Appendix A

Relevant Spectroscopic Data

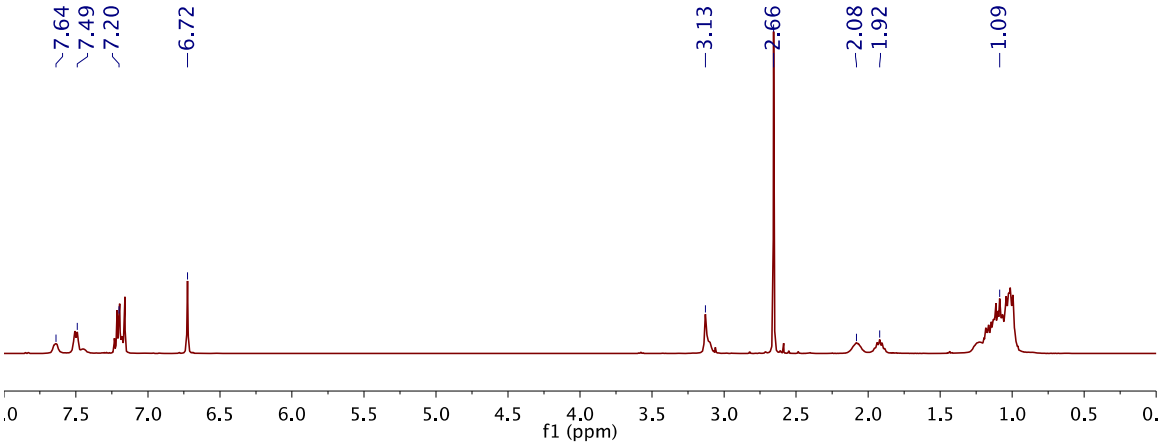

Figure A.1: ^{1}H NMR Spectrum (C_6D_6, 25°C, 399.80 MHz) of 1

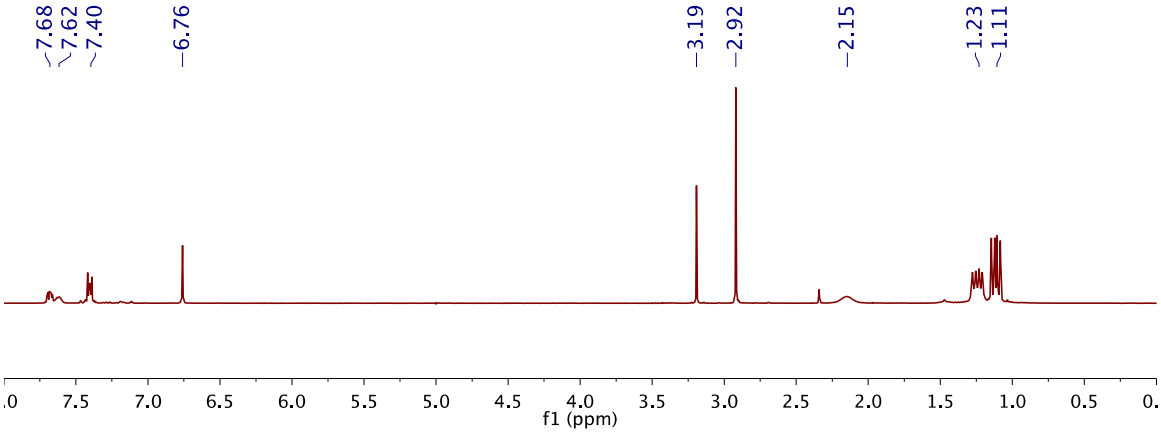

Figure A.2: ^{1}H NMR Spectrum (C_6D_6, 75°C, 300.08 MHz) of 1

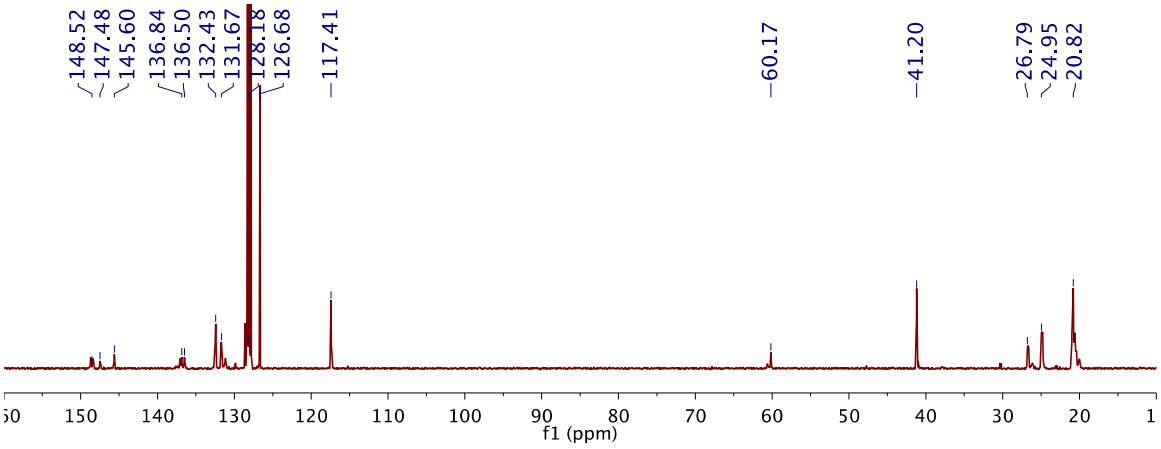

Figure A.3: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 25°C, 100.54 MHz) of 1

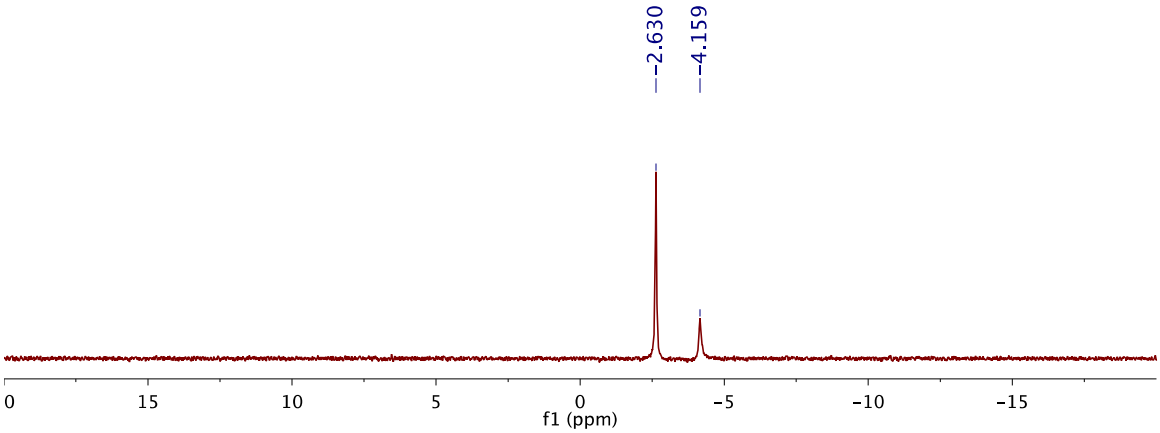

Figure A.4: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 1

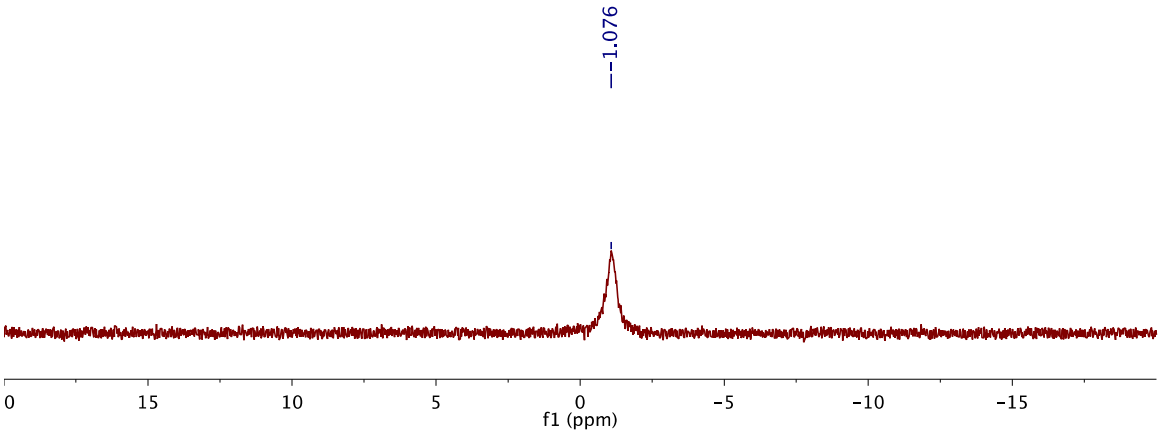

Figure A.5: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 75°C, 121.48 MHz) of 1

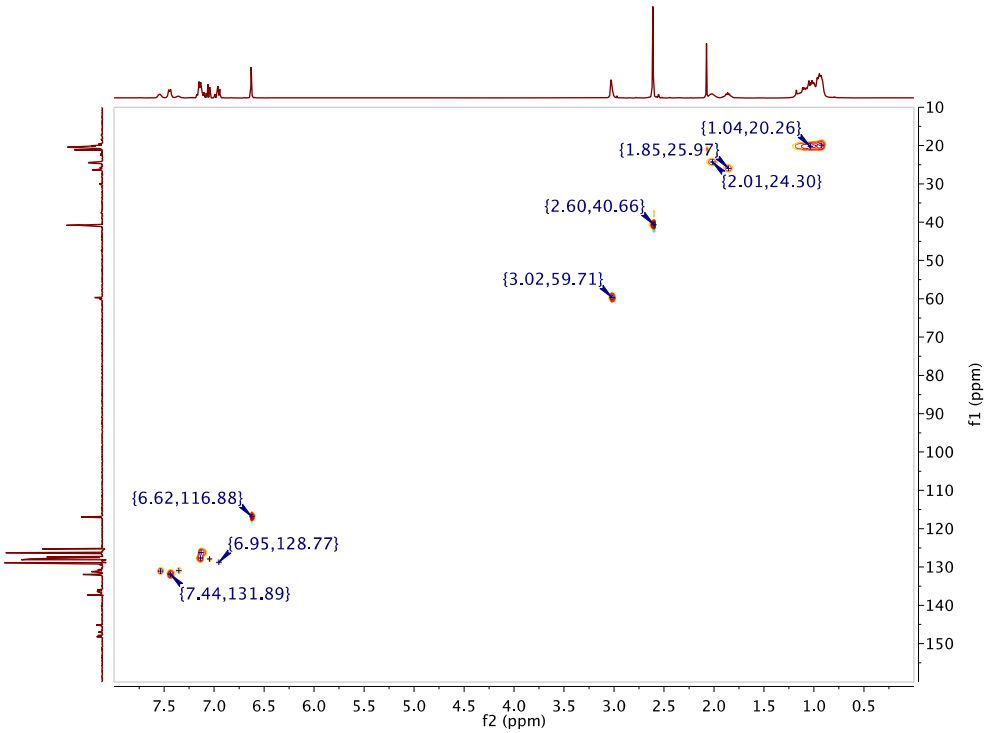

Figure A.6: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 25°C, 399.80, 100.54 MHz) of 1

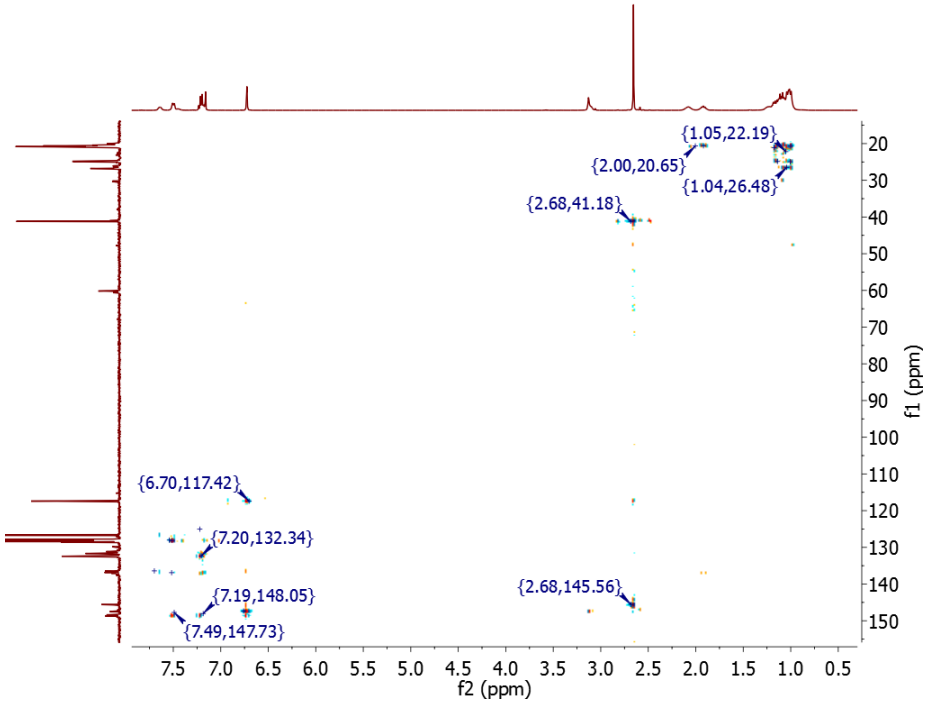

Figure A.7: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 399.80, 100.54 MHz) of 1

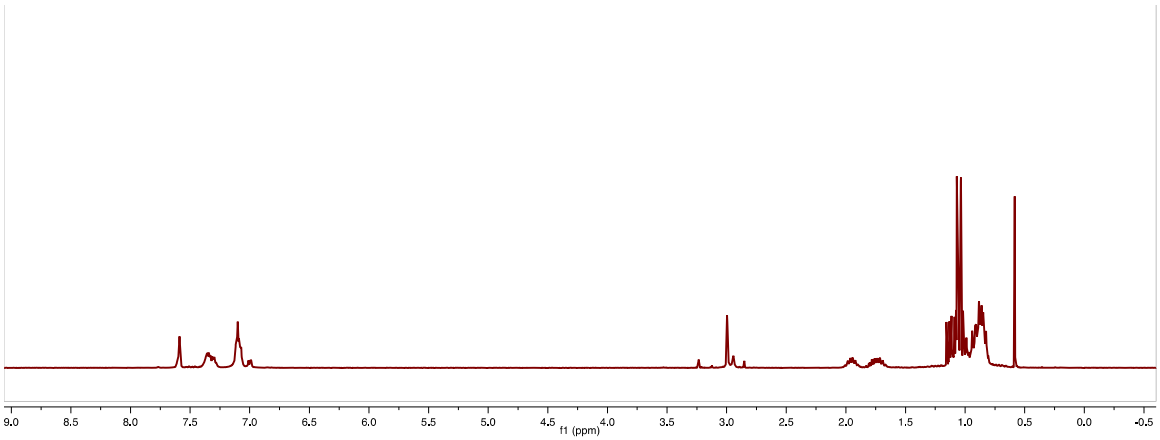

Figure A.8: ^{1}H NMR Spectrum of $\mathbf{1}_{CF3}$

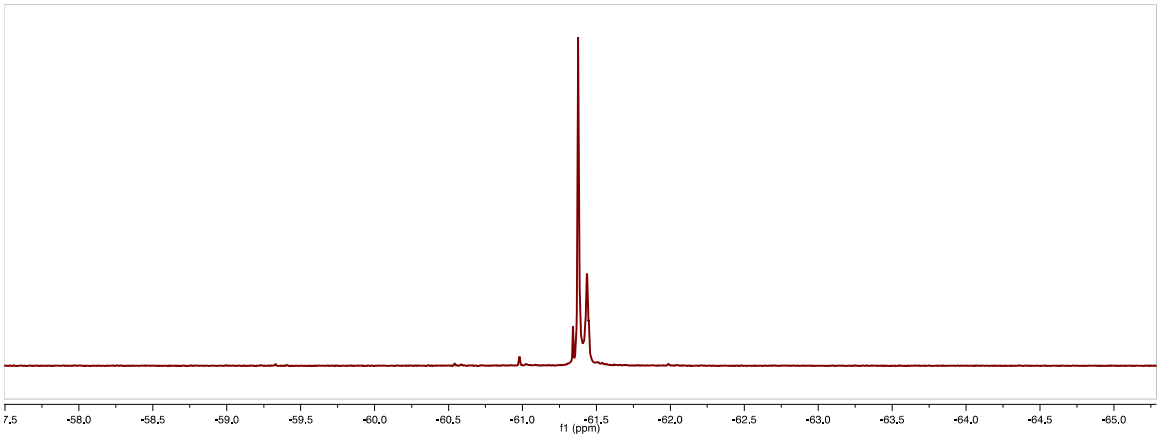

Figure A.9: ^{19}F{^{1}H} NMR Spectrum of $\mathbf{1}_{CF3}$

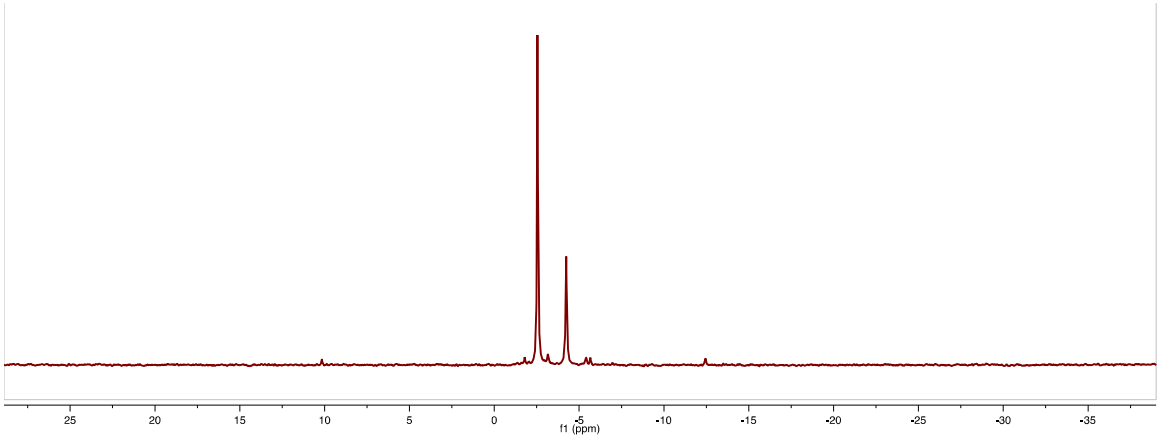

Figure A.10: ^{31}P{^{1}H} NMR Spectrum of $\mathbf{1}_{CF3}$

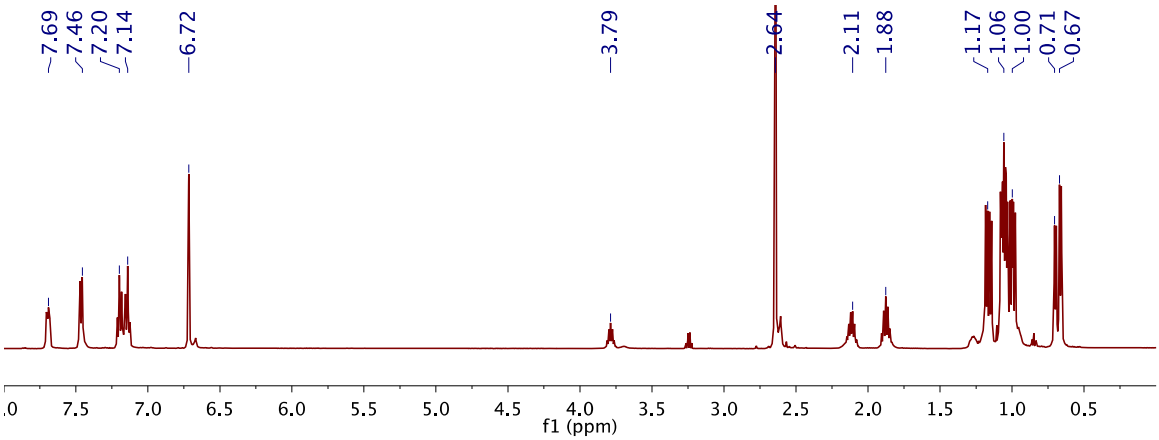

Figure A.11: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 1^{iPr}

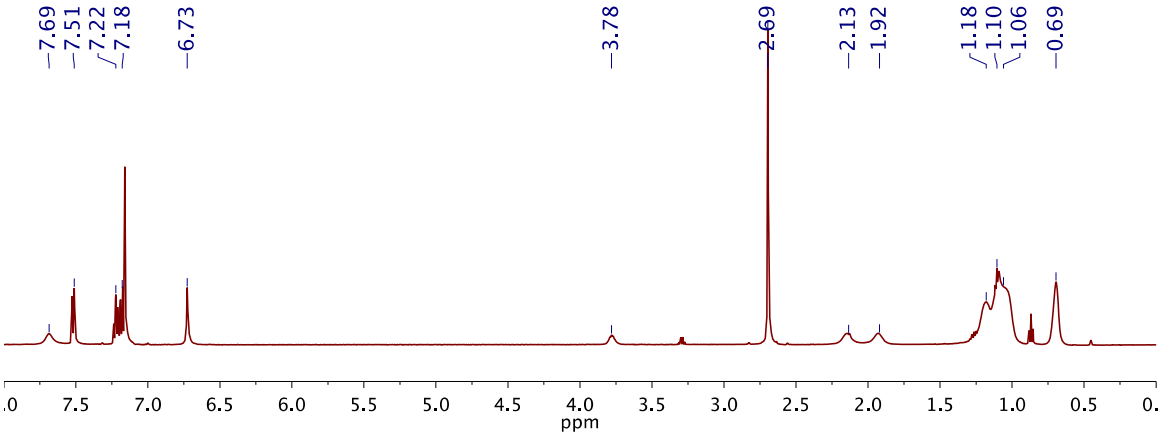

Figure A.12: ^{1}H NMR Spectrum (C_6D_6, 70°C, 499.85 MHz) of 1^{iPr}

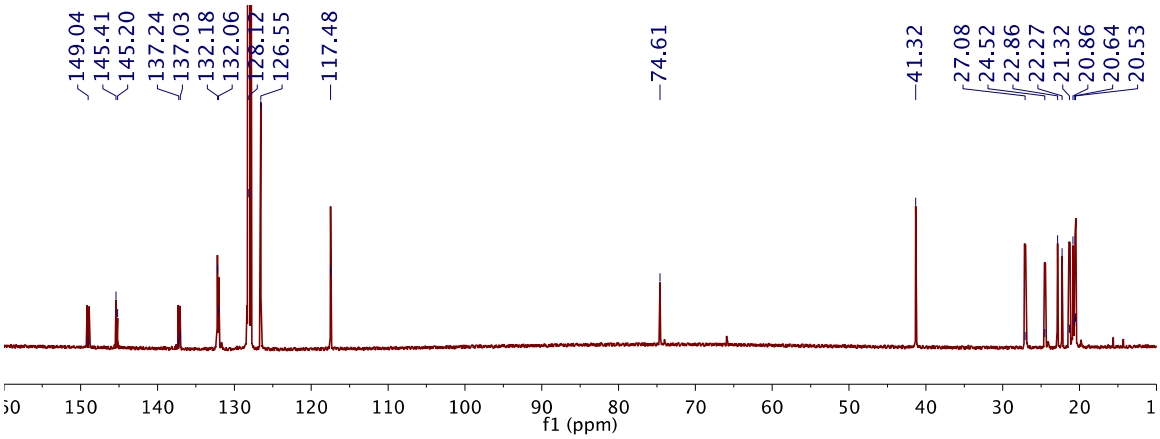

Figure A.13: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 1^{iPr}

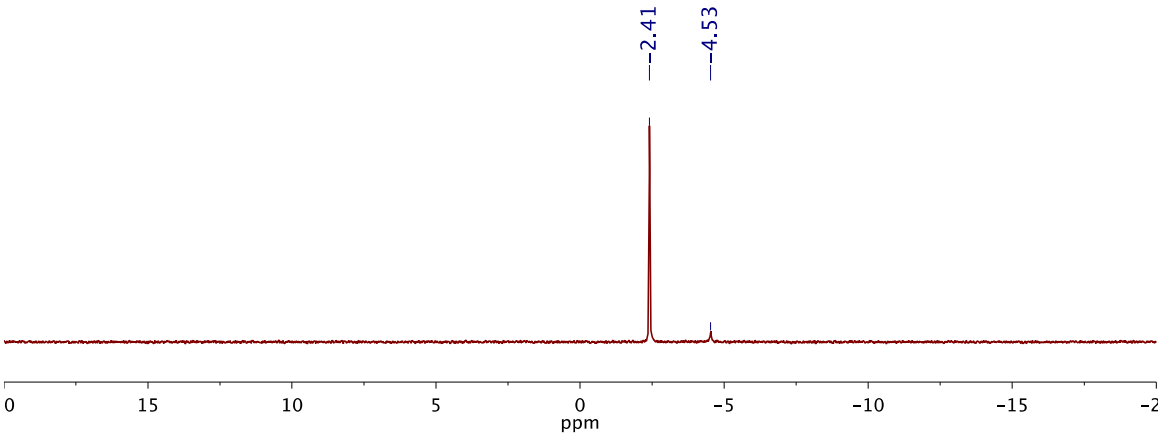

Figure A.14: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 1^{iPr}

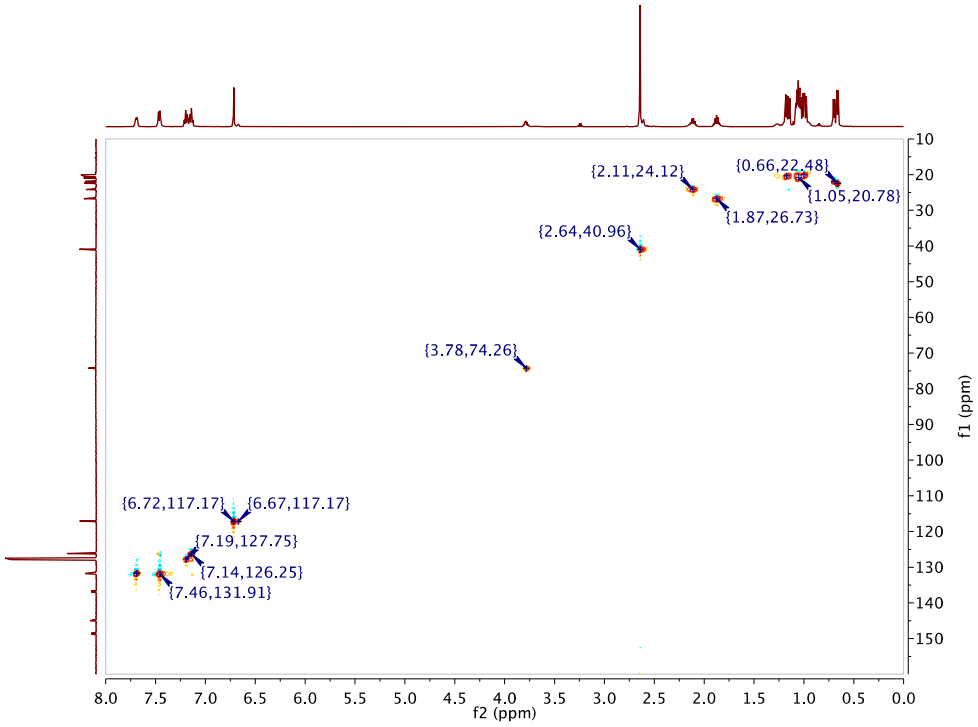

Figure A.15: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1^{iPr}

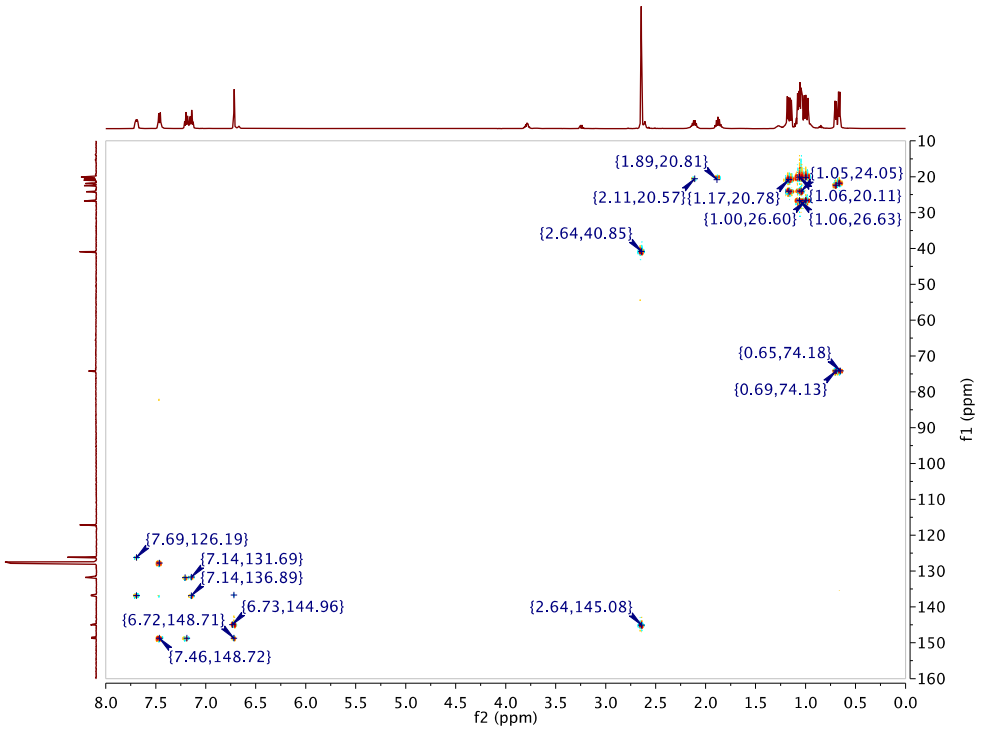

Figure A.16: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1^{iPr}

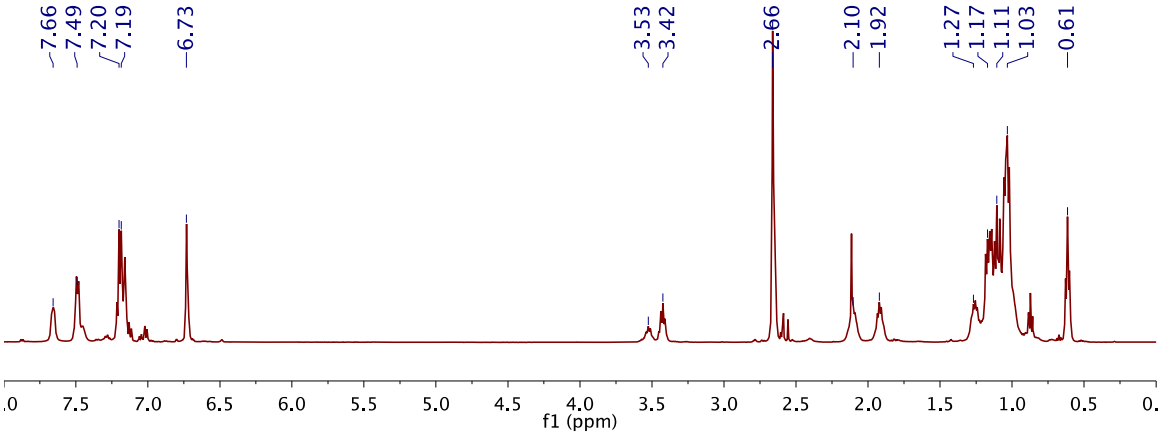

Figure A.17: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 1^{Et}

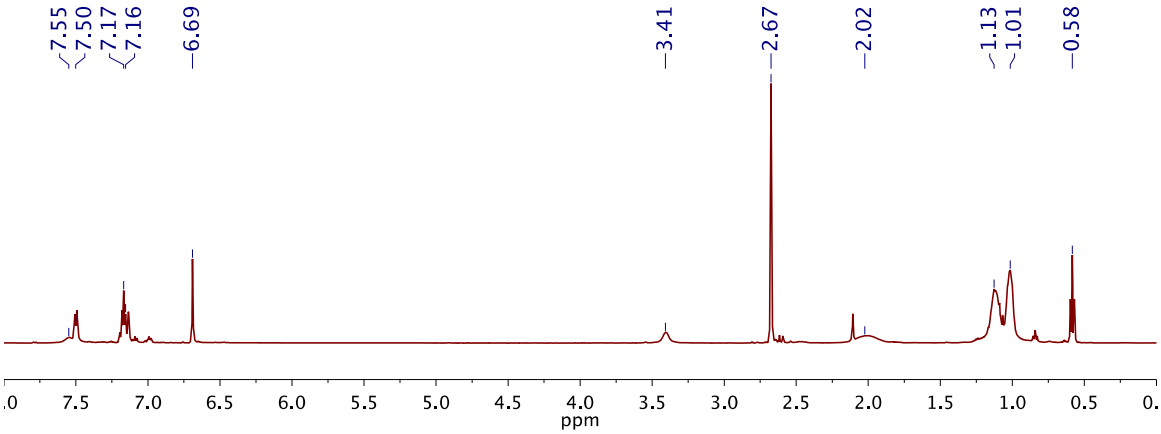

Figure A.18: ^{1}H NMR Spectrum (C_6D_6, 75°C, 499.85 MHz) of 1^{Et}

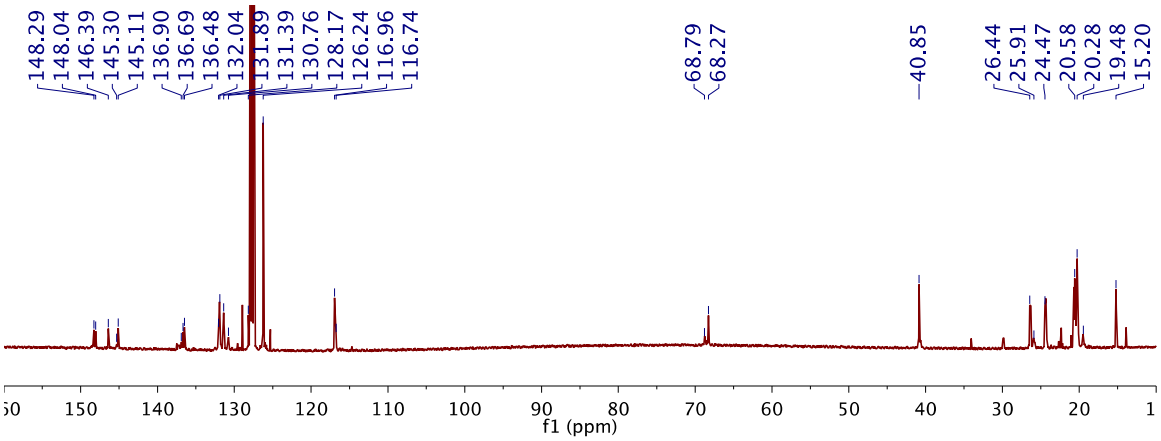

Figure A.19: ^{13}C NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 1^{Et}

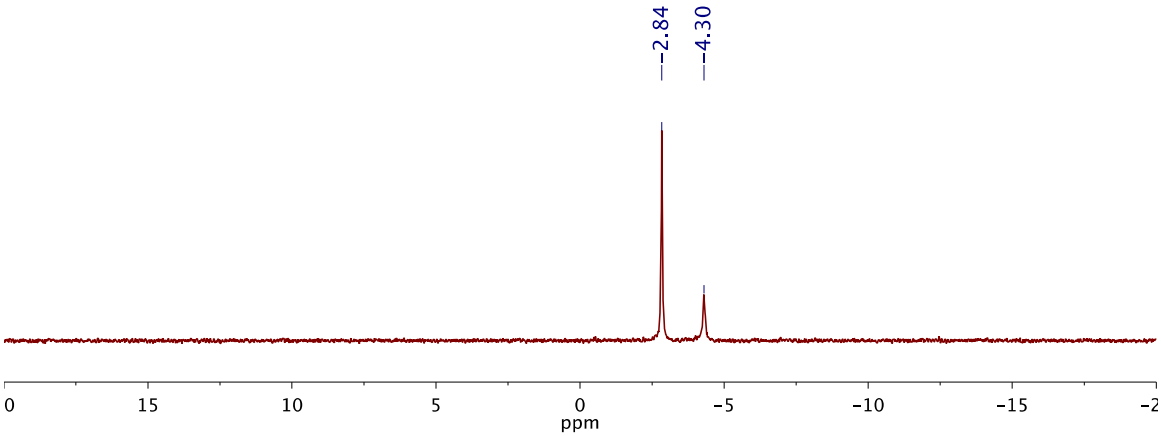

Figure A.20: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 1^{Et}

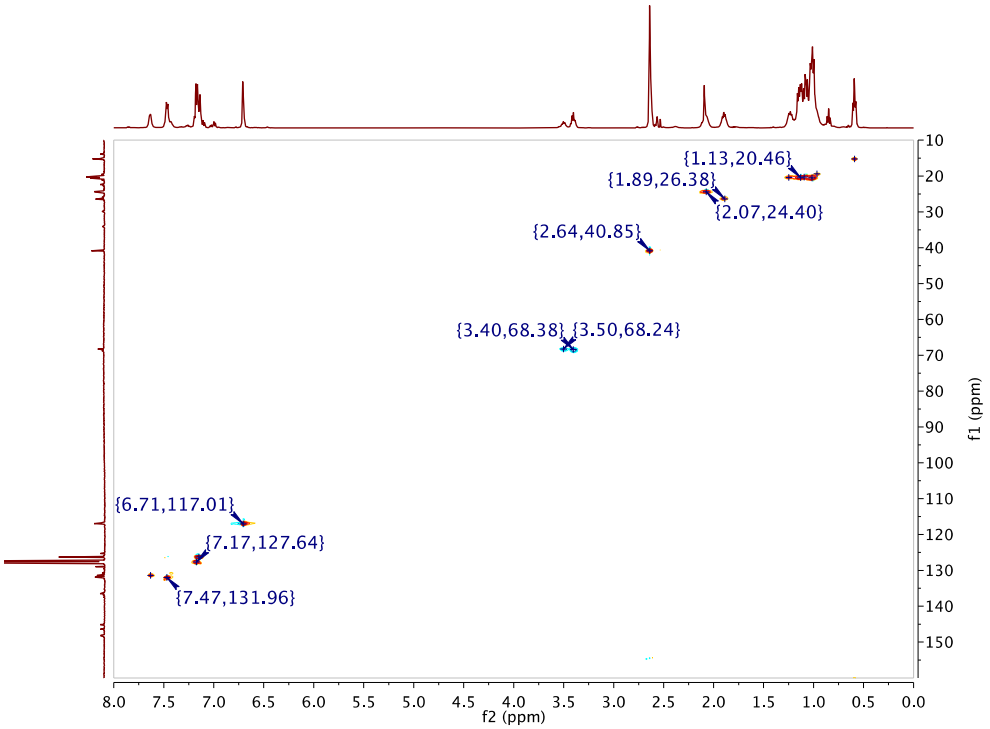

Figure A.21: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1^{Et}

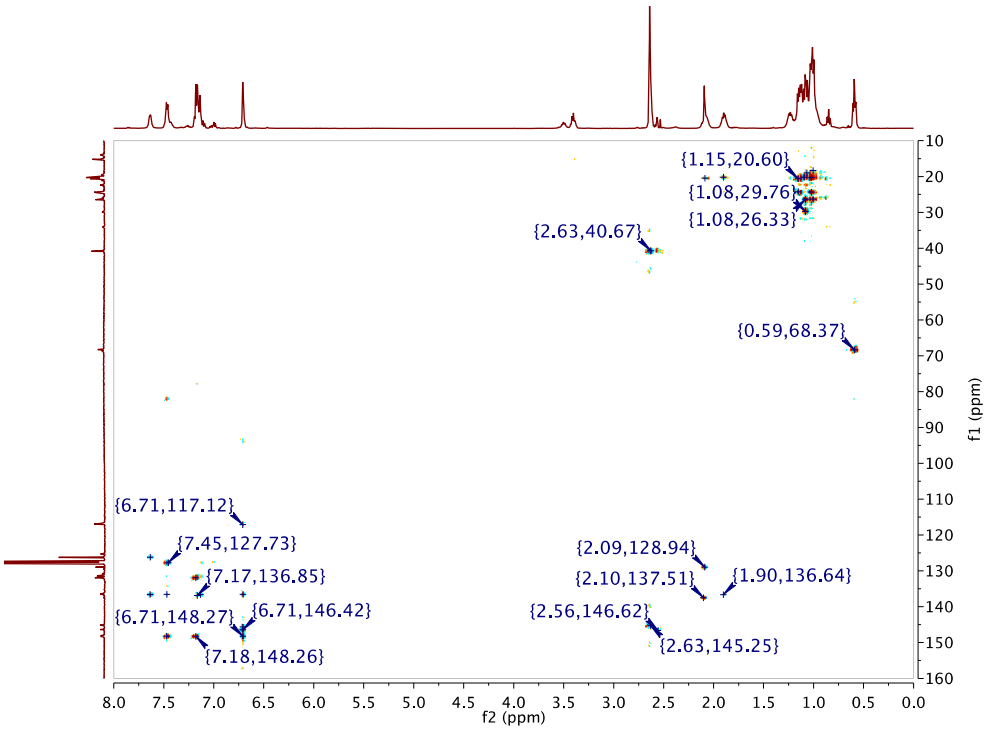

Figure A.22: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1^{Et}

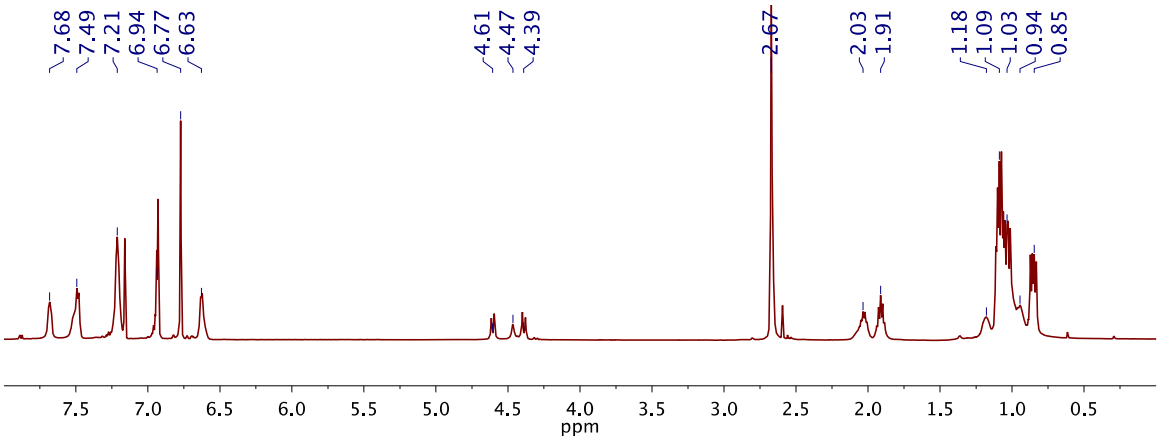

Figure A.23: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 1^{Bn}

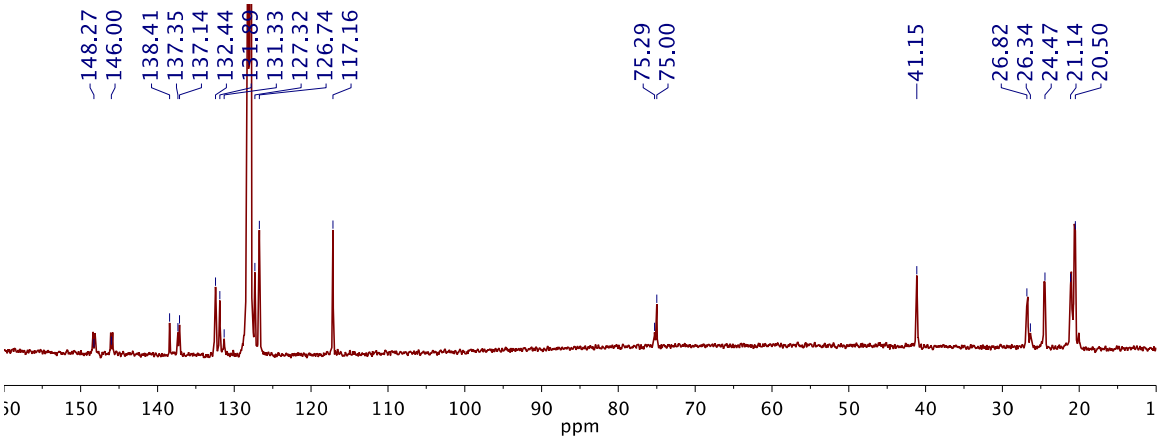

Figure A.24: $^{13}C\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 1^{Bn}

