Supplementary Material (ESI) for Organic & Biomolecular Chemistry

Supplementary Information

Alkyl sulfonyl derivatized PAMAM-G2 dendrimers as nonviral gene delivery vectors with improved transfection efficiencies

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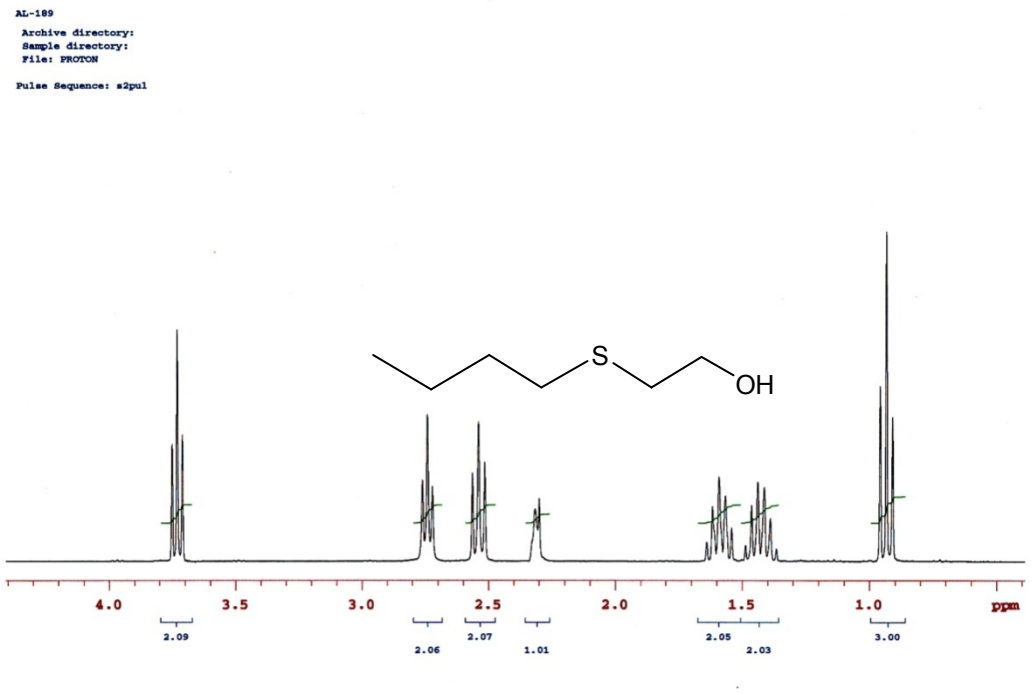

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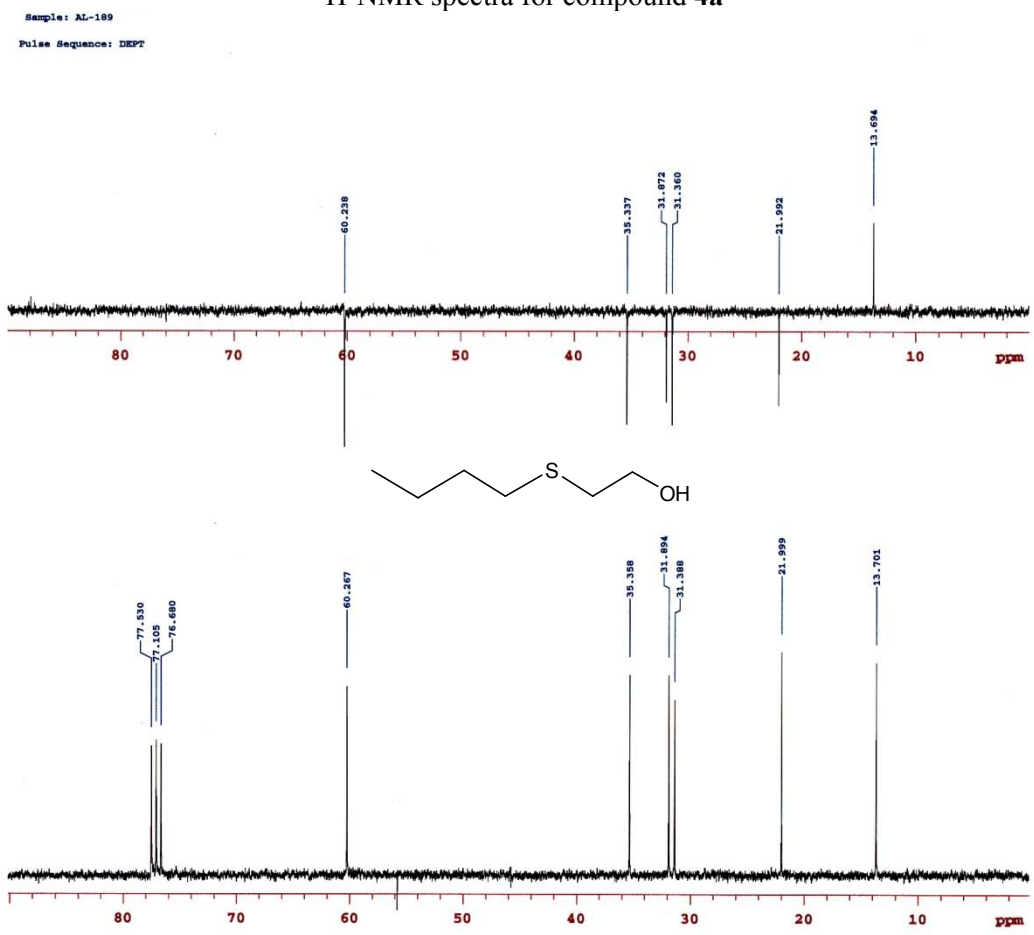

