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APPENDIX

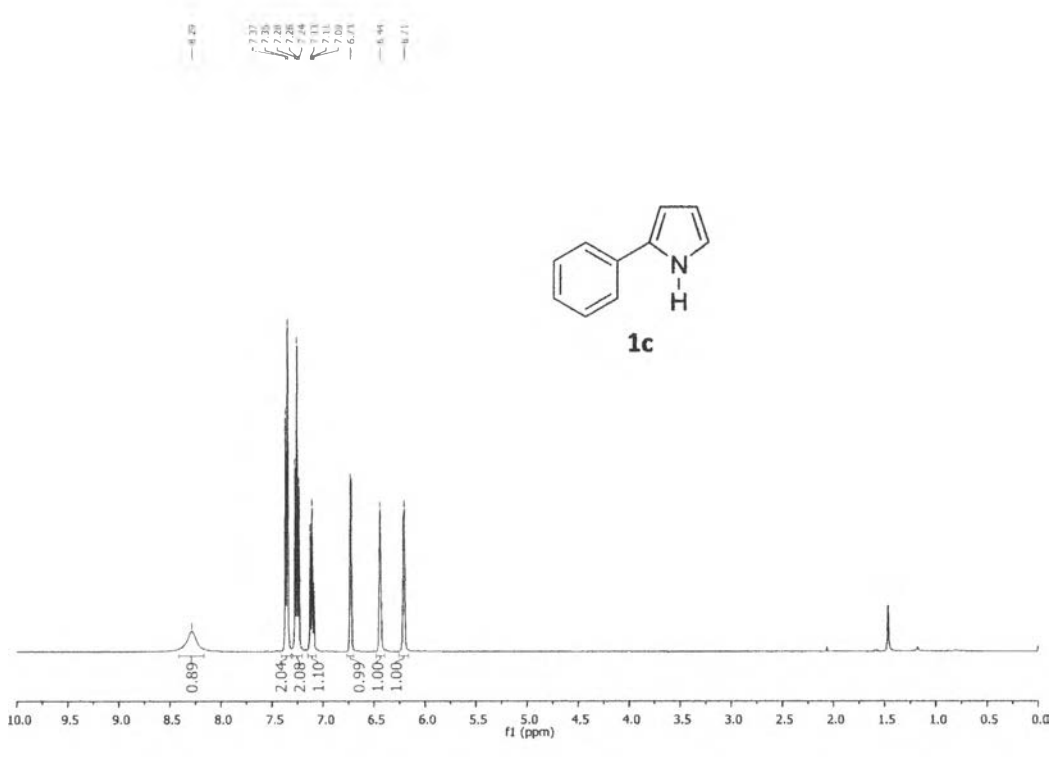

Figure A 1 ^{1}H NMR of 2-phenylpyrrole **(1c)**.

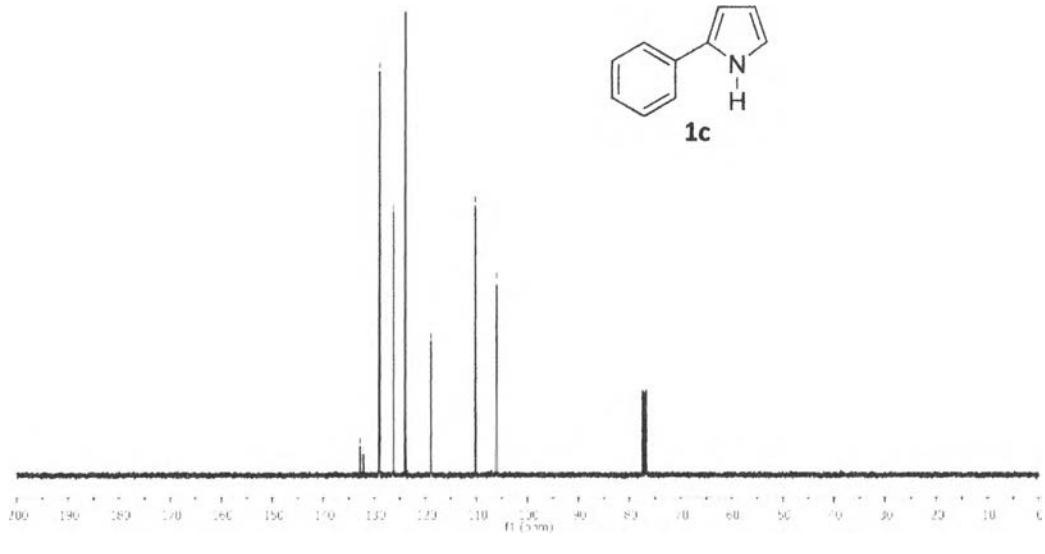

Figure A 2 ^{13}C NMR of 2-phenylpyrrole **(1c)**.

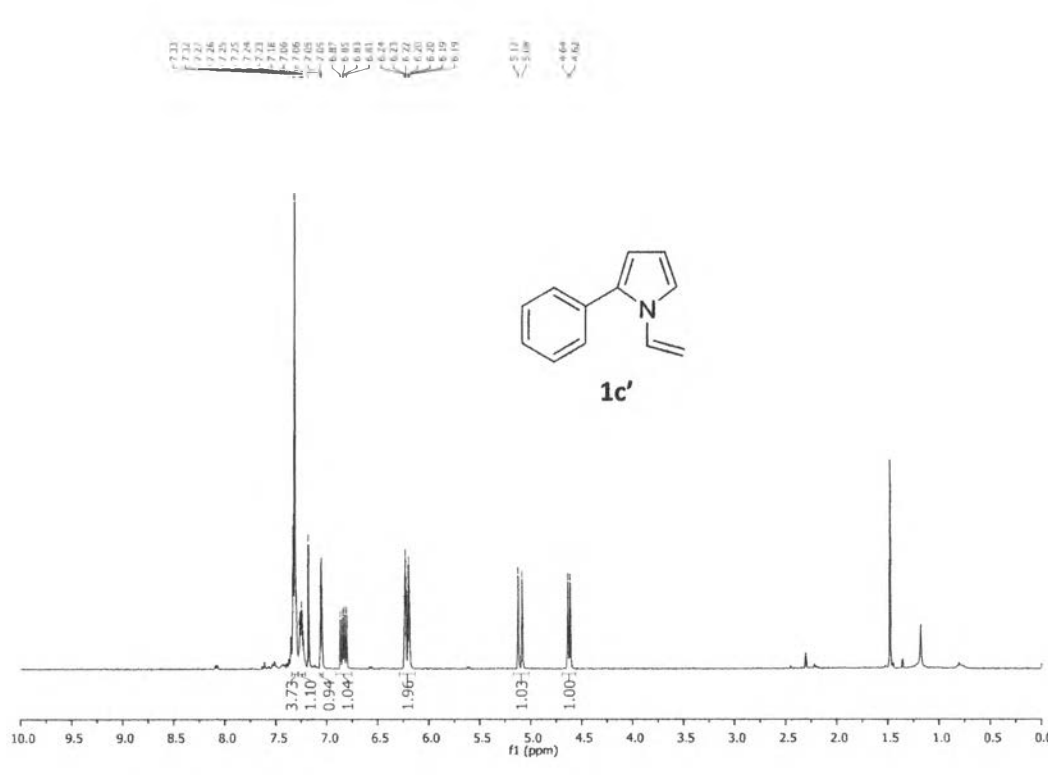

Figure A 3 ^{1}H NMR of 2-phenylvinylpyrrole **(1c')**.

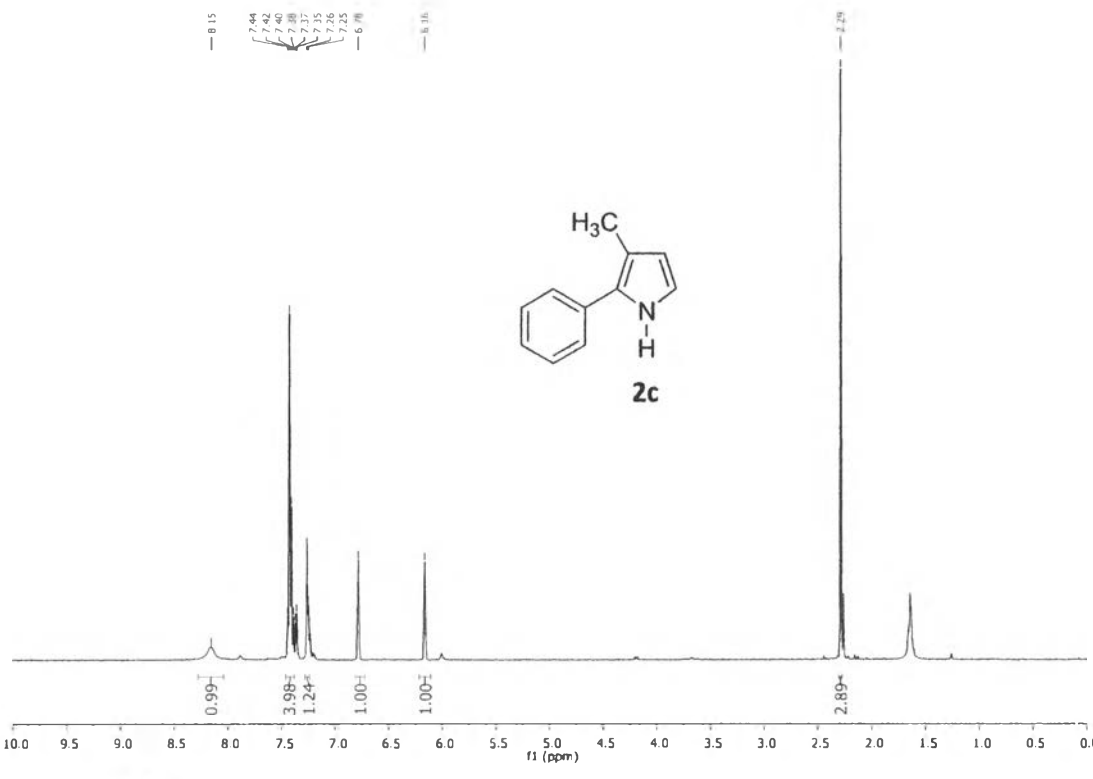

Figure A 4 ^{1}H NMR of 3-methyl-2-phenylpyrrole **(2c)**.