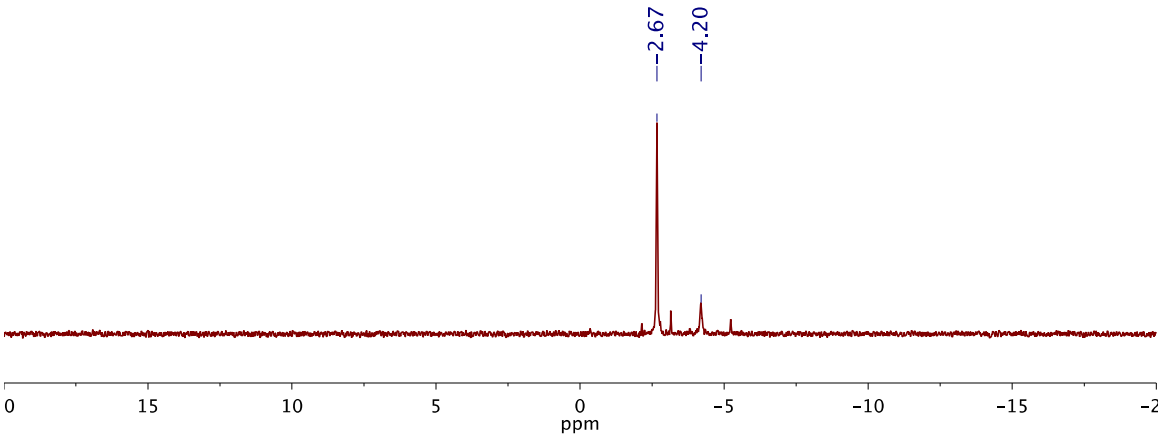

Figure A.25: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 1^{Bn}

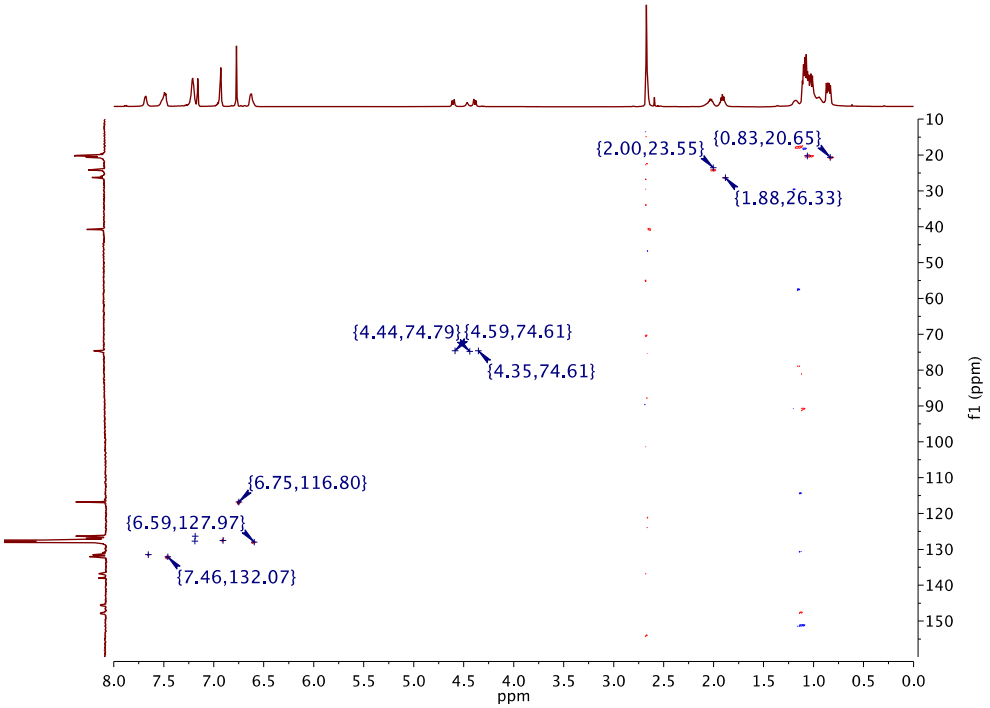

Figure A.26: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1^{Bn}

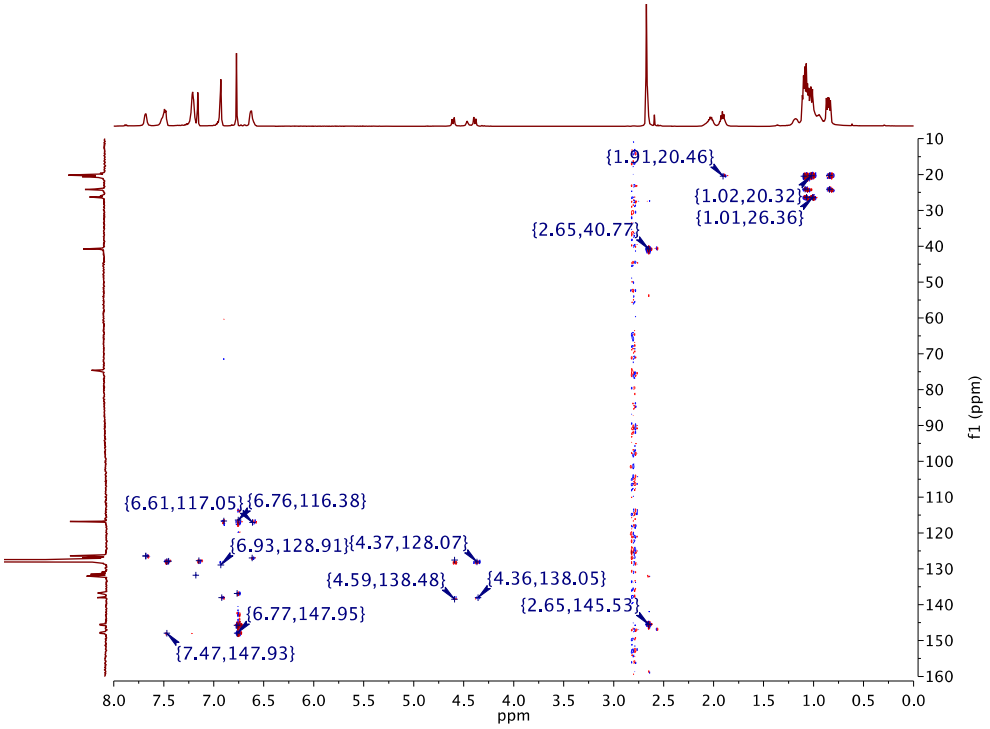

Figure A.27: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1^{Bn}

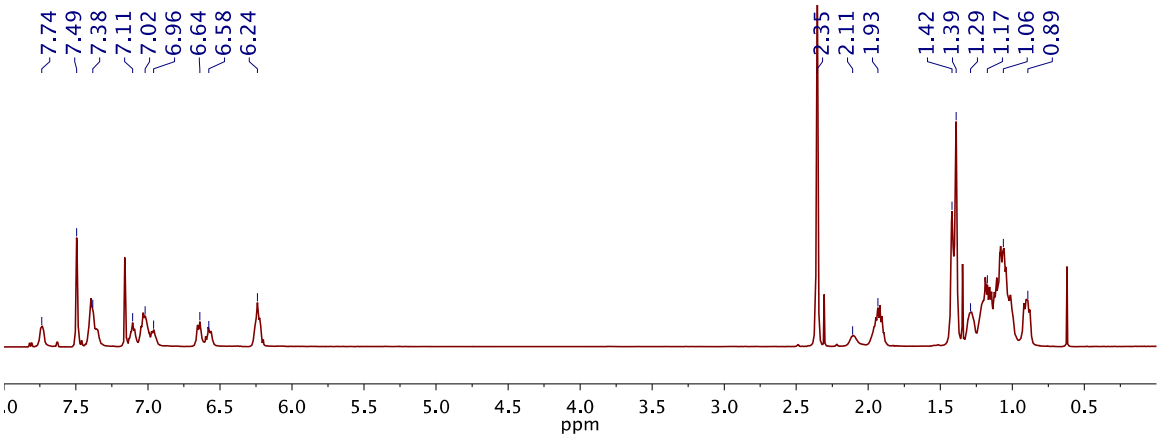

Figure A.28: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 1^{OAr}

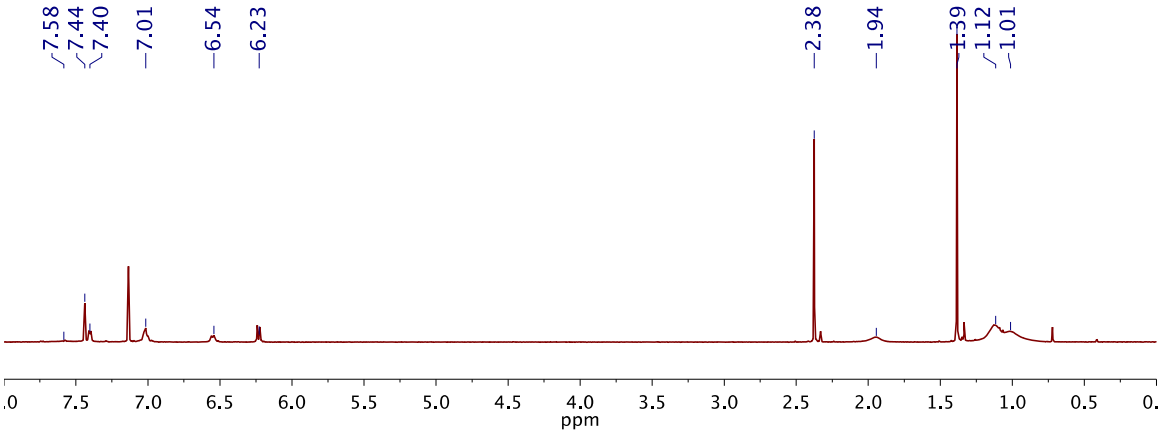

Figure A.29: ^{1}H NMR Spectrum (C_6D_6, 70°C, 499.85 MHz) of 1^{OAr}

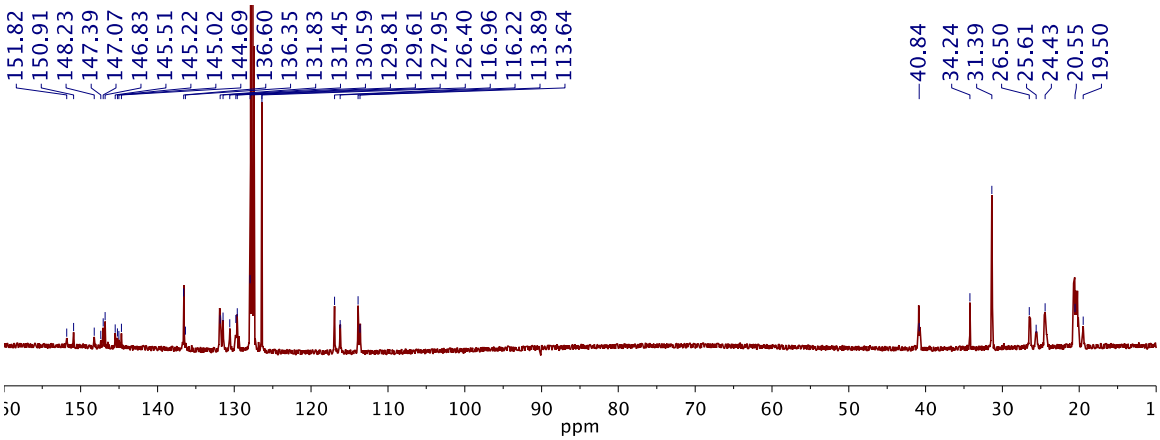

Figure A.30: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 1^{OAr}

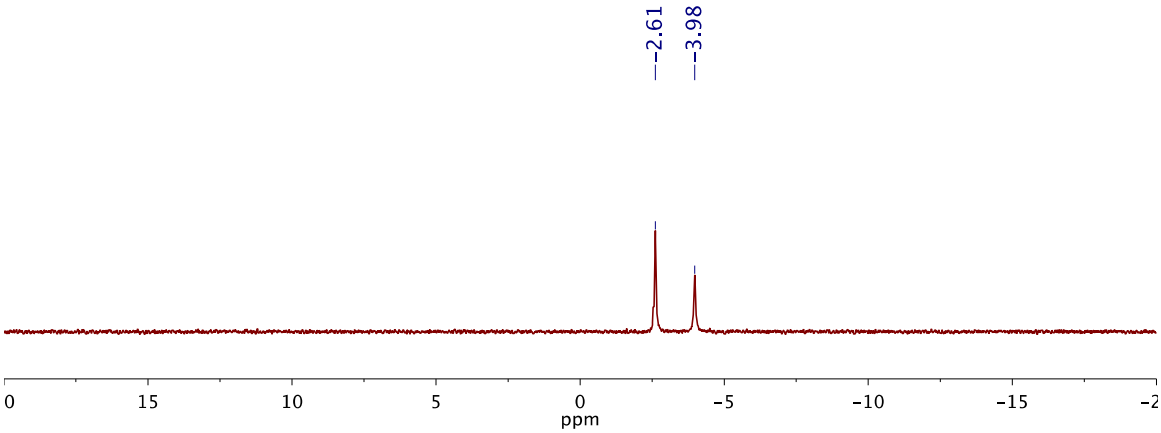

Figure A.31: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 1^{OAr}

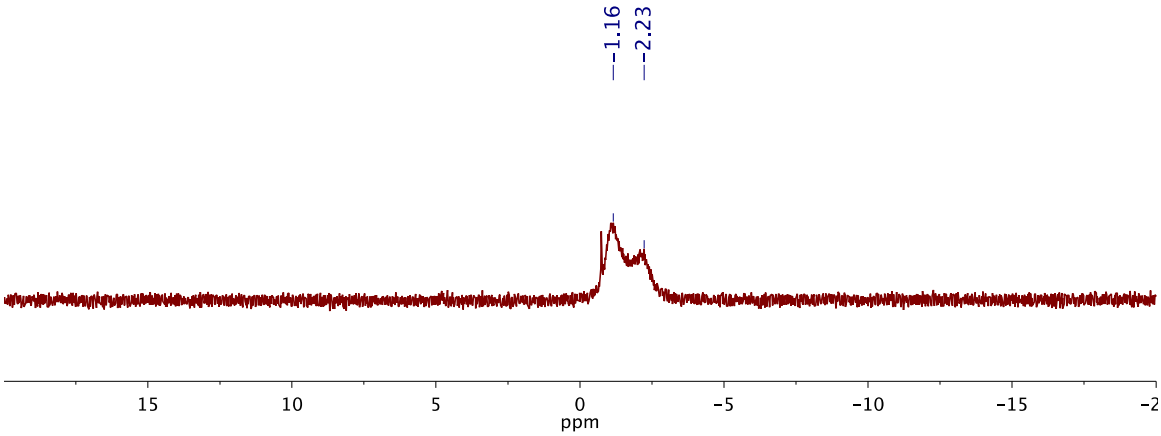

Figure A.32: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 70°C, 202.36 MHz) of 1^{OAr}

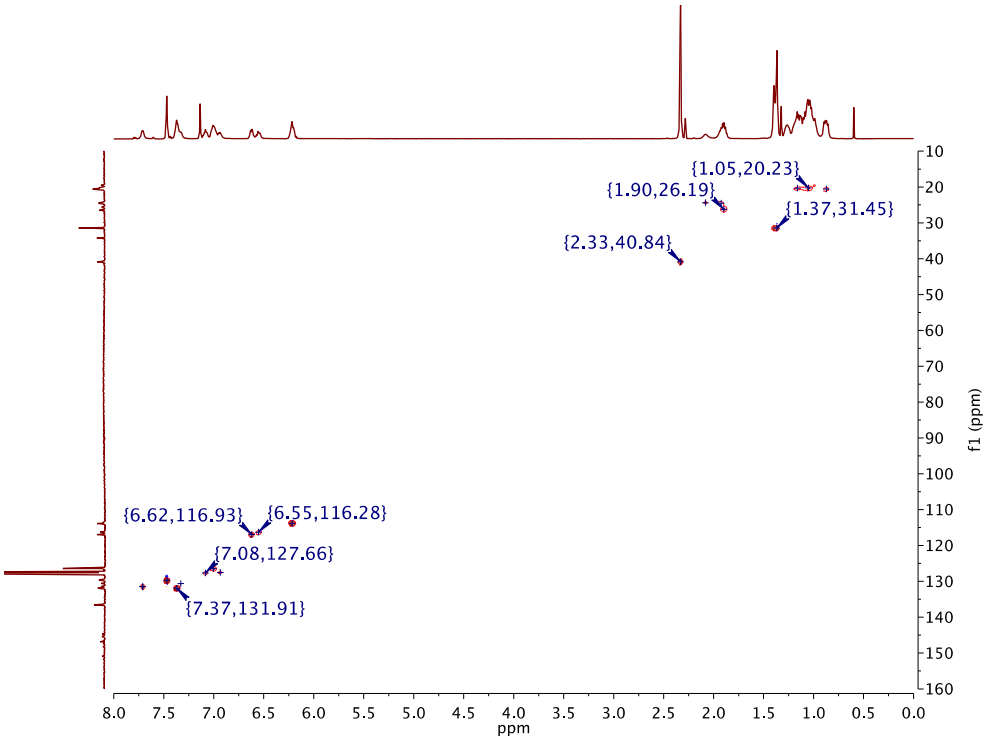

Figure A.33: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1^{OAr}

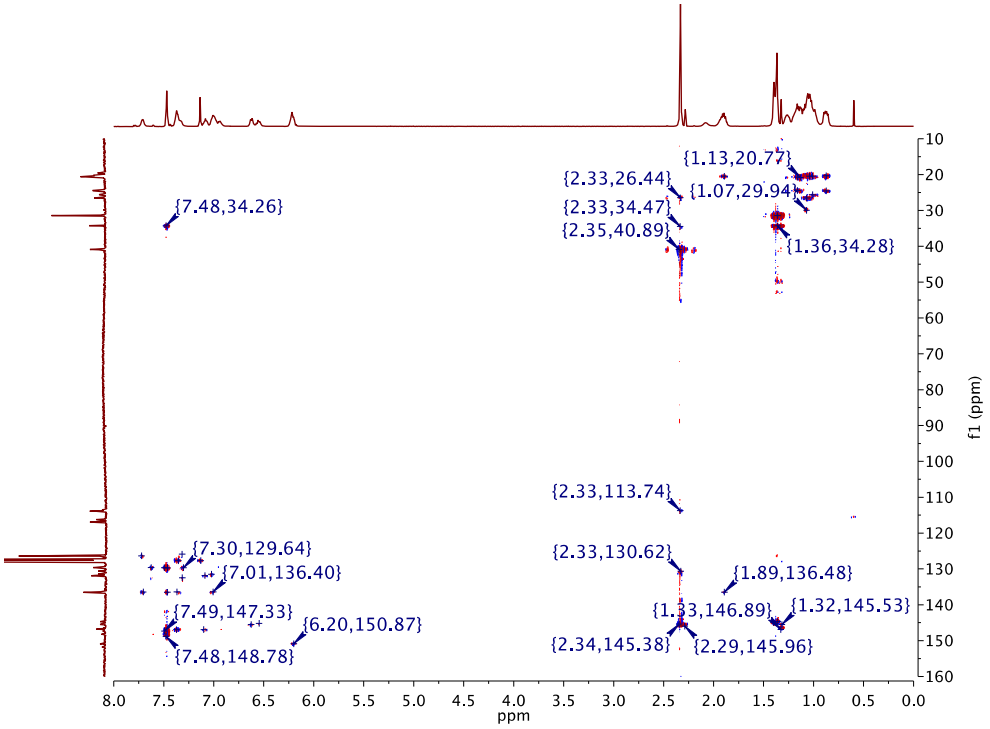

Figure A.34: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1^{Oar}

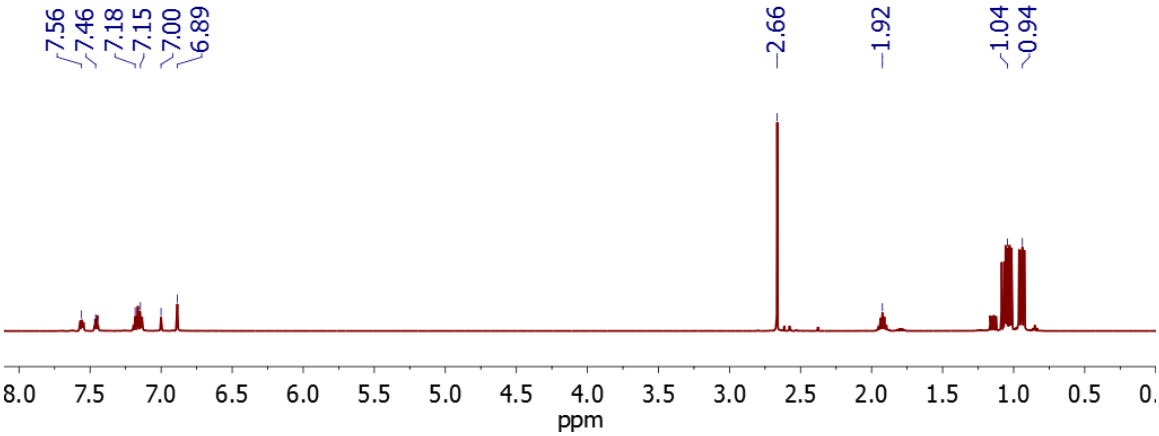

Figure A.35: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-dimethylaminobenzene.

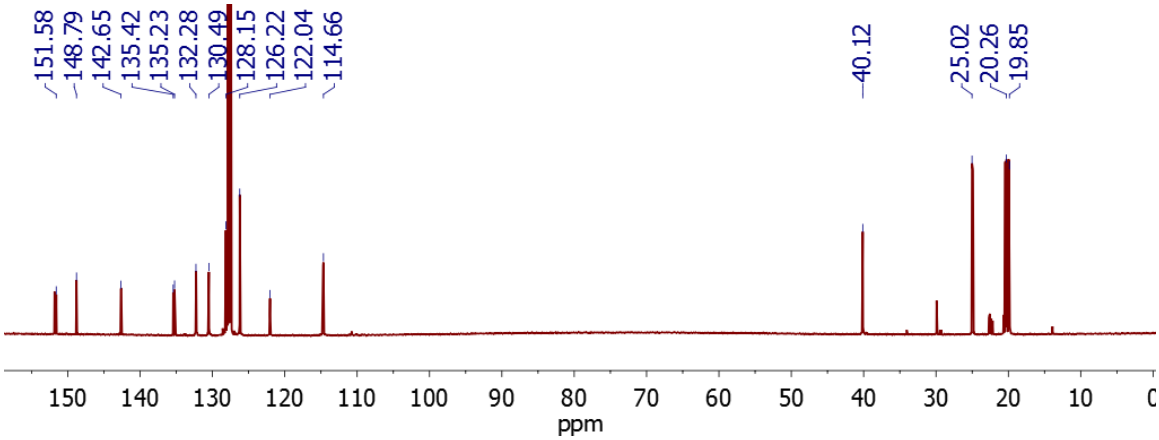

Figure A.36: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-dimethylaminobenzene.

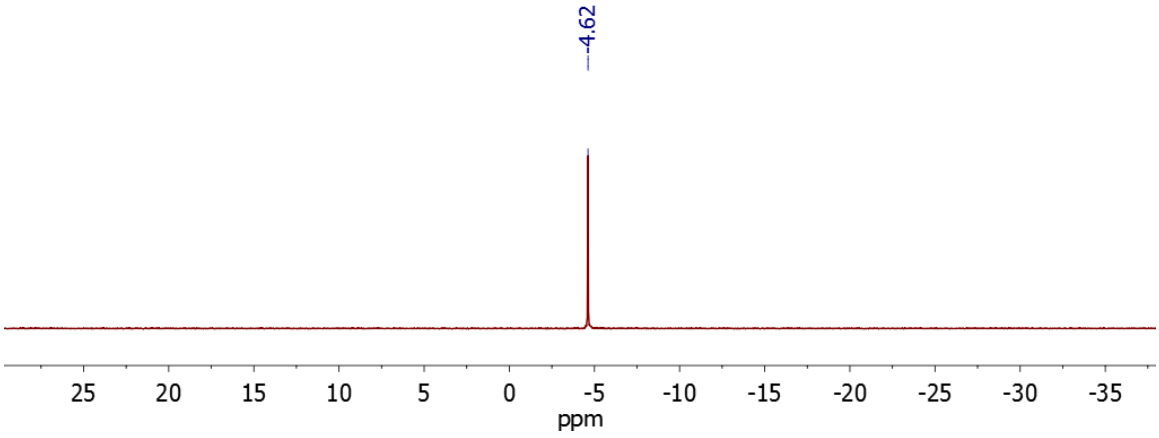

Figure A.37: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-dimethylaminobenzene.

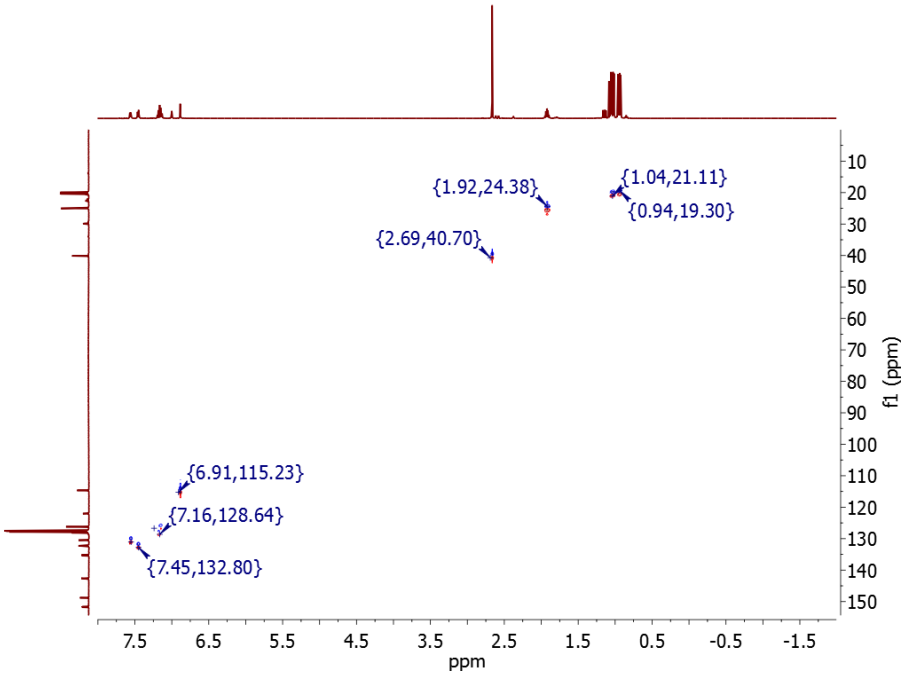

Figure A.38: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-dimethylaminobenzene.

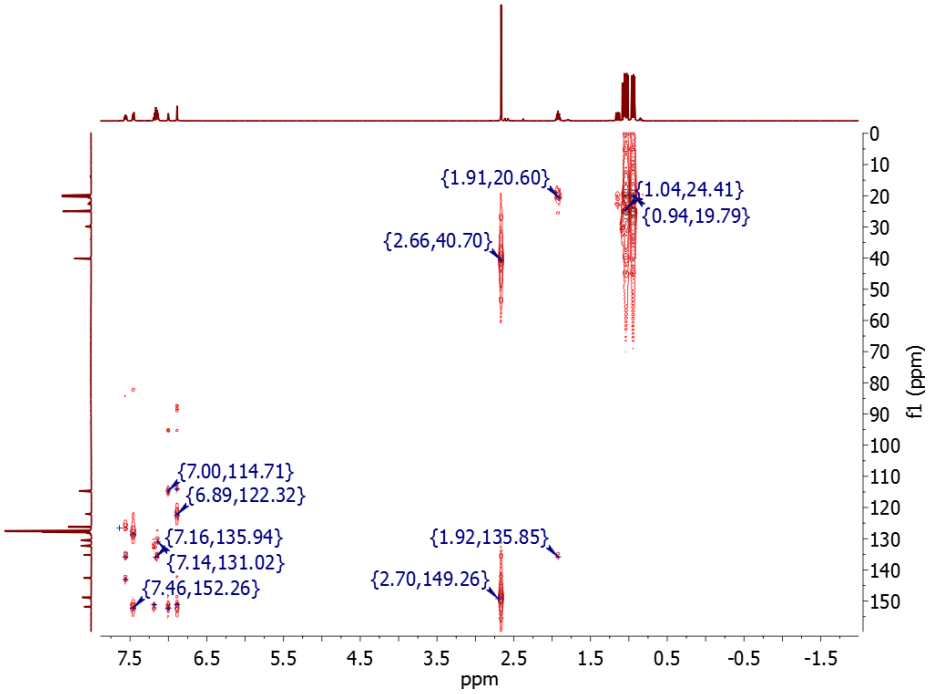

Figure A.39: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-dimethylaminobenzene.

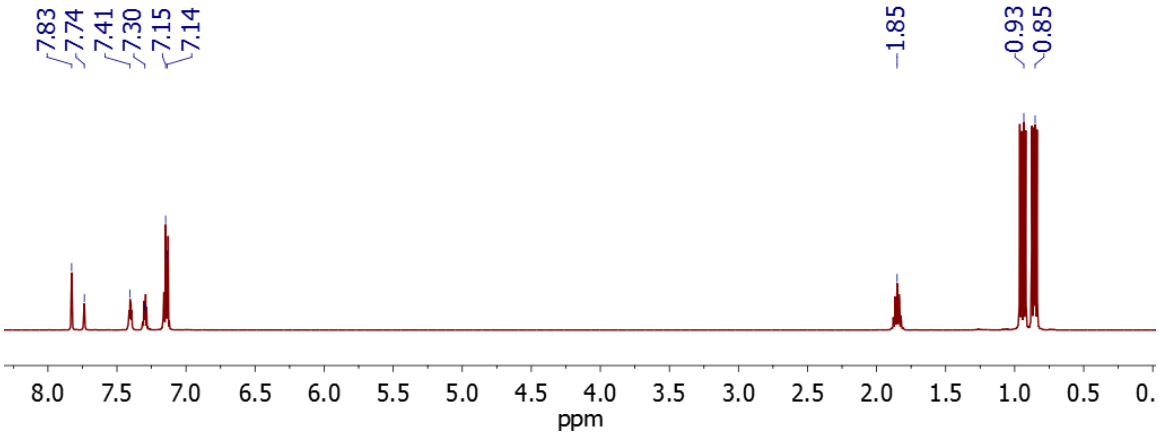

Figure A.40: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-trifluoromethylbenzene.

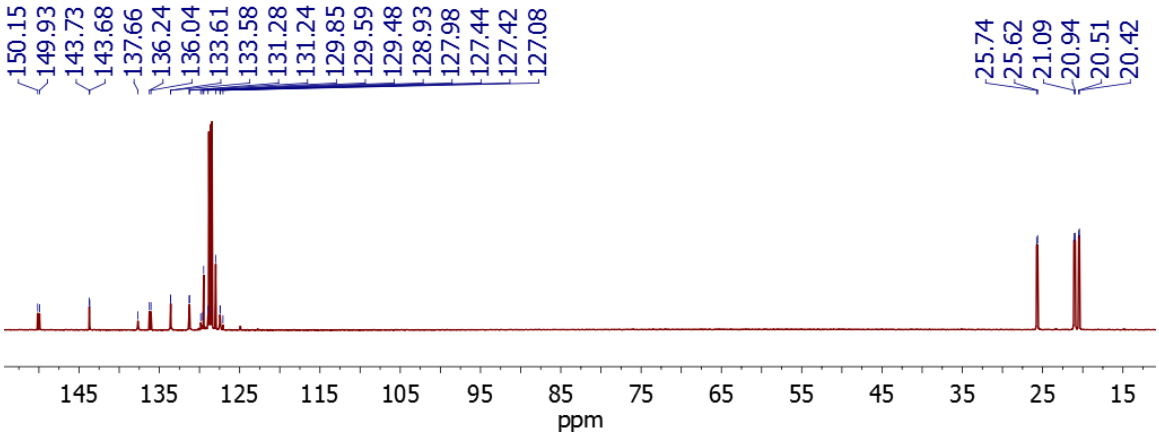

Figure A.41: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-trifluoromethylbenzene.

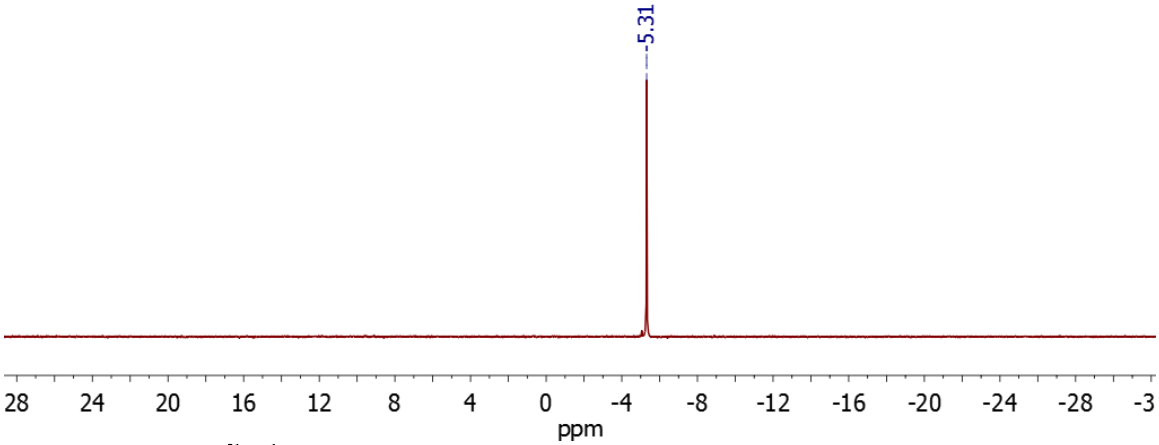

Figure A.42: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-trifluoromethylbenzene.

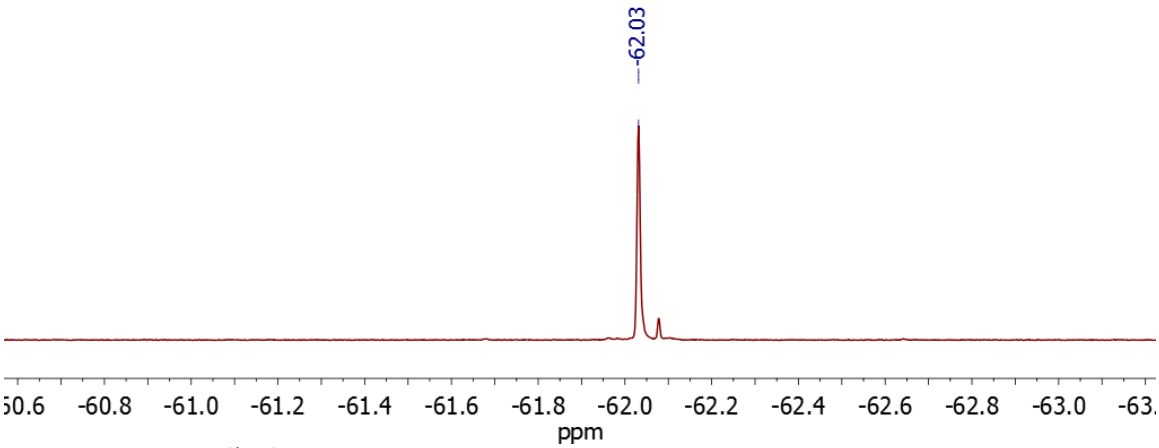

Figure A.43: $^{19}F\{^{1}H\}$ NMR Spectrum (C_6D_6, 121.48 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-trifluoromethylbenzene.

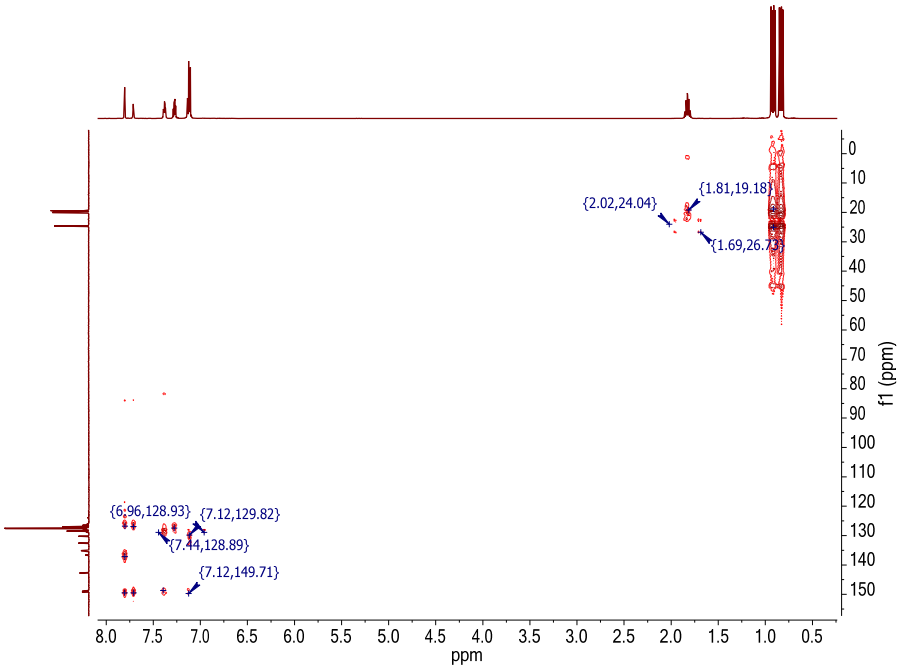

Figure A.44: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-trifluoromethylbenzene.

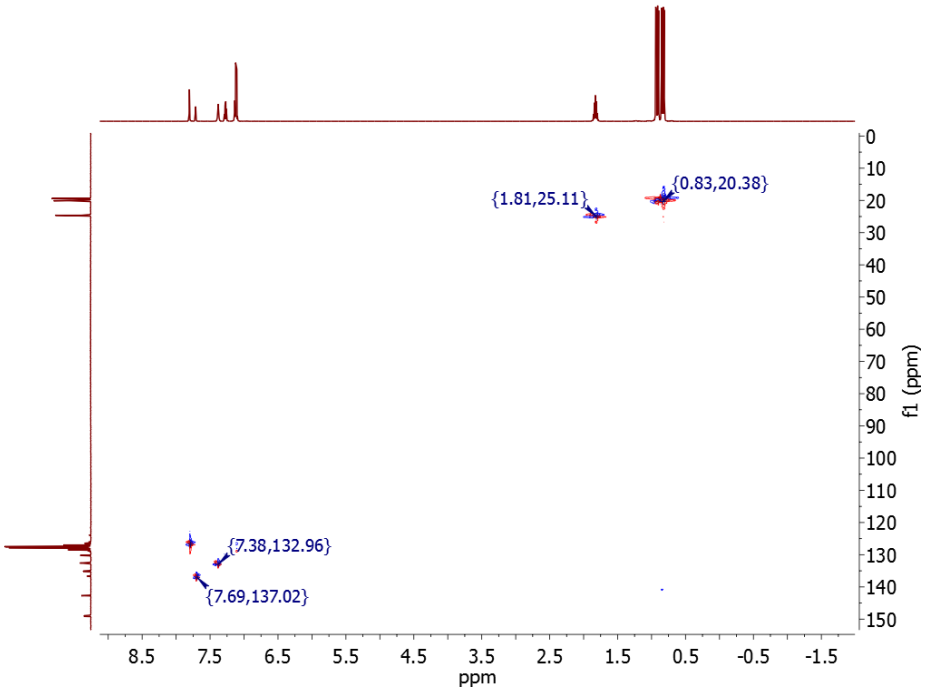

Figure A.45: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 1,3-bis(2'-diisopropylphosphino)-5-trifluoromethylbenzene.

