

# **SUPPORTING INFORMATION**

## **Microwave-Assisted Knoevenagel-Doebner Reaction: An Efficient Method for Phenolic Acids Synthesis**

Louis M. M. Mouterde and Florent Allais\*

AgroParisTech, Chaire Agro-Biotechnologie Industrielles (ABI), CEBB, 3 rue des Rouges  
Terres, 51110 Pomacle, France.

Phone & Fax +33 3 52 62 04 62, E-mail [florent.allais@agroparistech.fr](mailto:florent.allais@agroparistech.fr)

\*Author to whom correspondence should be addressed

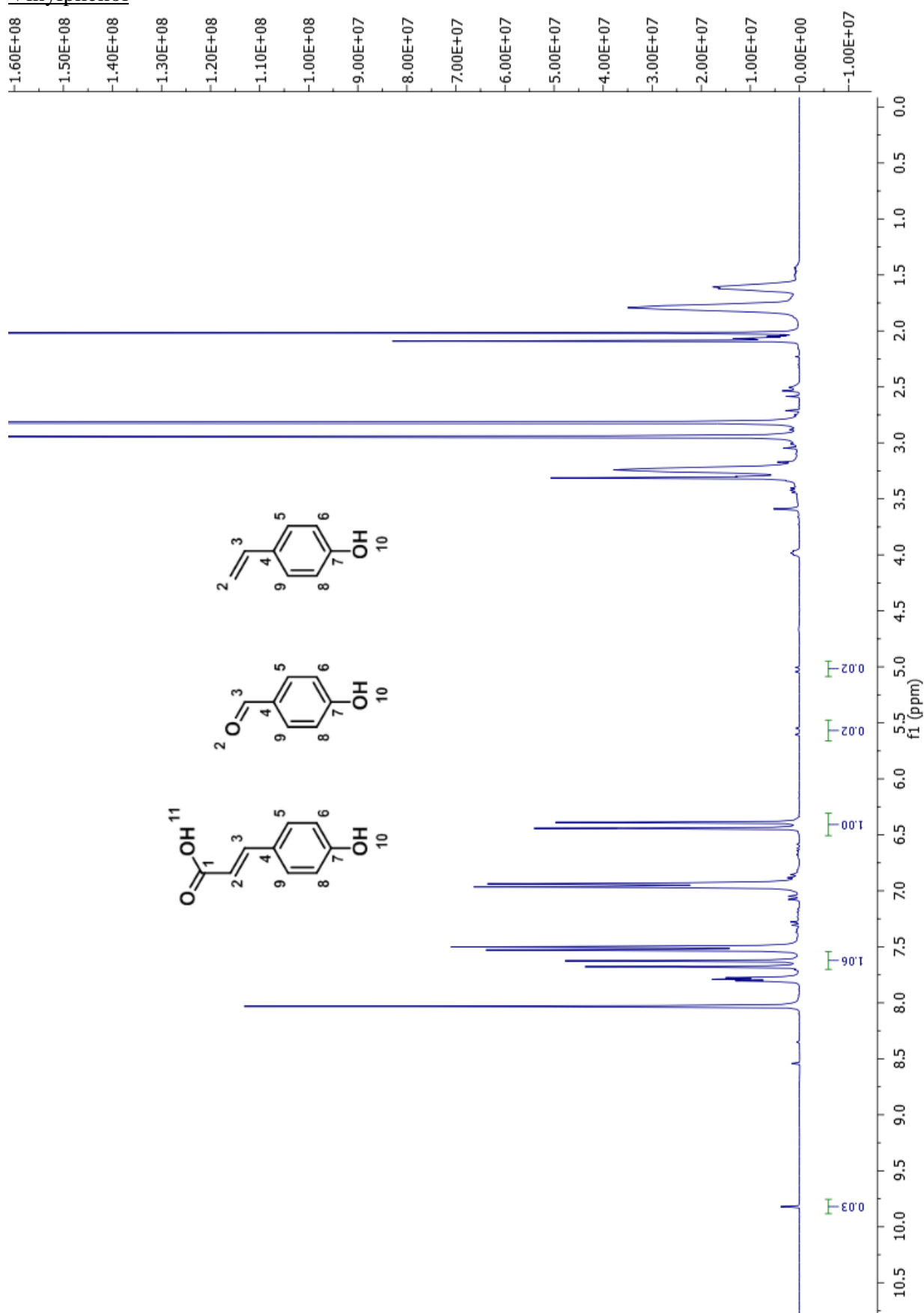
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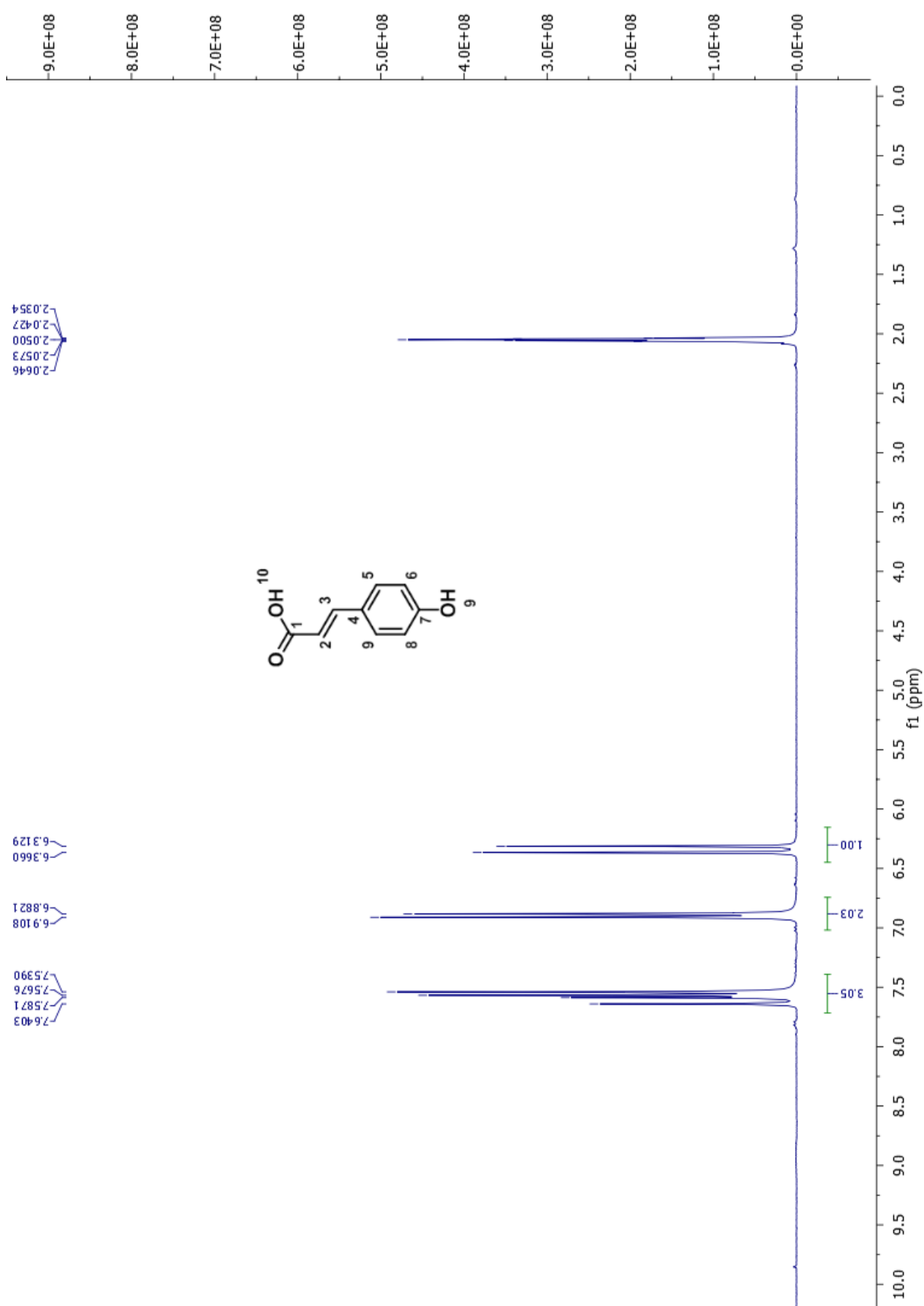
D-optimal design for optimization of the conversion rate (experimental values calculated accordingly the production of ferulic acid, analyzed by  $^1\text{H}$  NMR)

