

Sn(II)-mediated facile approach for the synthesis of 2-aryl-2H-indazole-3-phosphonates and their anticancer activity

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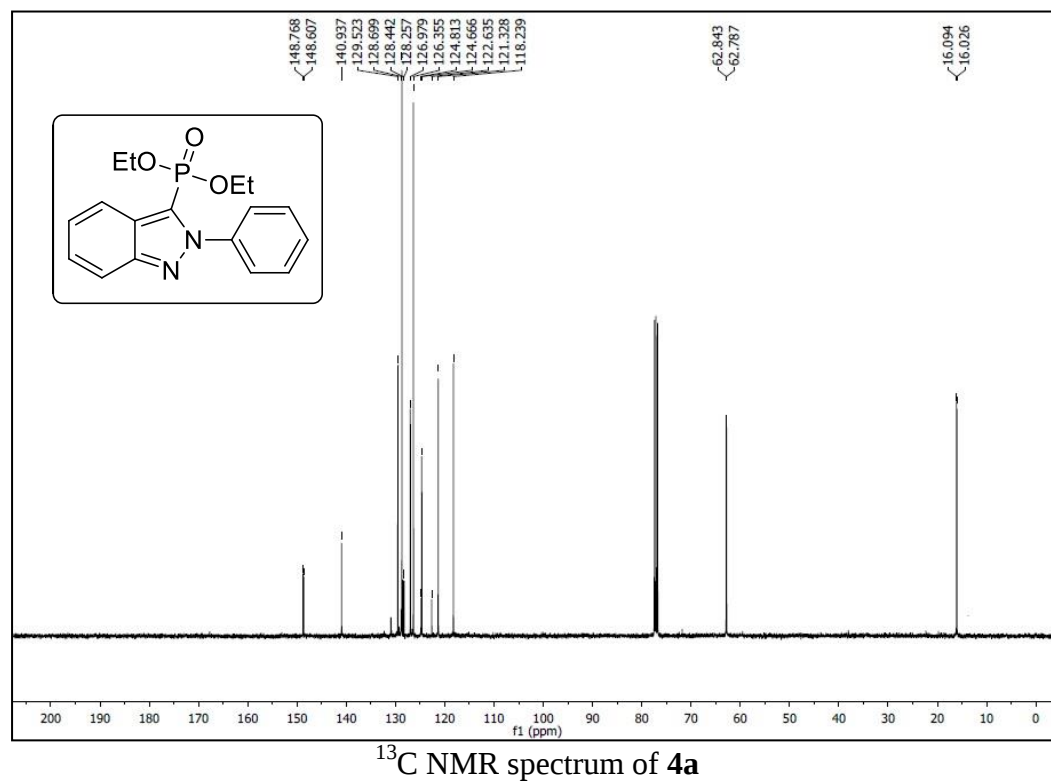
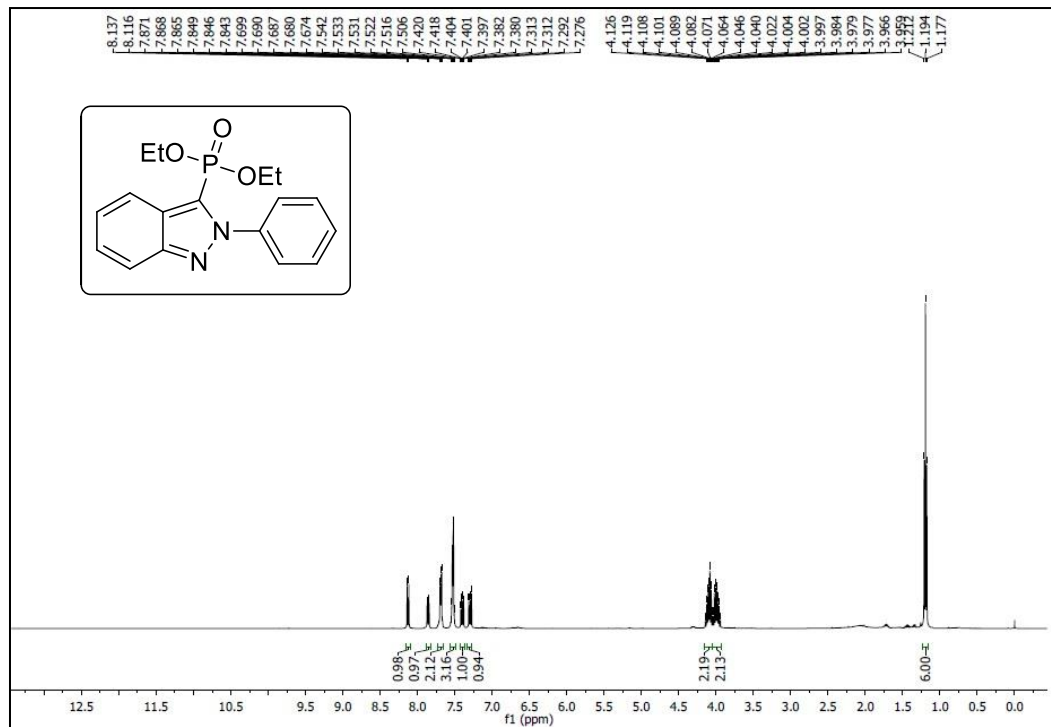
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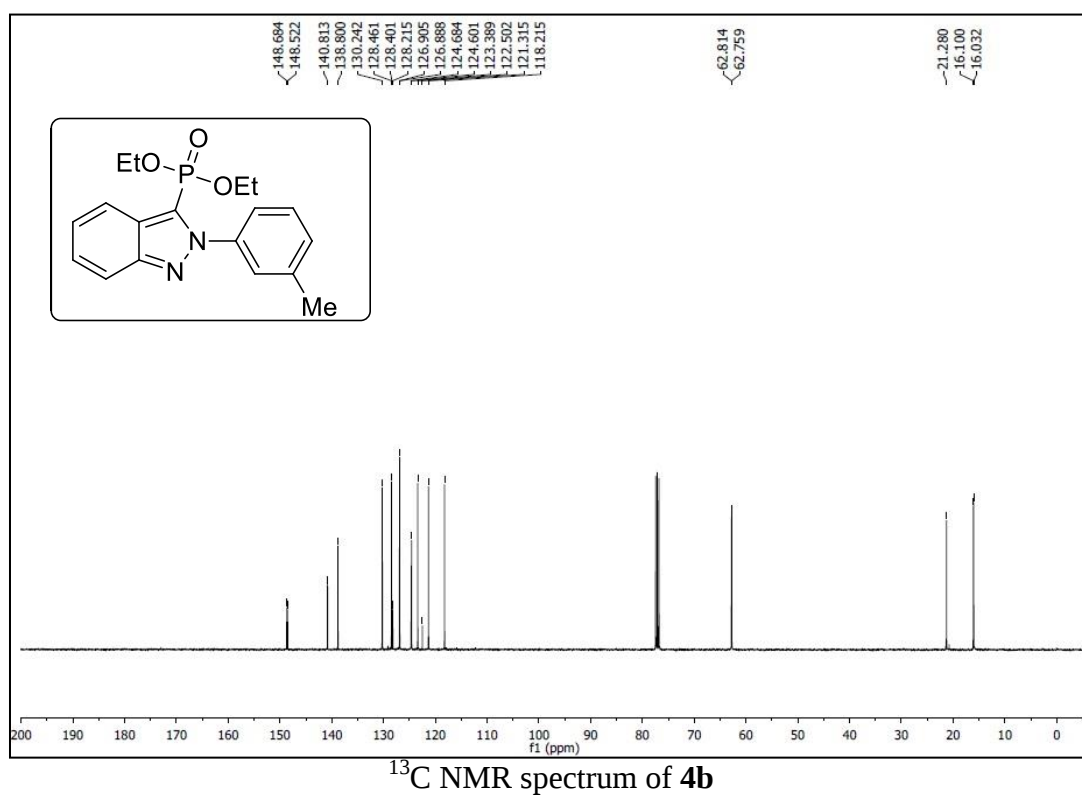
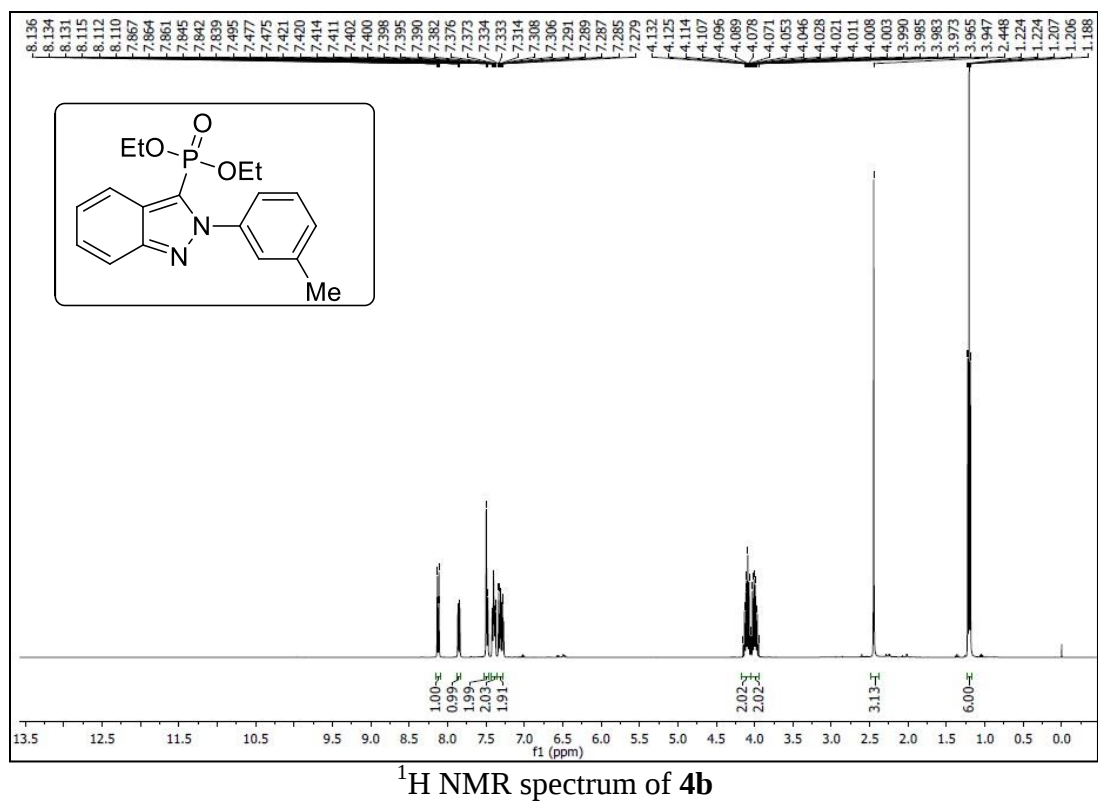
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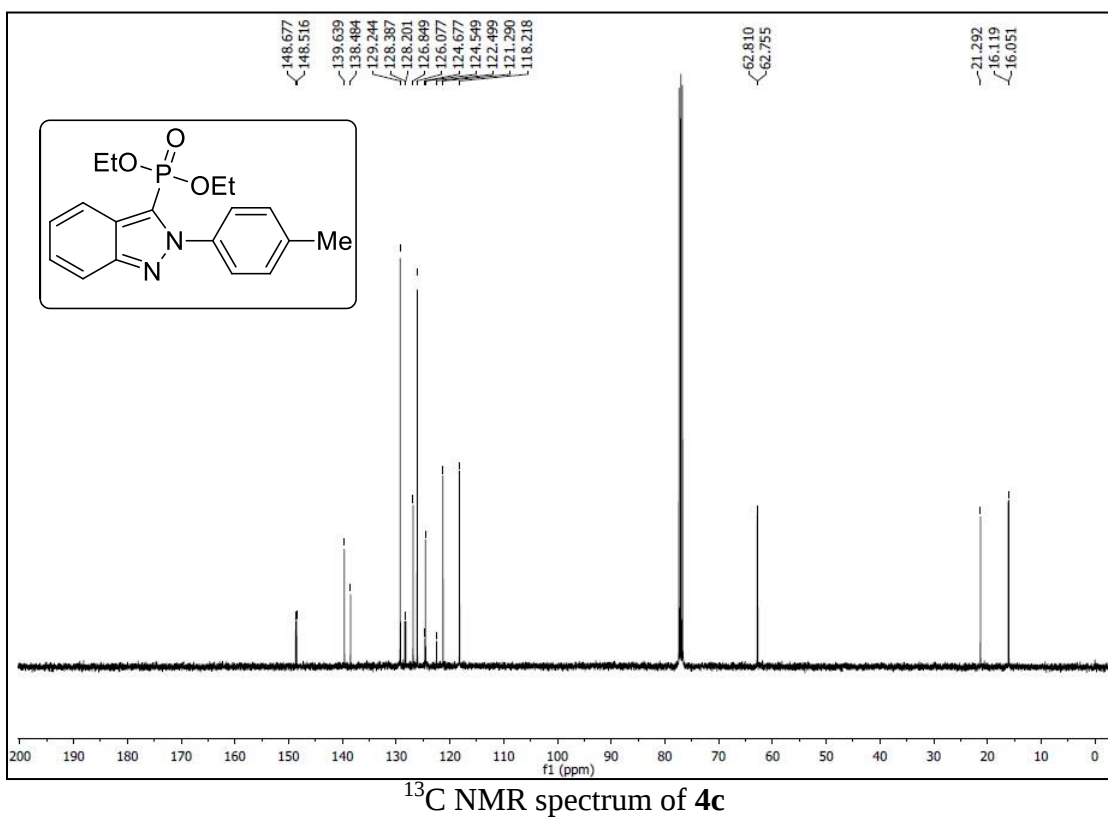
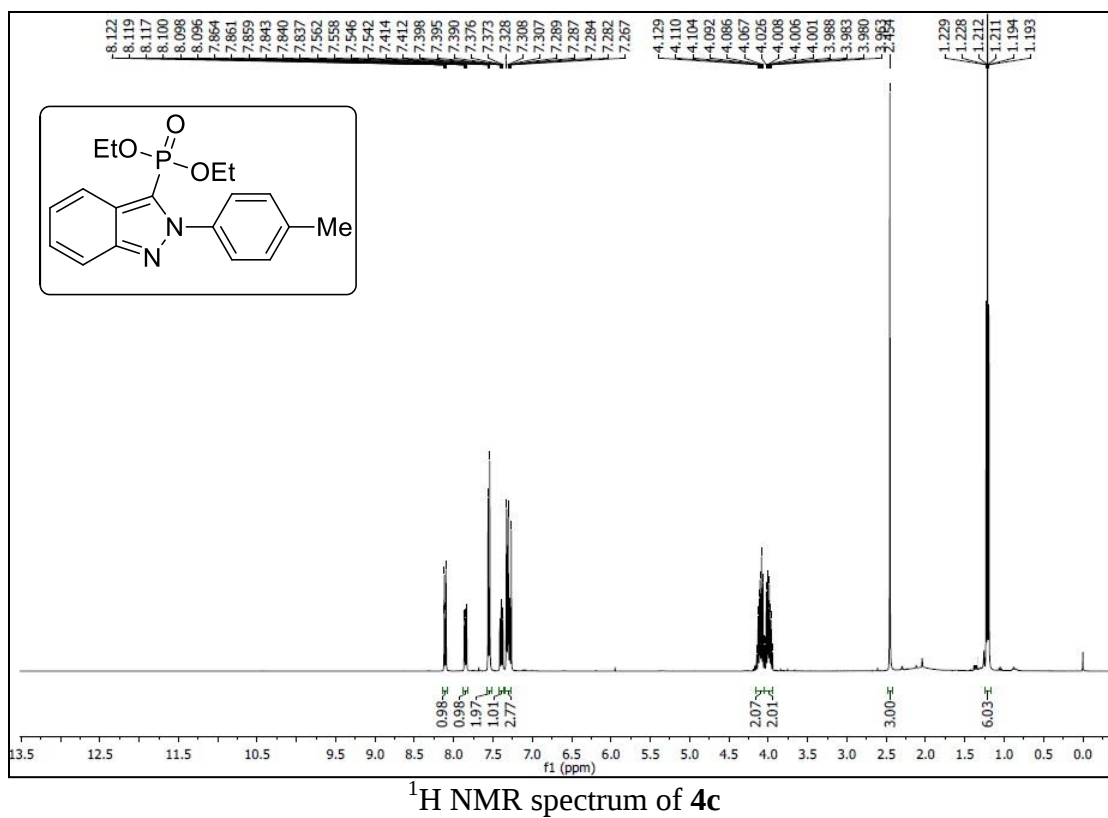
Fax: +91 44 24911589. E-mail: ptperumal@gmail.com

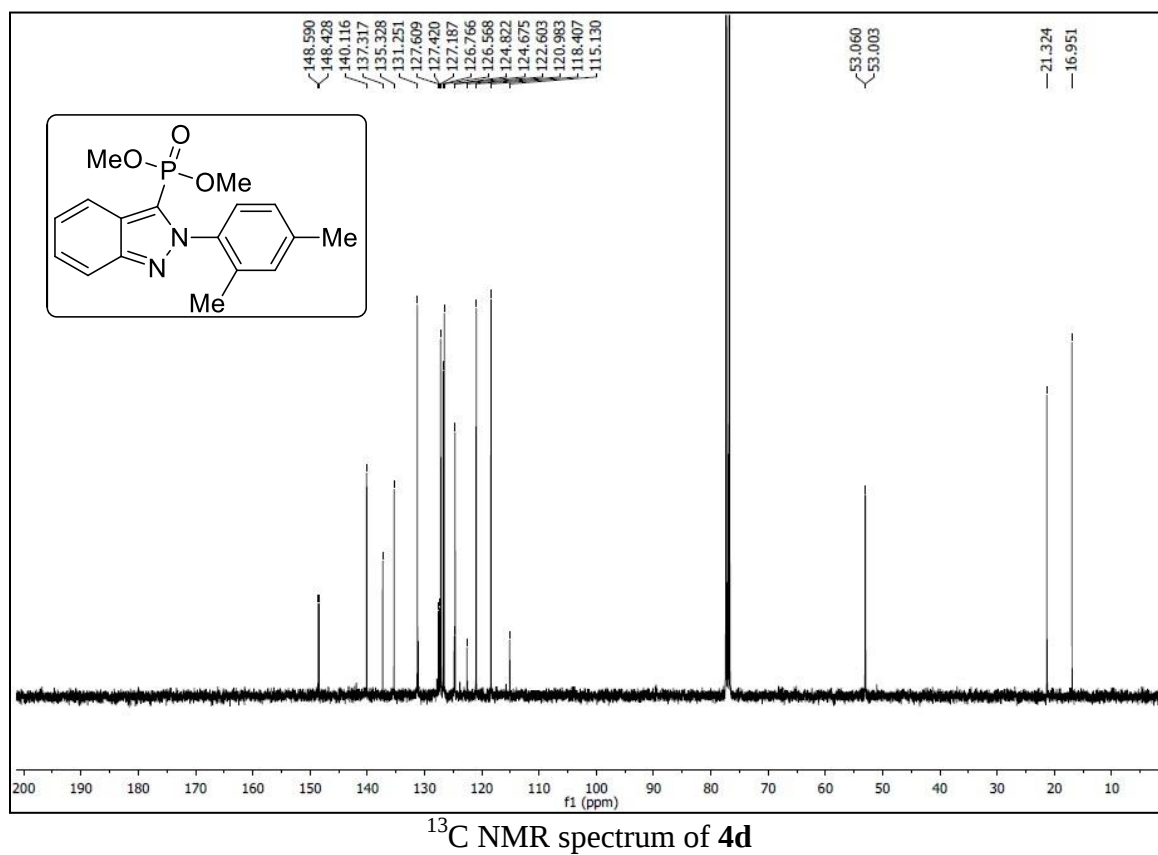
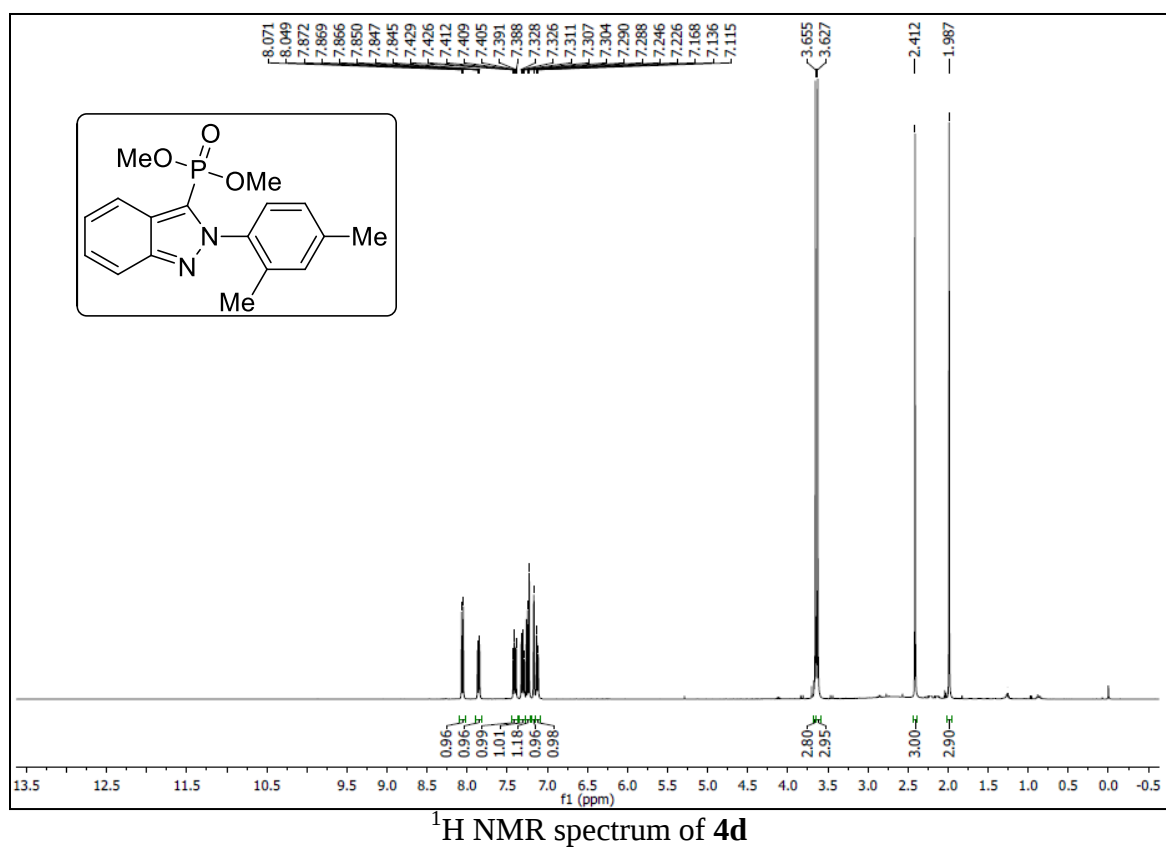
Supplementary material

