C(3)-C(4)-C(5)	106.95(19)
N(7)-C(4)-H(4)	116.1
C(3)-C(4)-H(4)	116.1
C(5)-C(4)-H(4)	116.1
C(3')-C(4')-C(10')	114.25(19)
C(3')-C(4')-C(5')	103.66(19)
C(10')-C(4')-C(5')	115.47(19)
C(3')-C(4')-C(7')	99.51(18)
C(10')-C(4')-C(7')	119.4(2)
C(5')-C(4')-C(7')	102.14(16)
C(3'')-C(4'')-C(5'')	118.9(2)
C(3'')-C(4'')-C(7'')	121.0(2)
C(5'')-C(4'')-C(7'')	120.2(2)
O(3)-C(5)-C(4)	111.17(17)
O(3)-C(5)-C(6)	112.02(16)
C(4)-C(5)-C(6)	102.26(16)
O(3)-C(5)-H(5)	110.4
C(4)-C(5)-H(5)	110.4
C(6)-C(5)-H(5)	110.4
C(6')-C(5')-C(4')	103.95(17)
C(6')-C(5')-H(5'1)	111.0
C(4')-C(5')-H(5'1)	111.0
C(6')-C(5')-H(5'2)	111.0
C(4')-C(5')-H(5'2)	111.0
H(5'1)-C(5')-H(5'2)	109.0

C(6'')-C(5'')-C(4'')	120.1(2)
C(6'')-C(5'')-H(5'')	119.9
C(4'')-C(5'')-H(5'')	119.9
C(5)-C(6)-C(1)	101.67(16)
C(5)-C(6)-S(1)	116.74(14)
C(1)-C(6)-S(1)	117.39(14)
C(5)-C(6)-H(6)	106.8
C(1)-C(6)-H(6)	106.8
S(1)-C(6)-H(6)	106.8
C(1')-C(6')-C(5')	101.15(18)
C(1')-C(6')-H(6'1)	111.5
C(5')-C(6')-H(6'1)	111.5
C(1')-C(6')-H(6'2)	111.5
C(5')-C(6')-H(6'2)	111.5
H(6'1)-C(6')-H(6'2)	109.4
C(1'')-C(6'')-C(5'')	120.1(2)
C(1'')-C(6'')-H(6'')	119.9
C(5'')-C(6'')-H(6'')	119.9
C(8')-C(7')-C(9')	109.25(19)
C(8')-C(7')-C(1')	115.08(18)
C(9')-C(7')-C(1')	113.36(19)
C(8')-C(7')-C(4')	113.70(18)
C(9')-C(7')-C(4')	113.15(18)
C(1')-C(7')-C(4')	91.49(16)
C(4'')-C(7'')-H(7'1)	109.5

C(4'')-C(7'')-H(7'2)	109.5
H(7'1)-C(7'')-H(7'2)	109.5
C(4'')-C(7'')-H(7'3)	109.5
H(7'1)-C(7'')-H(7'3)	109.5
H(7'2)-C(7'')-H(7'3)	109.5
C(7')-C(8')-H(8'1)	109.5
C(7')-C(8')-H(8'2)	109.5
H(8'1)-C(8')-H(8'2)	109.5
C(7')-C(8')-H(8'3)	109.5
H(8'1)-C(8')-H(8'3)	109.5
H(8'2)-C(8')-H(8'3)	109.5
C(7')-C(9')-H(9'1)	109.5
C(7')-C(9')-H(9'2)	109.5
H(9'1)-C(9')-H(9'2)	109.5
C(7')-C(9')-H(9'3)	109.5
H(9'1)-C(9')-H(9'3)	109.5
H(9'2)-C(9')-H(9'3)	109.5
C(4')-C(10')-H(10A)	109.5
C(4')-C(10')-H(10B)	109.5
H(10A)-C(10')-H(10B)	109.5
C(4')-C(10')-H(10C)	109.5
H(10A)-C(10')-H(10C)	109.5
H(10B)-C(10')-H(10C)	109.5
O(4)-C(11)-O(3)	124.2(2)
O(4)-C(11)-C(1')	125.6(2)

O(3)-C(11)-C(1')	110.29(19)
O(6)-C(12)-O(7)	126.4(2)
O(6)-C(12)-N(7)	123.2(2)
O(7)-C(12)-N(7)	110.35(18)
O(7)-C(13)-C(14)	109.43(18)
O(7)-C(13)-C(16)	101.58(18)
C(14)-C(13)-C(16)	111.6(2)
O(7)-C(13)-C(15)	109.23(19)
C(14)-C(13)-C(15)	113.1(2)
C(16)-C(13)-C(15)	111.3(2)
C(13)-C(14)-H(14A)	109.5
C(13)-C(14)-H(14B)	109.5
H(14A)-C(14)-H(14B)	109.5
C(13)-C(14)-H(14C)	109.5
H(14A)-C(14)-H(14C)	109.5
H(14B)-C(14)-H(14C)	109.5
C(13)-C(15)-H(15A)	109.5
C(13)-C(15)-H(15B)	109.5
H(15A)-C(15)-H(15B)	109.5
C(13)-C(15)-H(15C)	109.5
H(15A)-C(15)-H(15C)	109.5
H(15B)-C(15)-H(15C)	109.5
C(13)-C(16)-H(16A)	109.5
C(13)-C(16)-H(16B)	109.5
H(16A)-C(16)-H(16B)	109.5

C(13)-C(16)-H(16C)	109.5
H(16A)-C(16)-H(16C)	109.5
H(16B)-C(16)-H(16C)	109.5

Symmetry transformations used to generate equivalent atoms:

Table 4. Anisotropic displacement parameters ($Å^2 x 10^3$) for compound (-)-**23**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2 a^{*2}U^{11} + ... + 2 h k a^* b^* U^{12}]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
S(1)	25(1)	19(1)	25(1)	-2(1)	-3(1)	0(1)
O(1)	25(1)	29(1)	35(1)	0(1)	-8(1)	-1(1)
O(2)	37(1)	21(1)	30(1)	-8(1)	0(1)	6(1)
O(2')	23(1)	44(1)	22(1)	-16(1)	2(1)	-1(1)
O(3)	21(1)	28(1)	17(1)	-8(1)	-2(1)	1(1)
O(4)	33(1)	133(2)	51(1)	-58(1)	17(1)	-33(1)
O(5)	44(1)	62(1)	23(1)	-19(1)	7(1)	-11(1)
O(6)	40(1)	26(1)	20(1)	-6(1)	-4(1)	-2(1)
O(7)	43(1)	17(1)	27(1)	-1(1)	-2(1)	-3(1)
N(7)	25(1)	19(1)	13(1)	-2(1)	-3(1)	0(1)
C(1)	23(1)	18(1)	16(1)	-3(1)	0(1)	0(1)
C(1')	21(1)	26(1)	19(1)	-9(1)	8(1)	-1(1)
C(1'')	21(1)	16(1)	26(1)	3(1)	0(1)	-4(1)

C(2)	20(1)	22(1)	27(1)	-8(1)	1(1)	3(1)
C(2'')	24(1)	29(1)	31(1)	5(1)	-2(1)	0(1)
C(3)	26(1)	19(1)	27(1)	-5(1)	-7(1)	6(1)
C(3')	34(2)	33(1)	26(1)	-11(1)	1(1)	-5(1)
C(3'')	30(2)	45(2)	29(1)	7(1)	7(1)	0(1)
C(4)	31(1)	21(1)	16(1)	1(1)	-5(1)	-1(1)
C(4')	24(1)	28(1)	22(1)	-5(1)	3(1)	-7(1)
C(4'')	27(2)	43(2)	32(2)	19(1)	3(1)	-4(1)
C(5)	19(1)	22(1)	19(1)	-5(1)	-3(1)	-4(1)
C(5')	30(2)	23(1)	28(1)	-6(1)	3(1)	-3(1)
C(5'')	26(2)	30(1)	43(2)	13(1)	-6(1)	-3(1)
C(6)	18(1)	20(1)	18(1)	-2(1)	-3(1)	1(1)
C(6')	35(2)	24(1)	26(1)	-5(1)	1(1)	2(1)
C(6'')	27(2)	20(1)	32(1)	2(1)	1(1)	-6(1)
C(7')	24(1)	23(1)	19(1)	-2(1)	3(1)	-3(1)
C(7'')	46(2)	90(2)	40(2)	31(2)	2(2)	8(2)
C(8')	22(1)	25(1)	31(1)	-7(1)	4(1)	2(1)
C(9')	41(2)	29(1)	37(2)	4(1)	1(1)	-3(1)
C(10')	35(2)	47(2)	31(2)	-2(1)	-7(1)	-7(1)
C(11)	24(2)	35(1)	24(1)	-8(1)	6(1)	-2(1)
C(12)	23(1)	21(1)	25(1)	0(1)	-4(1)	-1(1)
C(13)	40(2)	13(1)	38(2)	-4(1)	-7(1)	-4(1)
C(14)	46(2)	25(1)	56(2)	-7(1)	0(2)	5(1)
C(15)	45(2)	34(2)	49(2)	-7(1)	-6(2)	-10(1)
C(16)	60(2)	24(1)	45(2)	8(1)	-5(2)	-6(1)

Table 5. Hydrogen coordinates (x 10^4) and isotropic displacement parameters (Å^{2}x 10^3) for compound (-)-**23**.

	x	y	z	U(eq)
H(1)	4535	1482	8911	23
H(2)	6560	1306	9475	28
H(2'')	5933	3199	8477	34
H(3)	6211	562	10558	29
H(3'')	5465	3610	7399	41
H(4)	3962	285	10709	27
H(5)	3011	2036	10594	24
H(5'1)	6195	5690	12259	32
H(5'2)	7186	5054	11836	32
H(5'')	2638	5415	7998	40
H(6)	3209	2569	9583	22
H(6'1)	4751	5212	11537	34
H(6'2)	5742	4564	11118	34
H(6'')	3092	4981	9073	32
H(7'1)	3380	4127	6678	88
H(7'2)	4388	5047	6666	88
H(7'3)	3041	5332	6880	88

H(8'1)	6820	2244	11336	39
H(8'2)	7830	2626	11839	39
H(8'3)	7228	3479	11356	39
H(9'1)	6592	1812	12733	53
H(9'2)	5584	1468	12220	53
H(9'3)	5227	2187	12834	53
H(10A)	7363	3425	13307	56
H(10B)	7483	4706	13257	56
H(10C)	8194	3951	12759	56
H(14A)	5176	-2408	9626	63
H(14B)	4539	-2329	8932	63
H(14C)	4474	-3425	9337	63
H(15A)	2405	-2079	8824	64
H(15B)	1551	-1990	9446	64
H(15C)	2024	-3142	9211	64
H(16A)	2438	-2484	10553	64
H(16B)	3857	-2688	10613	64
H(16C)	3015	-3572	10277	64

Table 6. Torsion angles [°] for compound (-)-**23**.

C(12)-N(7)-C(1)-C(2)	-86.6(2)
C(4)-N(7)-C(1)-C(2)	46.30(18)
C(12)-N(7)-C(1)-C(6)	162.84(19)
C(4)-N(7)-C(1)-C(6)	-64.31(17)
C(3')-O(2')-C(1')-C(11)	160.82(18)
C(3')-O(2')-C(1')-C(6')	-74.5(2)
C(3')-O(2')-C(1')-C(7')	34.2(2)
O(1)-S(1)-C(1'')-C(6'')	-149.62(16)
O(2)-S(1)-C(1'')-C(6'')	-18.39(19)
C(6)-S(1)-C(1'')-C(6'')	93.57(17)
O(1)-S(1)-C(1'')-C(2'')	32.7(2)
O(2)-S(1)-C(1'')-C(2'')	163.91(18)
C(6)-S(1)-C(1'')-C(2'')	-84.1(2)
N(7)-C(1)-C(2)-C(3)	-29.7(2)
C(6)-C(1)-C(2)-C(3)	70.7(2)
C(6'')-C(1'')-C(2'')-C(3'')	-1.0(3)
S(1)-C(1'')-C(2'')-C(3'')	176.59(18)
C(1)-C(2)-C(3)-C(4)	-0.6(2)
C(1')-O(2')-C(3')-O(5)	178.5(2)
C(1')-O(2')-C(3')-C(4')	1.3(2)
C(1'')-C(2'')-C(3'')-C(4'')	-0.1(4)
C(12)-N(7)-C(4)-C(3)	83.6(2)
C(1)-N(7)-C(4)-C(3)	-46.48(18)

C(12)-N(7)-C(4)-C(5)	-167.32(19)
C(1)-N(7)-C(4)-C(5)	62.63(18)
C(2)-C(3)-C(4)-N(7)	30.6(2)
C(2)-C(3)-C(4)-C(5)	-71.0(2)
O(5)-C(3')-C(4')-C(10')	19.1(4)
O(2')-C(3')-C(4')-C(10')	-164.2(2)
O(5)-C(3')-C(4')-C(5')	-107.4(3)
O(2')-C(3')-C(4')-C(5')	69.3(2)
O(5)-C(3')-C(4')-C(7')	147.5(3)
O(2')-C(3')-C(4')-C(7')	-35.8(2)
C(2'')-C(3'')-C(4'')-C(5'')	1.8(4)
C(2'')-C(3'')-C(4'')-C(7'')	-179.1(2)
C(11)-O(3)-C(5)-C(4)	-119.9(2)
C(11)-O(3)-C(5)-C(6)	126.4(2)
N(7)-C(4)-C(5)-O(3)	-154.16(16)
C(3)-C(4)-C(5)-O(3)	-49.5(2)
N(7)-C(4)-C(5)-C(6)	-34.5(2)
C(3)-C(4)-C(5)-C(6)	70.2(2)
C(3')-C(4')-C(5')-C(6')	-67.7(2)
C(10')-C(4')-C(5')-C(6')	166.61(19)
C(7')-C(4')-C(5')-C(6')	35.4(2)
C(3'')-C(4'')-C(5'')-C(6'')	-2.3(4)
C(7'')-C(4'')-C(5'')-C(6'')	178.6(2)
O(3)-C(5)-C(6)-C(1)	115.60(17)
C(4)-C(5)-C(6)-C(1)	-3.5(2)

O(3)-C(5)-C(6)-S(1)	-13.5(2)
C(4)-C(5)-C(6)-S(1)	-132.56(15)
N(7)-C(1)-C(6)-C(5)	40.18(18)
C(2)-C(1)-C(6)-C(5)	-64.62(19)
N(7)-C(1)-C(6)-S(1)	168.83(14)
C(2)-C(1)-C(6)-S(1)	64.0(2)
O(1)-S(1)-C(6)-C(5)	75.17(18)
O(2)-S(1)-C(6)-C(5)	-55.95(18)
C(1'')-S(1)-C(6)-C(5)	-169.18(16)
O(1)-S(1)-C(6)-C(1)	-45.90(19)
O(2)-S(1)-C(6)-C(1)	-177.02(15)
C(1'')-S(1)-C(6)-C(1)	69.75(18)
O(2')-C(1')-C(6')-C(5')	70.1(2)
C(11)-C(1')-C(6')-C(5')	-172.24(18)
C(7')-C(1')-C(6')-C(5')	-37.2(2)
C(4')-C(5')-C(6')-C(1')	0.6(2)
C(2'')-C(1'')-C(6'')-C(5'')	0.6(3)
S(1)-C(1'')-C(6'')-C(5'')	-177.16(17)
C(4'')-C(5'')-C(6'')-C(1'')	1.2(3)
O(2')-C(1')-C(7')-C(8')	-169.55(17)
C(11)-C(1')-C(7')-C(8')	73.2(2)
C(6')-C(1')-C(7')-C(8')	-60.2(2)
O(2')-C(1')-C(7')-C(9')	63.7(2)
C(11)-C(1')-C(7')-C(9')	-53.5(3)
C(6')-C(1')-C(7')-C(9')	172.99(17)