Experimental number	Factor				Conversion Acid (%)	Conversion Vinyl (%)
	Temperature (° C)	Time (min)	Eq. piperidine	Eq. malonic		
1	100	10	0.125	2	31	0
2	140	10	0.125	2	33	13
3	100	30	0.125	2	39	1
4	140	10	0.25	2	25	33
5	100	30	0.25	2	54	5
6	140	30	0.25	2	0	50
7	100	10	0.125	4	22	0
8	100	30	0.125	4	50	0
9	140	30	0.125	4	41	19
10	100	10	0.25	4	33	0
11	140	10	0.25	4	40	21
12	140	30	0.25	4	26	36
13	100	20	0.1875	3	40	1
14	140	20	0.1875	3	27	27
15	120	10	0.1875	3	45	5
16	120	30	0.1875	3	62	19
17	120	20	0.125	3	54	5
18	120	20	0.25	3	60	19
19	120	20	0.1875	2	56	20
20	120	20	0.1875	4	62	9
21	120	20	0.1875	3	62	12
22	120	20	0.1875	3	63	13
23	120	20	0.1875	3	60	14
24	110	10	0.125	2	53	6
25	110	15	0.125	3	68	18
26	100	20	0.125	3	61	5
27	100	60	0.125	3	74	17
28	110	10	0.25	3	54	6

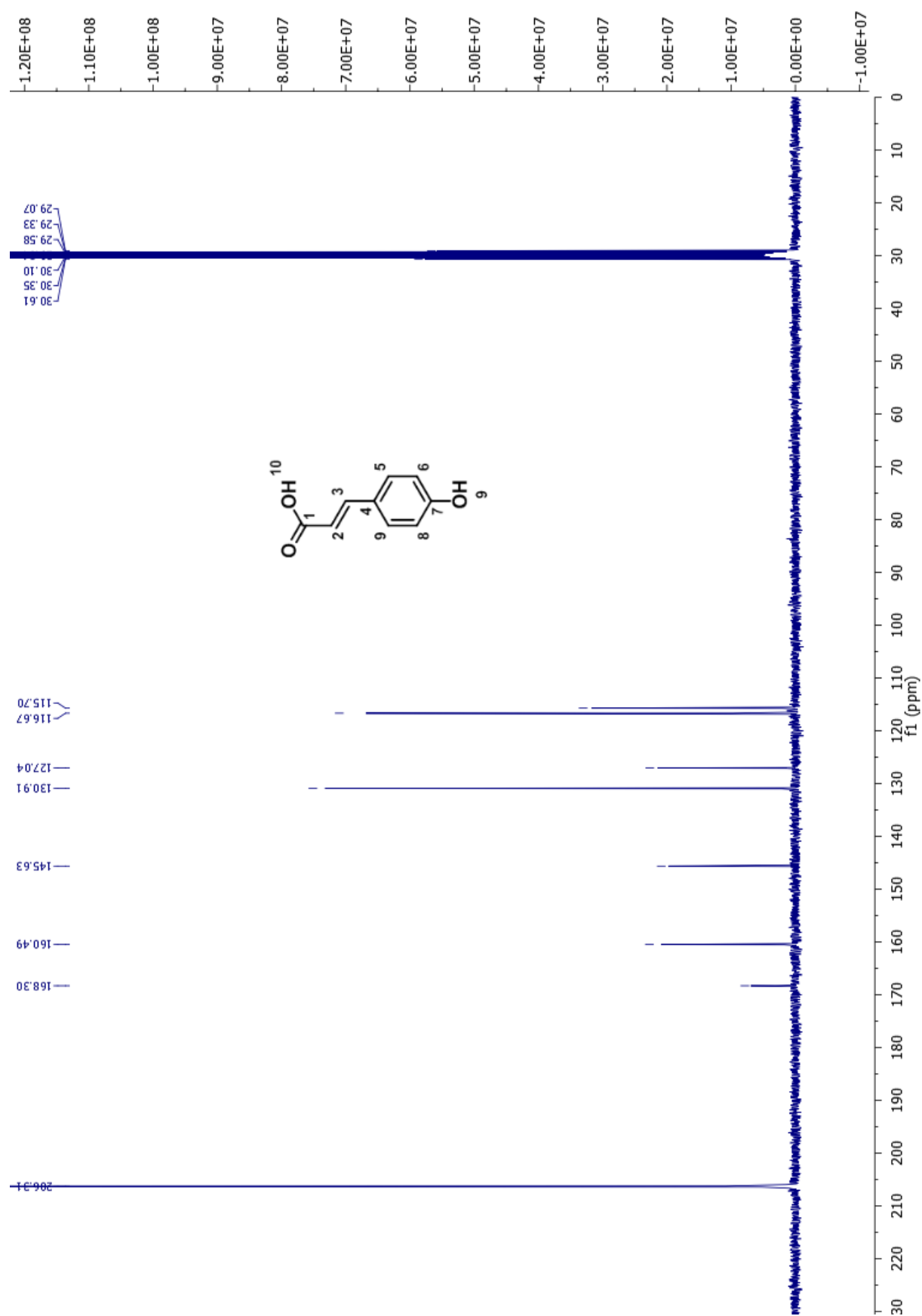
$^1\text{H}$  NMR spectrum of the crude mixture of 4-Hydroxybenzaldehyde, Coumaric acid and 4-Vinylphenol



