

Supporting information

Synthesis, Characterization and Coupling Reactions of Six-membered Cyclic P-Chiral Ammonium Phosphonite-boranes; Reactive *H*-Phosphinate Equivalents for the Stereoselective Synthesis of Glycomimetics

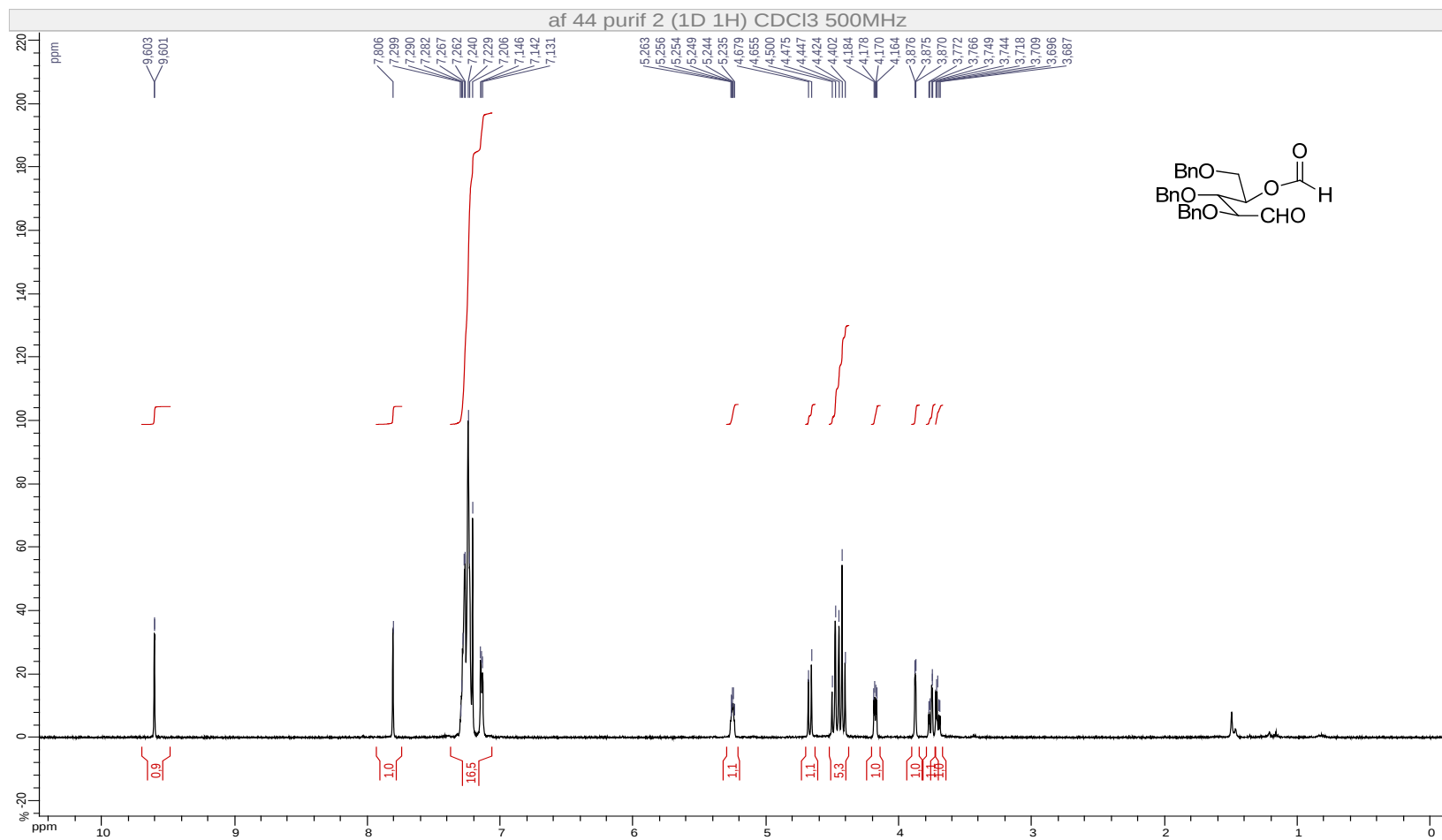
Angélique Ferry^a, Xavier Guinchard^a, Pascal Retailleau^a, David Crich^{a,b}*

^a*Centre de Recherche de Gif, Institut de Chimie des Substances Naturelles, CNRS, Avenue de la Terrasse, 91198 Gif-sur-Yvette, FRANCE.*

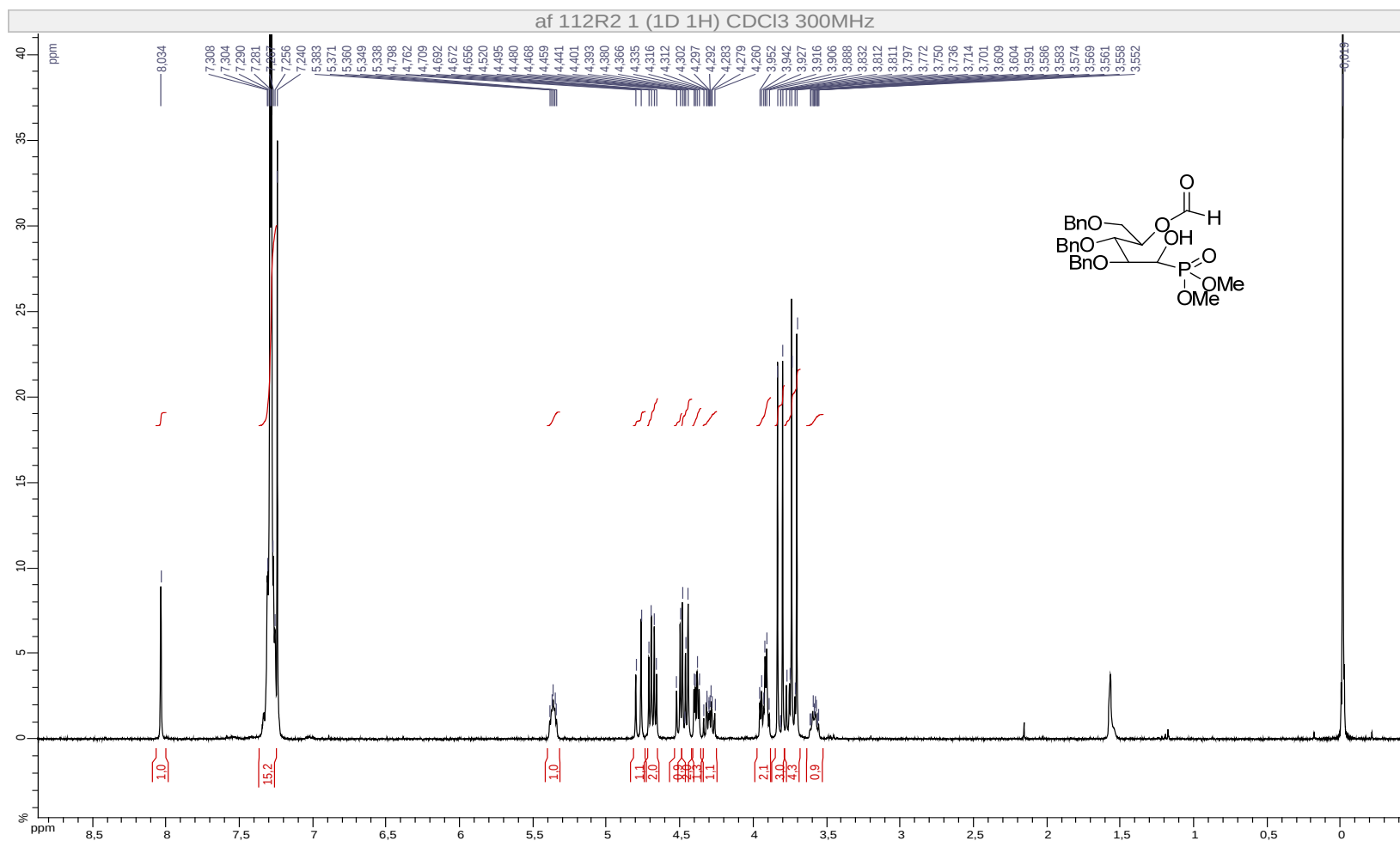
^b*Department of Chemistry, Wayne State University, 5101 Cass Avenue, Detroit, MI 48202, USA*

DCrich@chem.wayne.edu

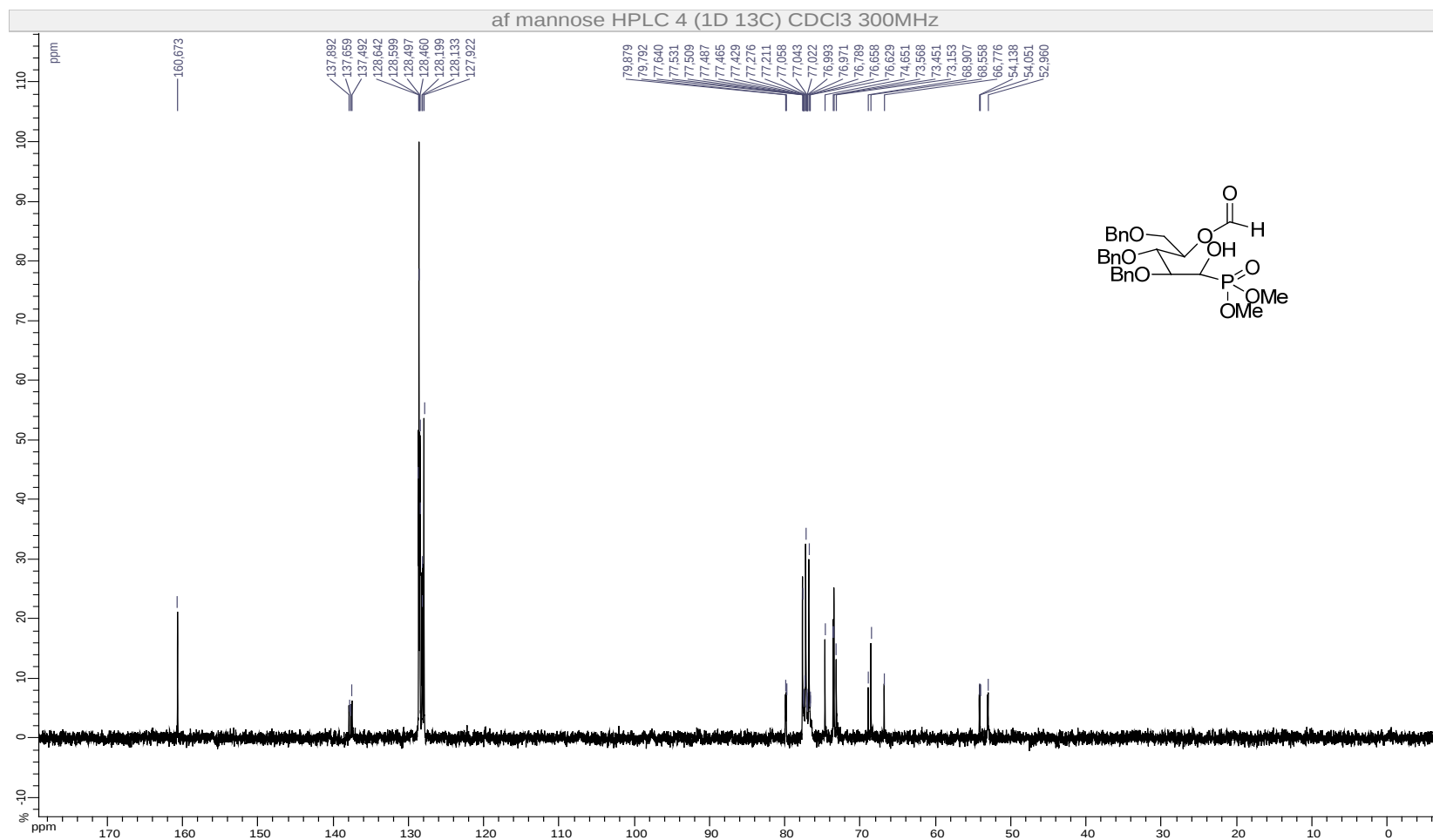
2, ^1H NMR (500 MHz, CDCl_3)



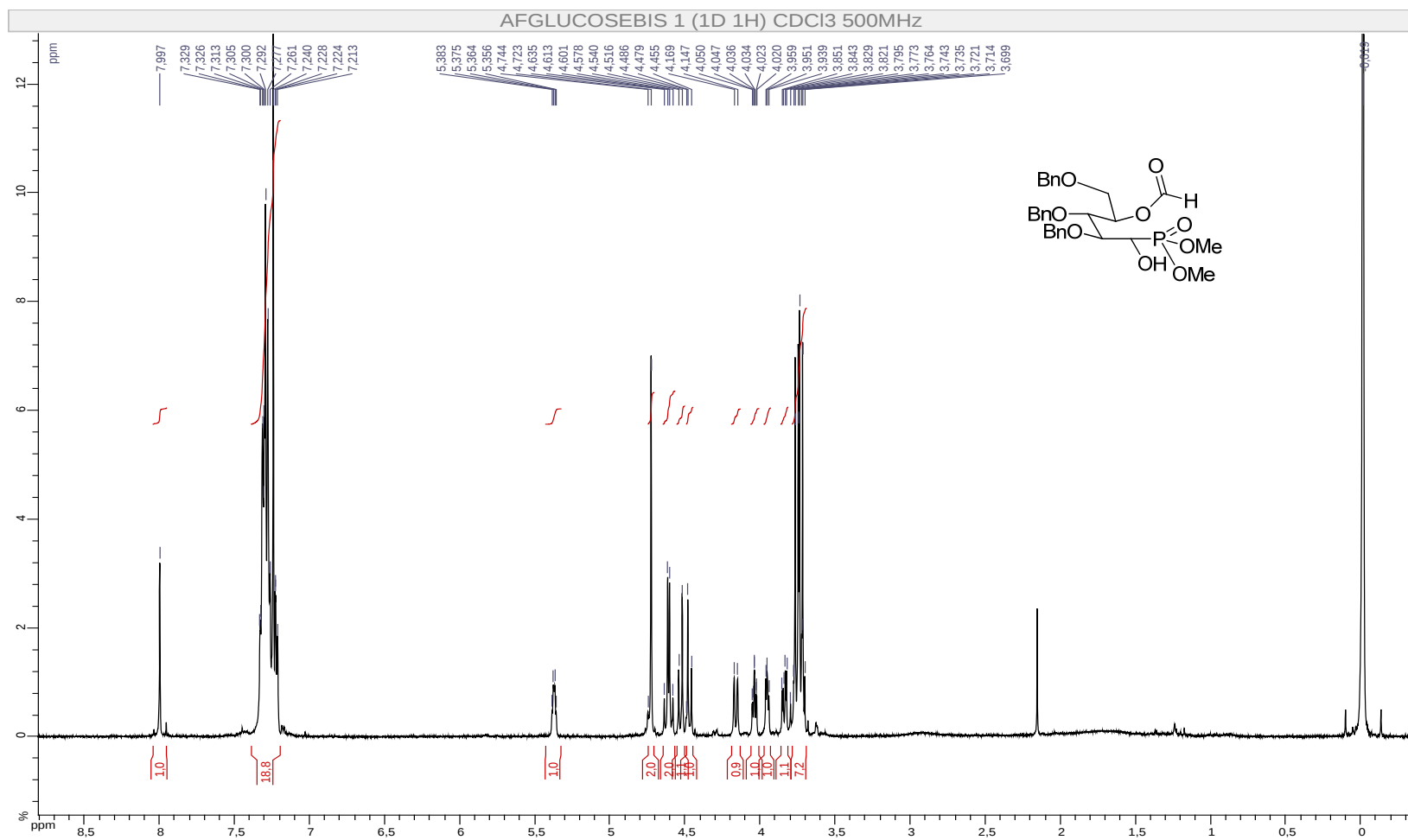
3m, ^1H NMR (300 MHz, CDCl_3)



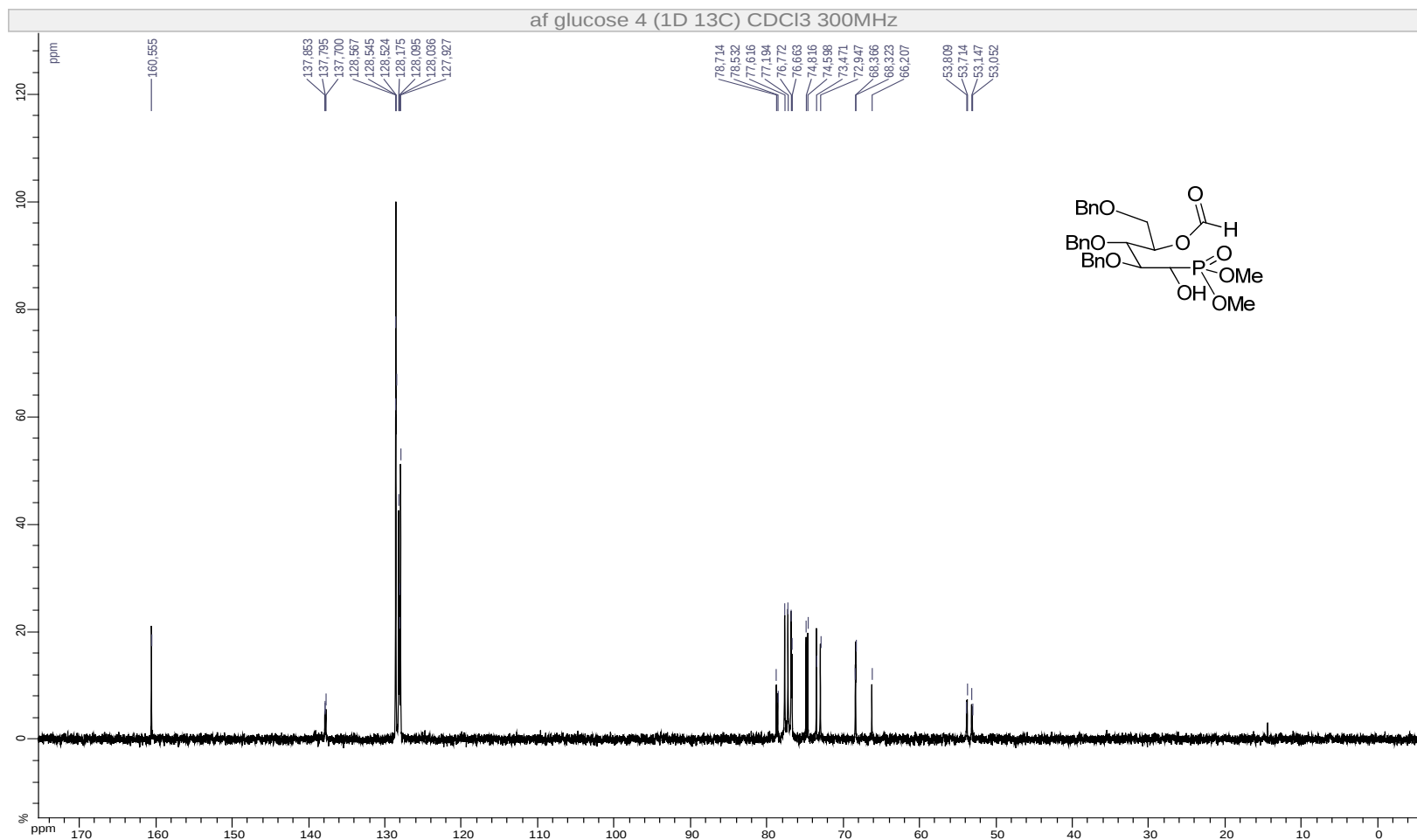
3m, ^{13}C NMR (75 MHz, CDCl_3)



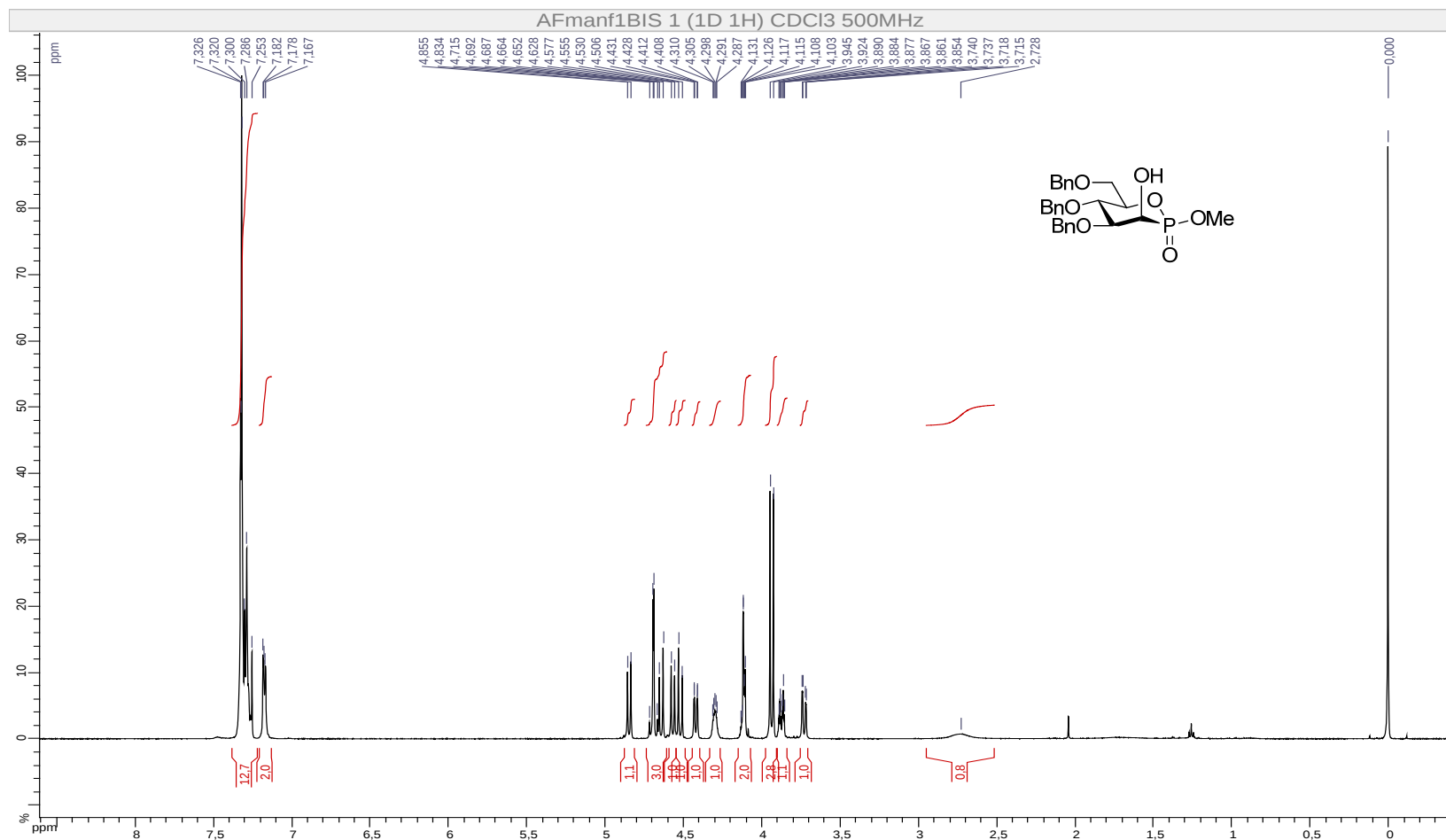
3g, ^1H NMR (500 MHz, CDCl_3)



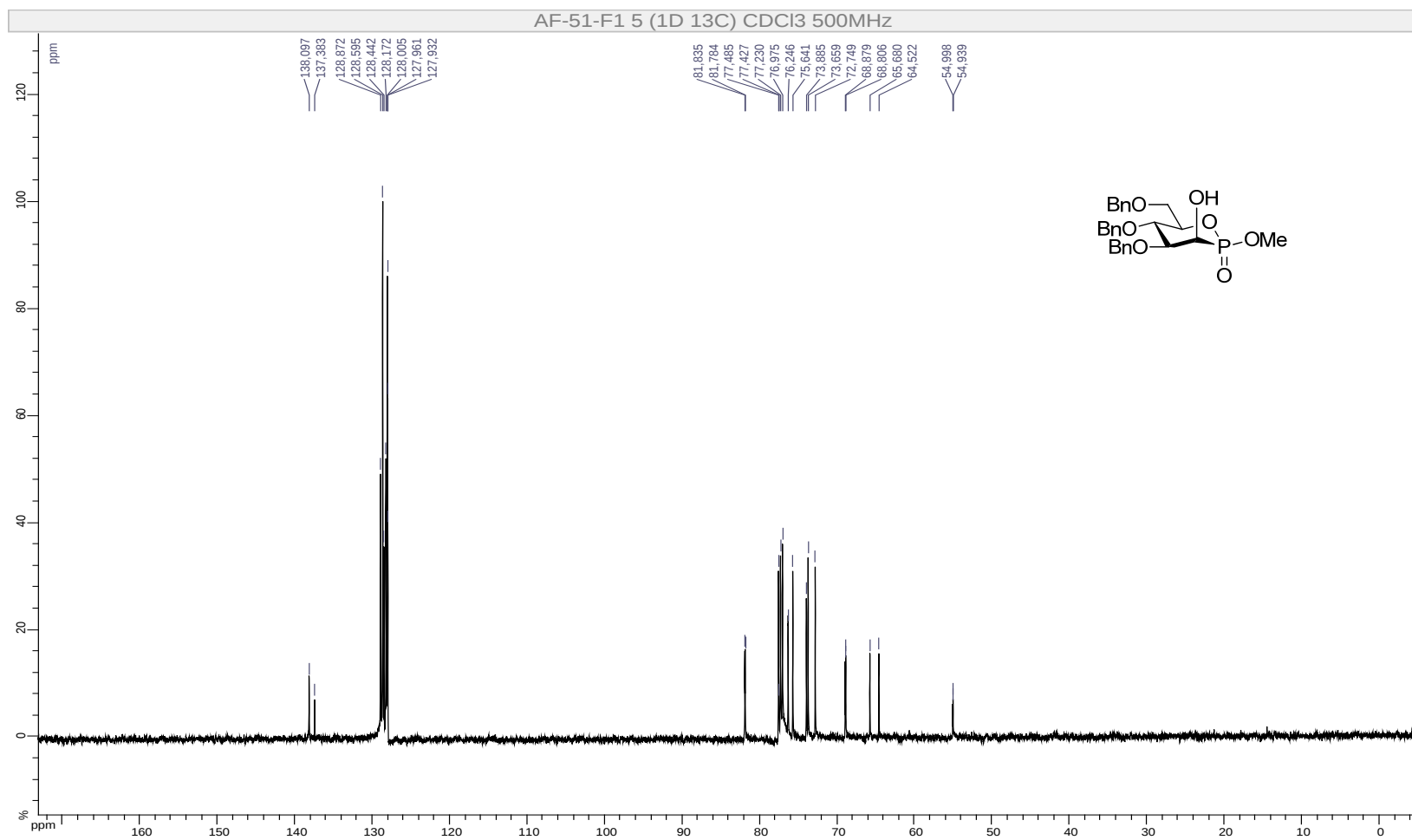
3g, ^{13}C NMR (75 MHz, CDCl_3)



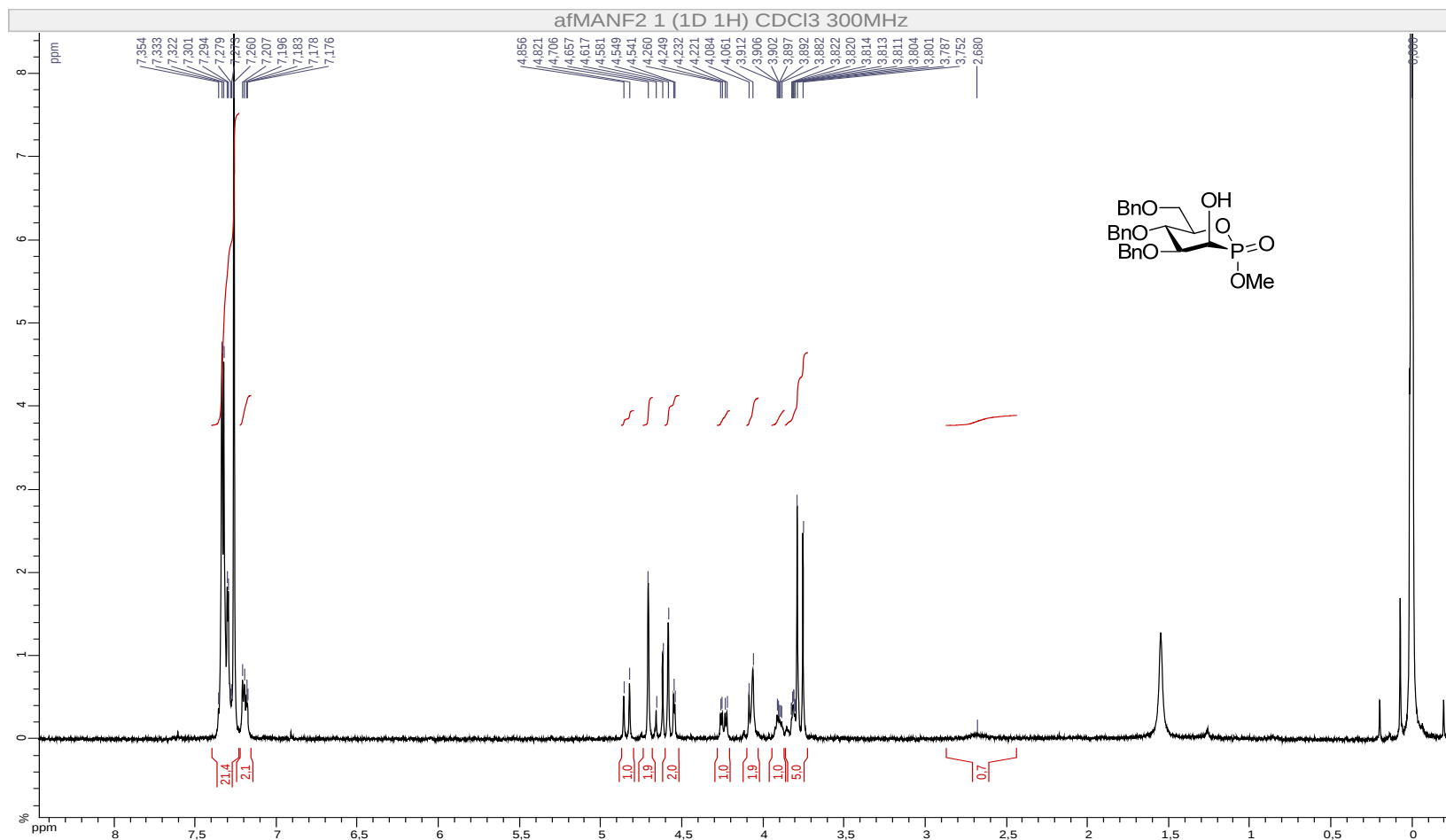
4m β , ^1H NMR (500 MHz, CDCl_3)



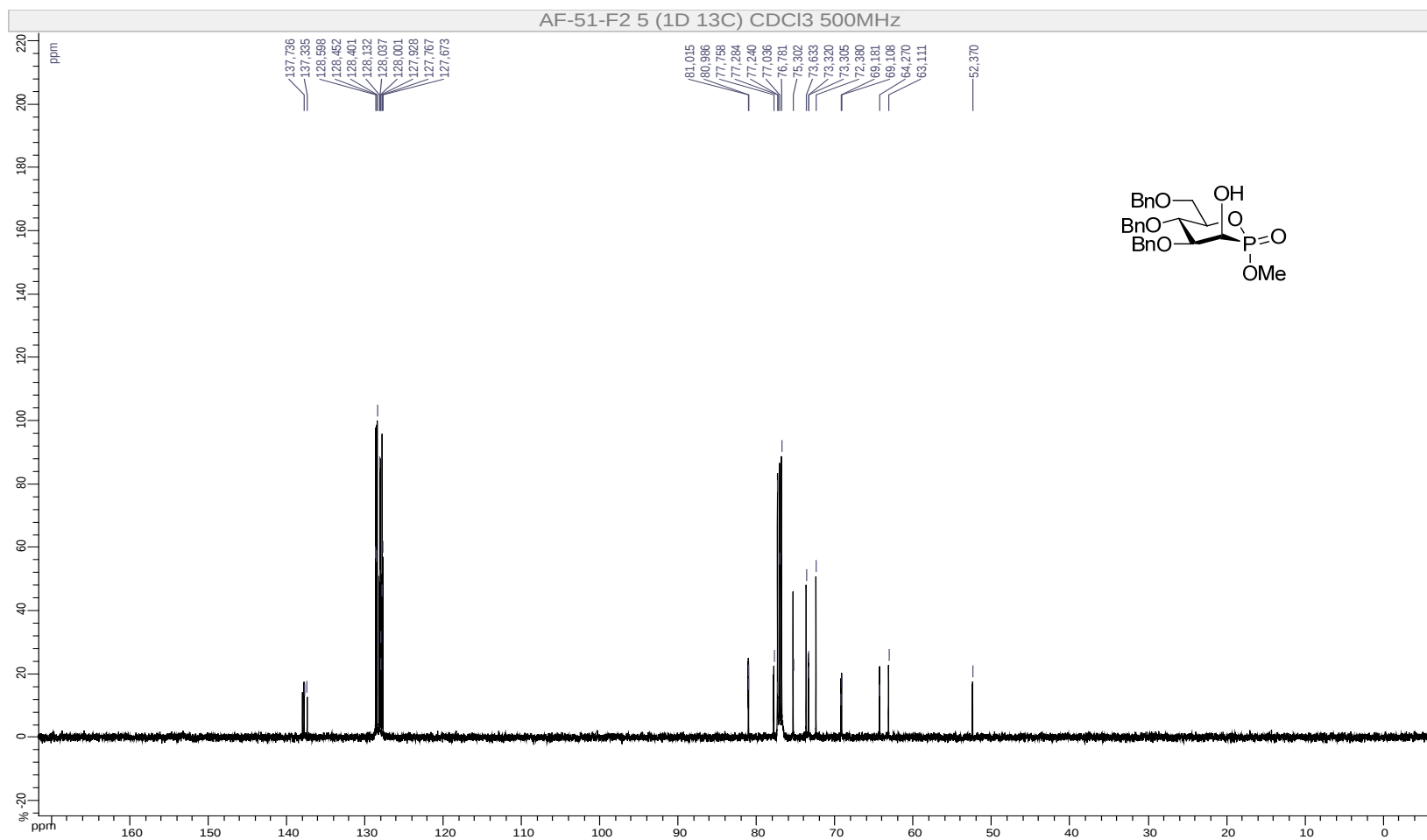
4m β , ^{13}C NMR (125 MHz, CDCl_3)



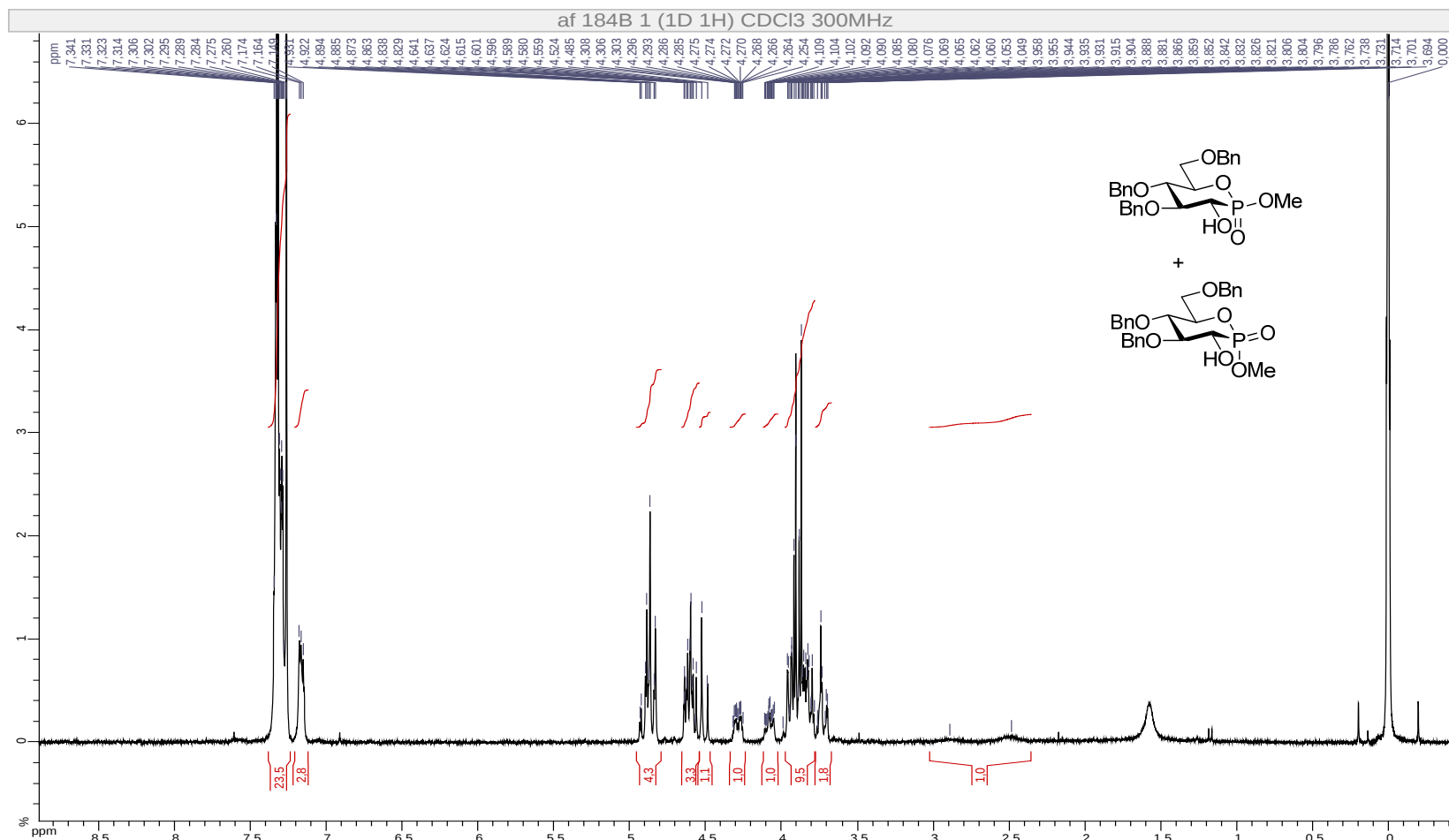
4ma, ^1H NMR (300 MHz, CDCl_3)



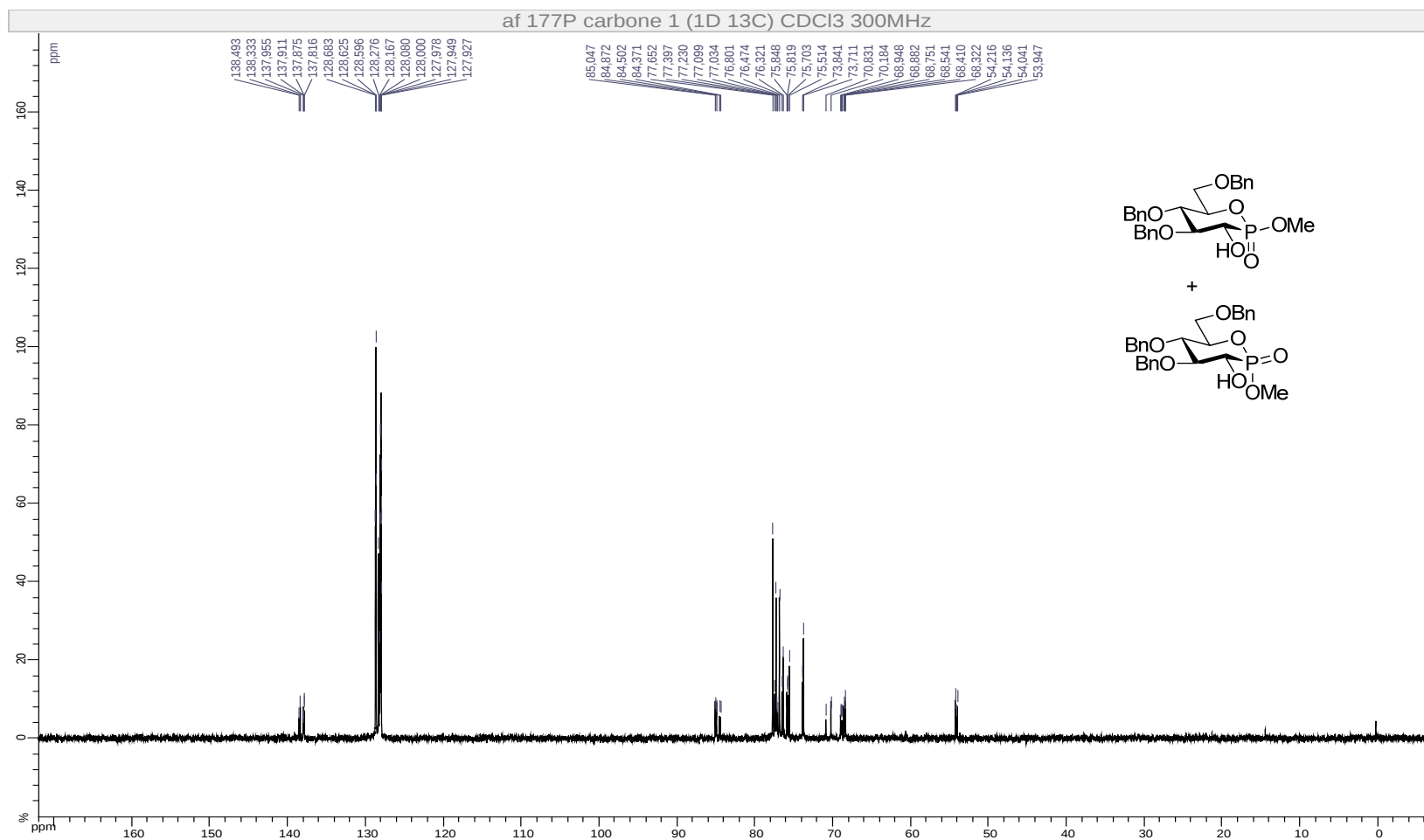
4ma, ^{13}C NMR (125 MHz, CDCl_3)



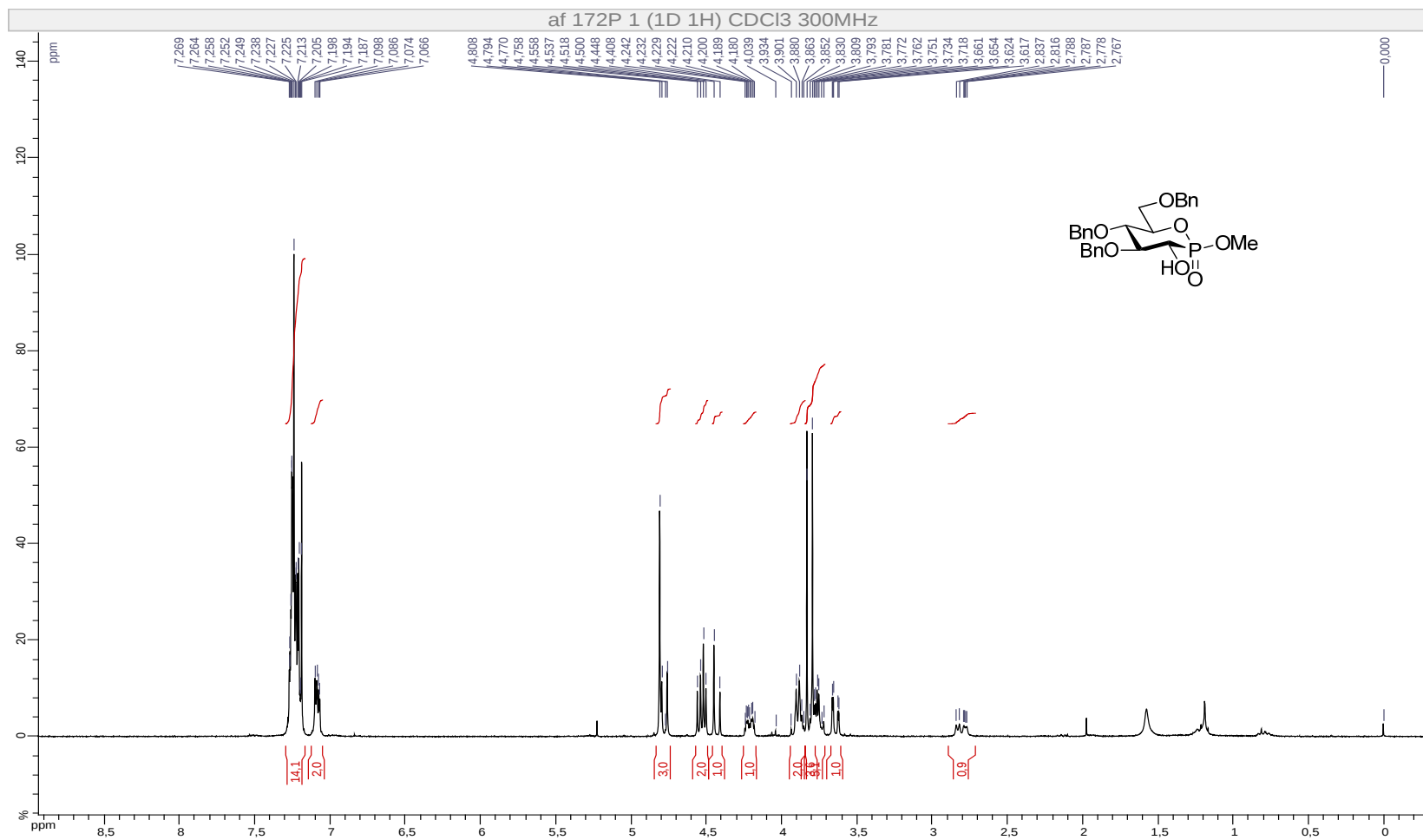
4g α and 4g β , ^1H NMR (300 MHz, CDCl_3)



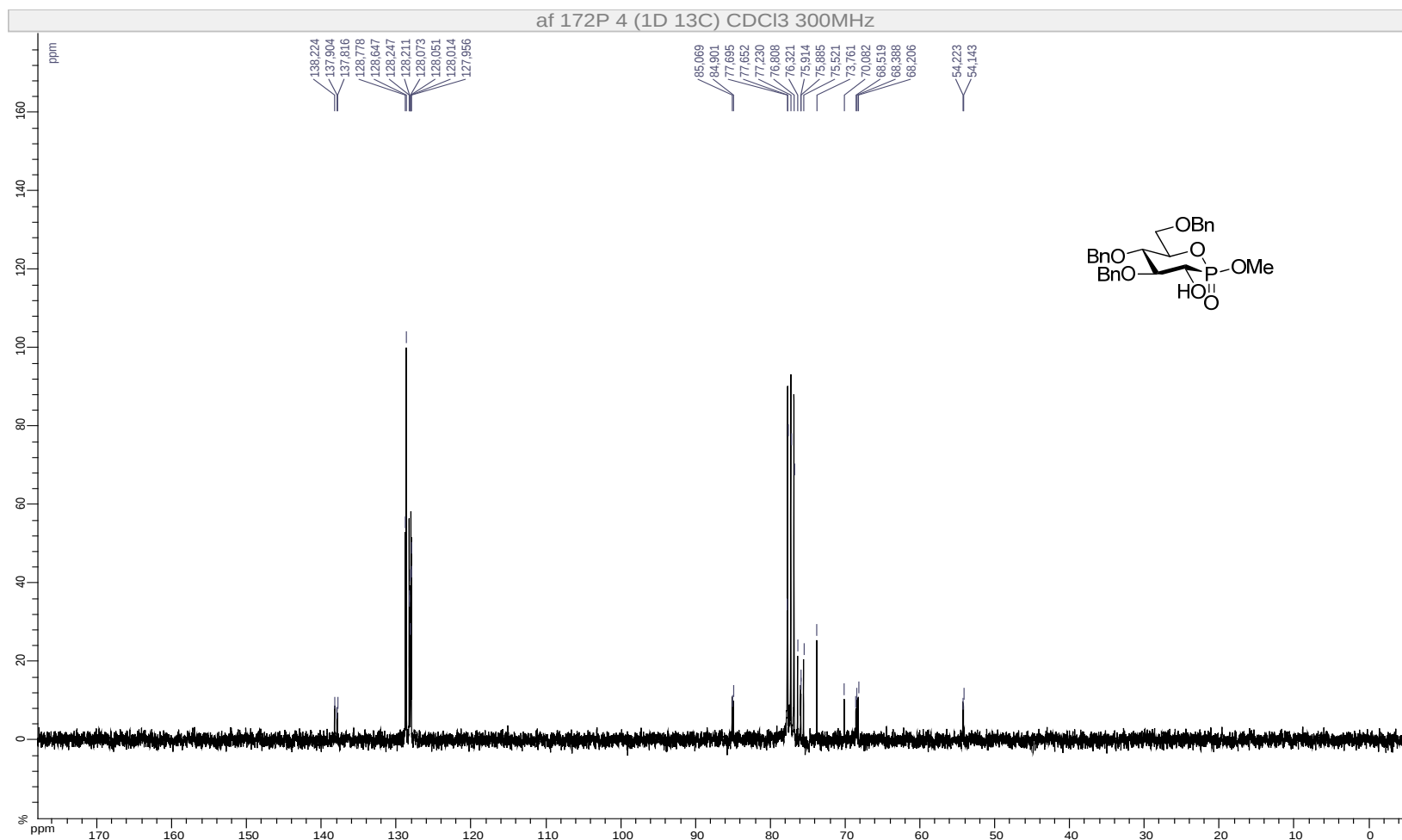
4g α and 4g β , ^{13}C NMR (75 MHz, CDCl_3)



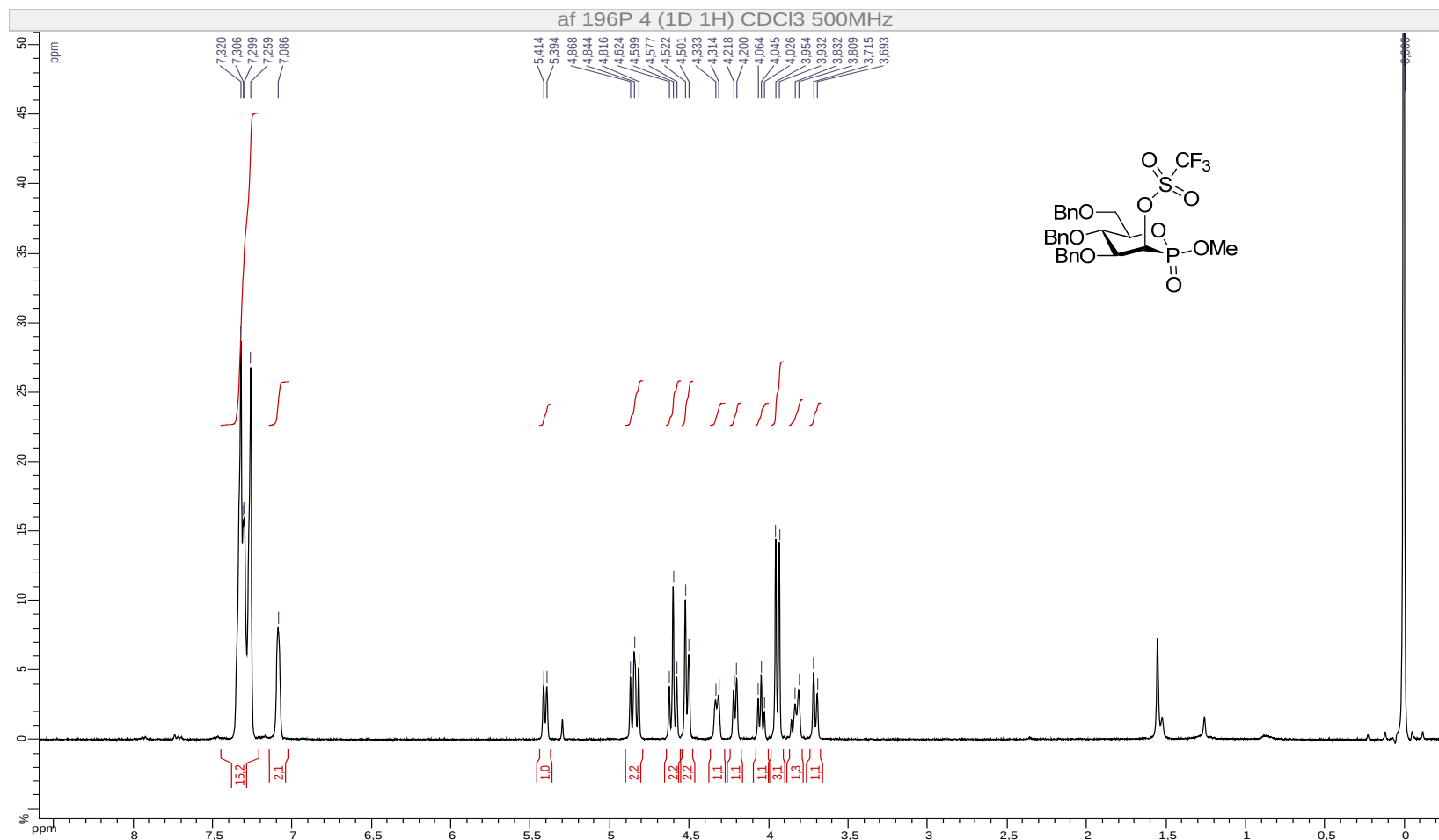
4g β , ^1H NMR (300 MHz, CDCl_3)



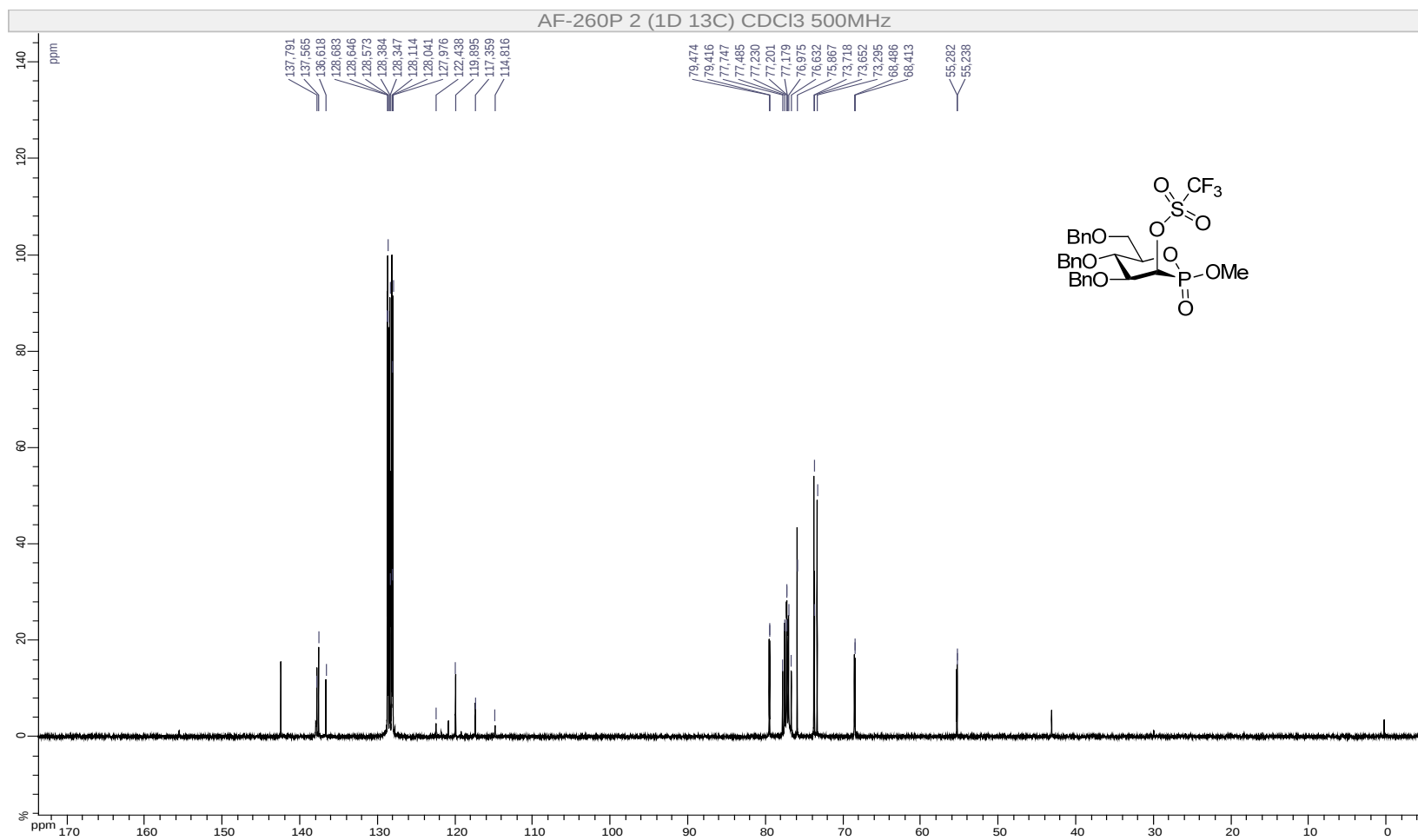
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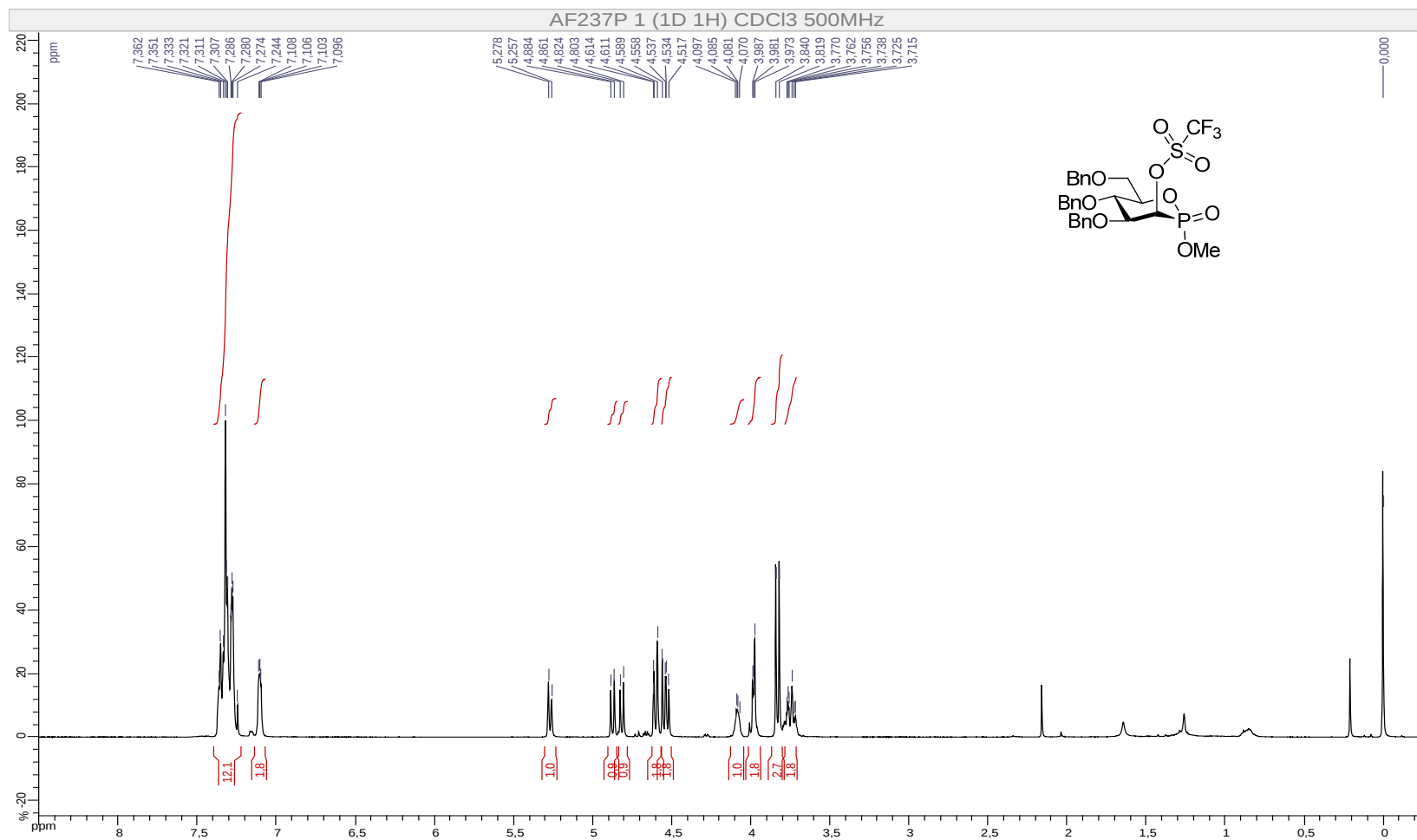
5m β , ^1H NMR (500 MHz, CDCl_3)



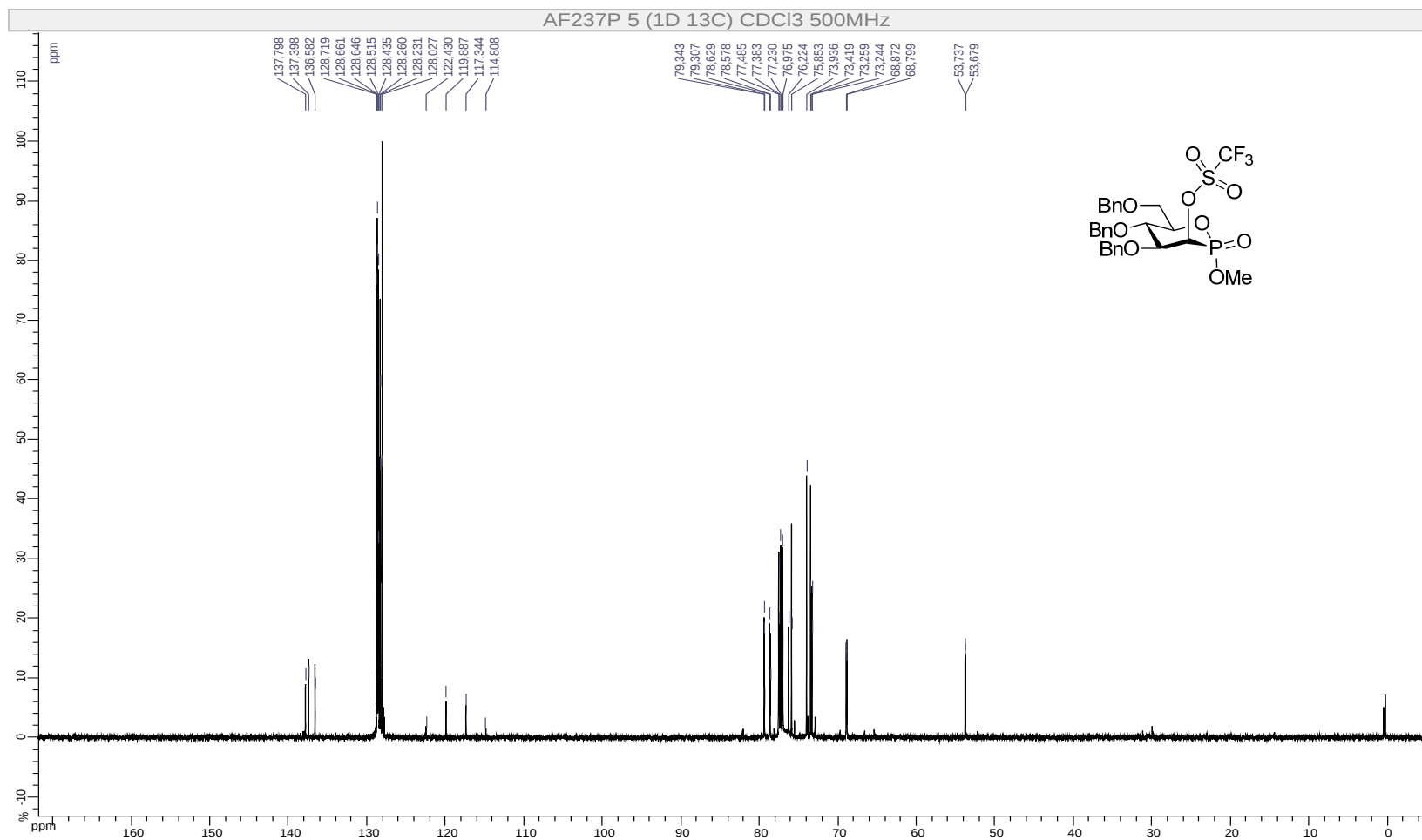
5m β , ^{13}C NMR (125 MHz, CDCl_3)



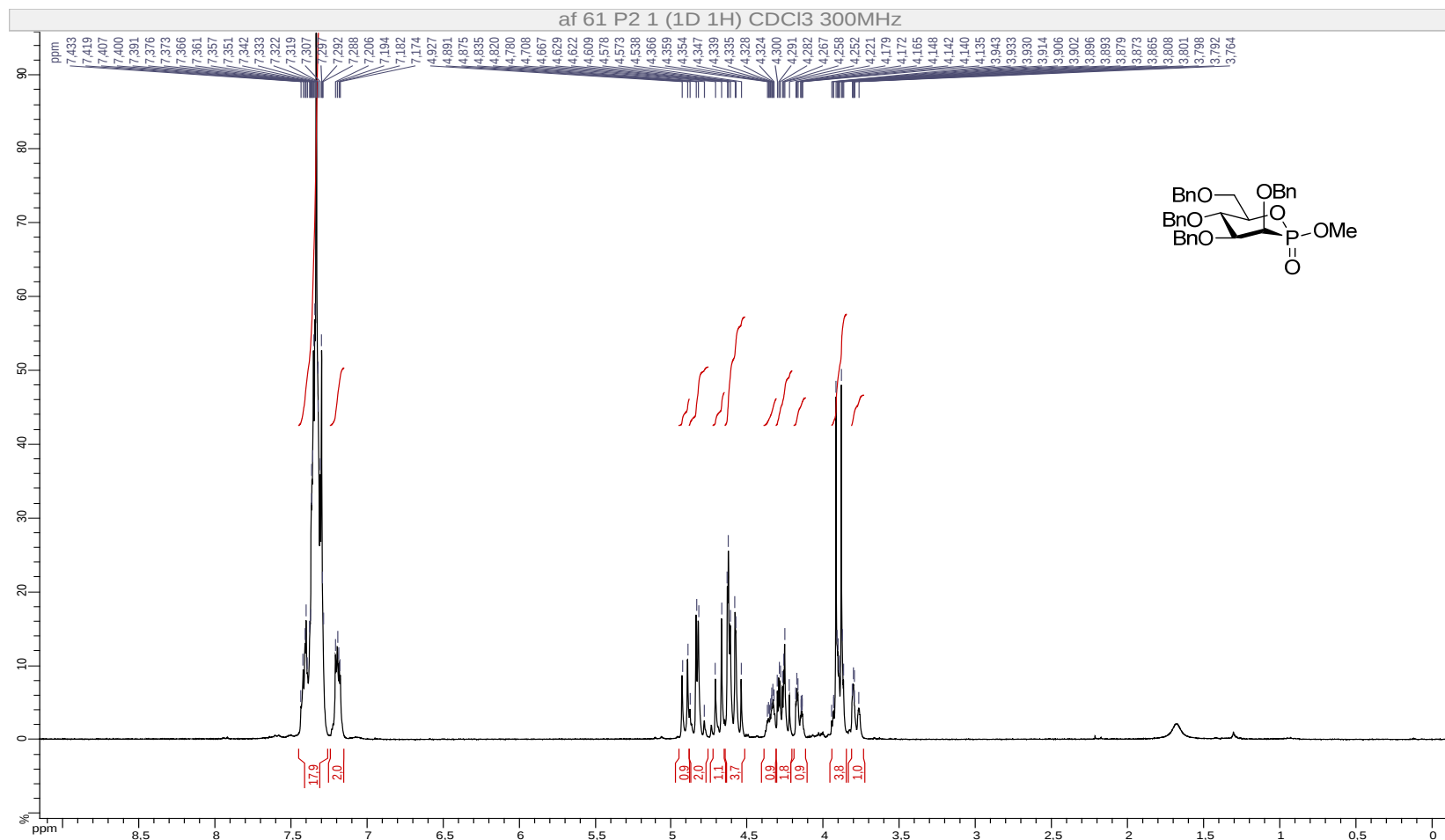
5mα, ¹H NMR (500 MHz, CDCl₃)



