

Coupling of Challenging Heteroaryl Halides with Alkyl Halides via the Nickel-Catalyzed Cross Electrophile Coupling

Eric C. Hansen^{1*‡}, Changfeng Li^{2‡}, Sihang Yang², Dylan Pedro¹, Daniel J. Weix^{3*}

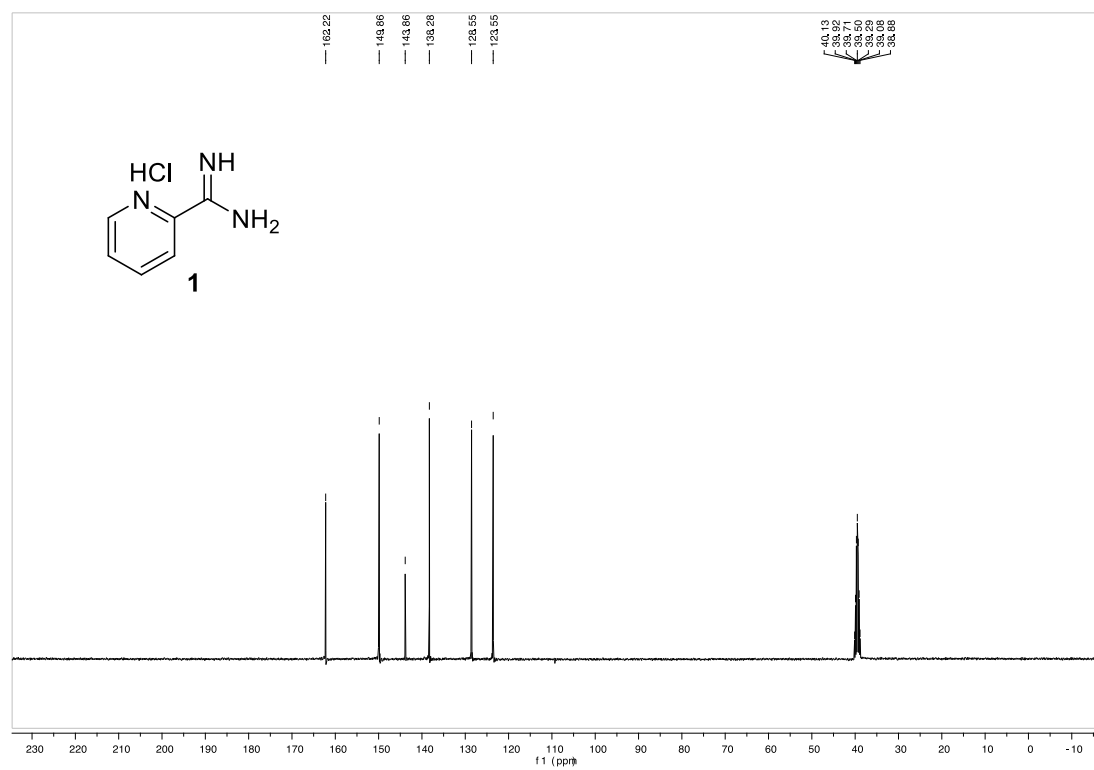
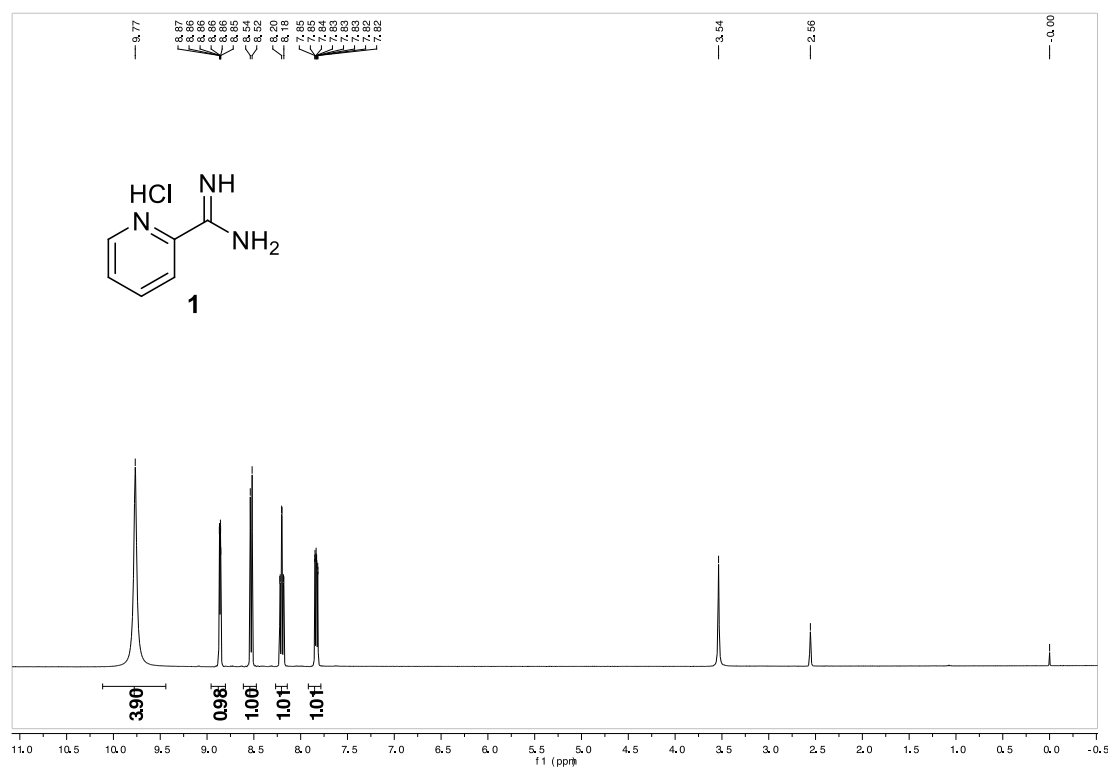
¹Chemical Research and Development Pfizer Worldwide Research and Development, Eastern Point Road, Groton, CT USA 06340

²Asymchem Life Science (Tianjin) Co., Ltd., 71 7th Avenue, TEDA Tianjin 300457, China

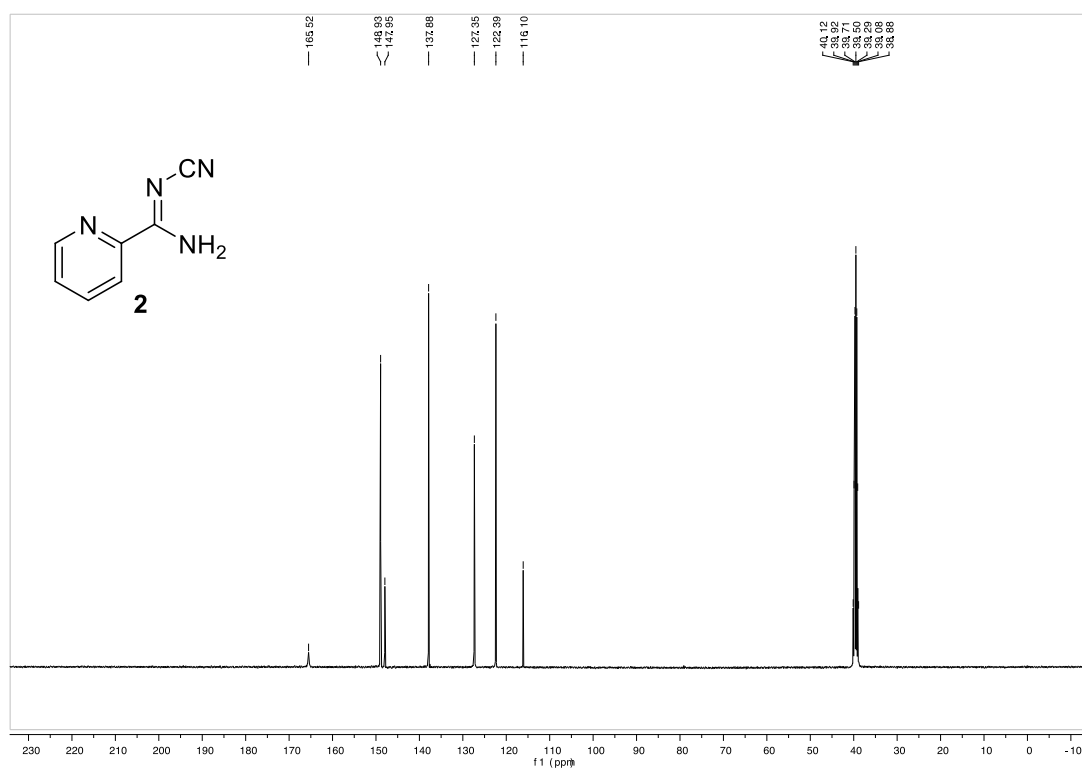
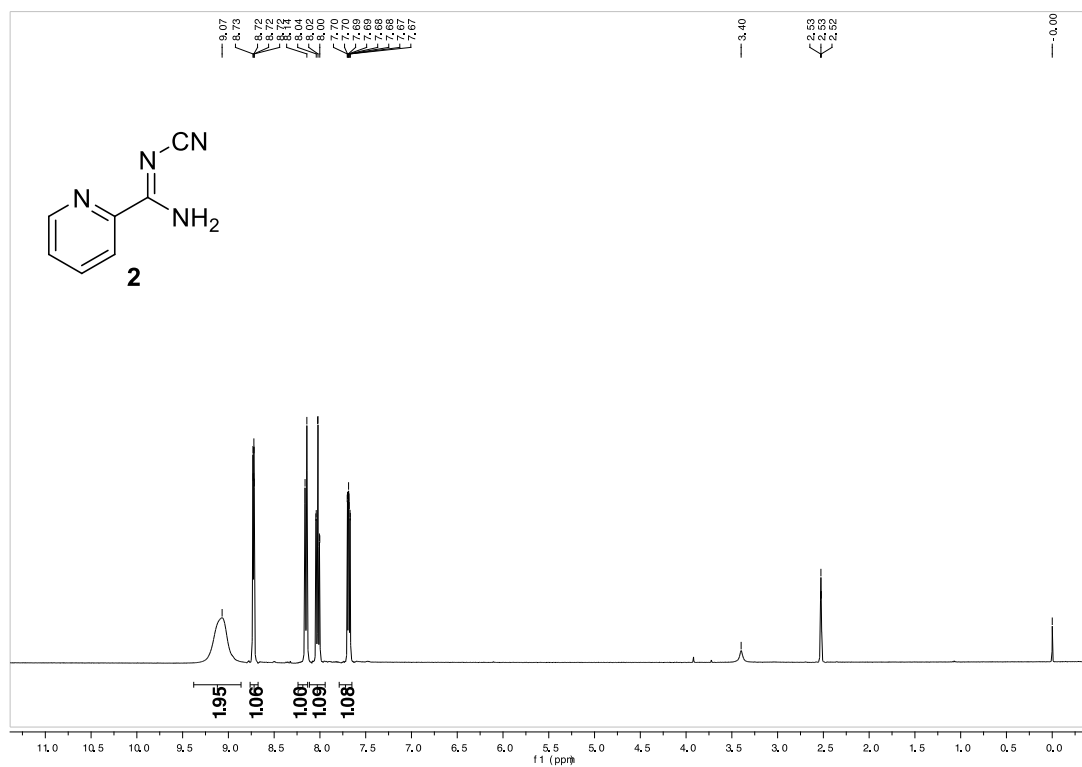
³Department of Chemistry, University of Rochester, Rochester, NY USA 14627-0216

1. Copies of ^1H , ^{13}C NMR and ^{19}F NMR Spectra for the compounds

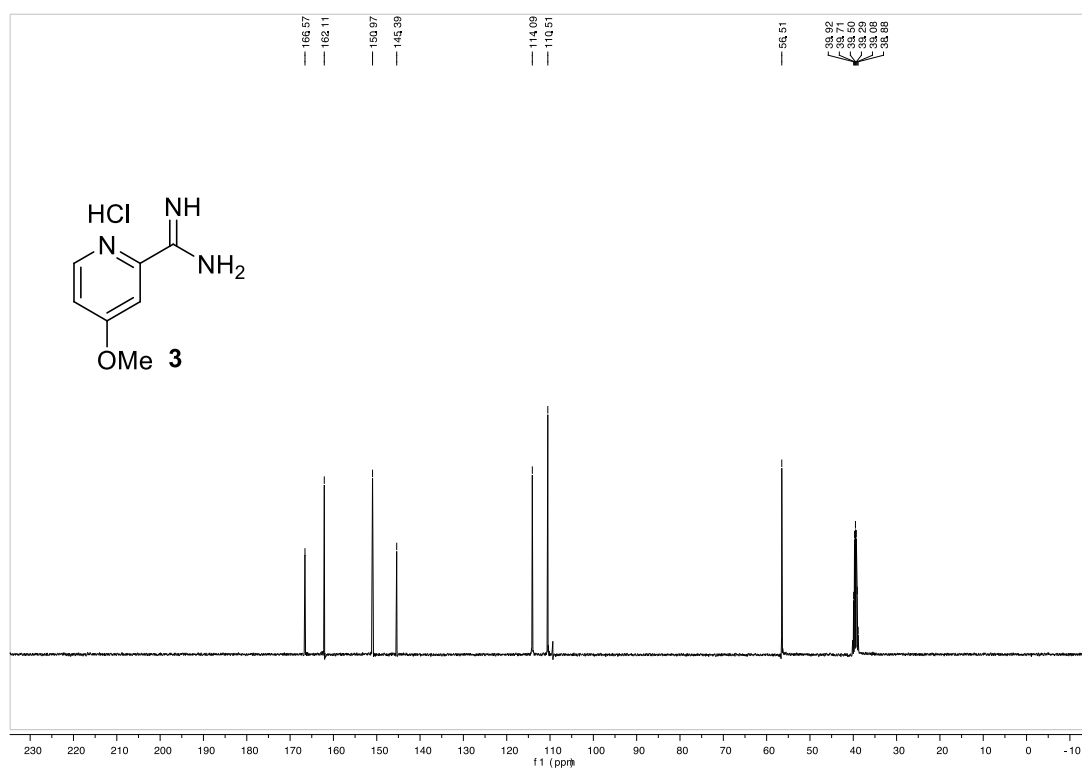
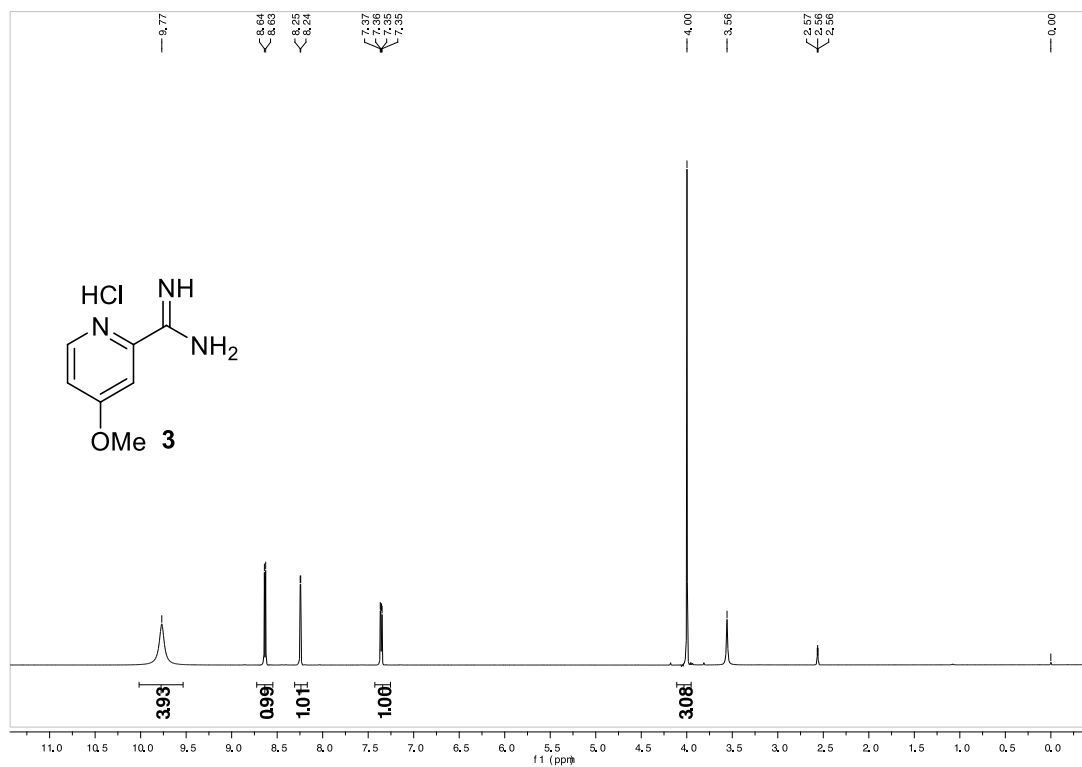
Picolinimide hydrochloride (1)



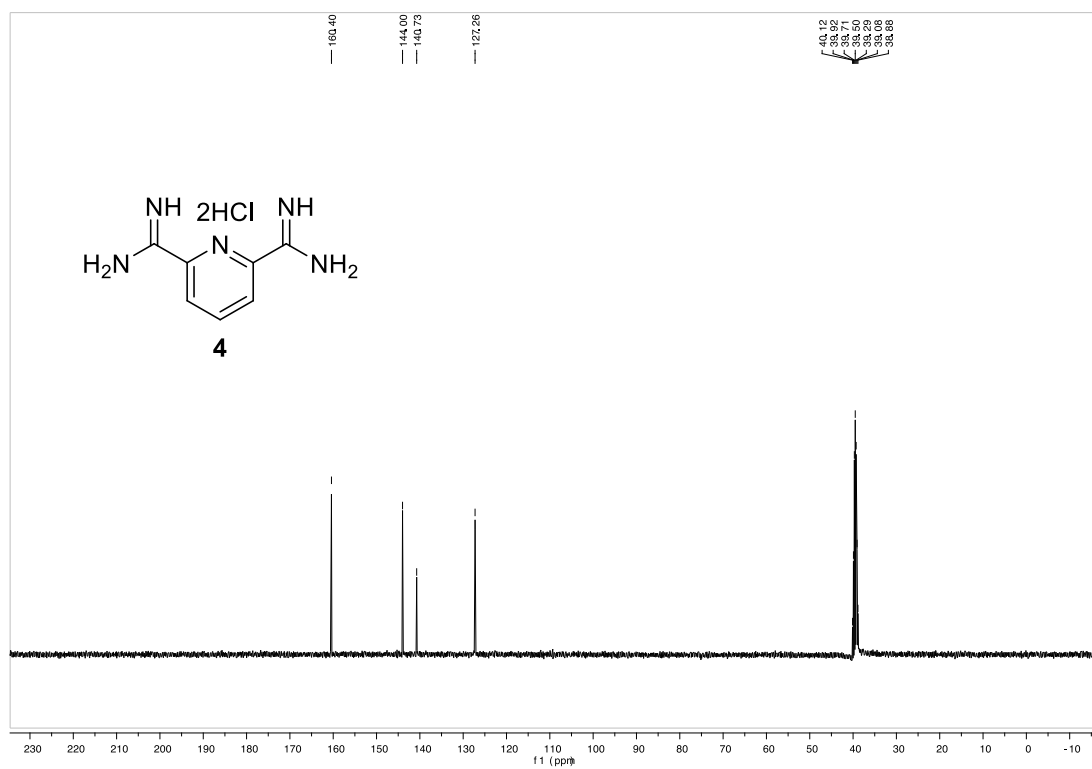
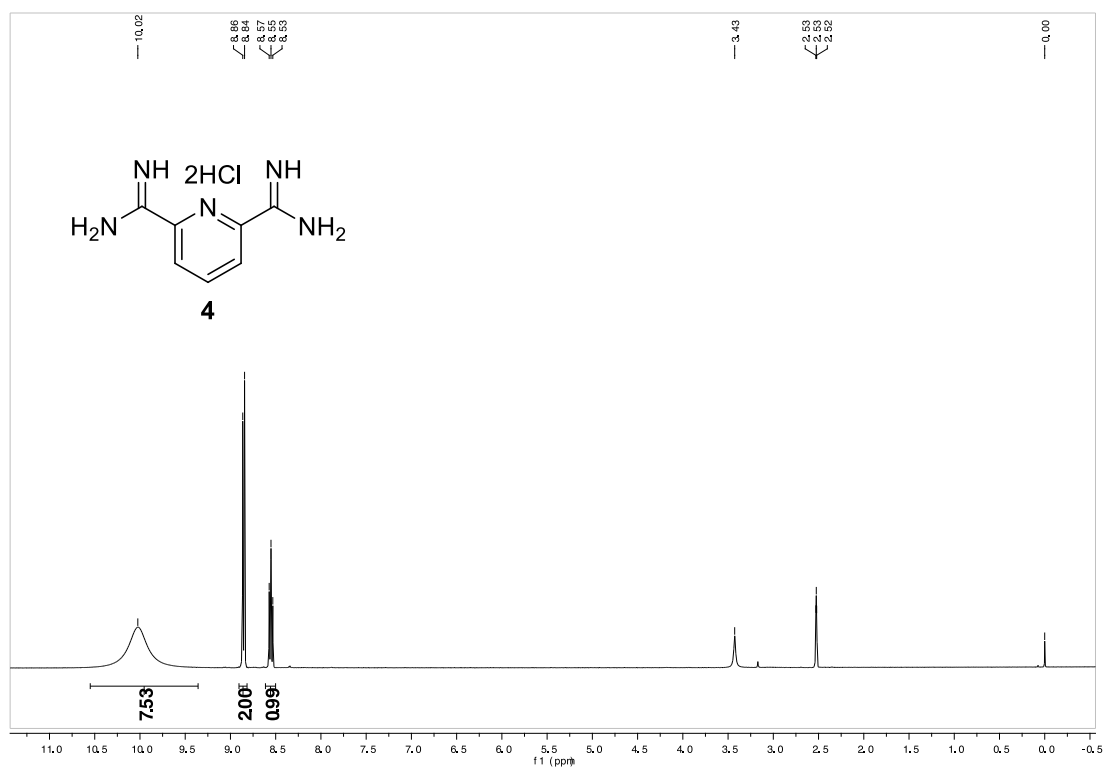
(Z)-N'-Cyanopicolinimide (2)



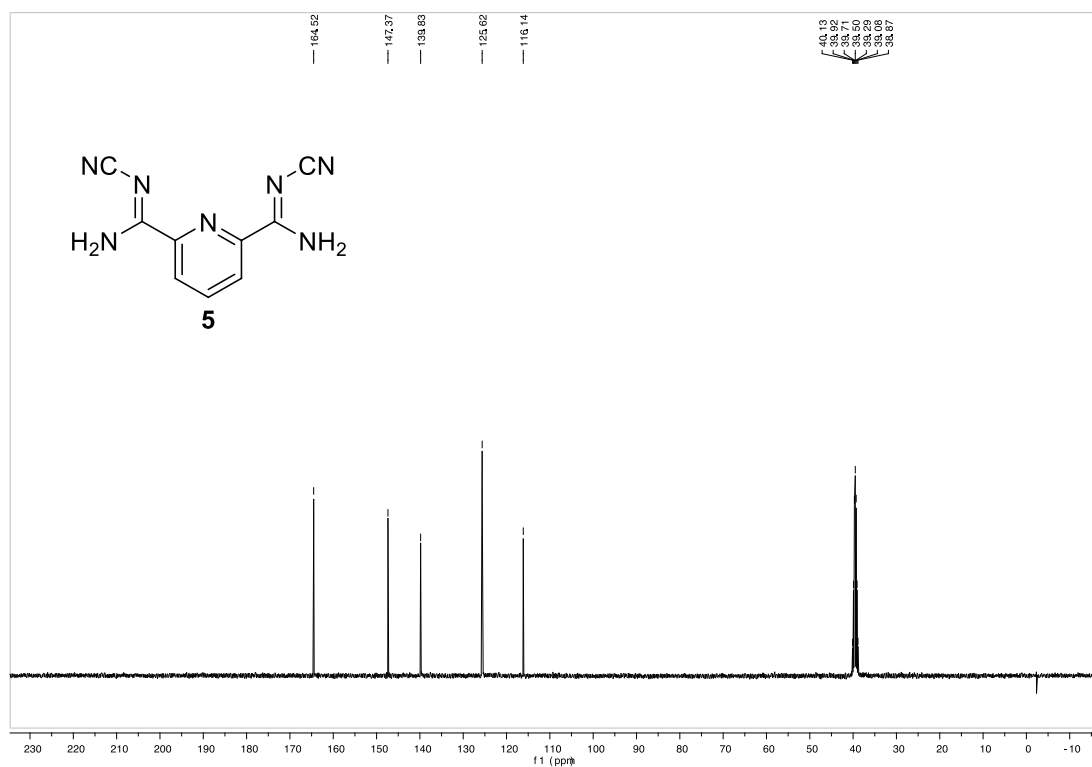
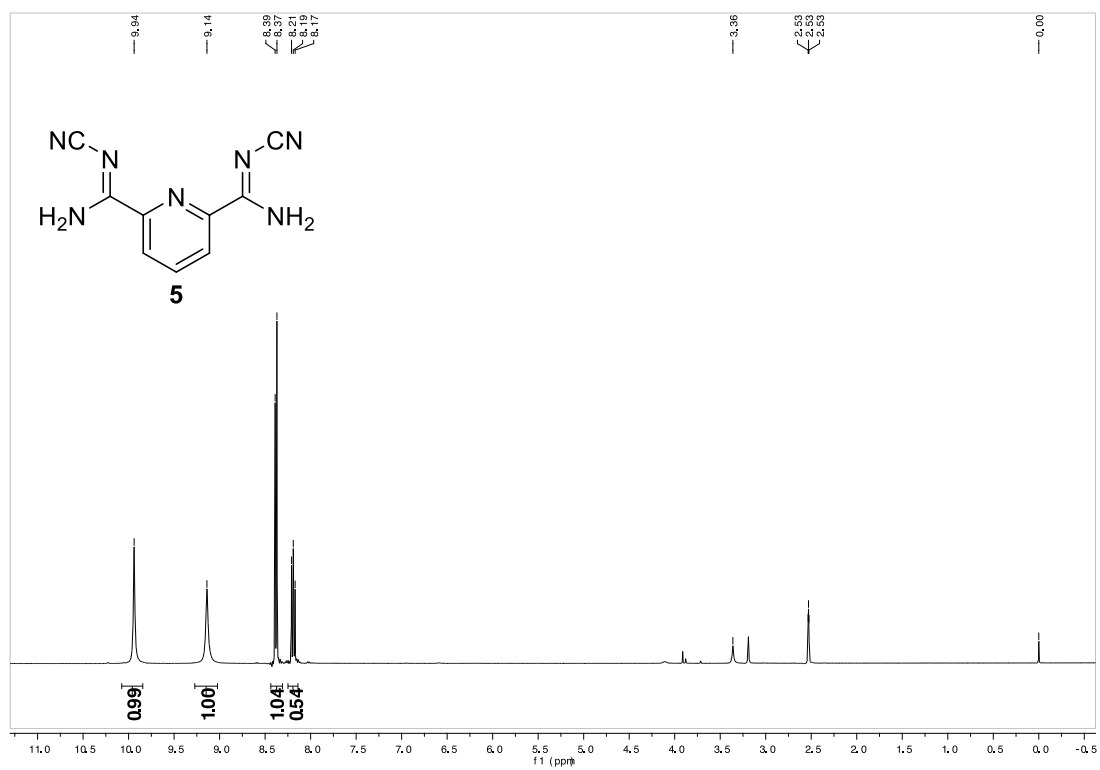
4-Methoxypicolinimide hydrochloride (3)



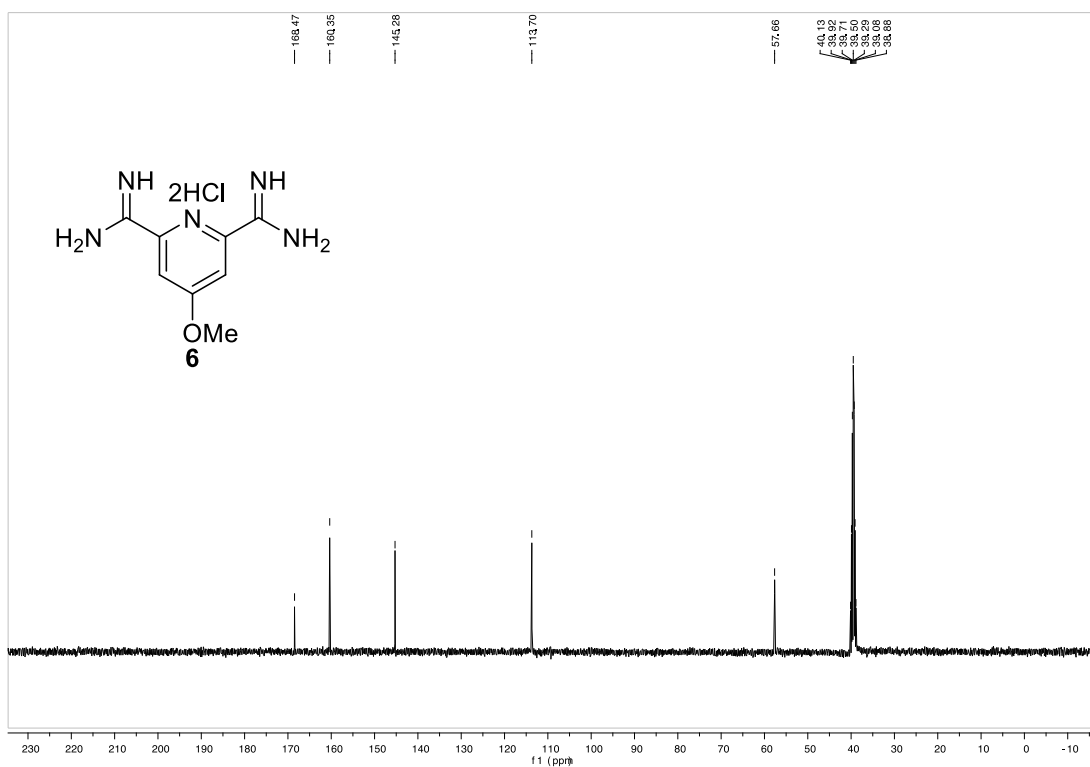
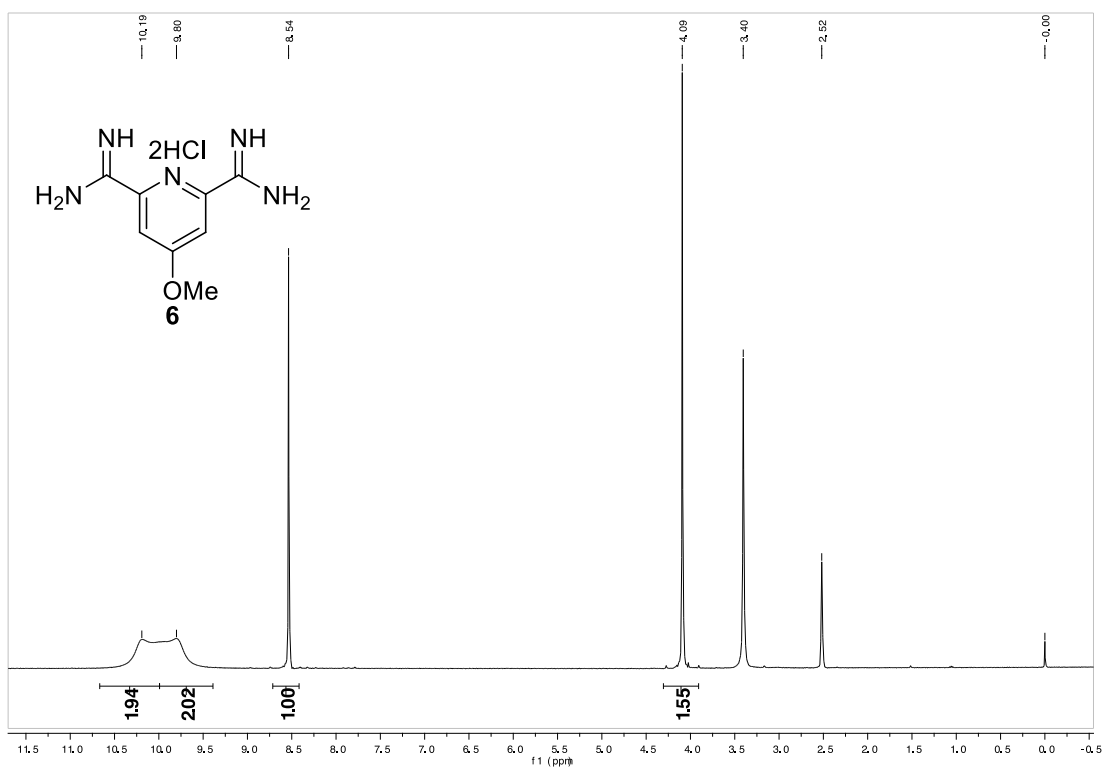
Pyridine-2,6-bis(carboximidamide) dihydrochloride (4)



