

Electronic Supplementary Information

Enantioselective electrophilic trifluoromethylation of β -keto esters with Umemoto reagents induced by chiral nonracemic guanidines

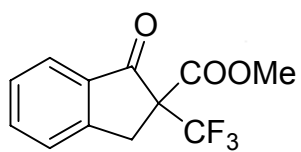
Shun Noritake,^a Norio Shibata,^{*a} Yoshinori Nomura,^a Yiyong Huang,^a Andrej Matsnev,^a
Shuichi Nakamura,^a Takeshi Toru,^a and Dominique Cahard^b

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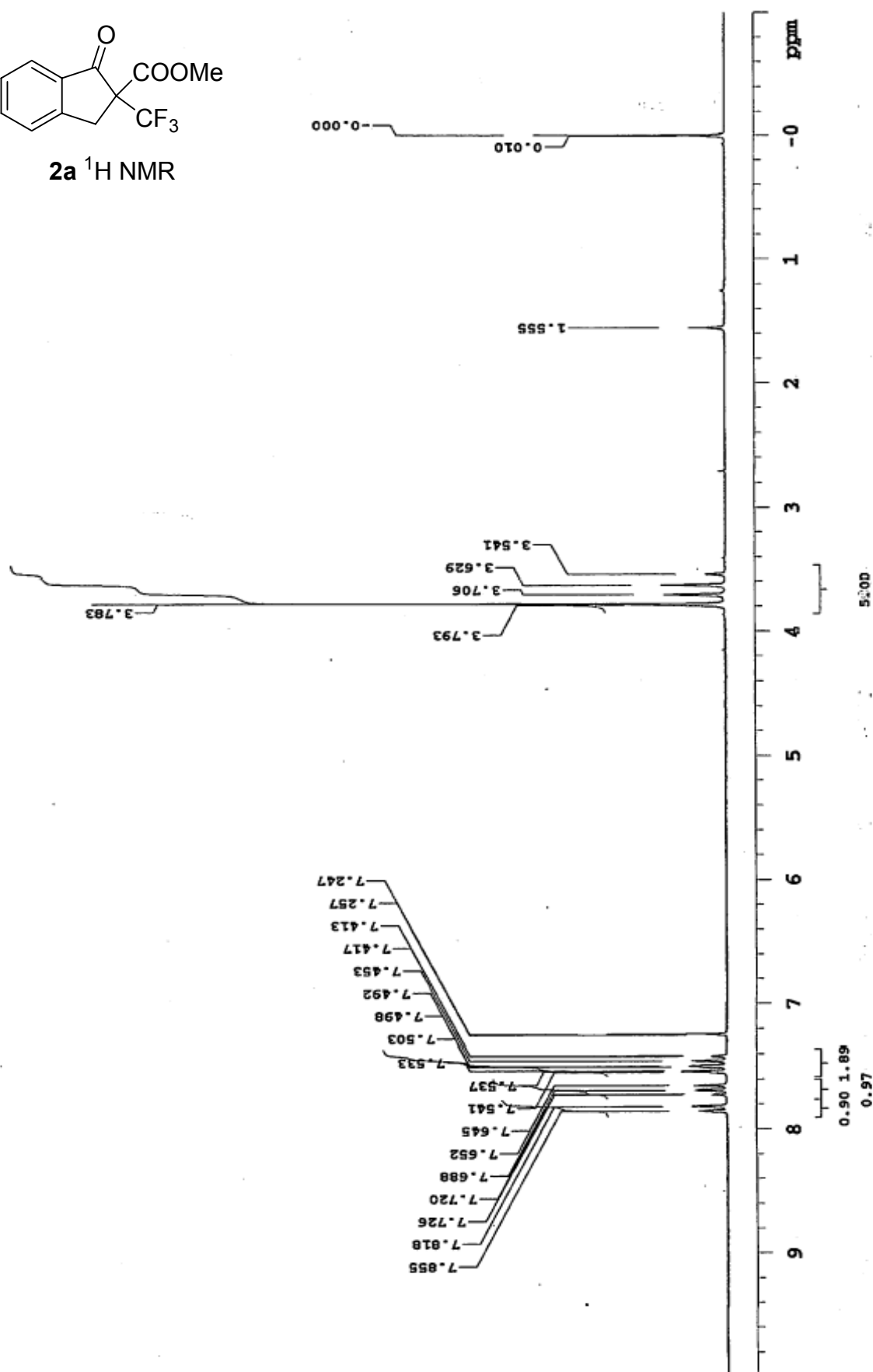
^b*UMR CNRS 6014 C.O.B.R.A., Université et INSA de Rouen, rue Tesnière, 76130 Mont Saint Aignan, France*

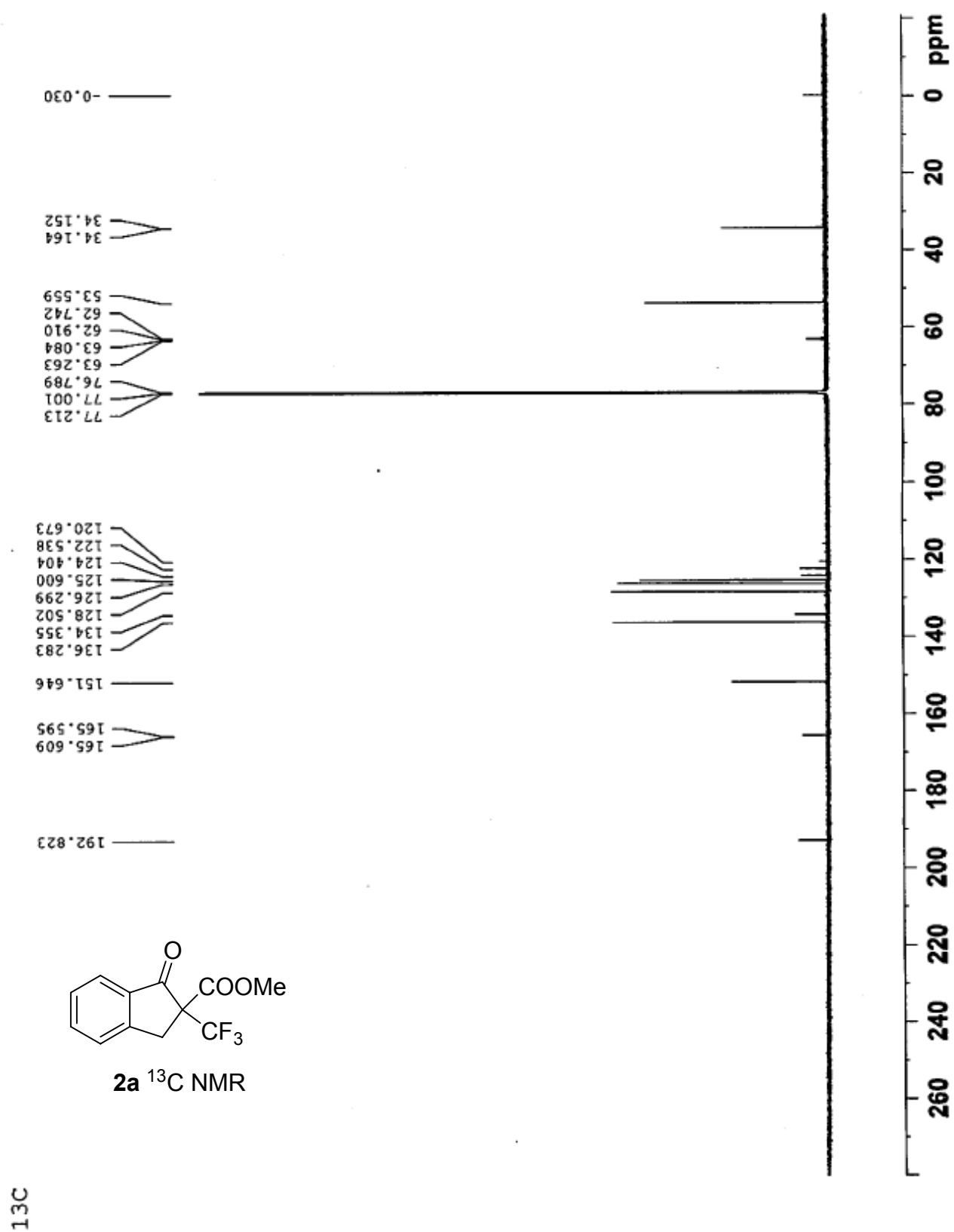
Copies of ^1H , ^{19}F and ^{13}C NMR of 2a-j

