Supplementary Information

Asymmetric Allylation of Sulfonyl Imines Catalyzed by in situ Generated Cu(II) Complexes of Chiral Amino Alcohol Based Schiff Bases

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Content

General

Different aldehydes and reagents were used as received. The imine substrates (**1a**-**1o**) were prepared following literature procedure.[1] All the solvents used in the present study were dried by known purification technique.[2] NMR spectra were obtained with a Bruker F113V spectrometer (500 MHz / 200 MHz) and are referenced internally with TMS. Splitting patterns were reported as s, singlet; d, doublet; dd, doublet of doublet; t, triplet; q, quartet; m, multiplet; br, broad. Enantiomeric excess (ee) were determined by HPLC using Daicel Chiralpak OD-H, AS-H and IA, chiral columns with 2-propanol/hexane as eluent. FTIR spectra were carried out using KBr. Optical rotations were determined by automatic polarimeter. For the product purification flash chromatography was performed using silica gel 100-200 mesh.

ESI-MS spectral analysis for the interaction of *in situ* generated catalyst (Cu_2-L) with L-tert-leucinol and substrate 1b

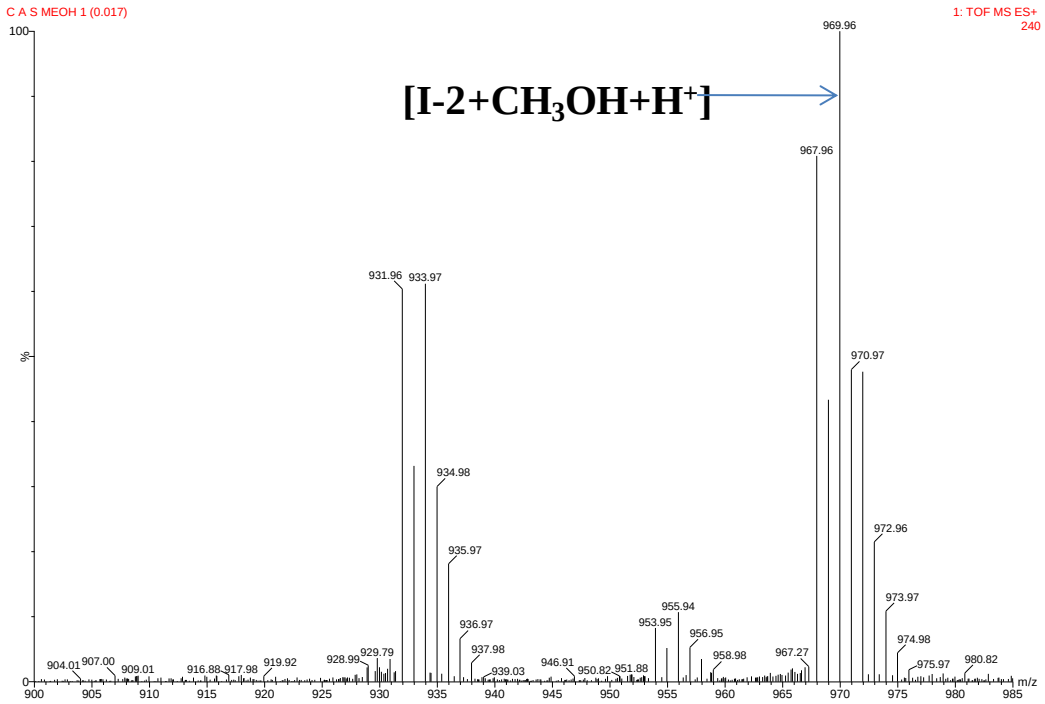
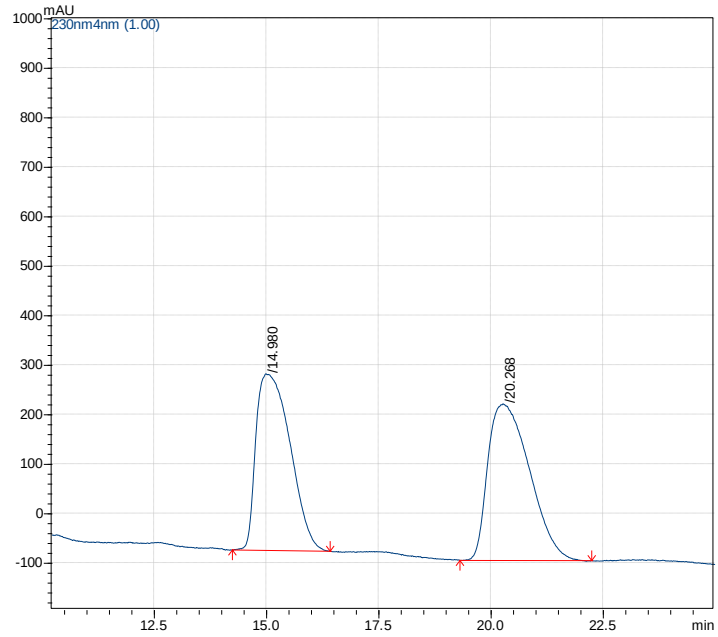
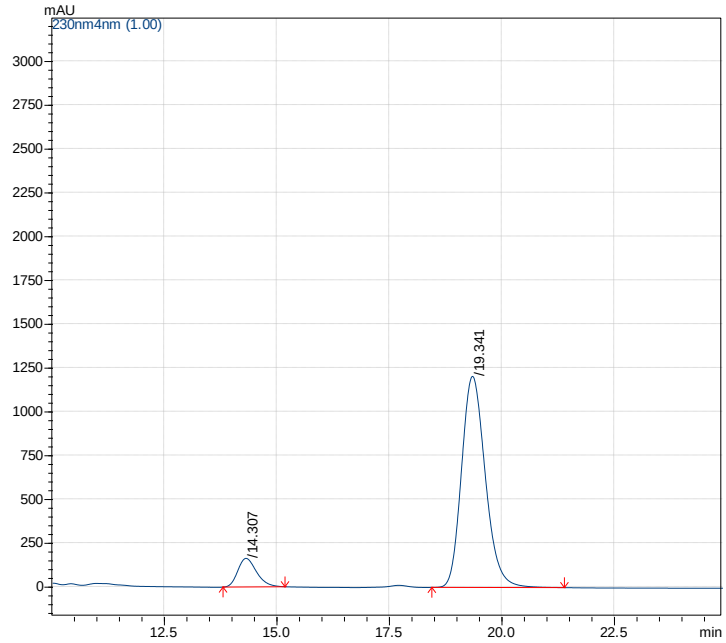


Figure 1 ESI-MS spectum of the in situ generated complex after addition of L-tert-leucinol ans substrate (**1c**) was recorded in methanol.

Copy of HPLC chromatogram of the products 2a-2p

N-(1-Phenylbut-3-enyl)-4-methylbenzenesulfonamide 2a

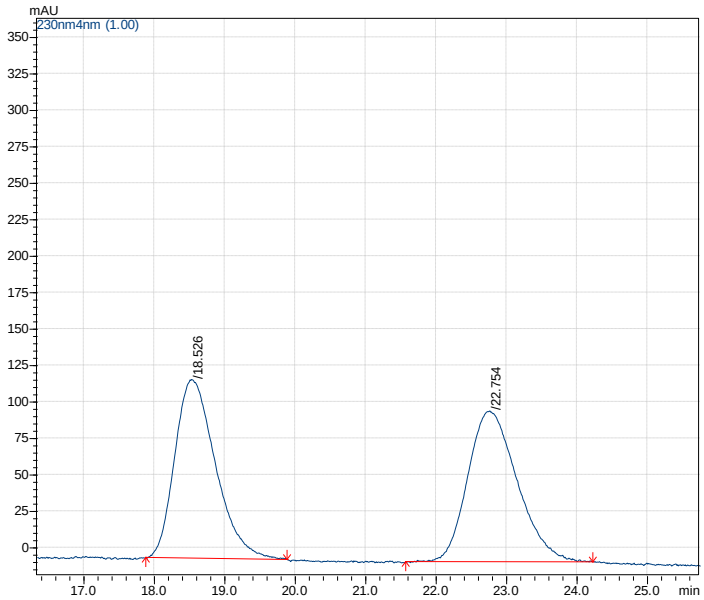


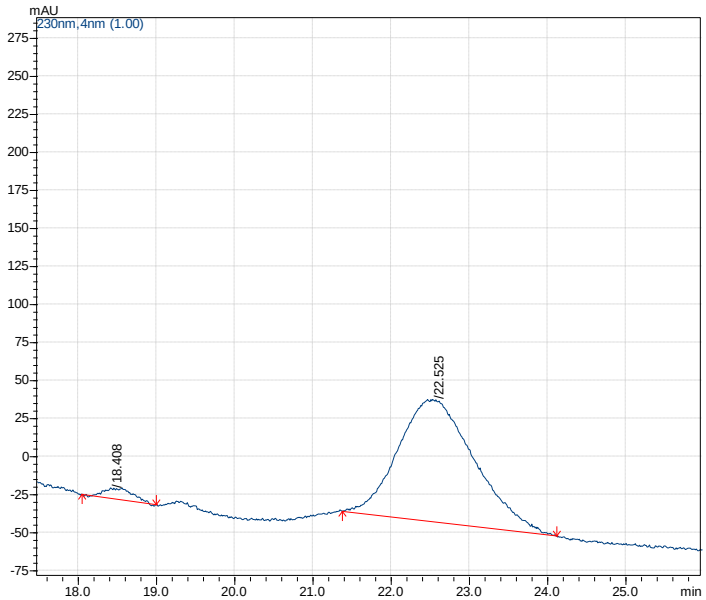


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	14.980	18904257	14.240	16.416	48.0460
2	20.268	20441876	19.307	22.240	51.9540

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	14.307	4747693	13.803	15.179	9.6709
2	19.341	44344728	18.443	21.387	90.3291

N-(1-(4-Chlorophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2b

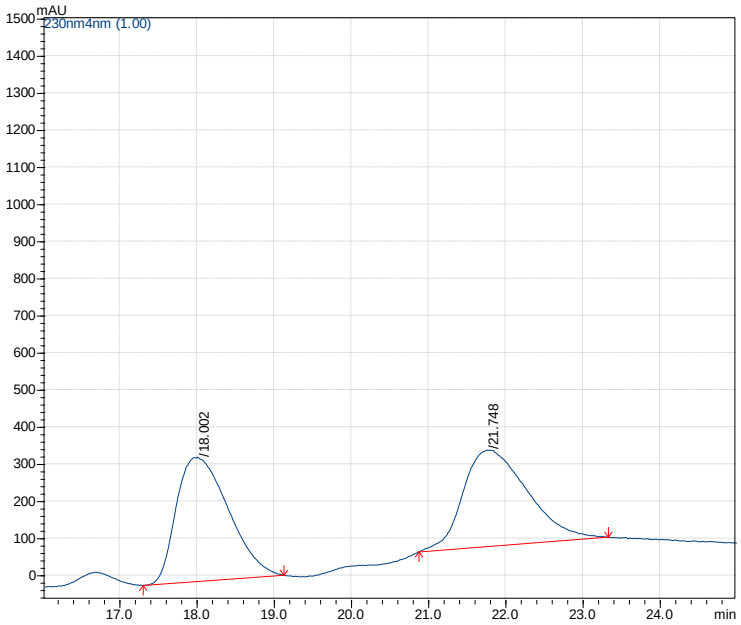


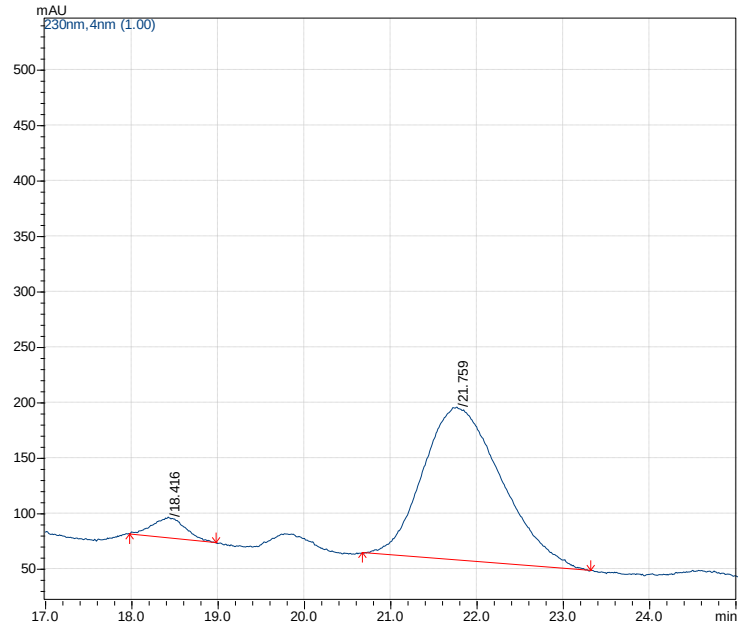


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	18.526	4918321	17.877	19.883	49.4156
2	22.754	5034659	21.568	24.224	50.5844

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	18.408	176931	18.048	18.997	3.1429
2	22.525	5452672	21.376	24.117	96.8571

N-(1-(4-Chlorophenyl)but-3-enyl)benzenesulfonamide 2c

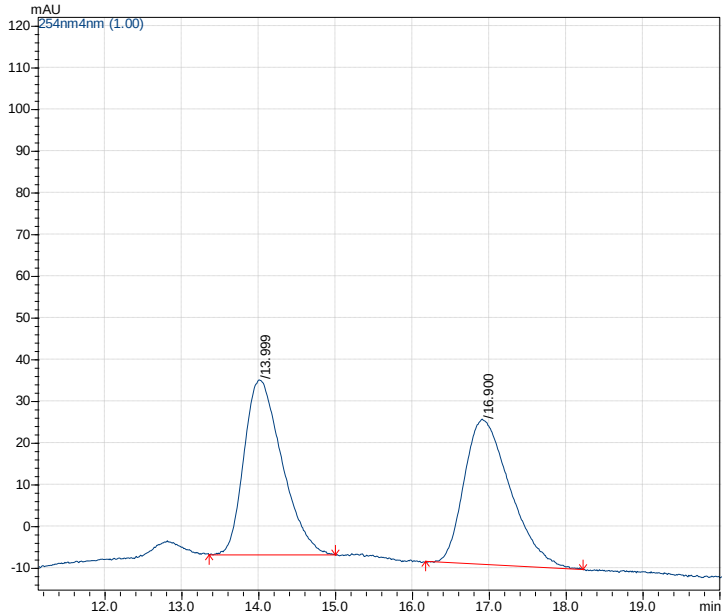


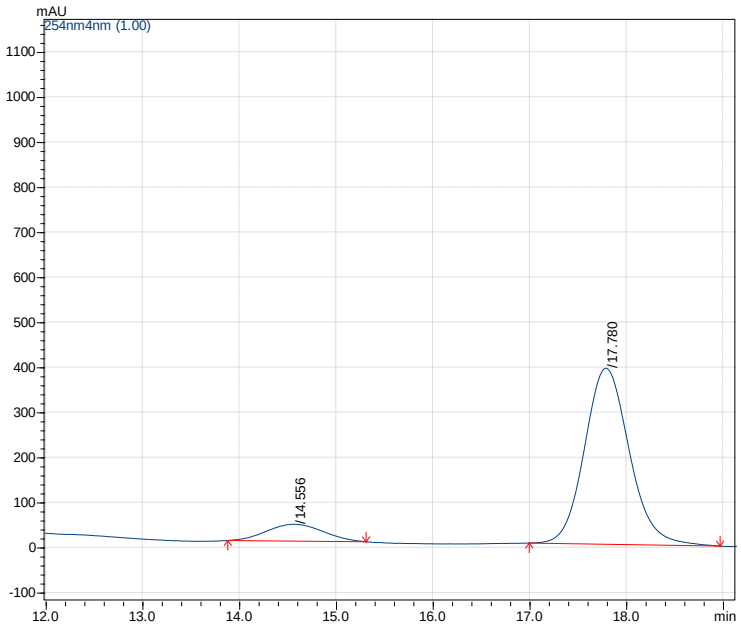


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	18.002	15714207	17.301	19.125	51.0605
2	21.748	15061465	20.875	23.328	48.9395

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	18.416	486316	17.973	18.976	5.3053
2	21.759	8680221	20.672	23.317	94.6947

N-(1-(4-Chlorophenyl)but-3-enyl)-4-nitrobenzenesulfonamide 2d

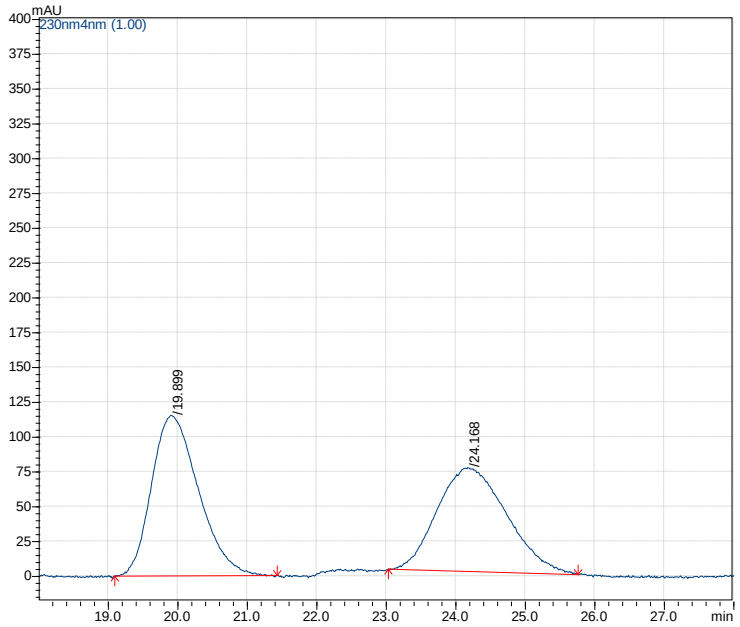


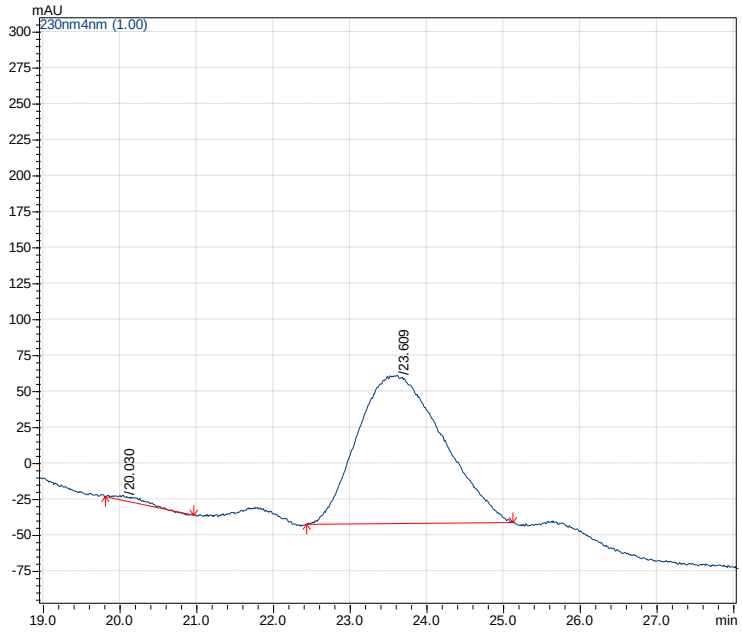


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	13.999	1444488	13.355	14.997	49.9851
2	16.900	1445349	16.171	18.219	50.0149

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	14.556	1515390	13.877	15.307	10.7374
2	17.780	12597803	16.992	18.965	89.2626

