

## ***Supporting Information***

### **Organocatalytic Asymmetric Michael Addition of Aldehydes and Ketones to Nitroalkenes Catalyzed by Adamantoyl *L*-Prolinamide**

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<sup>†</sup>Key Laboratory of Medicinal Chemistry for Natural Resource (Yunnan University), Ministry of Education, School of Chemical Science and Technology, Yunnan University, Kunming, 650091, P. R. China.

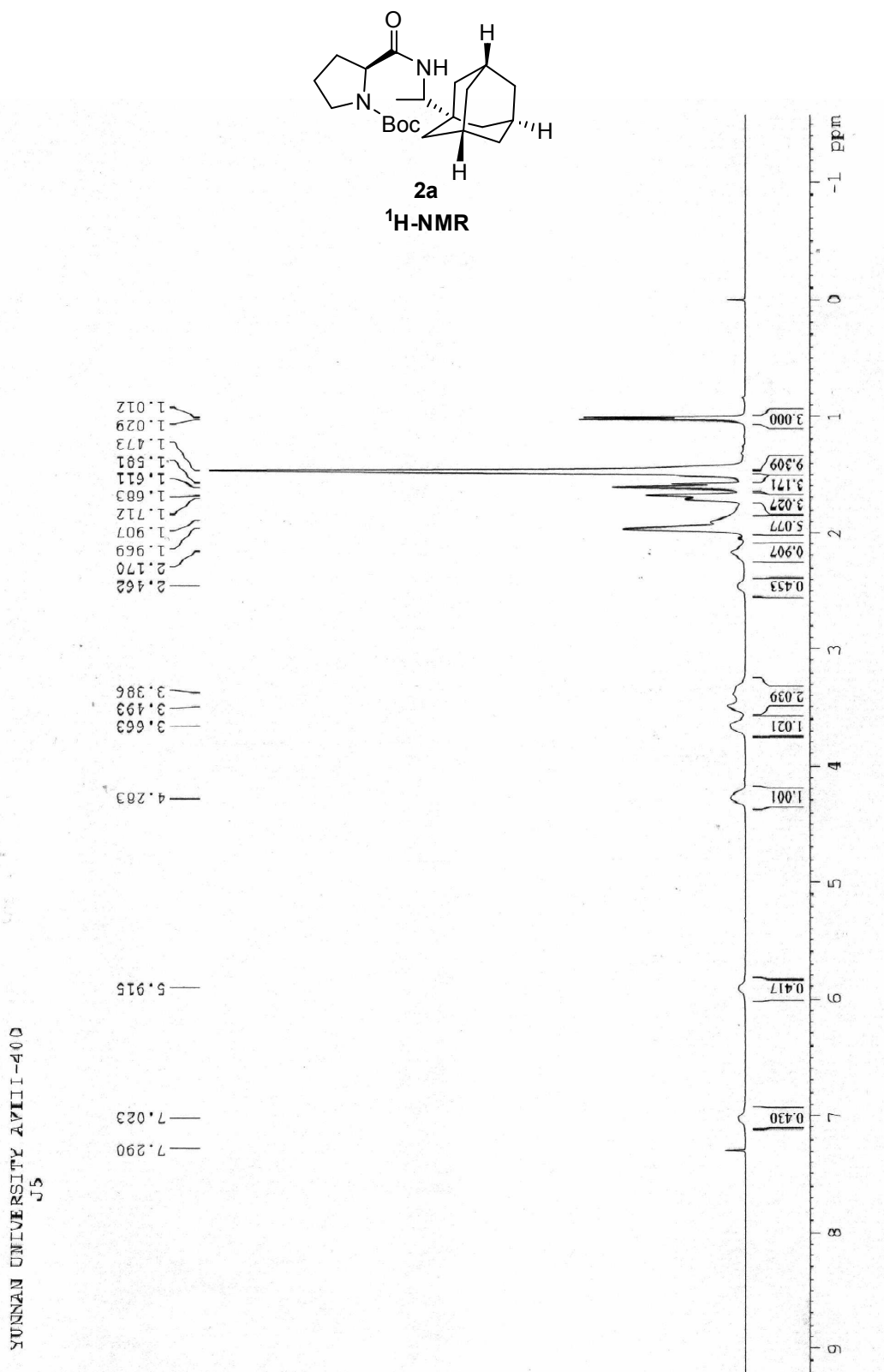
\*Corresponding author. Tel.: +86 871 5033715; fax: +86 871 5033715.

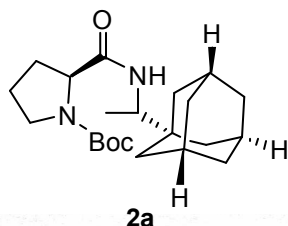
<sup>‡</sup>These authors contributed equally to the work.

E-mail: kunwei@ynu.edu.cn or linjun@ynu.edu.cn

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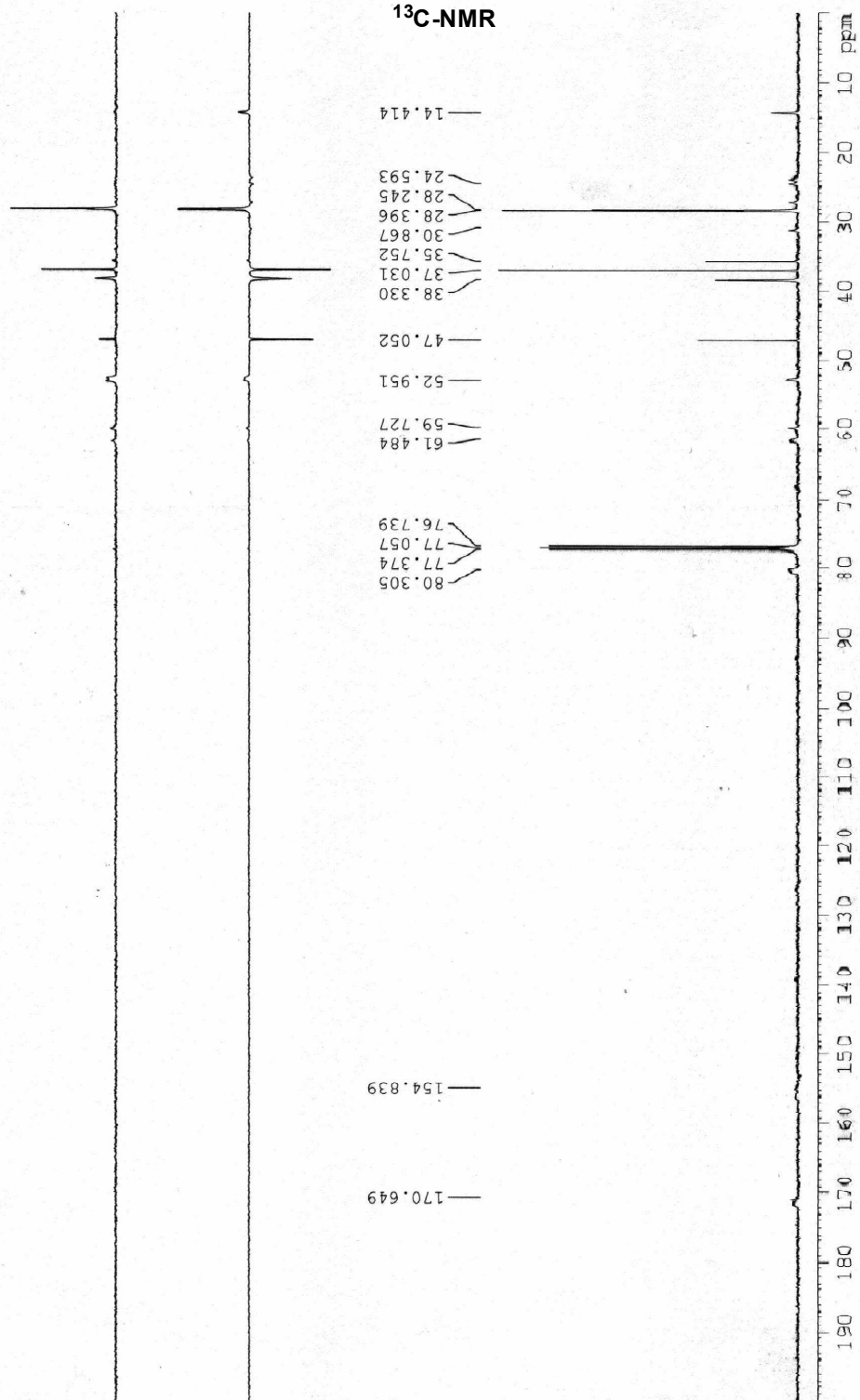
1.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra for compounds 2a-11a and 2-11.



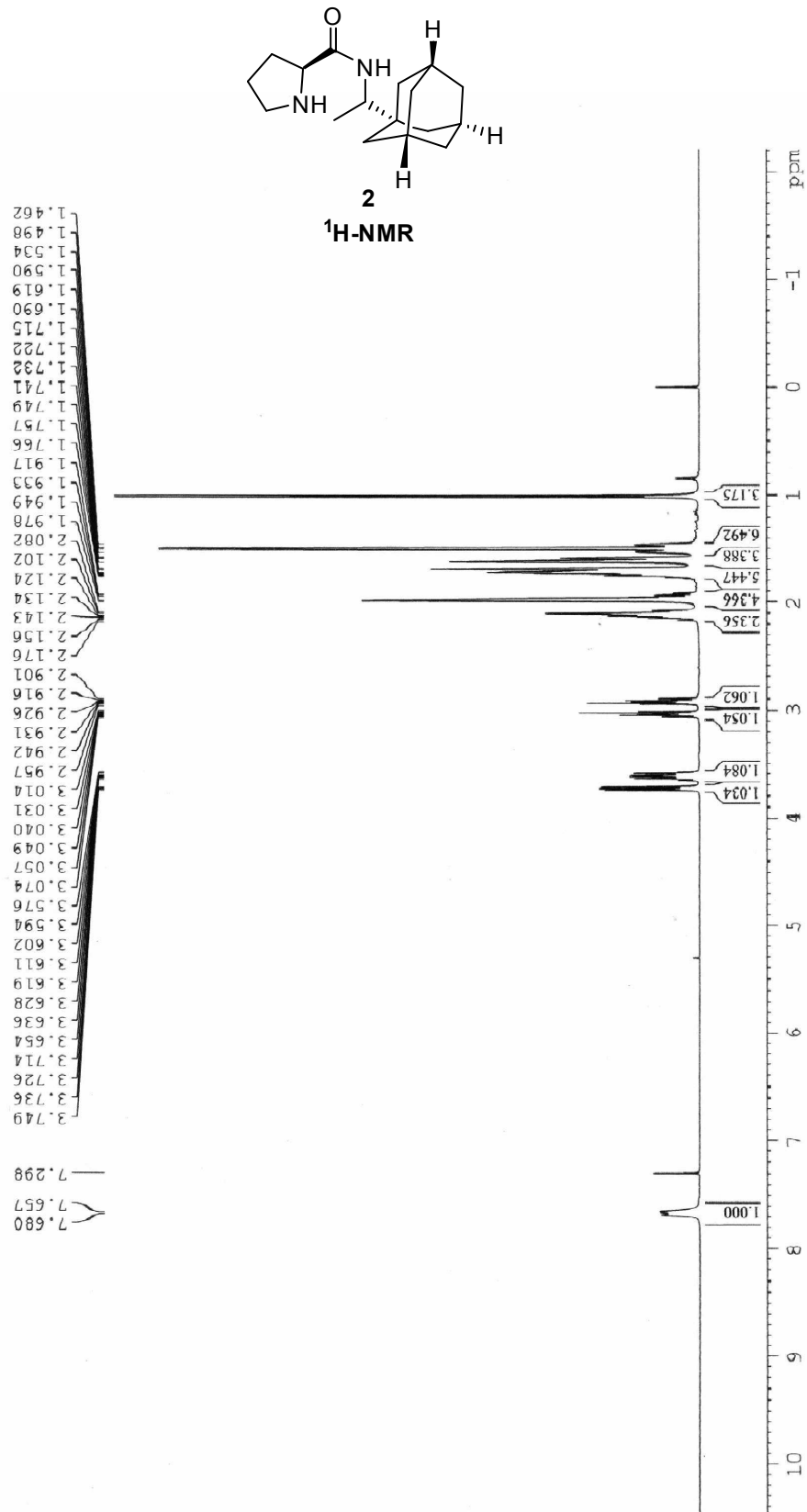


2a

<sup>13</sup>C-NMR

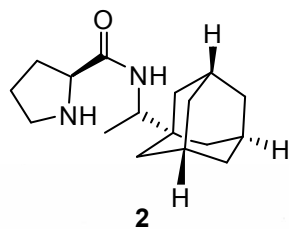


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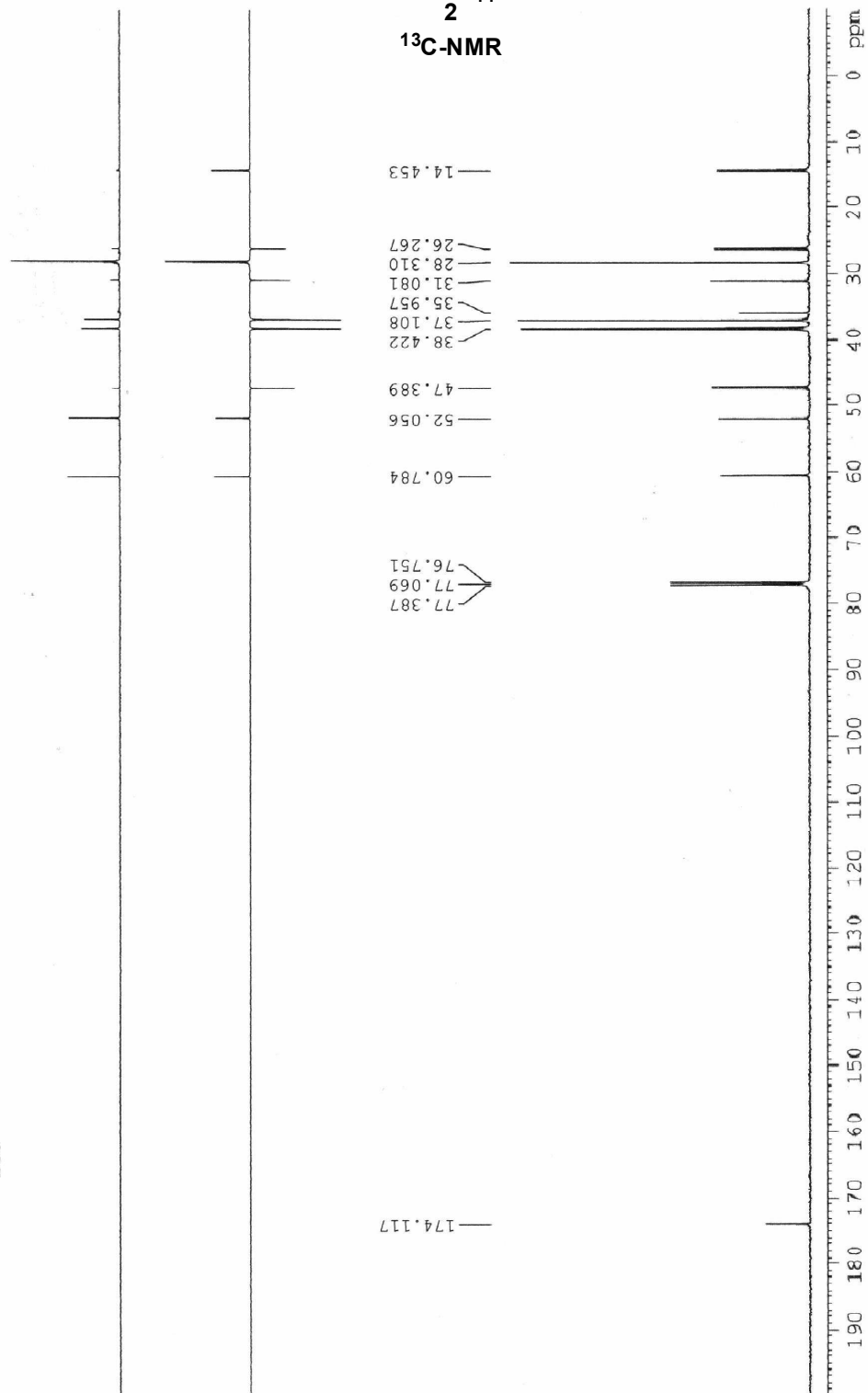


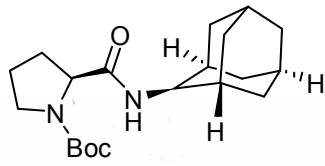


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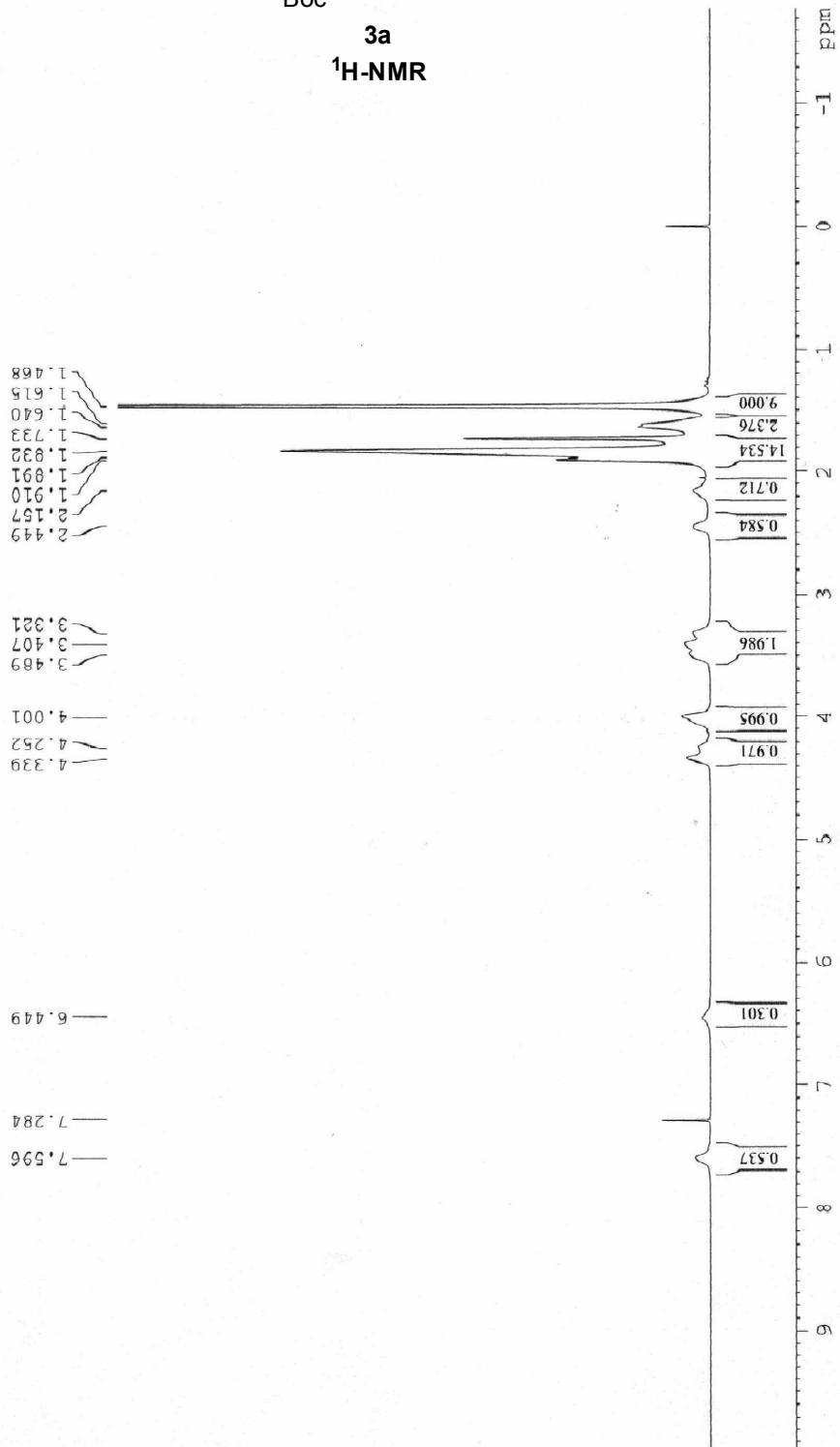


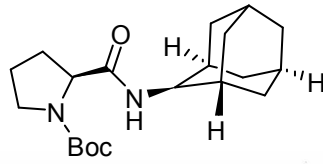
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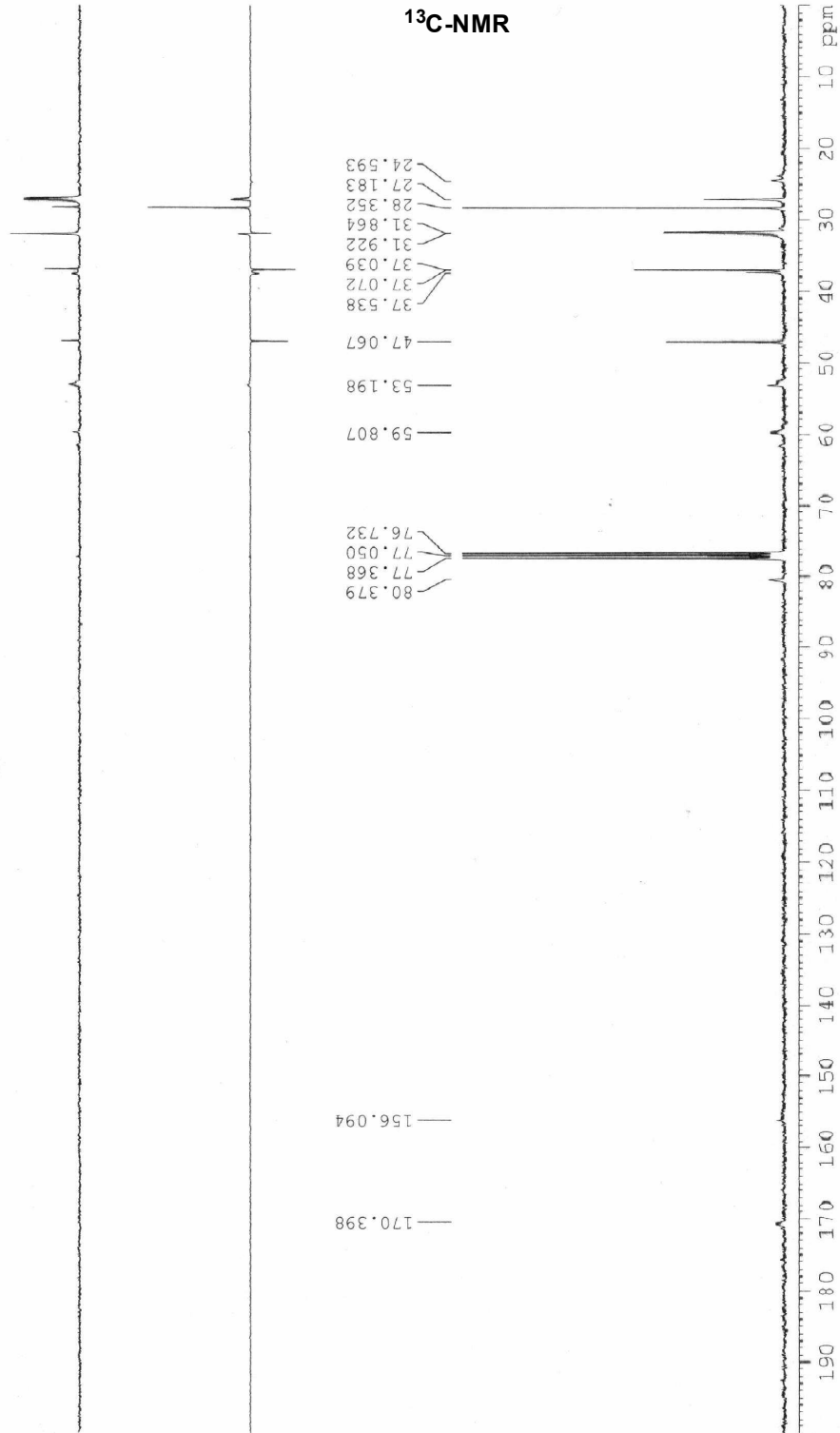


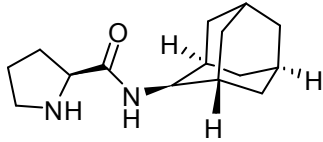
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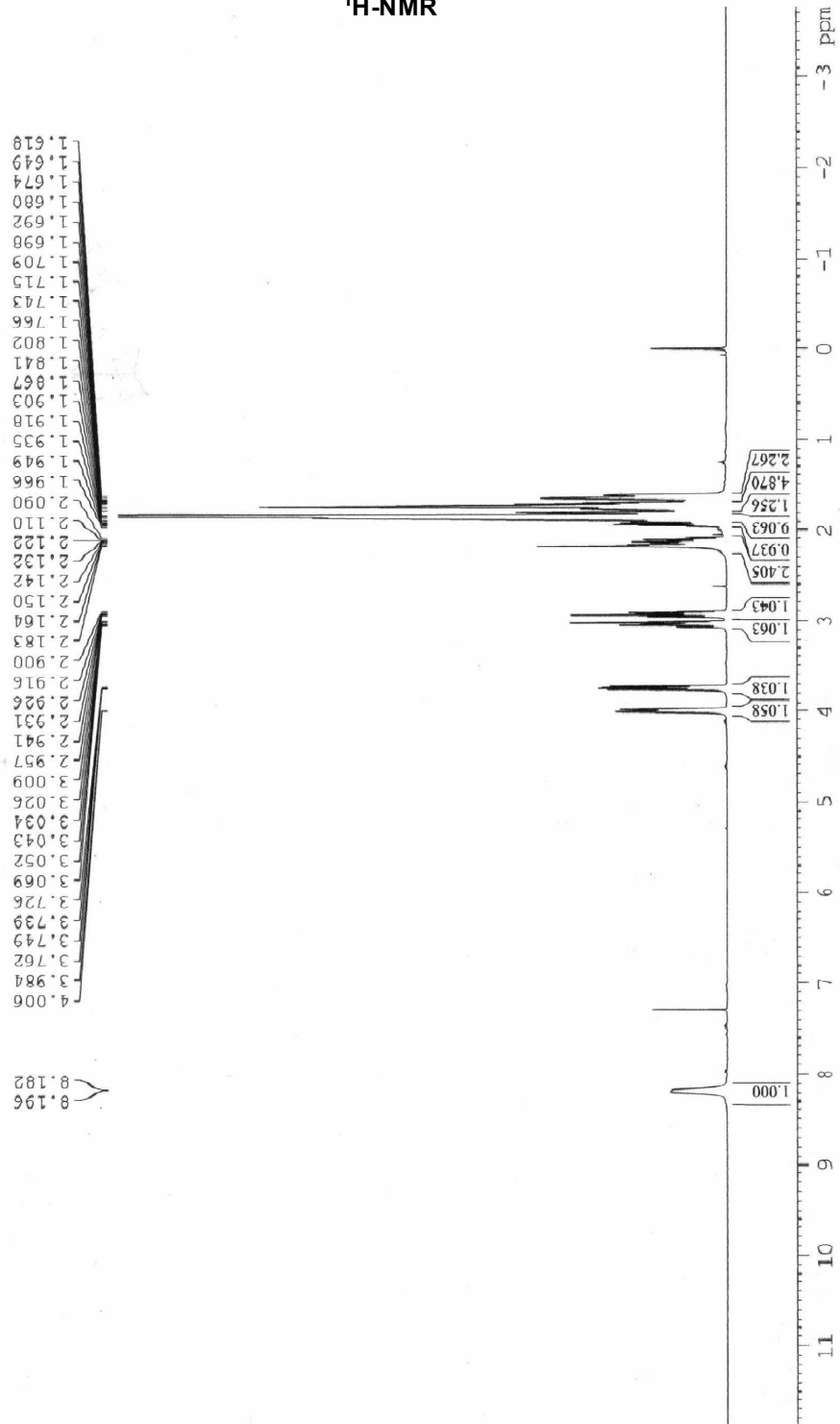


3a  
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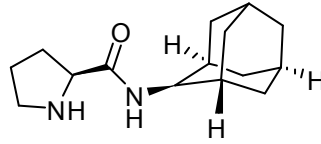




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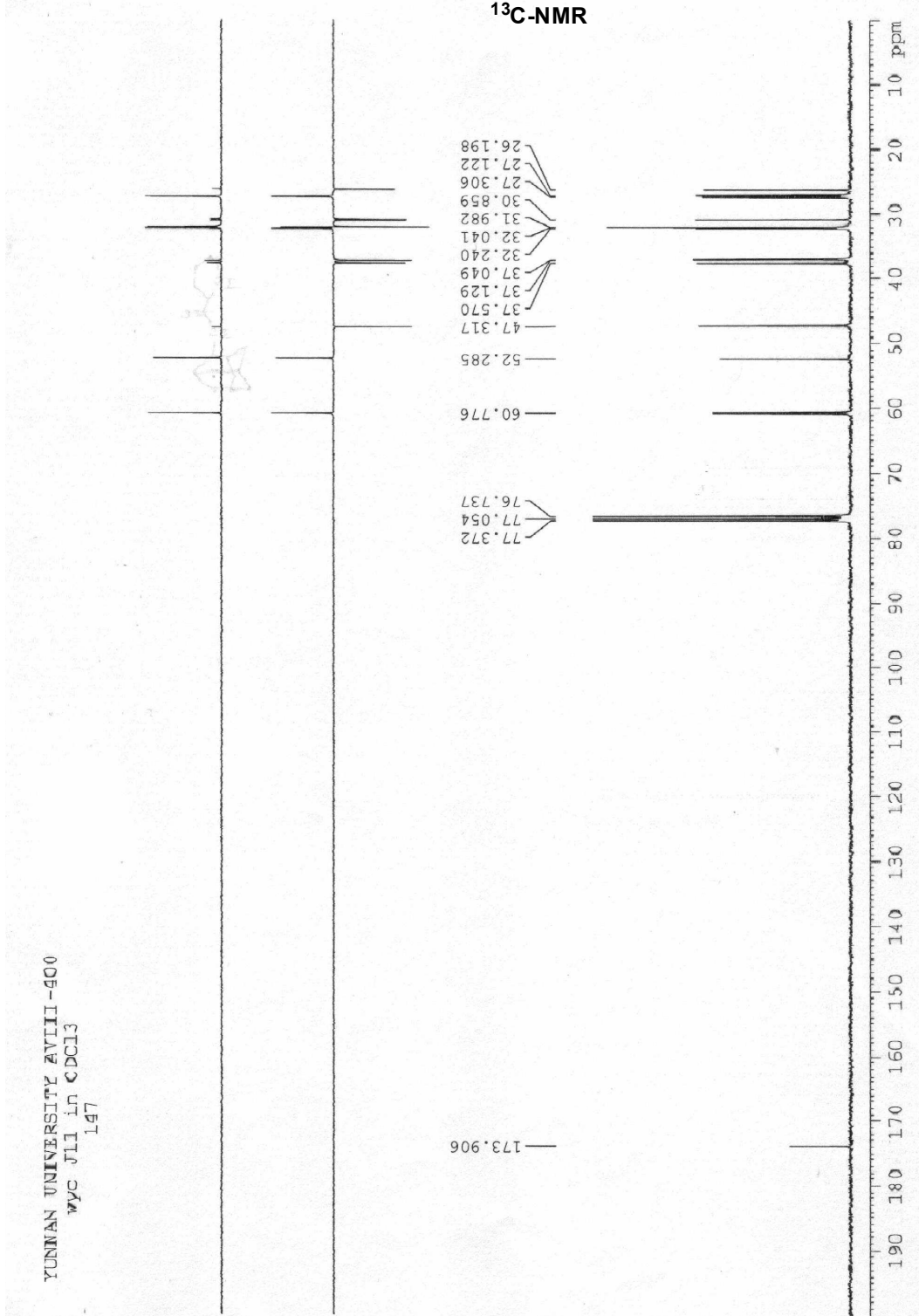


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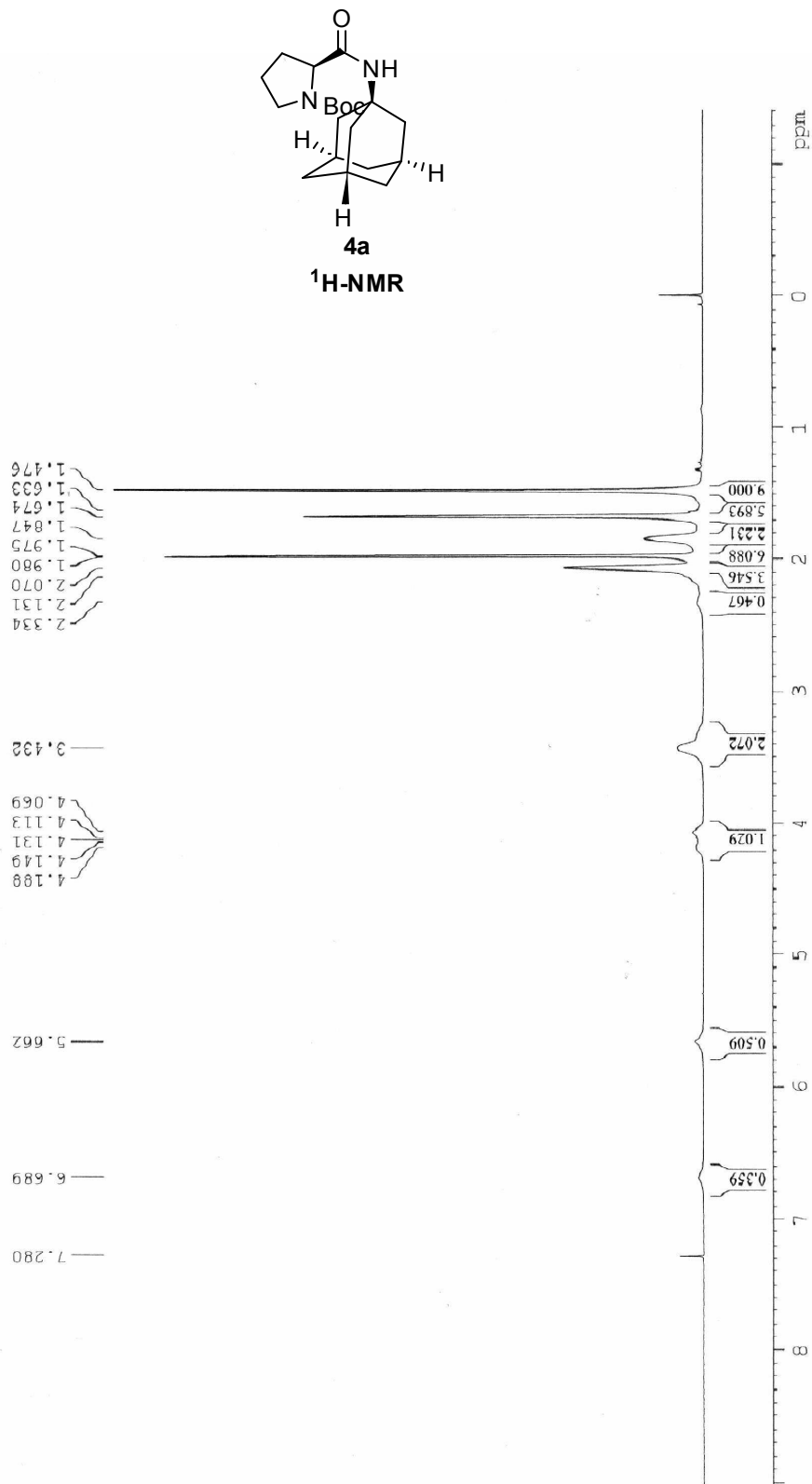
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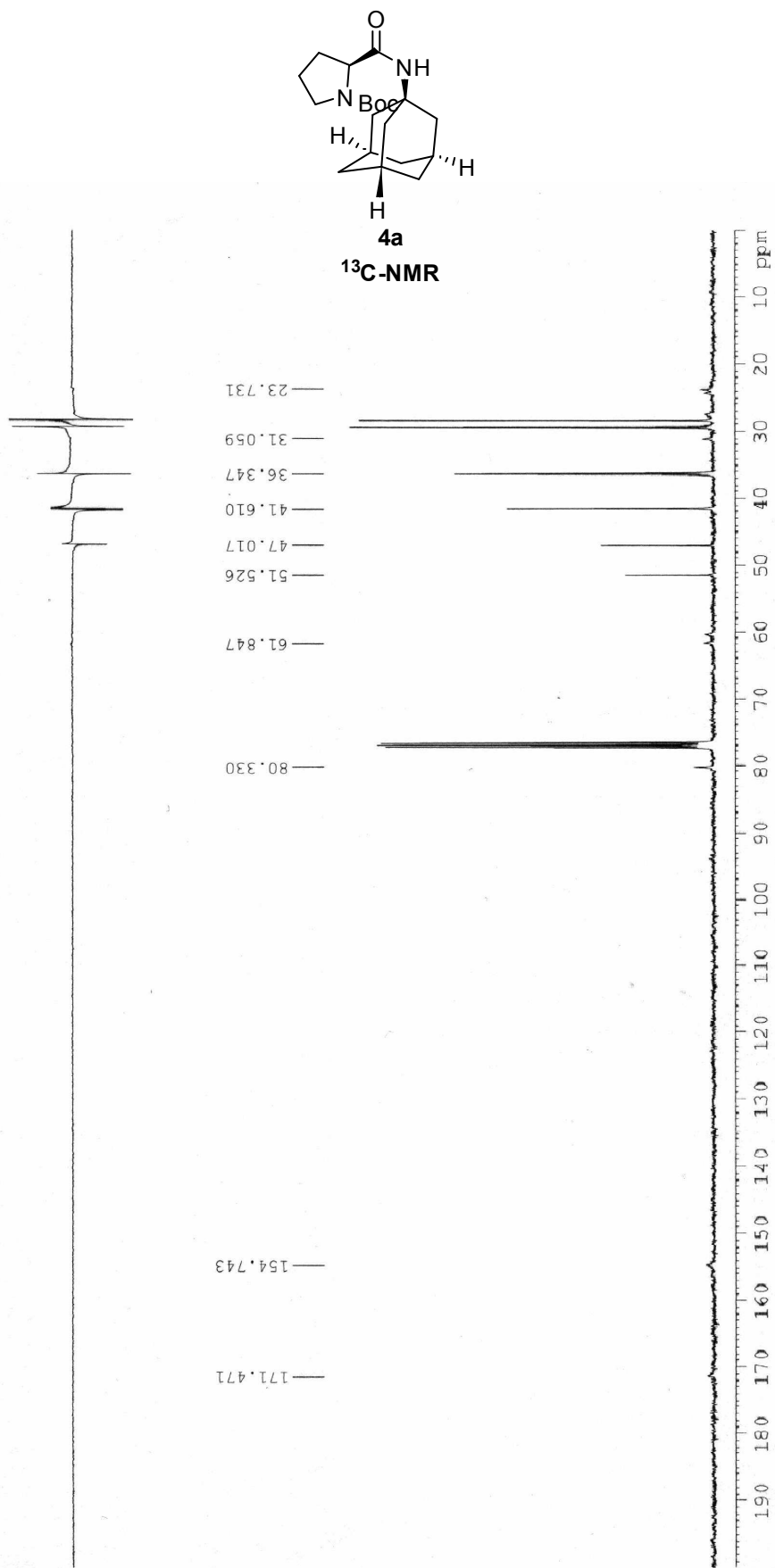


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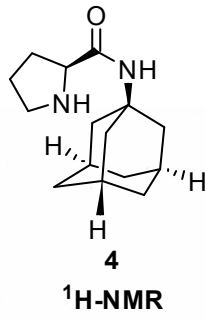
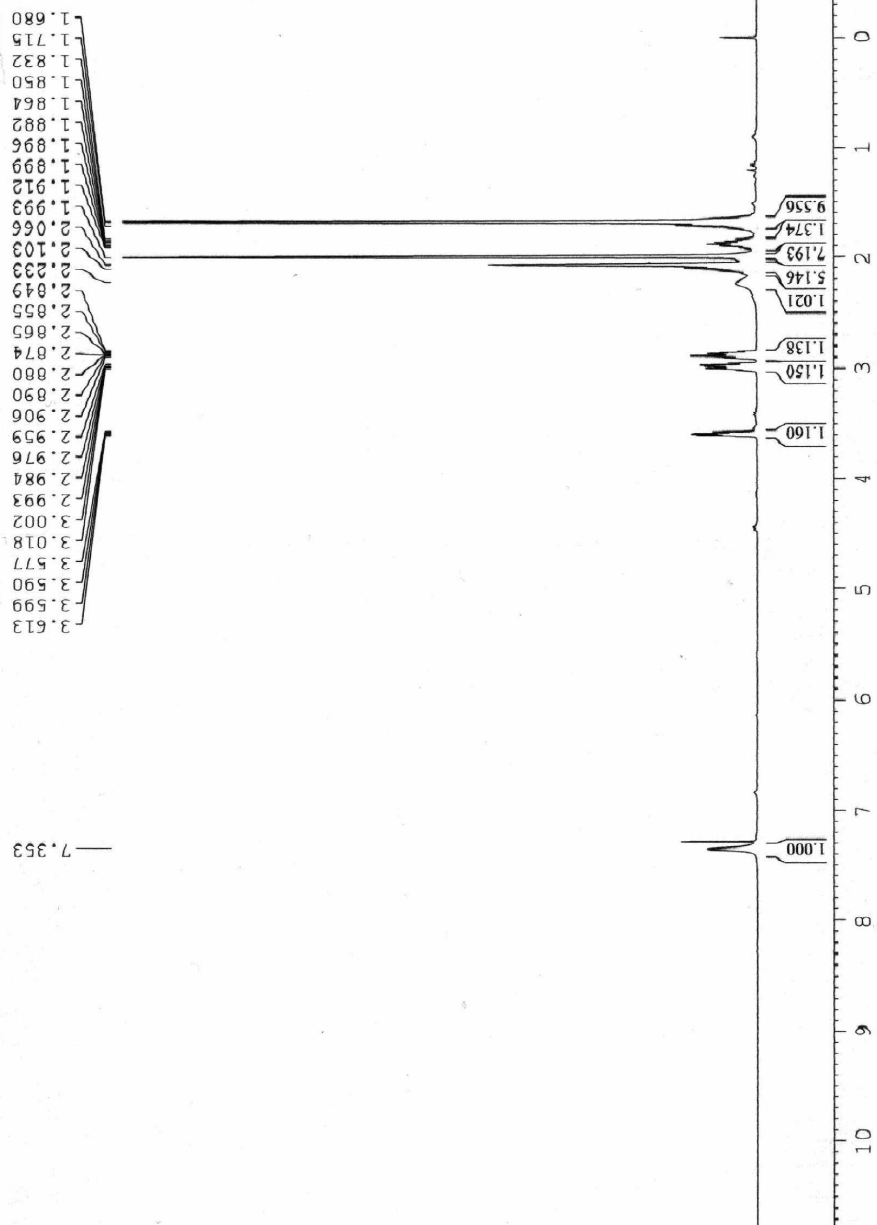
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wangyongchao F22 In CDCl3  
417

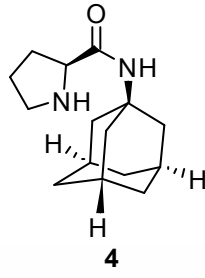


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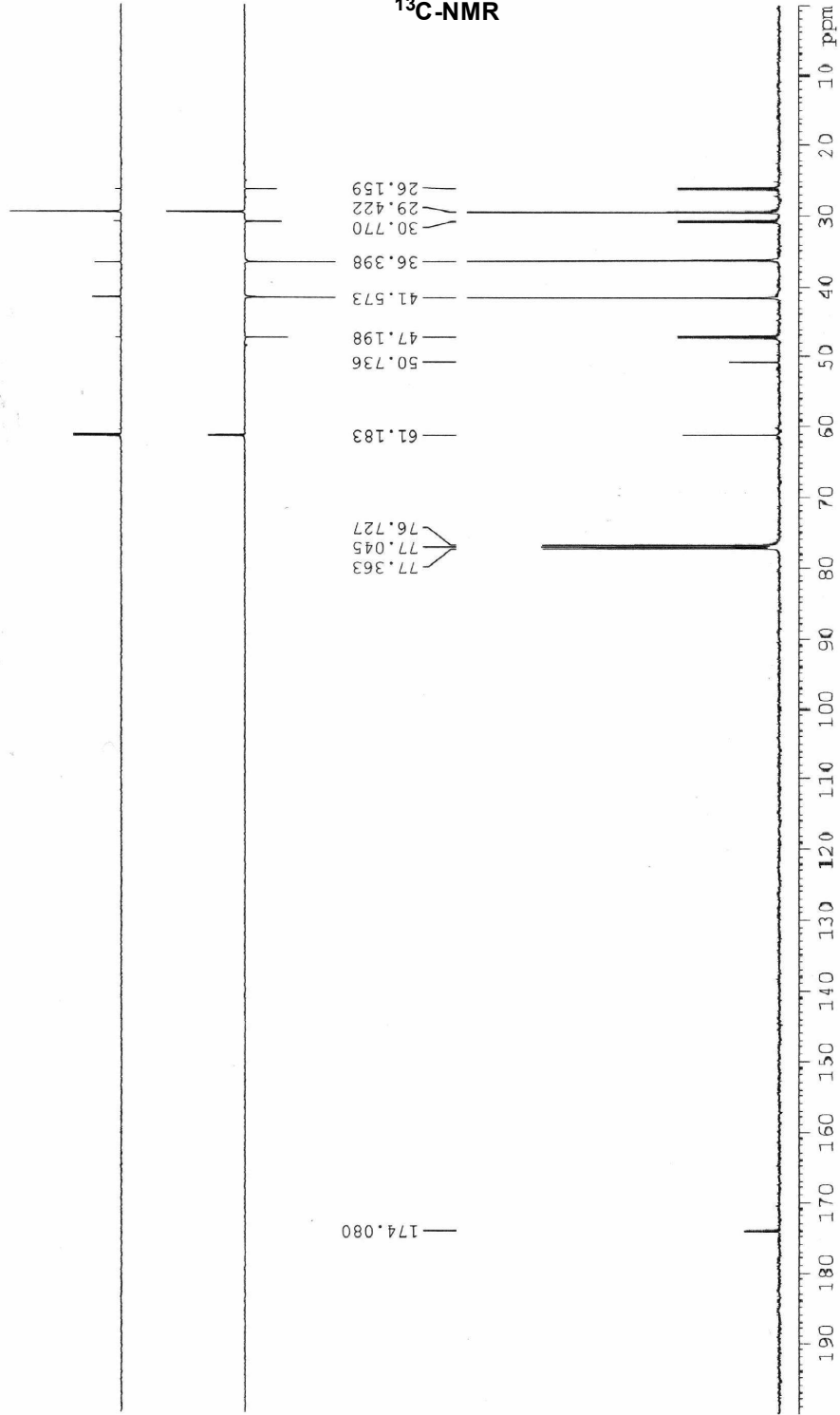


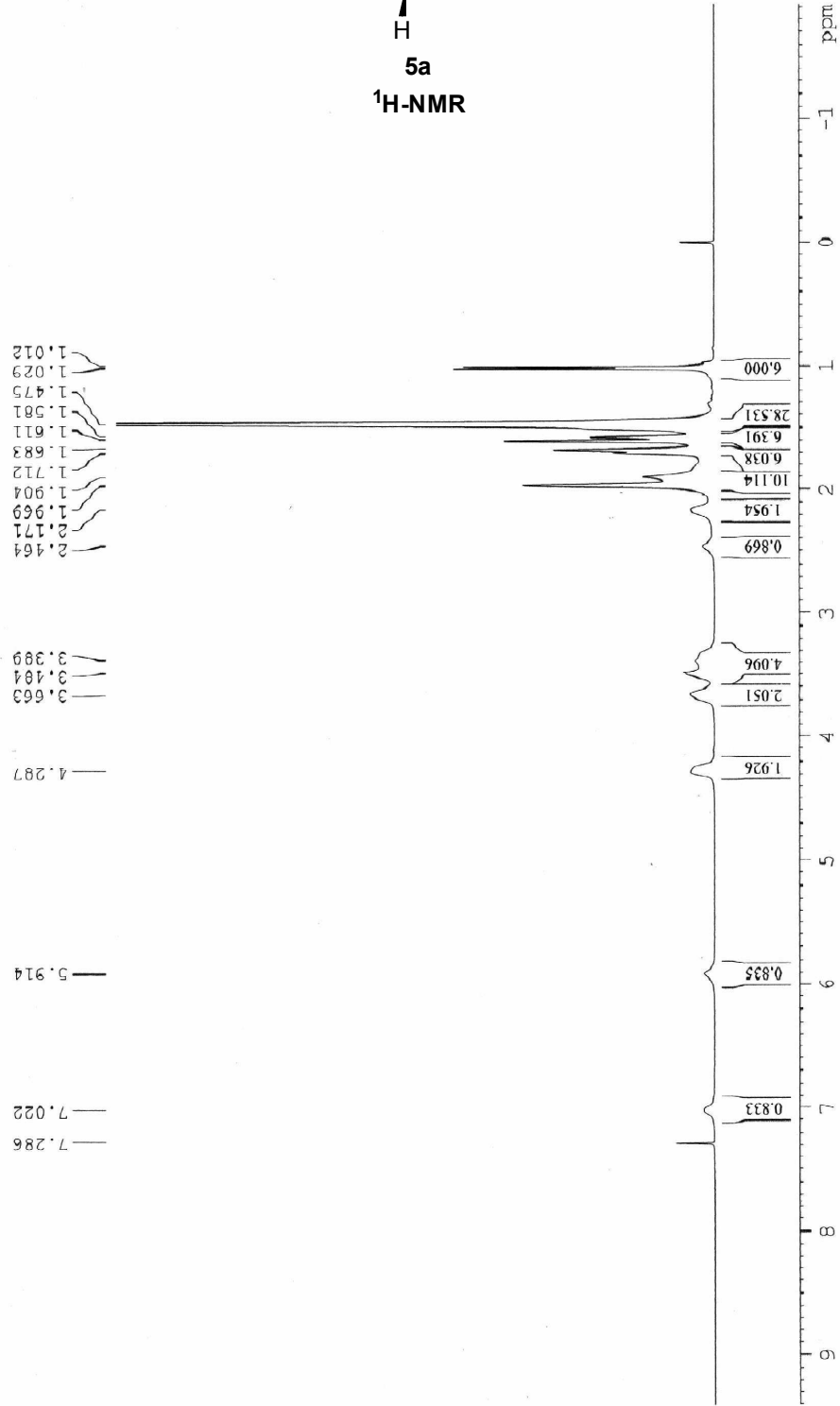
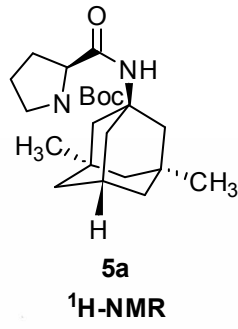


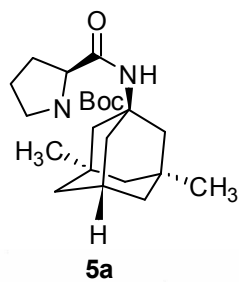
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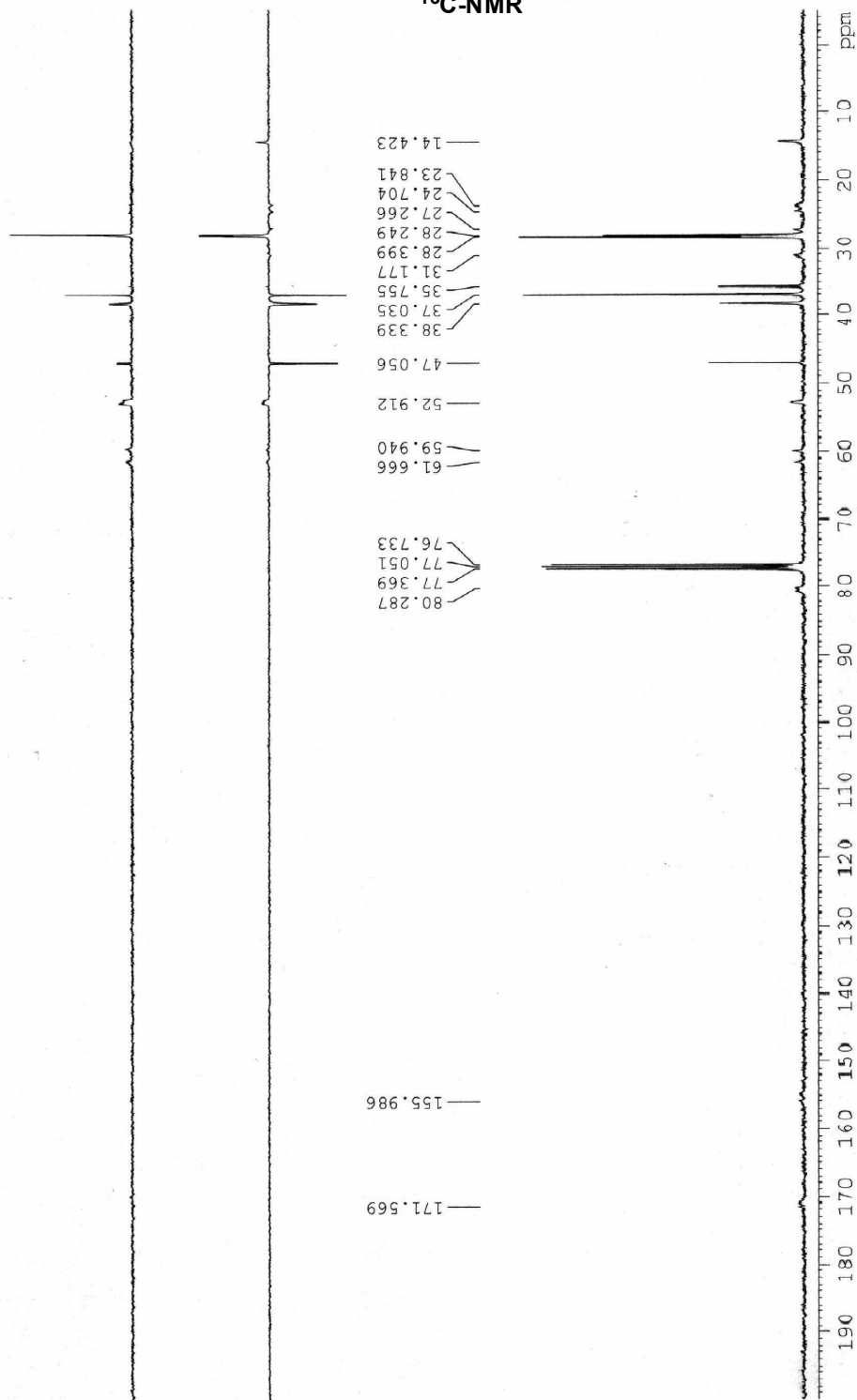
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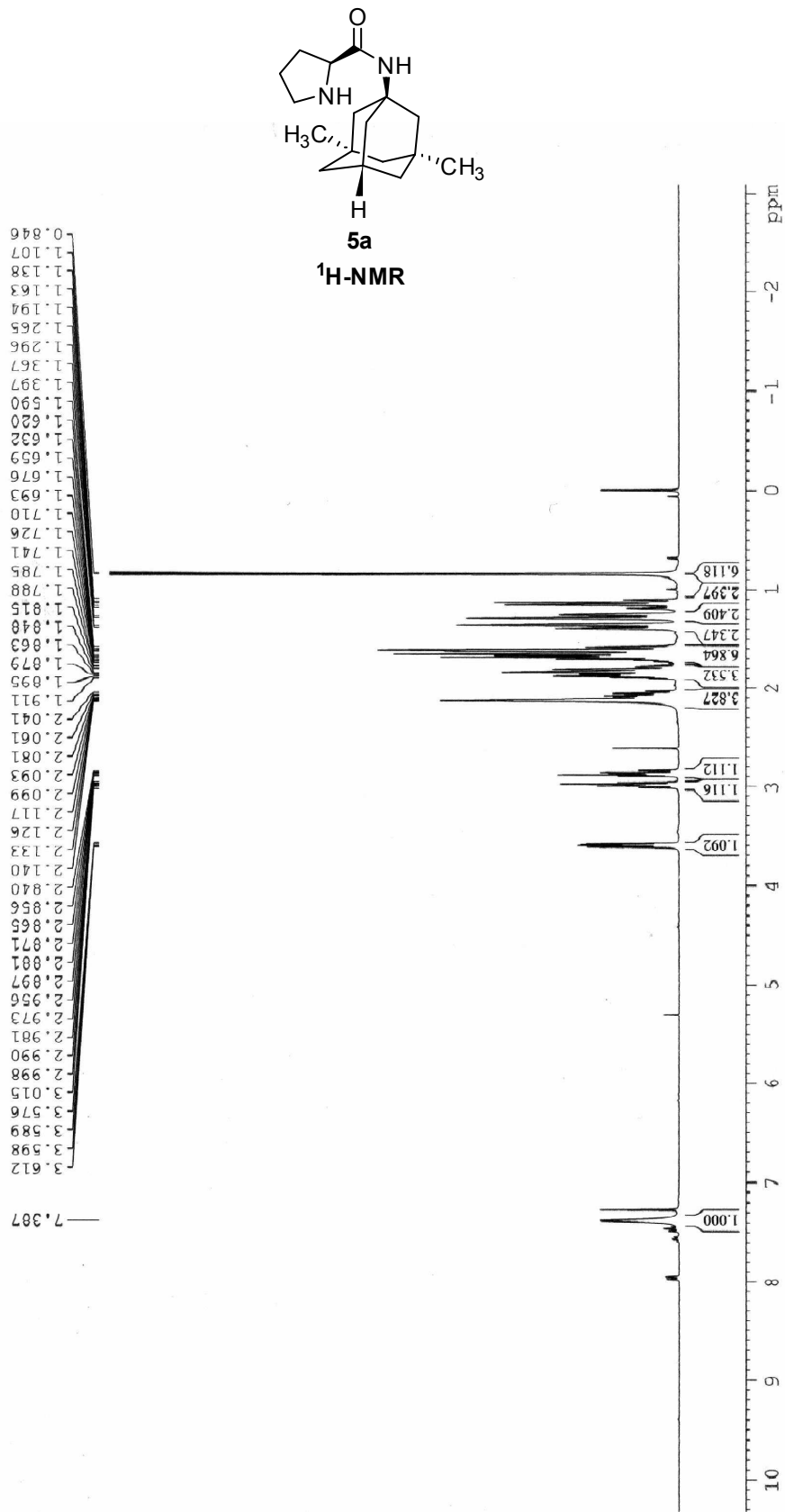




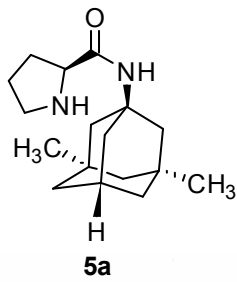
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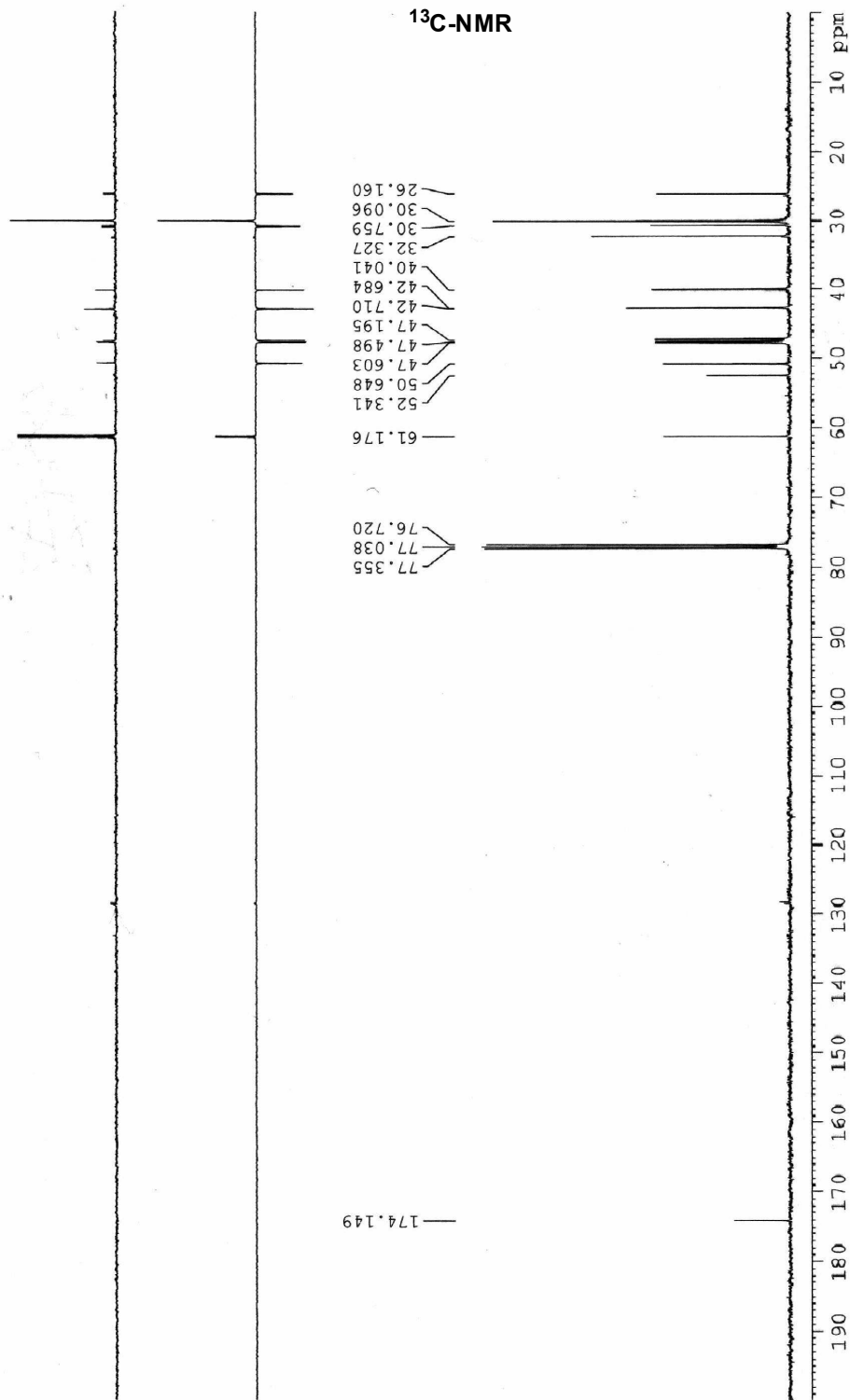
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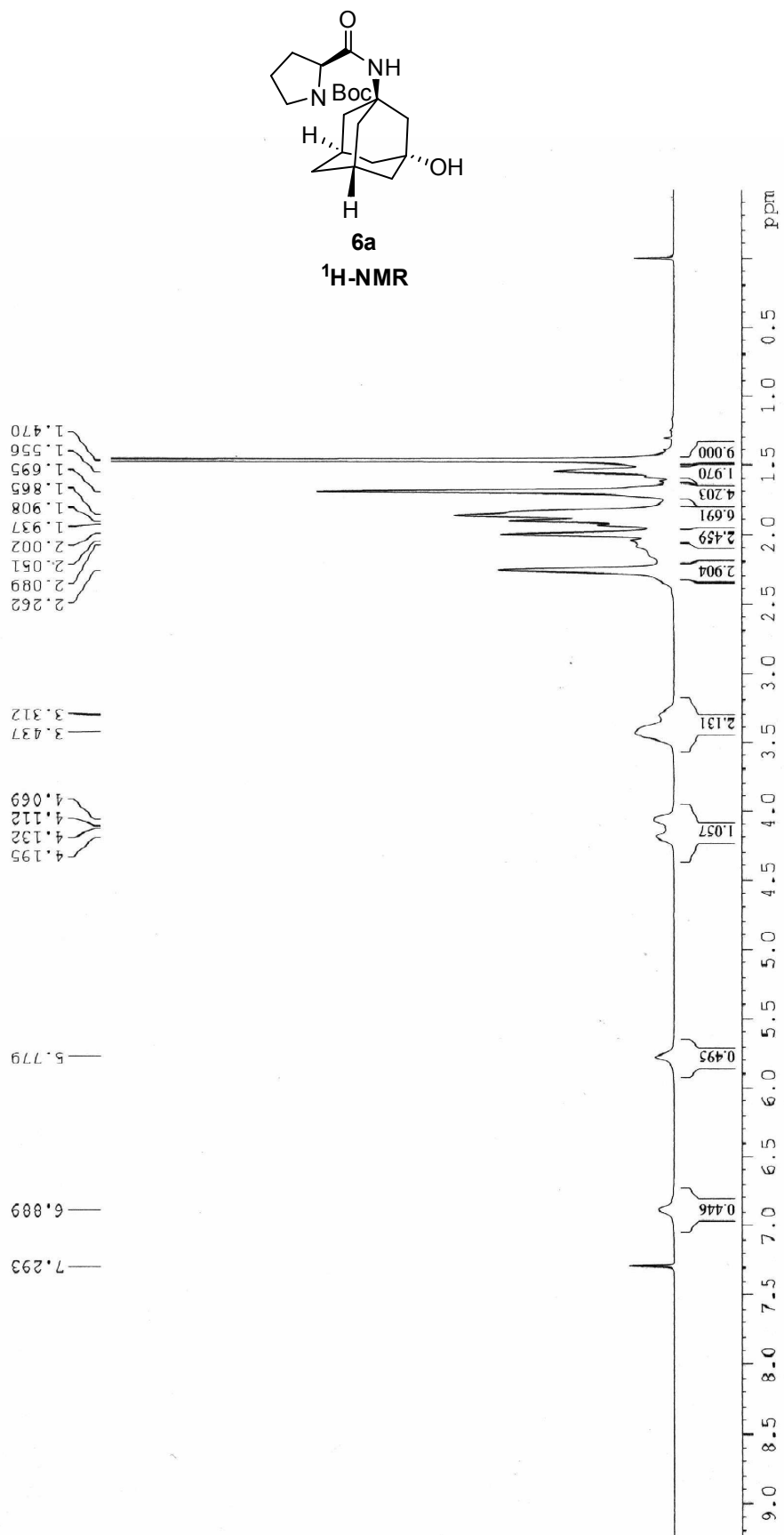