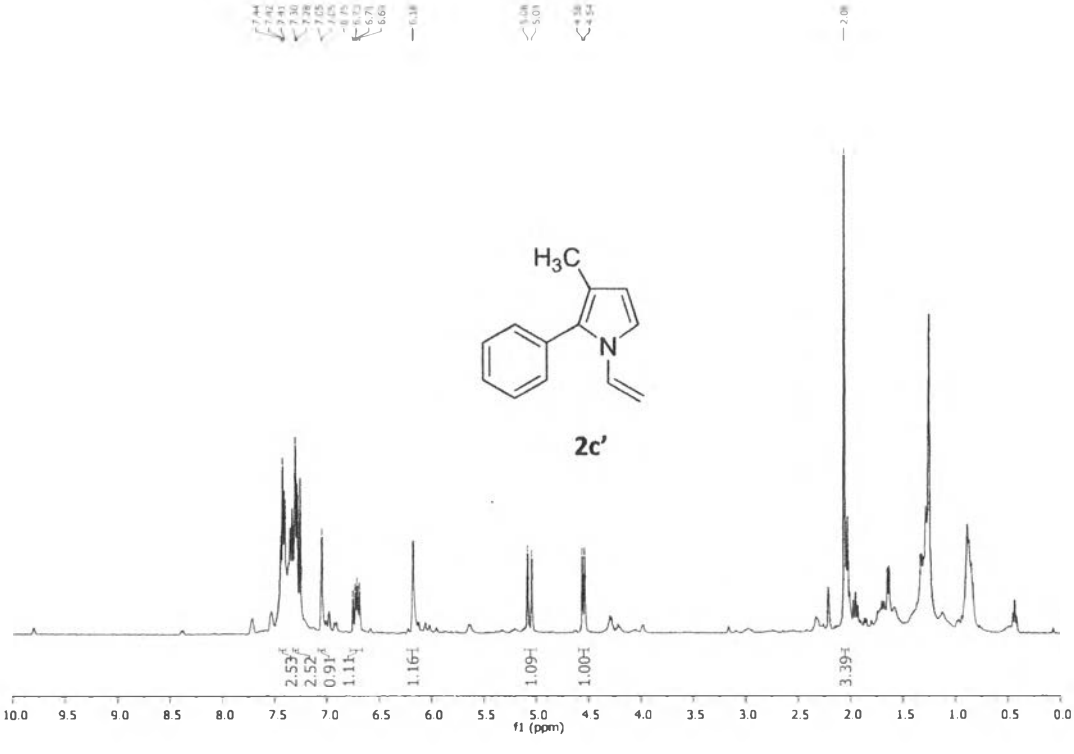

Figure A 5 ^{1}H NMR of 3-methyl-2-phenylvinylpyrrole **(2c')**.

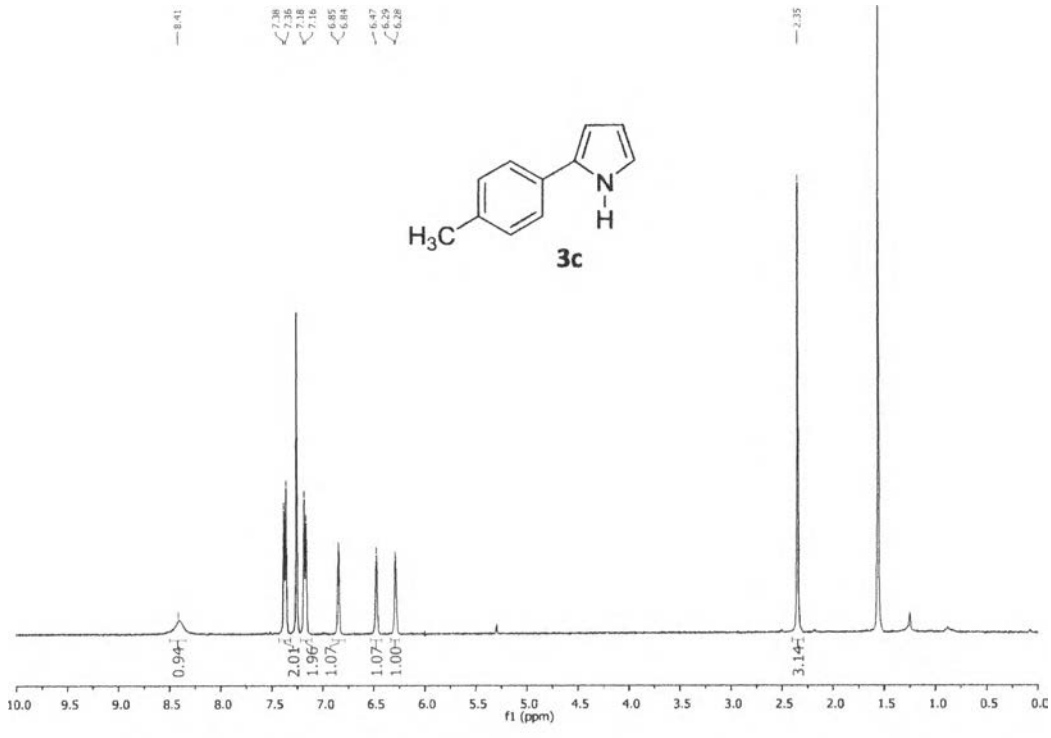

Figure A 6 ^{1}H NMR of 2-p-tolylpyrrole **(3c)**.

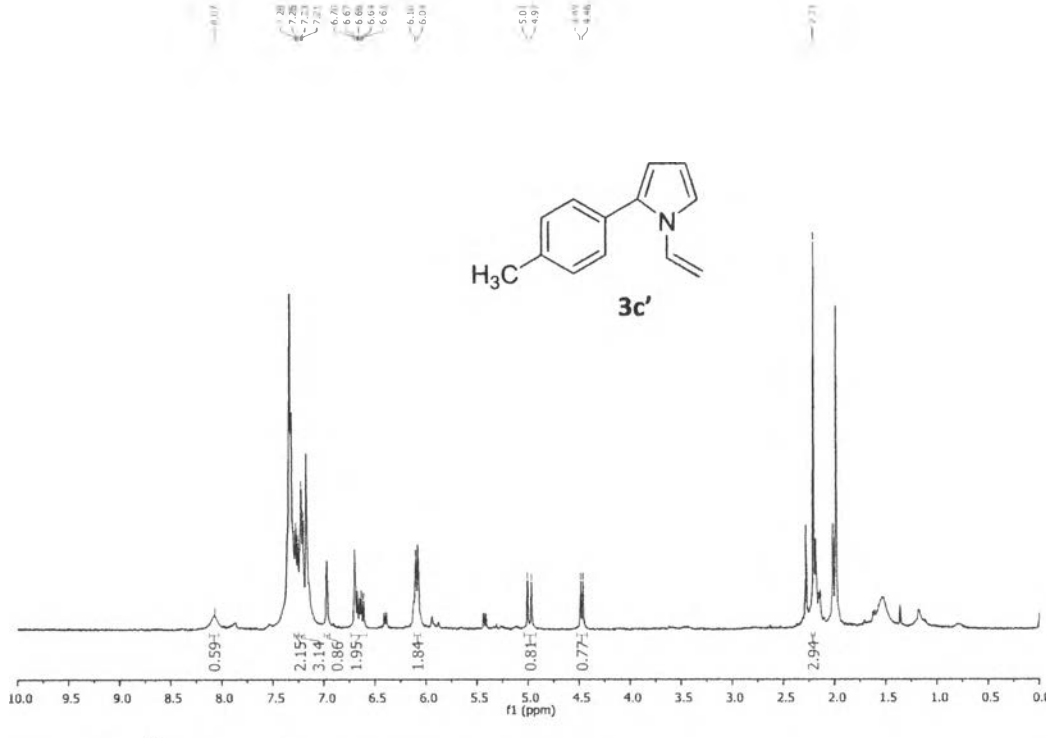

Figure A 7 ^{1}H NMR of 2-p-tolylvinylpyrrole **(3c')**.

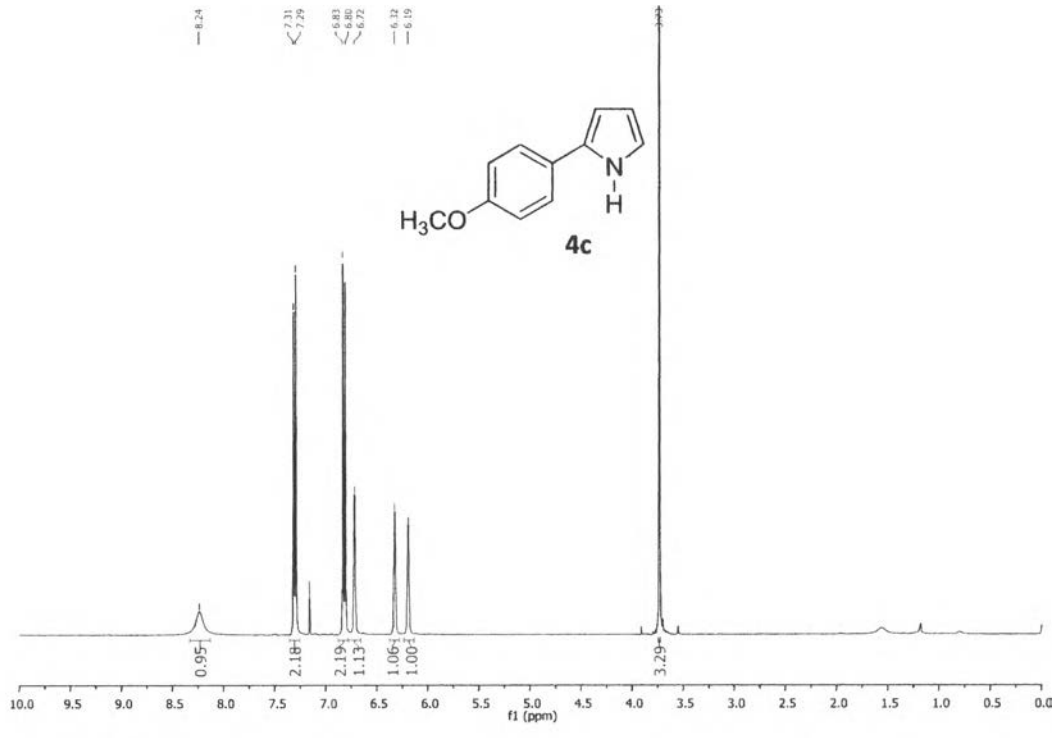

Figure A 8 ^{1}H NMR of 2-(4-methoxyphenyl)pyrrole **(4c)**.