N-(1-(4-Bromophenyl)but-3-enyl)benzenesulfonamide 2e

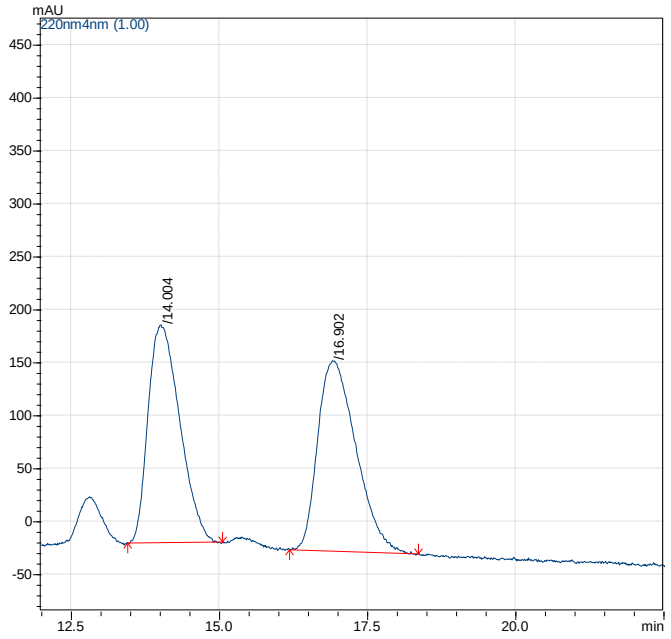


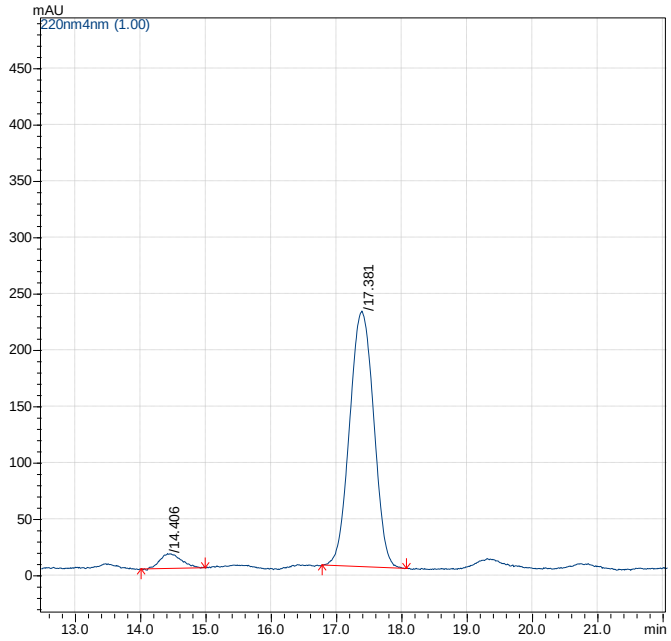


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	19.899	5400492	19.093	21.429	51.0112
2	24.168	5186380	23.029	25.760	48.9888

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	20.030	87212	19.808	20.960	1.0756
2	23.609	8020883	22.432	25.120	98.9244

N-(1-(4-Fluorophenyl)but-3-enyl)-4-ethylbenzenesulfonamide 2f

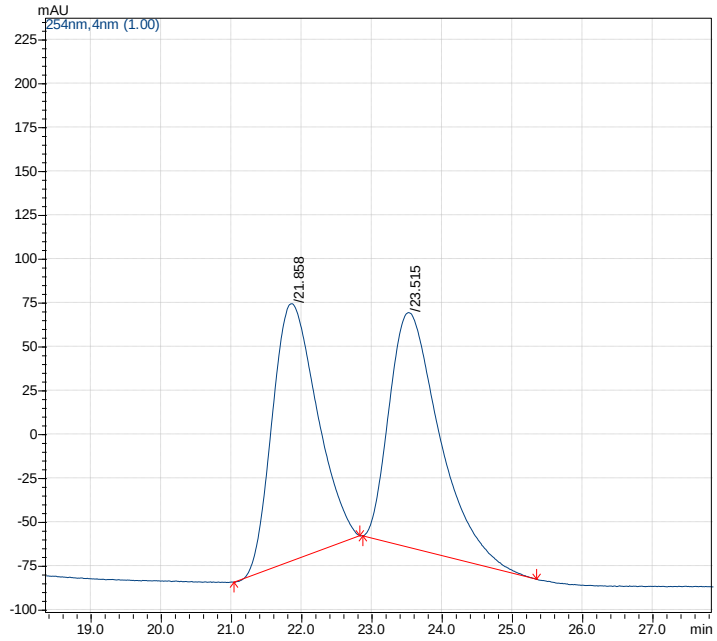


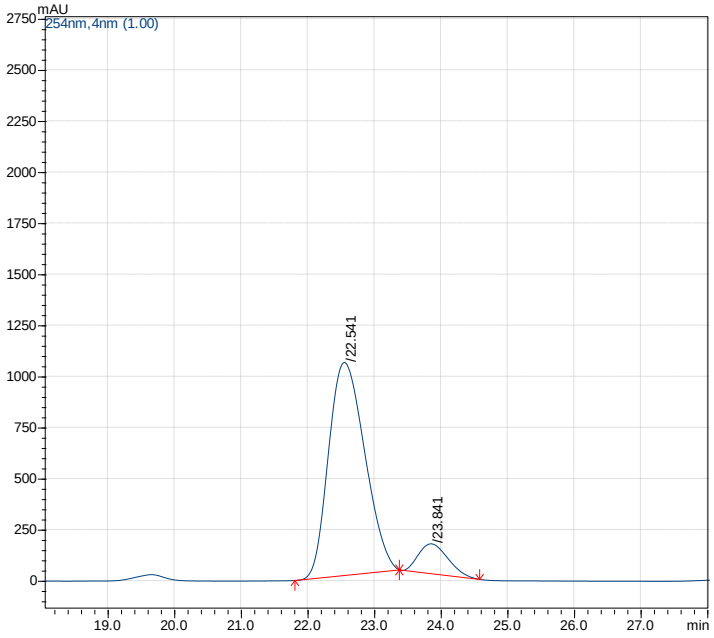


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	14.004	7646345	13.451	15.051	48.5627
2	16.902	8098962	16.181	18.357	51.4373

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	14.406	293718	14.005	14.987	4.8054
2	17.381	5818484	16.779	18.069	95.1946

N-(1-(4-Nitrophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2g

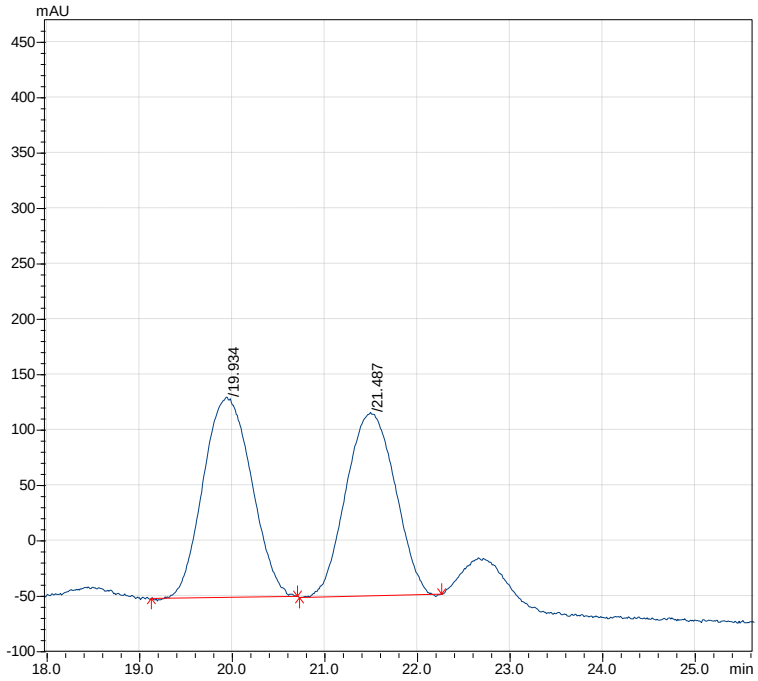


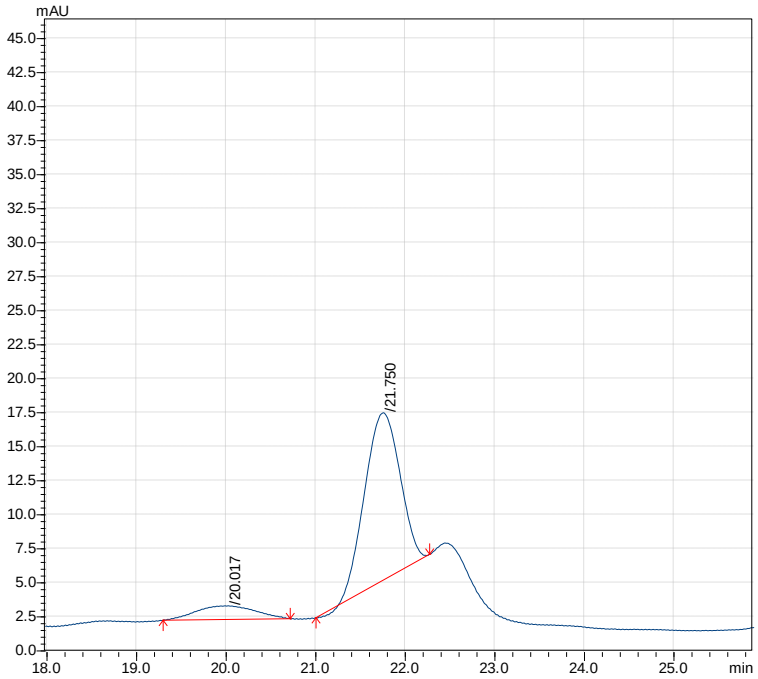


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	21.858	6509707	21.035	22.827	49.3548
2	23.515	6679918	22.869	25.344	50.6452

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	22.541	39401576	21.803	23.371	89.7496
2	23.841	4500113	23.371	24.576	10.2504

***N*-(1-(4-Trifluoromethylphenyl)but-3-enyl)-4-methylbenzenesulfonamide 2h**

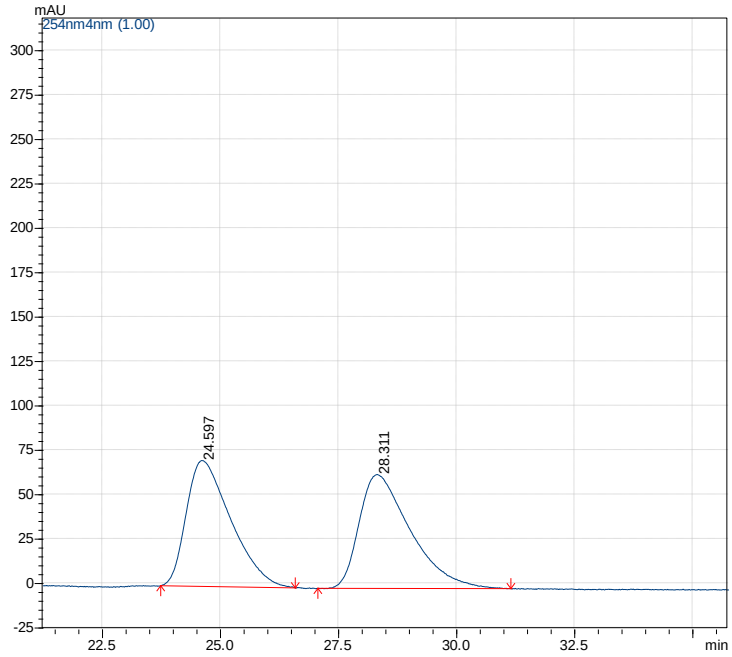


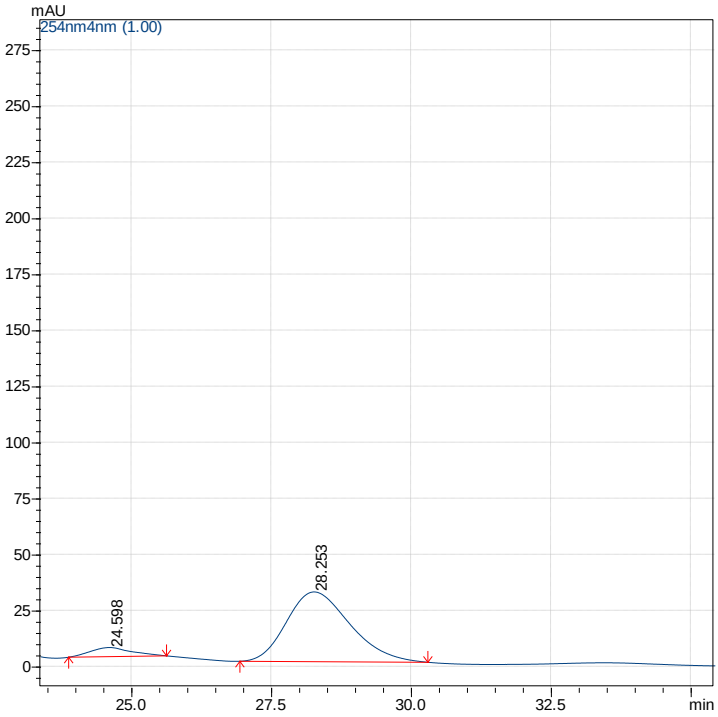


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	19.934	6548244	19.125	20.704	51.7905
2	21.487	6095463	20.725	22.261	48.2095

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	20.017	46250	19.296	20.715	12.0158
2	21.750	338659	21.003	22.272	87.9842

N-(1-(4-Methoxyphenyl)but-3-enyl)benzenesulfonamide 2i

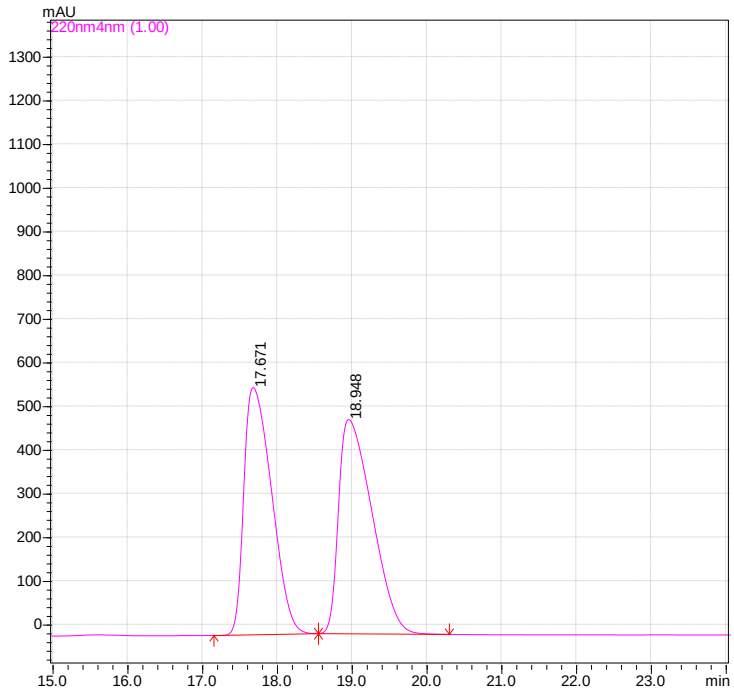


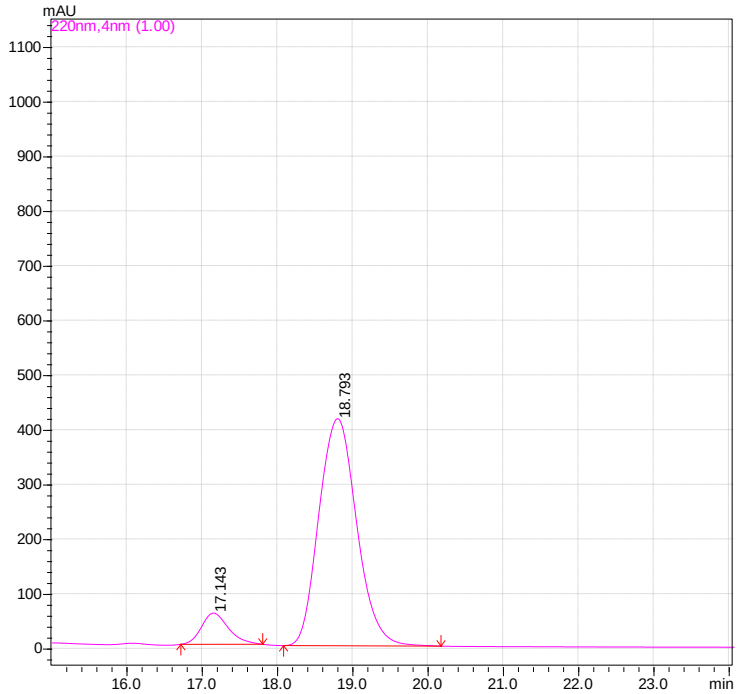


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	24.597	4654983	23.733	26.581	49.0726
2	28.311	4830923	27.061	31.147	50.9274

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	24.598	209625	23.872	25.621	7.8605
2	28.253	2457172	26.933	30.293	92.1395

N-(1-(3-Chlorophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2j

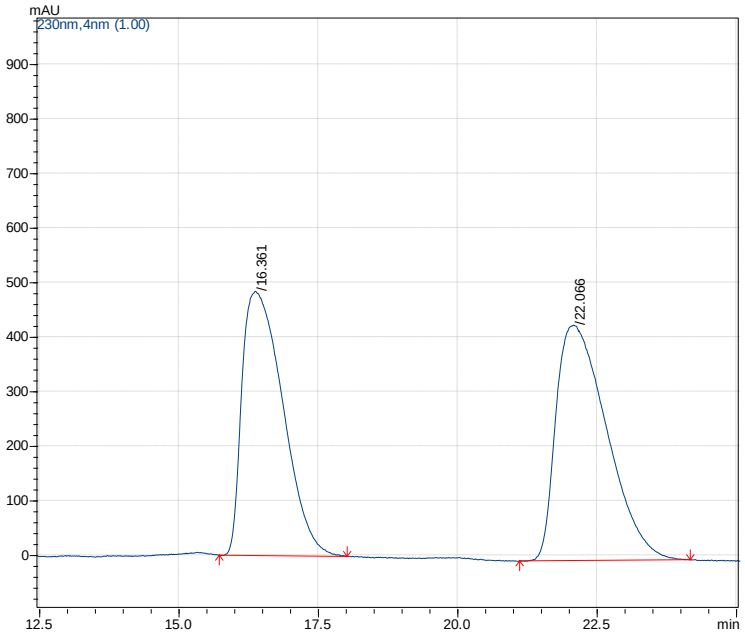


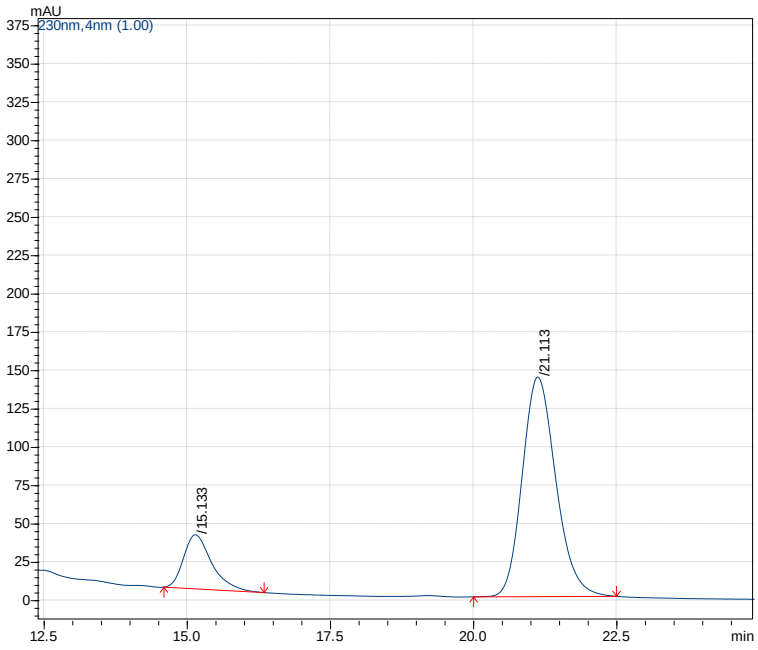


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	17.671	14621781	17.152	18.549	48.9527
2	18.948	15247409	18.549	20.299	51.0473