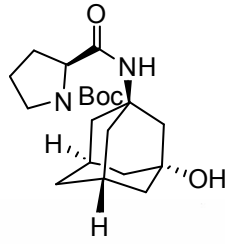
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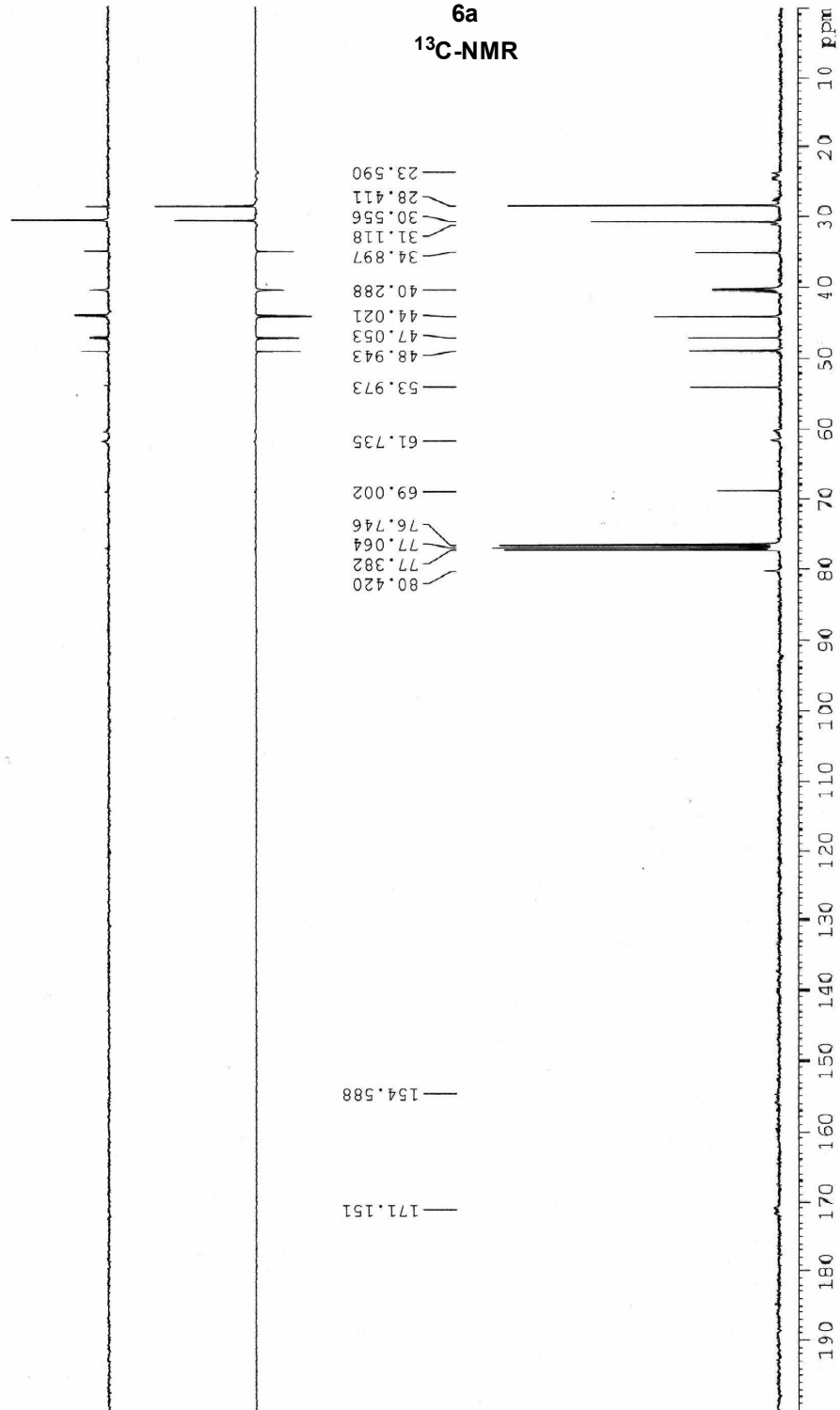


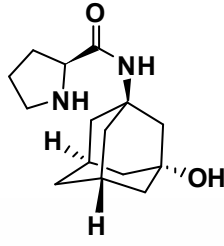




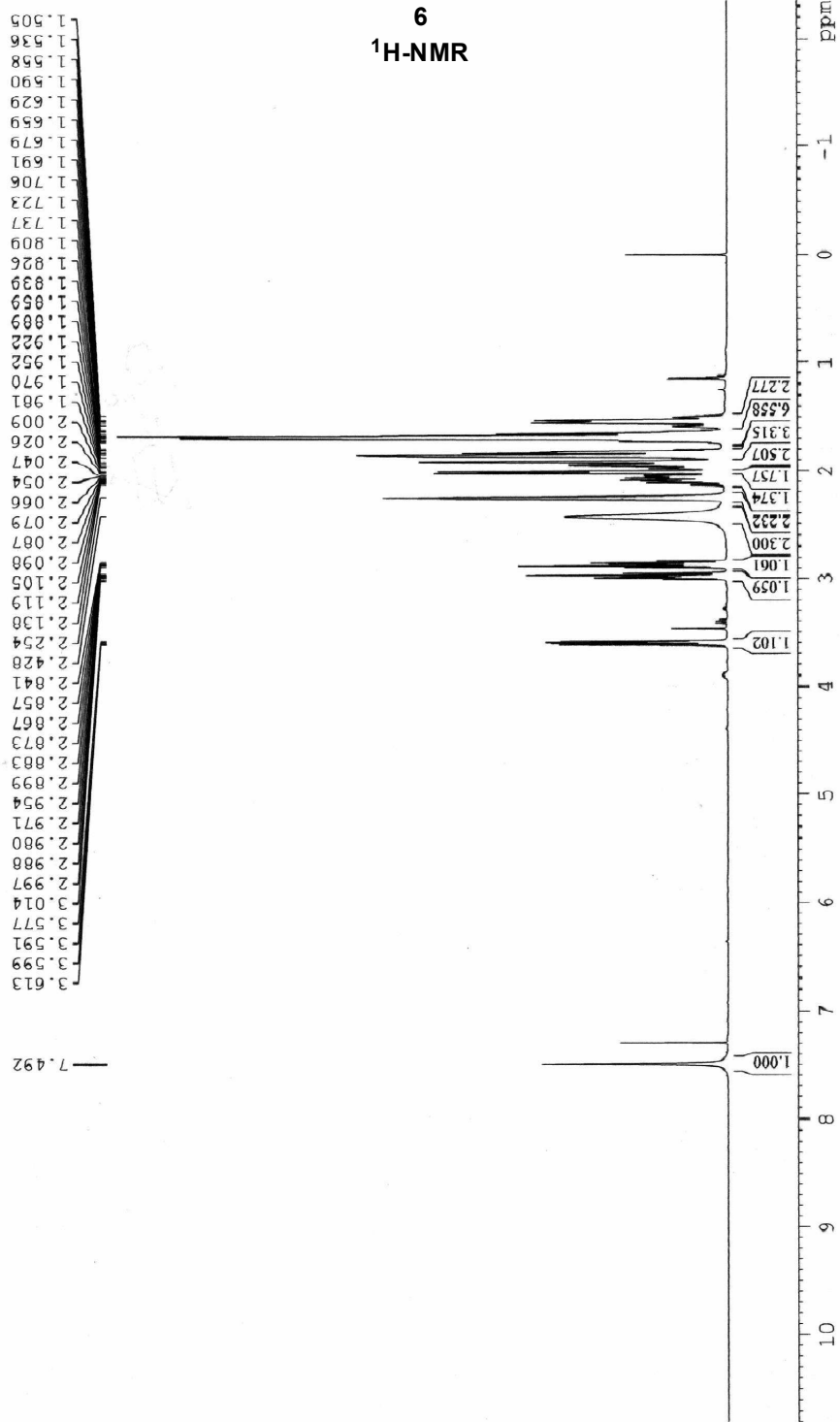
6a

<sup>13</sup>C-NMR





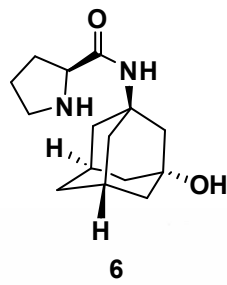
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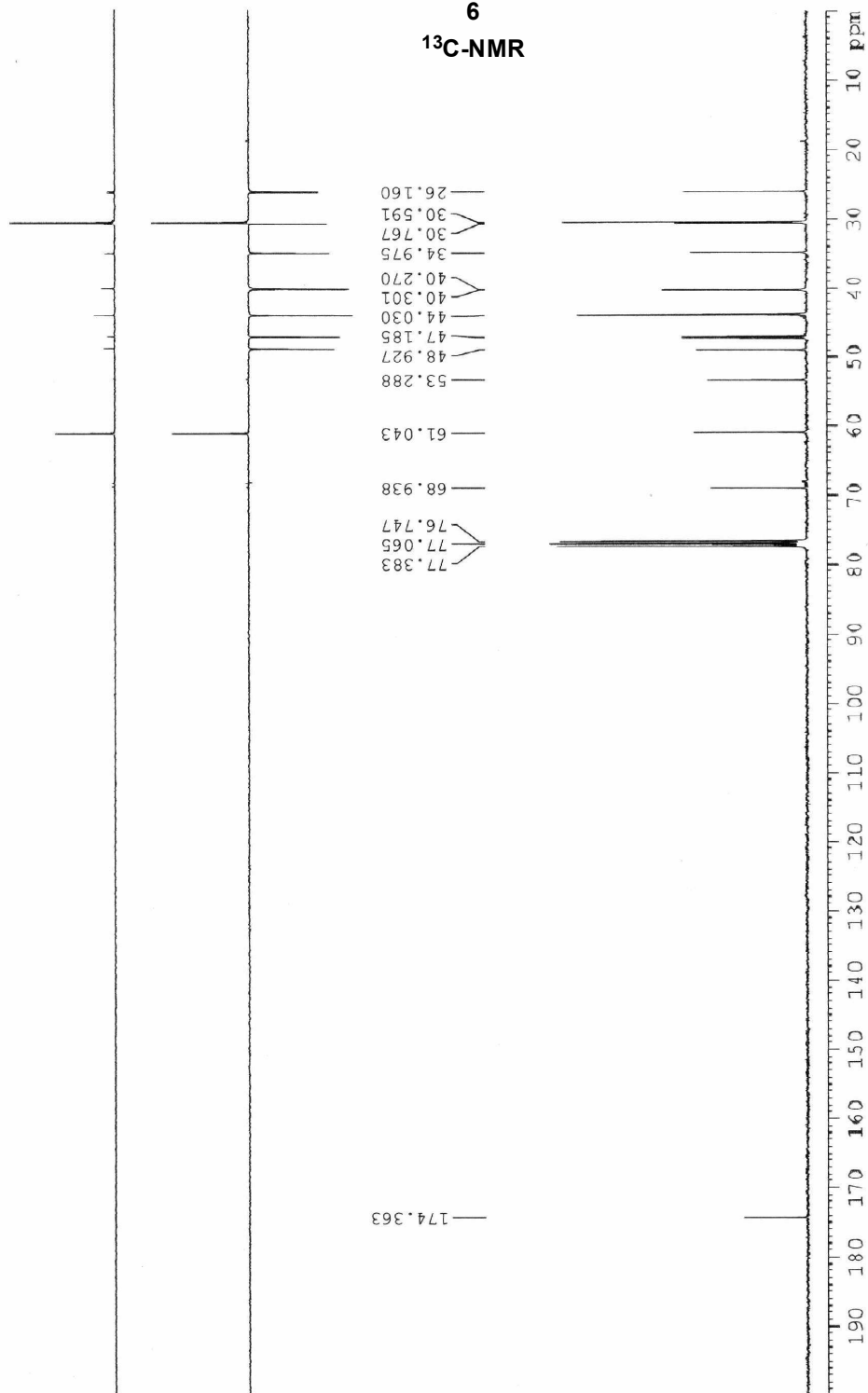
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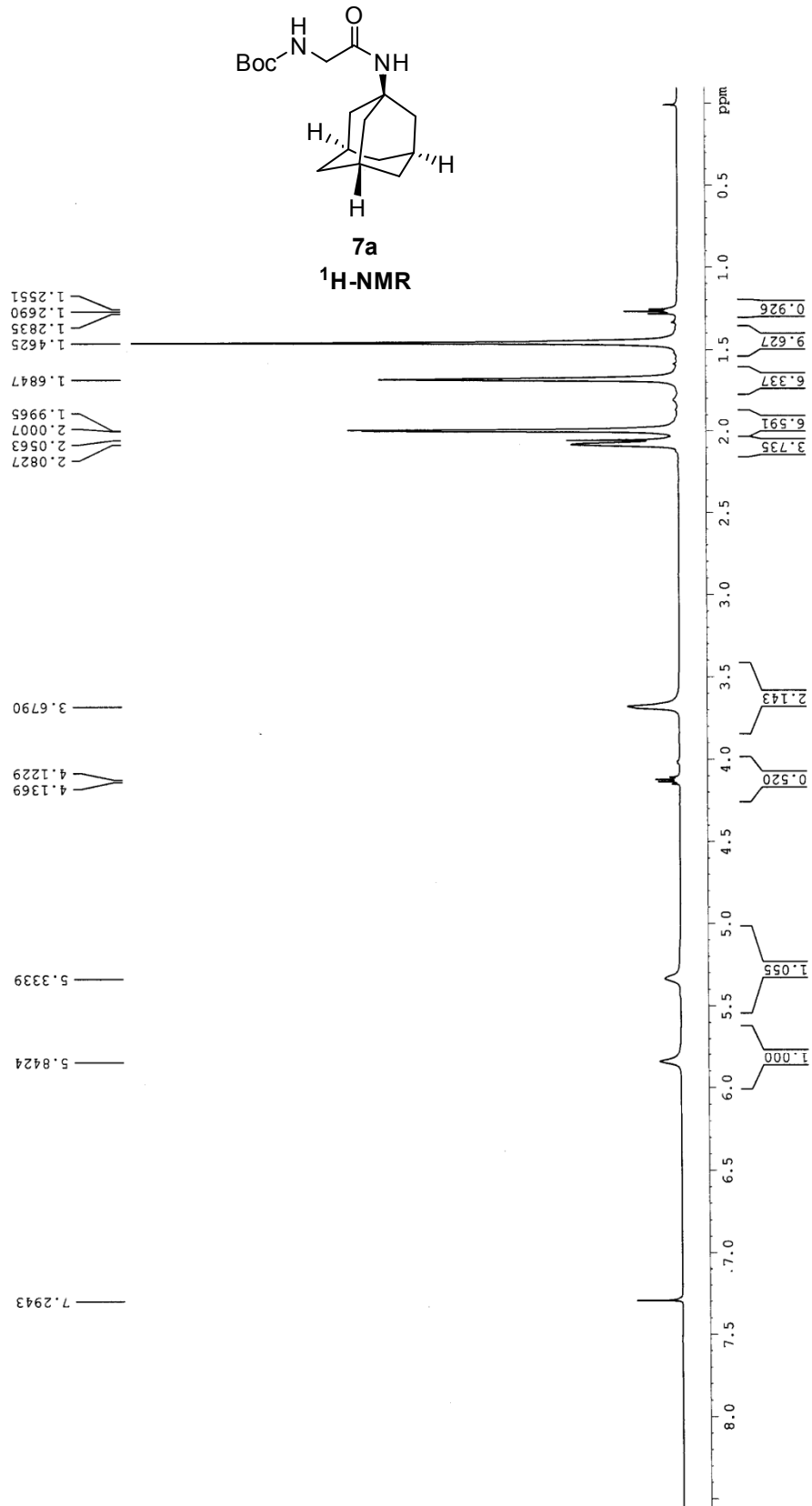
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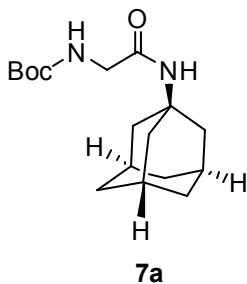


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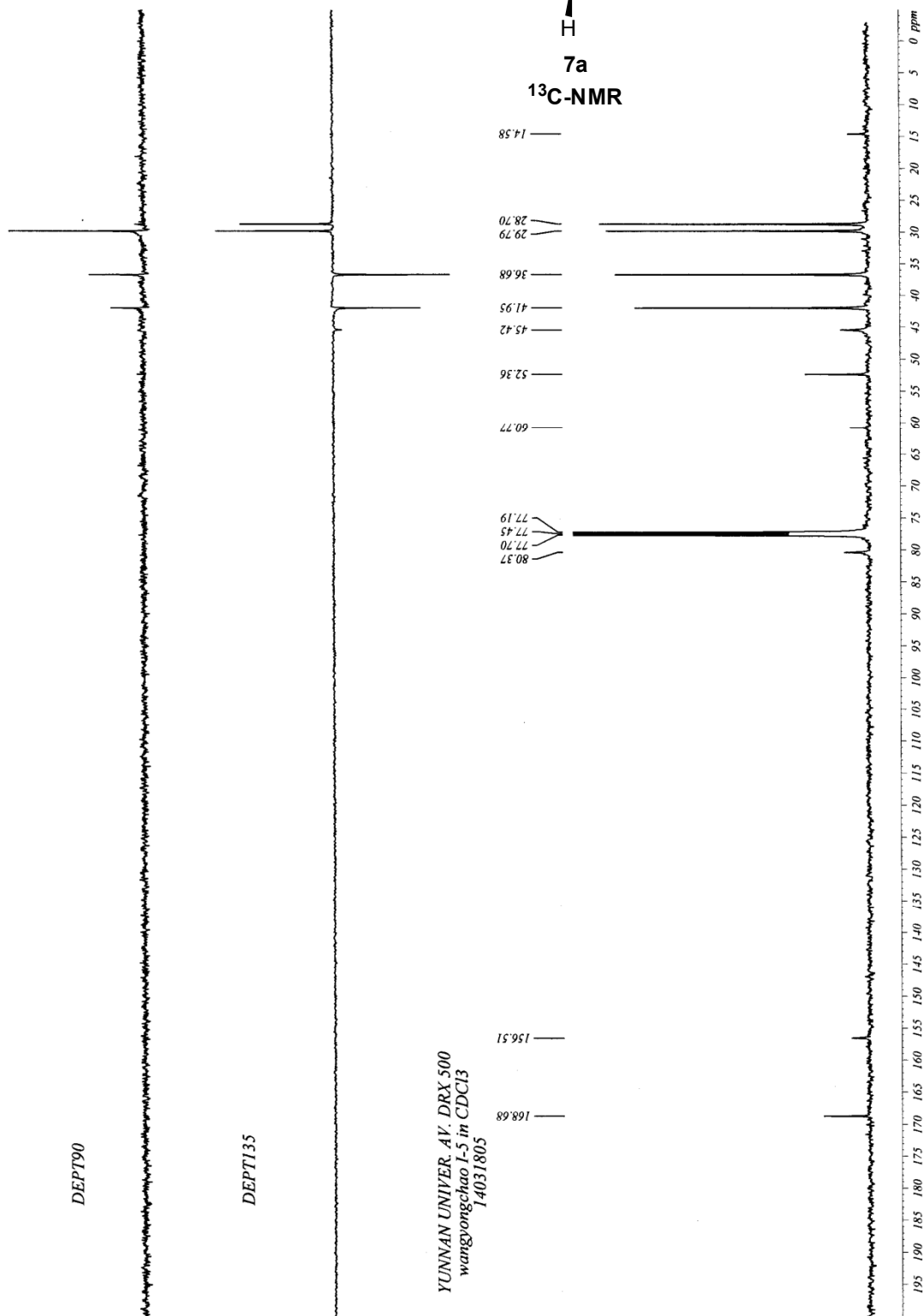


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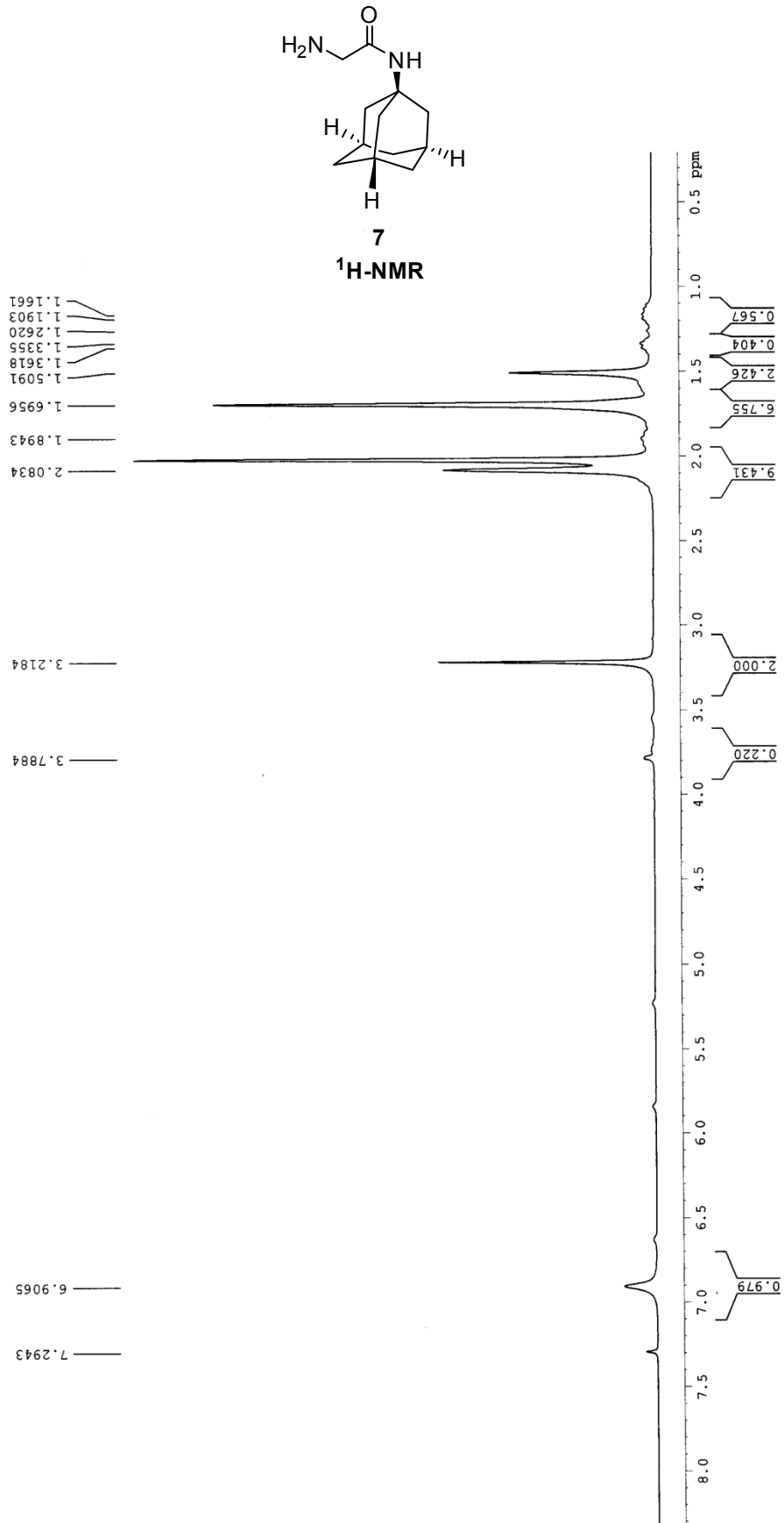


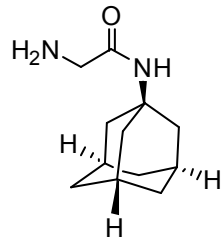
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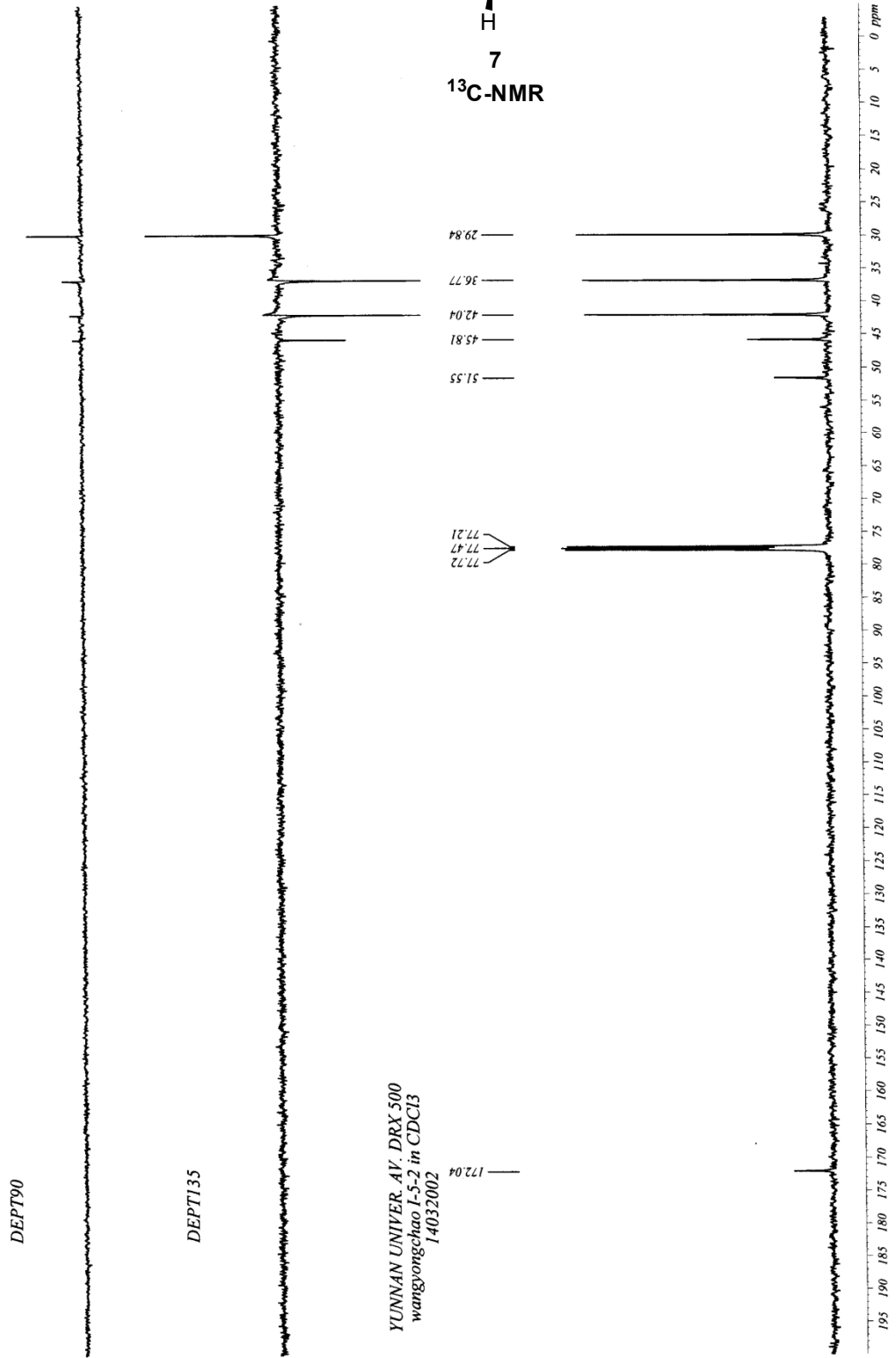
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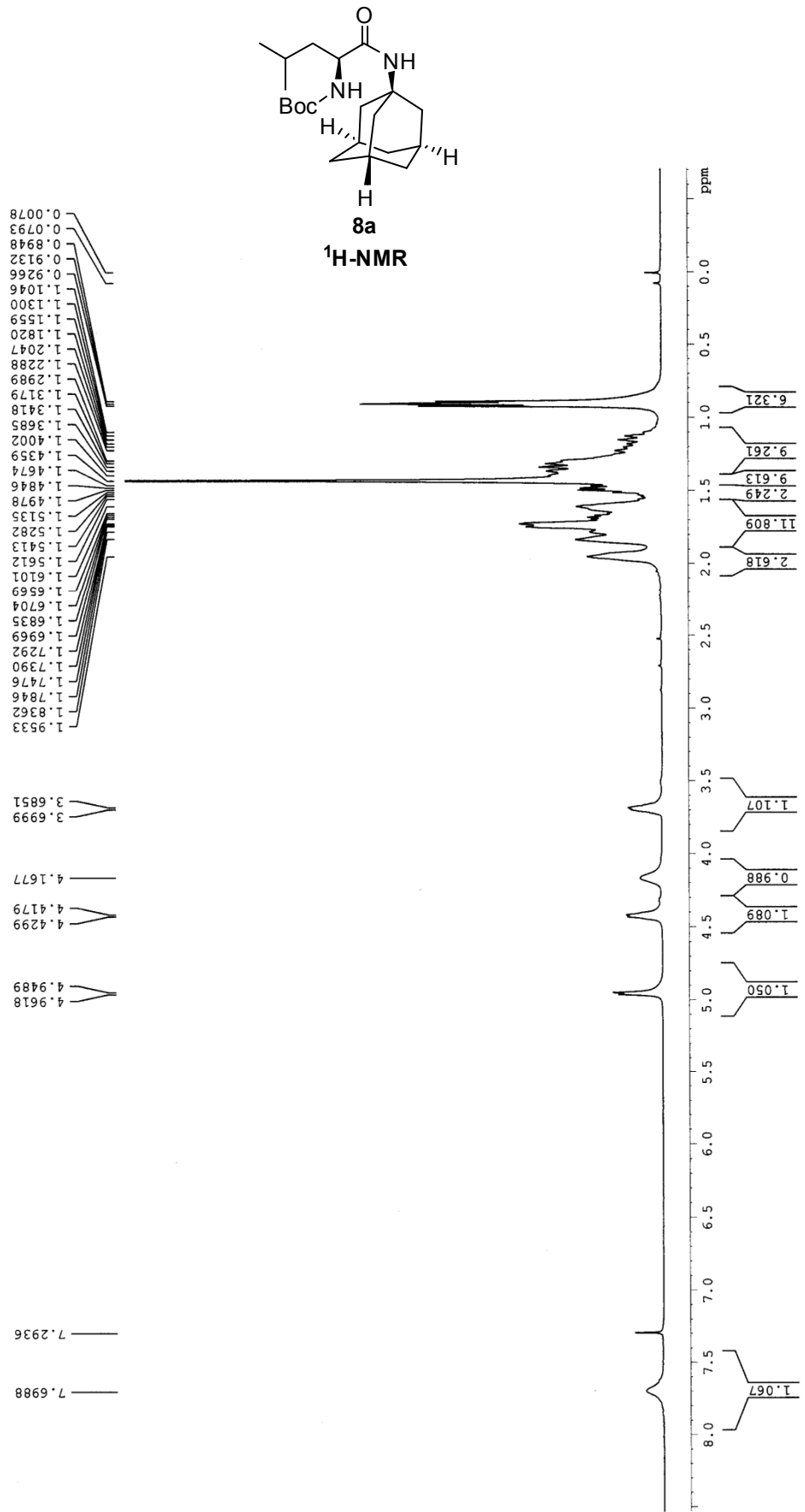
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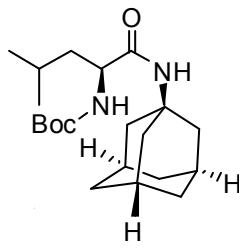
<sup>13</sup>C-NMR



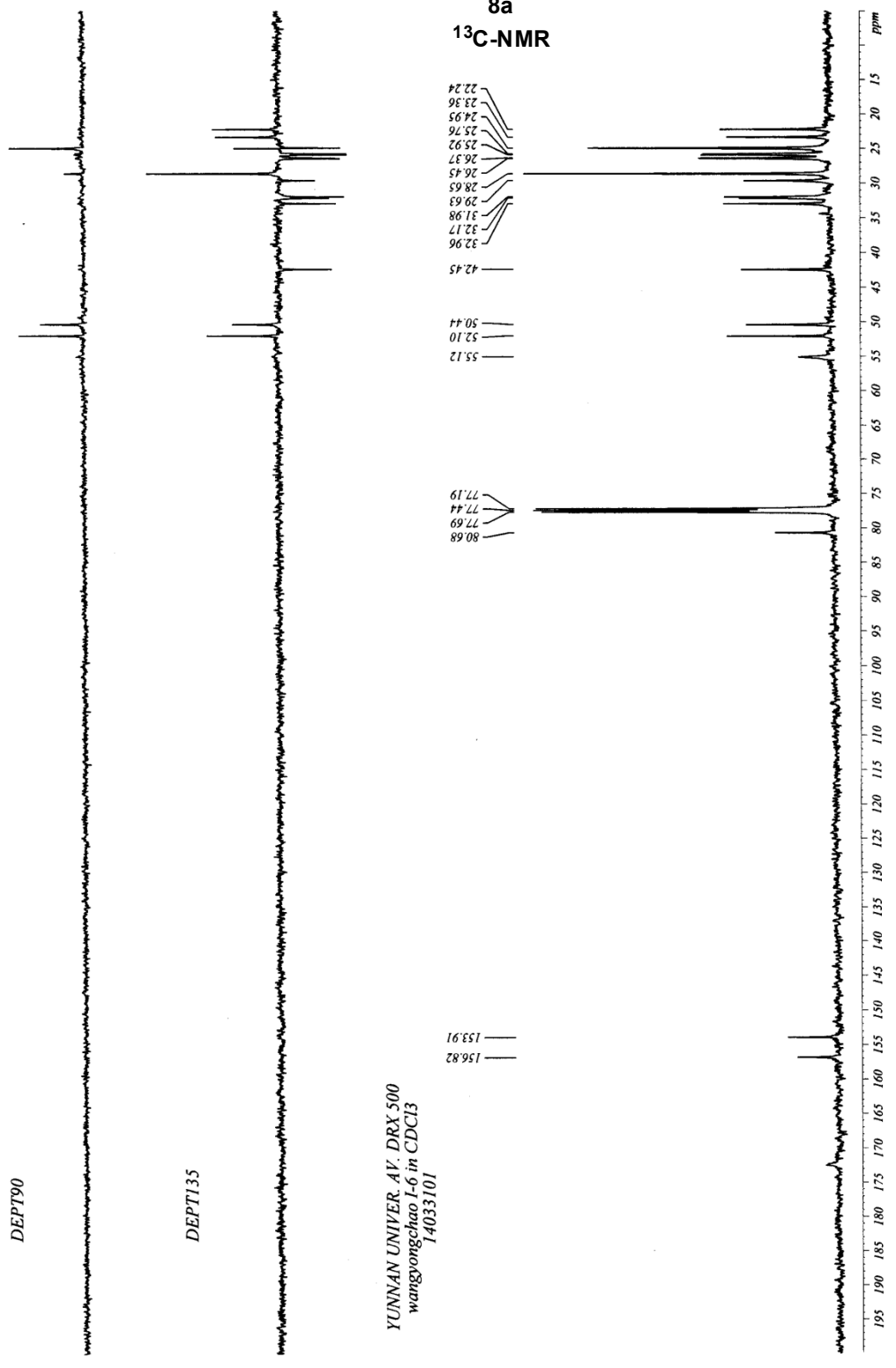
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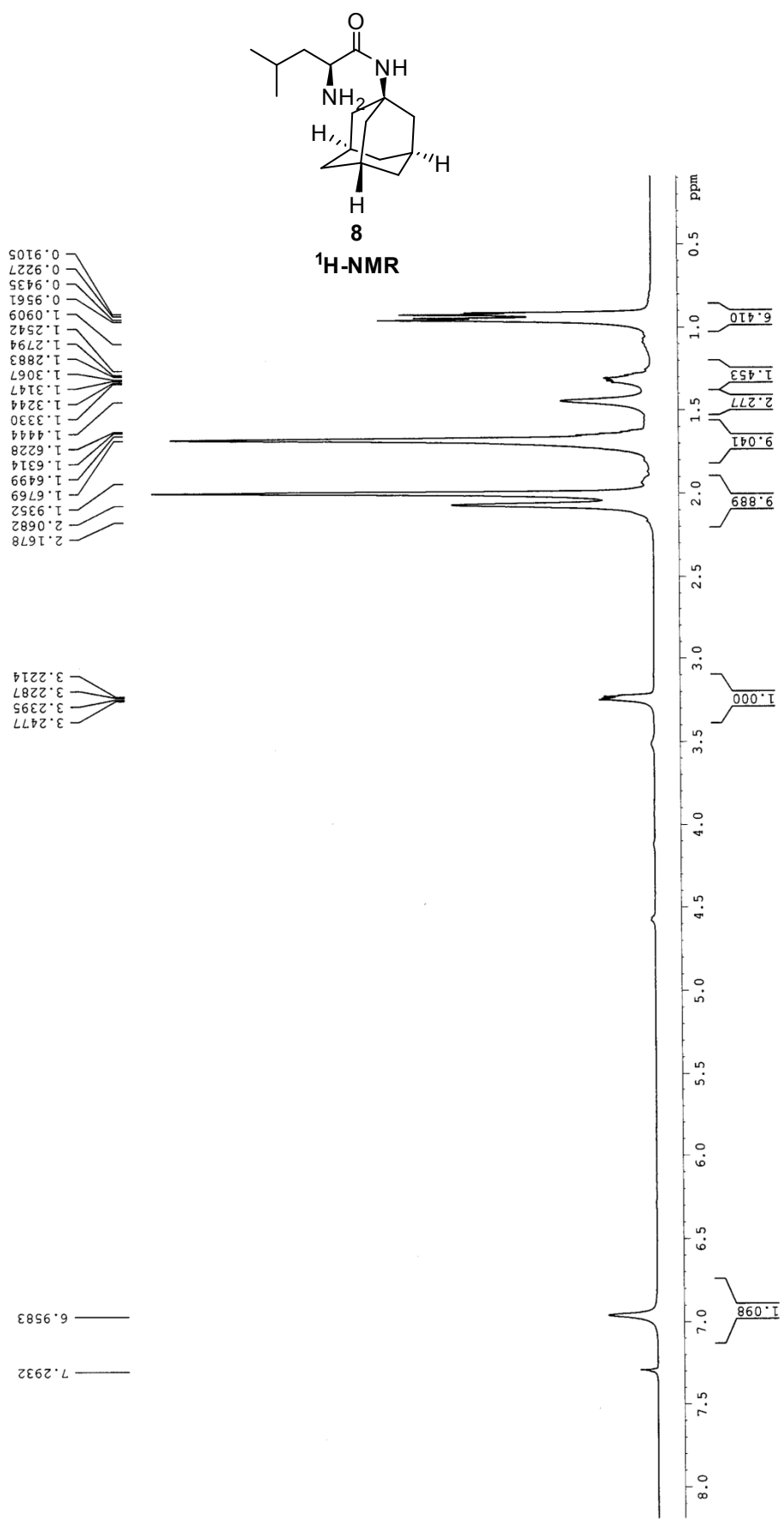


**8a**  
**<sup>13</sup>C-NMR**

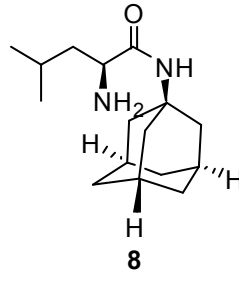


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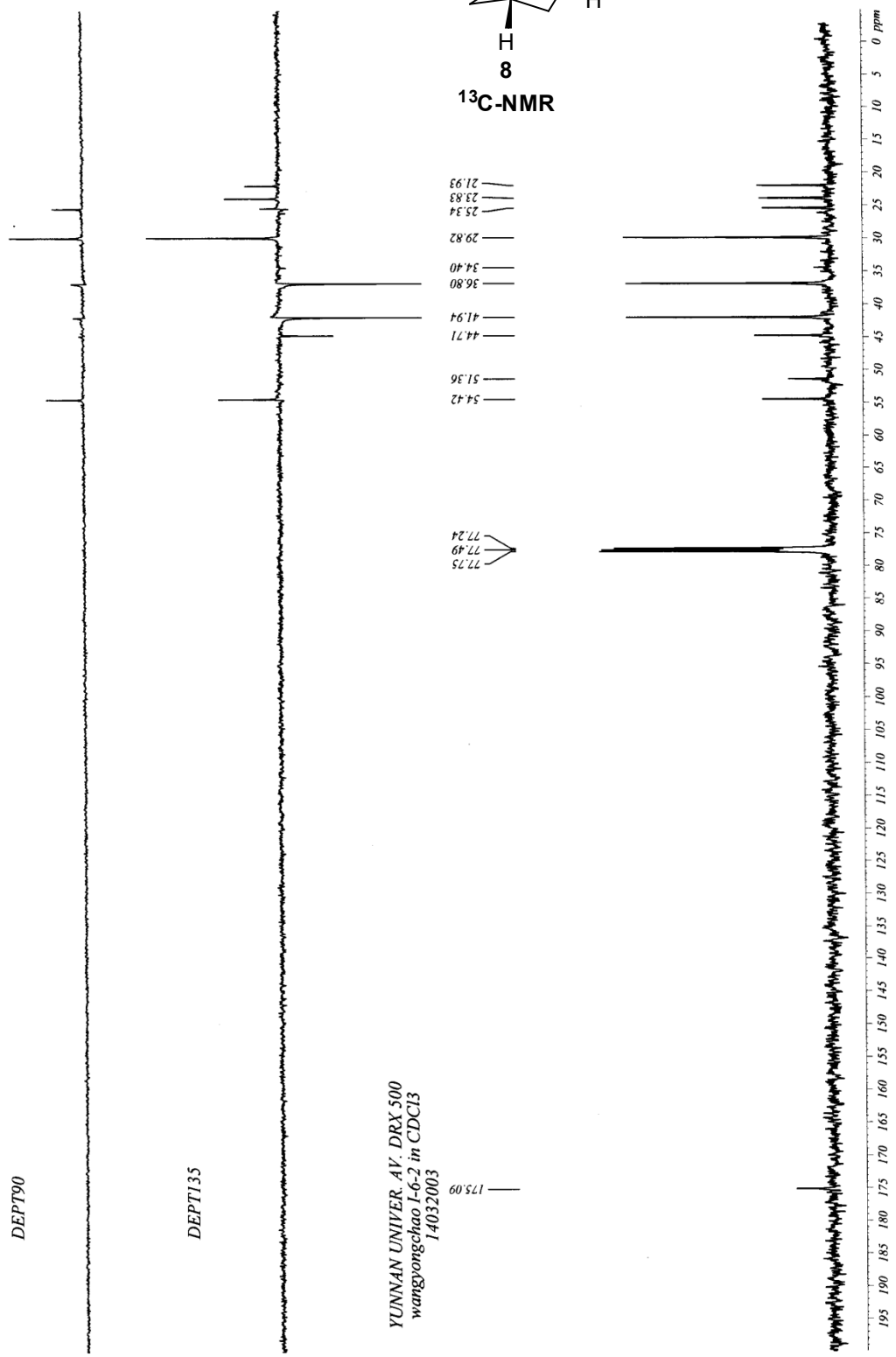
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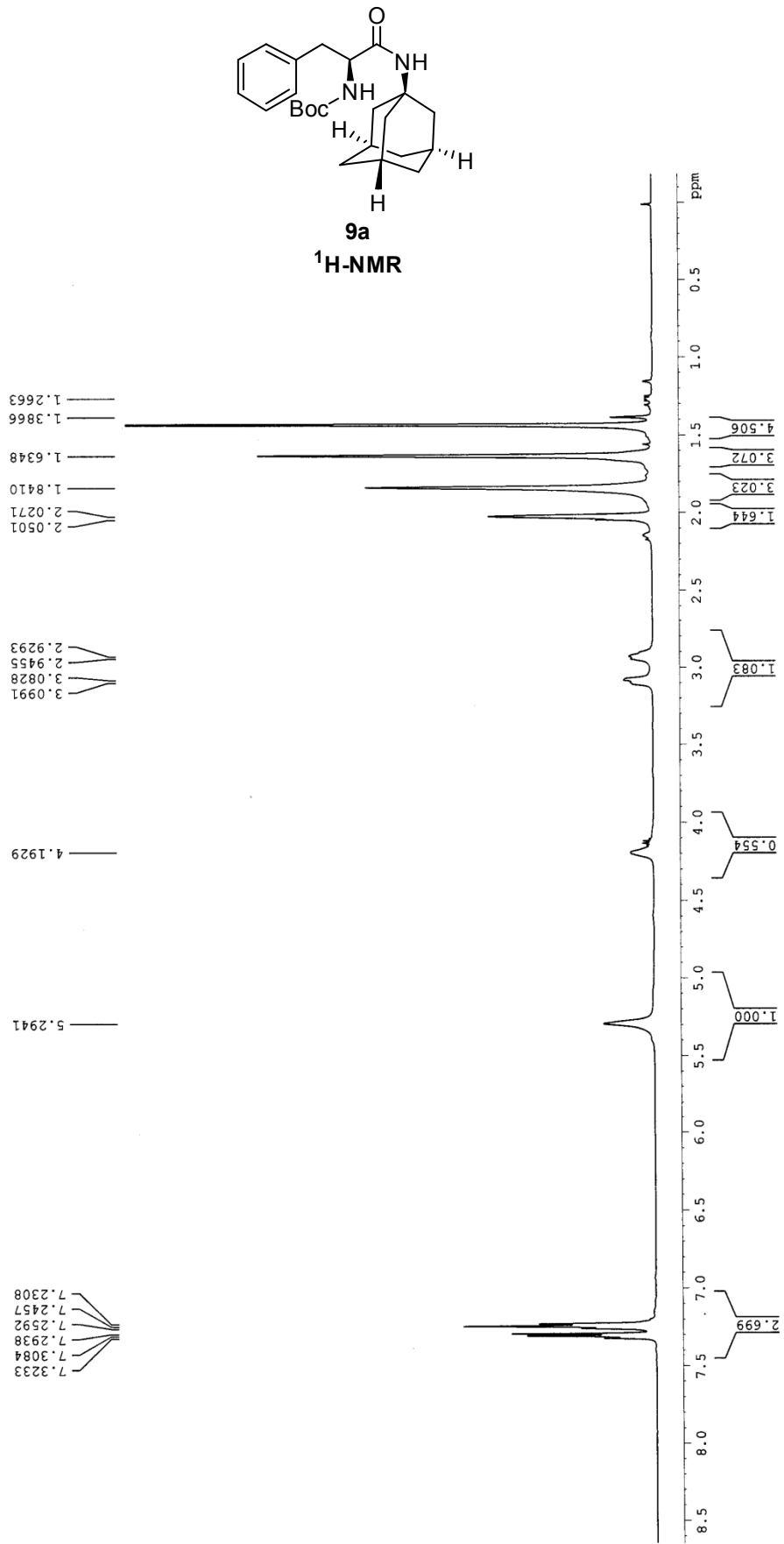


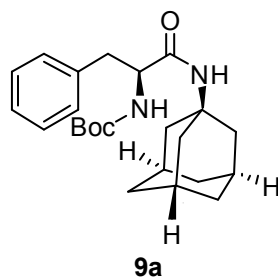
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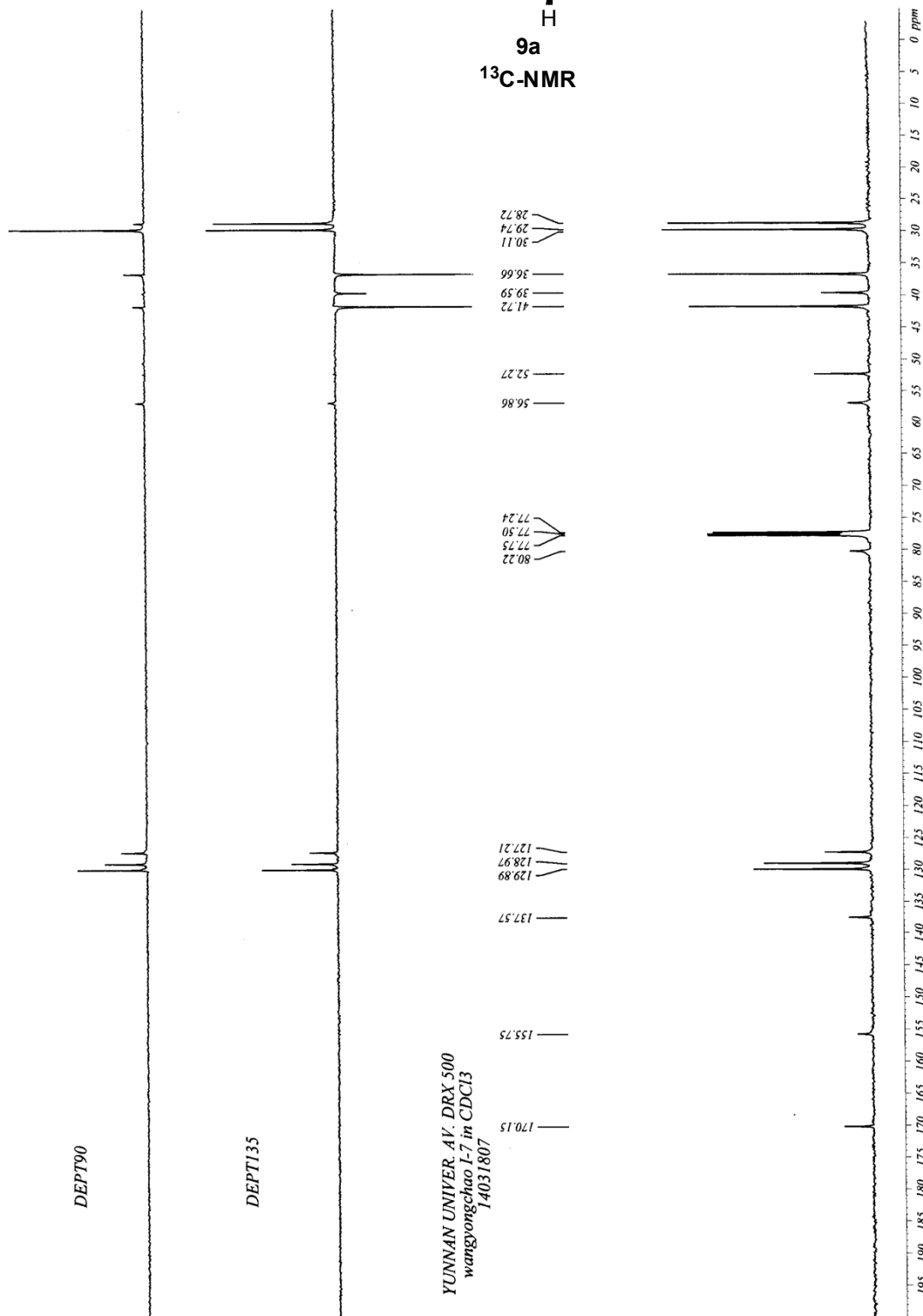
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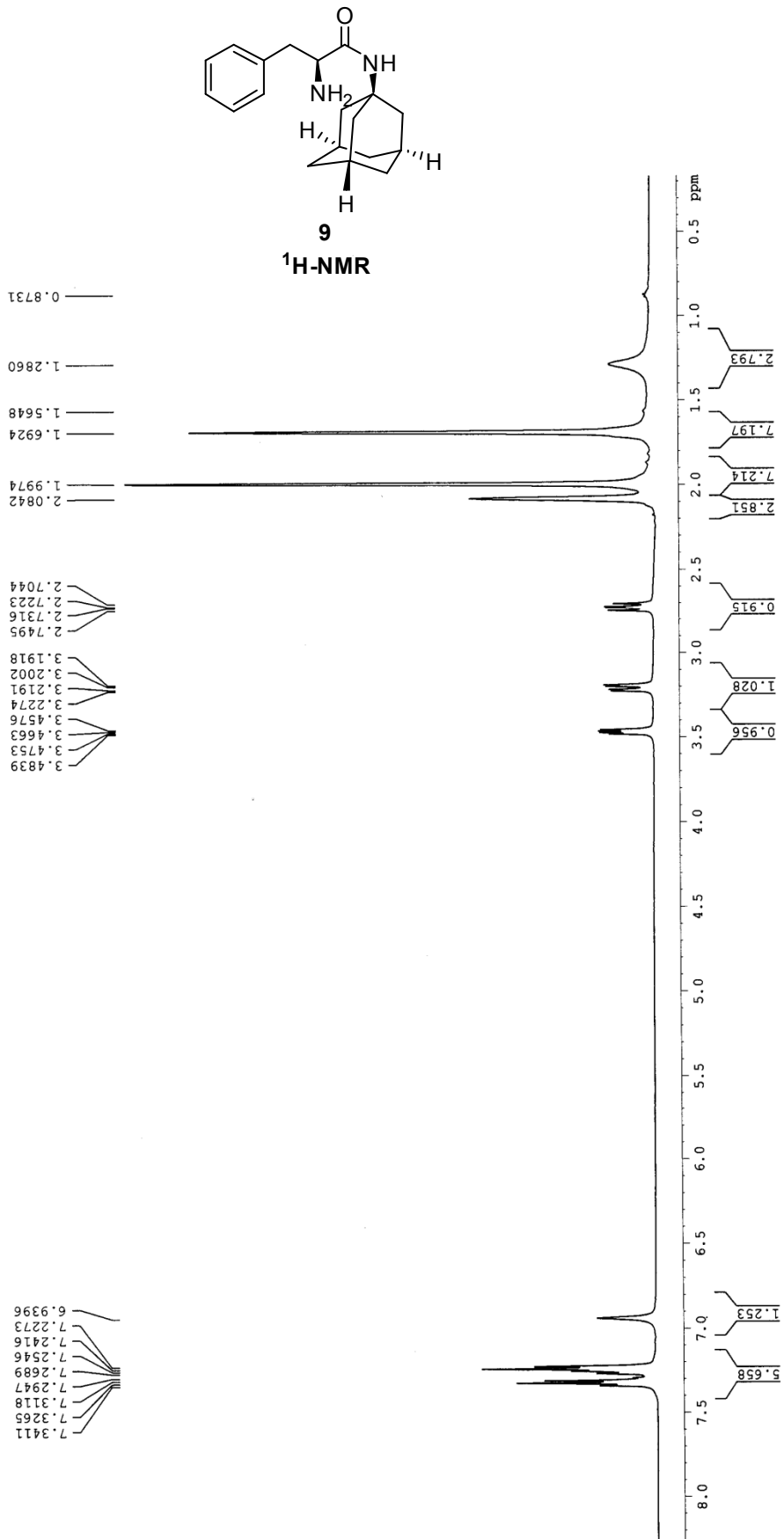


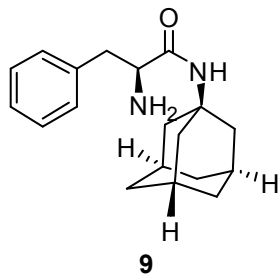


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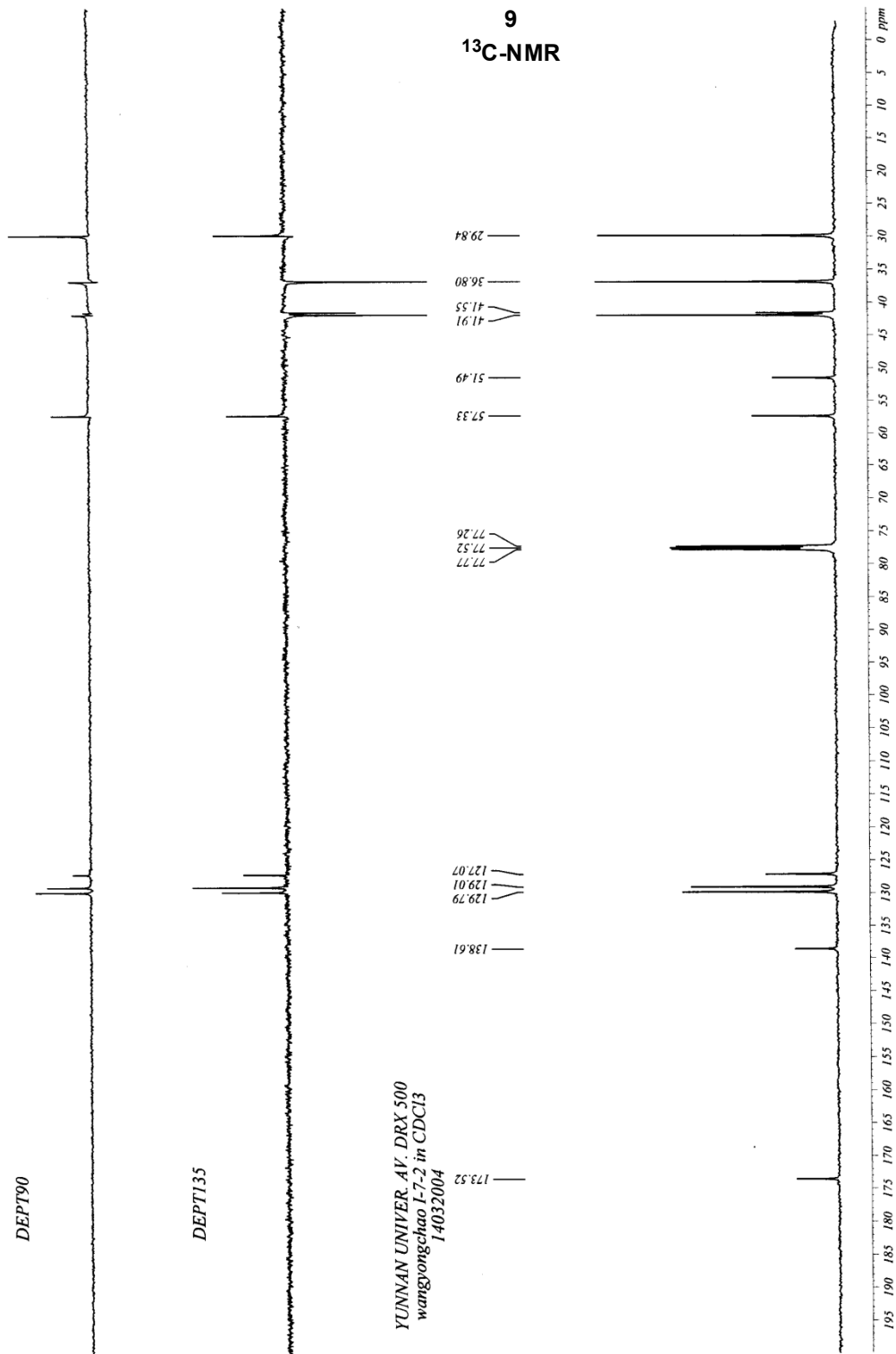


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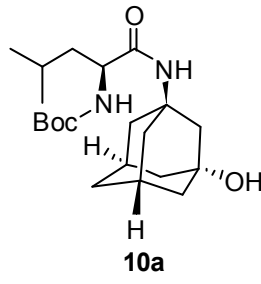




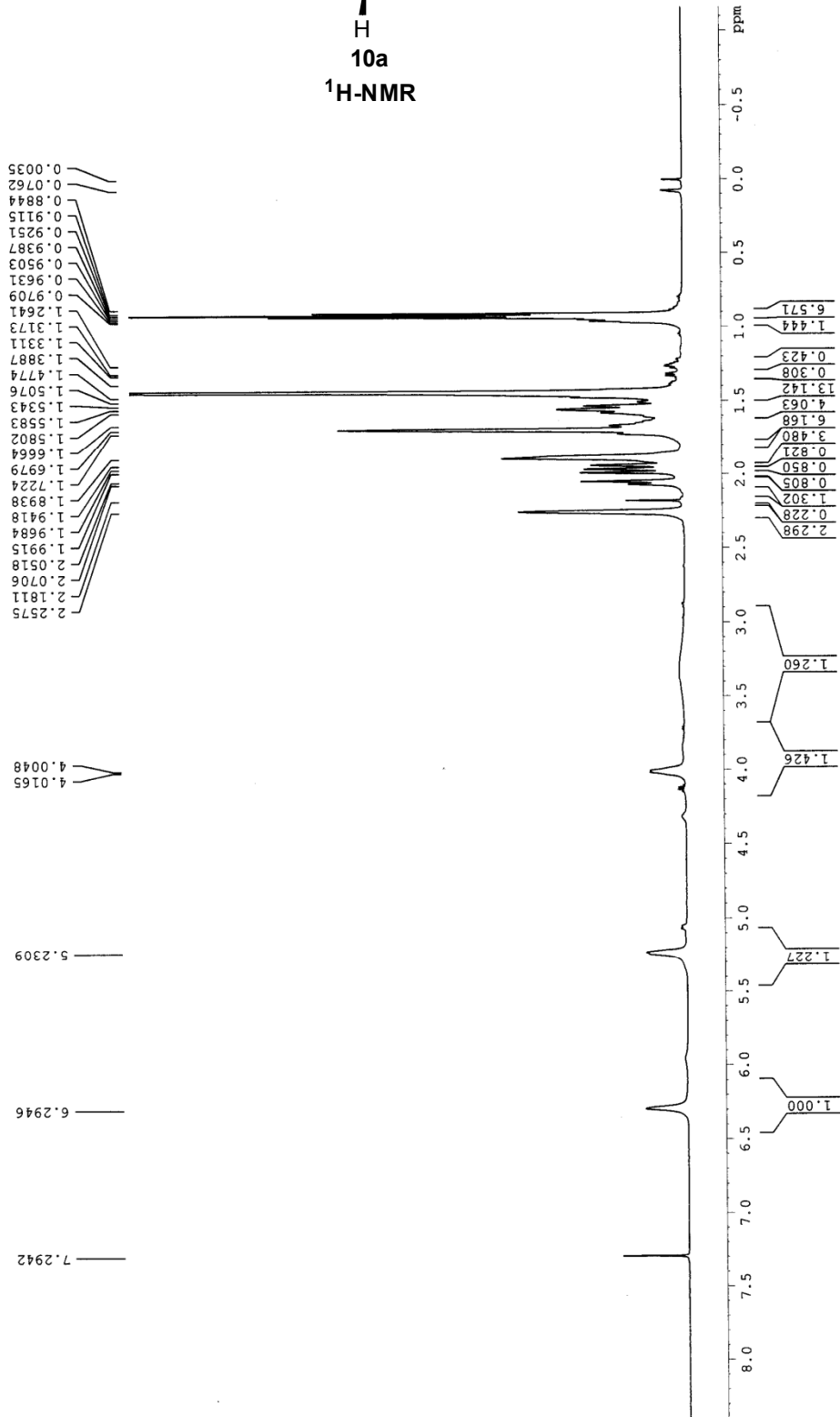
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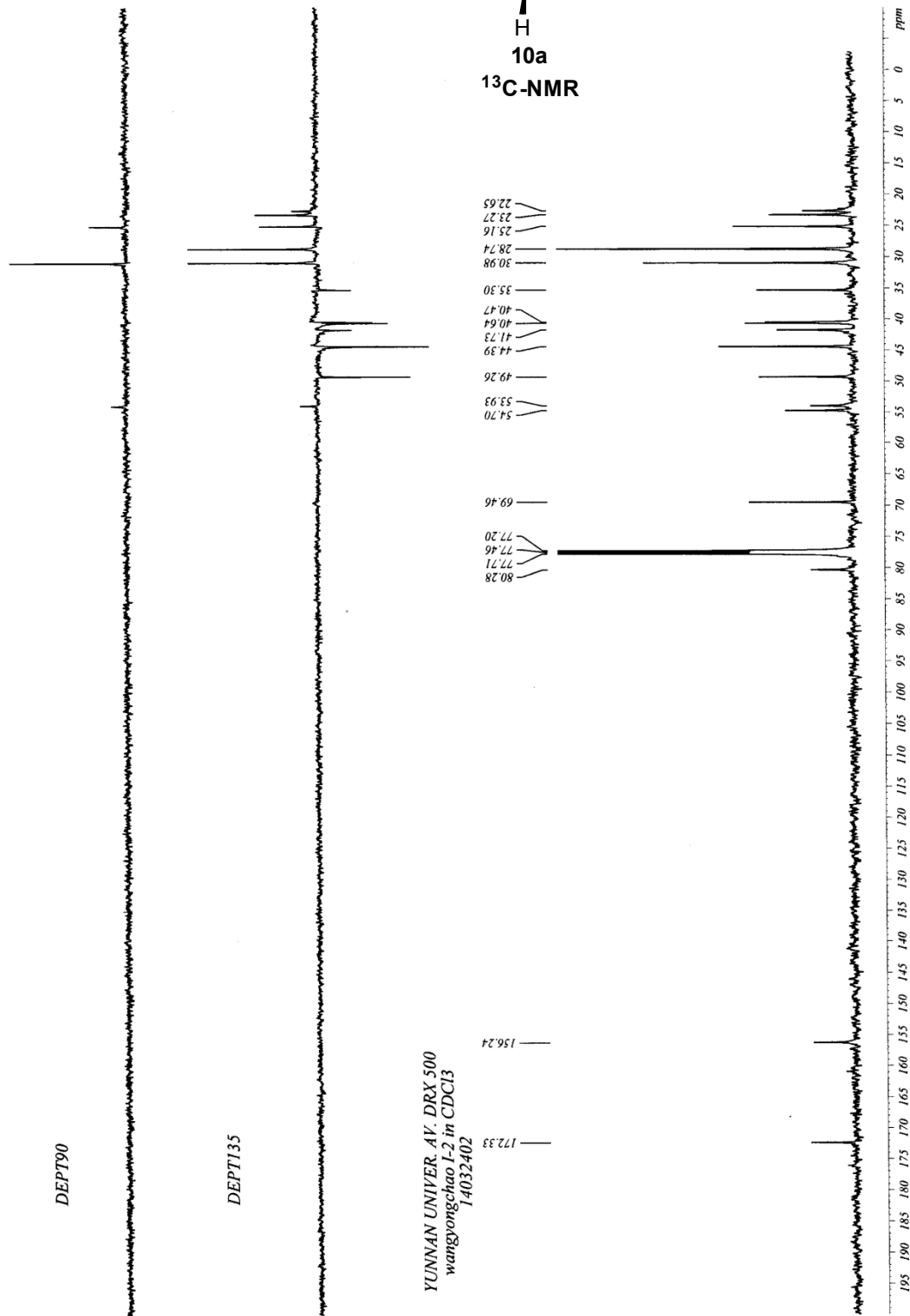
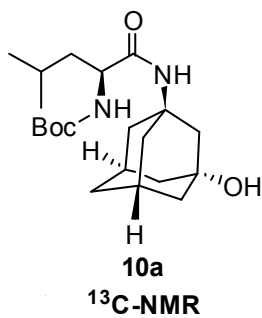
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**10a**  
**<sup>1</sup>H-NMR**