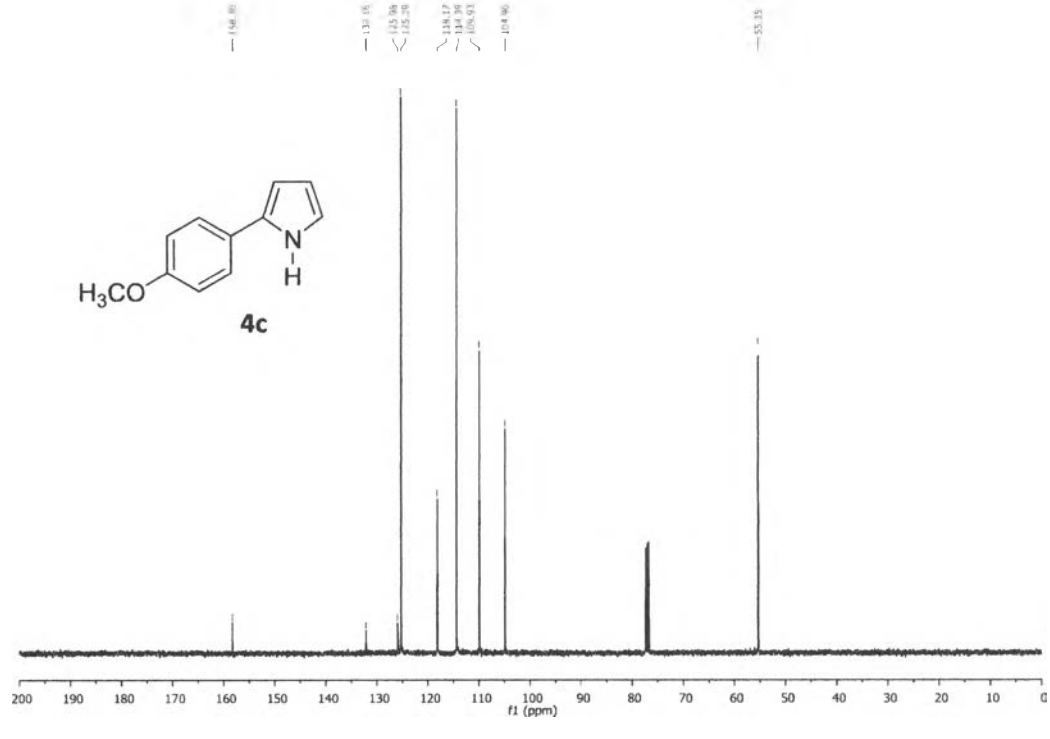

Figure A 9 ^{13}C NMR of 2-(4-methoxyphenyl)pyrrole **(4c)**.

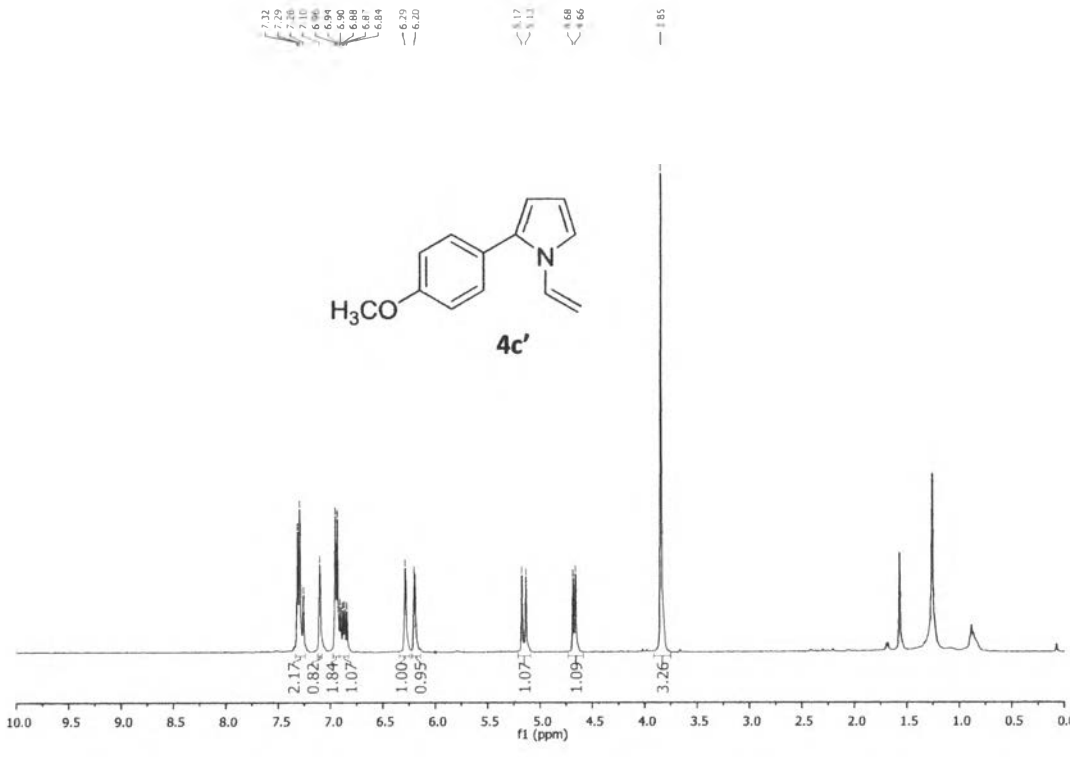

Figure A 10 ^{1}H NMR of 2-(4-methoxyphenyl)vinylpyrrole **(4c')**.

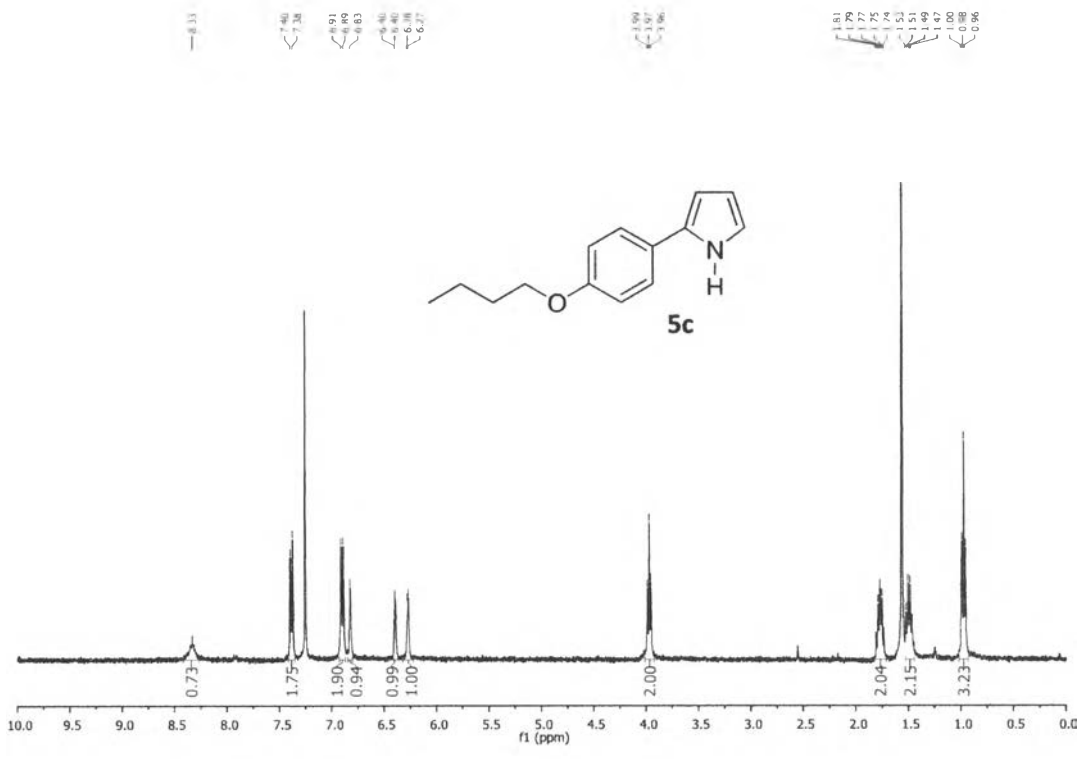

Figure A 11 ^{1}H NMR of 2-(4-butoxyphenyl)pyrrole **(5c)**.

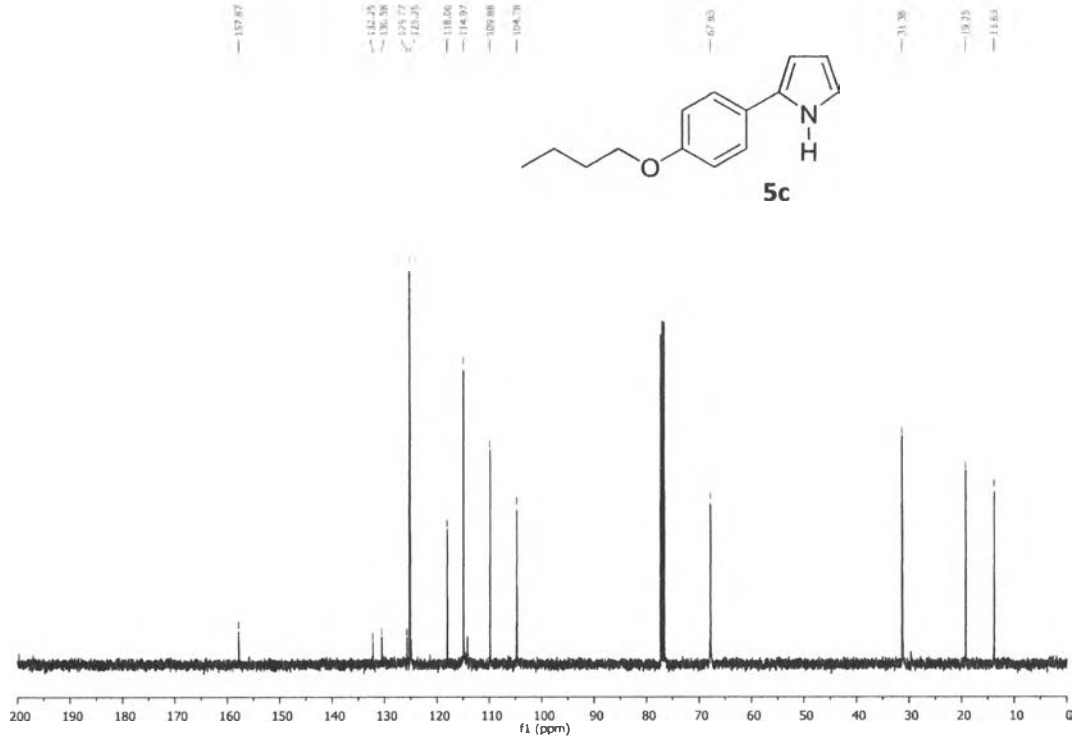

Figure A 12 ^{13}C NMR of 2-(4-butoxyphenyl)pyrrole **(5c)**.

