Supplementary Materials: The Effect of New Thiophene-Derived Aminophosphonic Derivatives on Growth of Terrestrial Plants: A Seedling Emergence and Growth Test

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Table S1. Average changes (mean of three replicates) in basic parameters of the plant growth test for oat *(Avena sativa)* treated with **2d** and **2e**. Least significant difference for samples (LSD_S) and concentration (LSD_C) is given for each tested parameter. % F.M. refer to plant biomass (fresh weight) expressed as percent of untreated control.

Sample Concentration in Soil (mg/kg of Soil Dry Matter)	Emerged Seedlings Number	% of Germination	Fresh Matter (g/pot)	% F.M.
0	20	100	2.780	100
1	19	97	2.688	97
10	19	97	2.663	96
100	20	98	2.819	101
200	19	97	2.675	96
400	19	95	2.691	97
800	19	95	2.566	92
1000	18	90	2.249	81
0	20	100	2.780	100
1	19	95	2.682	96
10	19	97	2.645	95
100	19	97	2.724	98
200	20	98	2.447	88
400	19	95	2.304	83
800	18	92	2.026	73
1000	18	88	1.921	69
	$LSD_S = 1$		$LSD_S = 0.3$	
	$LSD_C = 1$		$LSD_C = 0.15$	

Table S2. Average changes (mean of three replicates) in basic parameters of the plant growth test for radish *(Raphanus sativus)* treated with **2d** and **2e**. Least significant difference for samples (LSD_S) and concentration (LSD_C) is given for each tested parameter. % F.M. refer to plant biomass (fresh weight) expressed as percent of untreated control.

Sample Concentration in Soil (mg/kg of Soil Dry Matter)	Emerged Seedlings Number	% of Germination	Fresh Matter (g/pot)	% F.M.
0	20	100	4.951	100
1	19	98	4.850	98
10	19	98	4.811	97
100	20	100	4.735	96
200	19	95	4.934	100
400	19	95	4.149	84
800	17	86	2.719	55
1000	17	86	1.440	29
0	20	100	4.951	100
1	20	100	4.841	98

Table S2. *Cont.*

Sample Concentration in Soil (mg/kg of Soil Dry Matter)	Emerged Seedlings Number	% of Germination	Fresh Matter (g/pot)	% F.M.
10	19	95	4.745	96
100	19	97	4.842	98
200	19	97	4.035	81
400	17	86	3.748	76
800	17	85	1.436	29
1000	15	76	0.662	13
	$LSD_S = 2$		$LSD_S = 0.492$	
	$LSD_C = 1$		$LSD_C = 0.246$	

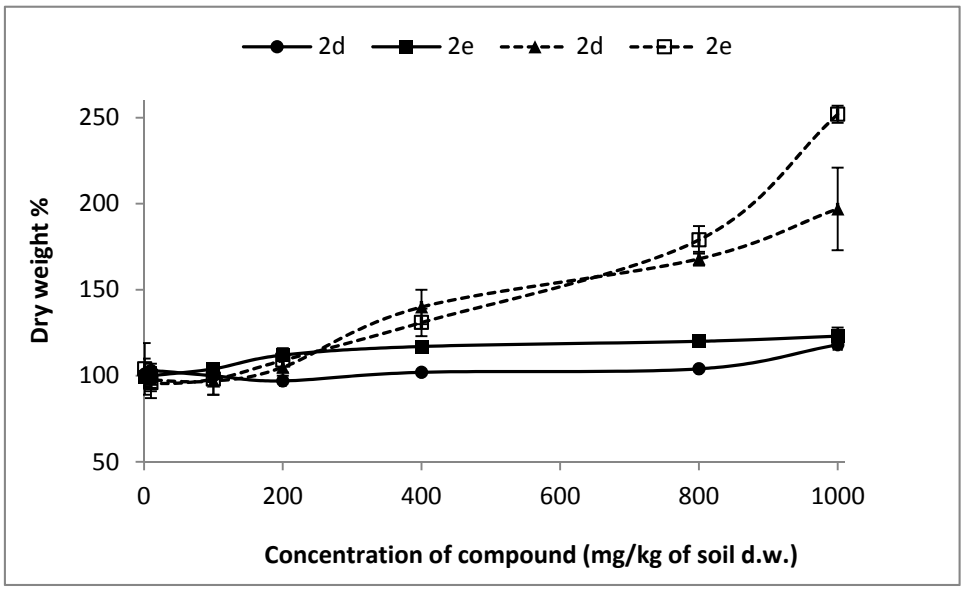

Figure S1. Changes of dry weight of treated plants with Compounds **2d** and **2e** expressed as percent to the value in untreated plants (control plants = 100% of dry weight). Solid lines represent changes of oat dry weight. Dotted lines represent changes of radish dry weight.

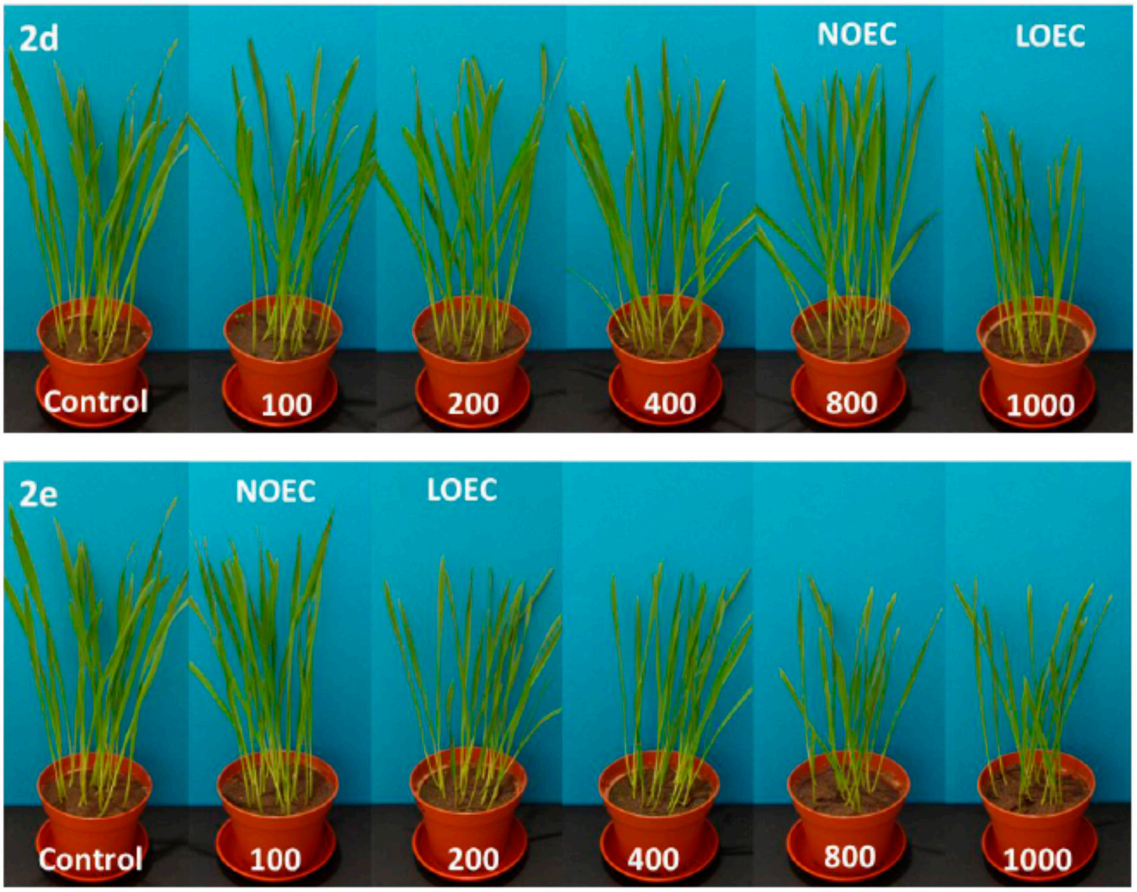

Figure S2. Digital photographs of oat treated with **2d** and **2e** (concentration in mg/kg of soil dry weight) on the 14th day of growth.

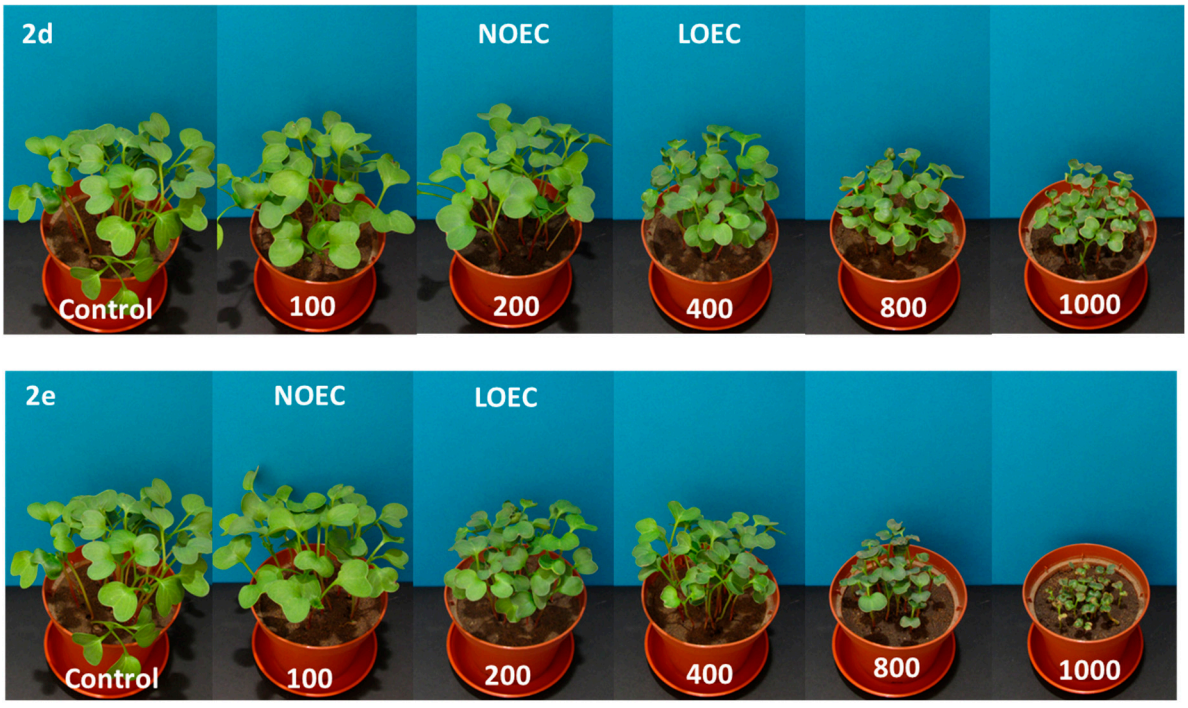

Figure S3. Digital photographs of radish treated with **2d** and **2e** (concentration in mg/kg of soil dry weight) on the 14th day of growth.

Table S3. Average changes (mean of three replicates) in basic parameters of the plant growth test for oat *(Avena sativa)* treated with **2f** and **2g**. Least significant difference for samples (LSD_S) and concentration (LSD_C) is given for each tested parameter. % F.M. refer to plant biomass (fresh weight) expressed as percent of untreated control.

Sample Concentration in Soil (mg/kg of Soil Dry Matter)	Emerged Seedlings Number	% of Germination	Fresh Matter (g/pot)	% F.M.
0	20	100	2.807	100
1	19	97	2.761	98
10	19	97	2.729	97
100	20	98	2.800	100
200	19	97	2.769	99
400	19	95	2.434	87
800	17	87	1.949	69
1000	14	70	0.483	17
0	20	100	2.807	100
1	20	98	2.752	98
10	19	97	2.771	99
100	20	98	2.887	103
200	19	97	2.784	99
400	20	98	2.728	97
800	18	90	2.340	83
1000	17	87	1.315	47
	$LSD_S = 2$		$LSD_S = 0.205$	
	$LSD_C = 1$		$LSD_C = 0.102$	

Table S4. Average changes (mean of three replicates) in basic parameters of the plant growth test for radish *(Raphanus sativus)* treated with **2f** and **2g**. Least significant difference for samples (LSD_S) and concentration (LSD_C) is given for each tested parameter. % F.M. refer to plant biomass (fresh weight) expressed as percent of untreated control.

Sample Concentration in Soil (mg/kg of Soil Dry Matter)	Emerged Seedlings Number	% of Germination	Fresh Matter (g/pot)	% F.M.
0	20	100	4.821	100
1	20	100	4.793	99
10	20	100	4.612	96
100	19	98	4.720	98
200	17	88	4.147	86
400	17	85	2.070	43
800	14	71	0.860	18
1000	12	61	0.394	8
0	20	100	4.821	100
1	20	100	4.765	99
10	19	95	4.700	97
100	19	95	4.741	98
200	19	98	4.543	94
400	17	85	3.410	71
800	15	76	1.920	40
1000	14	73	1.231	26
	$LSD_S = 2$		$LSD_S = 0.368$	
	$LSD_C = 1$		$LSD_C = 0.184$	

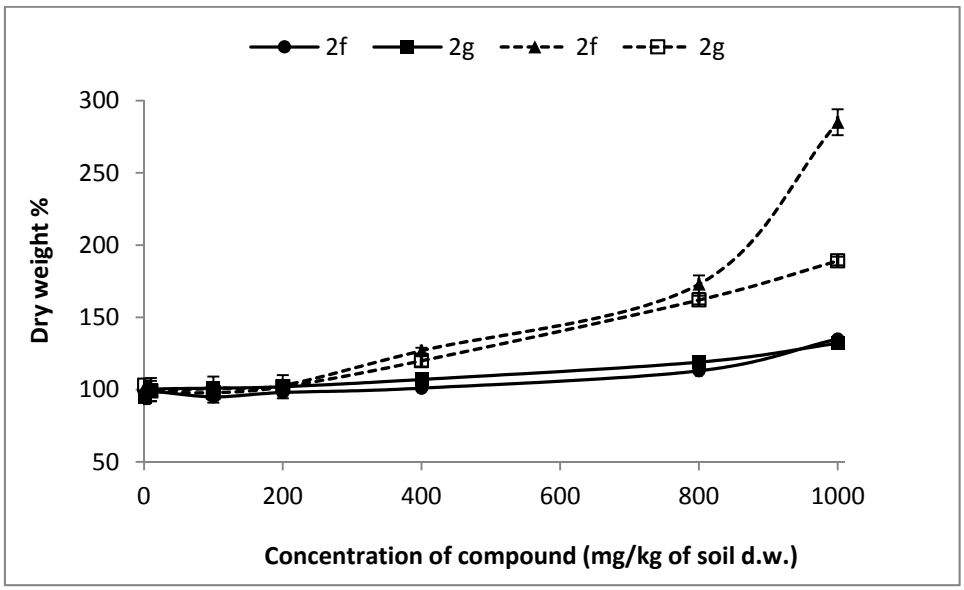

Figure S4. Changes of dry weight of treated plants with Compounds **2f** and **2g** expressed as percent to the value in untreated plants (control plants = 100% of dry weight). Solid lines represent changes of oat dry weight. Dotted lines represent changes of radish dry weight.