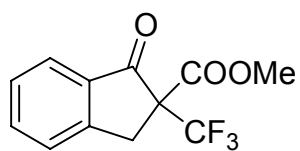
Spectra of Chiral HPLC analysis of 2a-j



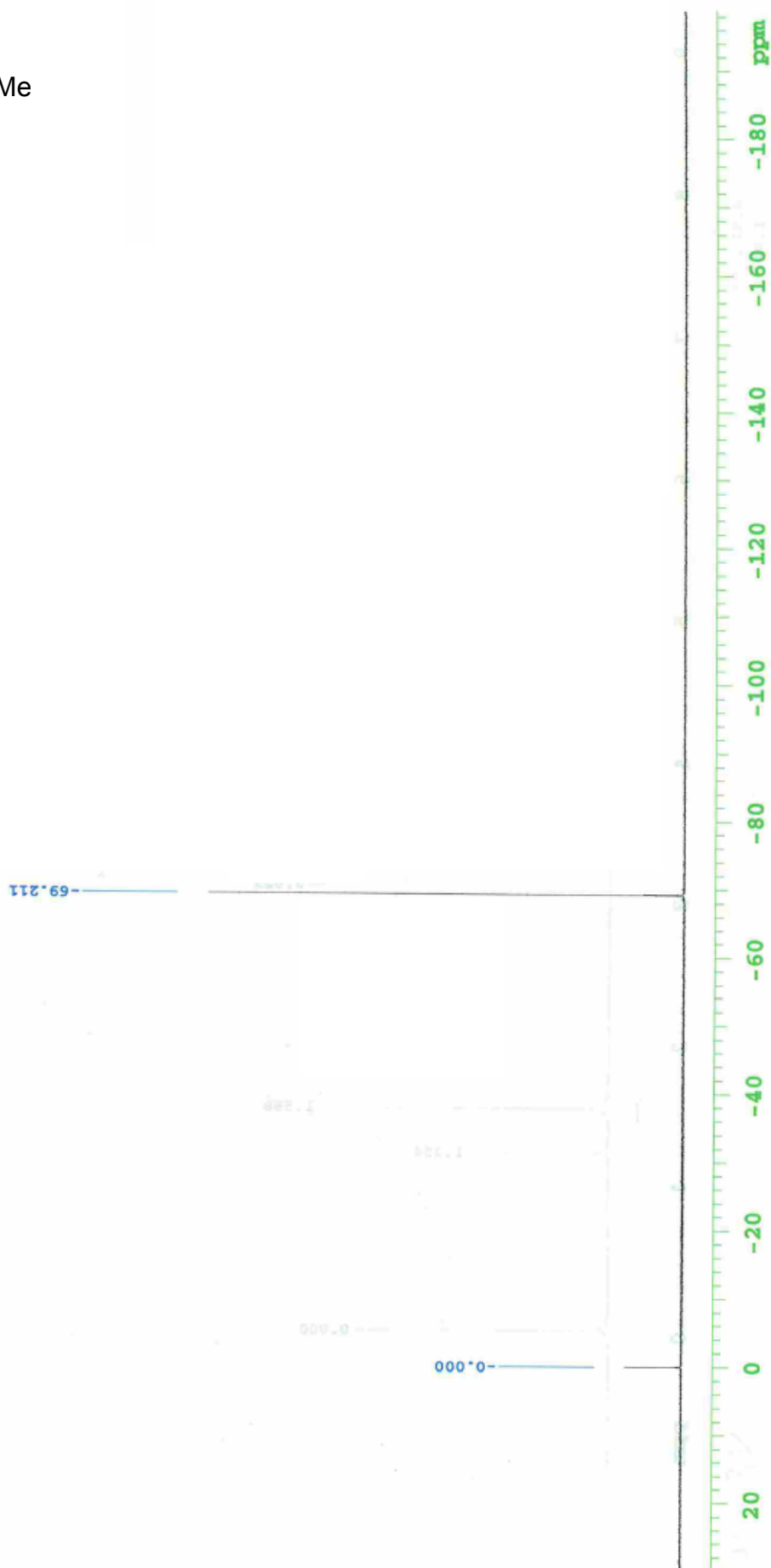
2a ^1H NMR

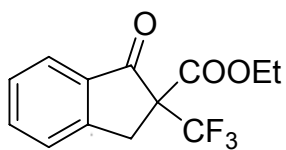




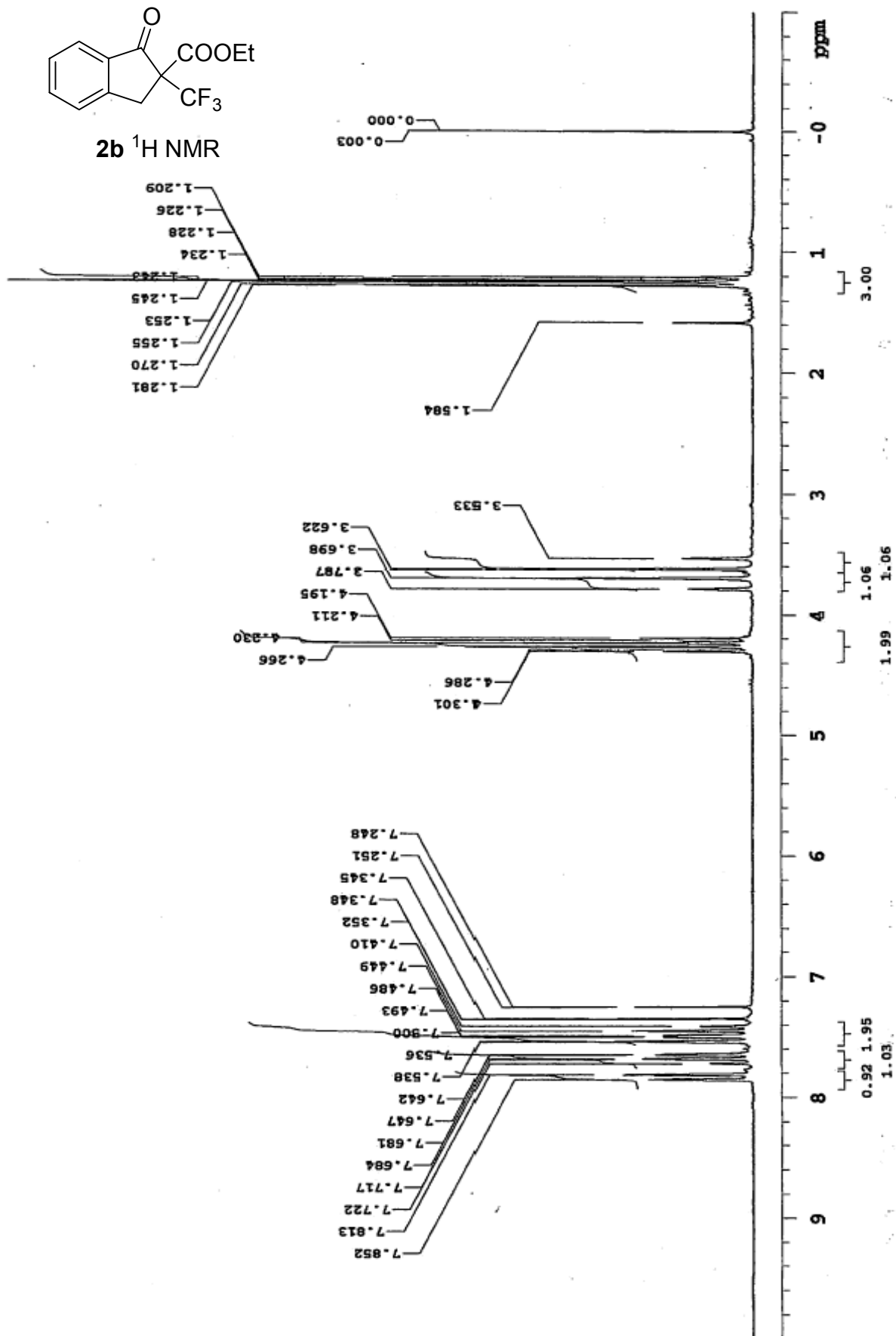


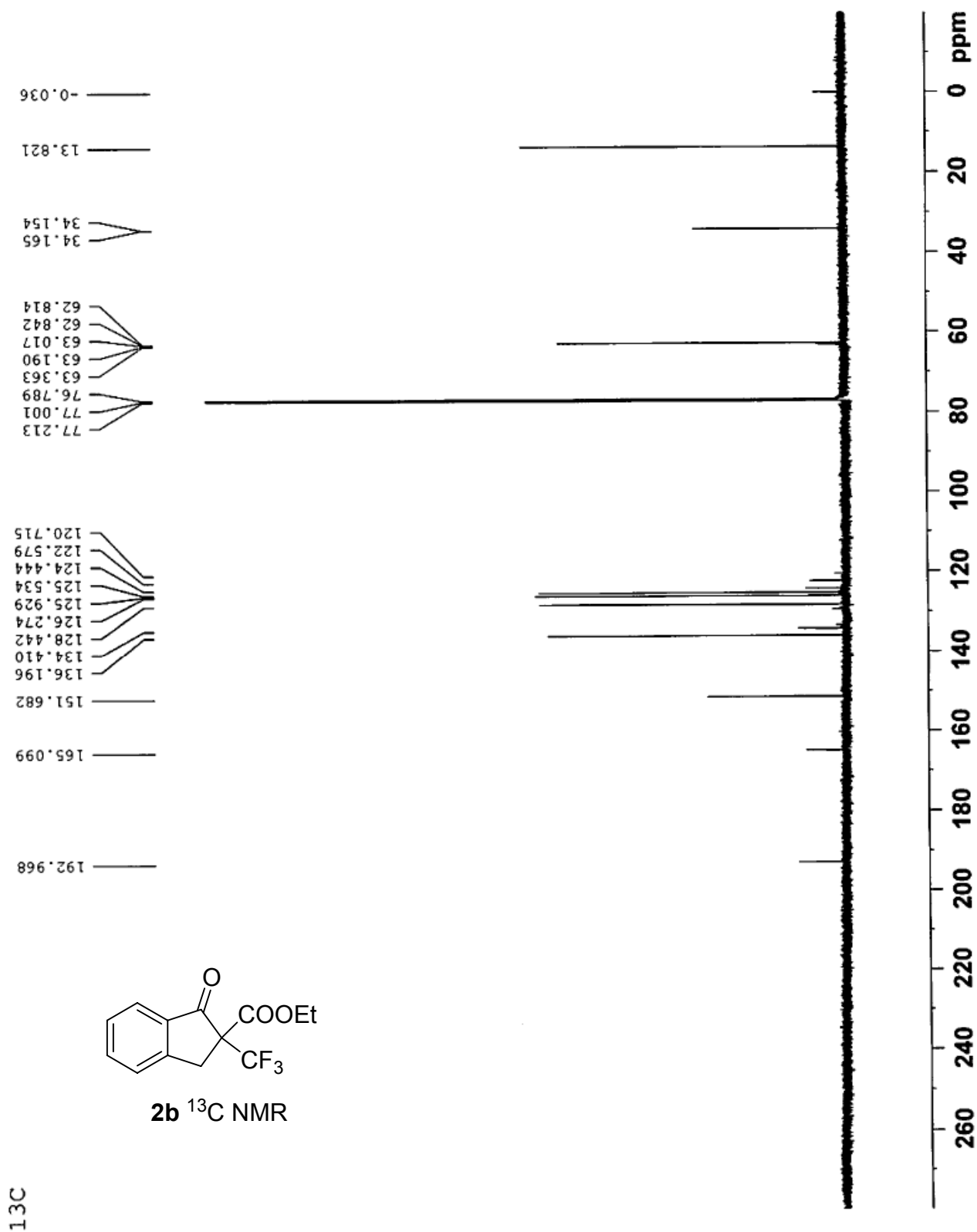
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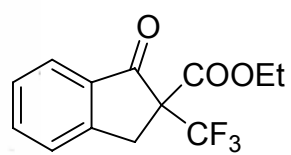




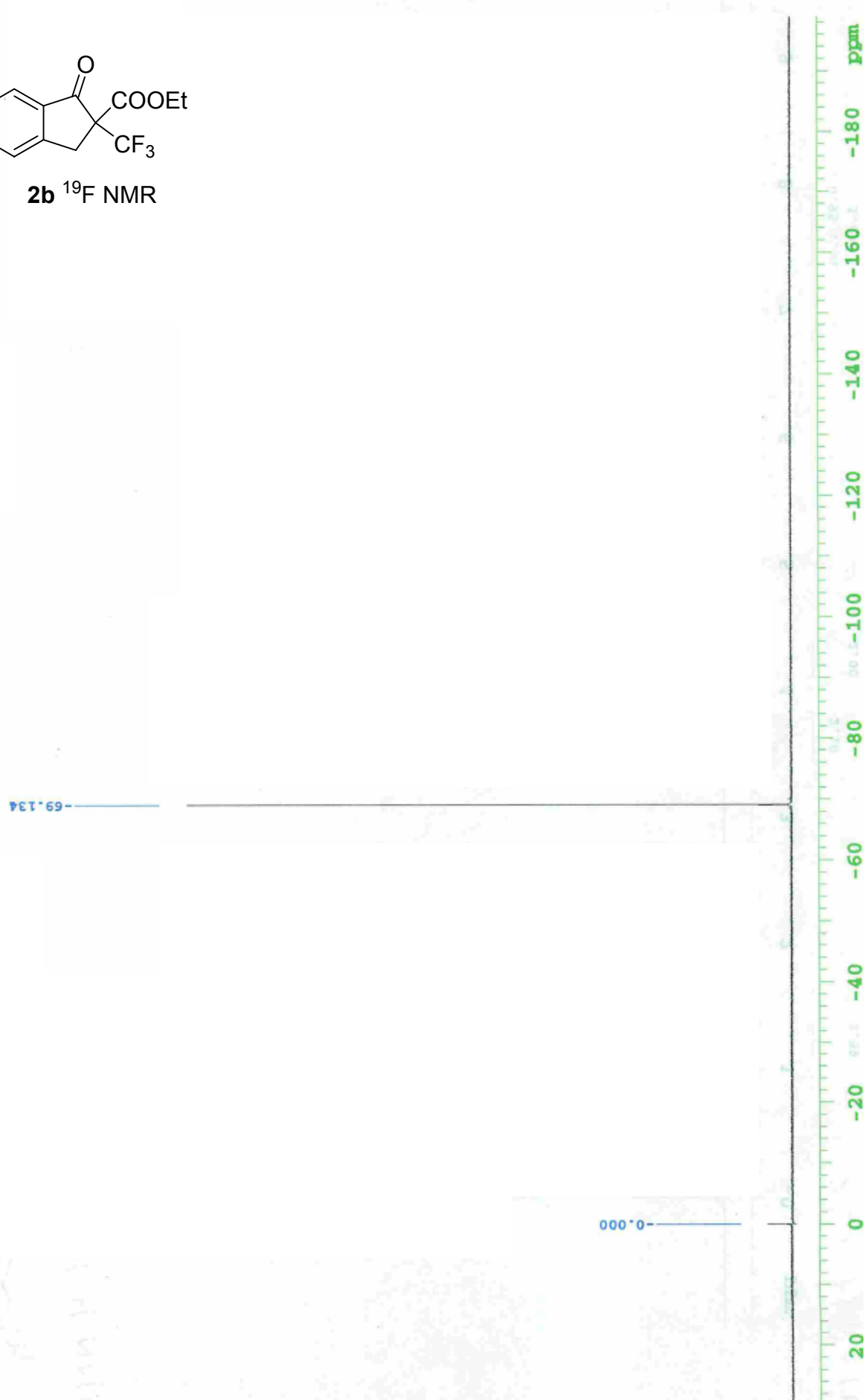
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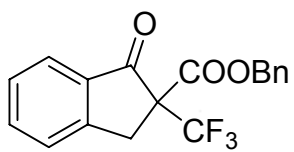