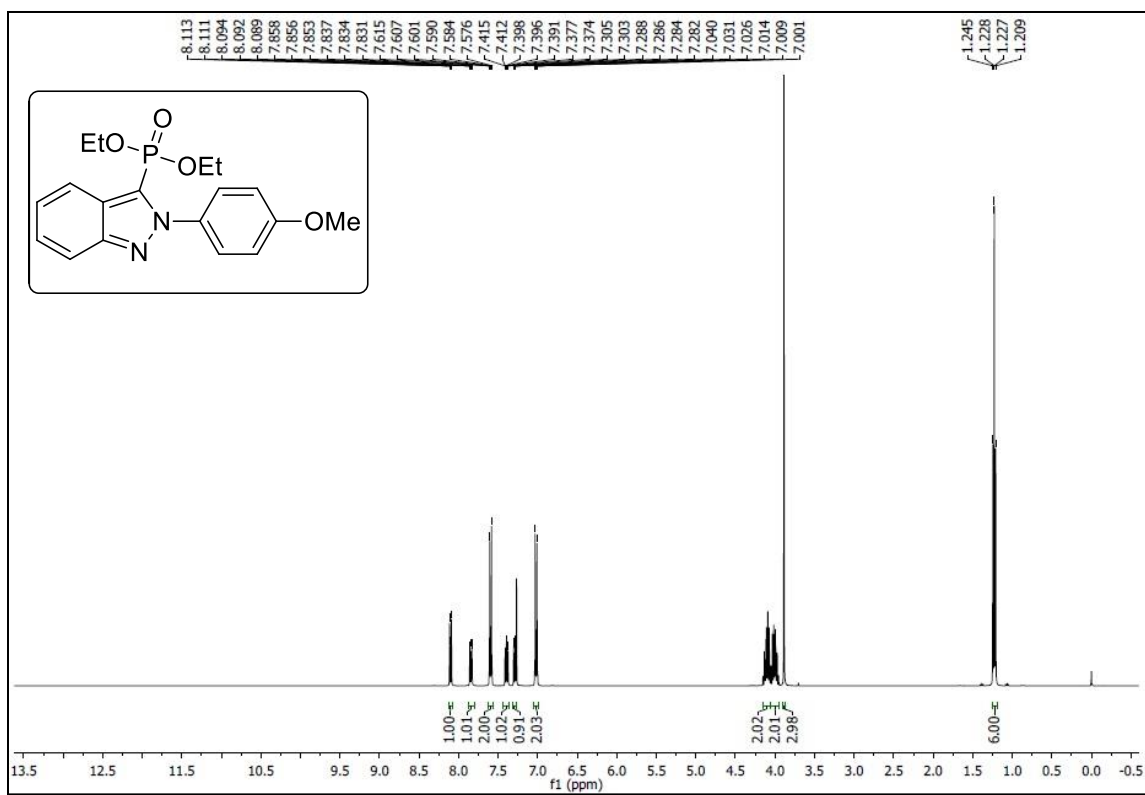
^1H , ^{13}C and ^{31}P NMR spectra of prepared compounds



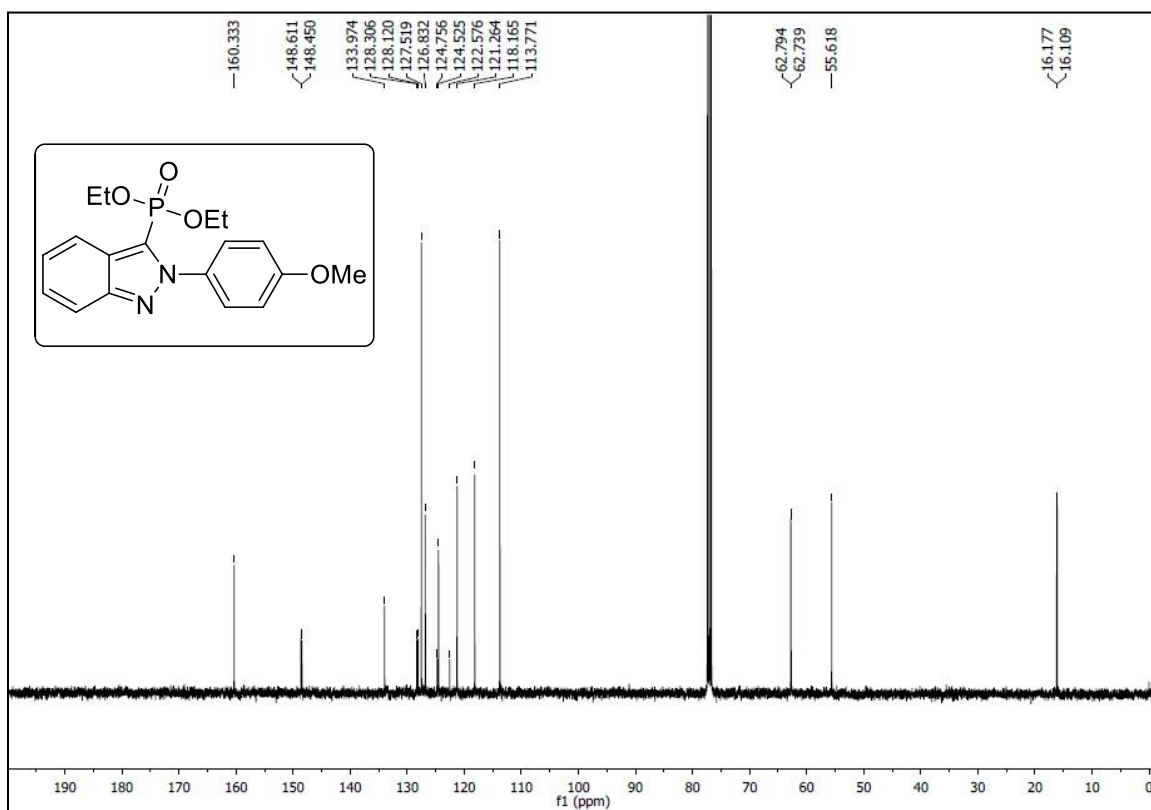




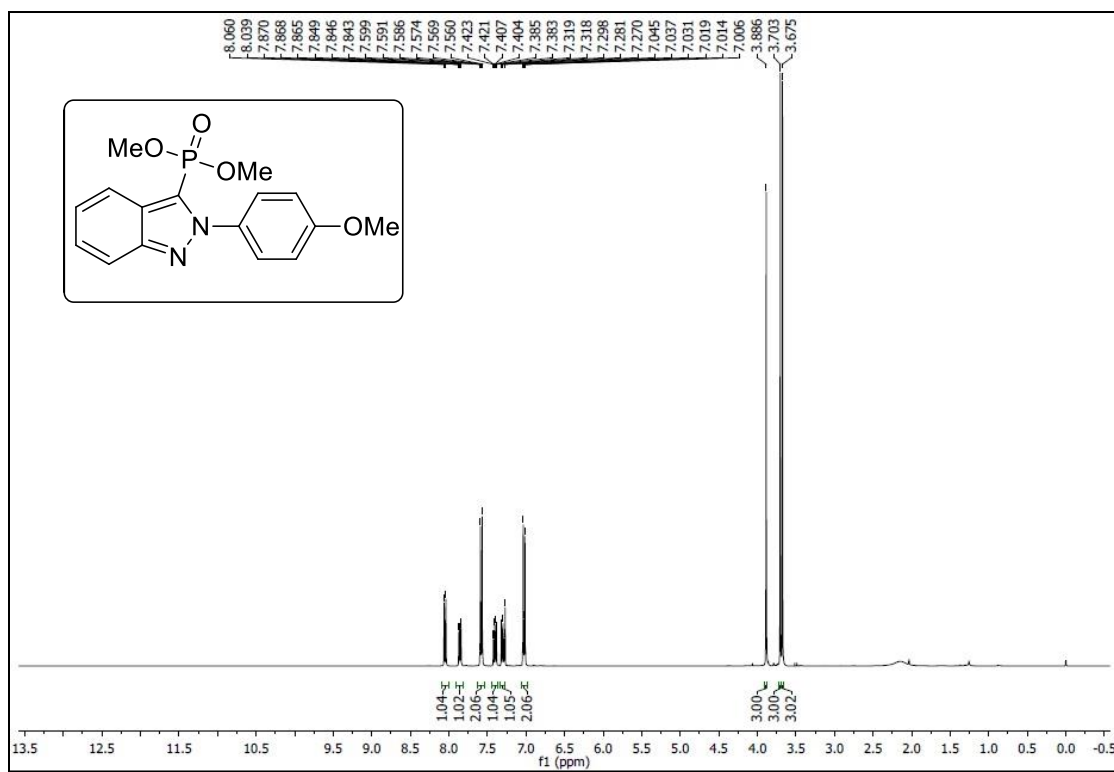




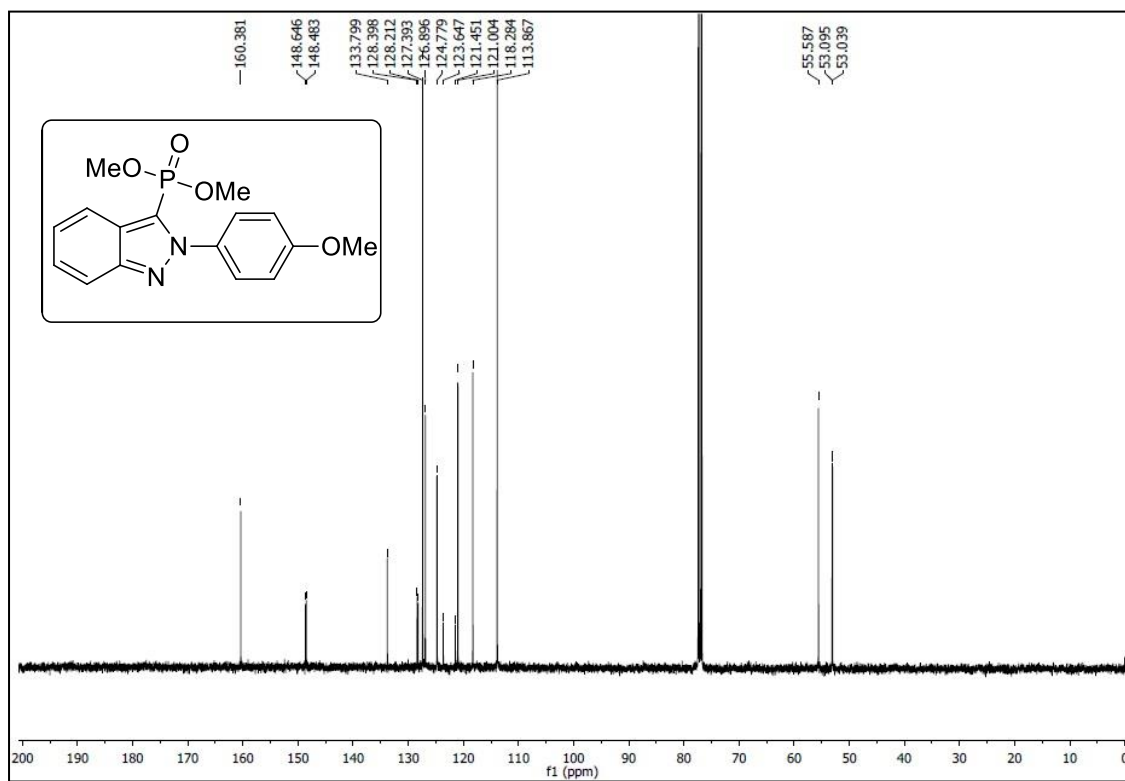
¹H NMR spectrum of 4e



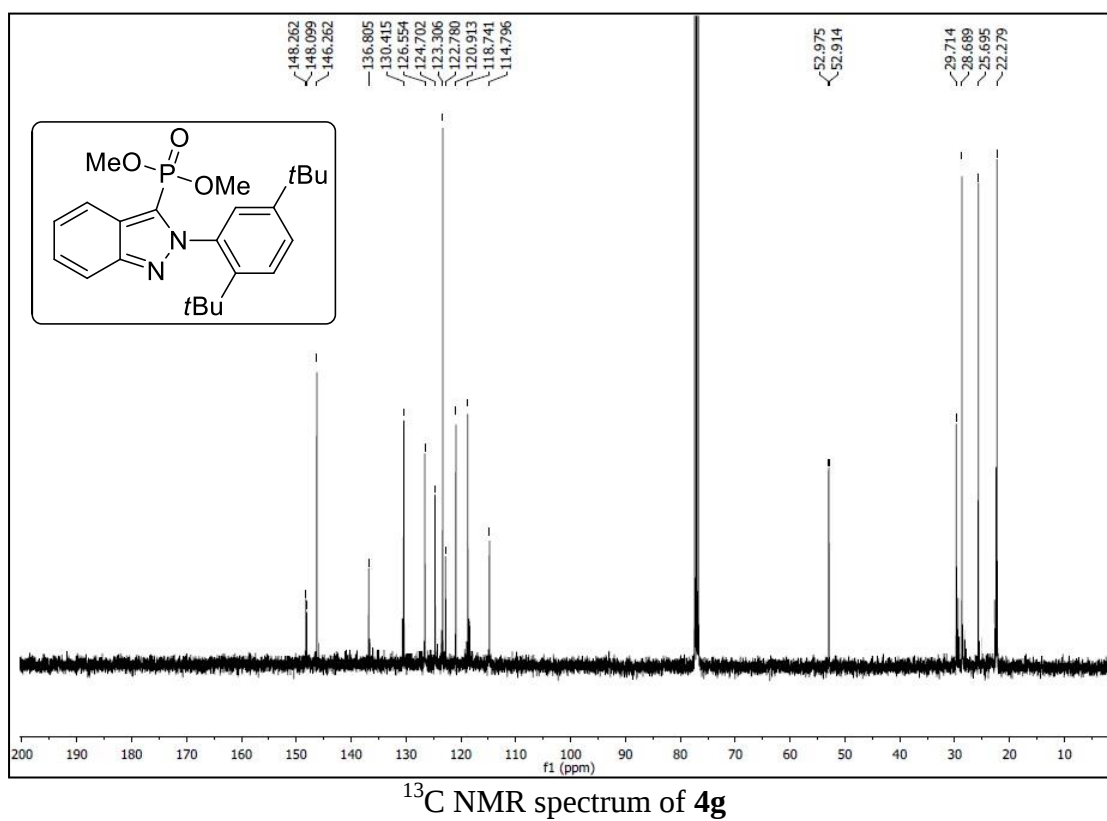
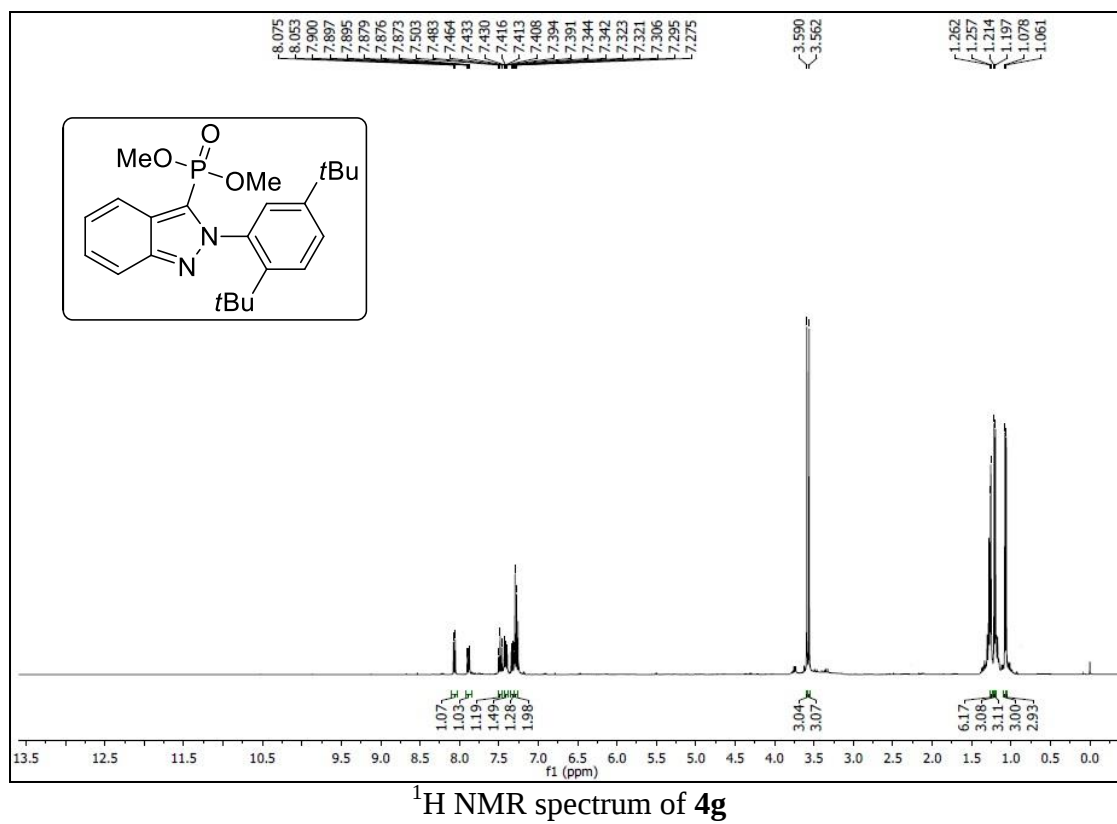
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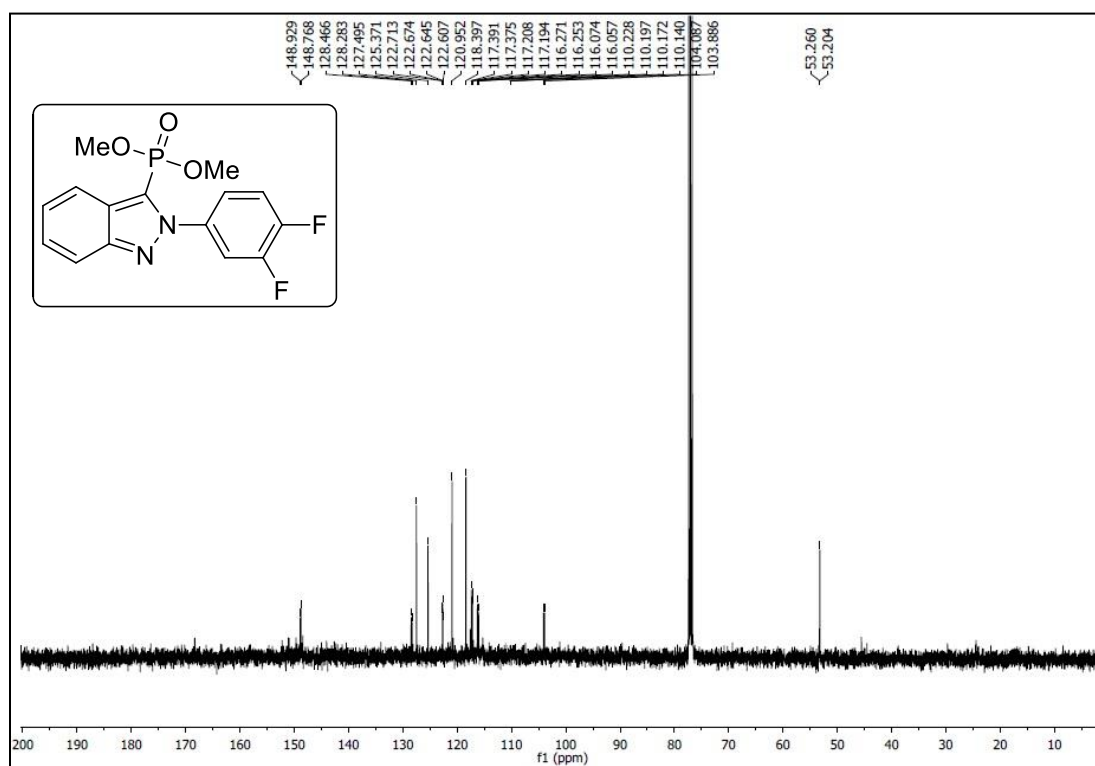
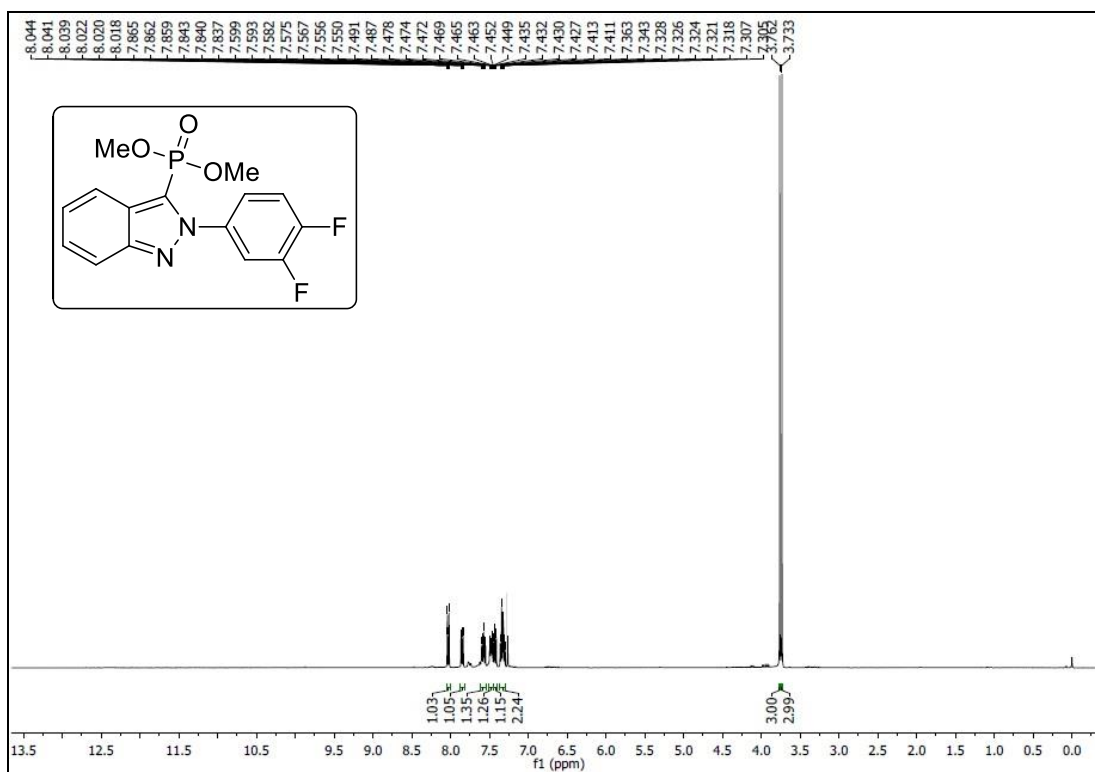