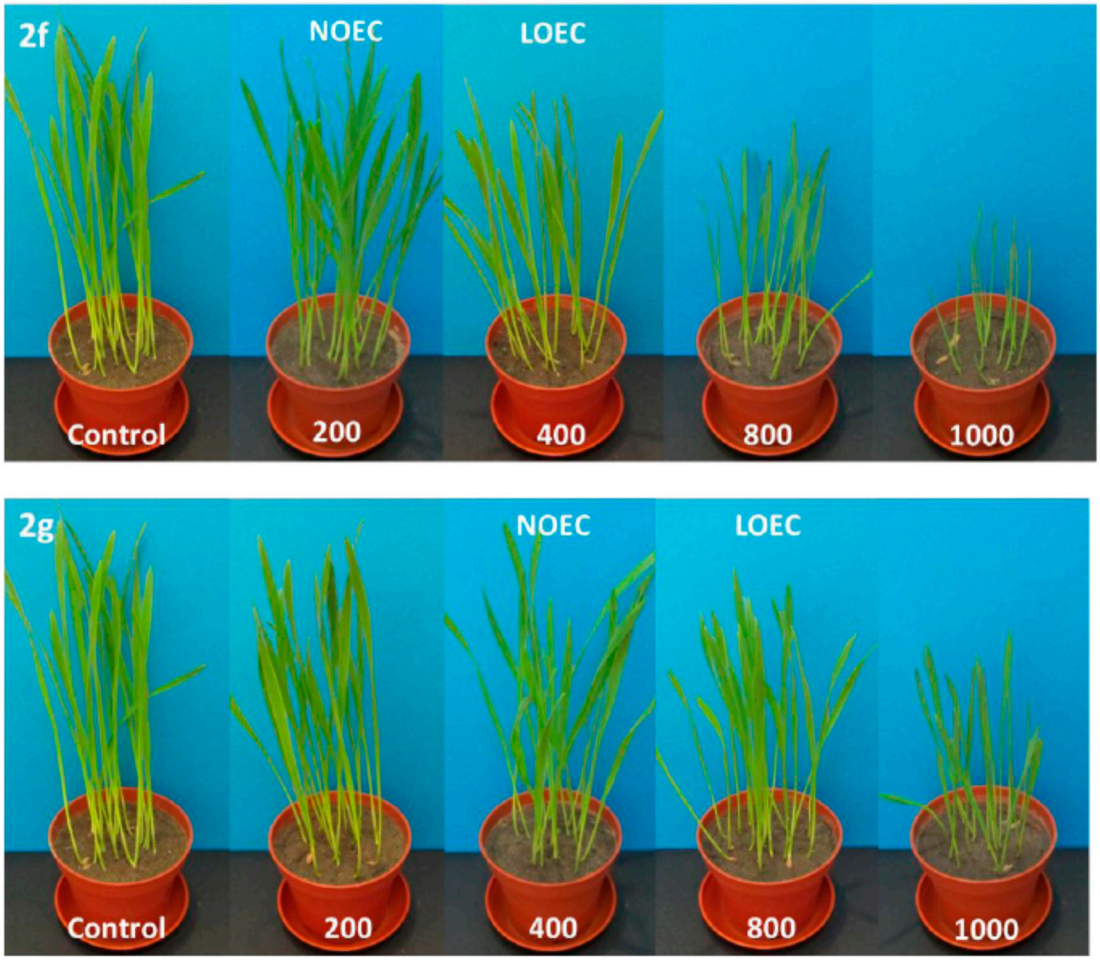

Figure S5. Digital photographs of oat treated with **2f** and **2g** (concentration in mg/kg of soil dry weight) on the 14th day of growth.

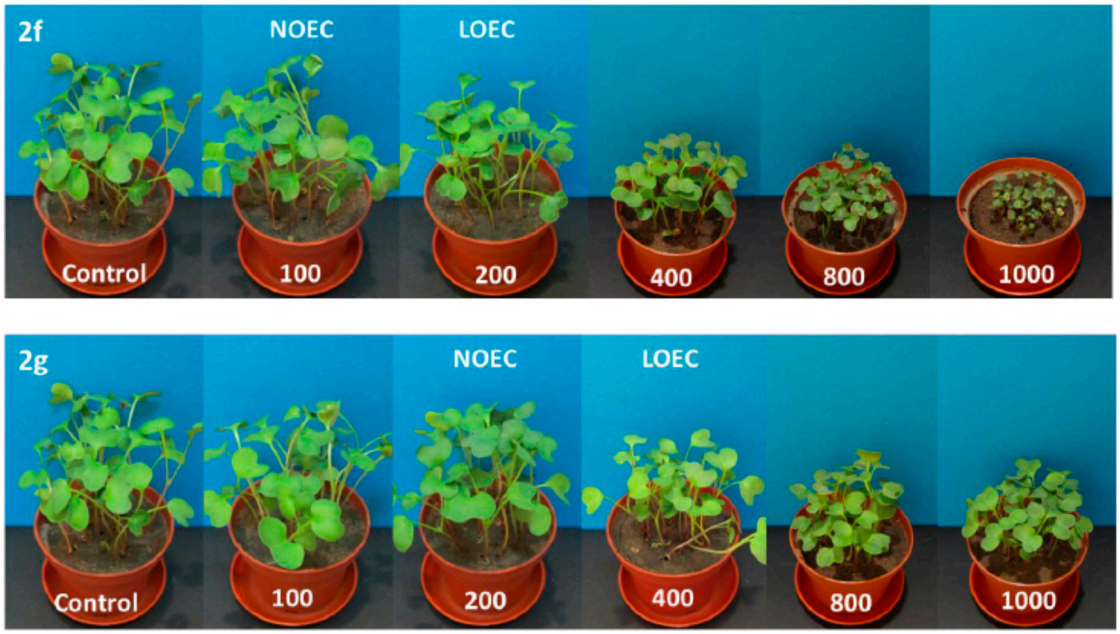

Figure S6. Digital photographs of radish treated with **2f** and **2g** (concentration in mg/kg of soil dry weight) on the 14th day of growth.

Table S5. Average changes (mean of three replicates) in basic parameters of the plant growth test for oat and radish treated with **2h.** Least significant difference for concentration (LSD) is given for each tested parameter. %F.M. refer to plant biomass (fresh weight) expressed as percent of untreated control.

Sample Concentration in Soil (mg/kg of Soil Dry Matter)	Emerged Seedlings Number	% of Germination	Fresh Matter (g/pot)	% F.M.
		OAT		
0	20	100	2.772	100
1	20	98	2.742	99
10	20	98	2.714	98
20	19	97	2.767	100
40	19	97	2.731	99
80	19	97	2.359	85
100	19	95	2.186	79
1000	17	87	1.730	62
		LSD = 1	LSD = 0.126	
		RADISH		
0	20	100	4.799	100
1	19	98	5.112	107
10	19	97	4.686	98
20	19	97	4.711	98
40	19	97	4.496	94
80	18	90	4.226	88
100	16	81	3.948	82
1000	13	66	2.867	60
		LSD = 1	LSD = 0.181	

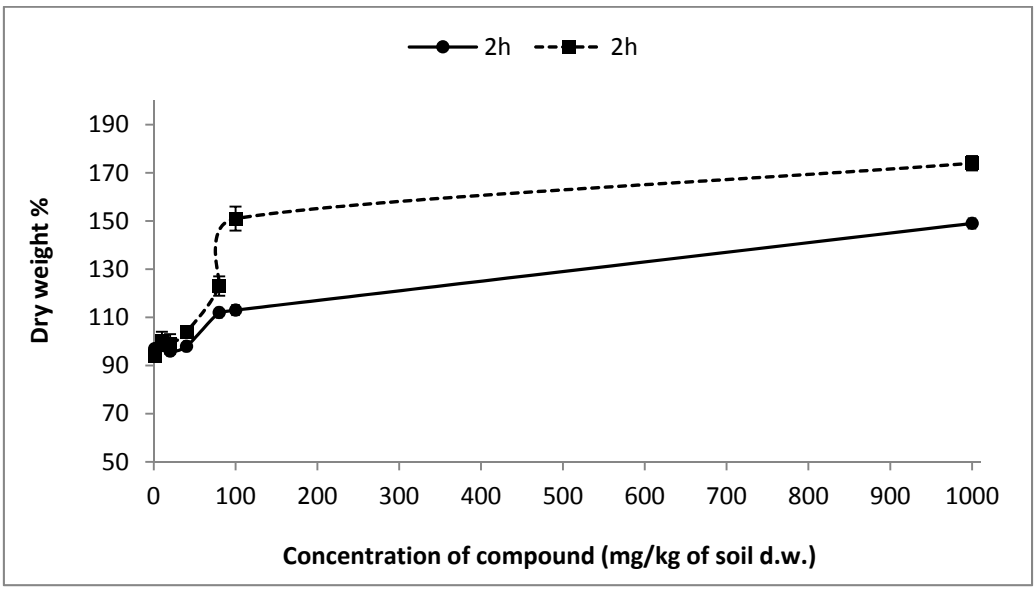

Figure S7. Changes of dry weight of treated plants with Compound **2h** expressed as percent to the value in untreated plants (control plants = 100% of dry weight). Solid lines represent changes of oat dry weight. Dotted lines represent changes of radish dry weight.

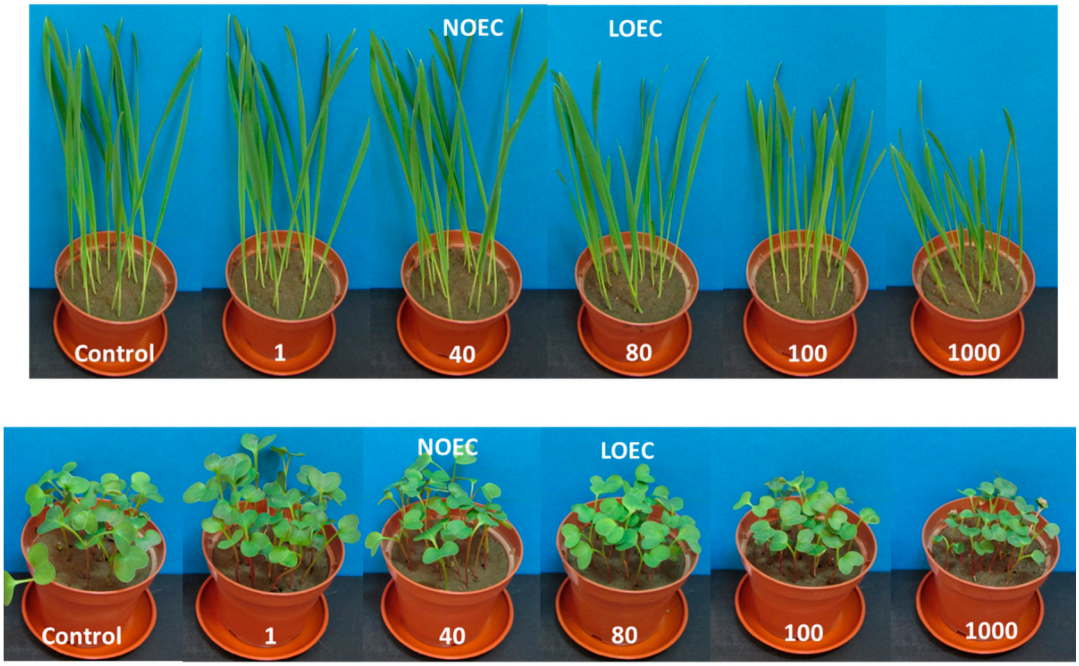

Figure S8. Digital photographs of oat and radish treated with **2h** (concentration in mg/kg of soil dry weight) on the 14th day of growth.

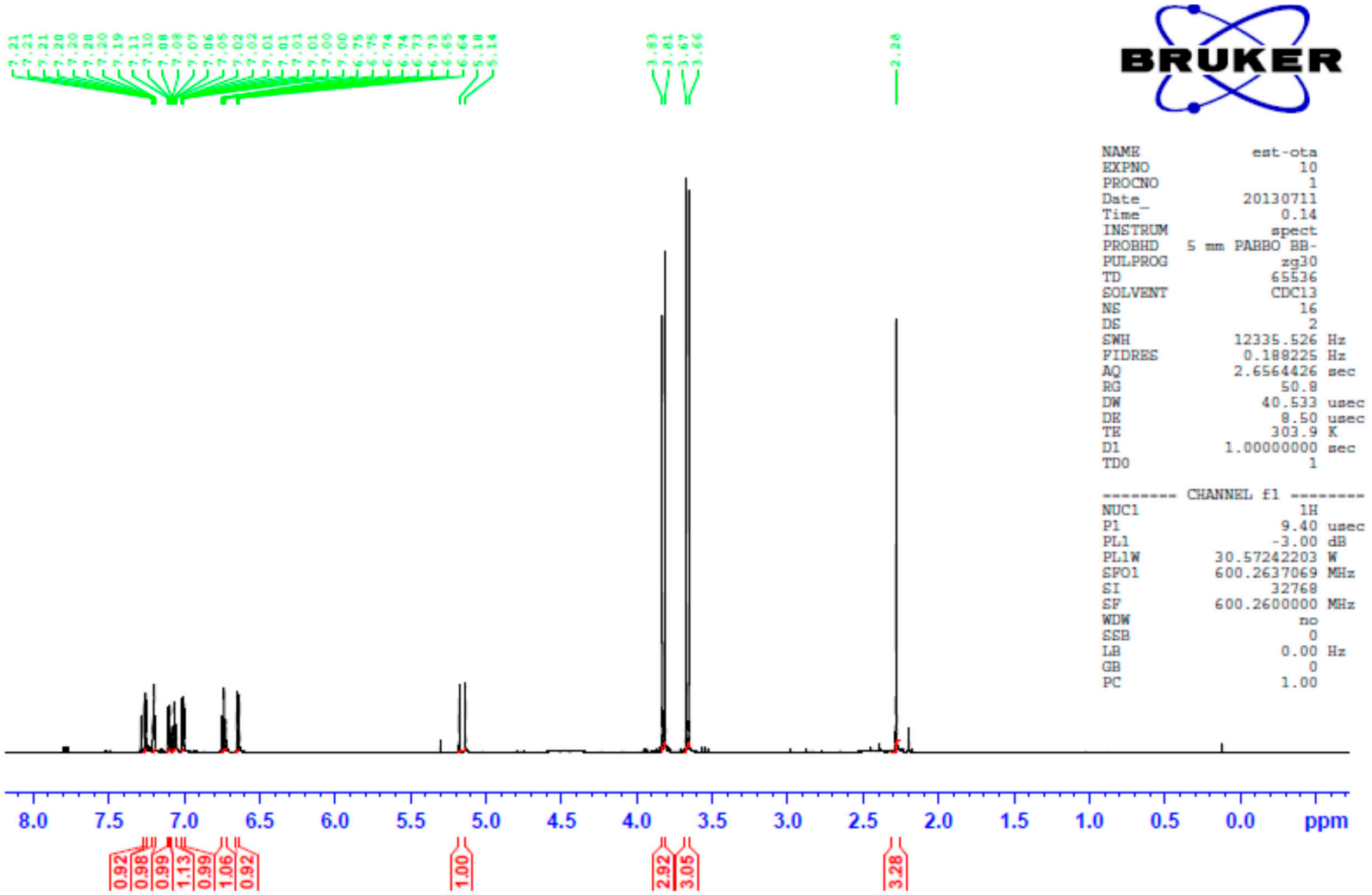

Figure S9. ^{1}H-NMR spectrum of dimethyl *N*-(2-methylphenyl)amino(2-thienyl)methylphosphonate (**2a**).

