

Efficient Cu-catalysed *N*-alkynylation of imidazoles, benzimidazoles, indazoles and pyrazoles

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Supporting Information

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NMR spectra

Imidazole series

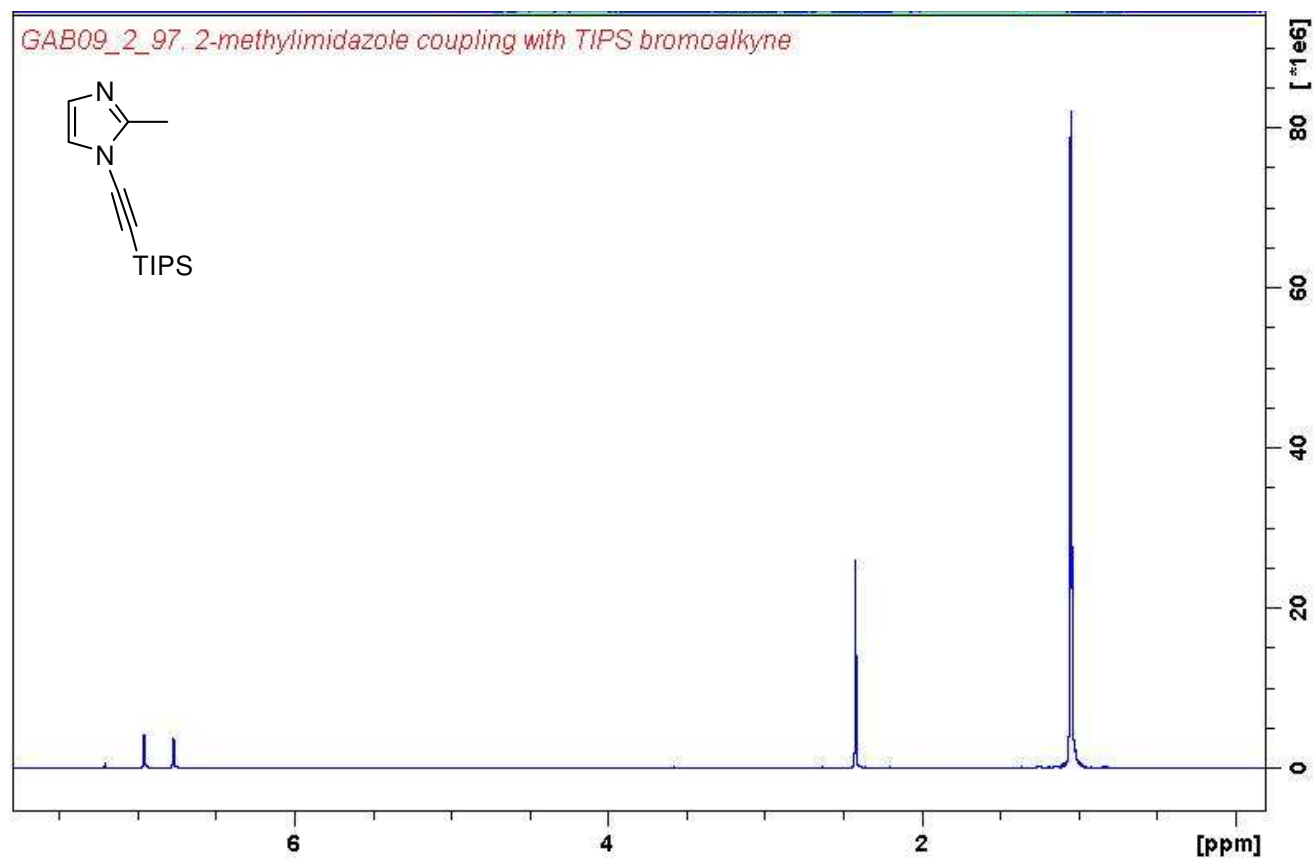


Table 2 Entry 4: 2-methyl-1-((triisopropylsilyl)ethynyl)-1H-imidazole

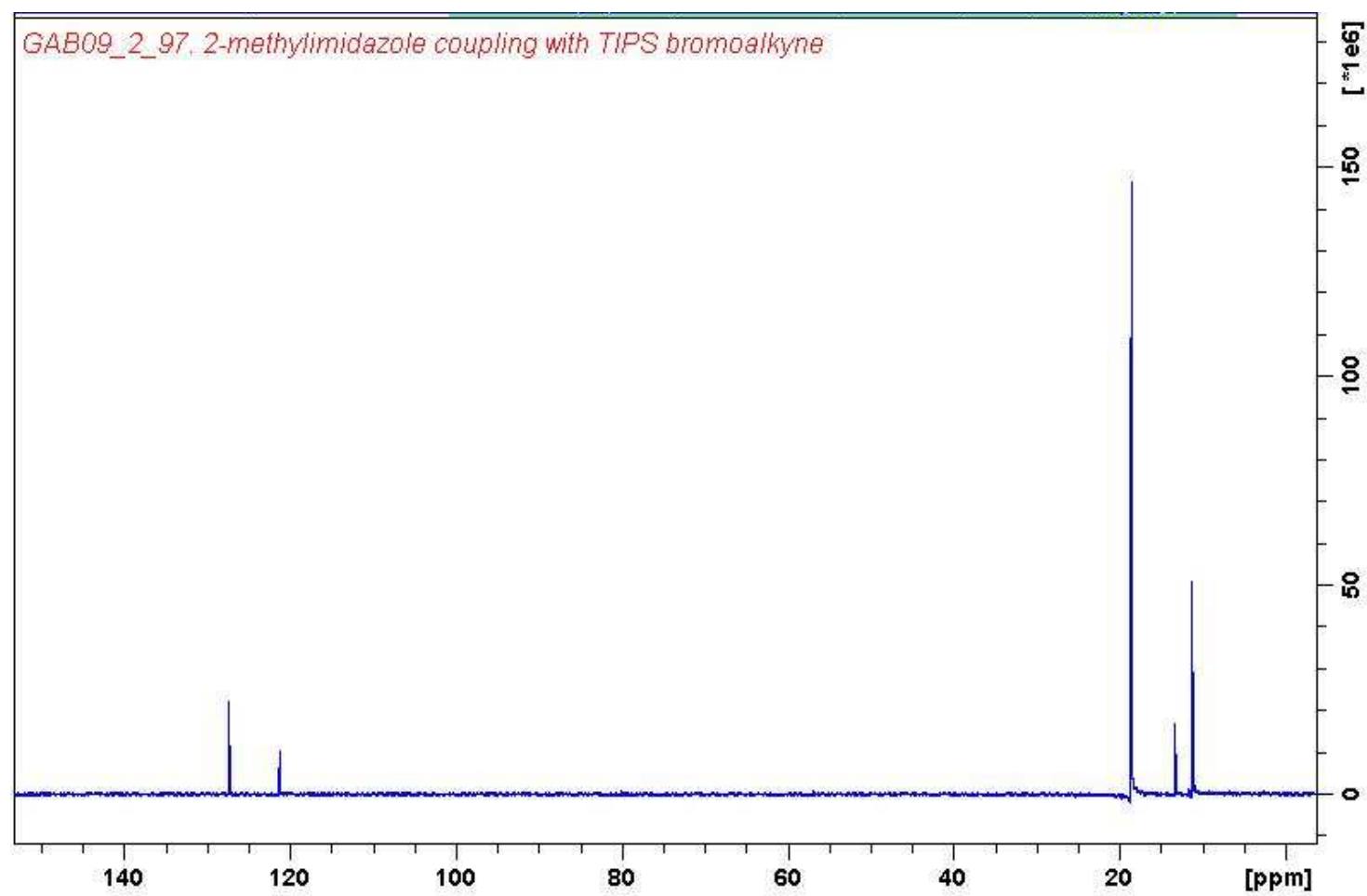


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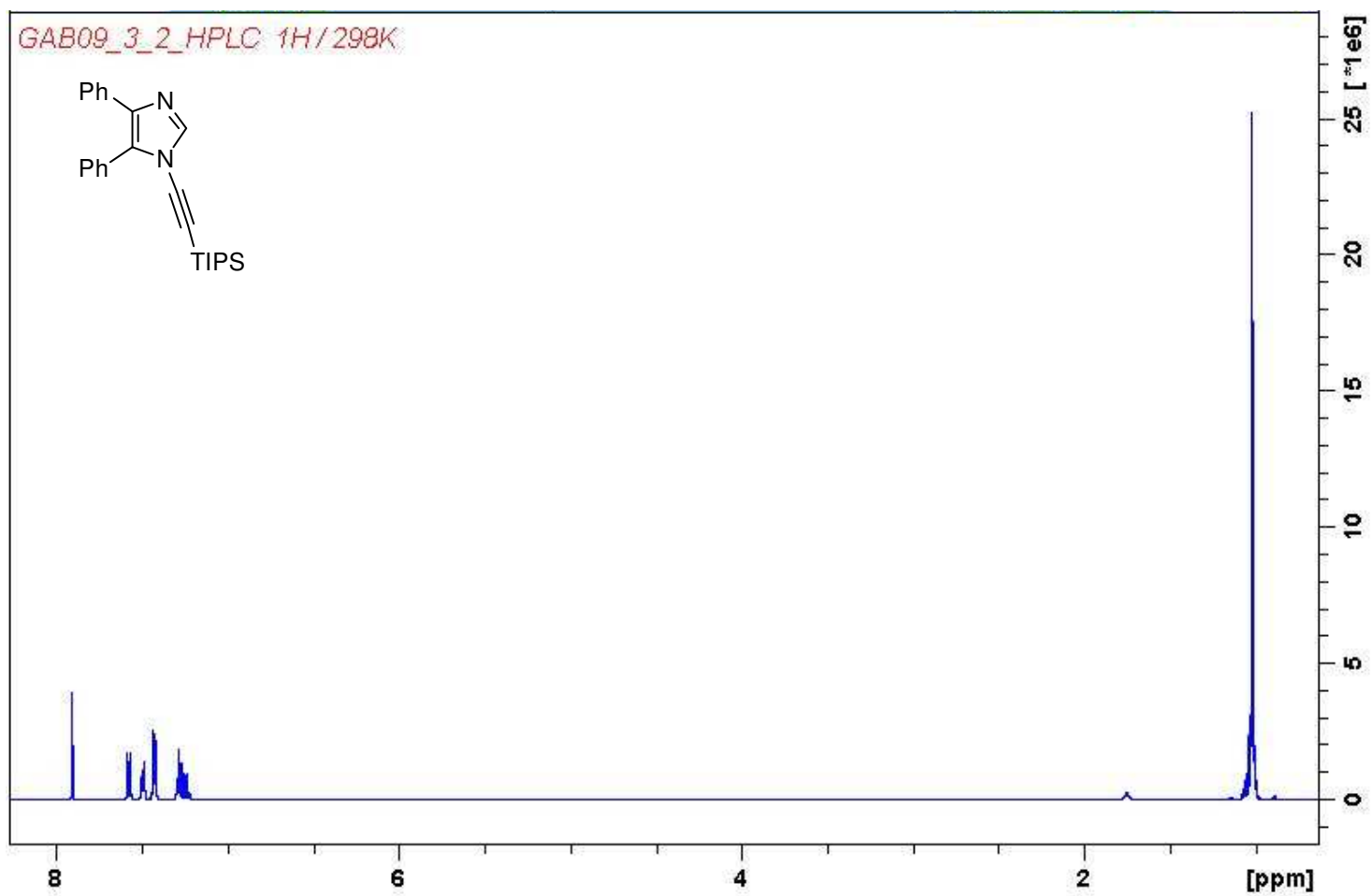


Table 2 Entry 7: 4,5-diphenyl-1-((triisopropylsilyl)ethynyl)-1H-imidazole

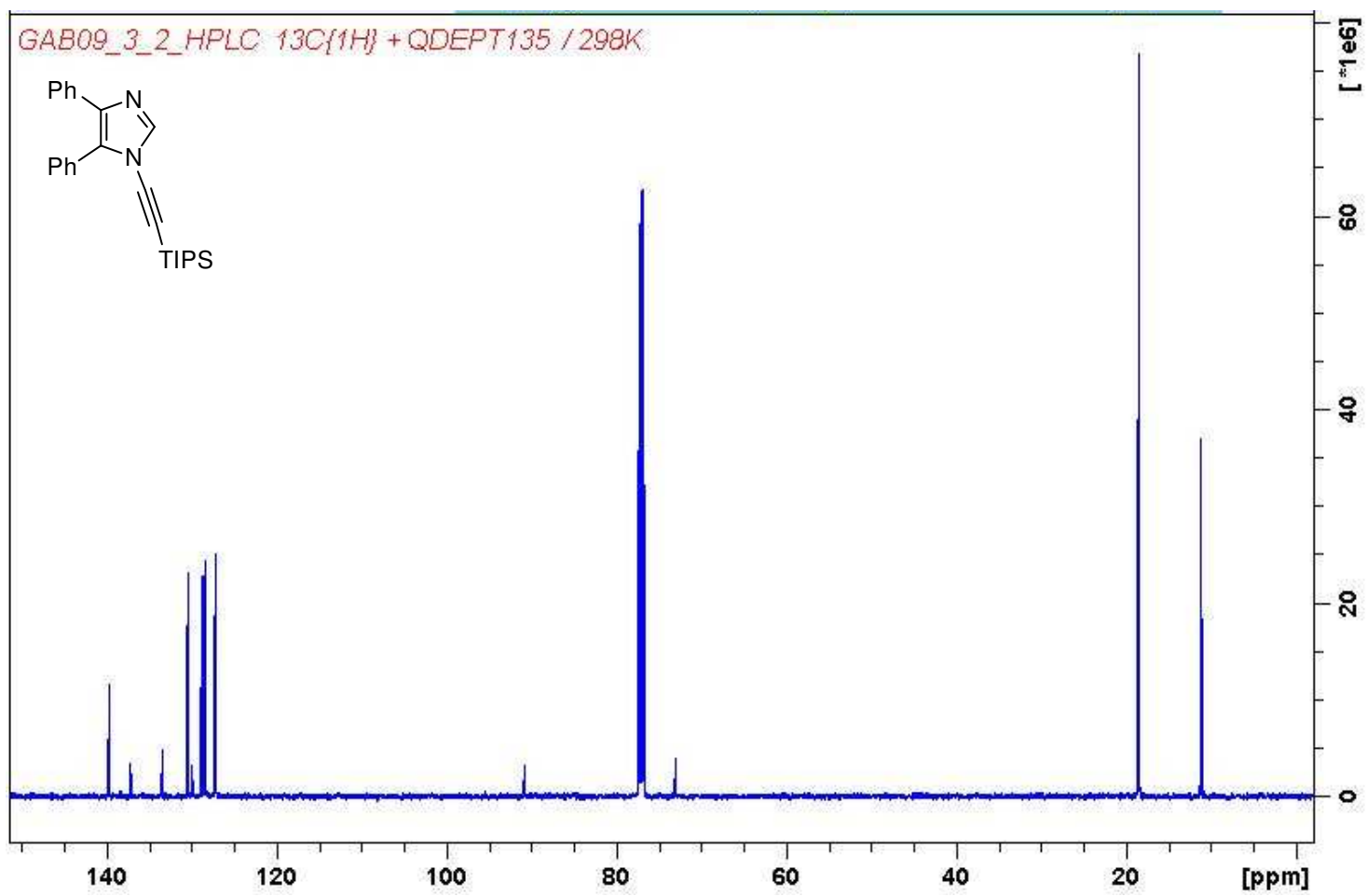


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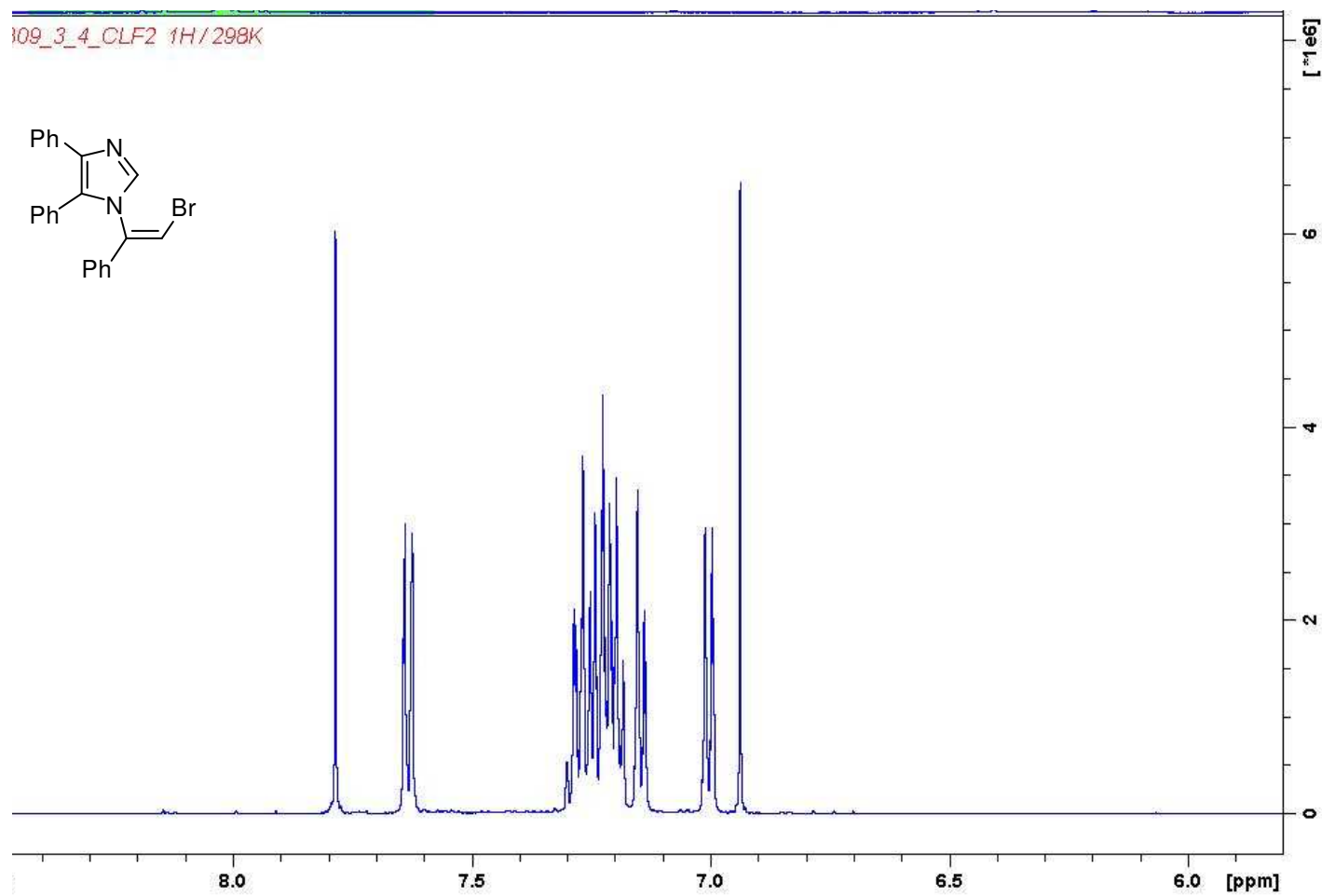


Table 2 Entry 8: (Z)-1-(2-bromo-1-phenylvinyl)-4,5-diphenyl-1H-imidazole

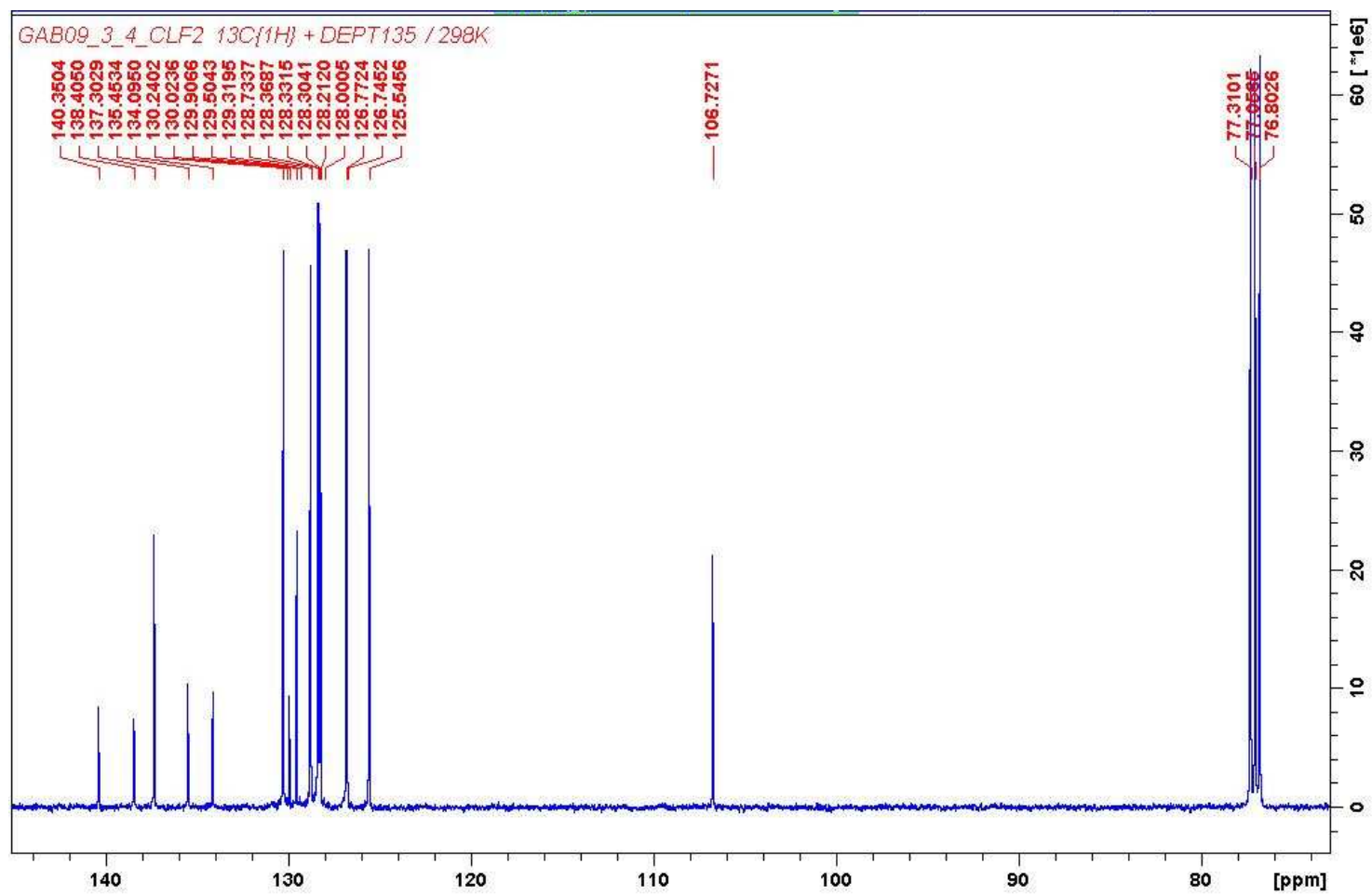


Table 2 Entry 8: (Z)-1-(2-bromo-1-phenylvinyl)-4,5-diphenyl-1H-imidazole

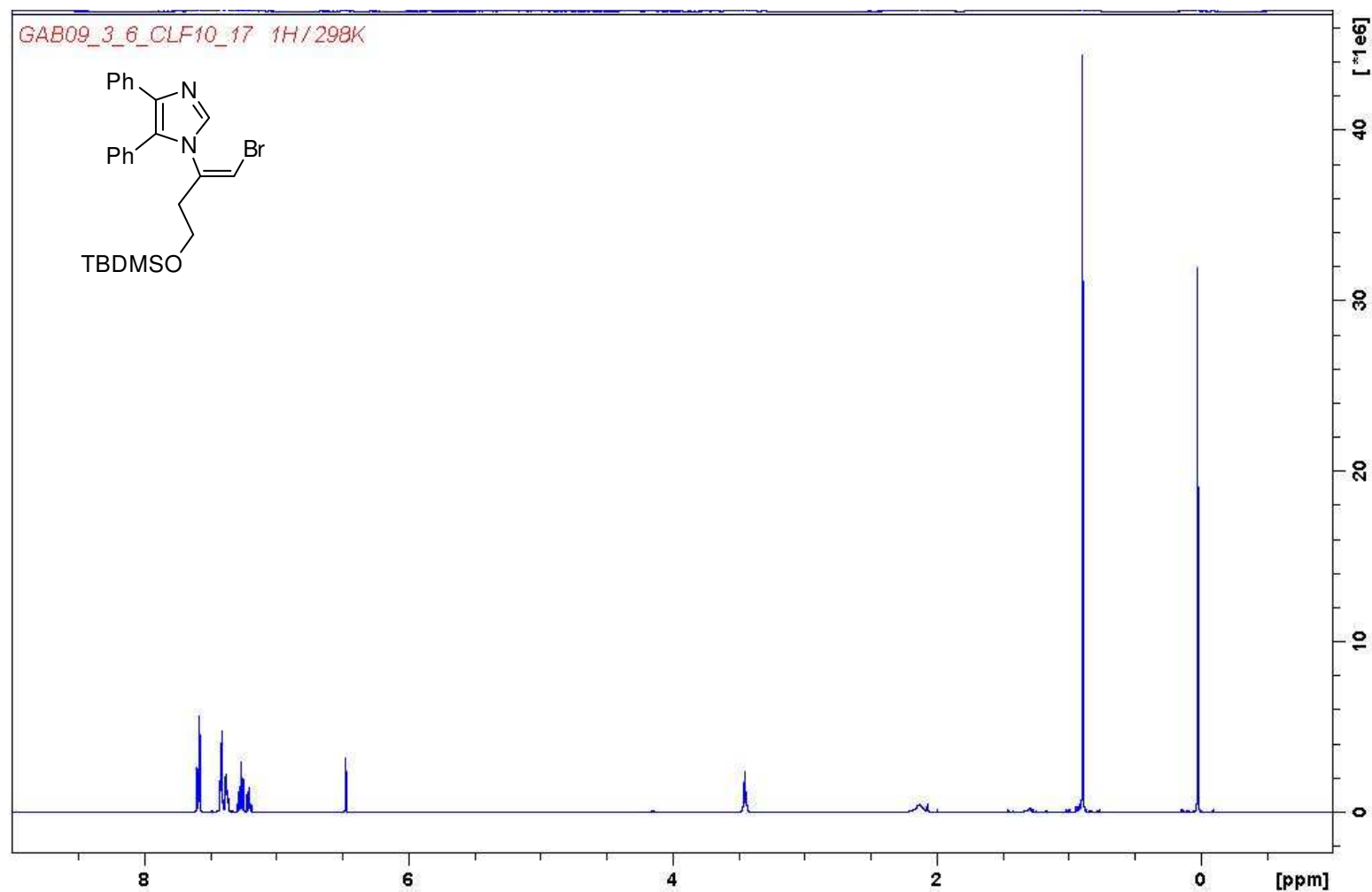
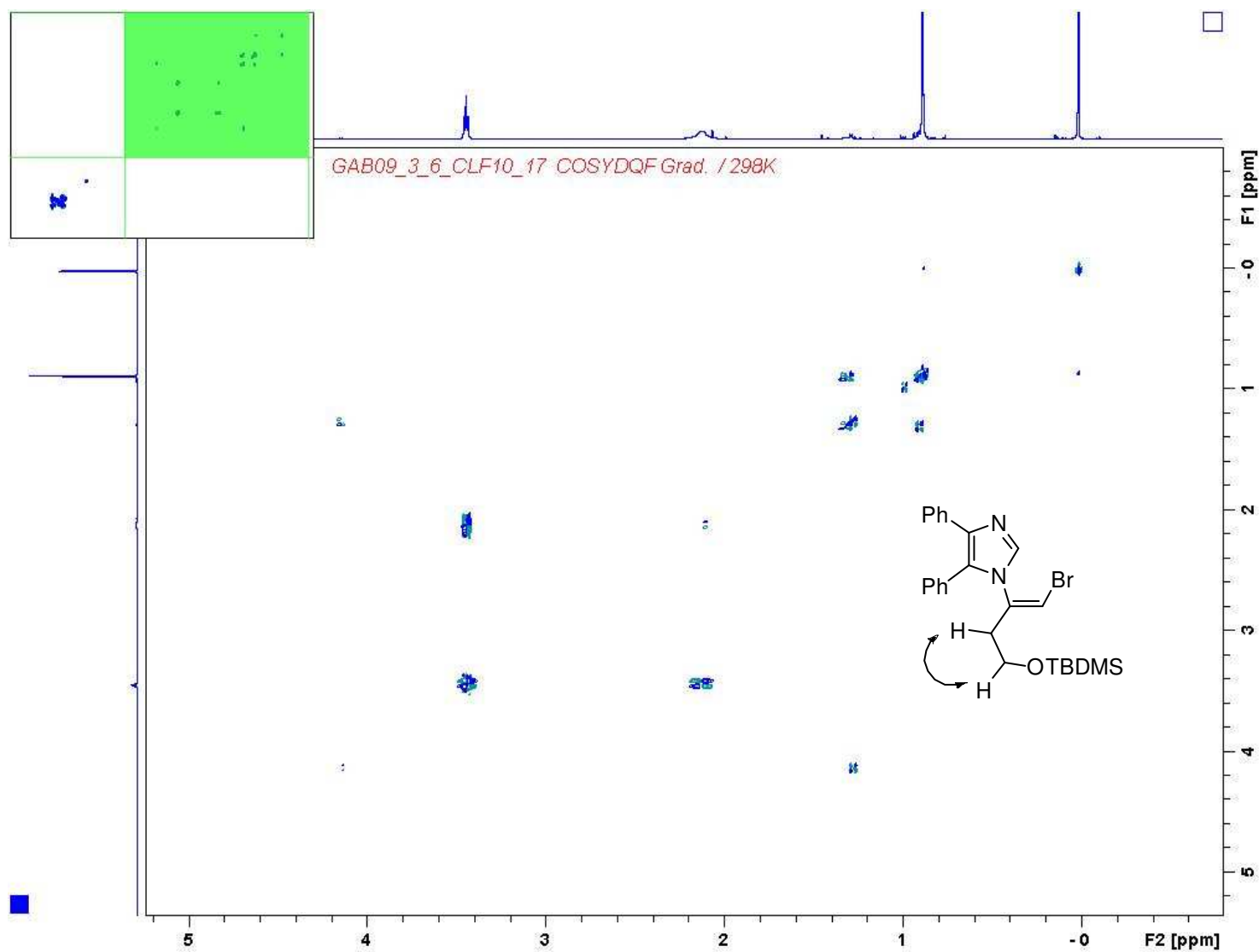


Table 2 Entry 9: (Z)-1-(1-bromo-4-(tert-butyldimethylsilyloxy)but-1-en-2-yl)-4,5-diphenyl-1H-imidazole



Benzimidazole series

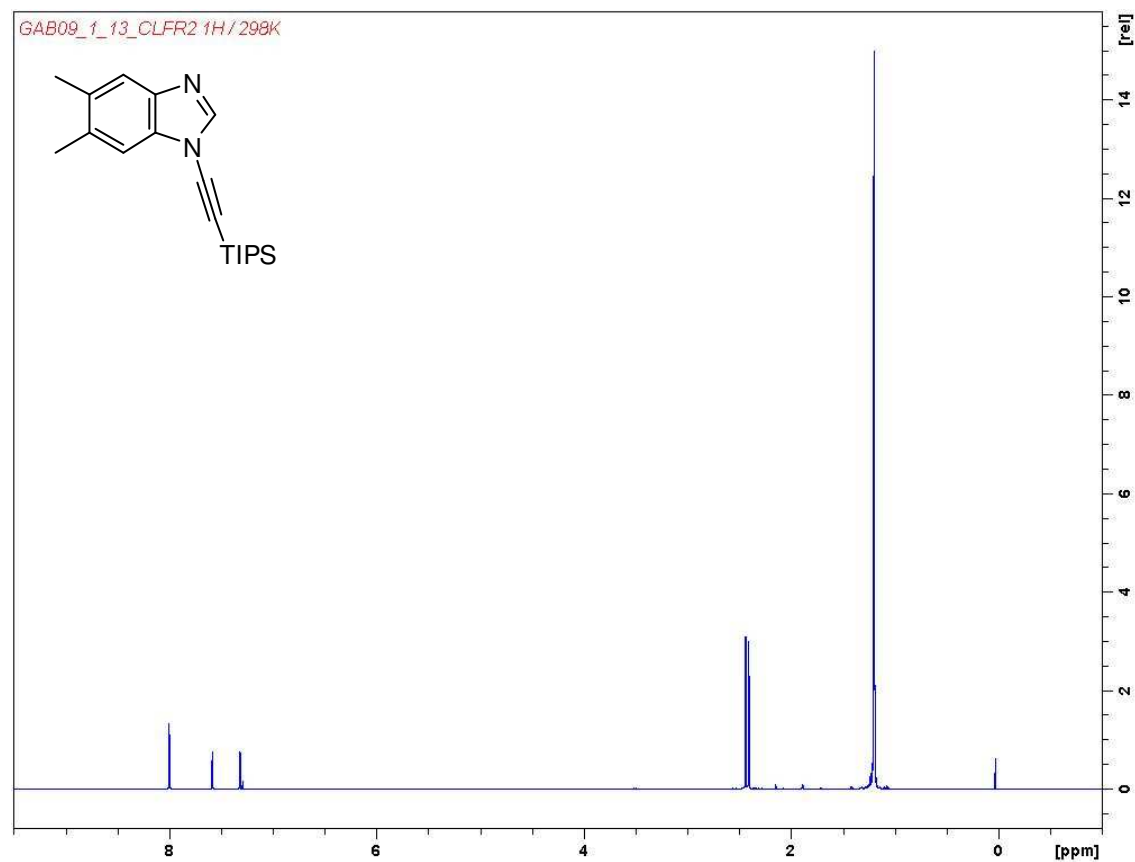


Table 2 Entry 13: 5,6-dimethyl-1-((triisopropylsilyl)ethynyl)-1H-benzo[d]imidazole