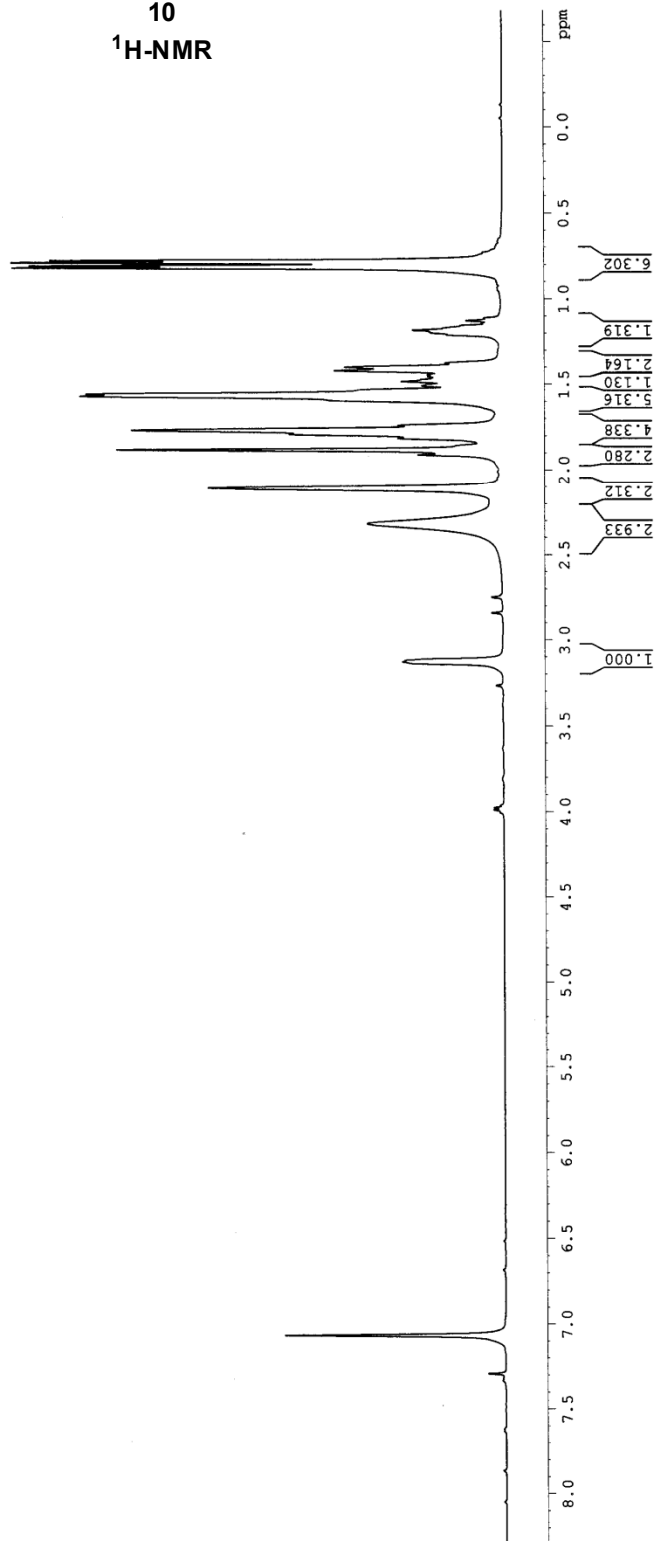
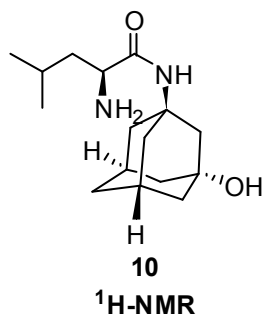


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YUNNAN UNIVER. AV. DRX 500  
wangyongchao I-2-2 in CDCl3  
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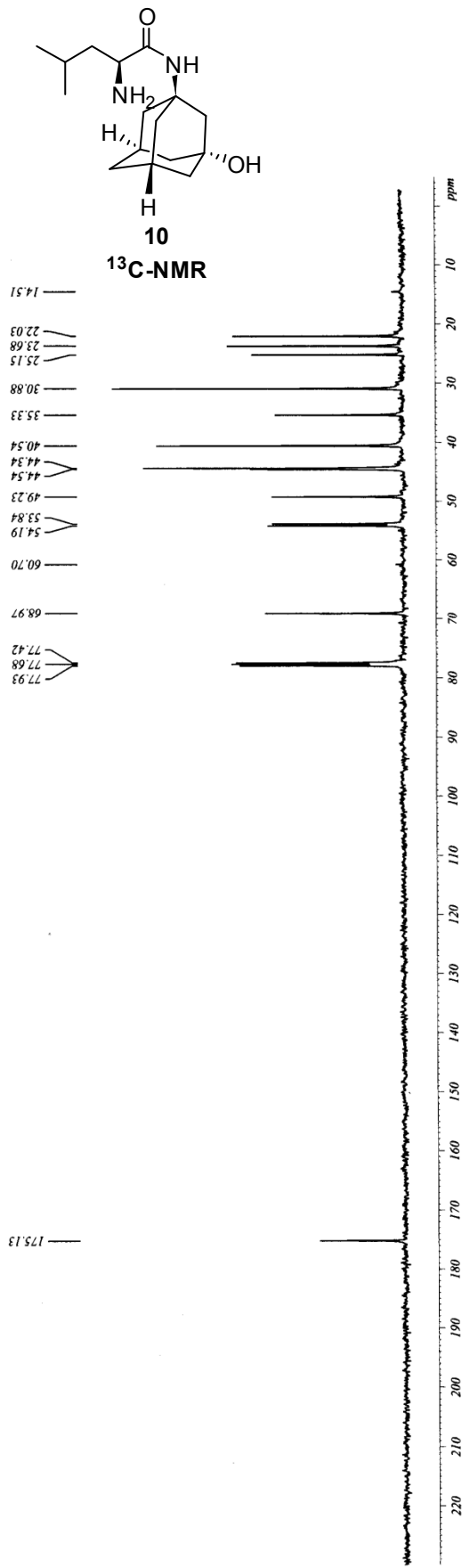


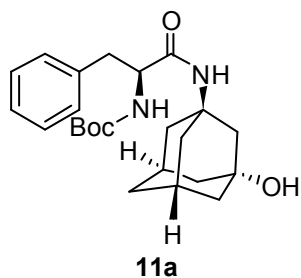


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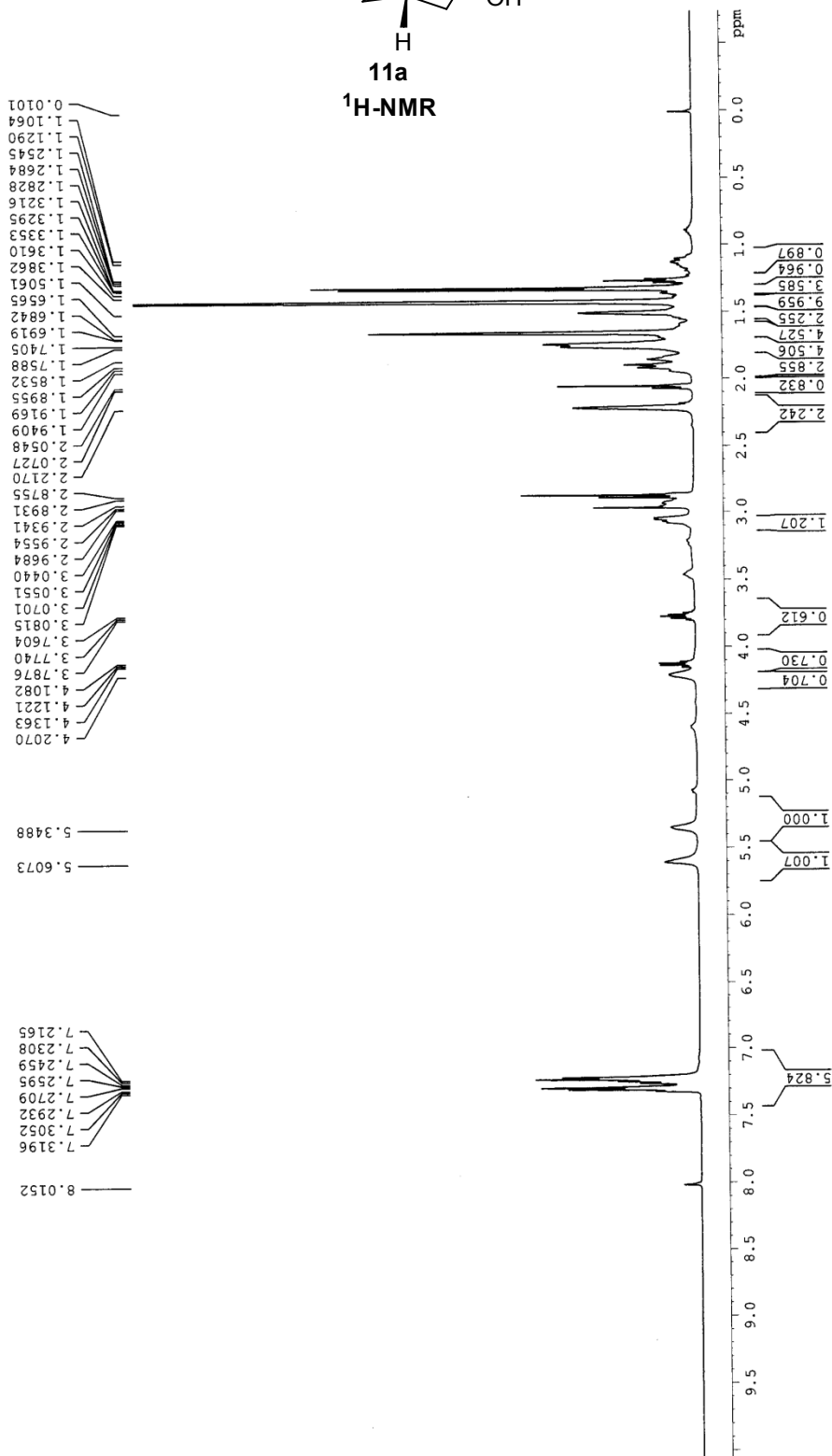
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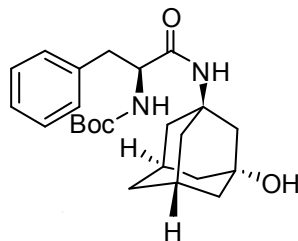




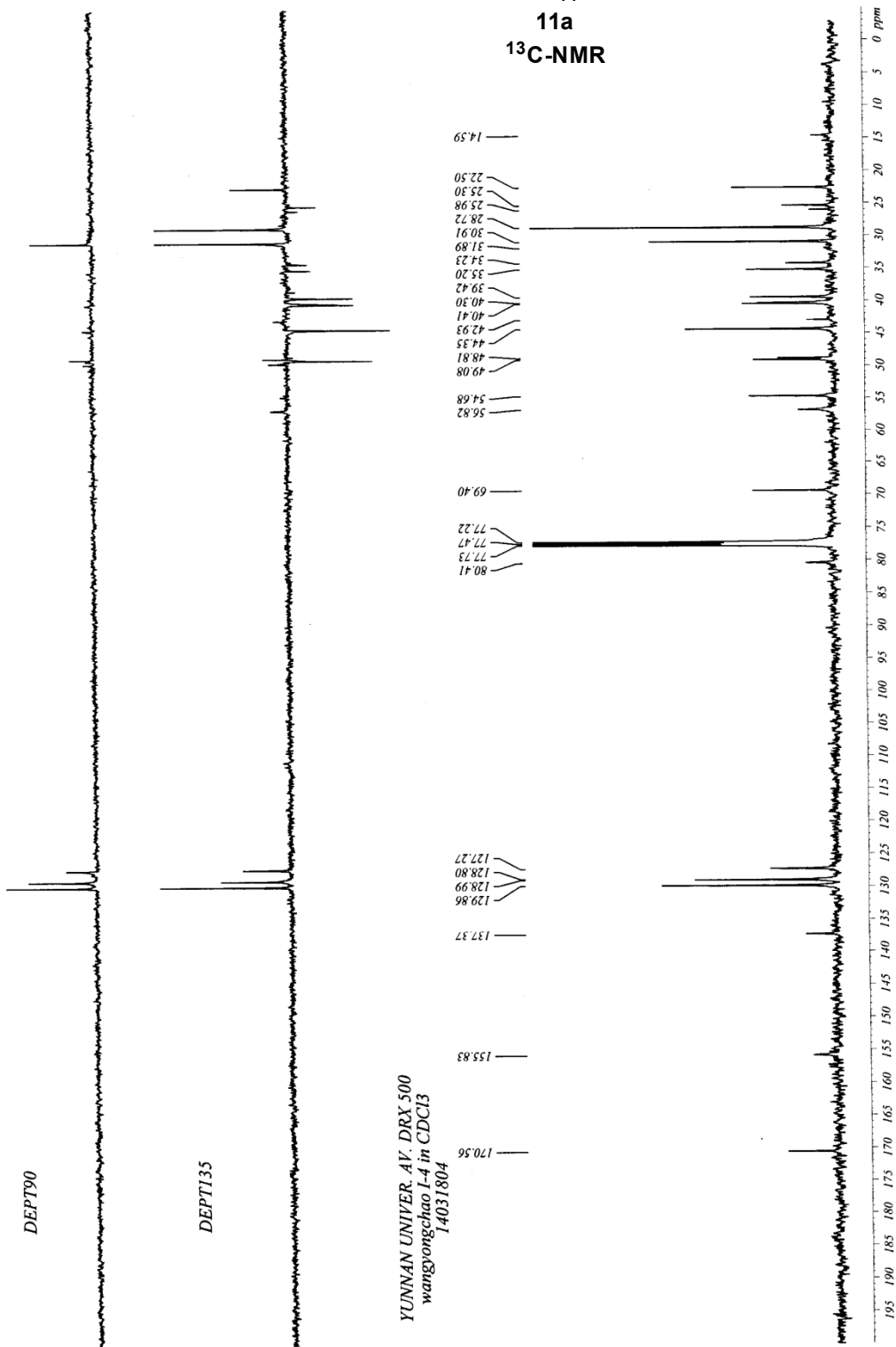
<sup>1</sup>H-NMR



YUNNAN UNIVER. AV. DRX 500  
 wangyongchao I-4 in CDCl3  
 14031804



**11a**  
**<sup>13</sup>C-NMR**



YUNNAN UNIVER. AV. DRX 500  
wangyongchao 1-4 in CDCl<sub>3</sub>  
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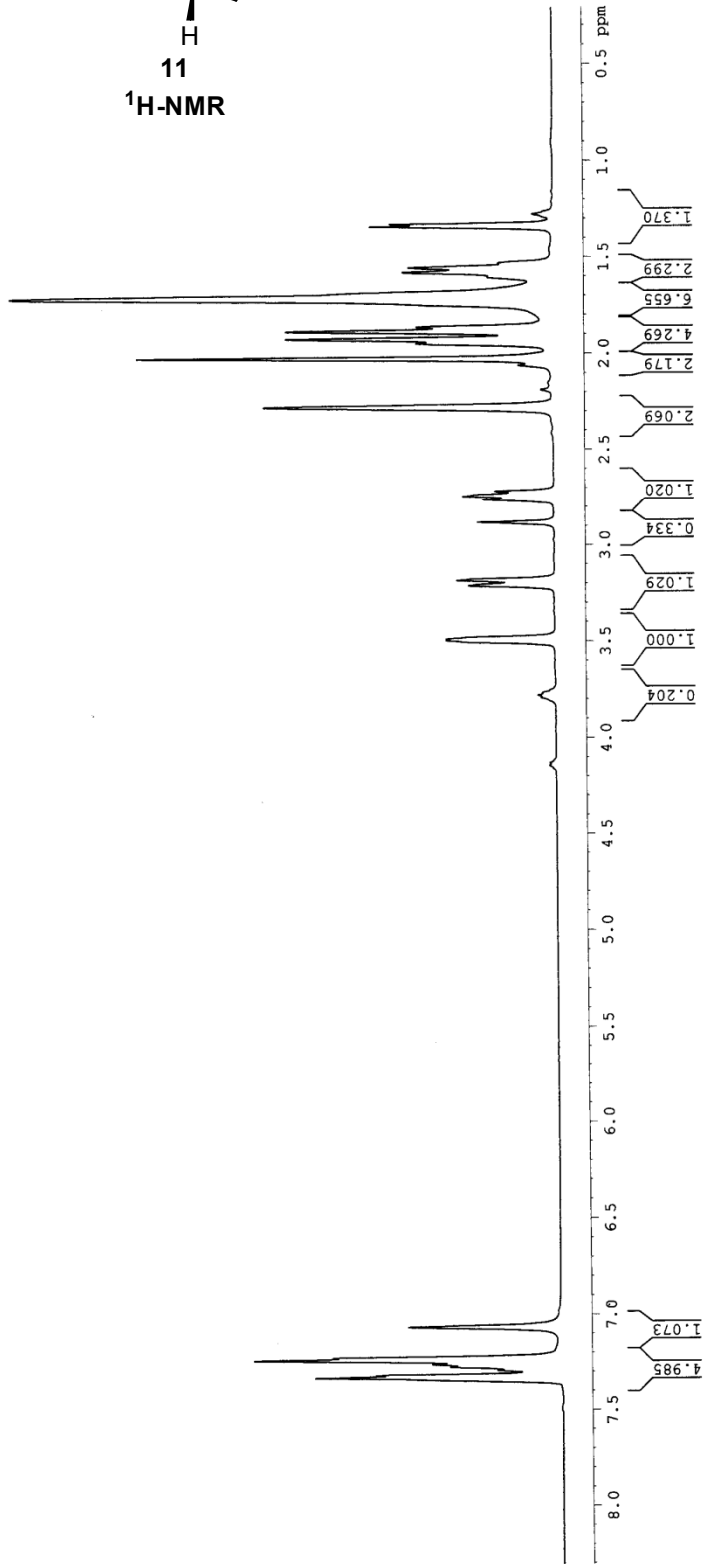
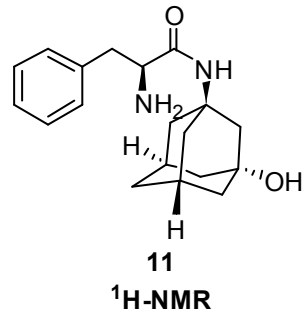
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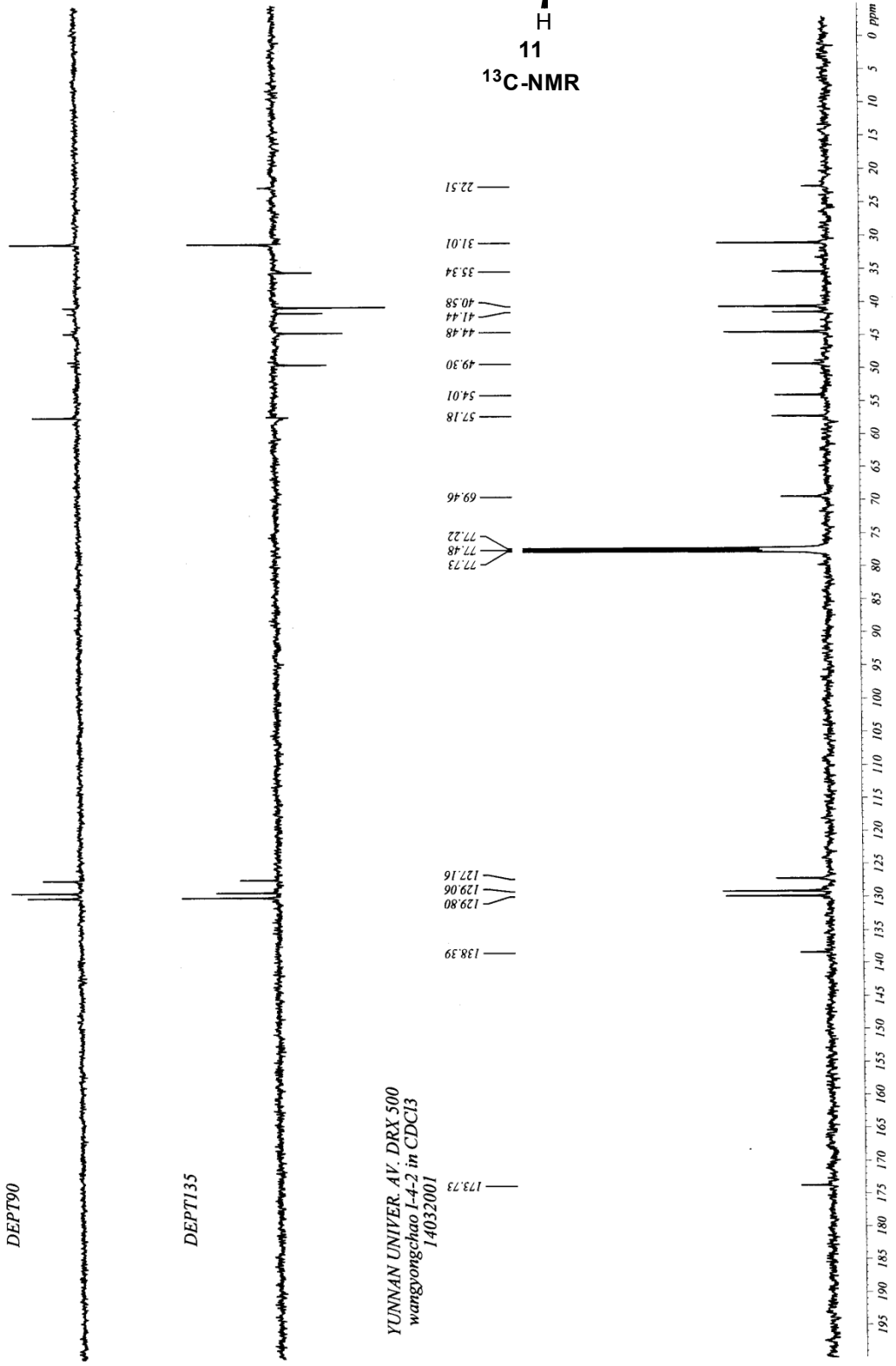
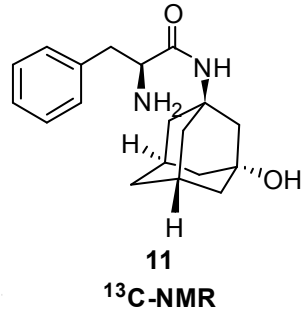
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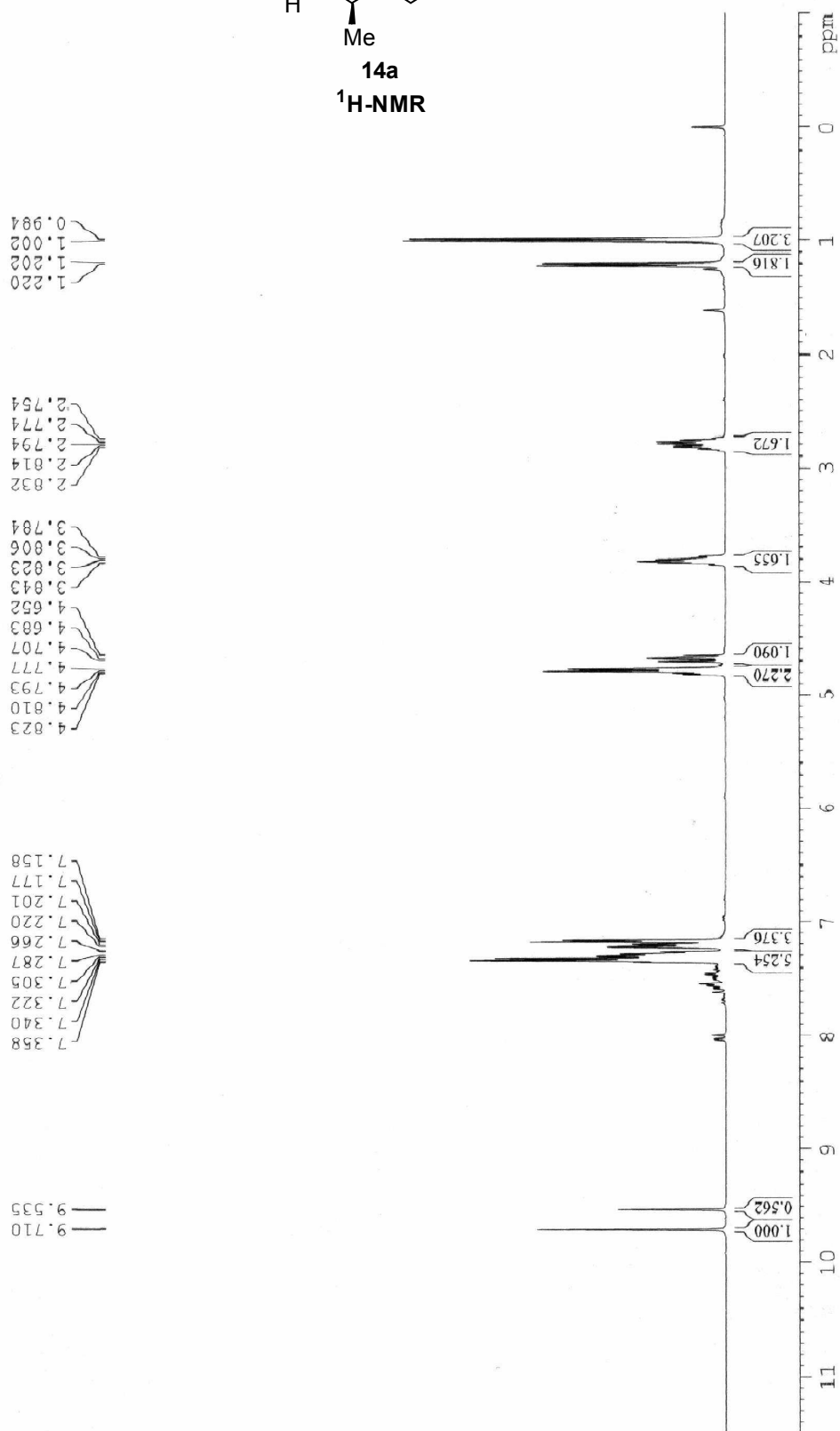
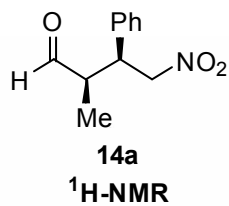
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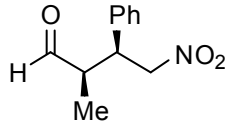


YUNNAN UNIVER. AV. DRX 500  
 wangyongchao 1-4-2 in CDCl3  
 14032001

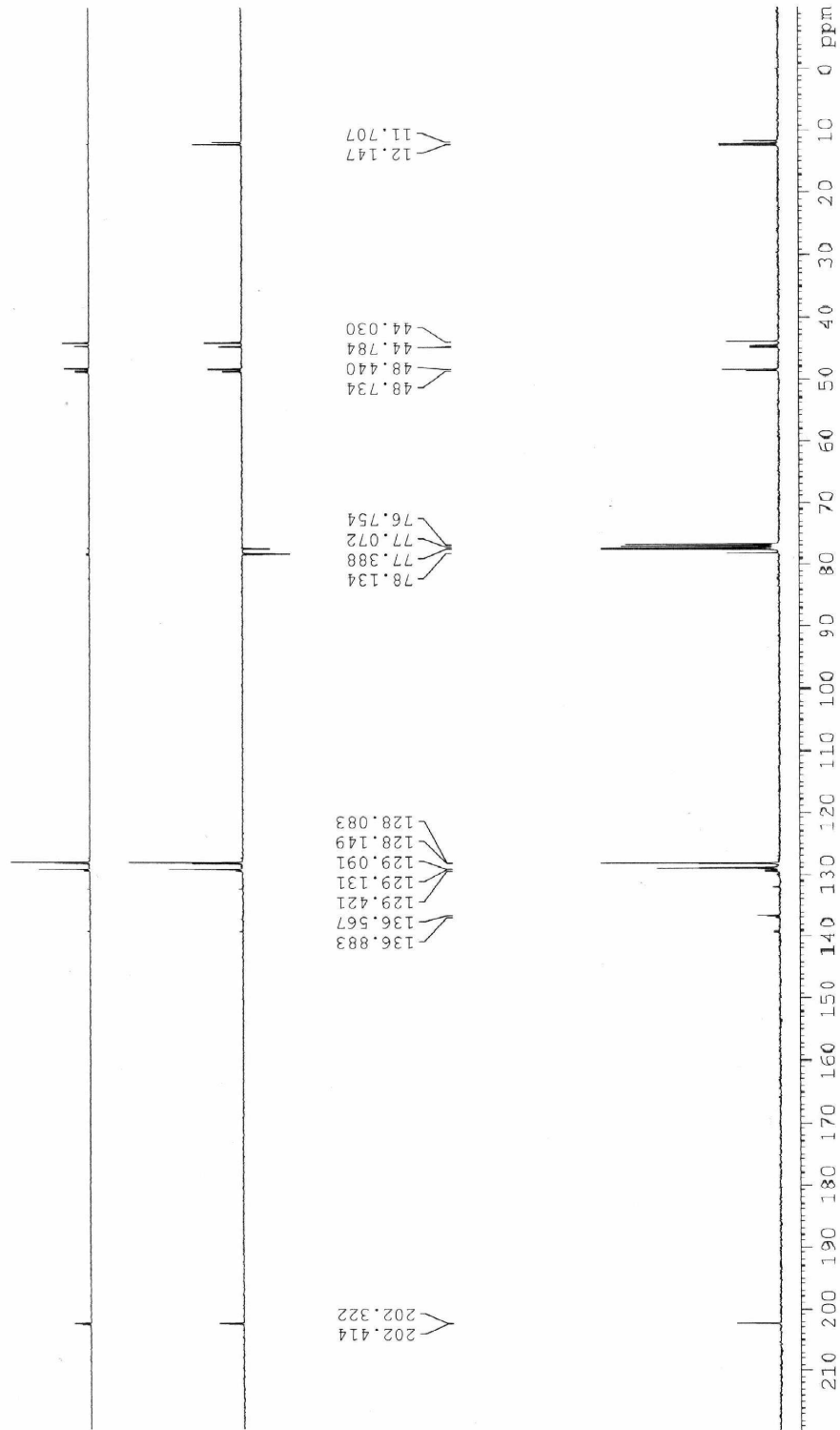
2.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra for compounds 14a-14r.



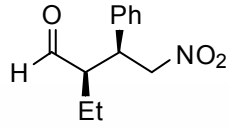
YUNNAN UNIVERSITY AVIII-400  
 J41 in CDCl3  
 320



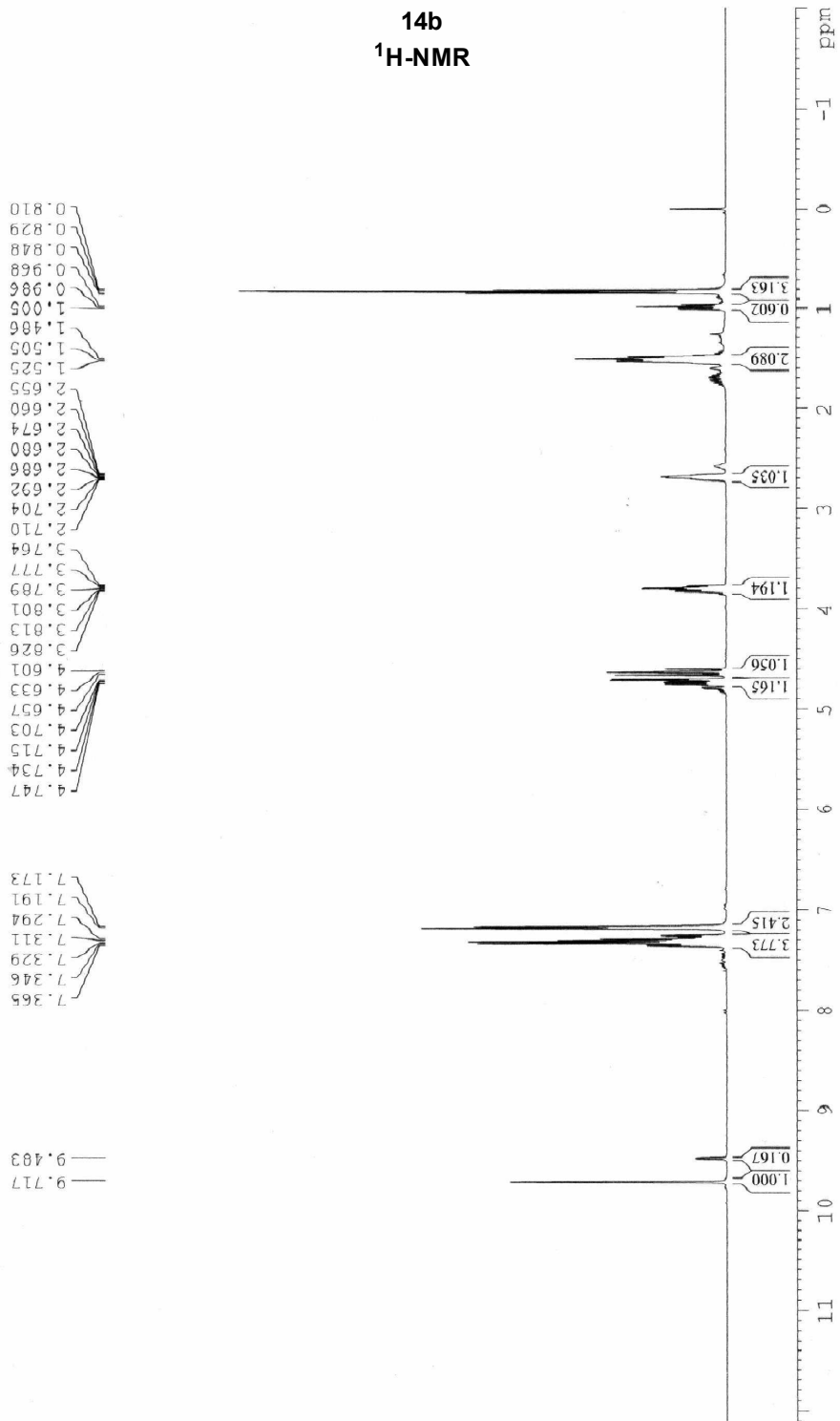
14a  
<sup>13</sup>C-NMR



YUNNAN UNIVERSITY AVIII-400  
J41 in CDCl<sub>3</sub>  
320

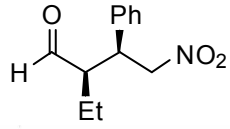


14b  
<sup>1</sup>H-NMR

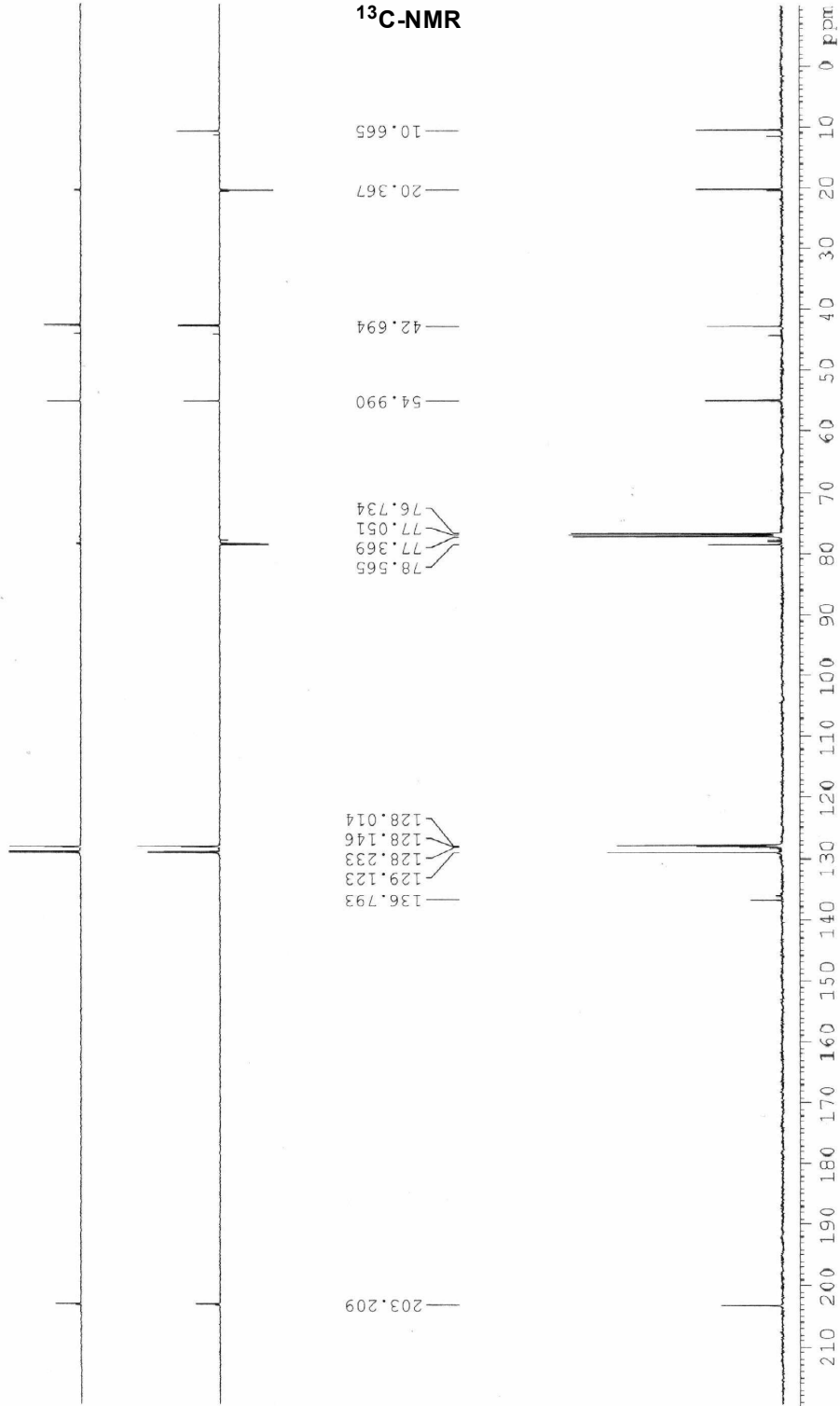


YUNNAN UNIVERSITY AVIII-400  
 J46 in CDCl<sub>3</sub>  
 283

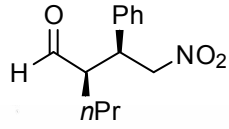




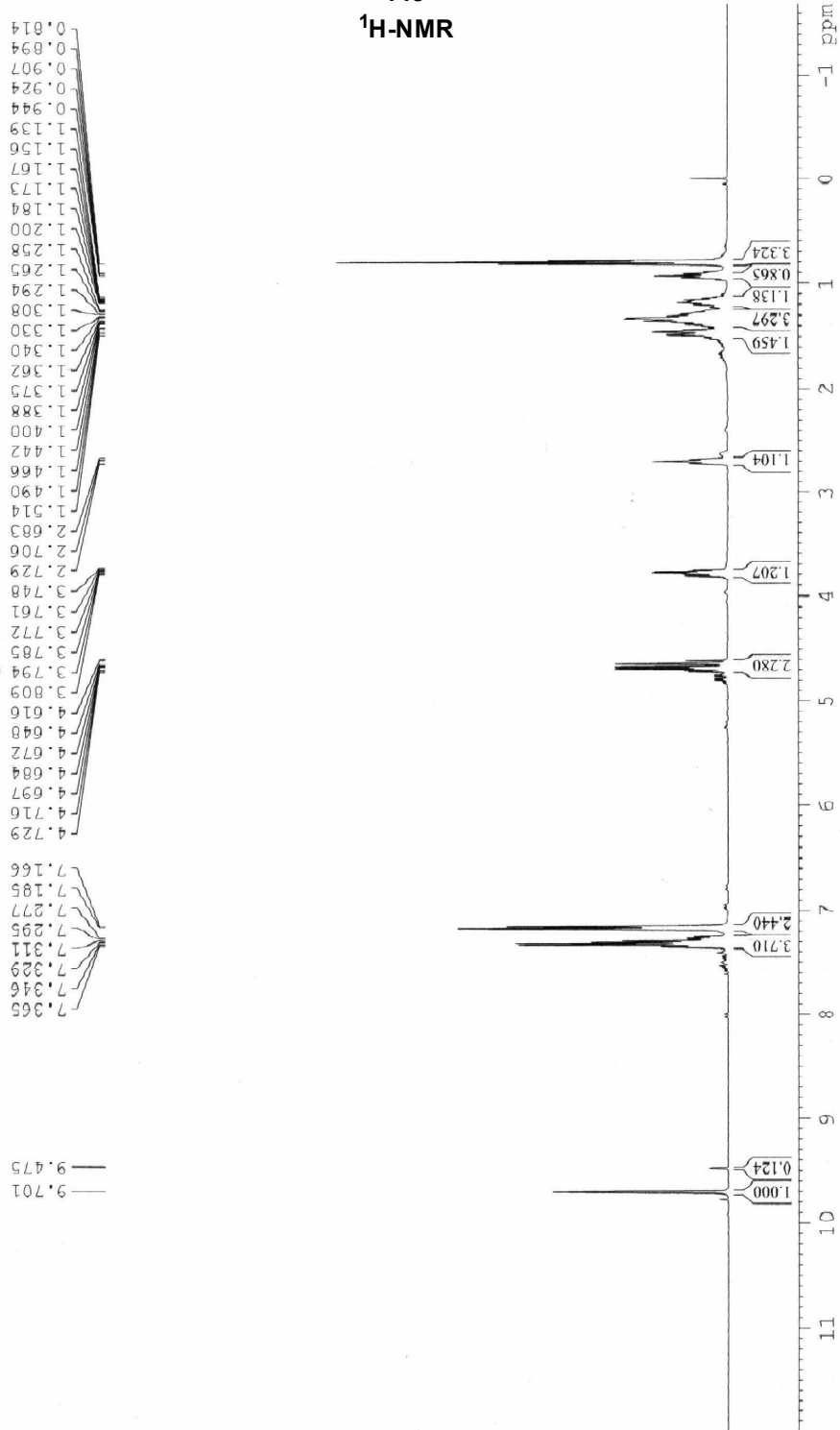
**14b**  
**<sup>13</sup>C-NMR**



YUNNAN UNIVERSITY AVIII-400  
J46 in CDCl<sub>3</sub>  
283

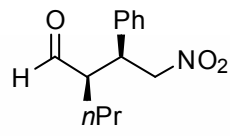


14c  
<sup>1</sup>H-NMR

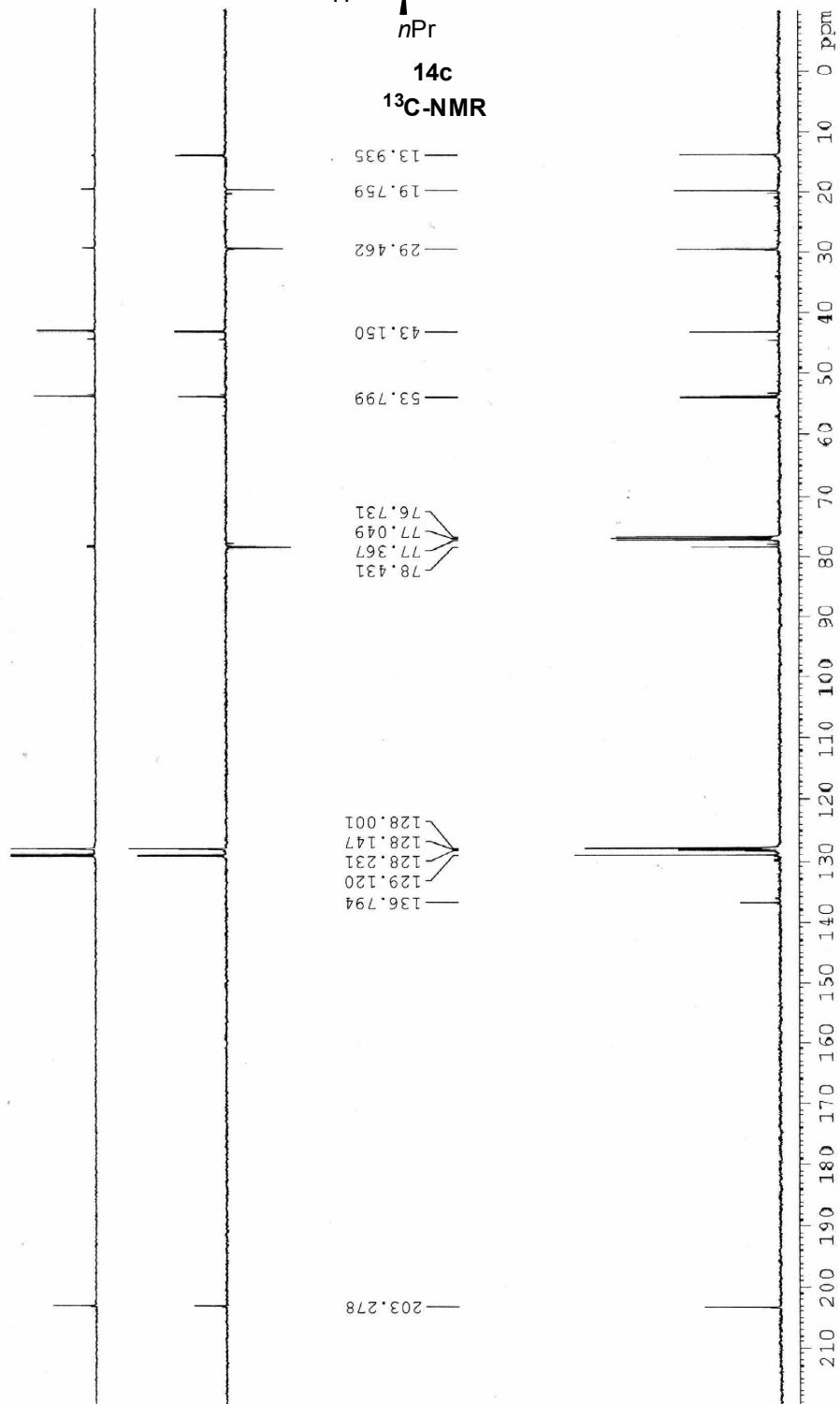


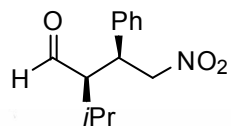
YUNNAN UNIVERSITY AVIII-400  
J47 in CDCl<sub>3</sub>  
287

YUNNAN UNIVERSITY AVIII-400  
J47 in CDCl3  
287

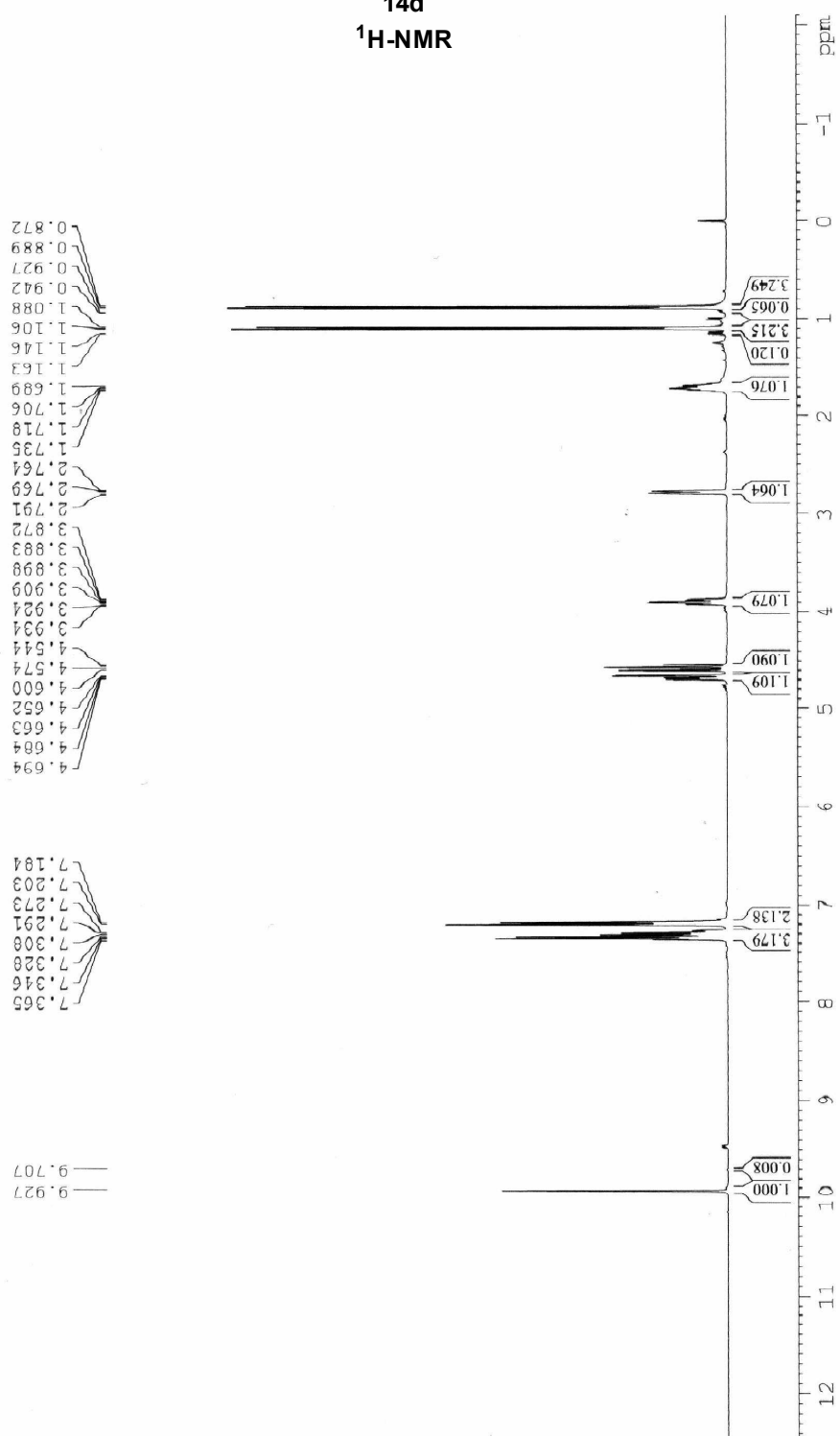


**14c**  
**<sup>13</sup>C-NMR**



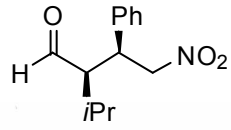


14d  
<sup>1</sup>H-NMR

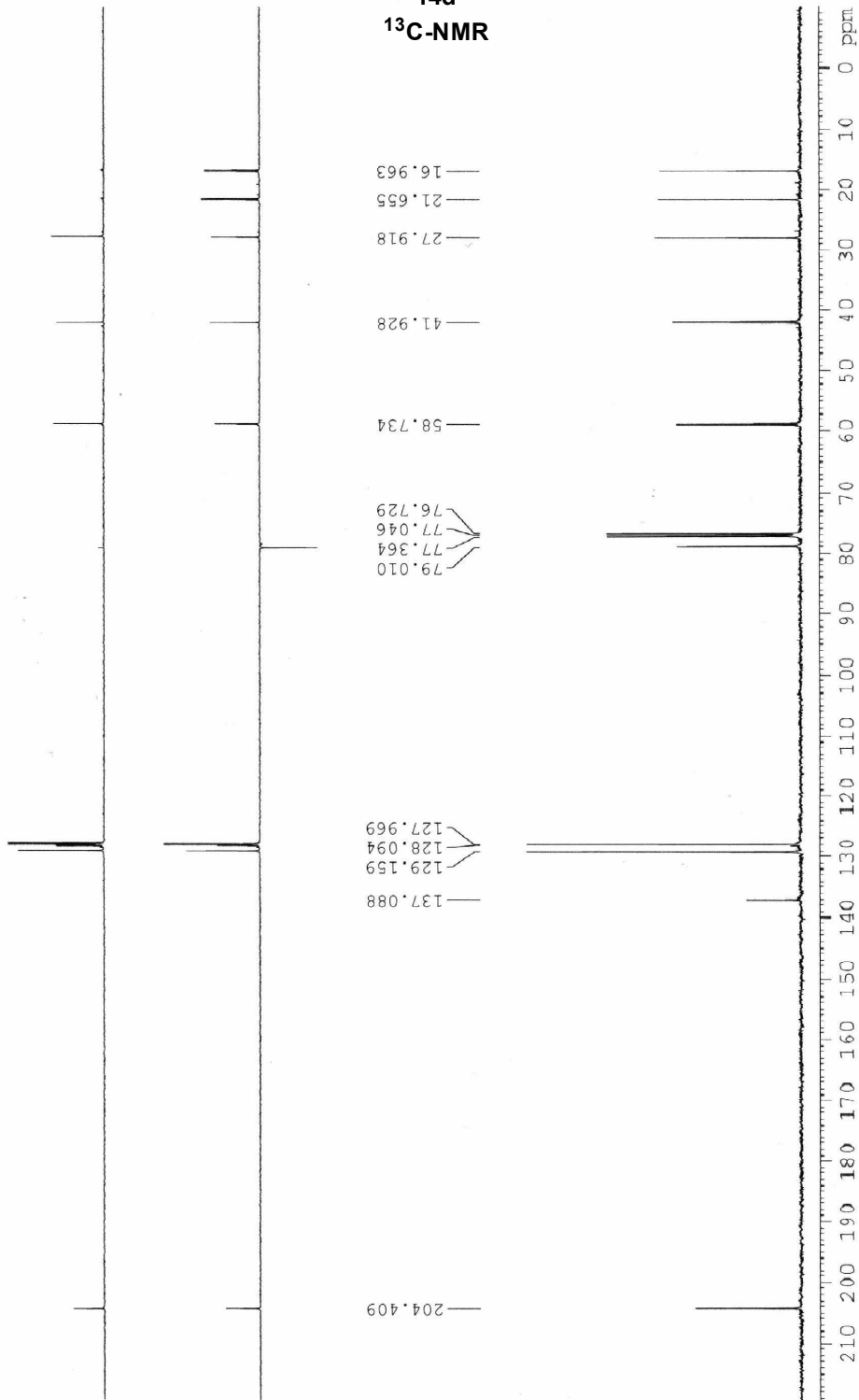


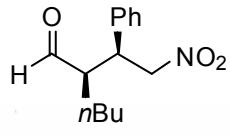
YUNNAN UNIVERSITY AVIII-400  
 J48 in CDCl<sub>3</sub>  
 291

YUNNAN UNIVERSITY AVIII-400  
J48 in CDCl3  
291

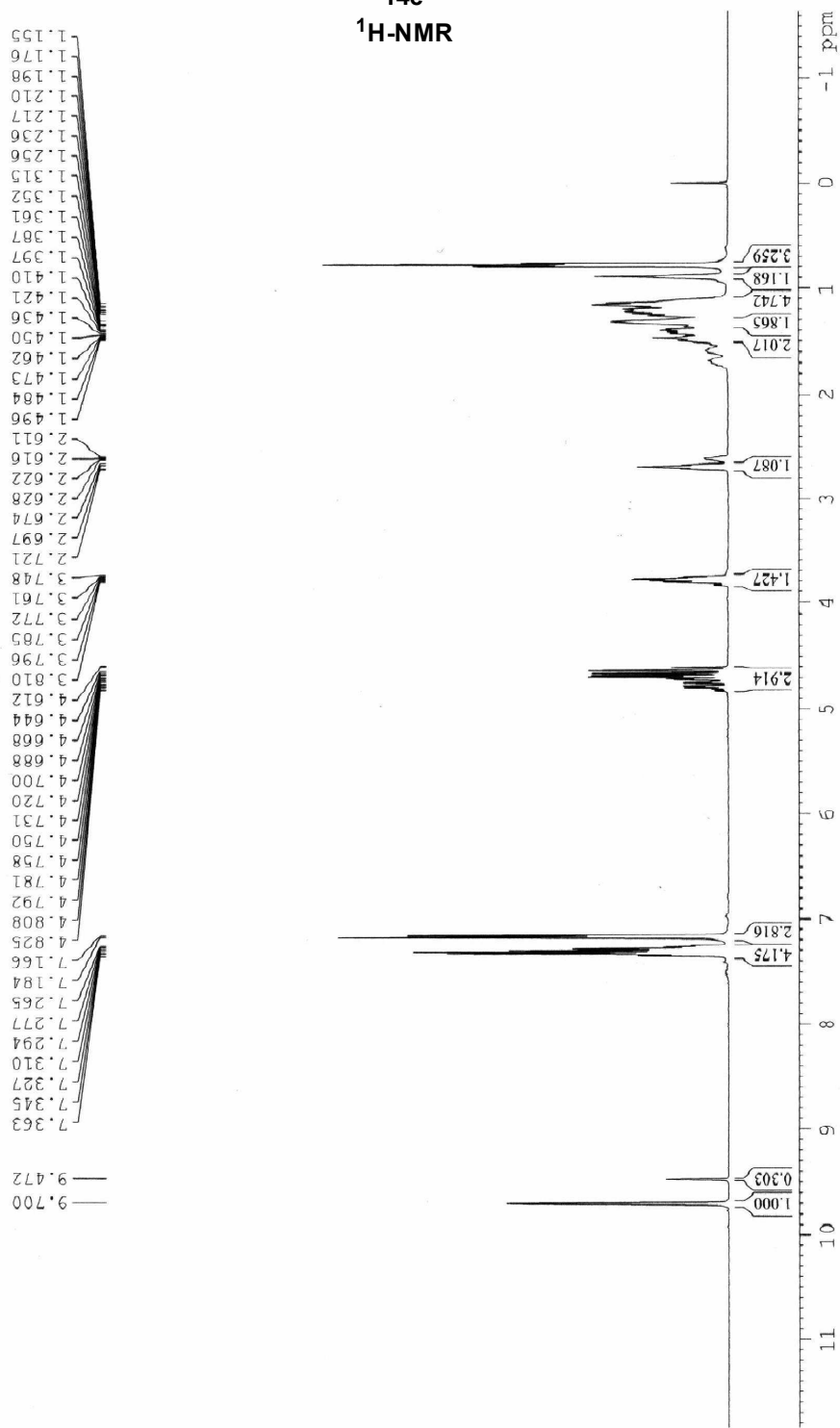


14d  
<sup>13</sup>C-NMR



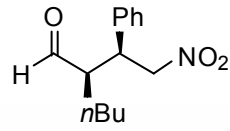


<sup>1</sup>H-NMR

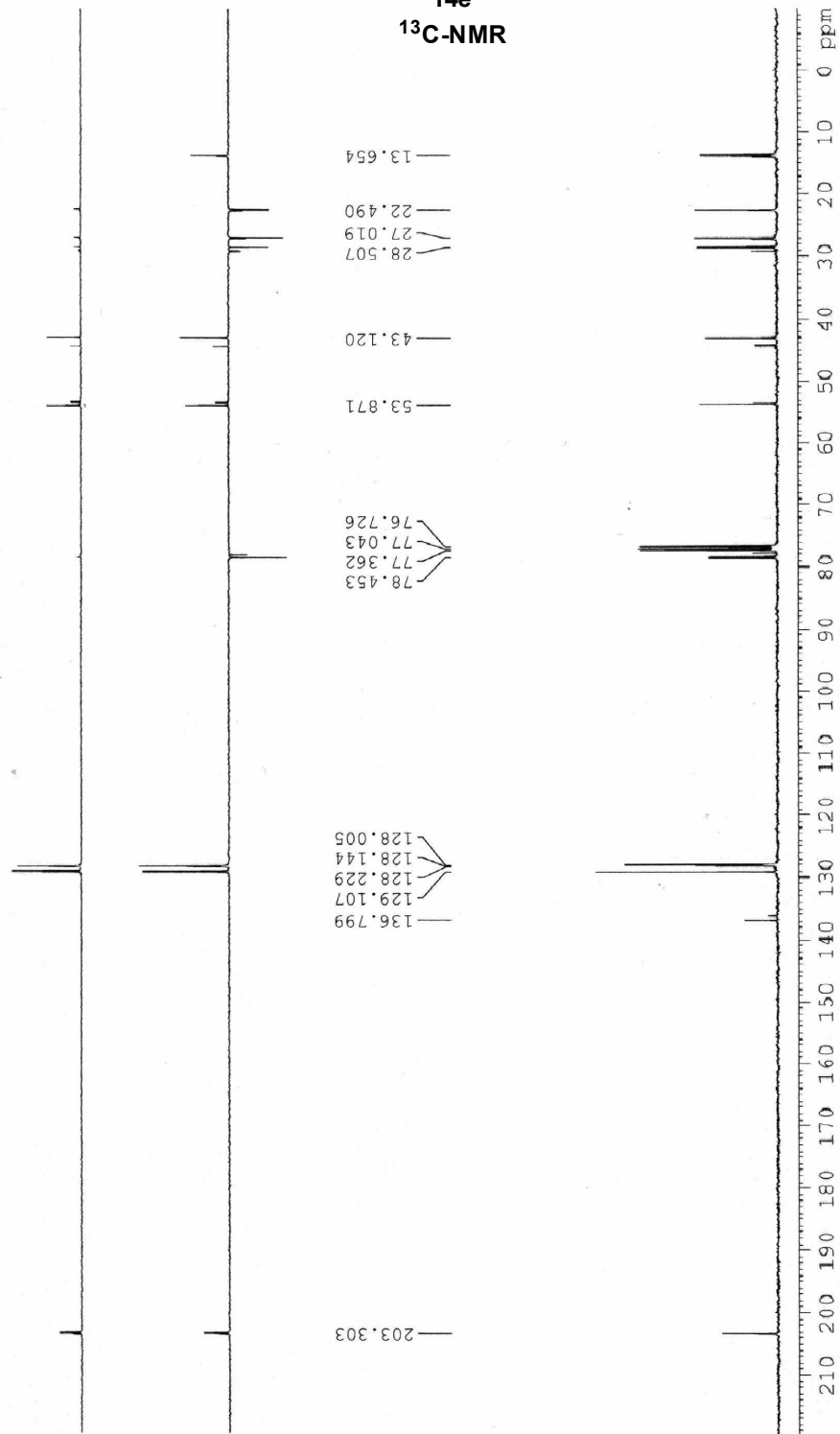


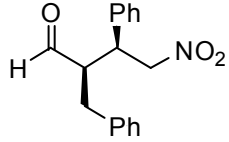
YUNNAN UNIVERSITY AVIII-400  
 J49 in CDCl3  
 295

YUNNAN UNIVERSITY AVIII-400  
J49 in CDCl3  
295



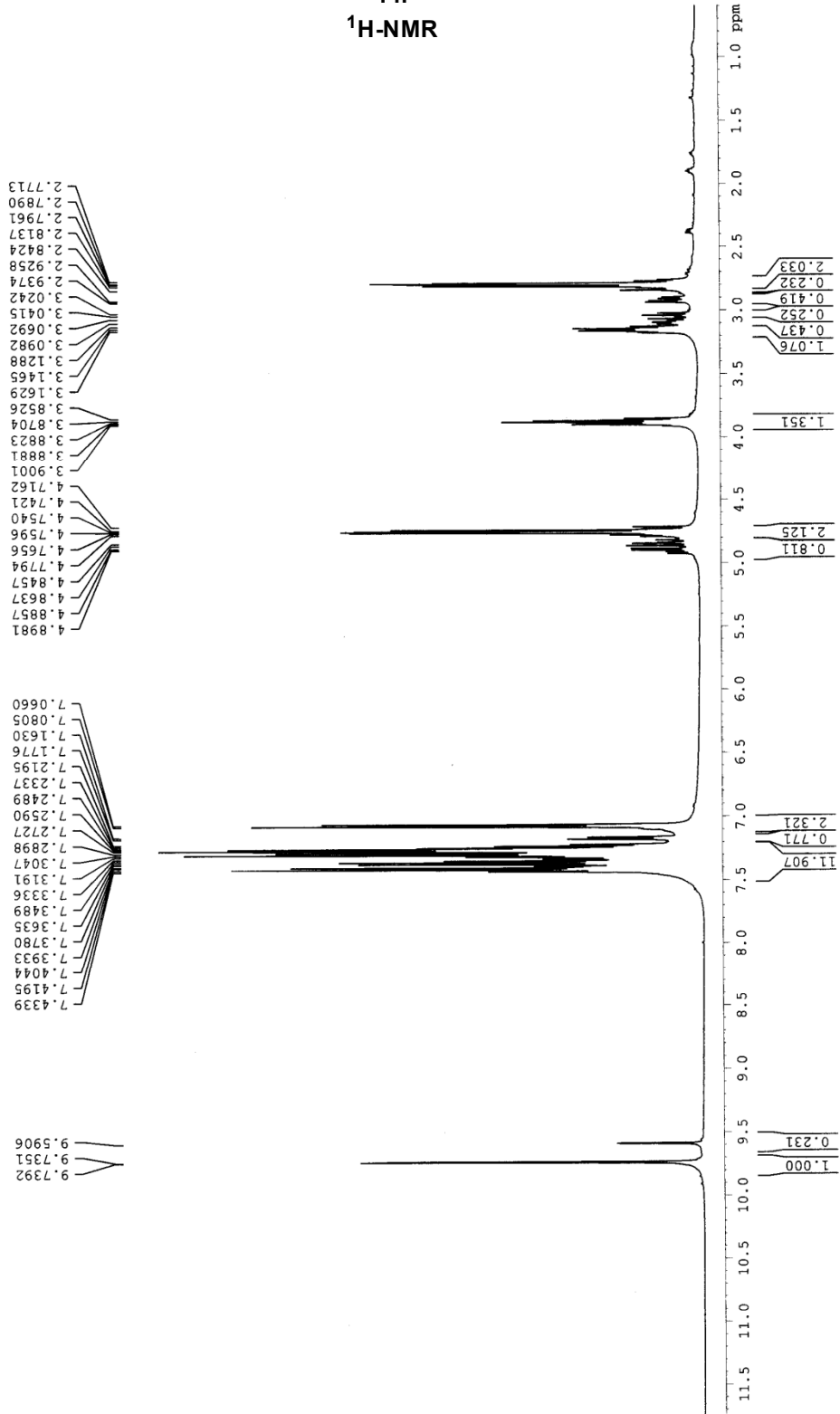
14e  
<sup>13</sup>C-NMR





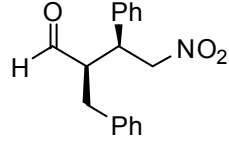
14f

<sup>1</sup>H-NMR



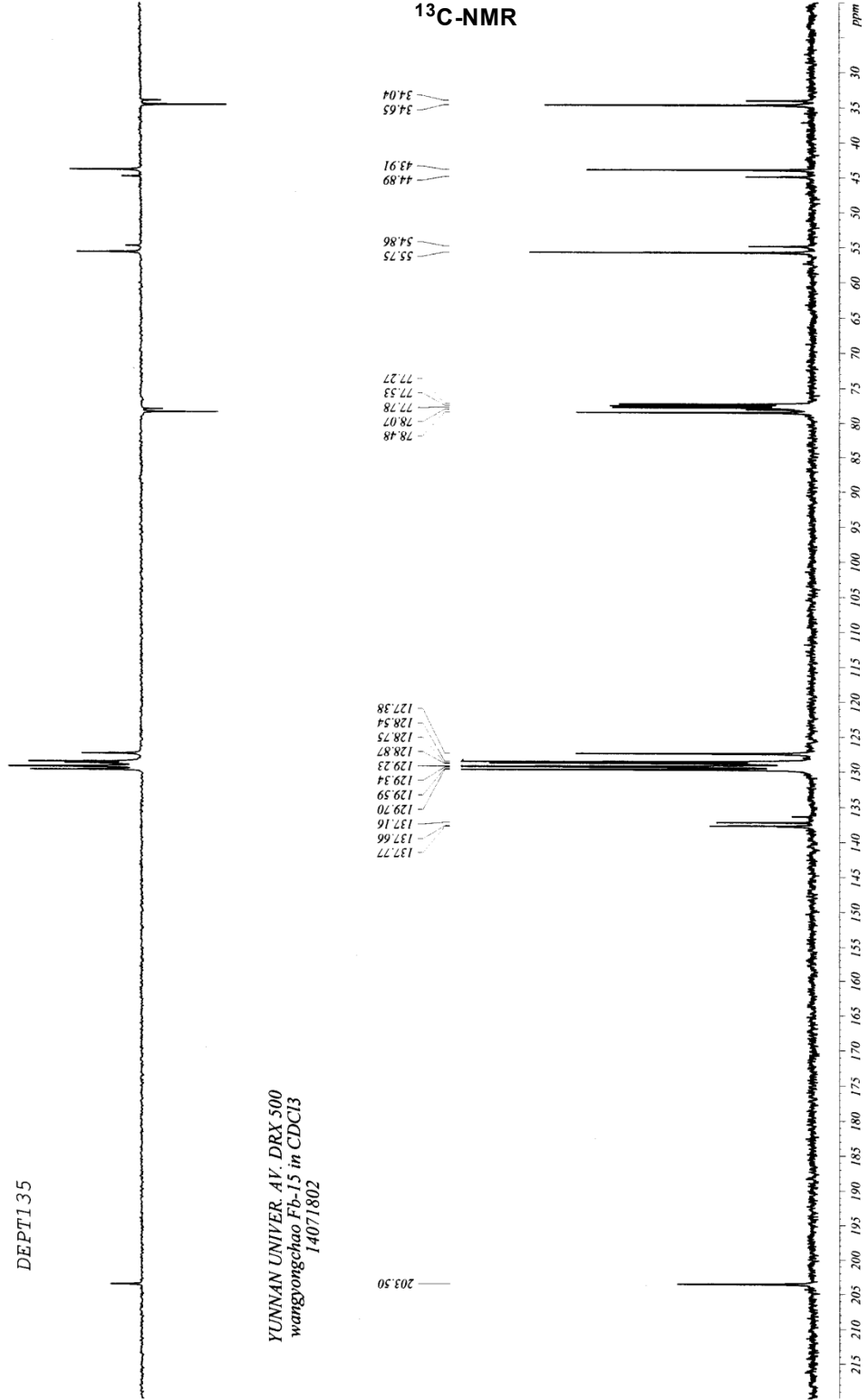
YUNNAN UNIVERSITY AV. DRX 500  
 wangyongchao Fb-15 in CDCl3  
 14071802

