

Synthesis of Serine-based Glycolipids as Potential TLR4 Activators

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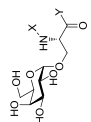
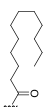
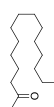
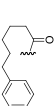
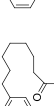
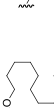
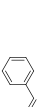
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SUPPORTING INFORMATION

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 $\text{HO}-\text{CH}_2-\text{CH}(\text{OH})-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}(\text{NH}_2)-\text{CO}-\text{Y}$	 $\text{X1 } [\text{C}_{11}\text{H}_{23}\text{O}_2]$	 $\text{X2 } [\text{C}_{17}\text{H}_{35}\text{O}_2]$	 $\text{X3 } [\text{C}_{24}\text{H}_{51}\text{O}_2]$	 $\text{X4 } [\text{C}_{31}\text{H}_{63}\text{O}_2]$	 $\text{X5 } [\text{C}_{38}\text{H}_{79}\text{O}_2]$	 $\text{X6 } [\text{C}_{45}\text{H}_{91}\text{O}_2]$	 $\text{X7 } [\text{C}_{52}\text{H}_{98}\text{O}_2]$	 $\text{X8 } [\text{C}_{59}\text{H}_{105}\text{O}_2]$	 $\text{X9 } [\text{C}_{66}\text{H}_{111}\text{O}_2]$	 $\text{X10 } [\text{C}_{73}\text{H}_{117}\text{O}_2]$	 $\text{X11 } [\text{C}_{80}\text{H}_{123}\text{O}_2]$	 $\text{X12 } [\text{C}_{87}\text{H}_{129}\text{O}_2]$
 $\text{Y1 } [\text{C}_{11}\text{H}_{23}\text{N}]$	4a-1	4a-2	4a-3	4a-4	4a-5	4a-6	4a-7	4a-8	4a-9	4a-10	4a-11	4a-12
 $\text{Y2 } [\text{C}_{17}\text{H}_{35}\text{N}]$	4b-1	4b-2	4b-3	4b-4	4b-5	4b-6	4b-7	4b-8	4b-9	4b-10	4b-11	4b-12
 $\text{Y3 } [\text{C}_{24}\text{H}_{51}\text{N}]$	4c-1	4c-2	4c-3	4c-4	4c-5	4c-6	4c-7	4c-8	4c-9	4c-10	4c-11	4c-12
 $\text{Y4 } [\text{C}_{31}\text{H}_{63}\text{N}]$	4d-1	4d-2	4d-3	4d-4	4d-5	4d-6	4d-7	4d-8	4d-9	4d-10	4d-11	4d-12
 $\text{Y5 } [\text{C}_{38}\text{H}_{79}\text{N}]$	4e-1	4e-2	4e-3	4e-4	4e-5	4e-6	4e-7	4e-8	4e-9	4e-10	4e-11	4e-12

S1. Serine-based lipid library structures

S2. NF-κB activities of Serine-based lipid library

	formula		Calc.	found
4a-1	C ₂₇ H ₅₂ N ₂ O ₈ Na	[M+Na] ⁺	555.3621	555.3622
4a-2	C ₂₉ H ₅₆ N ₂ O ₈ Na	[M+Na] ⁺	583.3934	583.3926
4a-3	C ₃₁ H ₆₀ N ₂ O ₈ Na	[M+Na] ⁺	611.4247	611.4244
4a-4	C ₃₃ H ₆₄ N ₂ O ₈ Na	[M+Na] ⁺	639.4560	639.4568
4a-5	C ₃₅ H ₆₈ N ₂ O ₈ Na	[M+Na] ⁺	667.4873	667.4871
4a-6	C ₃₇ H ₇₂ N ₂ O ₈ Na	[M+Na] ⁺	695.5186	695.5172
4a-7	C ₂₉ H ₅₄ N ₂ O ₈ Na	[M+Na] ⁺	581.3778	581.3771
4a-8	C ₃₀ H ₅₄ N ₂ O ₈ Na	[M+Na] ⁺	593.3778	593.3775
4a-9	C ₃₁ H ₅₂ N ₂ O ₈ Na	[M+Na] ⁺	603.3621	603.3622
4a-10	C ₃₃ H ₅₆ N ₂ O ₈ Na	[M+Na] ⁺	631.3934	631.3929
4a-11	C ₃₆ H ₆₂ N ₂ O ₉ Na	[M+Na] ⁺	689.4353	689.4353
4a-12	C ₃₀ H ₅₀ N ₂ O ₈ Na	[M+Na] ⁺	589.3465	589.3465
4b-1	C ₂₈ H ₅₄ N ₂ O ₈ Na	[M+Na] ⁺	569.3778	569.3778
4b-2	C ₃₀ H ₅₈ N ₂ O ₈ Na	[M+Na] ⁺	597.4091	597.4096
4b-3	C ₃₂ H ₆₂ N ₂ O ₈ Na	[M+Na] ⁺	625.4404	625.4400
4b-4	C ₃₄ H ₆₆ N ₂ O ₈ Na	[M+Na] ⁺	653.4717	653.4711
4b-5	C ₃₆ H ₇₀ N ₂ O ₈ Na	[M+Na] ⁺	681.5030	681.5029
4b-6	C ₃₈ H ₇₄ N ₂ O ₈ Na	[M+Na] ⁺	709.5343	709.5353
4b-7	C ₃₀ H ₅₆ N ₂ O ₈ Na	[M+Na] ⁺	595.3934	595.3926
4b-8	C ₃₁ H ₅₆ N ₂ O ₈ Na	[M+Na] ⁺	607.3934	607.3931
4b-9	C ₃₂ H ₅₄ N ₂ O ₈ Na	[M+Na] ⁺	617.3778	617.3771
4b-10	C ₃₄ H ₅₈ N ₂ O ₈ Na	[M+Na] ⁺	645.4091	645.4084
4b-11	C ₃₇ H ₆₄ N ₂ O ₉ Na	[M+Na] ⁺	703.4510	703.4503
4b-12	C ₃₁ H ₅₂ N ₂ O ₈ Na	[M+Na] ⁺	603.3621	603.3620
4c-1	C ₂₉ H ₅₆ N ₂ O ₈ Na	[M+Na] ⁺	583.3934	583.3926
4c-2	C ₃₁ H ₆₀ N ₂ O ₈ Na	[M+Na] ⁺	611.4247	611.4264
4c-3	C ₃₃ H ₆₄ N ₂ O ₈ Na	[M+Na] ⁺	639.4560	639.4553
4c-4	C ₃₅ H ₆₈ N ₂ O ₈ Na	[M+Na] ⁺	667.4873	667.4878
4c-5	C ₃₇ H ₇₂ N ₂ O ₈ Na	[M+Na] ⁺	695.5186	695.5129
4c-6	C ₃₉ H ₇₆ N ₂ O ₈ Na	[M+Na] ⁺	723.5499	723.5502
4c-7	C ₃₁ H ₅₈ N ₂ O ₈ Na	[M+Na] ⁺	609.4091	609.4101
4c-8	C ₃₂ H ₅₈ N ₂ O ₈ Na	[M+Na] ⁺	621.4091	621.4094
4c-9	C ₃₃ H ₅₆ N ₂ O ₈ Na	[M+Na] ⁺	631.3934	631.3923
4c-10	C ₃₅ H ₆₀ N ₂ O ₈ Na	[M+Na] ⁺	659.4247	659.4240

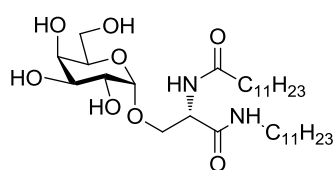
4c-11	C ₃₈ H ₆₆ N ₂ O ₉ Na	[M+Na] ⁺	717.4666	717.4666
4c-12	C ₃₂ H ₅₄ N ₂ O ₈ Na	[M+Na] ⁺	617.3778	617.3775
4d-1	C ₃₀ H ₅₈ N ₂ O ₈ Na	[M+Na] ⁺	597.4091	597.4077
4d-2	C ₃₂ H ₆₂ N ₂ O ₈ Na	[M+Na] ⁺	625.4404	625.4408
4d-3	C ₃₄ H ₆₆ N ₂ O ₈ Na	[M+Na] ⁺	653.4717	653.4722
4d-4	C ₃₆ H ₇₀ N ₂ O ₈ Na	[M+Na] ⁺	681.5030	681.5021
4d-5	C ₃₈ H ₇₄ N ₂ O ₈ Na	[M+Na] ⁺	709.5343	709.5333
4d-6	C ₄₀ H ₇₈ N ₂ O ₈ Na	[M+Na] ⁺	737.5656	737.5651
4d-7	C ₃₂ H ₆₀ N ₂ O ₈ Na	[M+Na] ⁺	623.4247	623.4249
4d-8	C ₃₃ H ₆₀ N ₂ O ₈ Na	[M+Na] ⁺	635.4247	635.4237
4d-9	C ₃₄ H ₅₈ N ₂ O ₈ Na	[M+Na] ⁺	645.4091	645.4105
4d-10	C ₃₆ H ₆₂ N ₂ O ₈ Na	[M+Na] ⁺	673.4404	673.4420
4d-11	C ₃₉ H ₆₈ N ₂ O ₉ Na	[M+Na] ⁺	731.4823	731.4823
4d-12	C ₃₃ H ₅₆ N ₂ O ₈ Na	[M+Na] ⁺	631.3934	631.3923
4e-1	C ₃₁ H ₆₀ N ₂ O ₈ Ne	[M+Ne] ⁺	611.4247	611.4236
4e-2	C ₃₃ H ₆₄ N ₂ O ₈ Ne	[M+Ne] ⁺	639.4560	639.4571
4e-3	C ₃₅ H ₆₈ N ₂ O ₈ Ne	[M+Ne] ⁺	667.4873	667.4888
4e-4	C ₃₇ H ₇₂ N ₂ O ₈ Ne	[M+Ne] ⁺	695.5186	695.5200
4e-5	C ₃₉ H ₇₆ N ₂ O ₈ Ne	[M+Ne] ⁺	723.5499	723.5505
4e-6	C ₄₁ H ₈₀ N ₂ O ₈ Ne	[M+Ne] ⁺	751.5812	751.5807
4e-7	C ₃₃ H ₆₂ N ₂ O ₈ Ne	[M+Ne] ⁺	637.4404	637.4394
4e-8	C ₃₄ H ₆₂ N ₂ O ₈ Ne	[M+Ne] ⁺	649.4404	649.4403
4e-9	C ₃₅ H ₆₀ N ₂ O ₈ Ne	[M+Ne] ⁺	659.4247	659.4255
4e-10	C ₃₇ H ₆₄ N ₂ O ₈ Ne	[M+Ne] ⁺	687.4560	687.4559
4e-11	C ₄₀ H ₇₁ N ₂ O ₉	[M+H] ⁺	723.5160	723.5153
4e-12	C ₃₄ H ₅₈ N ₂ O ₈ Ne	[M+Ne] ⁺	645.4091	645.4081

S3. The effects of lipid derivatives (10.1~14.2) on NF- κ B activation in HEK-293/TLR4/CD14/MD2 cells.

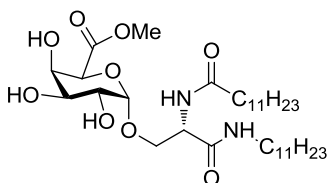
Relative luciferase activity (fold)								
Sample	Mean	± S.E.M.	Sample	Mean	± S.E.M.	Sample	Mean	± S.E.M.
Blank	1.0	± 0.0	4e-4	1.0	± 0.1	4c-9	0.9	± 0.1
H ₂ O	1.0	± 0.0	4a-5	0.9	± 0.2	4d-9	0.9	± 0.0
LPS 10 ng/ml	3.9	± 0.7*	4b-5	1.1	± 0.2	4e-9	0.9	± 0.2
DMSO 0.1%	1.0	± 0.1	4c-5	0.9	± 0.0	4a-10	0.9	± 0.2
4a-1	0.9	± 0.1	4d-5	1.0	± 0.2	4b-10	0.9	± 0.1
4b-1	0.8	± 0.2	4e-5	0.9	± 0.1	4c-10	0.9	± 0.0
4c-1	0.7	± 0.1	4a-6	0.9	± 0.2	4d-10	0.9	± 0.1
4d-1	0.8	± 0.1	4b-6	0.9	± 0.1	4e-10	0.8	± 0.0
4e-1	0.8	± 0.0	4c-6	1.0	± 0.0	4a-11	1.2	± 0.2
4a-2	1.0	± 0.1	4d-6	0.9	± 0.2	4b-11	0.9	± 0.2
4b-2	1.1	± 0.1	4e-6	0.9	± 0.0	4c-11	1.0	± 0.1
4c-2	0.8	± 0.0	4a-7	0.9	± 0.2	4d-11	0.9	± 0.1
4d-2	0.9	± 0.1	4b-7	1.1	± 0.1	4e-11	1.0	± 0.1
4e-2	0.9	± 0.1	4c-7	0.9	± 0.2	4a-12	1.2	± 0.2
4a-3	3.8	± 0.0*	4d-7	0.9	± 0.2	4b-12	0.8	± 0.2
4b-3	3.8	± 0.0*	4e-7	0.7	± 0.1	4c-12	0.9	± 0.1
4c-3	1.5	± 0.6	4a-8	1.1	± 0.2	4d-12	0.8	± 0.0
4d-3	2.4	± 1.5*	4b-8	1.2	± 0.1	4e-12	0.9	± 0.0
4e-3	1.0	± 0.1	4c-8	1.1	± 0.0			
4a-4	1.9	± 0.3	4d-8	1.2	± 0.2			
4b-4	1.5	± 0.3	4e-8	0.9	± 0.1			
4c-4	1.1	± 0.0	4a-9	0.9	± 0.1			
4d-4	1.0	± 0.2	4b-9	0.8	± 0.1			

10.1~14.12 10 μ M (* indicates 2-fold higher activity than vehicle-treated groups)

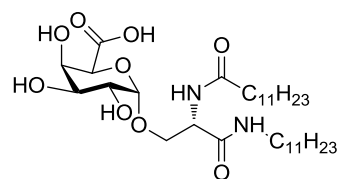
S4. Serine-based glycolipid derivatives



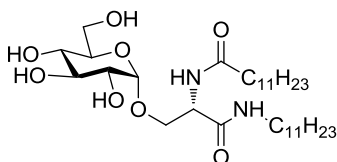
CCL-34



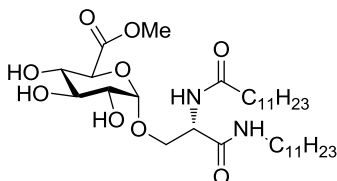
CCL-34-S1



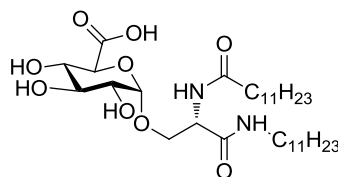
CCL-34-S2



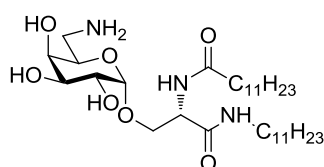
CCL-34-S3



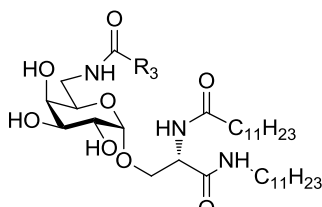
CCL-34-S4



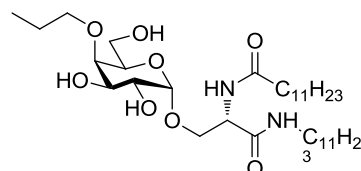
CCL-34-S5



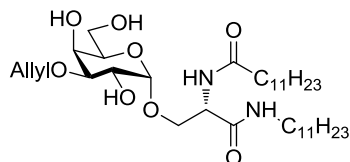
CCL-34-S6



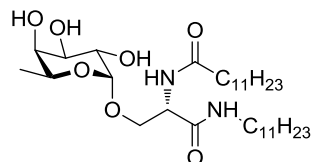
CCL-34-S7 $R_3 = C_7H_{14}Ph$
CCL-34-S8 $R_3 = CH(OH)C_{10}H_2$
CCL-34-S9 $R_3 = C_3H_7$
CCL-34-S10 $R_3 = \text{biotin}$



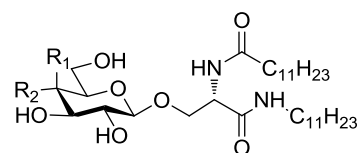
CCL-34-S11



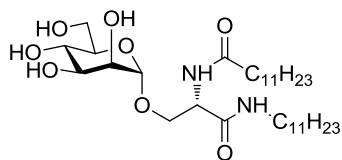
CCL-34-S12



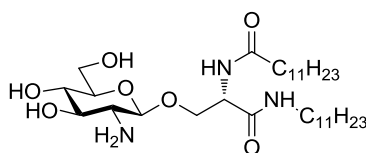
CCL-34-S13



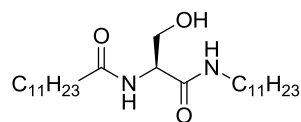
β -CCL-34 $R_1 = OH, R_2 = H$
CCL-34-S14 $R_1 = H, R_2 = OH$



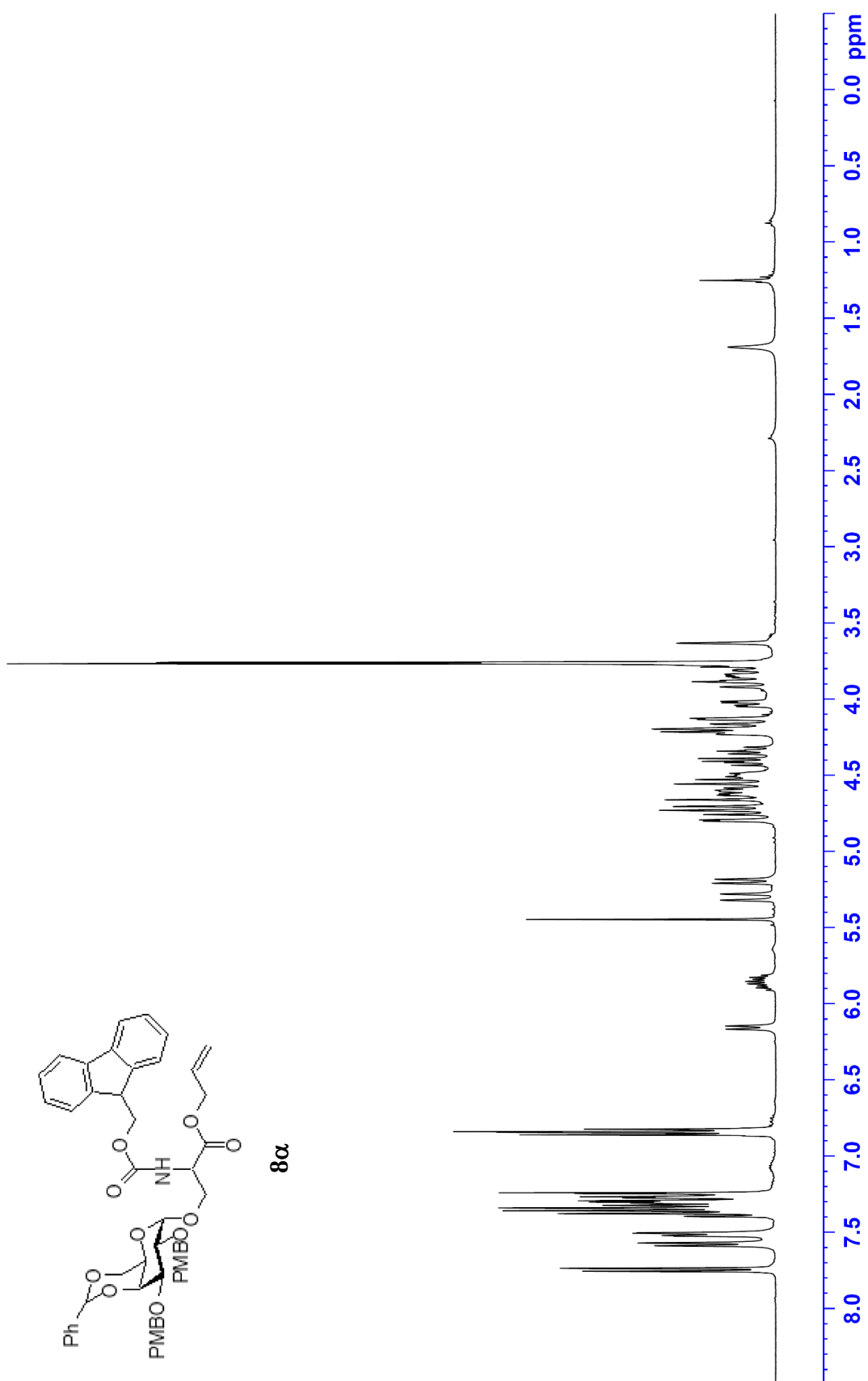
CCL-34-S15

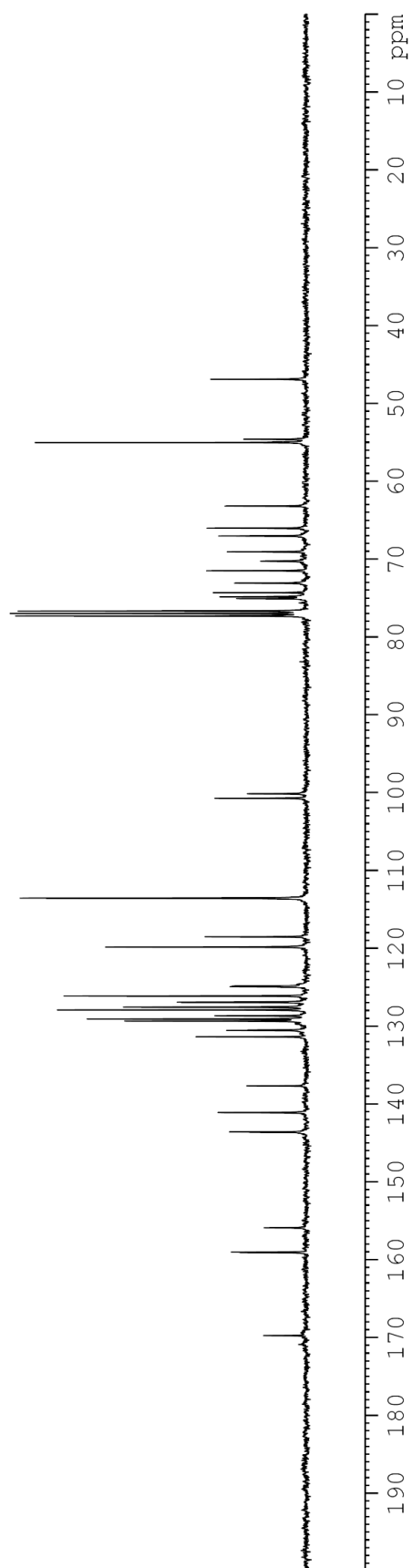
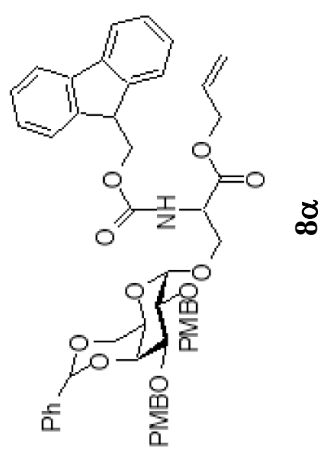


