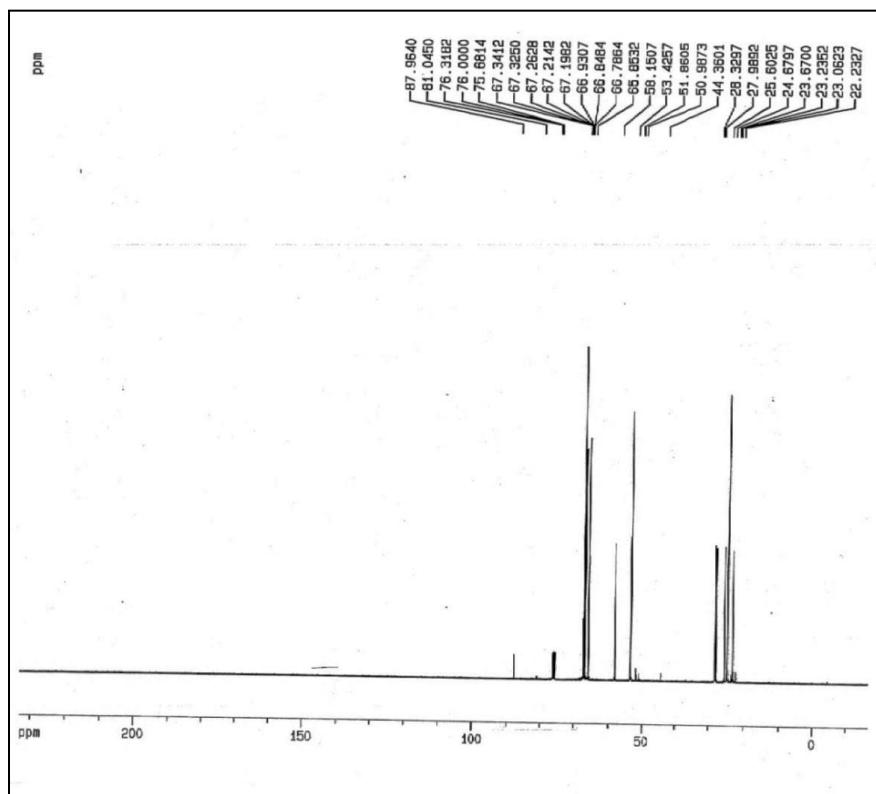
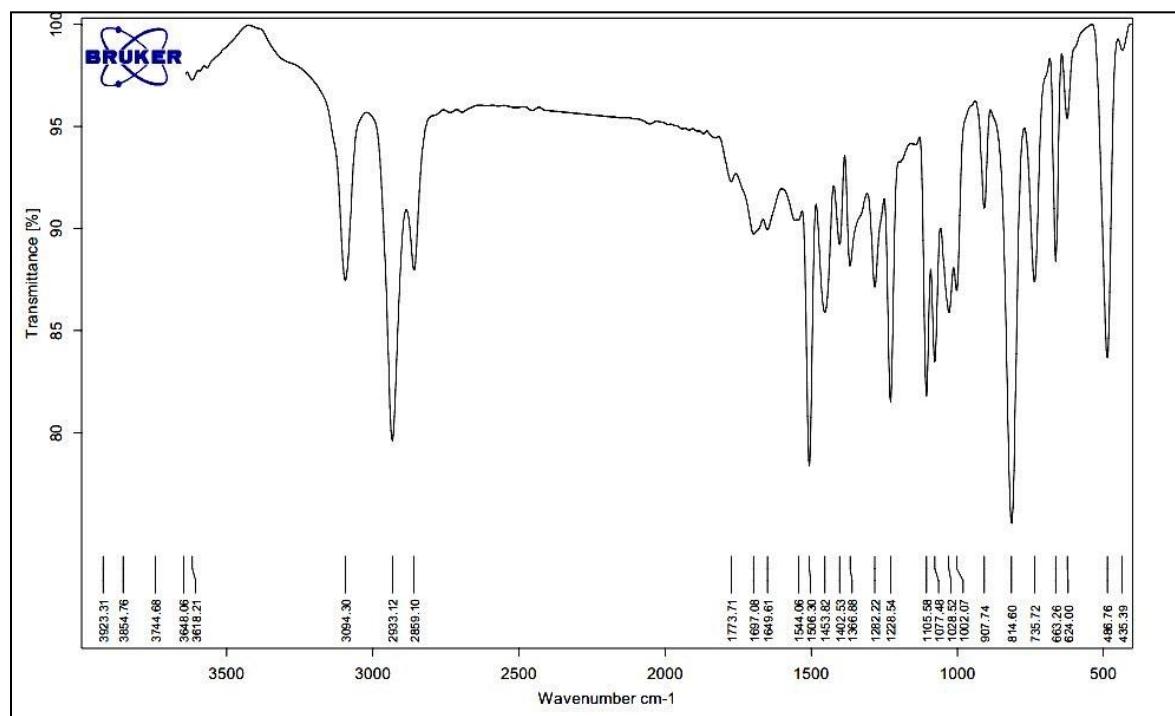
Figure S11. ^{13}C NMR spectrum of 1-(4-ferrocenylbutyl)piperidine (**6d**) (100 MHz, CDCl_3)**Figure S12.** FT-IR spectrum of 1-(4-ferrocenylbutyl)piperidine (**6d**) (KBr, cm^{-1})