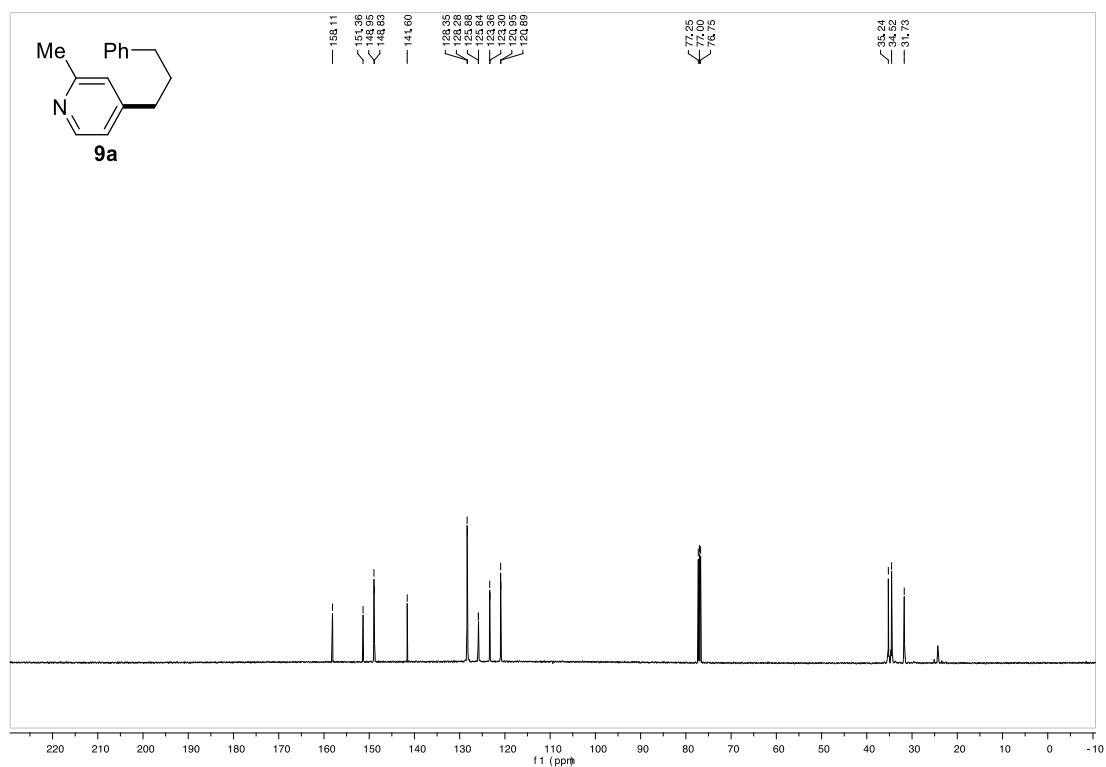
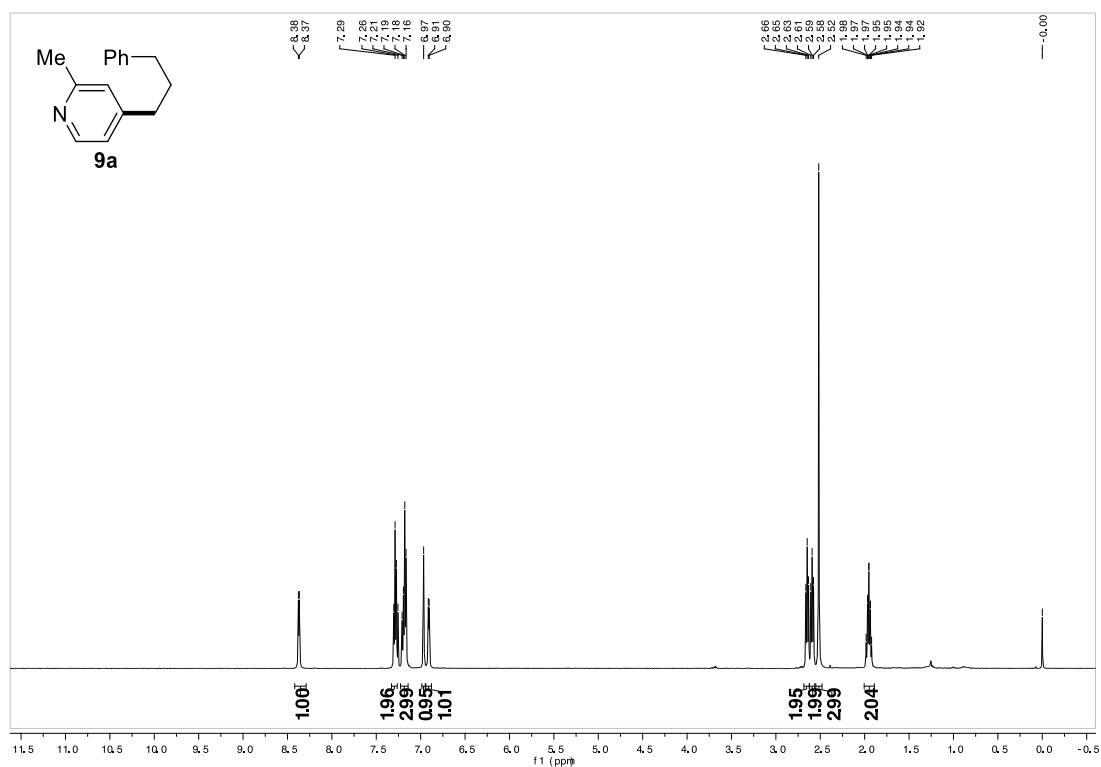
(2Z,6Z)-N'2,N'6-Dicyanopyridine-2,6-bis(carboximidamide) (5)



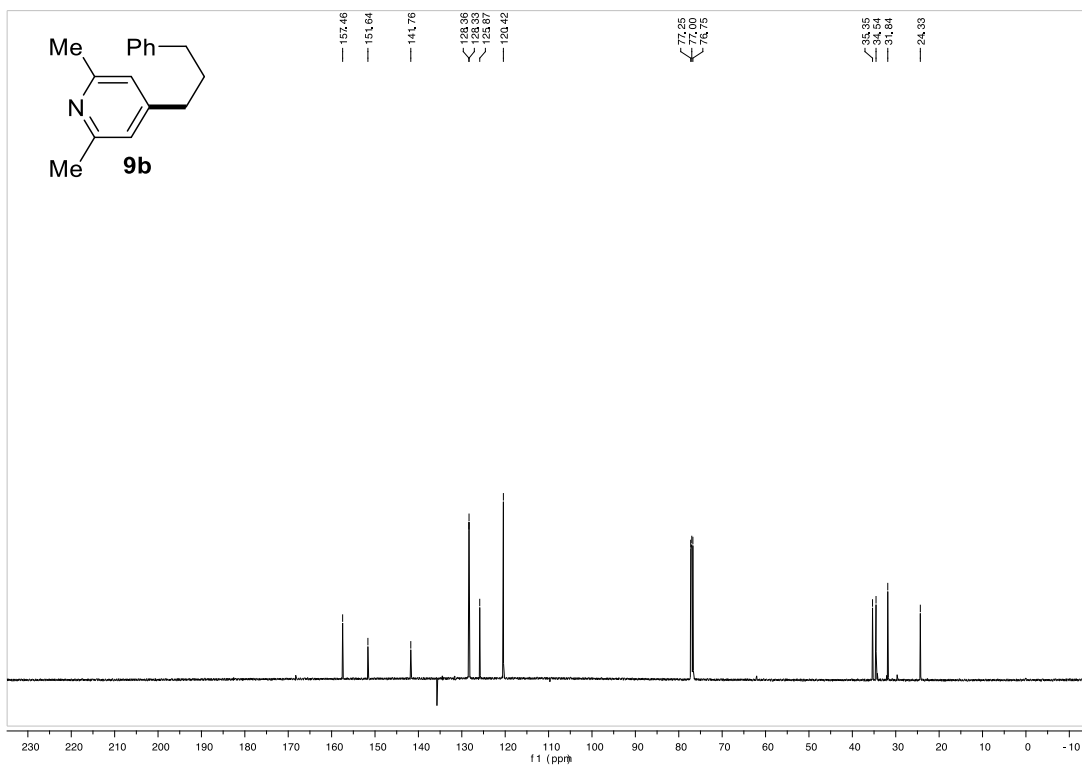
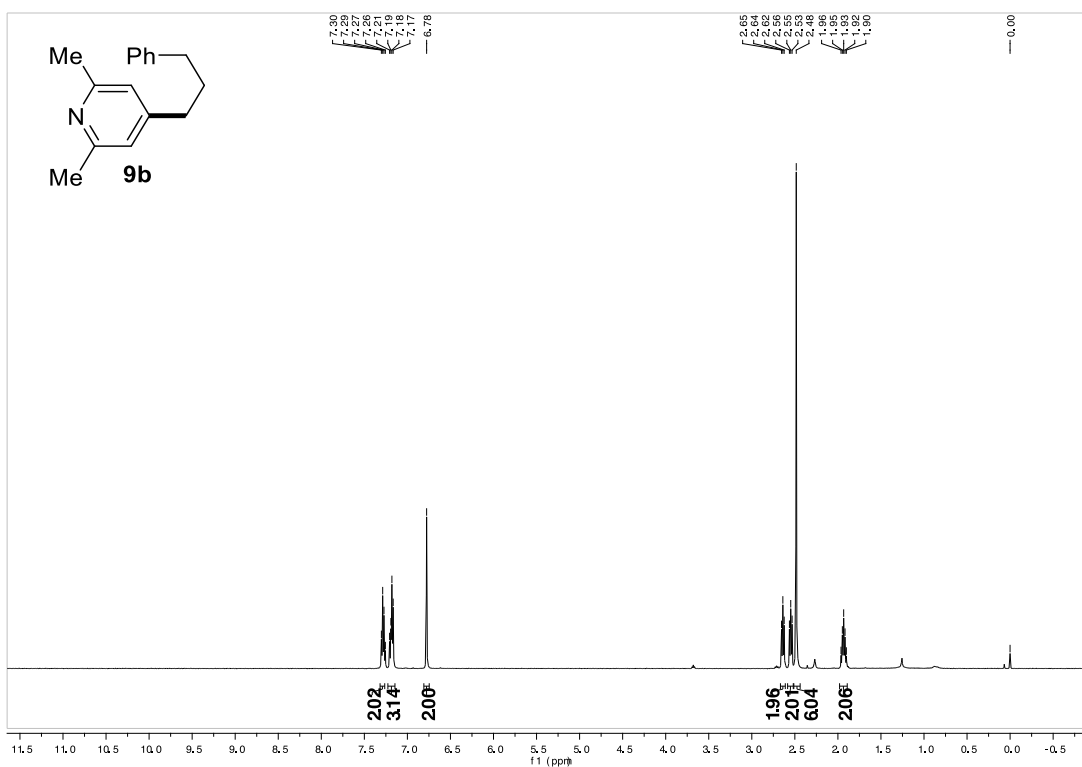
4-Methoxypyridine-2,6-bis(carboximidamide) dihydrochloride (6)



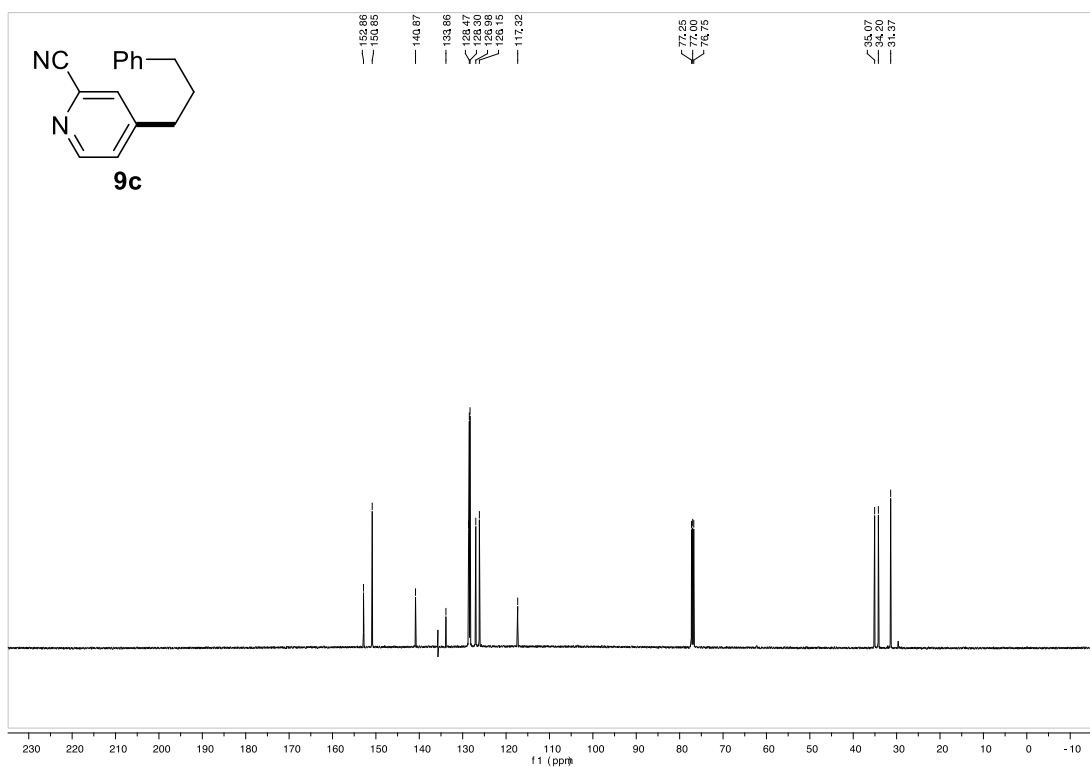
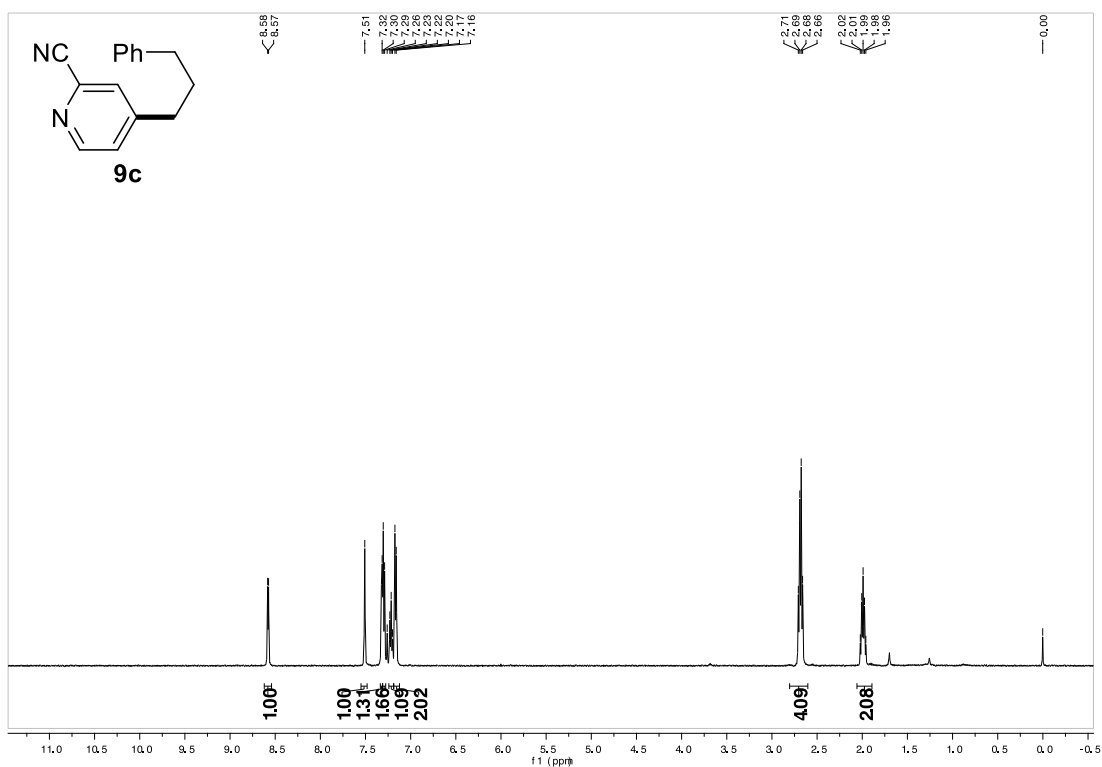
2-Methyl-4-(3-phenylpropyl)pyridine (9a)



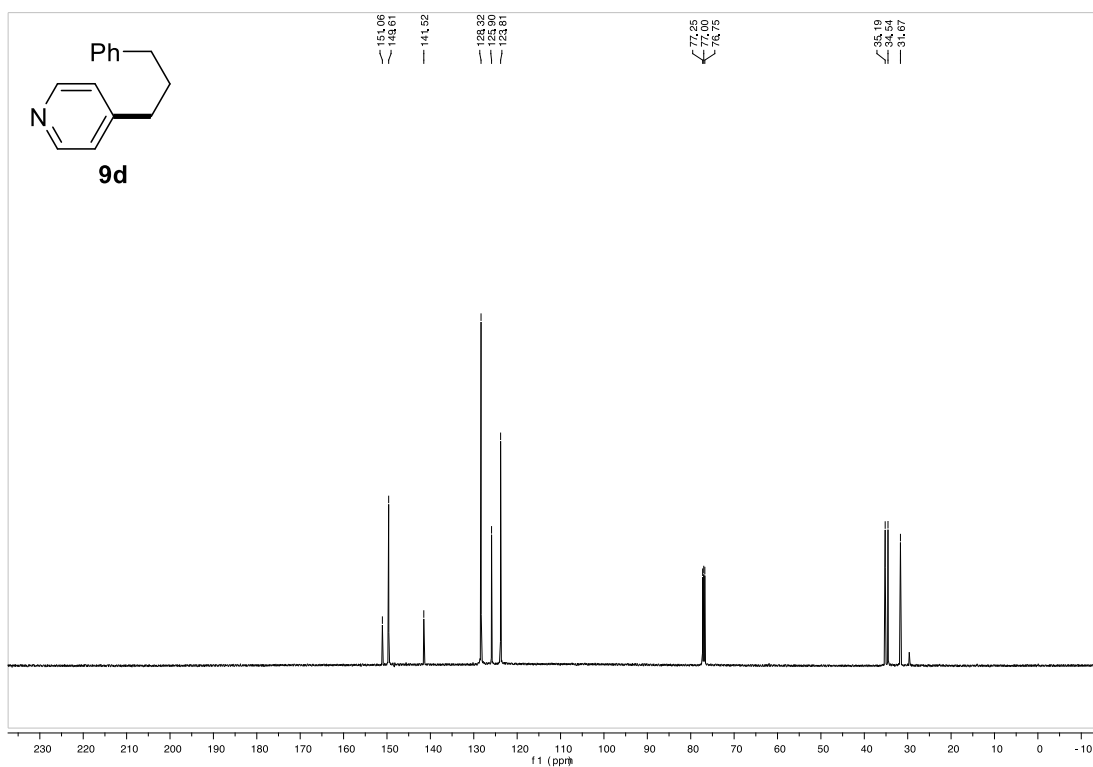
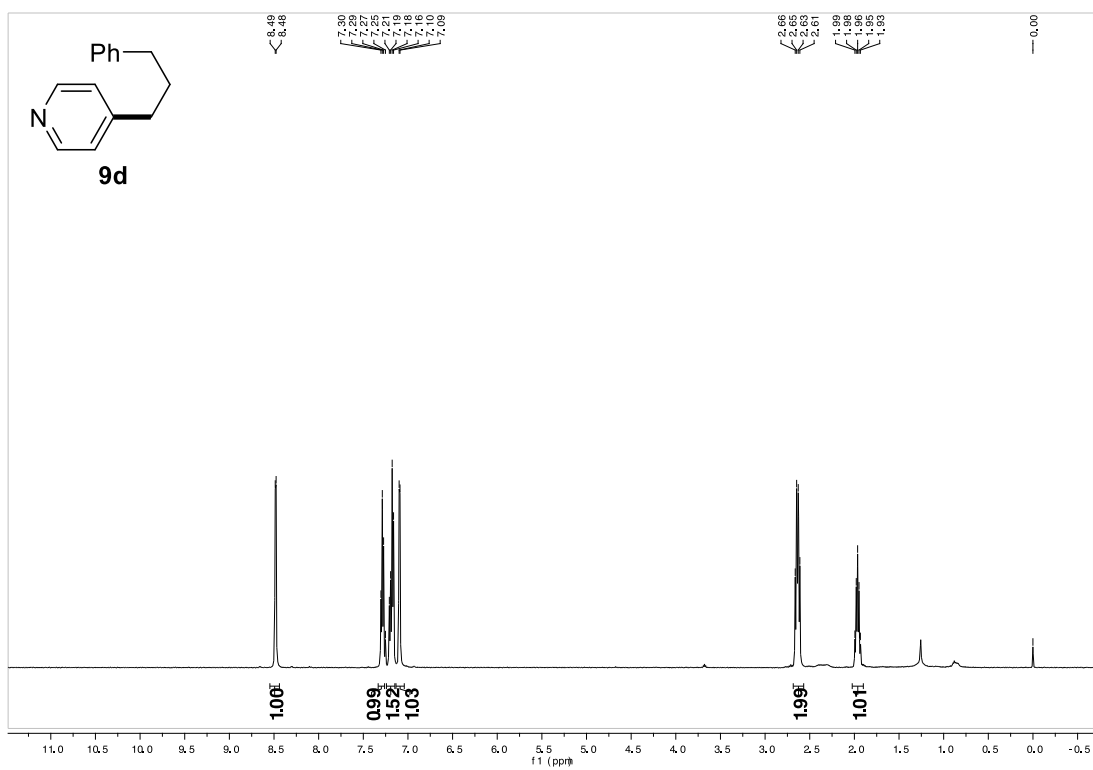
2,6-Dimethyl-4-(3-phenylpropyl)pyridine (9b)



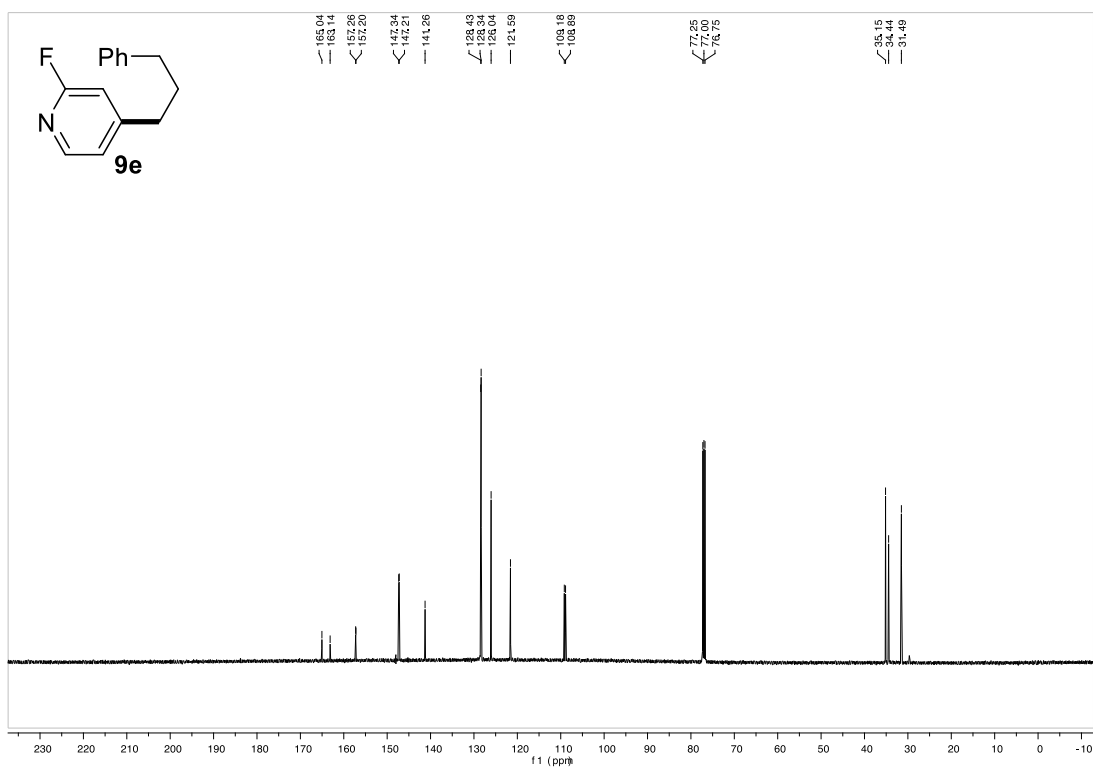
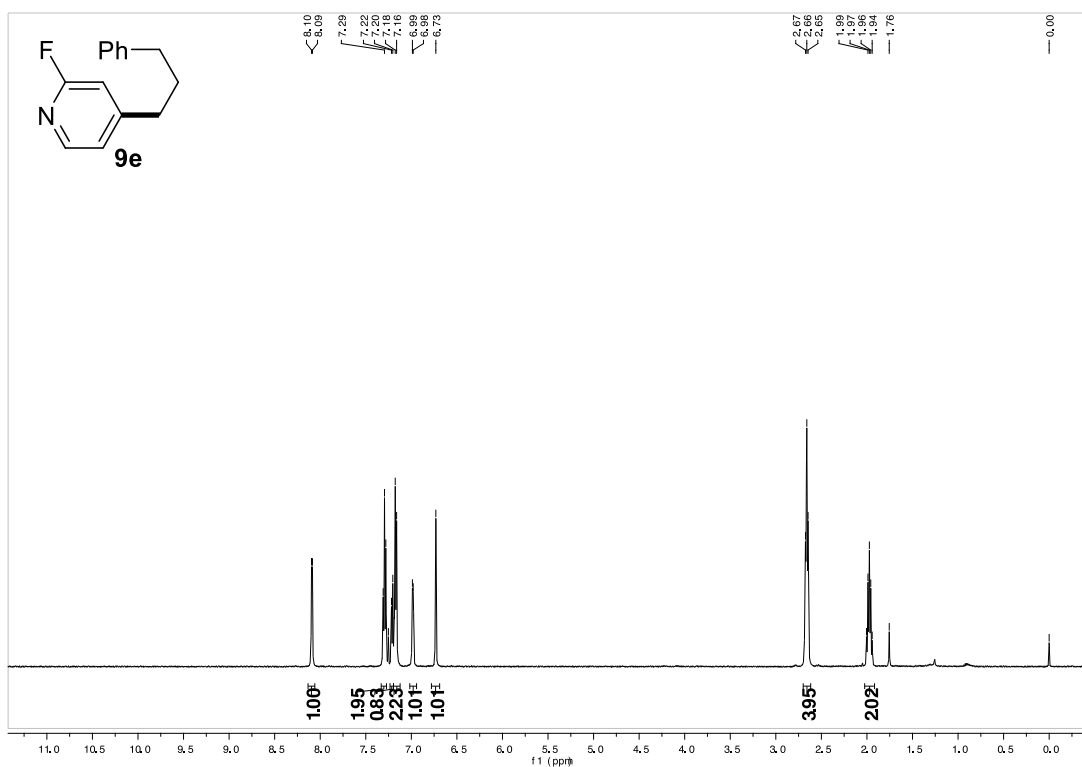
4-(3-Phenylpropyl)picolinonitrile (9c)

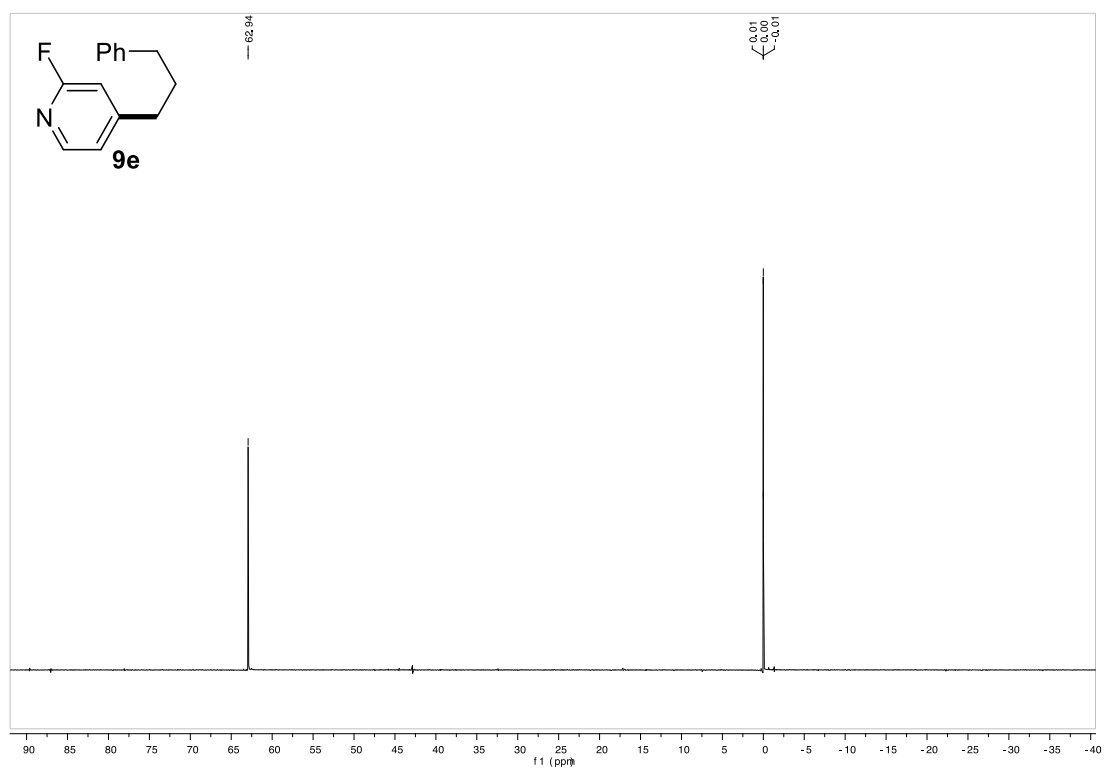


4-(3-Phenylpropyl)pyridine (9d)

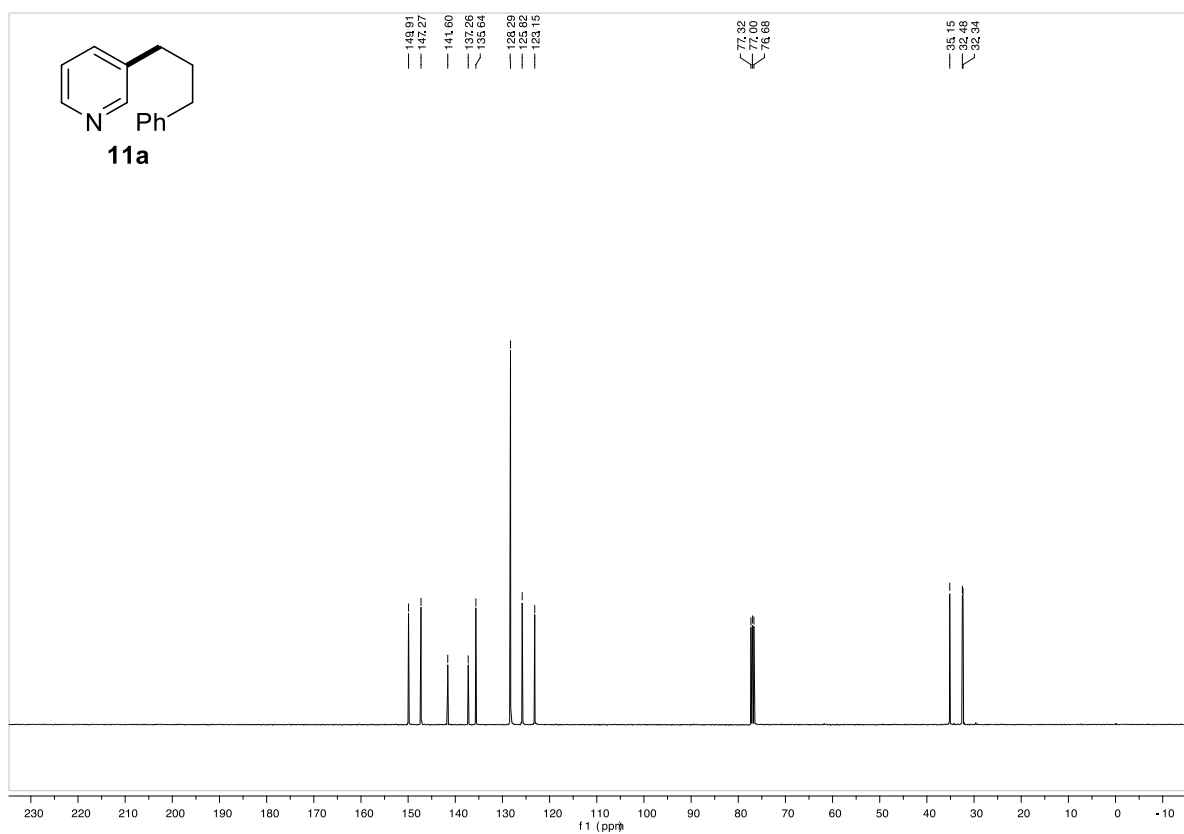
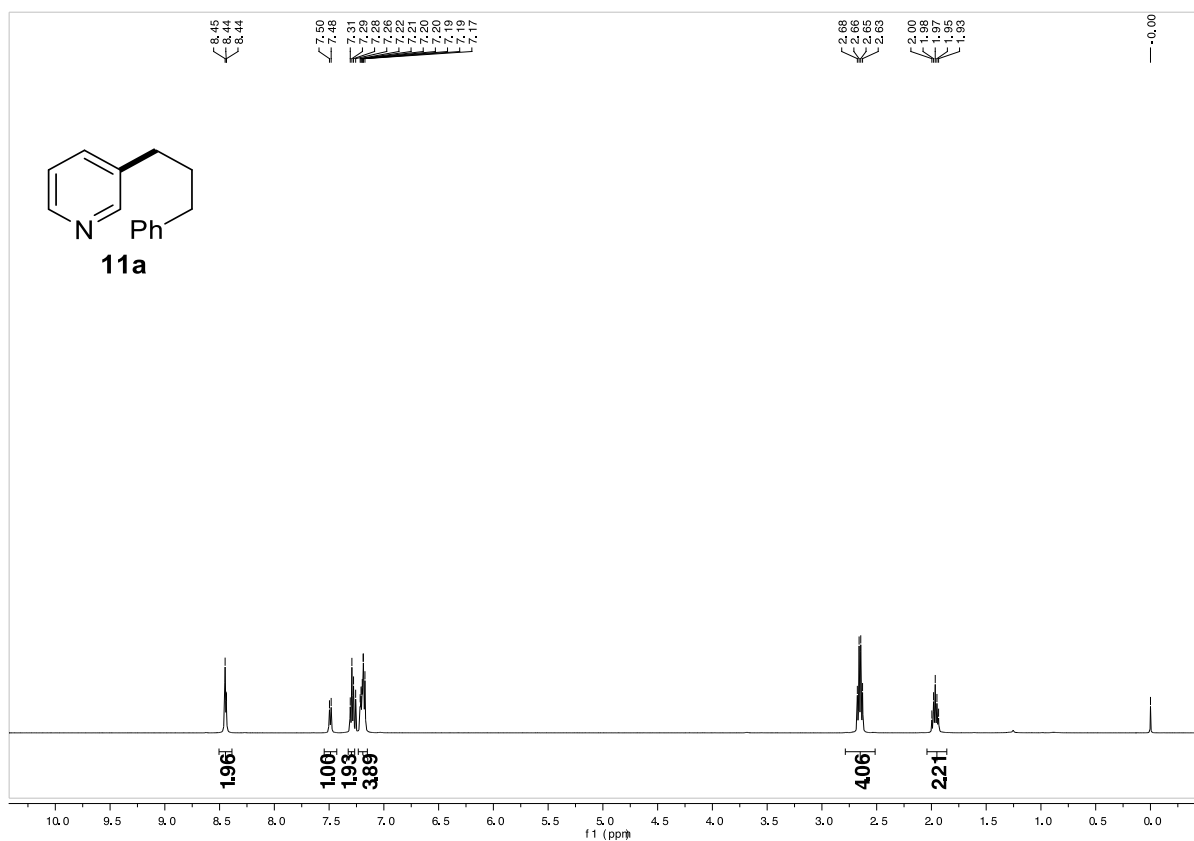