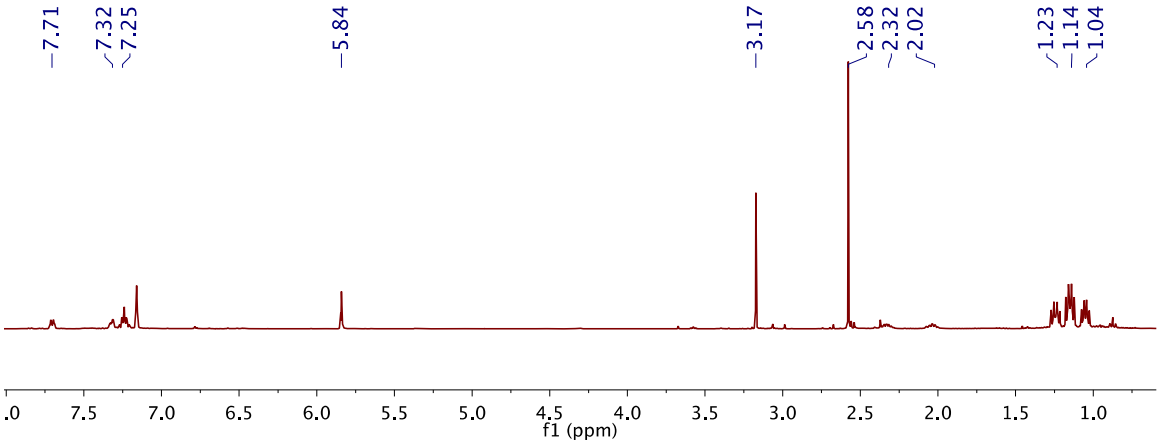

Figure A.46: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of 2

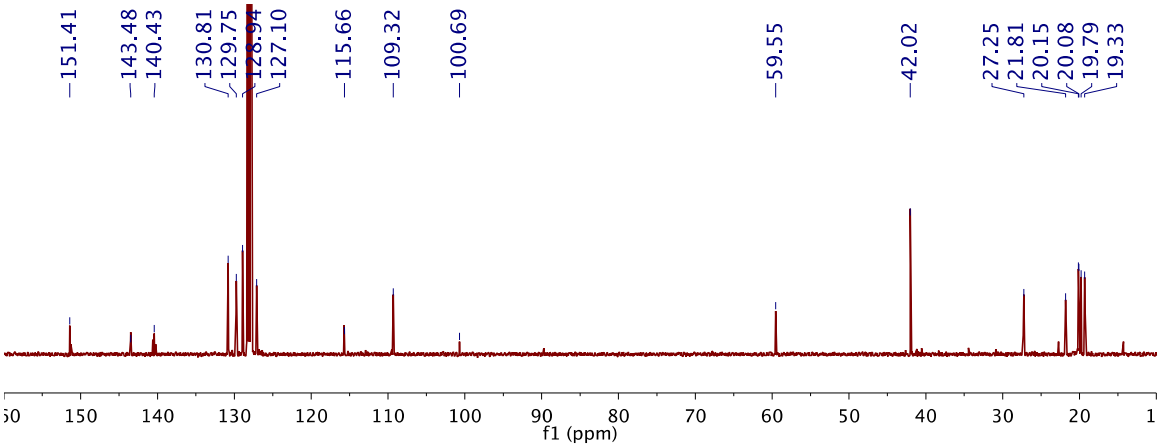

Figure A.47: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 100.54 MHz) of 2

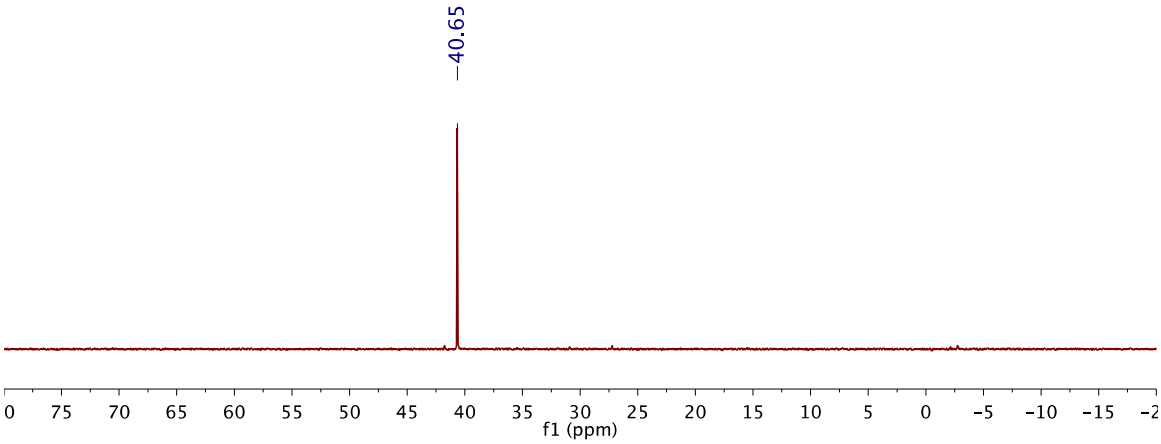

Figure A.48: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of 2

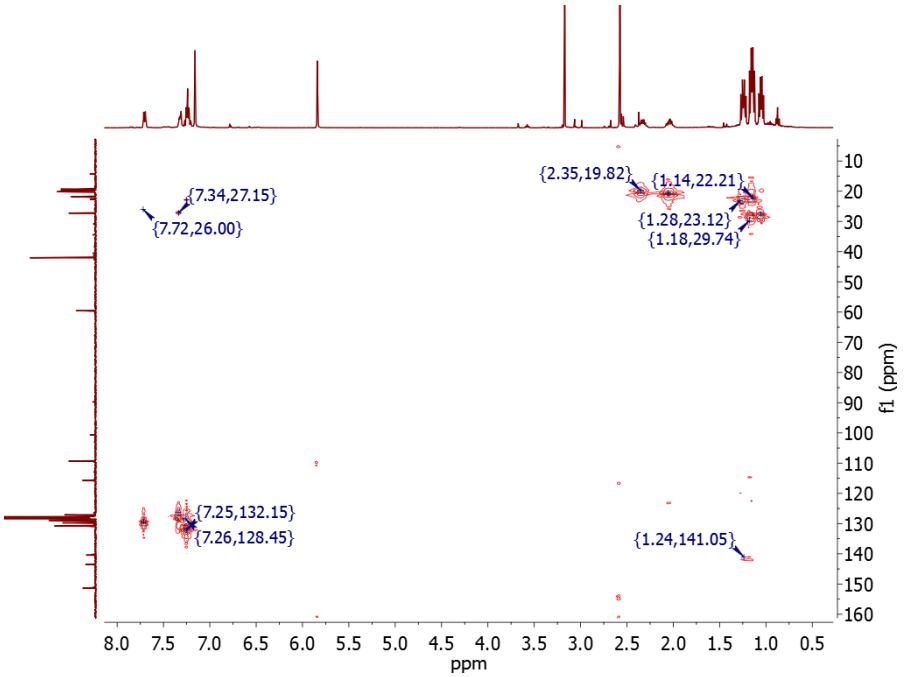

Figure A.49: ^{1}H-^{13}C H2BC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 2.

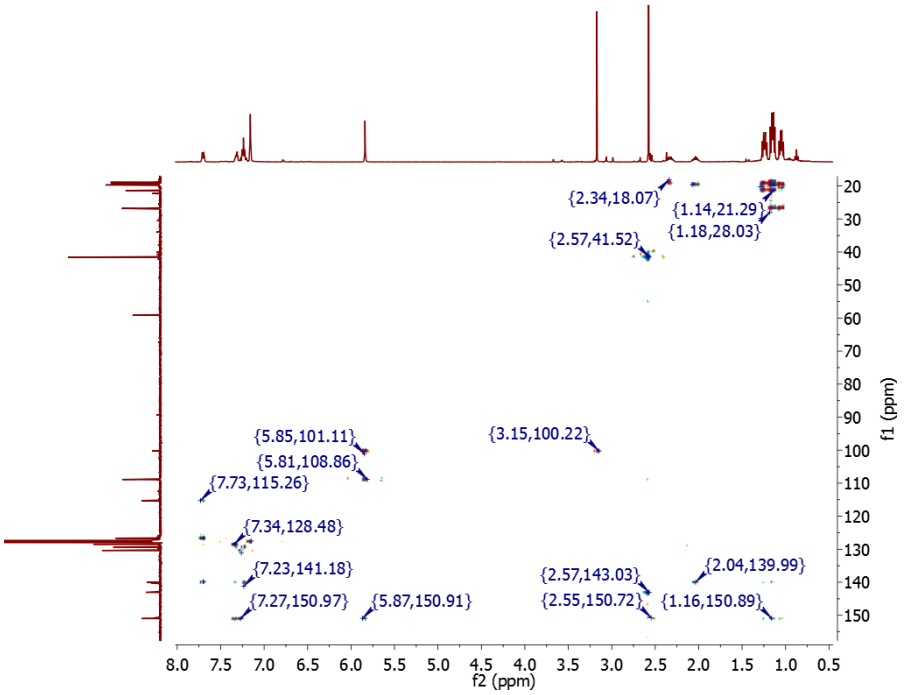

Figure A.50: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 2.

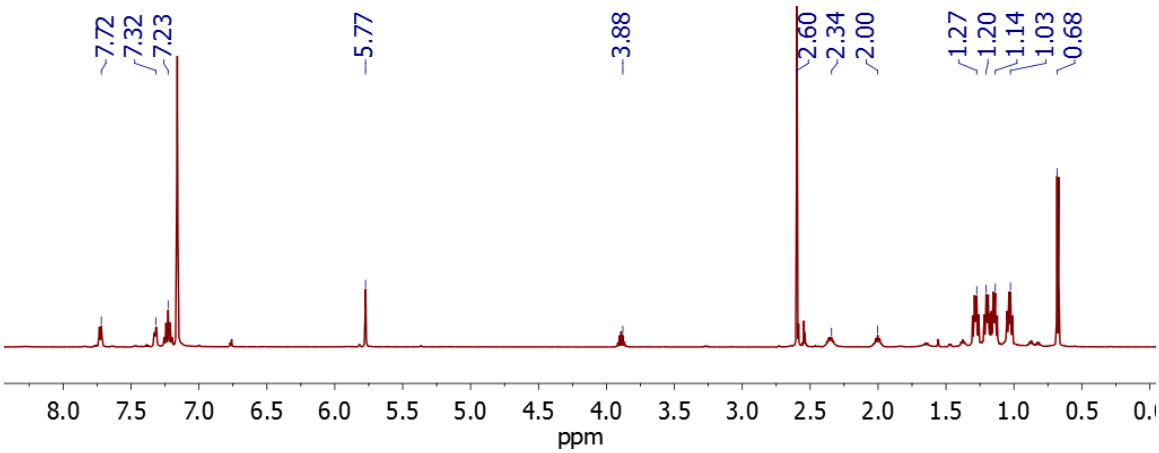

Figure A.51: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of 2^{iPr}

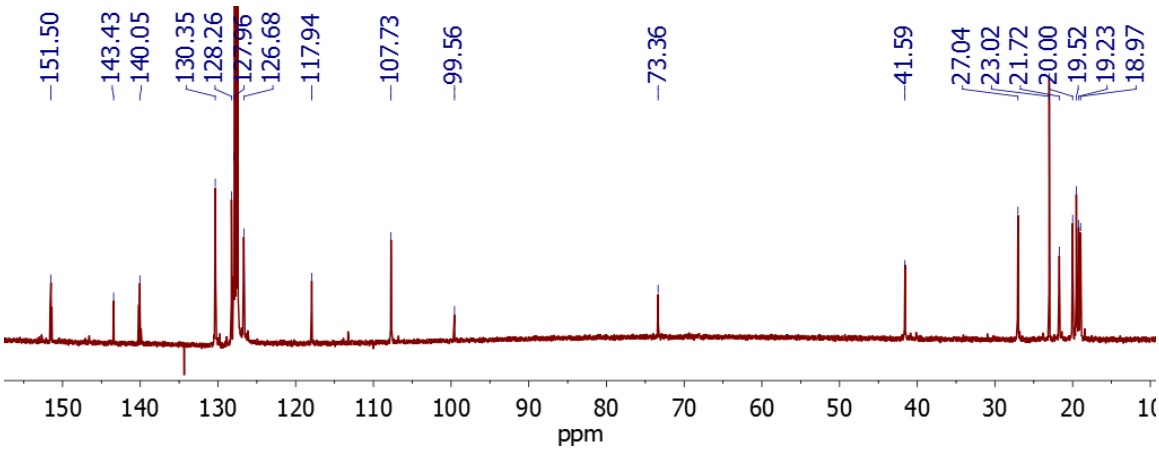

Figure A.52: ^{13}C NMR Spectrum (C_6D_6, 100.54 MHz) of 2^{iPr}

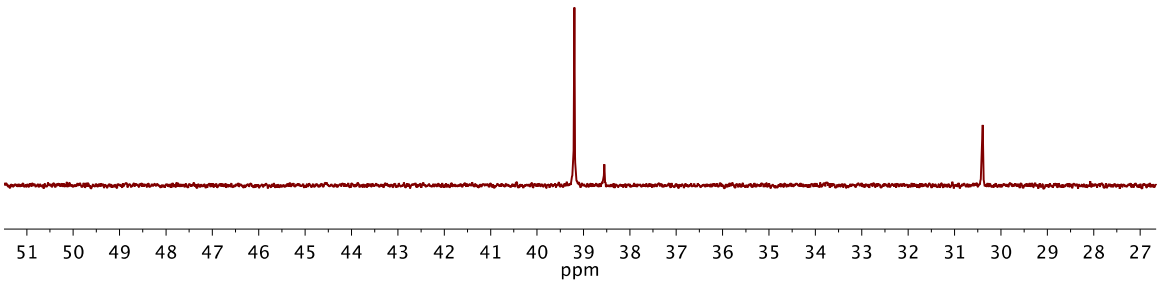

Figure A.53: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of 2^{iPr}

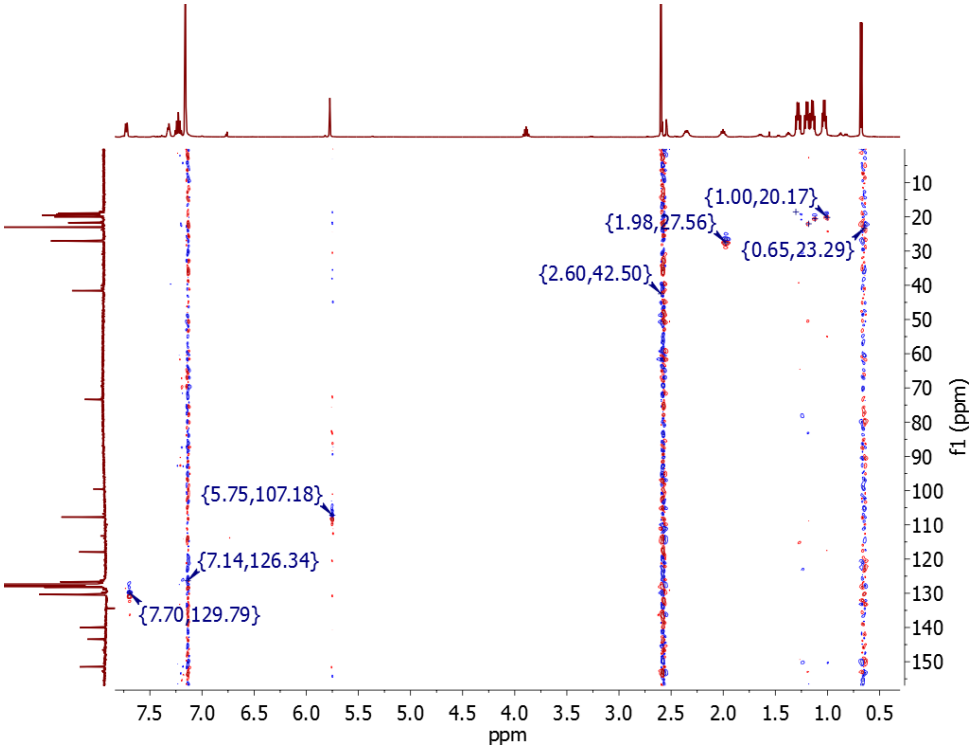

Figure A.54: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 2^{iPr}.

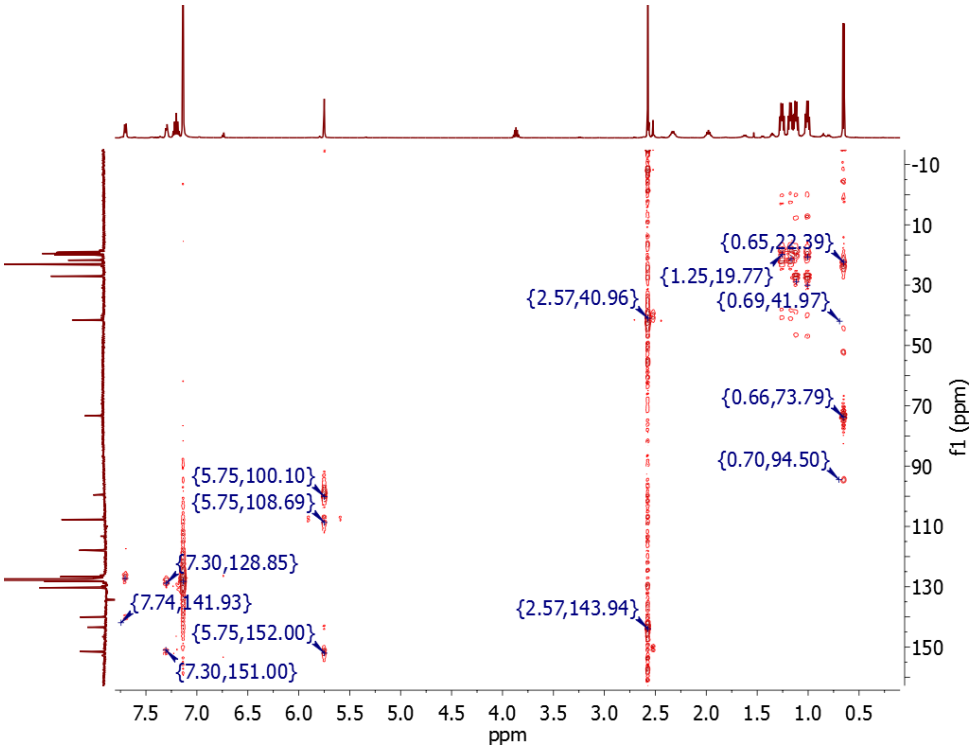

Figure A.55: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 2^{iPr}.

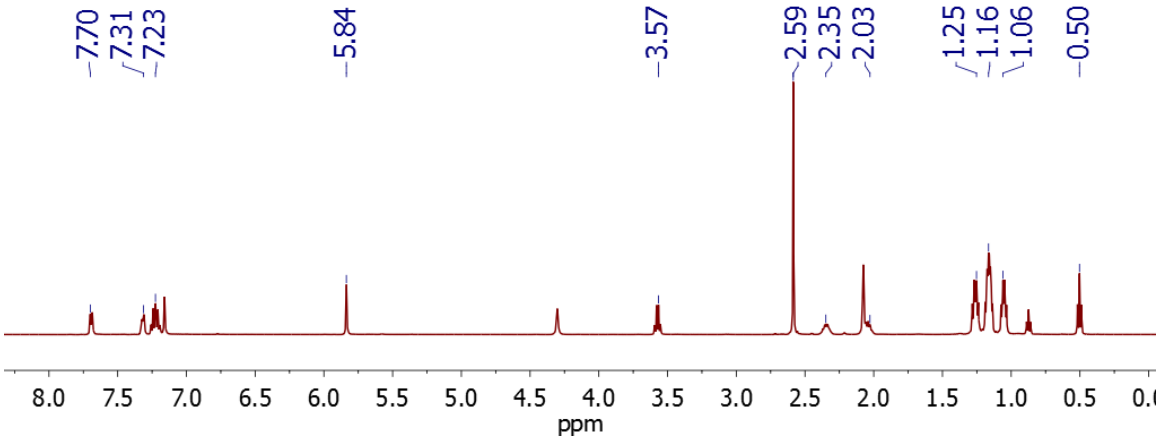

Figure A.56: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of 2^{Et}

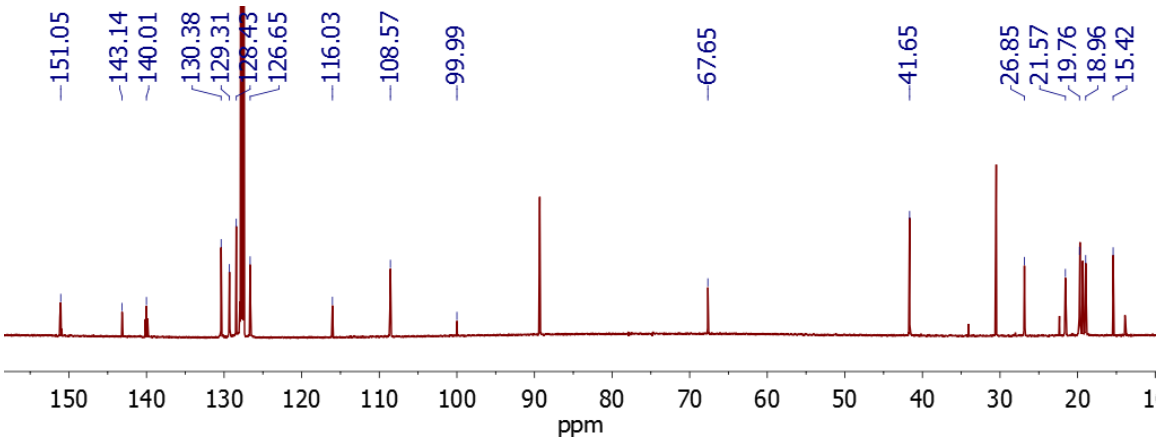

Figure A.57: ^{13}C NMR Spectrum (C_6D_6, 100.54 MHz) of 2^{Et}

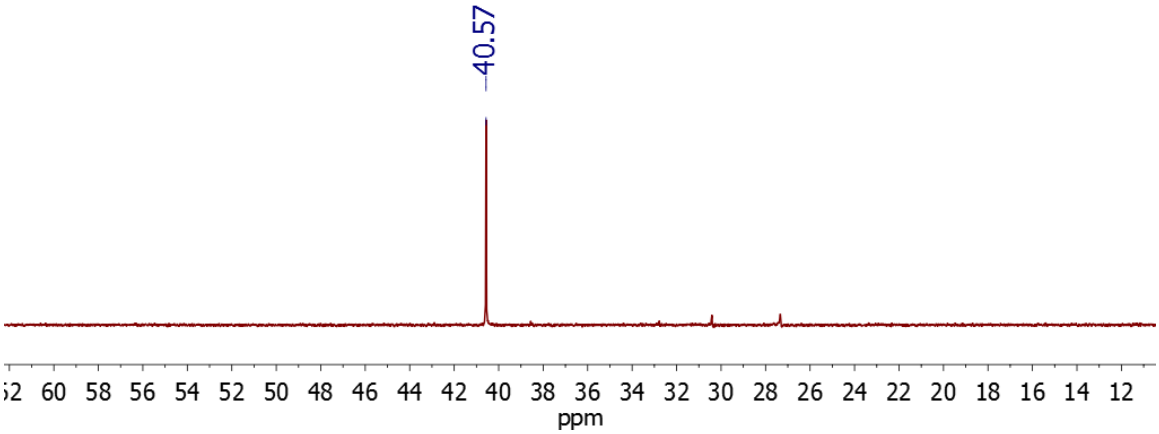

Figure A.58: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of 2^{Et}

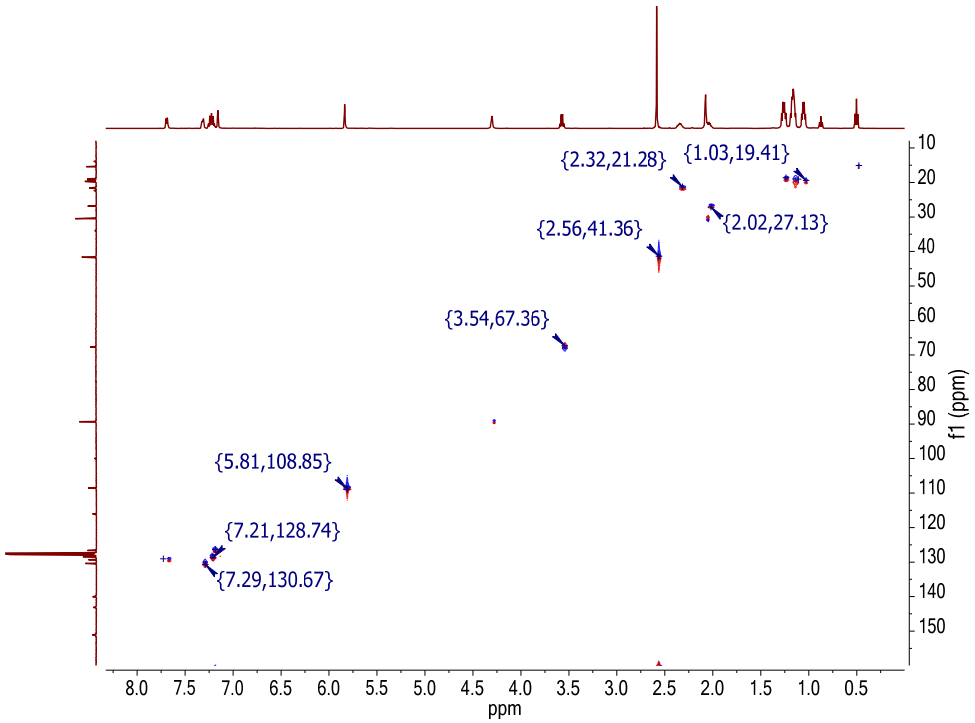

Figure A.59: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 2^{Et}.

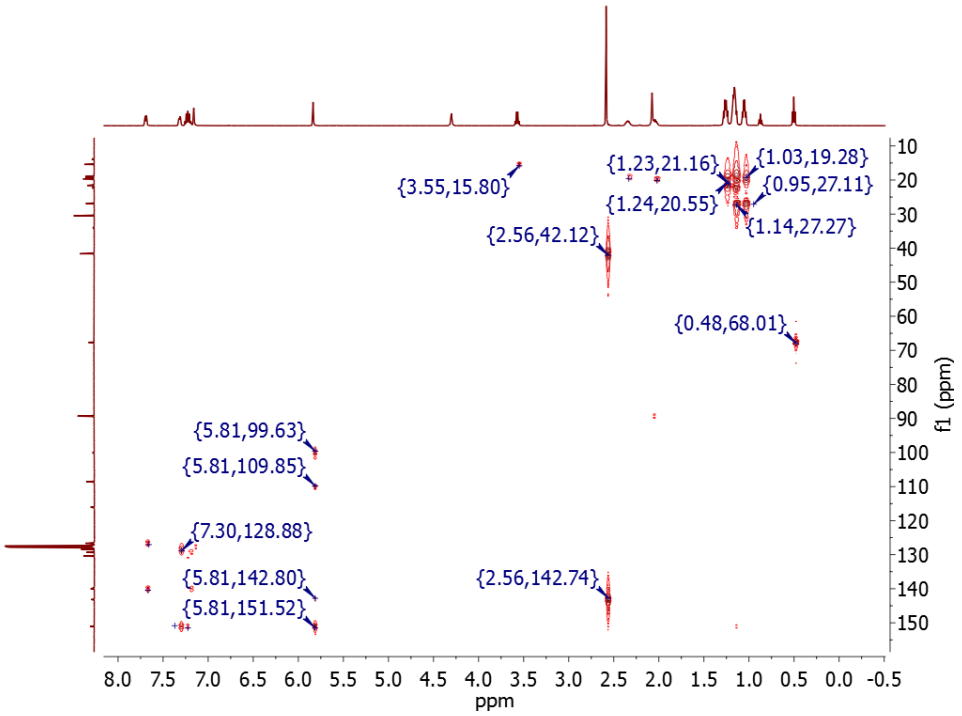

Figure A.60: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 25°C, 499.85, 125.70 MHz) of 2^{Et}.

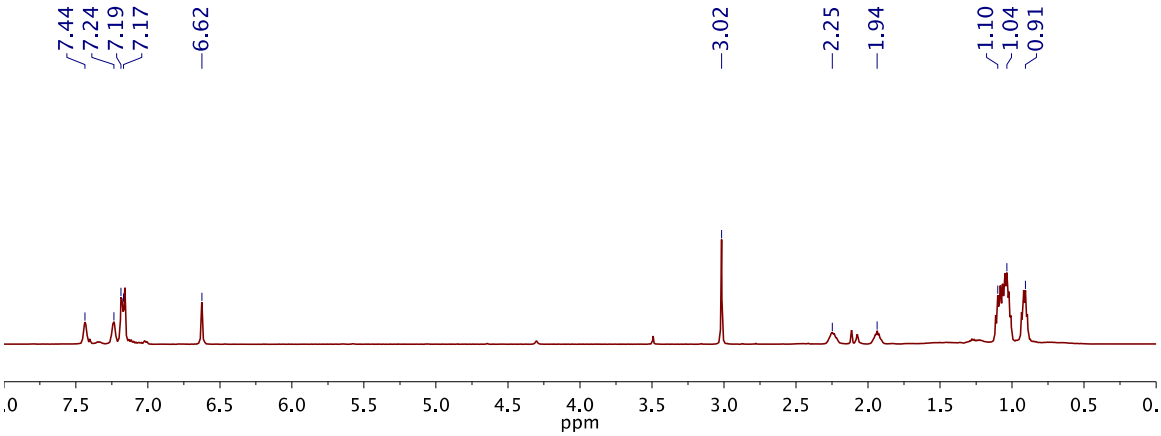

Figure A.61: ^{1}H NMR Spectrum (C_6D_6, 499.85 MHz) of 2_{CF_3}

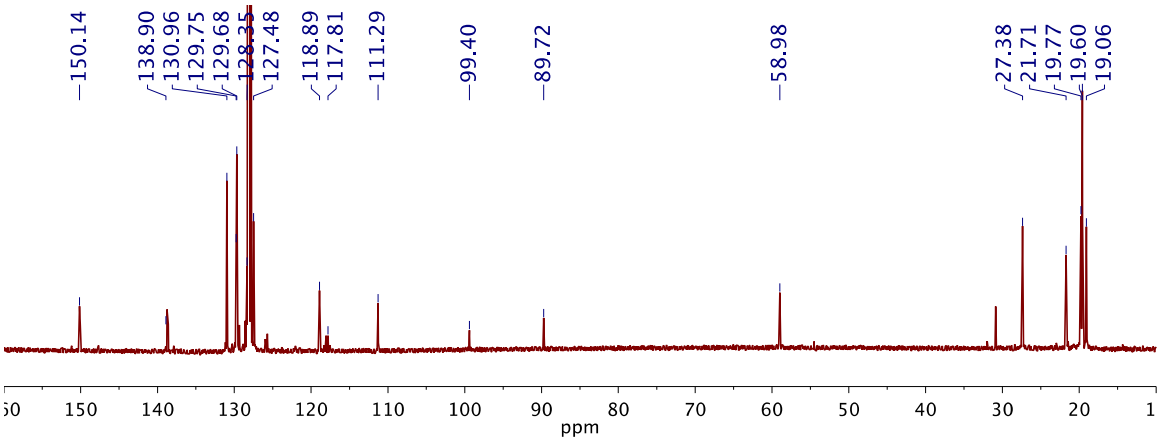

Figure A.62: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 125.70 MHz) of 2_{CF_3}

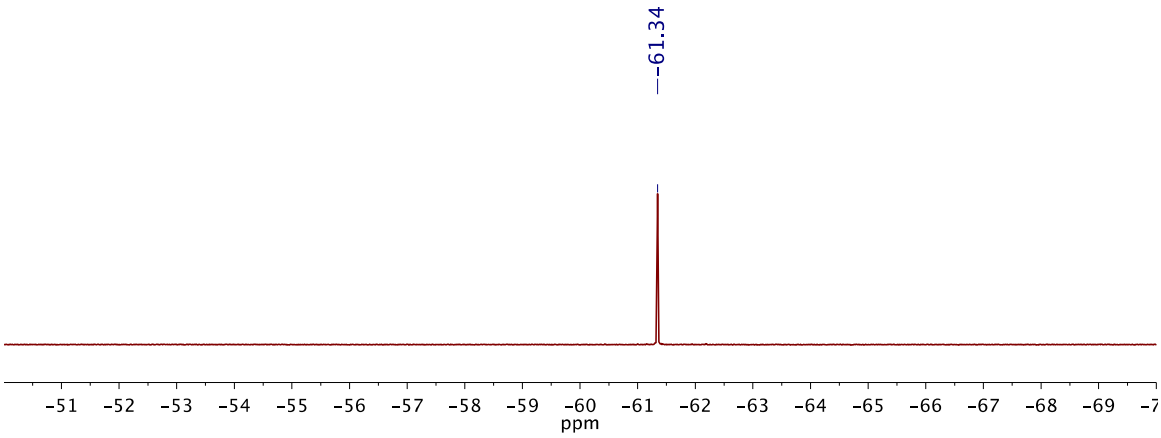

Figure A.63: ^{19}F{^{1}H} NMR Spectrum (C_6D_6, 282.33 MHz) of 2_{CF_3}

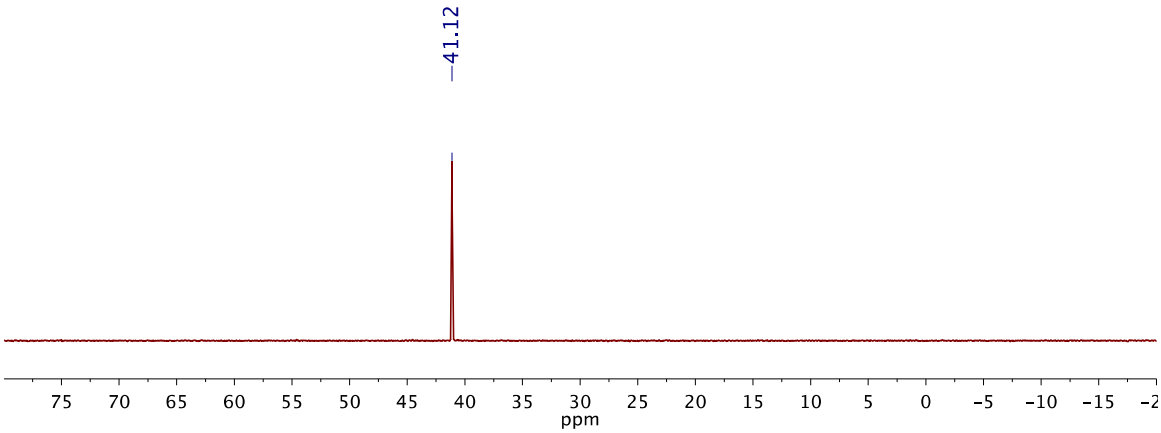

Figure A.64: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 121.48 MHz) of 2_{CF_3}