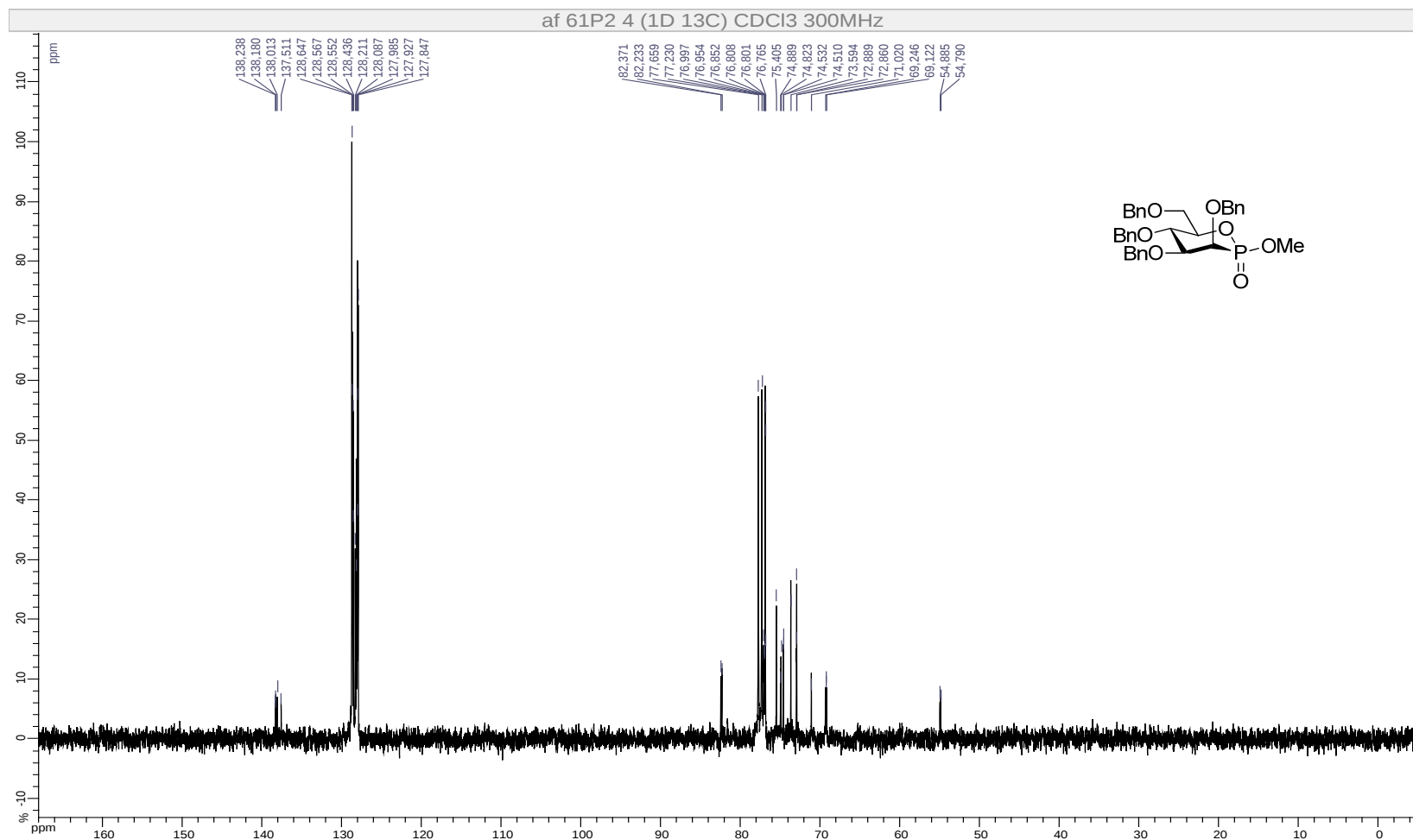
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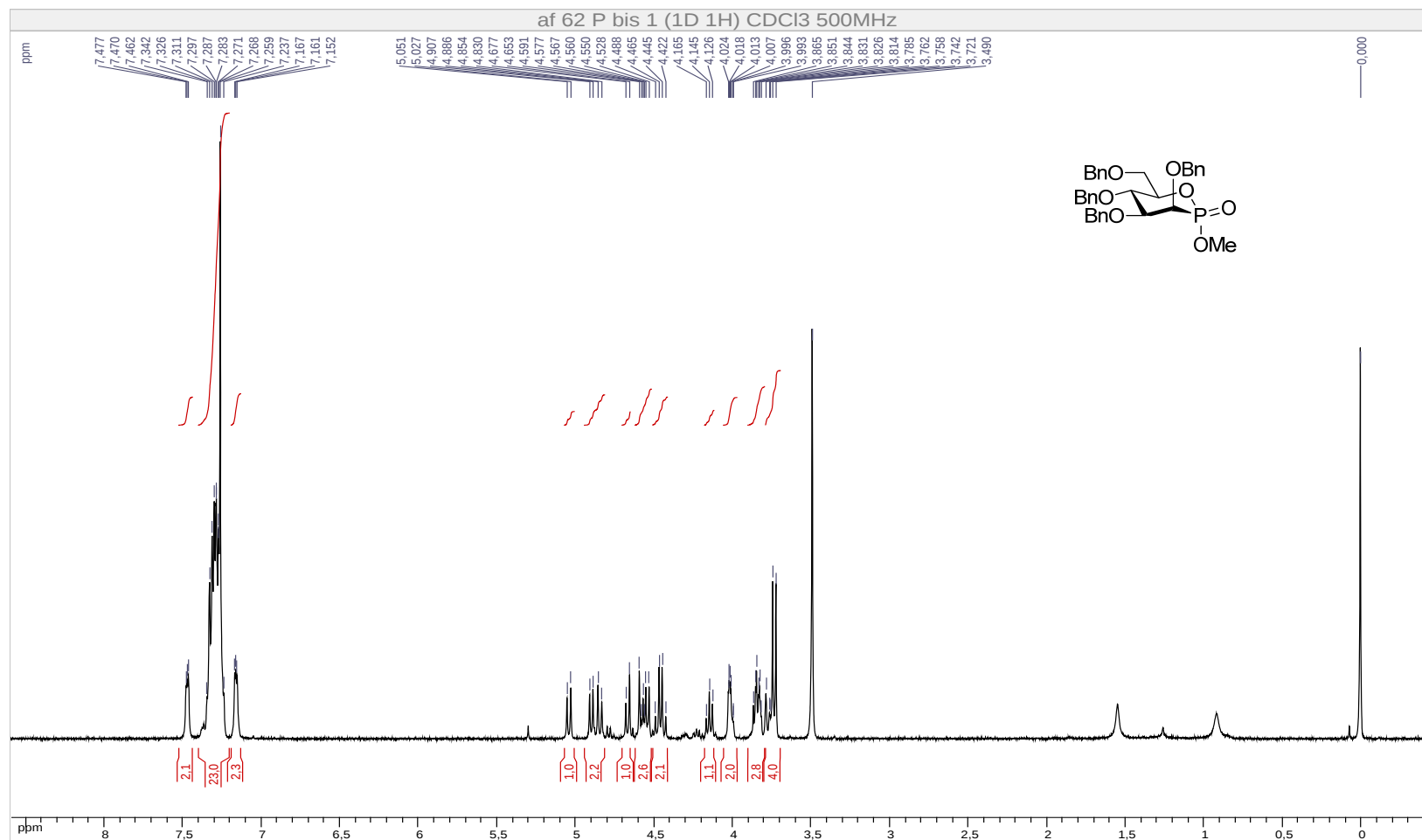
9mβ, ¹H NMR (300 MHz, CDCl₃)



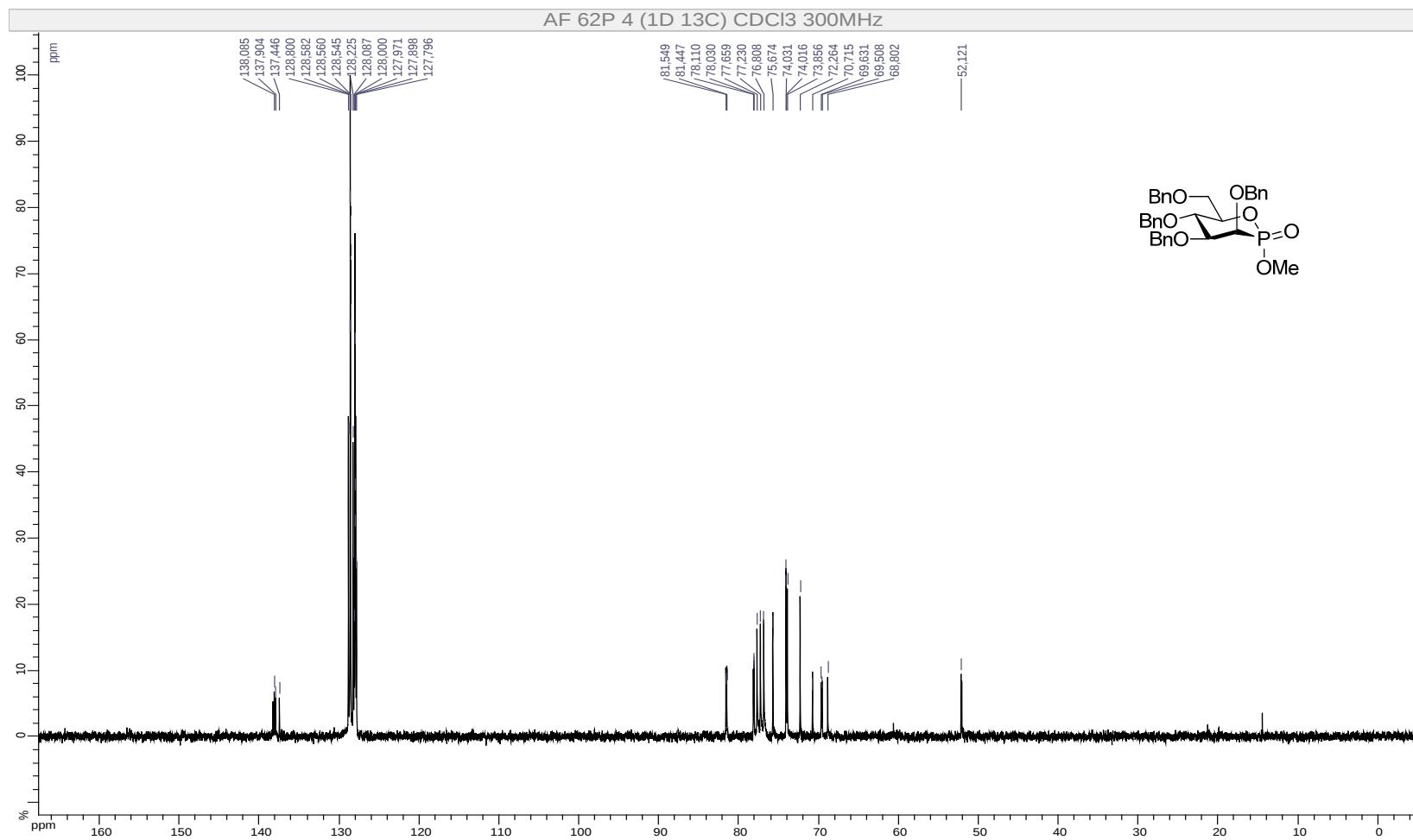
9m β , ^{13}C NMR (75 MHz, CDCl_3)



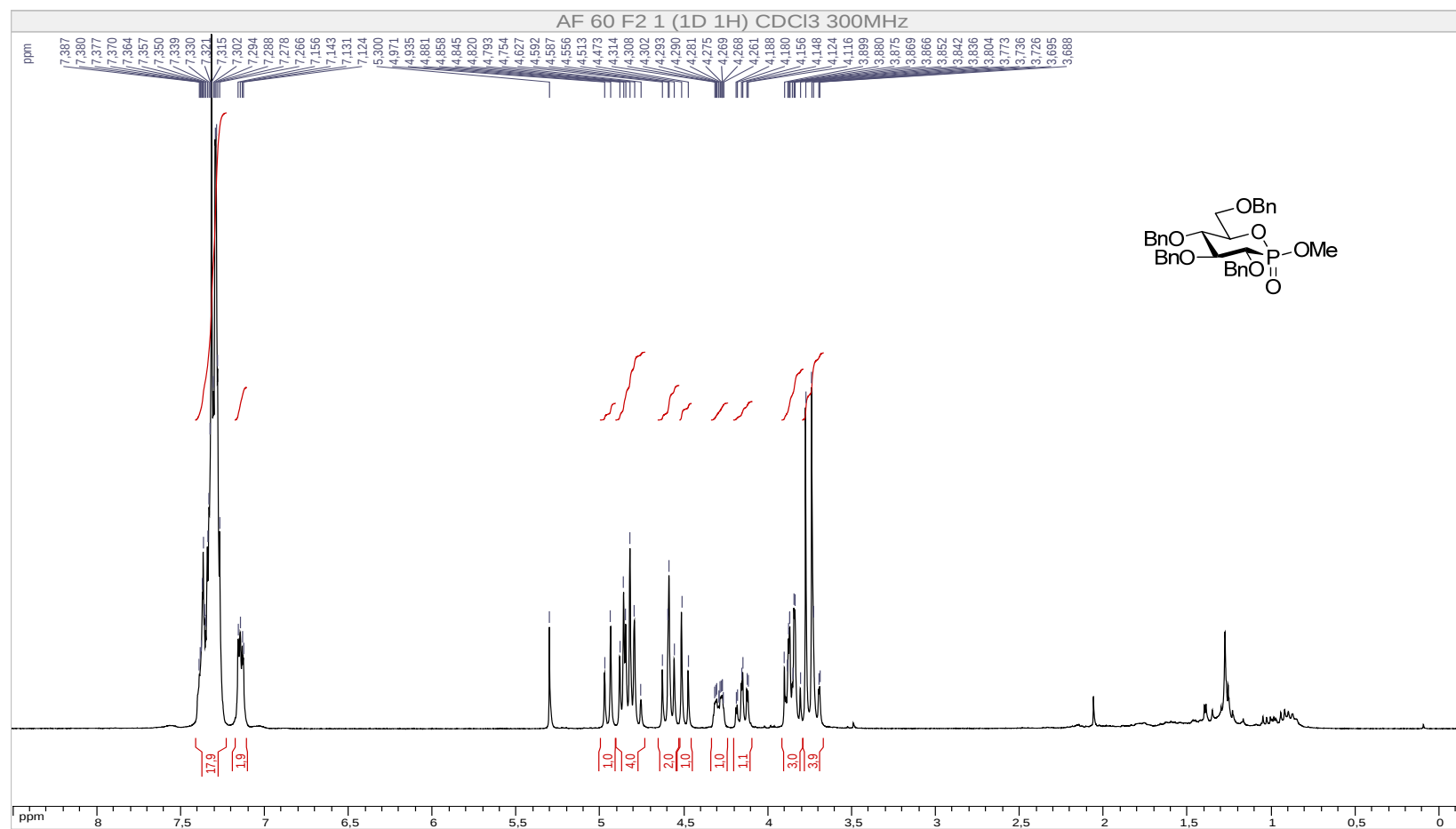
9ma, ^1H NMR (500 MHz, CDCl_3)



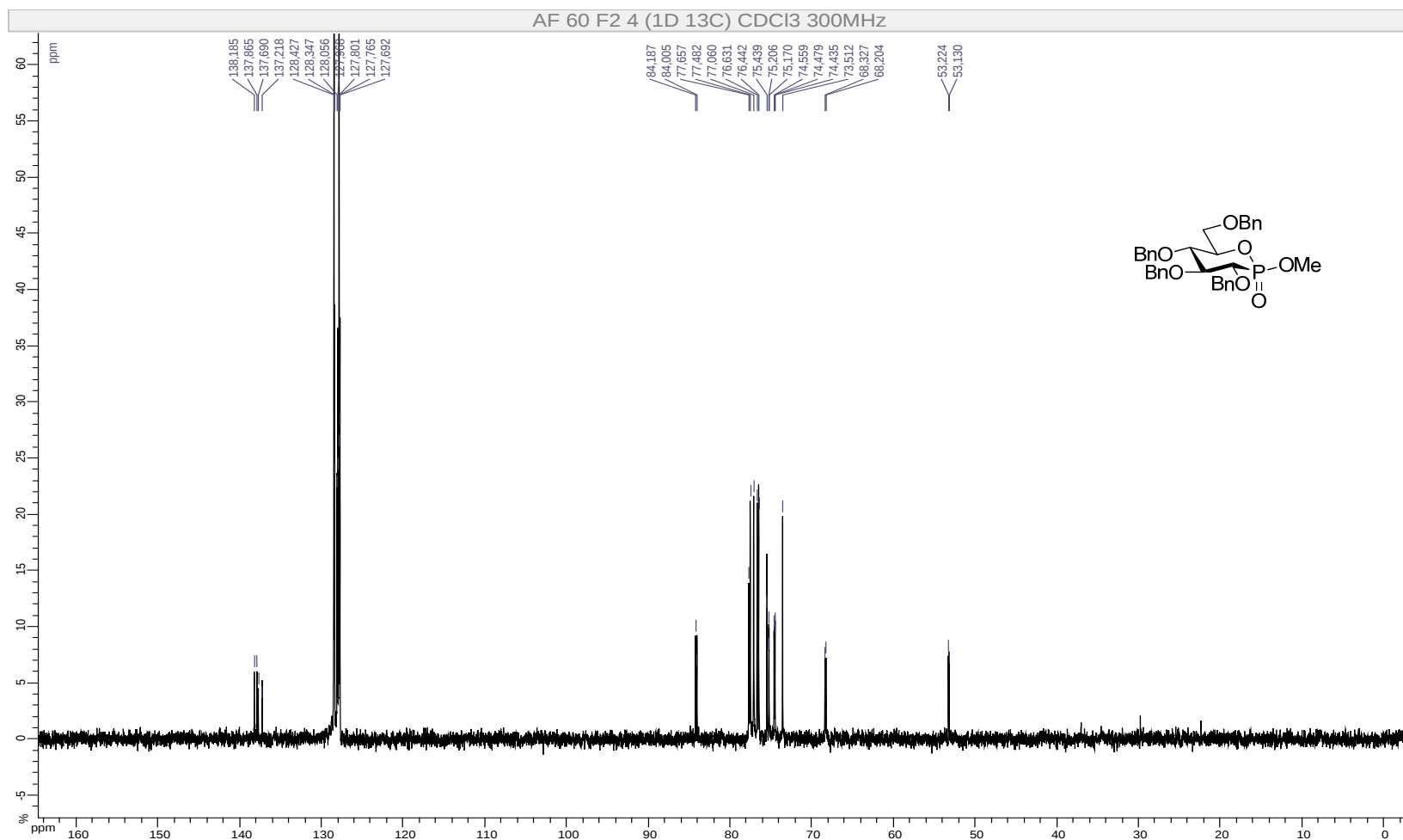
9ma, ^{13}C NMR (75 MHz, CDCl_3)



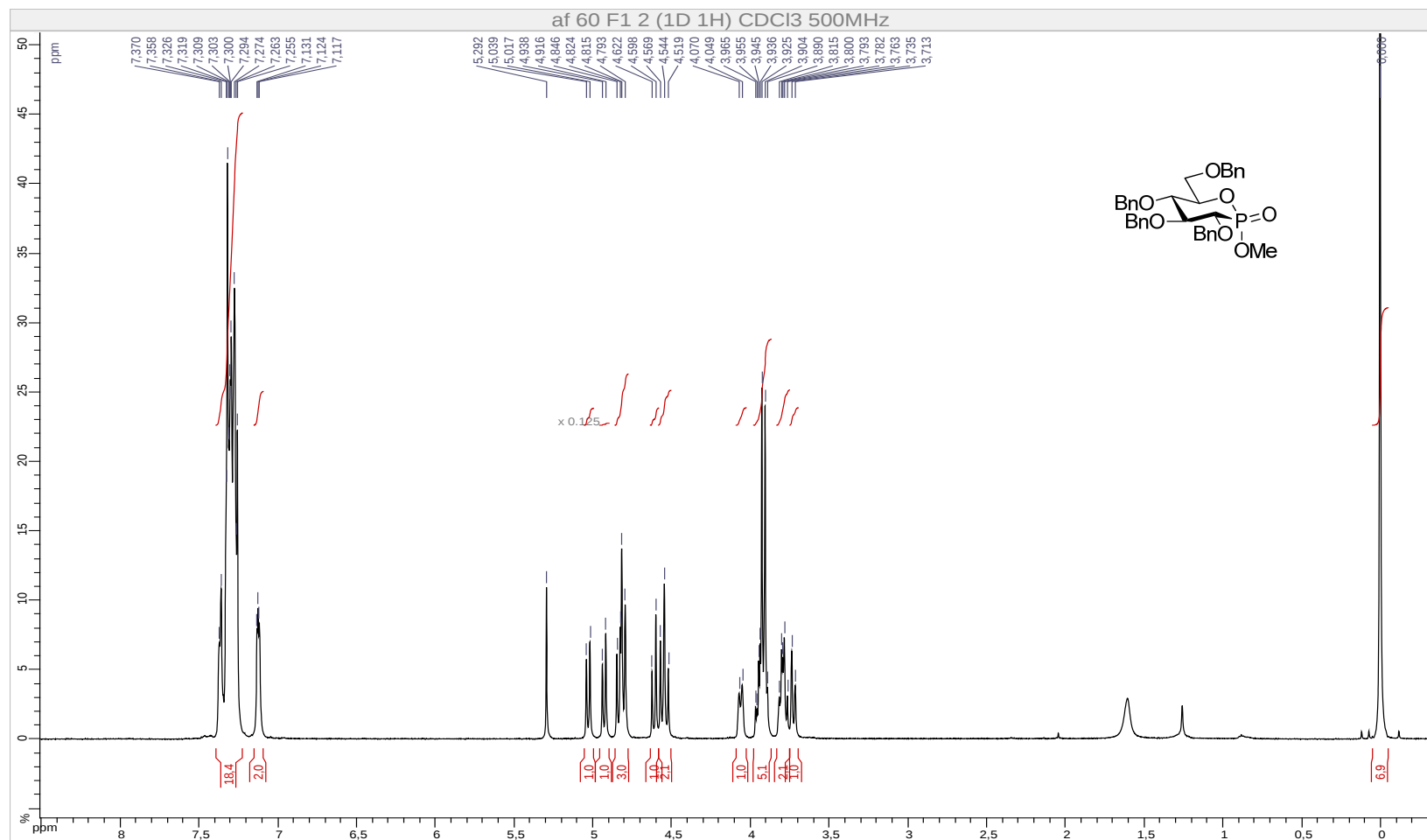
9gβ, ^1H NMR (300 MHz, CDCl_3)



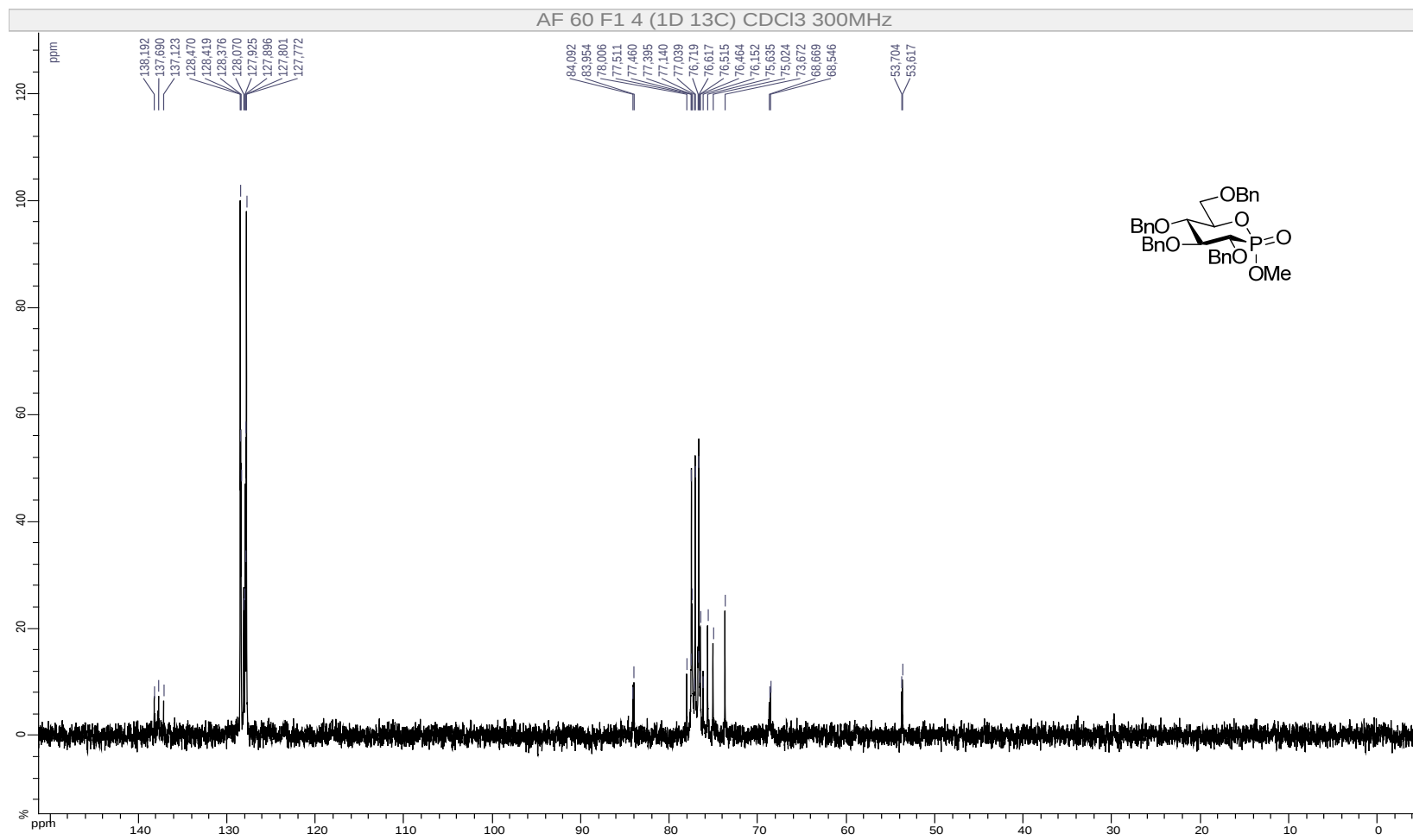
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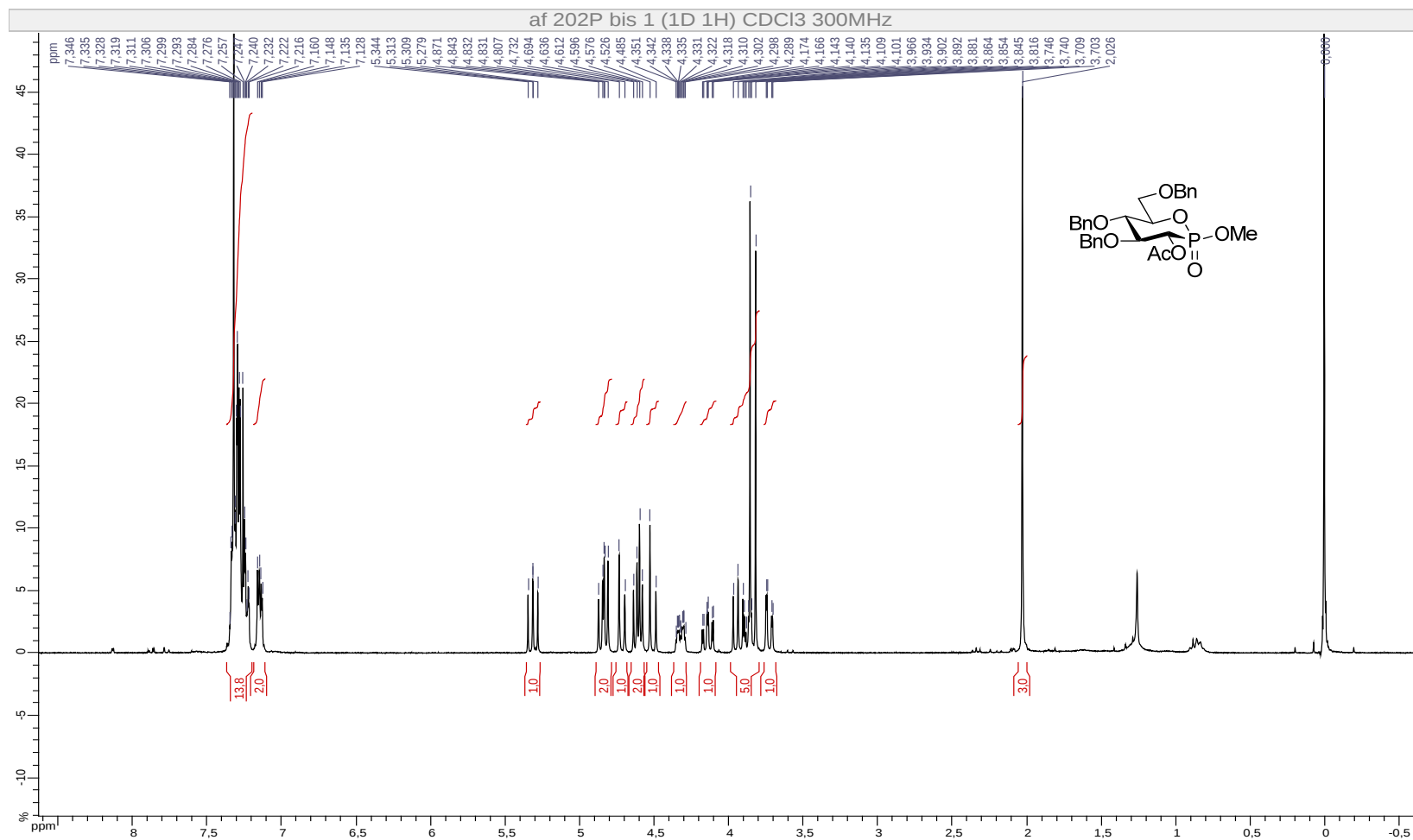
9ga, ^1H NMR (500 MHz, CDCl_3)



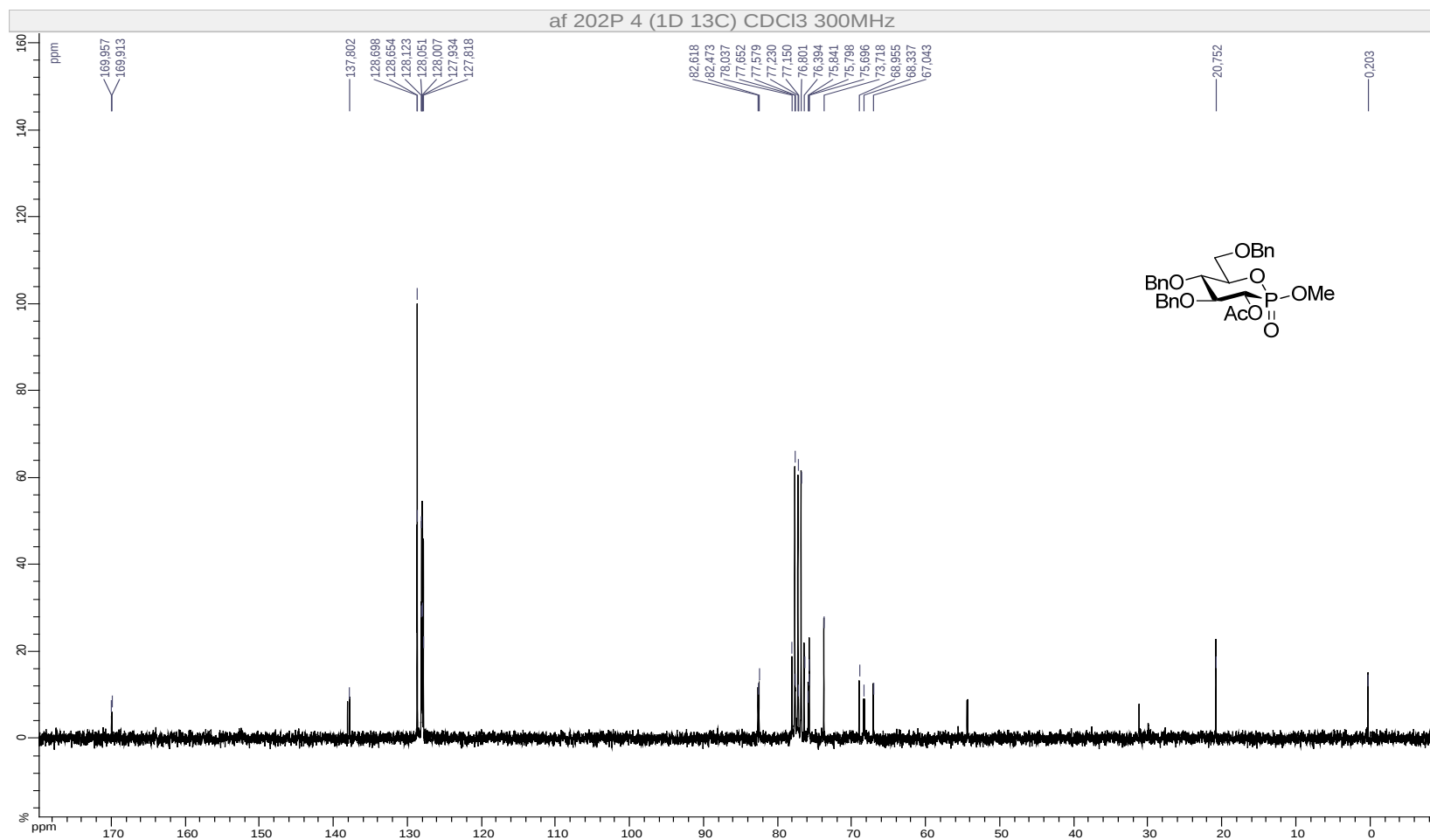
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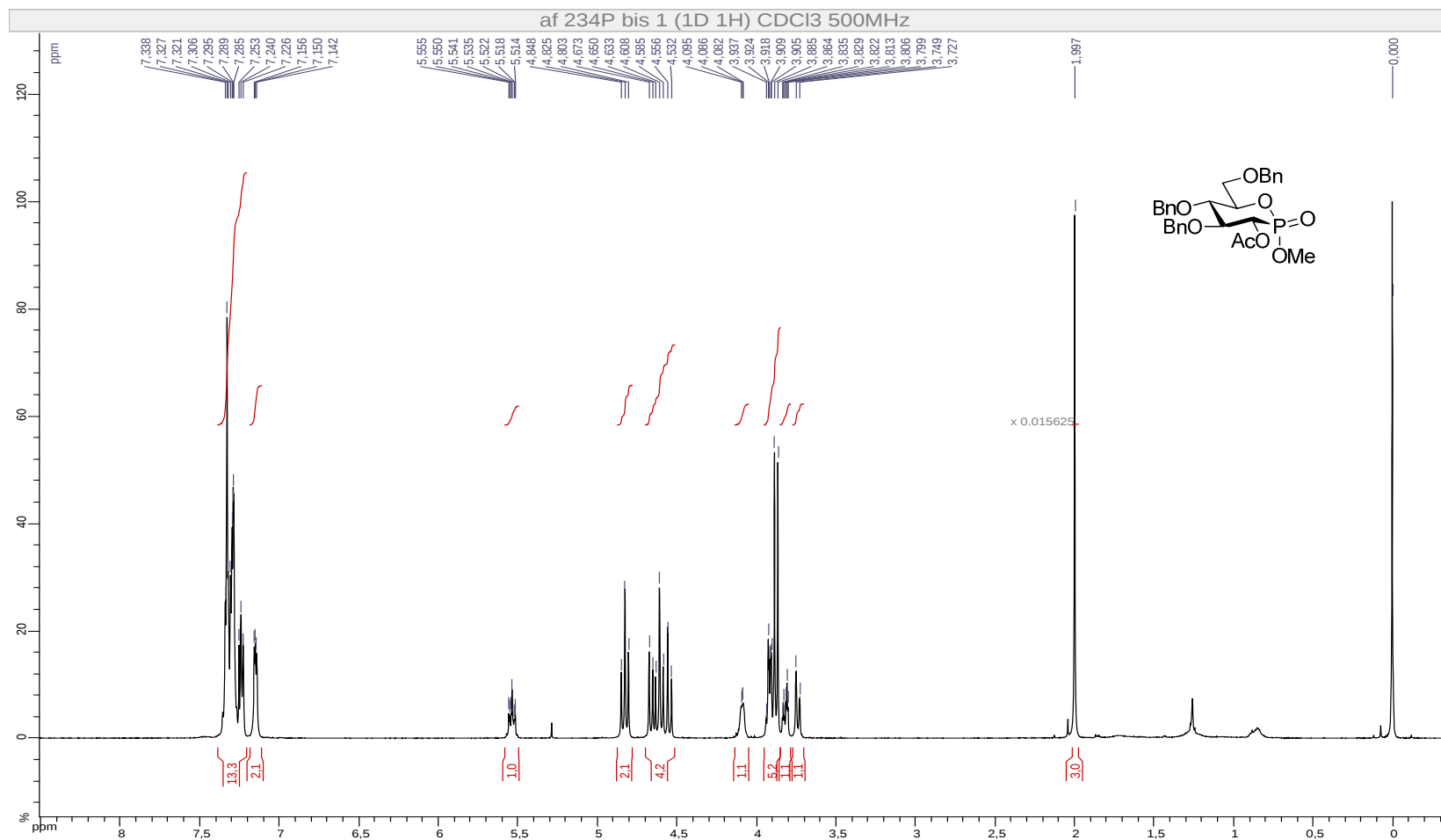
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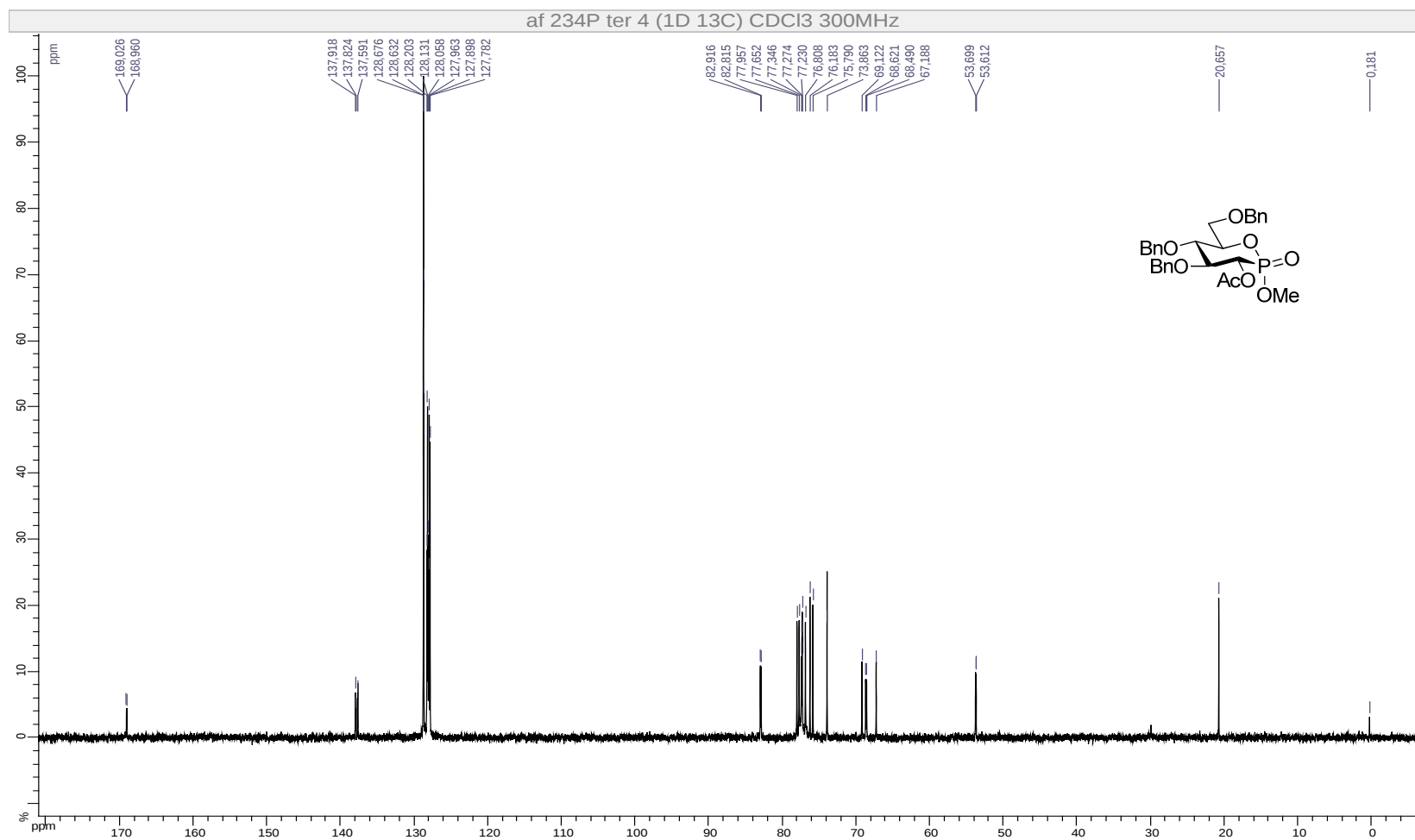
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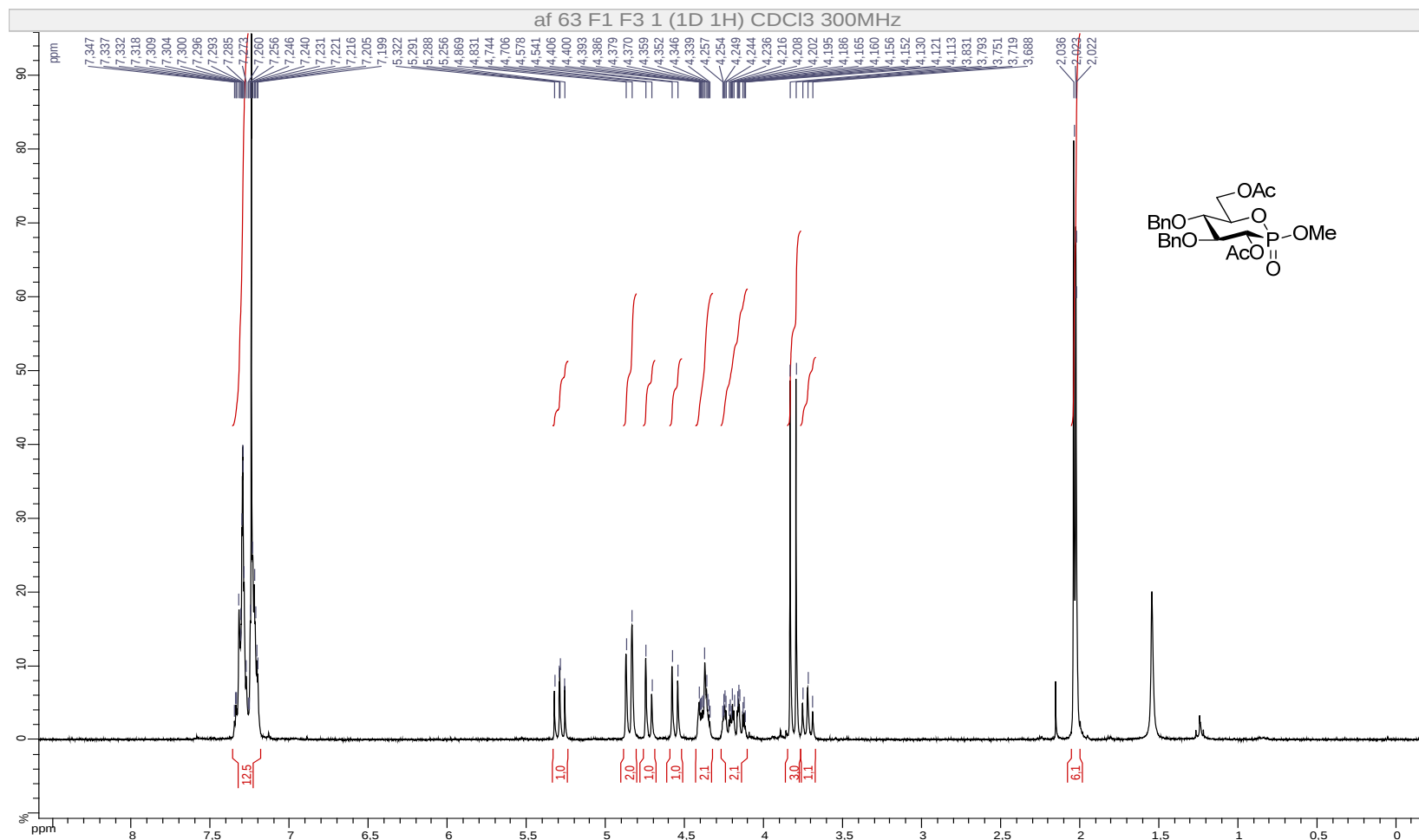
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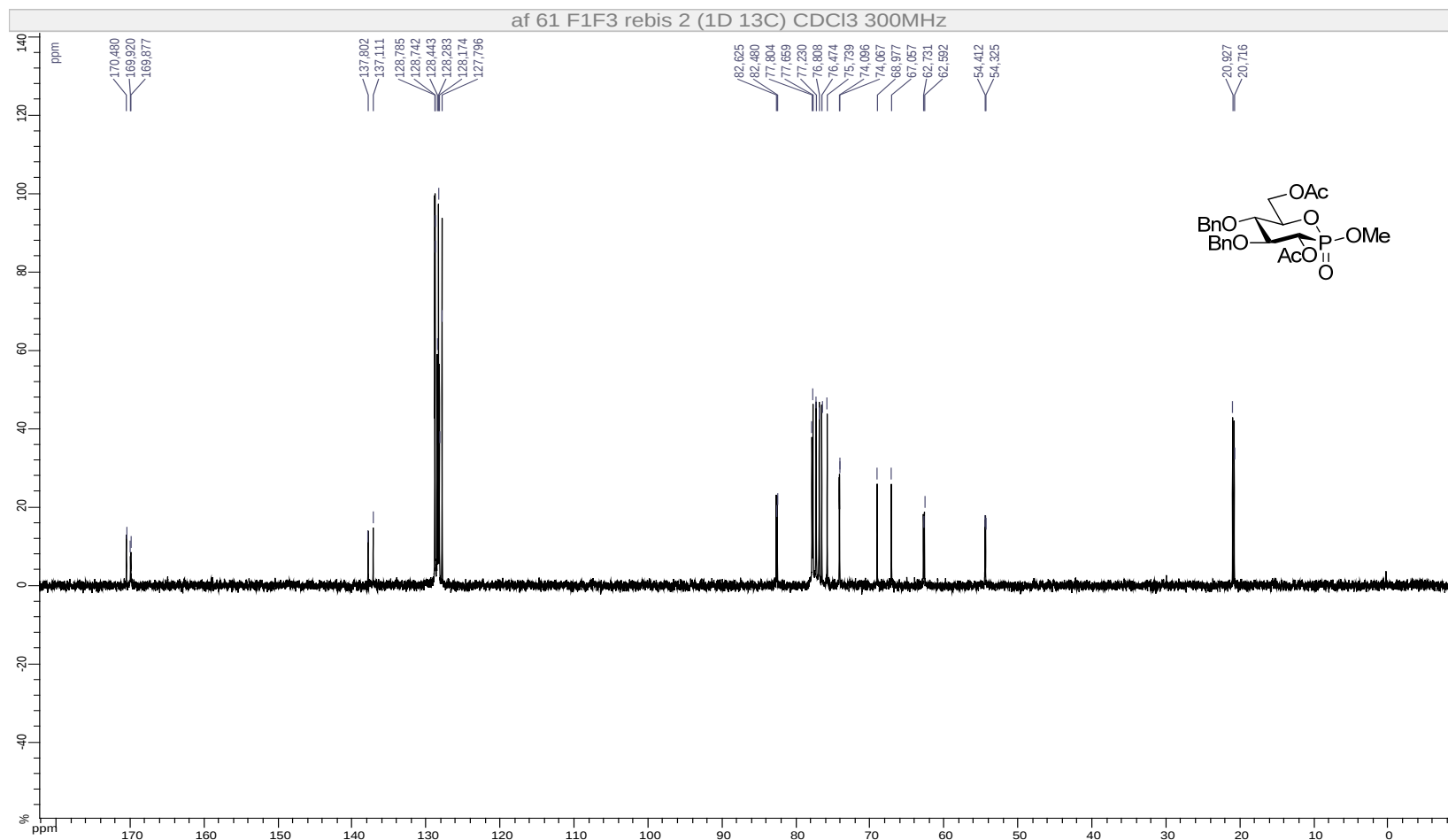
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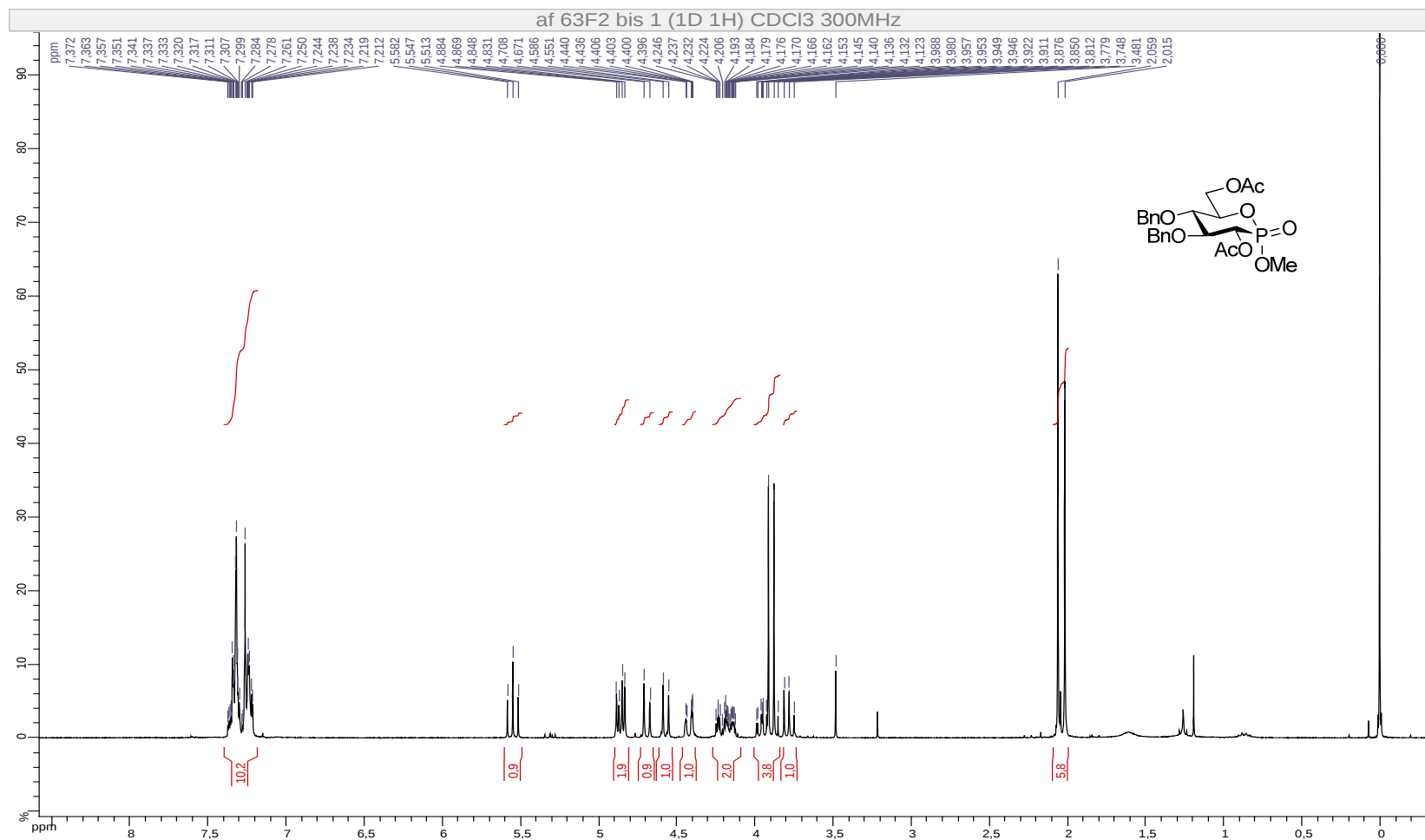
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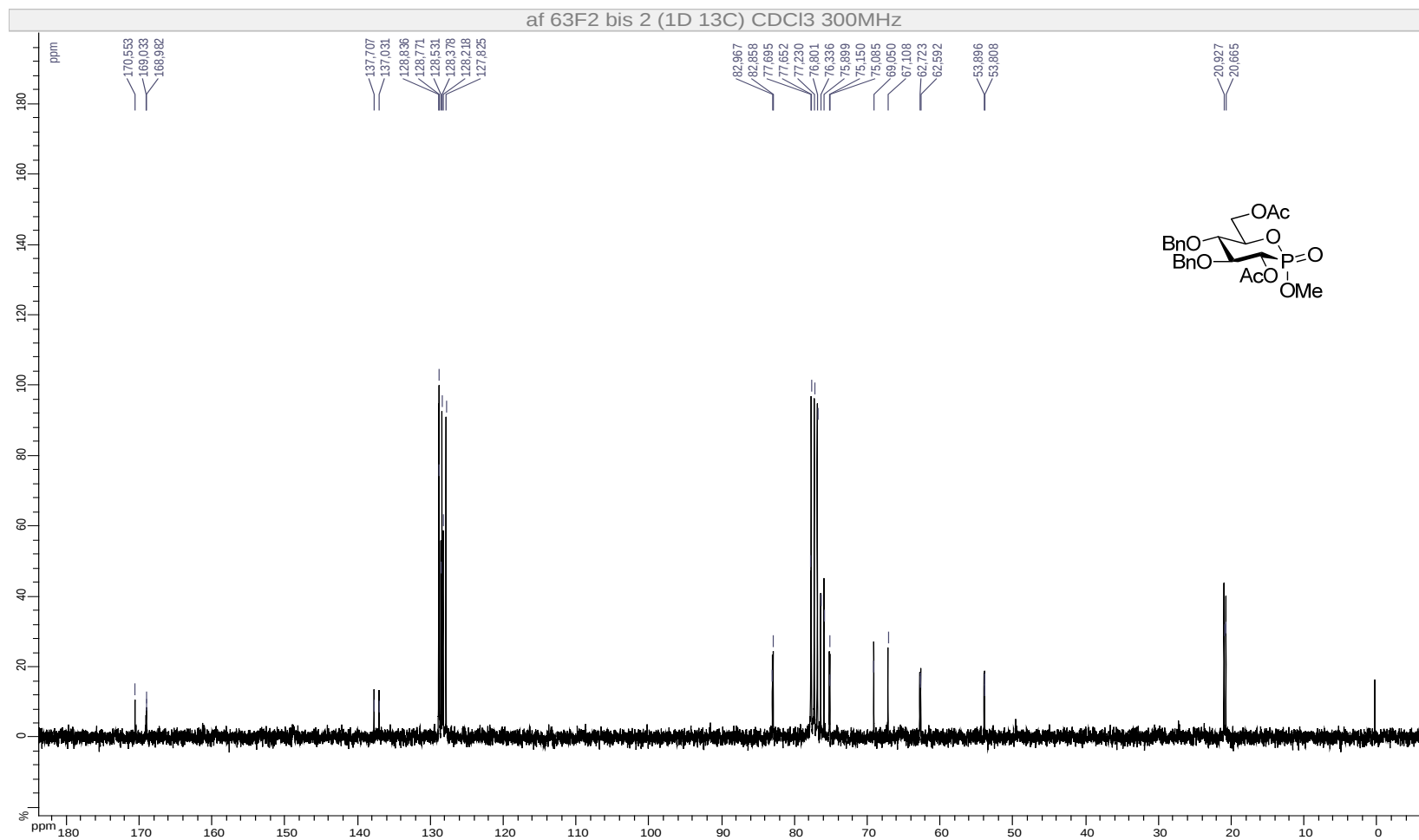
8g β , ^{13}C NMR (75 MHz, CDCl_3)