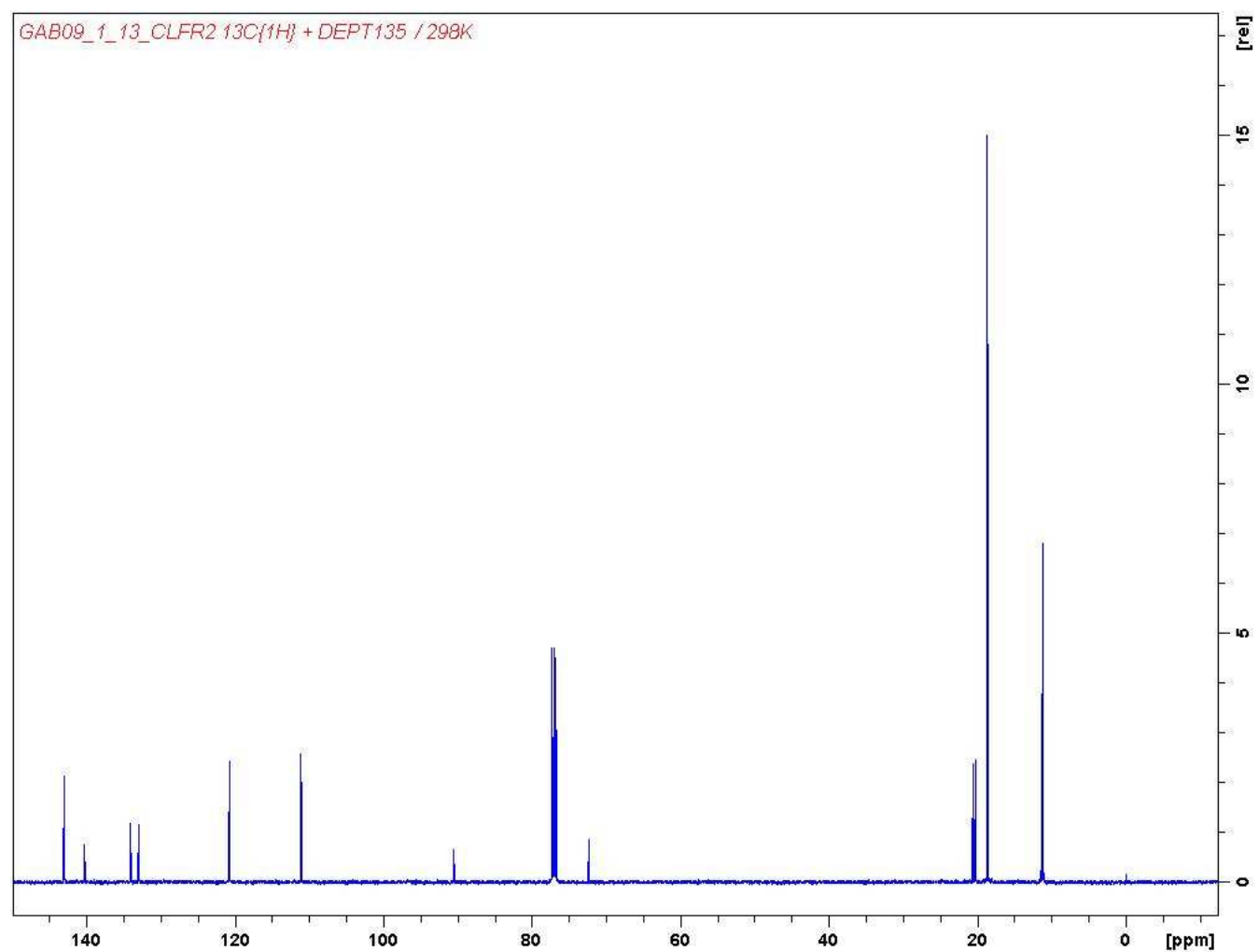


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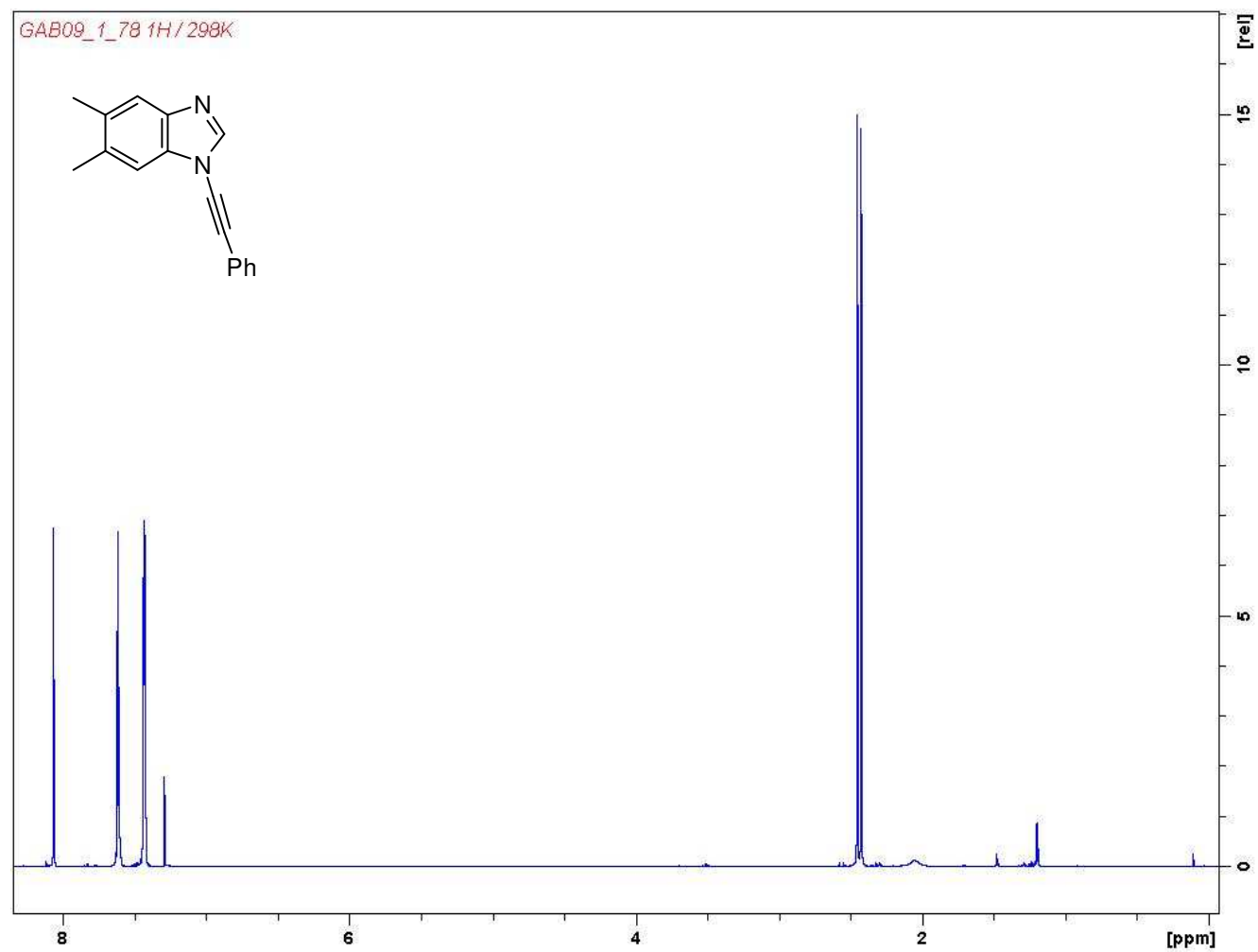


Table 2 Entry 14: 5,6-dimethyl-1-(phenylethynyl)-1H-benzo[d]imidazole

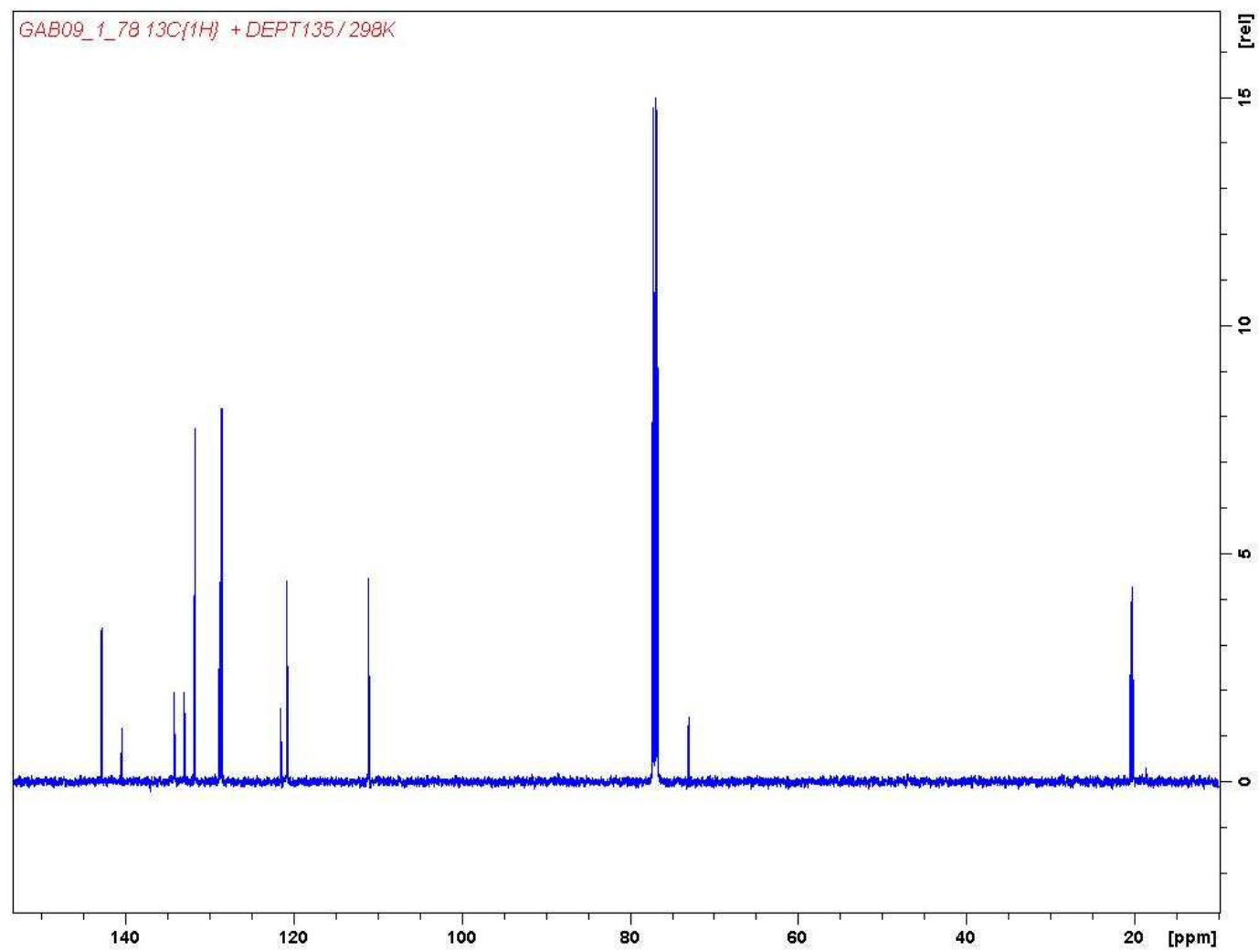
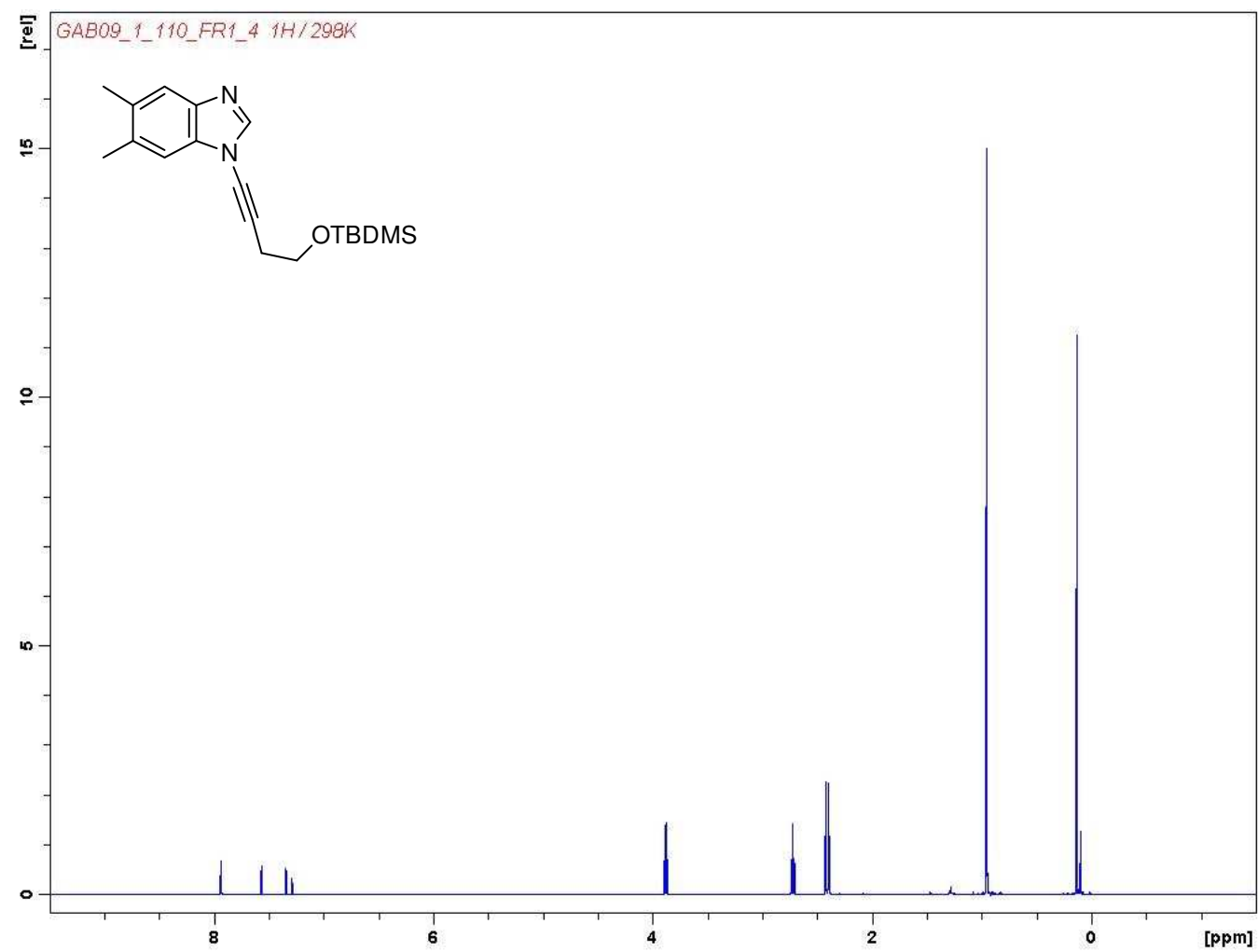


Table 2 Entry 14: 5,6-dimethyl-1-(phenylethynyl)-1H-benzo[d]imidazole



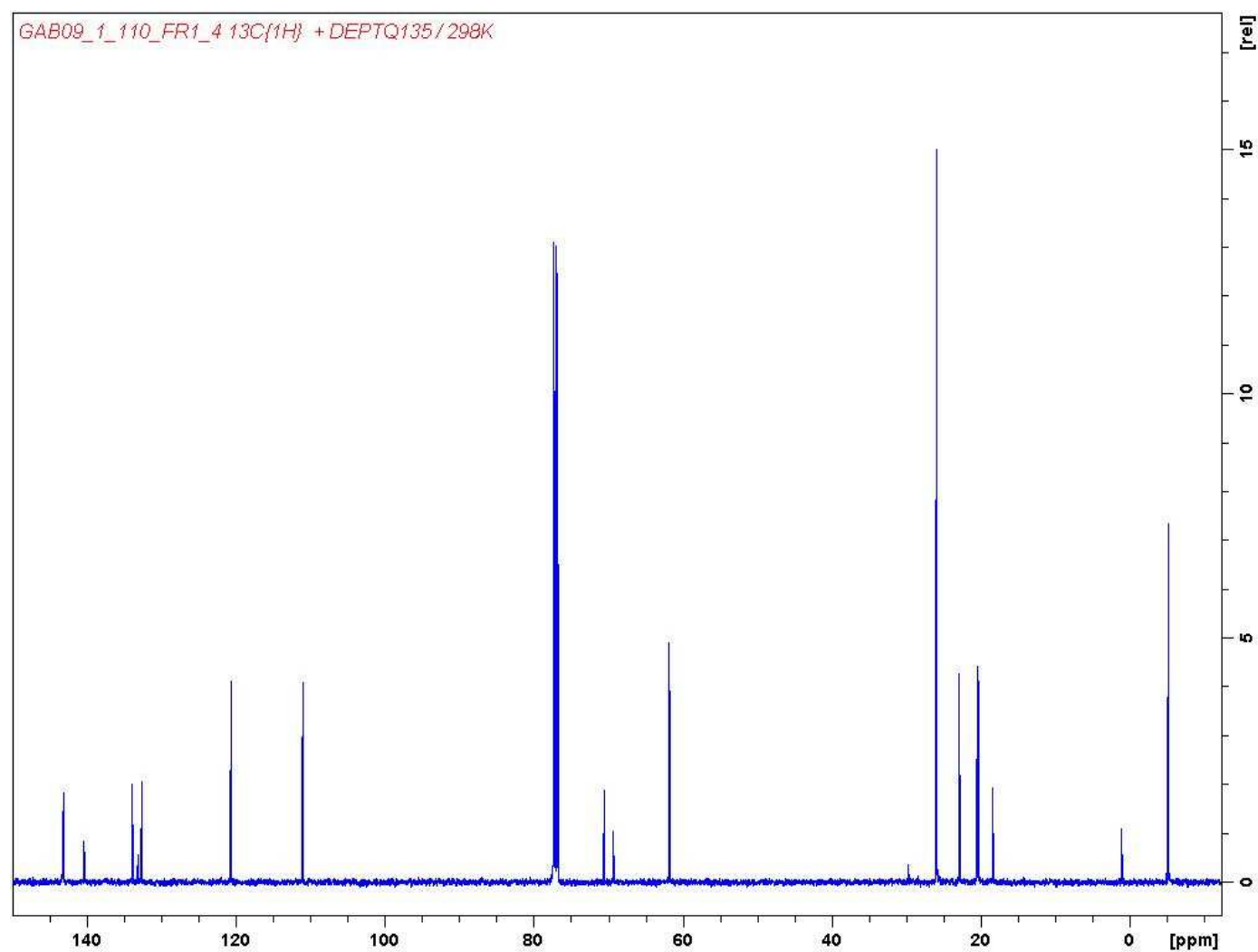


Table 2 Entry 15: 1-(4-(tert-butyldimethylsilyloxy)but-1-ynyl)-5,6-dimethyl-1H-benzo[d]imidazole

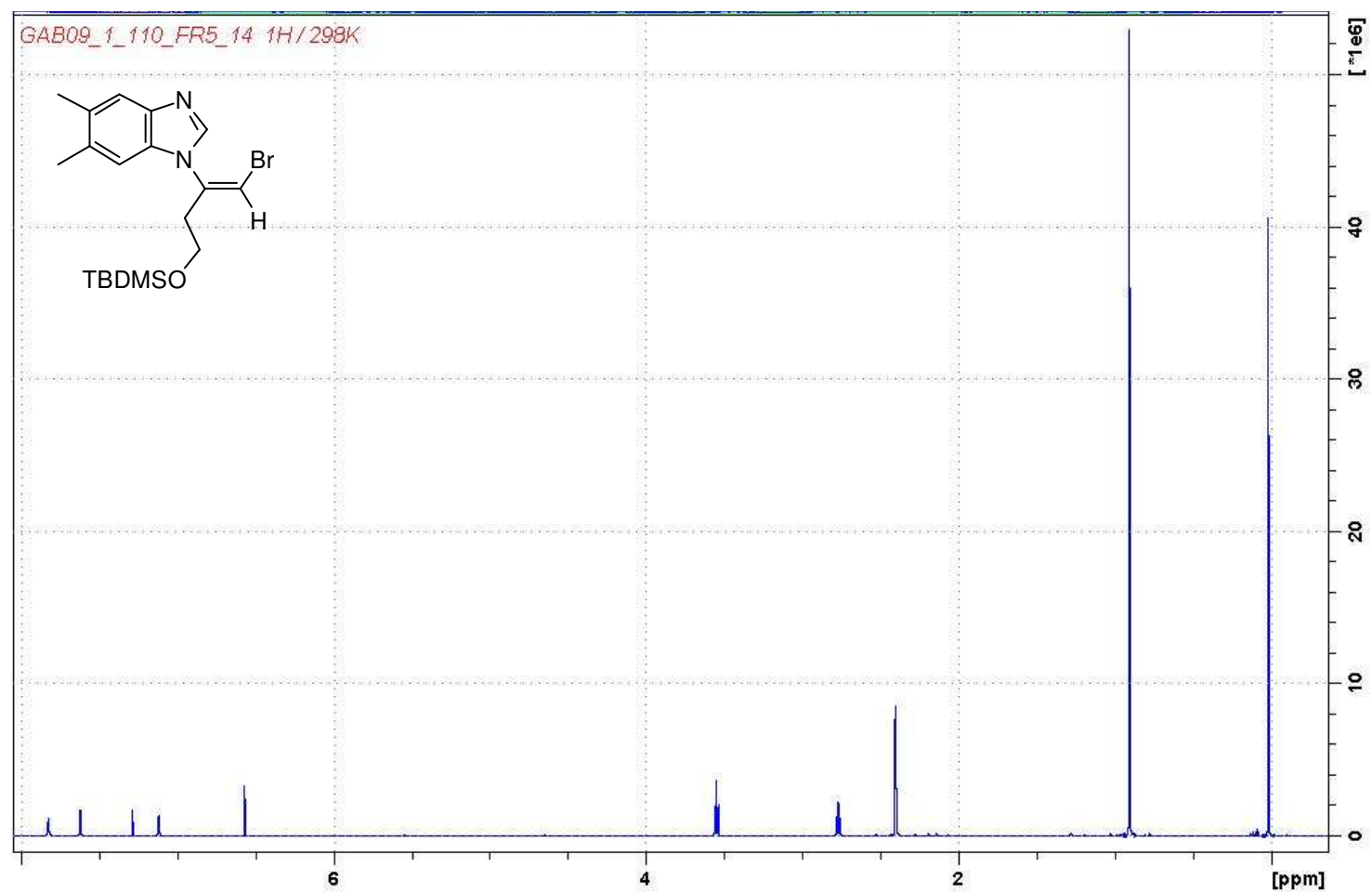


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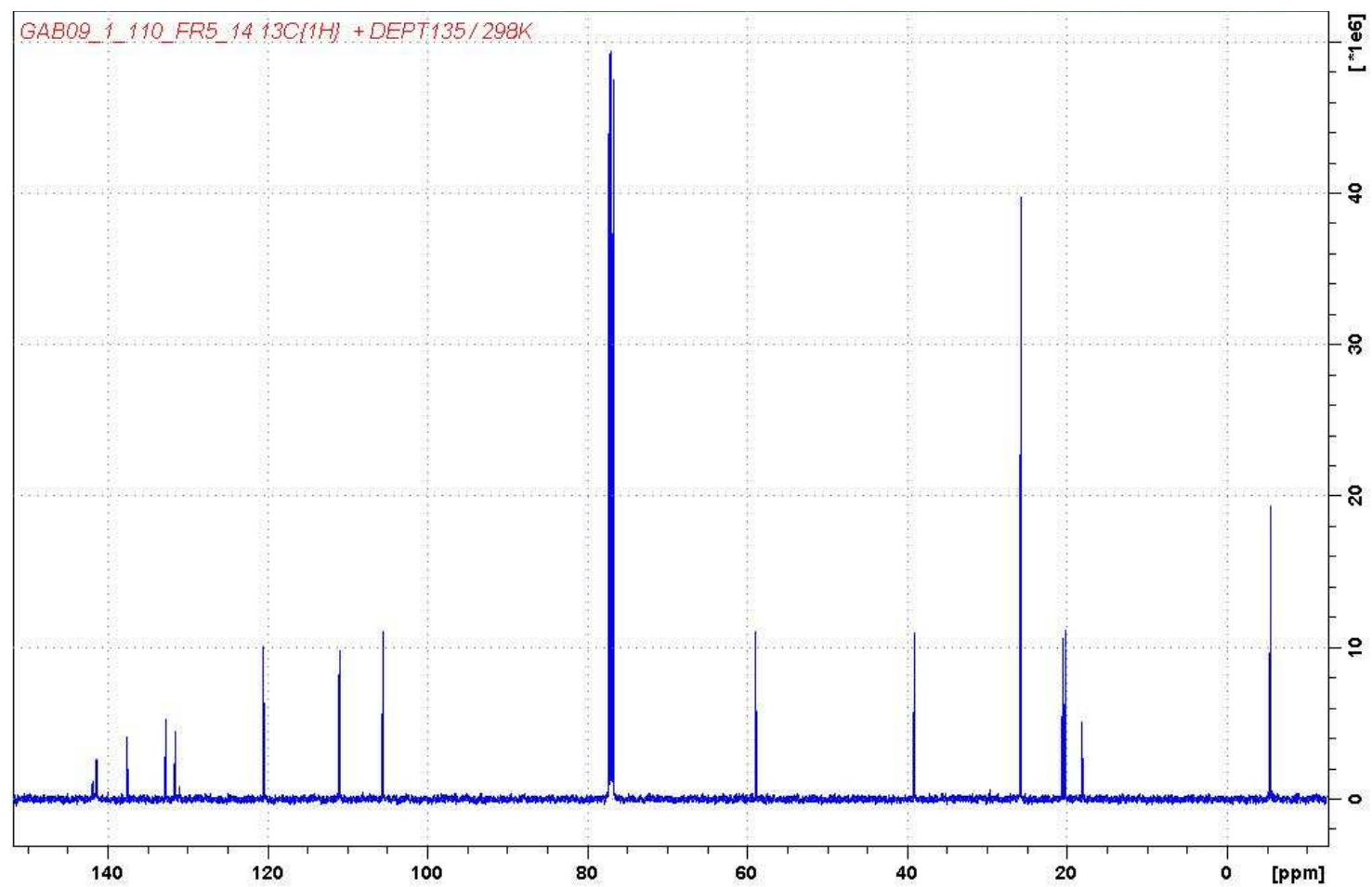


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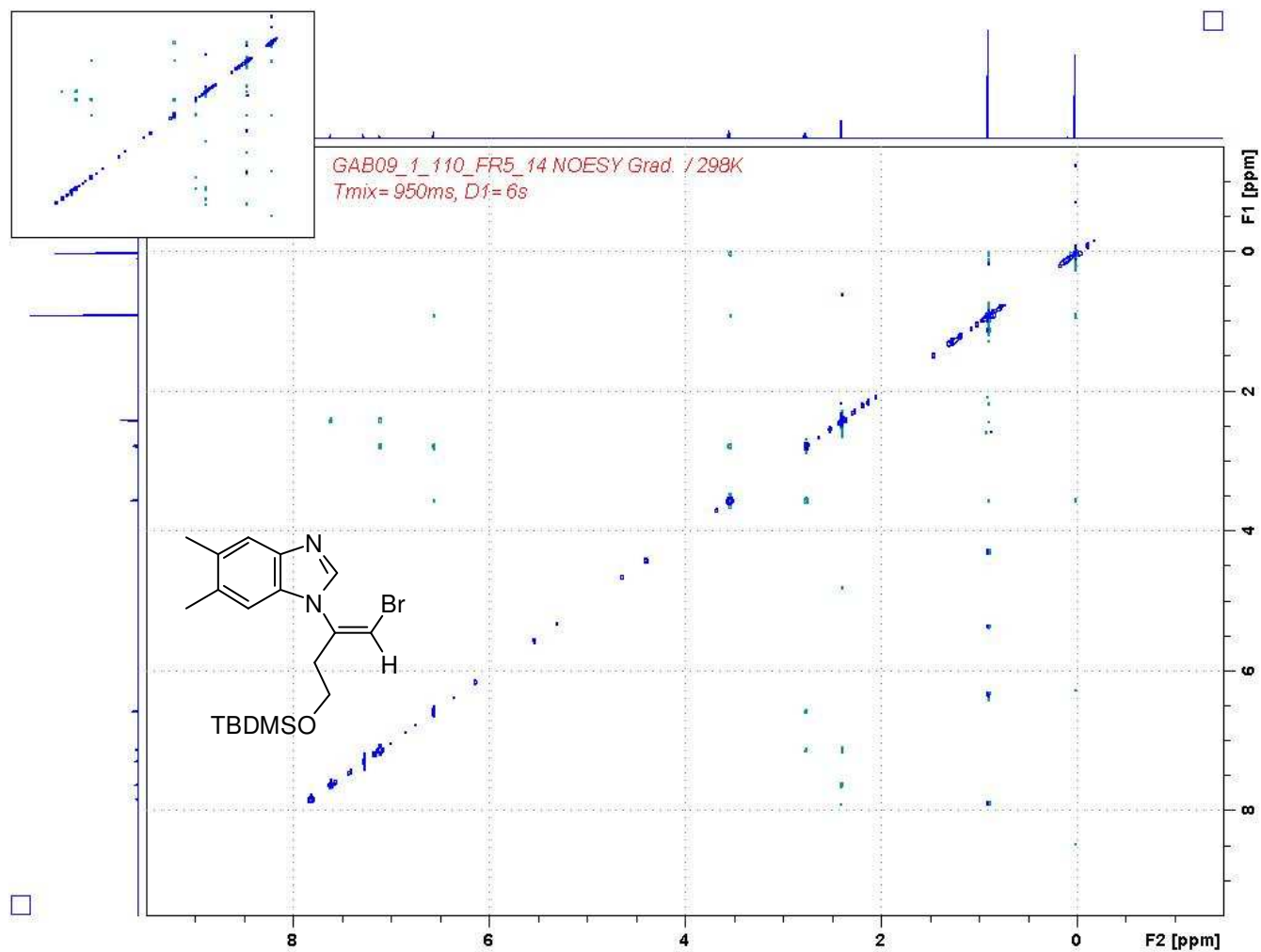


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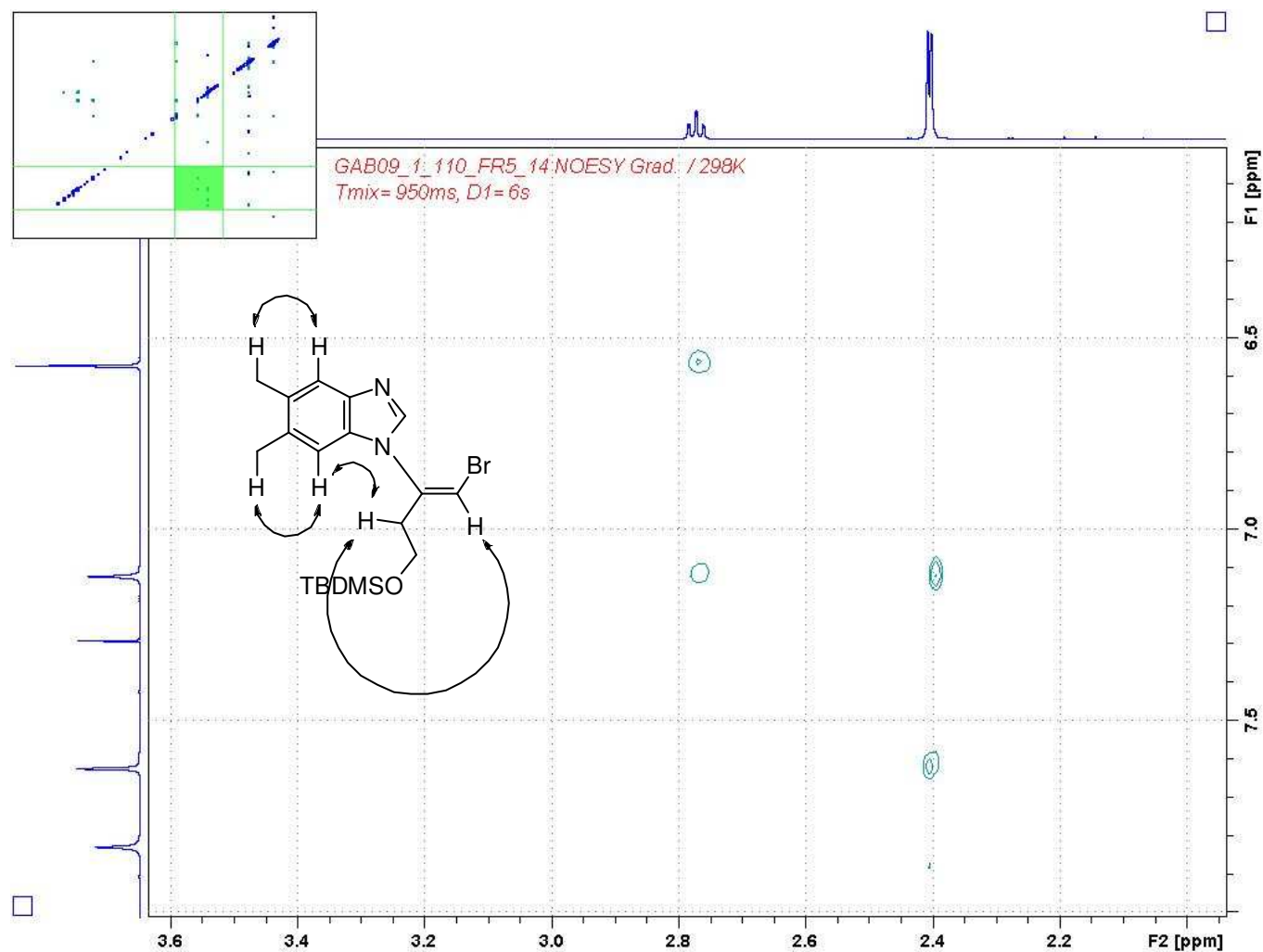