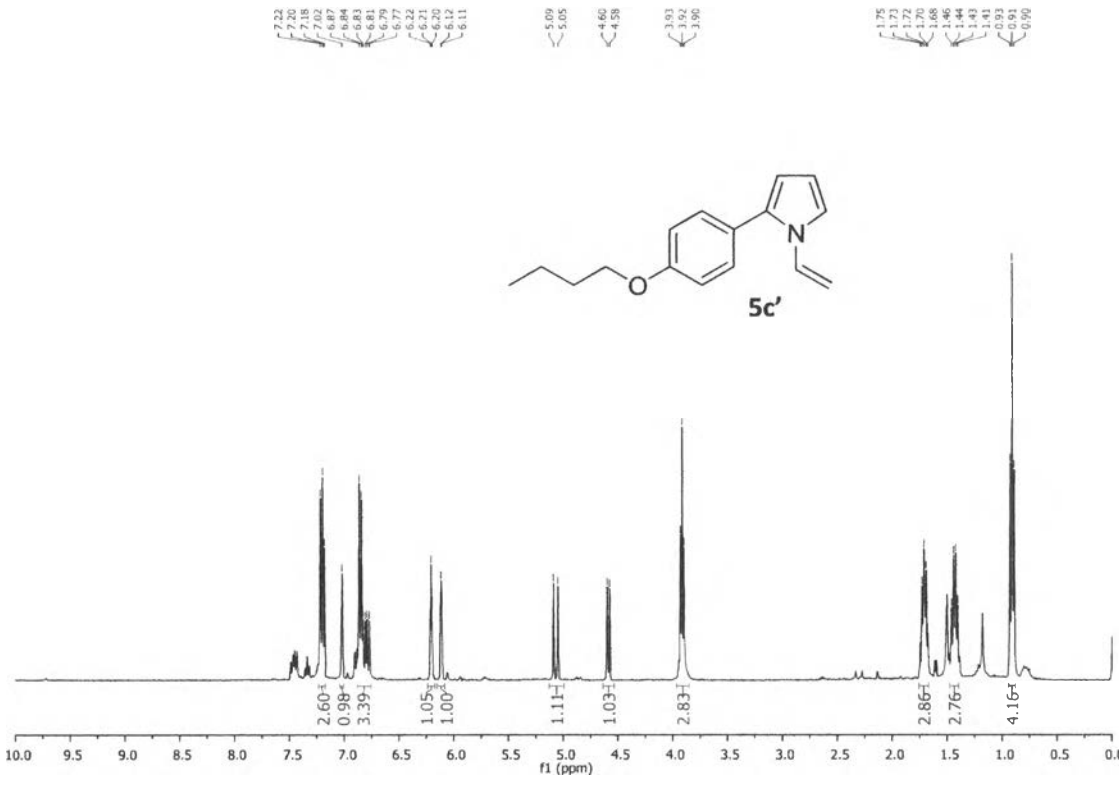

Figure A 13 ^{1}H of 2-(4-butoxyphenyl)vinylpyrrole **(5c')**.

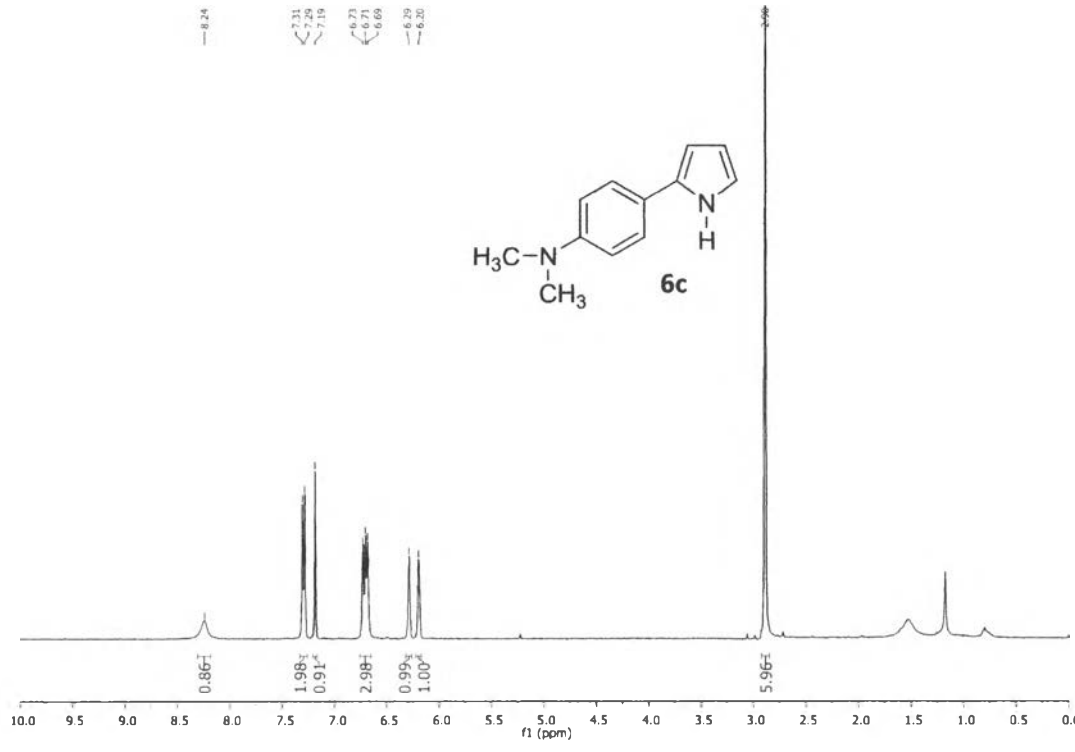

Figure A 14 ^{1}H NMR of *N,N*-dimethyl-4-(pyrrol-2-yl)aniline **(6c)**.

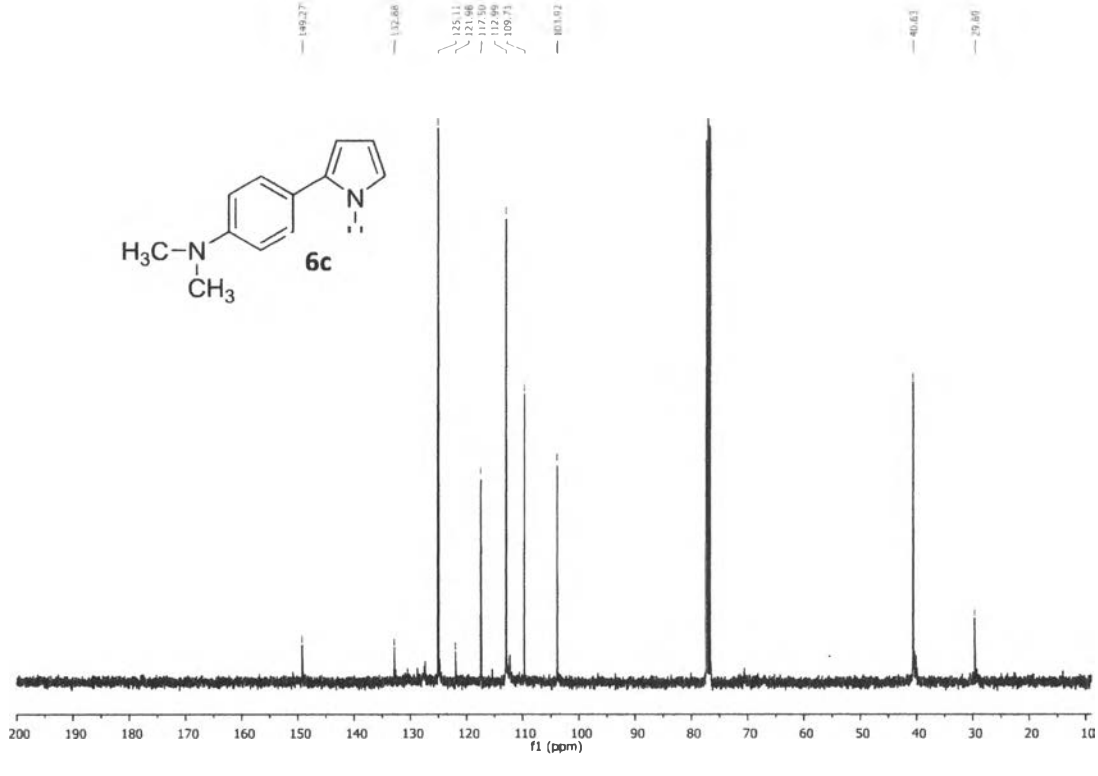

Figure A 15 ^{13}C NMR of *N,N*-dimethyl-4-(pyrrol-2-yl)aniline **(6c)**.

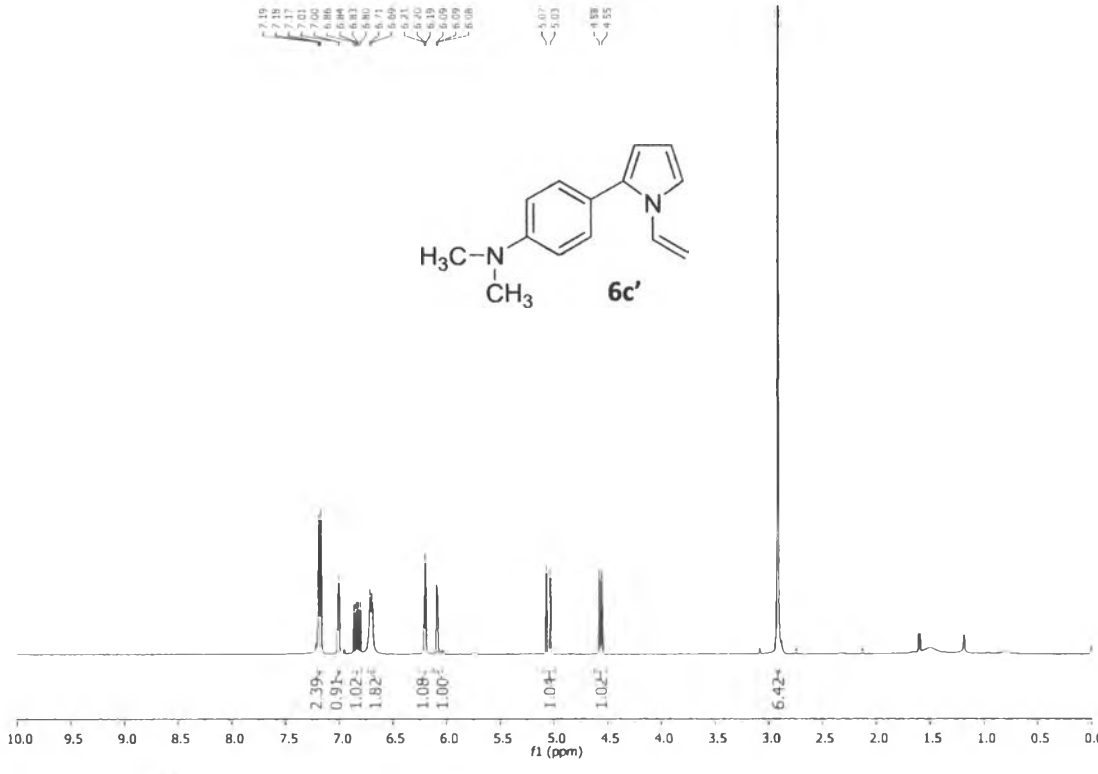

Figure A 16 ^{1}H NMR of *N,N*-dimethyl-4-(vinylpyrrol-2-yl)aniline **(6c')**.