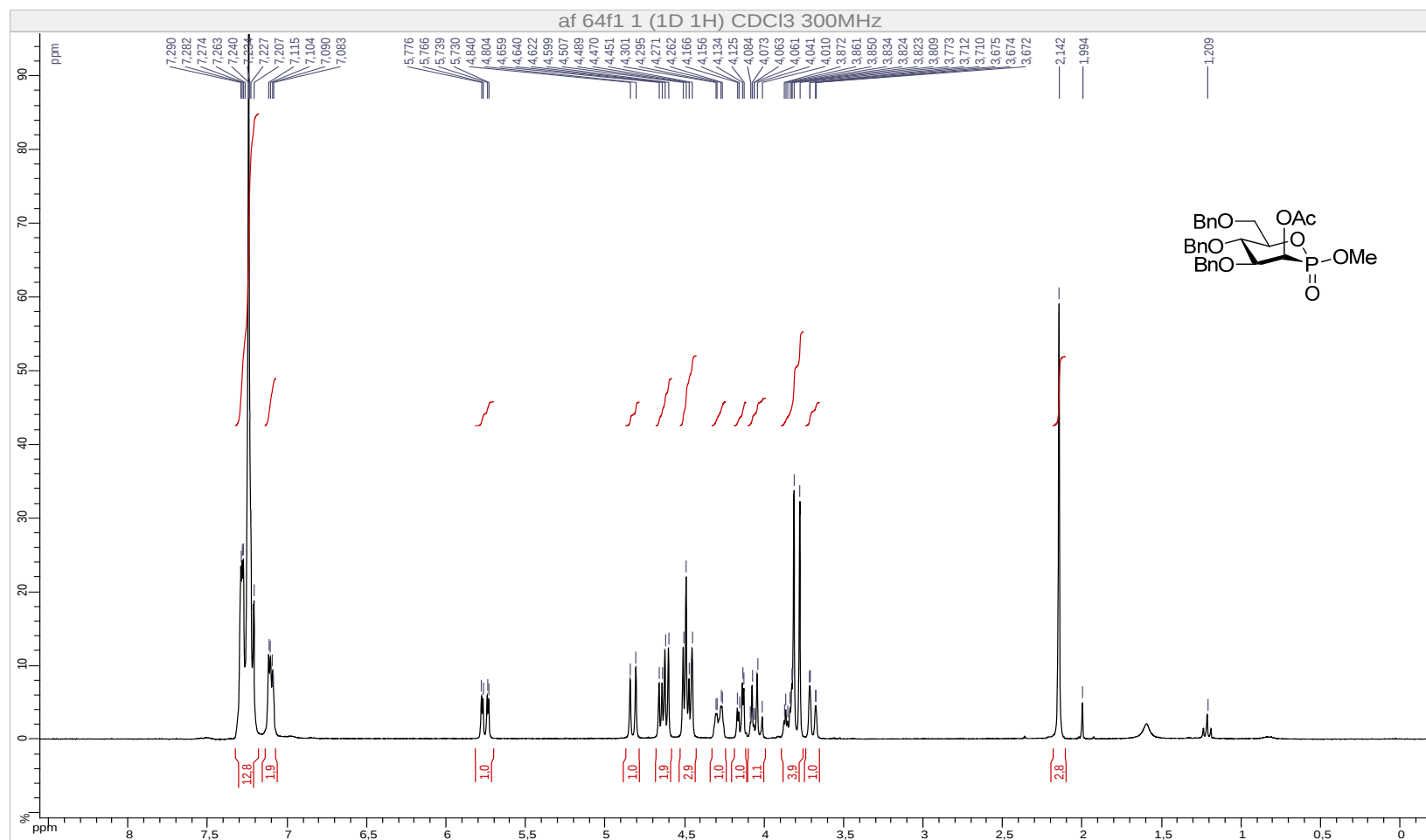
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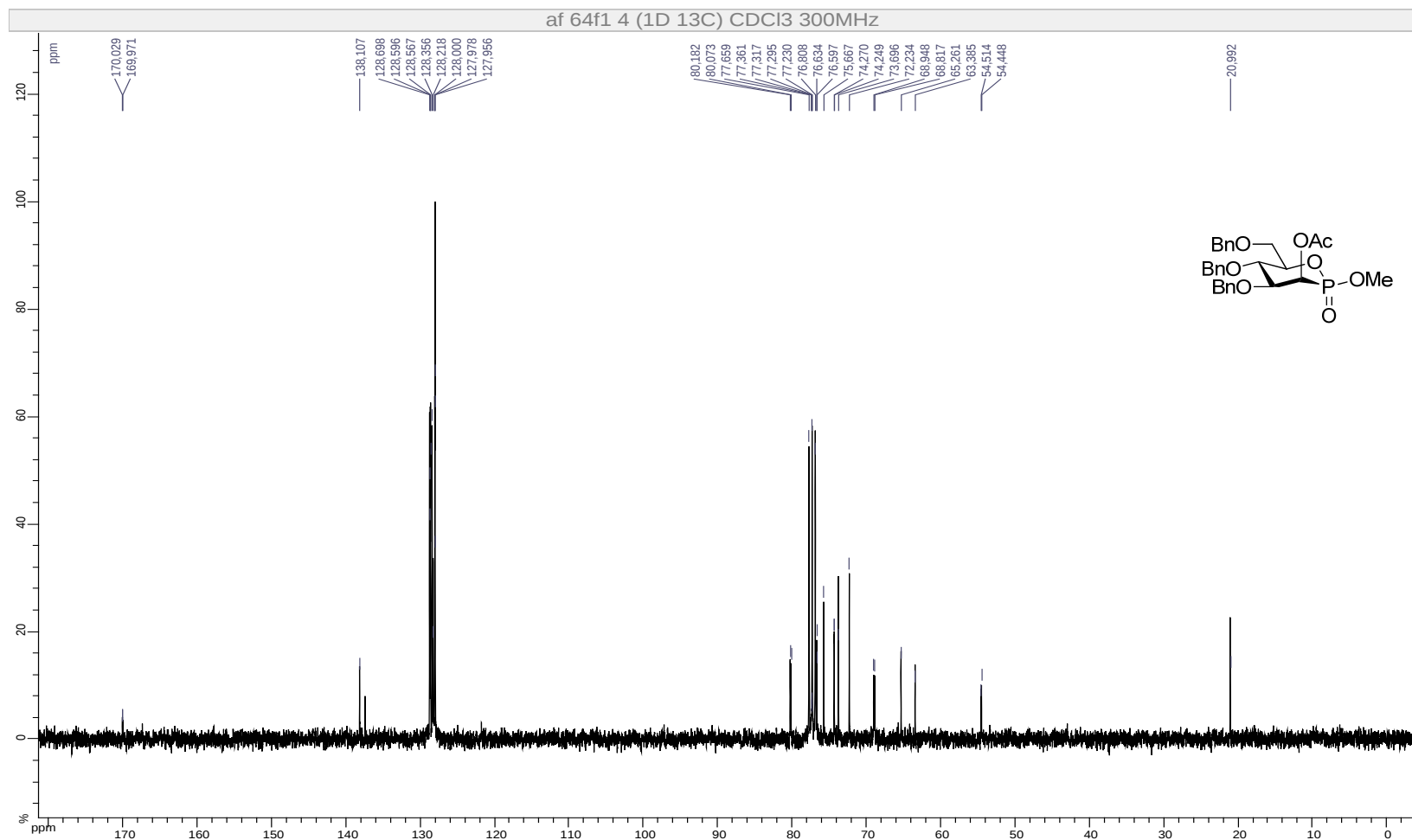
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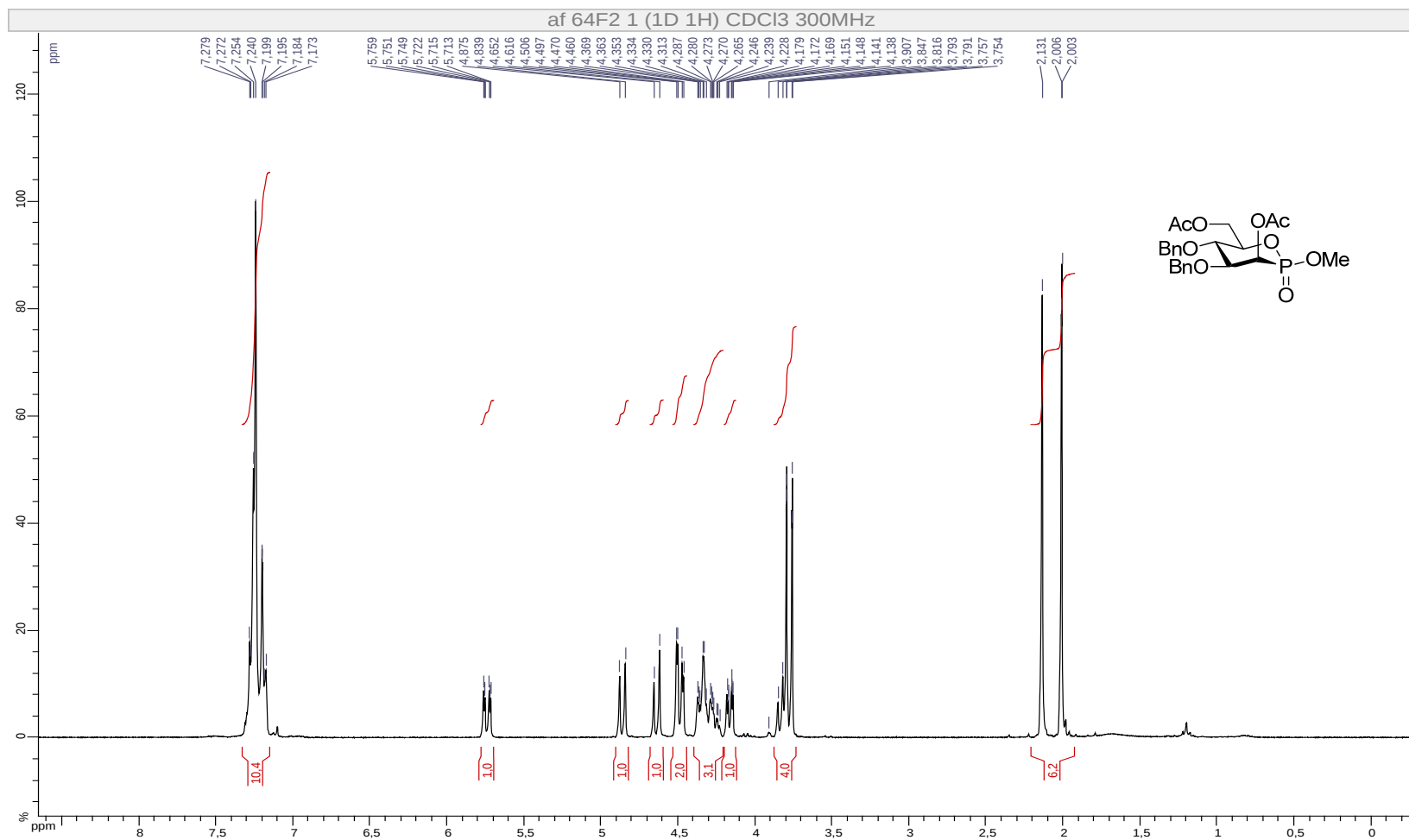
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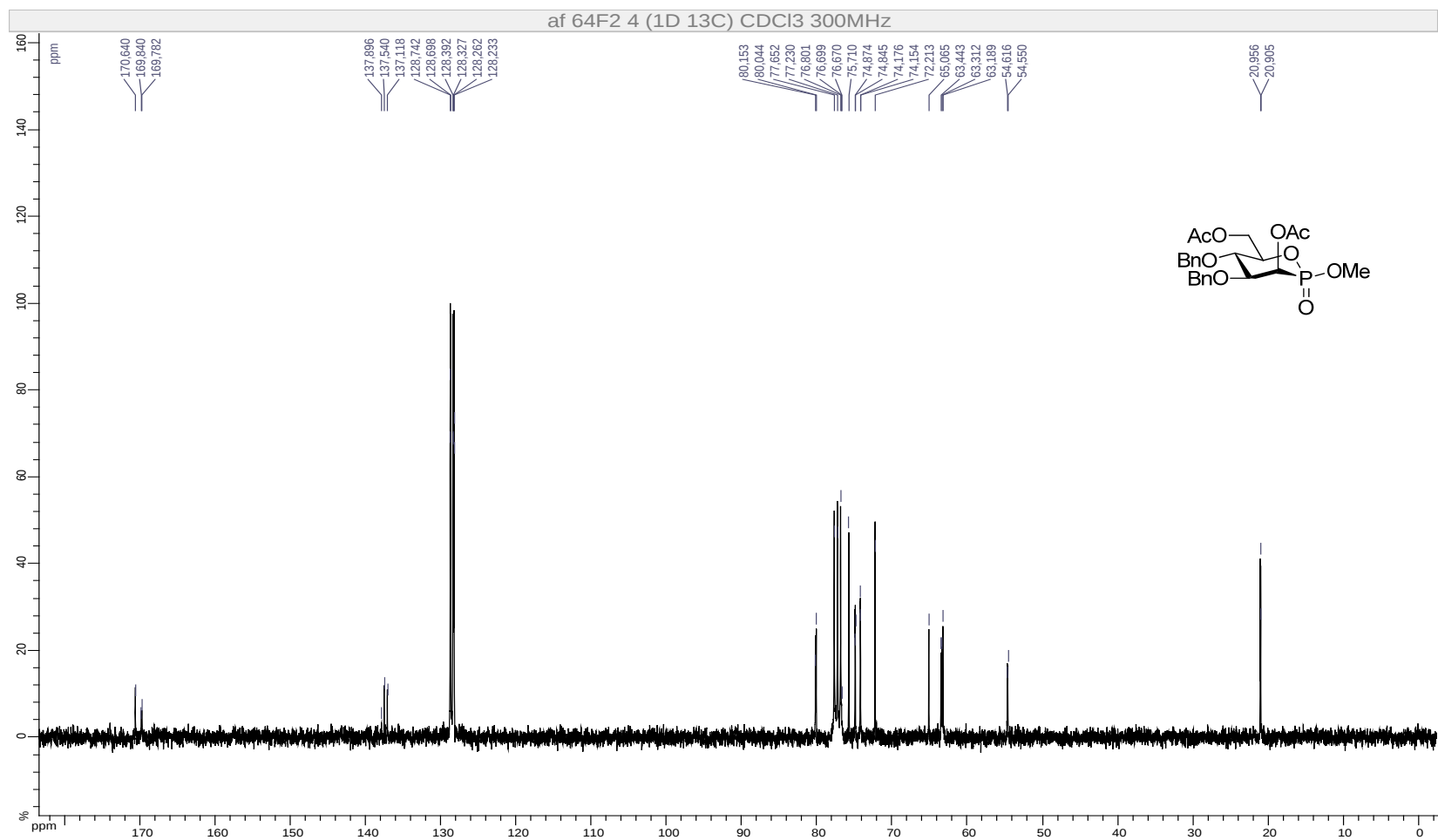
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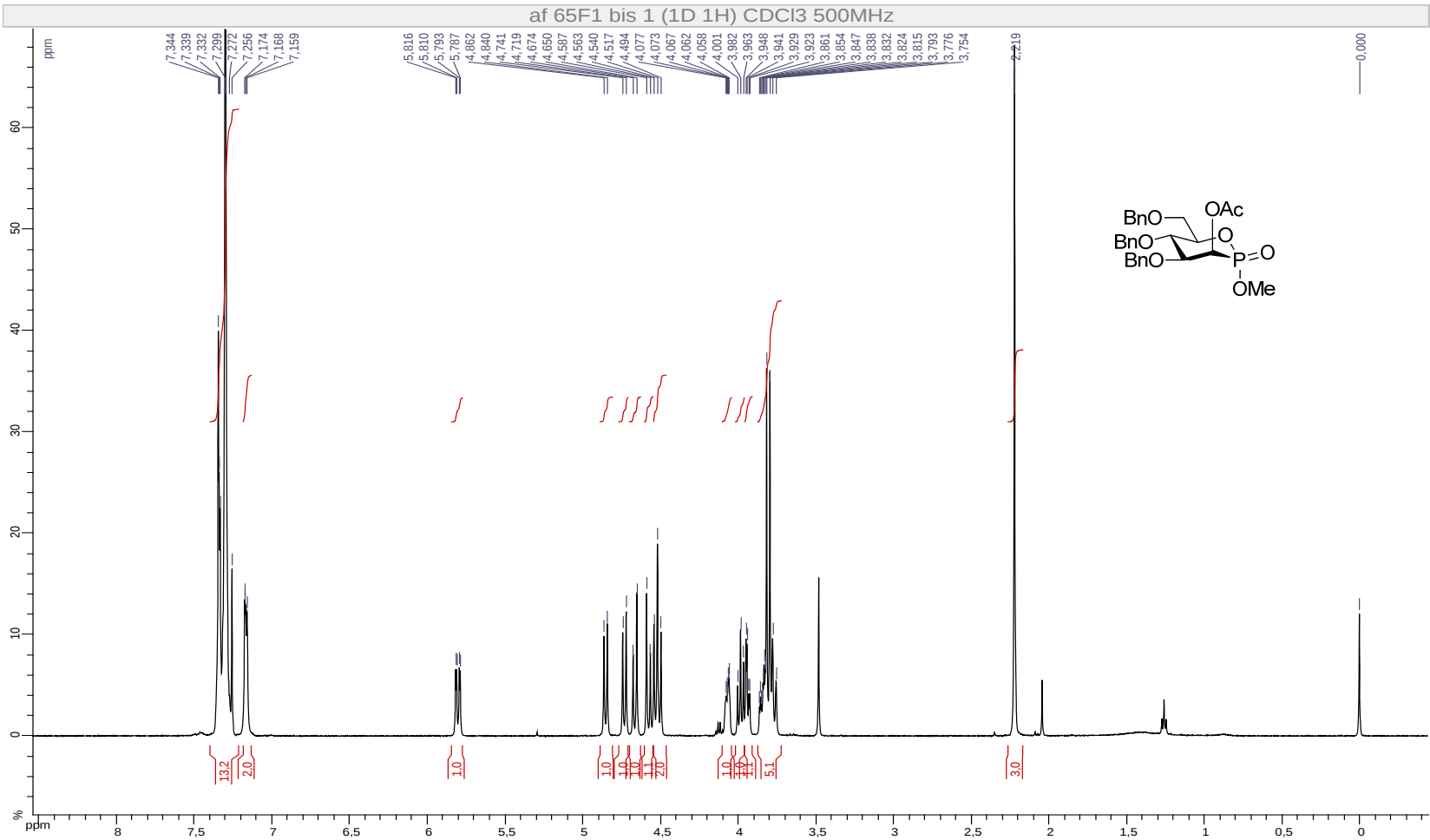
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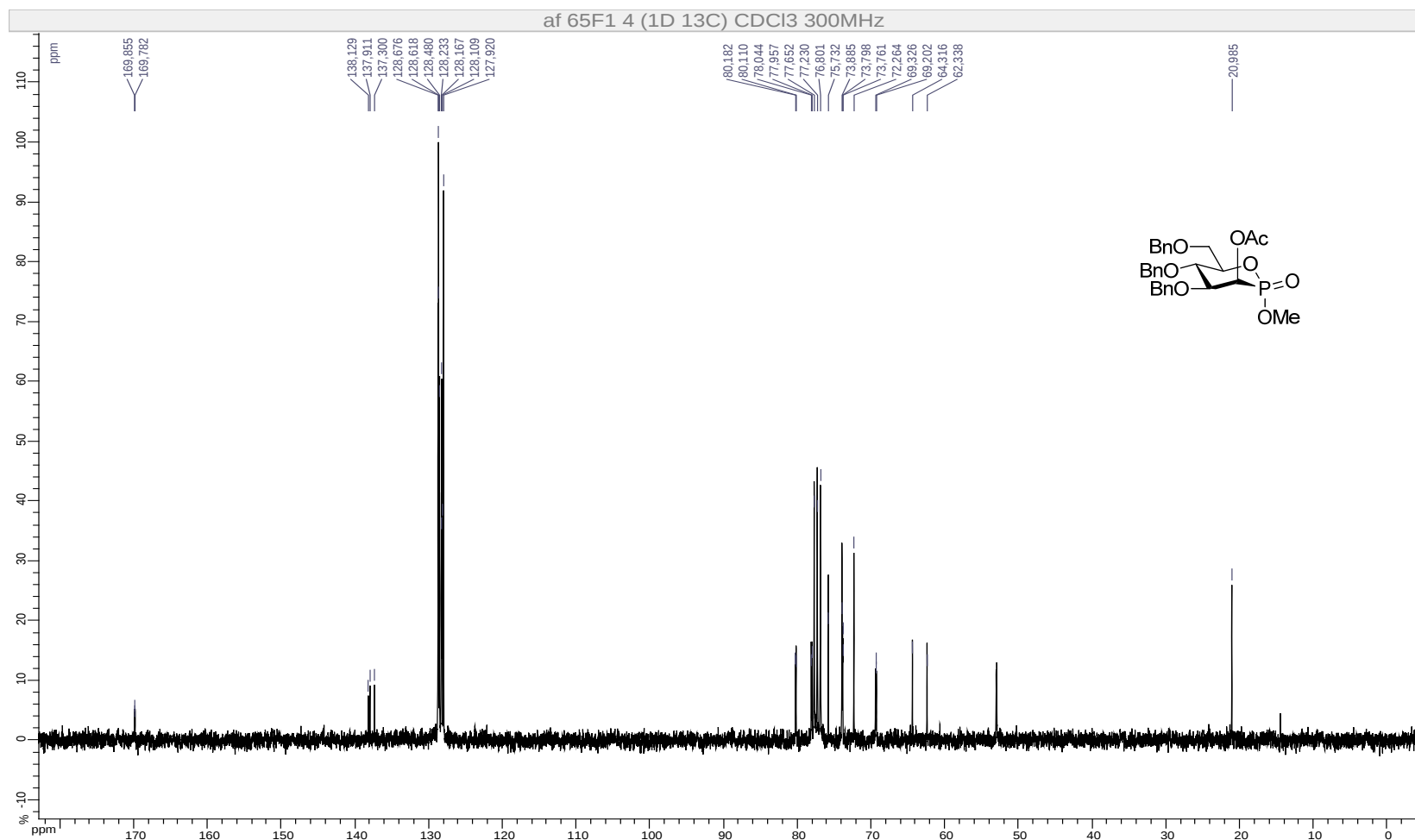
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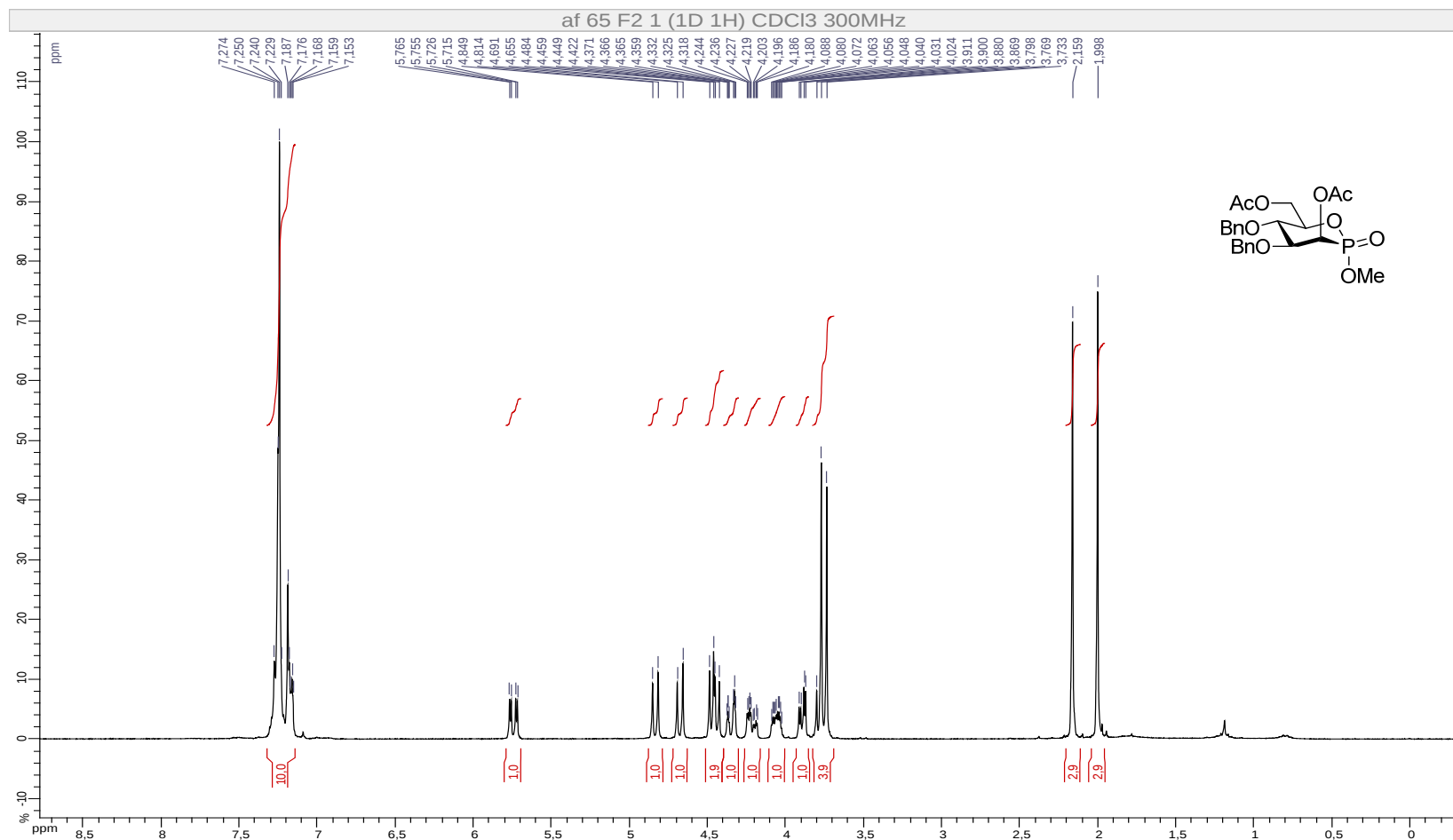
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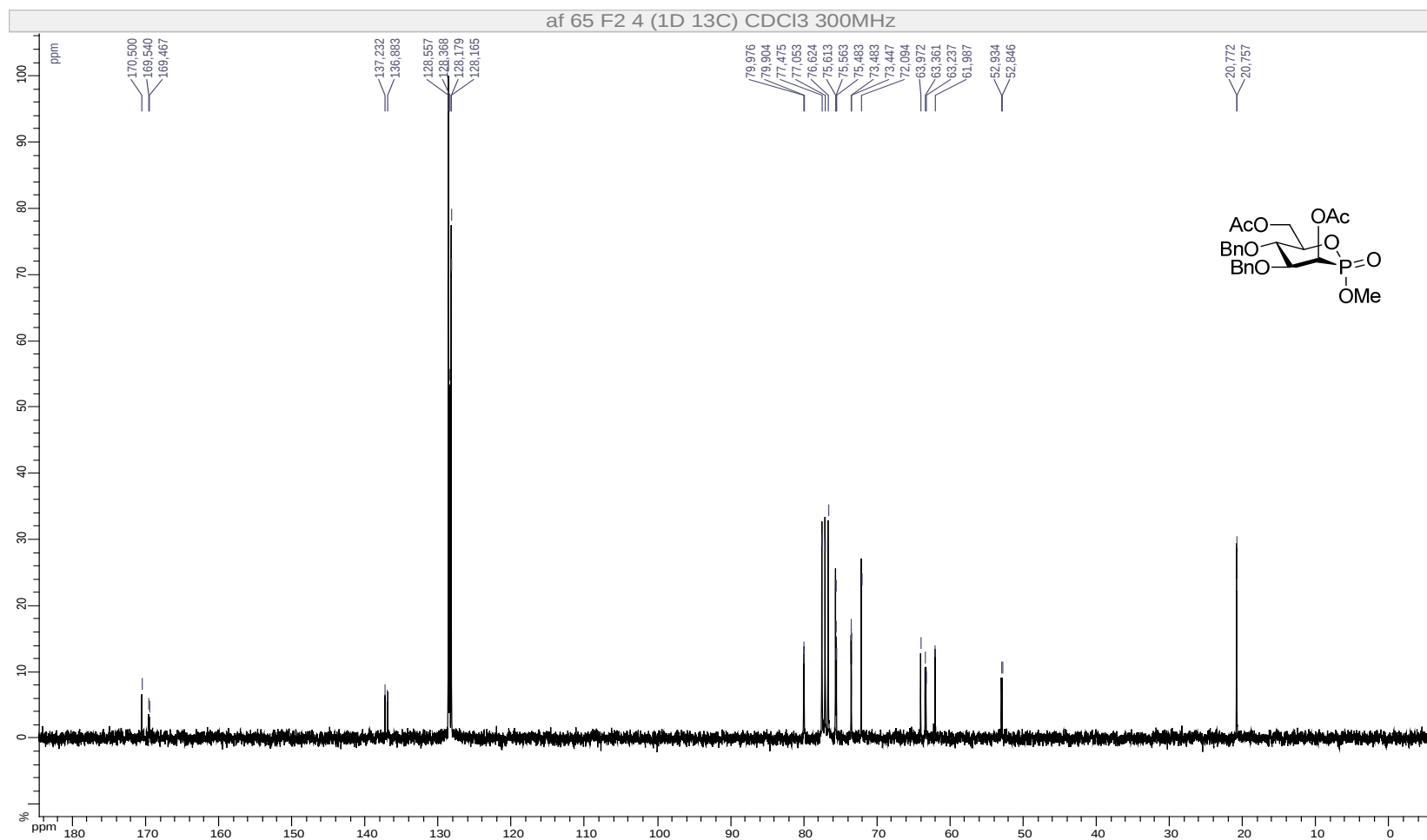
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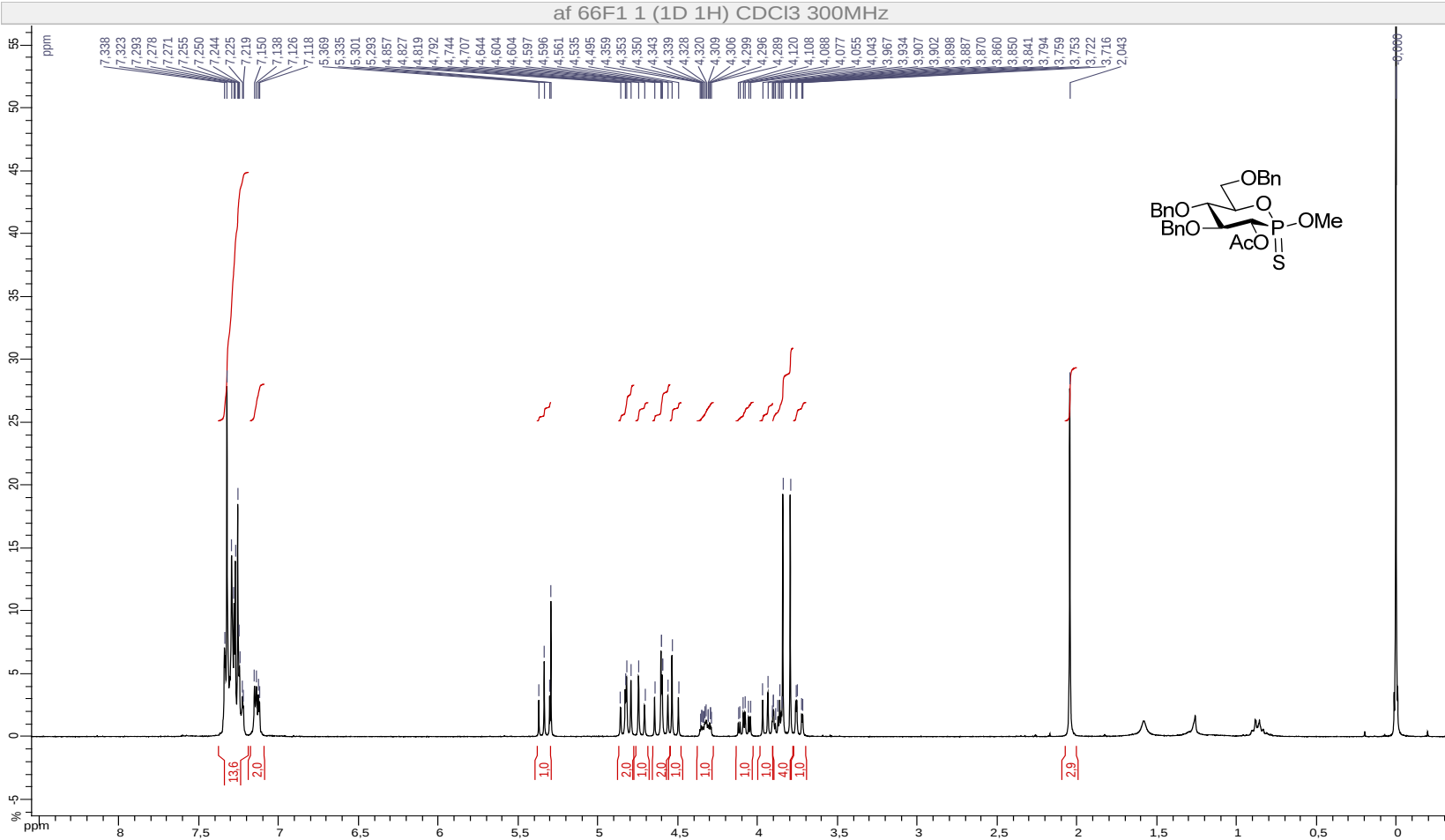
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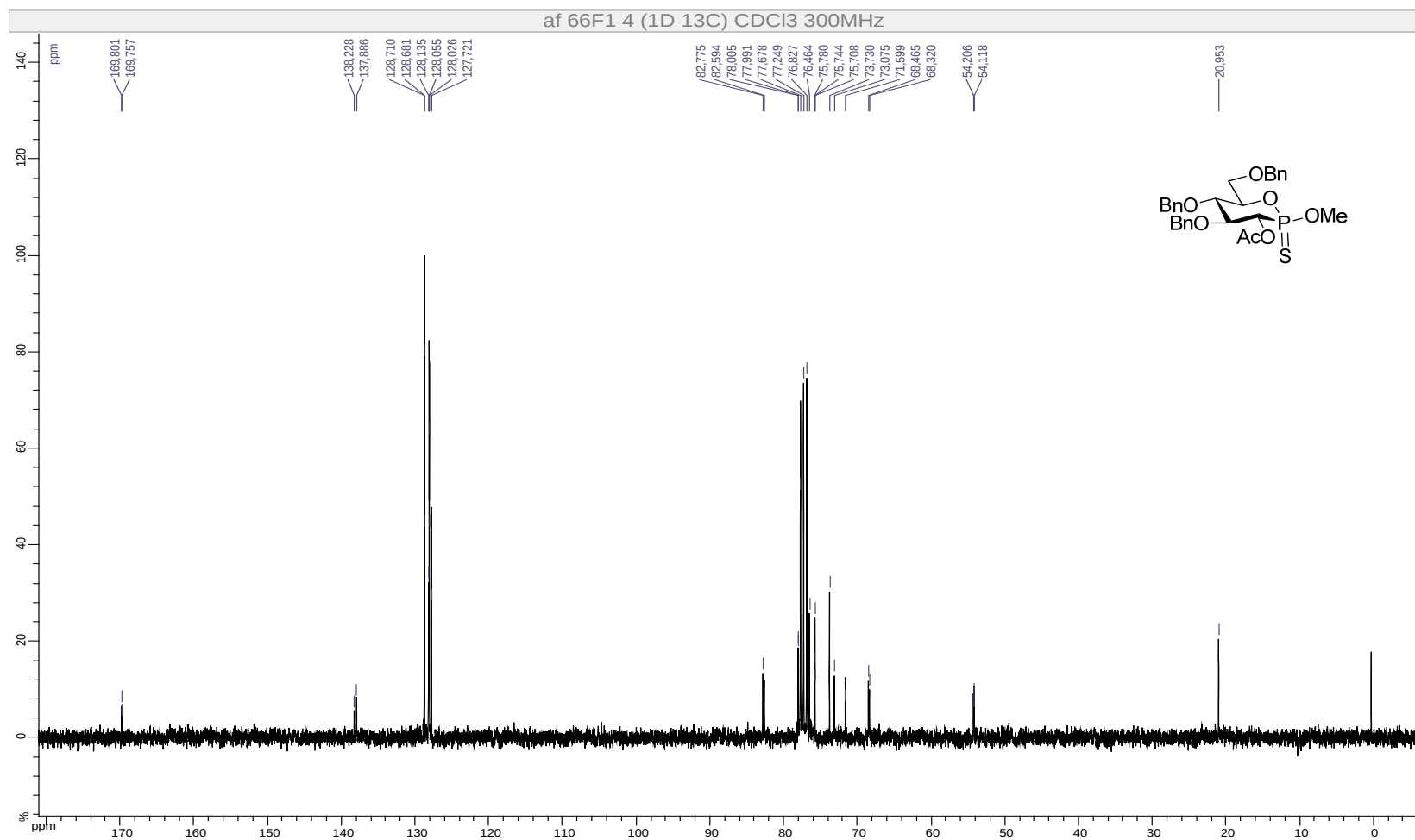
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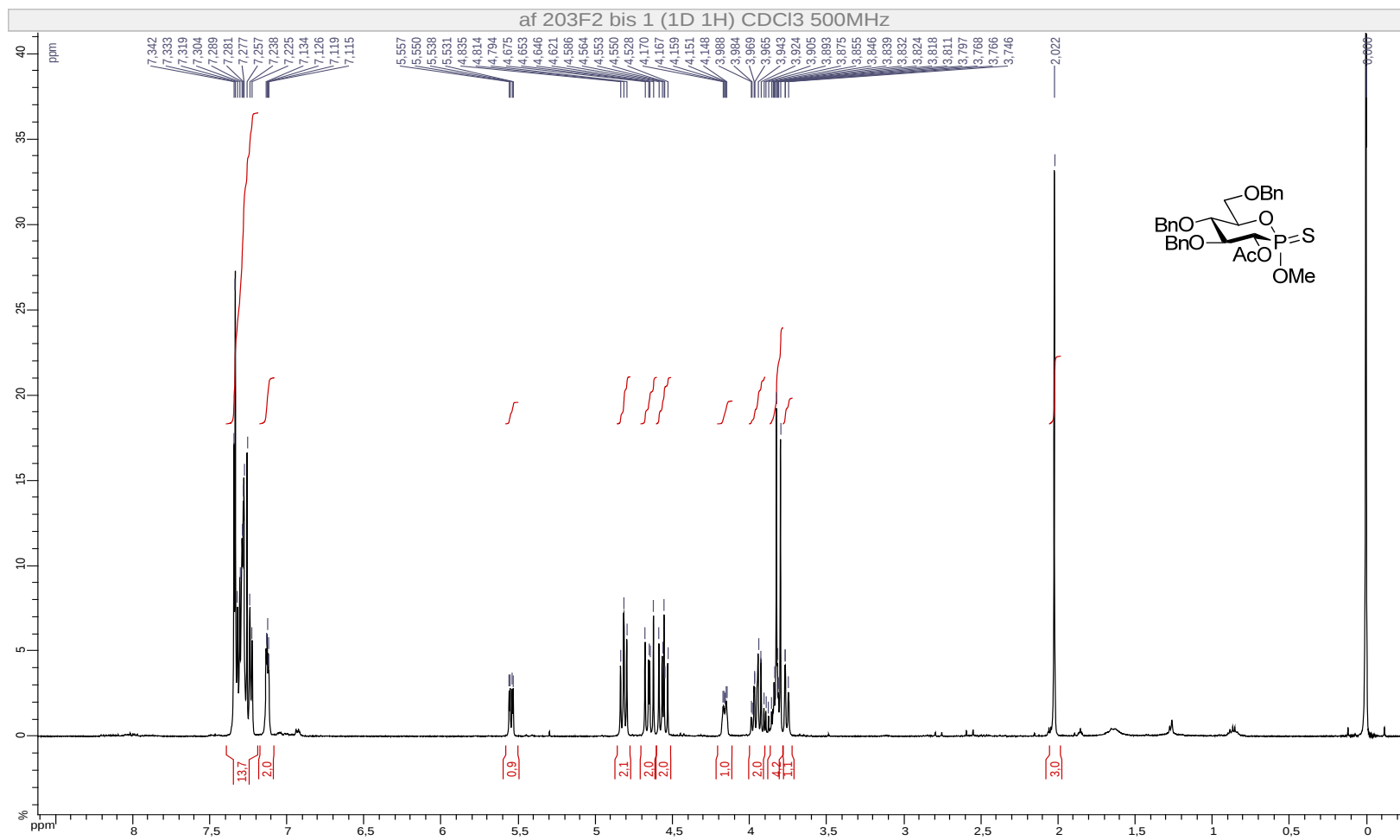
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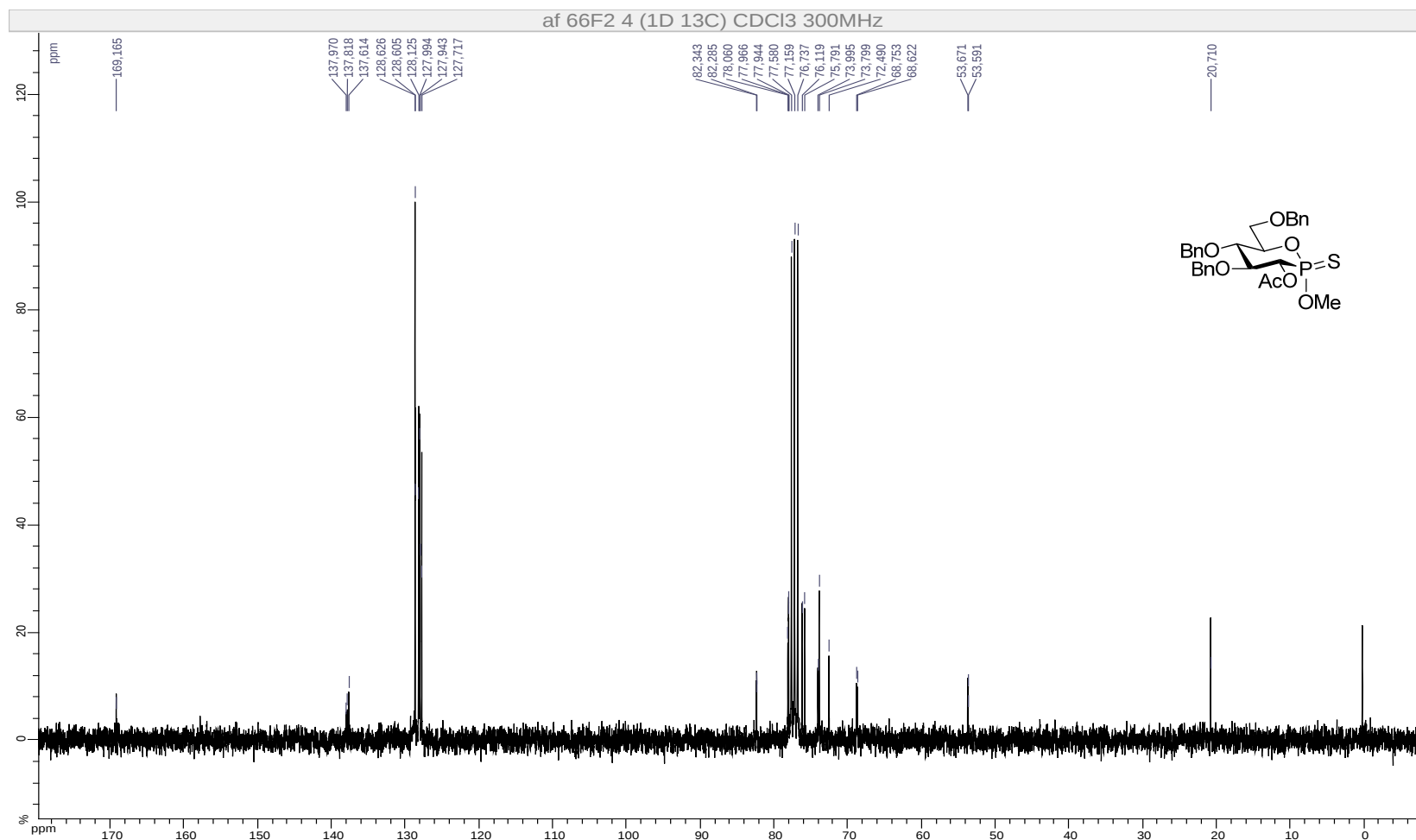
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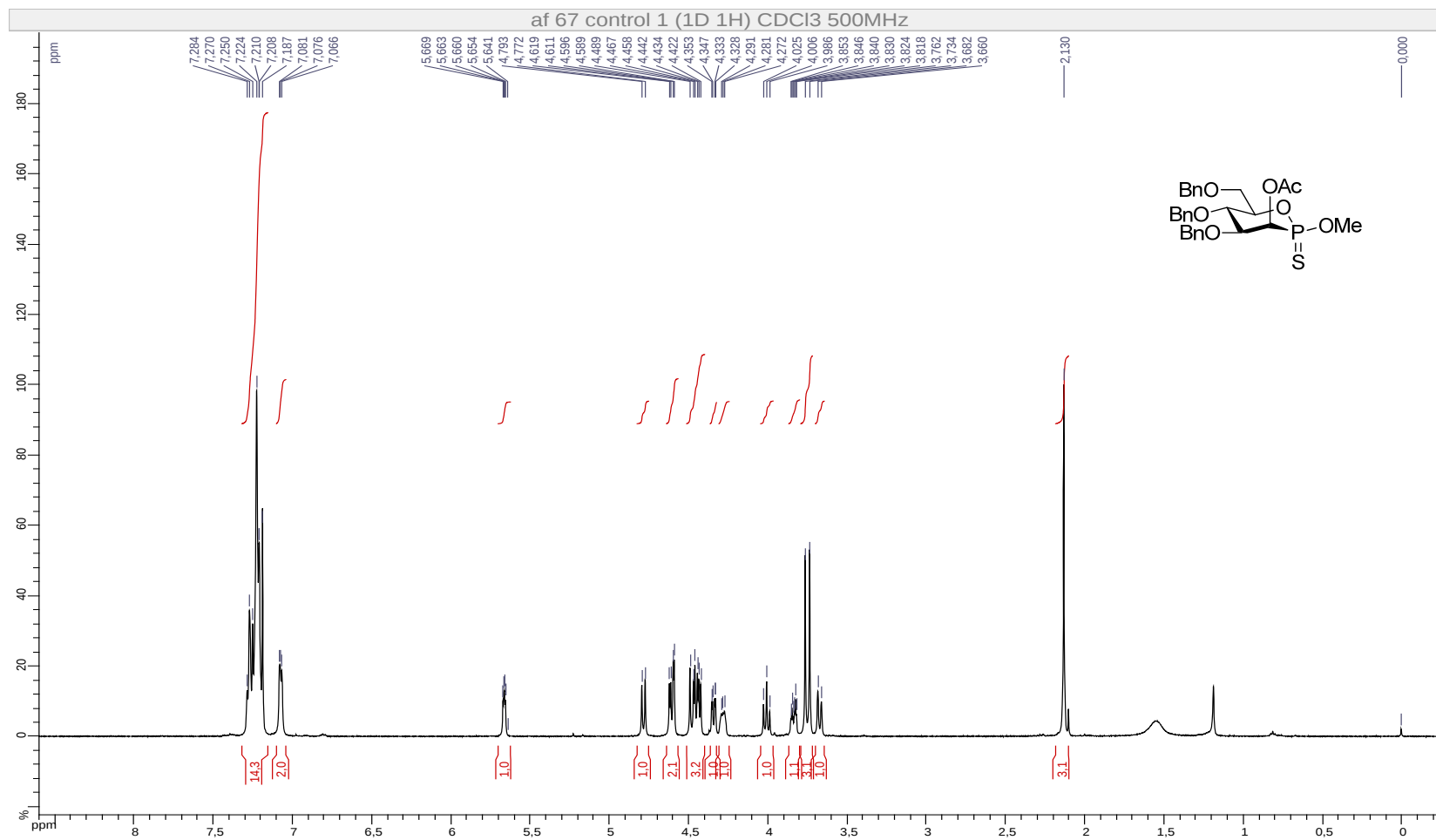
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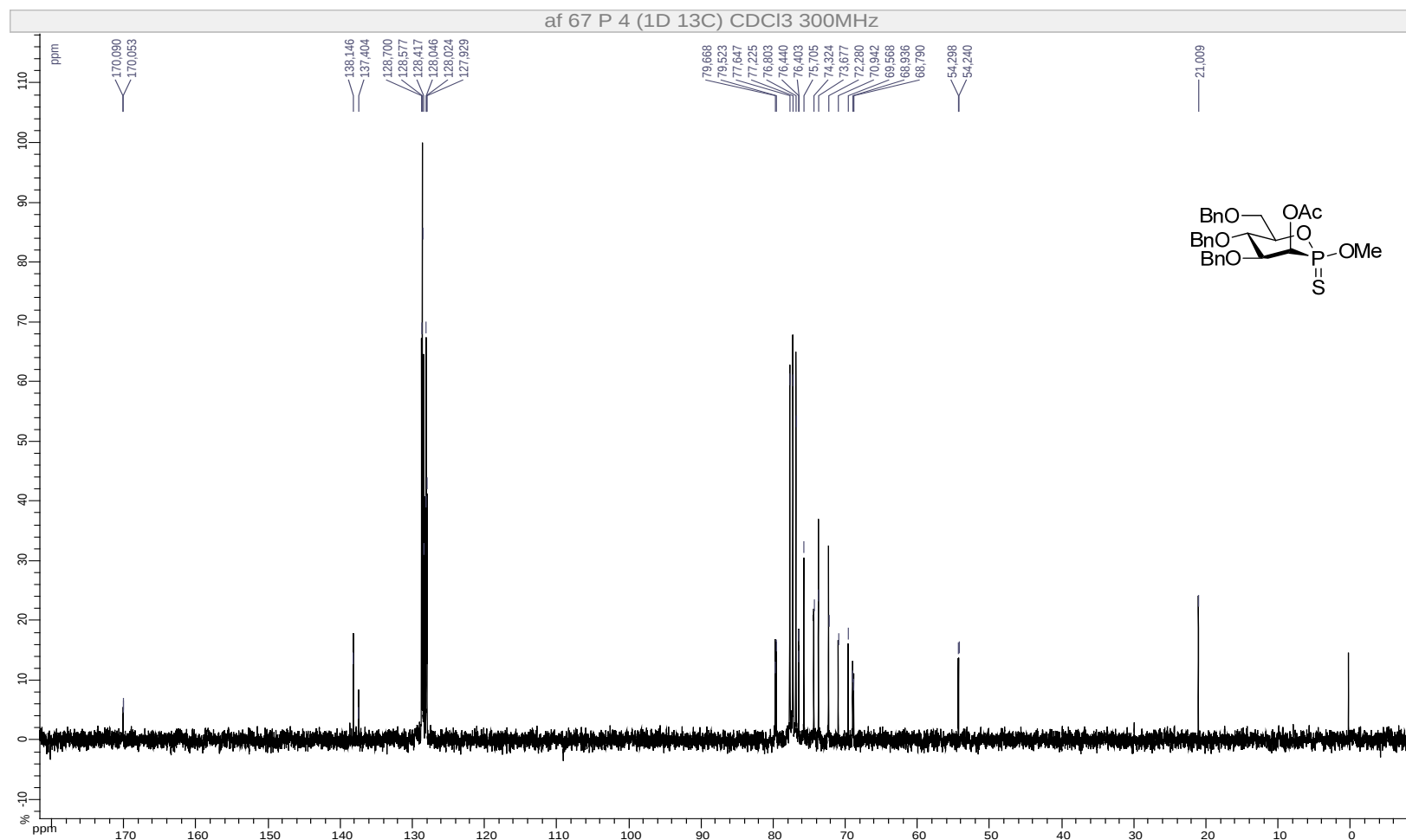
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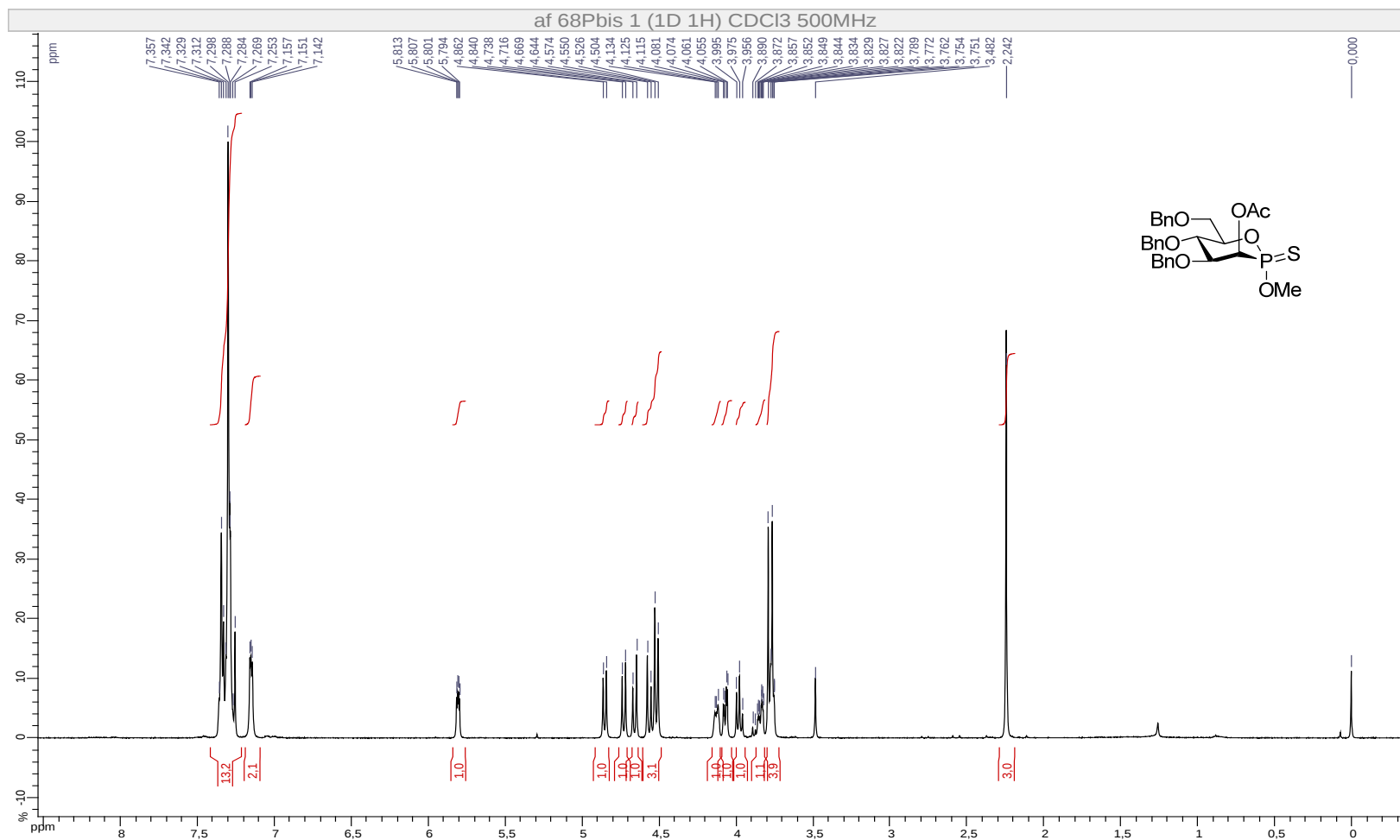
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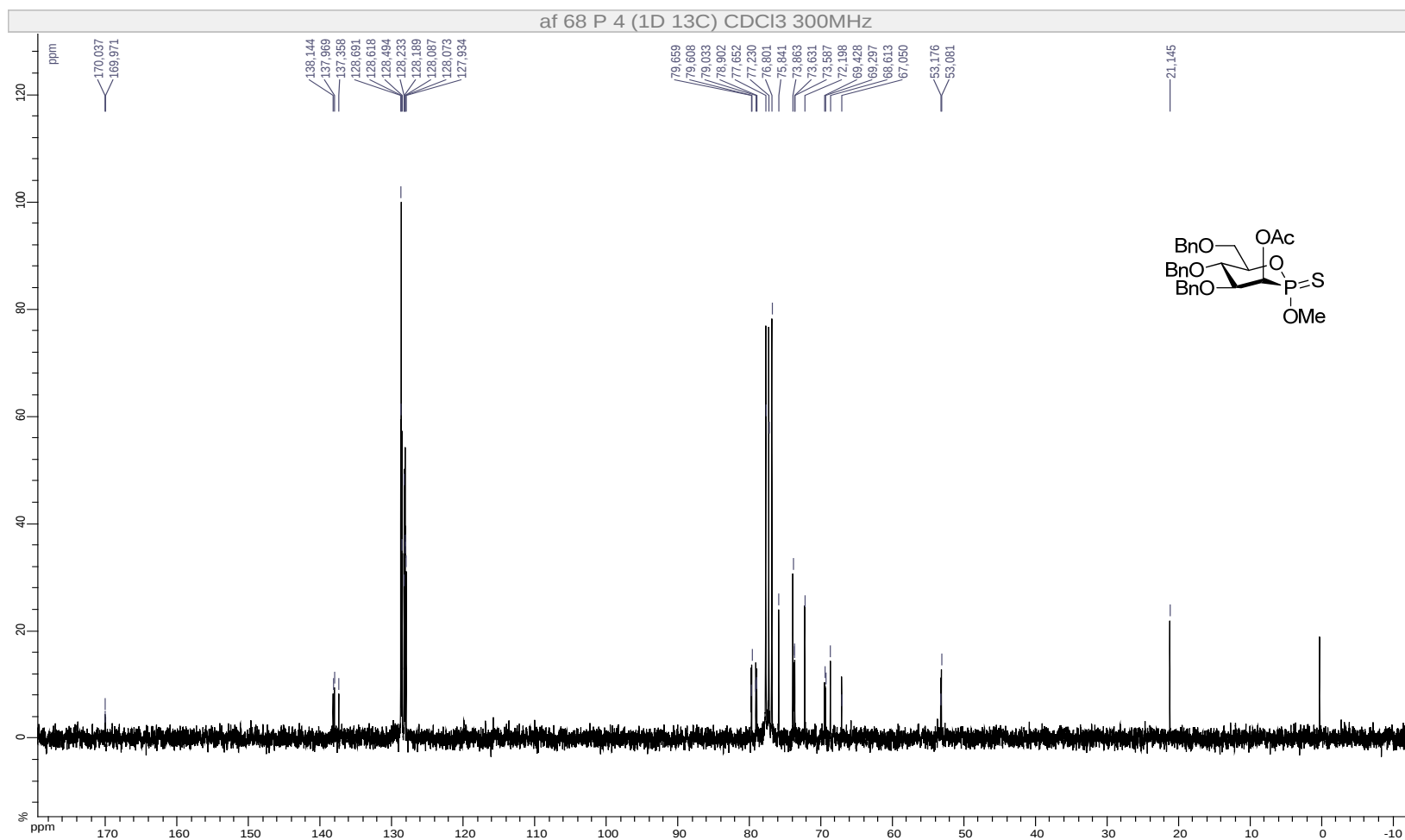
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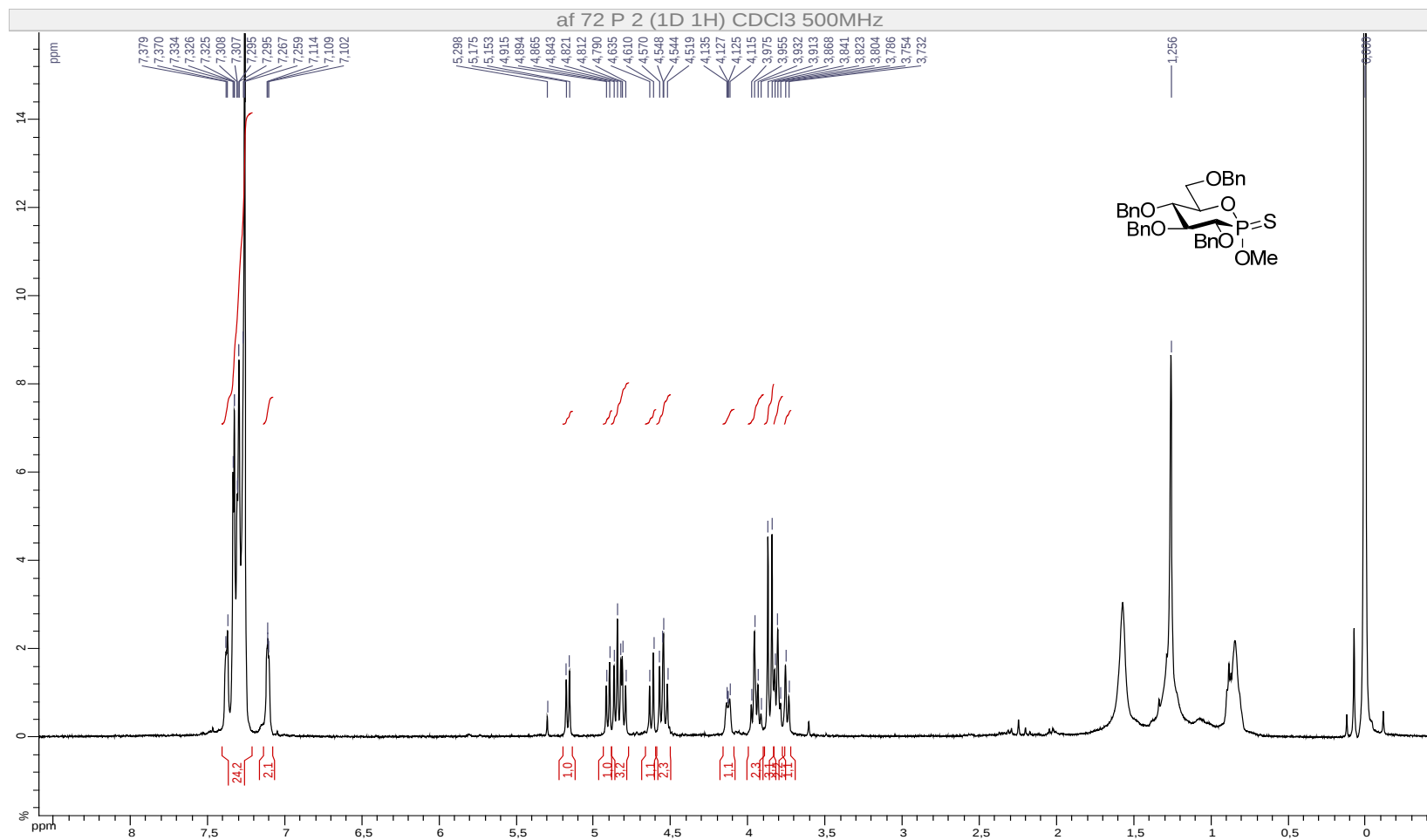
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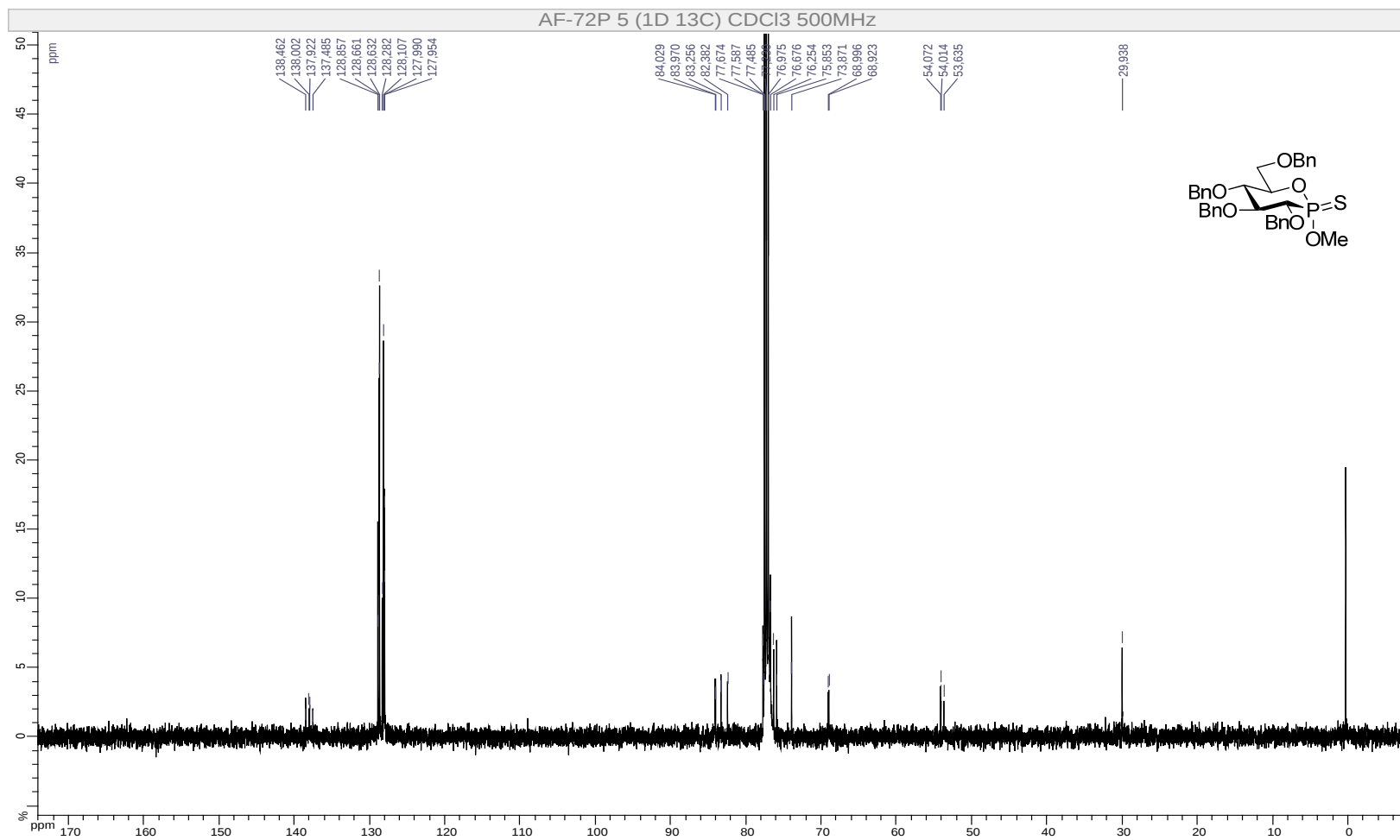
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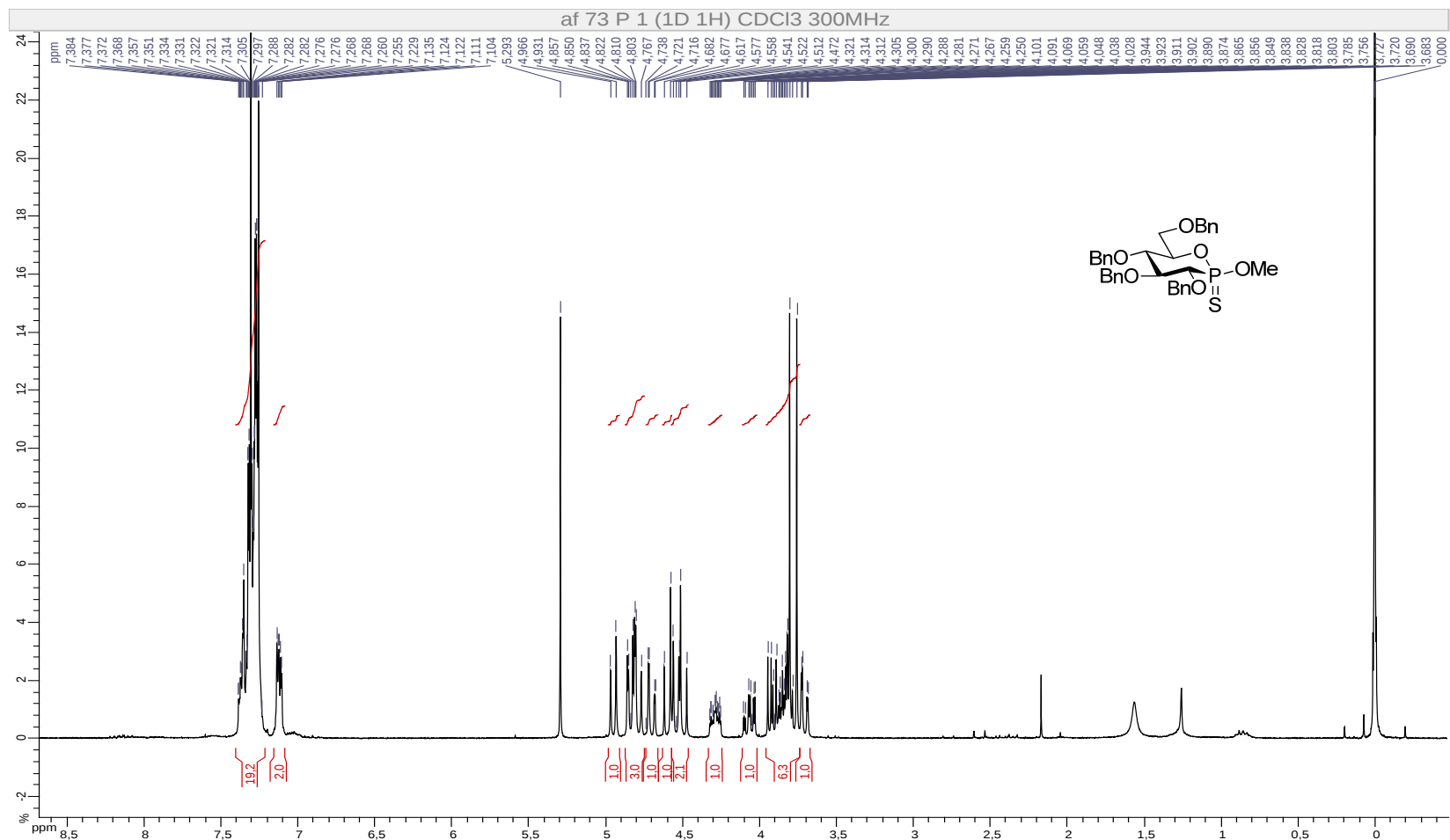
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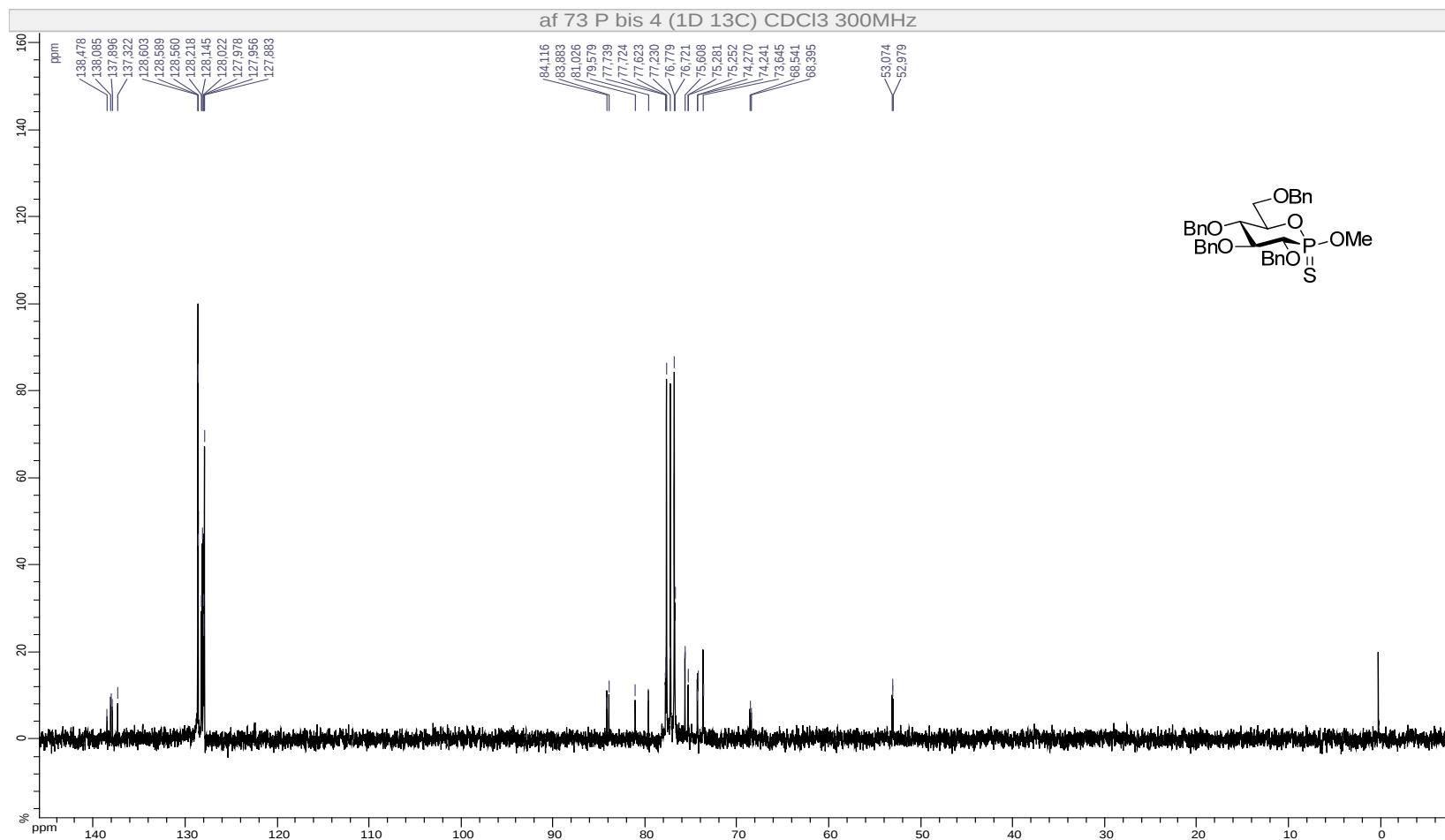
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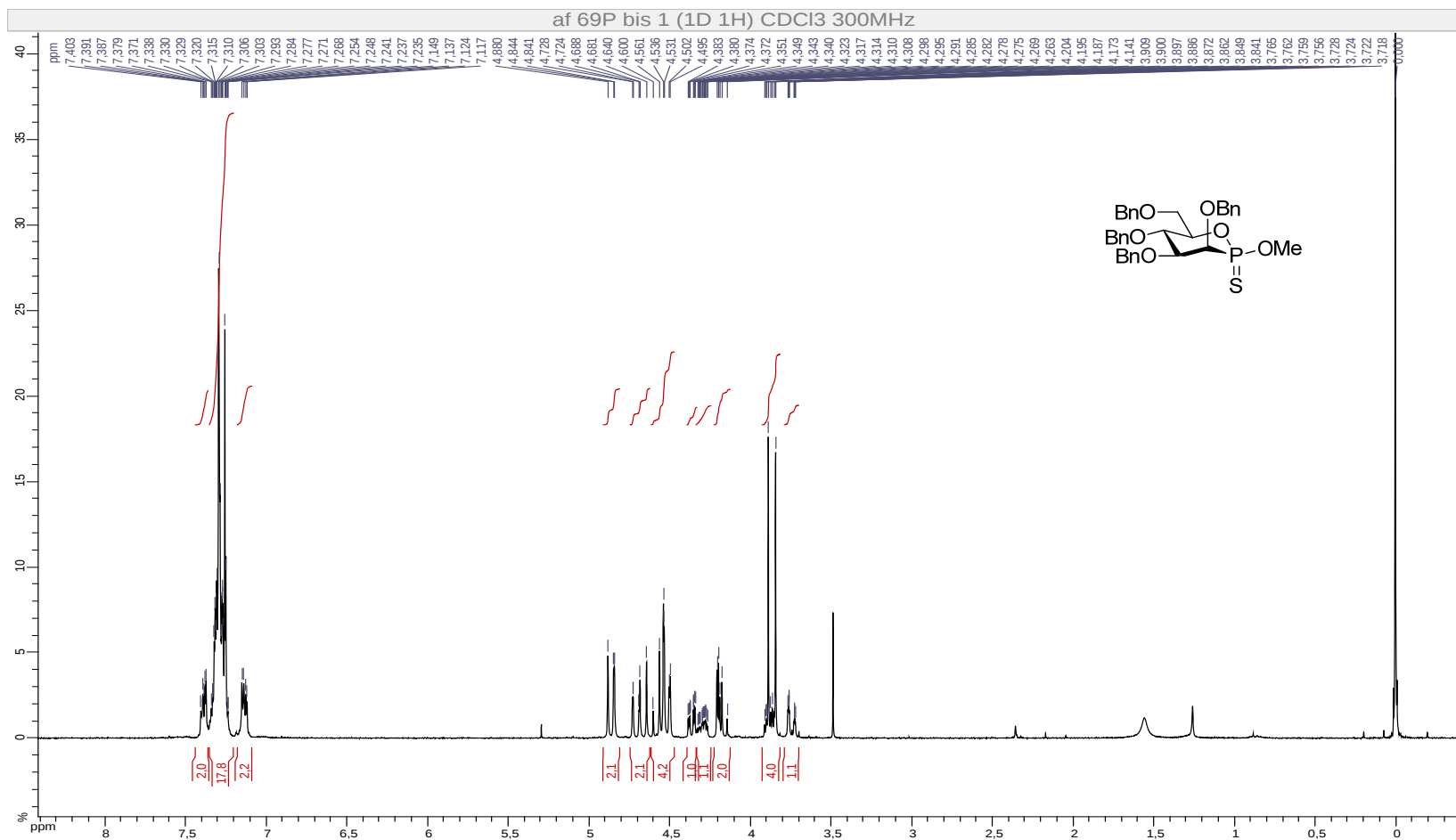
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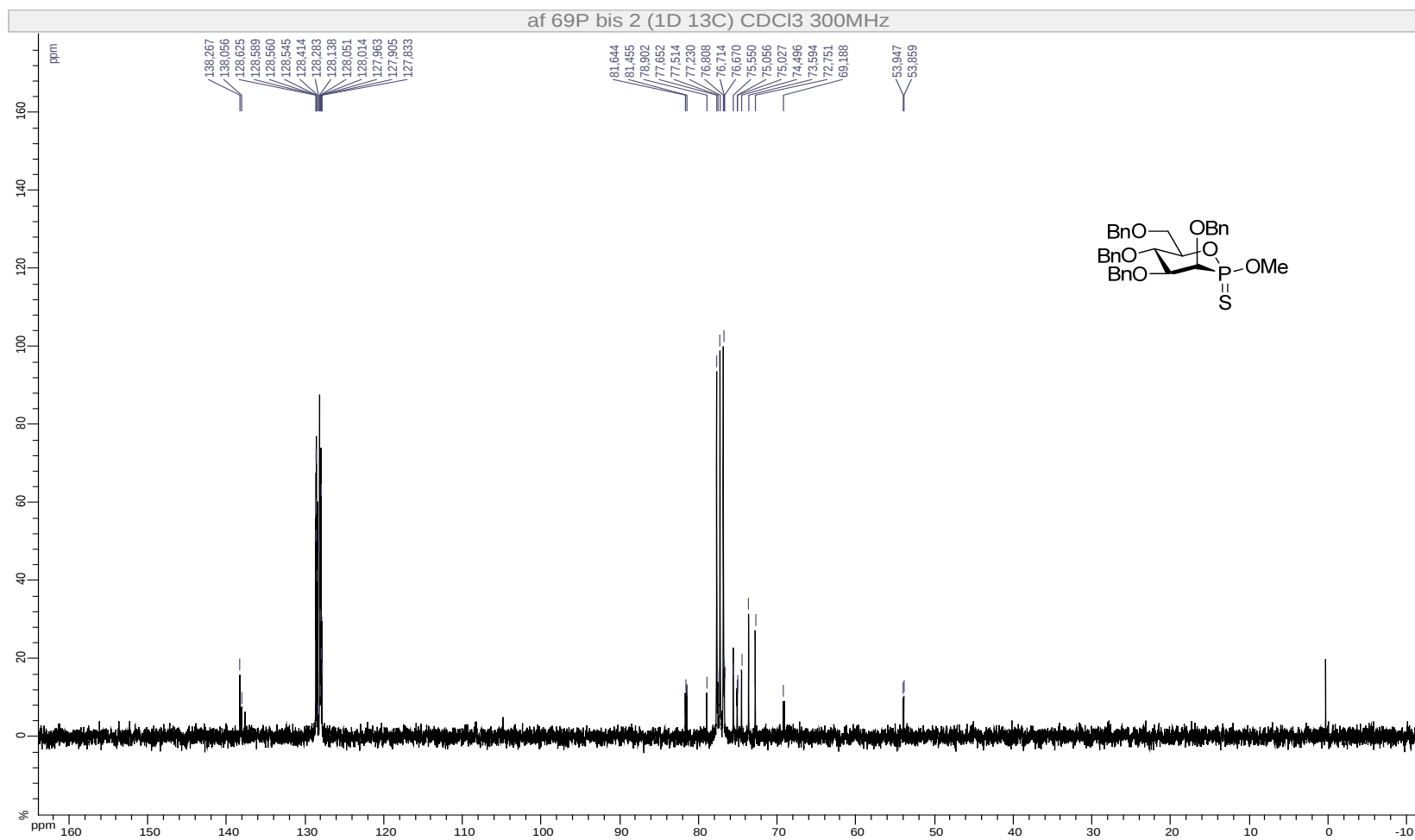
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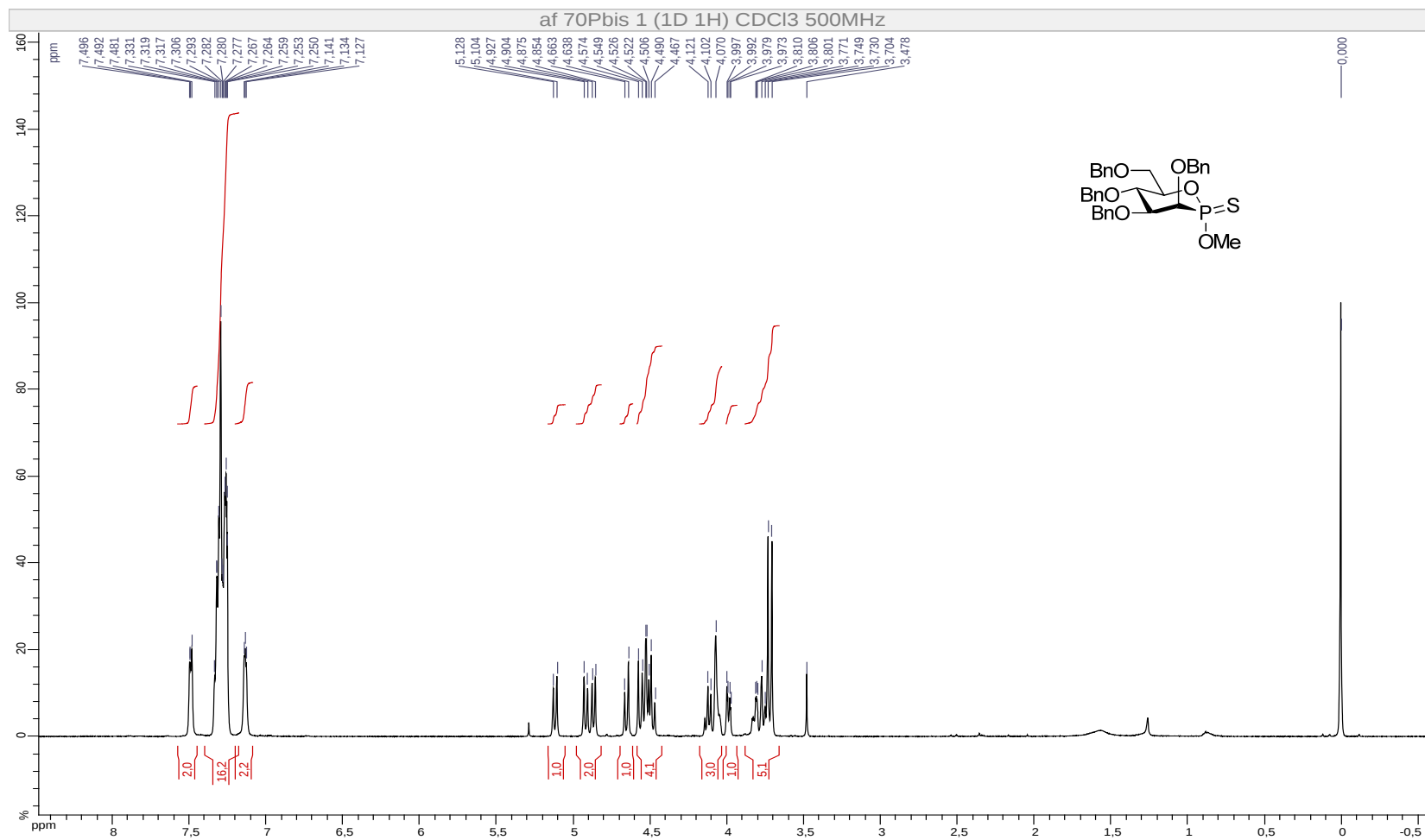
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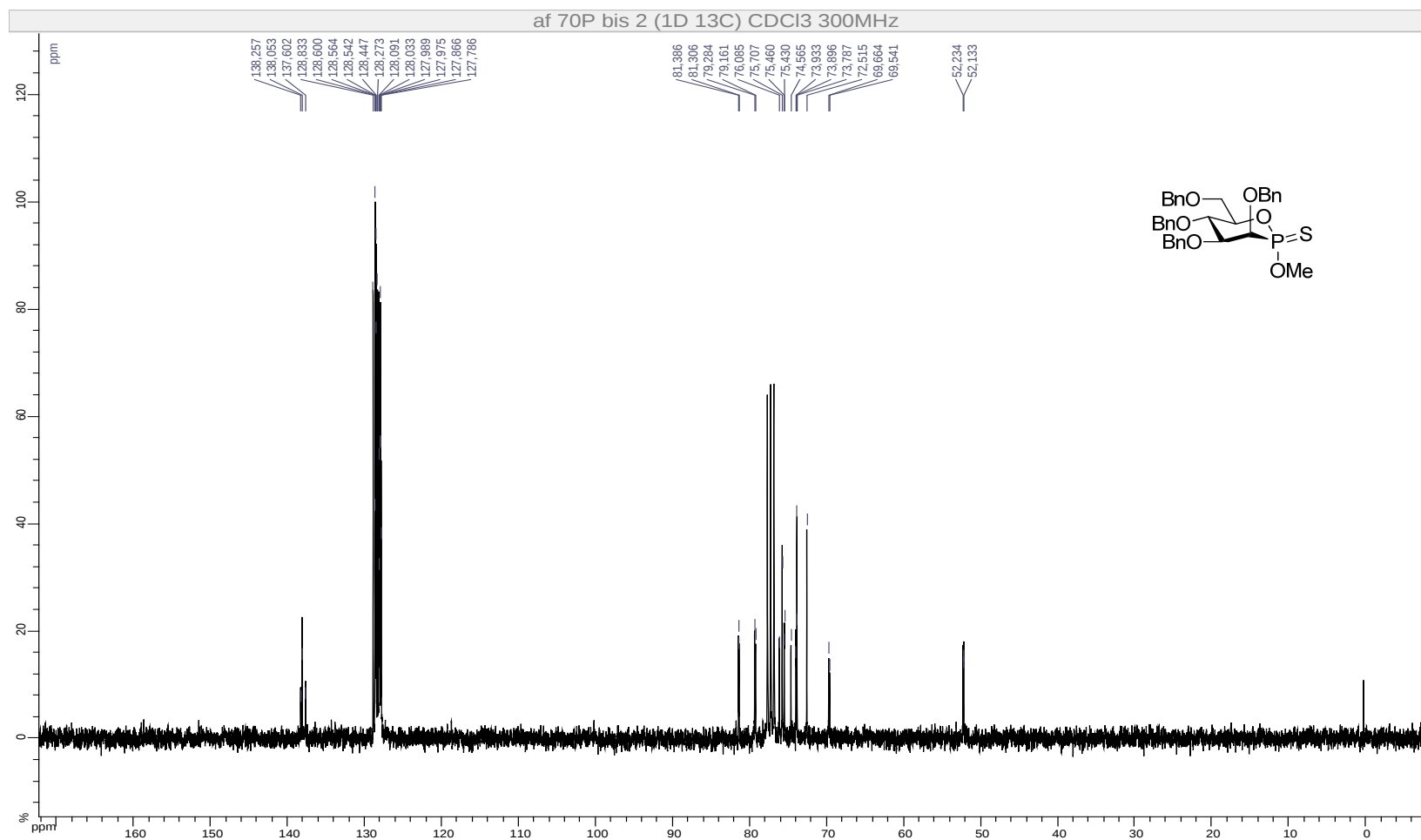
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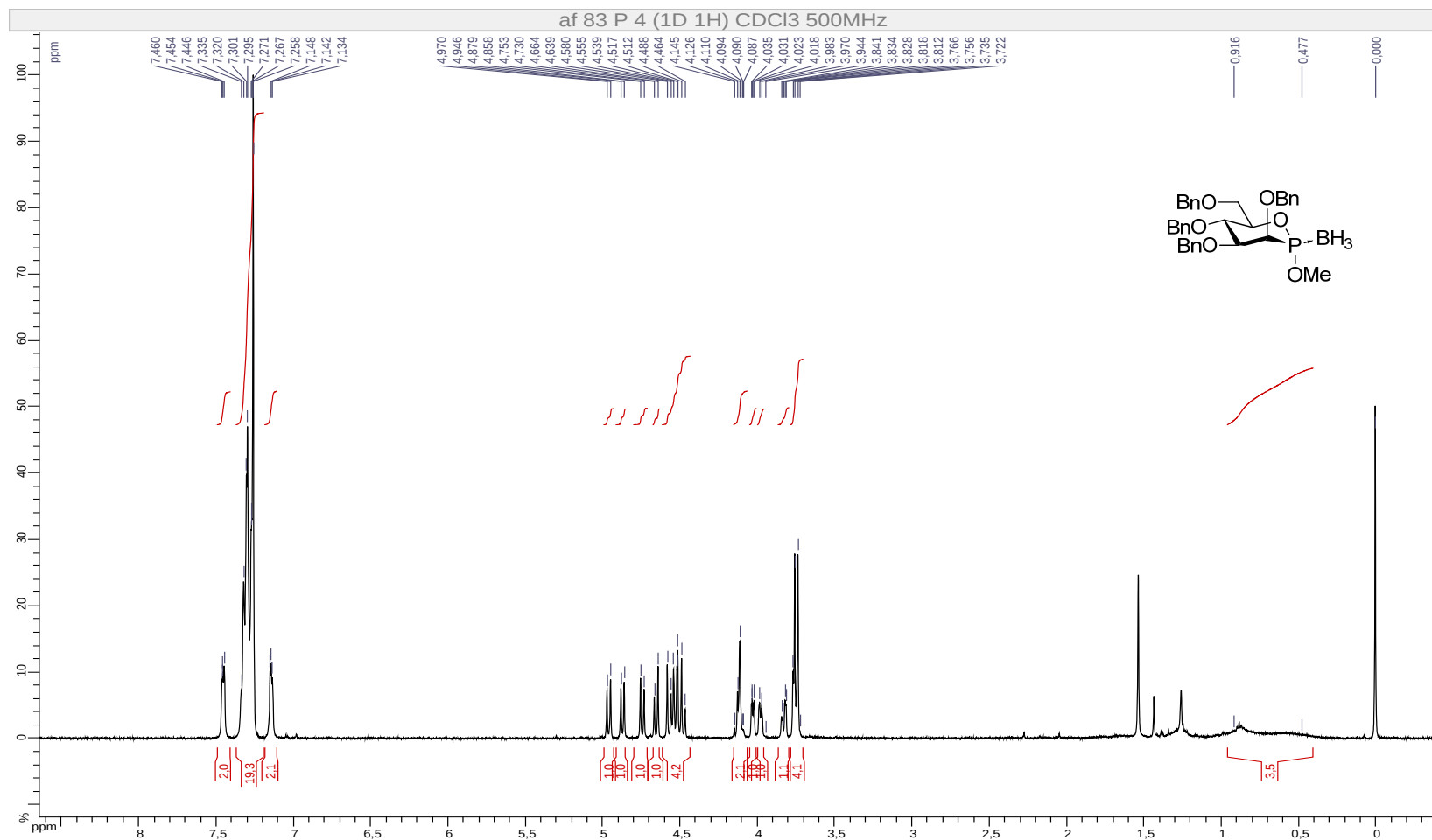
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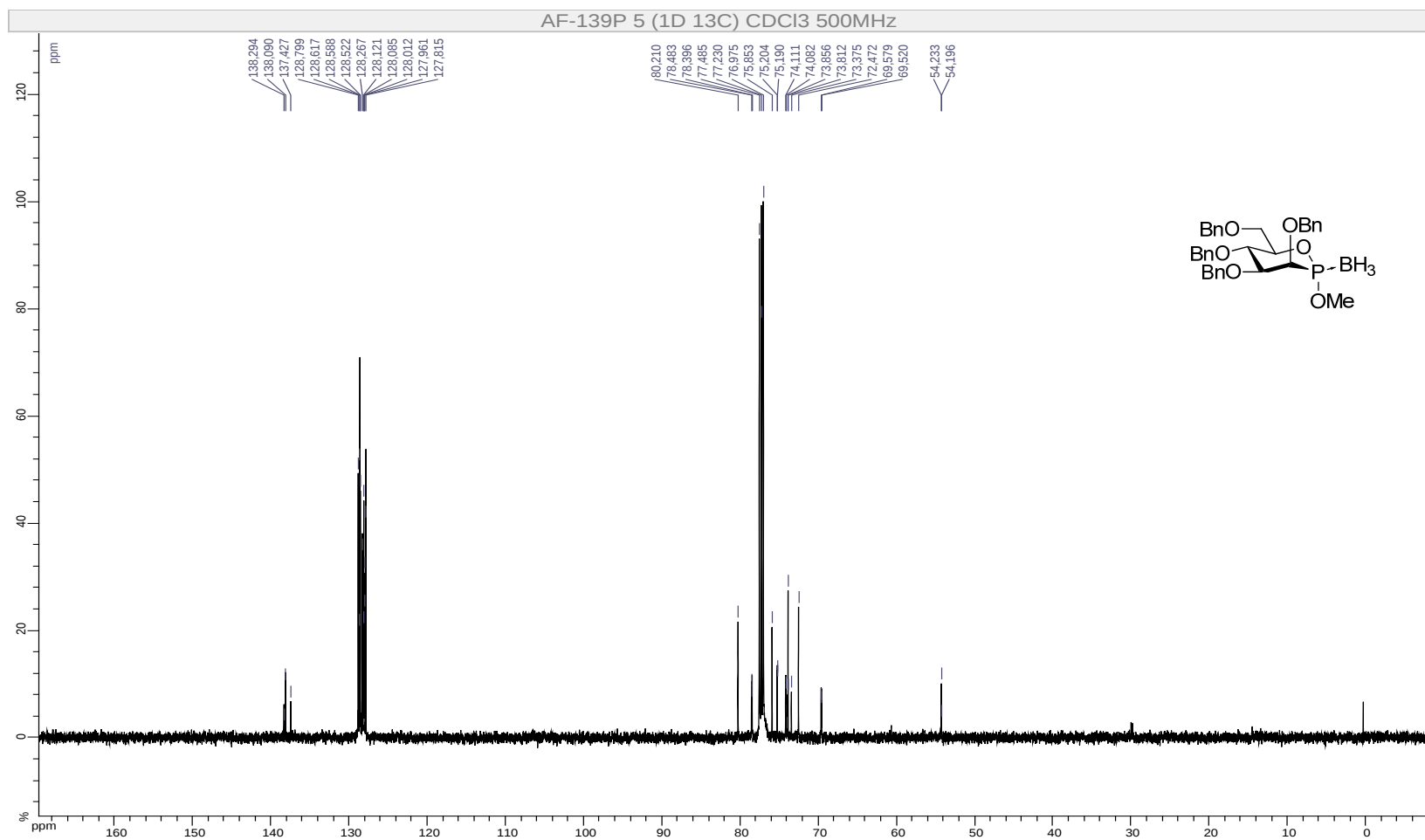
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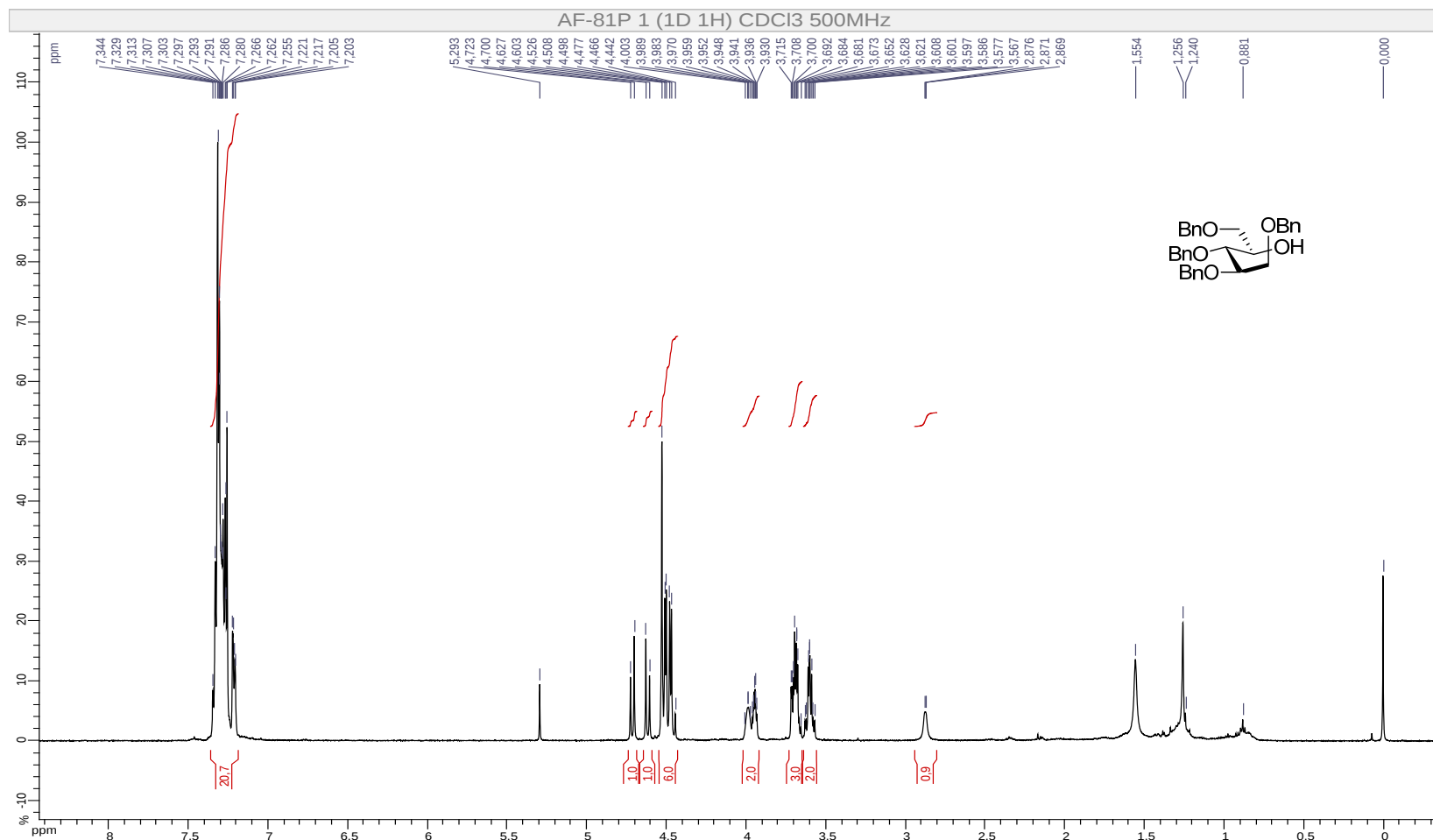
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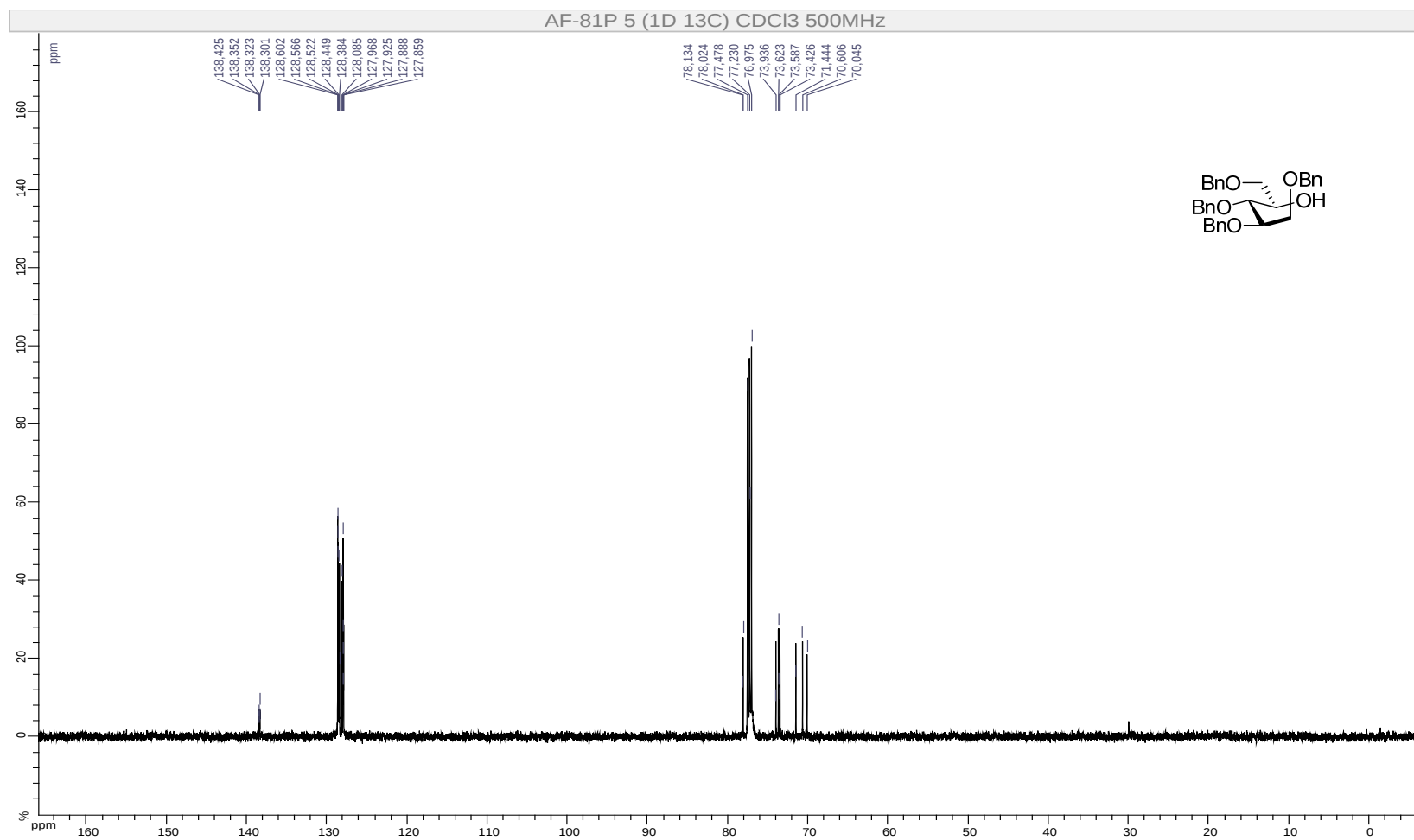
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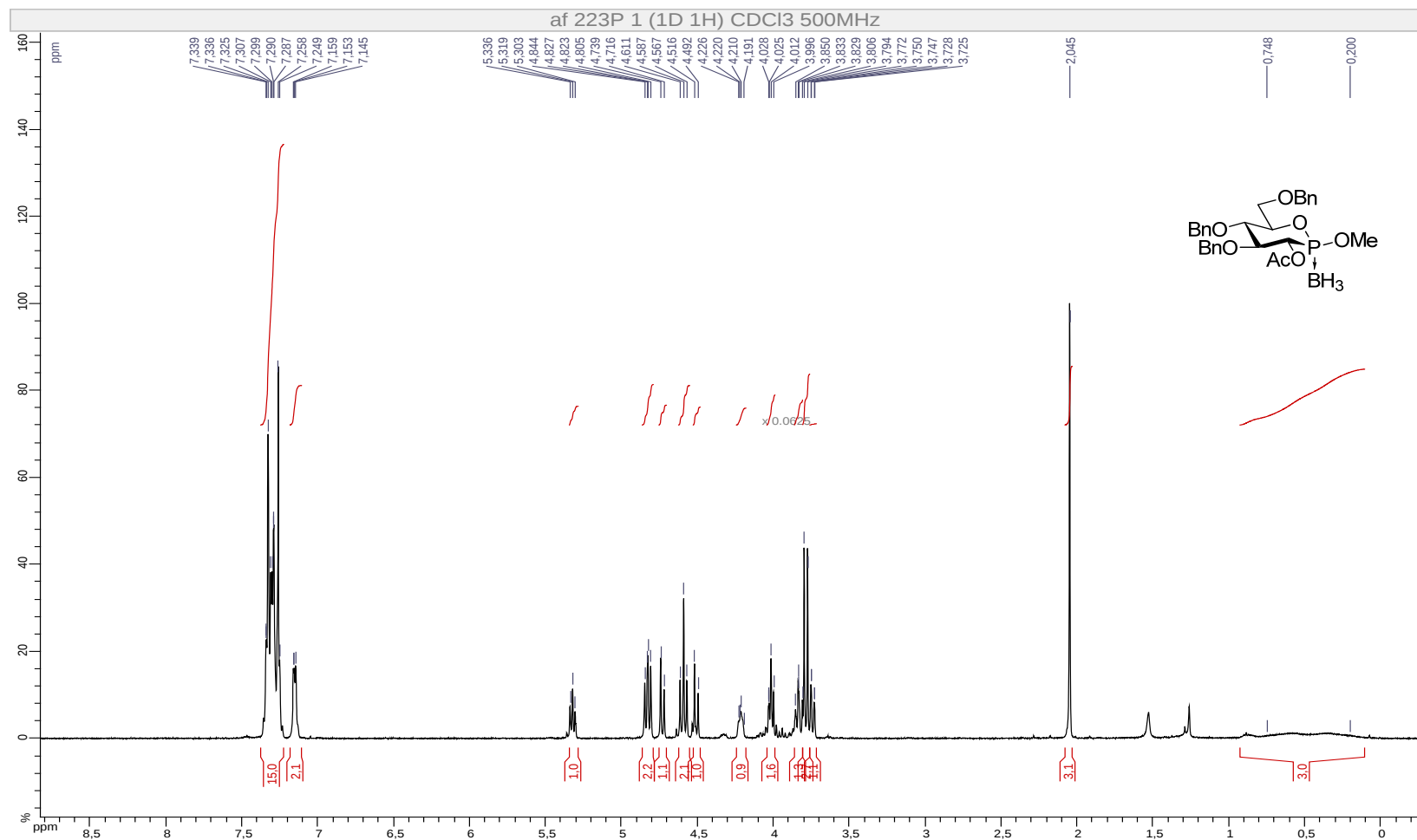
S1, ^1H NMR (500 MHz, CDCl_3)



