

Facile functionalization at the C4 position of pyrimidine nucleosides *via* amide group activation with (benzotriazol-1-yloxy)tris(dimethylamino)phosphonium hexafluorophosphate (BOP) and biological evaluations of the products

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Jan Balzarini, Lijia Yang and Mahesh K. Lakshman*

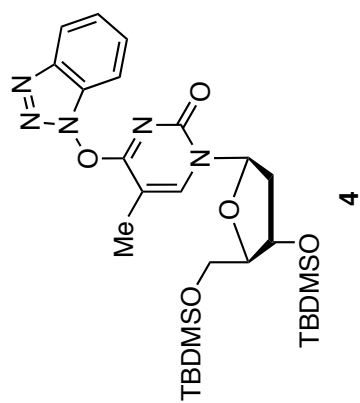
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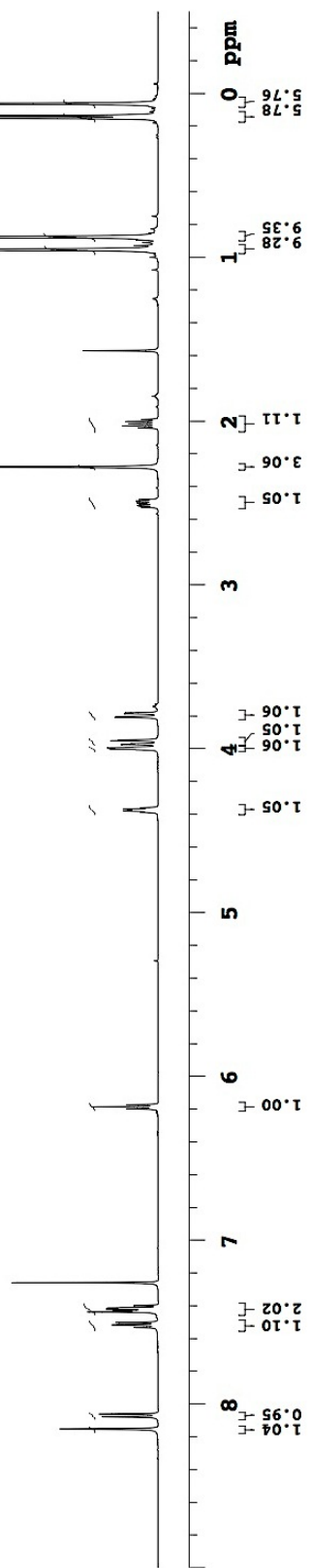
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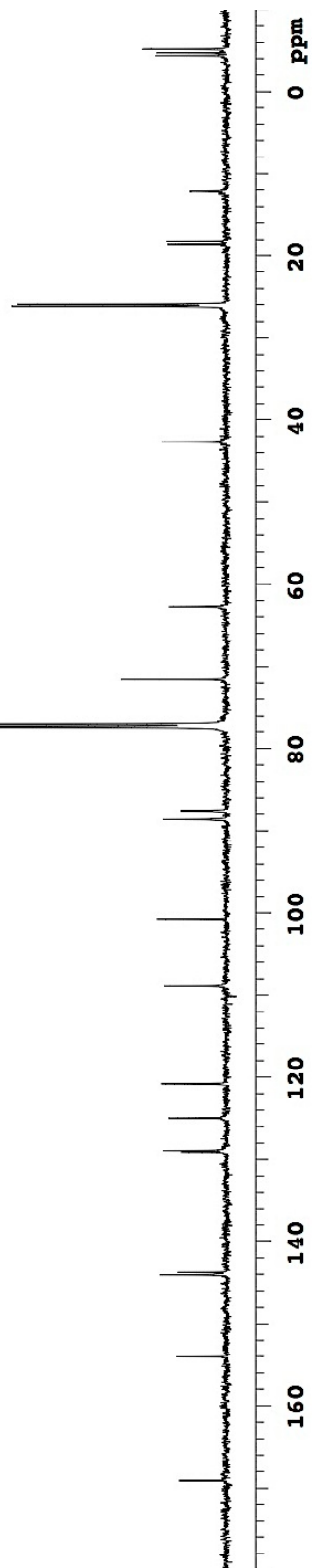
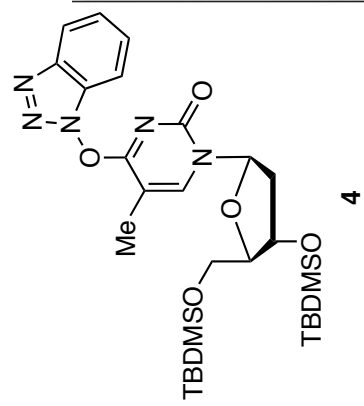
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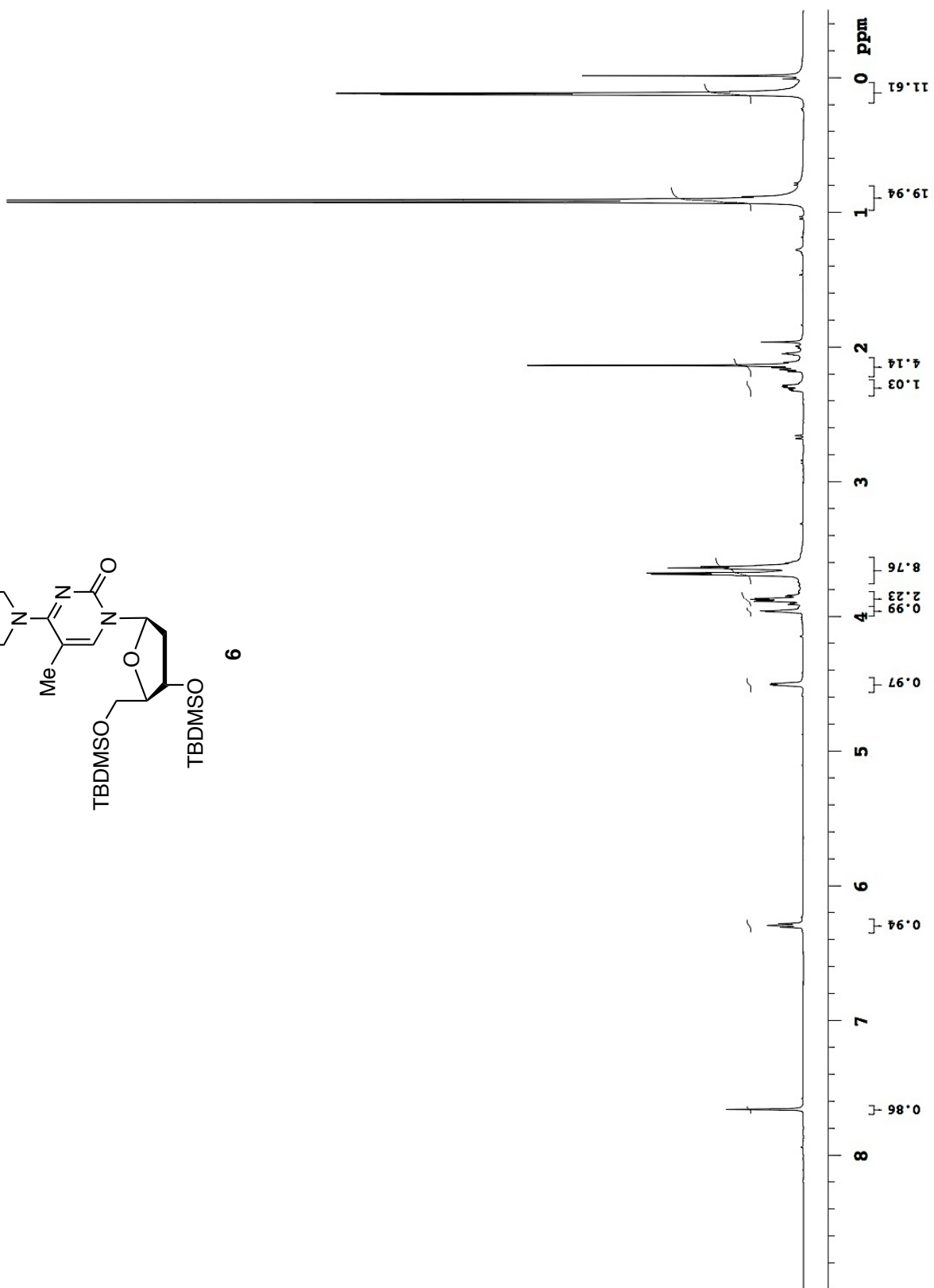
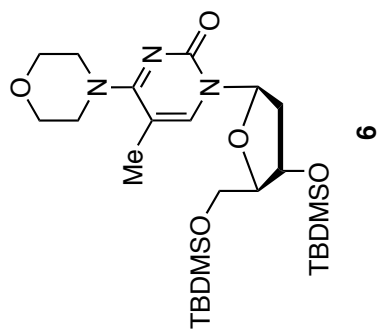
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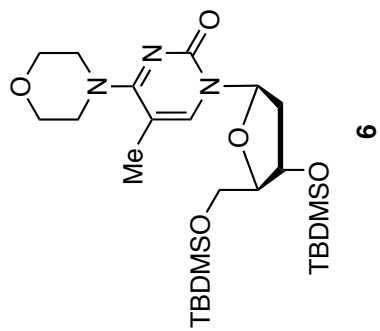


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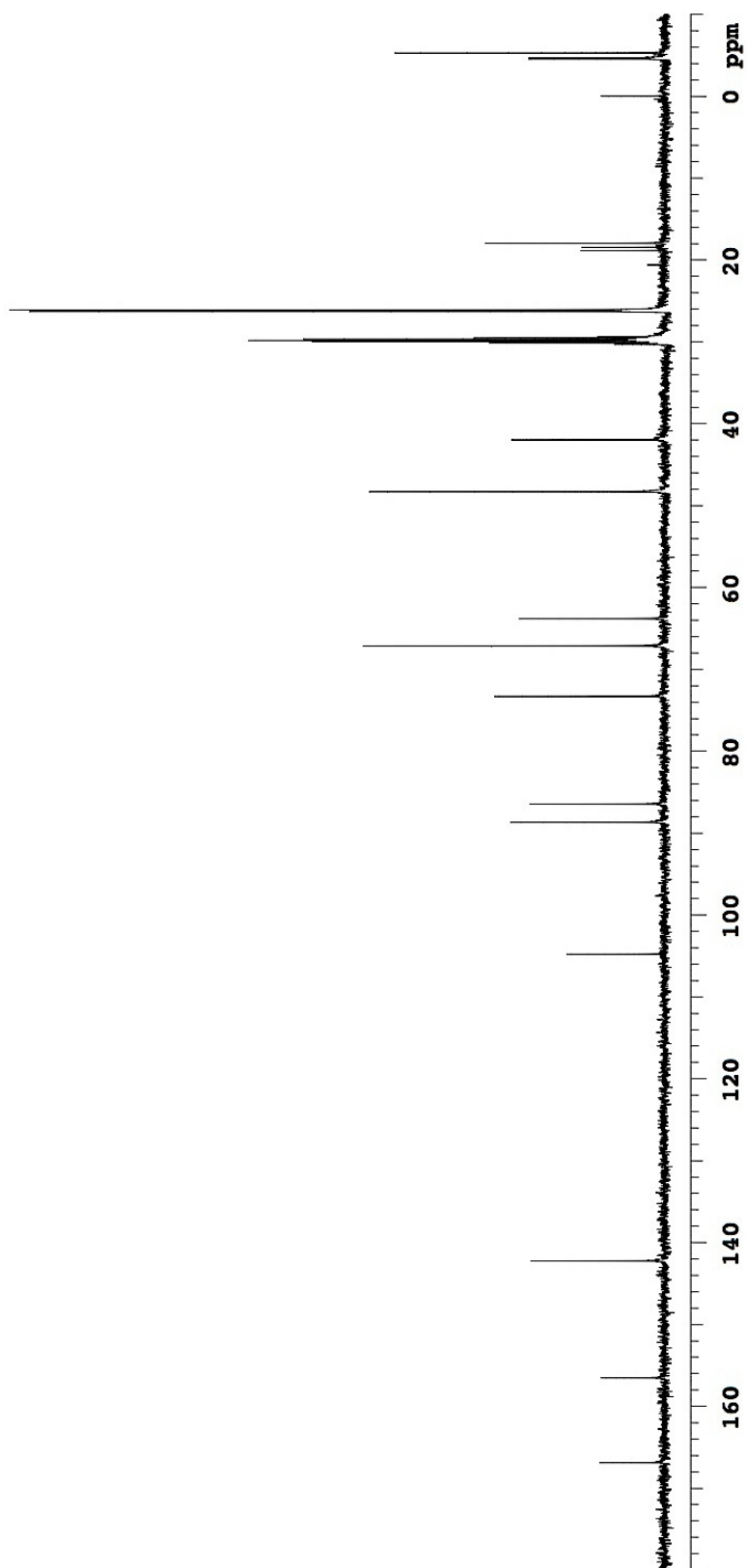


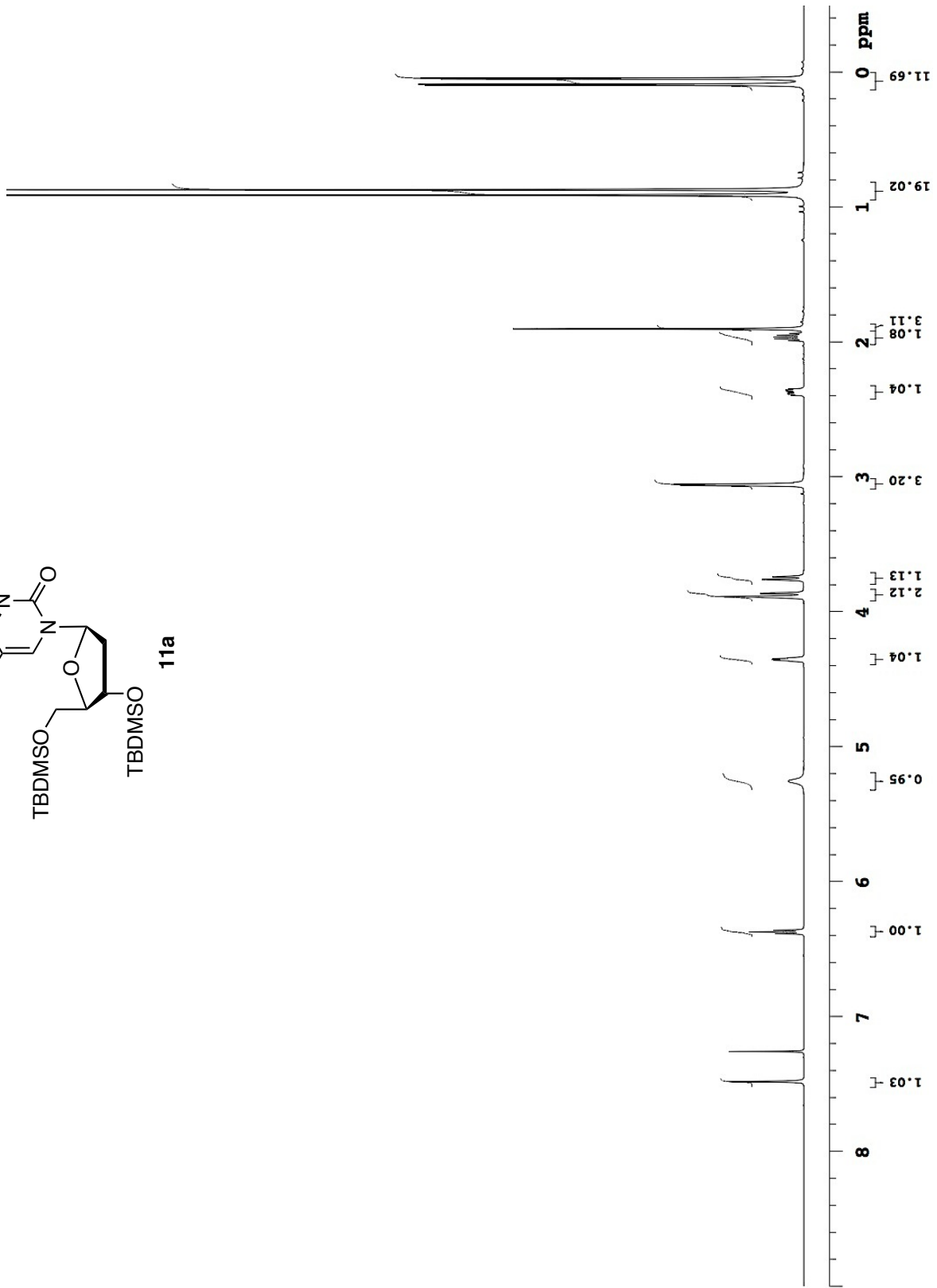
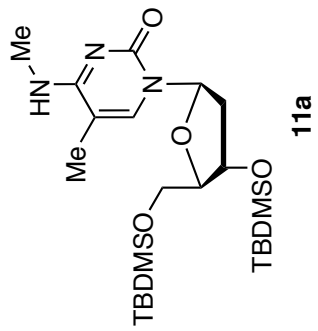


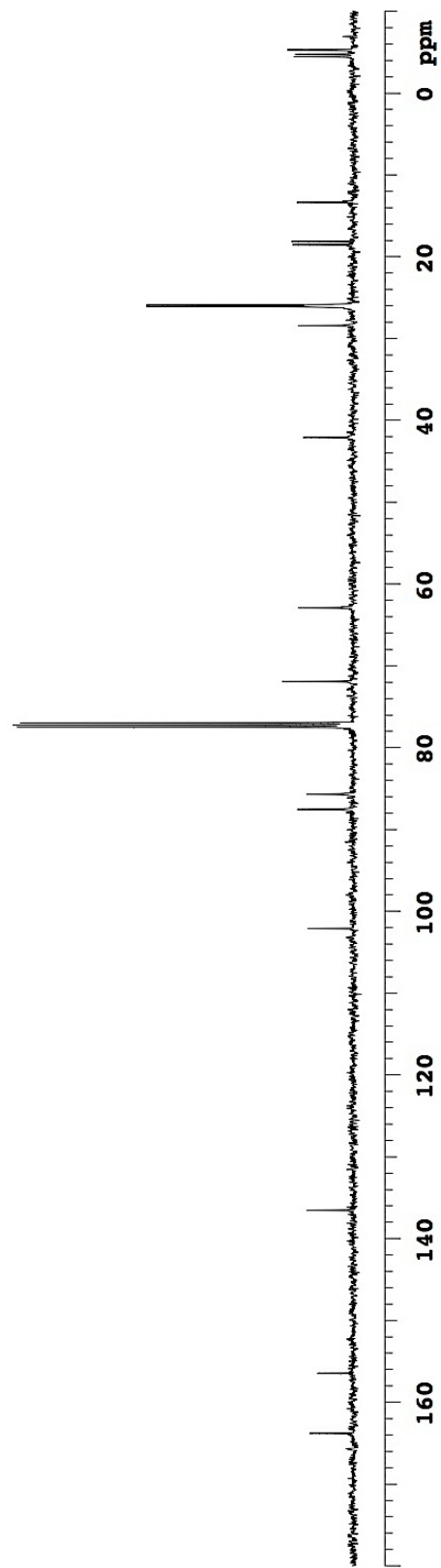
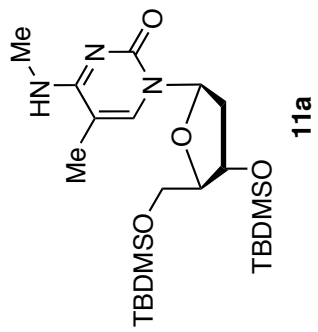


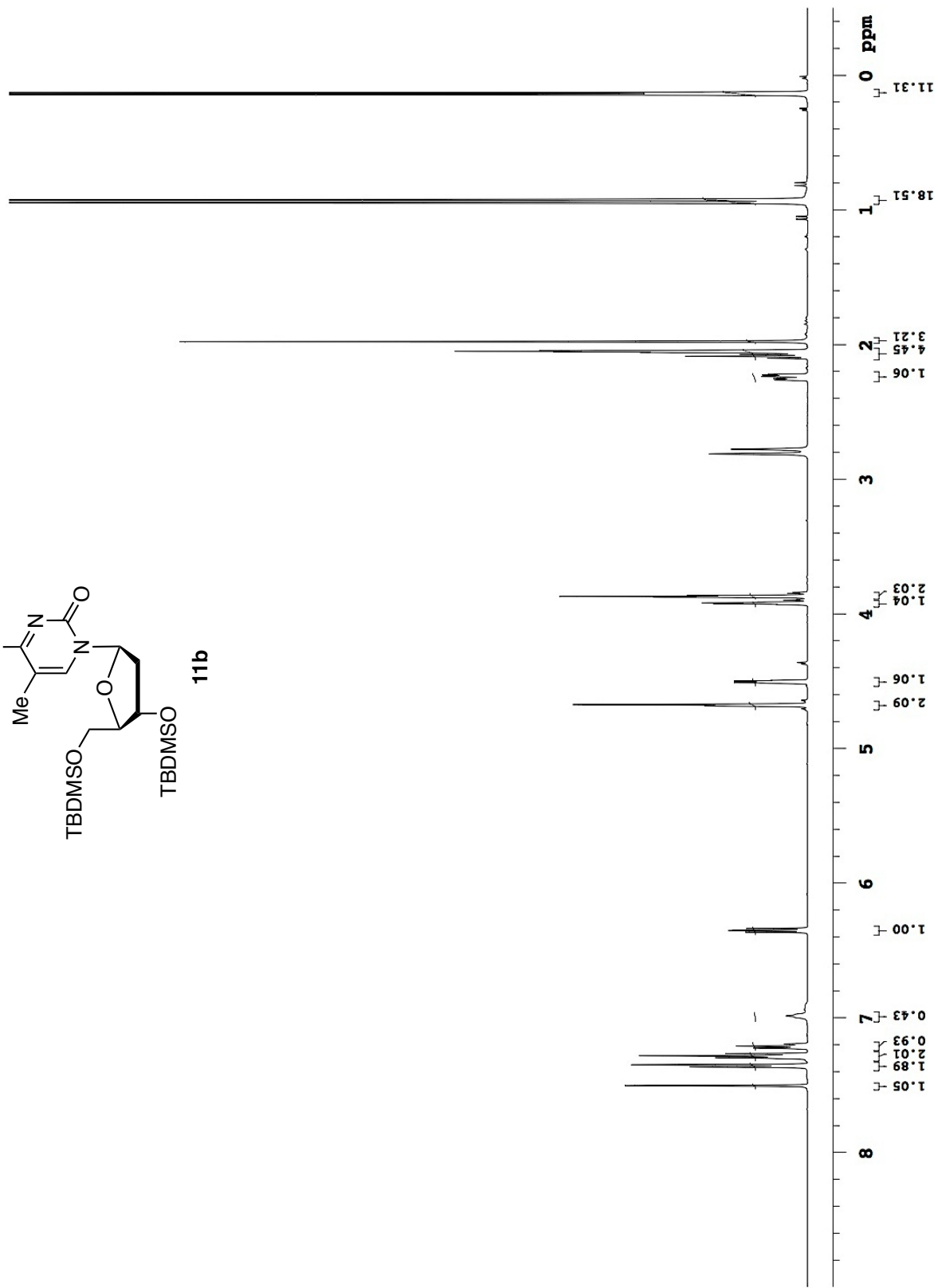
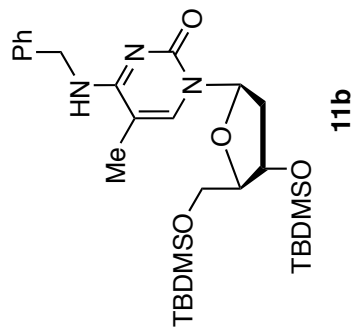


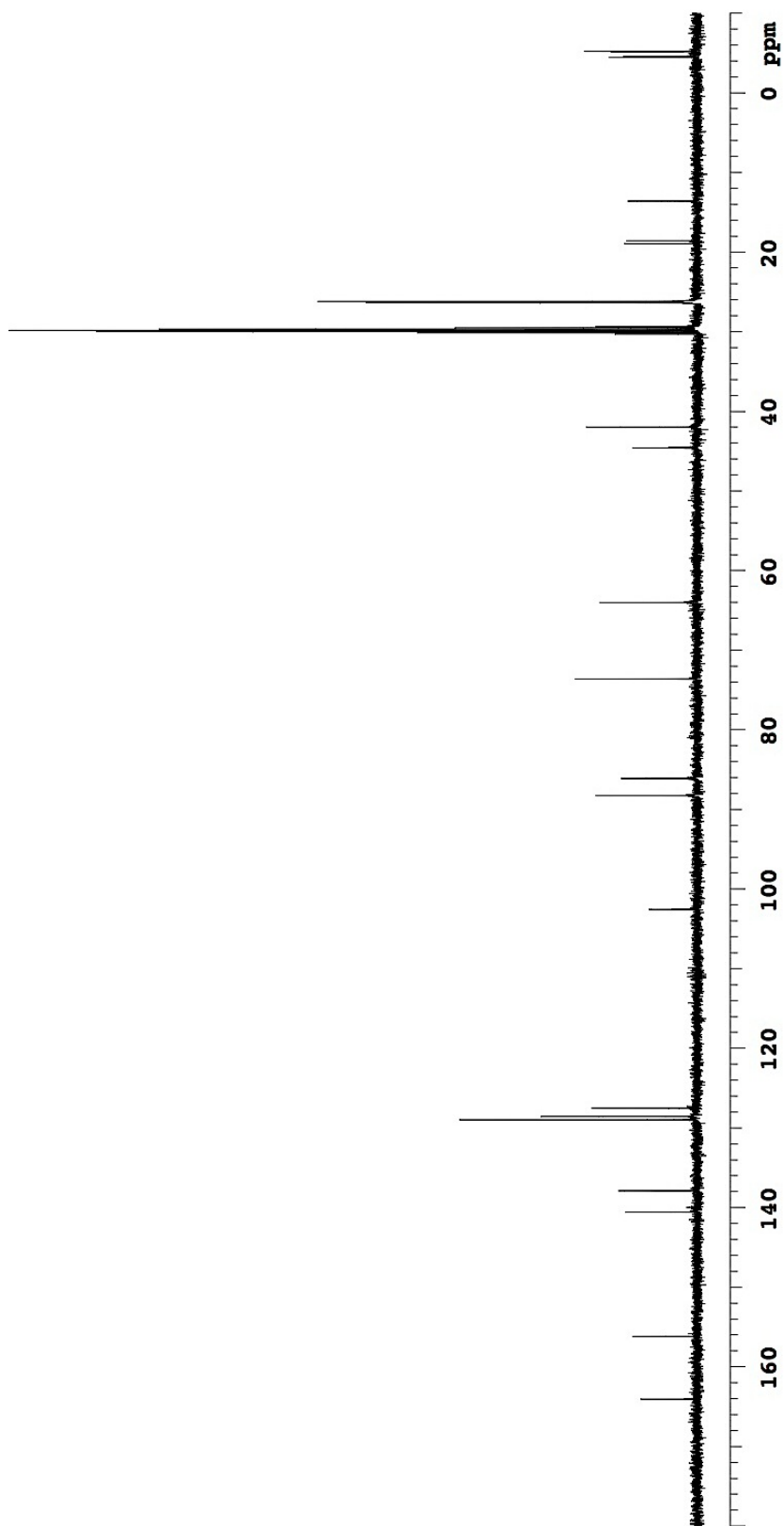
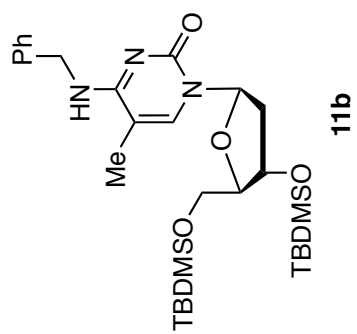
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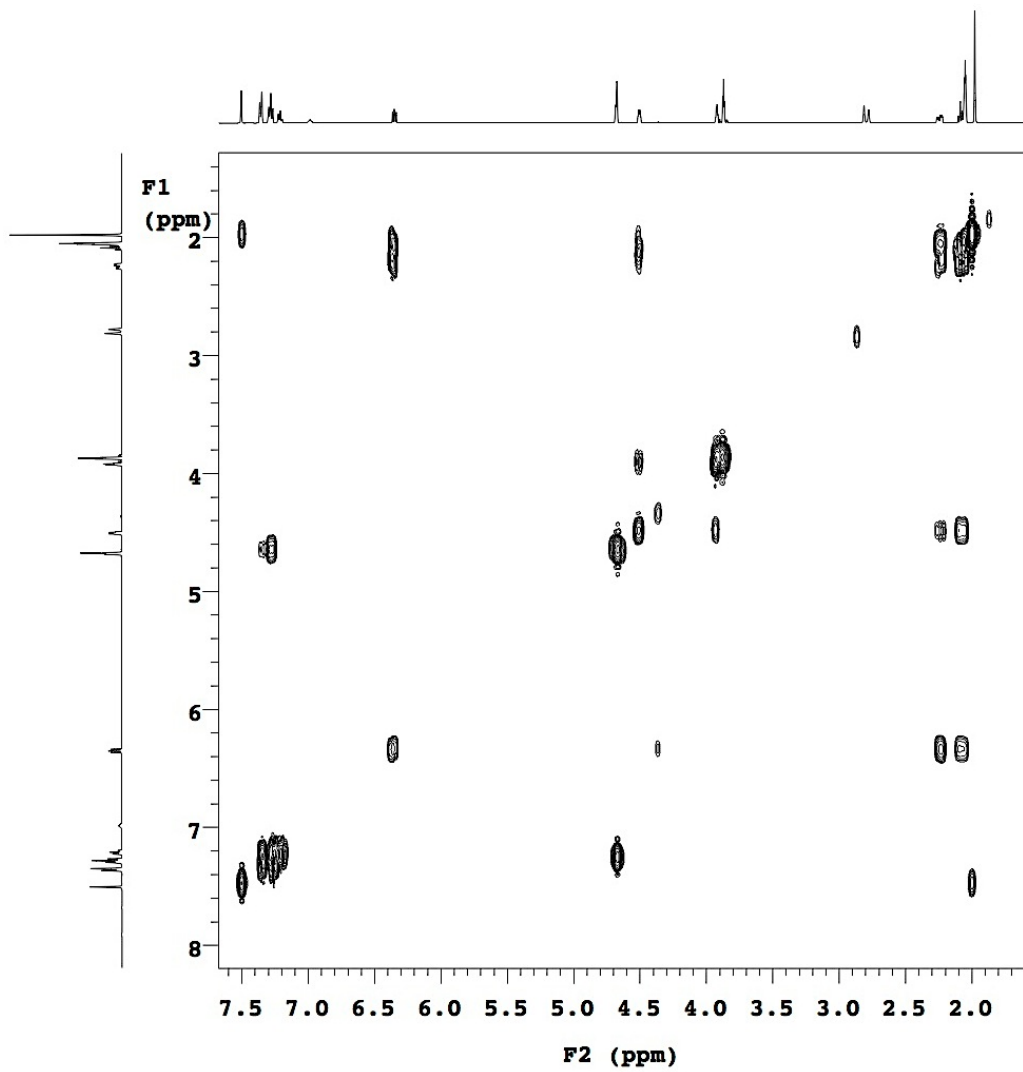
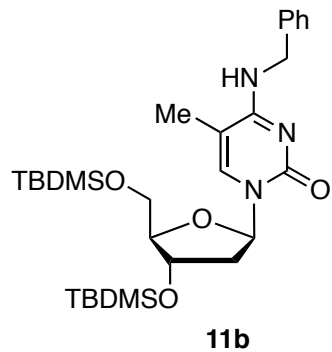


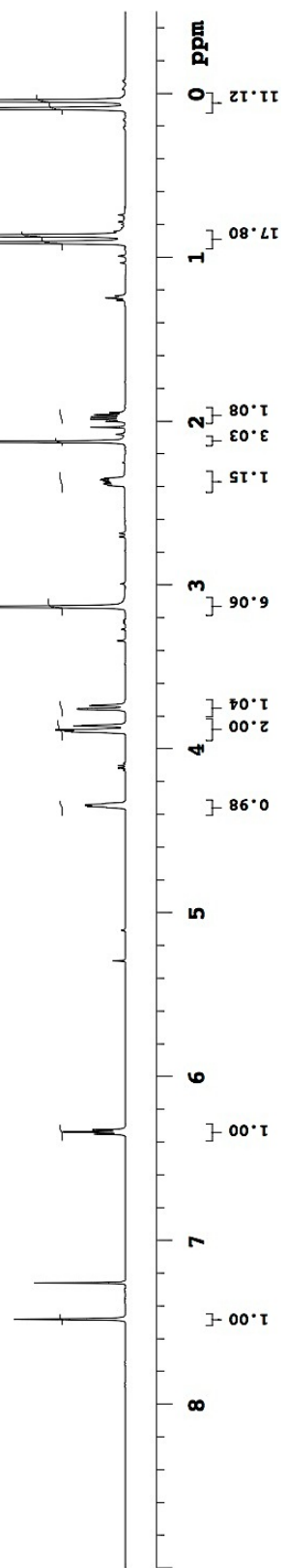
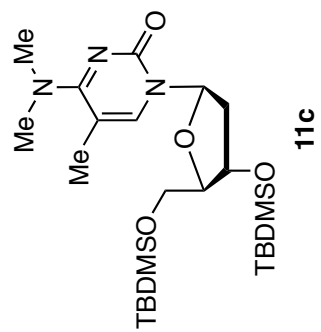


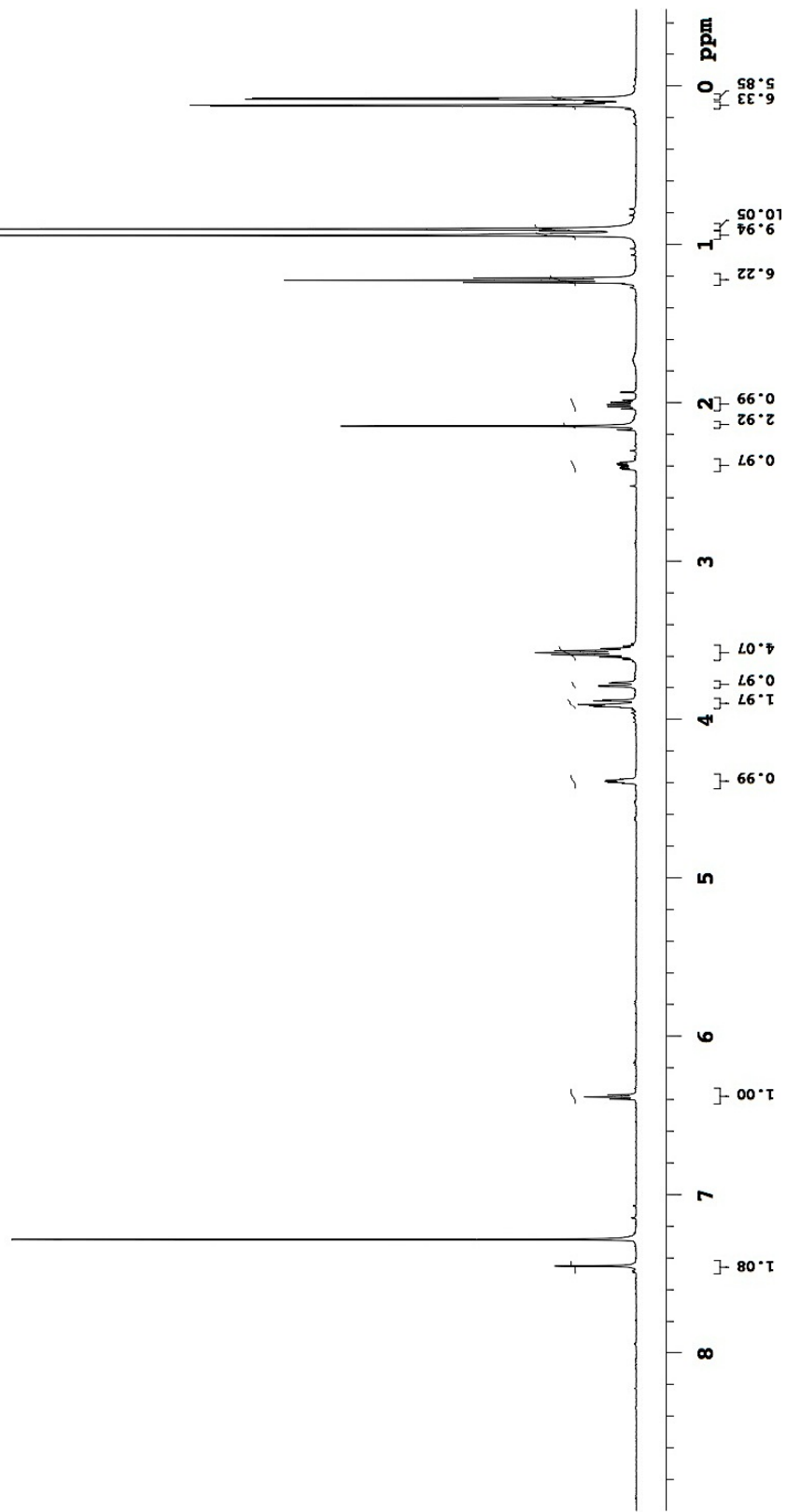
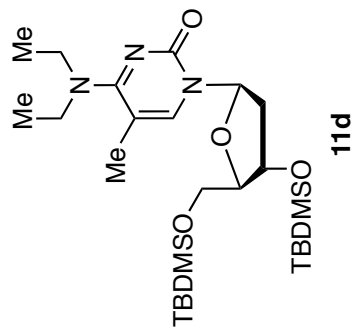


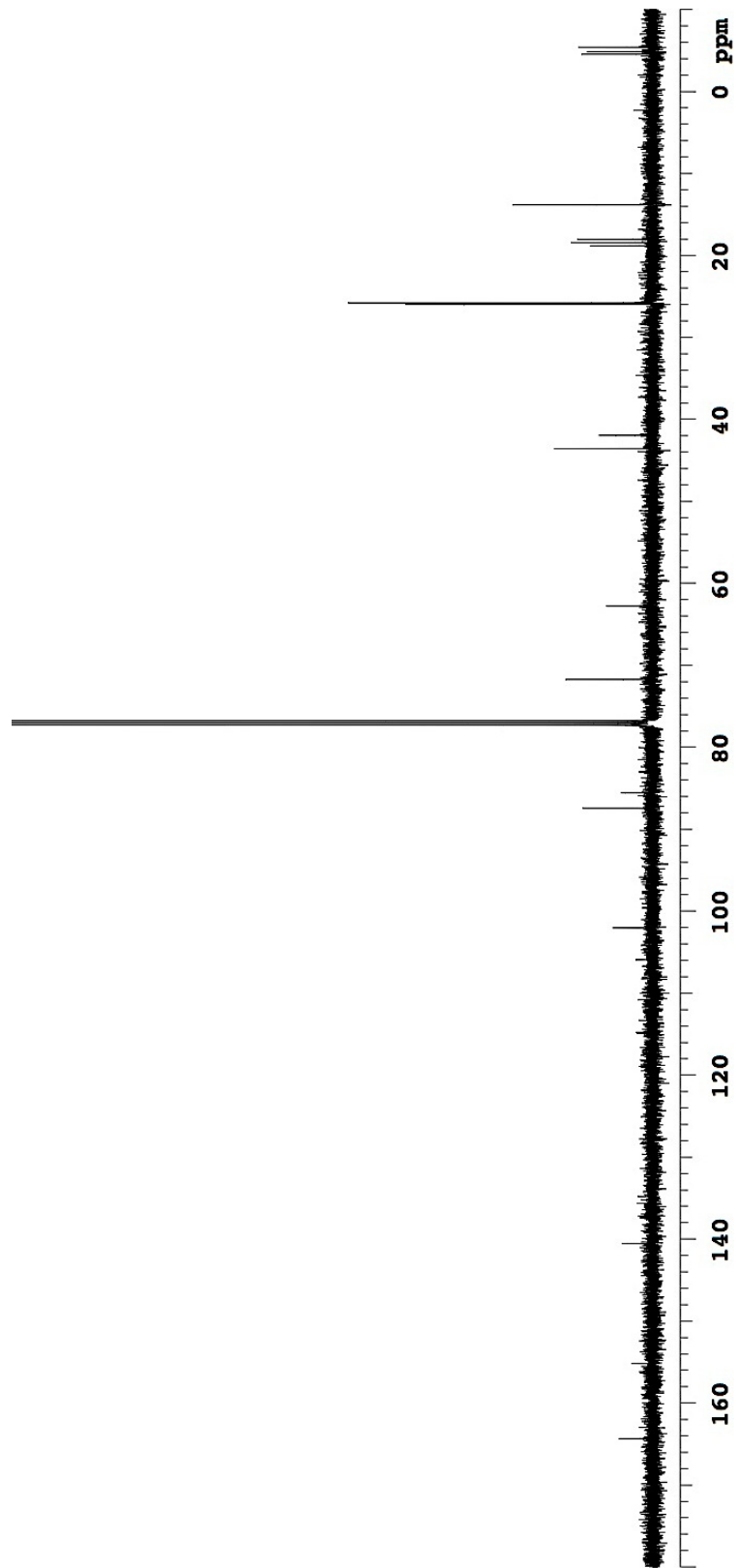
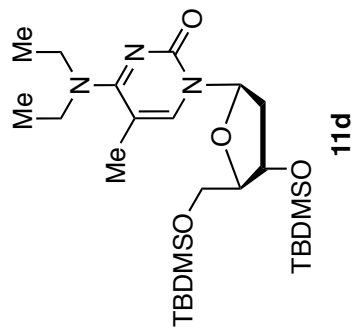


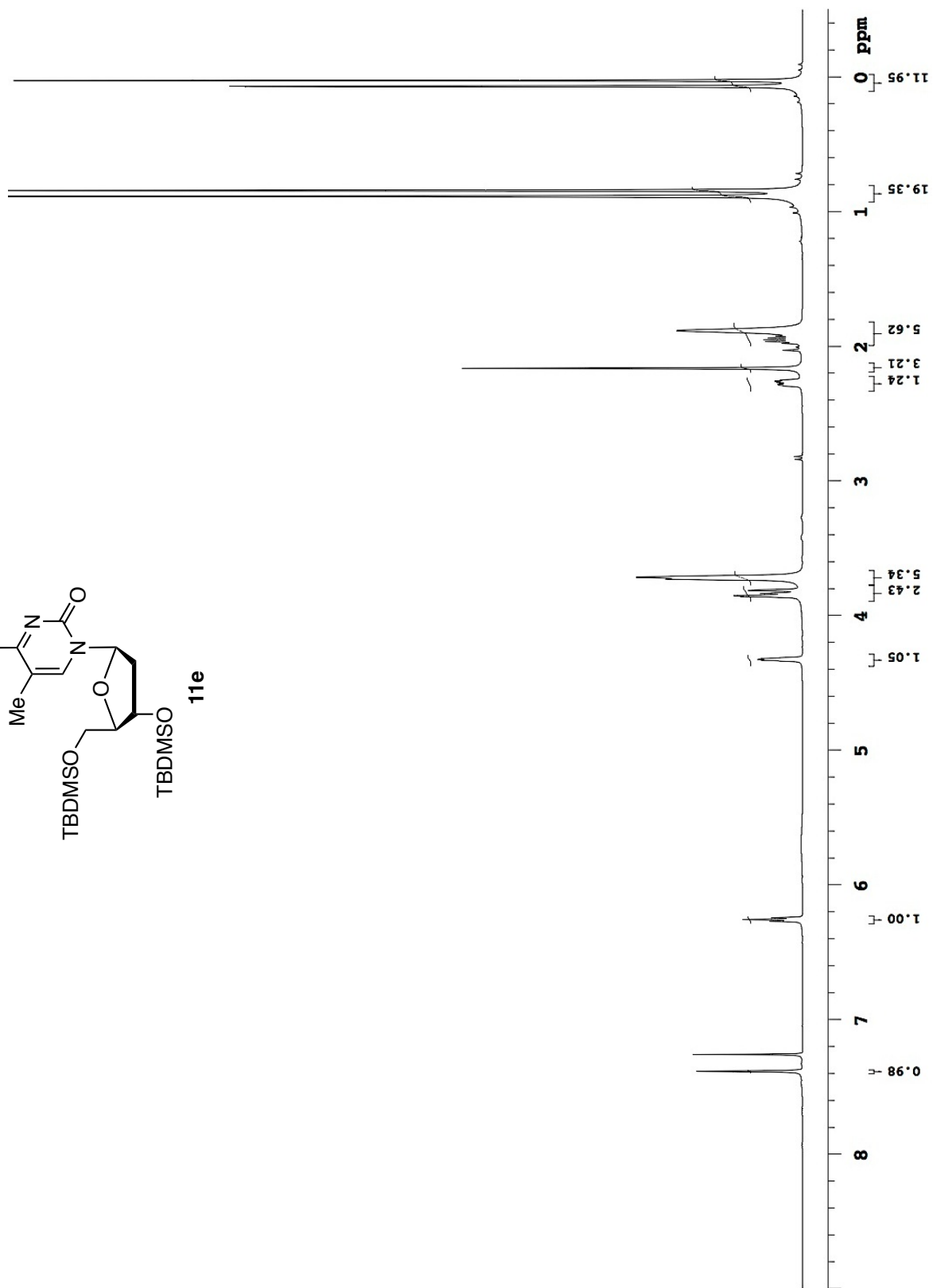
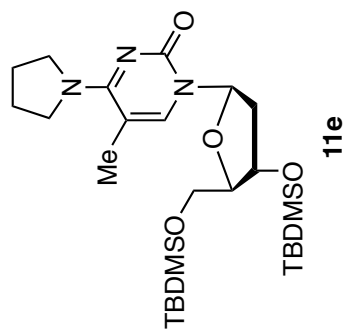
gCOSY spectrum of compound **11b** in acetone- d_6

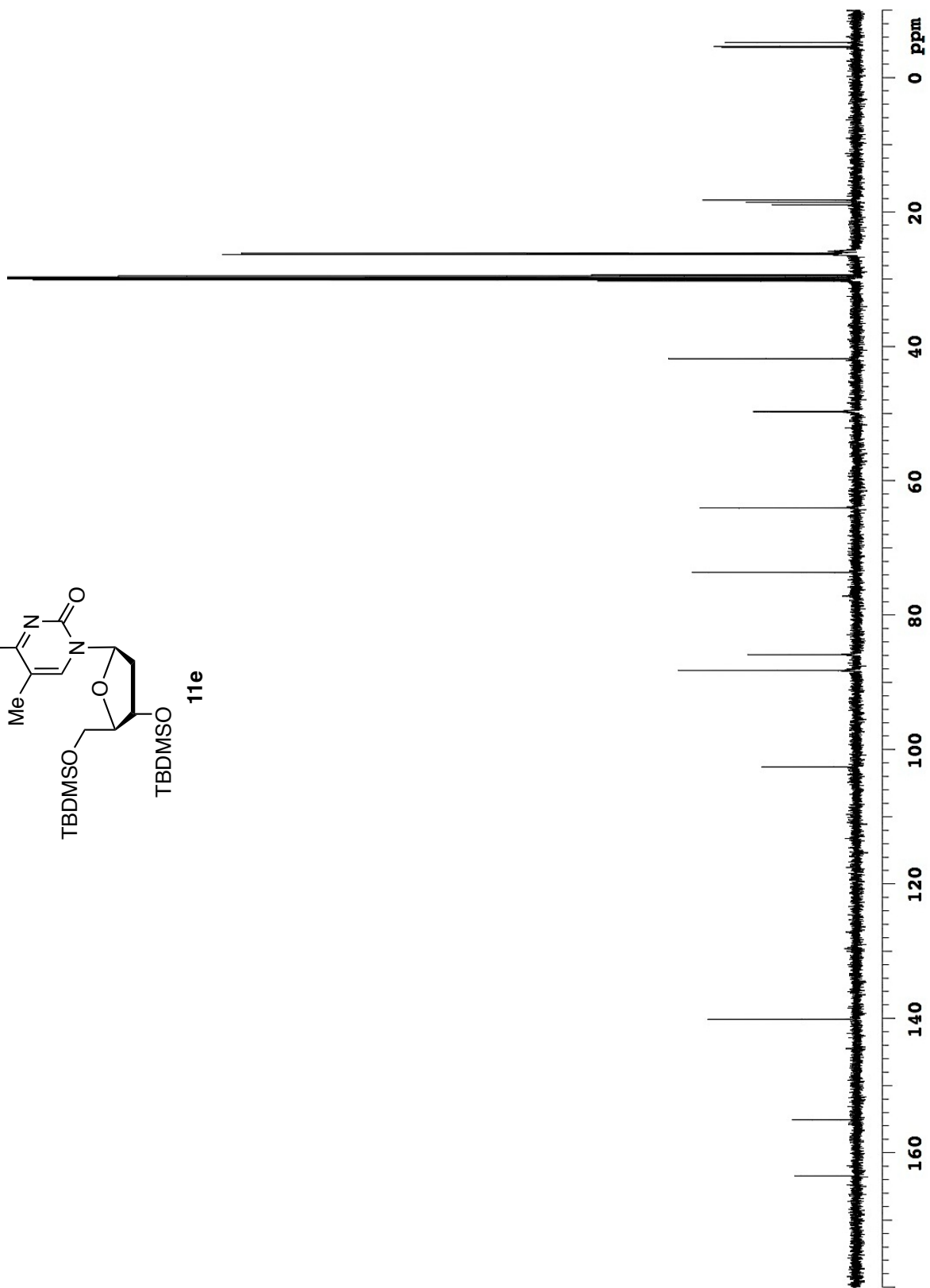
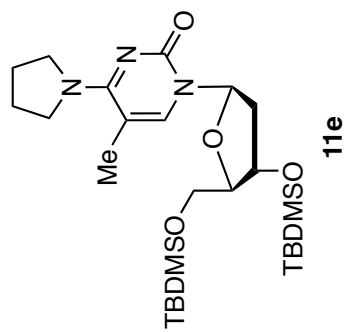


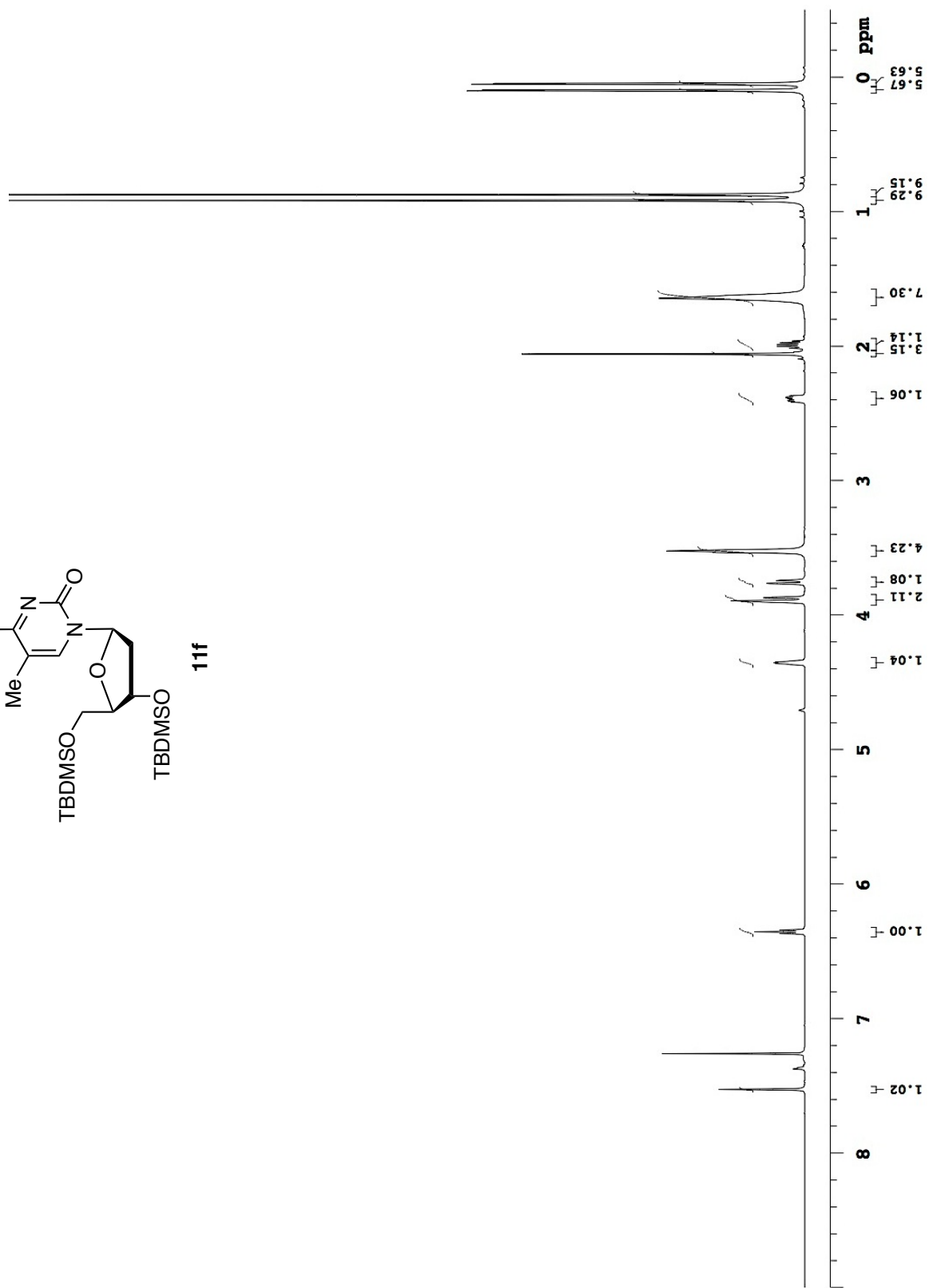
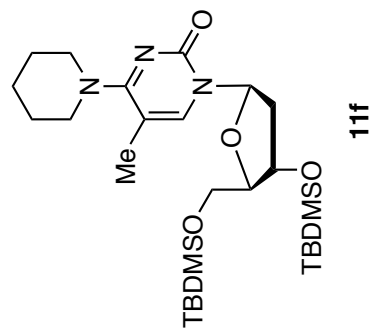


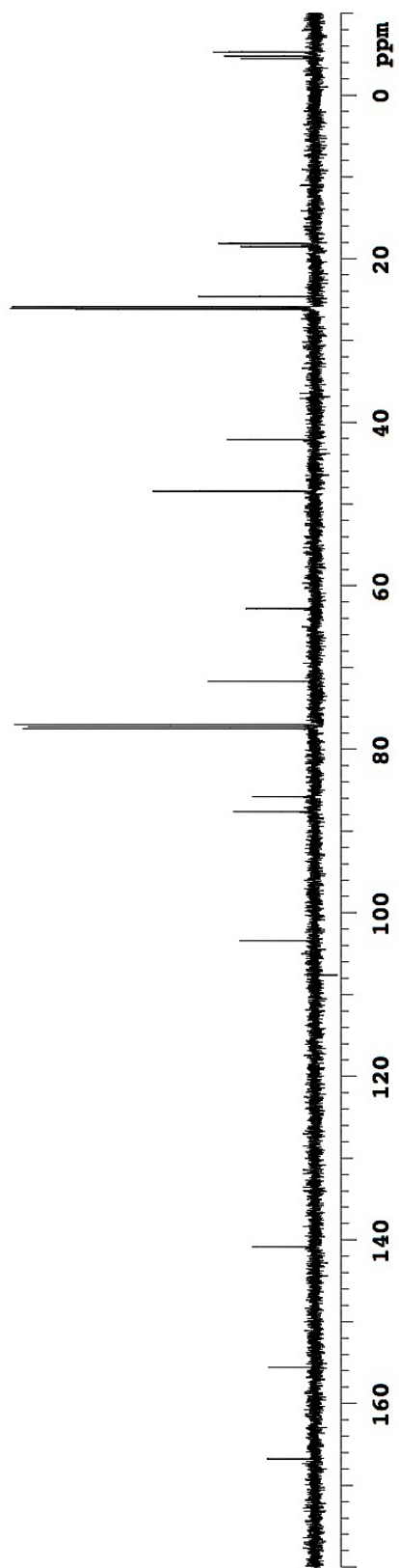
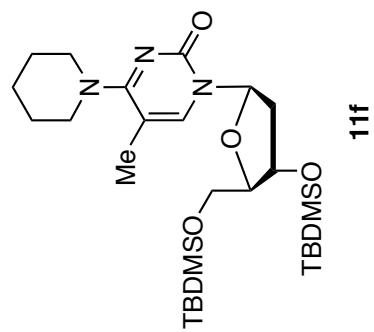