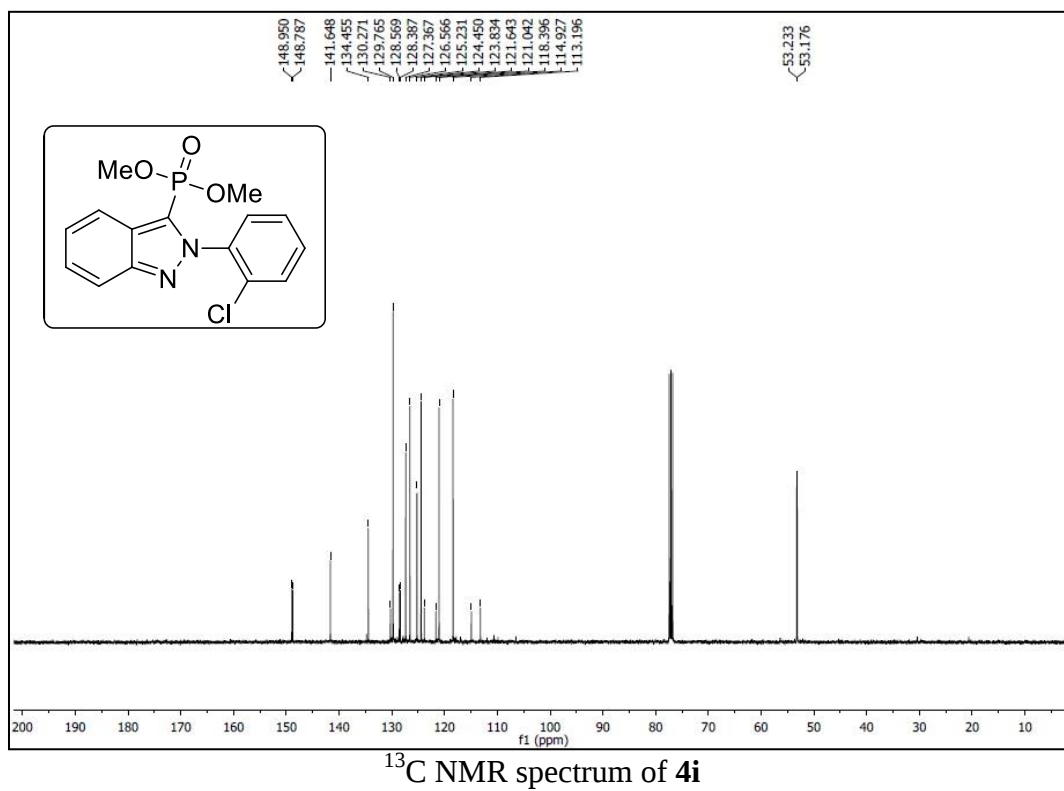
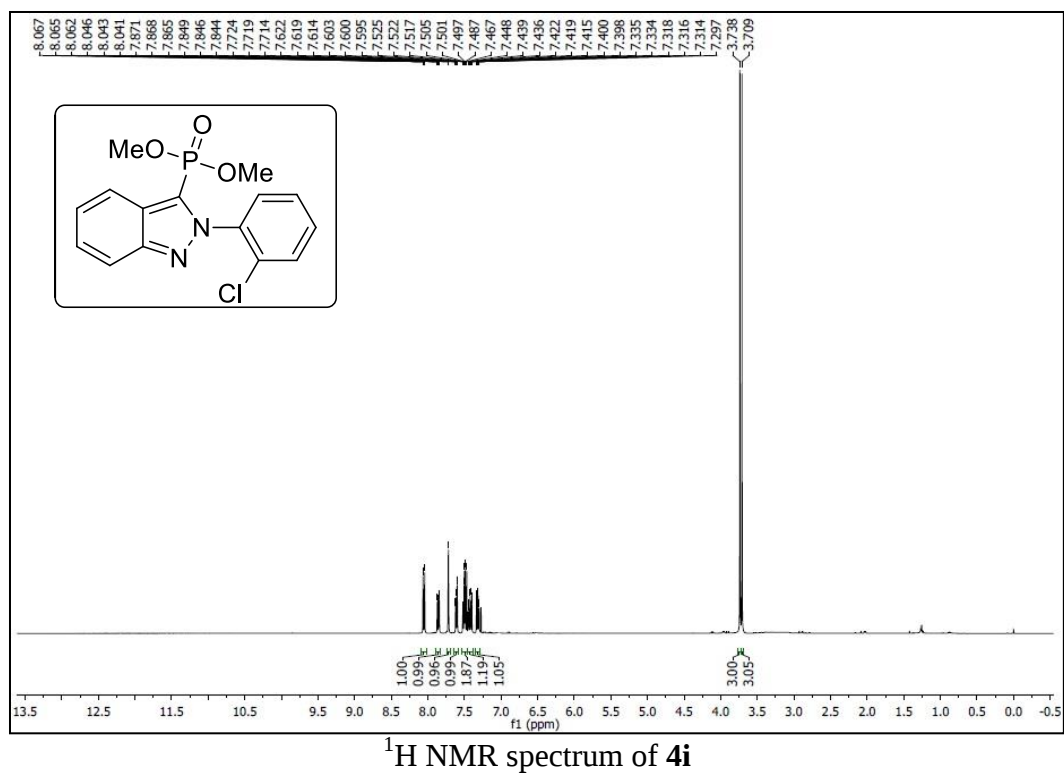
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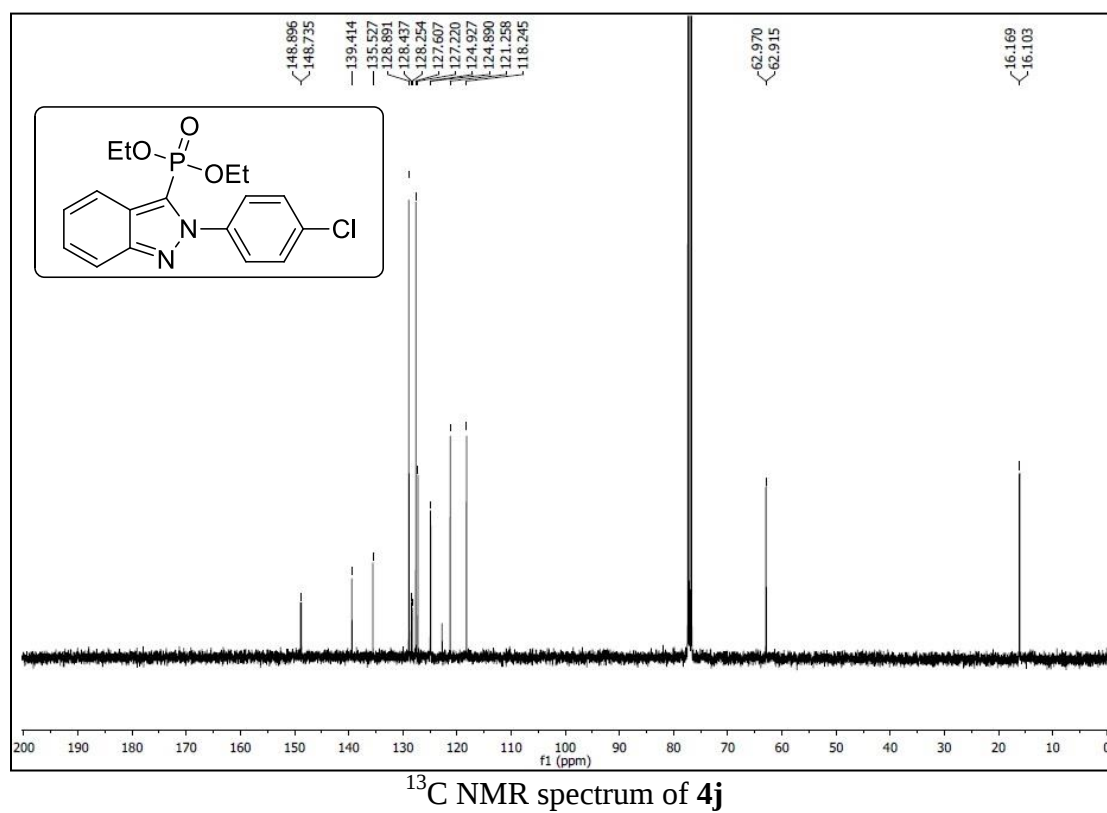
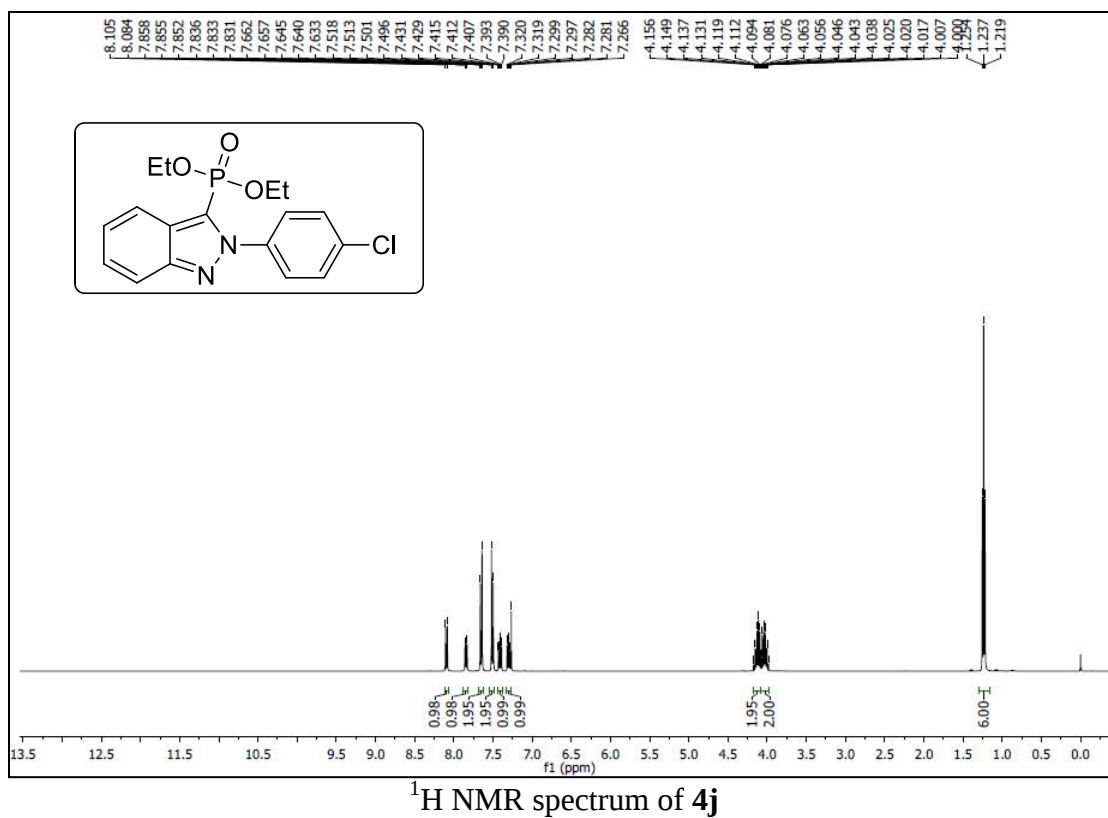


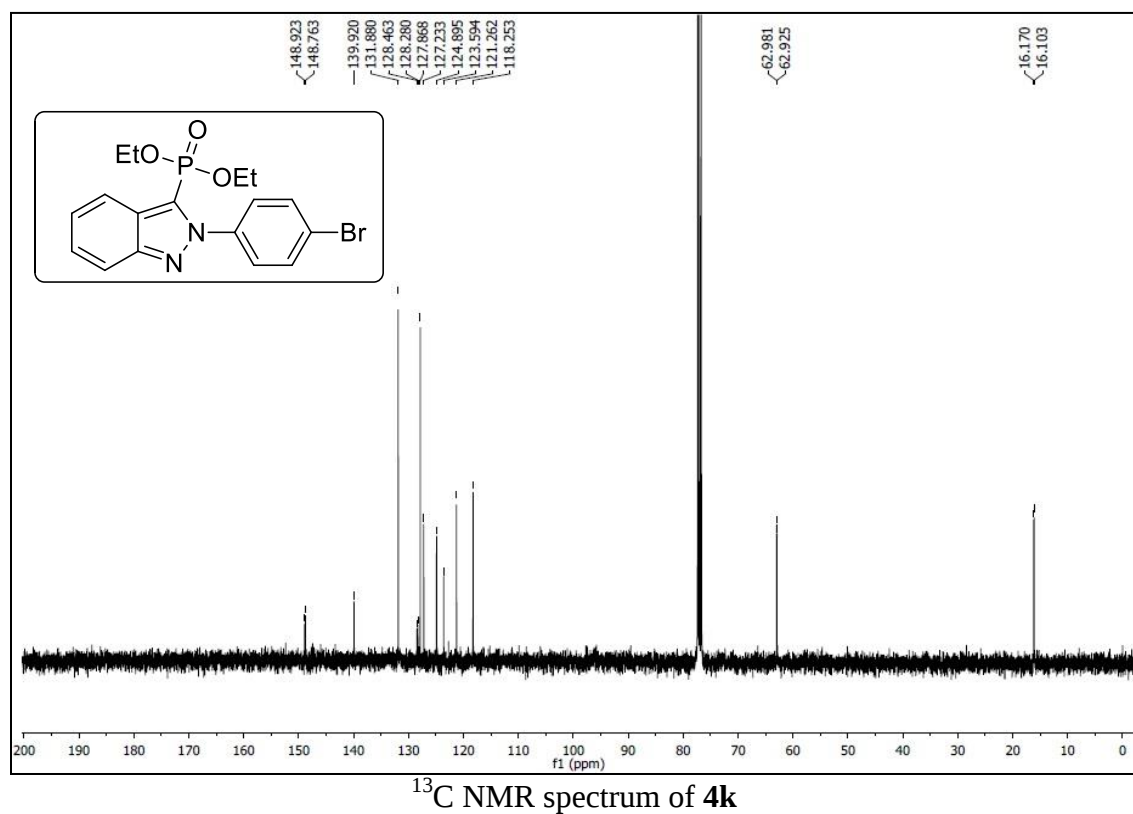
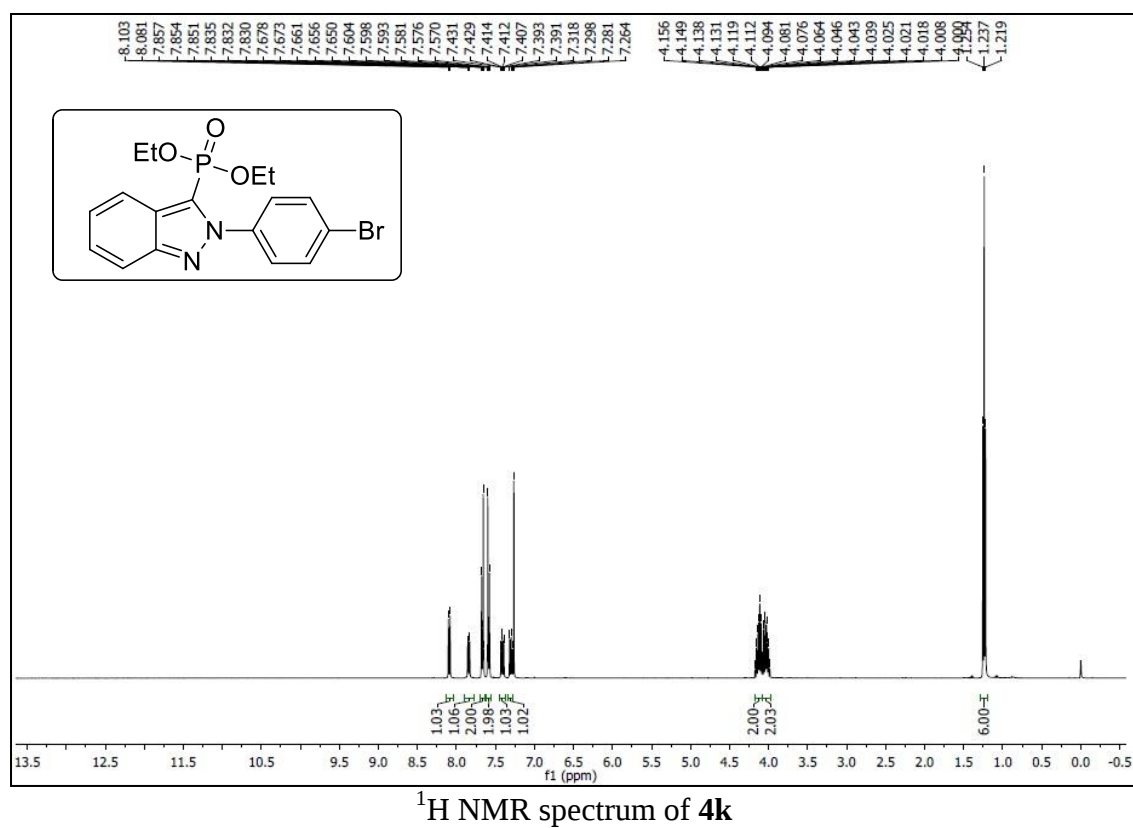
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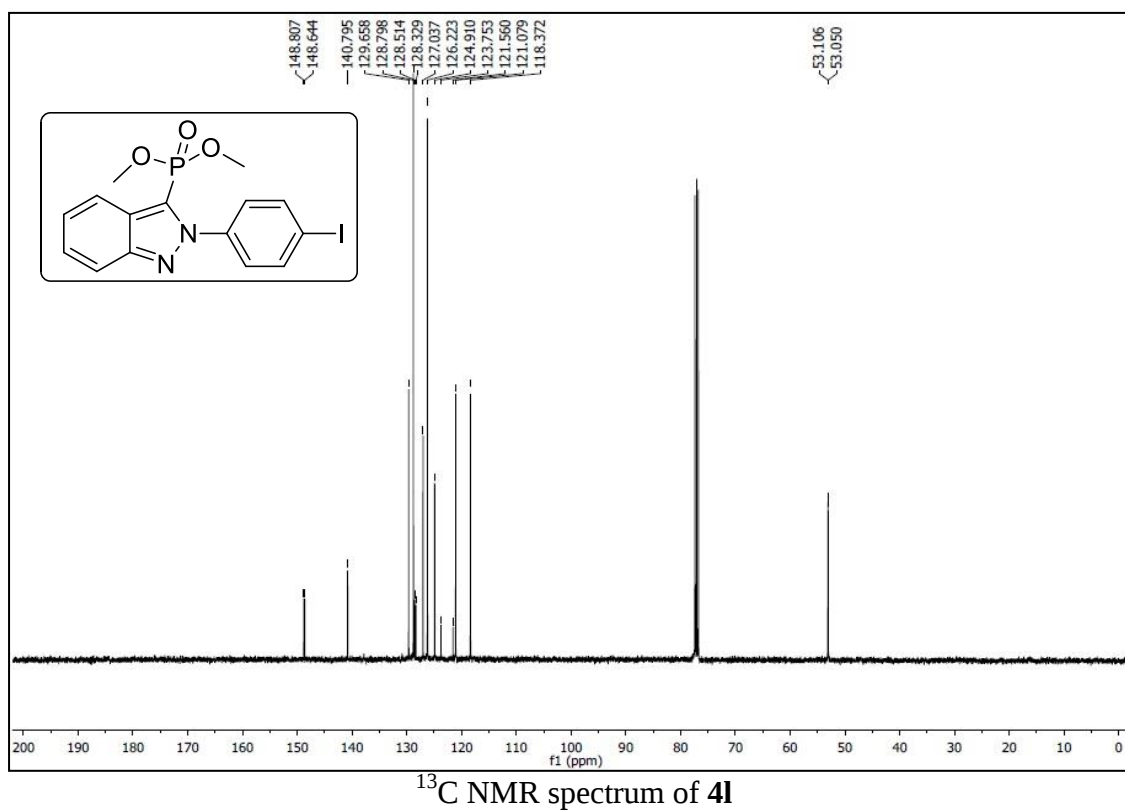
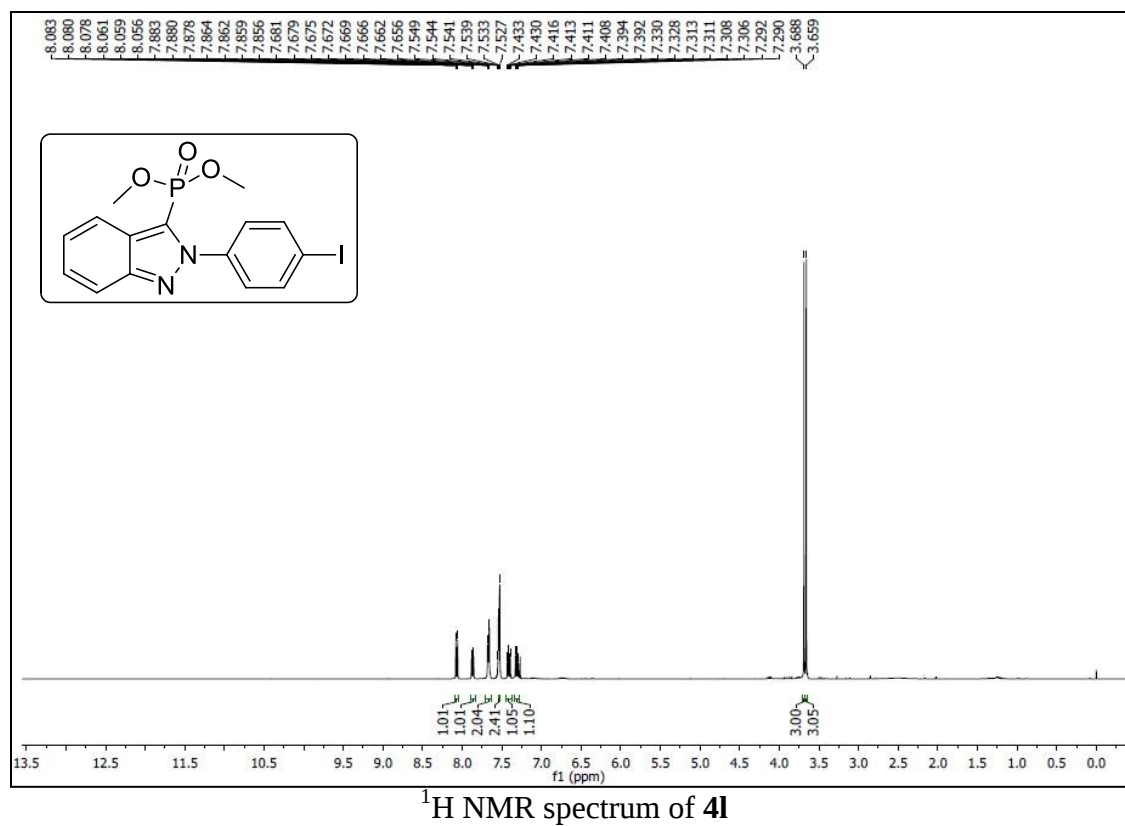