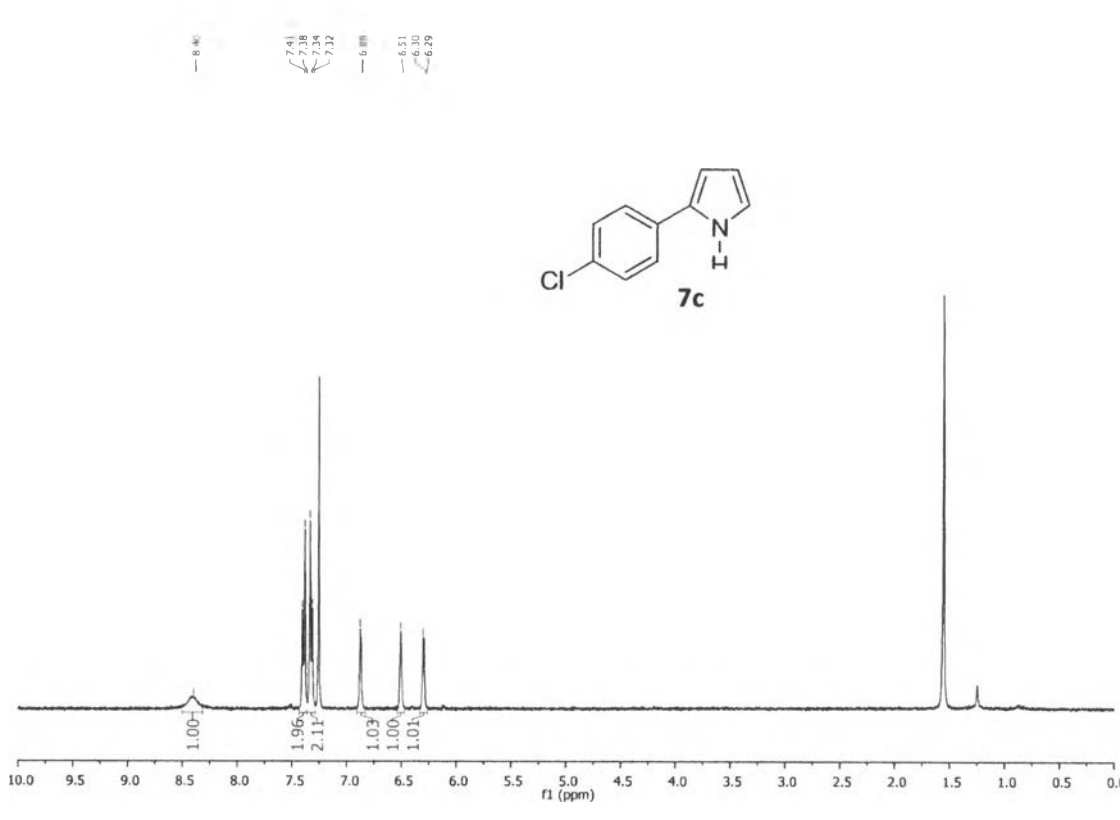

Figure A 17 ^{1}H NMR of 2-(4-chlorophenyl)pyrrole **(7c)**.

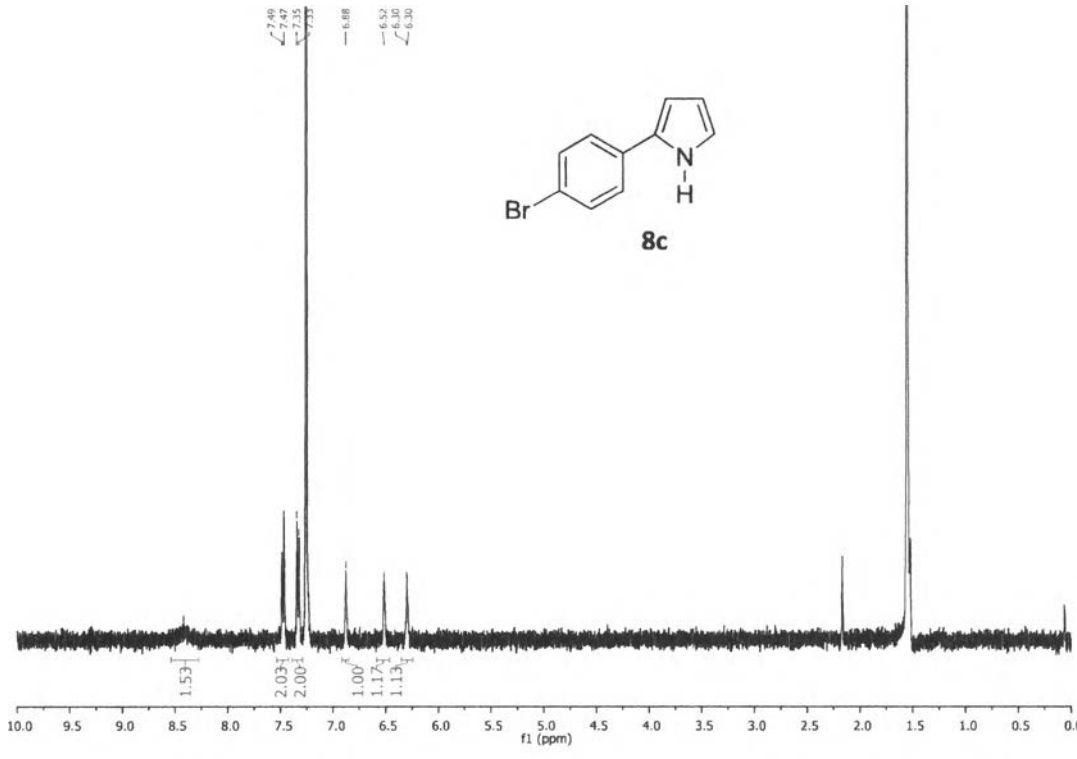

Figure A 18 ^{1}H NMR of 2-(4-bromophenyl)pyrrole **(8c)**.

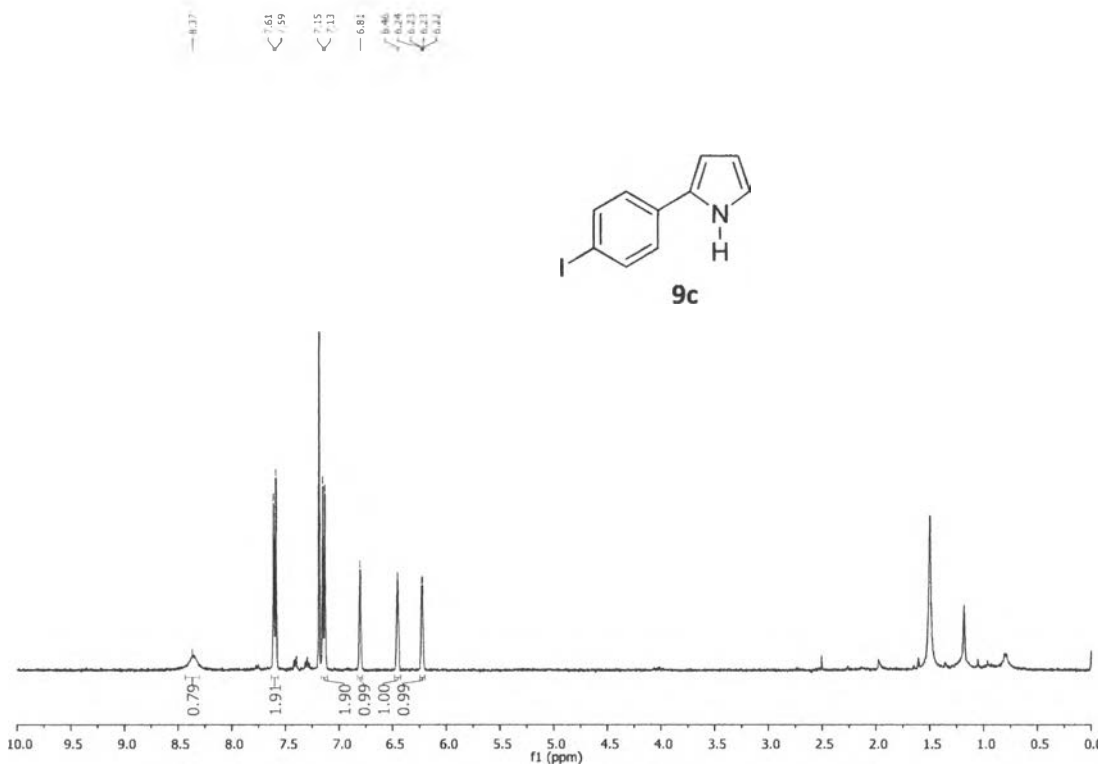

Figure A 19 ^{1}H NMR of 2-(4-iodophenyl)pyrrole **(9c)**.

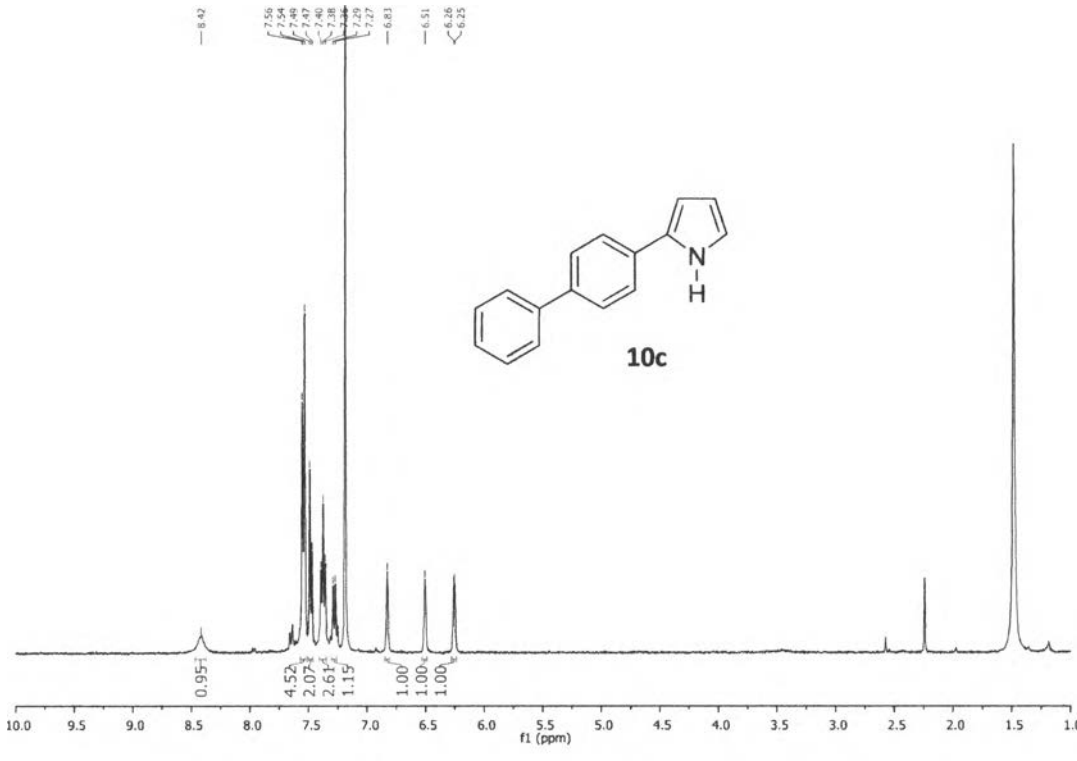

Figure A 20 ^{1}H NMR of 2-(biphenyl-4-yl)pyrrole **(10c)**.