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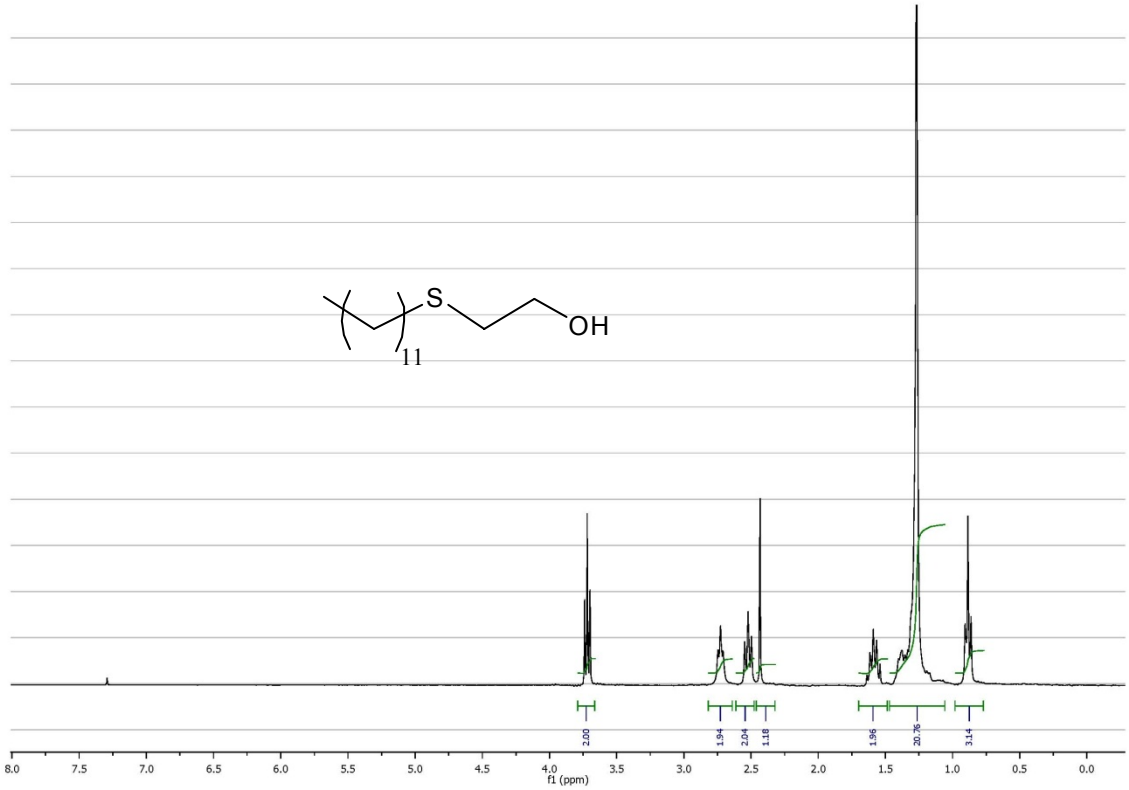

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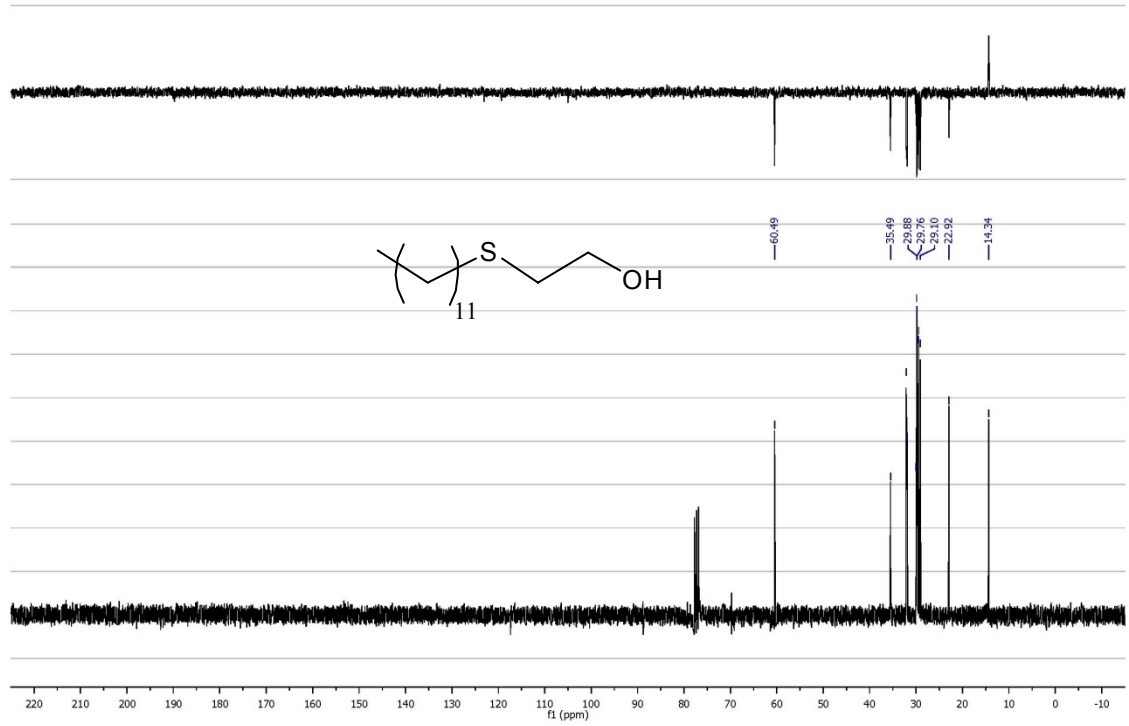