CCL-34-S16 $R = H$
CCL-34-S17 $R = C(O)C_{11}H_{23}$
CCL-34-S18 $R = Ac$

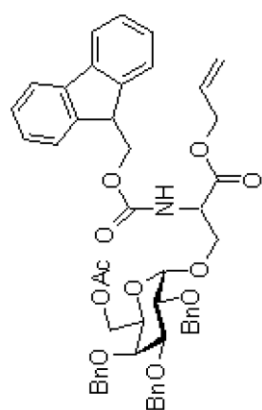


CCL-34-S19

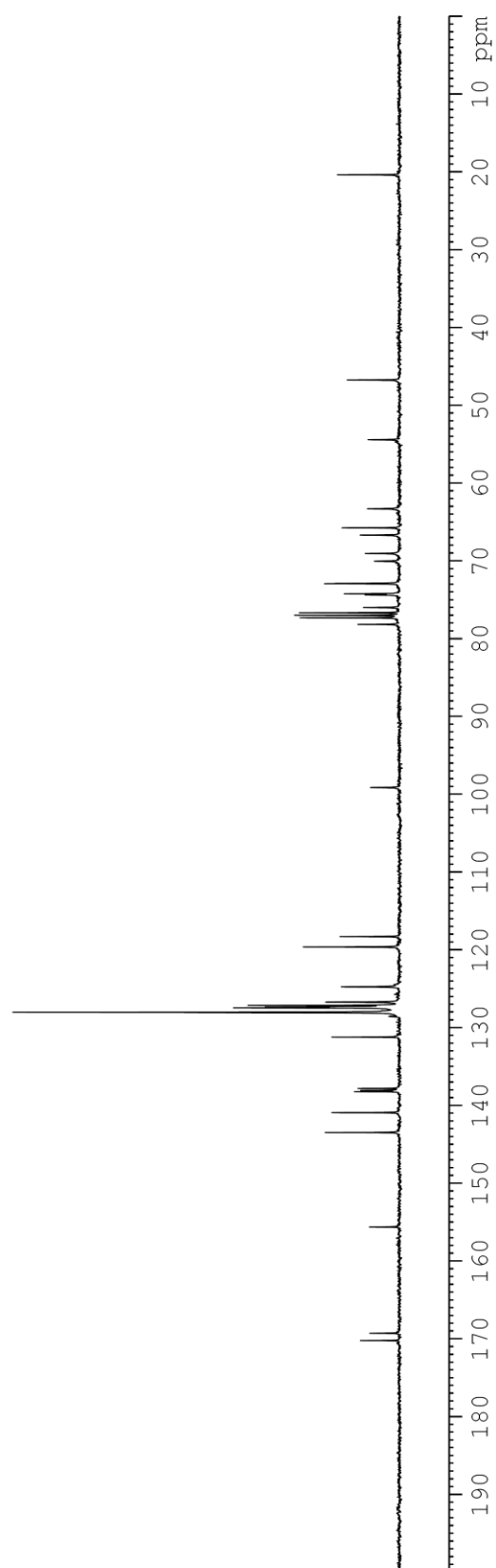


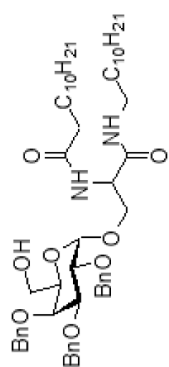




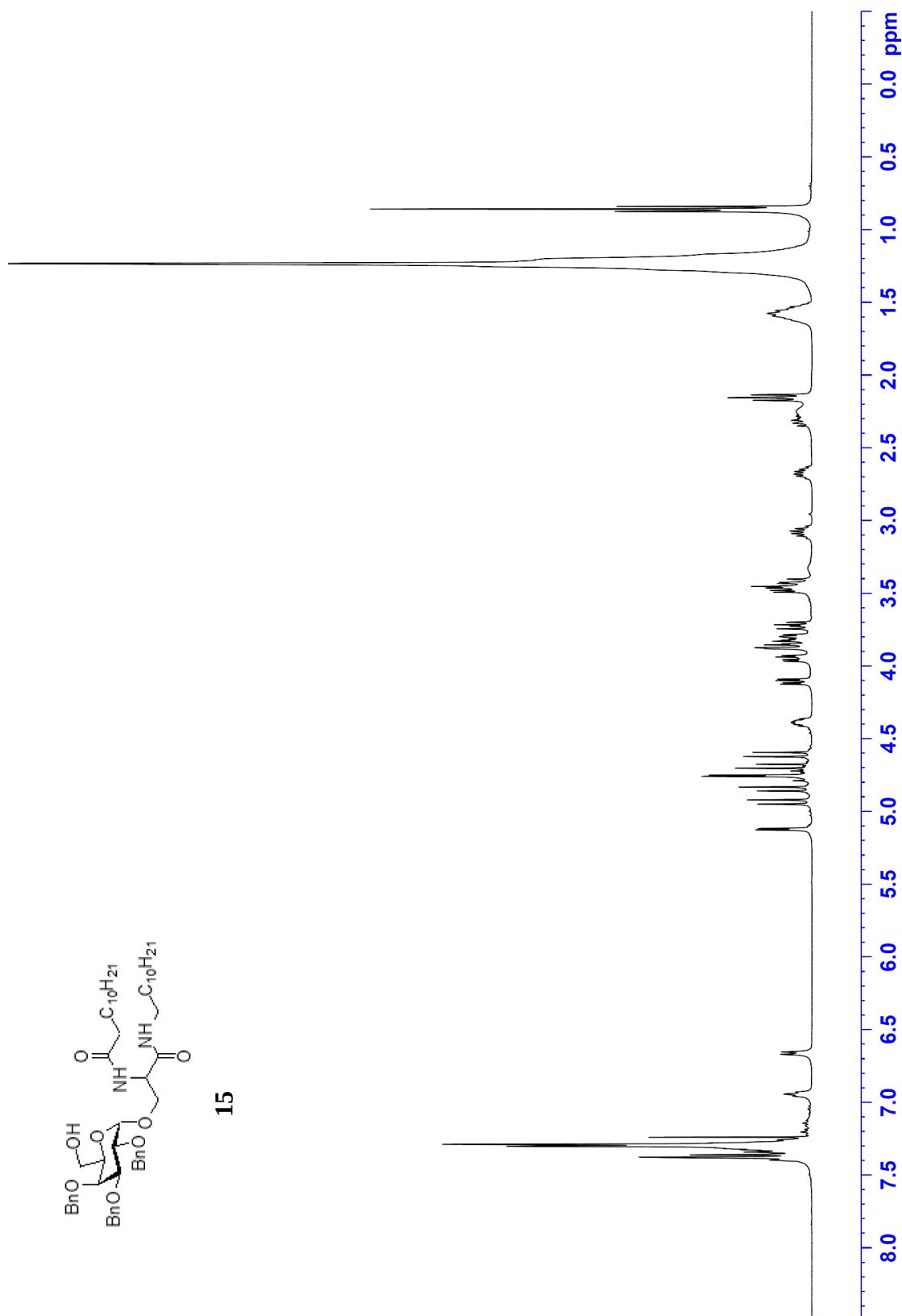


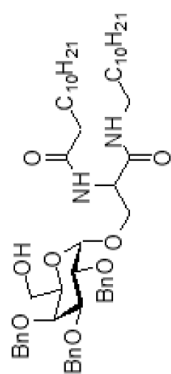
10α



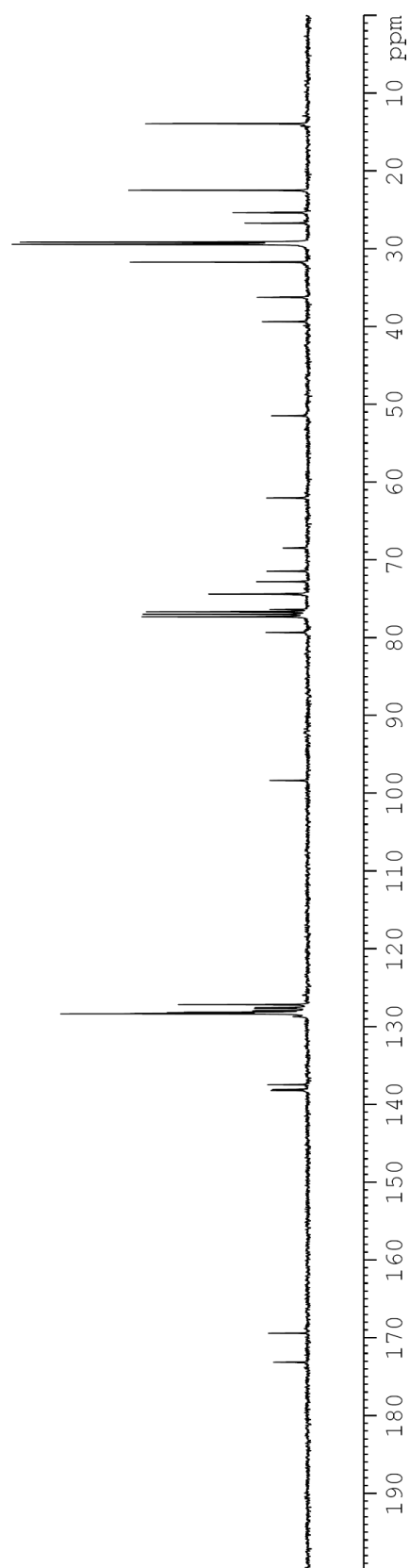


15

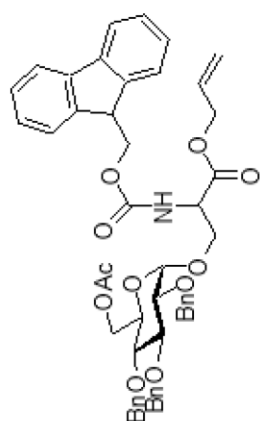




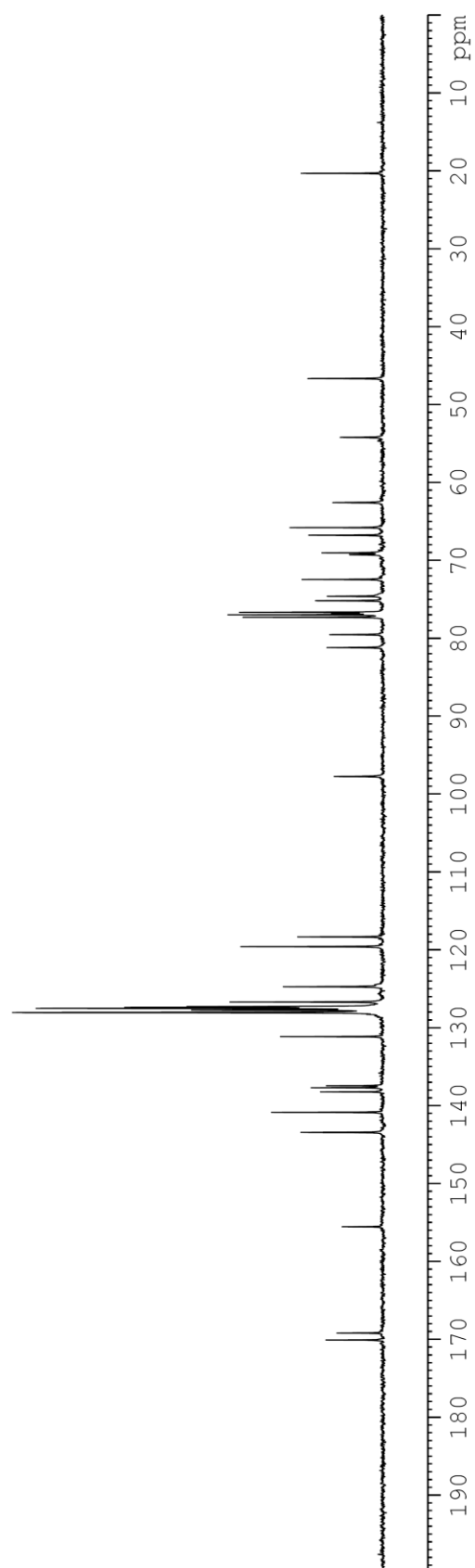
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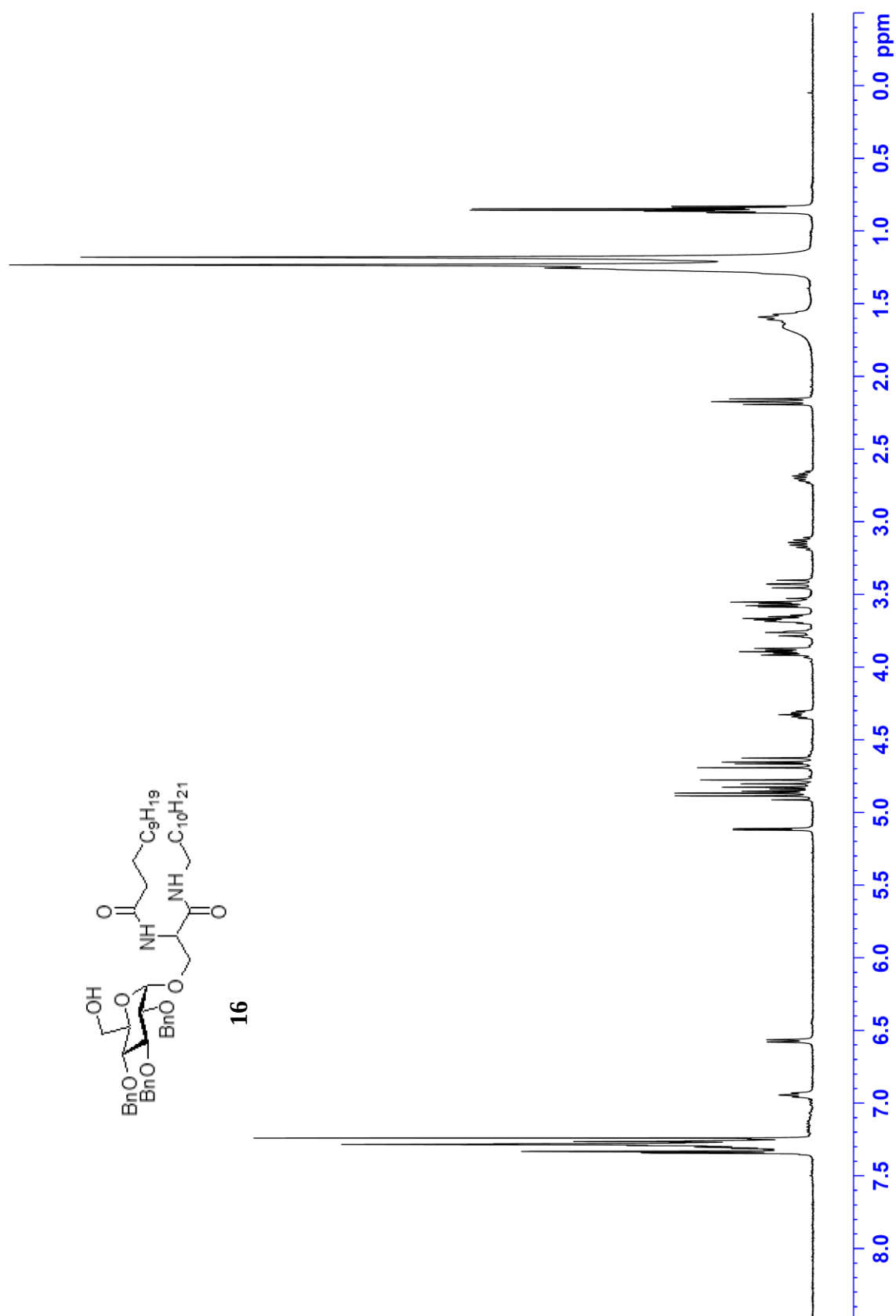


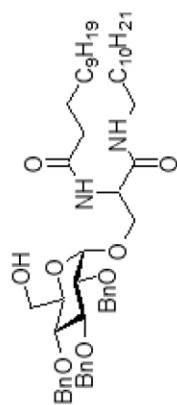




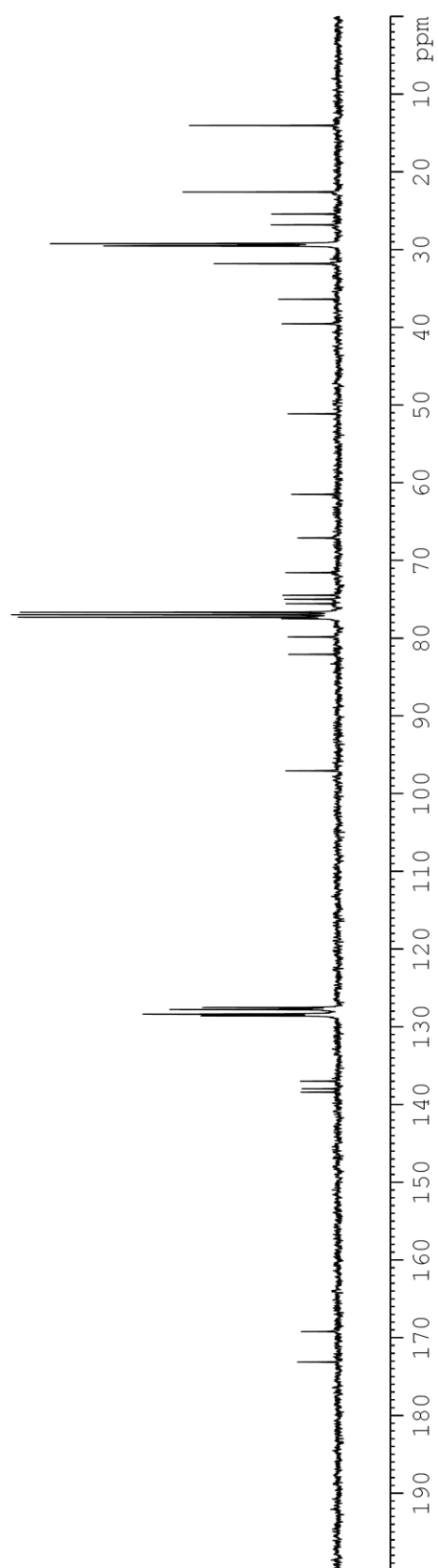
11α

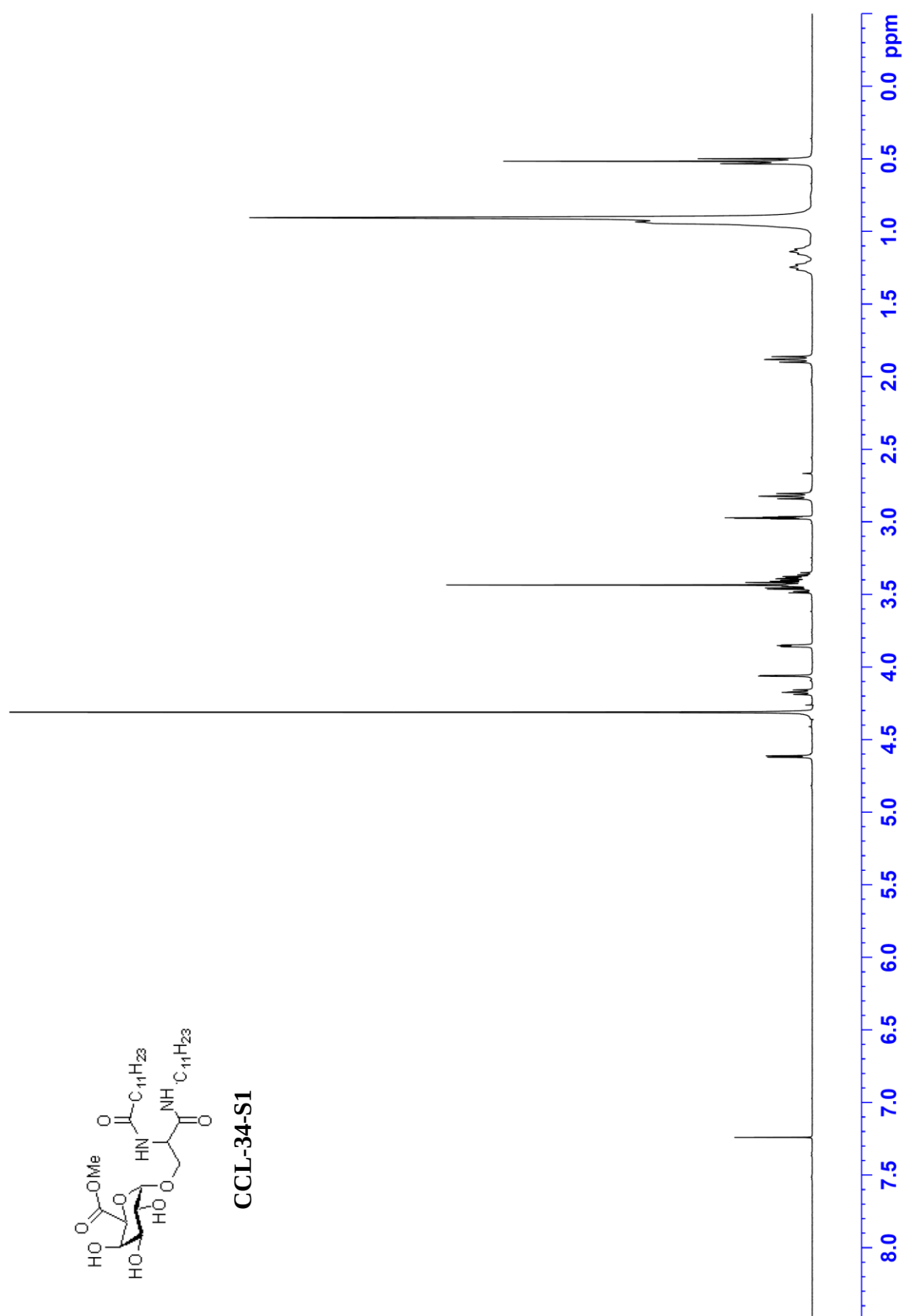


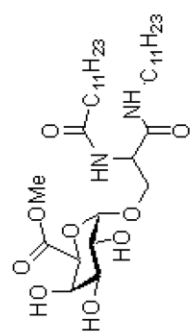




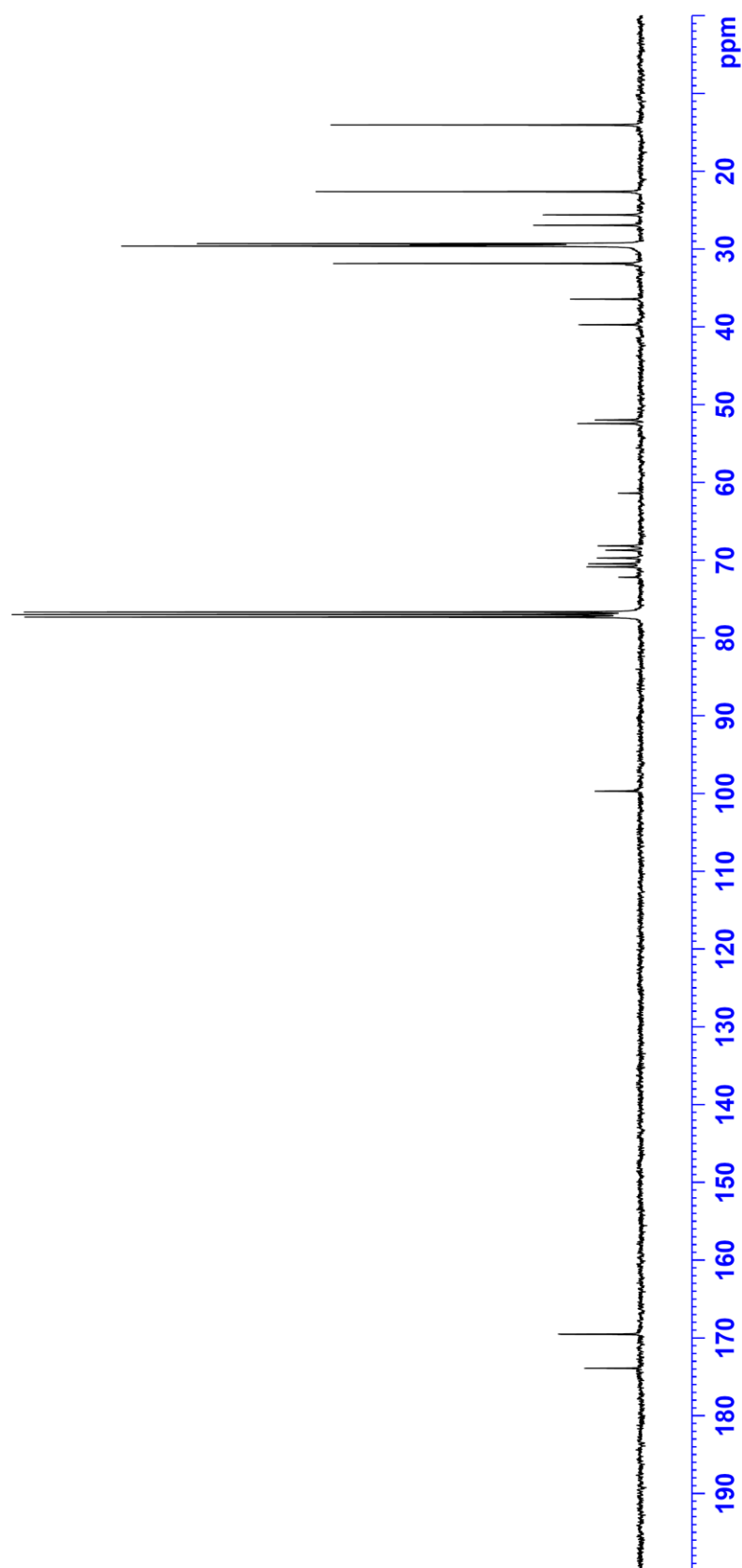
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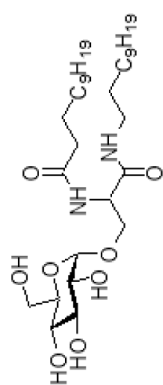




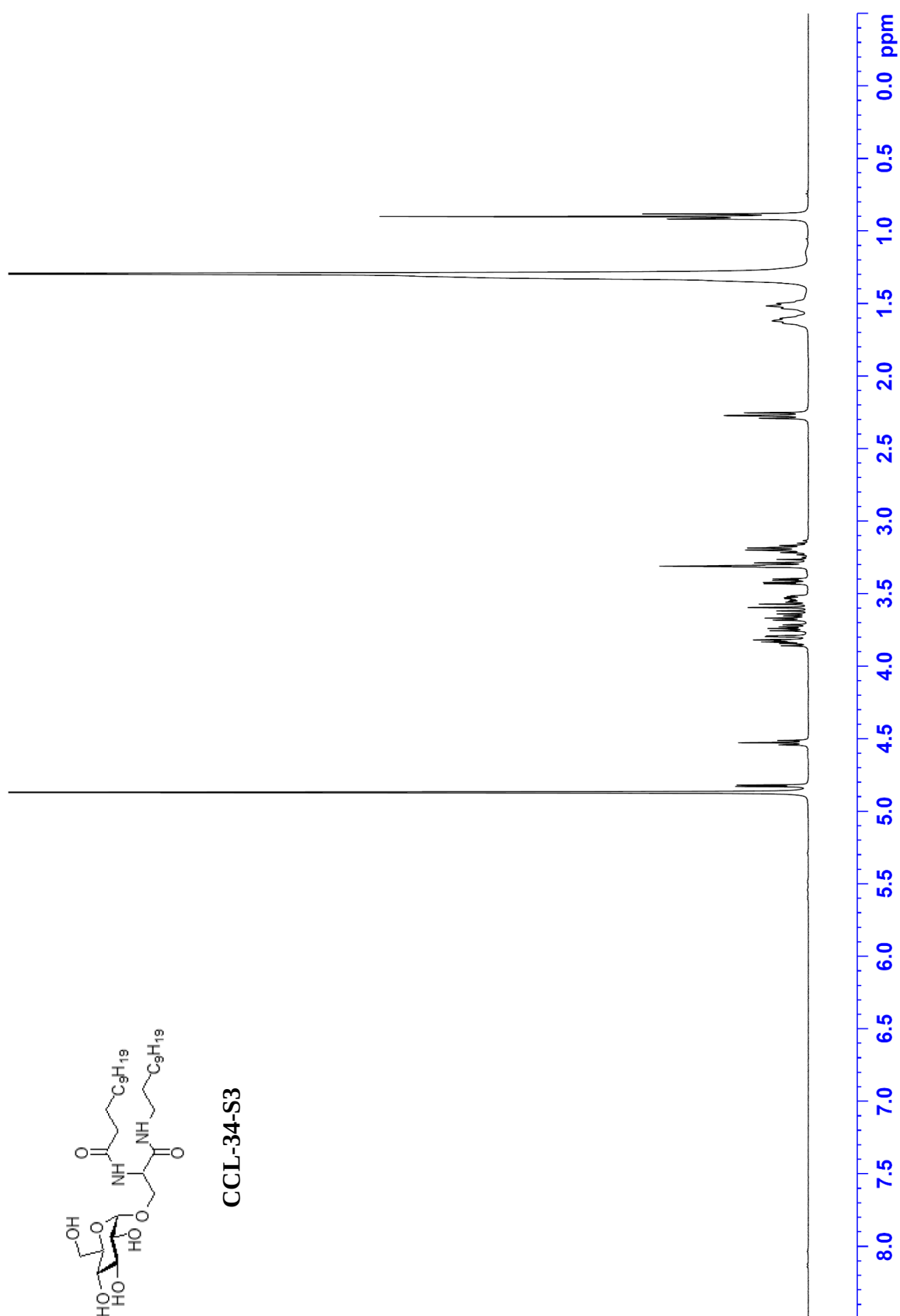


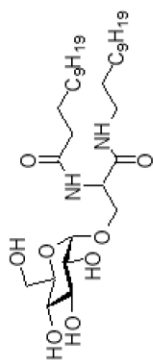
CCL-34-S1



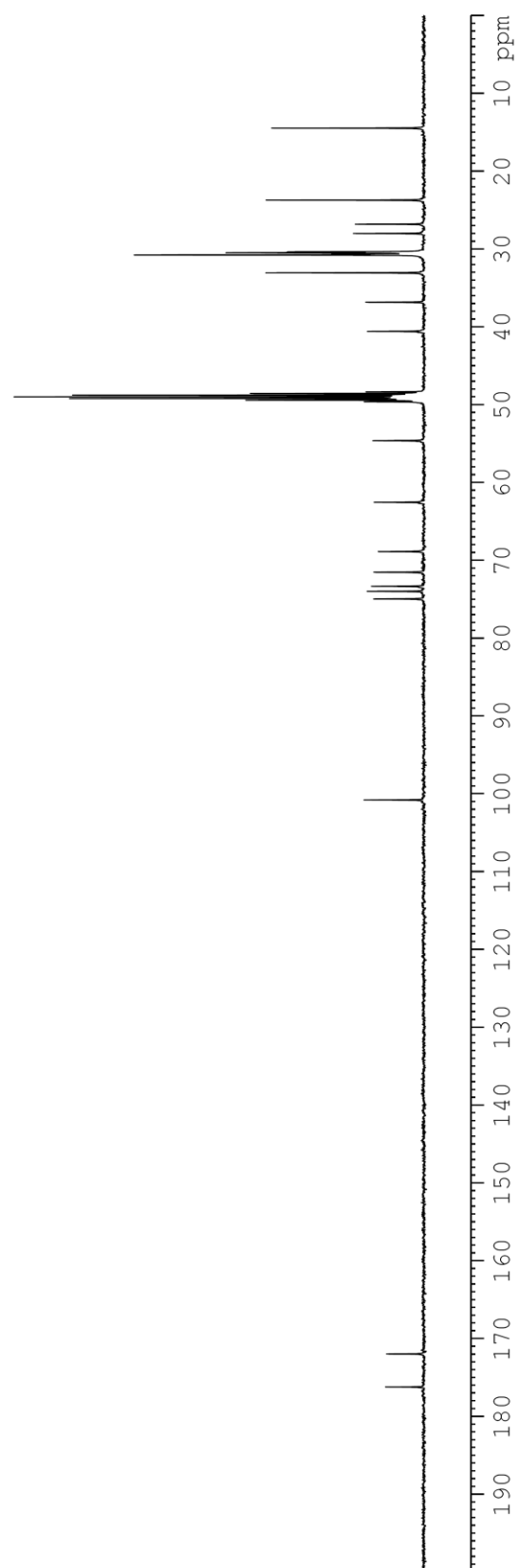


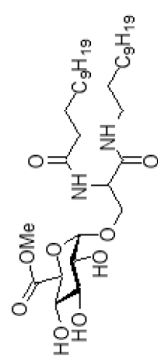
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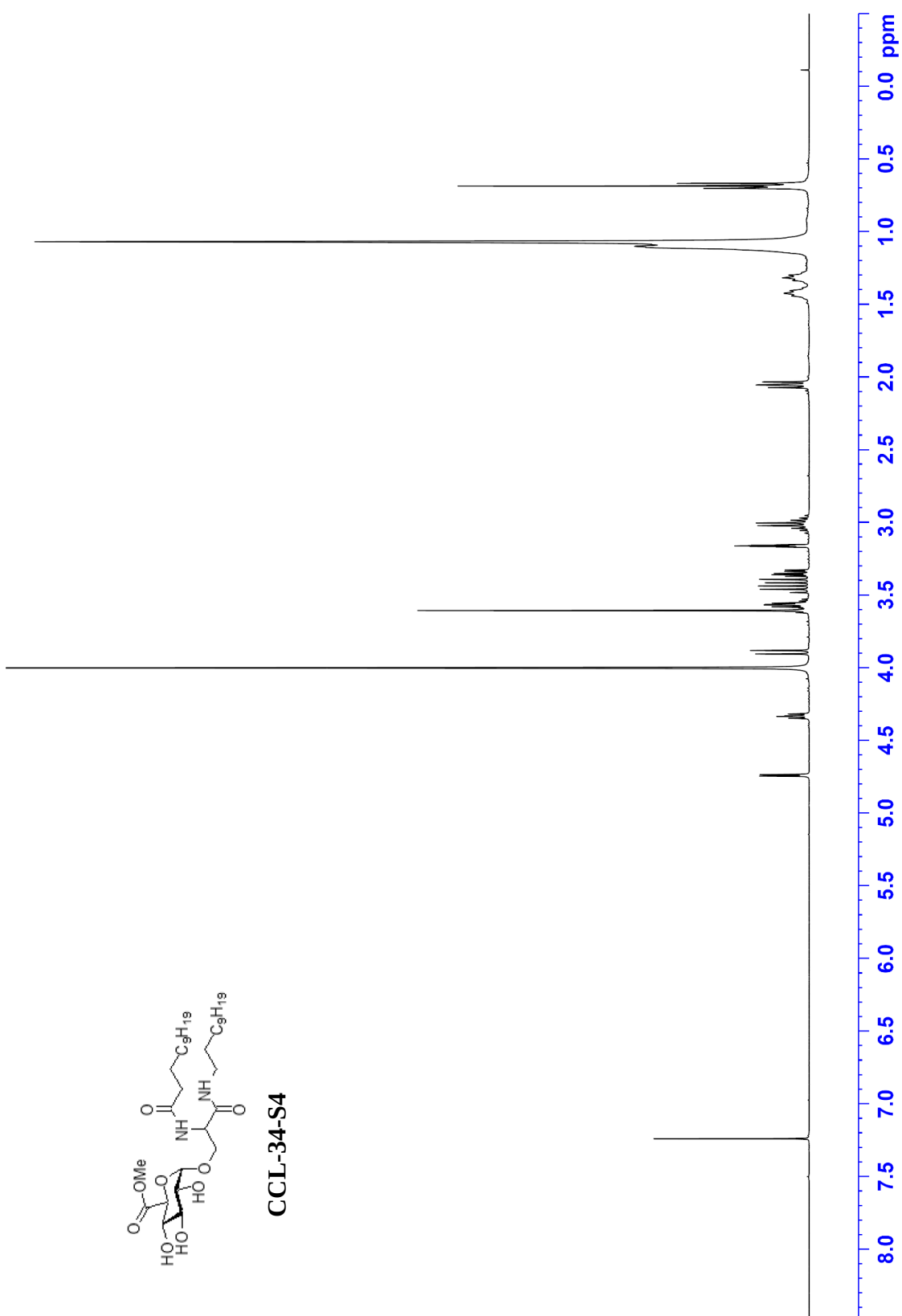