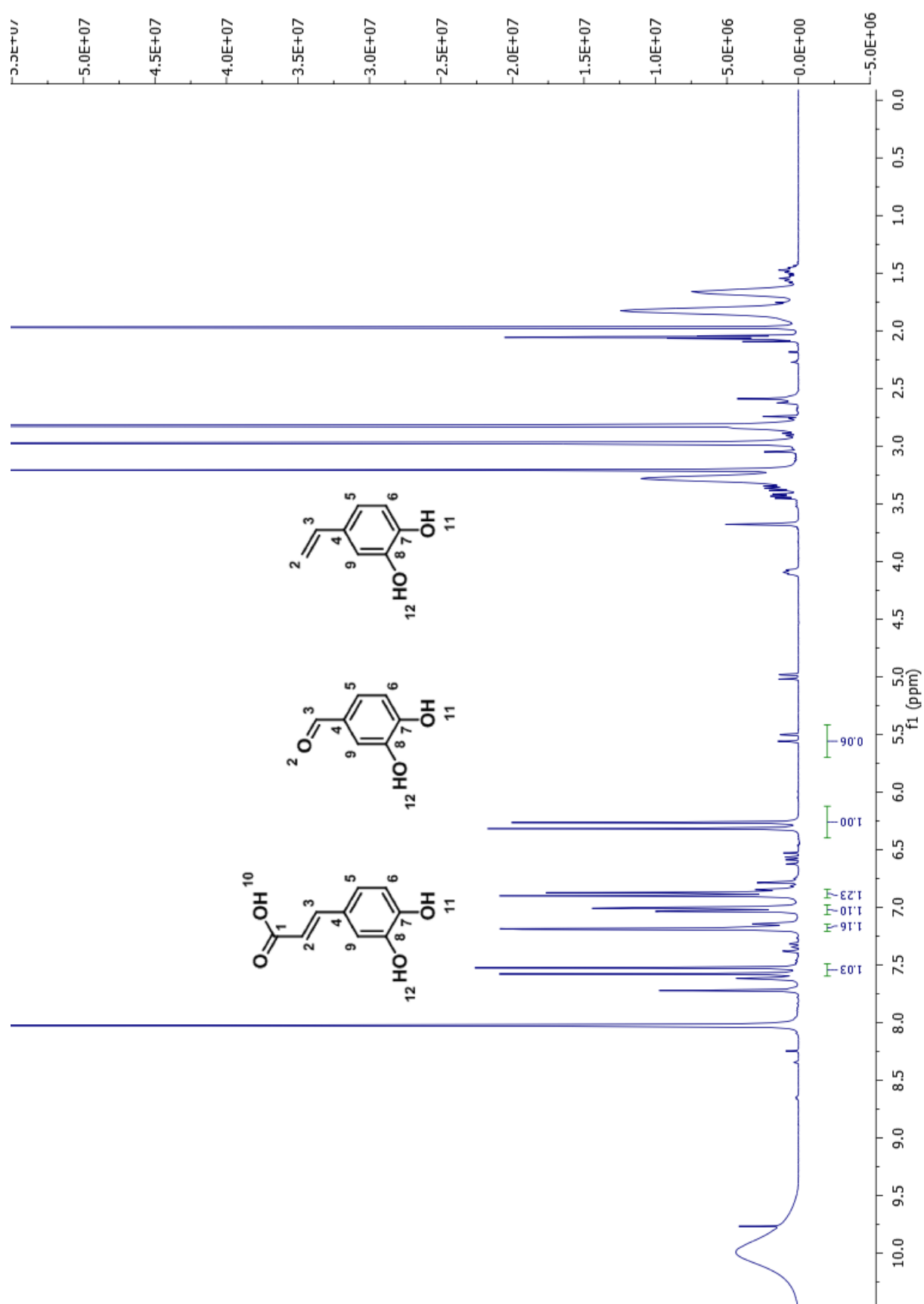
# <sup>1</sup>H spectrum of pure Coumaric acid



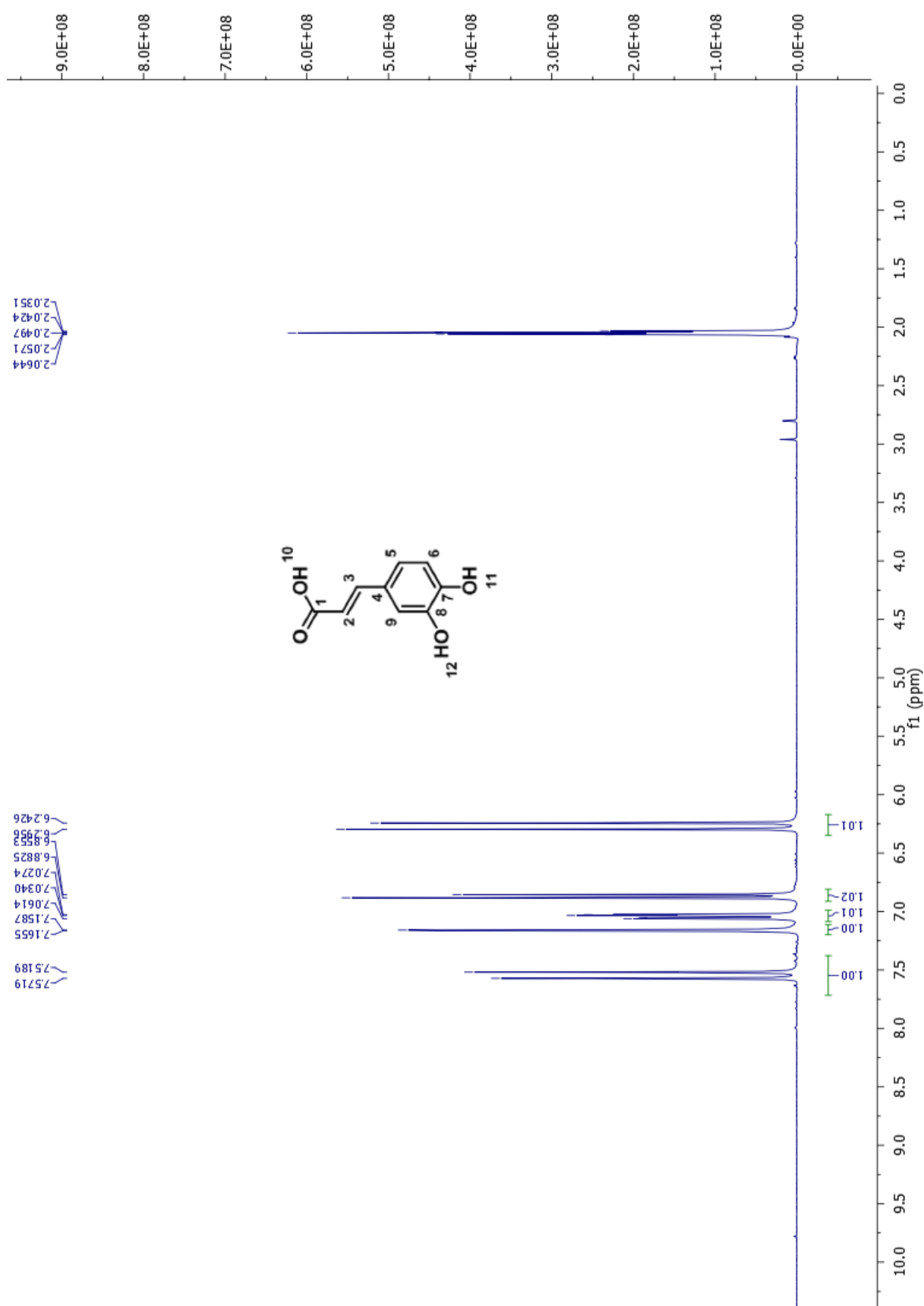
<sup>13</sup>C NMR spectrum of pure Coumaric acid