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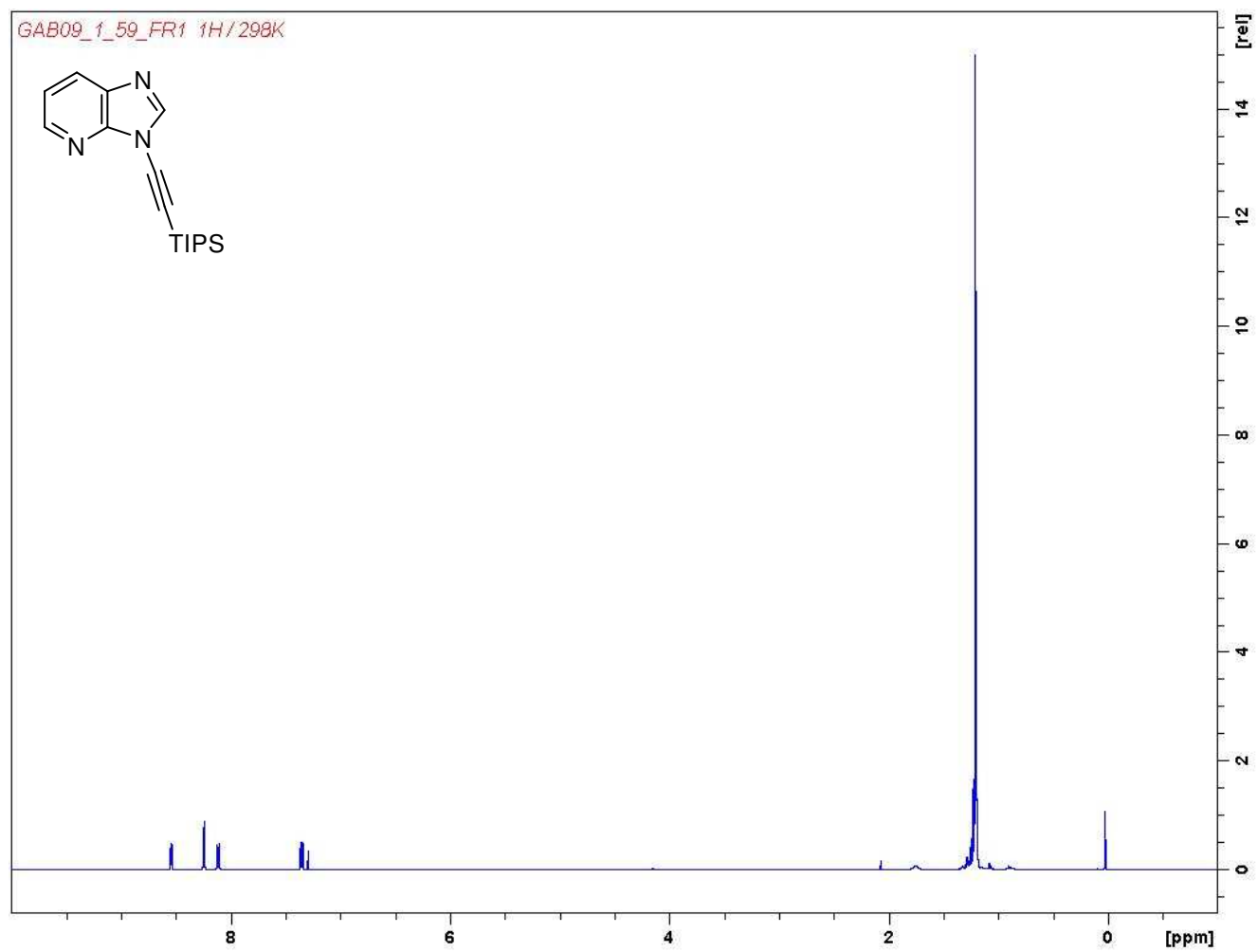


Table 2 Entry 16: 1-((triisopropylsilyl)ethynyl)-3H-imidazo[4,5-b]pyridine

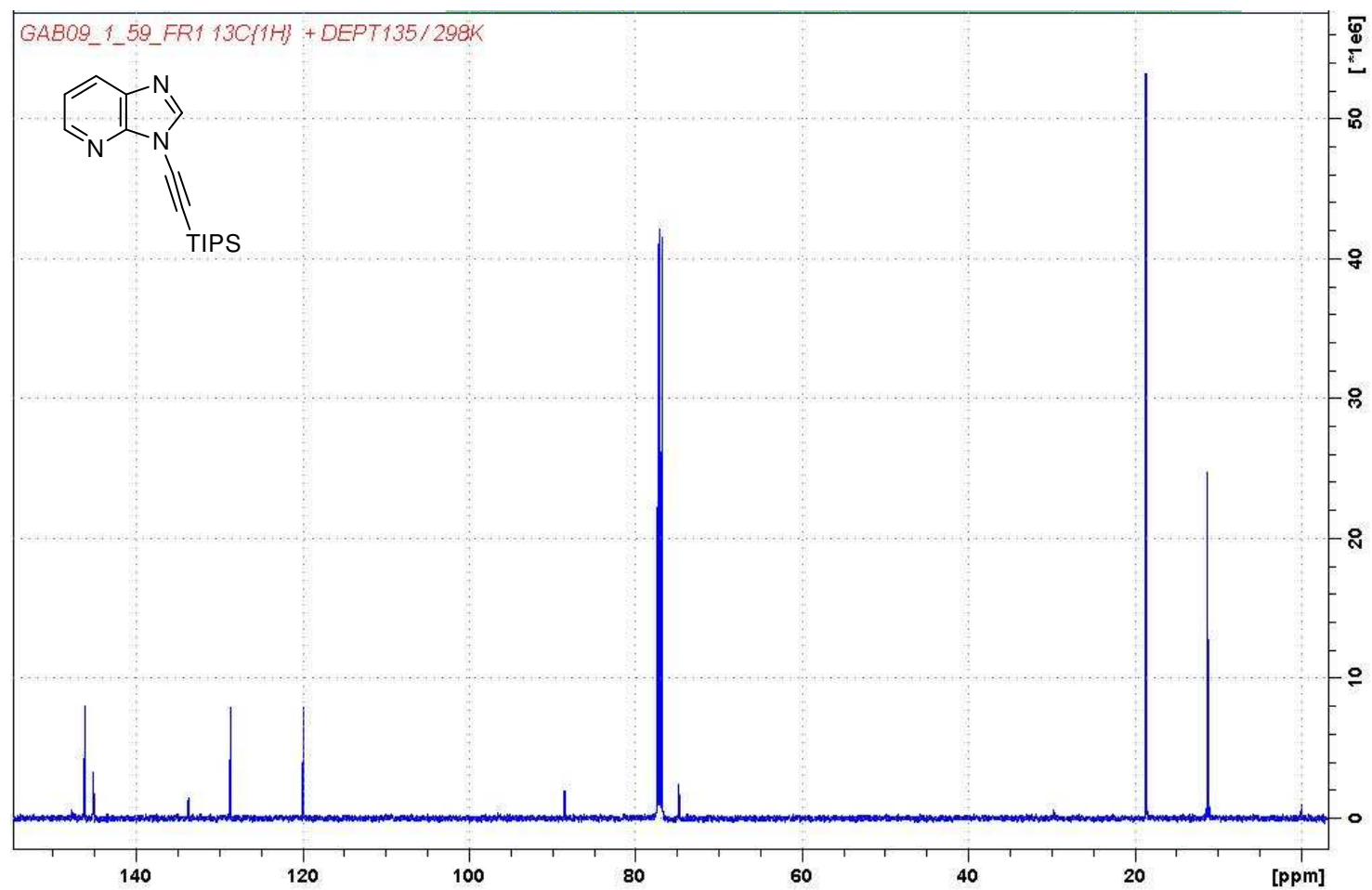
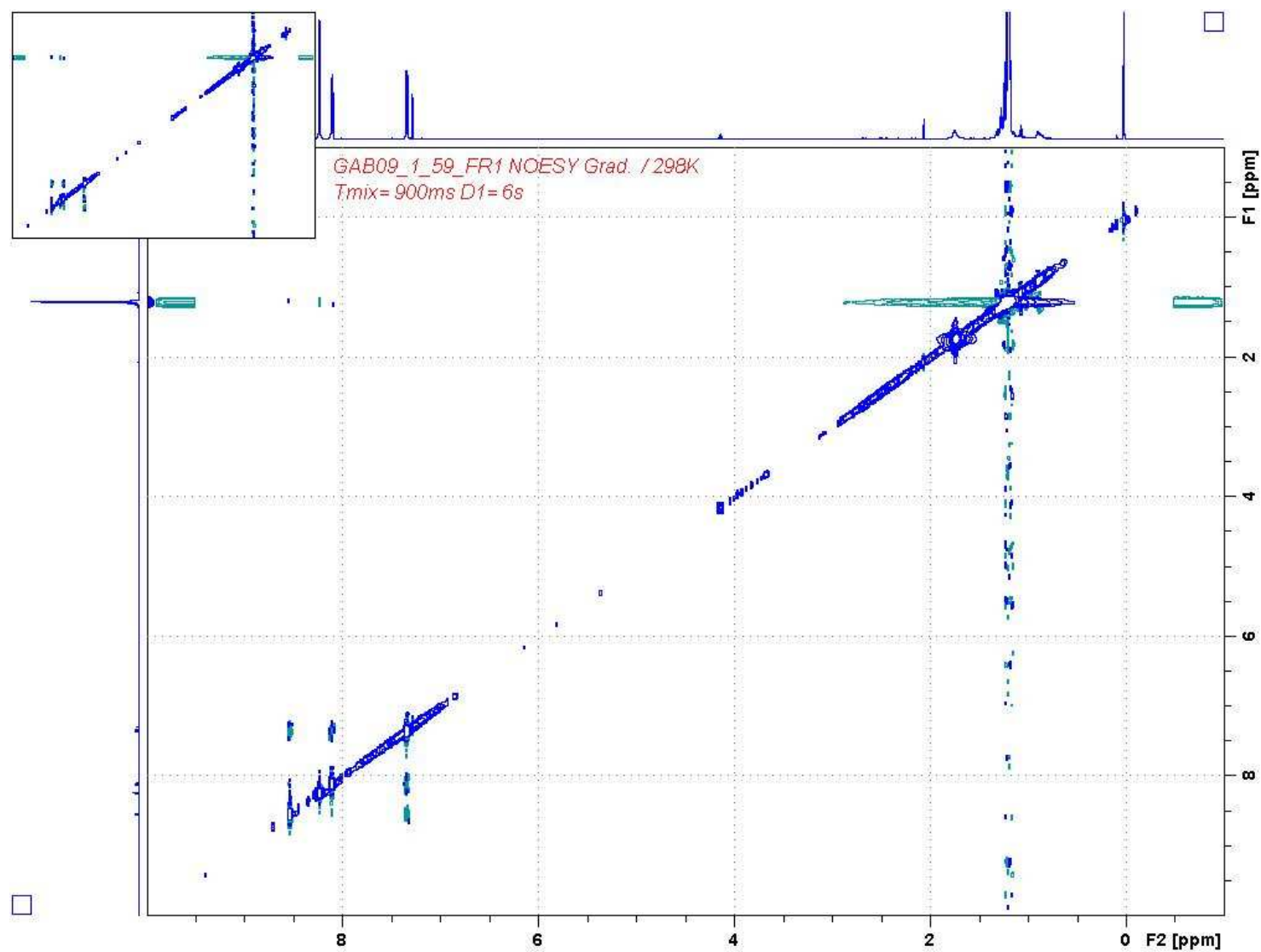
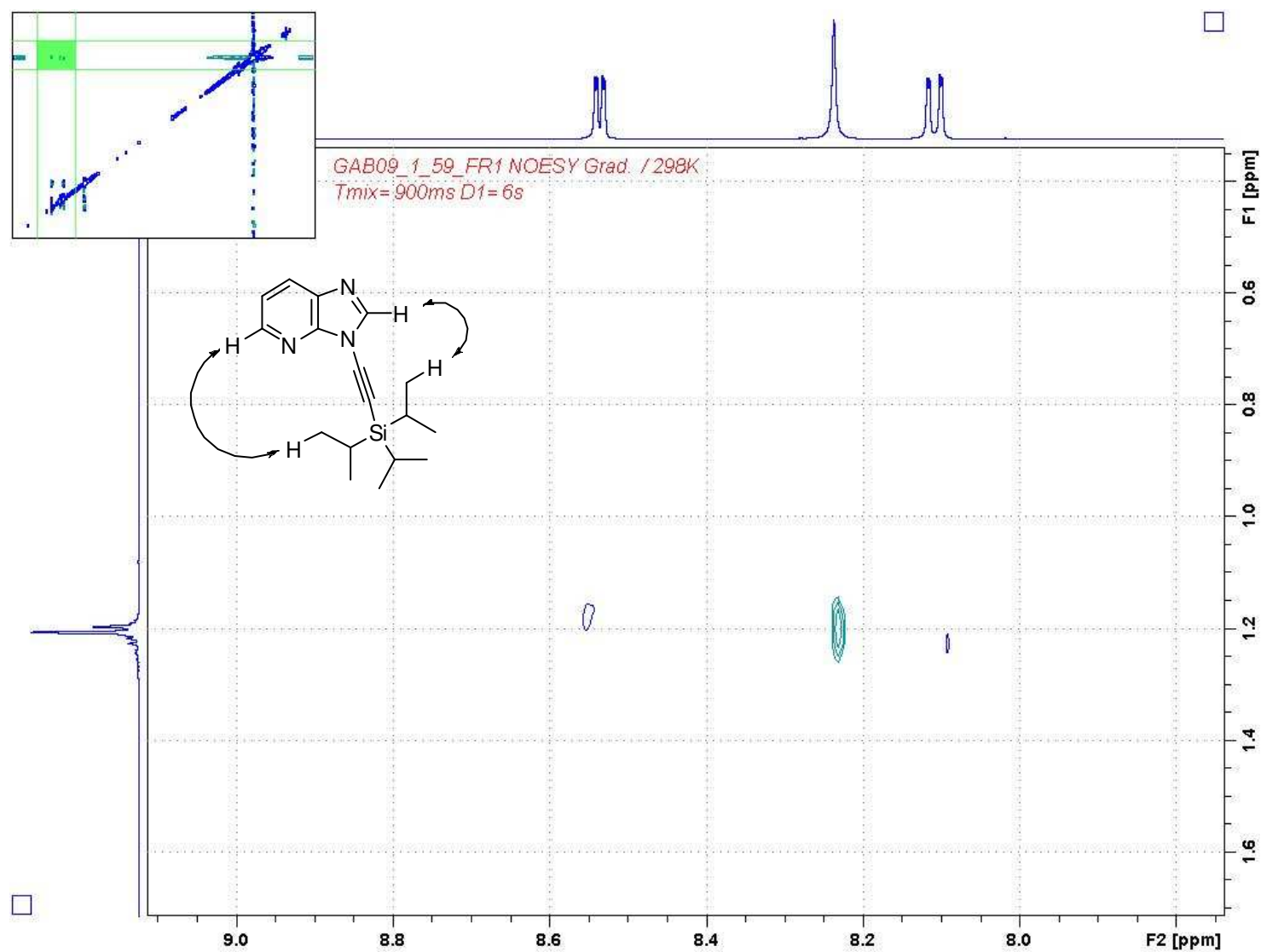


Table 2 Entry 16: 1-((triisopropylsilyl)ethynyl)-3H-imidazo[4,5-b]pyridine





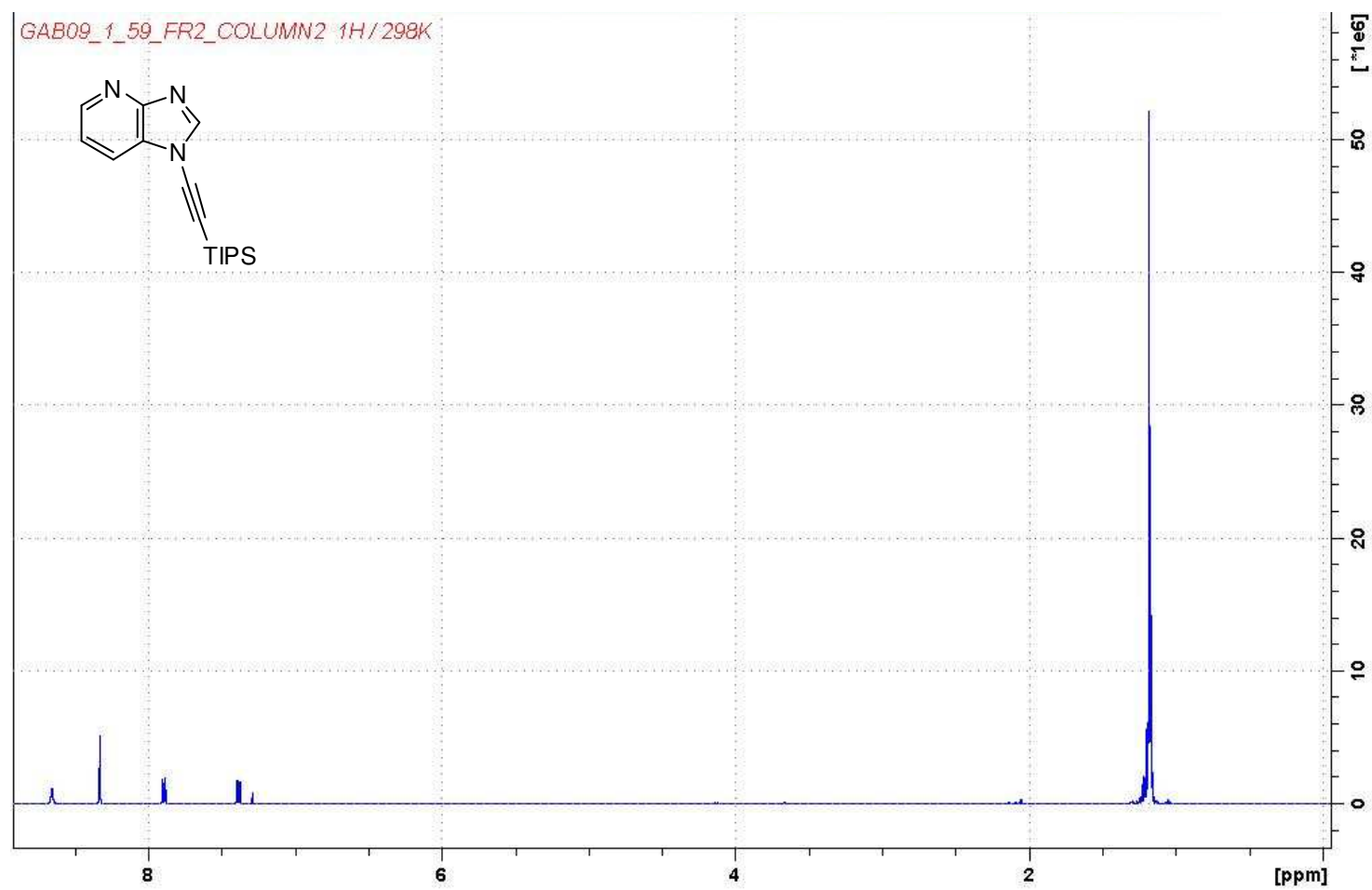
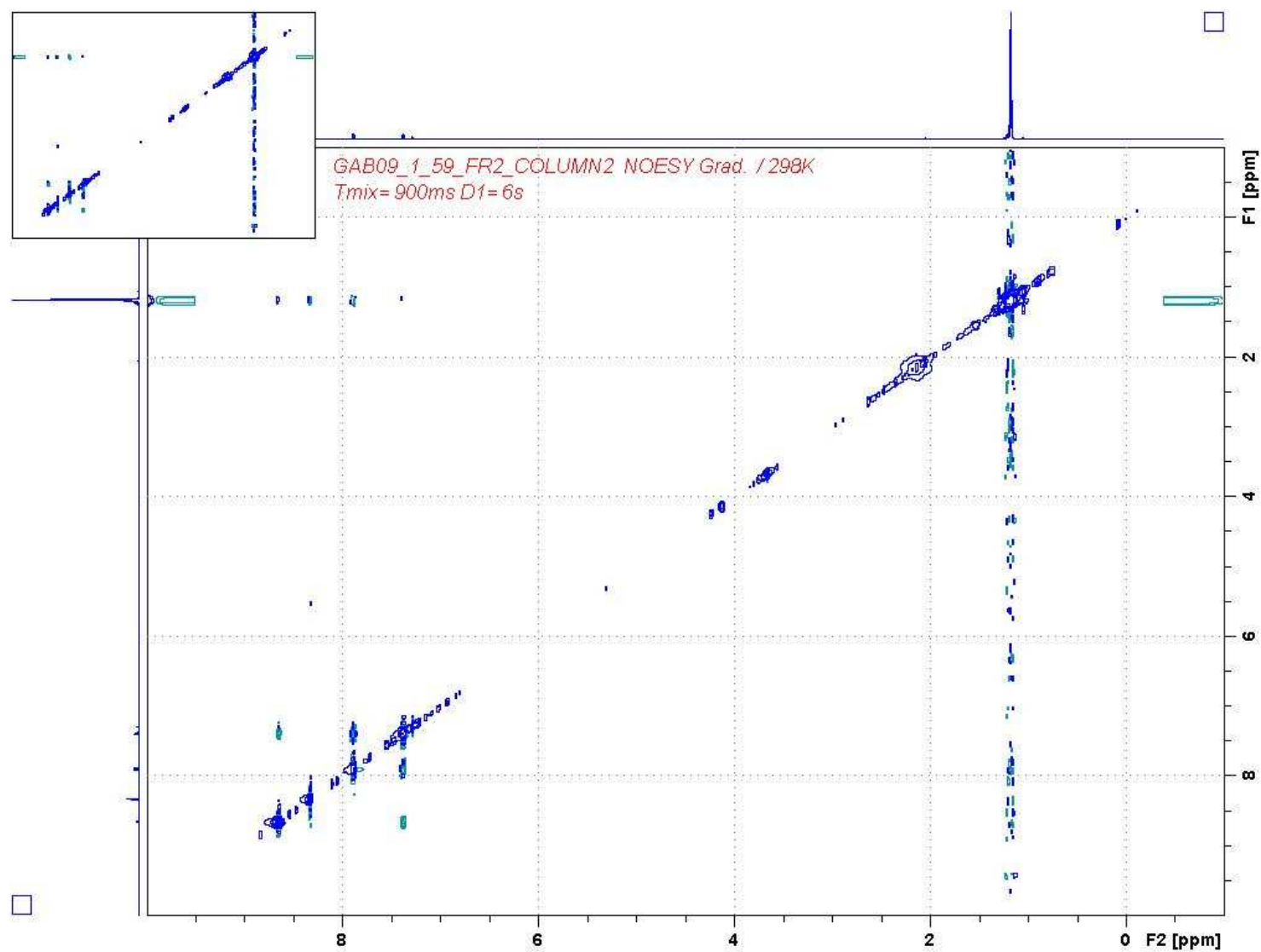
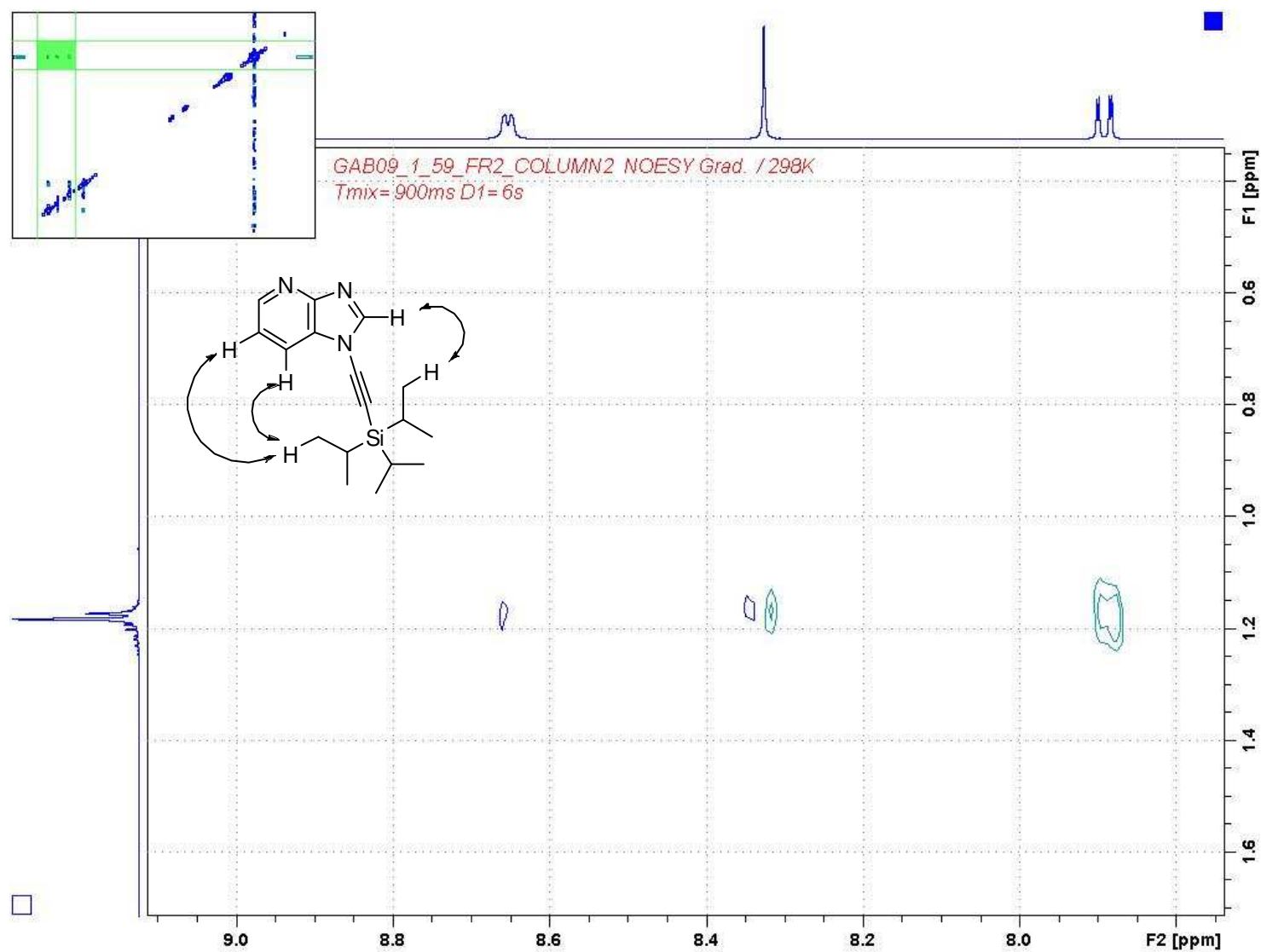


Table 2 Entry 16: 1-((triisopropylsilyl)ethynyl)-1H-imidazo[4,5-b]pyridine



Table 2 Entry 16: 1-((triisopropylsilyl)ethynyl)-1H-imidazo[4,5-b]pyridine/1-((triisopropylsilyl)ethynyl)-3H-imidazo[4,5-b]pyridine