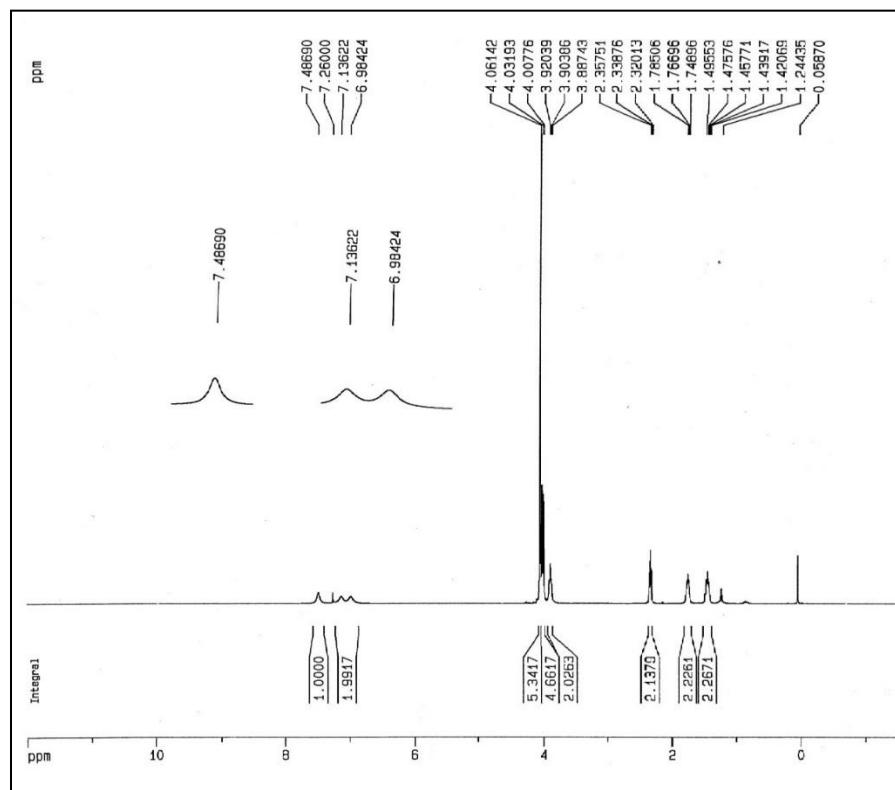
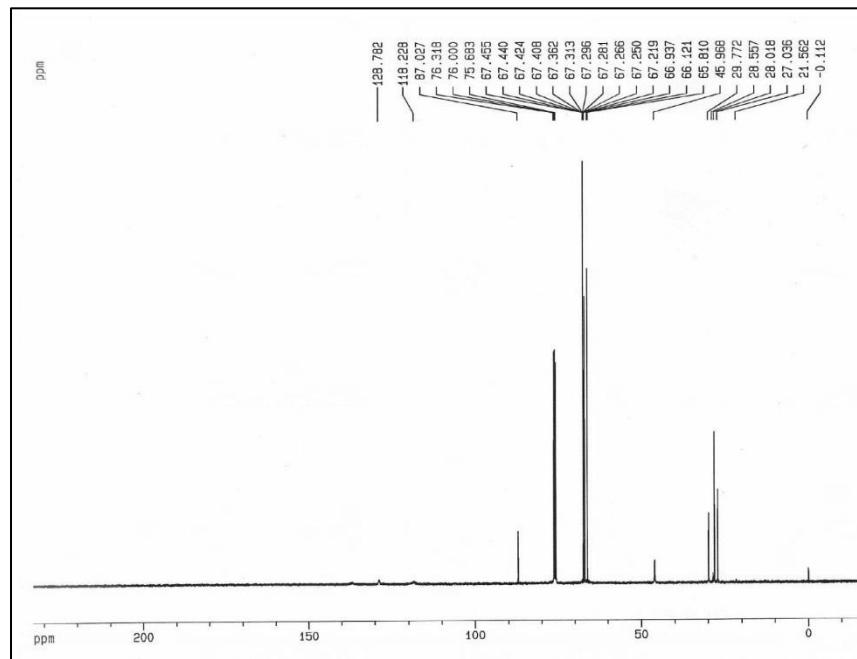
Figure S13. ^1H NMR spectrum of 1-(4-ferrocenylbutyl)imidazole (**6e**) (400 MHz, CDCl_3)**Figure S14.** ^{13}C NMR spectrum of 1-(4-ferrocenylbutyl)imidazole (**6e**) (100 MHz, CDCl_3)

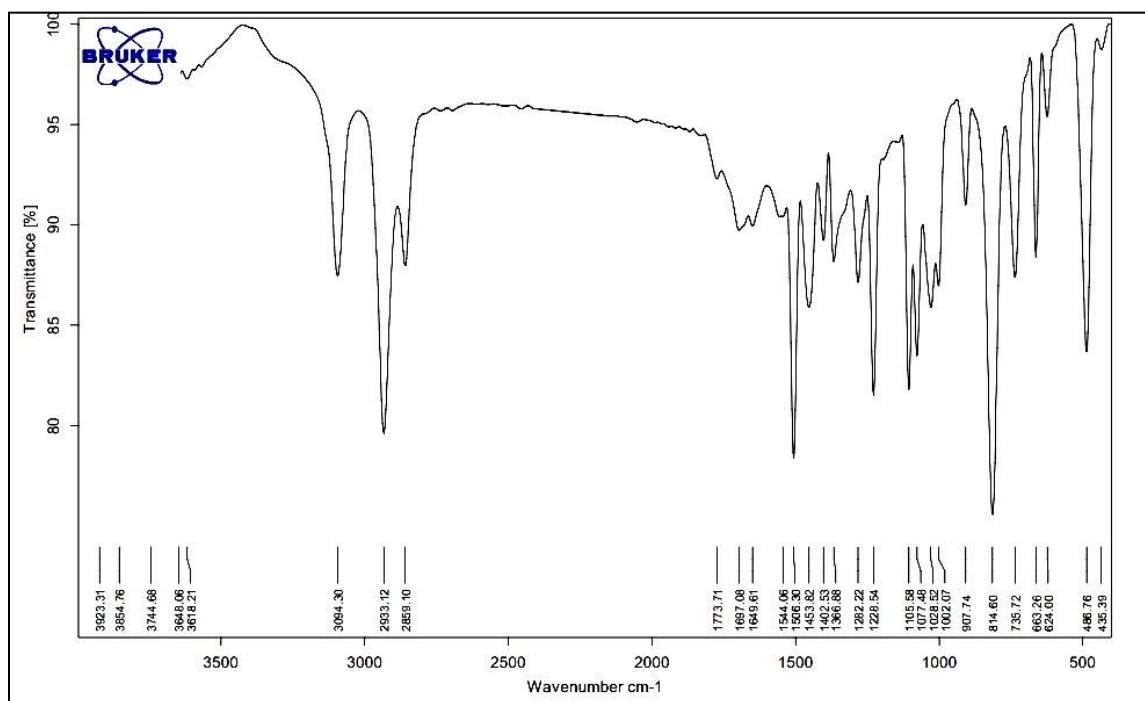