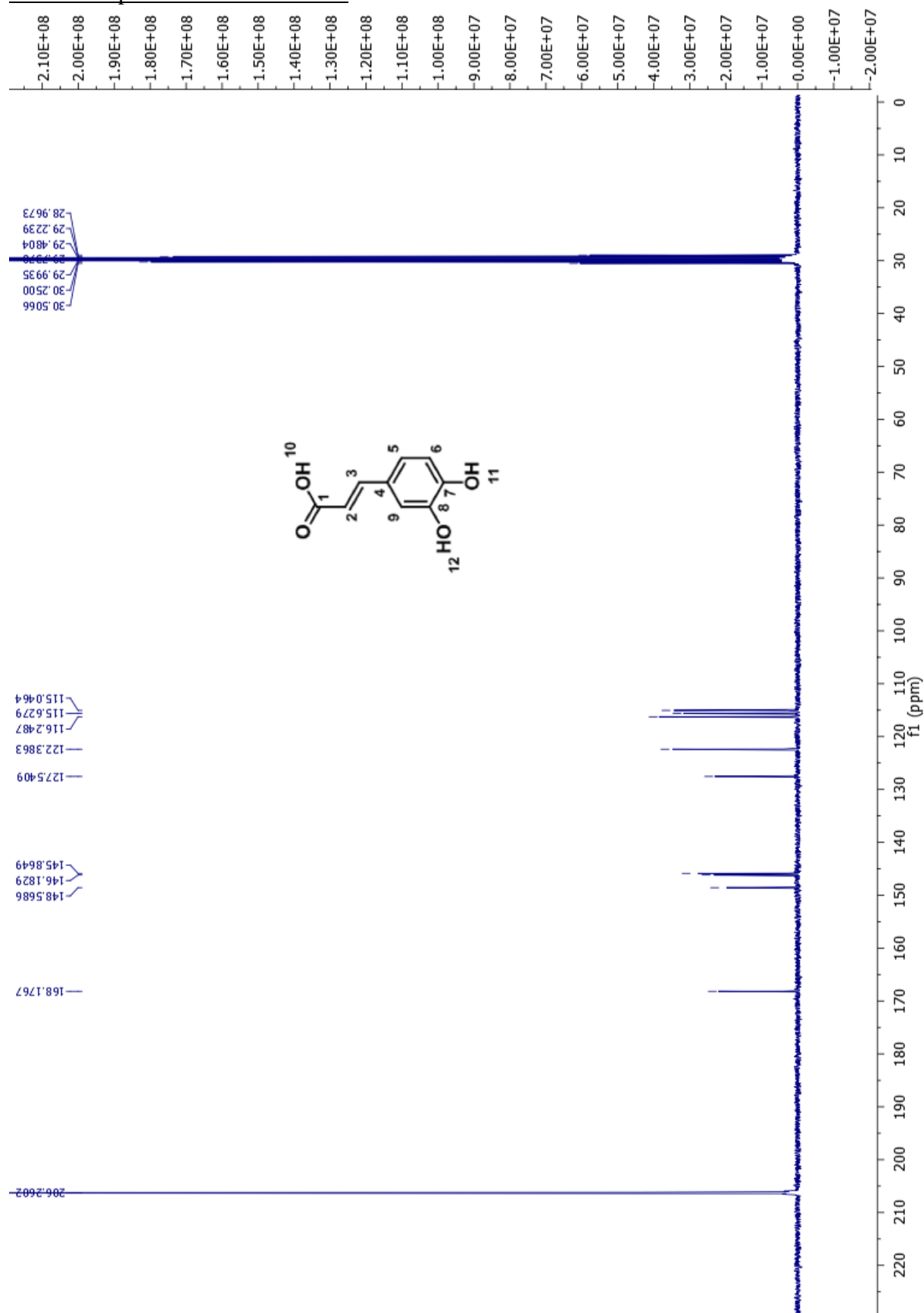
$^1\text{H}$  NMR spectrum of the crude mixture of 3,4-dihydroxybenzaldehyde, Caffeic acid and 4-Vinylbenzene-1,2-diol



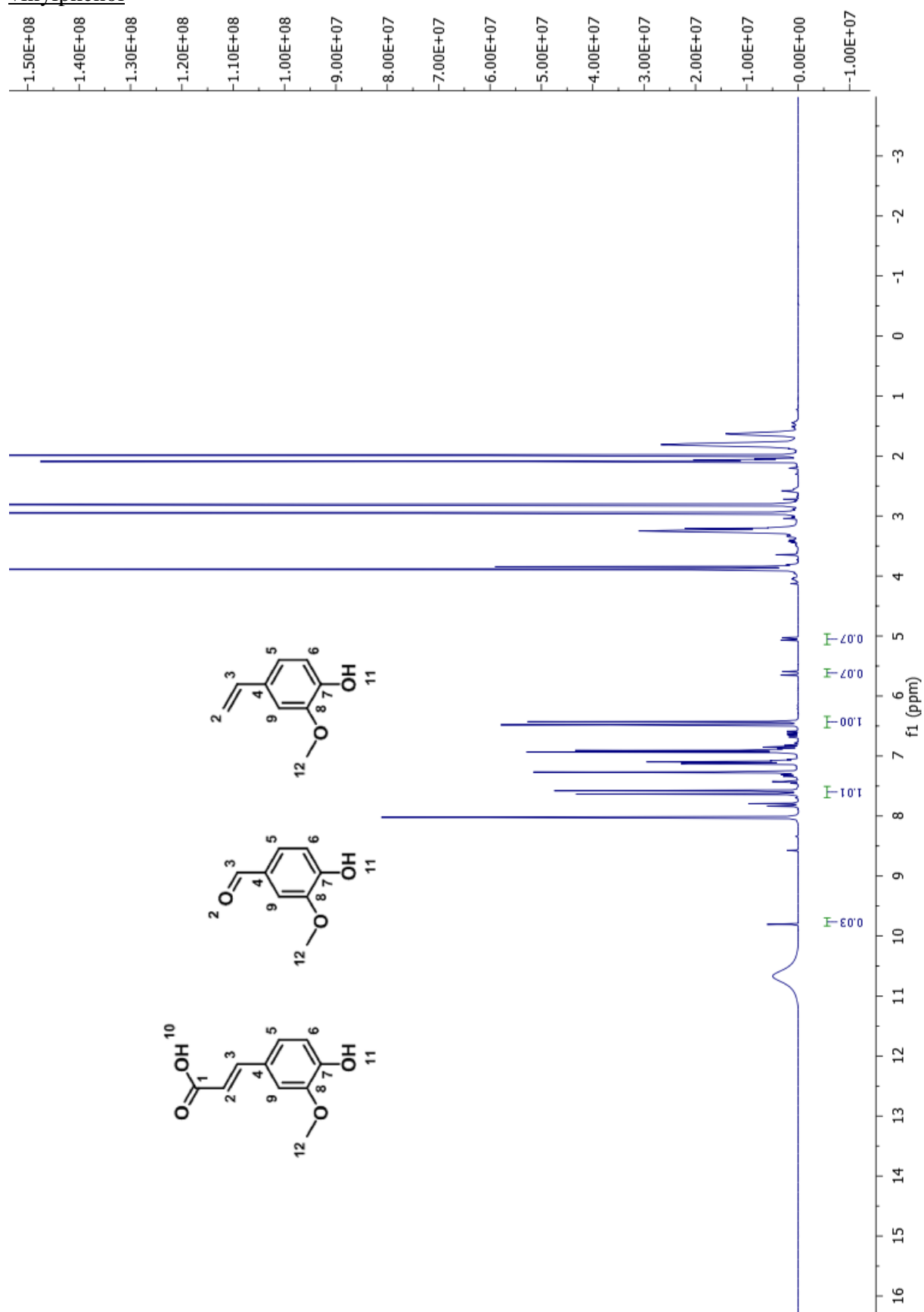
# <sup>1</sup>H NMR spectrum of Caffeic acid