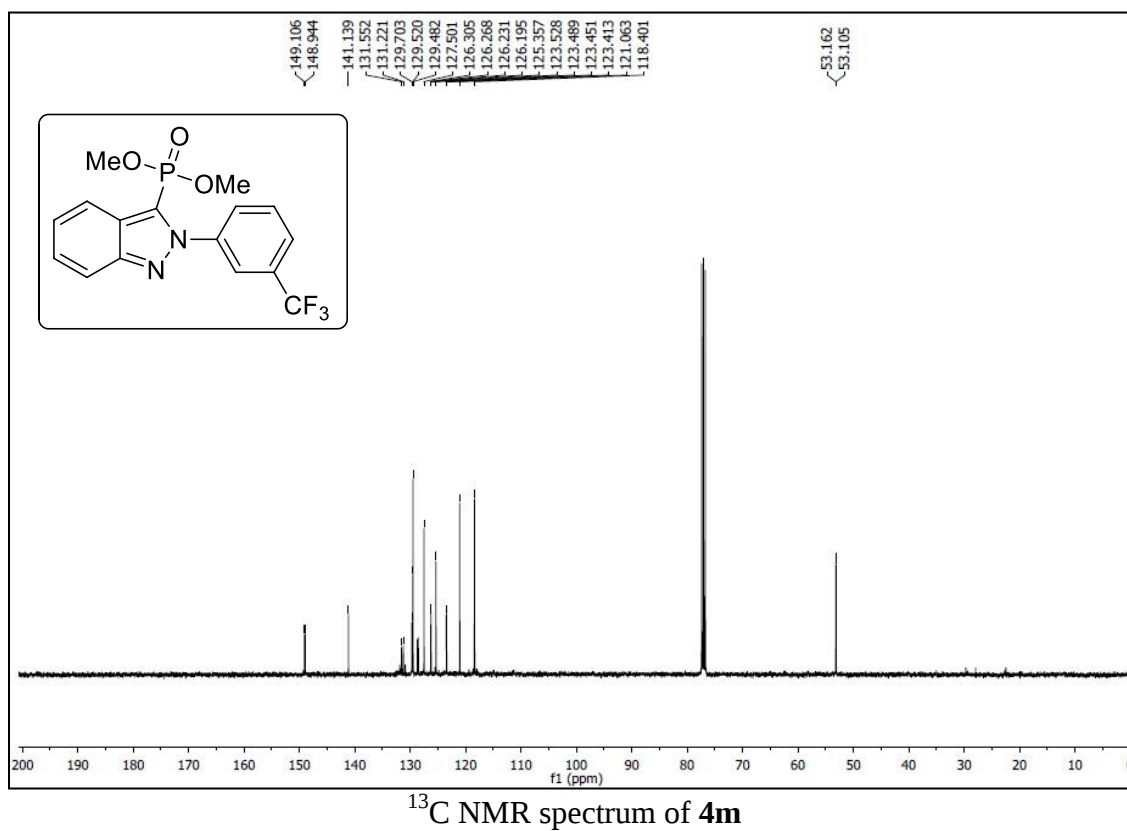
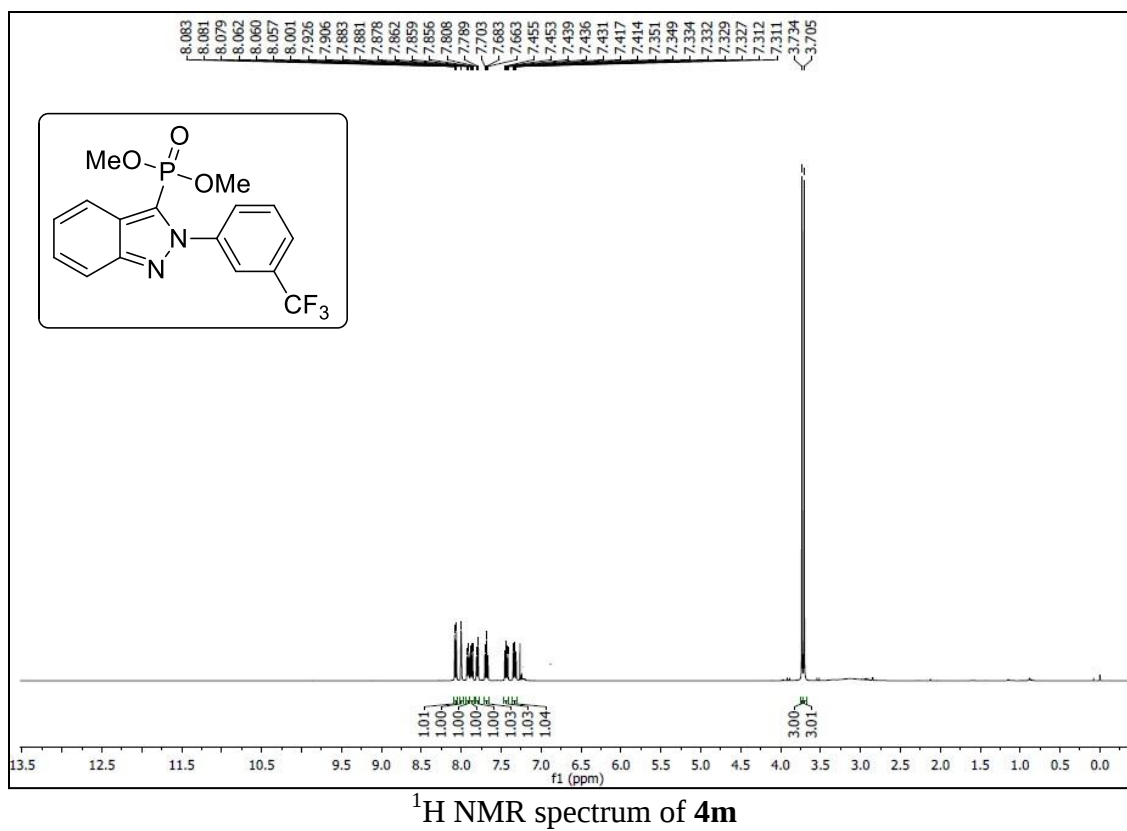


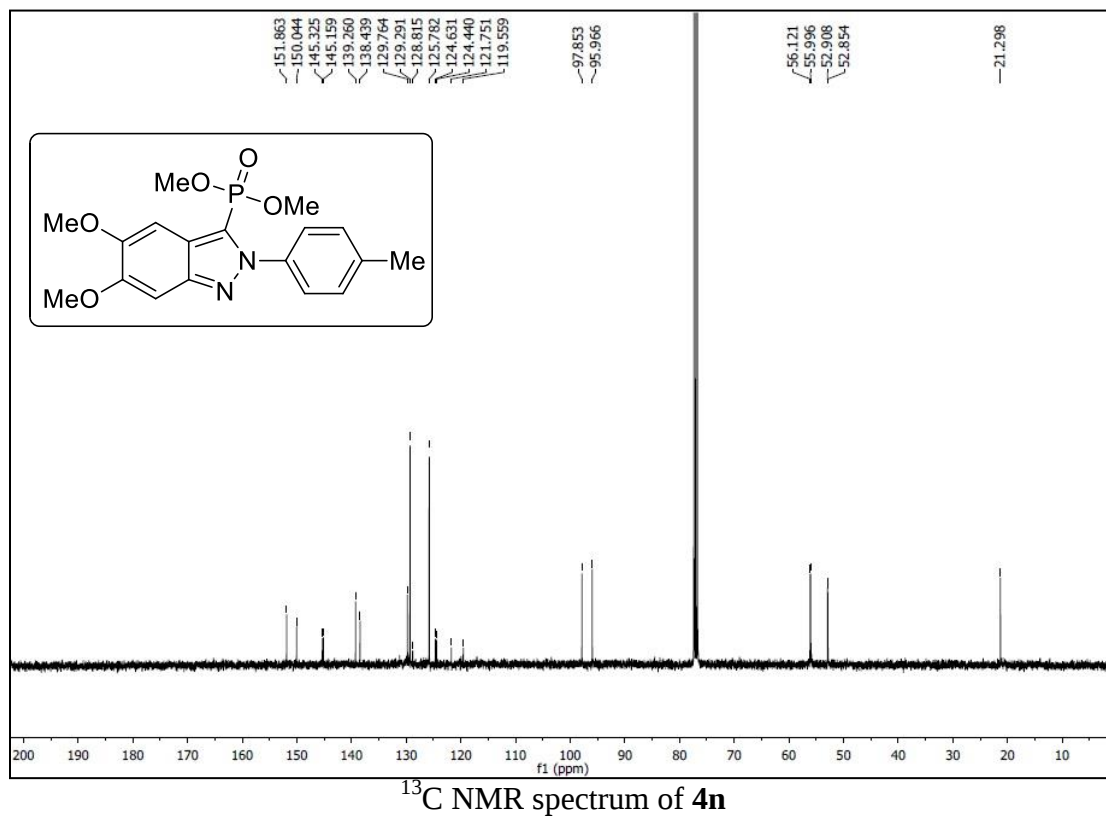
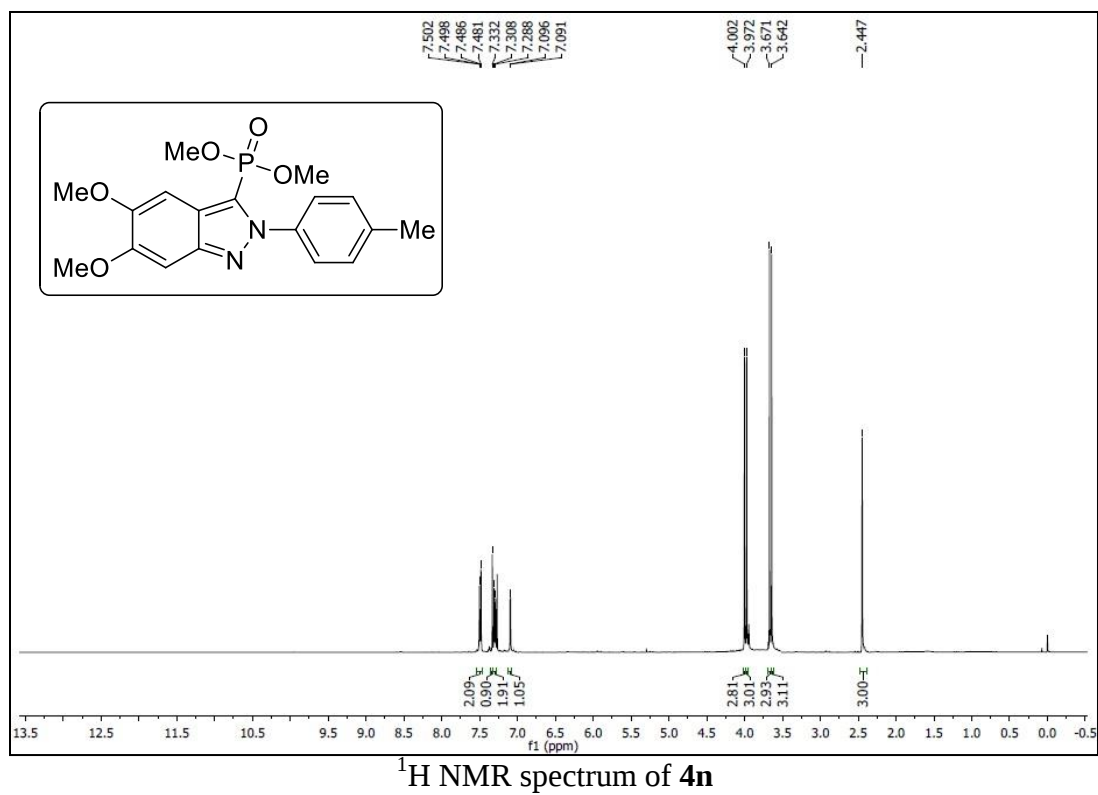


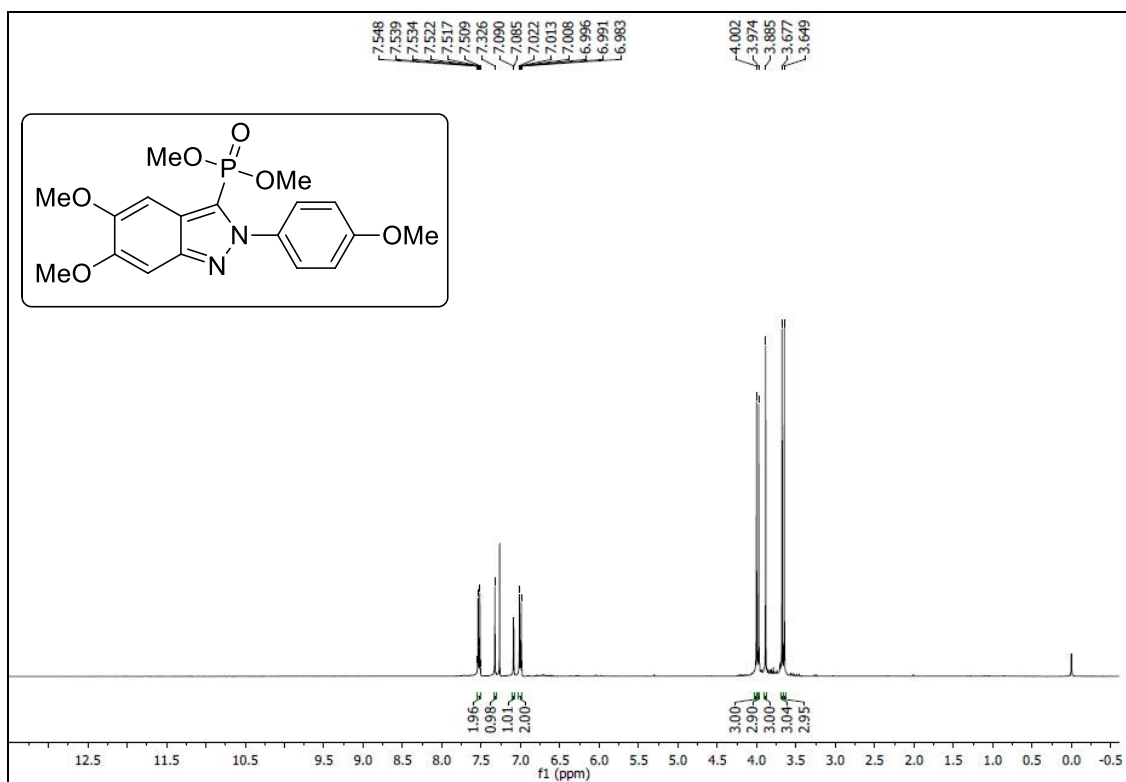




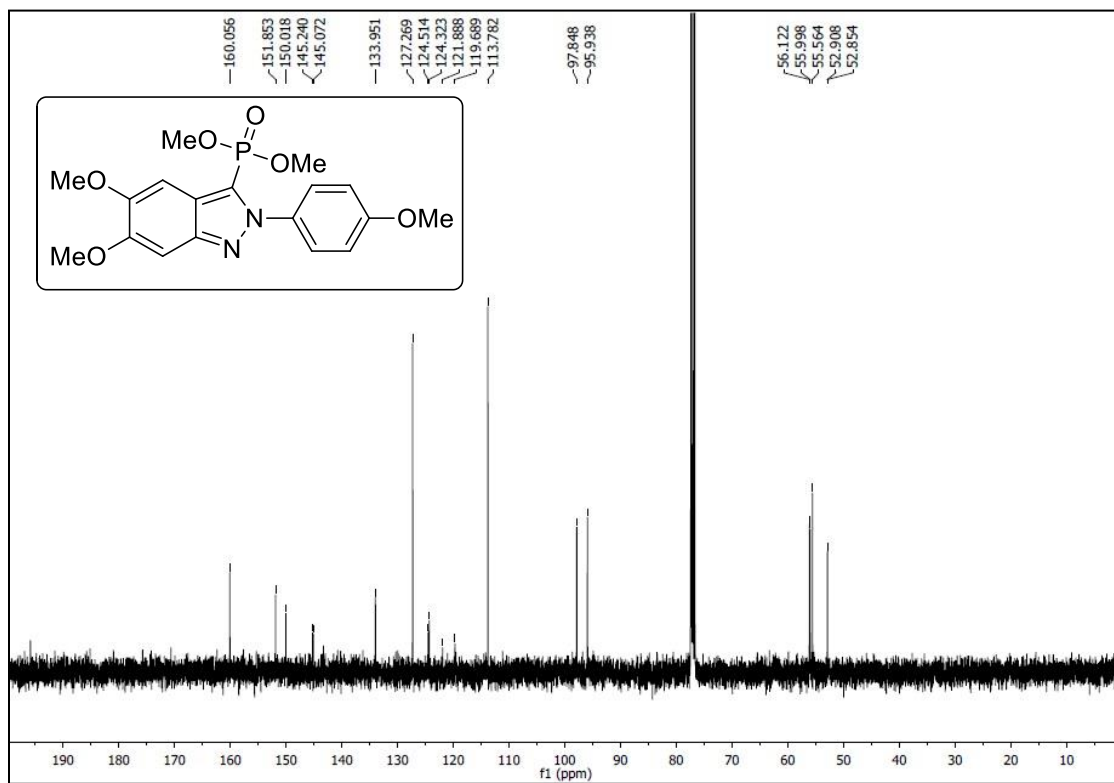




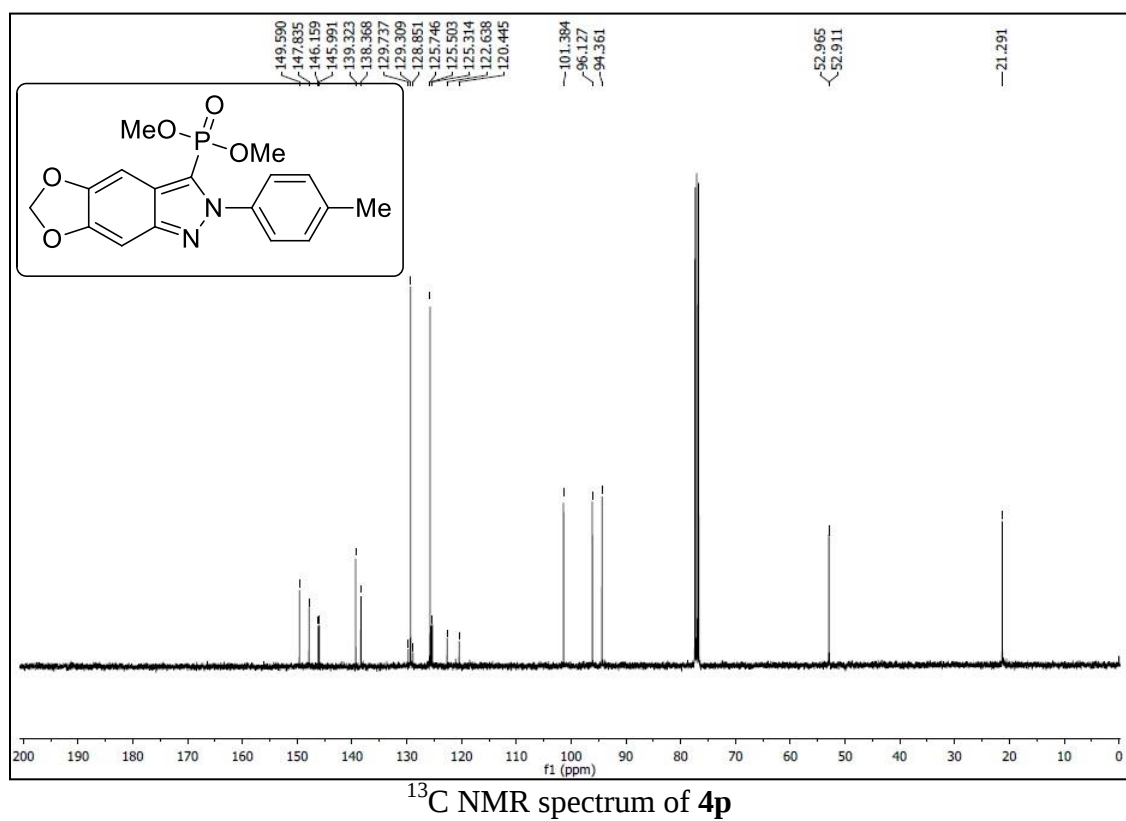
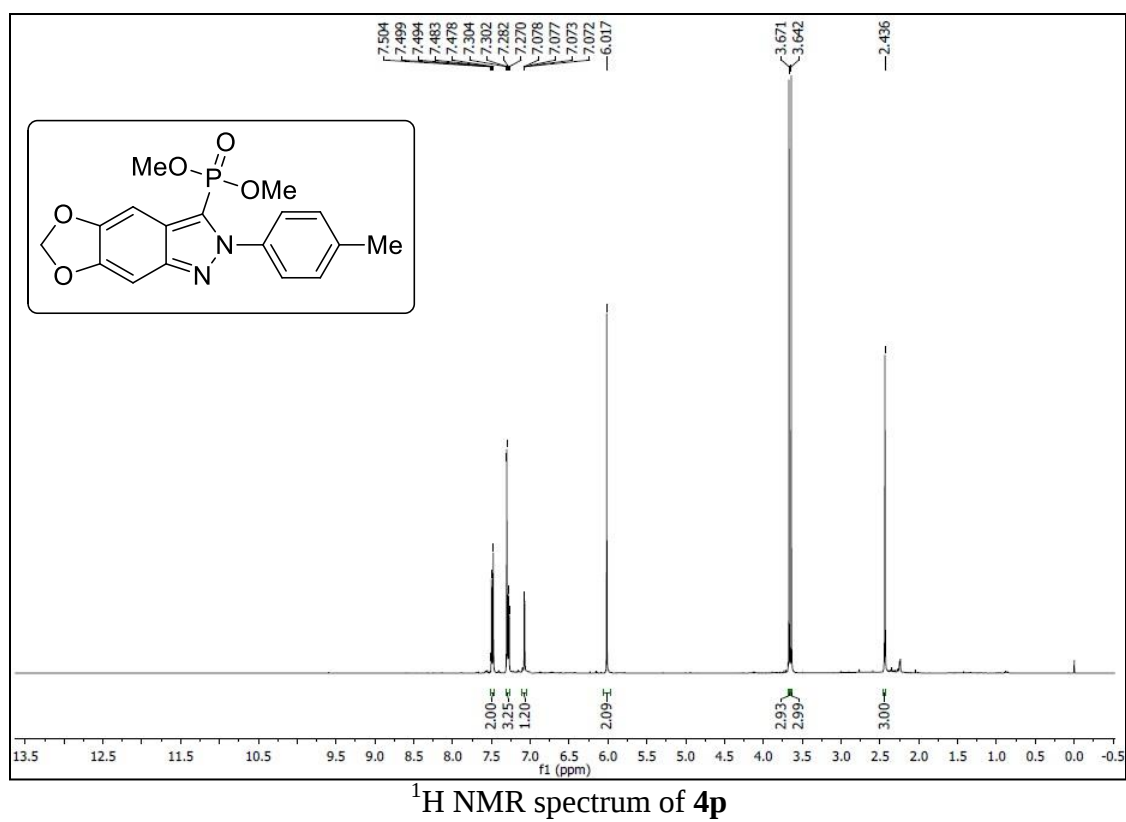