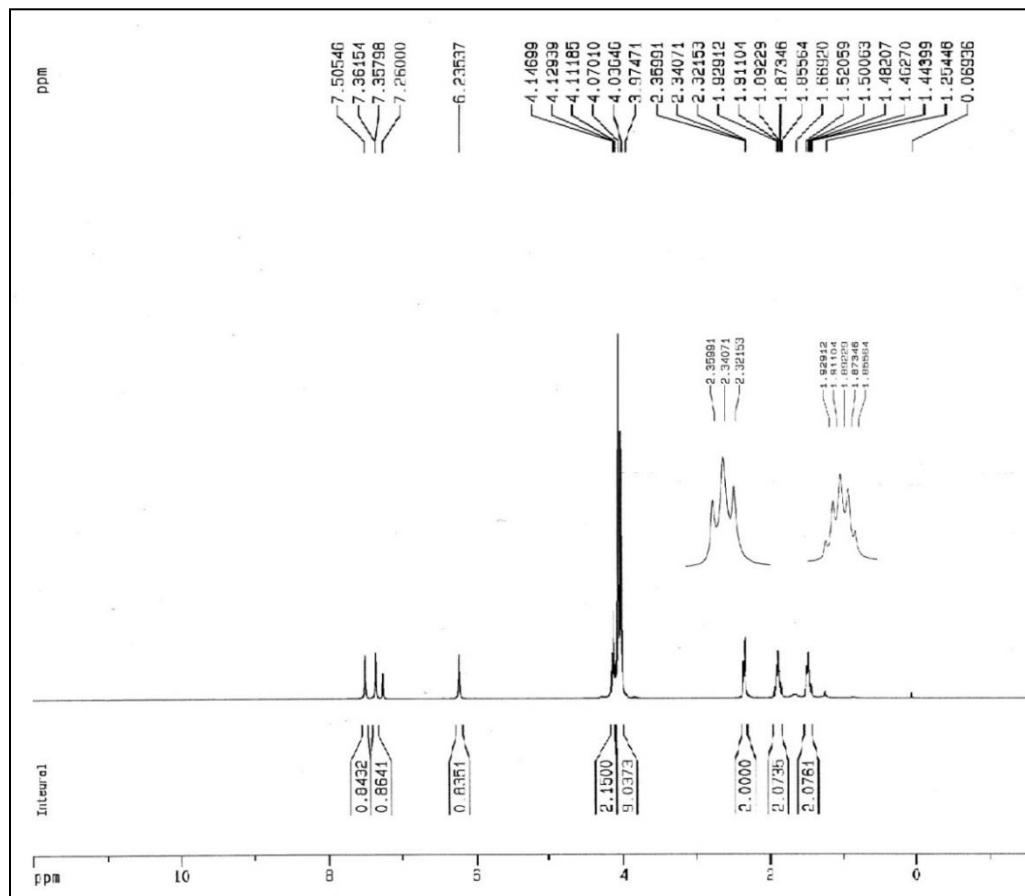
Figure S15. FT-IR spectrum of 1-(4-ferrocenylbutyl)imidazole (**6e**) (KBr, cm^{-1})**Figure S16.** ^1H NMR spectrum of 1-(4-ferrocenylbutyl)pyrazole (**6f**) (400 MHz, CDCl_3)

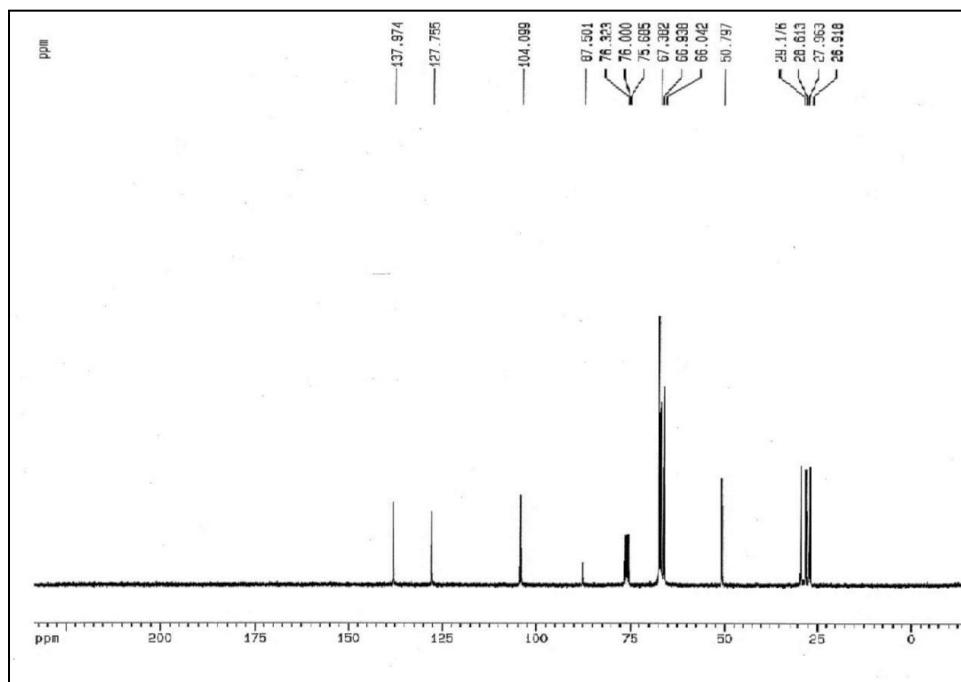