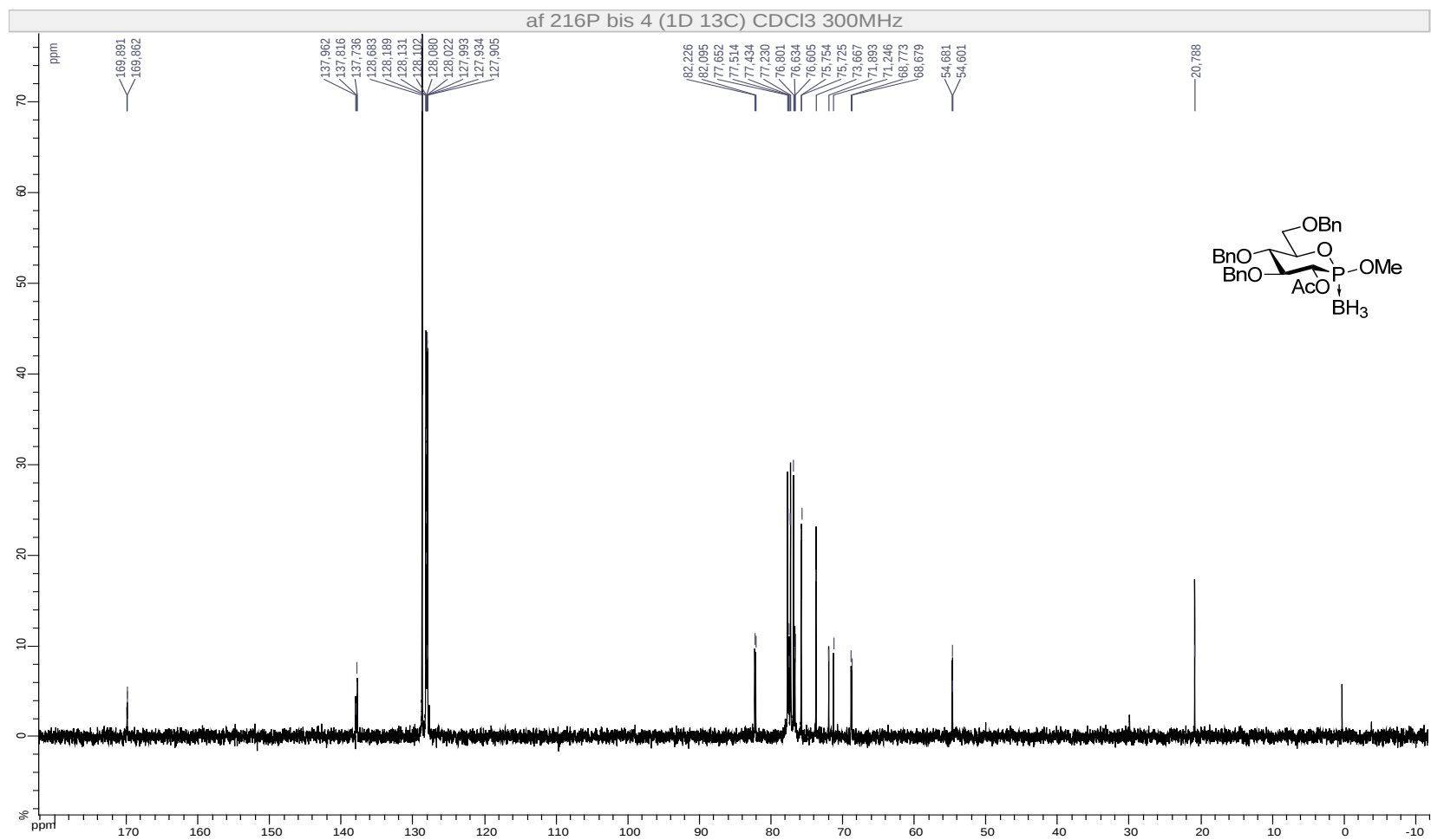
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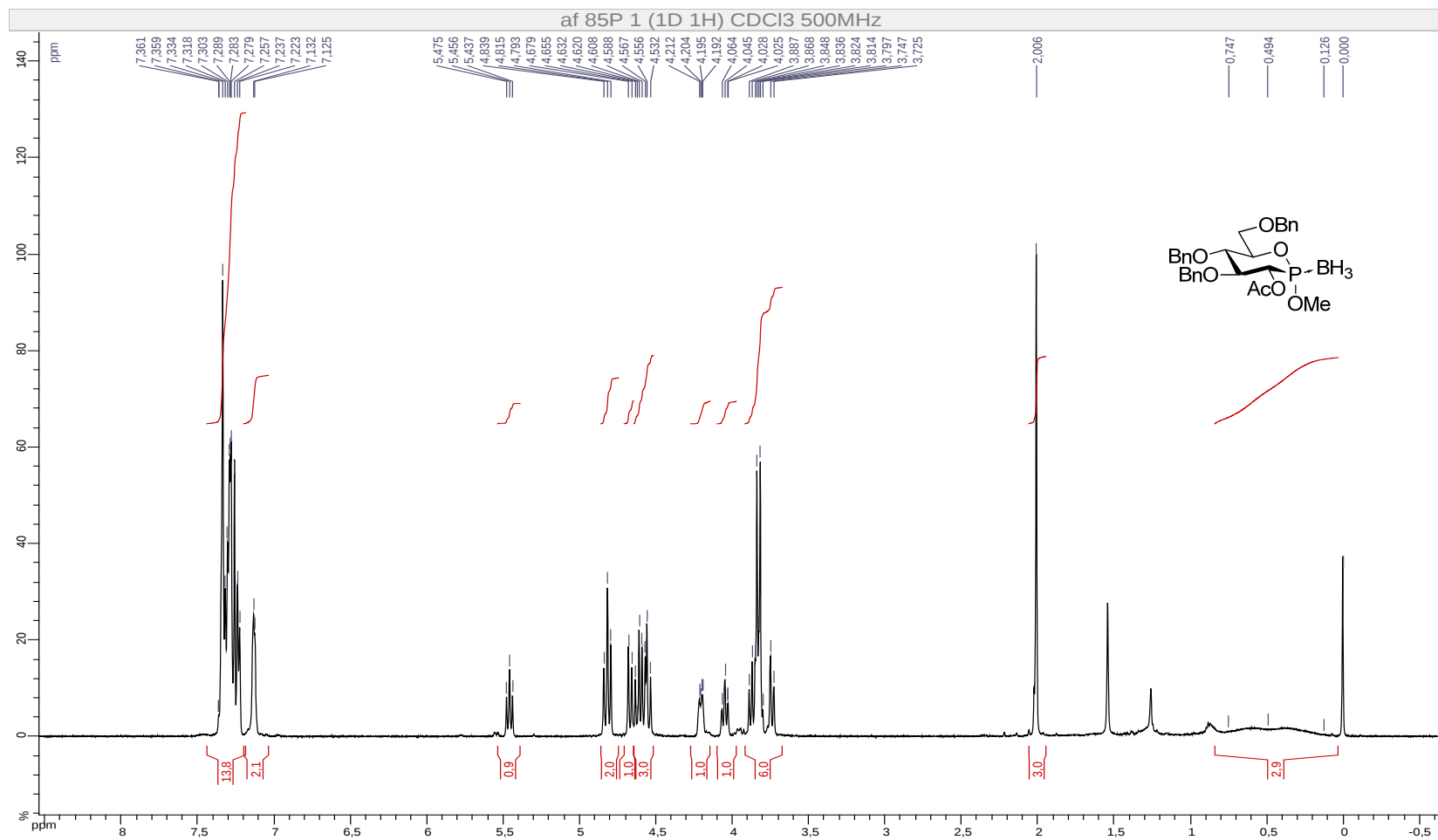
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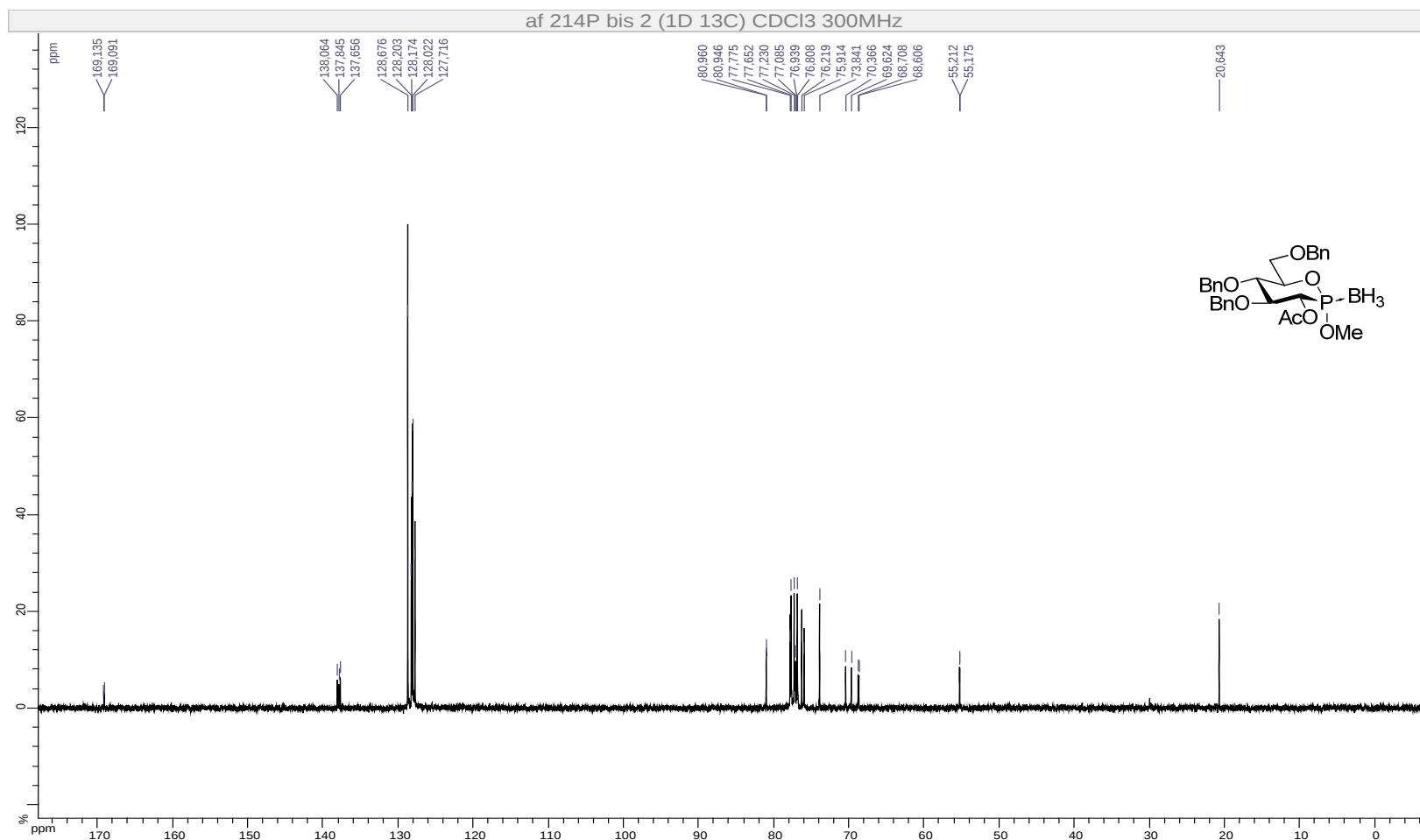
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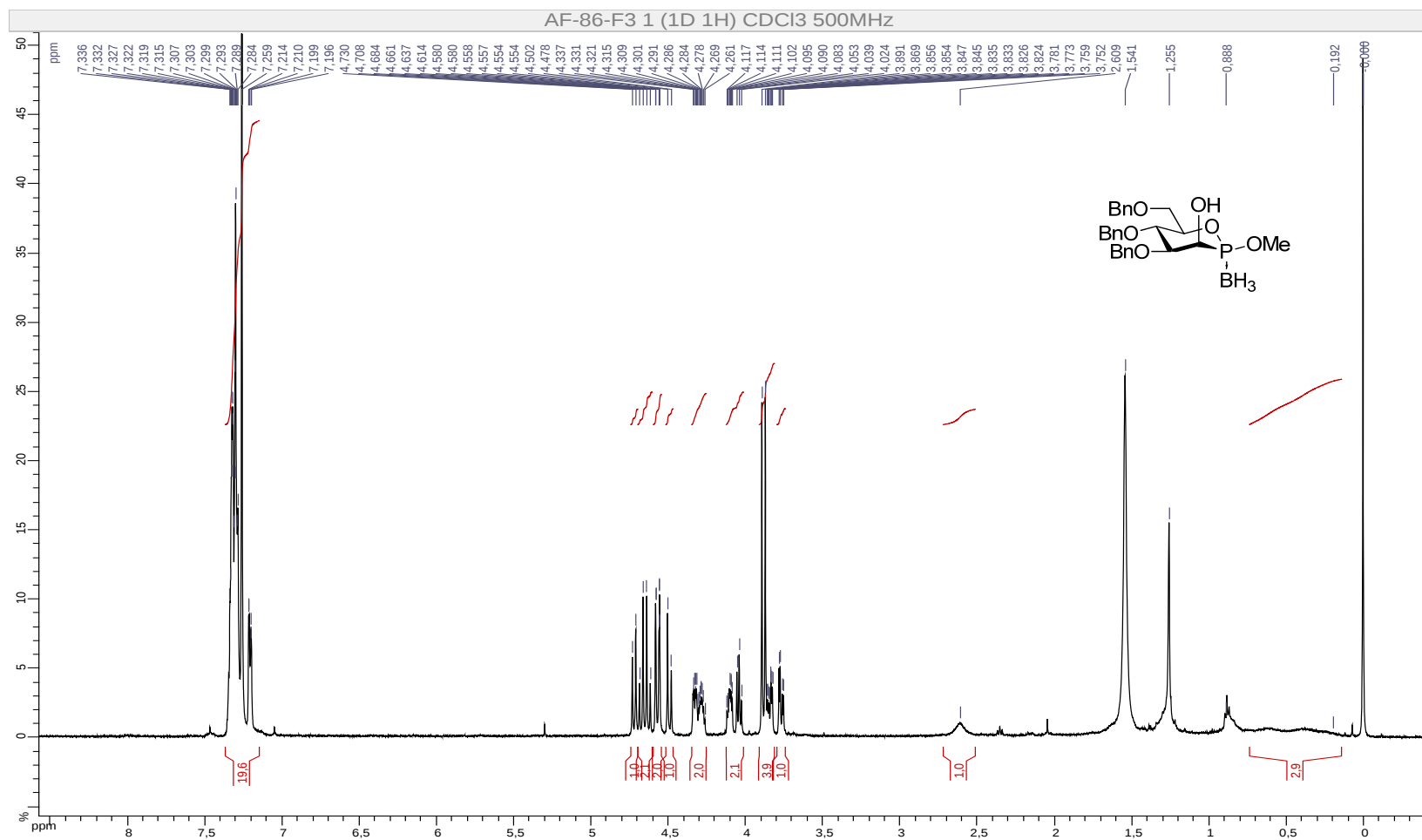
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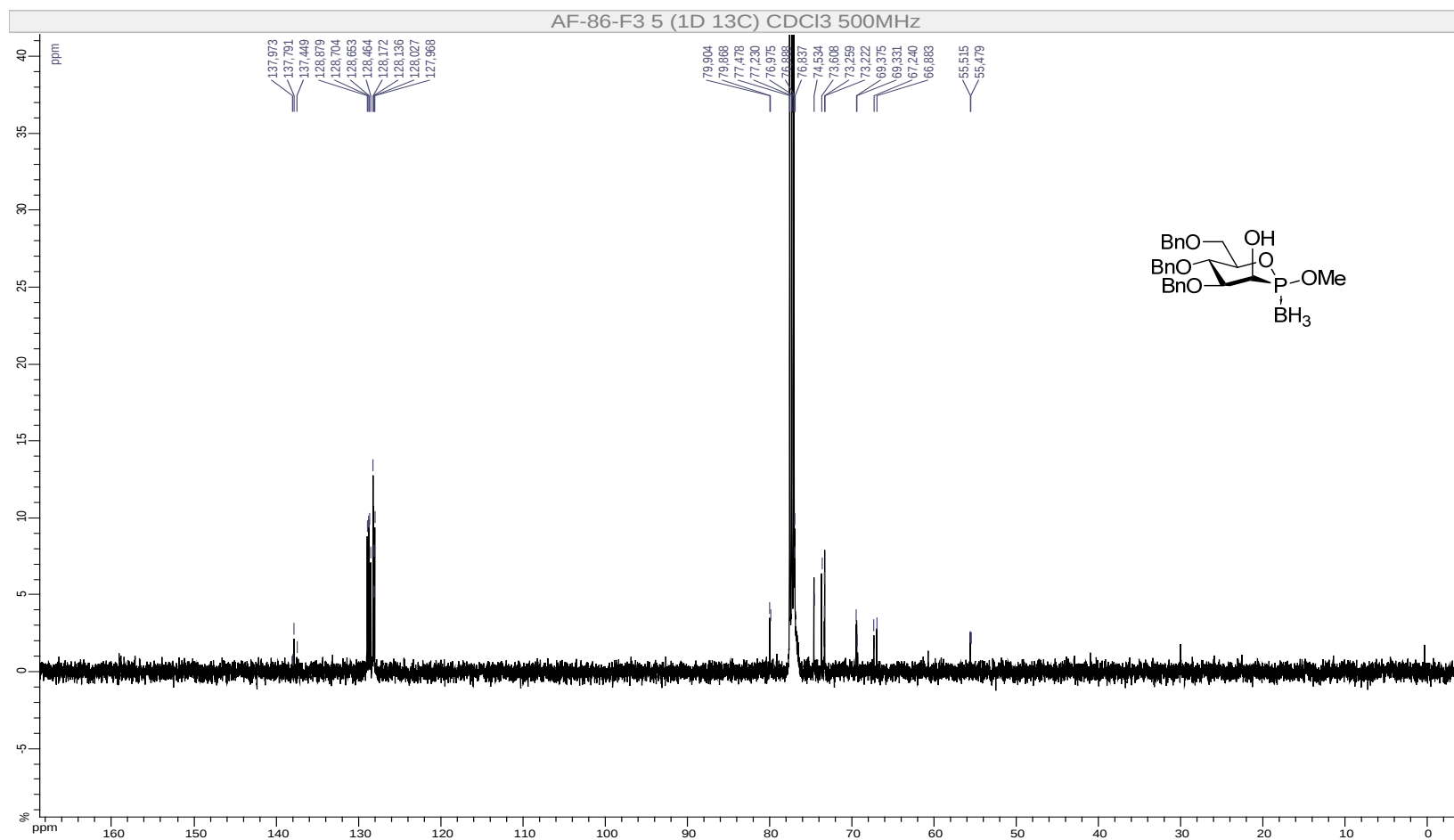
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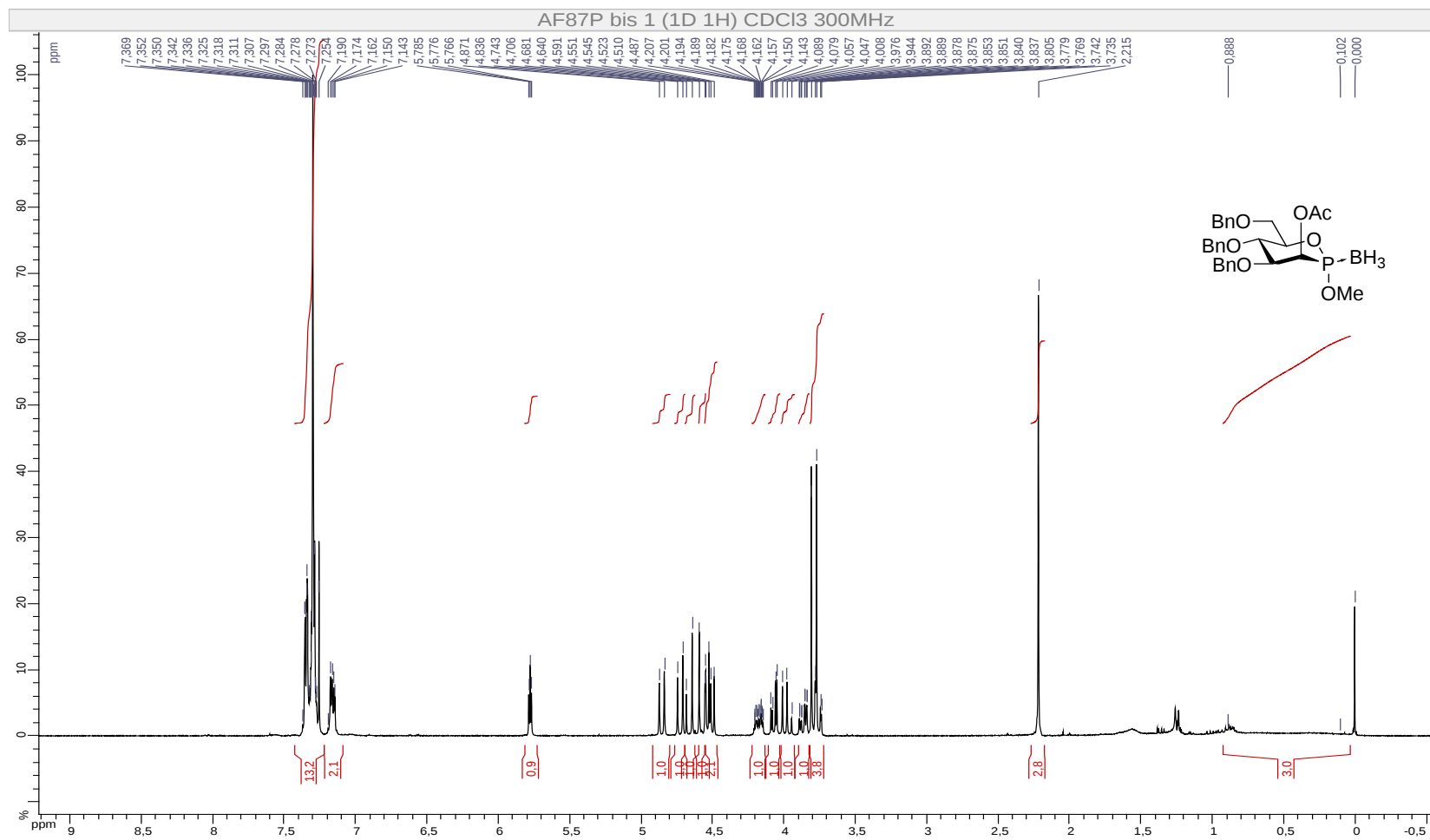
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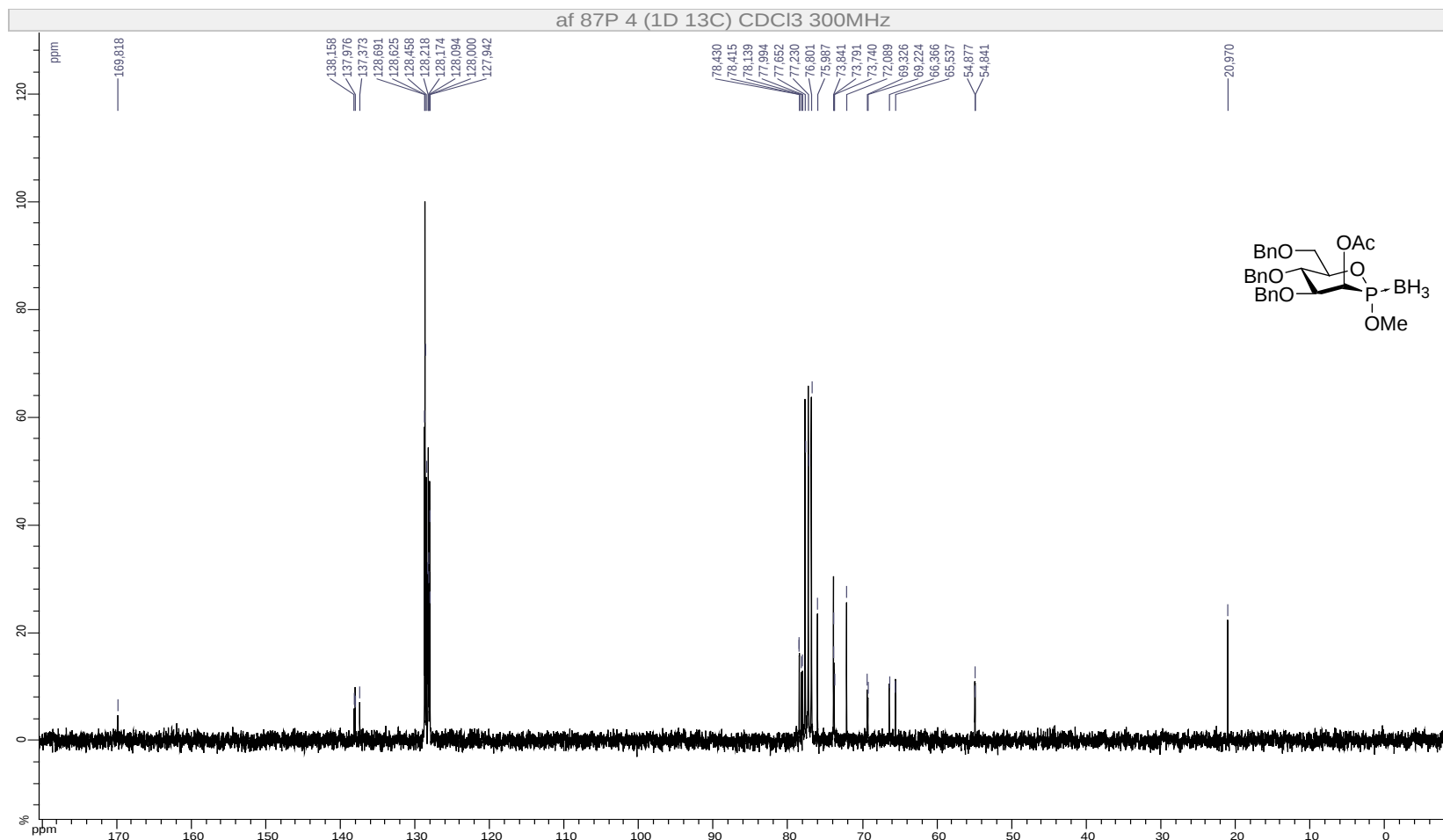
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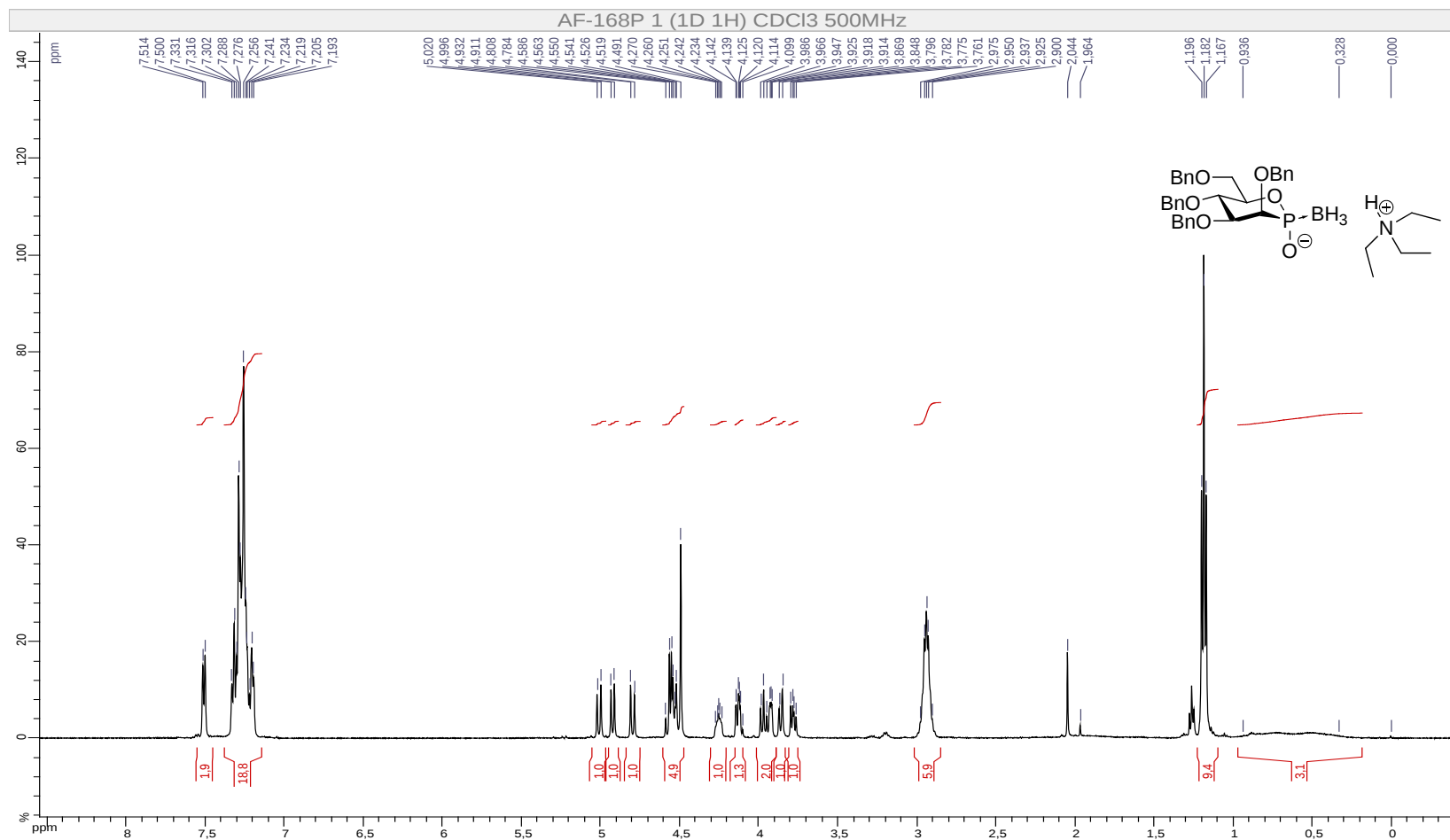
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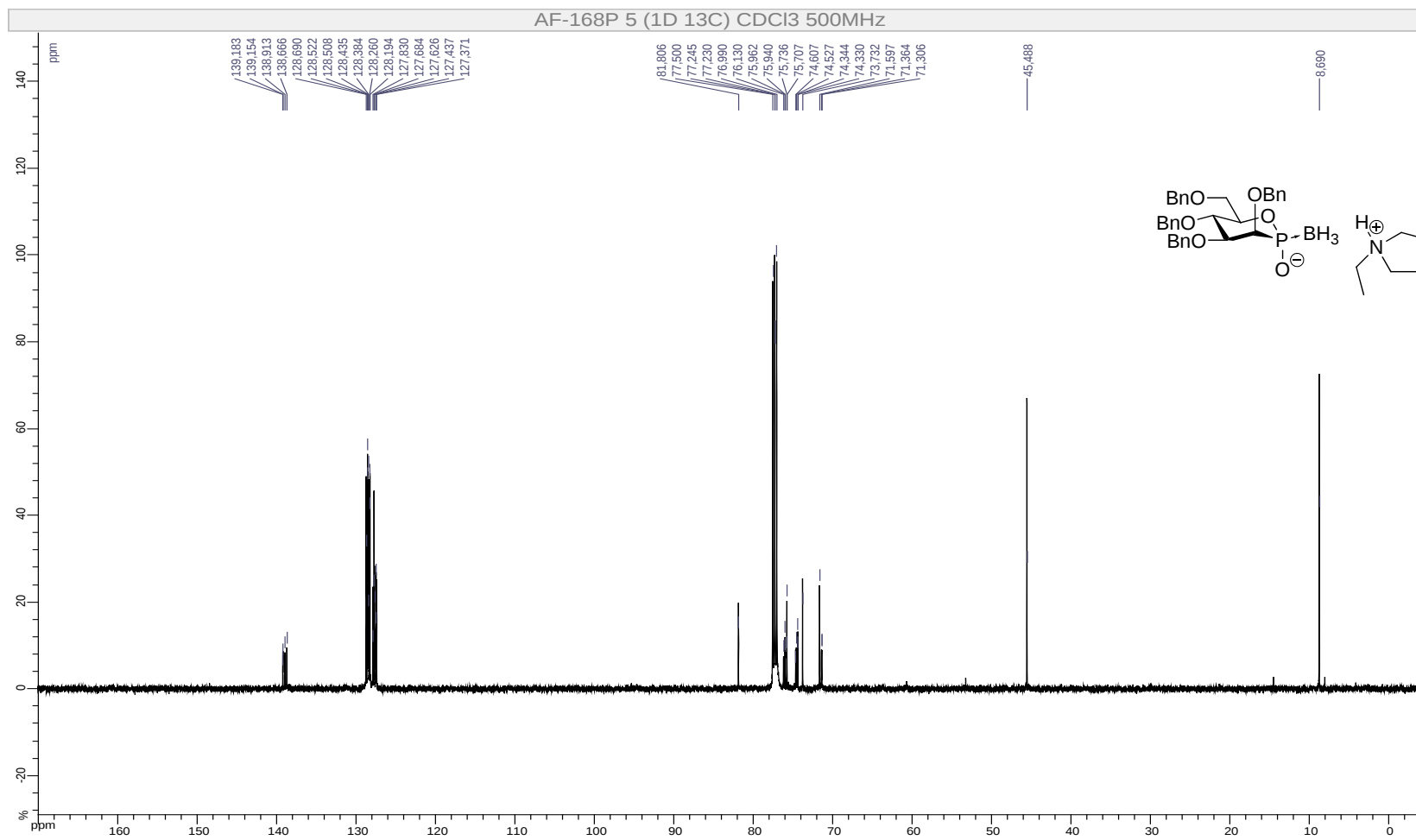
13ma, ^{13}C NMR (75 MHz, CDCl_3)



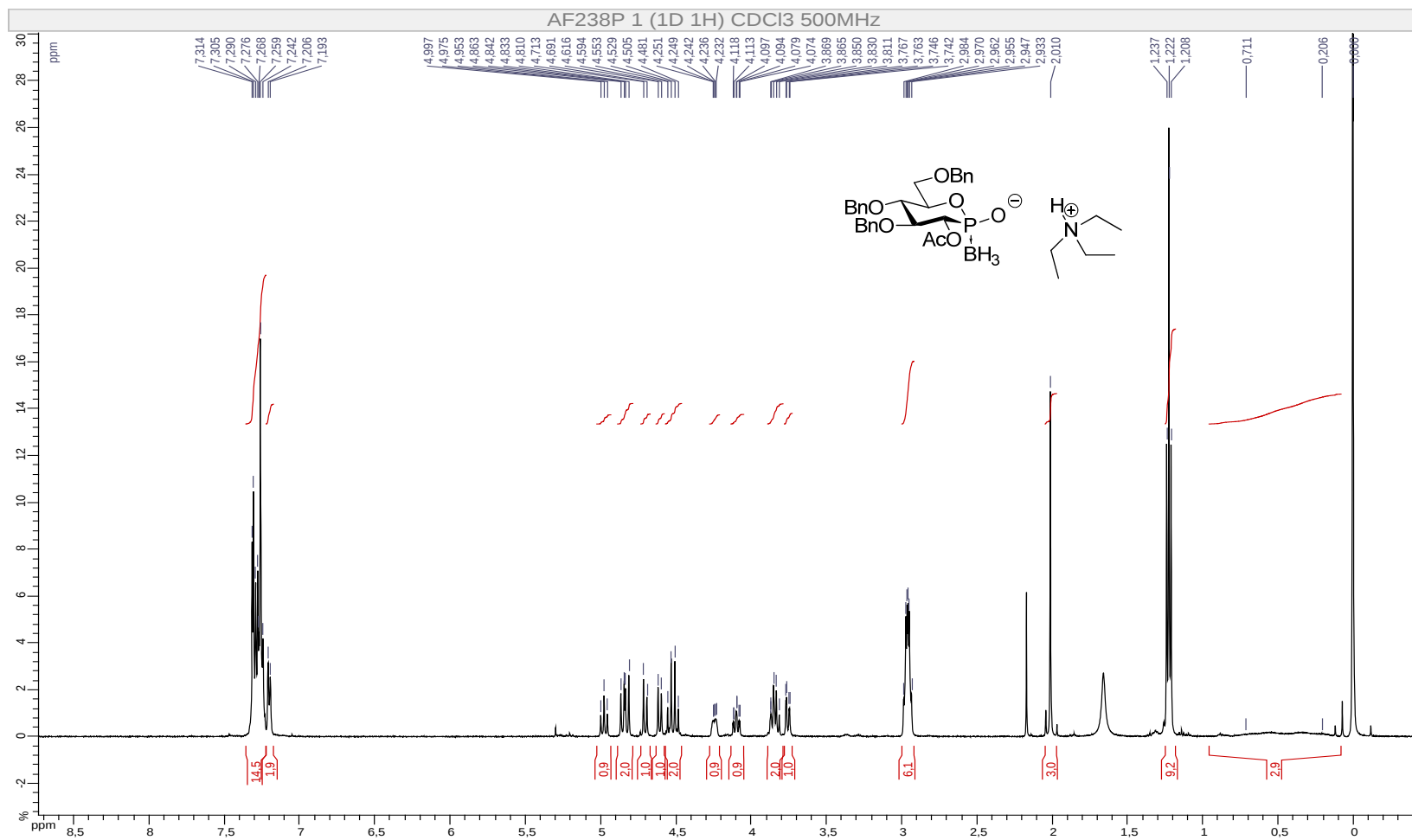
16ma, ^1H NMR (500 MHz, CDCl_3)



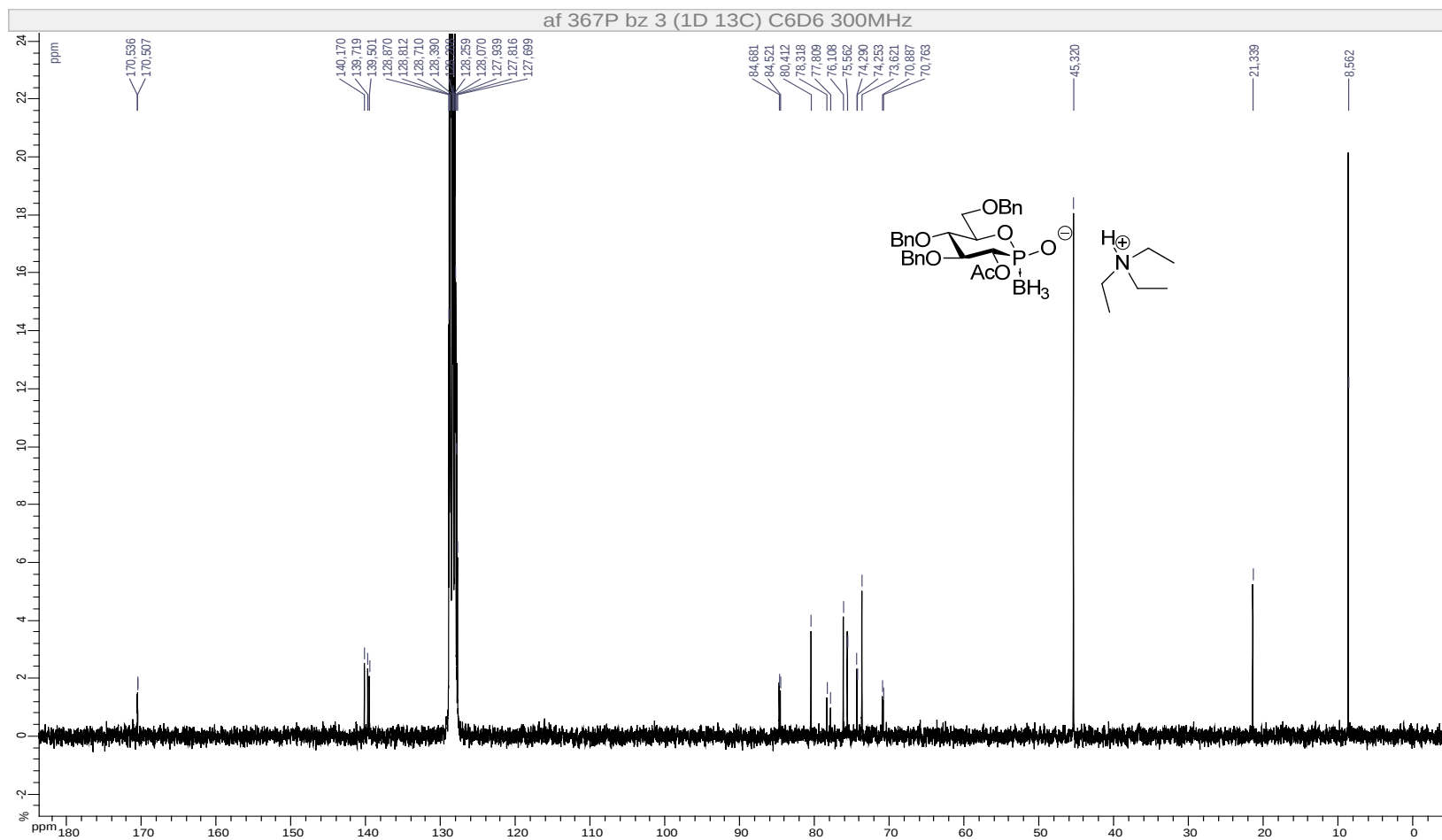
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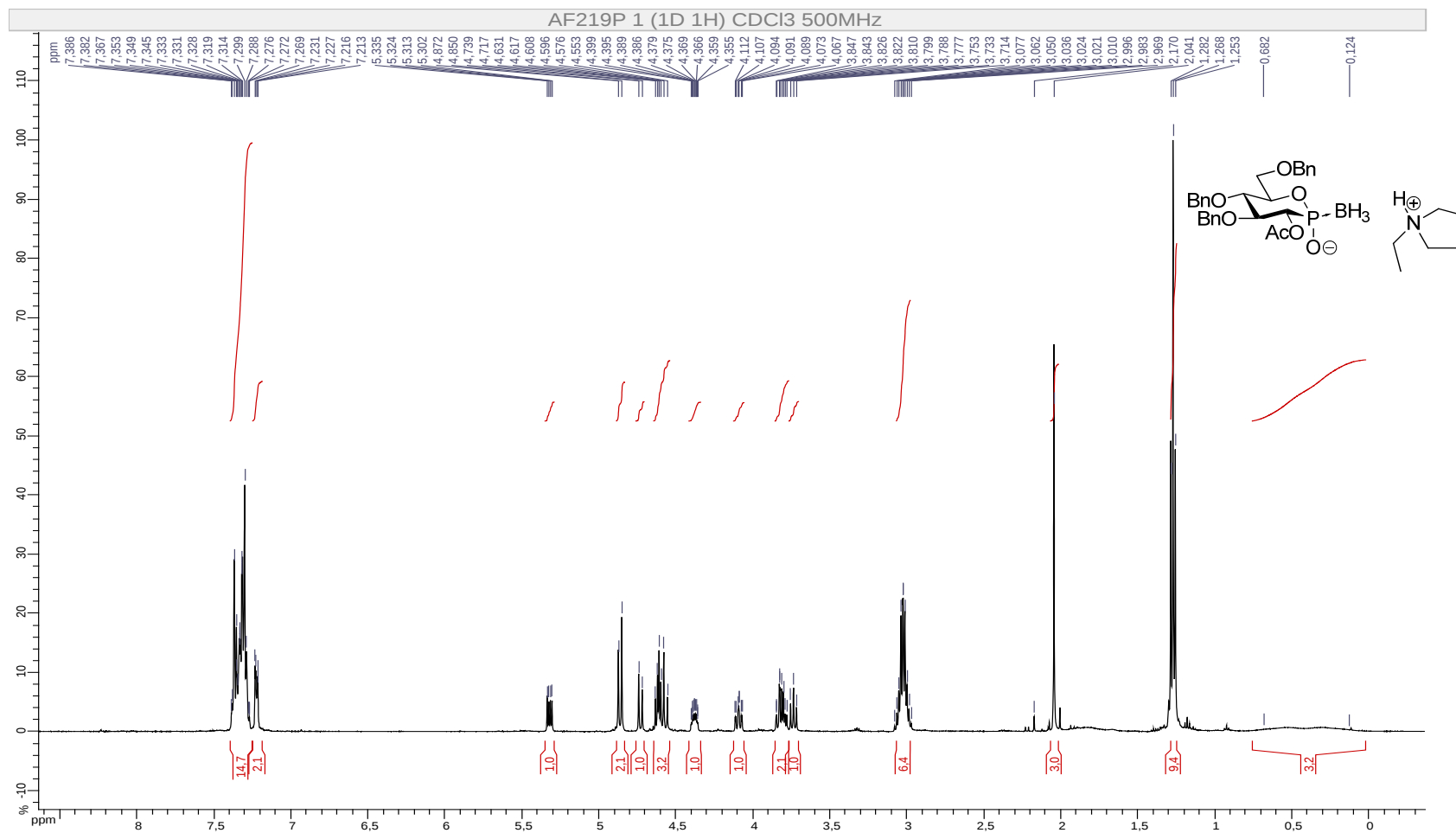
15gβ, ¹H NMR (500 MHz, CDCl₃)



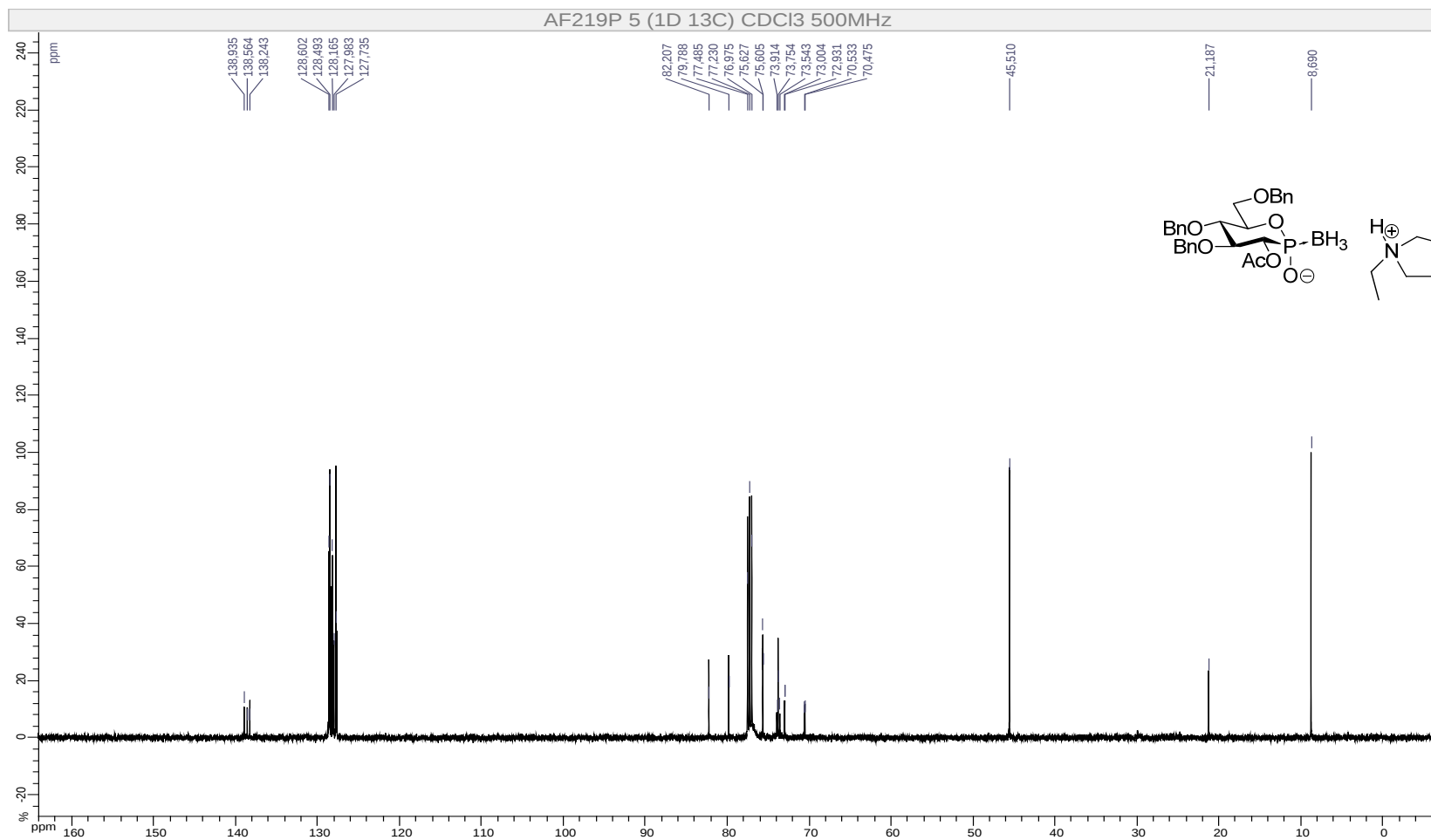
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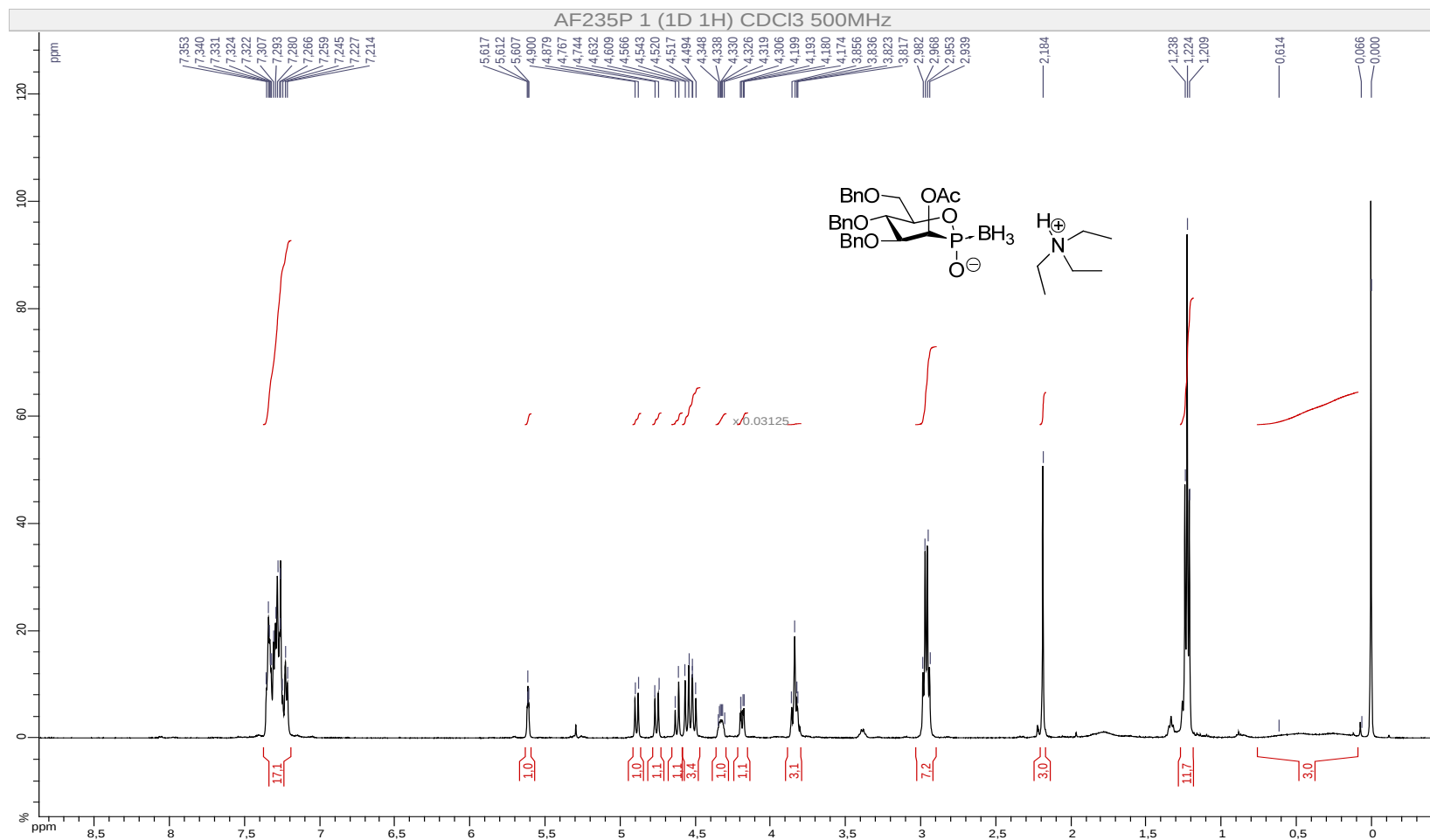
15g α , ^1H NMR (500 MHz, CDCl_3)