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	17.143	1426400	16.715	17.803	8.9628
2	18.793	14488260	18.080	20.171	91.0372

N-(1-(2-Chlorophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2k

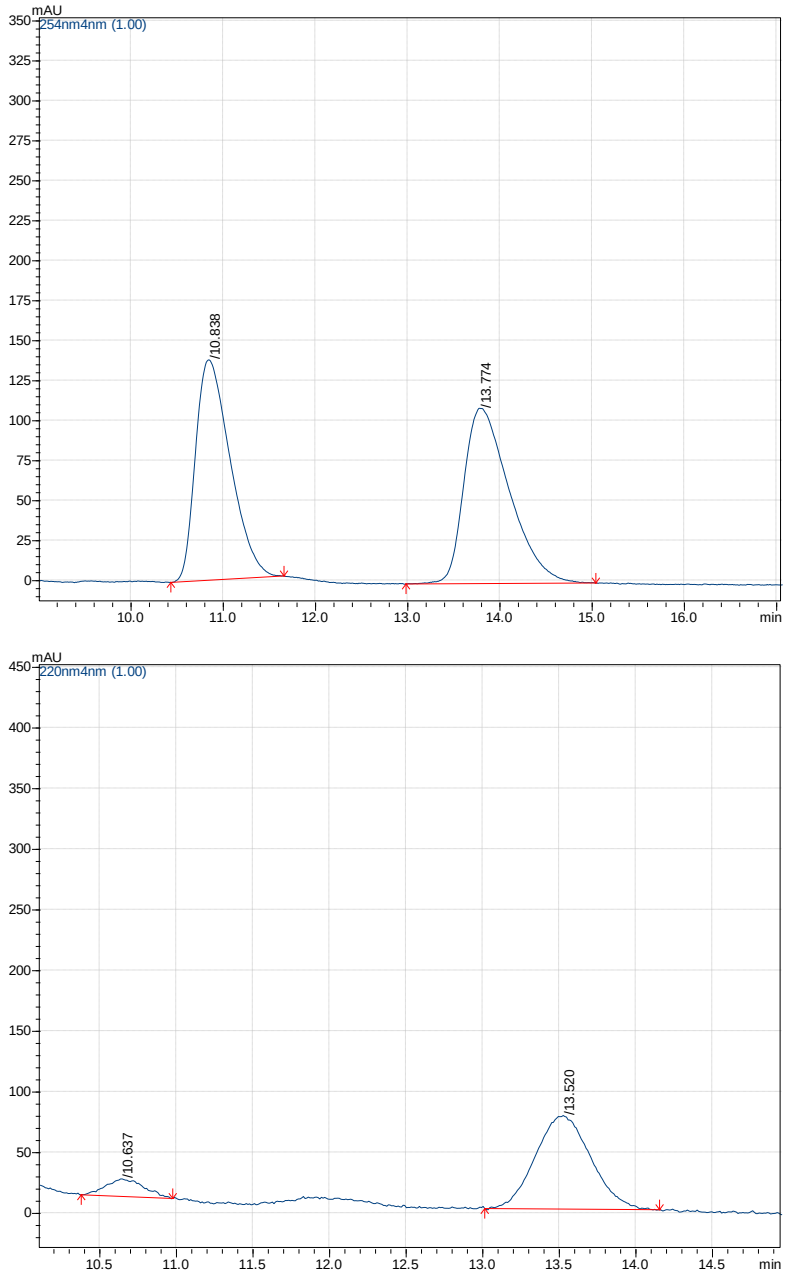




Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	16.361	24732814	15.723	18.016	47.5085
2	22.066	27326946	21.109	24.171	52.4915

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	15.133	1205239	14.592	16.341	17.0976
2	21.113	5843929	20.000	22.496	82.9024

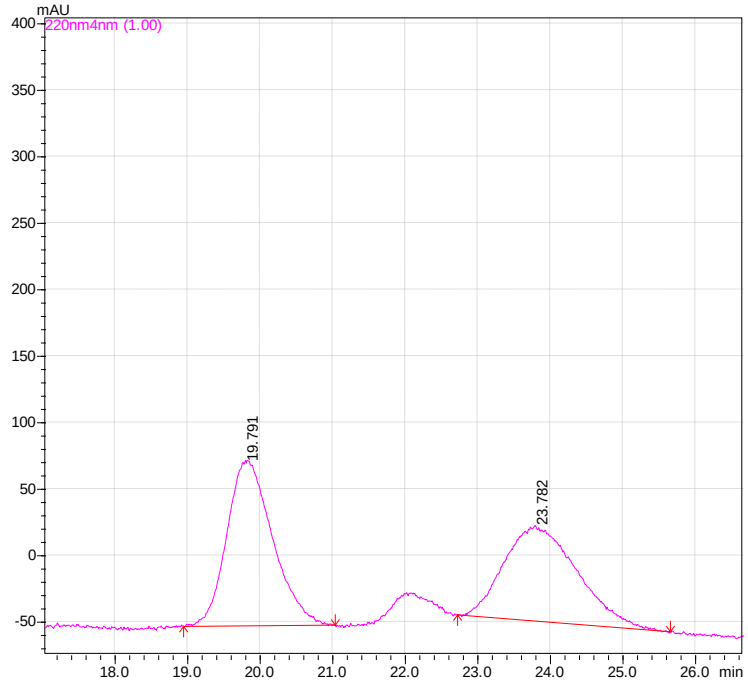
N-(1-(2-Fluorophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2l

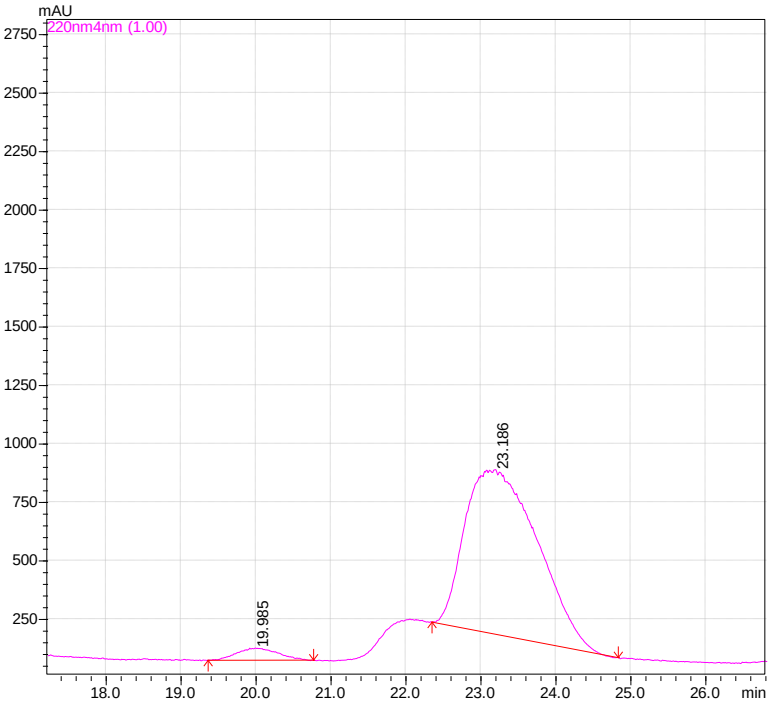


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	10.838	3602505	10.432	11.659	48.8919
2	13.774	3765803	12.981	15.040	51.1081

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	10.637	249989	10.379	10.976	11.4401
2	13.520	1935212	13.013	14.155	88.5599

N-(1-(1-Naphthyl)but-3-enyl)-4-methylbenzenesulfonamide 2m

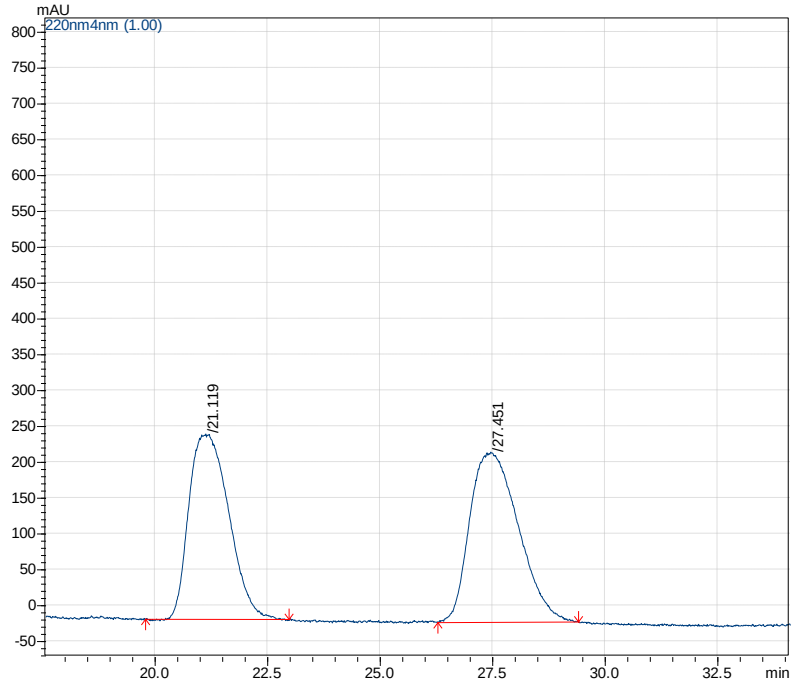


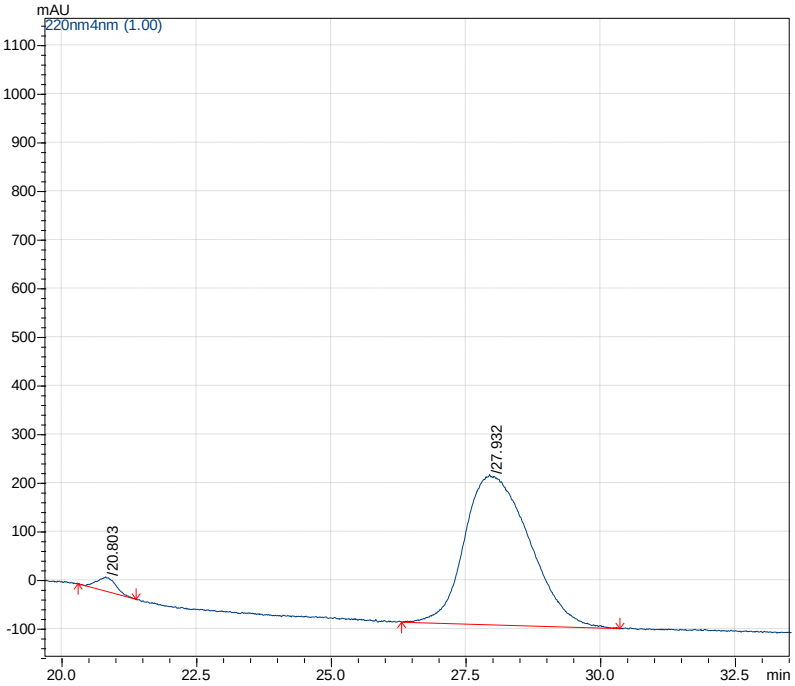


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	19.791	5457558	18.944	21.035	52.2180
2	23.782	4993929	22.720	25.653	47.7820

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	19.985	1978657	19.360	20.768	3.9929
2	23.186	47575321	22.347	24.832	96.0071

N-(1-(2-Naphthyl)but-3-enyl)-4-methylbenzenesulfonamide 2n

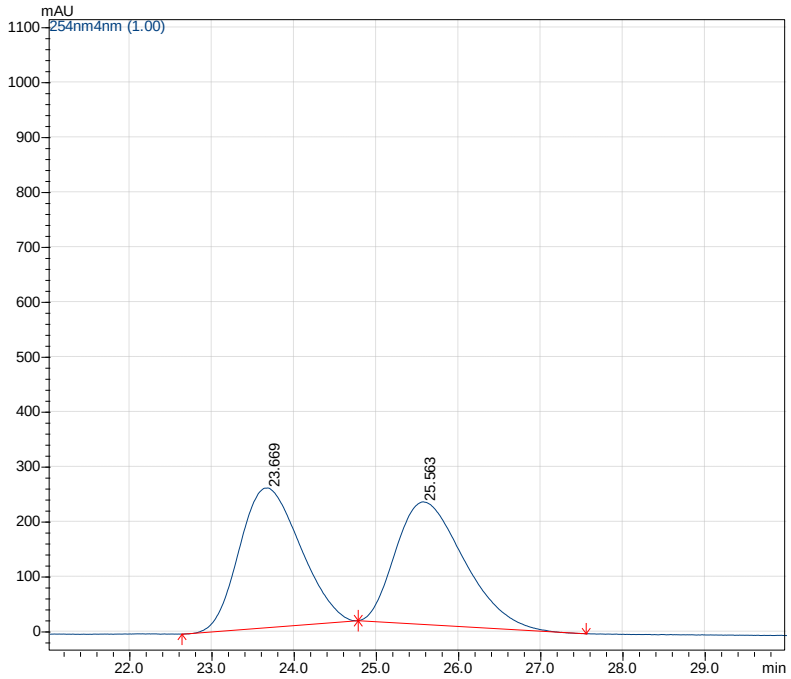


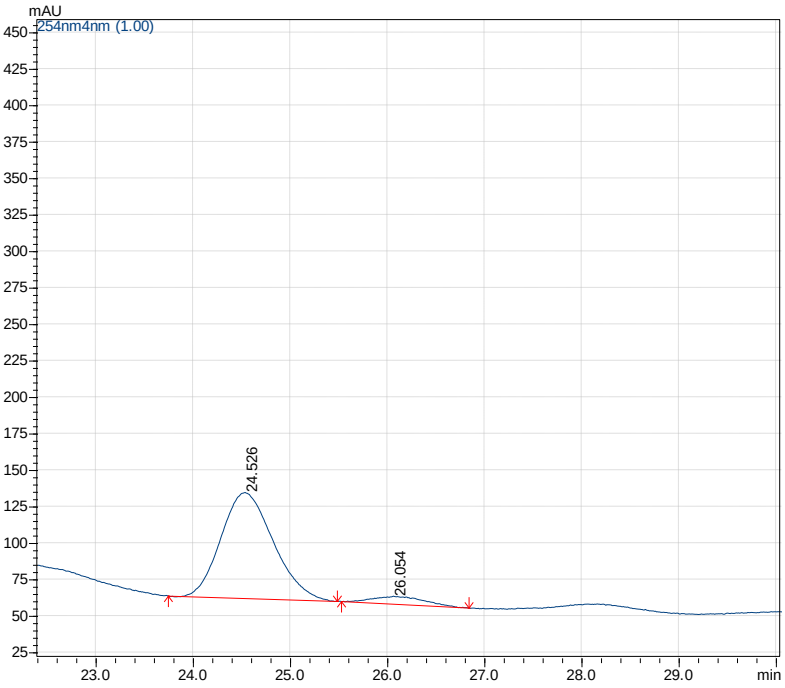


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	21.119	15938208	19.787	22.976	47.1301
2	27.451	17879230	26.283	29.408	52.8699

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	20.803	697514	20.299	21.376	2.6283
2	27.932	25841109	26.304	30.357	97.3717

(*E*)-*N*-(1-Phenylhexa-1,5-diene-3-yl)-4-methylbenzenesulfonamide 2o

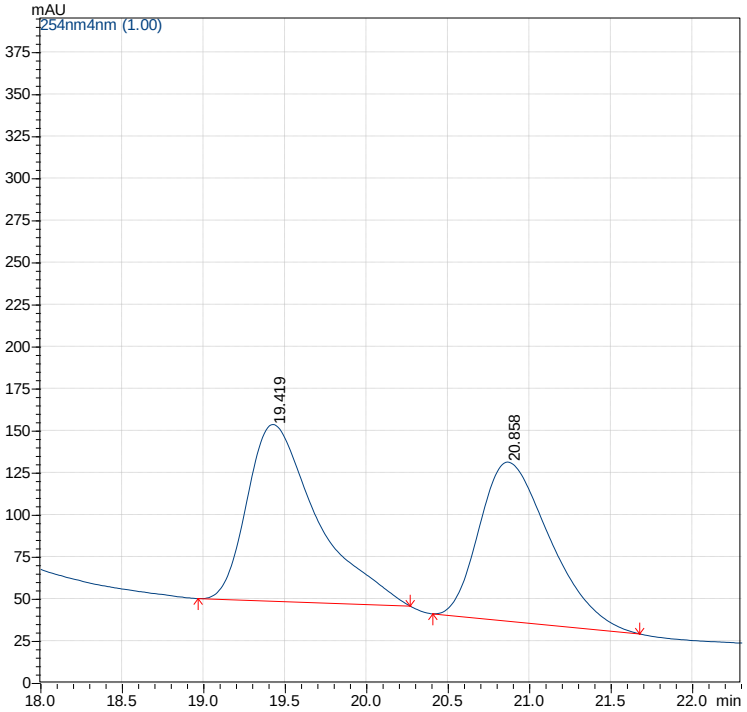


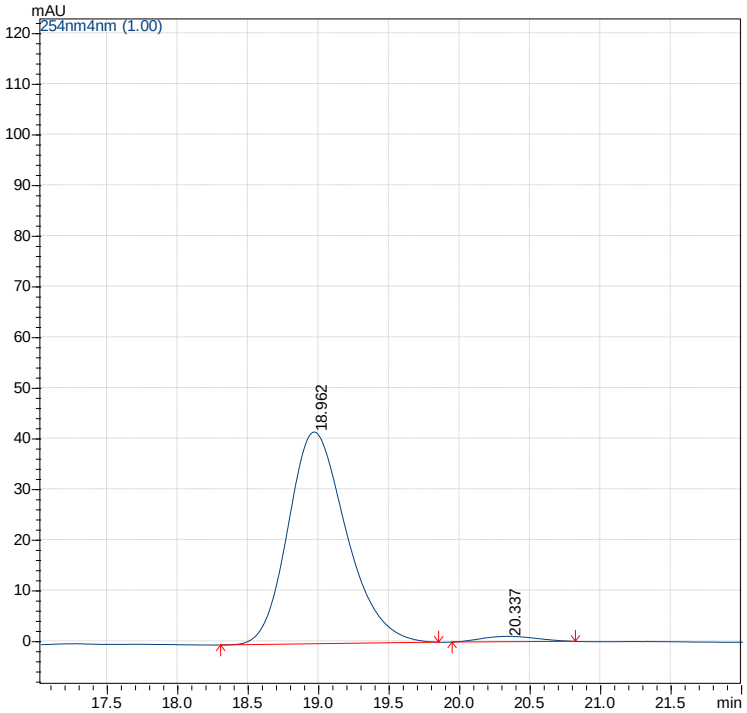


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	23.669	13081329	22.635	24.779	50.3257
2	25.563	12912029	24.779	27.552	49.6743

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	24.526	2725395	23.744	25.483	93.1427
2	26.054	200648	25.525	26.837	6.8573