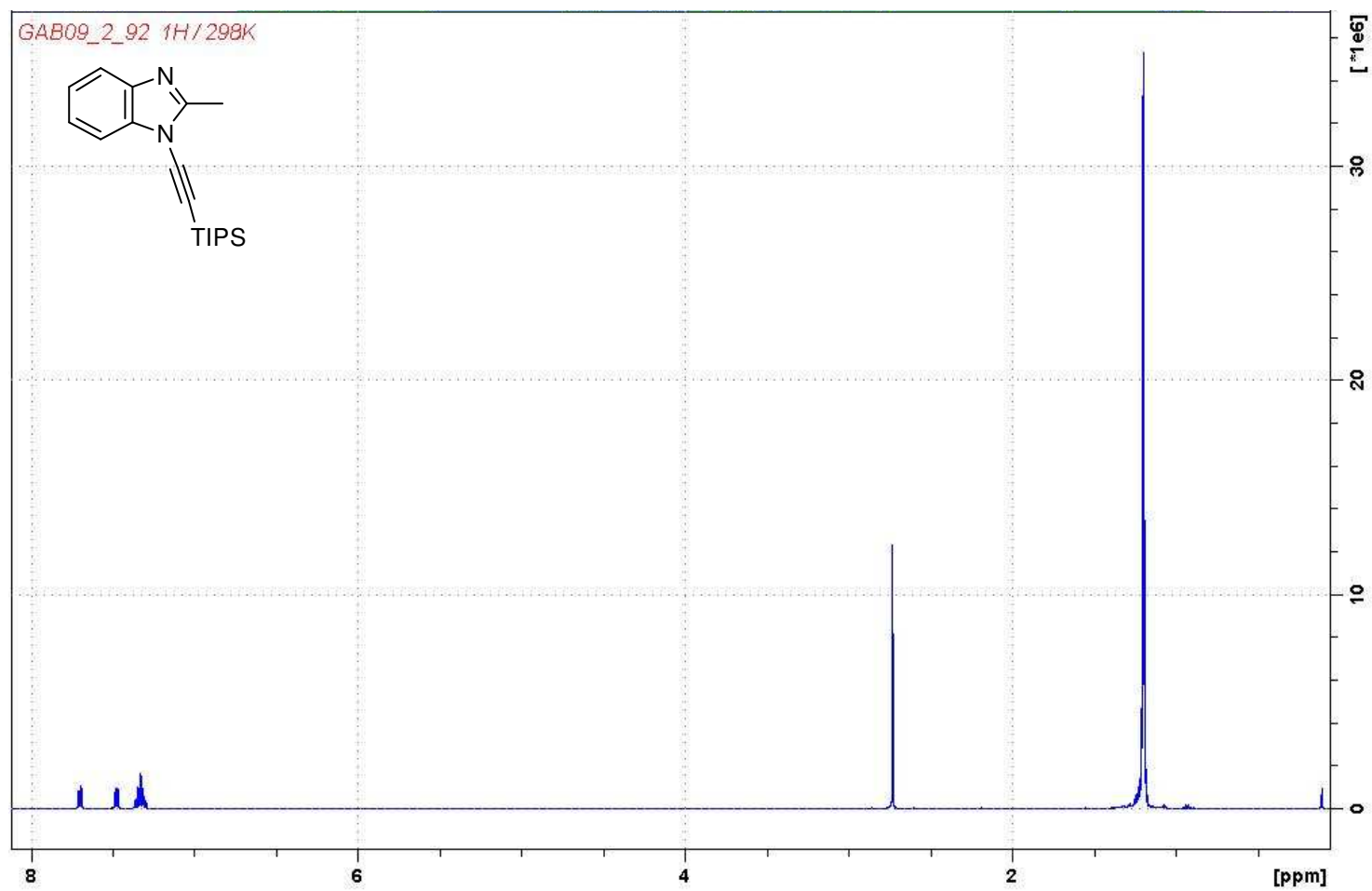


Table 2 Entry 22: 2-methyl-1-((triisopropylsilyl)ethynyl)-1H-benzo[d]imidazole

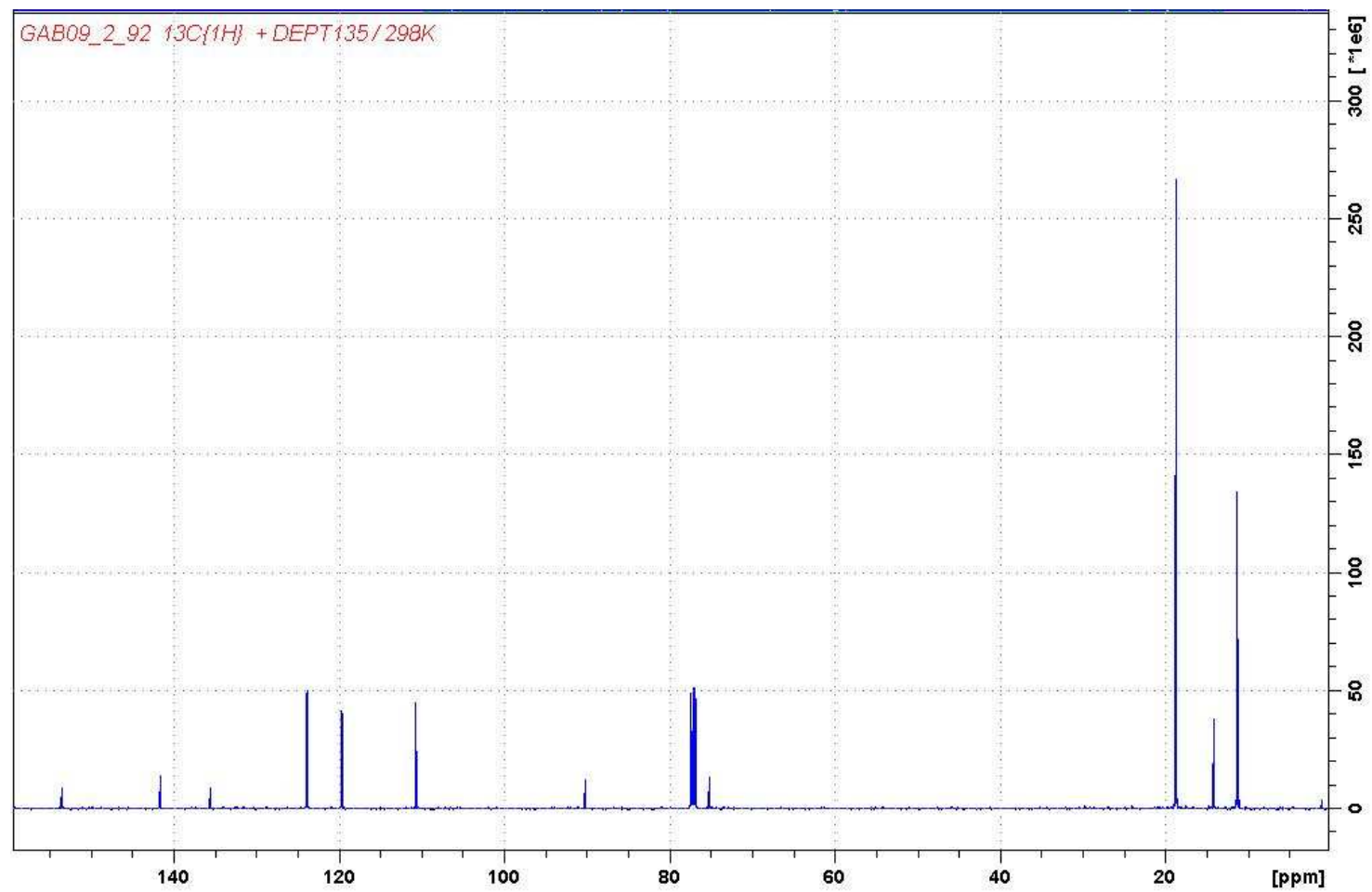


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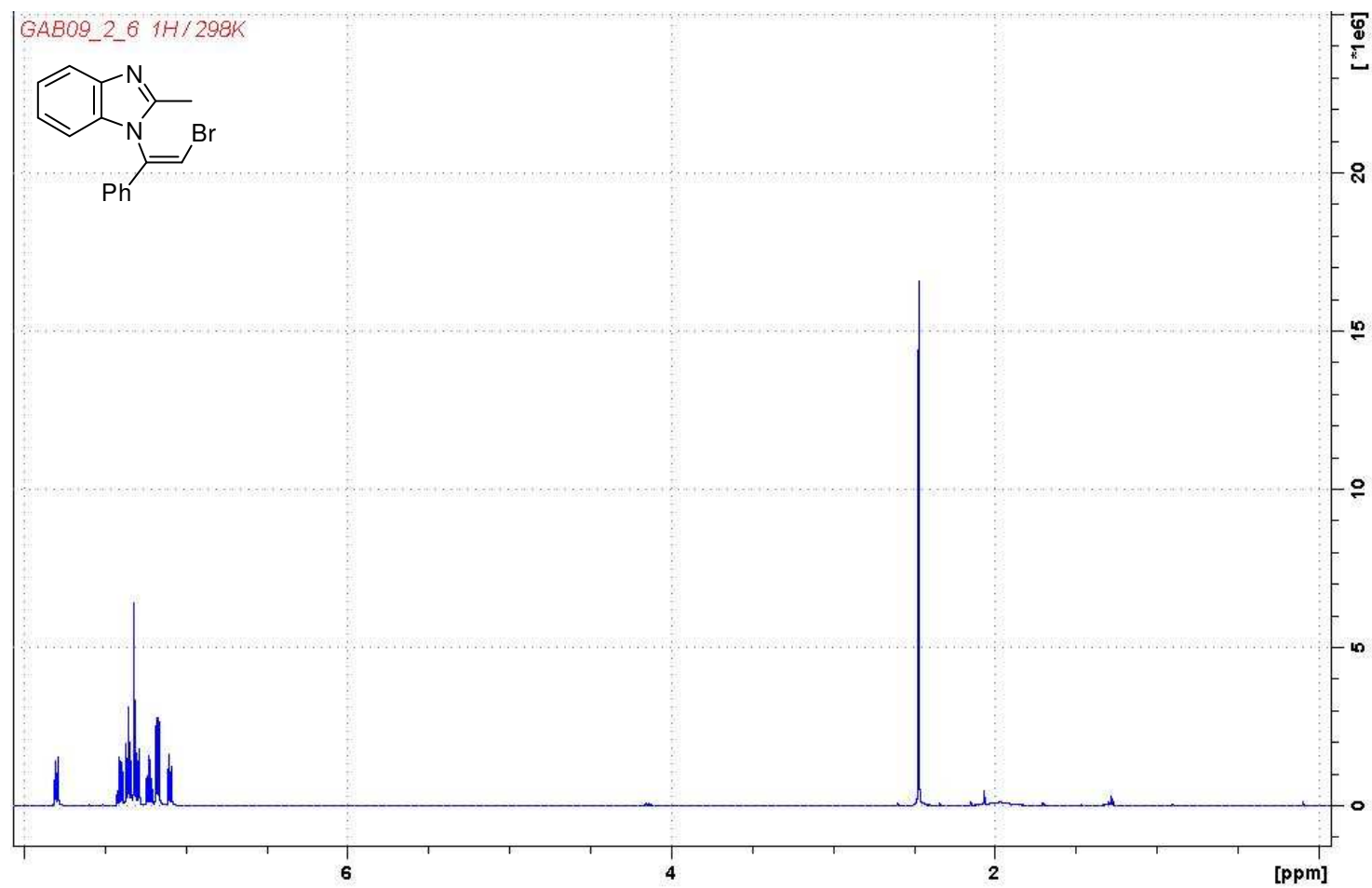


Table 2 Entry 23: (Z)-1-(2-bromo-1-phenylvinyl)-2-methyl-1H-benzo[d]imidazole

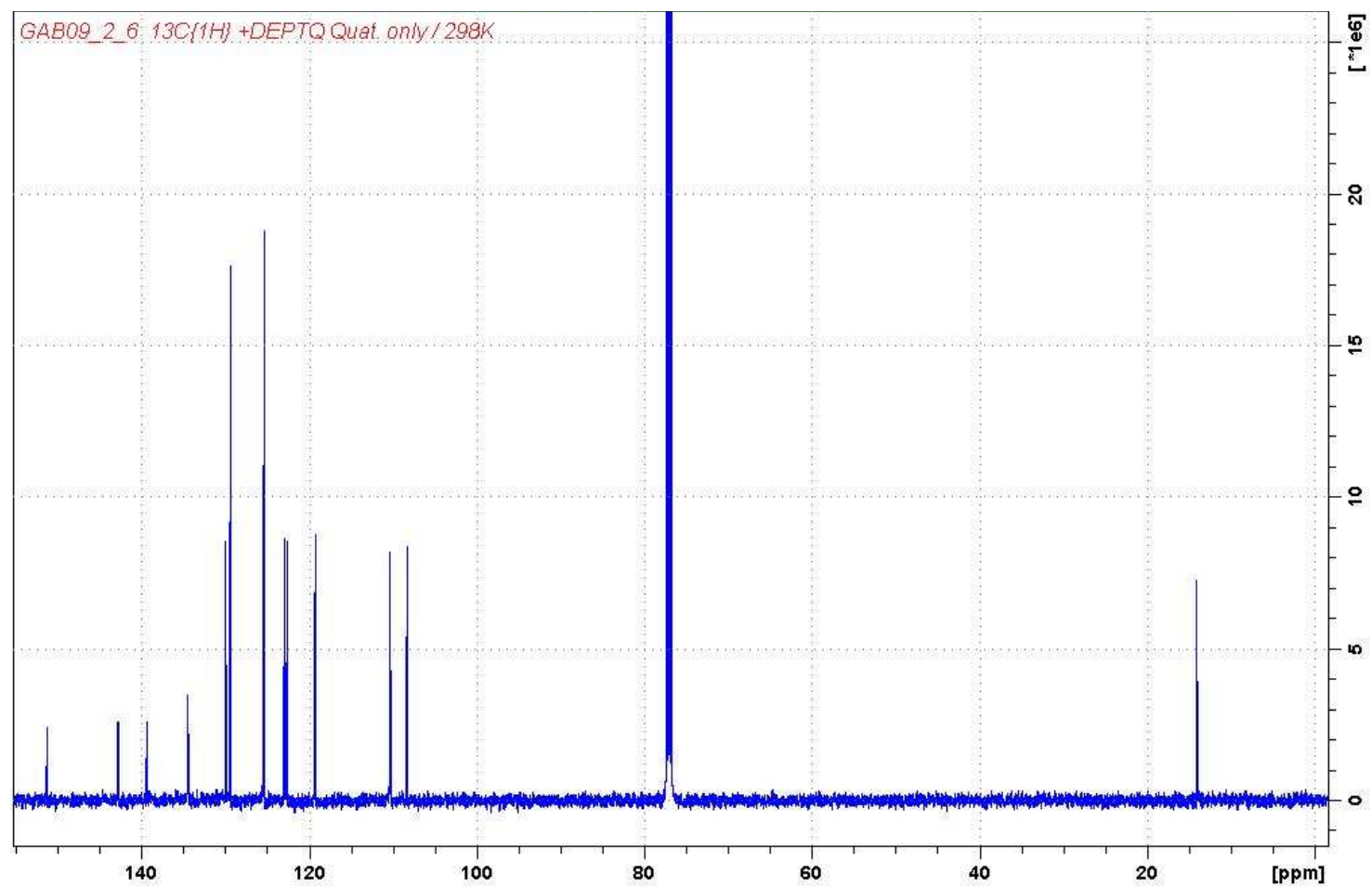
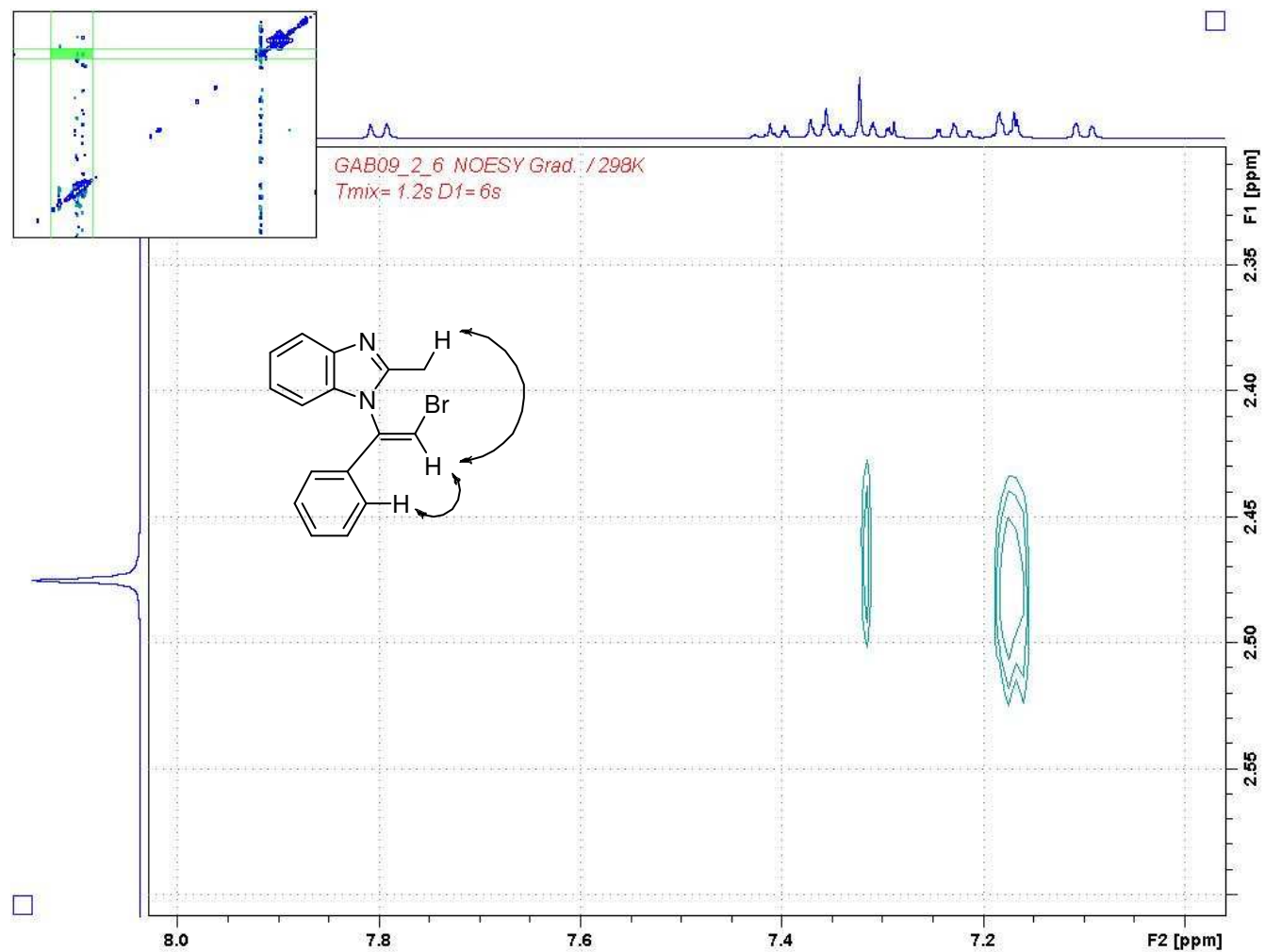


Table 2 Entry 23: (Z)-1-(2-bromo-1-phenylvinyl)-2-methyl-1H-benzo[d]imidazole



(Z)-1-(2-bromo-1-phenylvinyl)-2-methyl-1H-benzo[d]imidazole

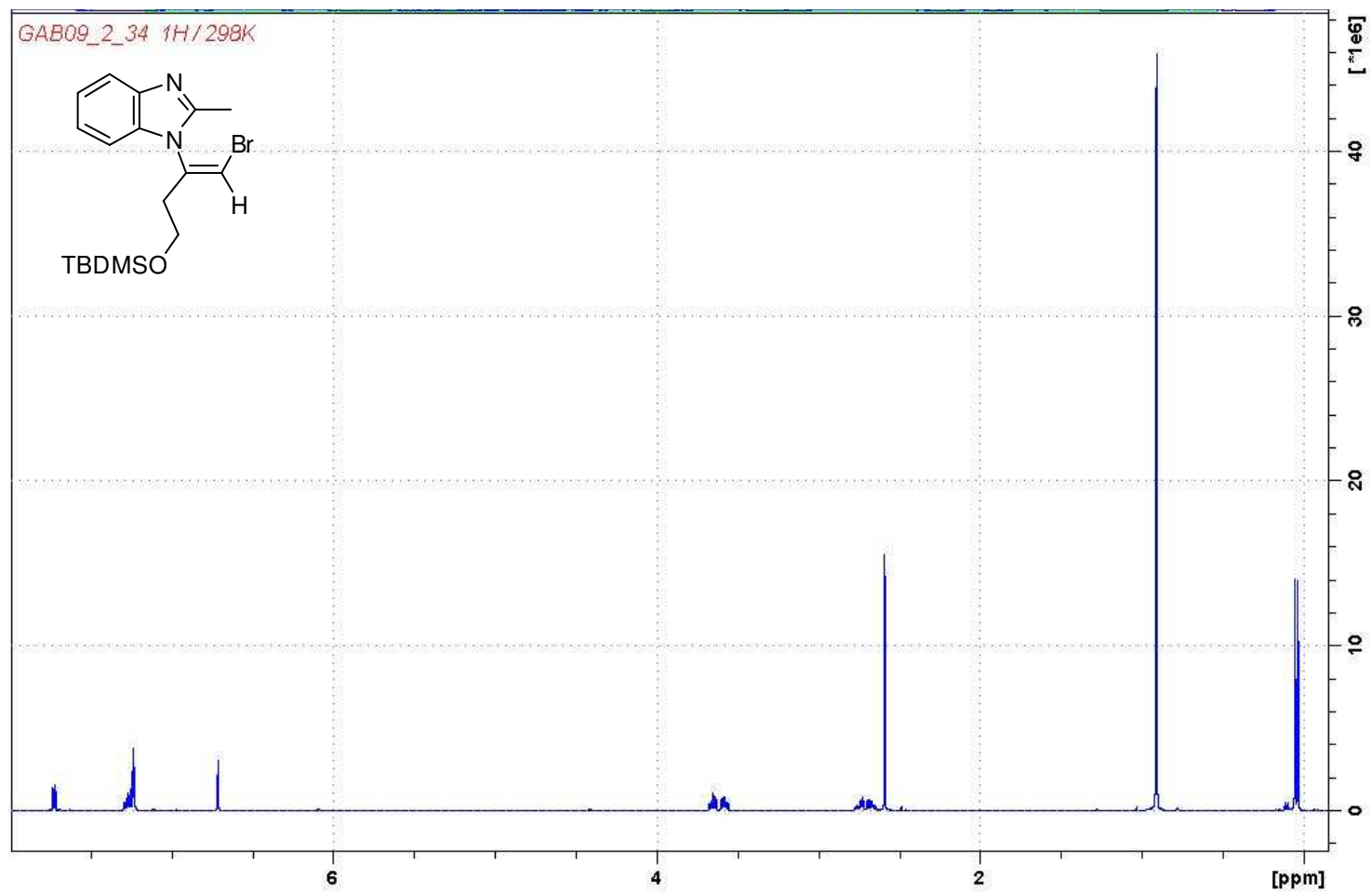


Table 2 Entry 24: (Z)-1-(1-bromo-4-(tert-butyldimethylsilyloxy)but-1-en-2-yl)-2-methyl-1H-benzo[d]imidazole

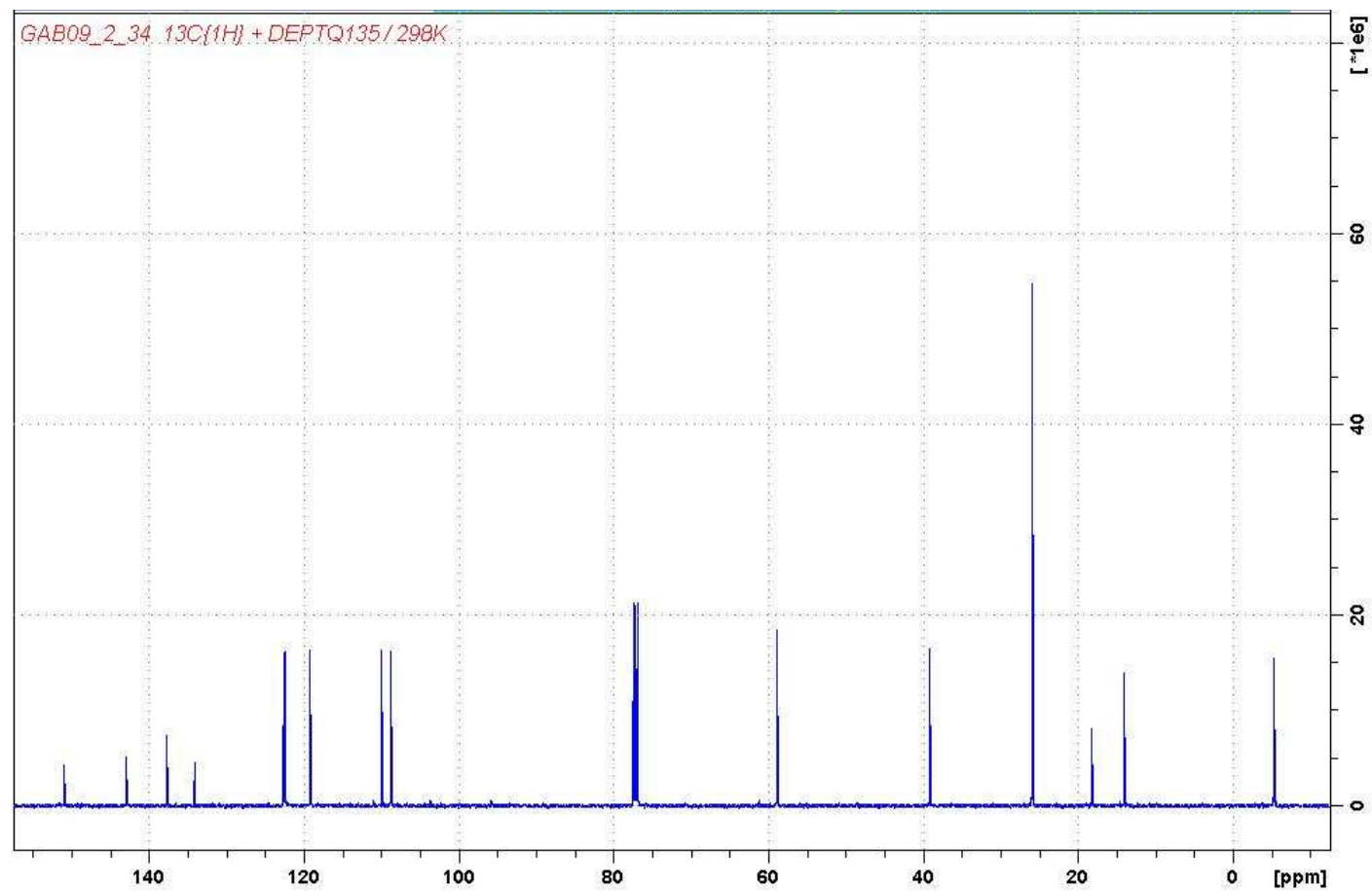
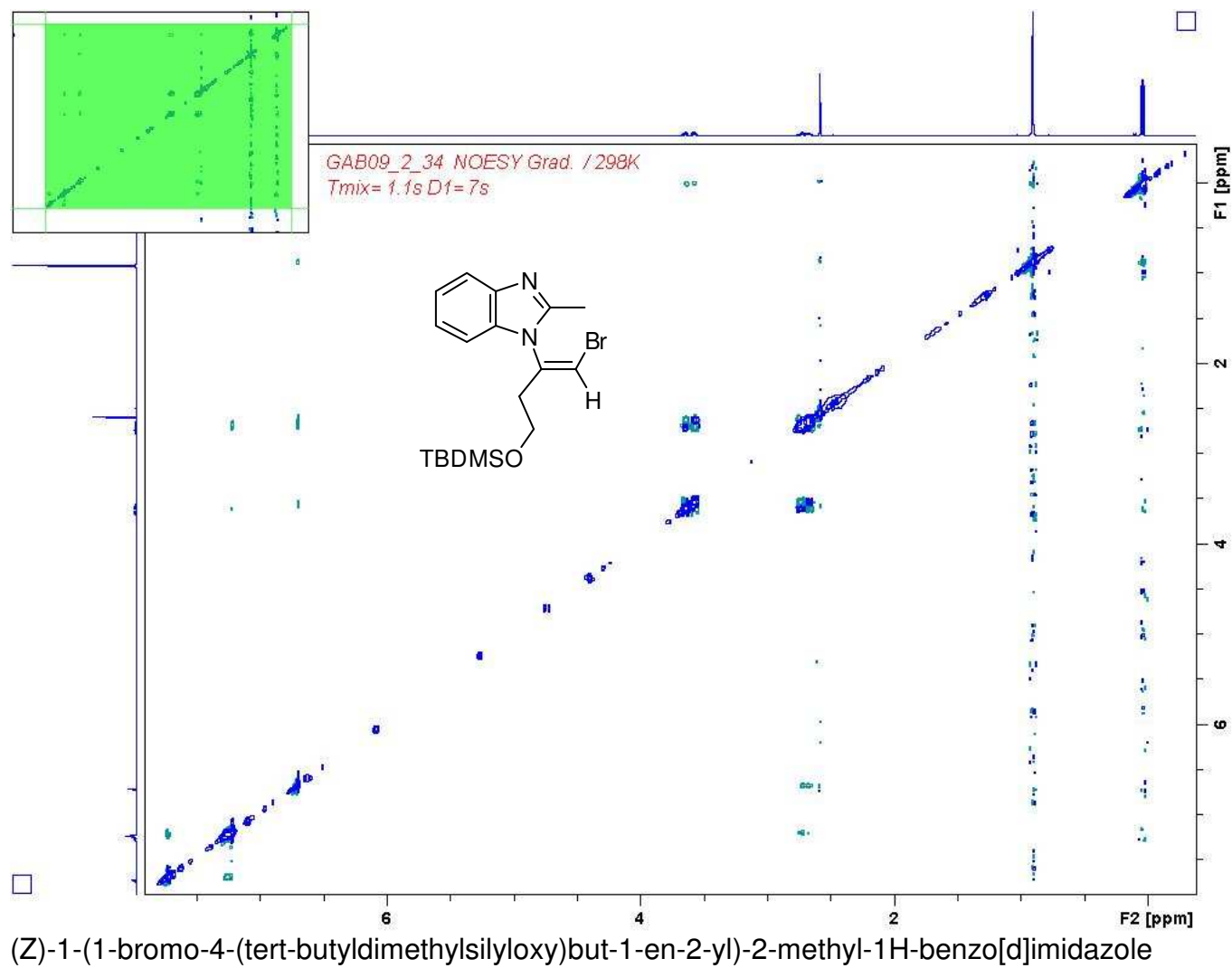
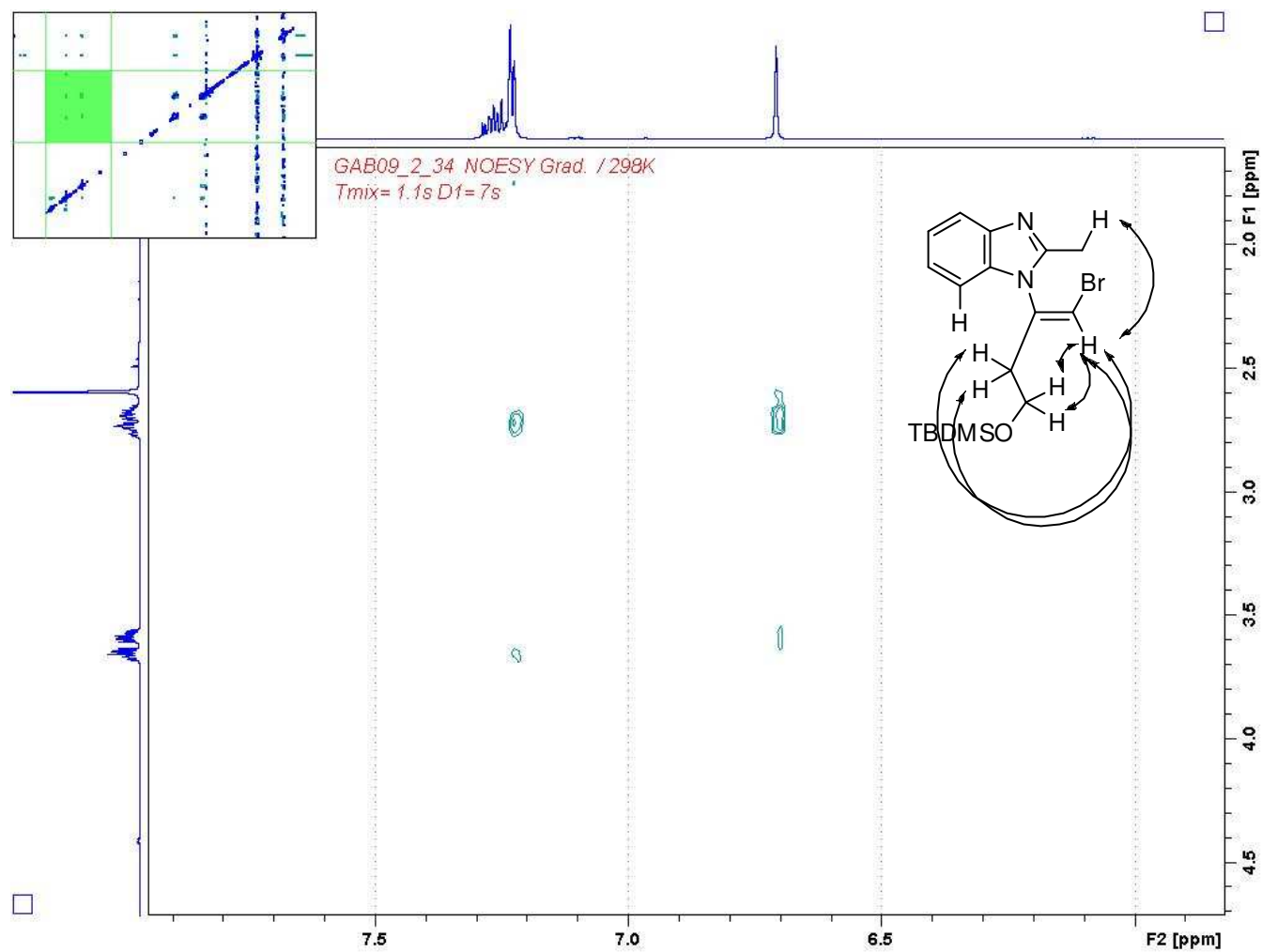
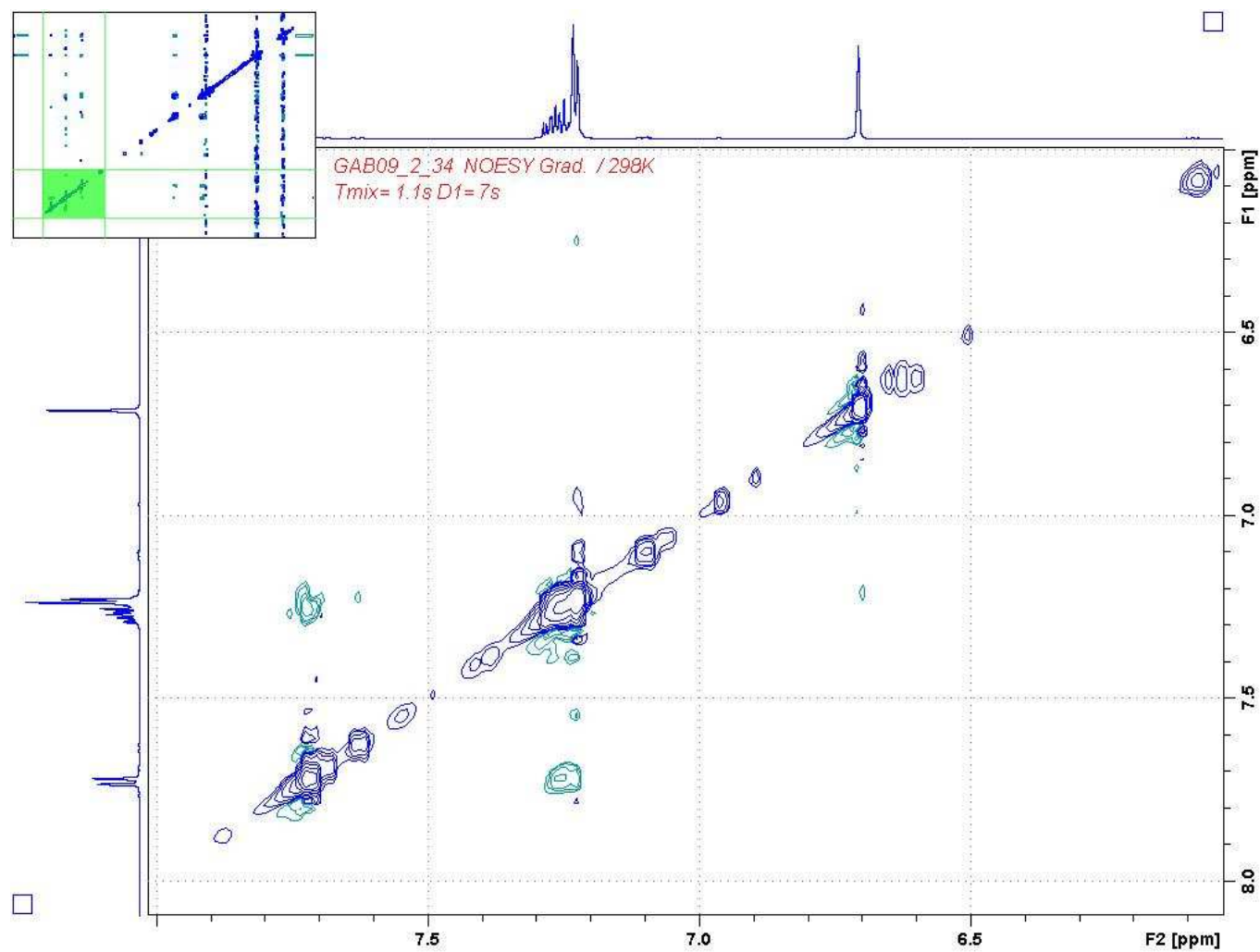