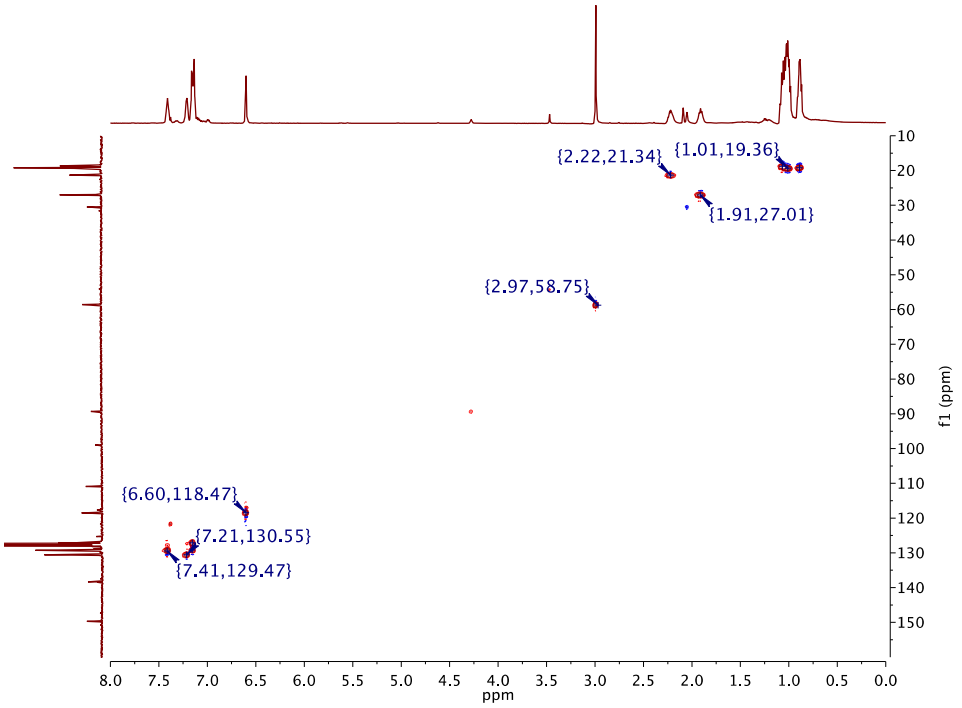

Figure A.65: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 2_{CF3}

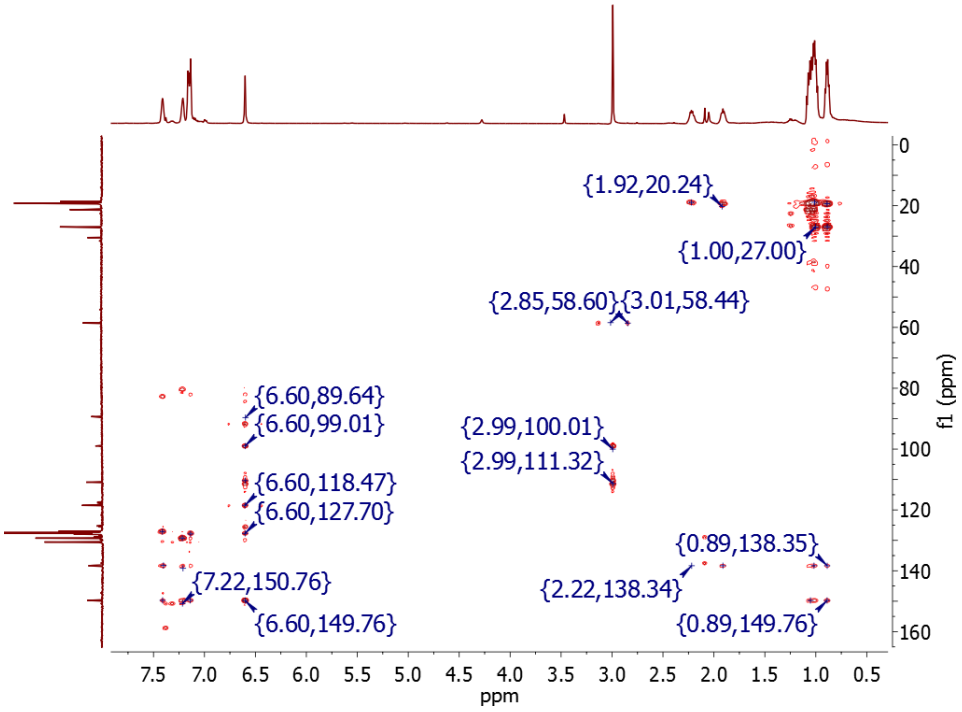

Figure A.66: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 2_{CF3}

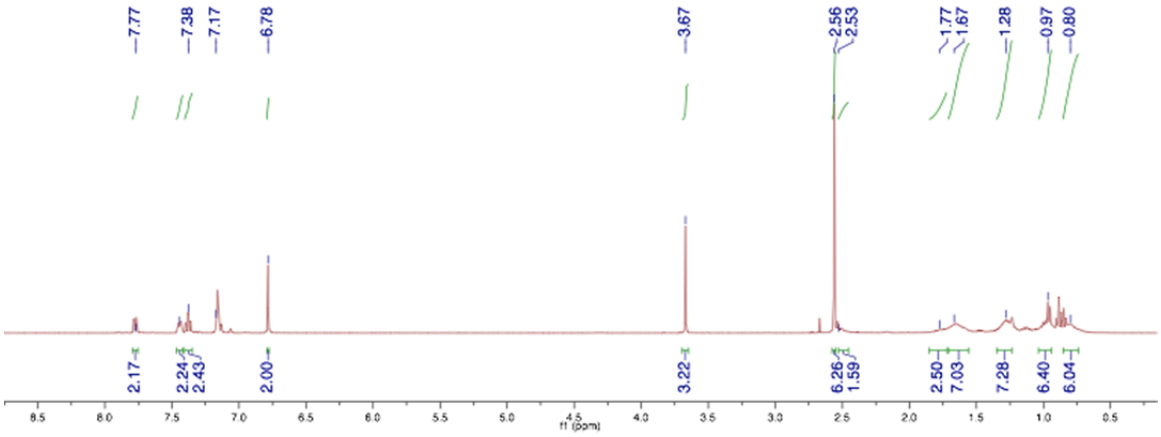

Figure A.67: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of 3

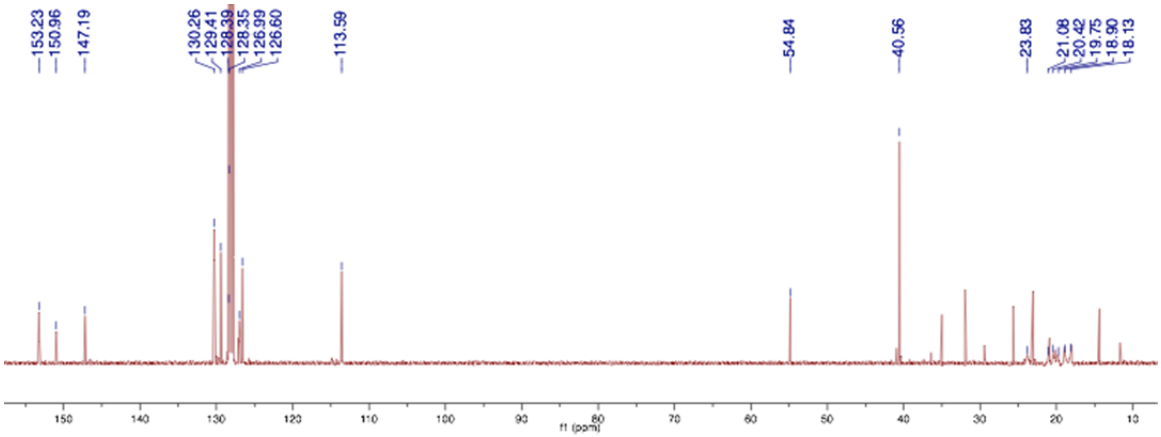

Figure A.68: ^{13}C NMR Spectrum (C_6D_6, 100.54 MHz) of 3

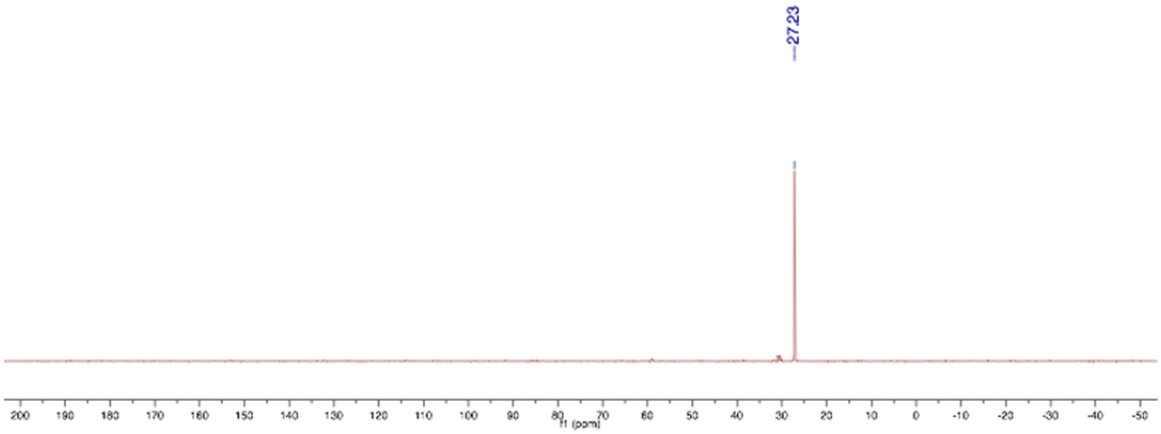

Figure A.69: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of 3

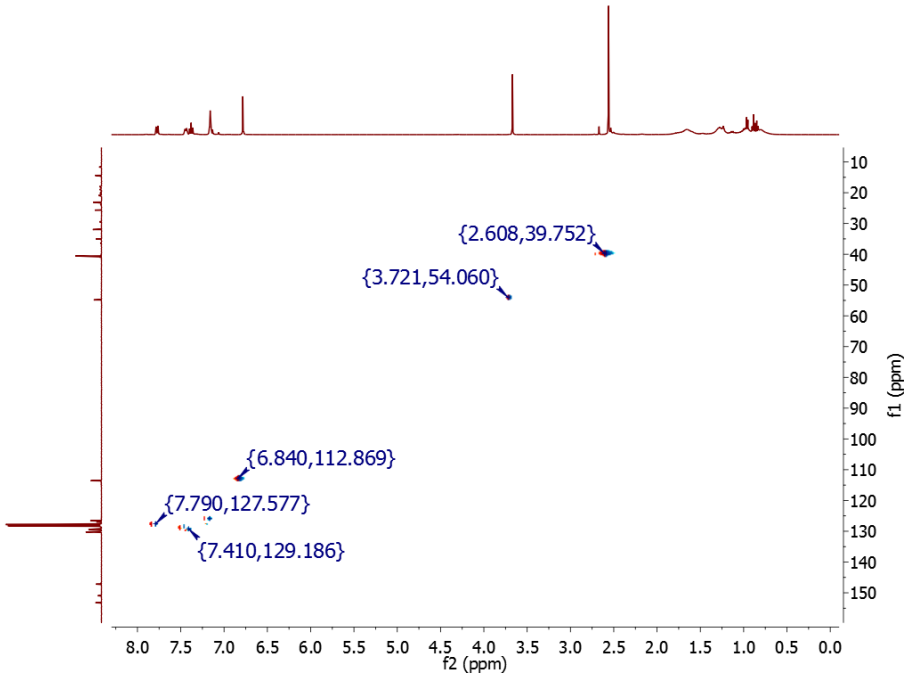

Figure A.70: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 3

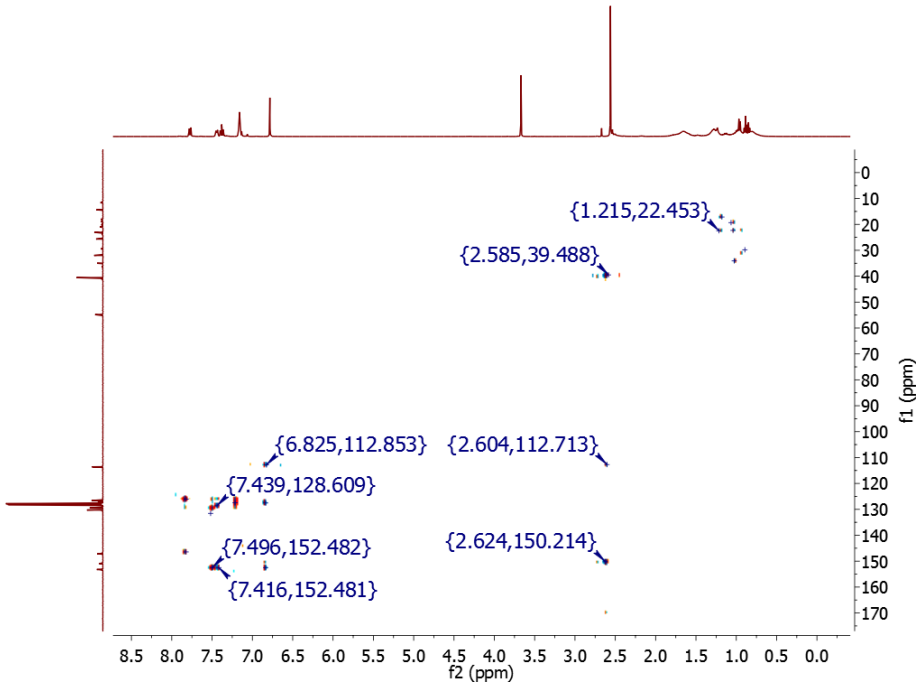

Figure A.71: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 3

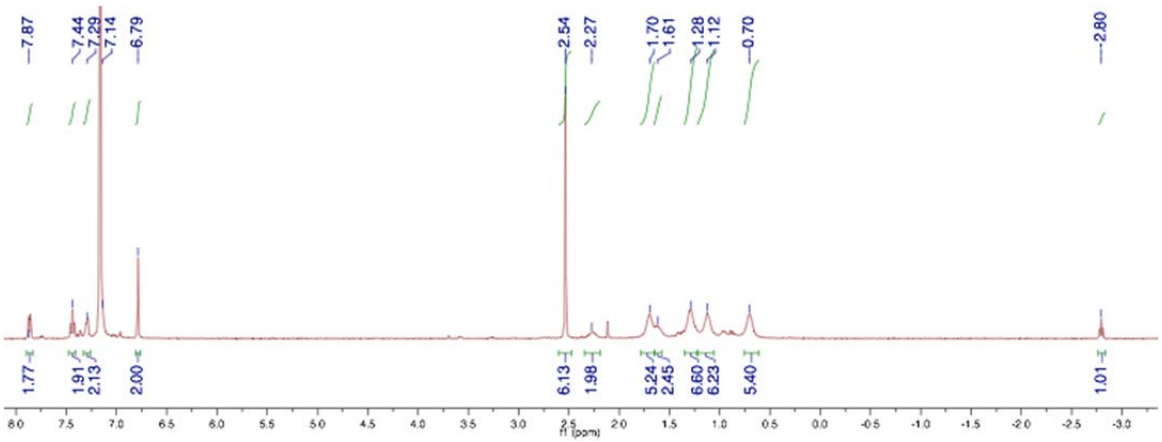

Figure A.72: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of 4

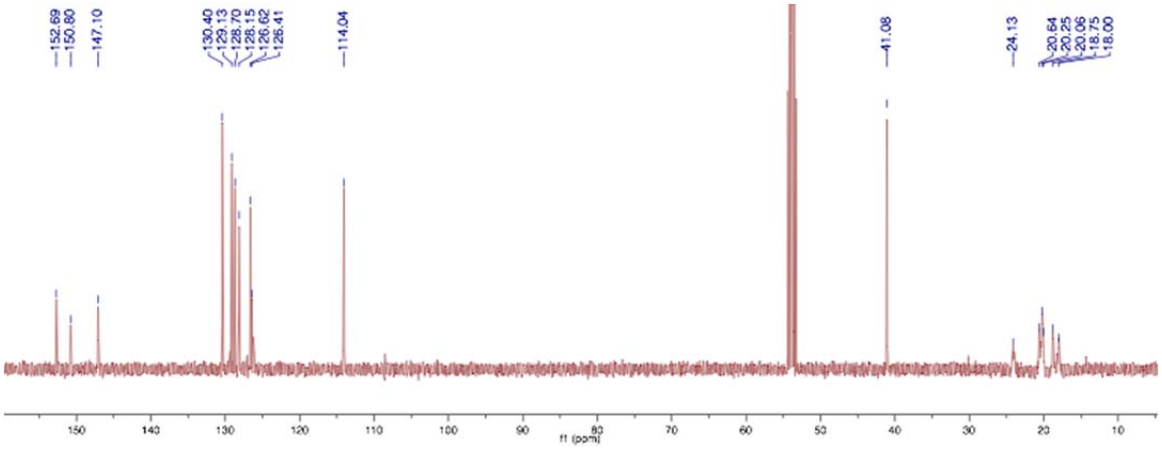

Figure A.73: ^{13}C NMR Spectrum (C_6D_6, 100.54 MHz) of 4

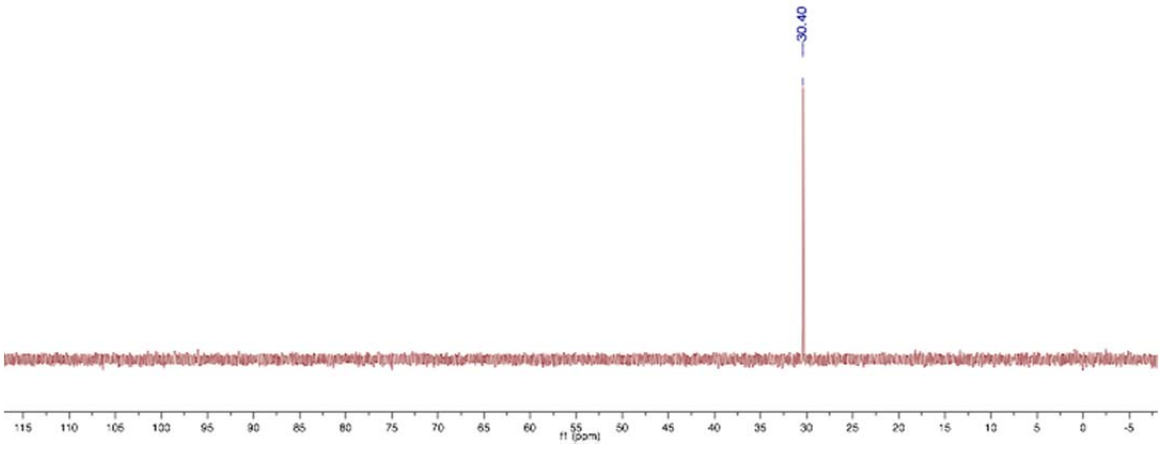

Figure A.74: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of 4

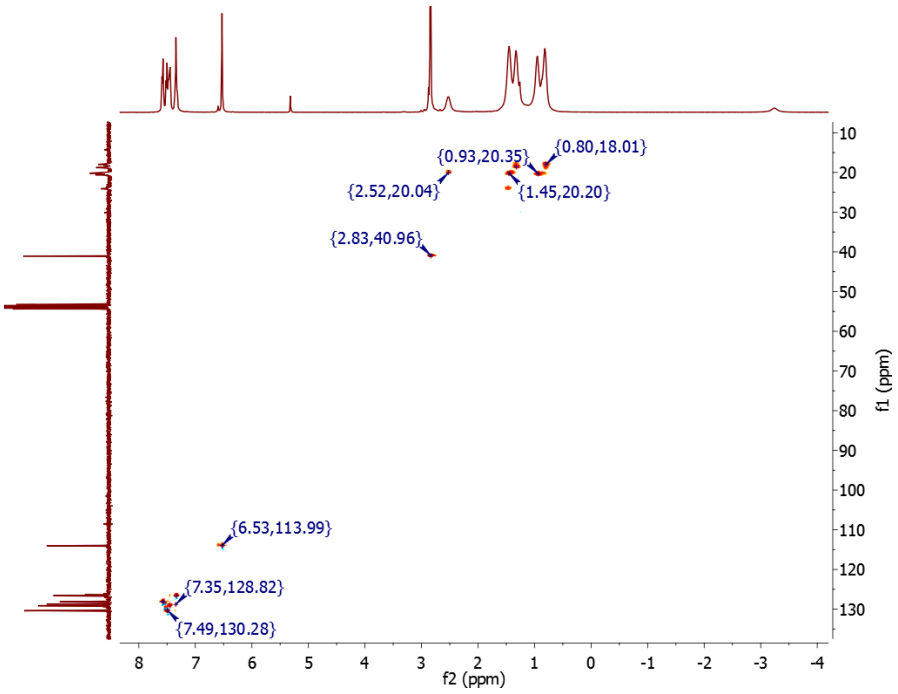

Figure A.75: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 4

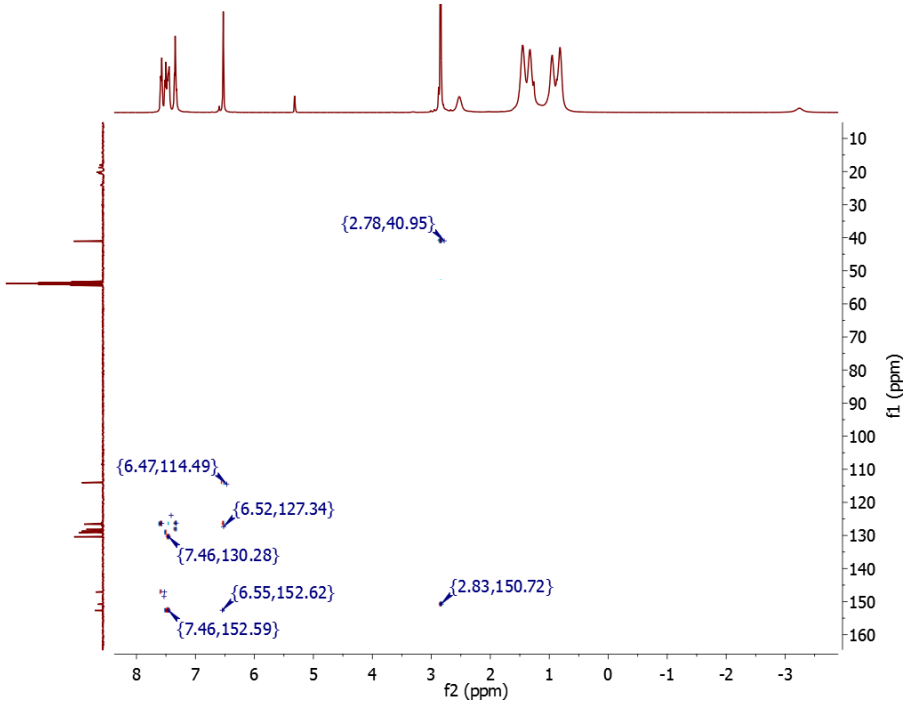

Figure A.76: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 4

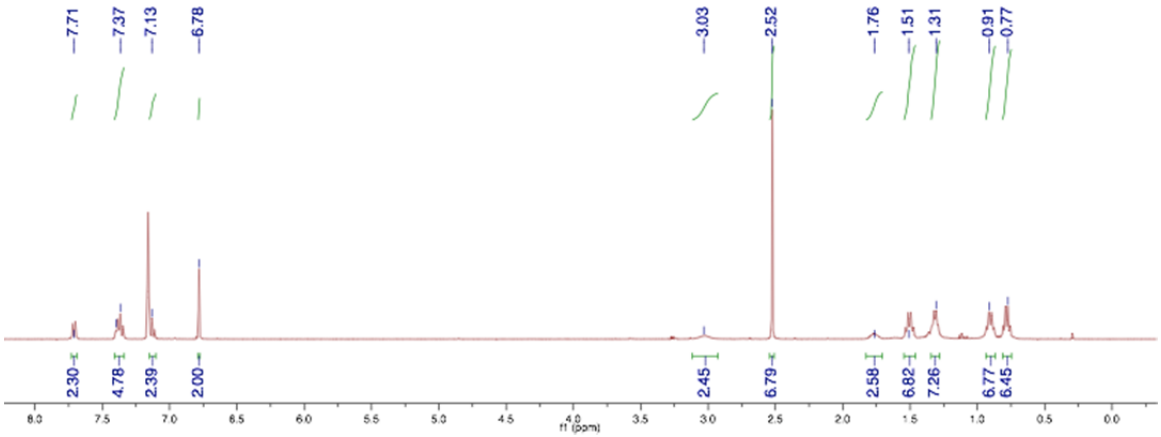

Figure A.77: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of *5*

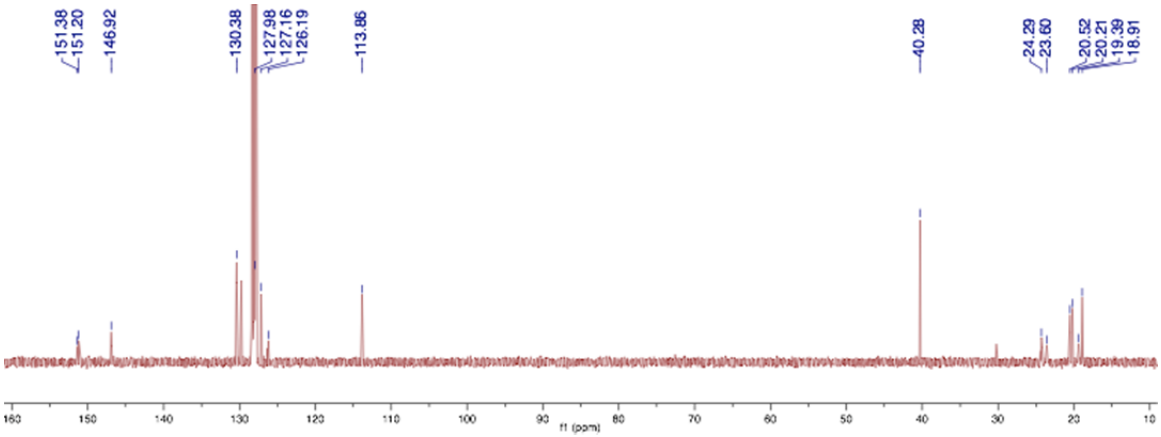

Figure A.78: ^{13}C NMR Spectrum (C_6D_6, 100.54 MHz) of *5*

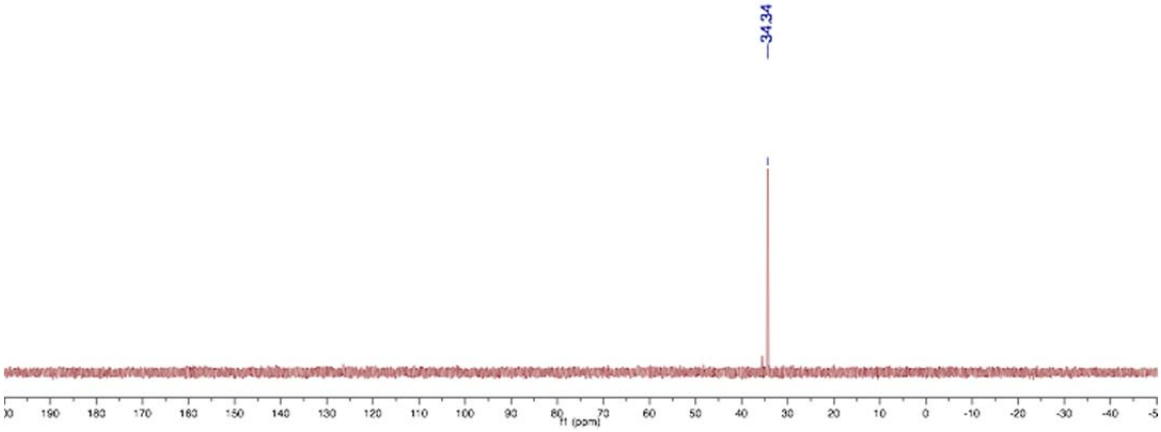

Figure A.79: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of *5*

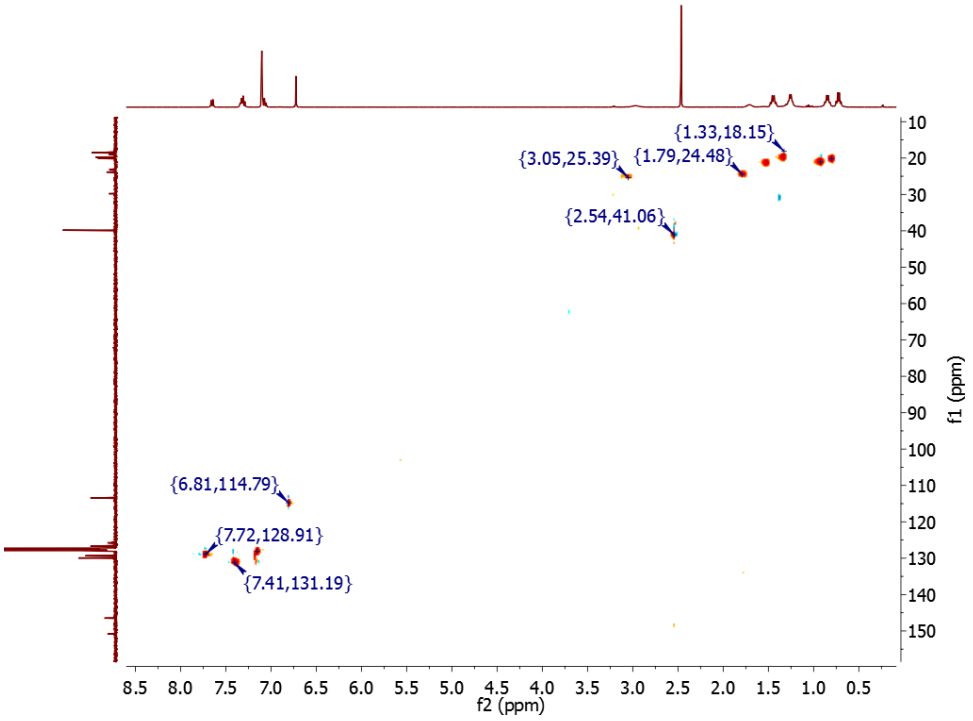

Figure A.80: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of *5*

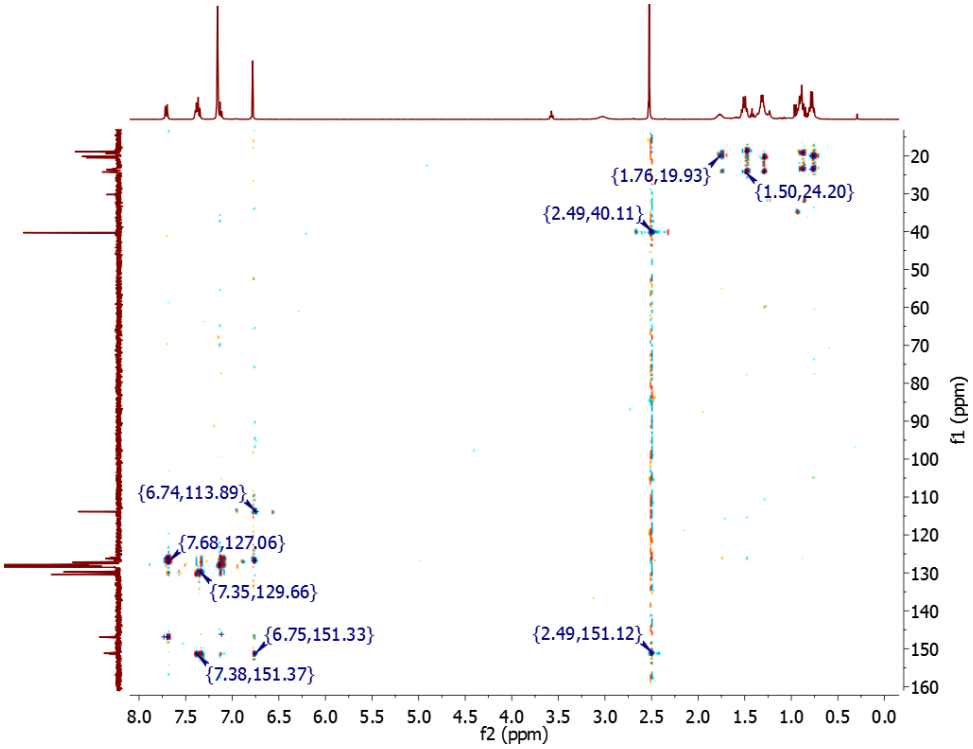

Figure A.81: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of *5*

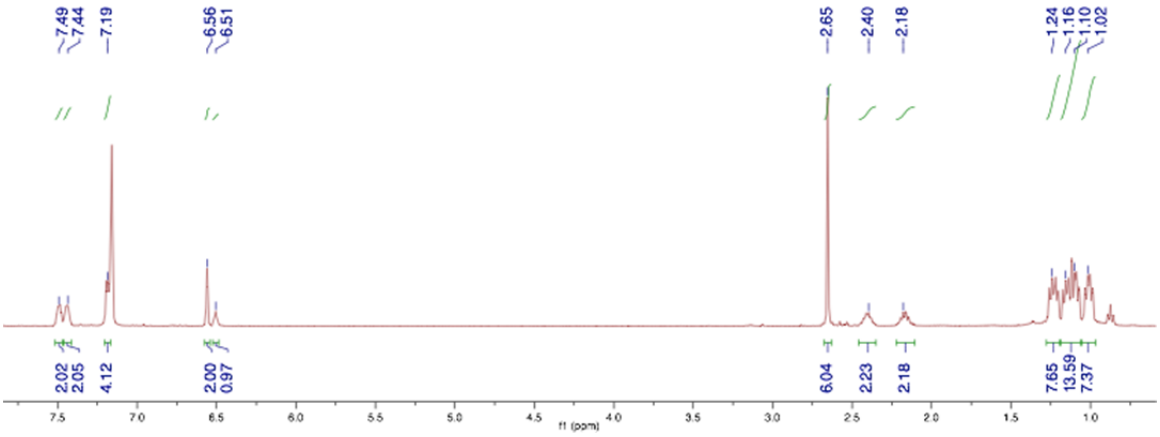

Figure A.82: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of 6

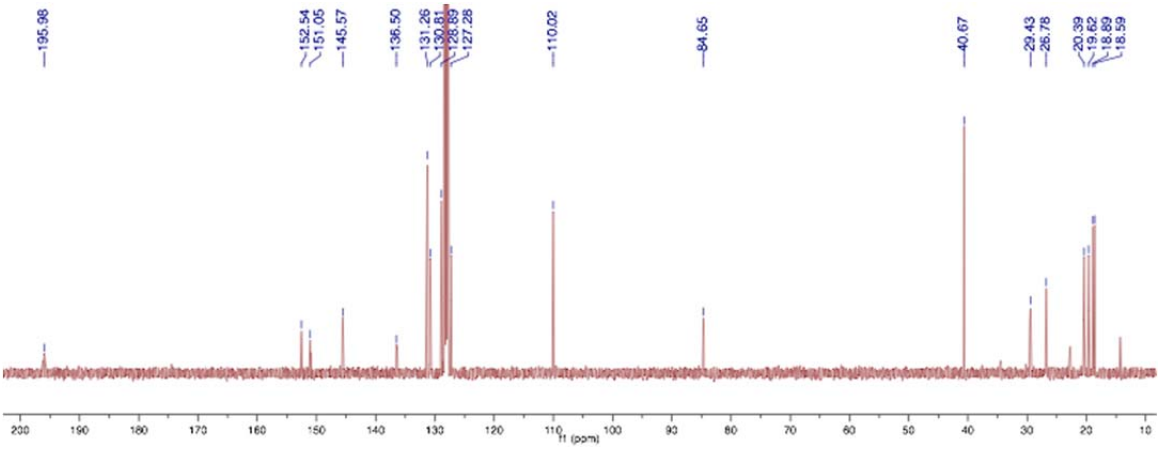

Figure A.83: ^{13}C NMR Spectrum (C_6D_6, 100.54 MHz) of 6

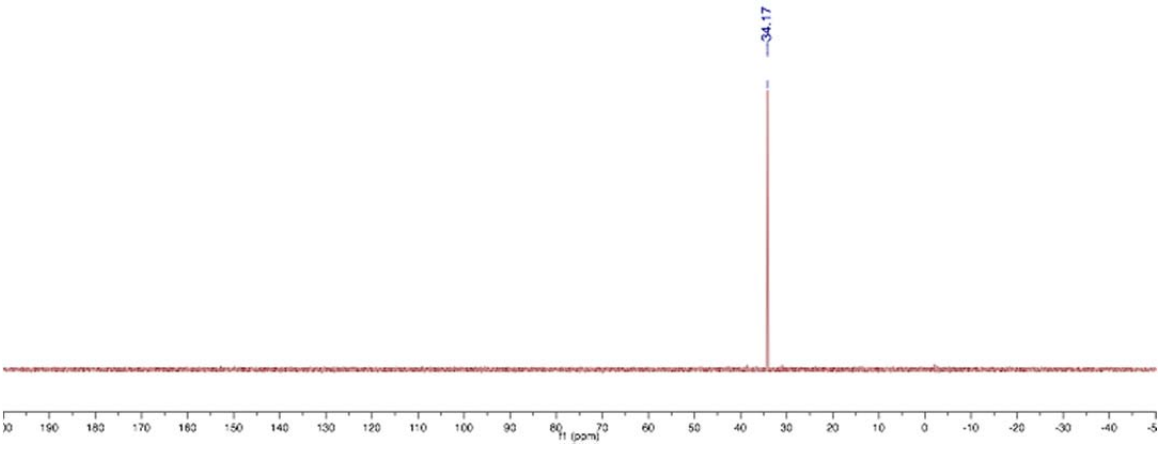

Figure A.84: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of 6

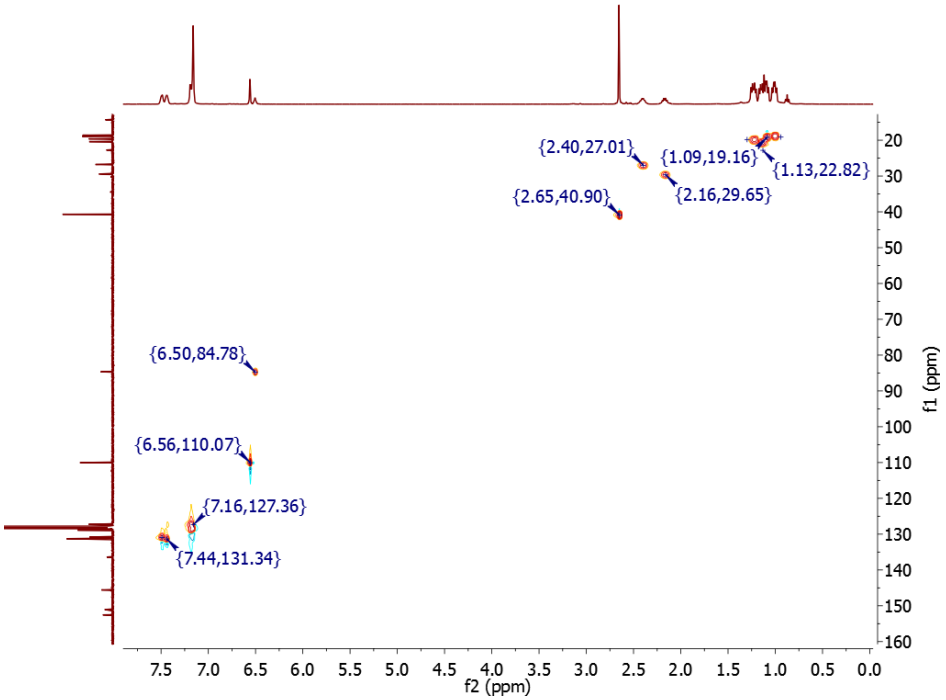

Figure A.85: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 6

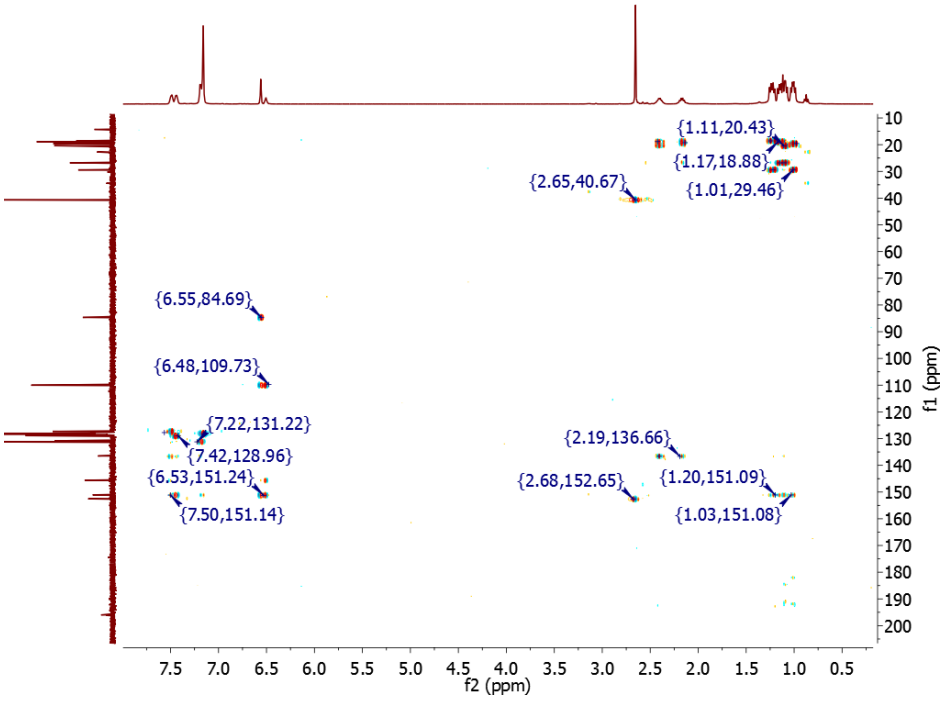

Figure A.86: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 6

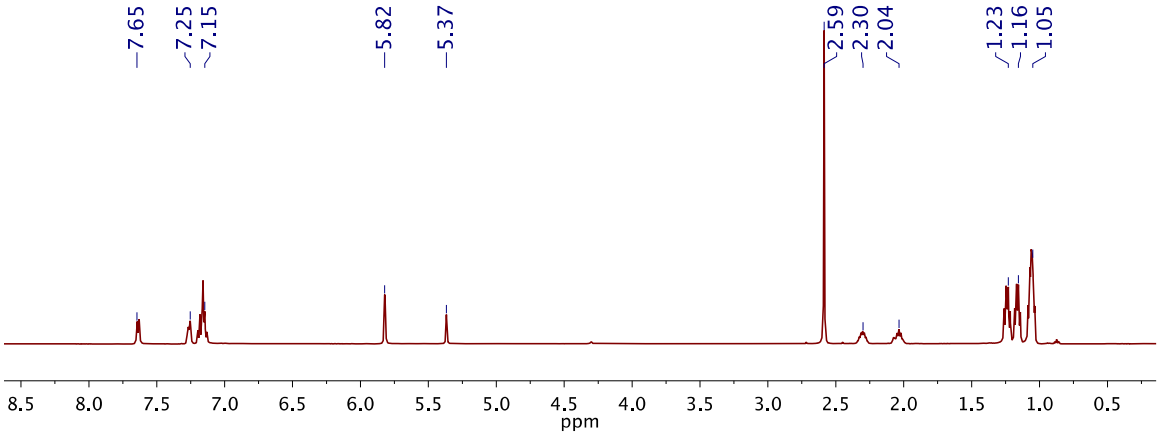

Figure A.87: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of 7

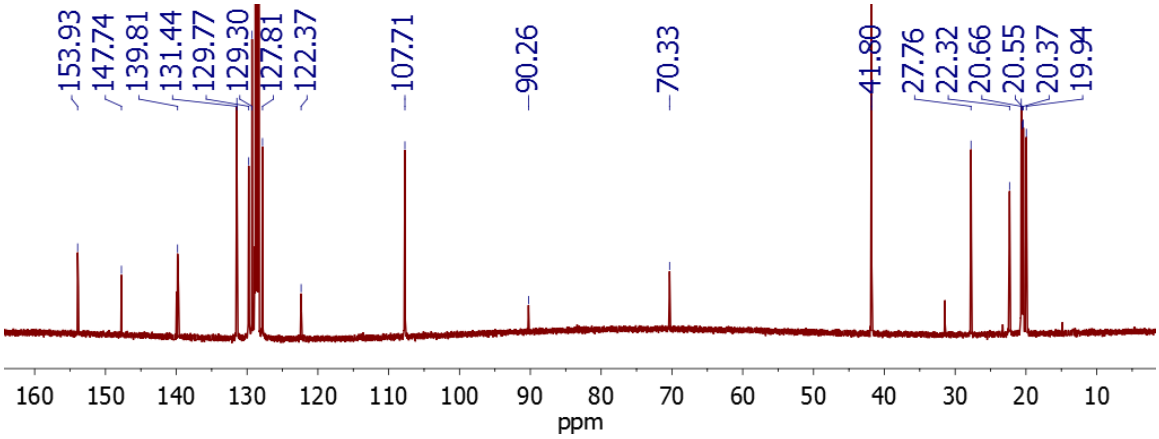

Figure A.88: ^{13}C NMR Spectrum (C_6D_6, 100.54 MHz) of 7

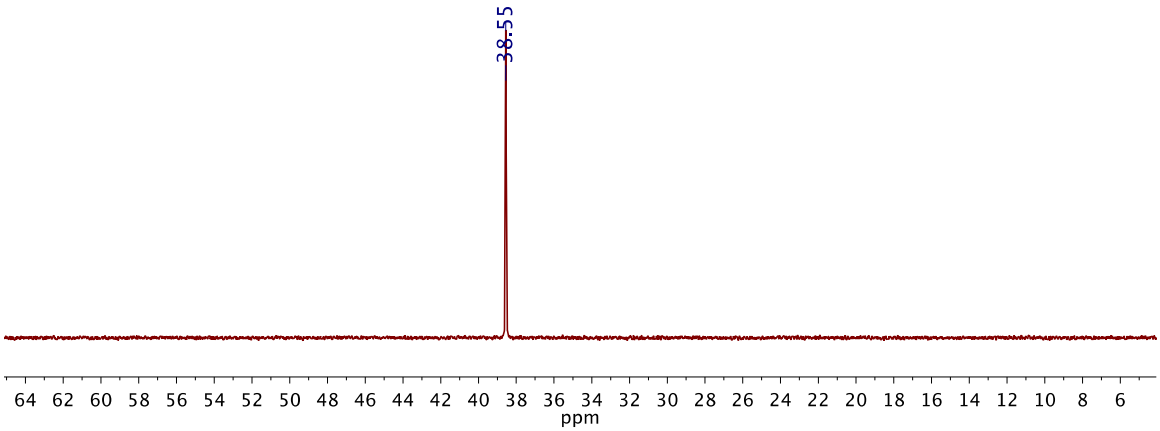

Figure A.89: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 121.48 MHz) of 7