(*E*)-*N*-(2-methyl-1-phenylhexa-1,5-dien-3-yl)-4-methyl-benzenesulfonamide 2p

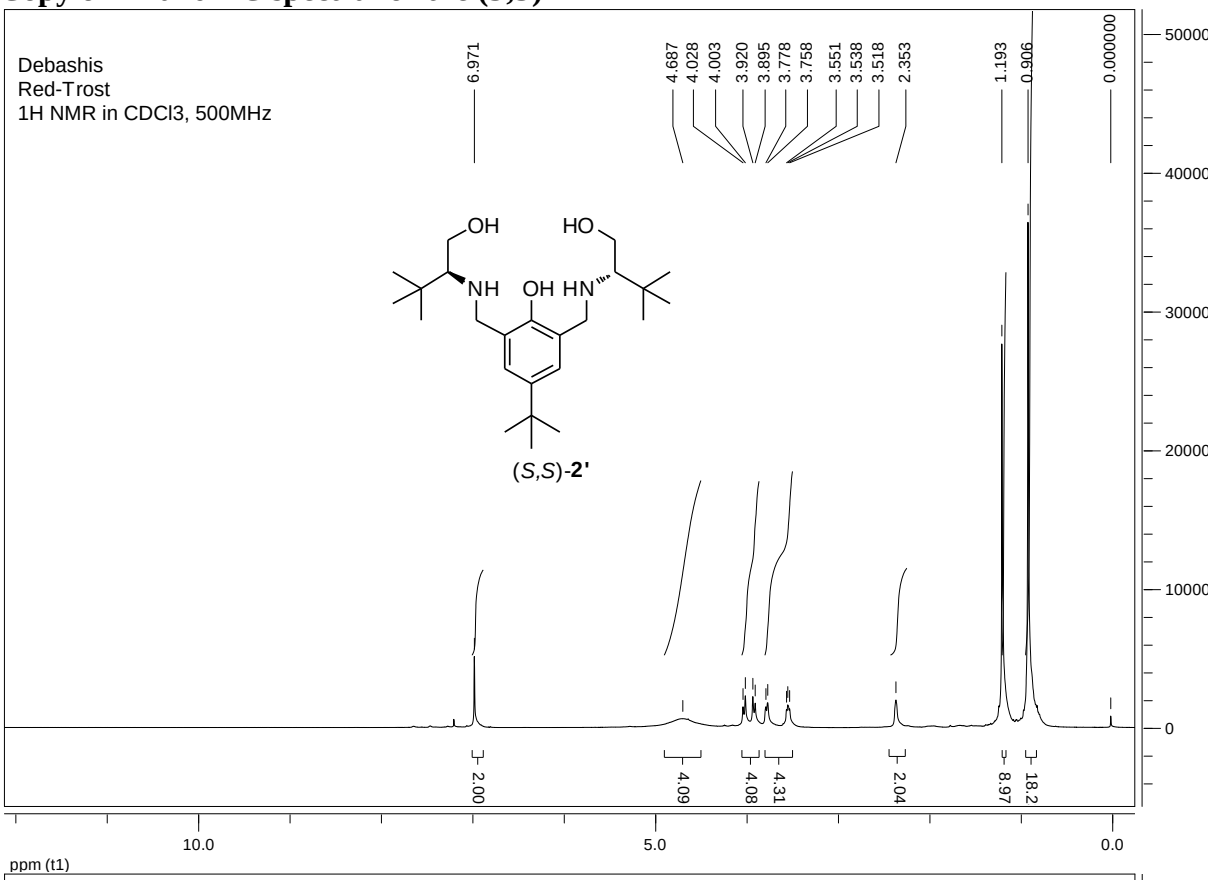


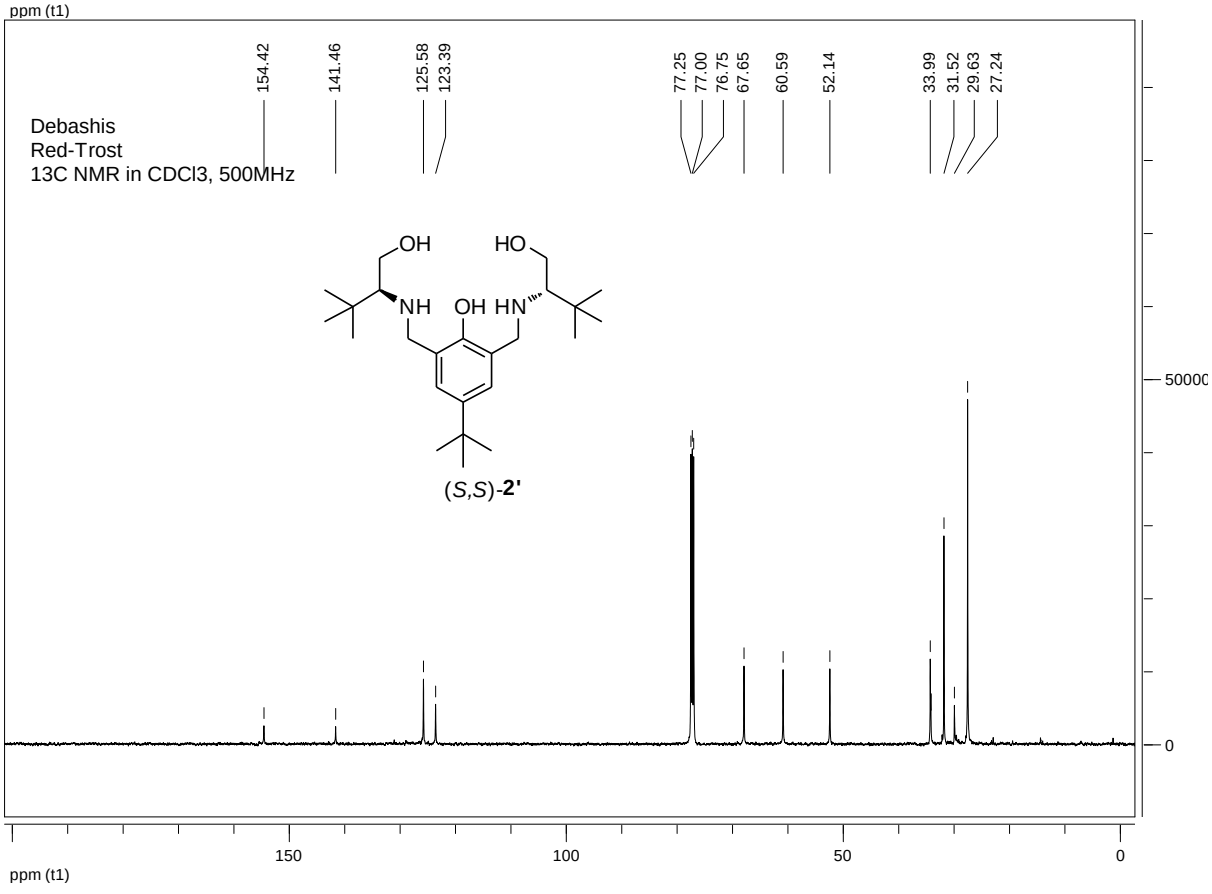


Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	19.419	3141571	18.965	20.267	52.3333
2	20.858	2861438	20.405	21.675	47.6667

Peak#	Ret. Time	Area	Peak Start	Peak End	Area%
1	18.962	1199928	18.304	19.851	97.6265
2	20.337	29172	19.947	20.821	2.3735

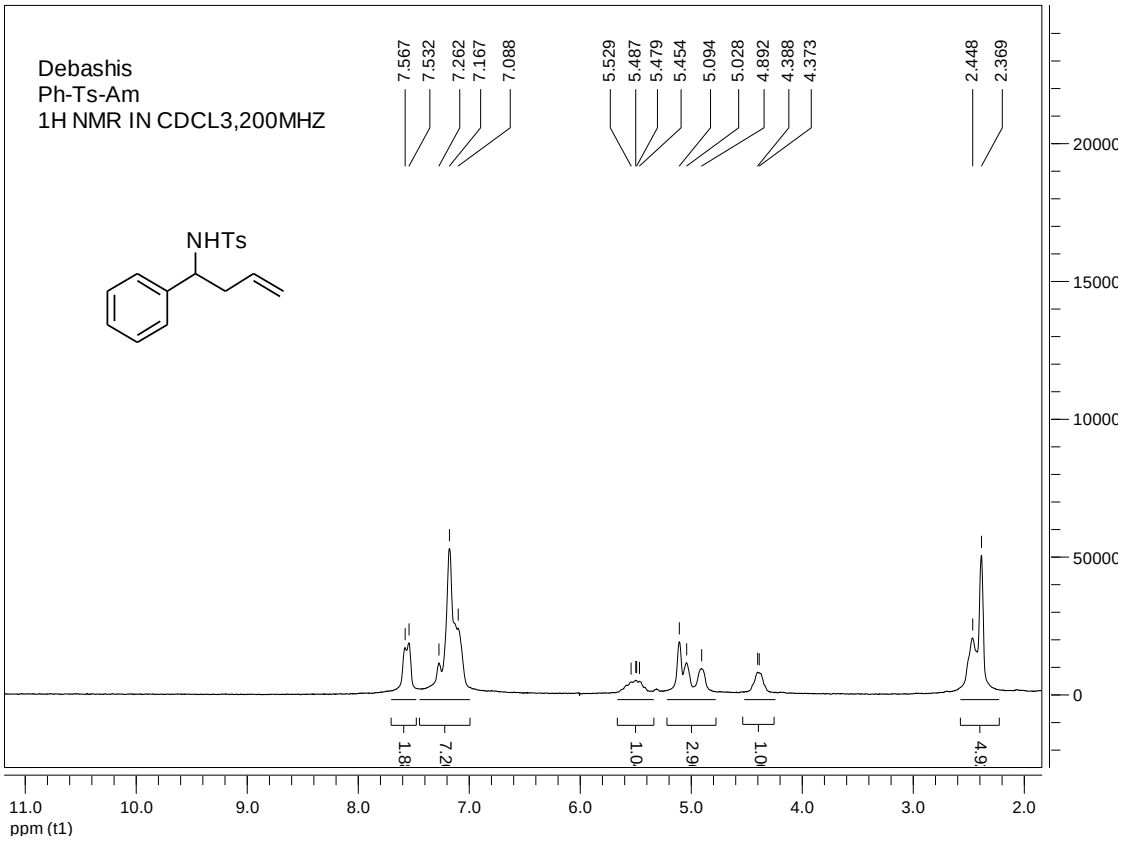
Copy of ^{1}H and ^{13}C spectra for the (*S*,*S*)-2'

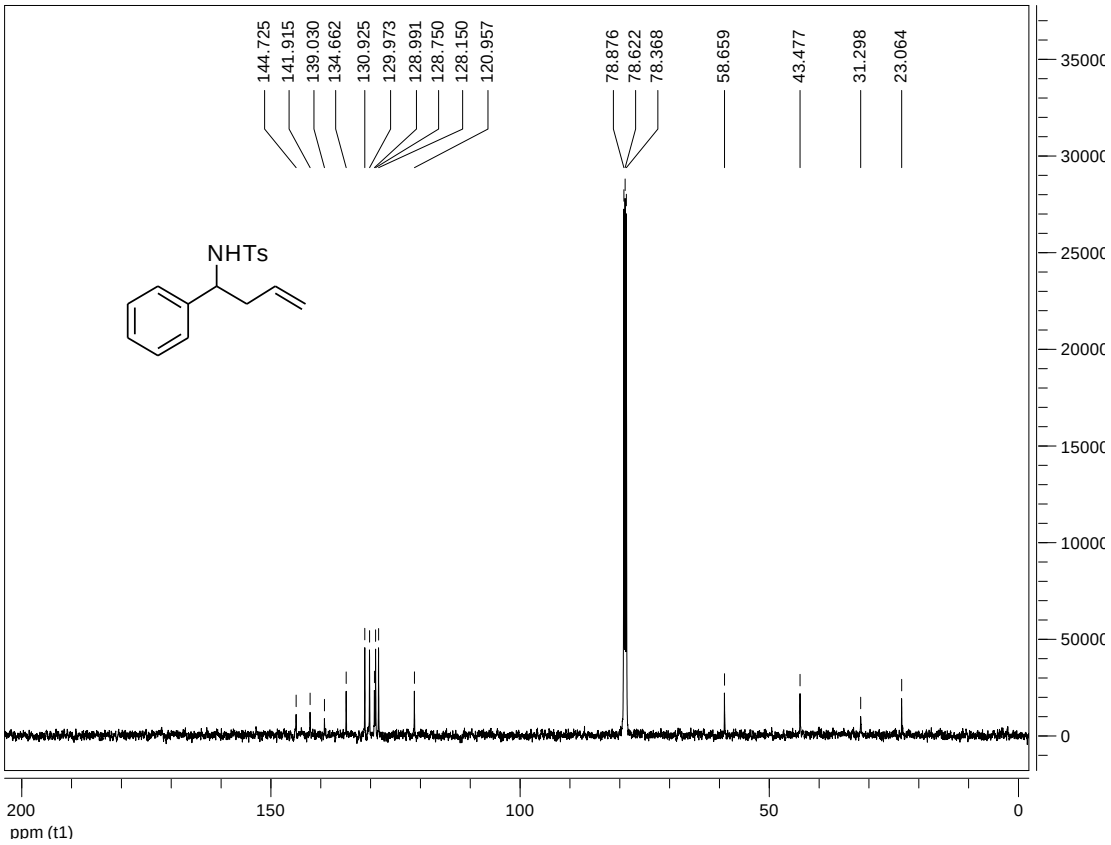




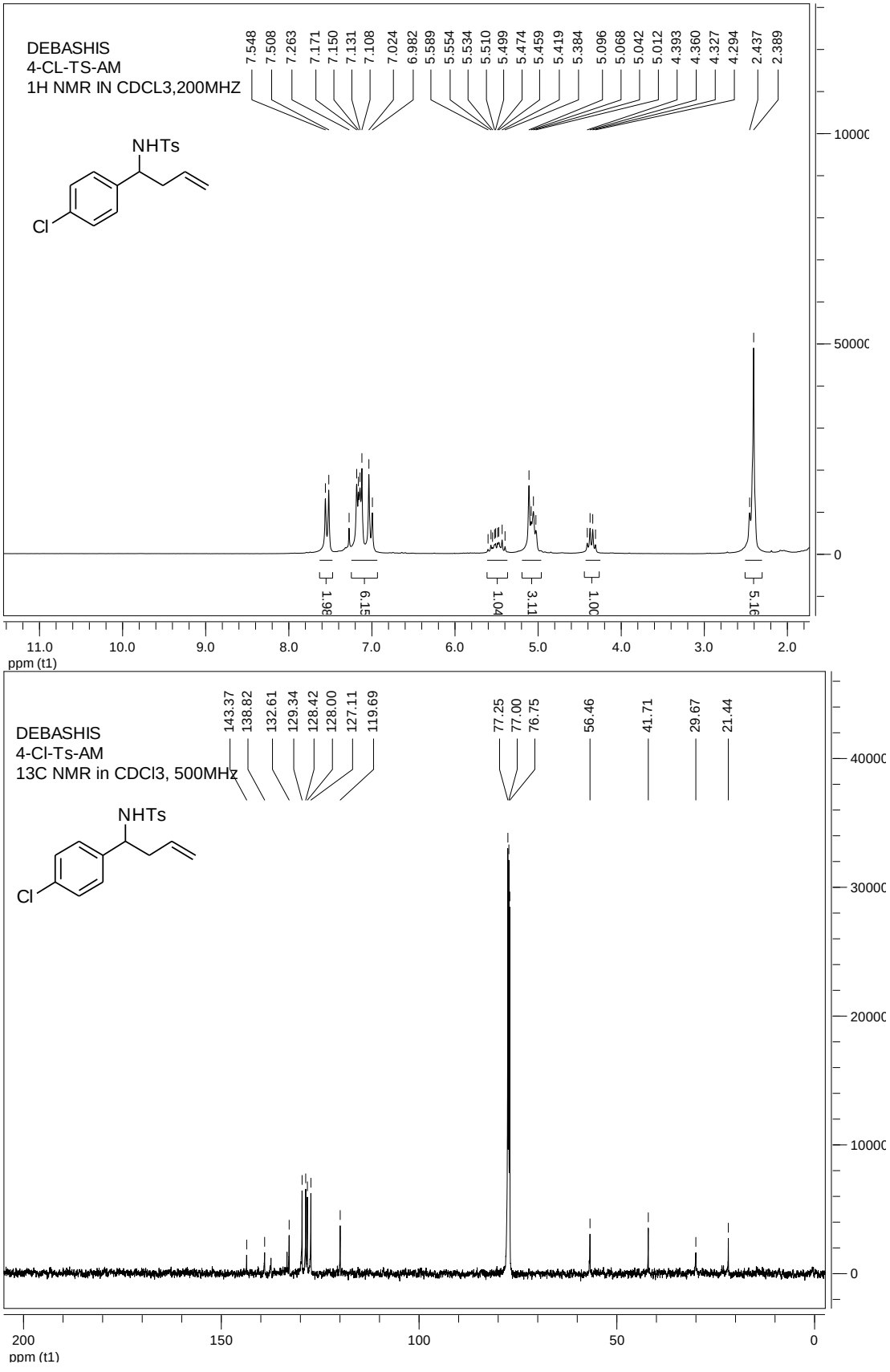
Copy of ^{1}H and ^{13}C spectra for the products

^{1}H and ^{13}C NMR spectra of *N*-(1-Phenylbut-3-enyl)-4-methylbenzenesulfonamide 2a

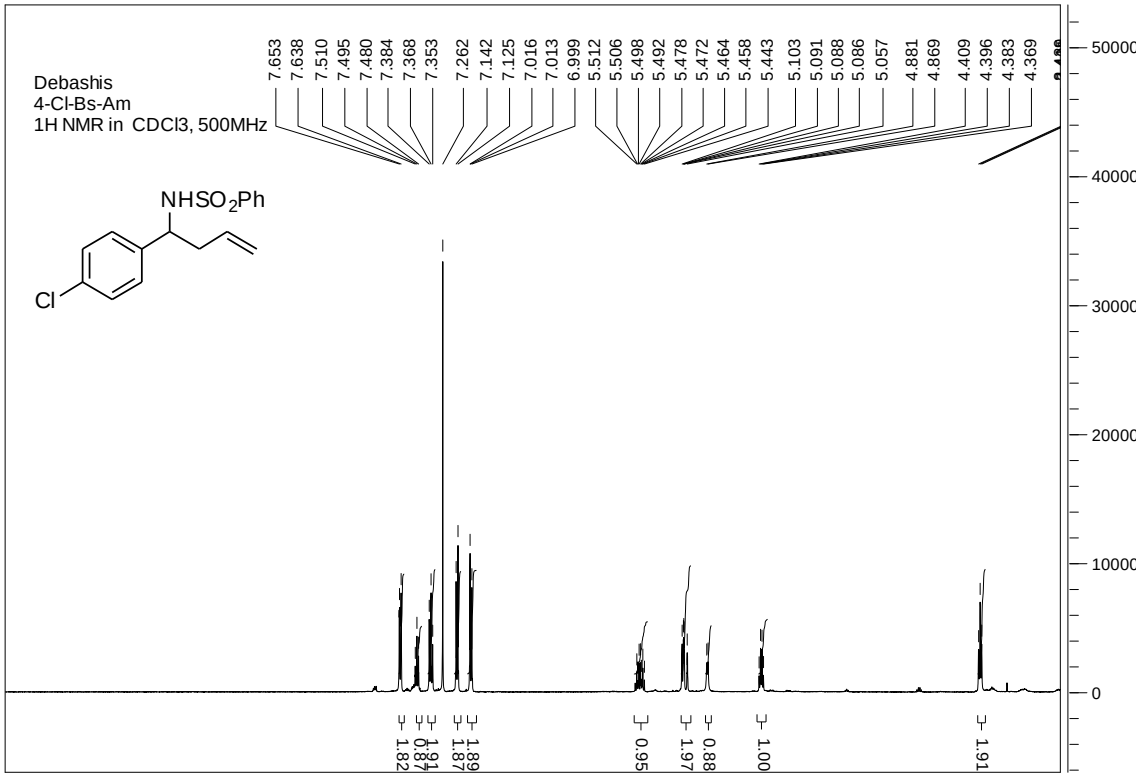


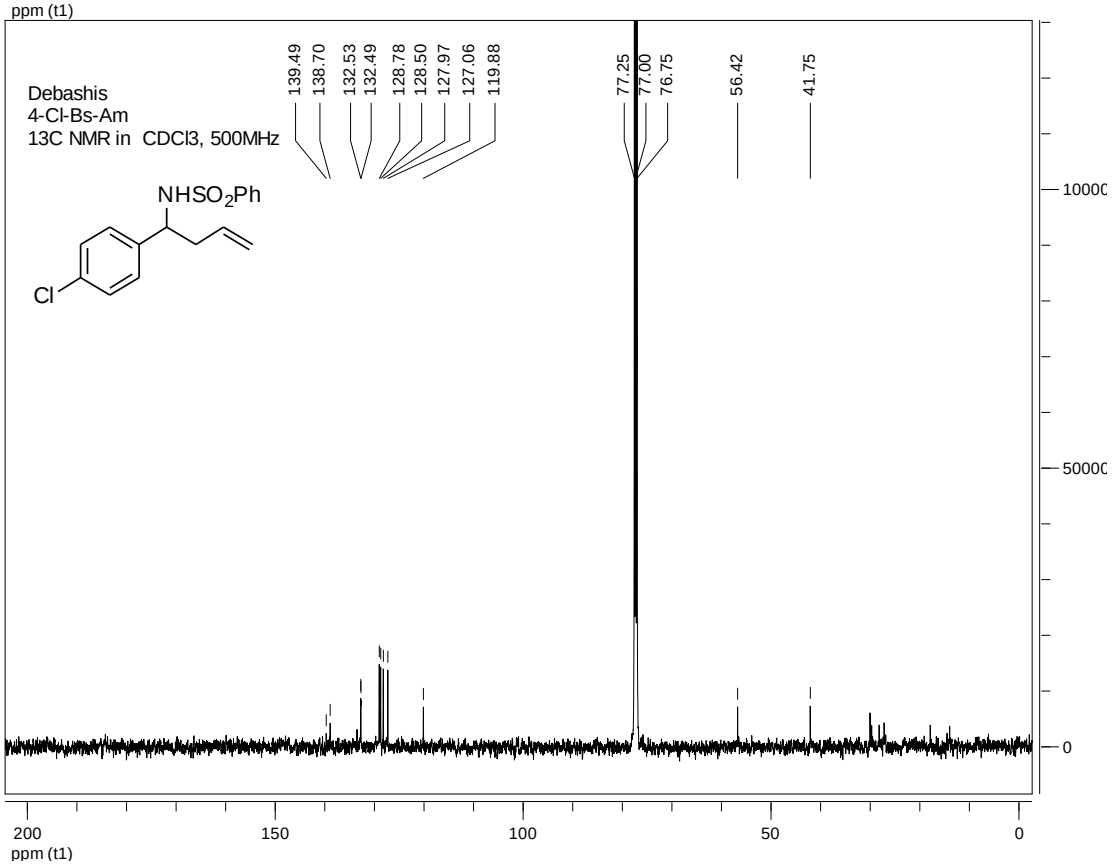


^{1}H and ^{13}C NMR spectra of *N*-(1-(4-Chlorophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2b