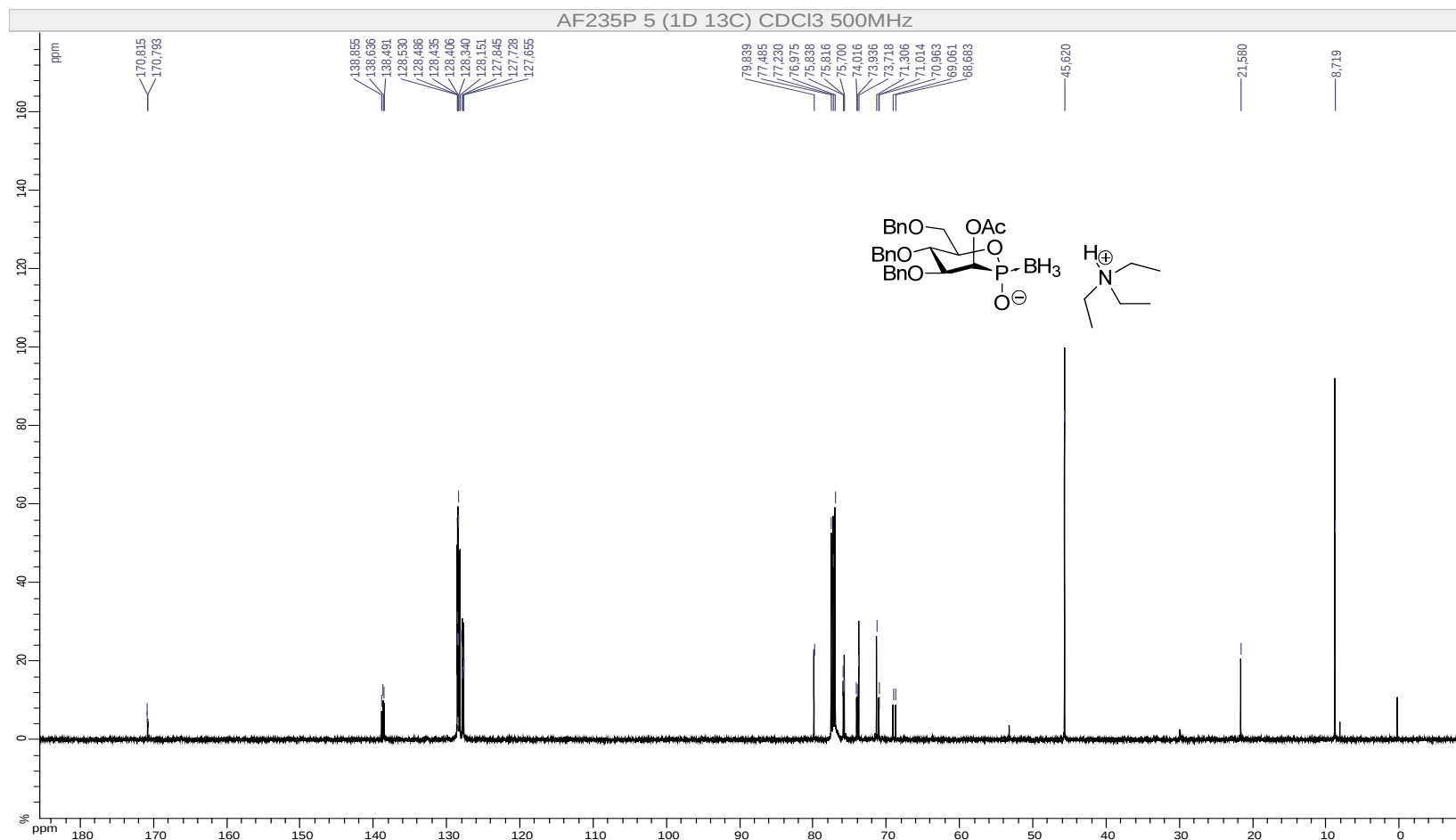
15g α , ^{13}C NMR (125 MHz, CDCl_3)



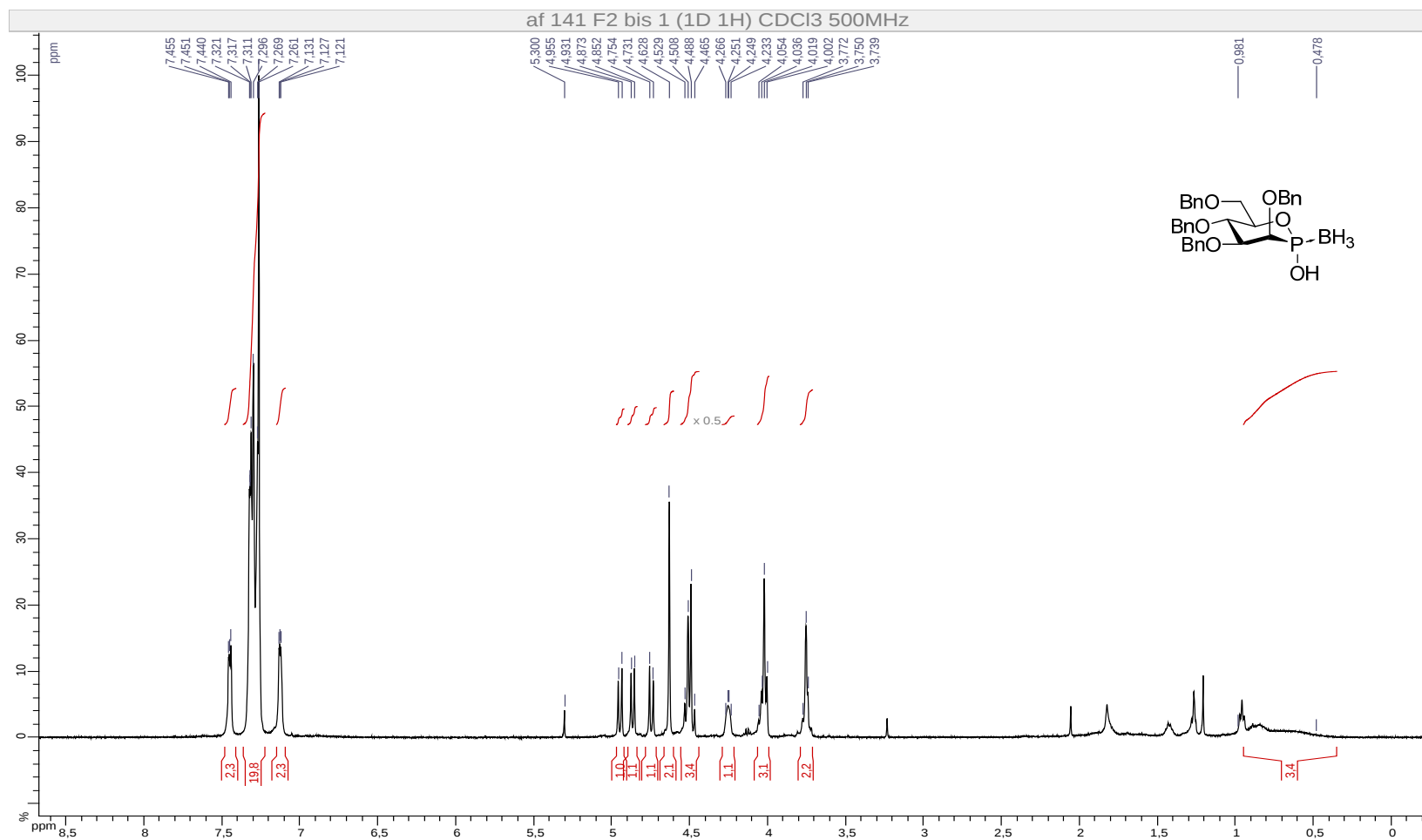
15ma, ^1H NMR (500 MHz, CDCl_3)



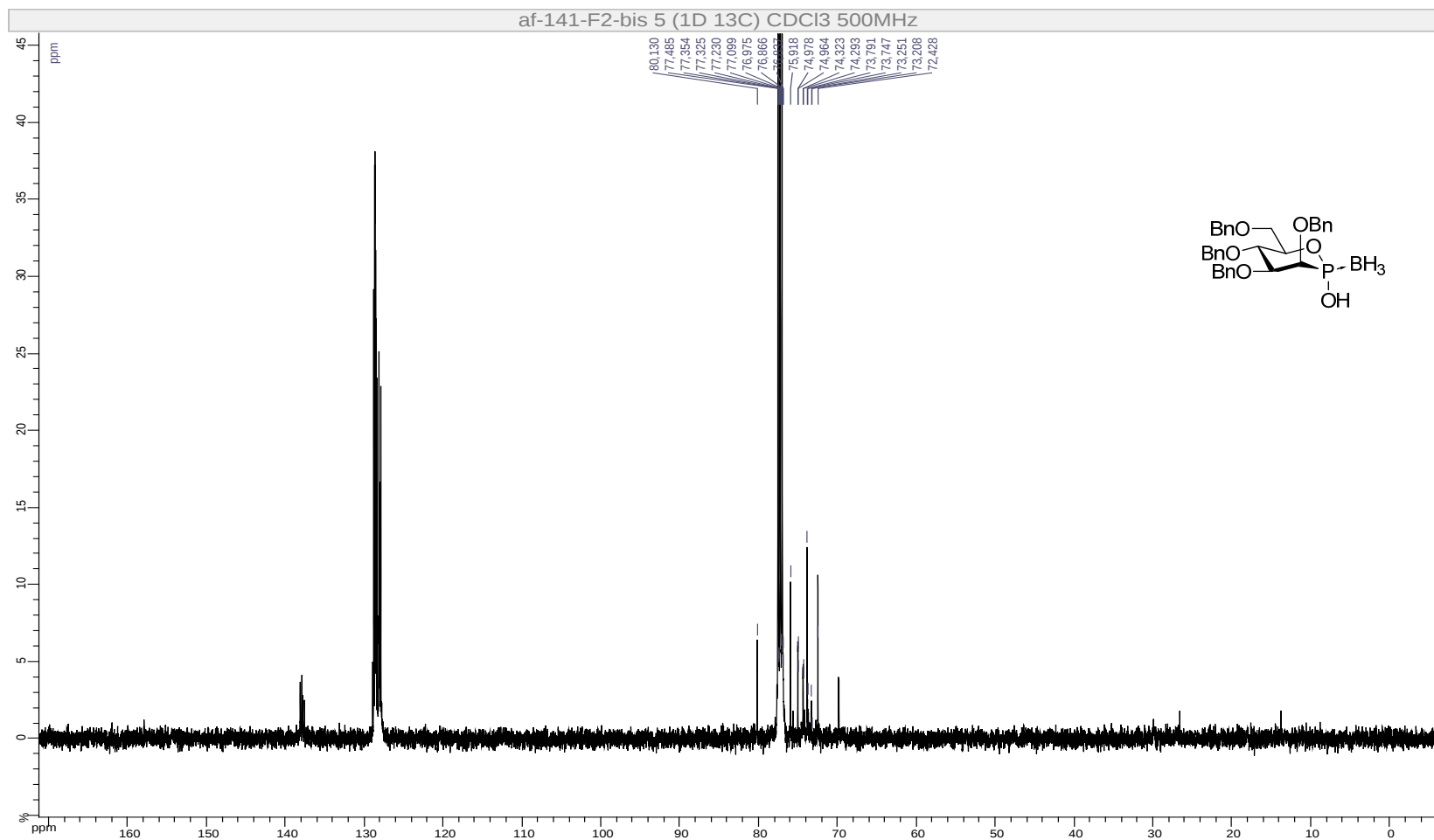
15ma, ^{13}C NMR (125 MHz, CDCl_3)



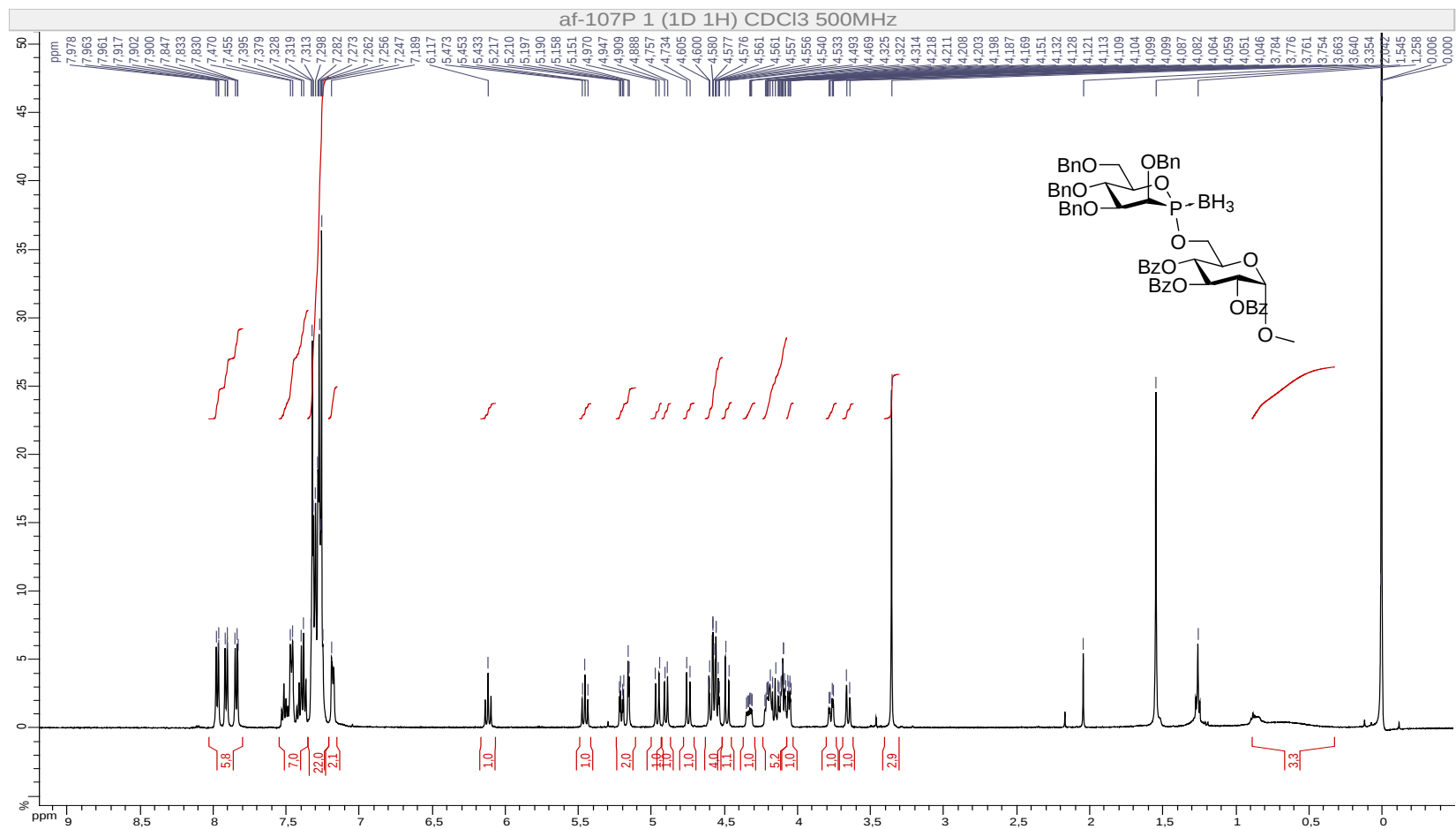
S3, ^1H NMR (500 MHz, CDCl_3)



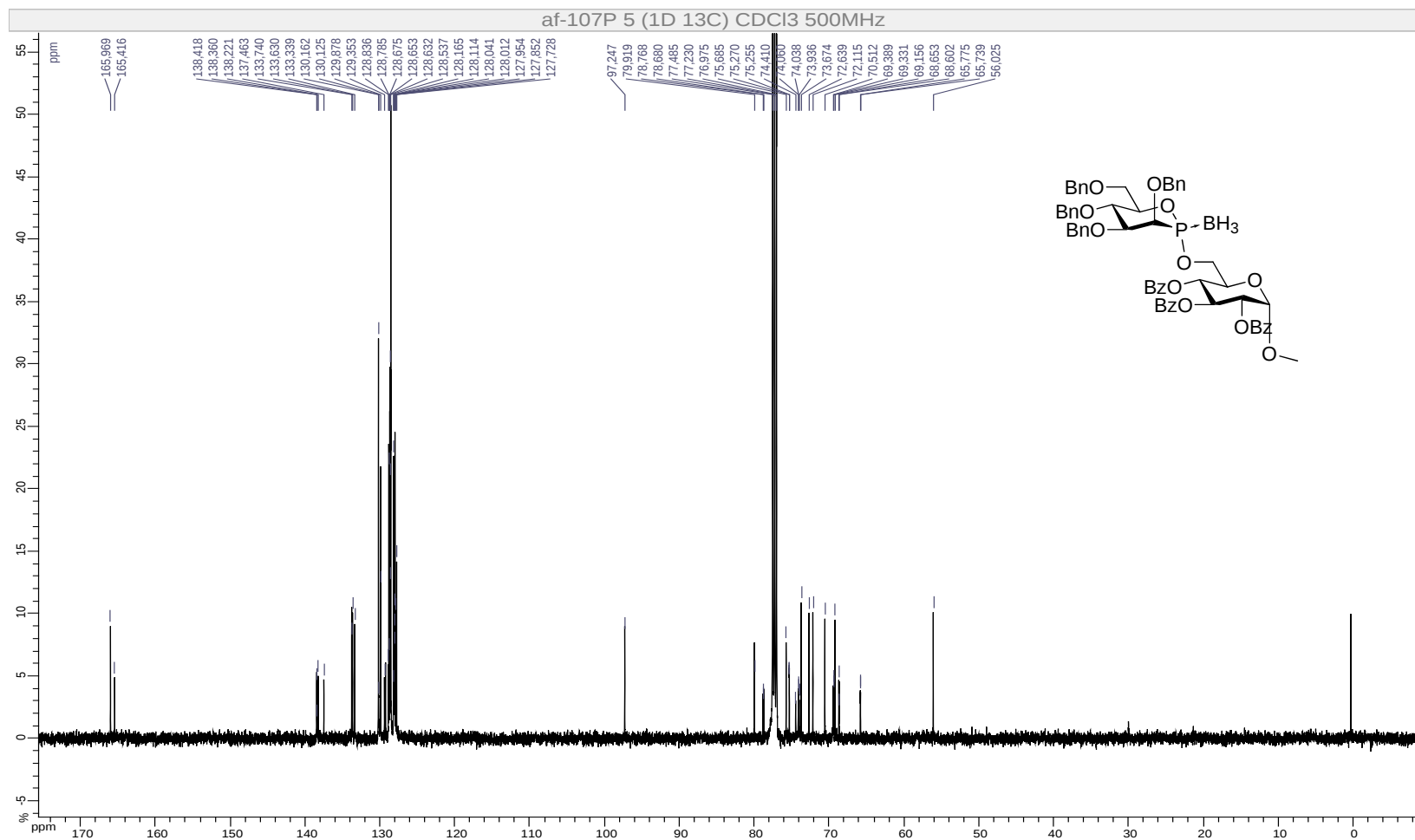
S3, ^{13}C NMR (125 MHz, CDCl_3)



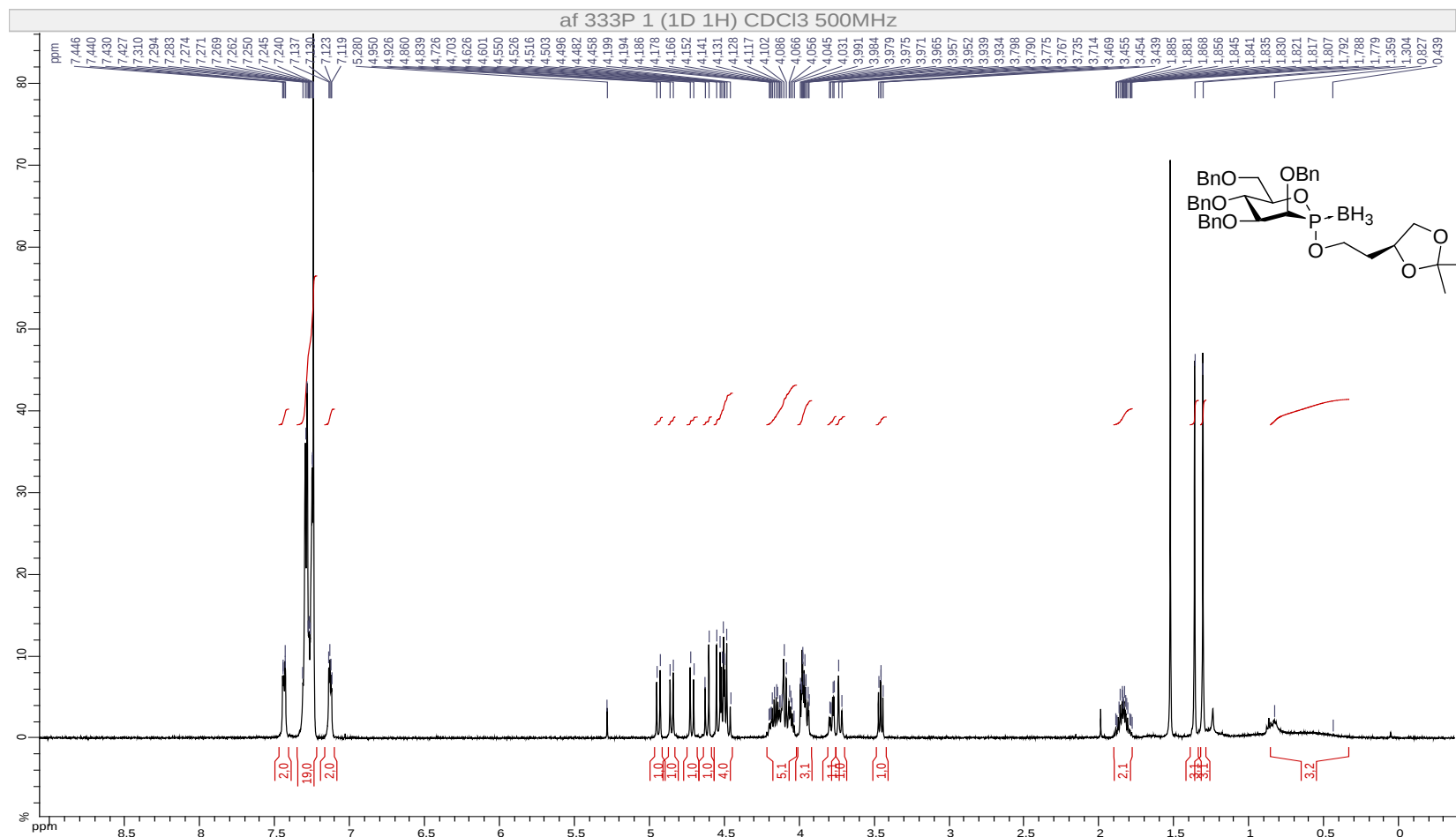
18ma, ^1H NMR (500 MHz, CDCl_3)



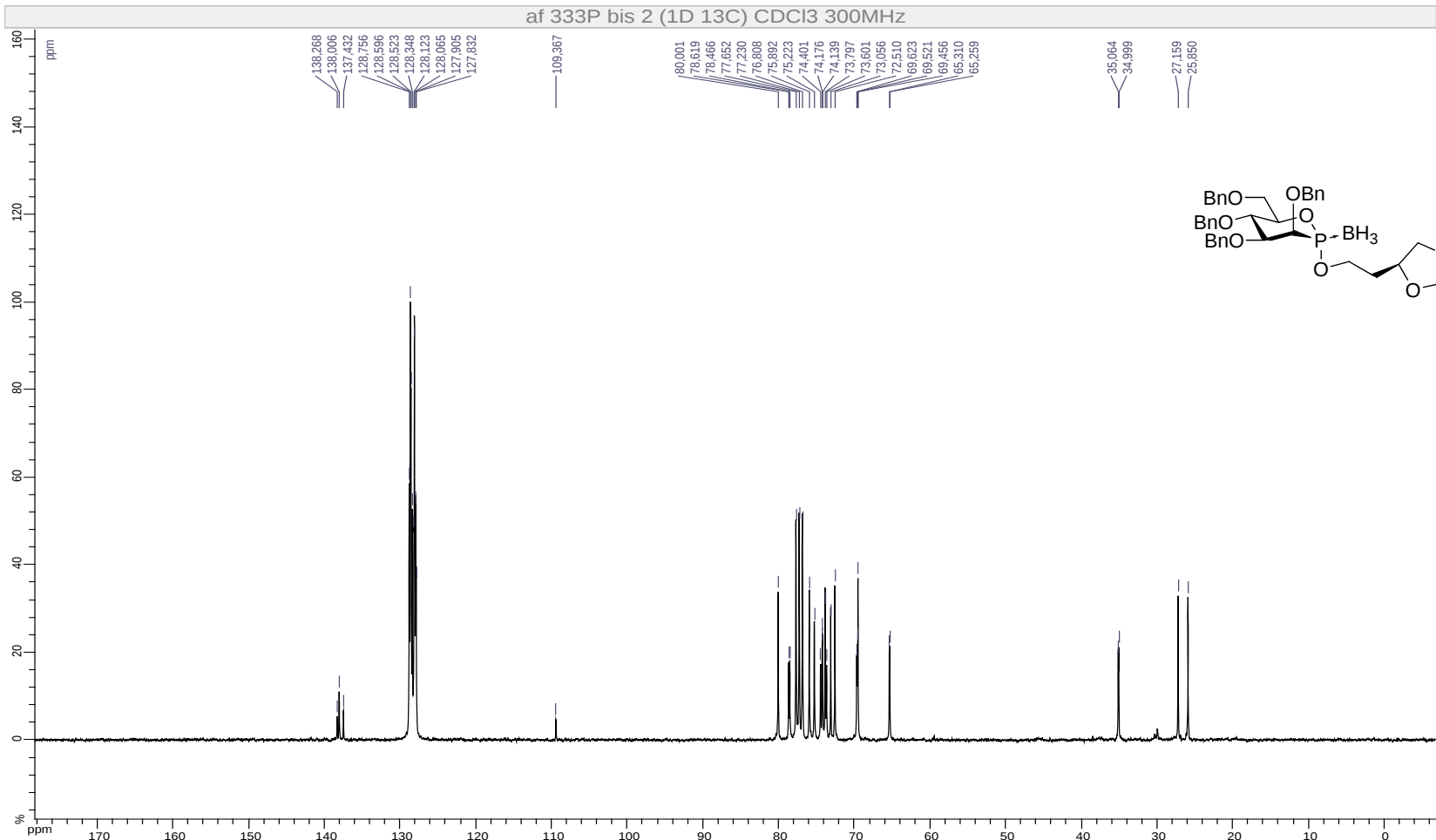
18ma, ^{13}C NMR (125 MHz, CDCl_3)



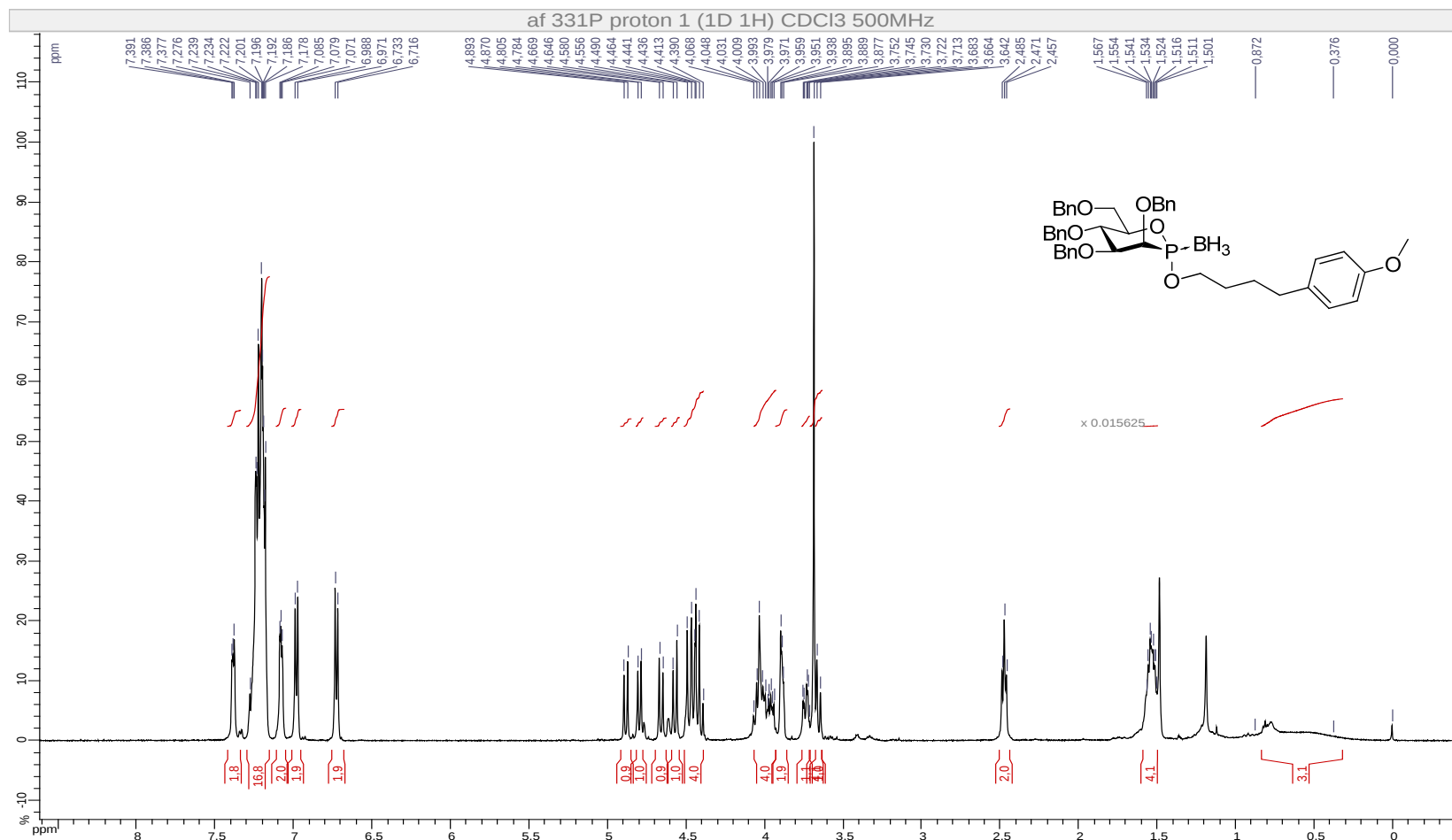
35ma, ^1H NMR (500 MHz, CDCl_3)



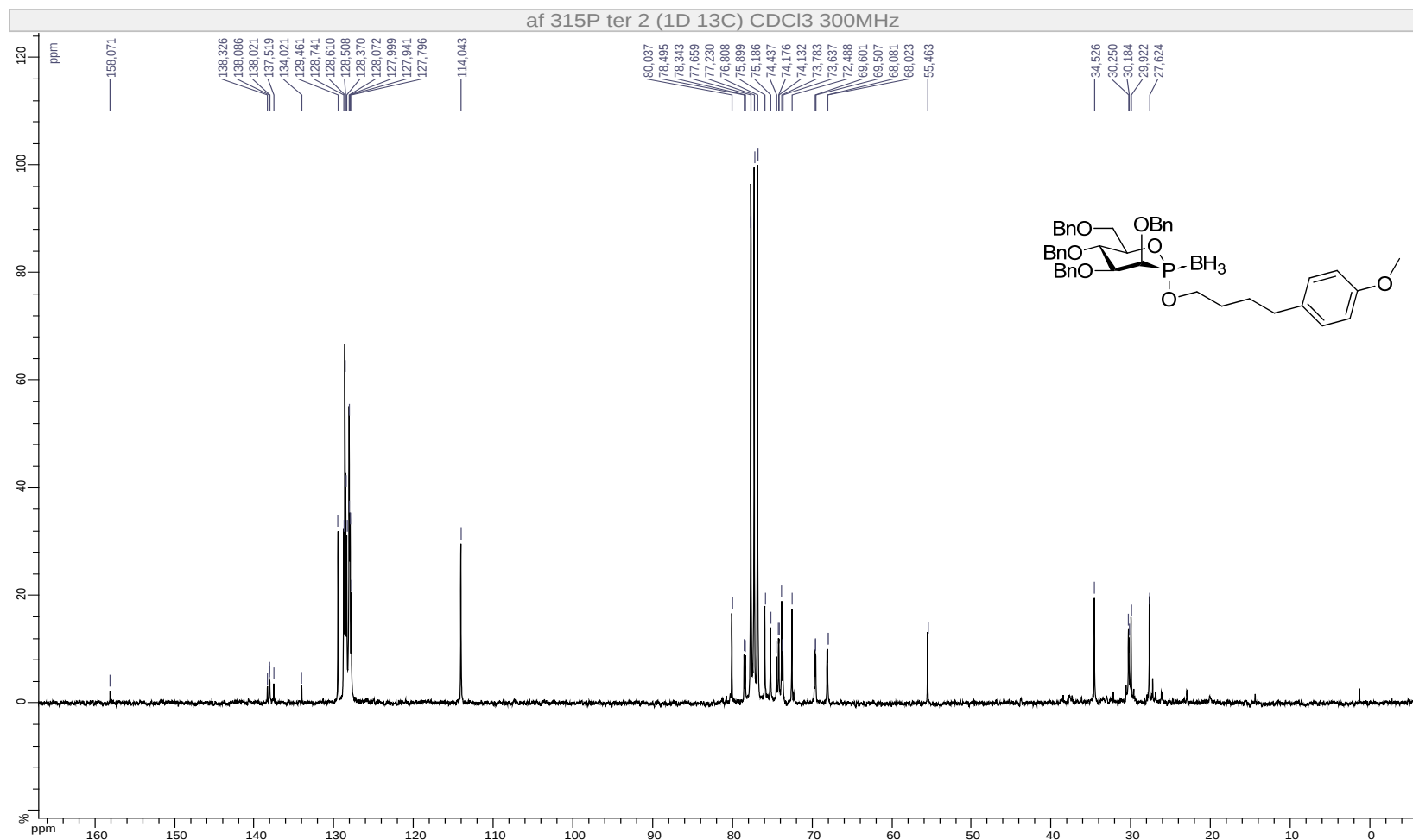
35mα, ¹³C NMR (75 MHz, CDCl₃)



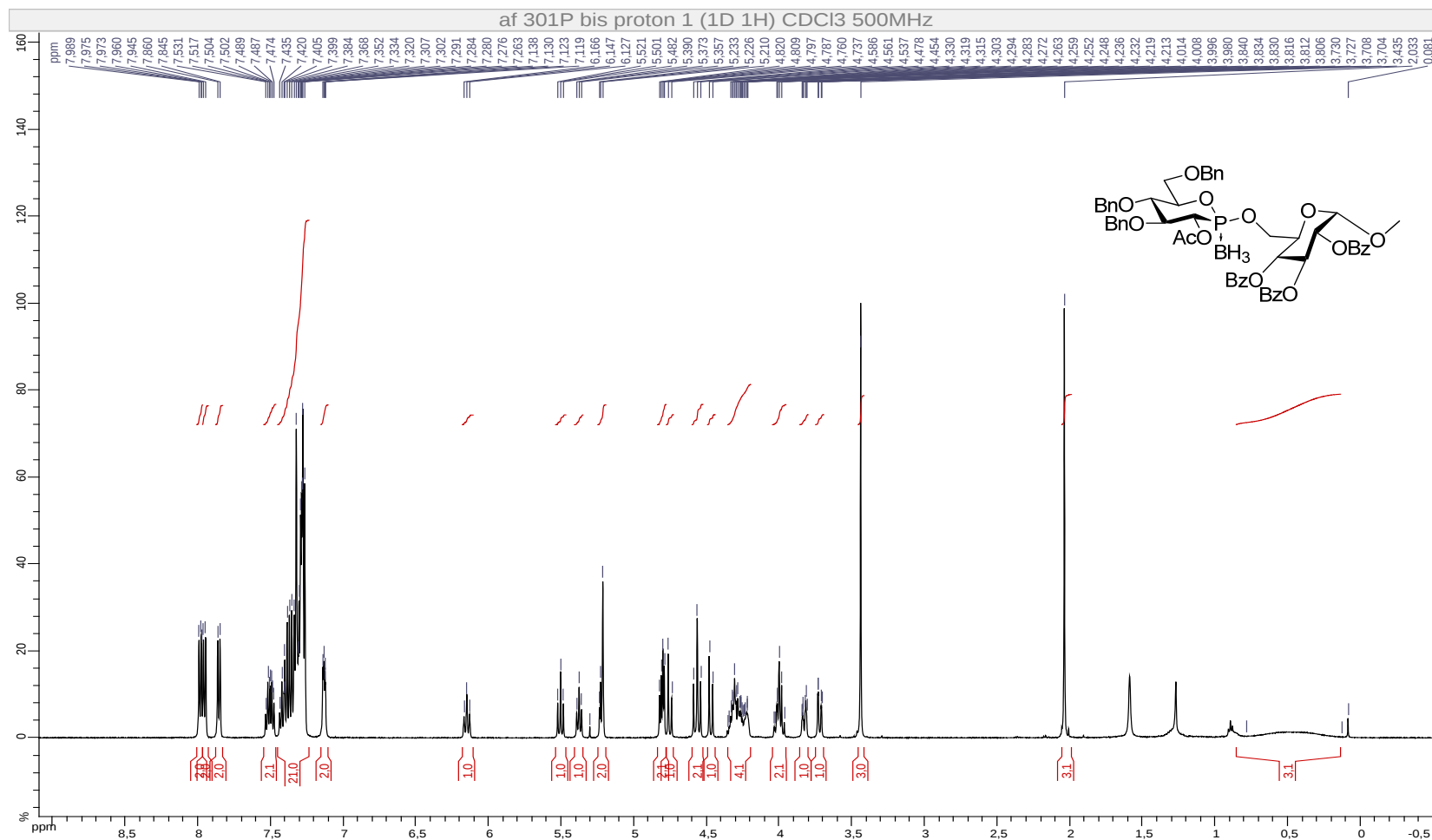
33ma, ^1H NMR (500 MHz, CDCl_3)



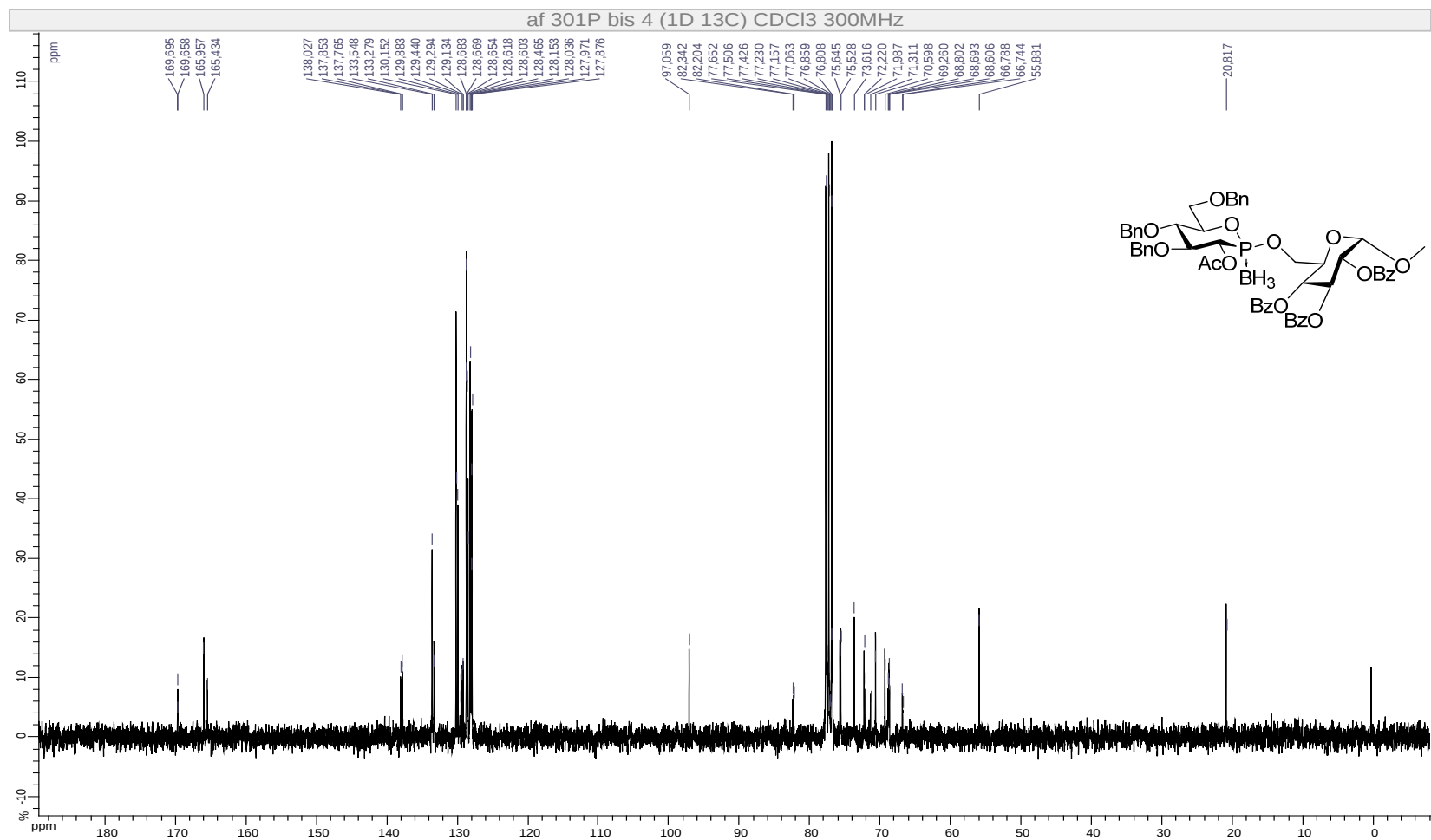
33ma, ^{13}C NMR (75 MHz, CDCl_3)



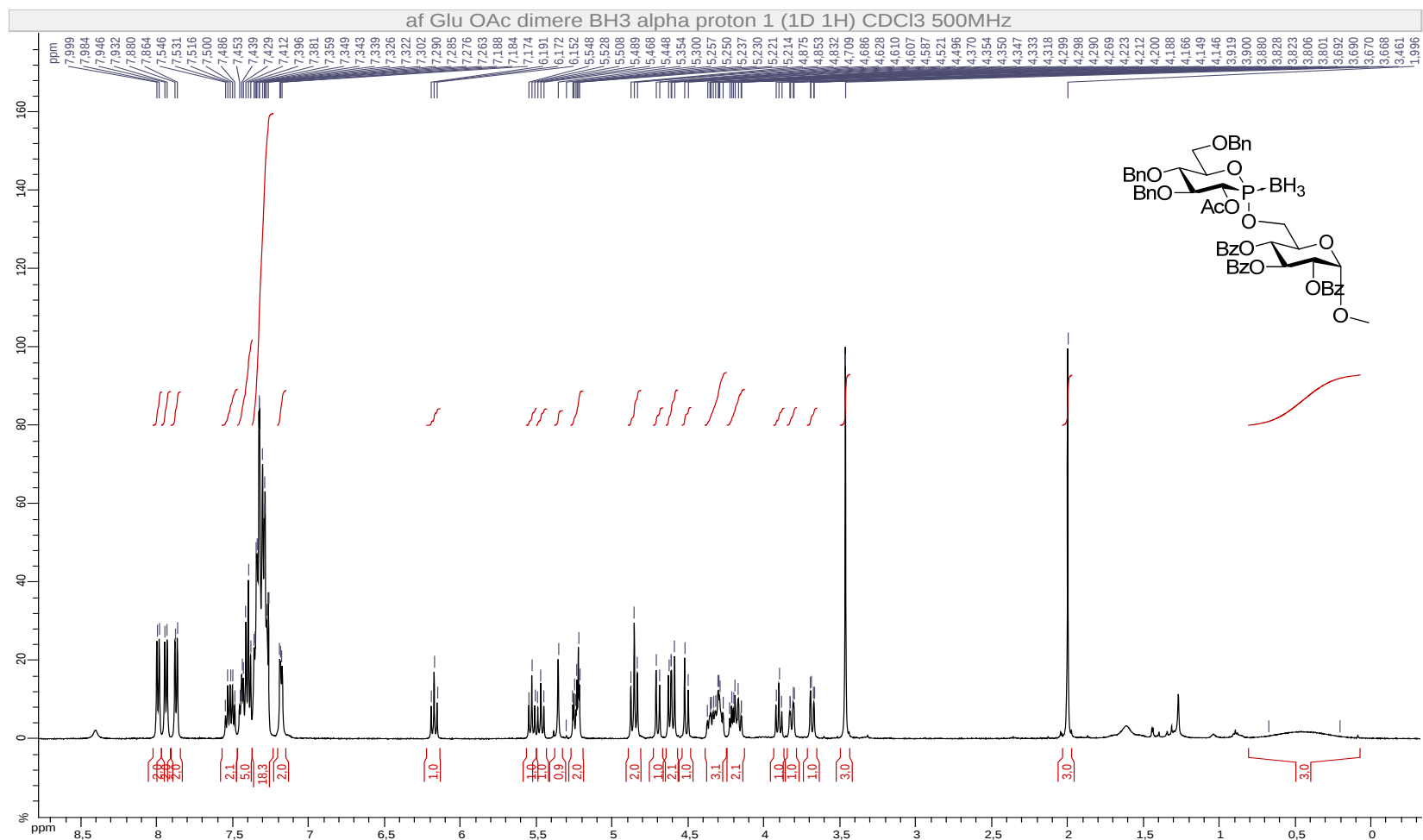
19gβ, ^1H NMR (500 MHz, CDCl_3)



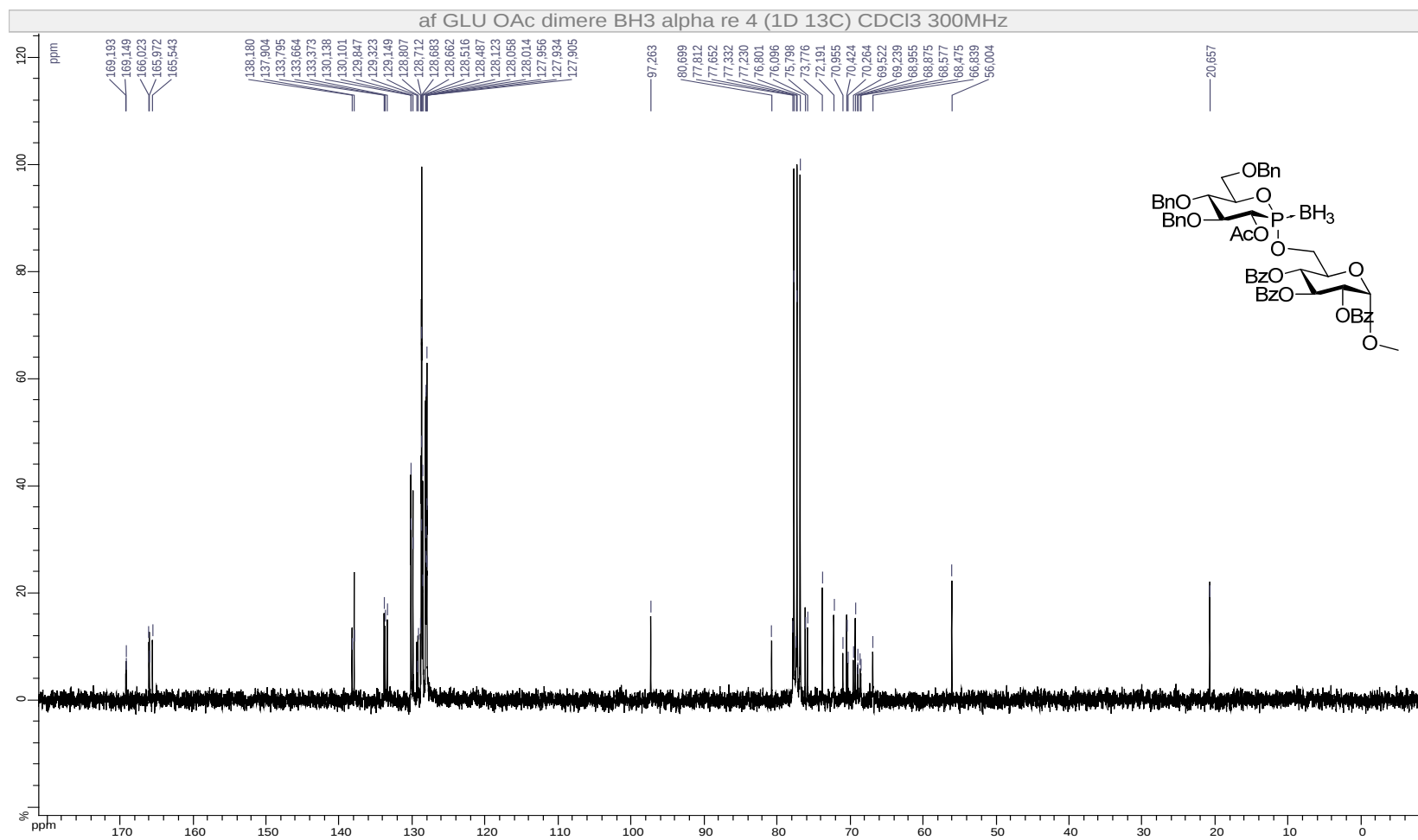
19gβ, ^{13}C NMR (75 MHz, CDCl_3)



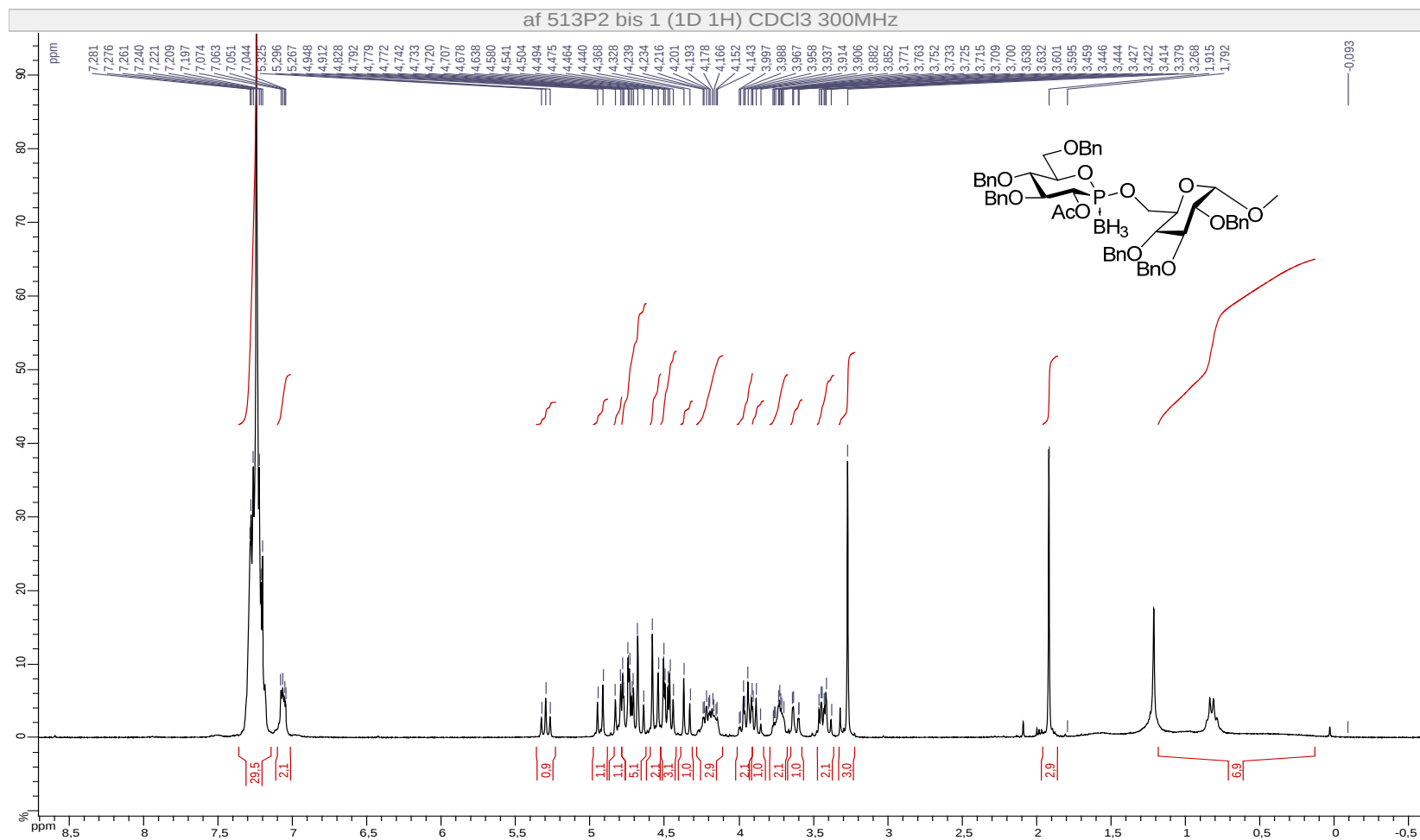
19g α , ^1H NMR (500 MHz, CDCl_3)



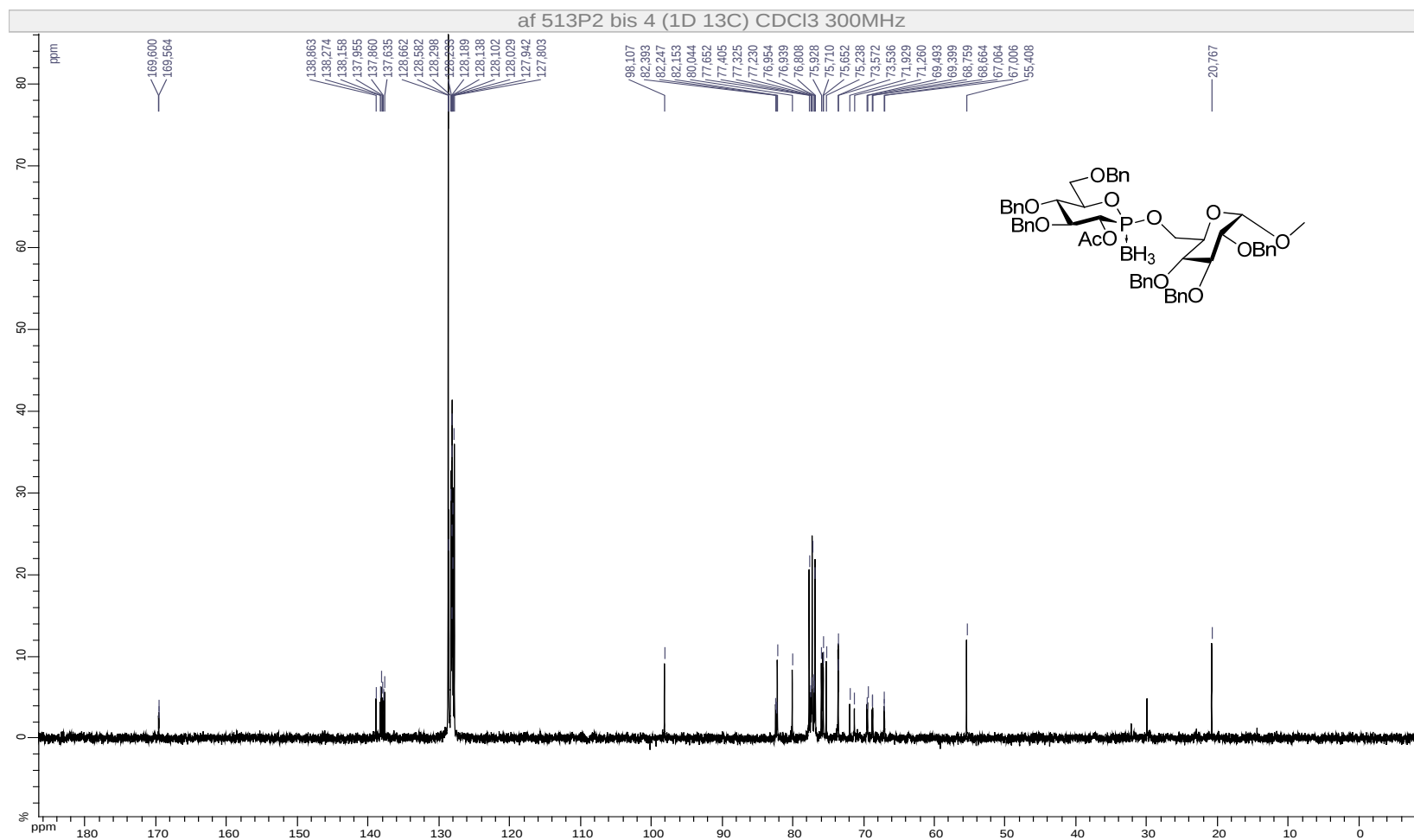
19 α , ^{13}C NMR (75 MHz, CDCl_3)



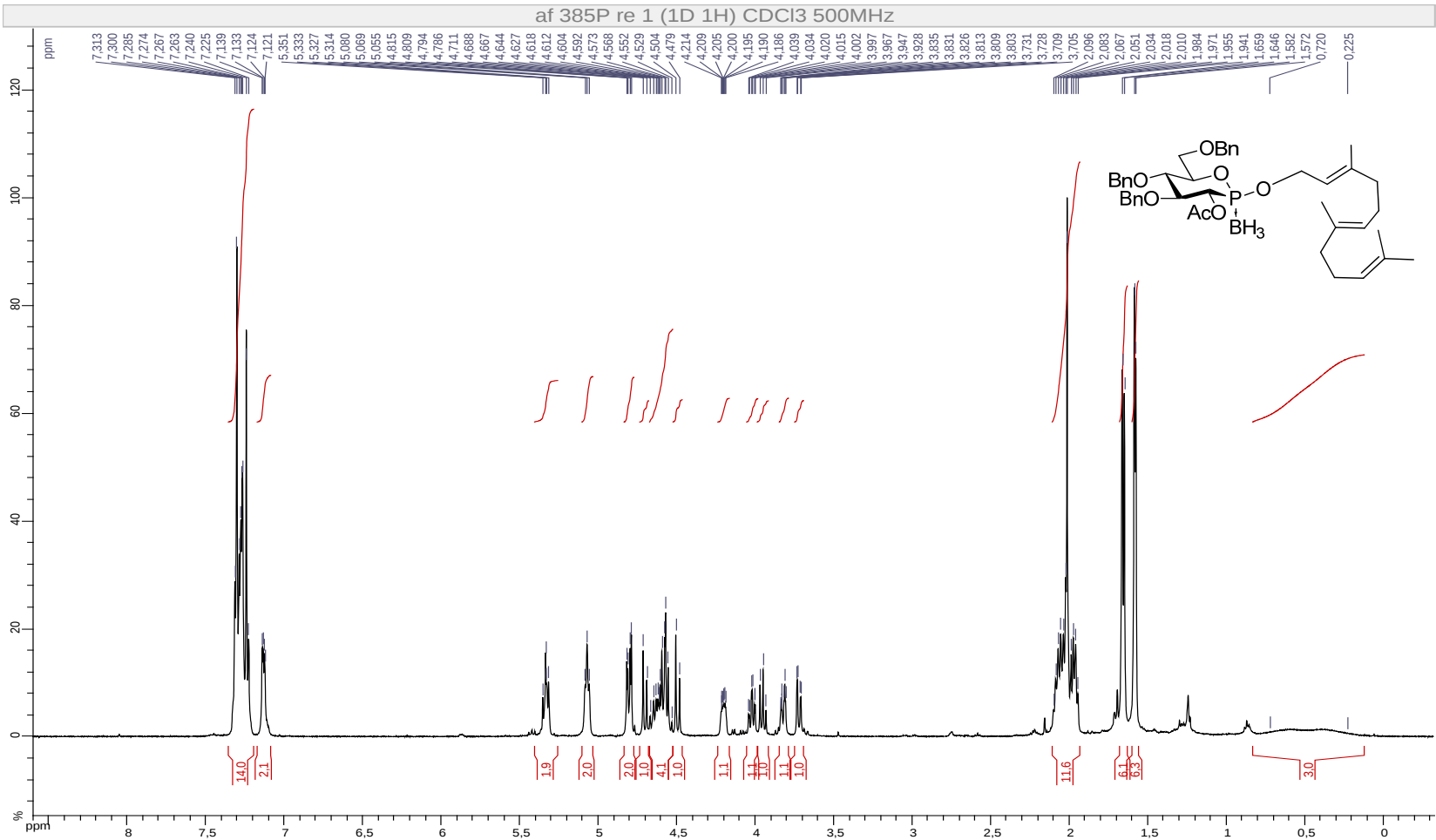
37gβ, ¹H NMR (300 MHz, CDCl₃)



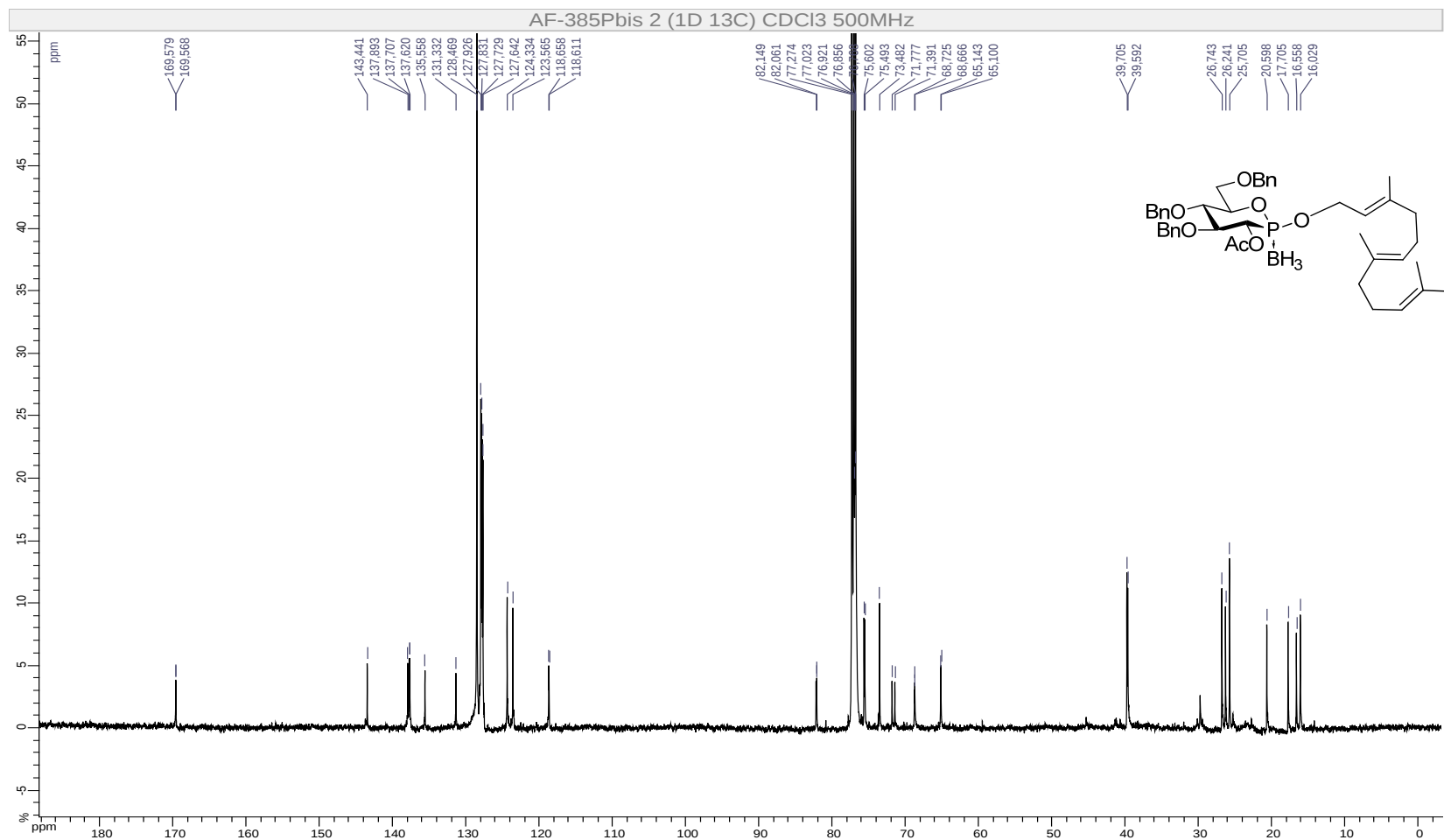
37g β , ^{13}C NMR (75 MHz, CDCl_3)



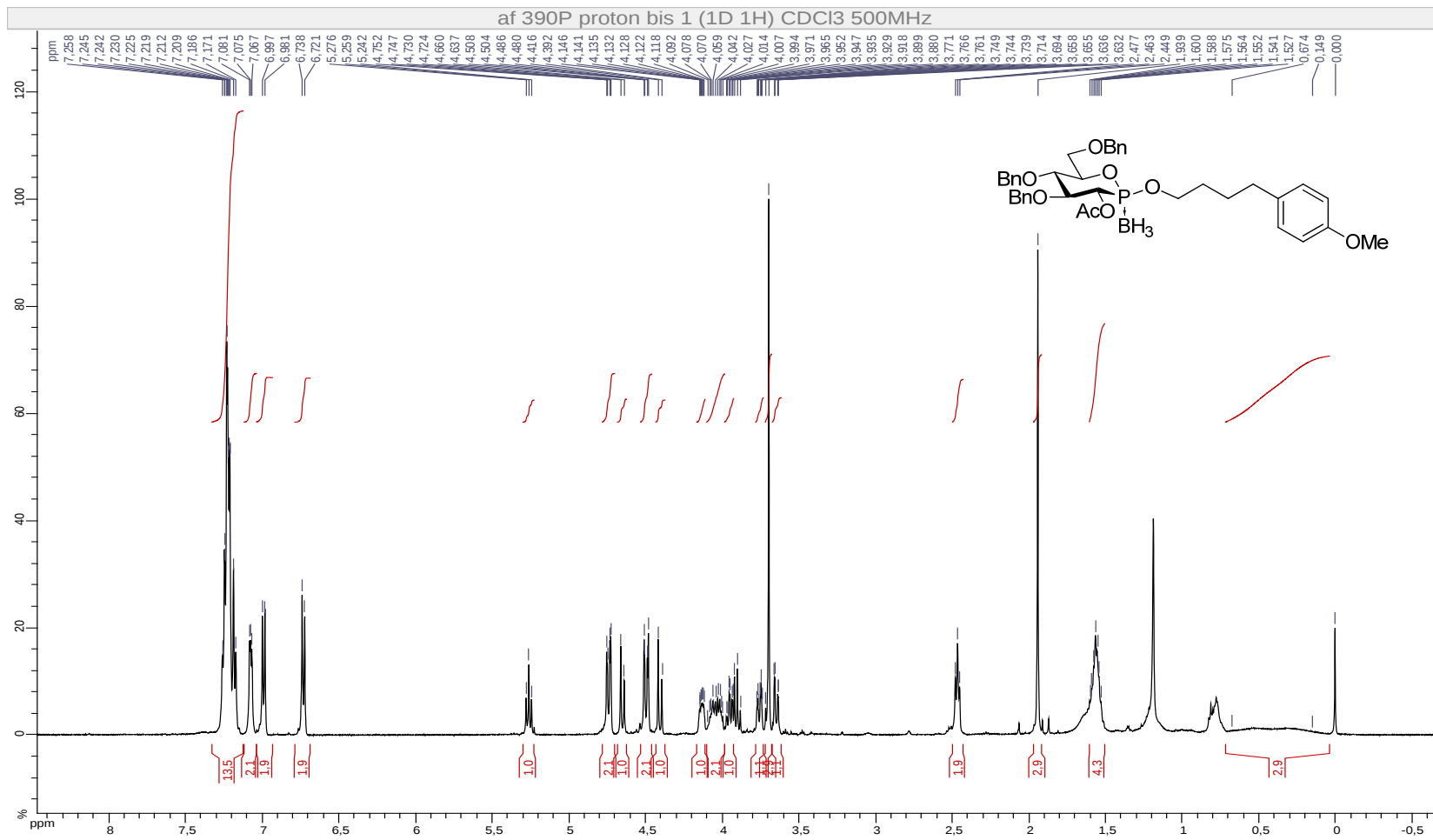
45gβ, ^1H NMR (500 MHz, CDCl_3)