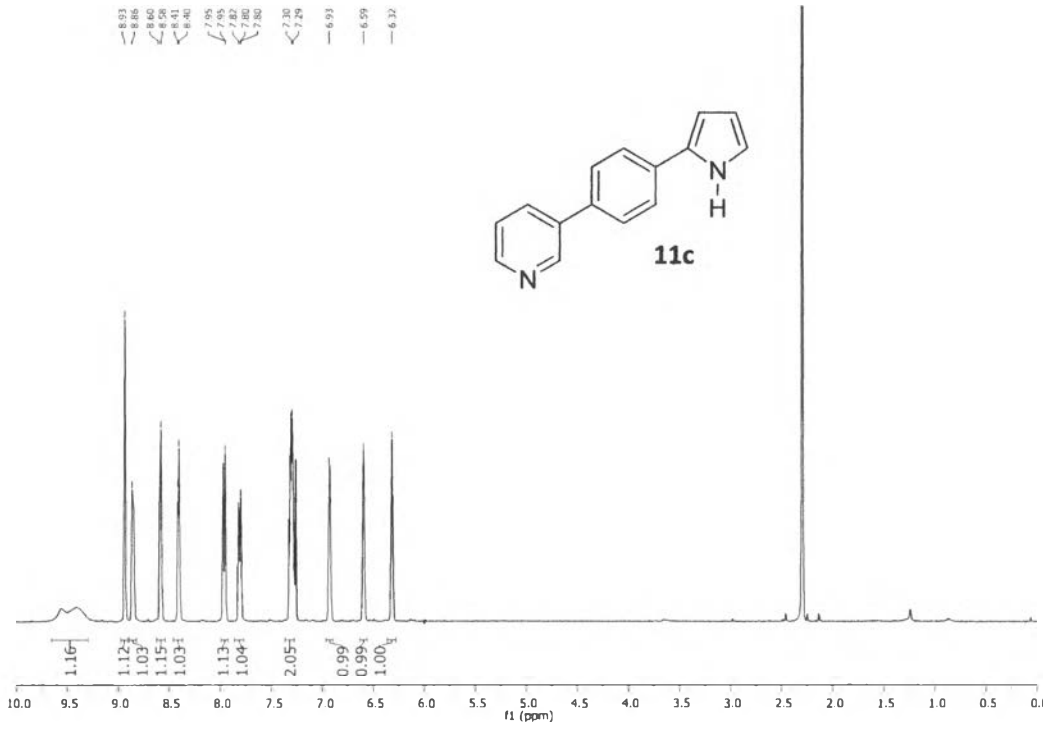

Figure A 21 ^{1}H NMR of 3-(4-(pyrrol-2-yl)phenyl)pyridine (**11c**).

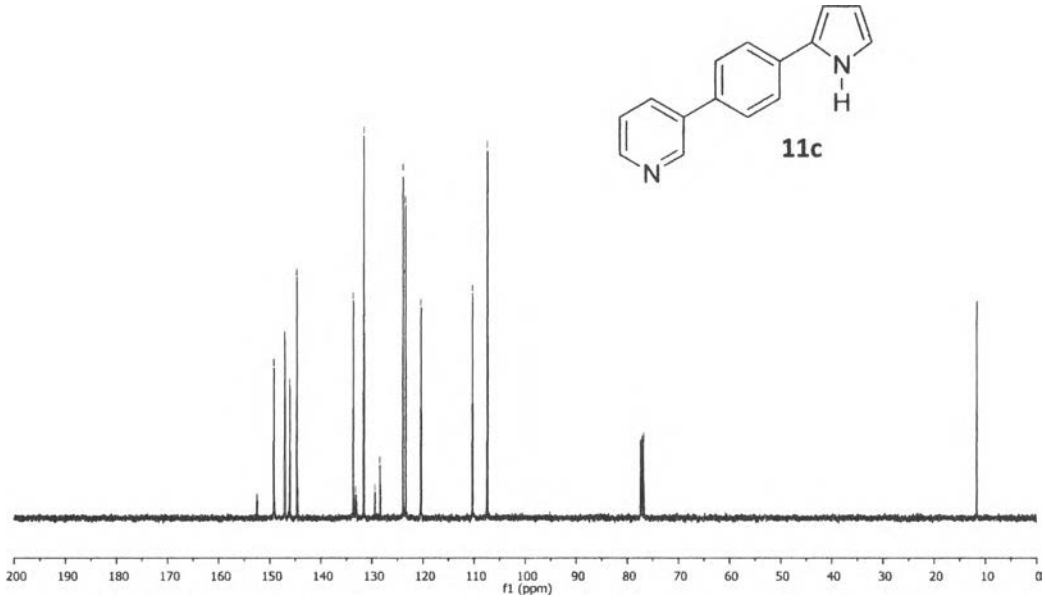

Figure A 22 ^{13}C NMR of 3-(4-(pyrrol-2-yl)phenyl)pyridine (**11c**).

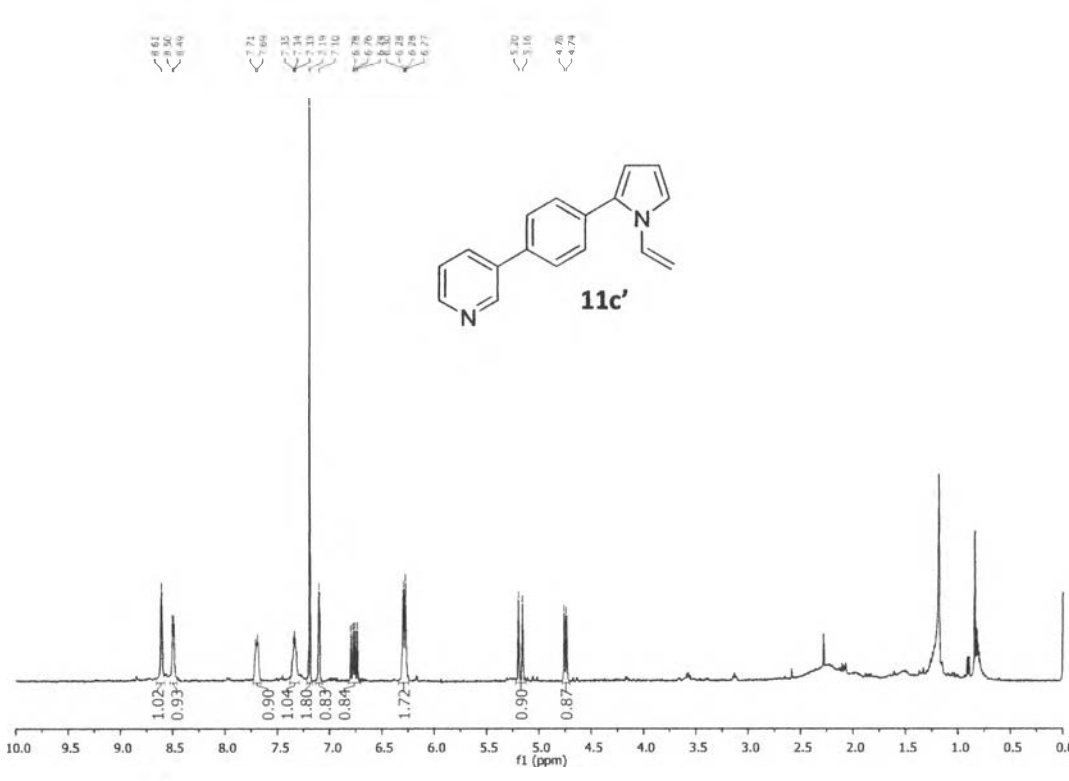

Figure A 23 ^{1}H NMR of 3-(4-(vinylpyrrol-2-yl)phenyl)pyridine **(11c')**.

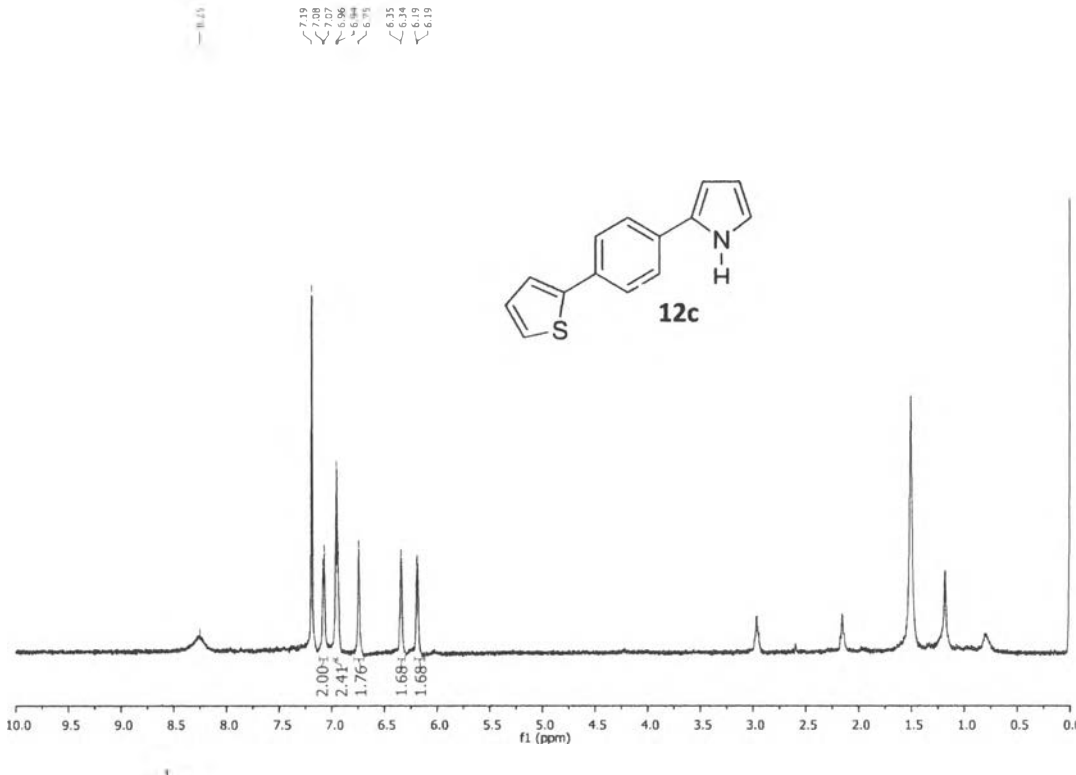

Figure A 24 ^{1}H NMR of 2-(4-(thiophen-2-yl)phenylpyrrole **(12c)**.