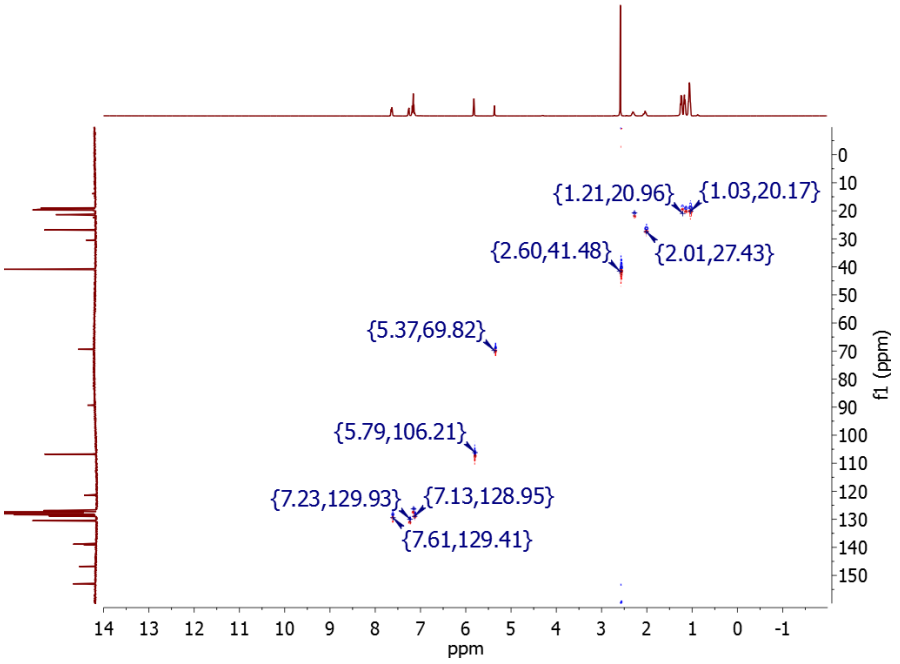

Figure A.90: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 7

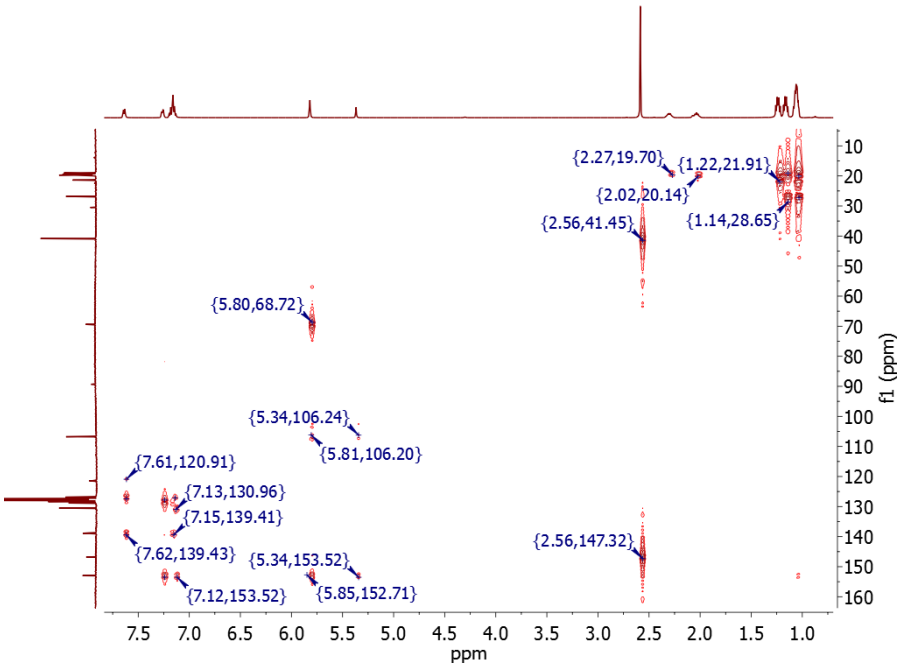

Figure A.91: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 7

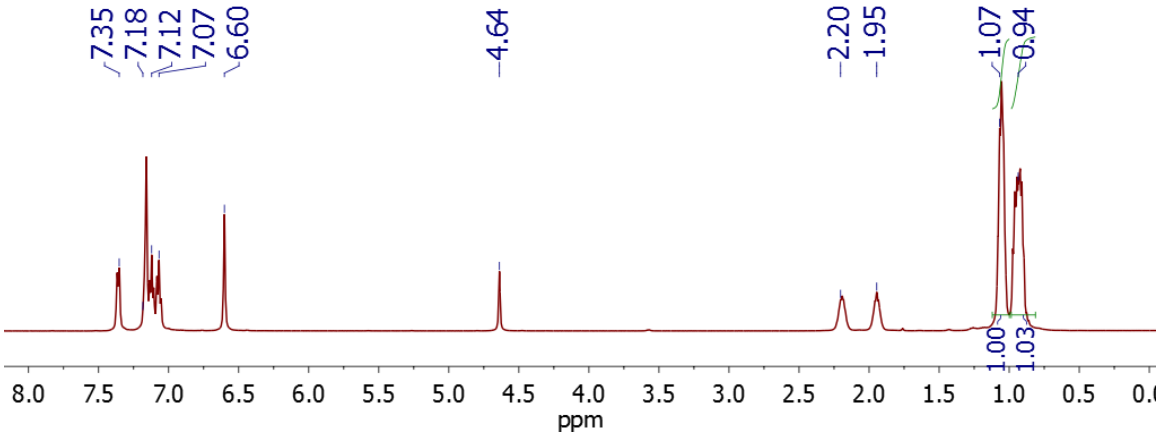

Figure A.92: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of 7_{CF_3}

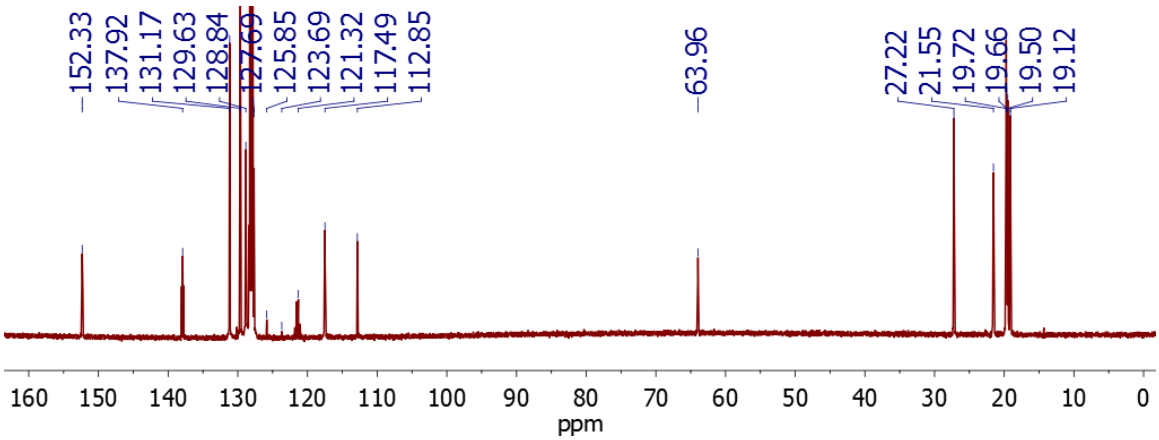

Figure A.93: ^{13}C NMR Spectrum (C_6D_6, 100.54 MHz) of 7_{CF_3}

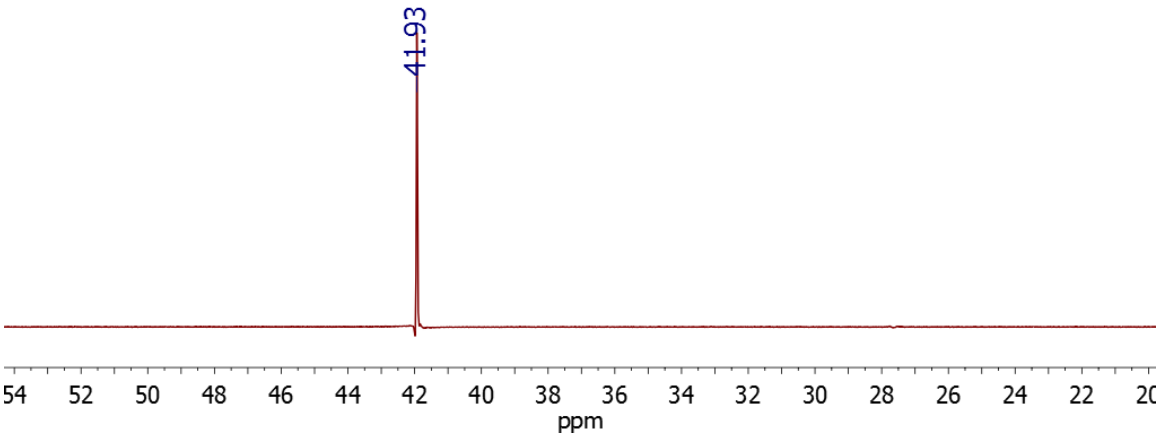

Figure A.94: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 7_{CF_3}

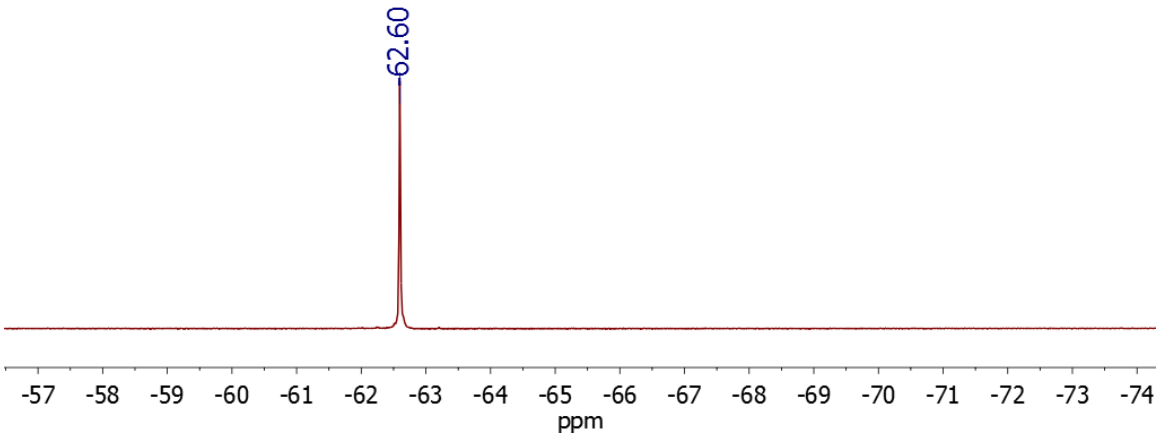

Figure A.95: $^{19}F\{^{1}H\}$ NMR Spectrum (C_6D_6, 282.33 MHz) of 7_{CF3}

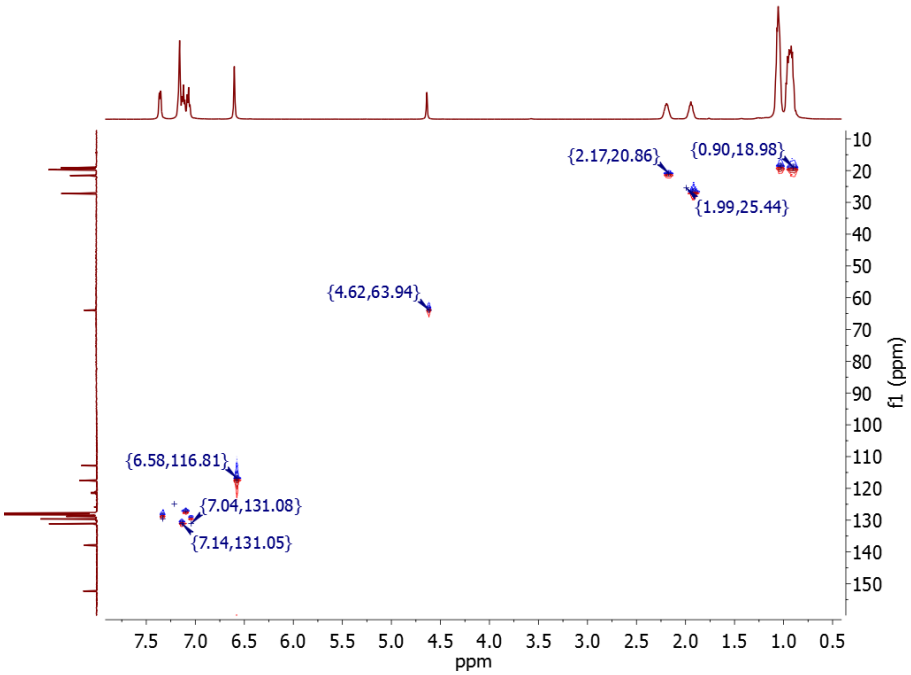

Figure A.96: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 7_{CF3}

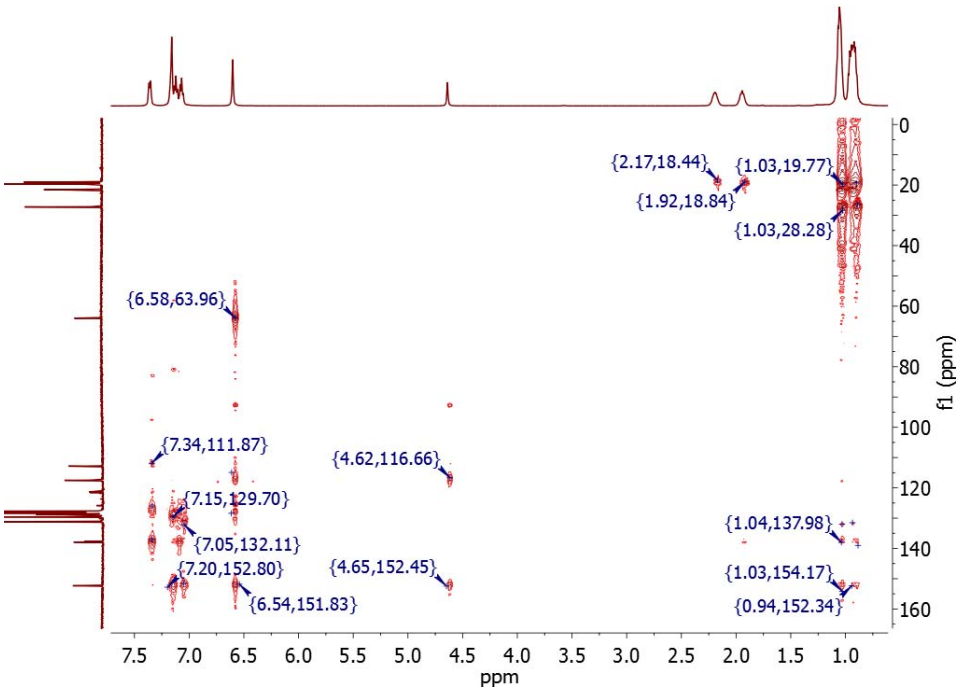

Figure A.97: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 7_{CF3}

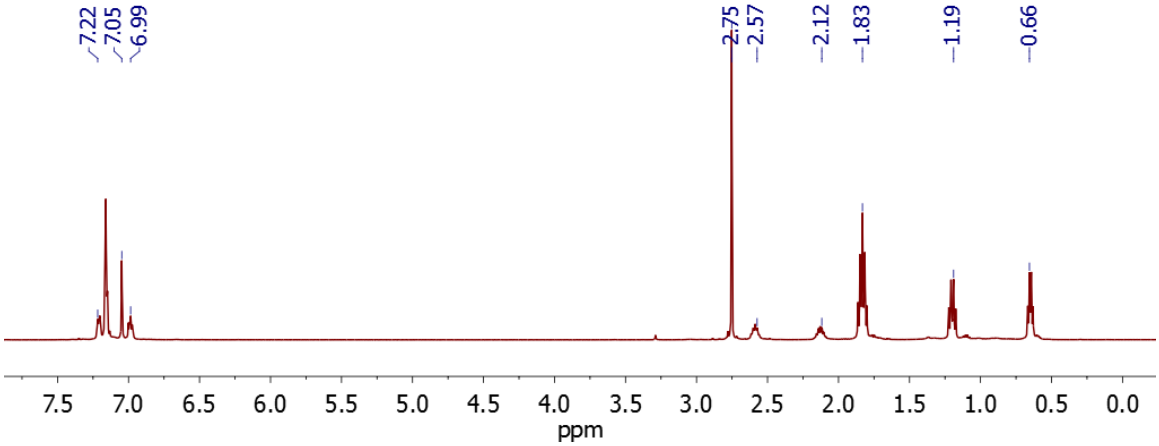

Figure A.98: ^{1}H NMR Spectrum (C_6D_6, 399.80 MHz) of 8

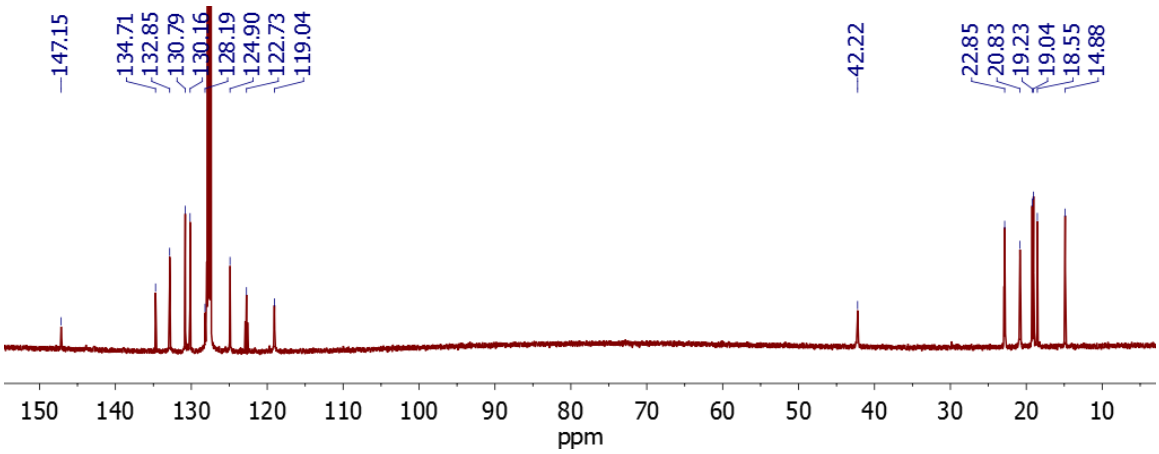

Figure A.99: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 100.54 MHz) of 8