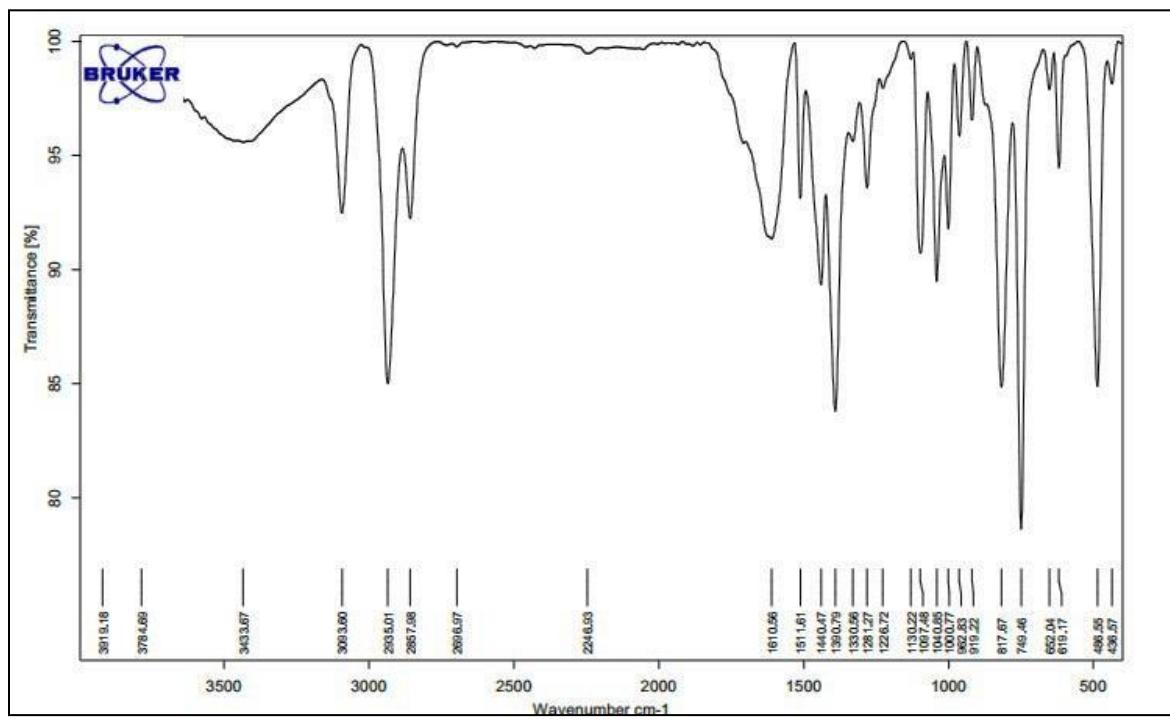
Figure S17. ^{13}C NMR spectrum of 1-(4-ferrocenylbutyl)pyrazole (**6f**) (100 MHz, CDCl_3)**Figure S18.** FT-IR spectrum of 1-(4-ferrocenylbutyl)pyrazole (**6f**) (KBr, cm^{-1})

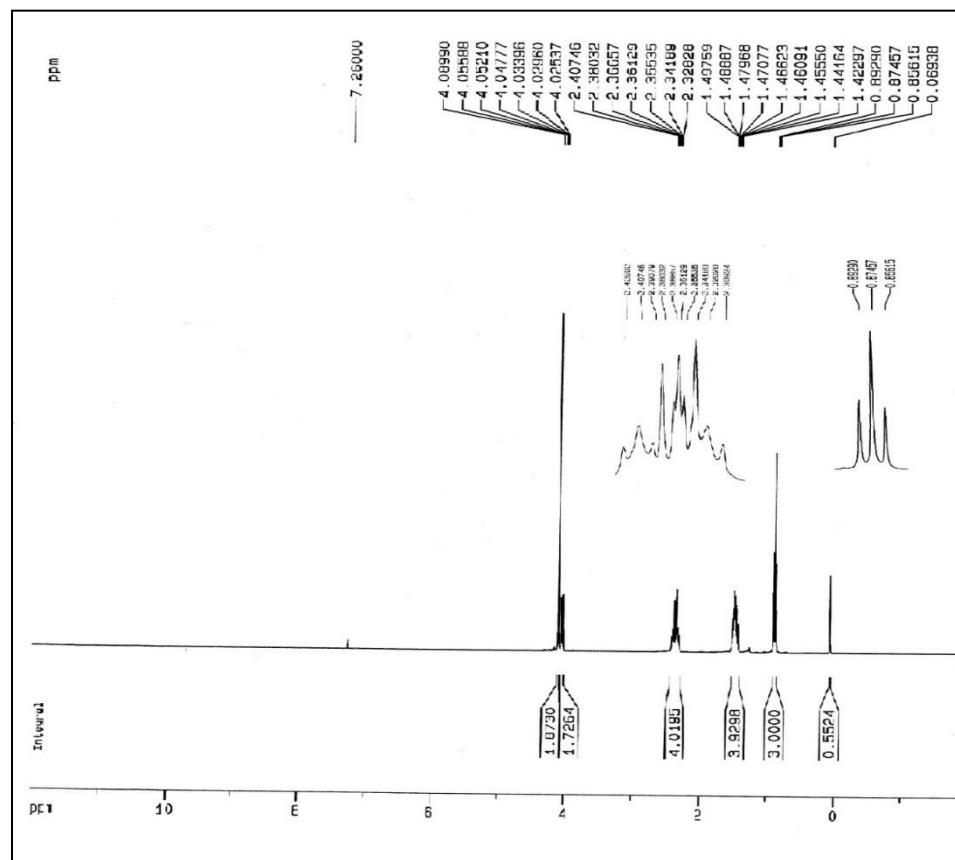
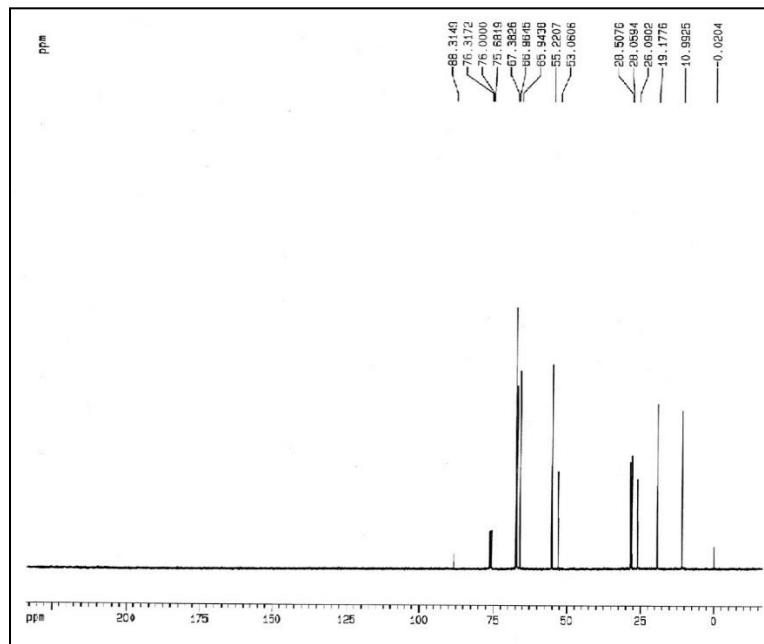