O(2')-C(1')-C(7')-C(4')	-52.41(18)
C(11)-C(1')-C(7')-C(4')	-169.62(19)
C(6')-C(1')-C(7')-C(4')	56.90(18)
C(3')-C(4')-C(7')-C(8')	169.81(19)
C(10')-C(4')-C(7')-C(8')	-65.3(3)
C(5')-C(4')-C(7')-C(8')	63.5(2)
C(3')-C(4')-C(7')-C(9')	-64.8(2)
C(10')-C(4')-C(7')-C(9')	60.1(3)
C(5')-C(4')-C(7')-C(9')	-171.10(19)
C(3')-C(4')-C(7')-C(1')	51.49(18)
C(10')-C(4')-C(7')-C(1')	176.40(19)
C(5')-C(4')-C(7')-C(1')	-54.83(18)
C(5)-O(3)-C(11)-O(4)	6.7(4)
C(5)-O(3)-C(11)-C(1')	-173.63(17)
O(2')-C(1')-C(11)-O(4)	5.9(4)
C(6')-C(1')-C(11)-O(4)	-111.1(3)
C(7')-C(1')-C(11)-O(4)	121.0(3)
O(2')-C(1')-C(11)-O(3)	-173.80(17)
C(6')-C(1')-C(11)-O(3)	69.2(3)
C(7')-C(1')-C(11)-O(3)	-58.6(3)
C(13)-O(7)-C(12)-O(6)	3.6(3)
C(13)-O(7)-C(12)-N(7)	-179.45(18)
C(1)-N(7)-C(12)-O(6)	-31.3(3)
C(4)-N(7)-C(12)-O(6)	-151.6(2)
C(1)-N(7)-C(12)-O(7)	151.64(17)

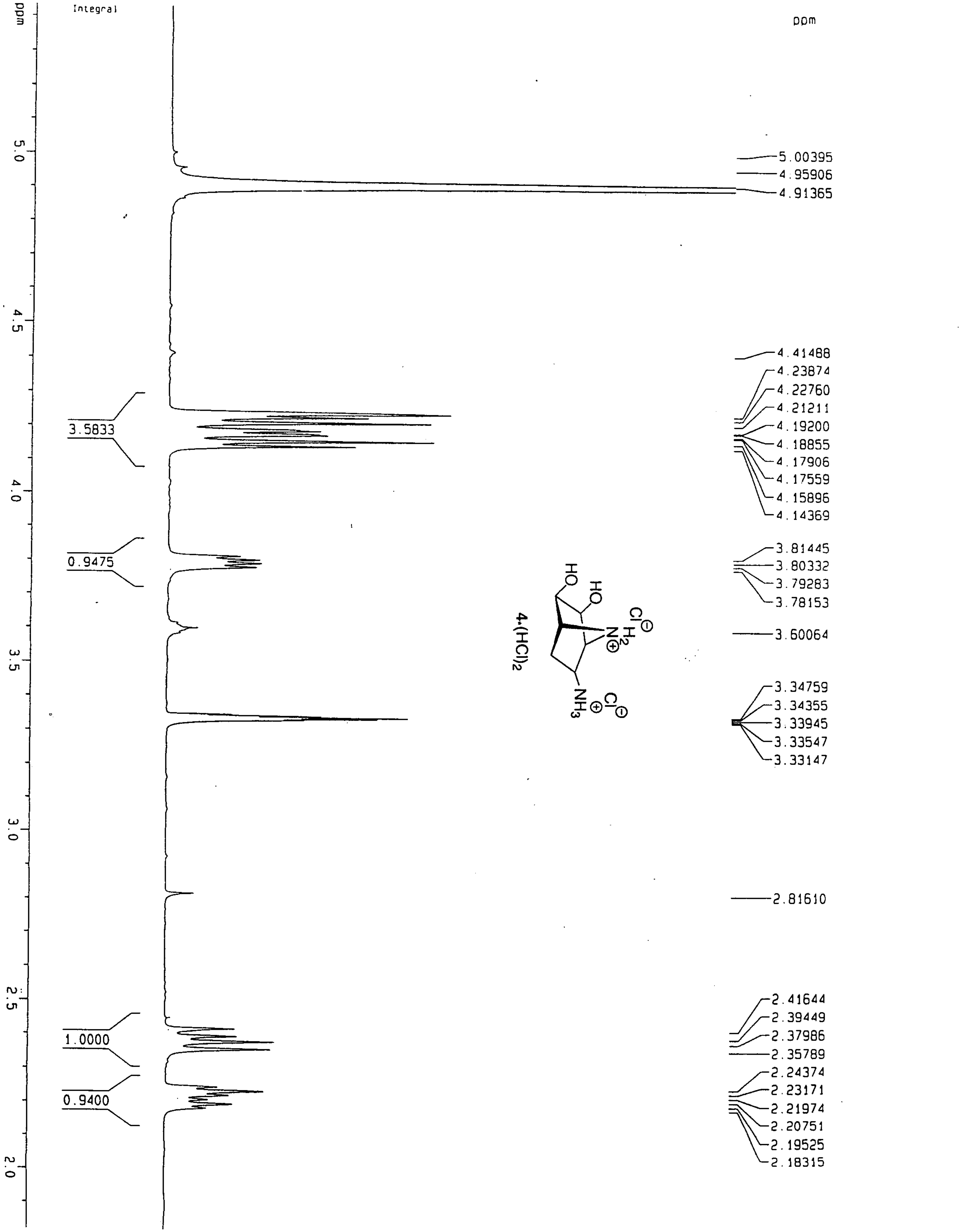
C(4)-N(7)-C(12)-O(7)	31.3(3)
C(12)-O(7)-C(13)-C(14)	59.6(3)
C(12)-O(7)-C(13)-C(16)	177.7(2)
C(12)-O(7)-C(13)-C(15)	-64.7(3)

Symmetry transformations used to generate equivalent atoms:

It shows the (1S,4R)-configuration for the camphanic part. Thus, the first crystal arise from the impurity that comes with the Acros product.

*In conclusion, the (-)-(1S,4R)-camphanic acid chloride (98%) sold by Acros contain enough (+)-(1R,4S)-camphanic acid chloride to give crystalline (+)-**23**. This impurity does not crystallize as a racemate!! By pure chance, the frist crystal we selected was the minor (+)-**23**!! Thus the configuration shown in the Acros catalog for (-)-camphanic acid chloride has to be inverted.*

*The crystal structures for (+)-**23** and (-)-**23** have been deposited at the Cambridge Crystallographic Data Centre and allocated the deposition numbers. Deposition number for (+)-**23**: CCDC 206882; Deposition number for (-)-**23**: CCDC 206883.*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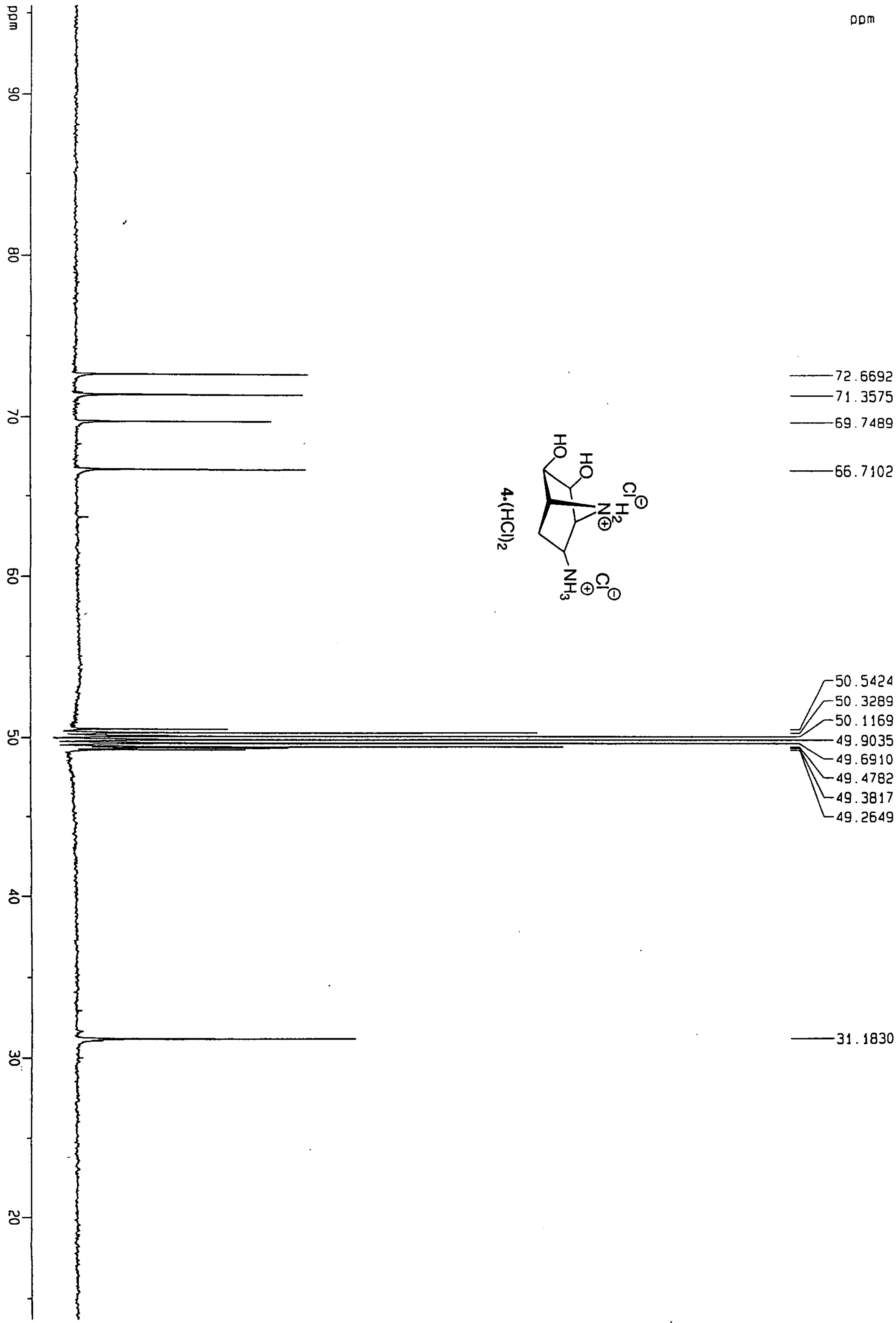

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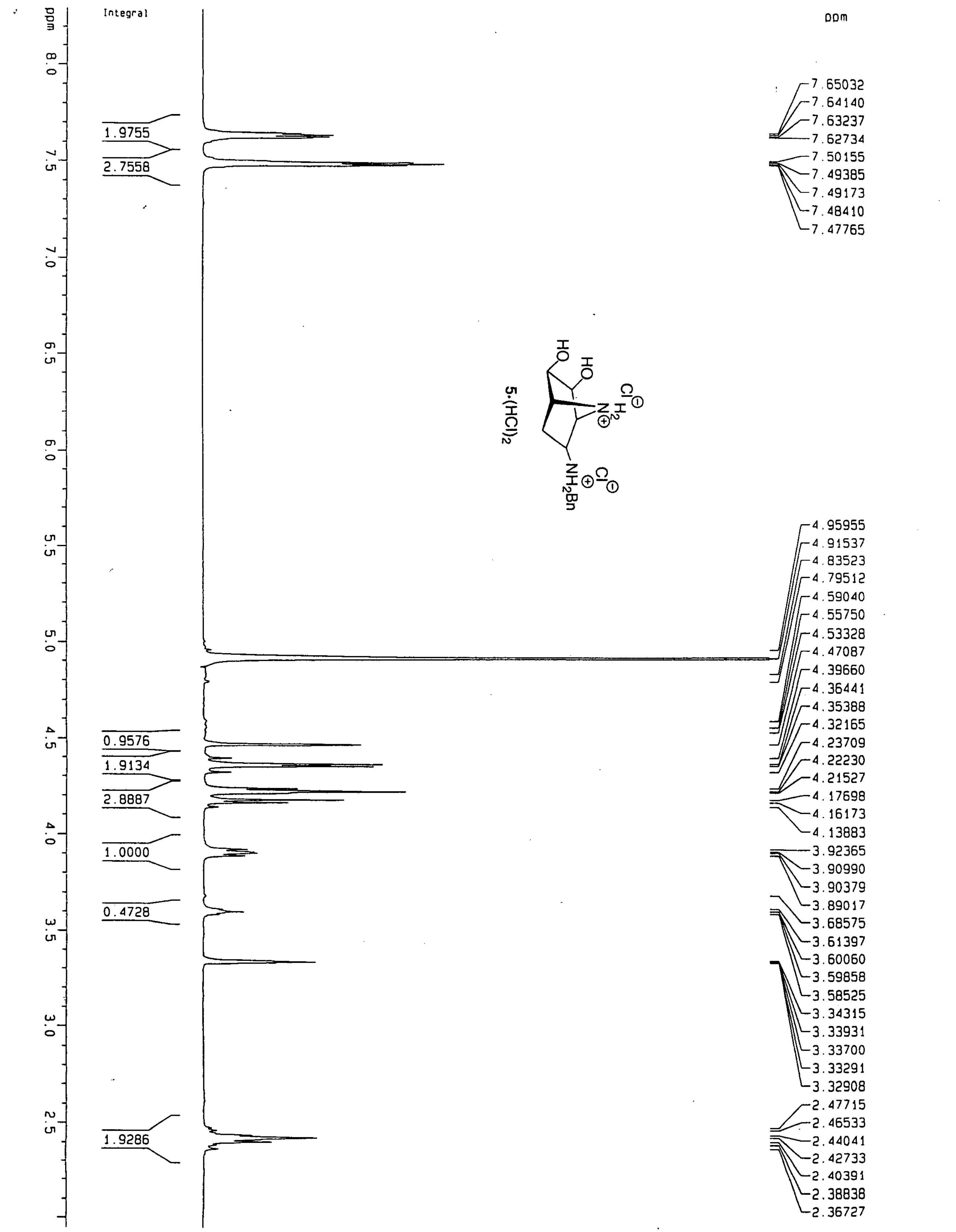
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ppm
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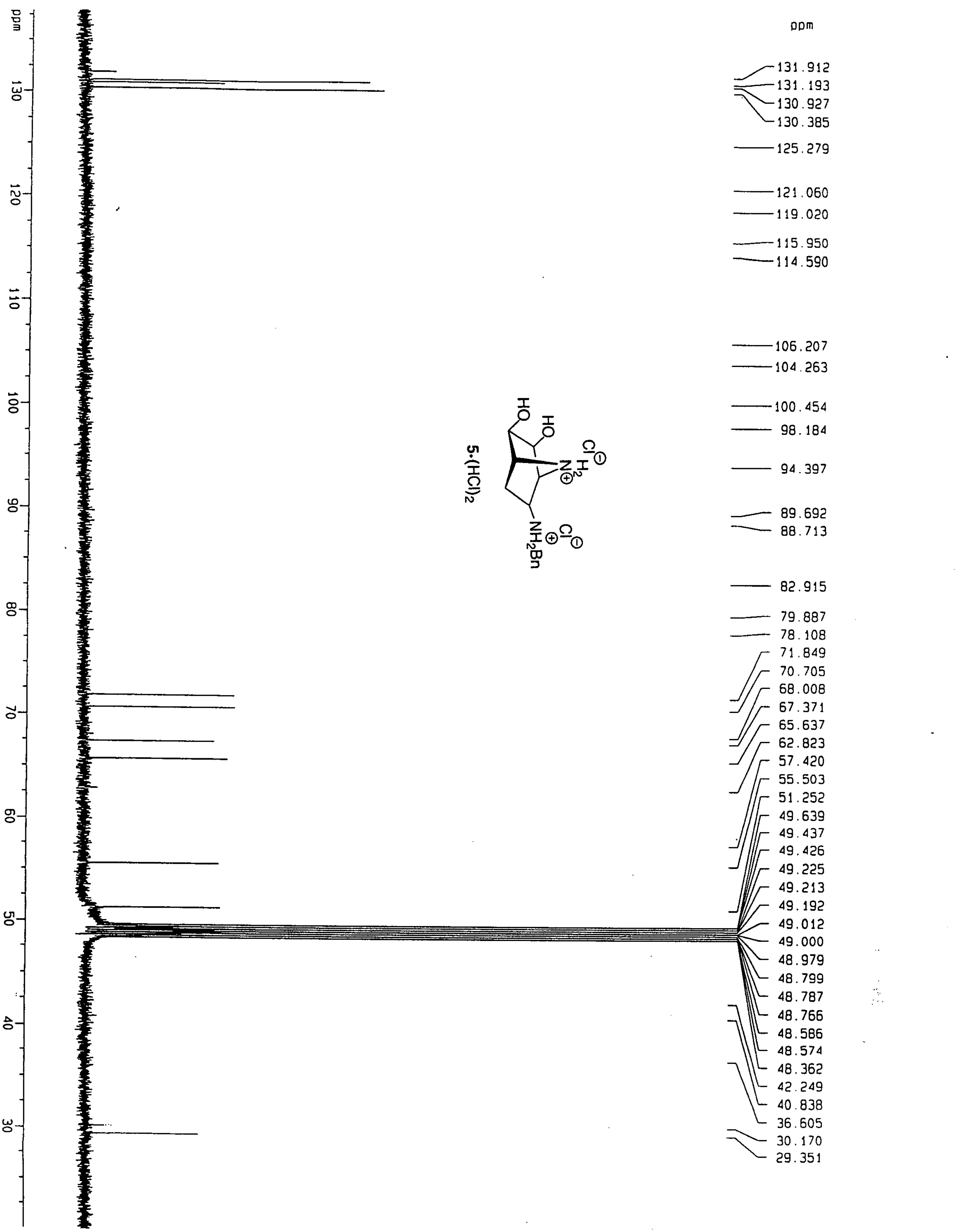
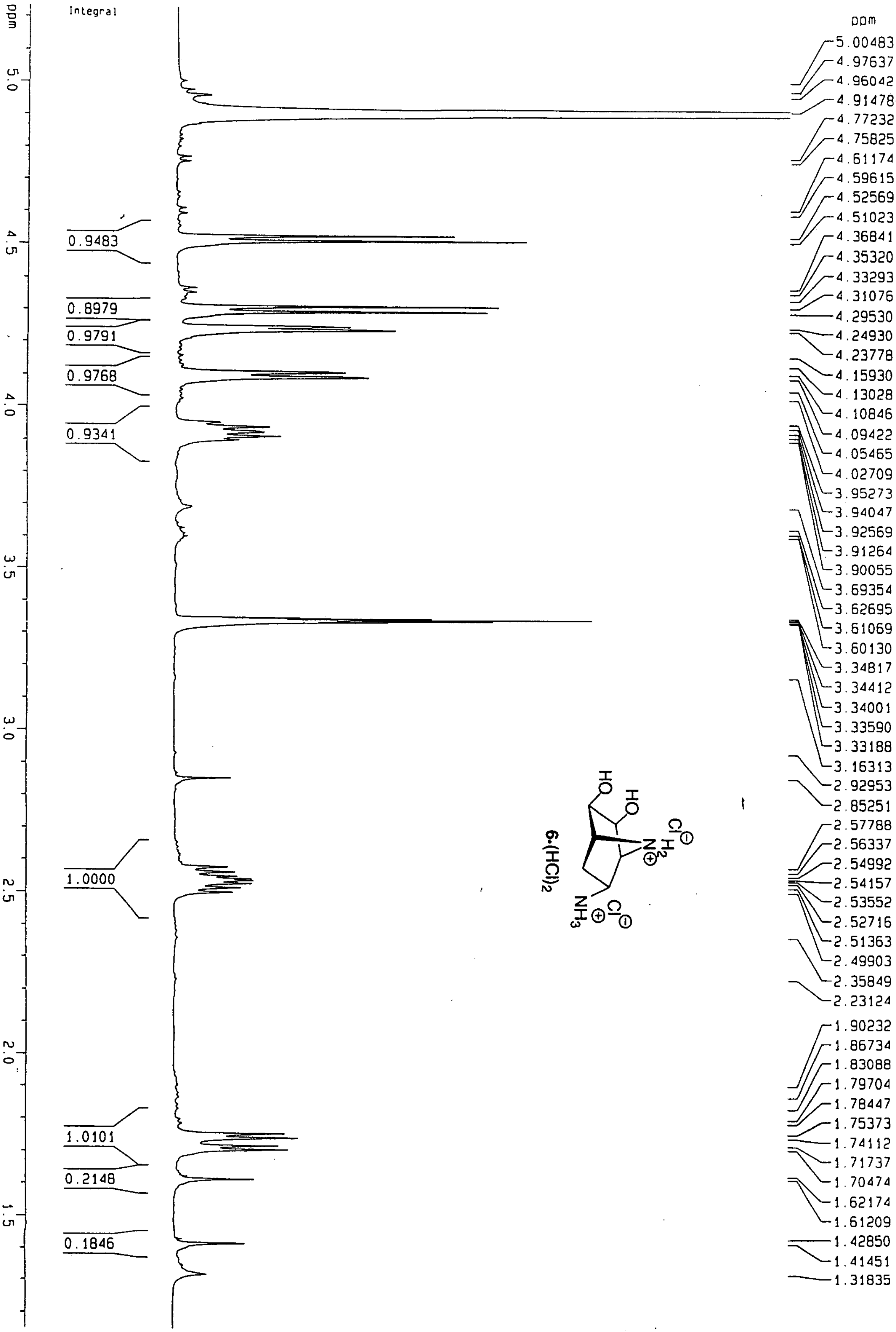
2.7558
0.9576
1.9134
2.8887
1.0000
0.4728
1.9286
7.65032
7.64140
7.63237
7.62734
7.50155
7.49385
7.49173
7.48410
7.47765
4.95955
4.91537
4.83523
4.79512
4.59040
4.55750
4.53328
4.47087
4.39660
4.36441
4.35388
4.32165
4.23709
4.22230
4.21527
4.17698
4.16173
4.13883
3.92365
3.90990
3.90379
3.89017
3.68575
3.61397
3.60060
3.59858
3.58525
3.34315
3.33931
3.33700
3.33291
3.32908
2.47715
2.46533
2.44041
2.42733
2.40391
2.38838
2.36727
5•(HCl)2