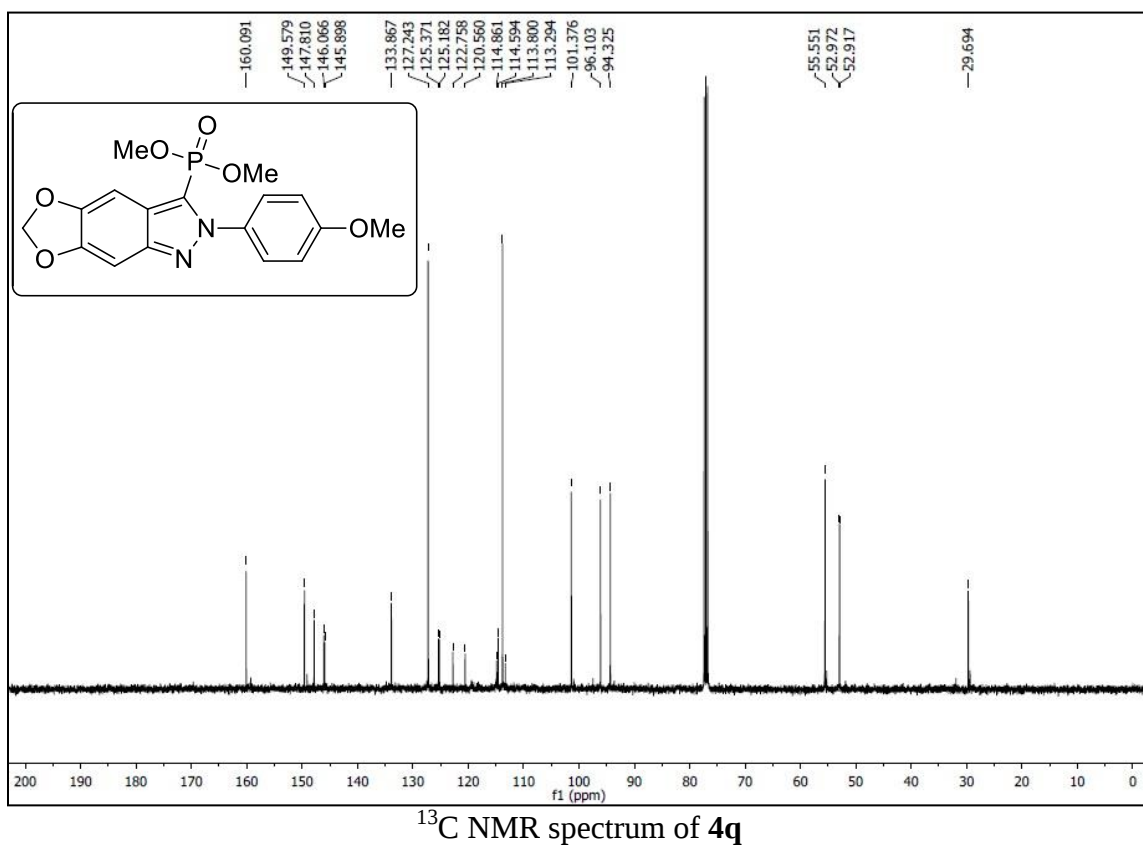
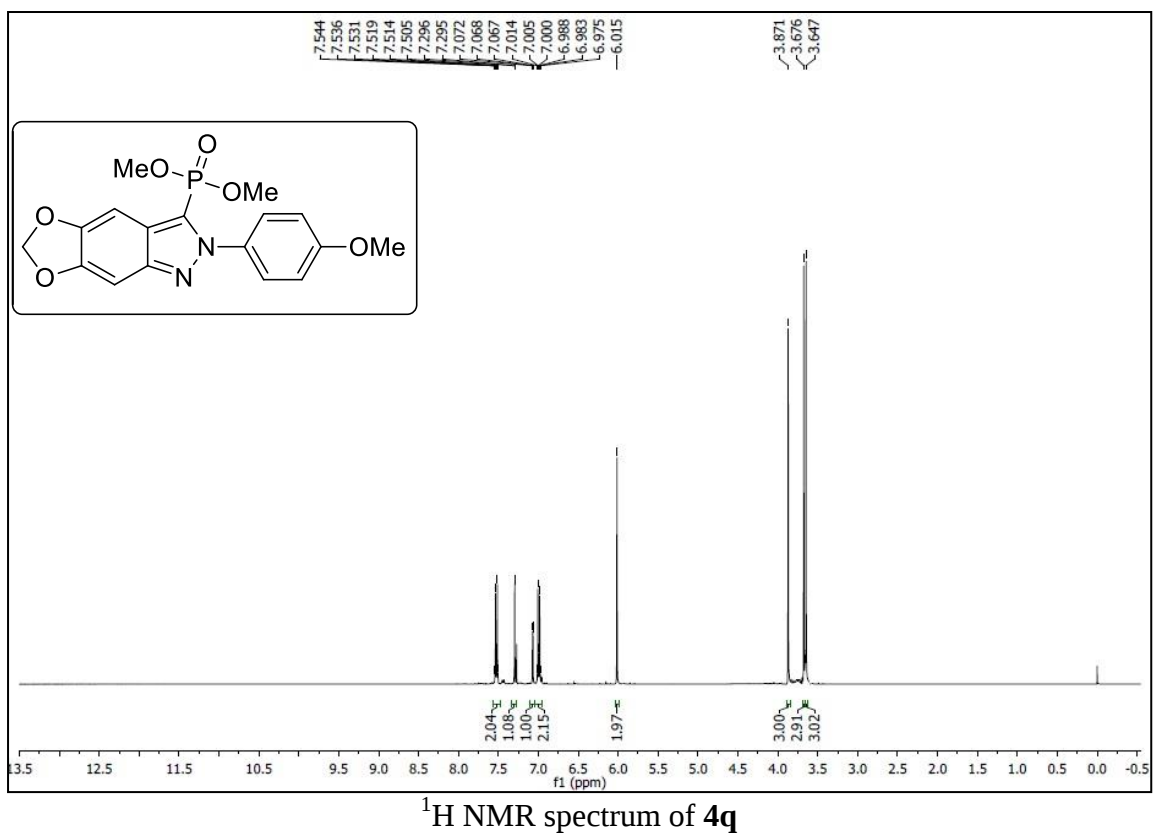


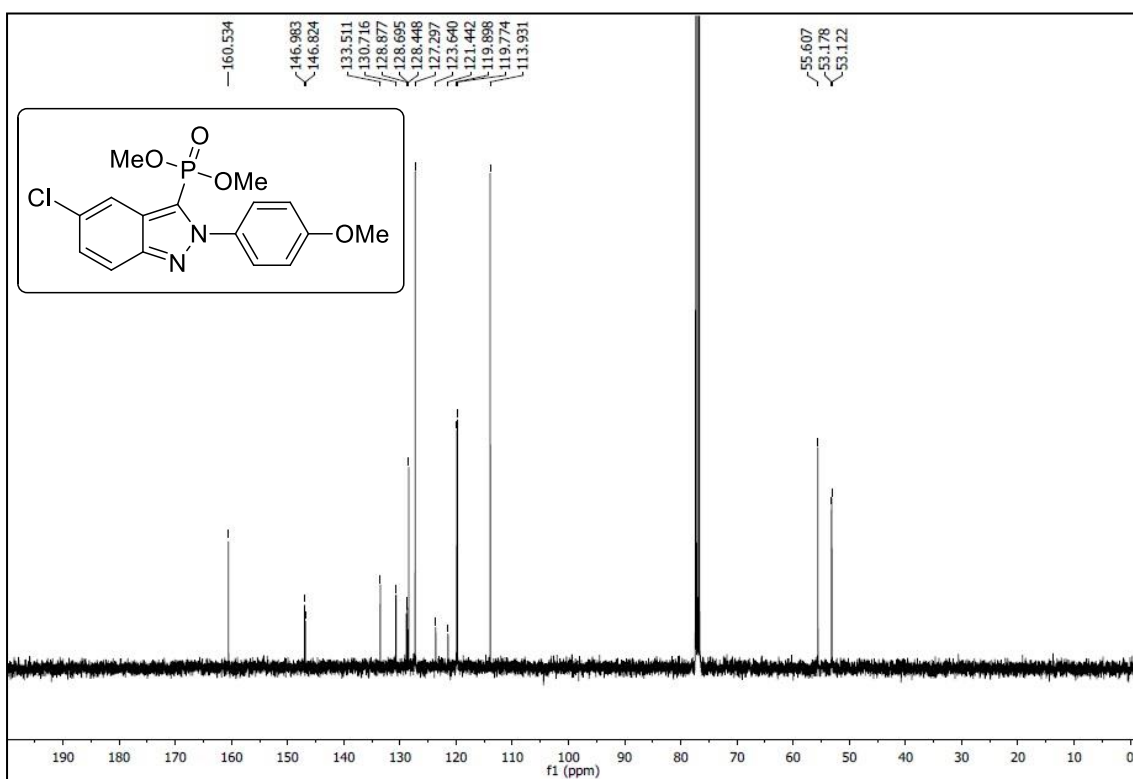
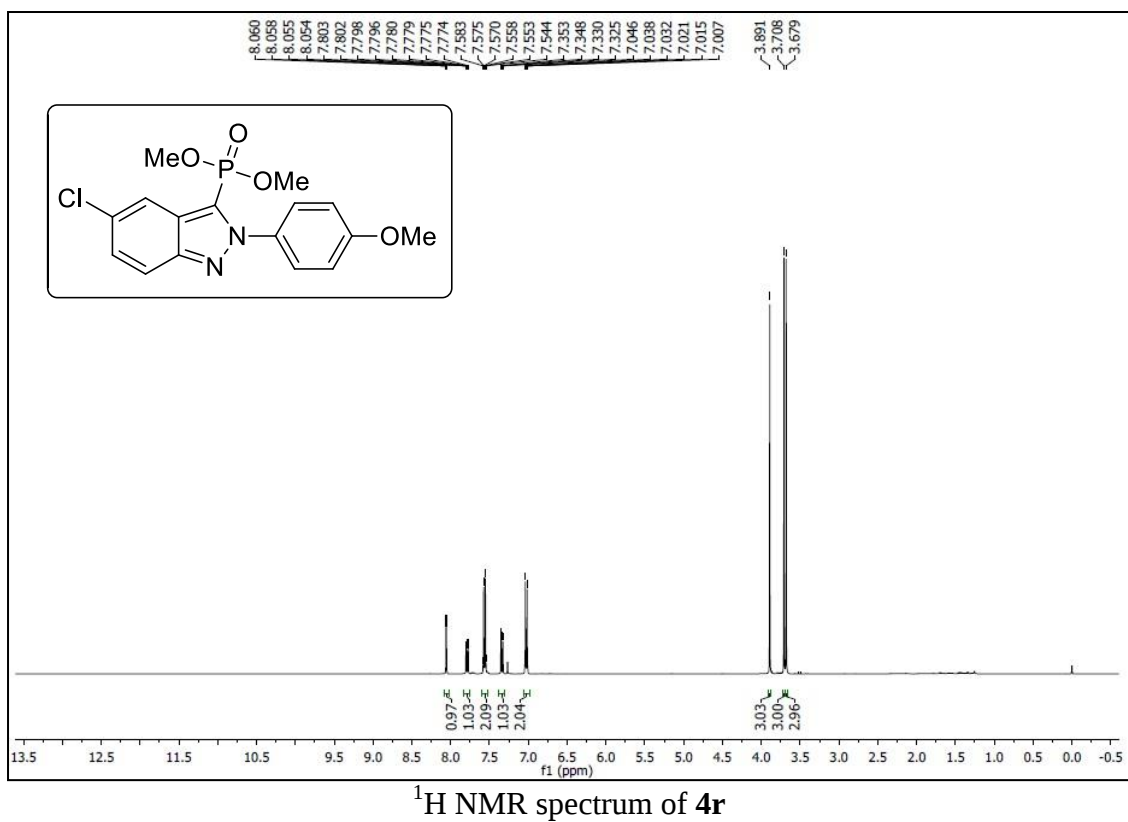
¹H NMR spectrum of **4o**



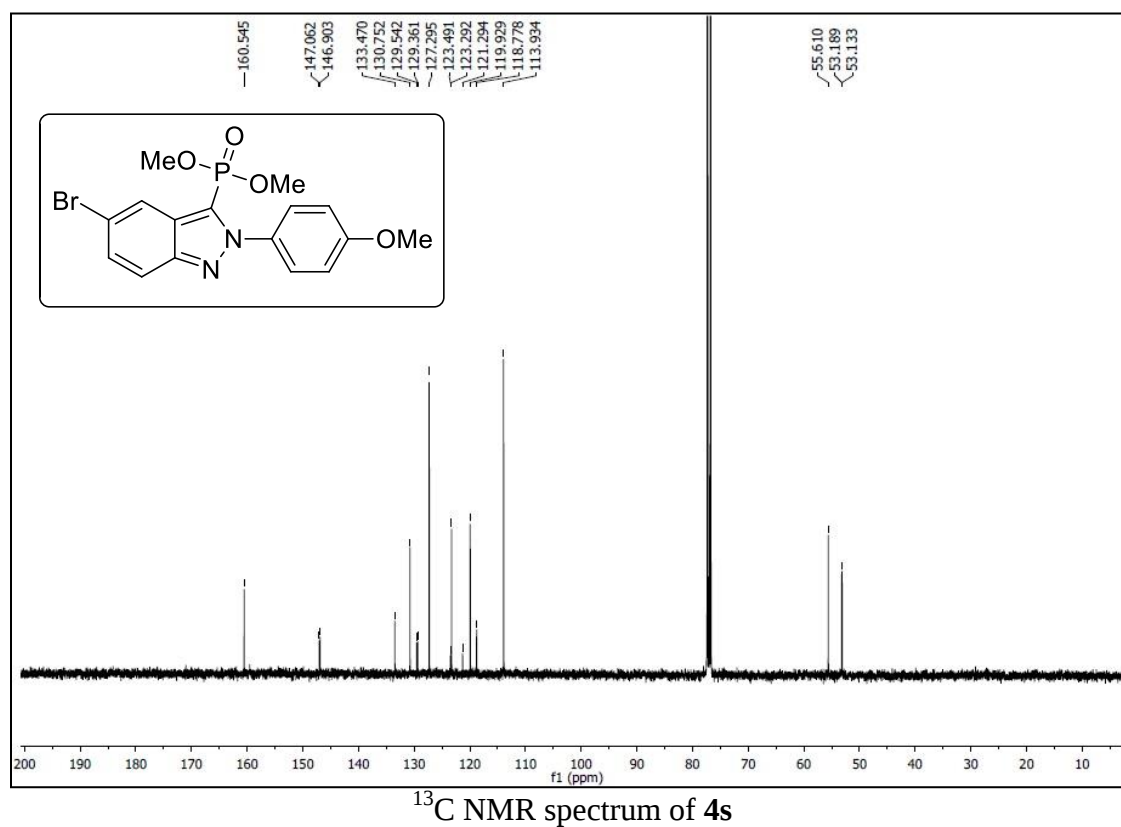
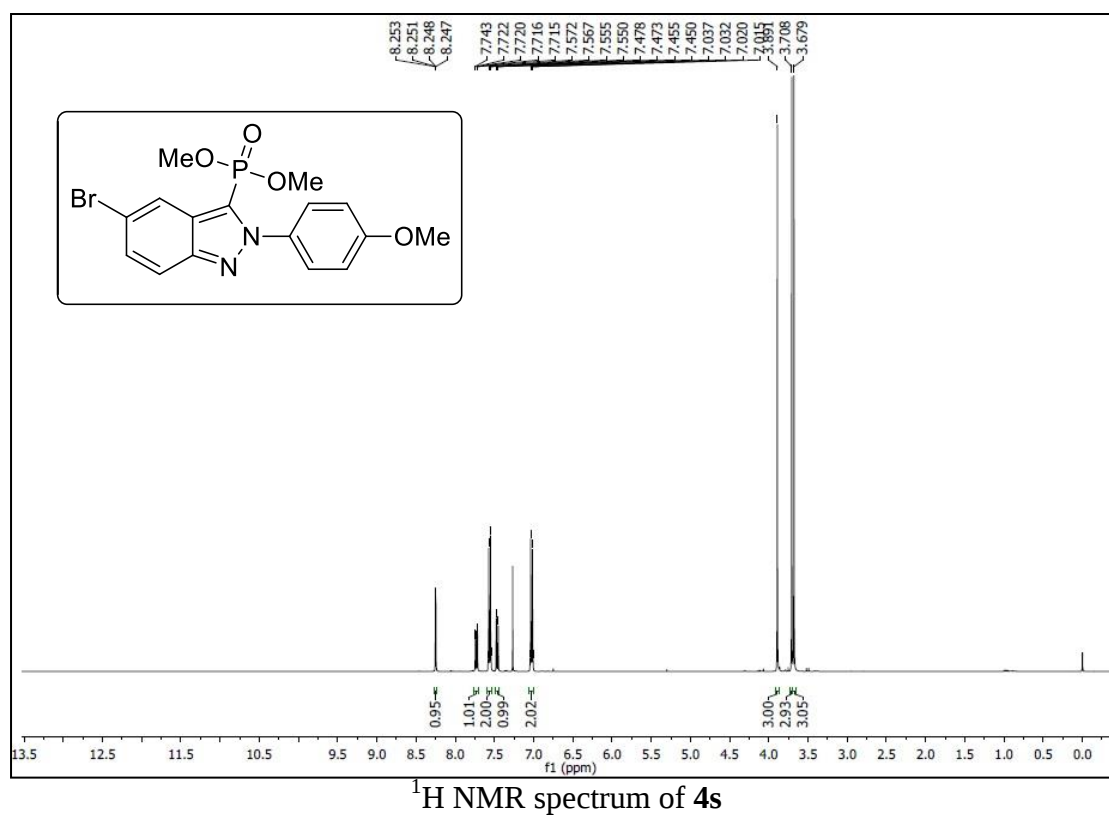
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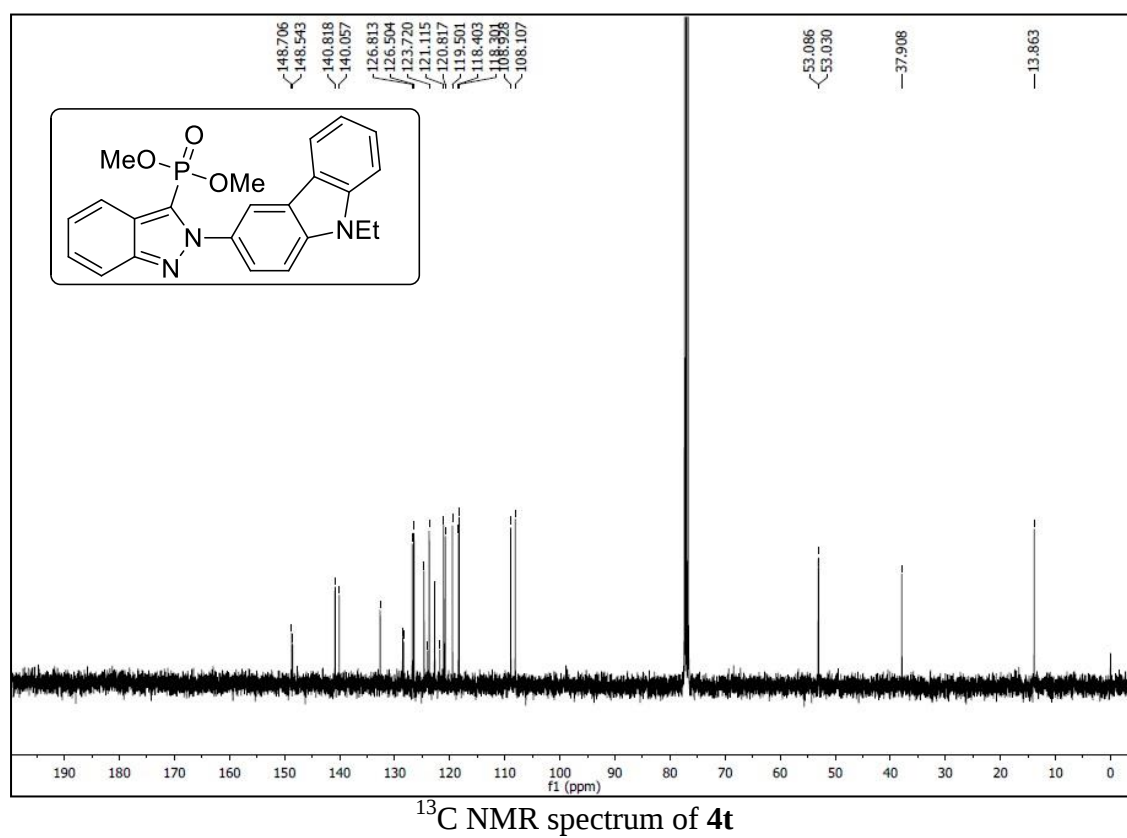
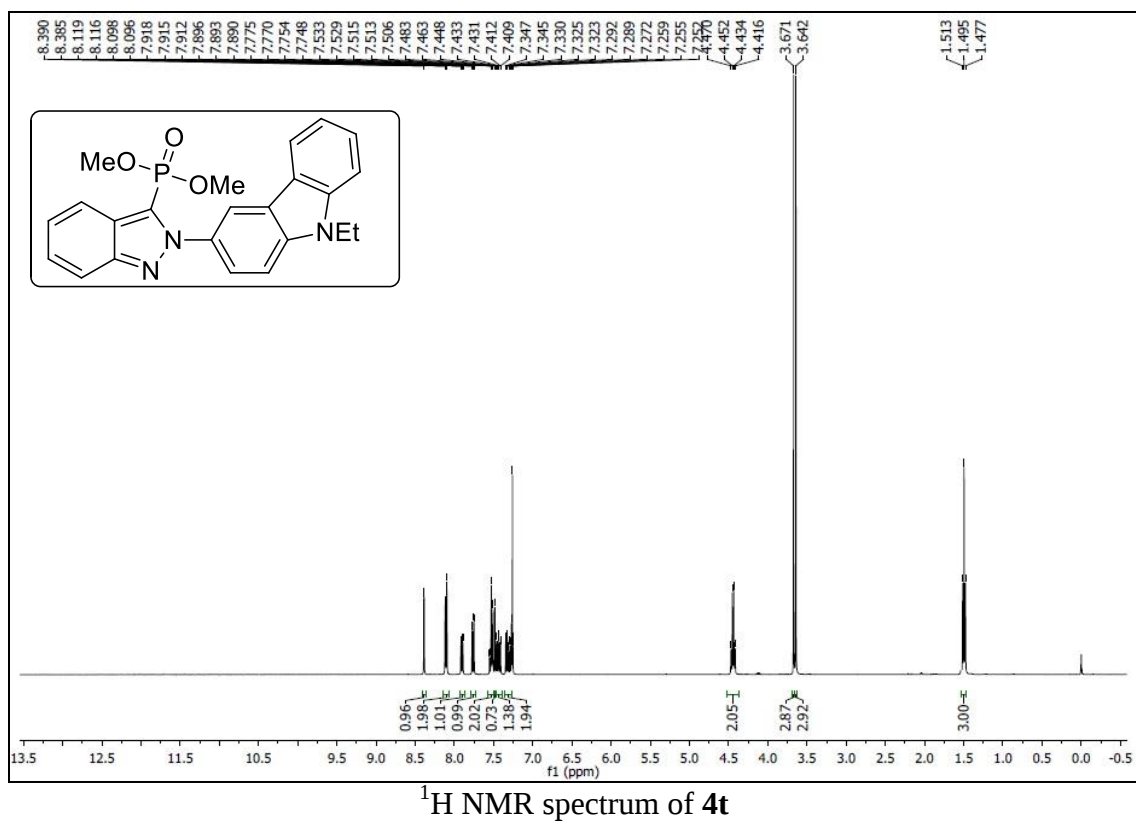