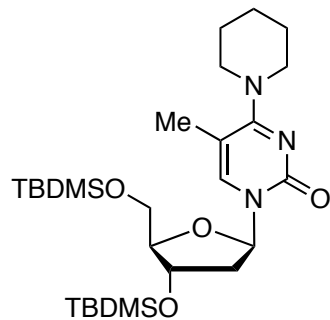




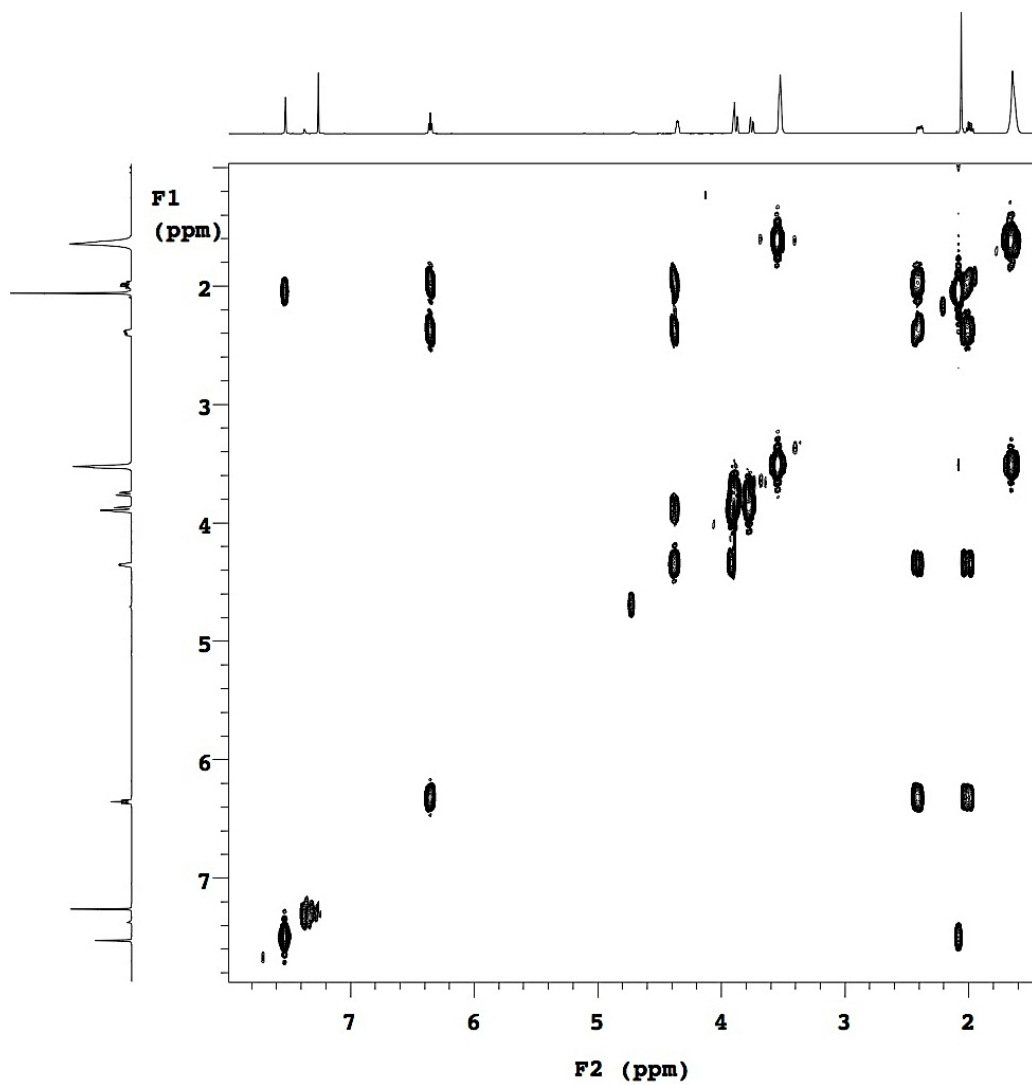


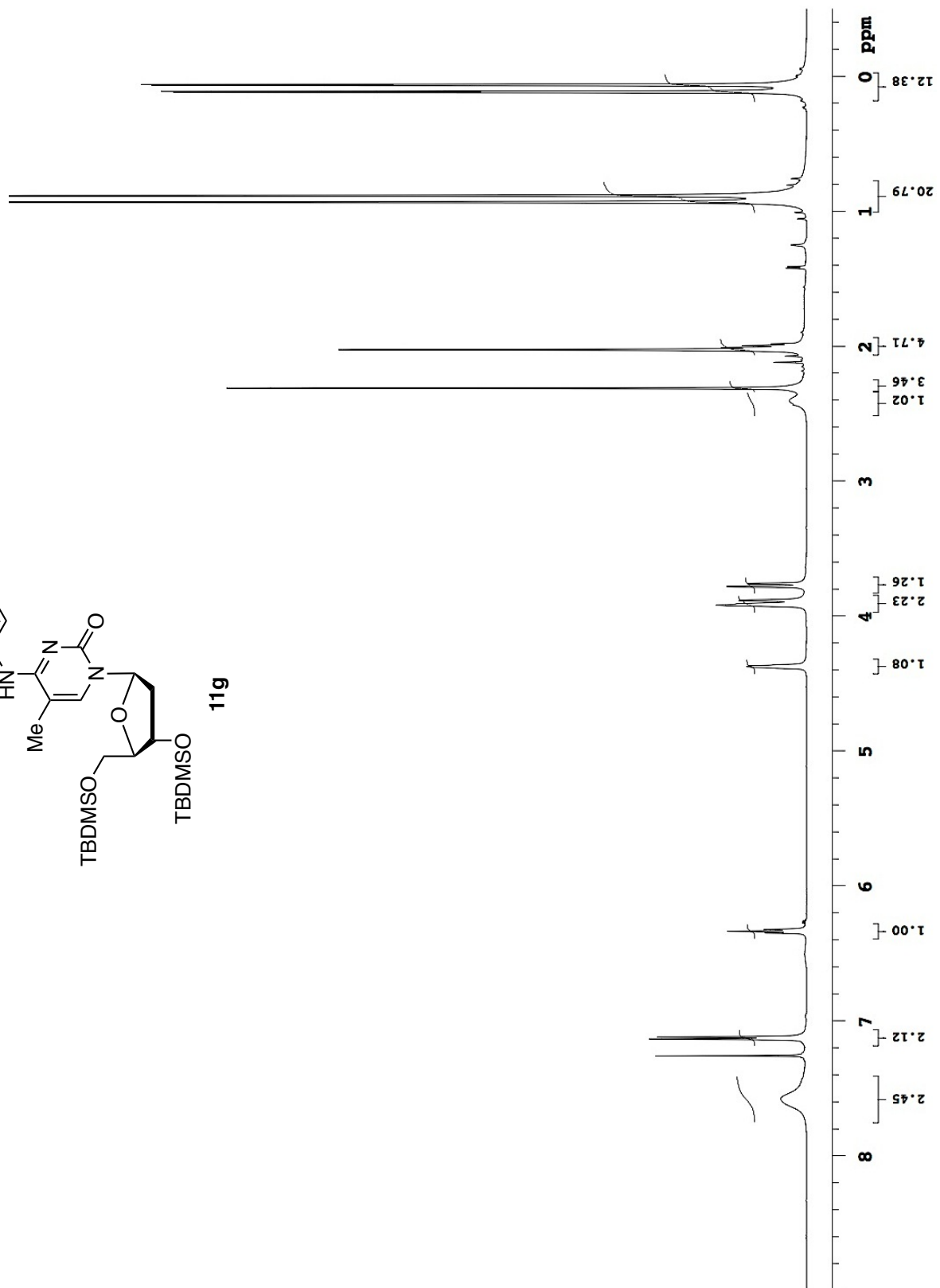
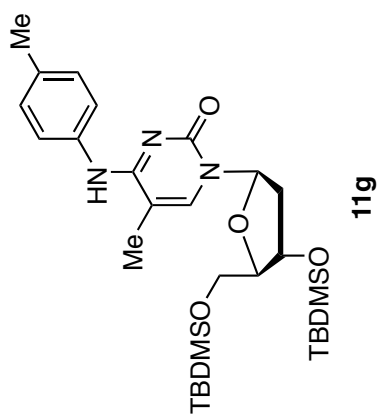


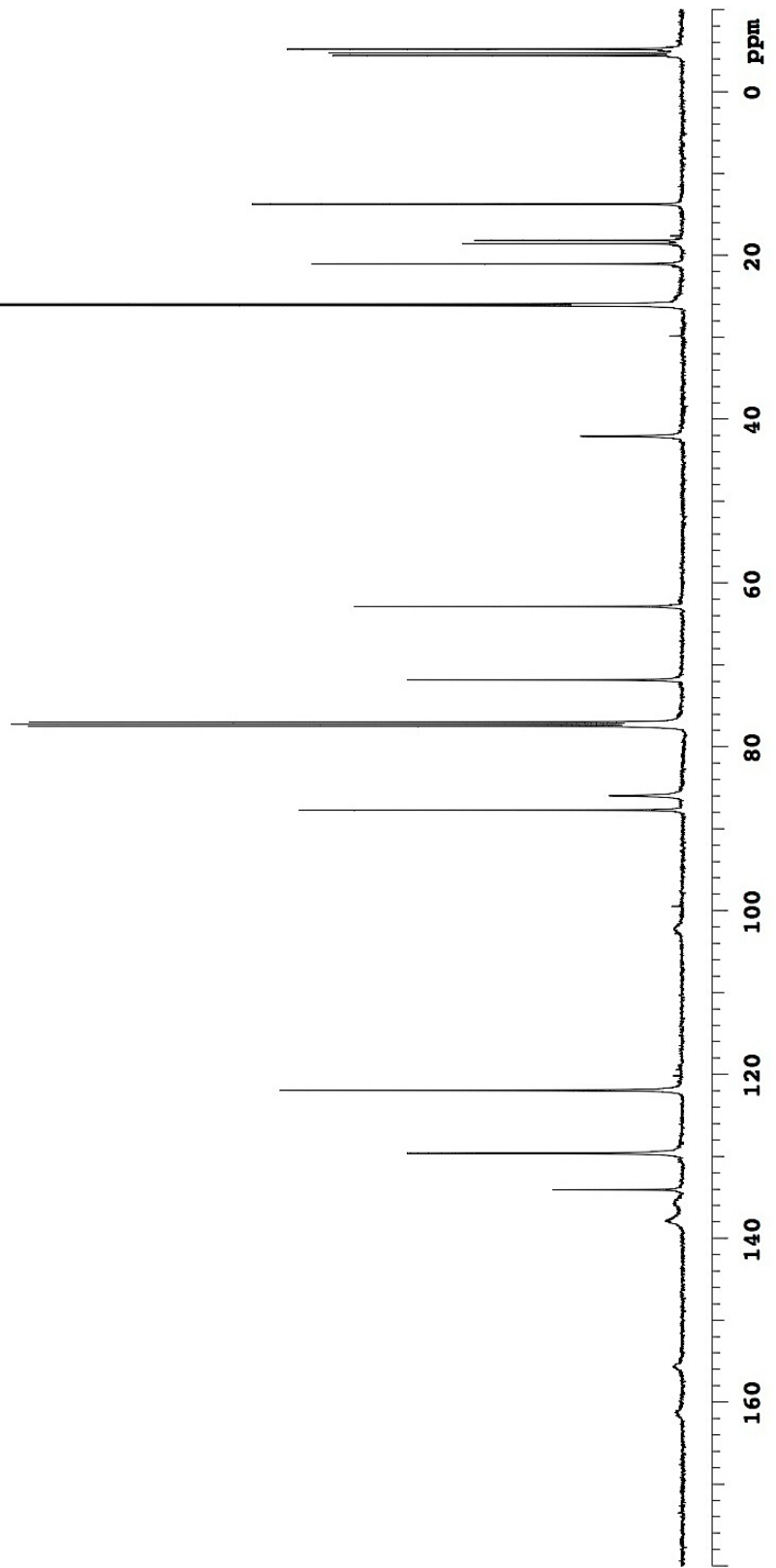
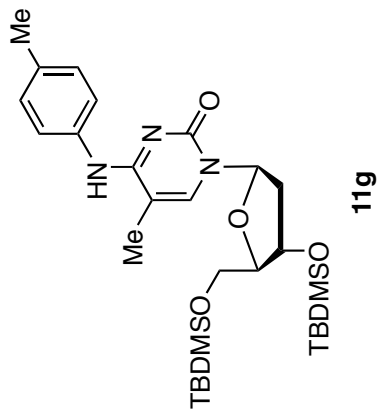
gCOSY spectrum of compound **11f** in CDCl₃



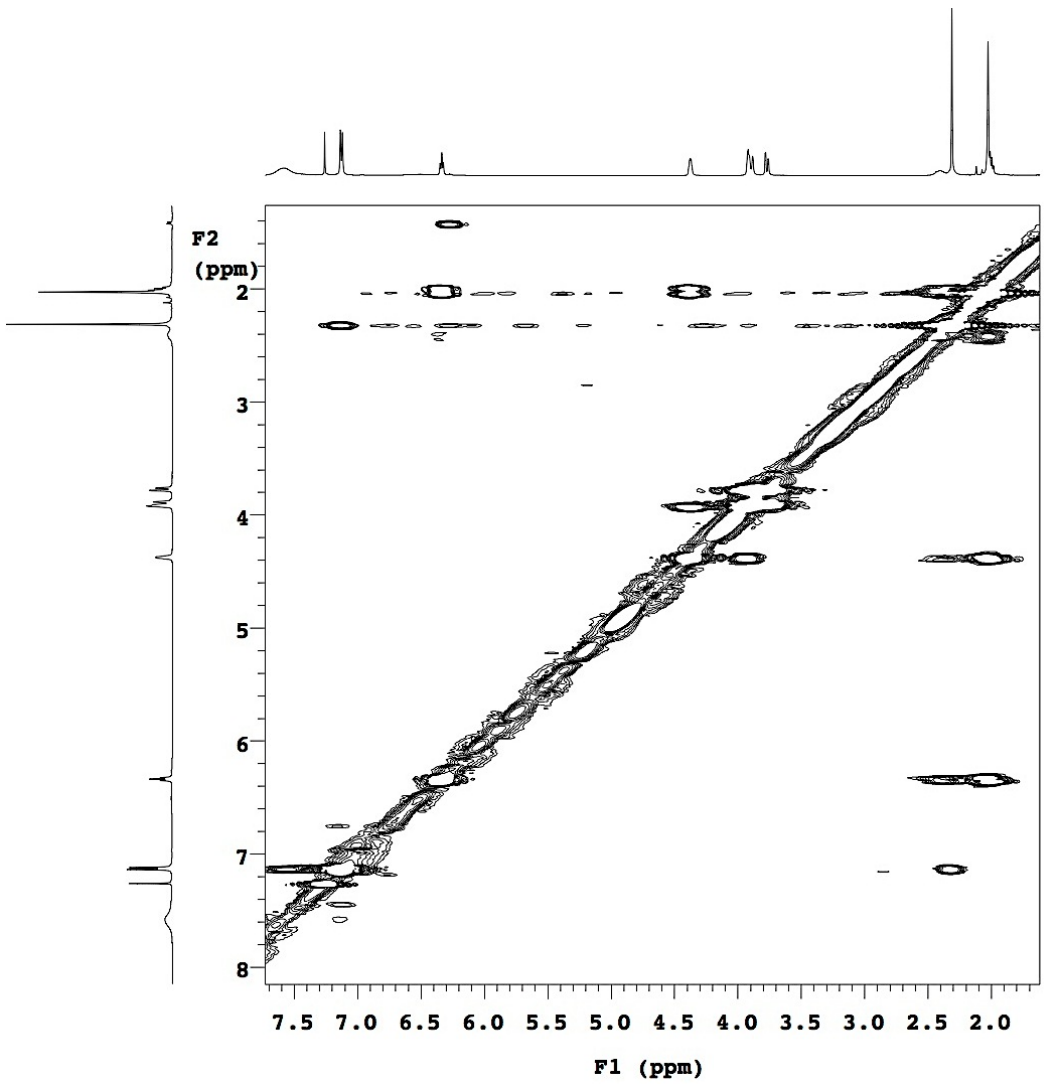
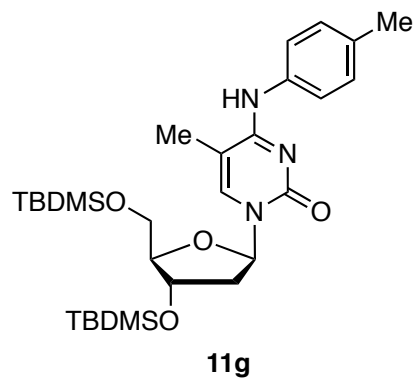
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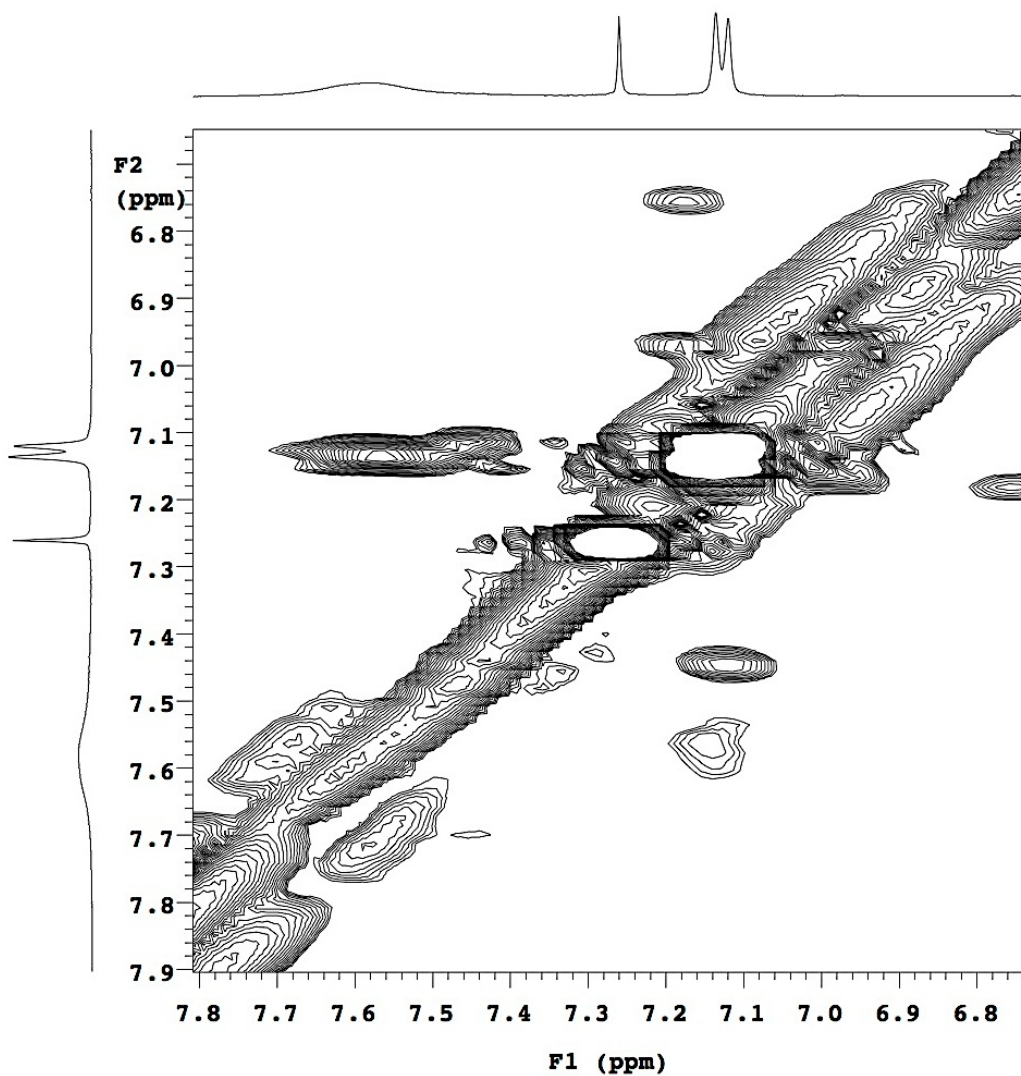
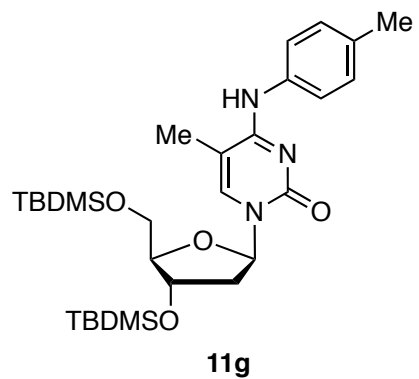


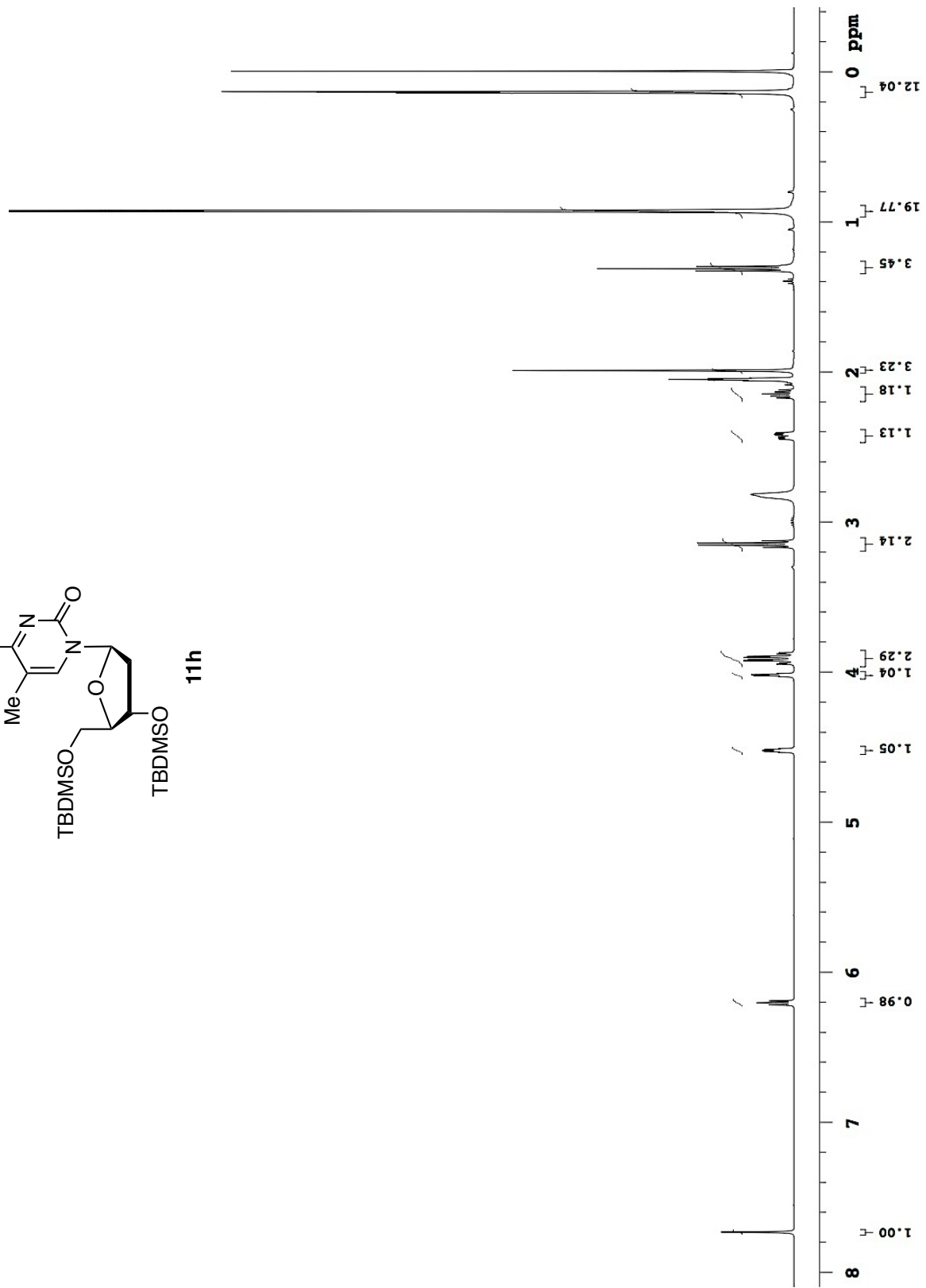
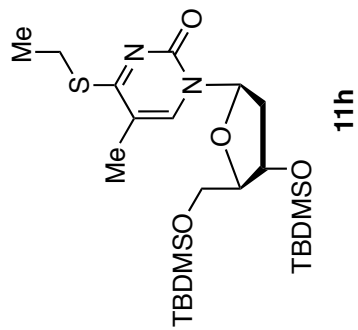


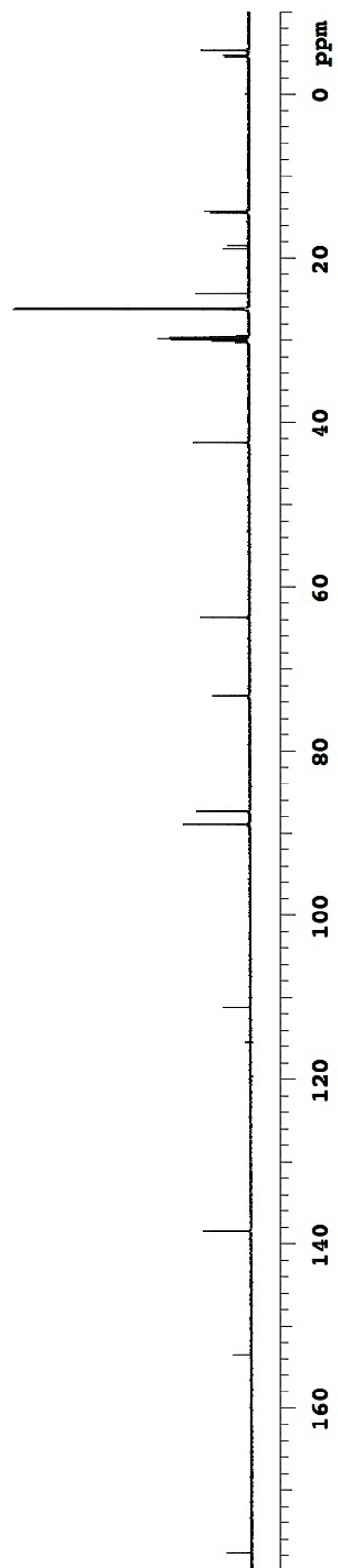
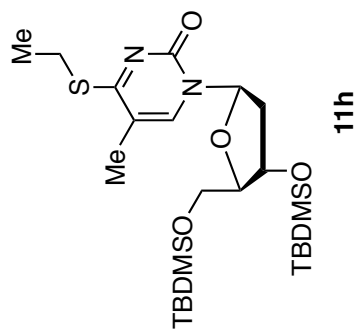
gCOSY spectrum of compound **11g** in CDCl₃

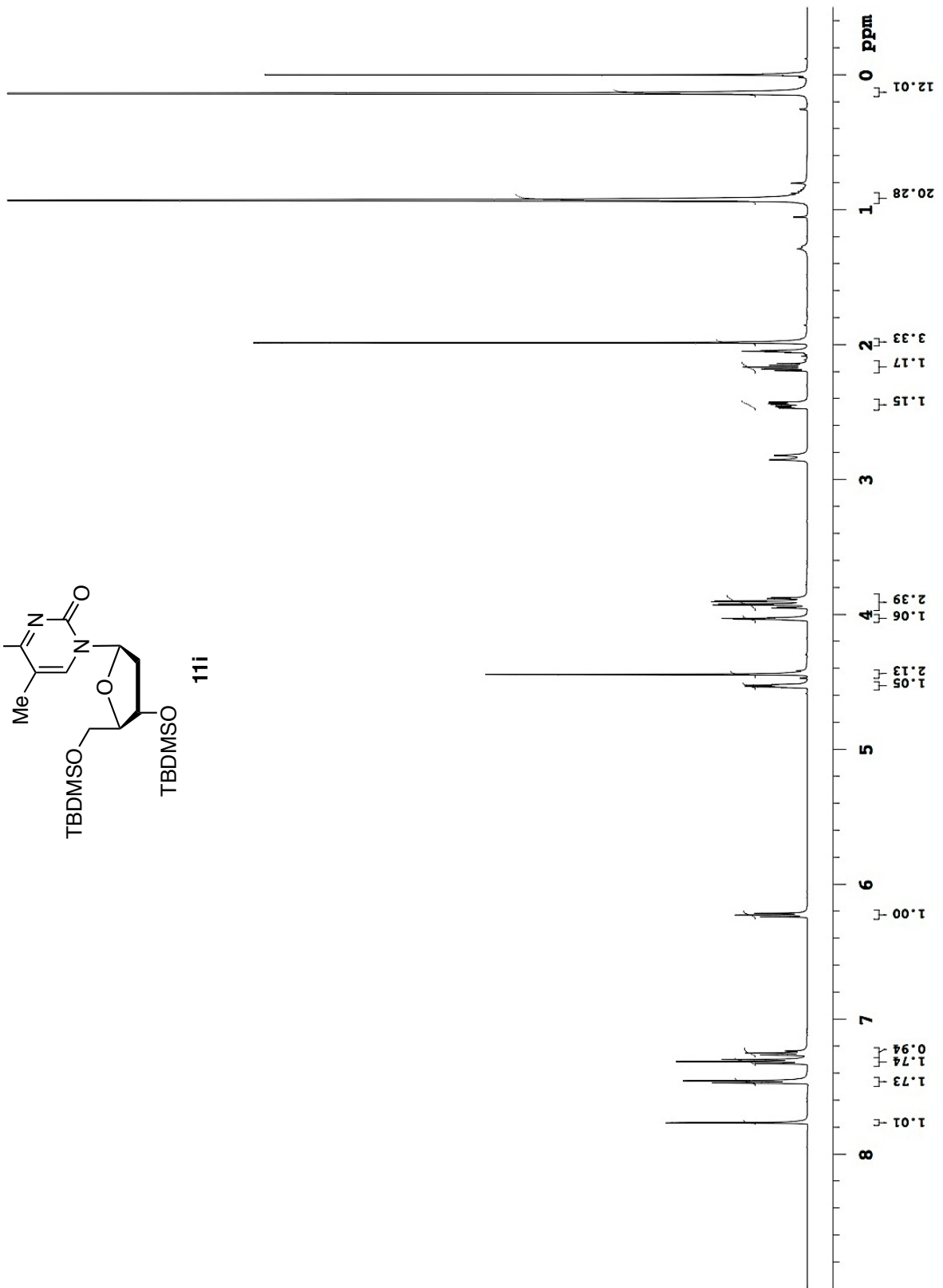
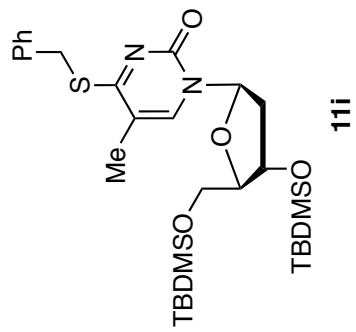


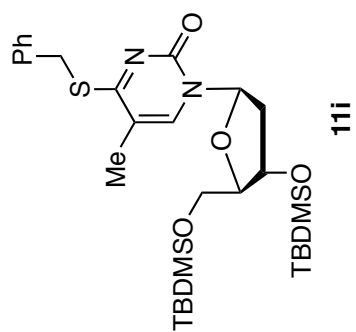
Expansion of gCOSY spectrum of compound **11g** in CDCl₃



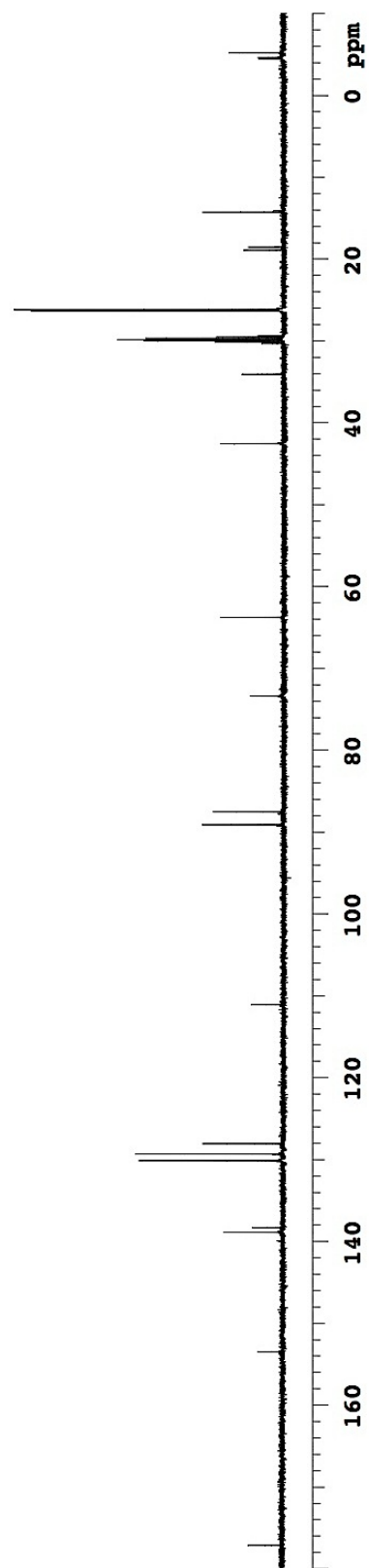


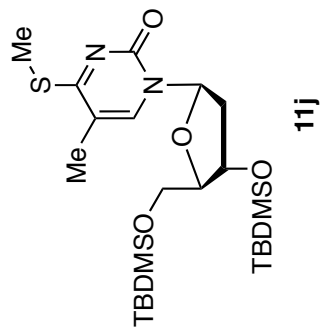




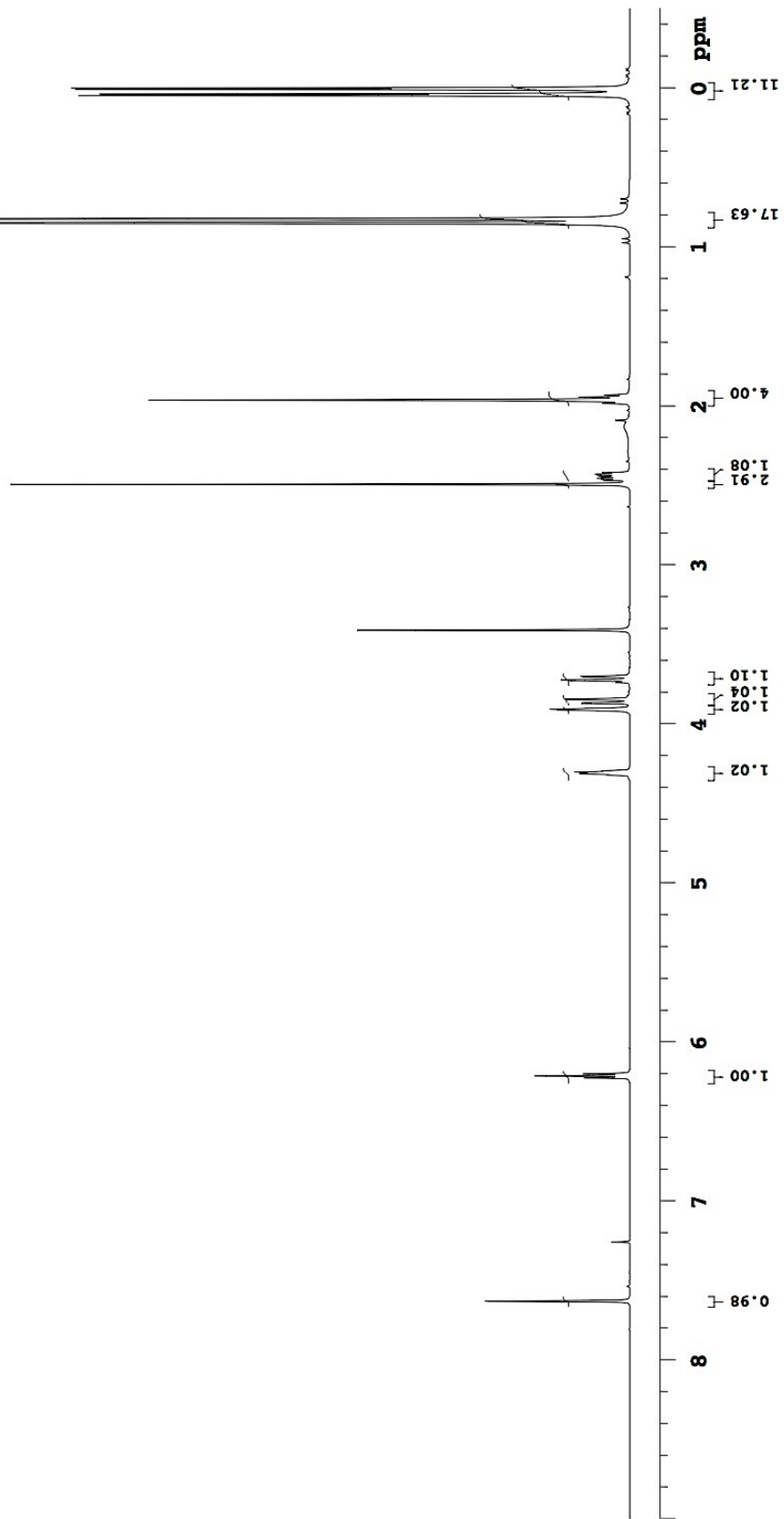


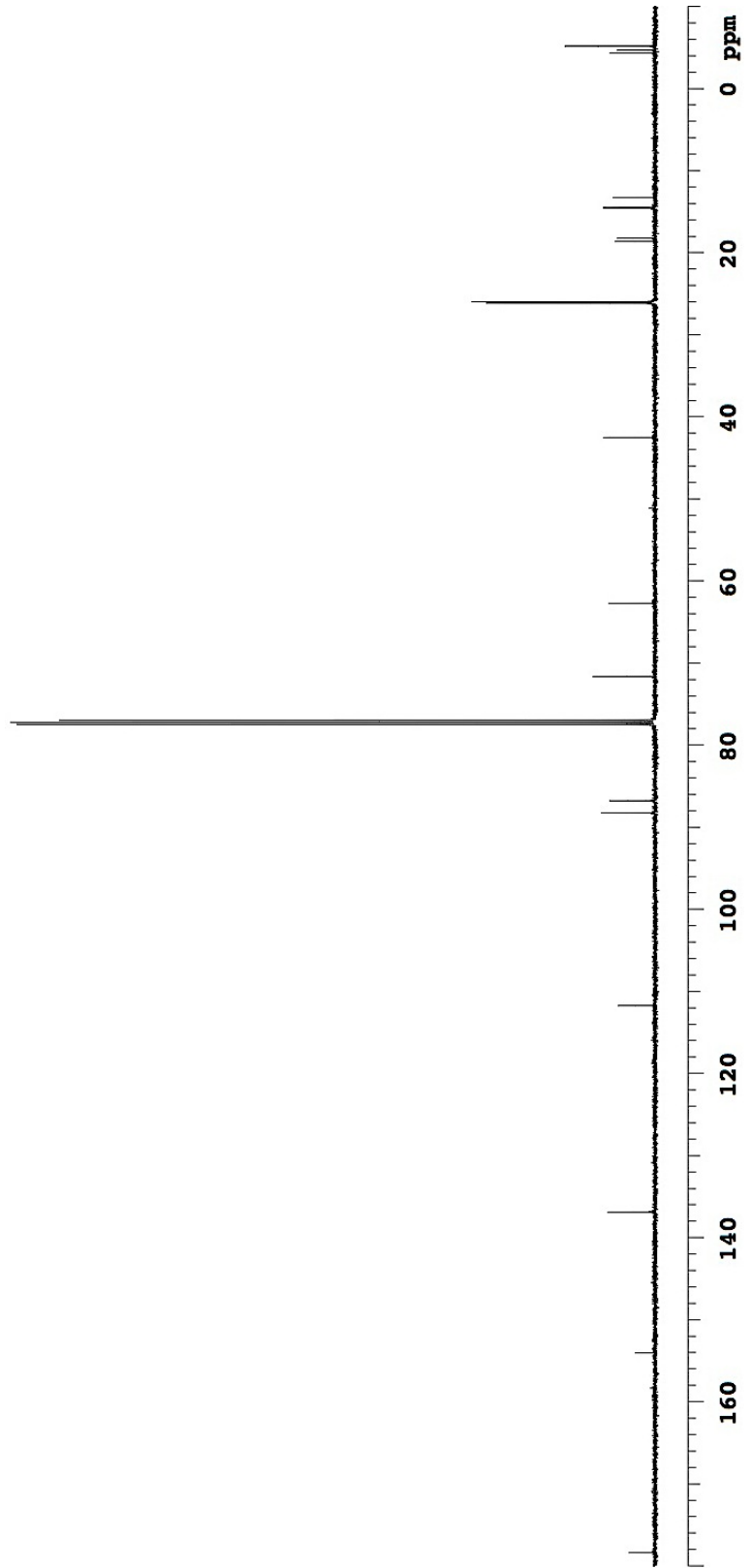
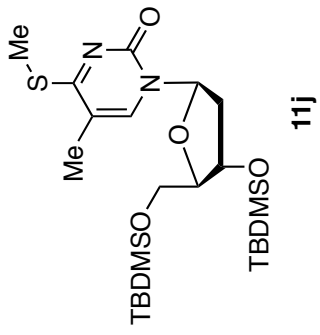
11i

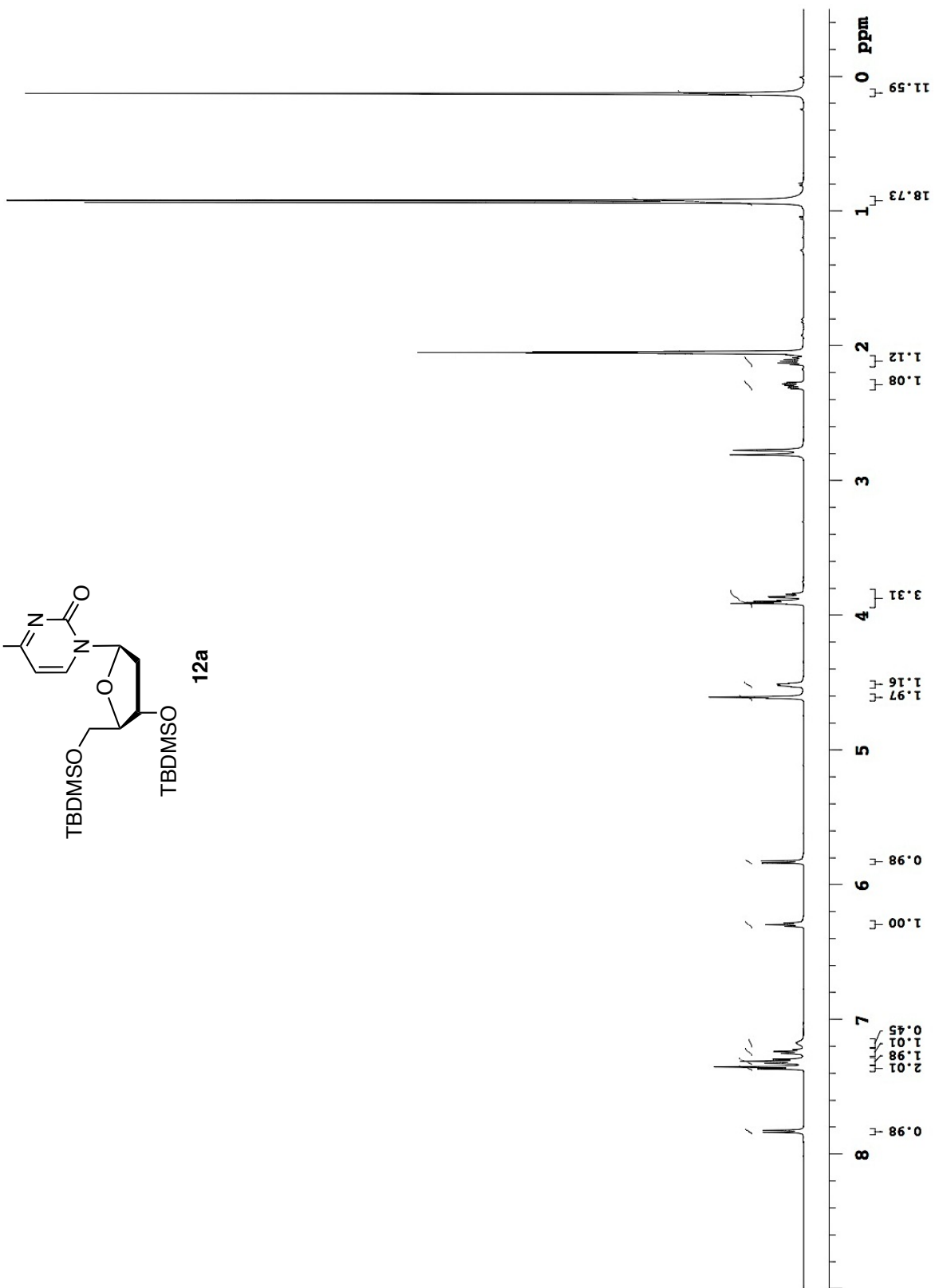
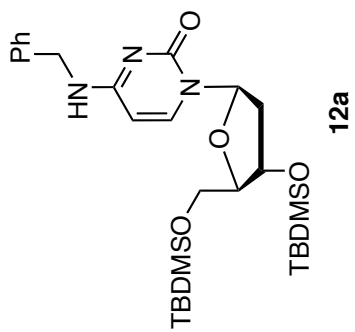


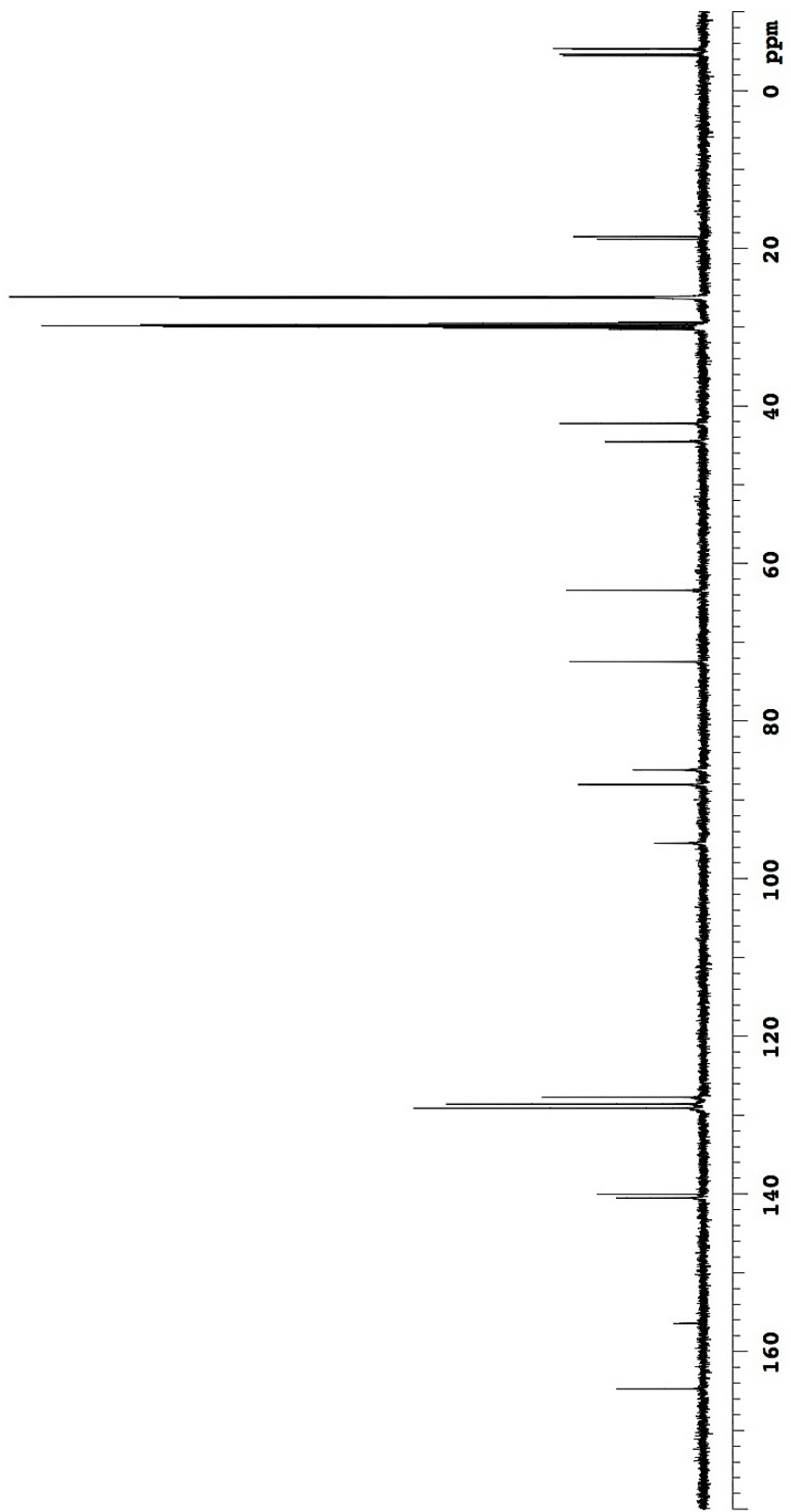
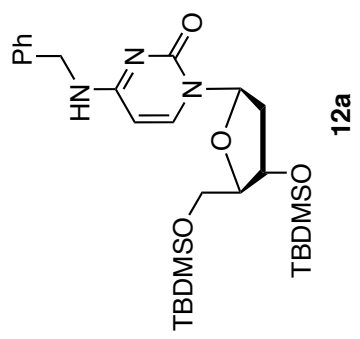


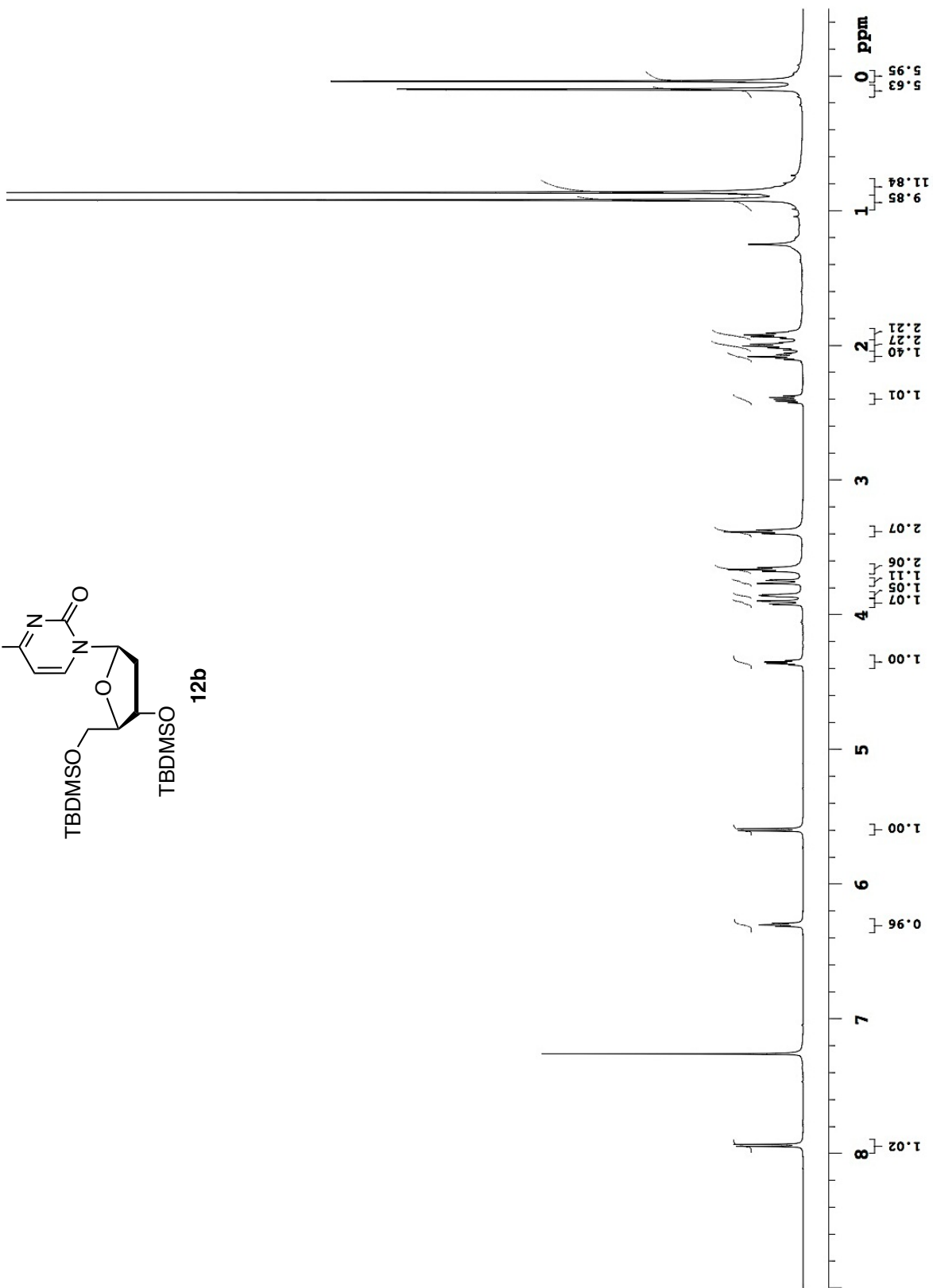
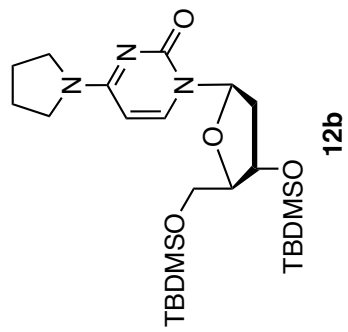
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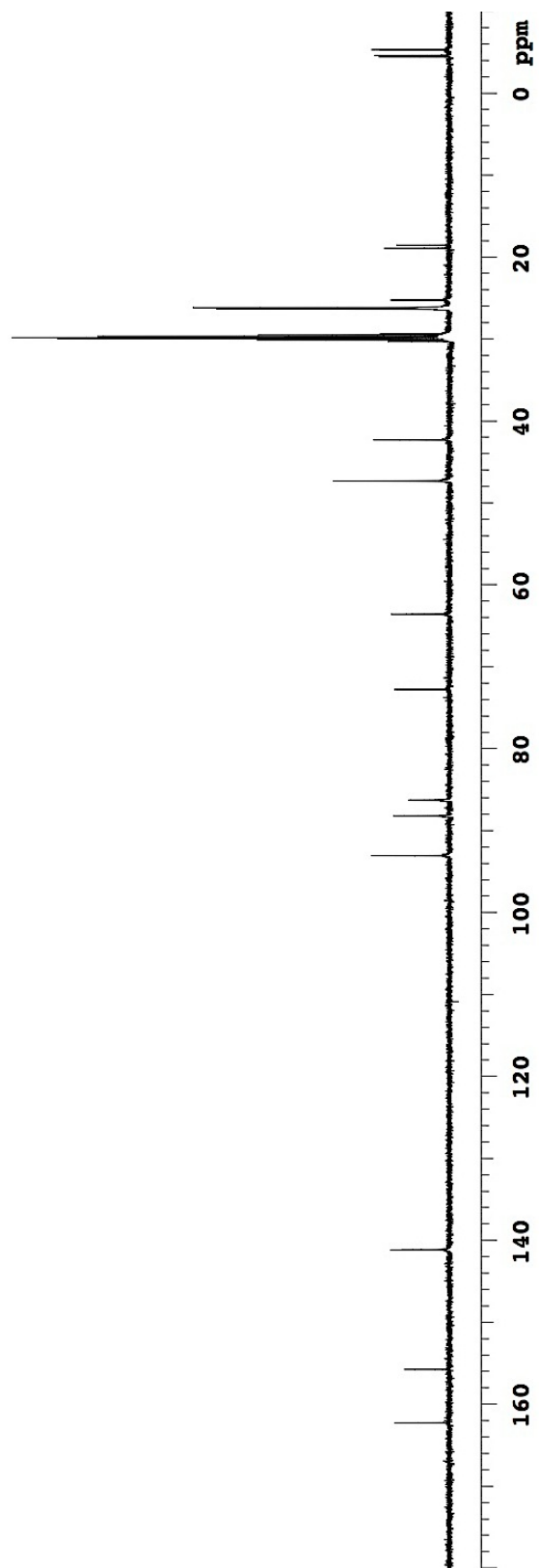
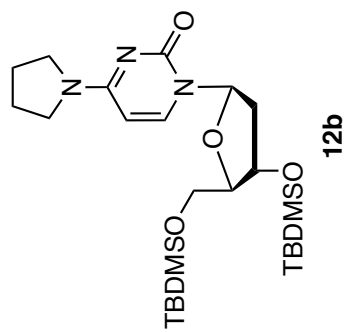