Table 2 Entry 24: (Z)-1-(1-bromo-4-(tert-butyldimethylsilyloxy)but-1-en-2-yl)-2-methyl-1H-benzo[d]imidazole





(Z)-1-(1-bromo-4-(tert-butyldimethylsilyloxy)but-1-en-2-yl)-2-methyl-1H-benzo[d]imidazole



(Z)-1-(1-bromo-4-(tert-butyldimethylsilyloxy)but-1-en-2-yl)-2-methyl-1H-benzo[d]imidazole

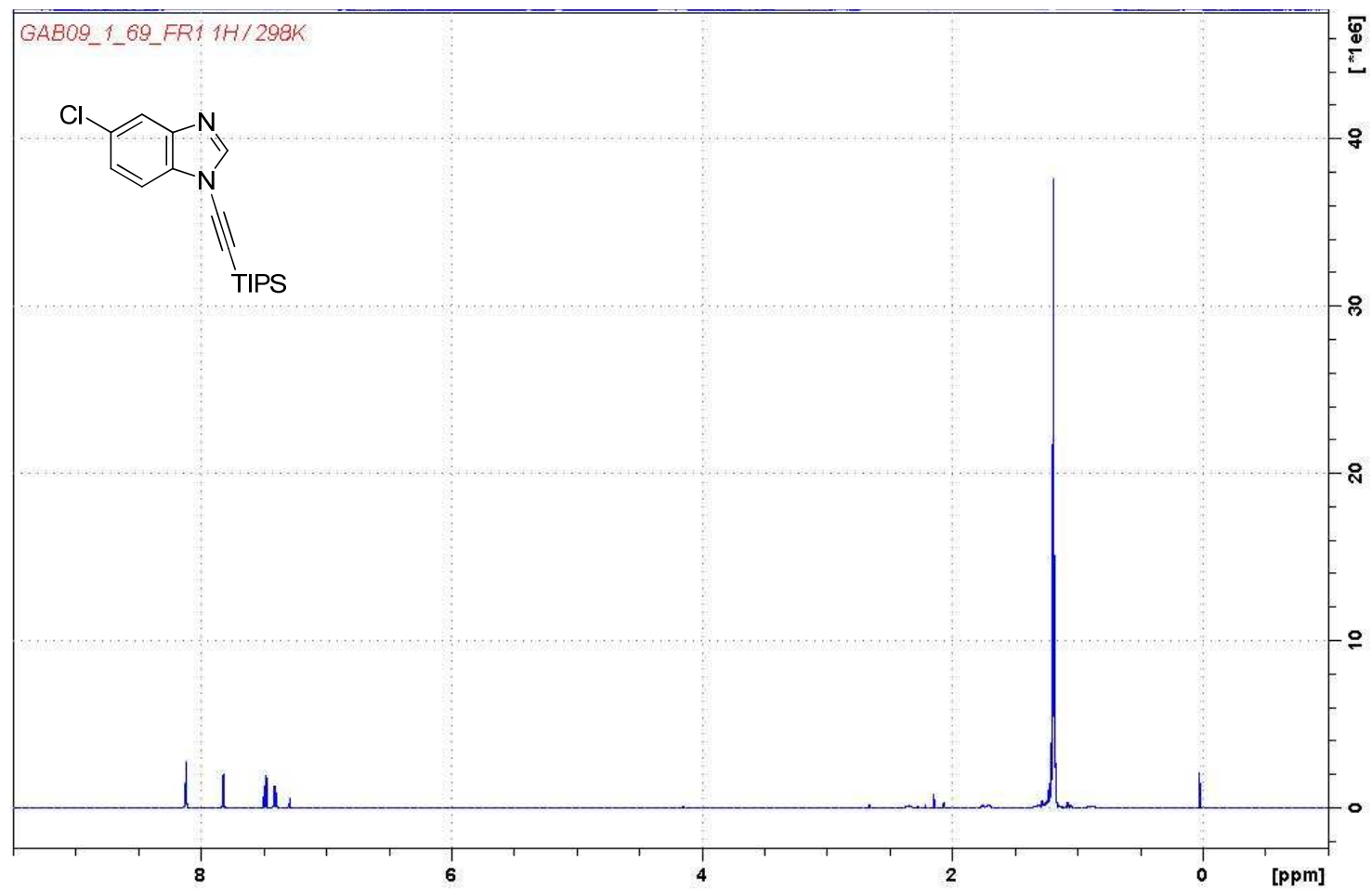


Table 2 Entry 25: 5-chloro-1-((triisopropylsilyl)ethynyl)-1H-benzo[d]imidazole

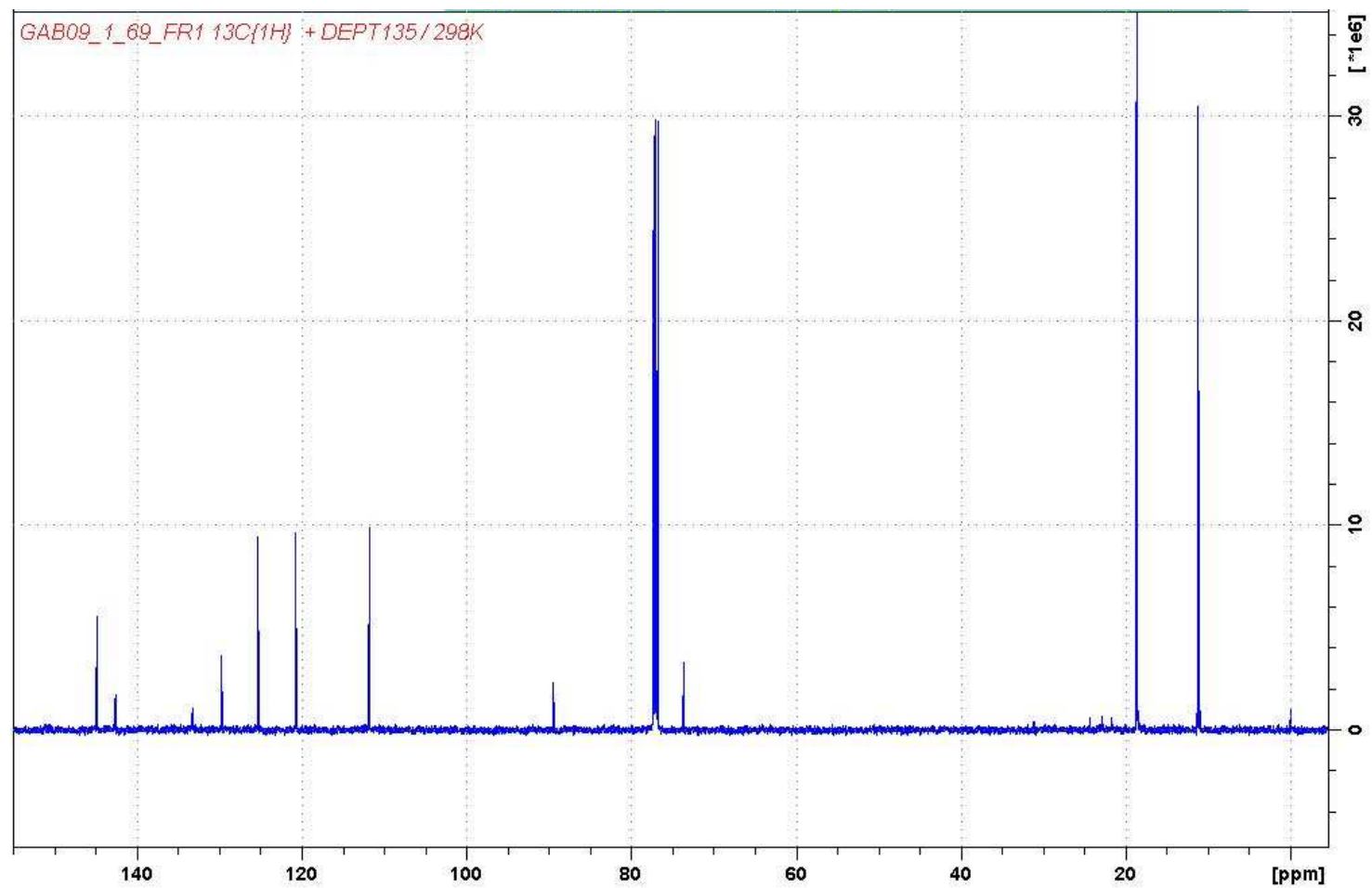
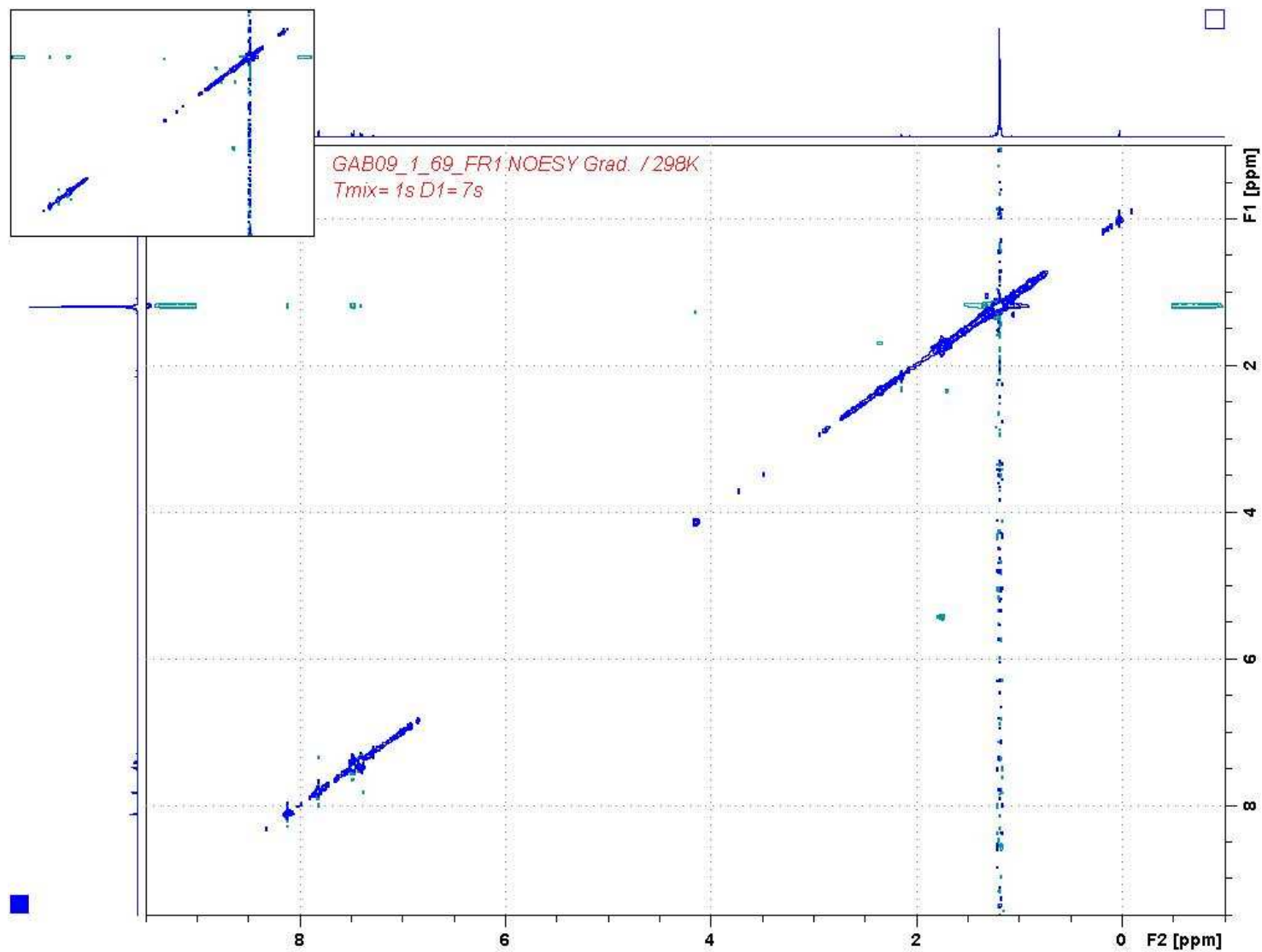
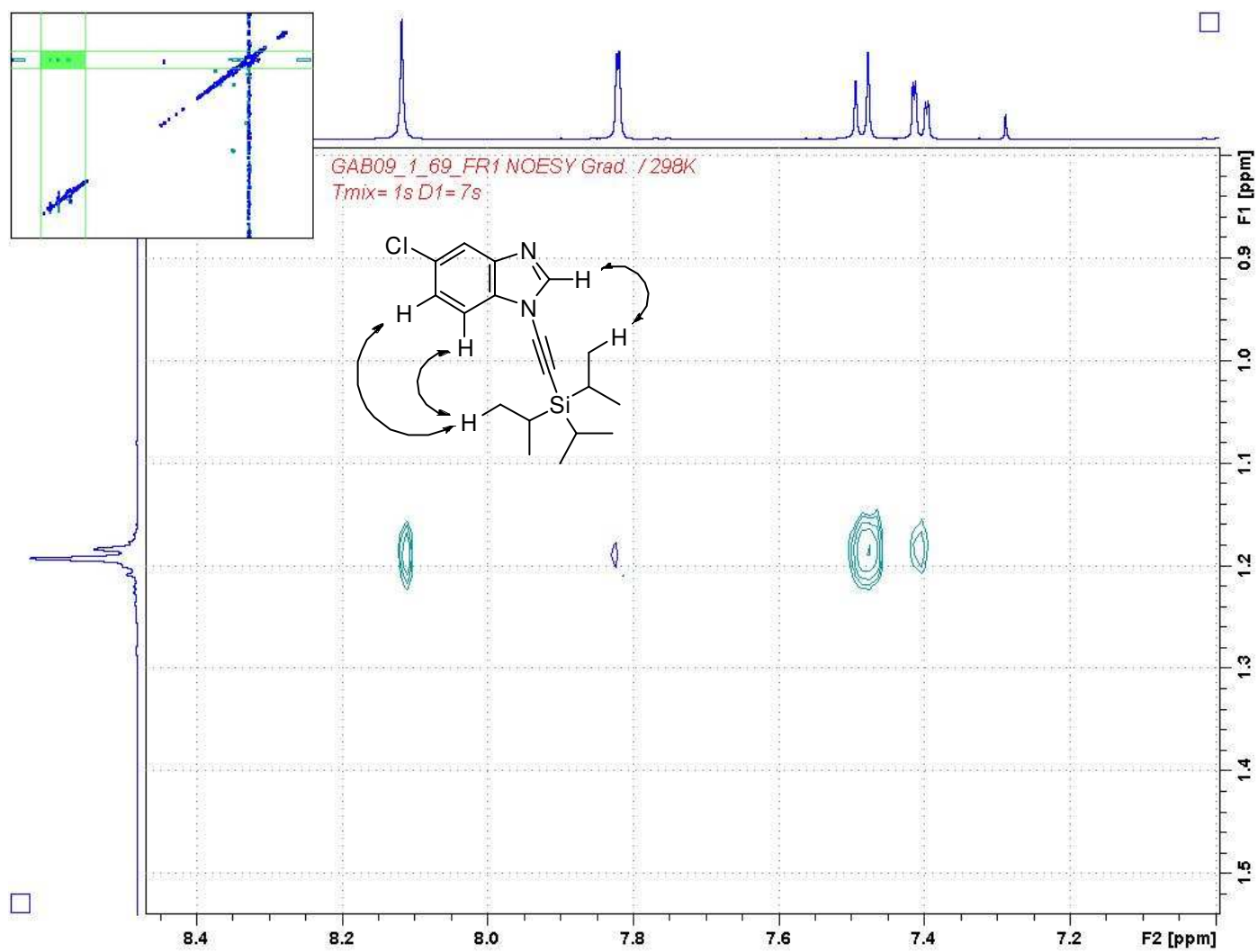


Table 2 Entry 25: 5-chloro-1-((triisopropylsilyl)ethynyl)-1H-benzo[d]imidazole





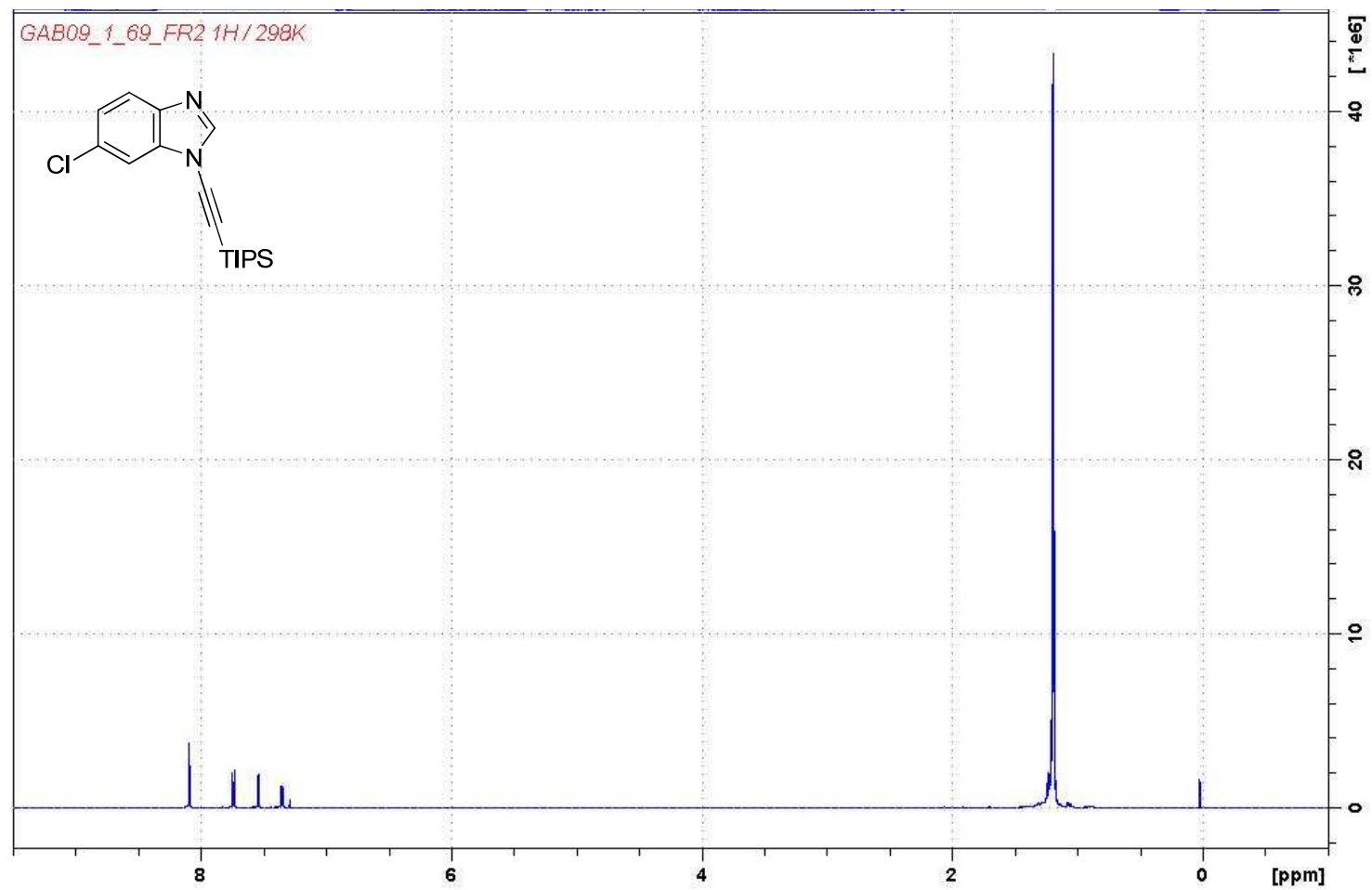


Table 2 Entry 25: 6-chloro-1-((triisopropylsilyl)ethynyl)-1H-benzo[d]imidazole

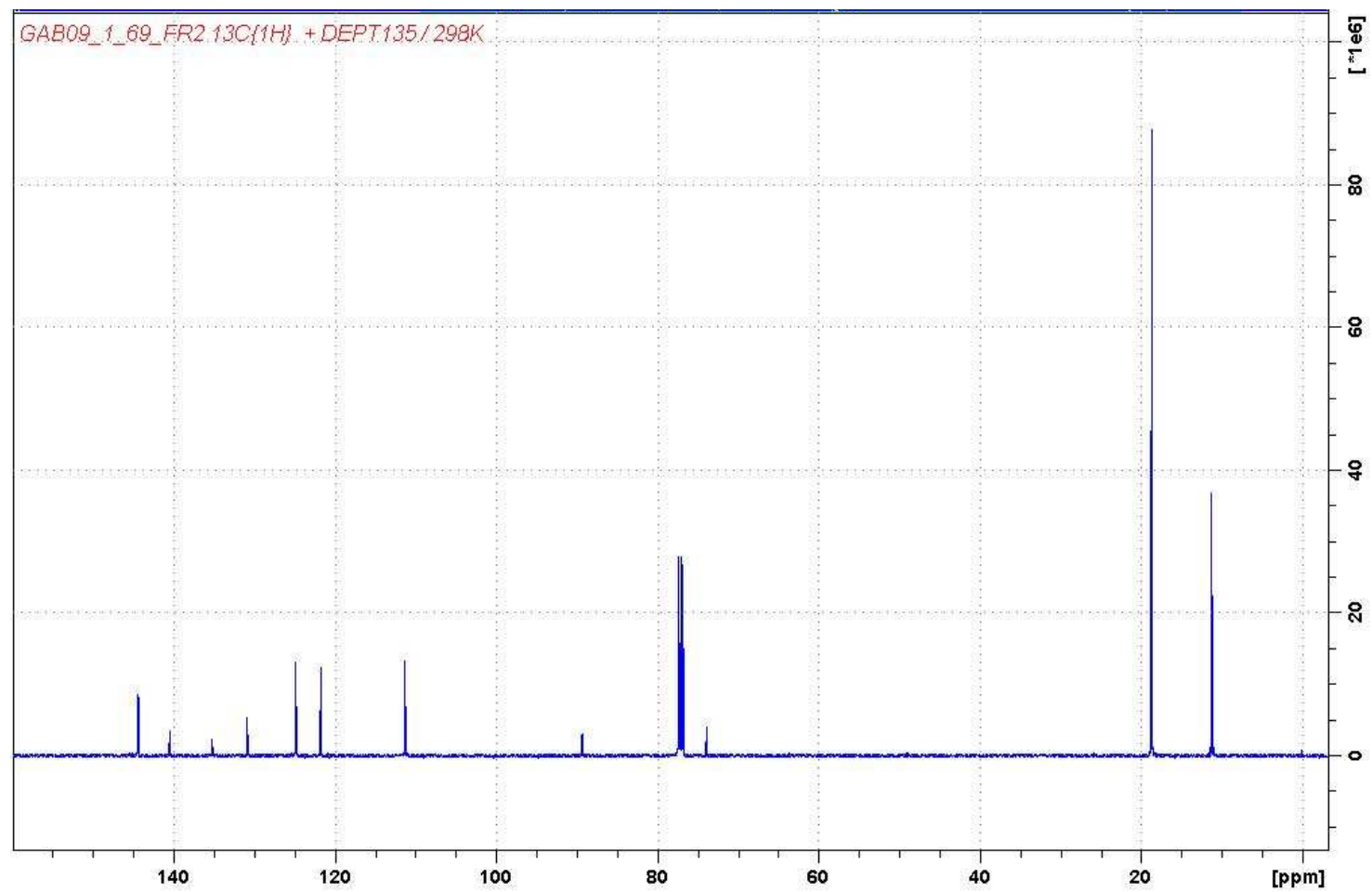
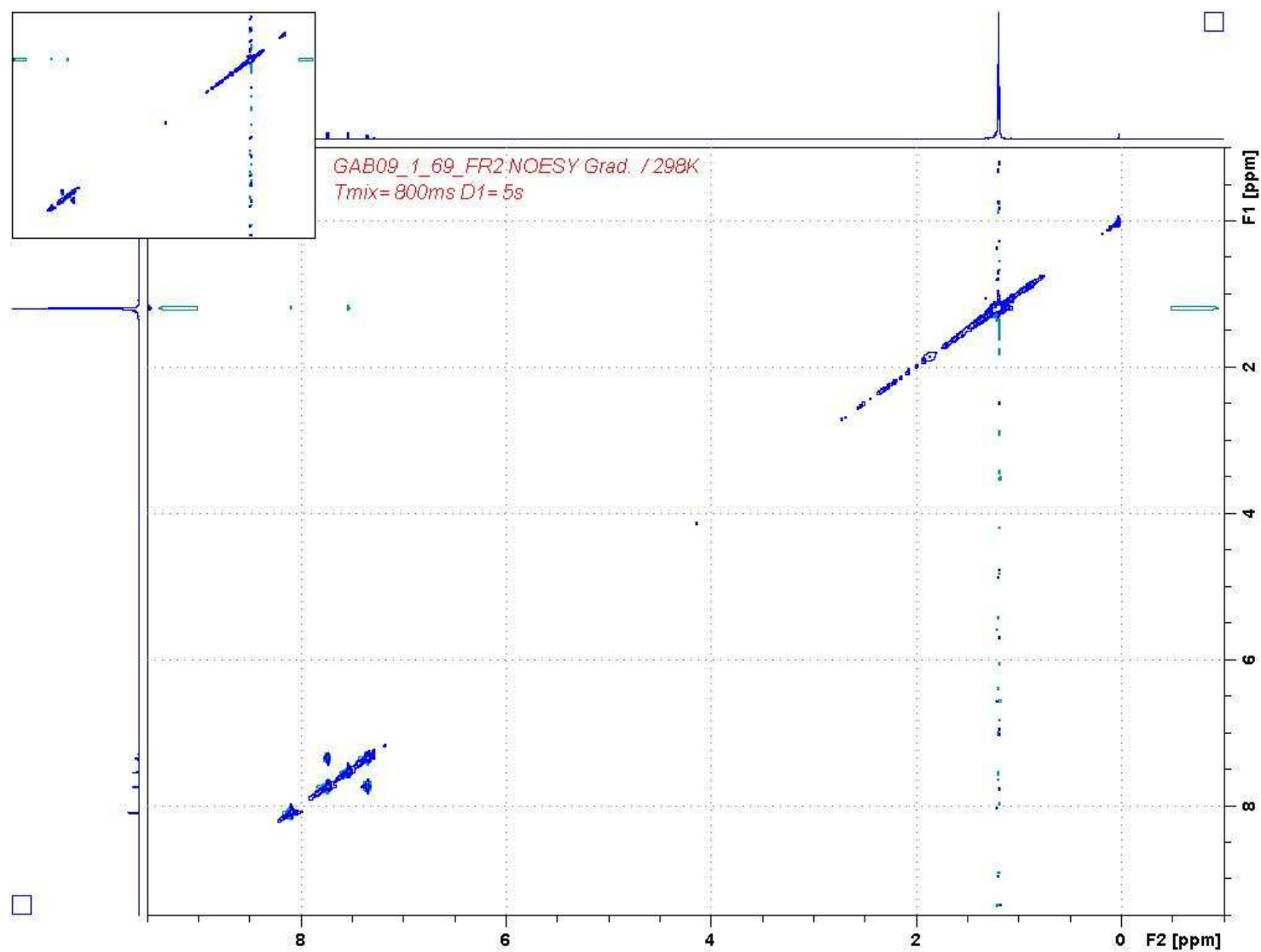
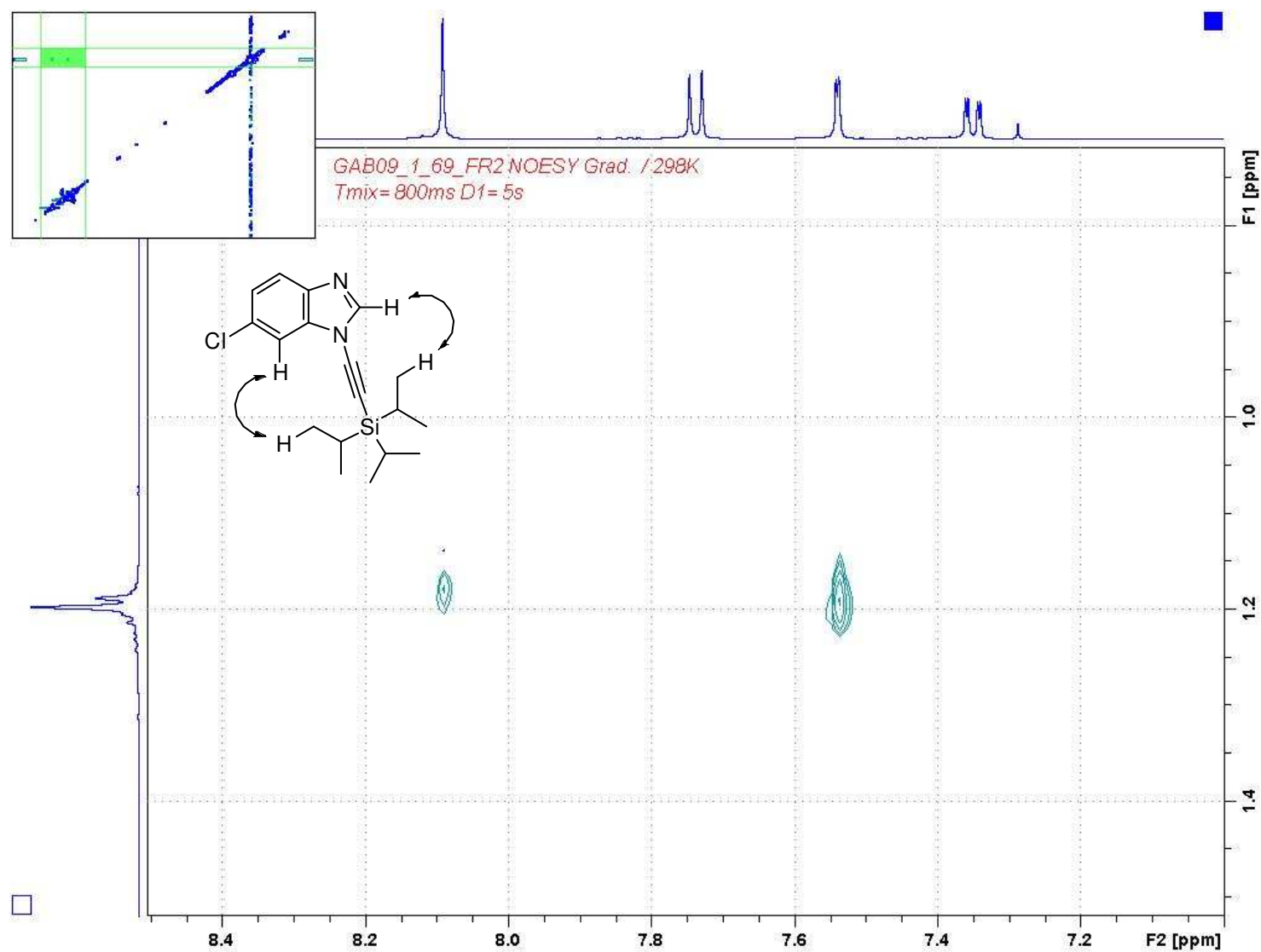