Figure S19. ^1H NMR spectrum of 1-(4-ferrocenylbutyl)dipropylamine (**6g**) (400 MHz, CDCl_3)**Figure S20.** ^{13}C NMR spectrum of 1-(4-ferrocenylbutyl)dipropylamine (**6g**) (100 MHz, CDCl_3)

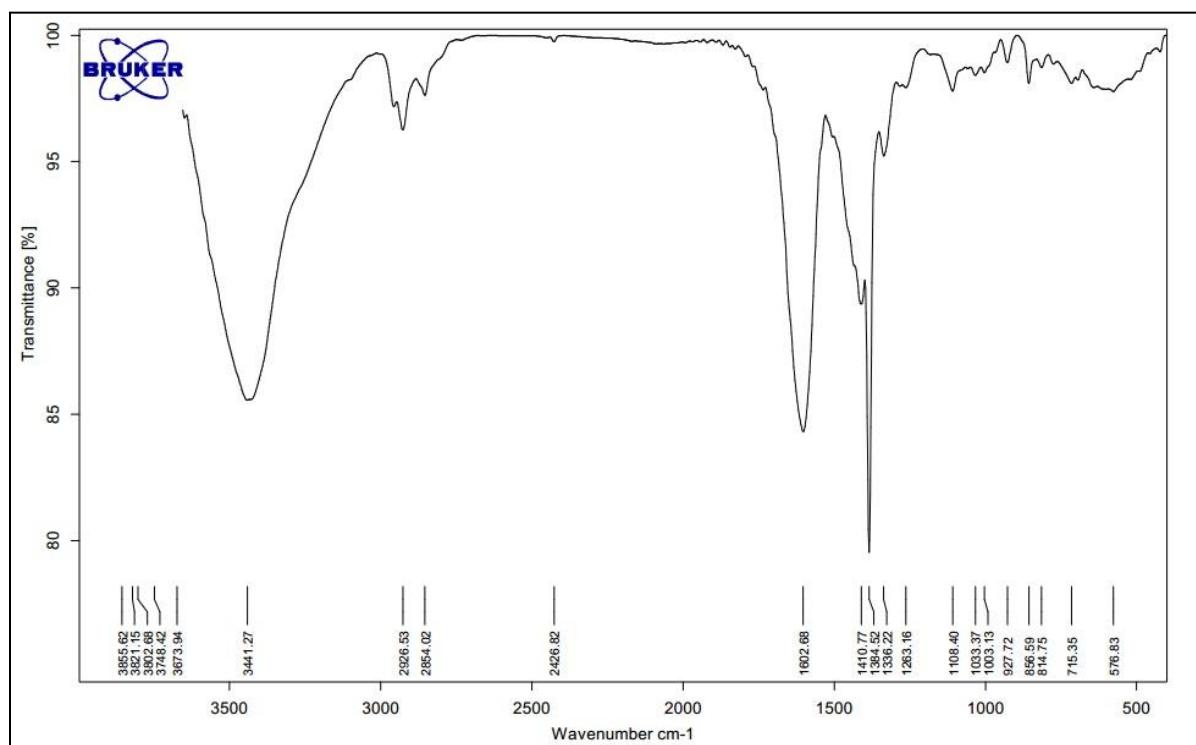
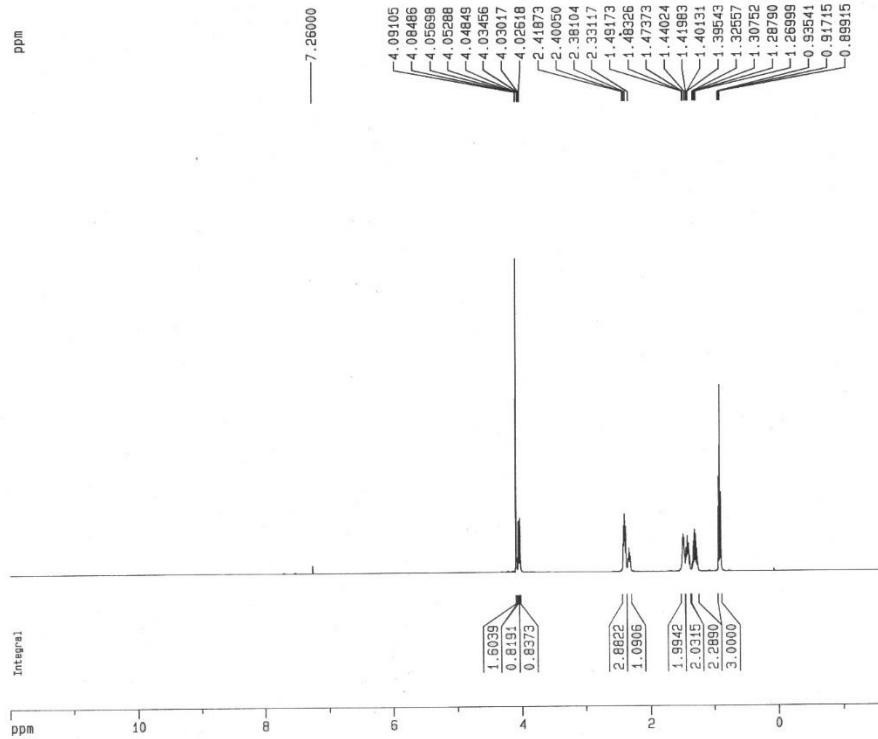