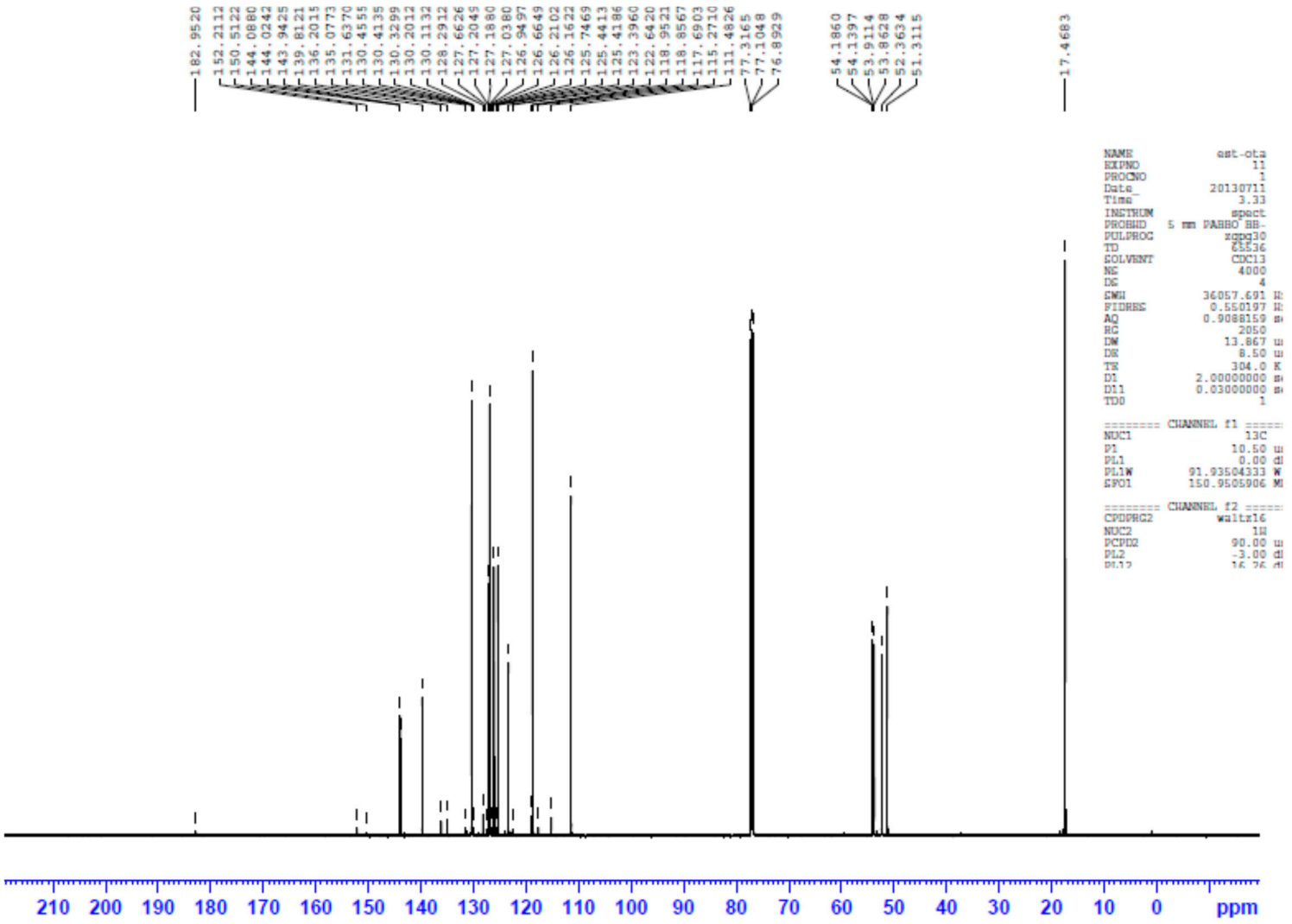

Figure S10. ^{13}C-NMR spectrum of dimethyl *N*-(2-methylphenyl)amino(2-thienyl)methylphosphonate (**2a**).

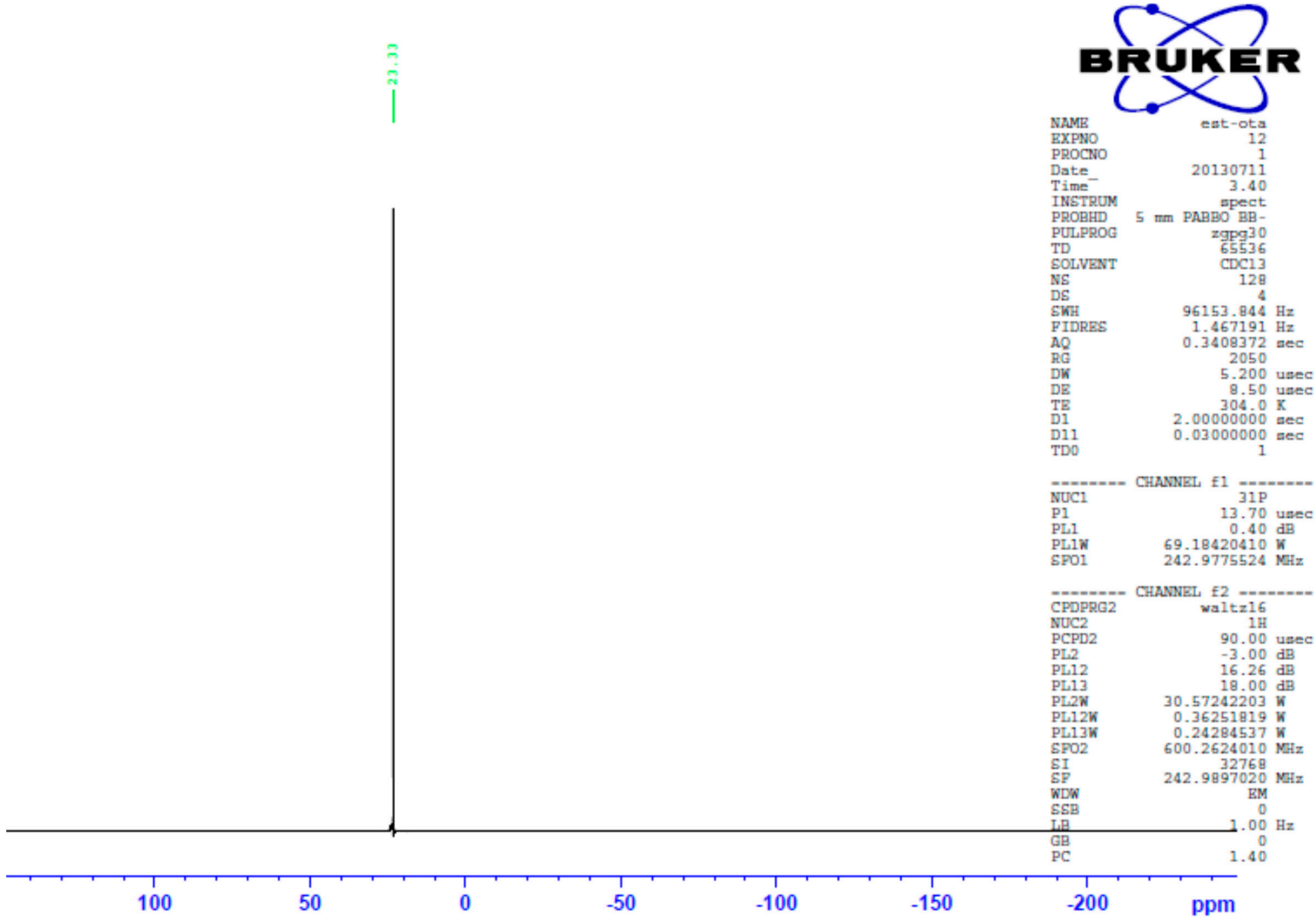

Figure S11. ^{31}P-NMR spectrum of dimethyl *N*-(2-methylphenyl)amino(2-thienyl)methylphosphonate (**2a**),

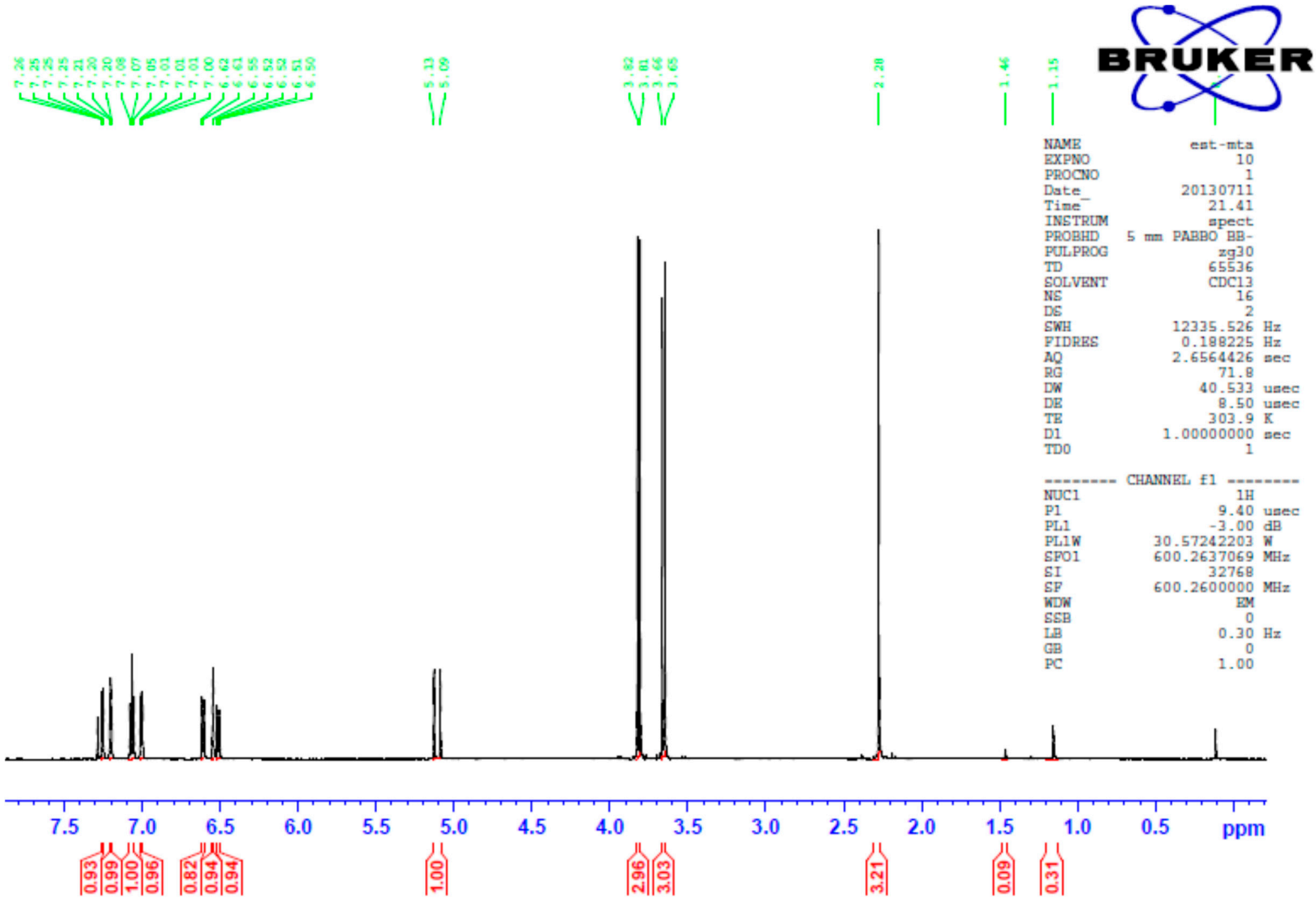

Figure S12. ^{1}H-NMR spectrum of dimethyl *N*-(3-methylphenyl)amino(2-thienyl)methylphosphonate (**2b**).

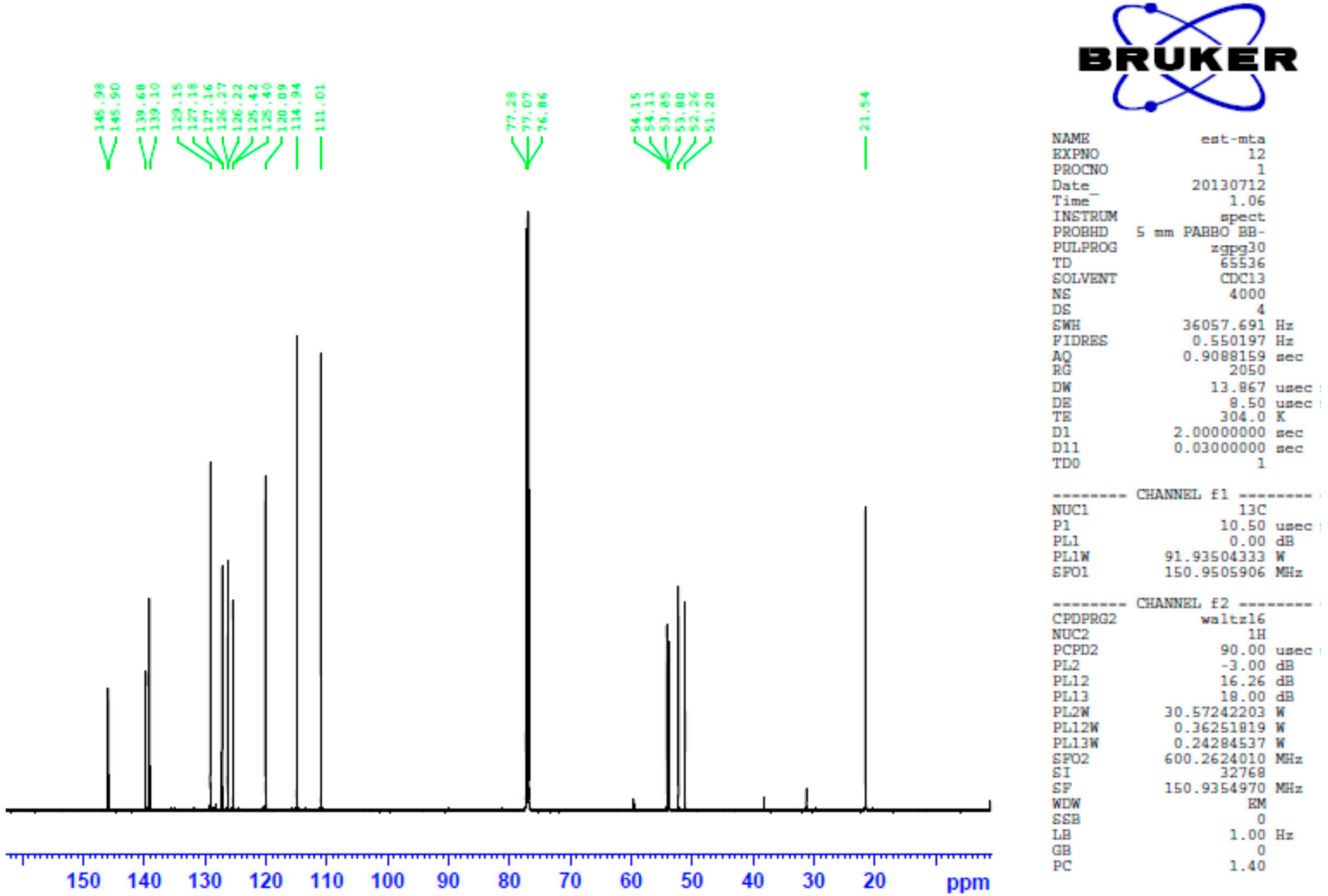

Figure S13. ^{13}C-NMR spectrum of dimethyl *N*-(3-methylphenyl)amino(2-thienyl)methylphosphonate (**2b**).