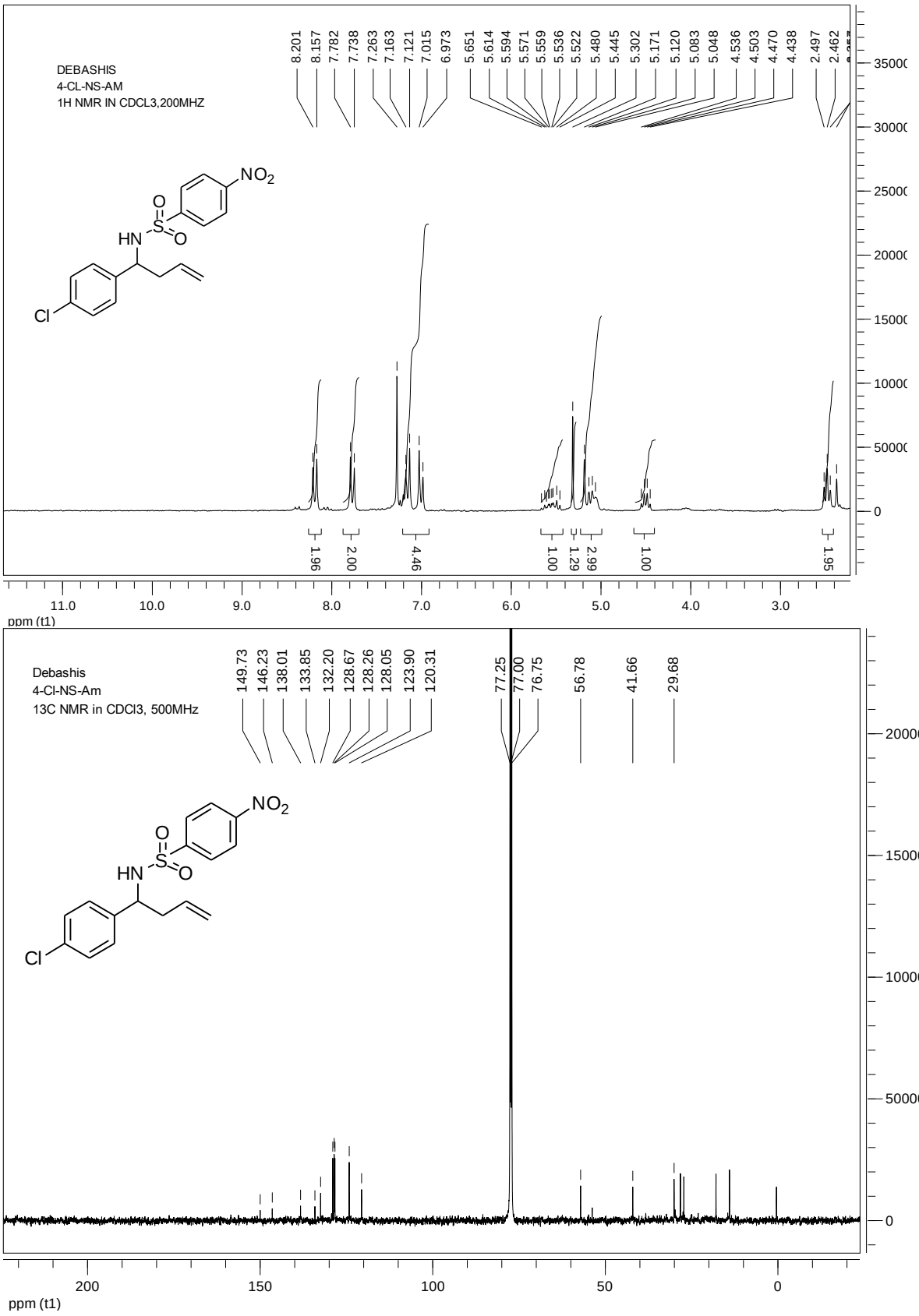


^{1}H and ^{13}C NMR spectra of *N*-(1-(4-Chlorophenyl)but-3-enyl)benzenesulfonamide 2c

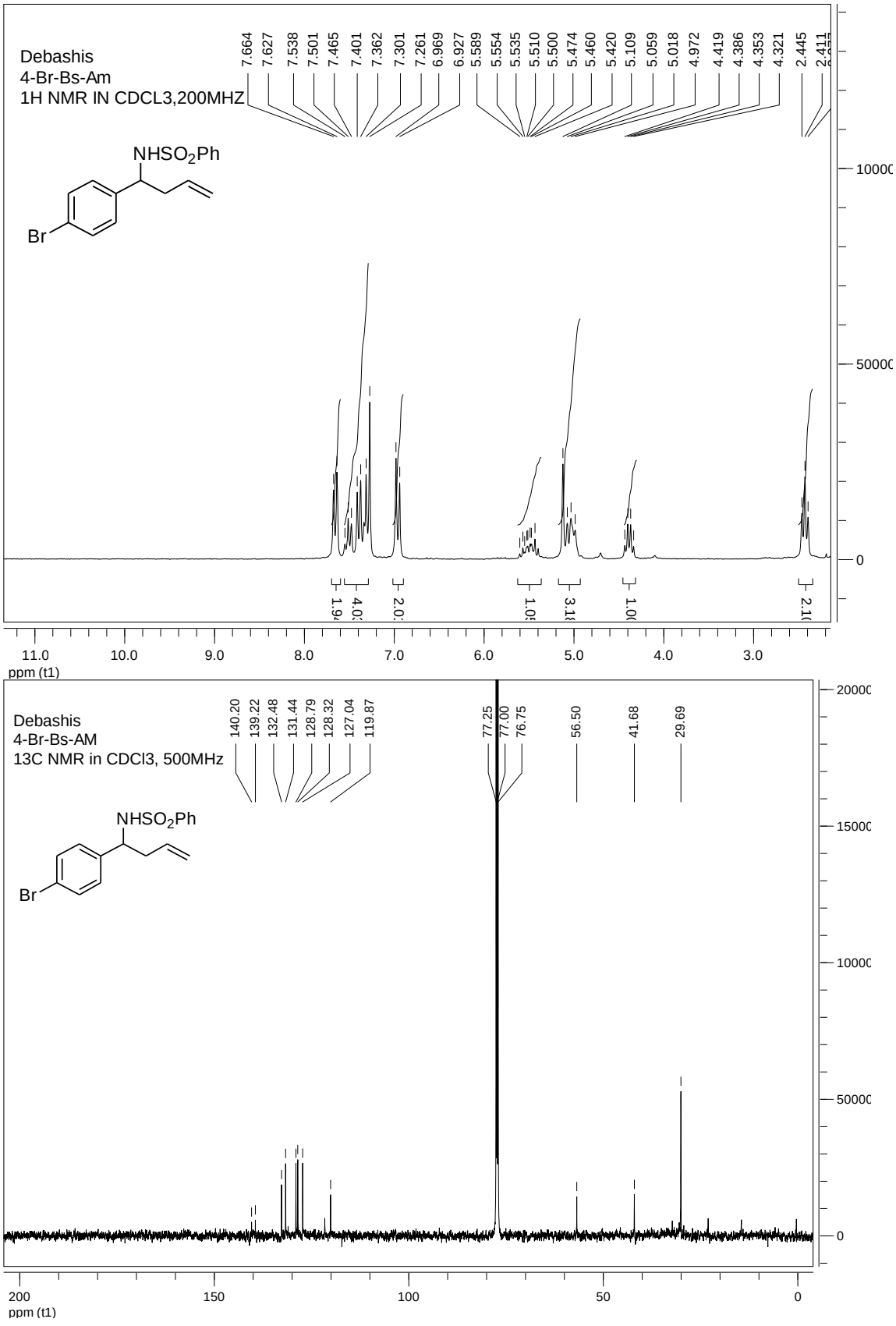




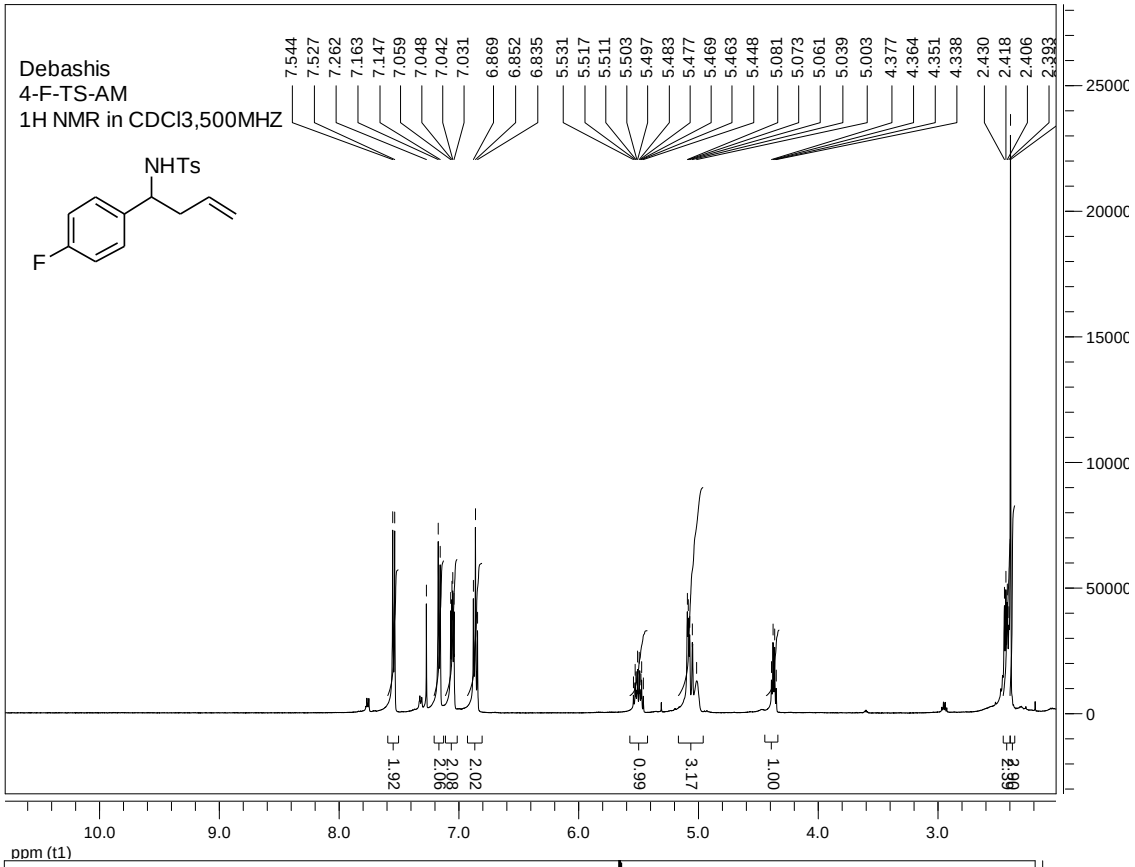
^{1}H and ^{13}C NMR spectra of *N*-(1-(4-Chlorophenyl)but-3-enyl)-4-nitrobenzenesulfonamide 2d

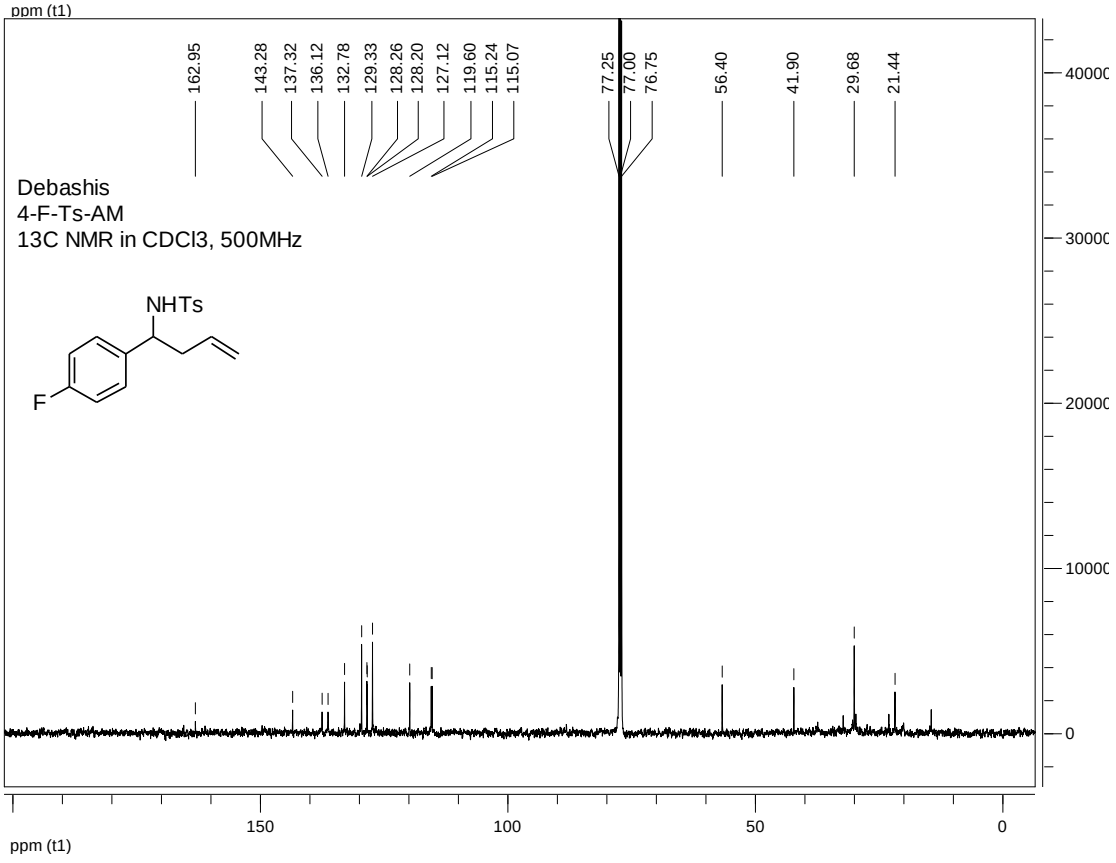


^{1}H and ^{13}C NMR spectra of *N*-(1-(4-Bromophenyl)but-3-enyl)benzenesulfonamide 2e

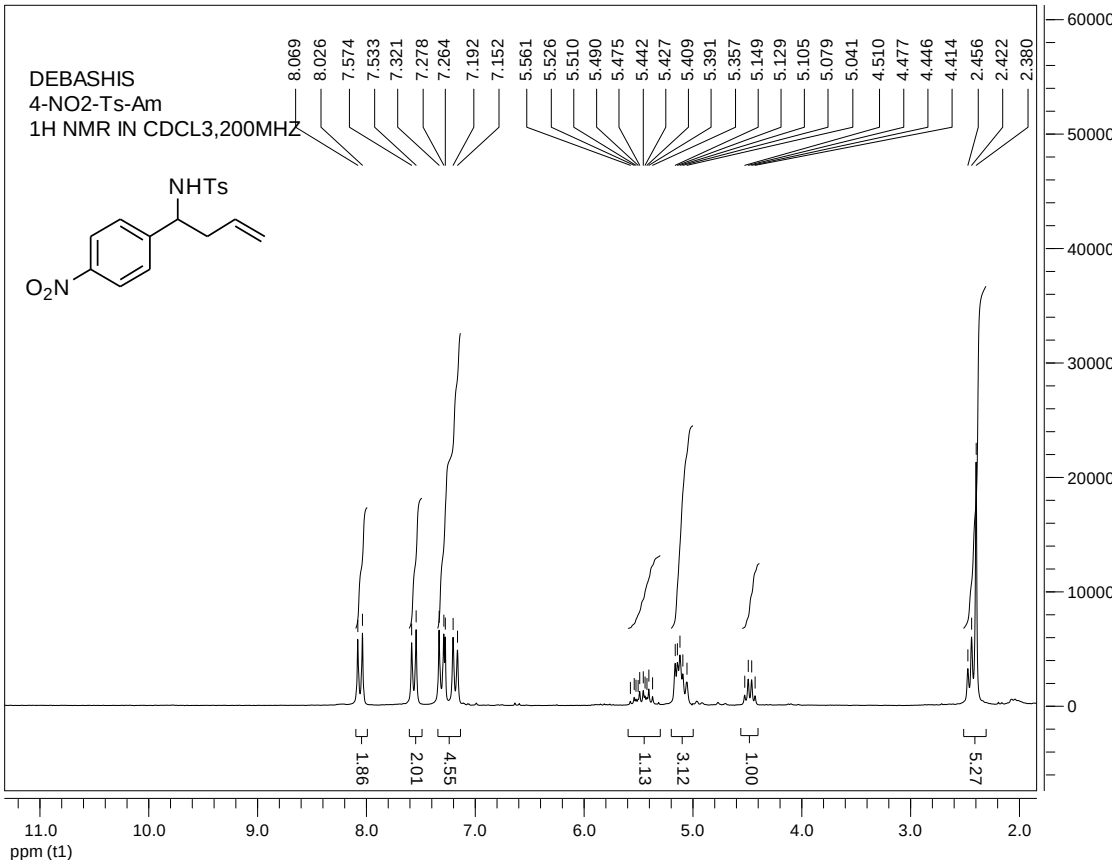


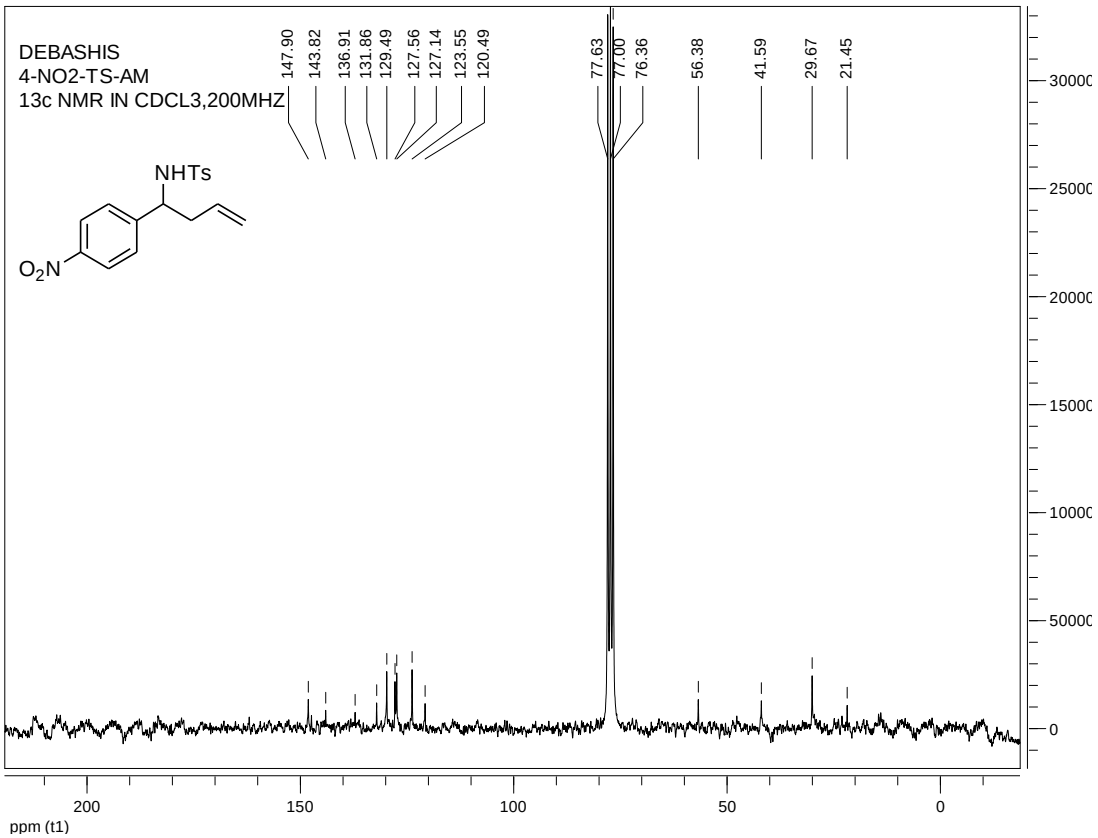
^{1}H and ^{13}C NMR spectra of *N*-(1-(4-Fluorophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2f