2-Fluoro-4-(3-phenylpropyl)pyridine (9e)

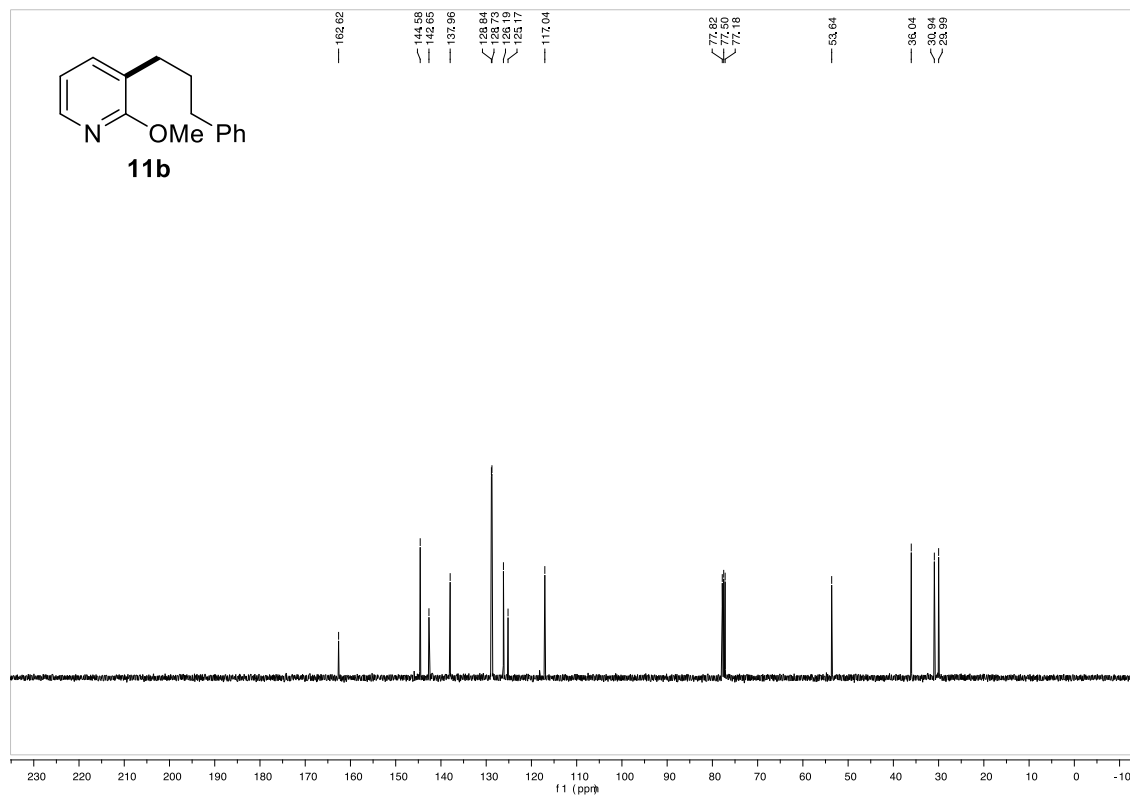
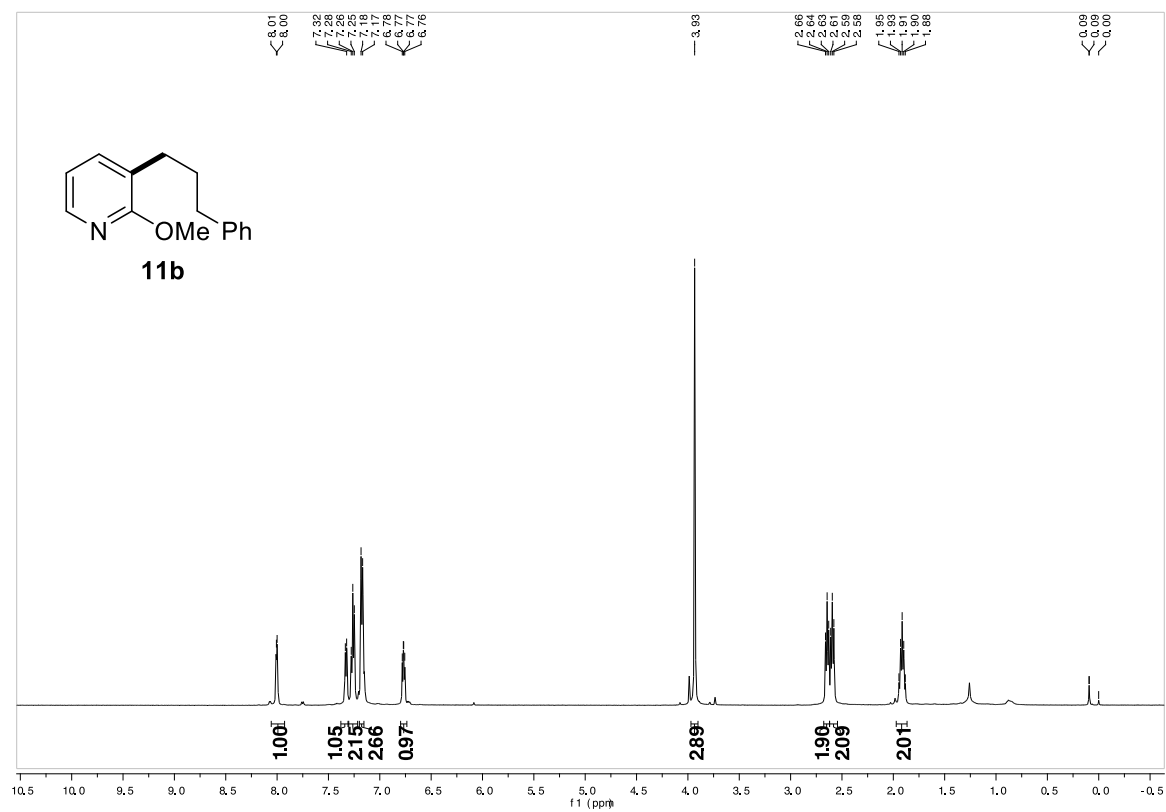




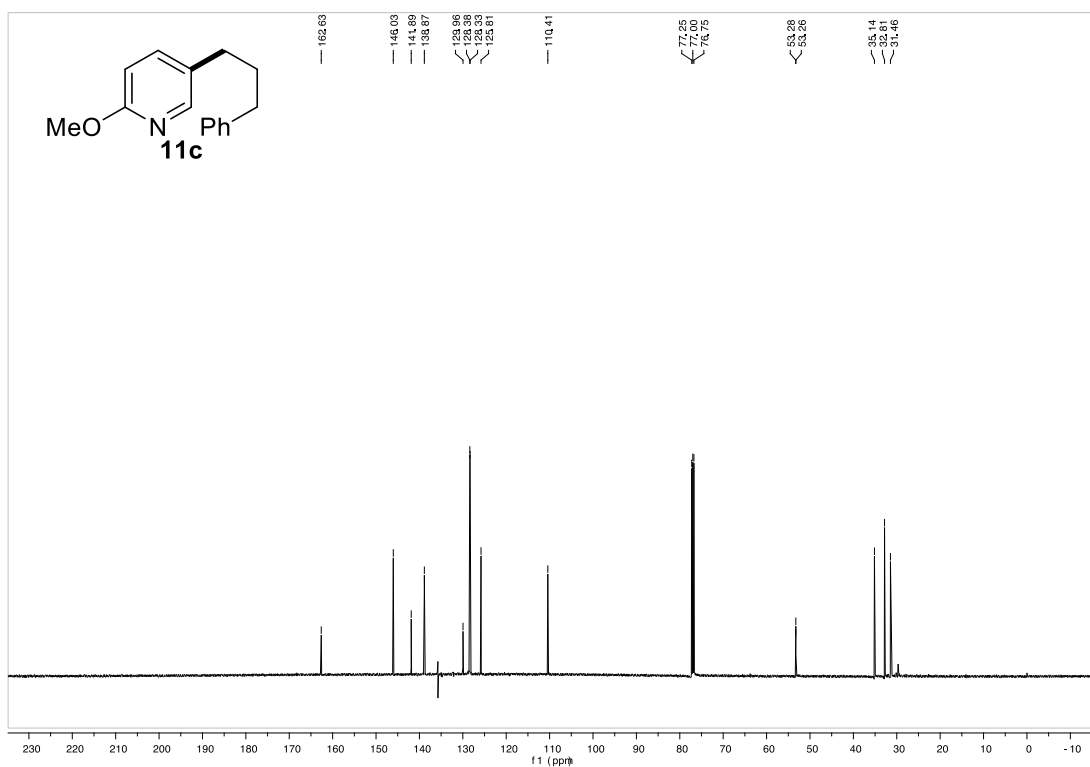
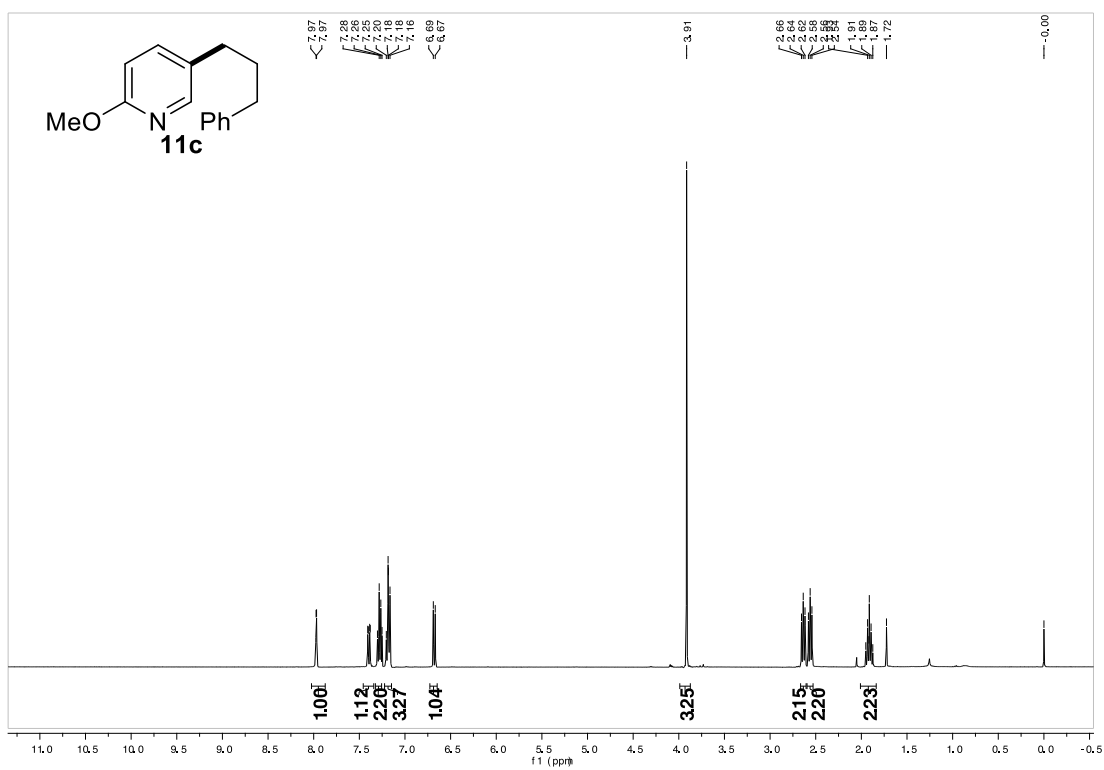
3-(3-Phenylpropyl)pyridine (11a)



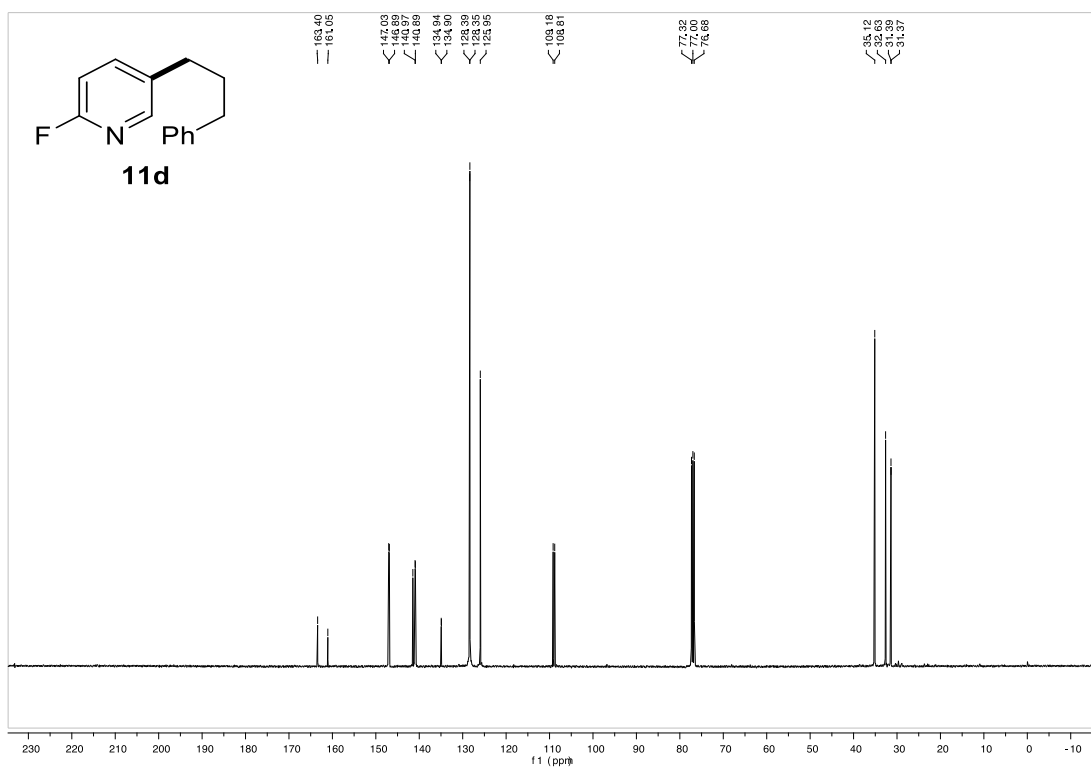
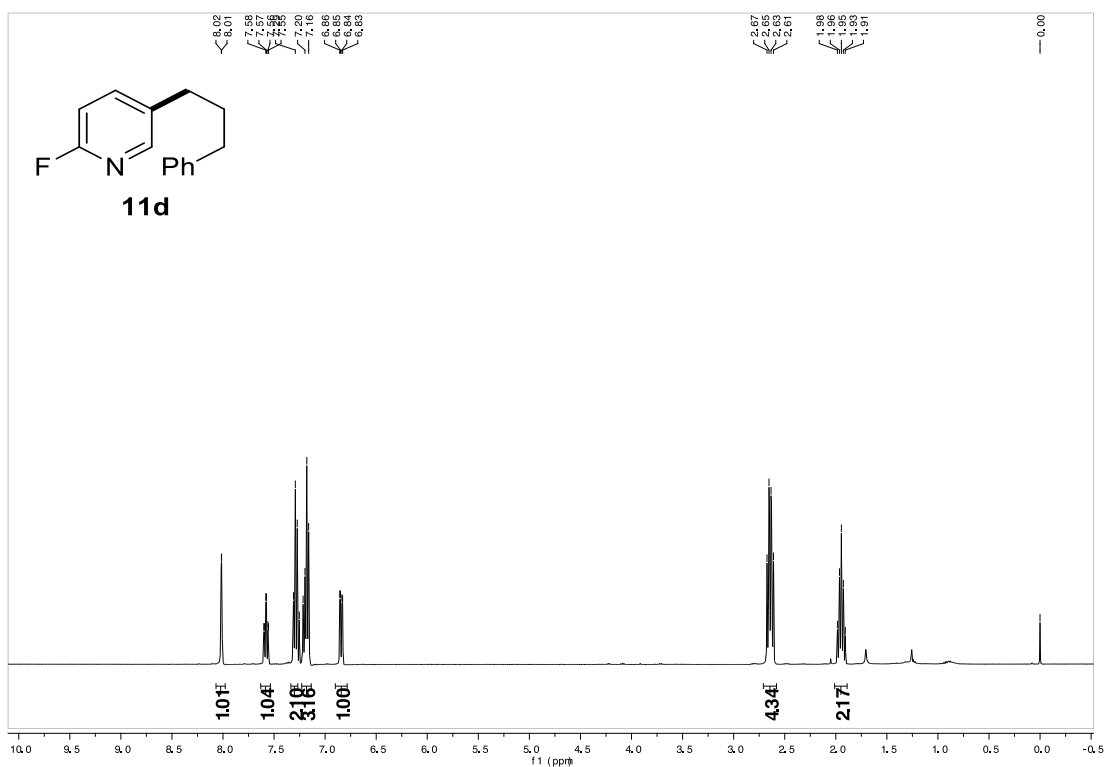
2-Methoxy-3-(3-phenylpropyl)pyridine (11b)

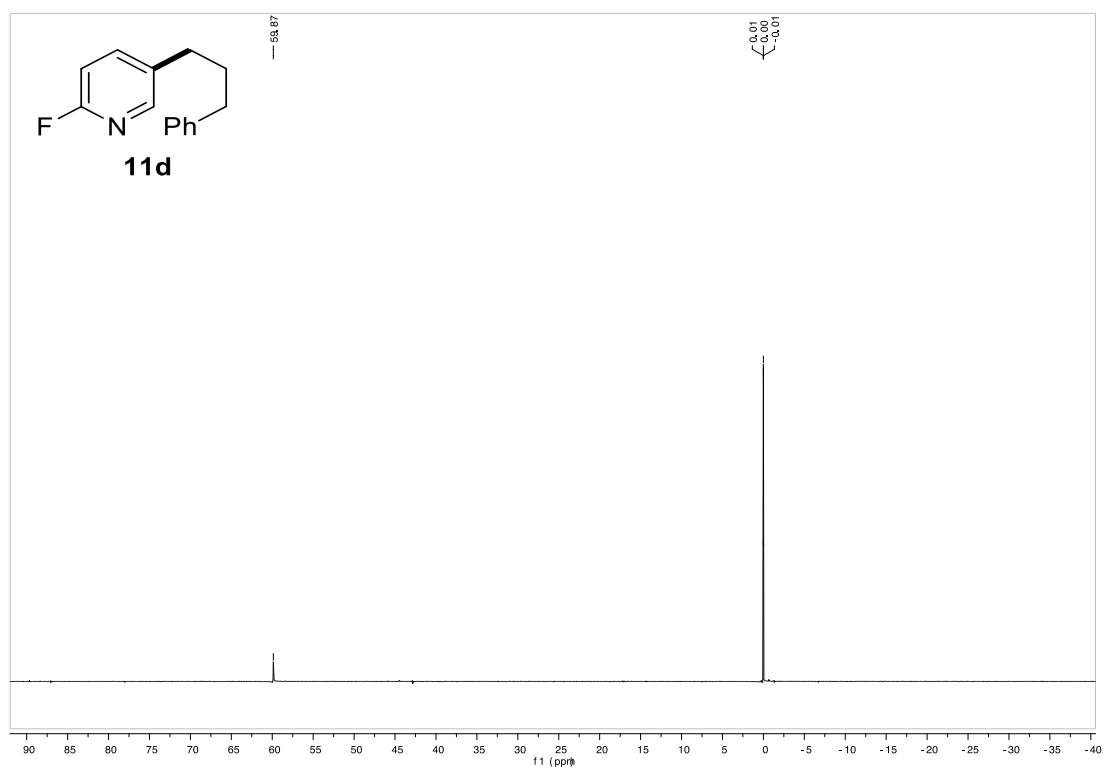


2-Methoxy-5-(3-phenylpropyl)pyridine (11c)

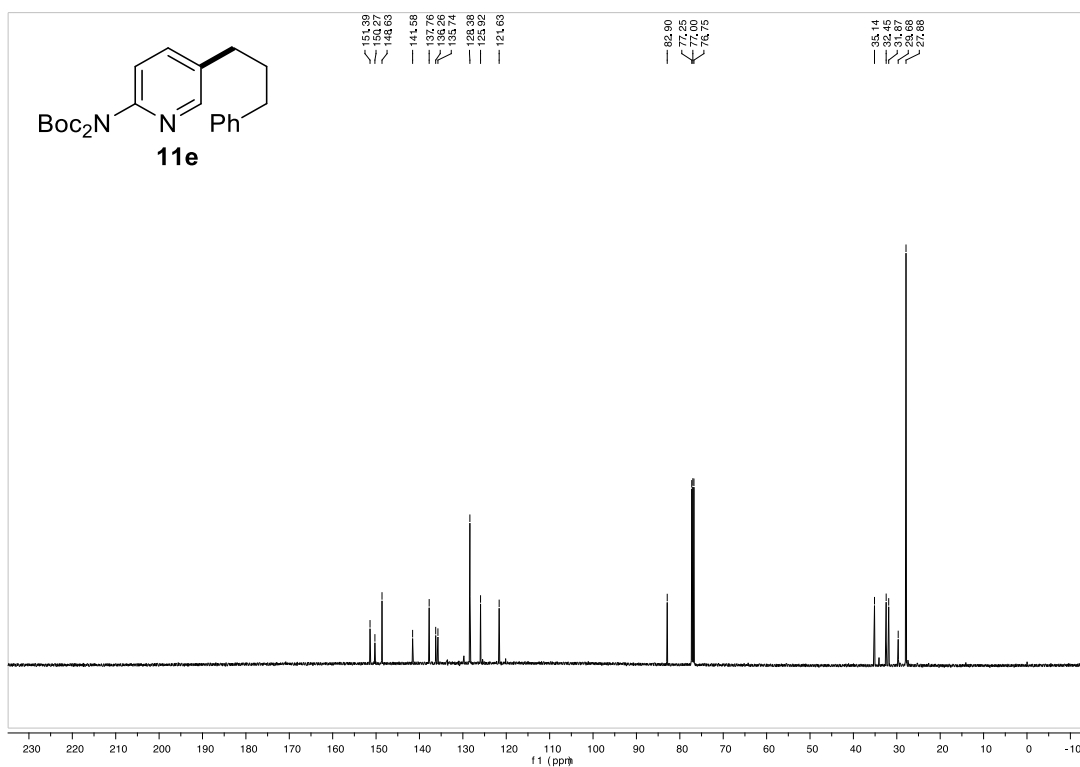
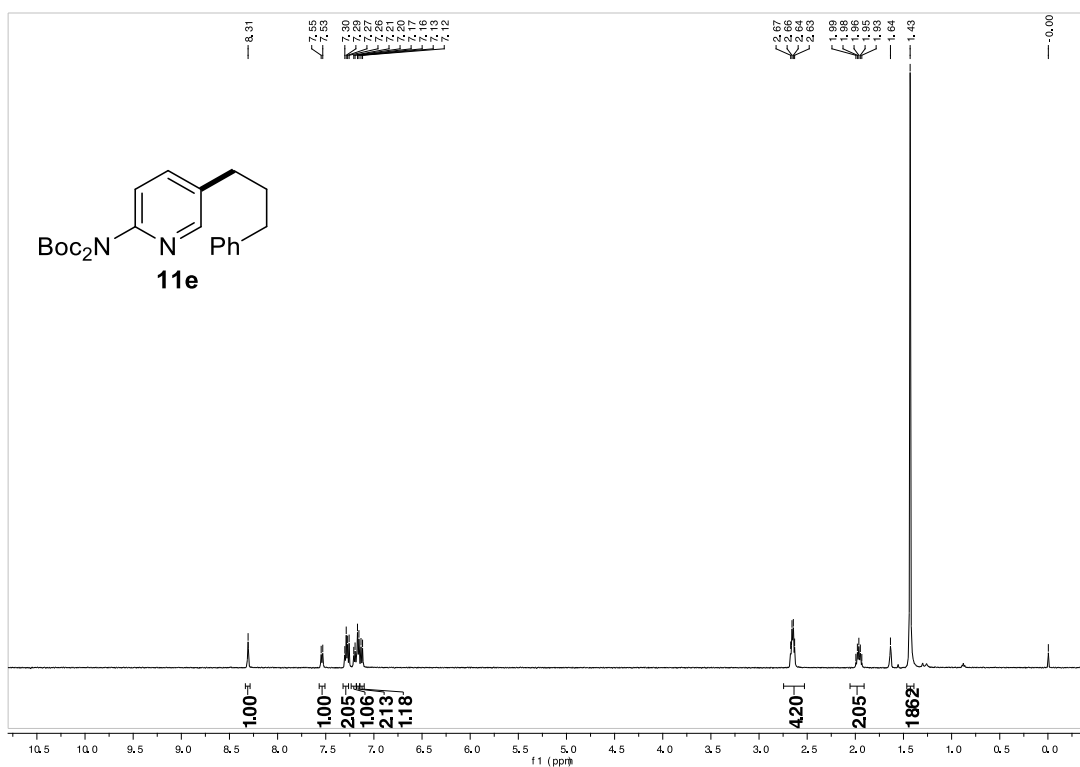


2-Fluoro-5-(3-phenylpropyl)pyridine (11d)

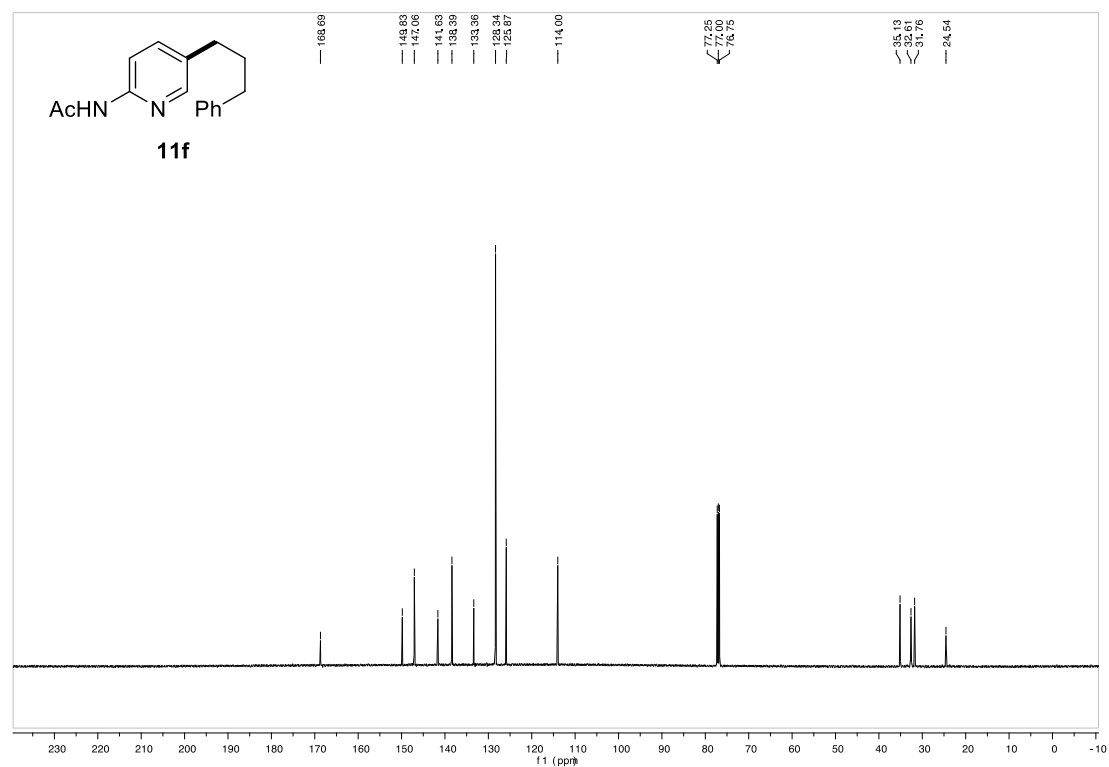
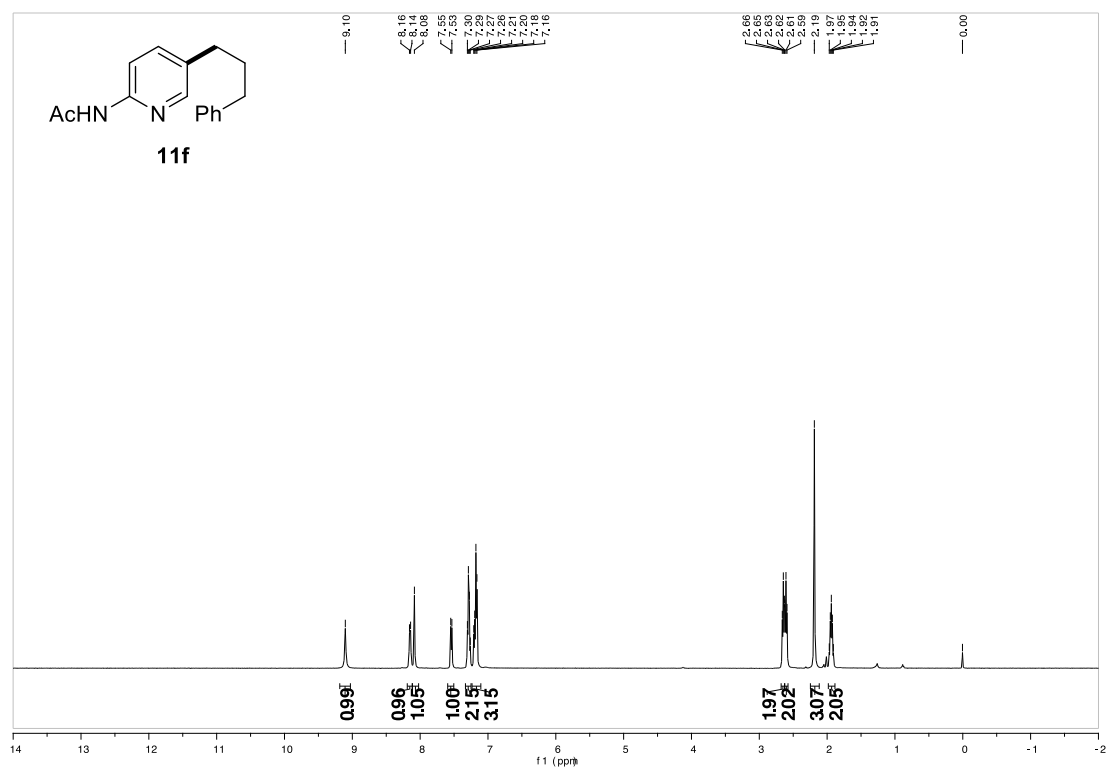