Figure S21. FT-IR spectrum of 1-(4-ferrocenylbutyl)dipropylamine (**6g**) (KBr, cm⁻¹)**Figure S22.** ¹H NMR spectrum of 1-(4-ferrocenylbutyl)dibutylamine (**6h**) (400 MHz, CDCl₃)

Figure S23. ^{13}C NMR spectrum of 1-(4-ferrocenylbutyl)dibutylamine (**6h**) (100 MHz, CDCl_3)

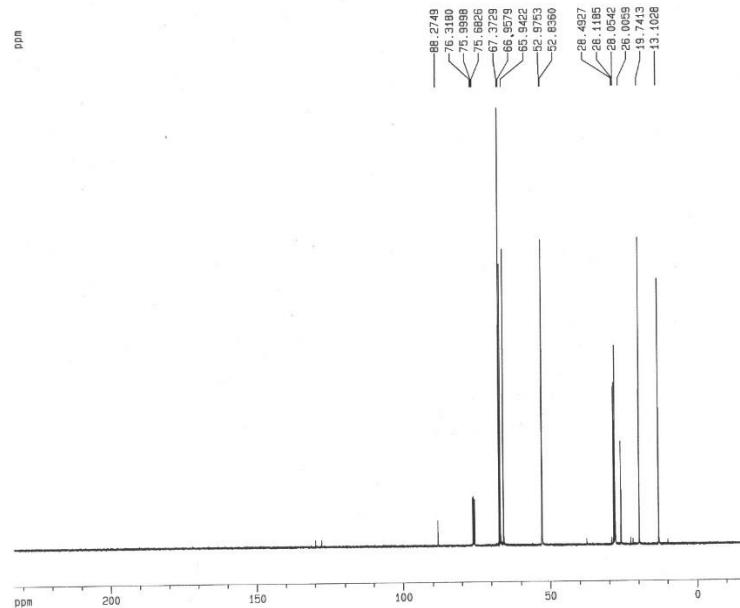


Figure S24. FT-IR spectrum of 1-(4-ferrocenylbutyl)dibutylamine (**6h**) (KBr, cm^{-1})

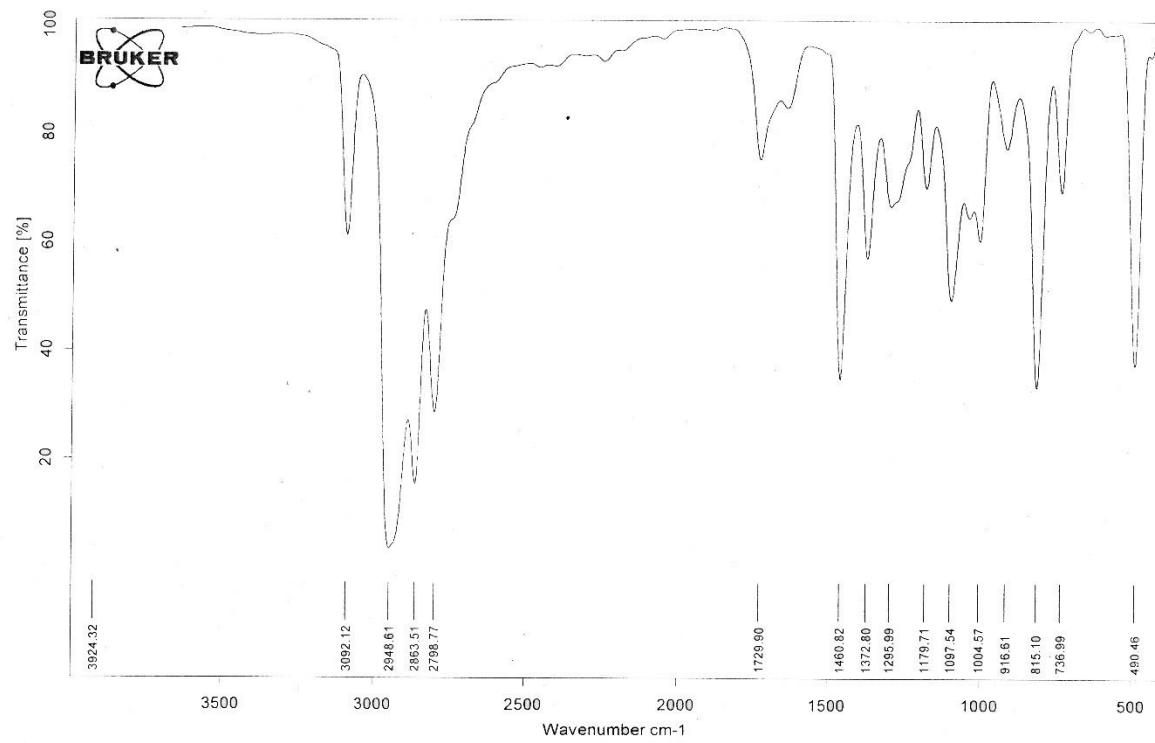


Figure S25. ^1H NMR spectrum of 4-(4-ferrocenylbutyl)-4-methyl morpholinium iodide (**6i**) (400 MHz, DMSO)