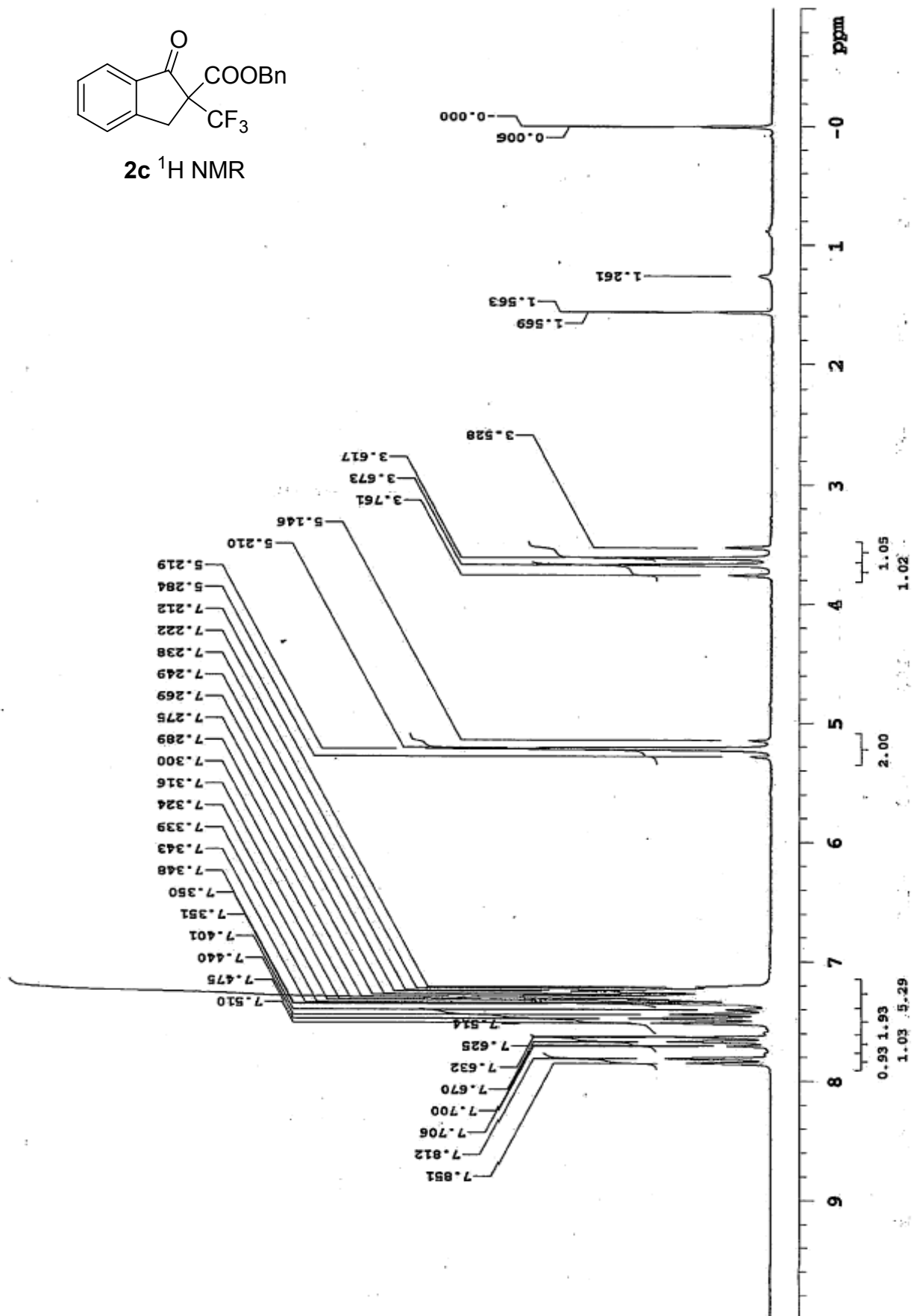


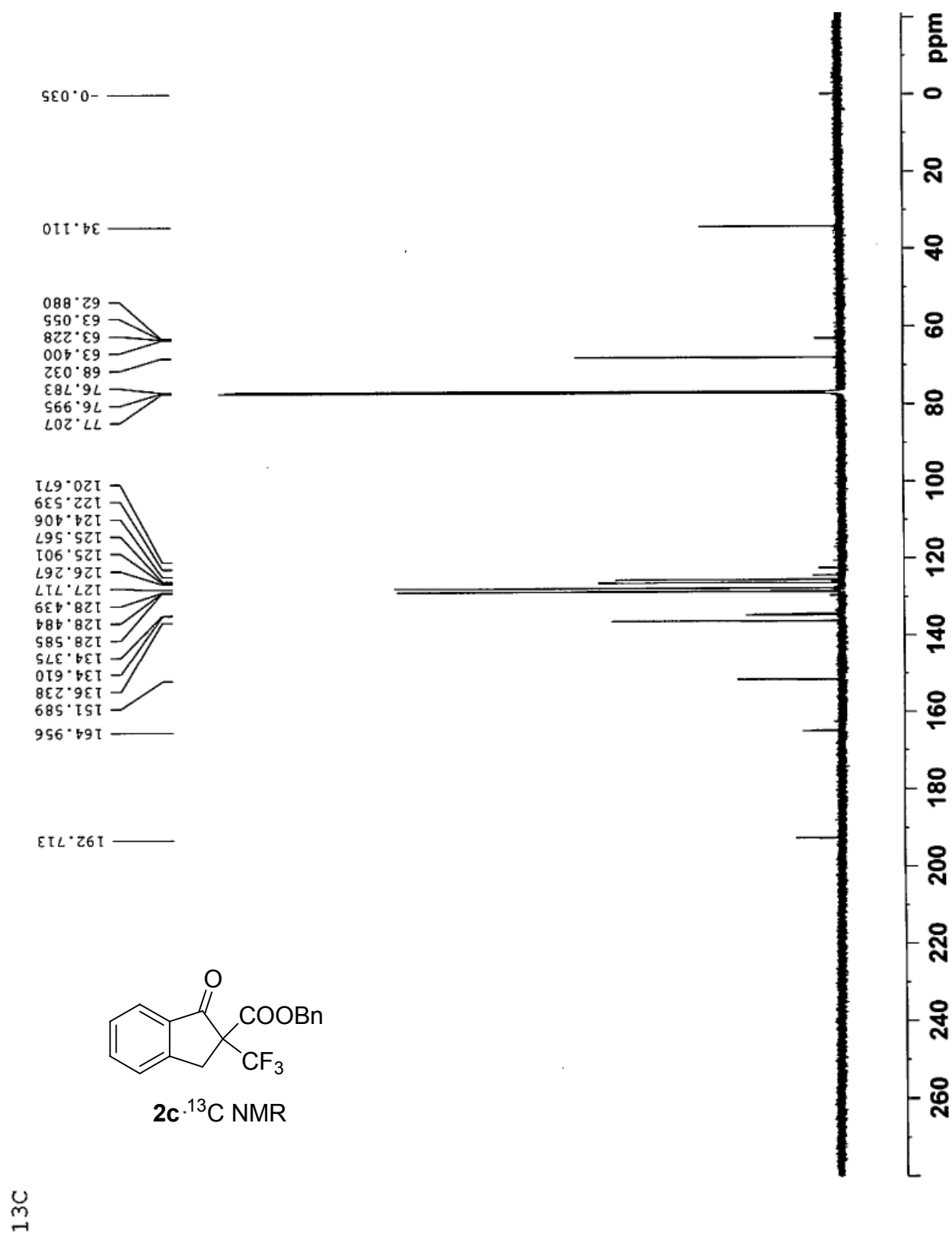
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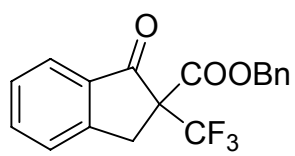