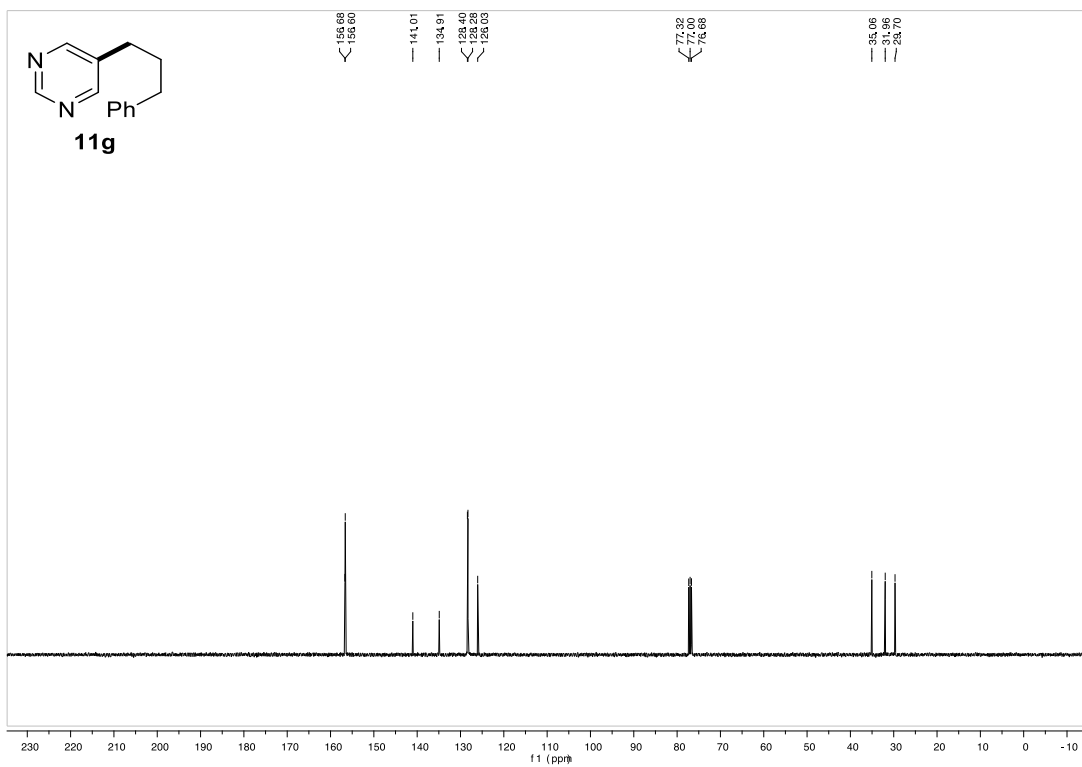
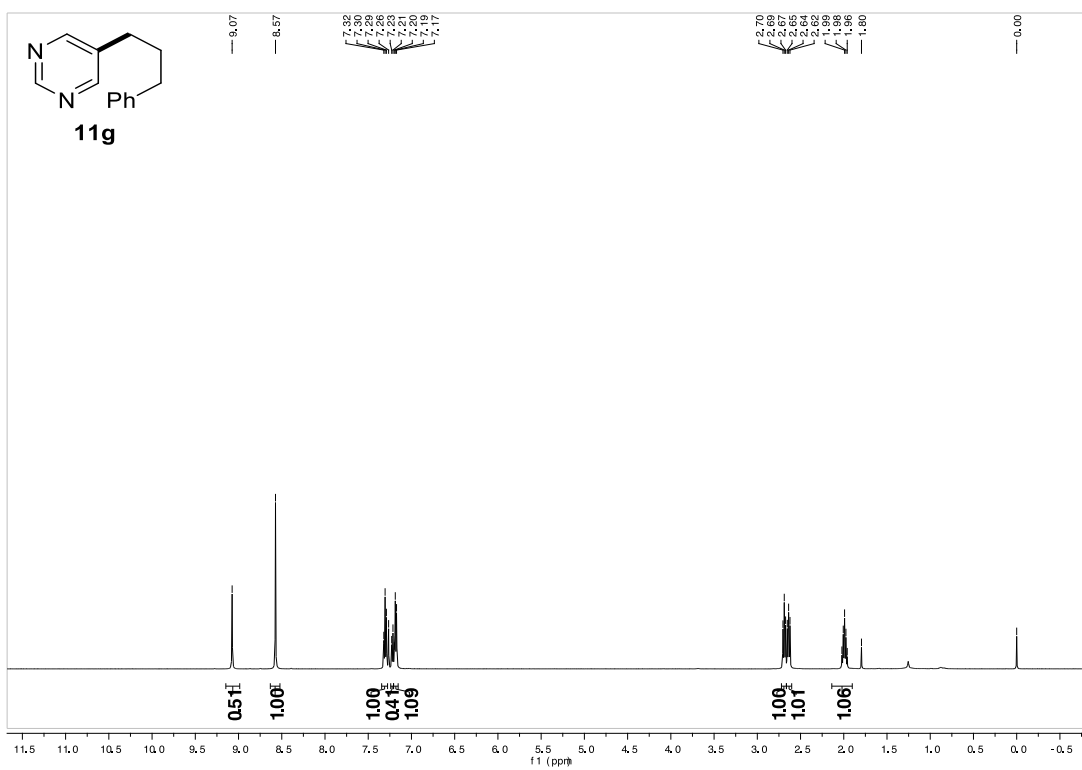
5-(3-Phenylpropyl)pyridin-2-yl di-tert-butyl-carbamate (11e)



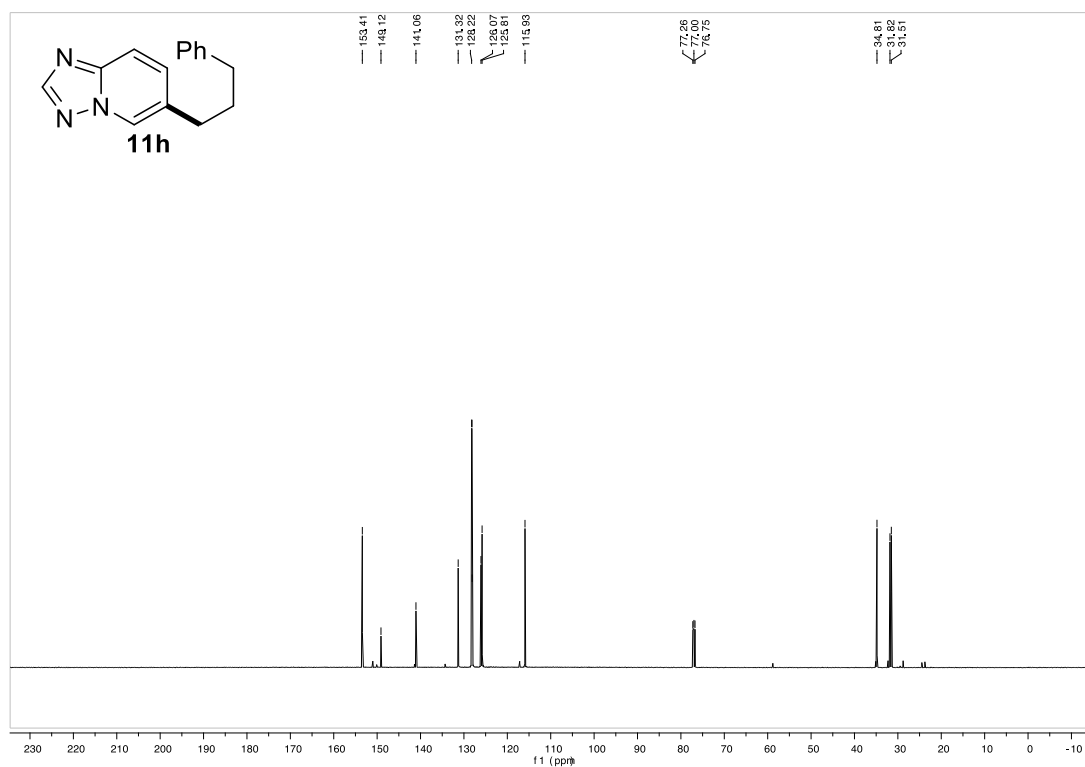
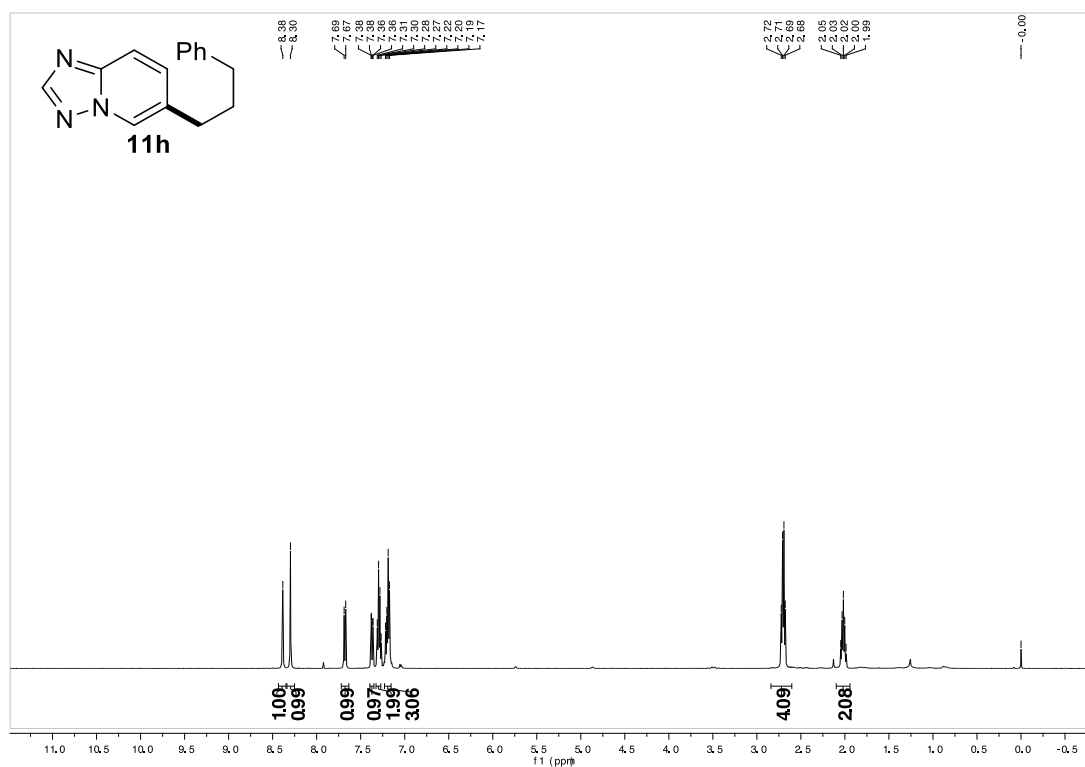
N-(5-(3-Phenylpropyl)pyridin-2-yl)acetamide (11f)



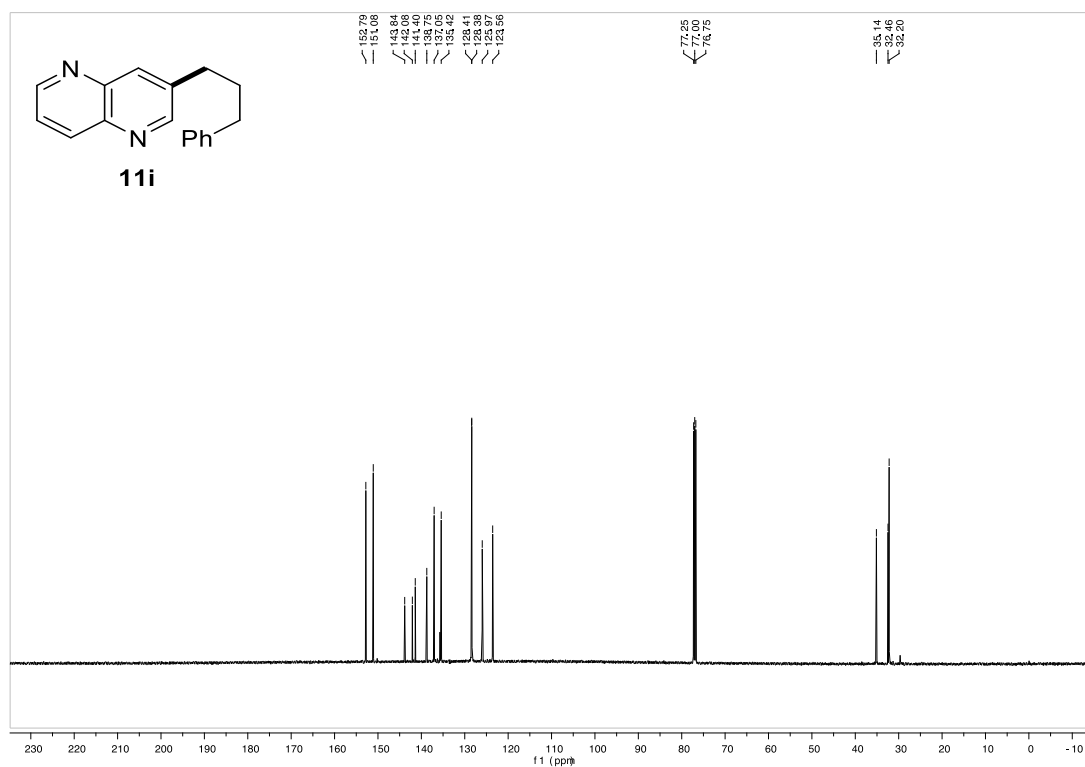
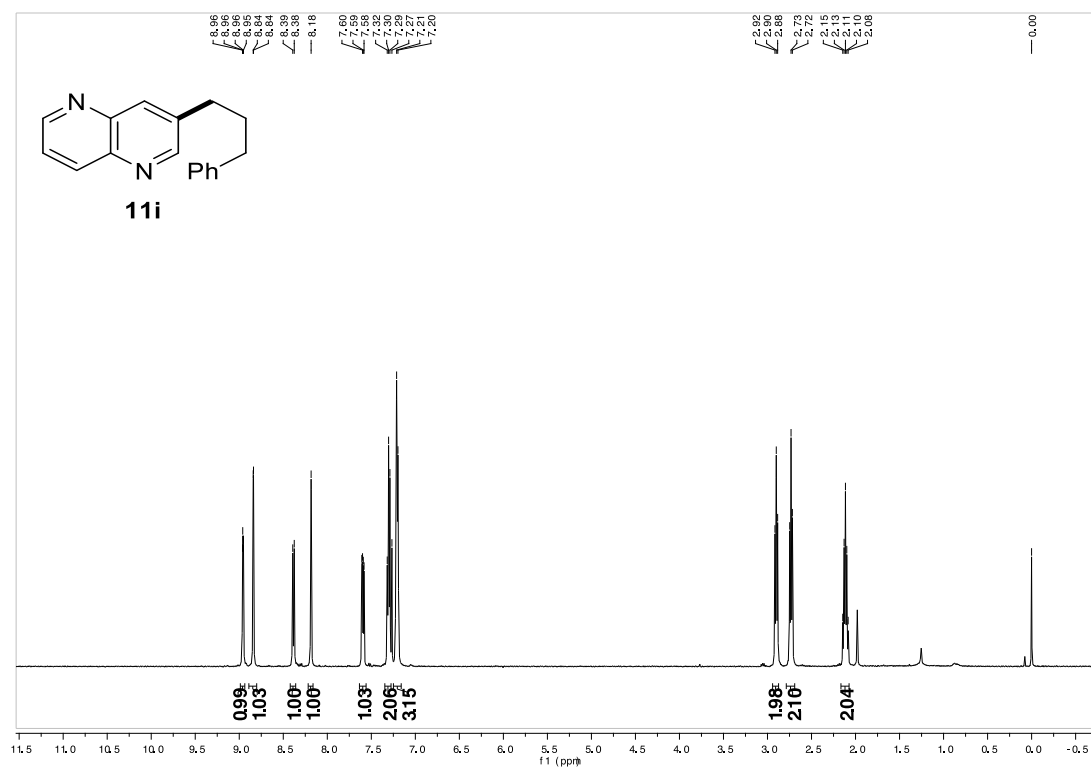
5-(3-Phenylpropyl)pyrimidine (11g)



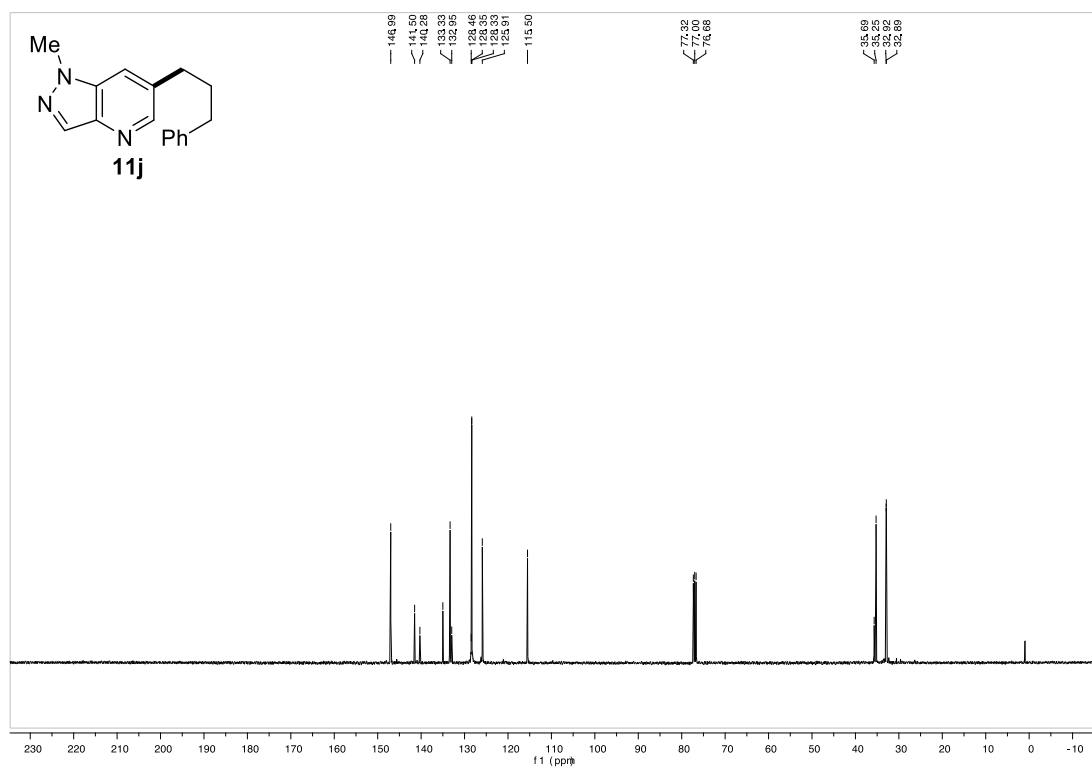
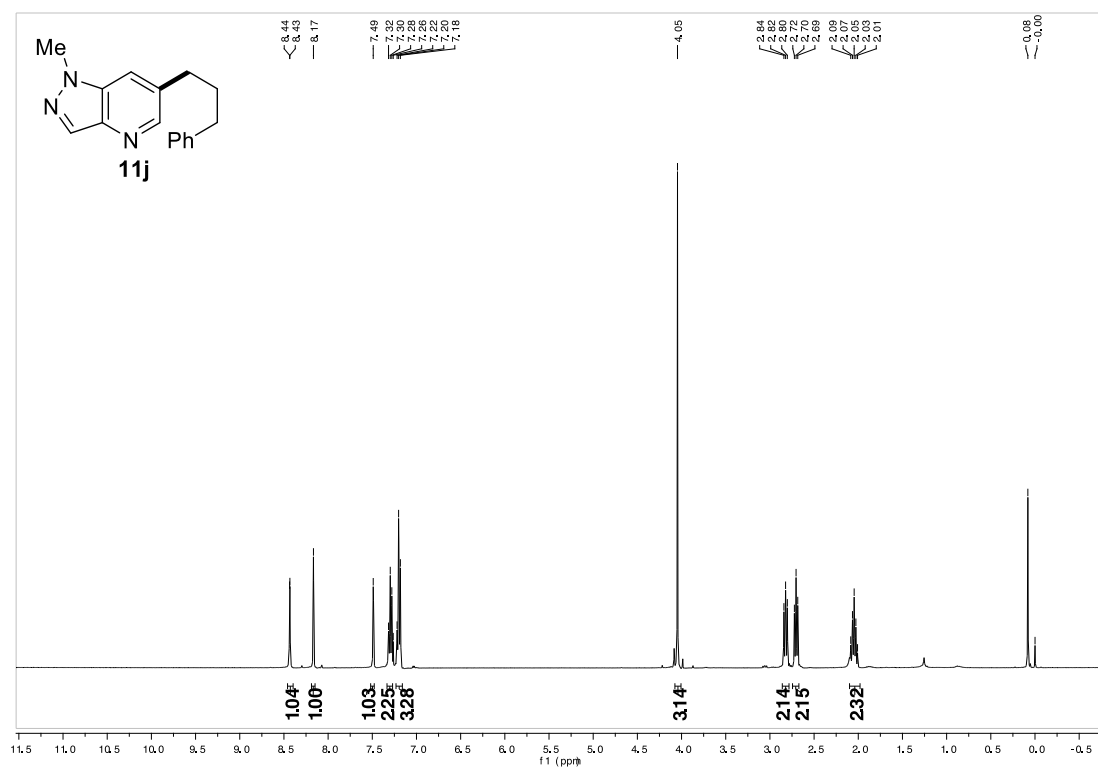
6-(3-Phenylpropyl)-[1,2,4]triazolo[1,5-a]pyridine (11h)



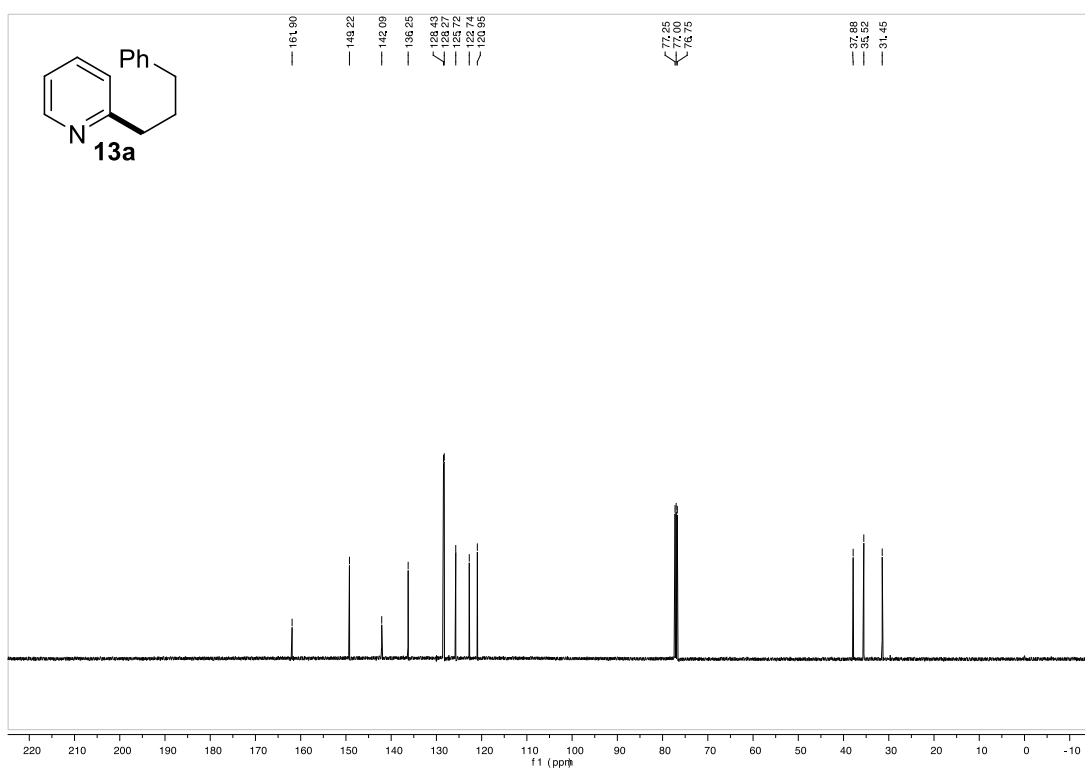
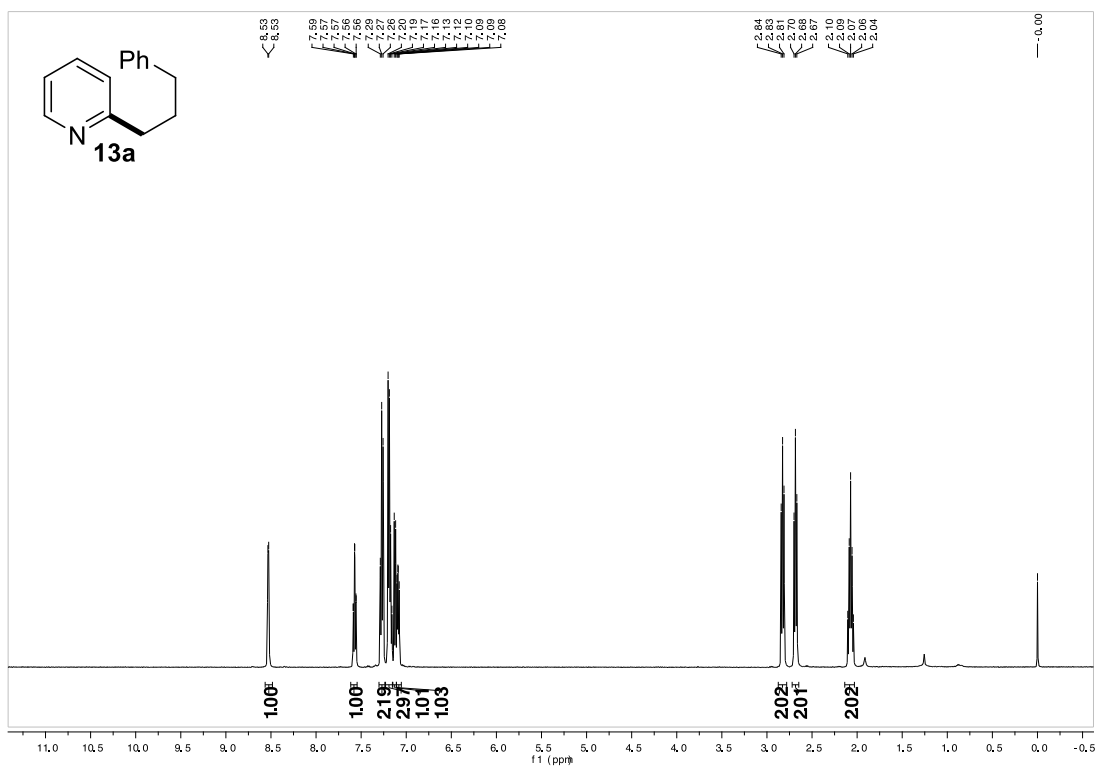
3-(3-Phenylpropyl)-1,5-naphthyridine (11i)



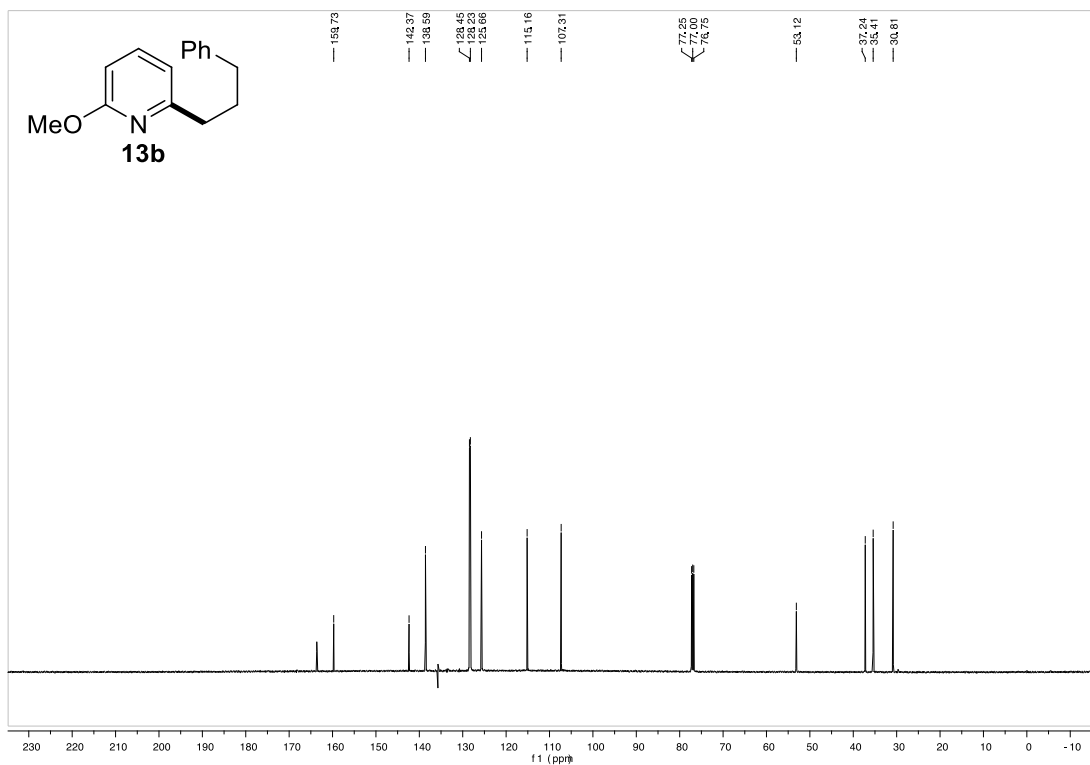
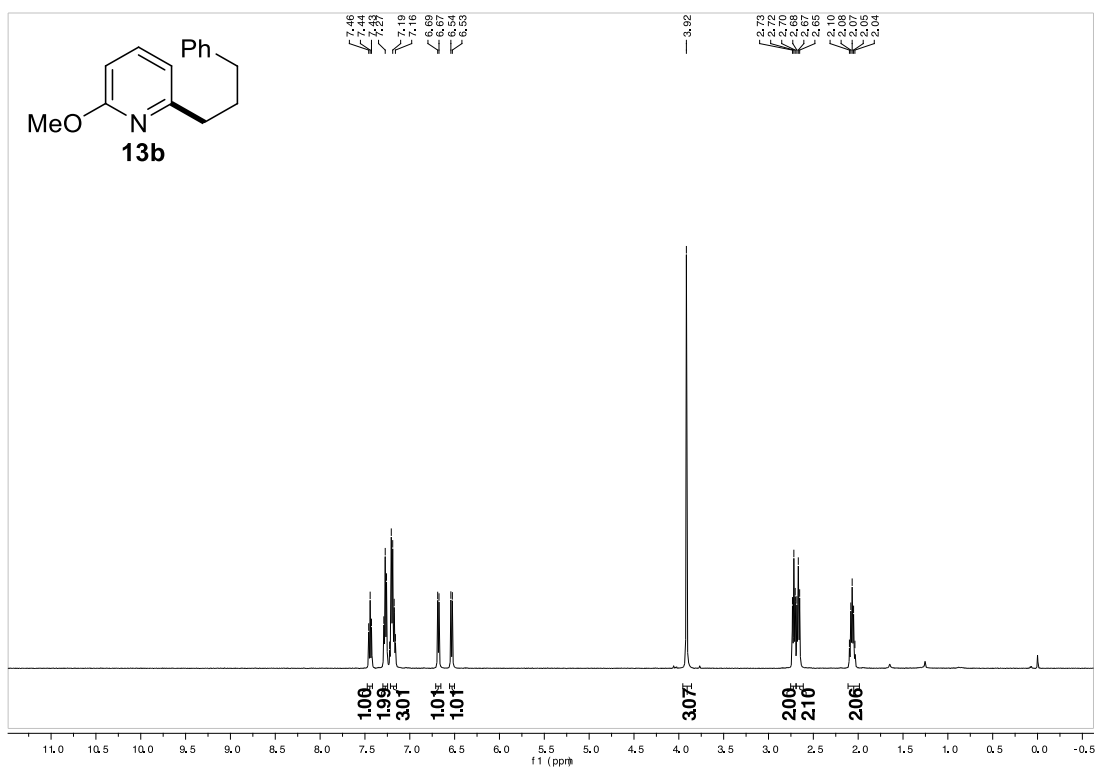
1-Methyl-6-(3-phenylpropyl)-1H-pyrazolo[4,3-b]pyridine (11j)