ppm
130
120
110
100
90
80
70
60
50
40
30
ppm
131.912
131.193
130.927
130.385
125.279
121.060
119.020
115.950
114.590
106.207
104.263
100.454
98.184
94.397
89.692
88.713
82.915
79.887
78.108
71.849
70.705
68.008
67.371
65.637
62.823
57.420
55.503
51.252
49.639
49.437
49.426
49.225
49.213
49.192
49.012
49.000
48.979
48.799
48.787
48.766
48.586
48.574
48.362
42.249
40.838
36.605
30.170
29.351
HO
HO
$Cl^{\ominus}$
H_2
$N^{\oplus}$
$Cl^{\ominus}$
$\oplus$
NH_2Bn
5•(HCl)2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4.0
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3.0
2.5
2.0
1.5
Integral
0.9483
0.8979
0.9791
0.9768
0.9341
1.0000
1.0101
0.2148
0.1846
6•(HCl)2
ppm
5.00483
4.97637
4.96042
4.91478
4.77232
4.75825
4.61174
4.59615
4.52569
4.51023
4.36841
4.35320
4.33293
4.31076
4.29530
4.24930
4.23778
4.15930
4.13028
4.10846
4.09422
4.05465
4.02709
3.95273
3.94047
3.92569
3.91264
3.90055
3.69354
3.62695
3.61069
3.60130
3.34817
3.34412
3.34001
3.33590
3.33188
3.16313
2.92953
2.85251
2.57788
2.56337
2.54992
2.54157
2.53552
2.52716
2.51363
2.49903
2.35849
2.23124
1.90232
1.86734
1.83088
1.79704
1.78447
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1.74112
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1.61209
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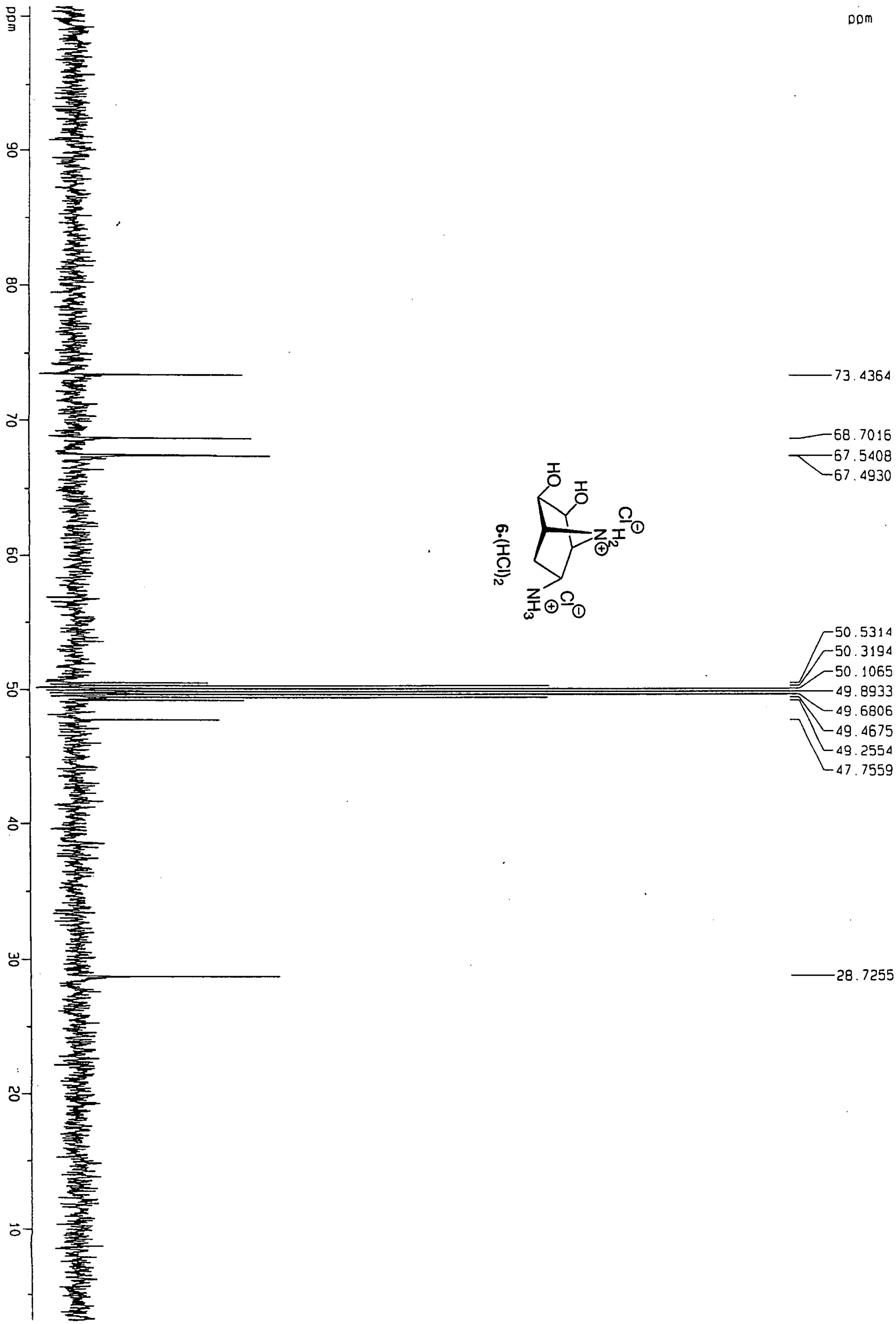
1.41451
1.31835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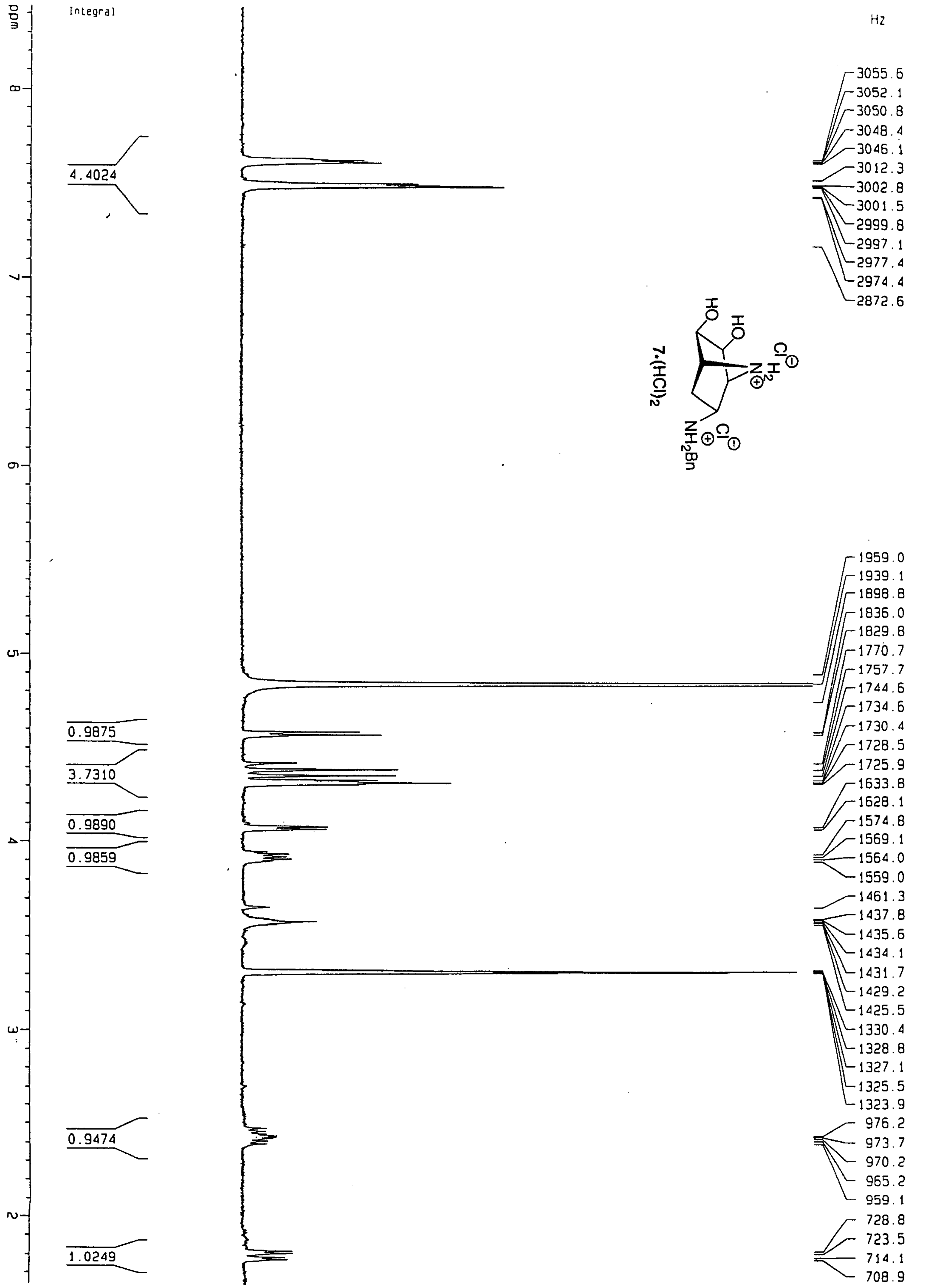
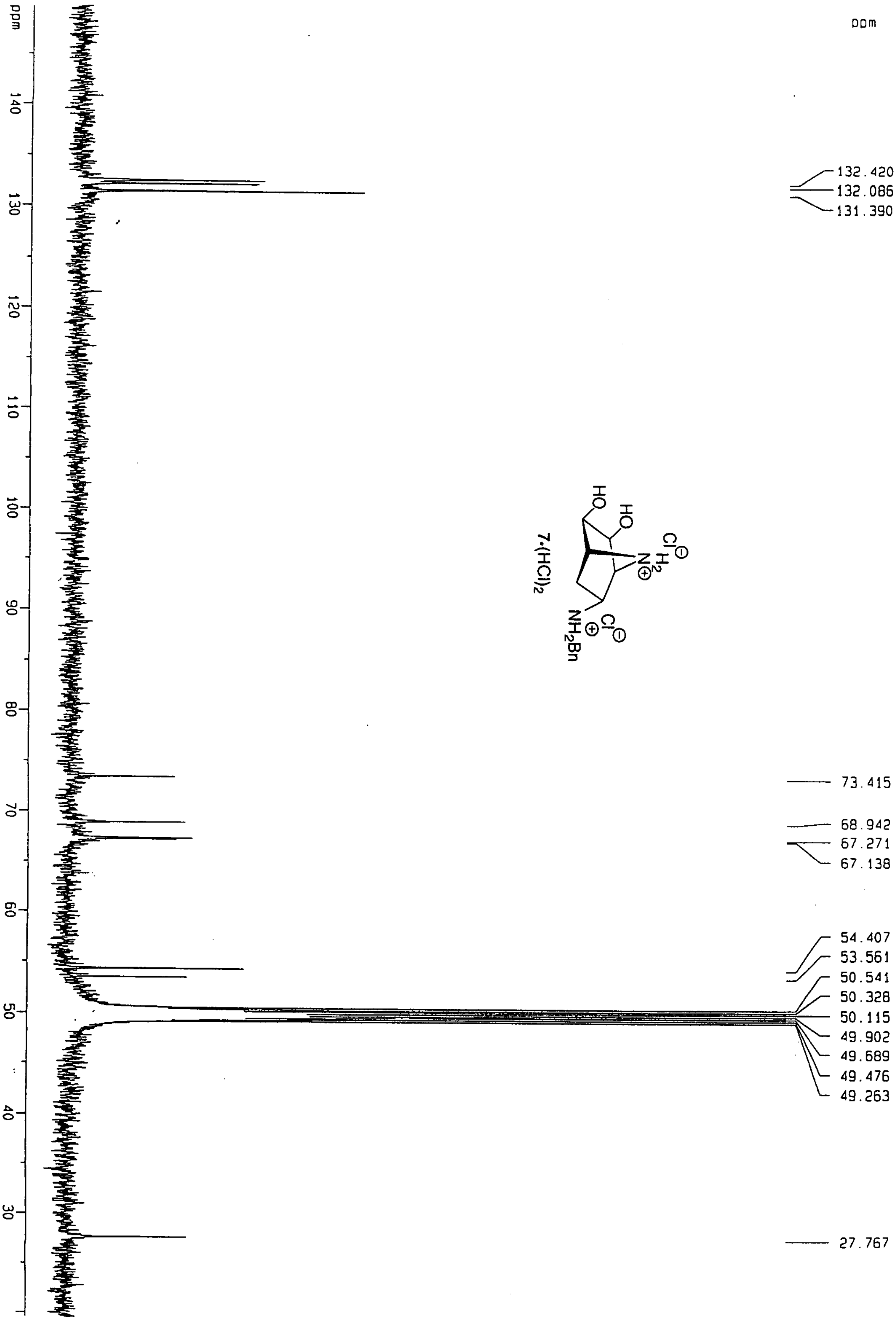
68.7016
67.5408
67.4930
50.5314
50.3194
50.1065
49.8933
49.6806
49.4675
49.2554
47.7559
28.7255
6•(HCl)2