Table 2 Entry 25: 6-chloro-1-((triisopropylsilyl)ethynyl)-1H-benzo[d]imidazole





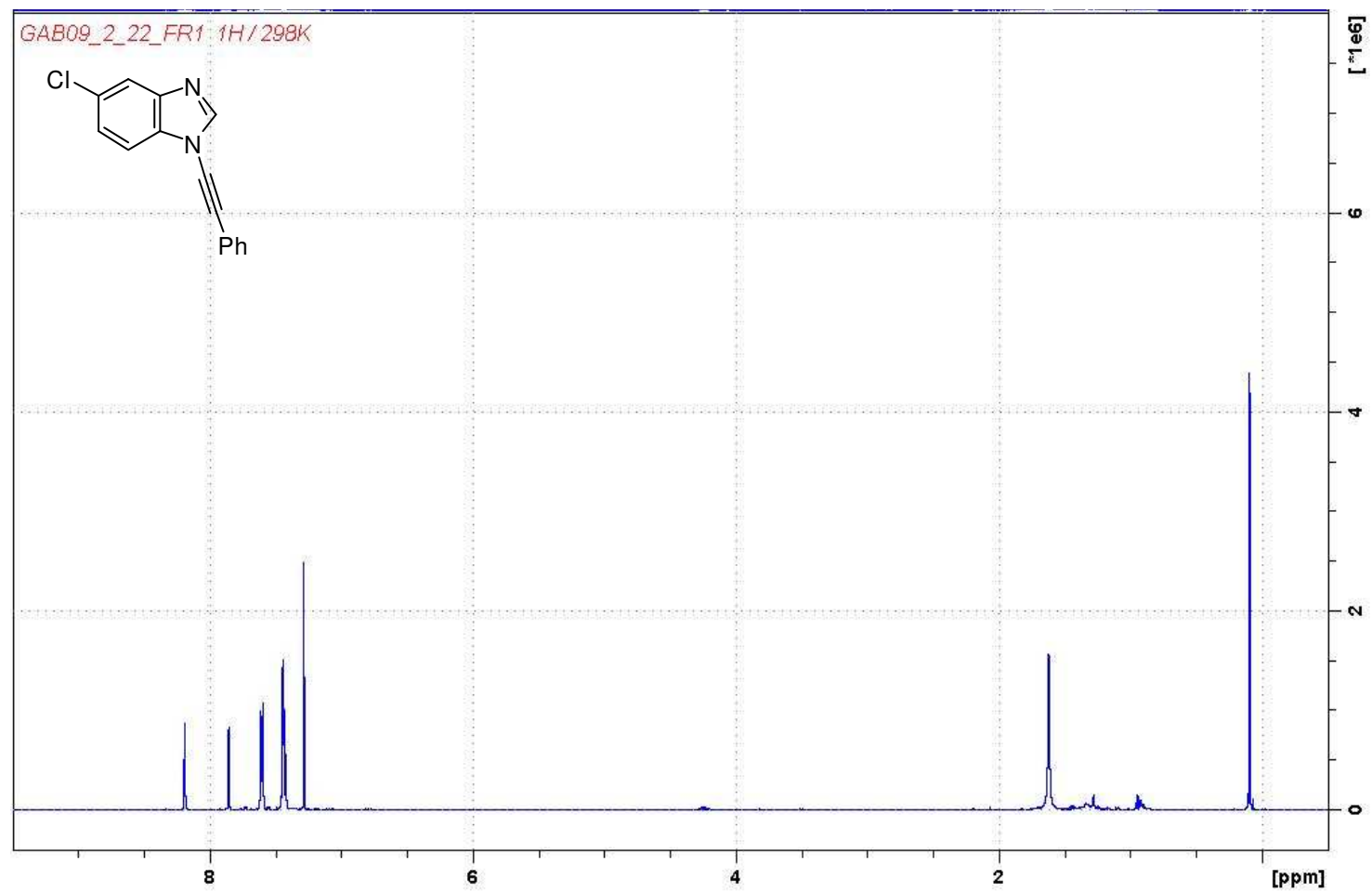


Table 2 Entry 26: 5-chloro-1-(phenylethynyl)-1H-benzo[d]imidazole

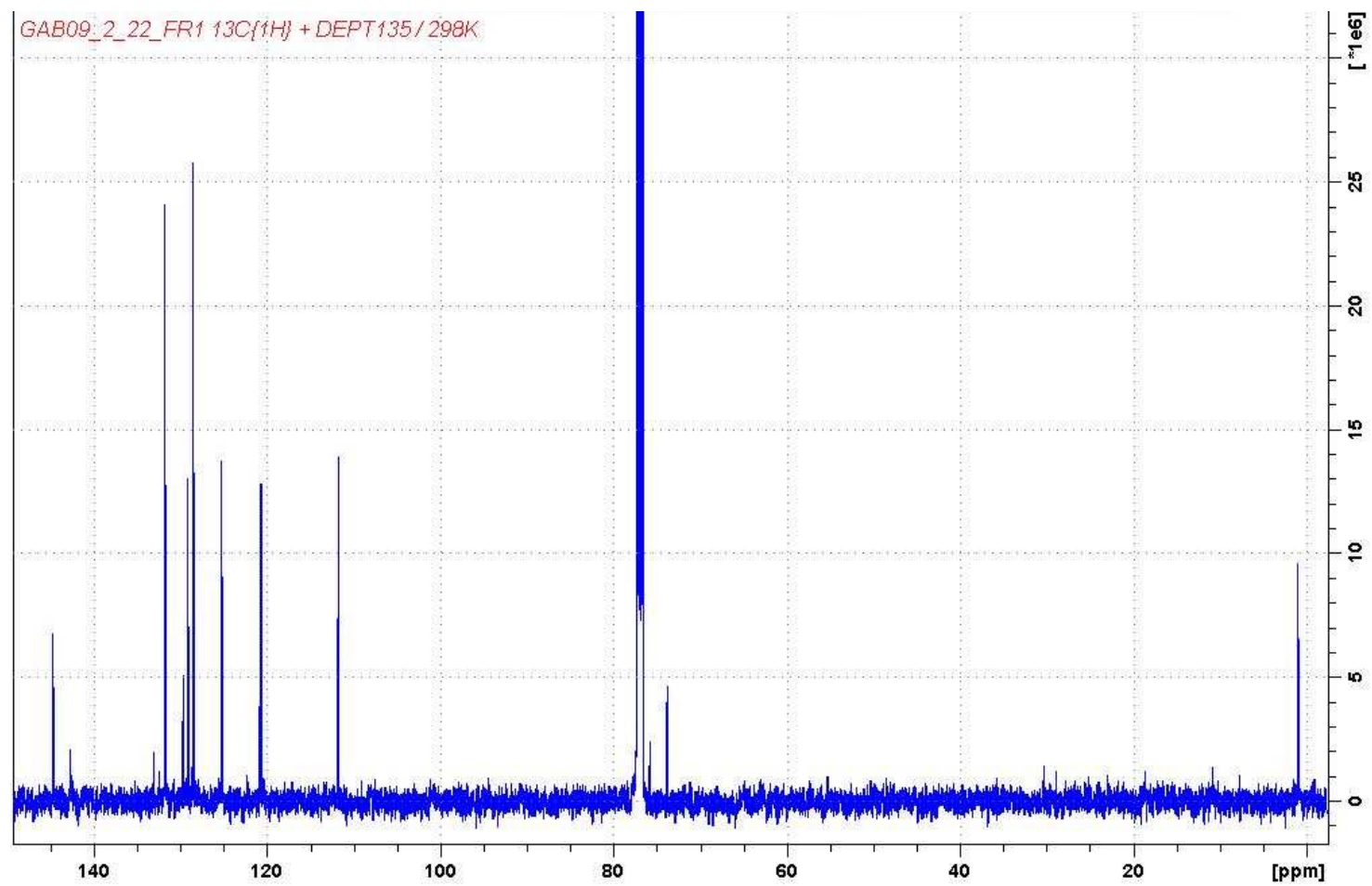


Table 2 Entry 26: 5-chloro-1-(phenylethynyl)-1H-benzo[d]imidazole

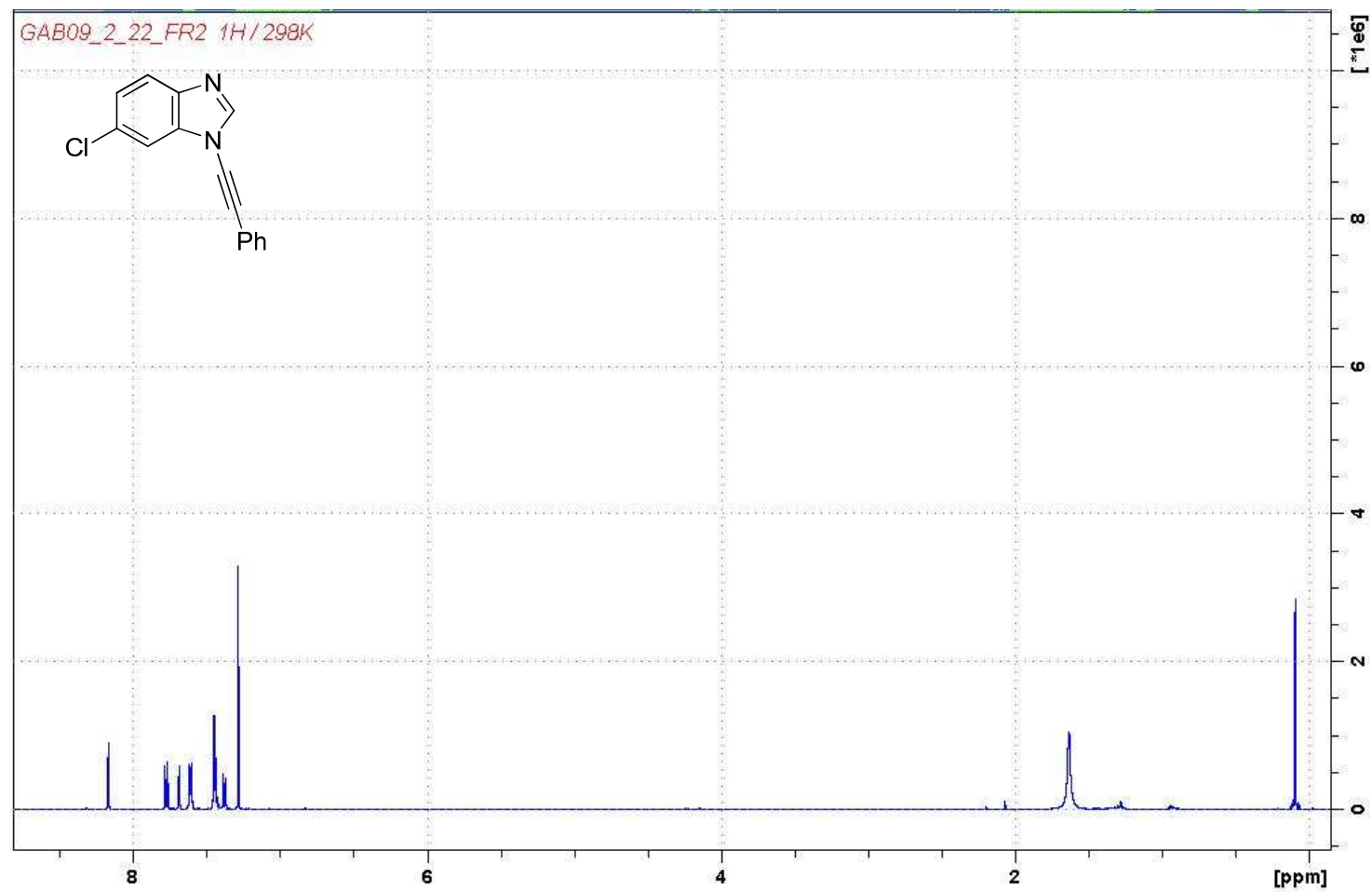


Table 2 Entry 26: 6-chloro-1-(phenylethynyl)-1H-benzo[d]imidazole

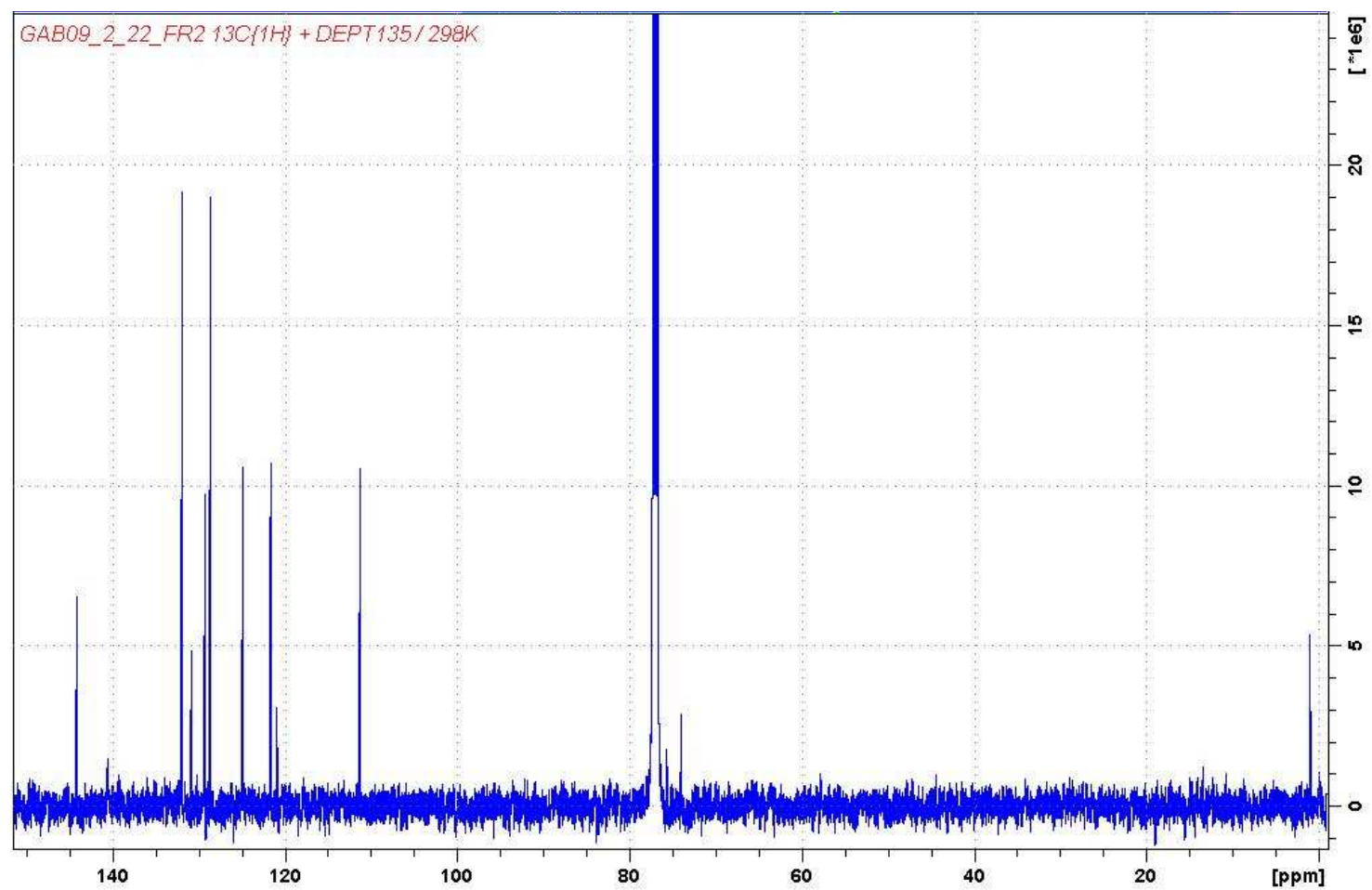
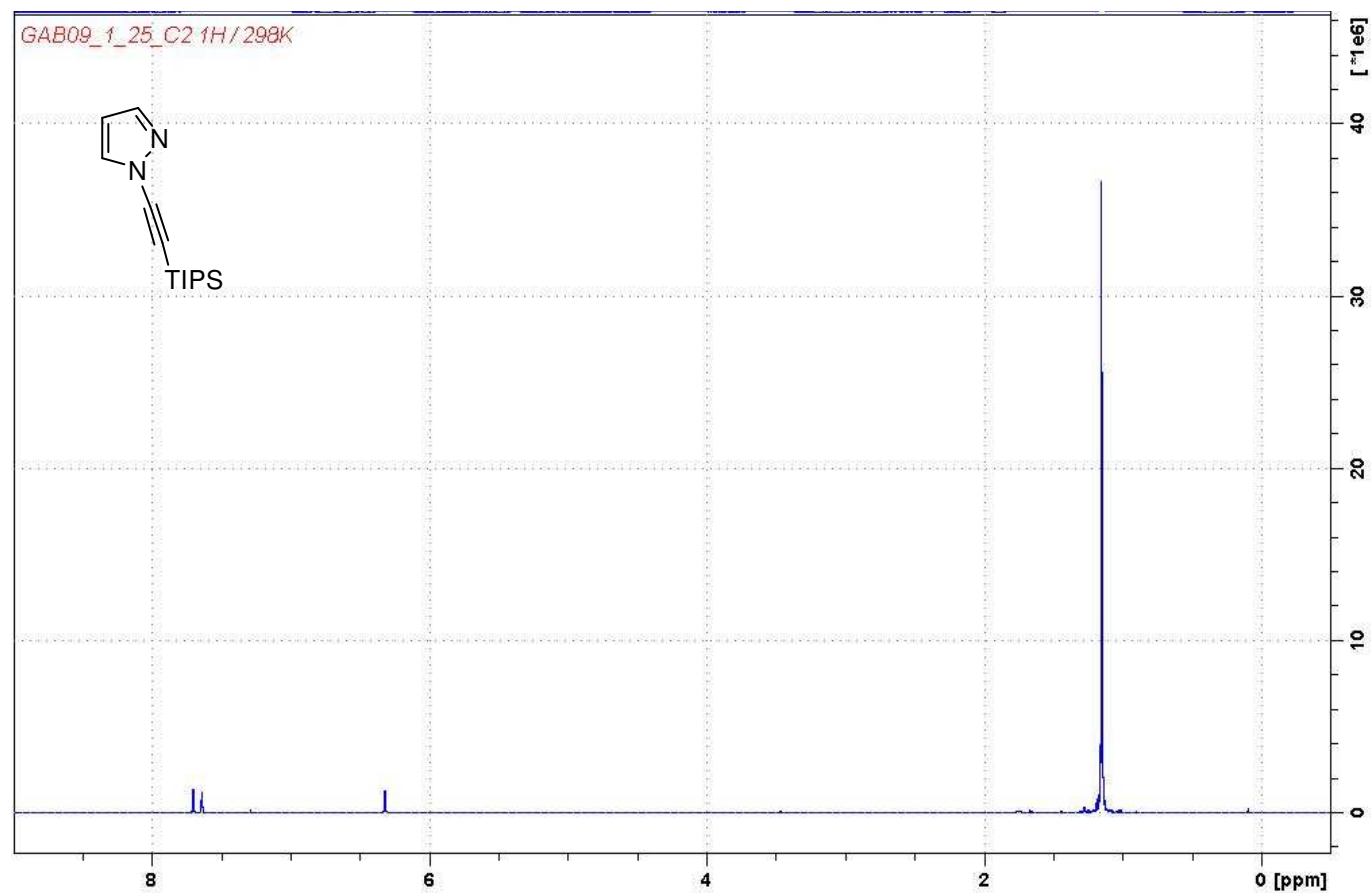


Table 2 Entry 26: 6-chloro-1-(phenylethynyl)-1H-benzo[d]imidazole

N-alkynylpyrazoles



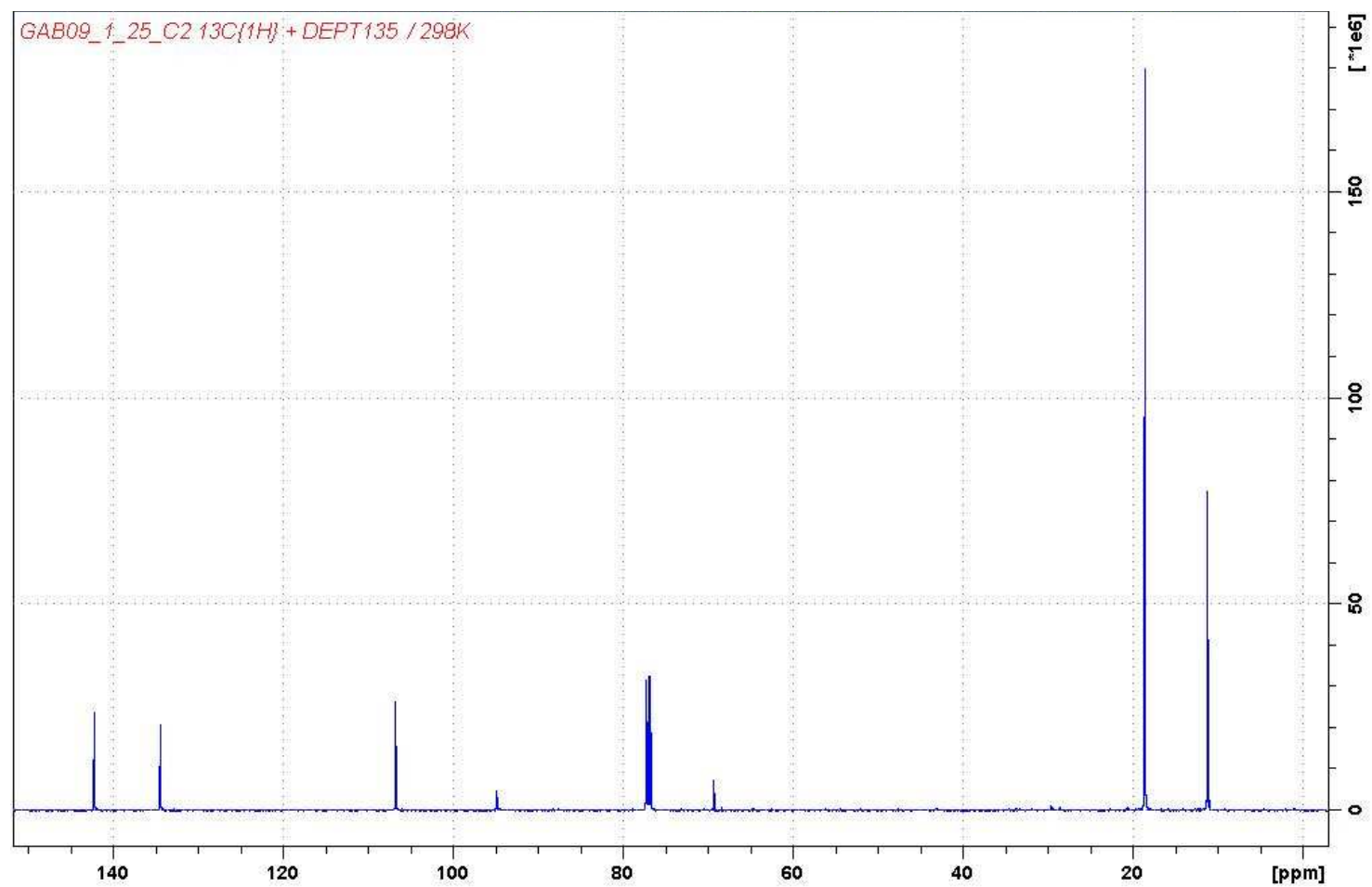


Table 3 Entry 1: 1-((triisopropylsilyl)ethynyl)-1H-pyrazole

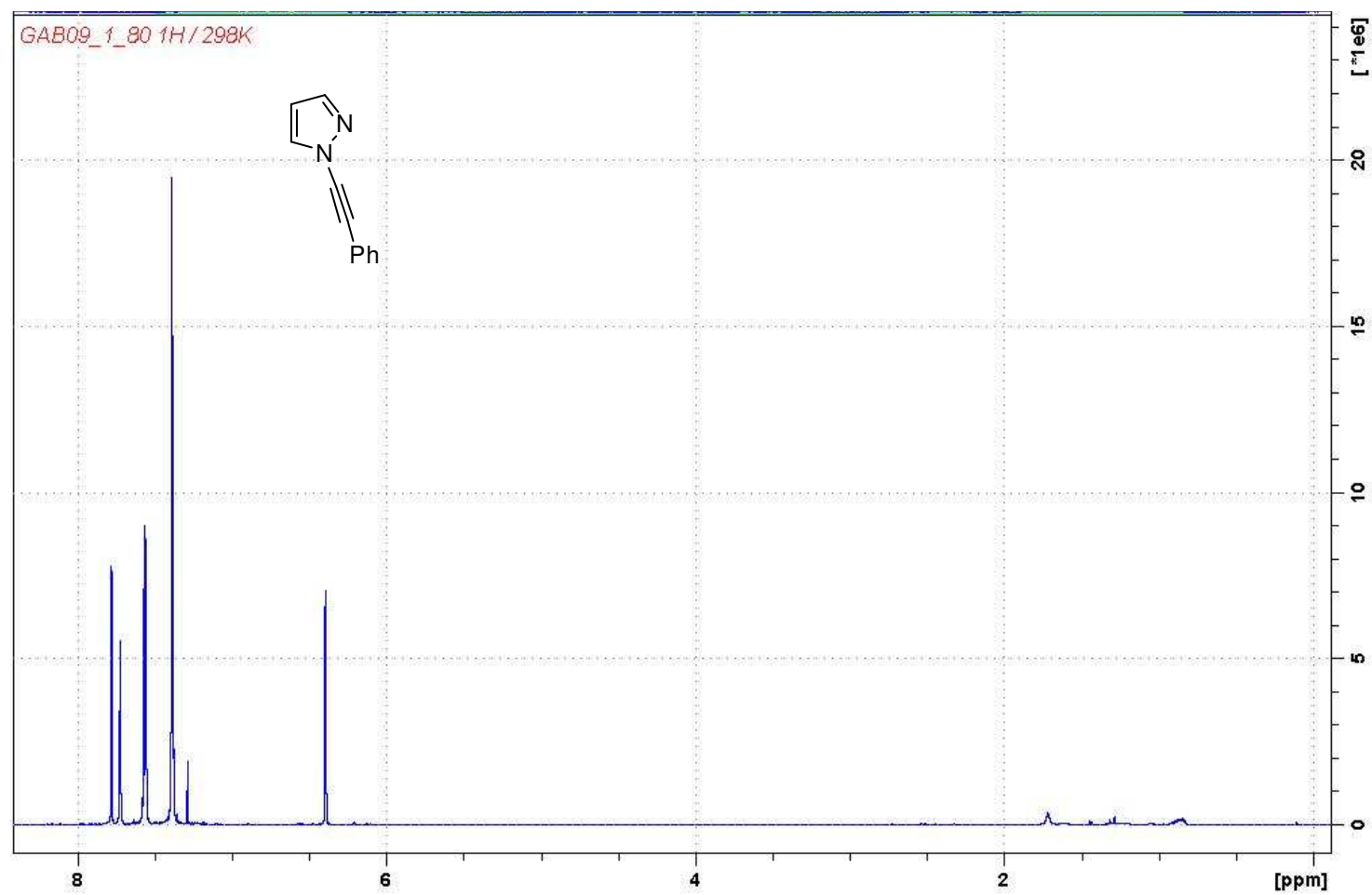


Table 3 Entry 2: 1-(phenylethynyl)-1H-pyrazole

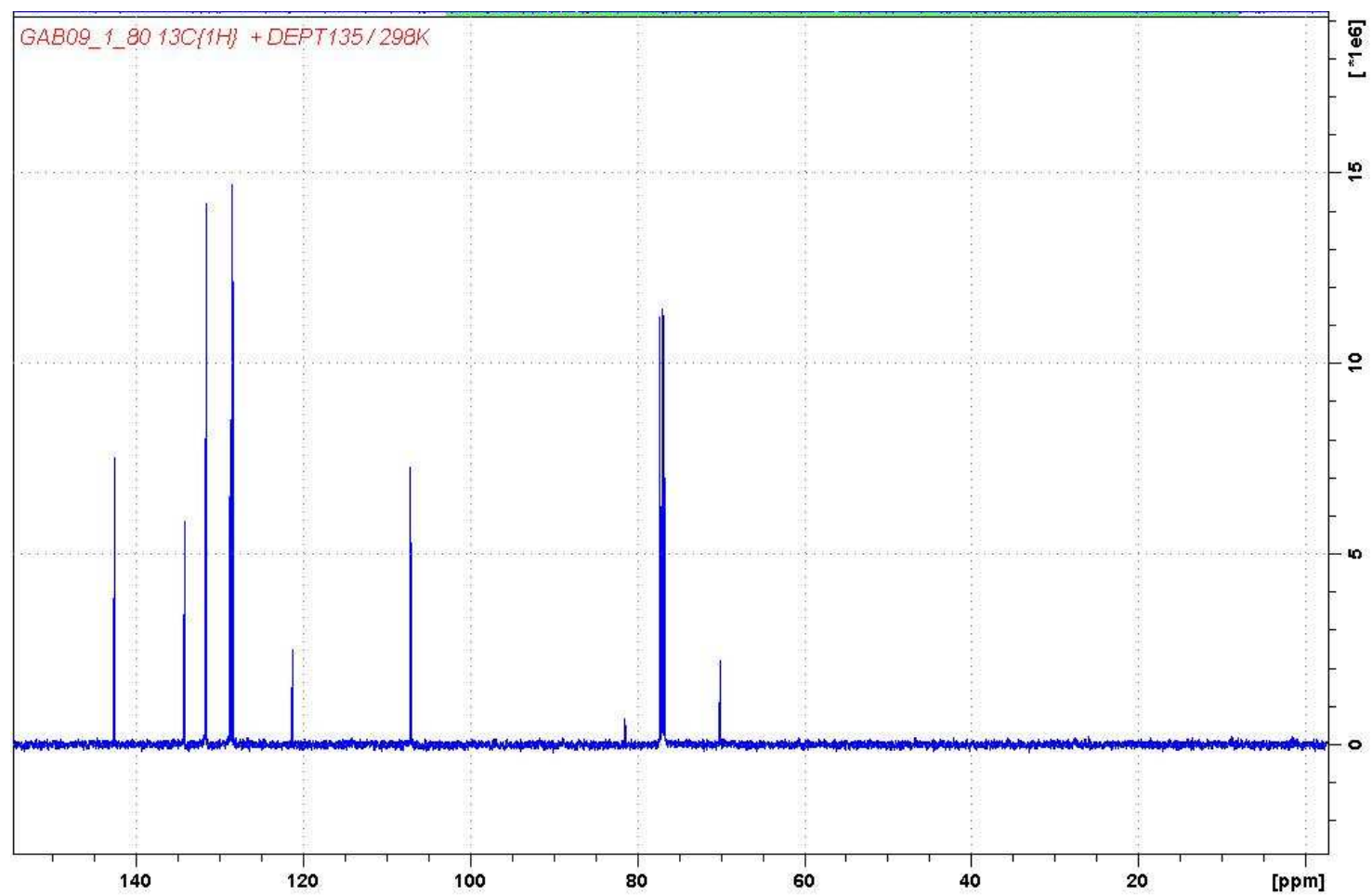


Table 3 Entry 2: 1-(phenylethynyl)-1H-pyrazole

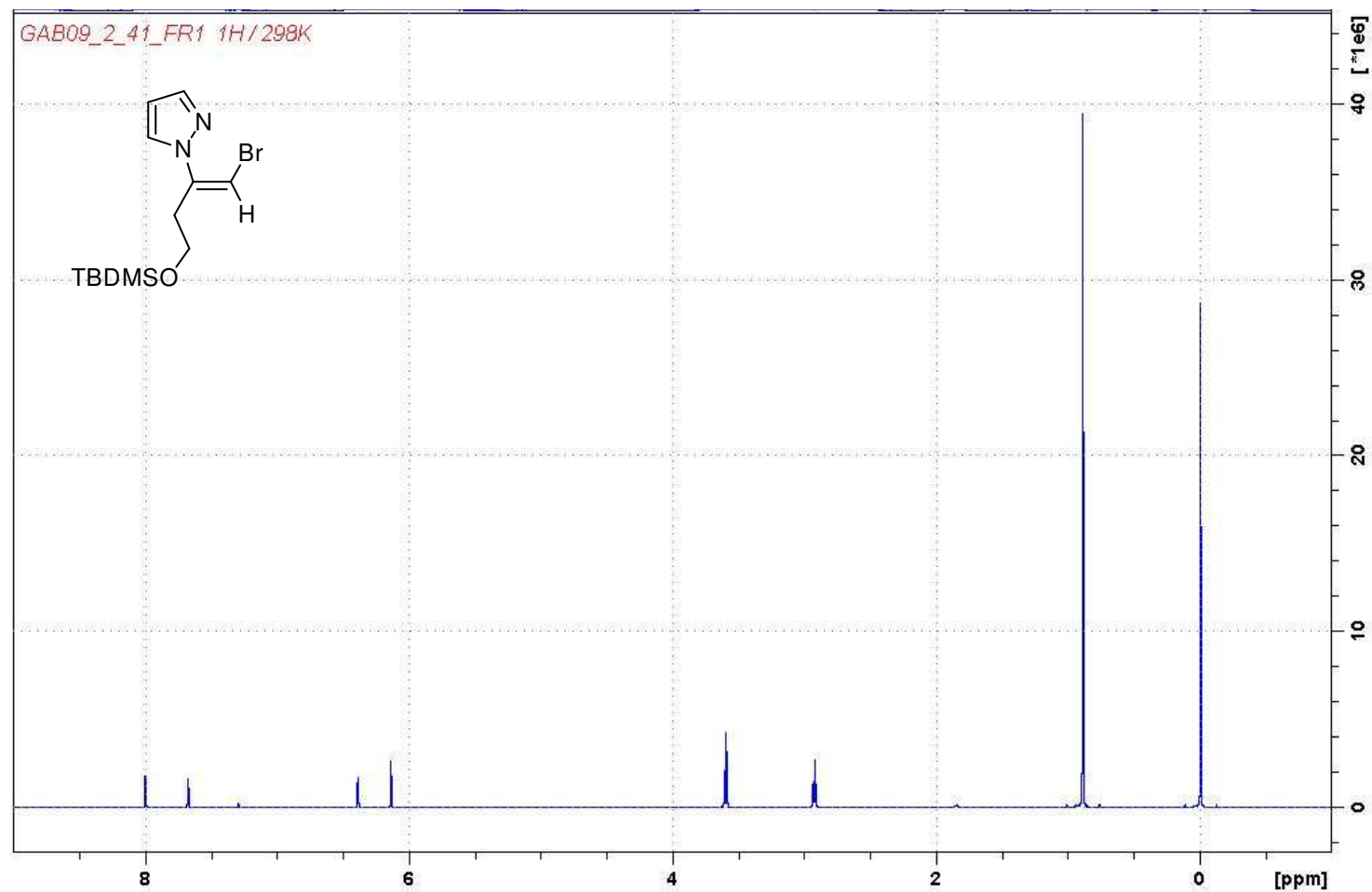
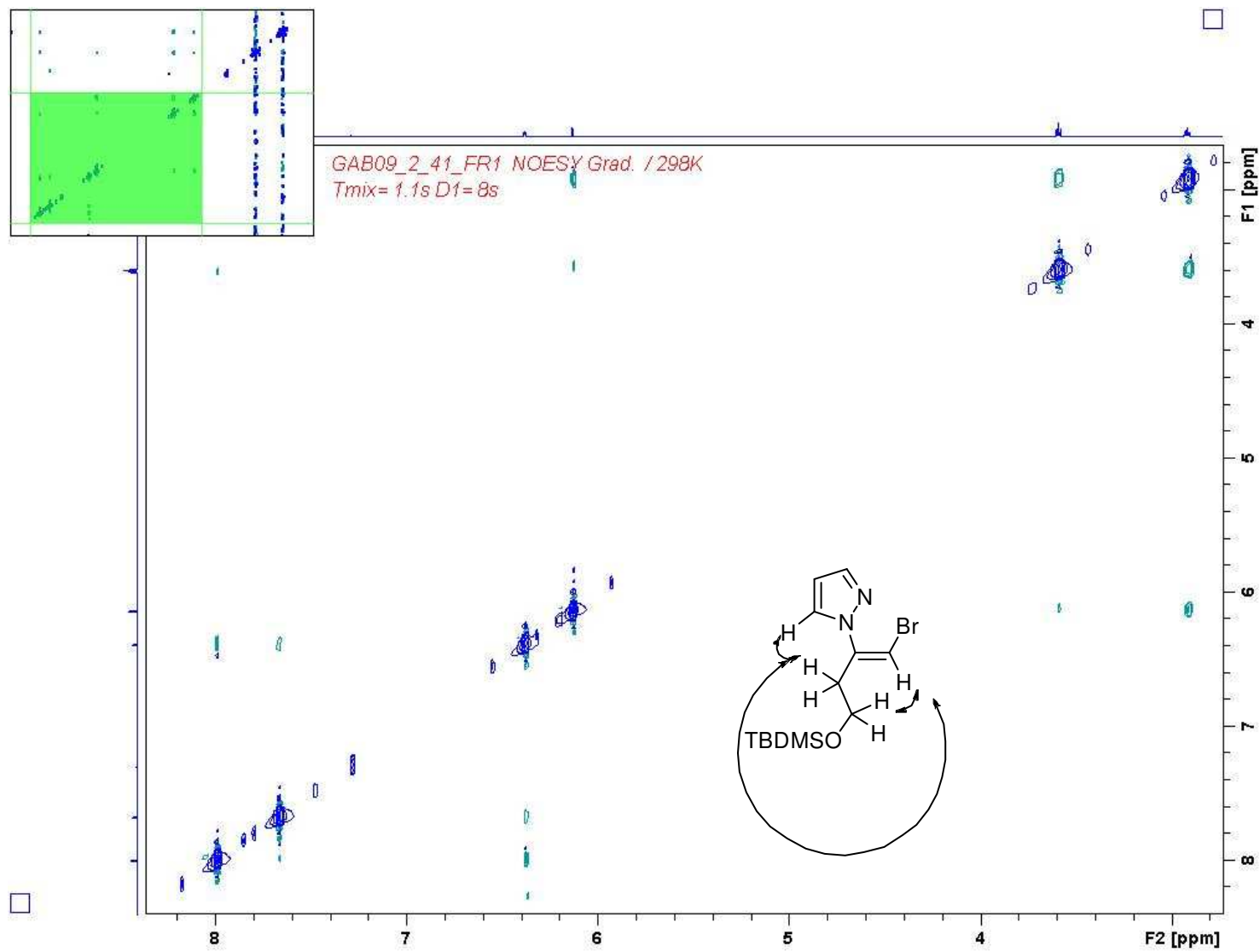