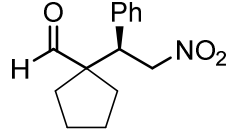




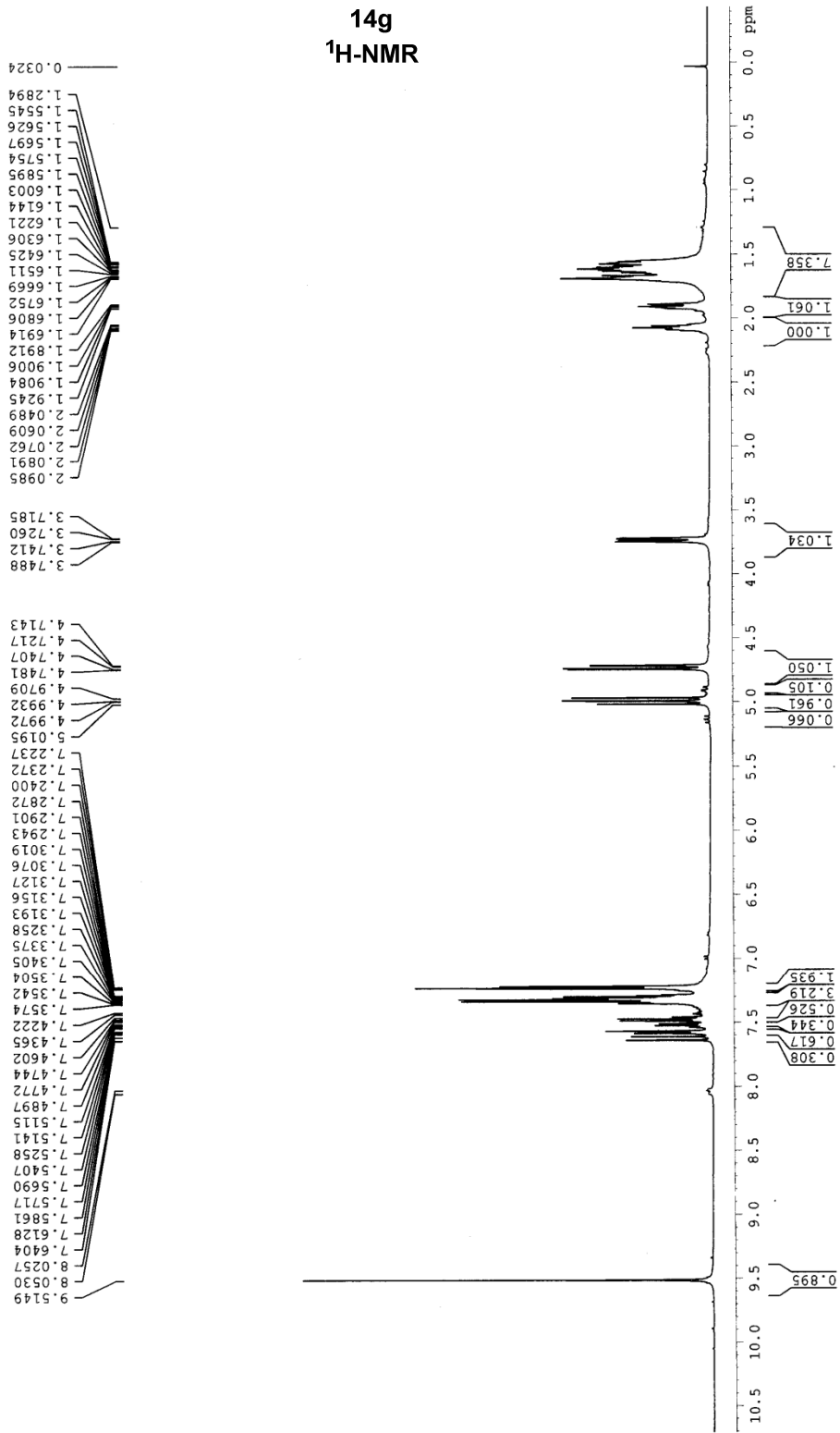
14f

<sup>13</sup>C-NMR

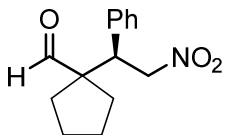




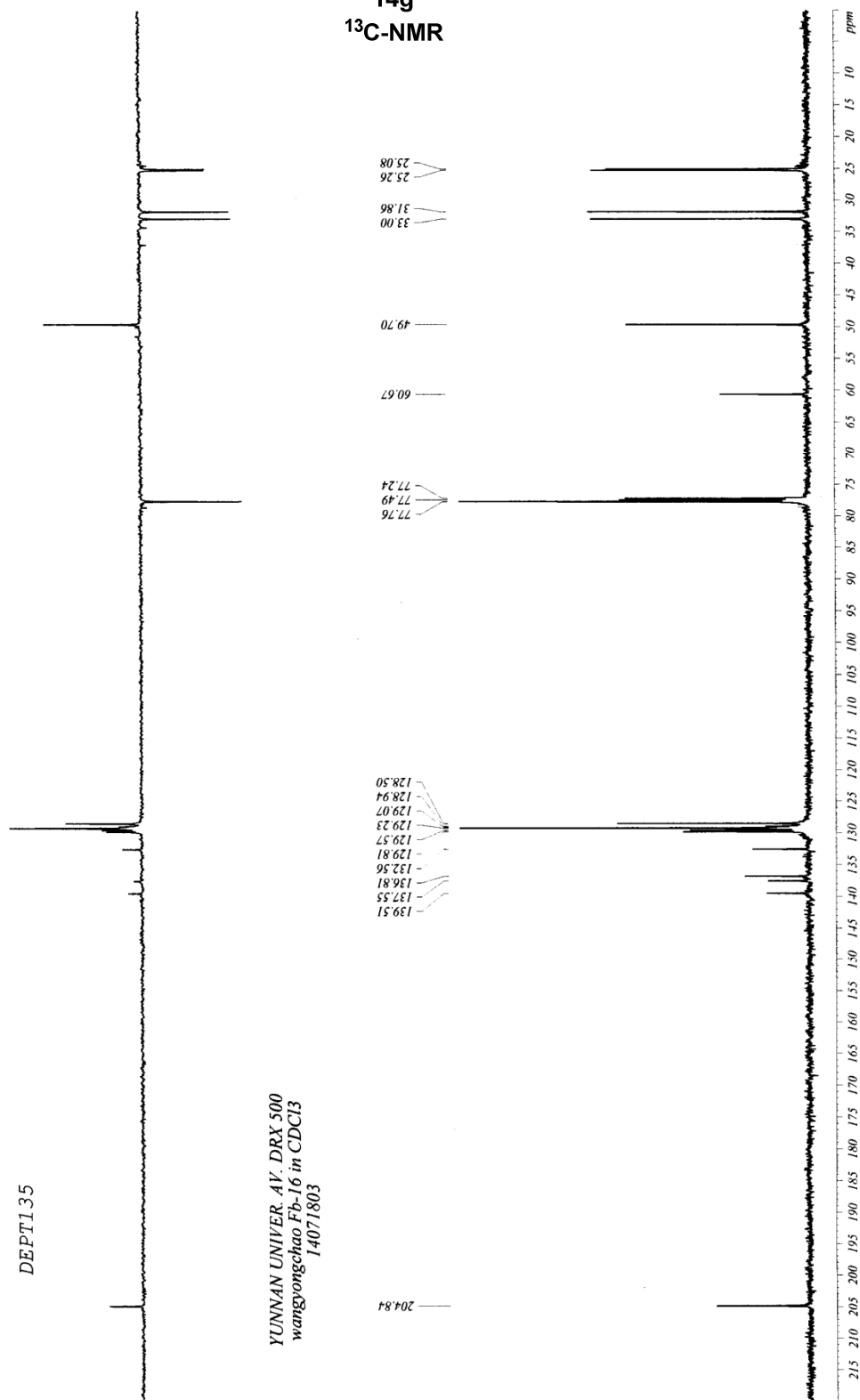
**14g**  
**<sup>1</sup>H-NMR**

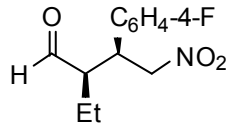


YUNNAN UNIVERSITY AV. DRX 500  
wangyongchao Fb-16 in CDCl3  
14071803

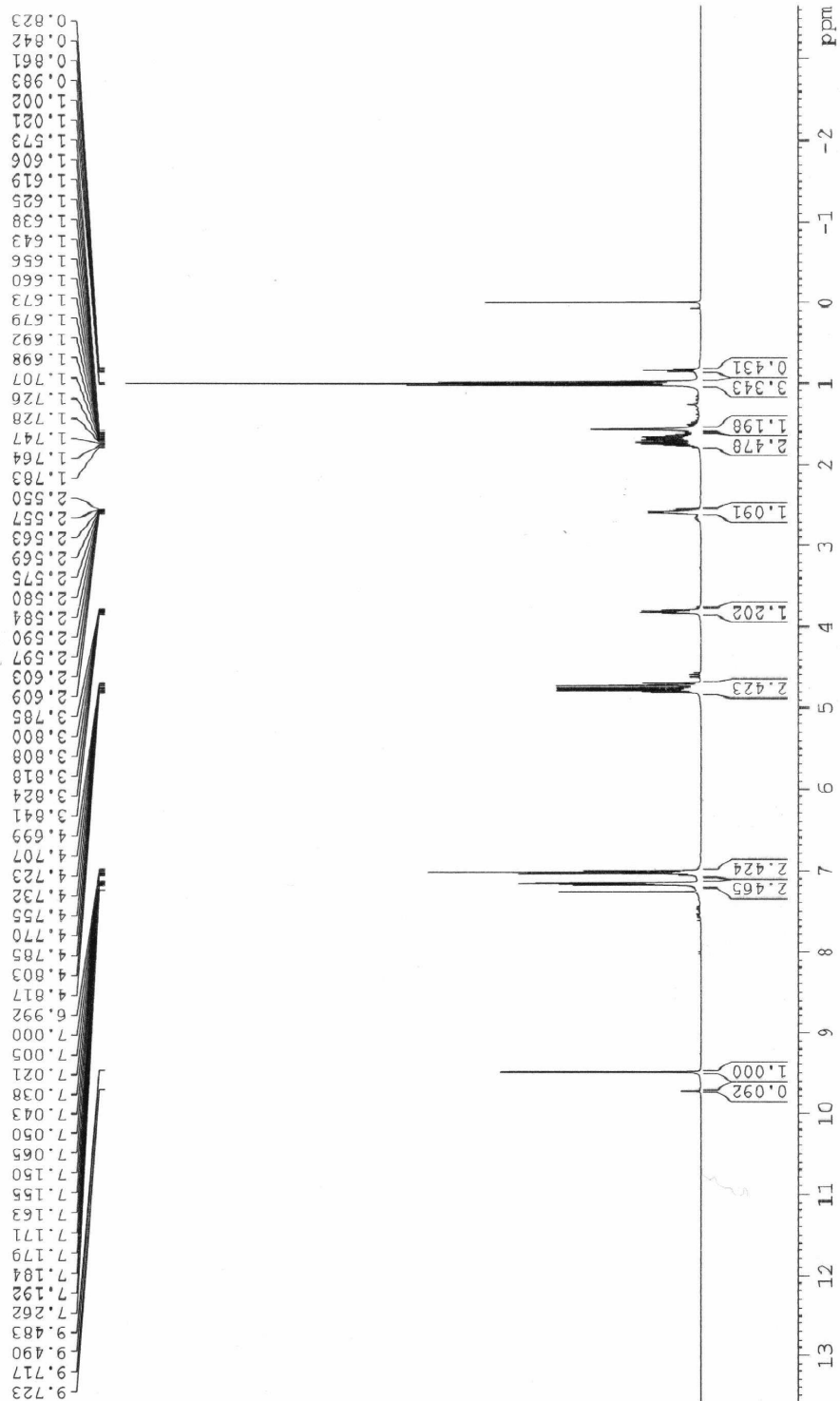


**14g**  
**<sup>13</sup>C-NMR**



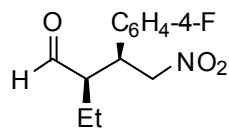


14h  
<sup>1</sup>H-NMR

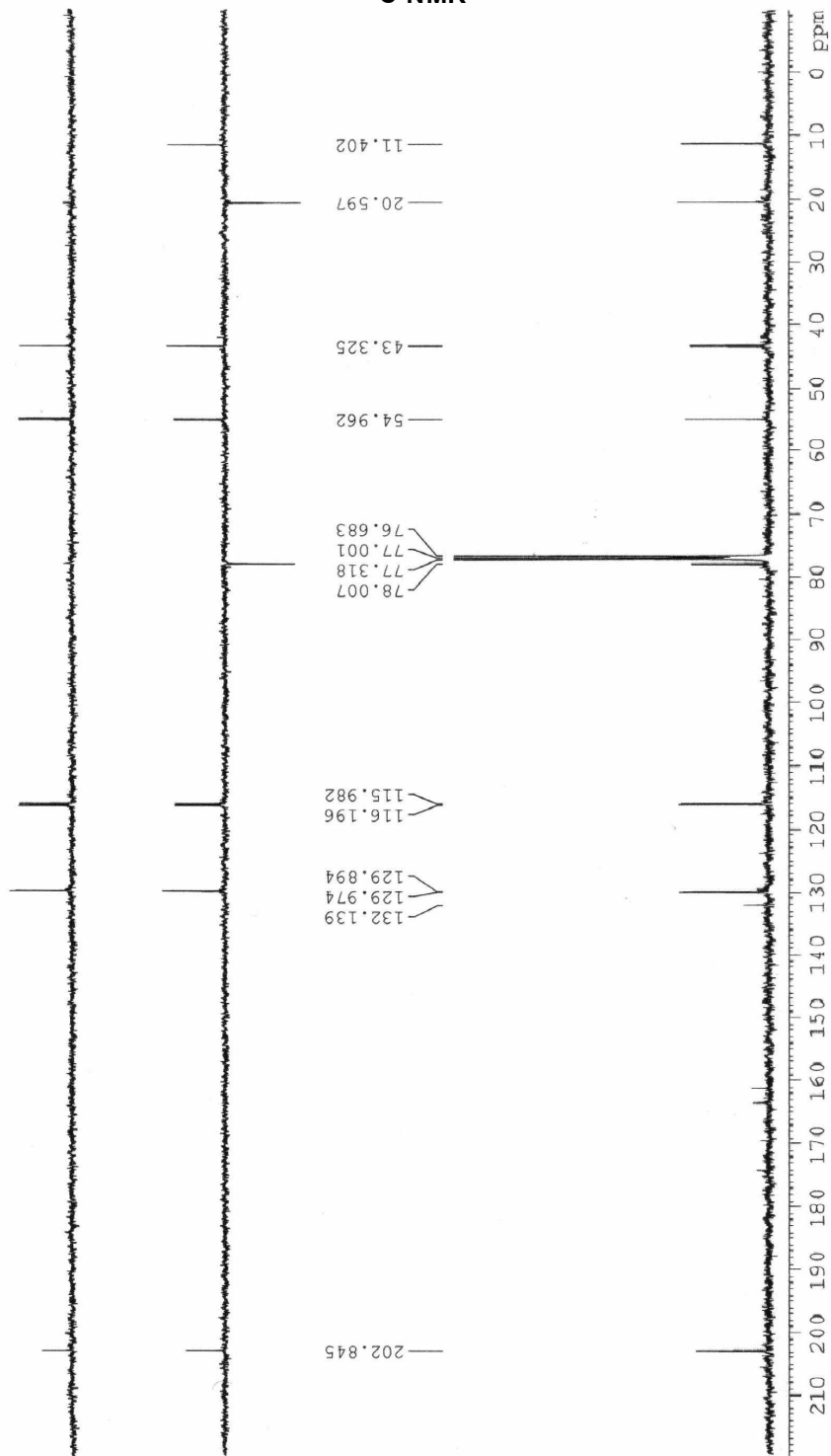


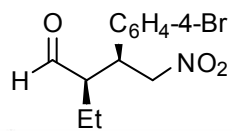
YUNNAN UNIVERSITY AVIII-400  
 wangyongchao E68 in CDCl<sub>3</sub>  
 591

YUNNAN UNIVERSITY AVIII-400  
- wangyongchao E68 in CDCl3  
591



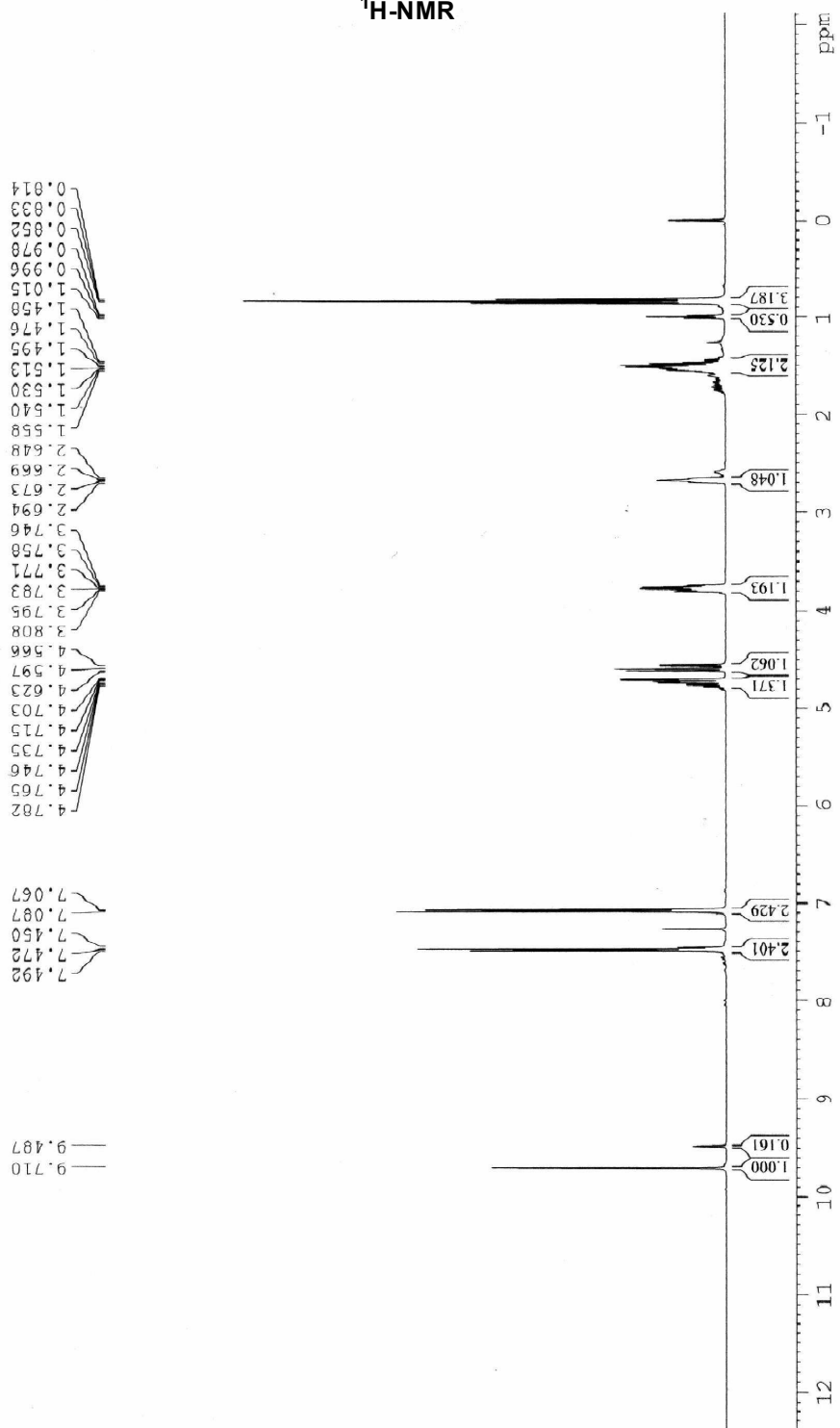
14h  
<sup>13</sup>C-NMR



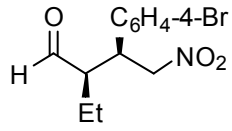


14i

<sup>1</sup>H-NMR



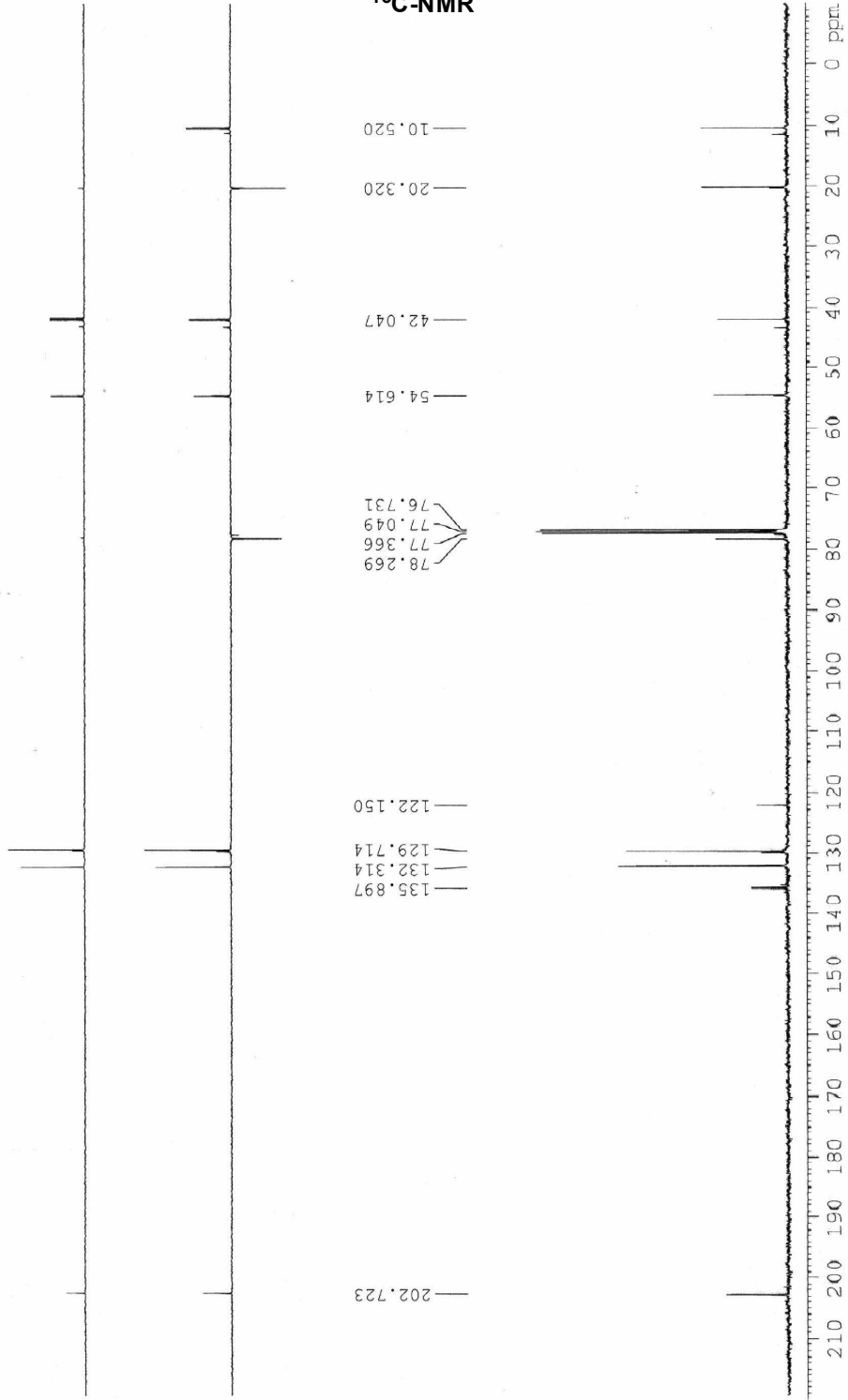
YUNNAN UNIVERSITY AVIII-400  
J50 in CDCl3  
299

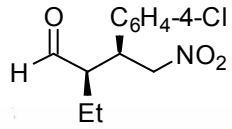


14i

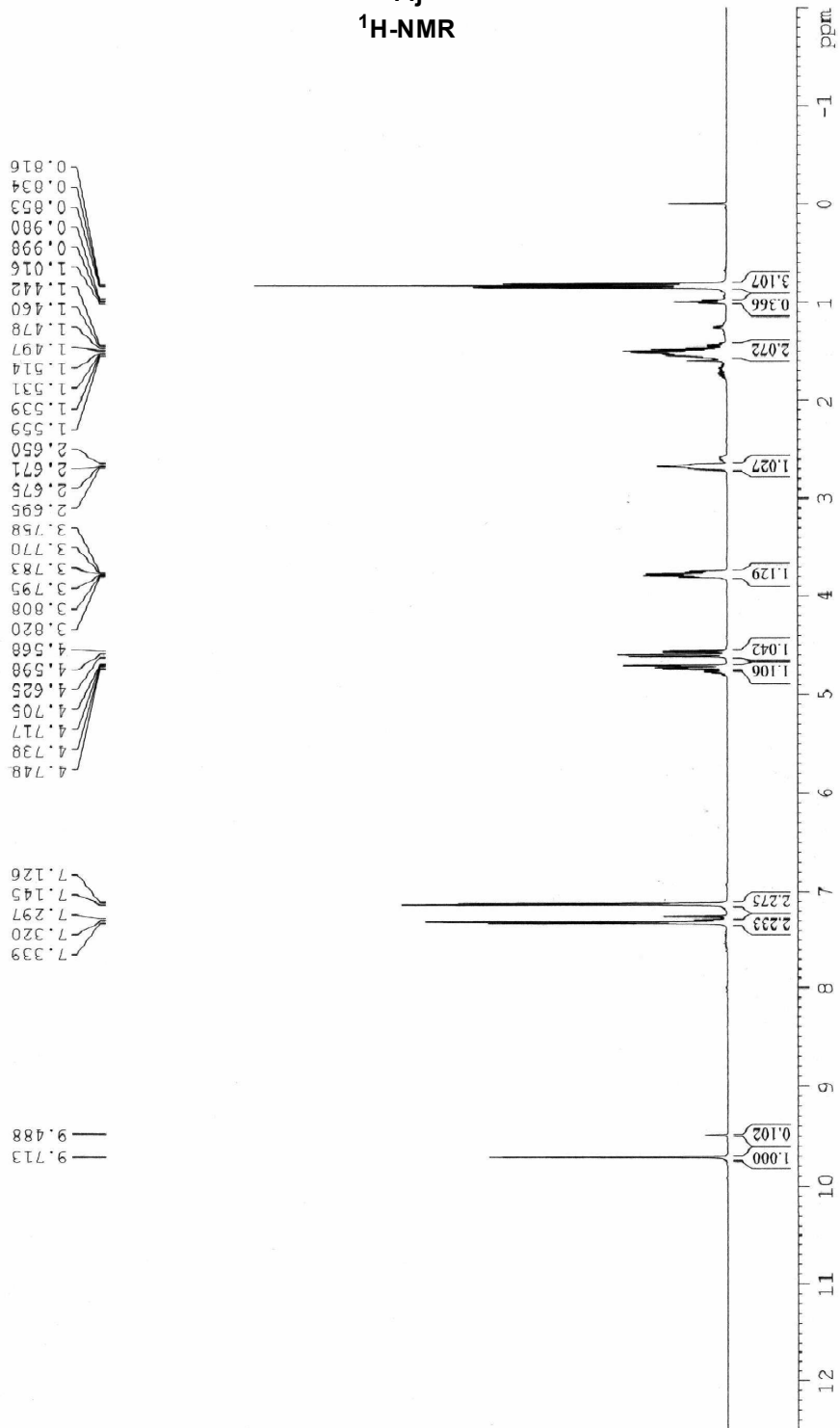
<sup>13</sup>C-NMR

YUNNAN UNIVERSITY AVIII-400  
J50 in CDCl<sub>3</sub>  
299



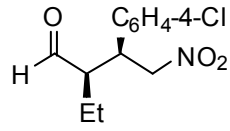


14j  
<sup>1</sup>H-NMR

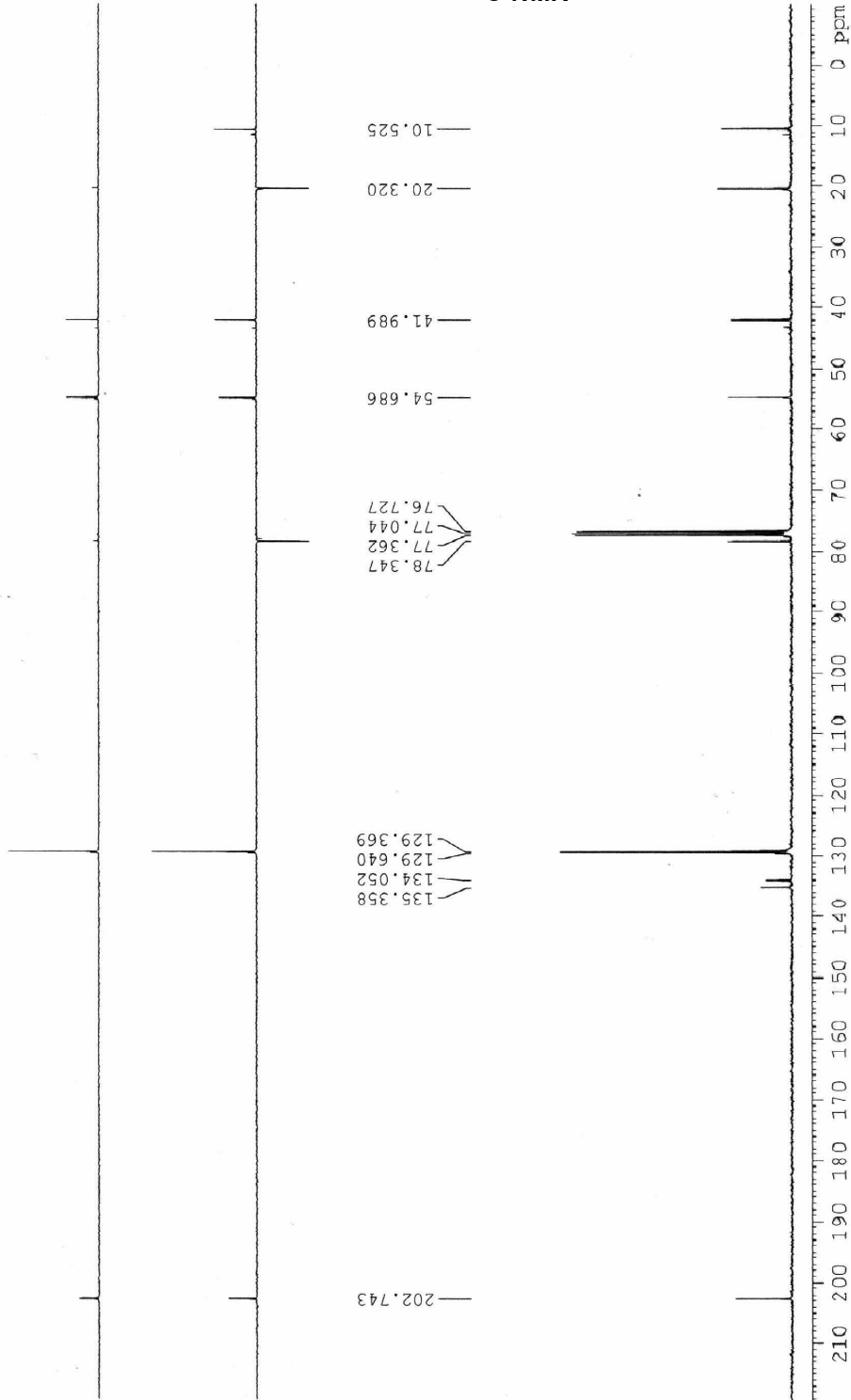


YUNNAN UNIVERSITY AVIII-400  
 J51 in CDCl3  
 303

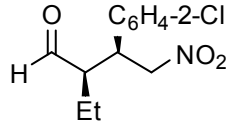




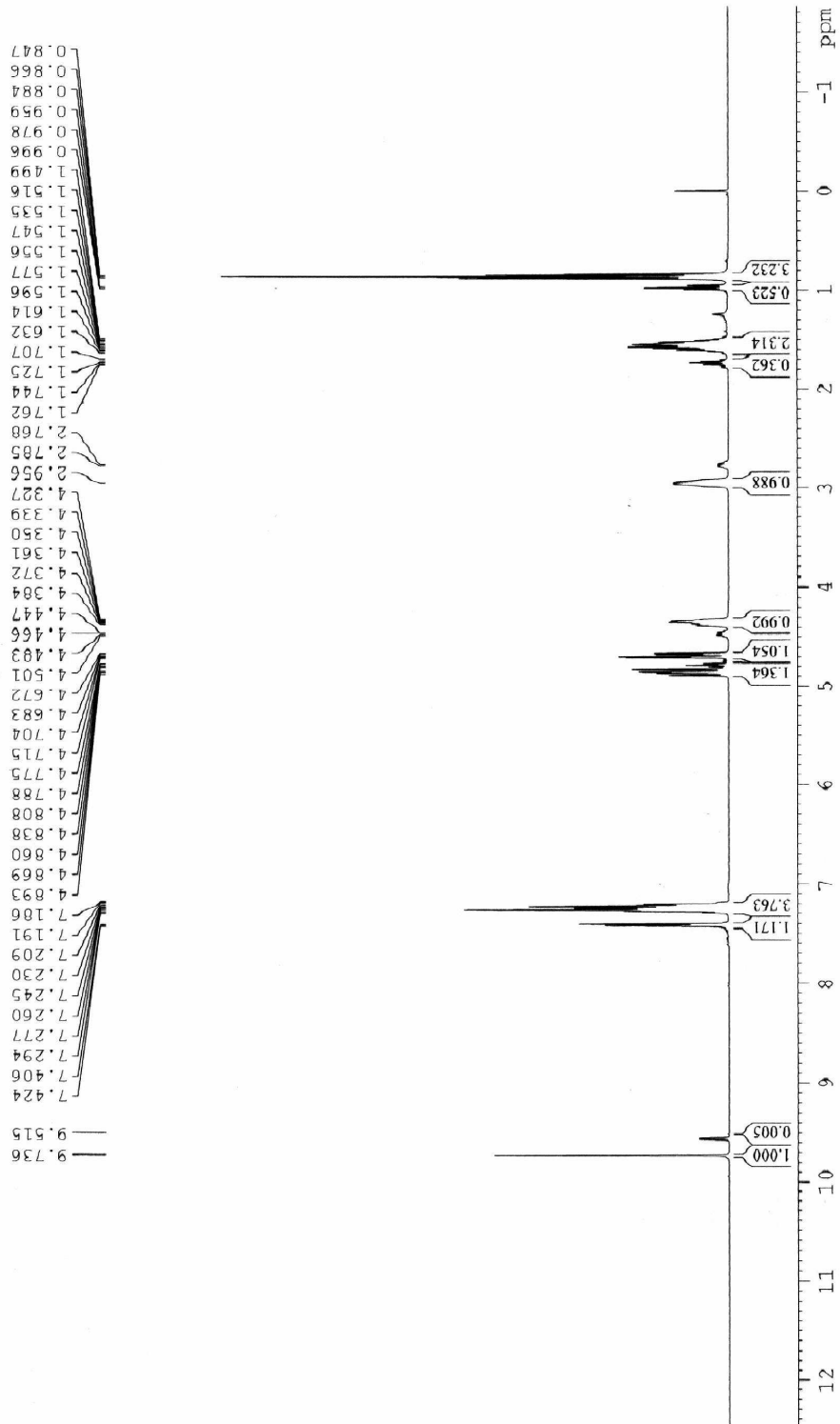
14j  
<sup>13</sup>C-NMR

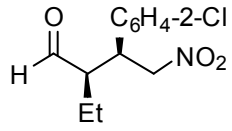


YUNNAN UNIVERSITY AVIII-400  
 J51 in CDCl<sub>3</sub>  
 303

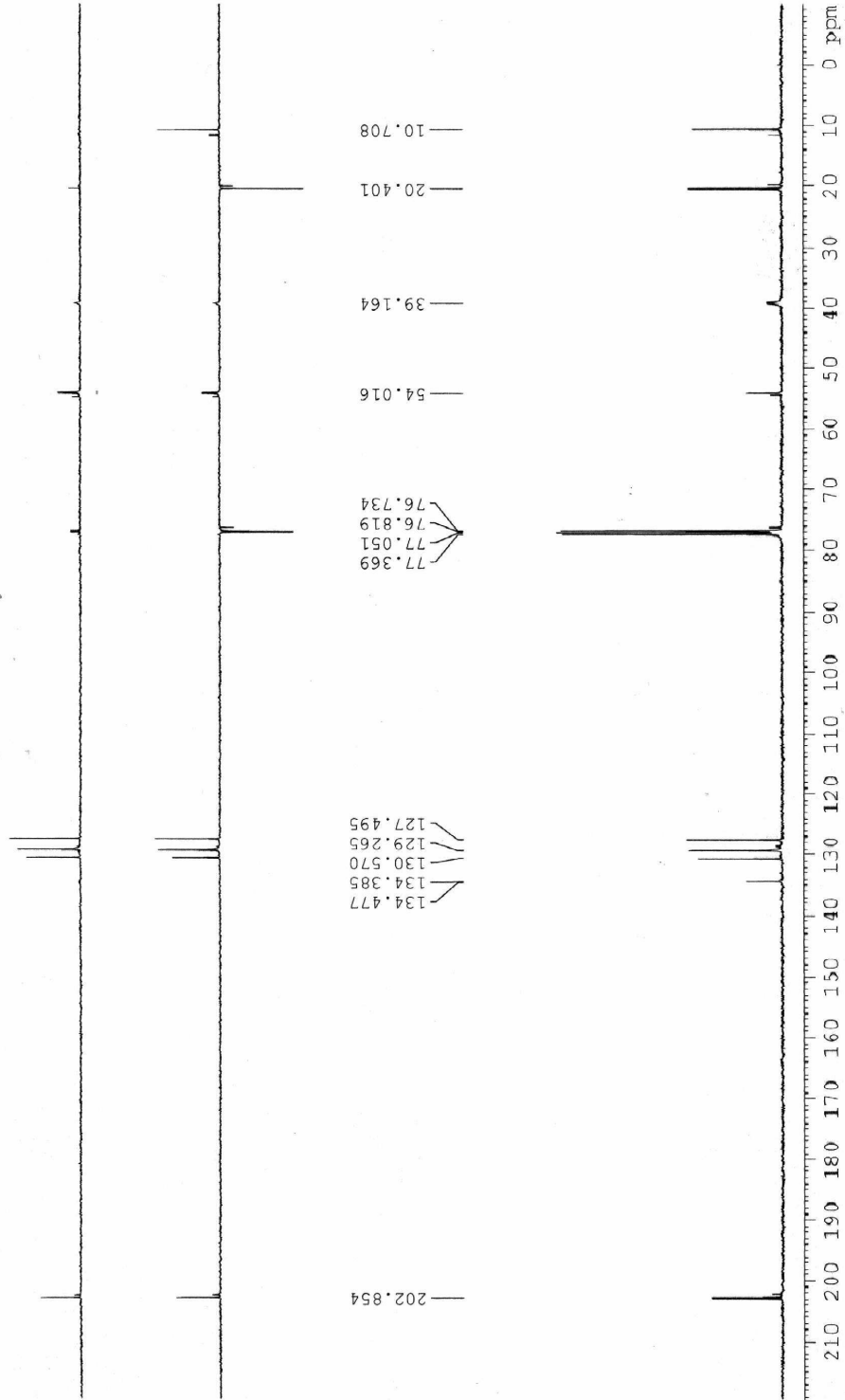


14k  
<sup>1</sup>H-NMR

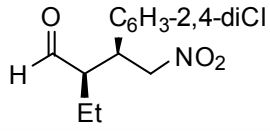




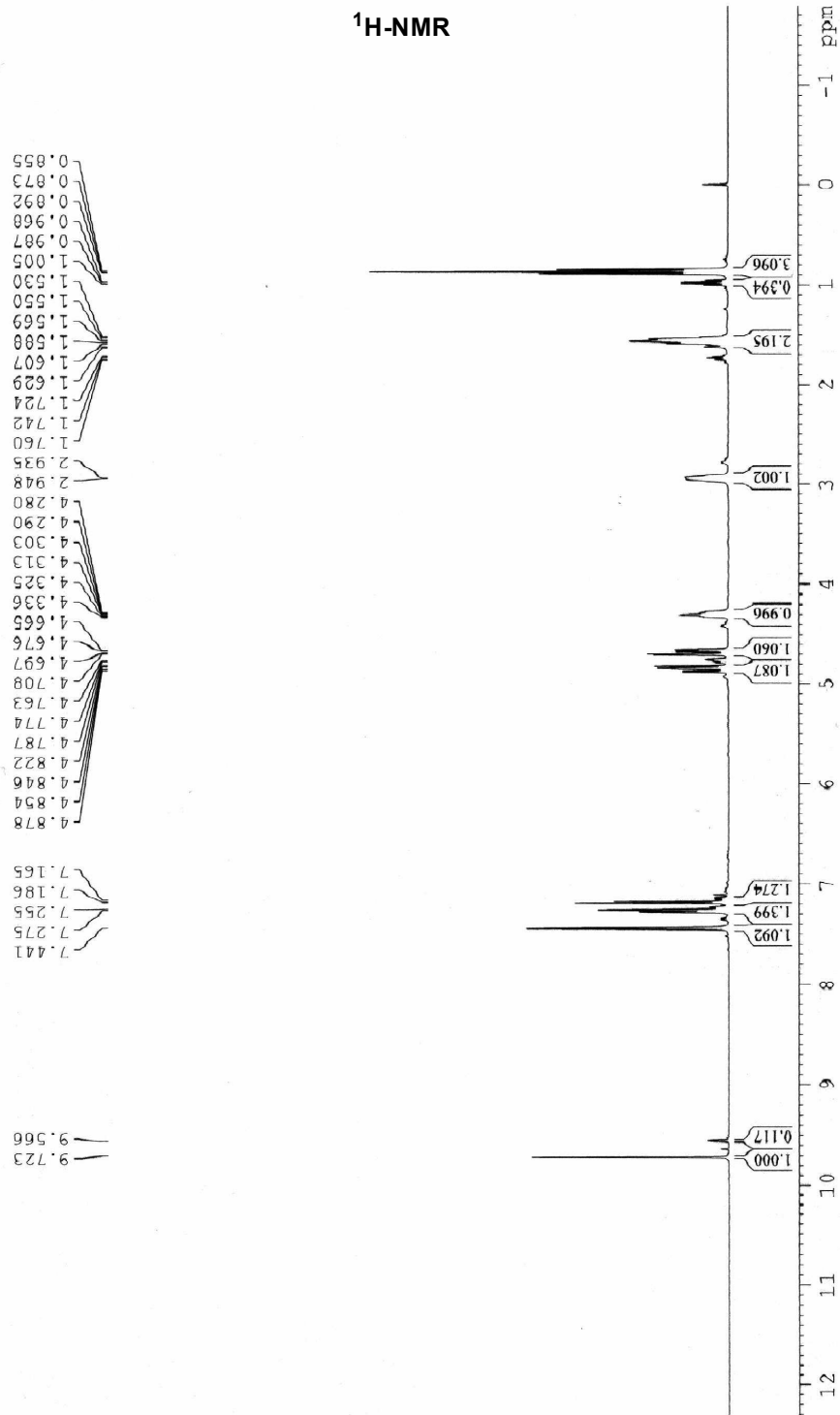
14k  
<sup>13</sup>C-NMR



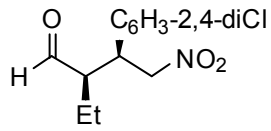
YUNNAN UNIVERSITY AVIII-400  
 J52 in CDCl3  
 307



14I  
<sup>1</sup>H-NMR

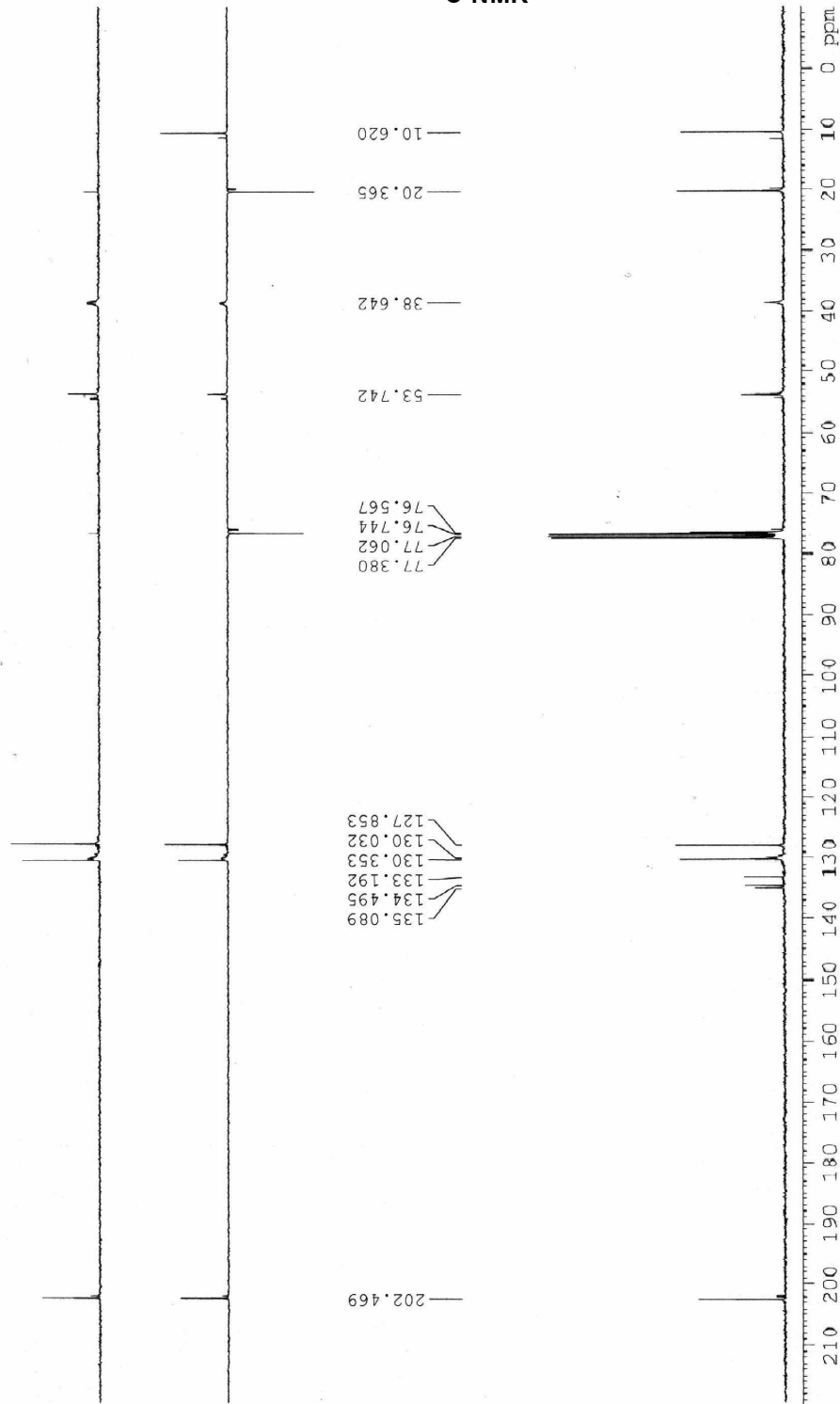


YUNNAN UNIVERSITY AVIII-400  
 J57 in CDCl<sub>3</sub>  
 336

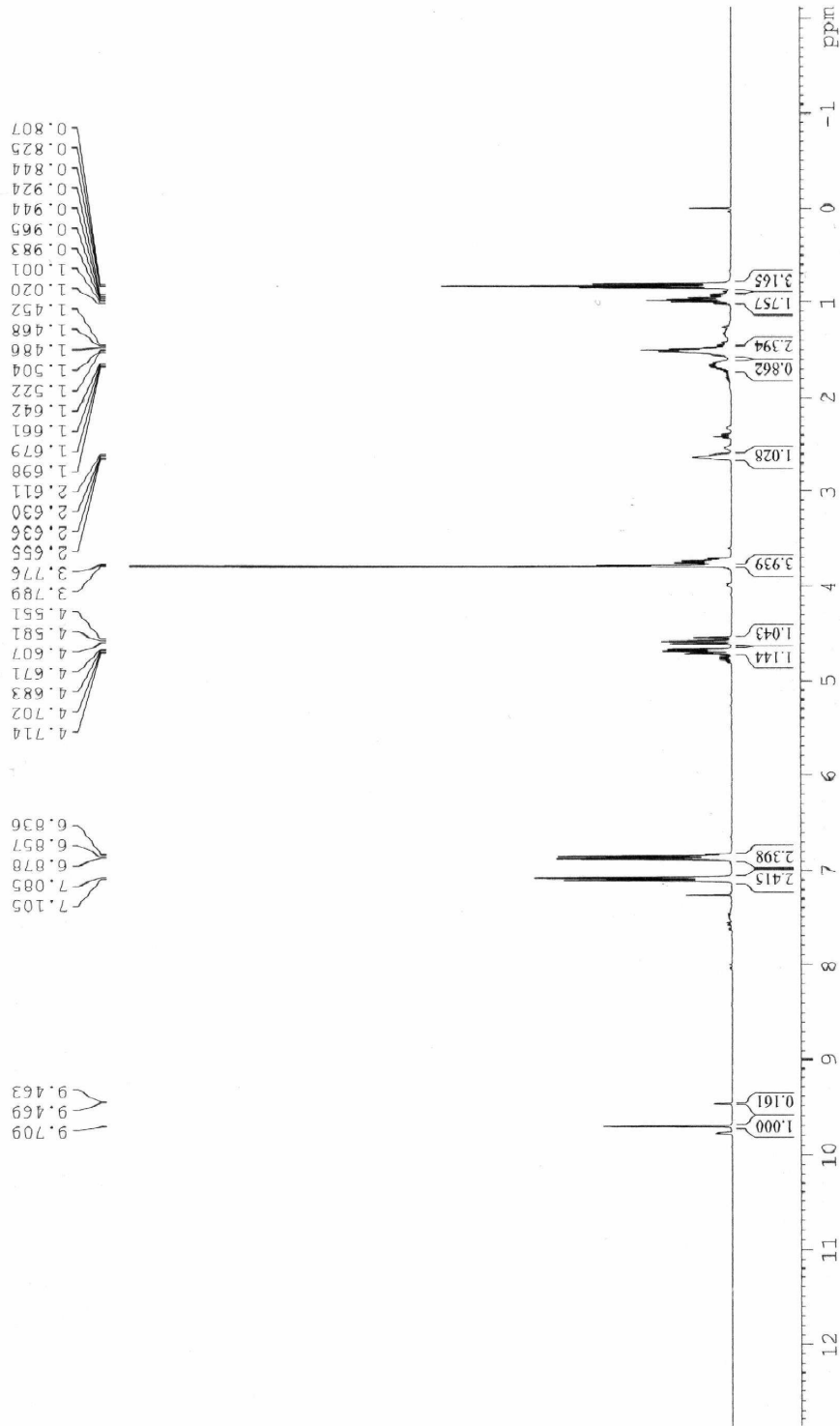
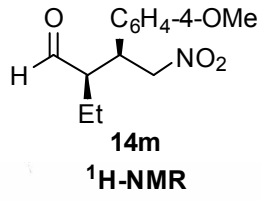


14l

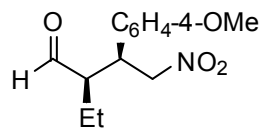
<sup>13</sup>C-NMR



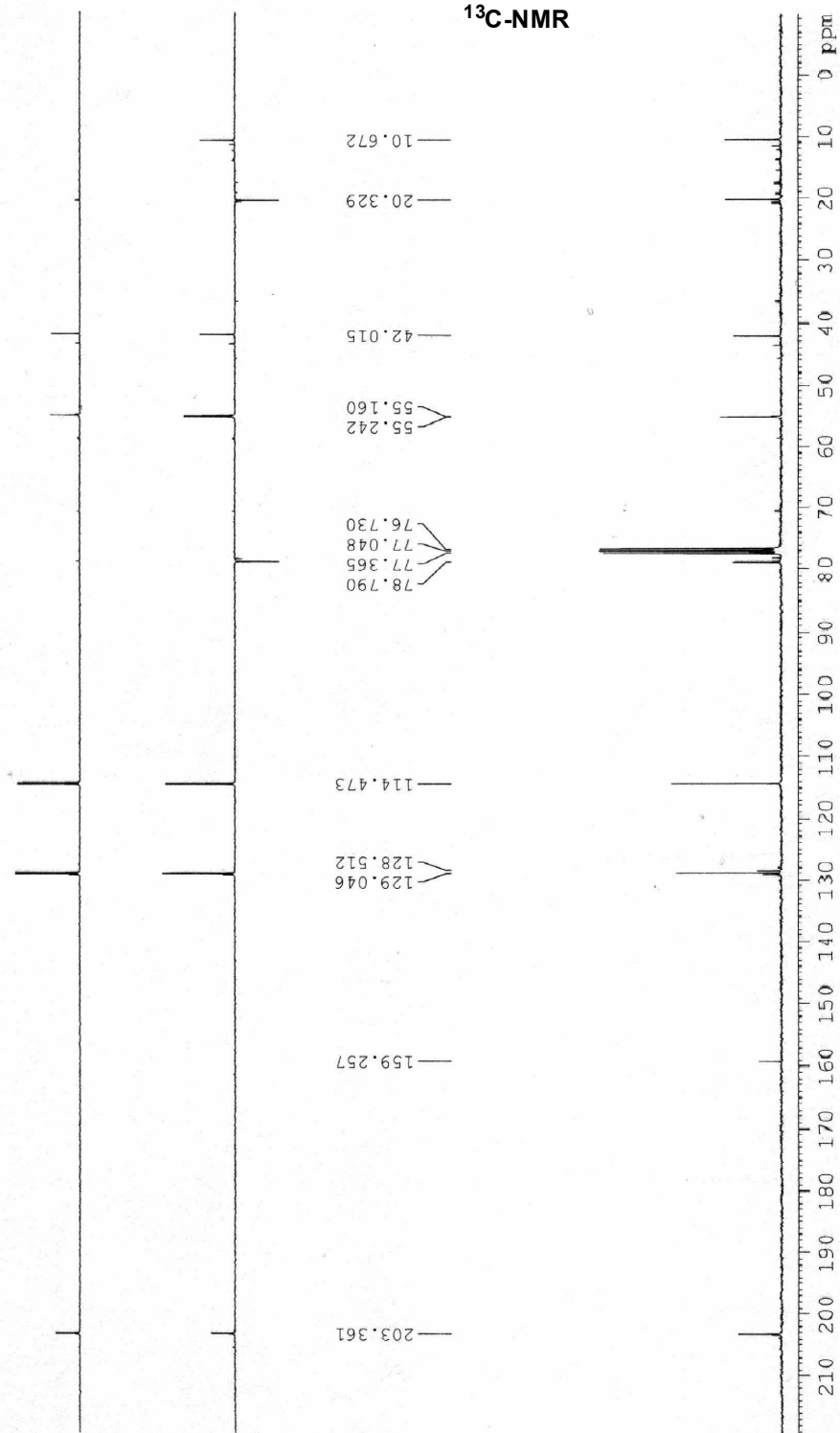
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J57 in CDCl<sub>3</sub>  
336



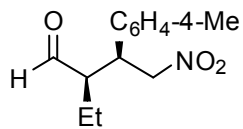
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 J53 in CDCl<sub>3</sub>  
 311