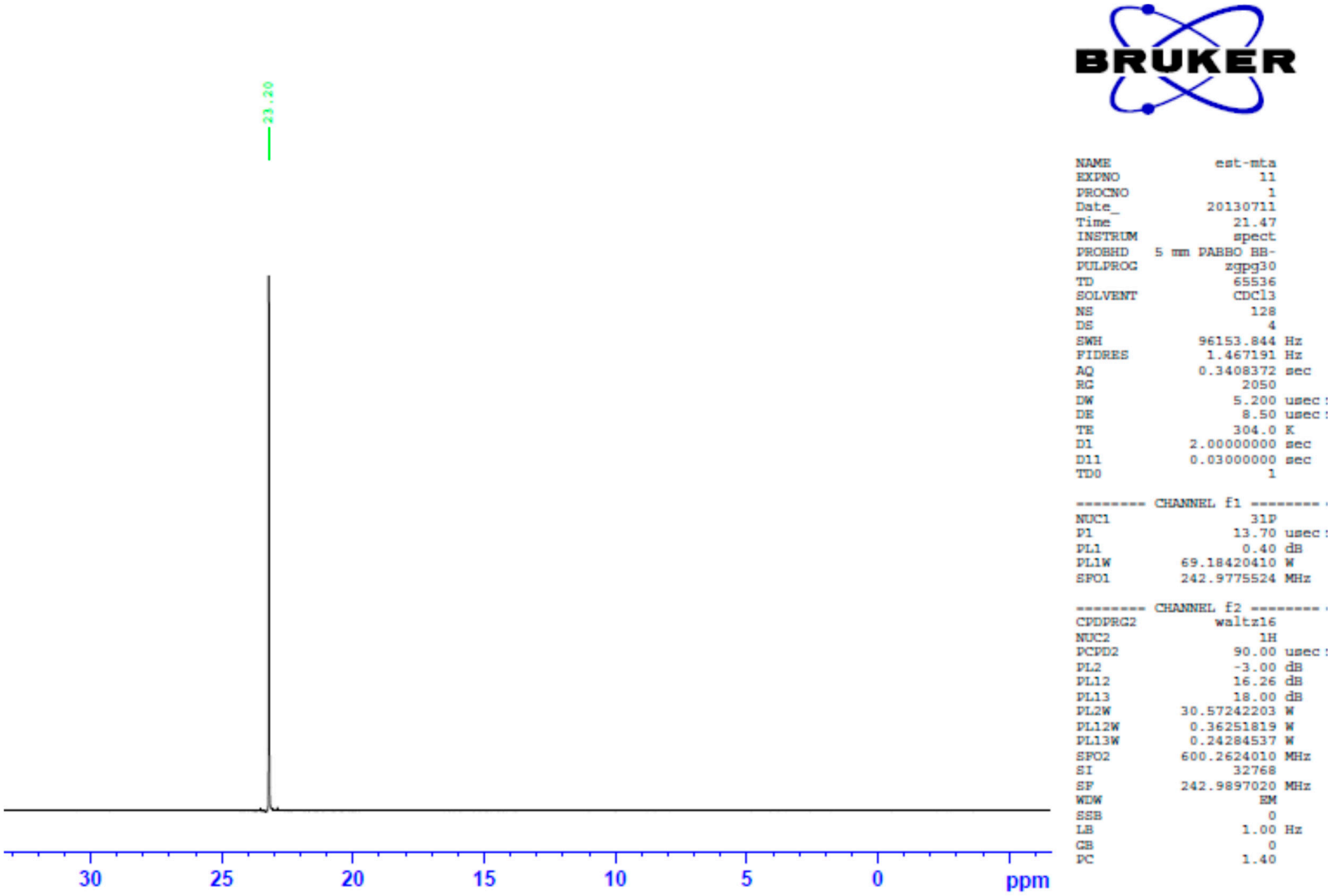

Figure S14. ^{31}P-NMR spectrum of dimethyl *N*-(3-methylphenyl)amino(2-thienyl)methylphosphonate (**2b**).

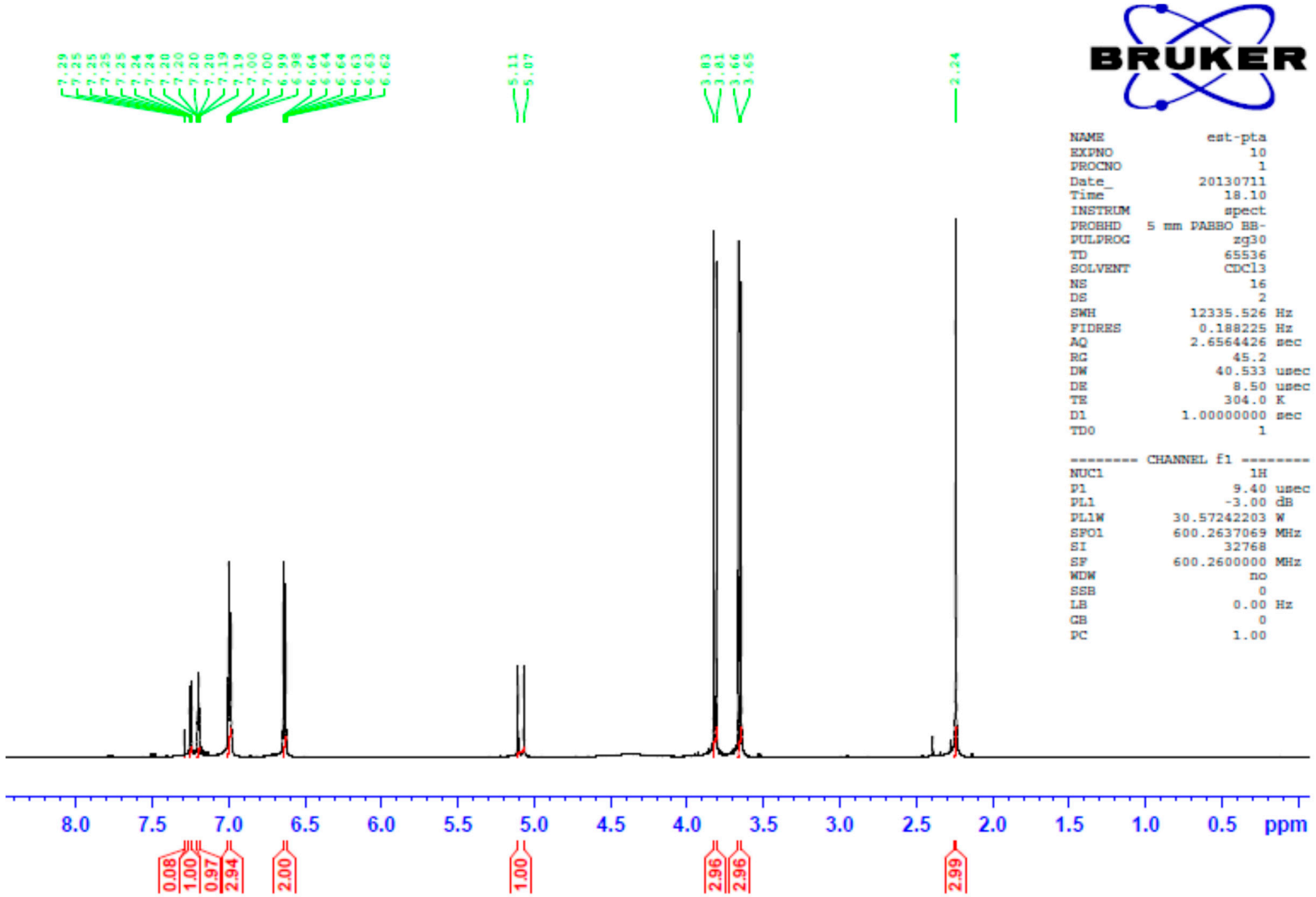

Figure S15. ^{1}H-NMR spectrum of dimethyl *N*-(4-methylphenyl)amino(2-thienyl)methylphosphonate (**2c**).

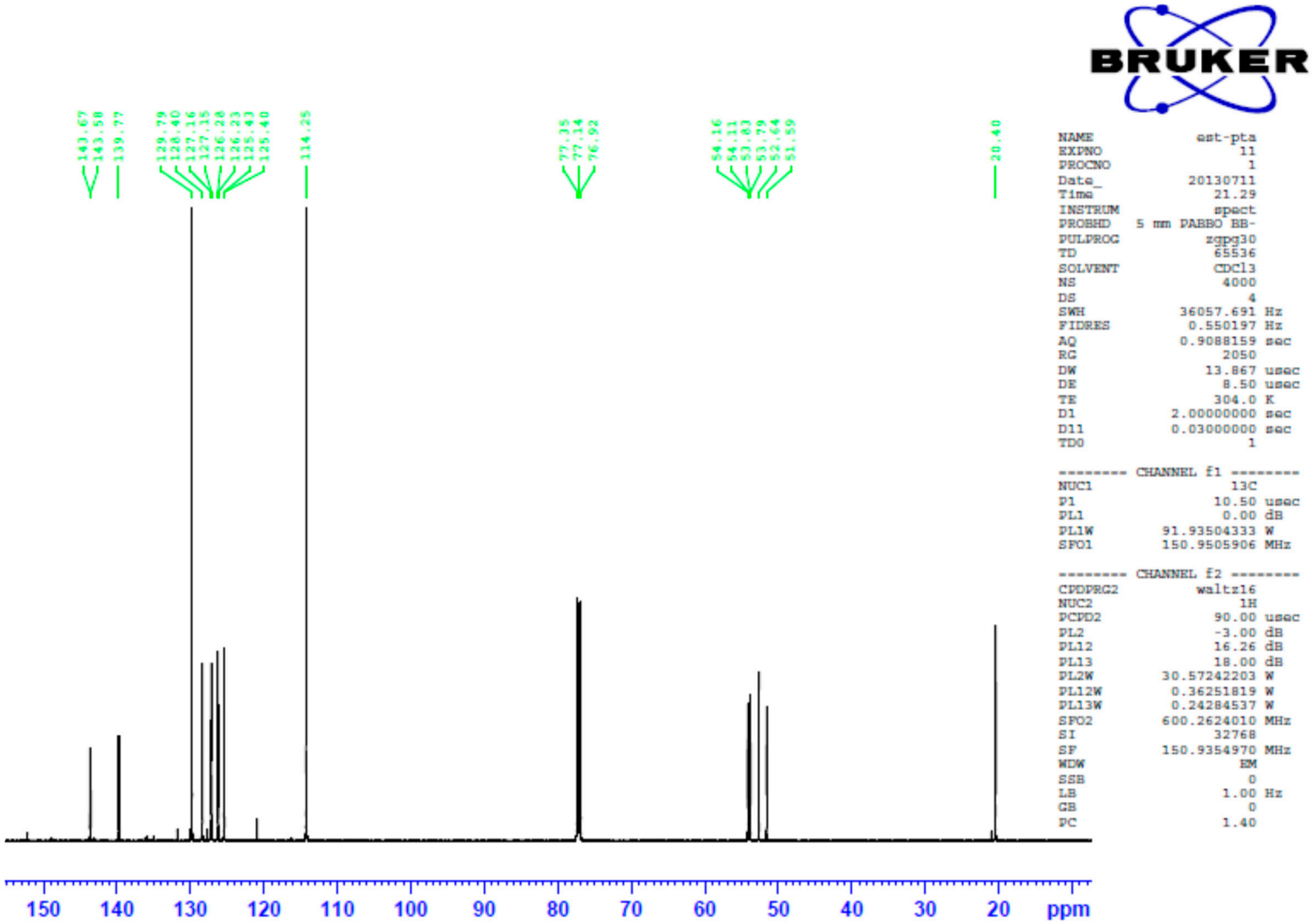

Figure S16. ^{13}C-NMR spectrum of dimethyl *N*-(4-methylphenyl)amino(2-thienyl)methylphosphonate (**2c**).

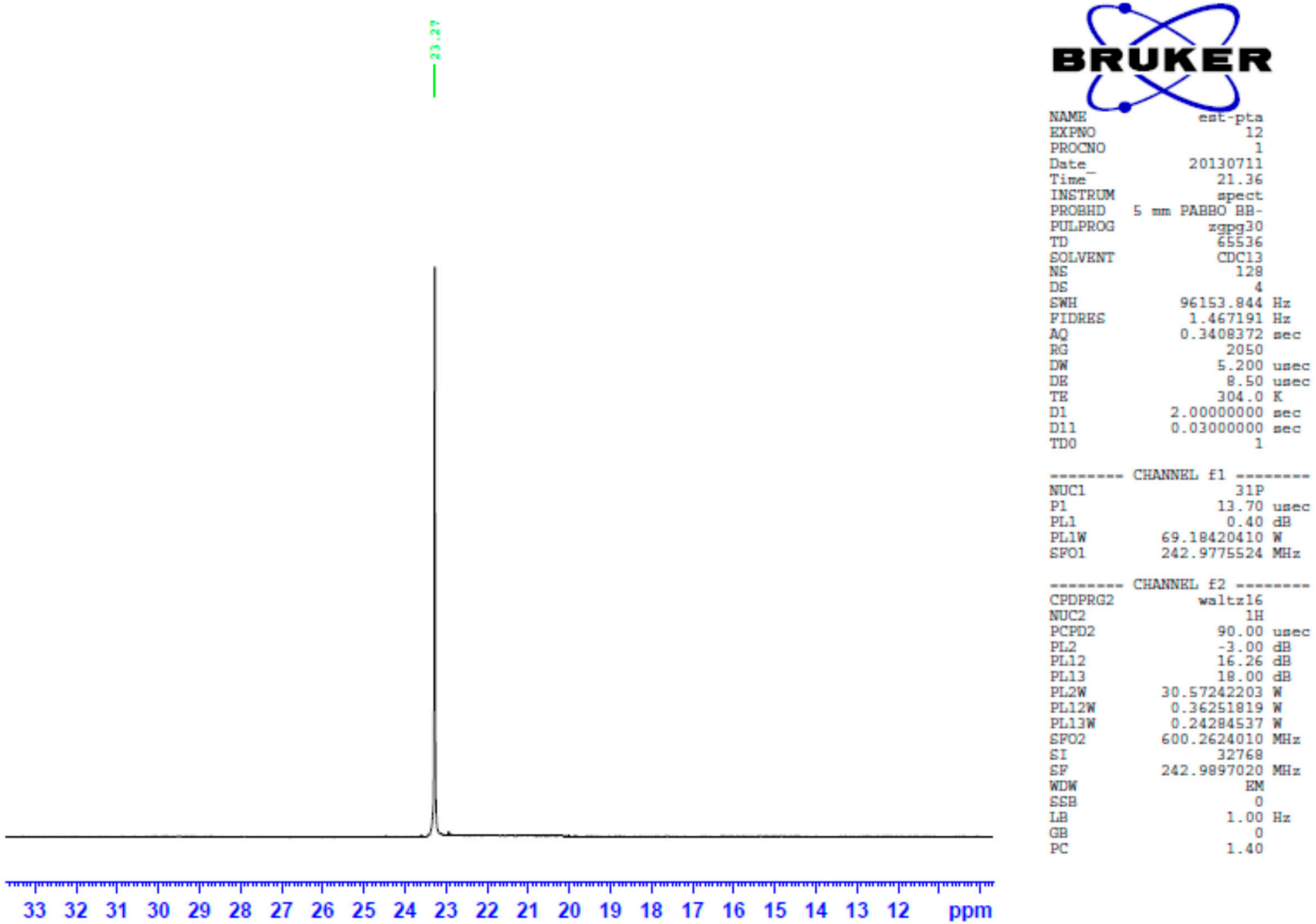

Figure S17. ^{31}P-NMR spectrum of dimethyl *N*-(4-methylphenyl)amino(2-thienyl)methylphosphonate (**2c**).