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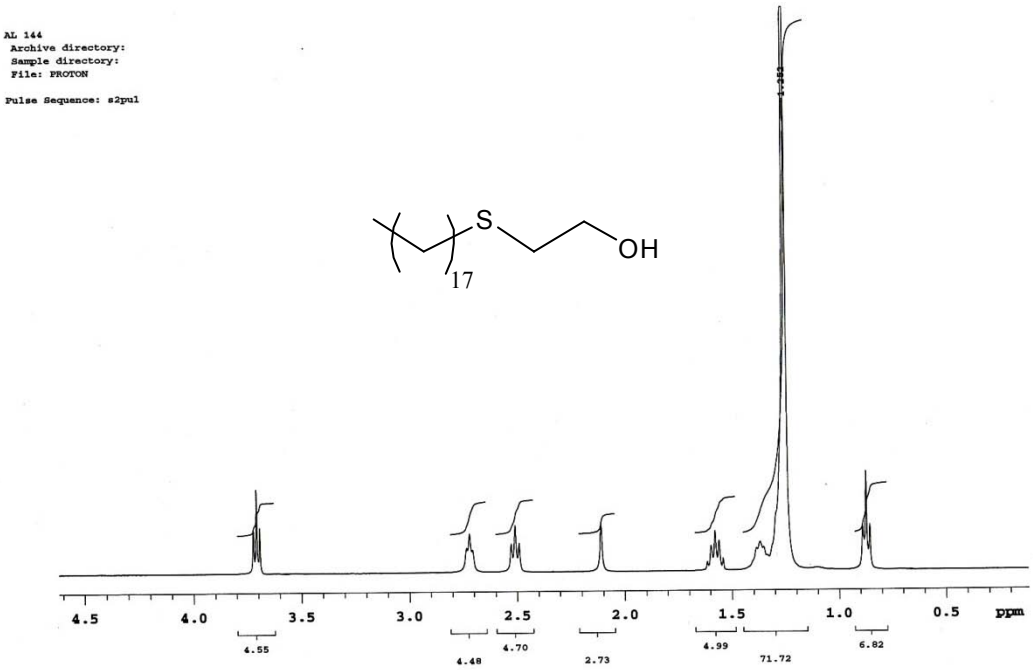

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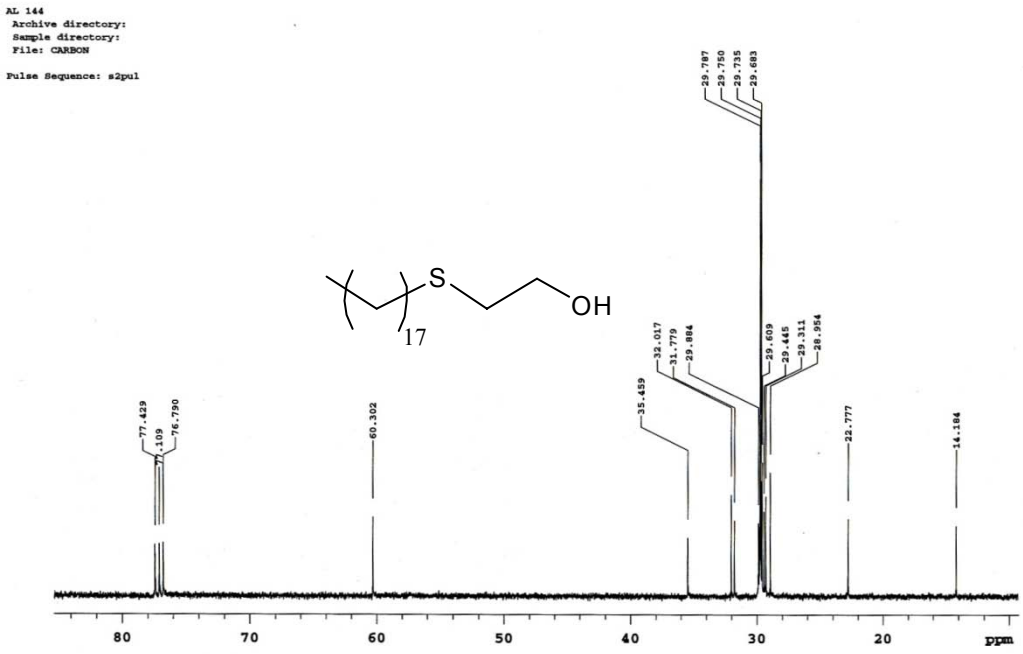

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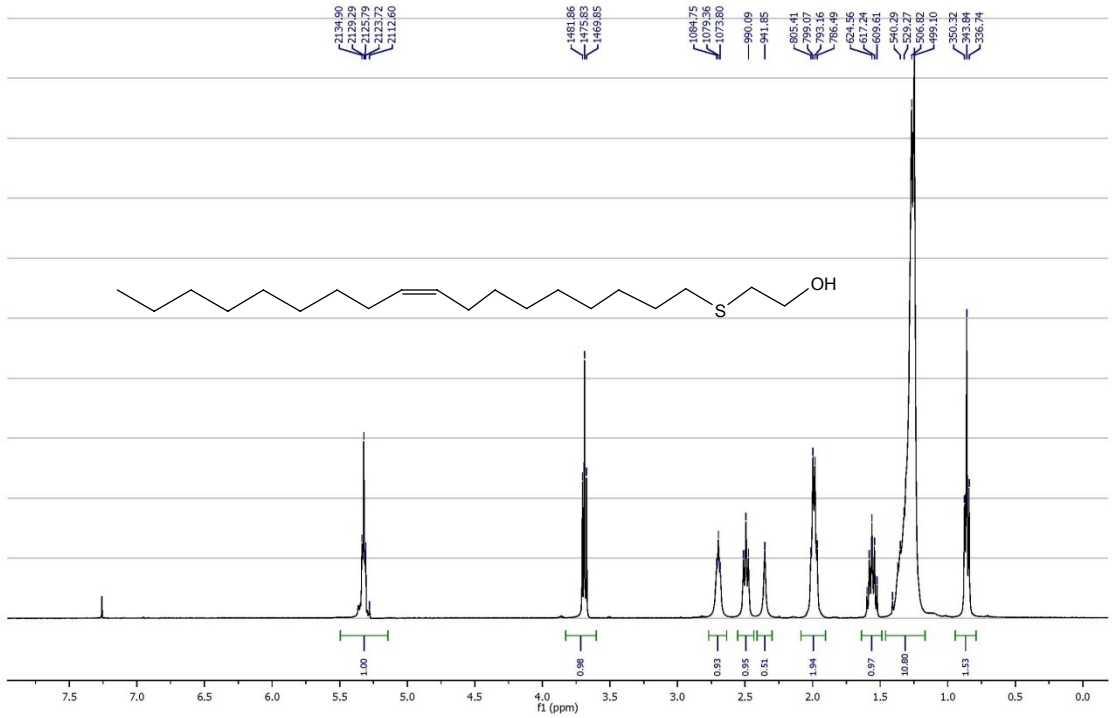