ppm
Integral
Hz
8
7
6
5
4
3
2
4.4024
0.9875
3.7310
0.9890
0.9859
0.9474
1.0249
3055.6
3052.1
3050.8
3048.4
3046.1
3012.3
3002.8
3001.5
2999.8
2997.1
2977.4
2974.4
2872.6
1959.0
1939.1
1898.8
1836.0
1829.8
1770.7
1757.7
1744.6
1734.6
1730.4
1728.5
1725.9
1633.8
1628.1
1574.8
1569.1
1564.0
1559.0
1461.3
1437.8
1435.6
1434.1
1431.7
1429.2
1425.5
1330.4
1328.8
1327.1
1325.5
1323.9
976.2
973.7
970.2
965.2
959.1
728.8
723.5
714.1
708.9
7•(HCl)2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140
130
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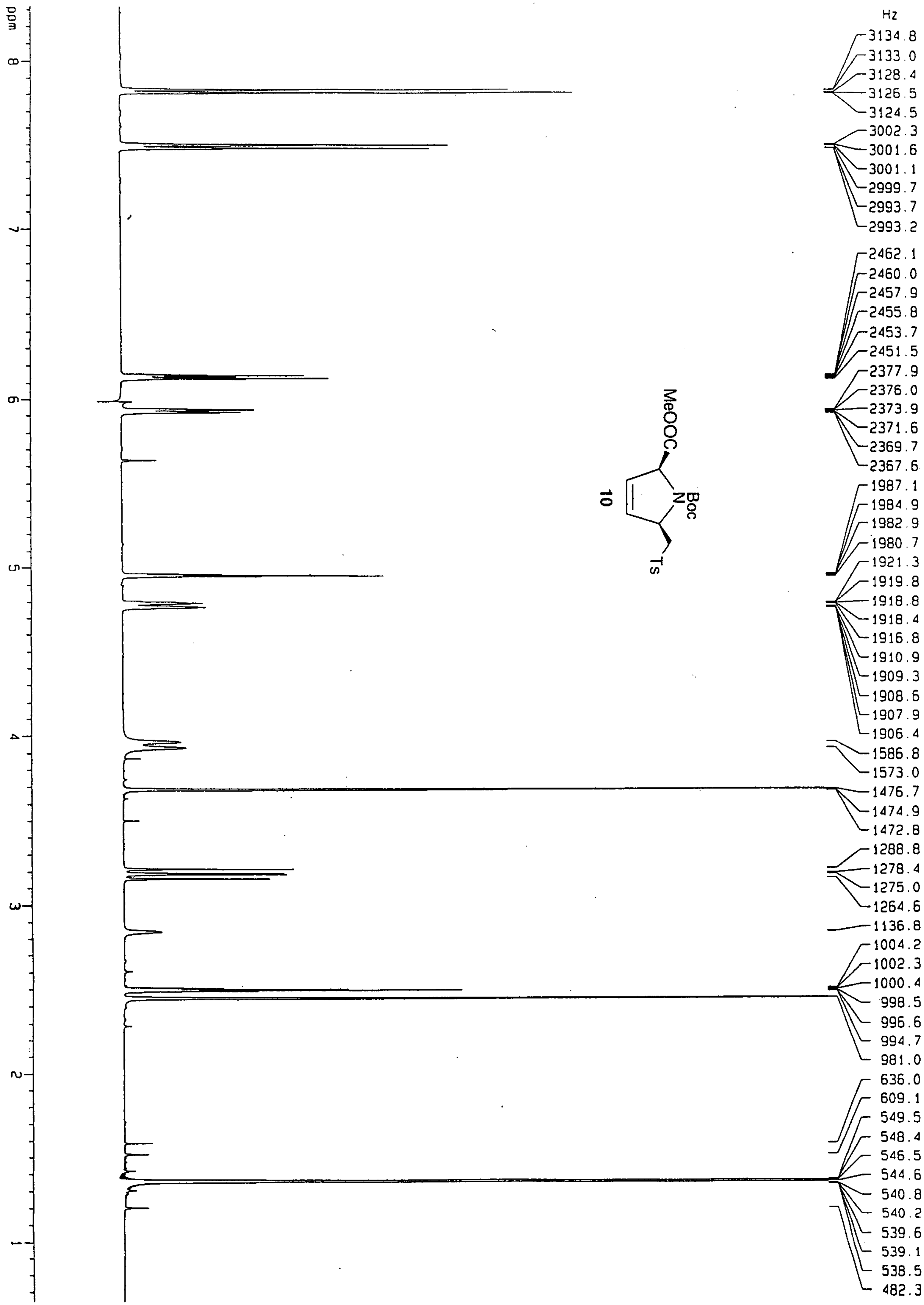
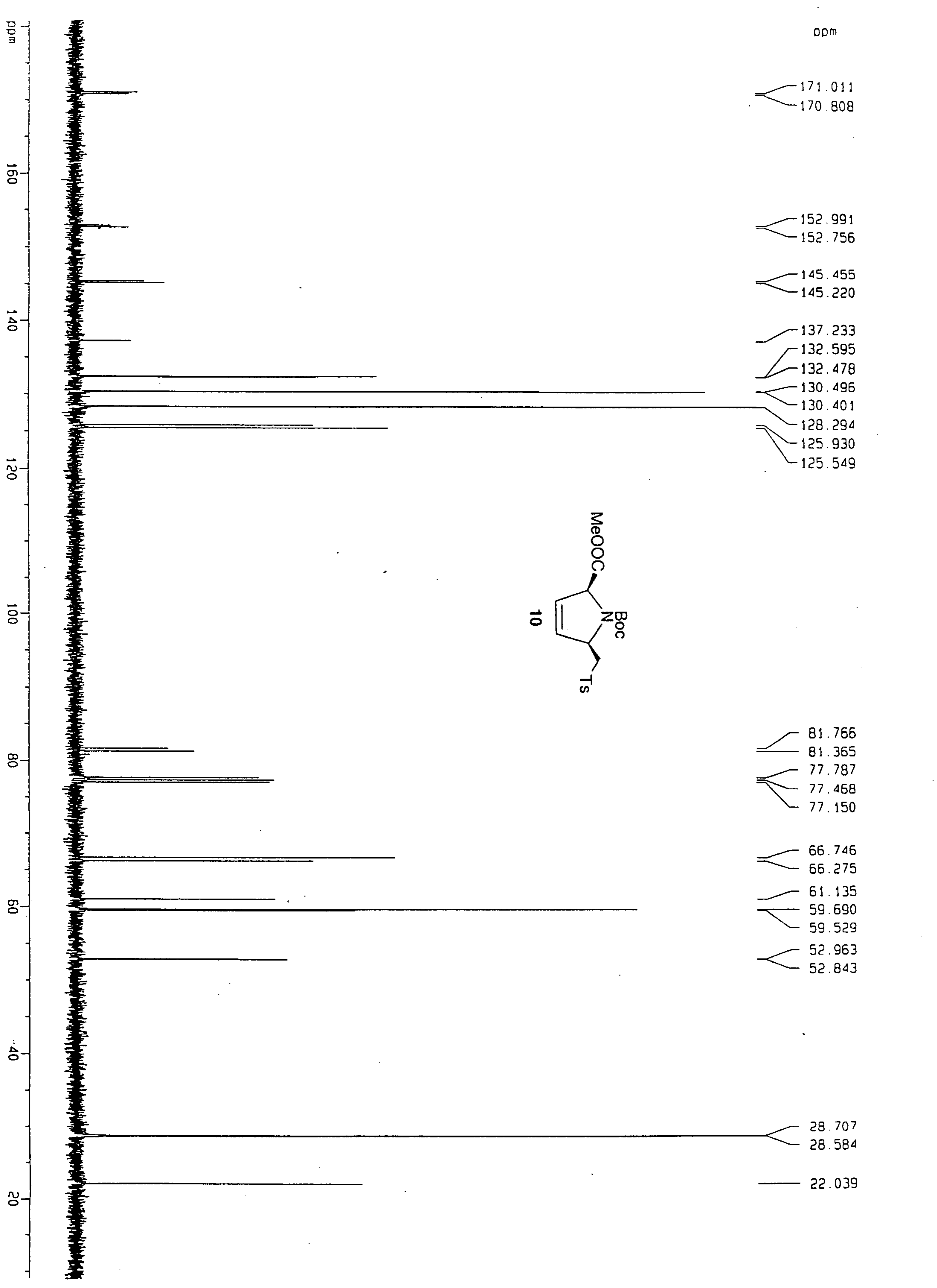
110
100
90
80
70
60
50
40
30
ppm
132.420
132.086
131.390
73.415
68.942
67.271
67.138
54.407
53.561
50.541
50.328
50.115
49.902
49.689
49.476
49.263
27.767
7•(HCl)2


ppm
8
7
6
5
4
3
2
1
MeOOC
N
Boc
Ts
10
Hz
3134.8
3133.0
3128.4
3126.5
3124.5
3002.3
3001.6
3001.1
2999.7
2993.7
2993.2
2462.1
2460.0
2457.9
2455.8
2453.7
2451.5
2377.9
2376.0
2373.9
2371.6
2369.7
2367.6
1987.1
1984.9
1982.9
1980.7
1921.3
1919.8
1918.8
1918.4
1916.8
1910.9
1909.3
1908.6
1907.9
1906.4
1586.8
1573.0
1476.7
1474.9
1472.8
1288.8
1278.4
1275.0
1264.6
1136.8
1004.2
1002.3
1000.4
998.5
996.6
994.7
981.0
636.0
609.1
549.5
548.4
546.5
544.6
540.8
540.2
539.6
539.1
538.5
482.3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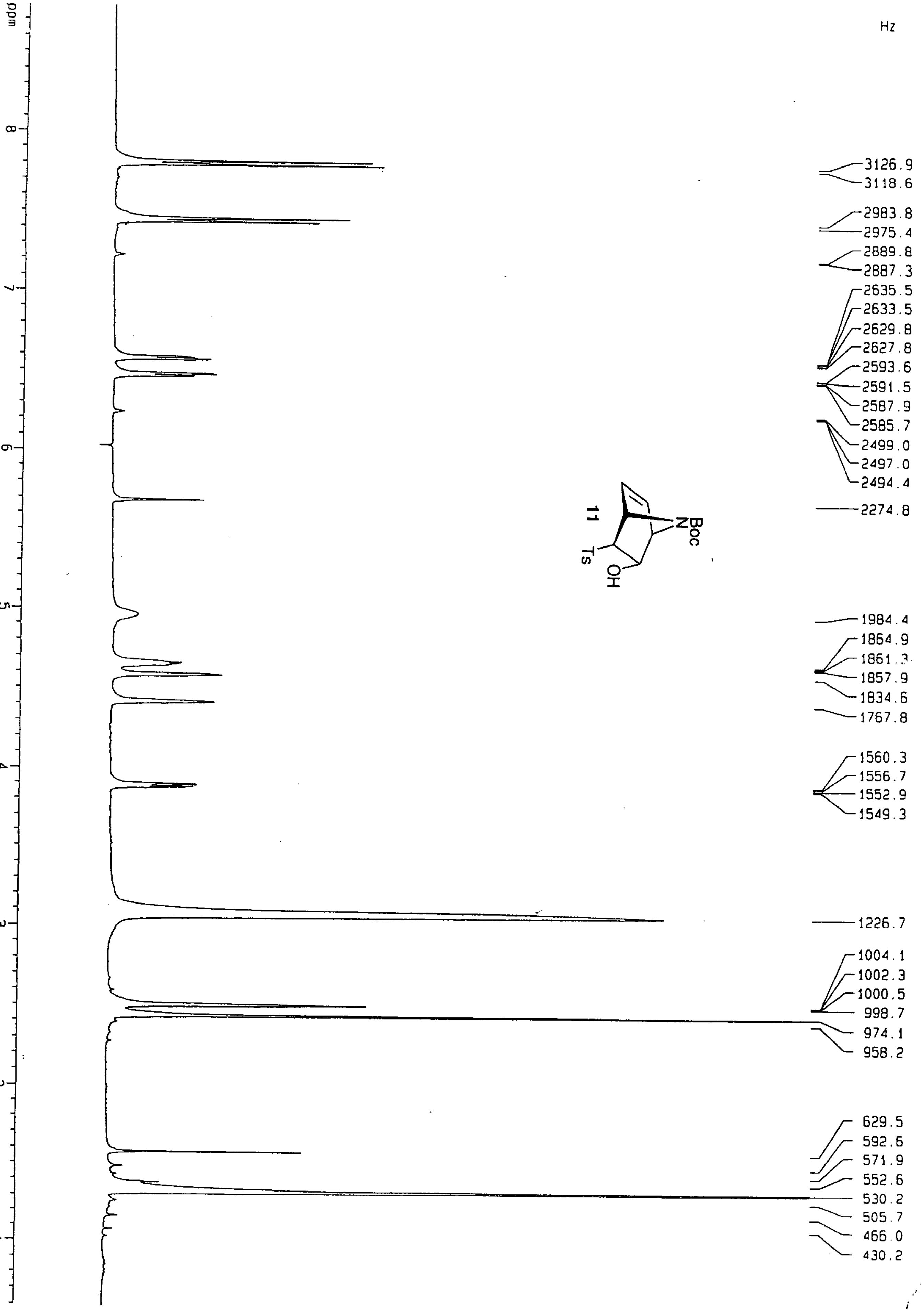
152.756
145.455
145.220
137.233
132.595
132.478
130.496
130.401
128.294
125.930
125.549
MeOOC
Boc
N
Ts
10
81.766
81.365
77.787
77.468
77.150
66.746
66.275
61.135
59.690
59.529
52.963
52.843
28.707
28.584
22.039