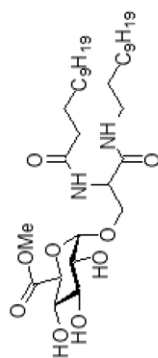
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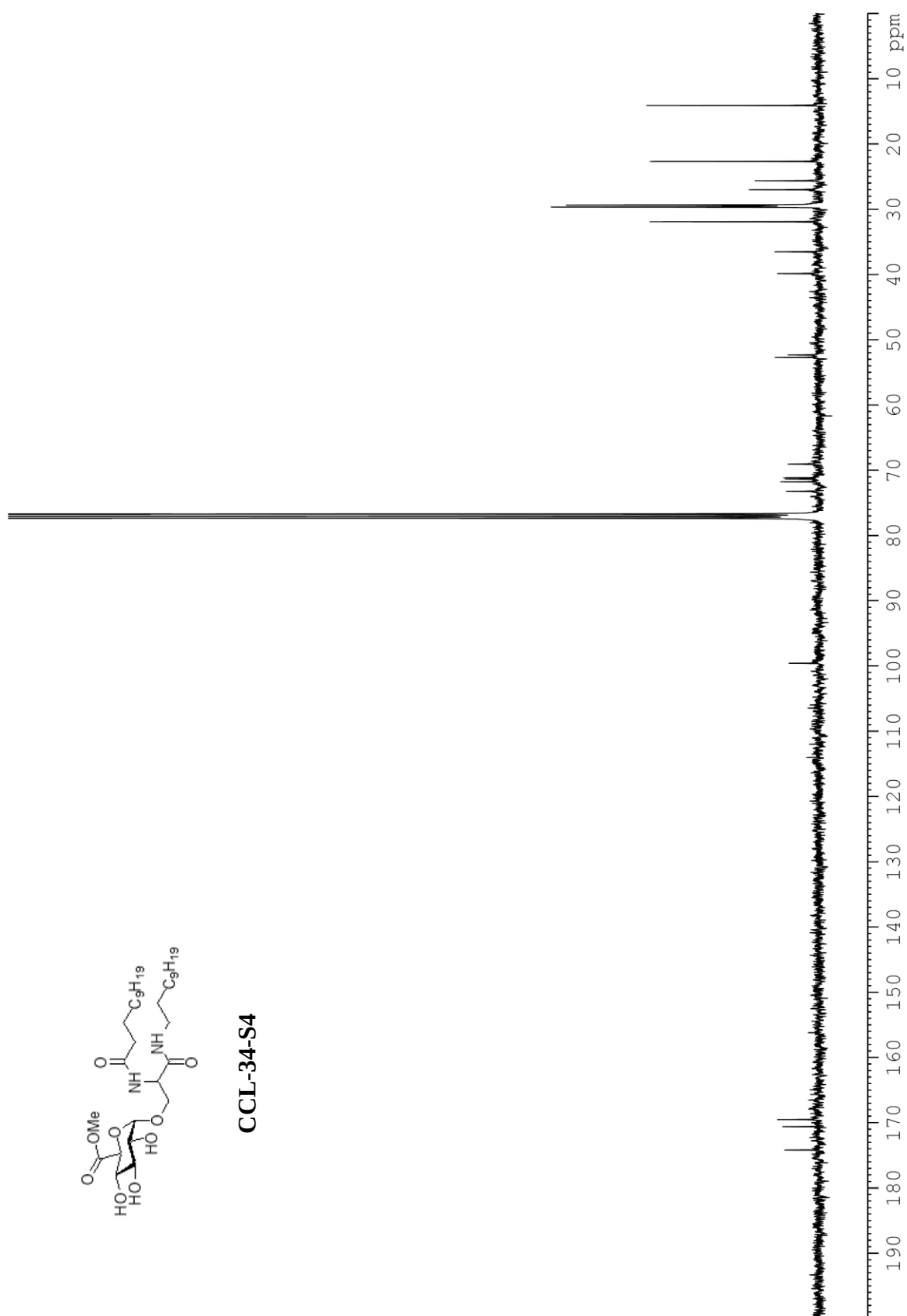


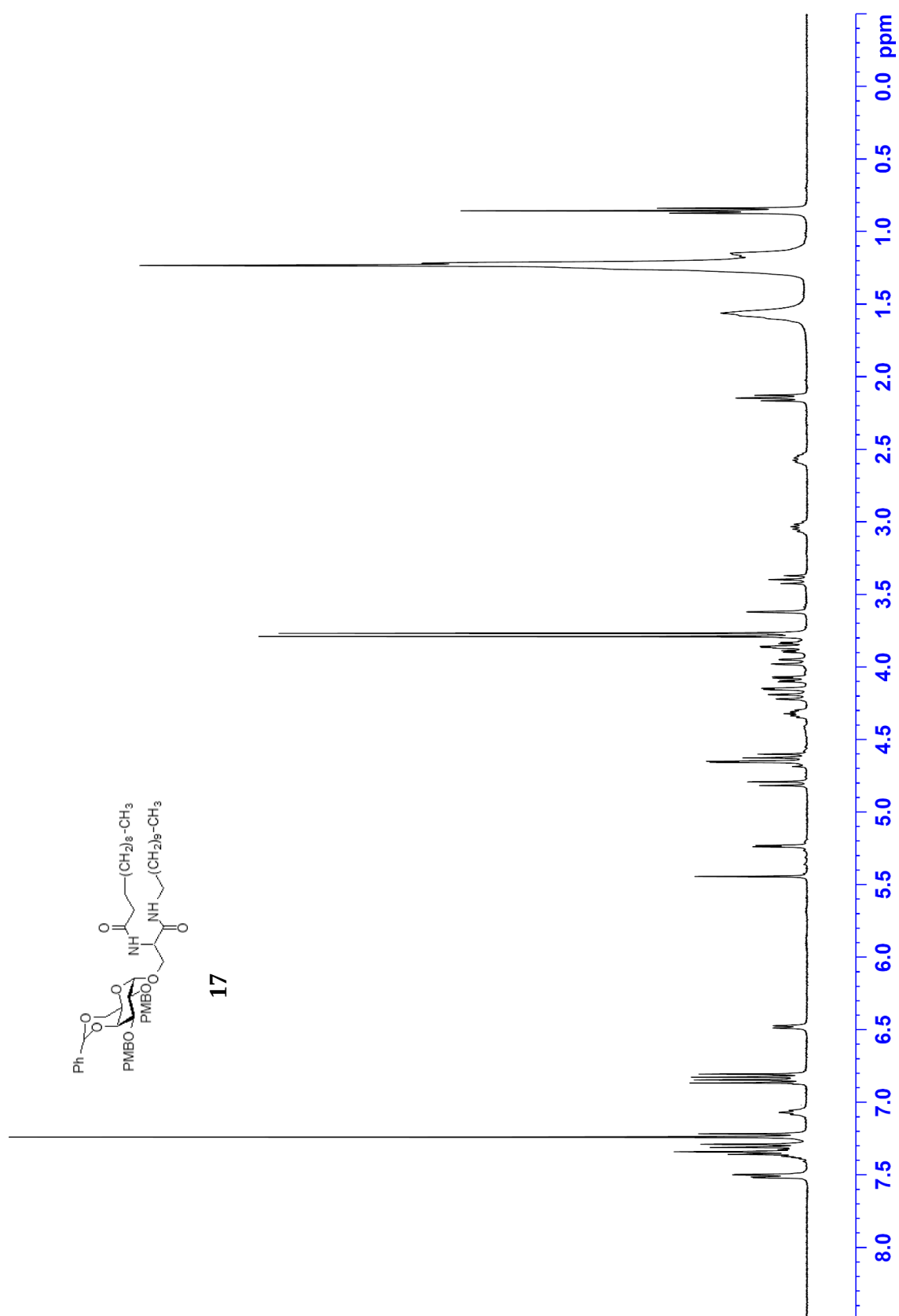
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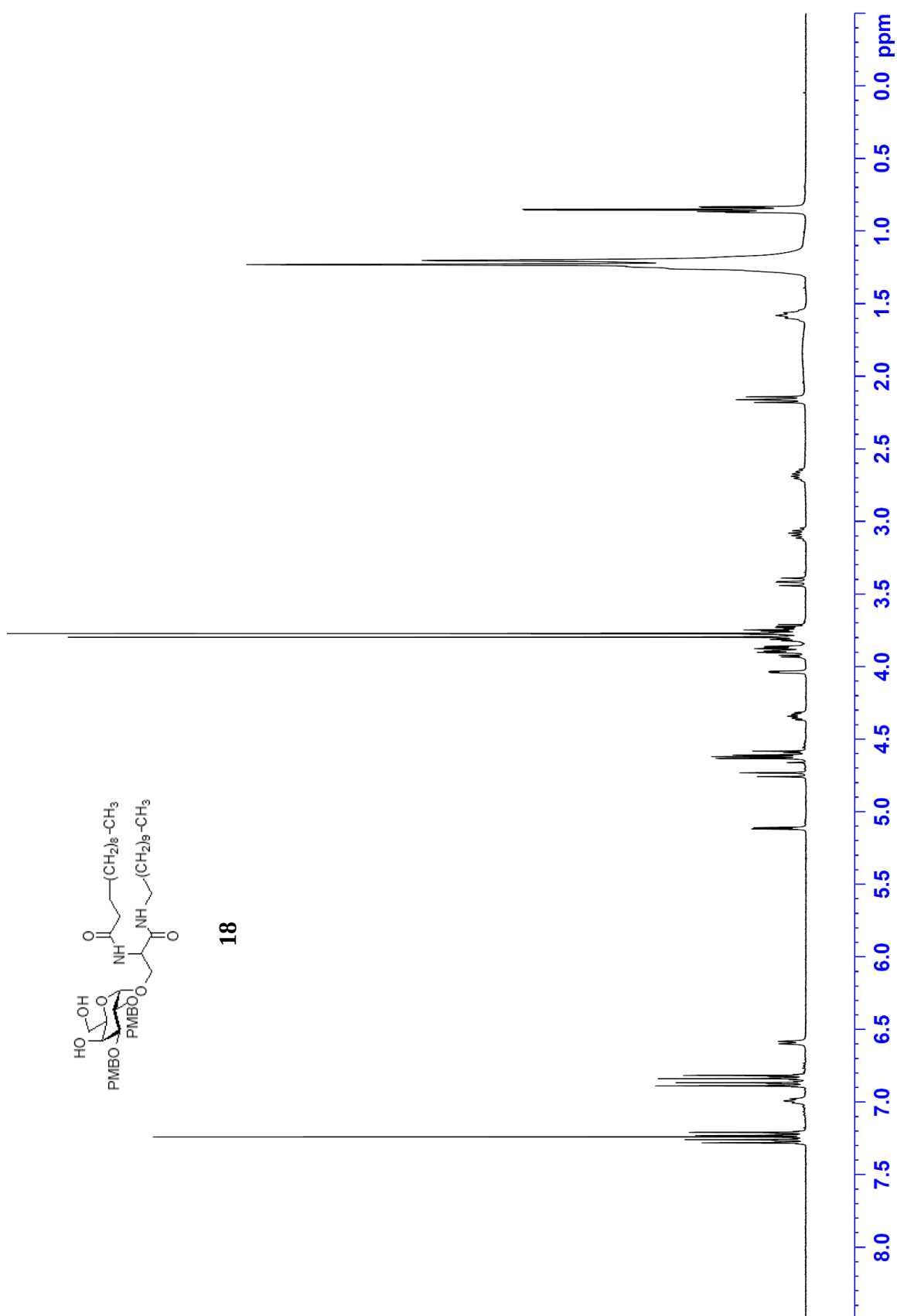


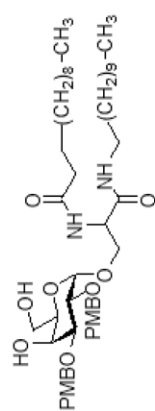
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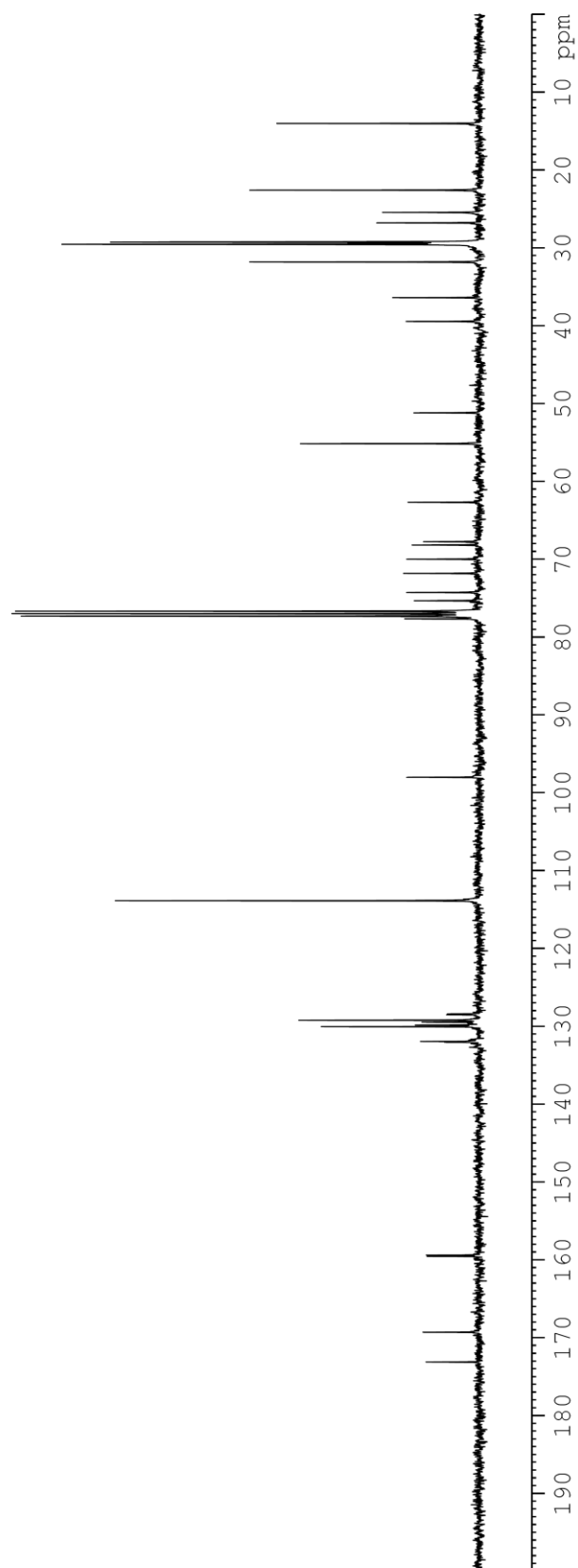


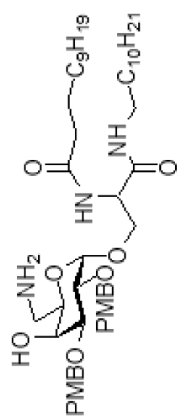




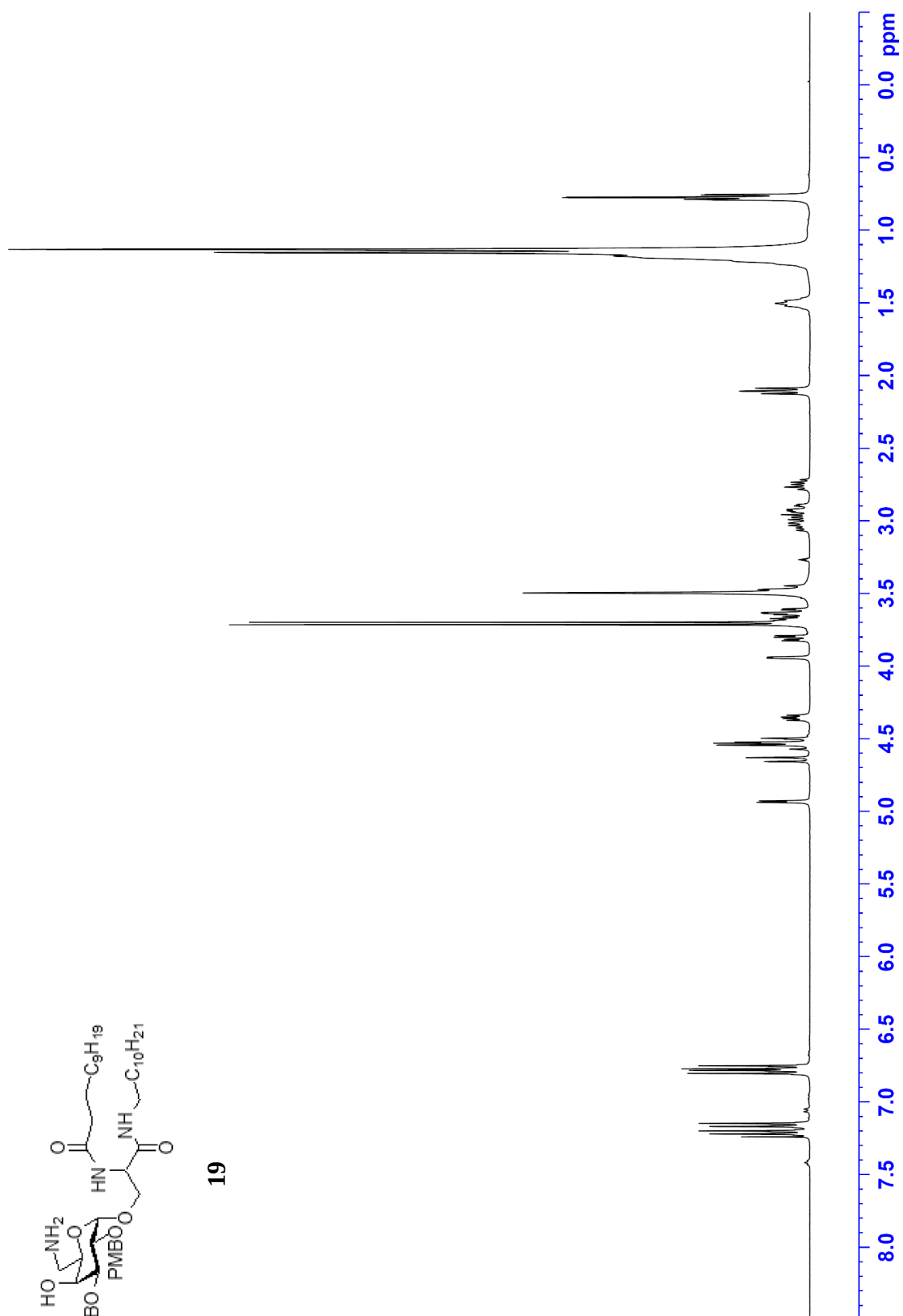


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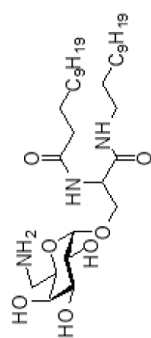




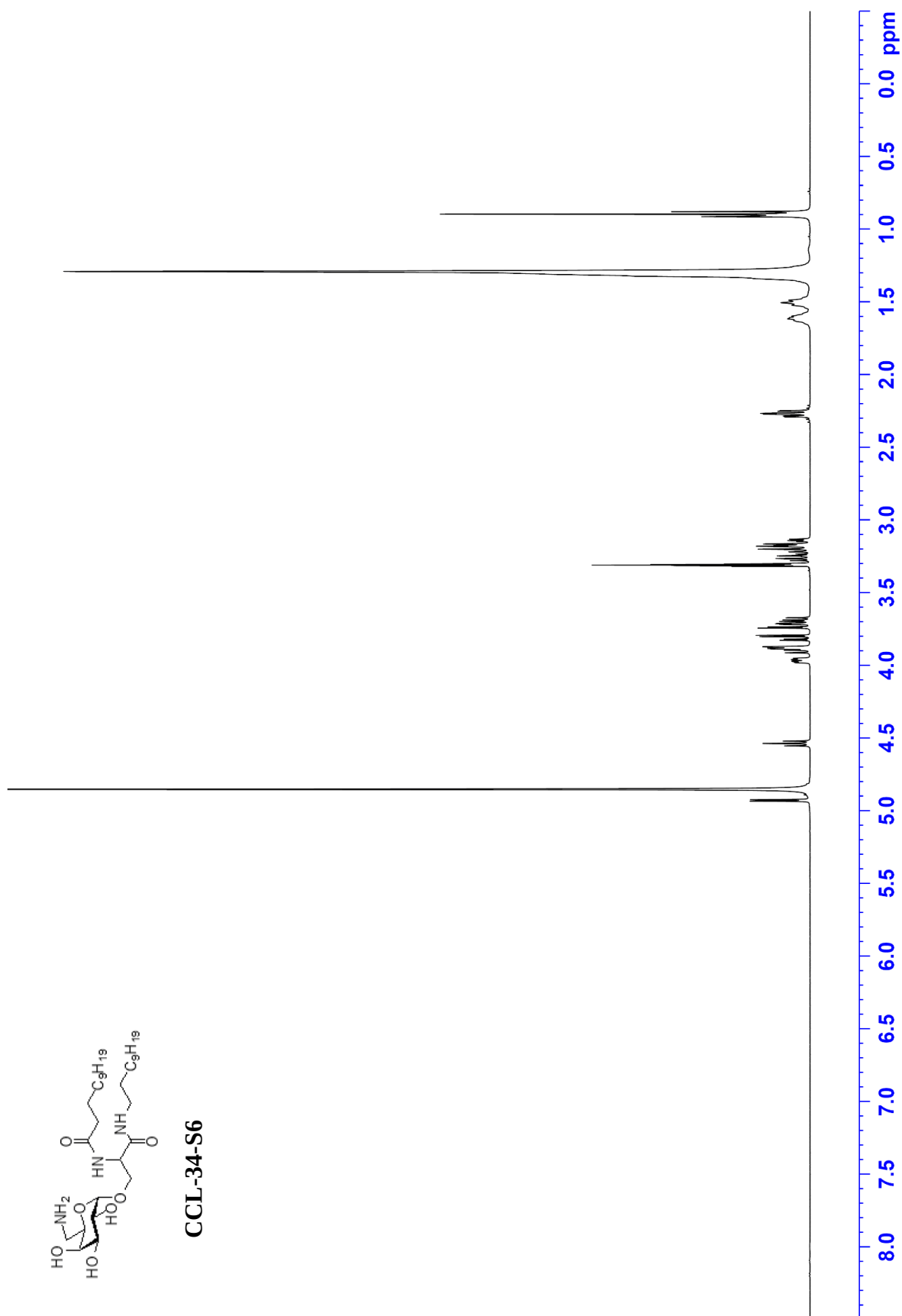
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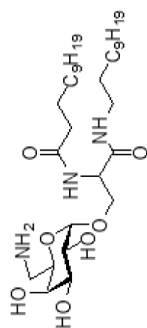




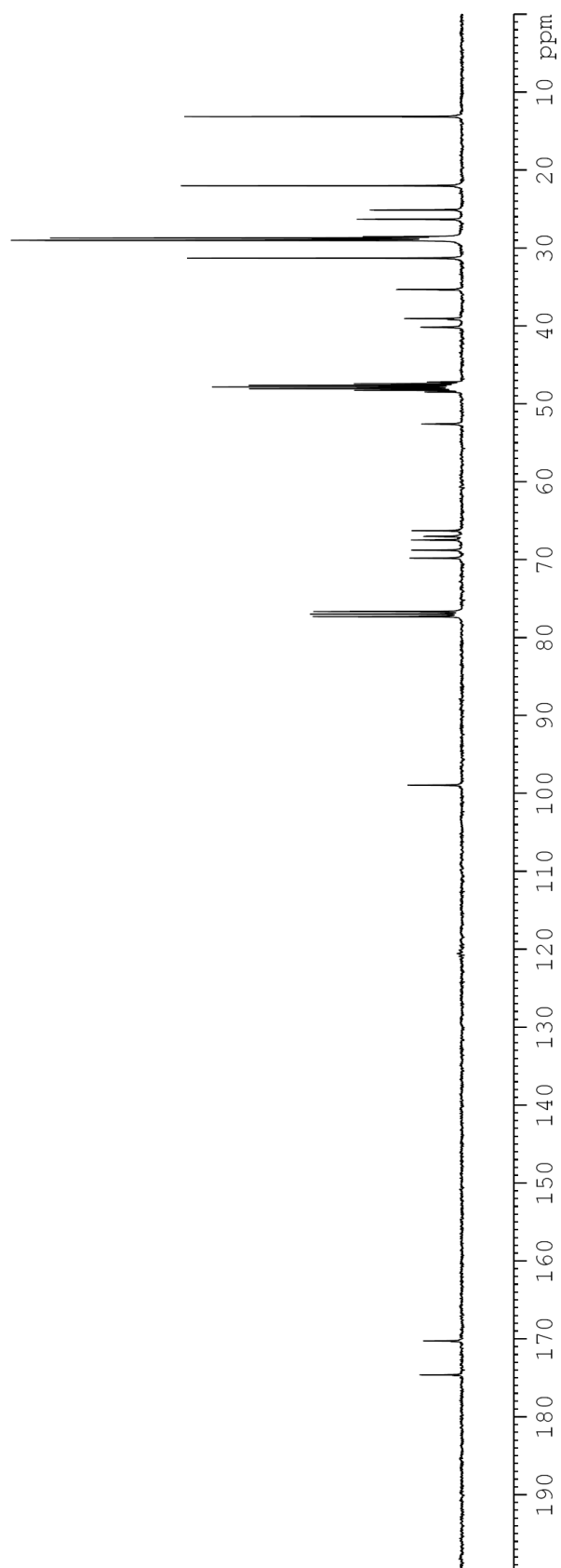


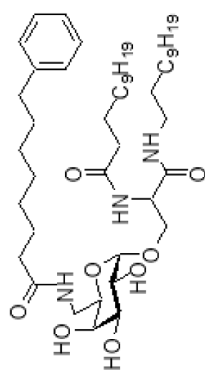
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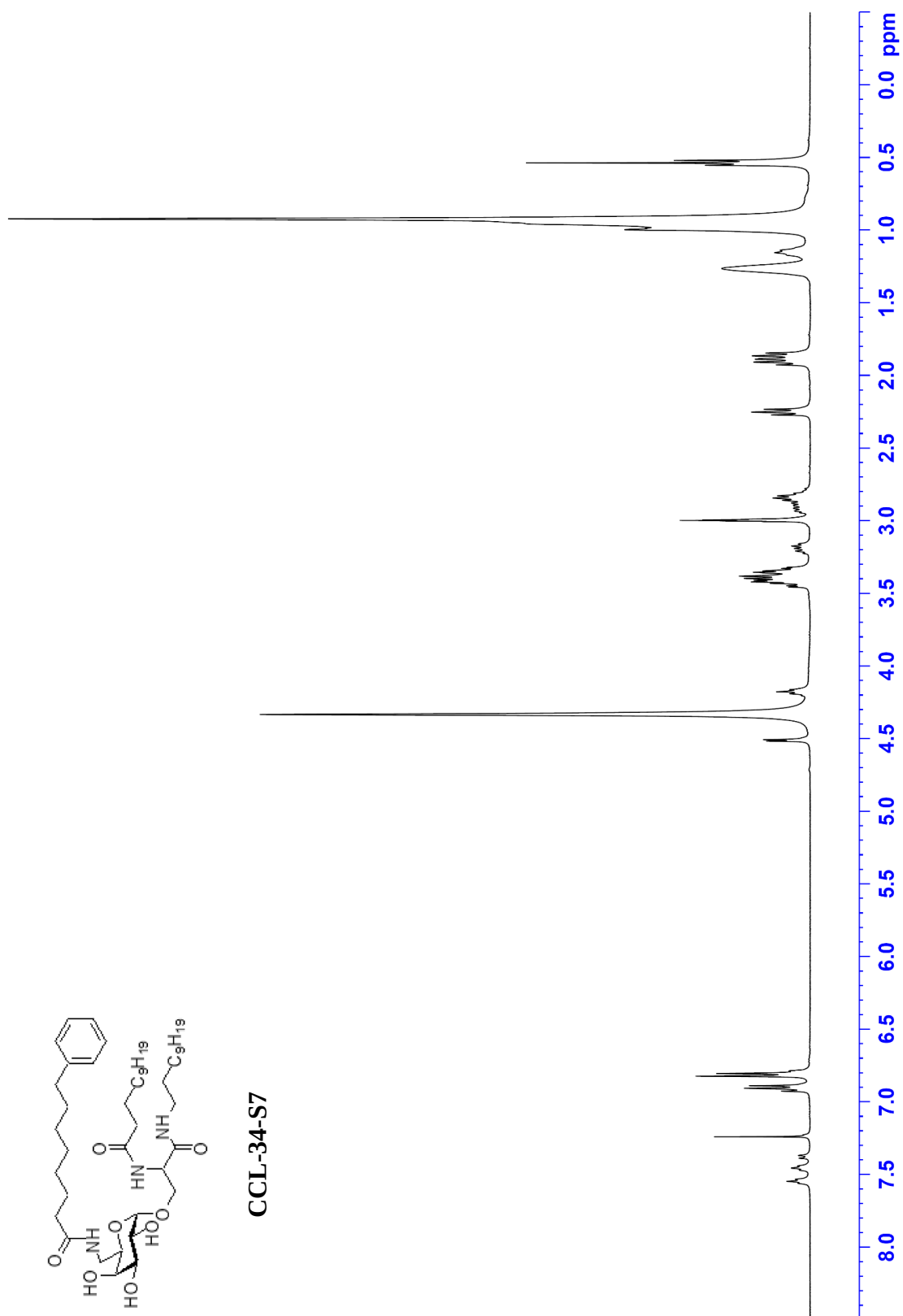