2c ^1H NMR

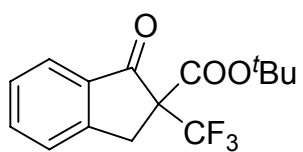




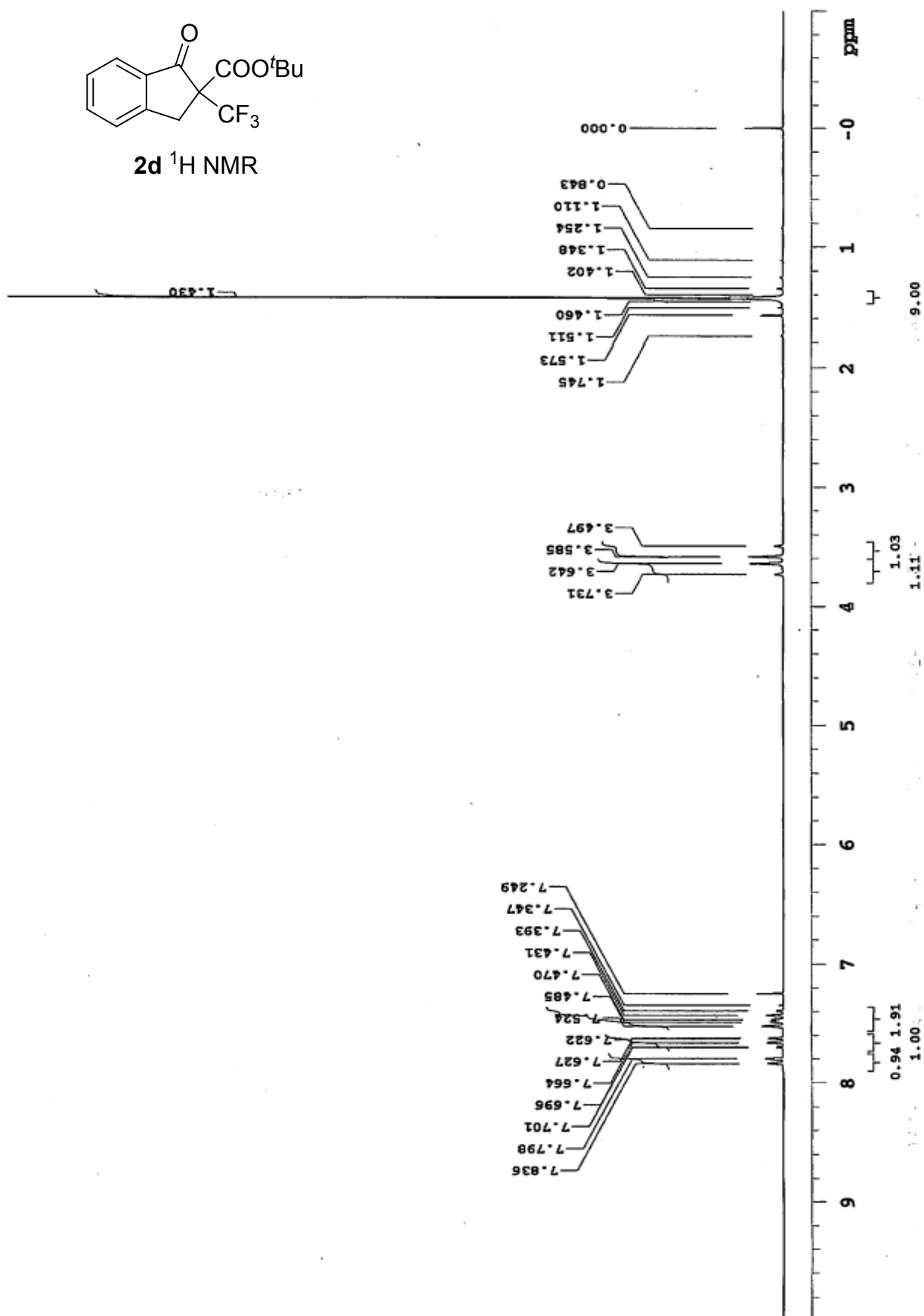


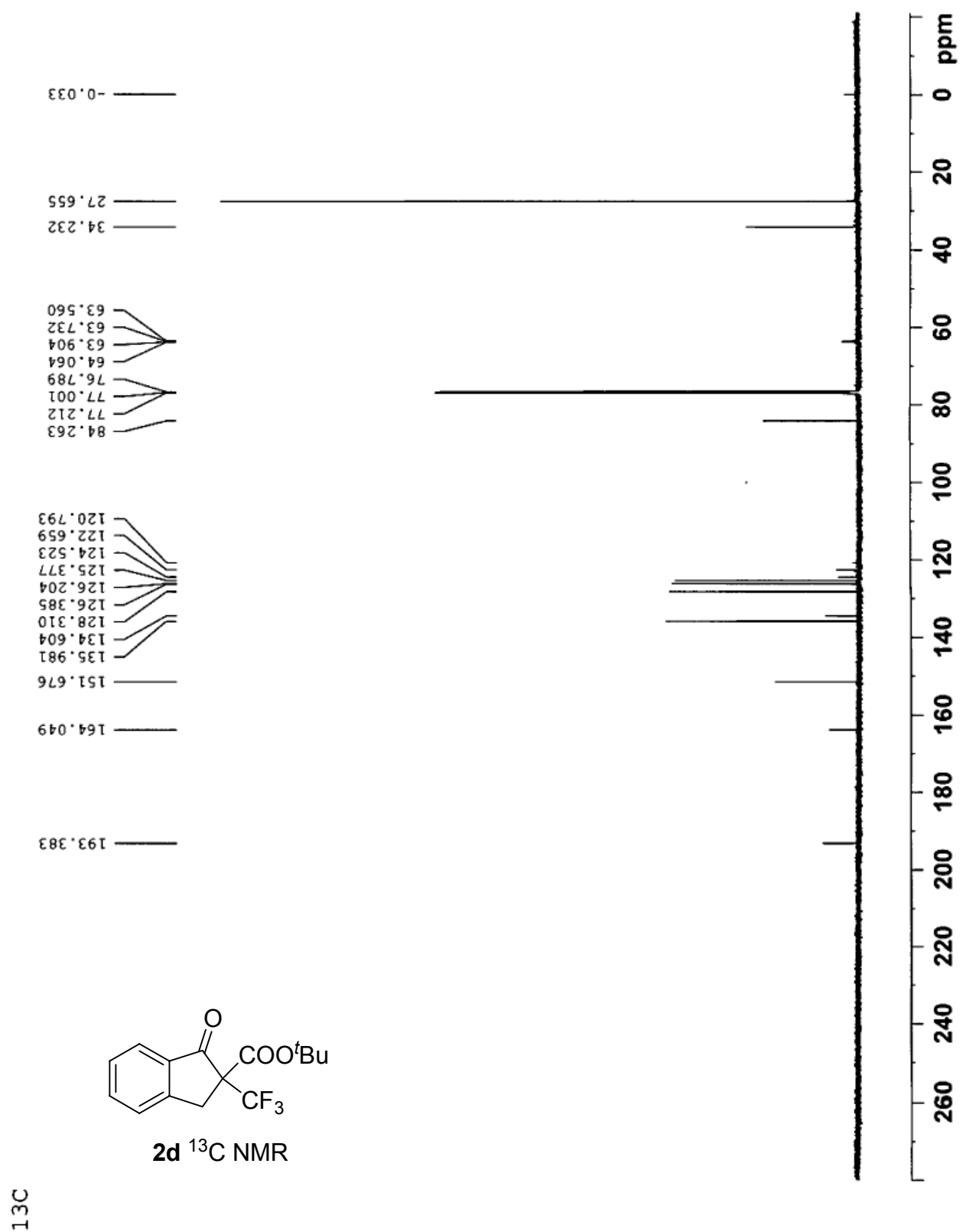
2c ^{19}F NMR

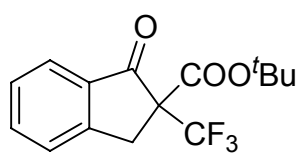




2d ^1H NMR





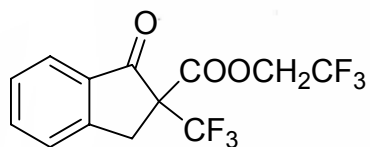


2d ^{19}F NMR

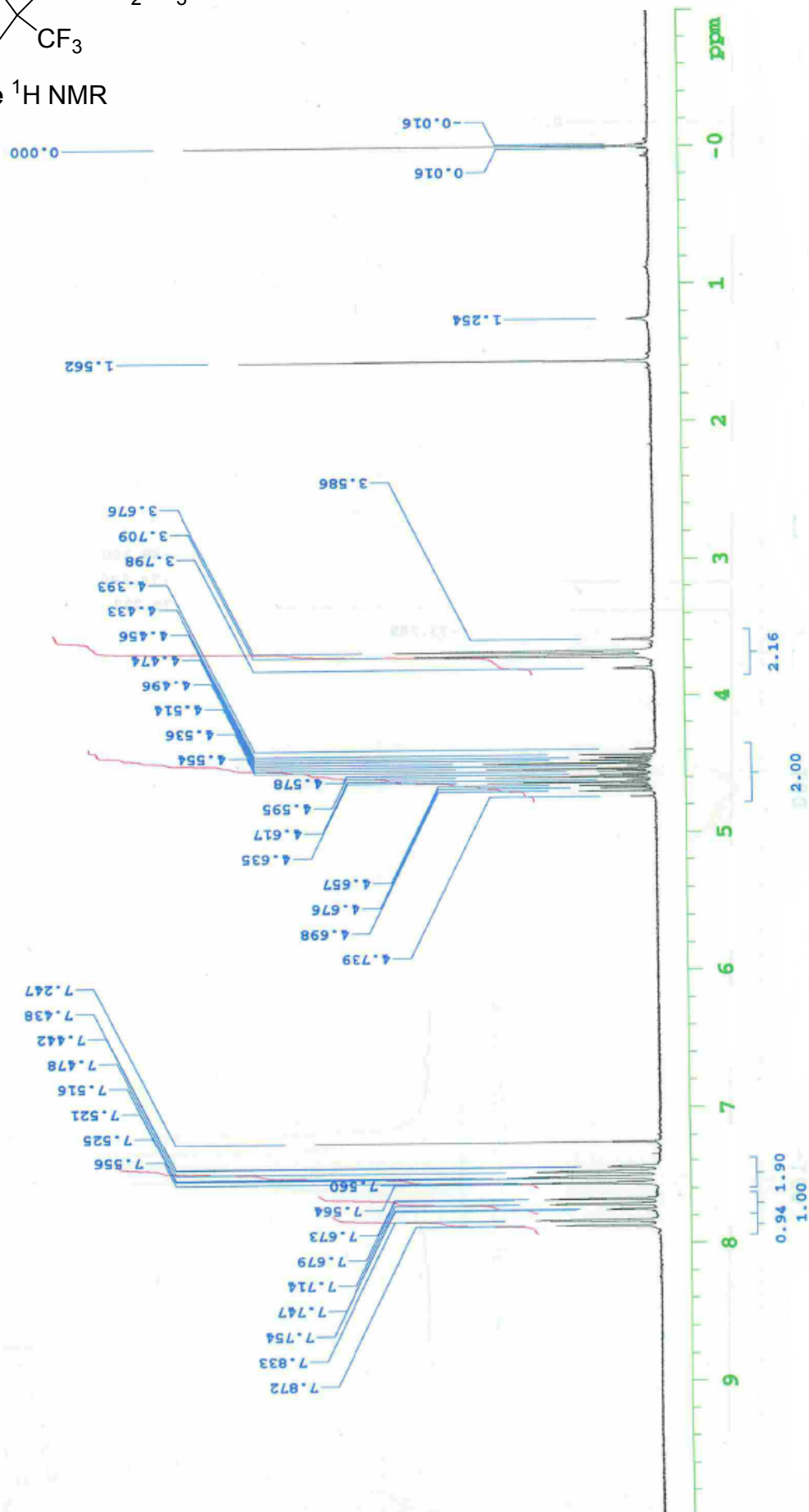
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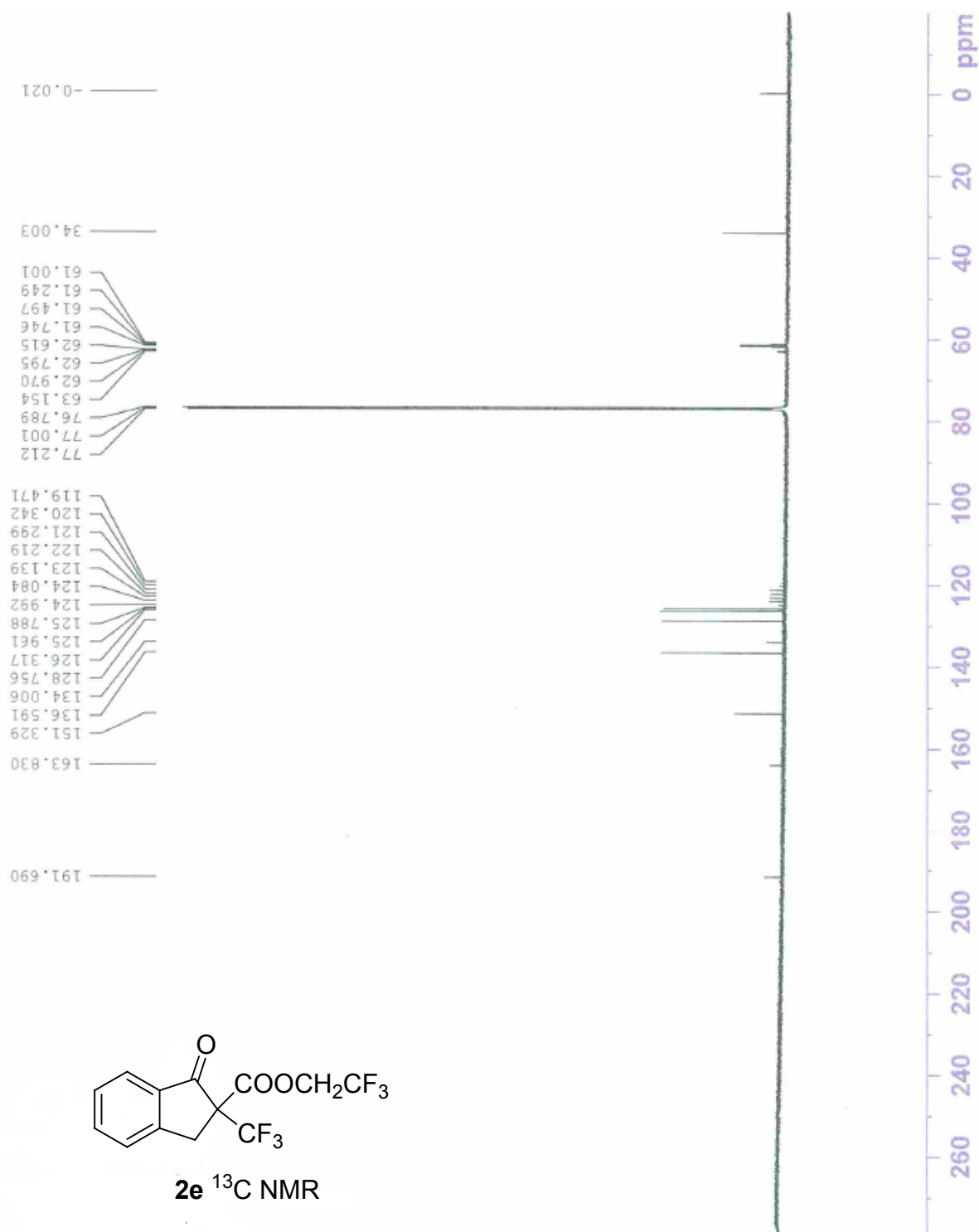
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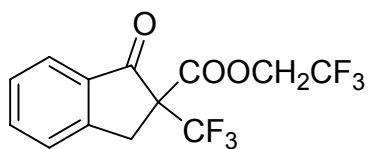
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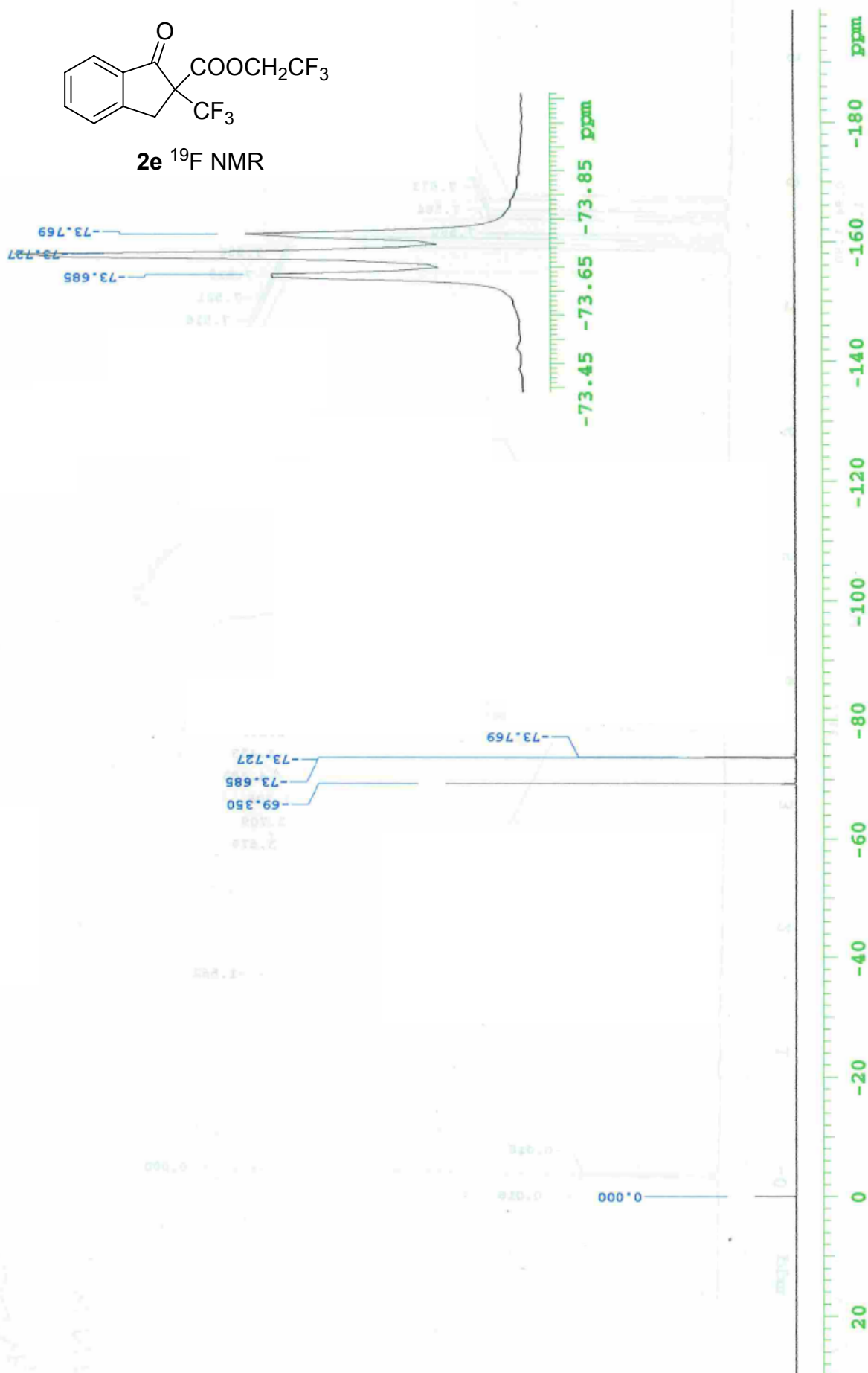
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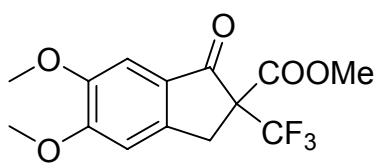