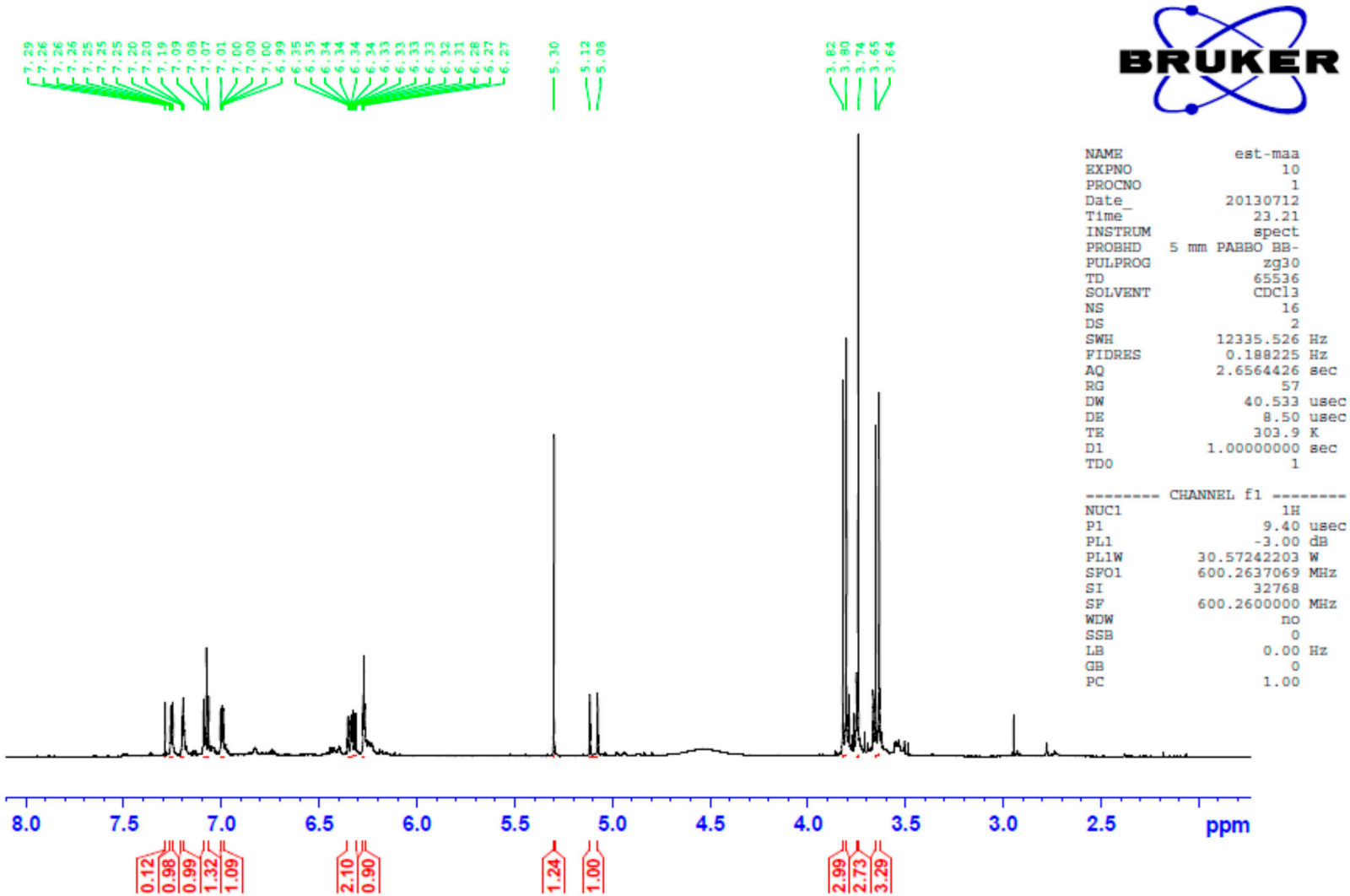

Figure S18. ^{1}H-NMR spectrum of dimethyl *N*-(3-methoxyphenyl)amino(2-thienyl)methylphosphonate (**2d**).

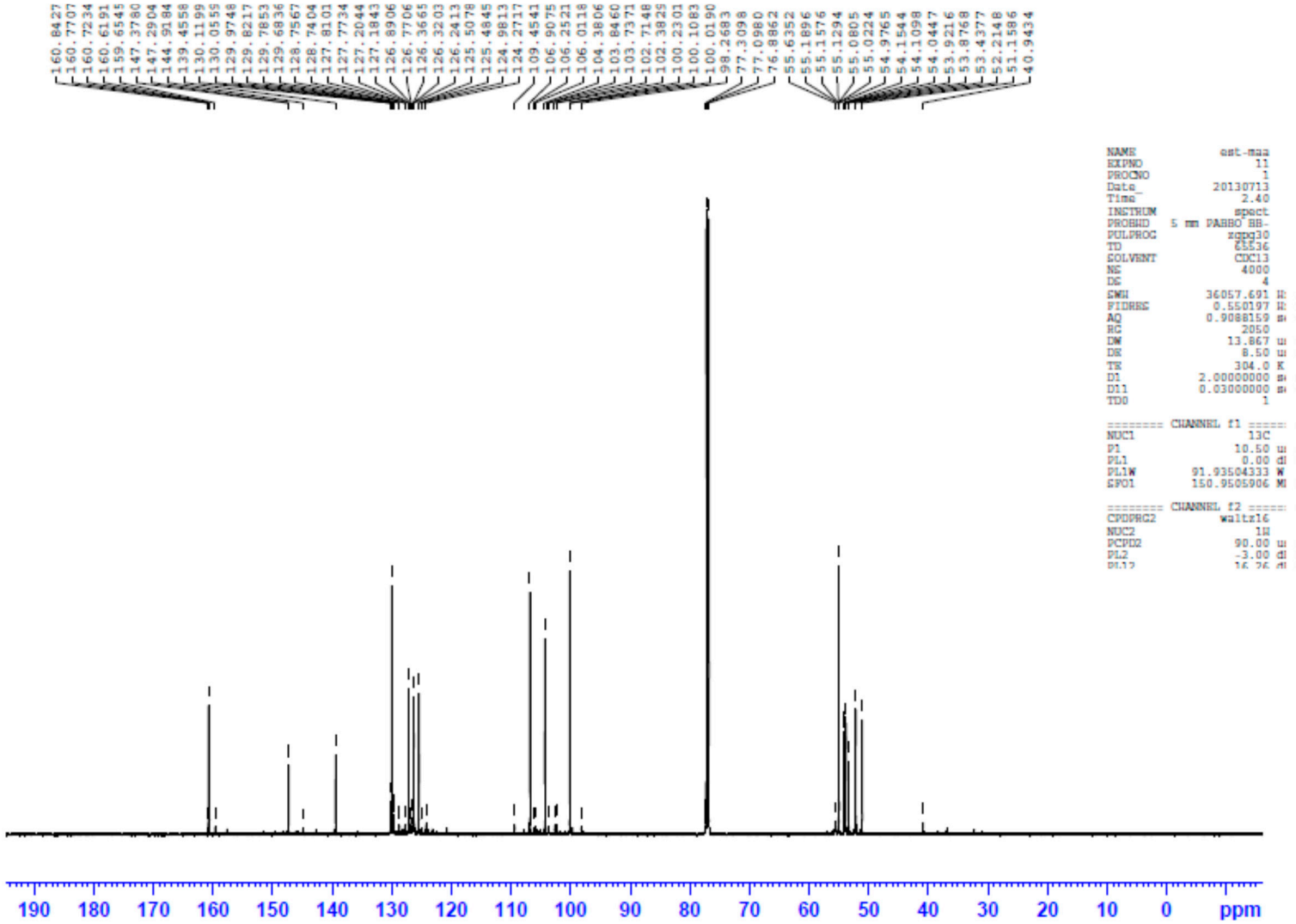

Figure S19. ^{13}C-NMR spectrum of dimethyl *N*-(3-methoxyphenyl)amino(2-thienyl)methylphosphonate (**2d**).

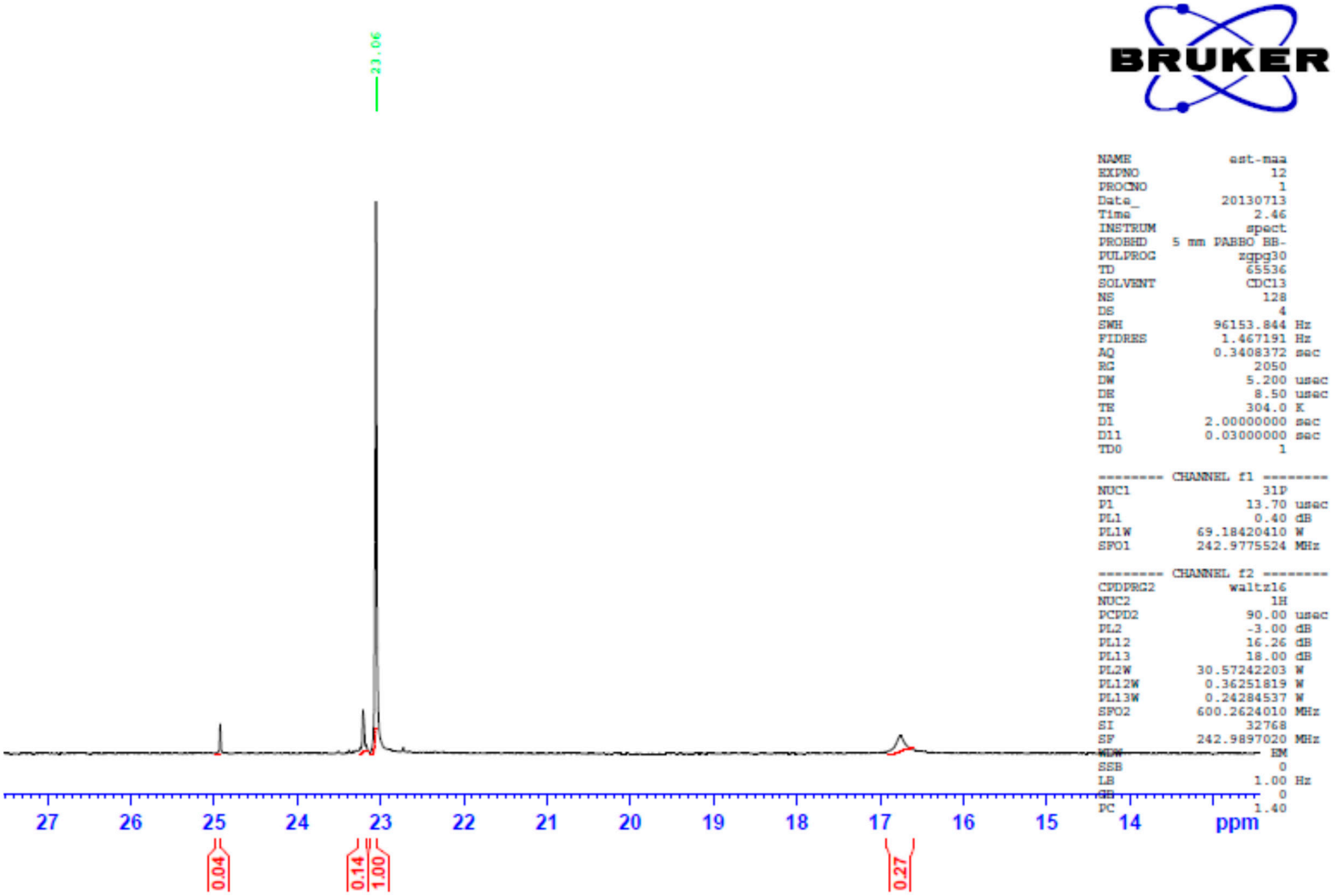

Figure S20. ^{31}P-NMR spectrum of dimethyl *N*-(3-methoxyphenyl)amino(2-thienyl)methylphosphonate (**2d**).