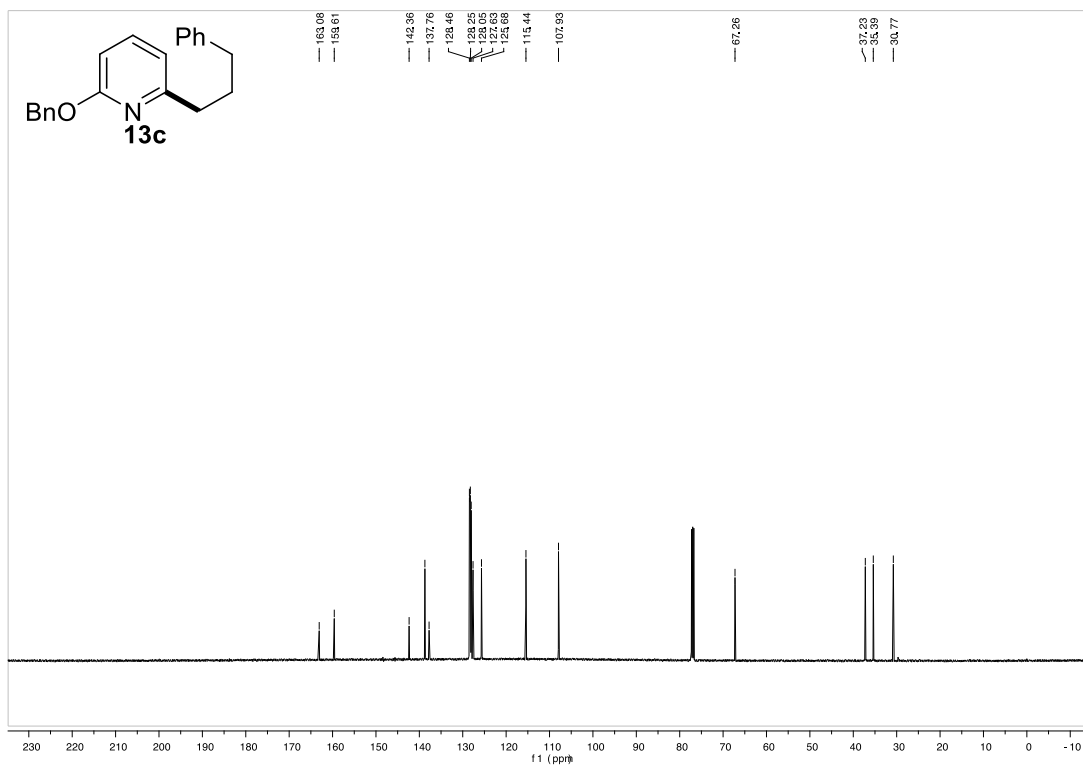
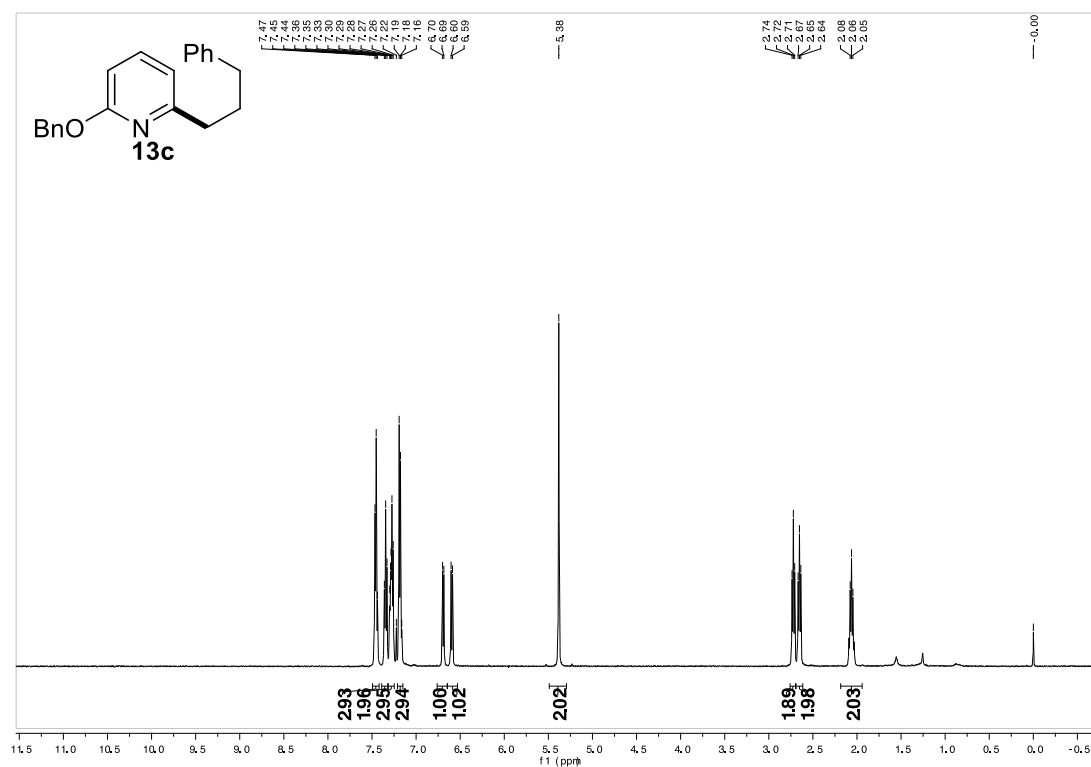
2-(3-Phenylpropyl)pyridine (13a)



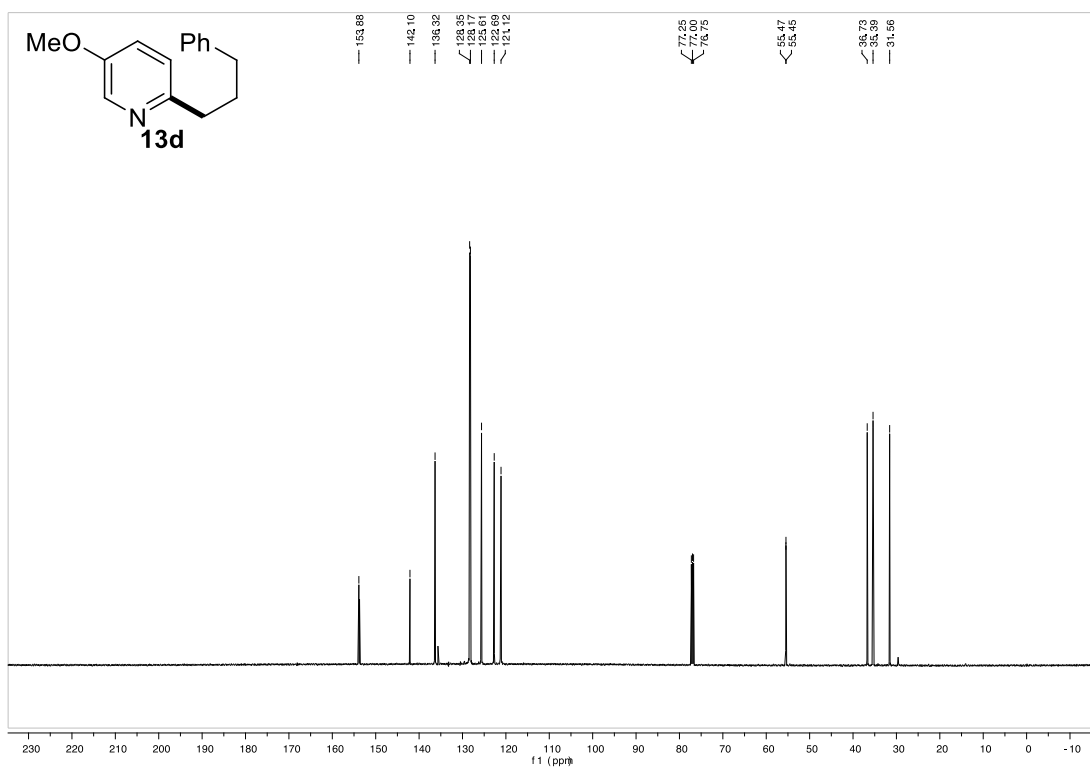
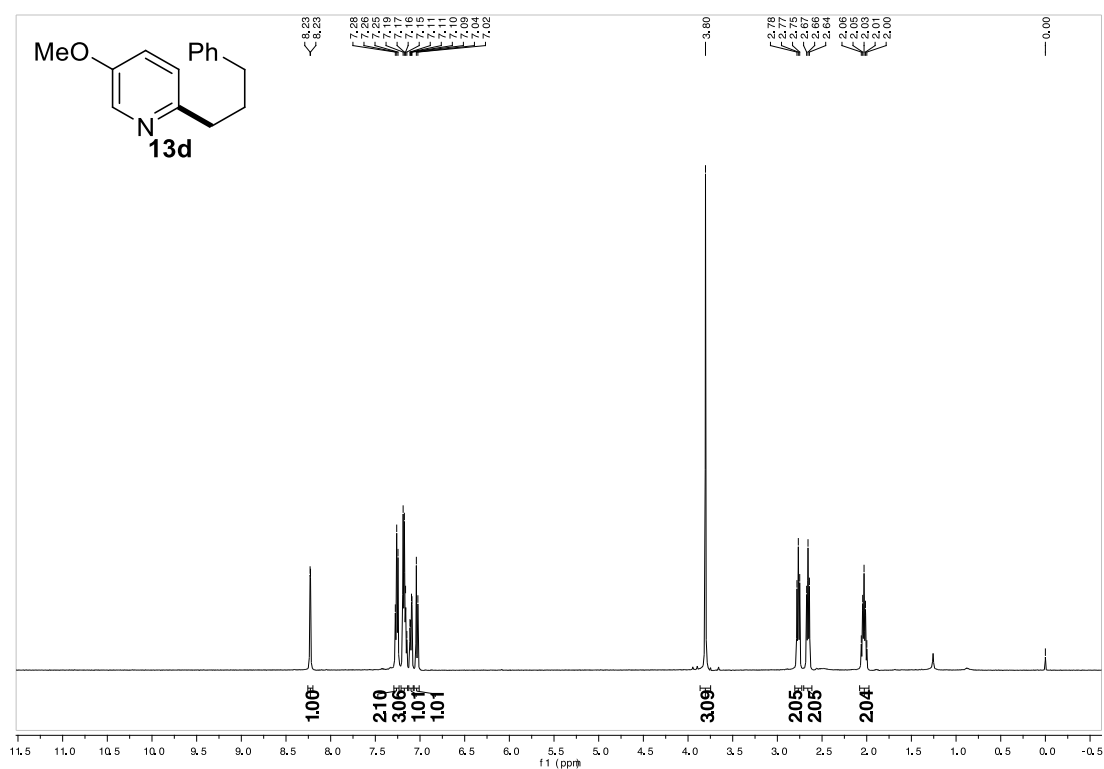
2-Methoxy-6-(3-phenylpropyl)pyridine (13b)



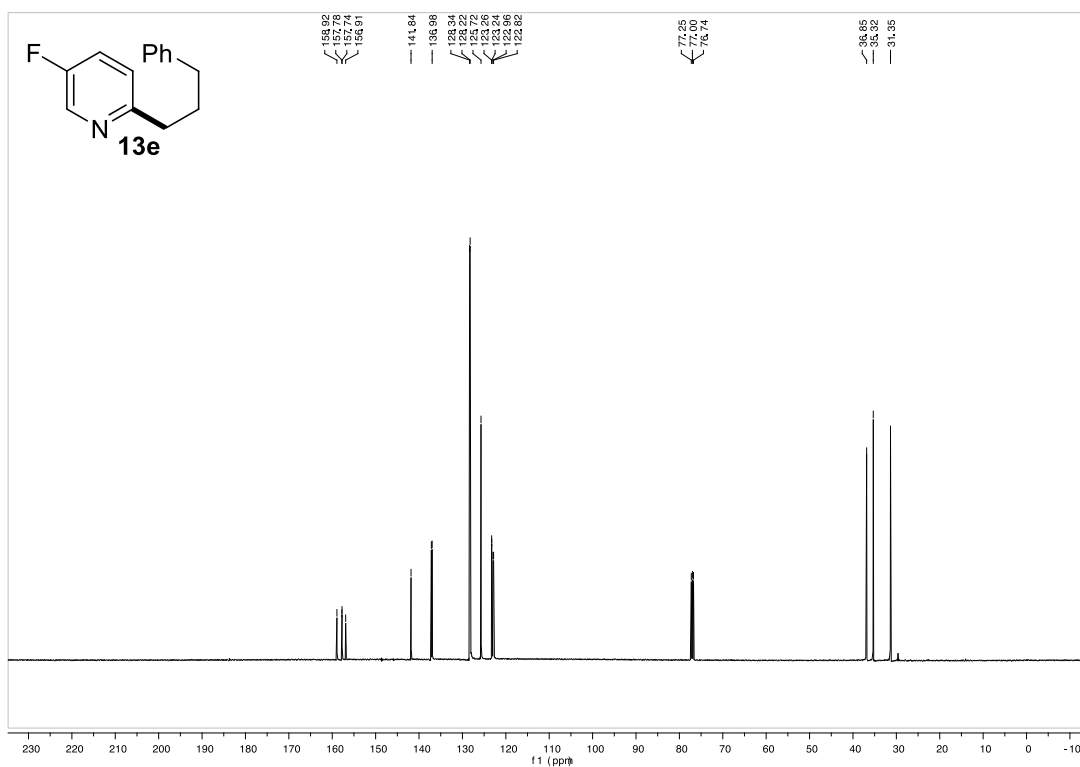
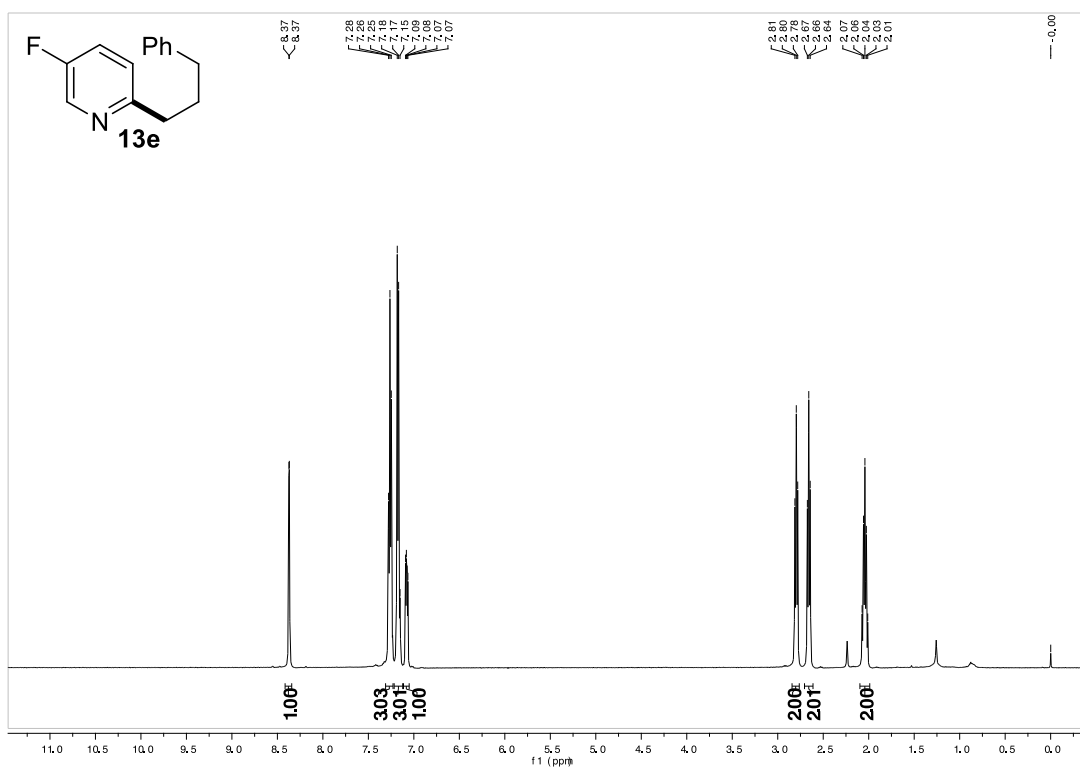
2-(Benzyloxy)-6-(3-phenylpropyl)pyridine (13c)

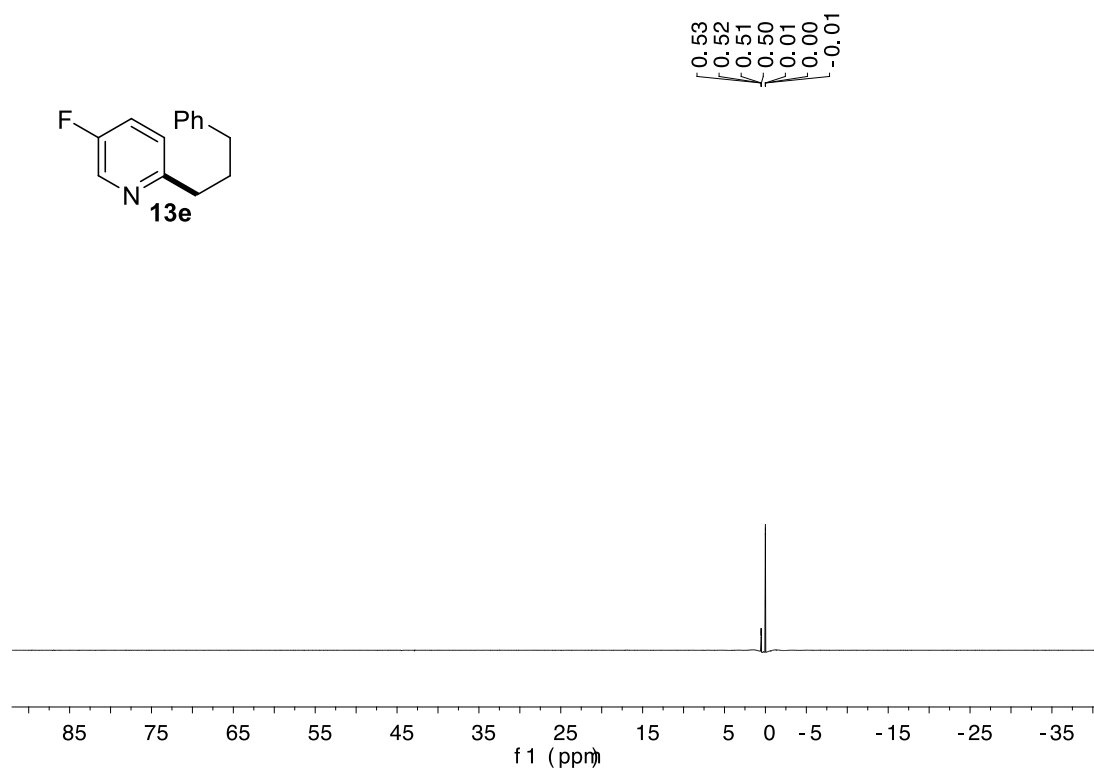


5-Methoxy-2-(3-phenylpropyl)pyridine (13d)

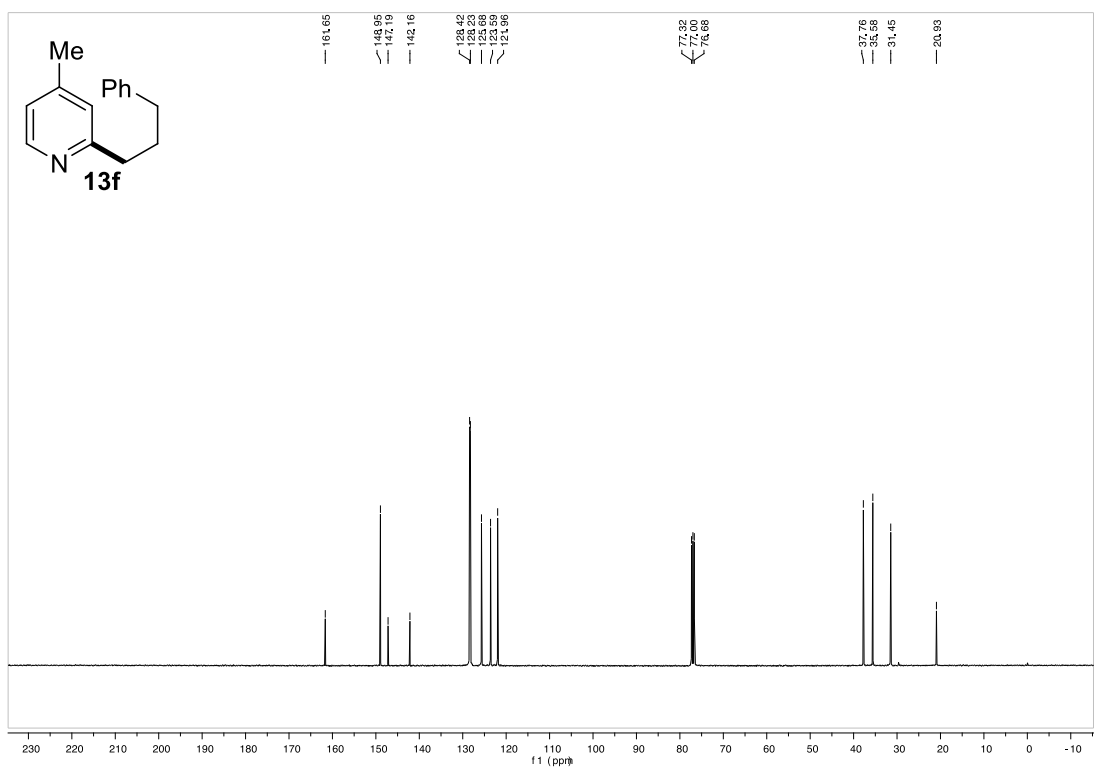
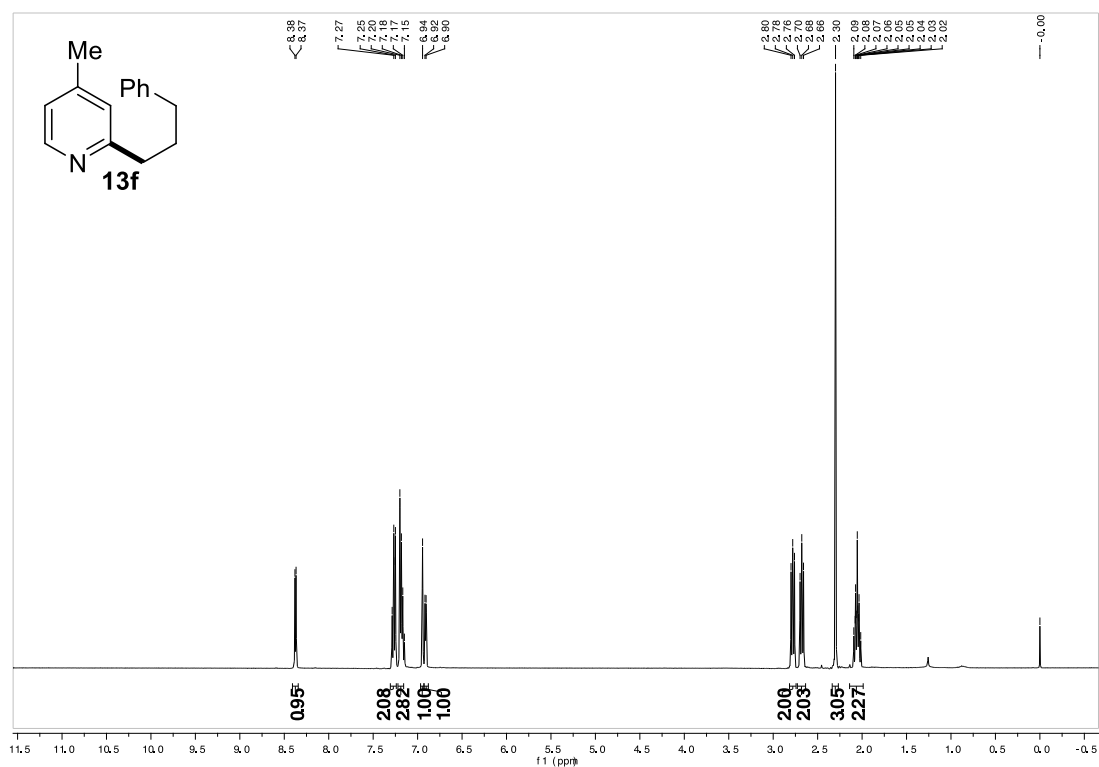


5-Fluoro-2-(3-phenylpropyl)pyridine (13e)

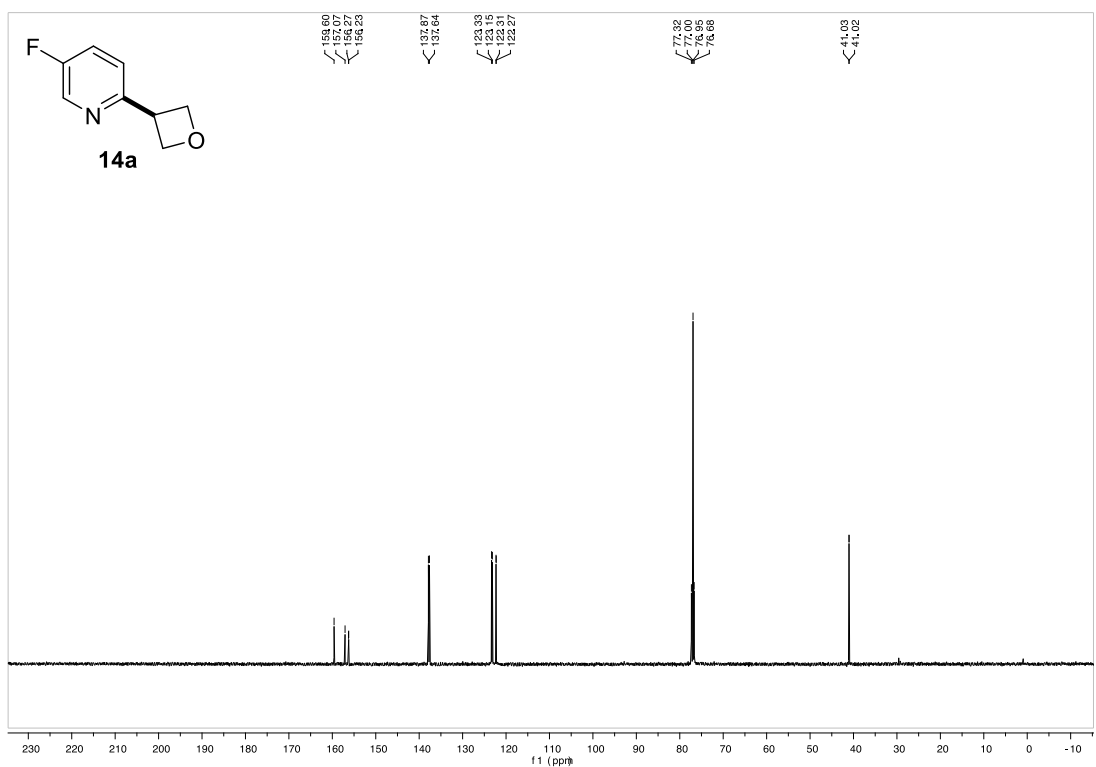
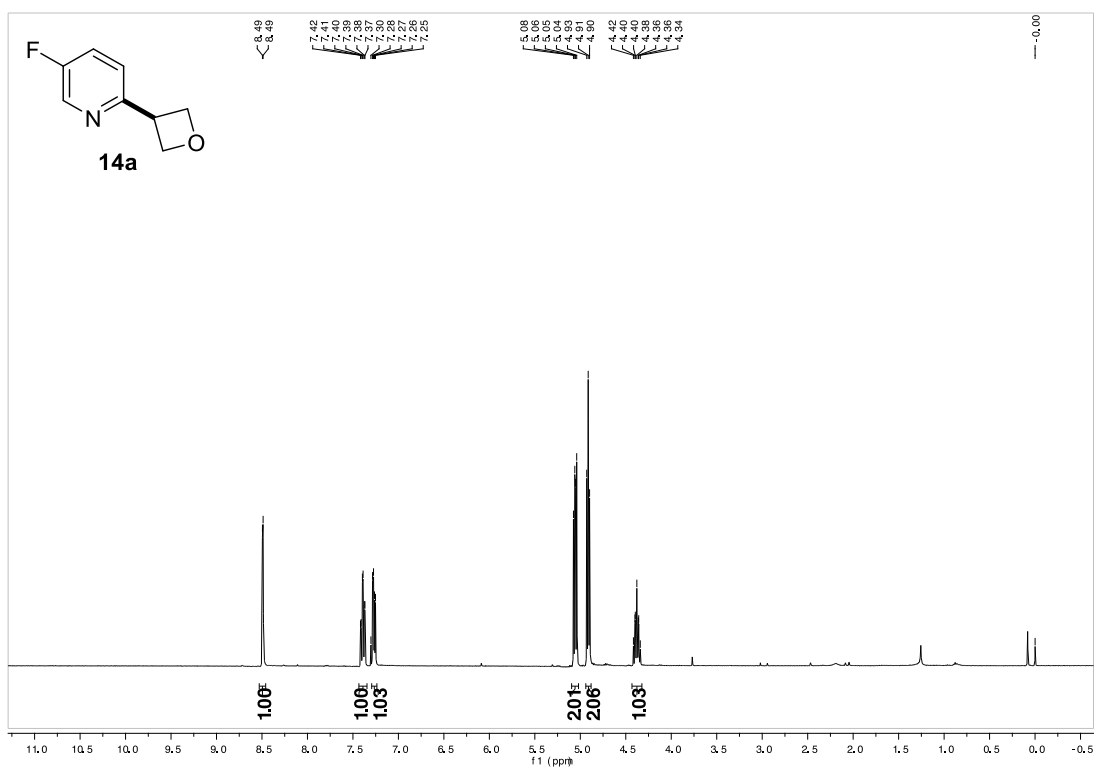


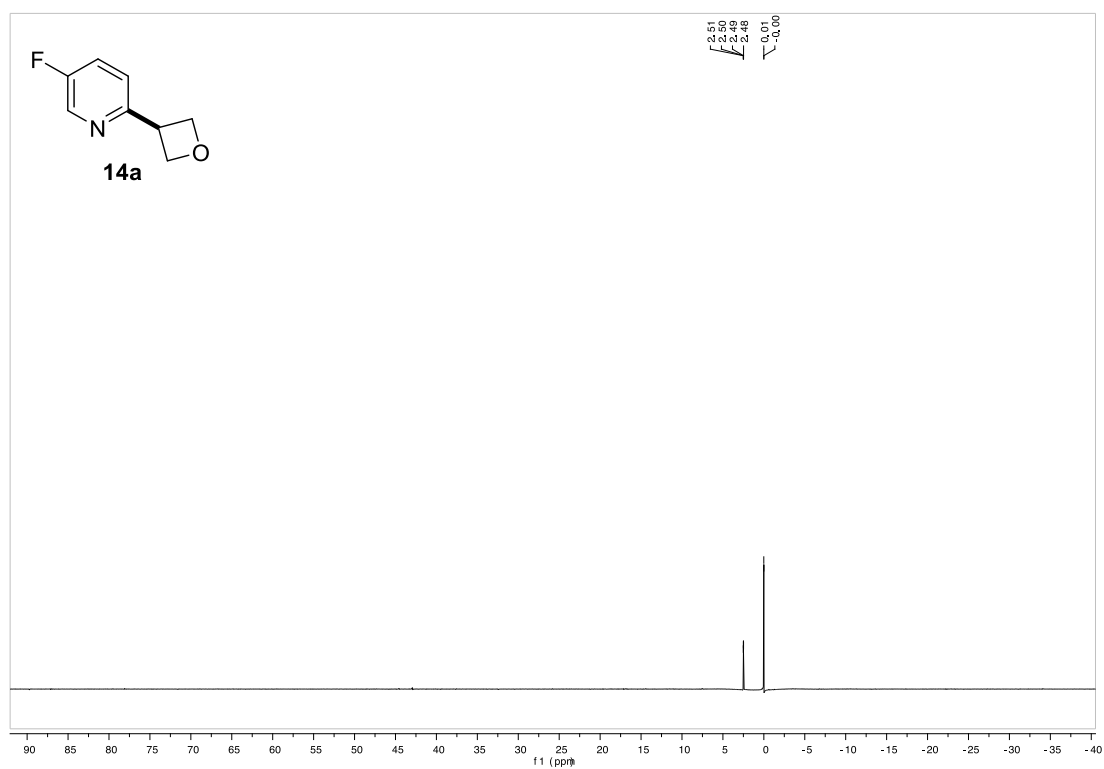


4-Methyl-2-(3-phenylpropyl)pyridine (13f)

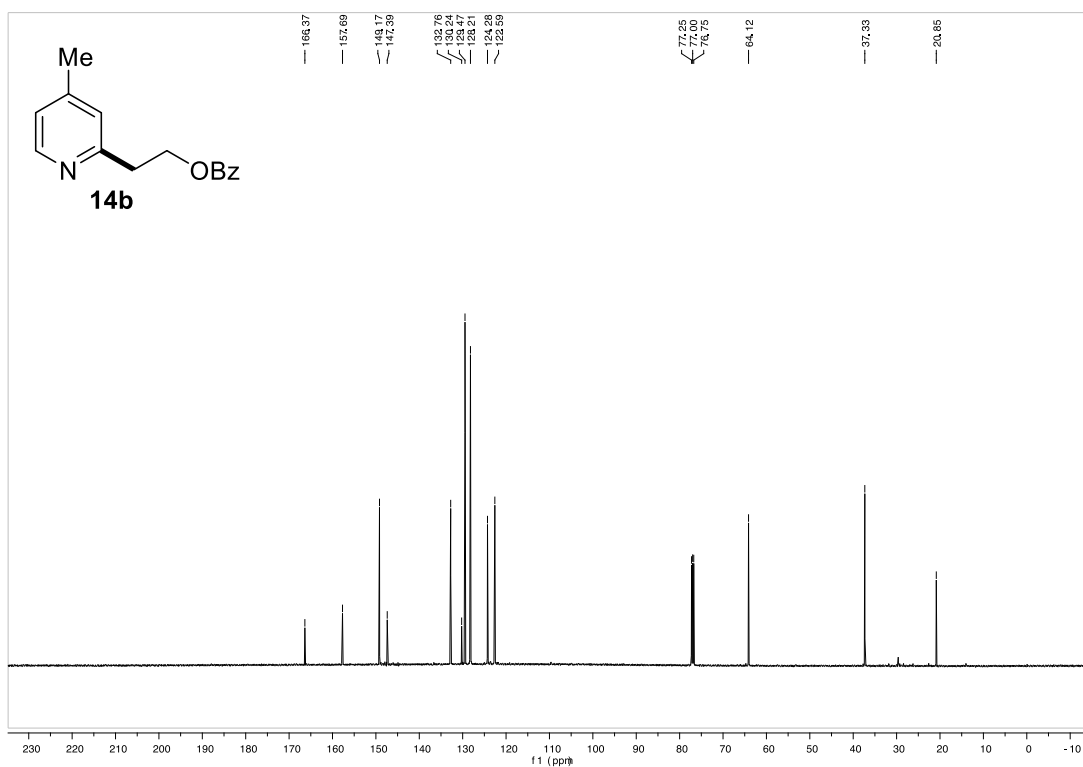
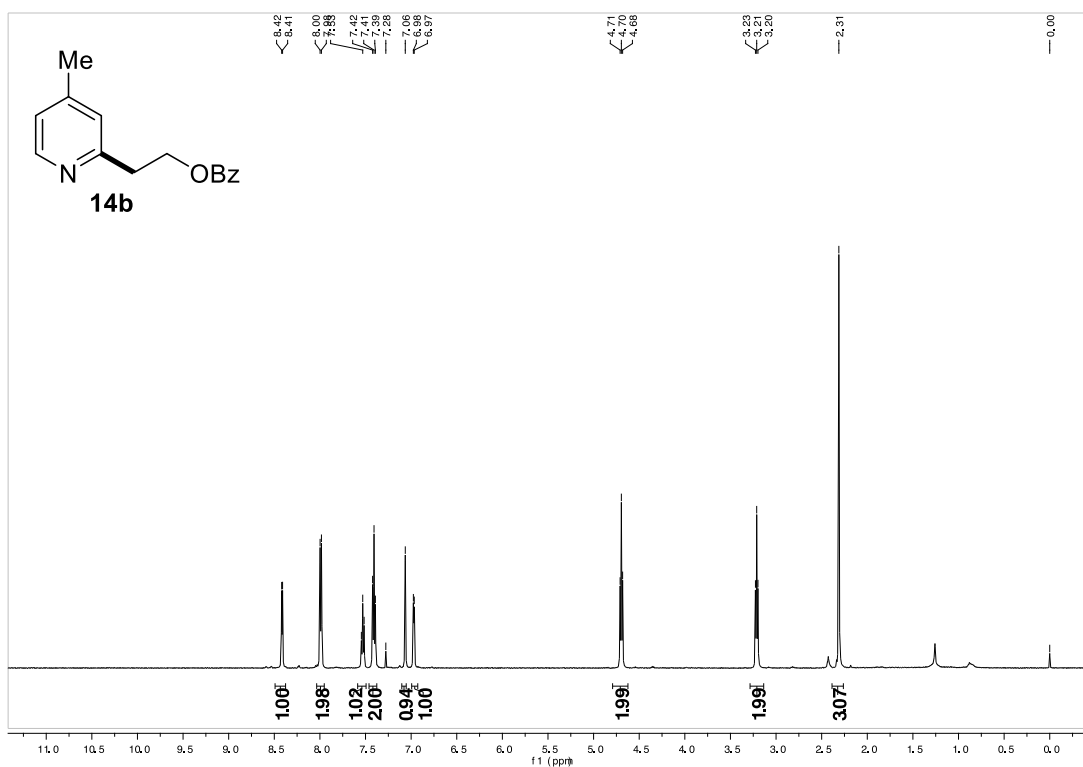