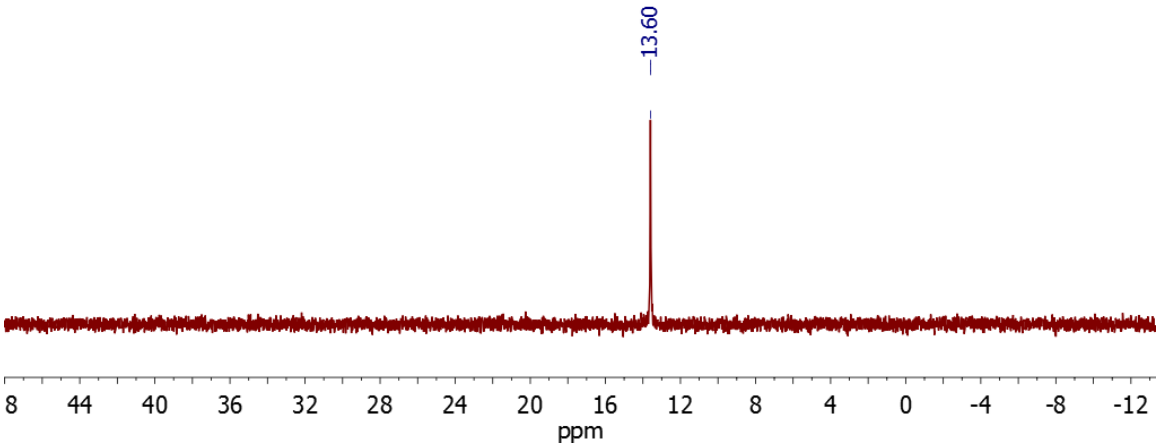

Figure A.100: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 8

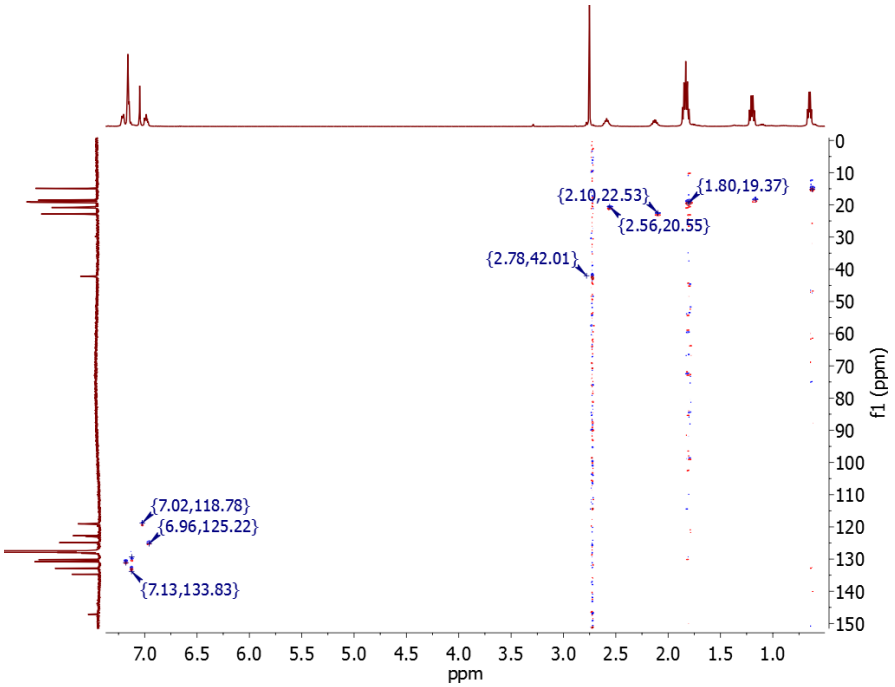

Figure A.101: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 8

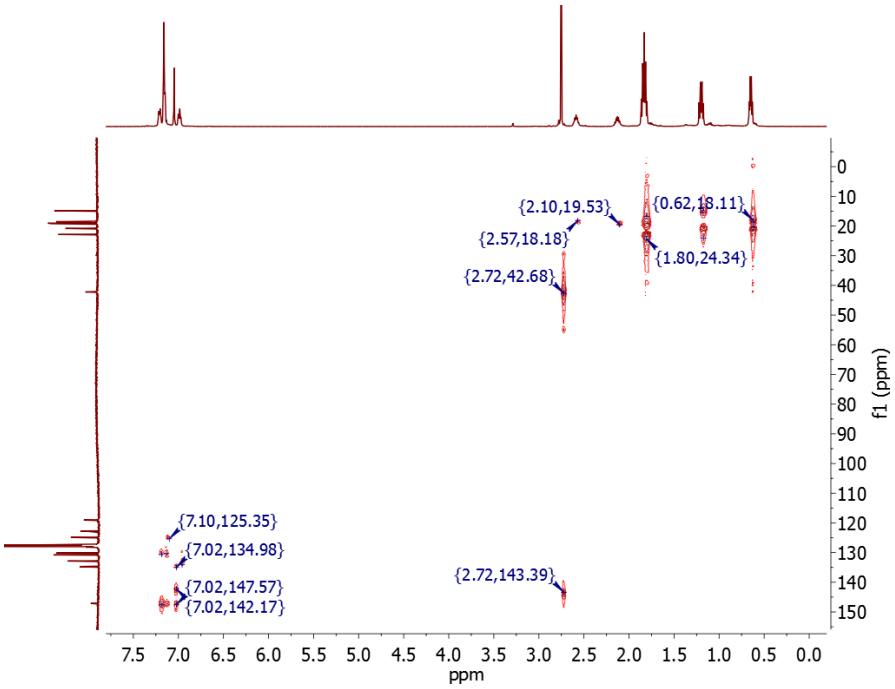

Figure A.102: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 8

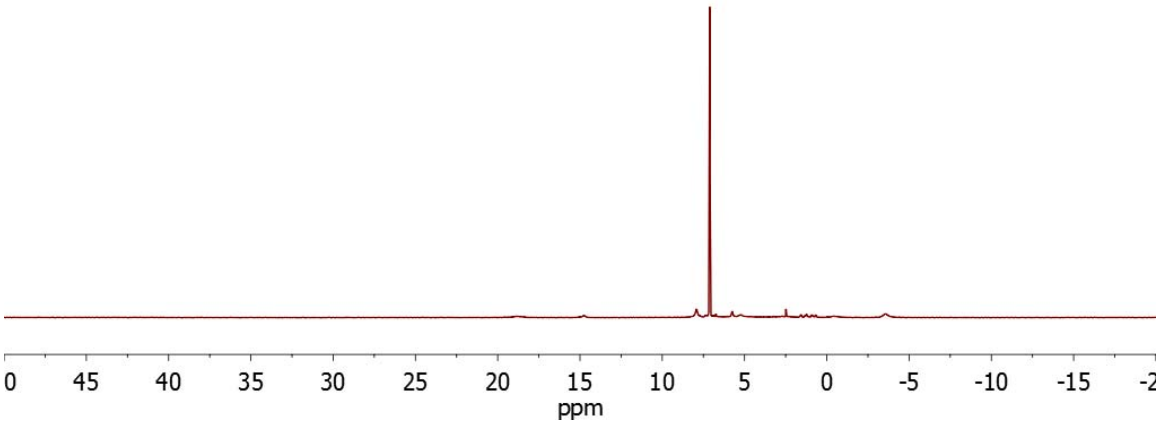

Figure A.103: ^{1}H NMR Spectrum (C_6D_6, 300 MHz)of 9

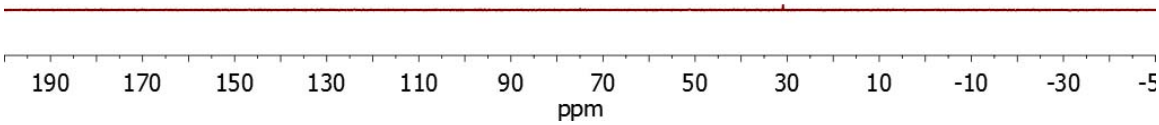

Figure A.104: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 9

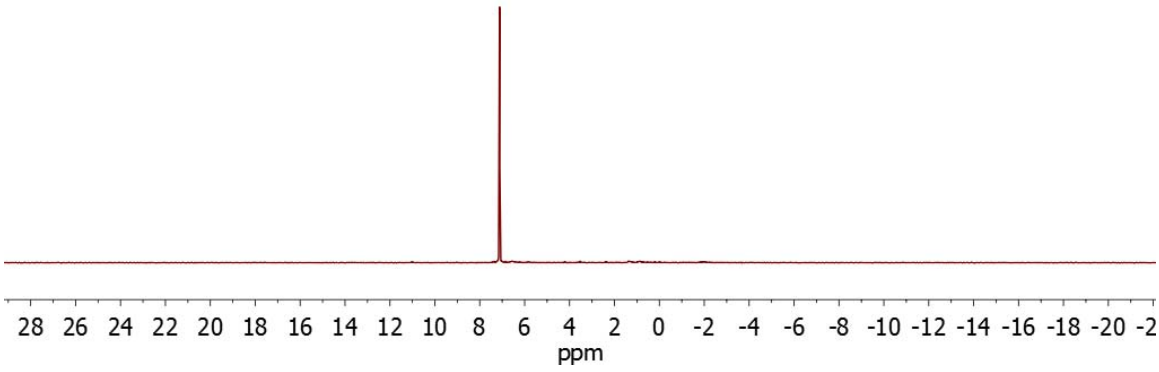

Figure A.105: ^{1}H NMR Spectrum (C_6D_6, 300 MHz) of 9^{OTF}

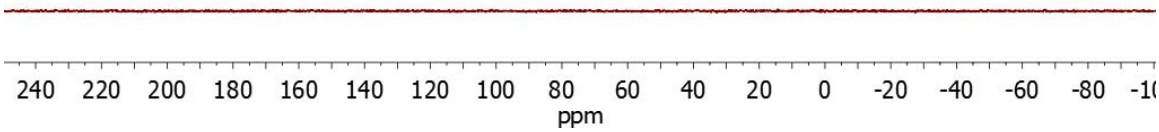

Figure A.106: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 9^{OTF}

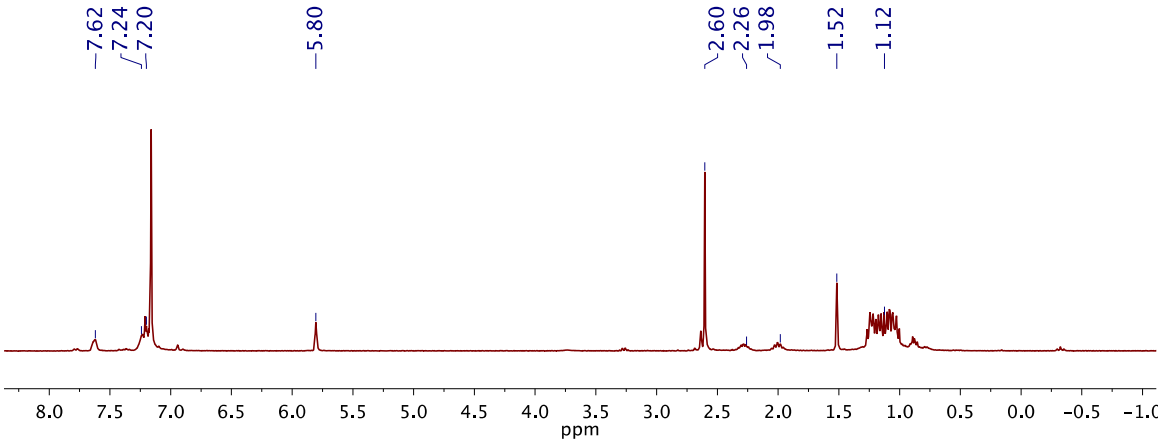

Figure A.107: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 10

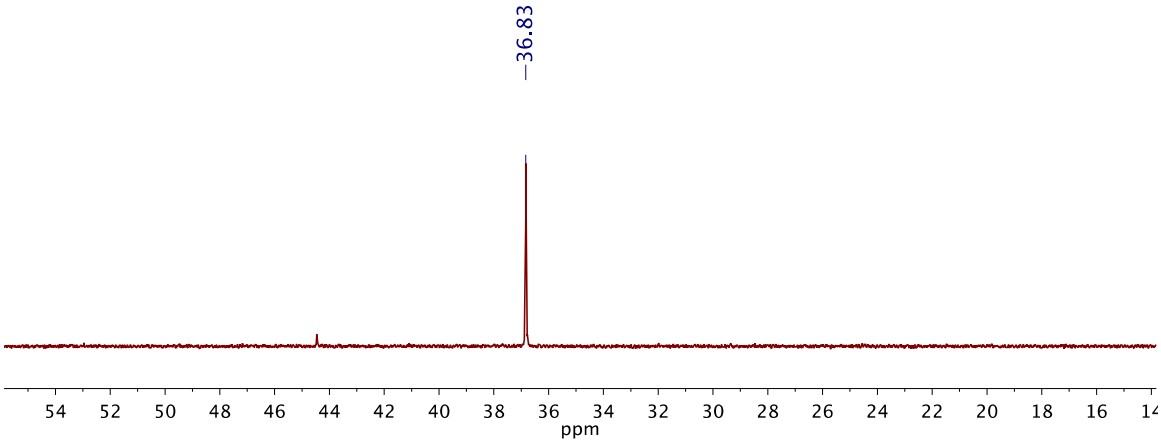

Figure A.108: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 10

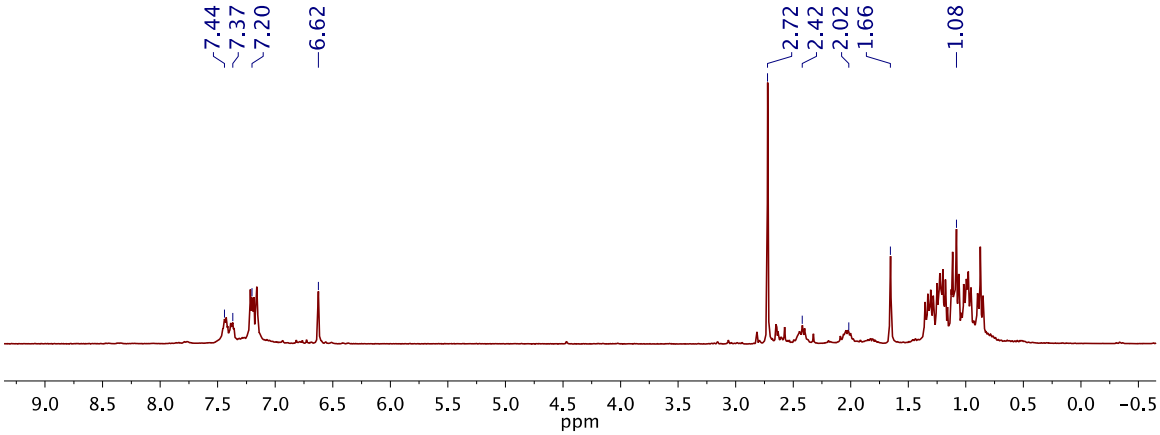

Figure A.109: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 11

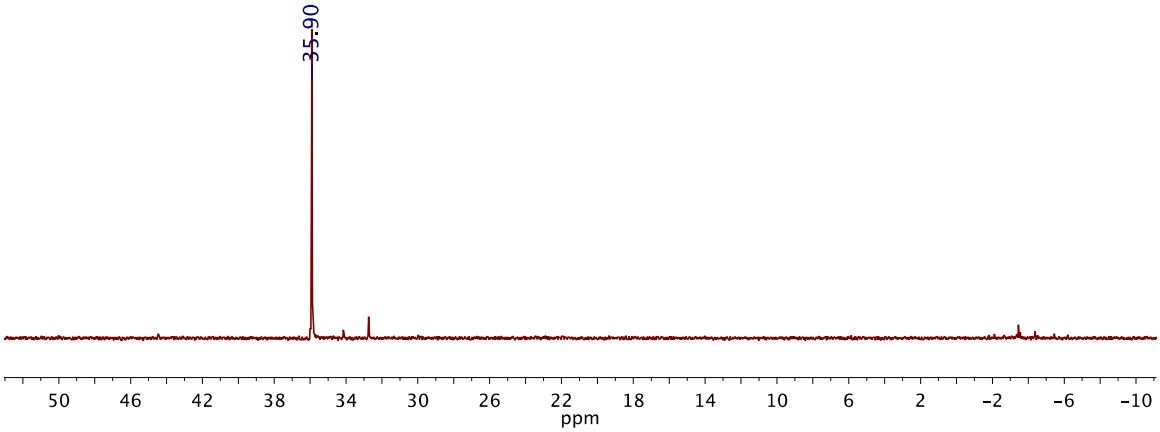

Figure A.110: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 11

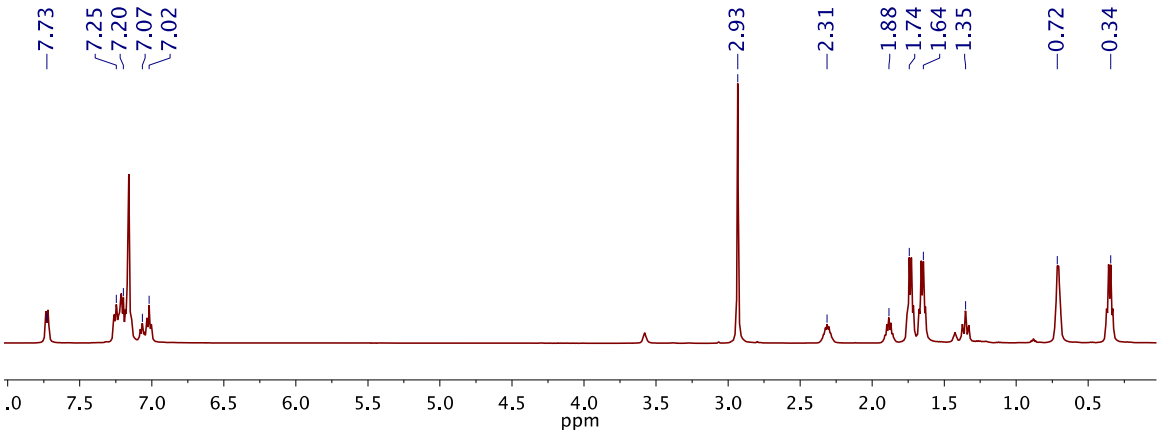

Figure A.111: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 12

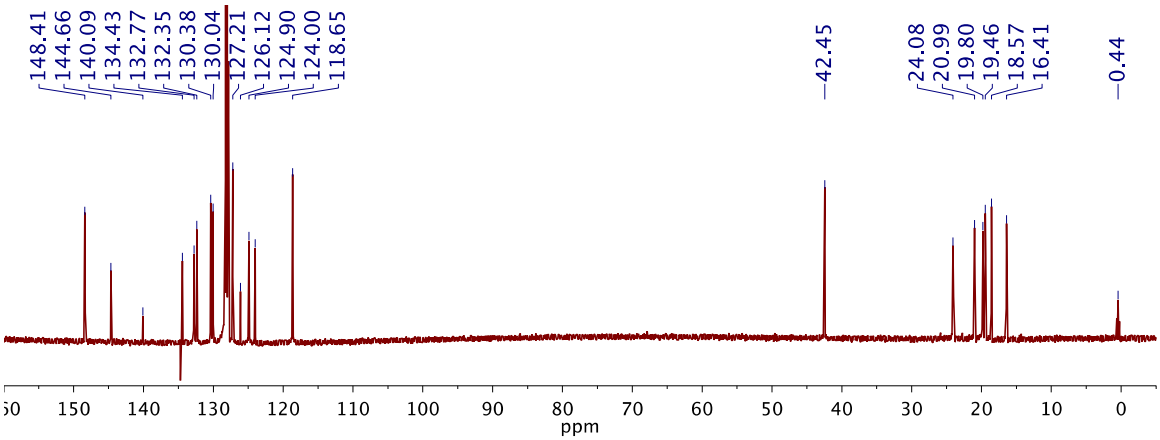

Figure D.112: $^{13}C\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 12

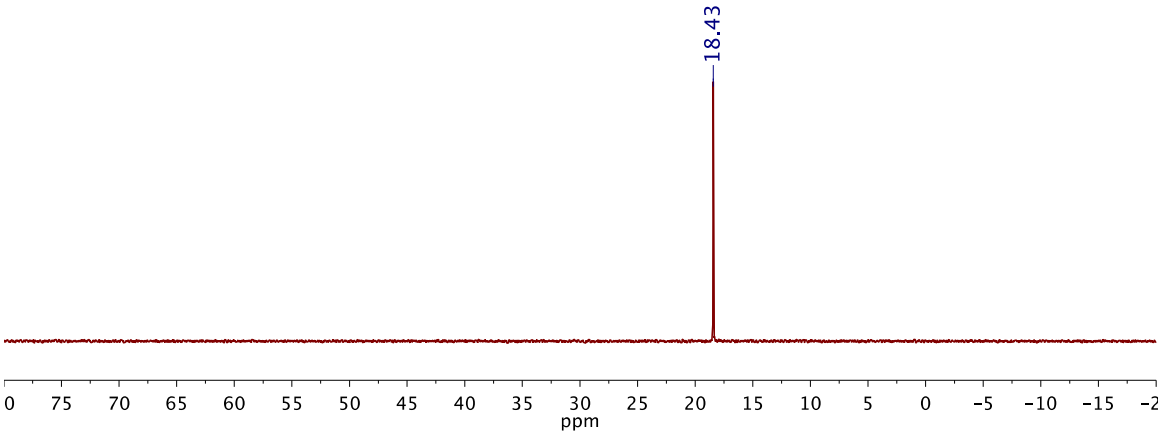

Figure A.113: $^{81}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 12

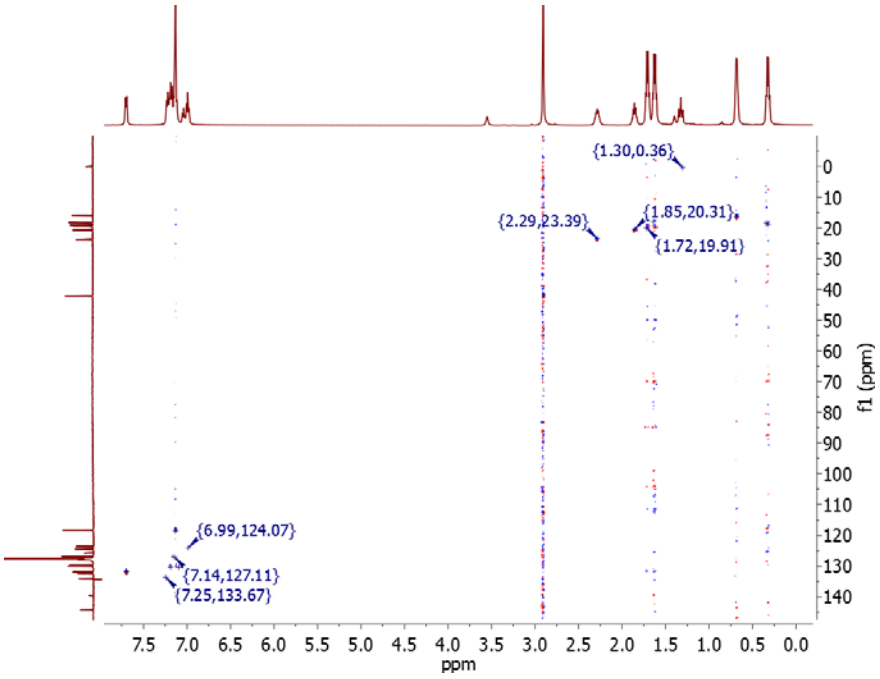

Figure A.114: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 12

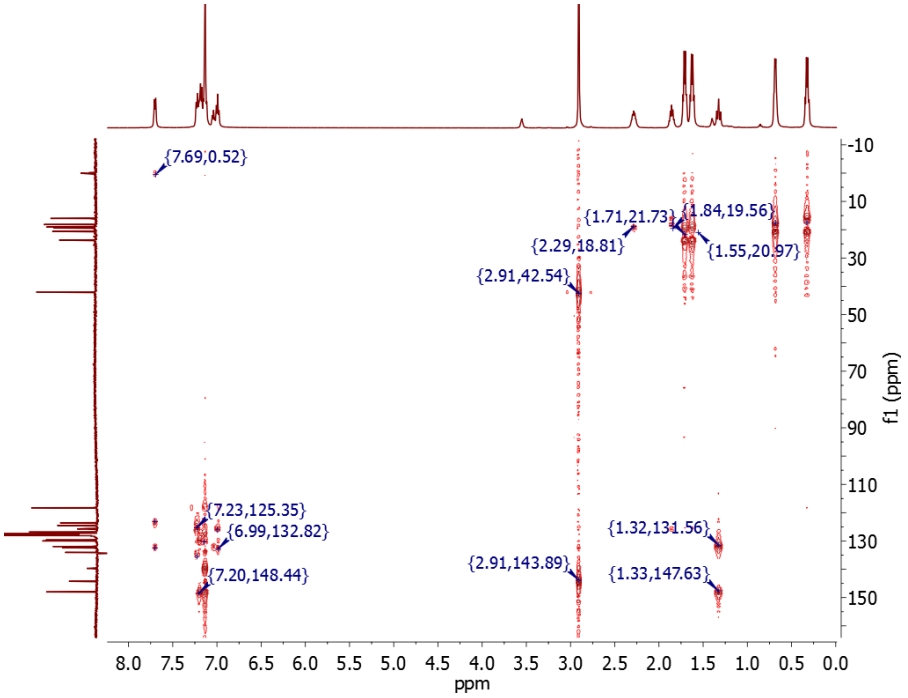

Figure A.115: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 12

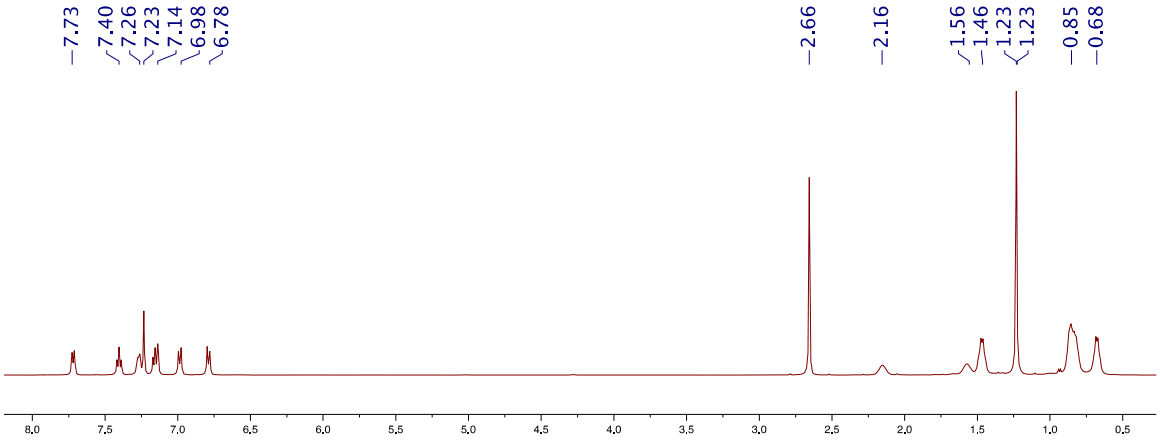

Figure A.116: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 13

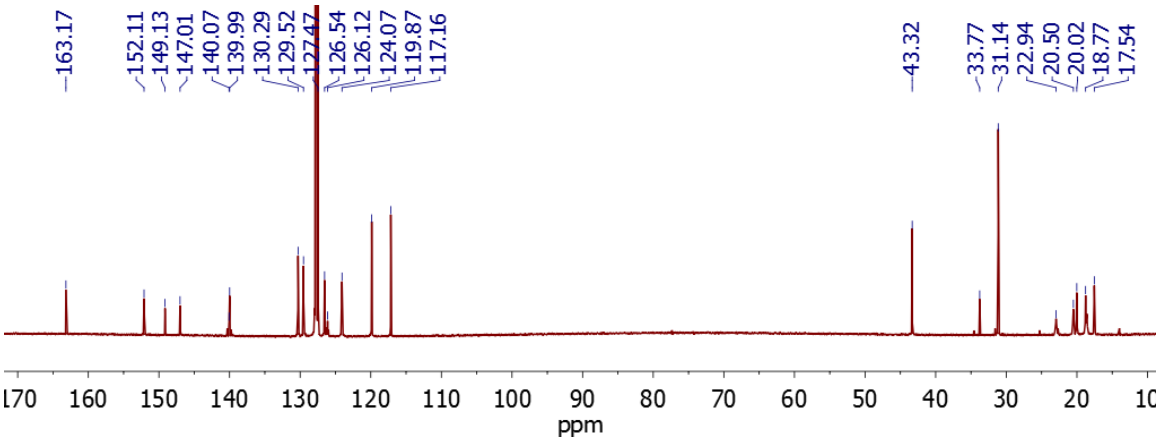

Figure A.117: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 13

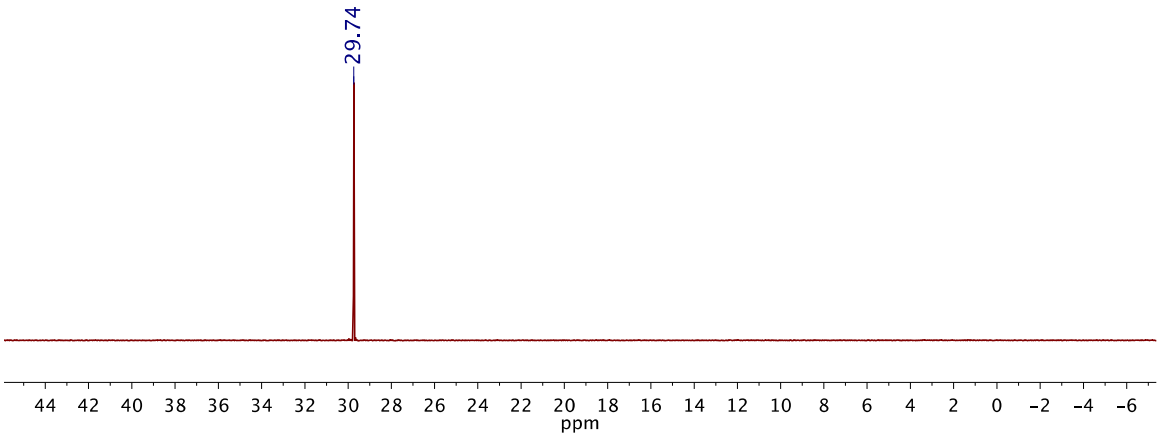

Figure A.118: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 13

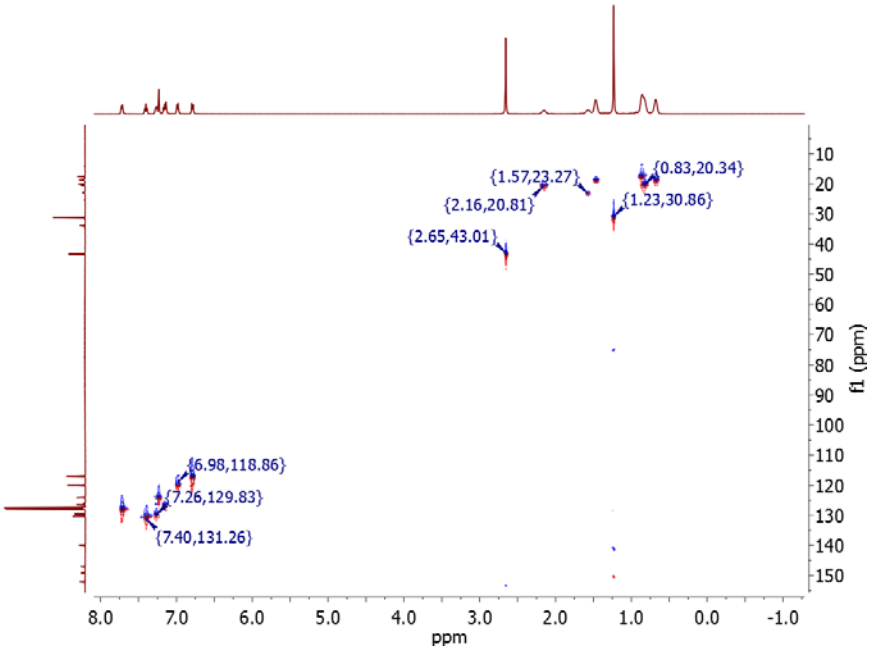

Figure A.119: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 13

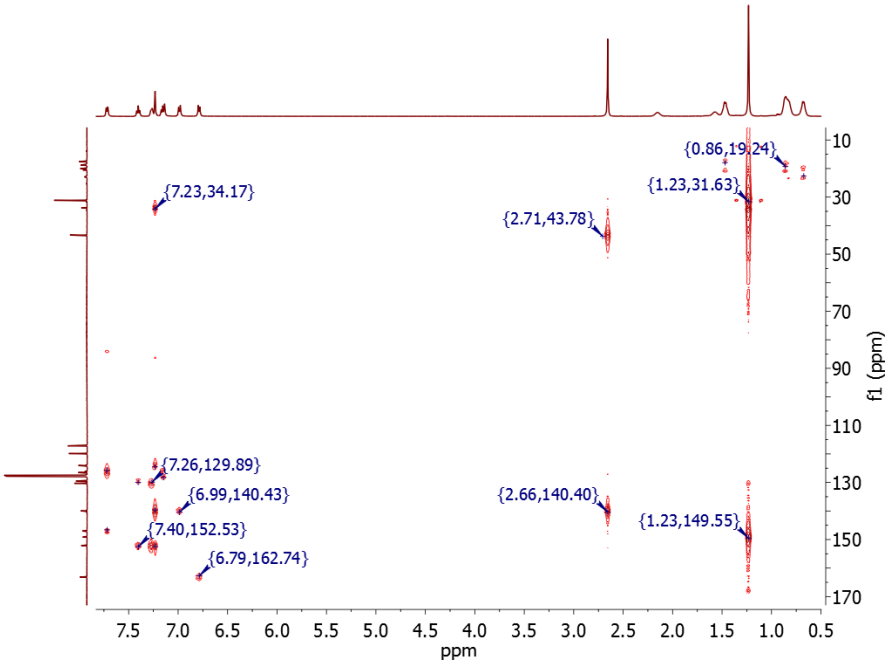

Figure A.120: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 13

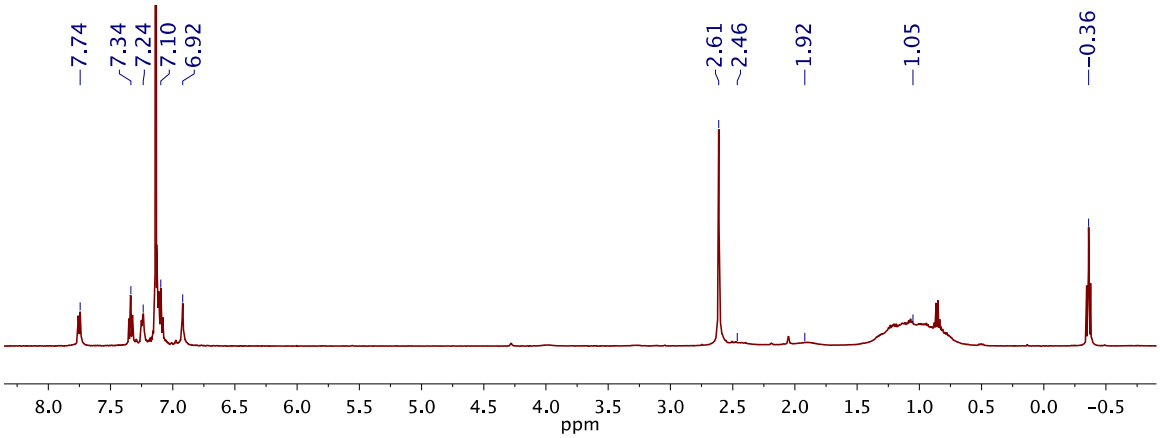

Figure A.121: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 14

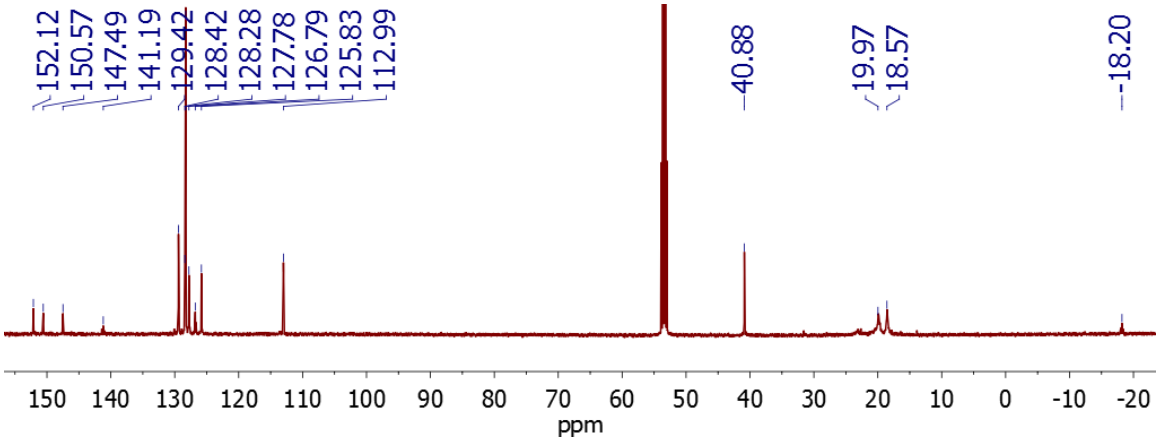

Figure A.122: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 14

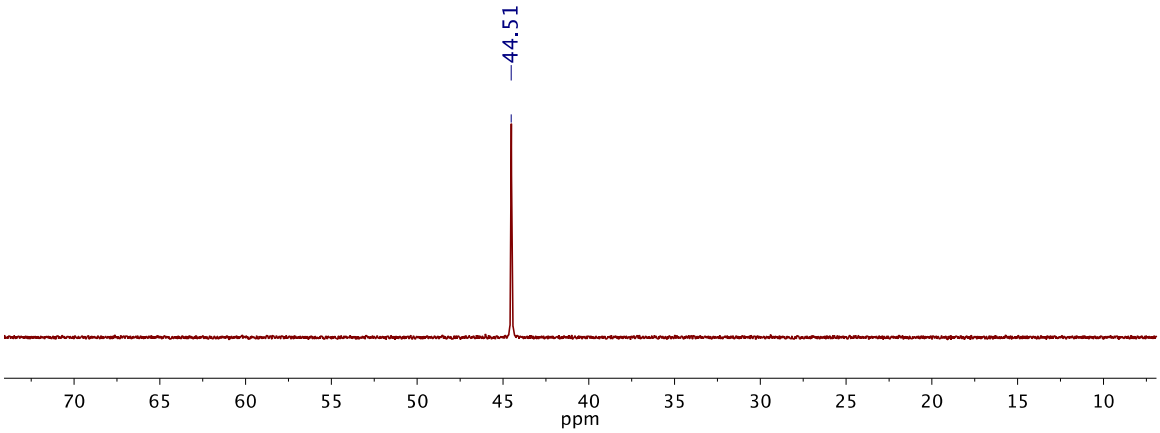

Figure A.123: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 14

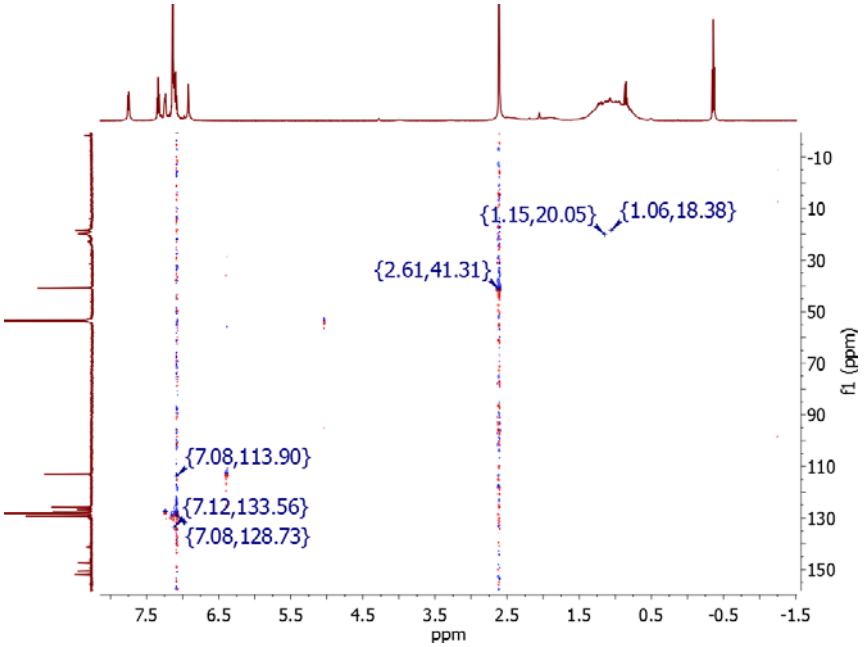

Figure A.124: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 14

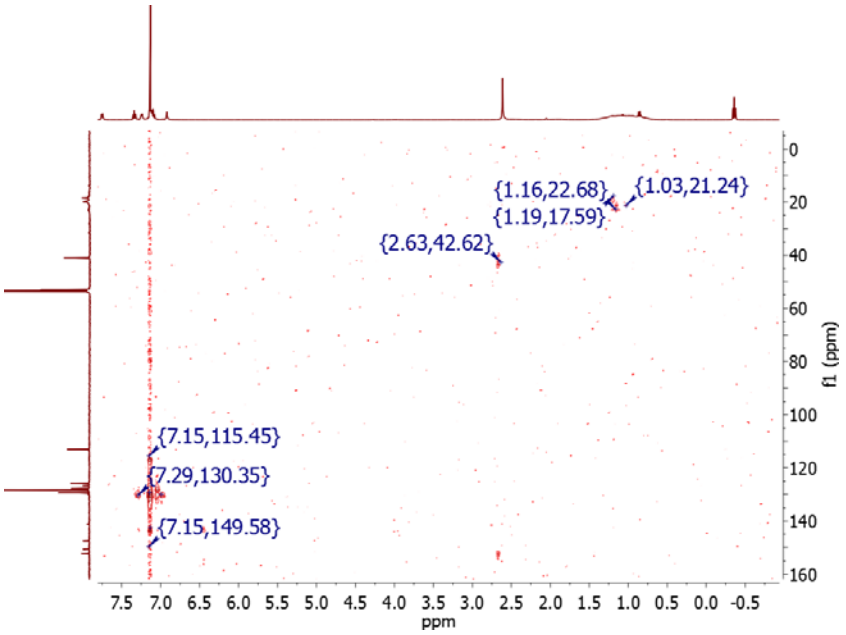

Figure A.125: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 14

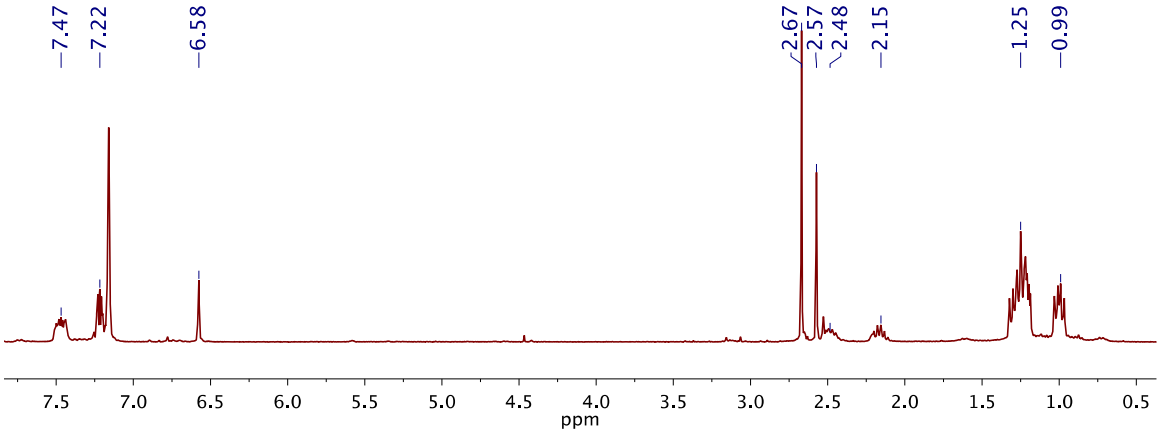

Figure A.126: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 16

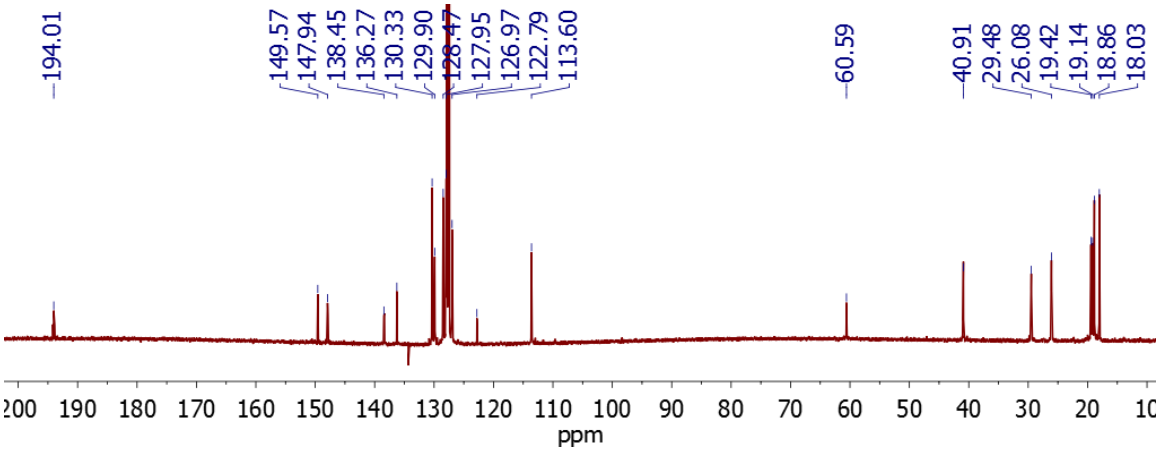

Figure A.127: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 16

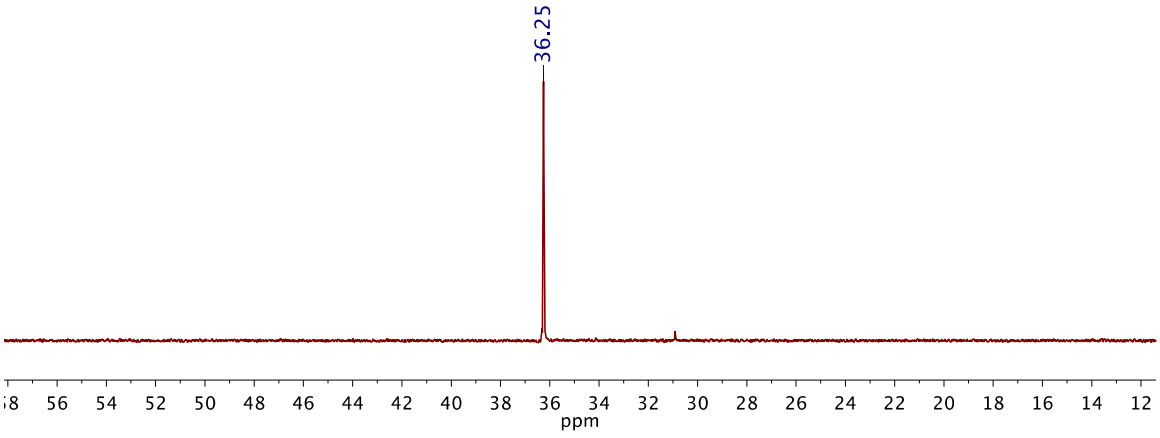

Figure A.128: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 16

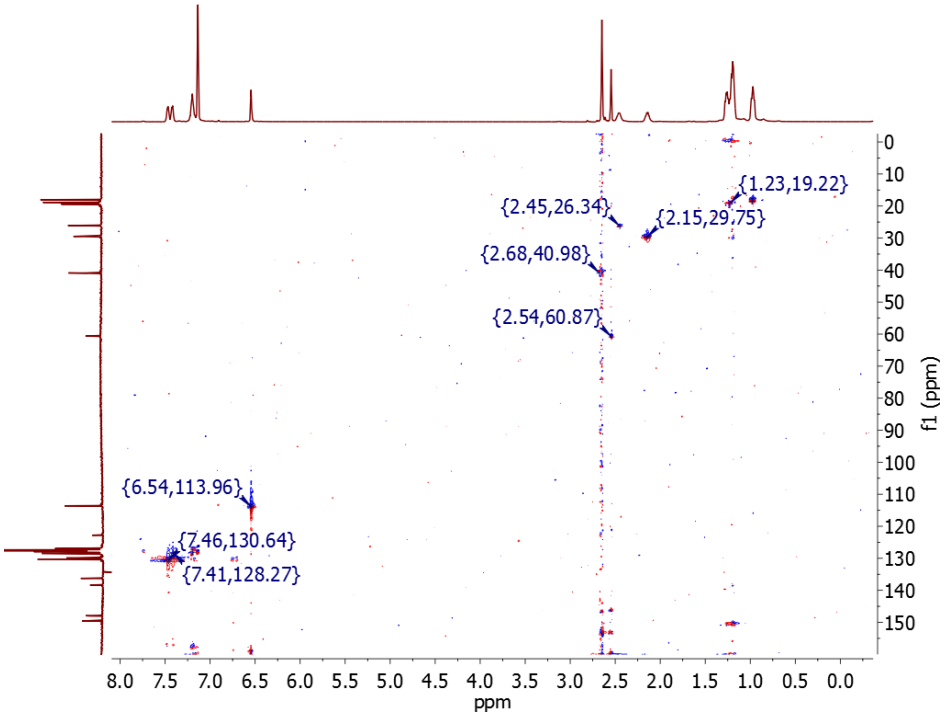

Figure A.129: ^{1}H-^{18}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 16

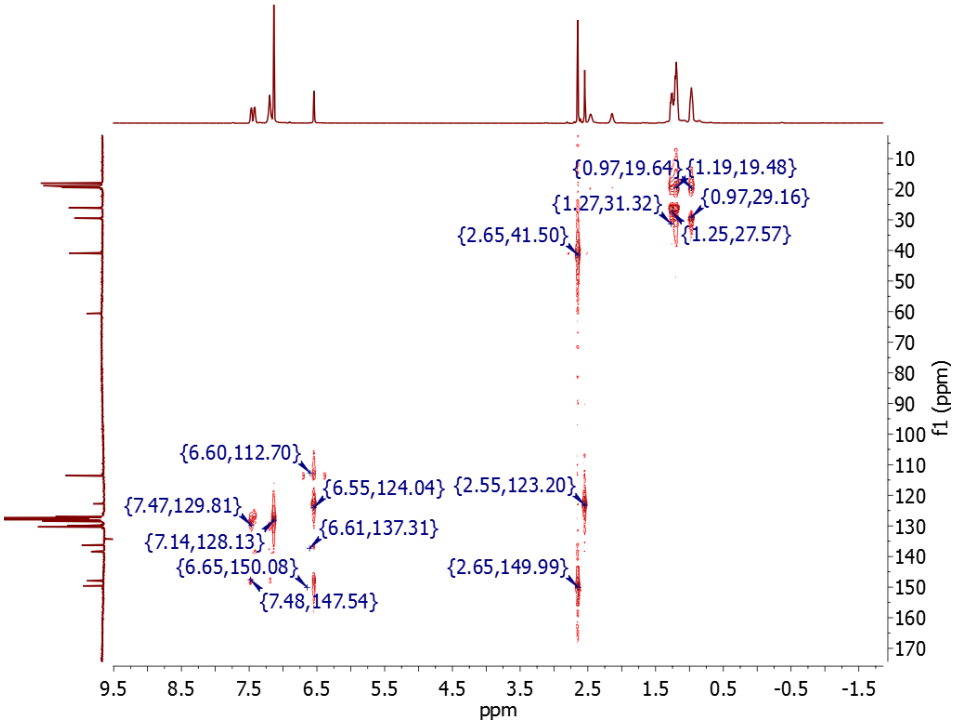

Figure A.130: ^{1}H-^{18}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 16

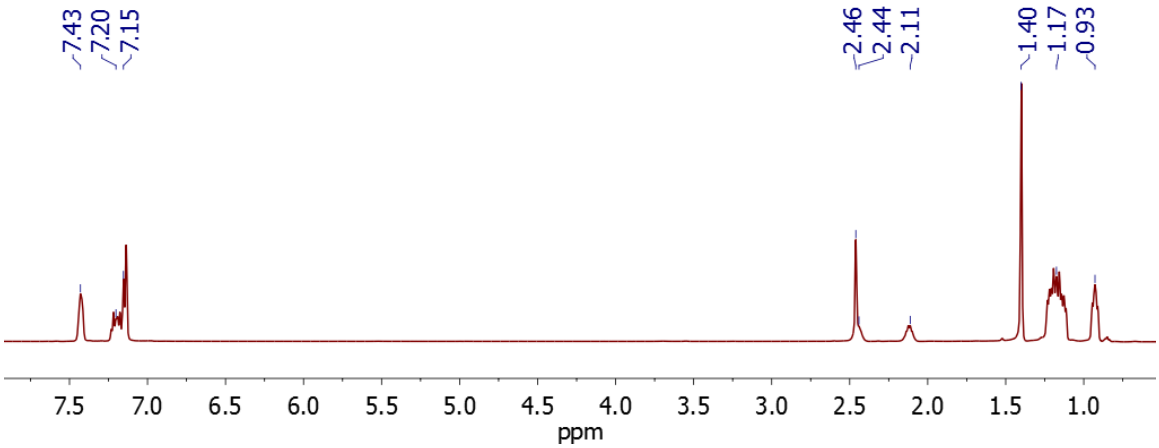

Figure A.131: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 16_{tBu}

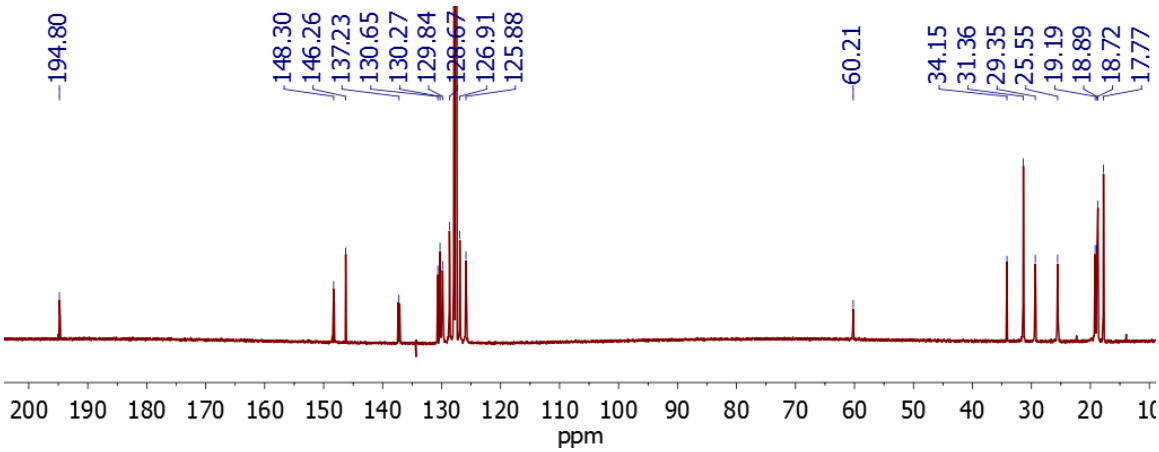

Figure A.132: ^{13}C{^{1}H} NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 16_{tBu}

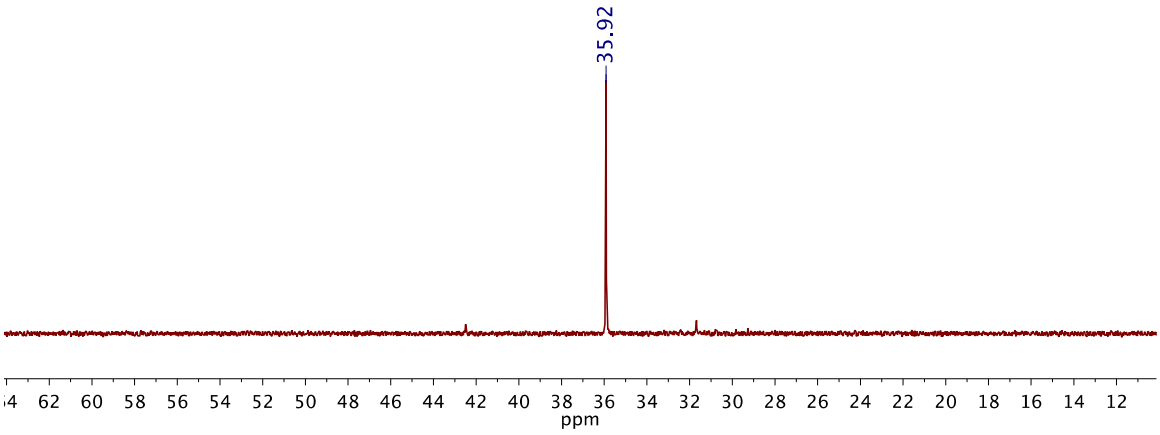

Figure A.133: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 16_{tBu}

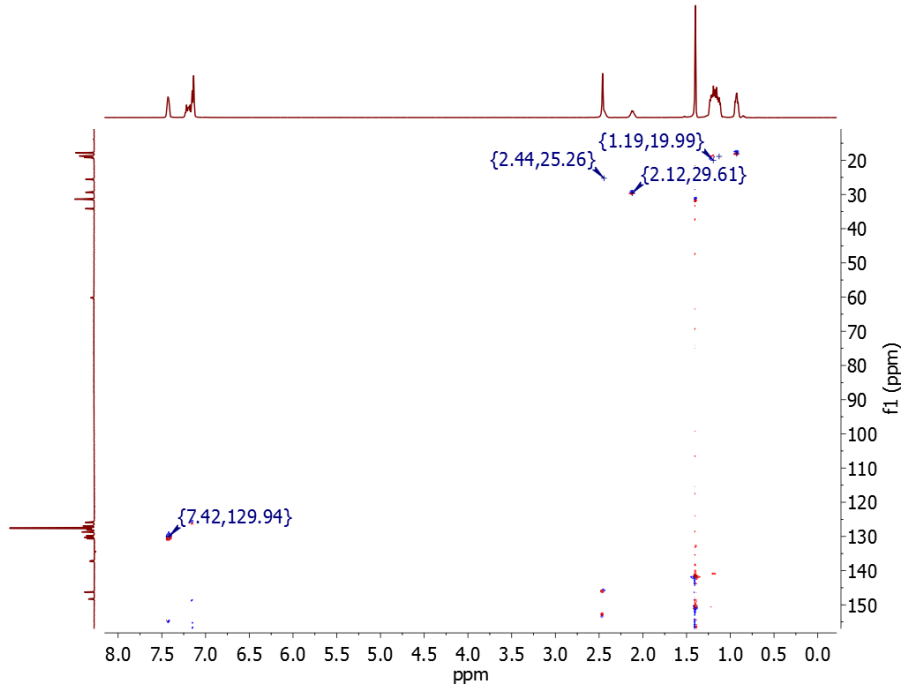

Figure A.134: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 16_{tBu}

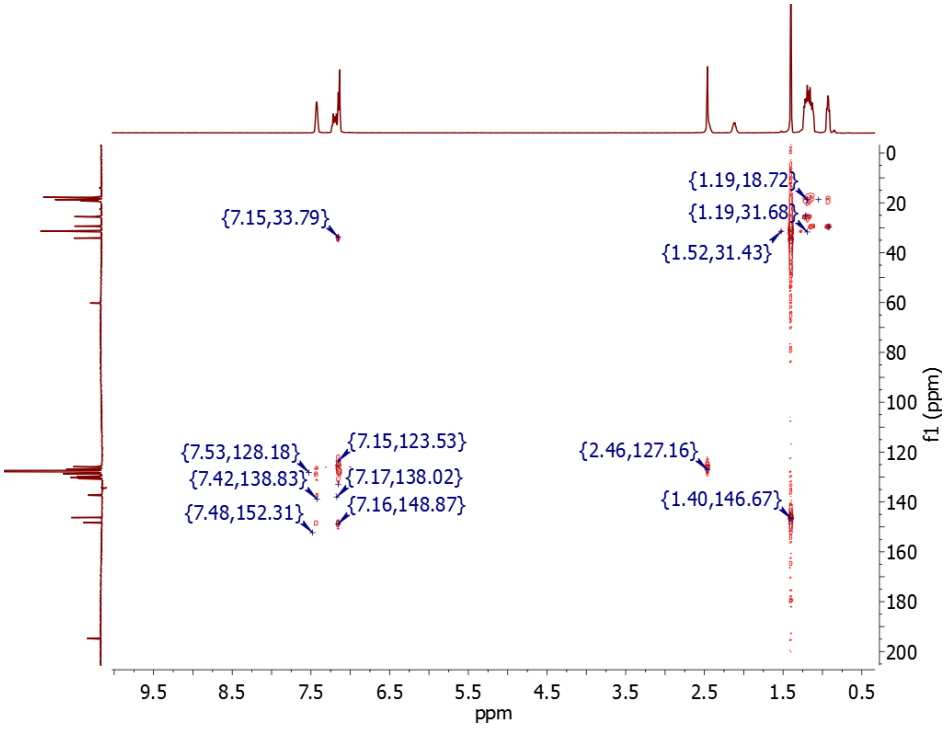

Figure A.135: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 16_{tBu}

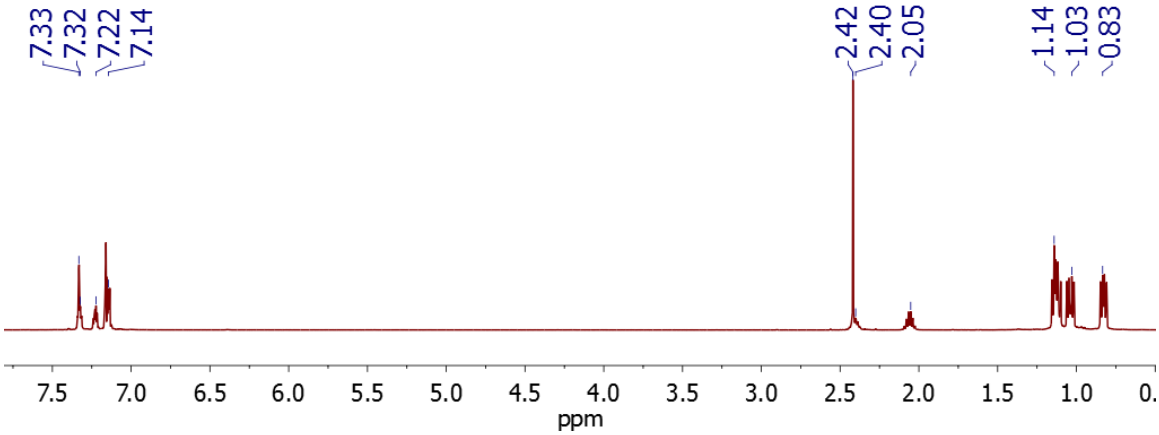

Figure A.136: ^{1}H NMR Spectrum (C_6D_6, 25°C, 499.85 MHz) of 16_{CF_3}

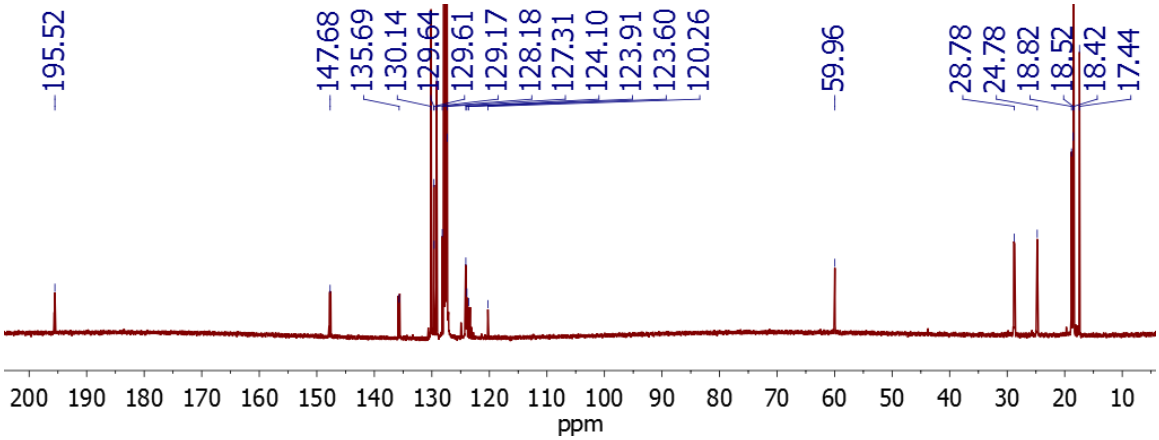

Figure A.137: ^{13}C NMR Spectrum (C_6D_6, 25°C, 125.70 MHz) of 16_{CF_3}

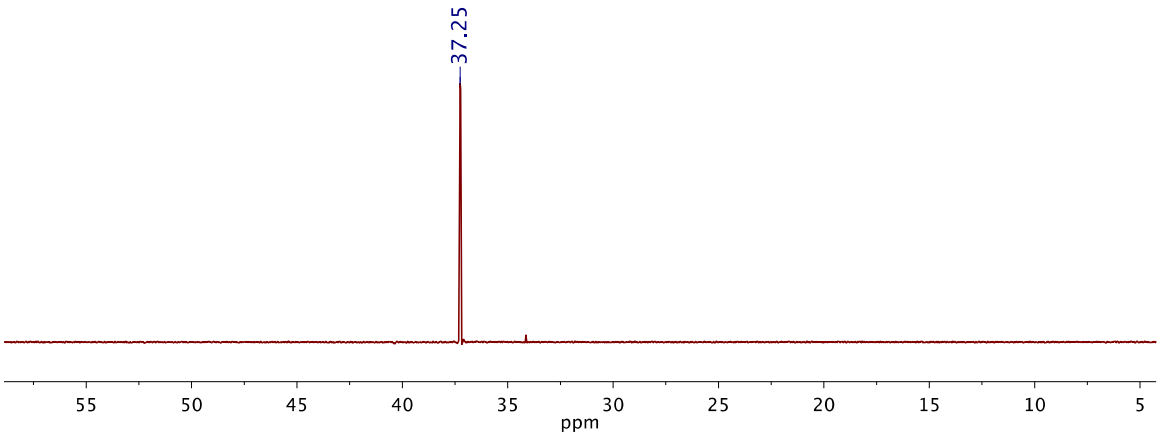

Figure A.138: ^{31}P{^{1}H} NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 16_{CF_3}