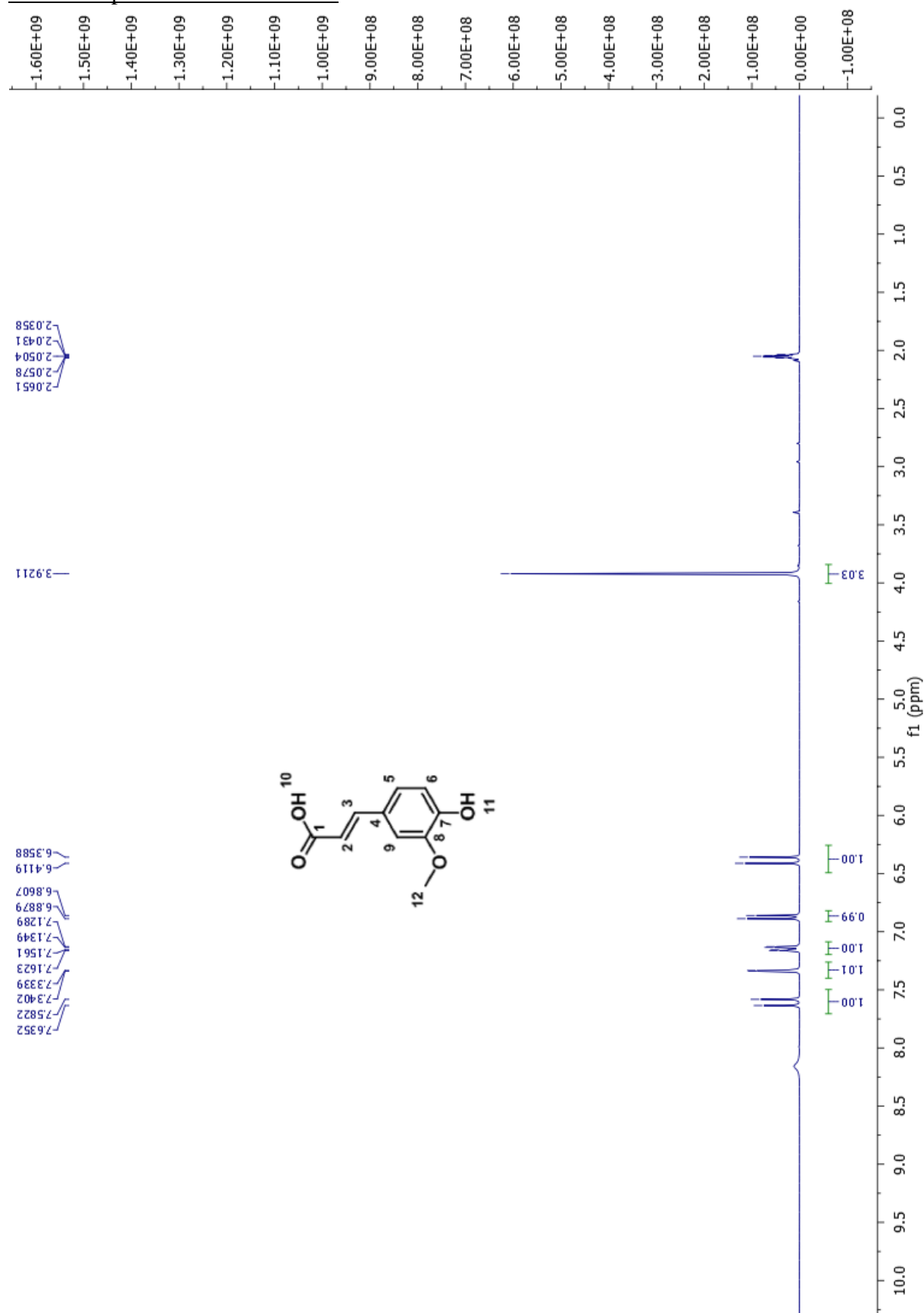
# <sup>13</sup>C NMR spectrum of Caffeic acid



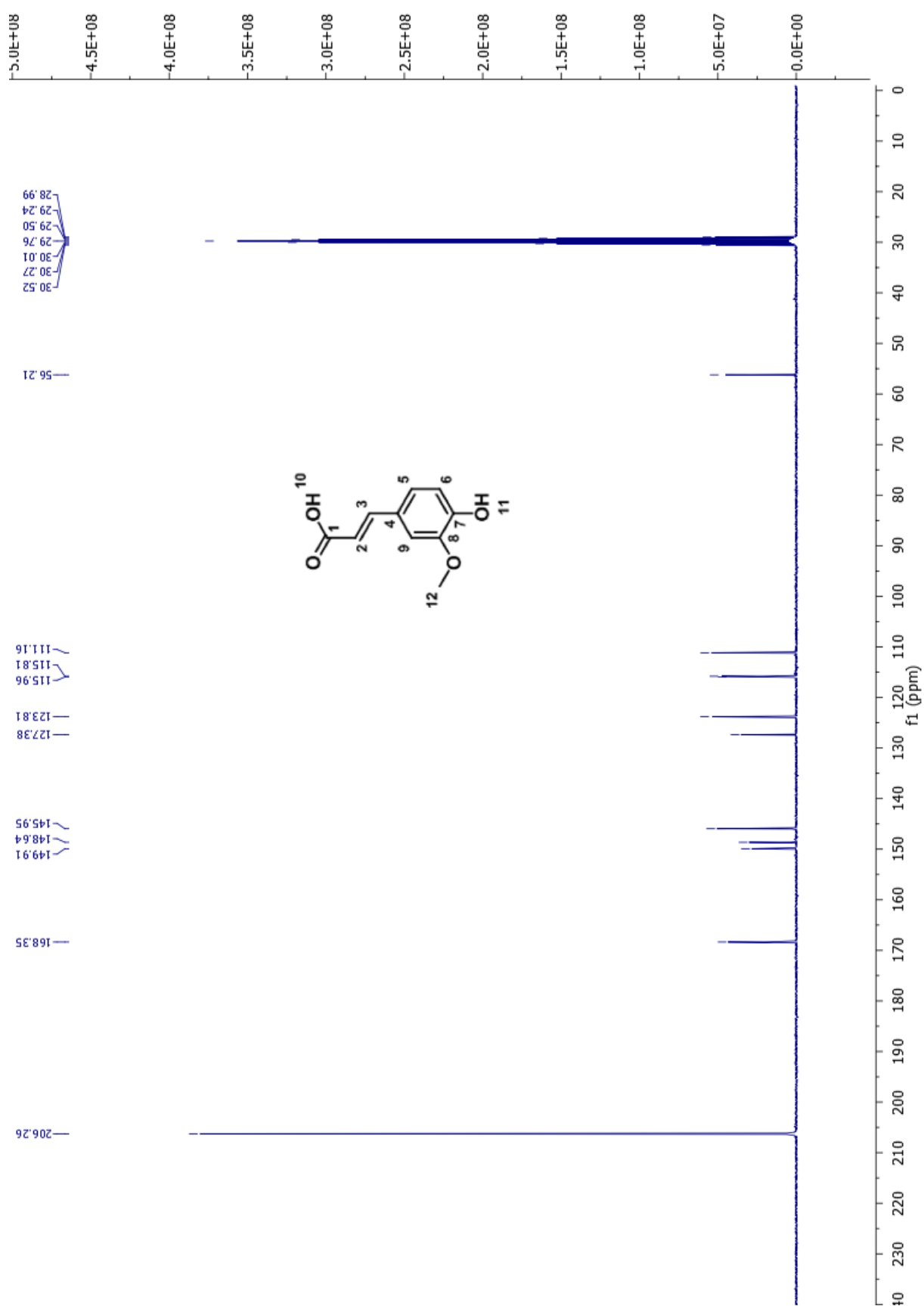
<sup>1</sup>H NMR spectrum of the crude mixture of Vanillin, Ferulic acid and 2-Methoxy-4-vinylphenol