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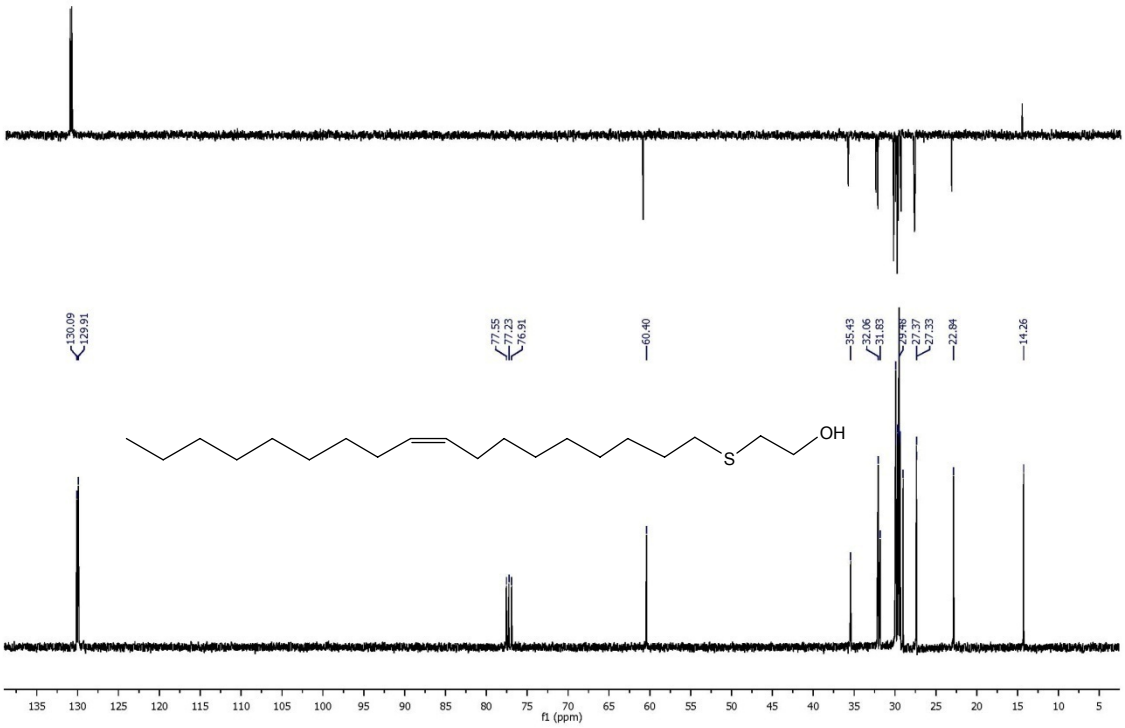

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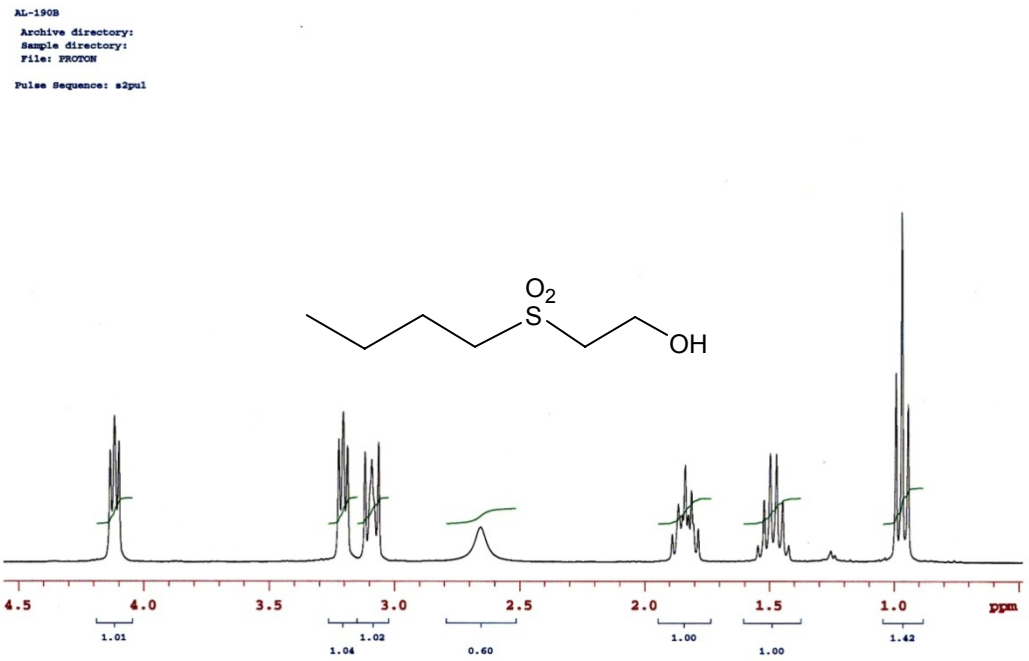