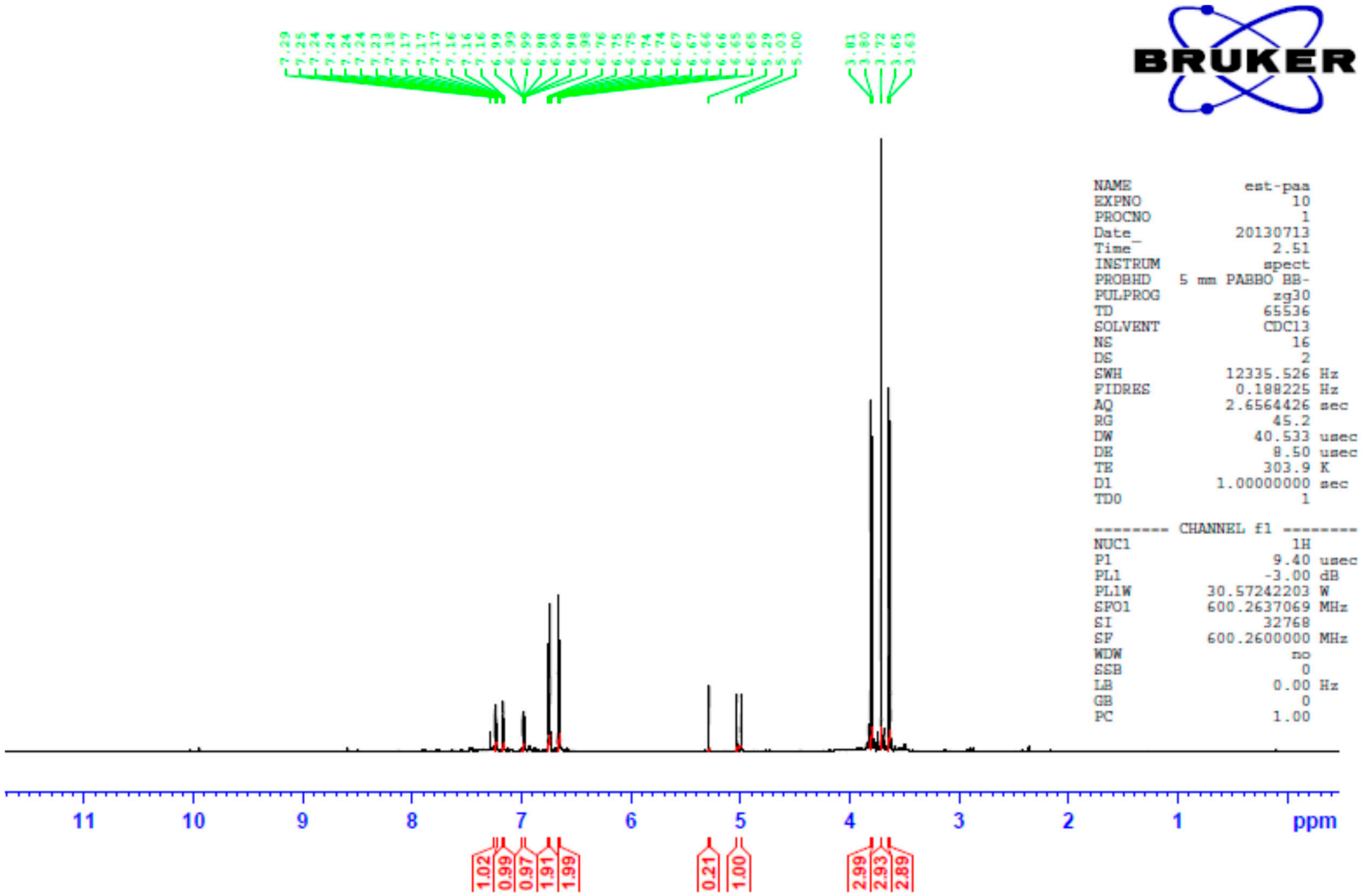

Figure S21. ^{1}H-NMR spectrum of dimethyl *N*-(4-methoxyphenyl)amino(2-thienyl)methylphosphonate (**2e**).

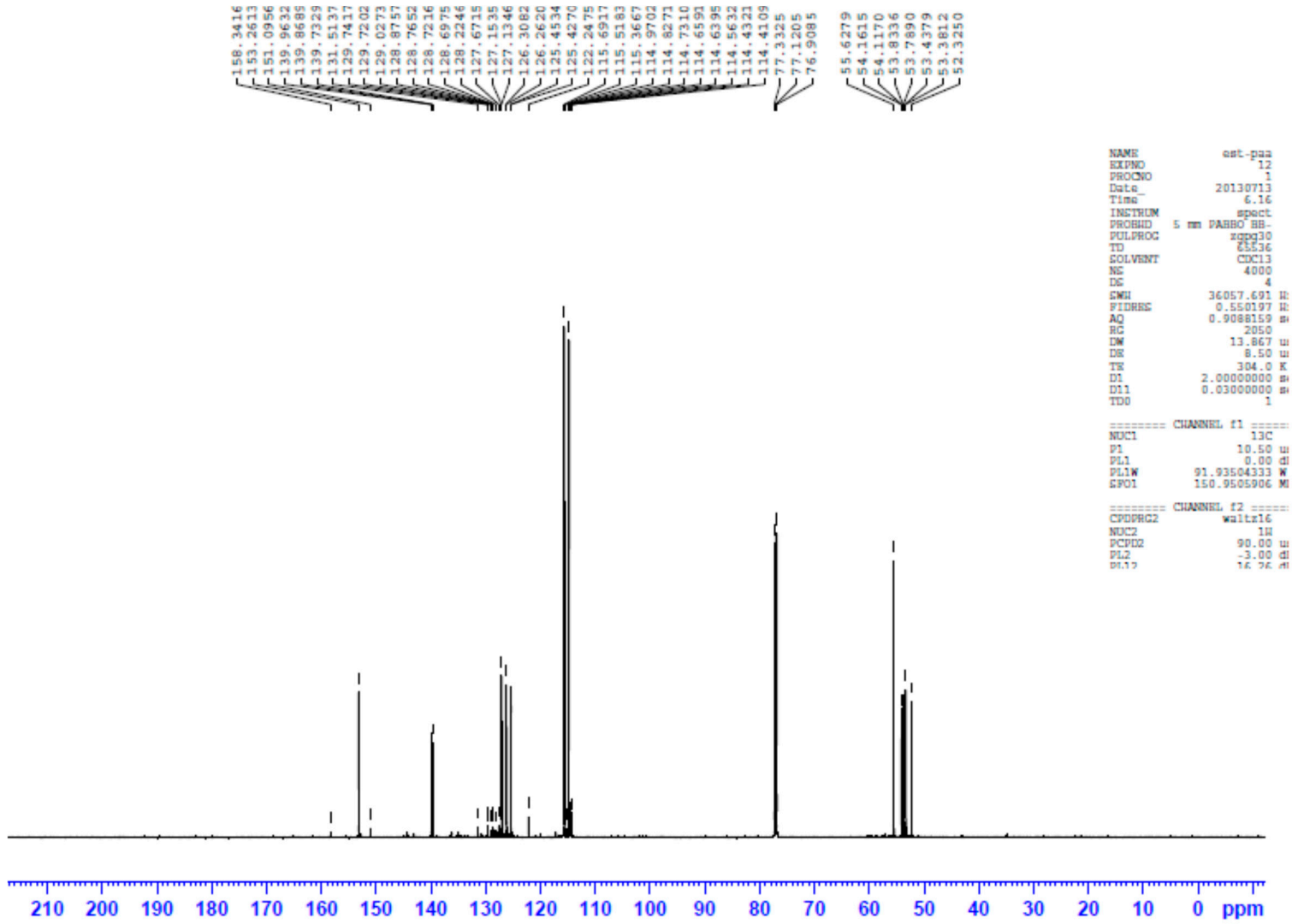

Figure S22. ^{13}C-NMR spectrum of dimethyl *N*-(4-methoxyphenyl)amino(2-thienyl)methylphosphonate **(2e).**

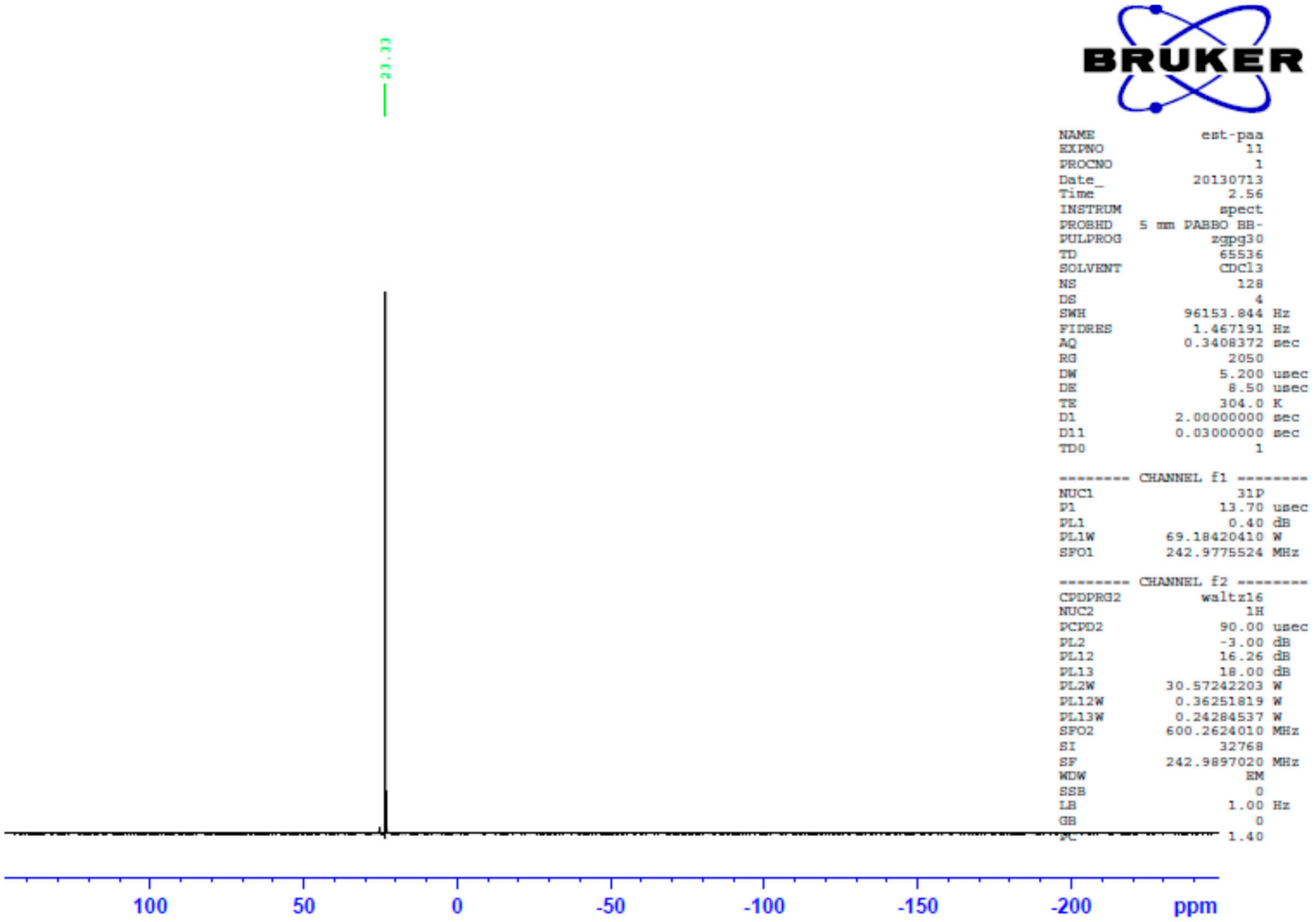

Figure S23. ^{31}P-NMR spectrum of dimethyl *N*-(4-methoxyphenyl)amino(2-thienyl)methylphosphonate (**2e**).

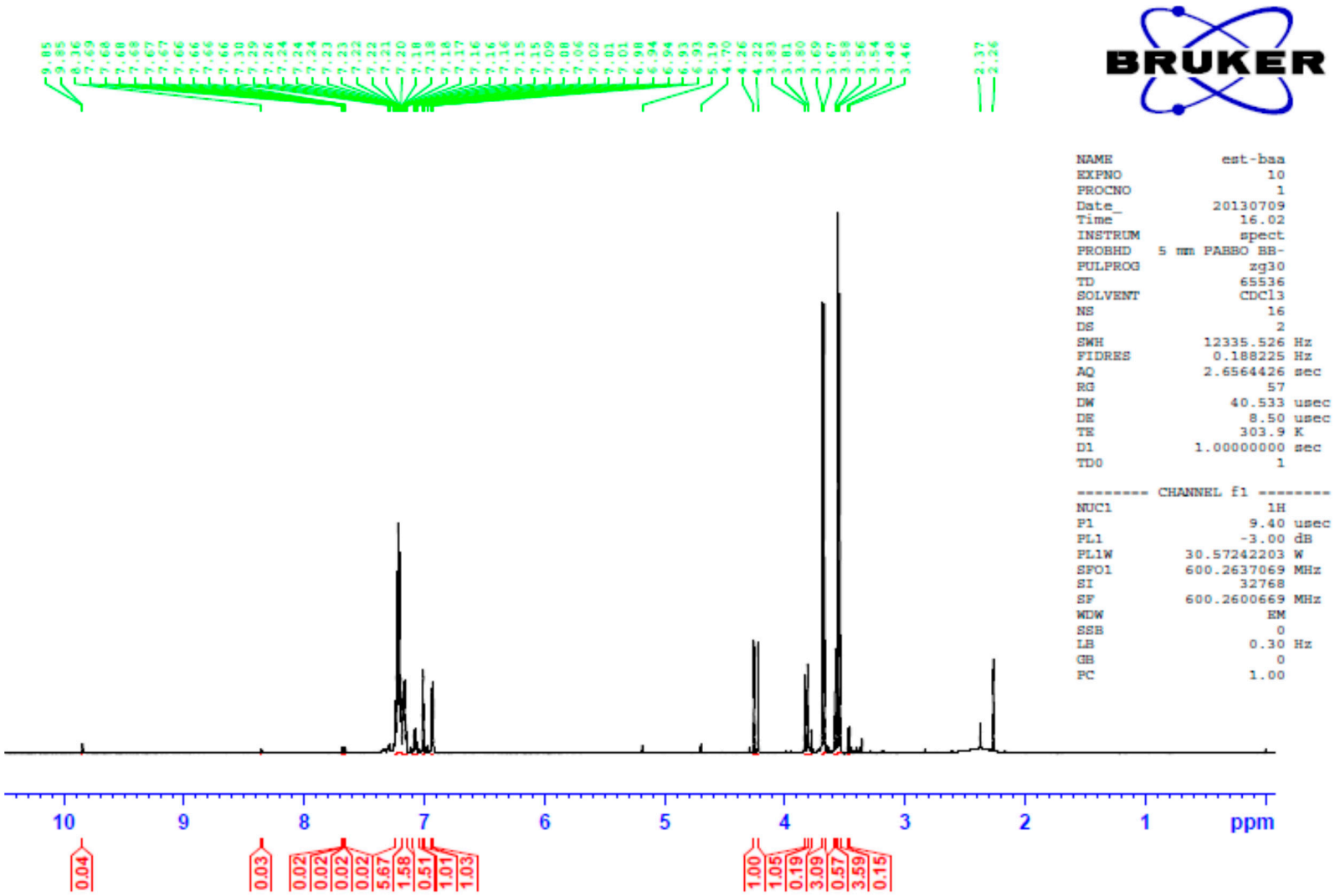

Figure S24. ^{1}H-NMR spectrum of dimethyl *N*-benzylamino(2-thienyl)methylphosphonate (**2f**).