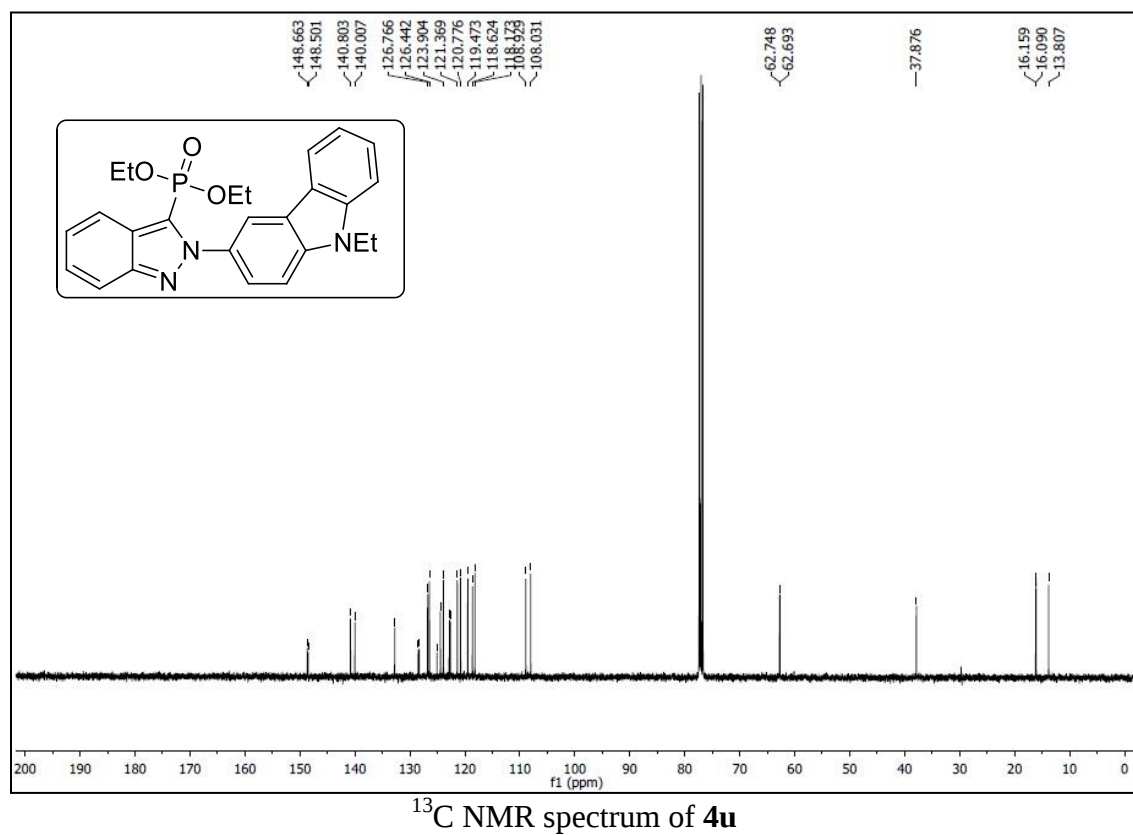
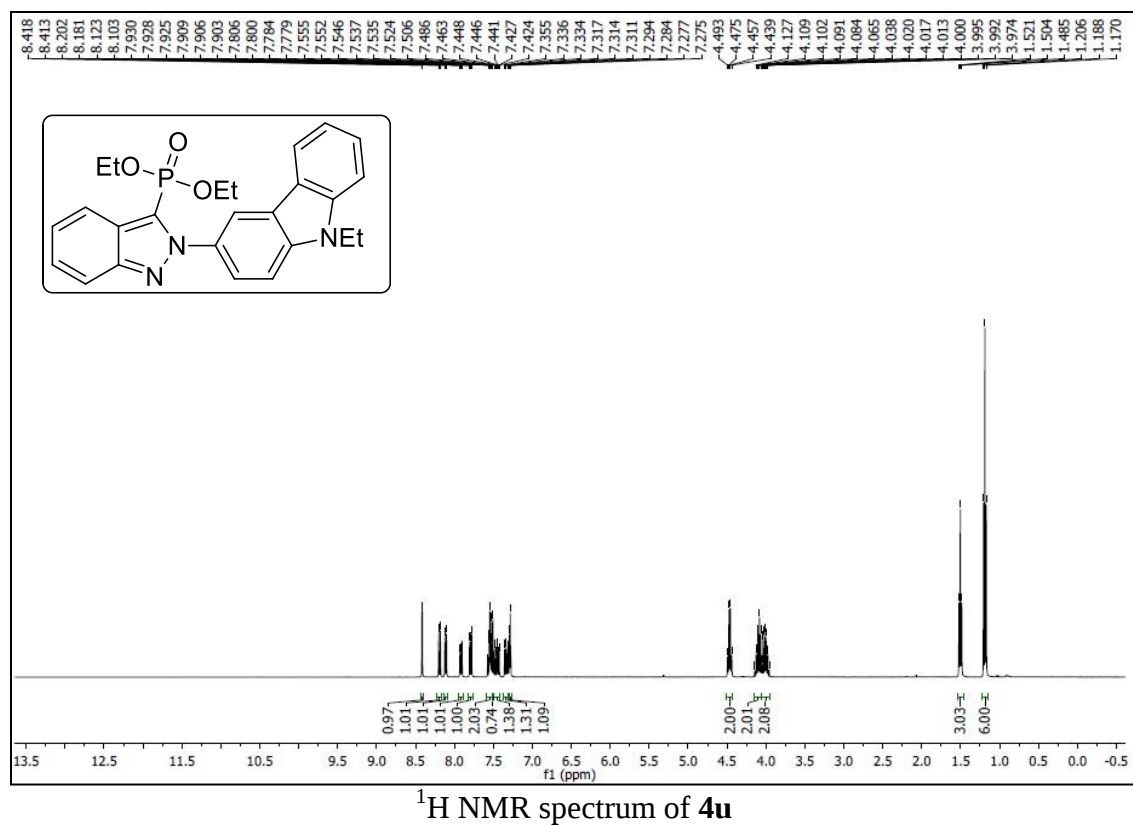


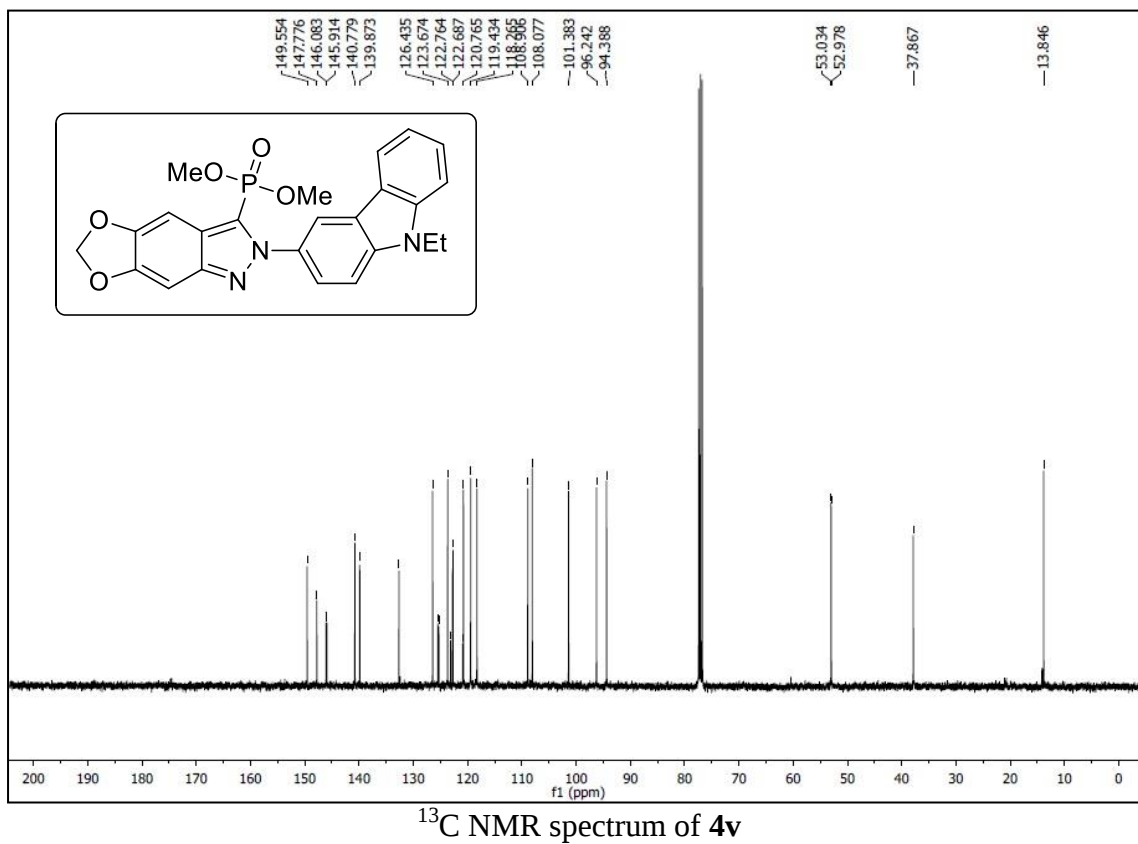
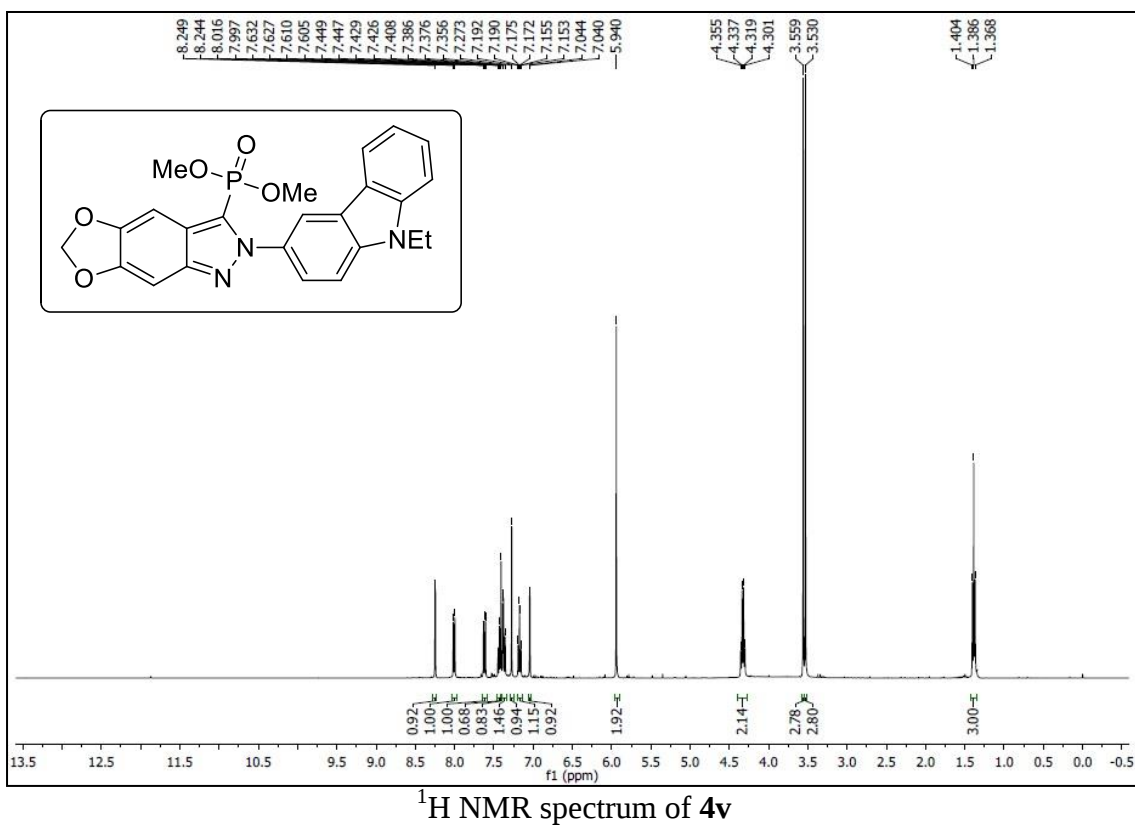


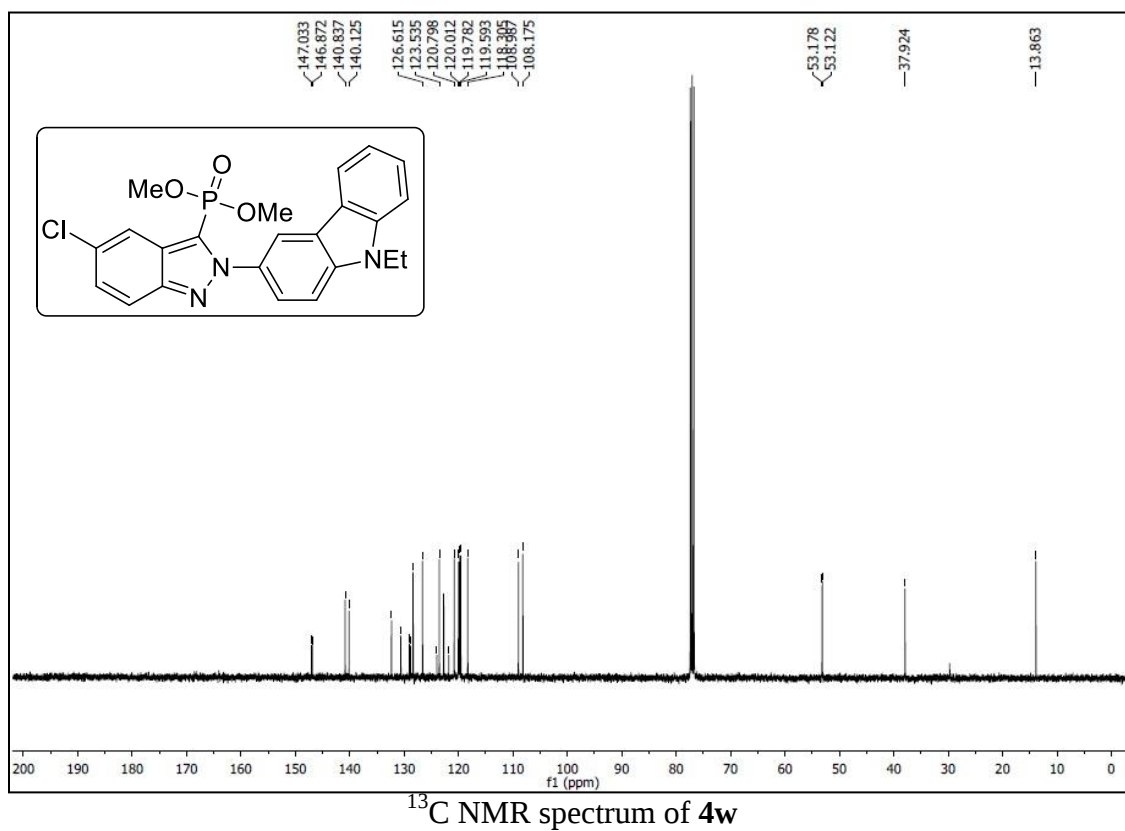
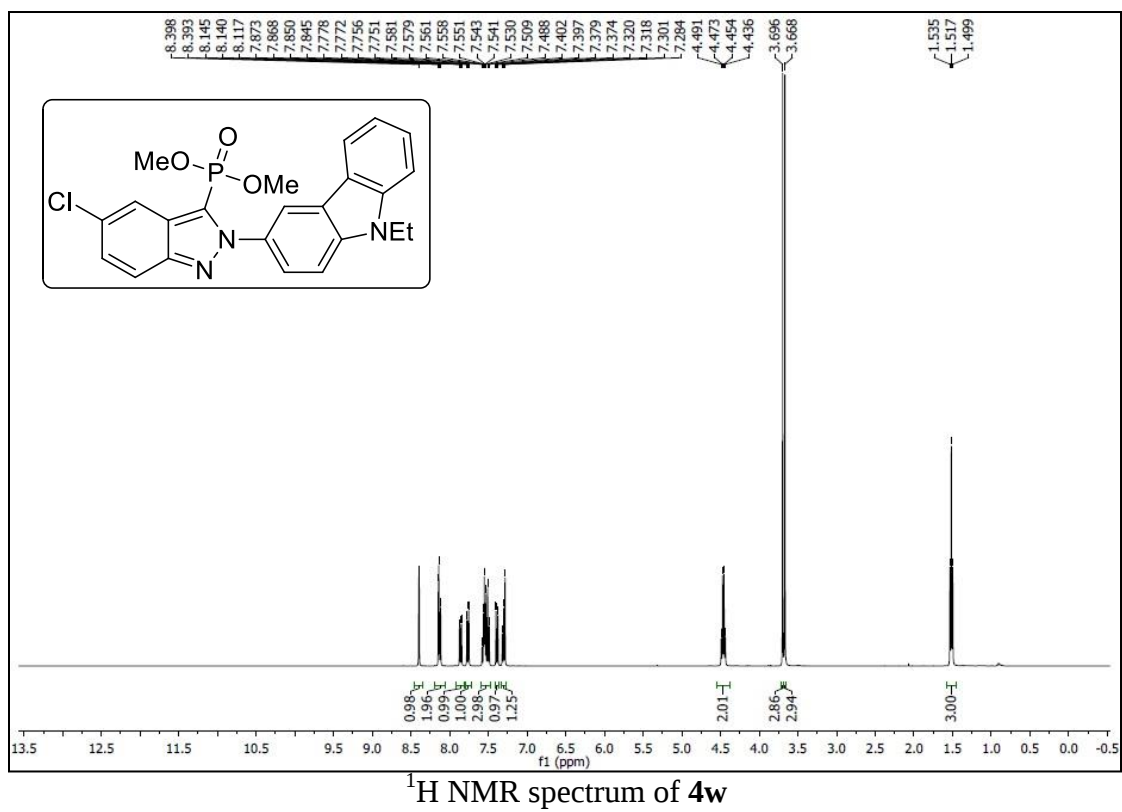
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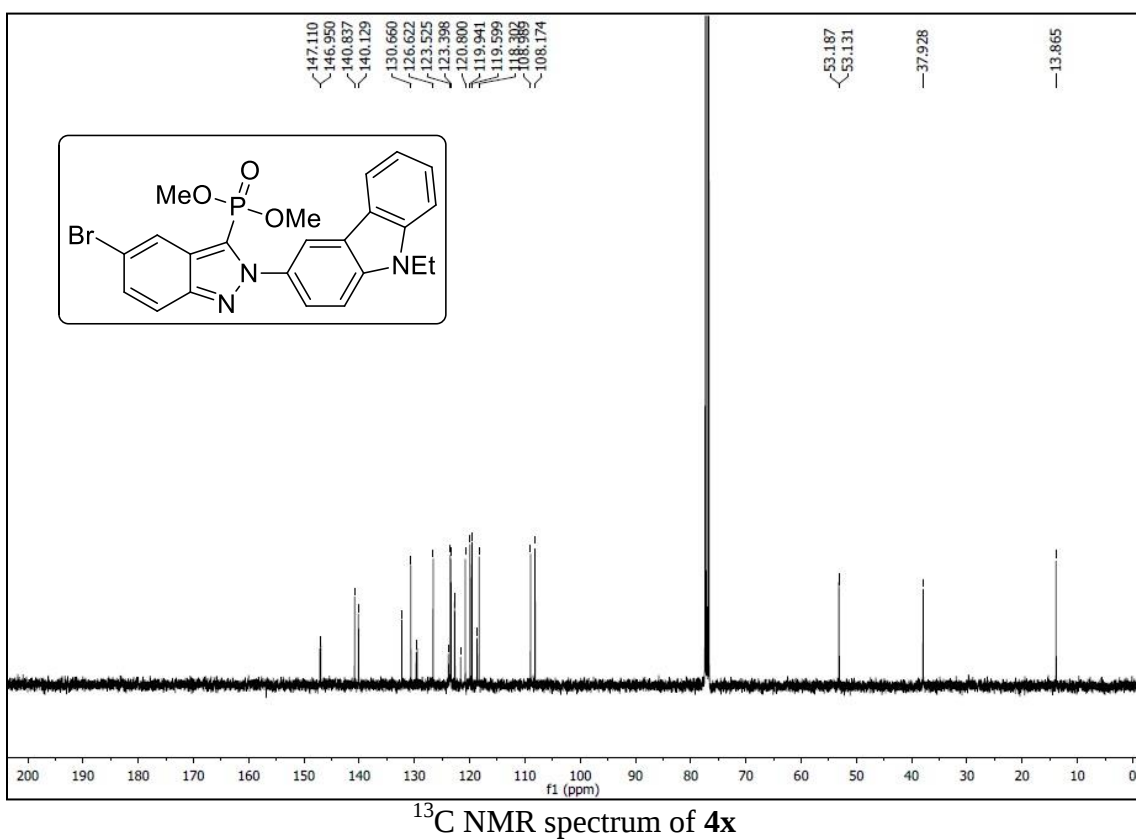
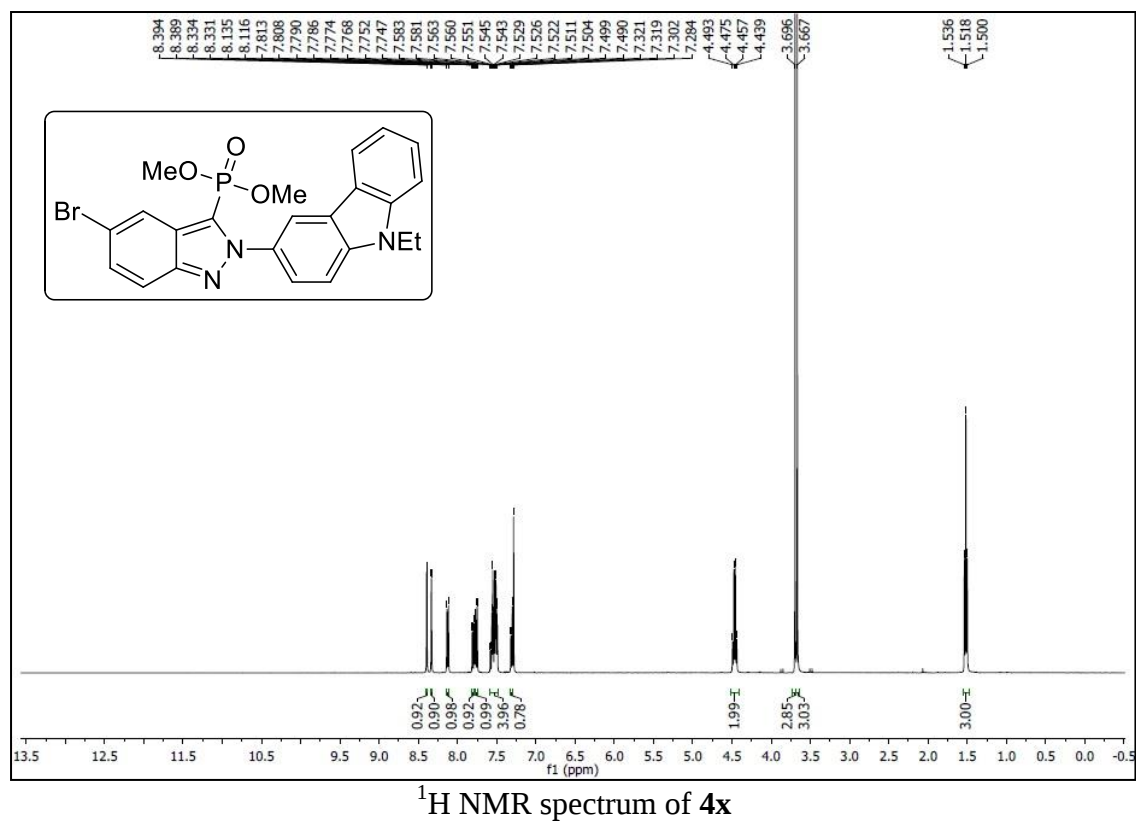