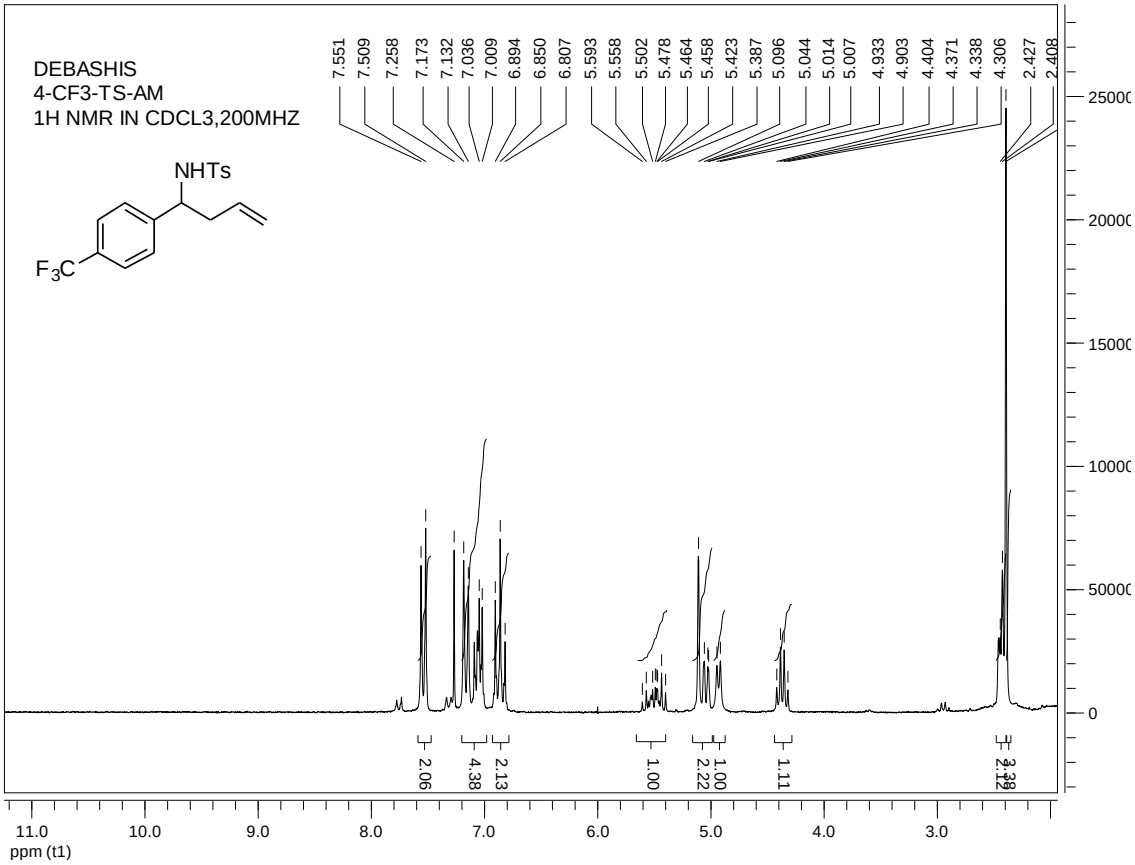


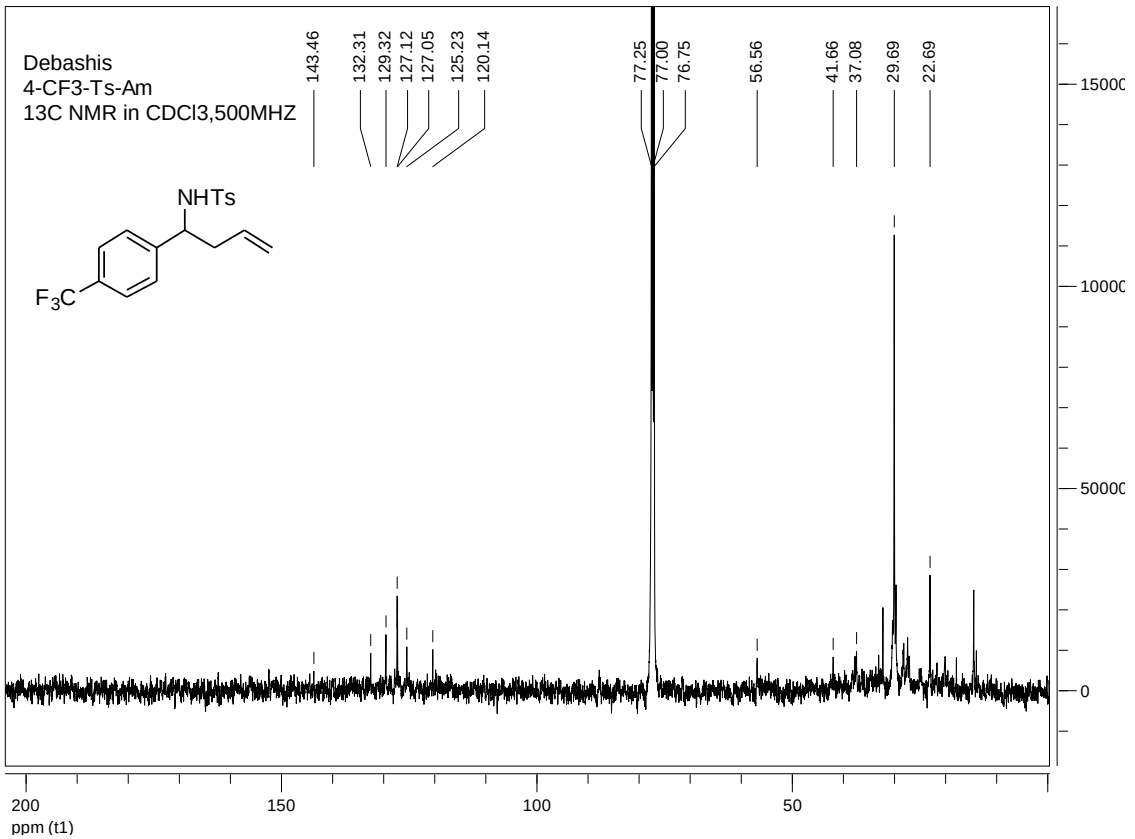
^{1}H and ^{13}C NMR spectra of *N*-(1-(4-Nitrophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2g



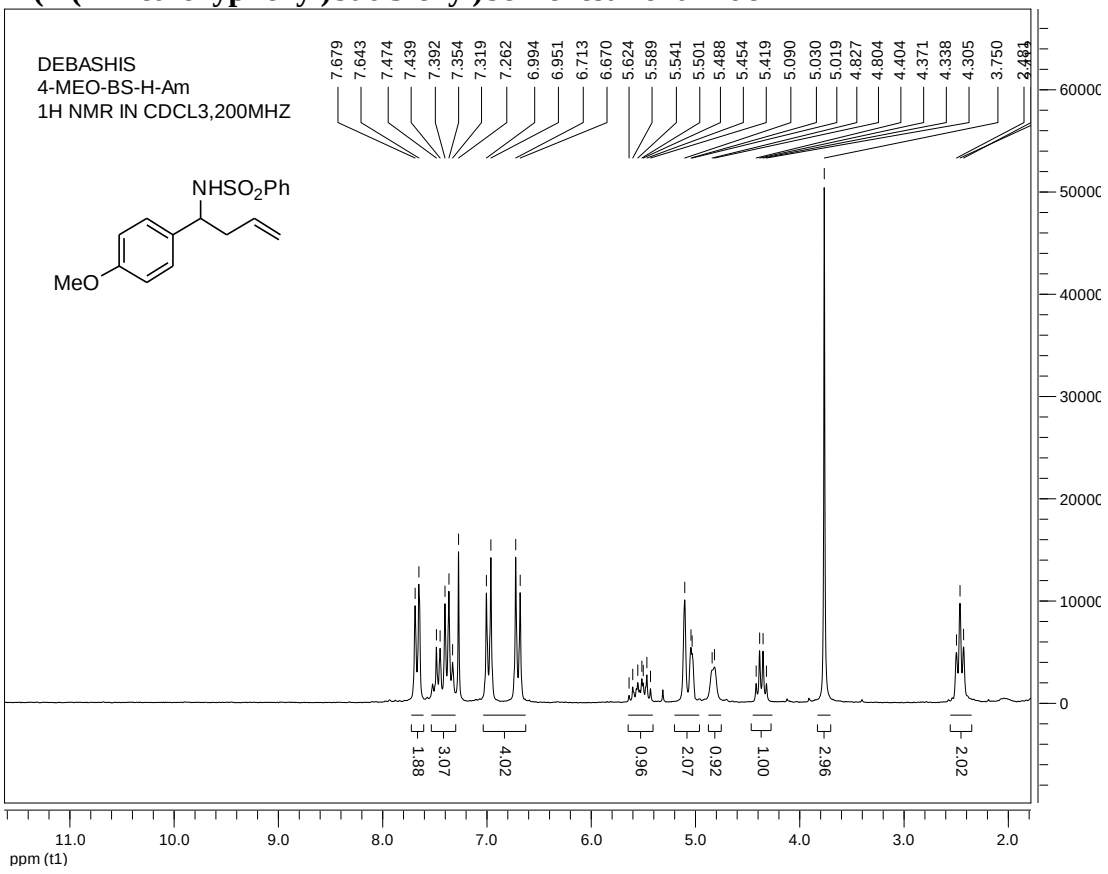


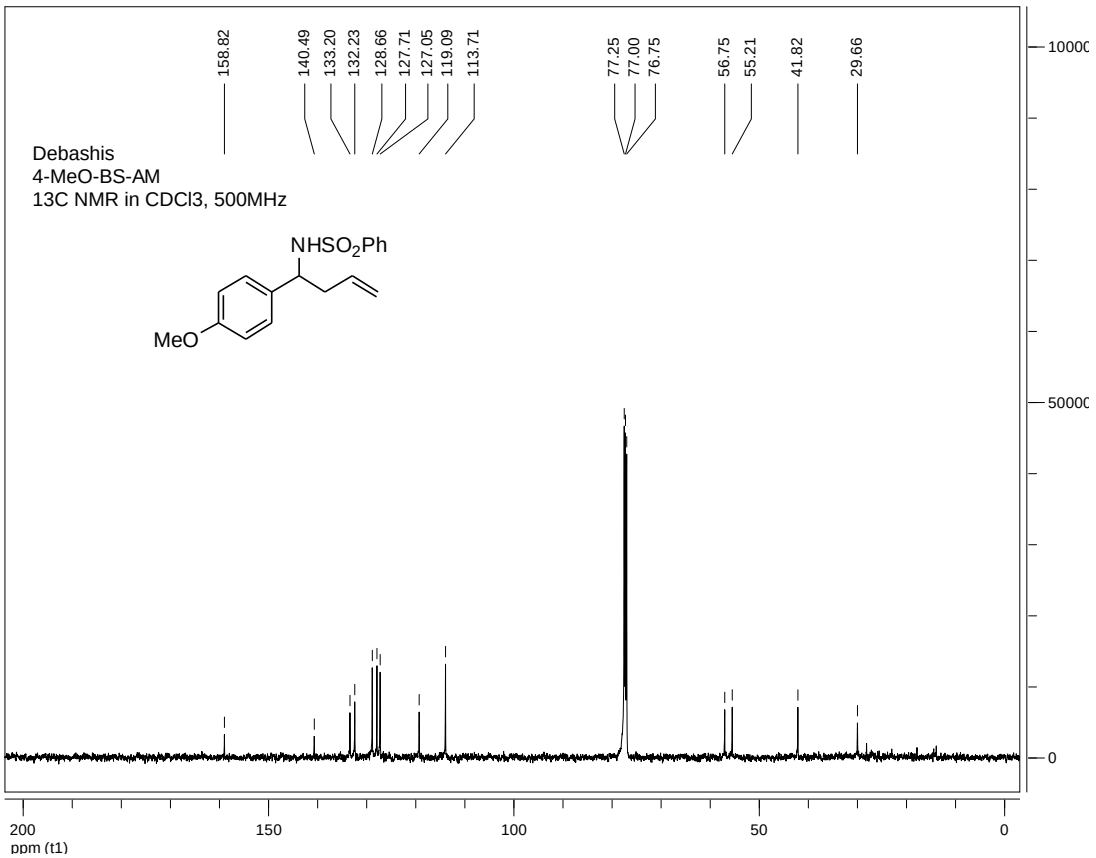
^{1}H and ^{13}C NMR spectra of *N*-(1-(4-Trifluoromethylphenyl)but-3-enyl)-4-methylbenzenesulfonamide 2h