ppm
Hz
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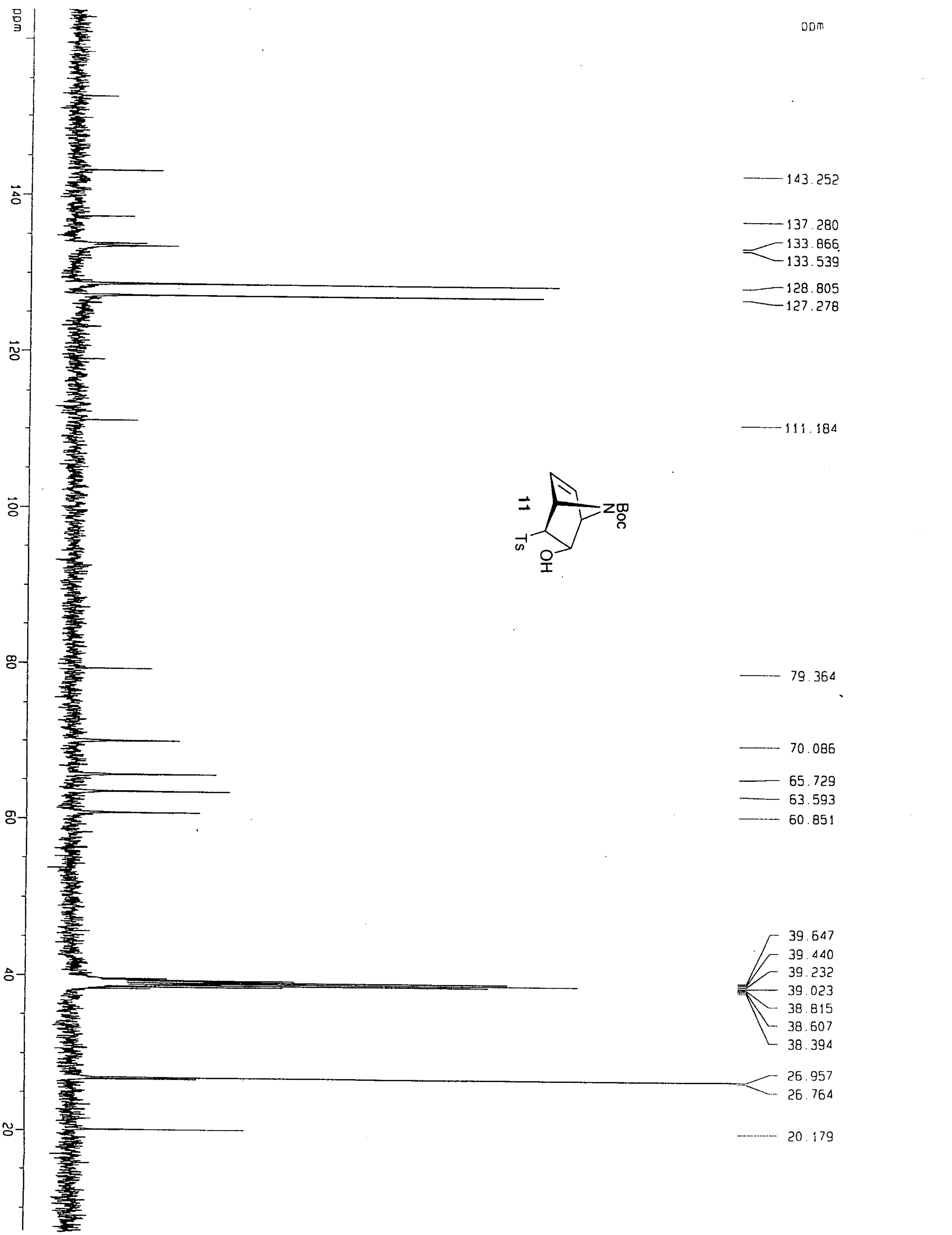
3118.6
2983.8
2975.4
2889.8
2887.3
2635.5
2633.5
2629.8
2627.8
2593.6
2591.5
2587.9
2585.7
2499.0
2497.0
2494.4
2274.8
1984.4
1864.9
1861.3
1857.9
1834.6
1767.8
1560.3
1556.7
1552.9
1549.3
1226.7
1004.1
1002.3
1000.5
998.7
974.1
958.2
629.5
592.6
571.9
552.6
530.2
505.7
466.0
430.2
Boc
N
OH
Ts
11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128.805
127.278
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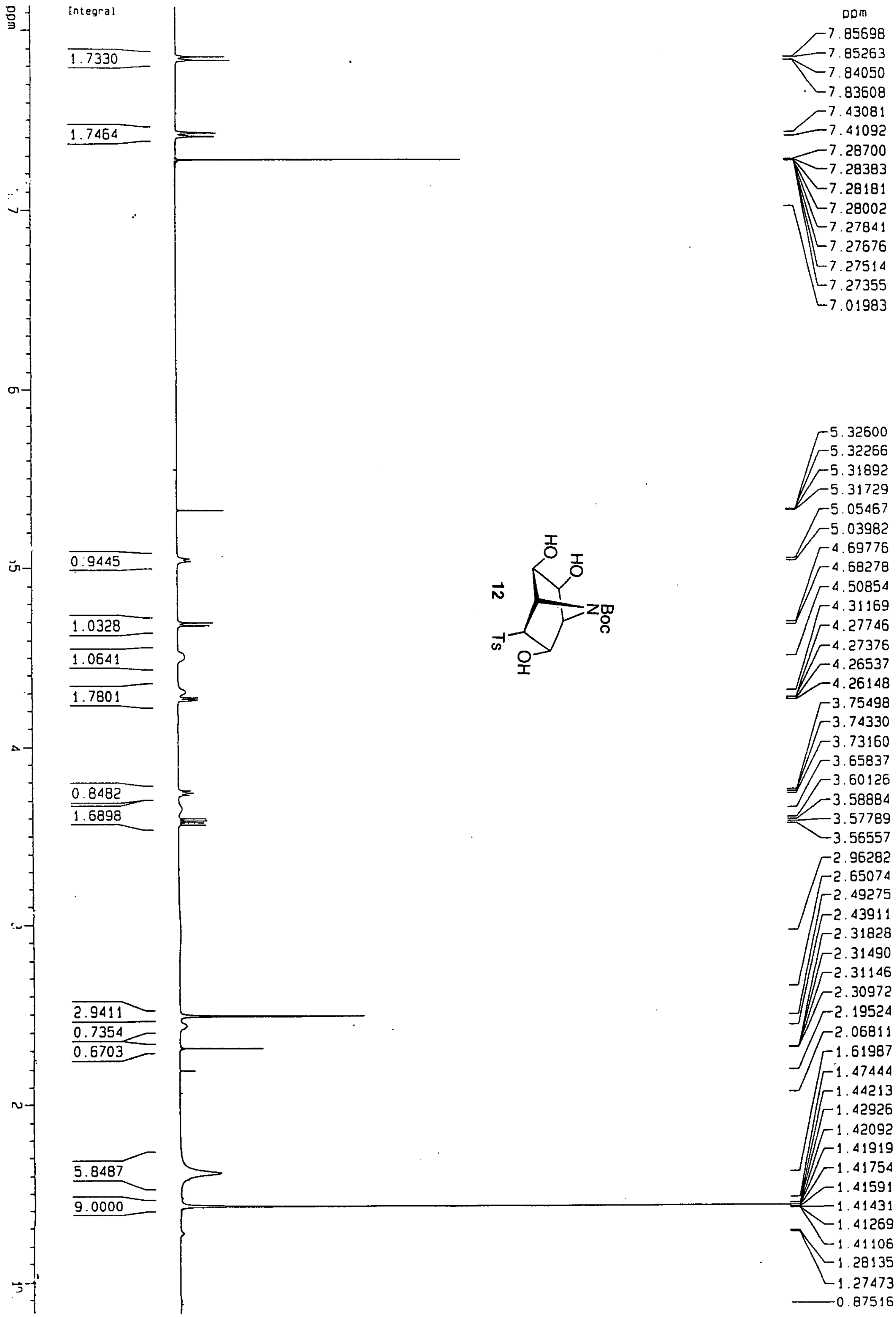
79.364
70.086
65.729
63.593
60.851
39.647
39.440
39.232
39.023
38.815
38.607
38.394
26.957
26.764
20.179
Boc
N
OH
Ts
11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Integral
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1.0328
1.0641
1.7801
0.8482
1.6898
2.9411
0.7354
0.6703
5.8487
9.0000
7
6
5
4
2
ppm
7.85698
7.85263
7.84050
7.83608
7.43081
7.41092
7.28700
7.28383
7.28181
7.28002
7.27841
7.27676
7.27514
7.27355
7.01983
5.32600
5.32266
5.31892
5.31729
5.05467
5.03982
4.69776
4.68278
4.50854
4.31169
4.27746
4.27376
4.26537
4.26148
3.75498
3.74330
3.73160
3.65837
3.60126
3.58884
3.57789
3.56557
2.96282
2.65074
2.49275
2.43911
2.31828
2.31490
2.31146
2.30972
2.19524
2.06811
1.61987
1.47444
1.44213
1.42926
1.42092
1.41919
1.41754
1.41591
1.41431
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1.41106
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1.27473
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Boc
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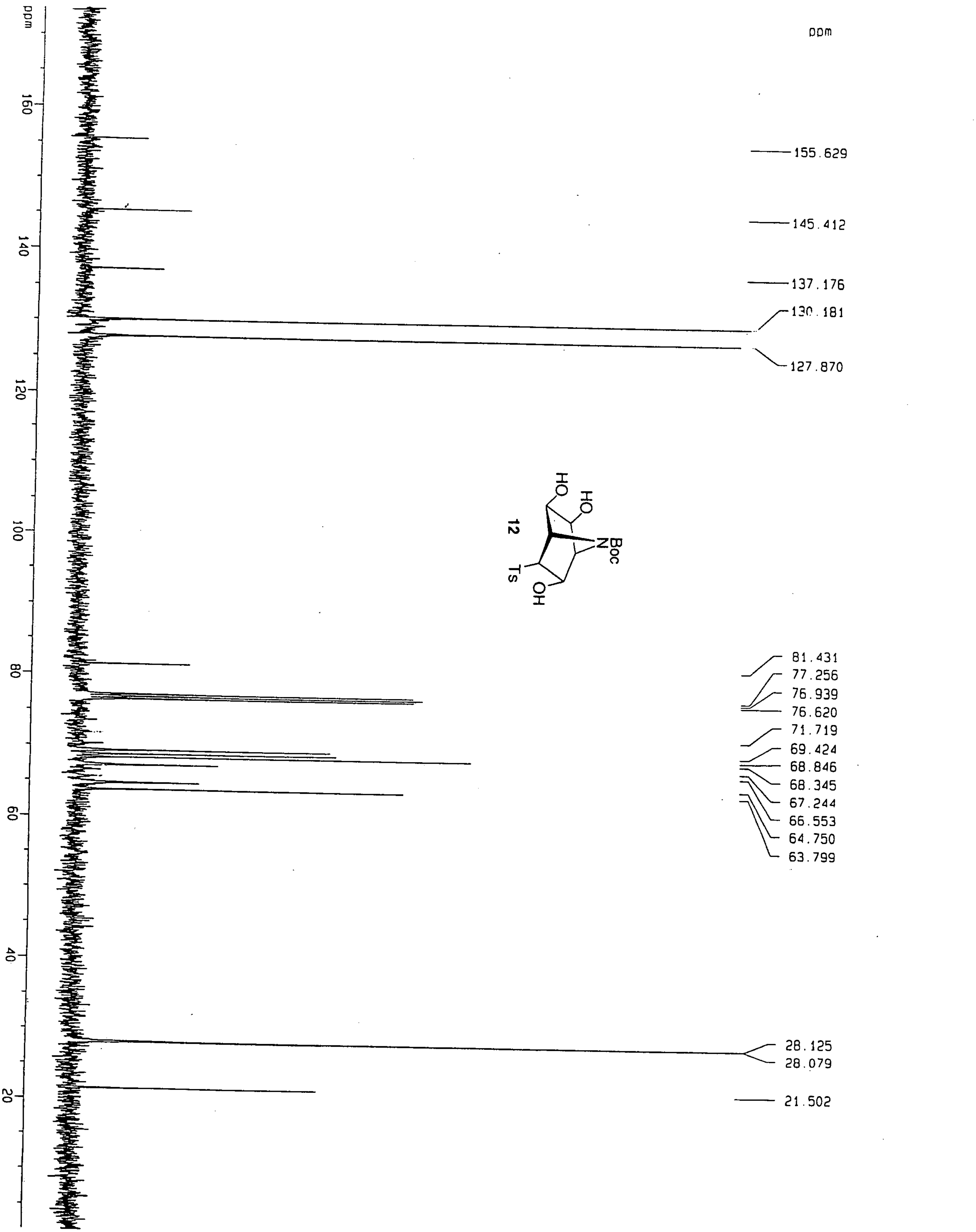
HO
HO
OH
Ts
12