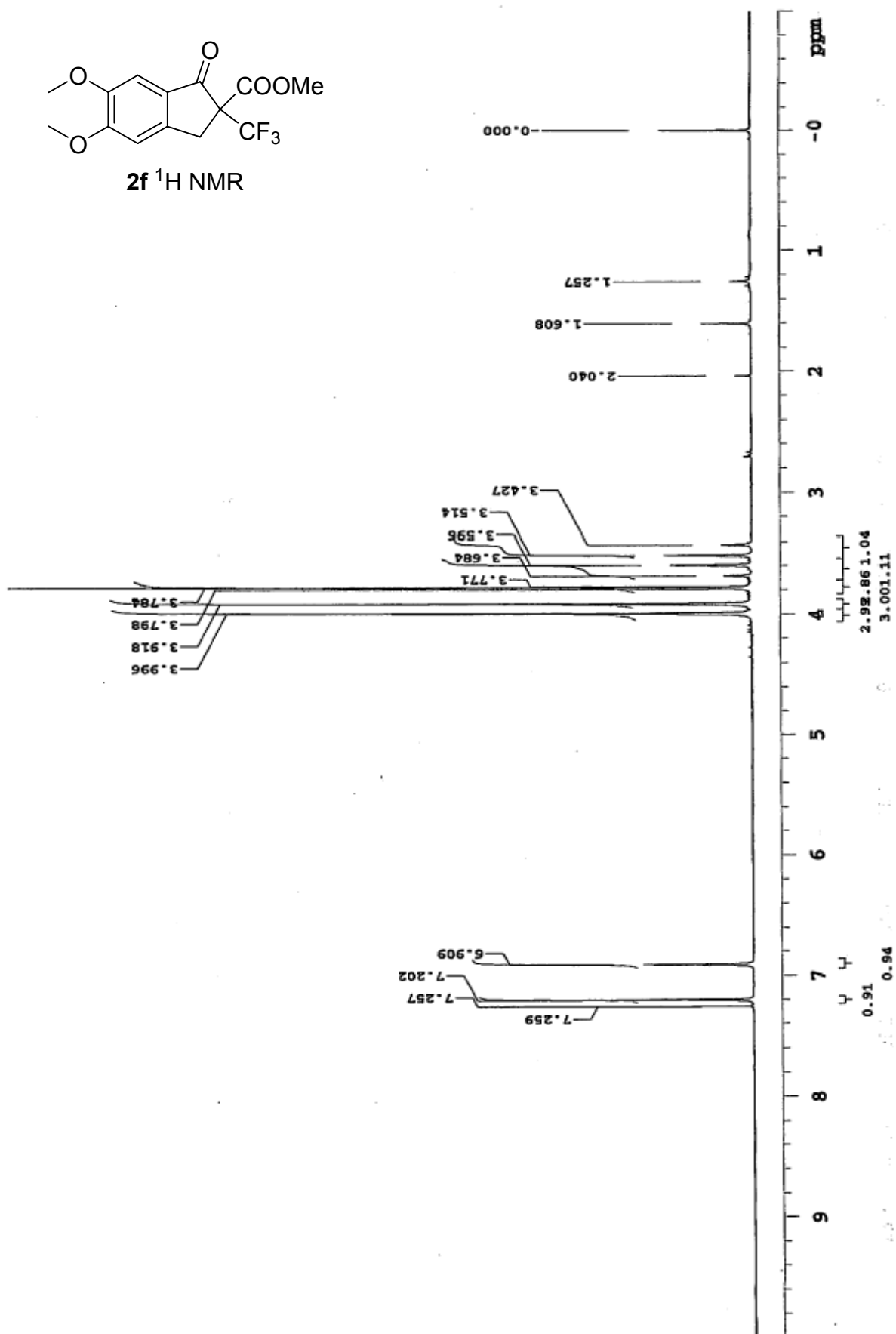


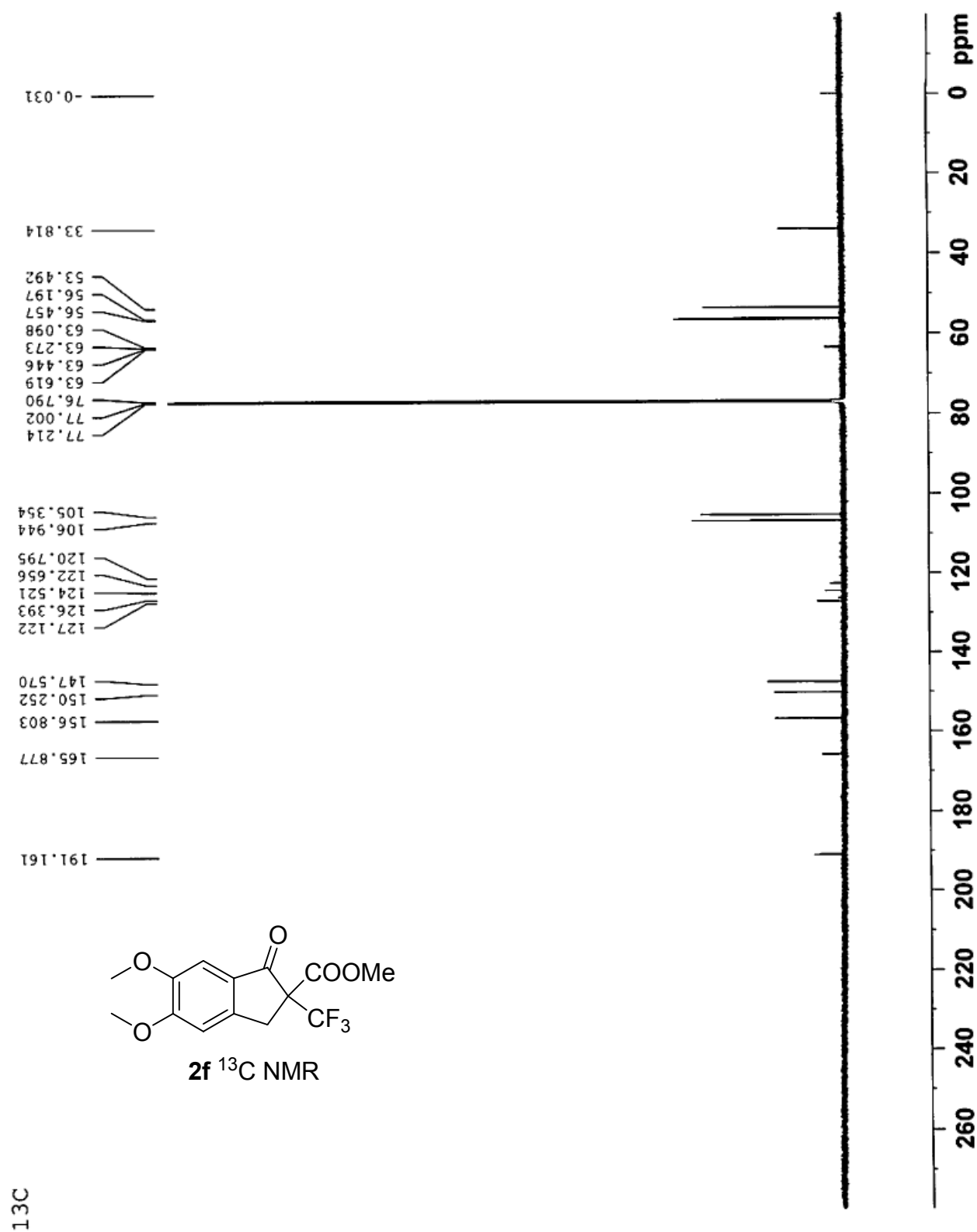
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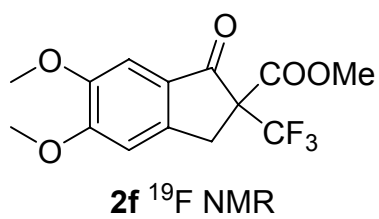


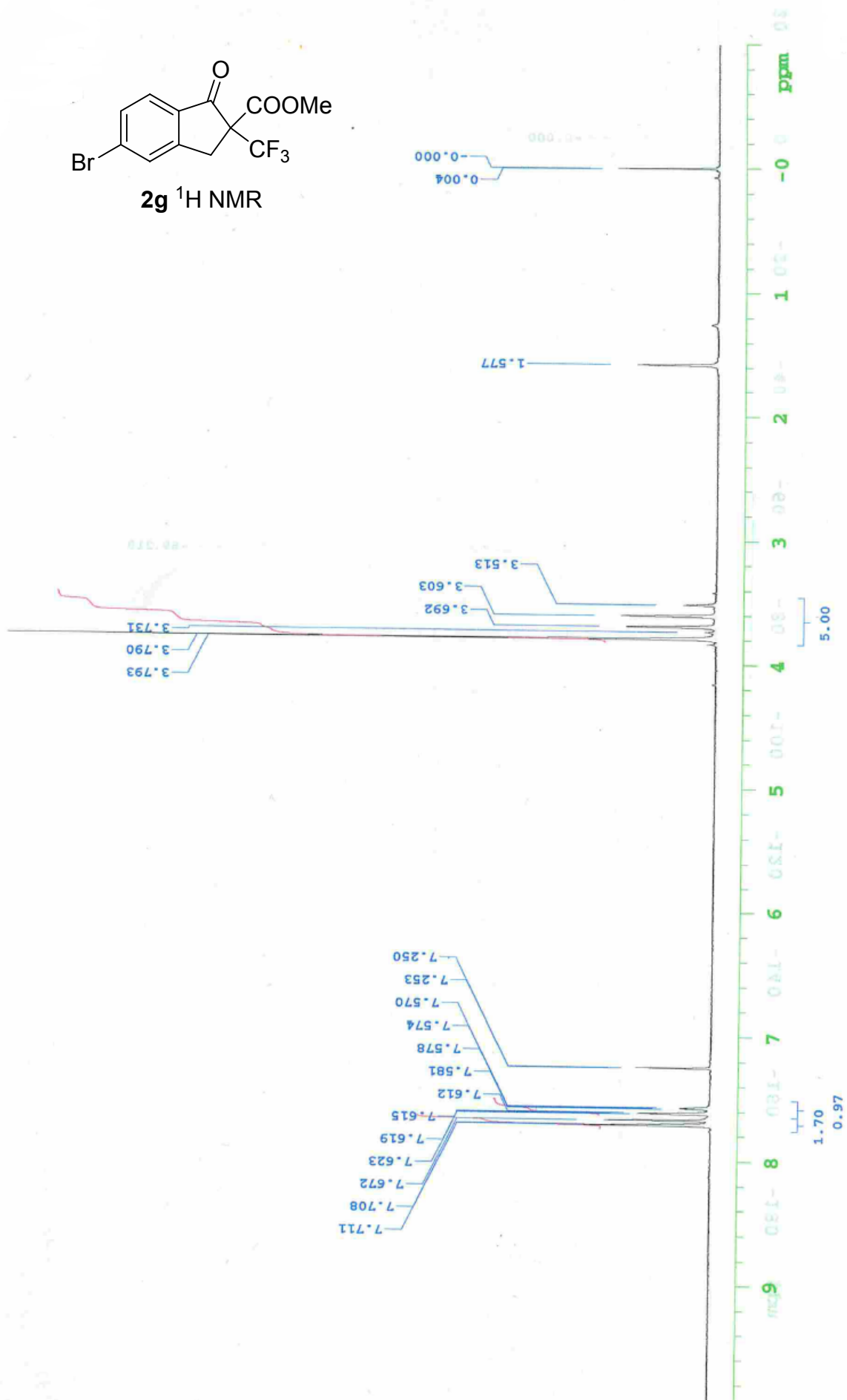
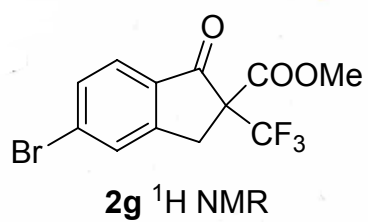


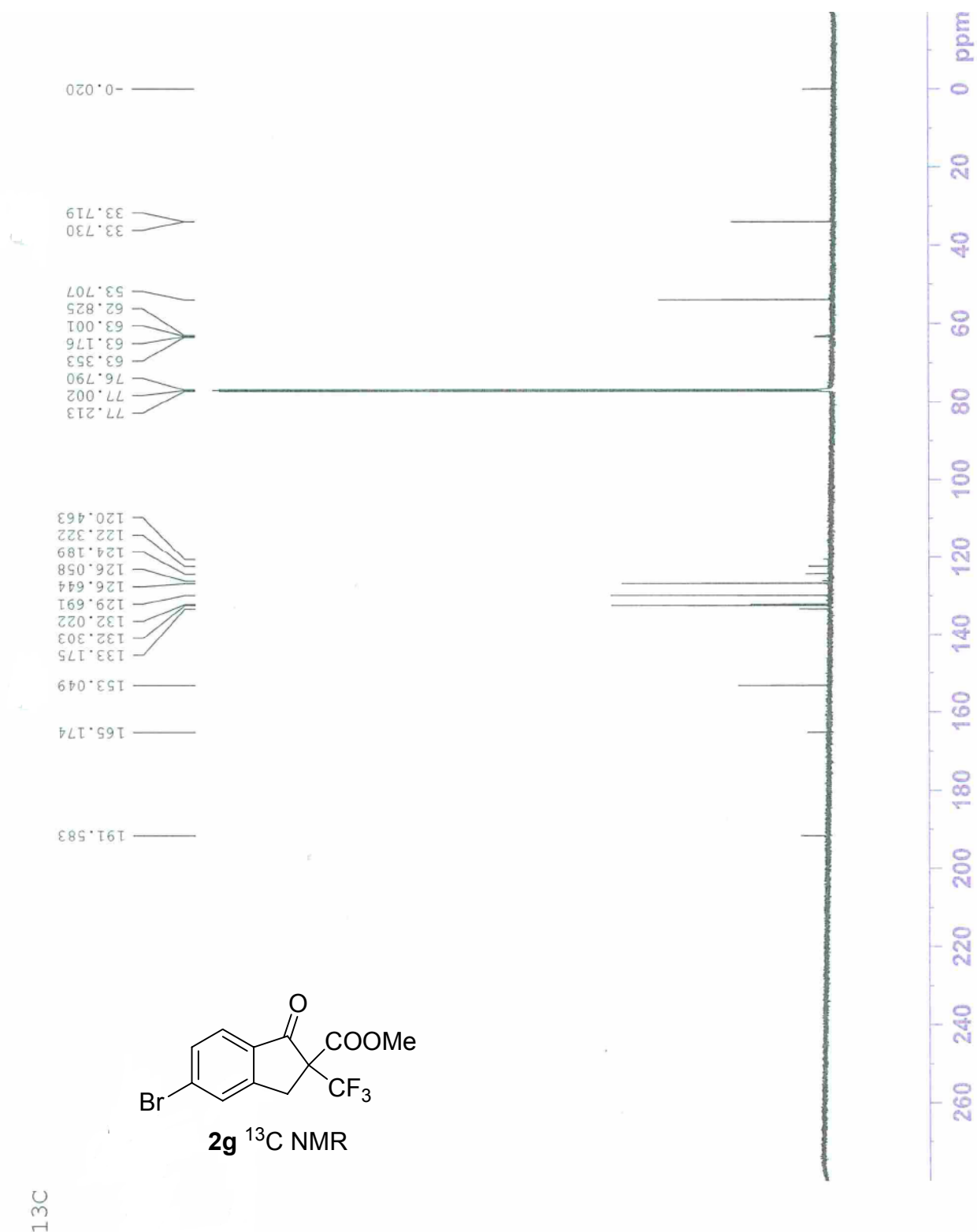
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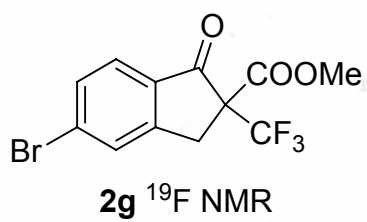