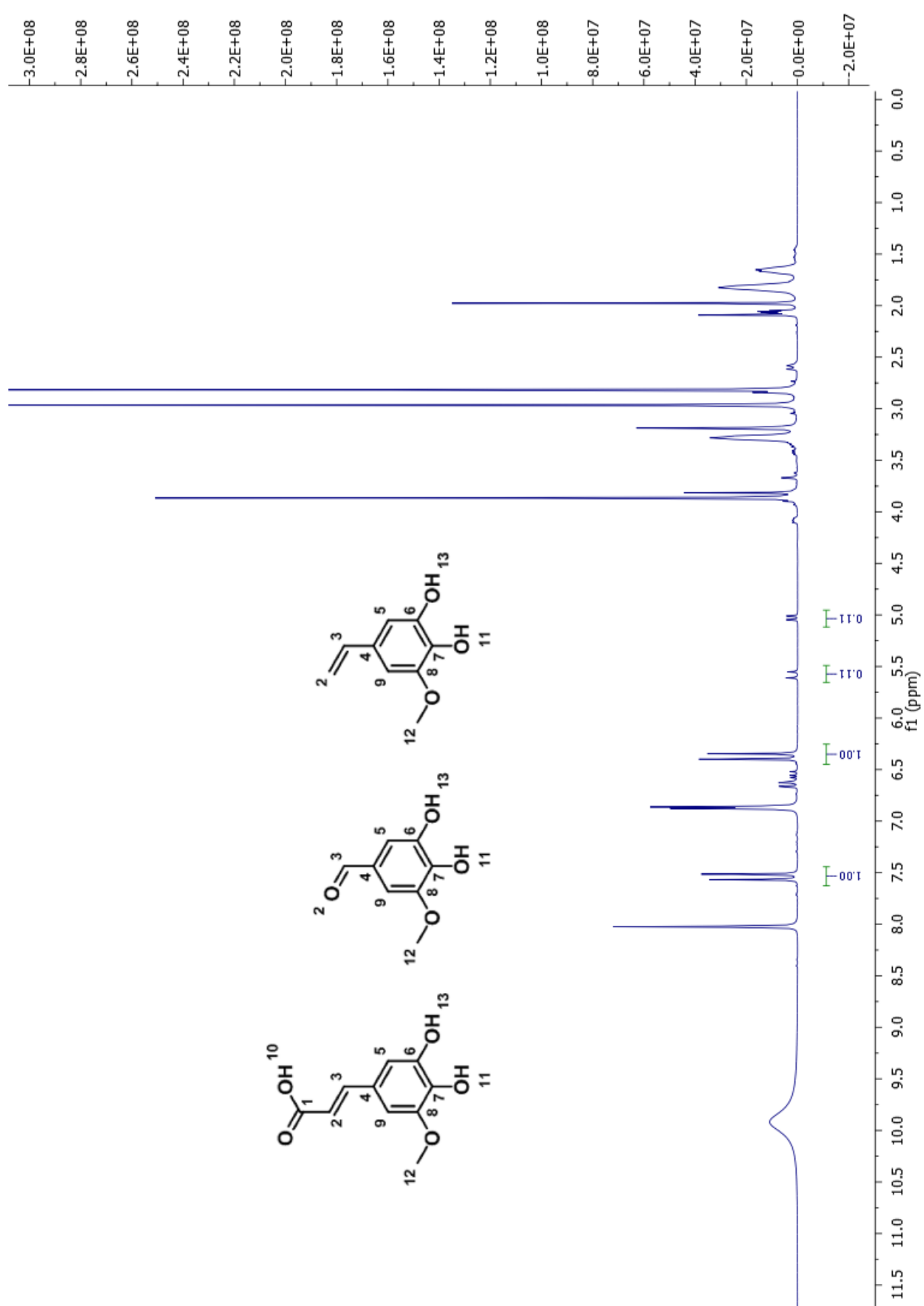
# <sup>1</sup>H NMR spectrum of Ferulic acid