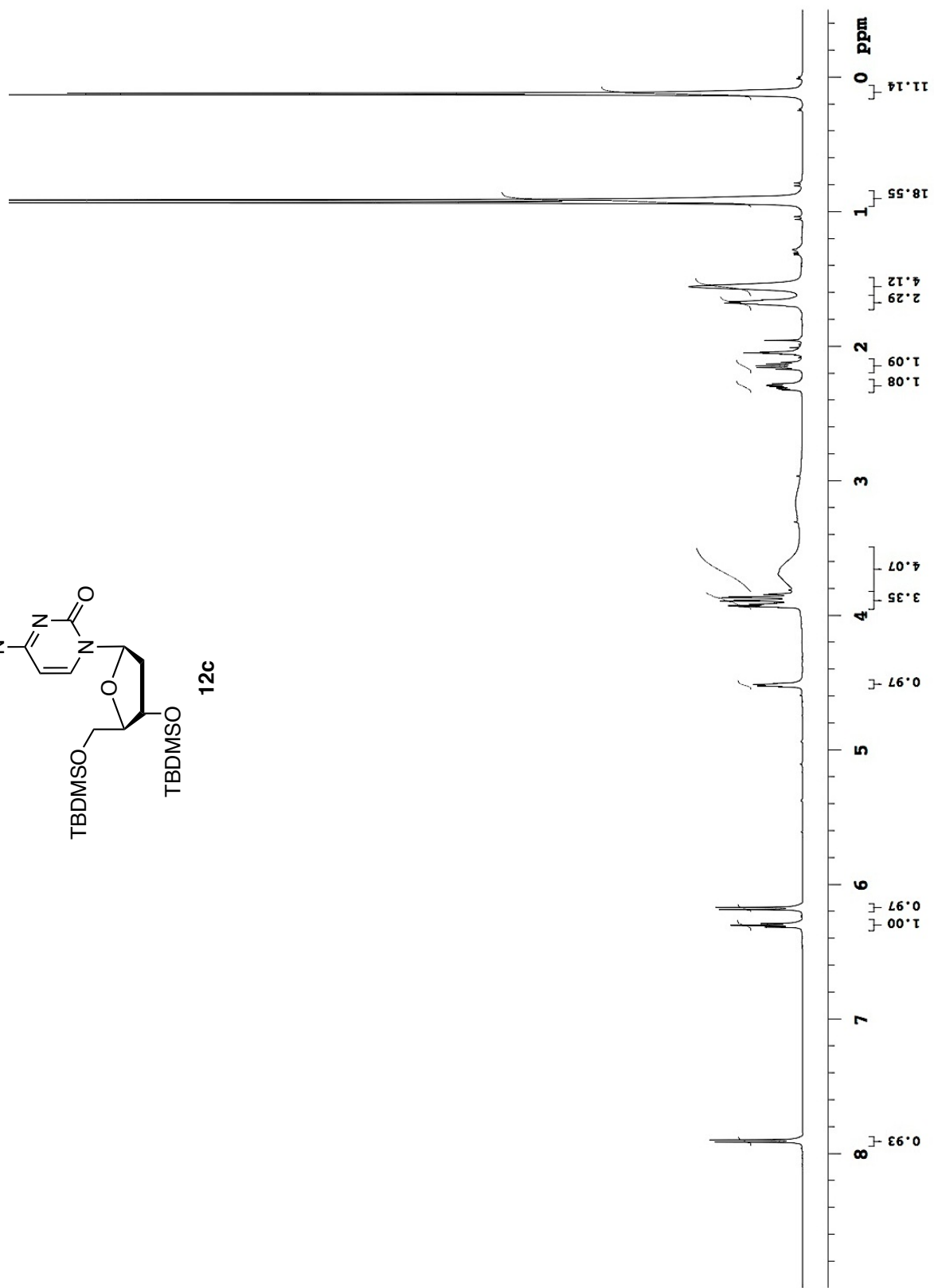
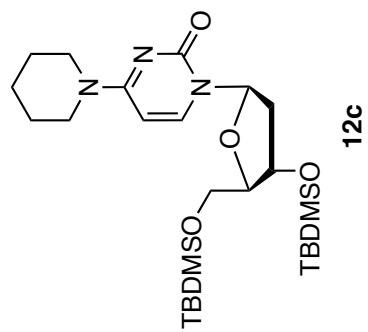


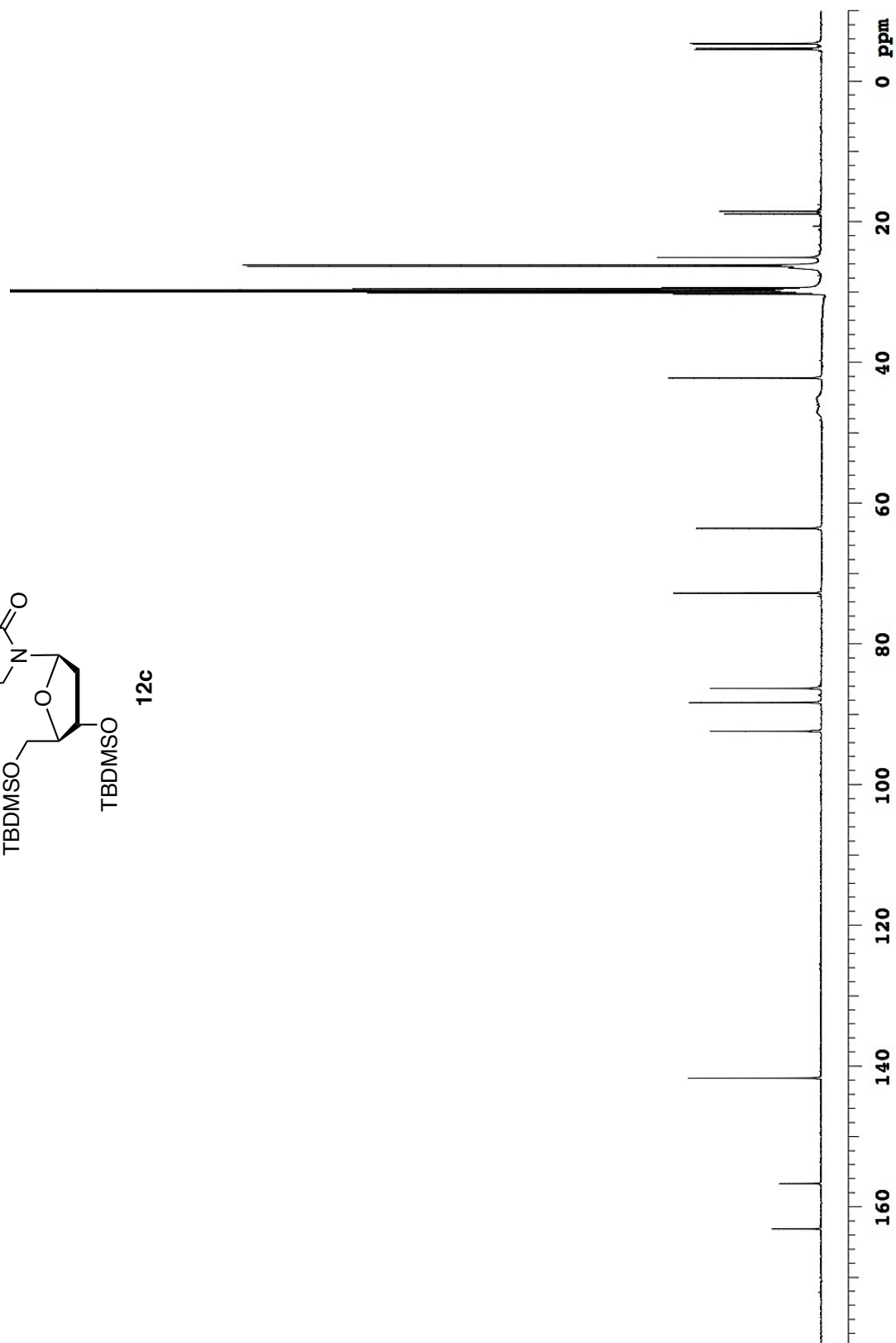
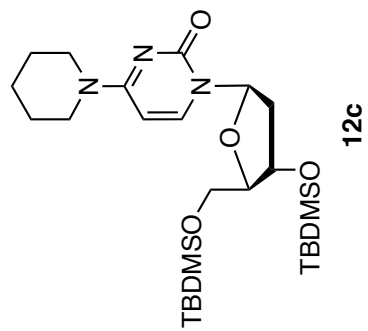




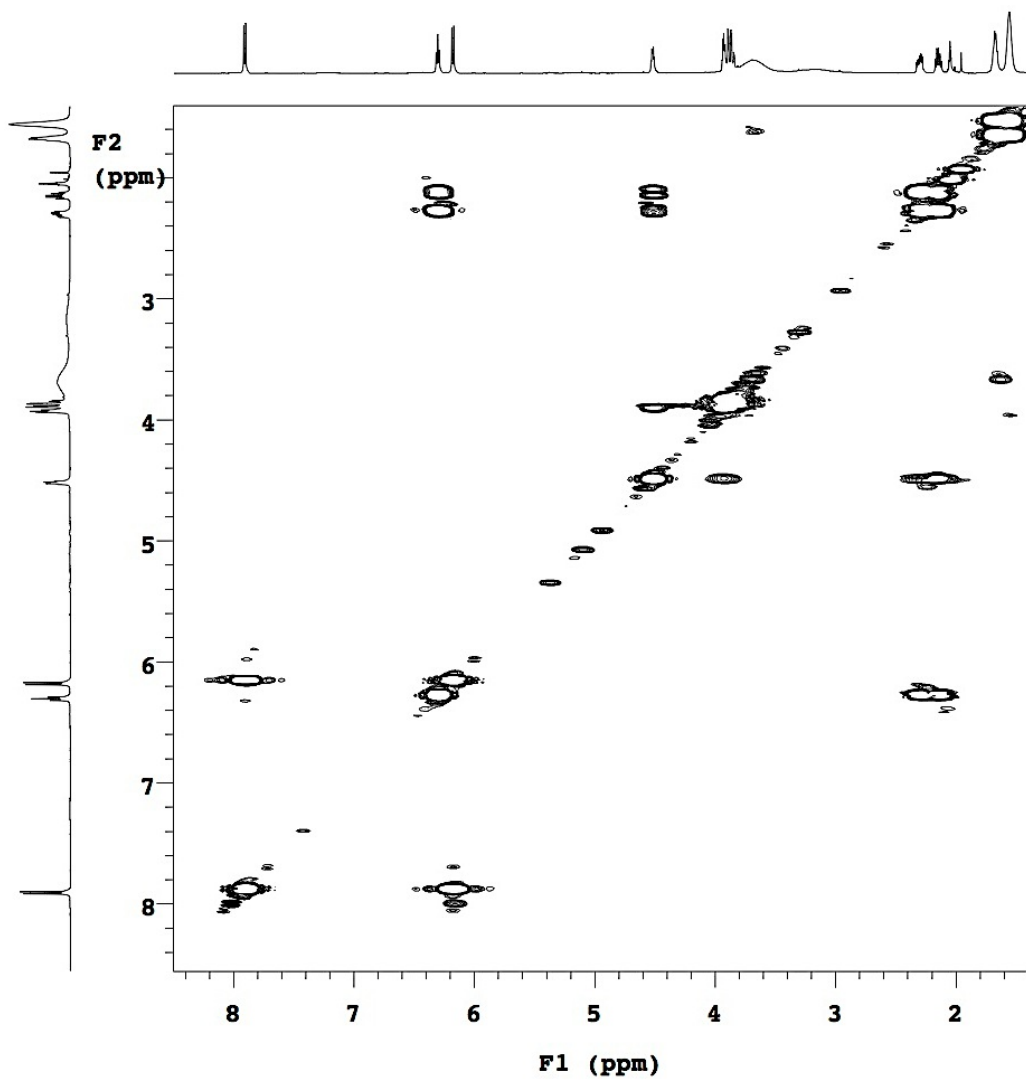
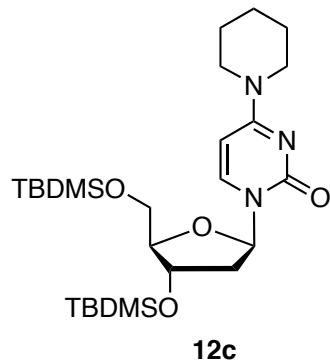




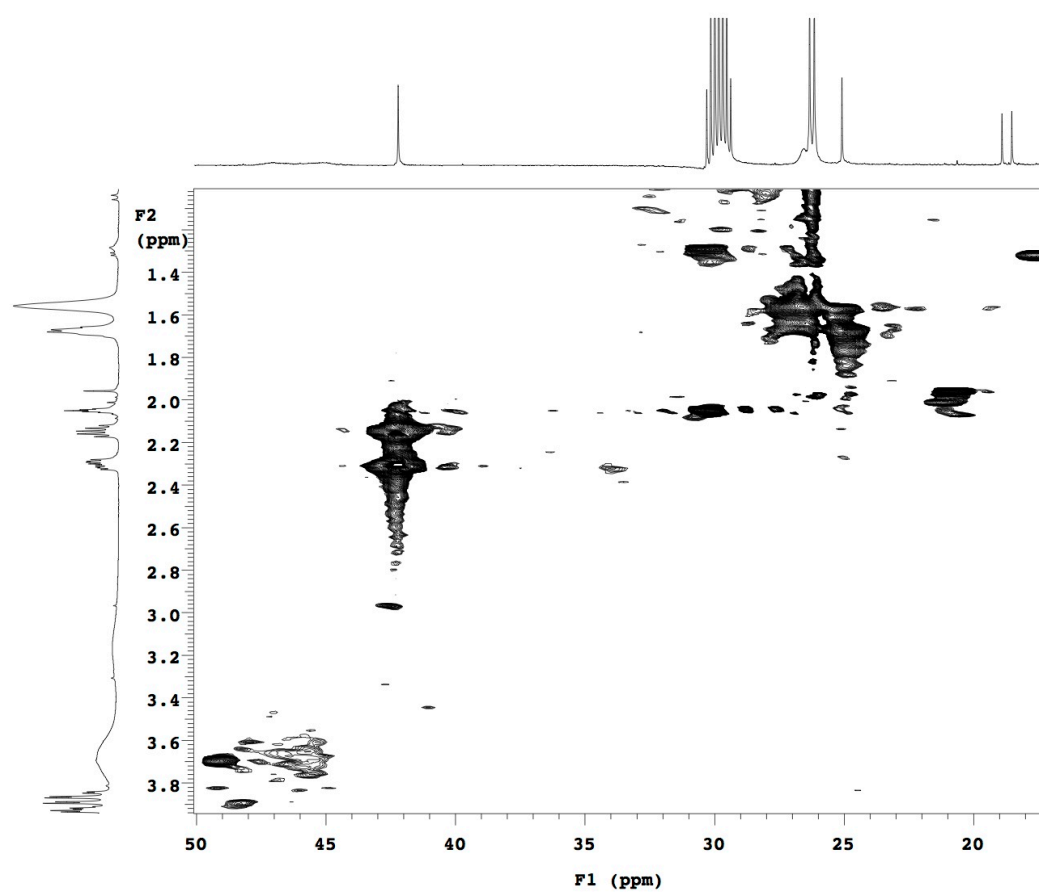
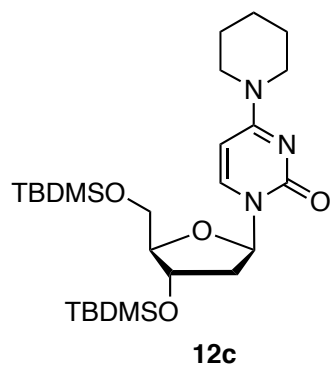


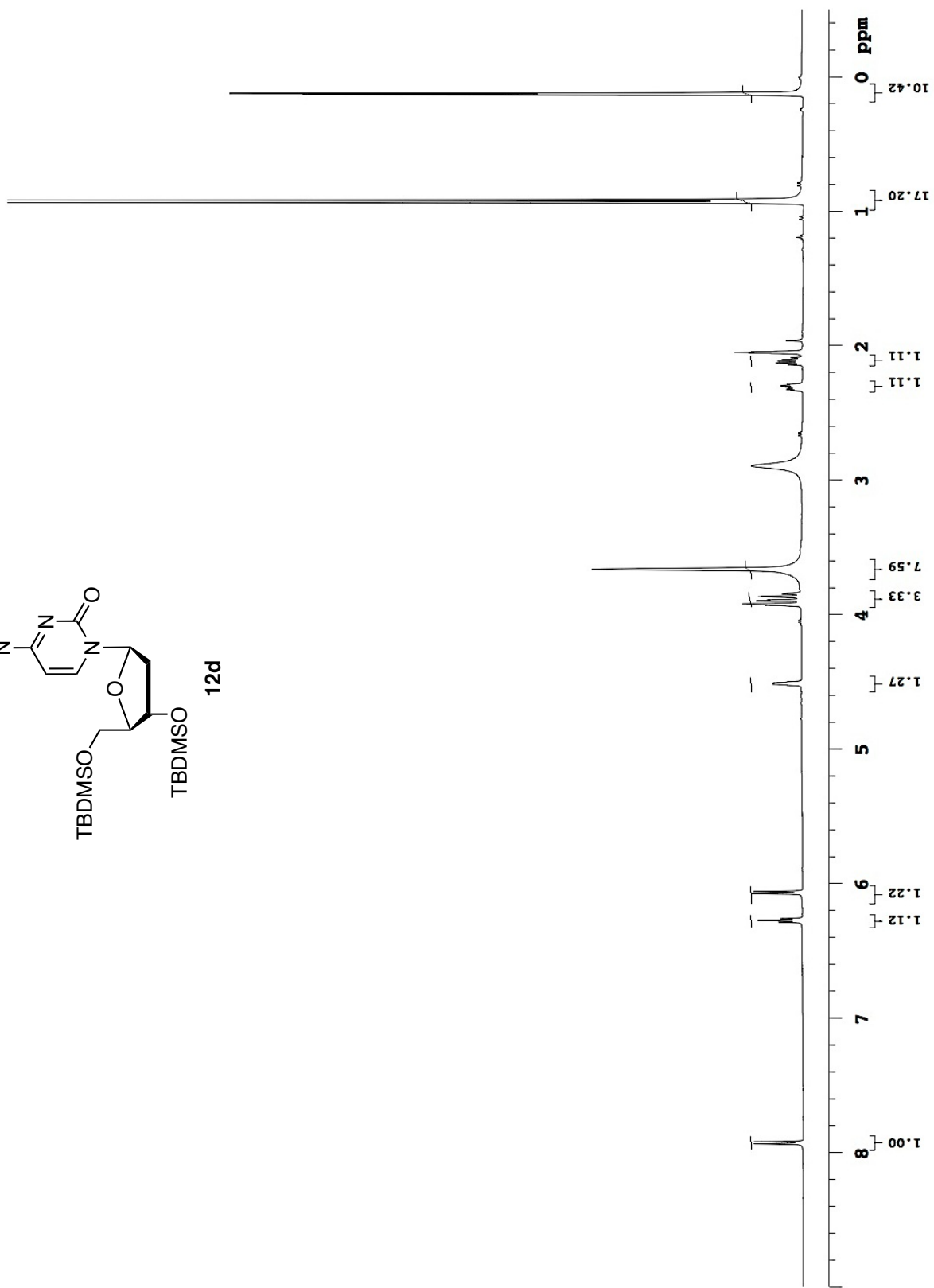
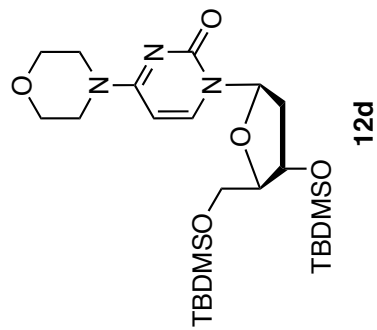


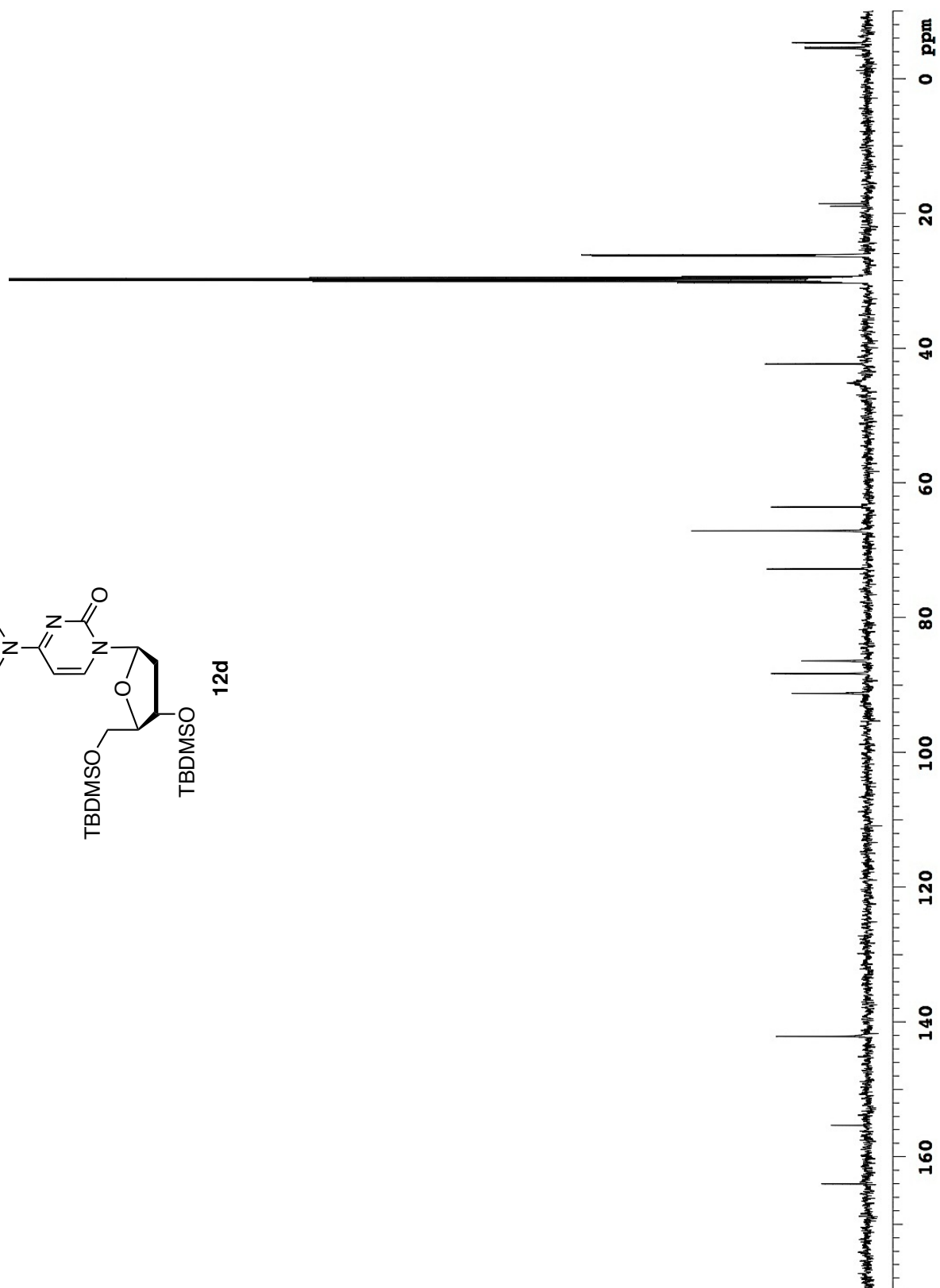
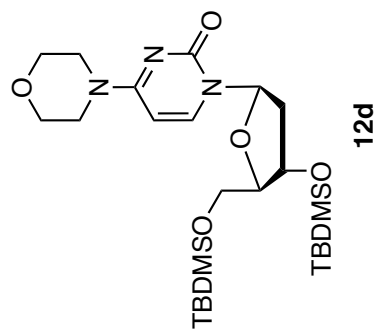
gCOSY spectrum of compound **12c** in acetone-*d*₆

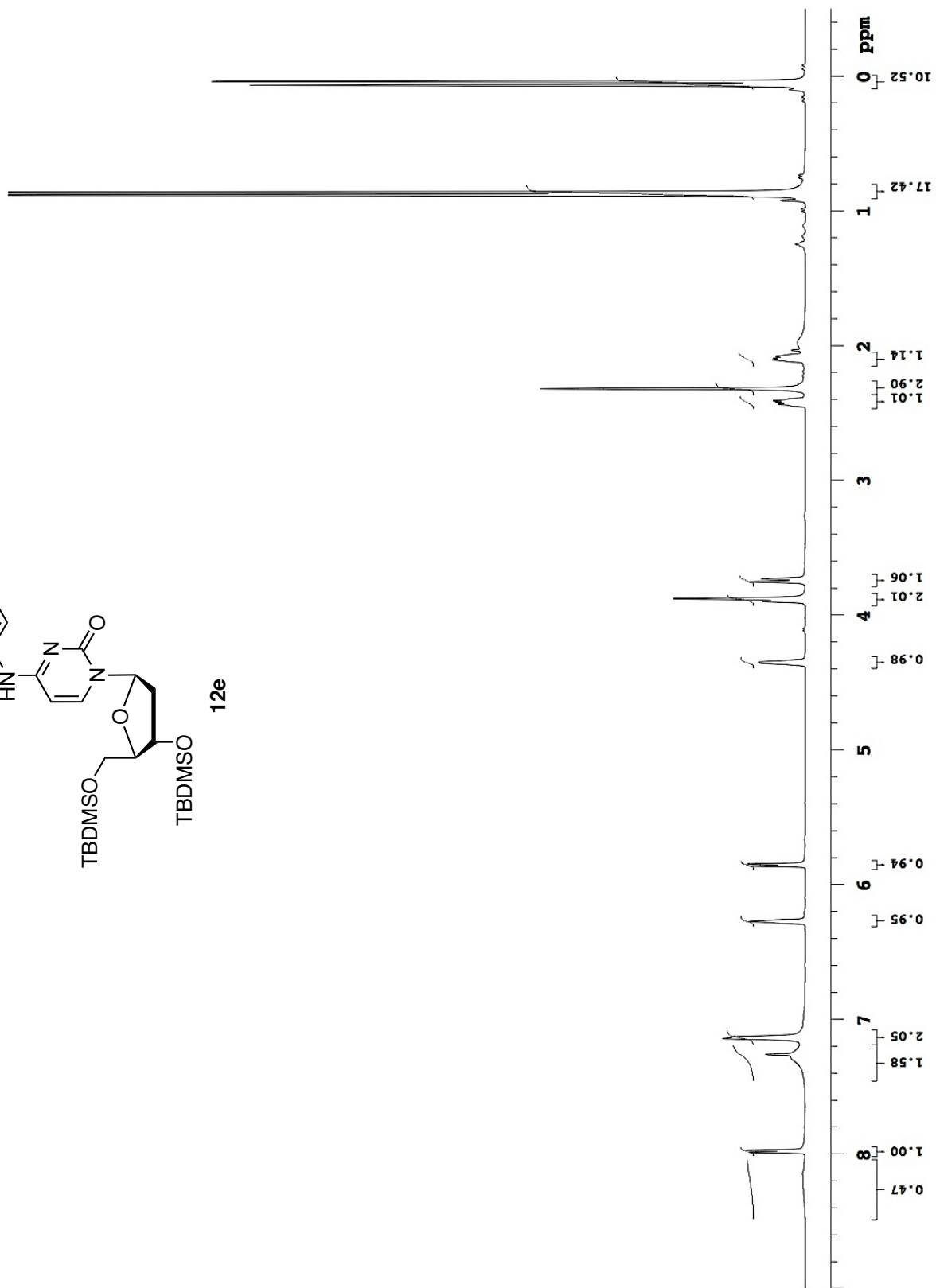
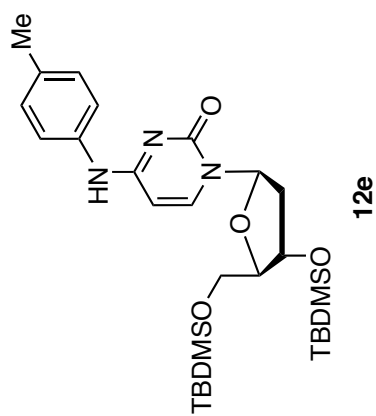


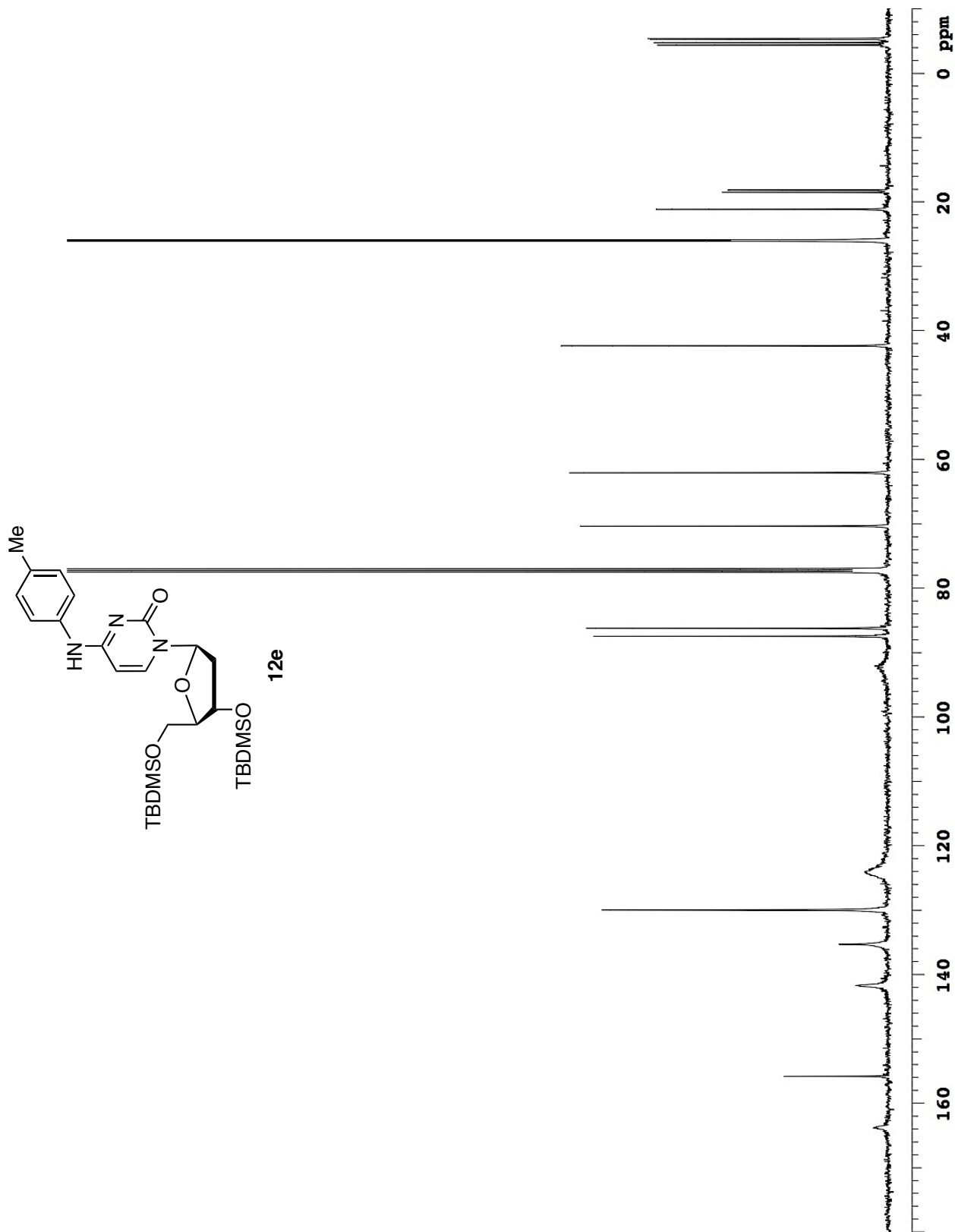
gHMQC spectrum of compound **12c** in acetone- d_6



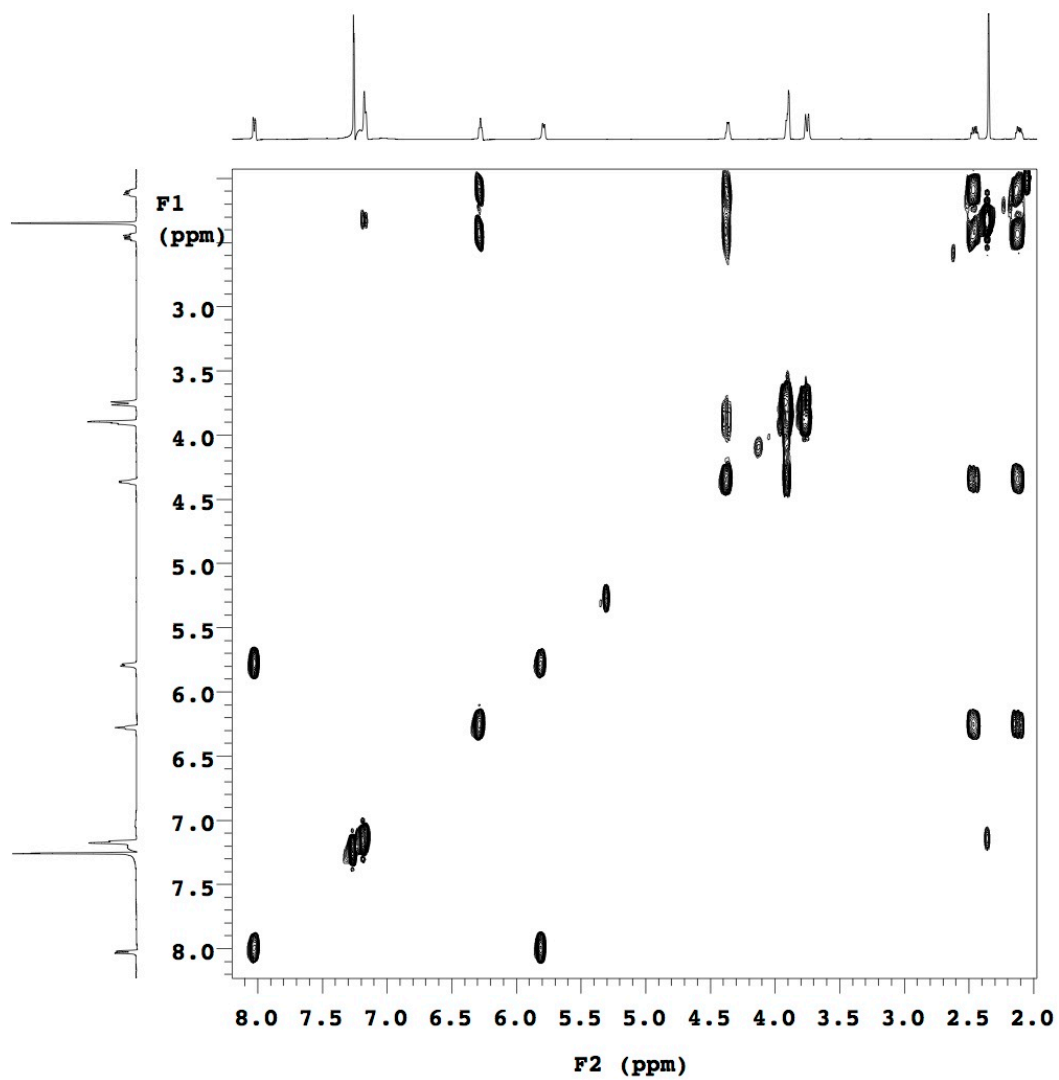
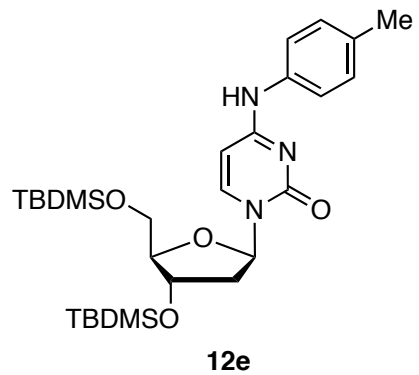


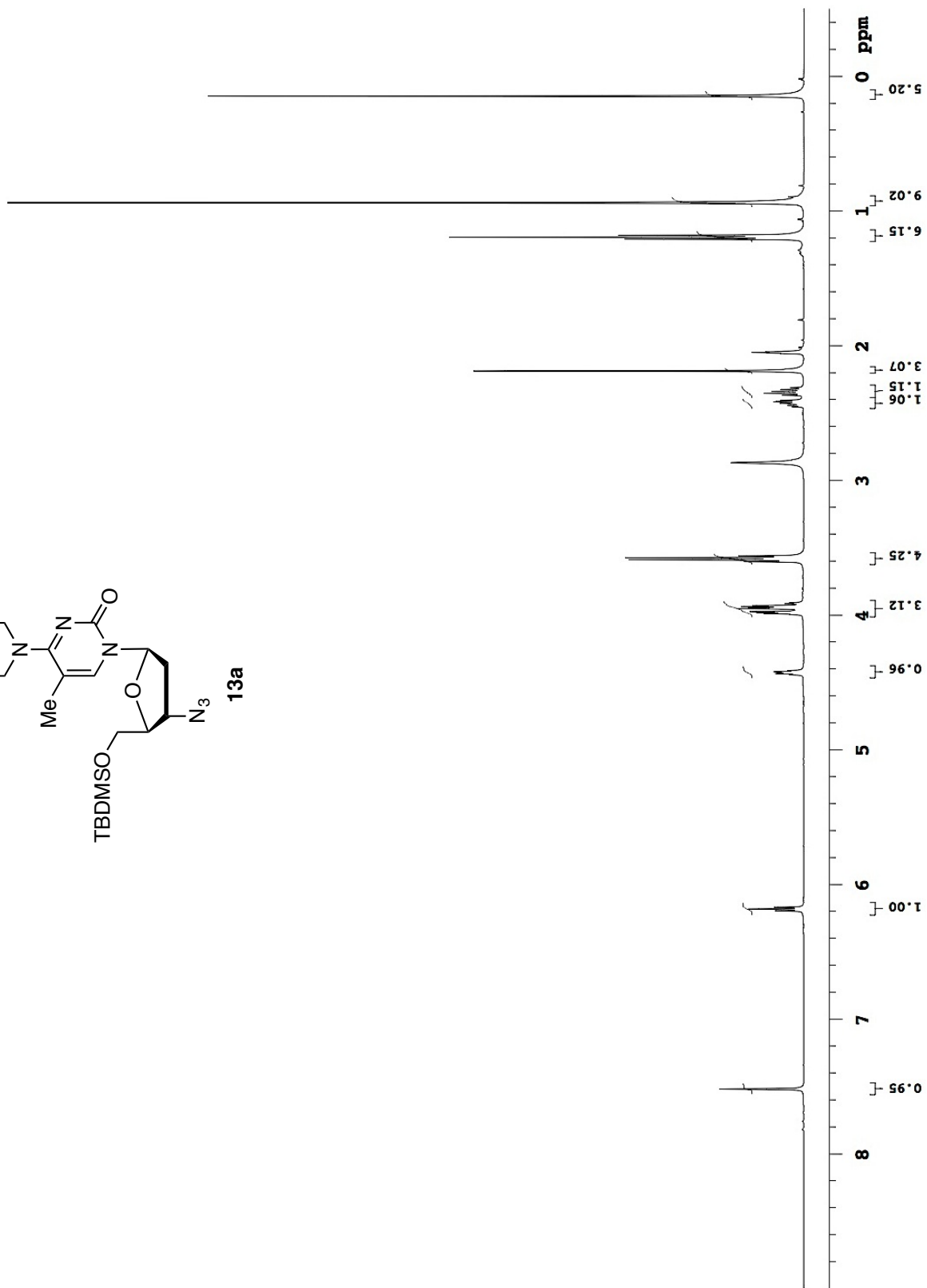
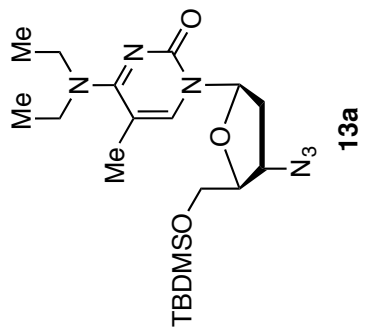


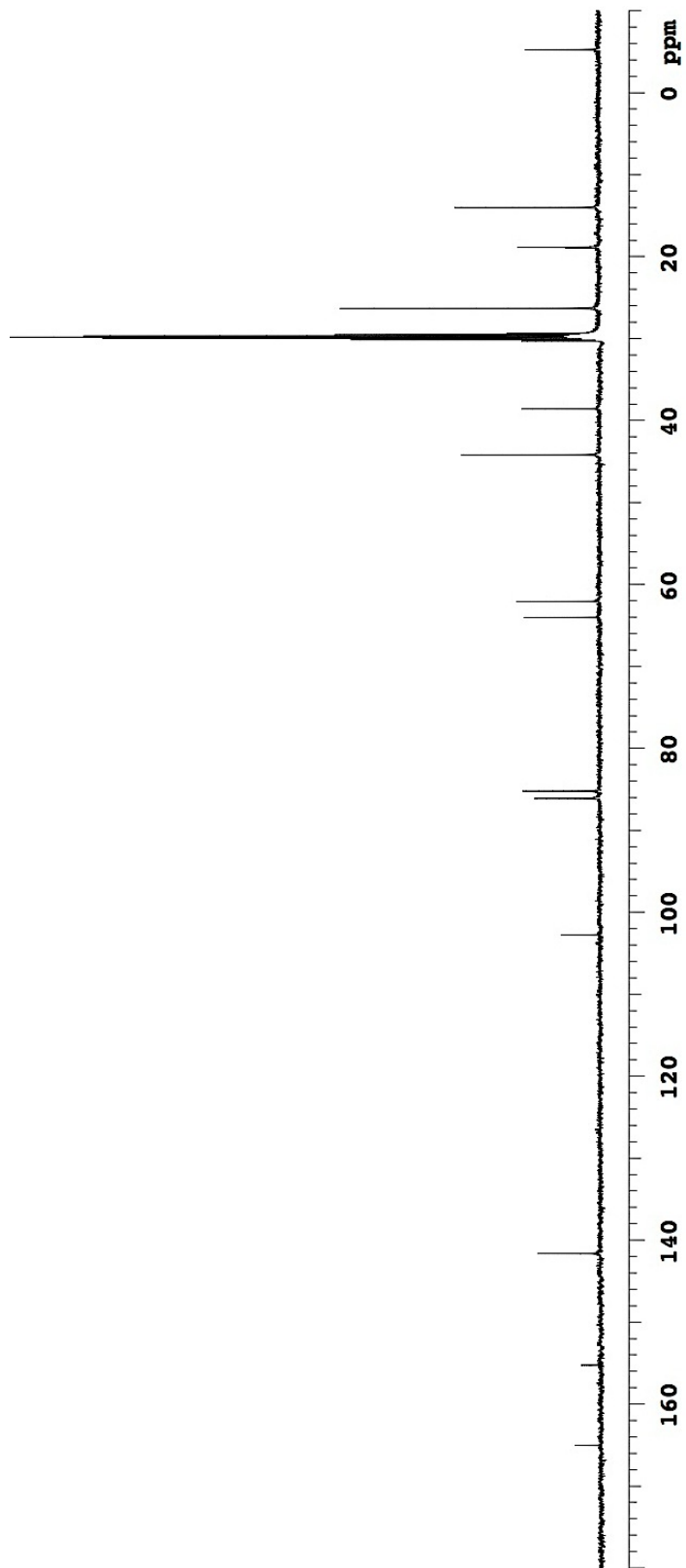
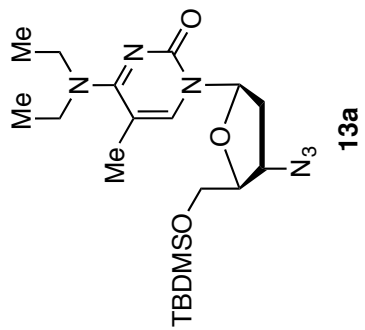


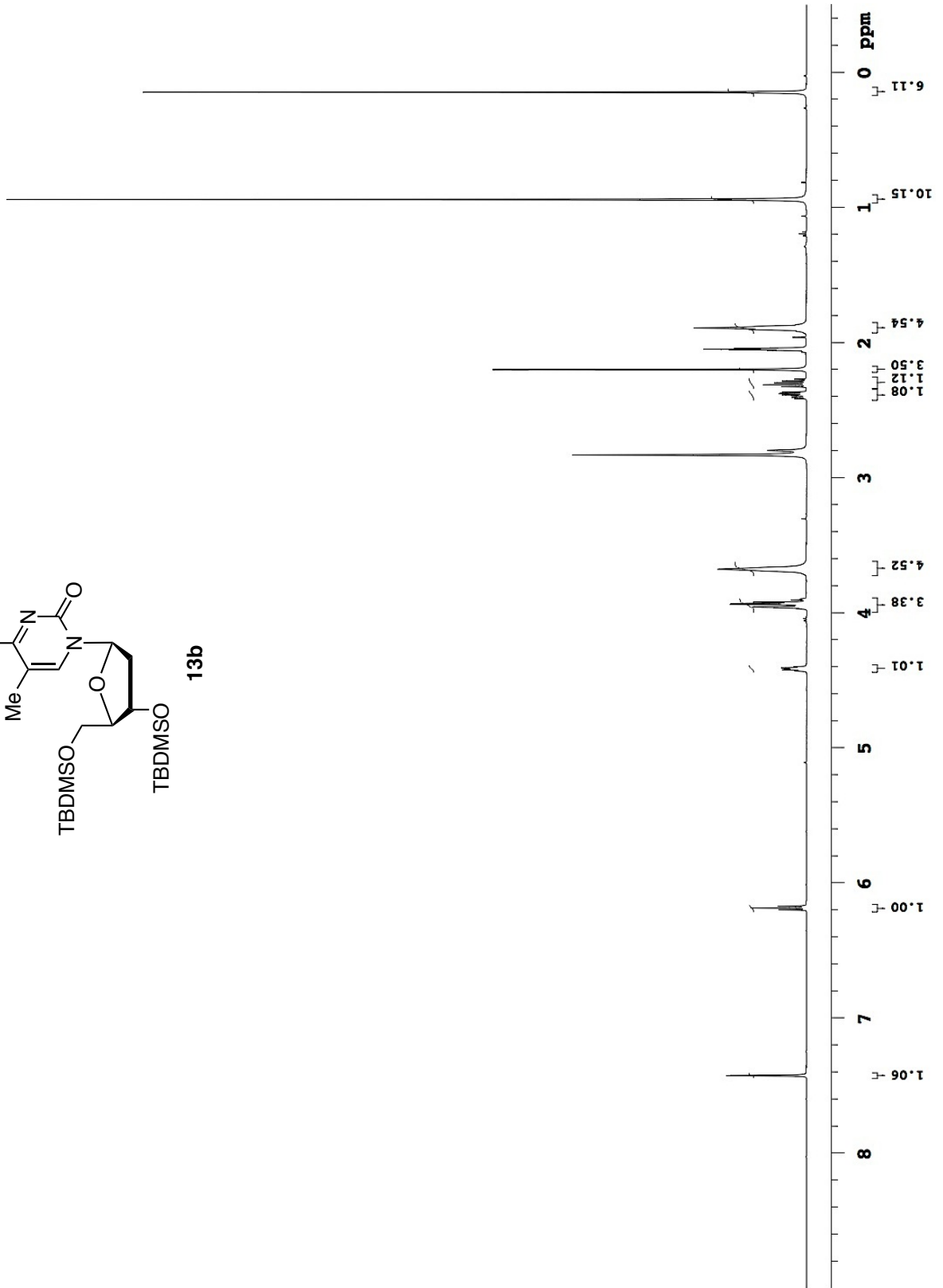
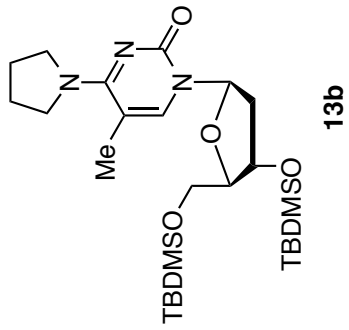


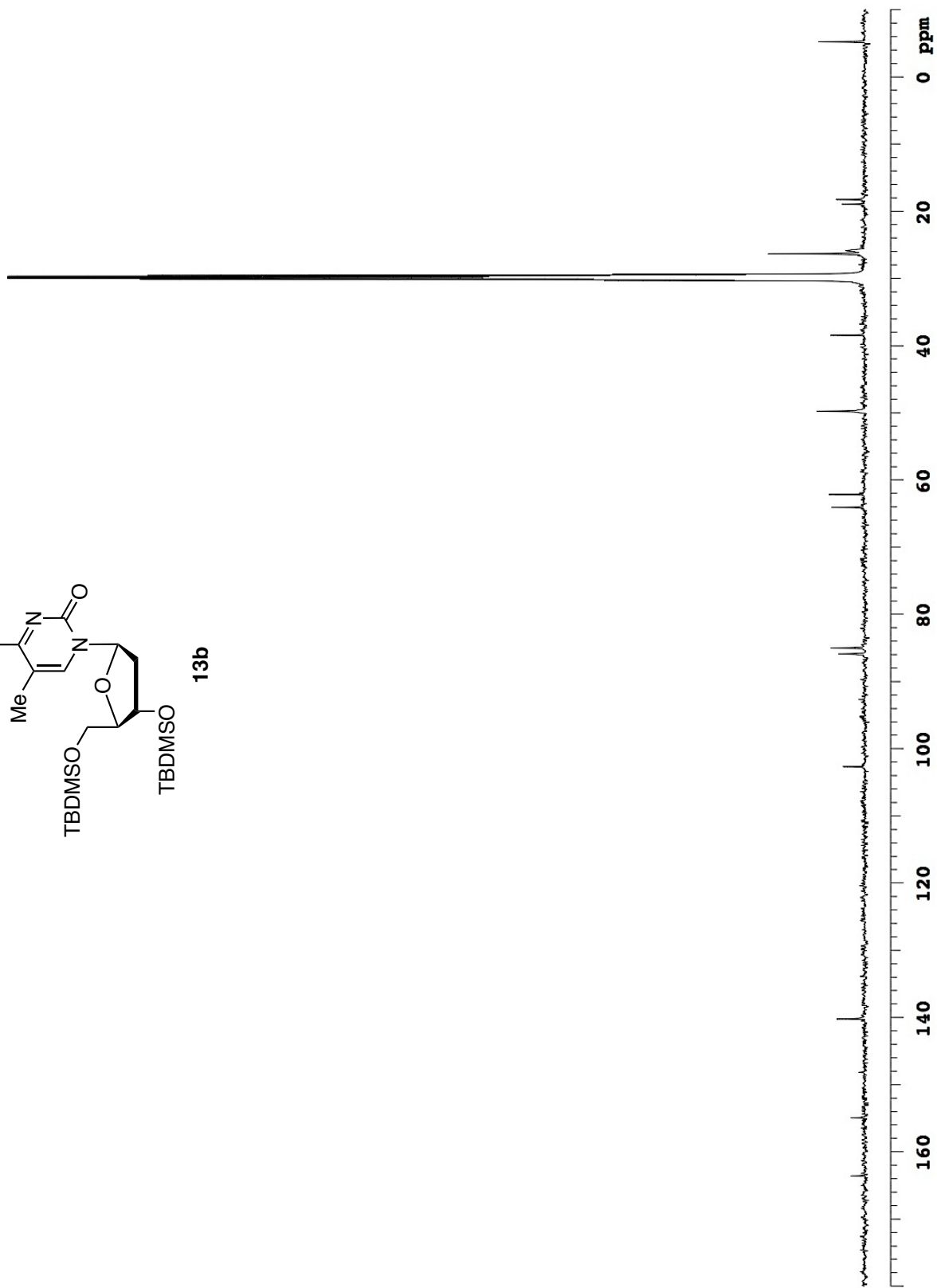
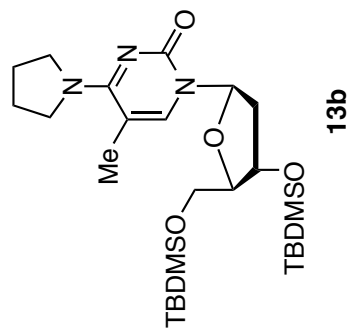
gCOSY spectrum of compound **12e** in CDCl₃

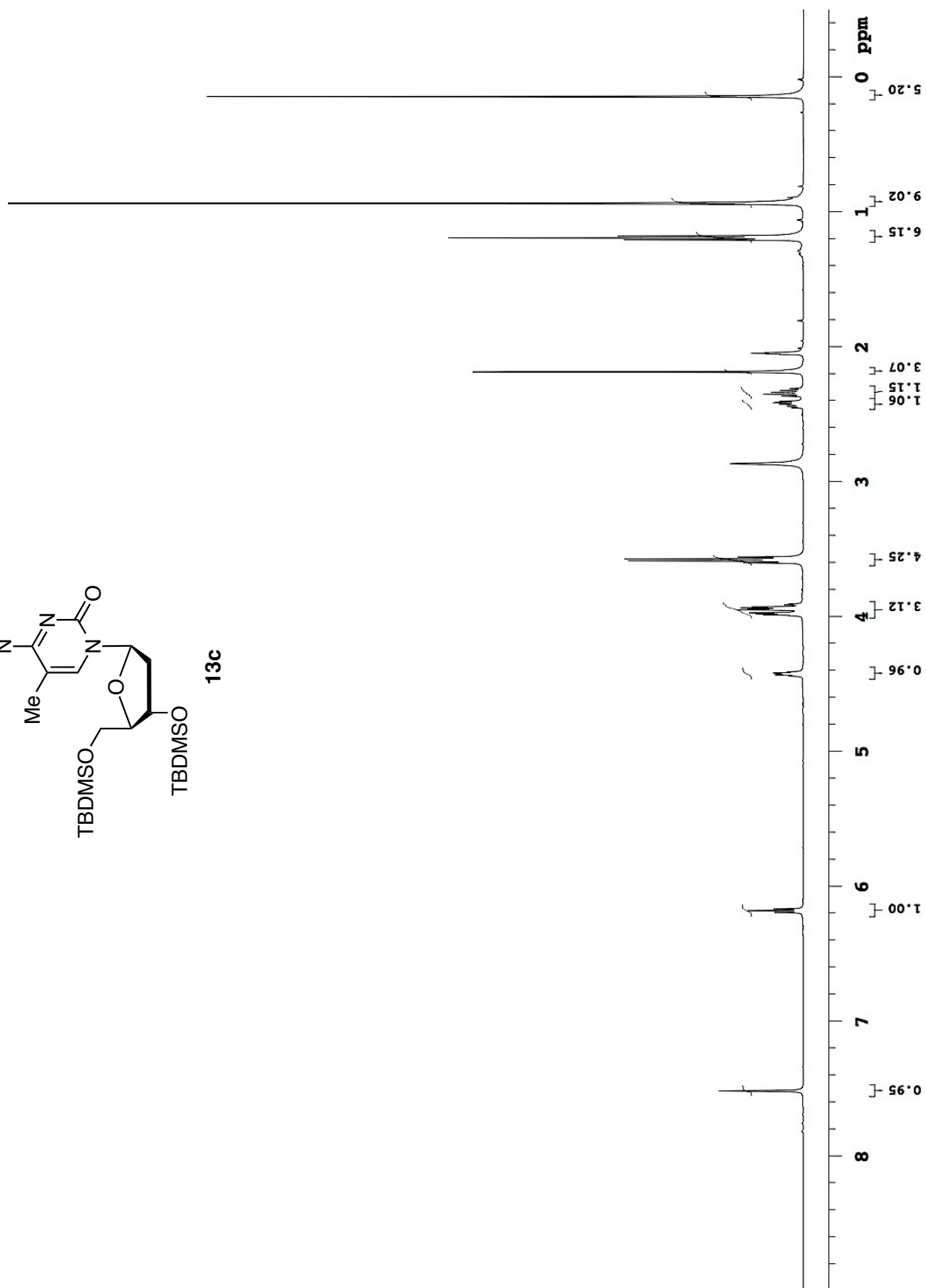
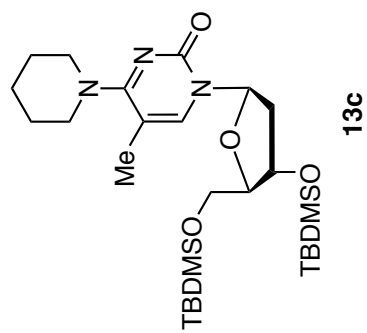


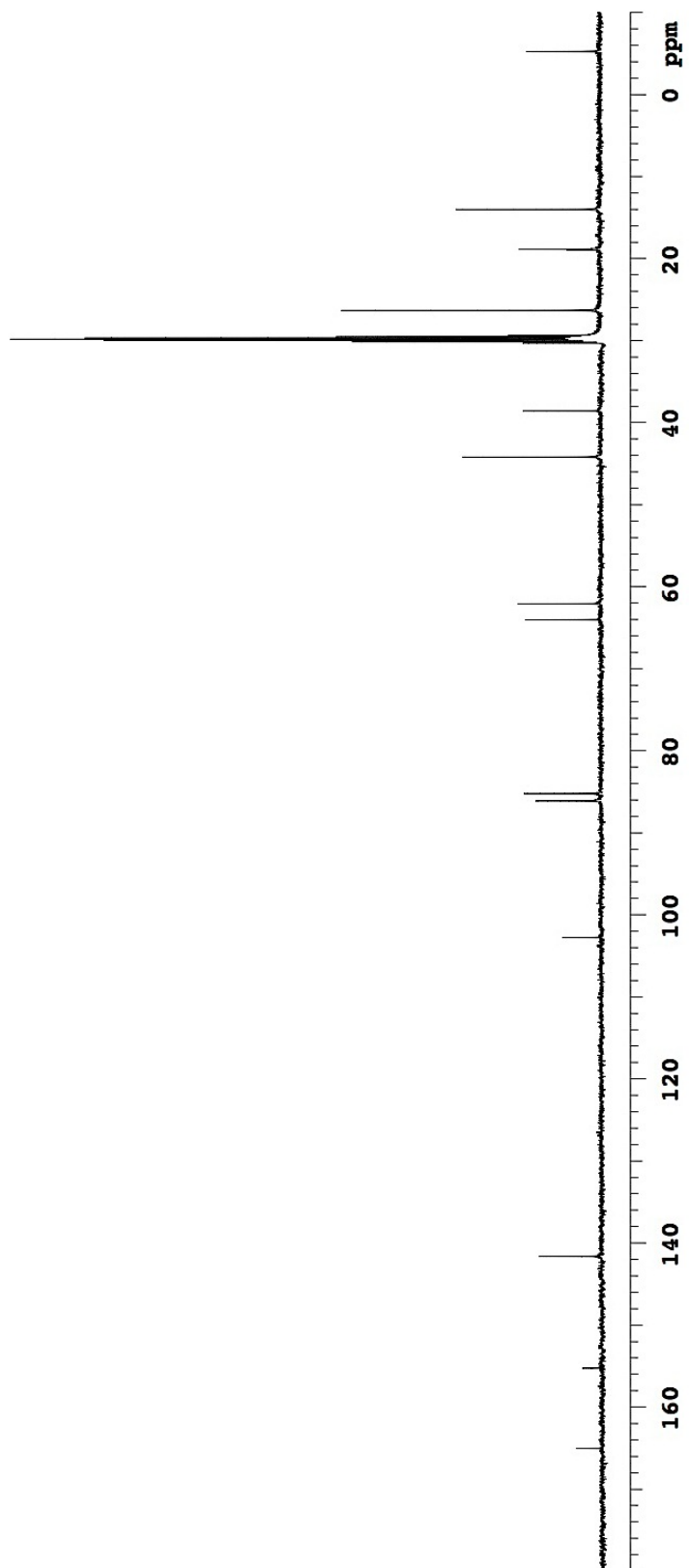
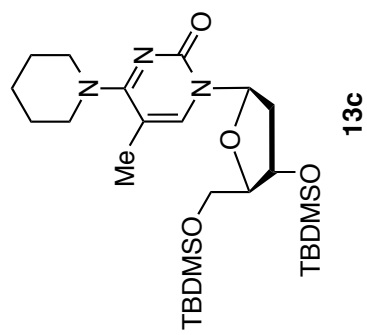