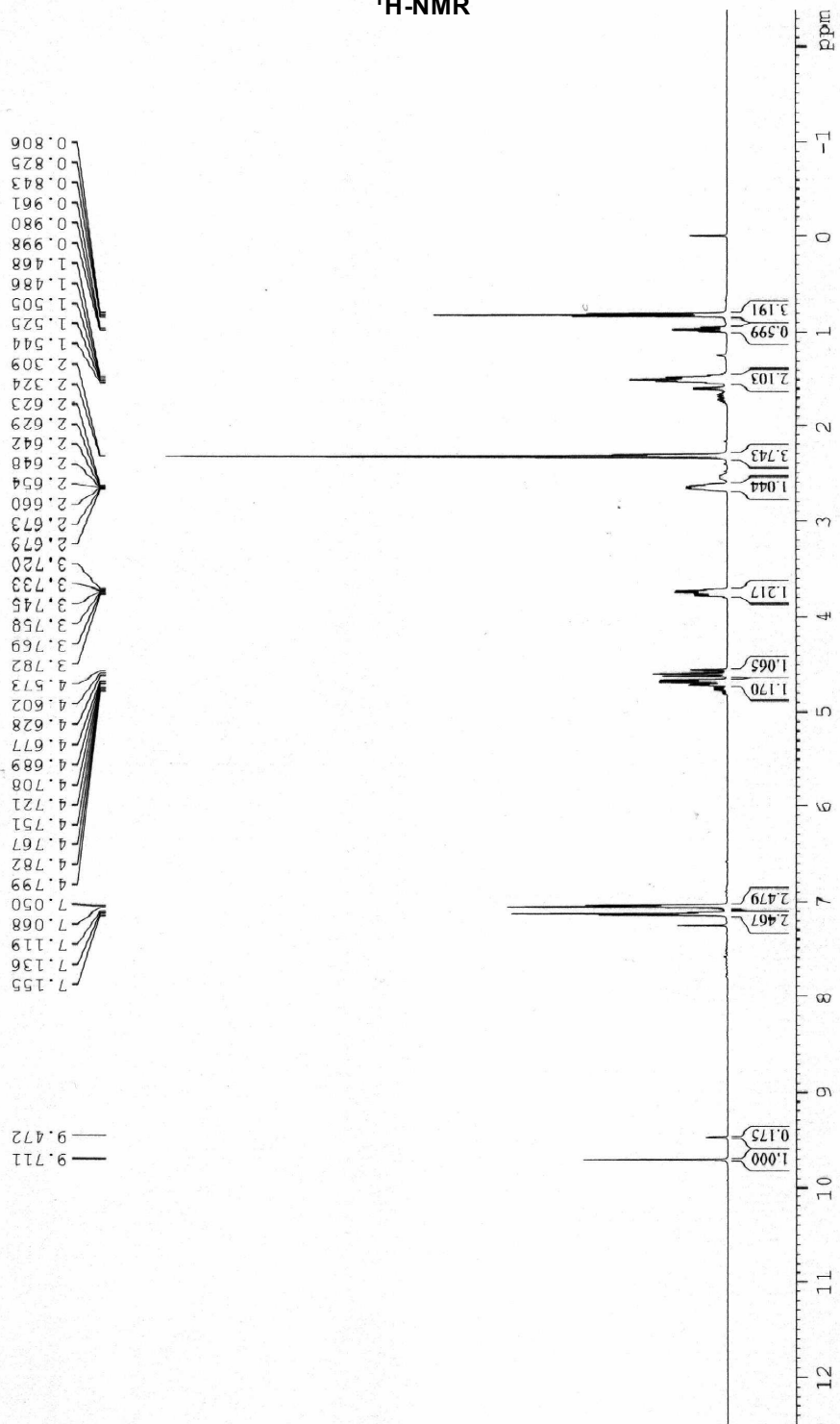
14m  
<sup>13</sup>C-NMR



YUNNAN UNIVERSITY AVIII-400  
J53 in CDCl<sub>3</sub>  
311

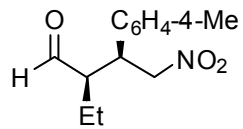


14n  
<sup>1</sup>H-NMR

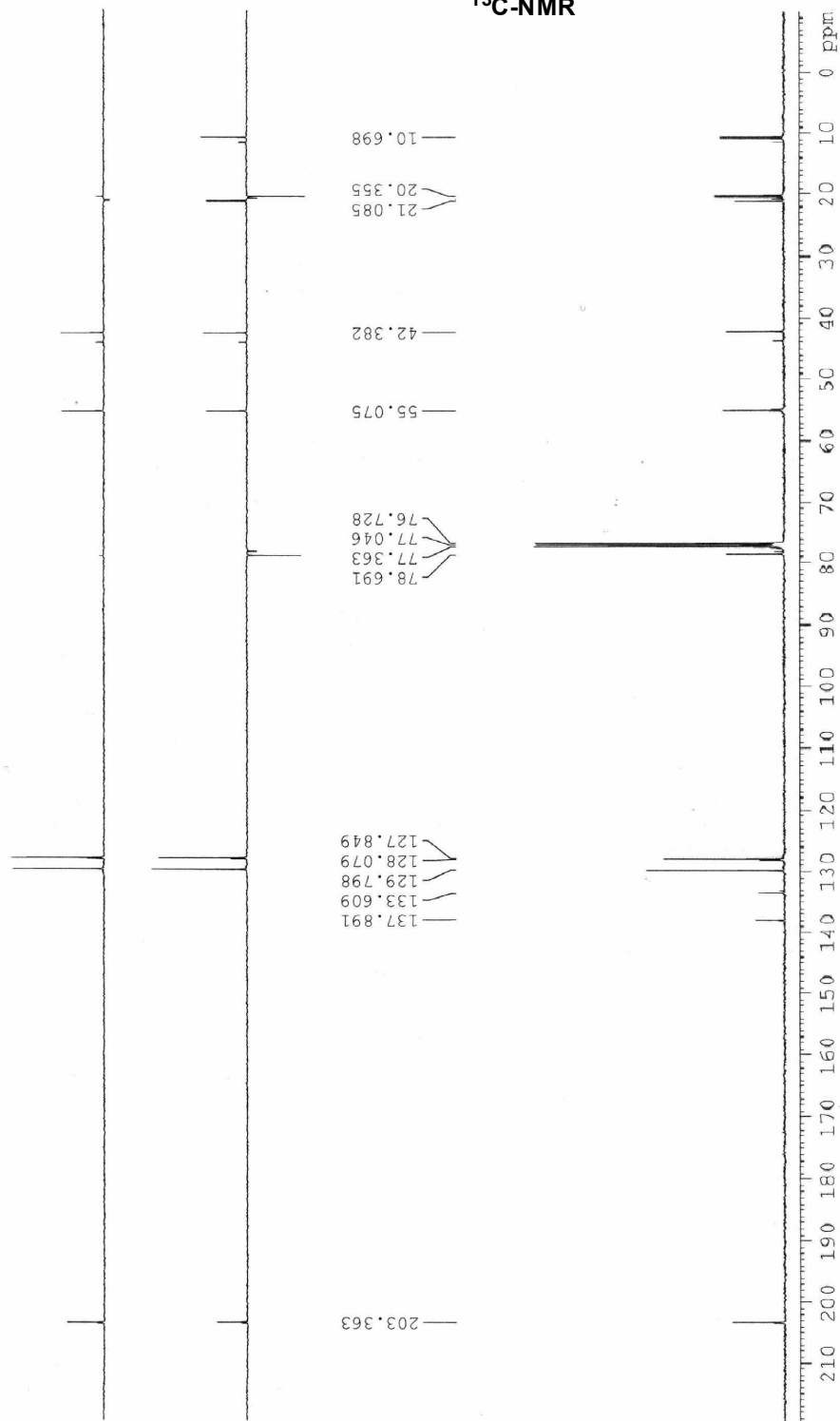


YUNNAN UNIVERSITY AVIII-400  
 J58 in CDCl3  
 340

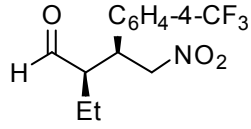




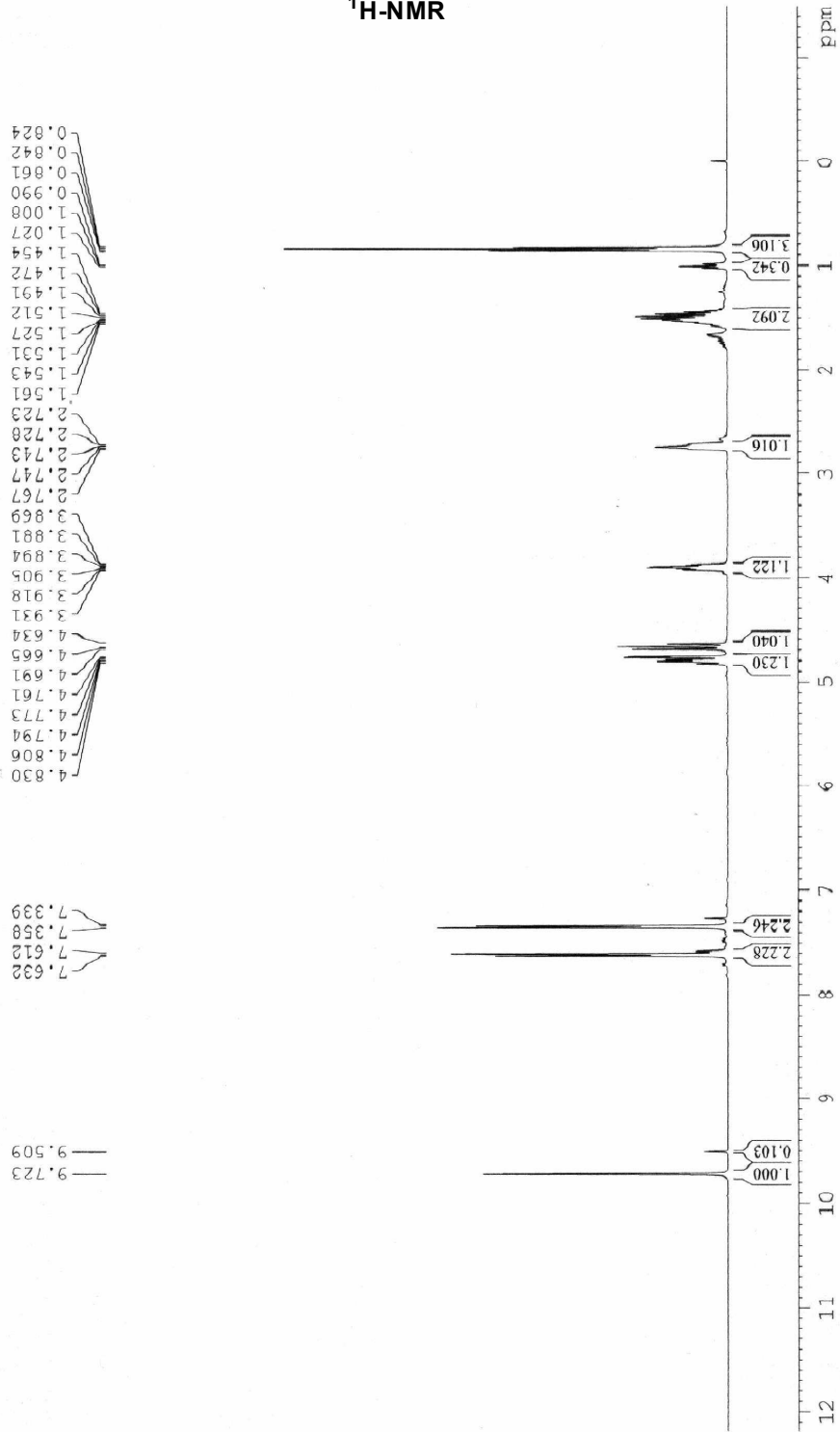
14n  
<sup>13</sup>C-NMR

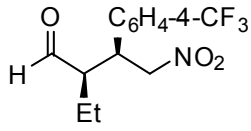


YUNNAN UNIVERSITY AVIII-000  
 J58 in CDCl<sub>3</sub>  
 340



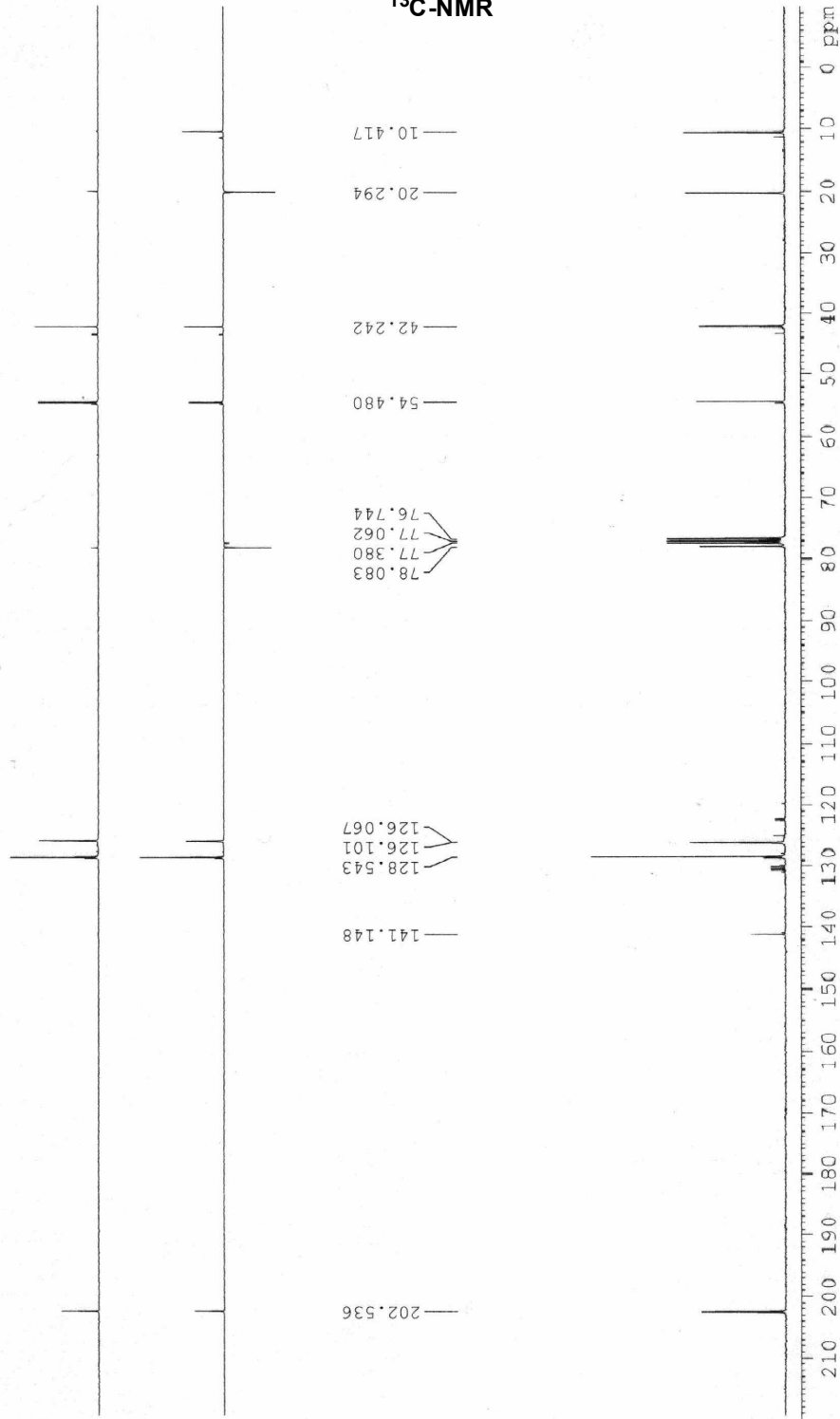
14o  
<sup>1</sup>H-NMR

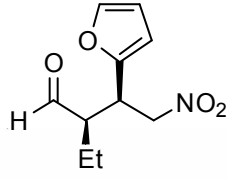




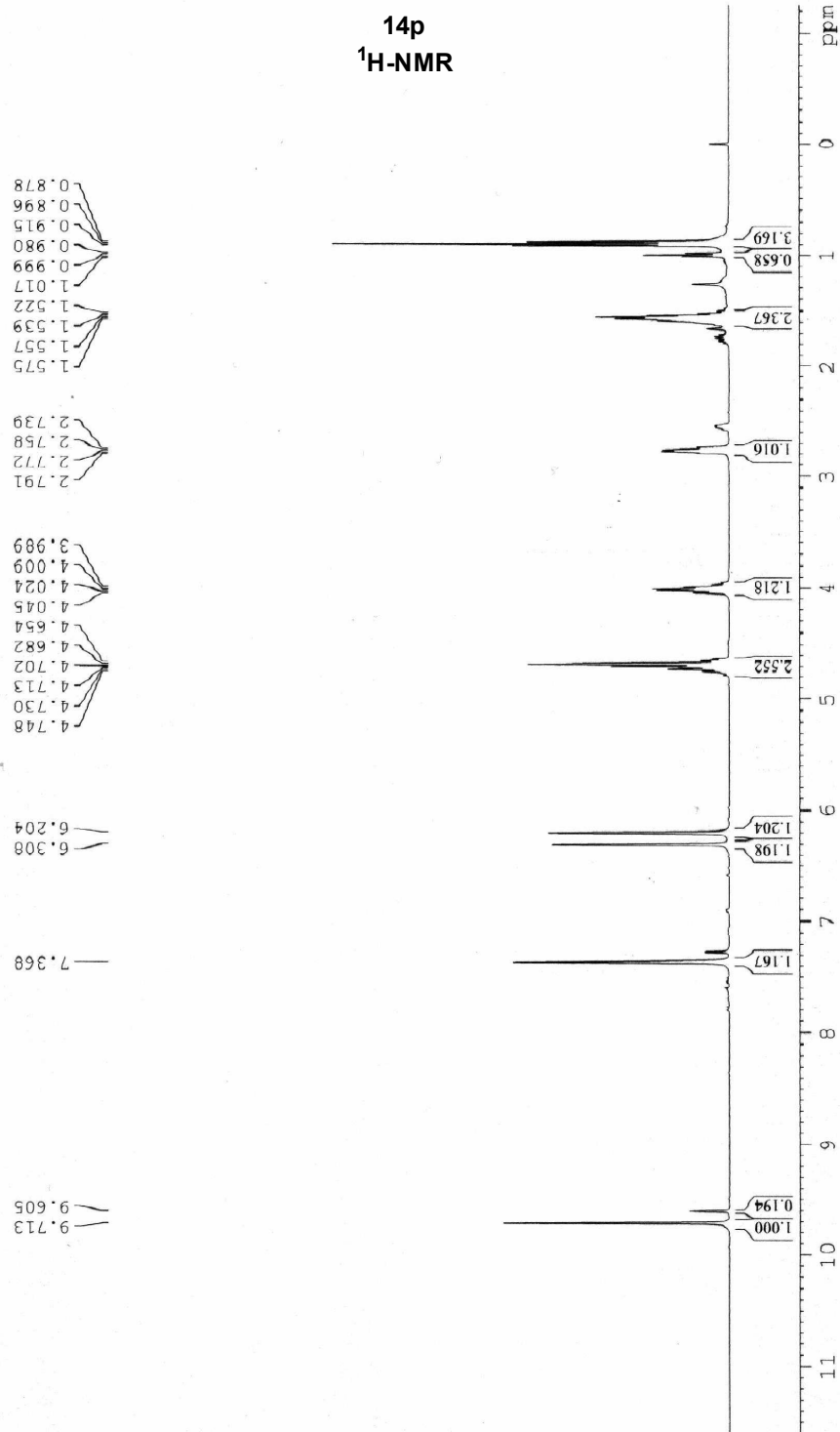
14o  
<sup>13</sup>C-NMR

YUNNAN UNIVERSITY AVIII-400  
 J59 in CDCl<sub>3</sub>  
 344

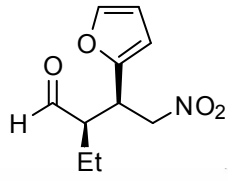




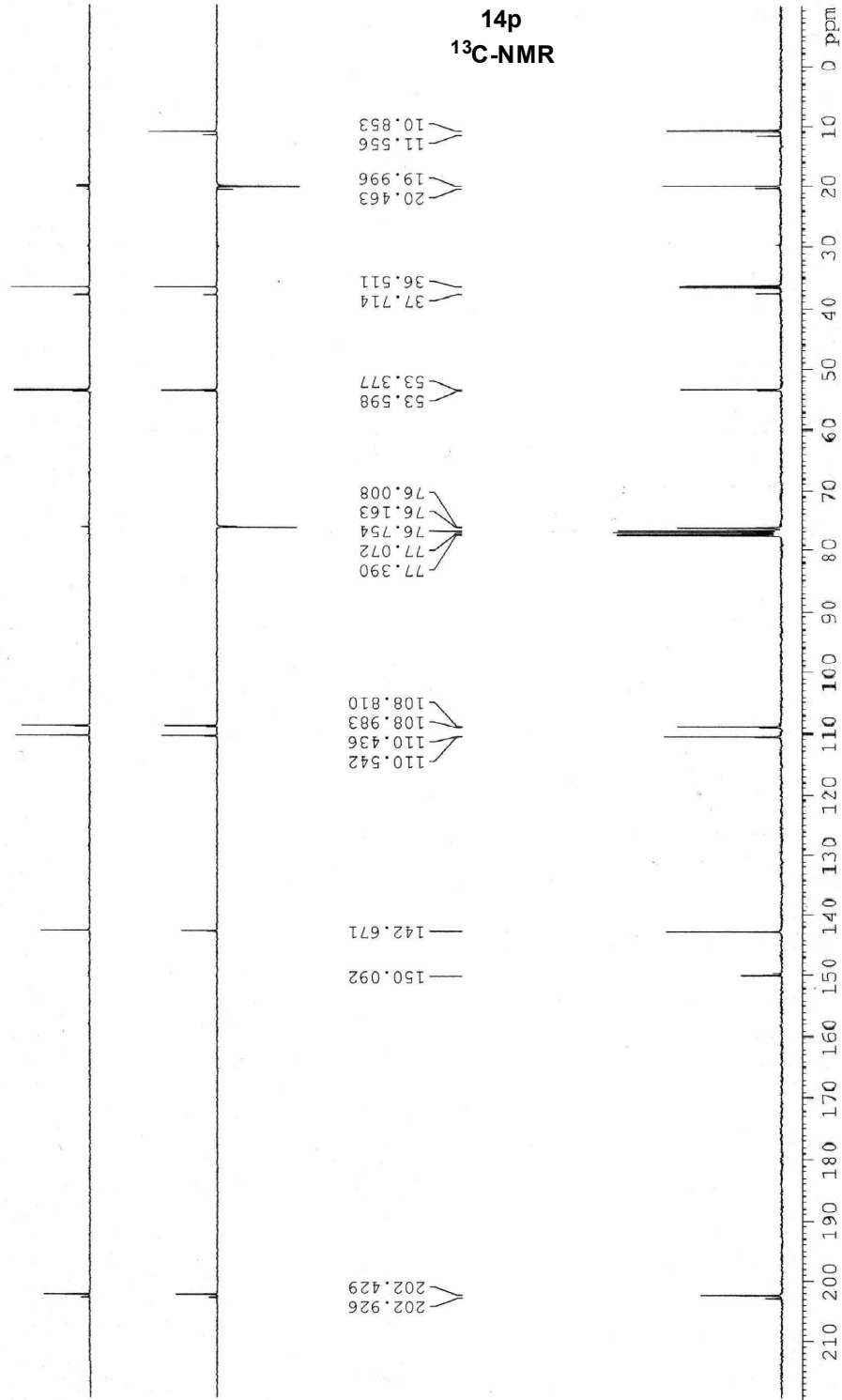
14p  
<sup>1</sup>H-NMR



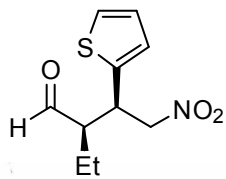
YUNNAN UNIVERSITY AVIIL-400  
 J56 in CDCl3  
 332



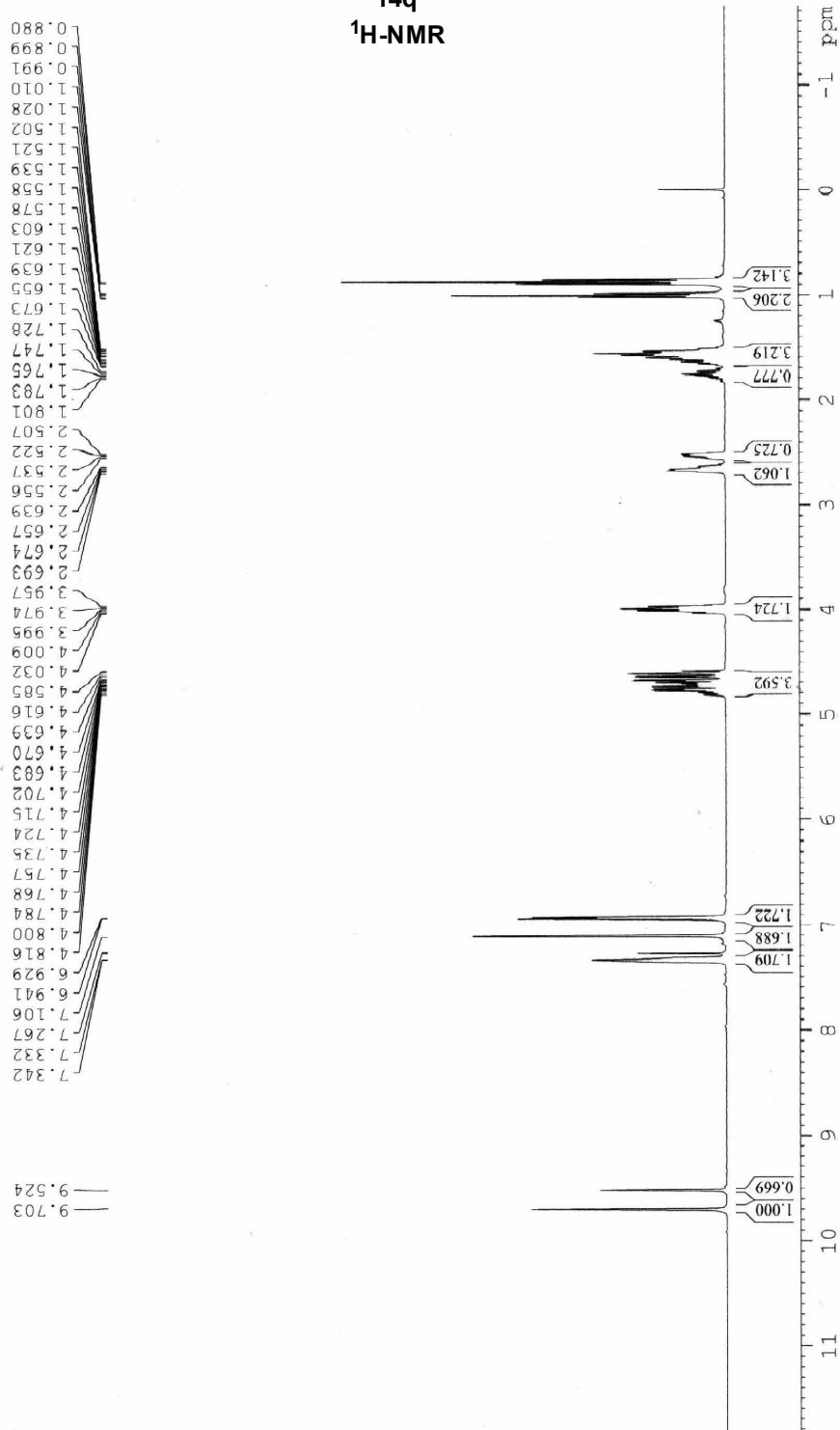
**14p**  
**<sup>13</sup>C-NMR**



YUNNAN UNIVERSITY AVIII-400  
J56 in CDCl3  
332

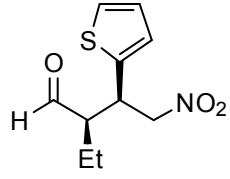


14q  
<sup>1</sup>H-NMR

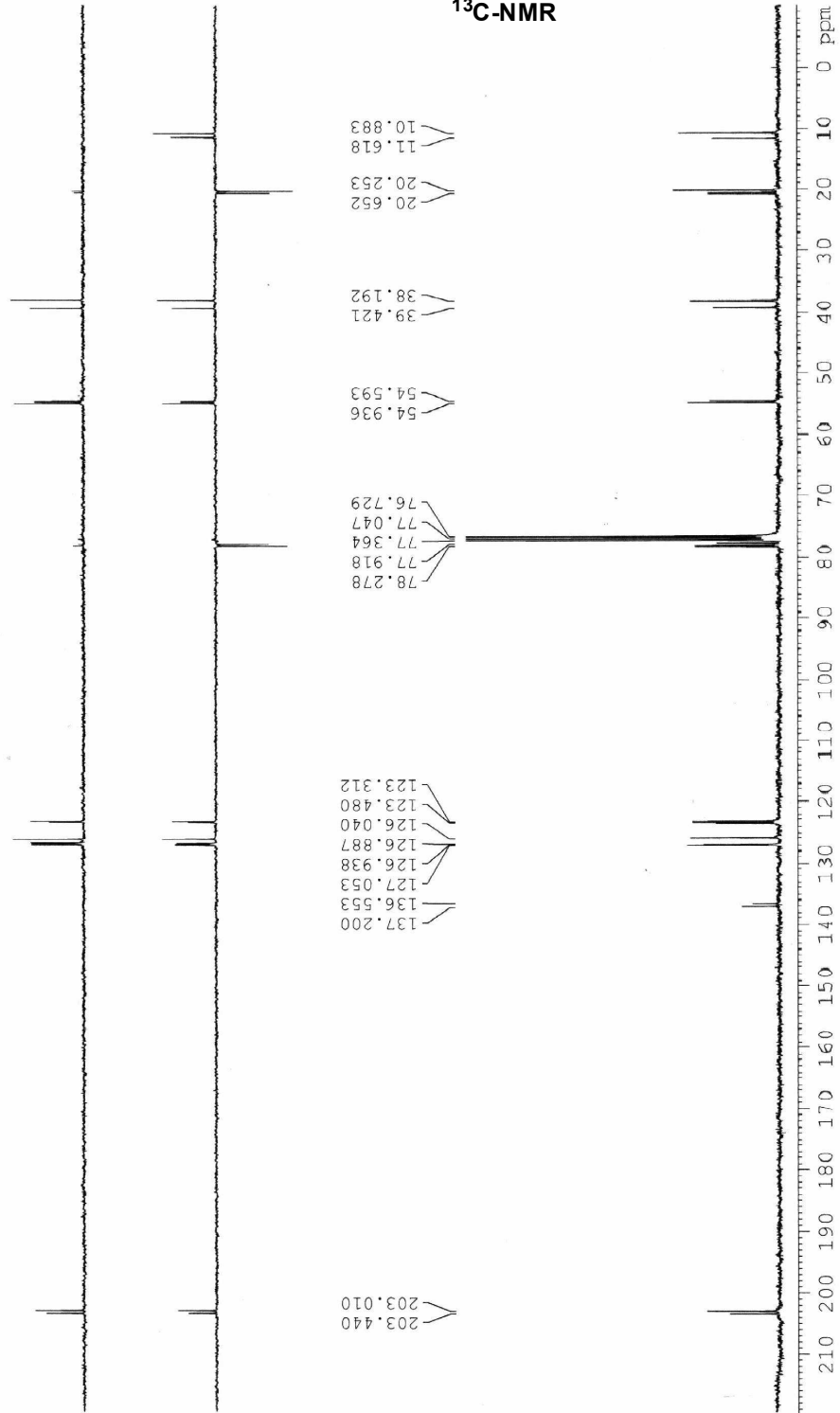


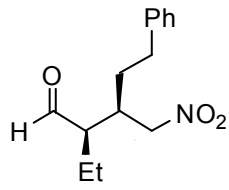
YUNNAN UNIVERSITY AVIII-400  
 J55 in CDCl3  
 328

YUNNAN UNIVERSITY AVIII-400  
J55 in CDCl3  
328

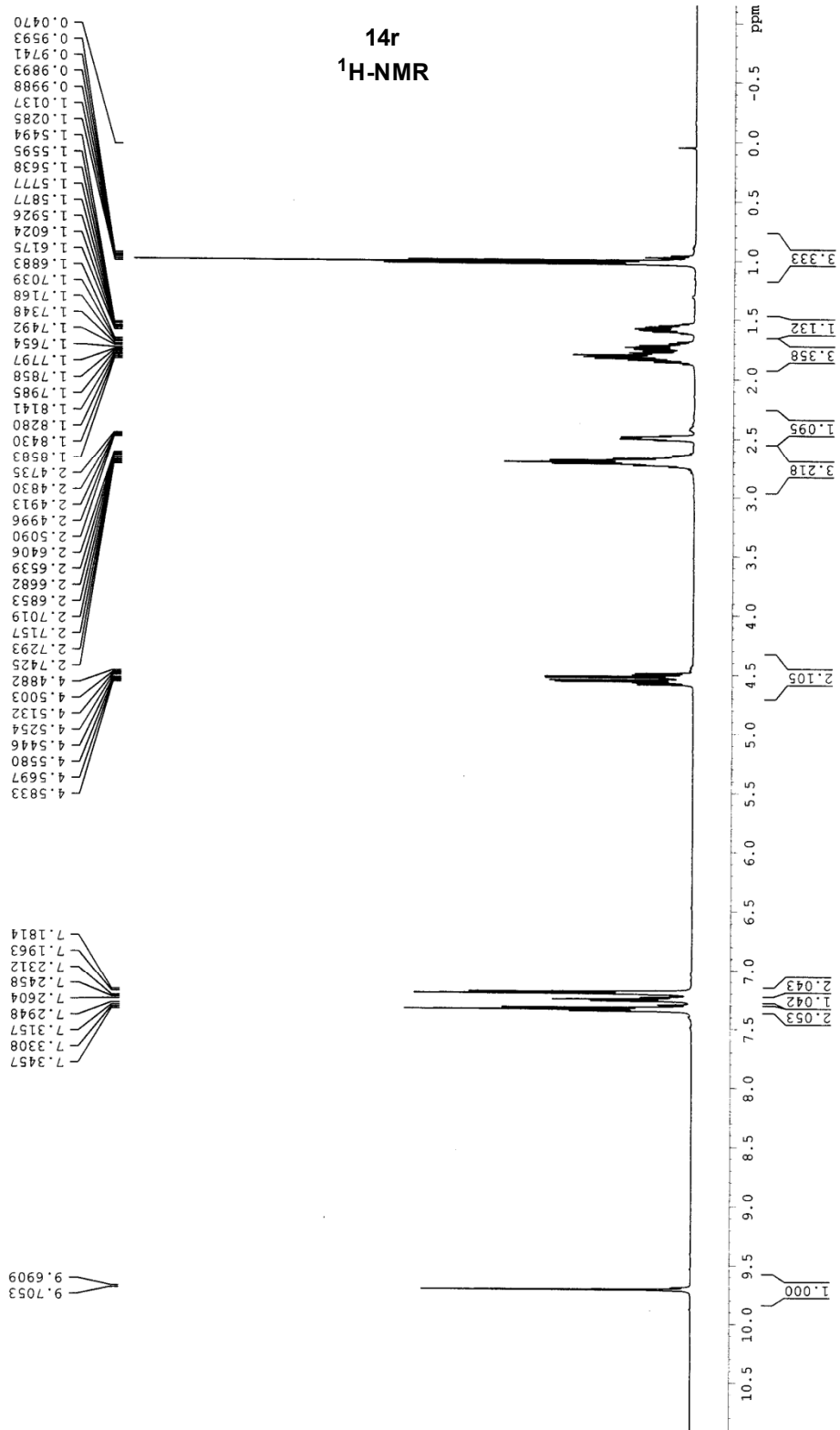


14q  
<sup>13</sup>C-NMR



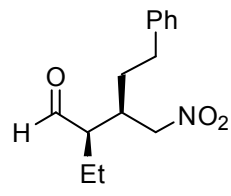


14r  
<sup>1</sup>H-NMR

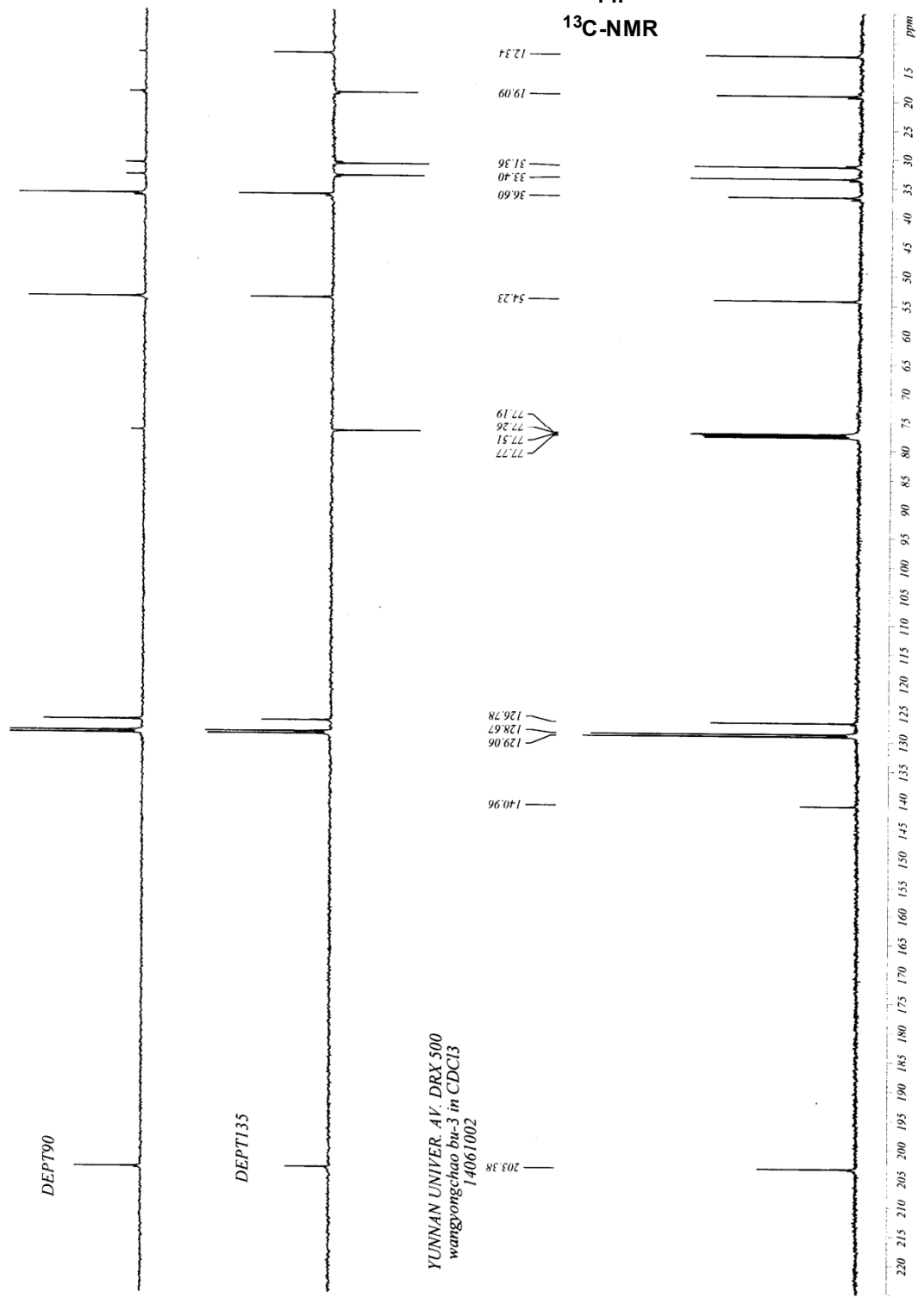


YUNNAN UNIVERSITY AV. DRX 500  
 wangyongchao bu-3 in CDCl<sub>3</sub>  
 14061002



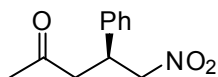


**14r**  
**<sup>13</sup>C-NMR**

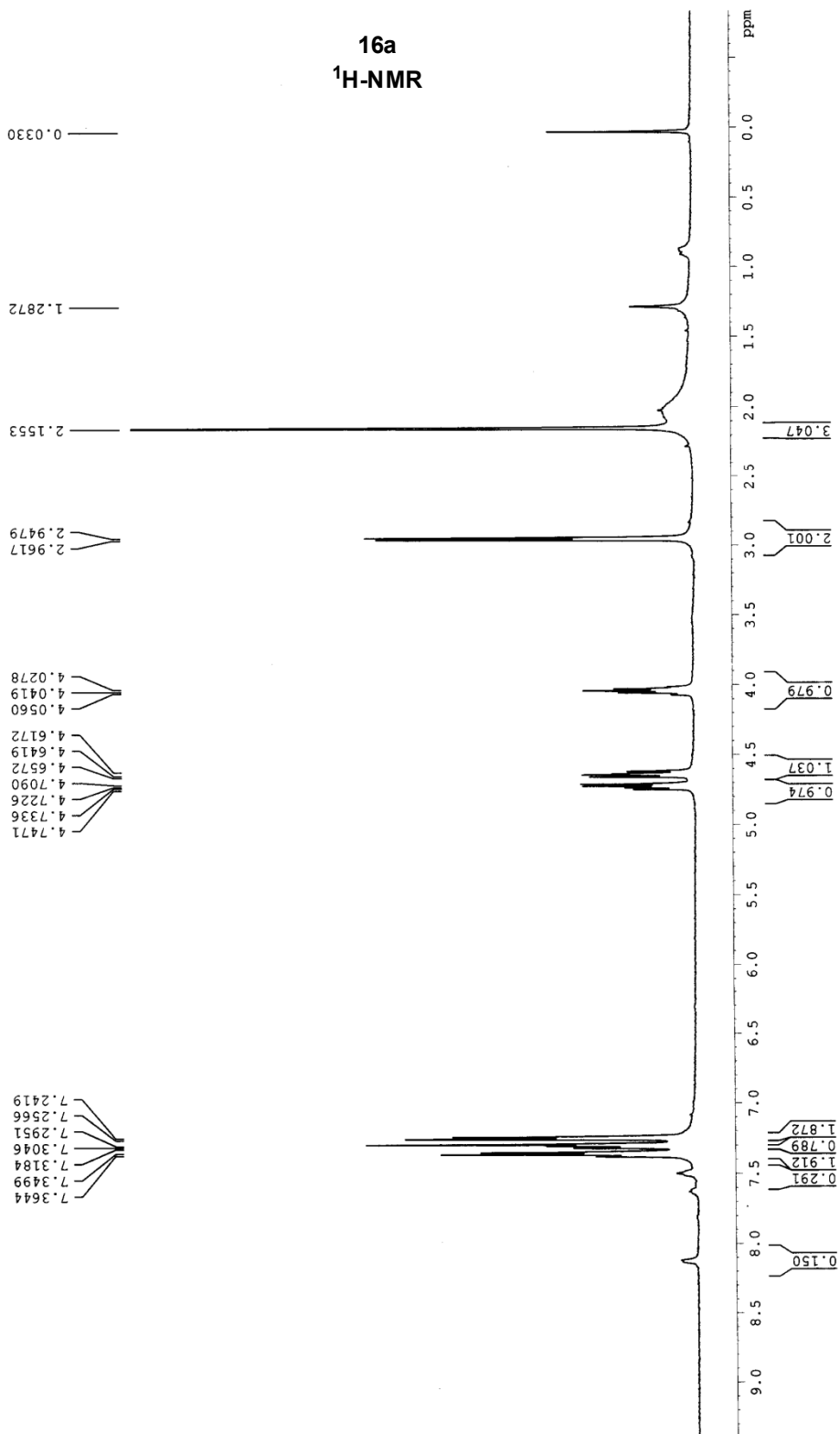


YUNNAN UNIVER. AV. DRY 500  
wangyongchao bu-3 in CDC13  
14061002

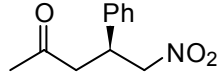
### 3. $^1\text{H}$ and $^{13}\text{C}$ NMR spectra for compounds 16a-16n.



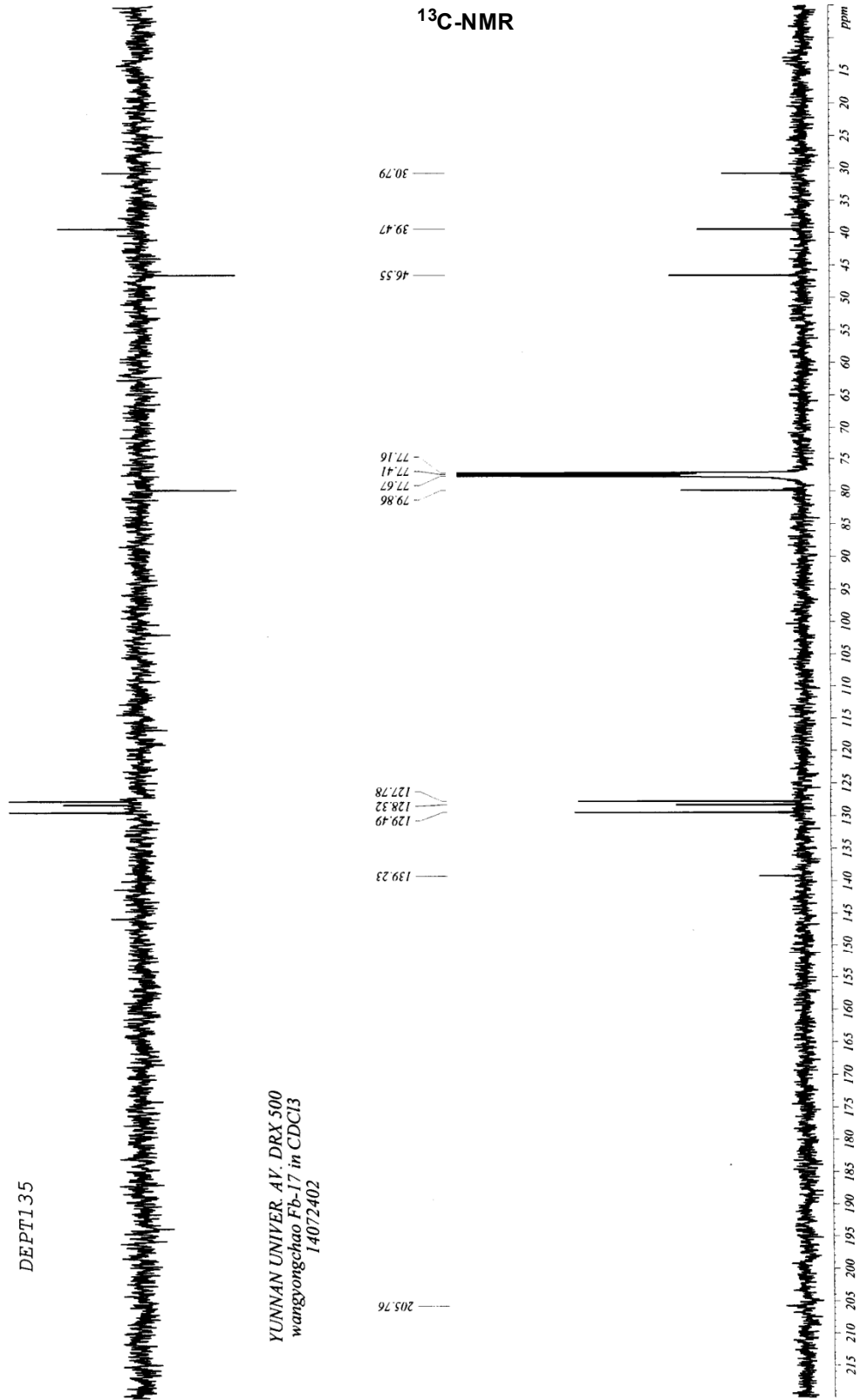
**16a**  
 **$^1\text{H}$ -NMR**

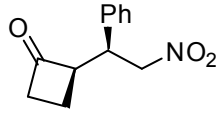


YUNNAN UNIVERSITY AV. DRX 500  
wangyongchao Fb-17 in CDCl3  
14072402

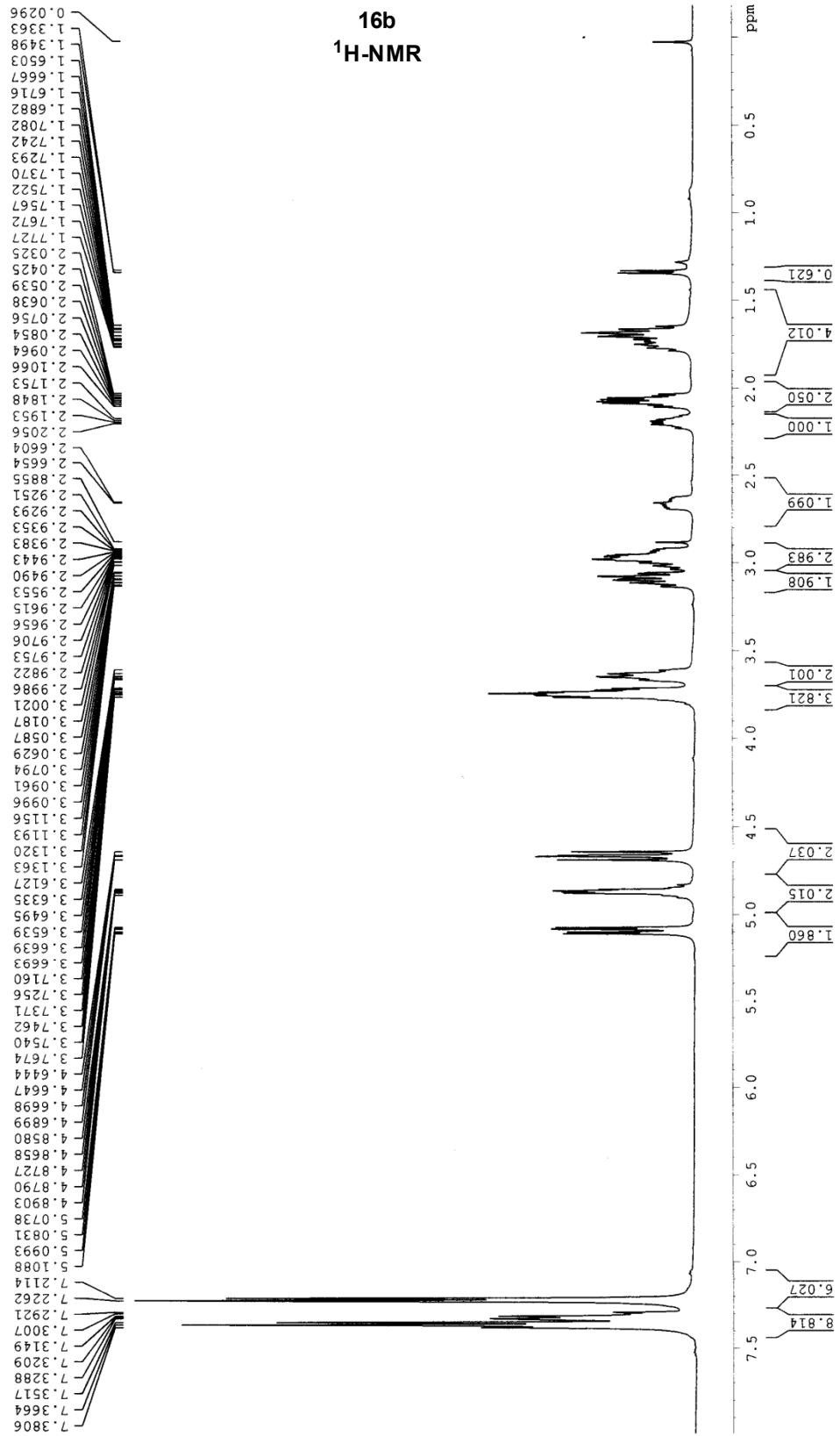


16a  
<sup>13</sup>C-NMR

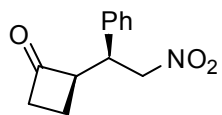




**16b**  
**<sup>1</sup>H-NMR**

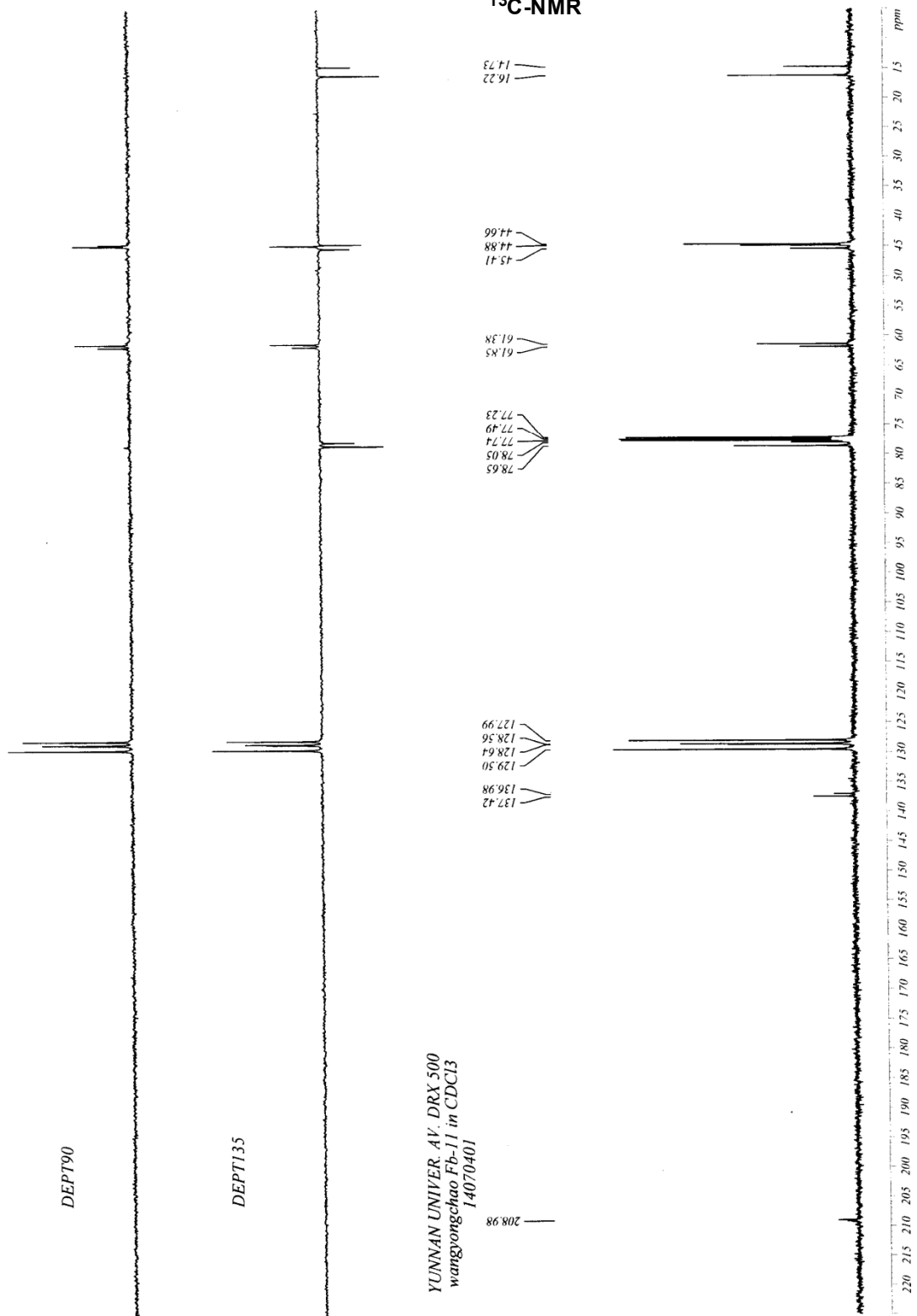


YUNNAN UNIVERSITY AV. DRX 500  
wangyongchao F6-11 in CDCl3  
14070401

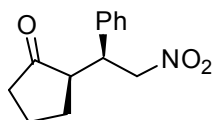


16b

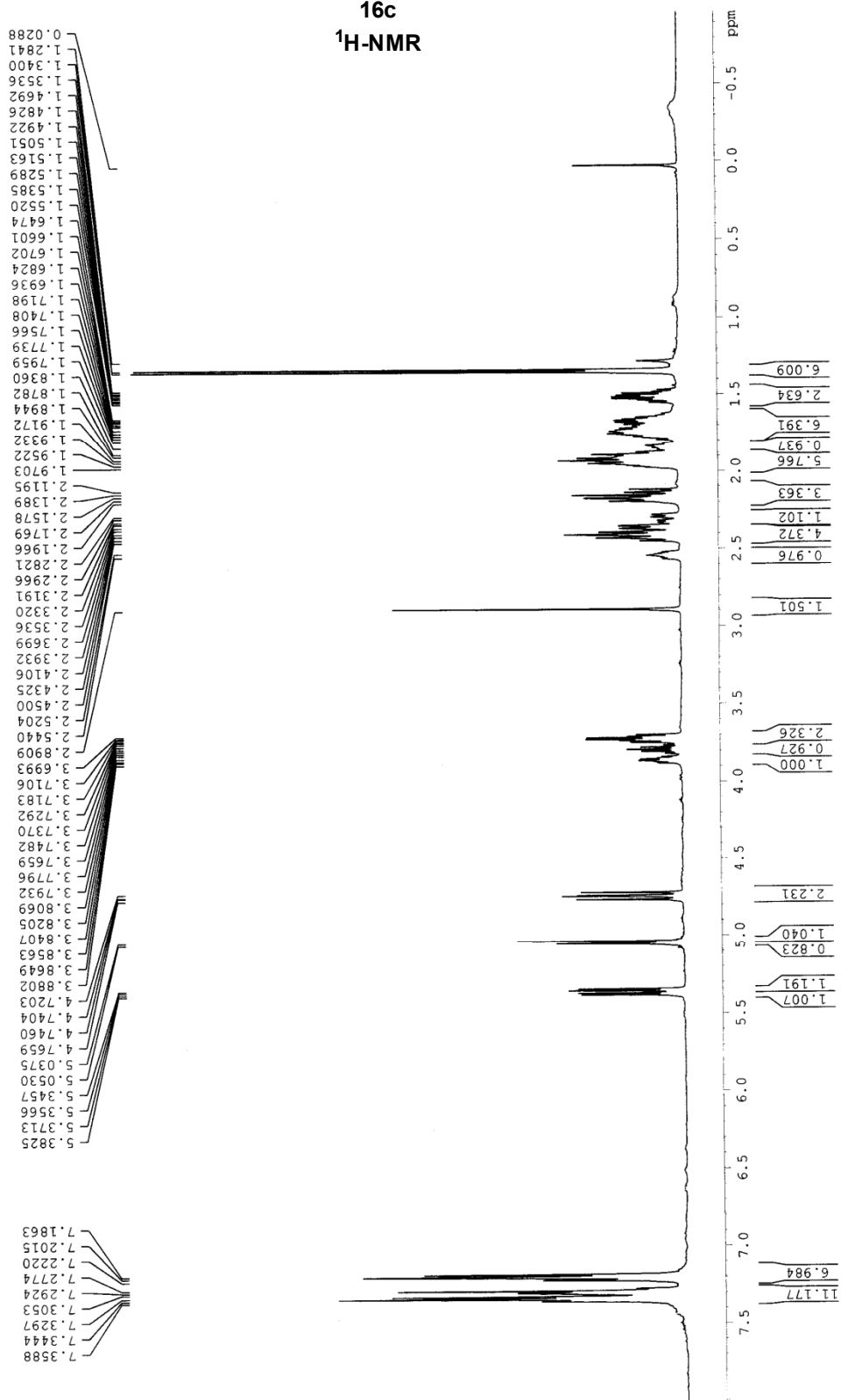
<sup>13</sup>C-NMR



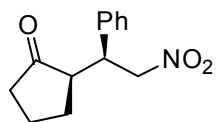
YUNNAN UNIVER. AV. DRX 500  
wangyongchao Fb-11 in CDCl3  
14070401



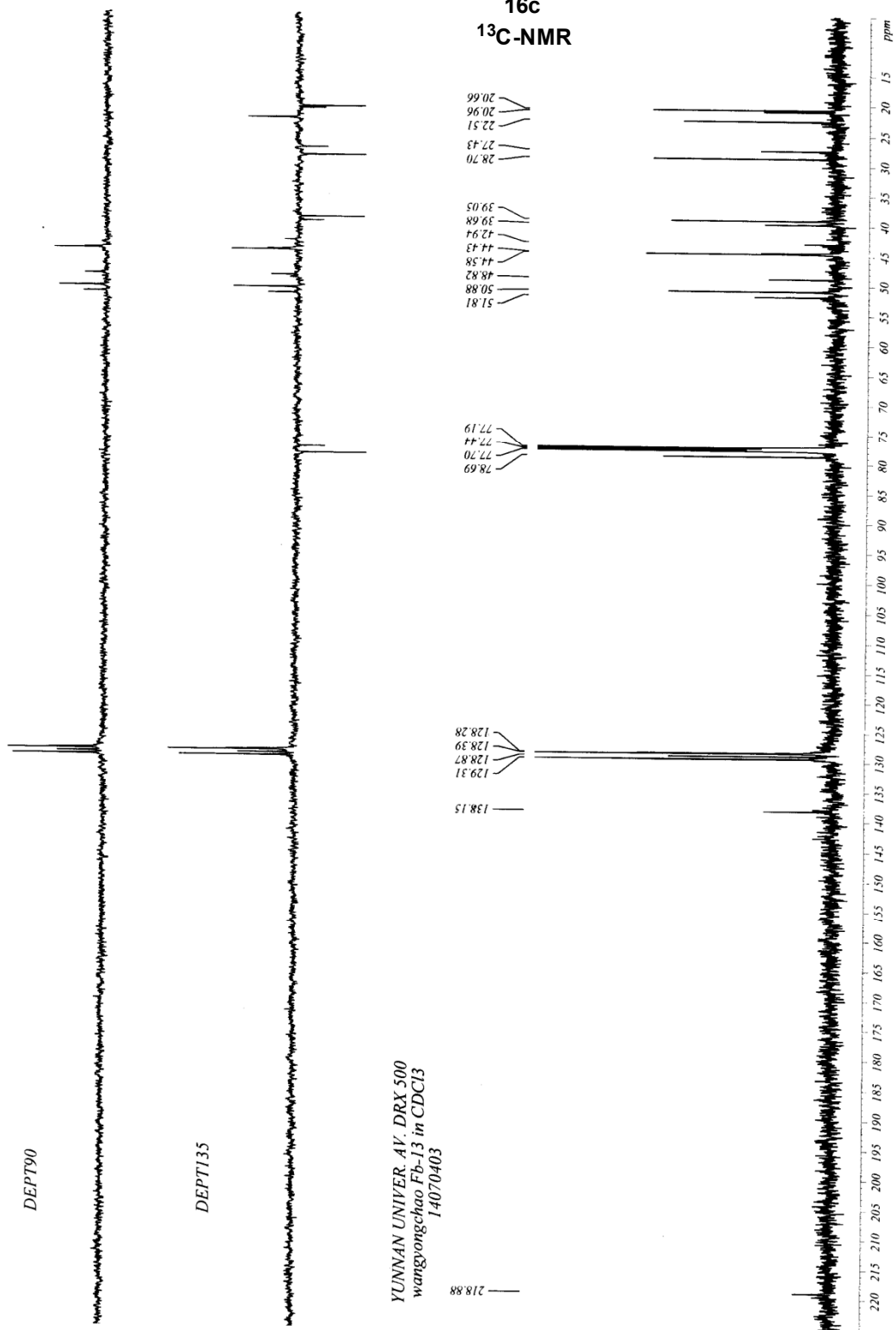
16c  
<sup>1</sup>H-NMR

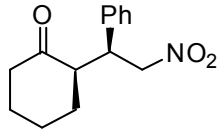


YUNNAN UNIVERSITY AV. DRX 500  
 wangyongchao F6-13 in CDCl3  
 14070403

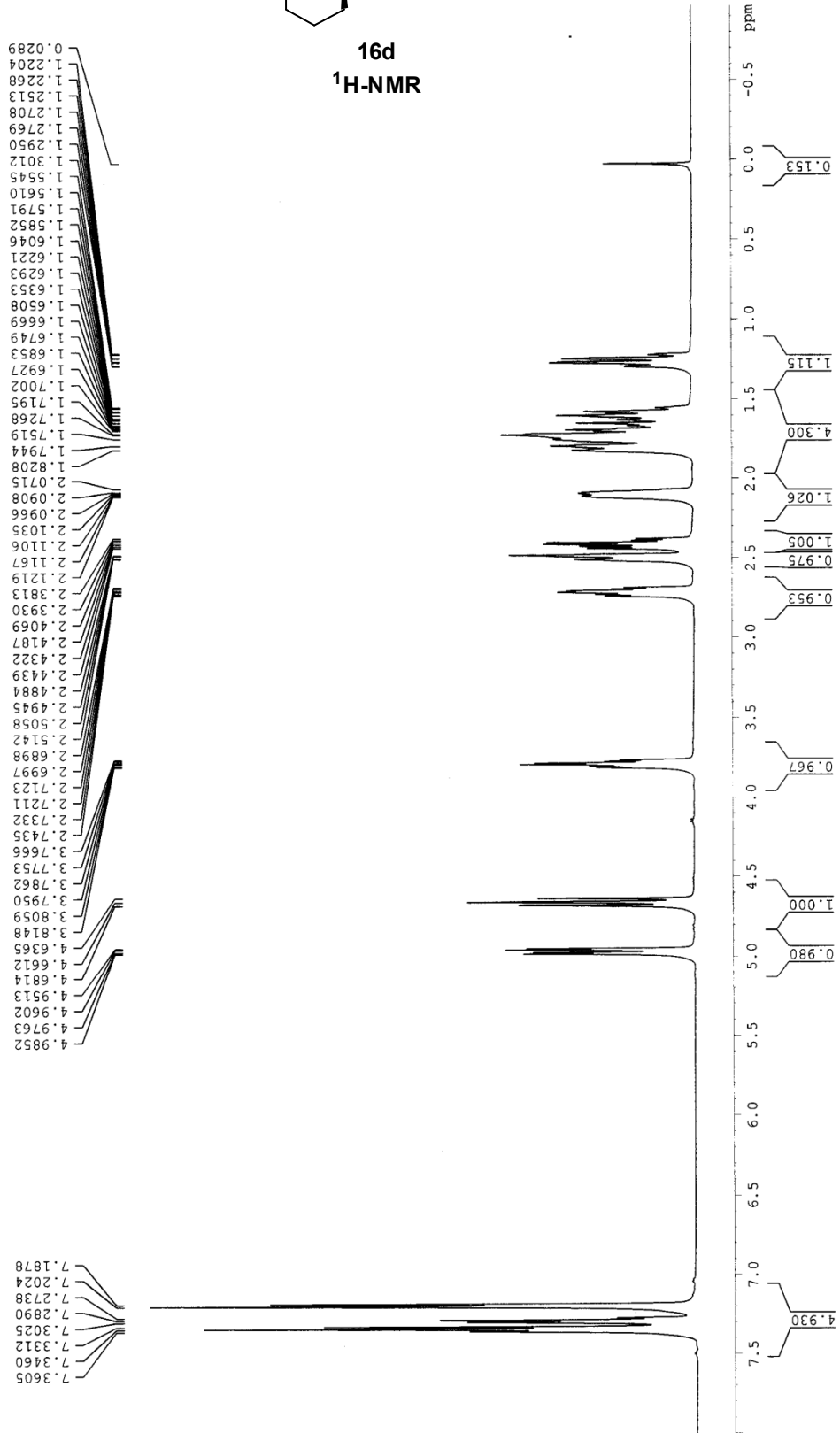


**16c**  
**<sup>13</sup>C-NMR**



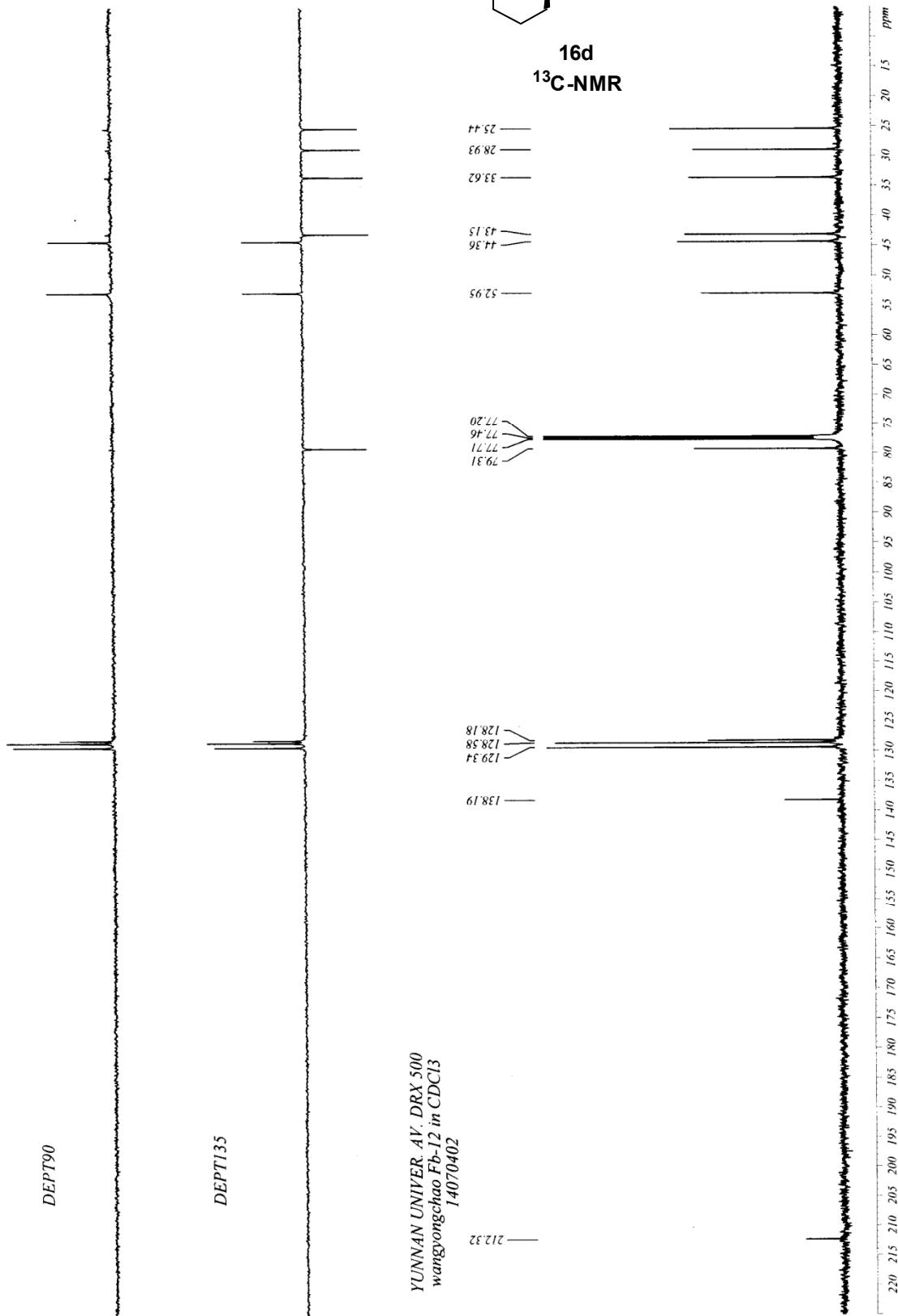


**16d**  
**<sup>1</sup>H-NMR**

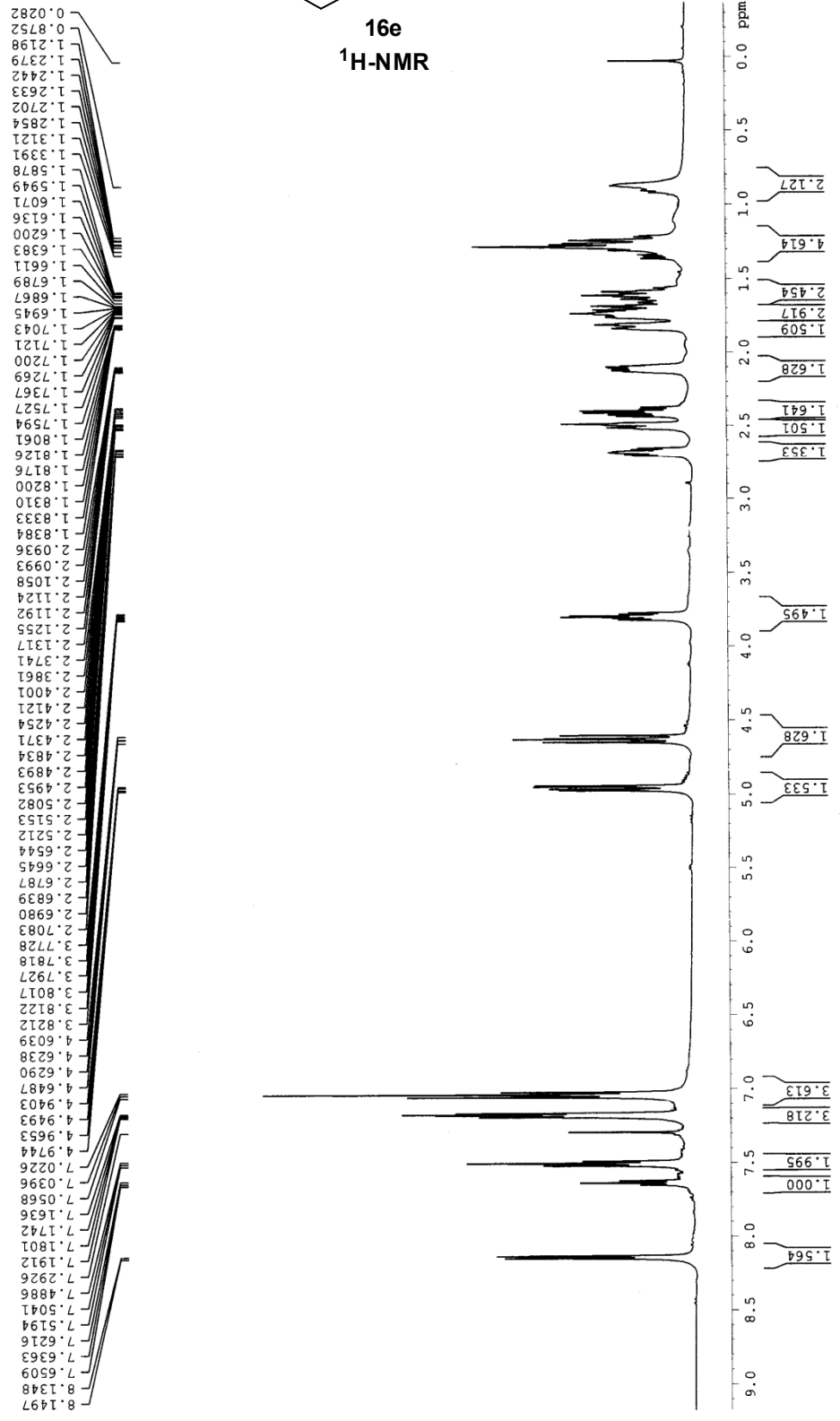
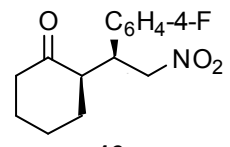