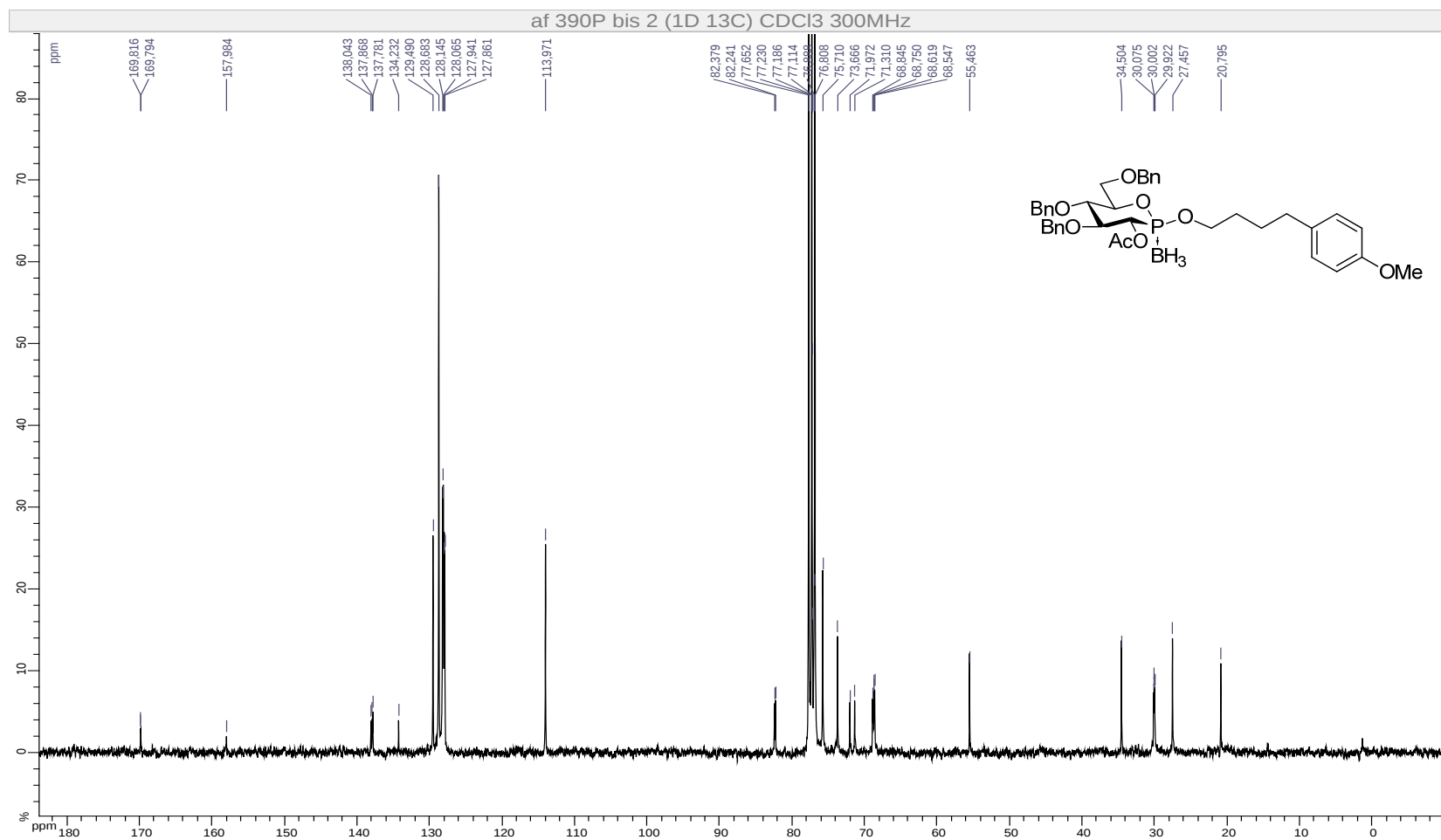
45gβ, ^{13}C NMR (125 MHz, CDCl_3)



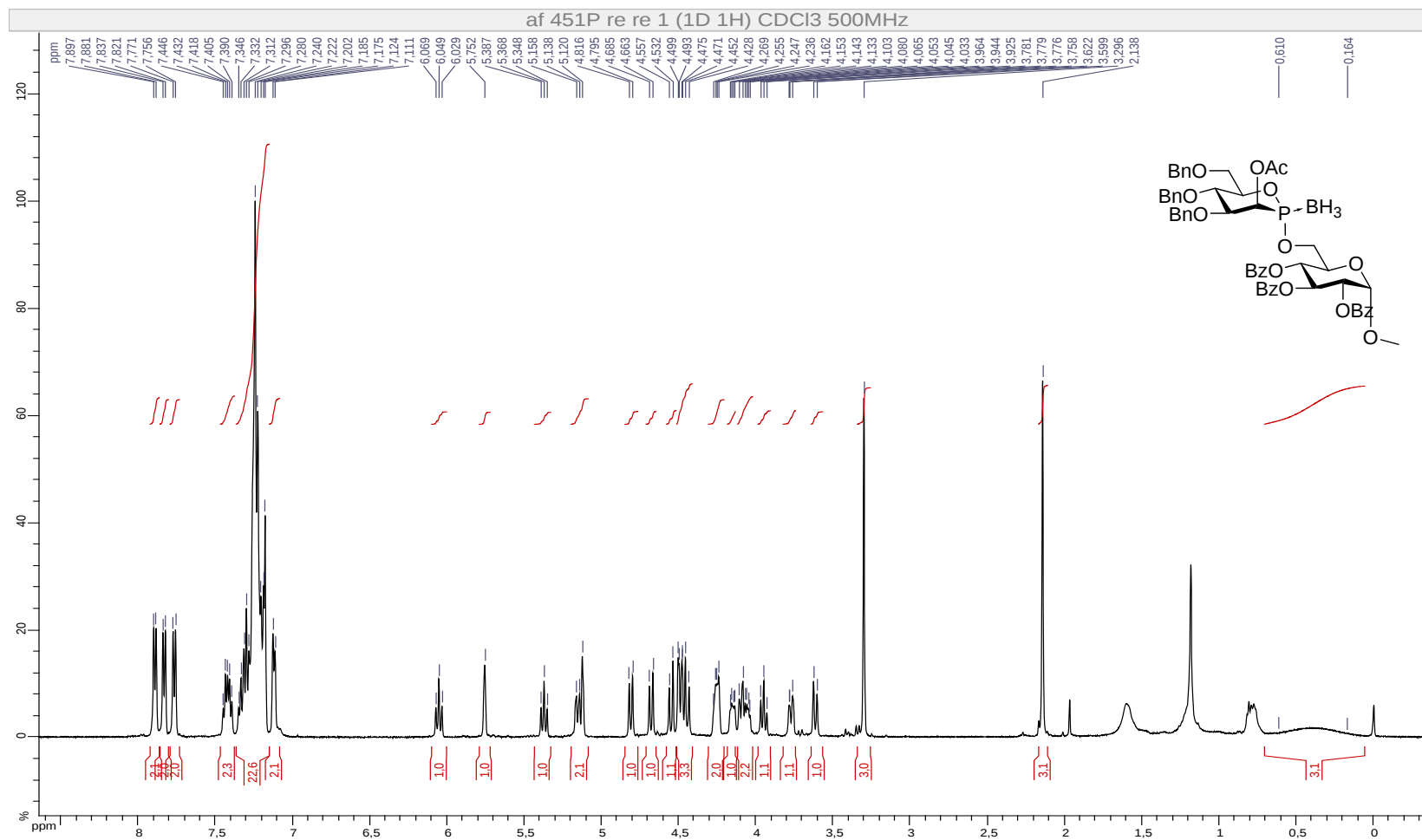
43gβ, ¹H NMR (500 MHz, CDCl₃)



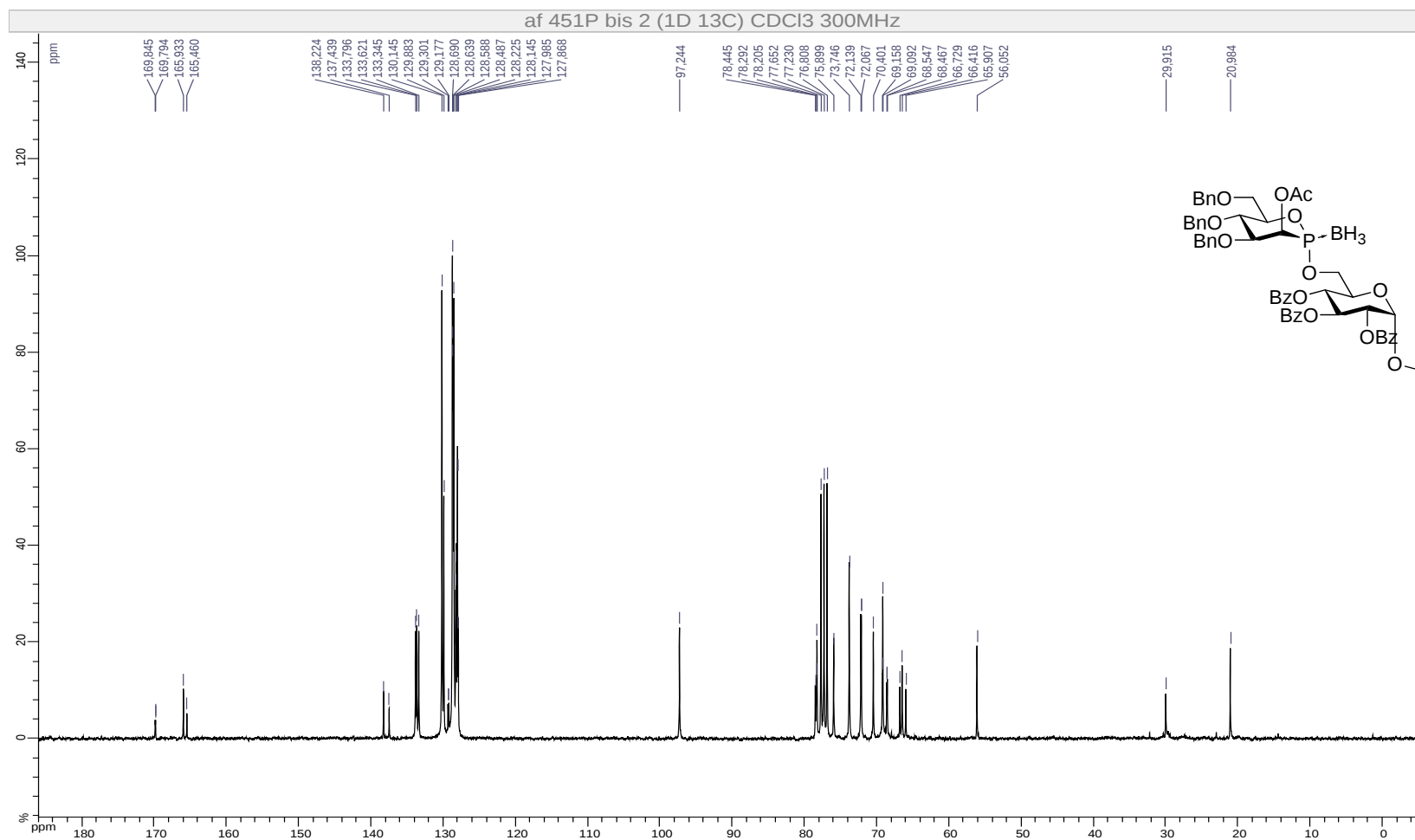
43g β , ^{13}C NMR (75 MHz, CDCl_3)



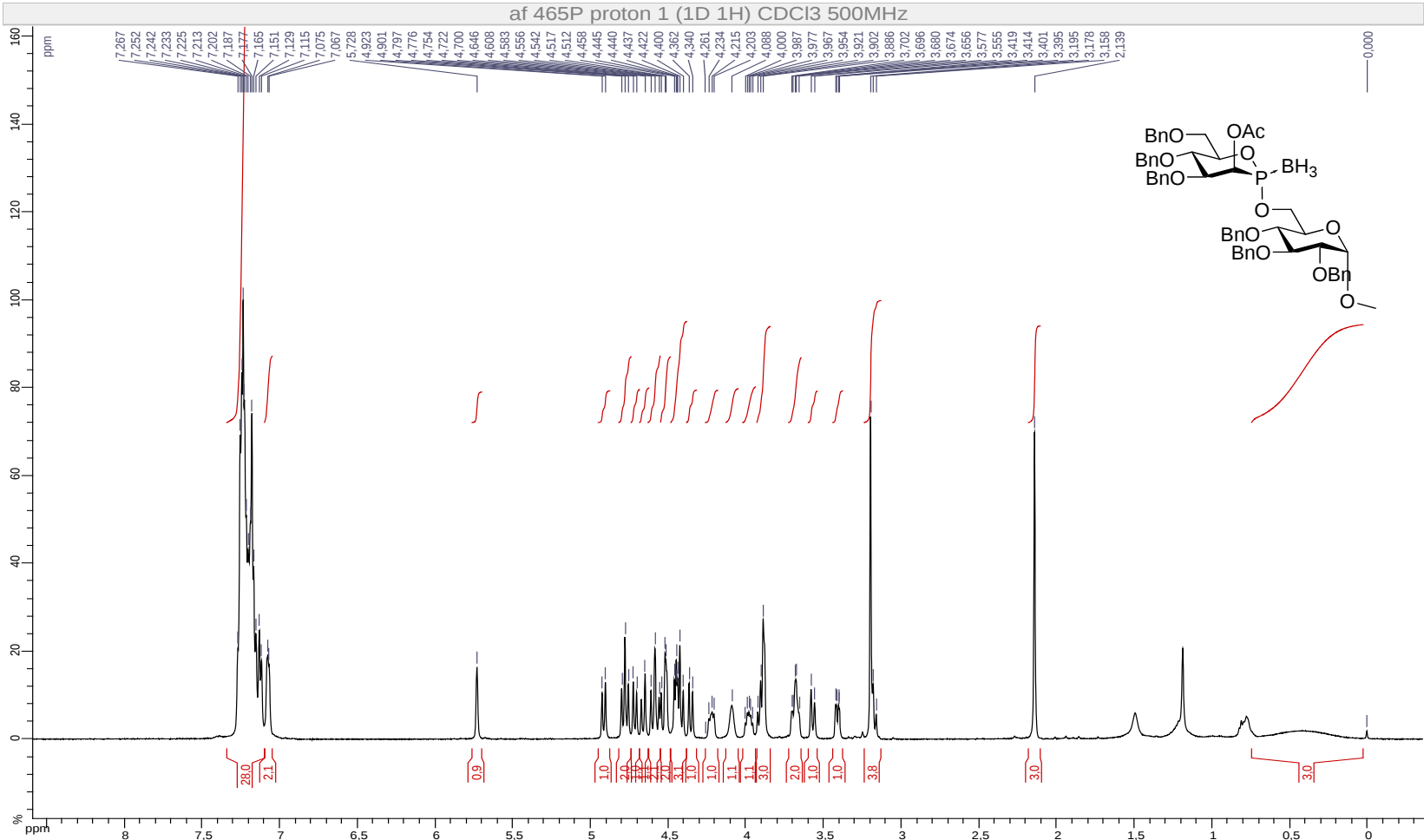
19ma, ^1H NMR (500 MHz, CDCl_3)



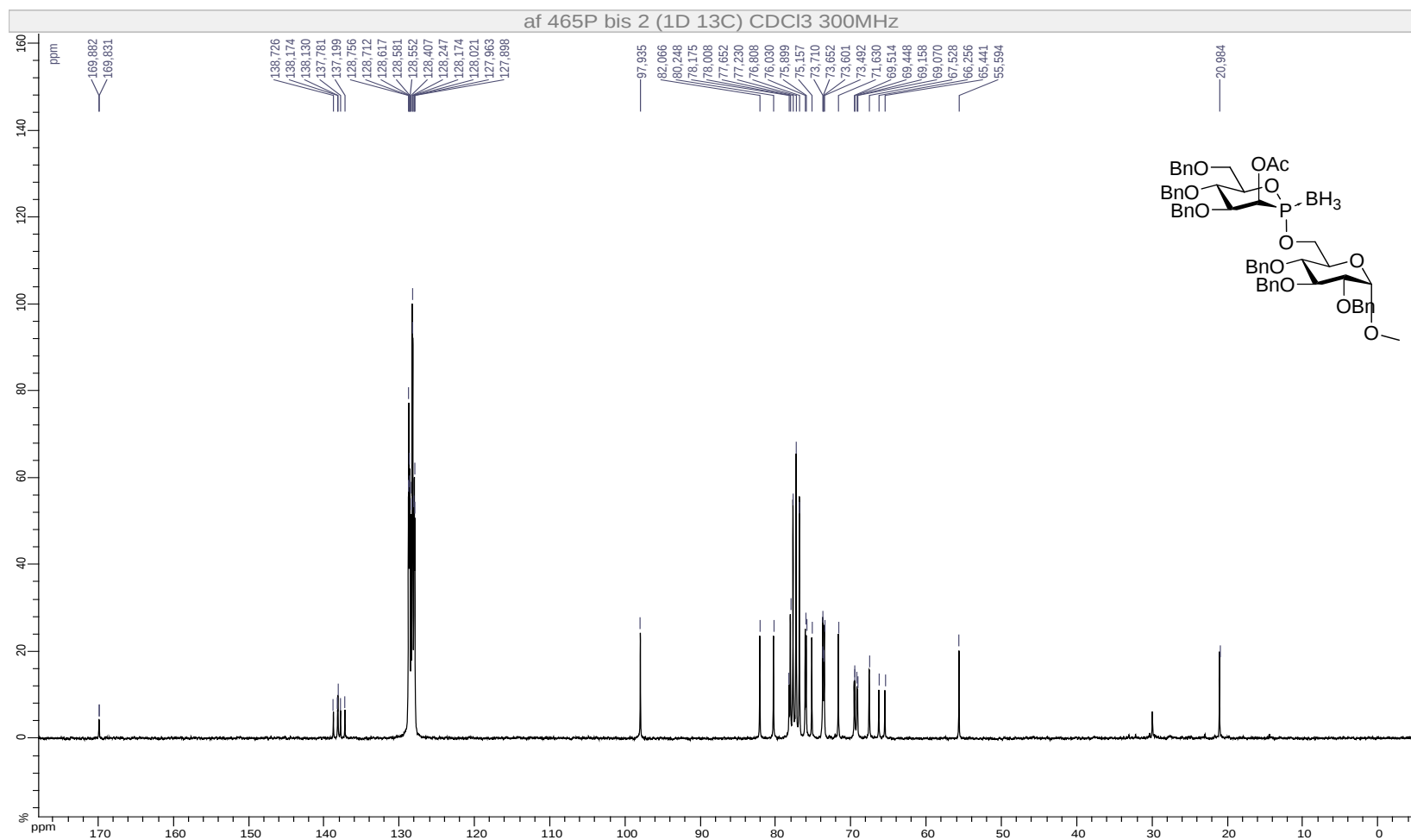
19ma, ^{13}C NMR (75 MHz, CDCl_3)



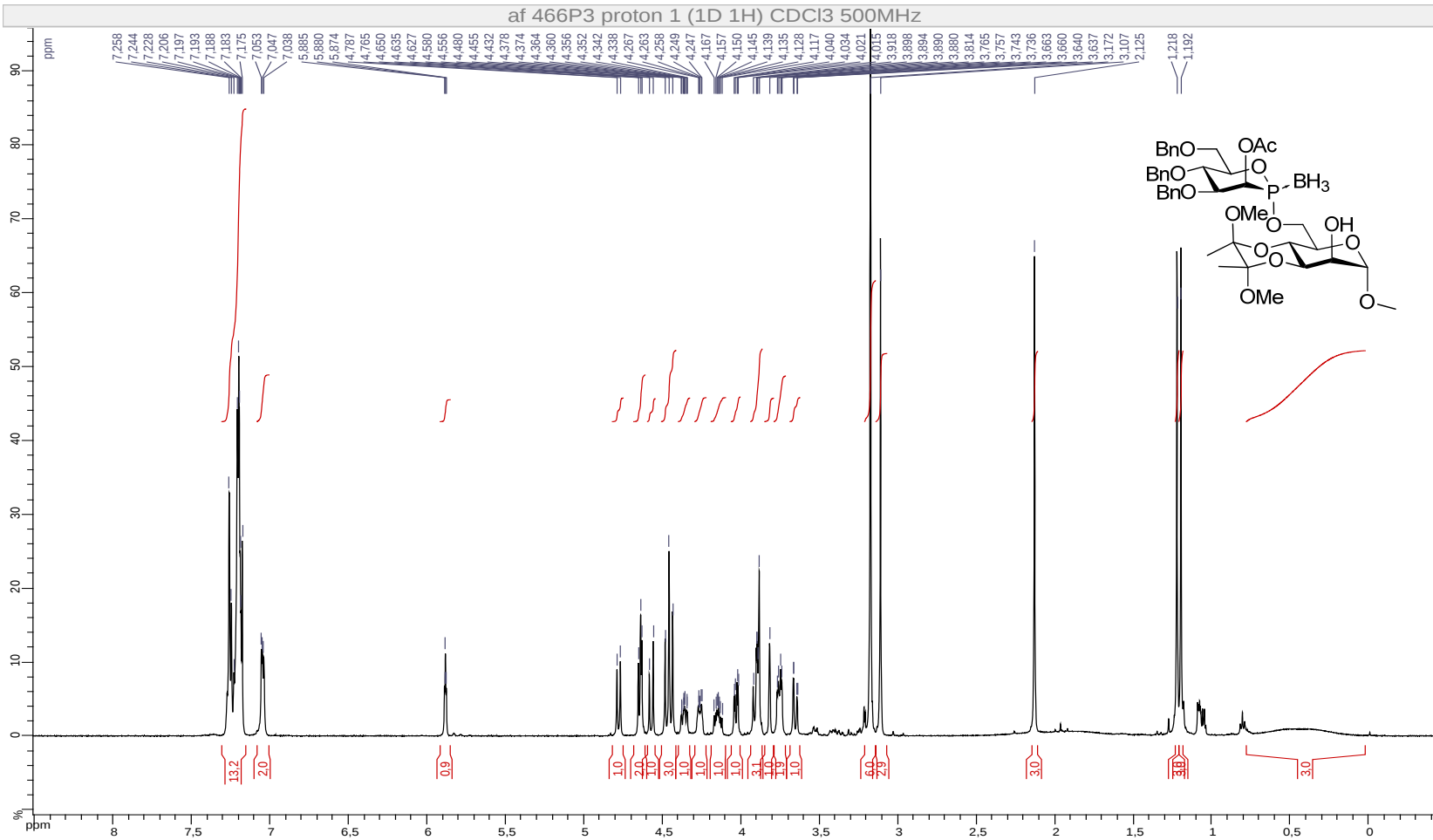
37mα, ^1H NMR (500 MHz, CDCl_3)



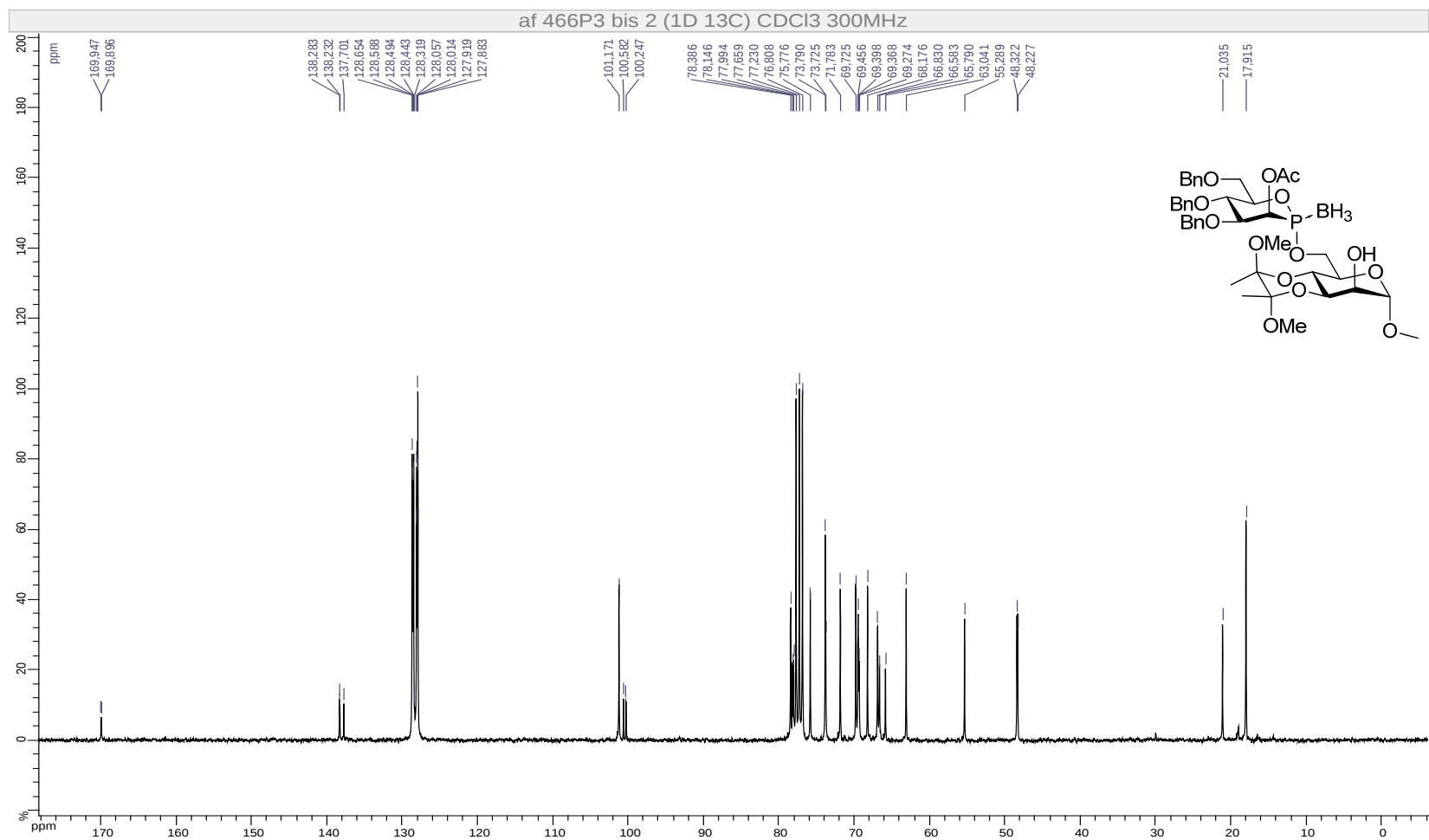
37ma, ^{13}C NMR (75 MHz, CDCl_3)



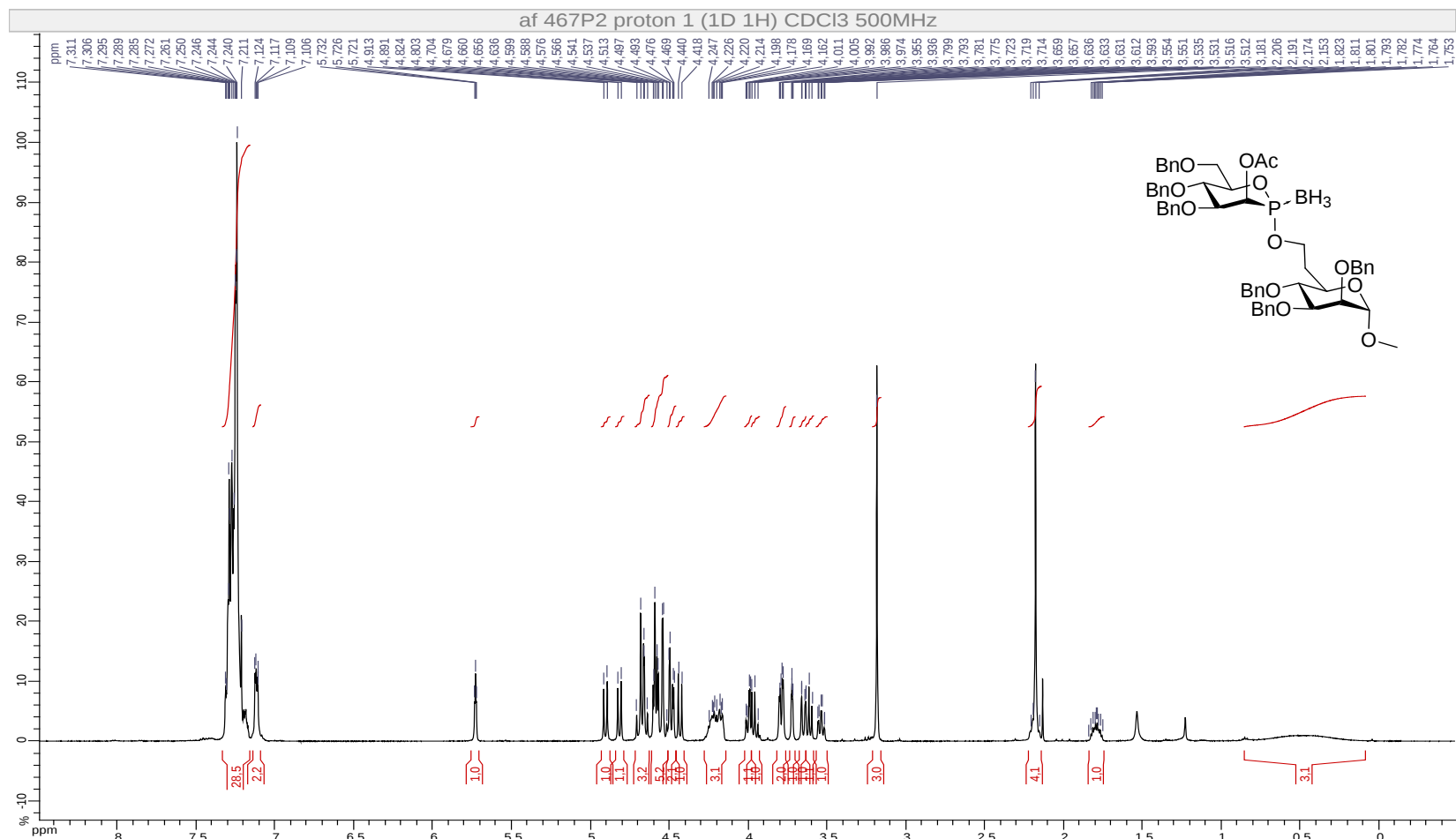
39mα, ¹H NMR (500 MHz, CDCl₃)



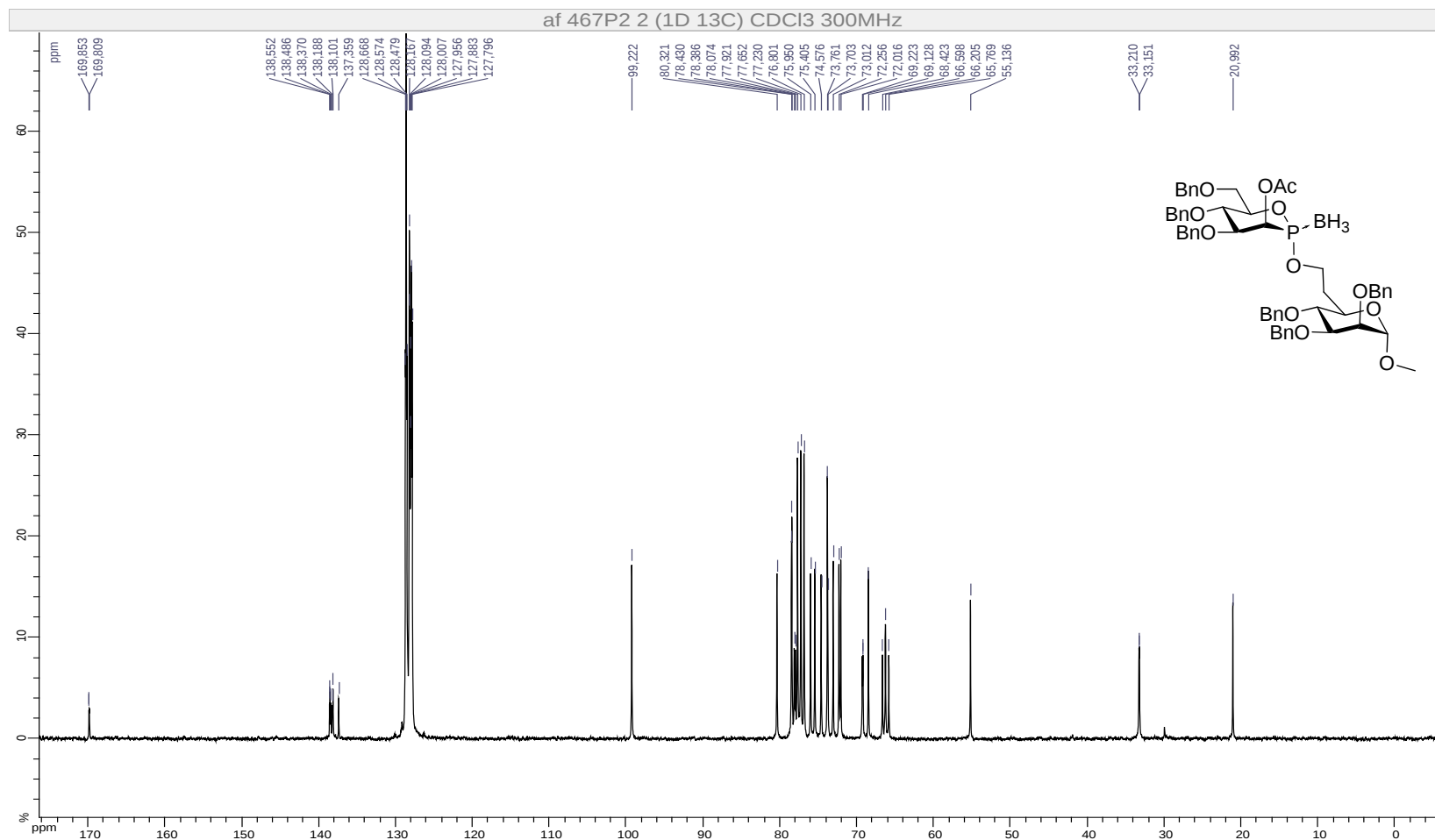
39ma, ^{13}C NMR (75 MHz, CDCl_3)



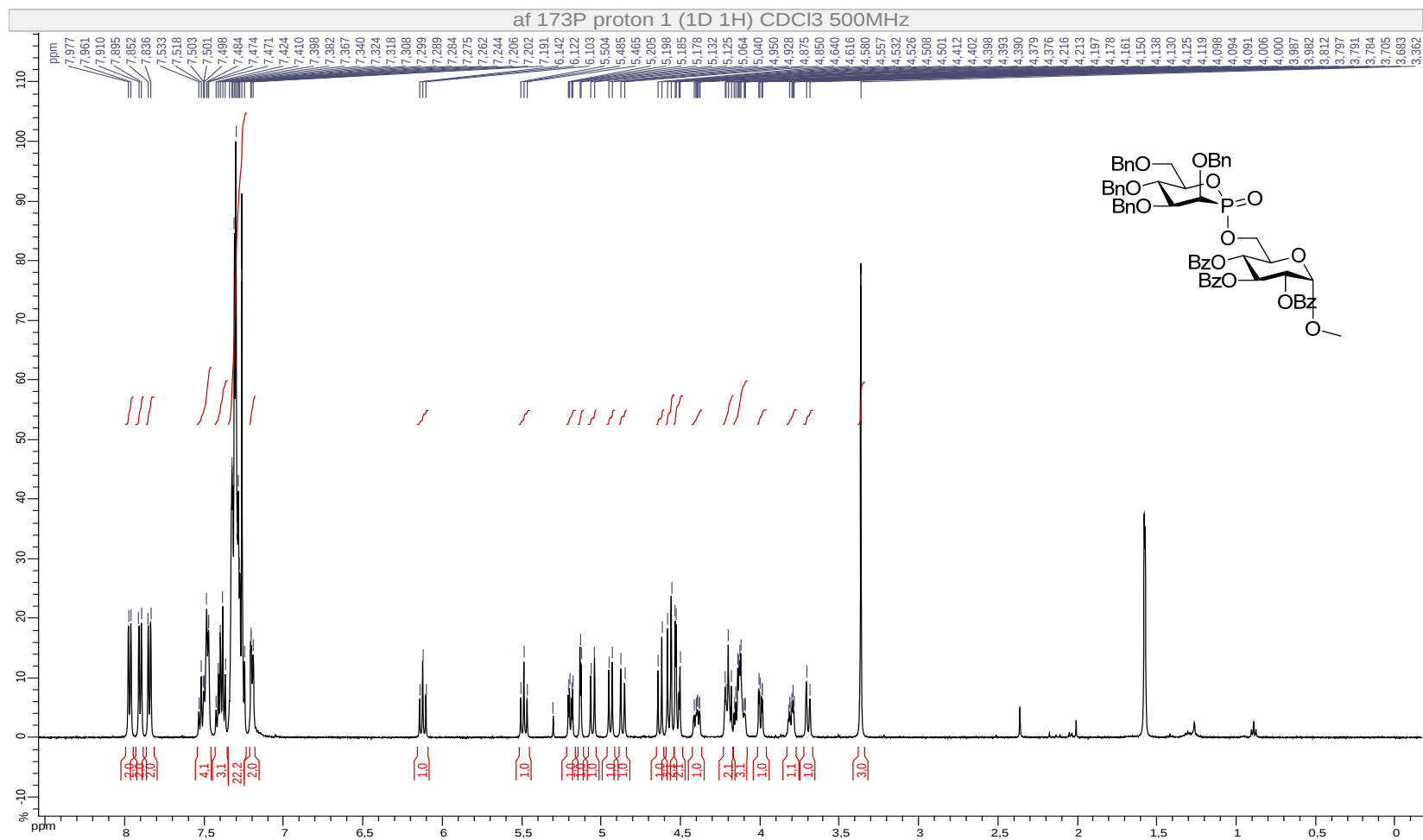
41ma, ^1H NMR (500 MHz, CDCl_3)



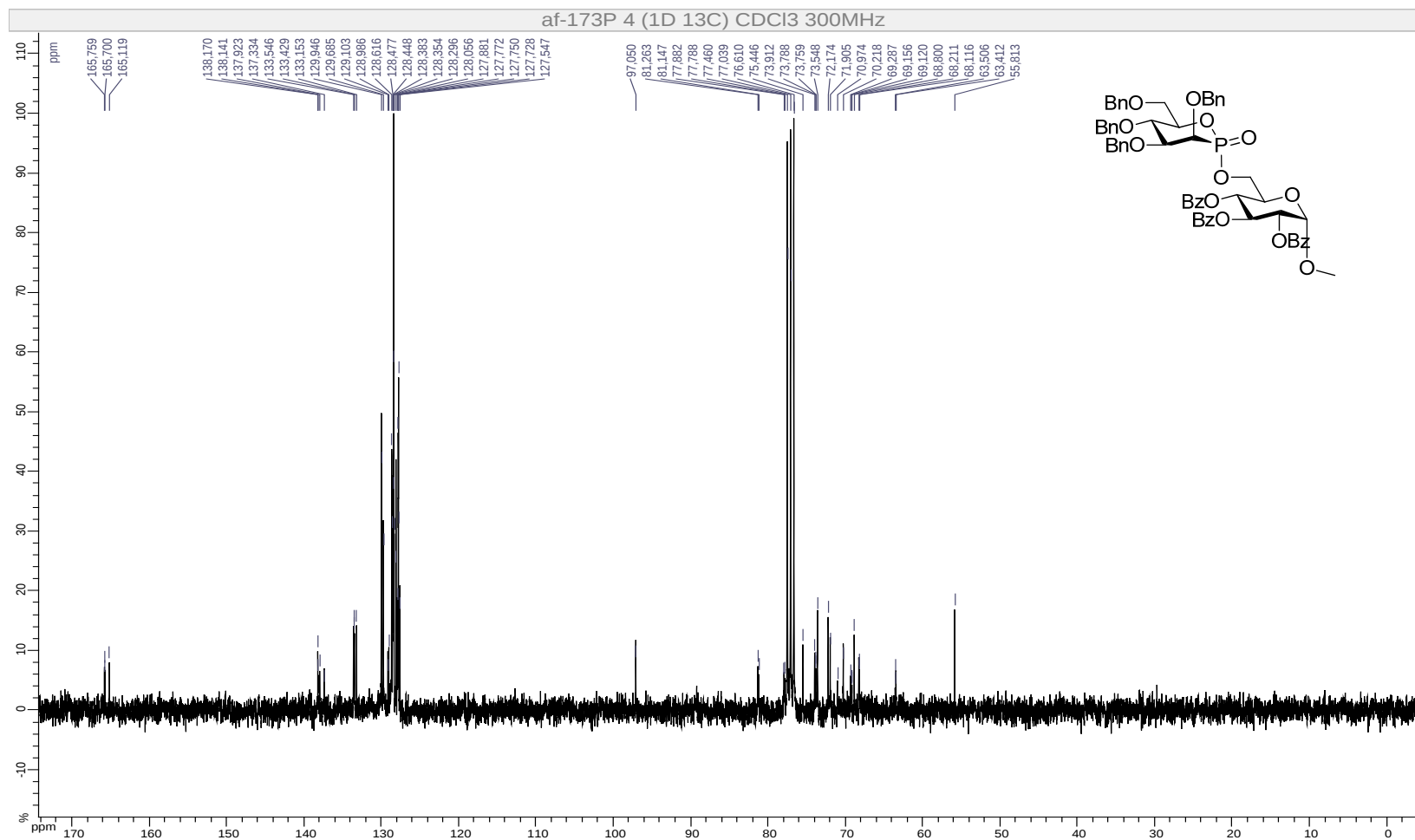
41ma, ^{13}C NMR (75 MHz, CDCl_3)



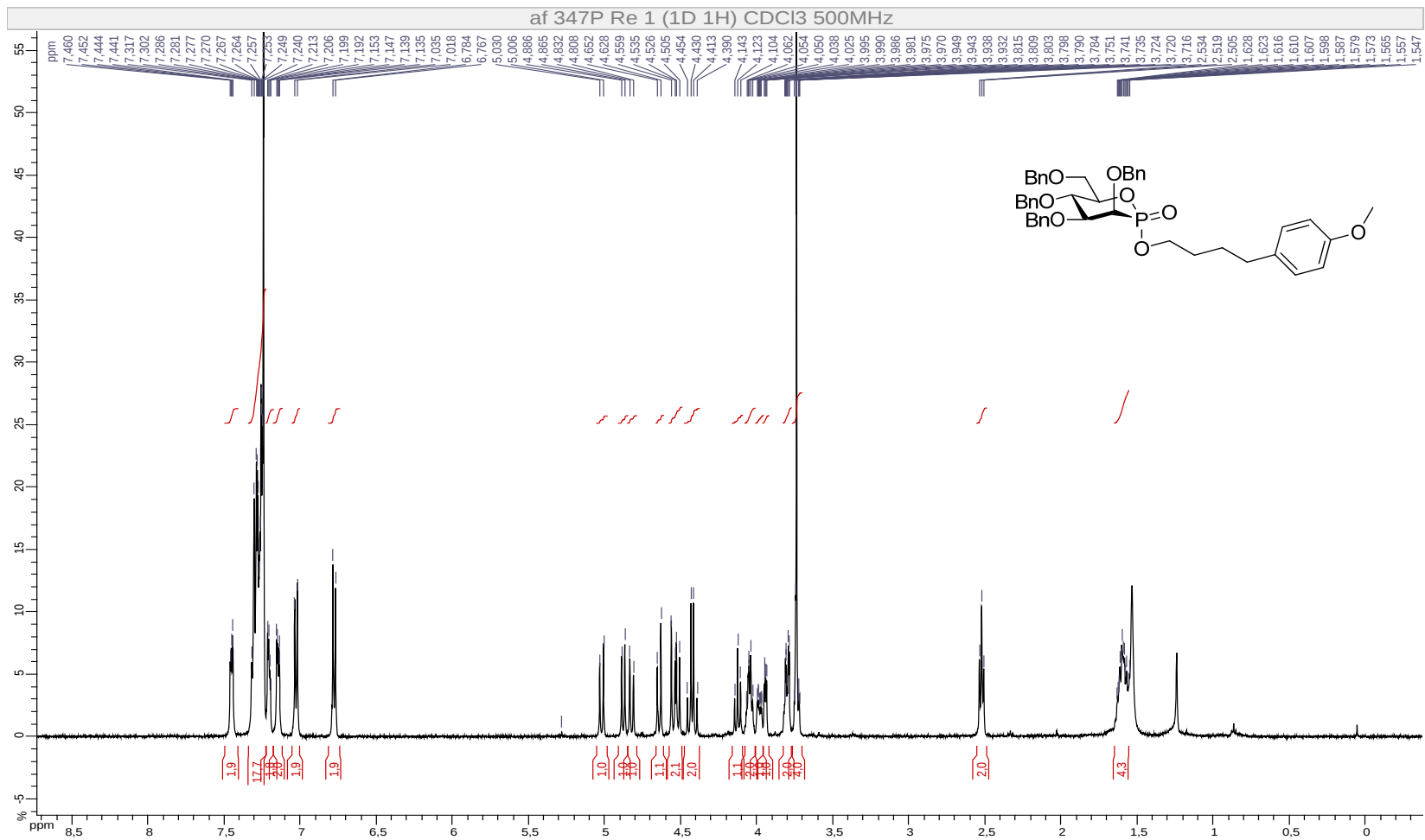
21mα, ¹H NMR (500 MHz, CDCl₃)



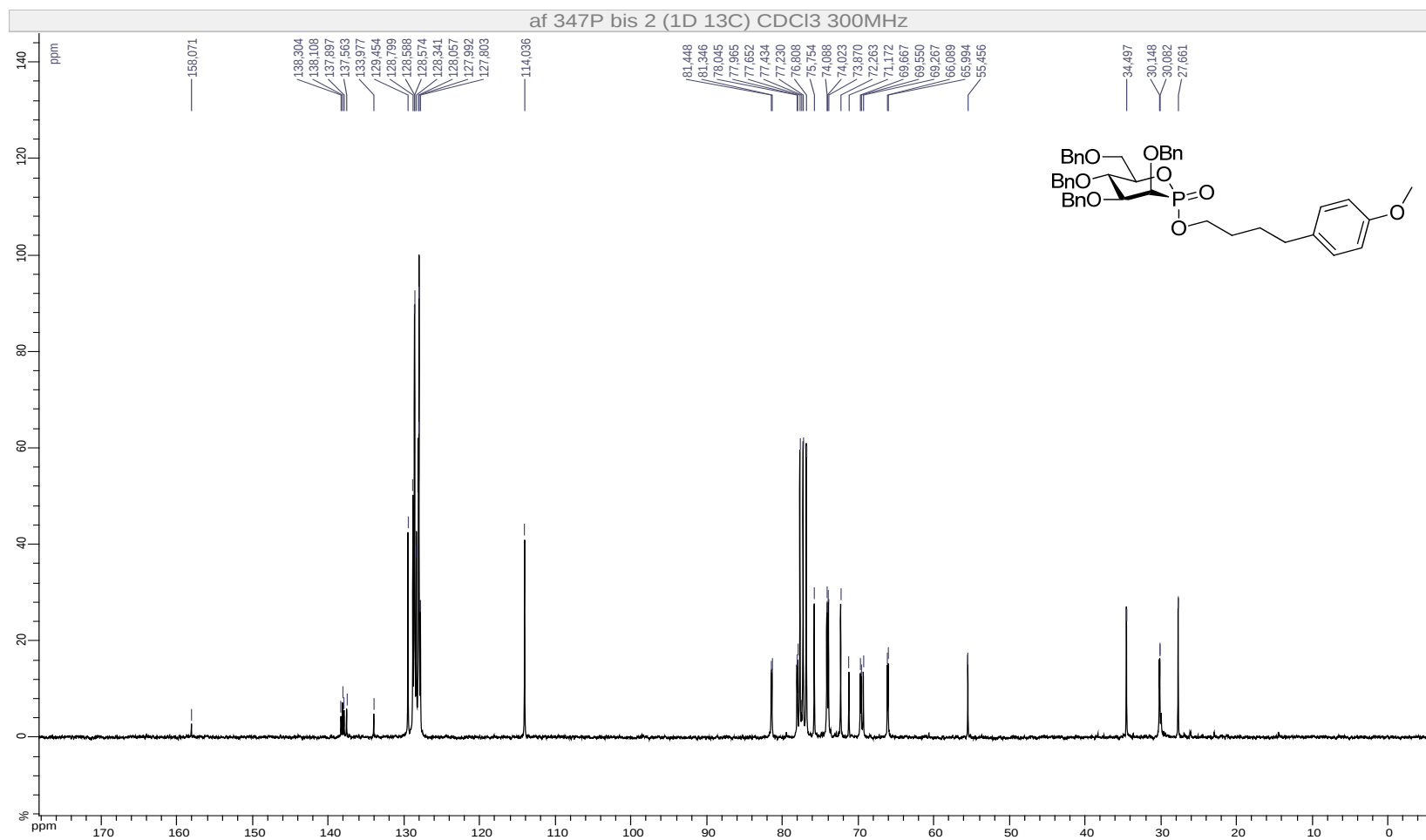
21ma, ^{13}C NMR (75 MHz, CDCl_3)



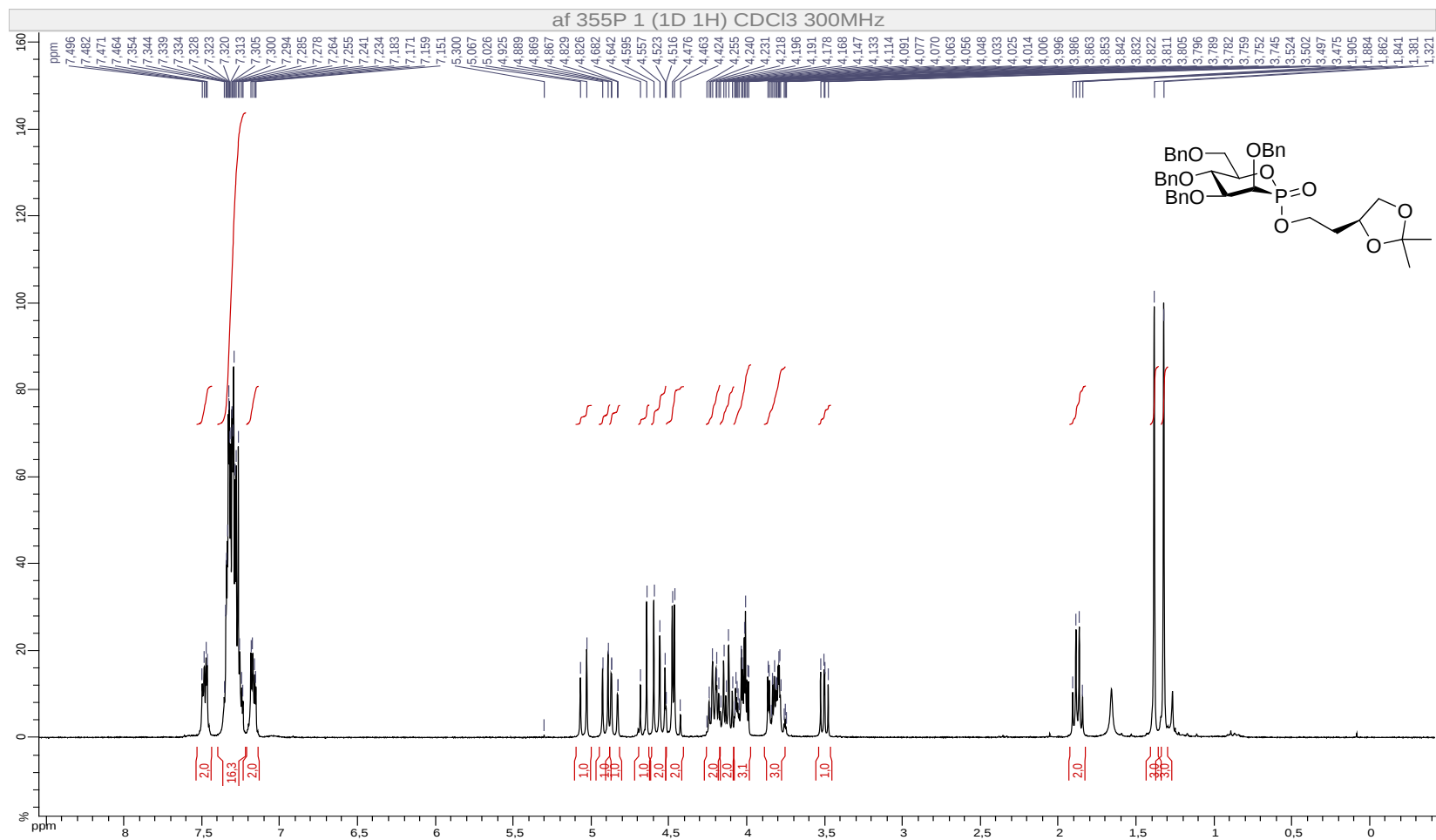
34mα, ¹H NMR (500 MHz, CDCl₃)



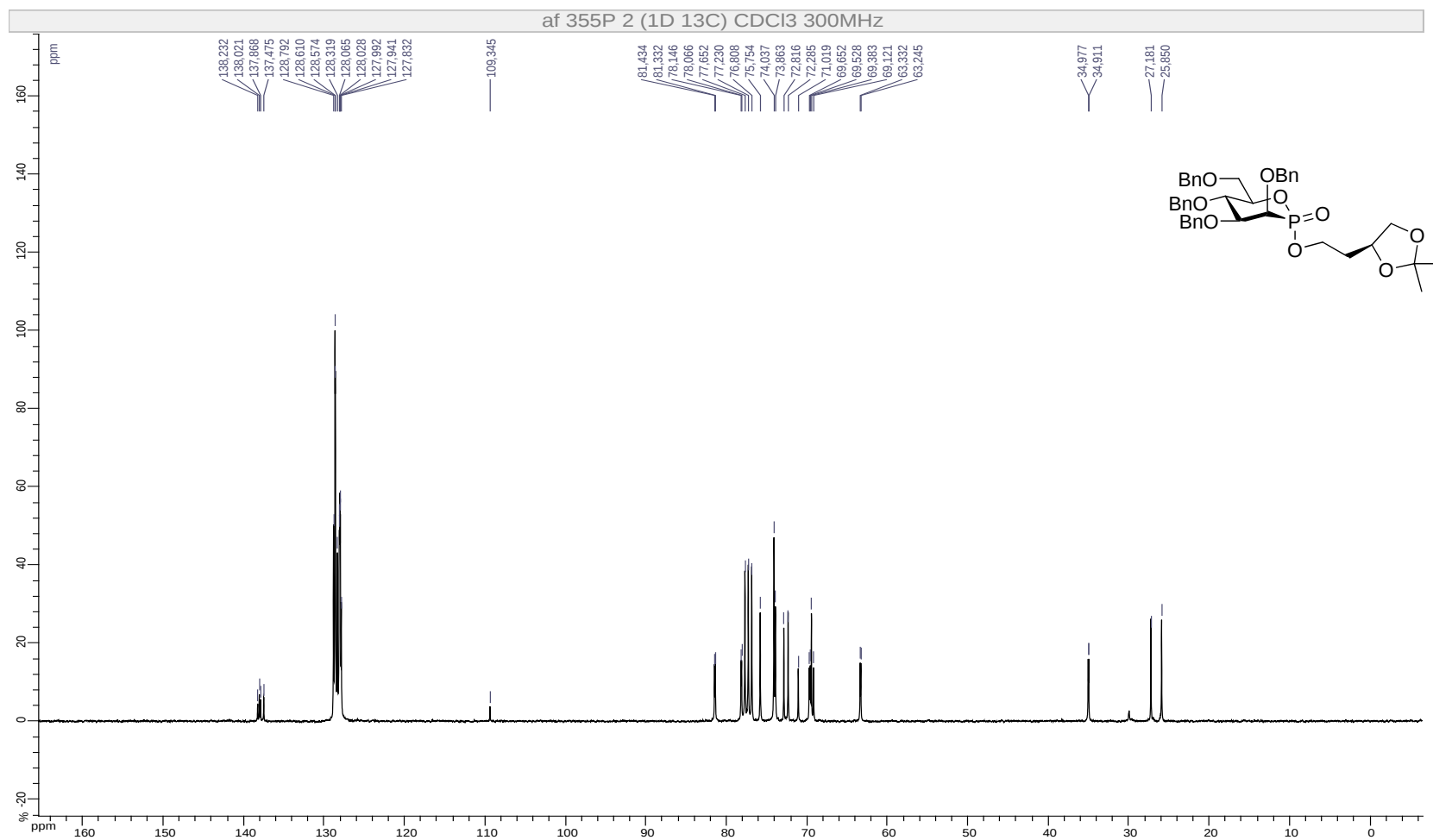
34ma, ^{13}C NMR (75 MHz, CDCl_3)



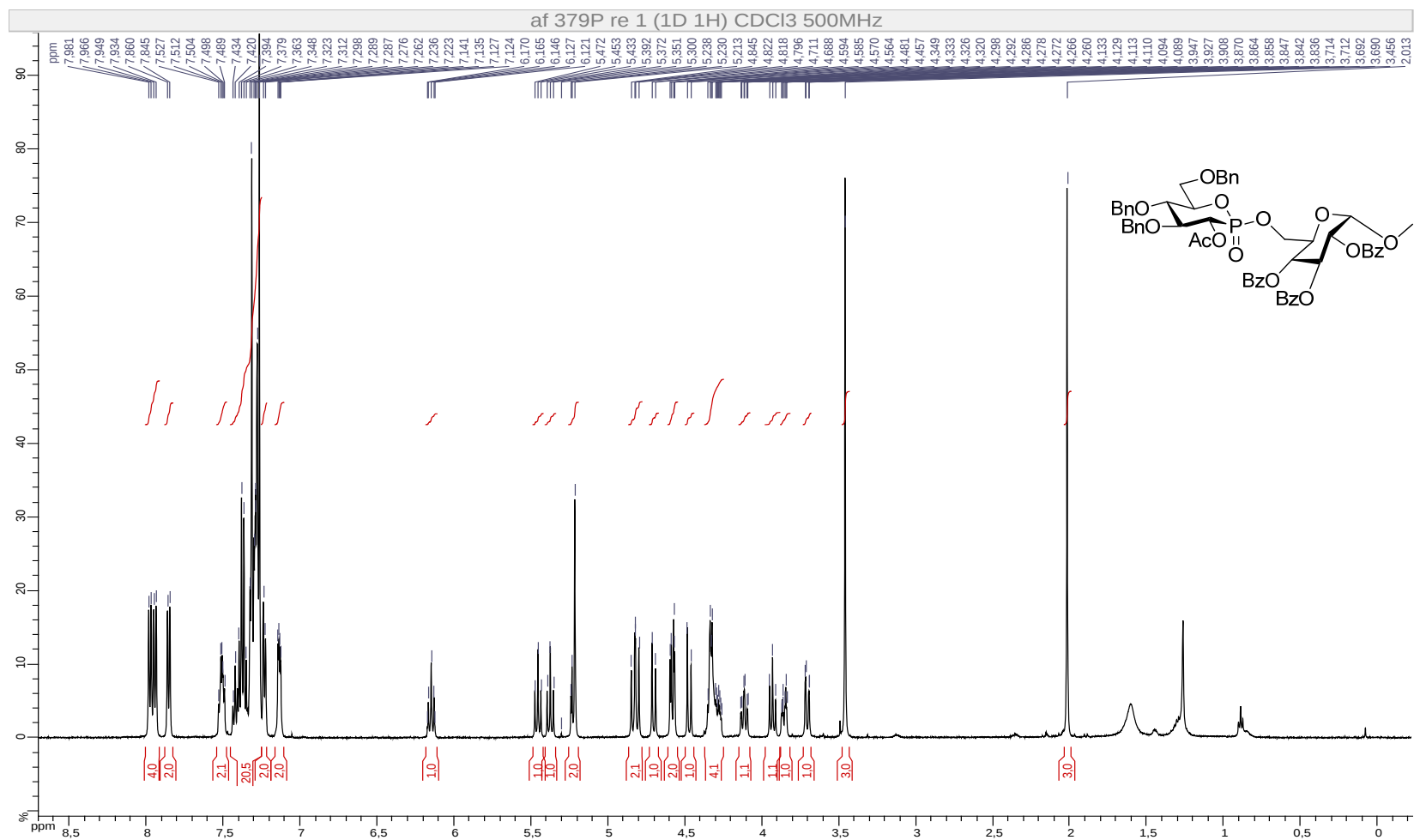
36ma, ^1H NMR (300 MHz, CDCl_3)



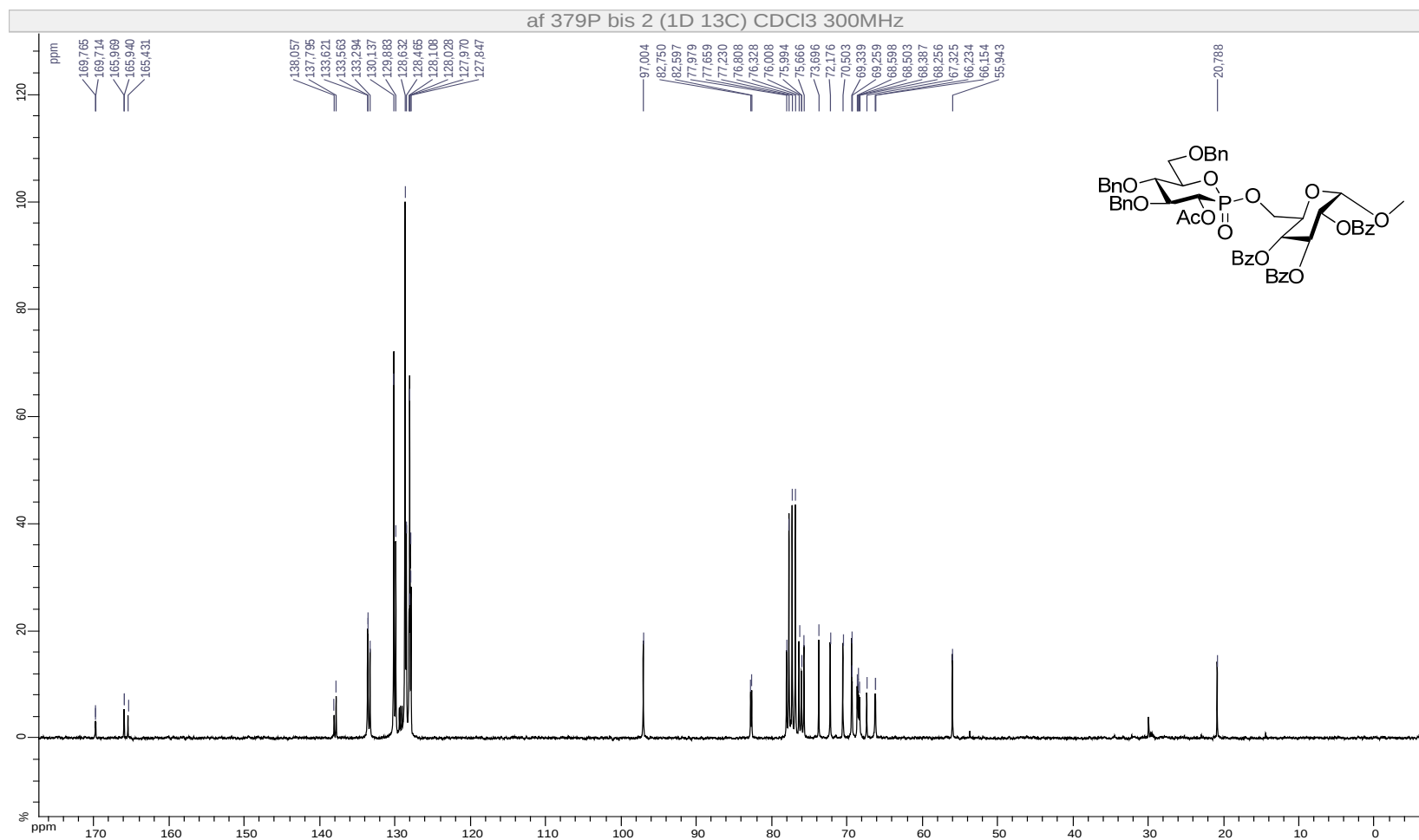
36ma, ^{13}C NMR (75 MHz, CDCl_3)



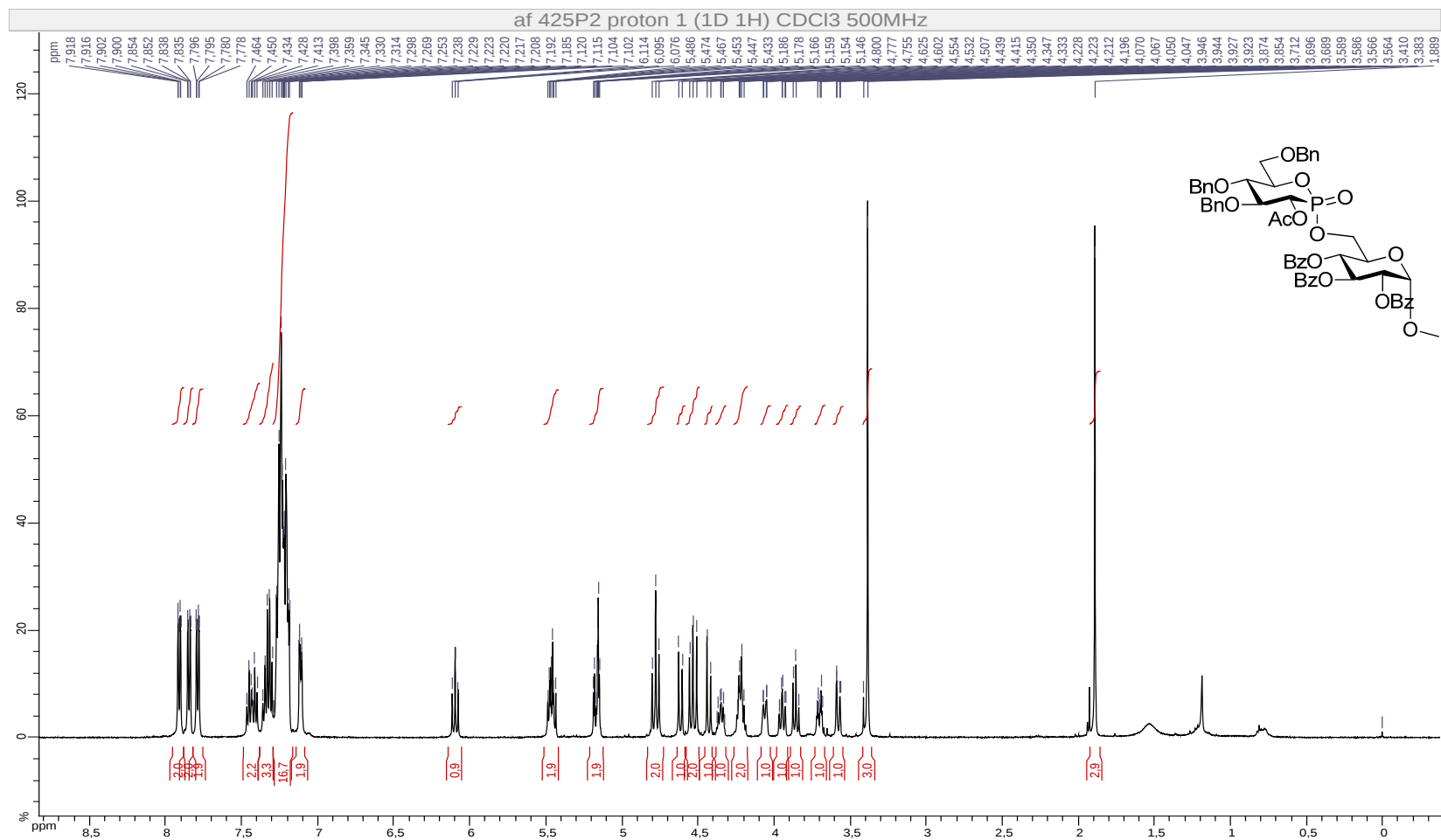
20gβ, ¹H NMR (500 MHz, CDCl₃)



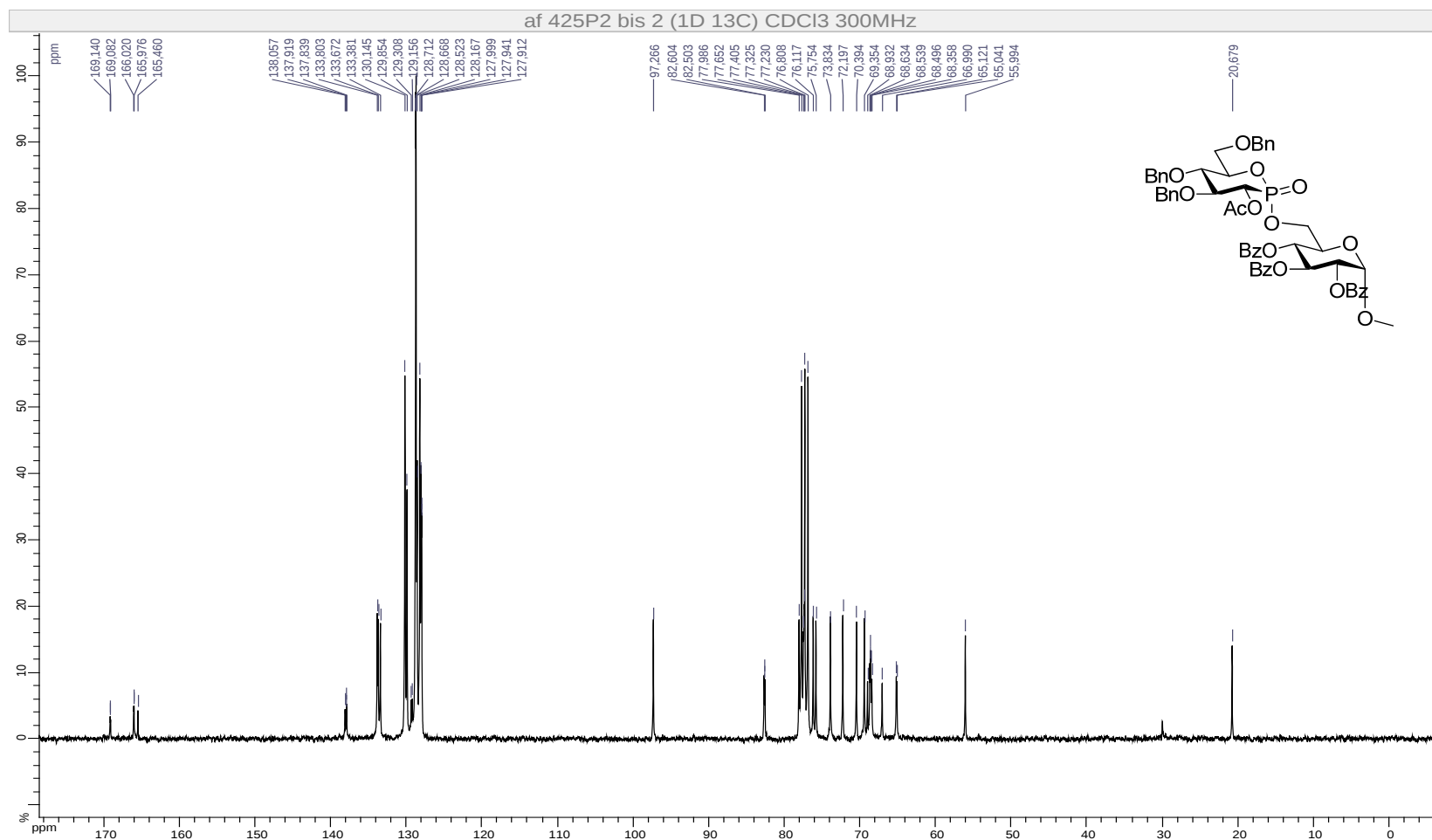
20gβ, ^{13}C NMR (75 MHz, CDCl_3)