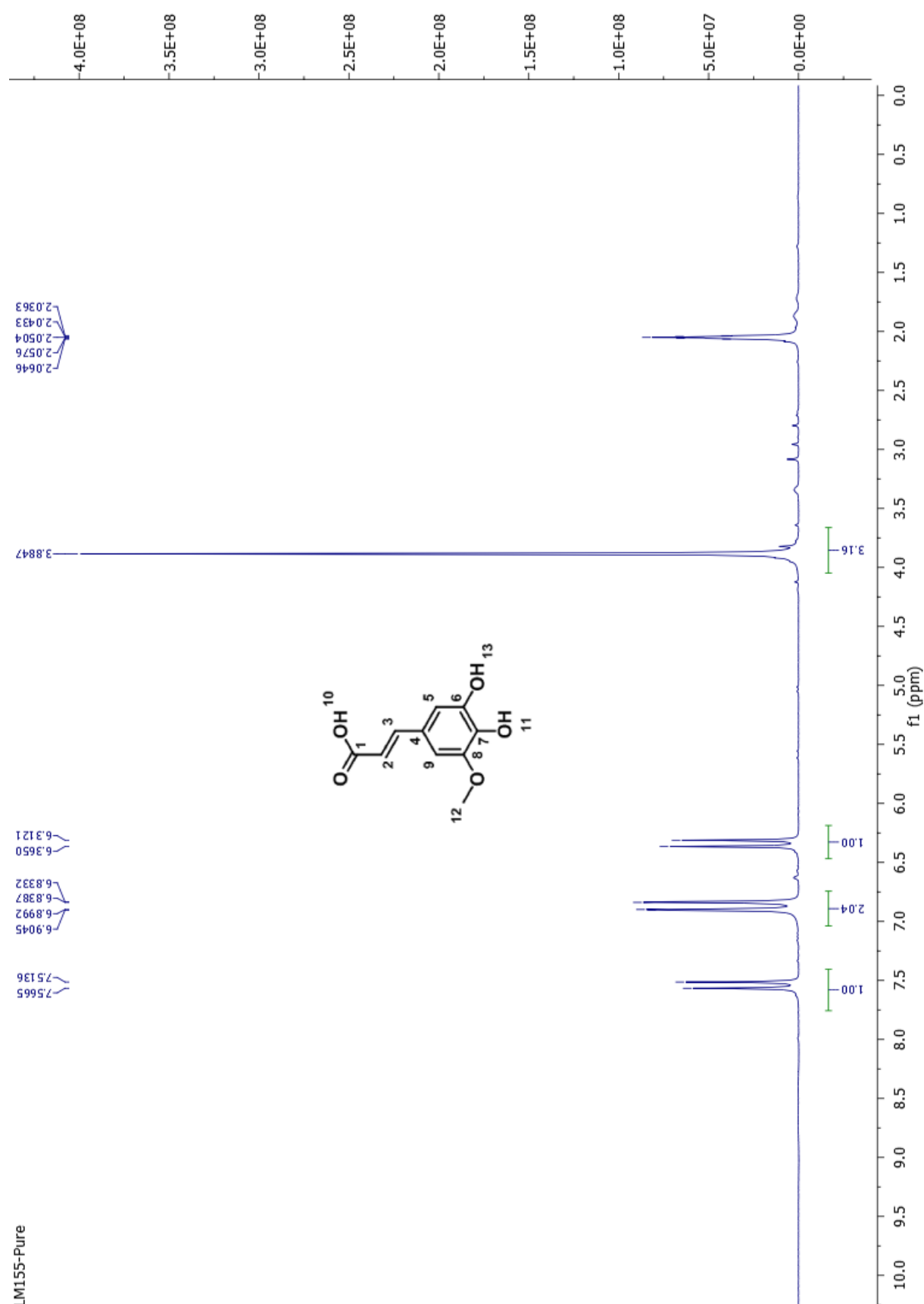
<sup>13</sup>C NMR spectrum of Ferulic acid



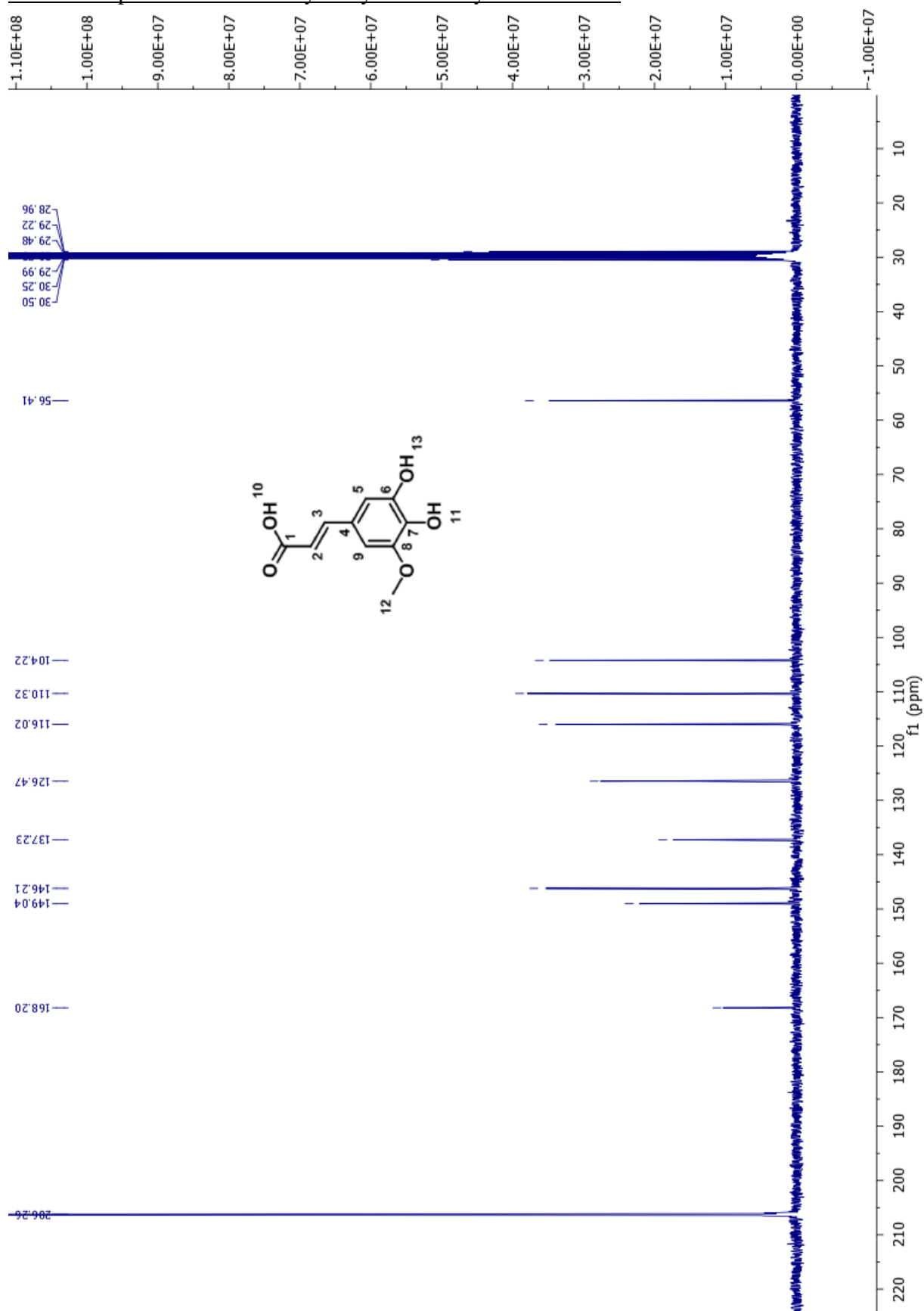
$^1\text{H}$  NMR spectrum of the crude mixture of 5-hydroxyvanillin, 3,4-Dihydroxy-5-methoxycinnamic acid and 3-Methoxy-5-vinylbenzene-1,2-diol