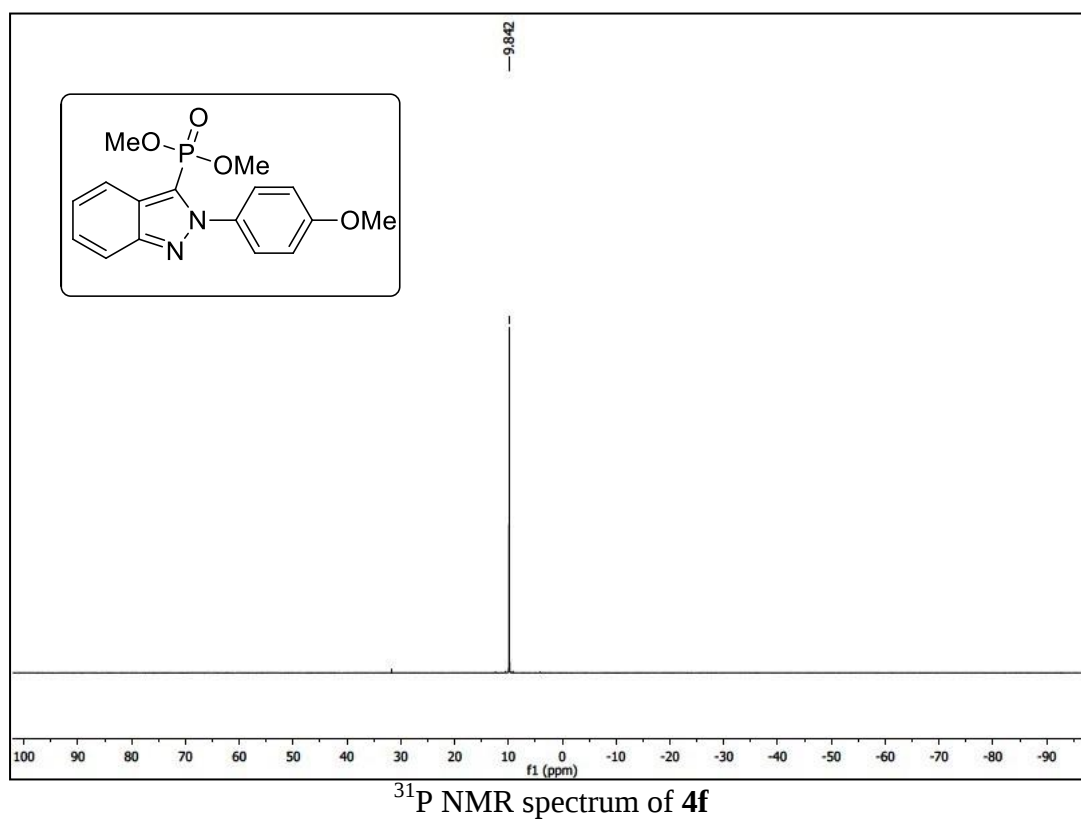
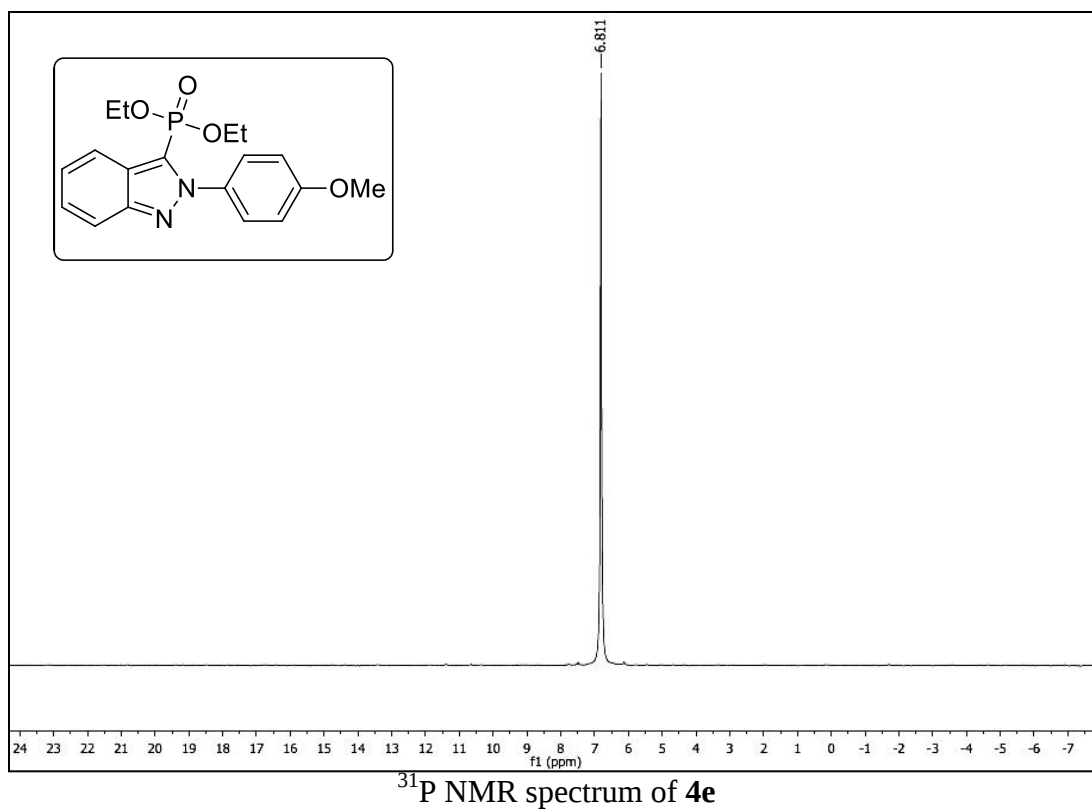