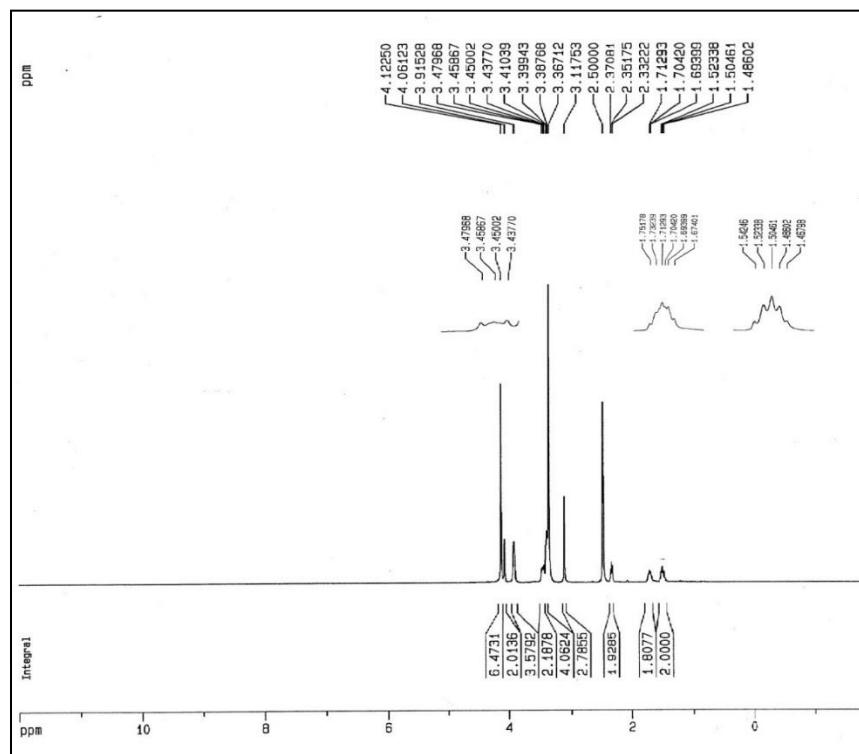


Figure S26. ^{13}C NMR spectrum of 4-(4-ferrocenylbutyl)-4-methyl morpholinium iodide (**6i**) (100 MHz, DMSO)

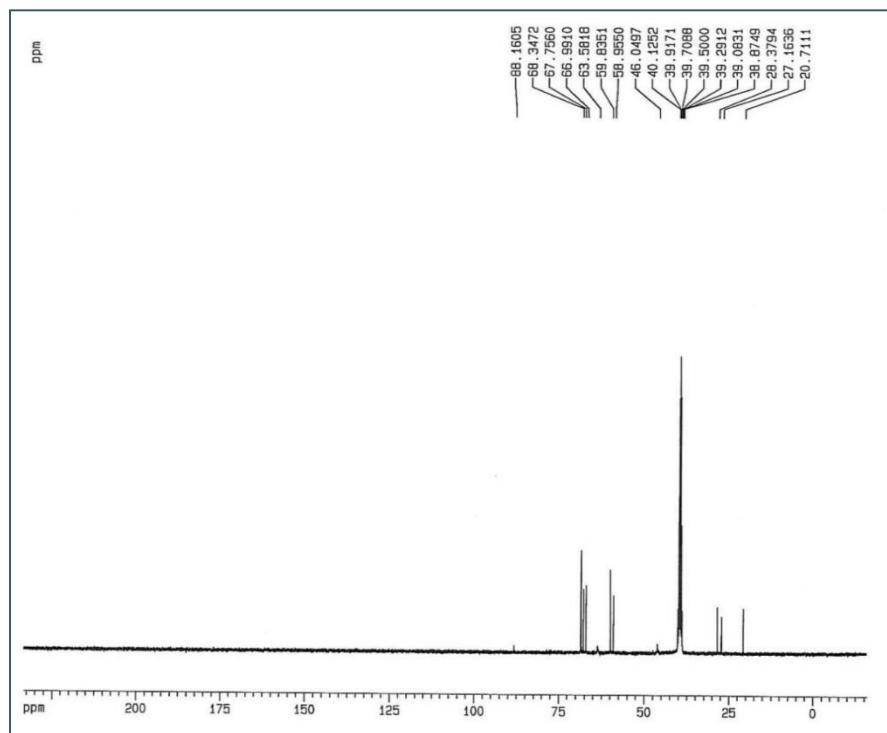


Figure S27. FT-IR spectrum of 4-(4-ferrocenylbutyl)-4-methyl morpholinium iodide (**6i**) (KBr, cm⁻¹)