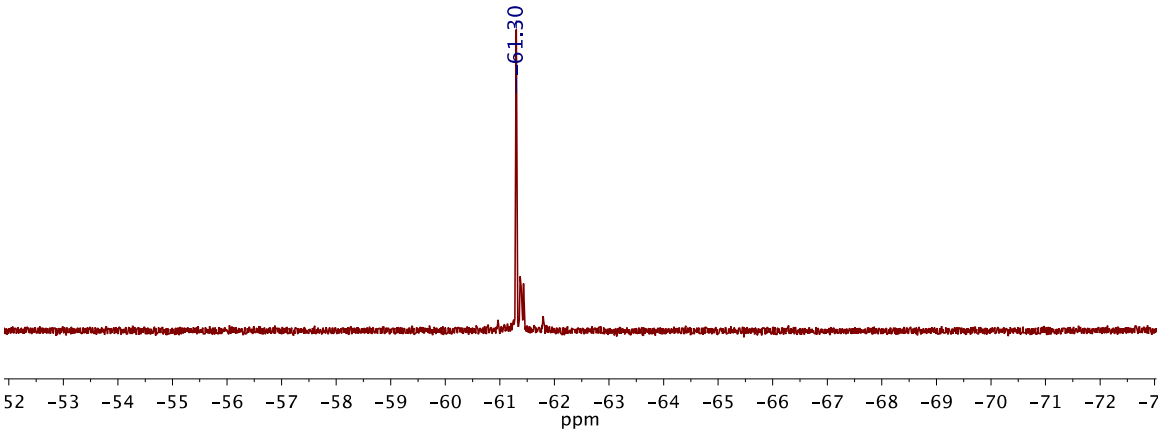

Figure A.139: $^{19}F\{^{1}H\}$ NMR Spectrum (C_6D_6, 282.33 MHz) of 16_{CF3}

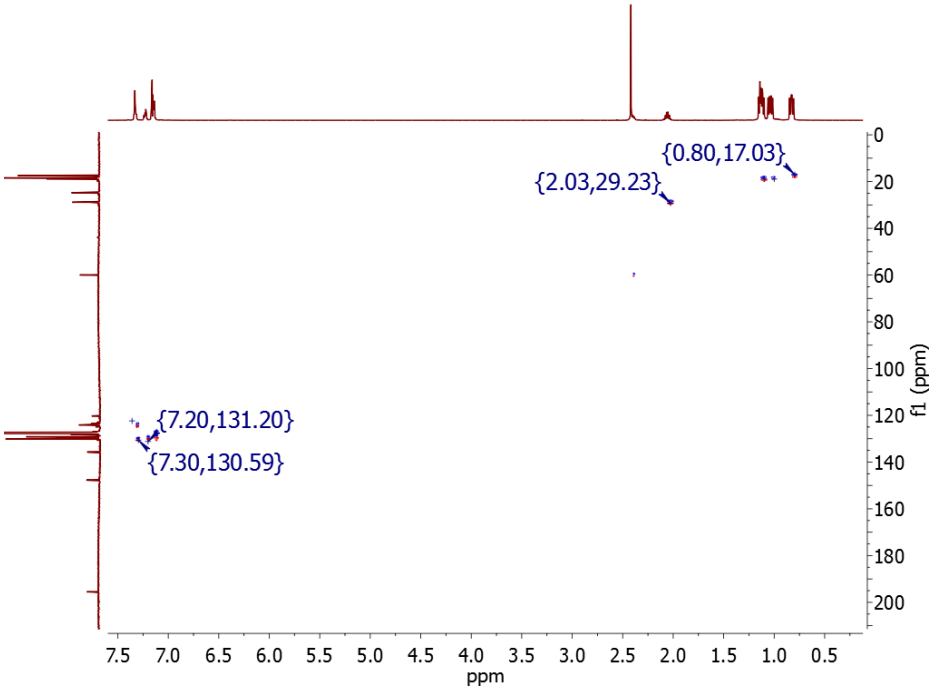

Figure A.140: ^{1}H-^{13}C HSQC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 16_{CF_3}

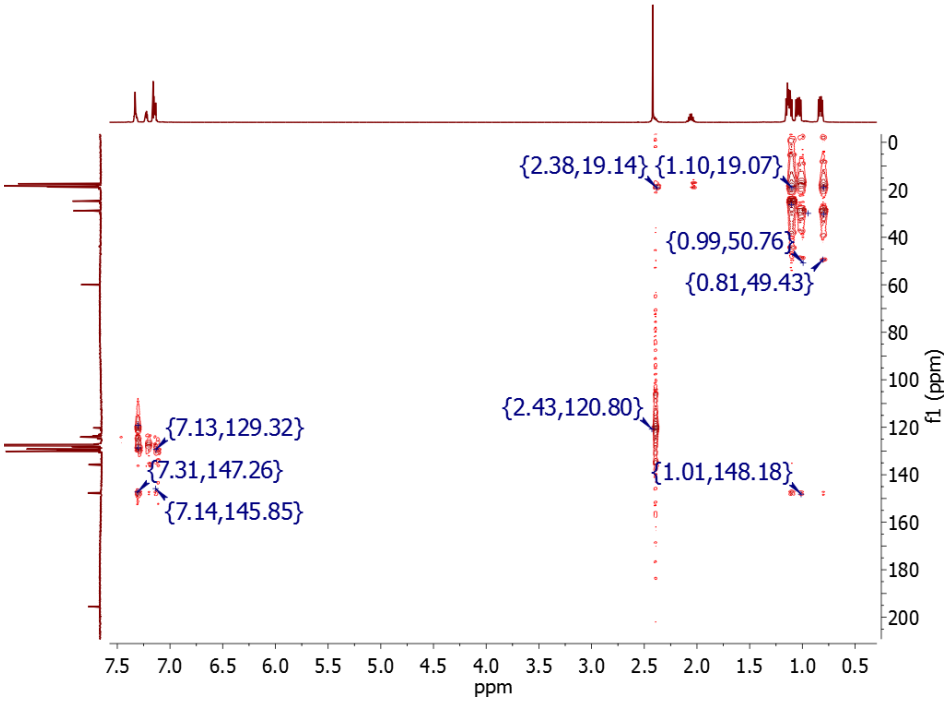

Figure A.141: ^{1}H-^{13}C HMBC NMR Spectrum (C_6D_6, 499.85, 125.70 MHz) of 16_{CF_3}

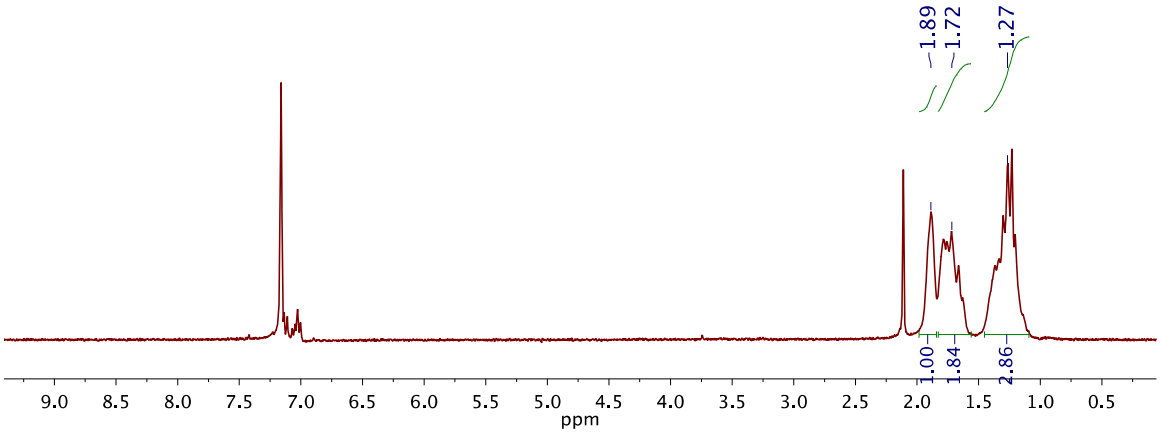

Figure A.142: ^{1}H NMR Spectrum (C_6D_6, 25°C, 300 MHz) of 18

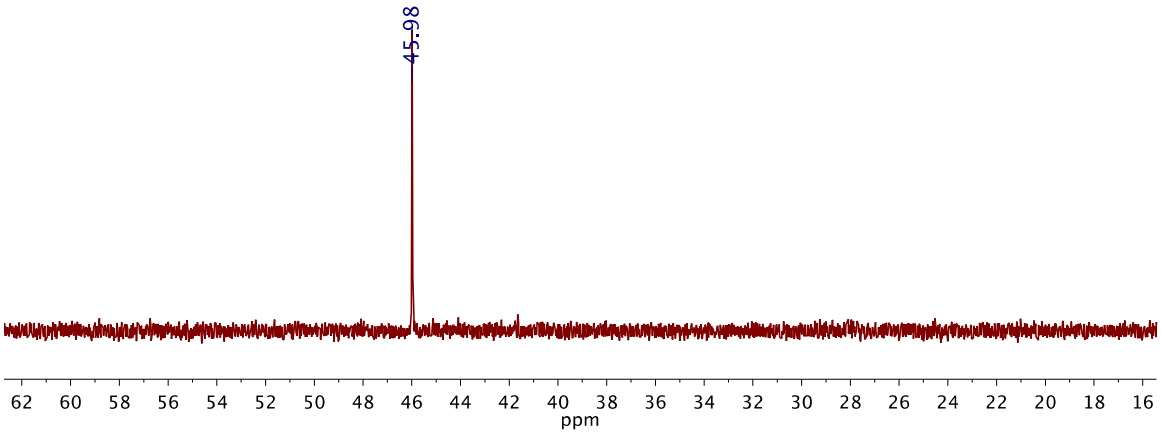

Figure A.143: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 18

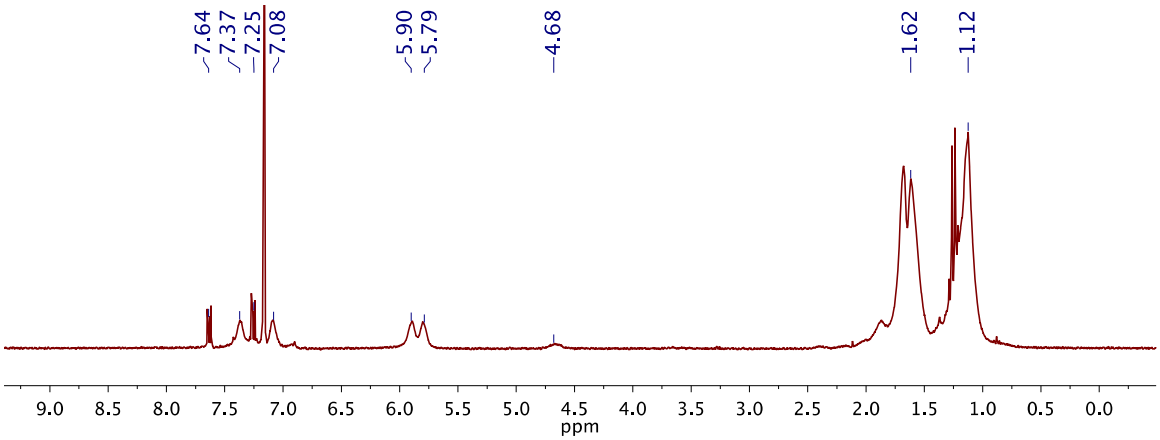

Figure A.144: ^{1}H NMR Spectrum (C_6D_6, 25°C, 300 MHz) of 19

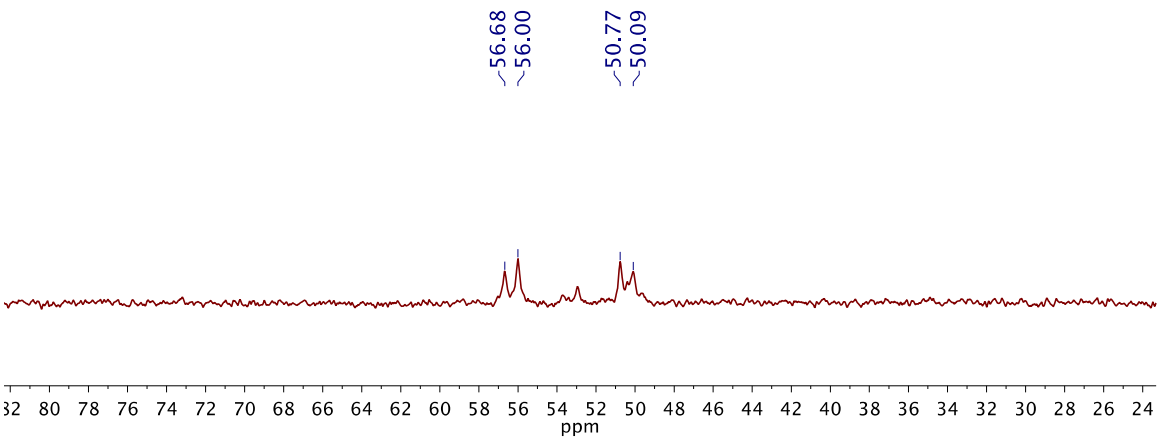

Figure A.145: $^{31}P\{^{1}H\}$ NMR Spectrum (C_6D_6, 25°C, 121.48 MHz) of 19

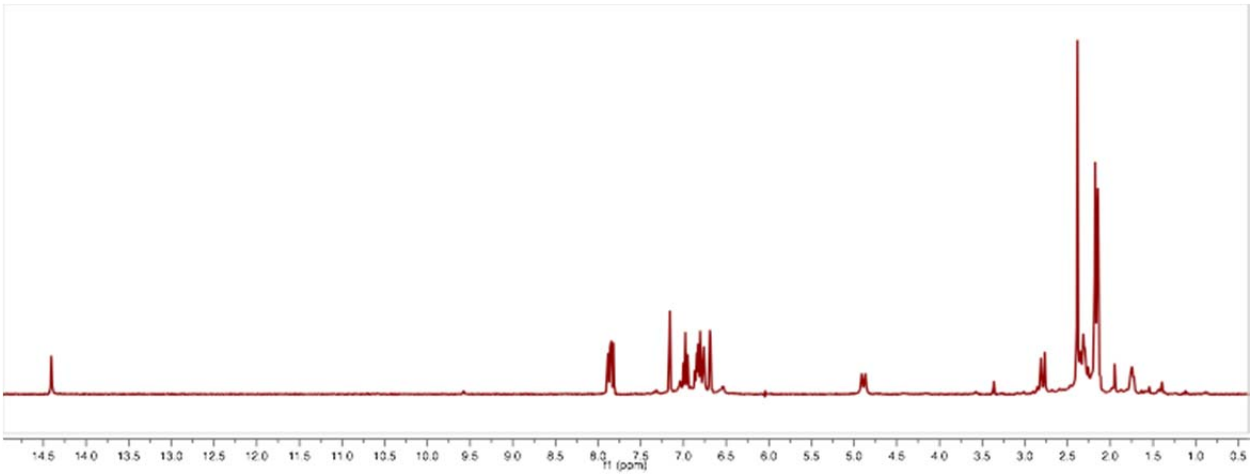

Figure A.146. ^{1}H NMR spectrum of 23 in C_6D_6.

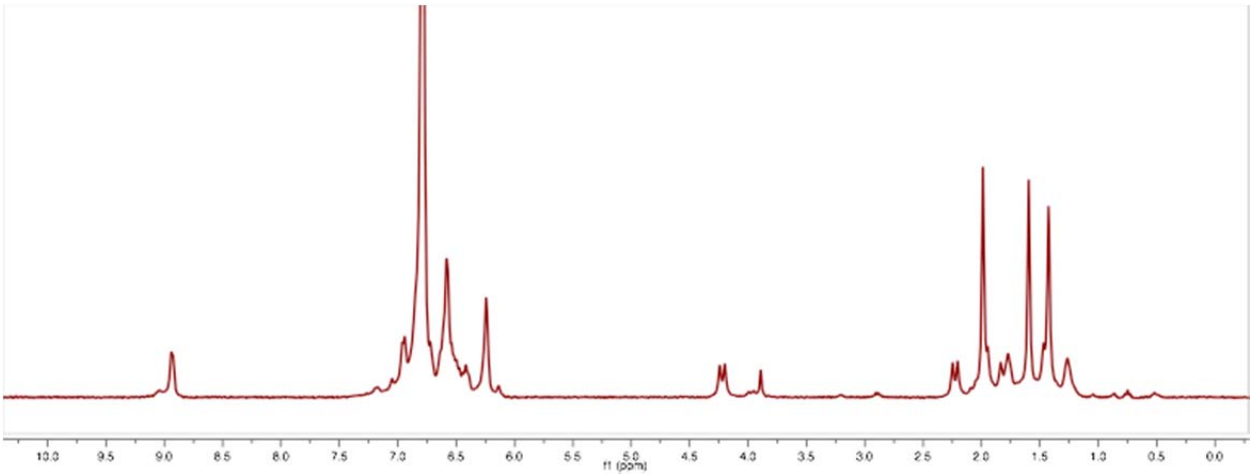

Figure A.147. ^{1}H NMR spectrum of 25 in C_6D_6.

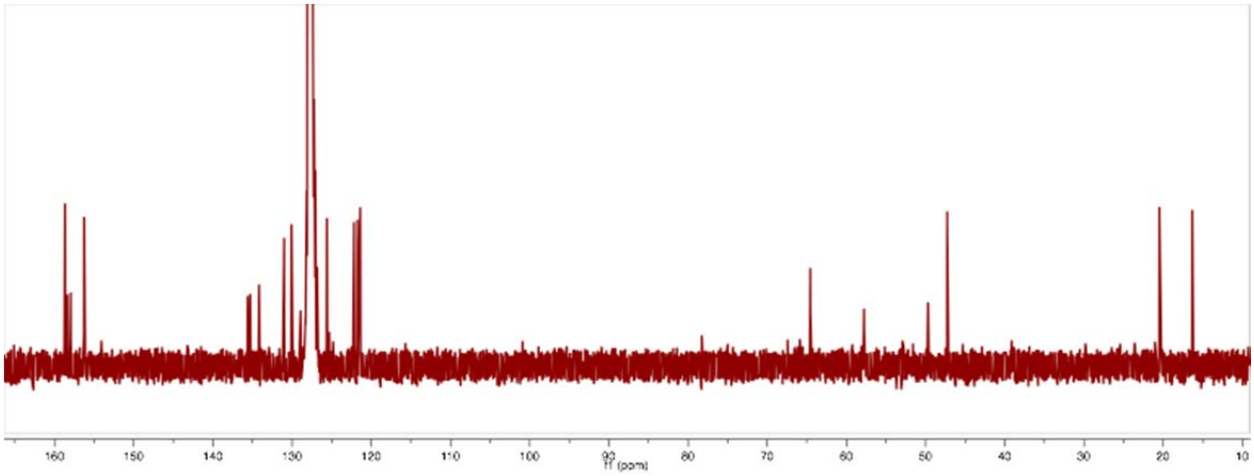

Figure A.148. ^{13}C NMR spectrum of 25 in C_6D_6.

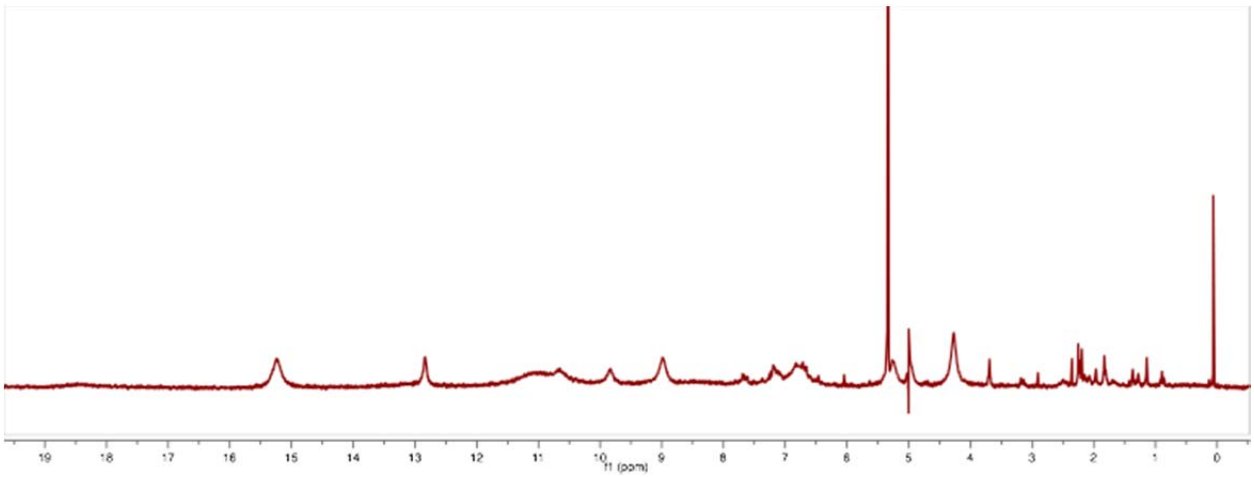

Figure A.149. ^{1}H NMR spectrum of 26 in CD_2Cl_2.

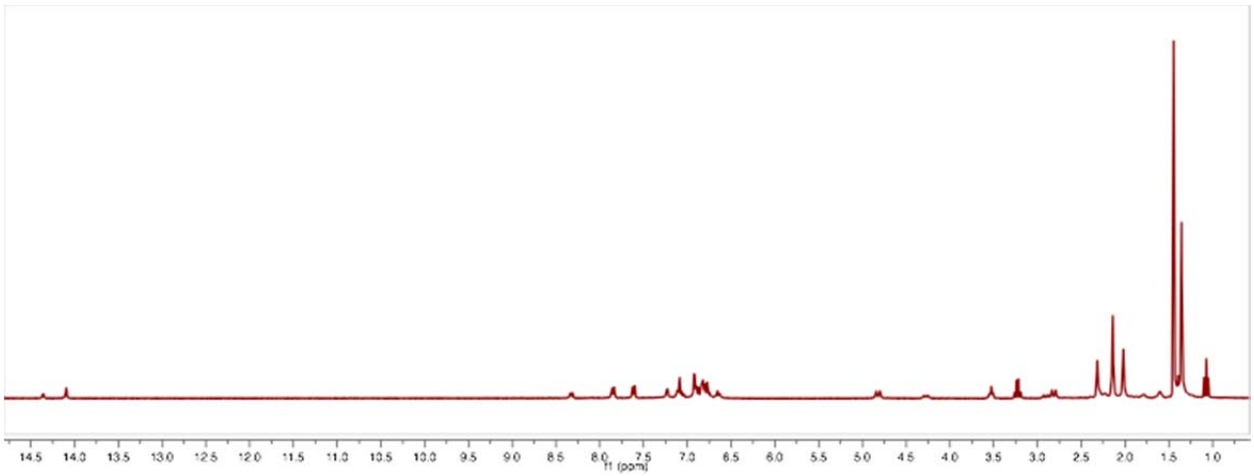

Figure A.150. ^{1}H NMR spectrum of 23^{tBu} in C_6D_6.

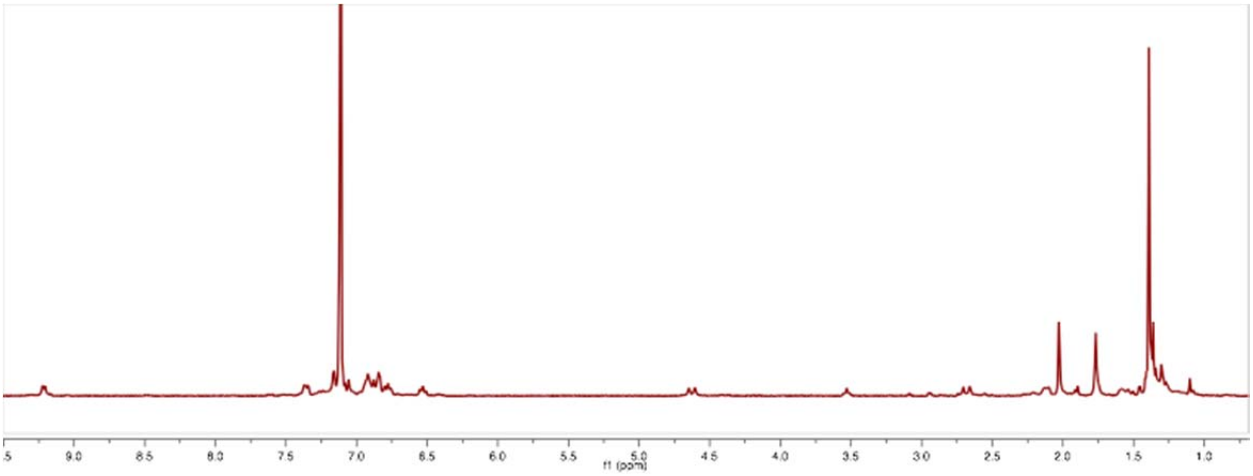

Figure A.151. ^{1}H NMR spectrum of 25^{tBu} in C_6D_6.

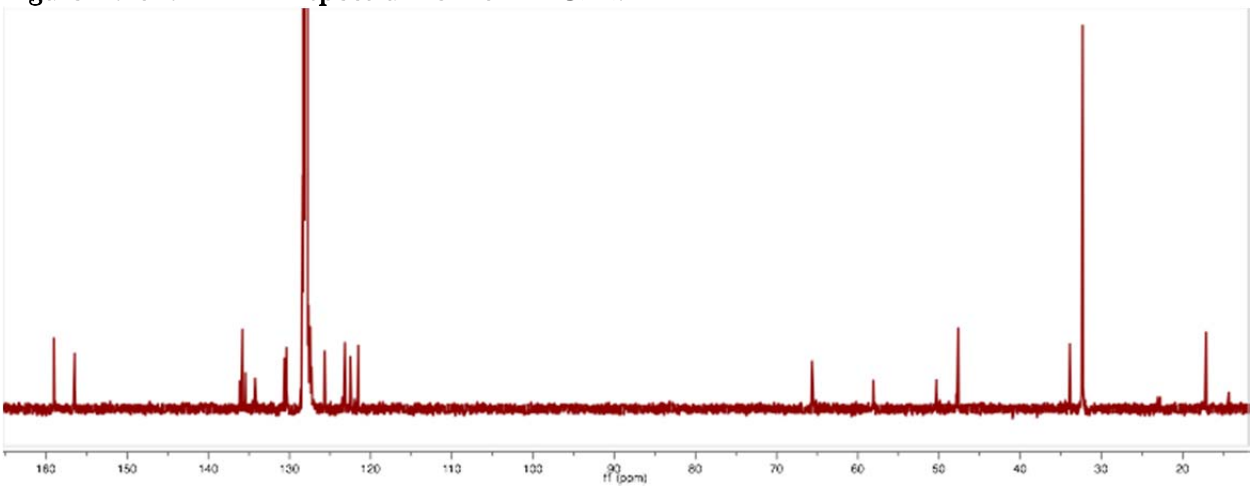

Figure A.152. $^{13}C\{^{1}H\}$ NMR spectrum of 25^{tBu} in C_6D_6.

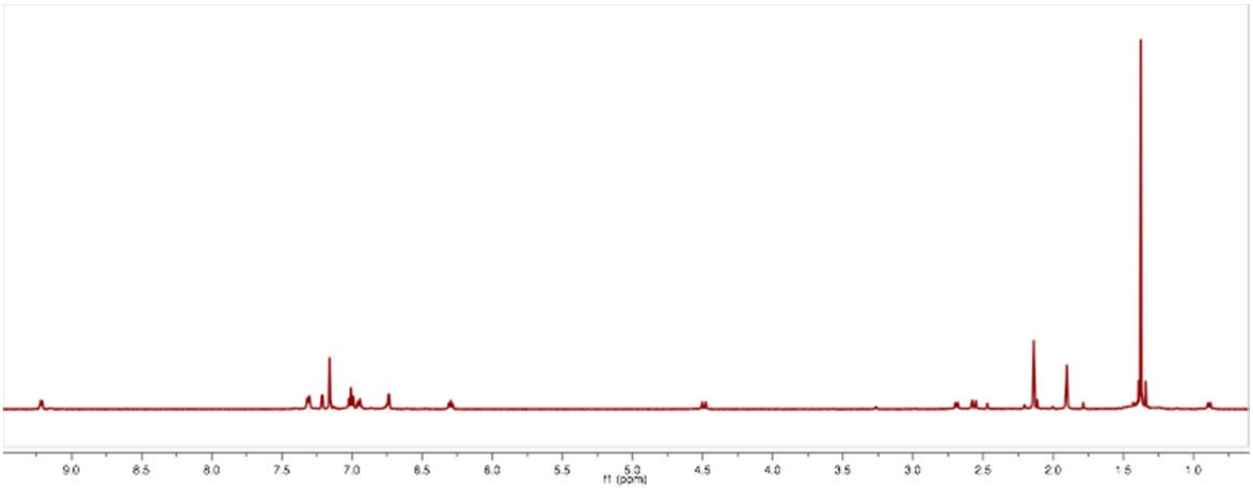

Figure A.153. ^{1}H NMR spectrum of 29^{tBu} in C_6D_6.

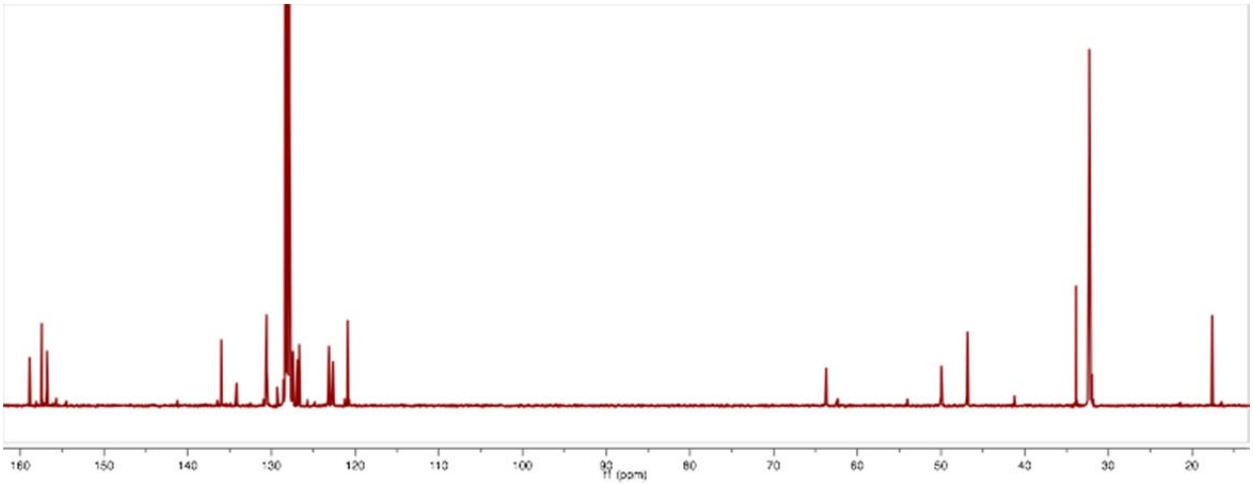

Figure A.154. $^{13}C\{^{1}H\}$ NMR spectrum of 29^{tBu} in C_6D_6.

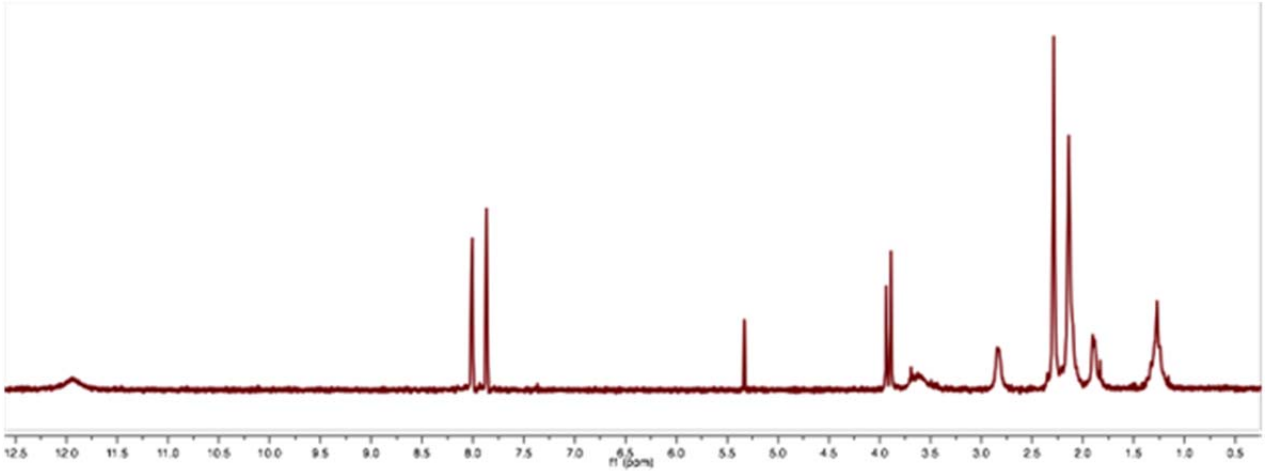

Figure A.155. ^{1}H NMR spectrum of 30^{NO2} in CD_2Cl_2

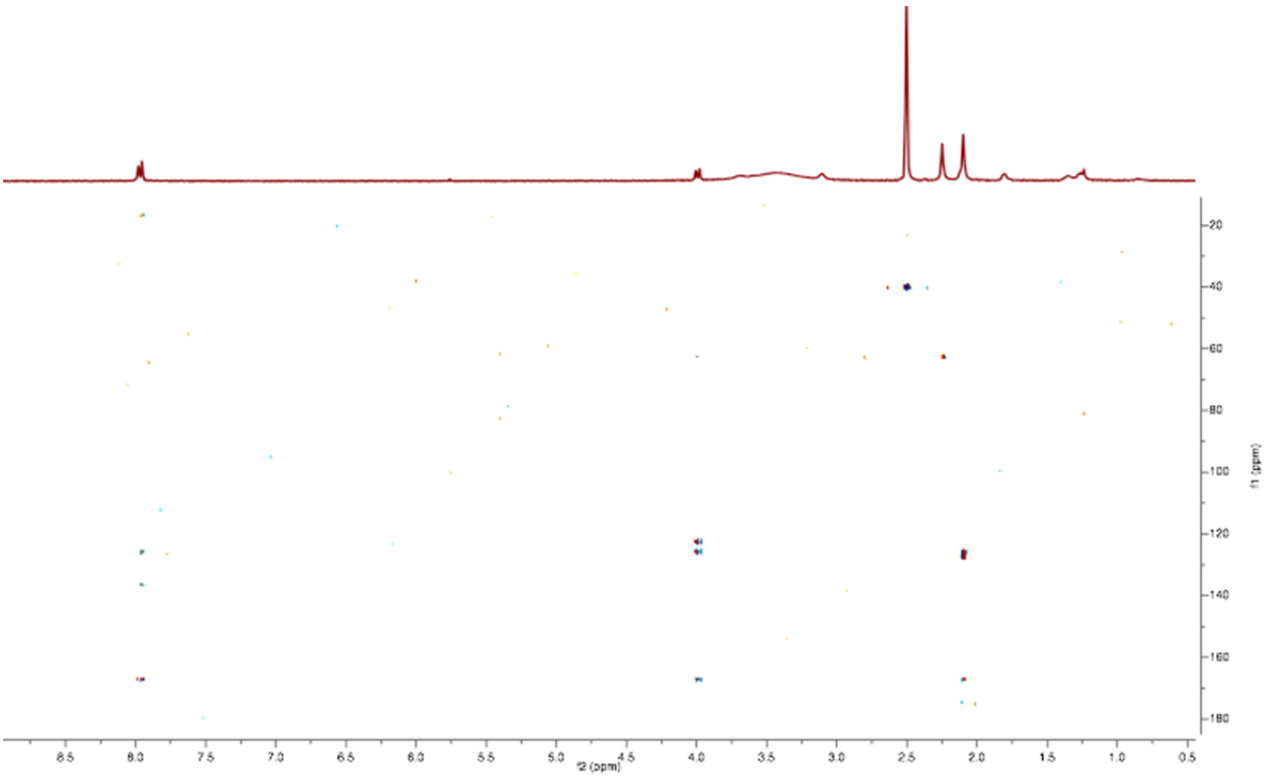

Figure A.156. ^{1}H-^{13}C gHMBCAD NMR spectrum of 30^{NO_2} in $(CD_3)_2SO$.

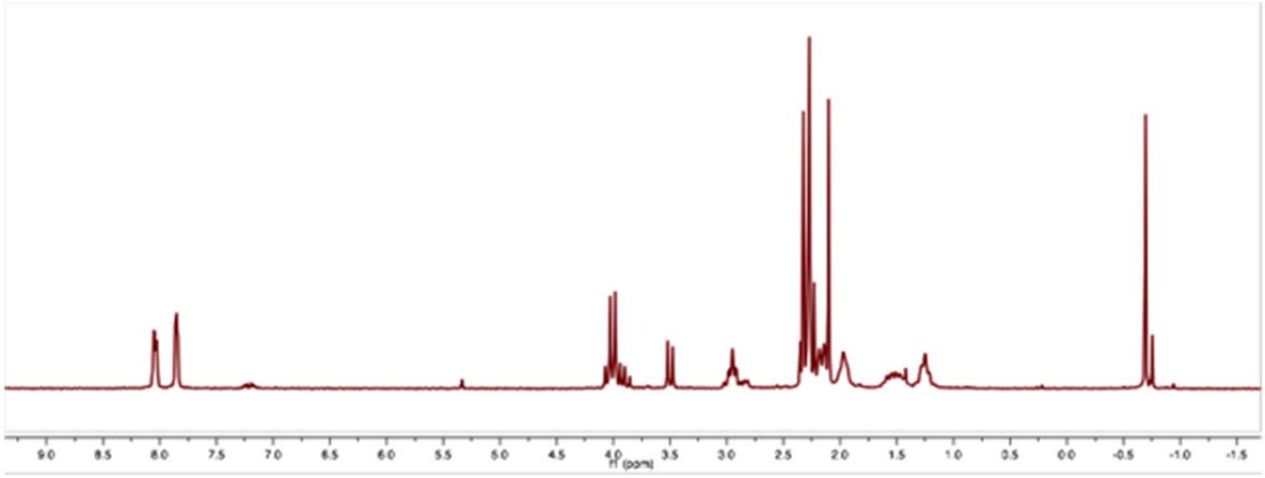

Figure A.157. ^{1}H NMR spectrum of 31^{NO_2} in CD_2Cl_2

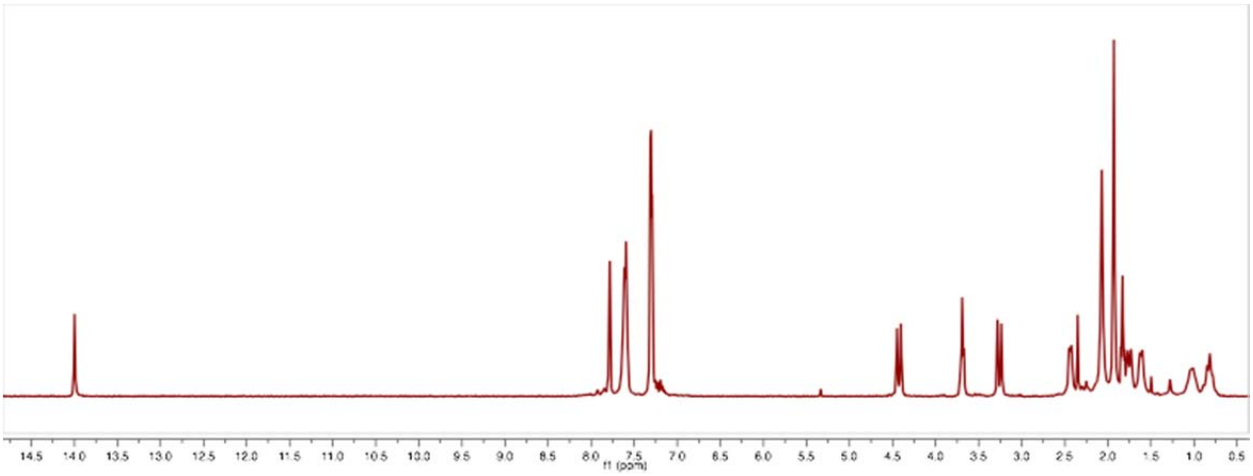

Figure A.158. ^{1}H NMR spectrum of 32^{NO_2} in CD_2Cl_2.