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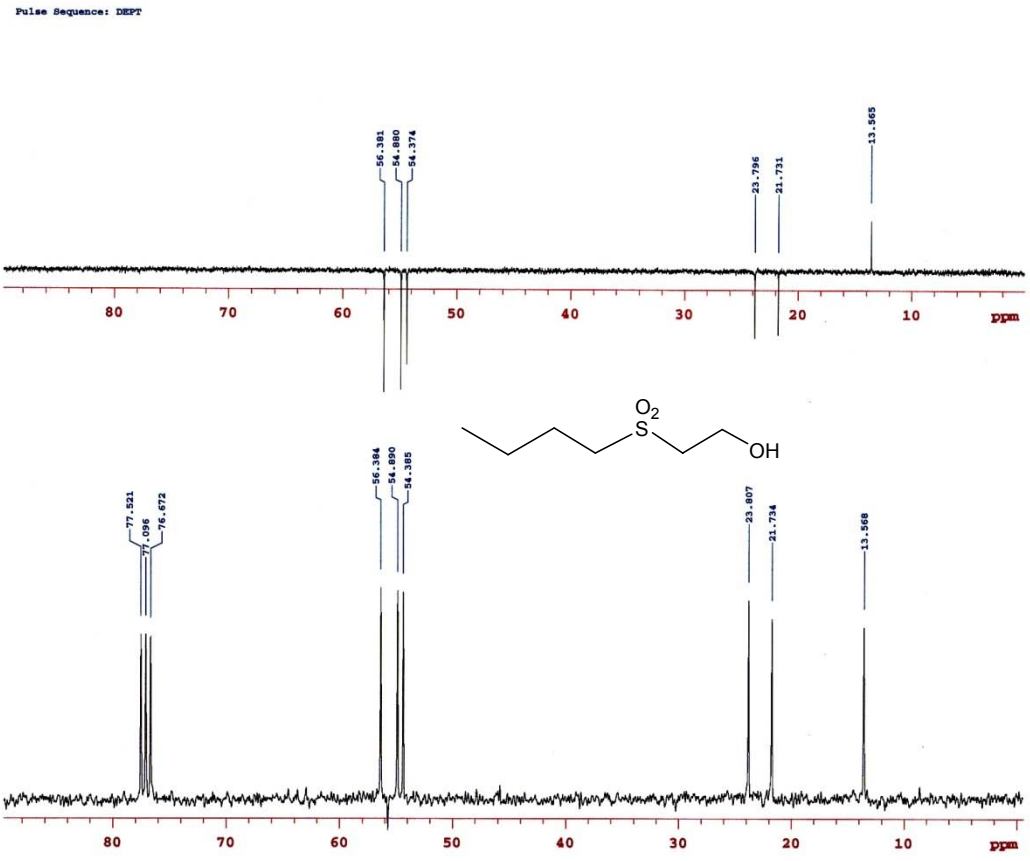

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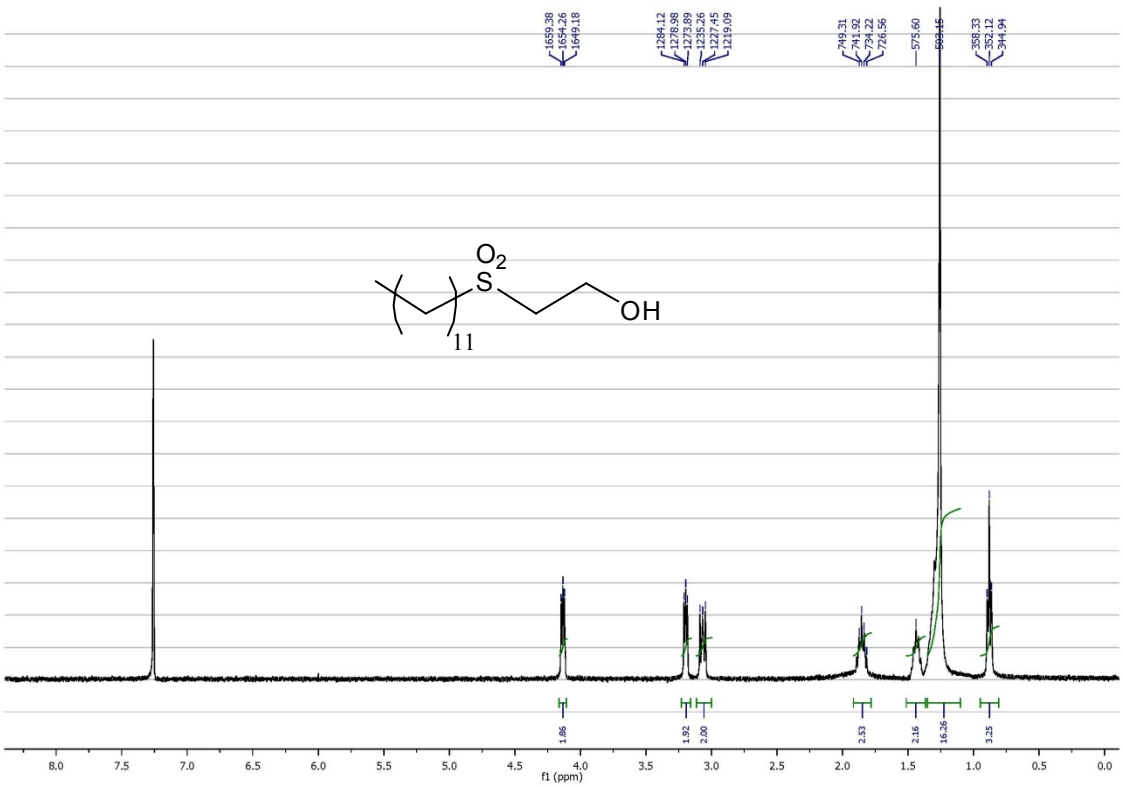