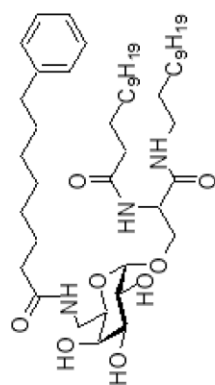
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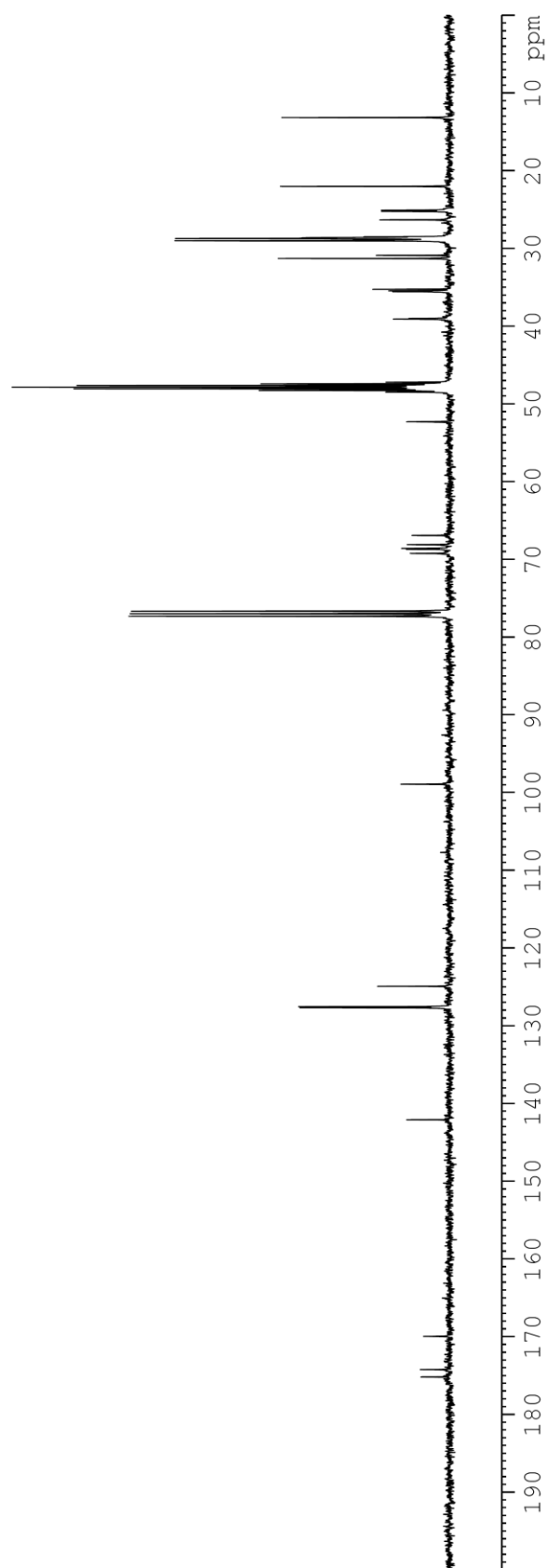


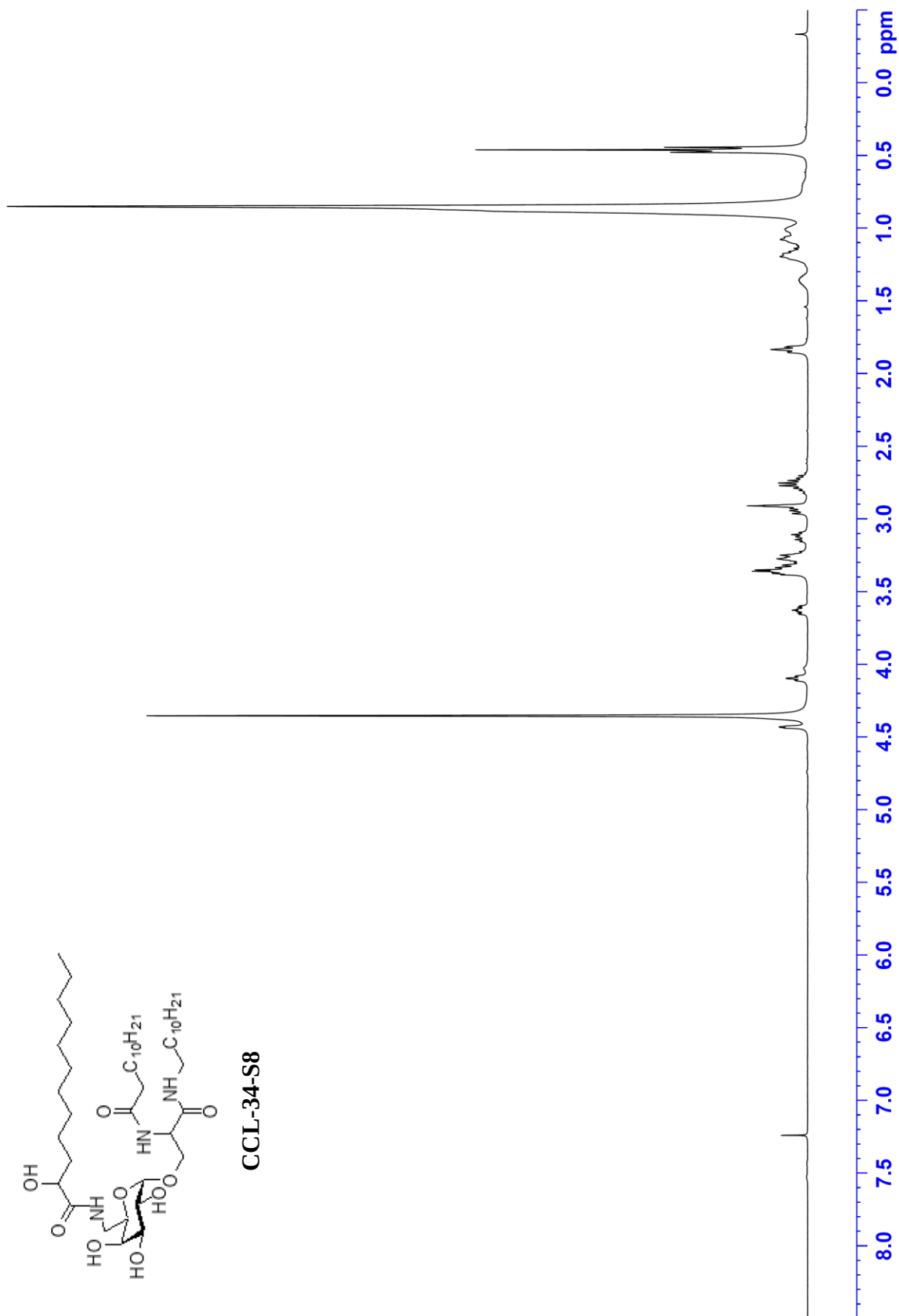
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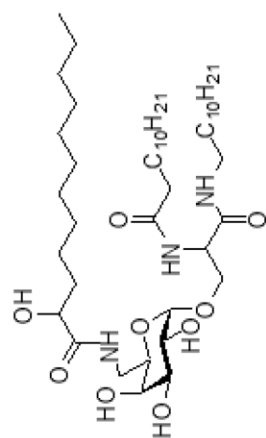


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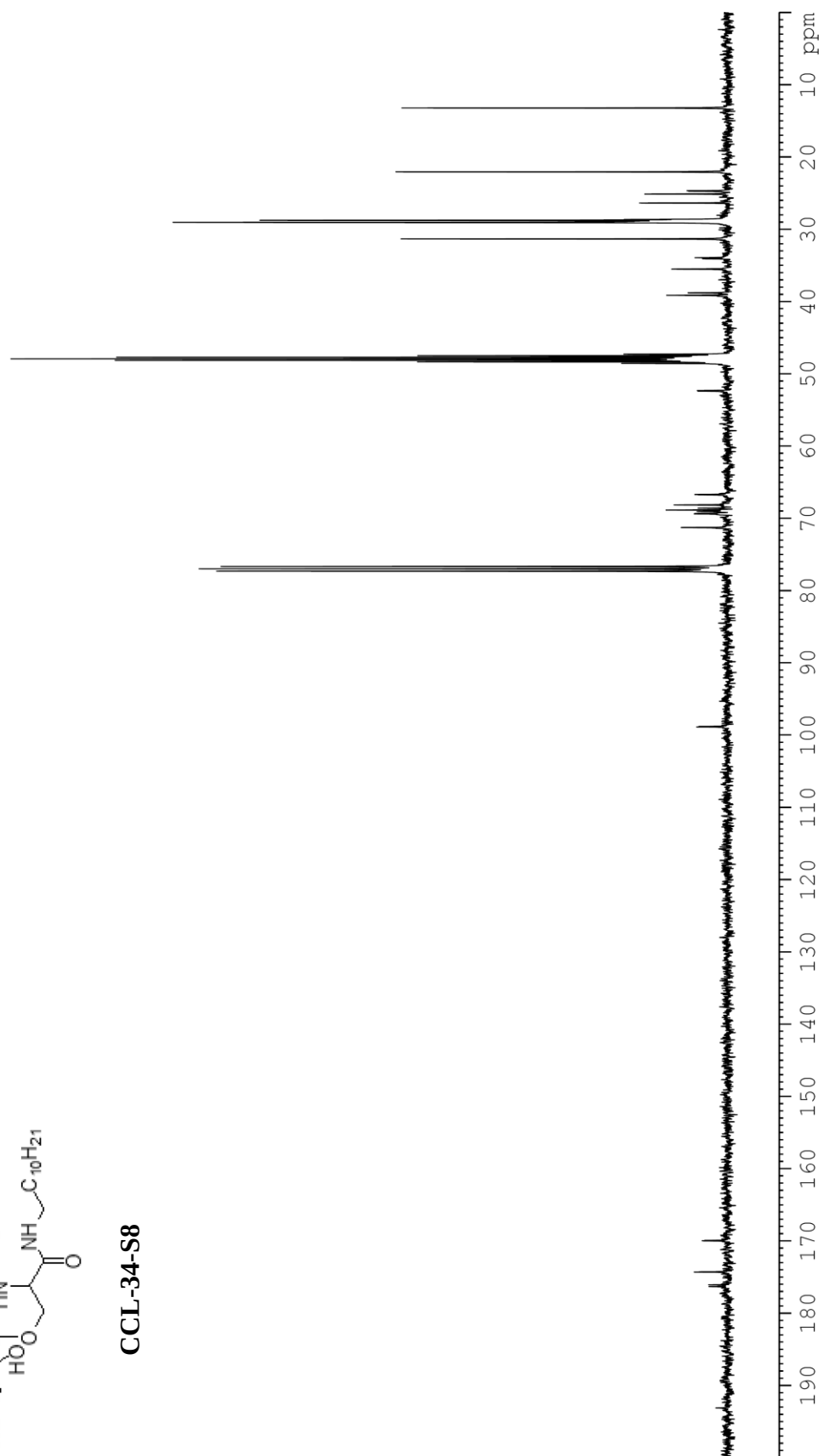


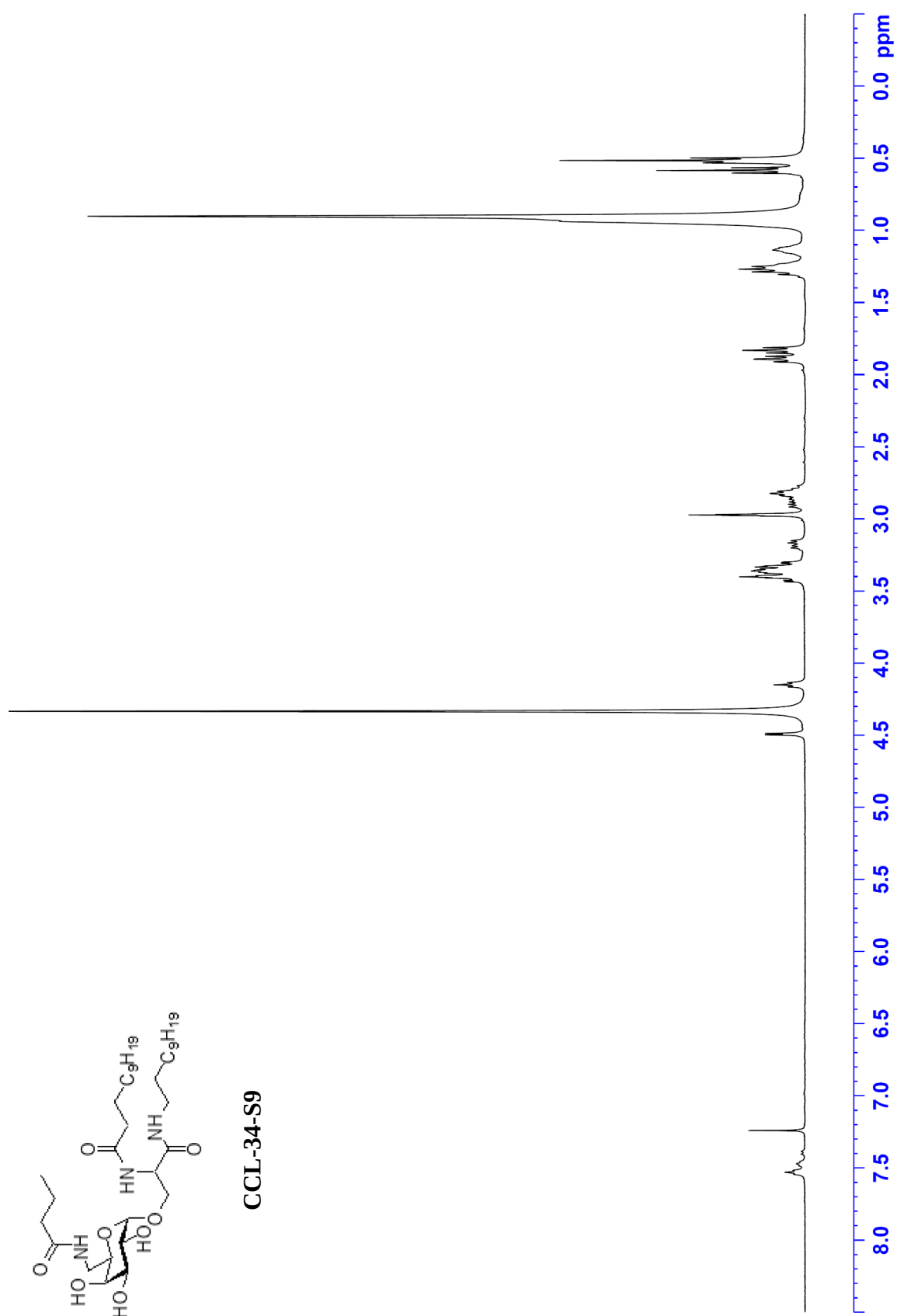


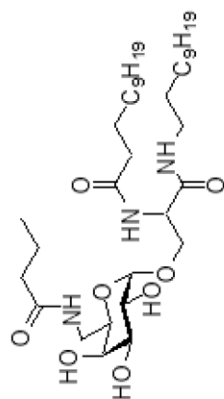
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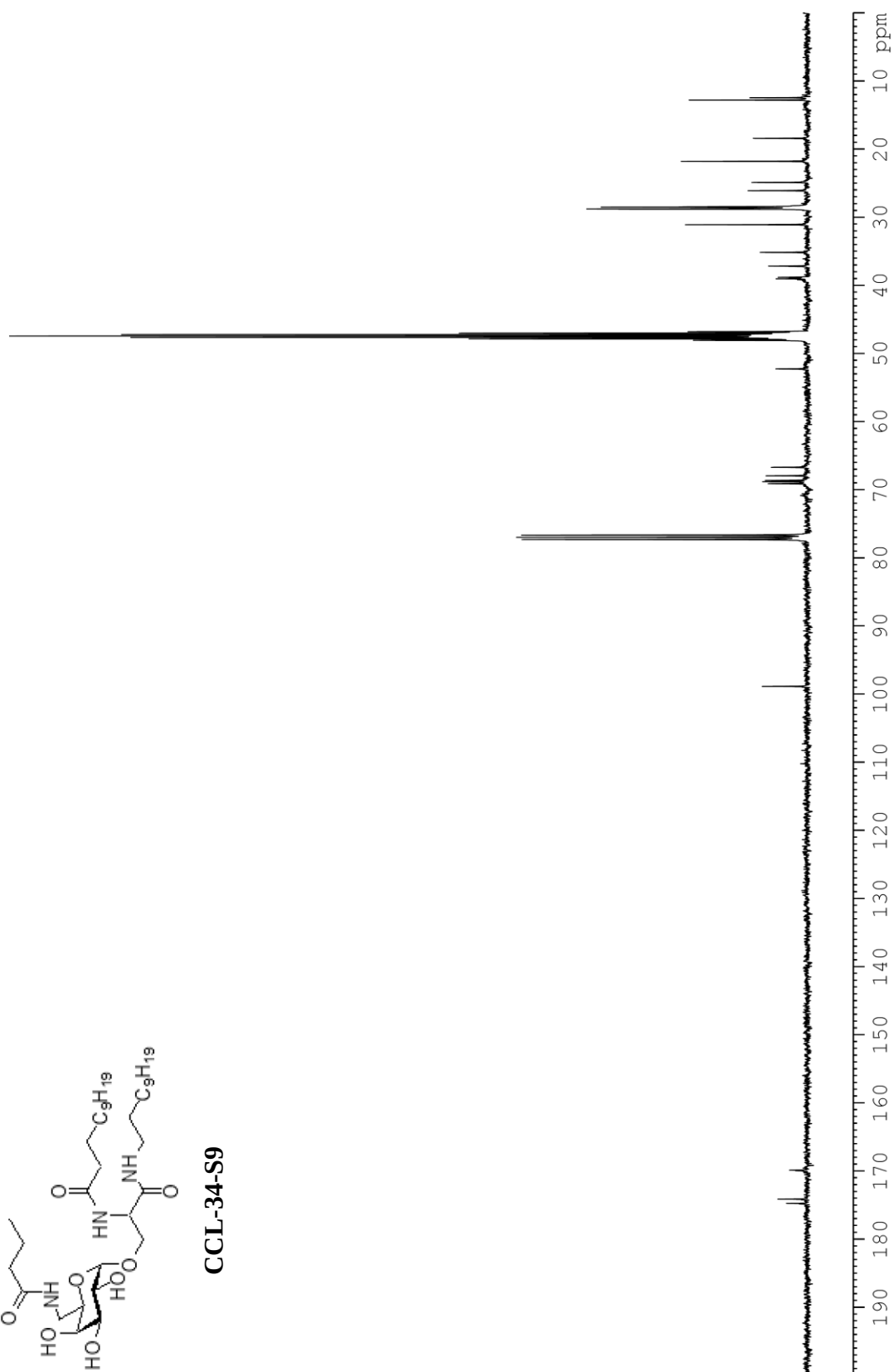
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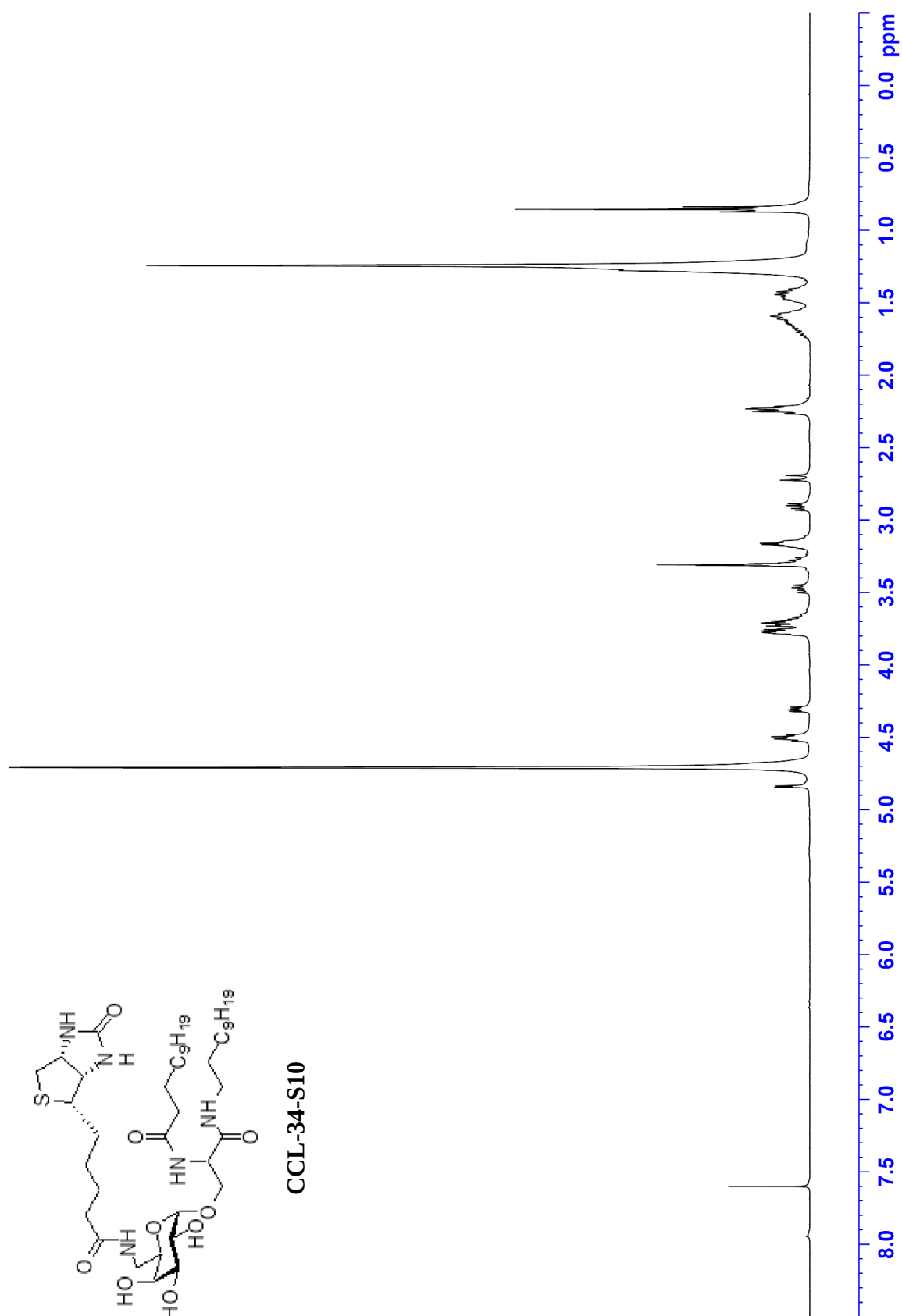


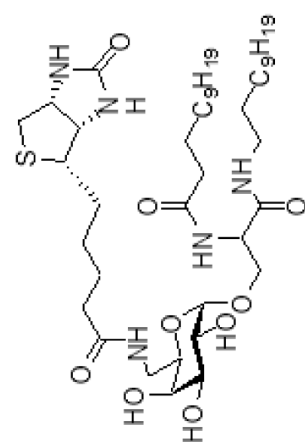




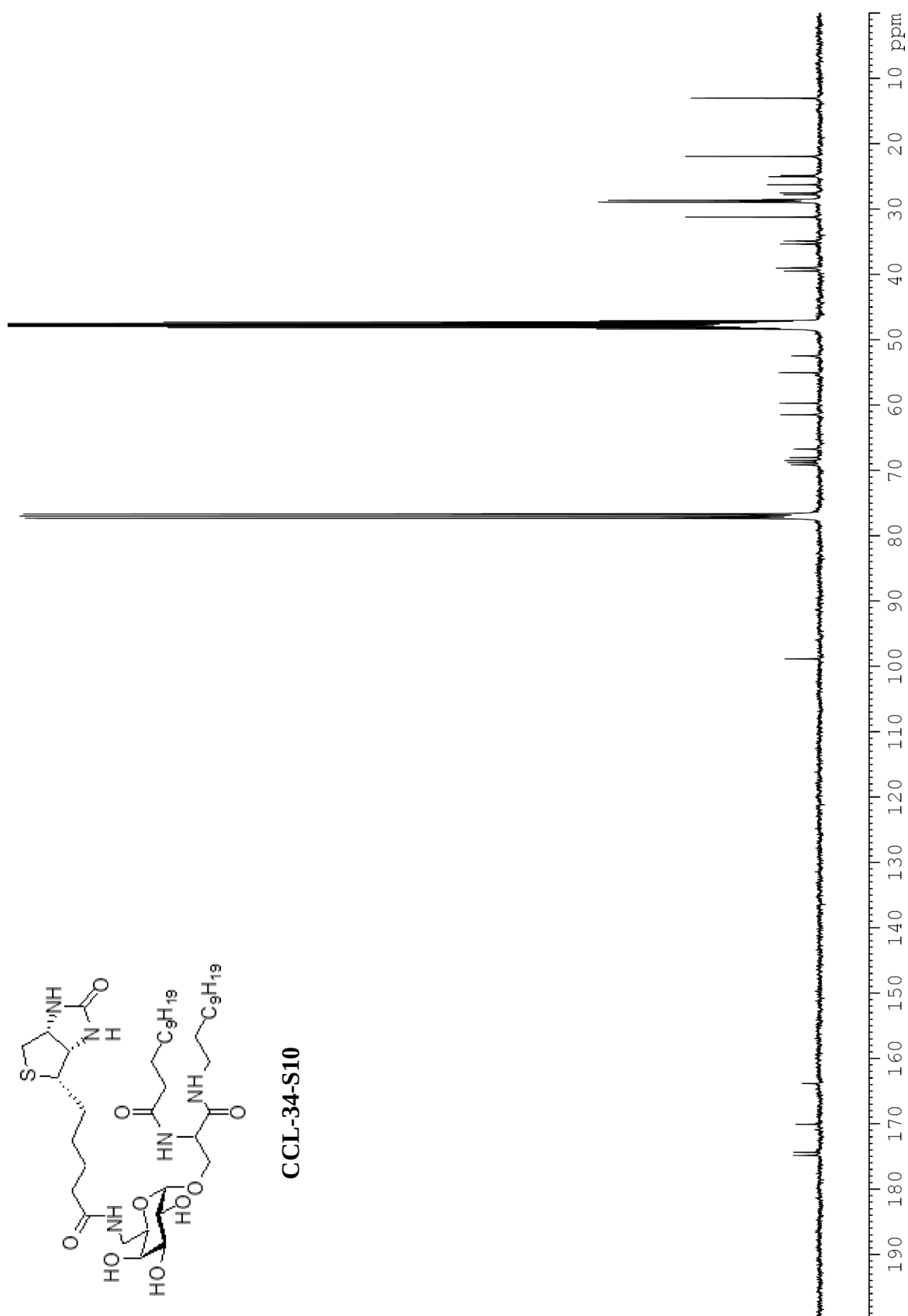
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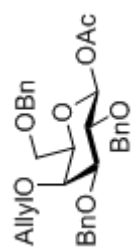




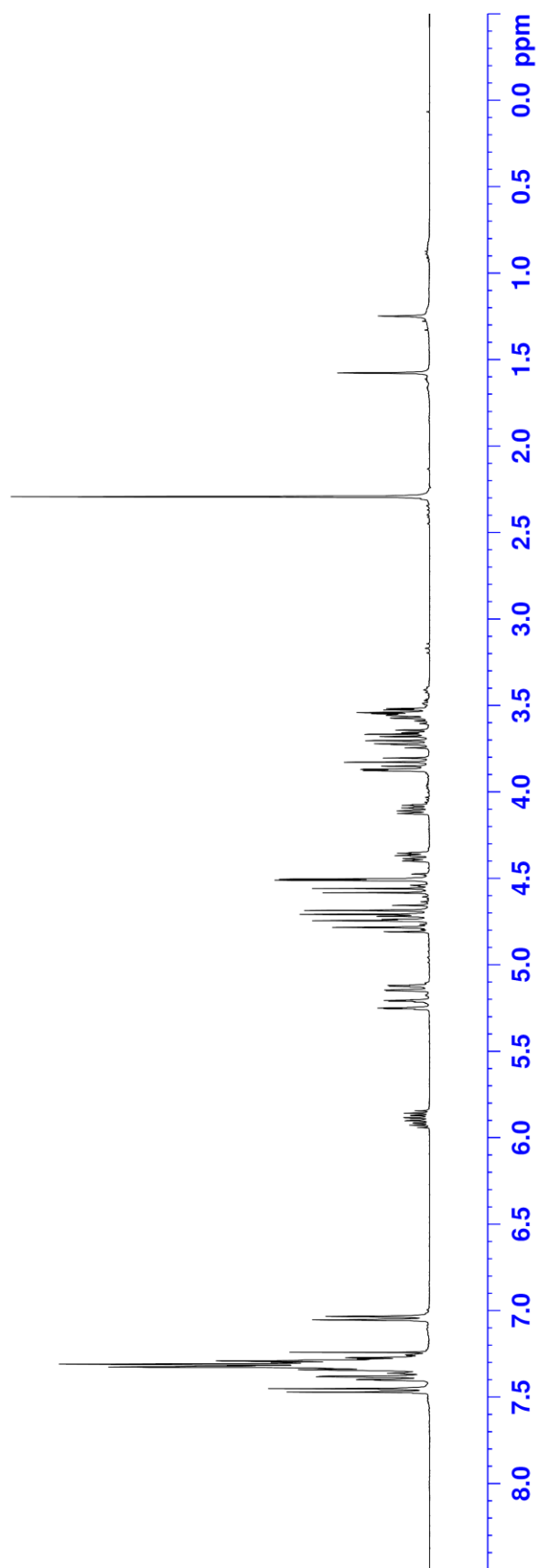


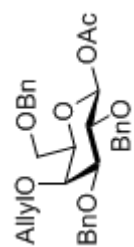
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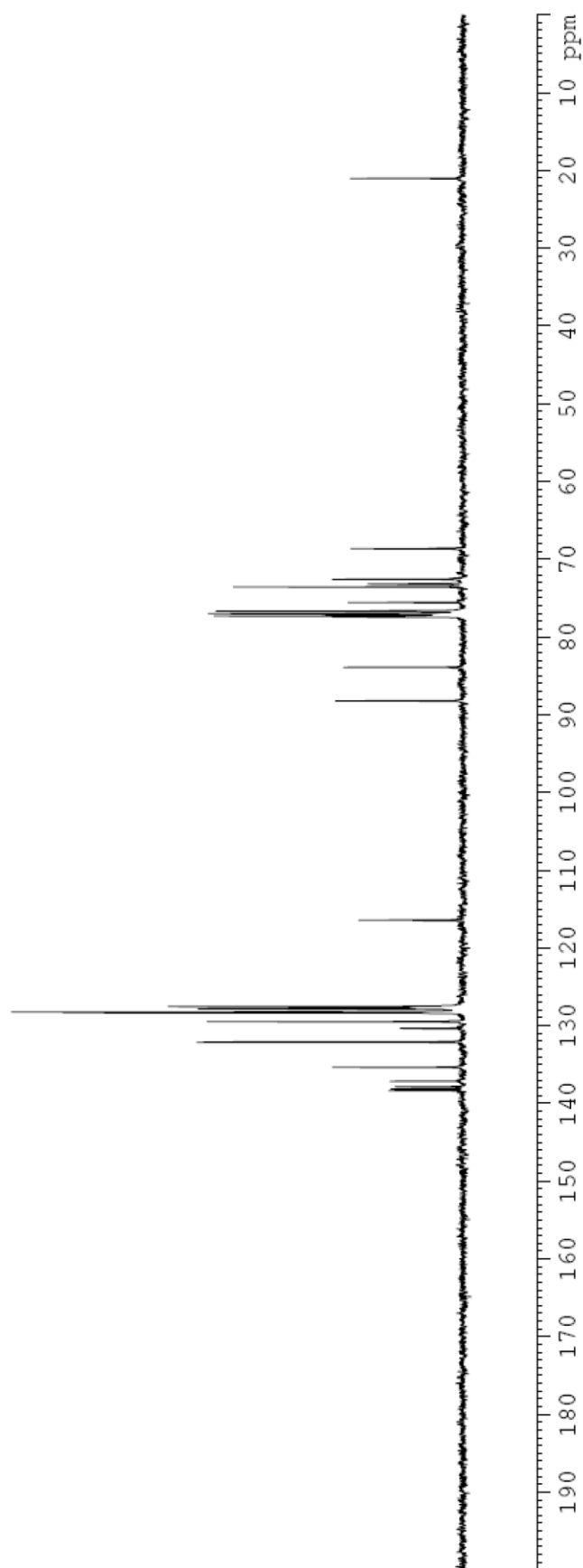