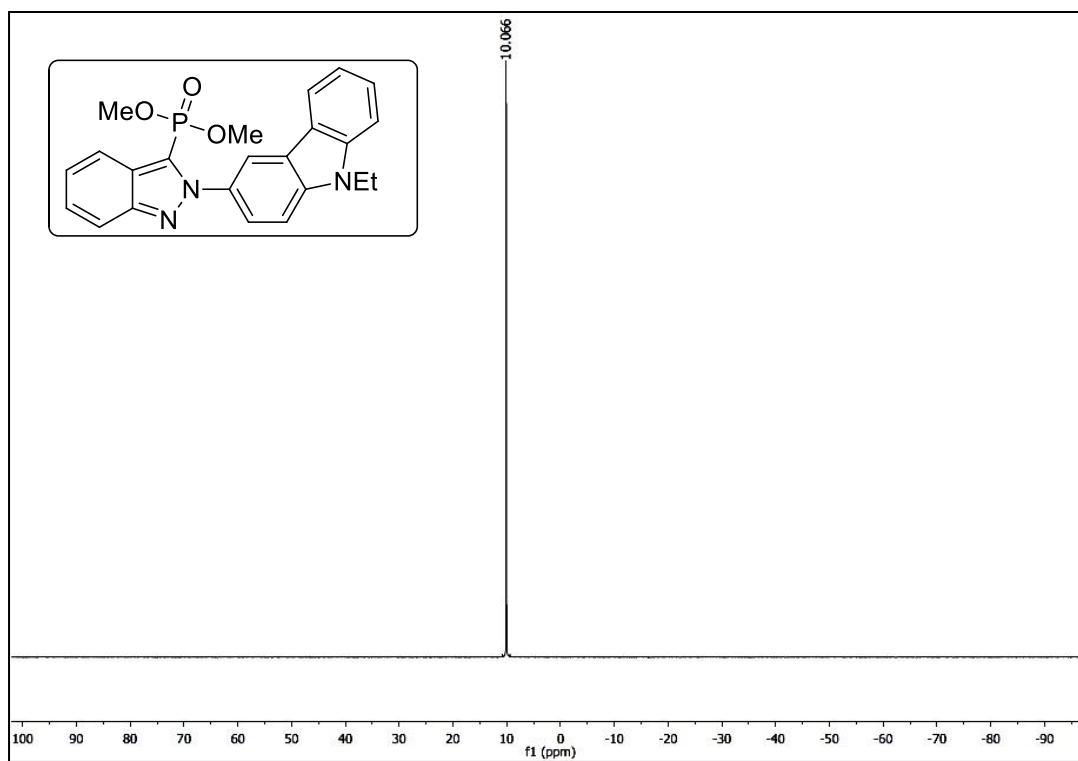




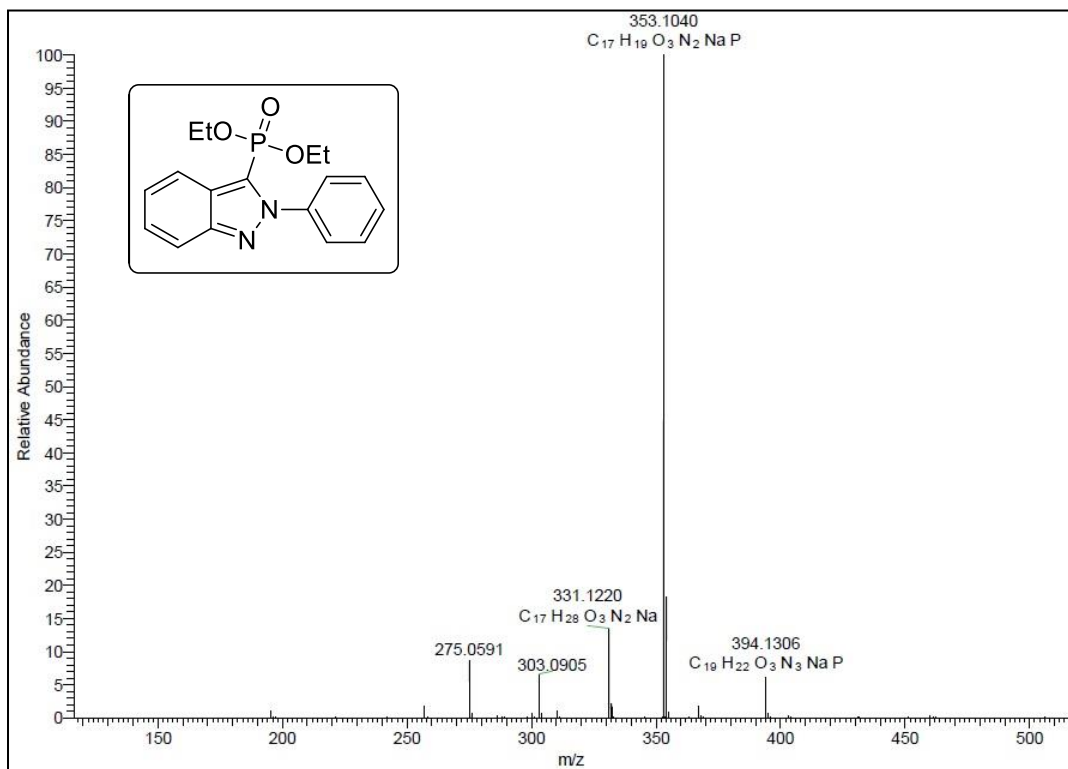




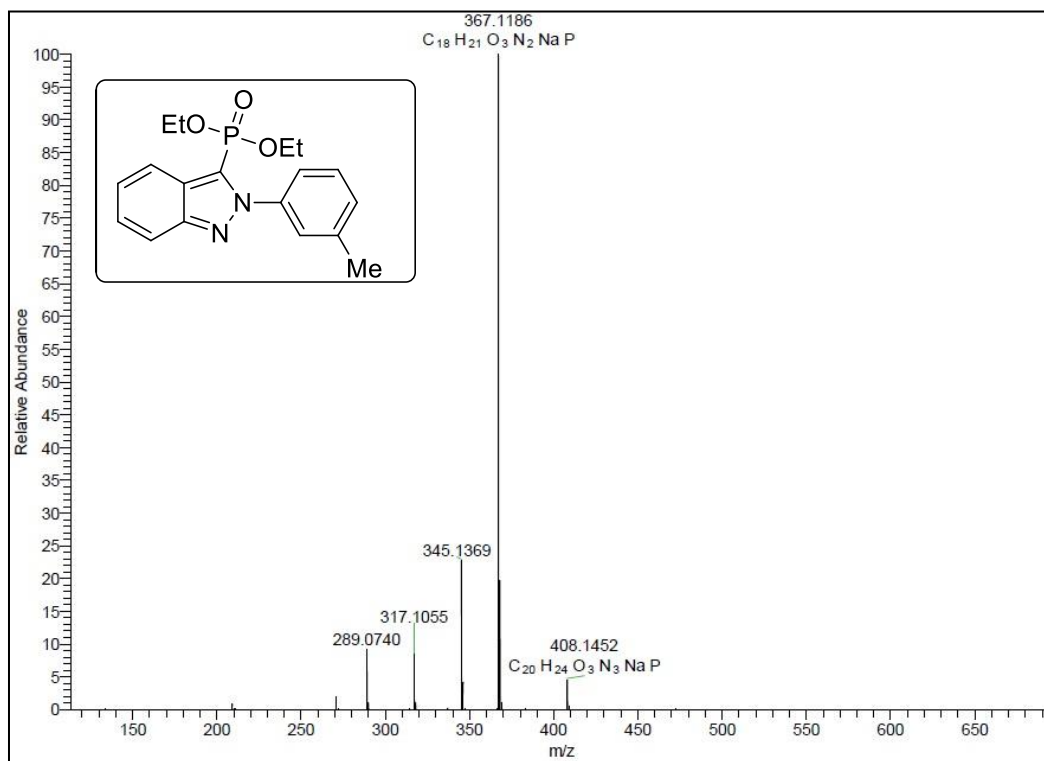




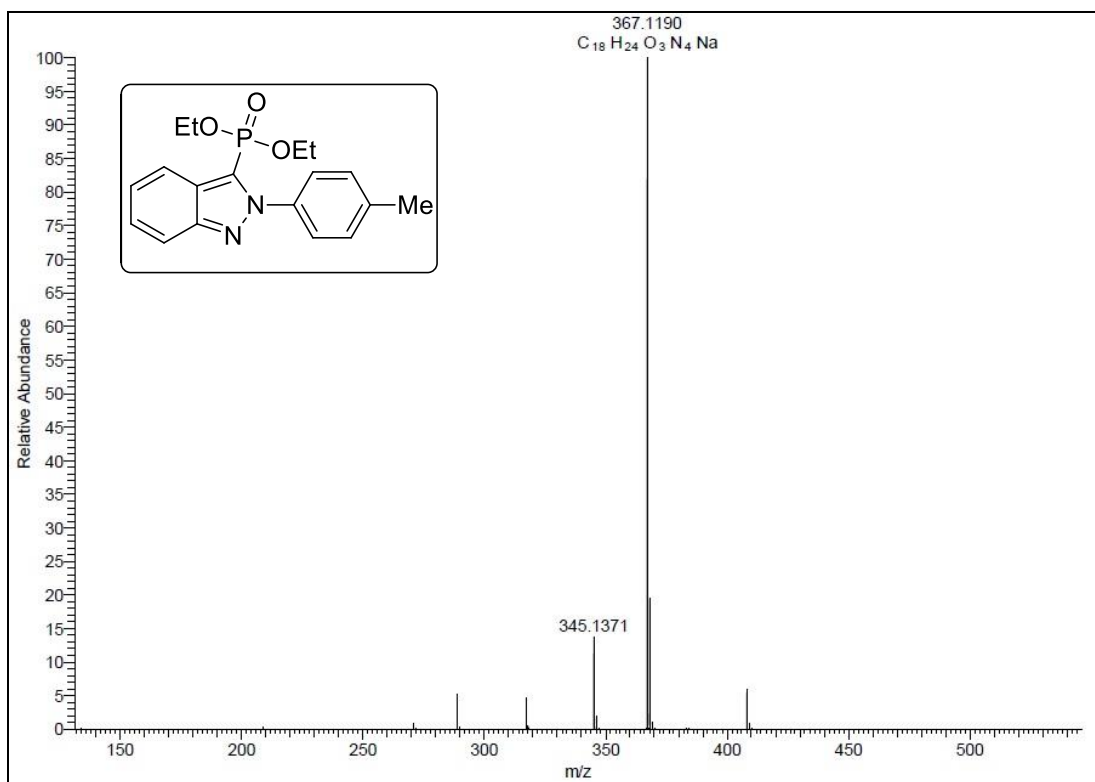
Mass spectra



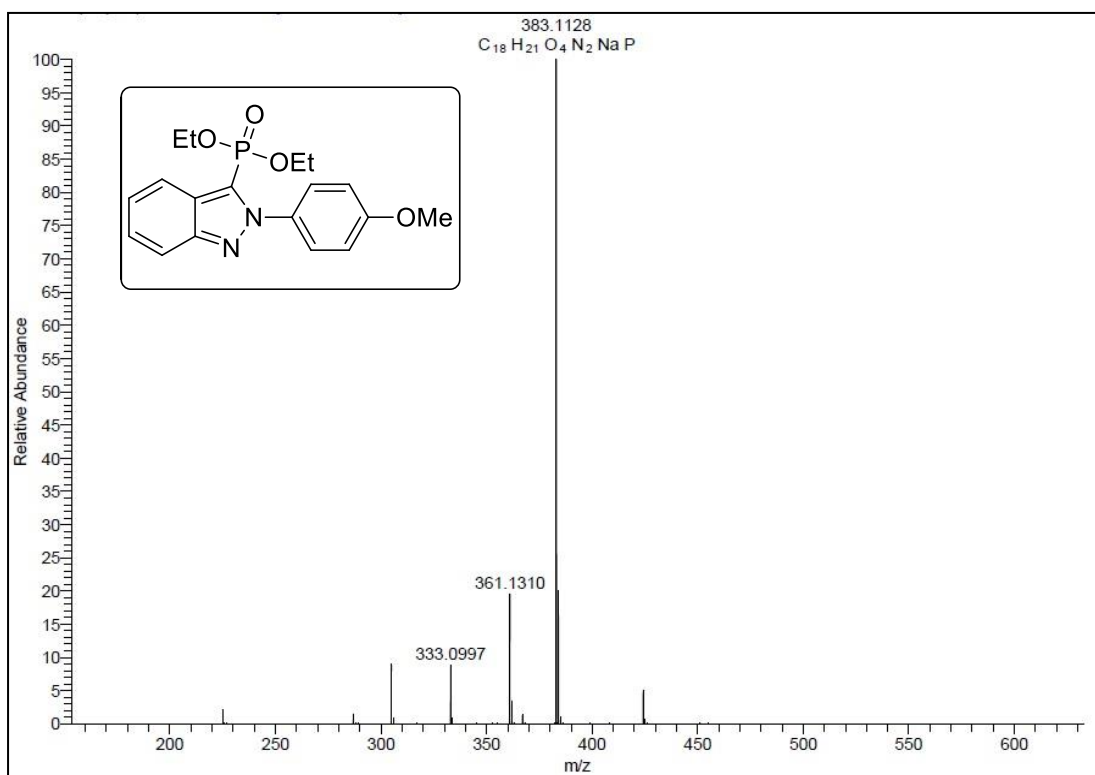
Mass spectrum of **4a**



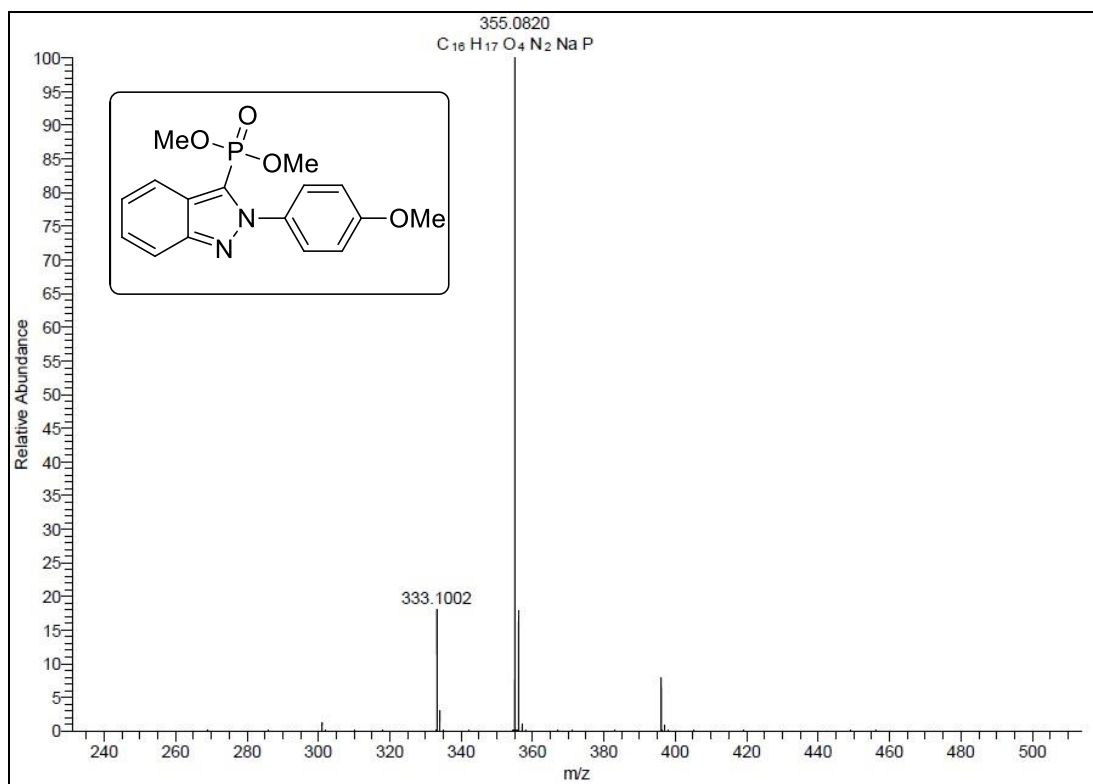
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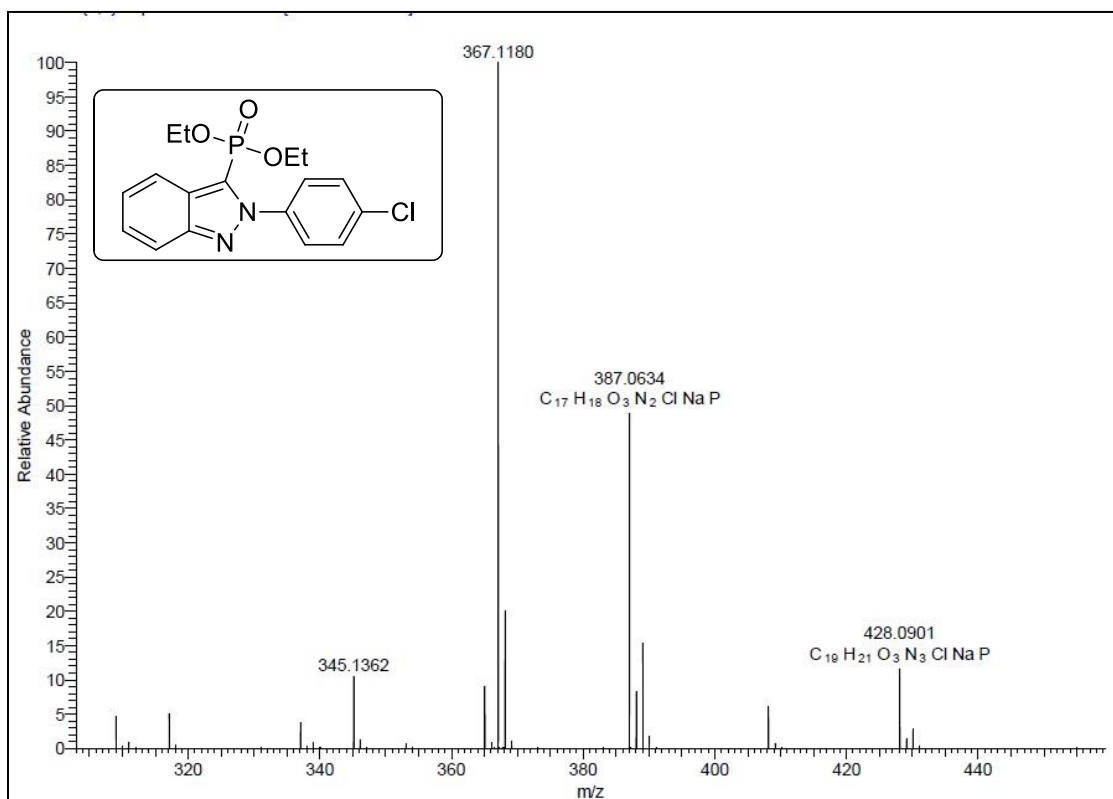
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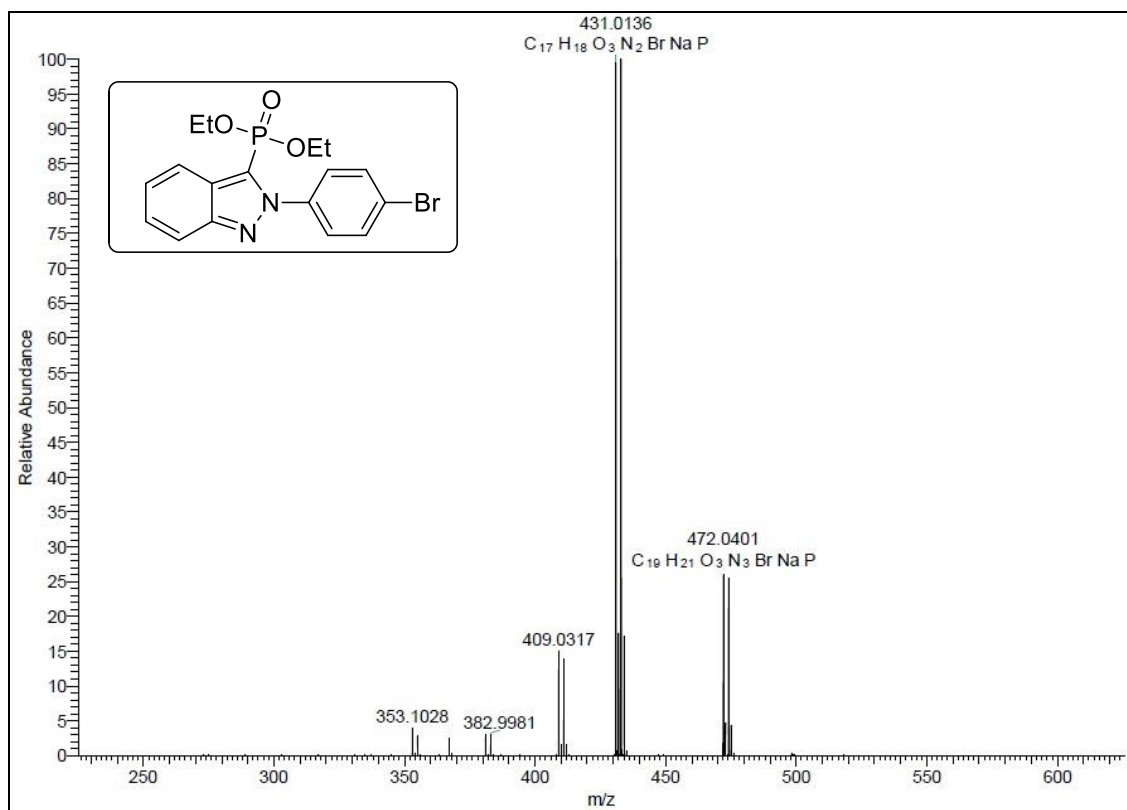
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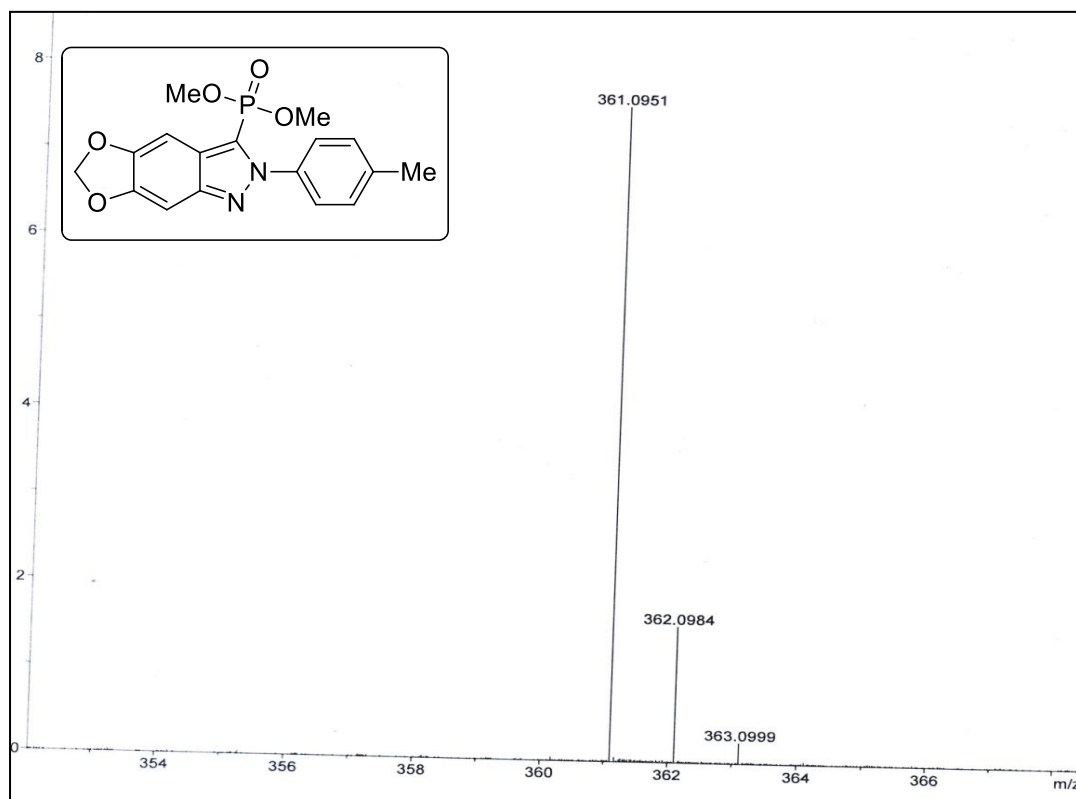
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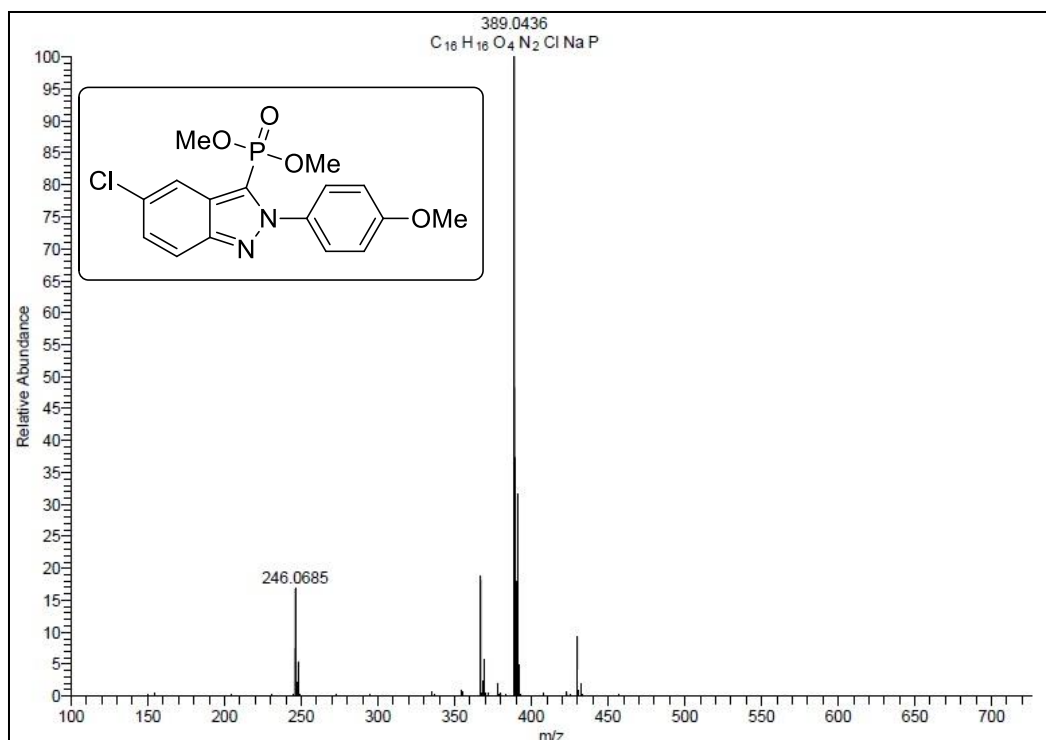
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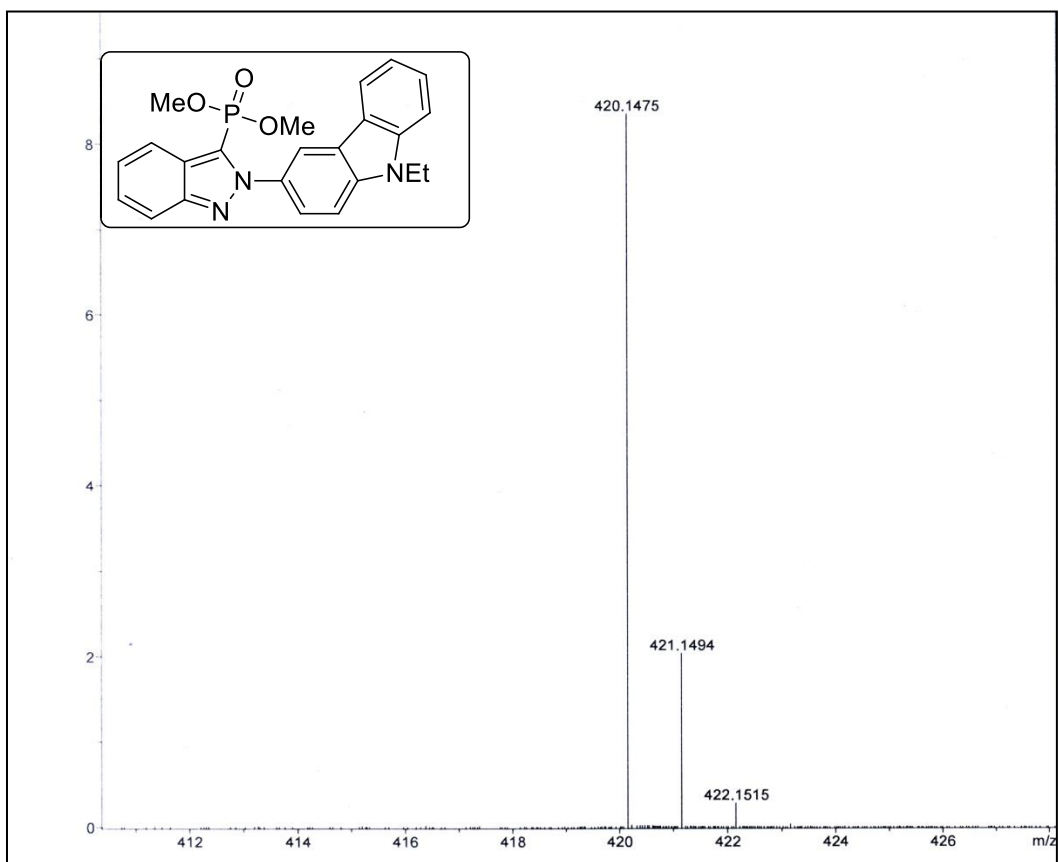
Mass spectrum of **4k**



Mass spectrum of **4p**



Mass spectrum of **4r**



Mass spectrum of **4t**

Table. 1 Anticancer activity of synthesized compounds (**4a-t**) against HepG-2 cells. Positive control Cisplatin 21.5±0.032 µM (IC₅₀)

Compounds	12.5µg/mL		25µg/mL		50µg/mL		100µg/mL	
	%	Mean±S.D	%	Mean±S.D	%	Mean±S.D	%	Mean±S.D
4a	24.1%	1.799±0.00335	57.6%	1.005±0.00402	67.5%	0.769±0.00354	86.4%	0.322±0.00603
4b	5.9%	2.230±0.00322	18.8%	1.923±0.00842	24.4%	1.791±0.00503	35%	1.541±0.00447
4c	14.3%	2.031±0.00469	25.9%	1.755±0.00298	53.4%	1.103±0.00325	77.9%	0.524±0.00547
4d	52.9%	1.116±0.00647	59.6%	0.958±0.00639	71.8%	0.668±0.00499	82.2%	0.422±0.00550
4e	17.7%	1.950±0.00359	33.8%	1.569±0.00766	60.5%	0.936±0.00554	69.4%	0.719±0.00608
4f	11.9%	2.088±0.00645	32.5%	1.599±0.00557	60.4%	0.937±0.00350	72.9%	0.642±0.00298
4g	58.1%	0.992±0.00559	69.6%	0.721±0.00889	78%	0.522±0.00337	85.5%	0.344±0.00409
4h	6.8%	2.209±0.00553	18.4%	1.932±0.00738	33%	1.588±0.00901	52.9%	1.115±0.00824
4i	2.6%	2.308±0.00339	7.6%	2.188±0.00542	13.9%	2.039±0.00744	16%	1.990±0.00660
4j	8.9%	2.159±0.00587	22.6%	1.833±0.00663	33.6%	1.573±0.00509	61%	0.923±0.00721
4k	3.5%	2.287±0.00338	16.9%	1.968±0.00498	21.7%	1.855±0.00809	31.2%	1.629±0.00994
4l	19.5%	1.906±0.00706	34.7%	1.547±0.00921	47.1%	1.253±0.00847	55.7%	1.049±0.00539
4m	3.1%	2.295±0.00509	14.3%	2.031±0.00687	22.8%	1.828±0.00457	32.3%	1.603±0.00366
4n	5.2%	2.245±0.00479	37.3%	1.947±0.00364	17.8%	1.485±0.00821	56.8%	1.023±0.00784
4o	30.2%	1.653±0.00558	57.6%	1.005±0.00921	70.3%	0.703±0.00603	77%	0.544±0.00809
4p	14.1%	2.036±0.00482	32.5%	1.598±0.00507	60.4%	0.937±0.00367	69.9%	0.713±0.00409
4q	18.4%	1.932±0.00558	30.5%	1.647±0.00336	42.8%	1.354±0.00234	63.7%	0.859±0.00524
4r	15.4%	2.003±0.00460	26.8%	1.733±0.00613	42.4%	1.365±0.00579	65.2%	0.824±0.00821
4s	11.7%	2.091±0.00507	20.2%	1.890±0.00691	36.6%	1.501±0.00466	56.9%	1.020±0.00529
4t	8%	2.180±0.00254	17.1%	1.964±0.00339	24.9%	1.780±0.00547	30.2%	1.654±0.00439

Table. 2 Anticancer activity of synthesized compounds (**4a-t**) against A549 cells. Positive control Cisplatin 18±0.059 μ M (IC₅₀)

Compounds	12.5 μ g/mL		25 μ g/mL		50 μ g/mL		100 μ g/mL	
	%	Mean±S.D	%	Mean±S.D	%	Mean±S.D	%	Mean±S.D
4a	2.7%	0.801±0.00557	16%	0.691±0.00369	33.8%	0.545±0.00288	51.3%	0.401±0.00210
4b	1.2%	0.813±0.00229	7.8%	0.759±0.00501	13.7%	0.710±0.00196	22.8%	0.635±0.00771
4c	10%	0.741±0.00336	31%	0.568±0.00156	40.6%	0.489±0.00258	55.7%	0.365±0.00233
4d	22.1%	0.641±0.00355	50.8%	0.405±0.00307	63.4%	0.301±0.00299	71.3%	0.236±0.00144
4e	2.1%	0.806±0.00173	7.8%	0.759±0.00228	16.5%	0.687±0.00249	35.4%	0.532±0.00117
4f	7.5%	0.761±0.00480	29%	0.584±0.00452	39.4%	0.498±0.00338	58.9%	0.338±0.00271
4g	29.4%	0.581±0.00723	51.5%	0.399±0.00884	68.7%	0.257±0.00631	75.9%	0.198±0.00501
4h	1.5%	0.811±0.00184	4.1%	0.789±0.00193	12.4%	0.721±0.00220	23.1%	0.633±0.00317
4i	6.1%	0.773±0.00339	18.5%	0.671±0.00559	32.1%	0.559±0.00403	41.9%	0.478±0.00280
4j	1.1%	0.815±0.00147	8.4%	0.754±0.00995	24.3%	0.623±0.00633	51.8%	0.397±0.00558
4k	3.8%	0.792±0.00633	9%	0.749±0.00625	17.3%	0.681±0.00540	32.4%	0.556±0.00517
4l	10%	0.741±0.00932	24.4%	0.622±0.00941	34.6%	0.538±0.00285	43.4%	0.466±0.00455
4m	3.9%	0.791±0.00225	15.8%	0.693±0.00477	30.9%	0.569±0.00355	56.7%	0.356±0.00504
4n	5.1%	0.781±0.00637	24.4%	0.622±0.00779	28.6%	0.588±0.00883	50.3%	0.409±0.00921
4o	17.5%	0.679±0.00163	36%	0.527±0.00159	56.3%	0.360±0.00230	74%	0.214±0.00286
4p	51.2%	0.402±0.00801	62%	0.313±0.00822	72.3%	0.228±0.00566	80.7%	0.159±0.00132
4q	2.2%	0.805±0.00822	32.3%	0.557±0.00709	42.2%	0.476±0.00668	53.8%	0.380±0.00597
4r	7%	0.765±0.00139	17.3%	0.681±0.00180	25.9%	0.610±0.00166	35.2%	0.533±0.00337
4s	1%	0.819±0.00339	17.9%	0.676±0.00628	35.1%	0.534±0.00711	58.6%	0.341±0.00281
4t	4.9%	0.783±0.00557	20.5%	0.654±0.00309	27.2%	0.599±0.00455	40.7%	0.488±0.00541