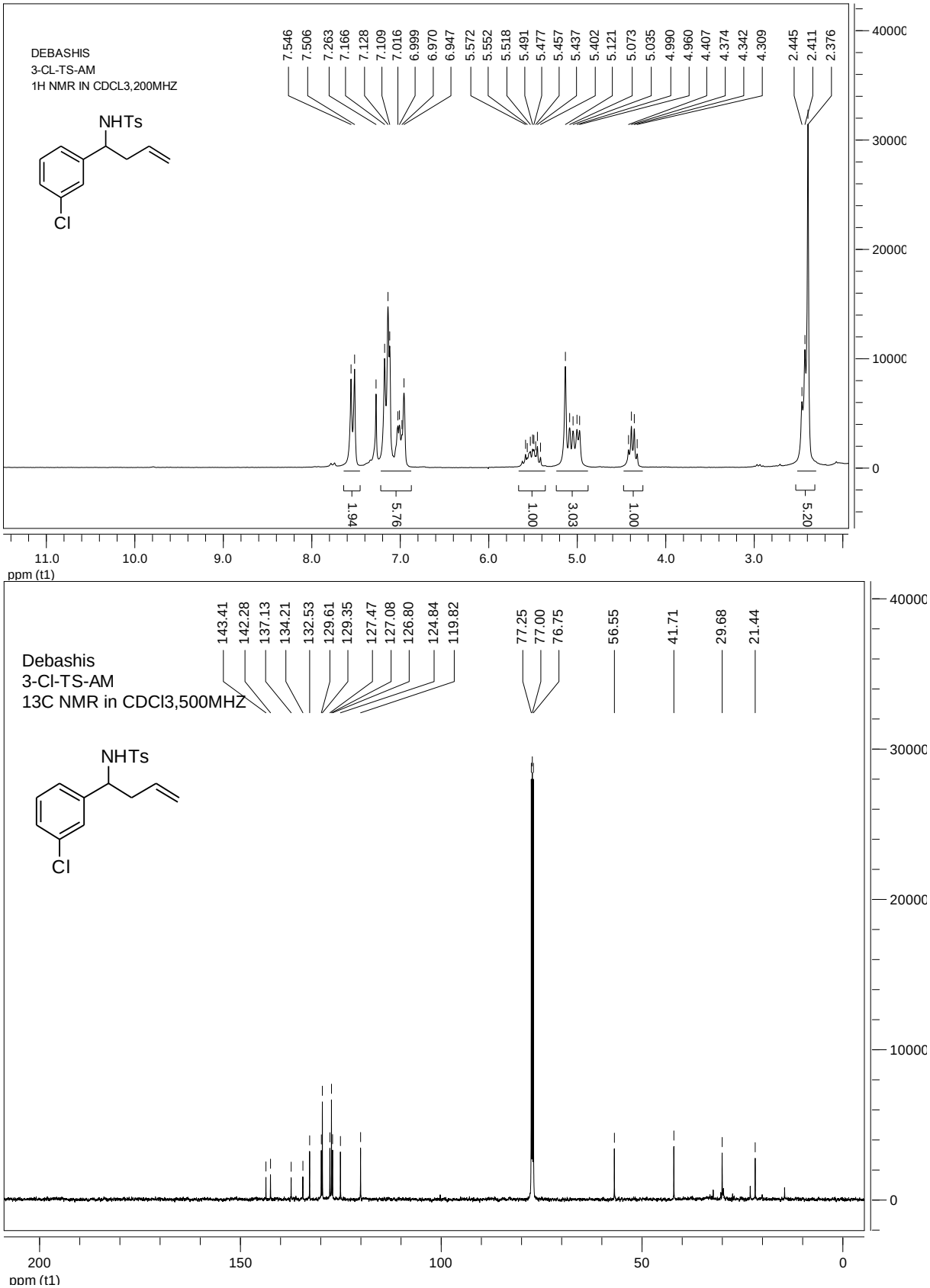


***N*-(1-(4-Methoxyphenyl)but-3-enyl)benzenesulfonamide 2i**

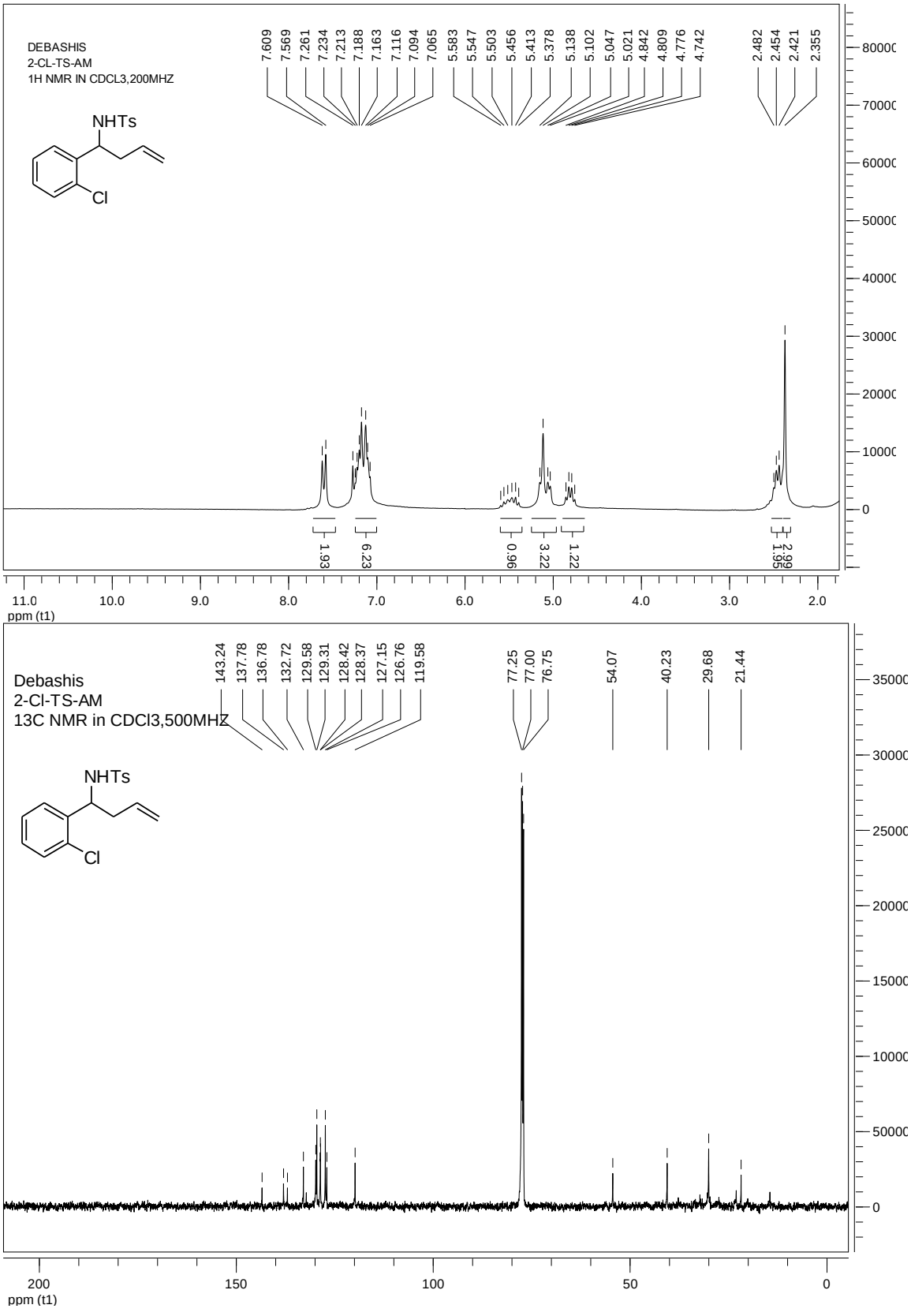




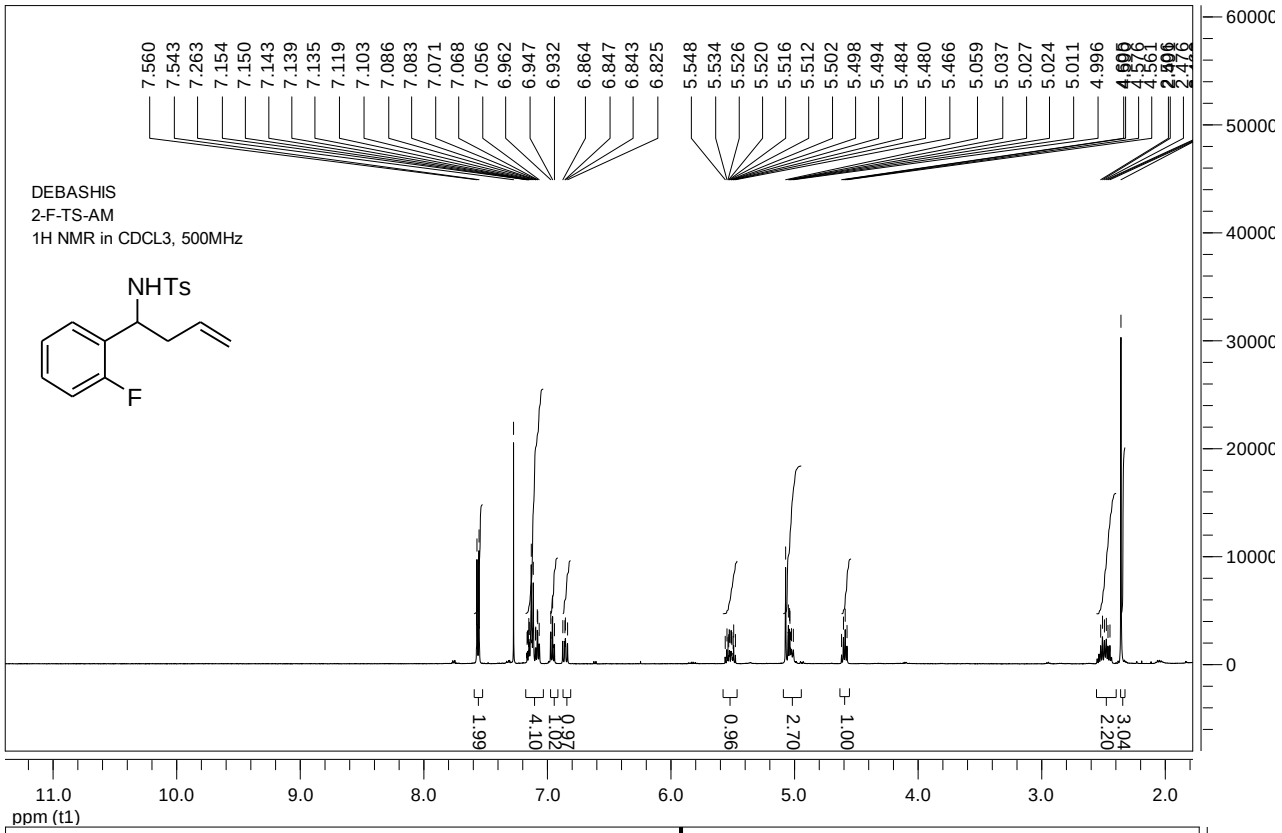
^{1}H and ^{13}C NMR spectra of *N*-(1-(3-Chlorophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2j

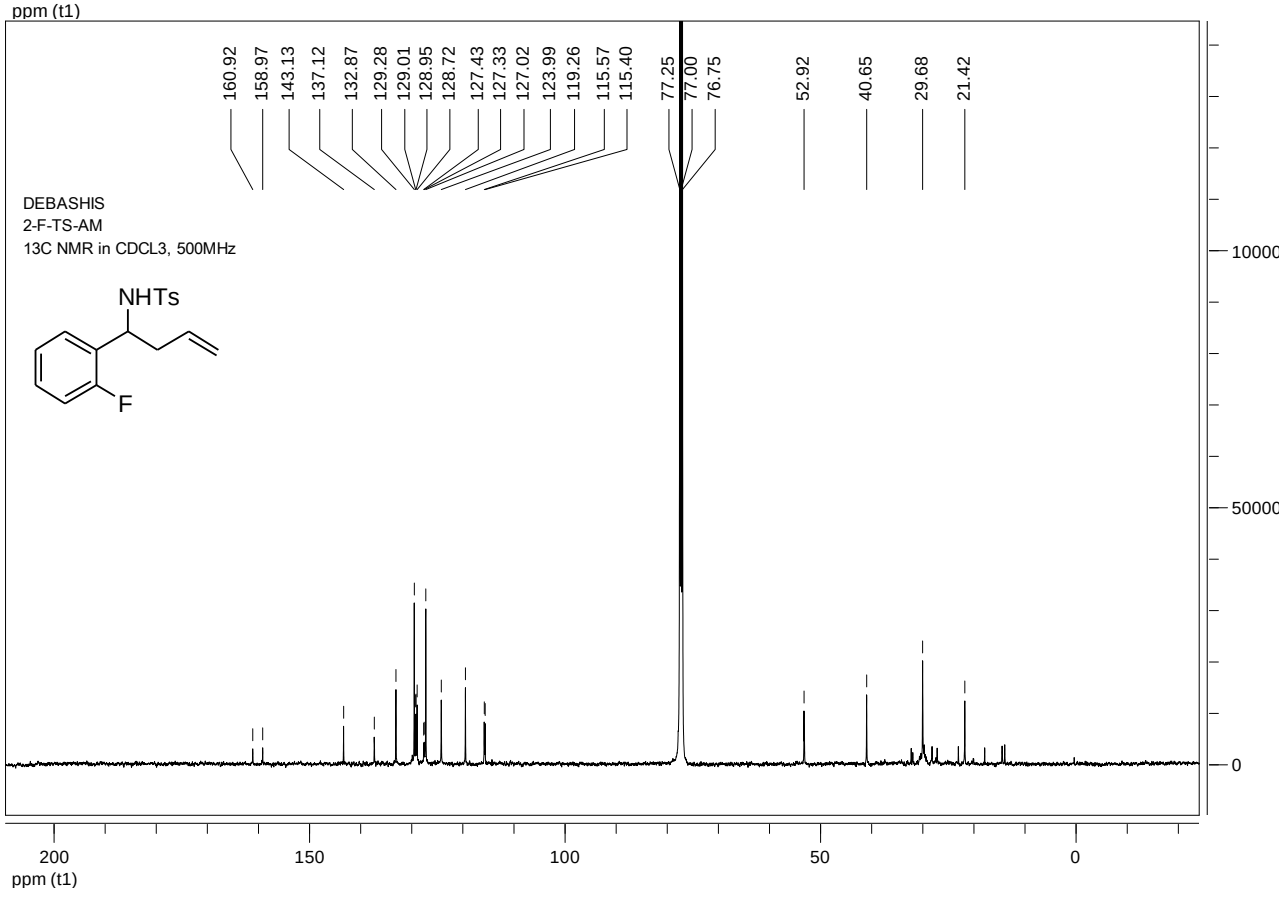


^{1}H and ^{13}C NMR spectra of *N*-(1-(2-Chlorophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2k

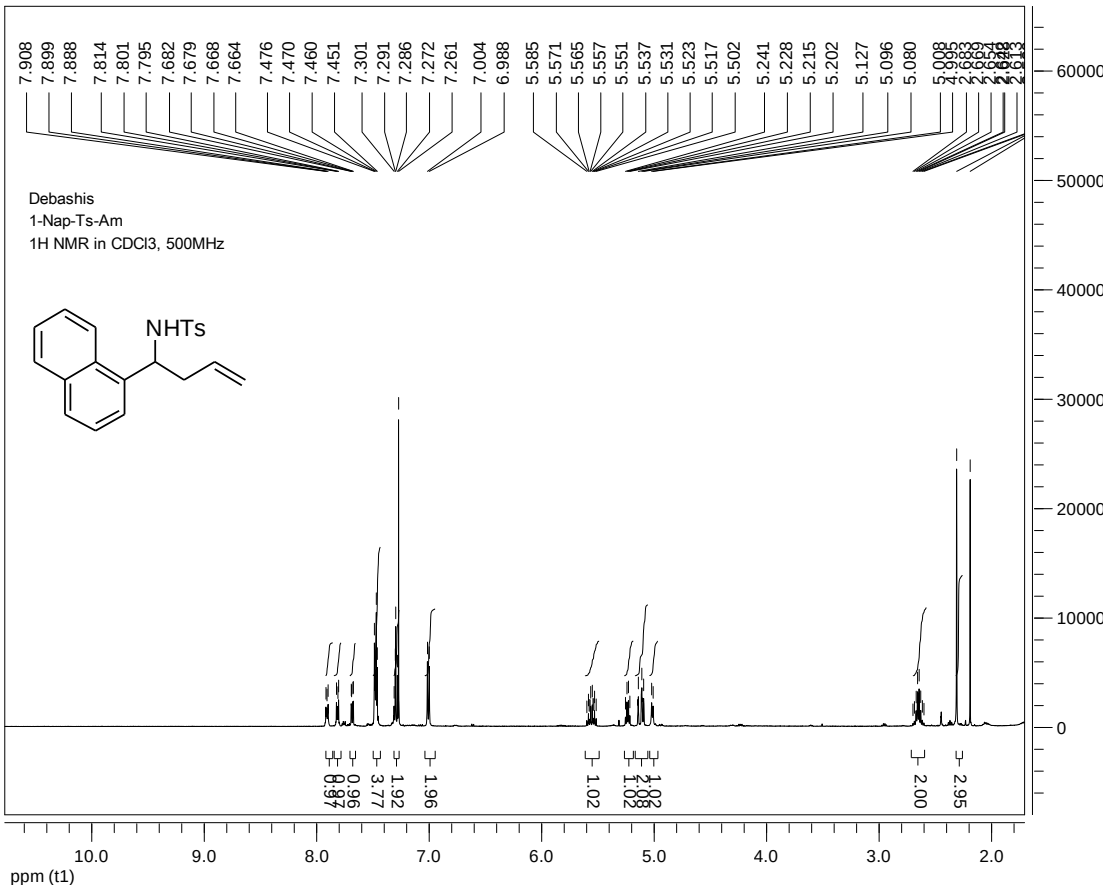


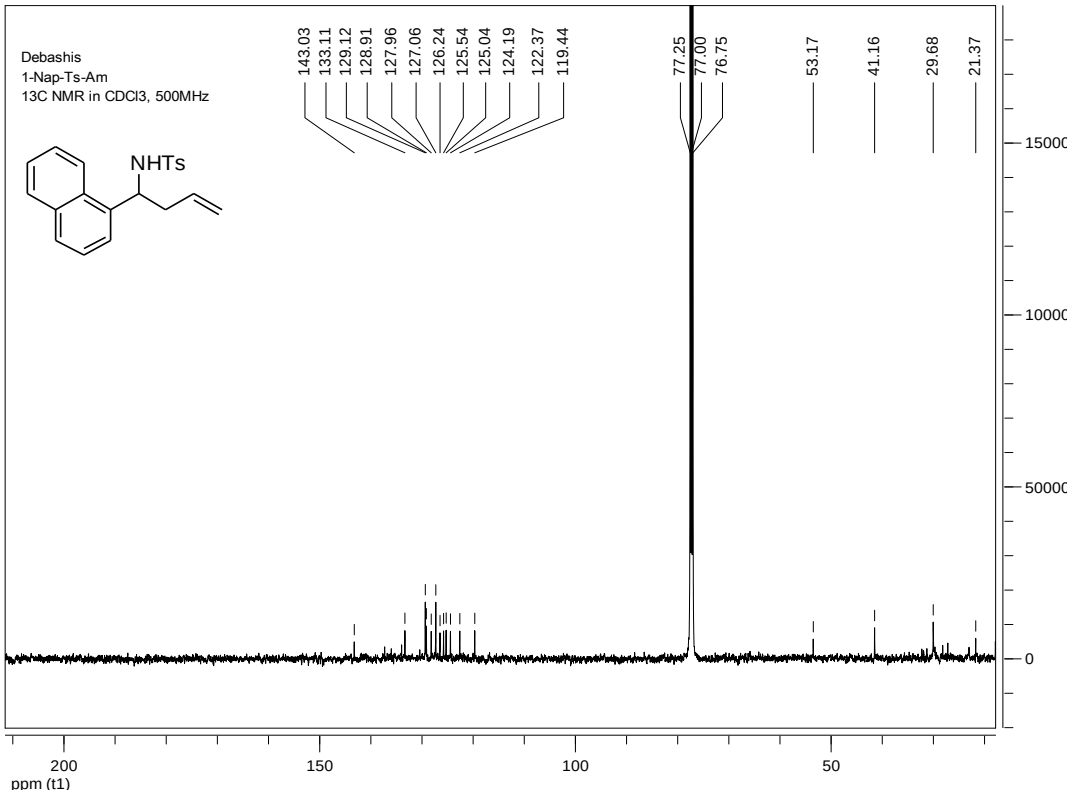
^{1}H and ^{13}C NMR spectra of *N*-(1-(2-Fluorophenyl)but-3-enyl)-4-methylbenzenesulfonamide 2l



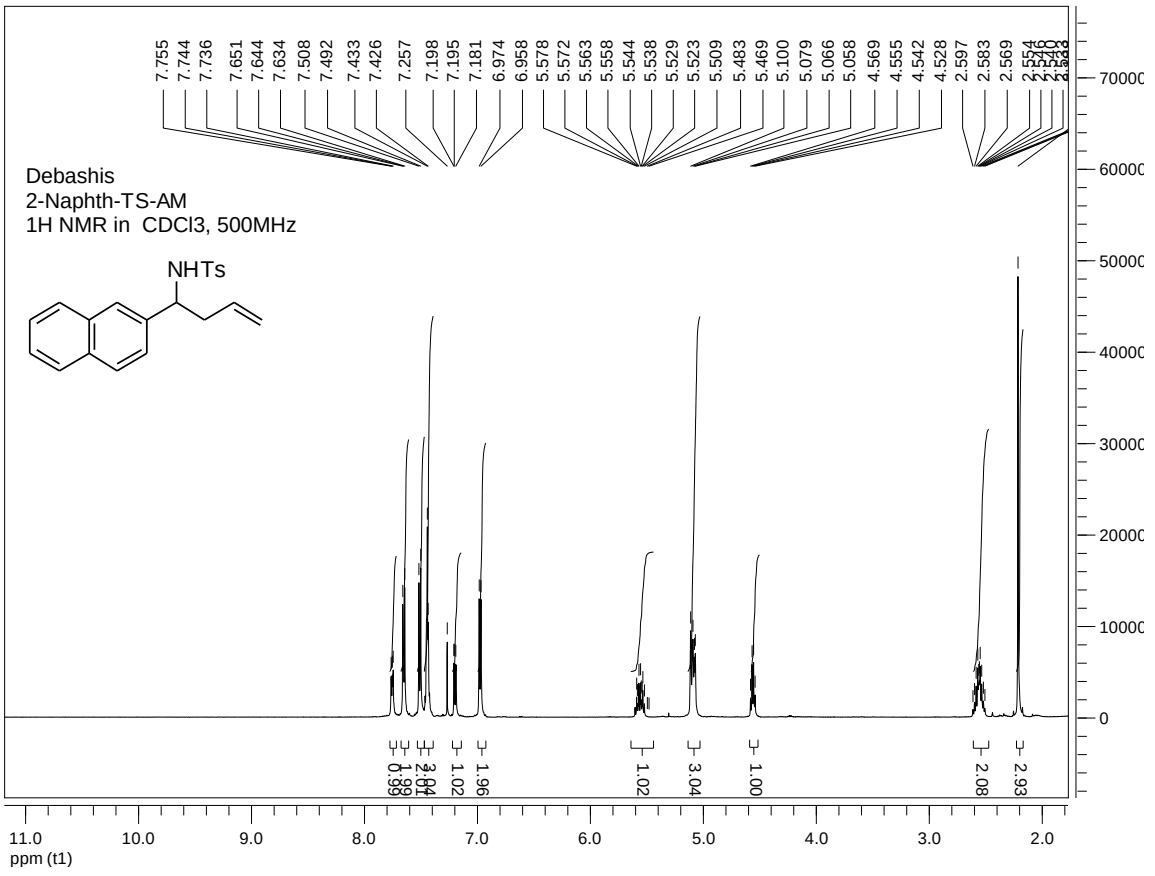


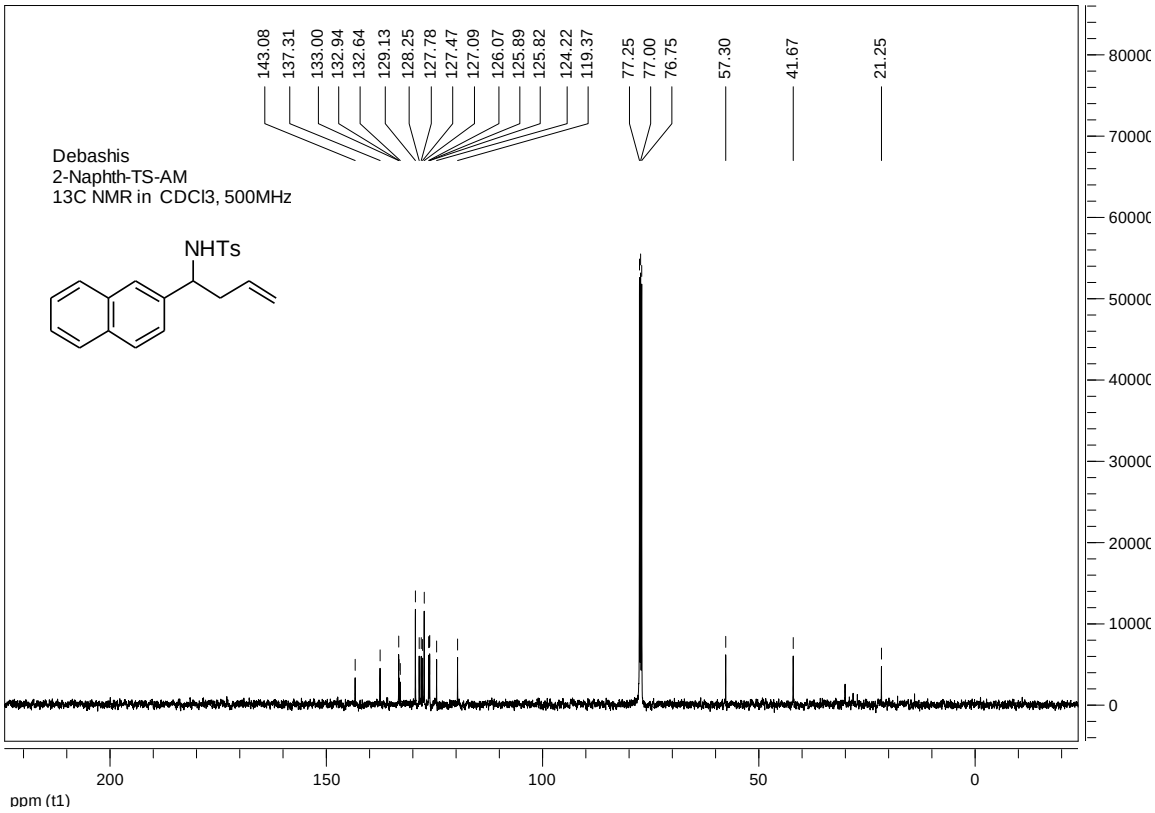
^{1}H and ^{13}C NMR spectra of *N*-(1-(1-Naphthyl)but-3-enyl)-4-methylbenzenesulfonamide 2m