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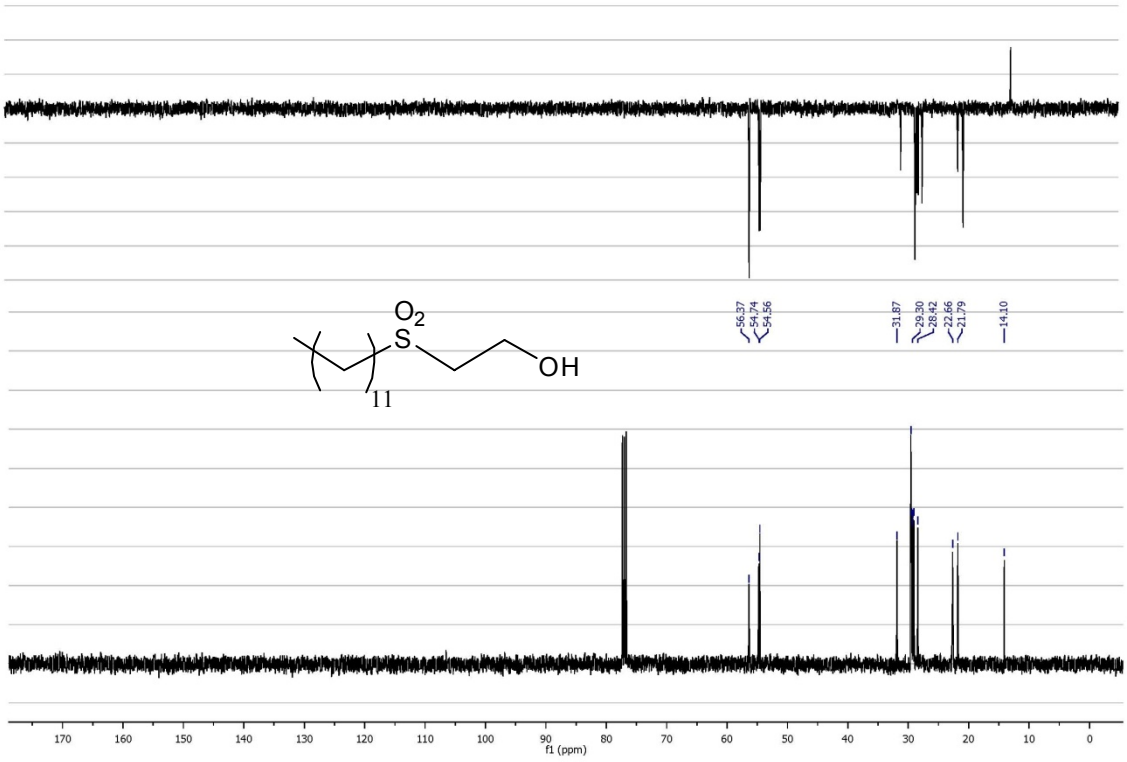

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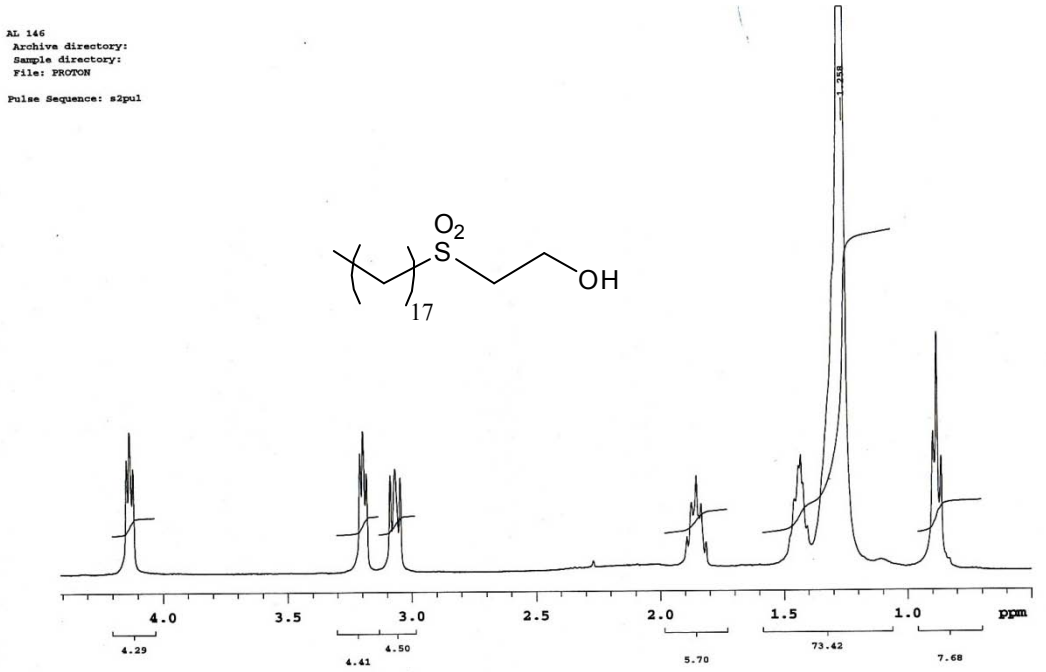