ppm
160
140
120
100
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60
40
20
ppm
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145.412
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130.181
127.870
81.431
77.256
76.939
76.620
71.719
69.424
68.846
68.345
67.244
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64.750
63.799
28.125
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Boc
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HO
HO
OH
Ts
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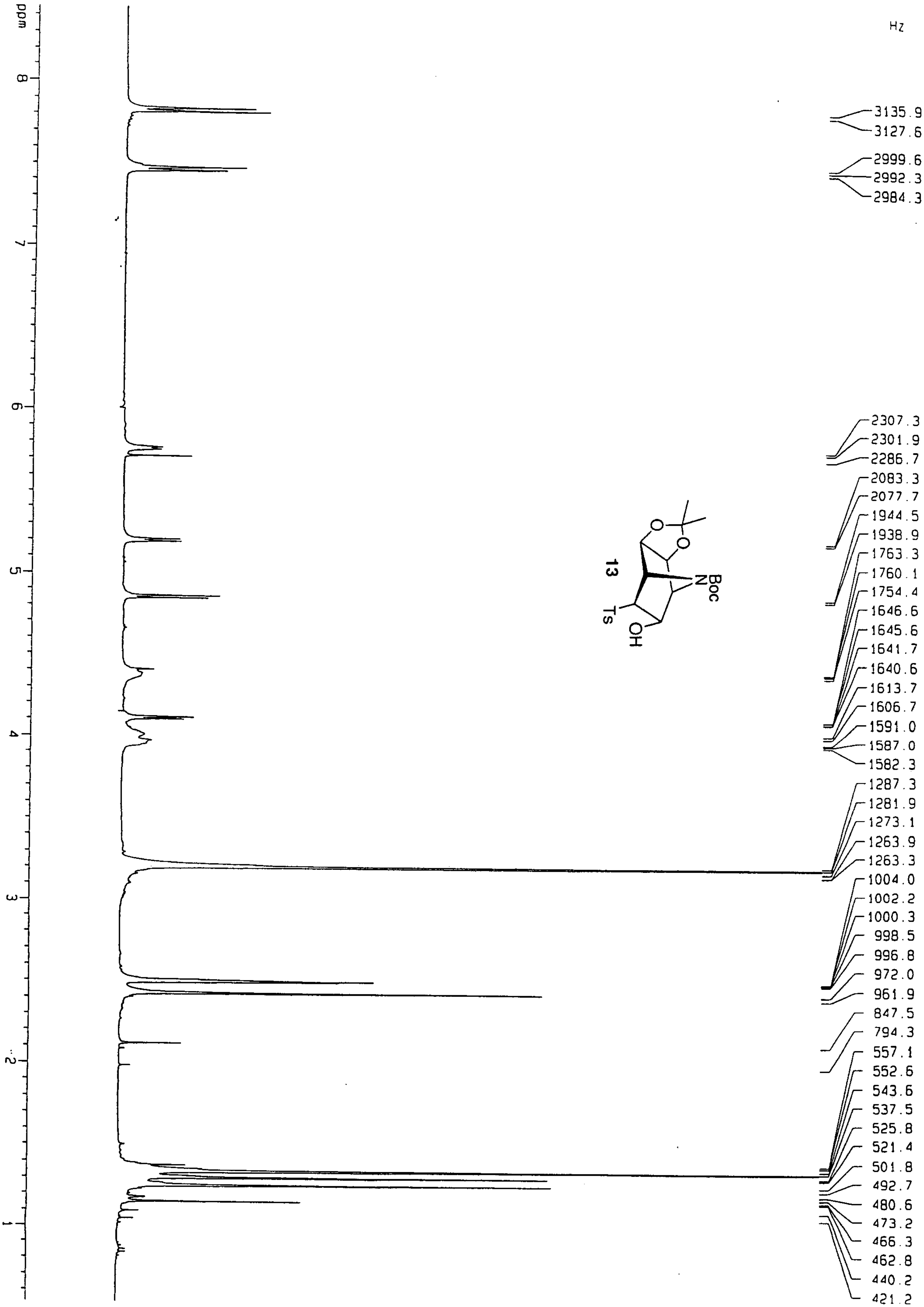
ppm
8
7
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5
4
3
2
1
Hz
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2999.6
2992.3
2984.3
2307.3
2301.9
2286.7
2083.3
2077.7
1944.5
1938.9
1763.3
1760.1
1754.4
1646.6
1645.6
1641.7
1640.6
1613.7
1606.7
1591.0
1587.0
1582.3
1287.3
1281.9
1273.1
1263.9
1263.3
1004.0
1002.2
1000.3
998.5
996.8
972.0
961.9
847.5
794.3
557.1
552.6
543.6
537.5
525.8
521.4
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492.7
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473.2
466.3
462.8
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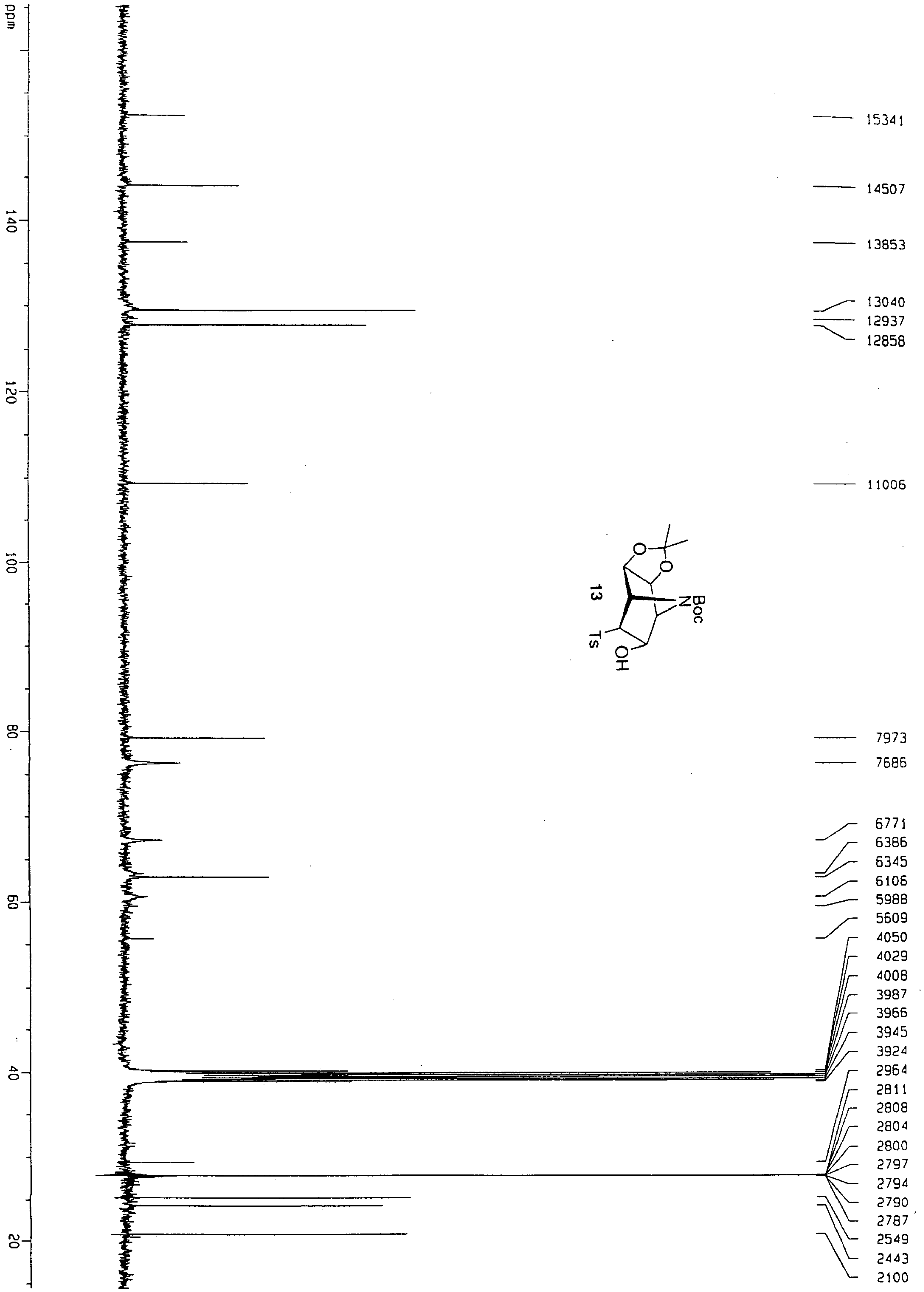
O
O
OH
Ts
13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6771
6386
6345
6106
5988
5609
4050
4029
4008
3987
3966
3945
3924
2964
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2804
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2794
2790
2787
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2100
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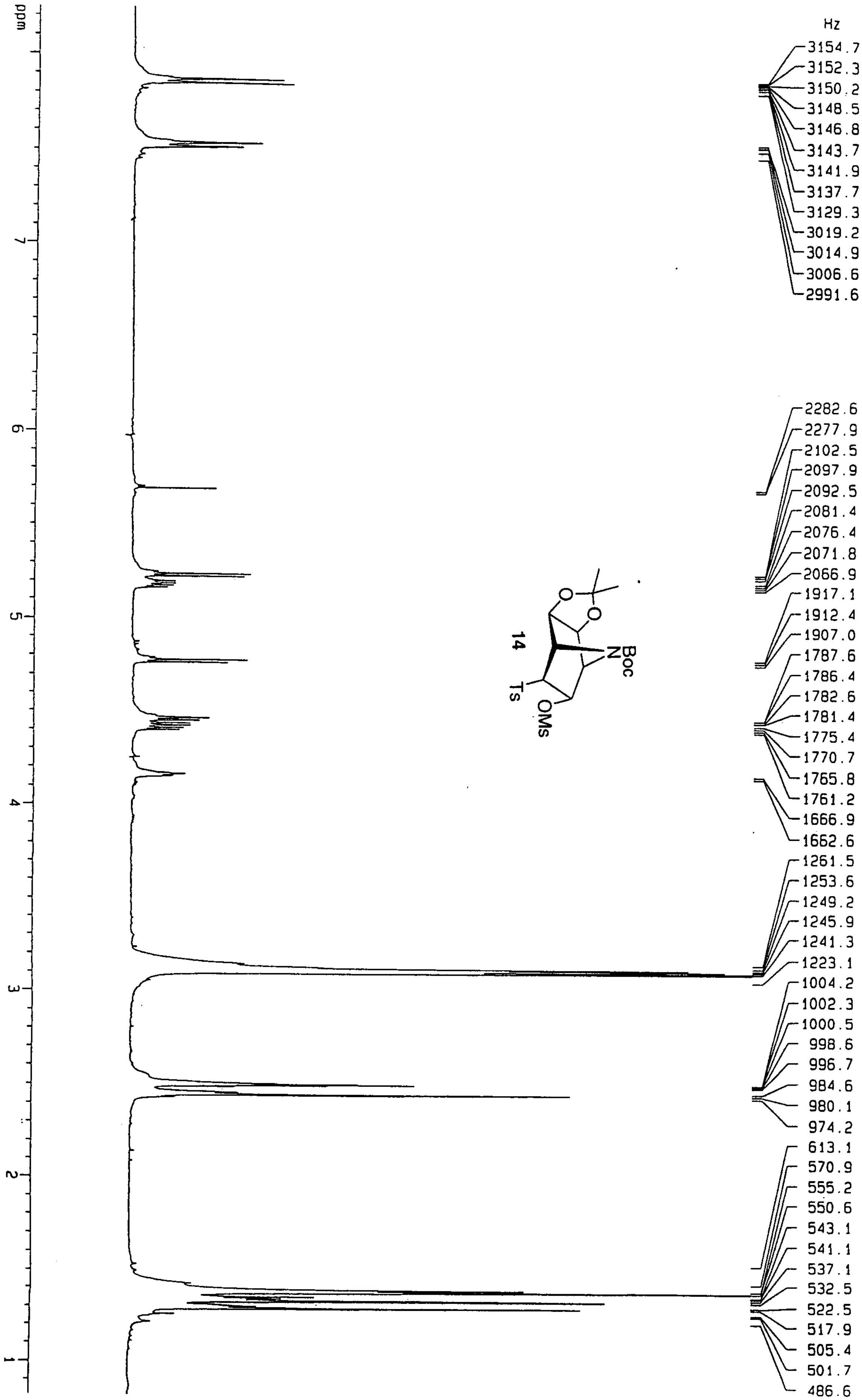
N
O
OH
Ts
13



ppm
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4
3
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3141.9
3137.7
3129.3
3019.2
3014.9
3006.6
2991.6
2282.6
2277.9
2102.5
2097.9
2092.5
2081.4
2076.4
2071.8
2066.9
1917.1
1912.4
1907.0
1787.6
1786.4
1782.6
1781.4
1775.4
1770.7
1765.8
1761.2
1666.9
1662.6
1261.5
1253.6
1249.2
1245.9
1241.3
1223.1
1004.2
1002.3
1000.5
998.6
996.7
984.6
980.1
974.2
613.1
570.9
555.2
550.6
543.1
541.1
537.1
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522.5
517.9
505.4
501.7
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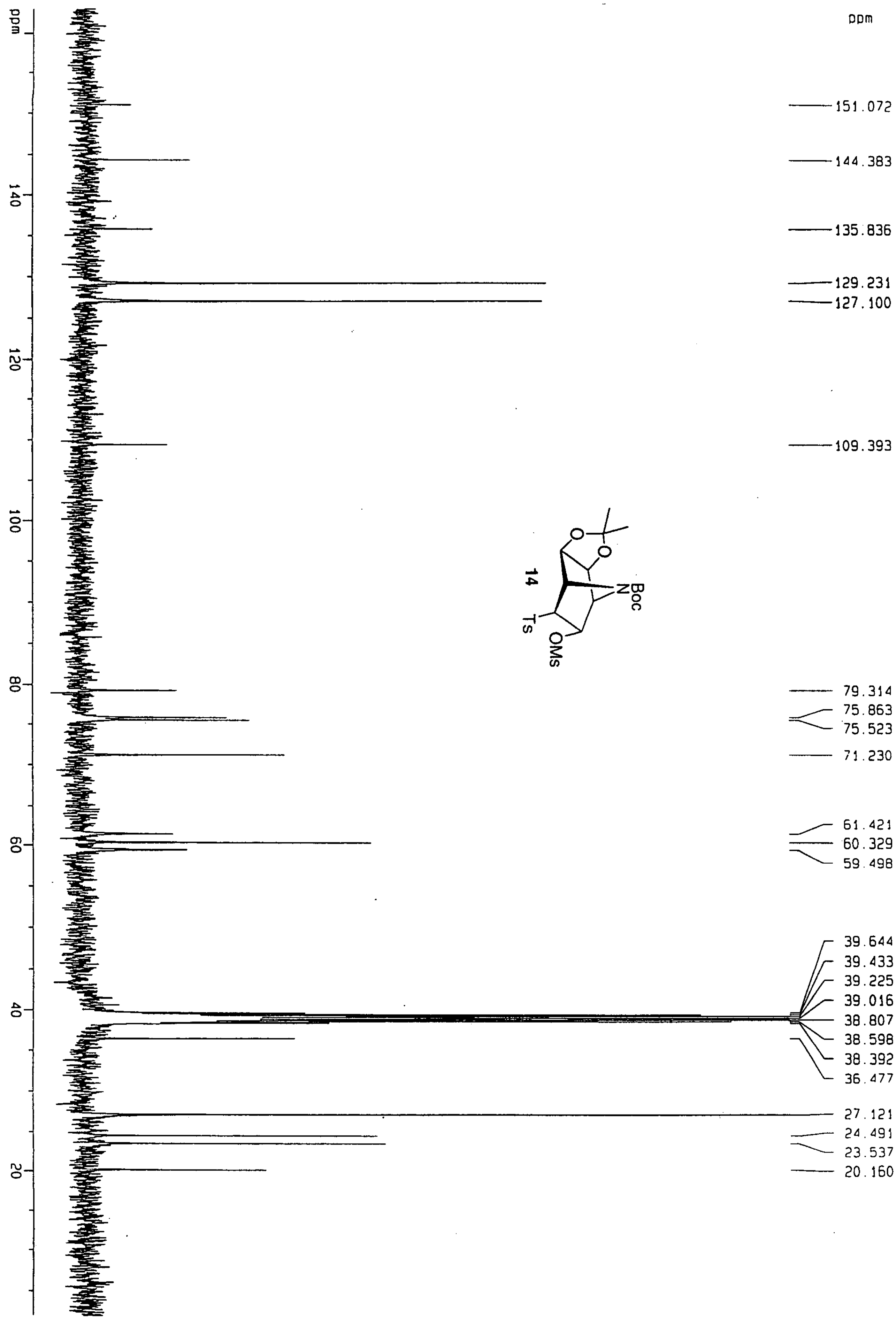
O
O
N
Boc
Ts
OMs
14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40
20
ppm
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127.100
109.393
79.314
75.863
75.523
71.230
61.421
60.329
59.498
39.644
39.433
39.225
39.016
38.807
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27.121
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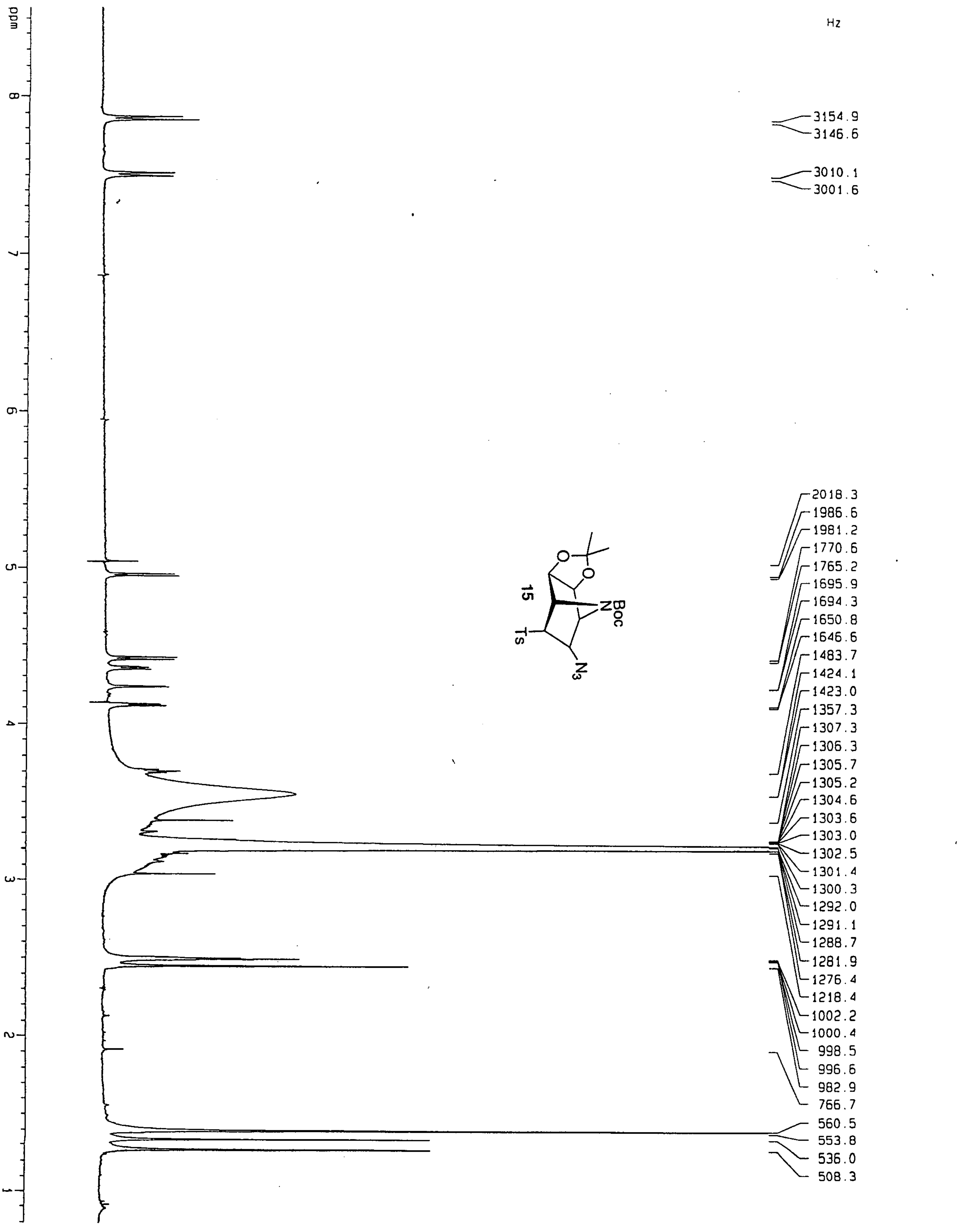
14
Boc
N
O
O
Ts
OMs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5
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3
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Hz
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1986.6
1981.2
1770.6
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1694.3
1650.8
1646.6
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1424.1
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1307.3
1306.3
1305.7
1305.2
1304.6
1303.6
1303.0
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1301.4
1300.3
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1281.9
1276.4
1218.4
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1000.4
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766.7
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536.0
508.3
Boc
N
Ts
N_3
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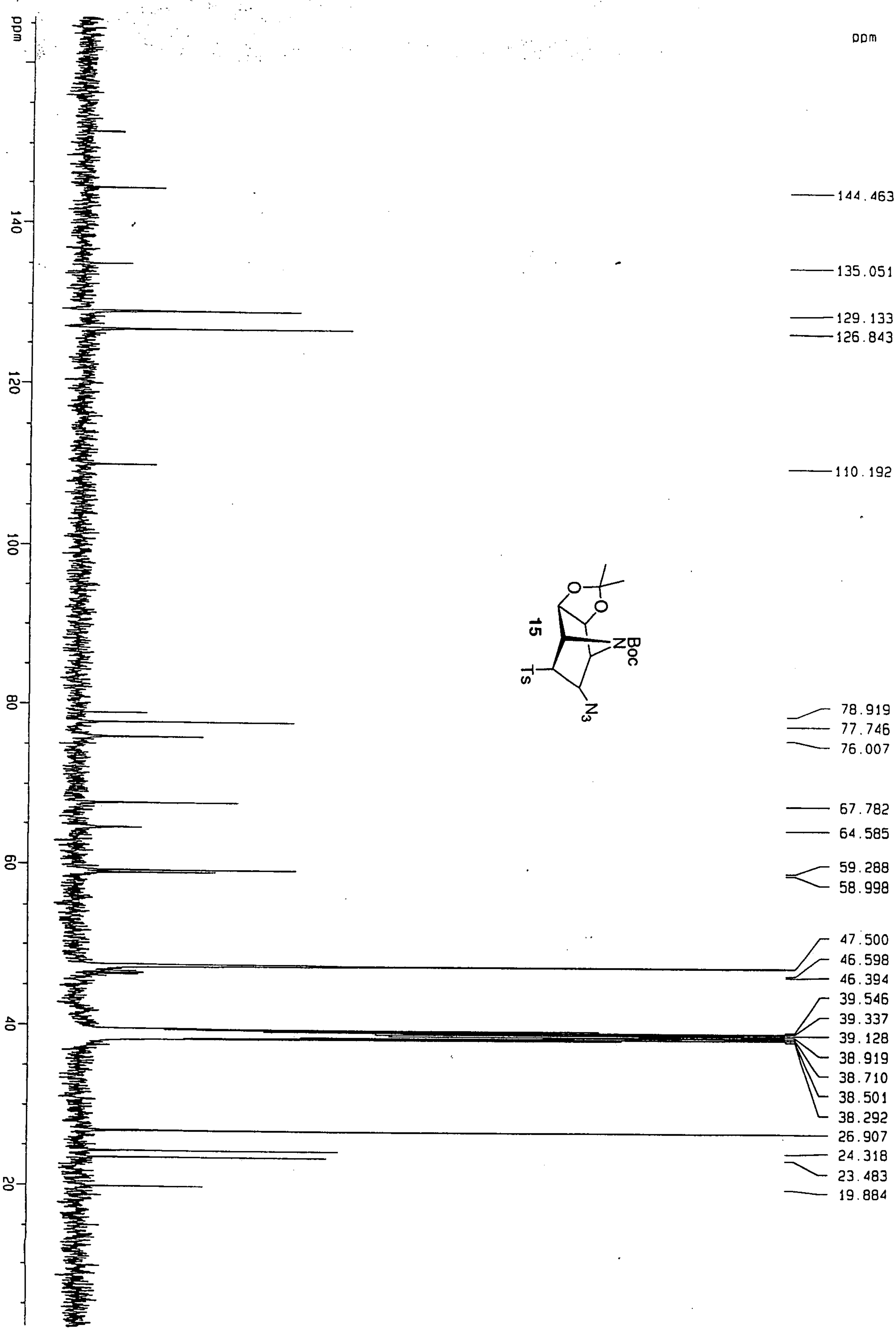
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67.782
64.585
59.288
58.998
47.500
46.598
46.394
39.546
39.337
39.128
38.919
38.710
38.501
38.292
26.907
24.318
23.483
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Boc
N
O
O
15
Ts
N_3
ppm
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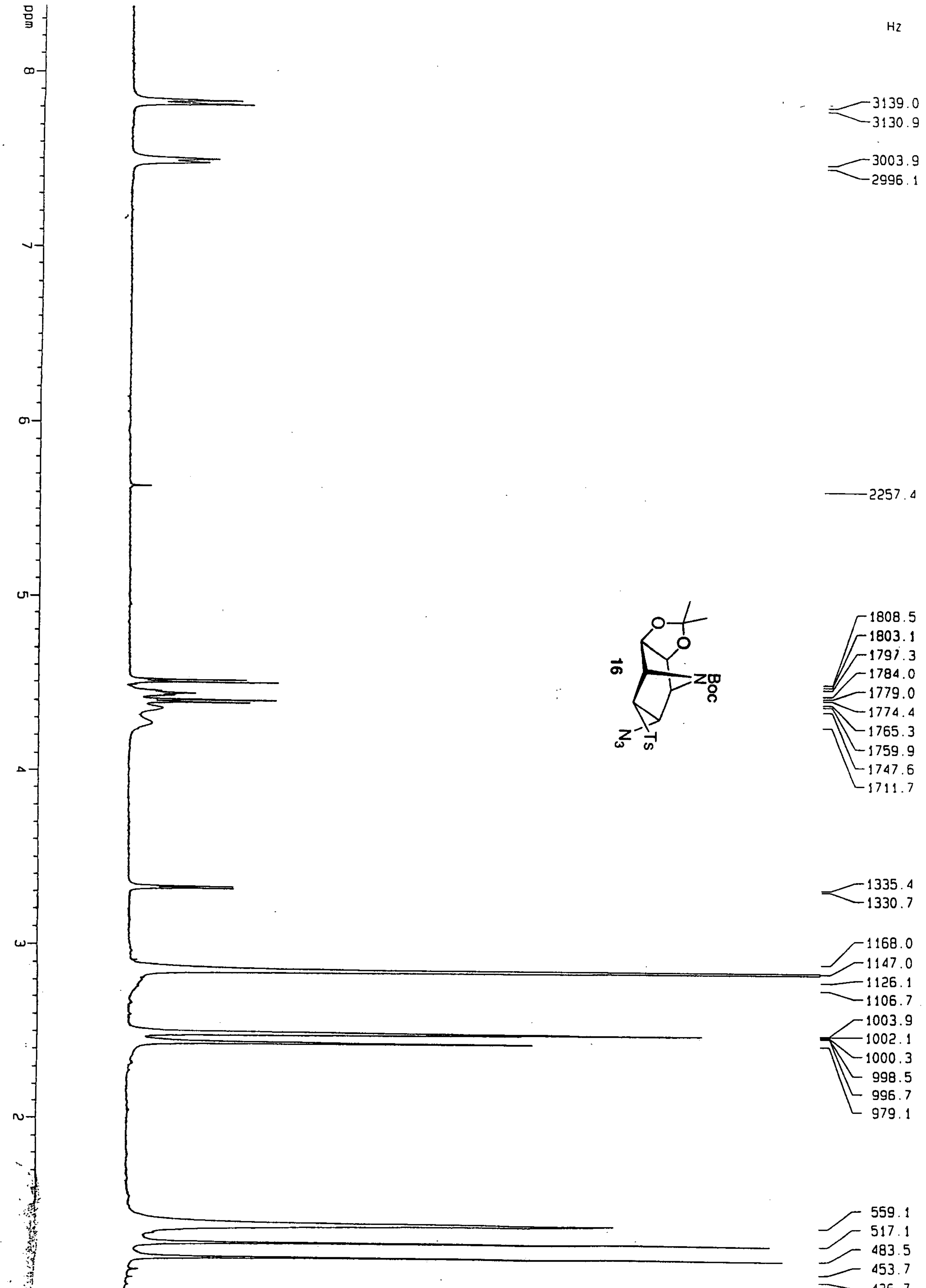
80
60
40
20