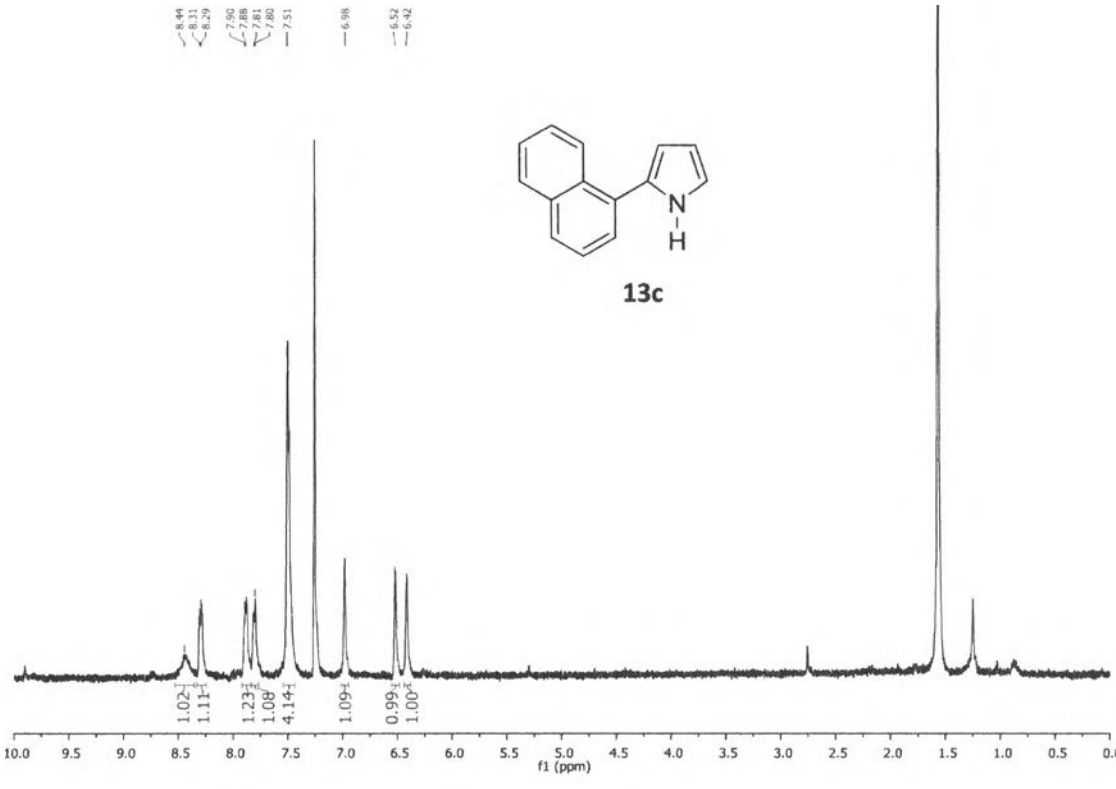

Figure A 25 ^{1}H NMR of 2-(naphthalen-1-yl)pyrrole **(13c)**.

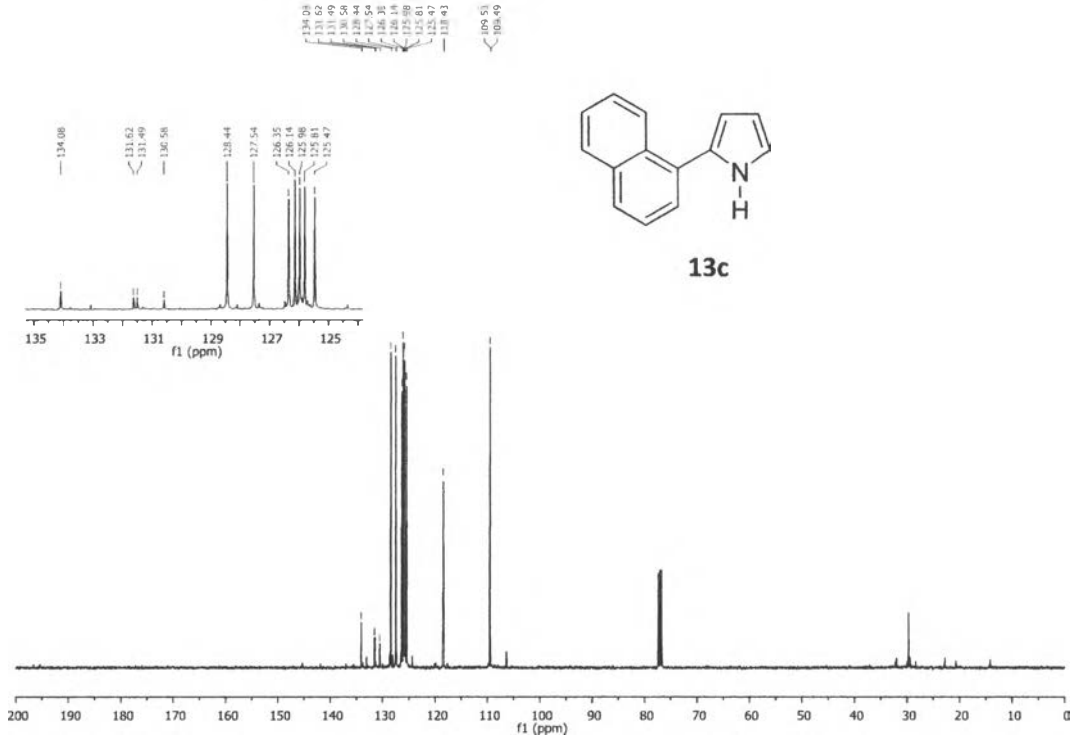

Figure A 26 ^{13}C NMR of 2-(naphthalen-1-yl)pyrrole **(13c)**.

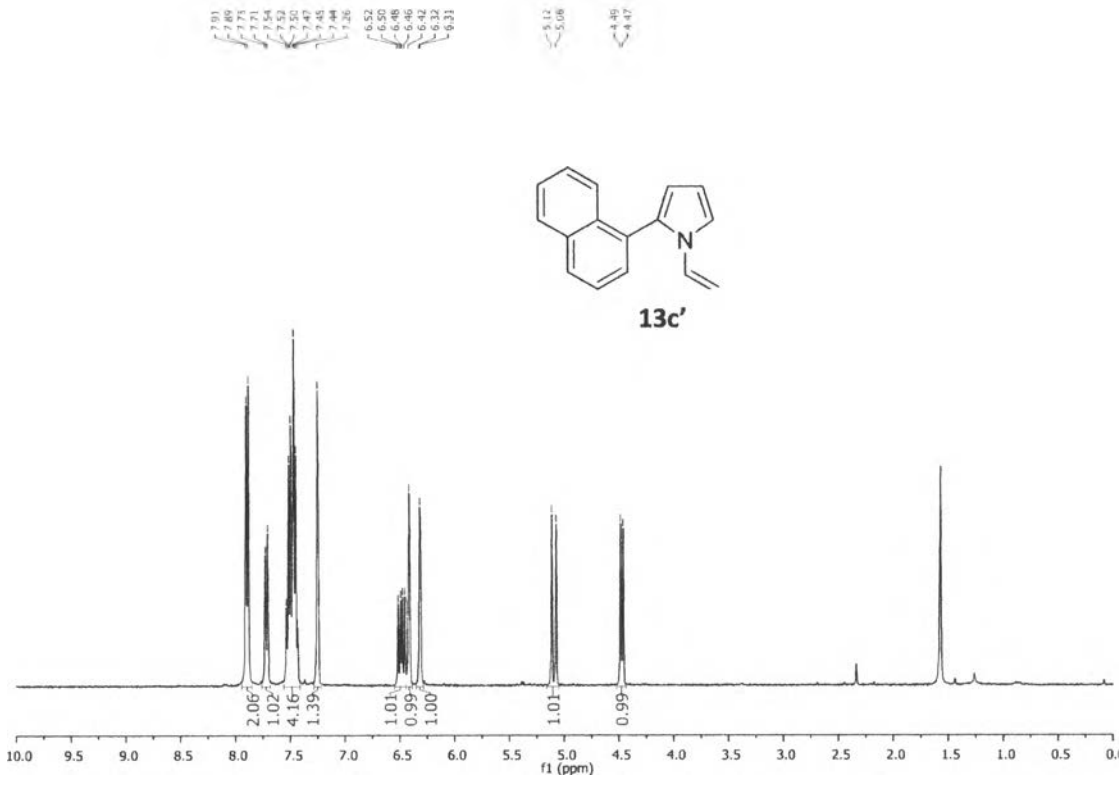

Figure A 27 ^{1}H NMR of 2-(naphthalen-1-yl)vinylpyrrole **(13c')**.

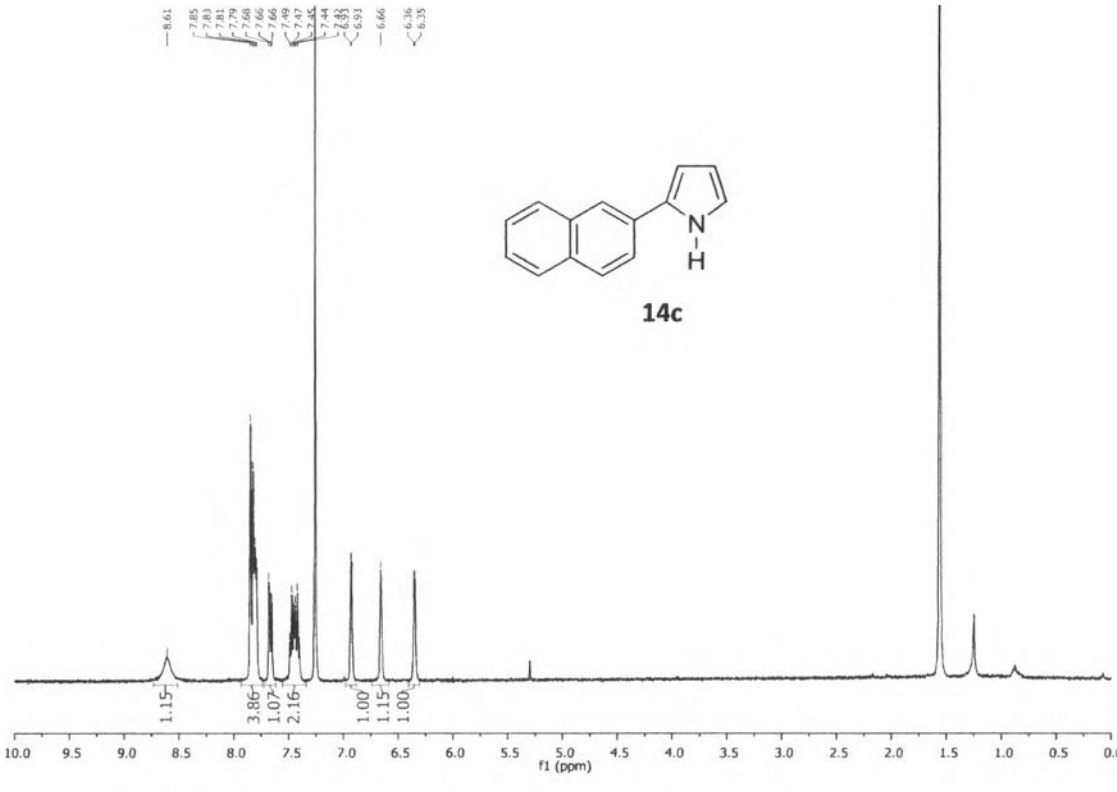

Figure A 28 ^{1}H NMR of 2-(naphthalen-2-yl)pyrrole (14c).