Table 3 Entry 3: (Z)-1-(1-bromo-4-(tert-butyl dimethylsilyloxy)but-1-en-2-yl)-1H-pyrazole



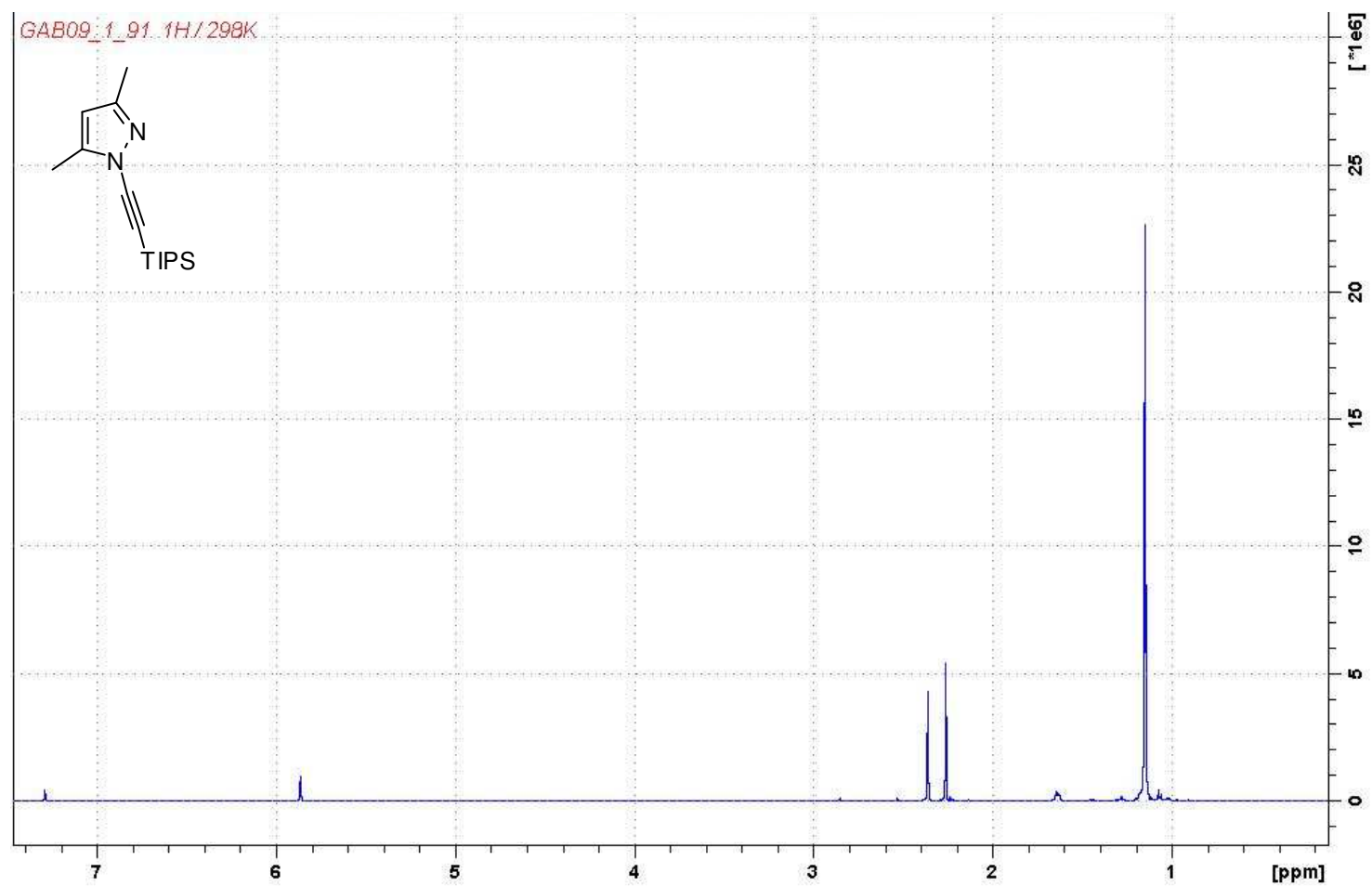


Table 3 Entry 4: 3,5-dimethyl-1-((triisopropylsilyl)ethynyl)-1H-pyrazole

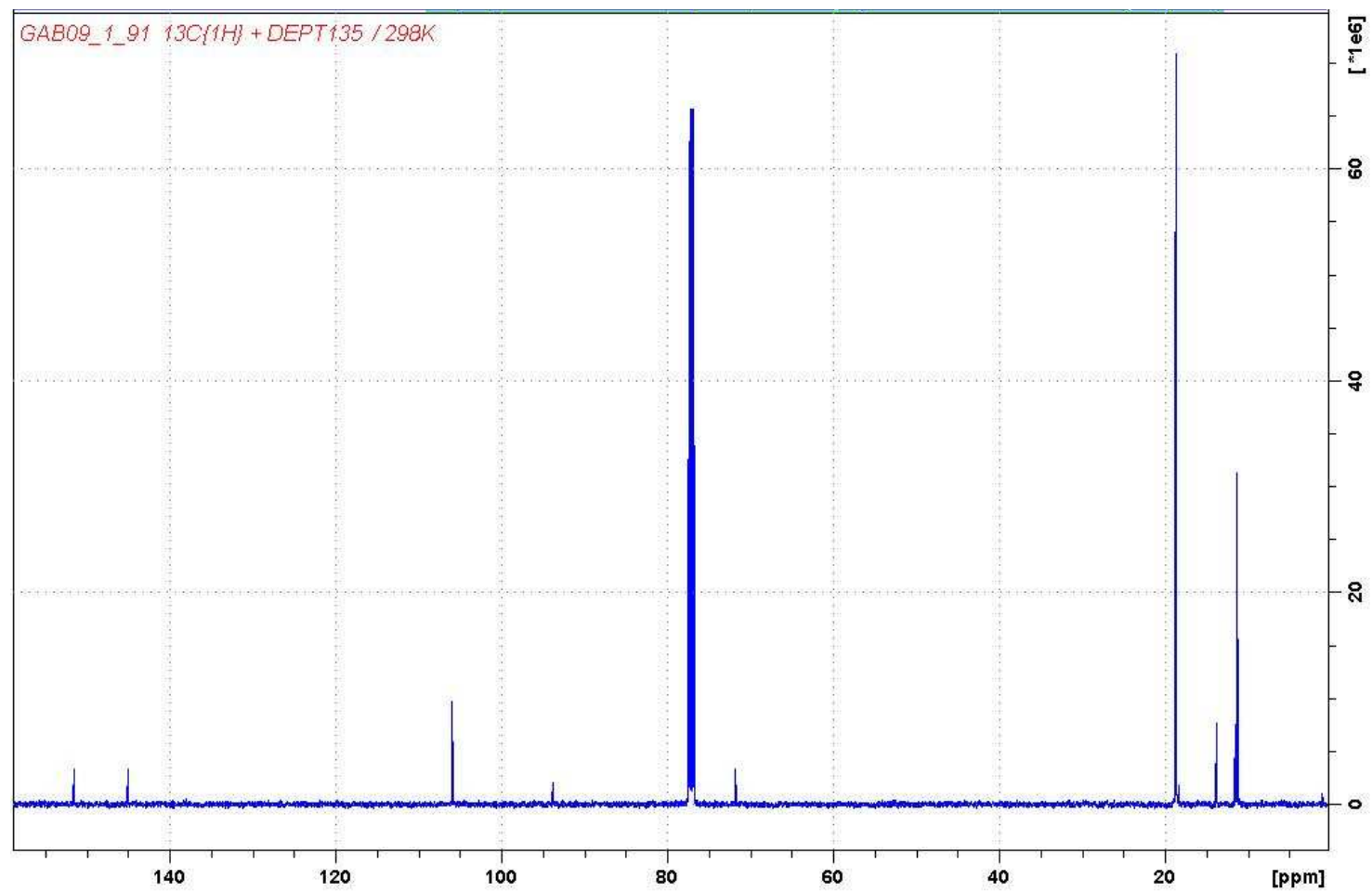


Table 3 Entry 4: 3,5-dimethyl-1-((triisopropylsilyl)ethynyl)-1H-pyrazole

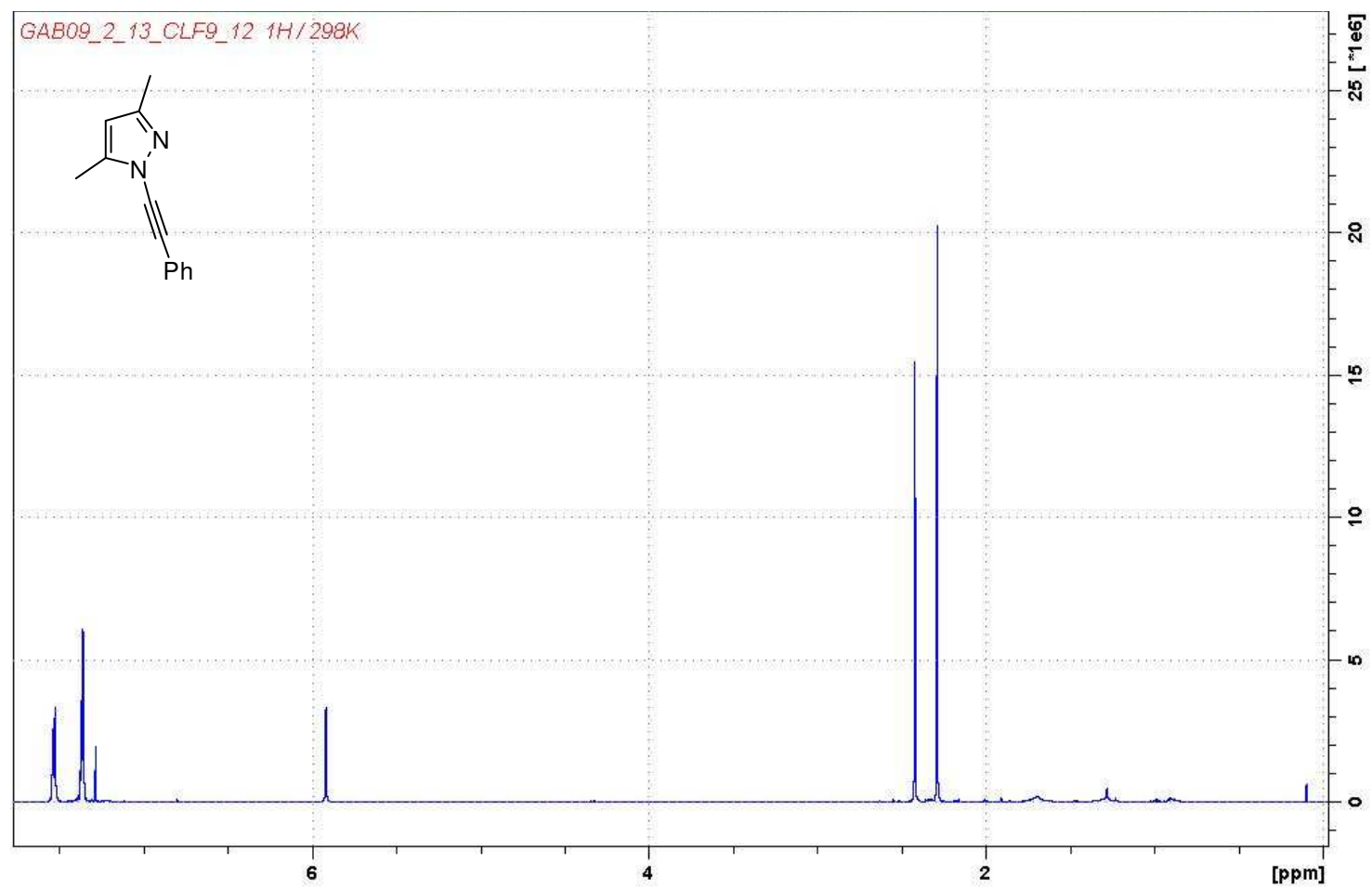


Table 3 Entry 5: 3,5-dimethyl-1-(phenylethynyl)-1H-pyrazole

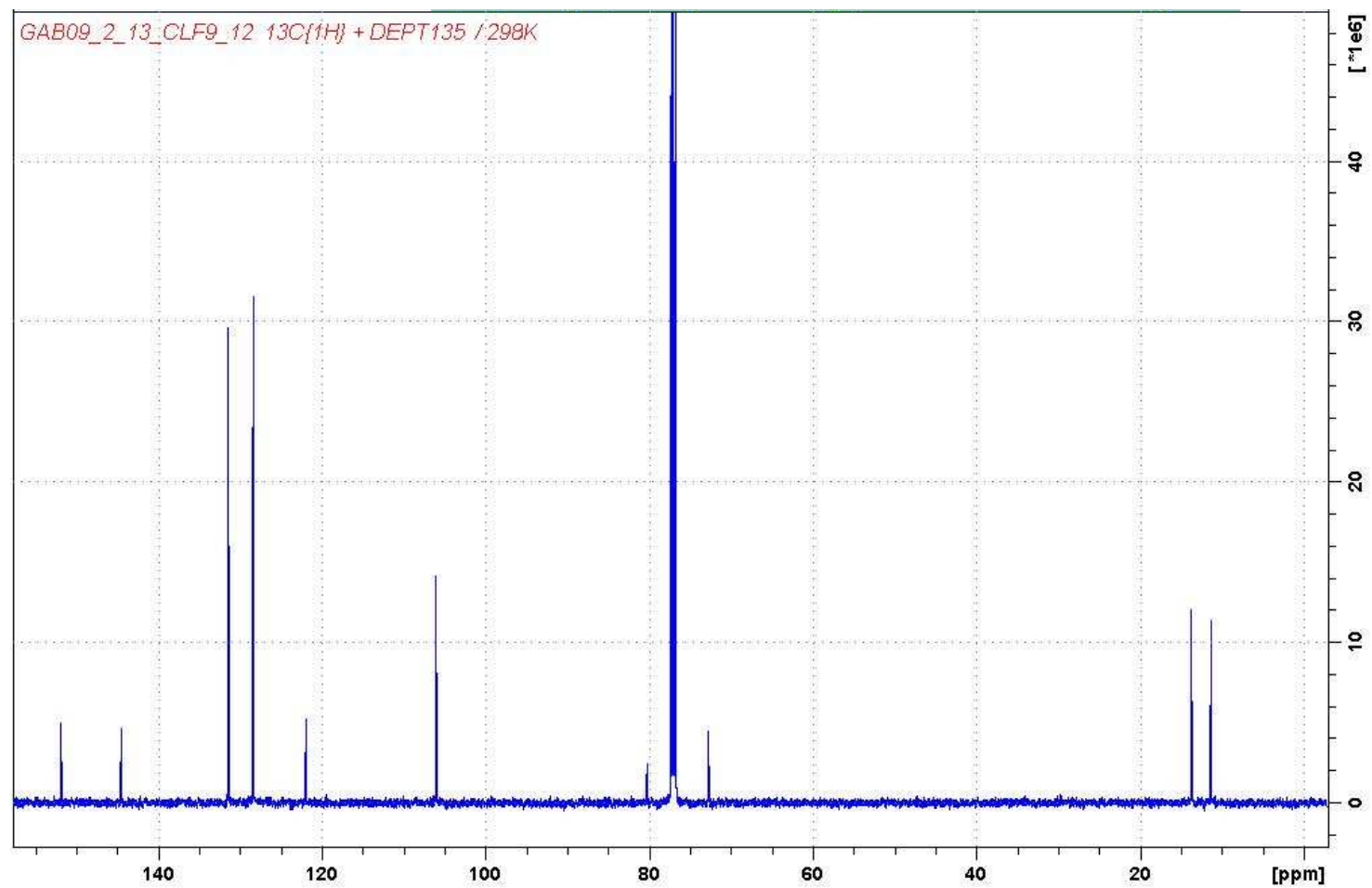


Table 3 Entry 5: 3,5-dimethyl-1-(phenylethynyl)-1H-pyrazole

N-alkynylindazoles

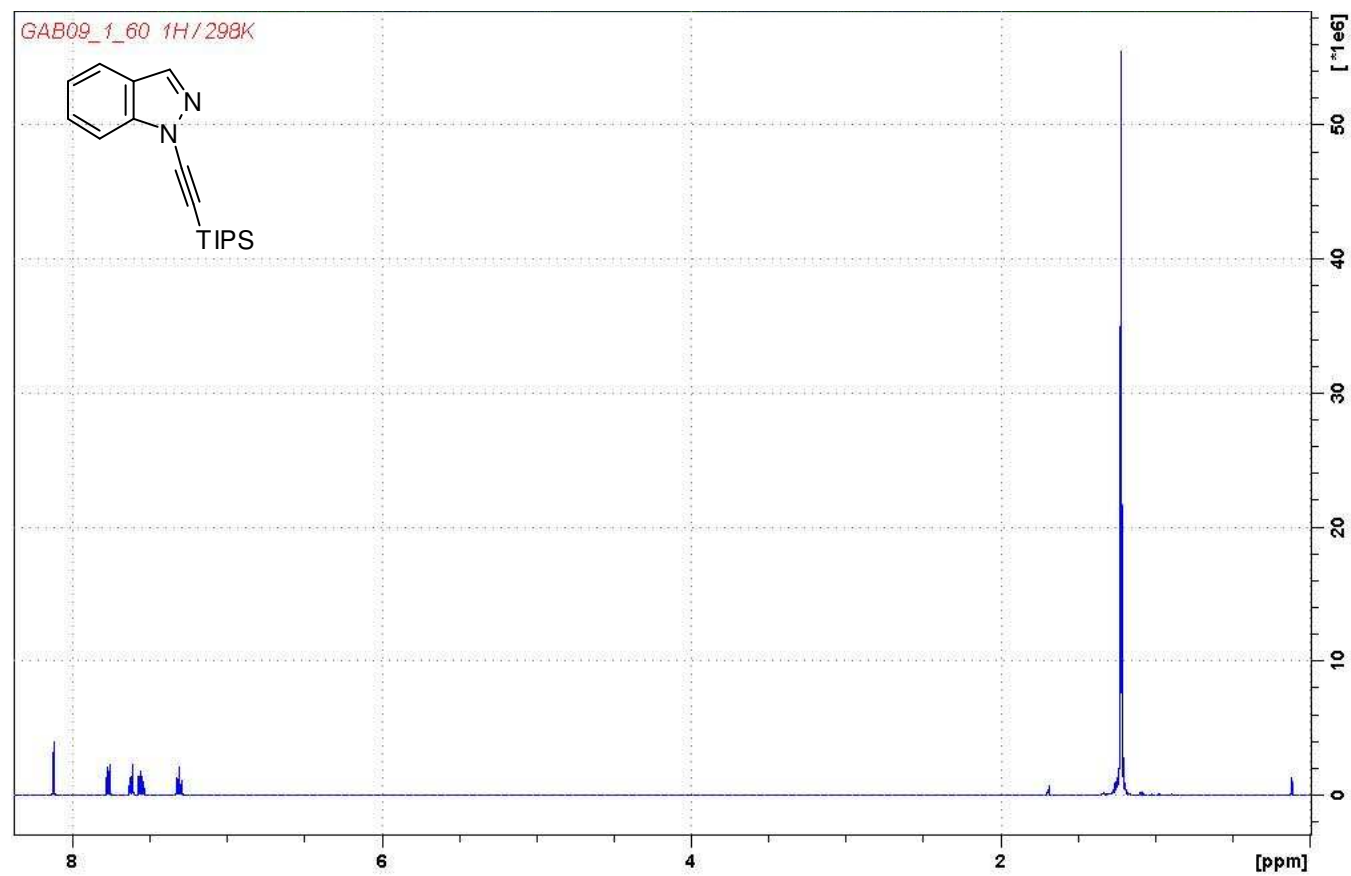


Table 3 Entry 7: 1-((triisopropylsilyl)ethynyl)-1H-indazole

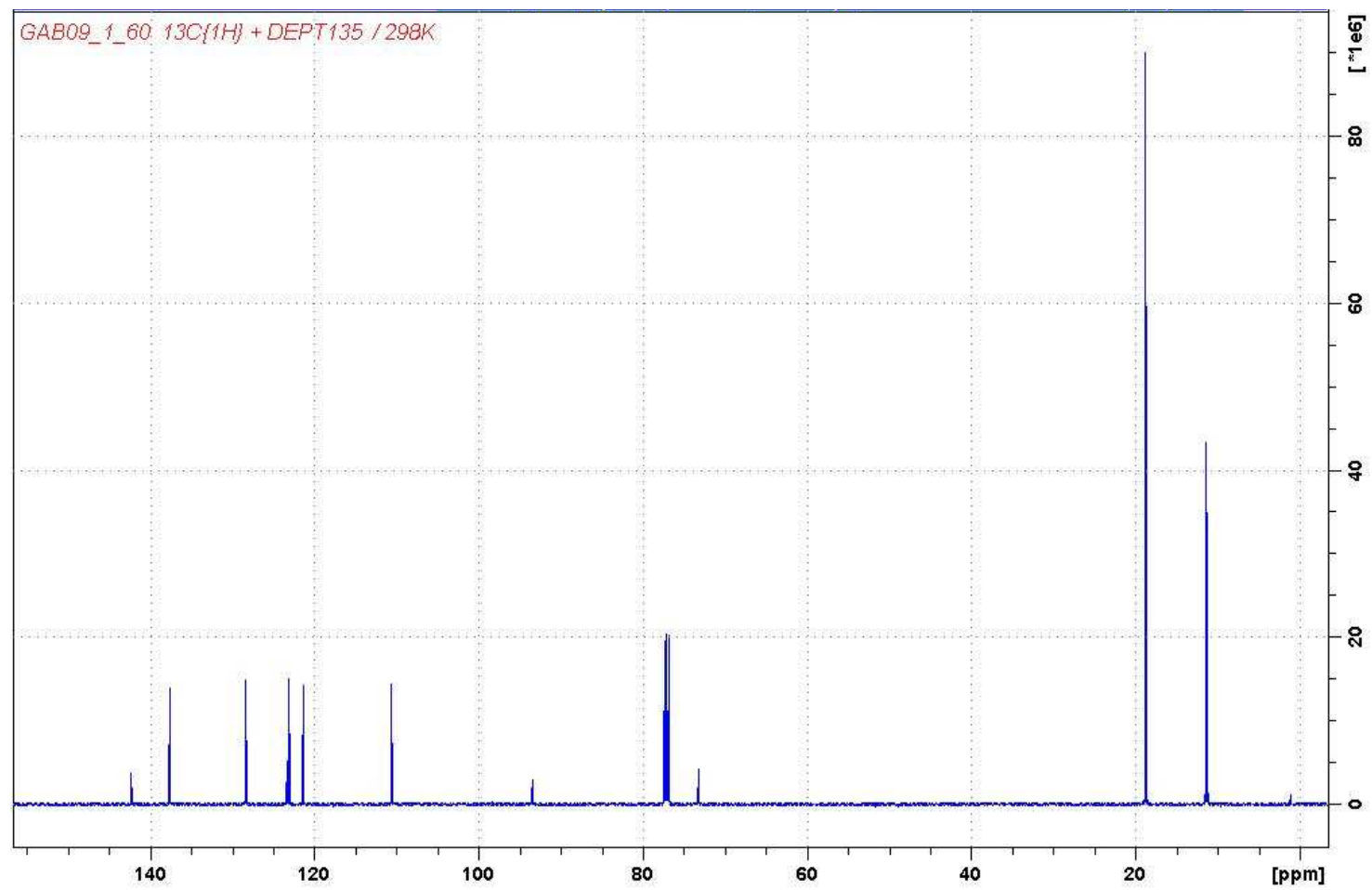


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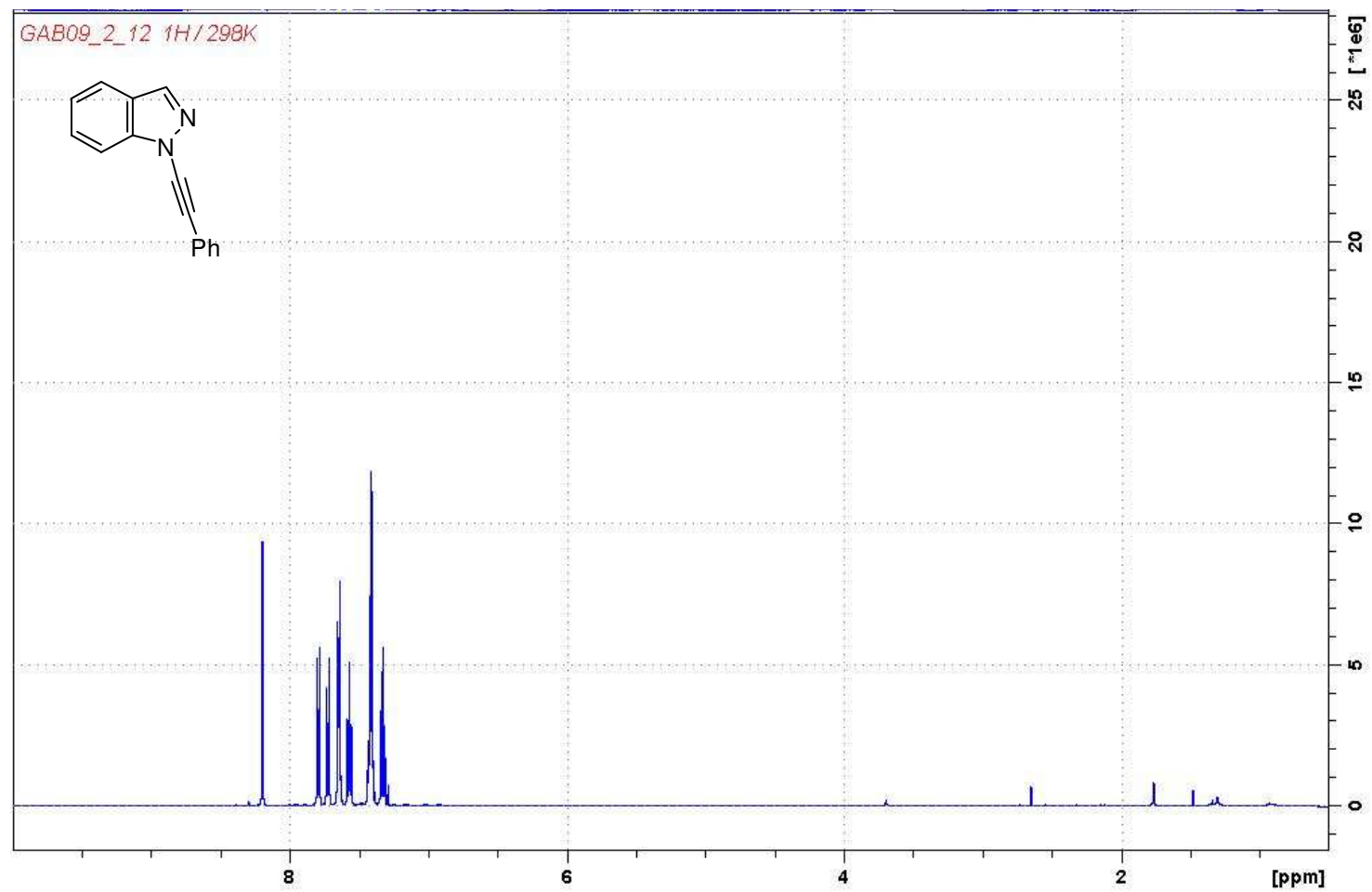