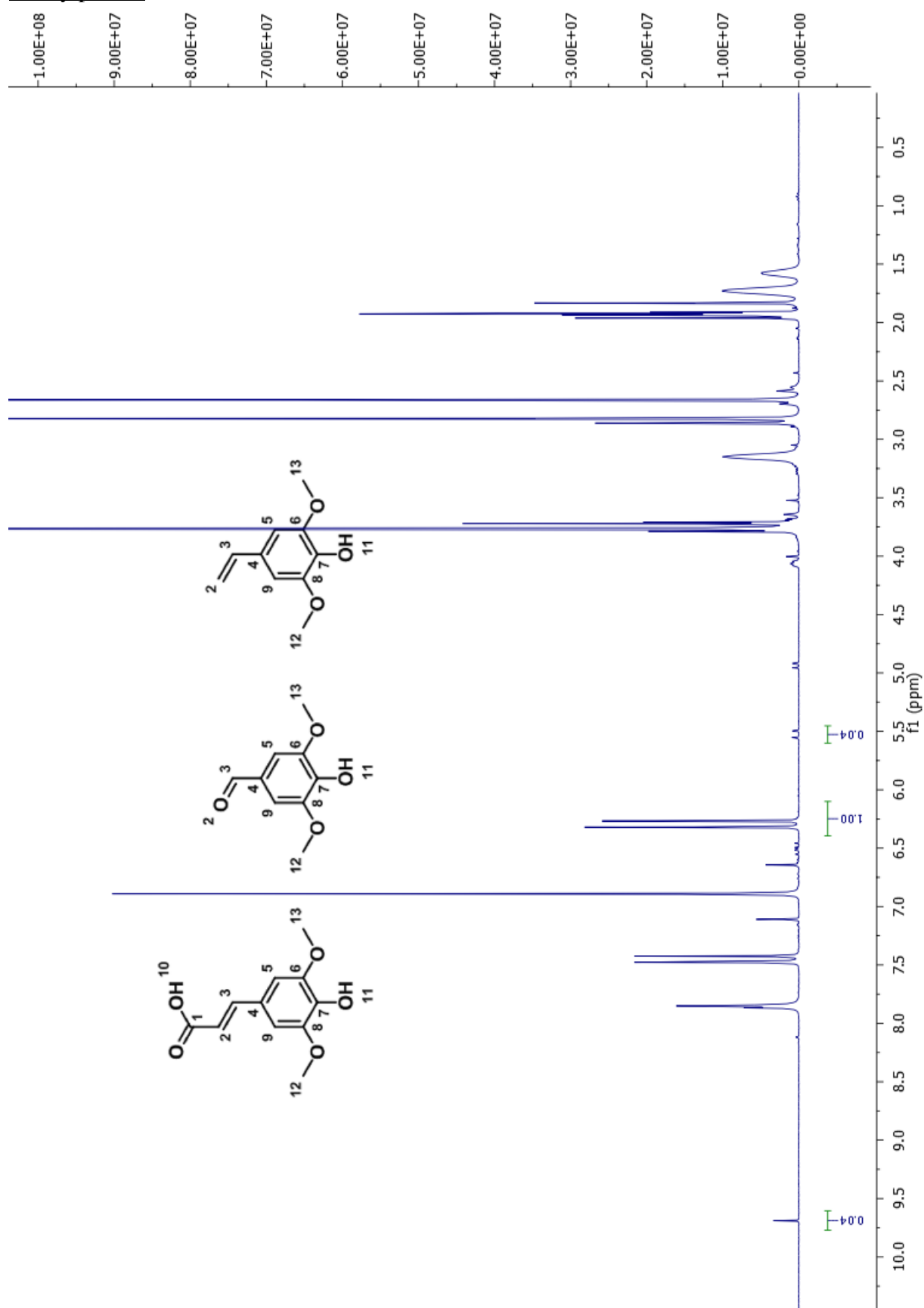
# <sup>1</sup>H NMR spectrum of 3,4-Dihydroxy-5-methoxycinnamic acid



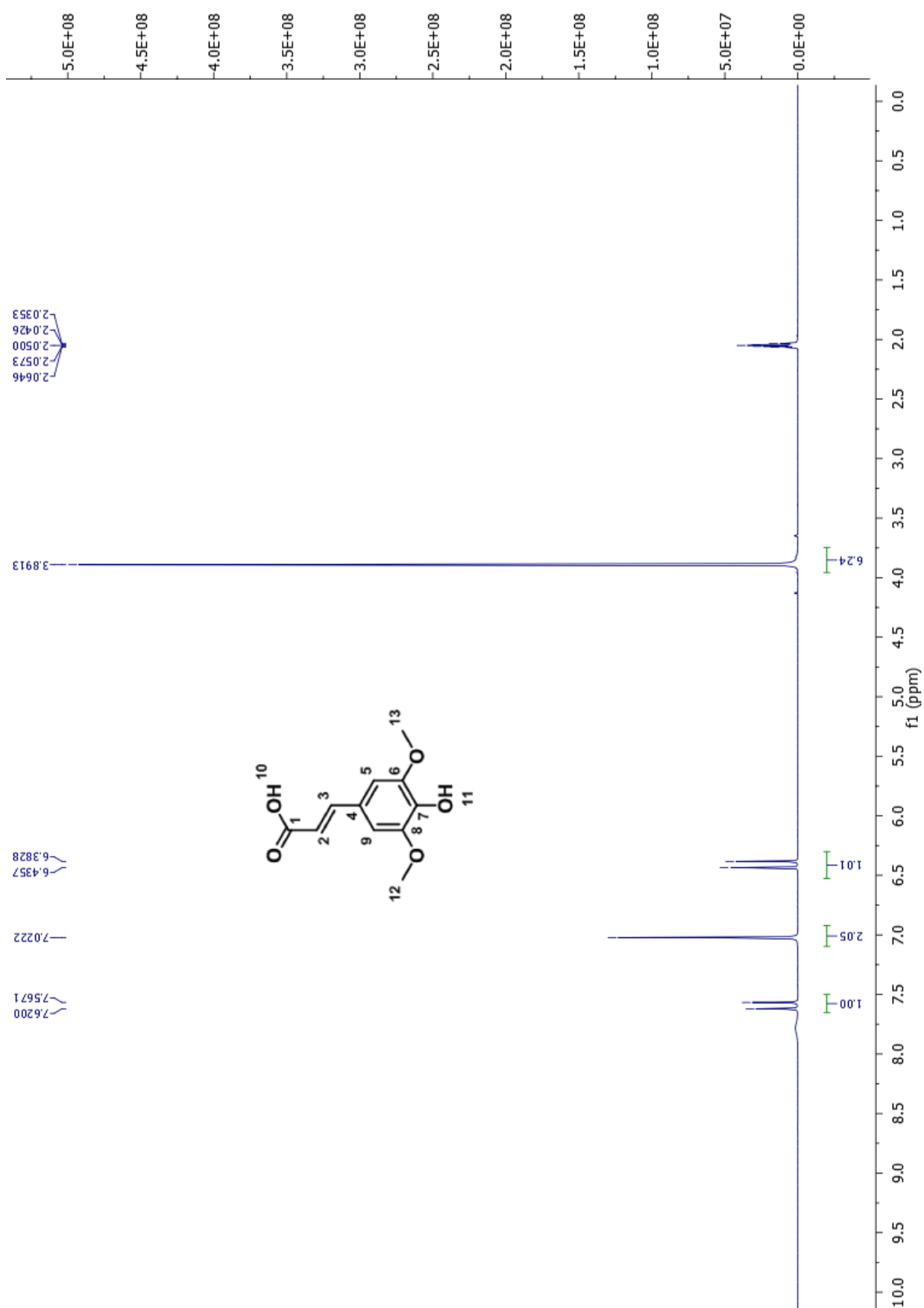
<sup>13</sup>C NMR spectrum of 3,4-Dihydroxy-5-methoxycinnamic acid



$^1\text{H}$  NMR spectrum of the crude mixture of Syringaldehyde. Sinapic acid and 2,6-dimethoxy-4-vinylphenol



# <sup>1</sup>H NMR spectrum of Sinapic acid



# <sup>13</sup>C NMR spectrum of Sinapic acid