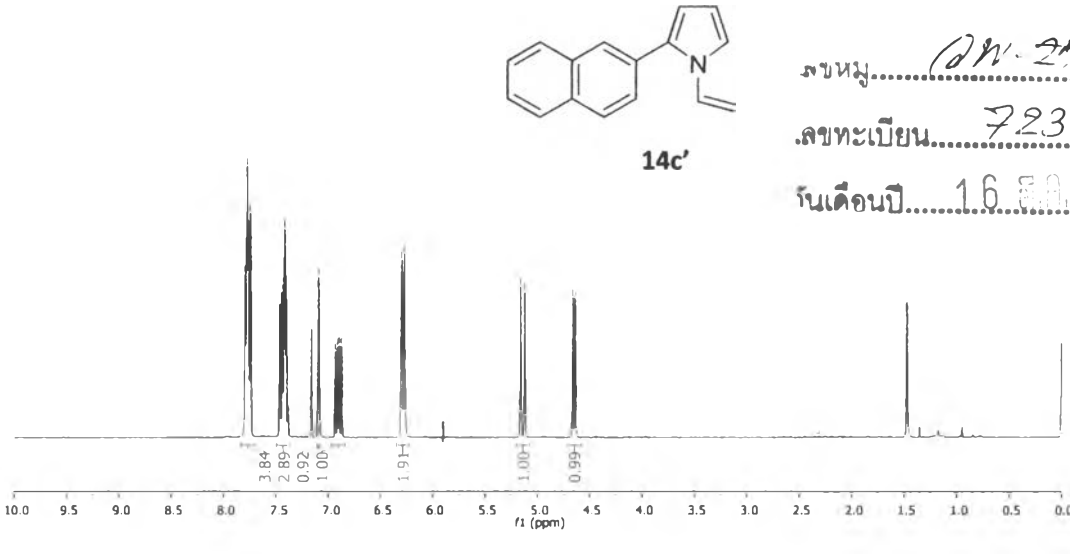

Figure A 29 ^{1}H NMR of 2-(naphthalen-2-yl)vinylpyrrole (14c').

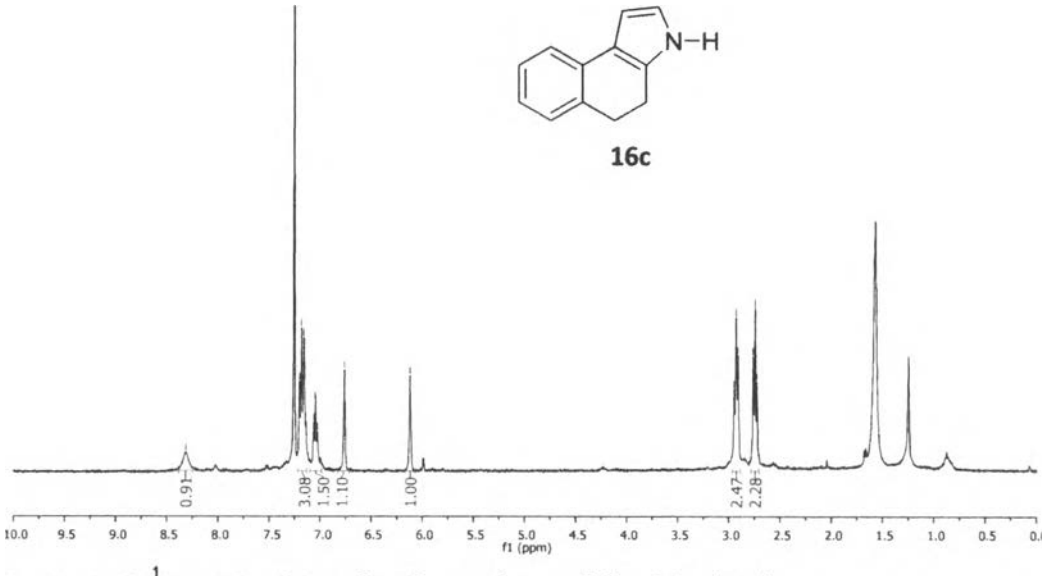

Figure A 30 ^{1}H NMR of 4,5-dihydro-1H-benzo[g]indole (16c).

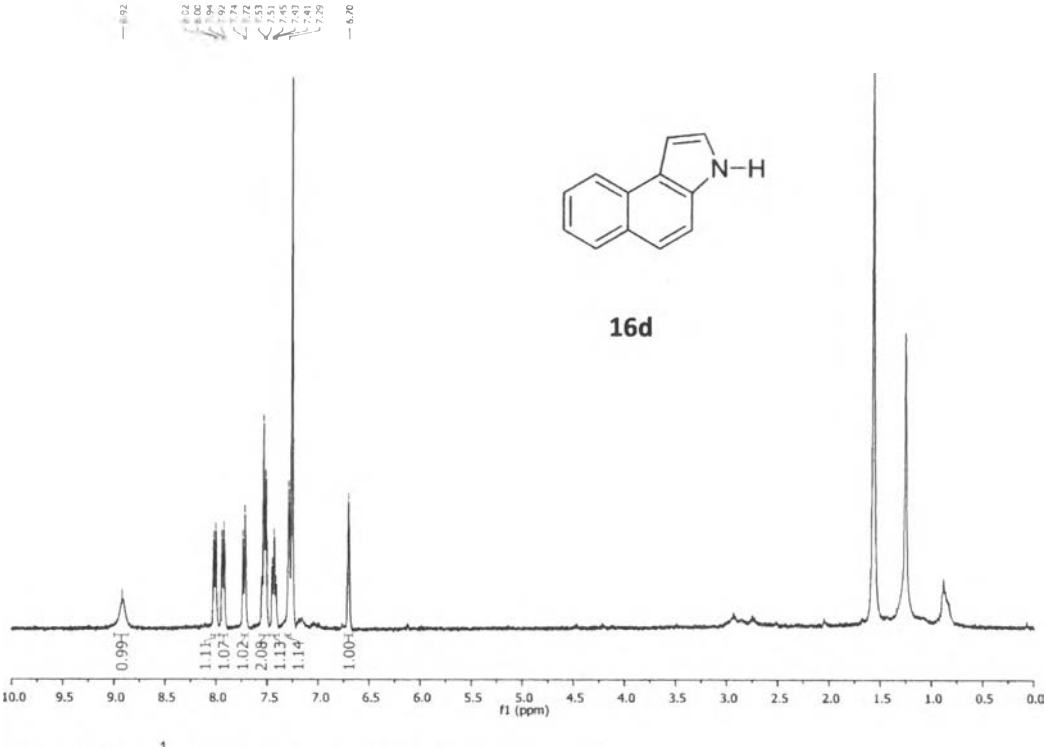

Figure A 31 ^{1}H NMR of *1H*-benzo[g]indole **(16d)**.

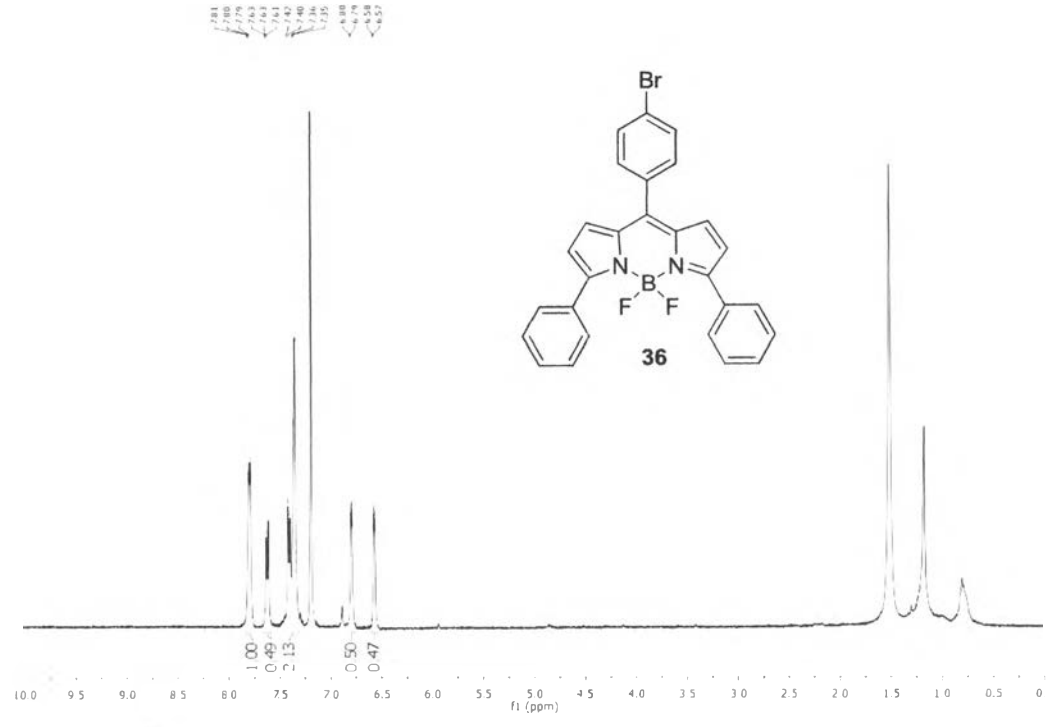

Figure A 32 ^{1}H NMR of BODIPY **36**

VITA

Mister Narongpol Kaewchangwad was born on August 08, 1988 in Nakhonpathom, Thailand. He got a Bachelor's Degree of Science in Chemistry from Silpakorn university in 2011. Then, he started he a Master's Degree in Petrochemistry and Polymer Science program at Chulalongkorn university. He had presented his research on "Cost-efficiency synthesis of 2-phenylpyrrole from calcium carbide as acetylene source via Trofimov reaction" in 39th Congress on Science and Technology of Thailand by oral presentation and "Direct synthesis of 2-arylpyrroles and their derivatives from calcium carbide as acetylene source via Trofimov reaction" in The Pure and Applied Chemistry International Conference (PACCON 2014) by poster presentation. Then, he went to Japan Advanced Institute of Science and Technology (JAIST) to associate in JASSO program for 42 days.

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