Table 3 Entry 8: 1-(phenylethynyl)-1H-indazole

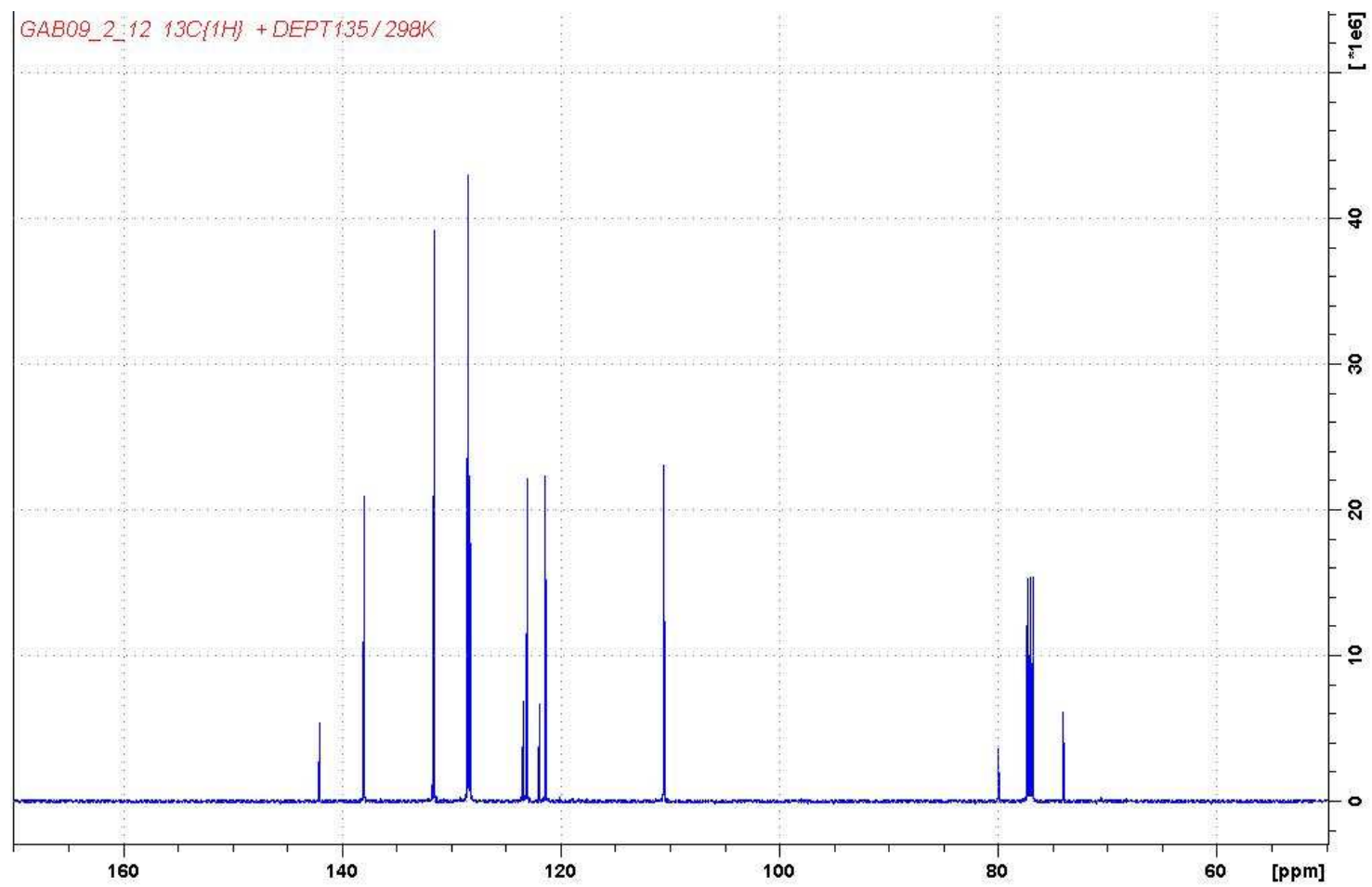


Table 3 Entry 8: 1-(phenylethynyl)-1H-indazole

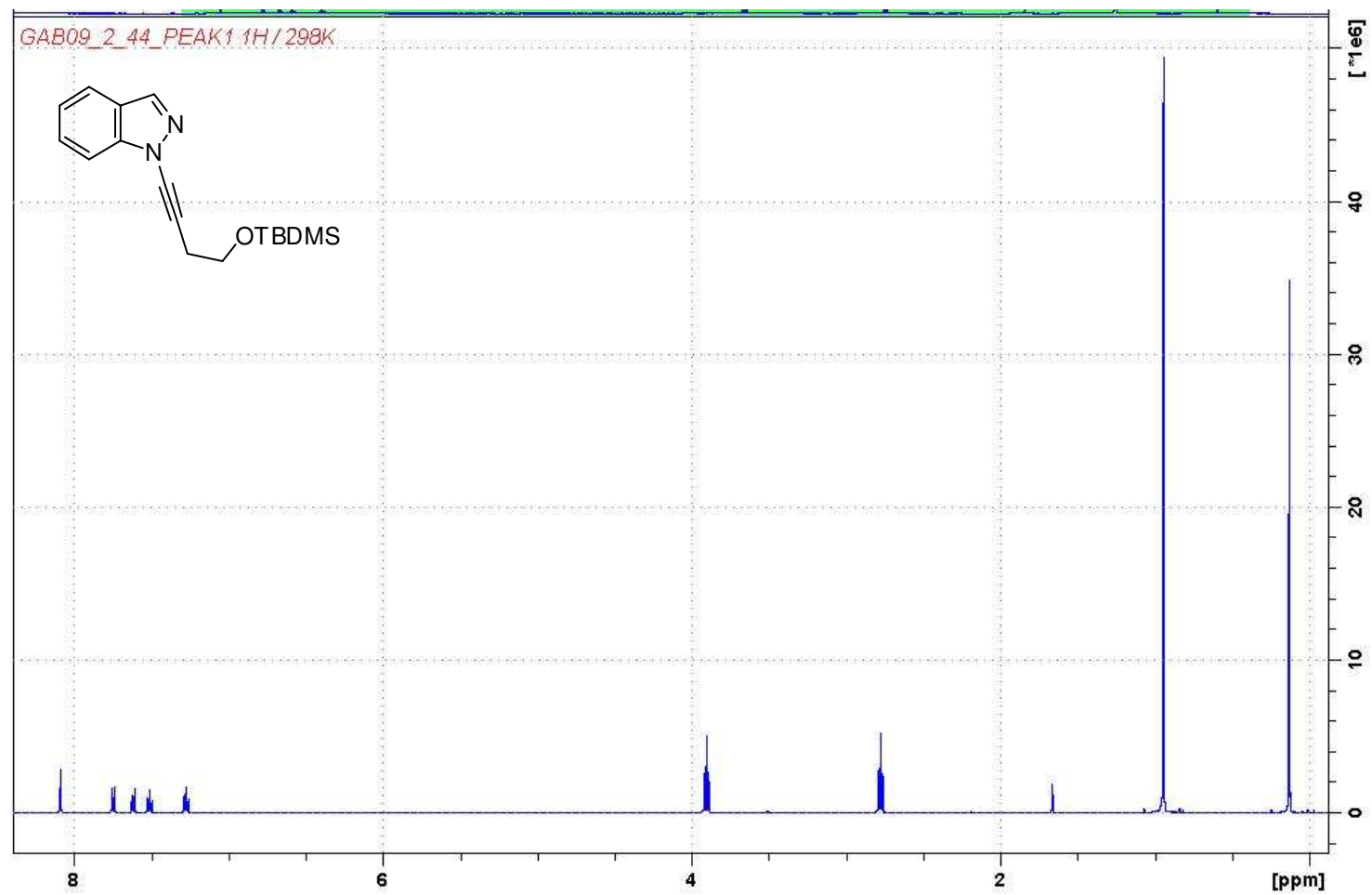


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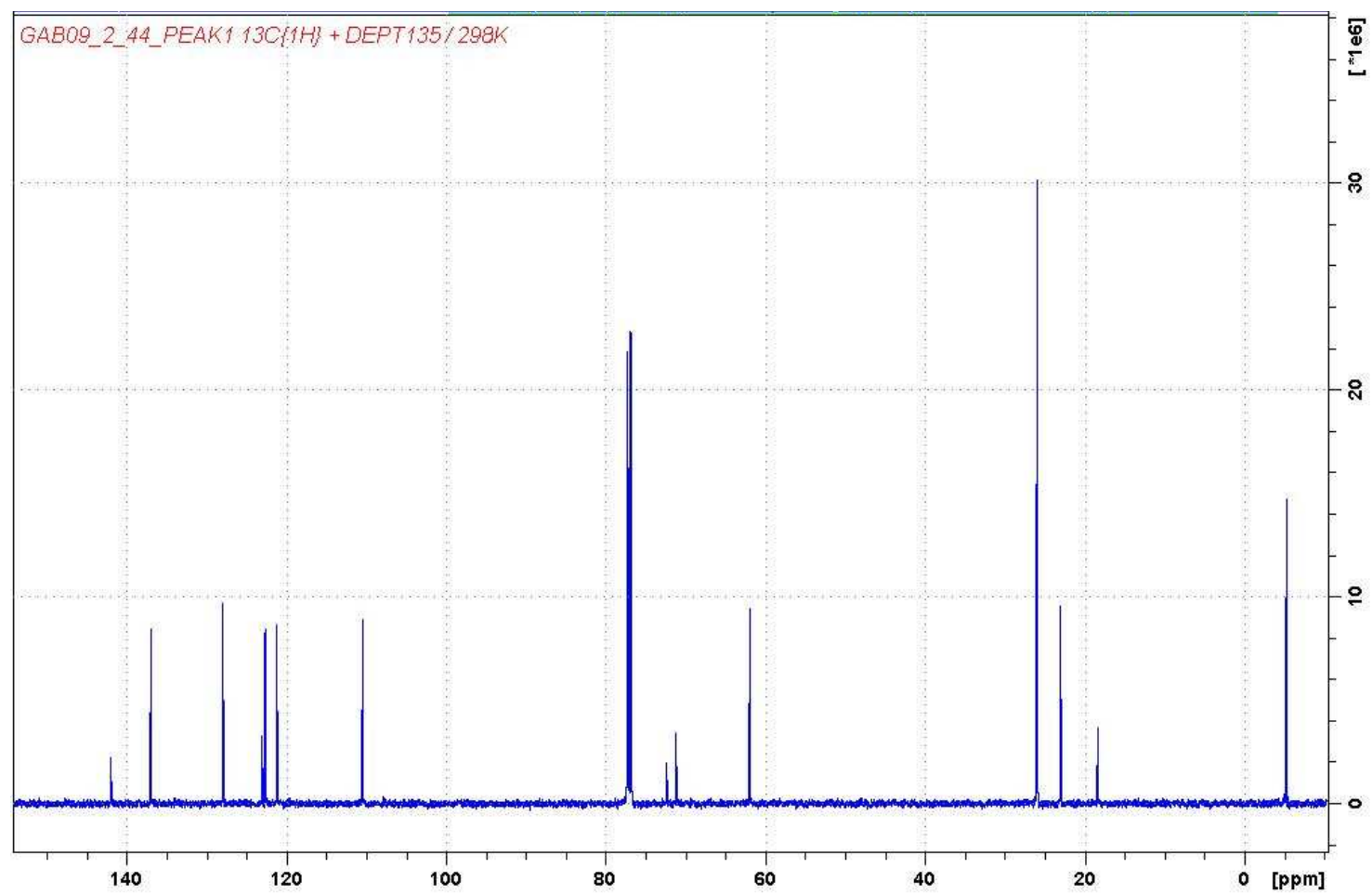


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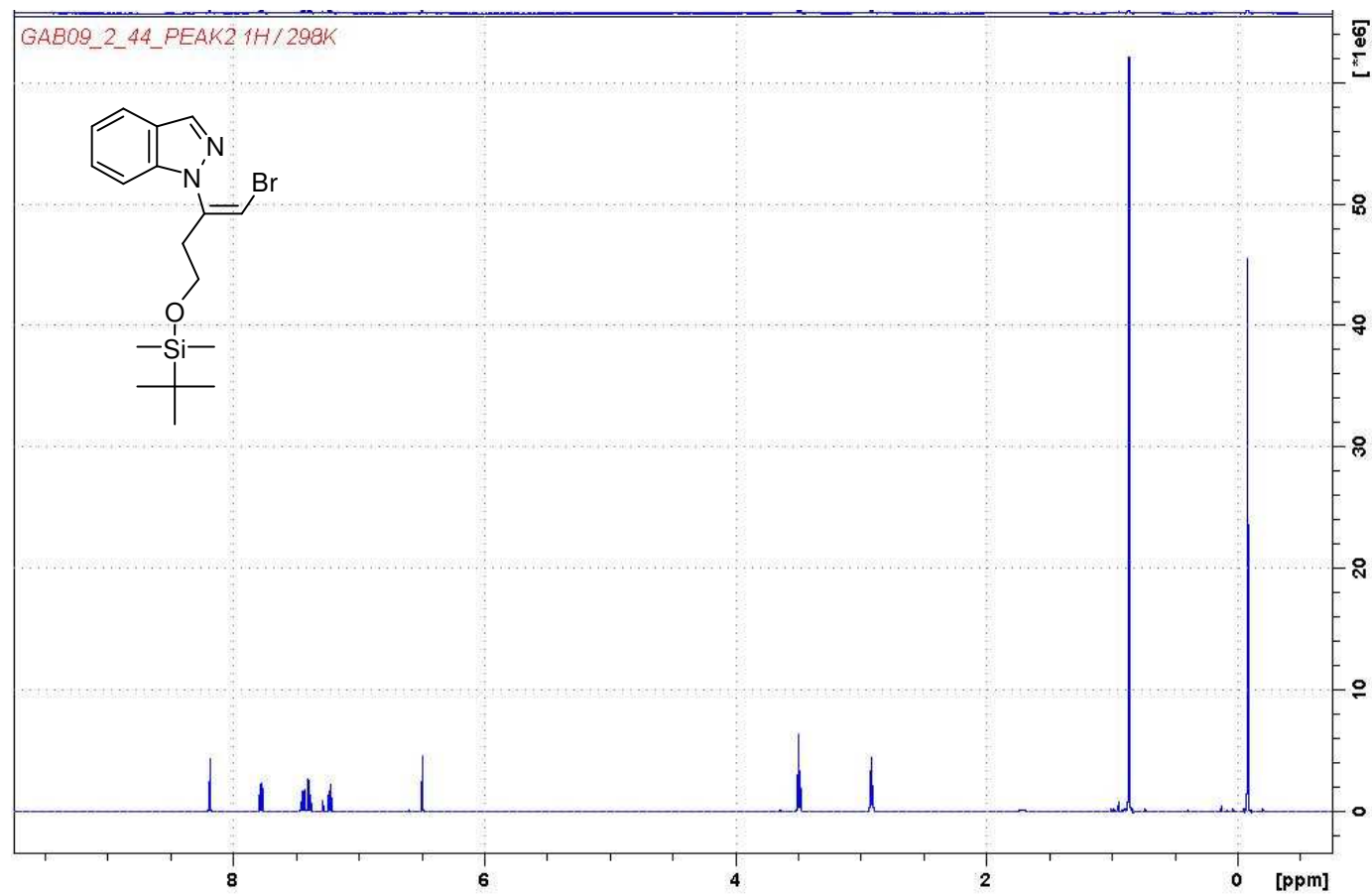


Table 3 Entry 9: (Z)-1-(1-bromo-4-(tert-butyldimethylsilyloxy)but-1-en-2-yl)-1H-indazole

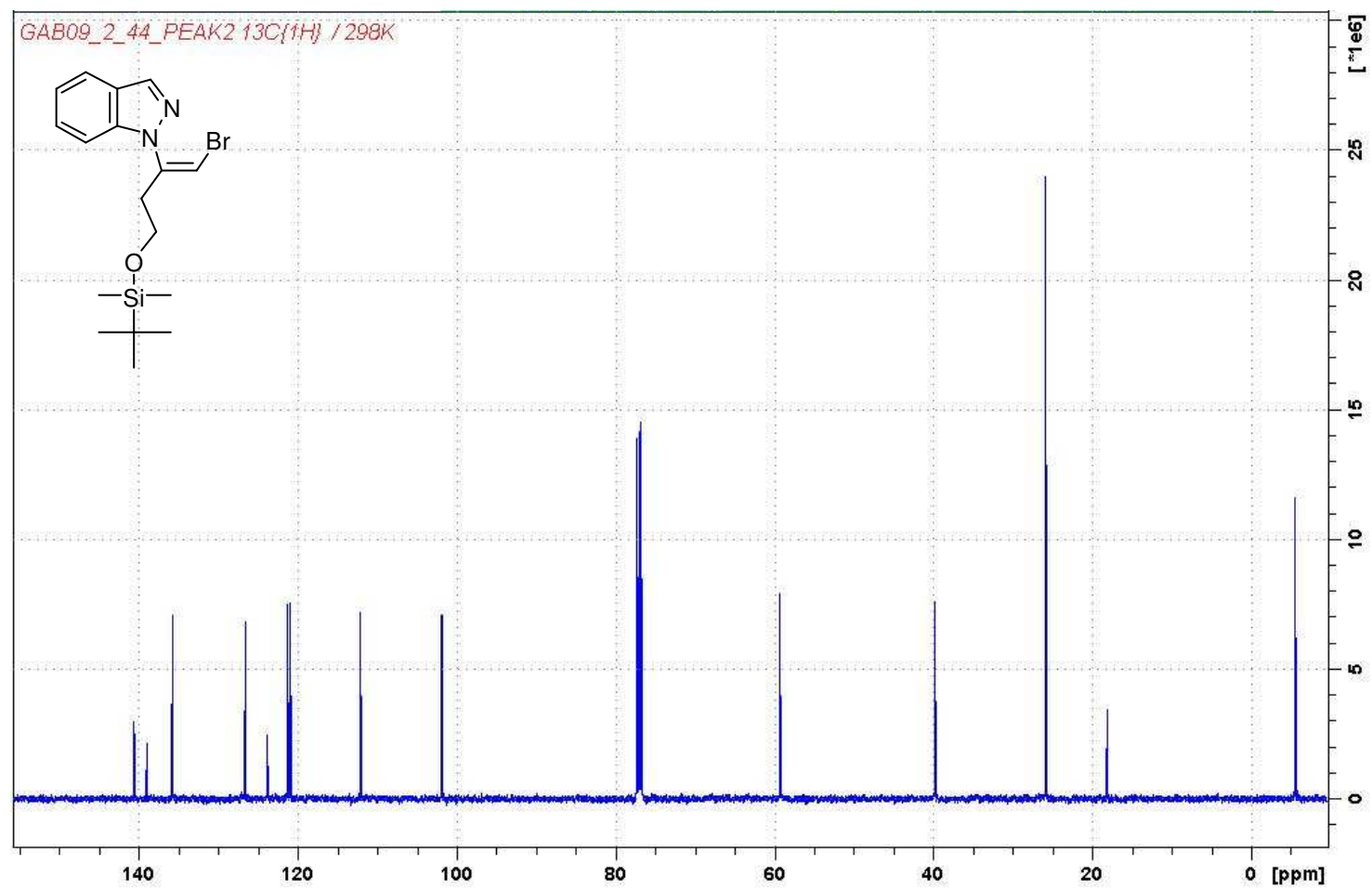


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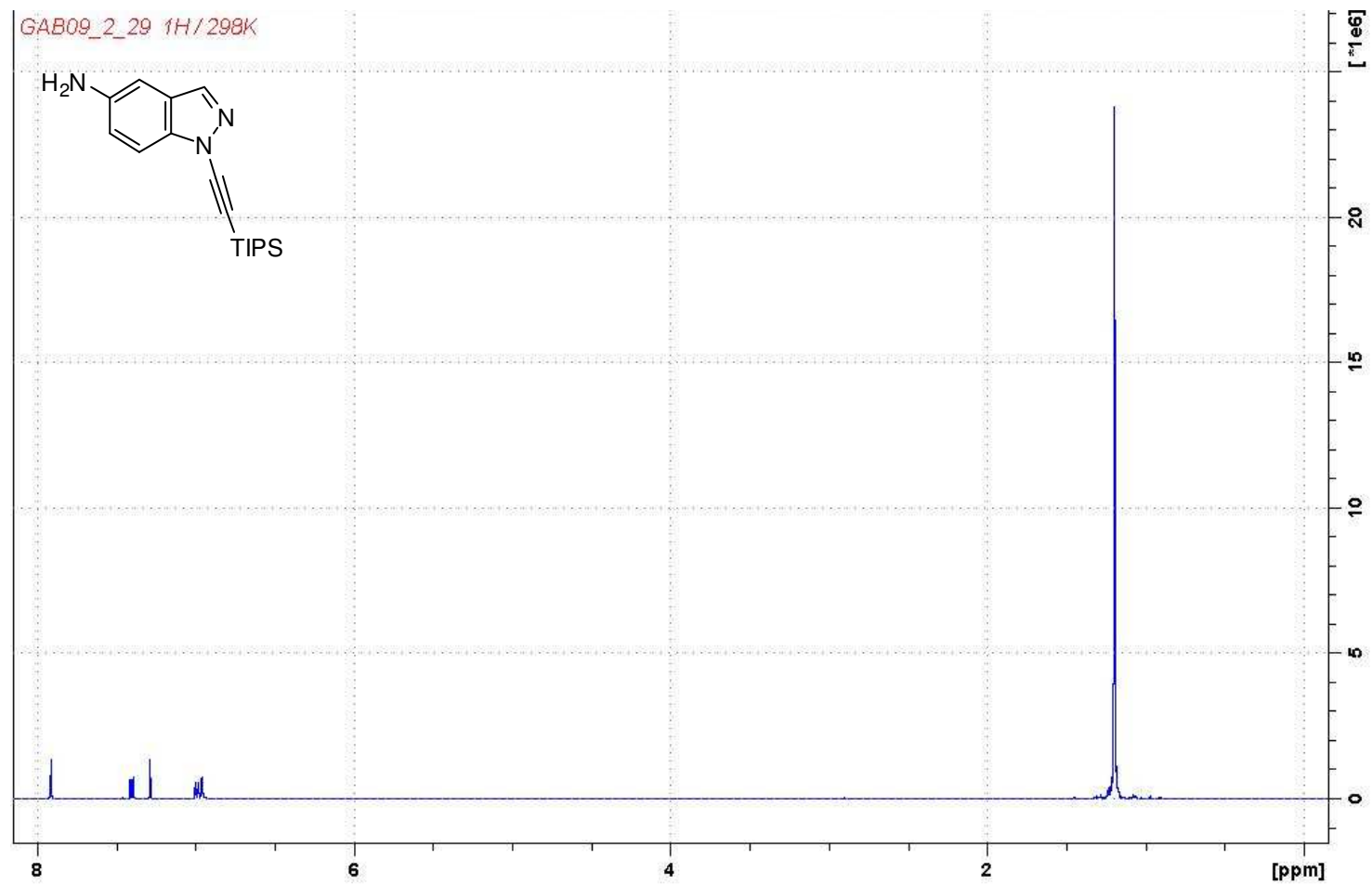


Table 3 Entry 10: 1-((triisopropylsilyl)ethynyl)-1H-indazol-5-amine

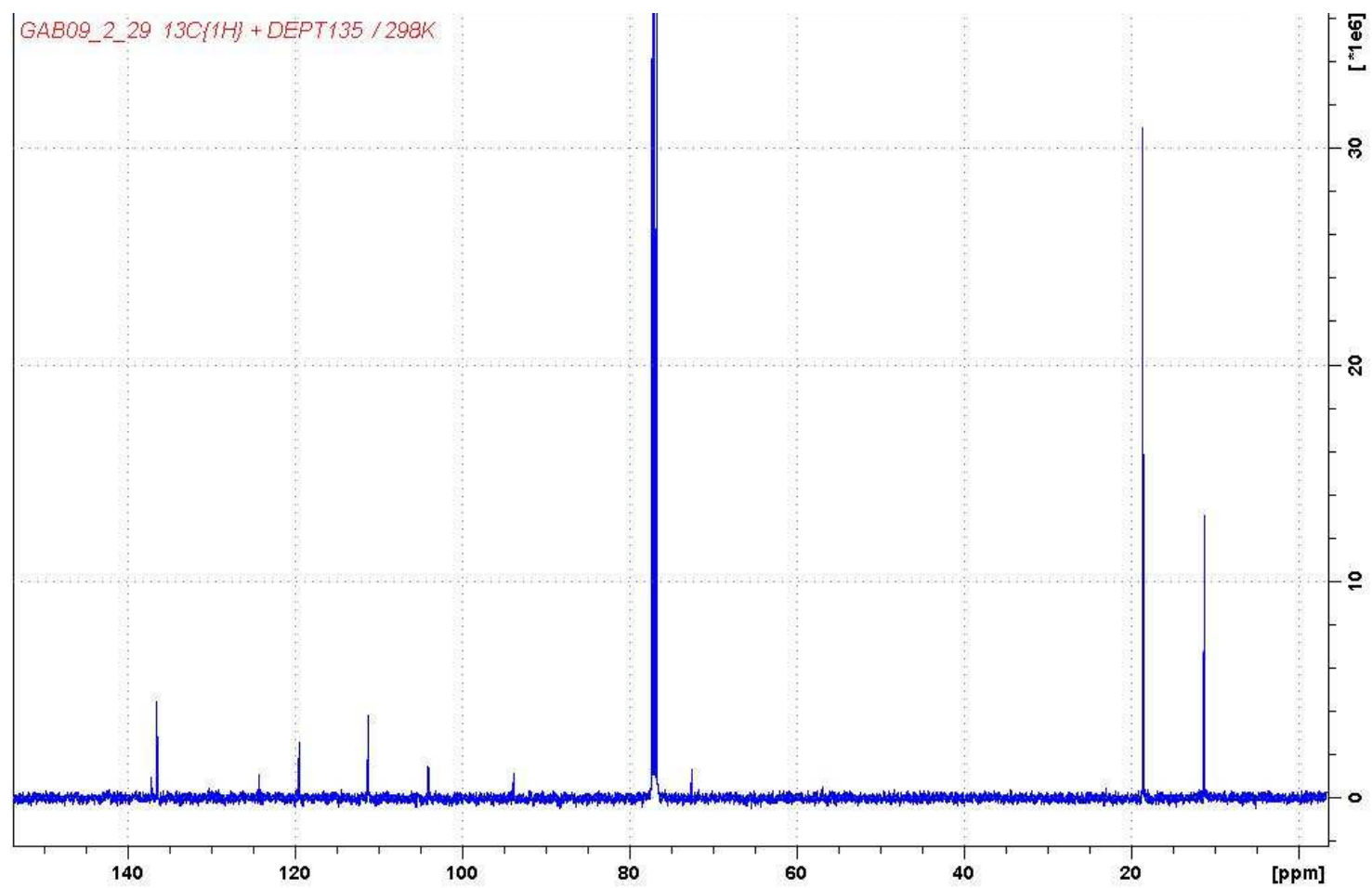
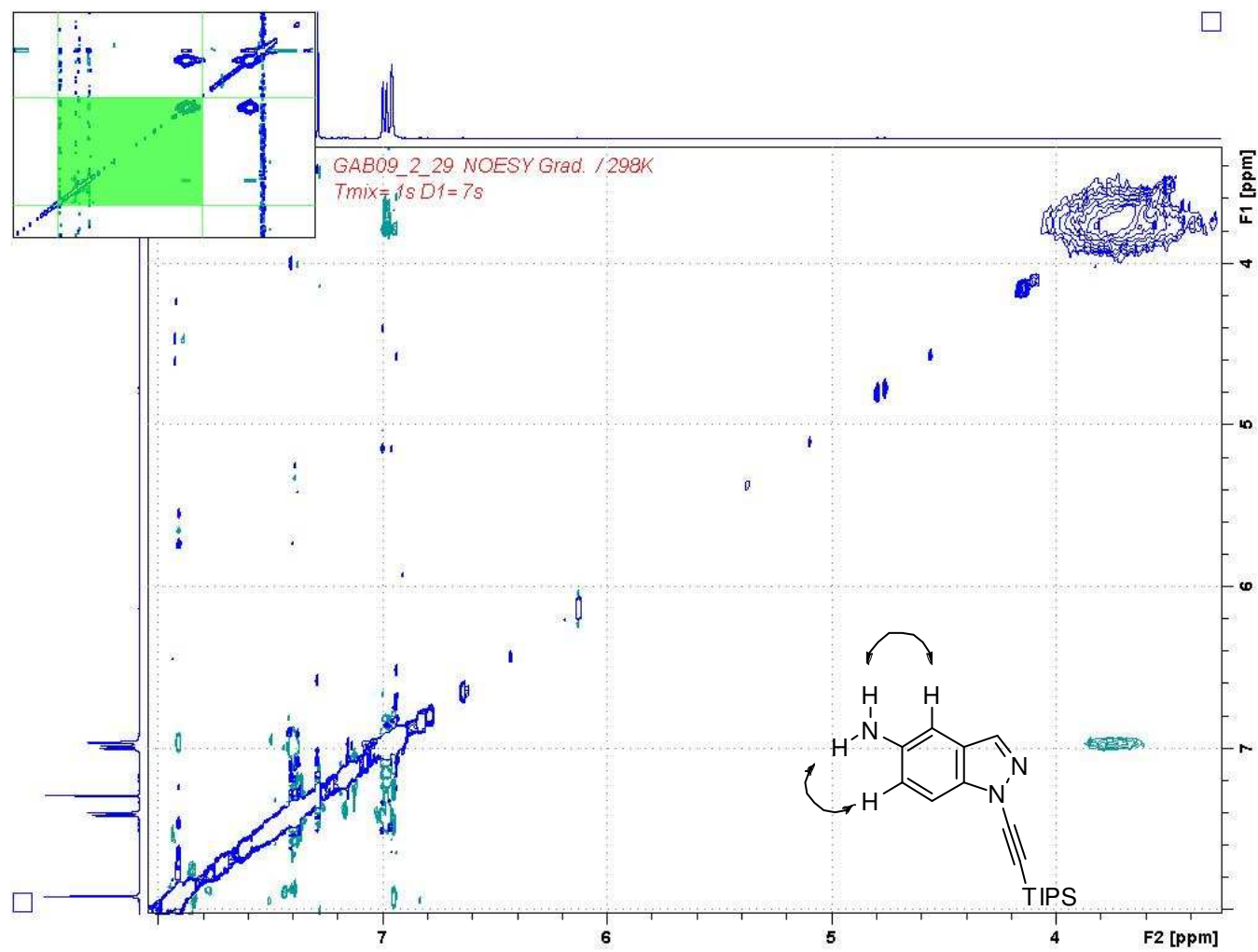
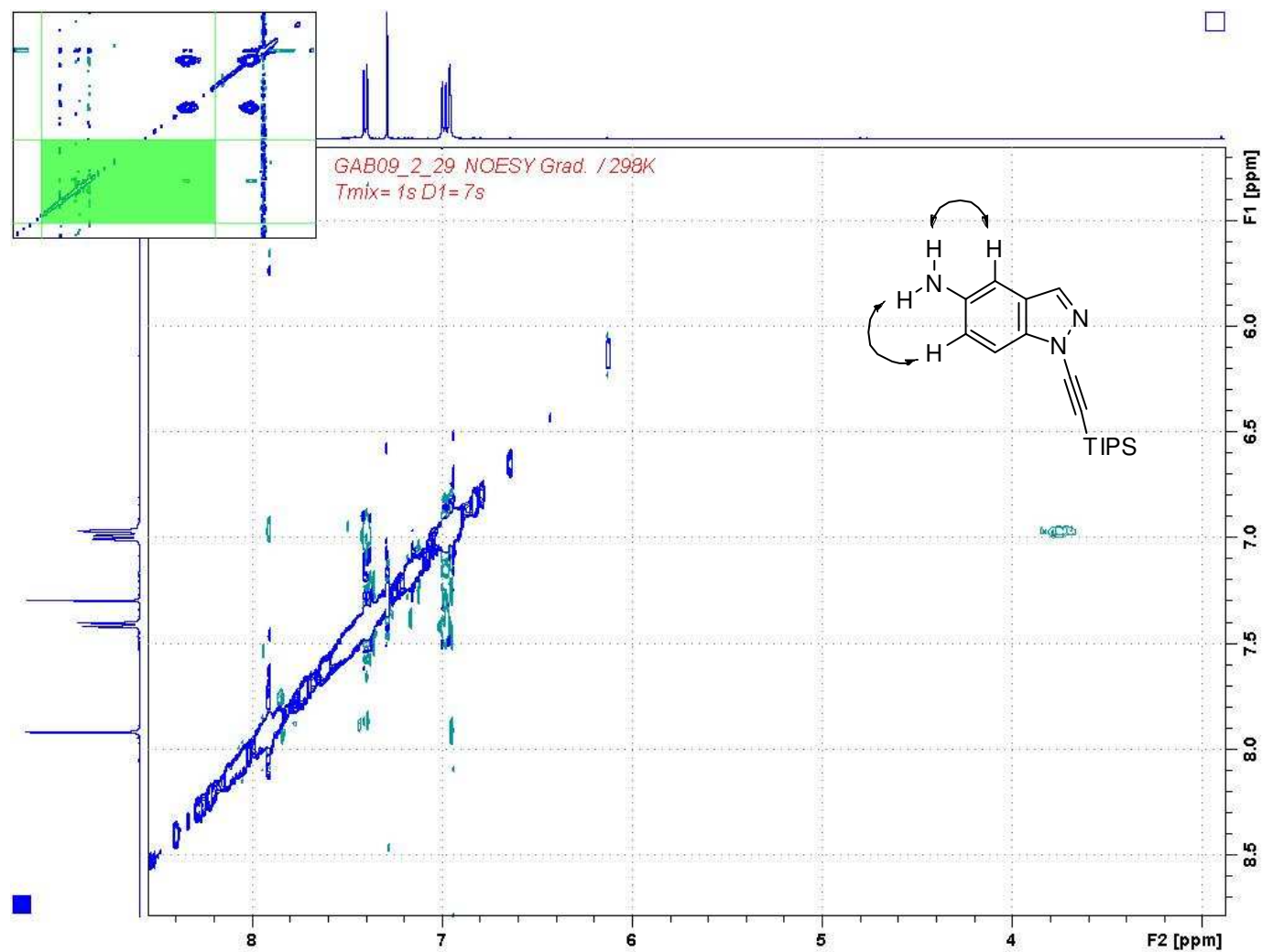


Table 3 Entry 10: 1-((triisopropylsilyl)ethynyl)-1H-indazol-5-amine



1-((triisopropylsilyl)ethynyl)-1H-indazol-5-amine



1-((triisopropylsilyl)ethynyl)-1H-indazol-5-amine

1-ethynyl-5,6-dimethyl-1H-benzo[d]imidazole

GAB09_1_17 1H/298K