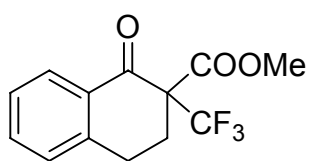




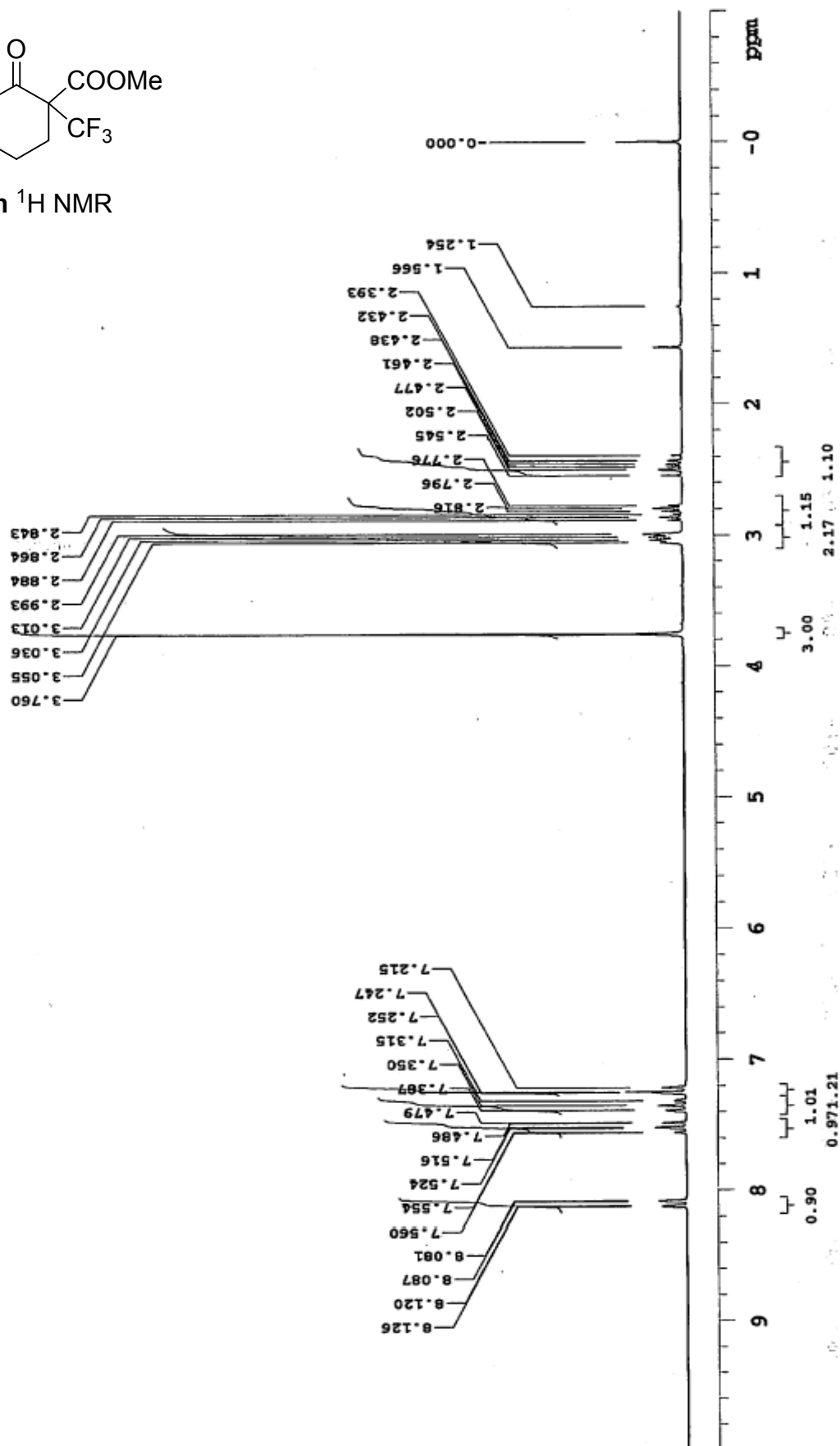


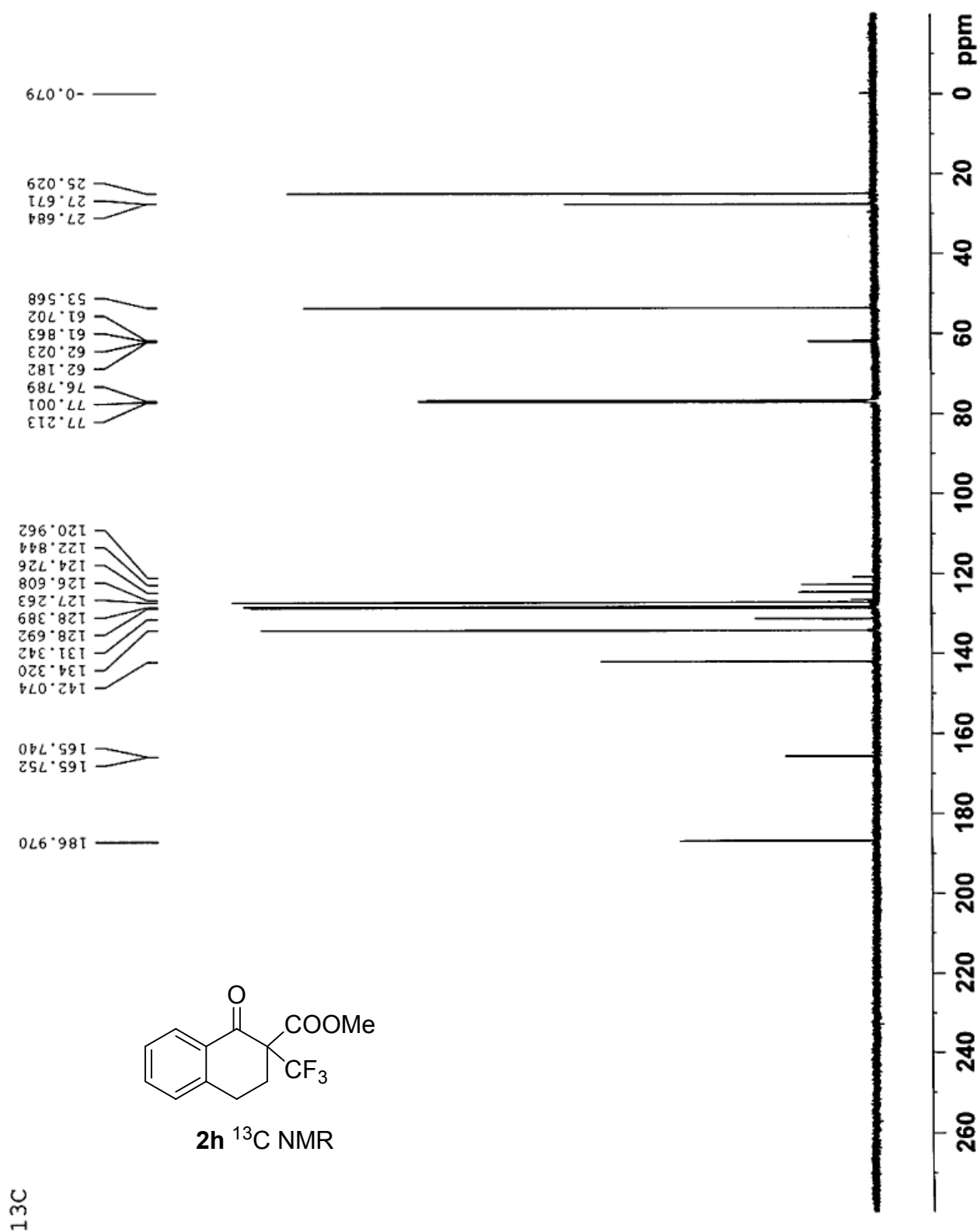


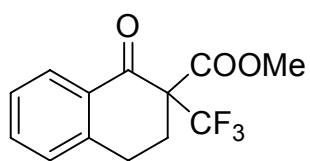




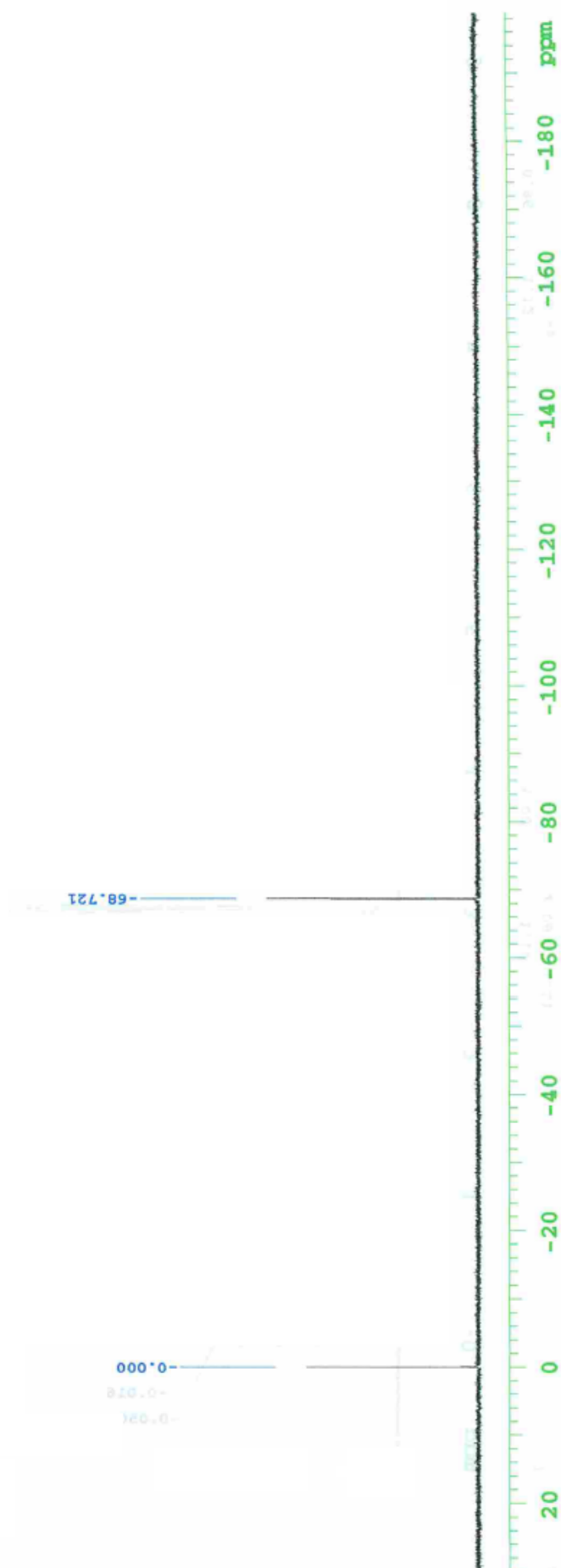
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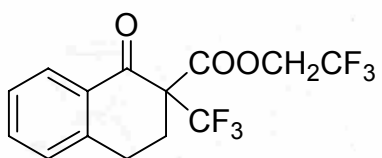