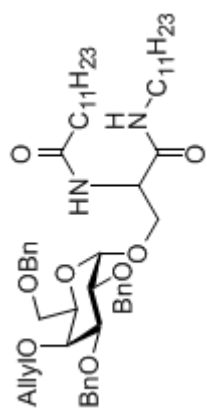
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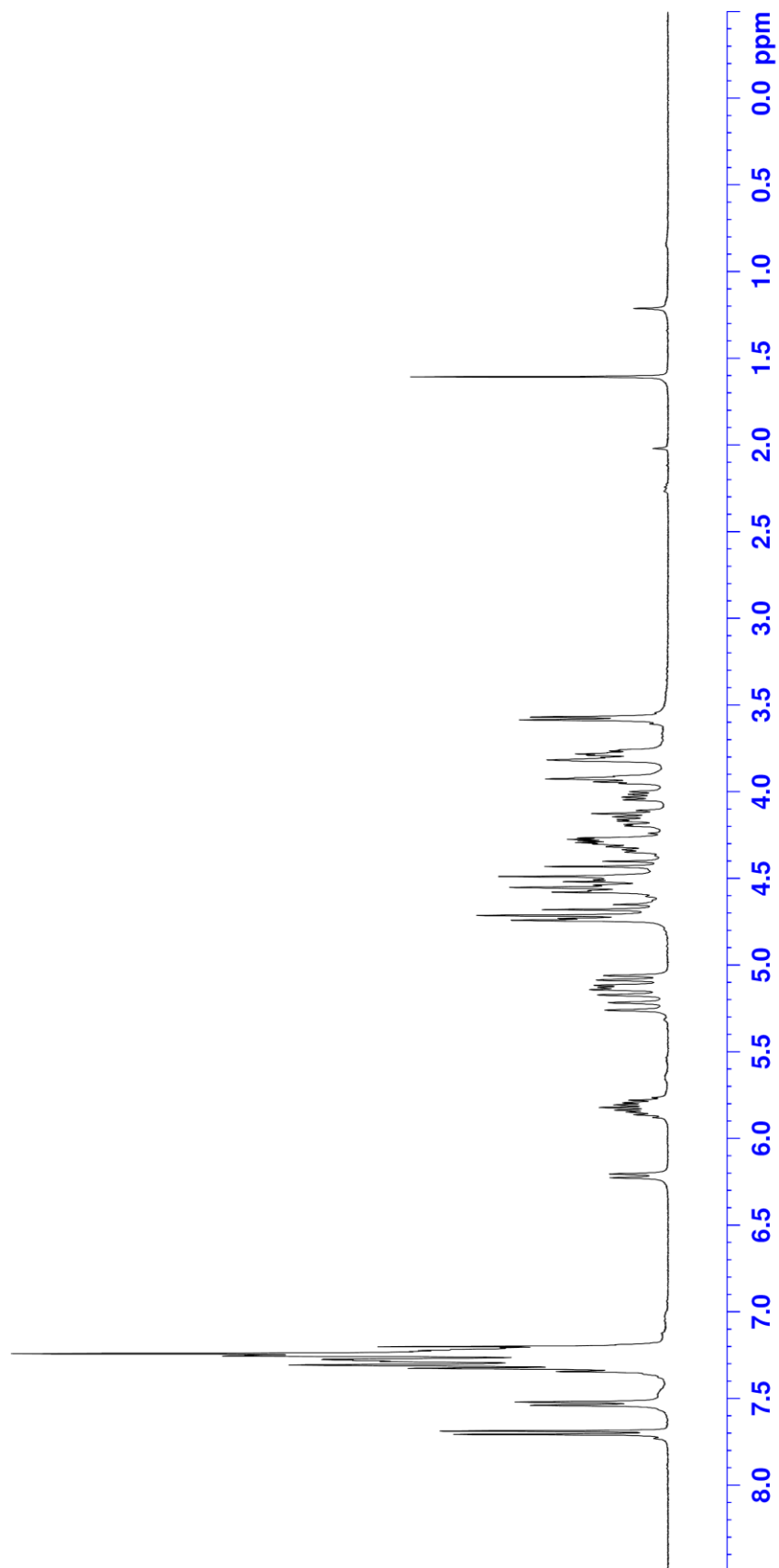


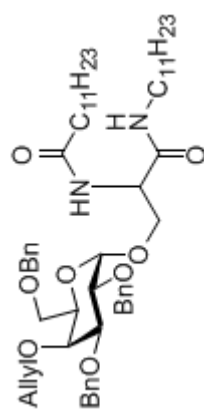
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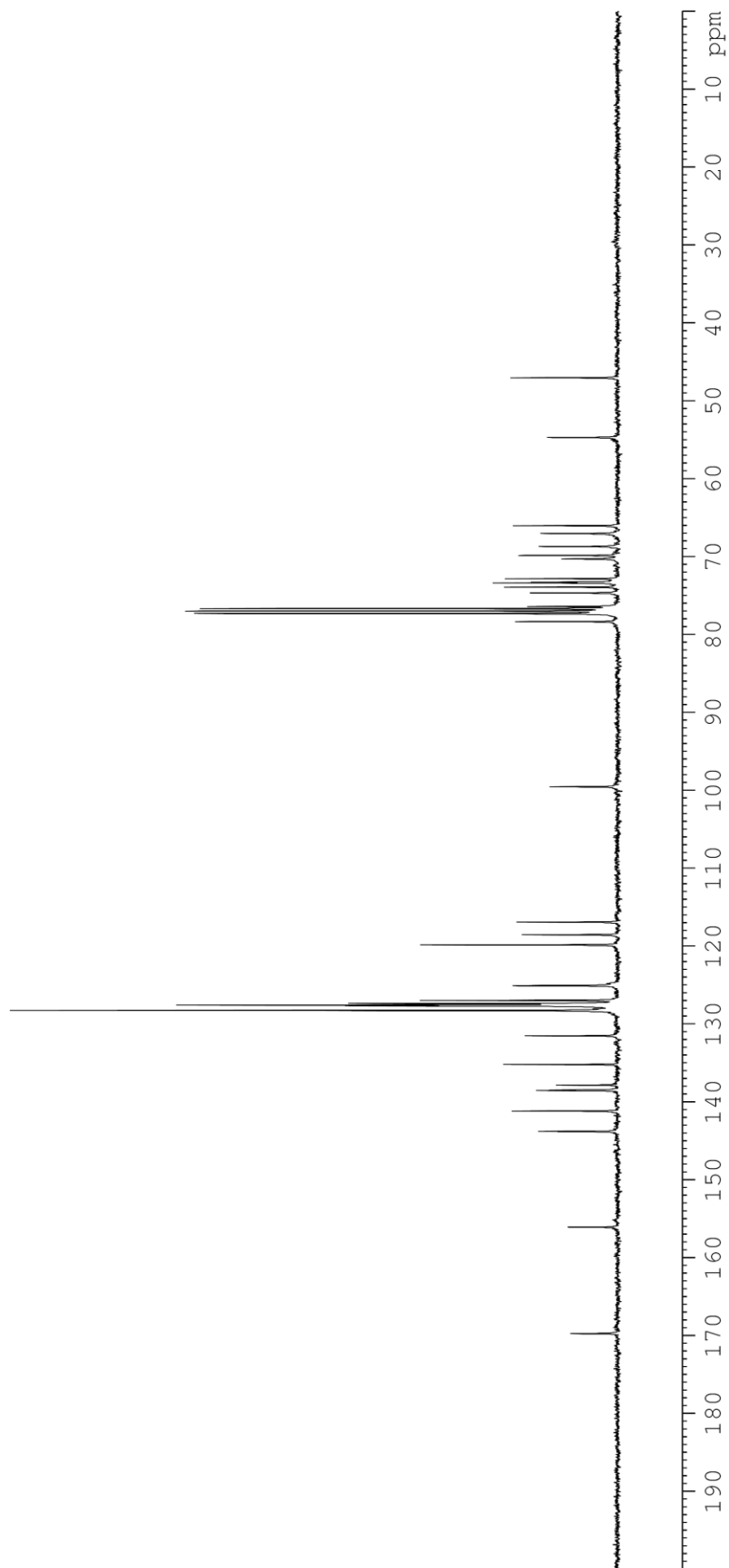


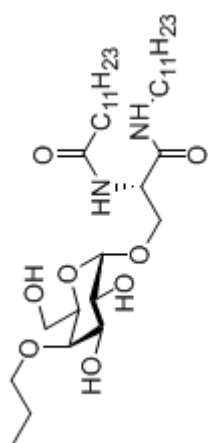
12α



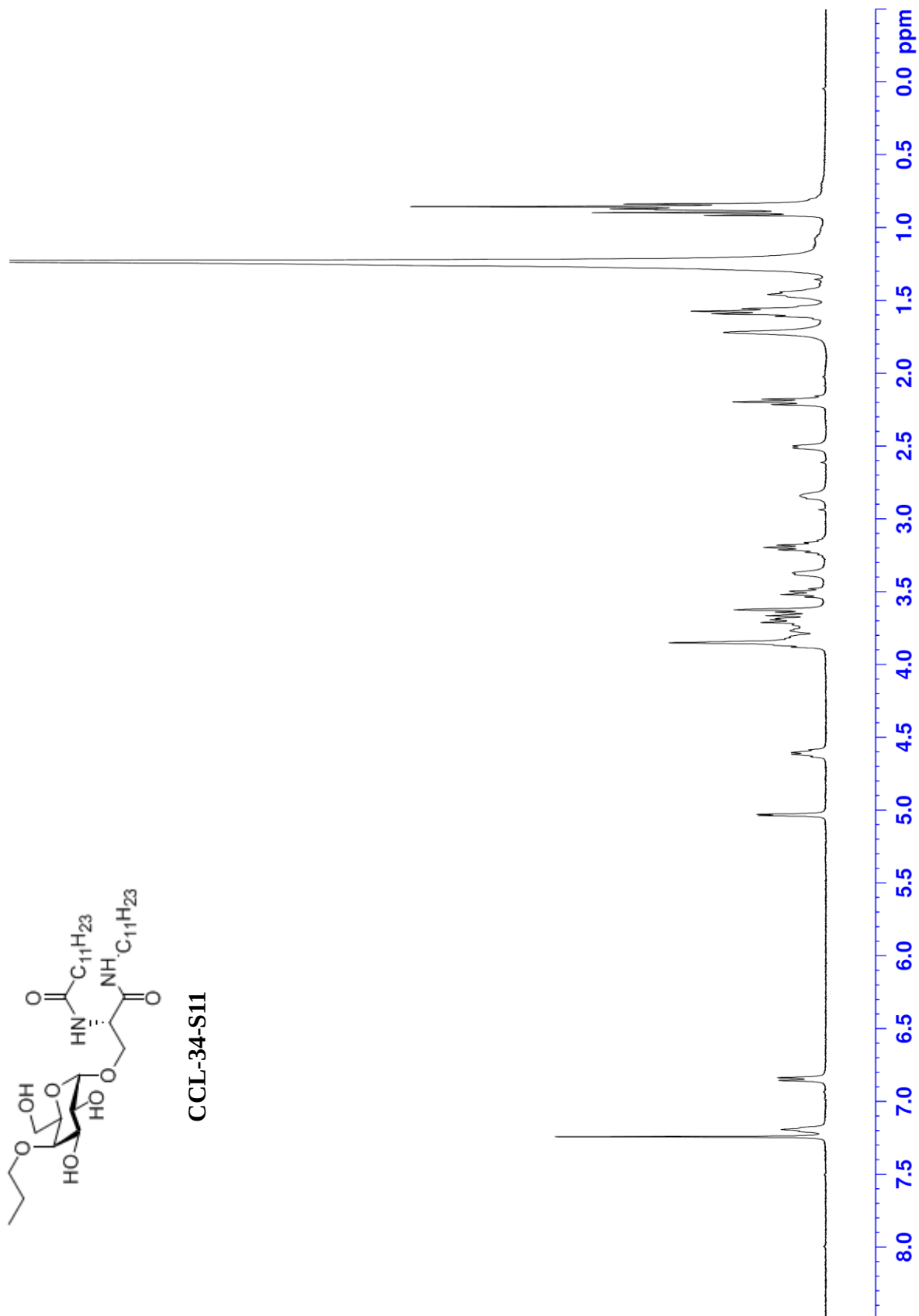


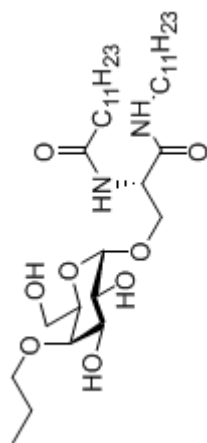
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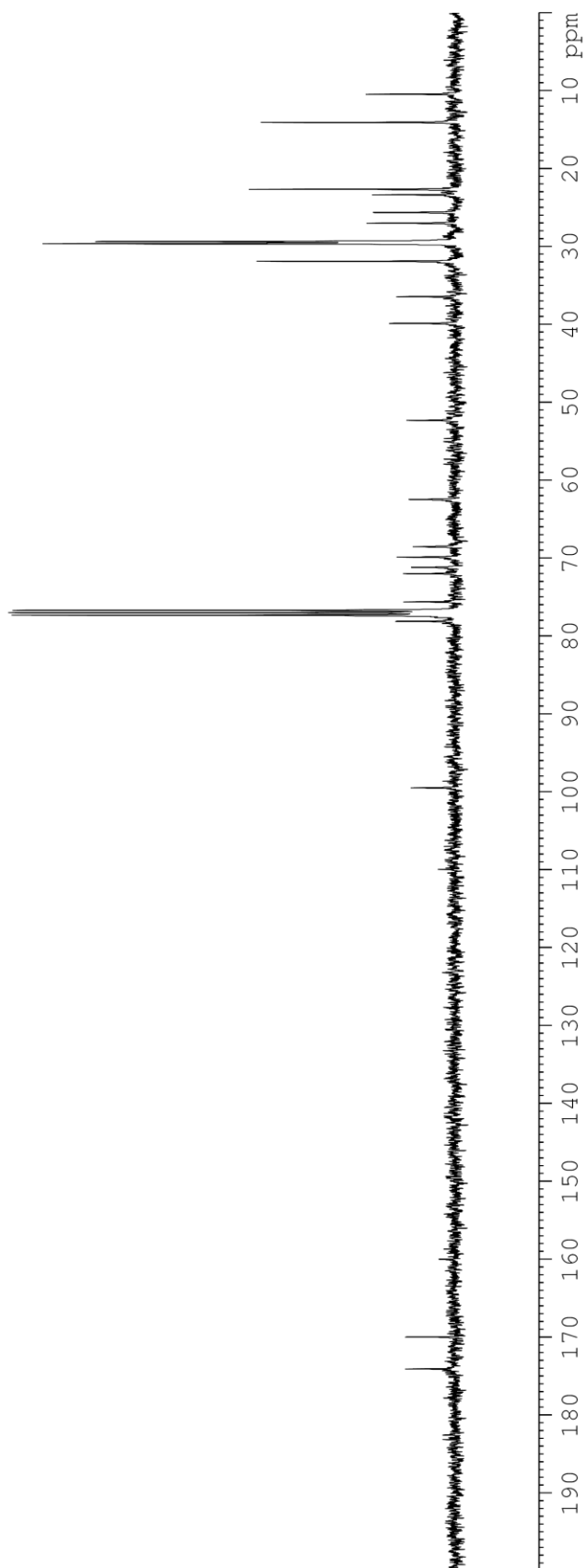


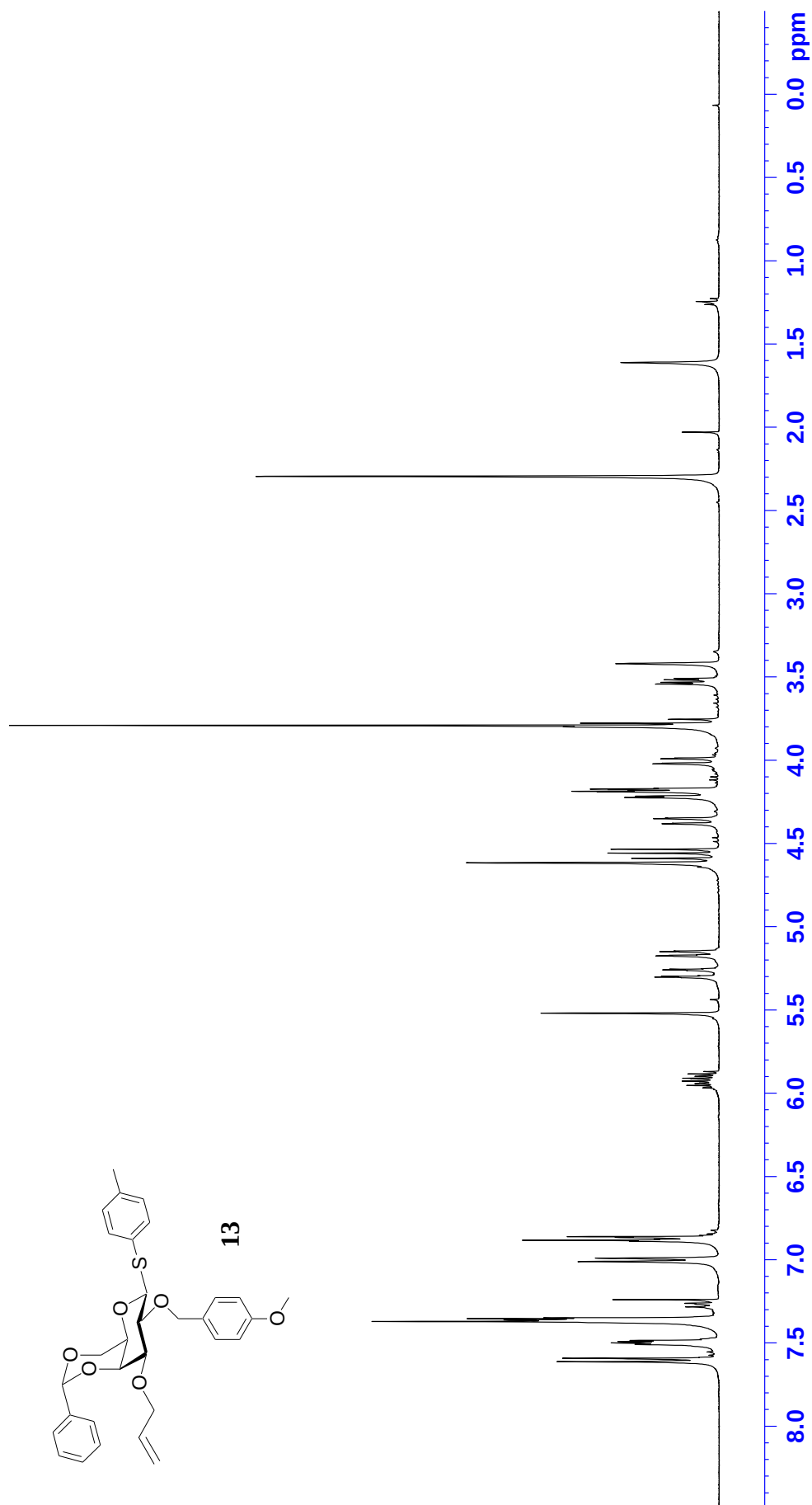
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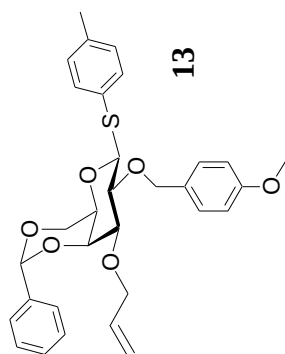




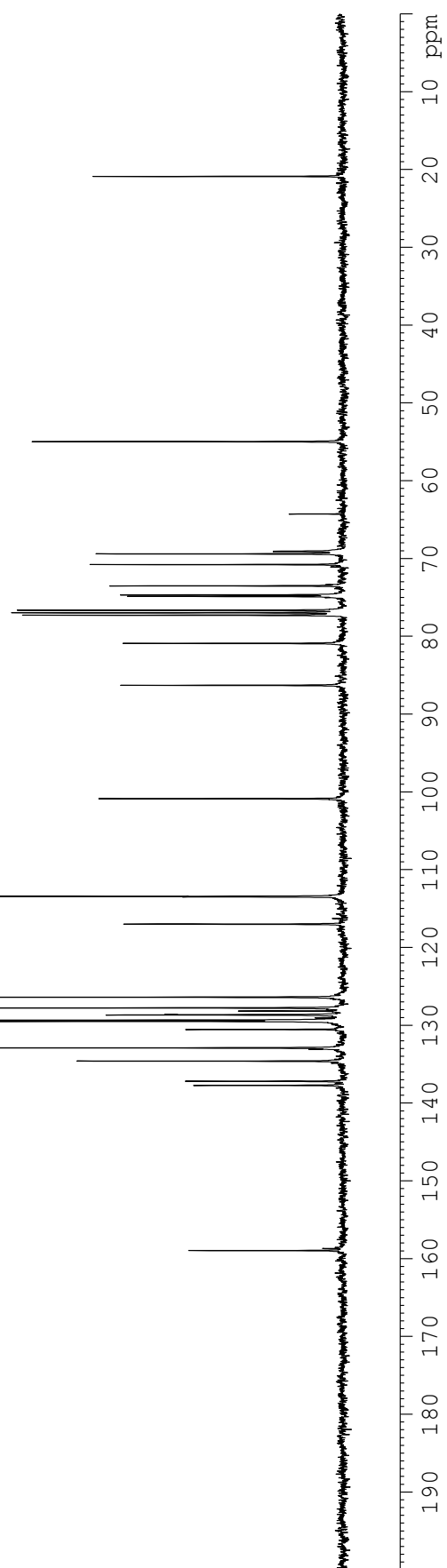
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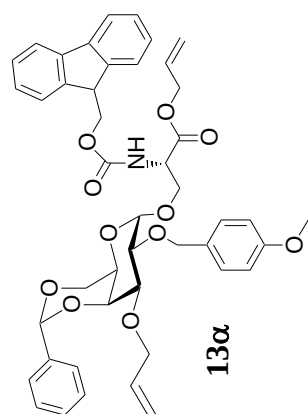




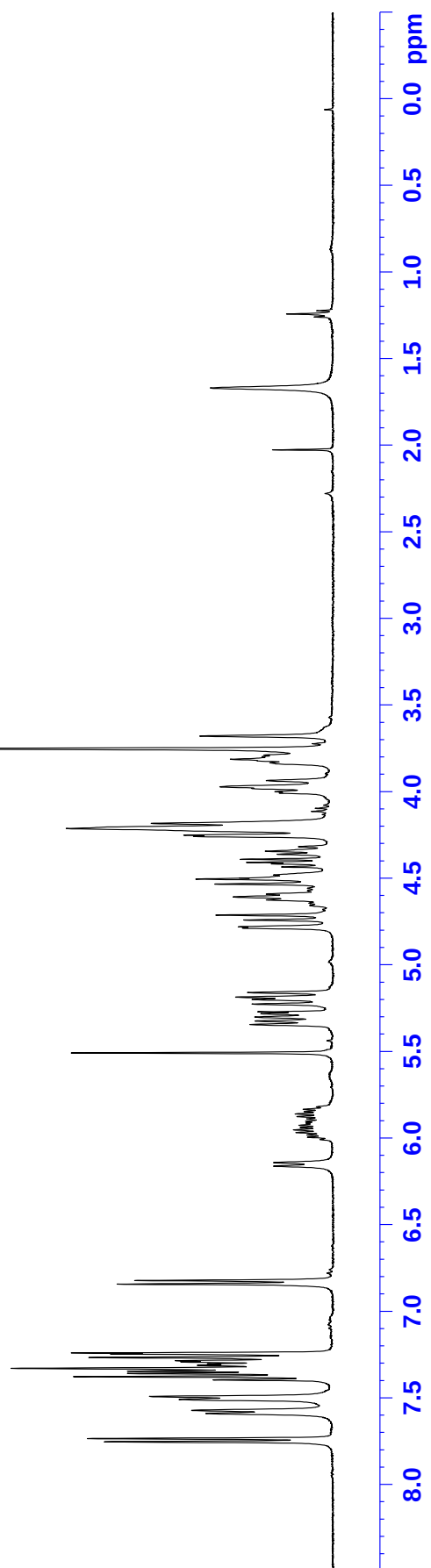


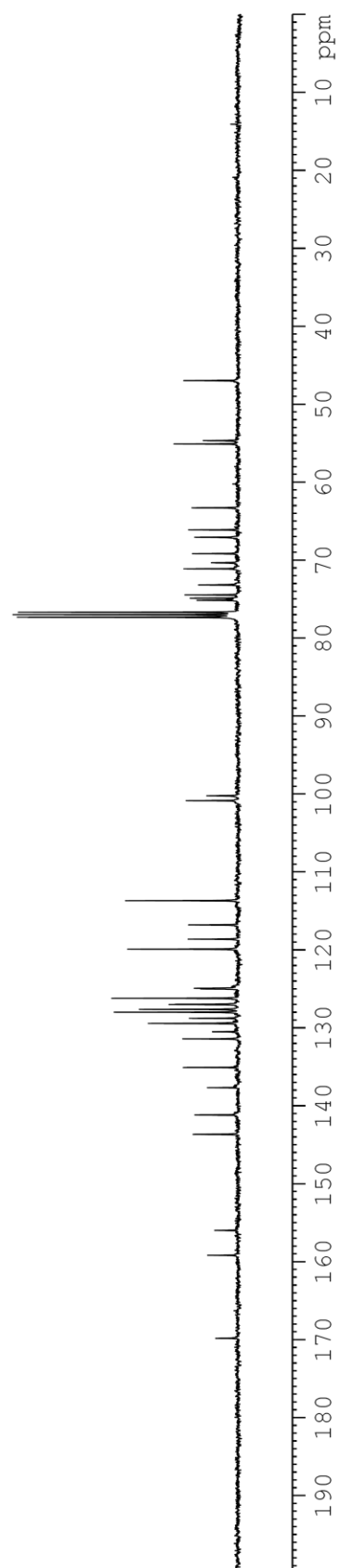
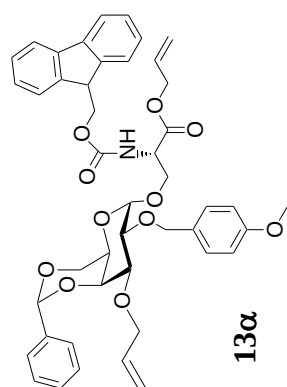
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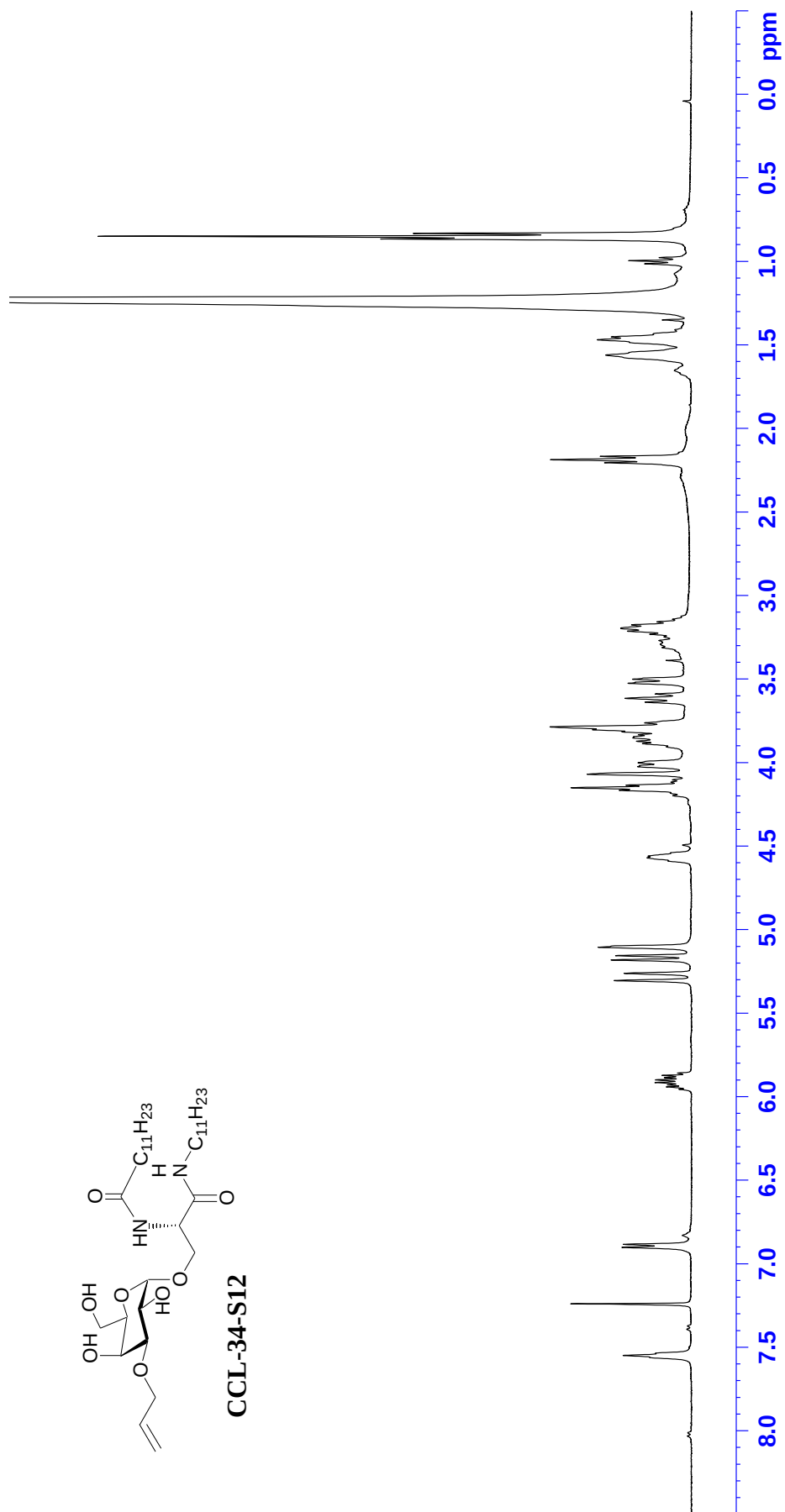