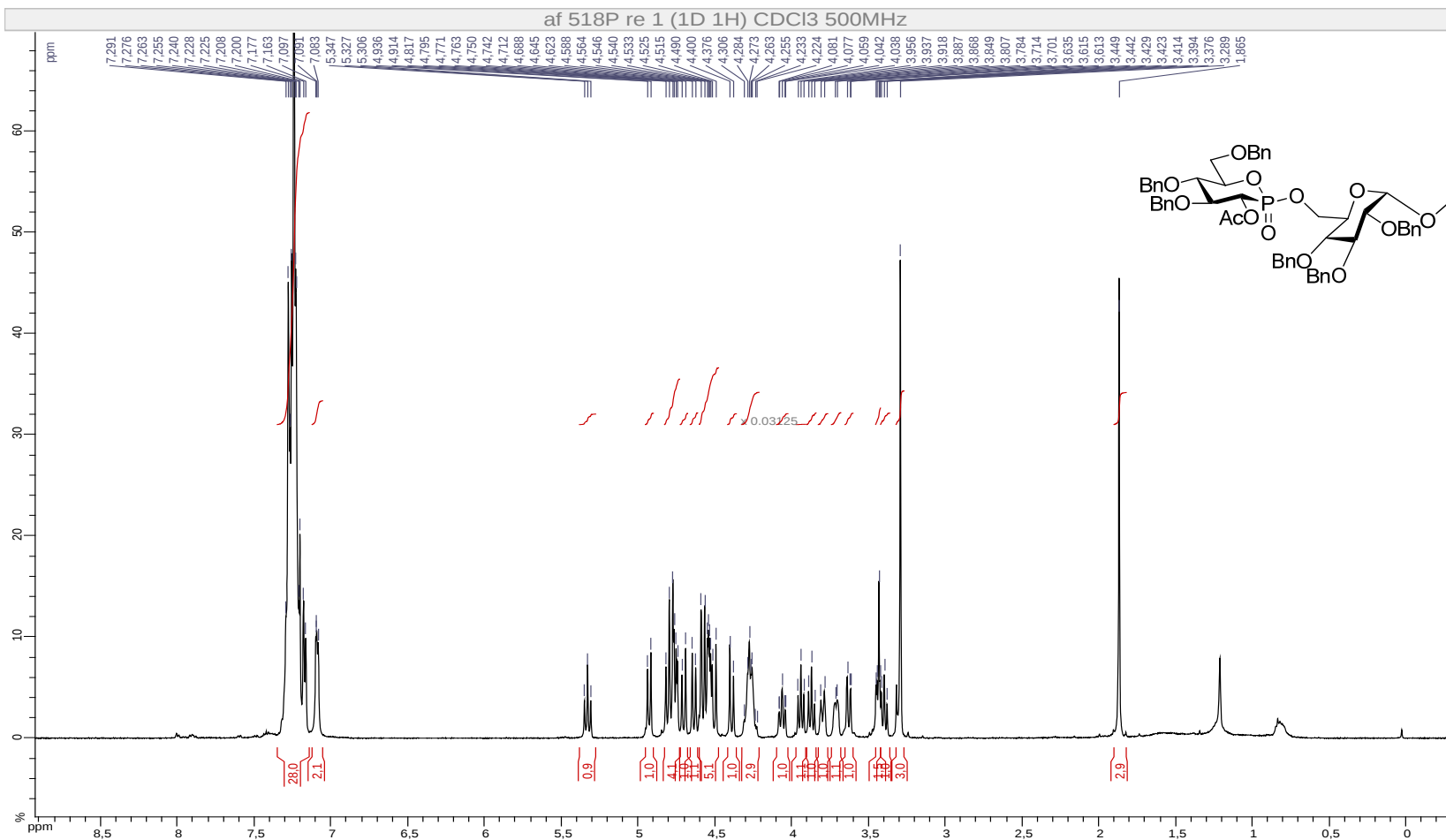
20ga, ^1H NMR (500 MHz, CDCl_3)



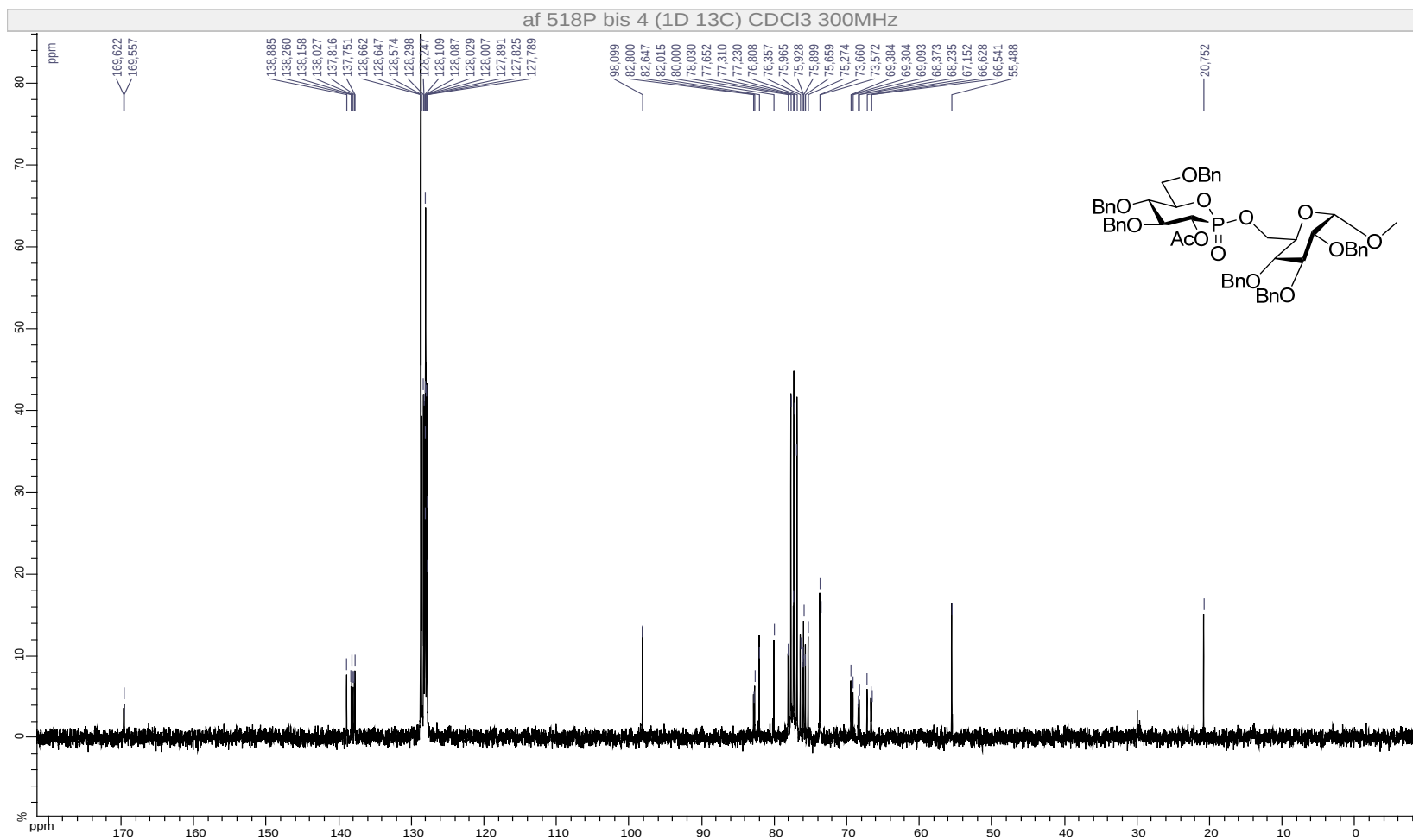
20g α , ^{13}C NMR (75 MHz, CDCl_3)



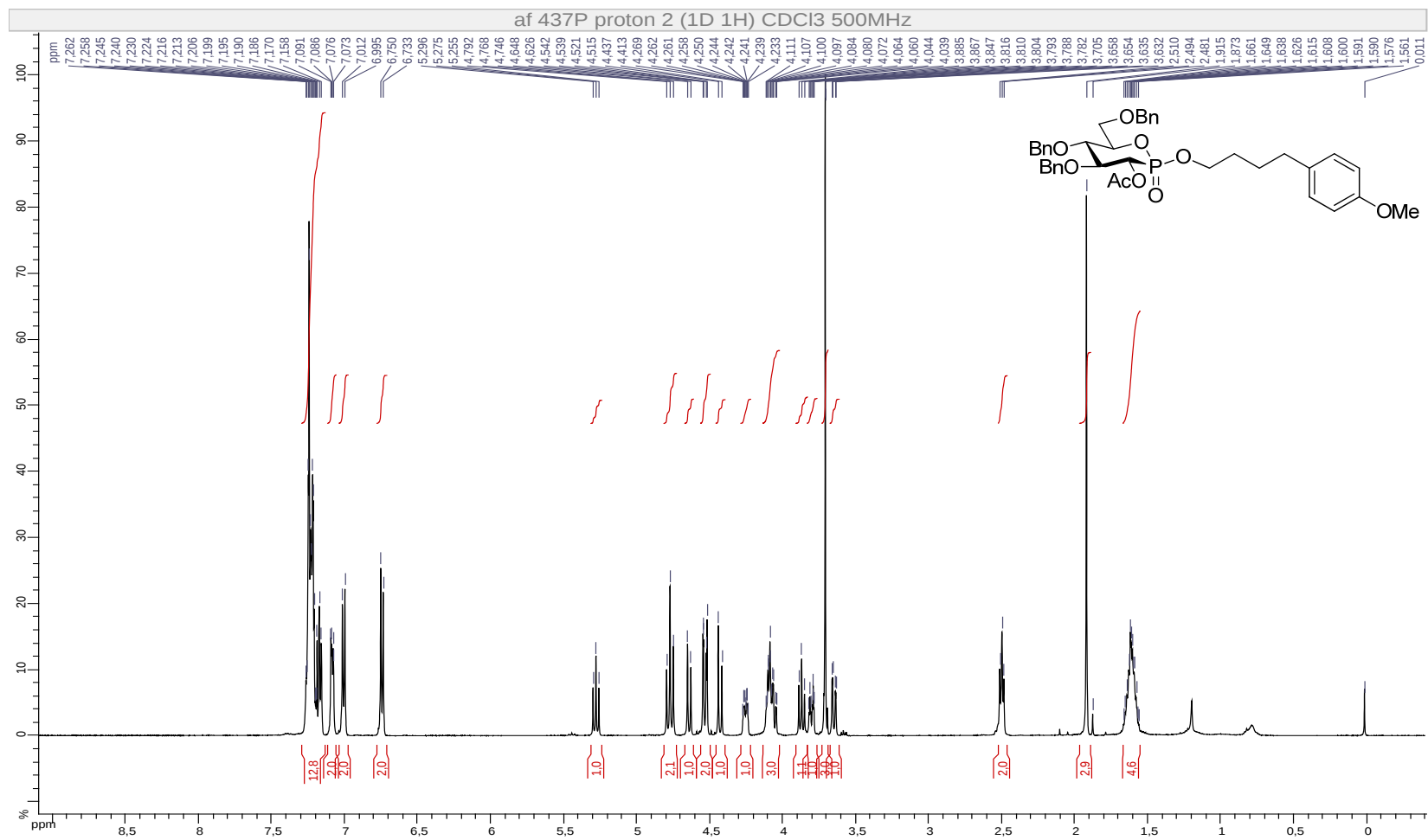
38gβ, ^1H NMR (500 MHz, CDCl_3)



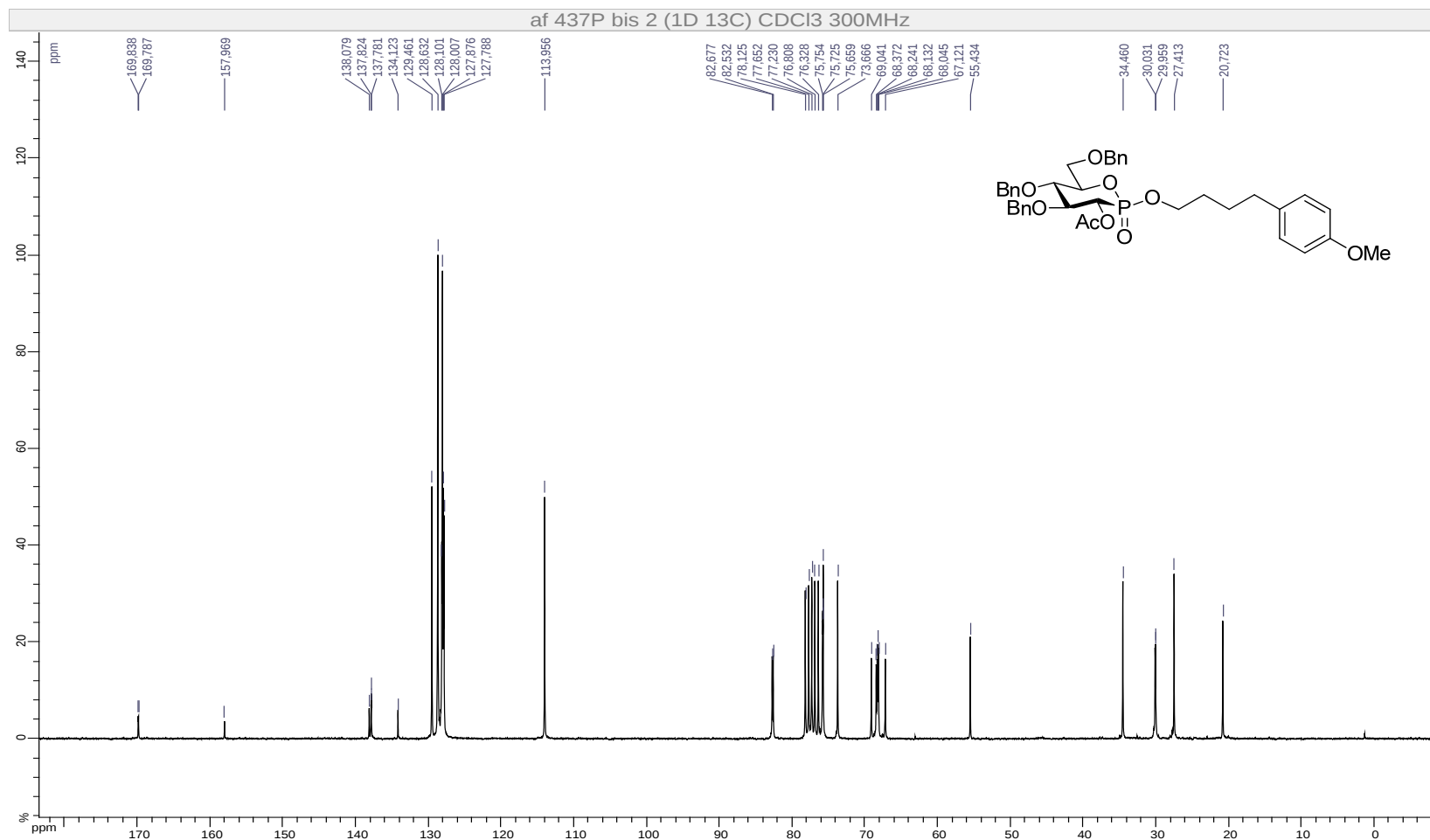
38gβ, ^{13}C NMR (75 MHz, CDCl_3)



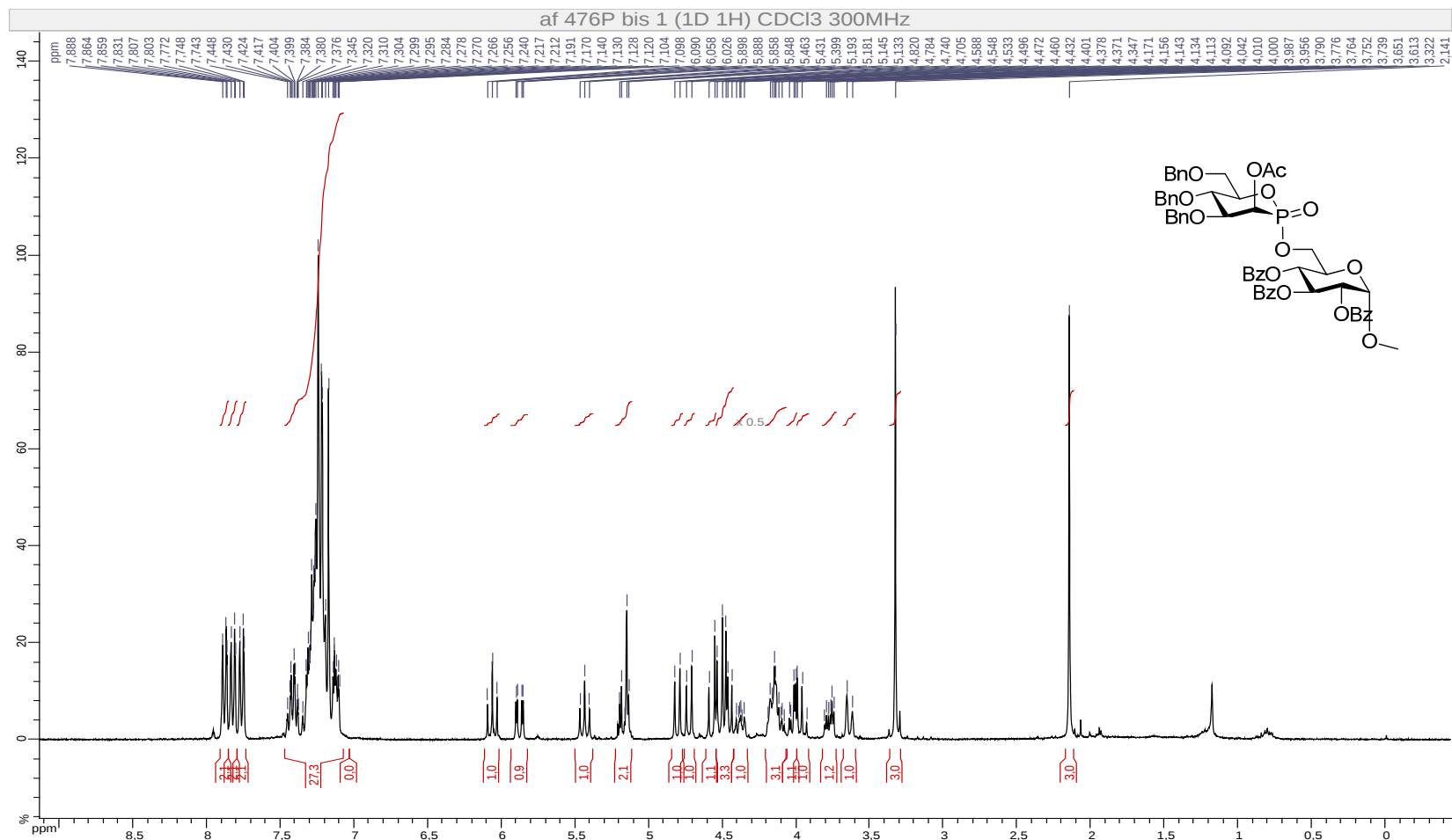
44gβ, ¹H NMR (500 MHz, CDCl₃)



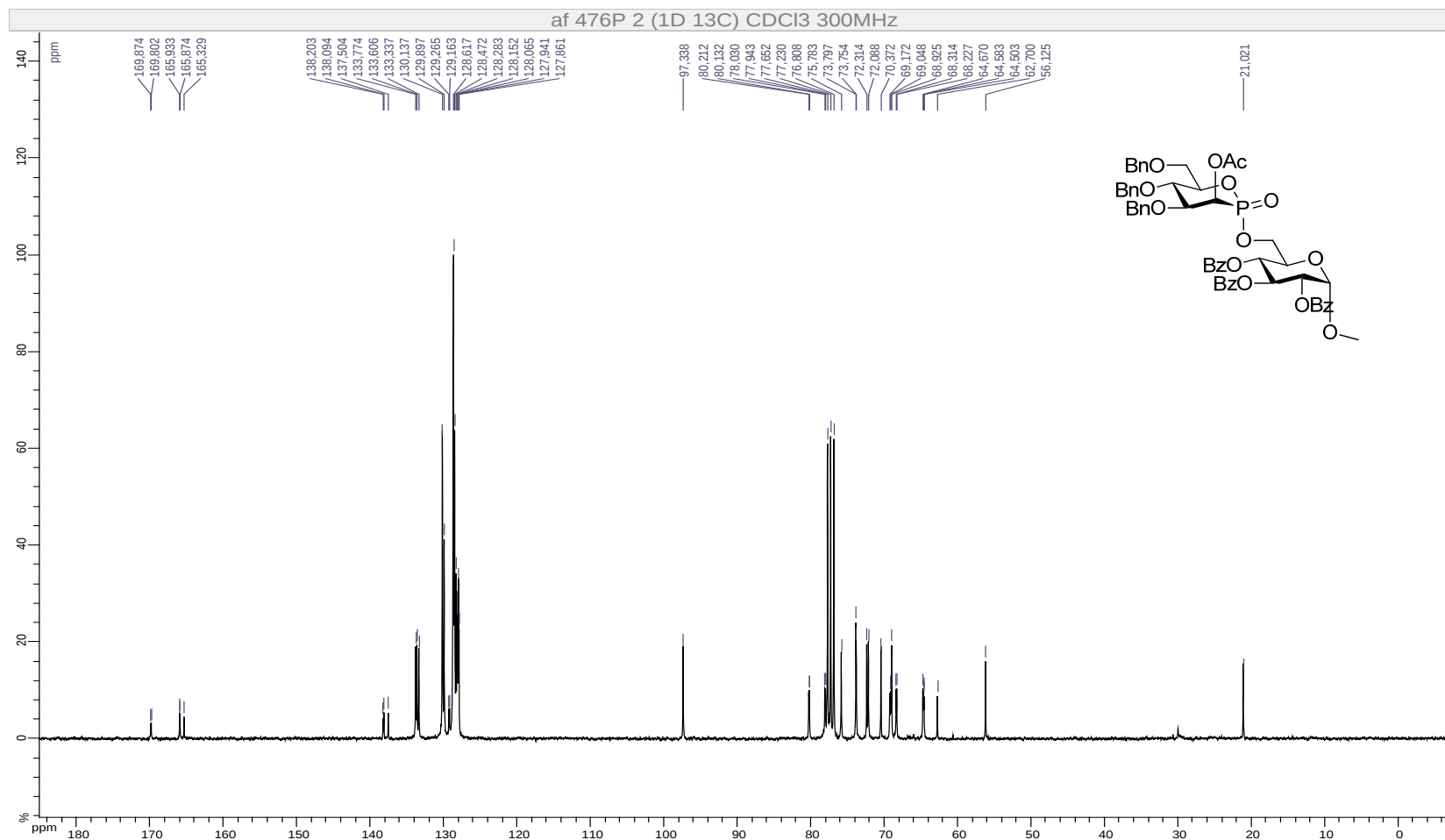
44g β , ^{13}C NMR (75 MHz, CDCl_3)



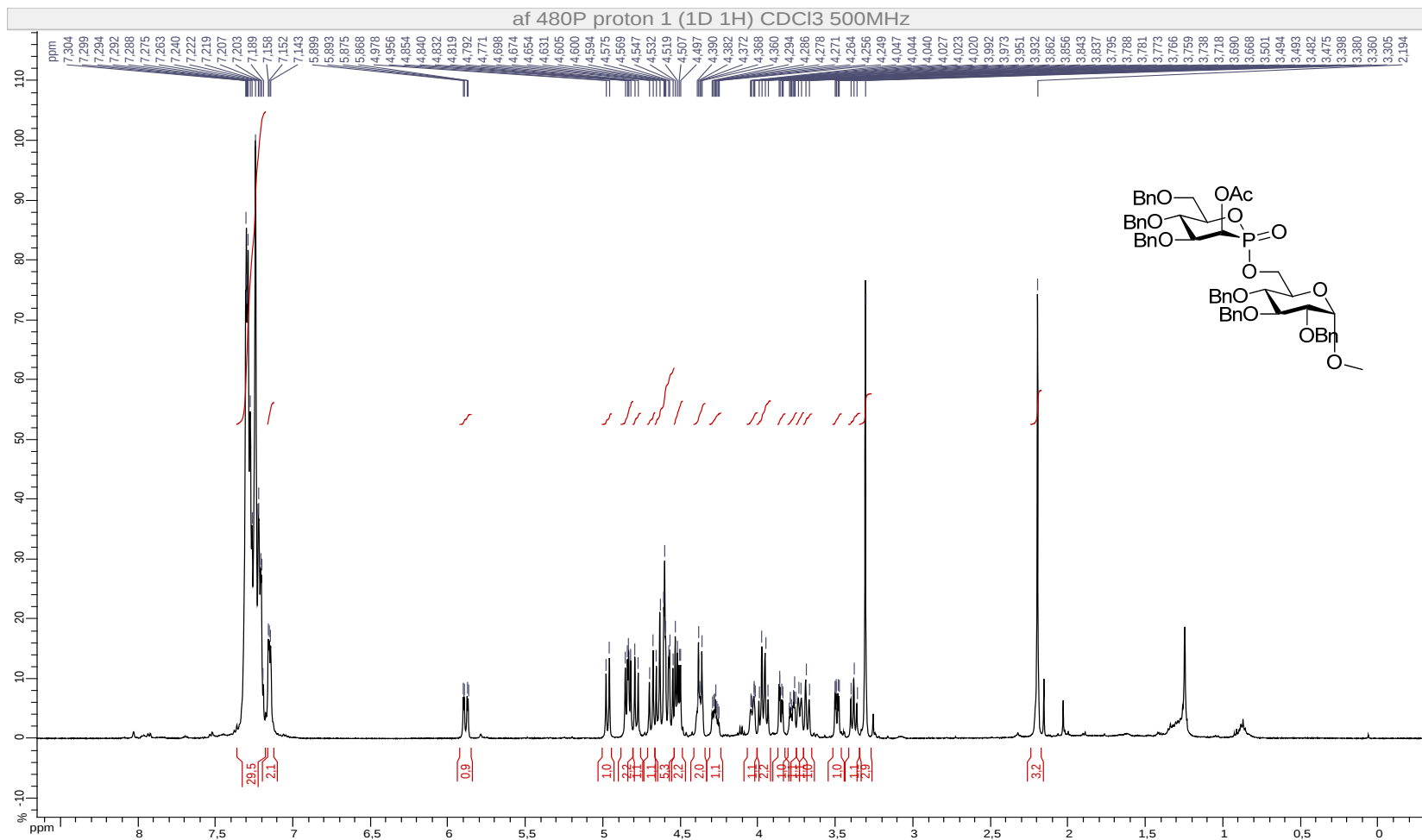
20ma, ^1H NMR (300 MHz, CDCl_3)



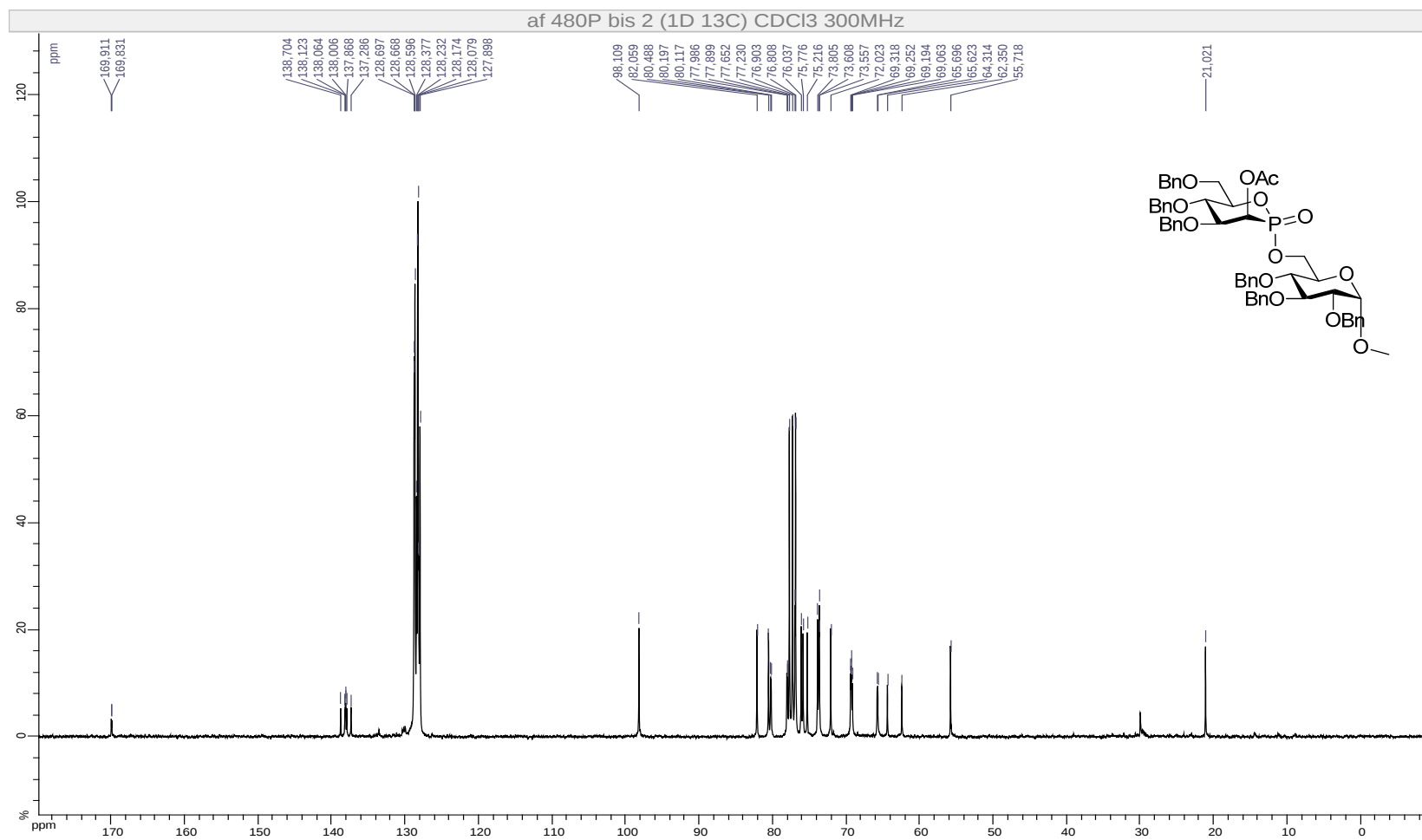
20ma, ^{13}C NMR (75 MHz, CDCl_3)



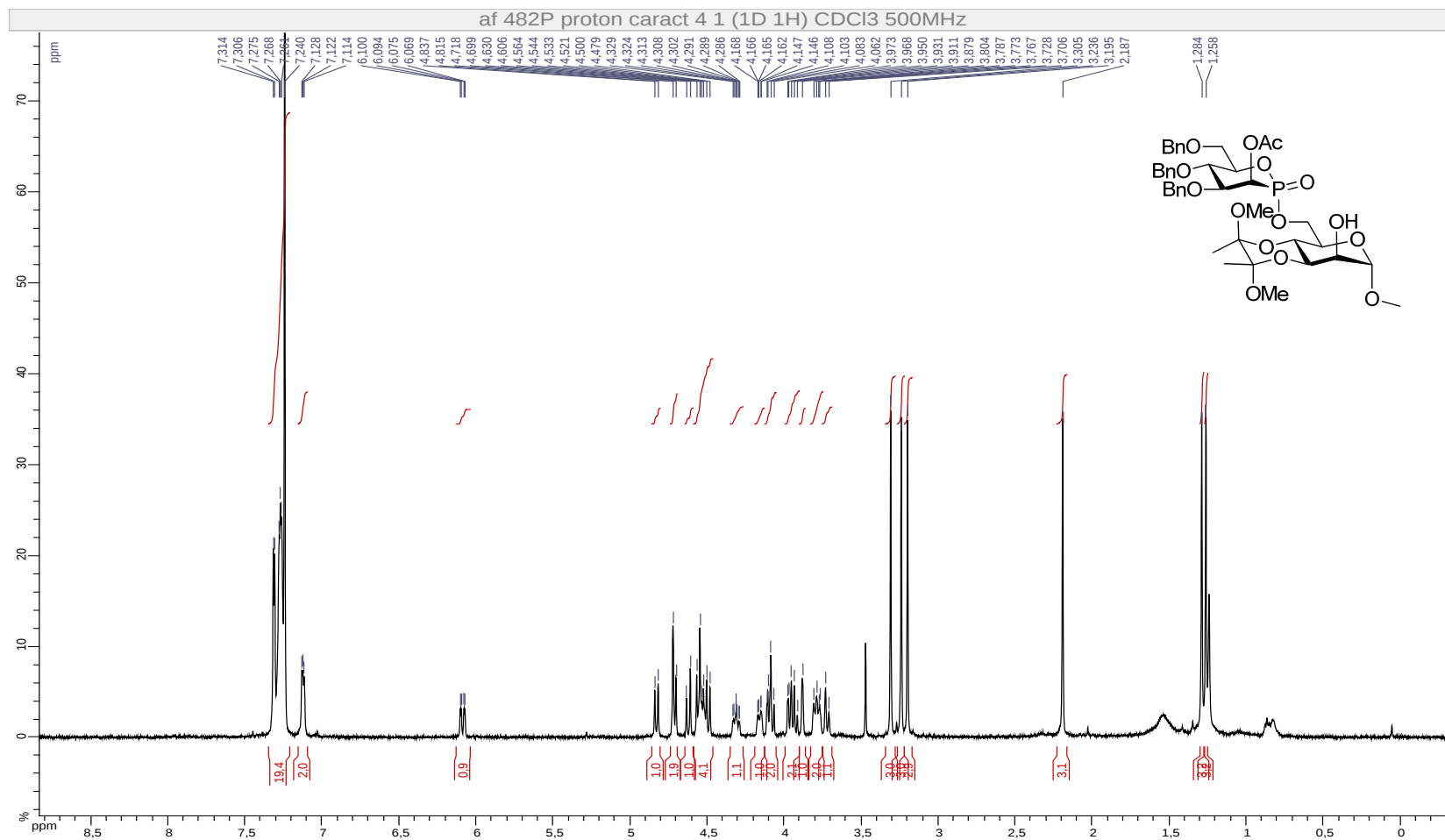
38mα, ¹H NMR (500 MHz, CDCl₃)



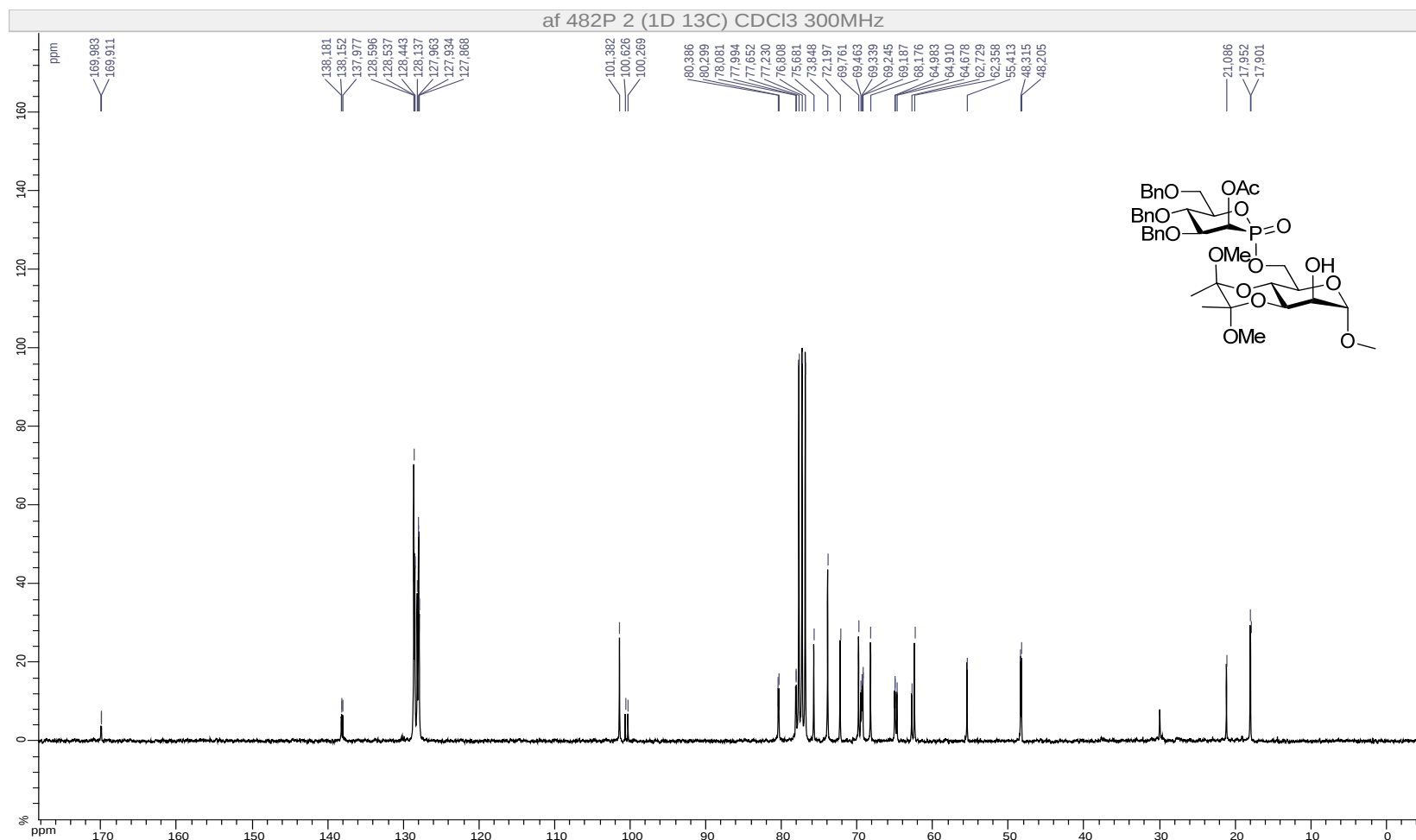
38ma, ^{13}C NMR (75 MHz, CDCl_3)



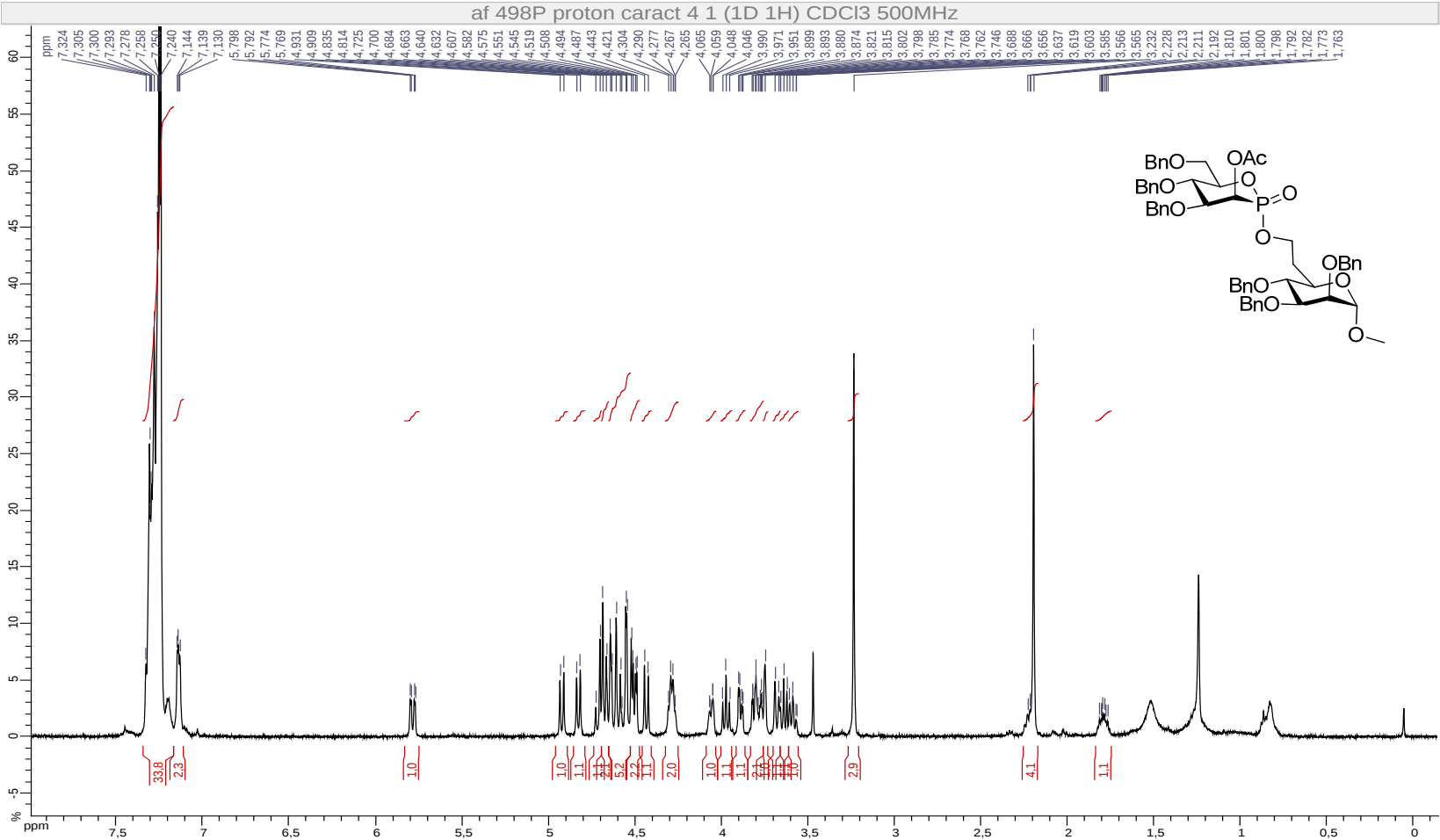
40ma, ^1H NMR (500 MHz, CDCl_3)



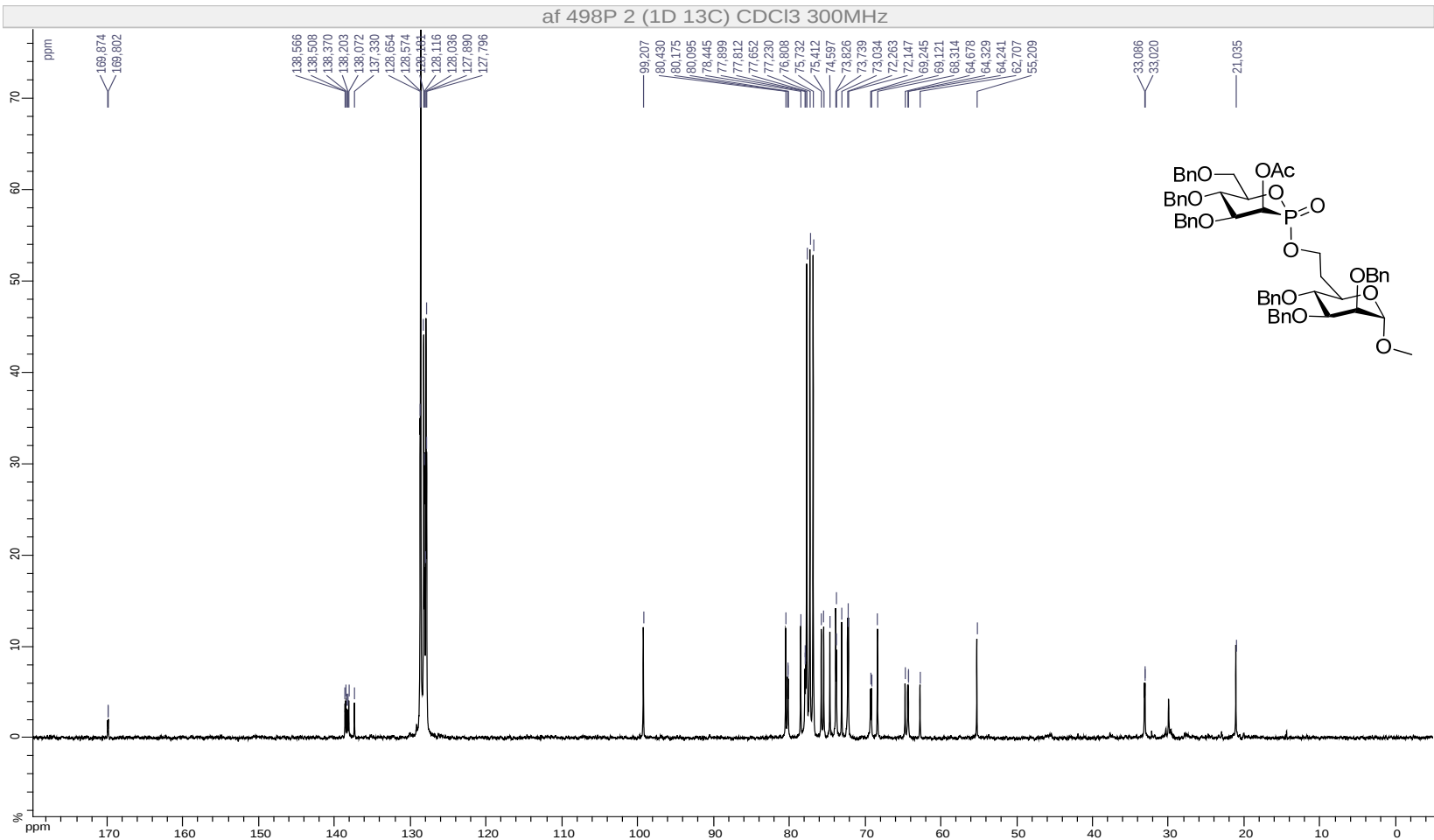
40ma, ^{13}C NMR (75 MHz, CDCl_3)



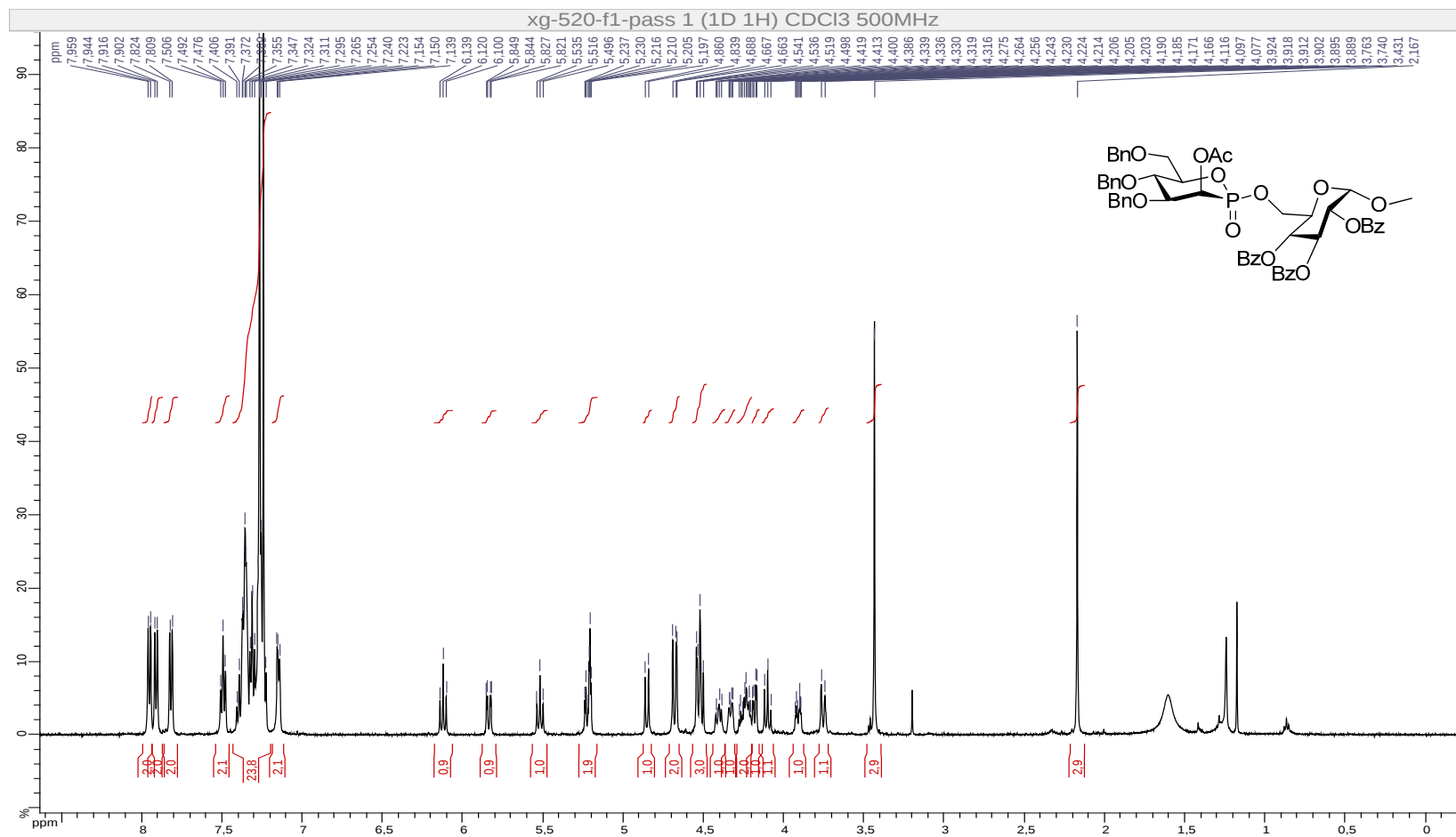
42mα, ^1H NMR (500 MHz, CDCl_3)



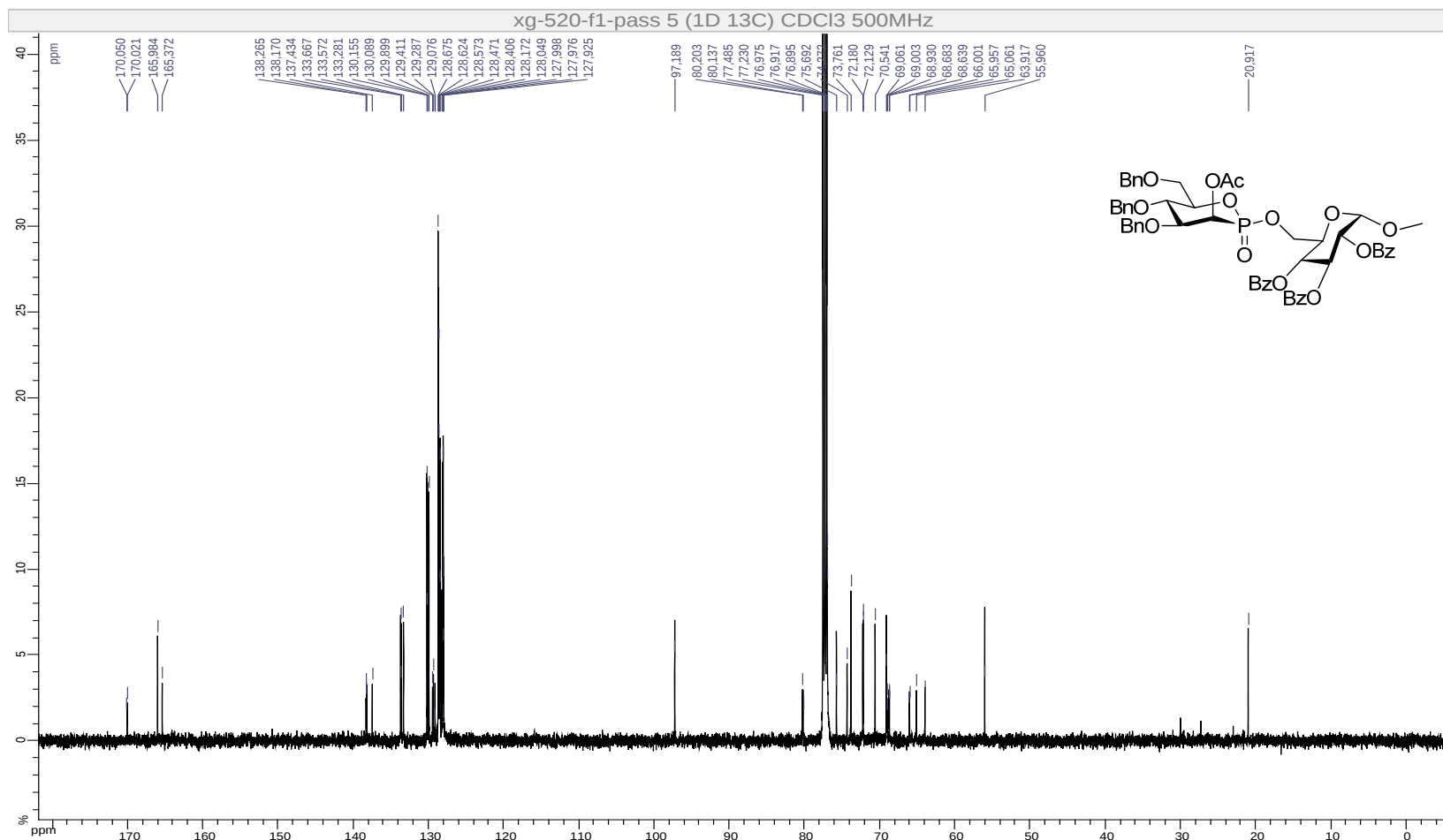
42mα, ¹³C NMR (75 MHz, CDCl₃)



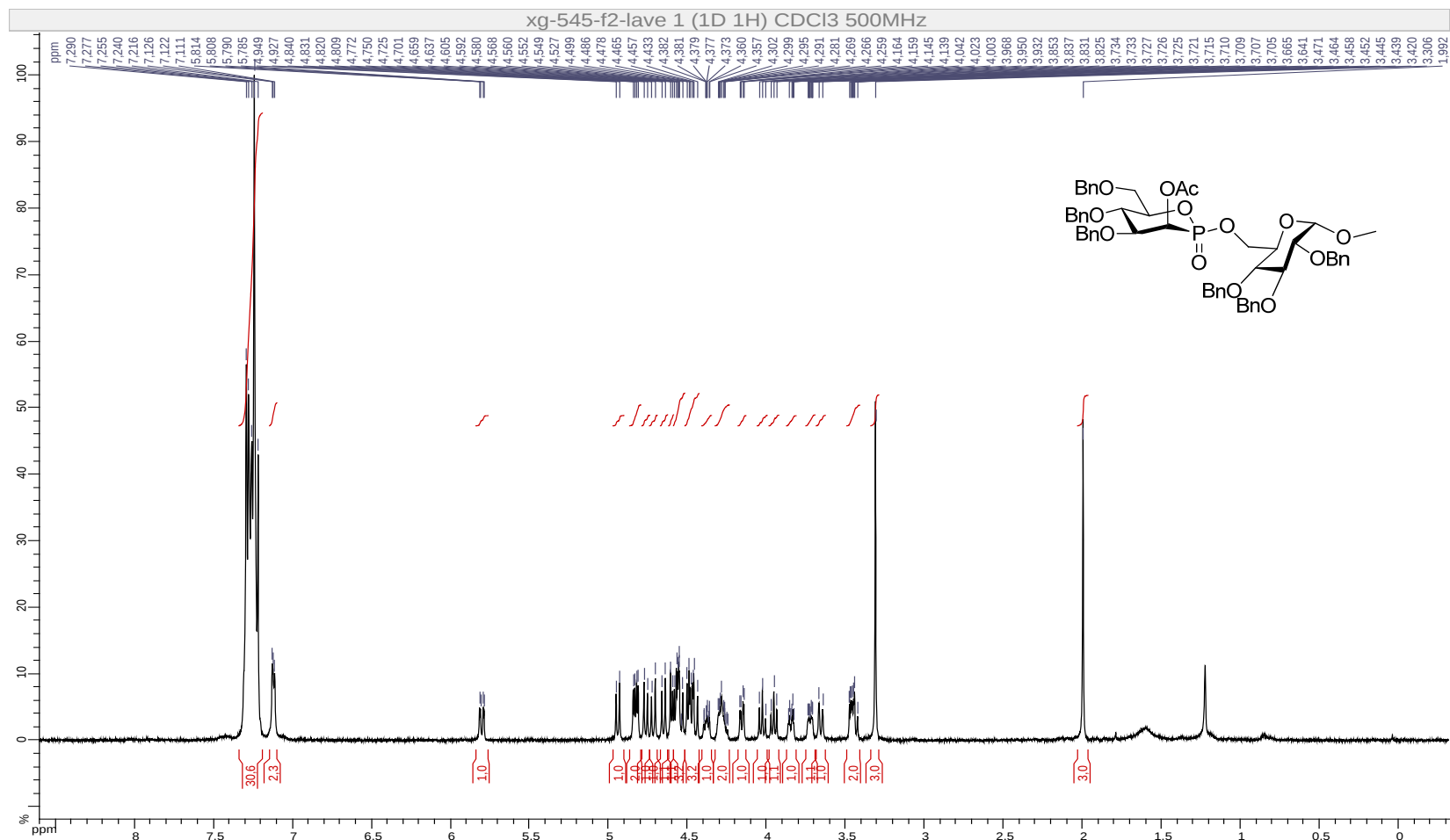
20mβ, ¹H NMR (500 MHz, CDCl₃)



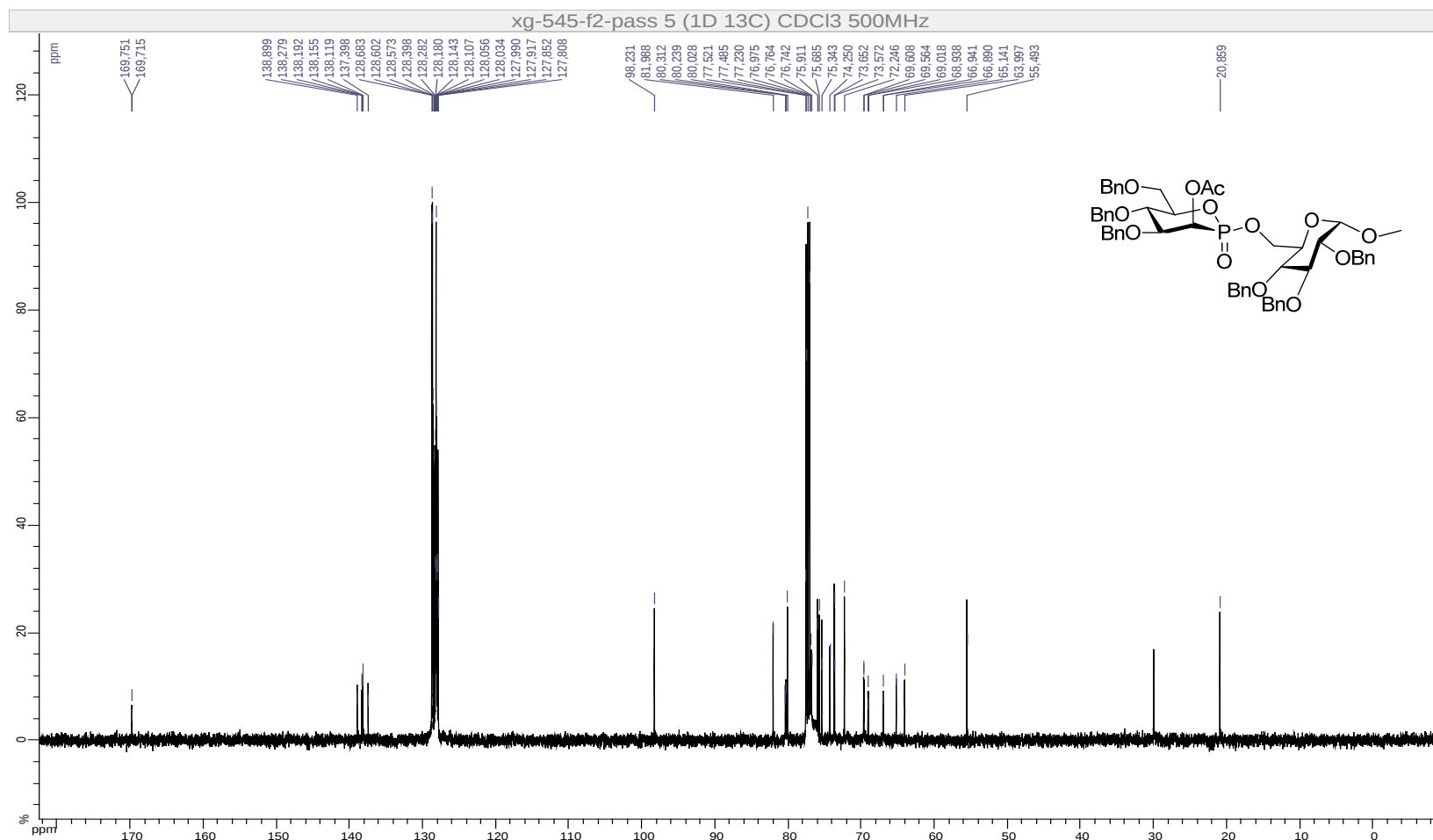
20m β , ^{13}C NMR (125 MHz, CDCl_3)



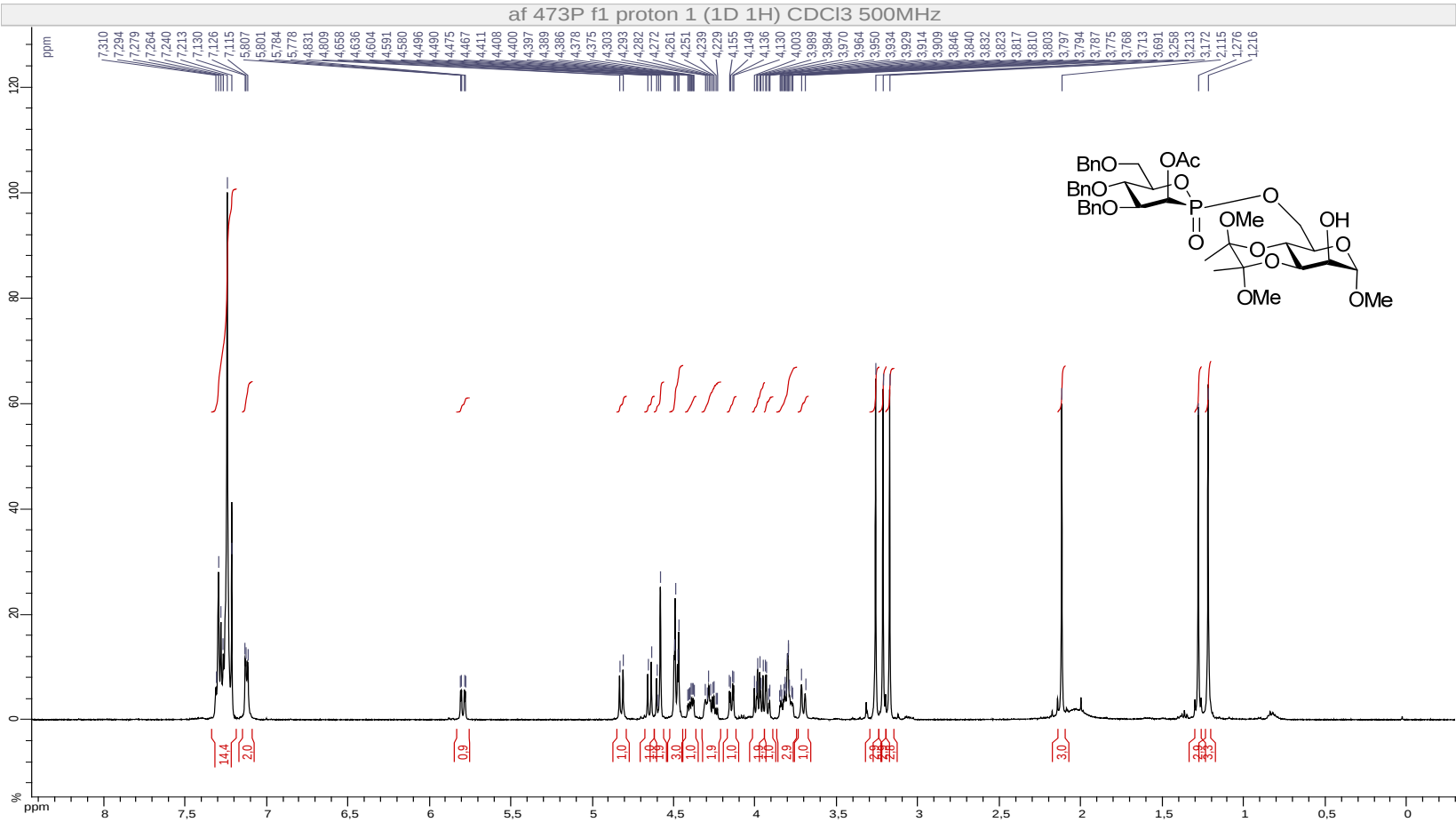
38mβ, ¹H NMR (500 MHz, CDCl₃)



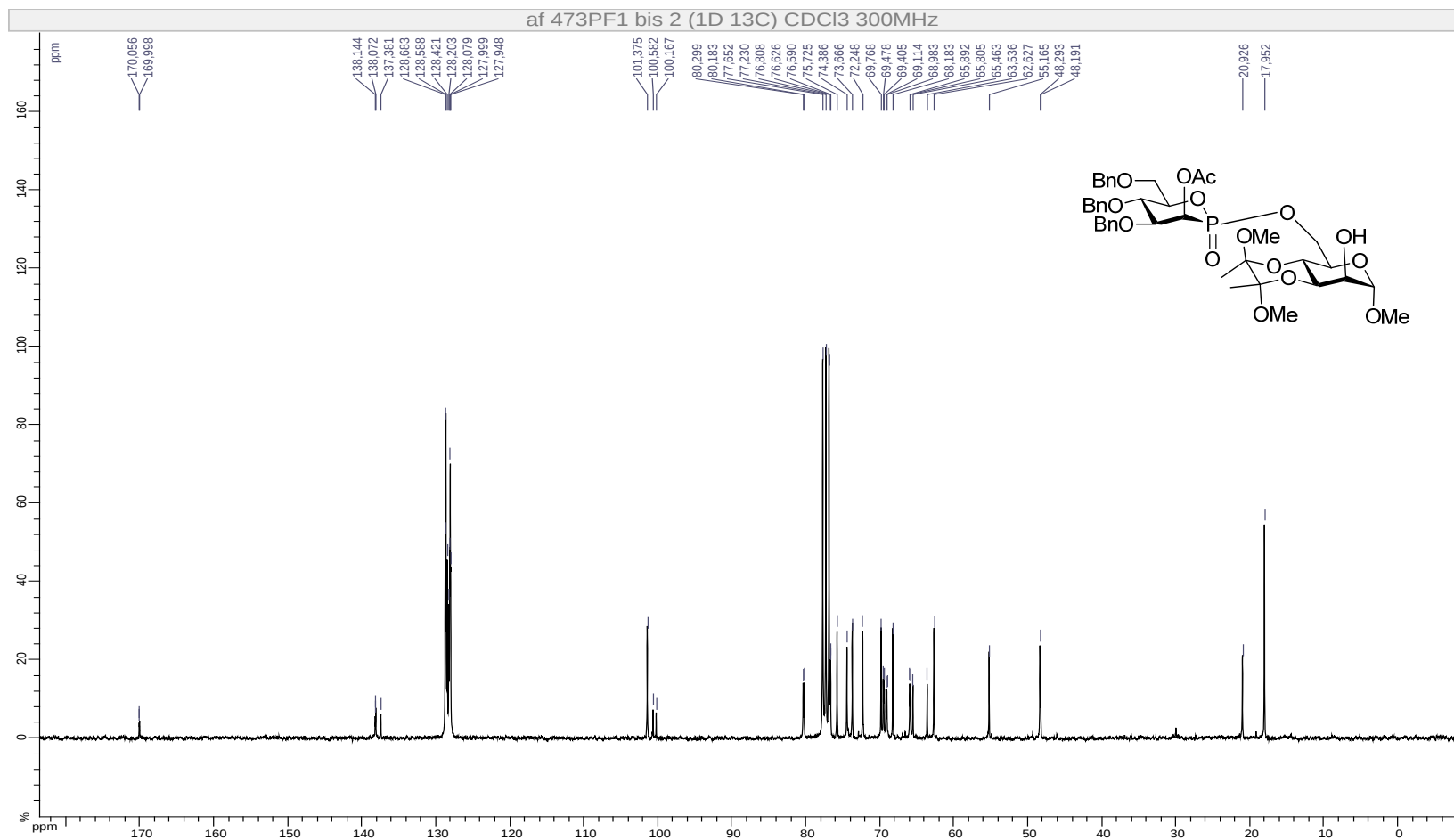
38m β , ^{13}C NMR (125 MHz, CDCl_3)