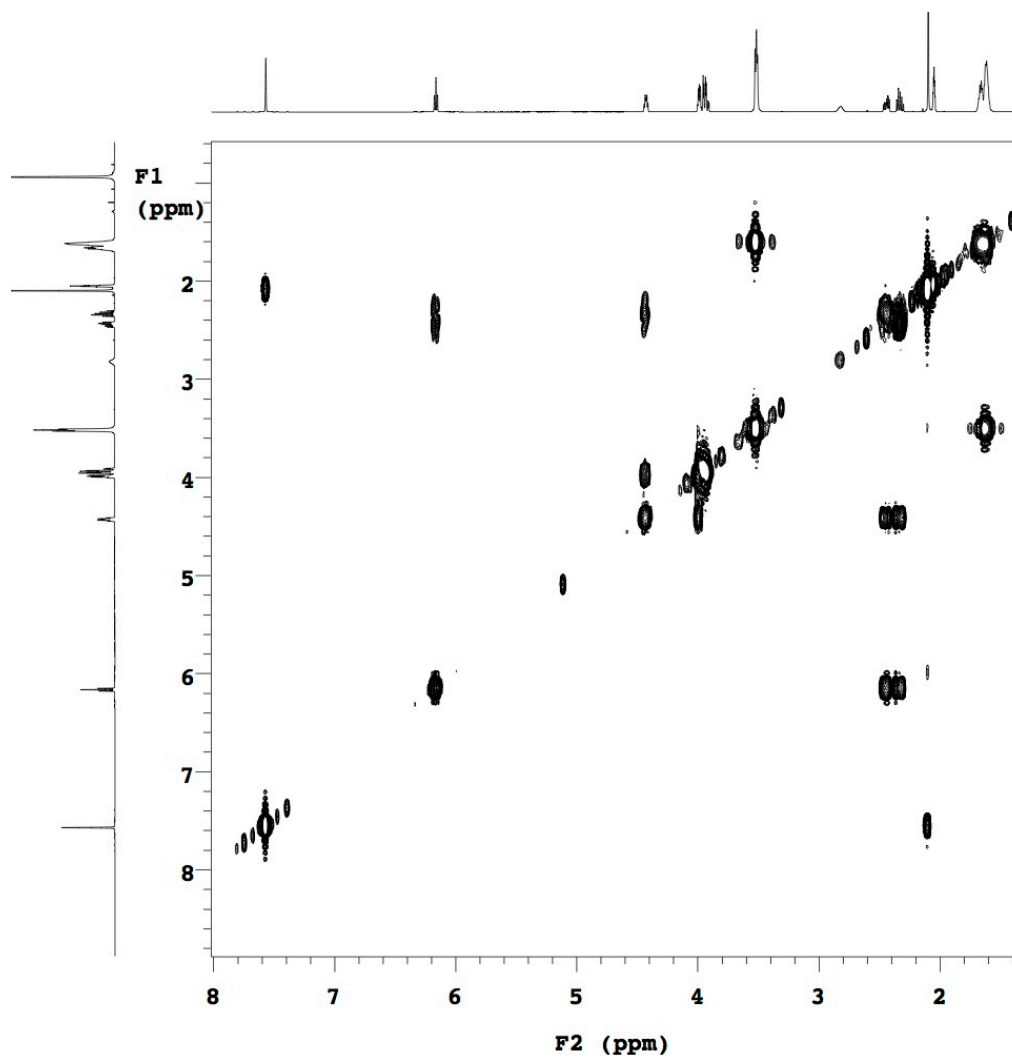
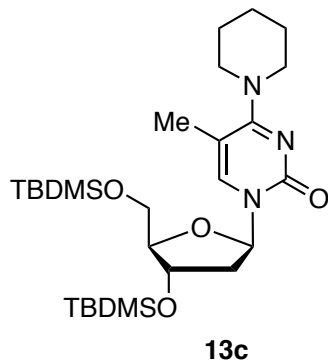


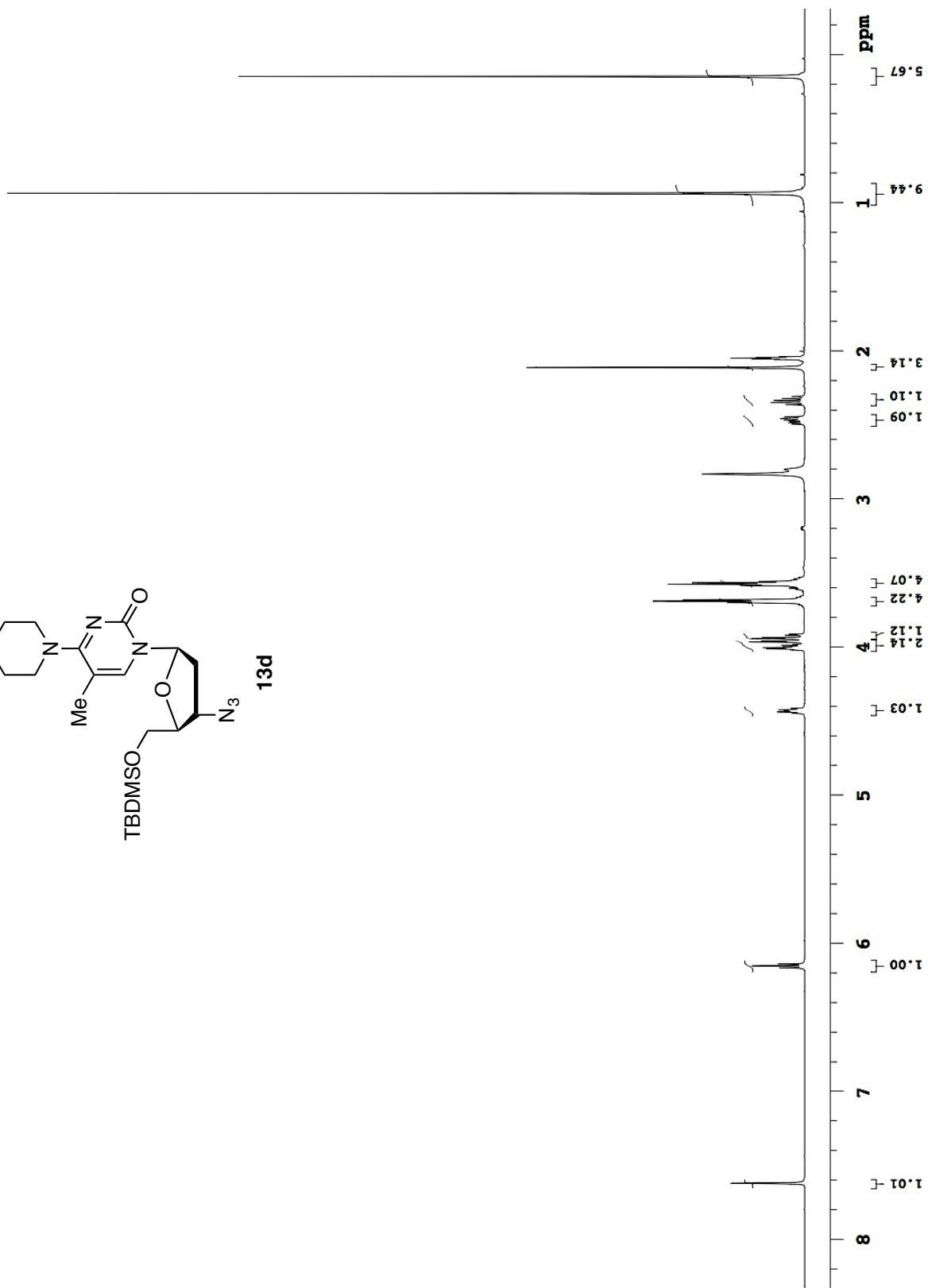
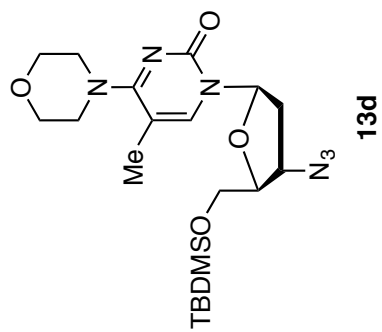


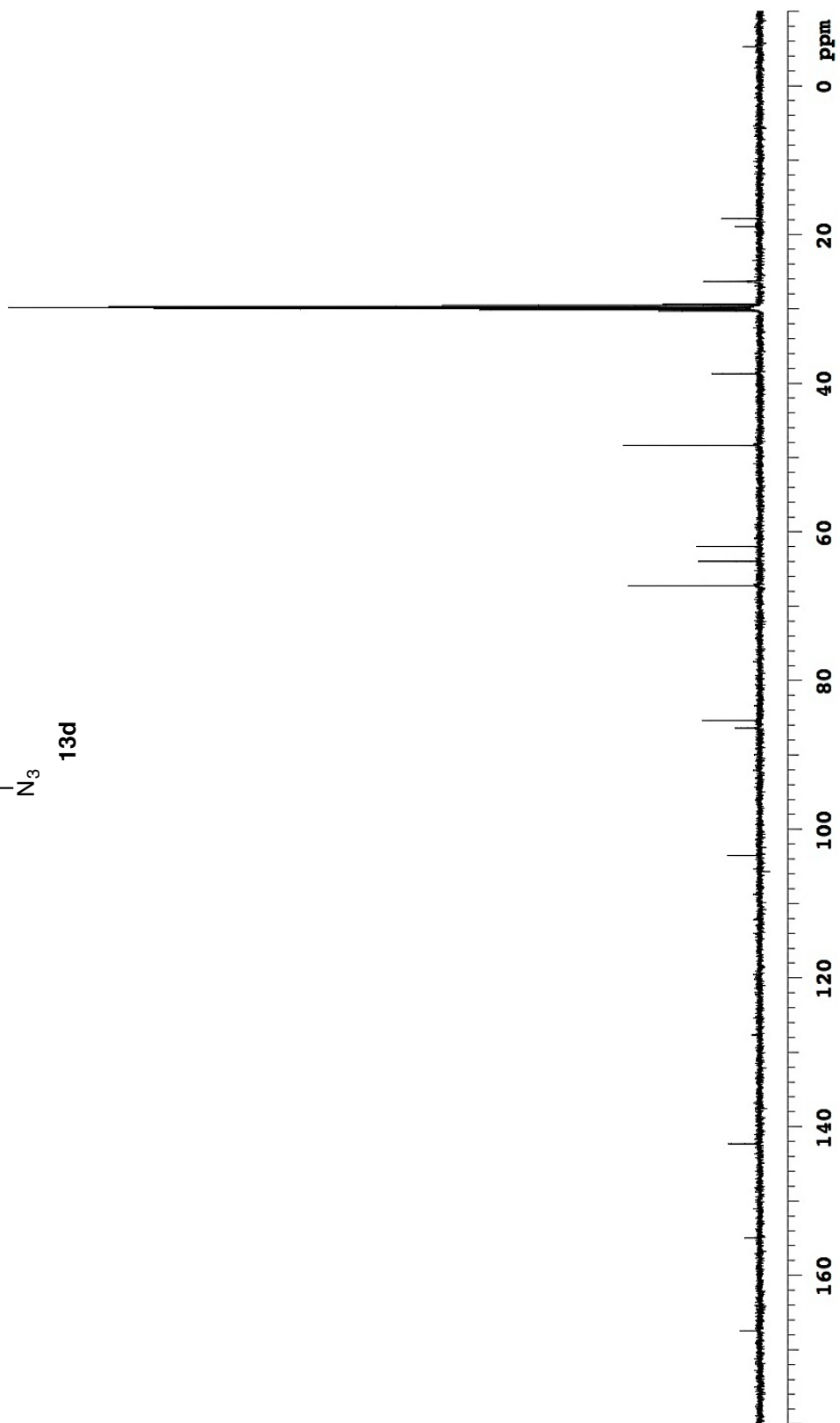
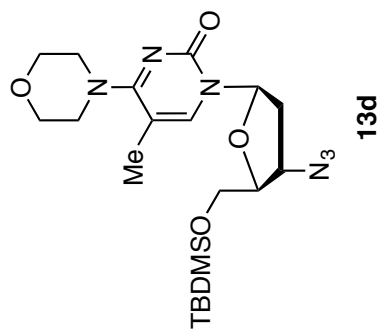


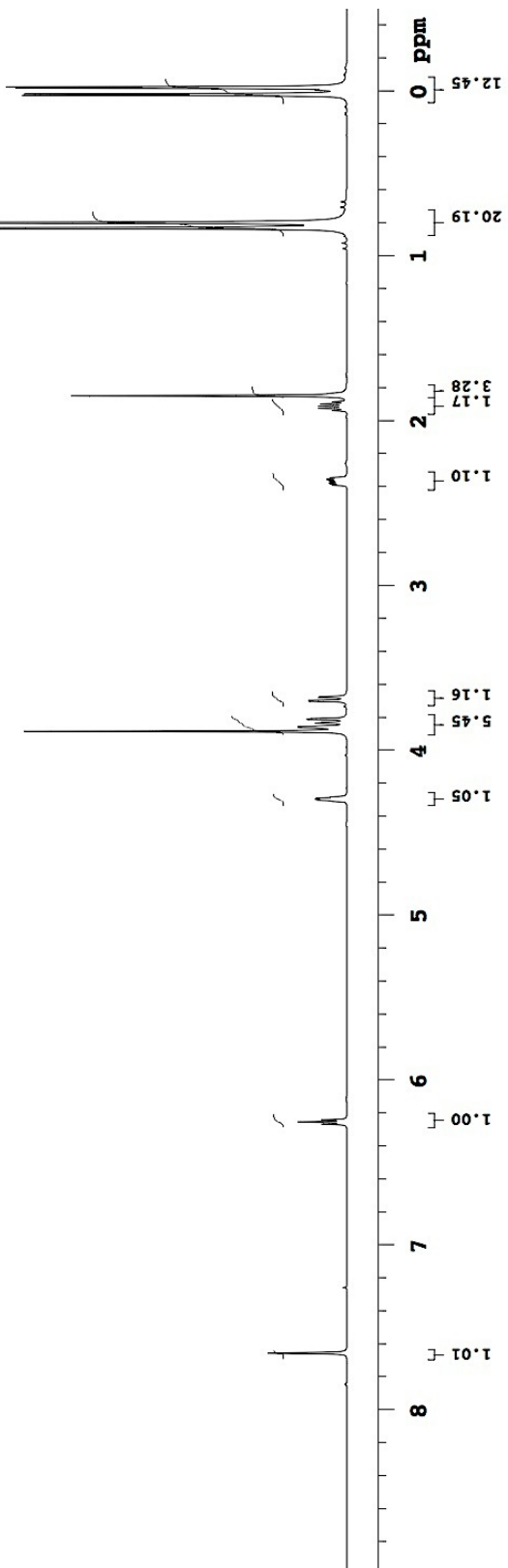
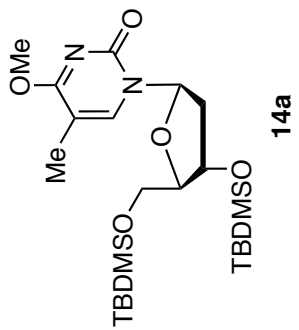


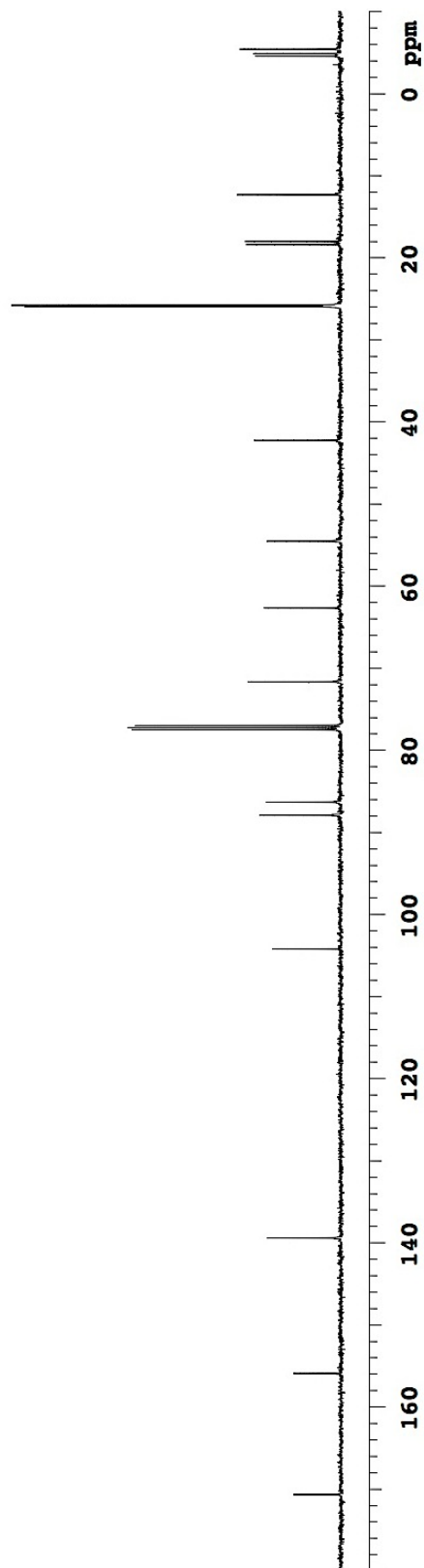
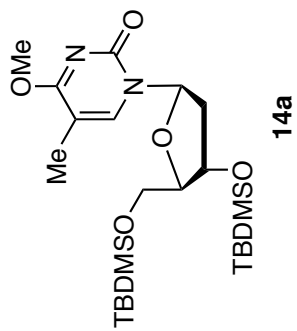
gCOSY spectrum of compound **13c** in acetone-*d*₆

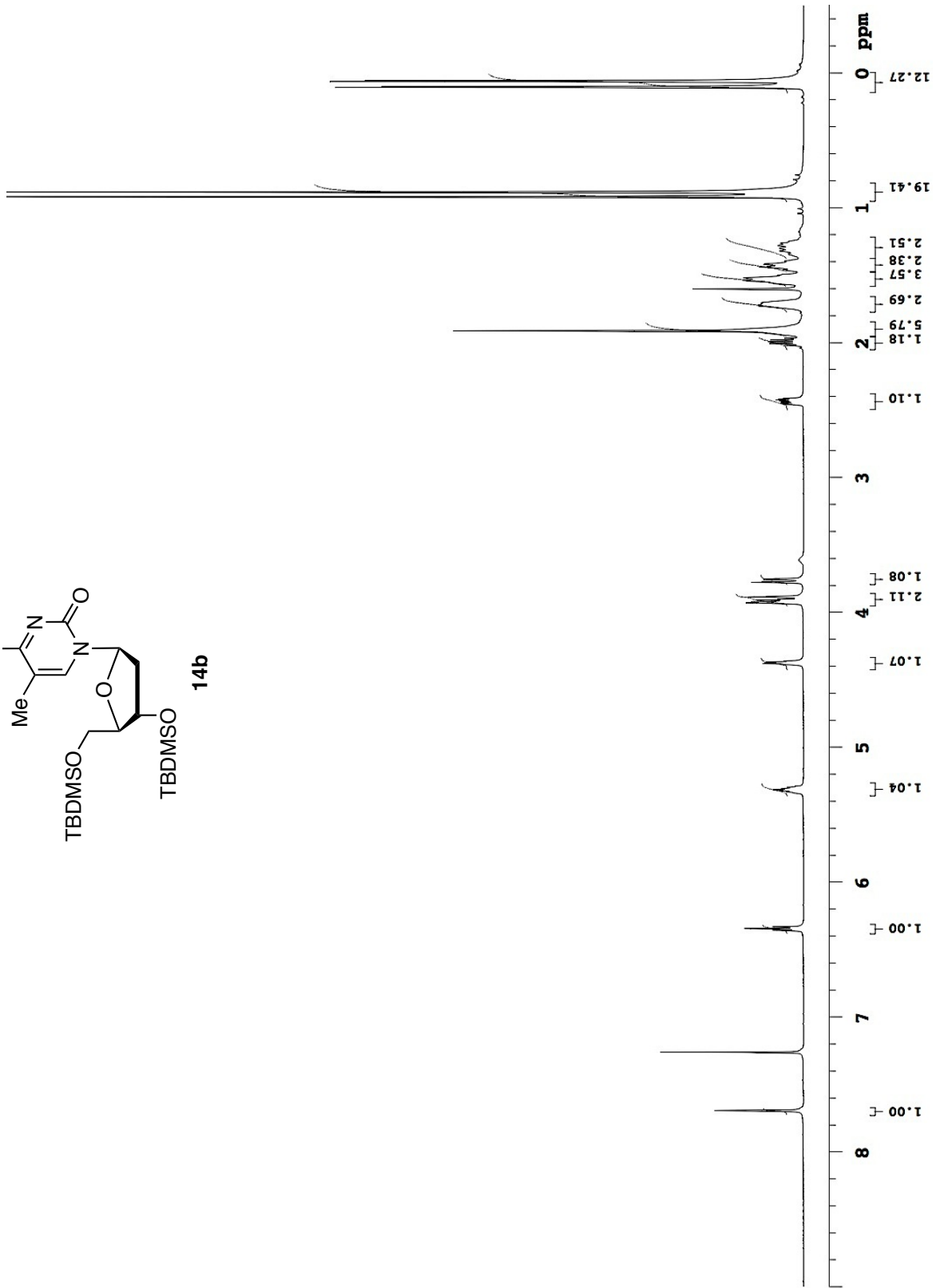
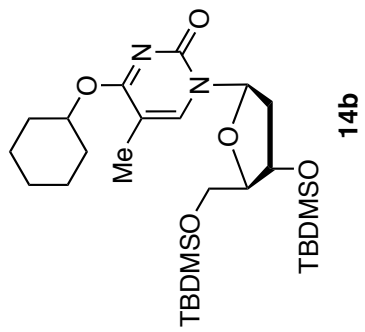


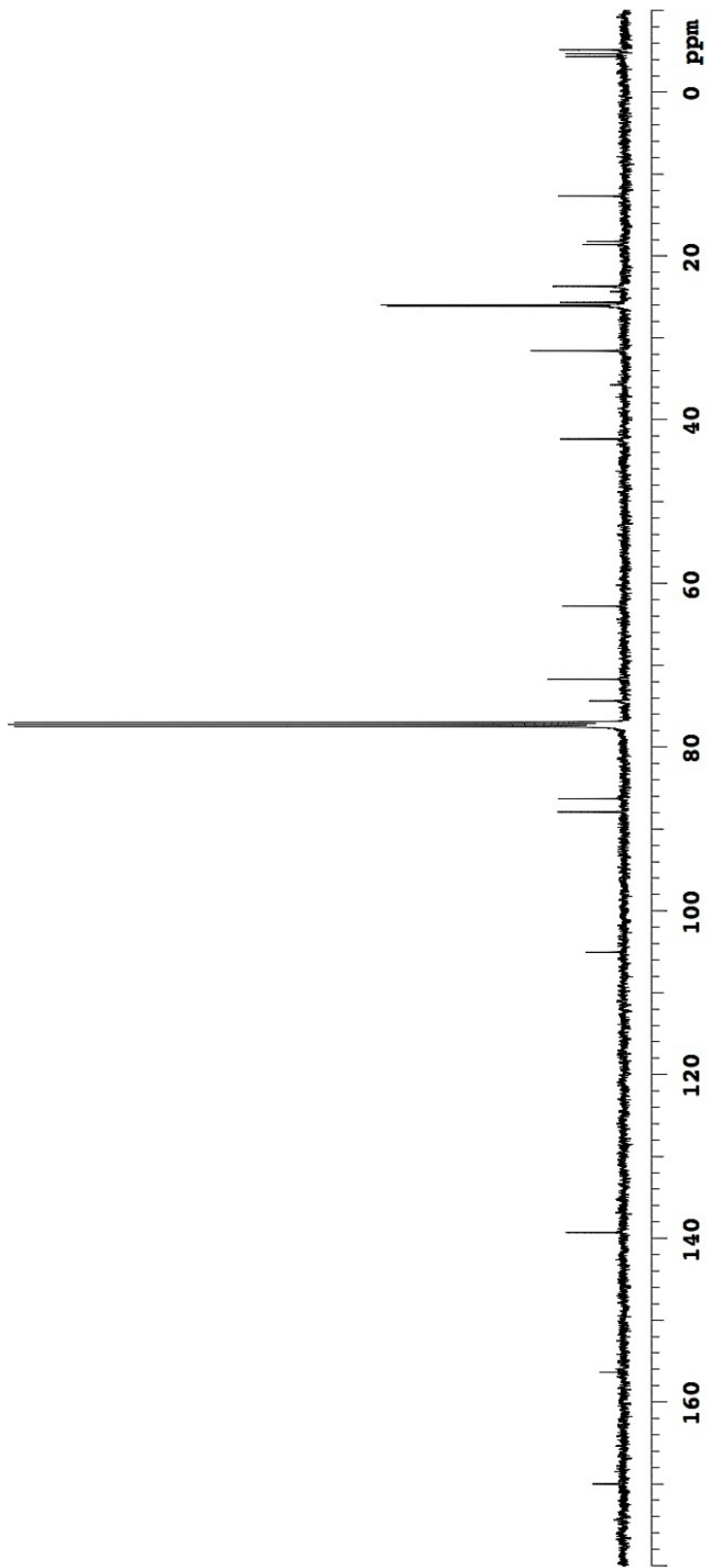
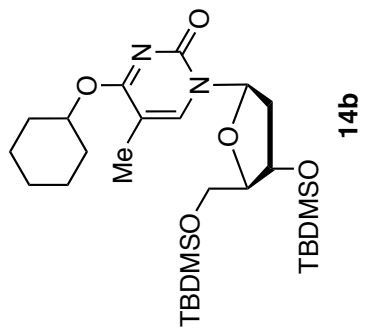


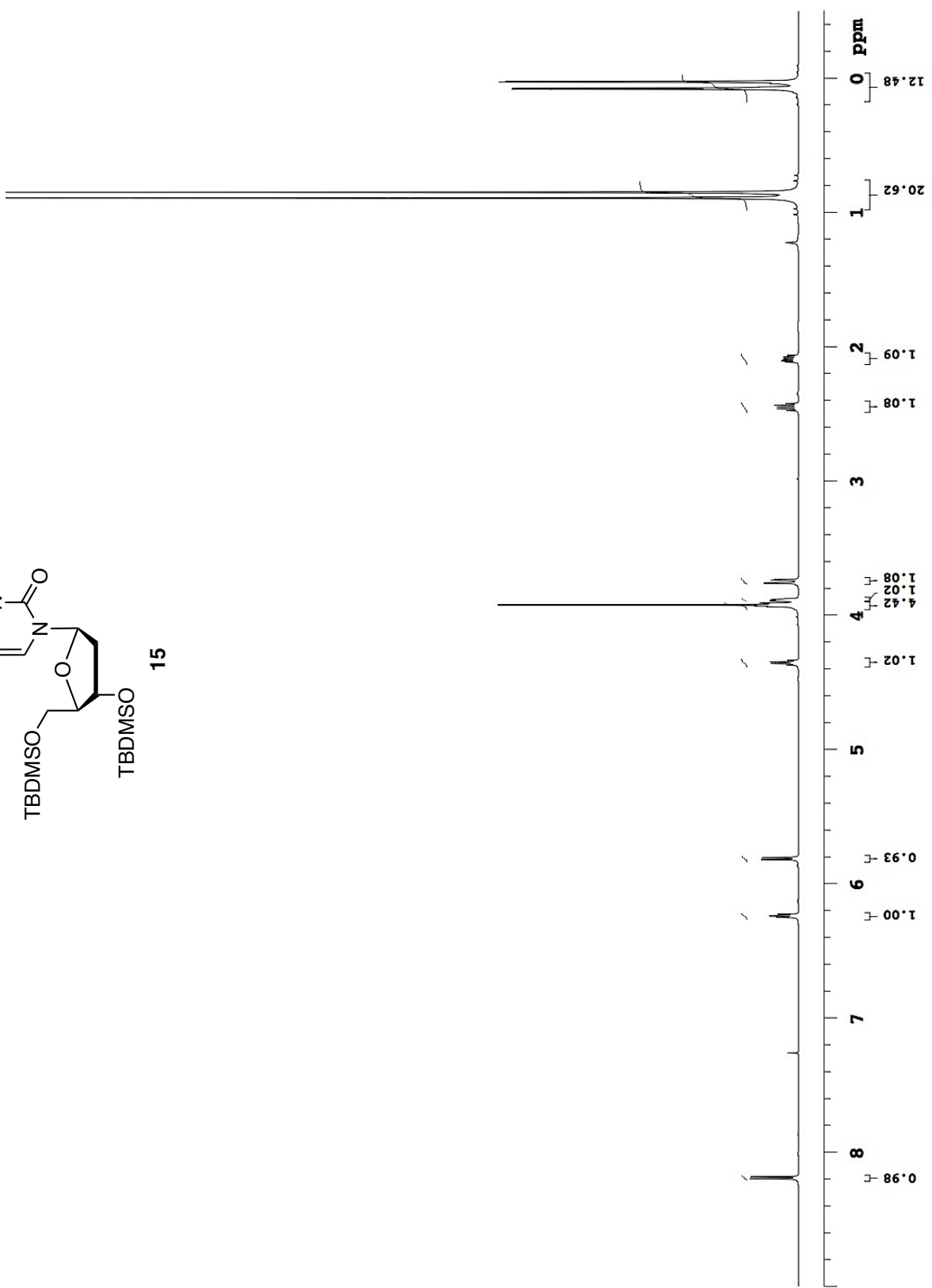
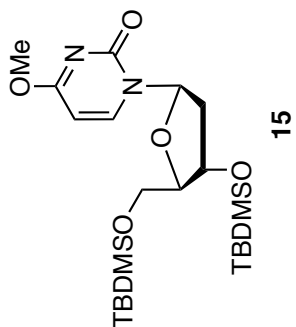


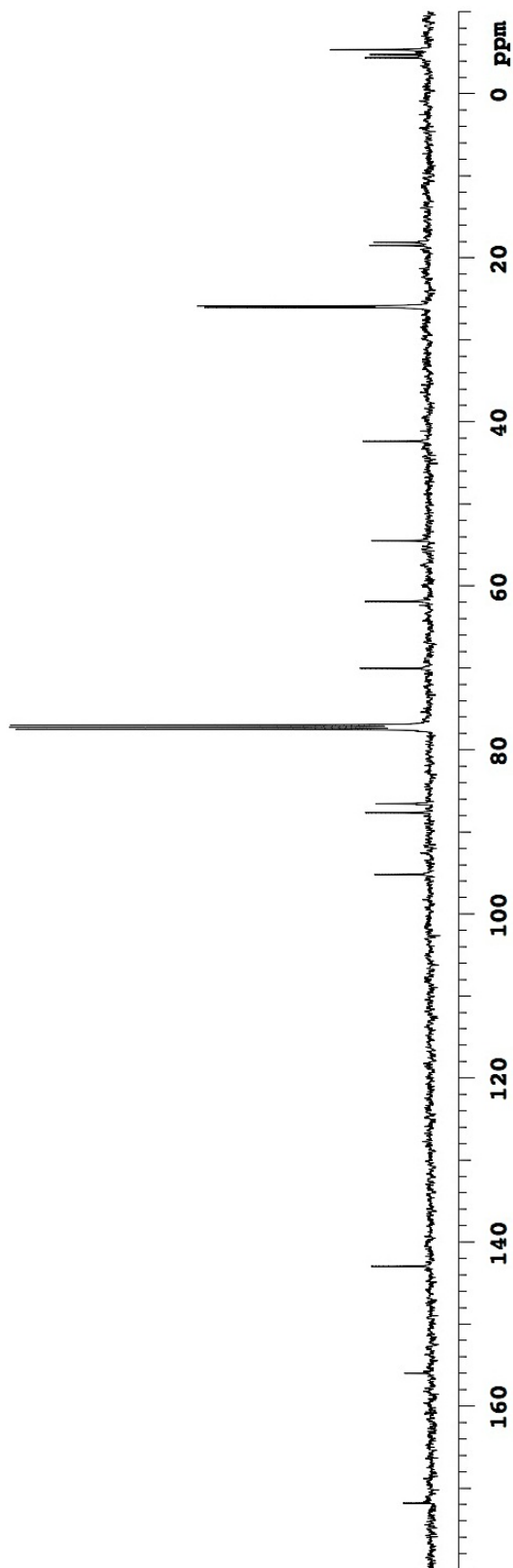
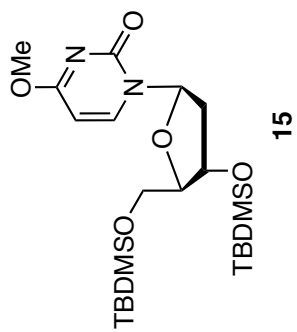


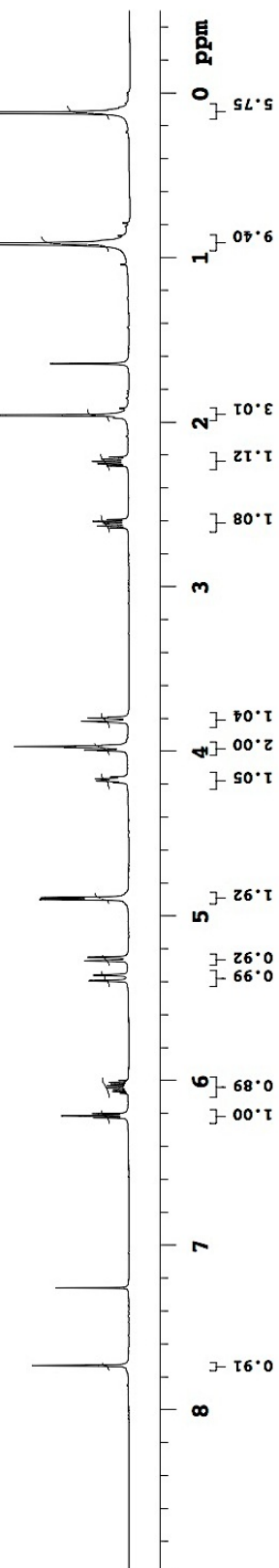
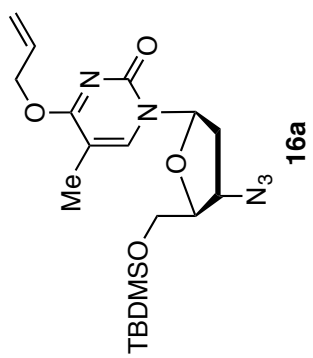


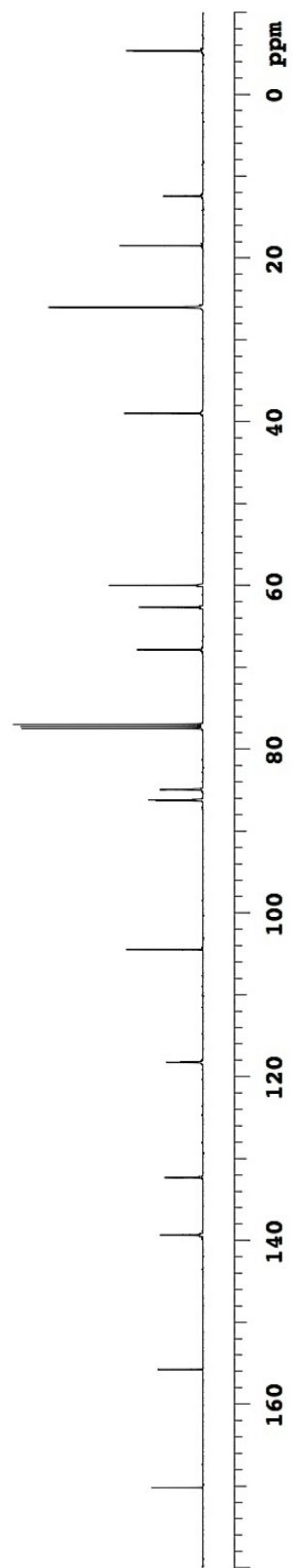
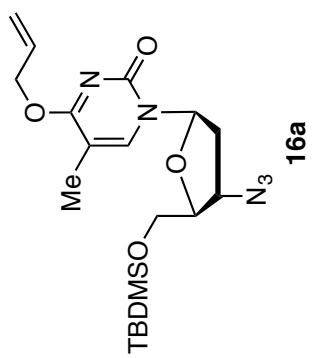


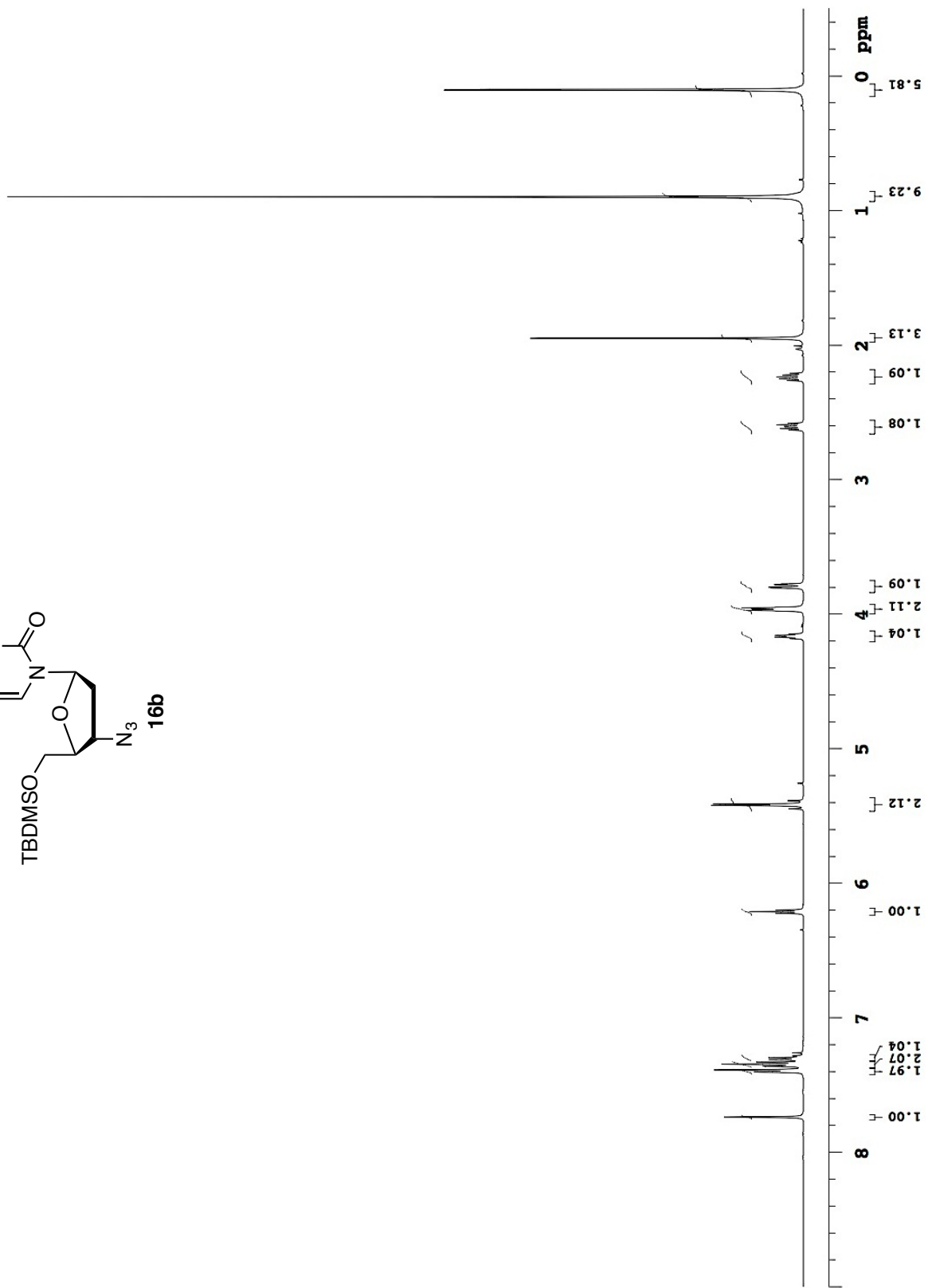
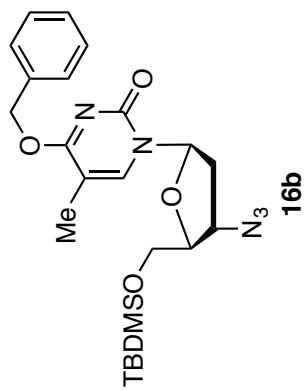


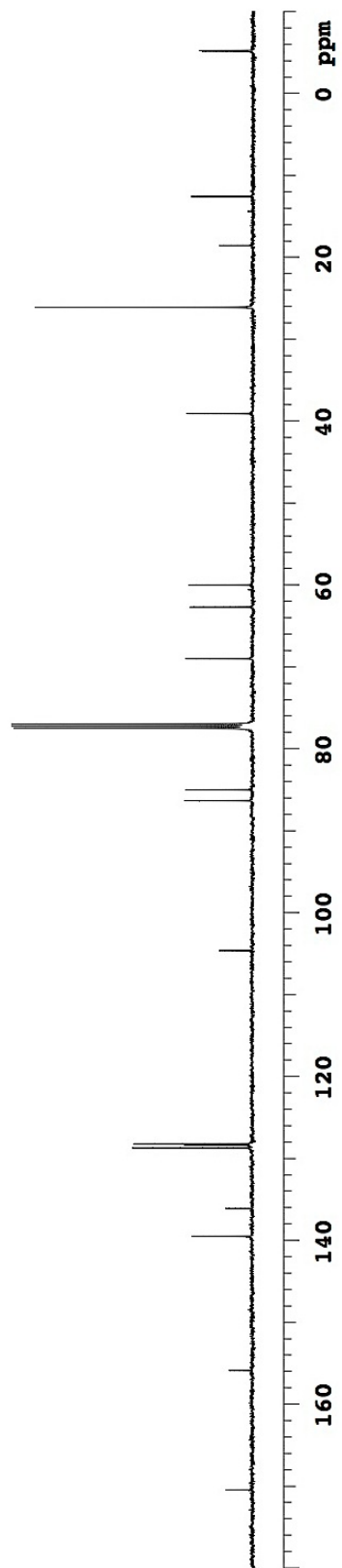
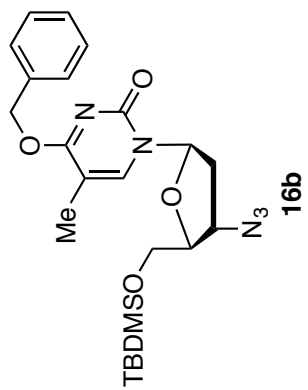


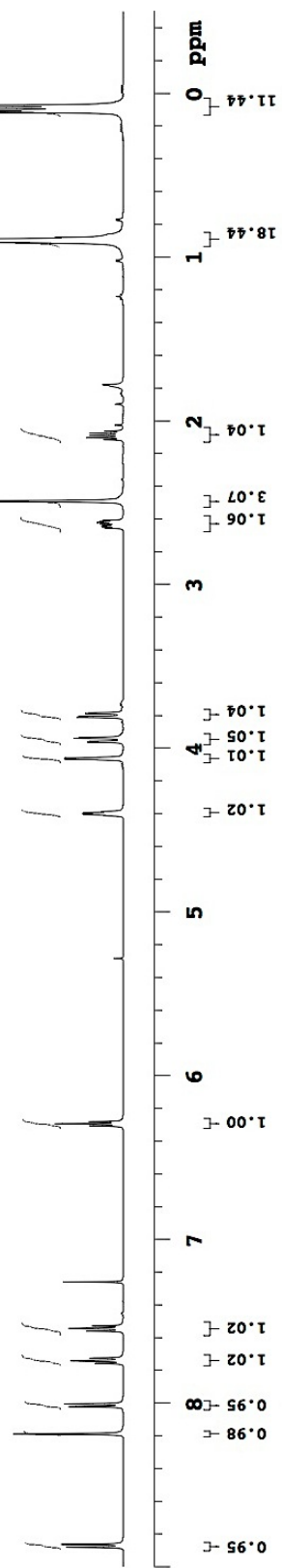
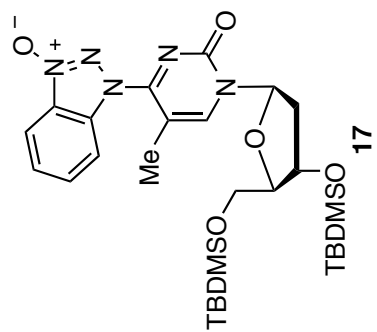


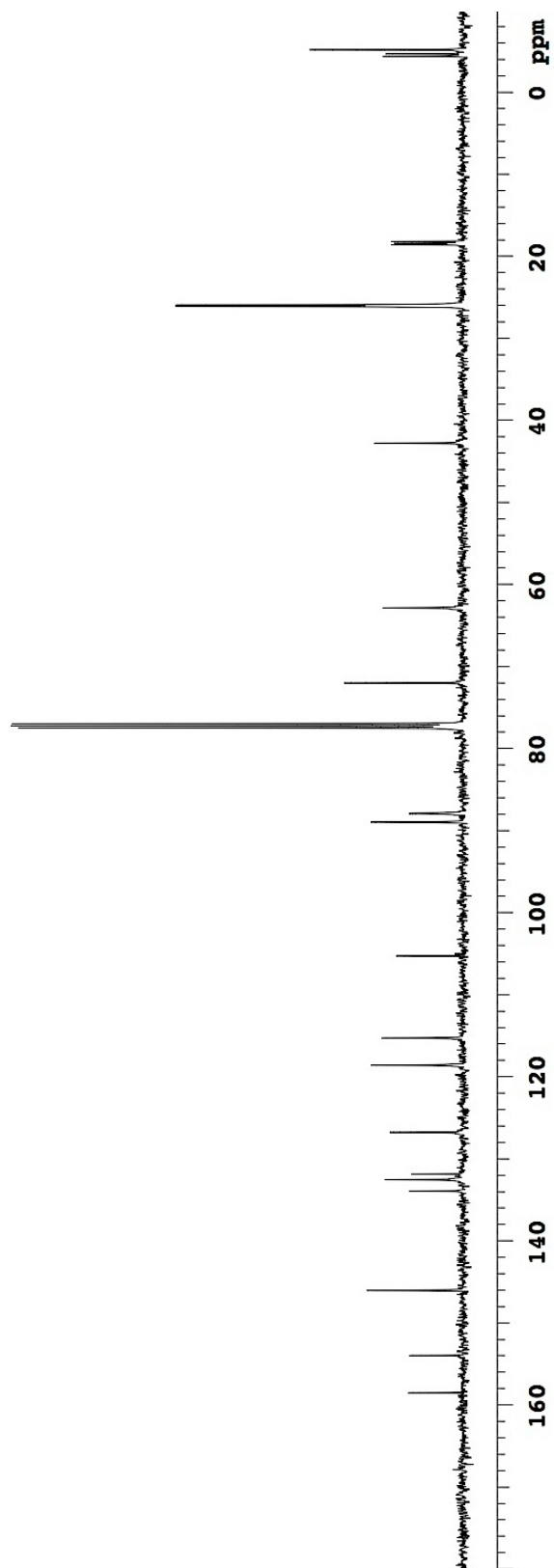
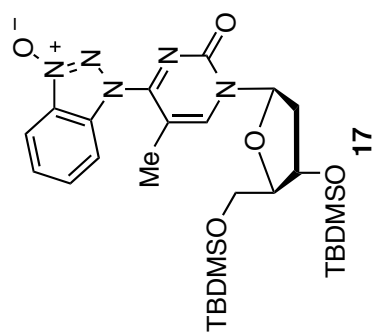


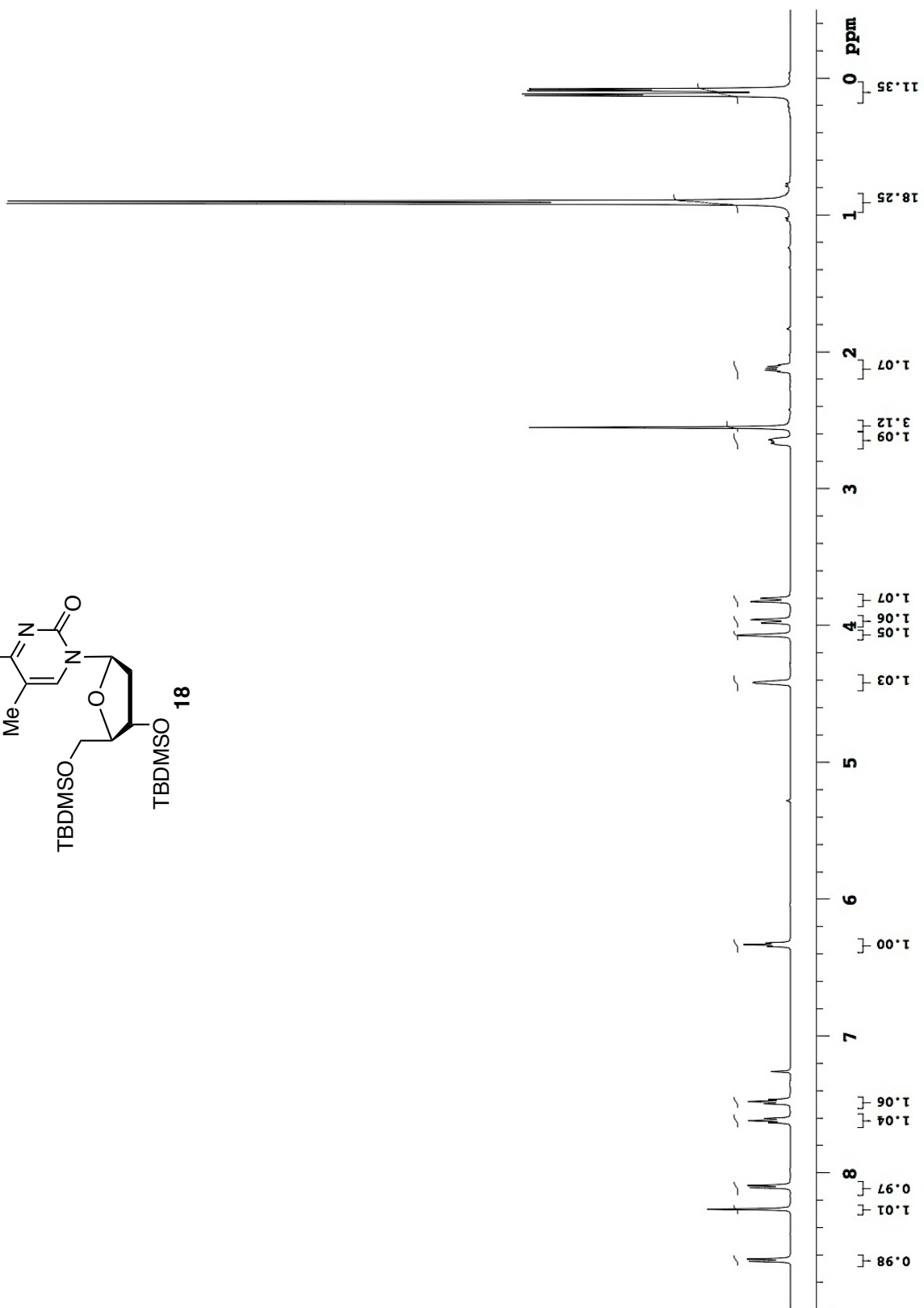
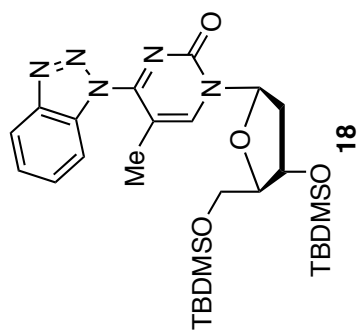


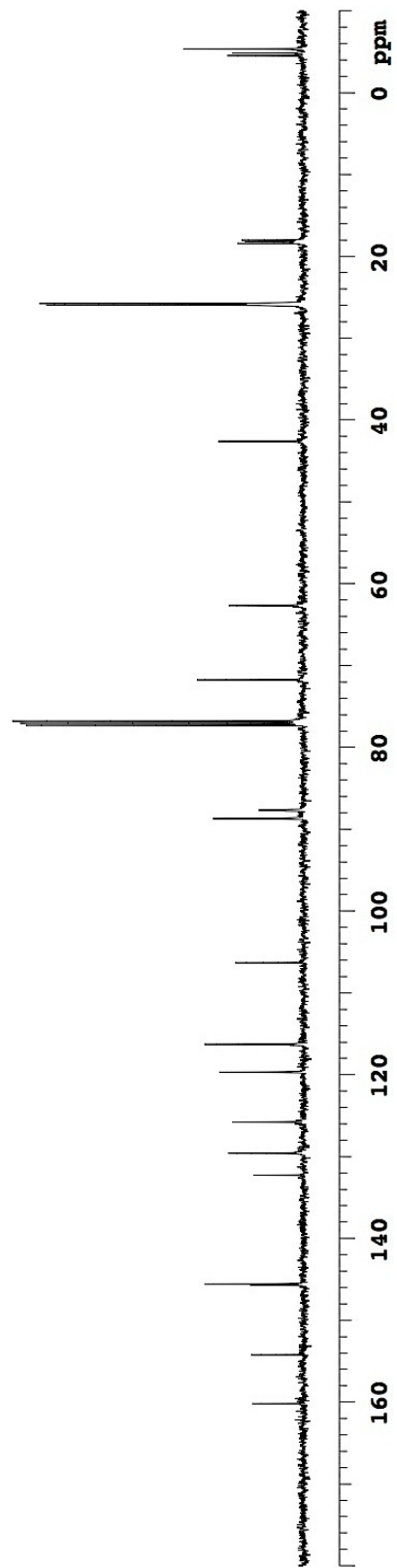
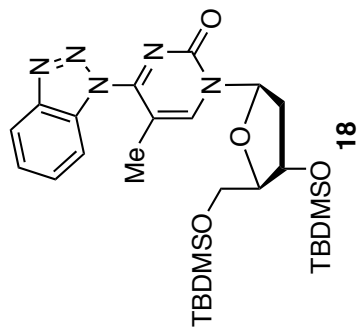


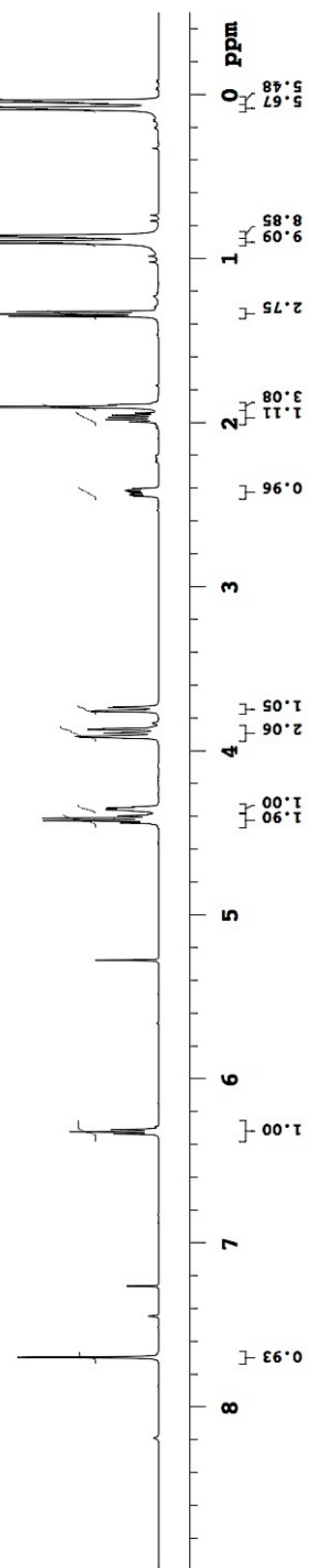
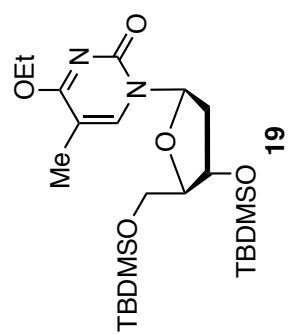