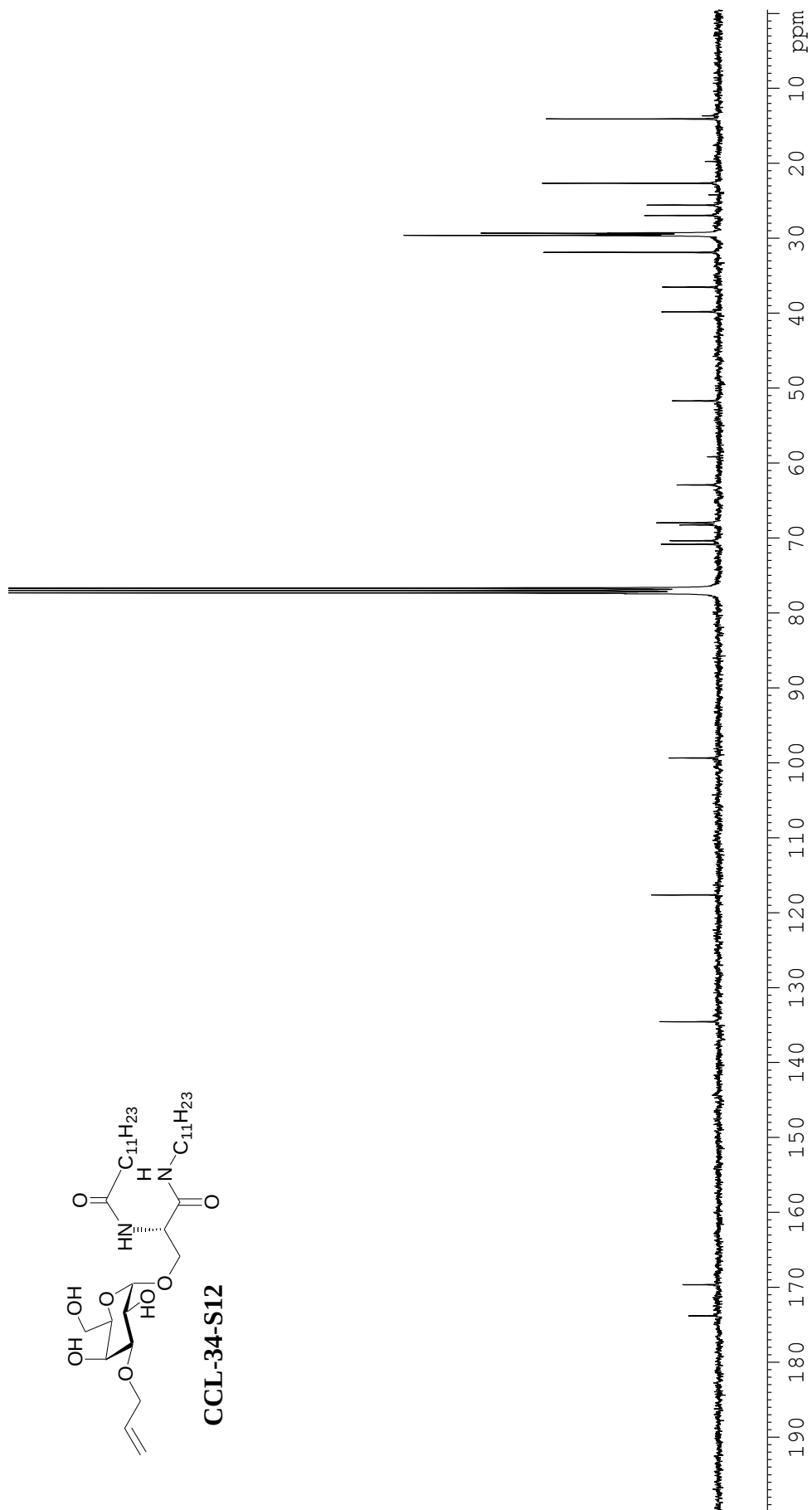
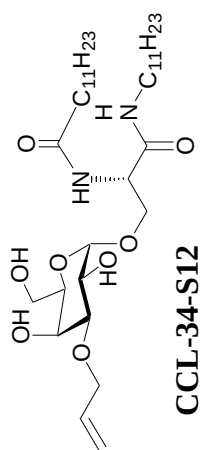


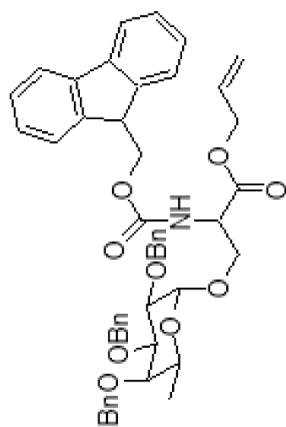
13 α



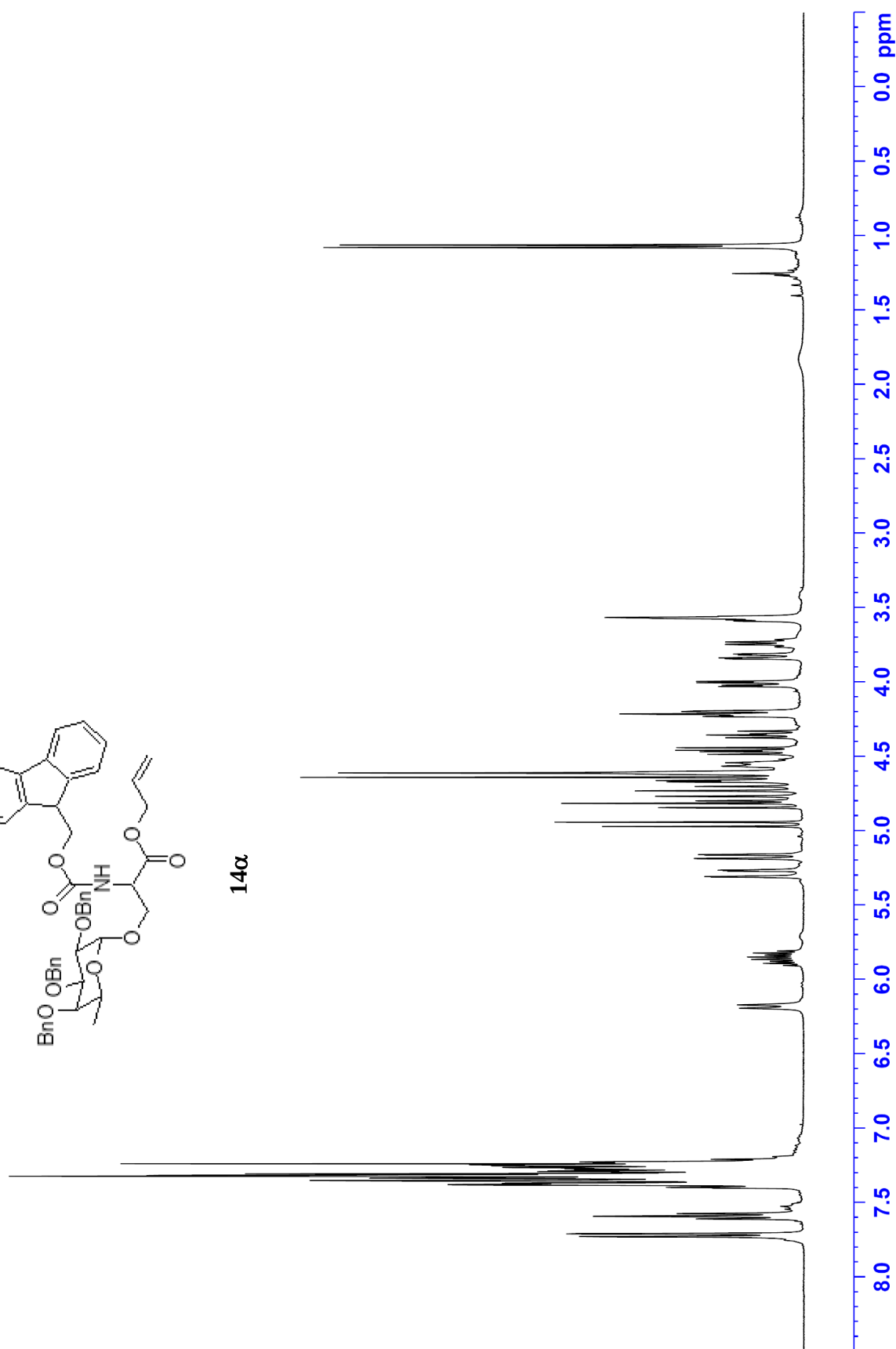




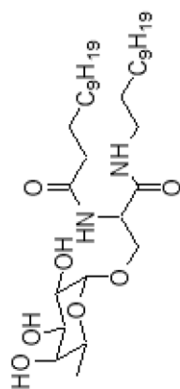




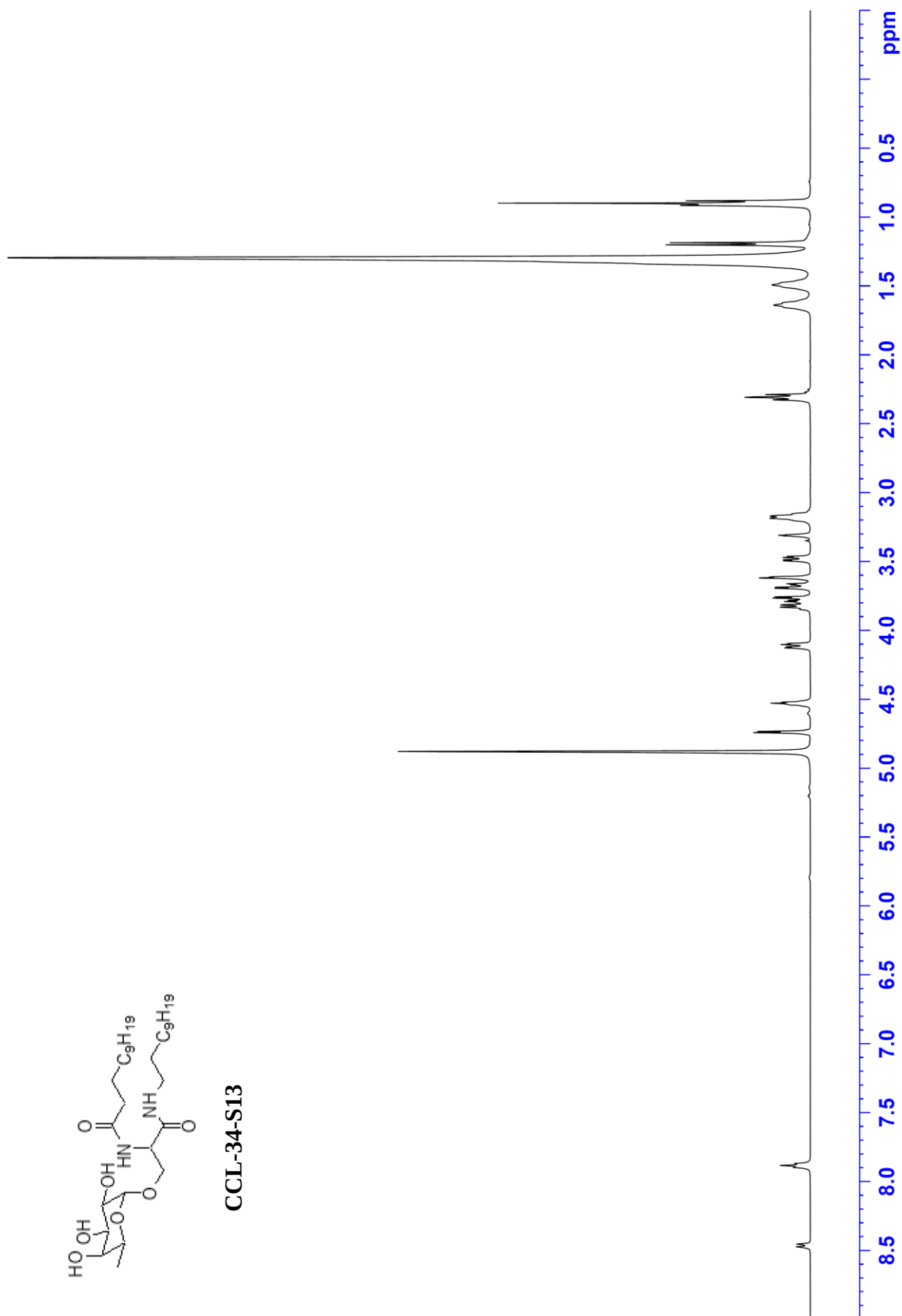
14α

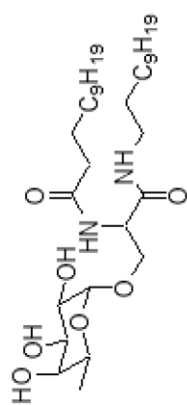




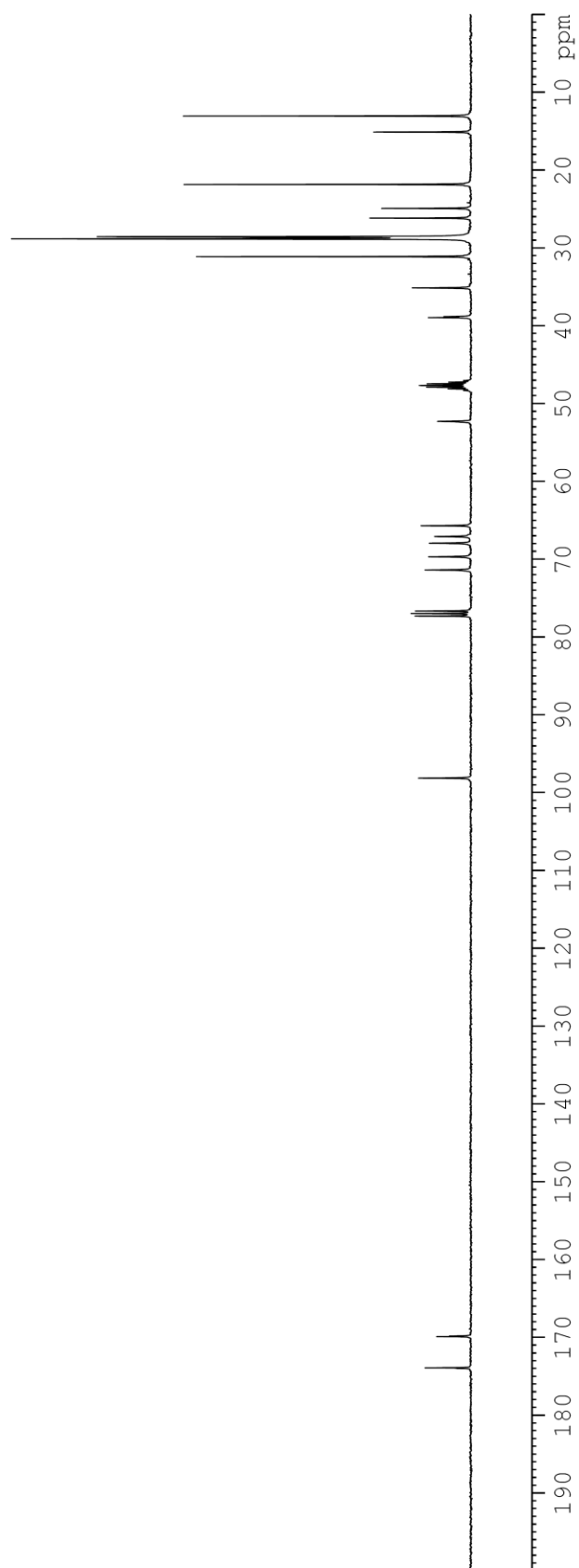


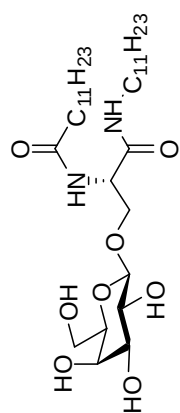
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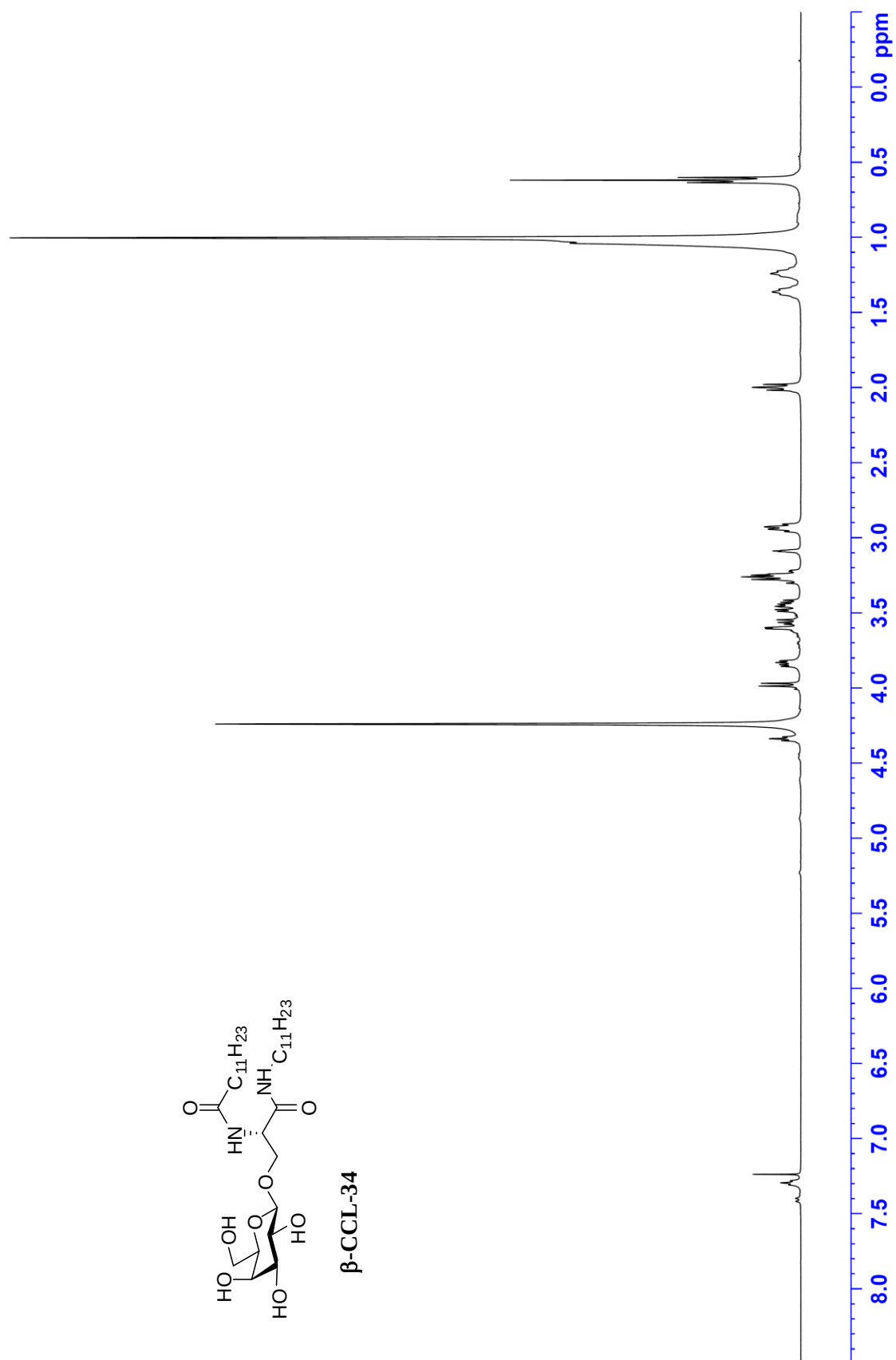


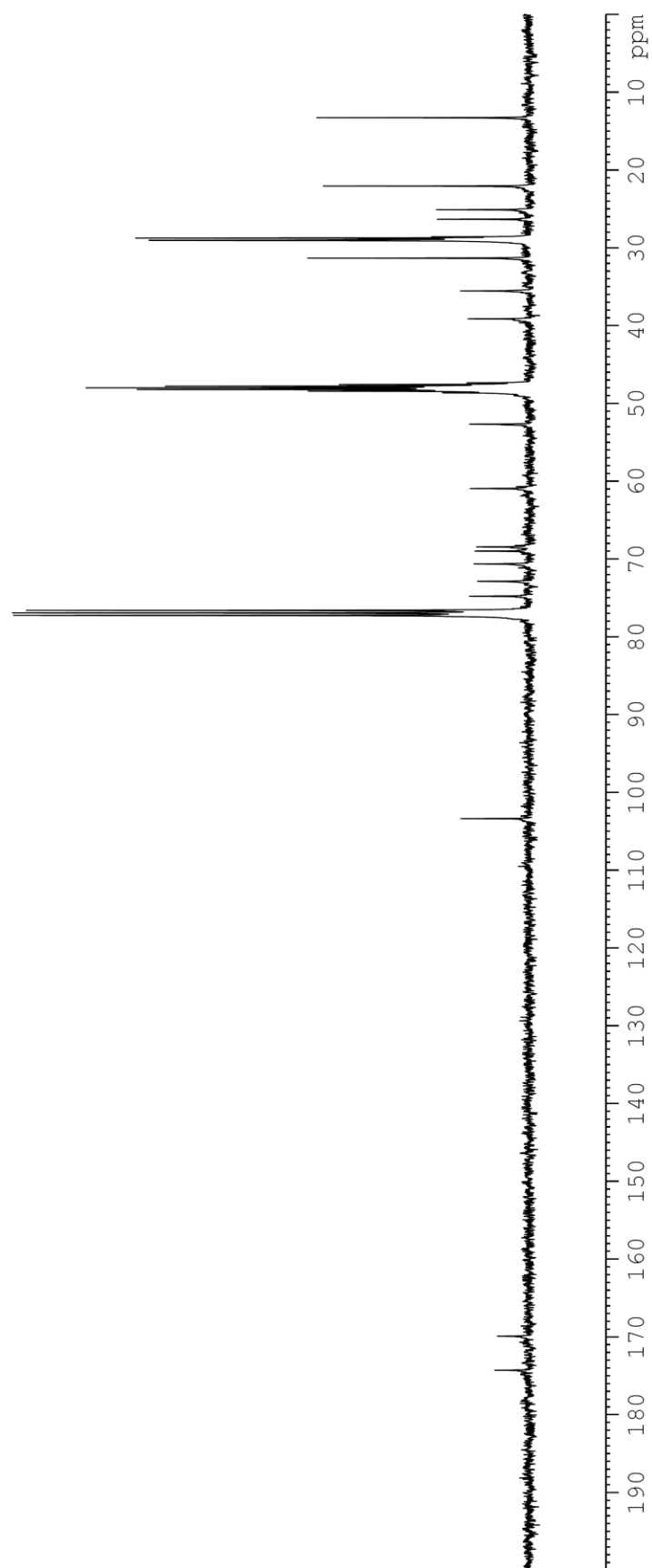
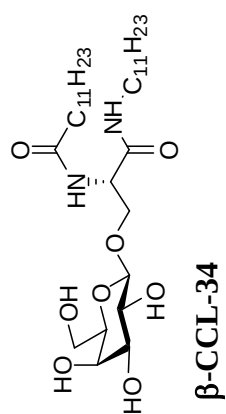
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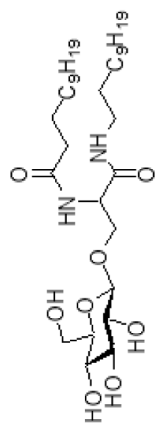




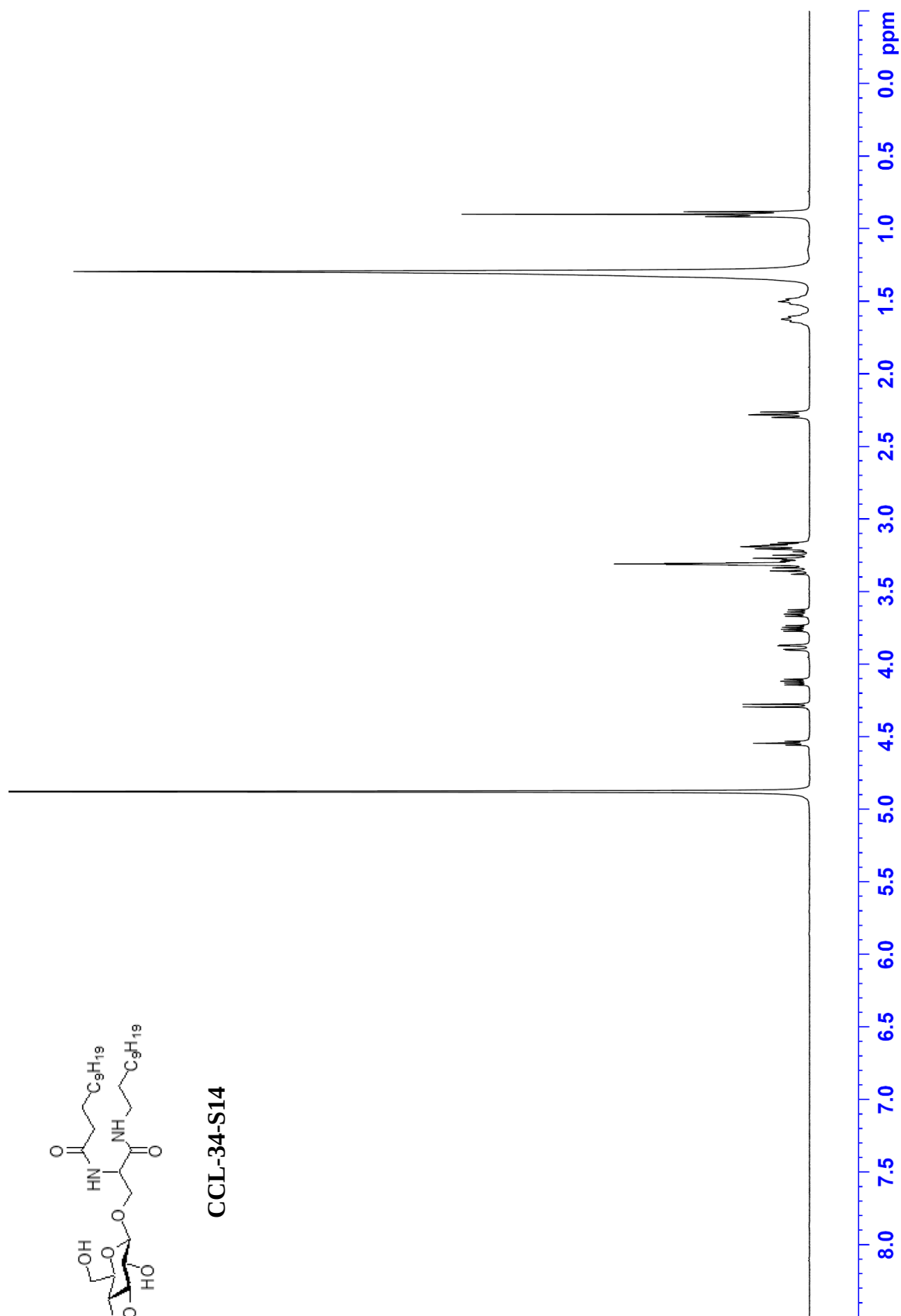
β -CCL-34

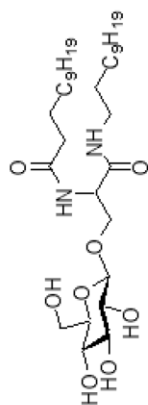




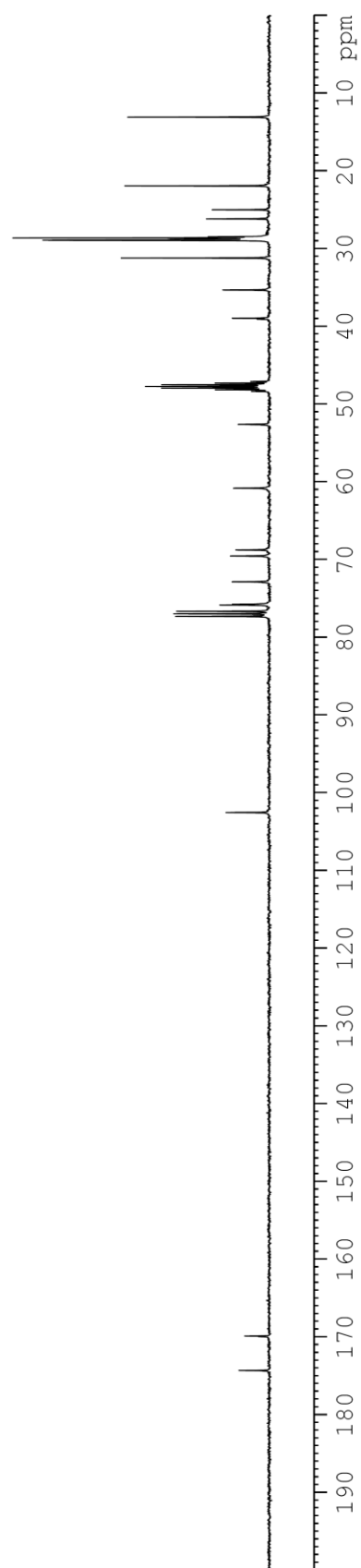


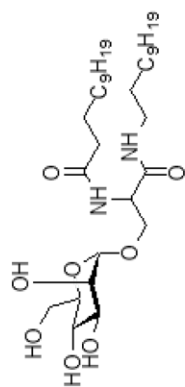
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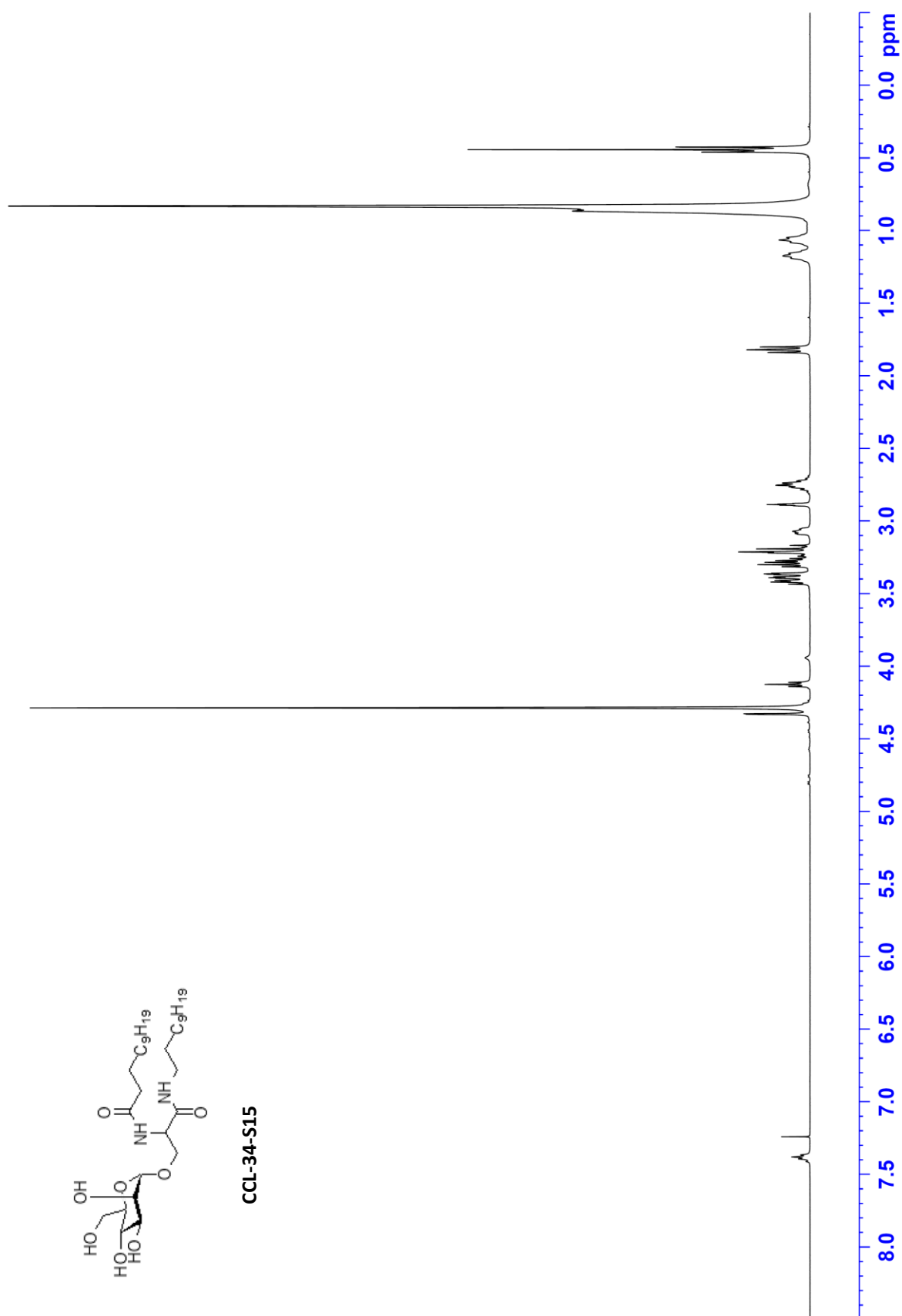