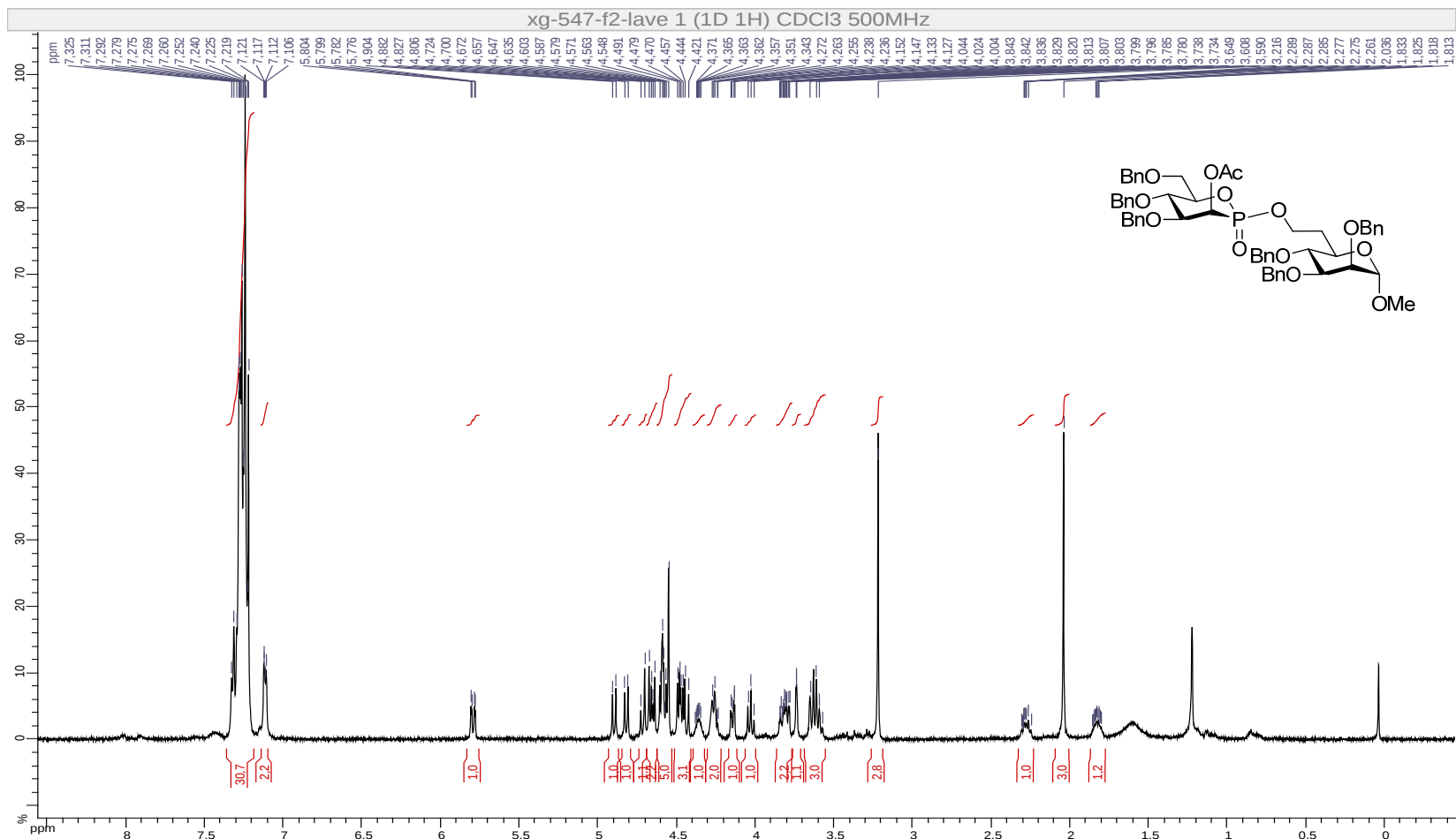
40mβ, ^1H NMR (500 MHz, CDCl_3)



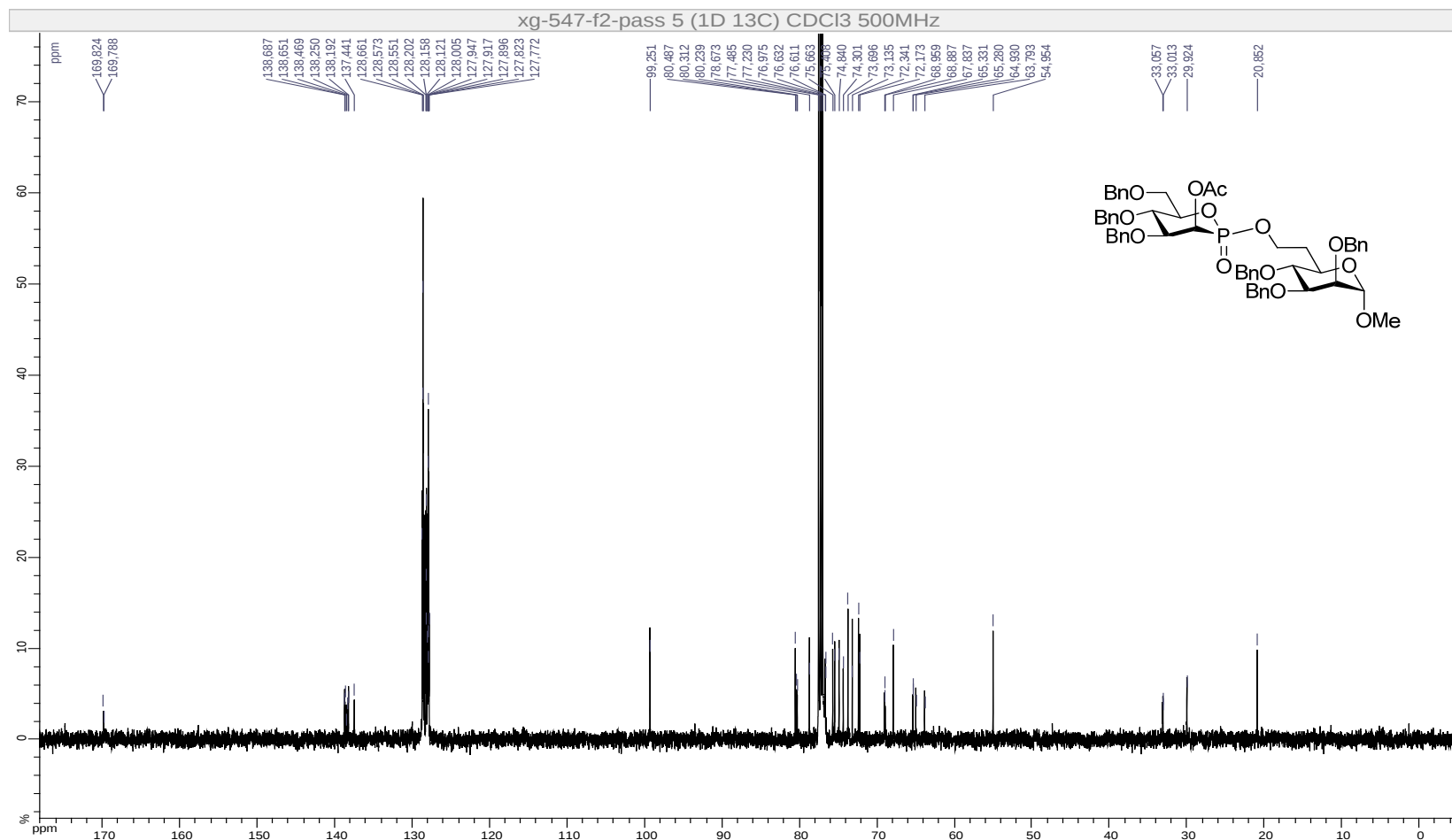
40mβ, ^{13}C NMR (75 MHz, CDCl_3)



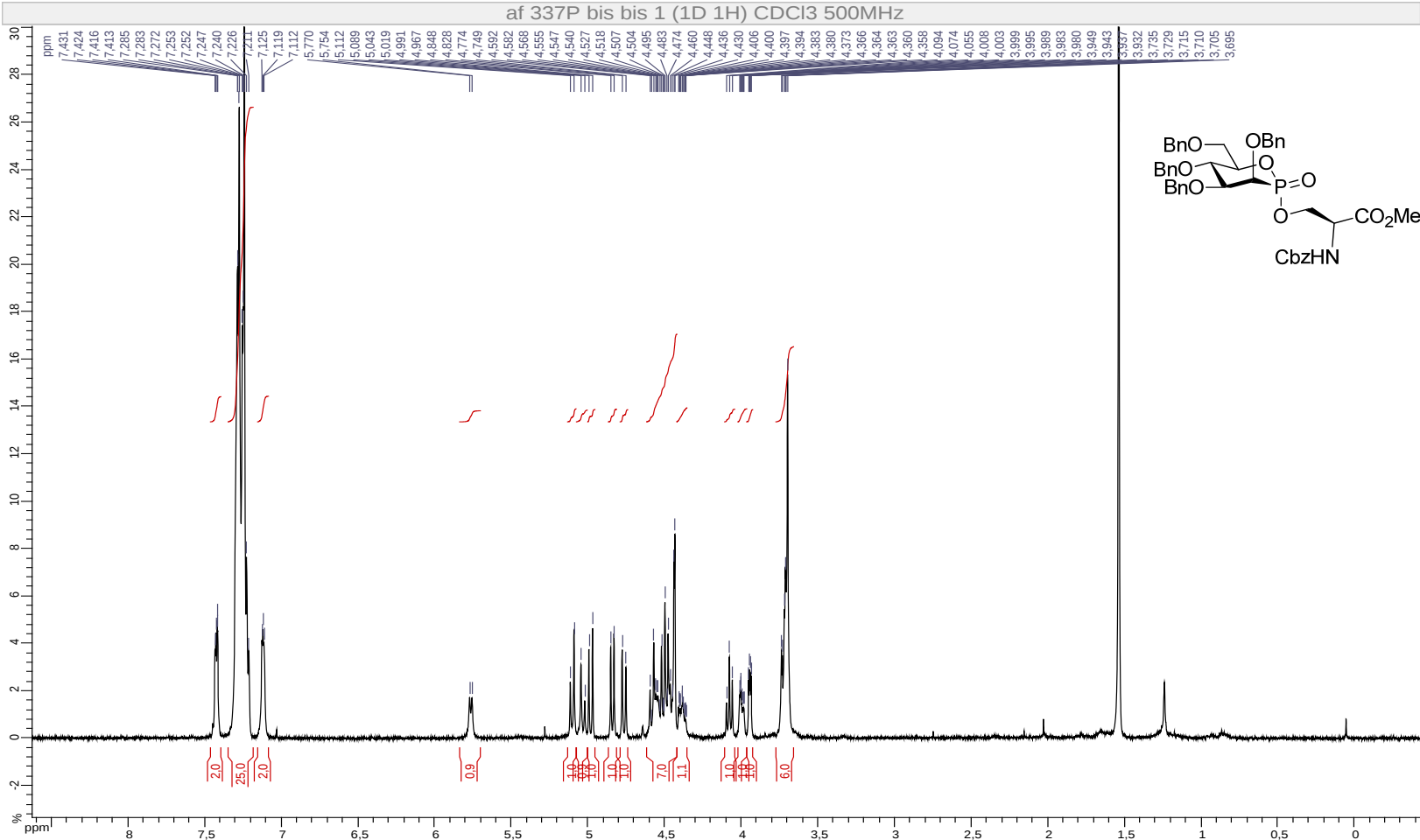
42mβ, ¹H NMR (500 MHz, CDCl₃)



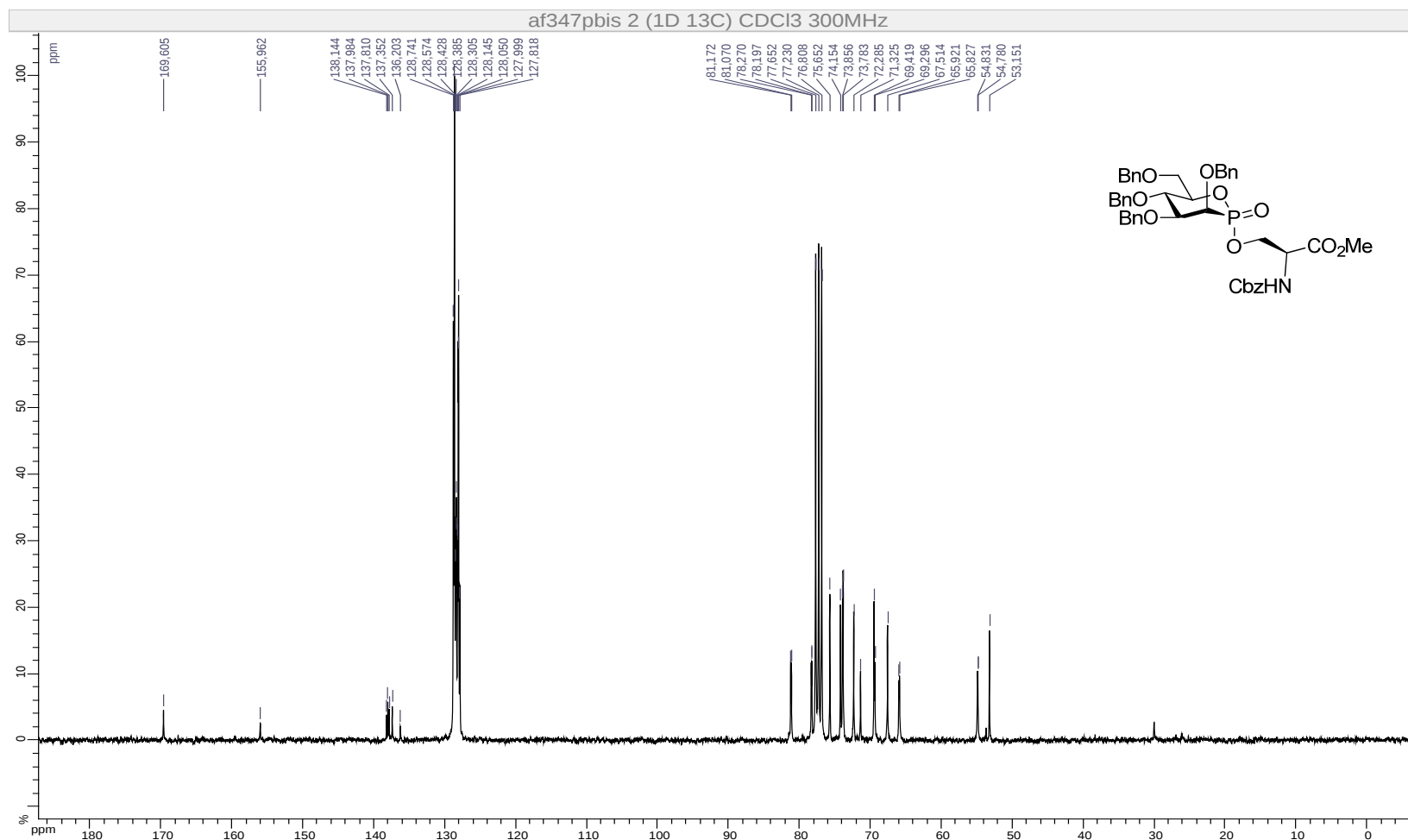
42m β , ^{13}C NMR (125 MHz, CDCl_3)



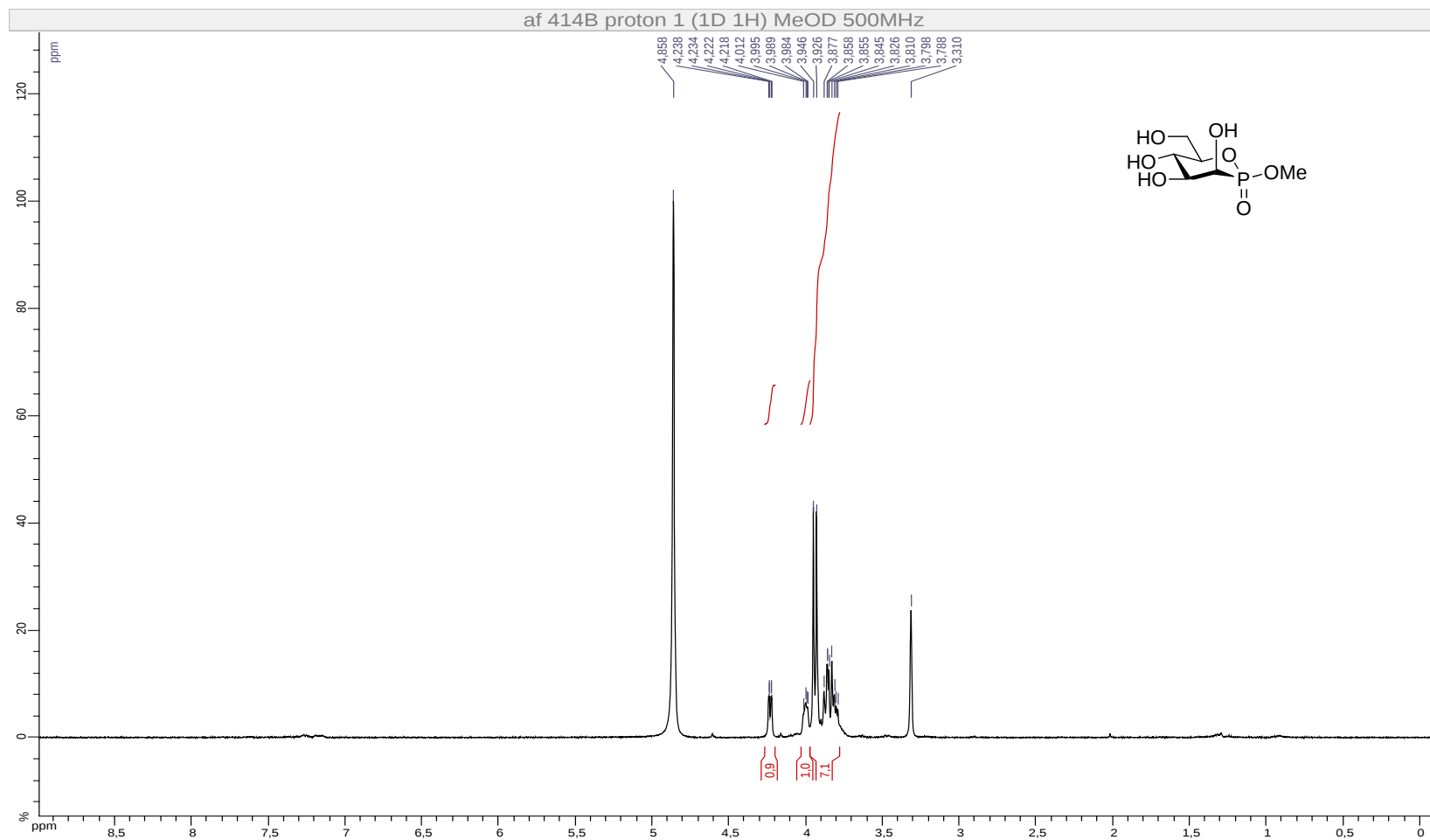
32mα, ^1H NMR (500 MHz, CDCl_3)



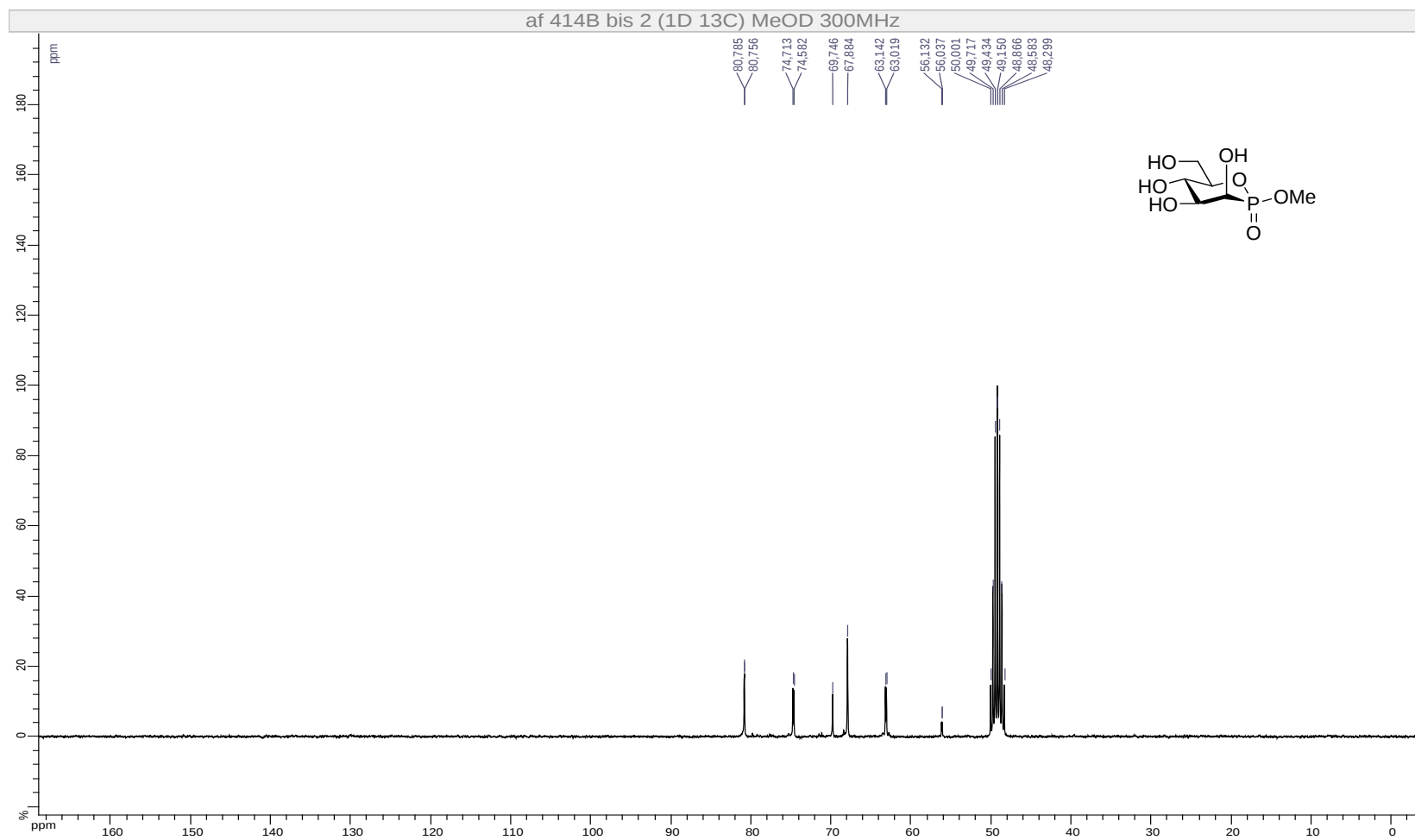
32ma, ^{13}C NMR (75 MHz, CDCl_3)



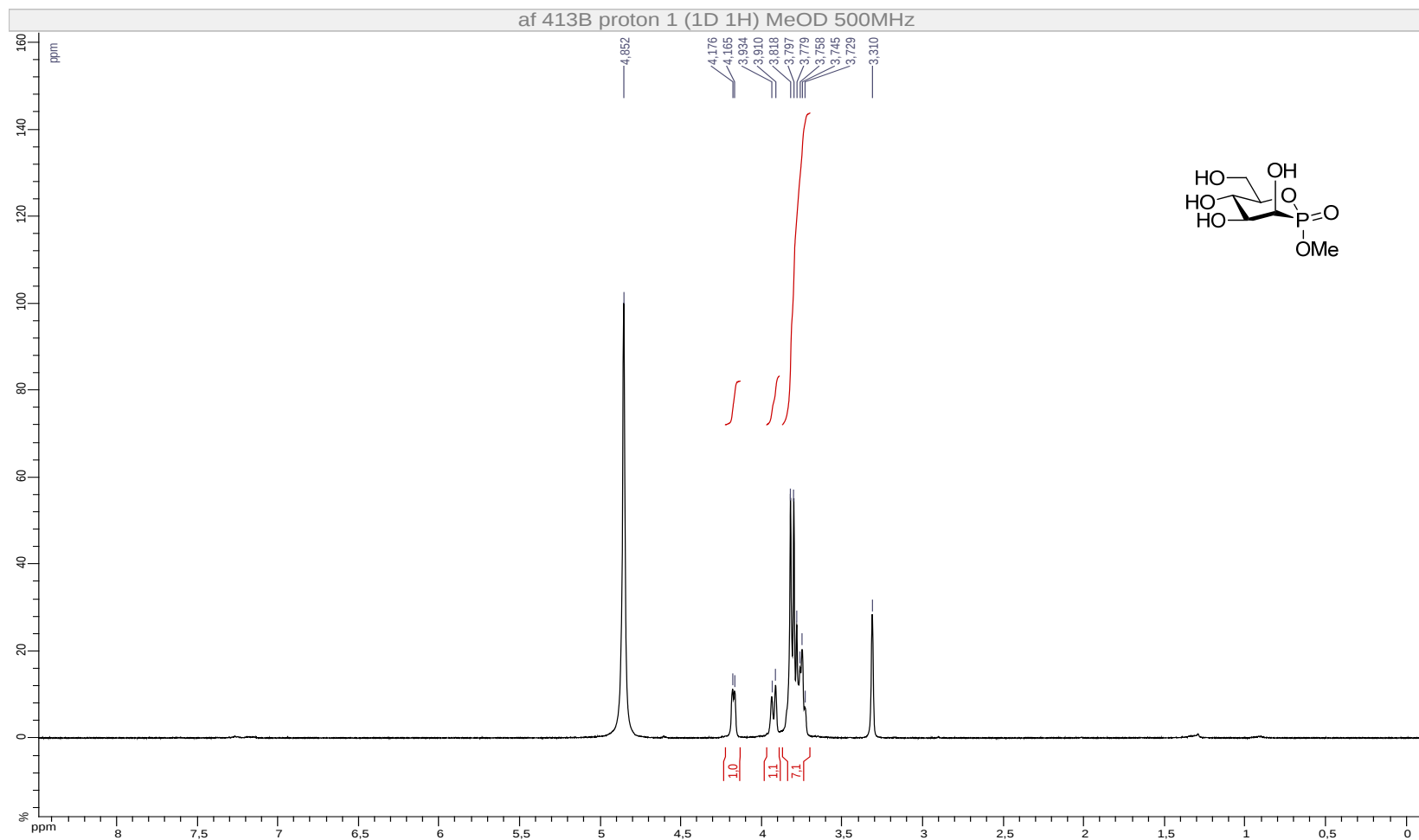
46m β , ^1H NMR (500 MHz, MeOD)



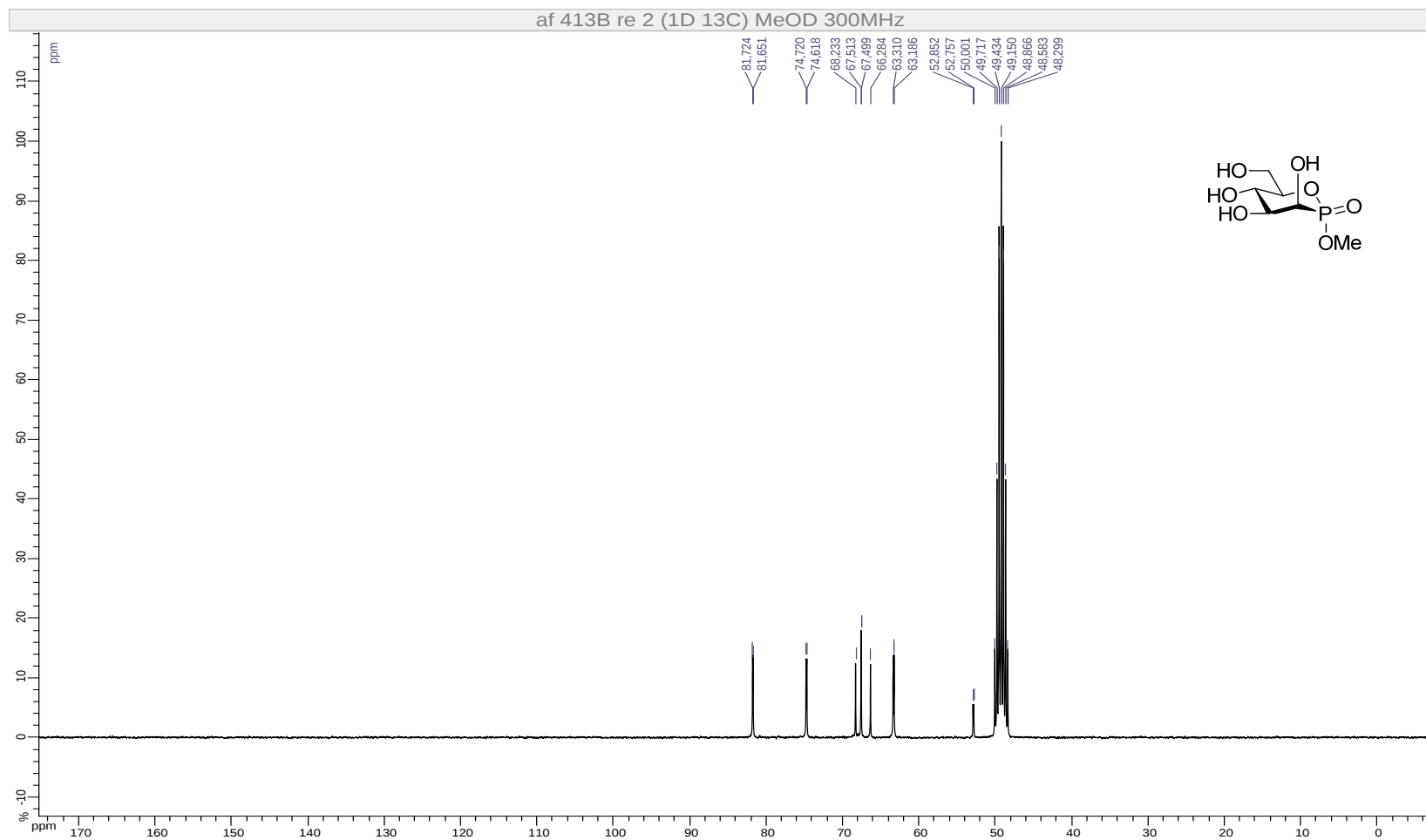
46m β , ^{13}C NMR (75 MHz, MeOD)



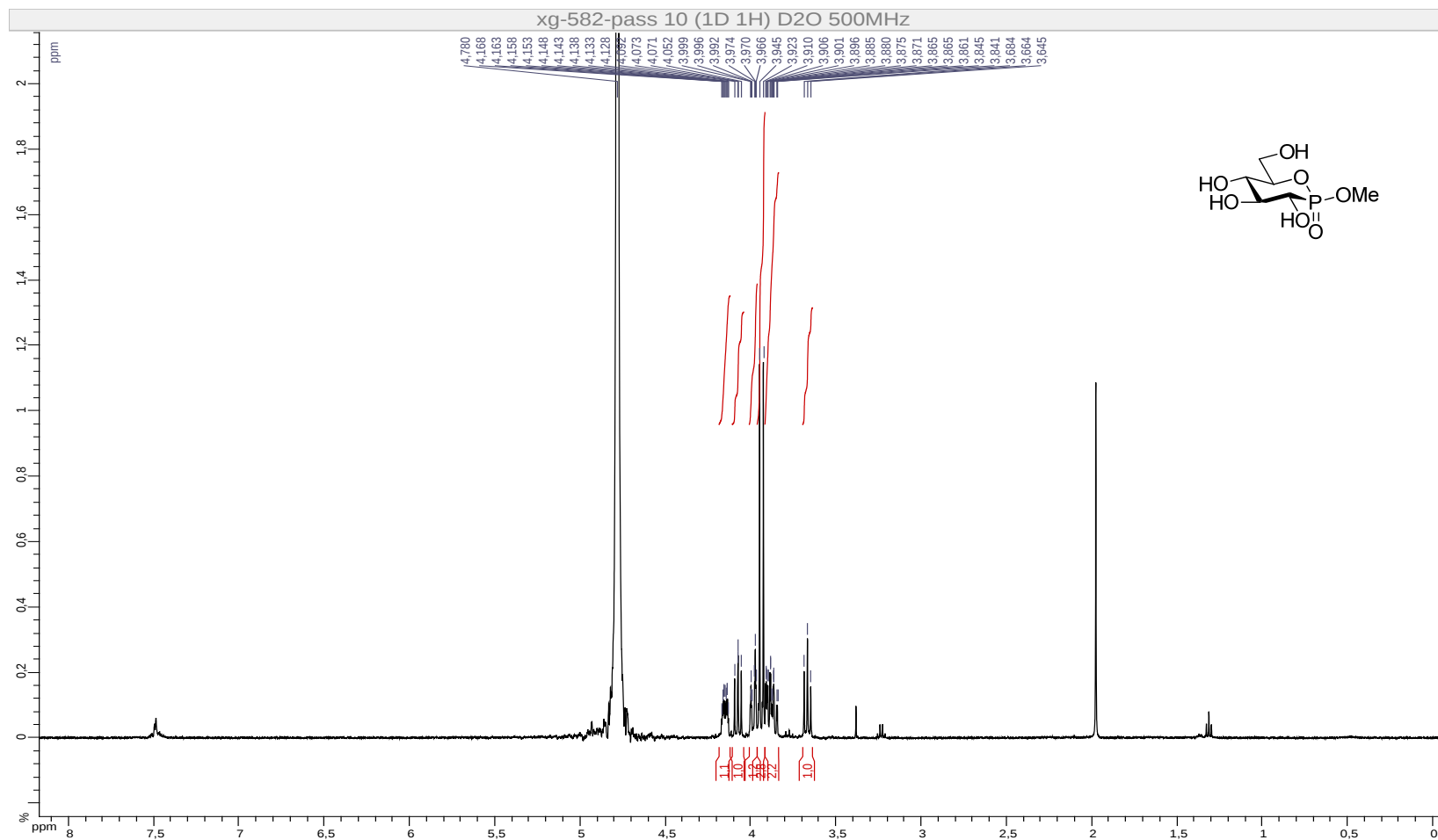
46ma, ^1H NMR (500 MHz, MeOD)



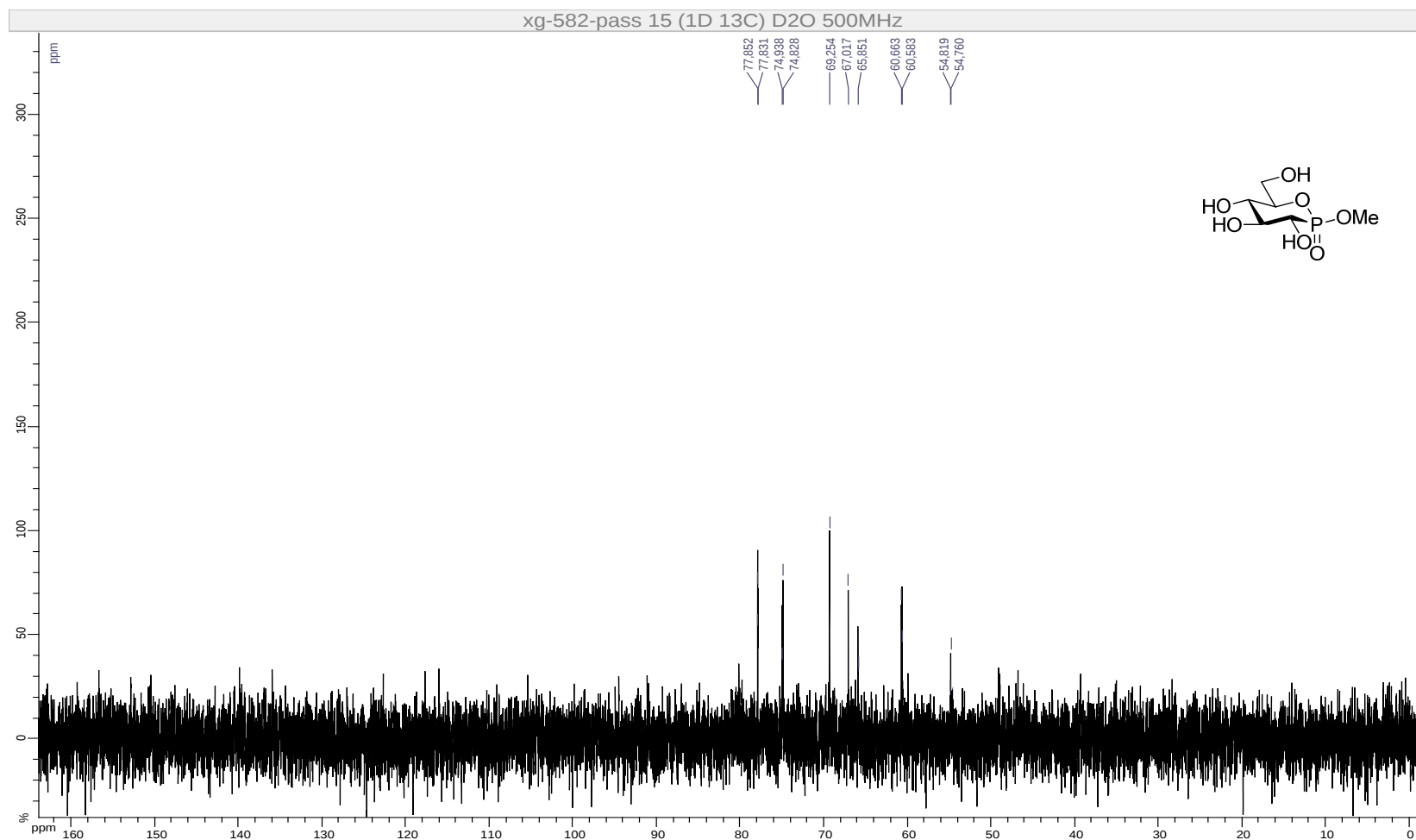
46ma, ^{13}C NMR (75 MHz, MeOD)



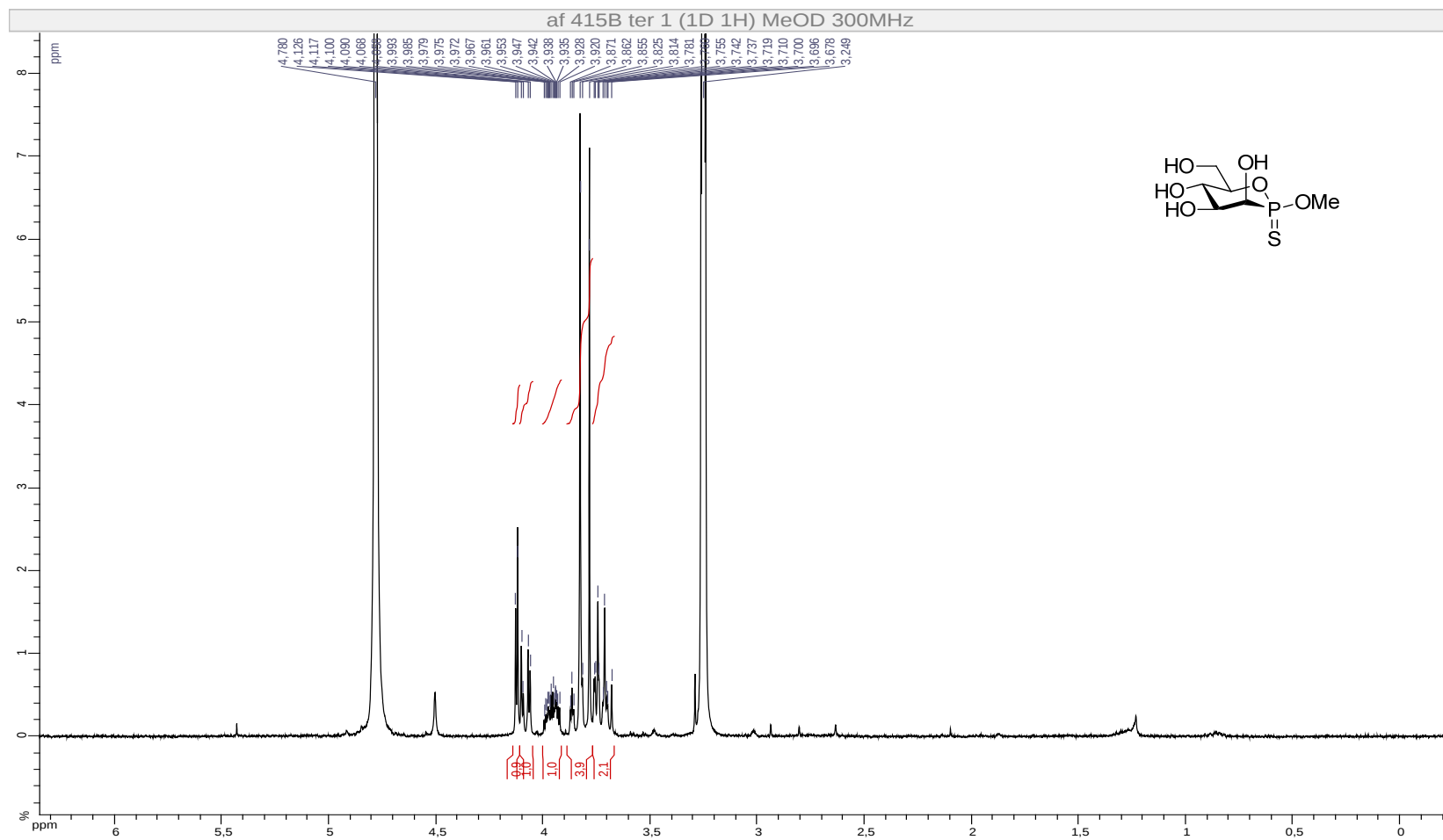
46gβ, ^1H NMR (500 MHz, D_2O)



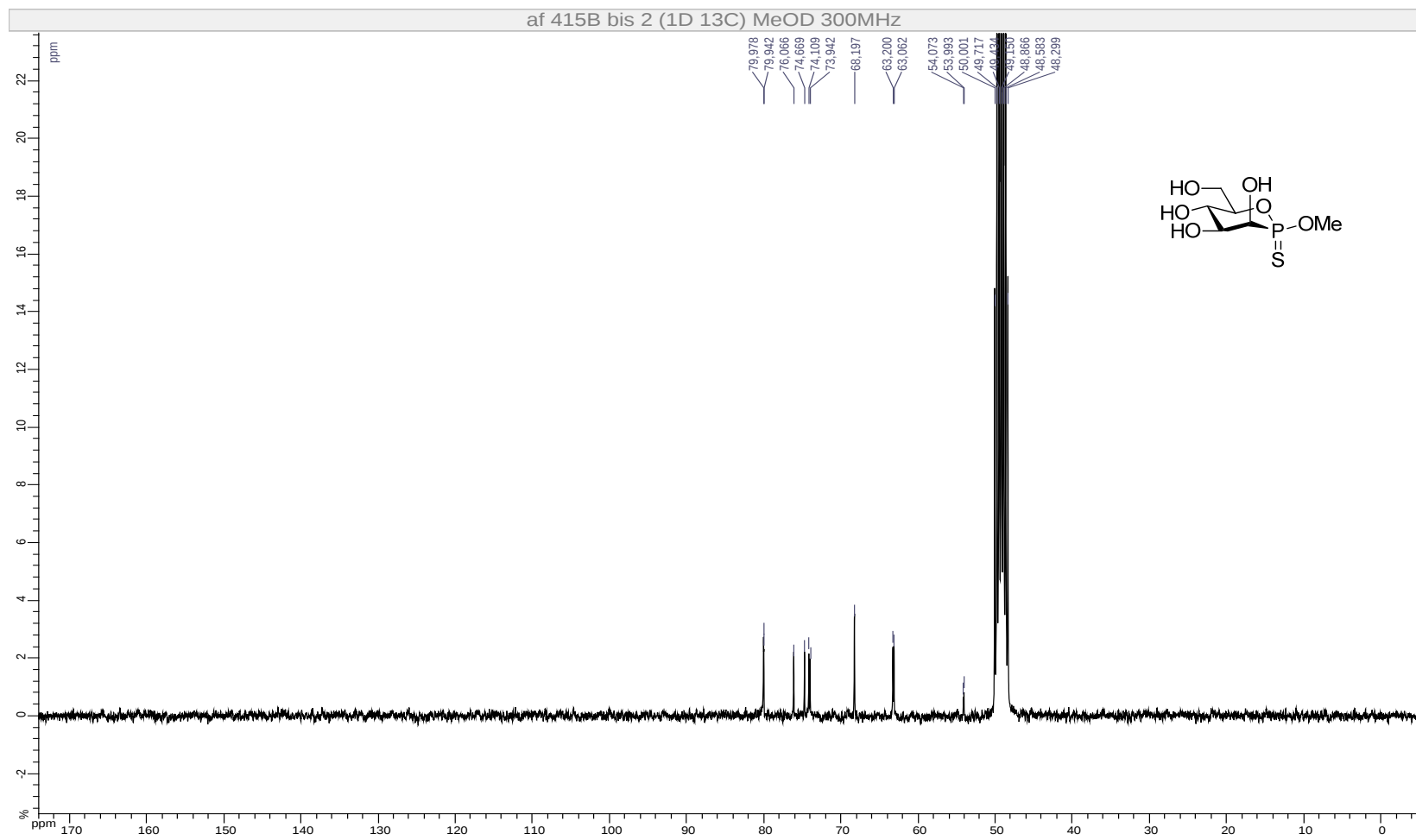
46gβ, ^{13}C NMR (125 MHz, D_2O)



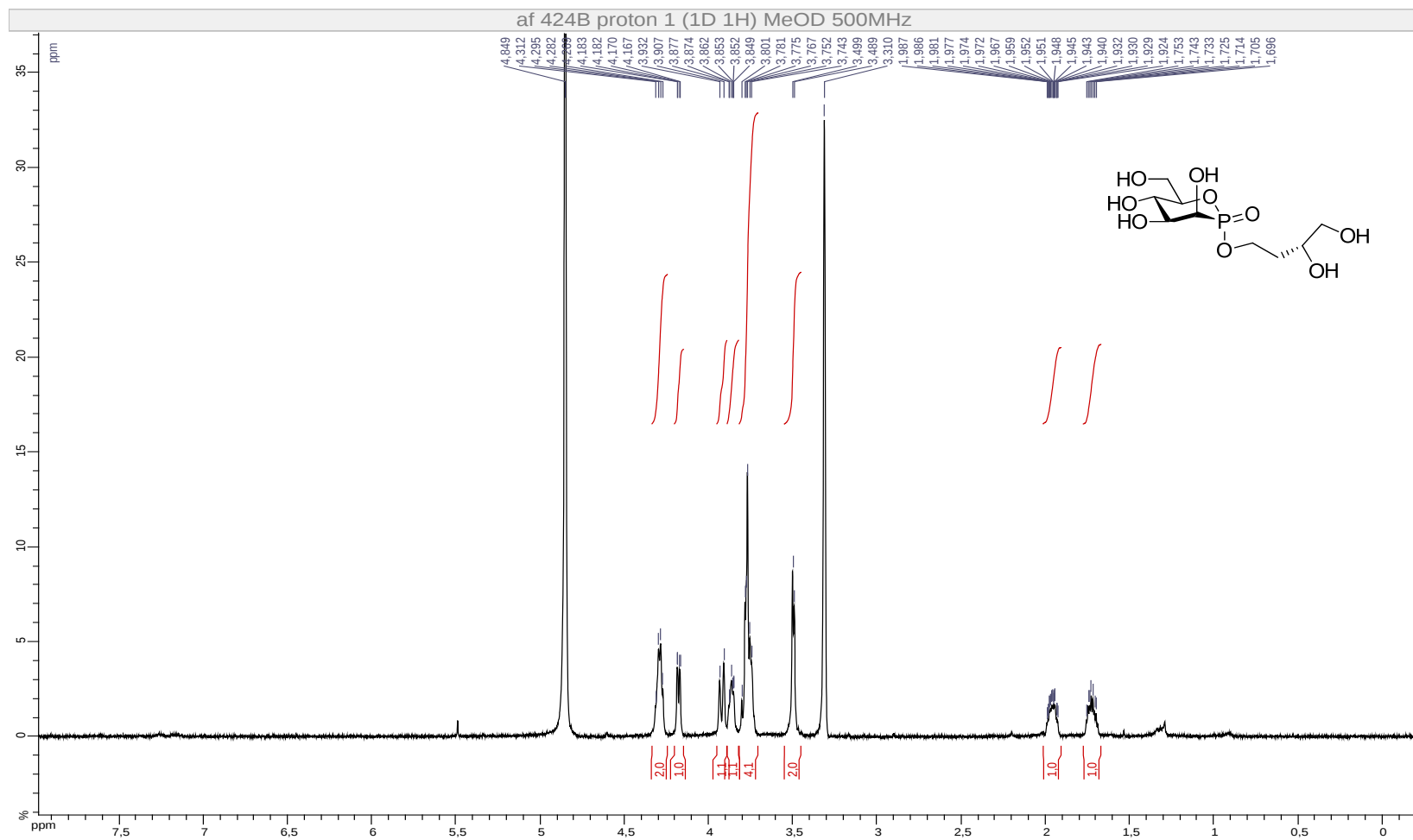
47mβ, ¹H NMR (300 MHz, MeOD)



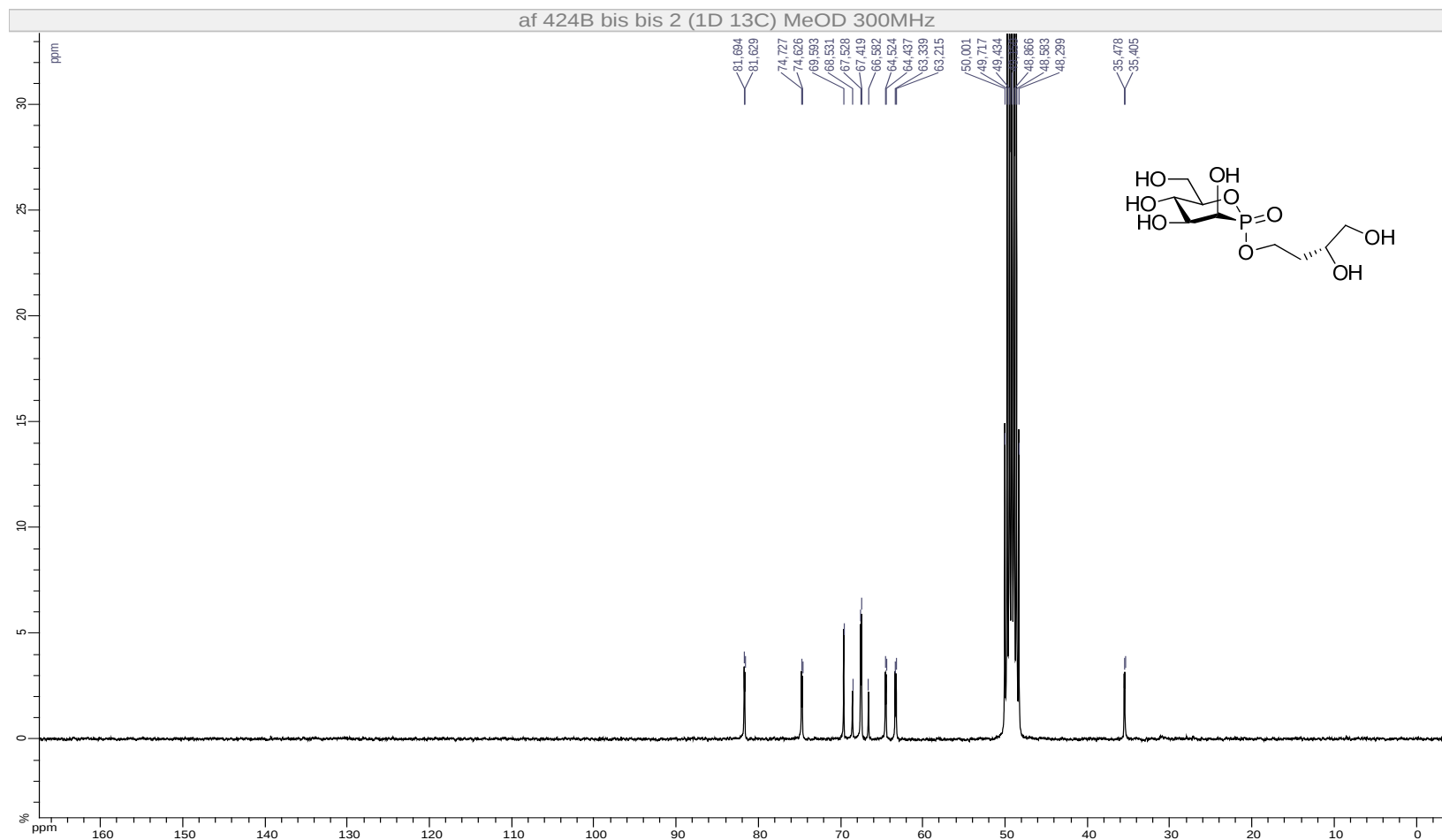
47m β , ^{13}C NMR (75 MHz, MeOD)



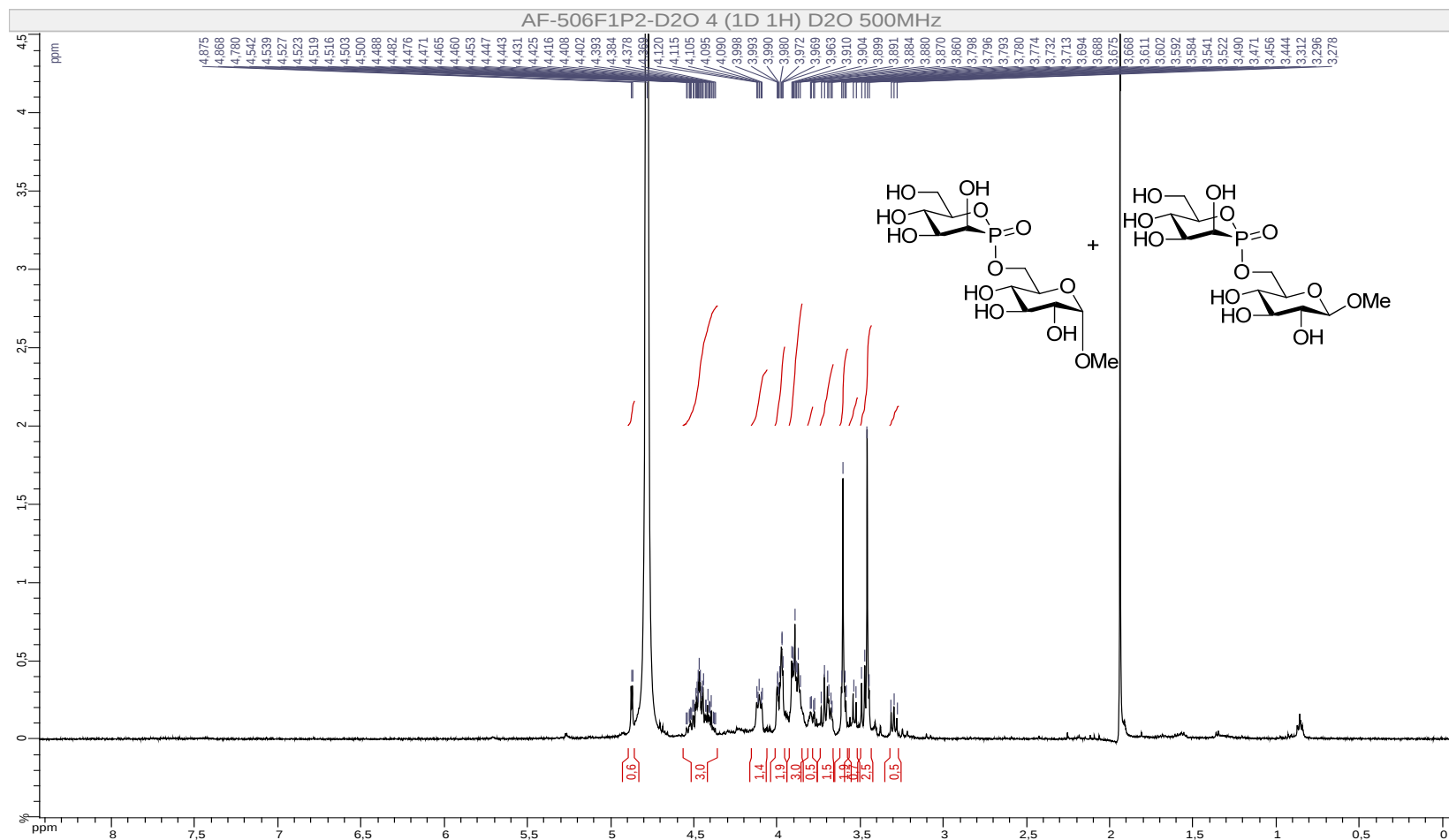
49ma, ^1H NMR (500 MHz, MeOD)



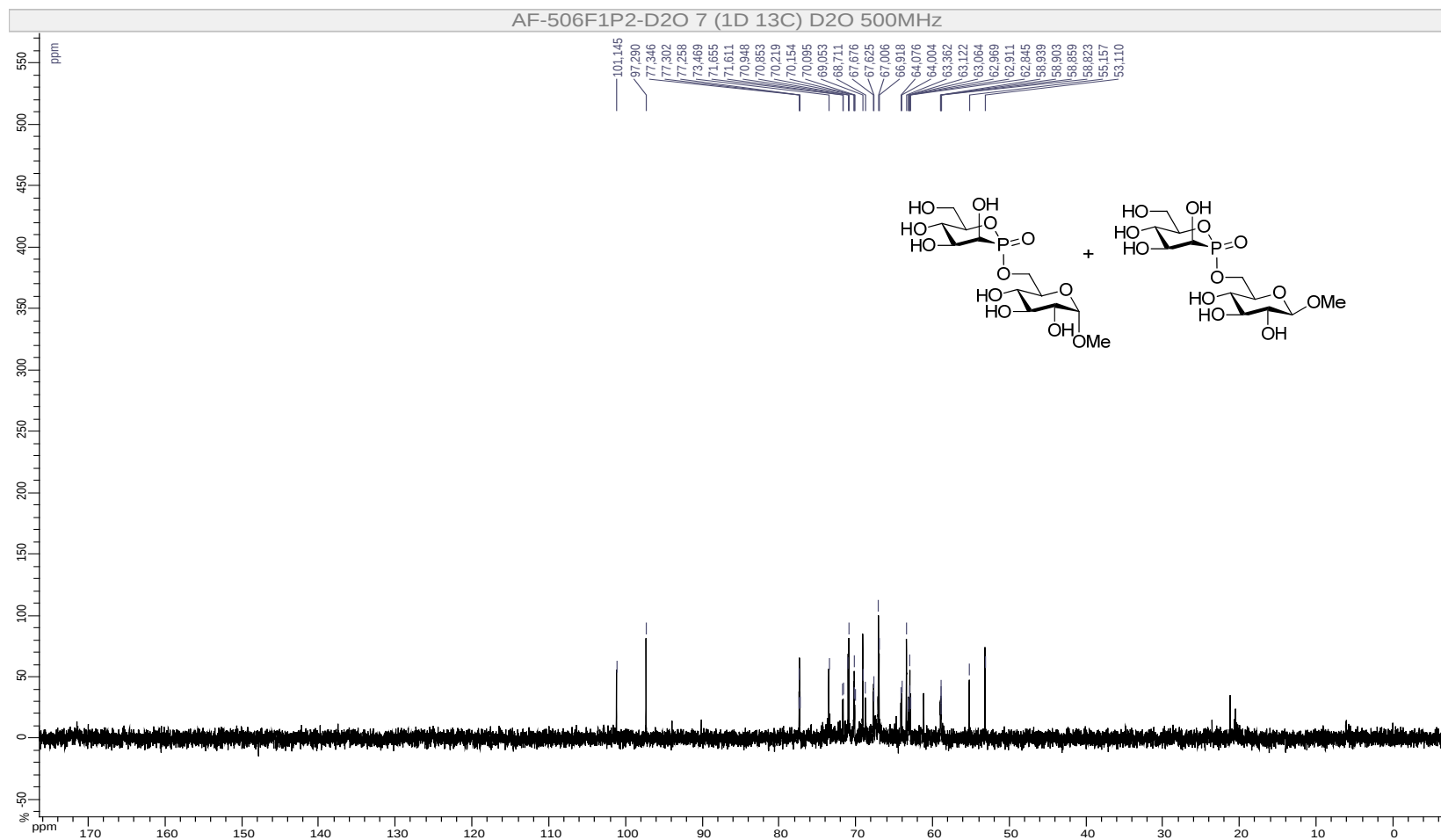
49ma, ^{13}C NMR (75 MHz, MeOD)



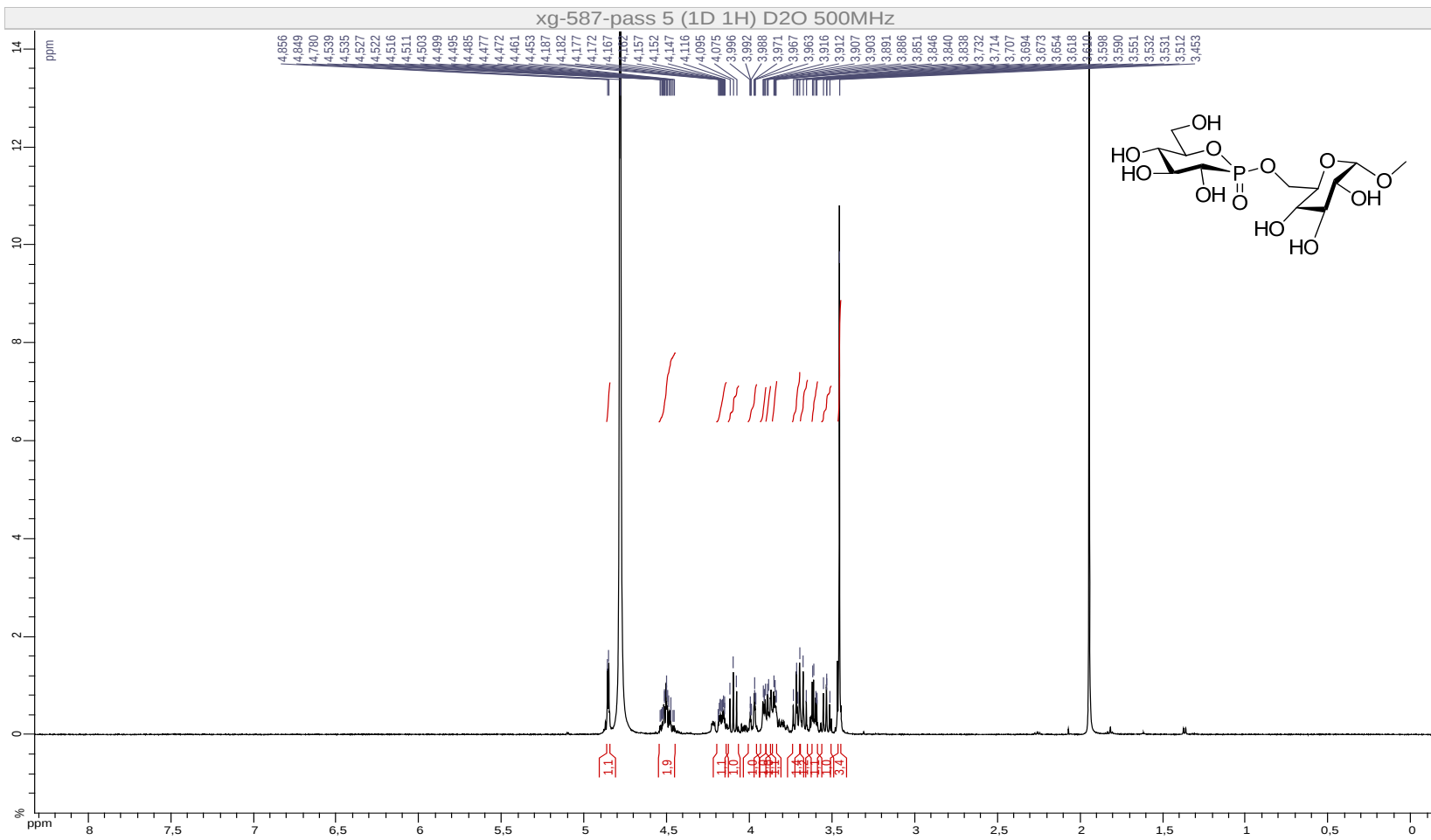
48ma, ^1H NMR (500 MHz, D_2O)



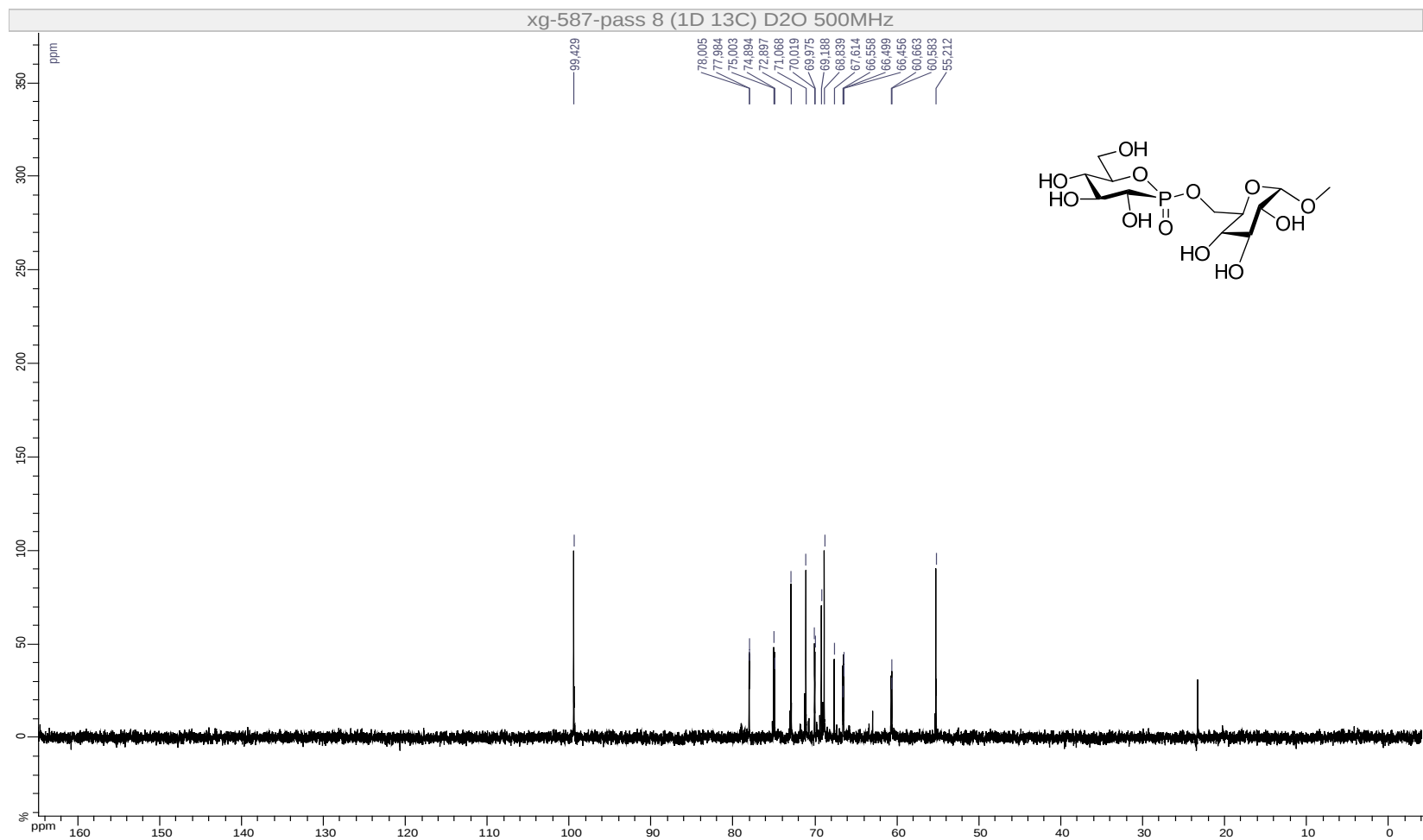
48ma, ^{13}C NMR (125 MHz, D_2O)



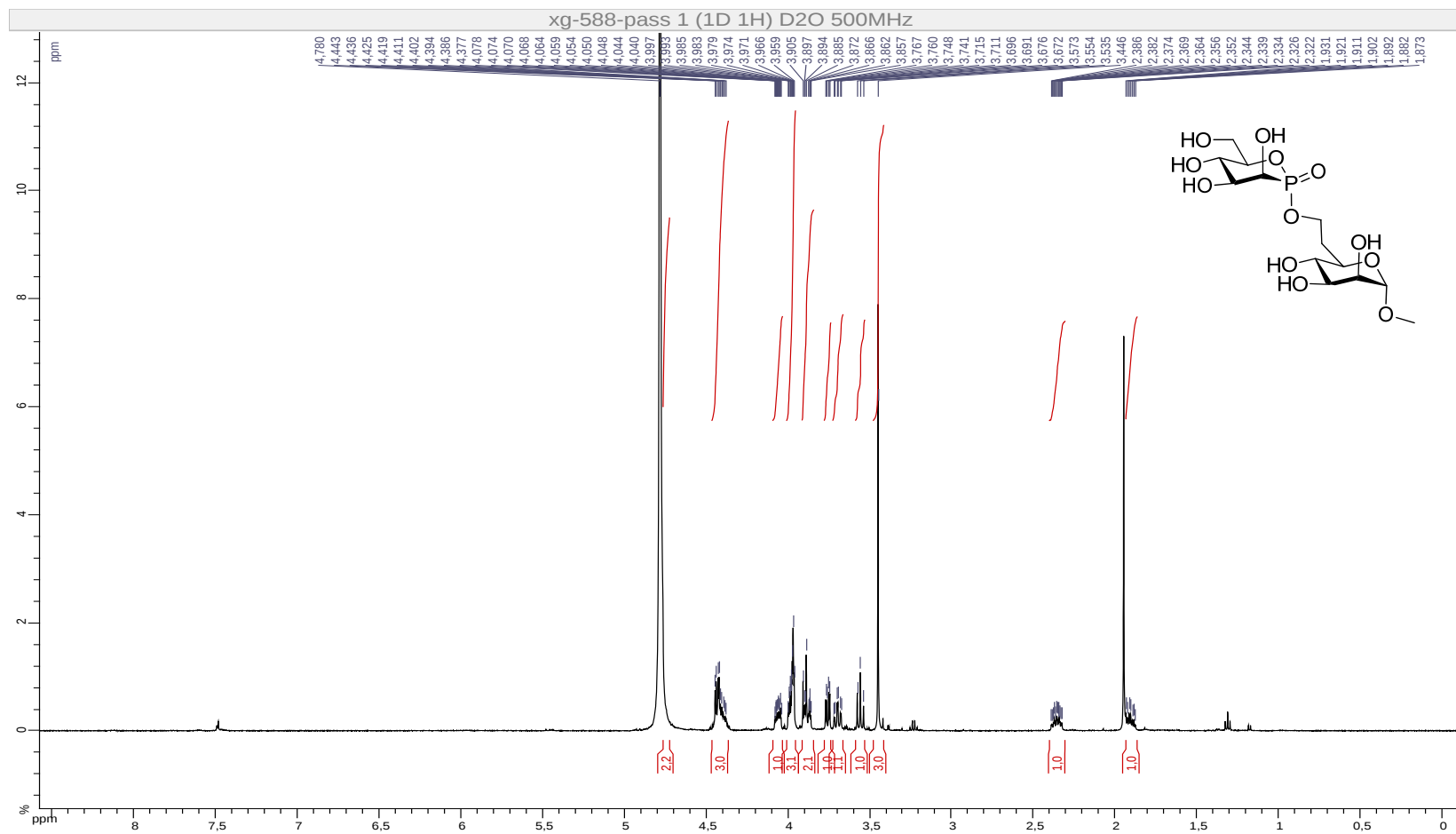
48gβ, ^1H NMR (500 MHz, D_2O)



48gβ, ¹³C NMR (125 MHz, D₂O)



50mM, ^1H NMR (500 MHz, D_2O)



50mM, ^{13}C NMR (125 MHz, D_2O)