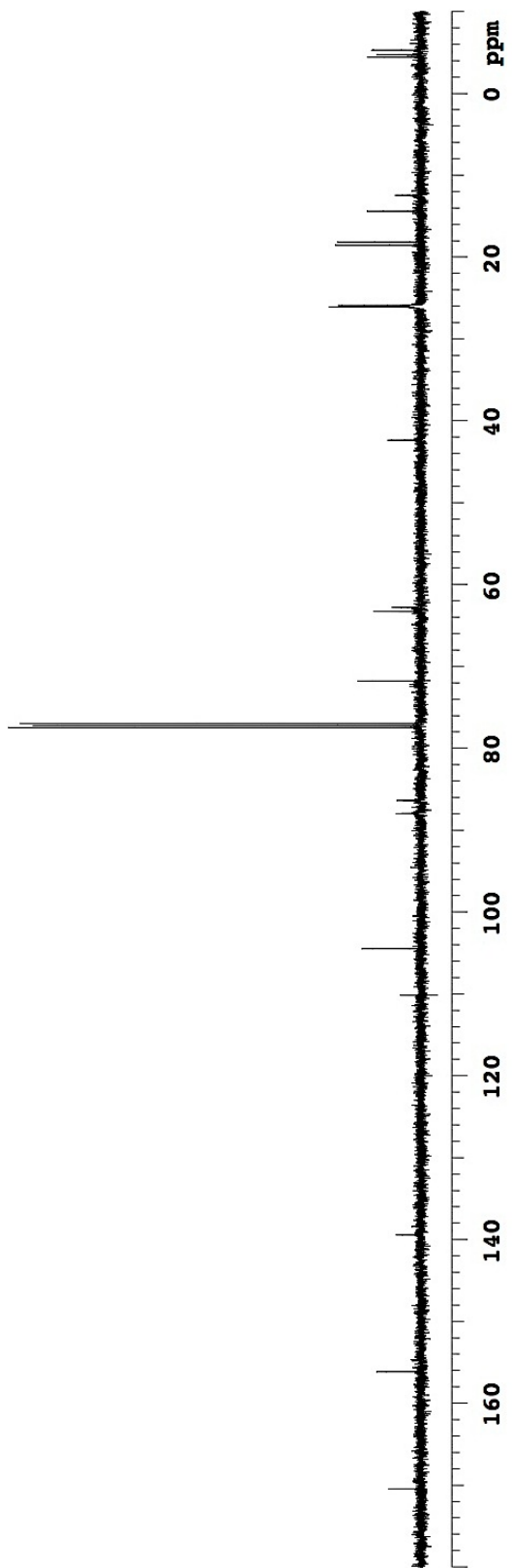
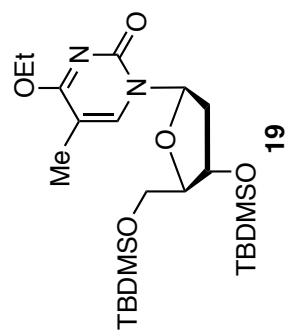


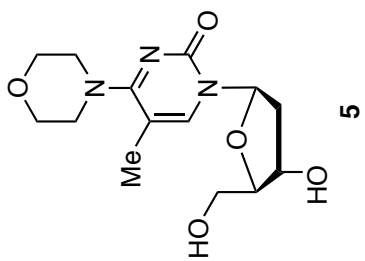




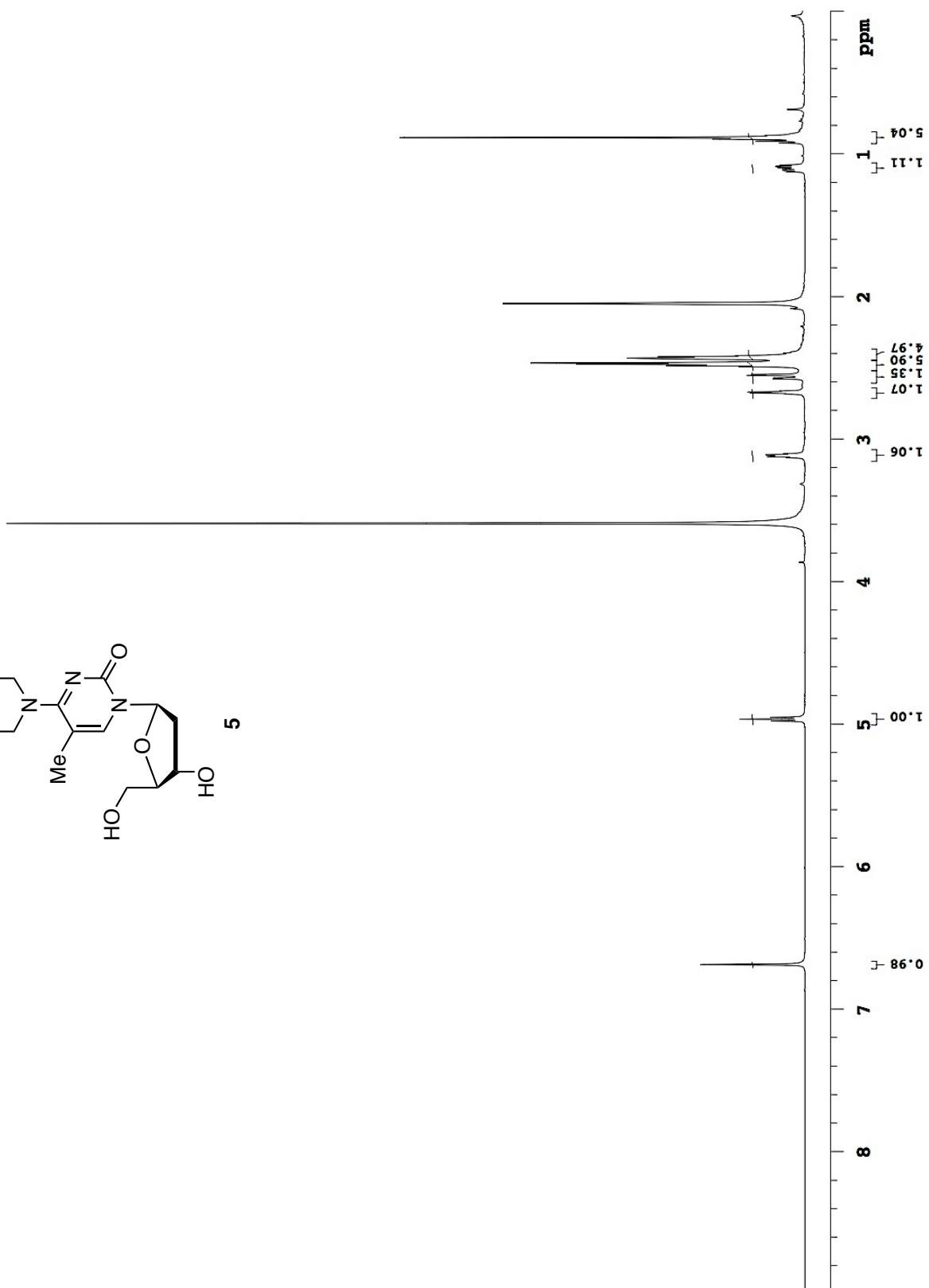


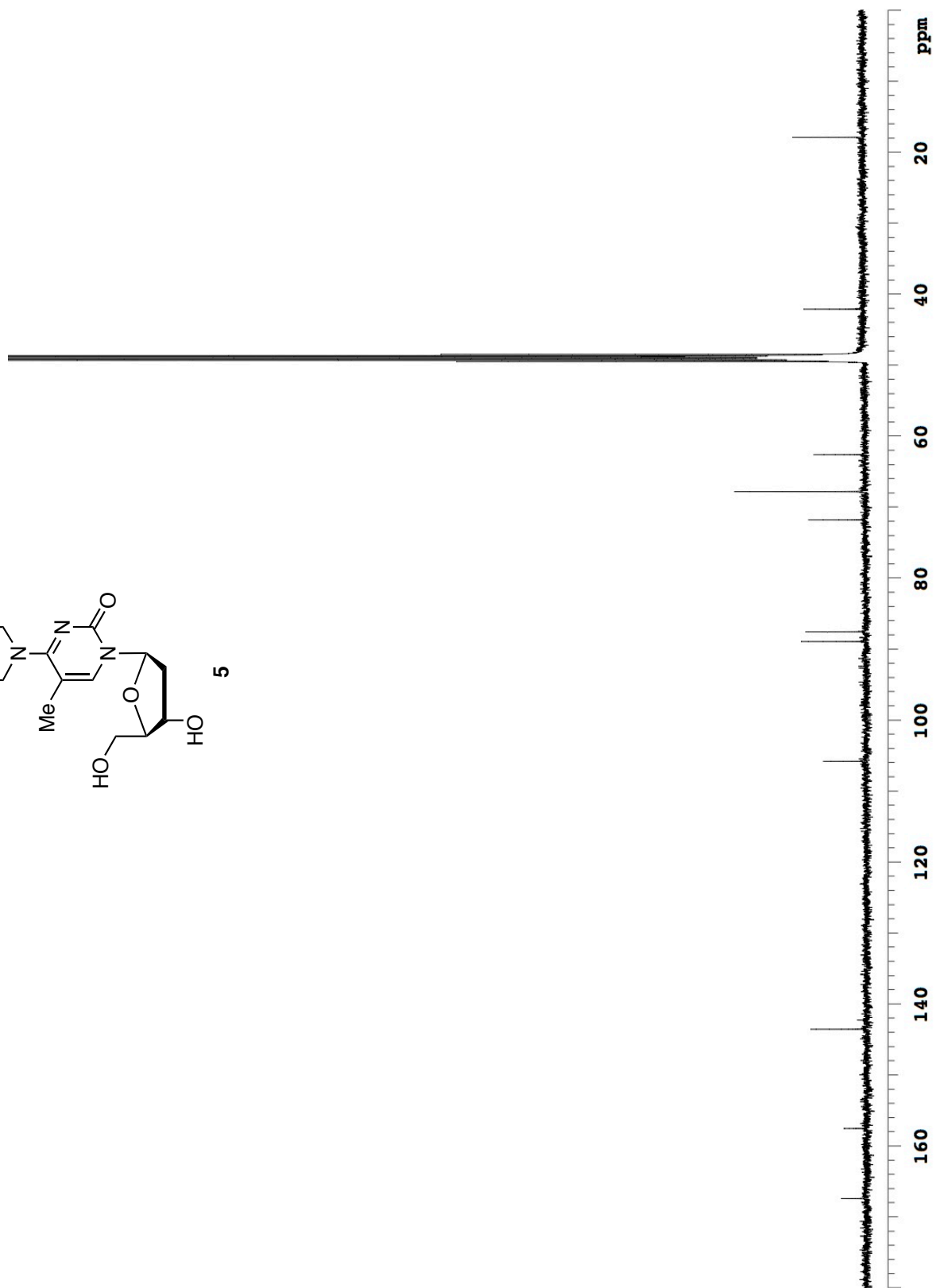
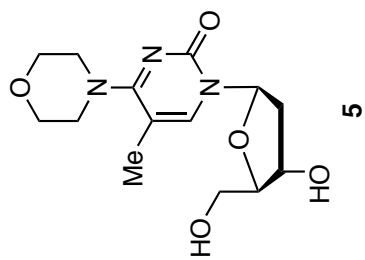


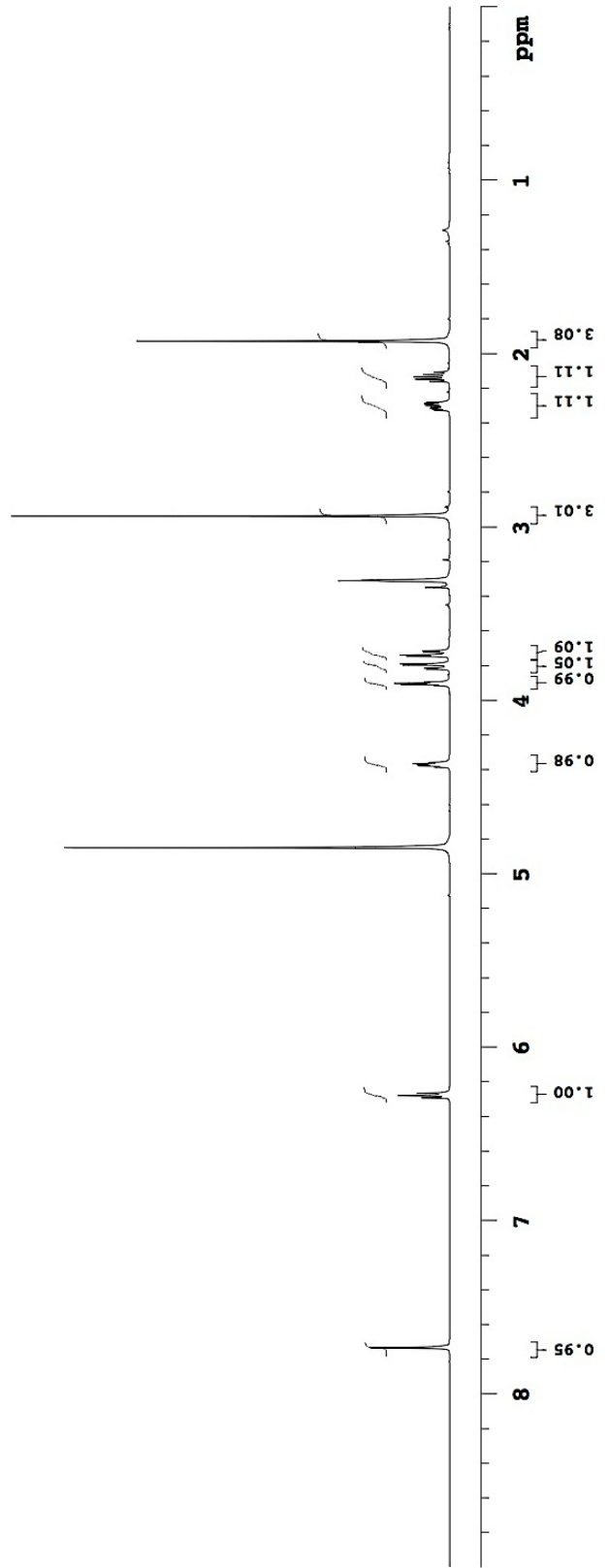
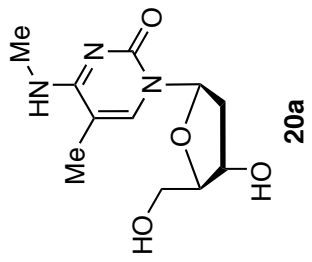


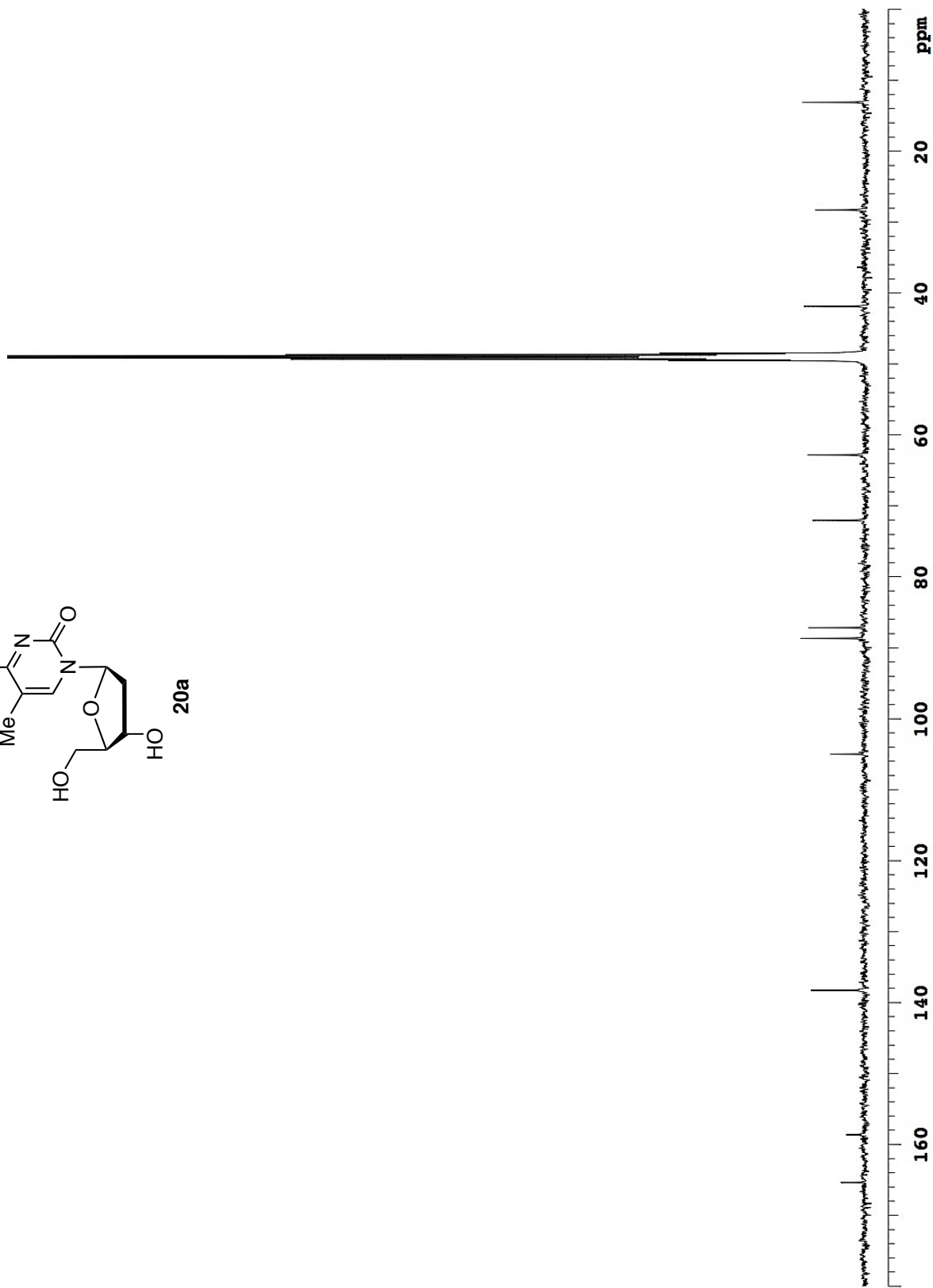
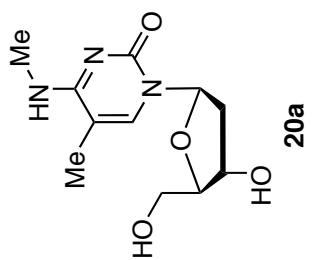


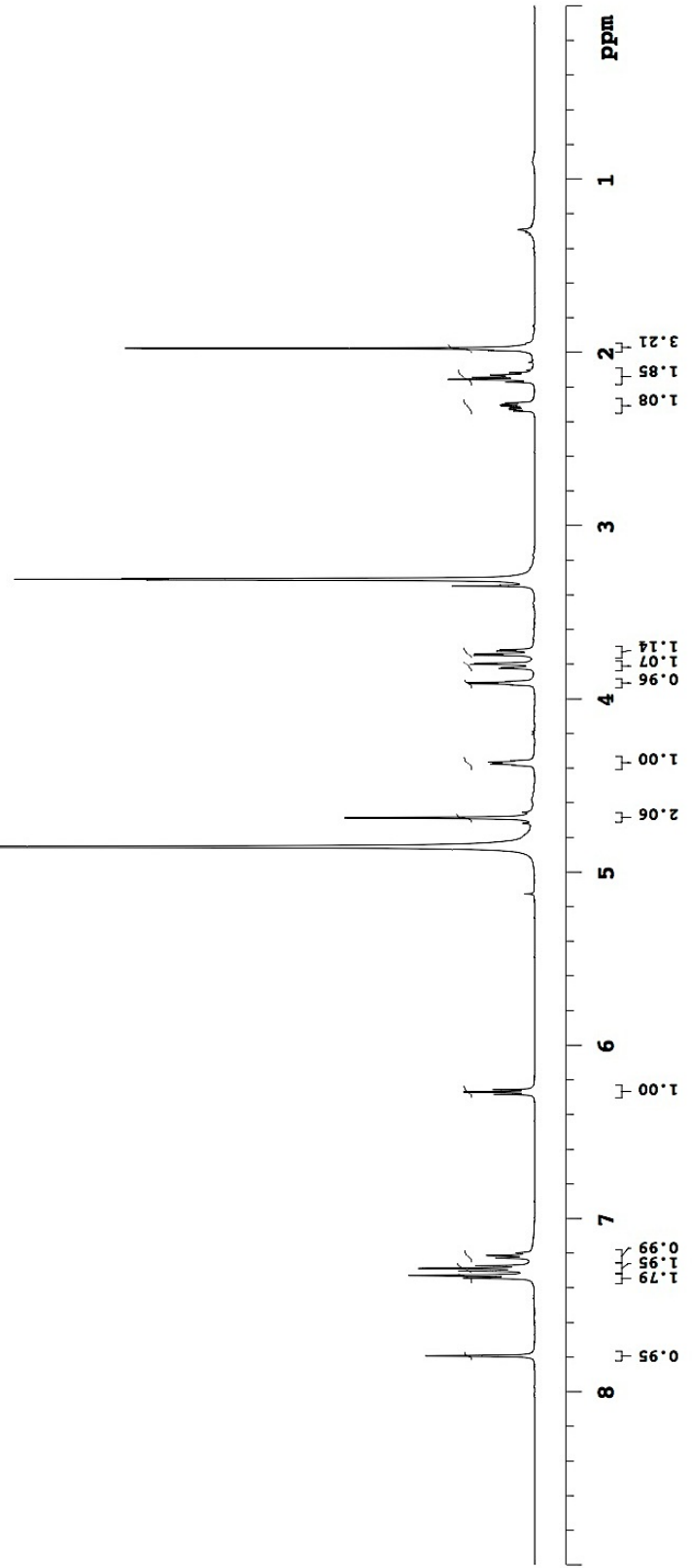
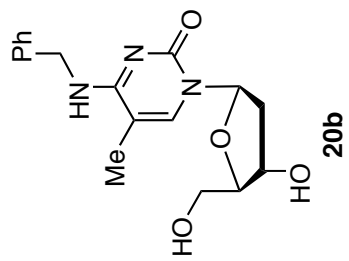
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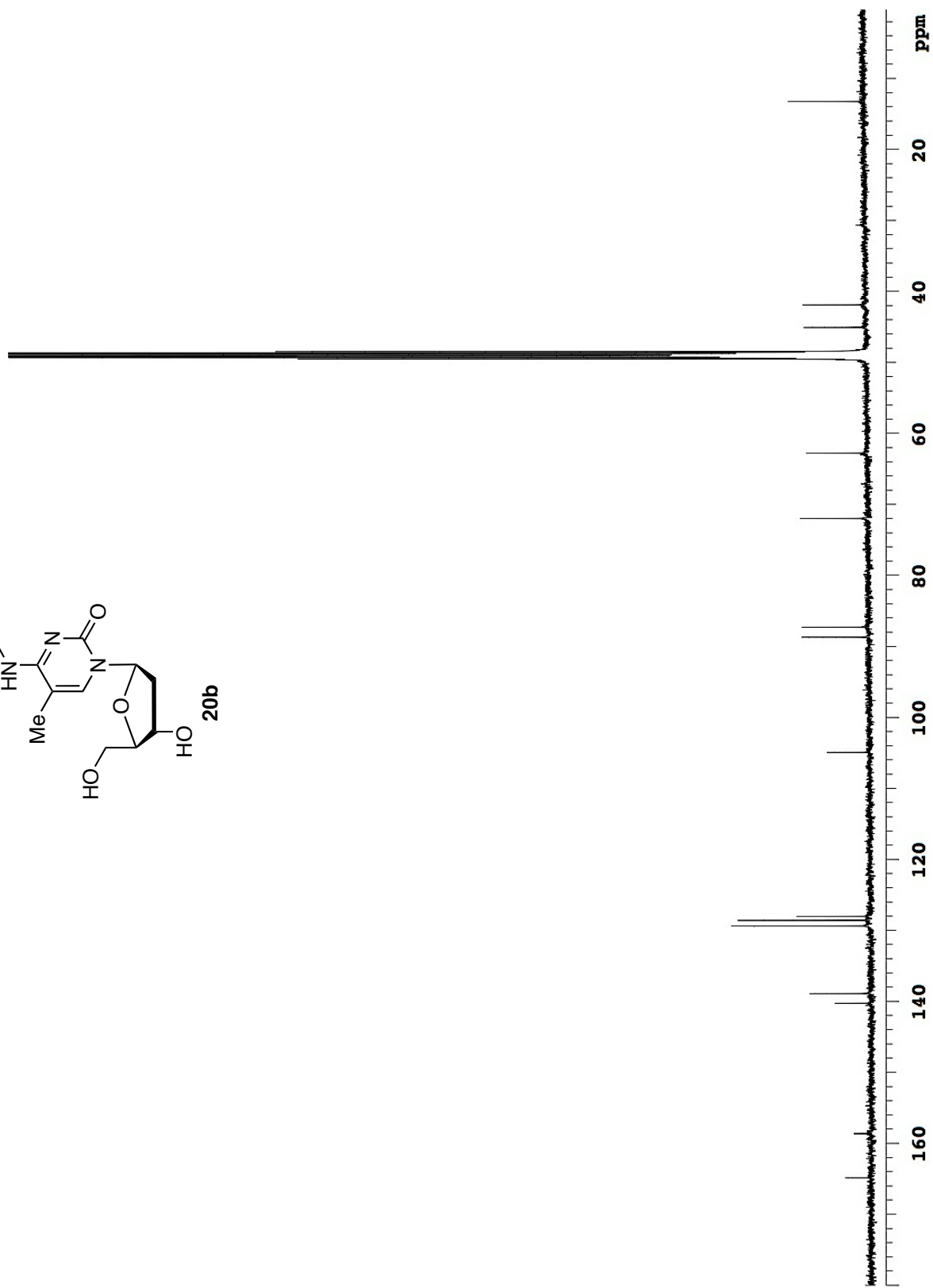
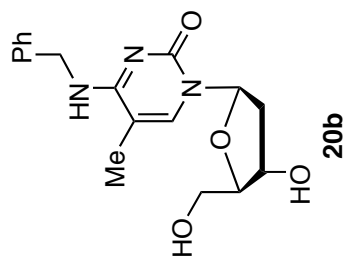


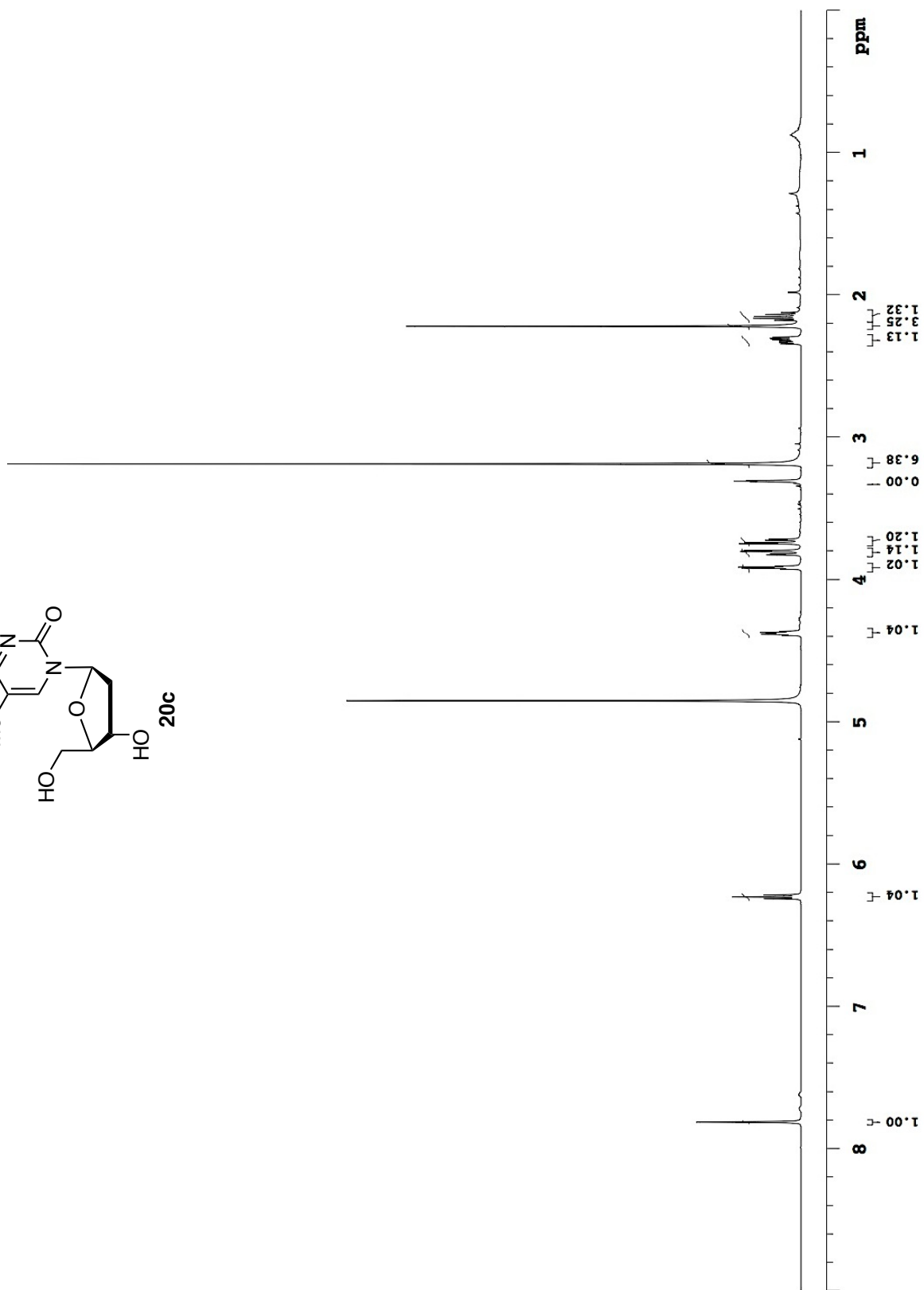
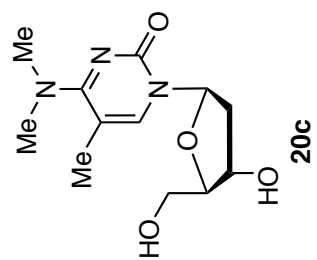


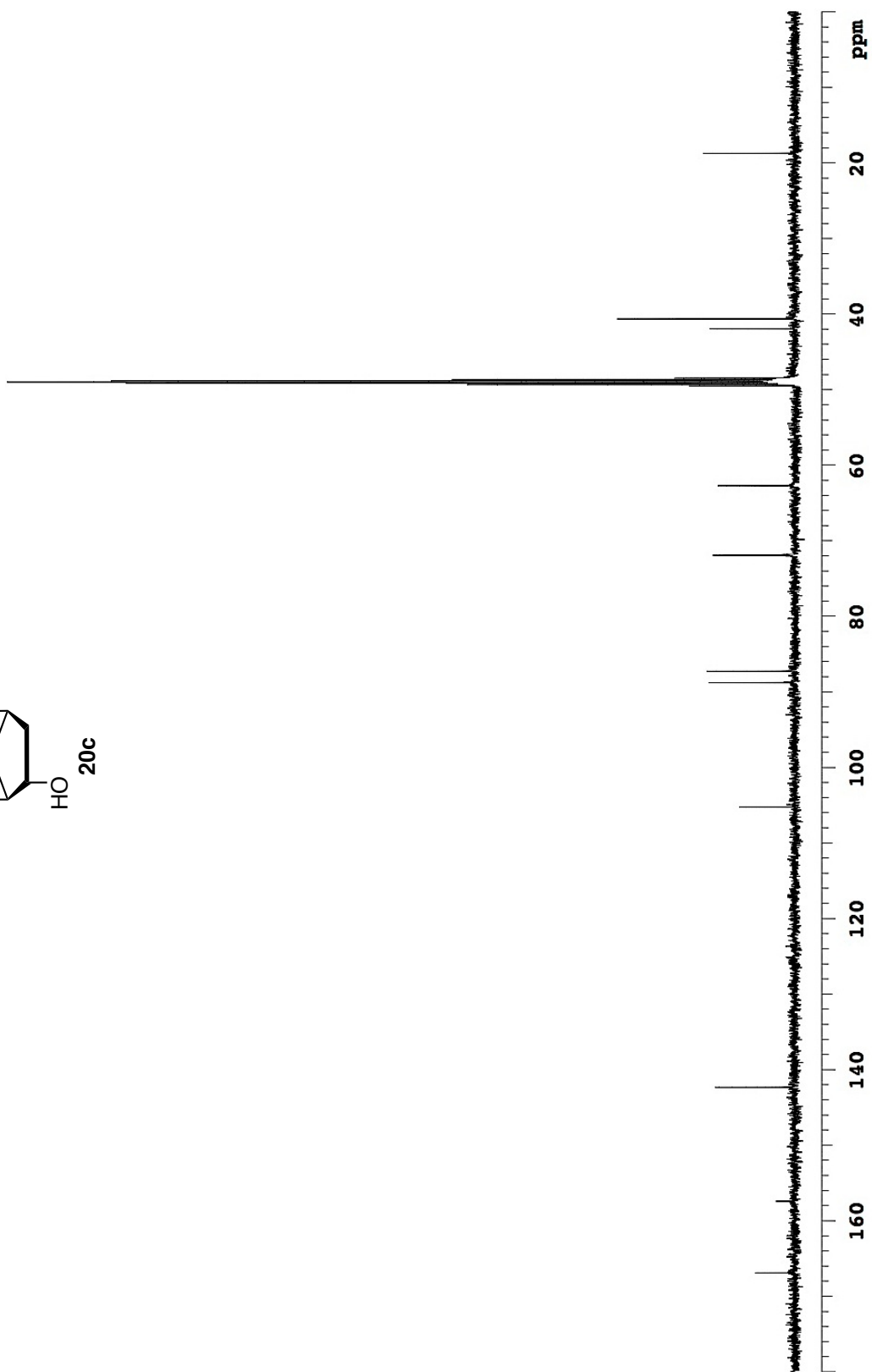
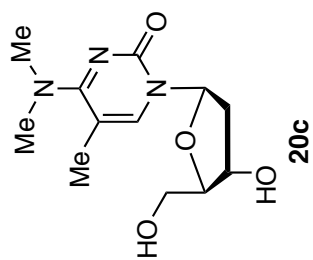


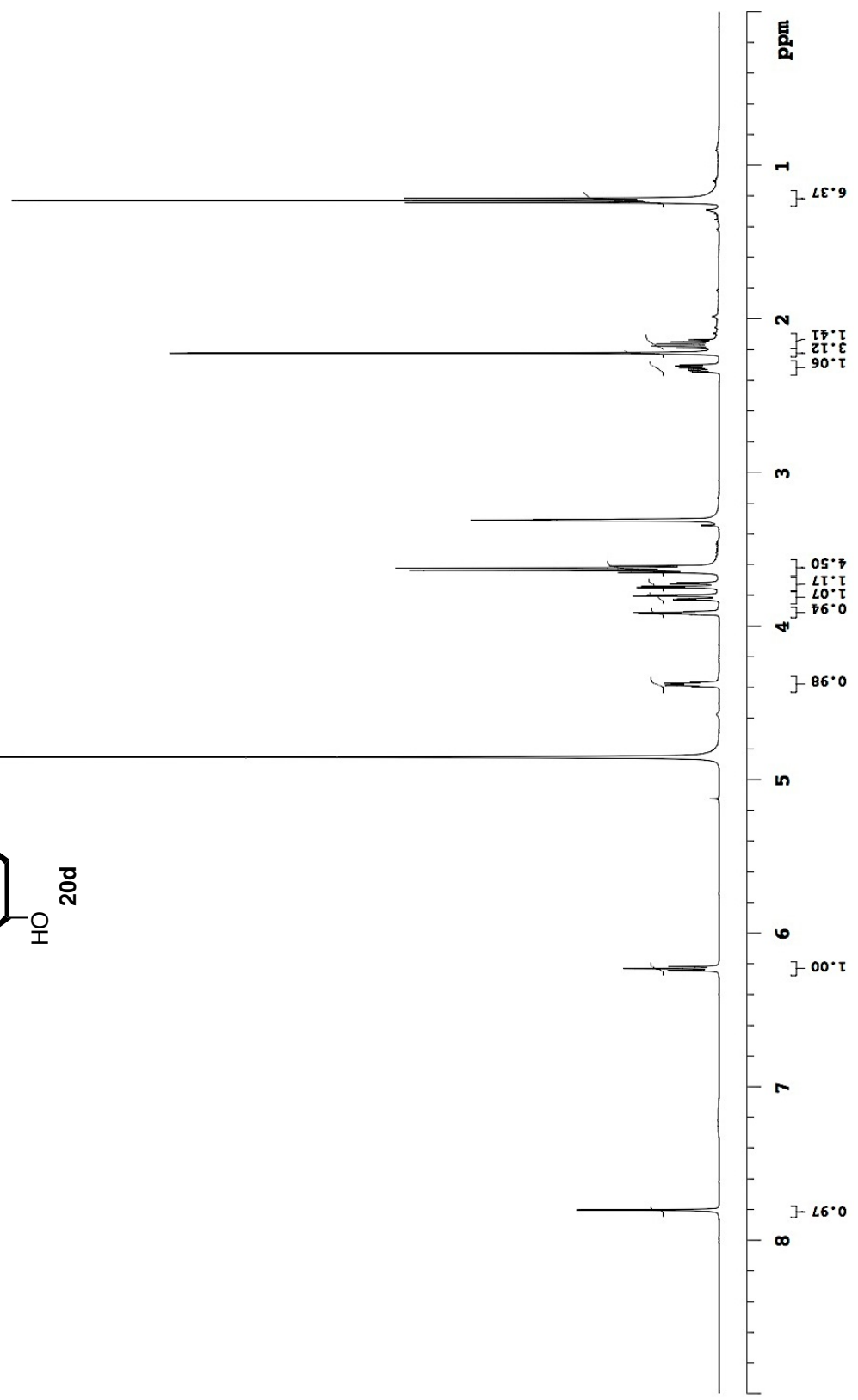
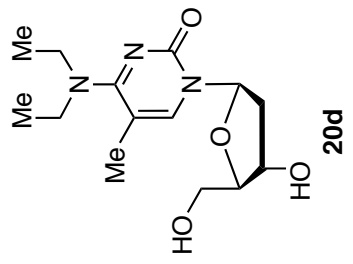


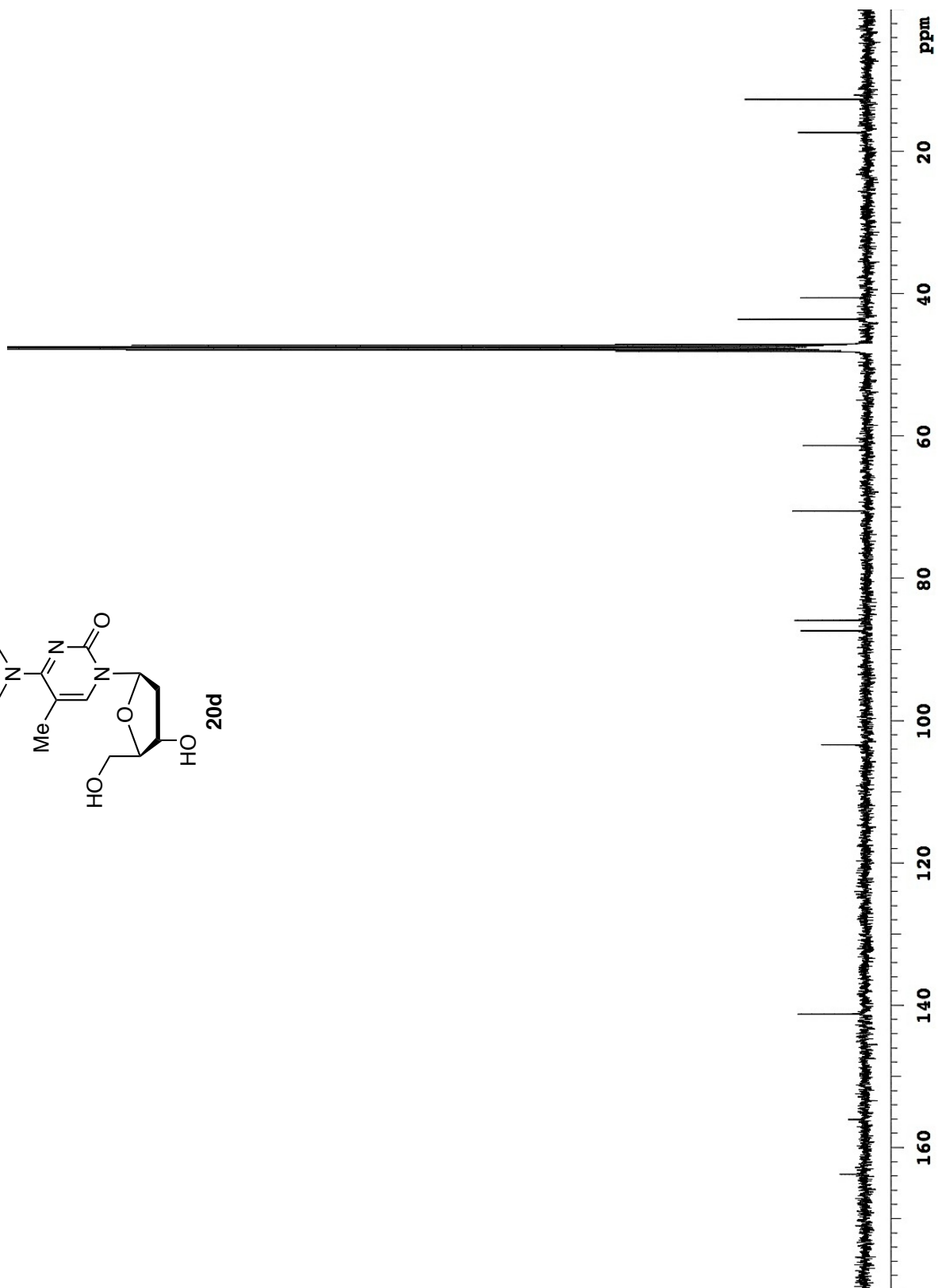
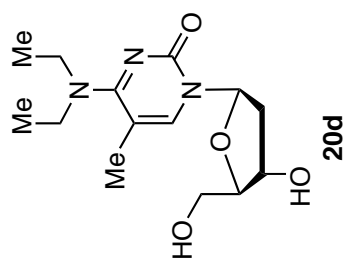


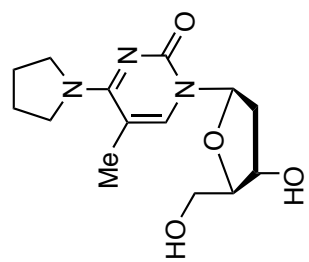




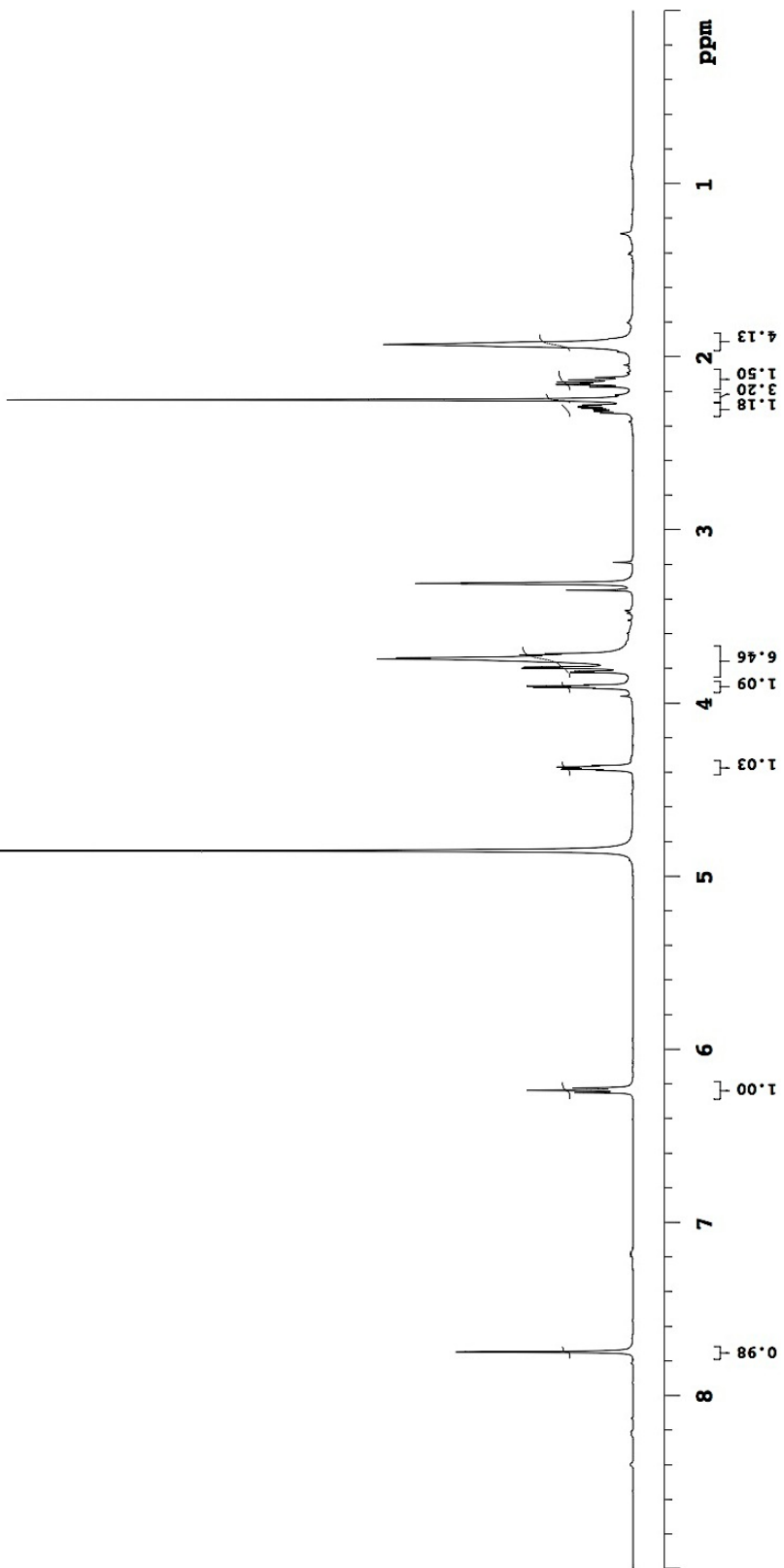


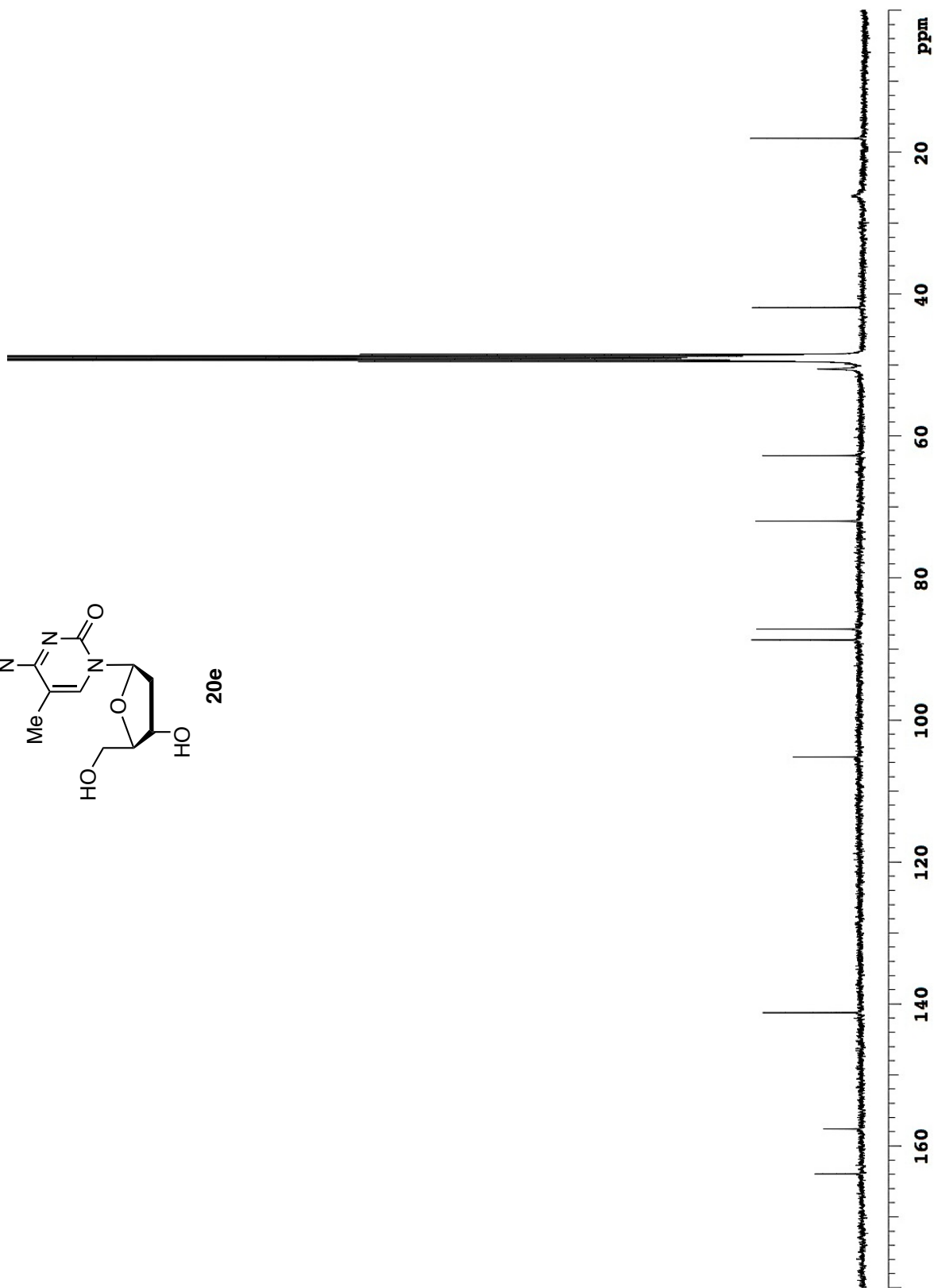
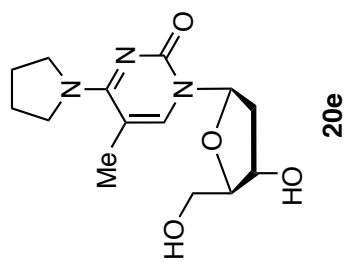




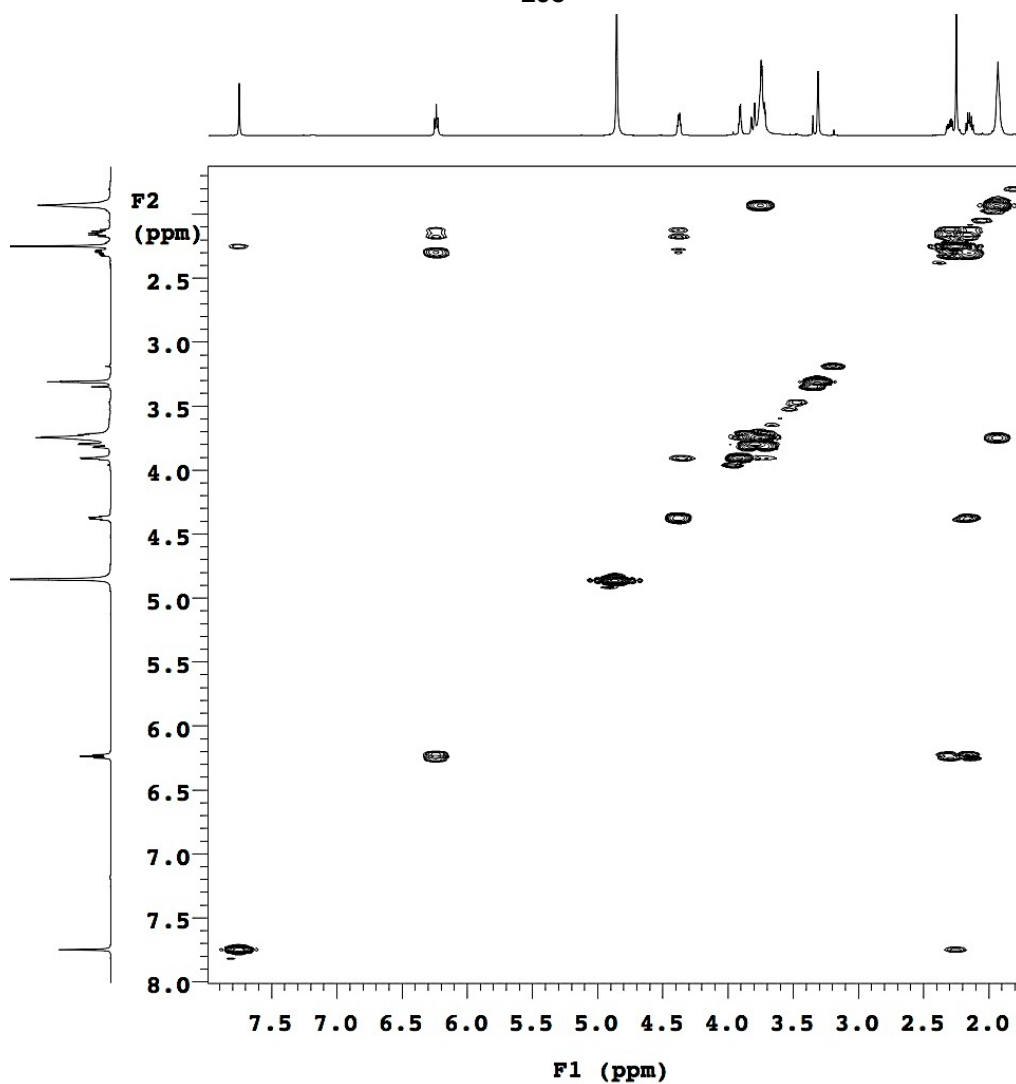
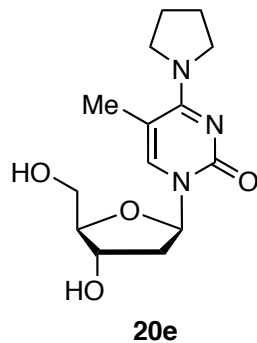


20e

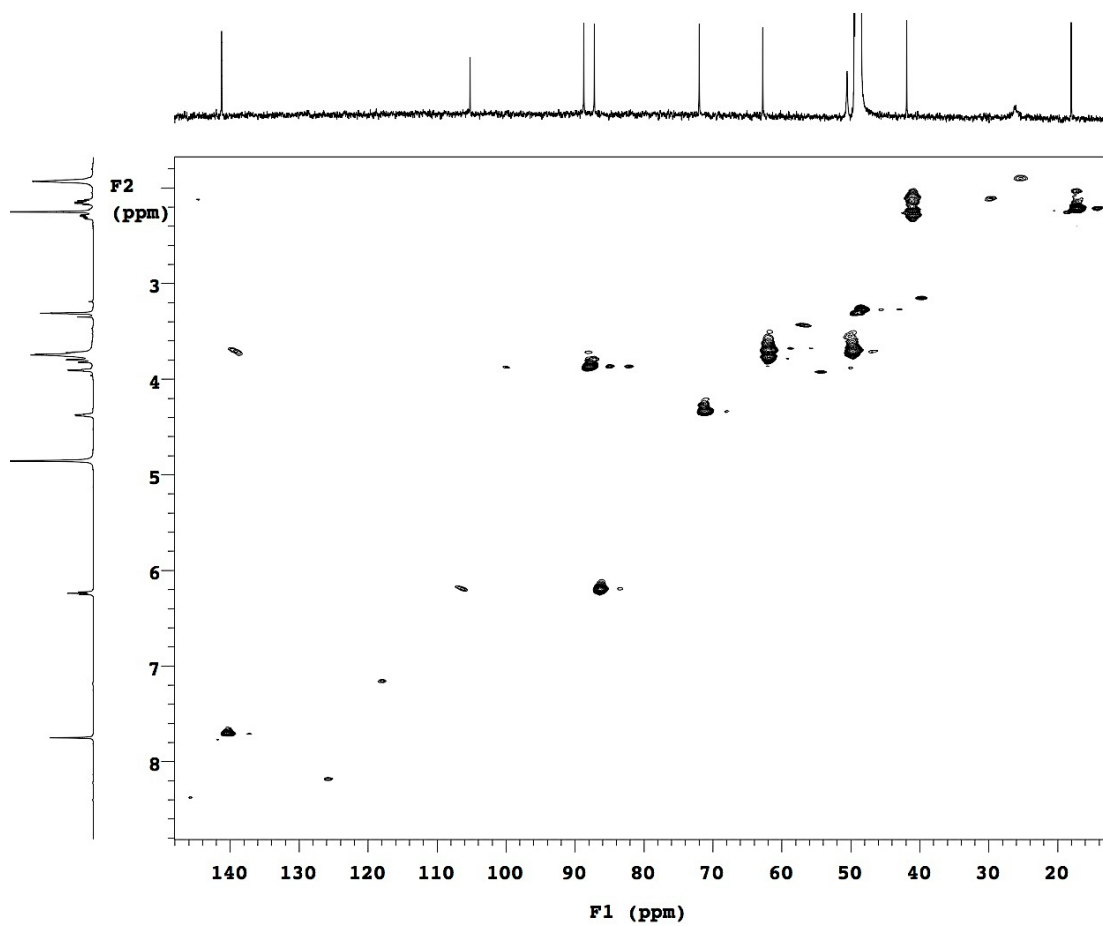
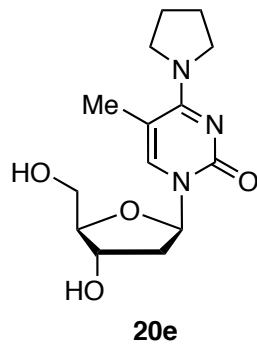