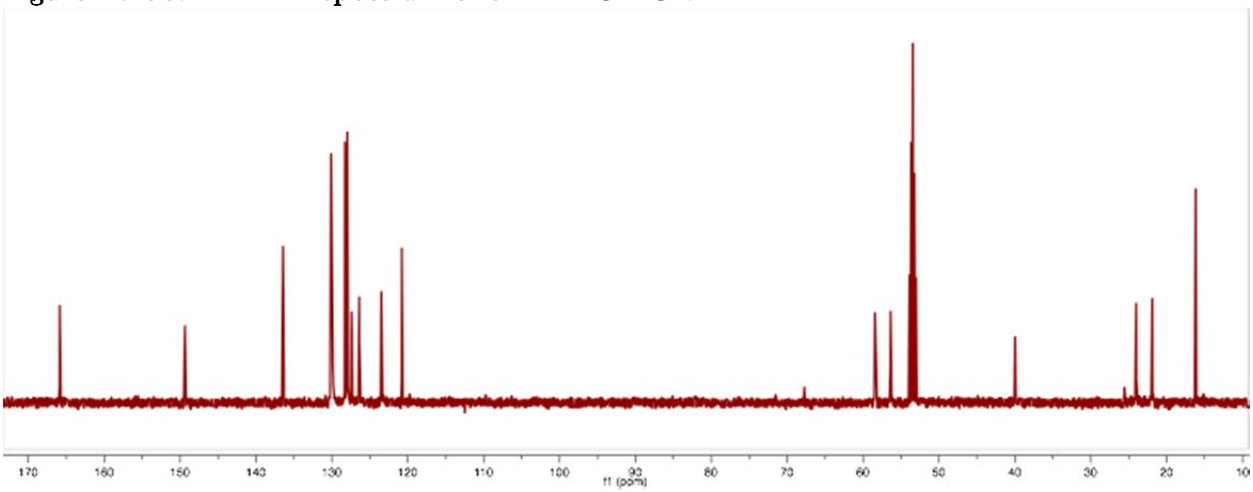

Figure A.159. $^{13}C\{^{1}H\}$ NMR spectrum of 32^{NO_2} in CD_2Cl_2.

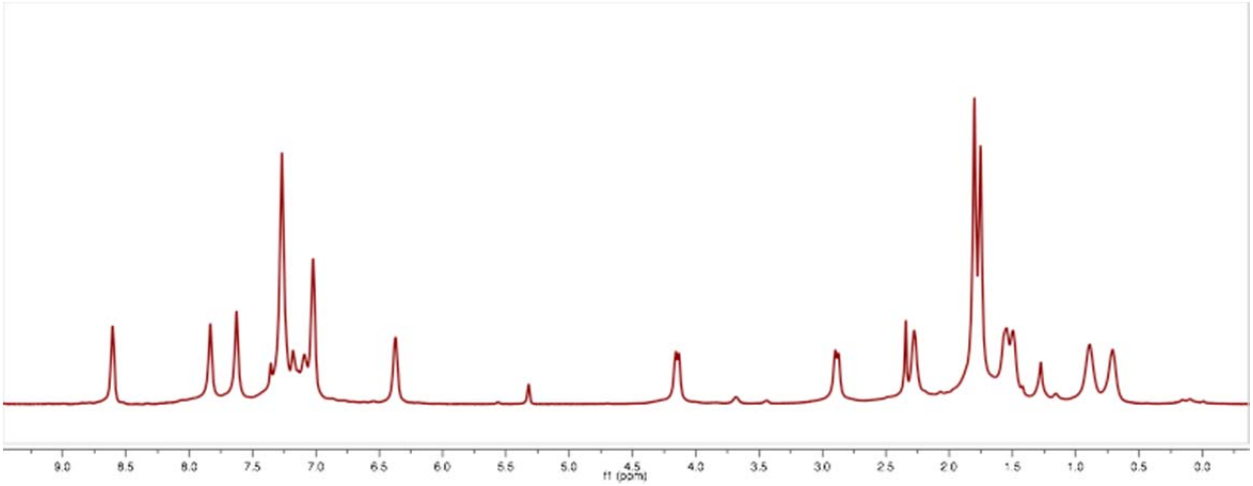

Figure A.160. ^{1}H NMR spectrum of 33^{NO_2} in CD_2Cl_2.

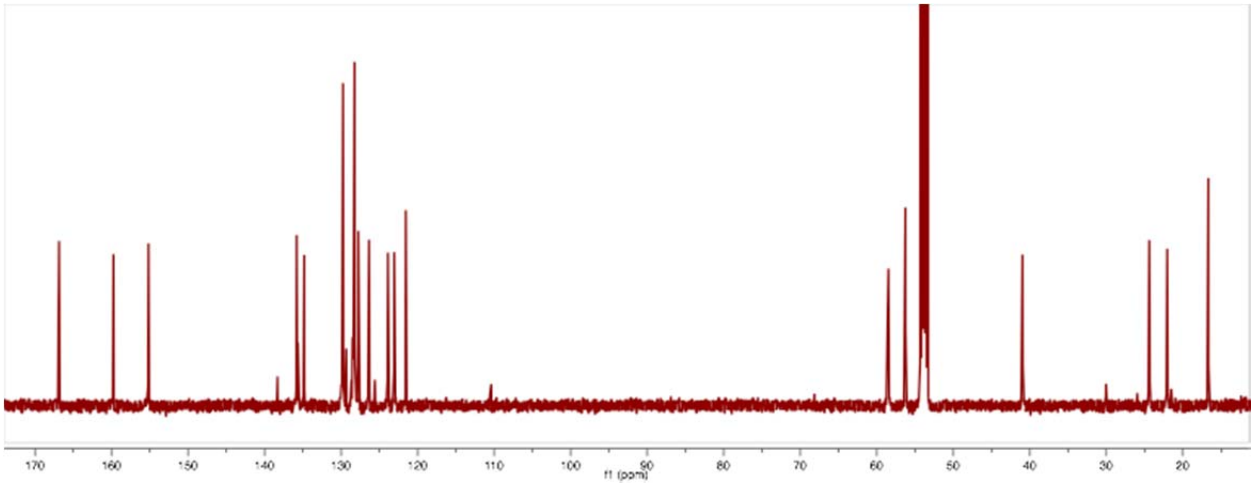

Figure A.161. $^{13}C\{^{1}H\}$ NMR spectrum of 33^{NO2} in CD_2Cl_2.

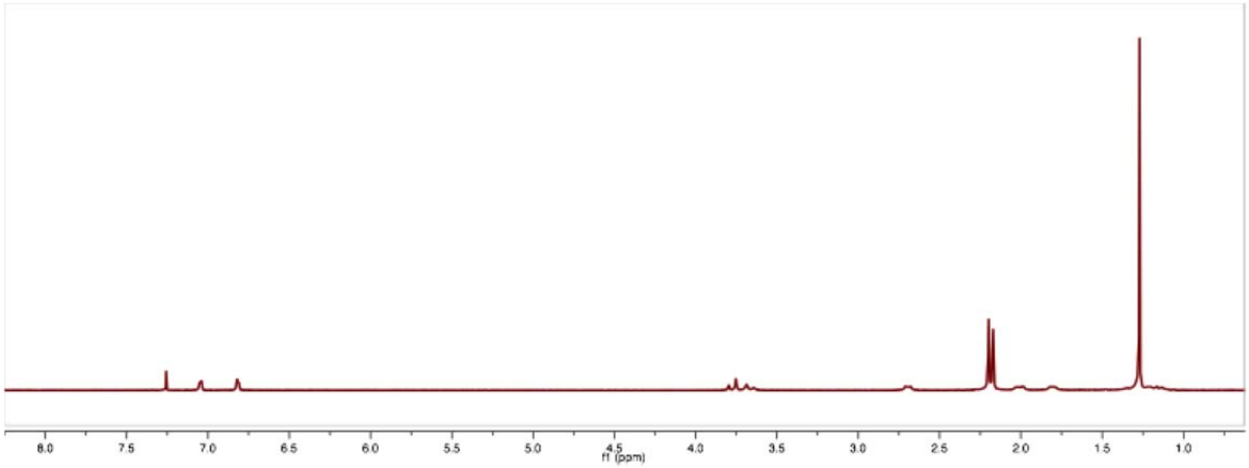

Figure A.162. ^{1}H NMR spectrum of 30^{tBu} in $CDCl_3$

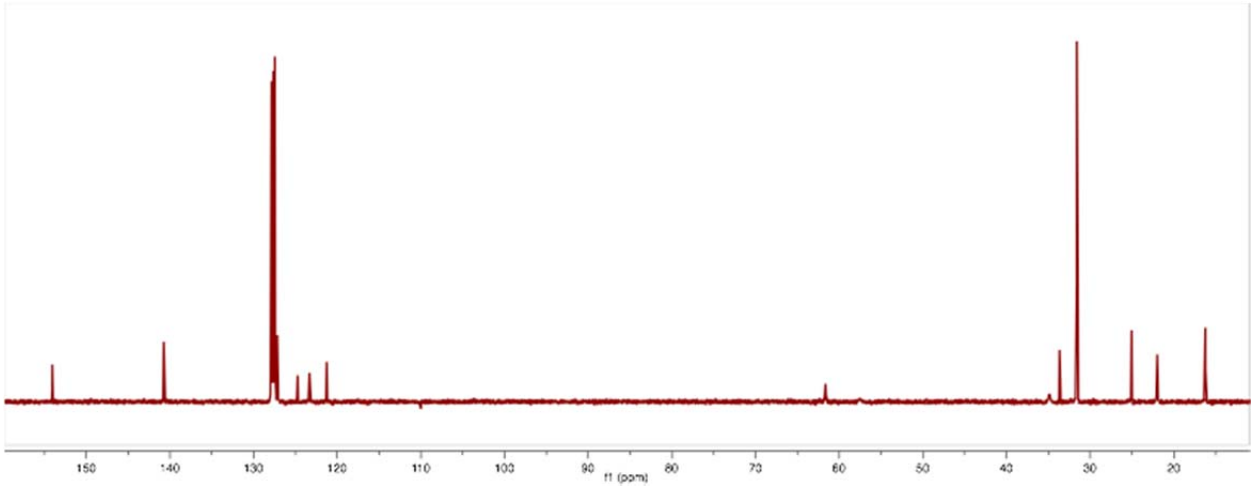

Figure A.163. $^{13}C\{^{1}H\}$ NMR spectrum of 30^{tBu} in C_6D_6

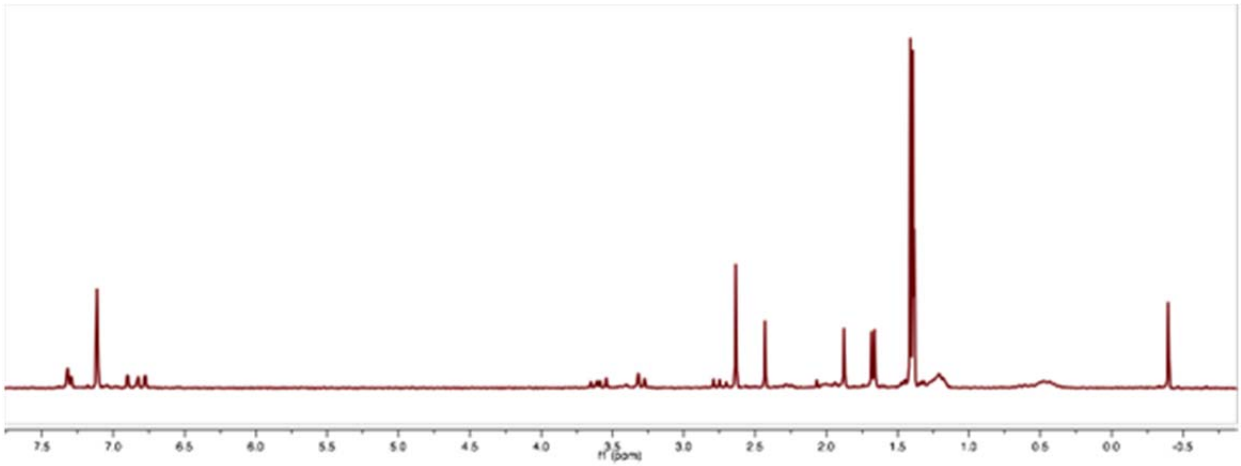

Figure A.164. ^{1}H NMR spectrum of 31^{tBu} in C_6D_6

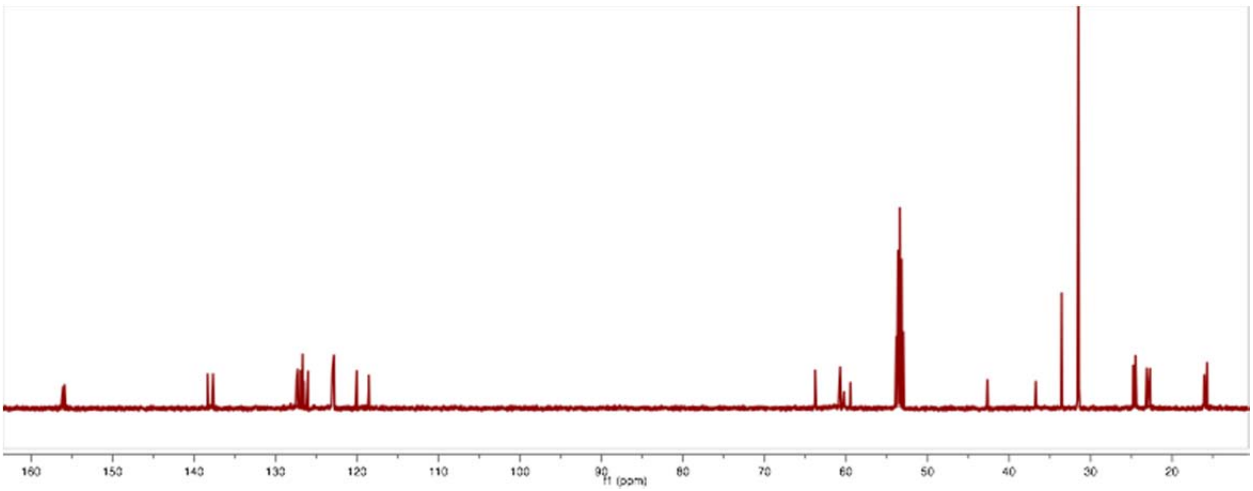

Figure A.165. $^{13}C\{^{1}H\}$ NMR spectrum of 31^{tBu} in CD_2Cl_2

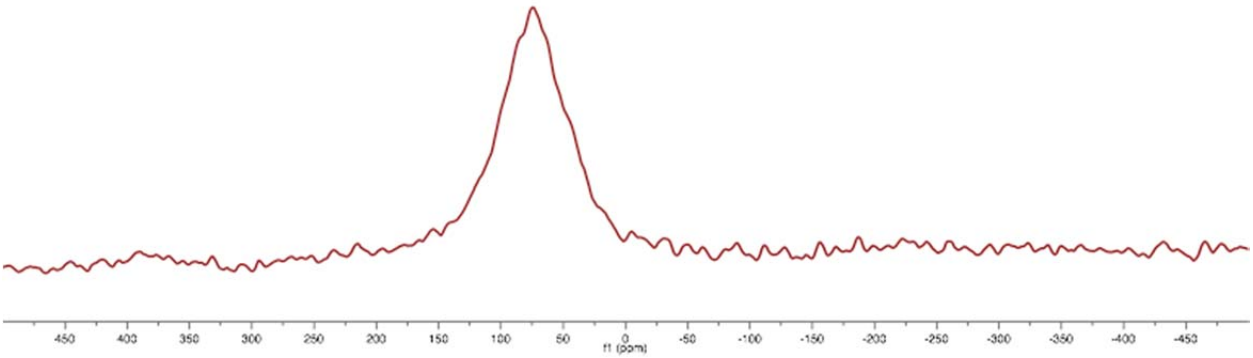

Figure A.166. ^{27}Al NMR spectrum of 31^{tBu} in CD_2Cl_2

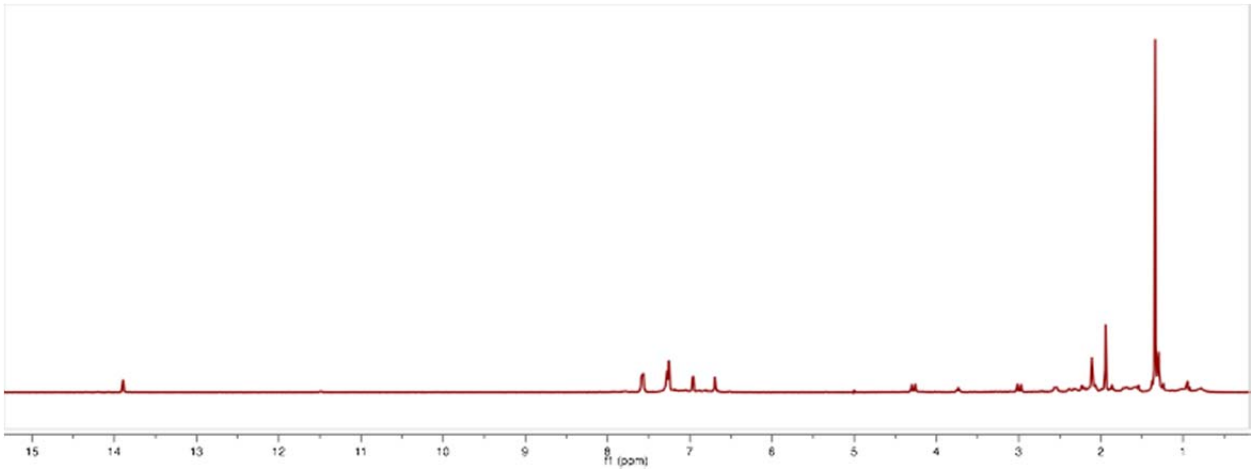

Figure A.167. ^{1}H NMR spectrum of 32^{tBu} in CD_2Cl_2.

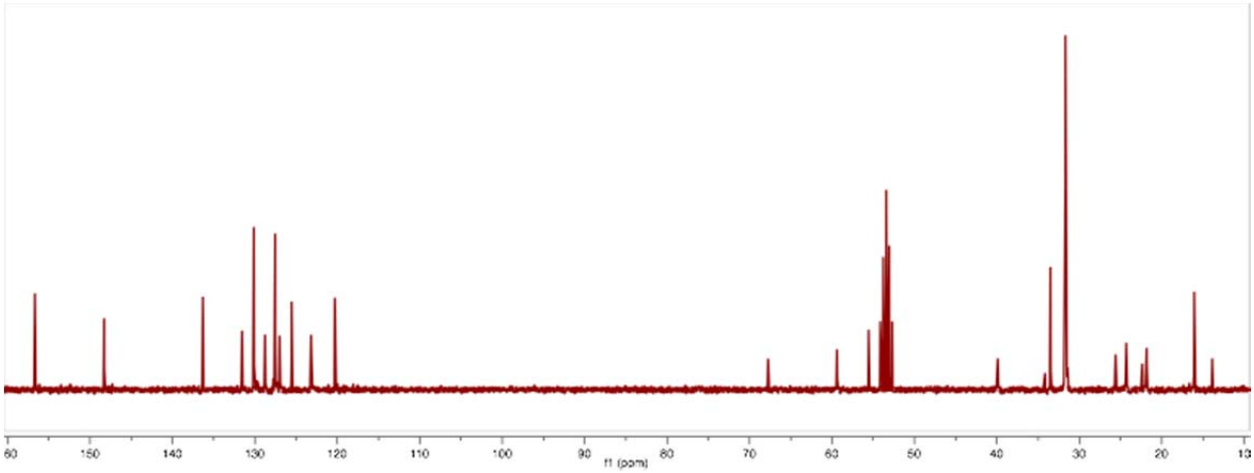

Figure A.168. $^{13}C\{^{1}H\}$ NMR spectrum of 32^{tBu} in CD_2Cl_2.

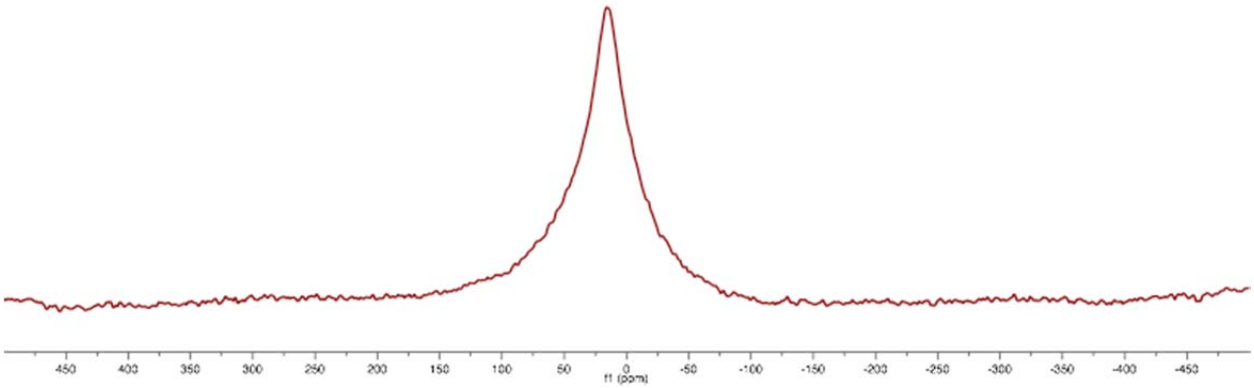

Figure A.169. ^{27}Al NMR spectrum of 32^{tBu} in CD_2Cl_2.

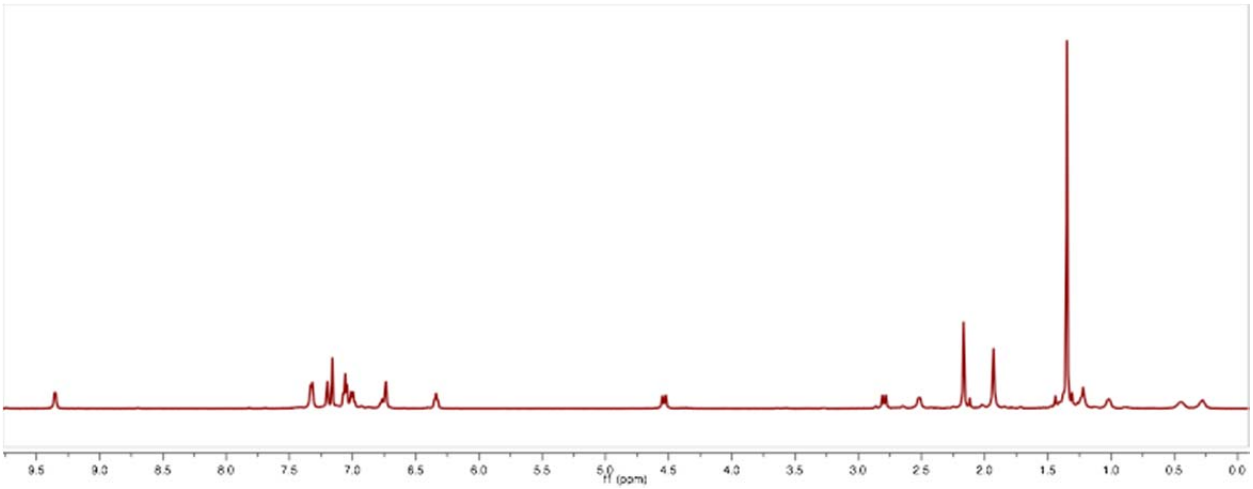

Figure A.170. ^{1}H NMR spectrum of 33^{tBu} in C_6D_6.

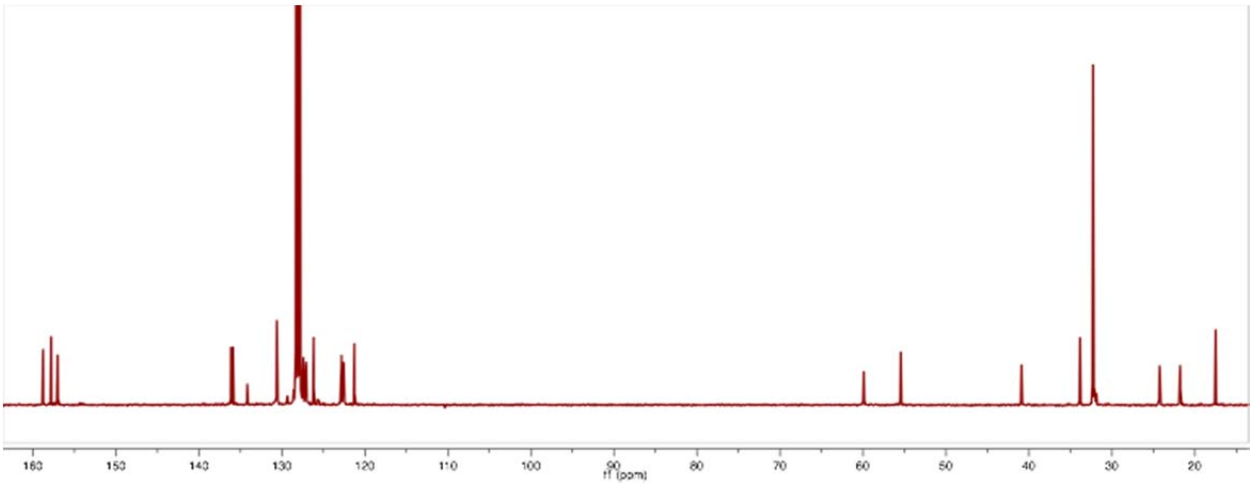

Figure A.171. ^{13}C{^{1}H} NMR spectrum of 33^{tBu} in C_6D_6.

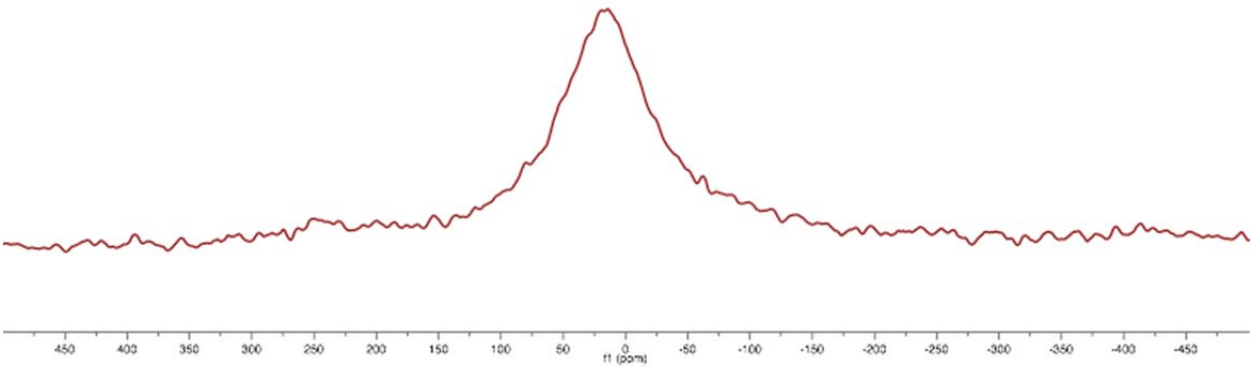

Figure A.172. ^{27}Al NMR spectrum of 33^{tBu} diphenylglyoxime macrocycle in C_6D_6.

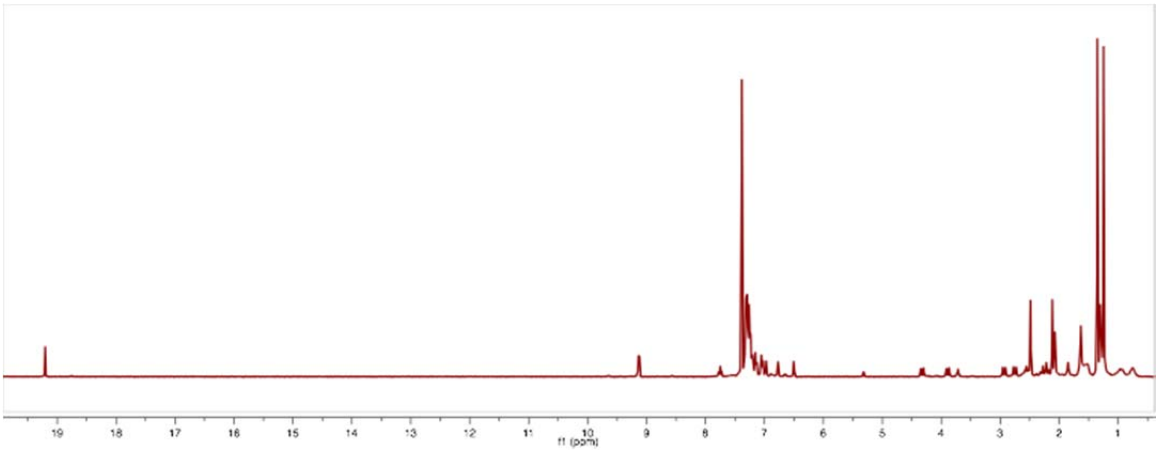

Figure A.173. ^{1}H NMR spectrum of 35 in in CD_2Cl_2.

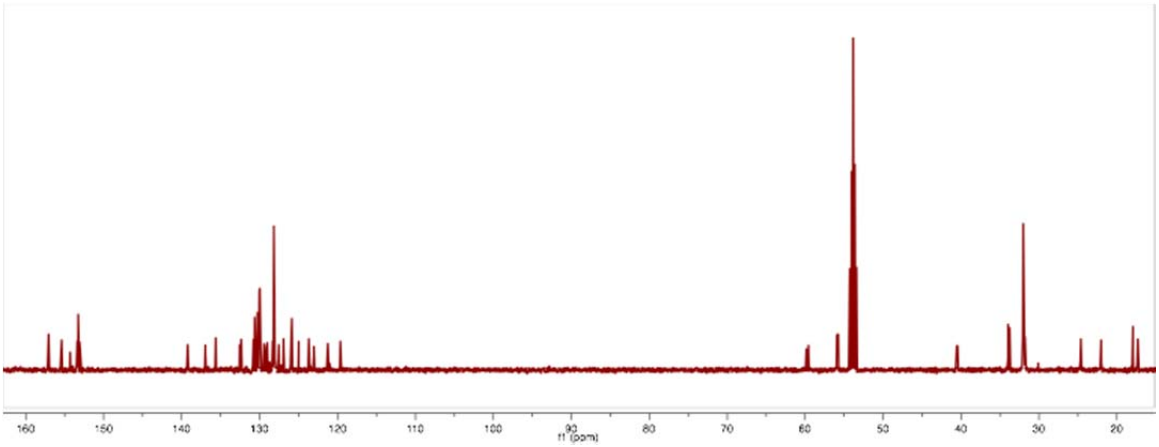

Figure A.174. $^{13}C\{^{1}H\}$ NMR spectrum of 35 in CD_2Cl_2.

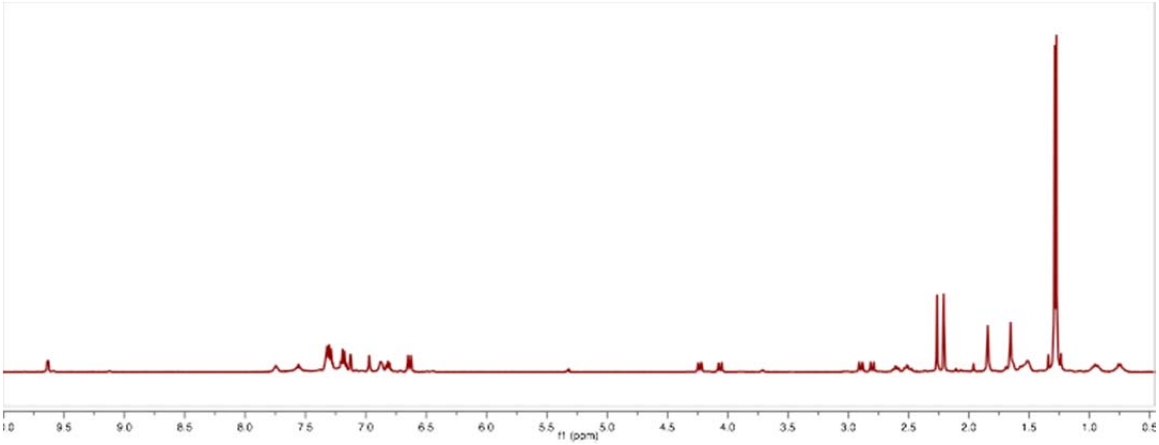

Figure A.175. ^{1}H NMR spectrum of 36^{tBu} in CD_2Cl_2.

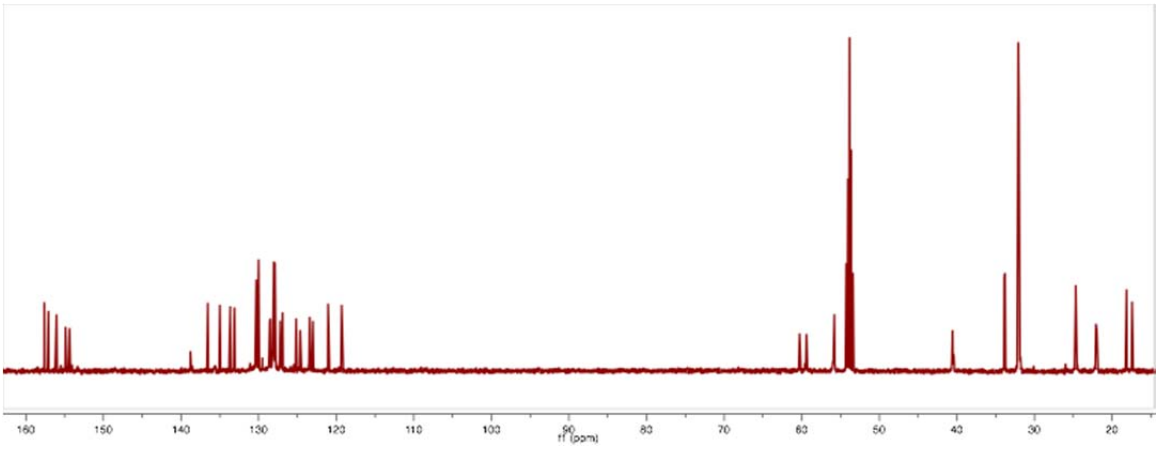

Figure A.176. $^{13}C\{^{1}H\}$ NMR spectrum of 36^{tBu} in CD_2Cl_2.

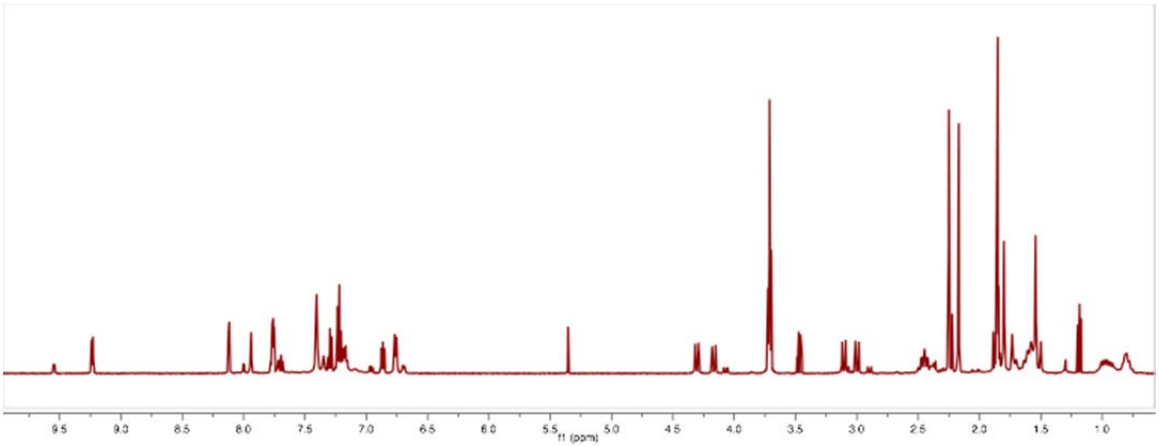

Figure A.177. ^{1}H NMR spectrum of crystals of 36^{NO2} in CD_2Cl_2 (contains THF and Et_2O).

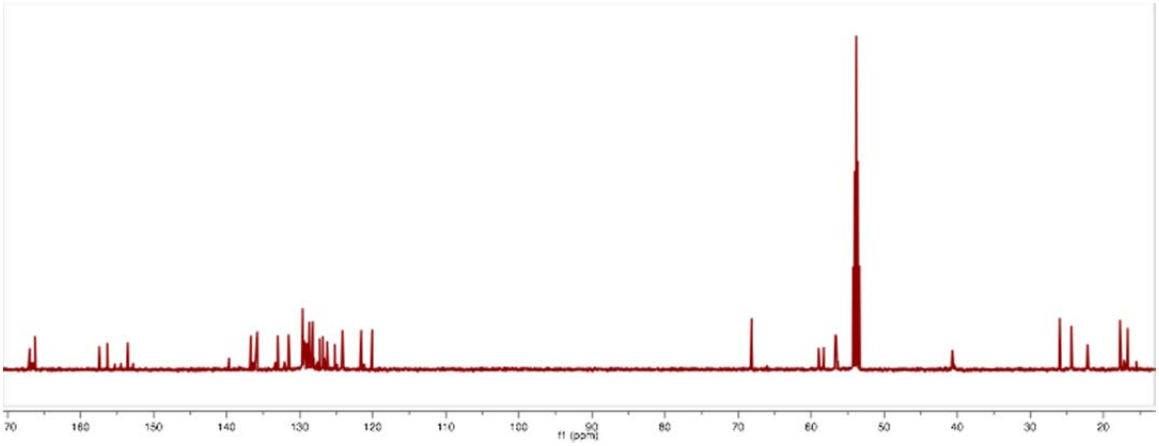

Figure A.178. $^{13}C\{^{1}H\}$ NMR spectrum of crystals of 36^{NO2} in CD_2Cl_2 (contains THF and Et_2O).

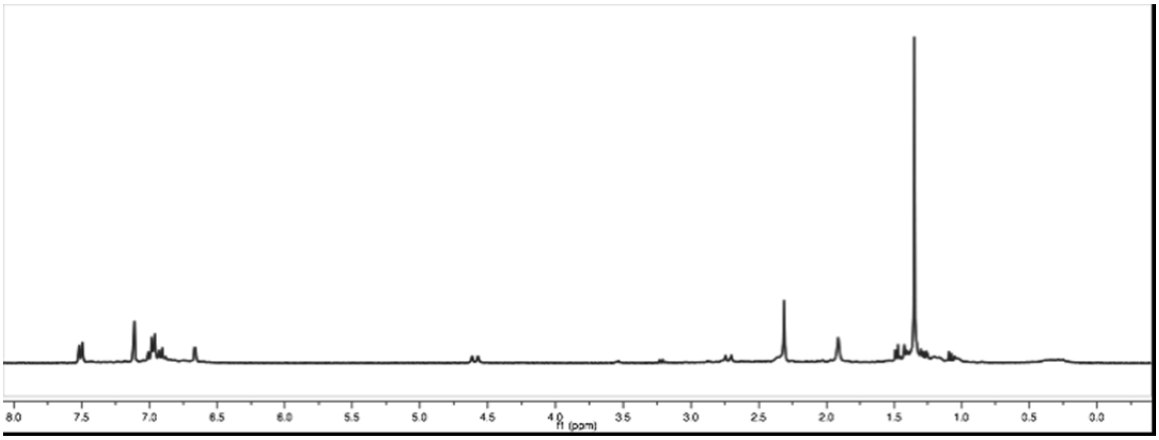

Figure A.179. ^{1}H NMR spectrum of 37 in C_6D_6.

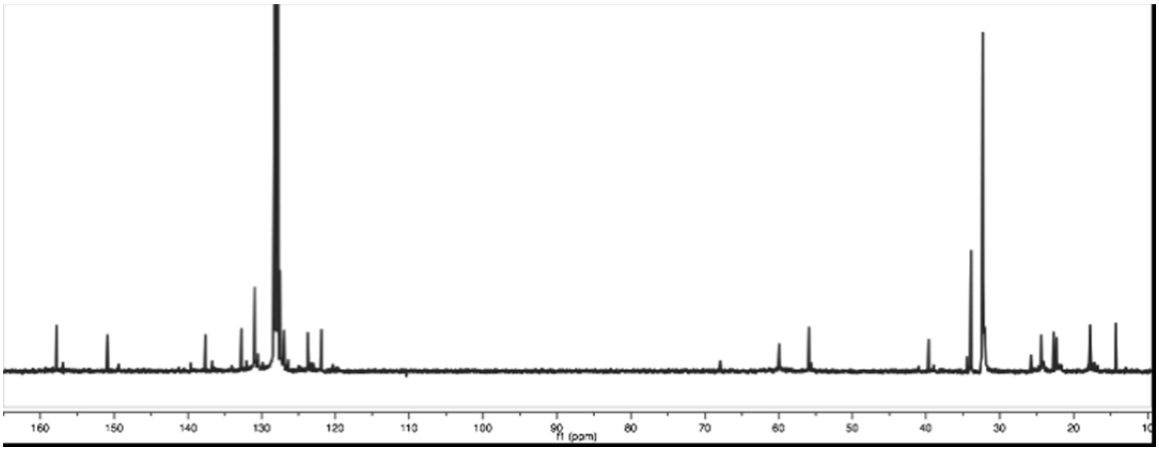

Figure A.180. $^{13}C\{^{1}H\}$ NMR spectrum of 37 in C_6D_6 (contains pentane and THF).