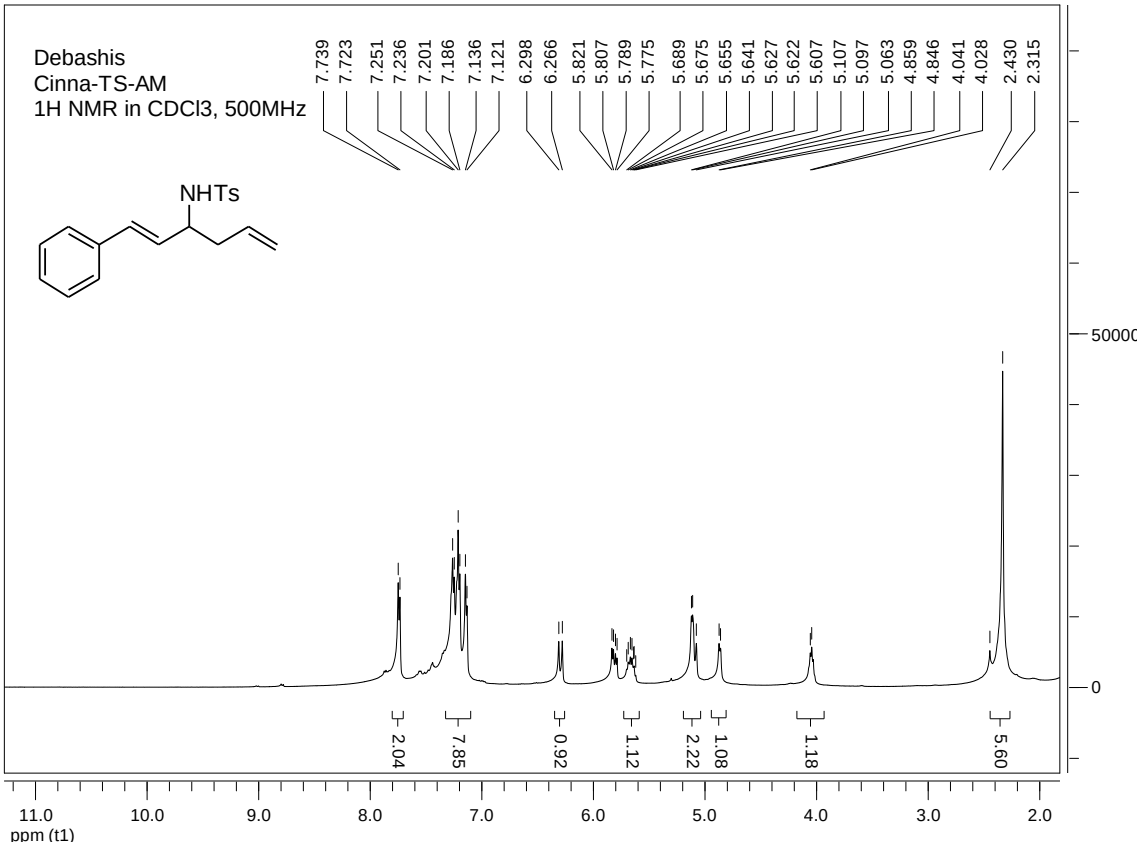


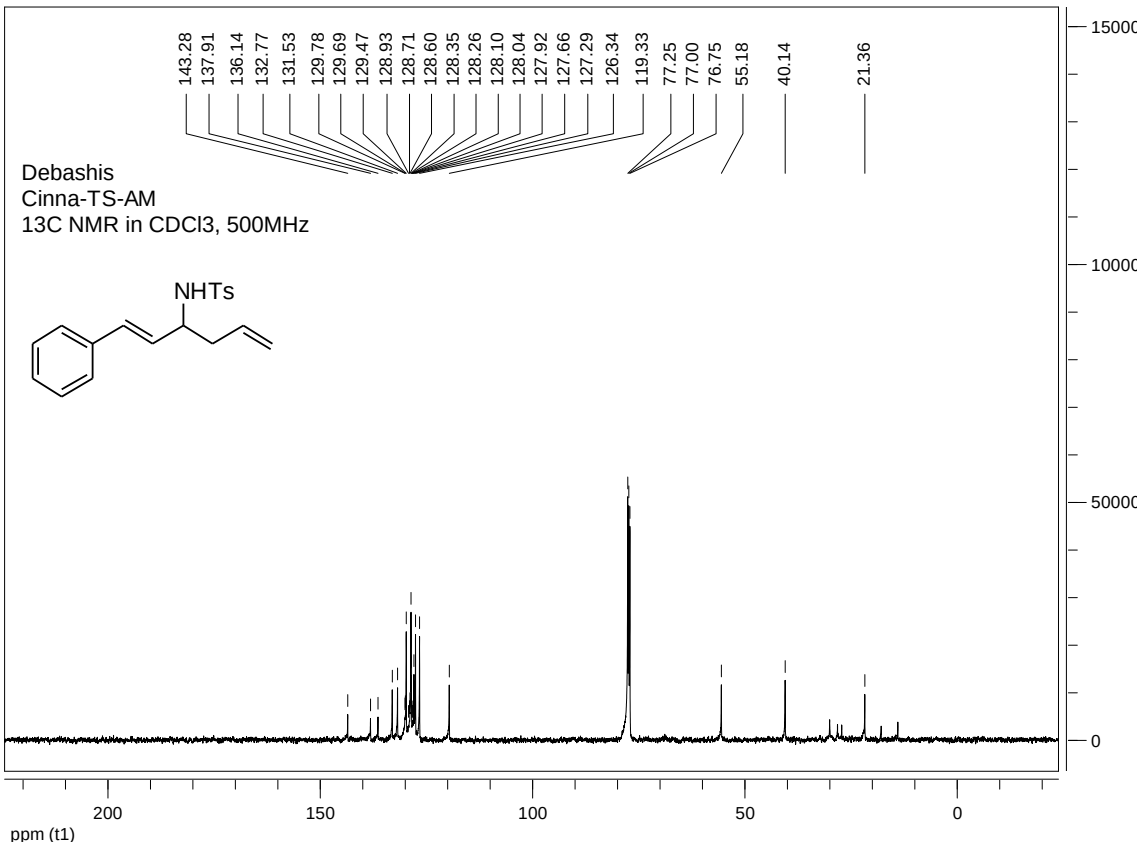
^{1}H and ^{13}C NMR spectra of *N*-(1-(2-Naphthyl)but-3-enyl)-4-methylbenzenesulfonamide 2n



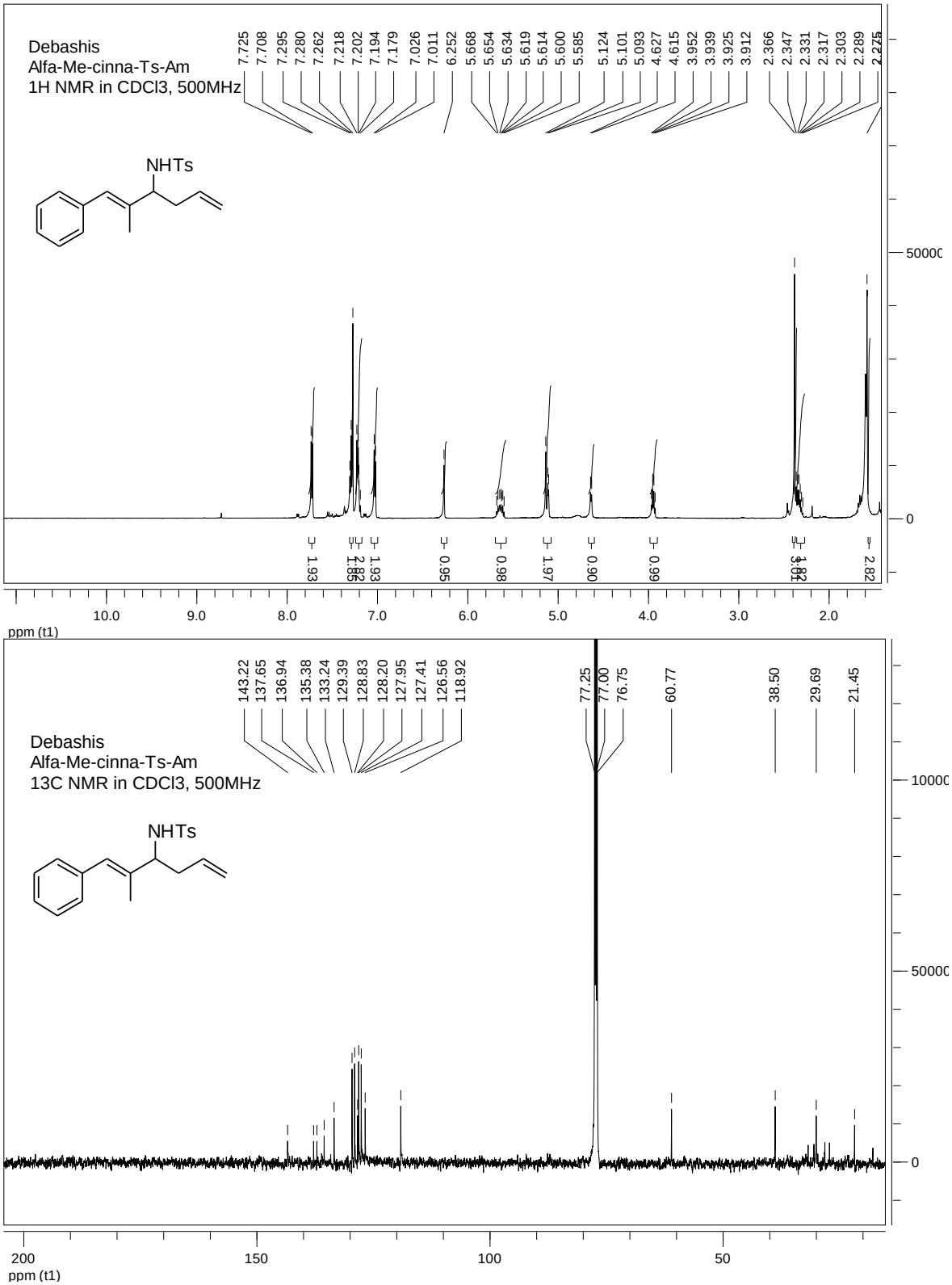


^{1}H and ^{13}C NMR spectra of (*E*)-*N*-(1-Phenylhexa-1,5-diene-3-yl)-4-methylbenzenesulfonamide 2o

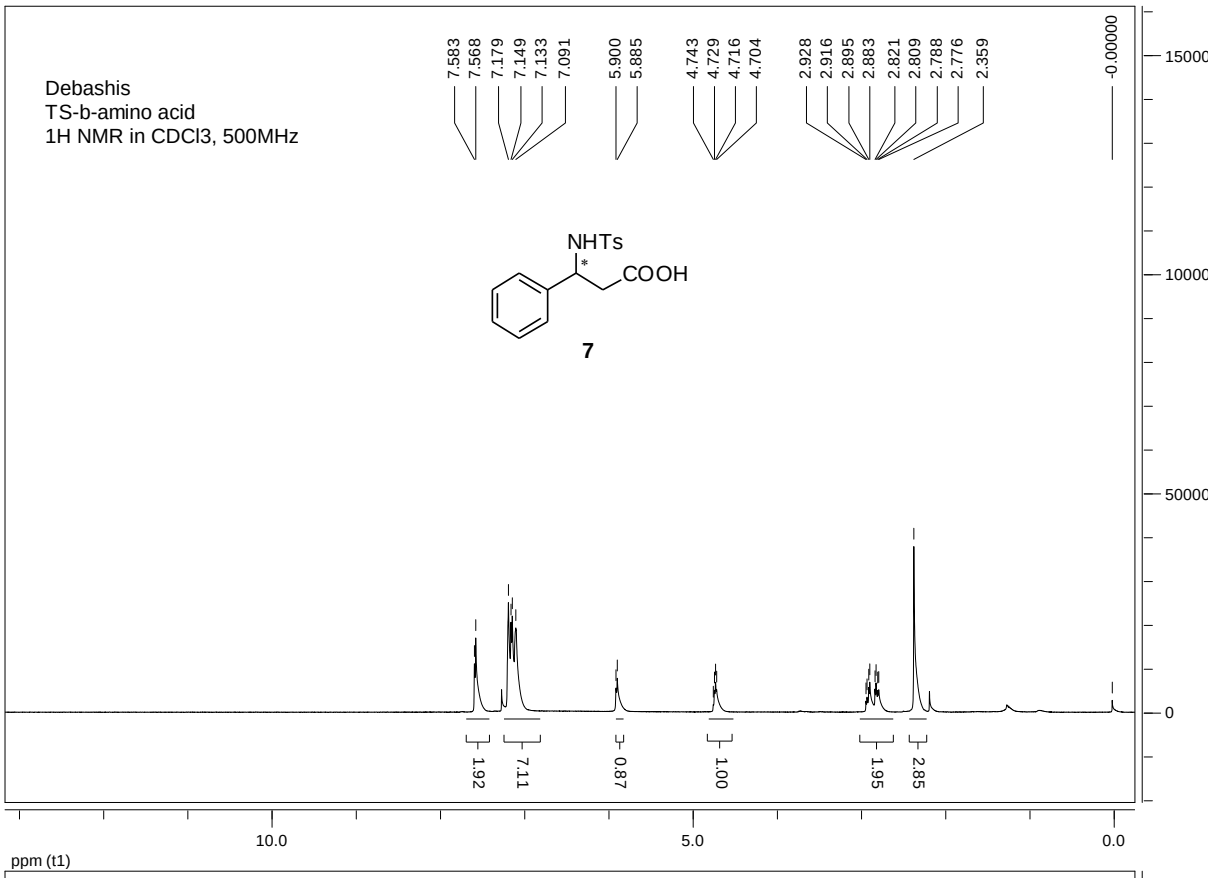


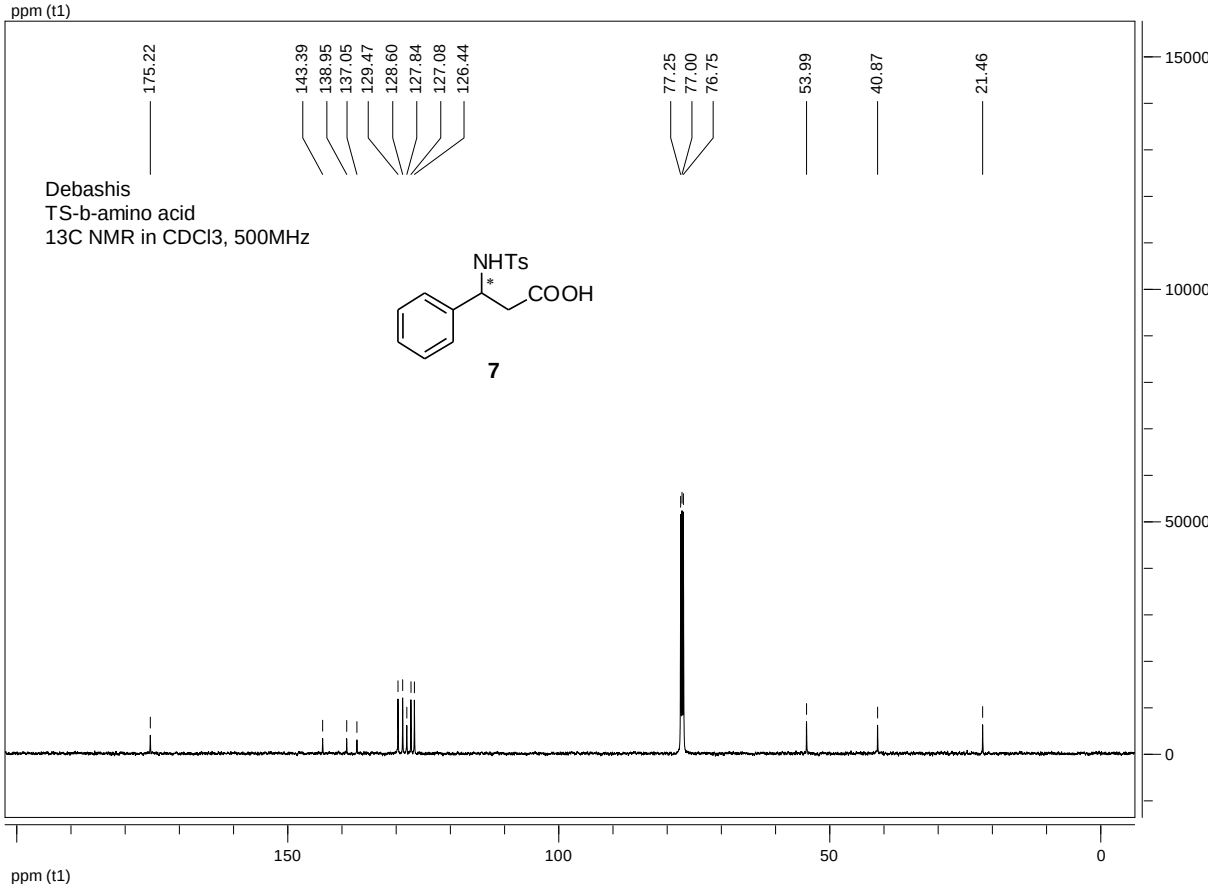


^{1}H and ^{13}C NMR spectra of (*E*)-*N*-(2-methyl-1-phenylhexa-1,5-dien-3-yl)-4-methyl-benzenesulfonamide 2p



3-(4-methylphenylsulfonamido)-3-phenylpropanoic acid





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1. P. Kumari, P. K. Bera, N. H. Khan, R. I. Kureshy, S. H. R. Abdi and H. C. Bajaj, *Catal. Sci. Technol.*, 2014, **4**, 563-568.
2. D. D. Perrin, W. L. F. Armarego and D. R. Perrin, *Purification of Laboratory Chemicals;* Pergamon: New York, 1981.