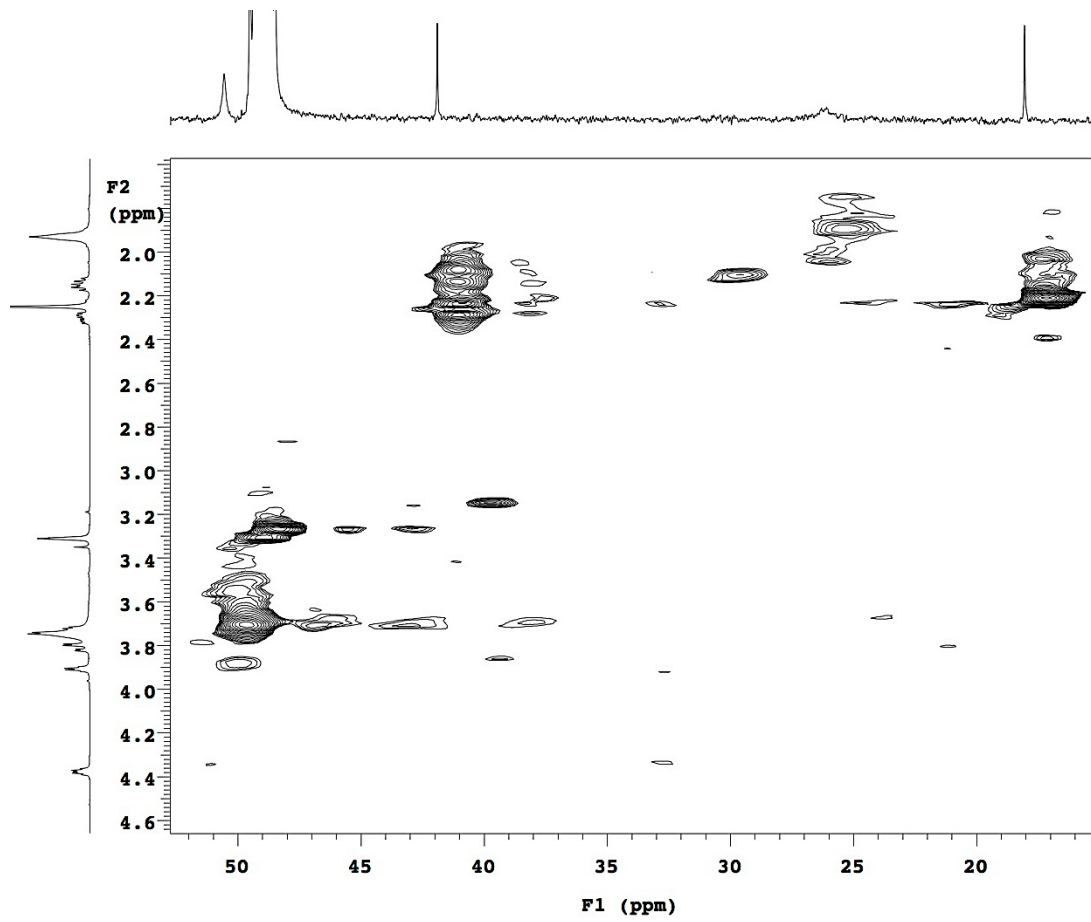
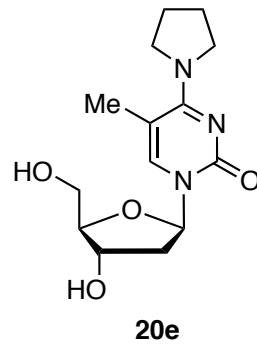
gCOSY spectrum of compound **20e** in CD₃OD

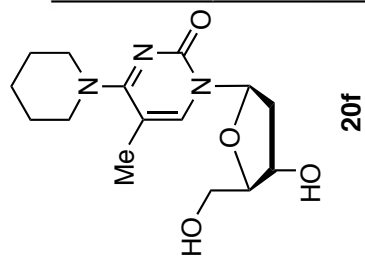


gHMQC spectrum of compound **20e** in CD₃OD

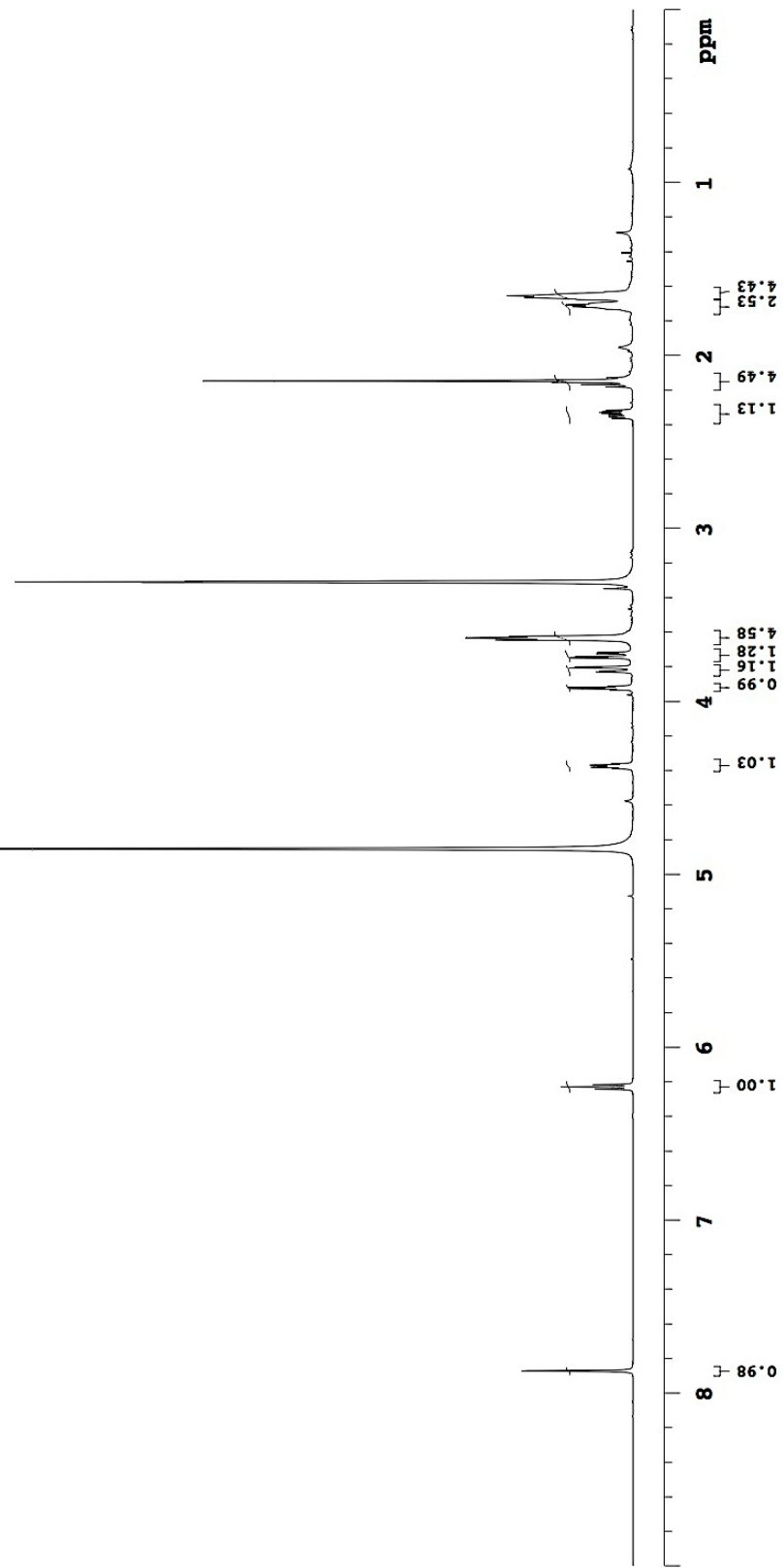


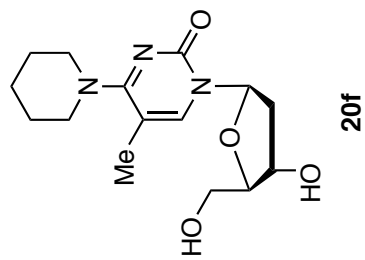
gHMQC spectrum of compound **20e** in CD₃OD



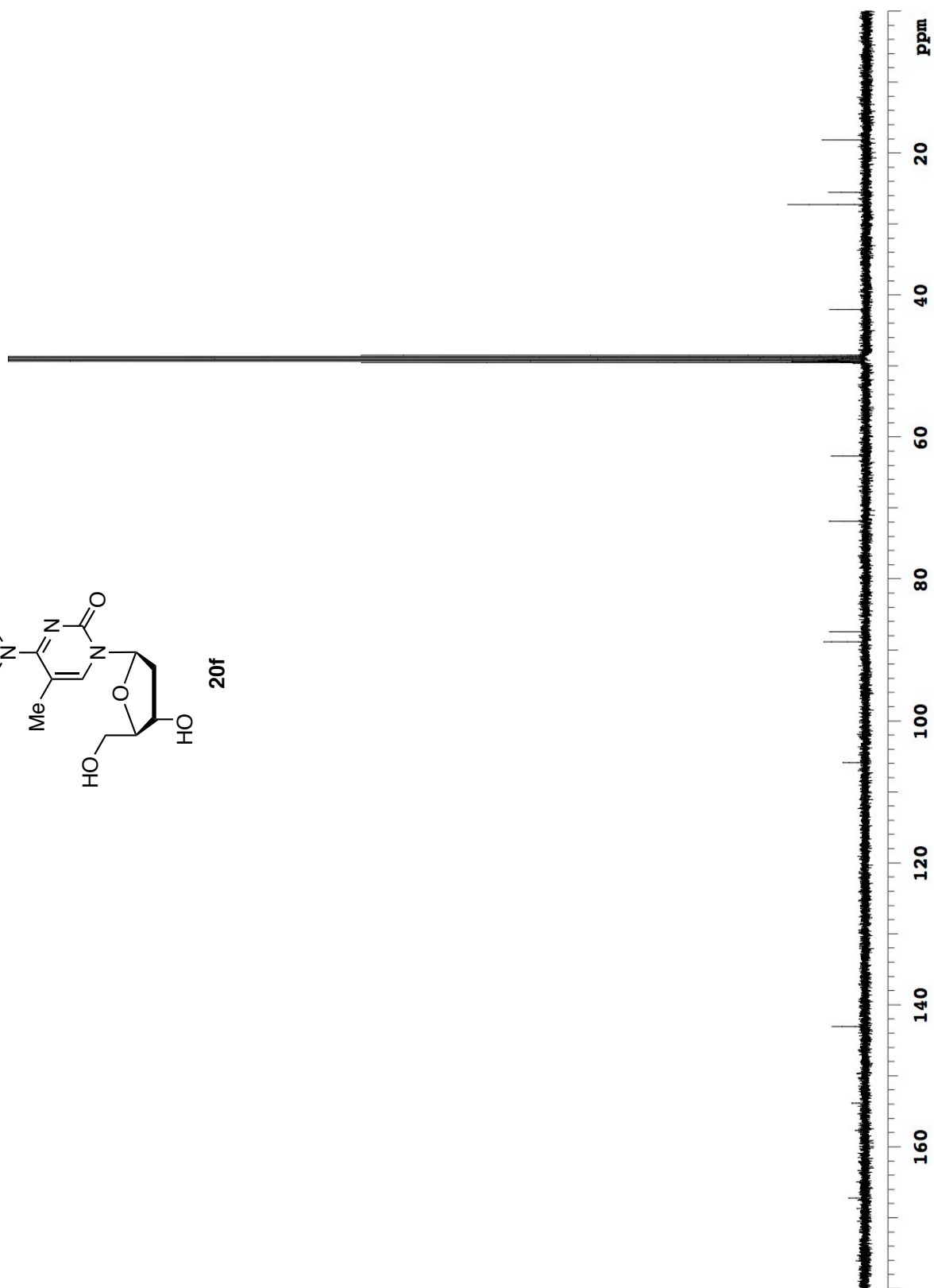


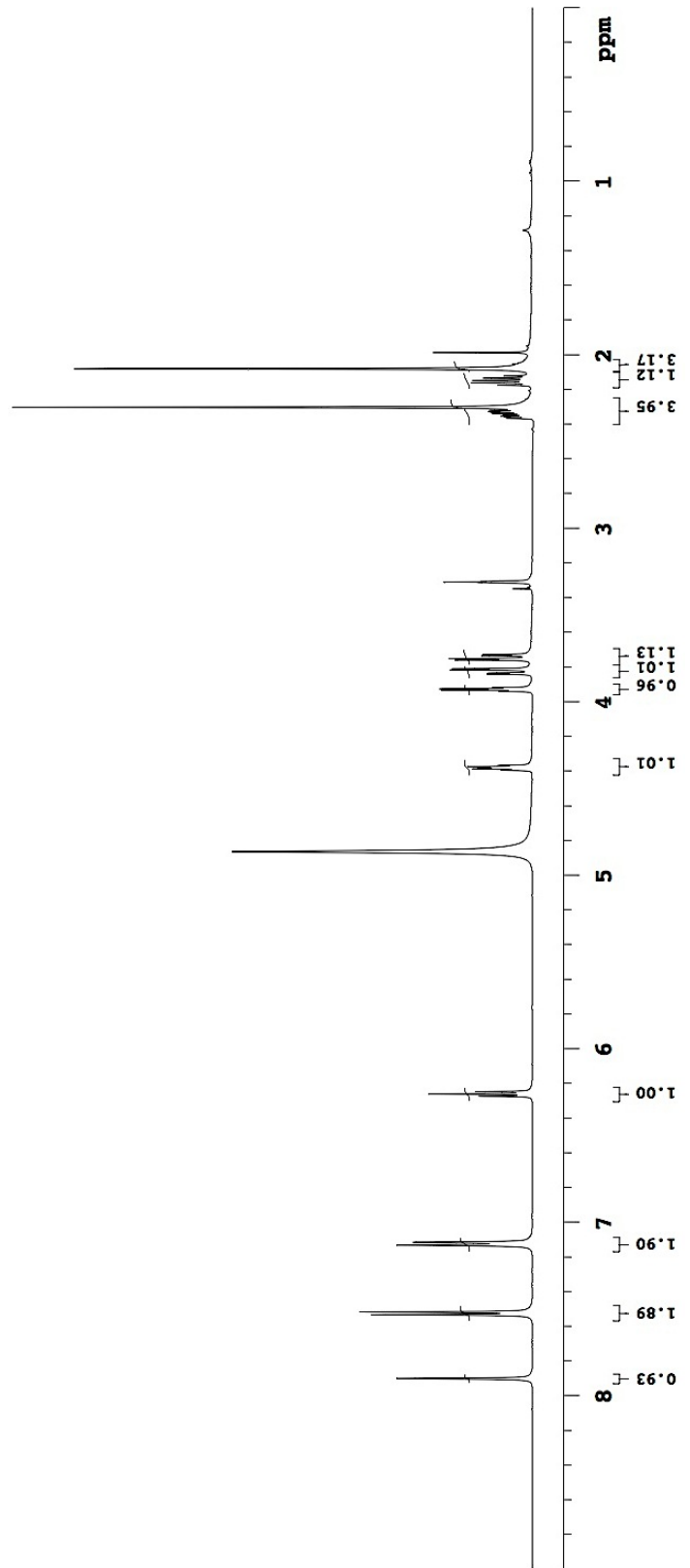
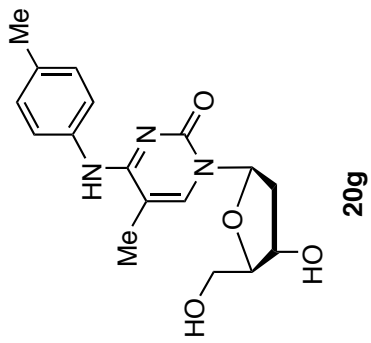
20f

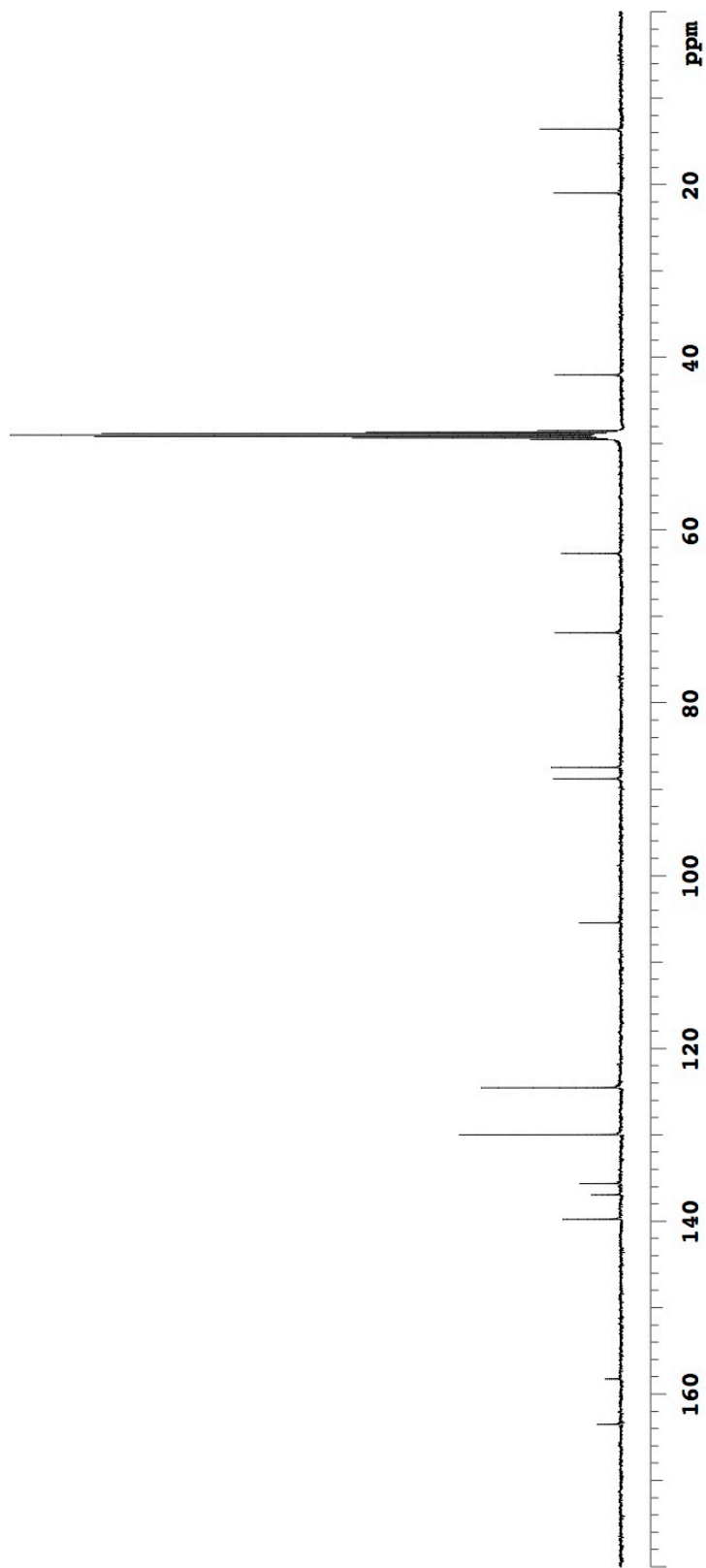
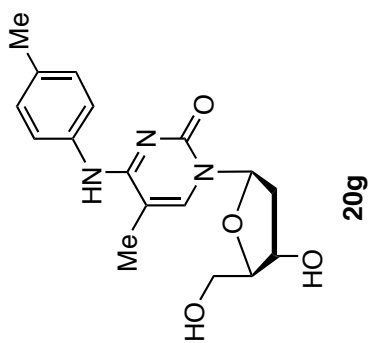


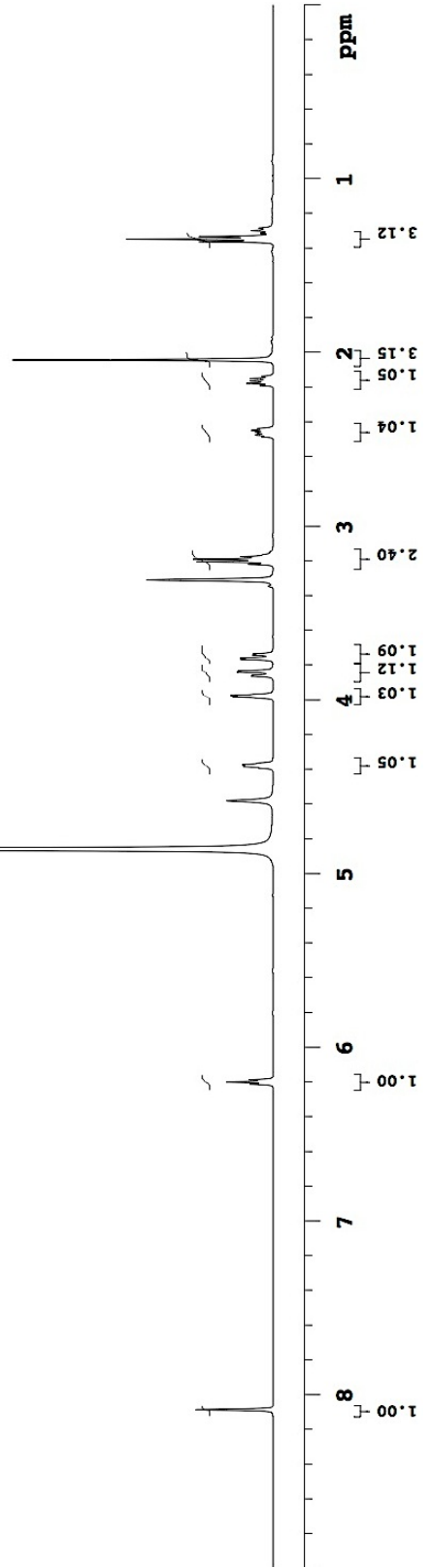
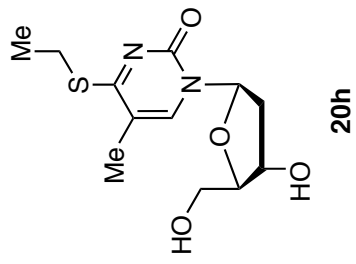


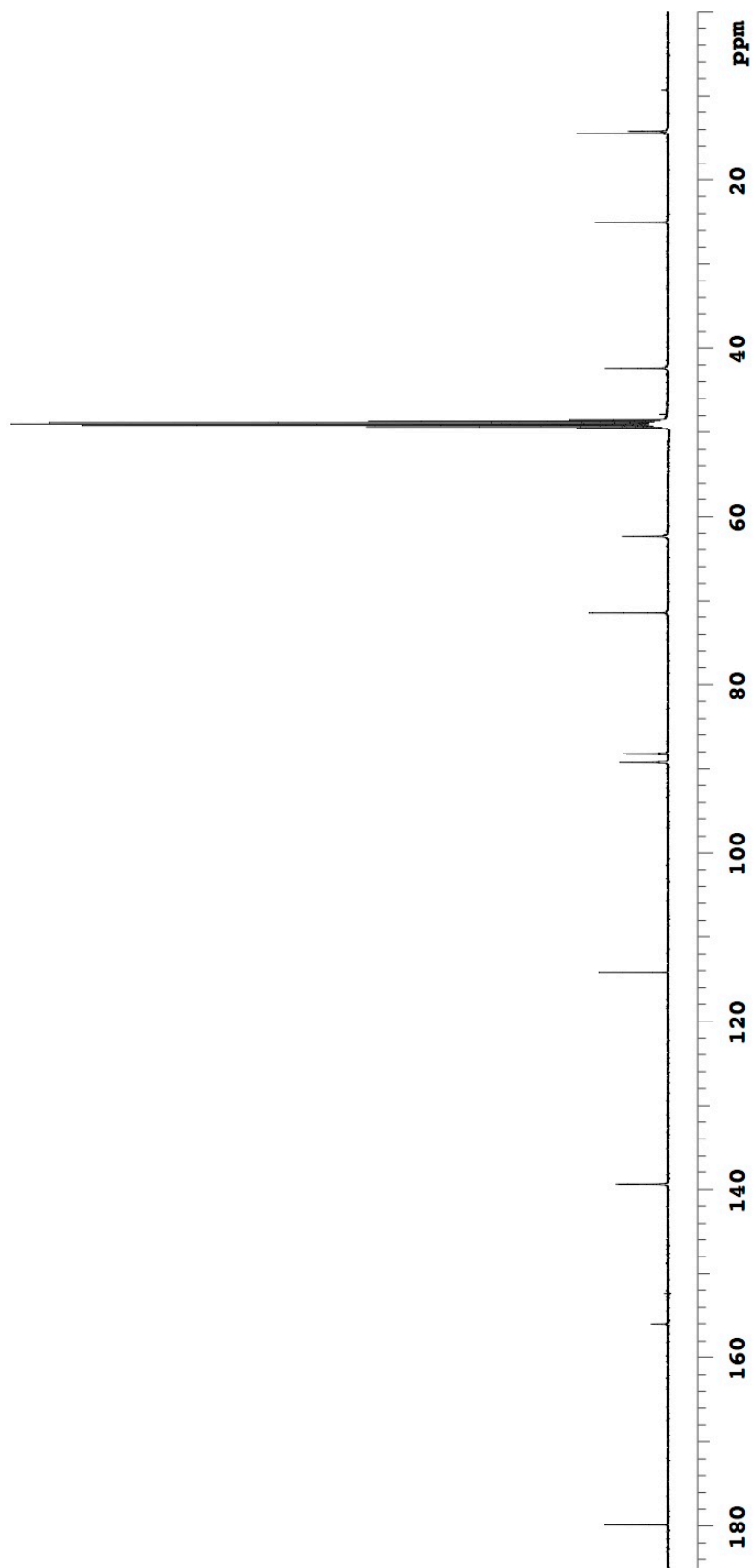
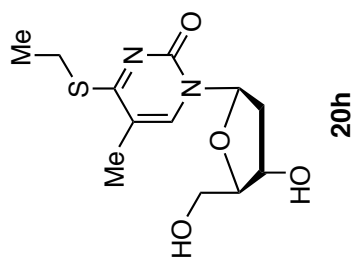
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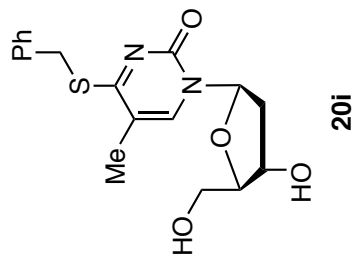




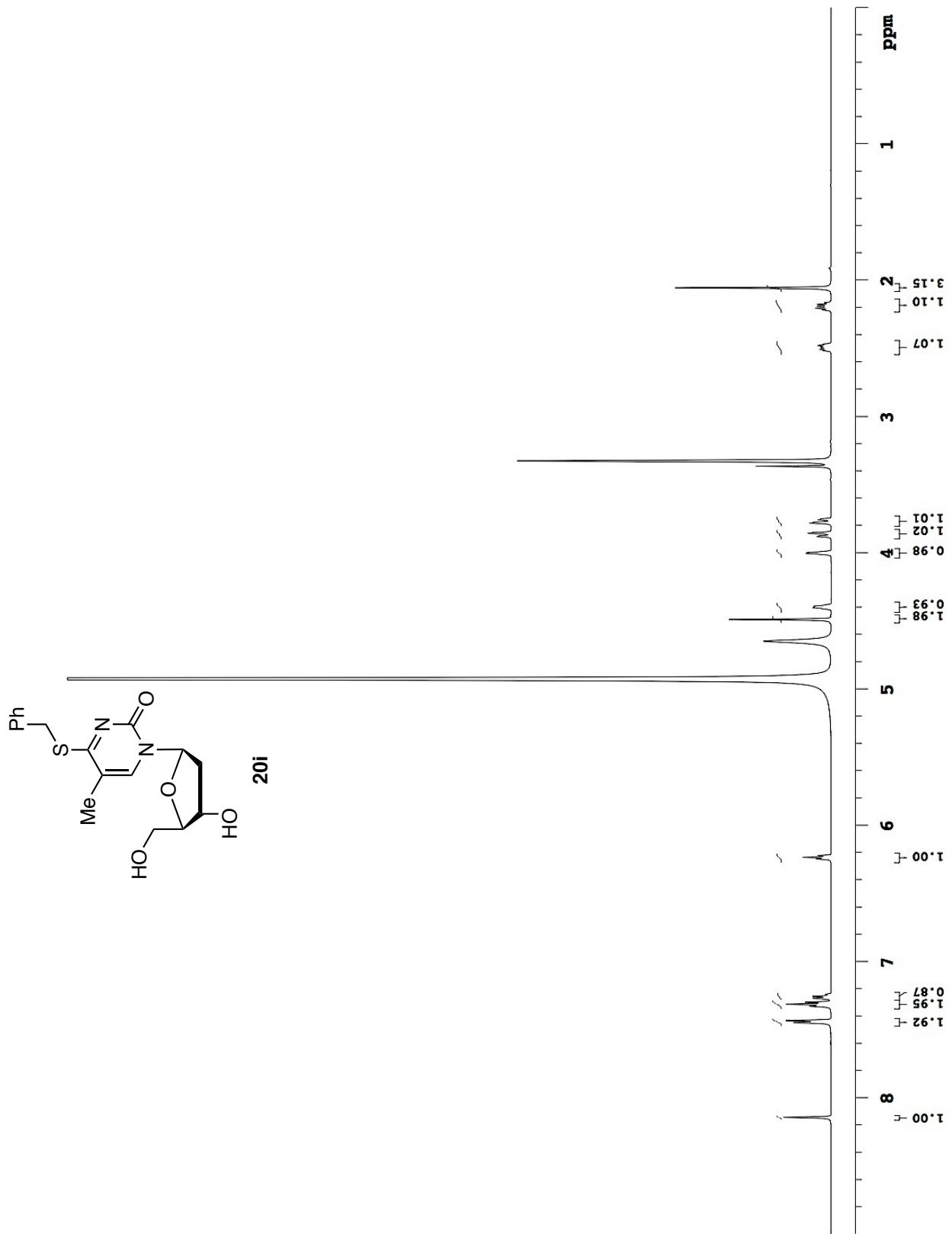


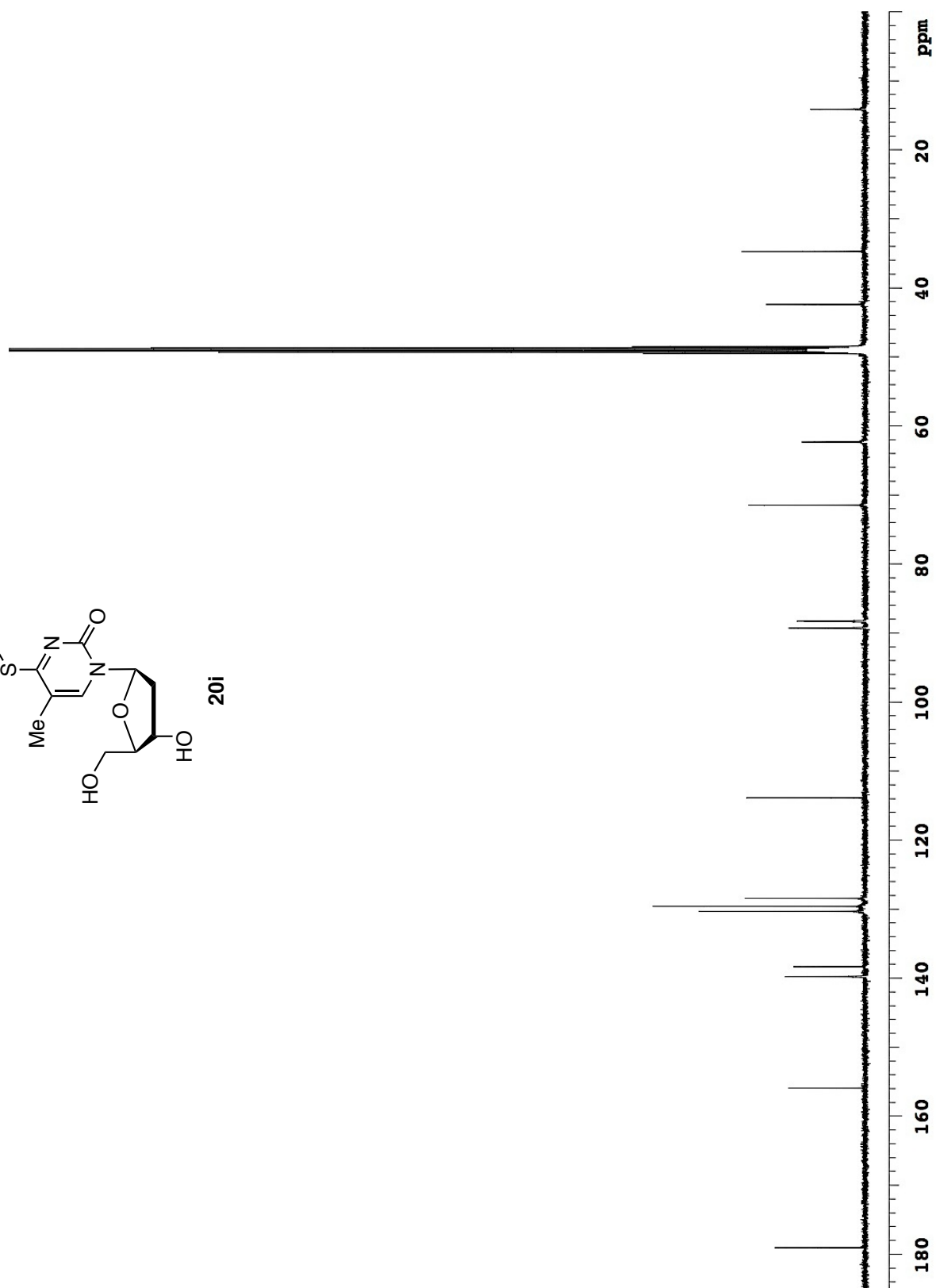
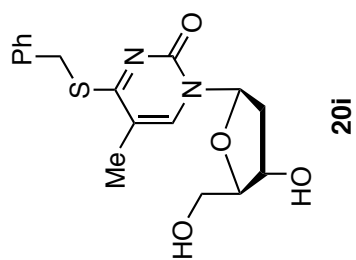


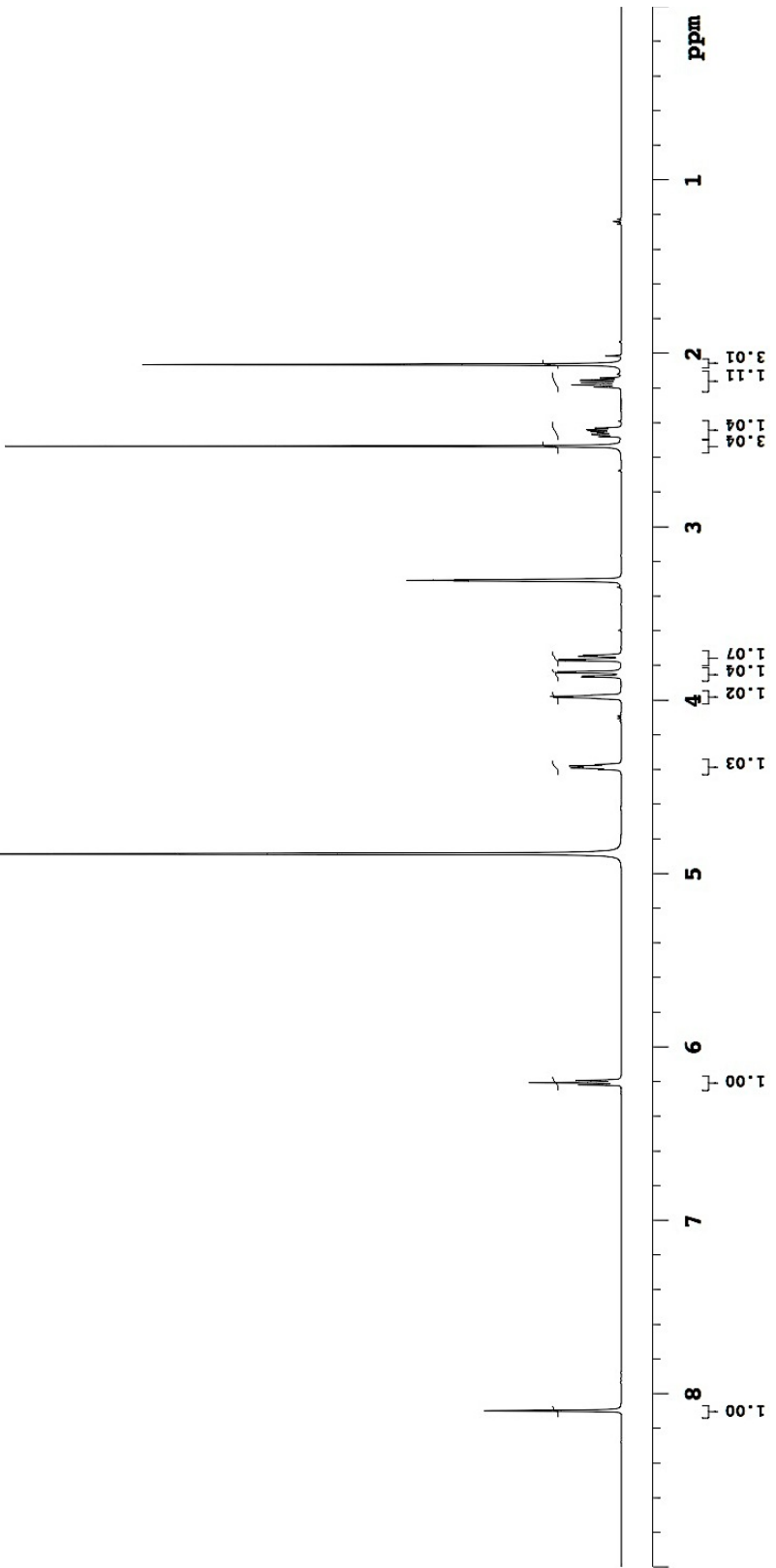
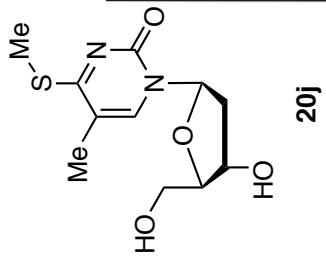


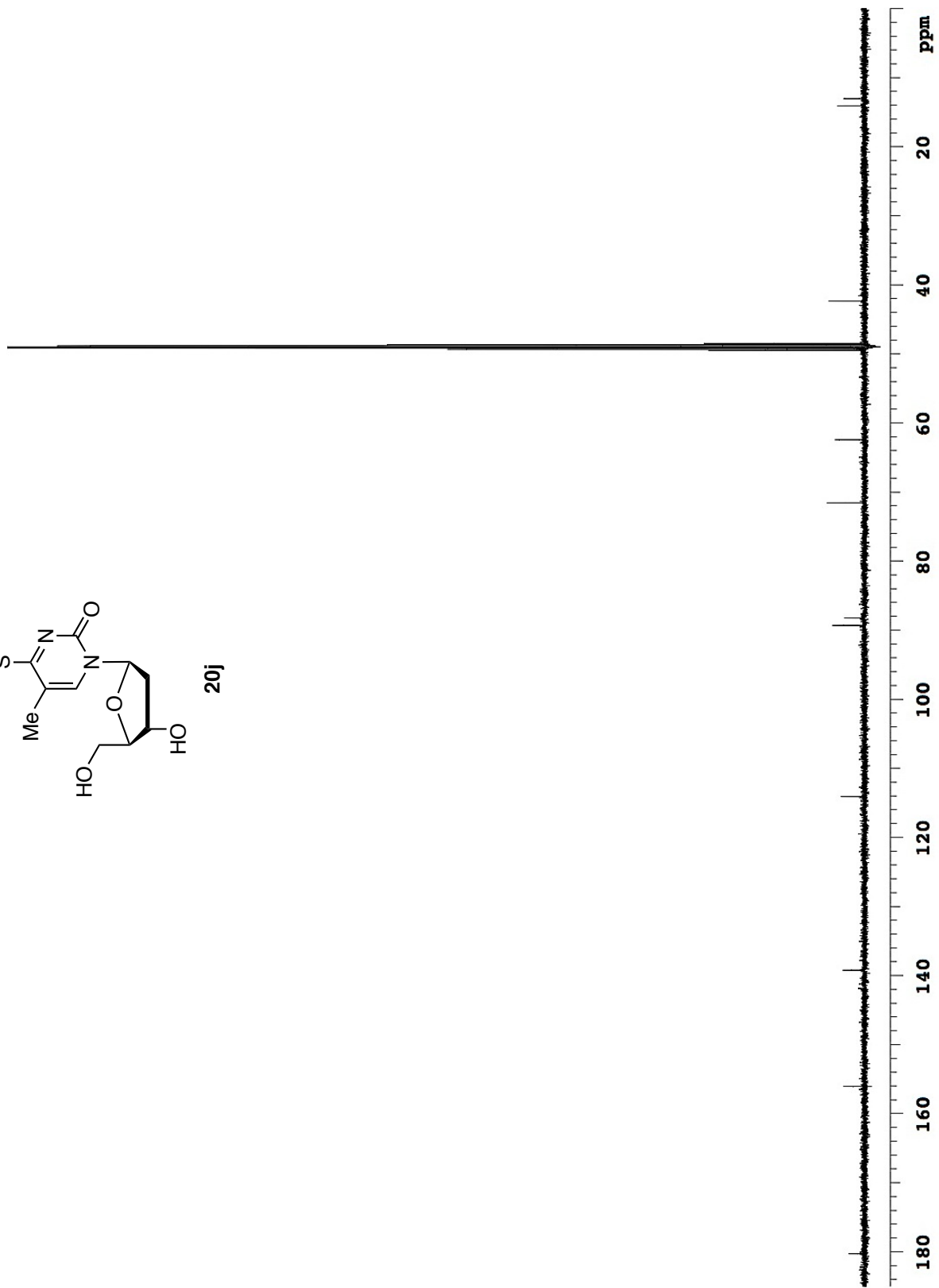
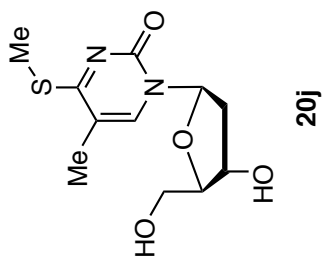


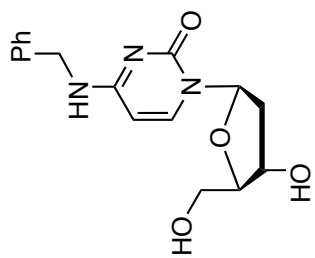
20i



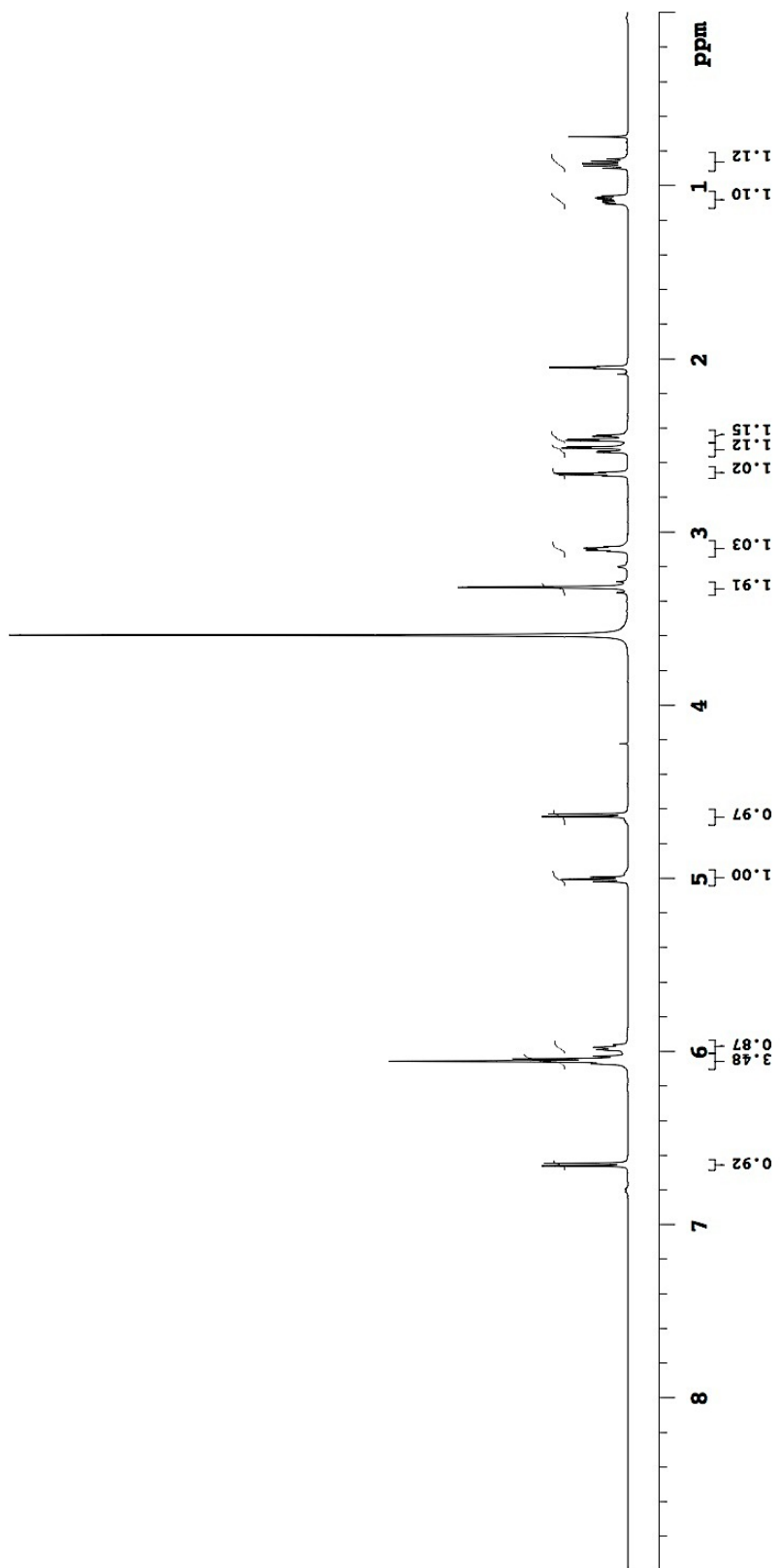


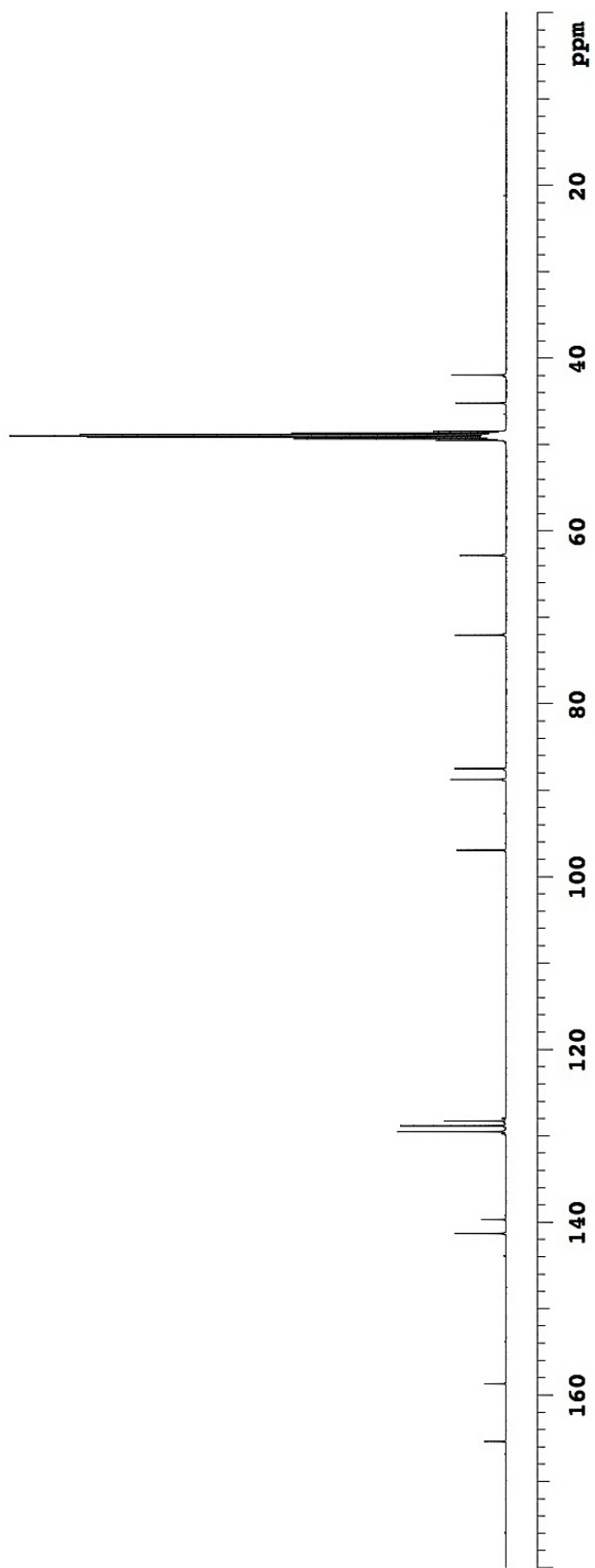
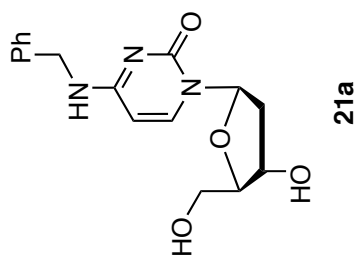


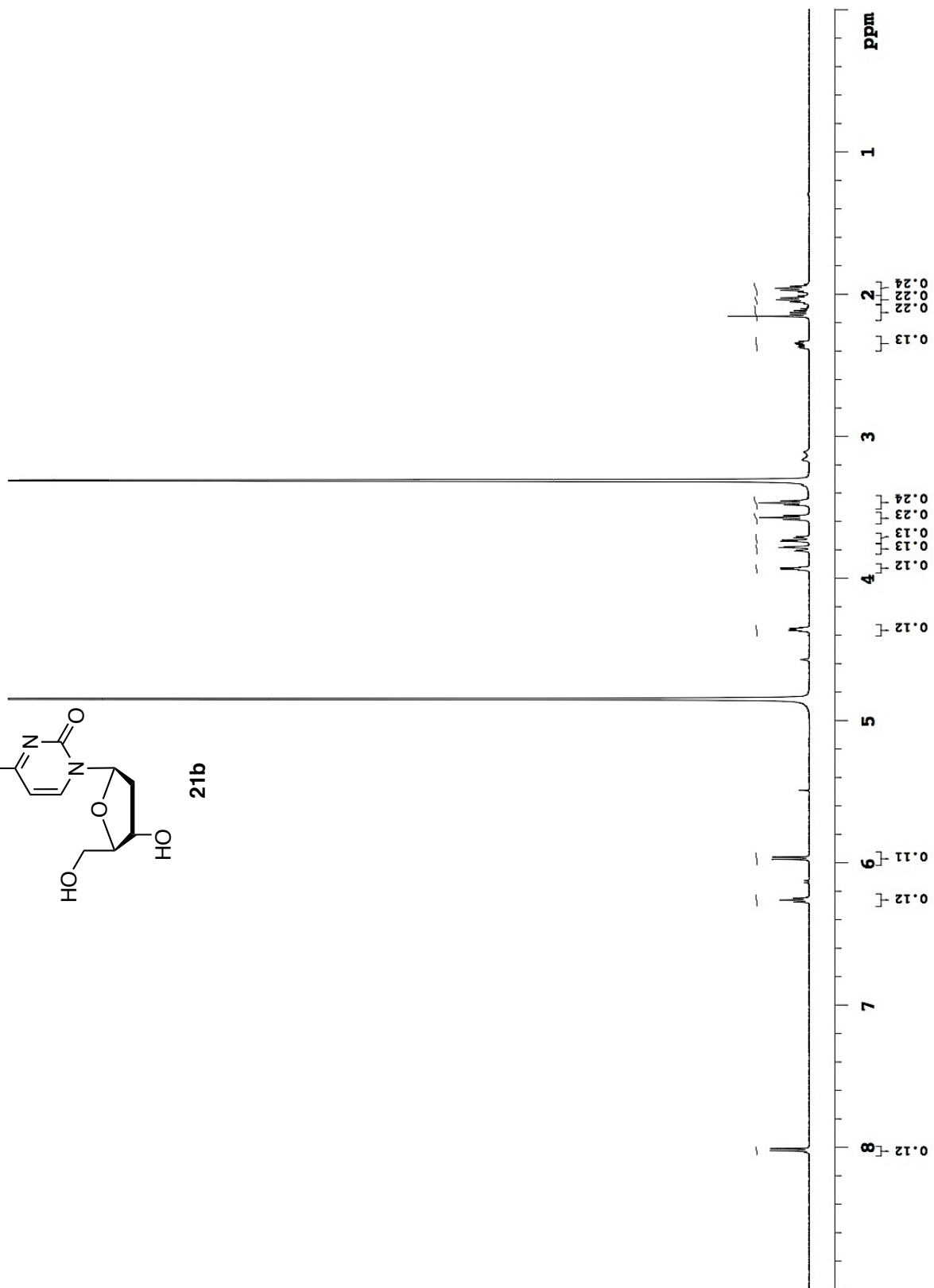
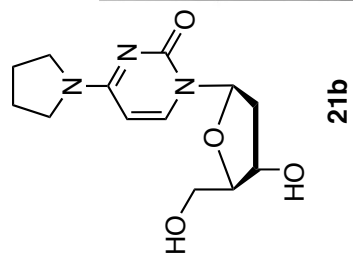