5-Fluoro-2-(oxetan-3-yl)pyridine (14a)

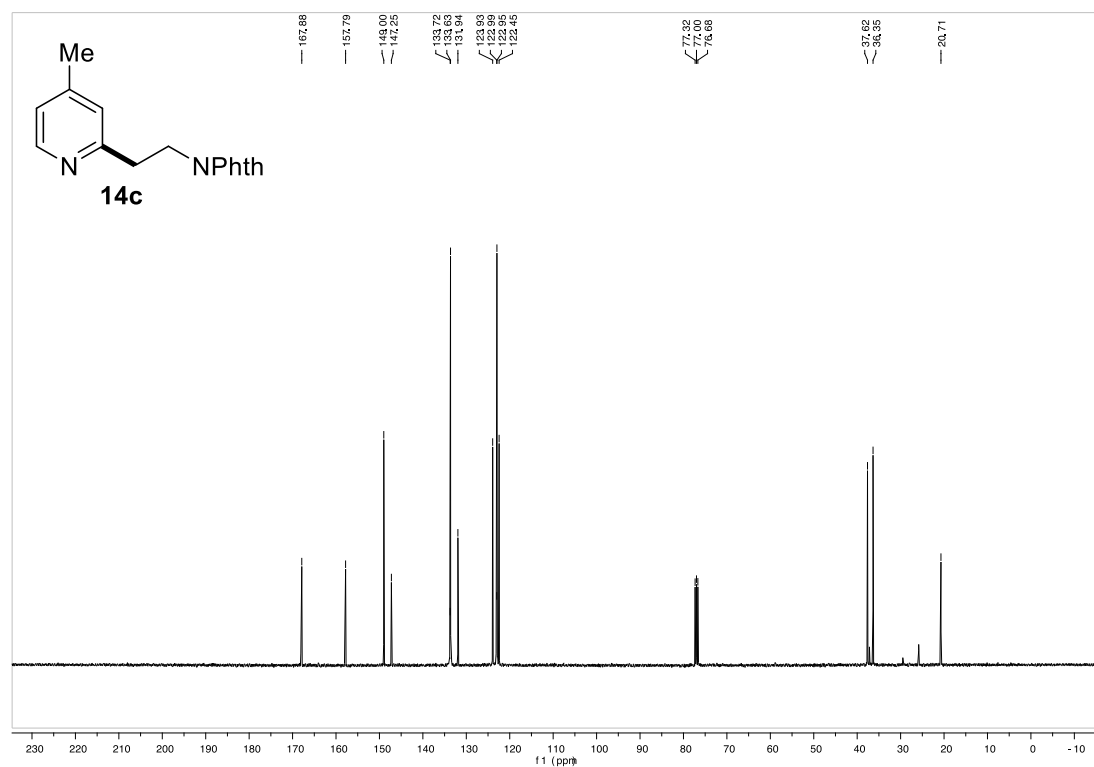
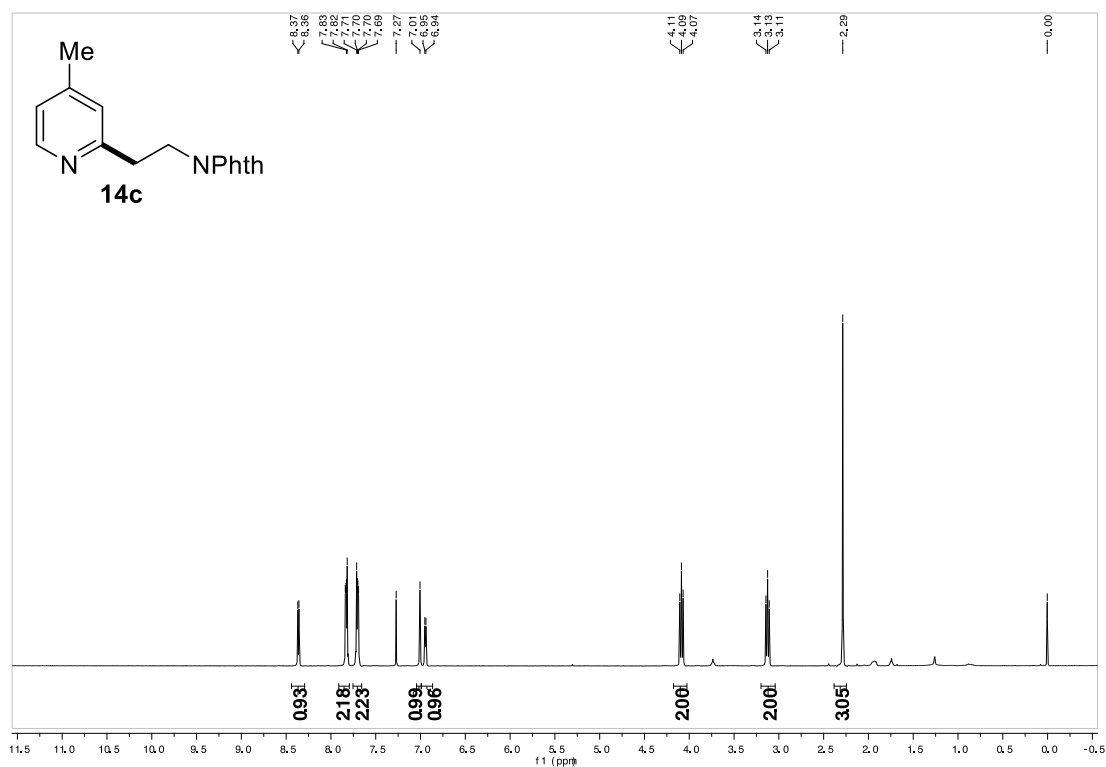




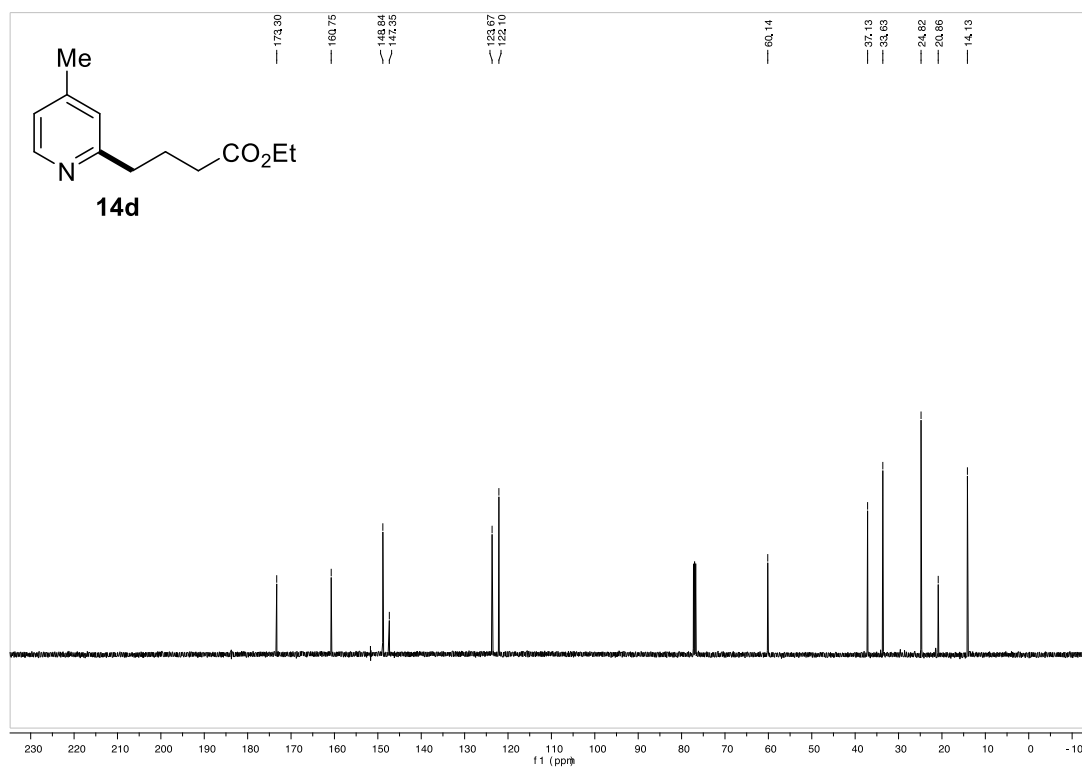
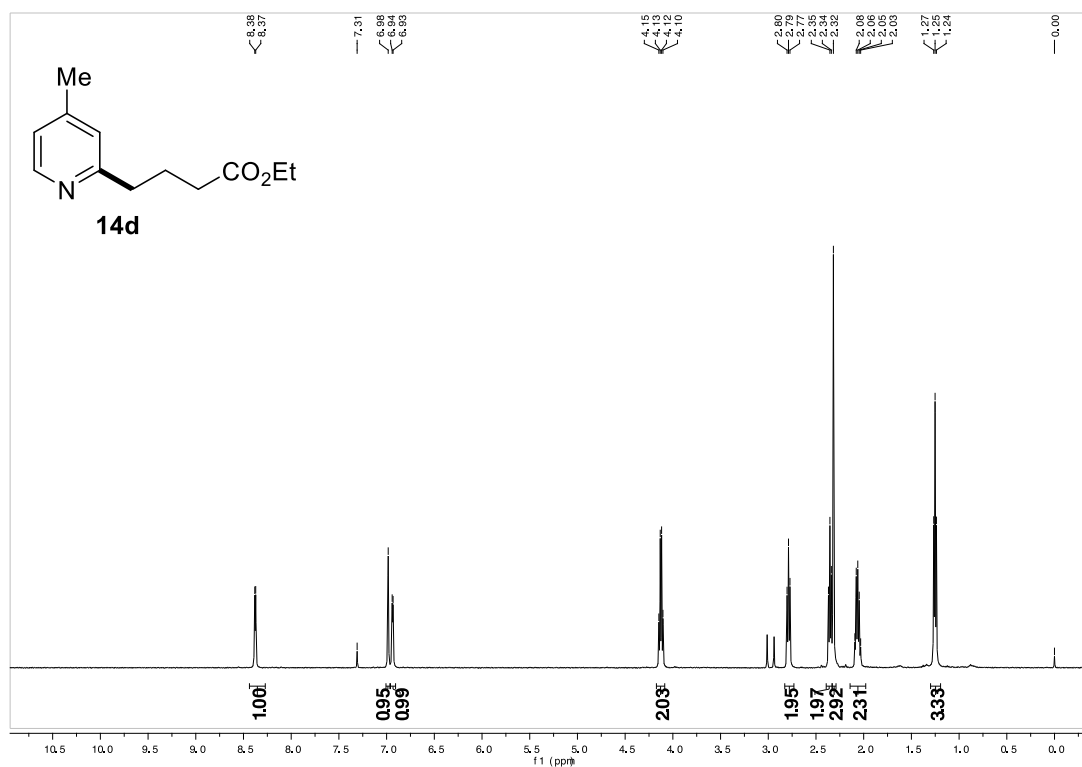
2-(4-Methylpyridin-2-yl)ethyl benzoate (14b)



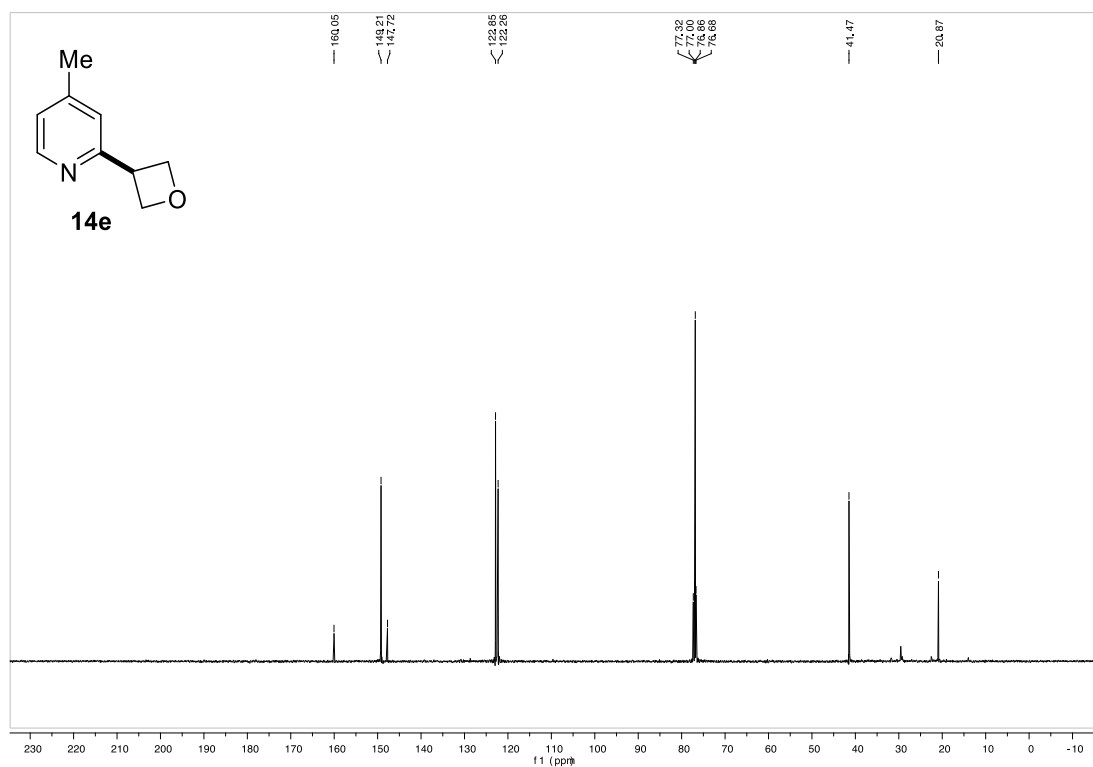
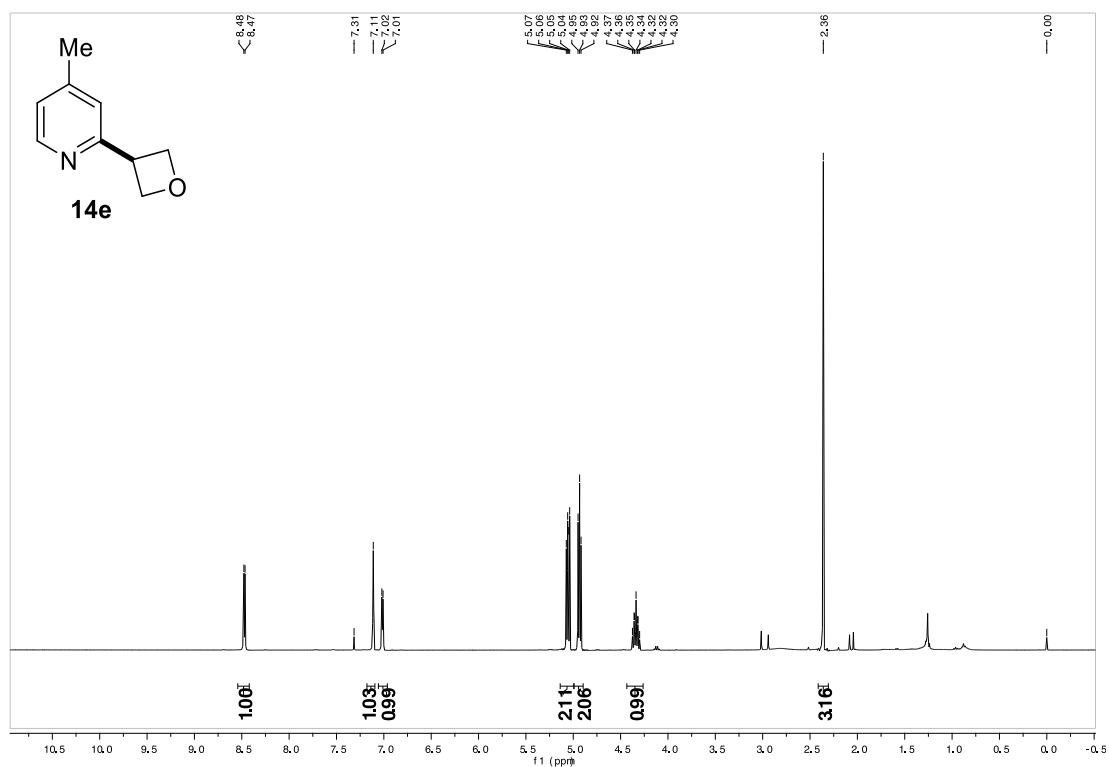
2-(2-(4-Methylpyridin-2-yl)ethyl)isoindoline-1,3-dione (14c)



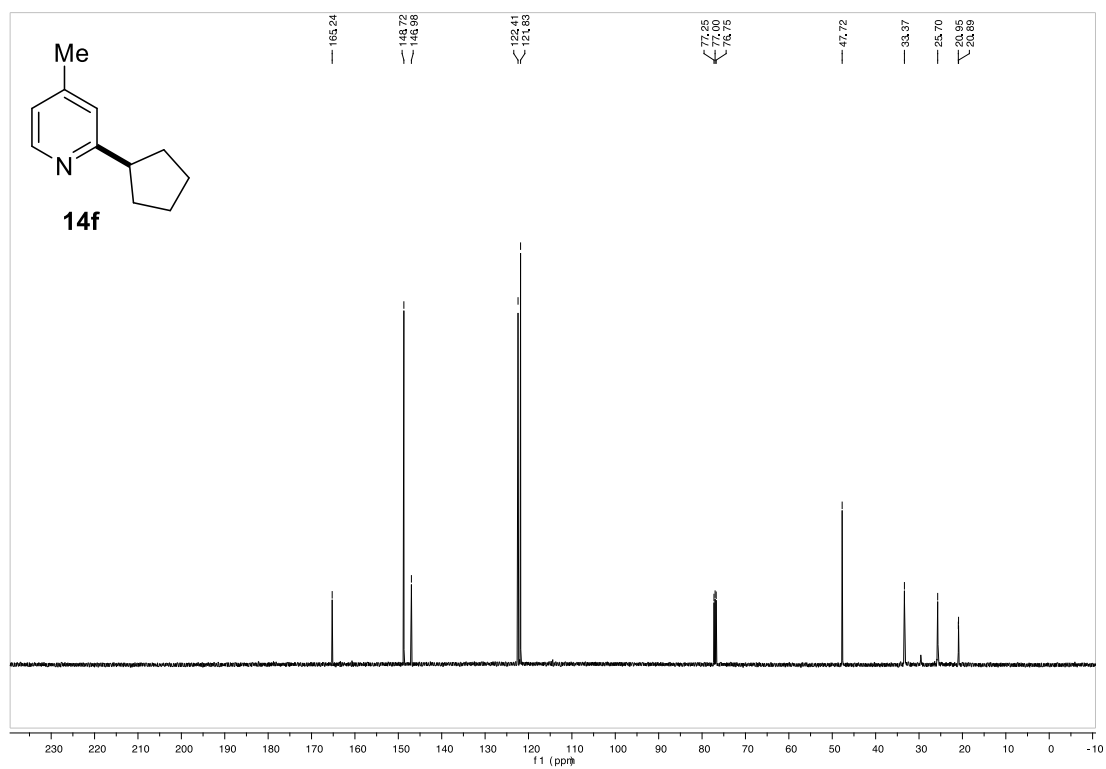
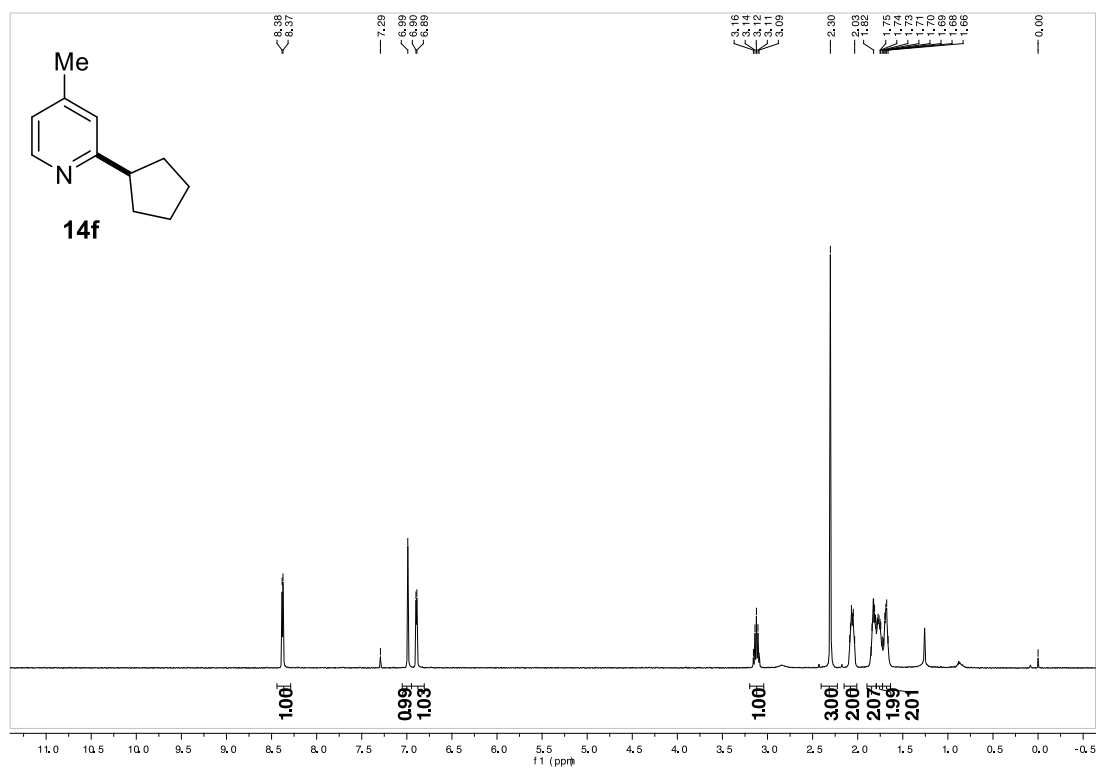
Ethyl 4-(4-methylpyridin-2-yl)butanoate (14d)



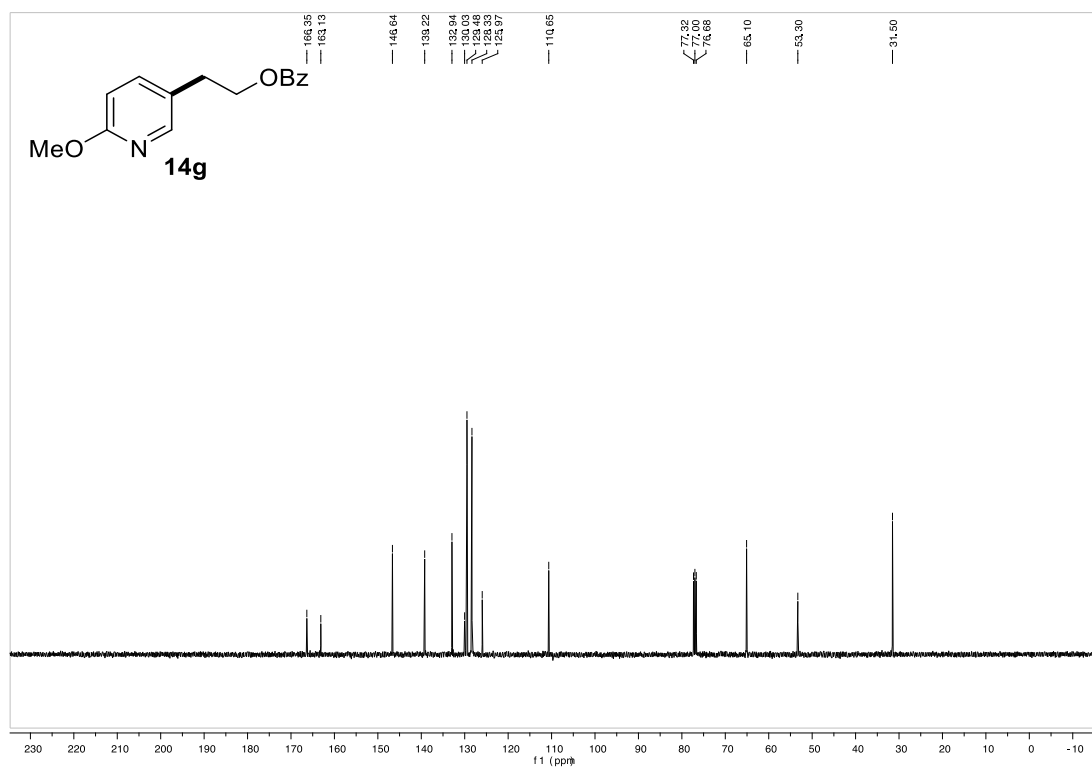
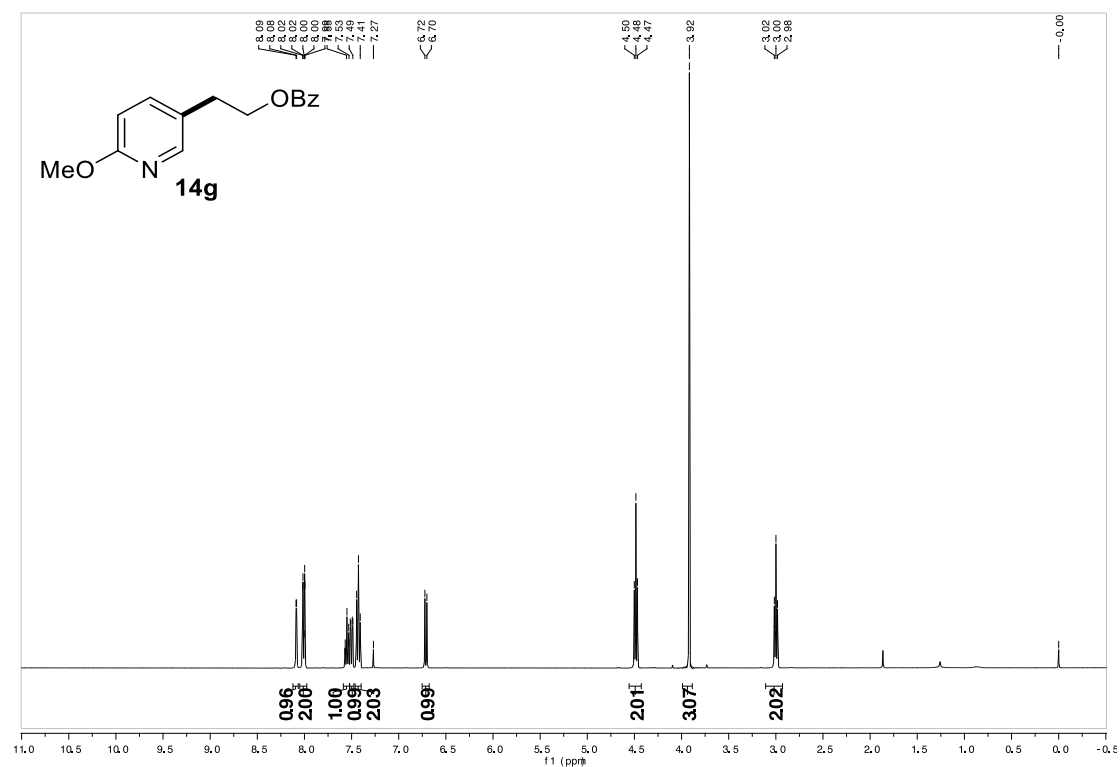
4-Methyl-2-(oxetan-3-yl)pyridine (14e)



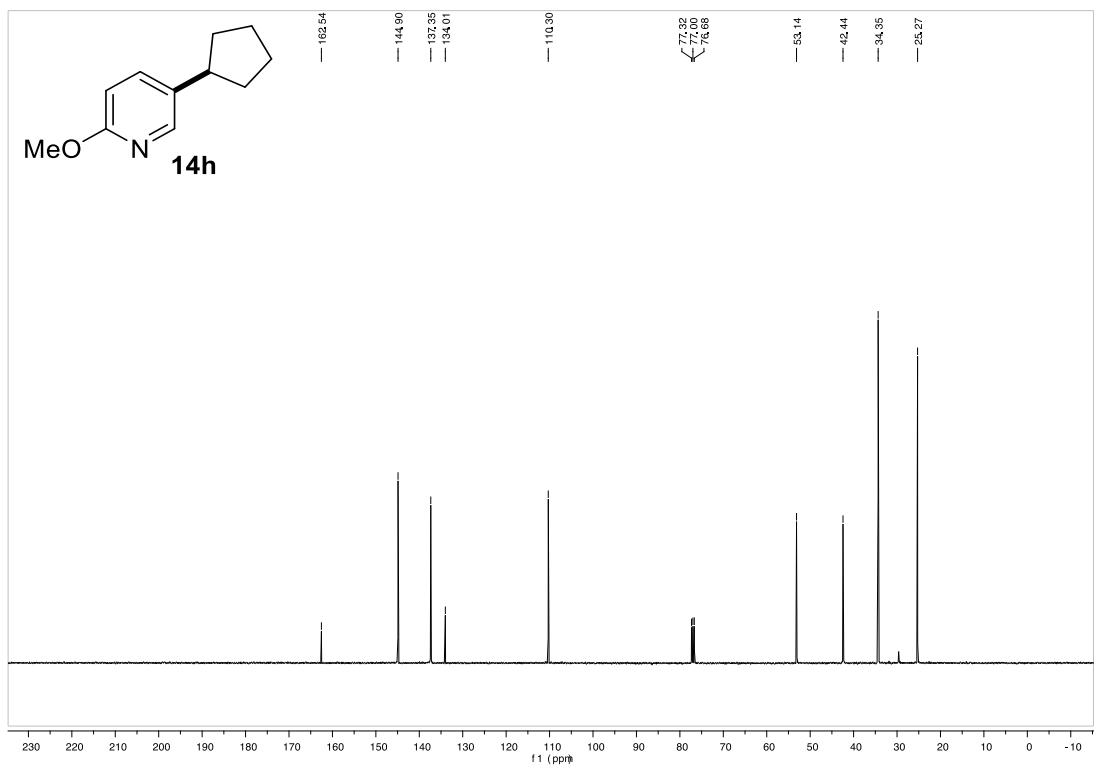
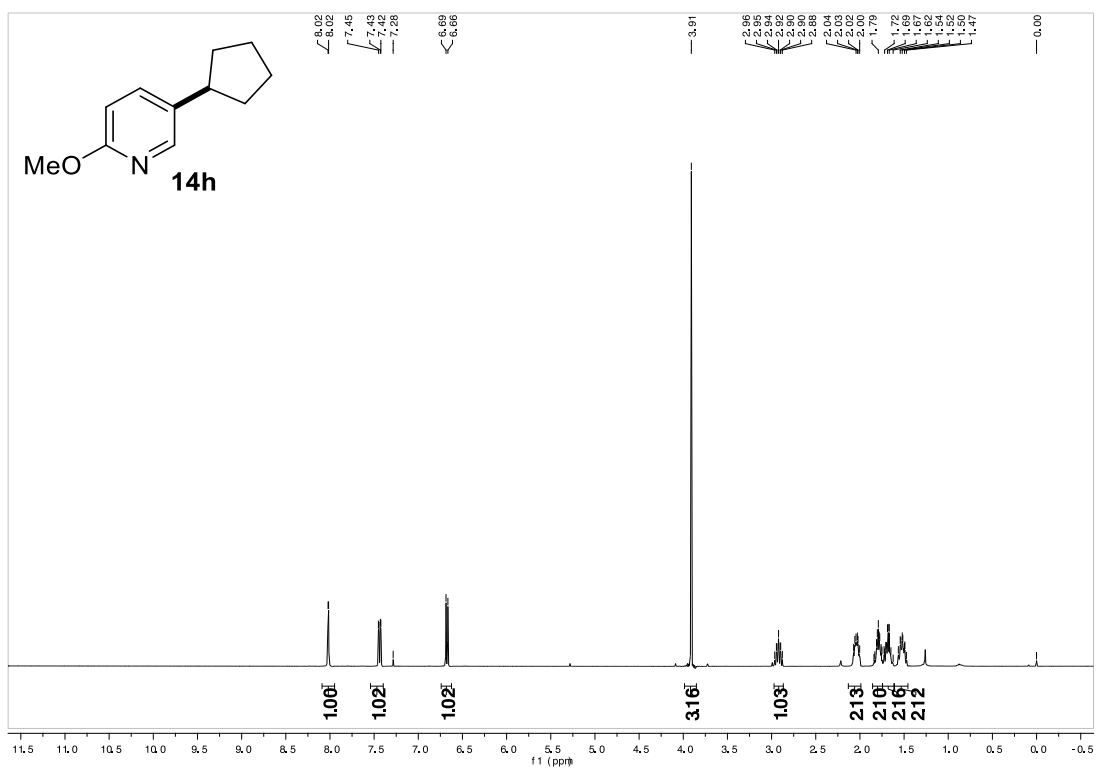
2-Cyclopentyl-4-methylpyridine (14f)