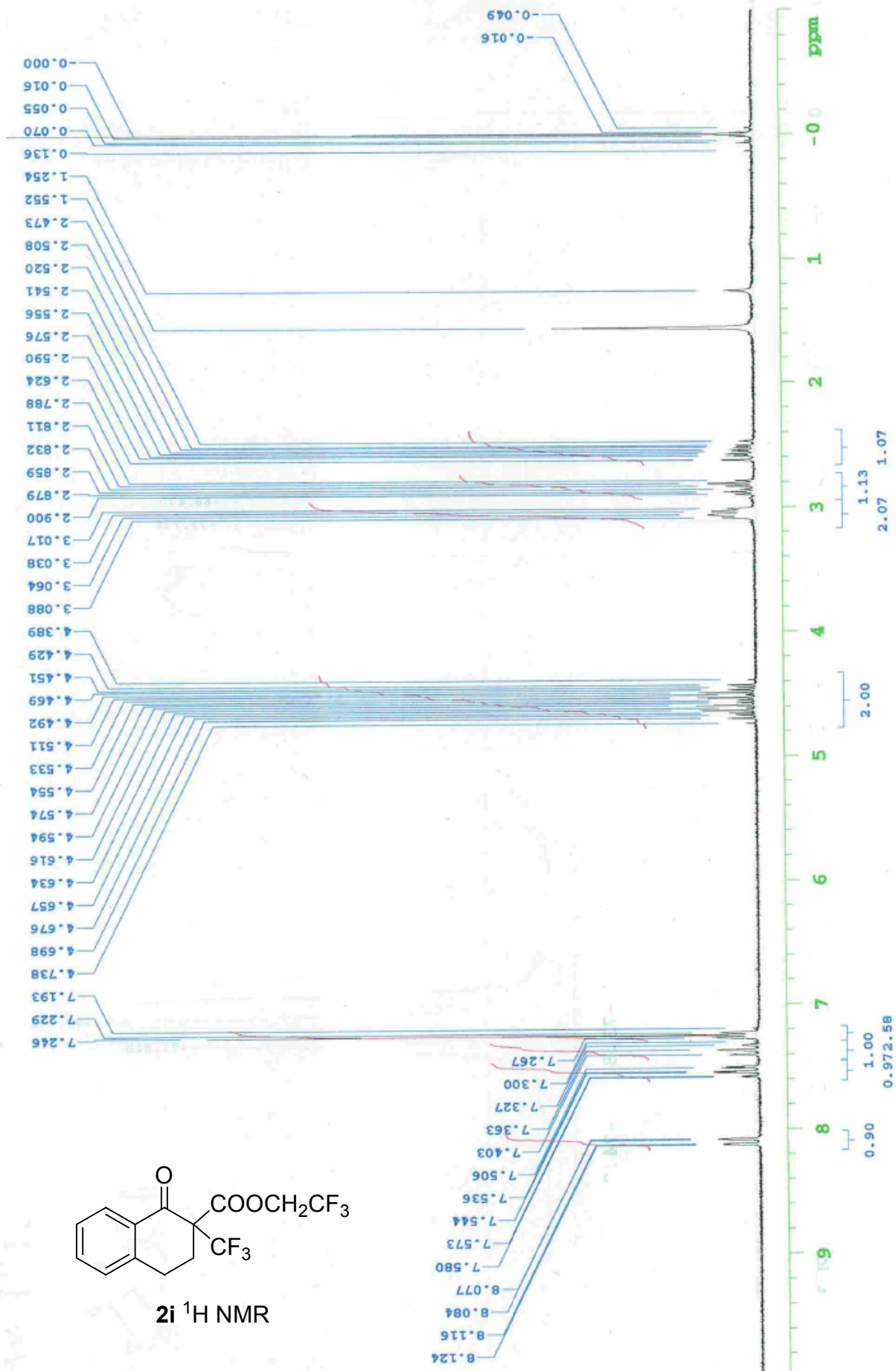


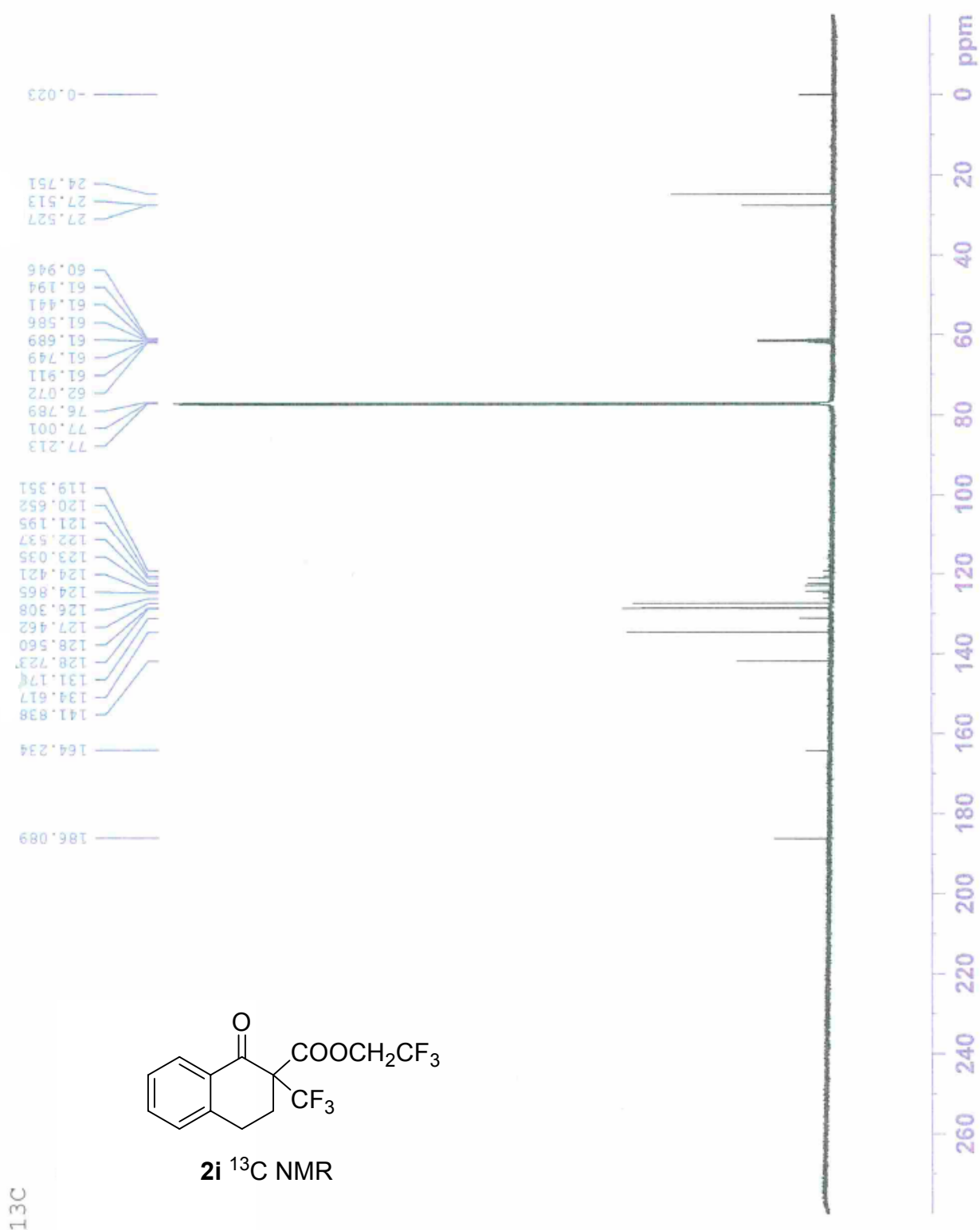
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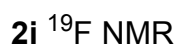


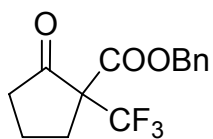


2i ¹H NMR

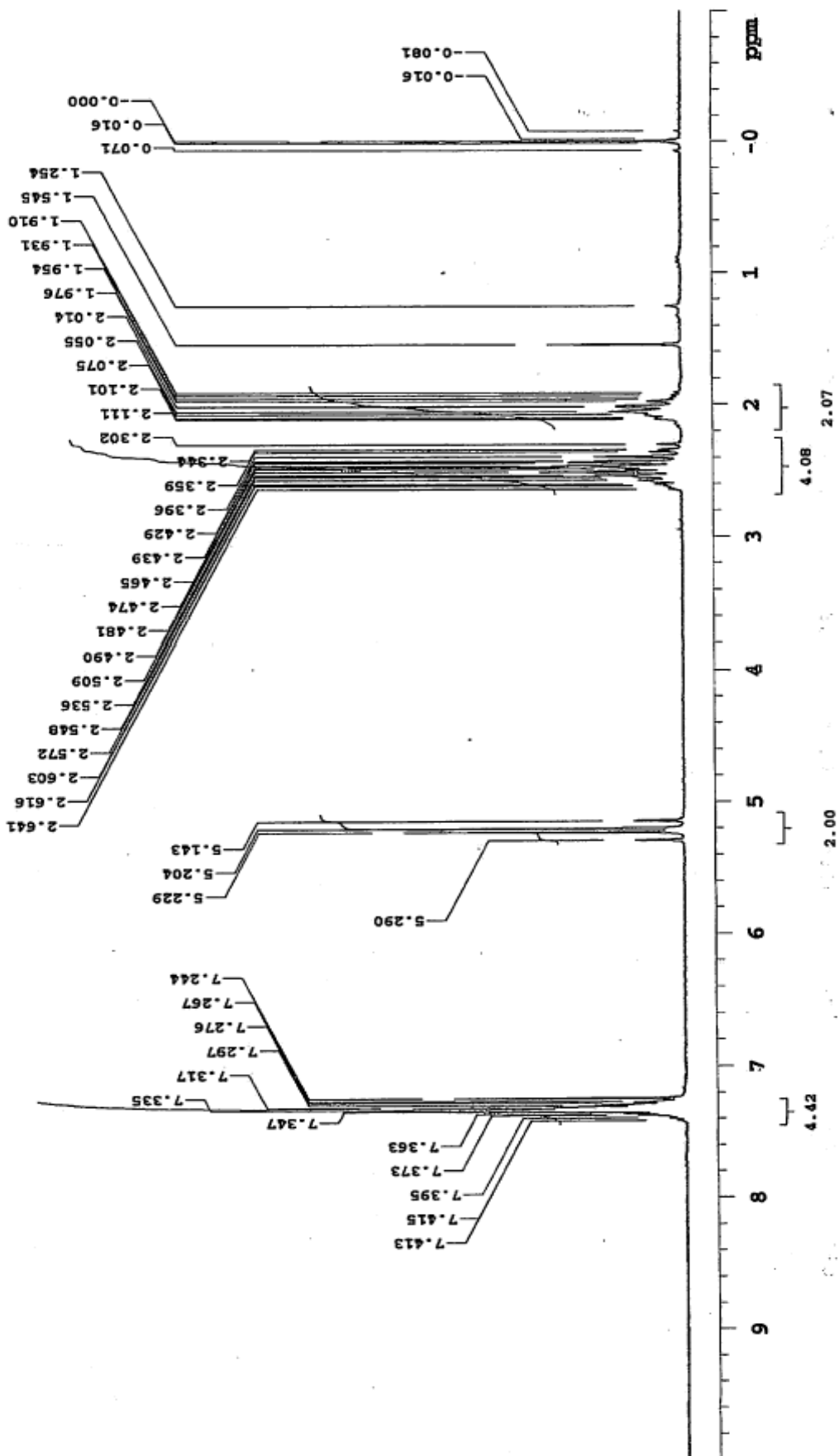


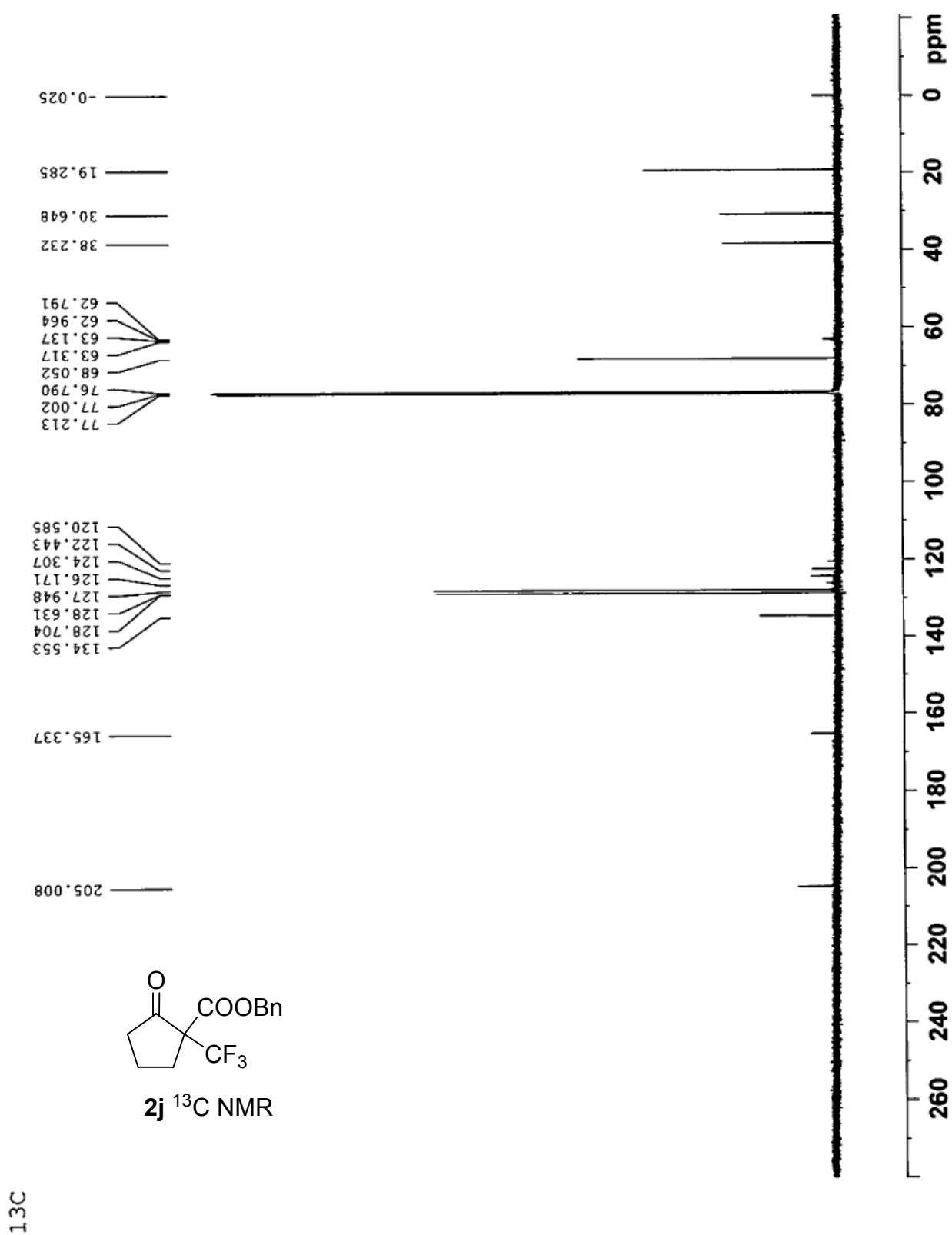


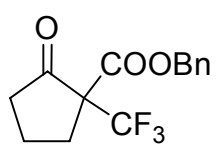




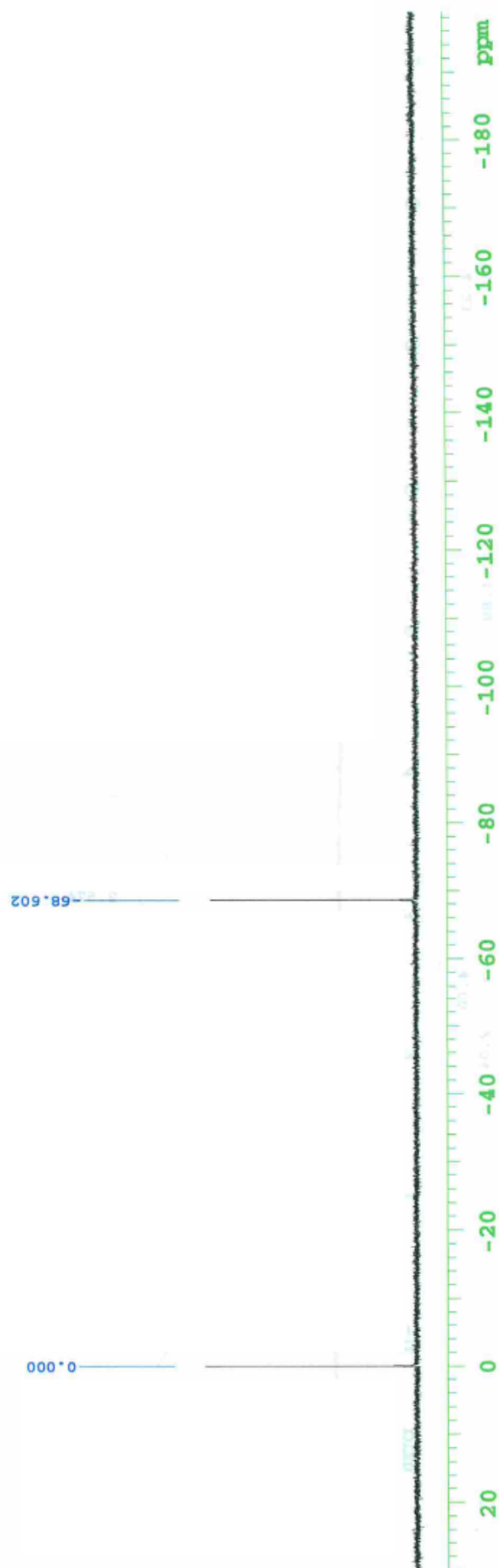
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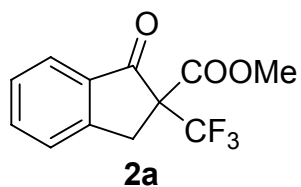