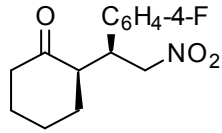
YUNNAN UNIVERSITY AV. DRX 500  
wangyongchao F6-12 in CDC13  
14070402



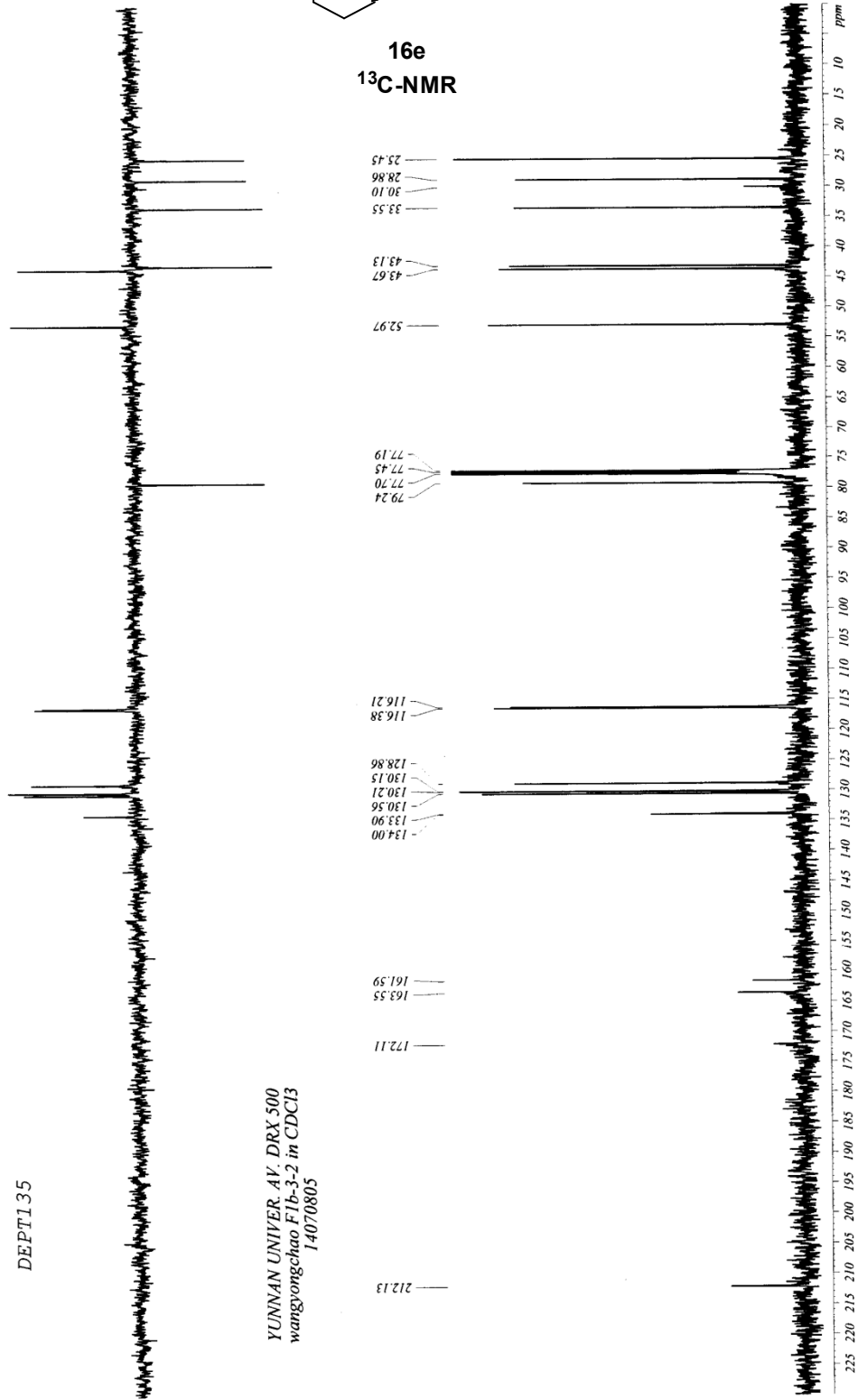


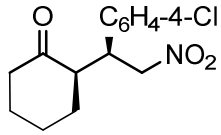
YUNNAN UNIVERSITY AV. DRX 500  
 wangyongchao Flb-3-2 in CDC13  
 14070805



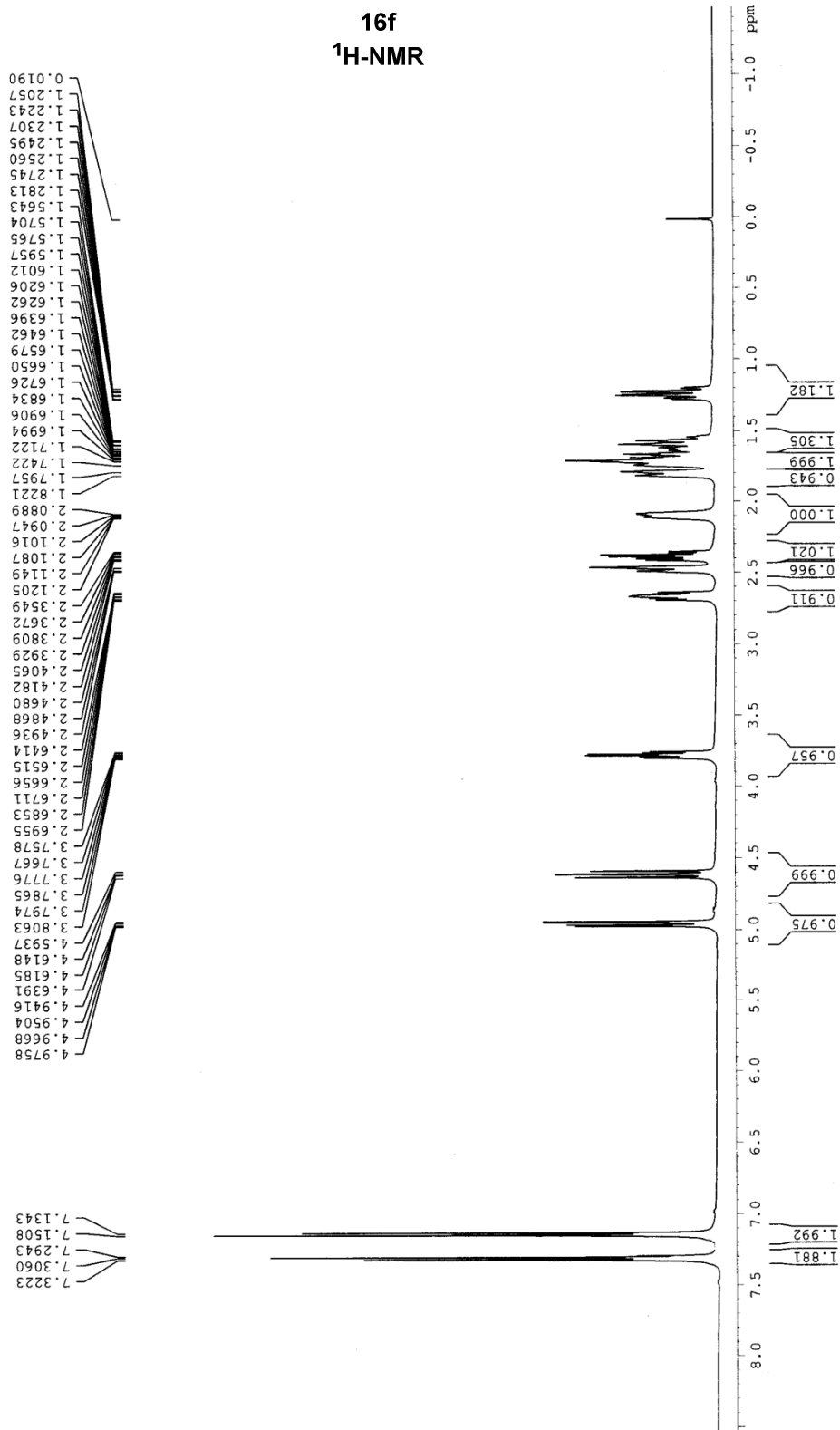


**16e**  
**<sup>13</sup>C-NMR**

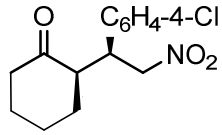




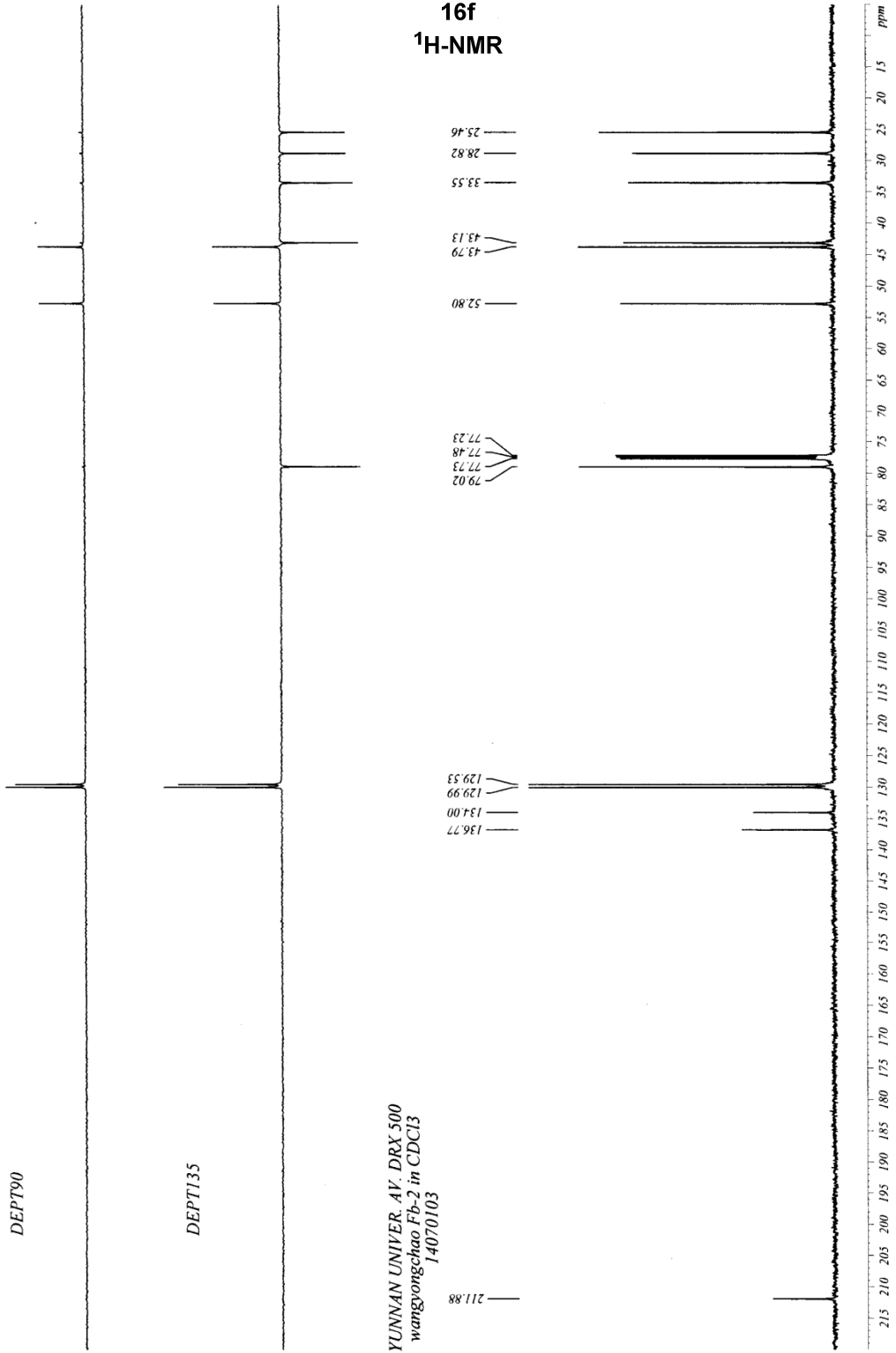
**16f**  
**<sup>1</sup>H-NMR**

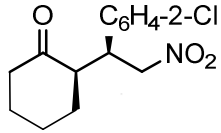


YUNNAN UNIVERSITY AV. DRX 500  
wangyongchao Fb-2 in CDCl3  
14070103

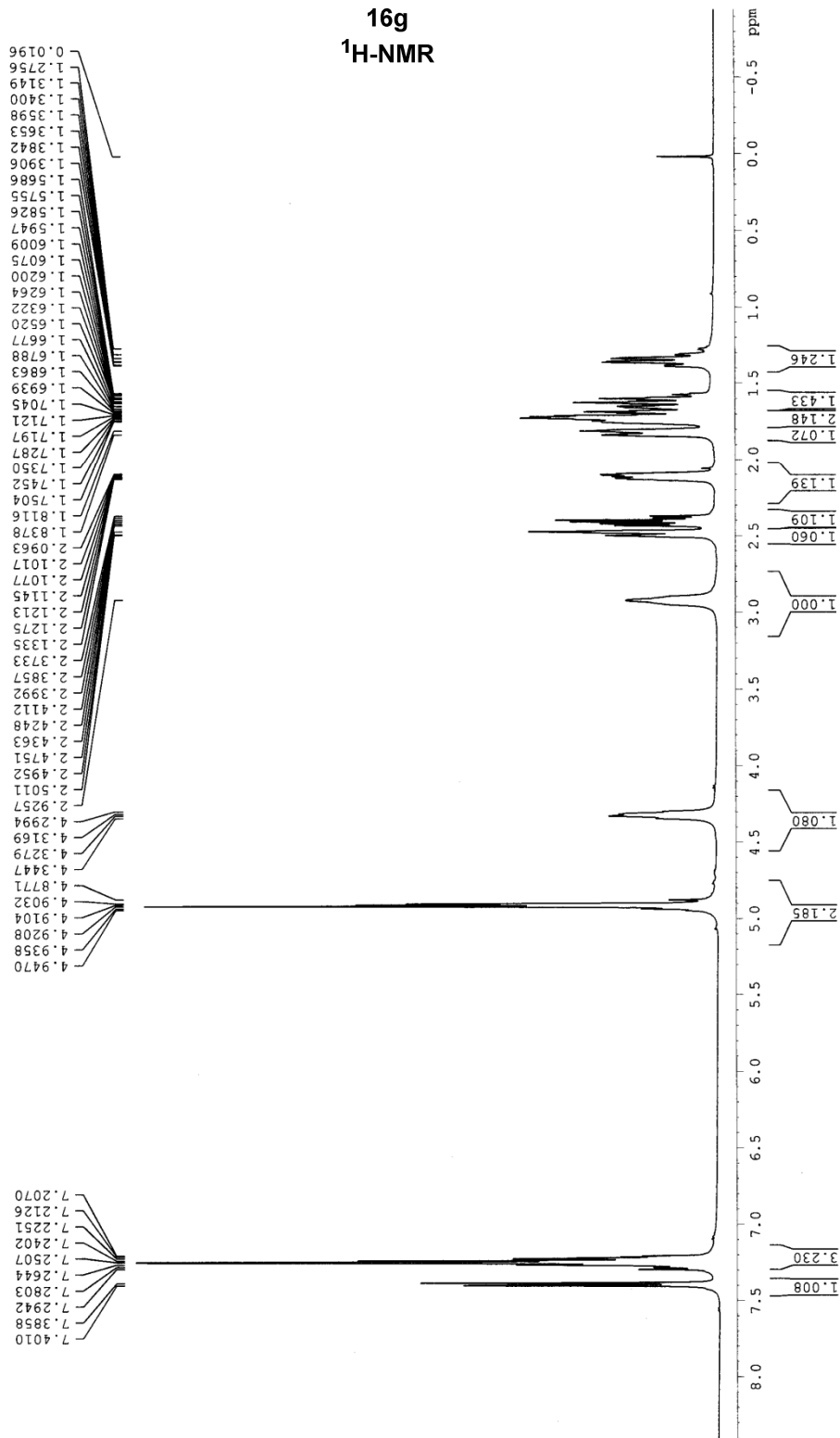


**16f**  
**<sup>1</sup>H-NMR**

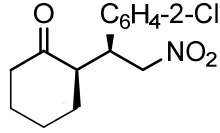




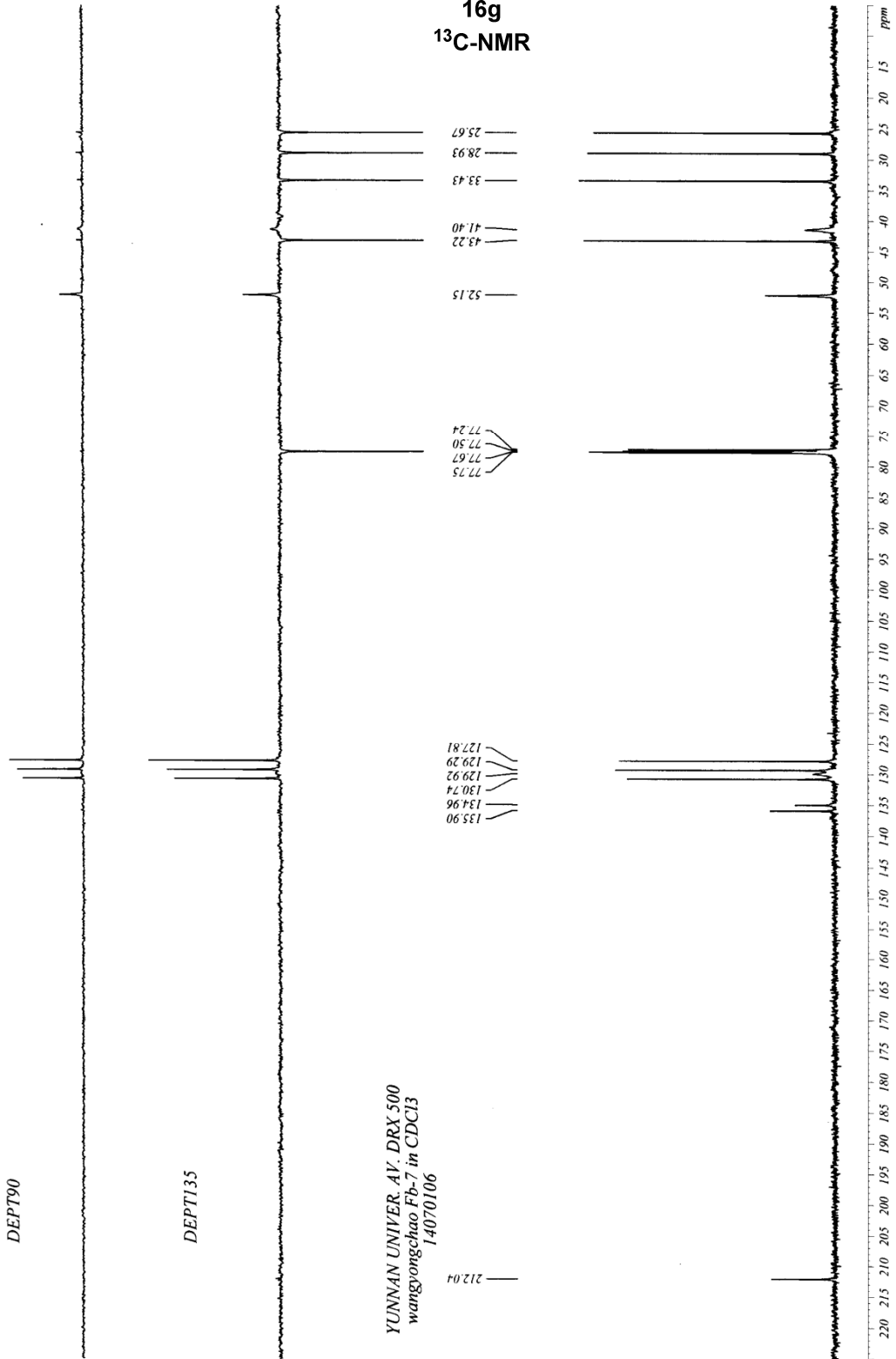
**16g**  
**<sup>1</sup>H-NMR**

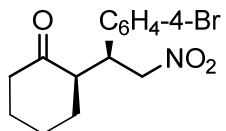


YUNNAN UNIVERSITY AV. DRX 500  
wangyongchao Fb-7 in CDCl3  
14070106

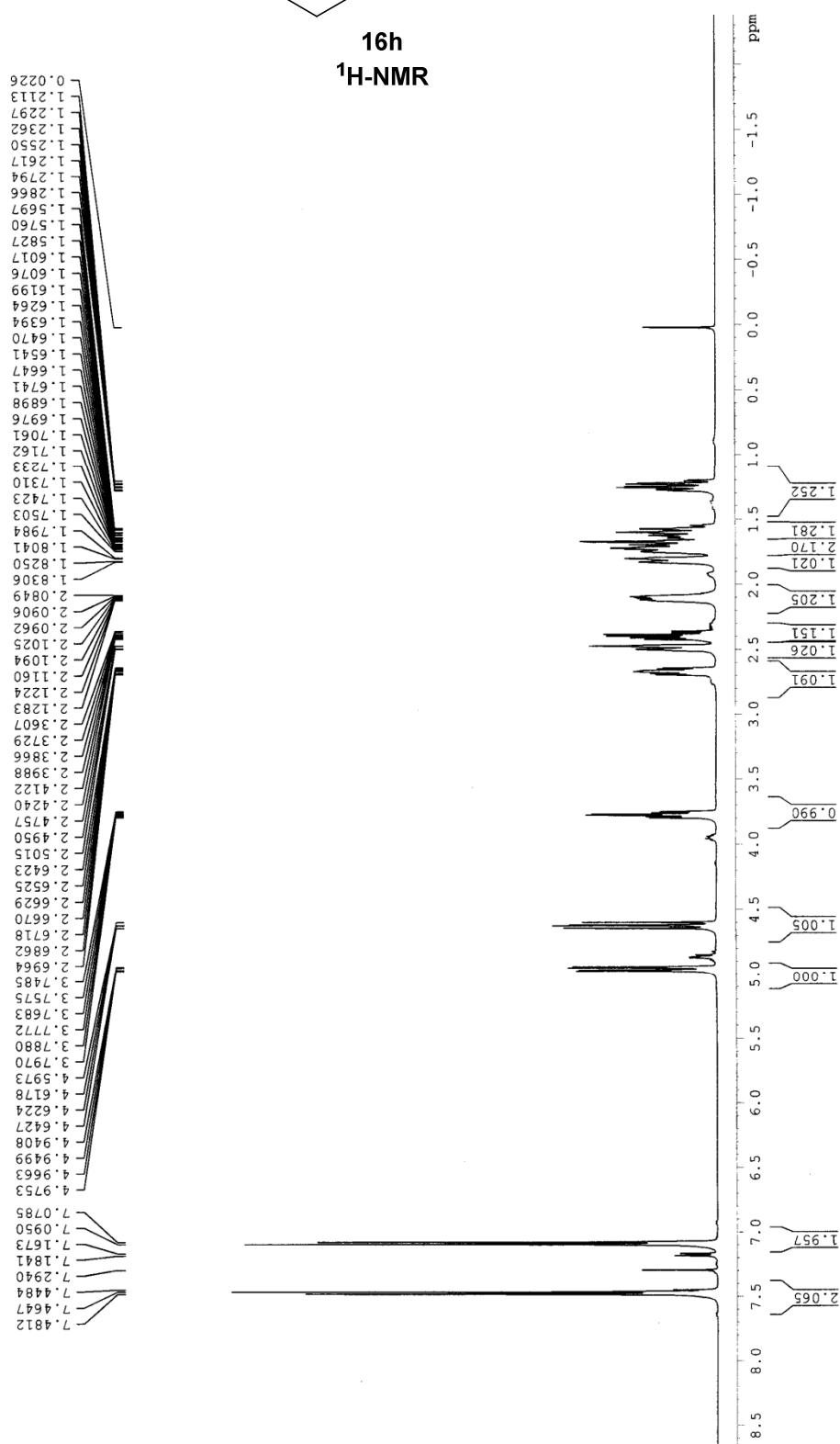


**16g**  
**<sup>13</sup>C-NMR**



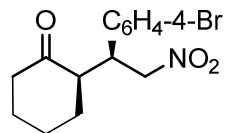


**16h**  
**<sup>1</sup>H-NMR**

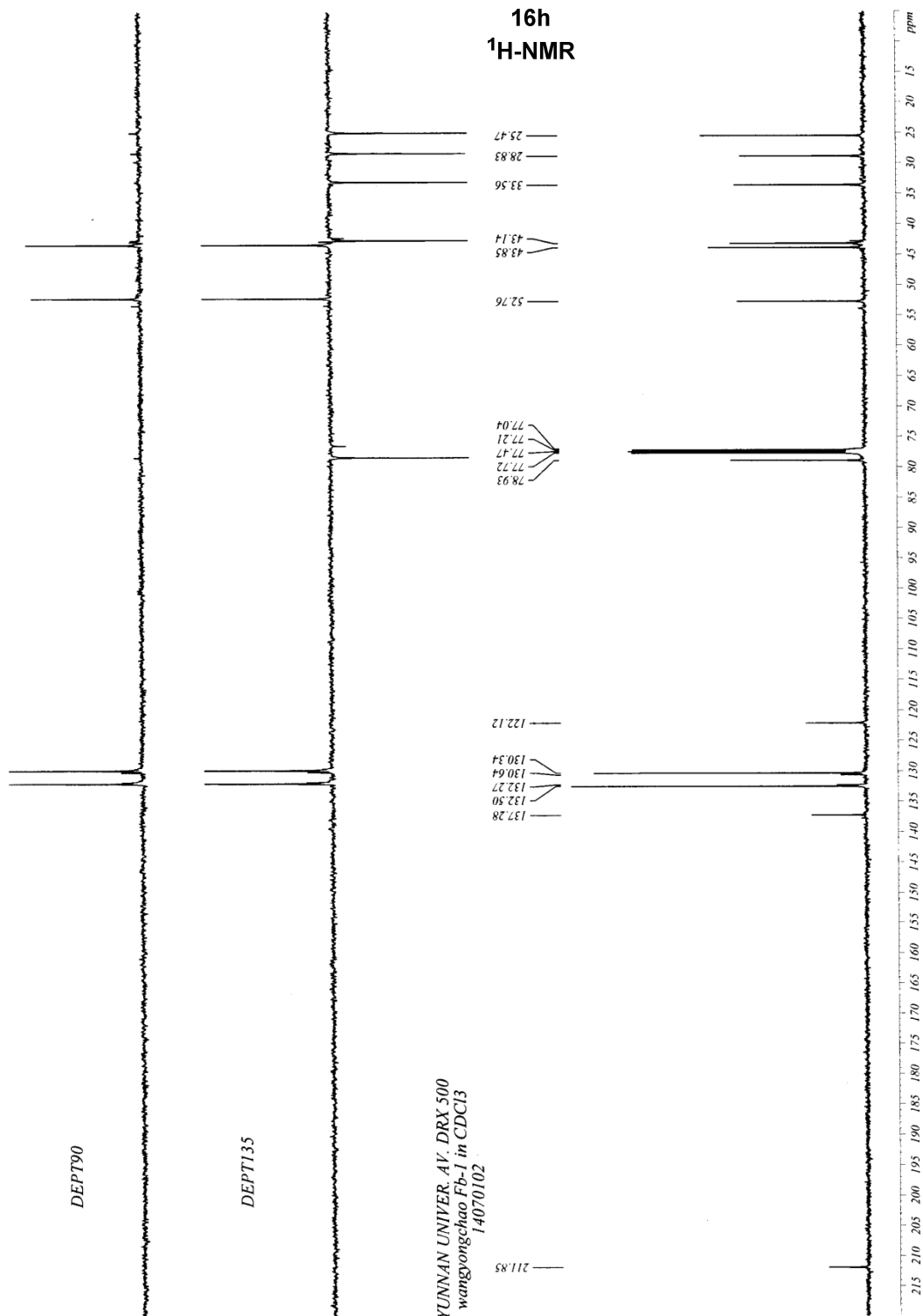


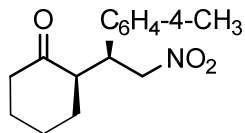
YUNNAN UNIVERSITY AV. DRX 500  
wangyongchao Fb-1 in CDCl3  
14070102



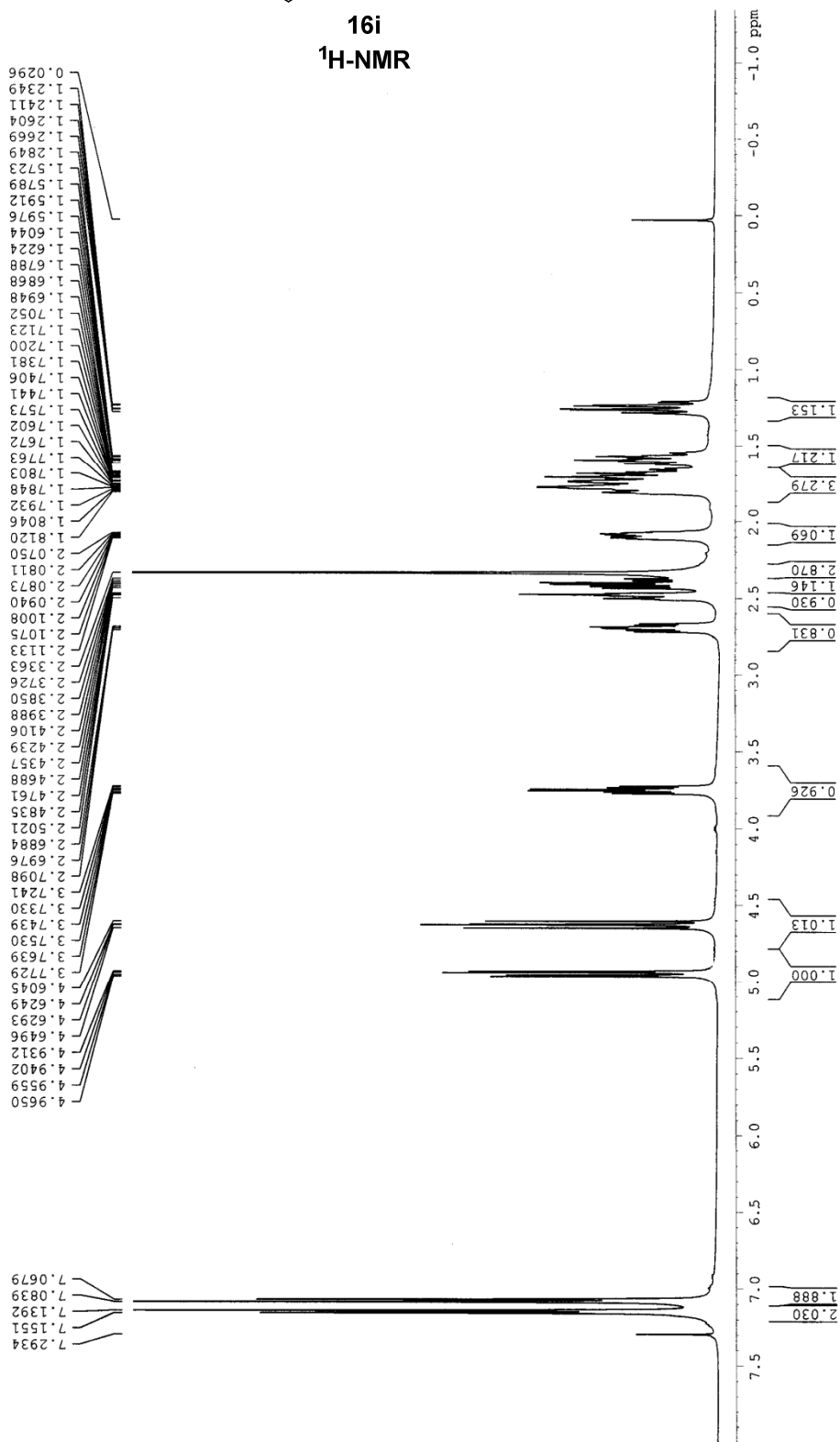


**16h**  
**<sup>1</sup>H-NMR**

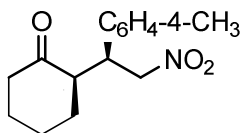




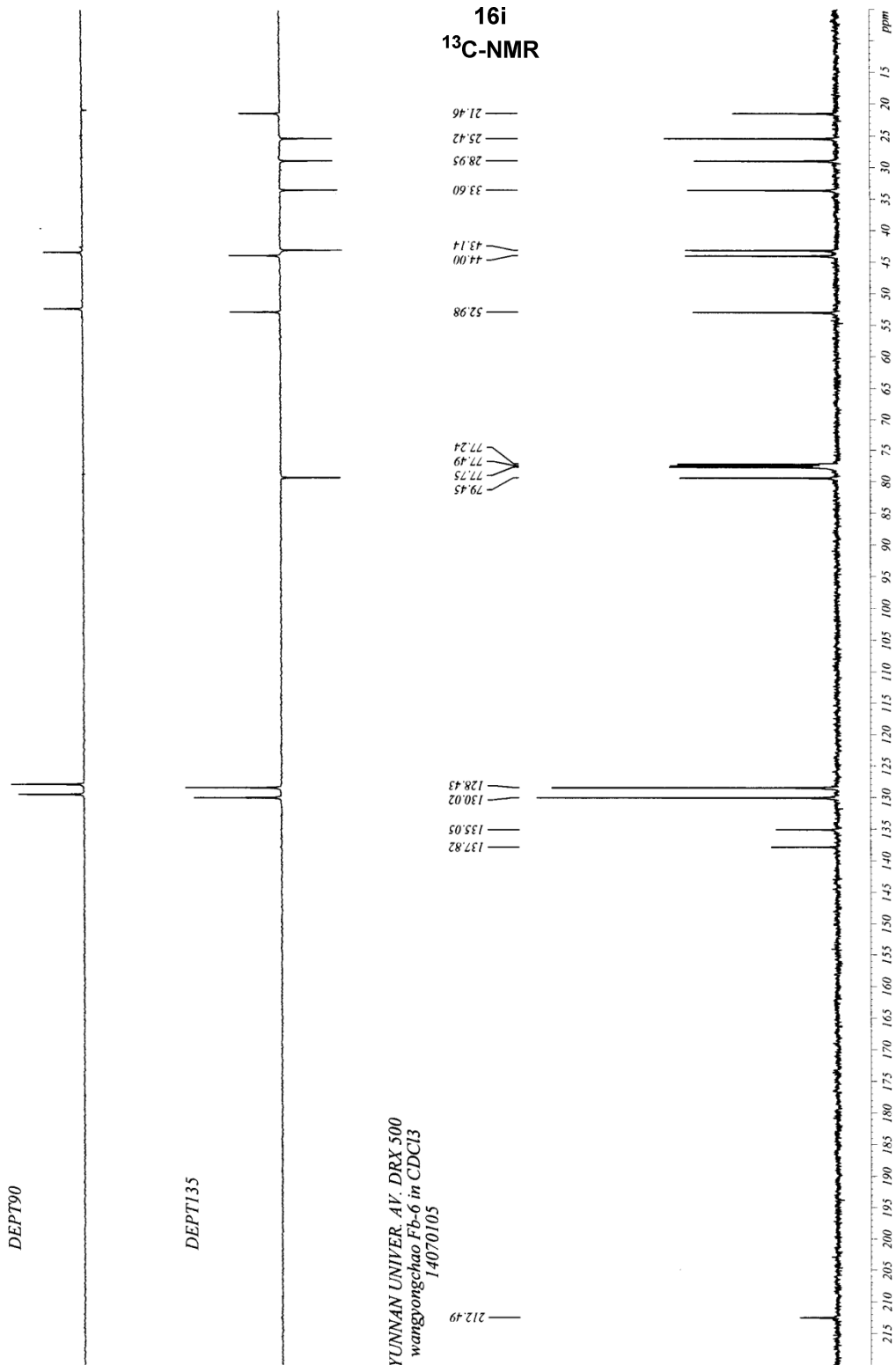
**16i**  
**<sup>1</sup>H-NMR**

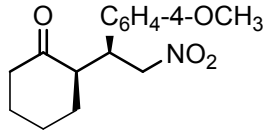


YUNNAN UNIVERSITY AV. DRX 500  
wangyongchao Fb-6 in CDCl3  
14070105

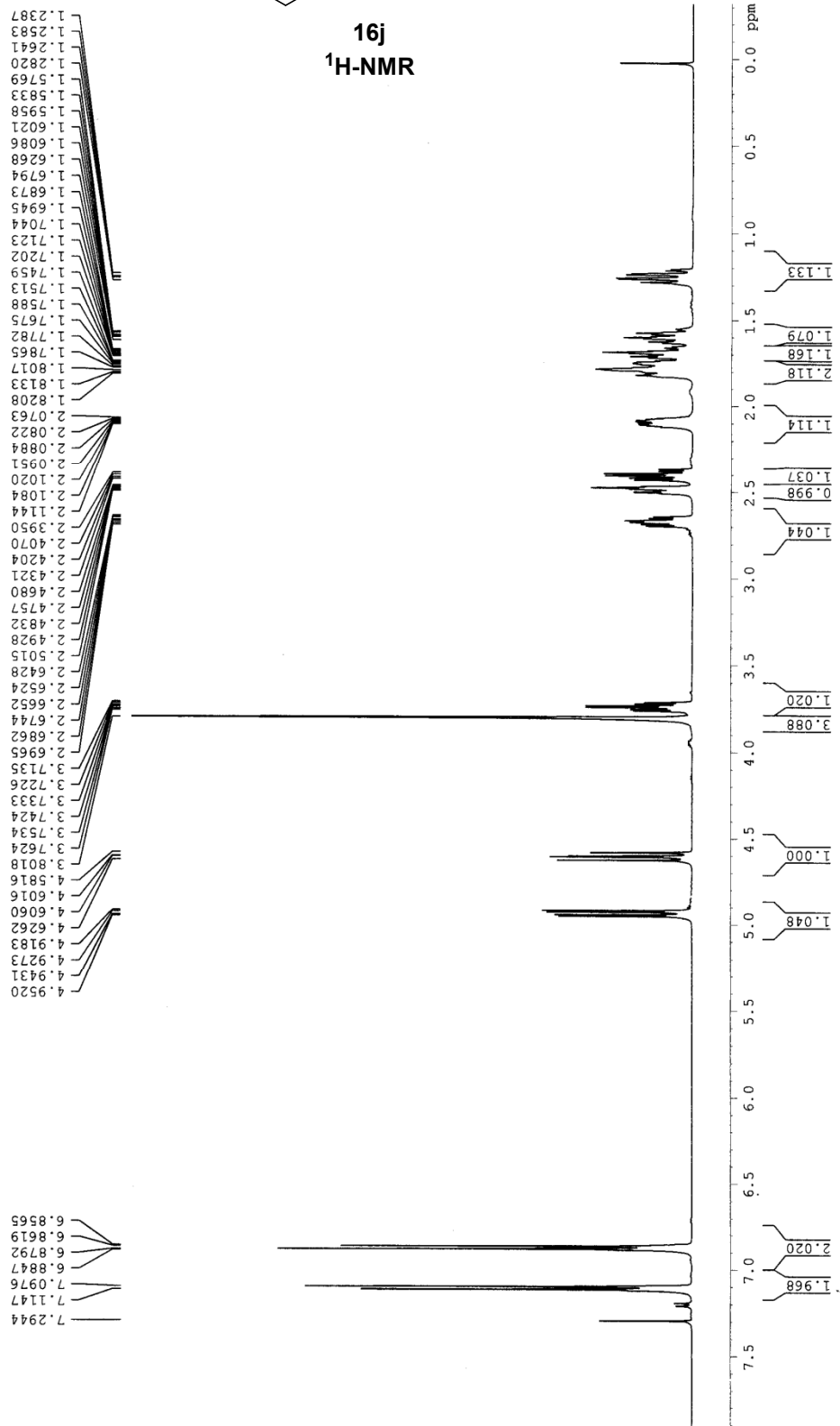


**16i**  
**<sup>13</sup>C-NMR**

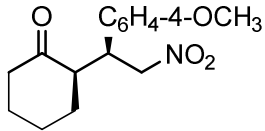




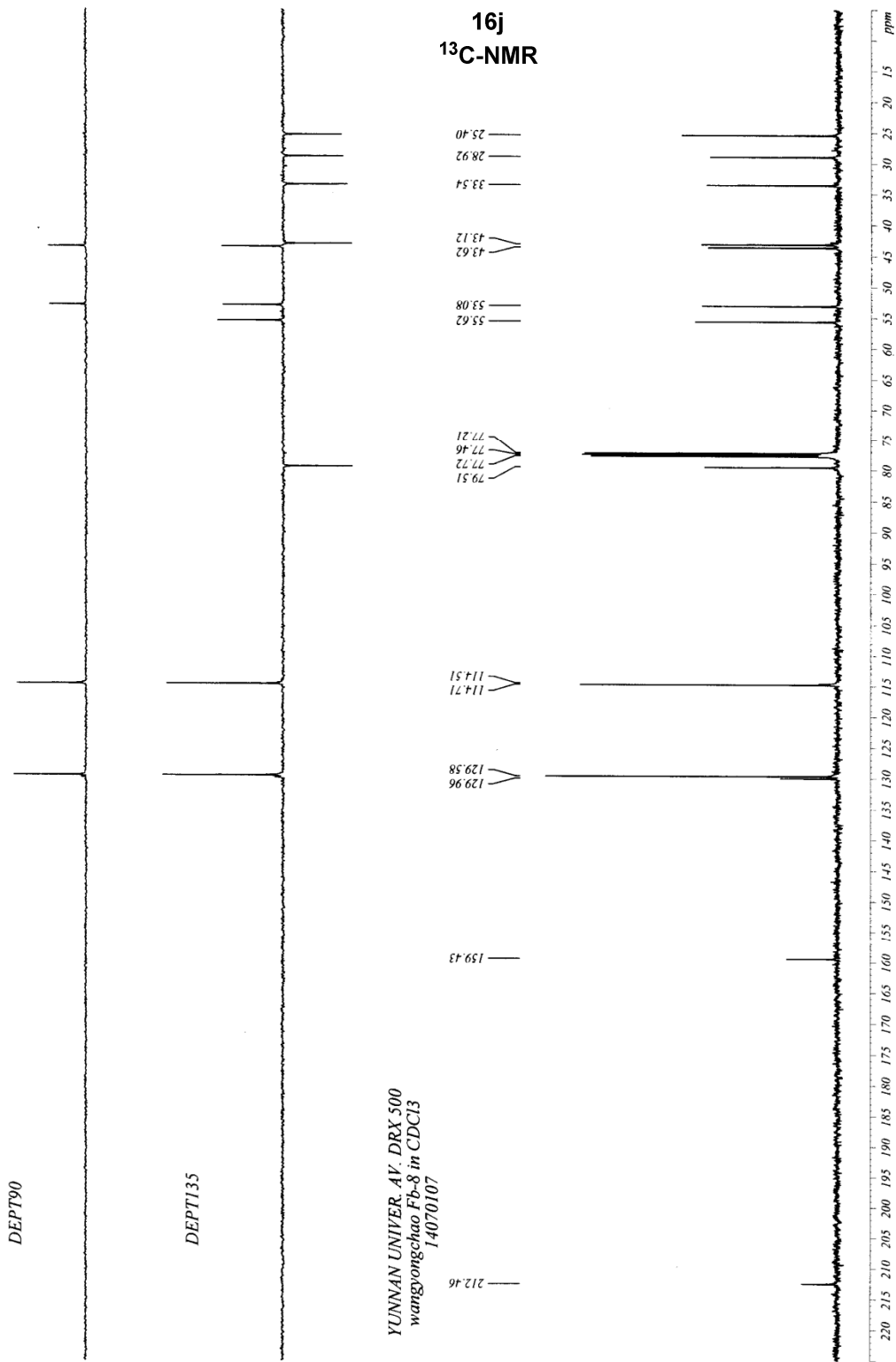
16j  
<sup>1</sup>H-NMR



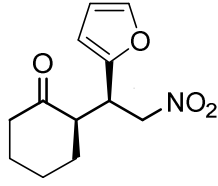
YUNNAN UNIVERSITY AV. DRX 500  
 wangyongchao Fb-8 in CDCl3  
 14070107



**16j**  
**<sup>13</sup>C-NMR**

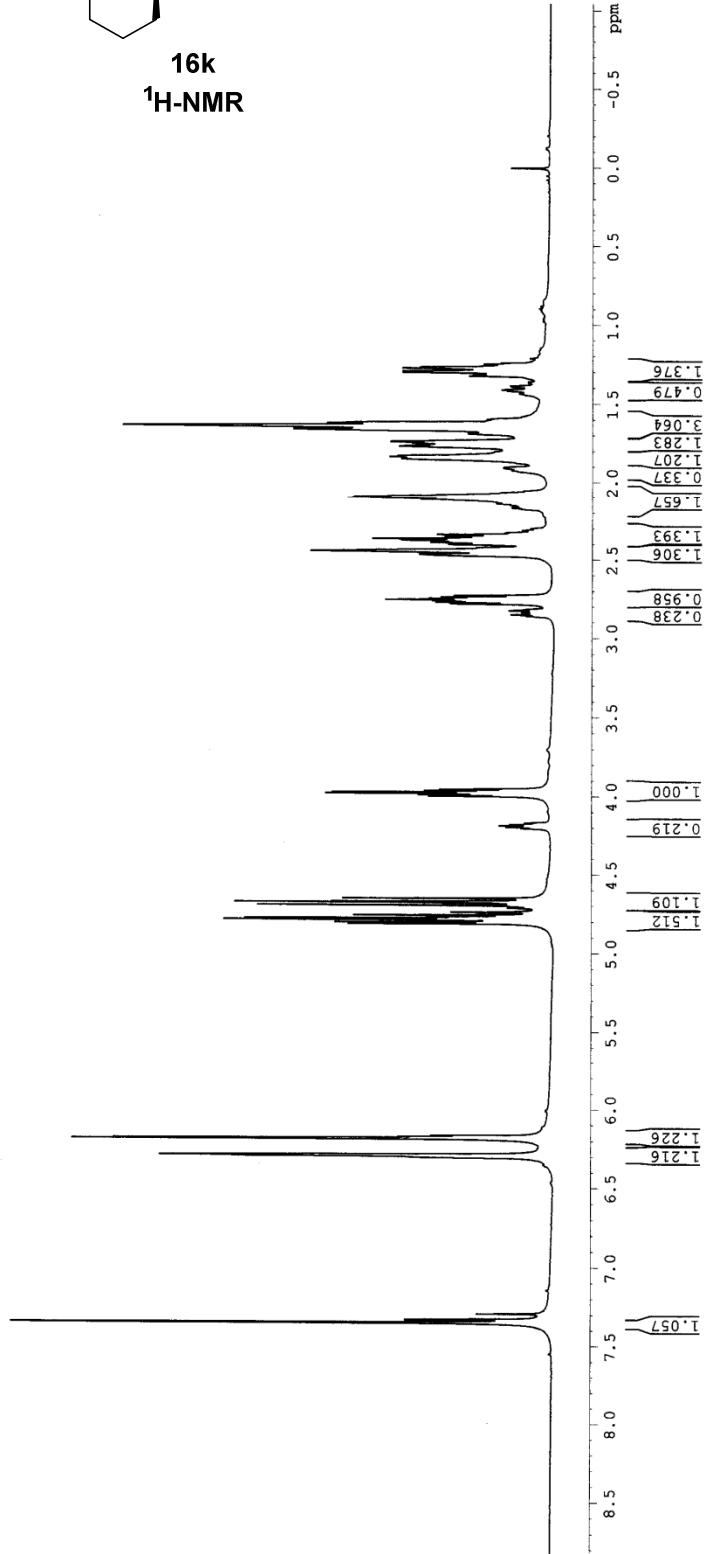


YUNNAN UNIVER. AV. DRX 500  
wangyongchao Fb-8 in CDCl<sub>3</sub>  
14070107

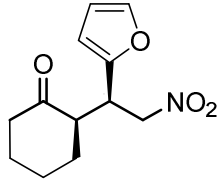


**16k**  
**<sup>1</sup>H-NMR**

-0.1216  
 0.0053  
 1.2530  
 1.2712  
 1.2781  
 1.2965  
 1.3034  
 1.3214  
 1.3282  
 1.3890  
 1.4141  
 1.6257  
 1.6455  
 1.6658  
 1.7443  
 1.7516  
 1.7715  
 1.8390  
 1.9081  
 2.0943  
 2.1016  
 2.1136  
 2.3399  
 2.3524  
 2.3655  
 2.3775  
 2.3912  
 2.4030  
 2.4460  
 2.4675  
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 2.7402  
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 7.3291  
 7.2928

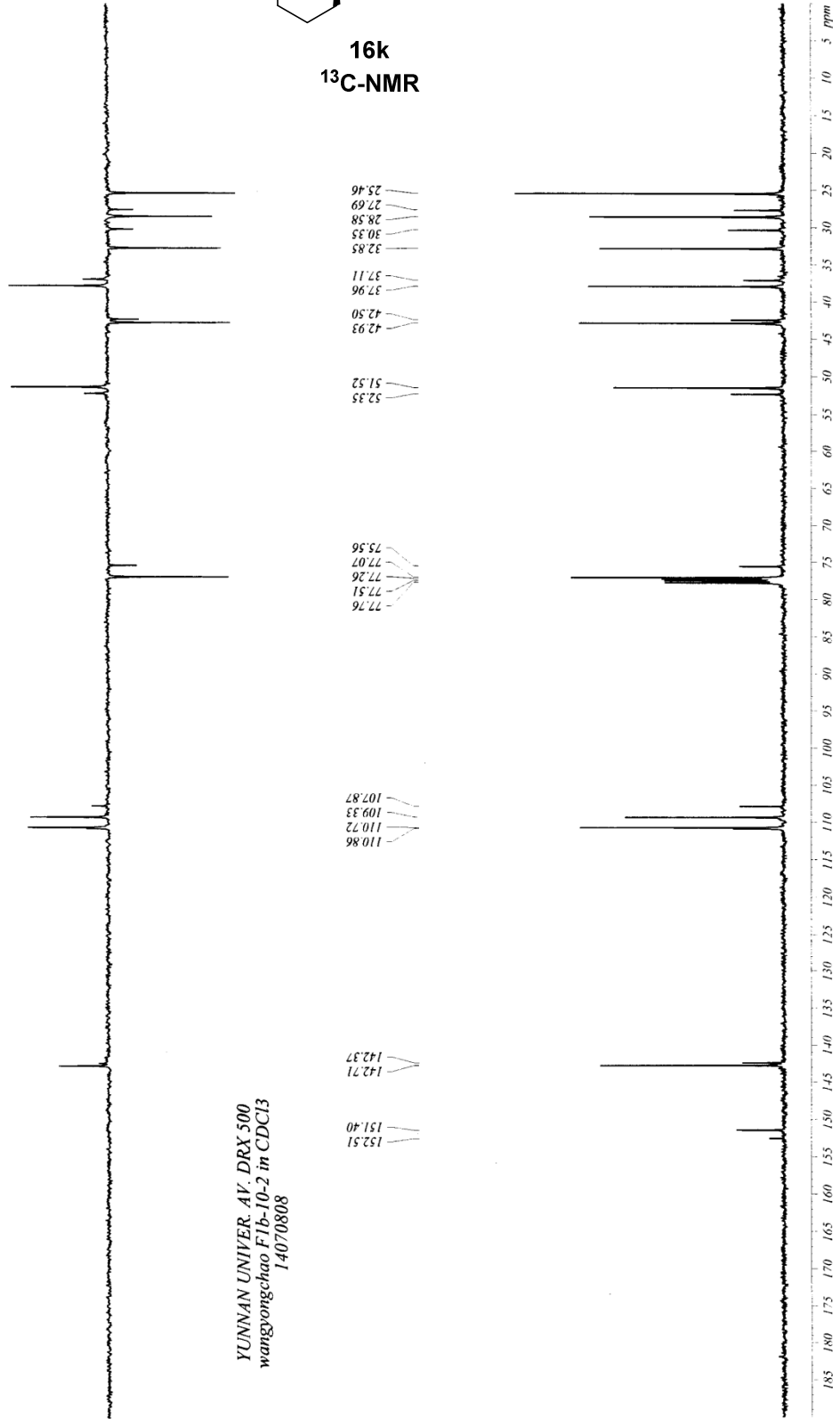


YUNNAN UNIVERSITY AV. DRX 500  
 wangyongchao Fib-10-2 in CDCl3  
 14070808

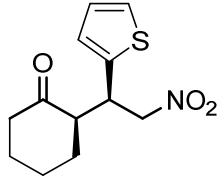


**16k**  
**<sup>13</sup>C-NMR**

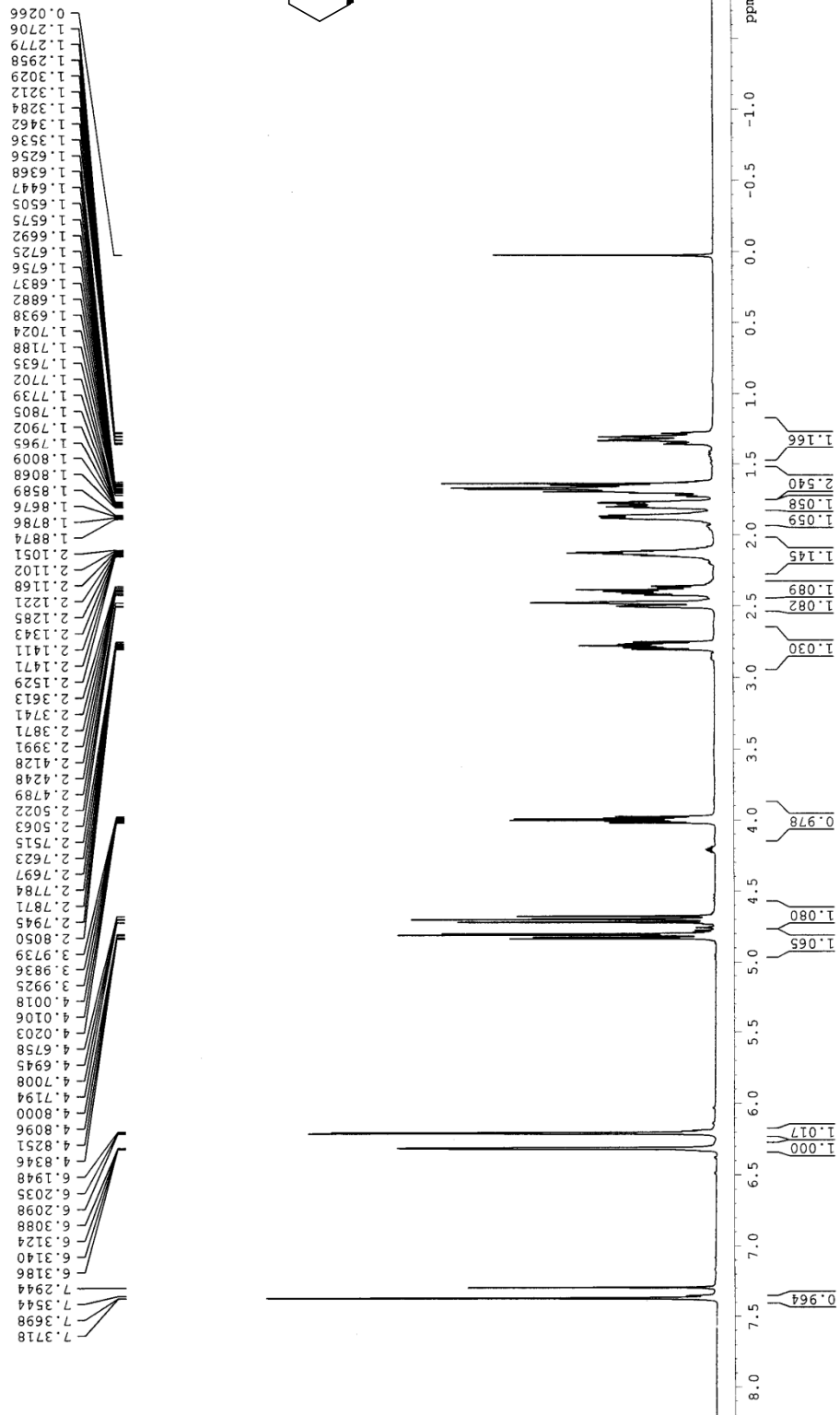
DEPT135



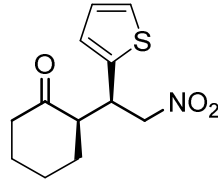
YUNNAN UNIVER. AV. DRX 500  
wangyongchao F16-10-2 in CDCl3  
14070808



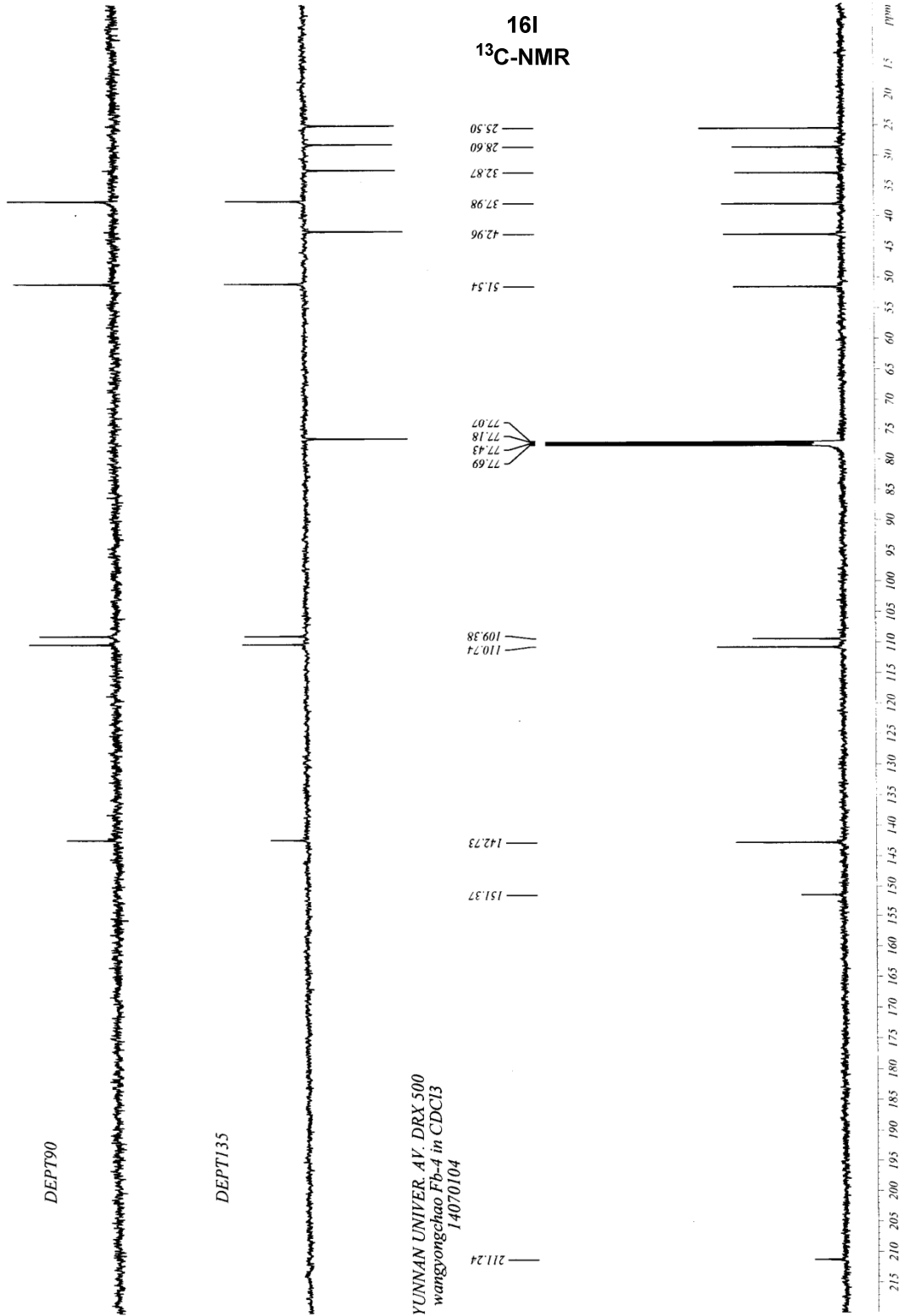
YUNNAN UNIVERSITY AV. DRX 500  
 wangyongchao Fb-4 in CDCl3  
 14070104







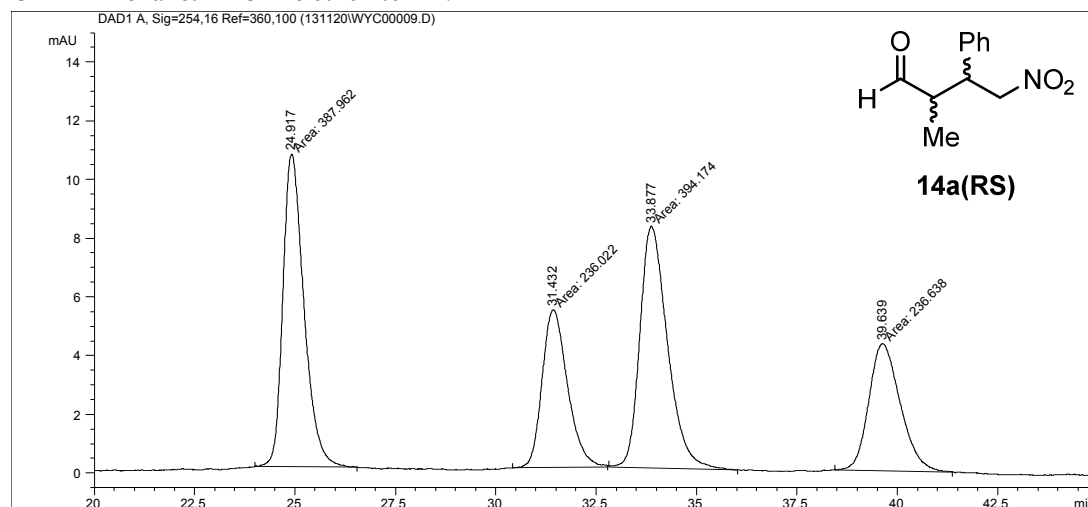
**16I**  
**<sup>13</sup>C-NMR**



YUNNAN UNIVER. AV. DRX 500  
wangyongchao Fb-4 in CDCl<sub>3</sub>  
14070104

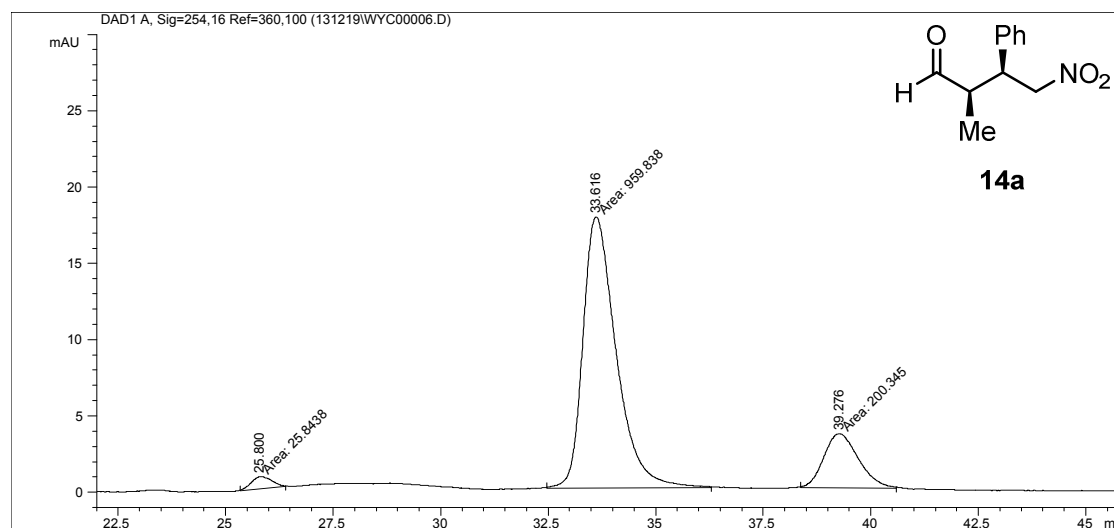
#### 4. The spectra of chiral HPLC for compounds 14a-14r.