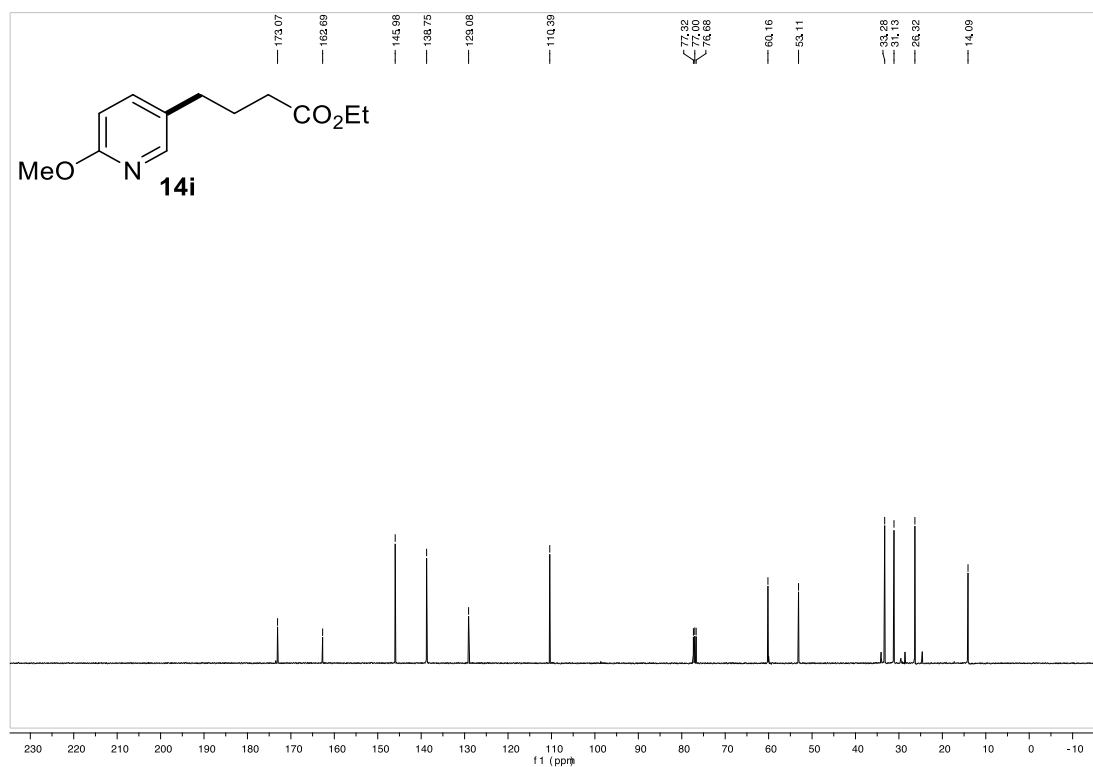
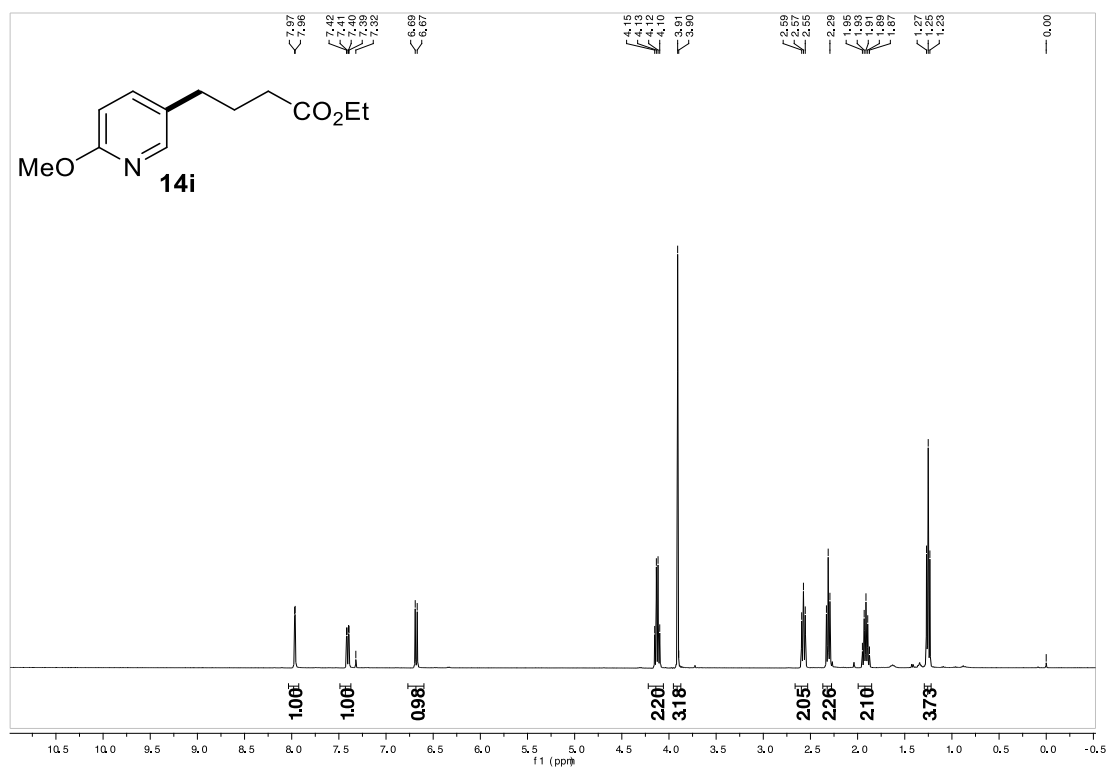
2-(6-Methoxypyridin-3-yl)ethyl benzoate (14g)



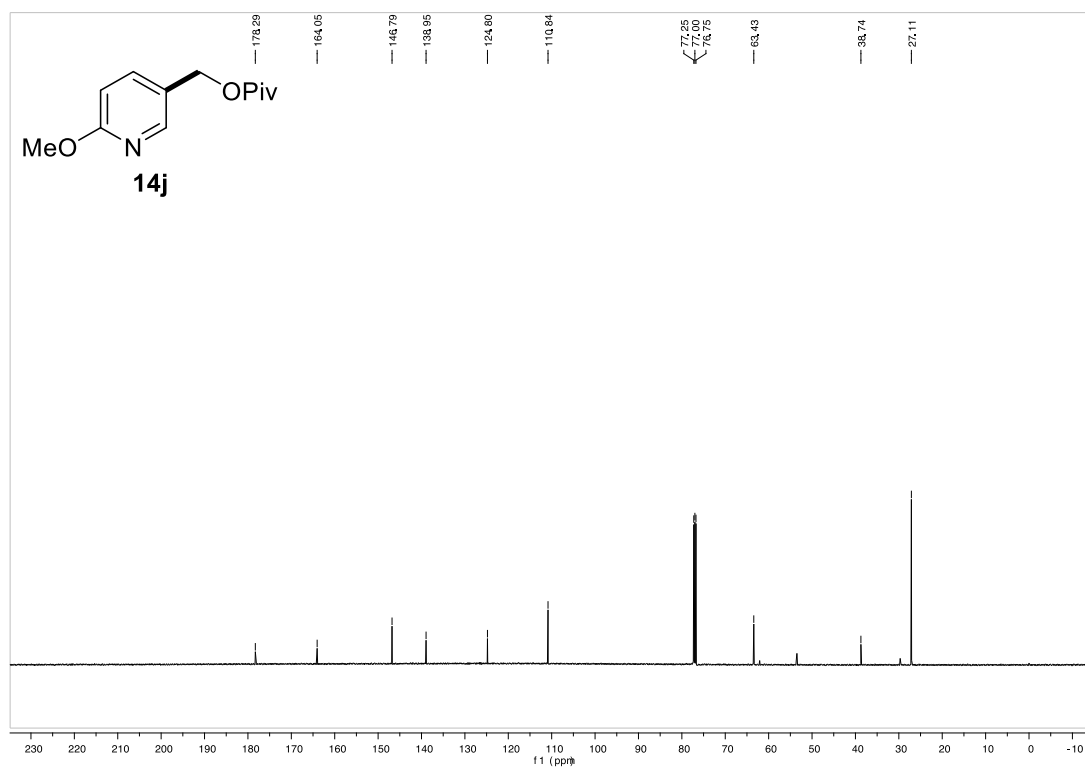
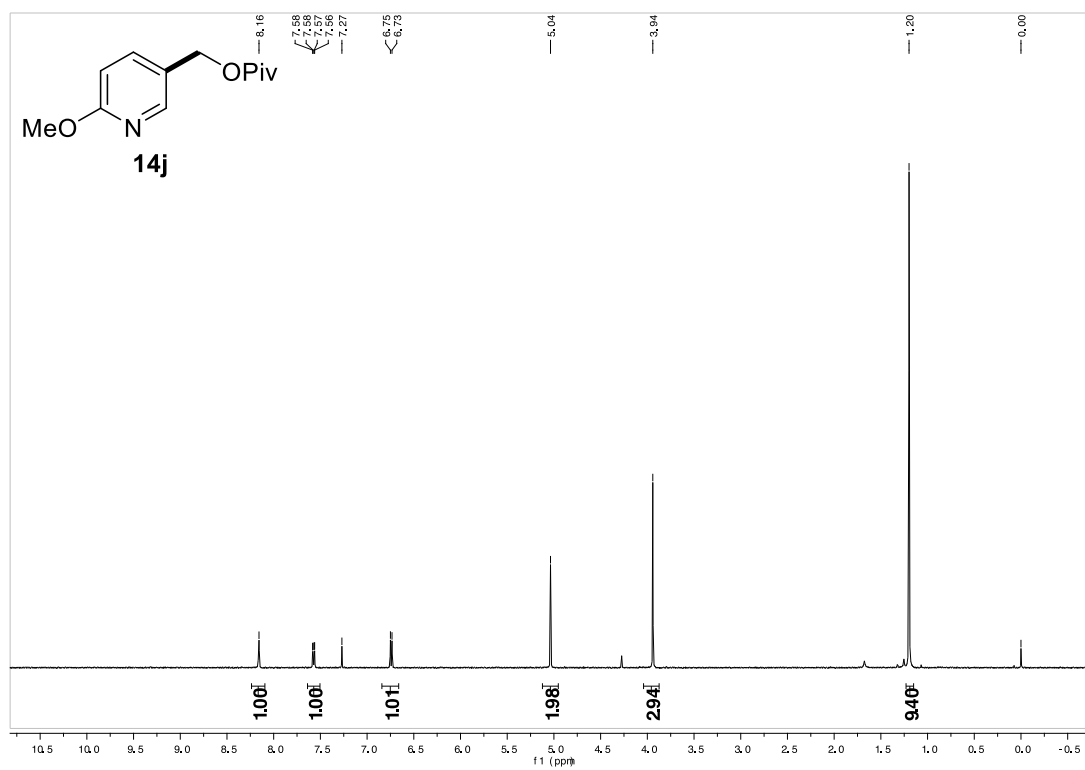
5-Cyclopentyl-2-methoxypyridine (14h)



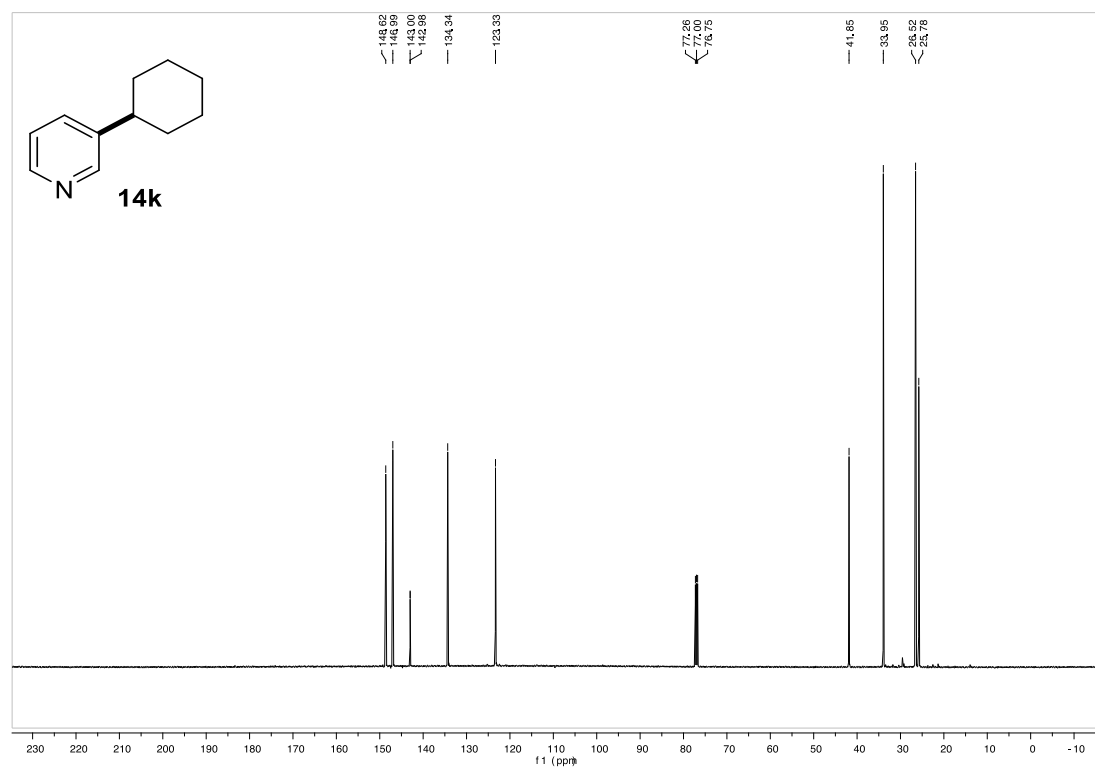
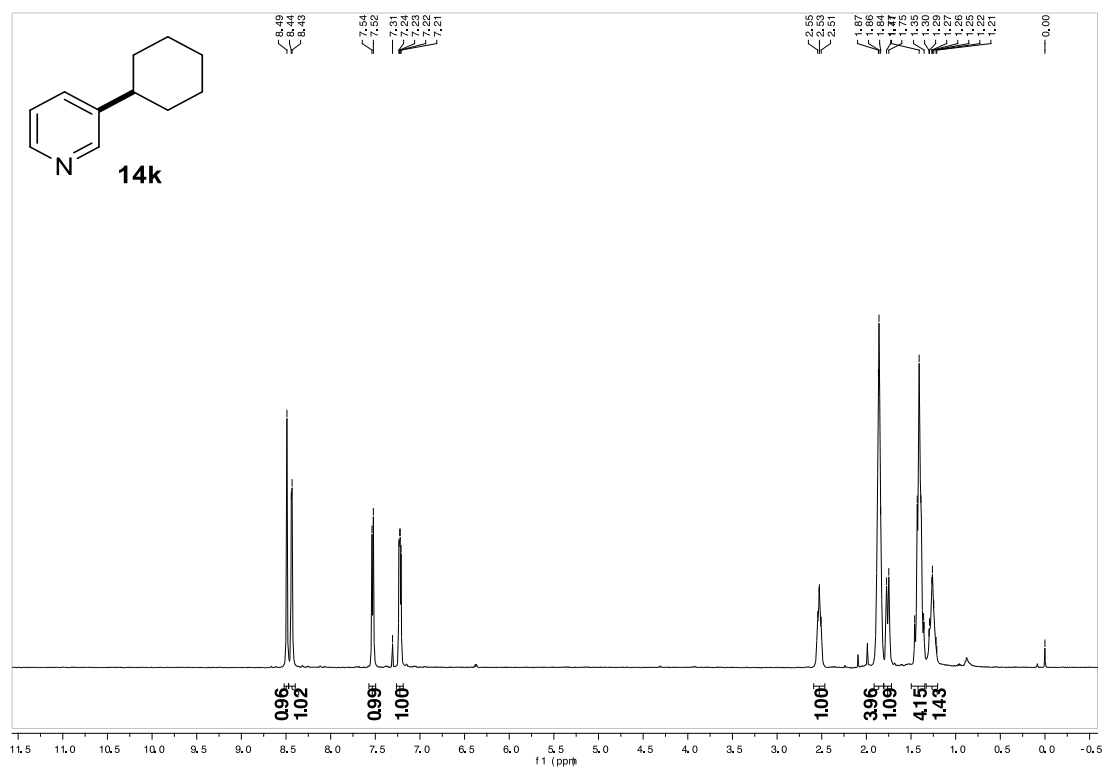
Ethyl 4-(6-methoxypyridin-3-yl)butanoate (14i)



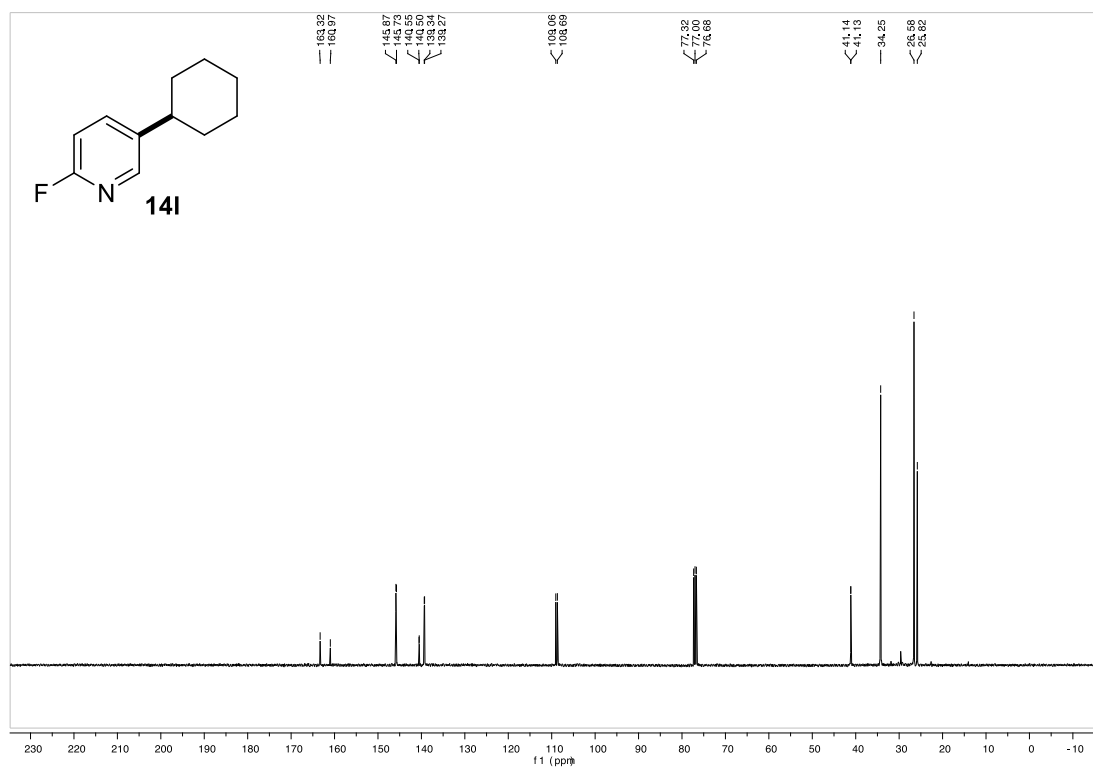
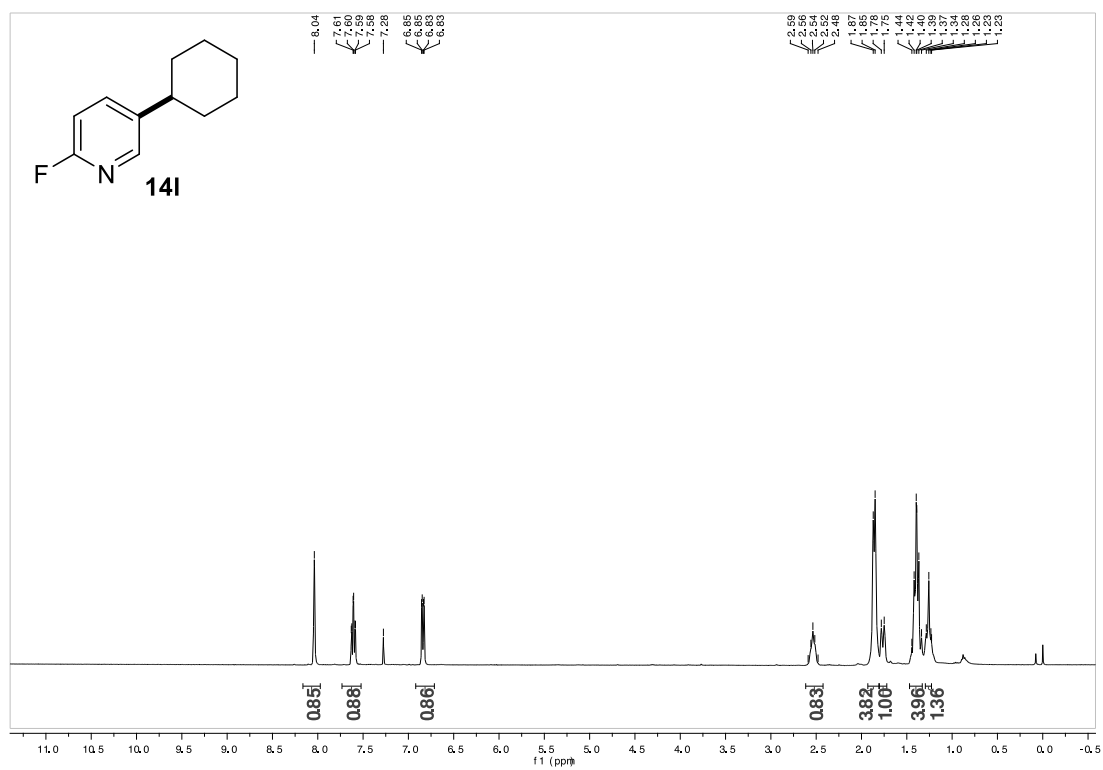
(6-Methoxypyridin-3-yl)methyl pivalate (14j)

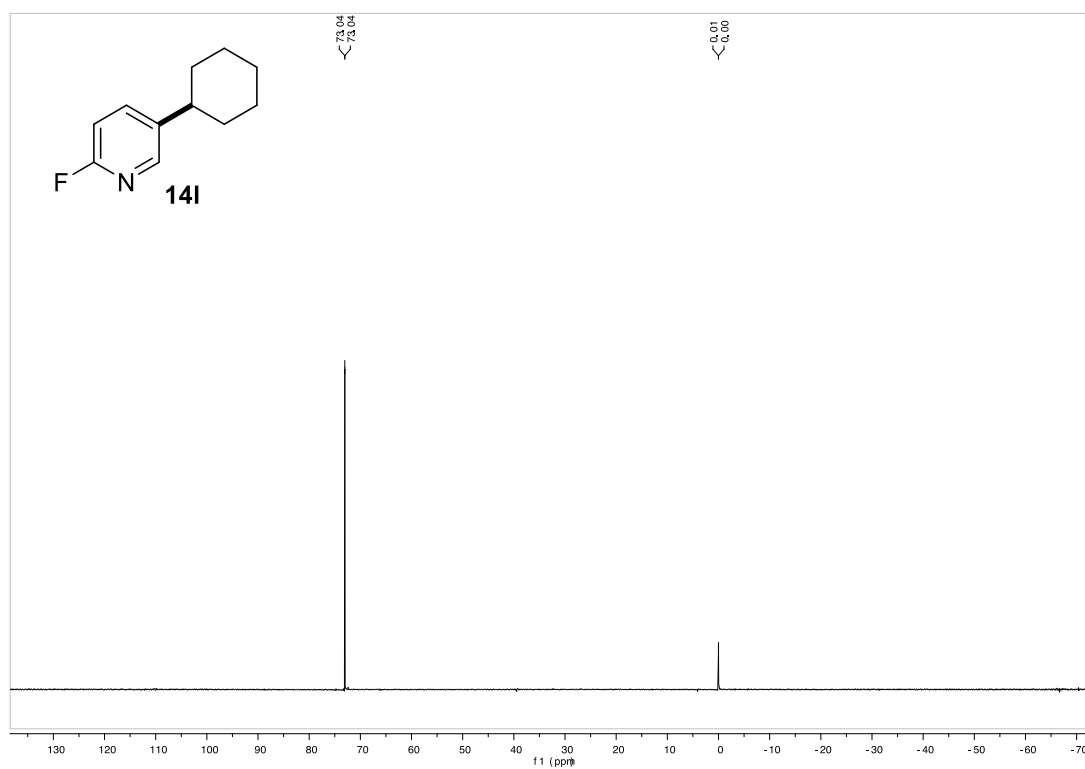


3-Cyclohexylpyridine (14k)

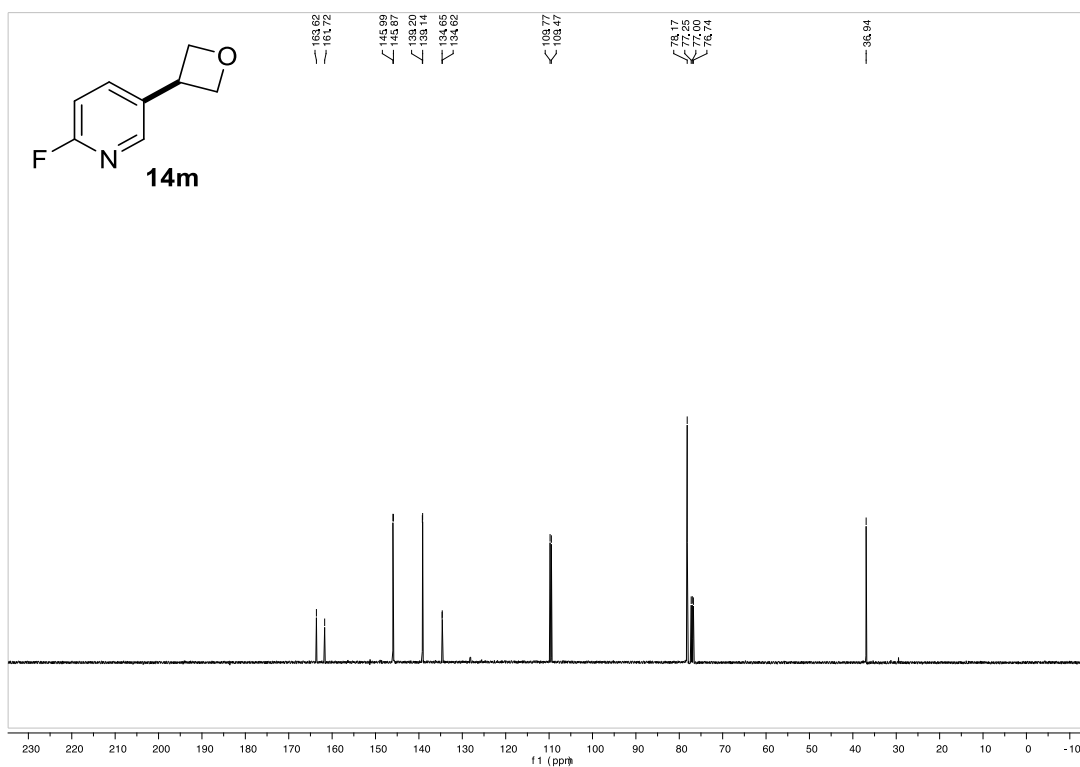
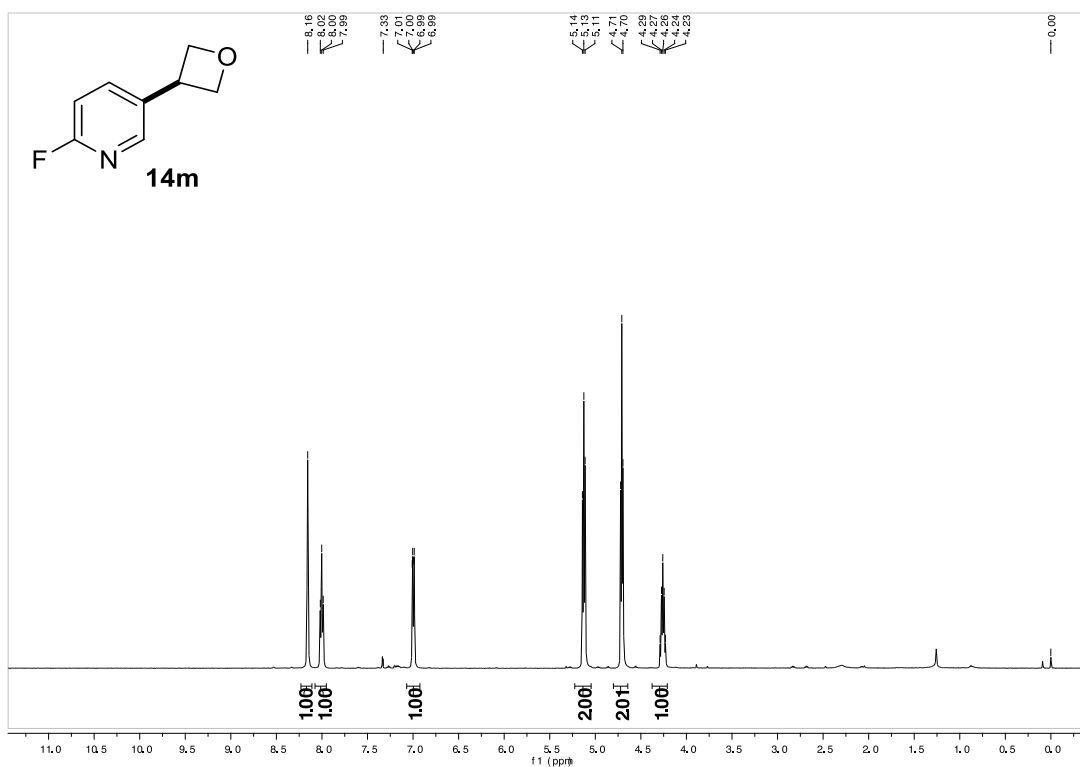


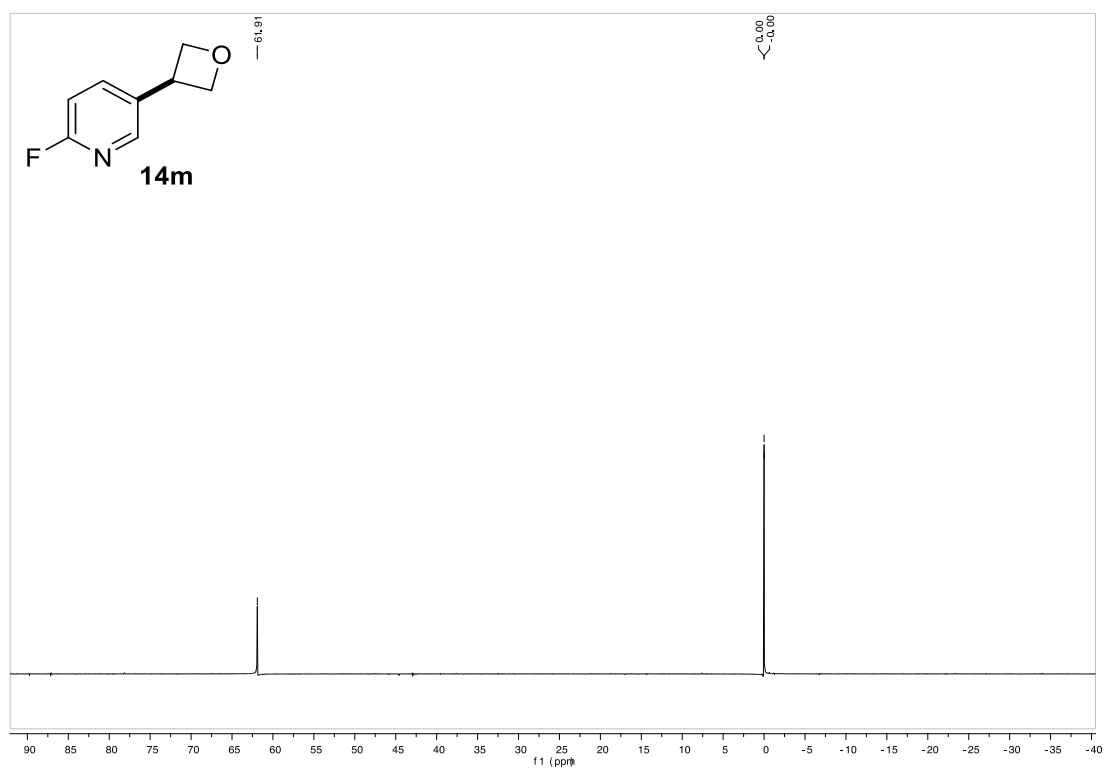
5-Cyclohexyl-2-fluoropyridine (14l)