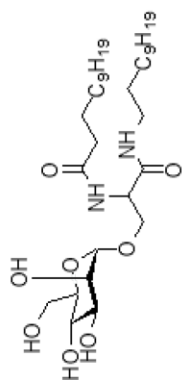
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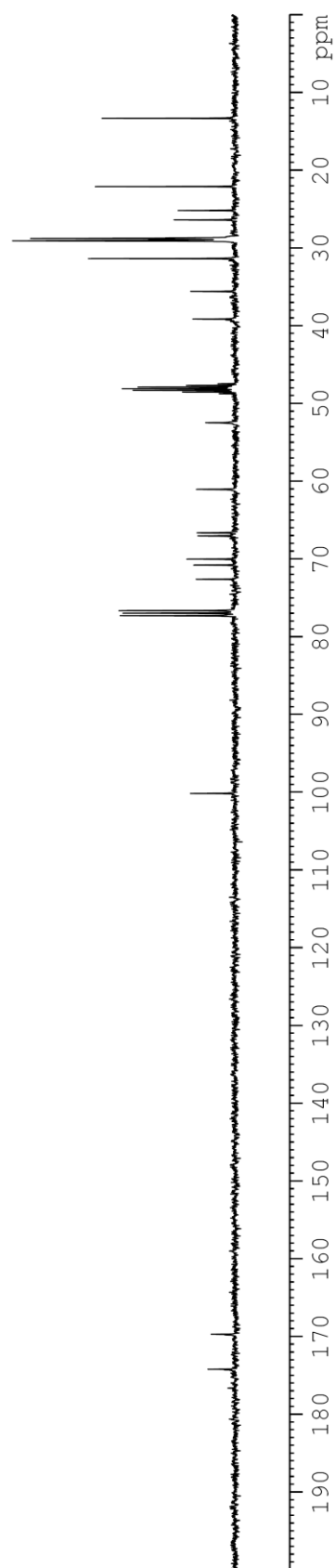


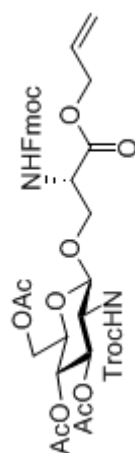
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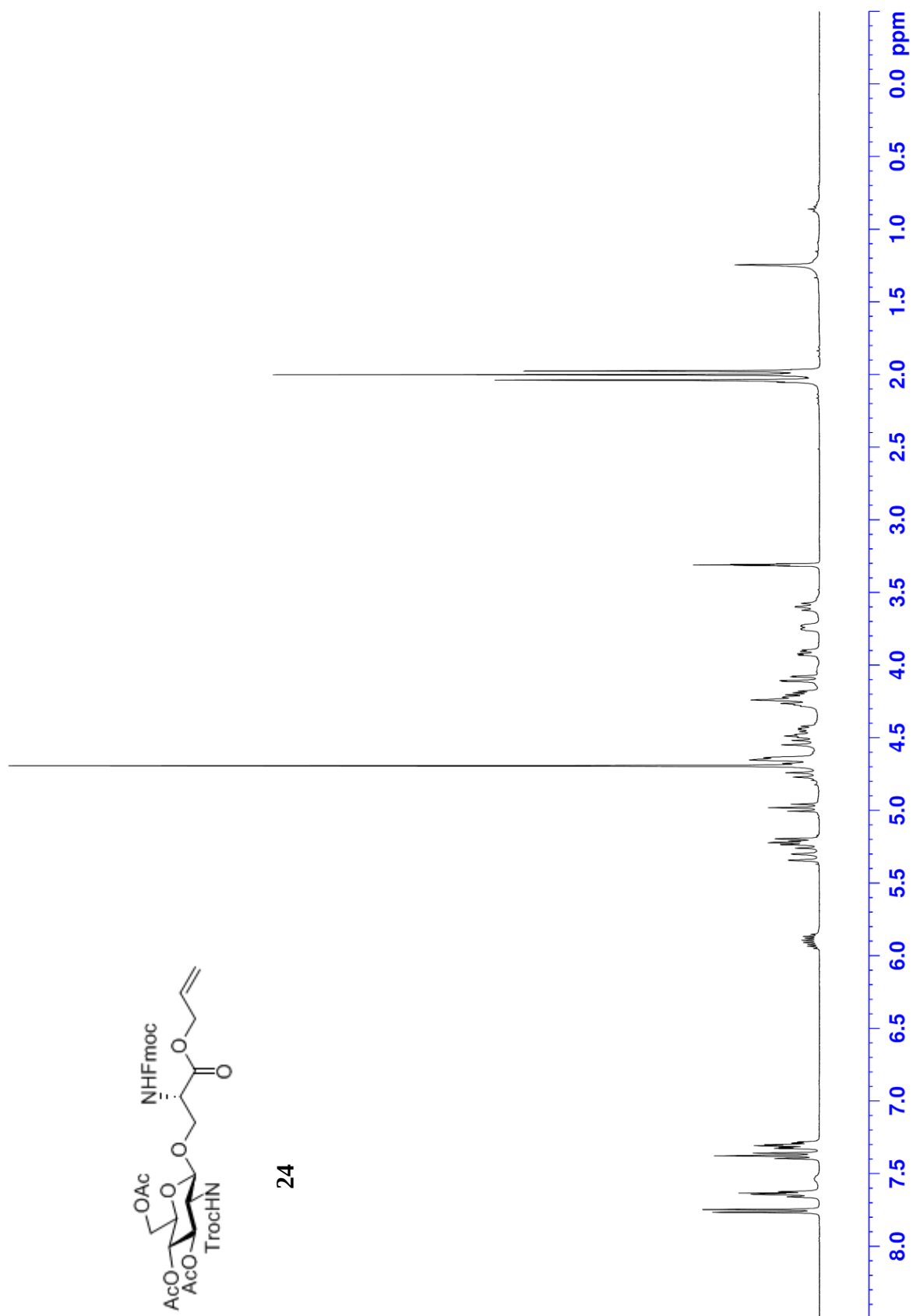


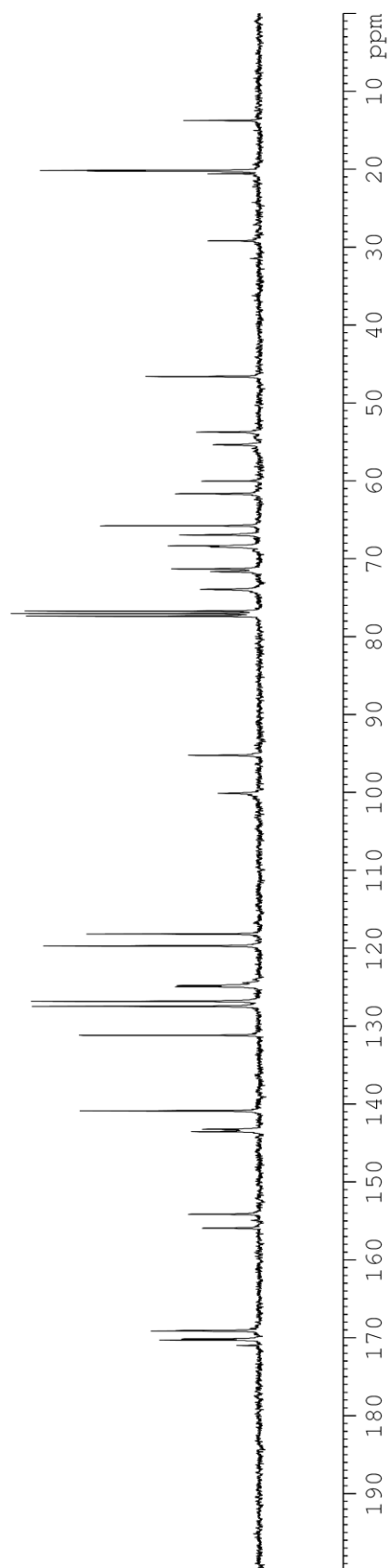
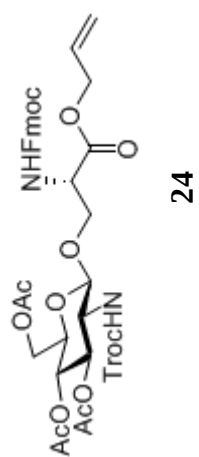
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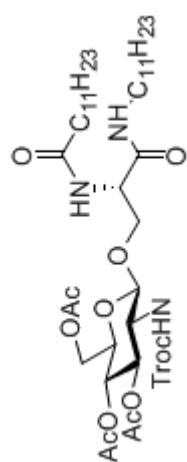




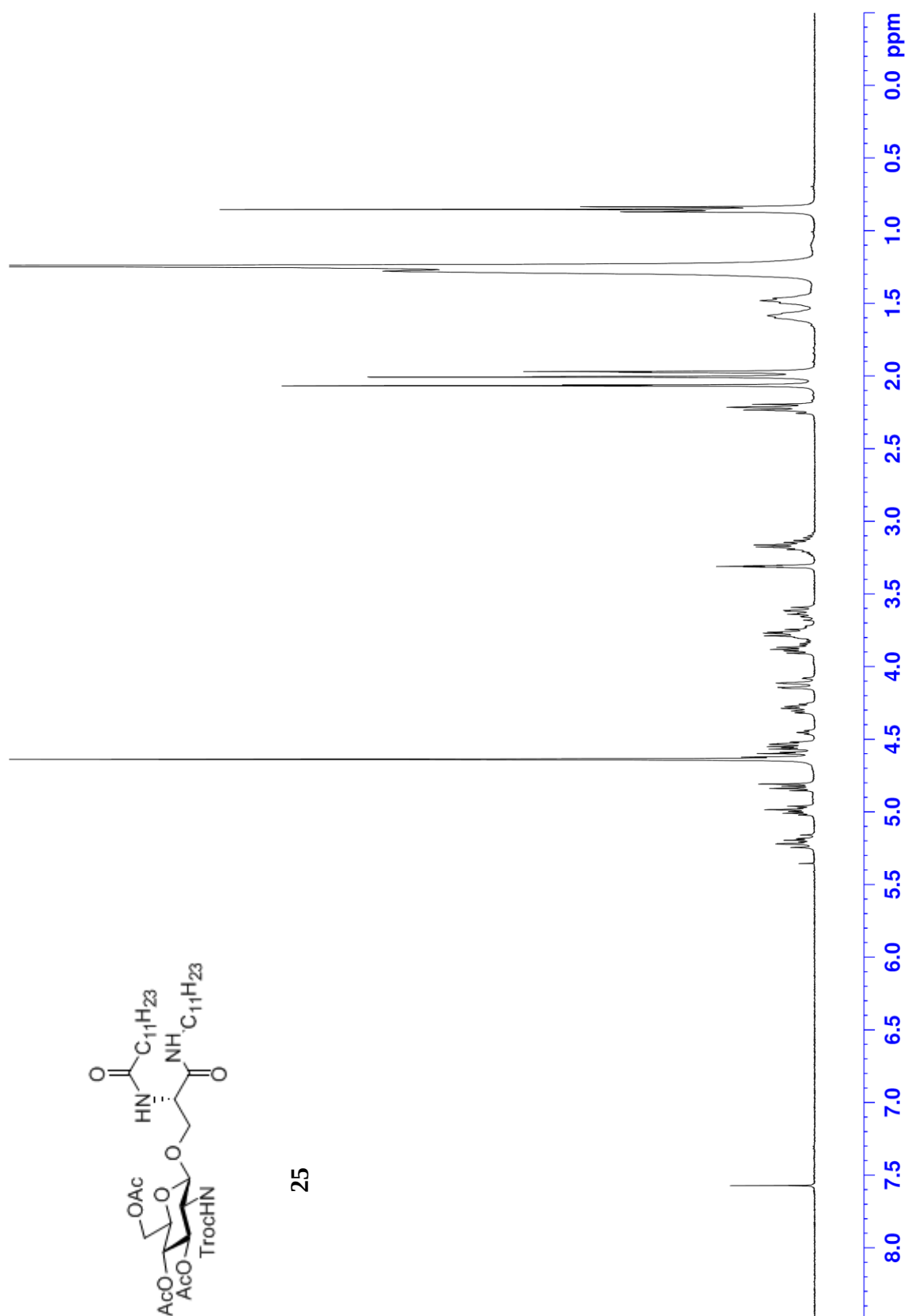
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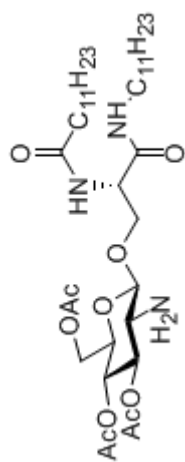




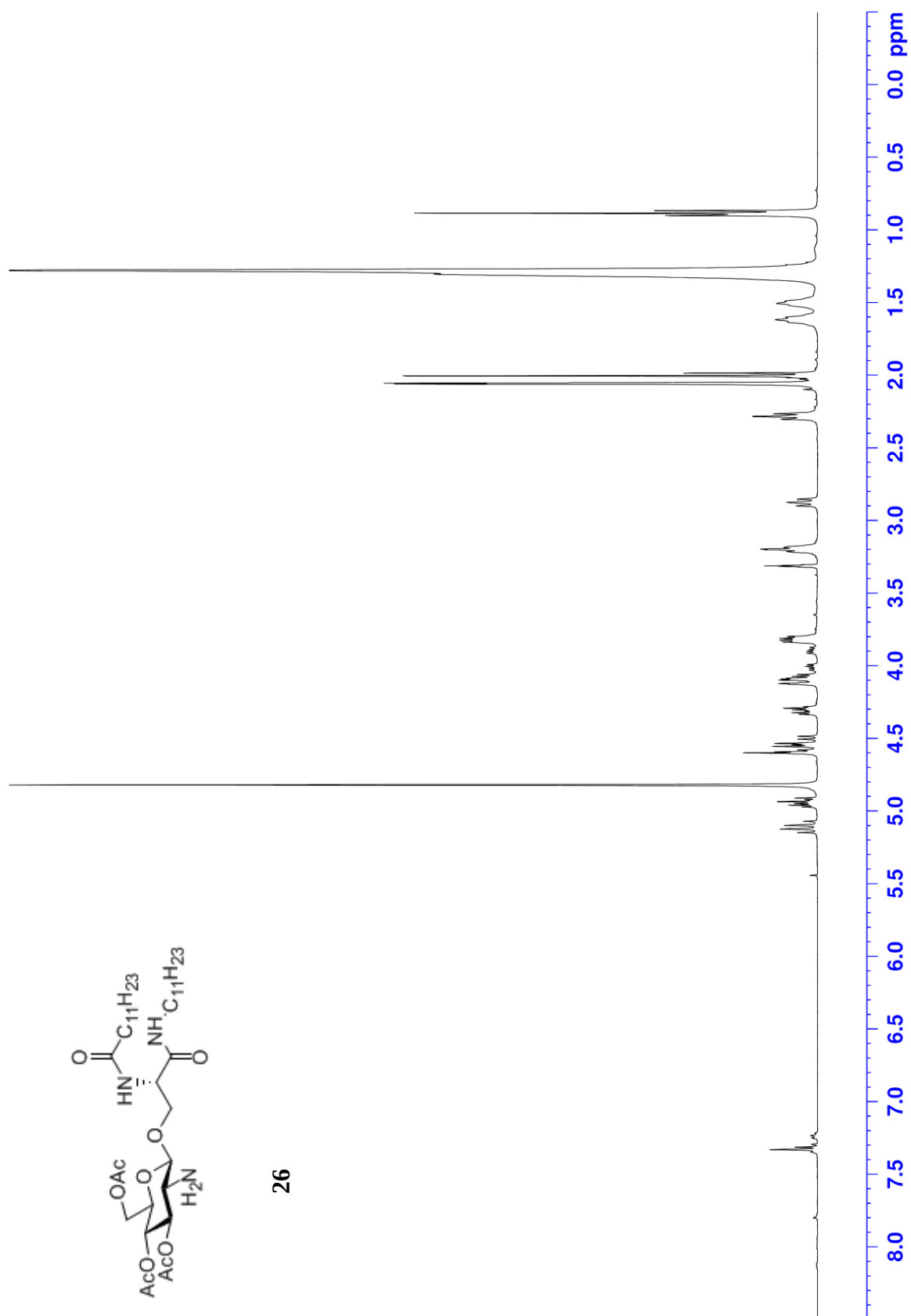
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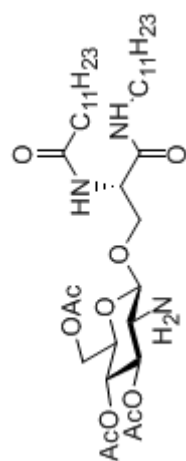




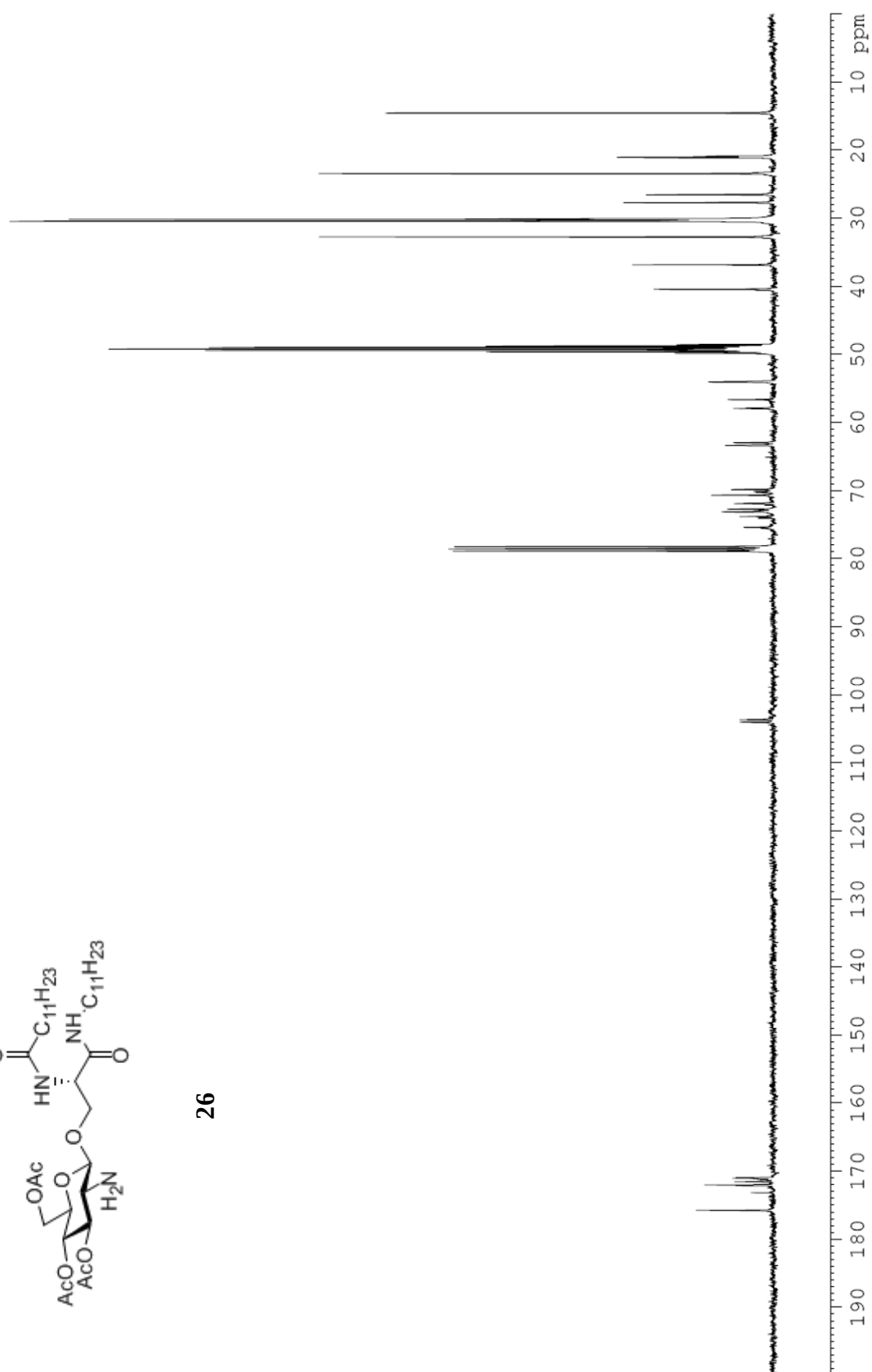


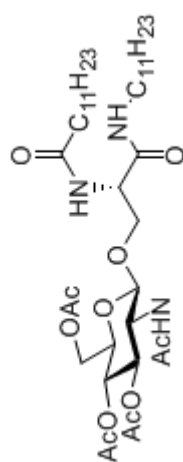
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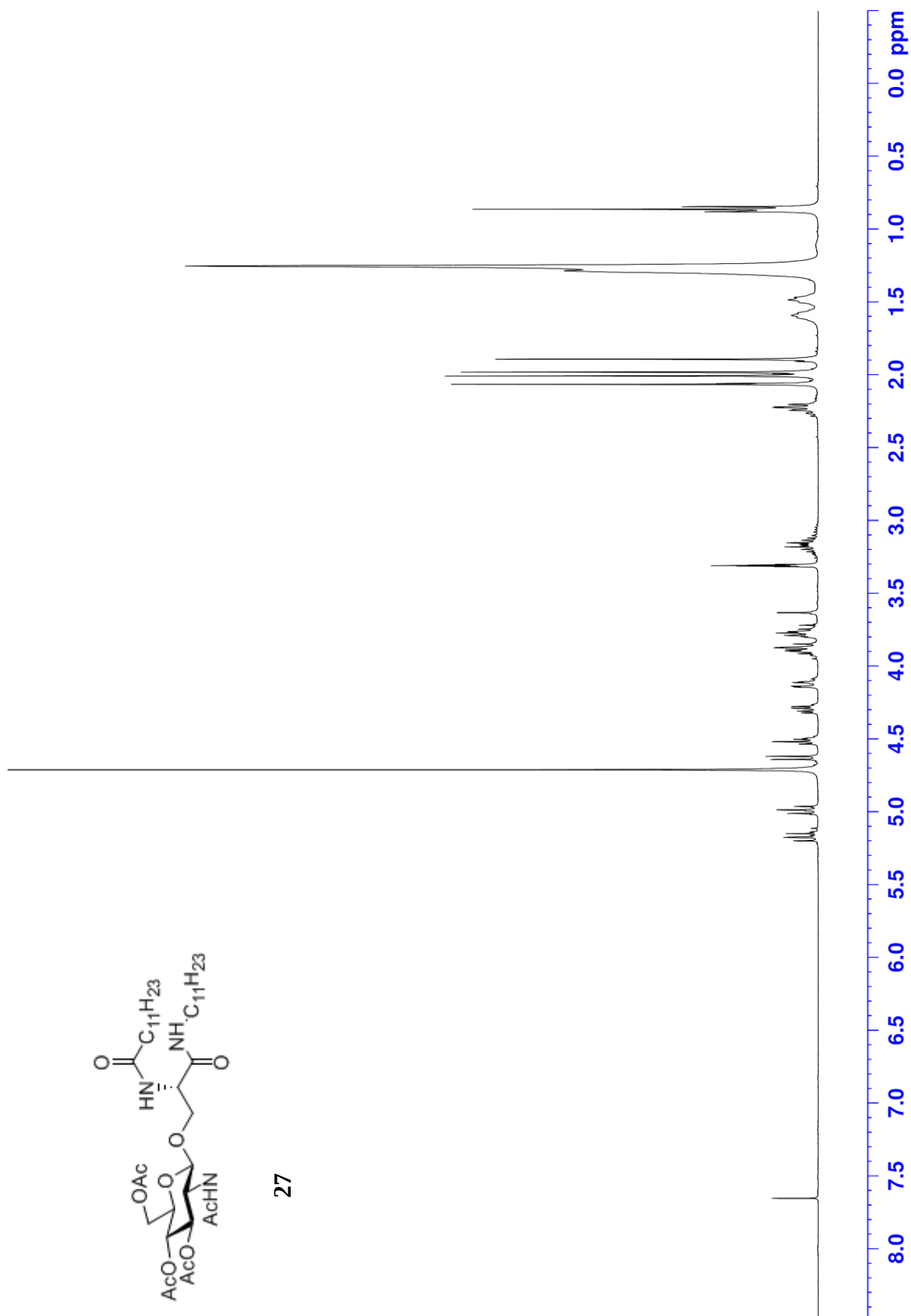


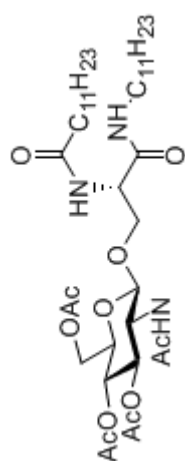
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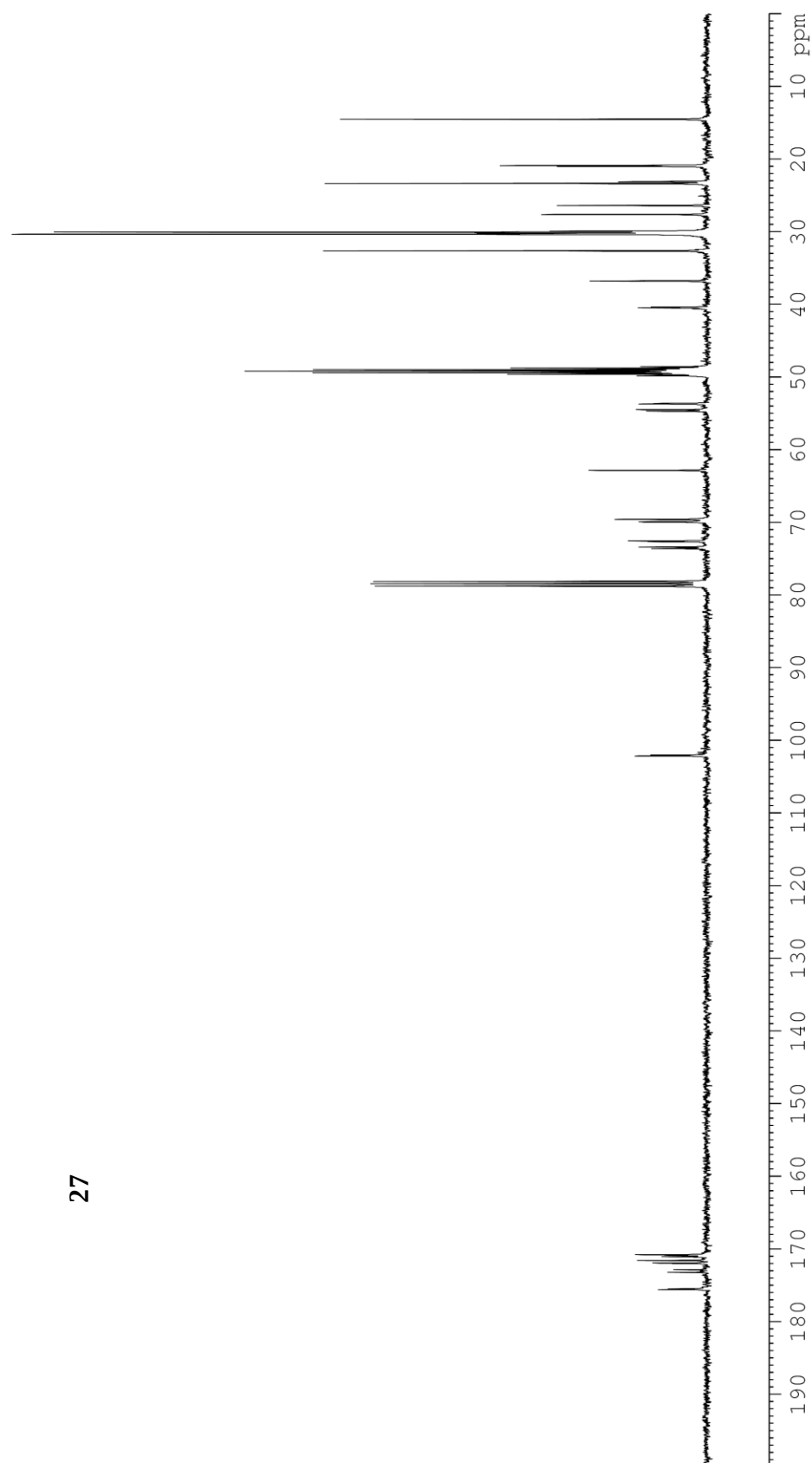