ppm
8
7
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5
4
3
2
Hz
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2257.4
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1803.1
1797.3
1784.0
1779.0
1774.4
1765.3
1759.9
1747.6
1711.7
1335.4
1330.7
1168.0
1147.0
1126.1
1106.7
1003.9
1002.1
1000.3
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979.1
559.1
517.1
483.5
453.7
436.7
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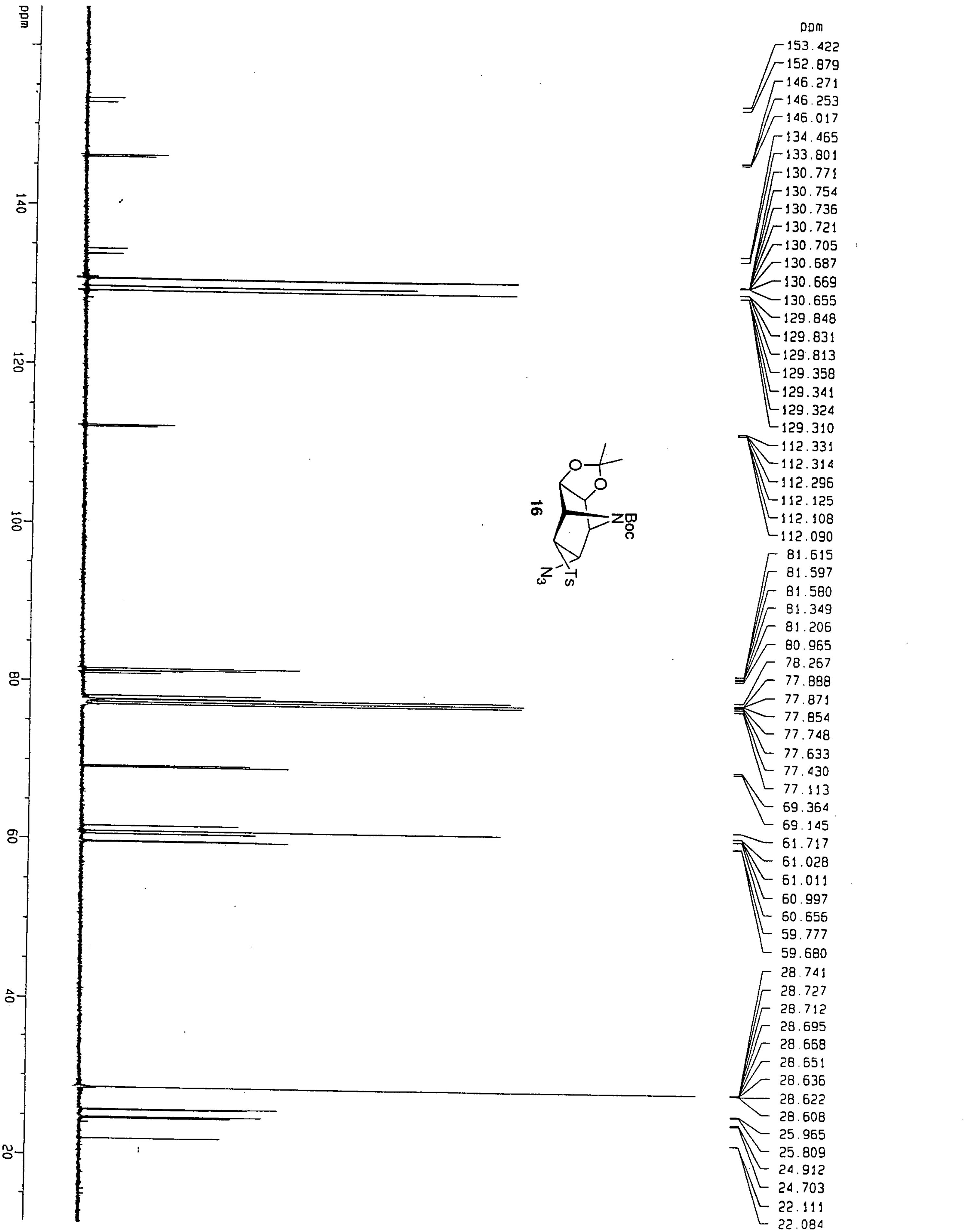
N
Ts
N_3
16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129.324
129.310
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112.314
112.296
112.125
112.108
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81.597
81.580
81.349
81.206
80.965
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77.871
77.854
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77.633
77.430
77.113
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61.028
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60.997
60.656
59.777
59.680
28.741
28.727
28.712
28.695
28.668
28.651
28.636
28.622
28.608
25.965
25.809
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22.084
Boc
N
Ts
N_3
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ppm
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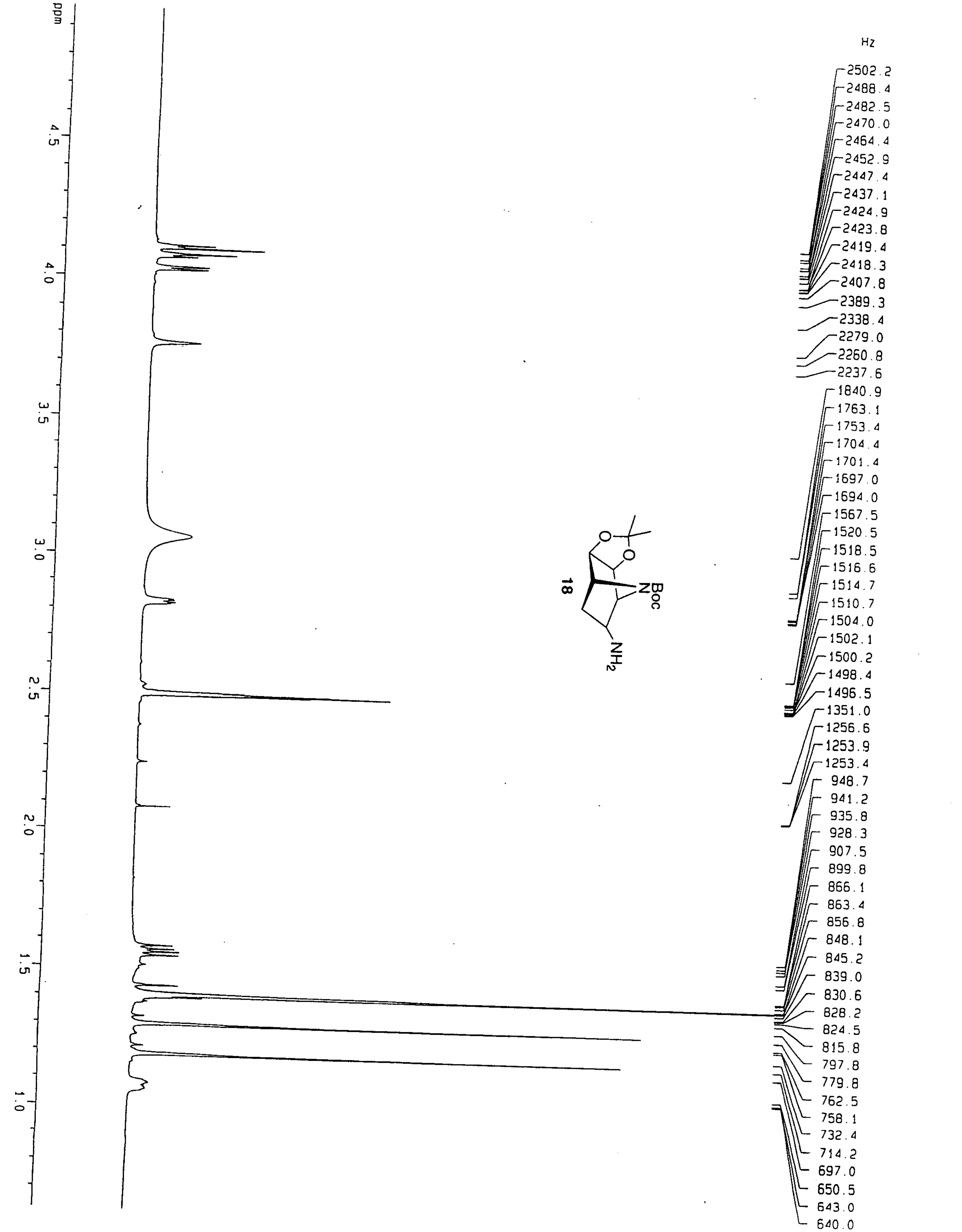
80
60
40
20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2.0
1.5
1.0
Hz
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2482.5
2470.0
2464.4
2452.9
2447.4
2437.1
2424.9
2423.8
2419.4
2418.3
2407.8
2389.3
2338.4
2279.0
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2237.6
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1763.1
1753.4
1704.4
1701.4
1697.0
1694.0
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1520.5
1518.5
1516.6
1514.7
1510.7
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935.8
928.3
907.5
899.8
866.1
863.4
856.8
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845.2
839.0
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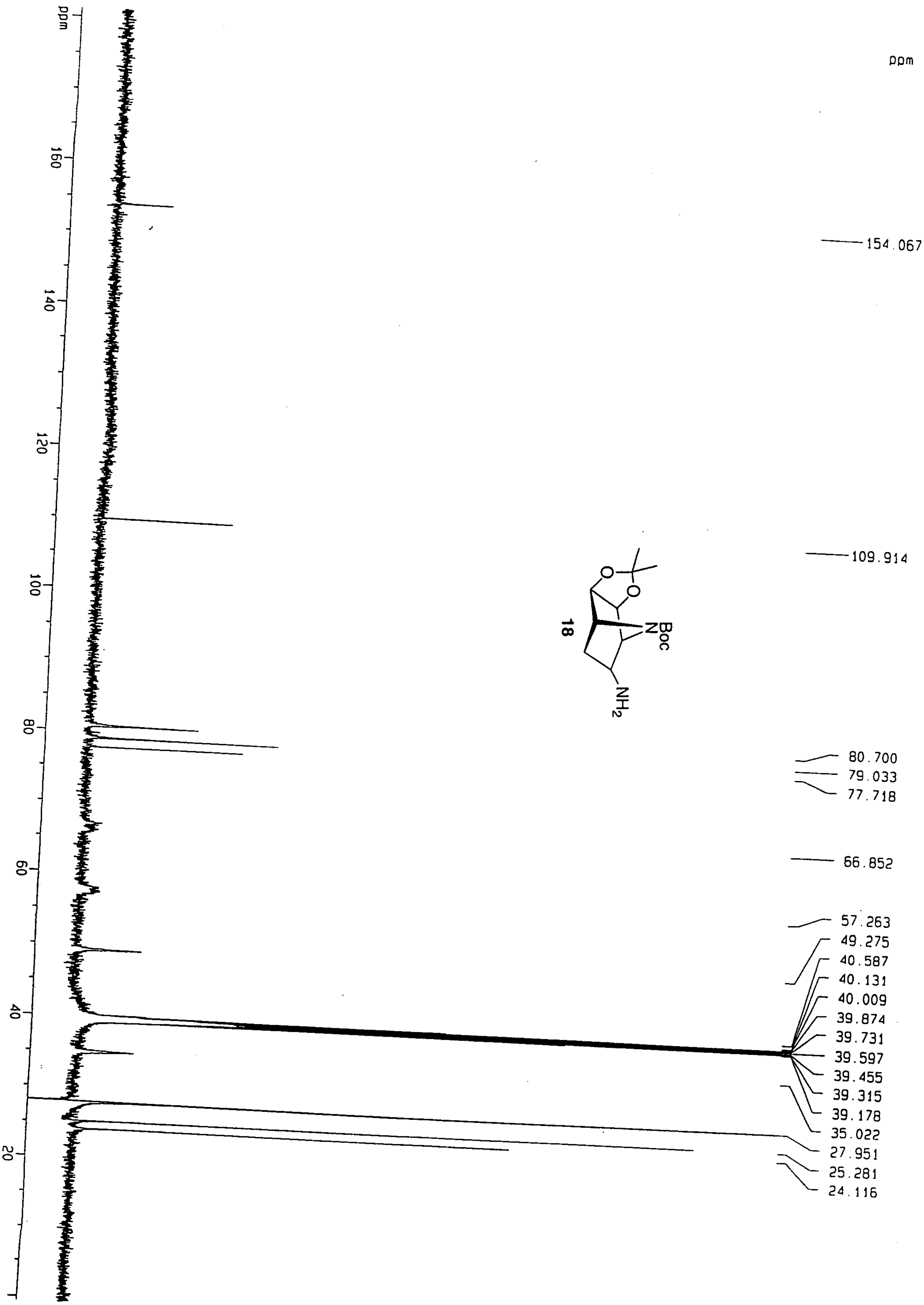
824.5
815.8
797.8
779.8
762.5
758.1
732.4
714.2
697.0
650.5
643.0
640.0
Boc
N
O
O
NH2