OD-H *n*-hexane:*i*-PrOH=90:10 1.0 mL/min



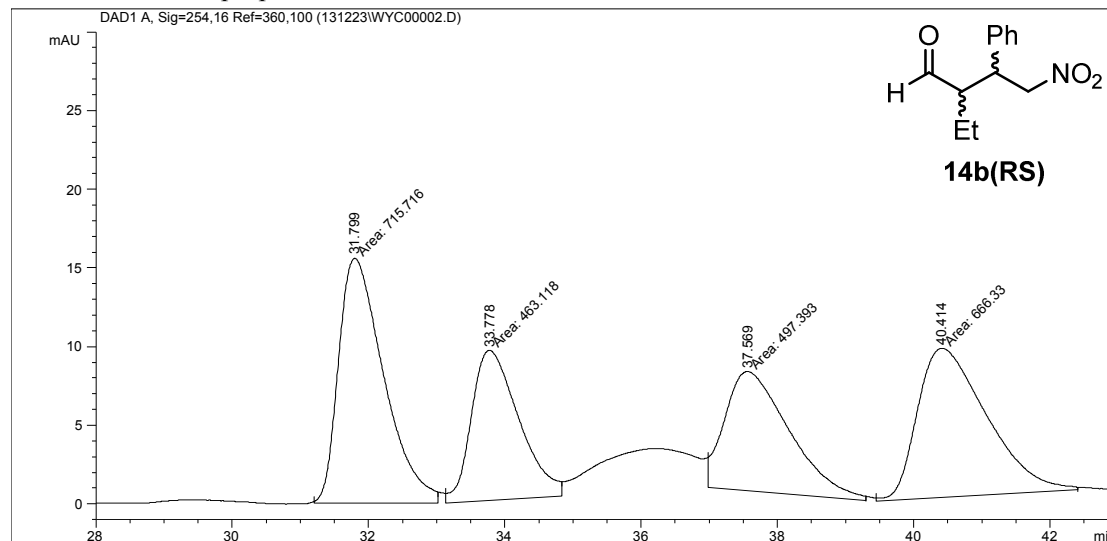
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	24.917	MM	0.6078	387.96219	10.63757	30.9183
2	31.432	MM	0.7320	236.02213	5.37374	18.8096
3	33.877	MM	0.7976	394.17386	8.23626	31.4134
4	39.639	MM	0.9100	236.63814	4.33422	18.8487

OD-H *n*-hexane:*i*-PrOH=90:10 1.0 mL/min ee=95%



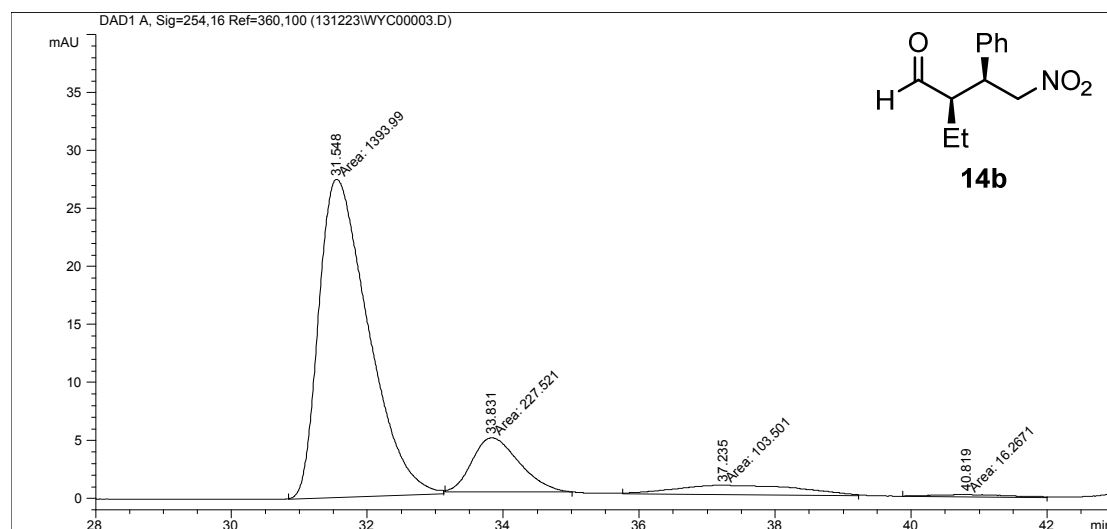
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	25.800	MM	0.5430	25.84380	7.93236	2.1790
2	33.616	MM	0.8992	959.83844	17.79032	80.9288
3	39.276	MM	0.9416	00.34543	3.54608	16.8921

AD-H n-hexane:2-propanol=99:1 0.8 mL/min



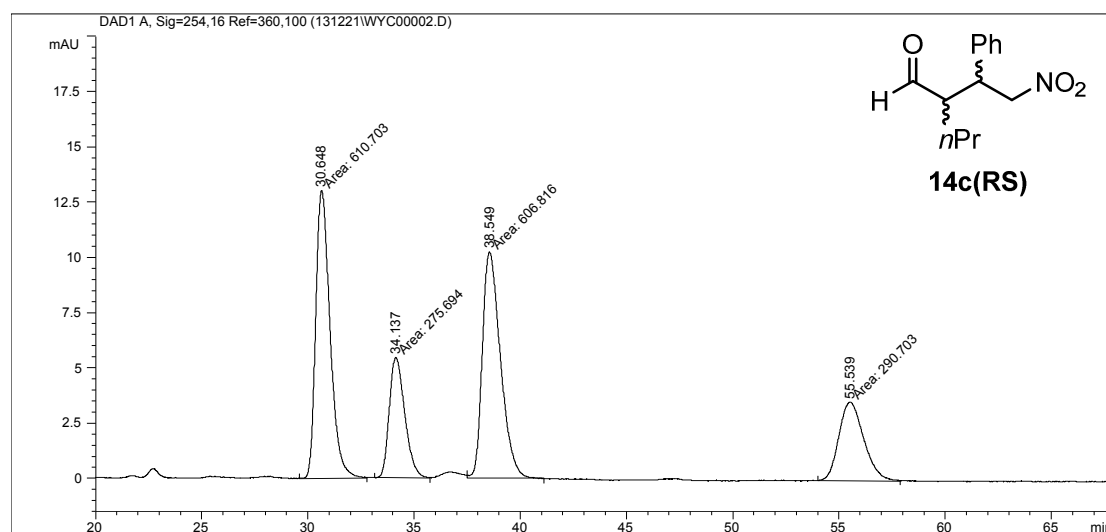
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	31.799	MM	0.7662	715.71613	15.56842	30.5528
2	33.778	MM	0.8078	463.11777	9.55460	19.7698
3	37.569	MM	1.0955	497.39349	7.56715	21.2329
4	40.414	MM	1.1747	666.32959	9.45413	28.4445

AD-H n-hexane:2-propanol=99:1 0.8 mL/min ee=98%



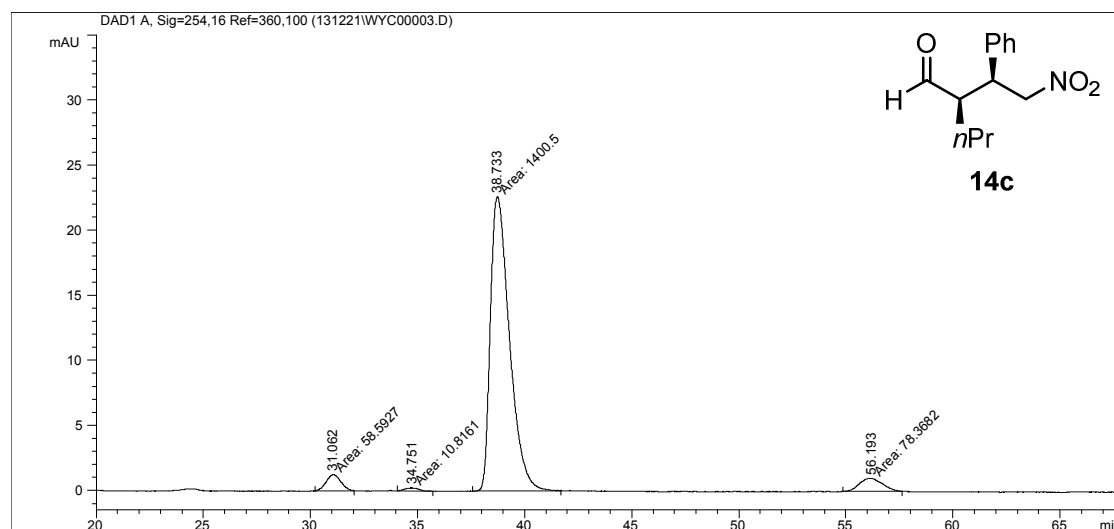
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	31.548	MM	0.8459	1393.98950	27.46679	80.0555
2	33.831	MM	0.8076	227.52115	4.69549	13.0663
3	37.235	MM	2.1584	103.50072	7.99212	5.9439
4	40.819	MM	1.3400	16.26706	2.02329	0.9342

OD-H n-hexane:2-propanol=96:4 1.0 mL/min.



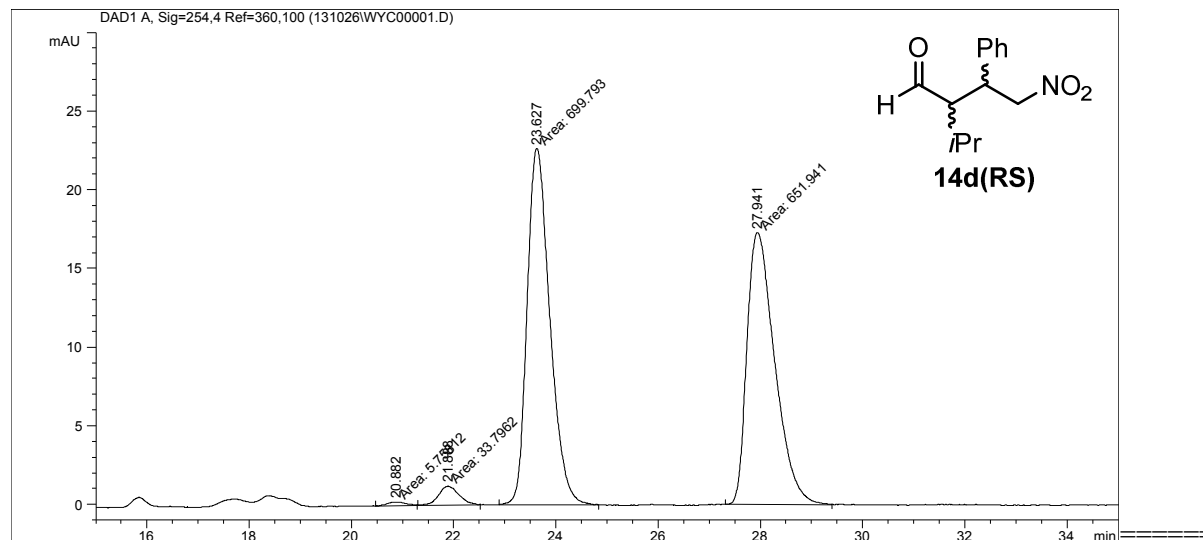
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	30.648	MM	0.7818	610.70319	13.01951	34.2339
2	34.137	MM	0.8437	275.69409	5.44585	15.4544
3	38.549	MM	0.9886	606.81561	10.22975	34.0159
4	55.539	MM	1.3610	290.70309	3.55999	16.2958

OD-H n-hexane:i-PrOH=96:4 1.0 mL/min ee=92%.



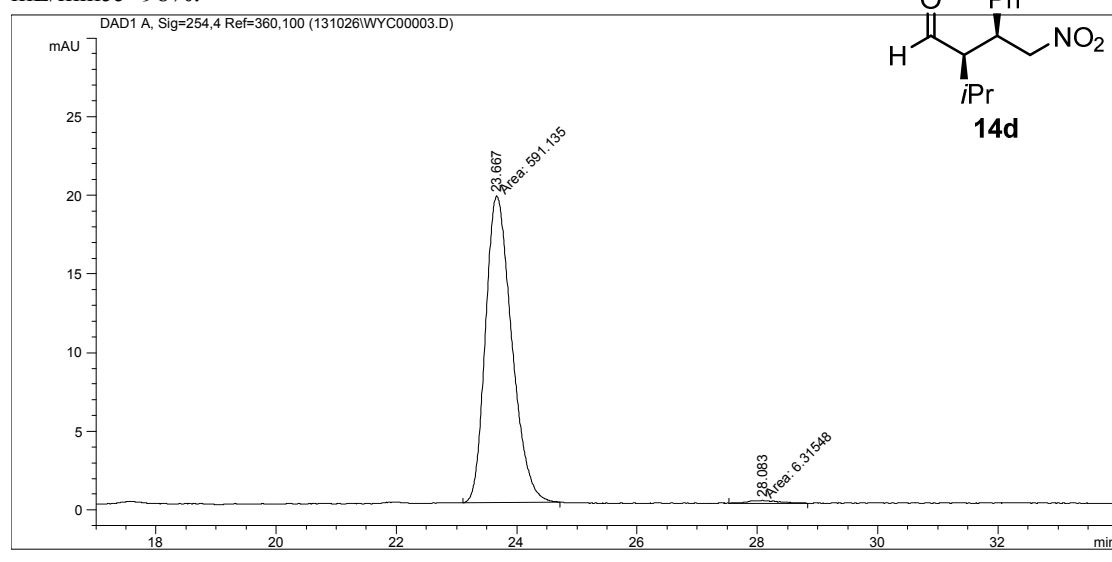
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	31.062	MM	0.7927	58.59267	1.23189	3.7844
2	34.751	MM	0.7626	10.81606	2.36370	0.6986
3	38.733	MM	1.0319	1400.49731	22.61934	90.4554
4	56.193	MM	1.2637	78.36816	1.03355	5.0616

AD-H n-hexane:i-PrOH=97:3 0.5 mL/min.



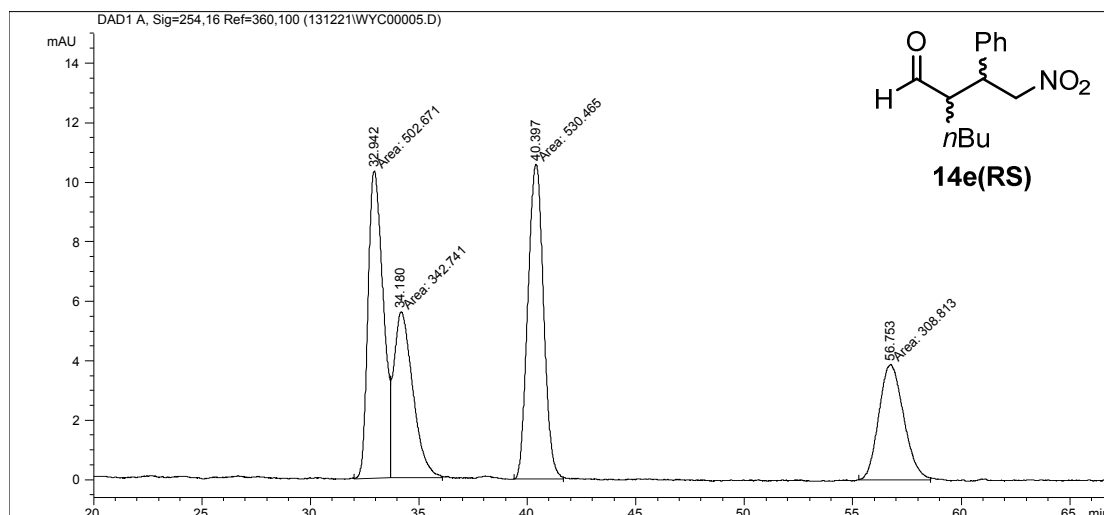
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	20.882	MM	0.4141	5.75812	2.31774	0.4139
2	21.888	MM	0.4647	33.79617	1.21205	2.4291
3	23.627	MM	0.5144	699.79260	22.67182	50.2982
4	27.941	MM	0.6286	651.94135	17.28503	46.8588

AD-H n-hexane:i-PrOH=97:3 0.5 mL/min ee=98%.



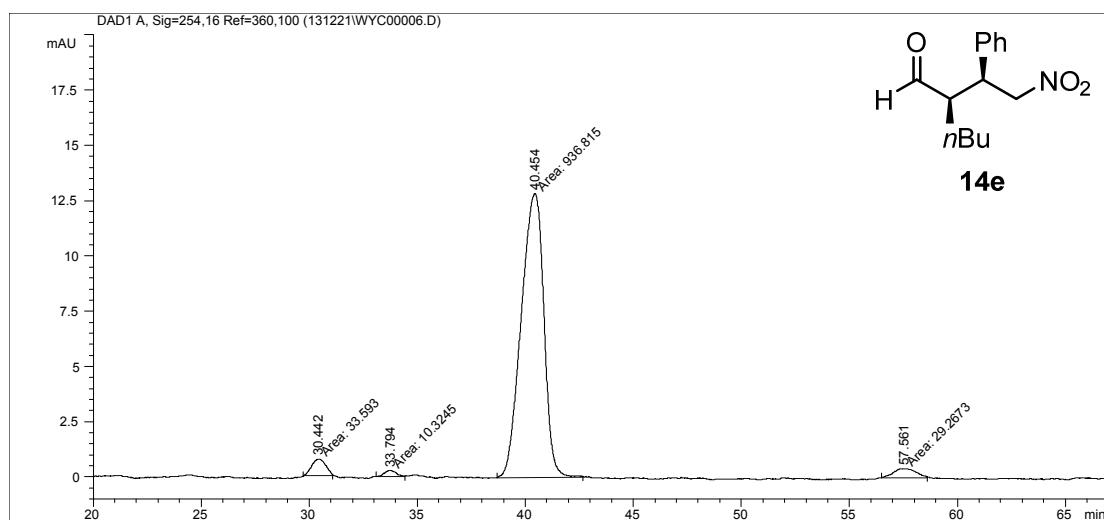
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	23.667	MM	0.5057	591.13538	19.48333	98.9429
2	28.083	MM	0.5942	6.31548	1.77151	1.0571

OD-H *n*-hexane:2-propanol=97:3 1.0 mL/min.



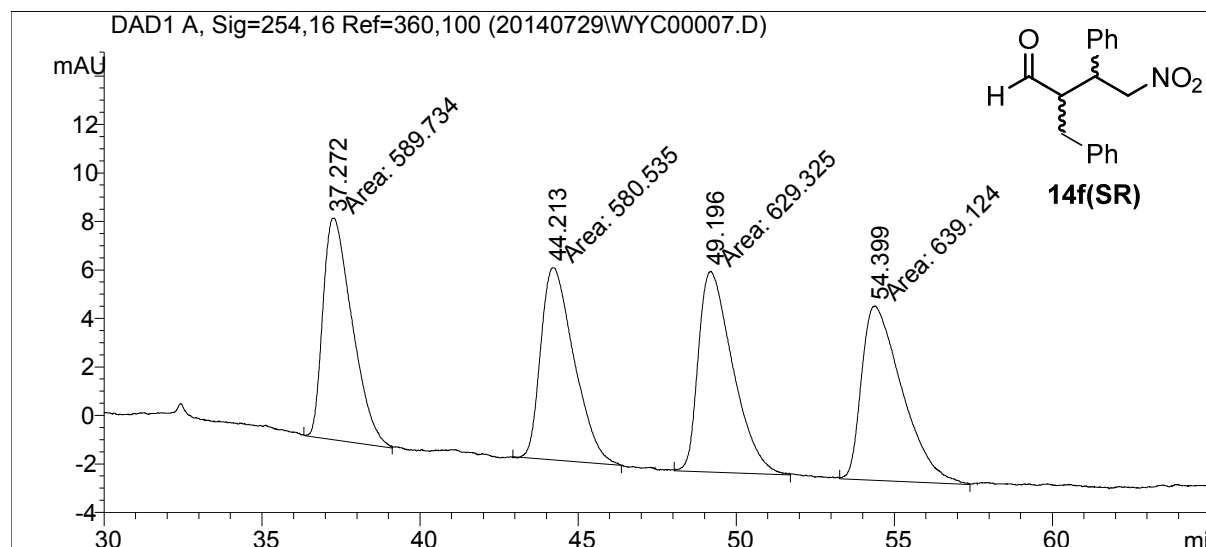
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	32.942	MM	0.8109	502.67102	10.33216	29.8376
2	34.180	MM	1.0250	342.74149	5.57283	20.3445
3	40.397	MM	0.8359	530.46545	10.57693	31.4874
4	56.753	MM	1.3260	308.81253	3.88139	18.3305

OD-H *n*-hexane:2-propanol=97:3 1.0 mL/min *ee*=93%.



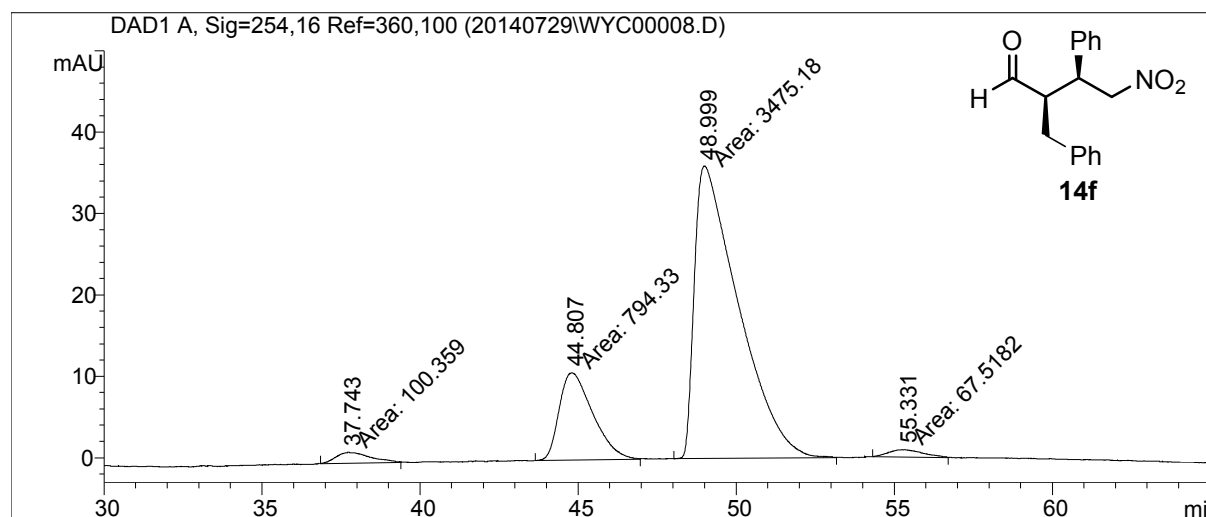
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	30.442	MM	0.7487	33.59303	7.47760	3.3260
2	33.794	MM	0.6323	10.32454	2.72144	1.0222
3	40.454	MM	1.2141	936.81458	12.86042	92.7540
4	57.561	MM	1.1985	29.26734	4.06990	2.8978

AD-H *n*-hexane:2-propanol=97:3, 0.7mL/min 254nm



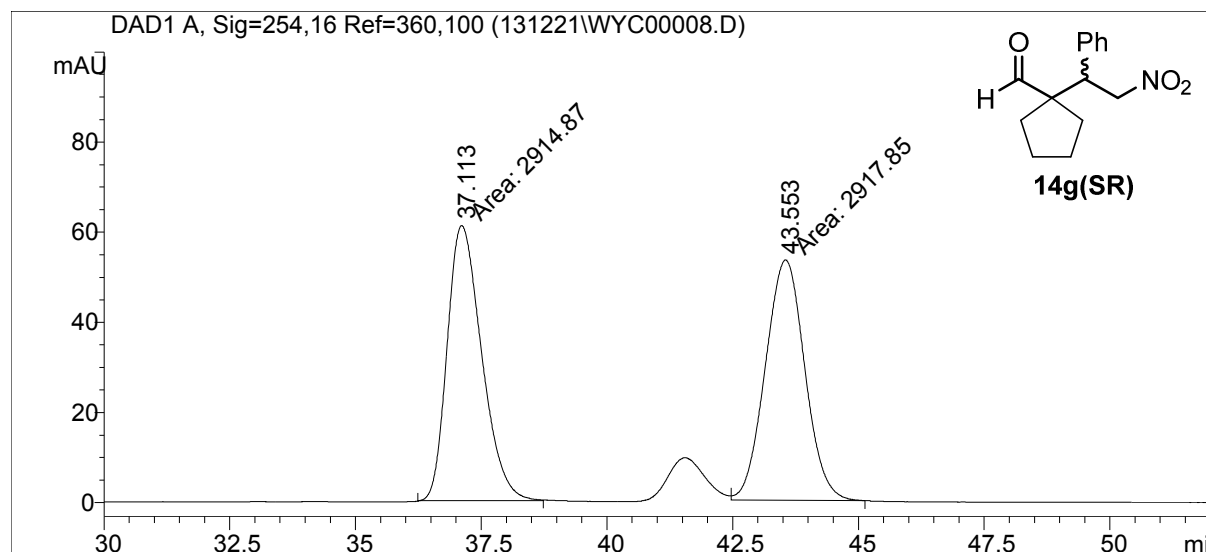
#	Time	Area	Height	Width	Area%	Symmetry
1	37.272	589.7	9.1	1.0745	24.182	0.527
2	44.213	580.5	7.9	1.2191	23.805	0.581
3	49.196	629.3	8.3	1.2655	25.806	0.547
4	54.399	639.1	7.2	1.482	26.207	0.496

AD-H *n*-hexane:2-propanol=97:3, 0.7mL/min 254nm *ee*=96%.



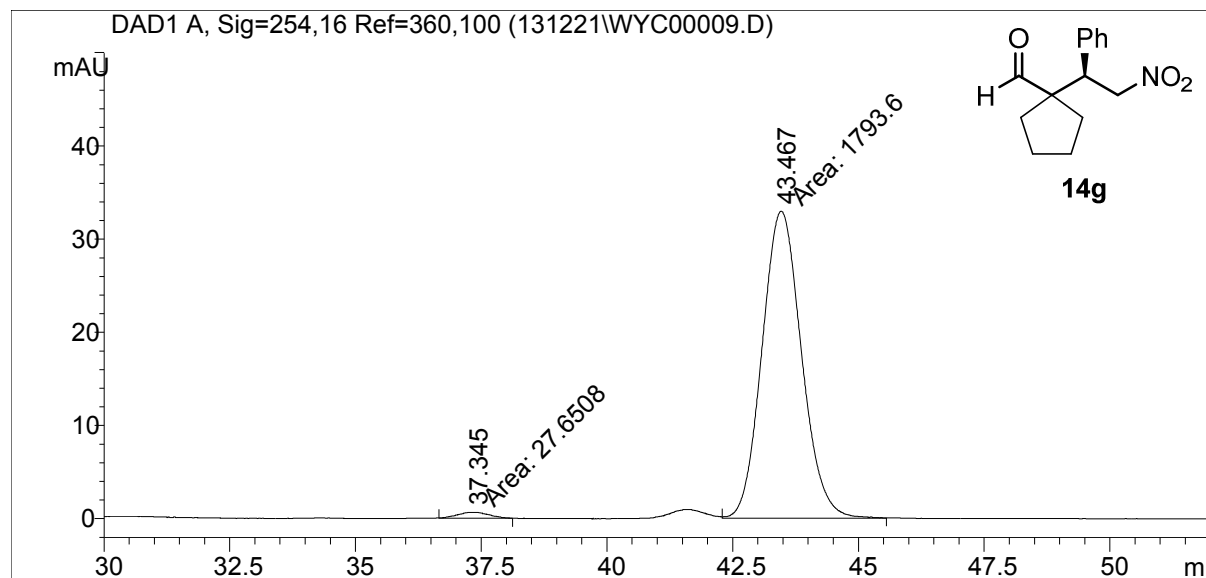
#	Time	Area	Height	Width	Area%	Symmetry
1	37.743	100.4	1.3	1.2689	2.262	0.576
2	44.807	794.3	10.7	1.2335	17.901	0.6
3	48.999	3475.2	35.9	1.6129	78.316	0.291
4	55.331	67.5	9.1	1.2352	1.522	0.86

AD-H *n*-hexane:2-propanol=95:5, 0.5mL/min, 254nm.



#	Time	Area	Height	Width	Area%	Symmetry
1	37.113	2914.9	61.1	0.7952	49.974	0.699
2	43.553	2917.8	53.4	0.9115	50.026	1.008

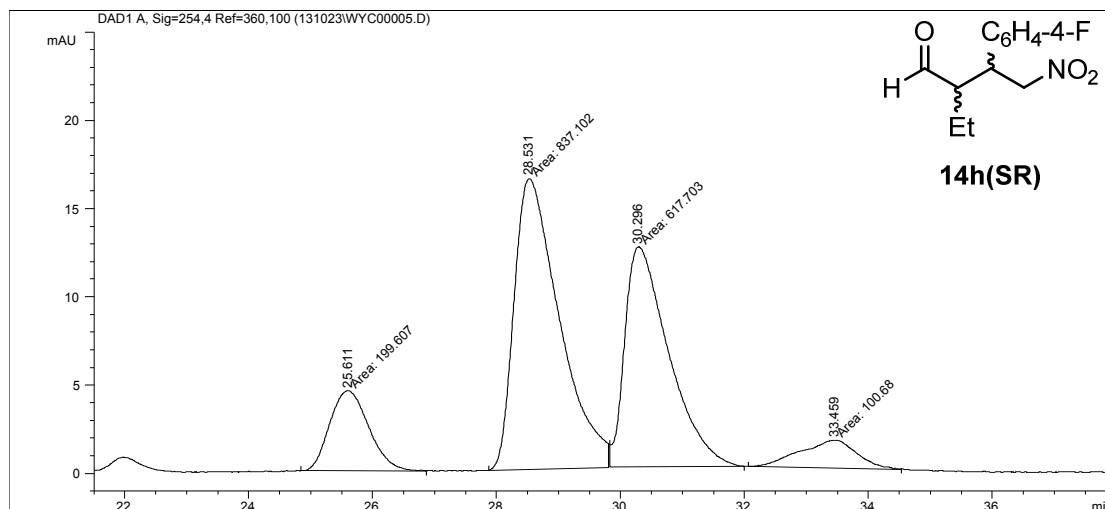
AD-H *n*-hexane:2-propanol=95:5, 0.5mL/min, 254nm, *ee* = 97%.



#	Time	Area	Height	Width	Area%	Symmetry
1	37.345	27.7	6.41	0.718	1.518	0.945
2	43.467	1793.6	32.9	0.9078	98.482	0.911

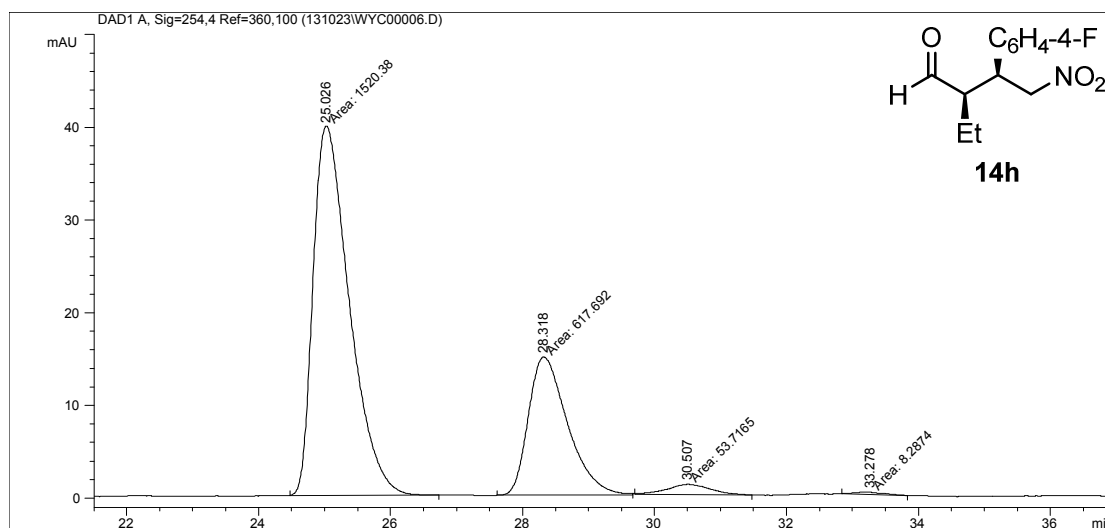


AD-H n-hexane:2-propanol=99:1 1.0 mL/min.



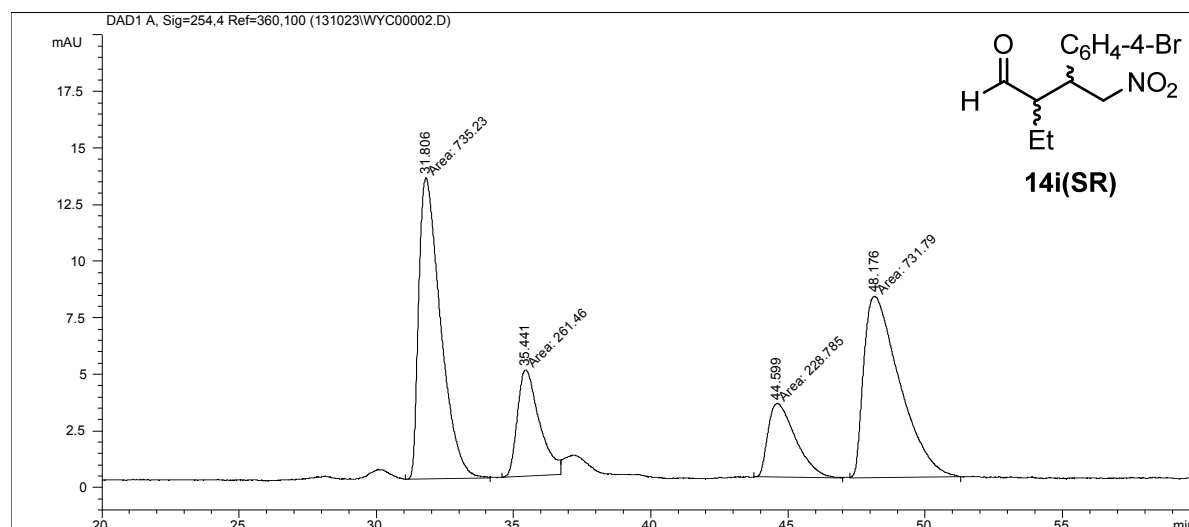
Peak	RetTime	Type	Width	Area	Height	Area
1	25.611	MM	0.7317	199.60738	4.54670	11.3730
2	28.531	MM	0.8465	837.10156	16.48241	47.6956
3	30.296	MM	0.8255	617.70337	12.47155	35.1949
4	33.459	MM	1.0562	100.67973	1.58866	5.7364

AD-H n-hexane:2-propanol=99:1 1.0 mL/min, ee=99%.



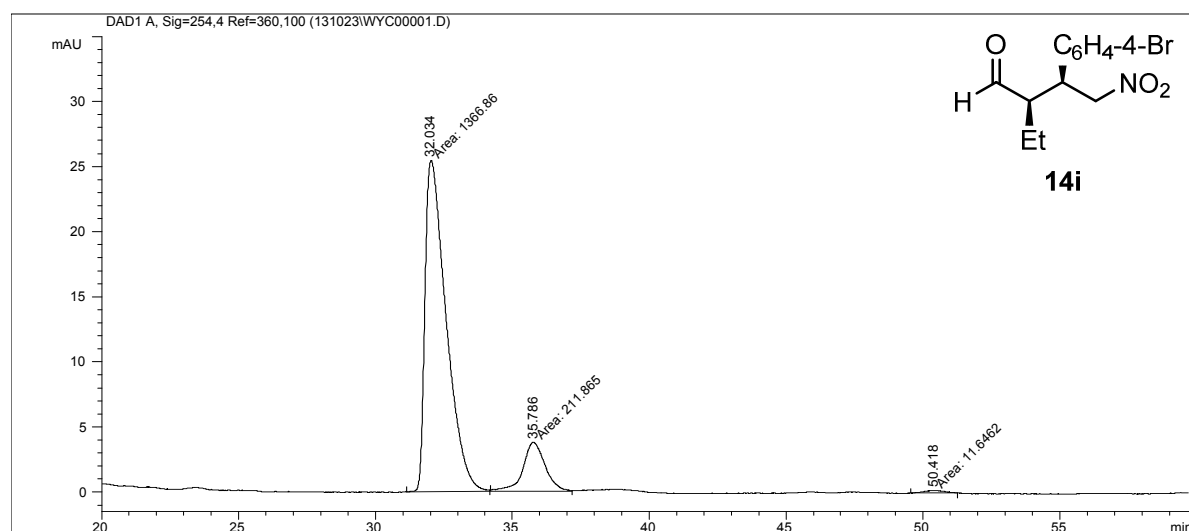
Peak	RetTime	Type	Width	Area	Height	Area
1	25.026	MM	0.6356	1520.37537	39.87033	69.1057
2	28.318	MM	0.6911	617.69189	14.89722	28.0760
3	30.507	MM	0.7821	53.71649	1.14471	2.4416
4	33.278	MM	0.5461	8.28740	2.52918	0.3767

AD-H n-hexane:2-propanol=98.5:1.5 1.0 mL/min.



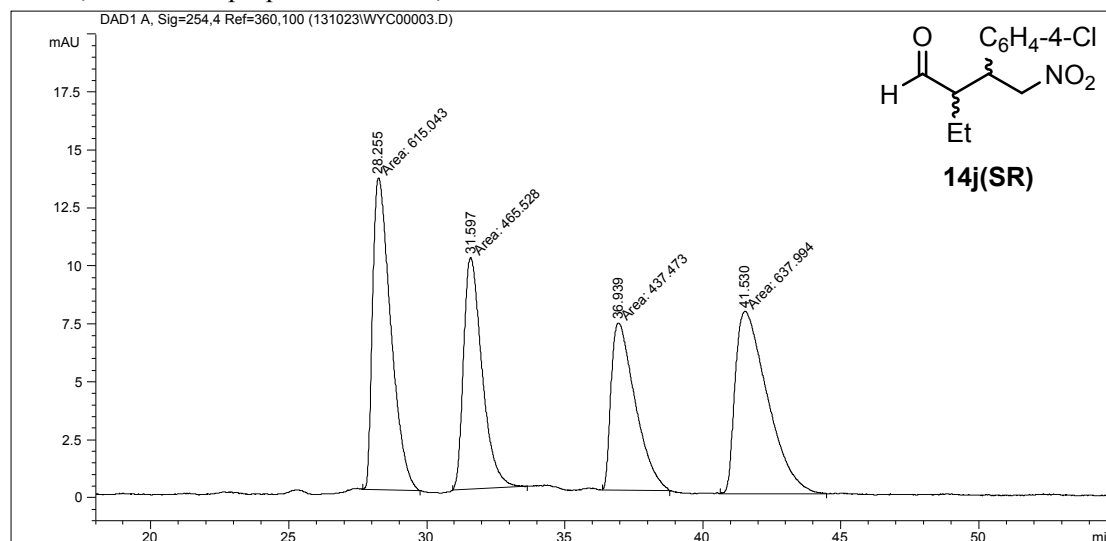
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	31.806	MM	0.9205	735.23010	13.31213	37.5642
2	35.441	MM	0.9287	261.46024	4.69229	13.3584
3	44.599	MM	1.1700	228.78531	3.25898	11.6890
4	48.176	MM	1.5213	731.78961	8.01691	37.3884

AD-H, n-hexane: *i*-PrOH=98.5:1.5, 1.0 mL/min, ee=98%.



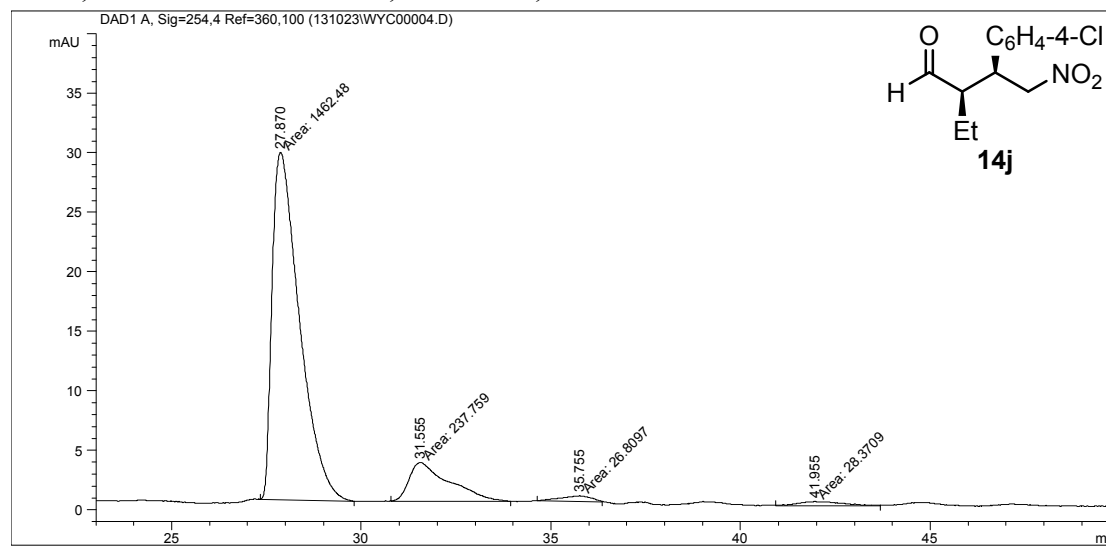
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	32.034	MM	0.8954	1366.86145	25.44221	85.9460
2	35.786	MM	0.9417	211.86499	3.74969	13.3217
3	50.418	MM	0.8921	11.64620	2.17569	0.7323

AD-H, n-hexane:2-propanol=98.5:1.5, 1.0 mL/min.



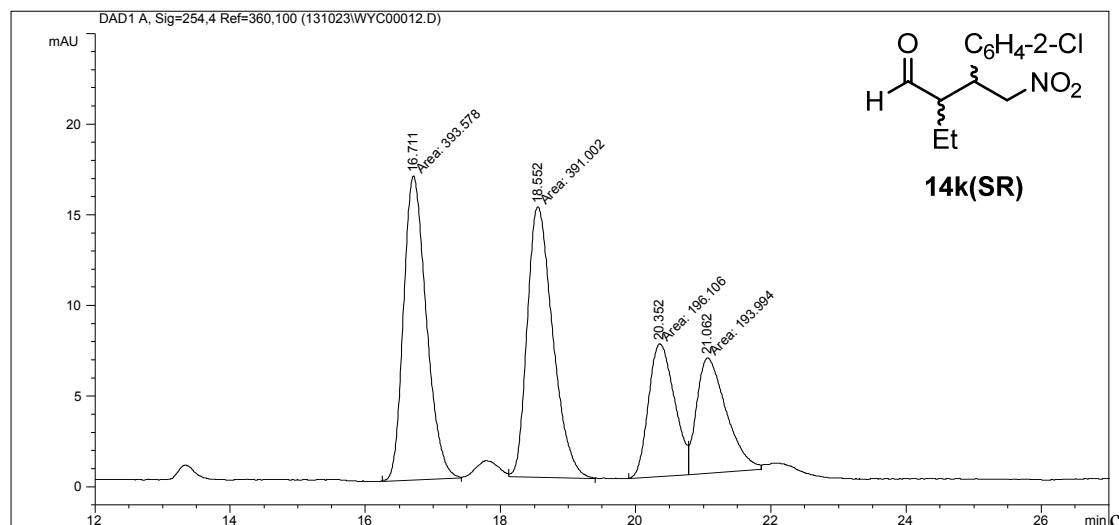
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	28.255	MM	0.7618	615.04266	13.45658	28.5265
2	31.597	MM	0.7777	465.52792	9.97720	21.5918
3	36.939	MM	1.0122	437.47266	7.20319	20.2906
4	41.530	MM	1.3533	637.99445	7.85739	29.5911

AD-H, n-hexane:i-PrOH=98.5:1.5, 1.0 mL/min, ee=96%.



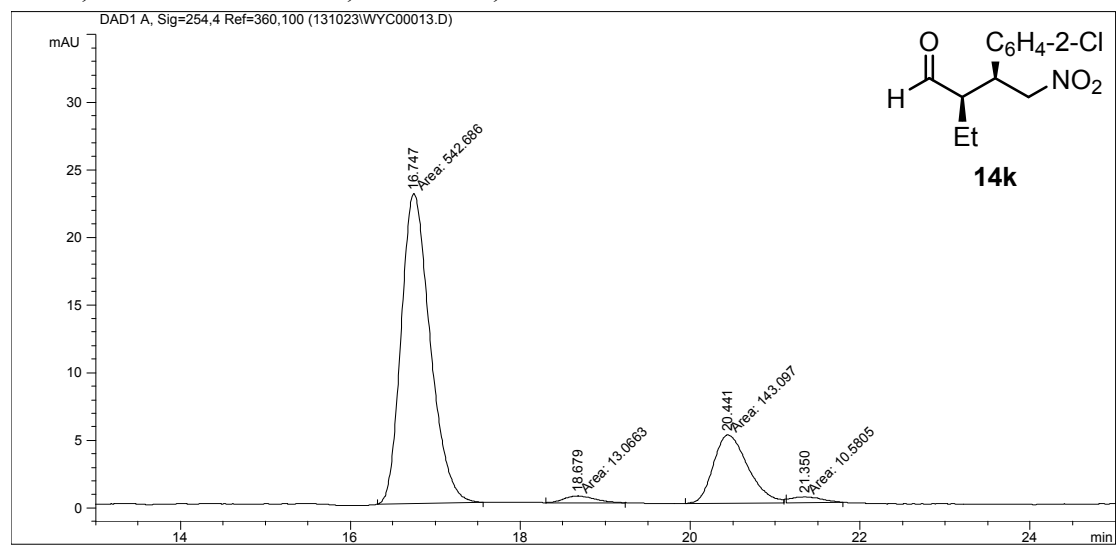
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	27.870	MM	0.8351	1462.48242	29.18931	83.3123
2	31.555	MM	1.2230	237.75861	3.24001	13.5442
3	35.755	MM	0.9451	26.80969	4.72798	1.5273
4	41.955	MM	1.3440	28.37094	3.51828	1.6162

AD-H,*n*-hexane:*i*-propanol=99:1, 1.0 mL/min.



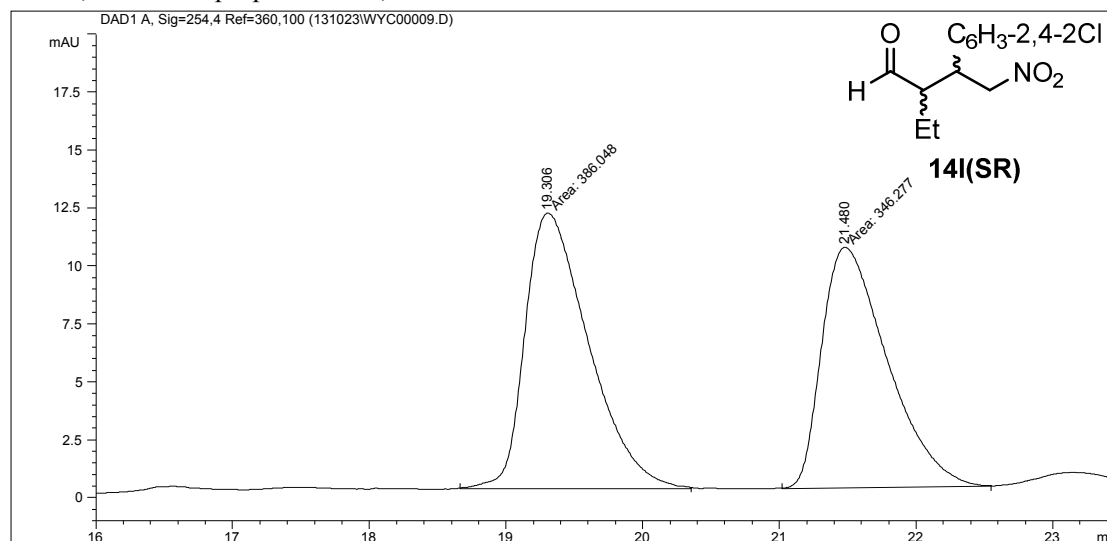
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.711	MM	0.3911	393.57806	16.77200	33.5051
2	18.552	MM	0.4372	391.00241	14.90699	33.2859
3	20.352	MM	0.4469	196.10551	7.31297	16.6944
4	21.062	MM	0.5082	193.99385	6.36192	16.5146

AD-H,*n*-hexane:*i*-PrOH=99:1, 1.0 mL/min, *ee*=95%.



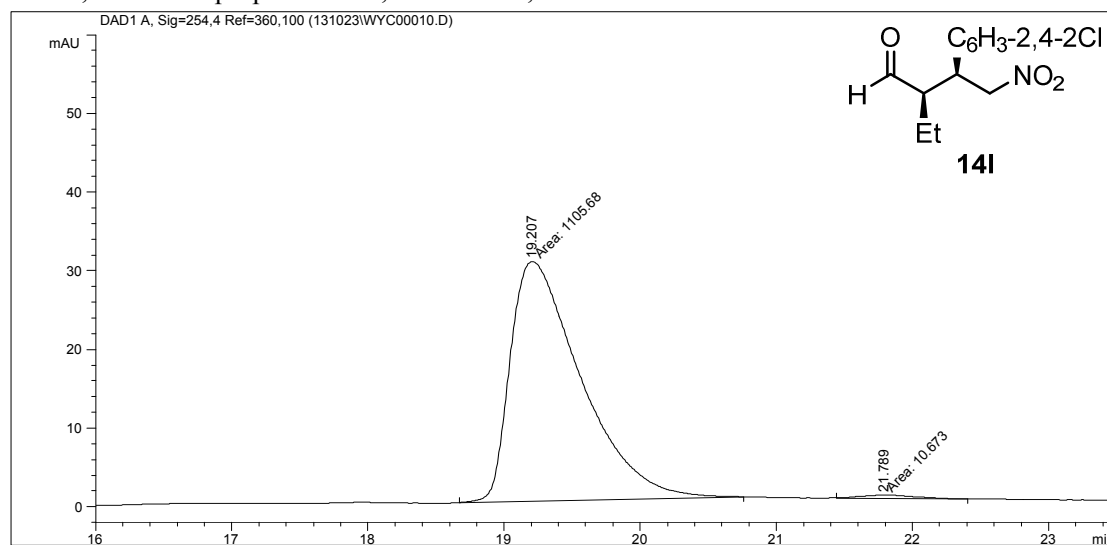
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.747	MM	0.3944	542.68640	22.93151	76.4961
2	18.679	MM	0.4118	13.06633	5.28862	1.8418
3	20.441	MM	0.4717	143.09720	5.05558	20.1707
4	21.350	MM	0.4045	10.58054	4.35941	1.4914

AD-H,*n*-hexane:*i*-propanol=99:1, 1.0 mL/min.



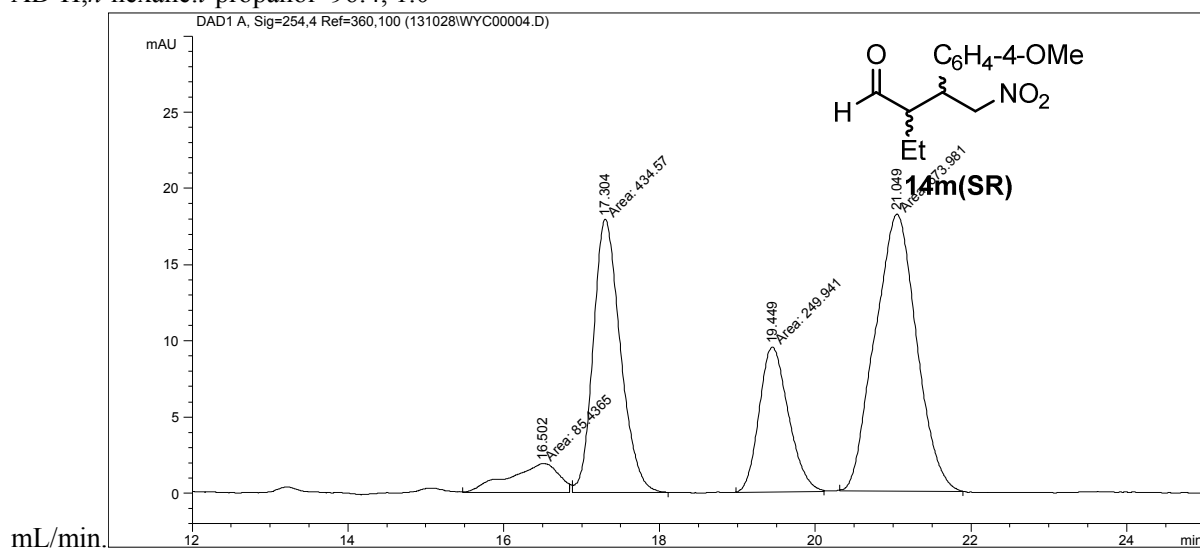
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	19.306	MM	0.5411	386.04770	11.89033	52.7154
2	21.480	MM	.5558	346.27710	10.38315	47.2846

AD-H,*n*-hexane:*i*-propanol=99:1, 1.0 mL/min, *ee*=98%.



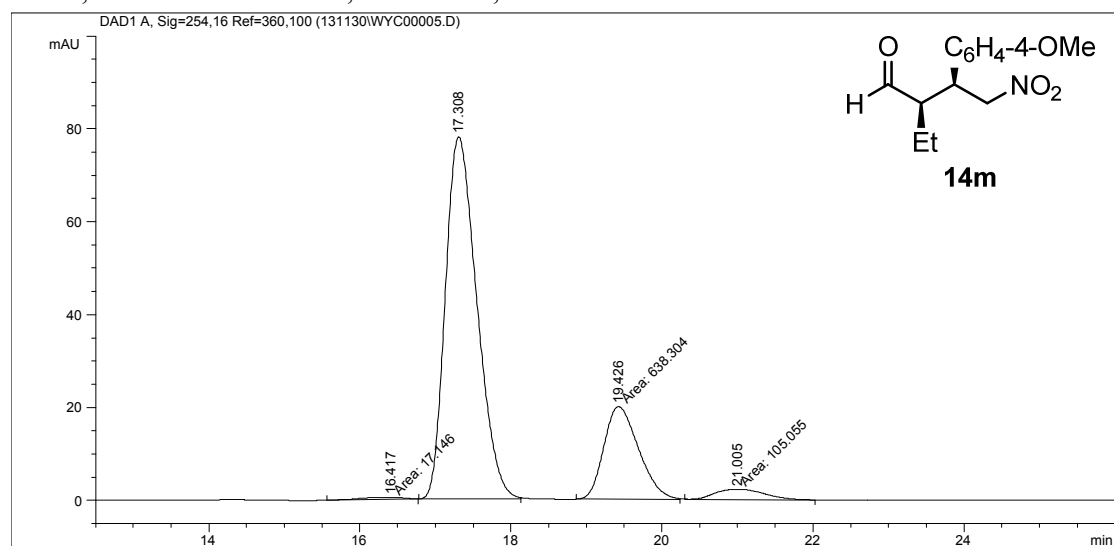
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	19.207	MM	0.6034	1105.67871	30.53927	99.0439
2	21.789	MM	0.4333	10.67299	4.10557	0.9561

AD-H,*n*-hexane:*i*-propanol=96:4, 1.0



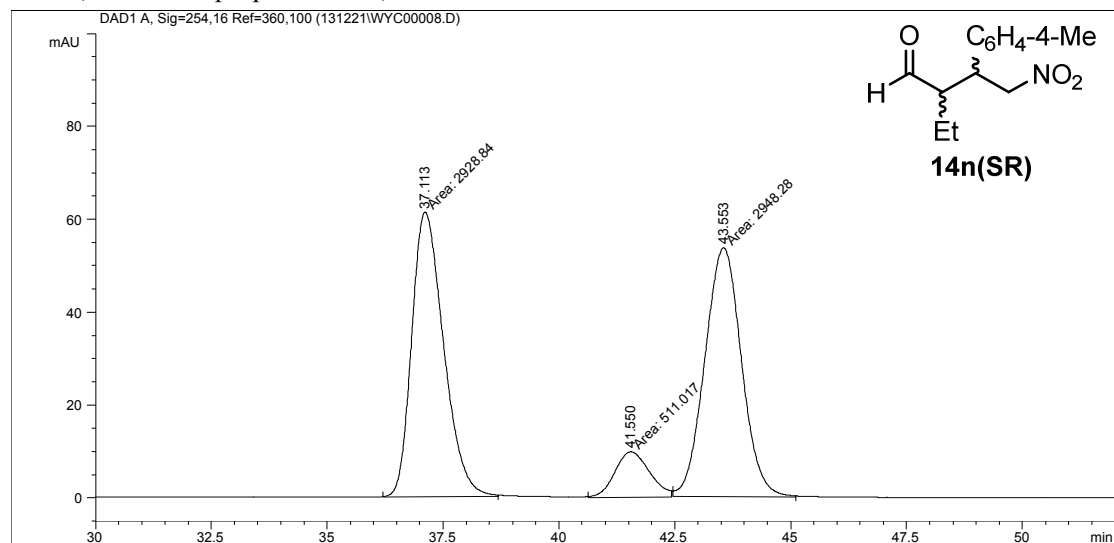
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.502	MM	0.7470	85.43653	1.90624	5.9169
2	17.304	MM	0.4039	434.57007	17.93040	30.0964
3	19.449	MM	0.4366	249.94090	9.54109	17.3098
4	21.049	MM	0.6186	673.98114	18.16005	46.6769

AD-H,*n*-hexane:*i*-PrOH=96:4, 1.0 mL/min, *ee*=95%.



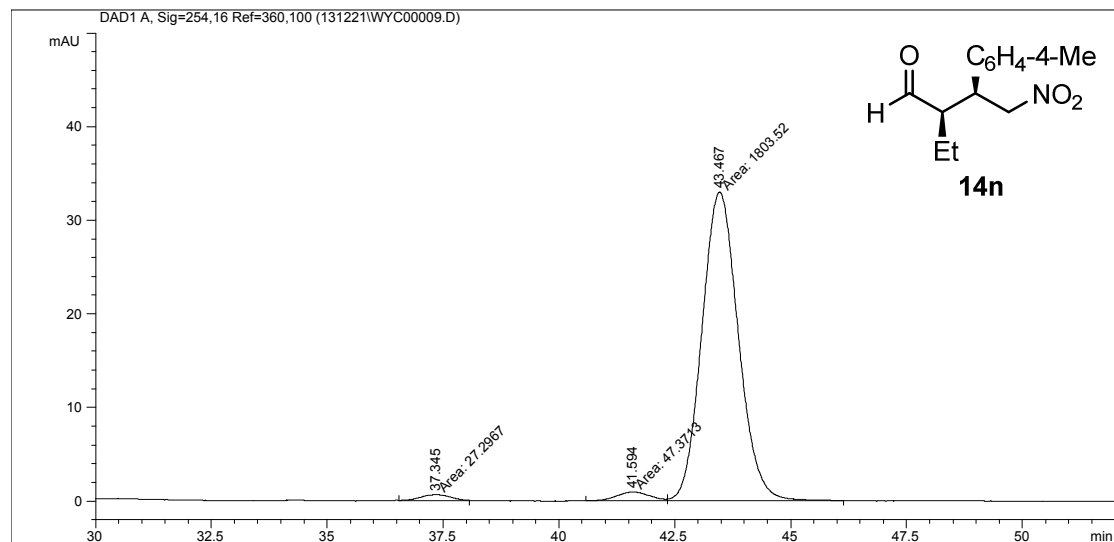
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.417	MM	0.6687	17.14600	4.27354	0.5685
2	17.308	PB	0.4497	2255.53003	77.92641	74.7846
3	19.426	MM	0.5327	638.30383	19.97107	21.1637
4	21.005	MM	0.7631	105.05487	2.29445	3.4832

OD-H,*n*-hexane:*i*-propanol=92:8, 0.5 mL/min.



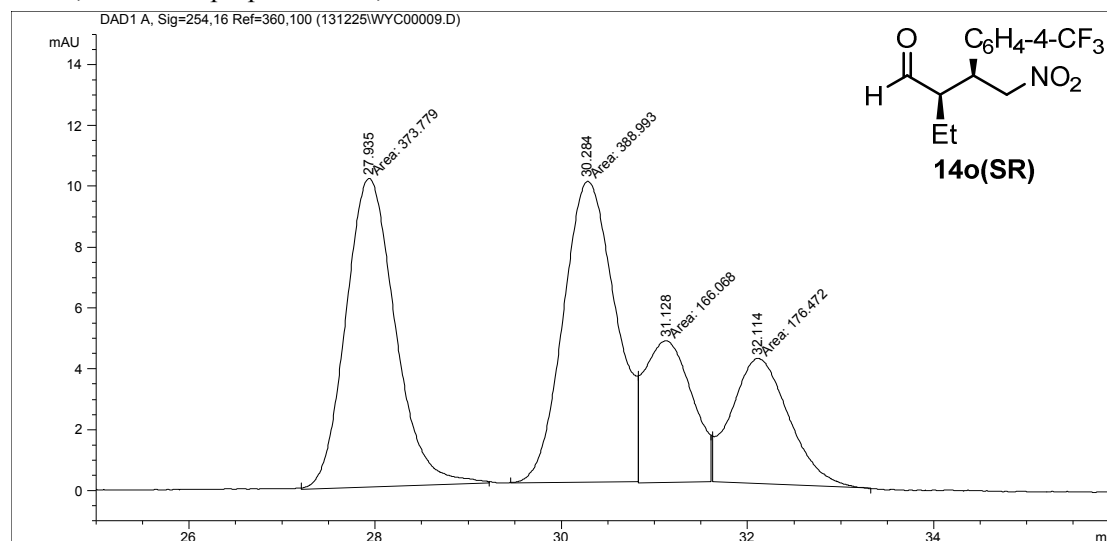
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	37.113	MM	0.7974	2928.83813	61.21539	45.8481
2	41.550	MM	0.8679	511.01736	9.81289	7.9995
3	43.553	MM	0.9178	2948.28003	53.54023	46.152

OD-H,*n*-hexane:*i*-PrOH=92:8, 0.5 mL/min, *ee*=97%.



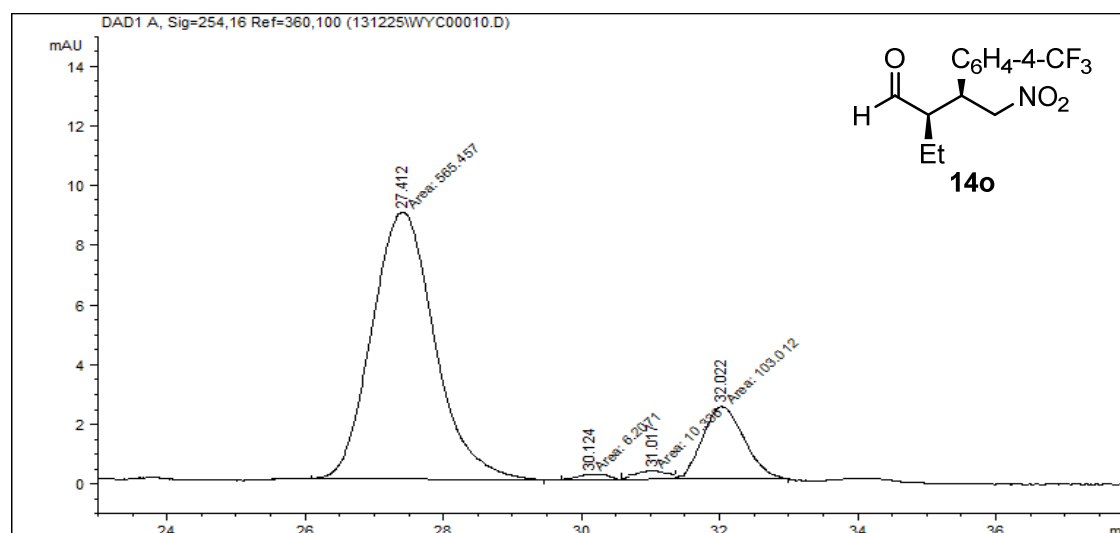
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	37.345	MM	0.7128	27.29667	6.38272	1.4534
2	41.594	MM	0.8213	47.37132	9.61329	2.5222
3	43.467	MM	0.9114	1803.52124	32.97959	96.0245

AS-H,*n*-hexane:*i*-propanol=93:7, 0.5 mL/min.



Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	27.935	MM	0.6140	373.77905	10.14625	33.8166
2	30.284	MM	0.6550	388.99313	9.89753	35.1931
3	31.128	MM	0.5928	166.06775	4.66900	15.0245
4	32.114	MM	0.7140	176.47198	4.11950	15.9658

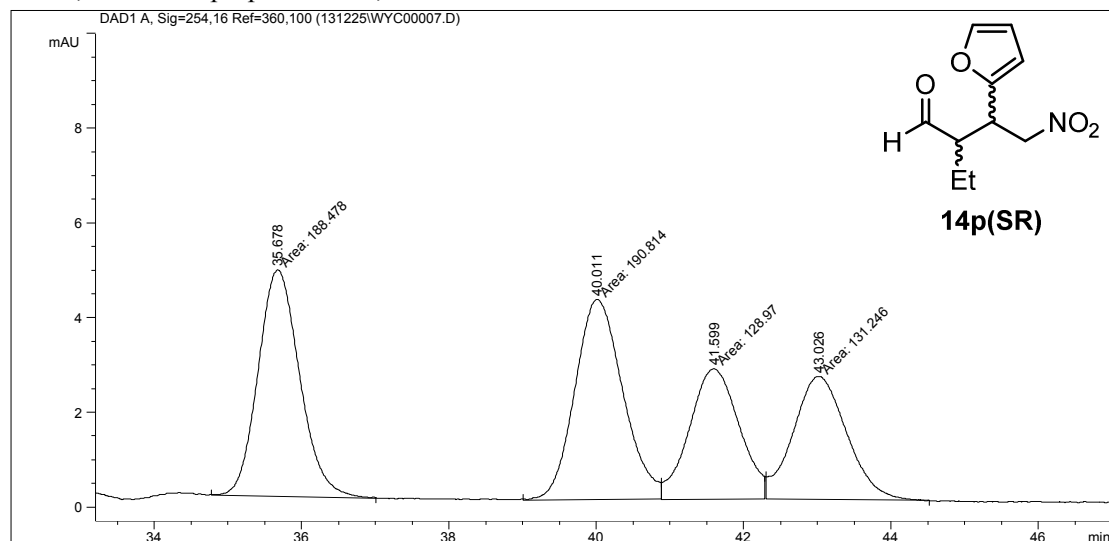
AS-H,*n*-hexane:*i*-PrOH=93:7, 0.5 mL/min, *ee*=98%.



Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	27.412	MM	1.0527	565.45740	8.95280	82.5471
2	30.124	MM	0.5655	6.20710	1.82931	0.9061
3	31.017	MM	0.5788	10.33600	2.97620	1.5089
4	32.022	MM	0.7054	103.01168	2.43399	15.0379

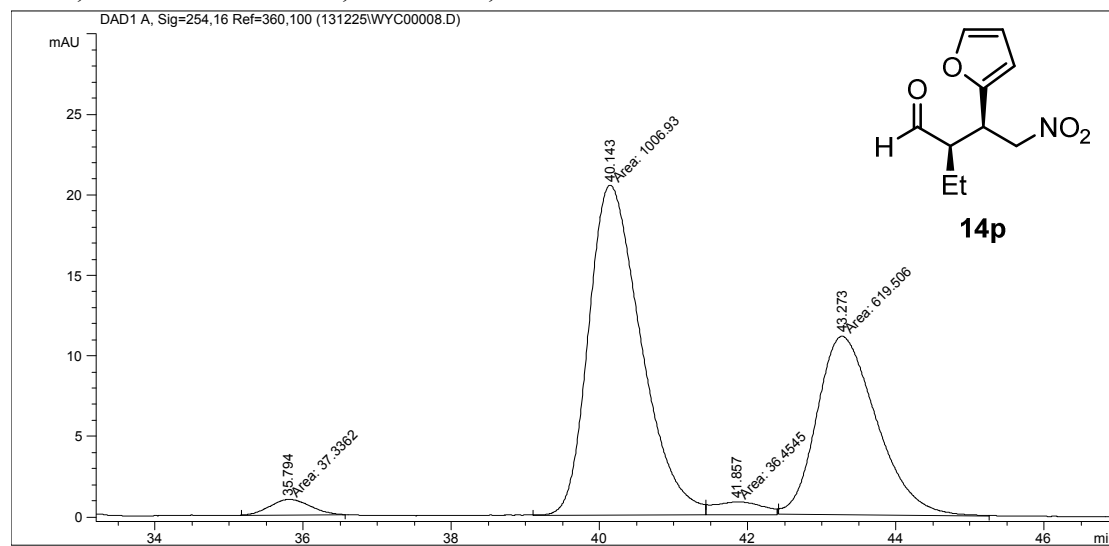


AS-H,*n*-hexane:*i*-propanol=96:4, 0.5 mL/min.



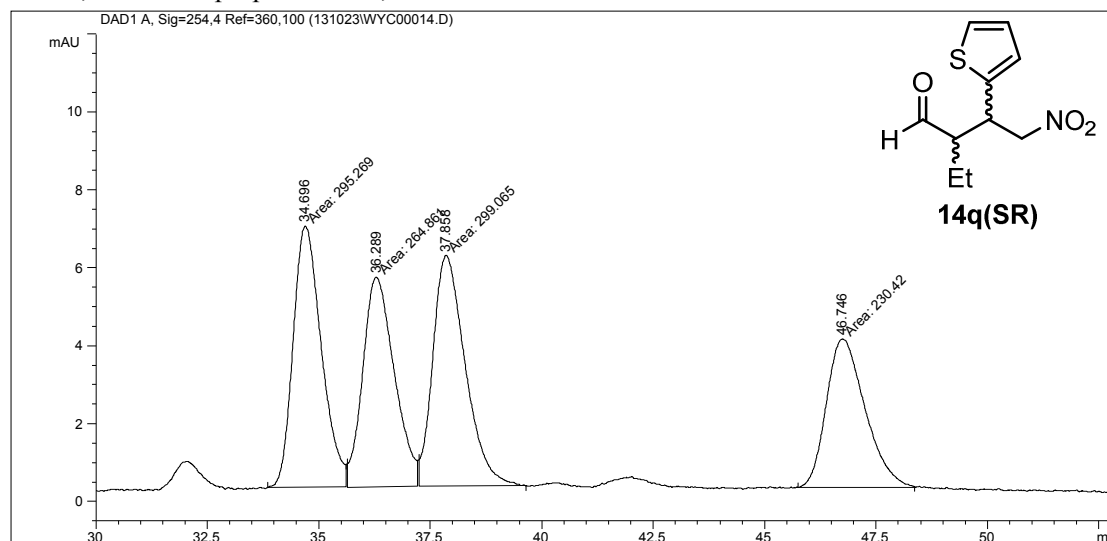
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	35.678	MM	0.6562	188.47801	4.78742	29.4724
2	40.011	MM	0.7528	190.81355	4.22438	29.8376
3	41.599	MM	0.7797	128.97012	2.75674	20.1671
4	43.026	MM	0.8426	131.24576	2.59612	20.5229

AS-H,*n*-hexane:*i*-PrOH=96:4, 0.5 mL/min,*ee*=93%.



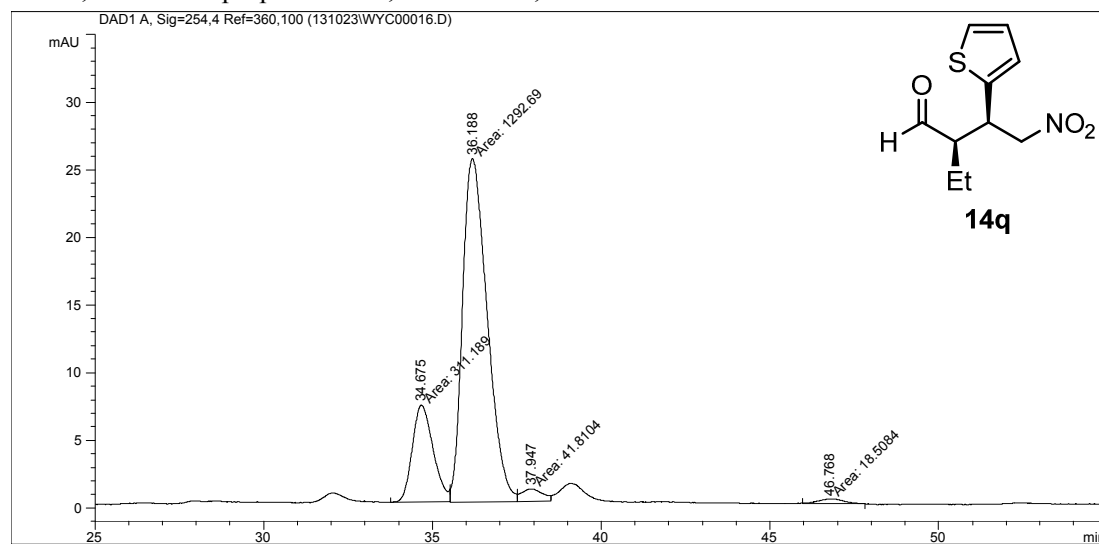
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	35.794	MM	0.6451	37.33624	9.64670	2.1960
2	40.143	MM	0.8192	1006.92926	20.48515	59.2232
3	41.857	MM	0.7634	36.45454	7.95875	2.1441
4	43.273	MM	0.9307	619.50641	11.09394	36.4367

AD-H,*n*-hexane:*i*-propanol=98:2, 0.7 mL/min.



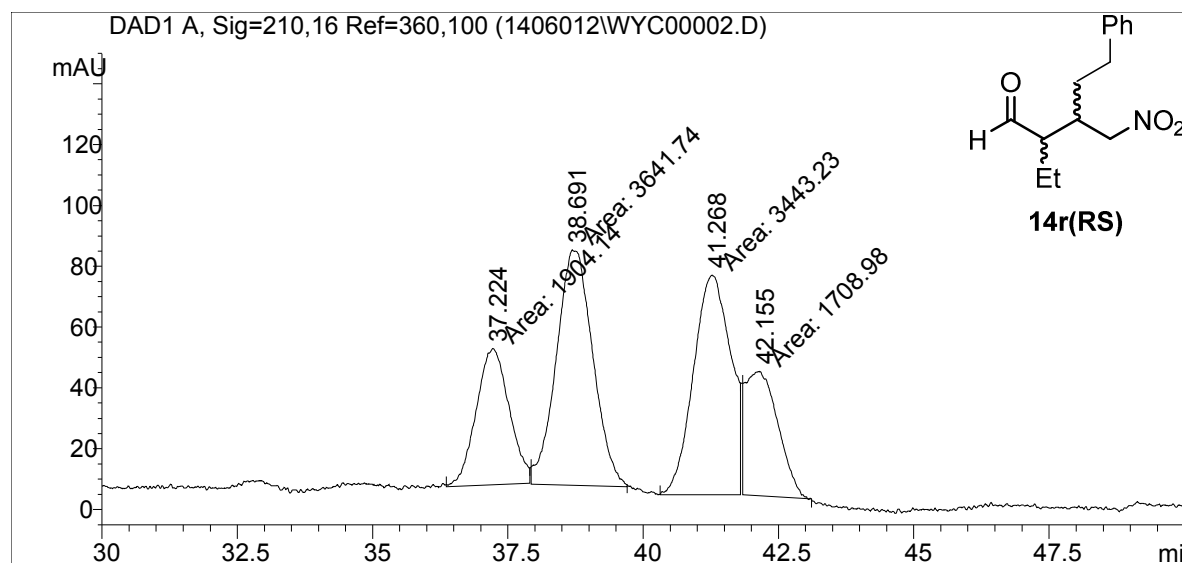
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	34.696	MM	0.7336	295.26886	6.70837	27.0985
2	36.289	MM	0.8199	264.86072	5.38370	24.3077
3	37.858	MM	0.8416	299.06500	5.92274	27.4469
4	46.746	MM	1.0065	230.41977	3.81550	21.1469

AD-H,*n*-hexane: *i*-propanol=98:2, 0.7 mL/min, ee=97%.



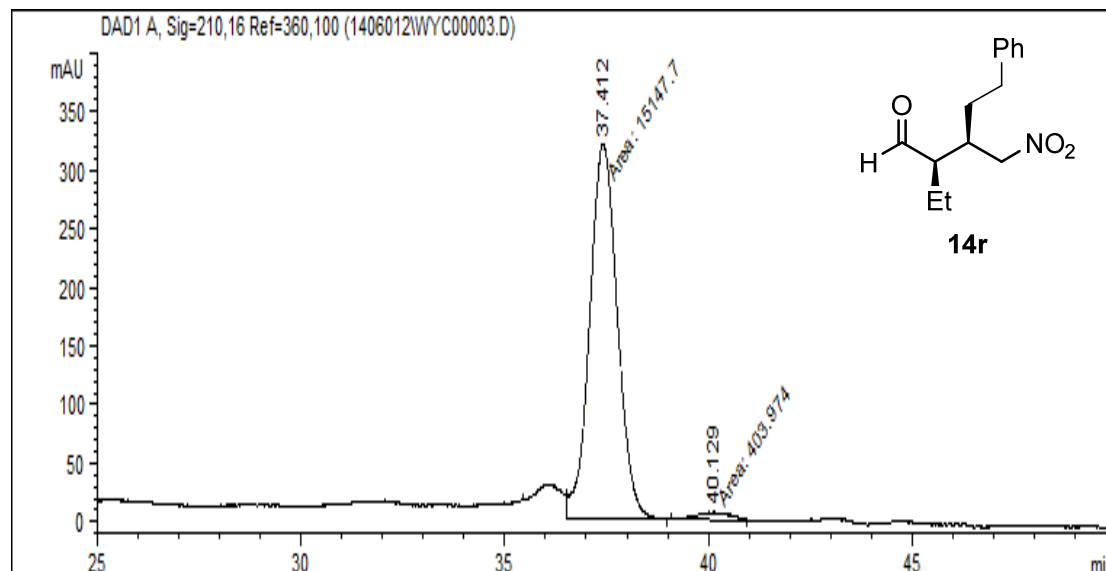
Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	34.675	MM	0.7233	311.18890	7.17081	18.6990
2	36.187	MM	0.8484	1292.69348	25.39523	77.6765
3	37.947	MM	0.7417	41.81036	9.39497	2.5123
4	46.768	MM	0.8699	18.50836	3.54593	1.1121

OH-H,*n*-hexane:*i*-pronol=90:10, 0.5mL/min, 210nm.



Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	37.224	1904.1	44.8	0.7078	17.799	1.000
2	38.691	3641.7	77.5	0.7836	34.041	0.783
3	41.268	3443.2	72.3	0.794	32.185	0.969
4	42.155	1709	40.9	0.6962	15.975	0.633

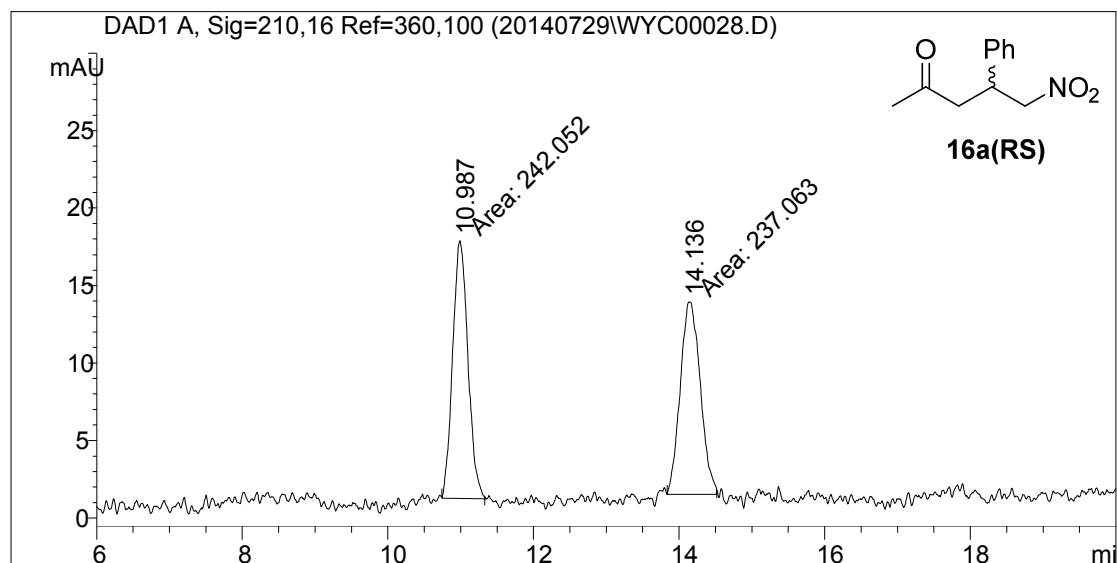
OH-H,*n*-hexane:*i*-pronol=90:10, 0.5mL/min, 210nm, ee = 99%.



Peak	RetTime[min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
2	37.412	1514	7.731	9.8	0.7894	98.941
3	40.129	404	6.7	1.0076	2.454	1.059

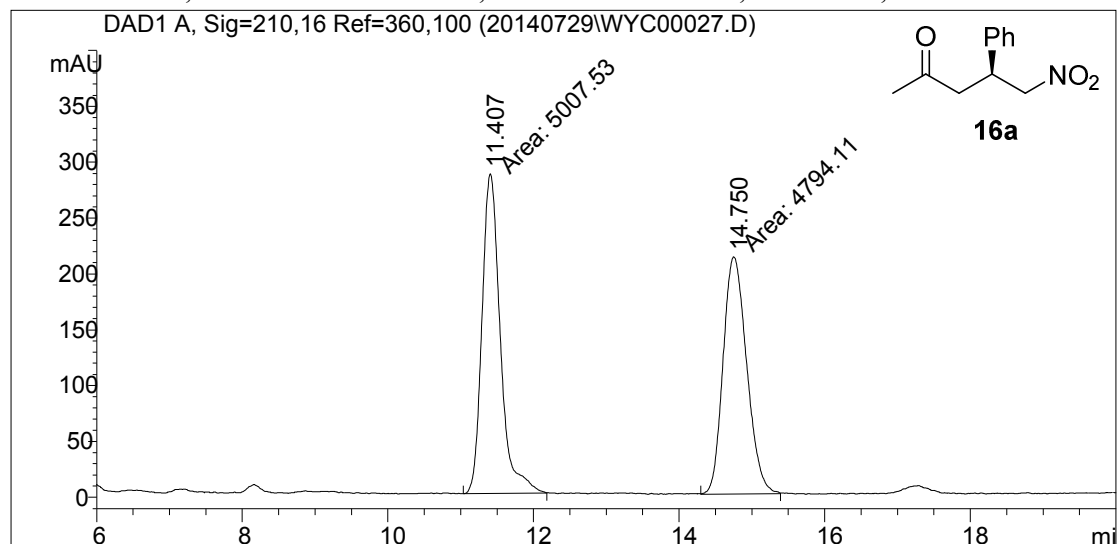
## 5. The spectra of chiral HPLC for compounds 16a-16n.

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 92:8, flow rate: 0.5 mL/min,  $\lambda = 210$  nm.



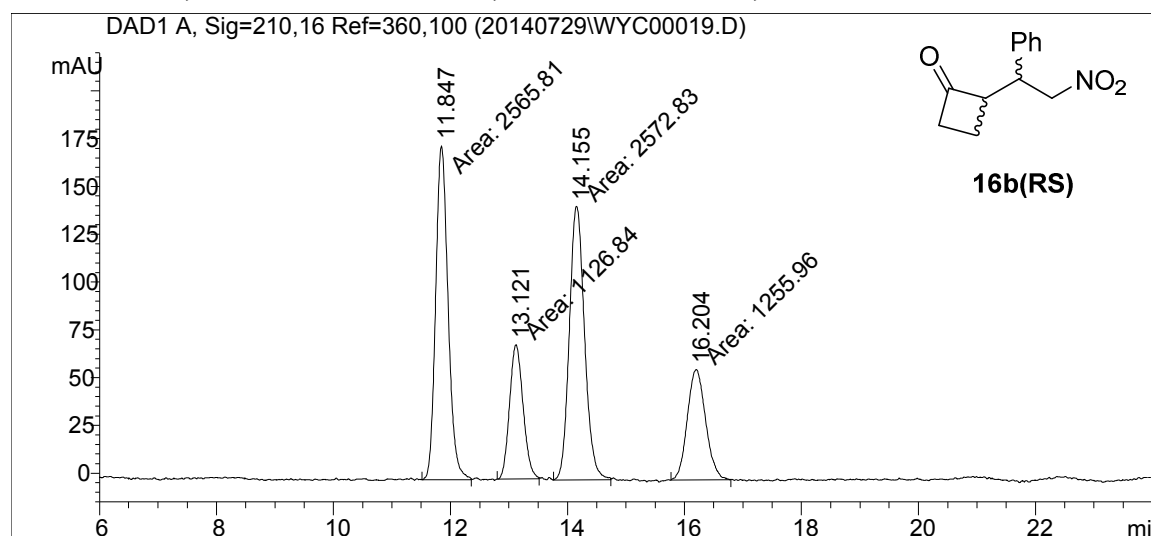
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	10.987	242.1	16.6	0.2425	50.521	0.838
2	14.136	237.1	12.4	0.3186	49.479	0.775

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 92:8, flow rate: 0.5 mL/min,  $\lambda = 210$  nm, 2% *ee*.



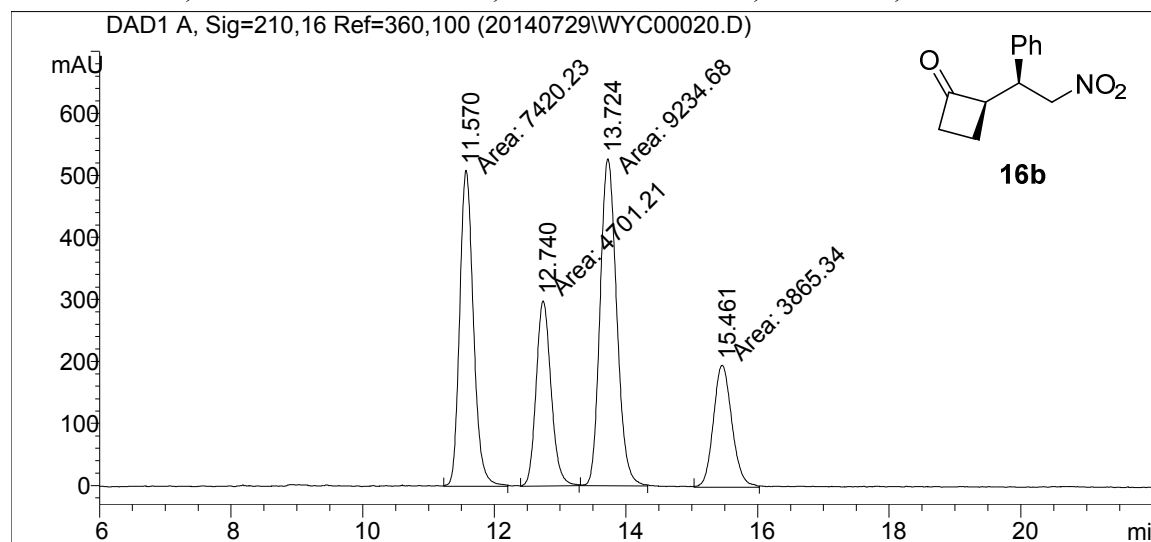
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	11.407	5007.5	286.2	0.2916	51.089	0.784
2	14.75	4794.1	212.3	0.3764	48.911	0.791

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 75:25, flow rate: 0.7 mL/min,  $\lambda = 210$  nm.



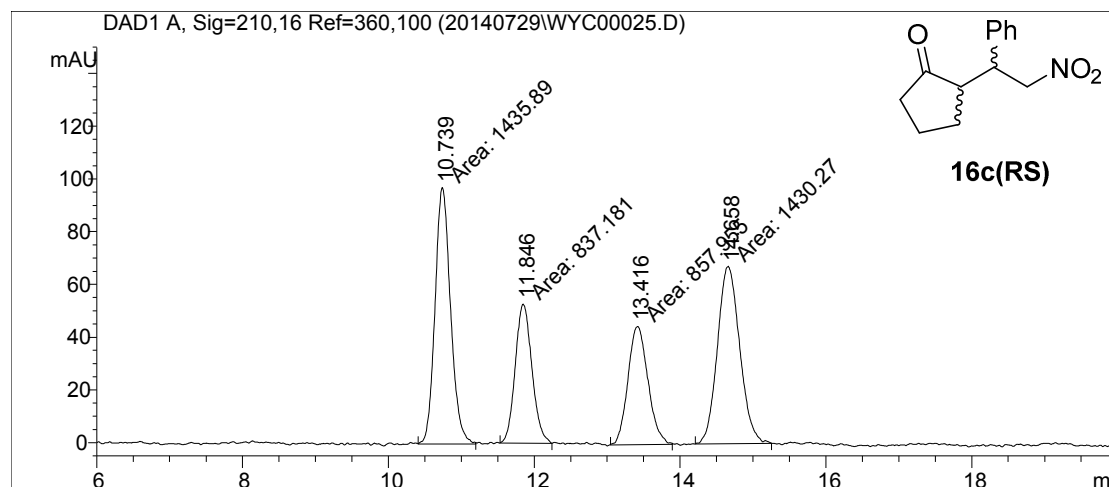
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	11.847	2565.8	174.5	0.2451	34.113	0.835
2	13.121	1126.8	70.2	0.2674	14.982	0.881
3	14.155	2572.8	143.2	0.2995	34.207	0.854
4	16.204	1256	57.8	0.3623	16.698	0.944

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 75:25, flow rate: 0.7 mL/min,  $\lambda = 210$  nm, 11% *ee*.



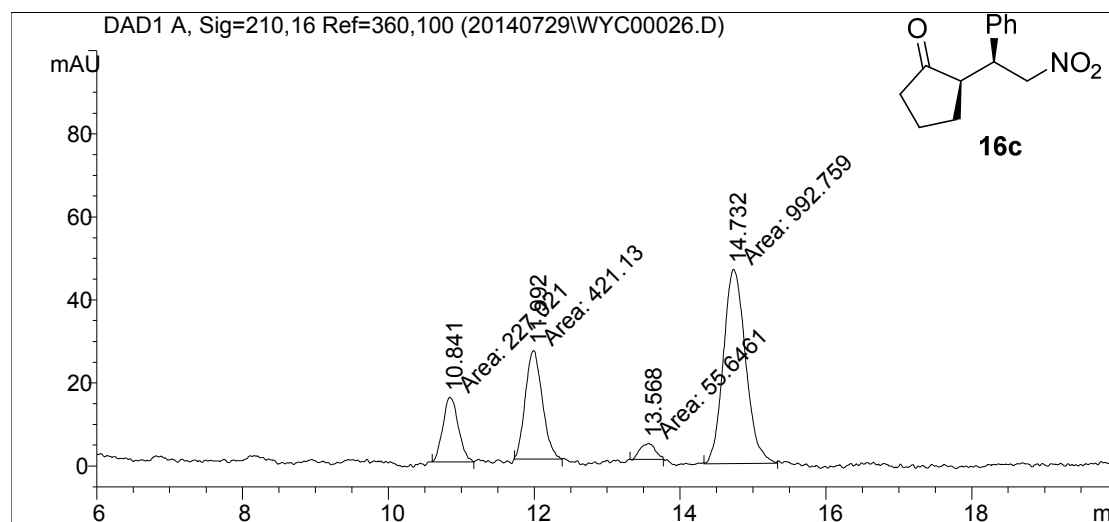
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	11.57	7420.2	509.6	0.2427	29.420	0.829
2	12.74	4701.2	298.6	0.2624	18.640	0.833
3	13.724	9234.7	527	0.2921	36.614	0.841
4	15.461	3865.3	196.6	0.3277	15.326	0.866

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 75:25, flow rate: 0.8 mL/min,  $\lambda = 210$  nm.



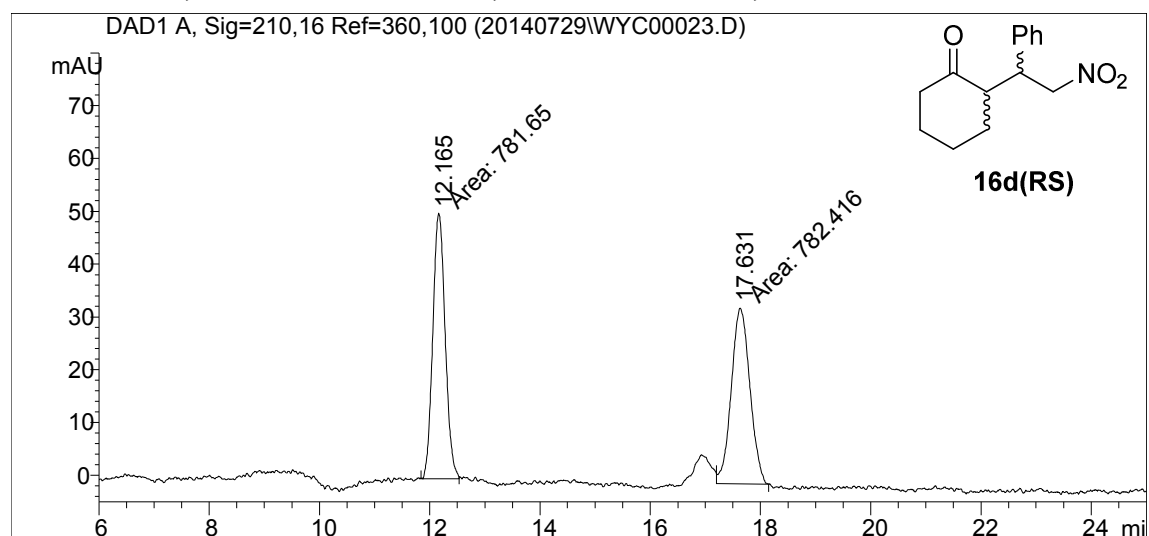
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	10.739	1435.9	97.2	0.2462	31.480	0.842
2	11.846	837.2	52.7	0.2647	18.354	0.854
3	13.416	858	44.9	0.3187	18.809	0.887
4	14.658	1430.3	67.2	0.3547	31.357	0.884

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 75:25, flow rate: 0.8 mL/min,  $\lambda = 210$  nm, 40% *ee*.



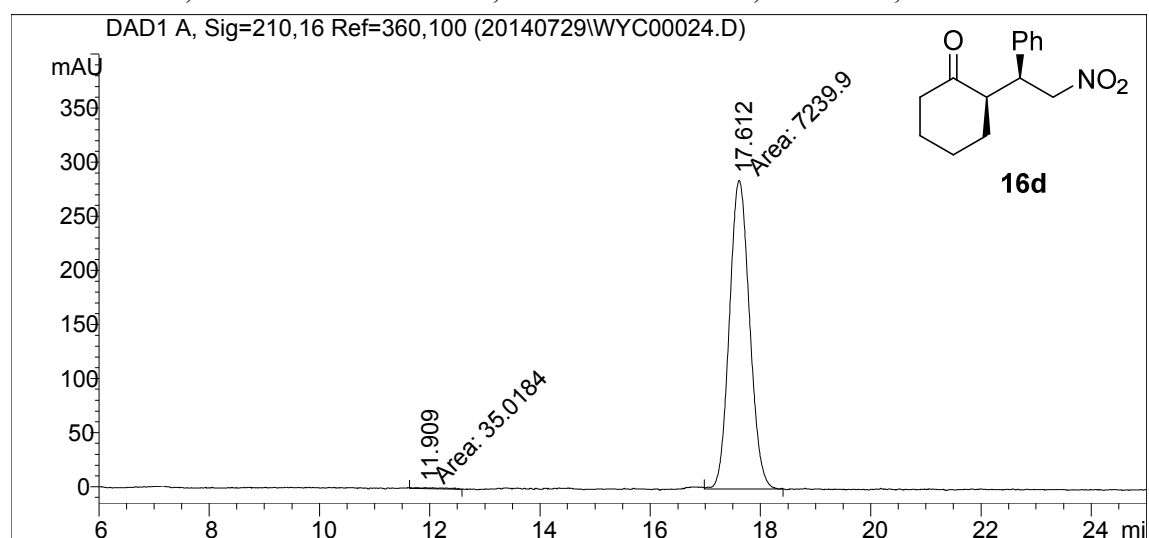
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	10.841	227	15.6	0.2429	13.381	0.797
2	11.992	421.1	26.1	0.2689	24.823	0.934
3	13.568	55.6	3.9	0.2402	3.280	1.183
4	14.732	992.8	46.8	0.3532	58.516	0.812

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 85:15, flow rate: 0.8 mL/min,  $\lambda = 210$  nm.



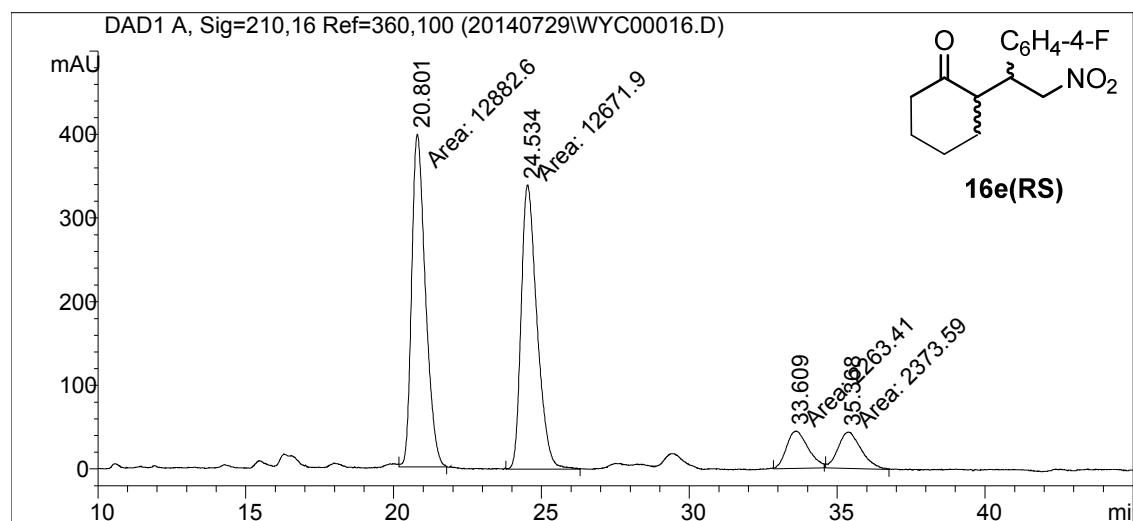
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	12.165	781.7	50.2	0.2597	49.976	0.905
2	17.631	782.4	33.3	0.3914	50.024	0.893

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 85:15, flow rate: 0.8 mL/min,  $\lambda = 210$  nm, 99% *ee*.



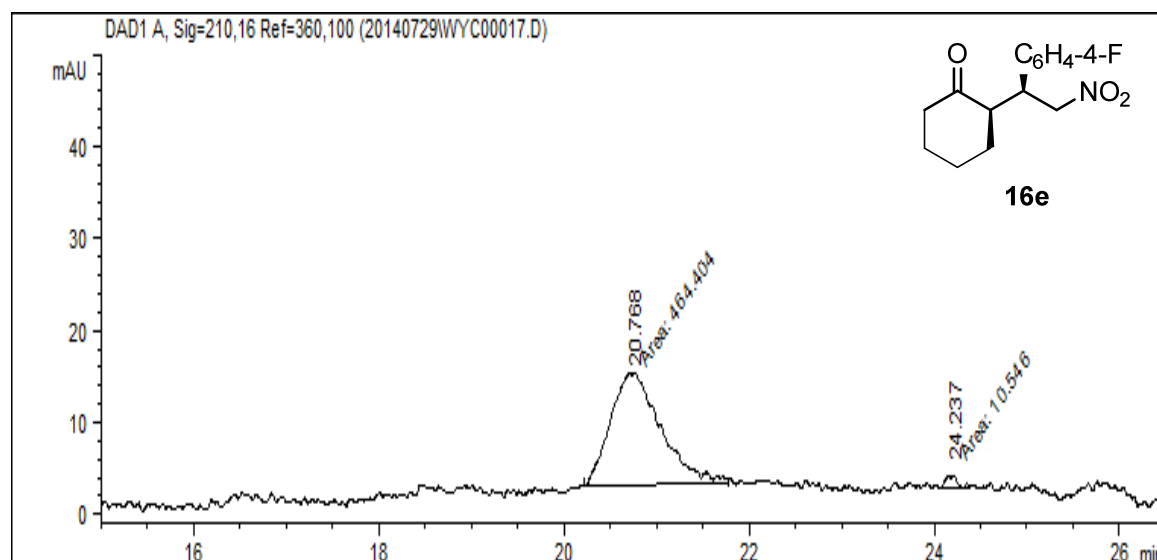
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	11.909	35	1.1	0.5351	0.481	0.496
2	17.612	7239.9	285.4	0.4228	99.519	0.896

Chiralcel AD-H, *n*-hexane: *i*-PrOH = 92:8, flow rate: 0.9 mL/min,  $\lambda = 210$  nm.



Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	20.801	12882.6	397.7	0.5399	42.670	0.676
2	24.534	12671.9	339.9	0.6214	41.972	0.674
3	33.609	2263.4	44.5	0.8468	7.497	0.772
4	35.368	2373.6	43.4	0.9107	7.862	0.746

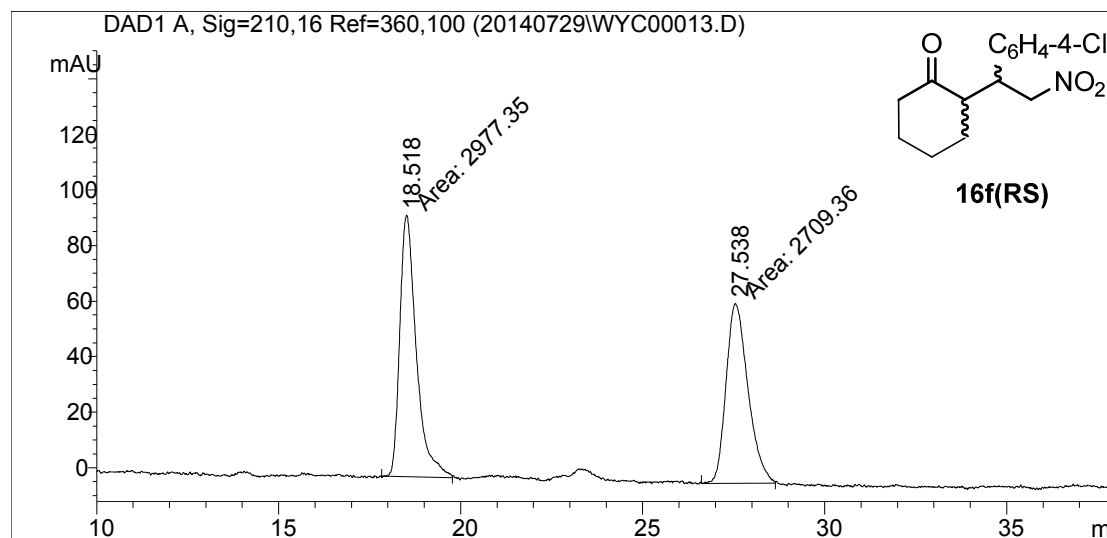
Chiralcel AD-H, *n*-hexane: *i*-PrOH = 92:8, flow rate: 0.9 mL/min,  $\lambda = 210$  nm, 96% *ee*.



Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	20.768	464.4	12.2	0.6357	97.781	0.882
2	24.237	10.5	9.3	0.188	2.219	6.432

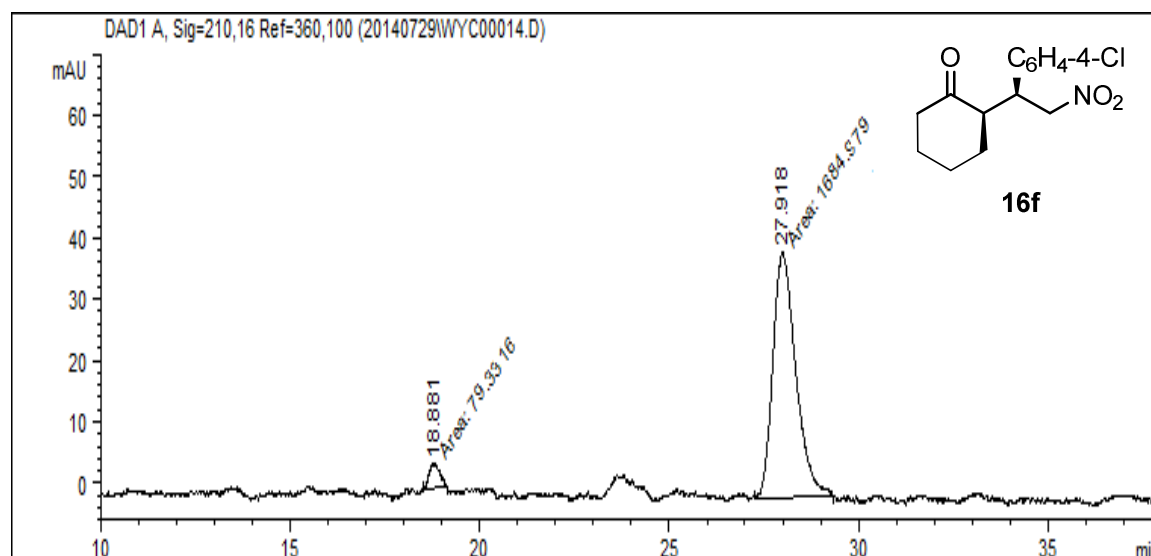


Chiralcel AD-H, n-hexane: *i*-PrOH = 90:10, flow rate: 0.9 mL/min,  $\lambda$  = 210 nm.



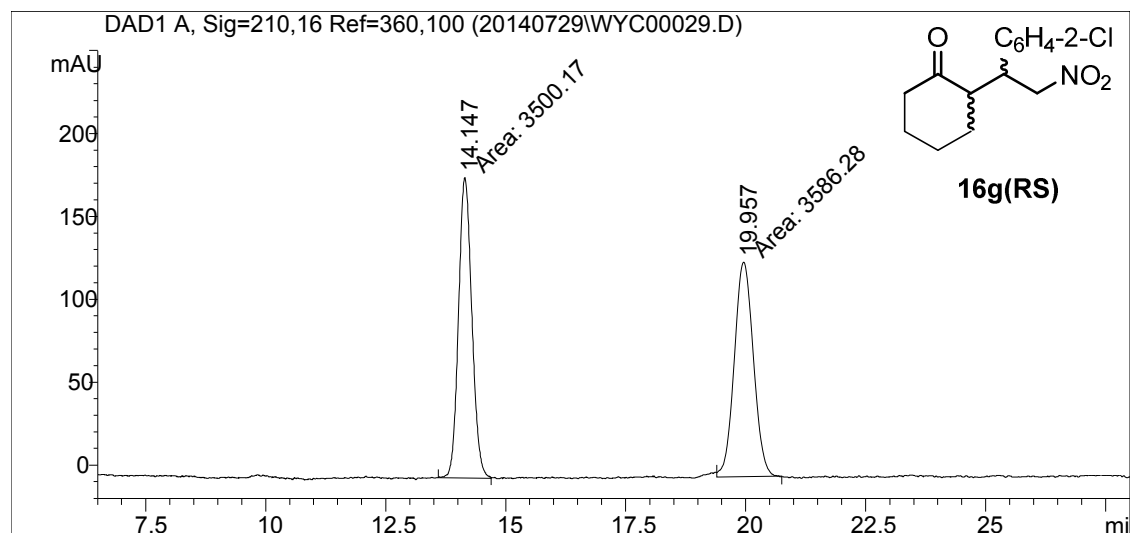
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	18.518	2977.3	94.1	0.5275	52.356	0.689
2	27.538	2709.4	64.7	0.698 4	7.644	0.695

Chiralcel AD-H, n-hexane: *i*-PrOH = 90:10, flow rate: 0.9 mL/min,  $\lambda$  = 210 nm, 90% *ee*.



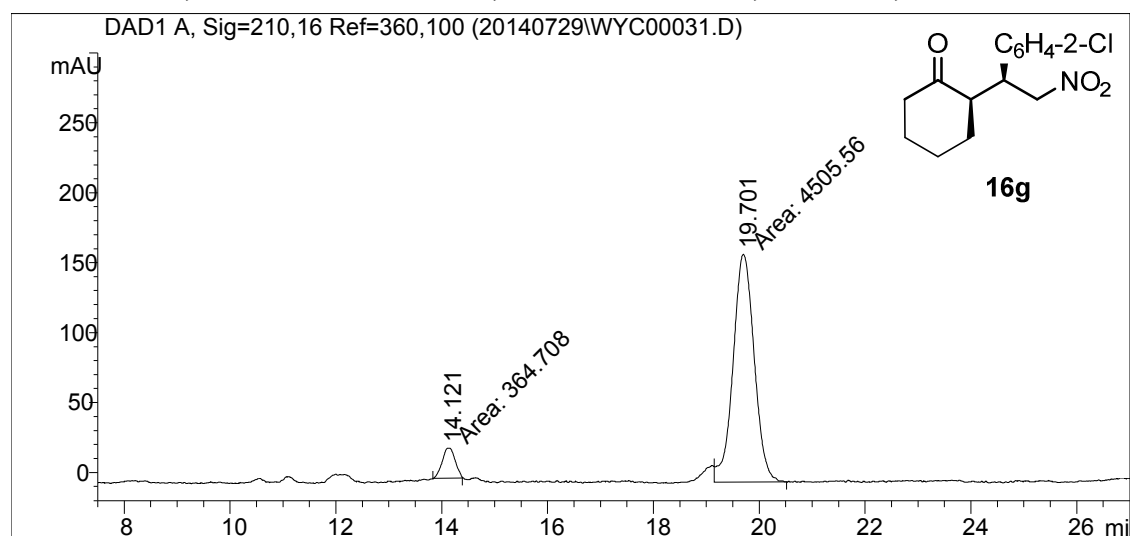
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	18.881	79.3	4	0.3334	4.497	0.894
2	27.918	1685	39.9	0.7032	95.503	0.652

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 90:10, flow rate: 0.8 mL/min,  $\lambda = 210$  nm.



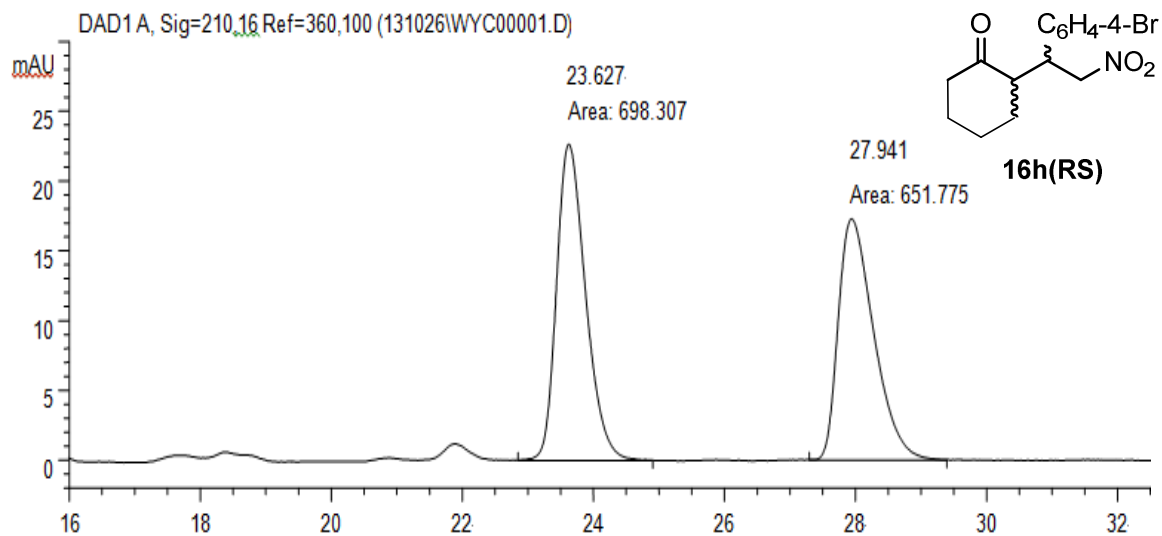
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	14.147	3500.2	181.3	0.3219	49.392	0.857
2	19.957	3586.3	129.3	0.4622	50.608	0.932

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 90:10, flow rate: 0.8 mL/min,  $\lambda = 210$  nm, 85% *ee*.



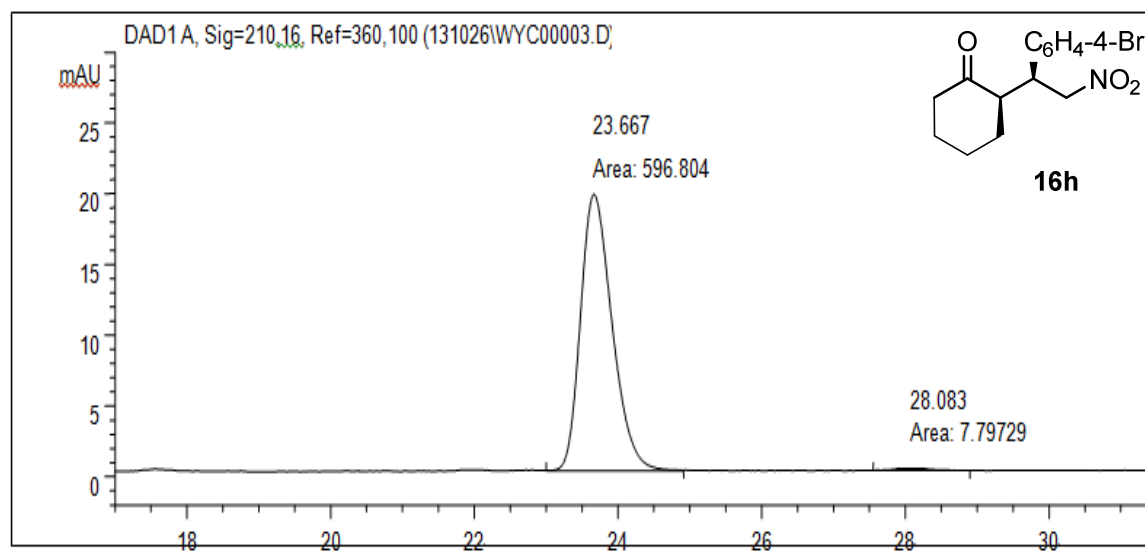
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	14.121	364.7	21.6	0.2816	7.488	0.843
2	19.701	4505.6	162.6	0.4617	92.512	0.941

Chiralcel AD-H, *n*-hexane: *i*-PrOH = 90:10, flow rate: 0.7 mL/min,  $\lambda = 210$  nm.



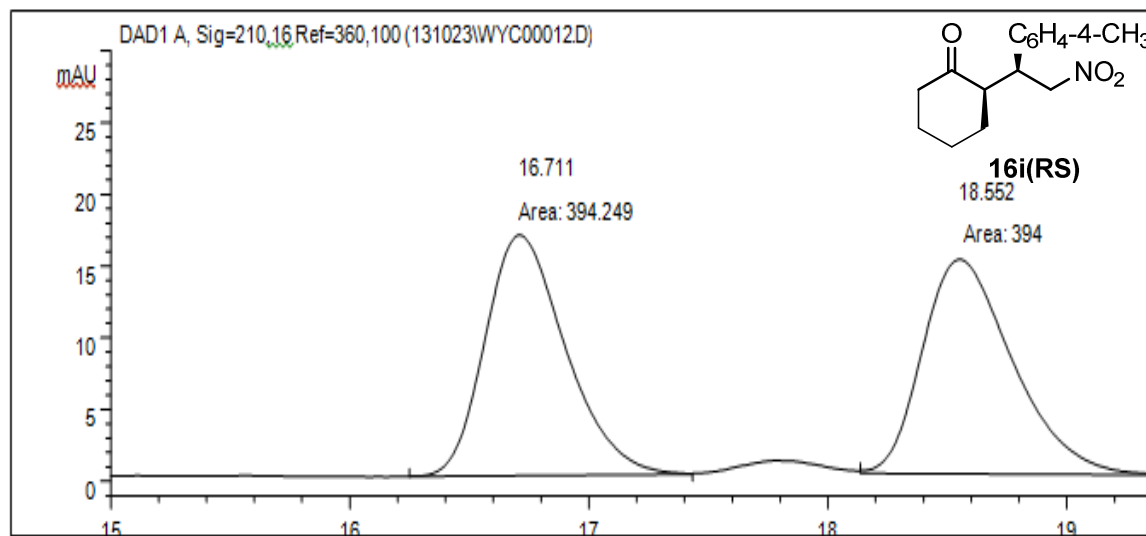
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	23.627	698.3	22.7	0.5136	51.723	0.708
2	27.941	651.8	17.3	0.6283	48.277	0.575

Chiralcel AD-H, *n*-hexane: *i*-PrOH = 90:10, flow rate: 0.7 mL/min,  $\lambda = 210$  nm, 98% *ee*.



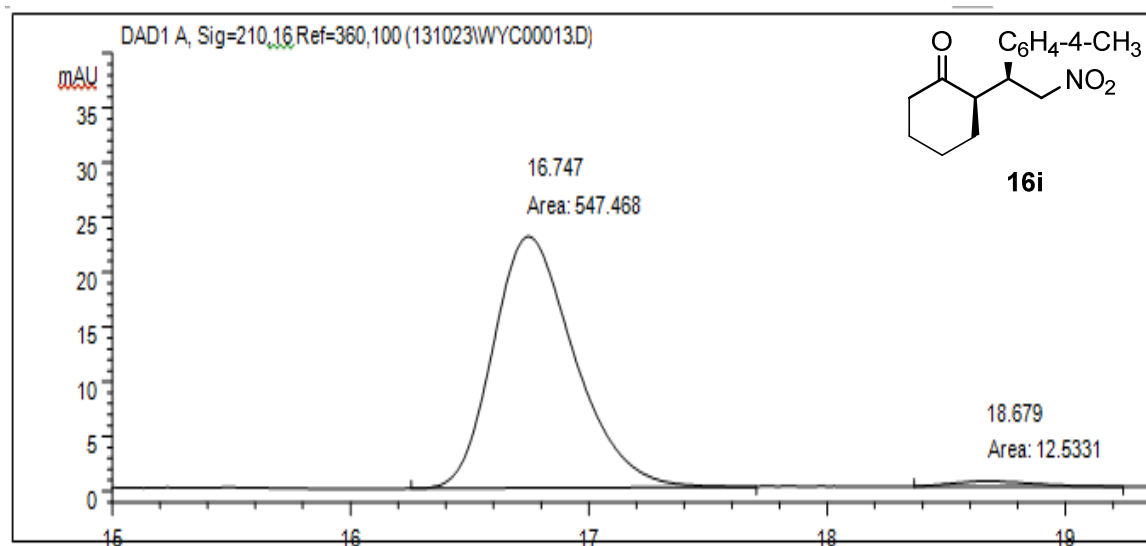
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	23.667	596.8	19.5	0.5092	98.710	0.714
2	28.083	7.8	20.6635	0.001	1.290	0.784

Chiralcel AD-H, n-hexane: *i*-PrOH = 92:8, flow rate: 0.8 mL/min,  $\lambda = 210$  nm.



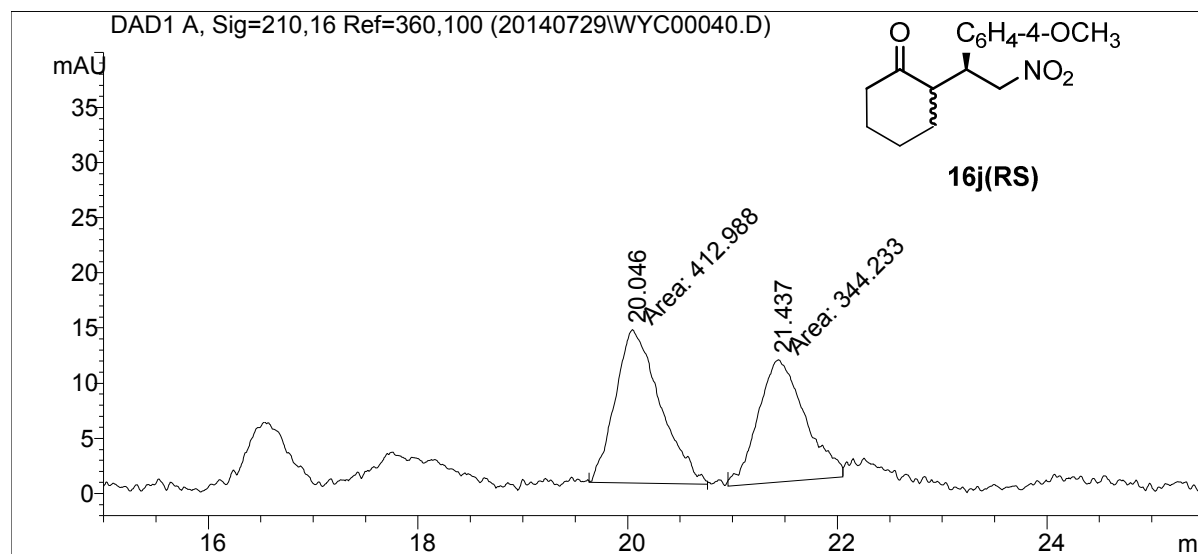
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	16.711	394.2	16.8	0.3917	50.016	0.735
2	18.552	394	14.9	0.4394	49.984	0.685

Chiralcel AD-H, n-hexane: *i*-PrOH = 92:8, flow rate: 0.8 mL/min,  $\lambda = 210$  nm, 96% *ee*.



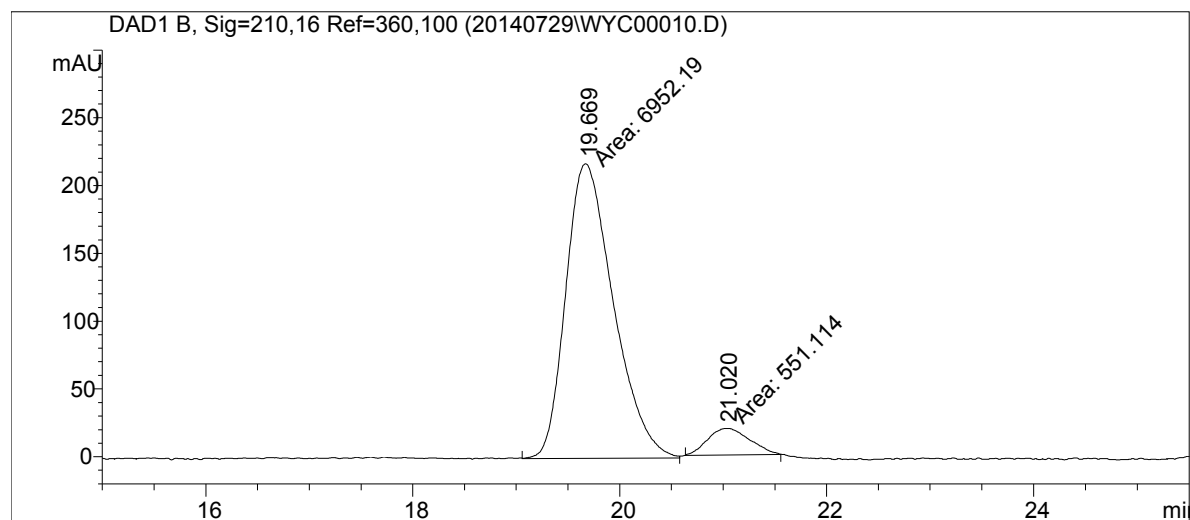
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	16.747	547.5	23	0.397	97.762	0.747
2	18.679	12.5	5.2	0.4044	2.238	0.74

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 90:20, flow rate: 0.8 mL/min,  $\lambda = 210$  nm.



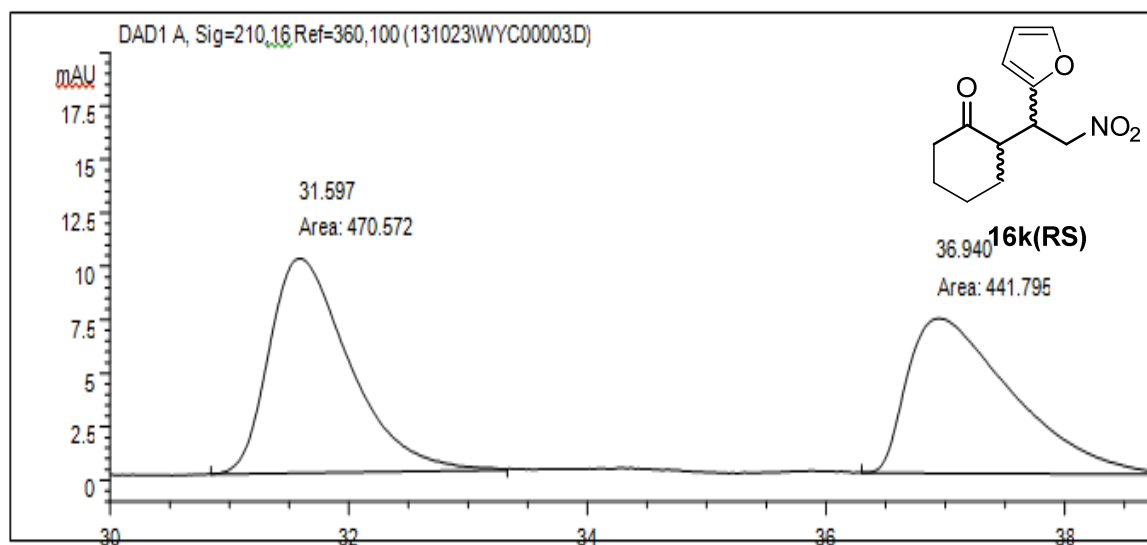
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	20.046	413	13.9	0.4951	54.540	0.616
2	21.437	344.2	11.1	0.5169	45.460	0.755

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 90:20, flow rate: 0.8 mL/min,  $\lambda = 210$  nm, 85% *ee*.



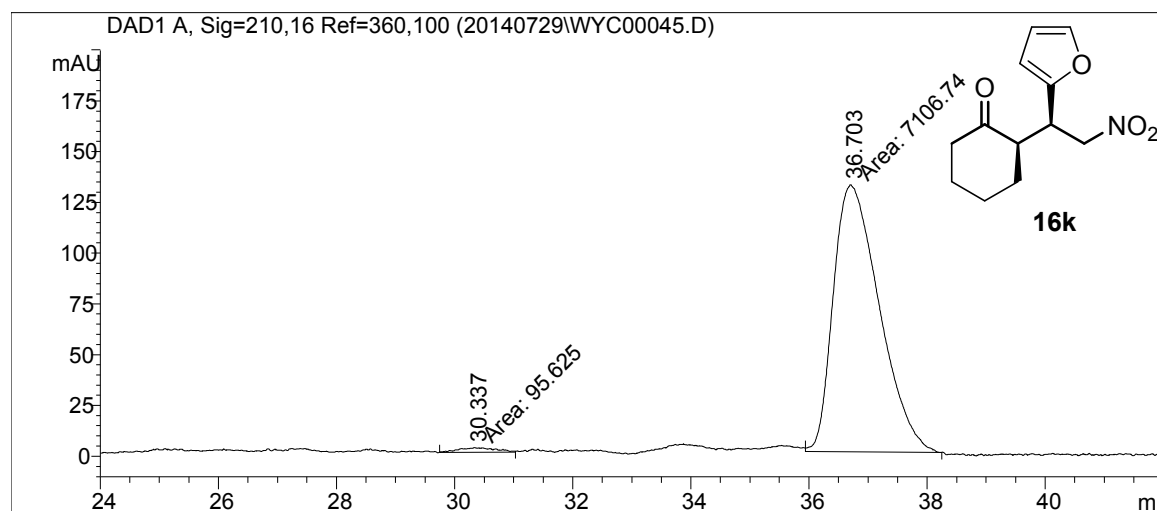
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	19.669	6952.2	217.3	0.5331	92.655	0.684
2	21.02	551.1	19.5	0.4713	7.345	0.715

Chiralcel AD-H, *n*-hexane: *i*-PrOH = 98:2, flow rate: 1.0 mL/min,  $\lambda$  = 210 nm.



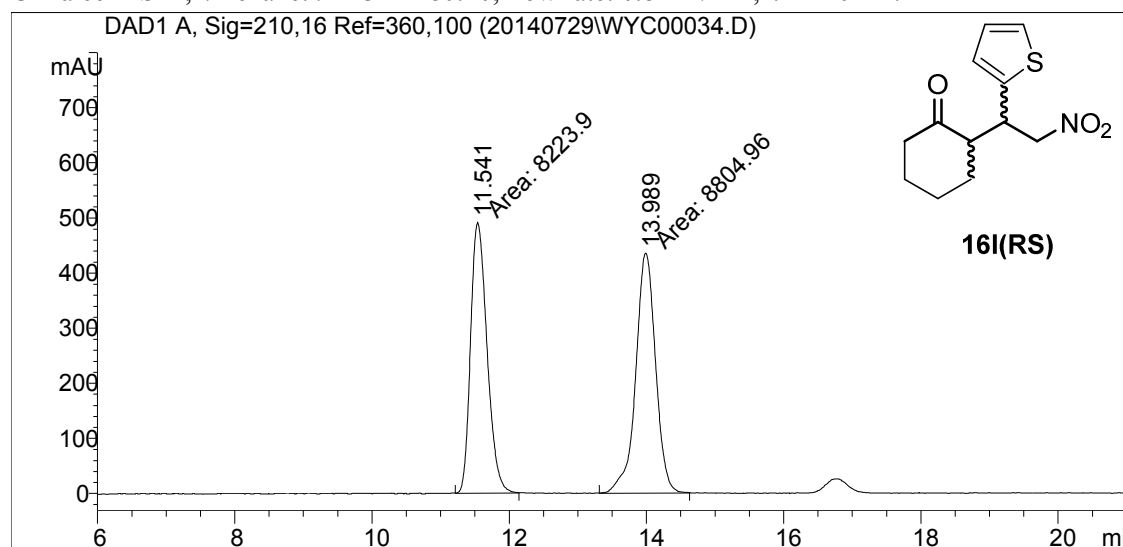
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	31.597	470.6	10	0.7821	51.577	0.613
2	36.94	441.8	7.2	1.0188	48.423	0.405

Chiralcel AD-H, *n*-hexane: *i*-PrOH = 98:2, flow rate: 1.0 mL/min,  $\lambda$  = 210 nm, 97% ee.



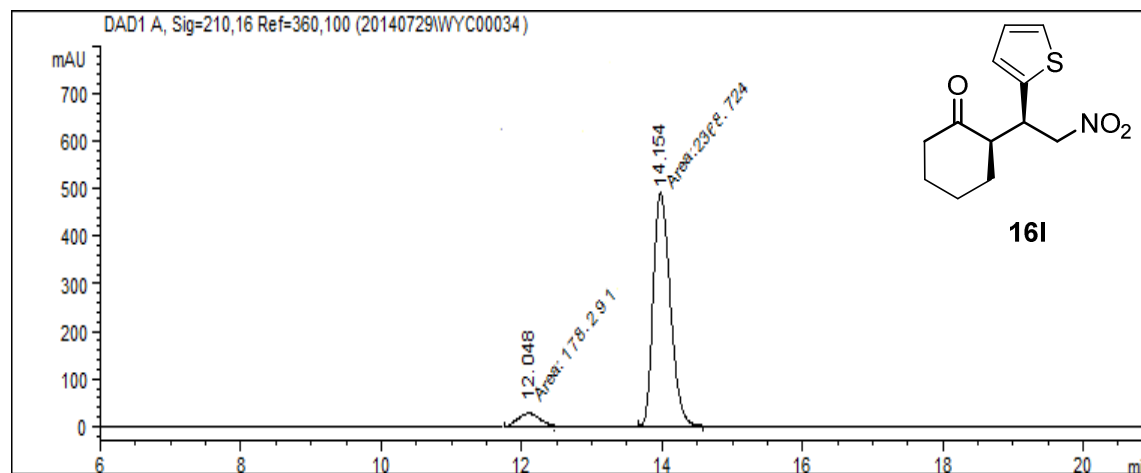
Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	30.337	95.6	2.2	0.7216	1.328	0.767
2	36.703	7106.7	131.4	0.9012	98.672	0.587

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 80:20, flow rate: 0.8 mL/min,  $\lambda$  = 210 nm.



Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	11.541	8223.9	491.2	0.279	48.294	0.737
2	13.989	8805	435.7	0.3368	51.706	0.998

Chiralcel AS-H, *n*-hexane: *i*-PrOH = 80:20, flow rate: 0.8 mL/min,  $\lambda$  = 210 nm, 93% *ee*.



Peak	RetTime[min]	Area	Height	Width [min]	Area%	Symmetry
1	12.048	178.3	30.8	0.1374	7.001	0.287
2	14.154	2368.7	487.3	0.4085	92.999	0.992