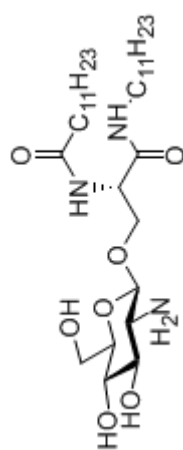
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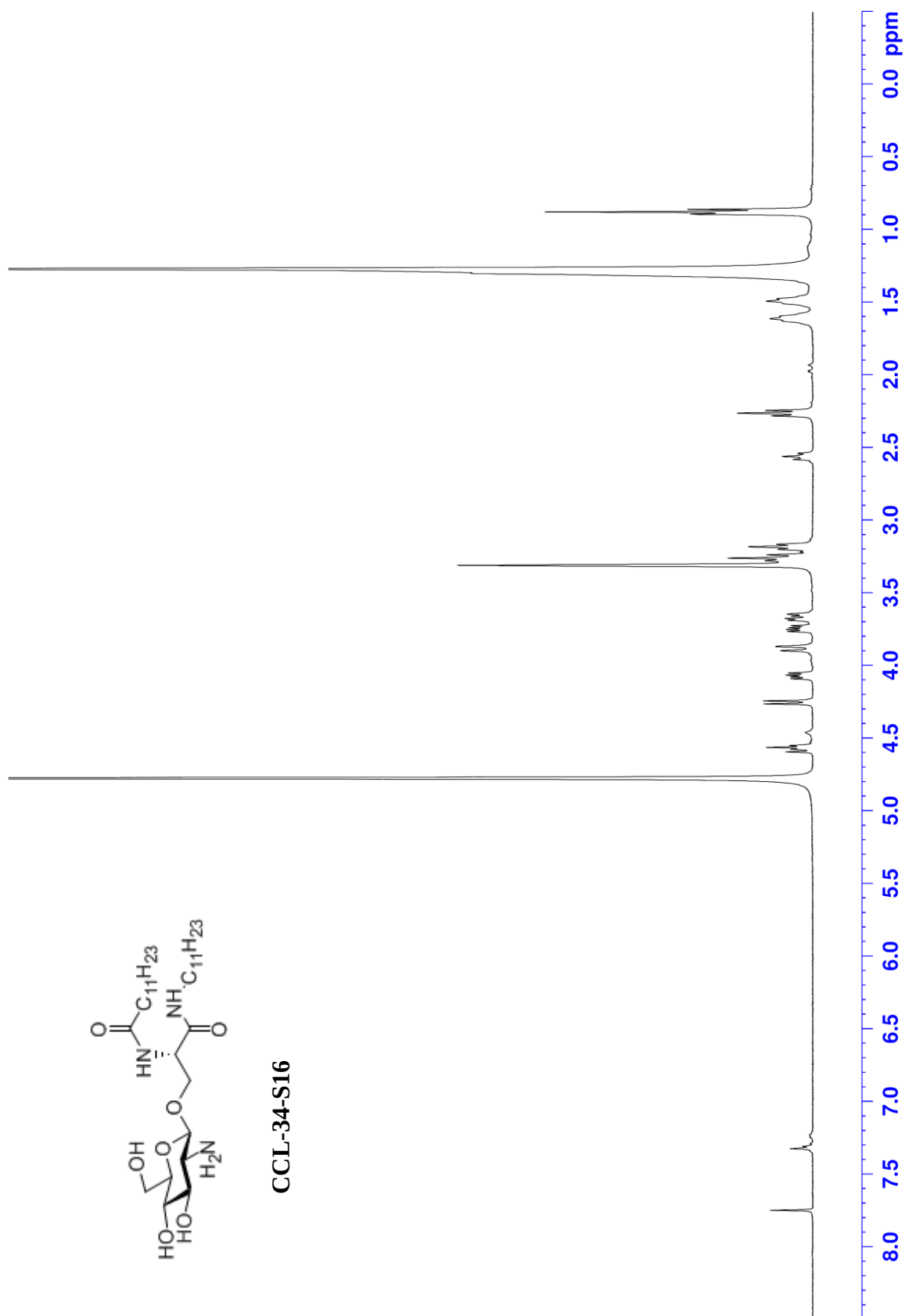


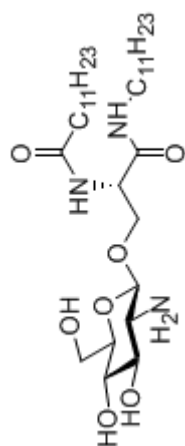
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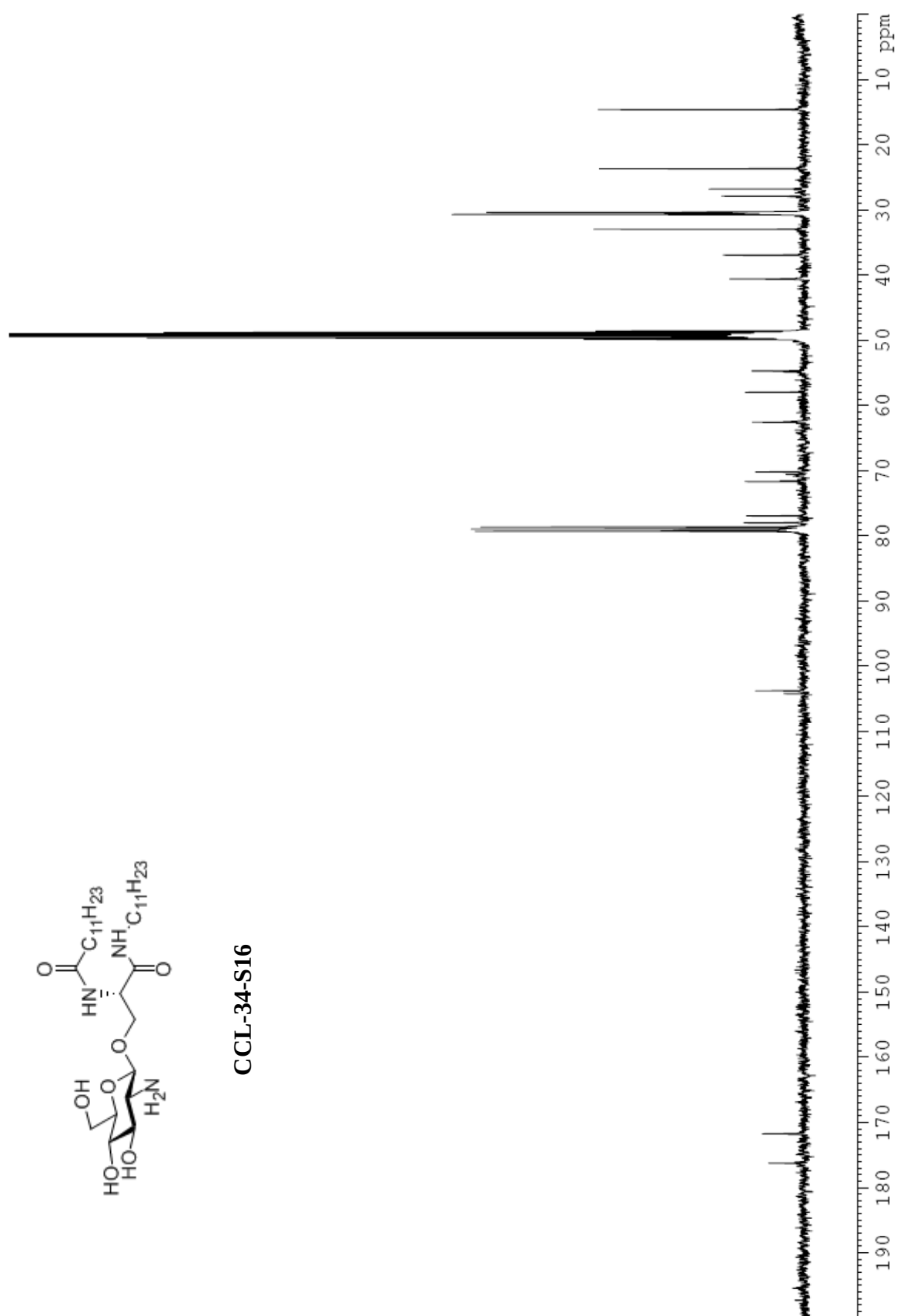


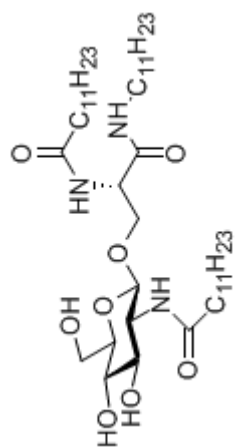
CCL-34-S16



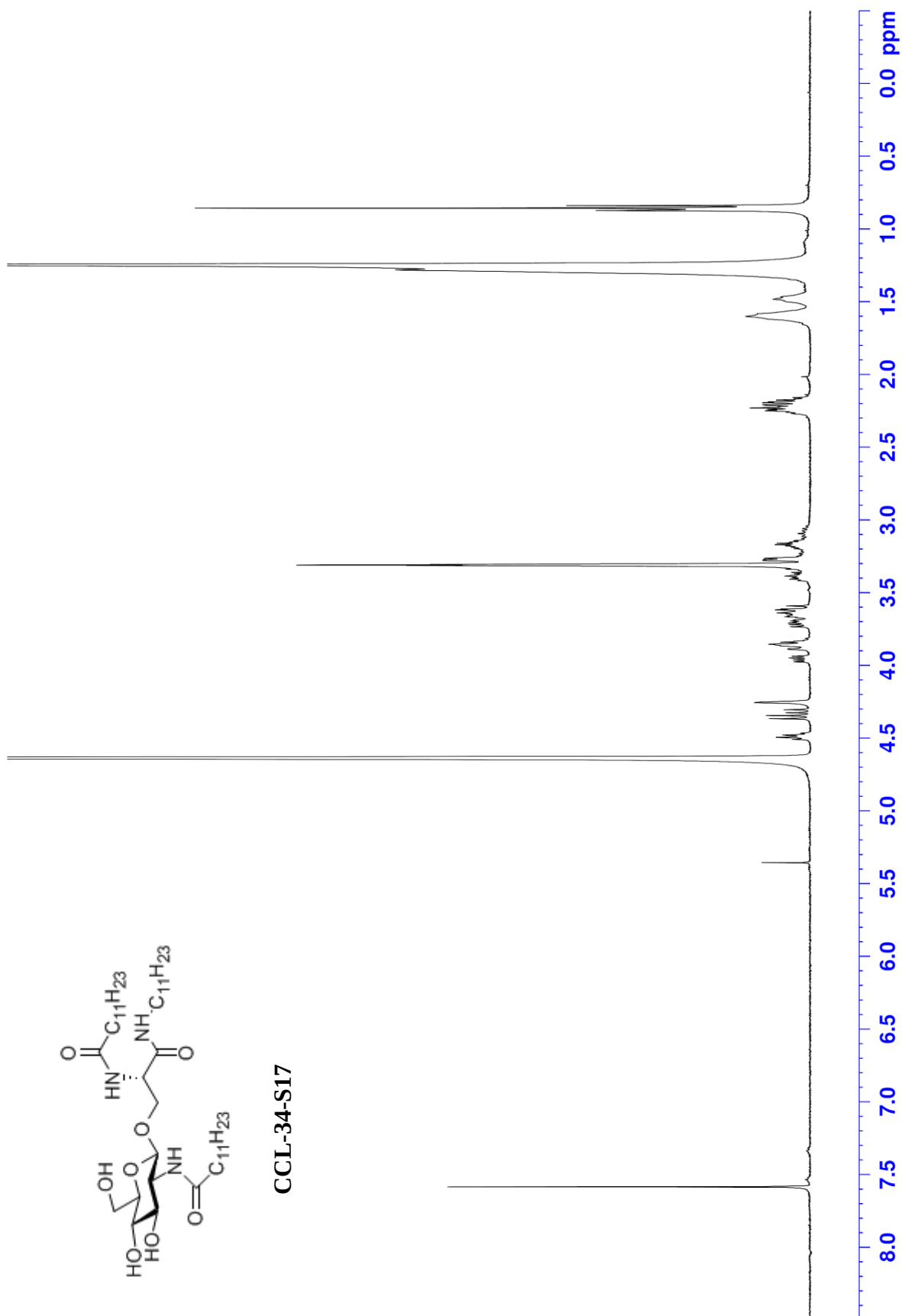


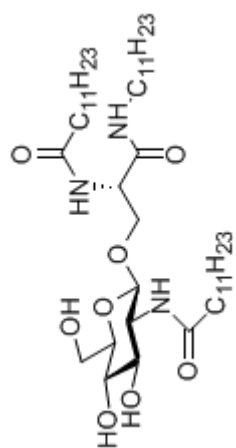
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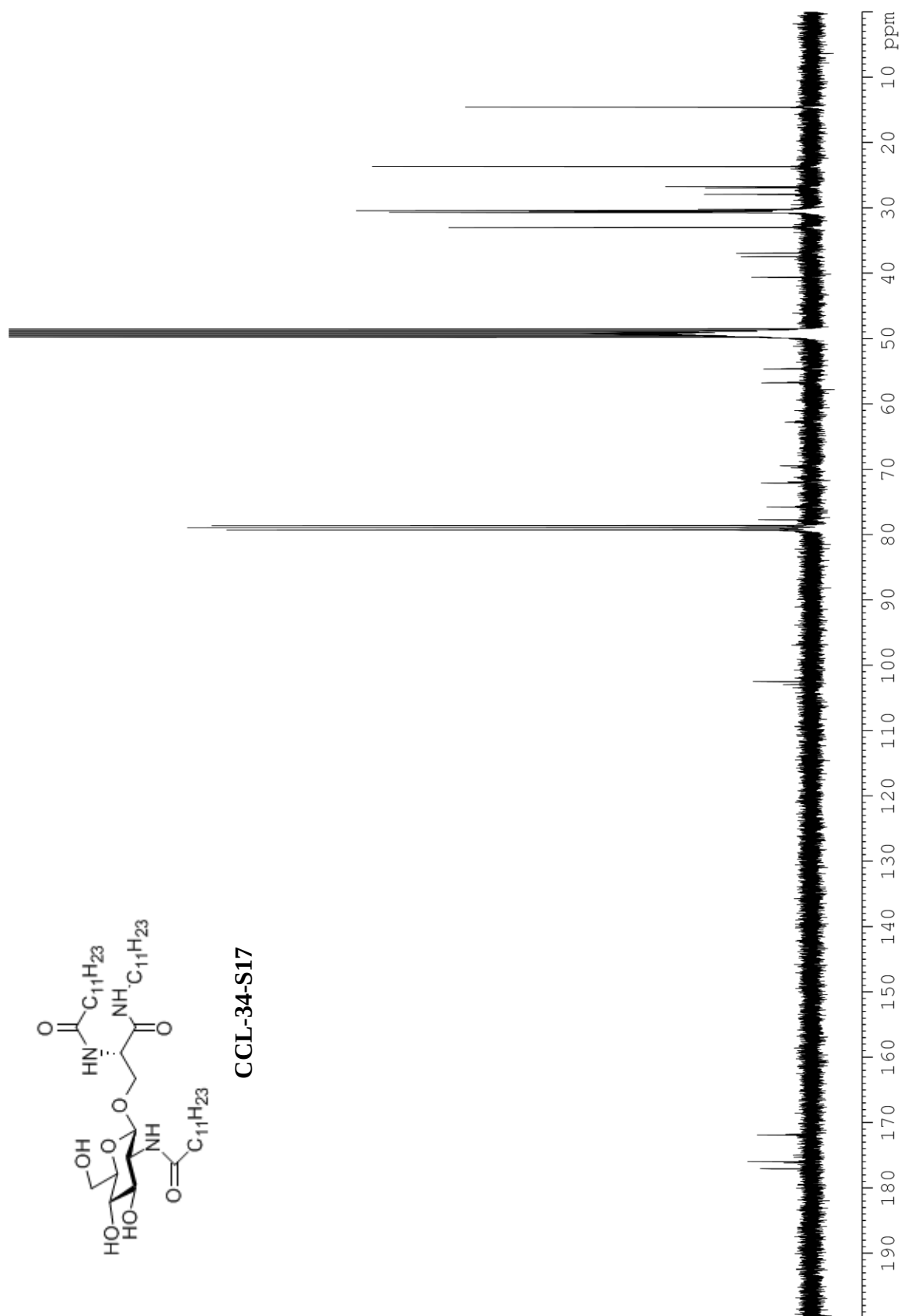


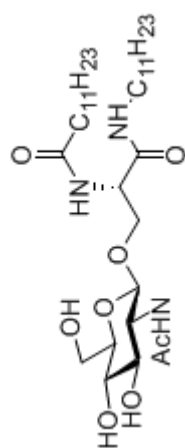
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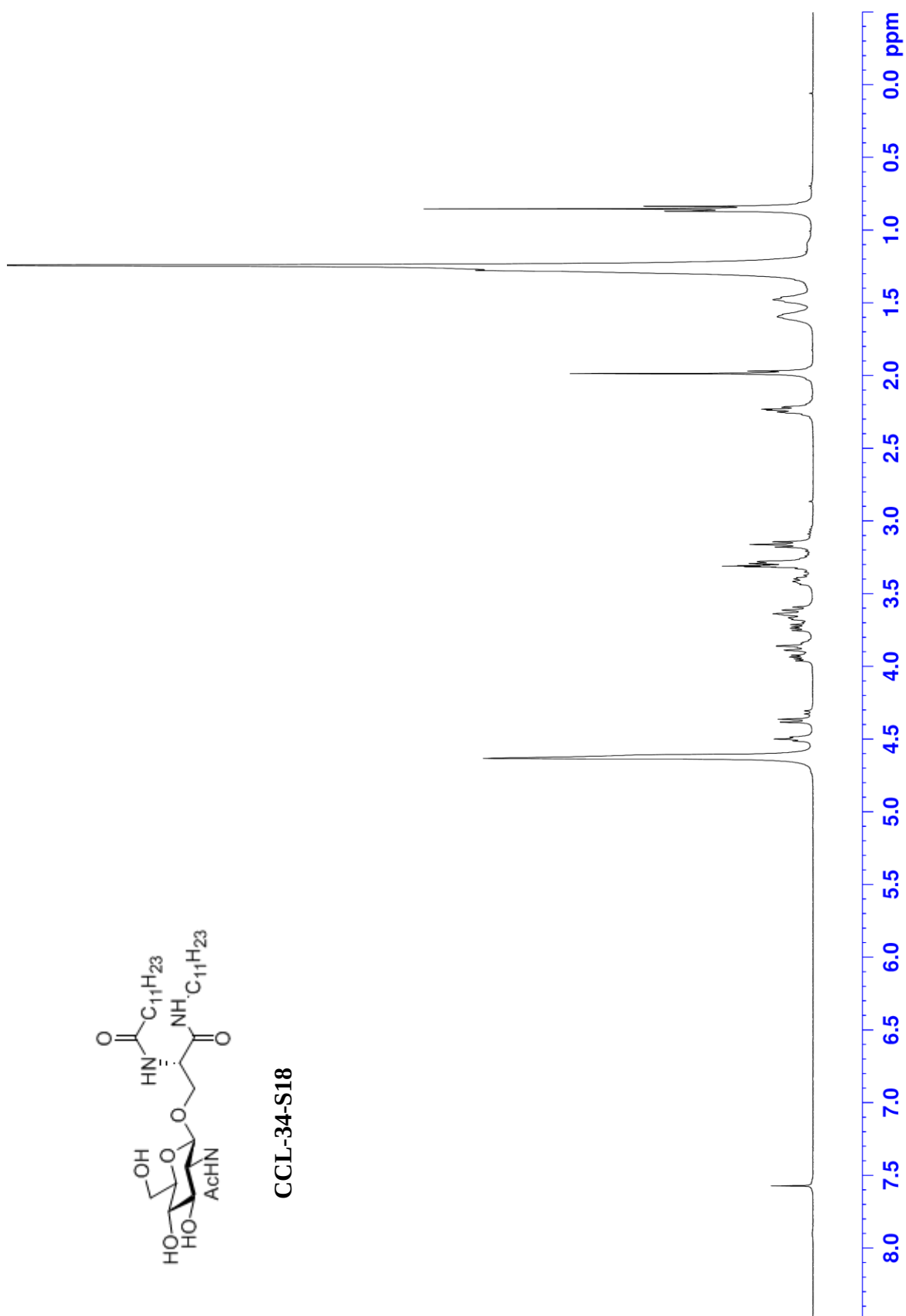


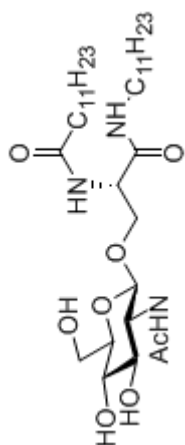
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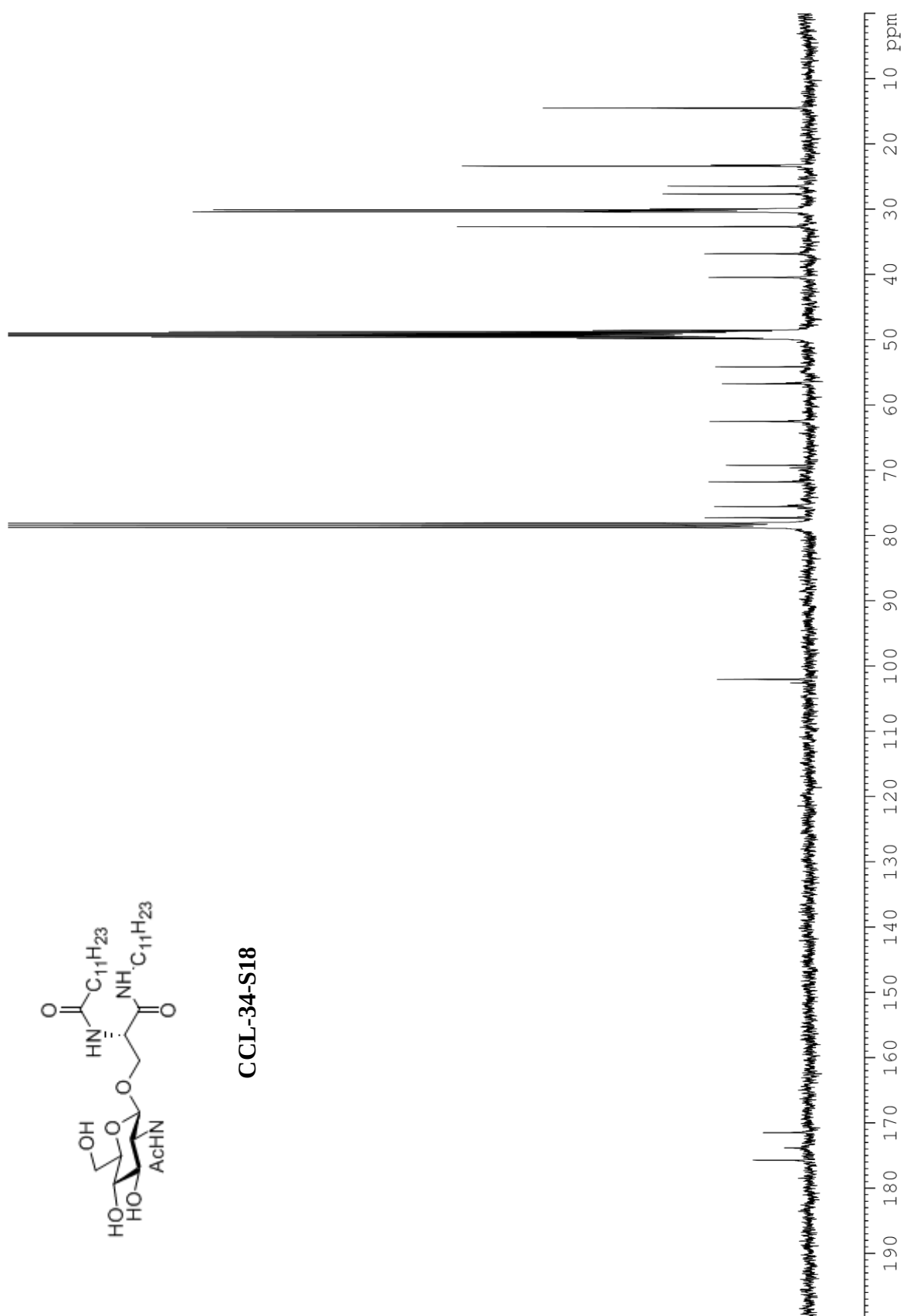


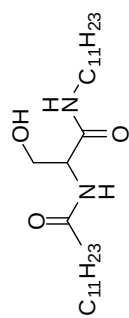
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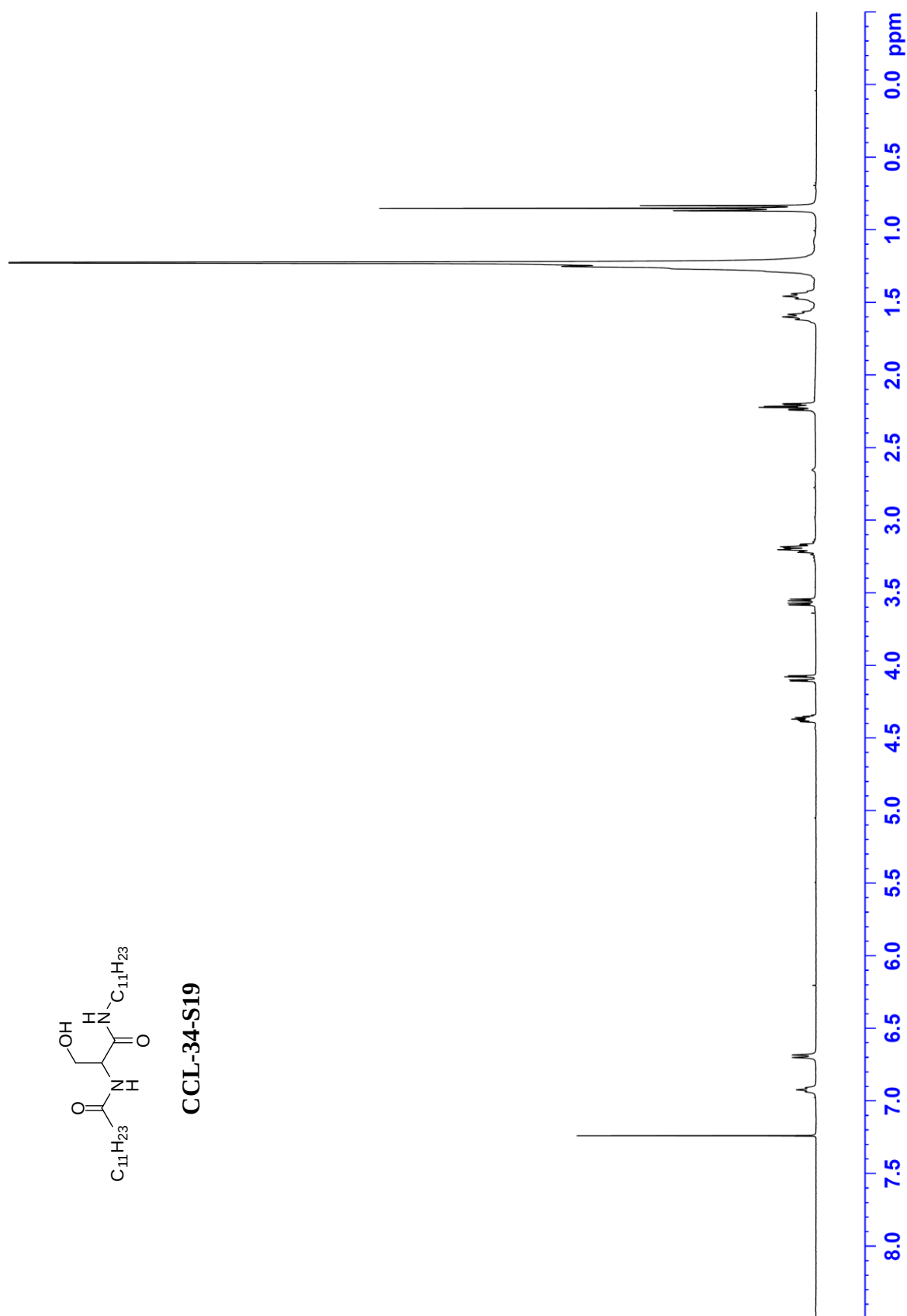


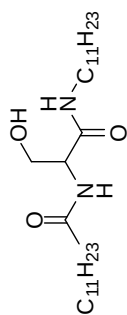
CCL-34-S18





CCL-34-S19





CCL-34-S19