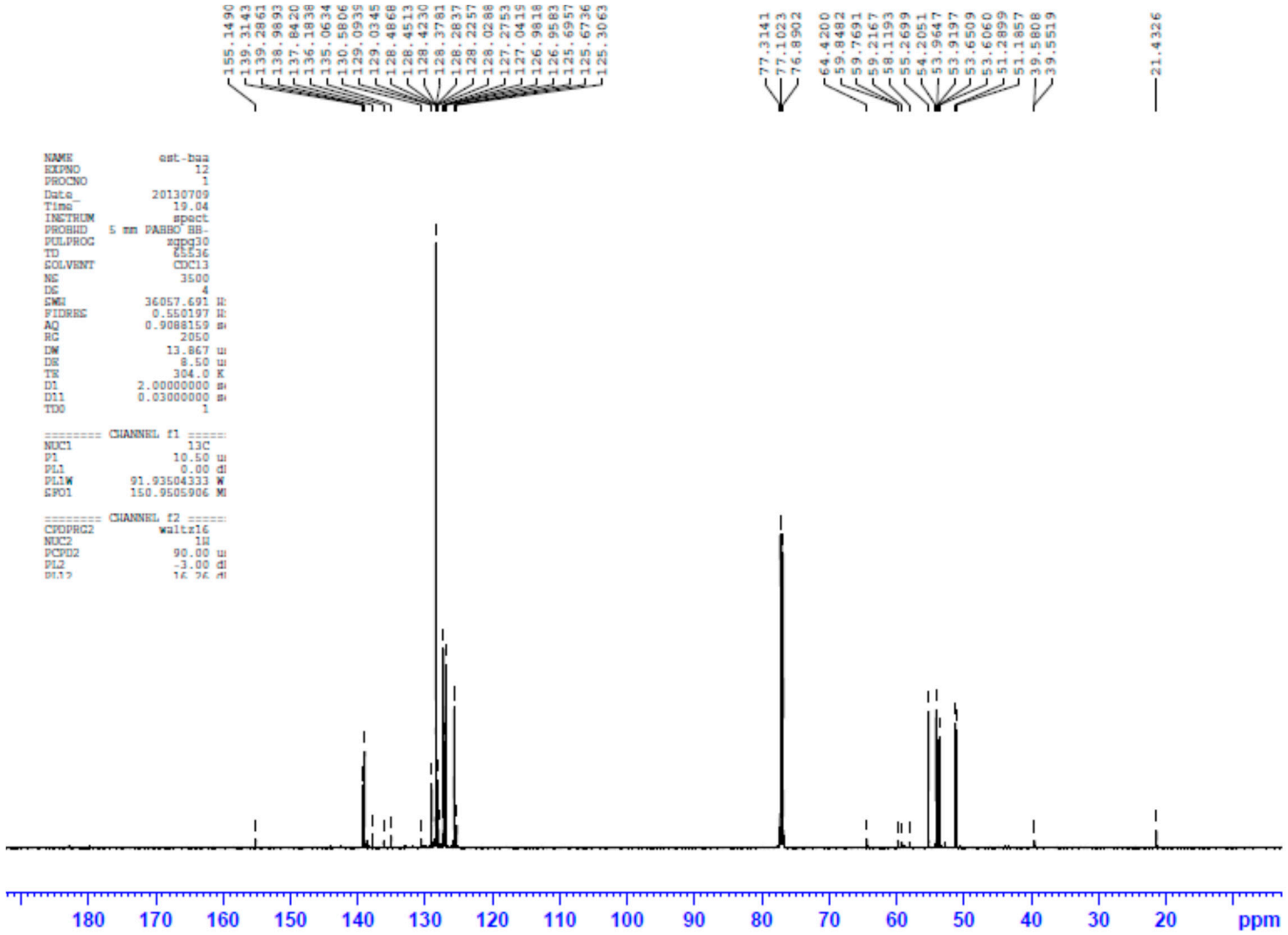

Figure S25. ^{13}C-NMR spectrum of dimethyl *N*-benzylamino(2-thienyl)methylphosphonate (**2f**).

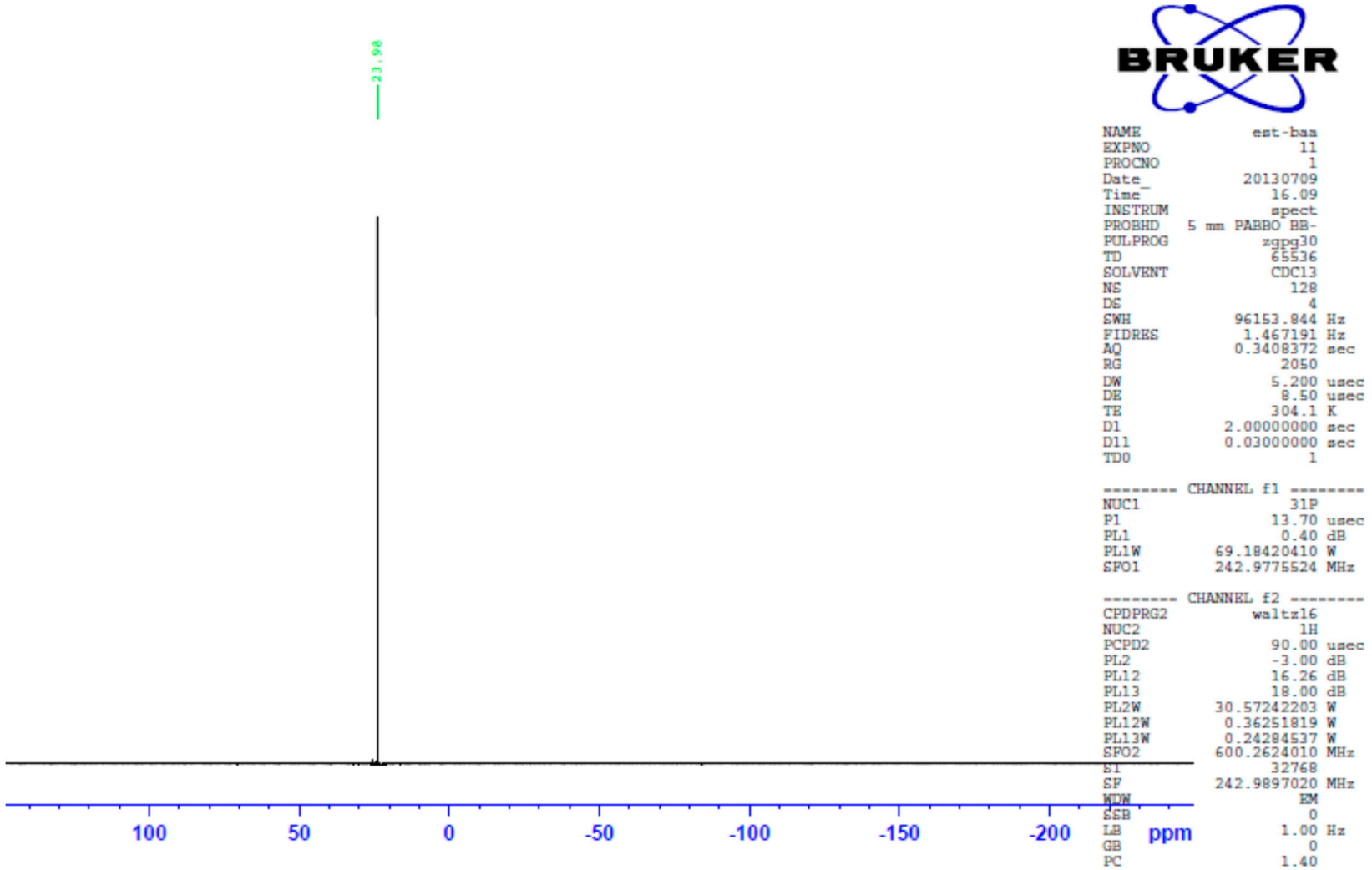

Figure S26. ^{31}P-NMR spectrum of dimethyl *N*-benzylamino(2-thienyl)methylphosphonate (**2f**).

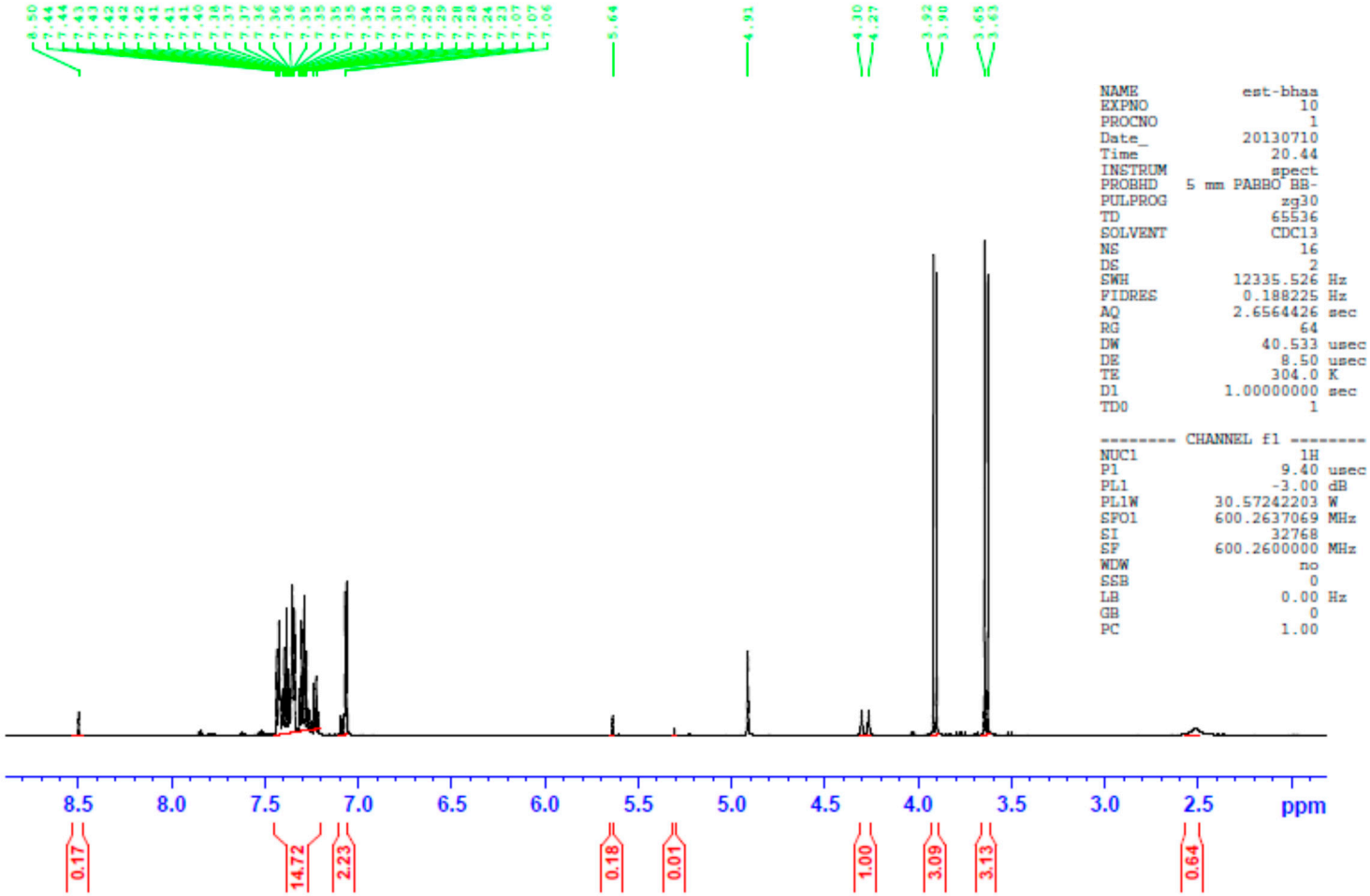

Figure S27. ^{1}H-NMR spectrum of dimethyl *N*-benzhydrylamino(2-thienyl)methylphosphonate (**2g**).

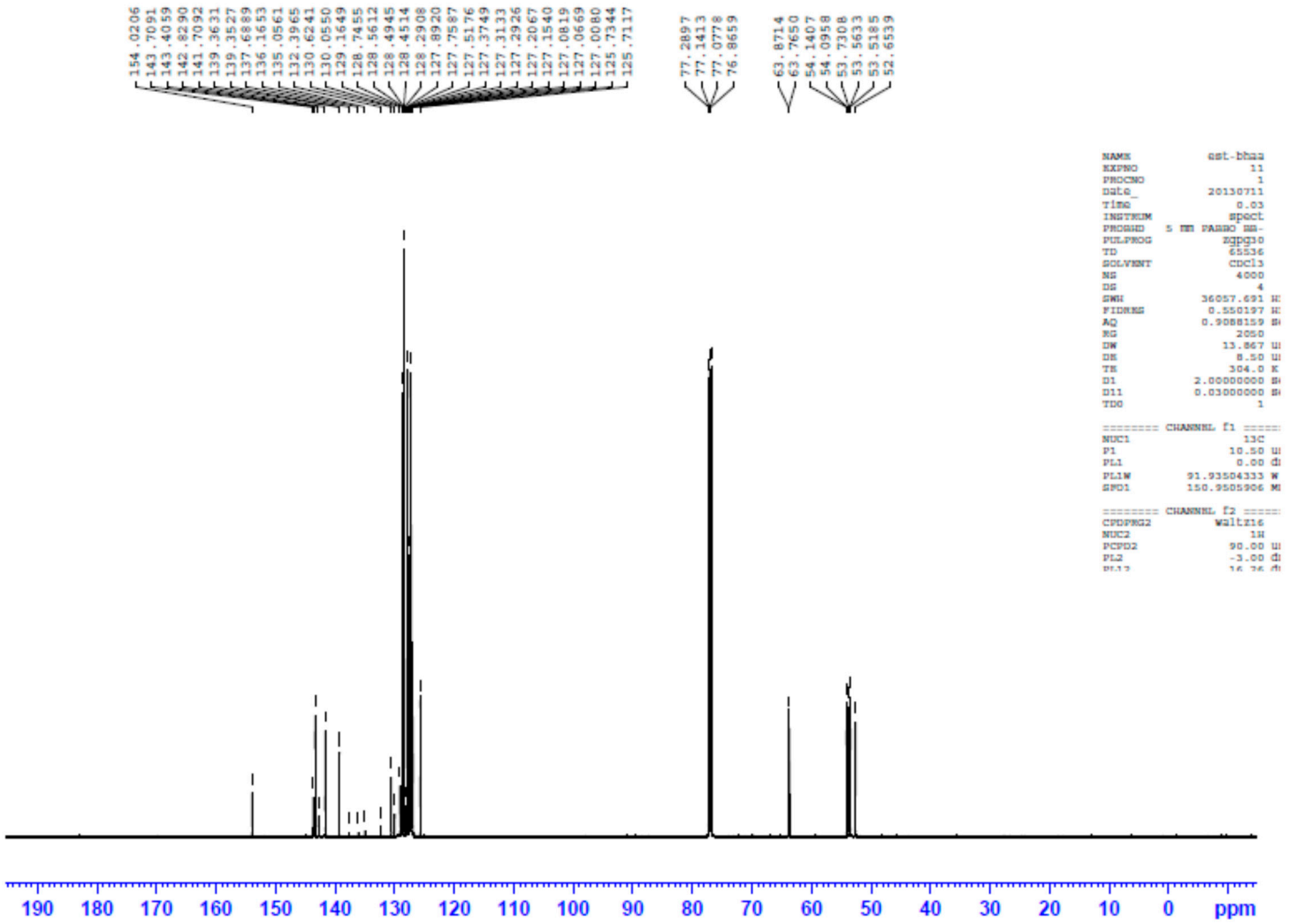

Figure S28. ^{13}C-NMR spectrum of dimethyl *N*-benzhydrylamino(2-thienyl)methylphosphonate (**2g**).