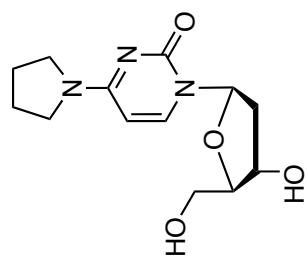


21a

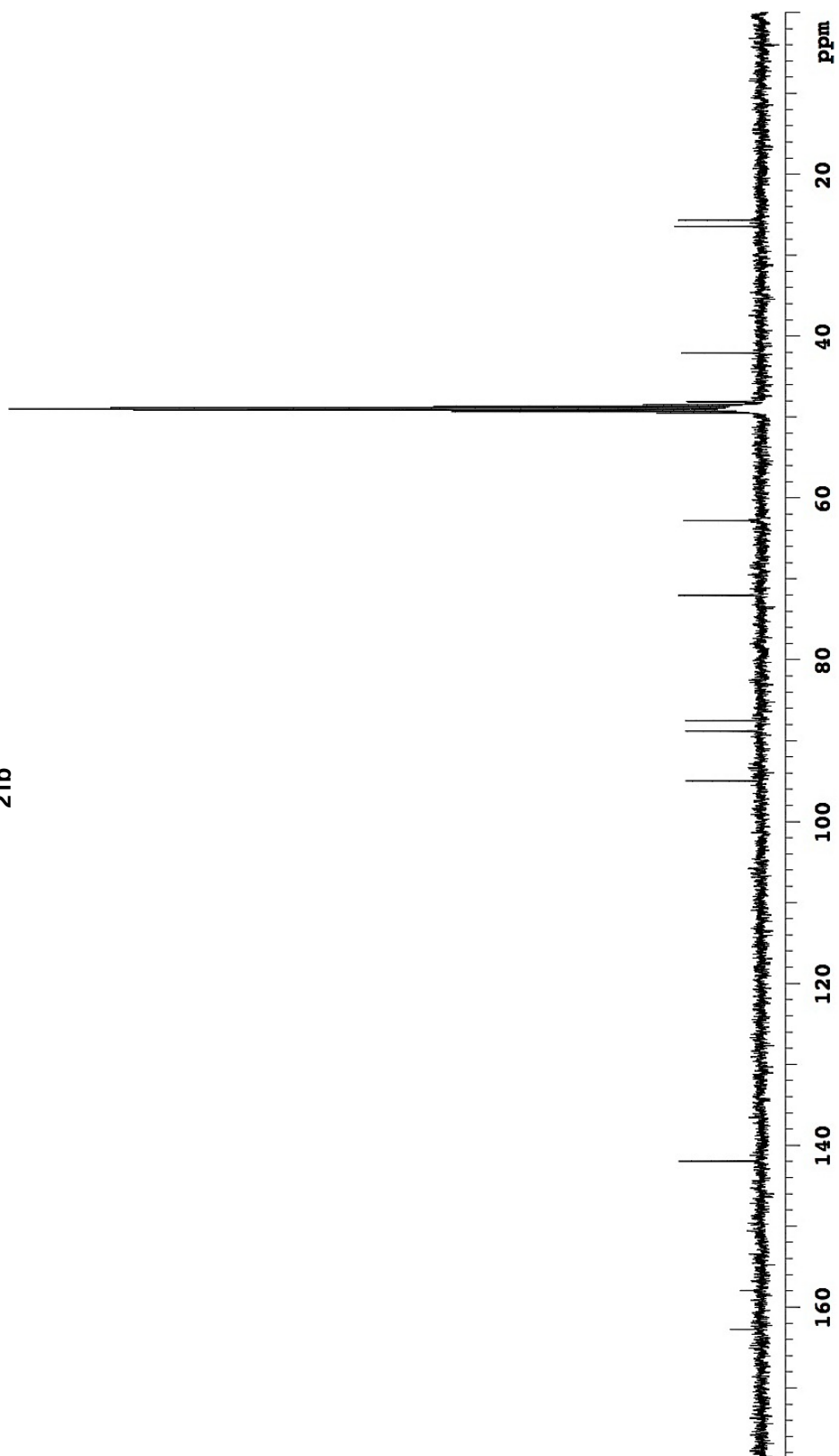


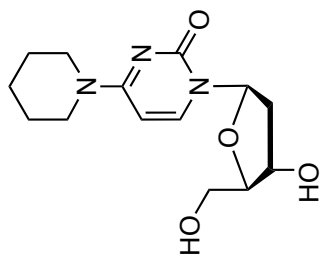




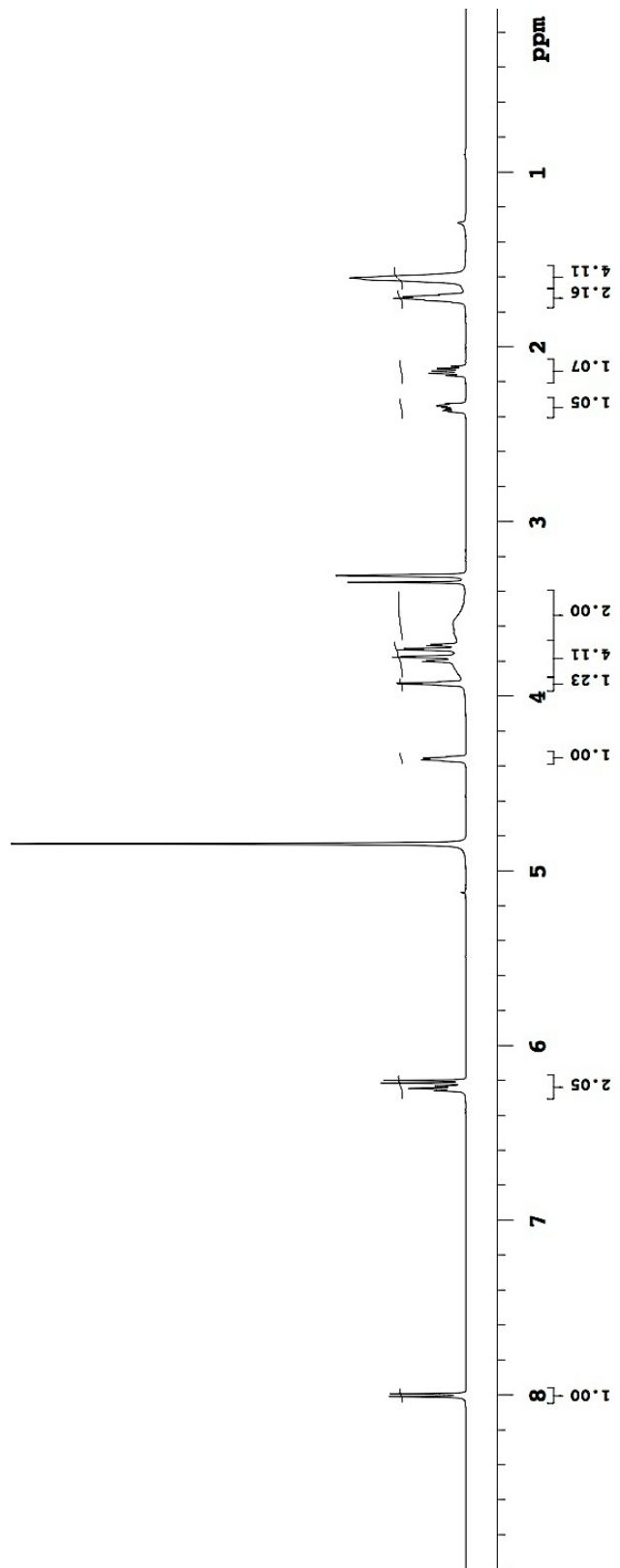


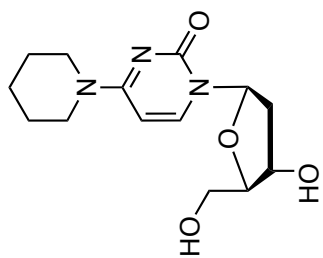
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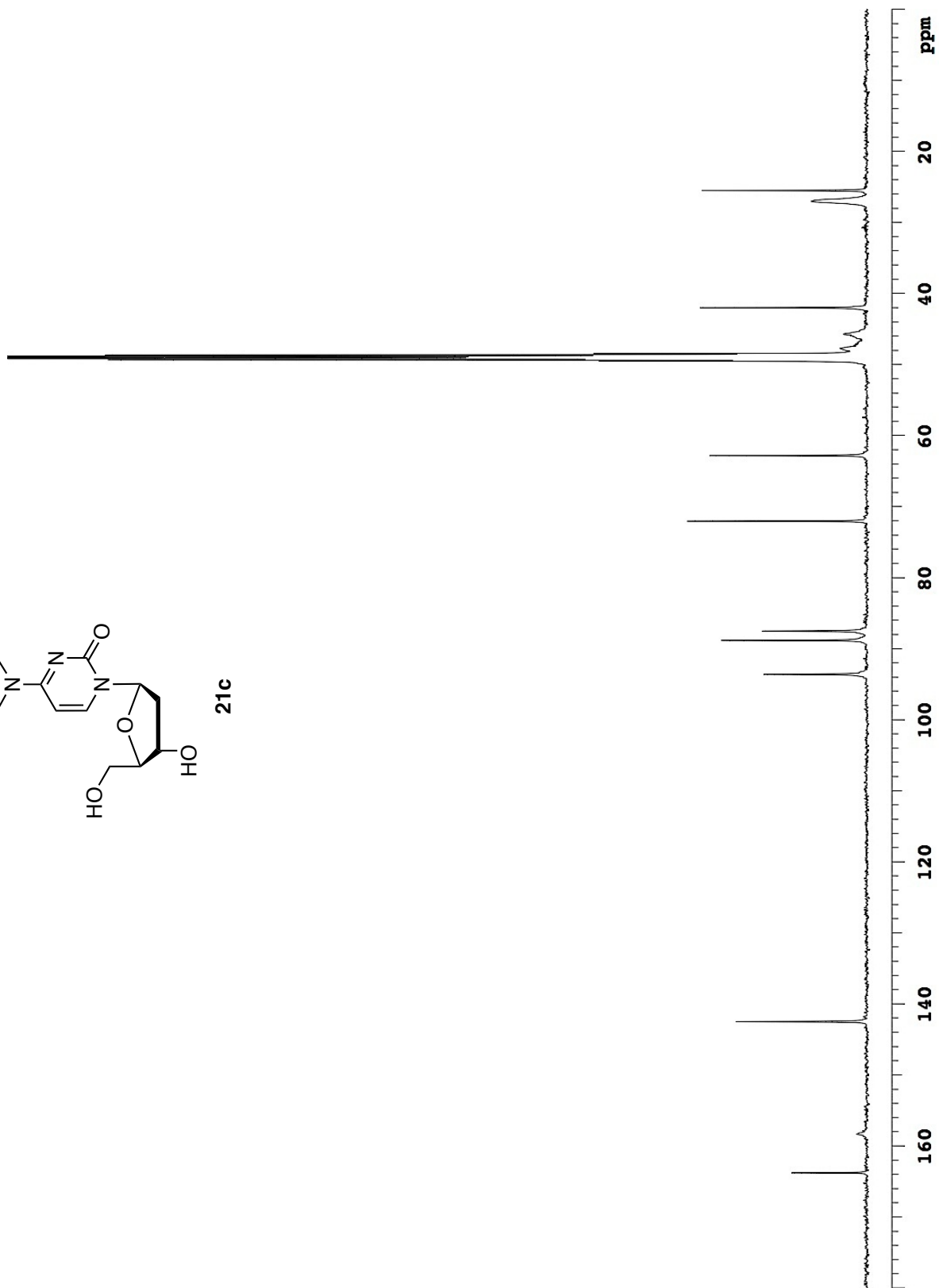


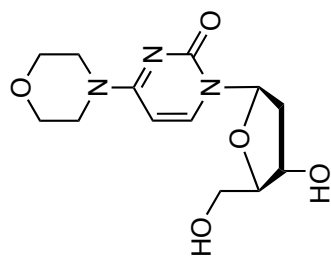
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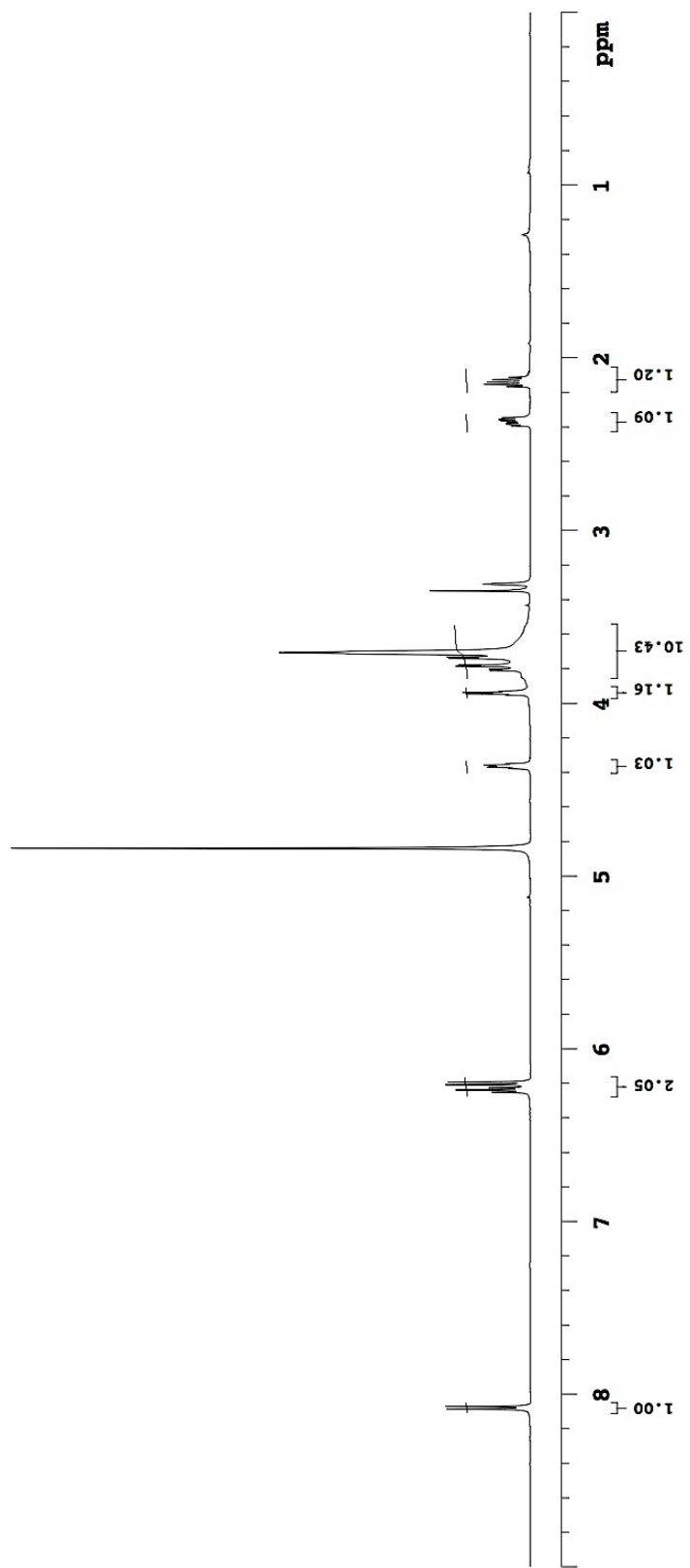


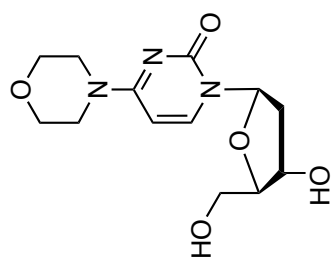
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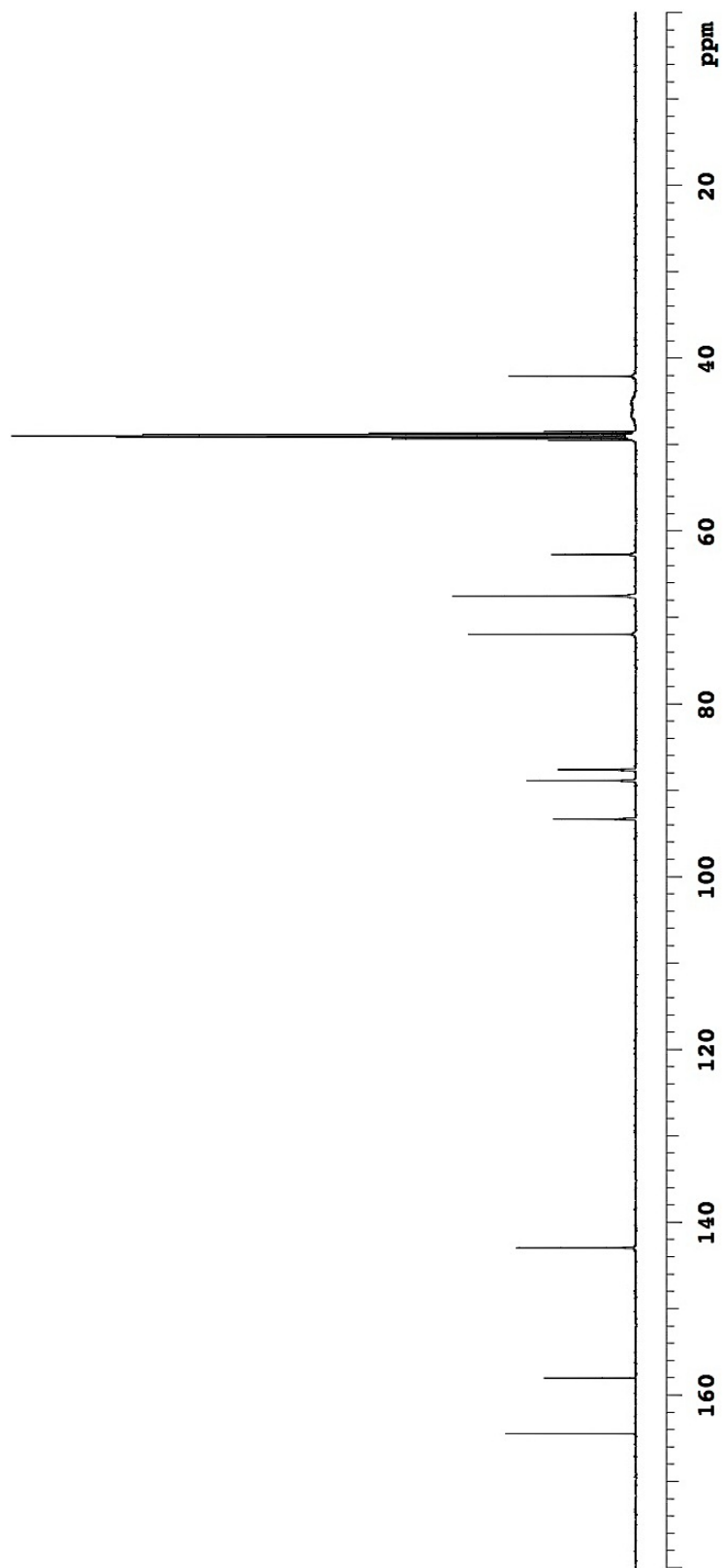


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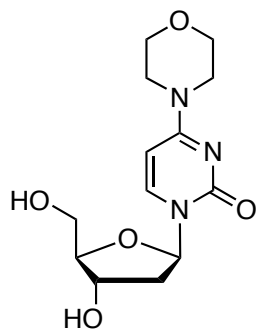




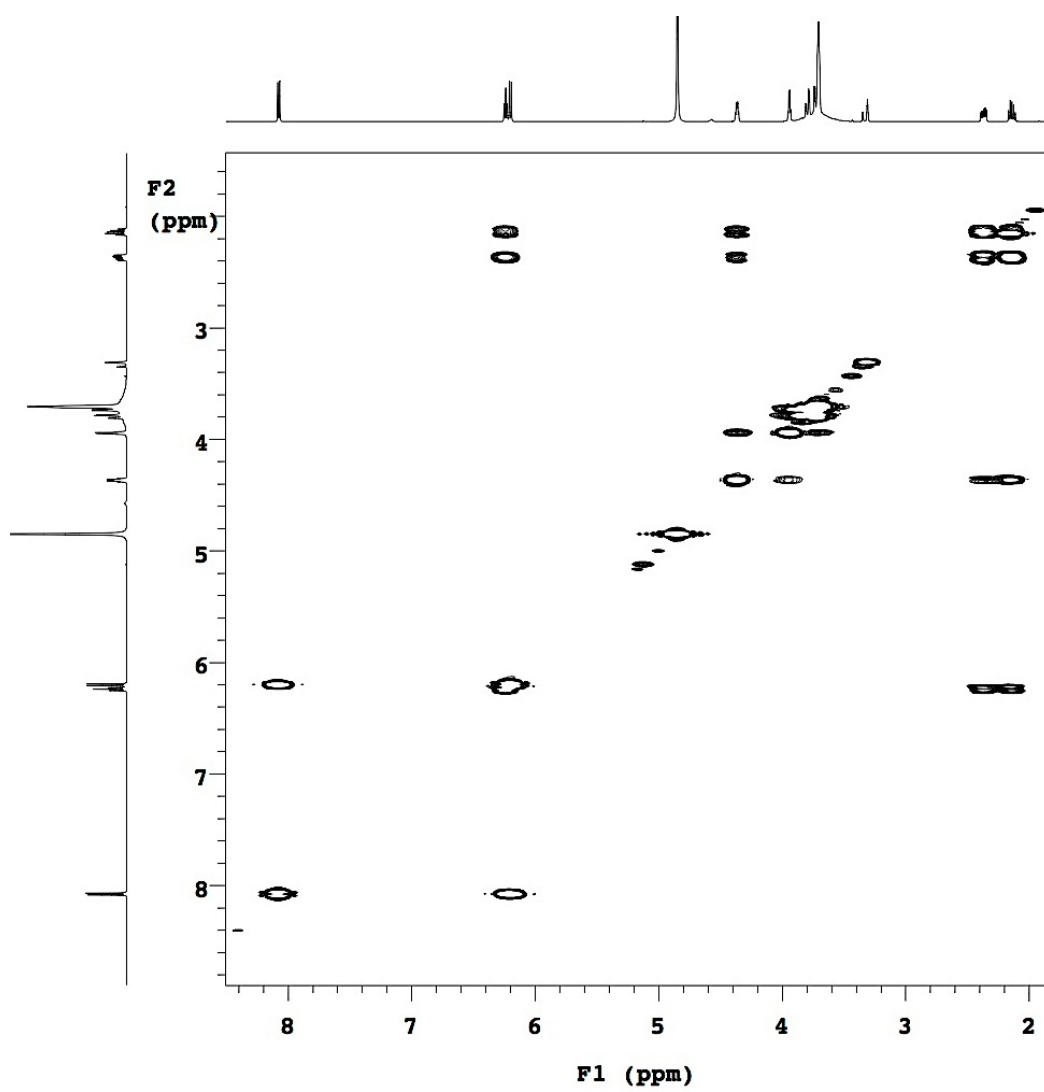
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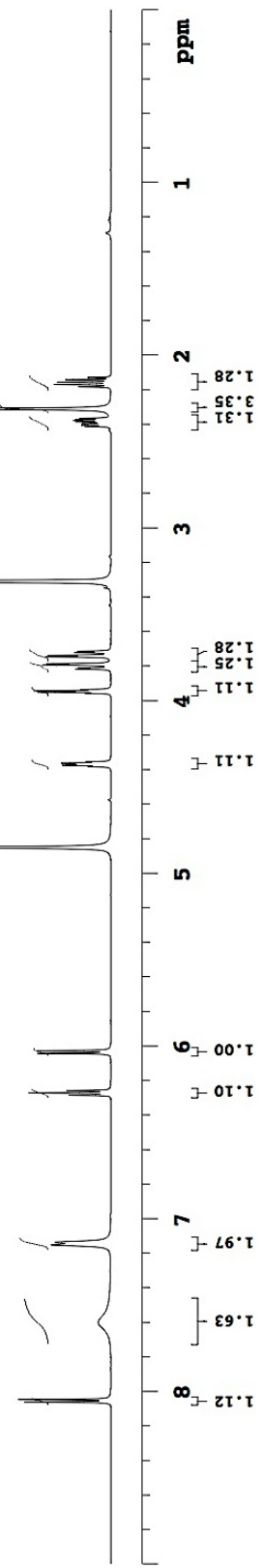
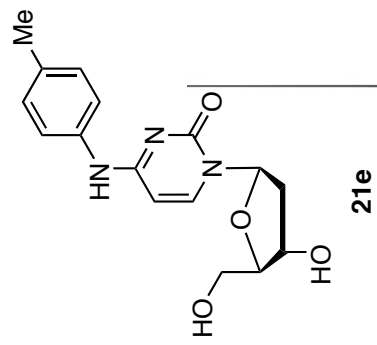


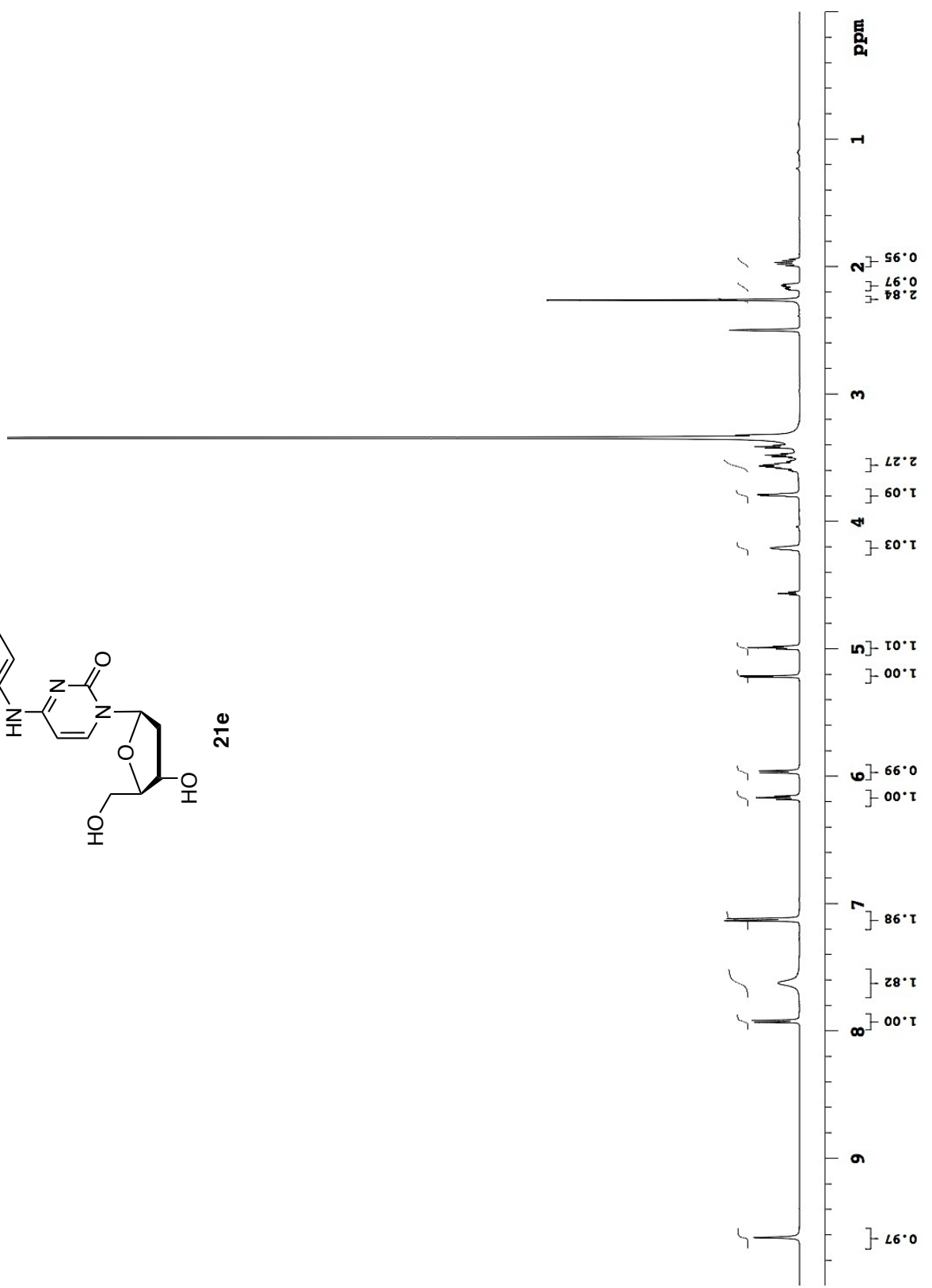
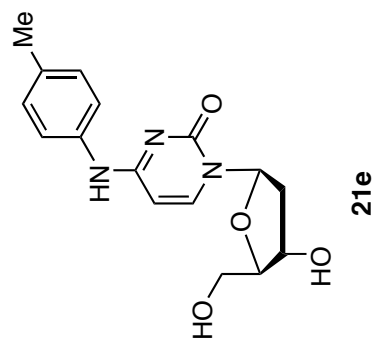
gCOSY spectrum of compound **21d** in CD₃OD

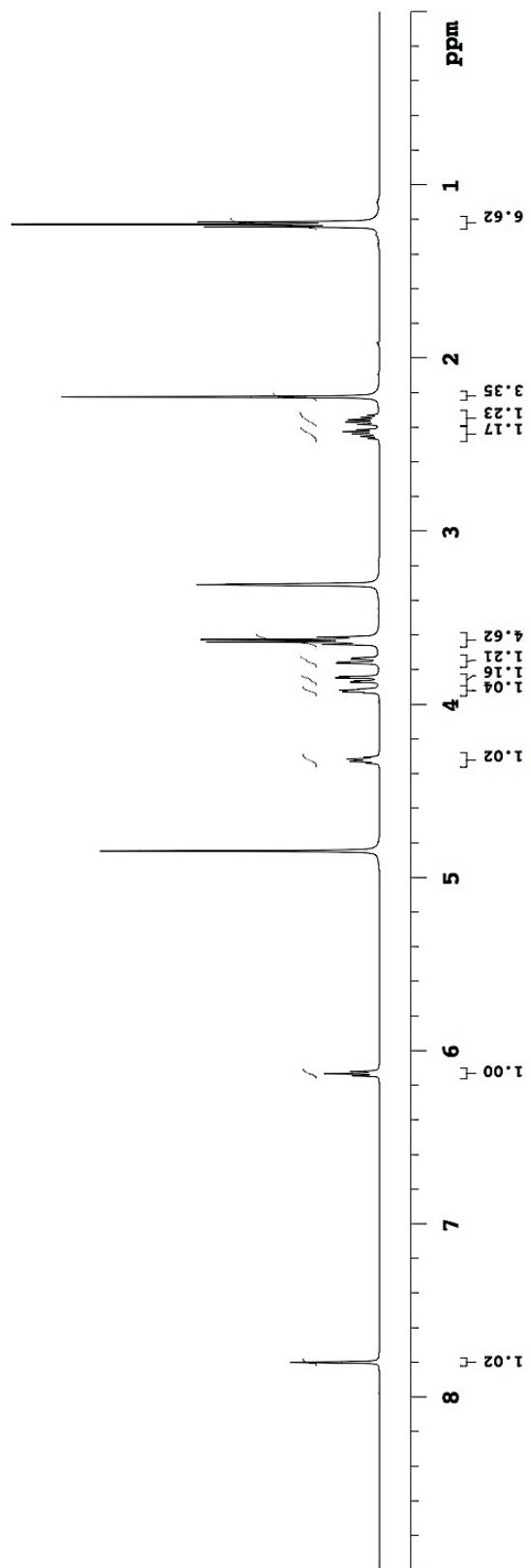
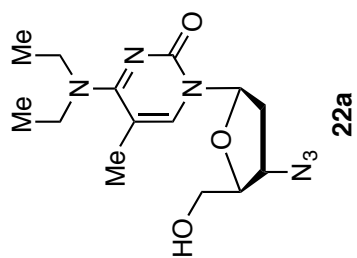


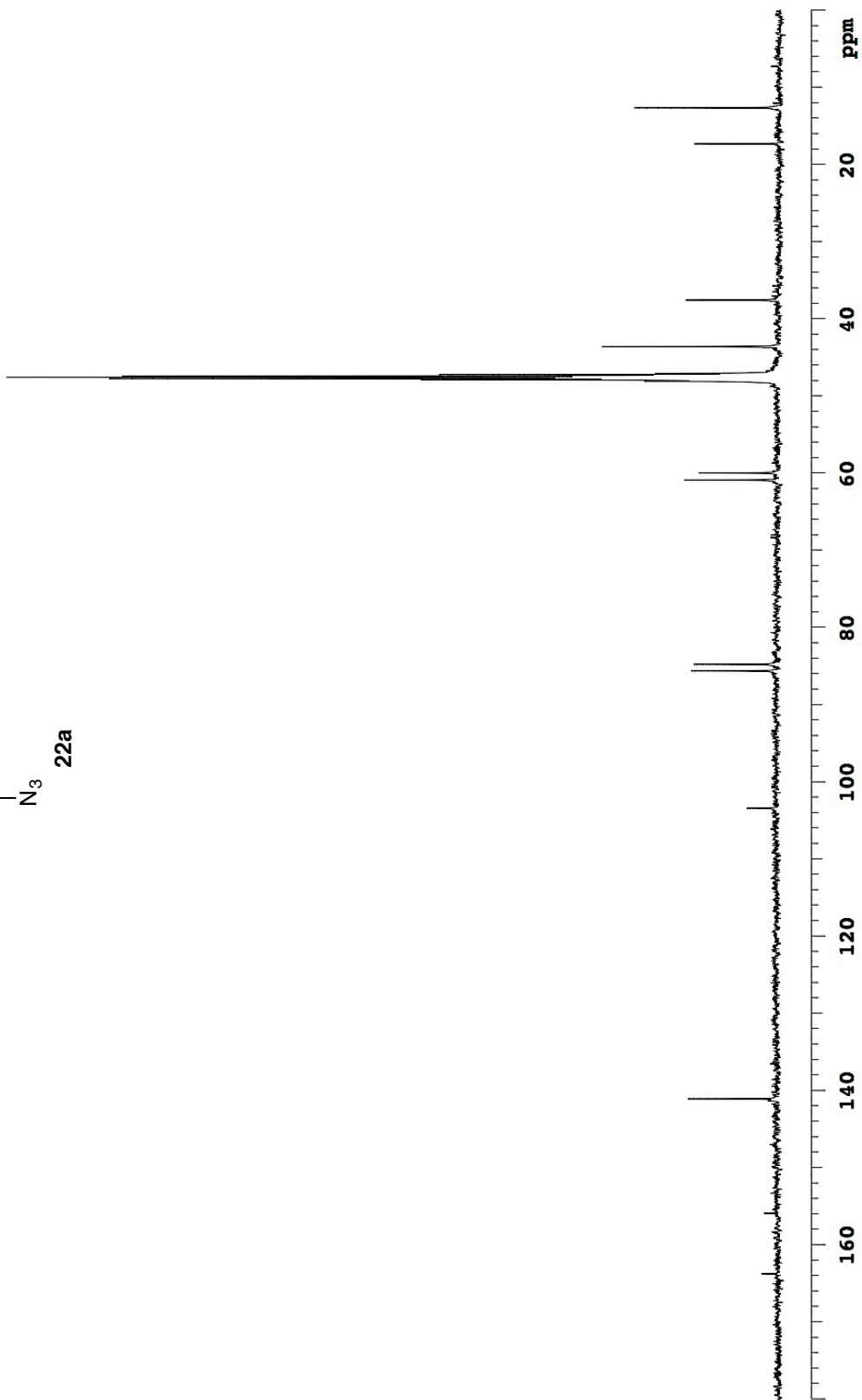
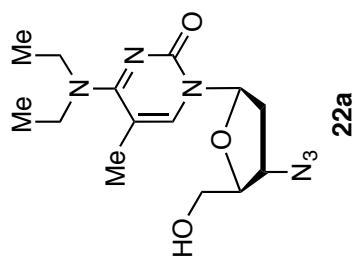
21d

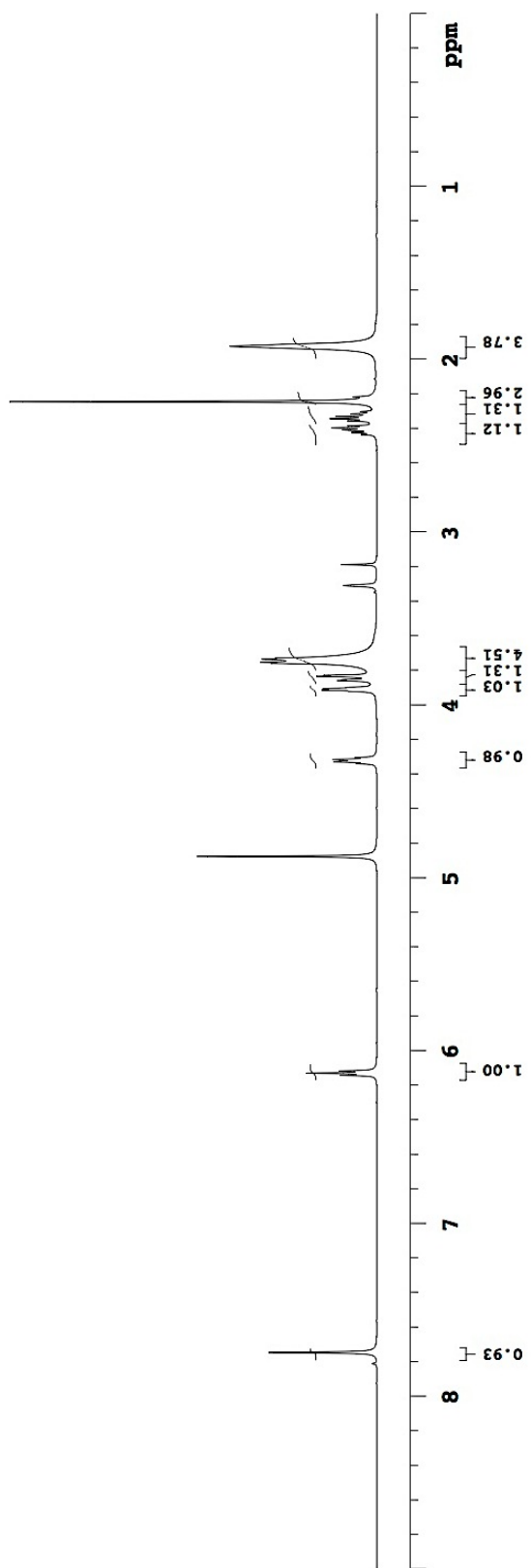
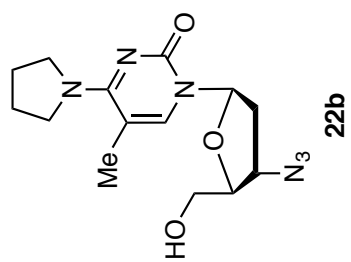


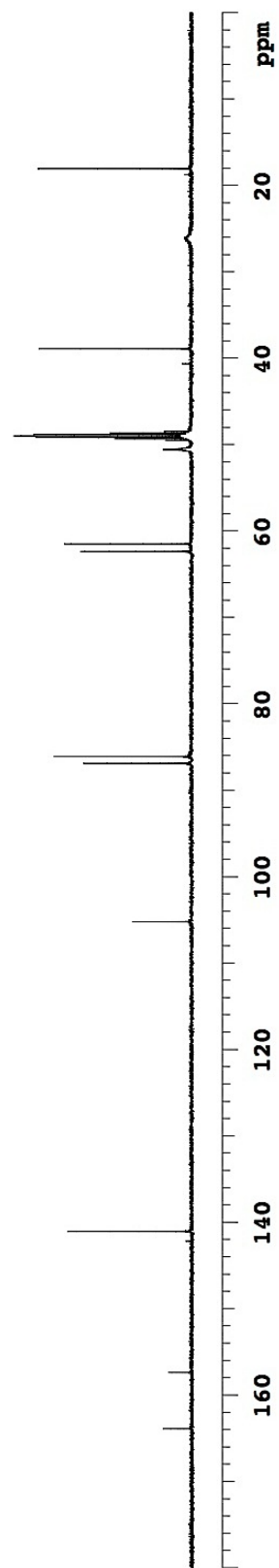
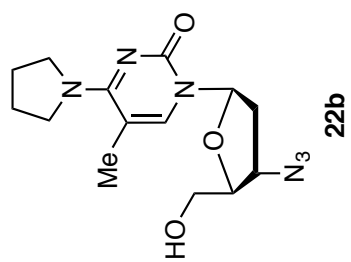




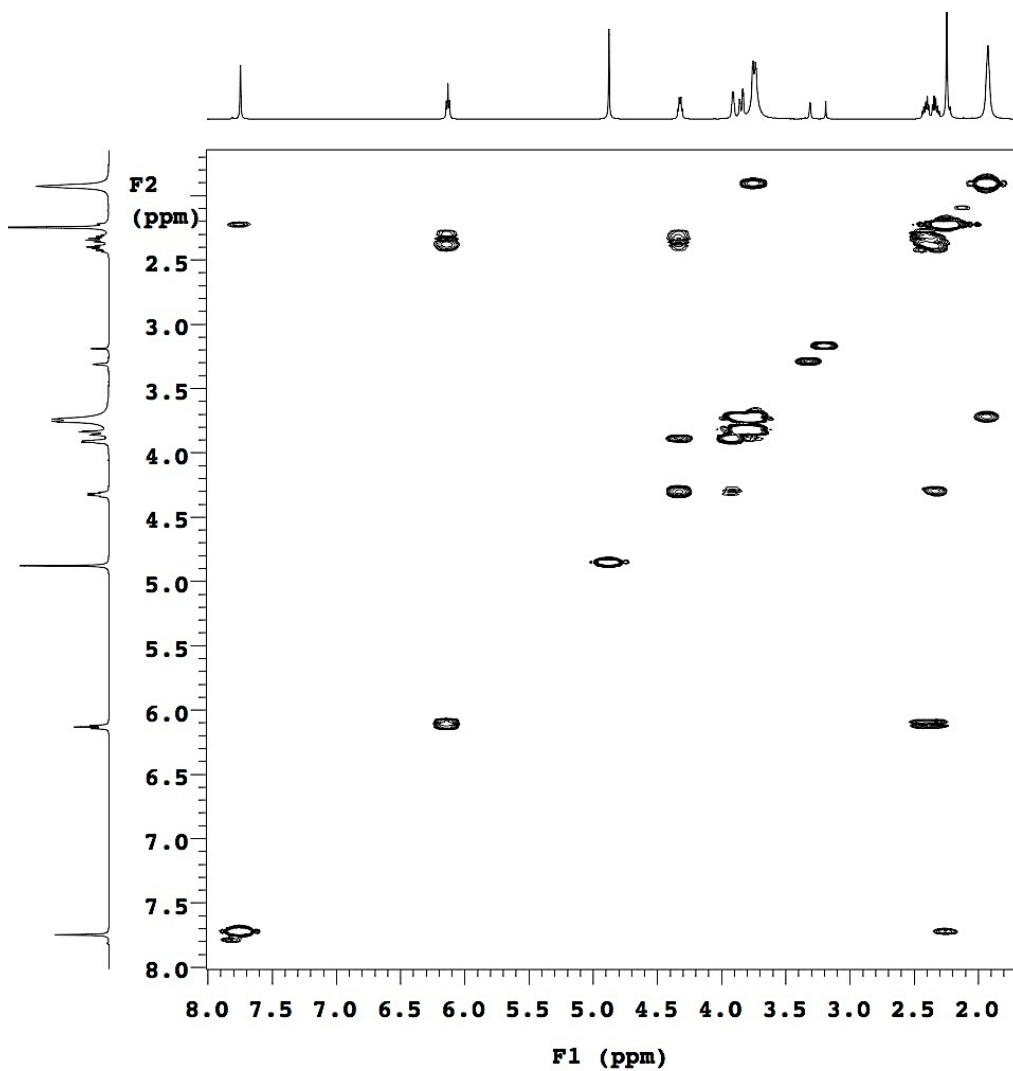
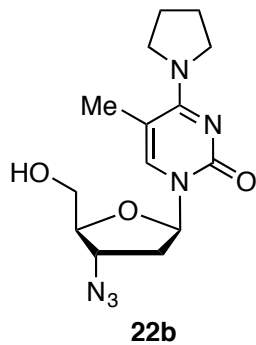




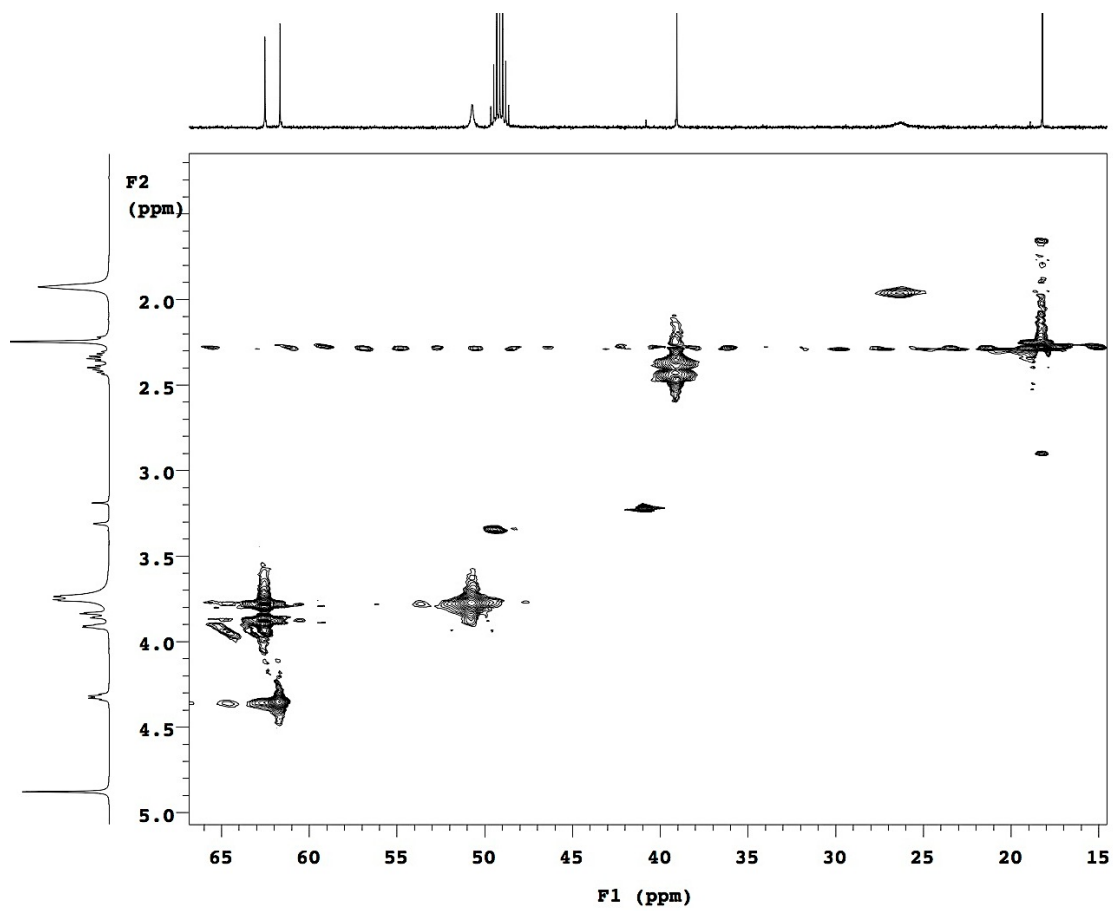
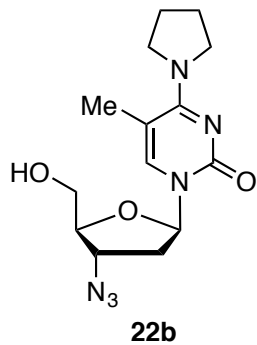


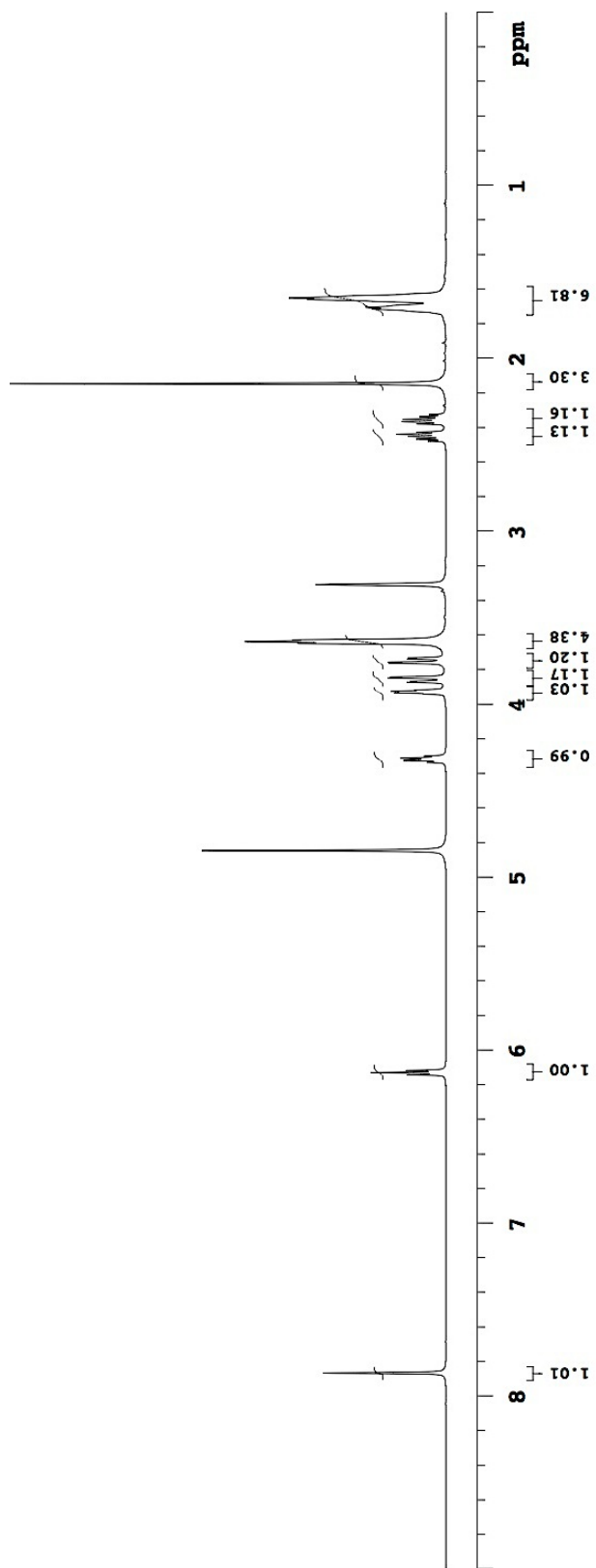
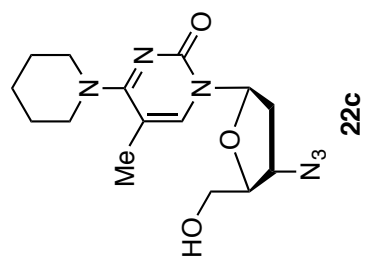


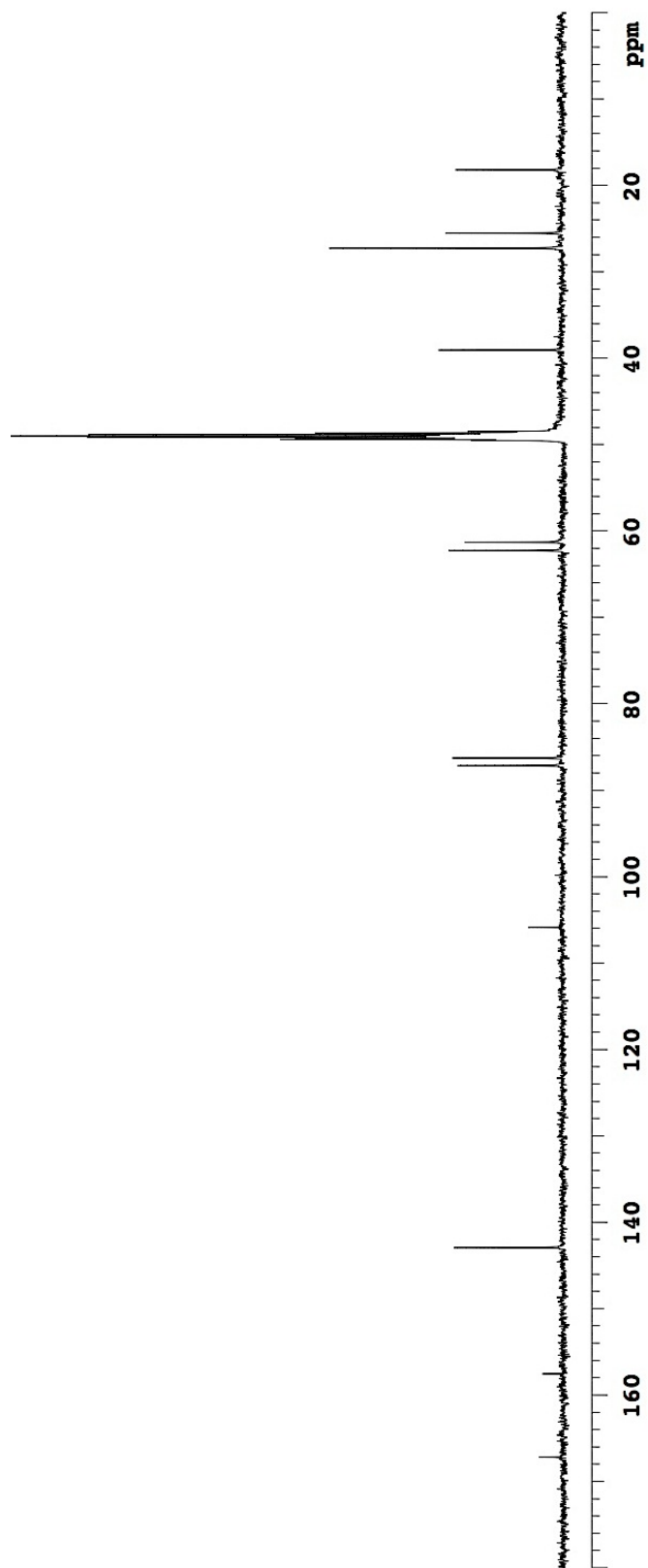
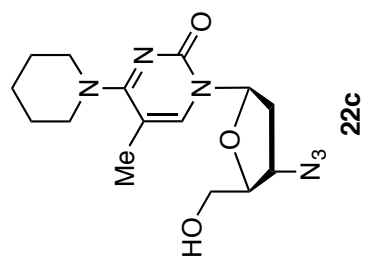
gCOSY spectrum of compound **22b** in CD₃OD

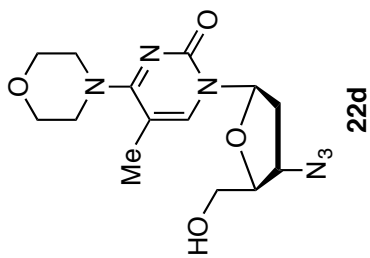


gHMQC spectrum of compound **22b** in CD₃OD

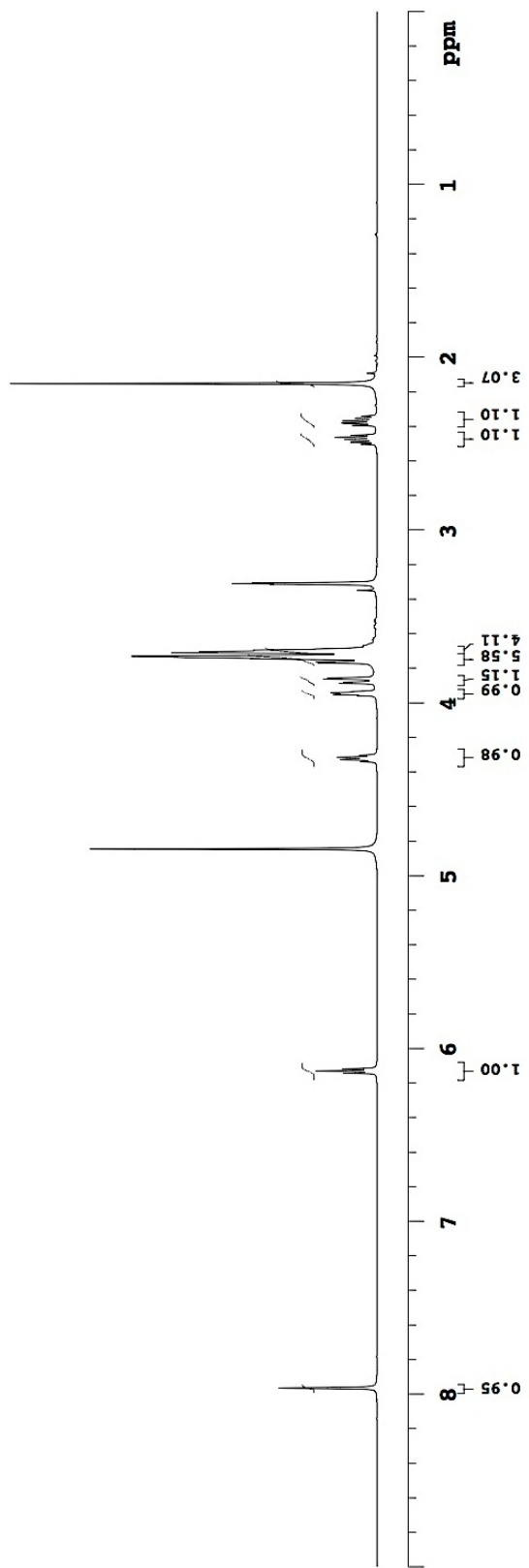


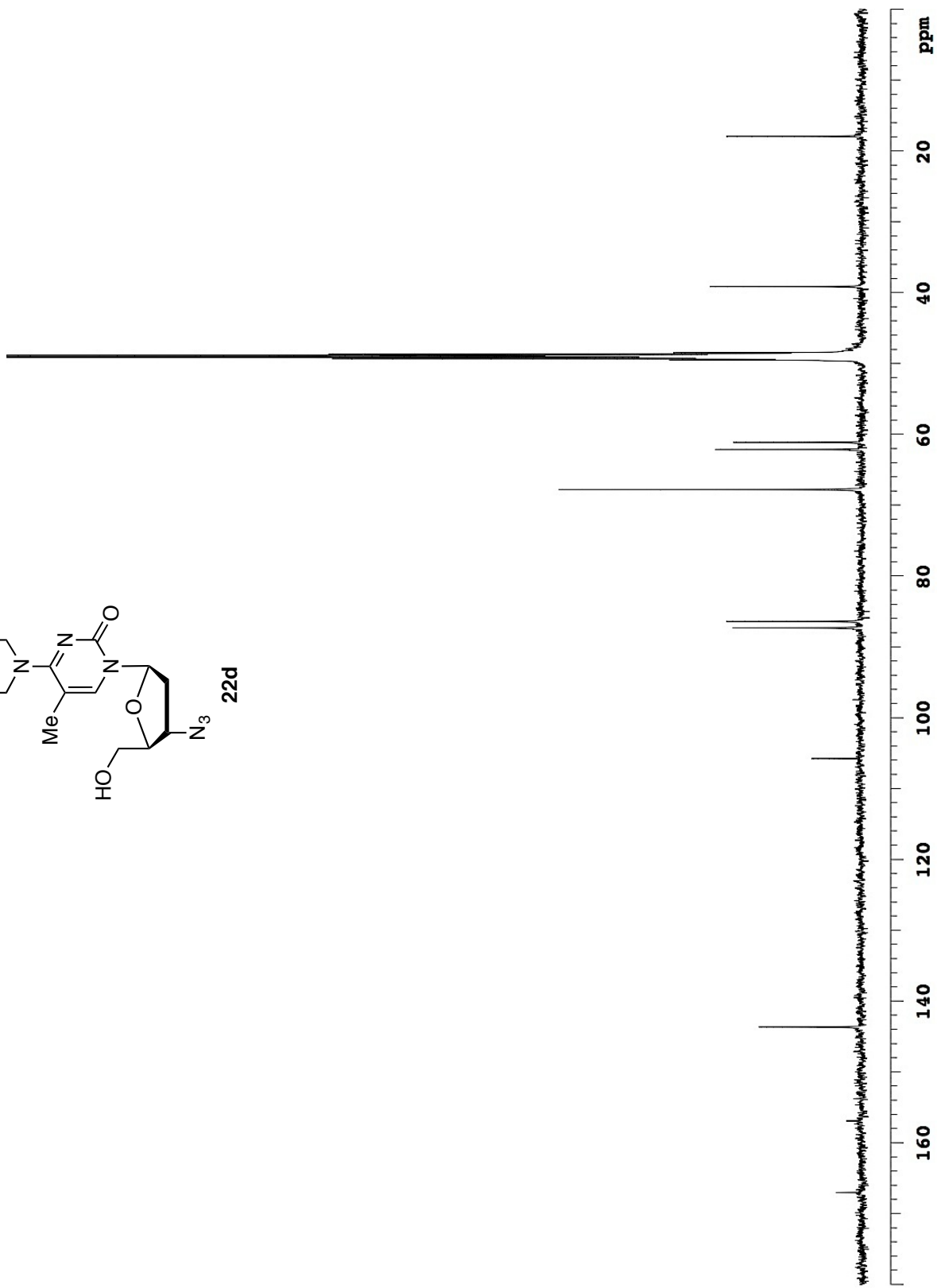
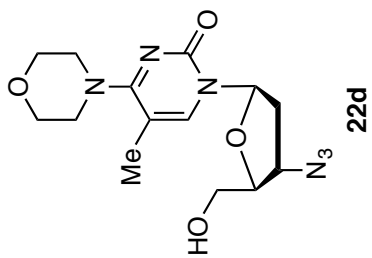