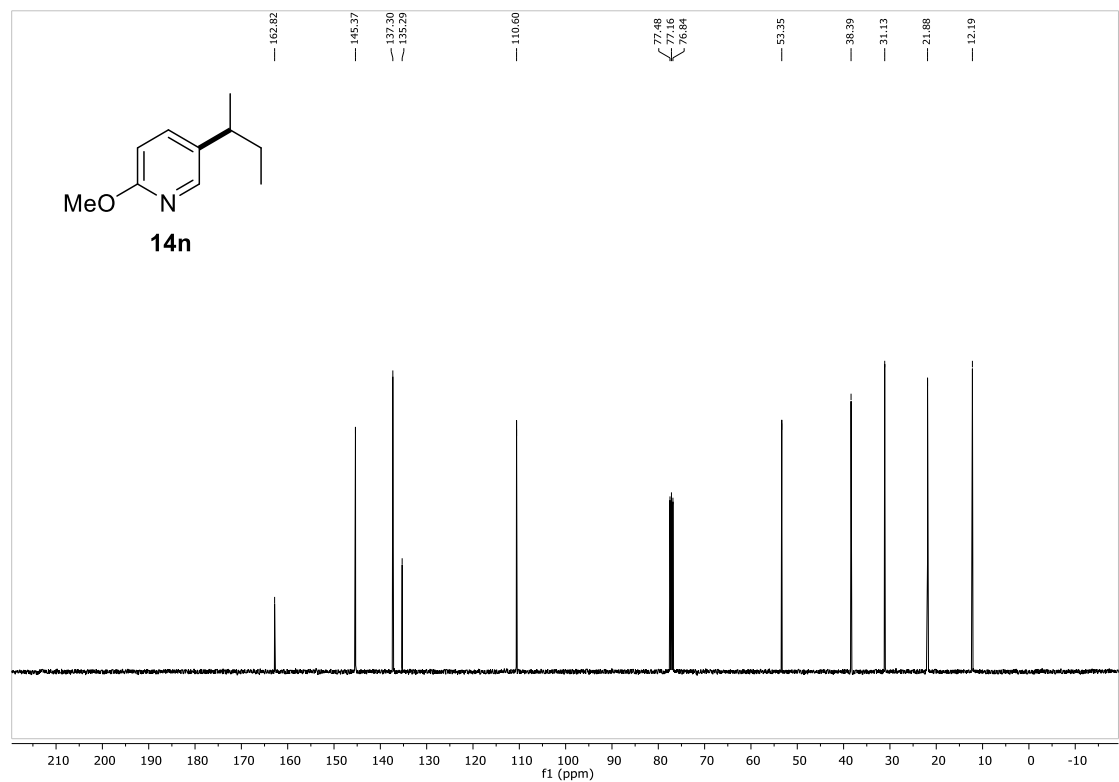
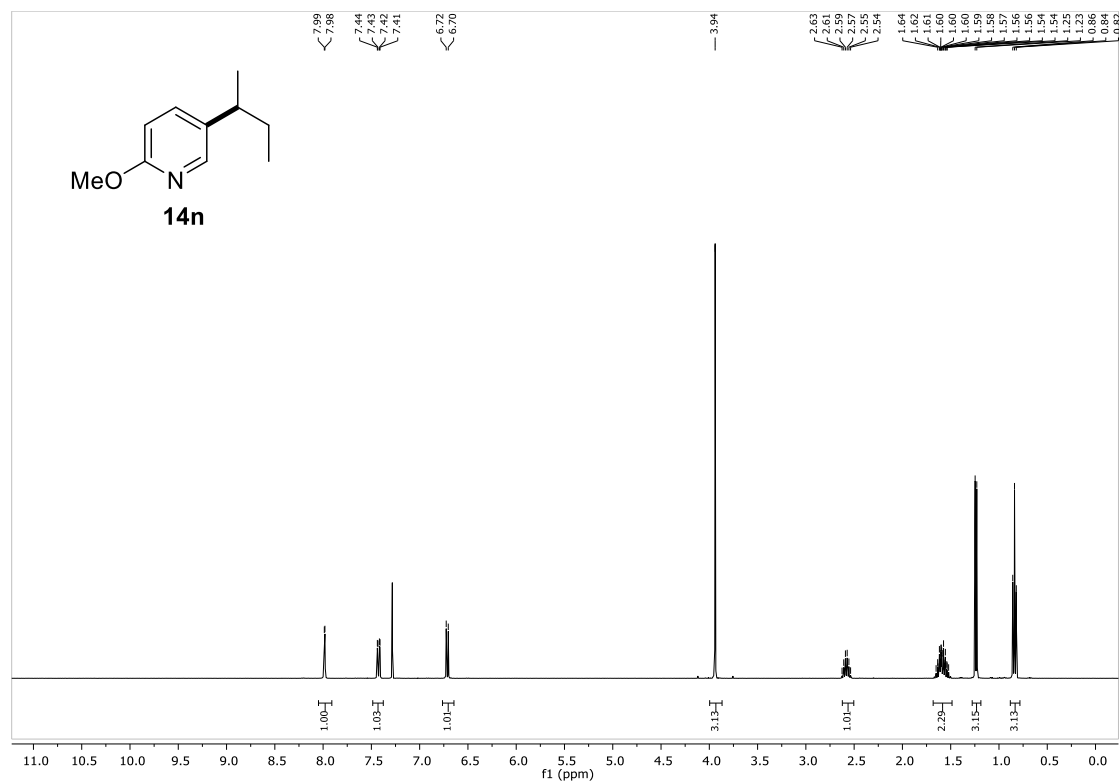


2-Fluoro-5-(oxetan-3-yl)pyridine (14m)

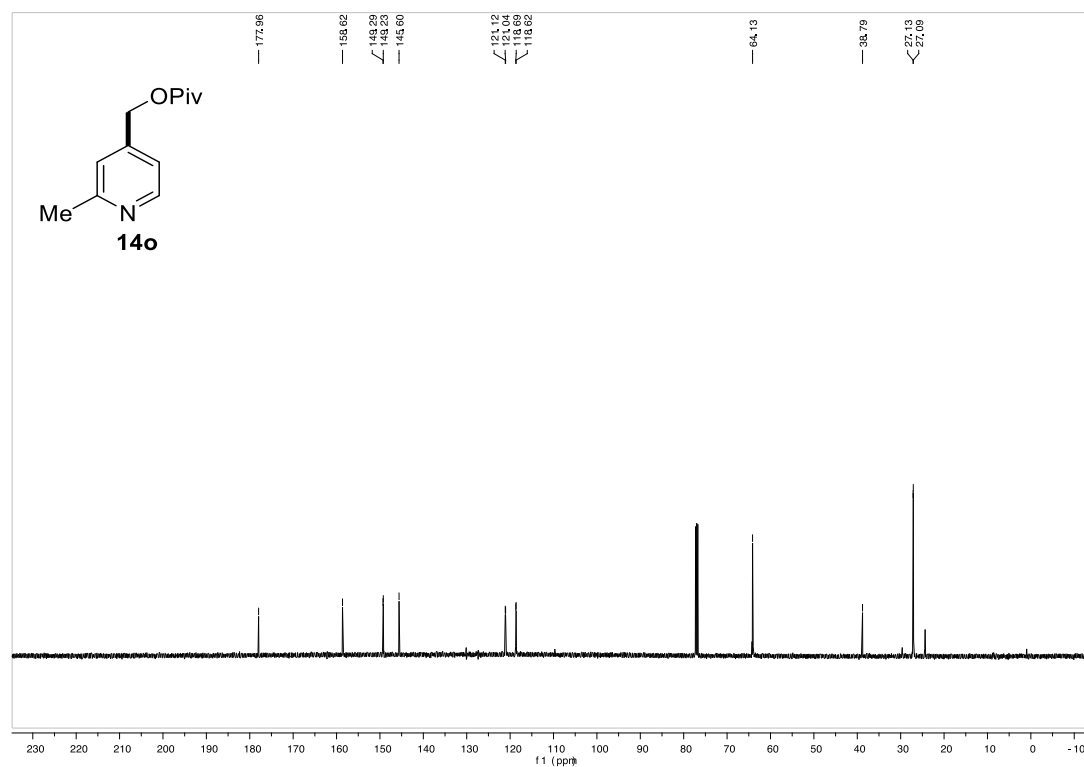
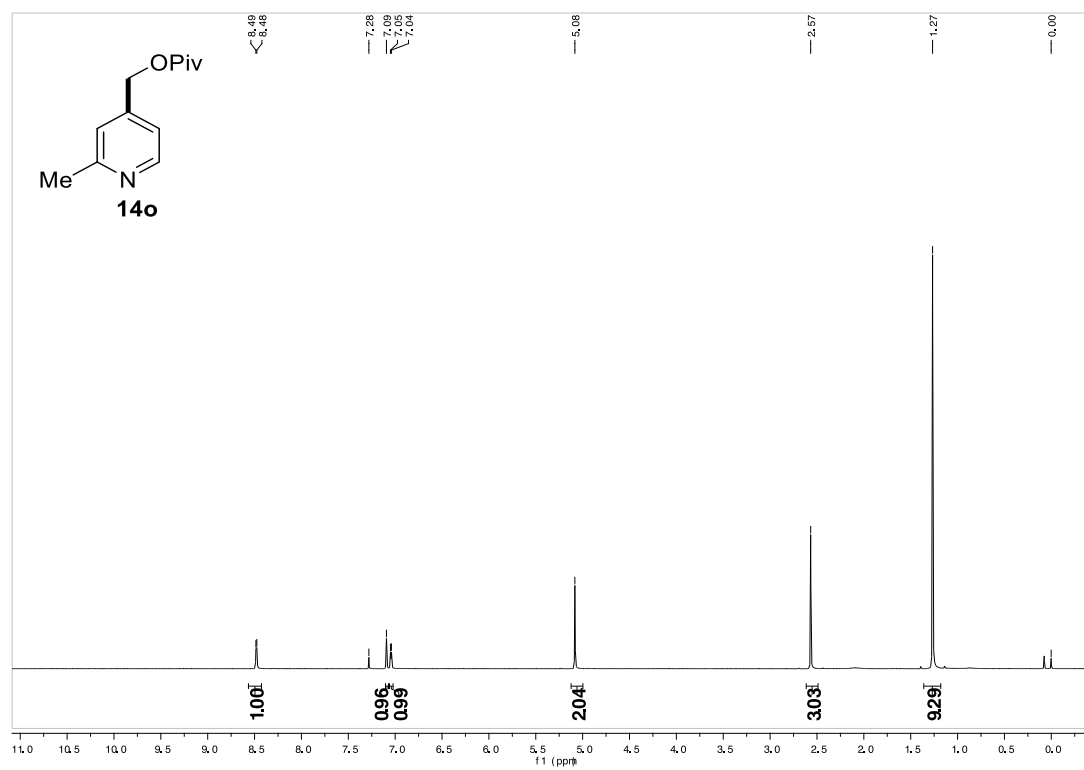




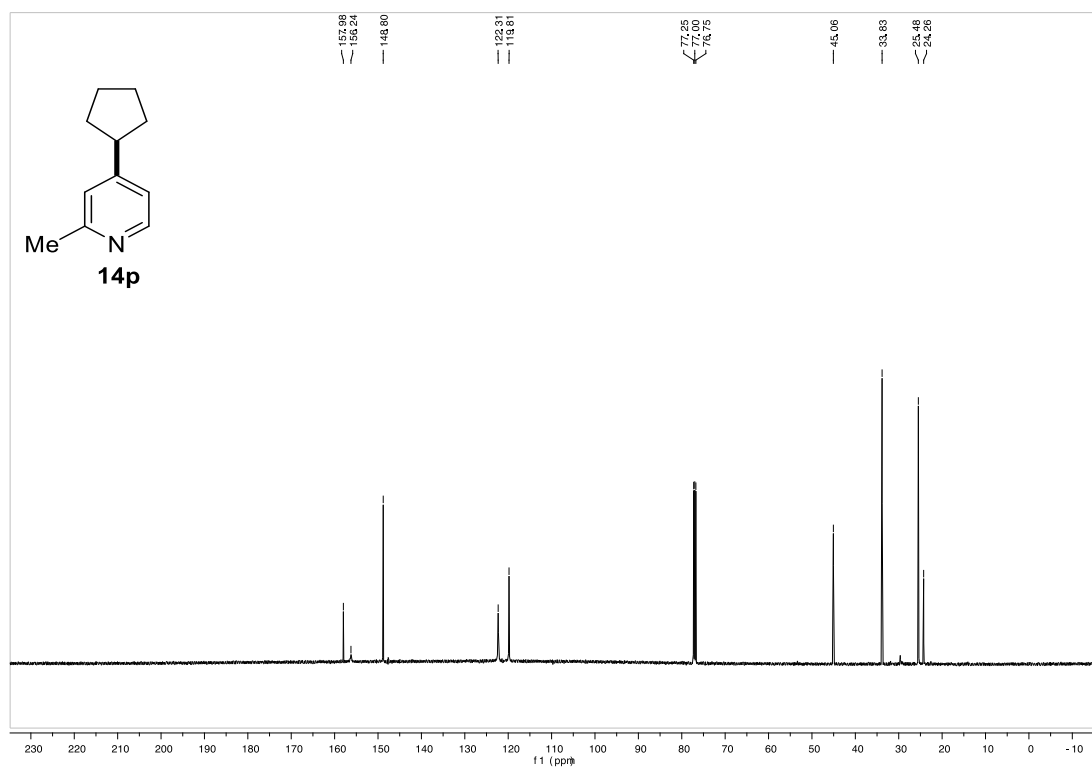
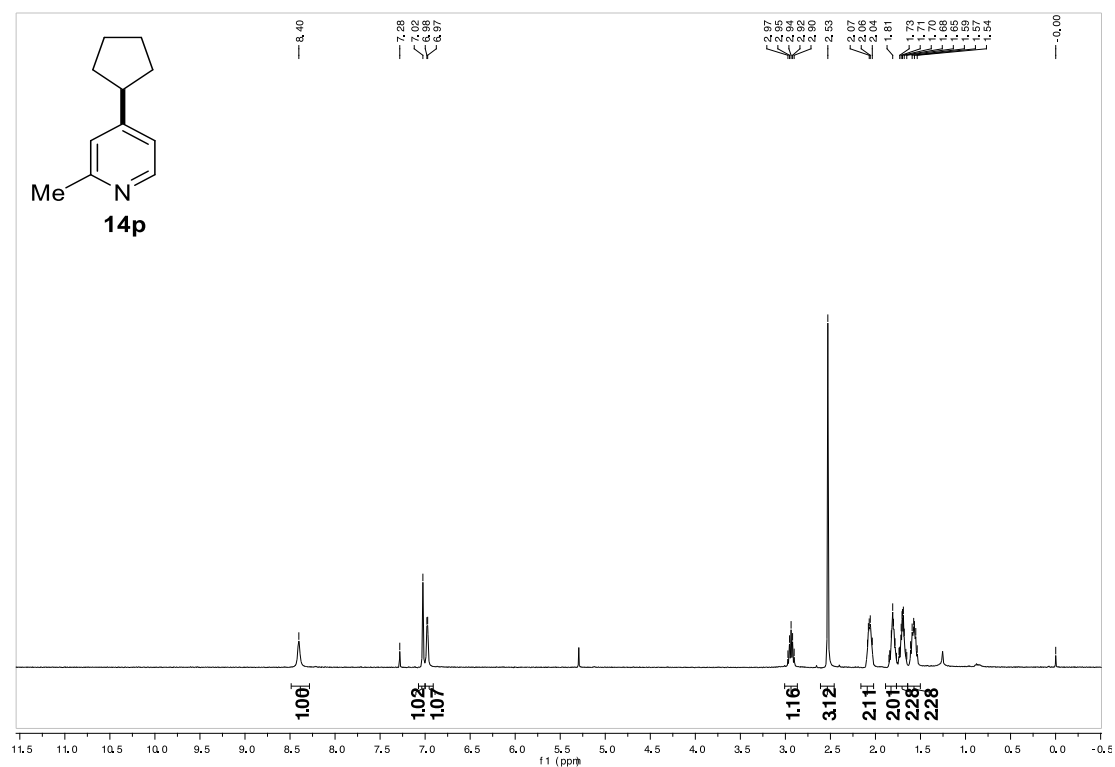
5-(sec-butyl)-2-methoxypyridine (14n)



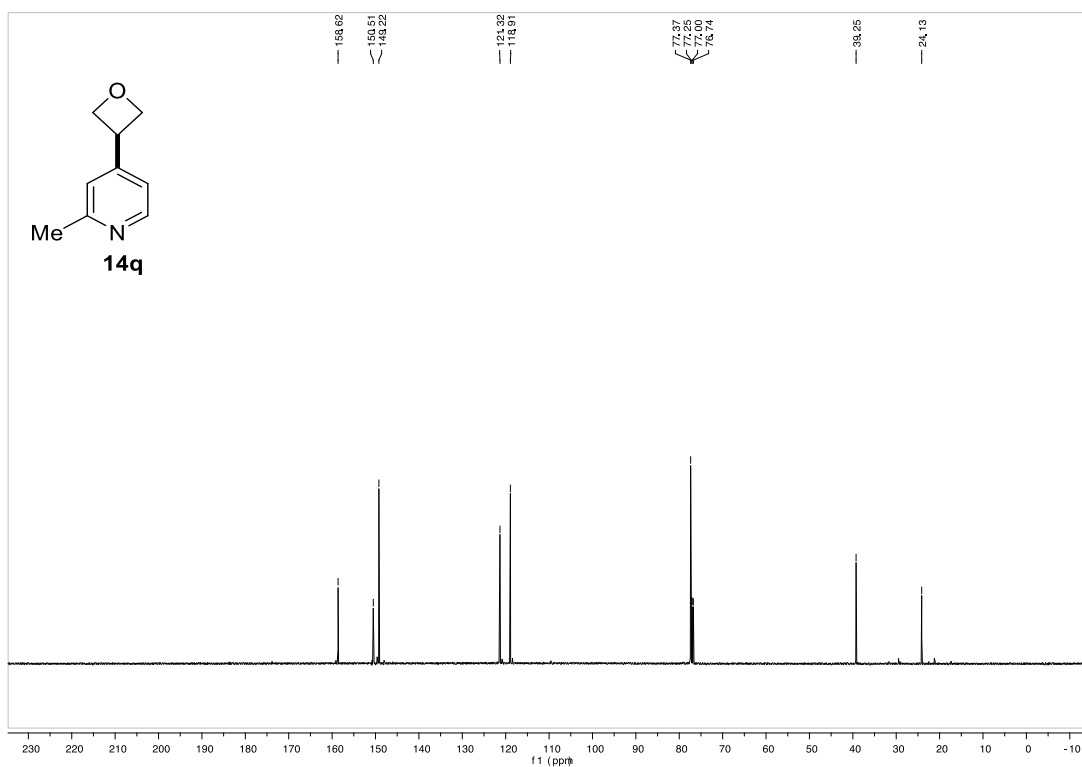
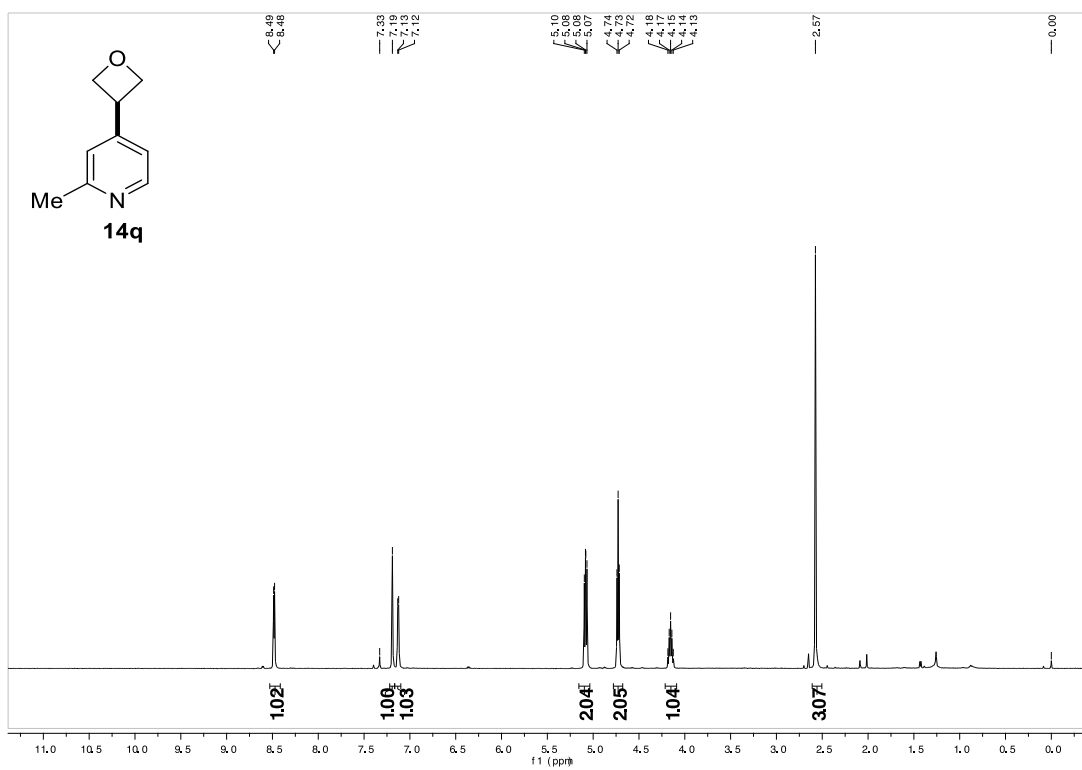
(2-Methylpyridin-4-yl)methyl pivalate (14o)



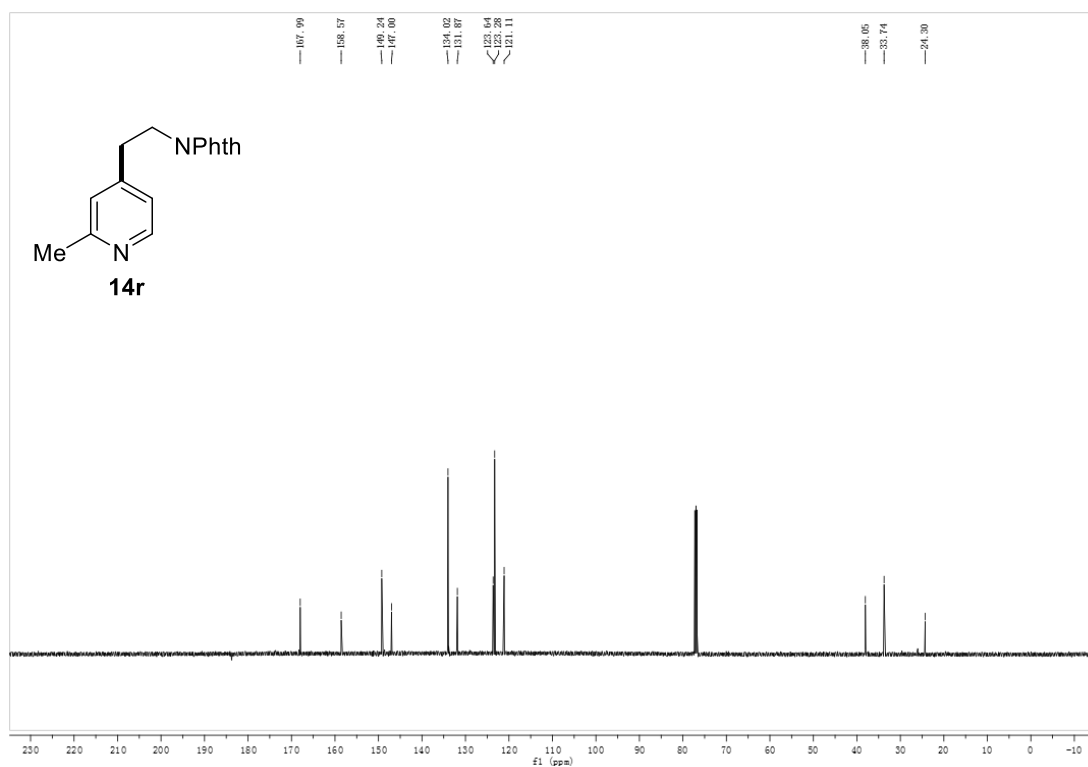
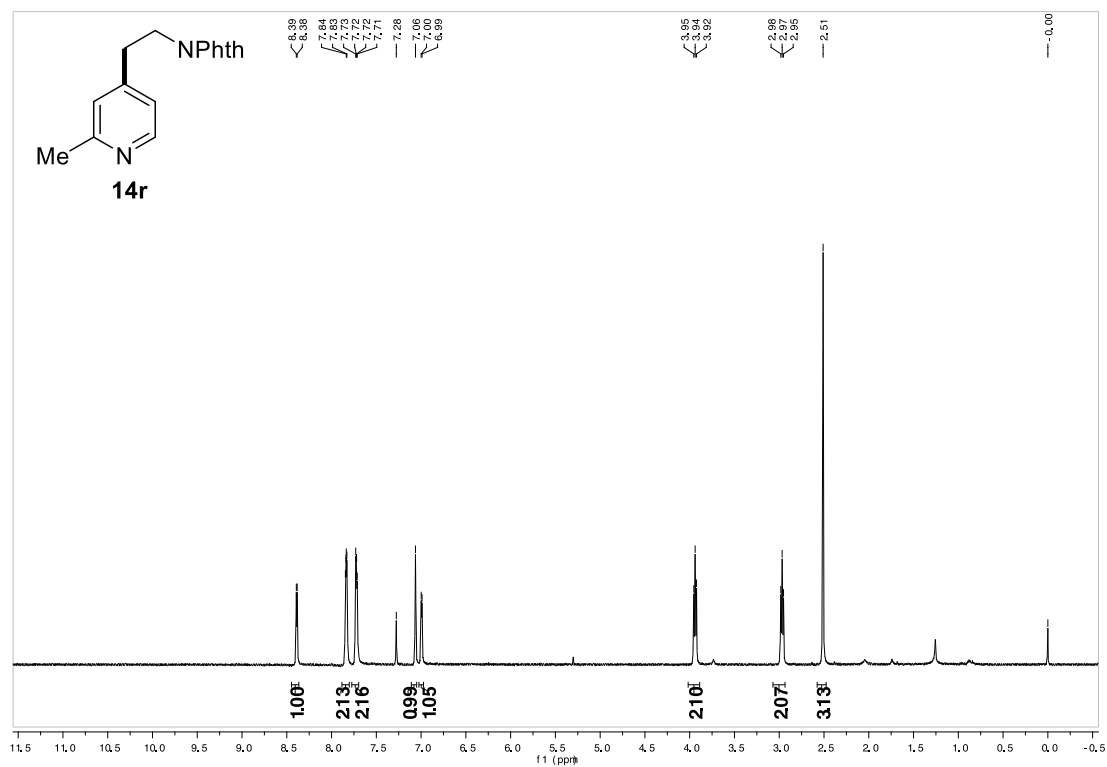
4-Cyclopentyl-2-methylpyridine (14p)



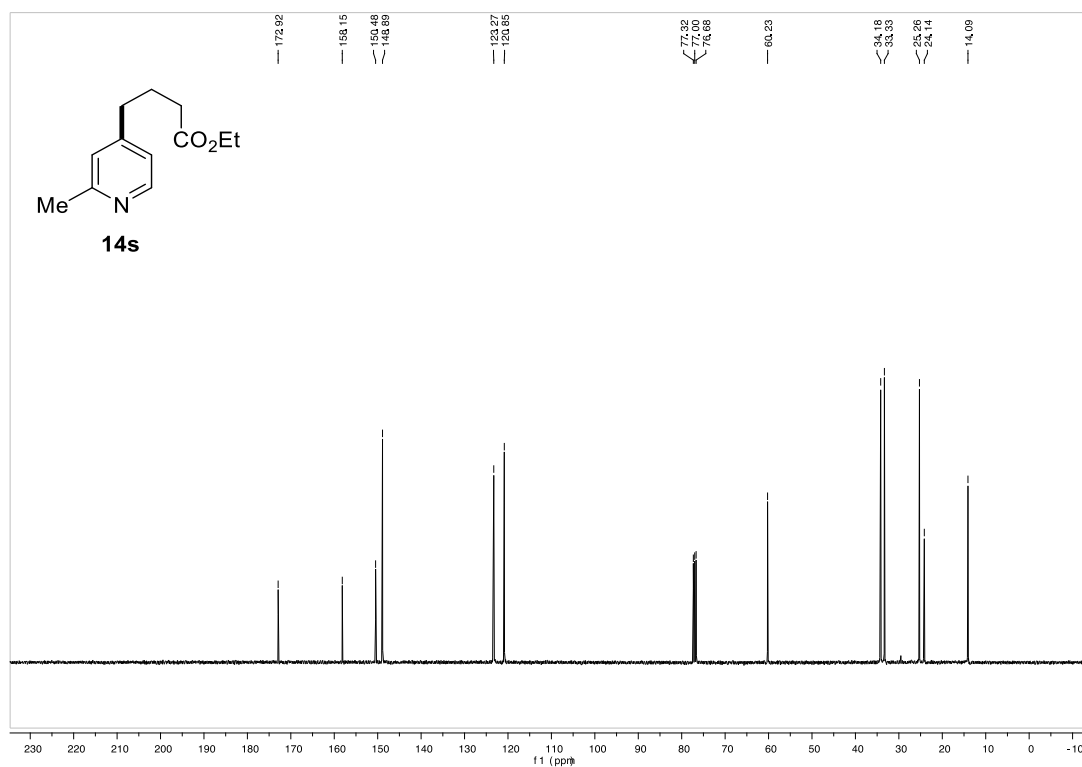
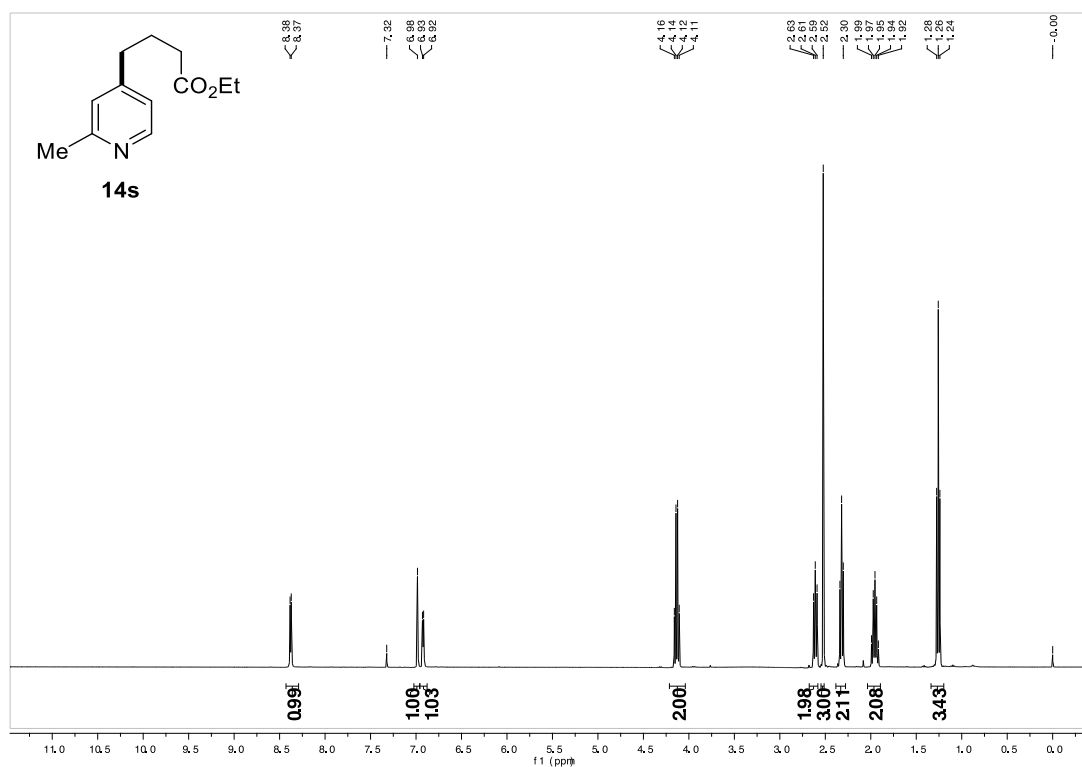
2-Methyl-4-(oxetan-3-yl)pyridine (14q)



2-(2-(2-Methylpyridin-4-yl)ethyl)isoindoline-1,3-dione (14r)



Ethyl 4-(2-methylpyridin-4-yl)butanoate (**14s**)



2-(2-Methylpyridin-4-yl)ethyl benzoate (14t)