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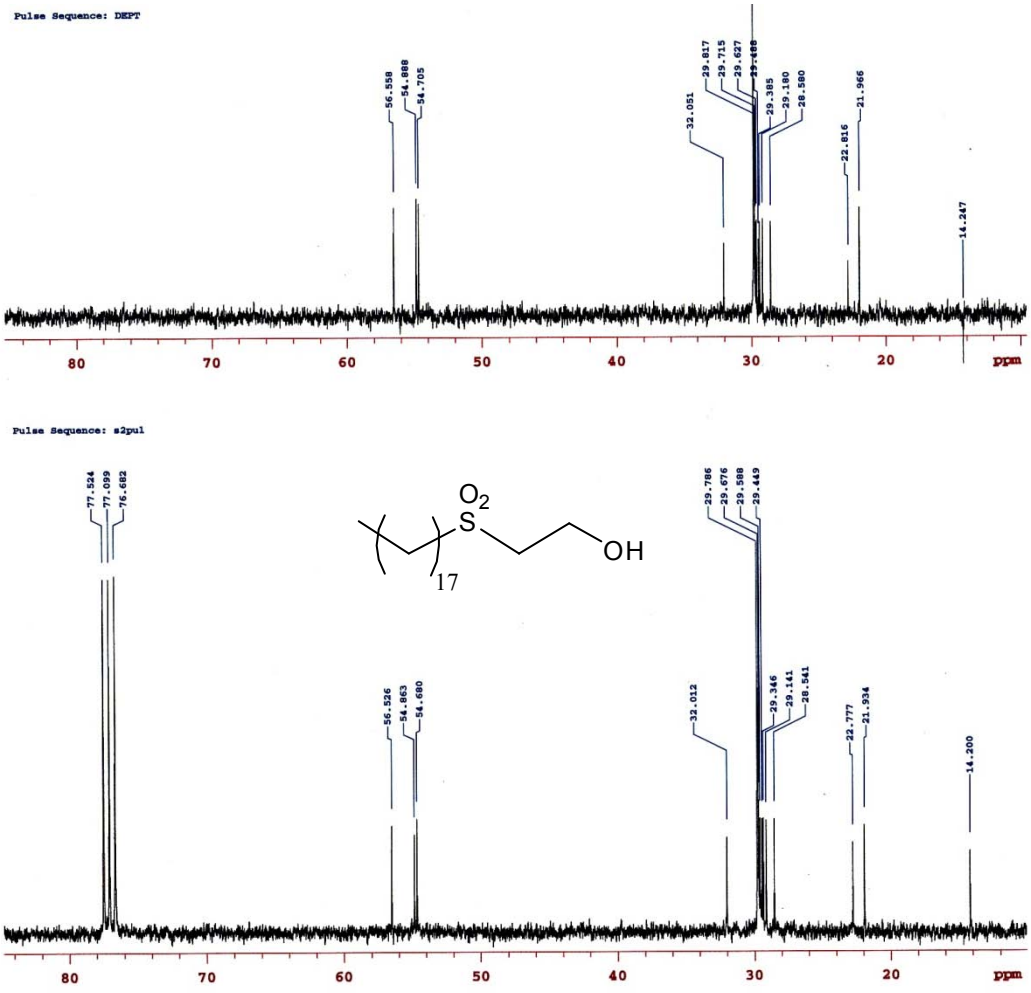

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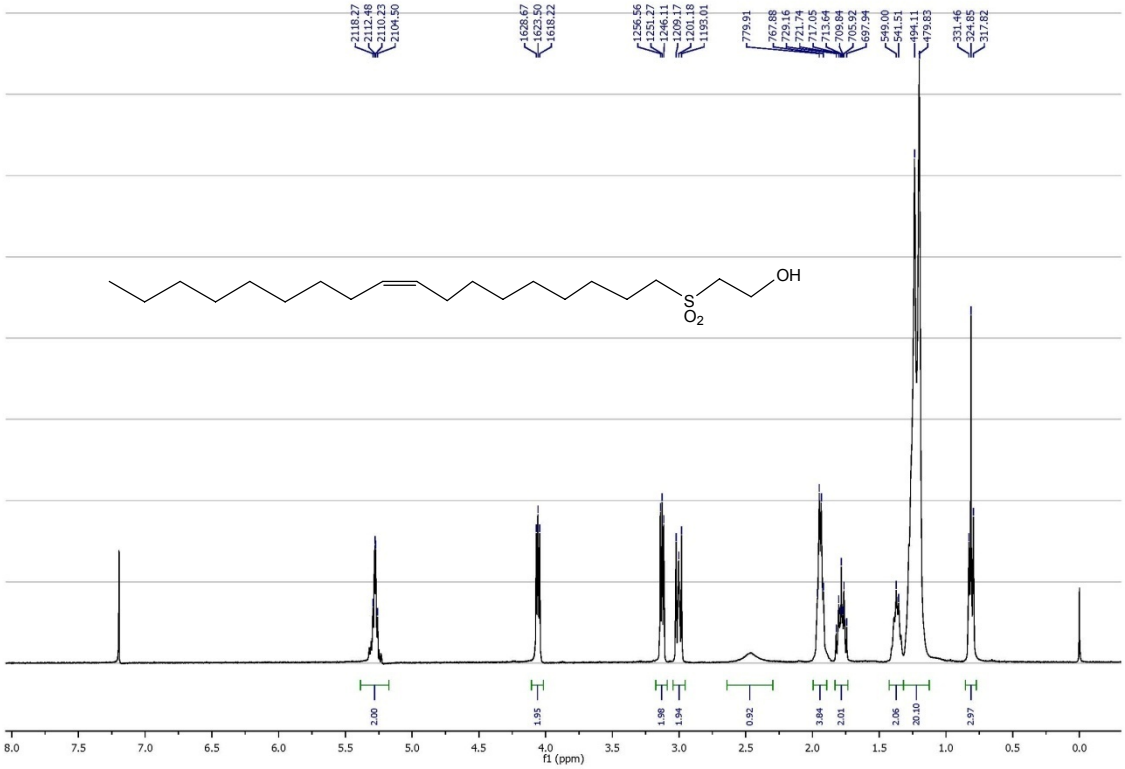