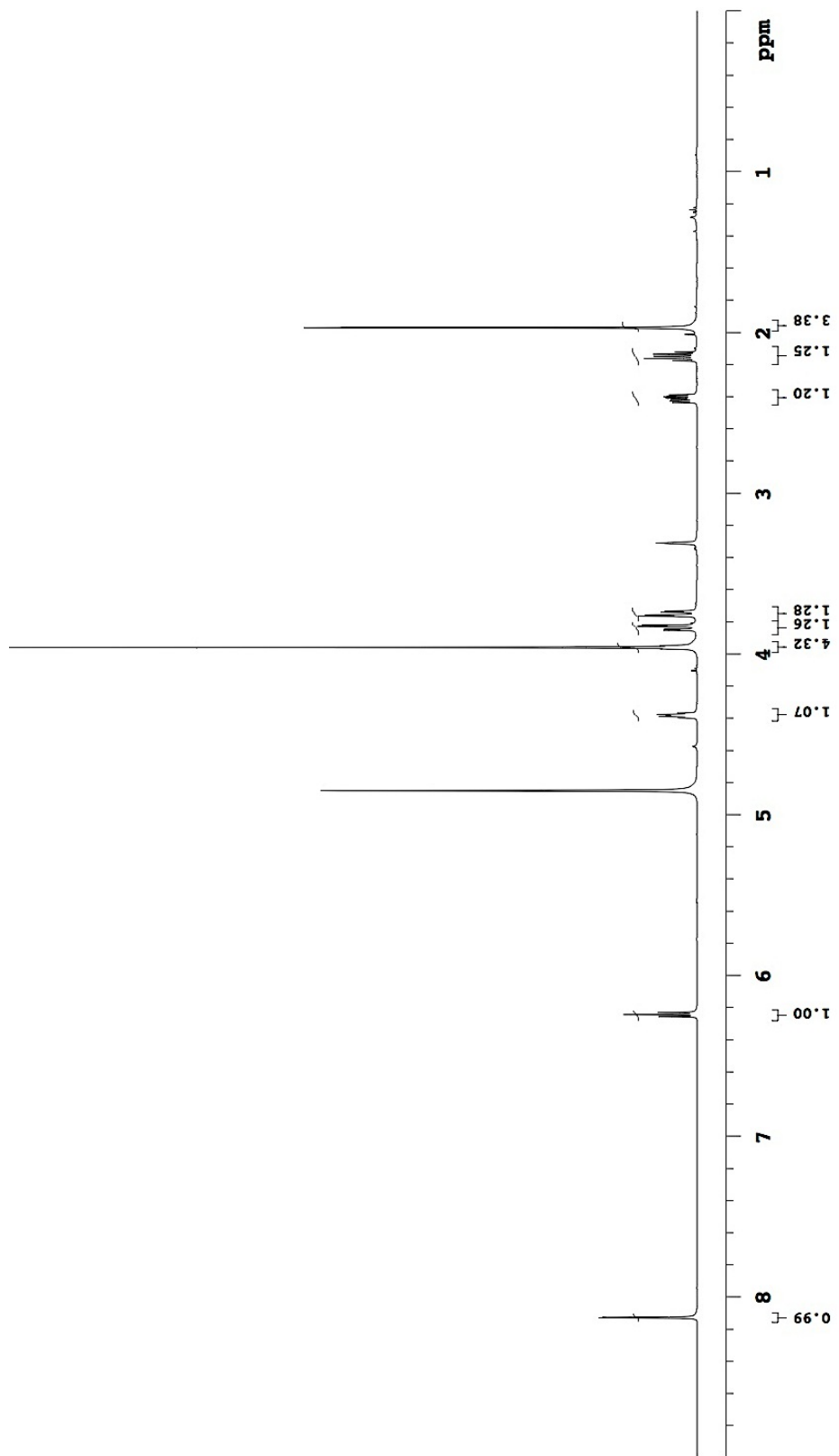
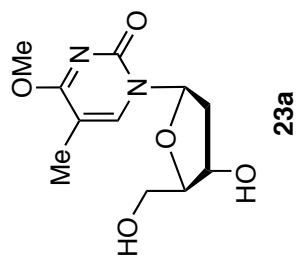


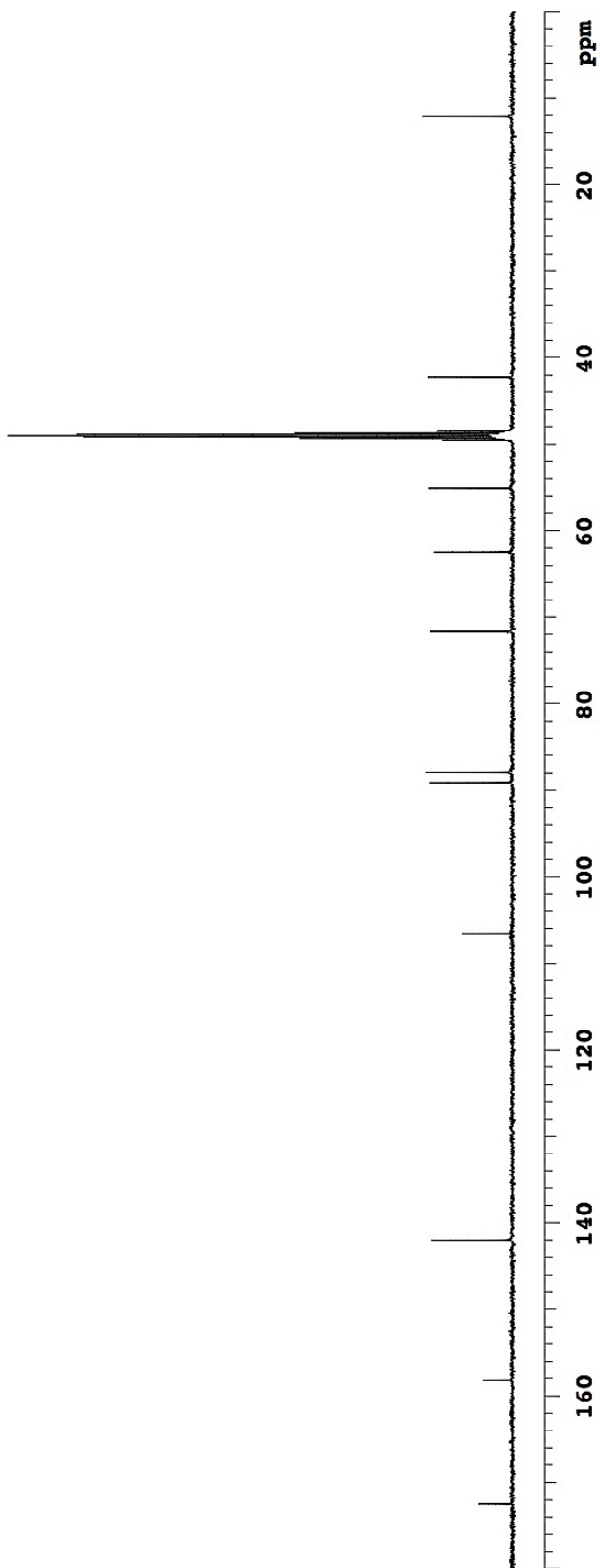
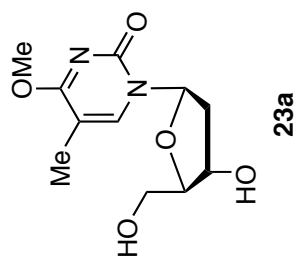


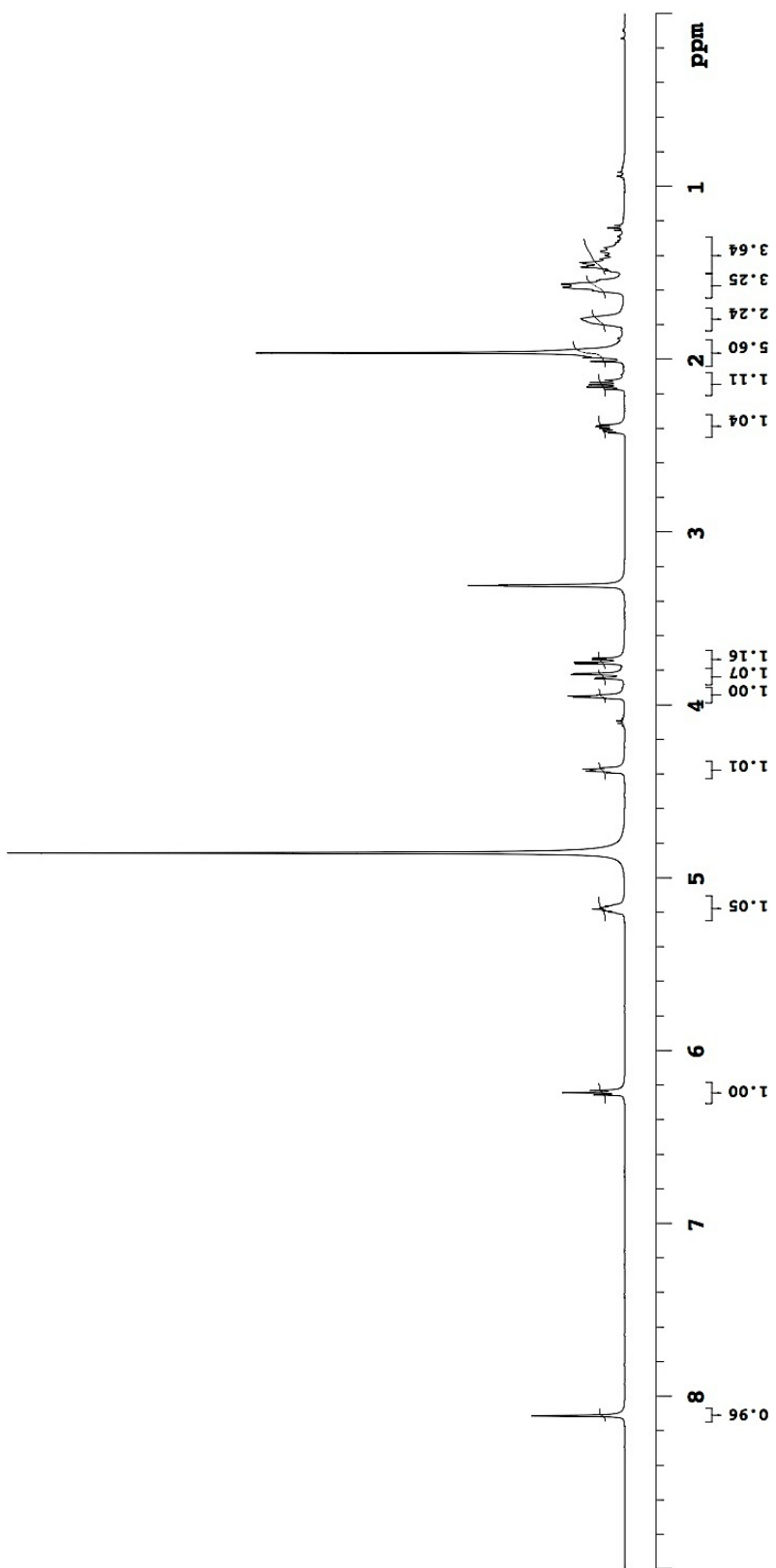
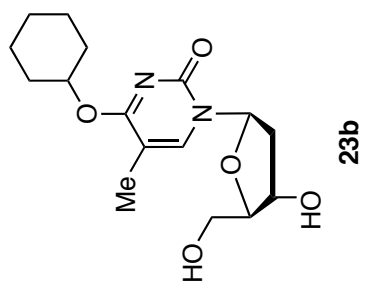
22d

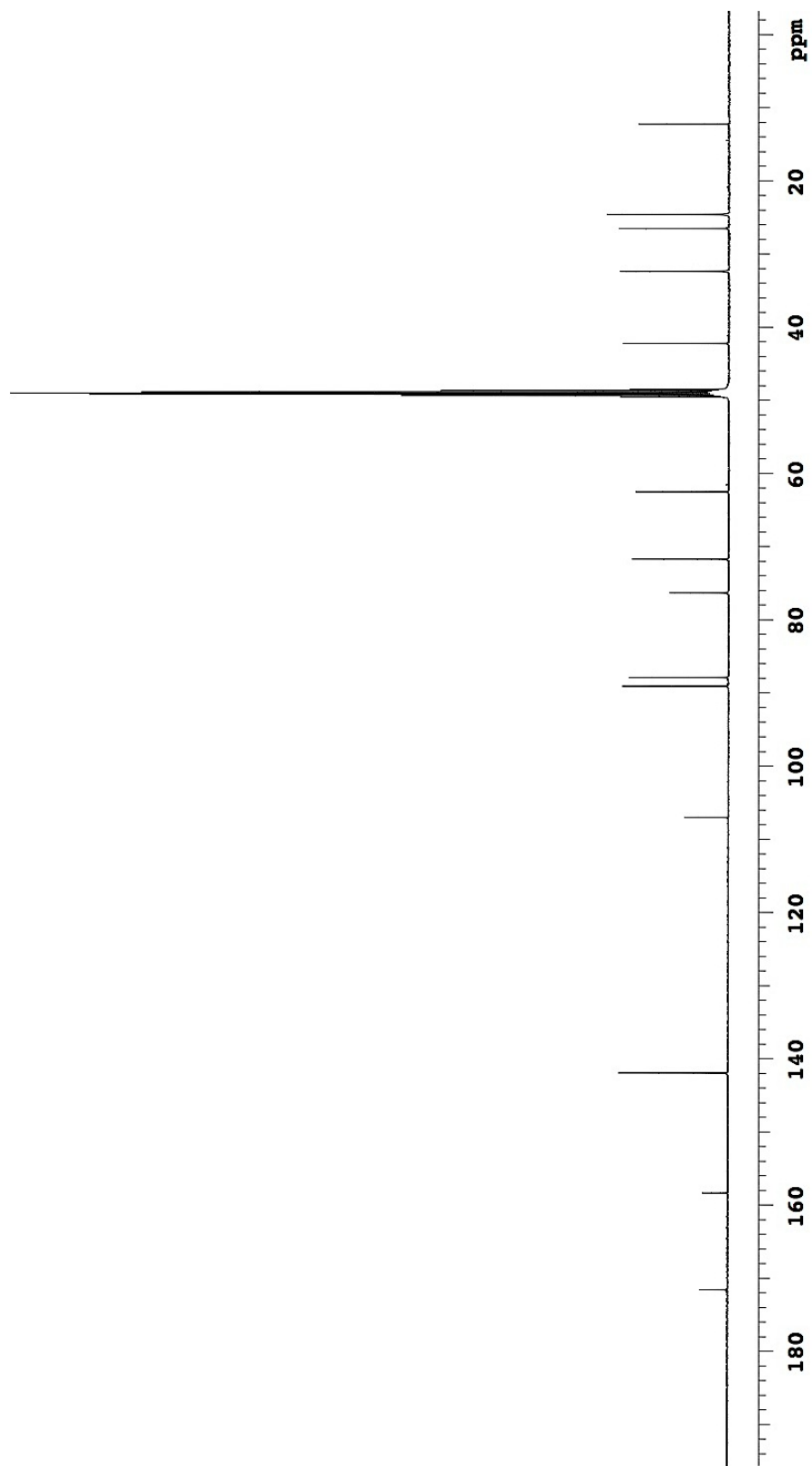
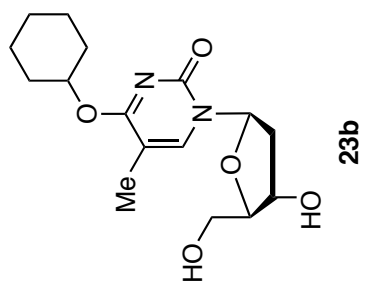


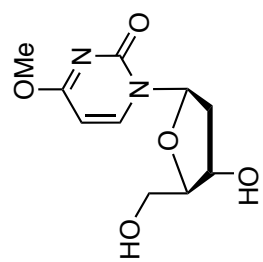




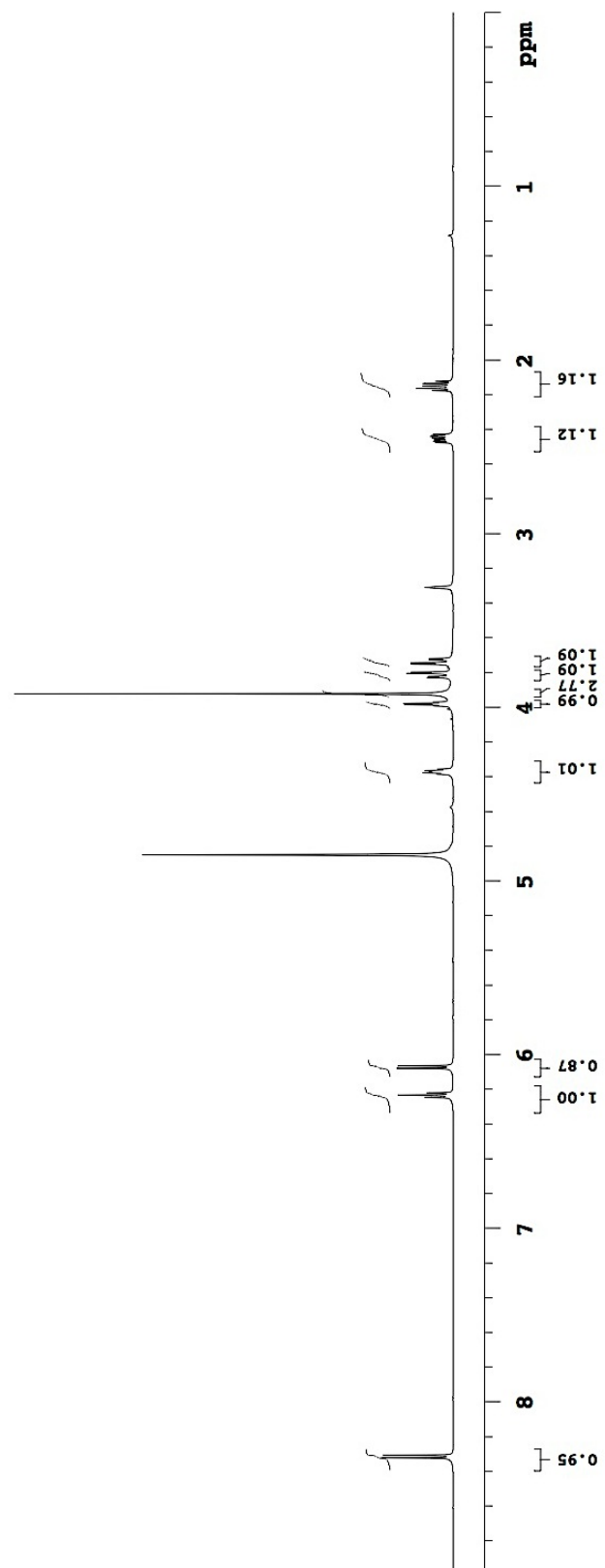


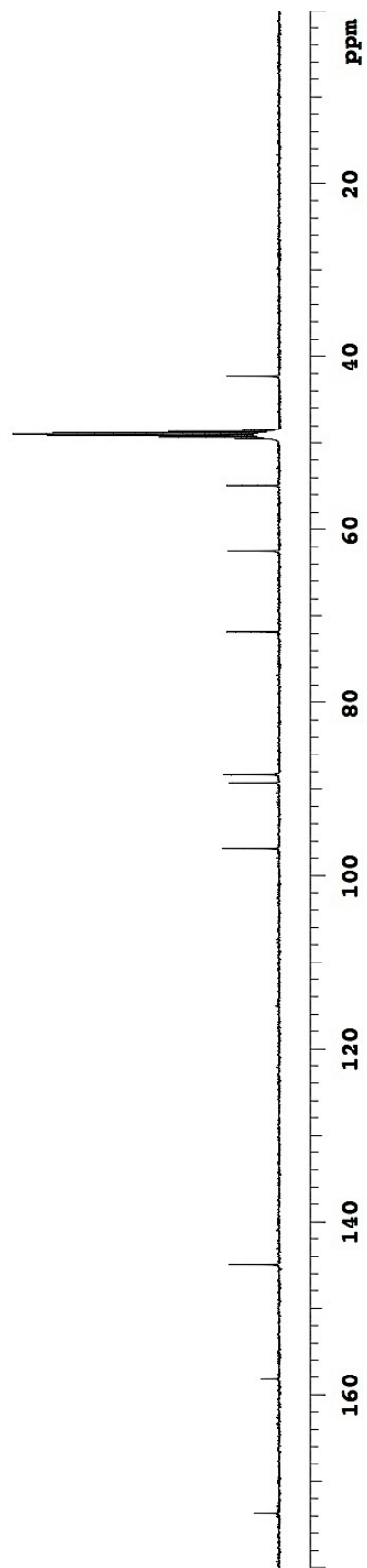
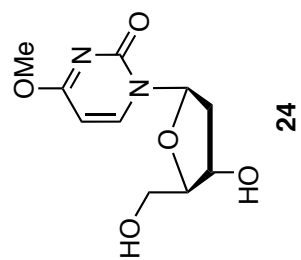


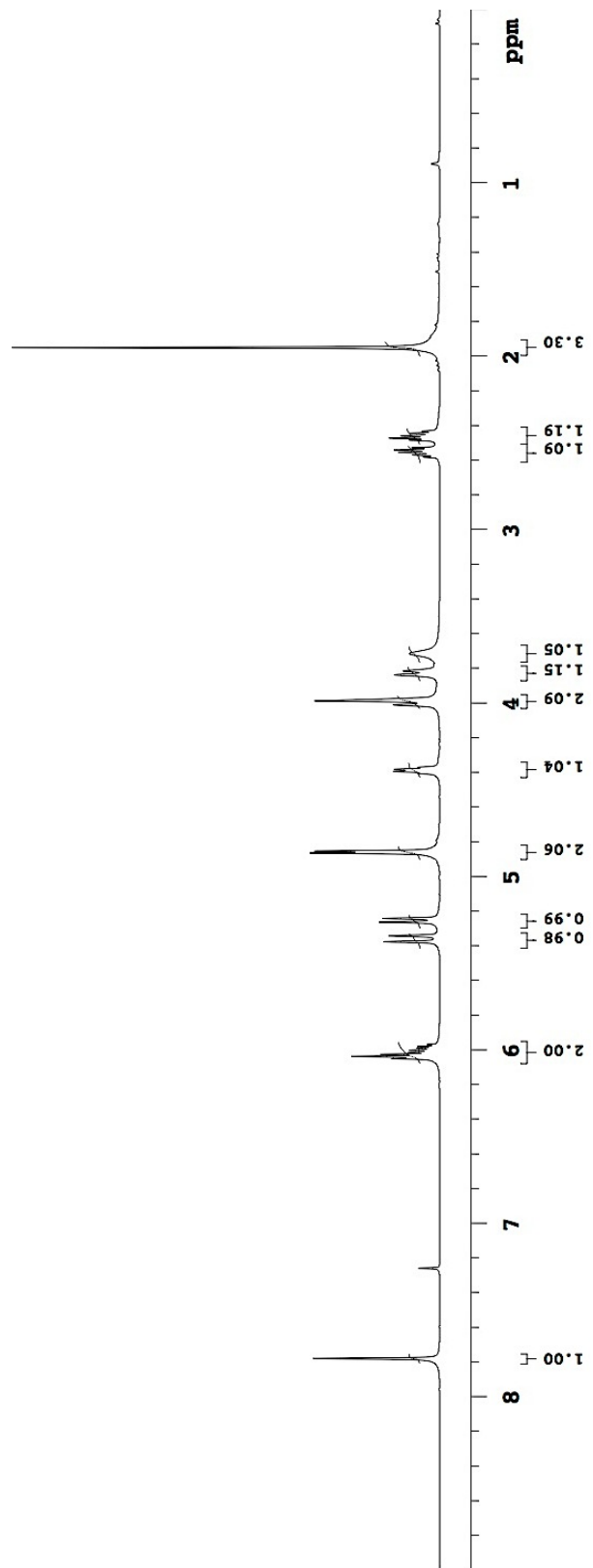
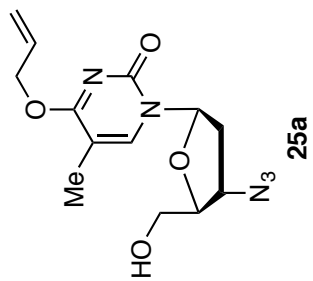


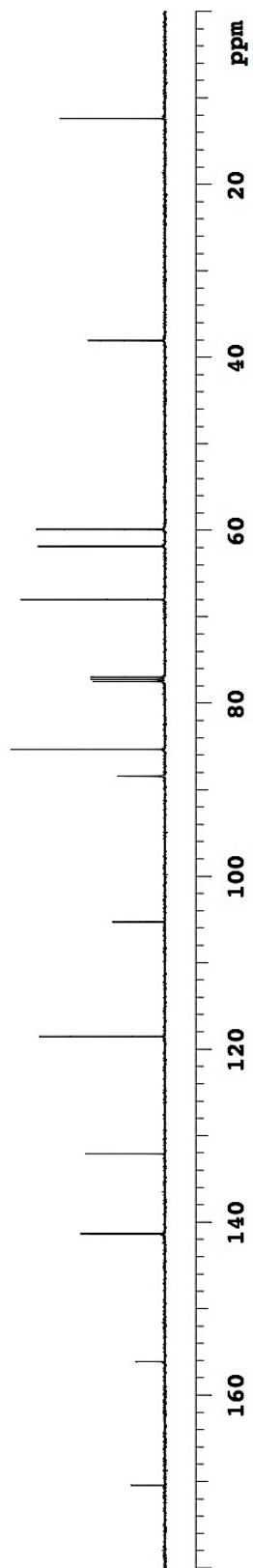
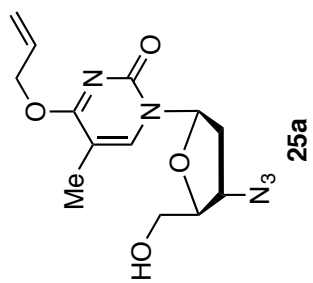


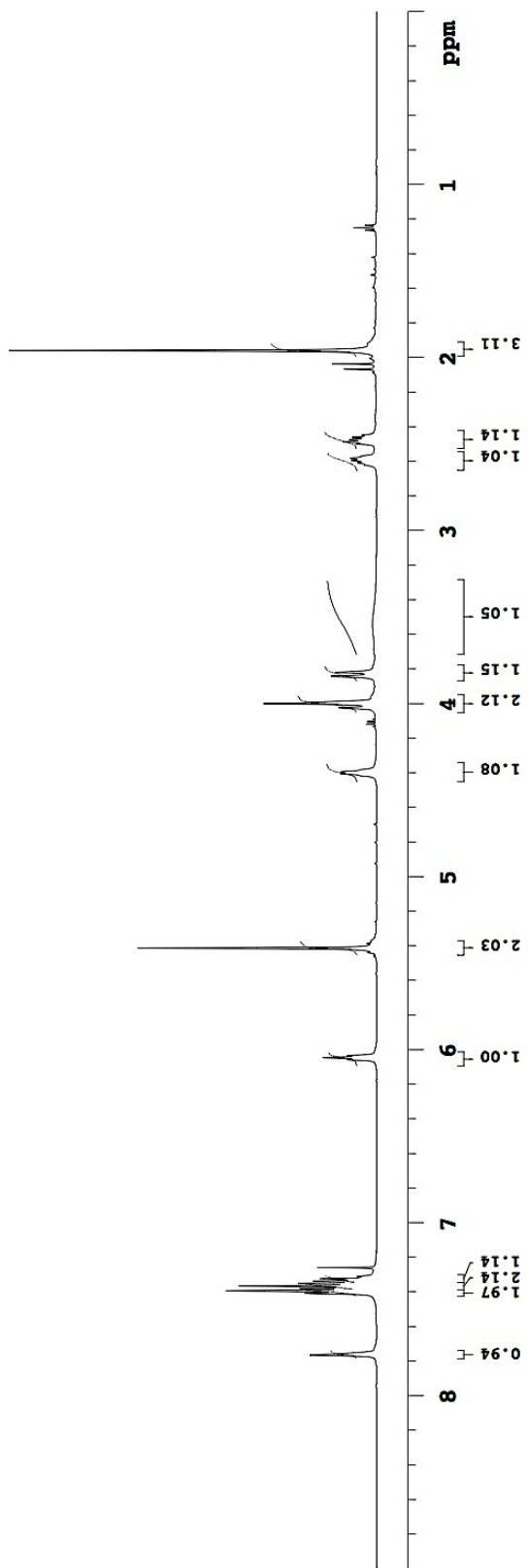
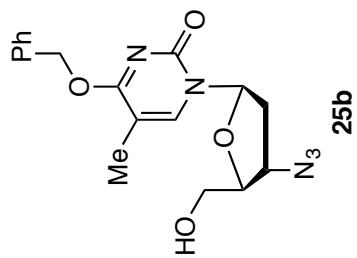
24

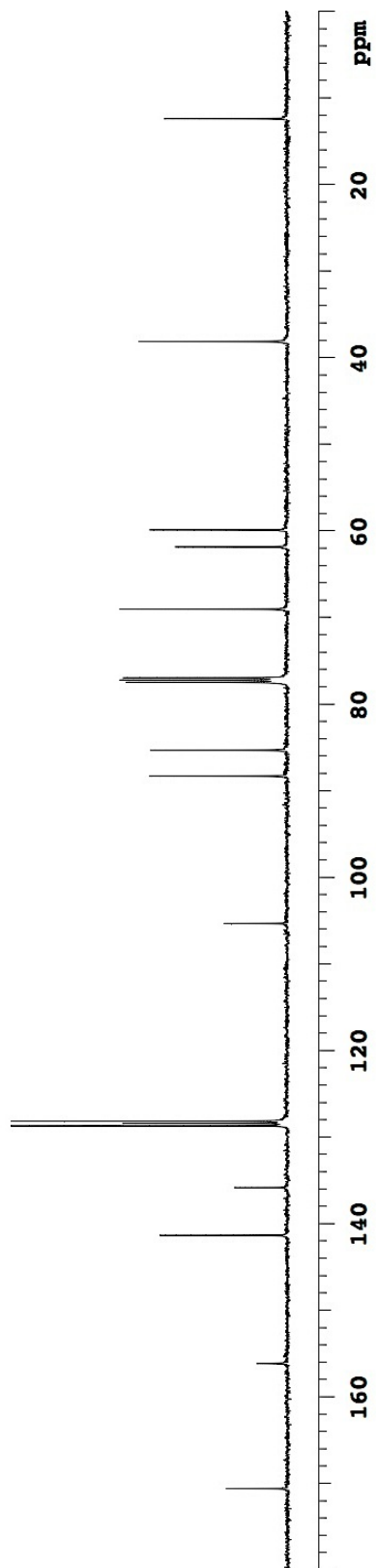
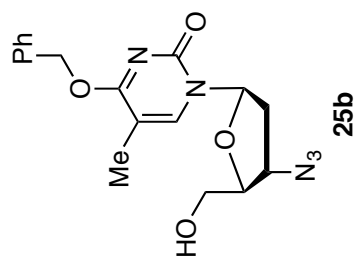


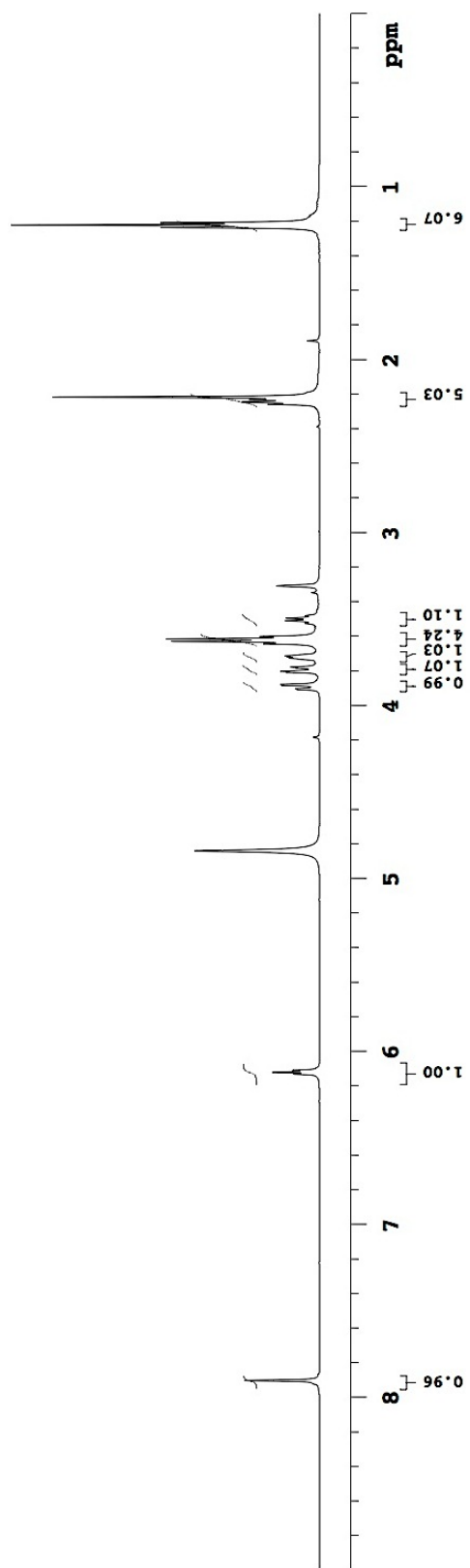
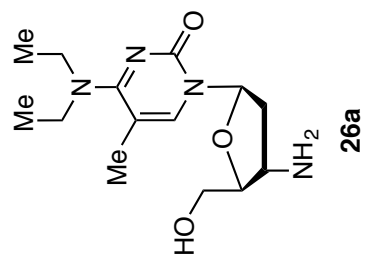


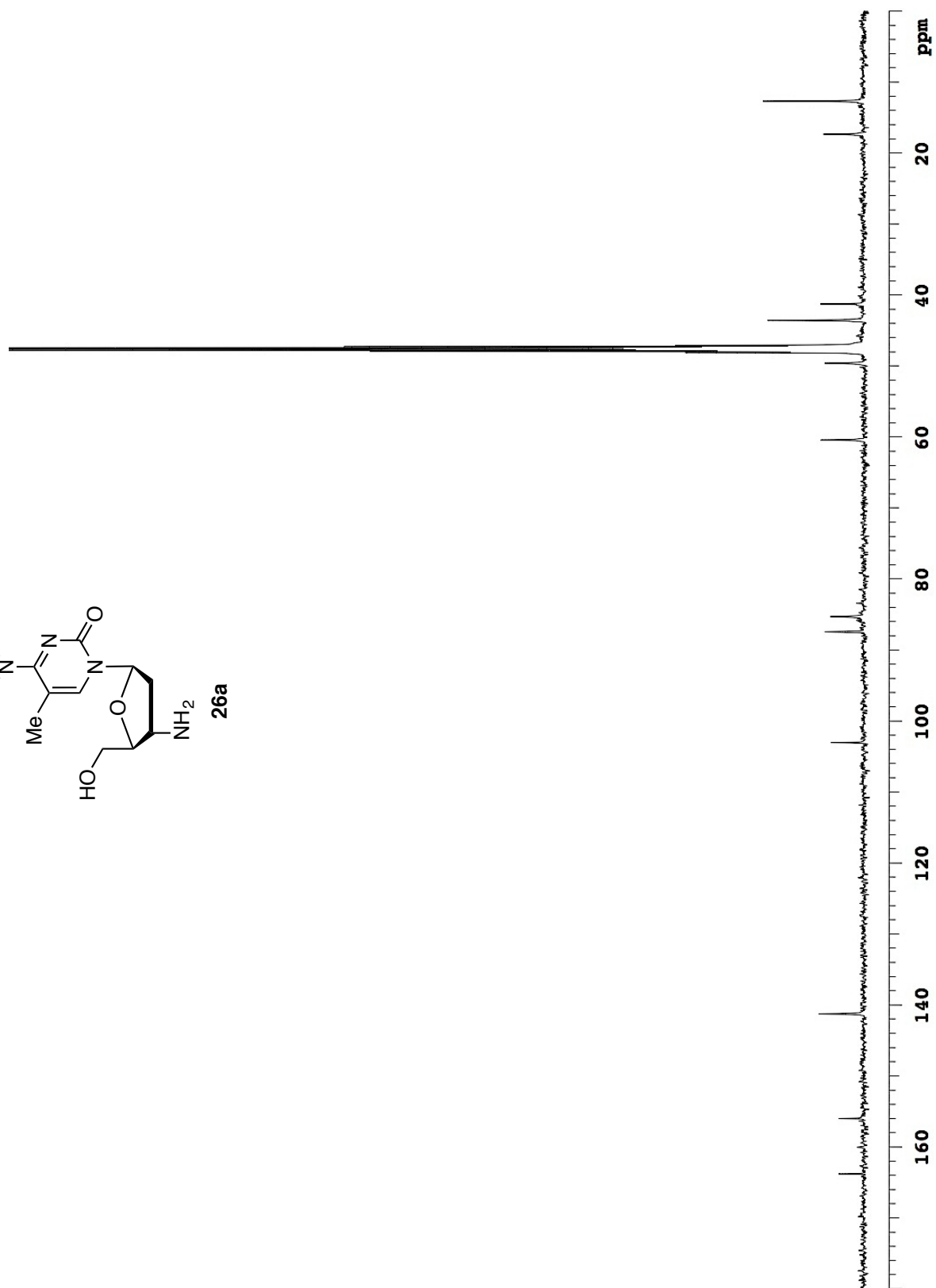
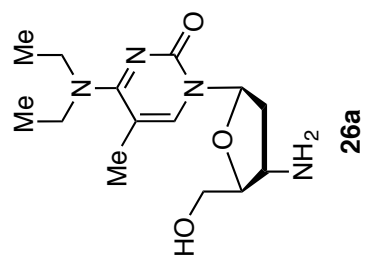


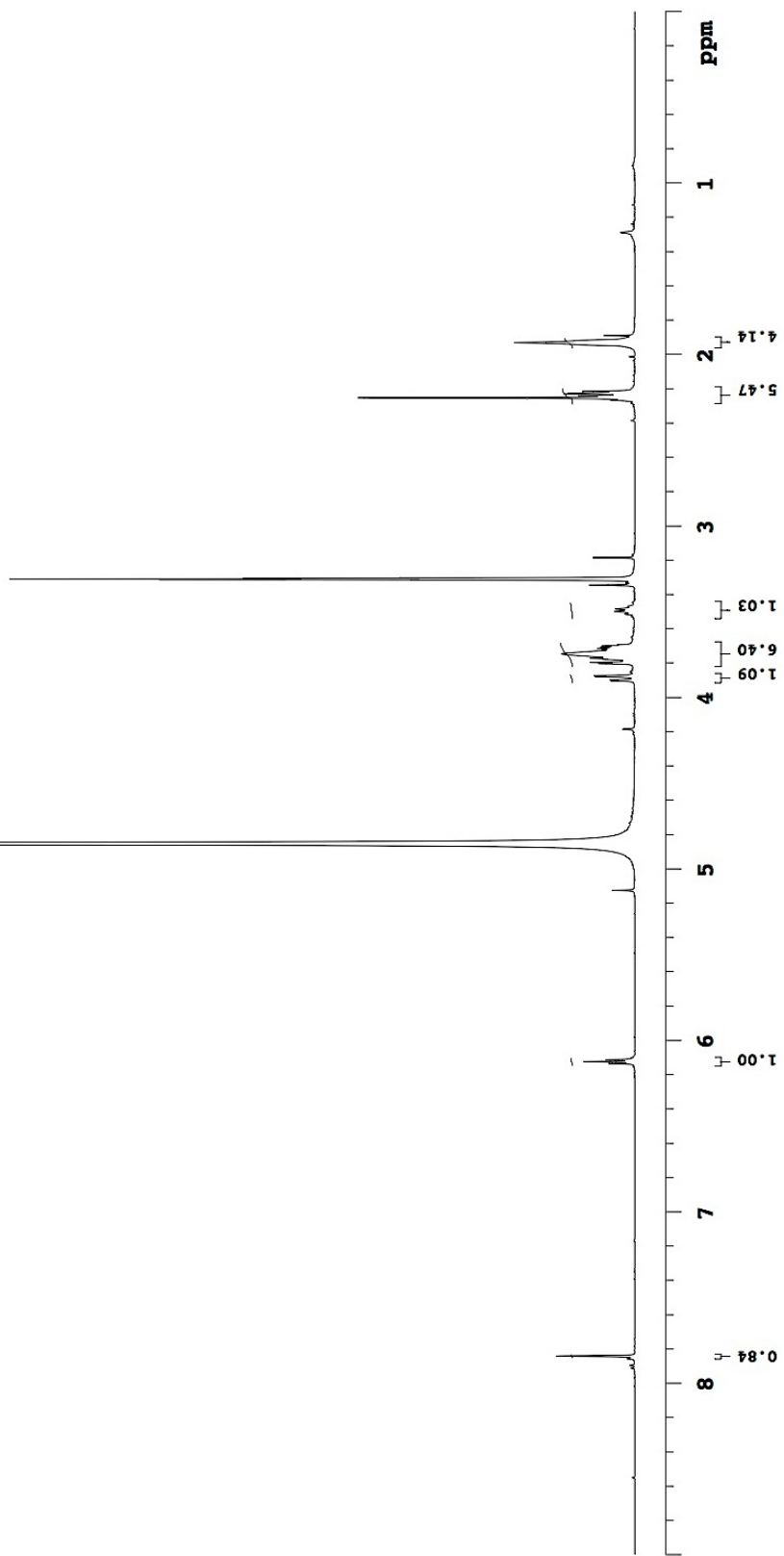
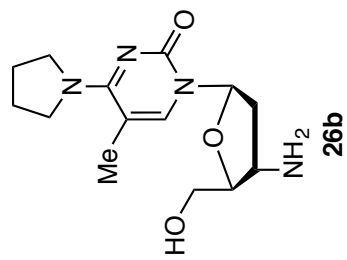


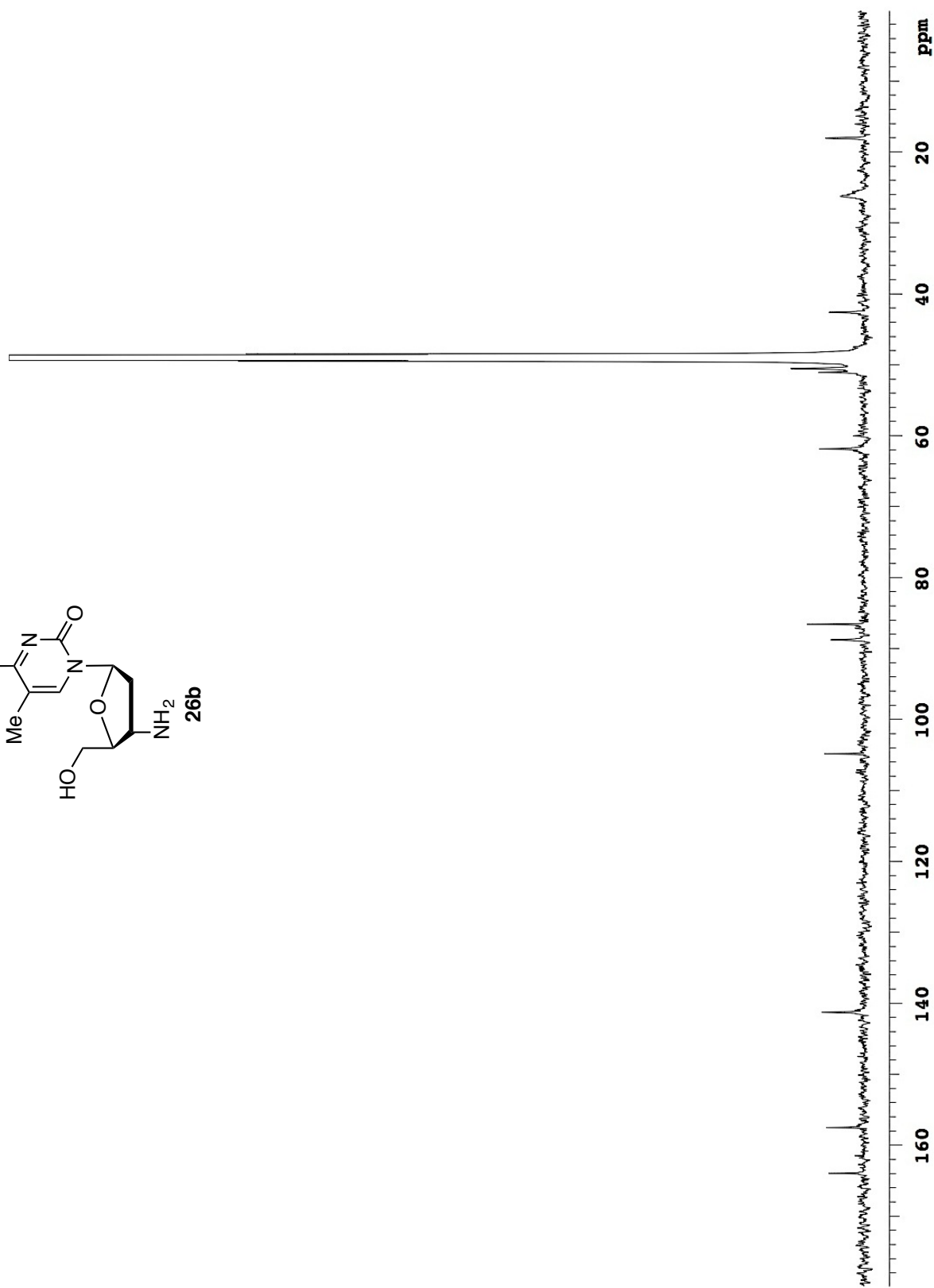
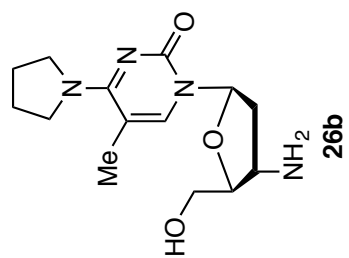


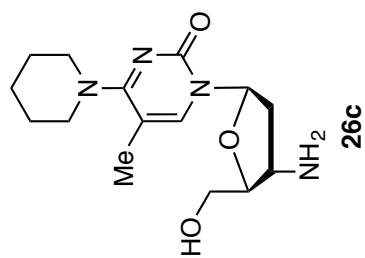




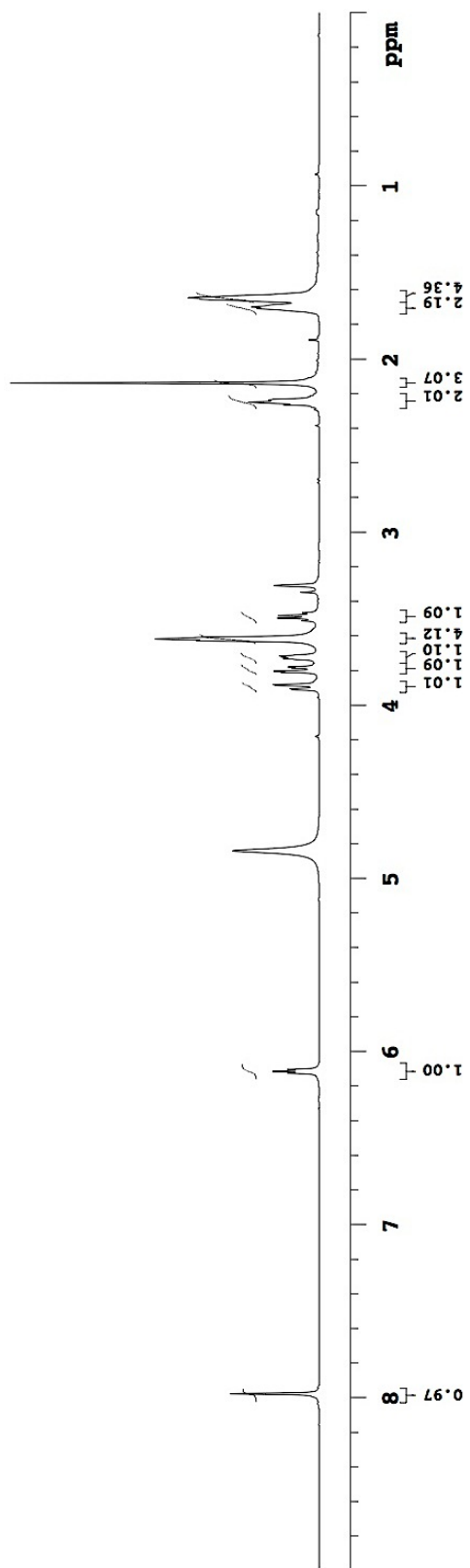


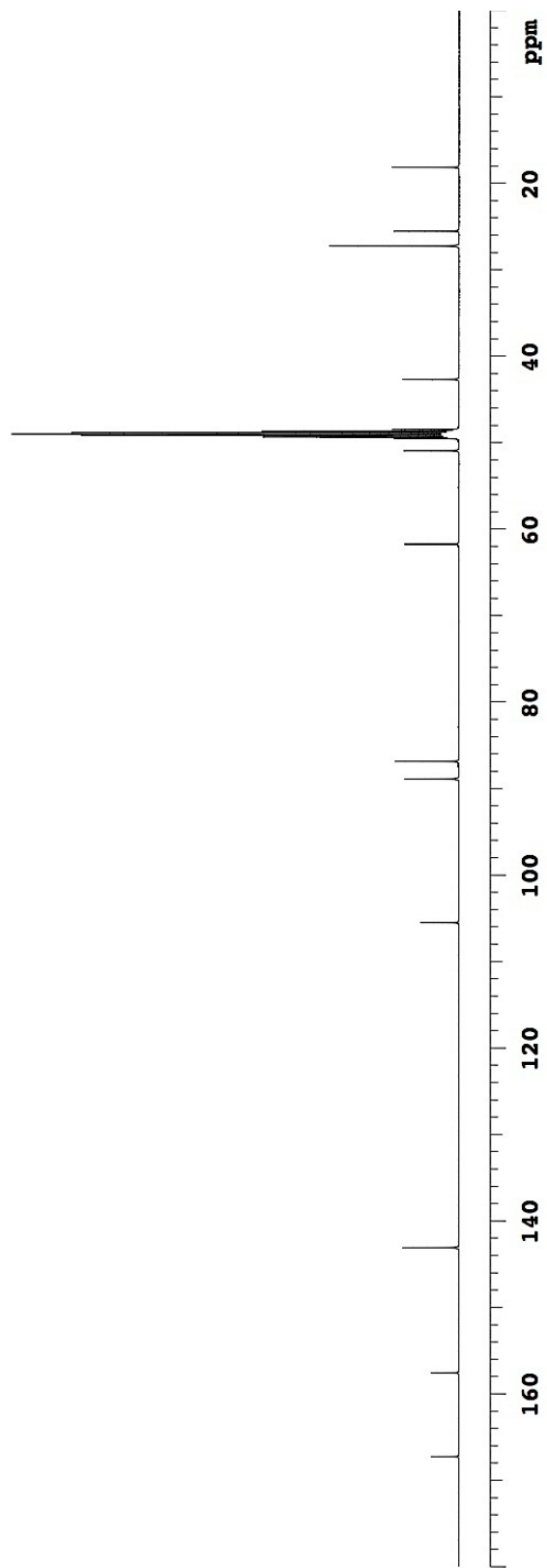
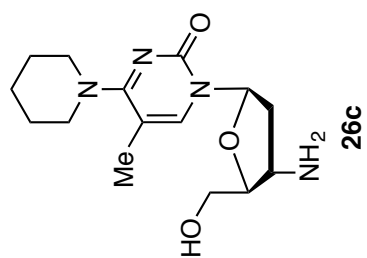




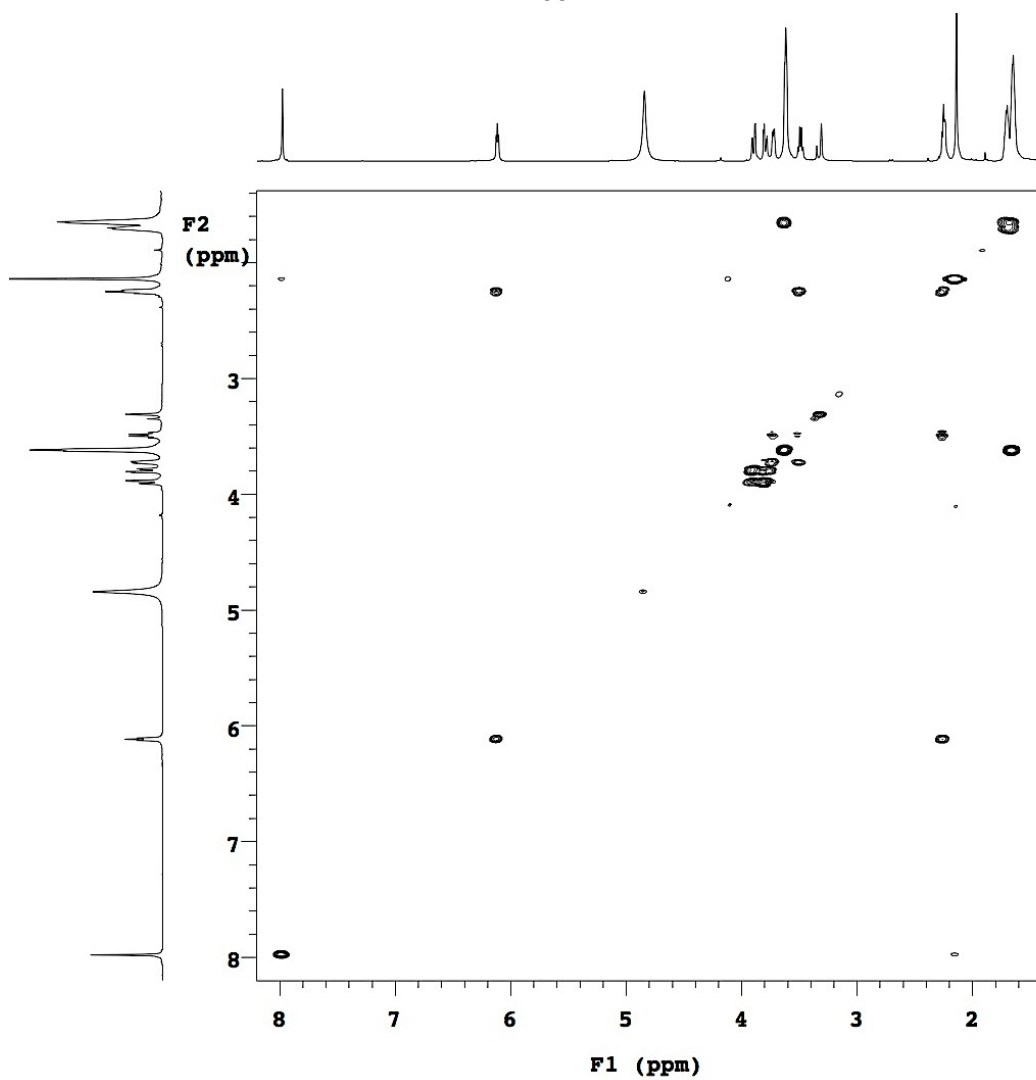
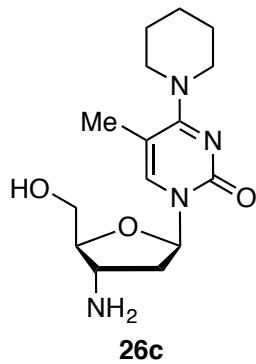


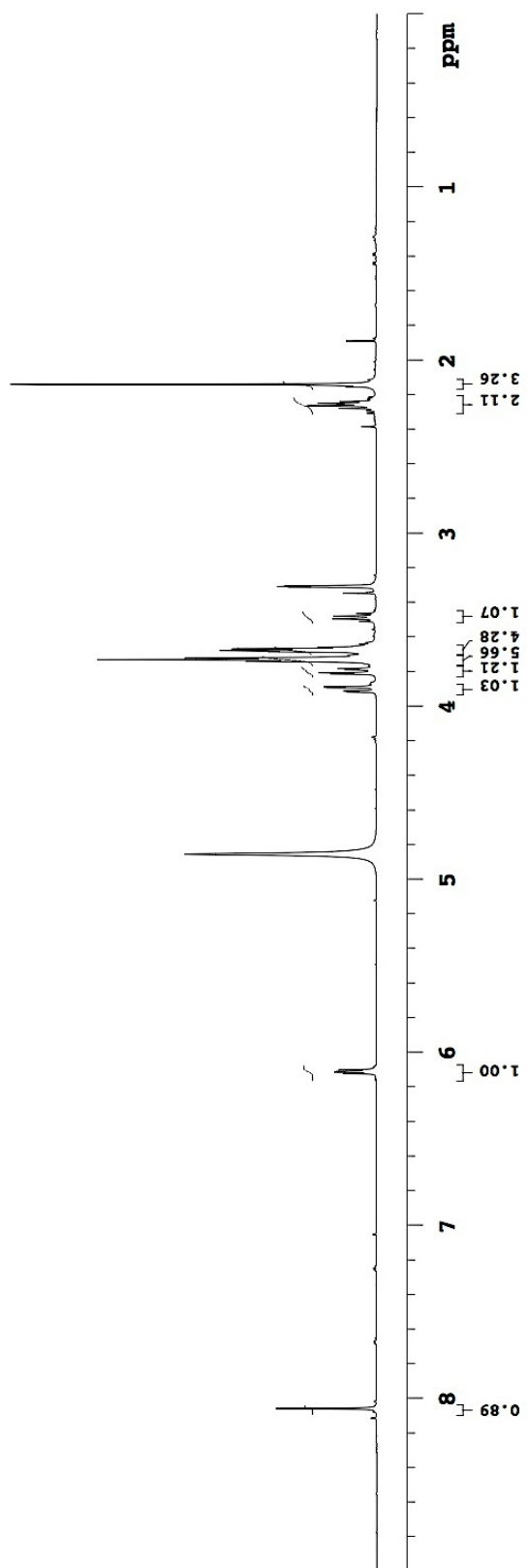
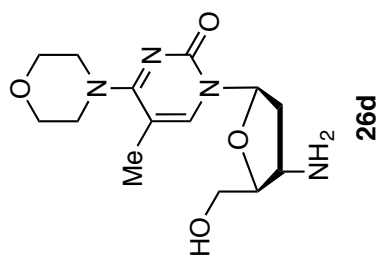
26c

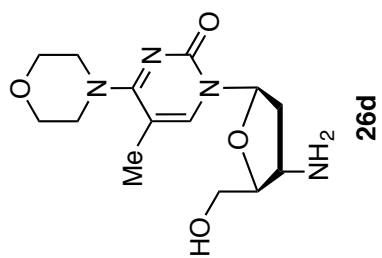




gCOSY spectrum of compound **26c** in CD₃OD







26d