18


ppm
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109.914
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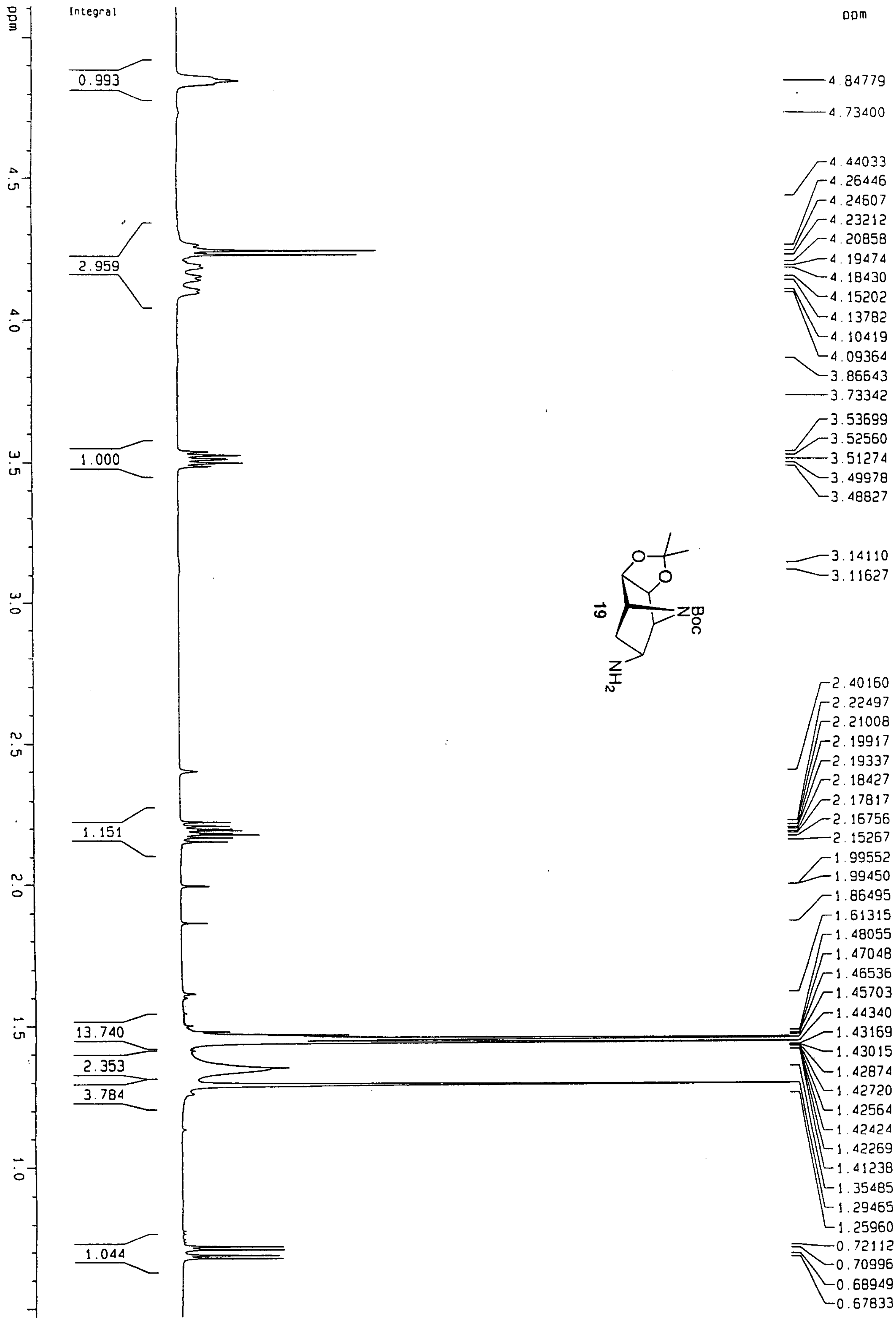
79.033
77.718
66.852
57.263
49.275
40.587
40.131
40.009
39.874
39.731
39.597
39.455
39.315
39.178
35.022
27.951
25.281
24.116
Boc
N
O
O
NH2
18
ppm
160
140
120
100
80
60
40
20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Integral
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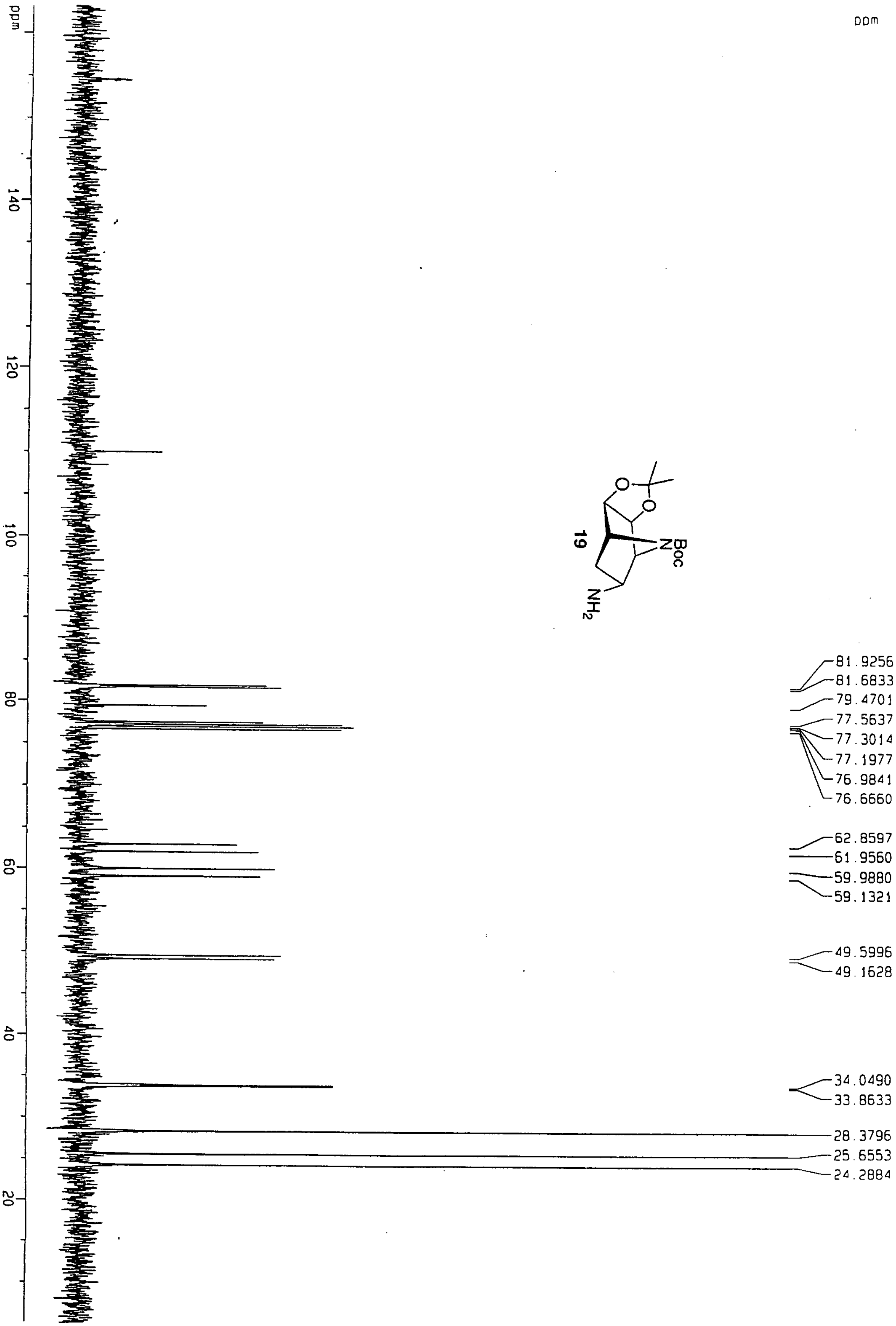
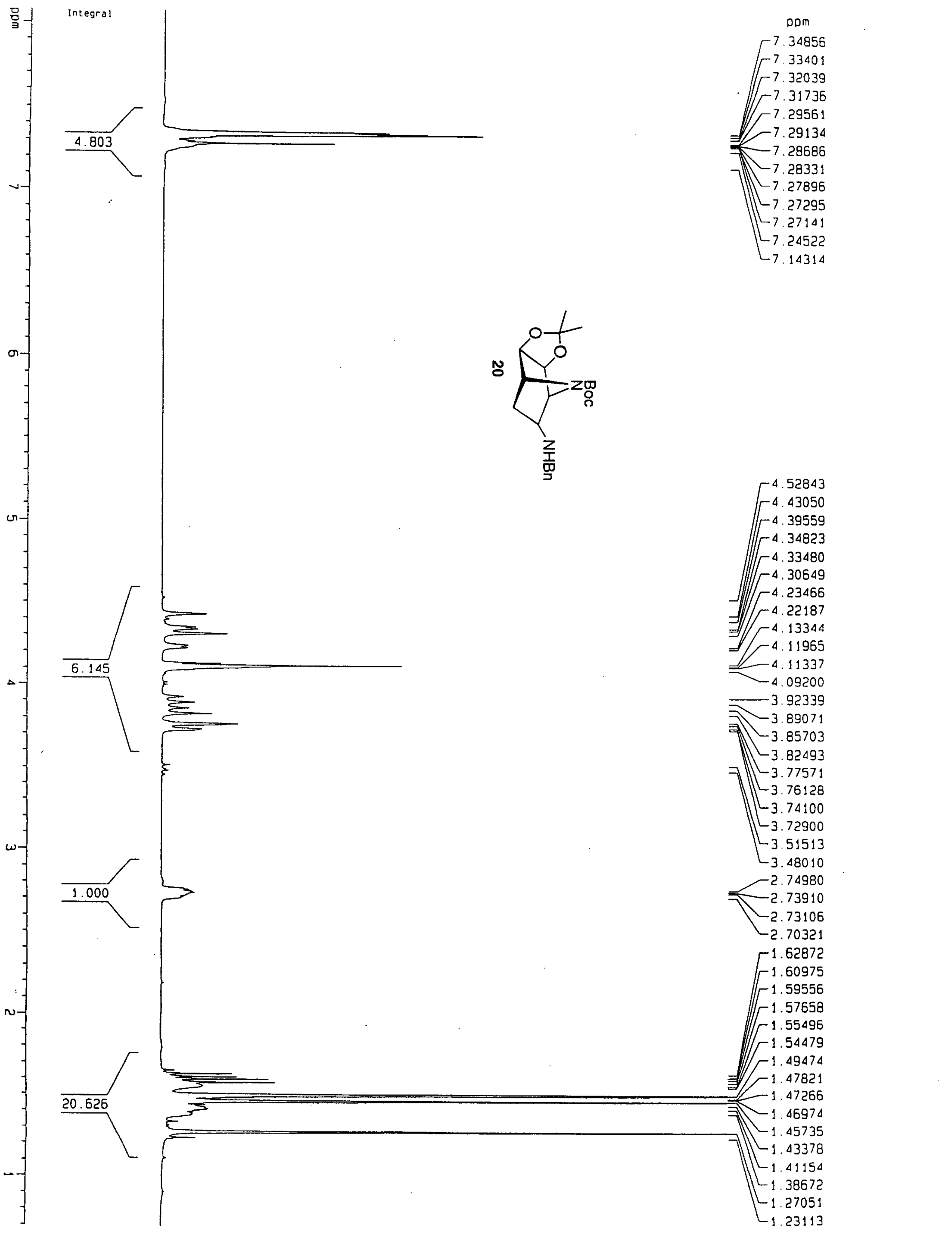
2.959
1.000
1.151
13.740
2.353
3.784
1.044
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
ppm
4.84779
4.73400
4.44033
4.26446
4.24607
4.23212
4.20858
4.19474
4.18430
4.15202
4.13782
4.10419
4.09364
3.86643
3.73342
3.53699
3.52560
3.51274
3.49978
3.48827
3.14110
3.11627
2.40160
2.22497
2.21008
2.19917
2.19337
2.18427
2.17817
2.16756
2.15267
1.99552
1.99450
1.86495
1.61315
1.48055
1.47048
1.46536
1.45703
1.44340
1.43169
1.43015
1.42874
1.42720
1.42564
1.42424
1.42269
1.41238
1.35485
1.29465
1.25960
0.72112
0.70996
0.68949
0.67833
O
O
N
Boc
NH2
19


ppm
140
120
100
80
60
40
20
ppm
81.9256
81.6833
79.4701
77.5637
77.3014
77.1977
76.9841
76.6660
62.8597
61.9560
59.9880
59.1321
49.5996
49.1628
34.0490
33.8633
28.3796
25.6553
24.2884
O
O
N
Boc
NH2

19


ppm
Integral
4.803
6.145
1.000
20.626
7
6
5
4
3
2
1
ppm
7.34856
7.33401
7.32039
7.31736
7.29561
7.29134
7.28686
7.28331
7.27896
7.27295
7.27141
7.24522
7.14314
O
O
20
N
Boc
NHBn
4.52843
4.43050
4.39559
4.34823
4.33480
4.30649
4.23466
4.22187
4.13344
4.11965
4.11337
4.09200
3.92339
3.89071
3.85703
3.82493
3.77571
3.76128
3.74100
3.72900
3.51513
3.48010
2.74980
2.73910
2.73106
2.70321
1.62872
1.60975
1.59556
1.57658
1.55496
1.54479
1.49474
1.47821
1.47266
1.46974
1.45735
1.43378
1.41154
1.38672
1.27051
1.23113