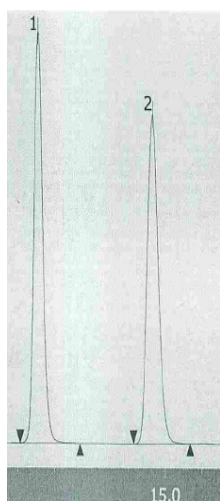
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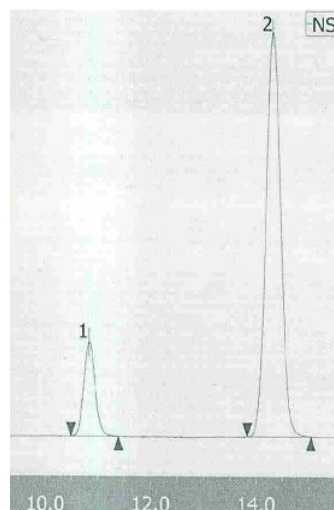
HPLC using an OD-H

hexane:2-propanol=99:1, flow rate 1.0 ml/min, $\lambda=254$ nm

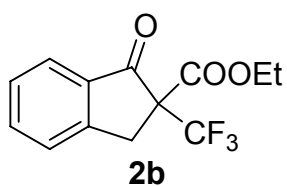


racemic compound of **2a**

No.	tR (min)	Area (%)
1	11.5	49.776
2	14.6	50.224

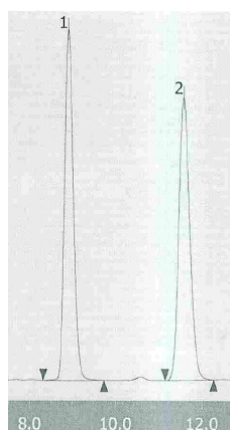


No.	tR (min)	Area (%)
1	10.8	15.210
2	14.3	84.790



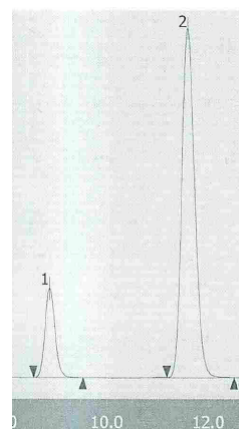
HPLC using an OD-H

hexane:2-propanol=99:1, flow rate 1.0 ml/min, $\lambda=254$ nm

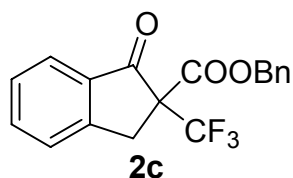


racemic compound of **2b**

No.	tR (min)	Area (%)
1	8.9	49.910
2	11.6	50.090

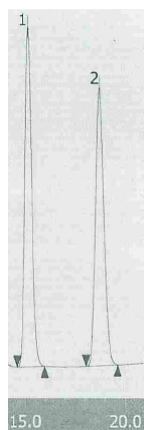


No.	tR (min)	Area (%)
1	8.9	16.322
2	11.6	83.678



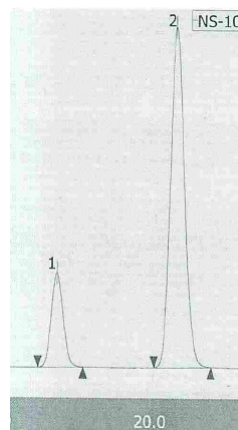
HPLC using an OD-H

hexane:2-propanol=99:1, flow rate 1.0 ml/min, $\lambda=254$ nm

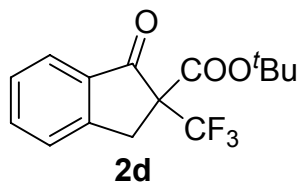


racemic compound of **2c**

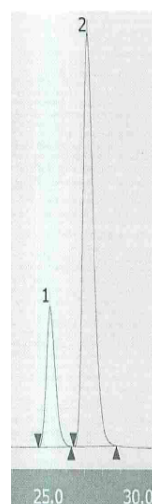
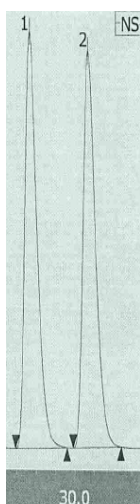
No.	tR (min)	Area (%)
1	15.1	49.712
2	18.7	50.288



No.	tR (min)	Area (%)
1	17.0	18.276
2	20.9	81.724



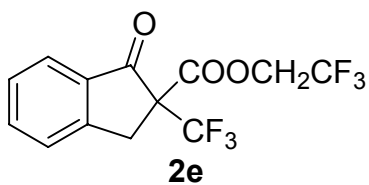
HPLC using an OD-H
hexane, flow rate 0.5 ml/min, $\lambda=254$ nm



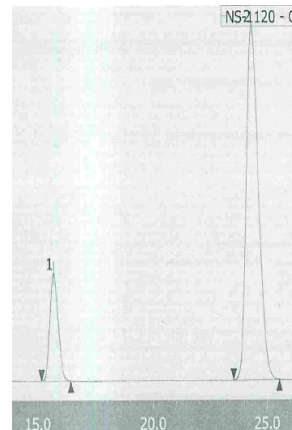
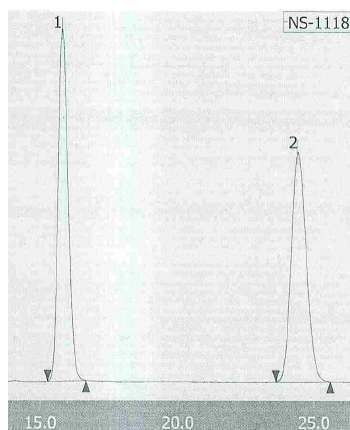
racemic compound of **2d**

No.	tR (min)	Area (%)
1	27.6	50.282
2	30.6	49.718

No.	tR (min)	Area (%)
1	25.1	22.640
2	27.1	77.360



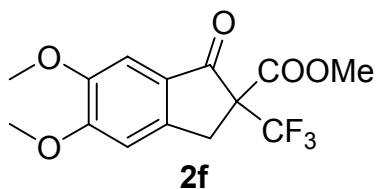
HPLC using an OD-H
hexane:2-propanol=99.5:0.5, flow rate 1.0 ml/min, $\lambda=254$ nm



racemic compound of **2e**

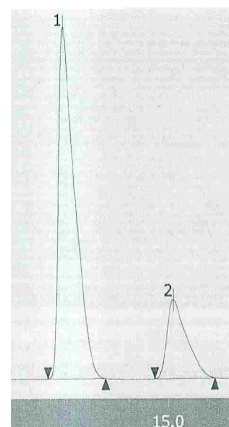
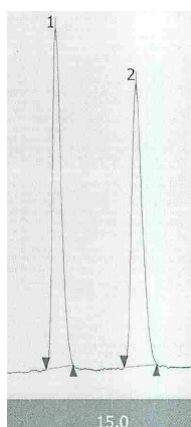
No.	tR (min)	Area (%)
1	15.8	49.994
2	24.4	50.006

No.	tR (min)	Area (%)
1	15.7	16.905
2	24.4	83.095



HPLC using an AD-H

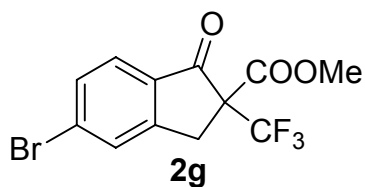
hexane:2-propanol=90:10, flow rate 1.0 ml/min, $\lambda=254$ nm



racemic compound of **2f**

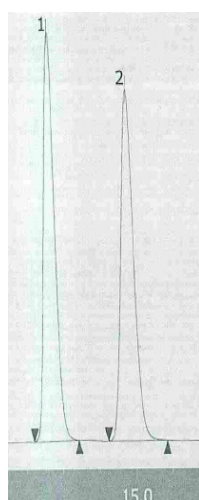
No.	tR (min)	Area (%)
1	13.0	50.043
2	15.9	49.957

No.	tR (min)	Area (%)
1	12.4	78.944
2	15.2	21.056



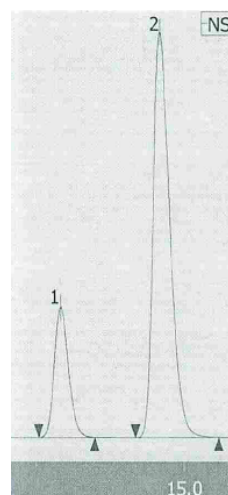
HPLC using an OD-H

hexane:2-propanol=99:1, flow rate 1.0 ml/min, $\lambda=254$ nm

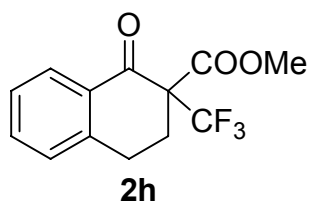


racemic compound of **2g**

No.	tR (min)	Area (%)
1	12.6	49.812
2	14.8	50.188

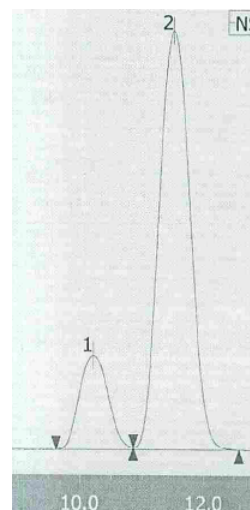
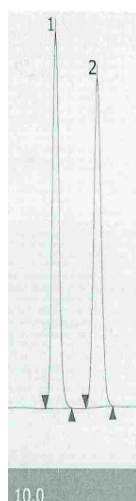


No.	tR (min)	Area (%)
1	12.5	20.985
2	14.5	79.015



HPLC using an OD-H

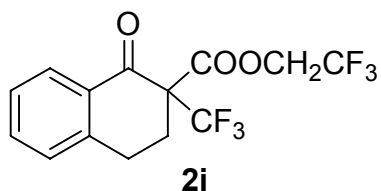
hexane:2-propanol=99:1, flow rate 1.0 ml/min, $\lambda=254$ nm



racemic compound of **2h**

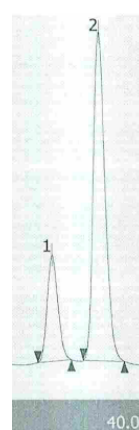
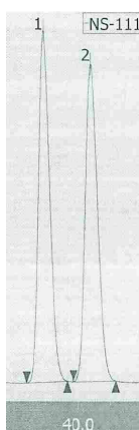
No.	tR (min)	Area (%)
1	10.9	50.247
2	12.3	49.753

No.	tR (min)	Area (%)
1	10.2	17.284
2	11.5	82.716



HPLC using an OD-H

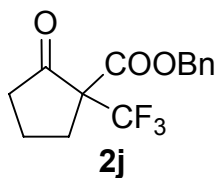
hexane:2-propanol=99.5:0.5, flow rate 0.5 ml/min, $\lambda=254$ nm



racemic compound of **2i**

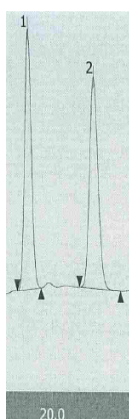
No.	tR (min)	Area (%)
1	37.9	50.109
2	40.8	49.891

No.	tR (min)	Area (%)
1	34.7	22.818
2	38.3	77.182



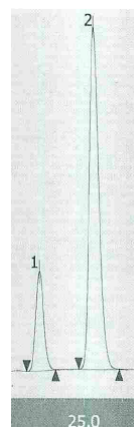
HPLC using an OJ-H

hexane:2-propanol=95:5, flow rate 1.0 ml/min, $\lambda=205$ nm



racemic compound of **2i**

No.	tR (min)	Area (%)
1	18.7	49.472
2	22.1	50.528



No.	tR (min)	Area (%)
1	22.7	19.185
2	25.5	80.815