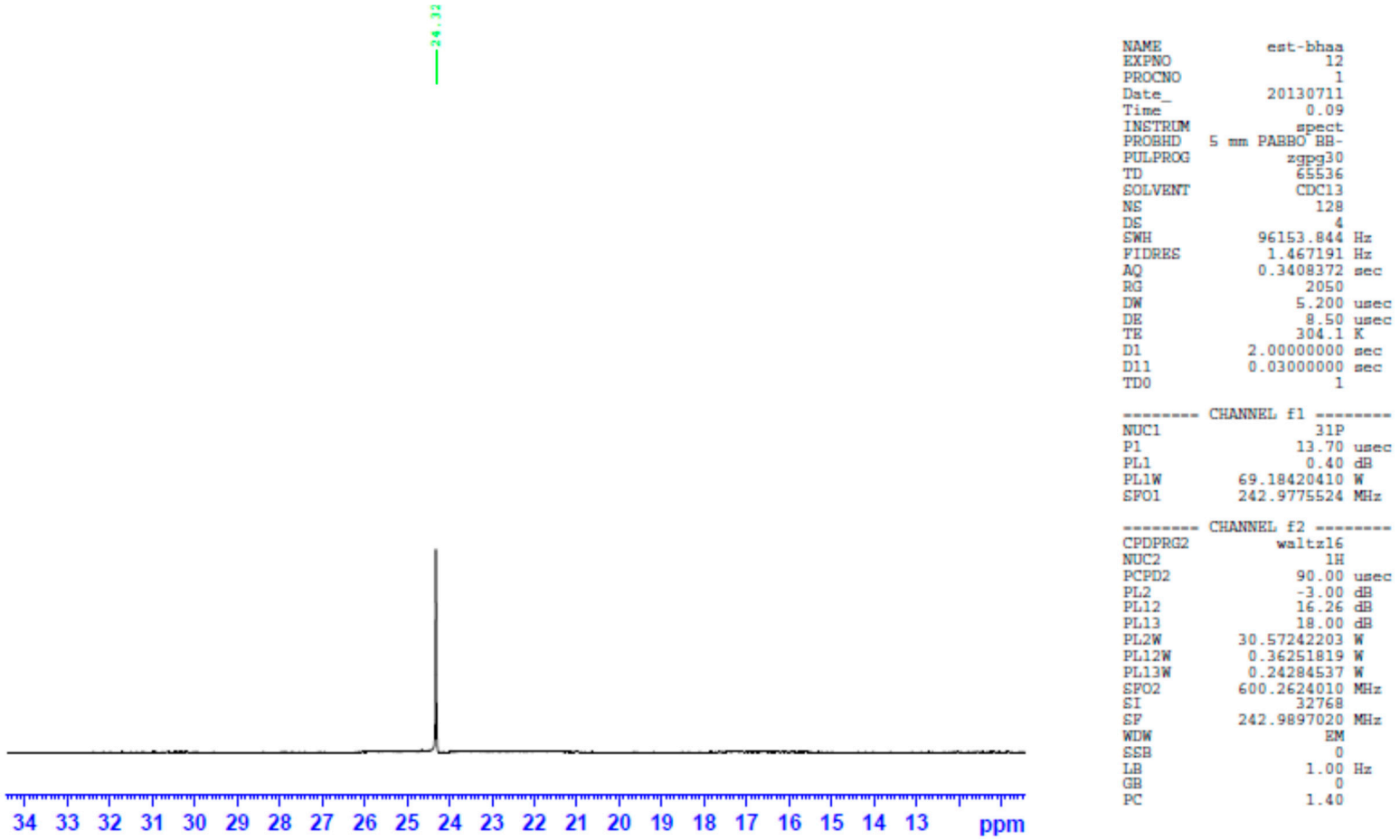

Figure S29. ^{31}P-NMR spectrum of dimethyl *N*-benzhydrylamino(2-thienyl)methylphosphonate (**2g**).

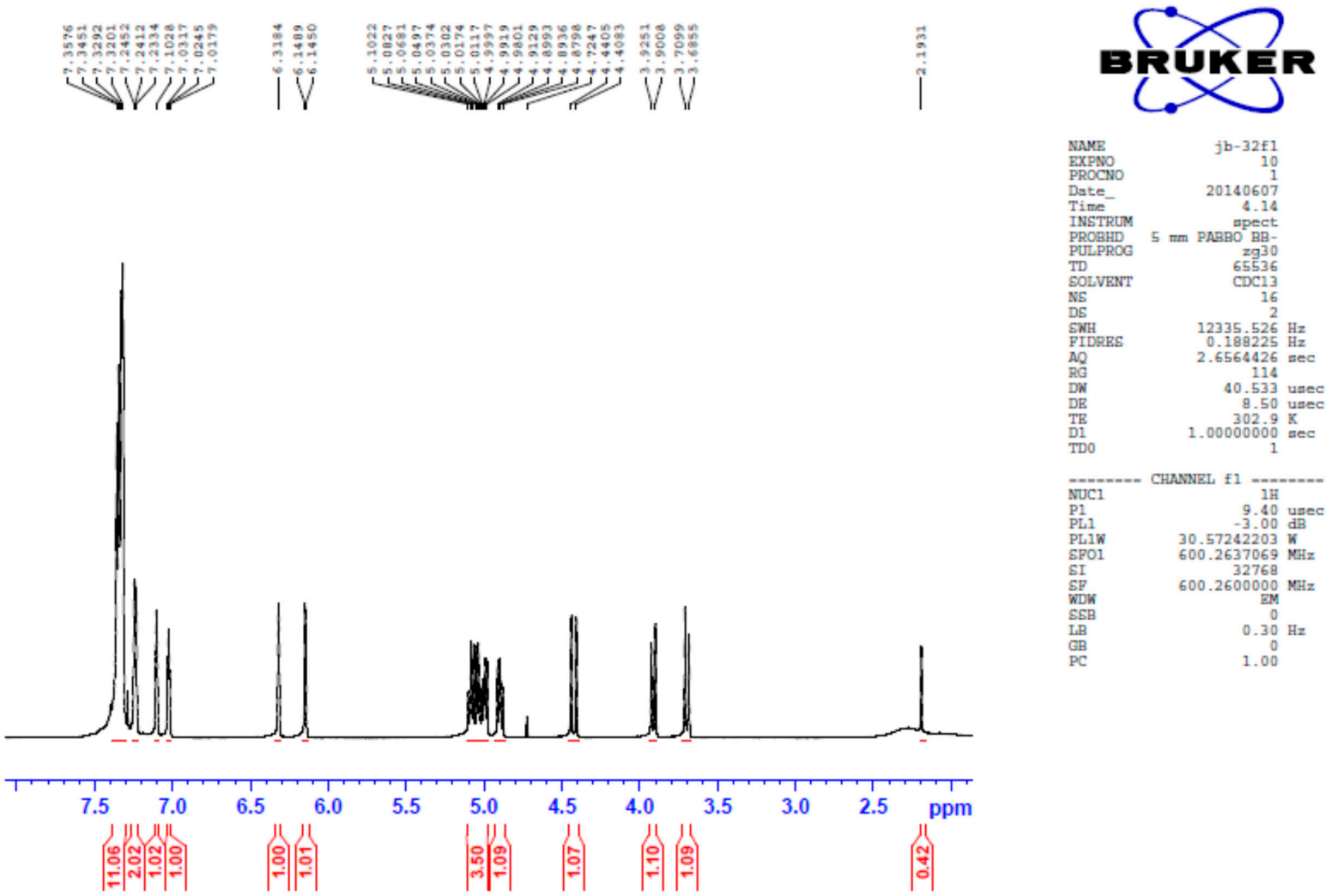

Figure S30. ^{1}H-NMR spectrum of dibenzyl *N*-furfurylamino(2-thienyl)methylphosphonate (**2h**).

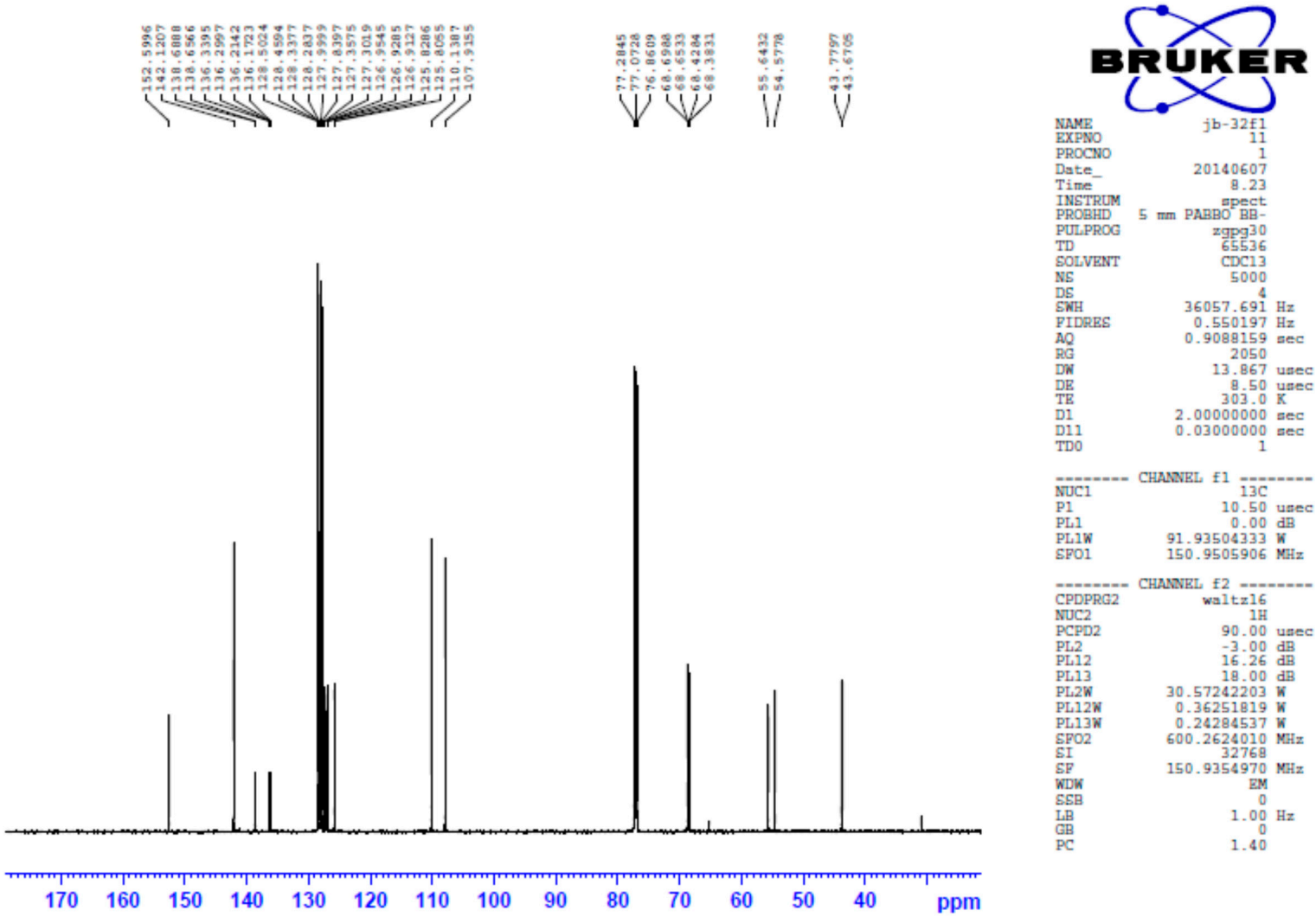

Figure S31. ^{13}C-NMR spectrum of dibenzyl *N*-furfurylamino(2-thienyl)methylphosphonate (**2h**).

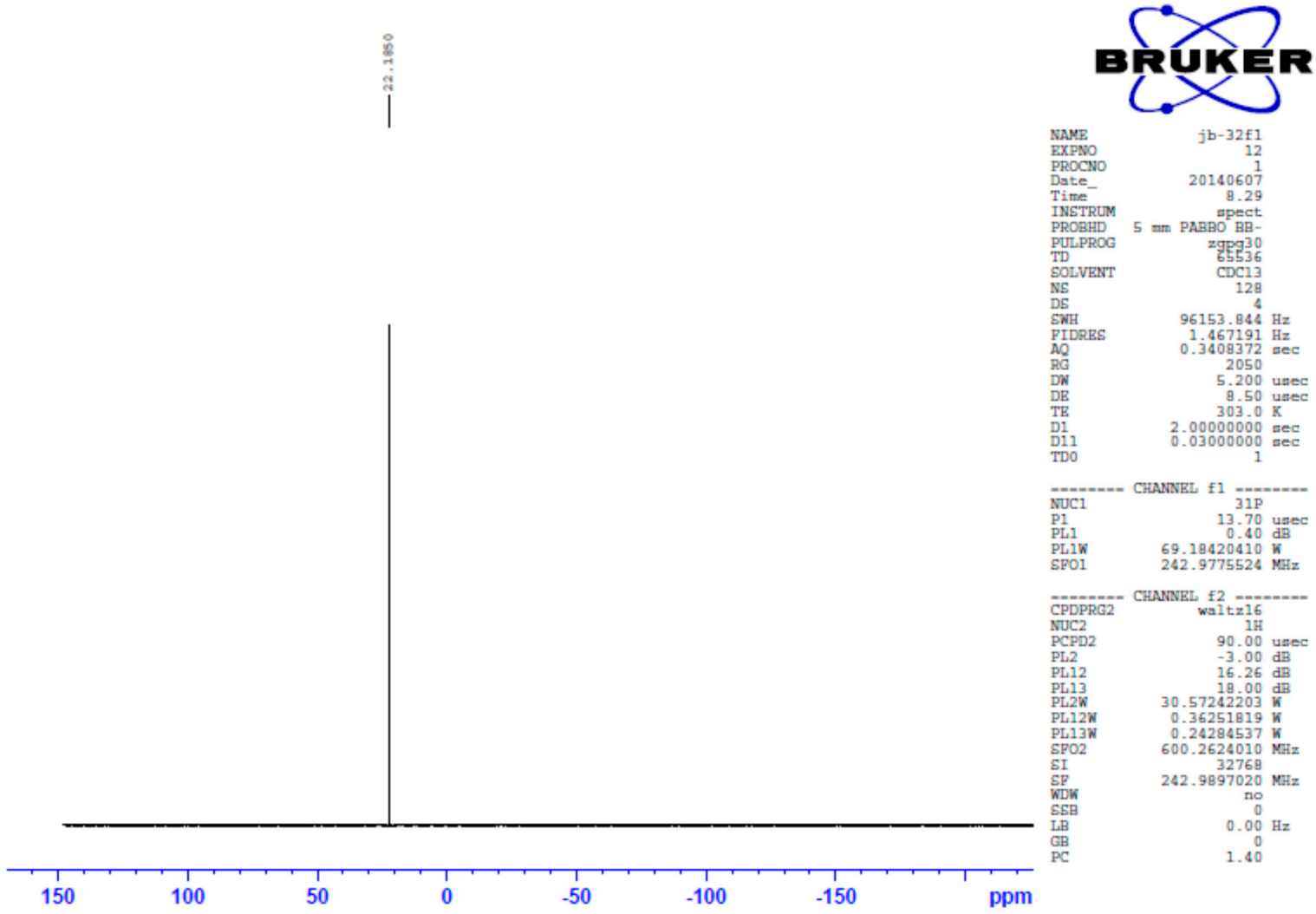

Figure S32. ^{31}P-NMR spectrum of dibenzyl *N*-furfurylamino(2-thienyl)methylphosphonate (**2h**).