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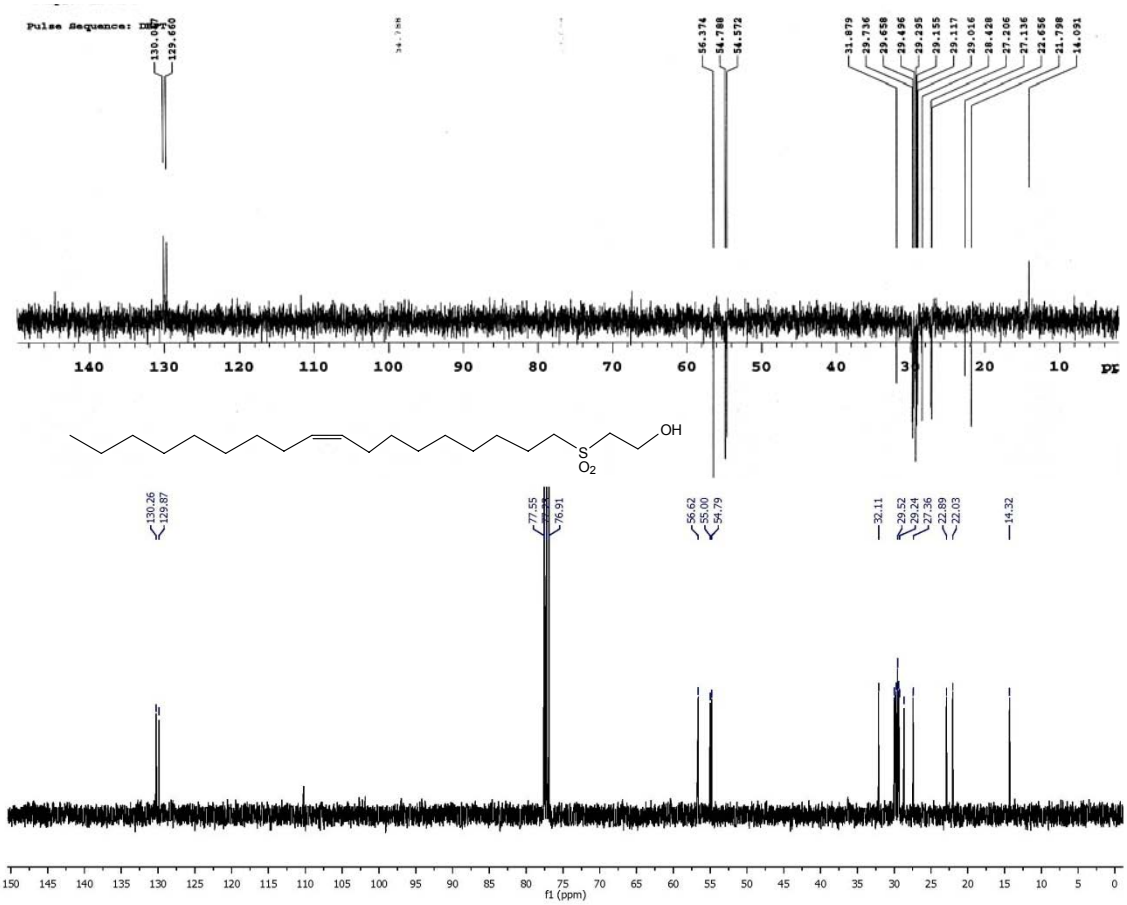

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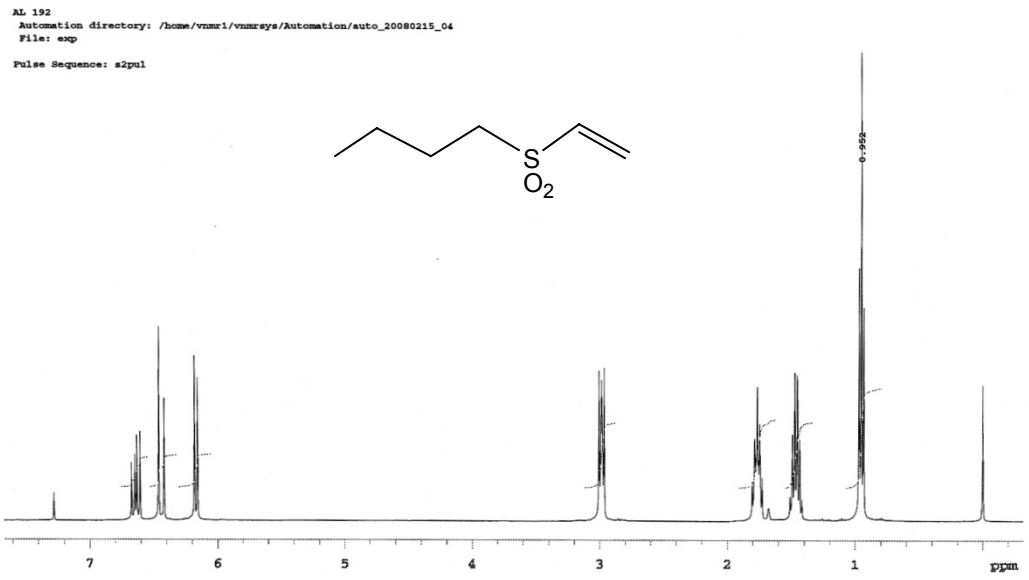

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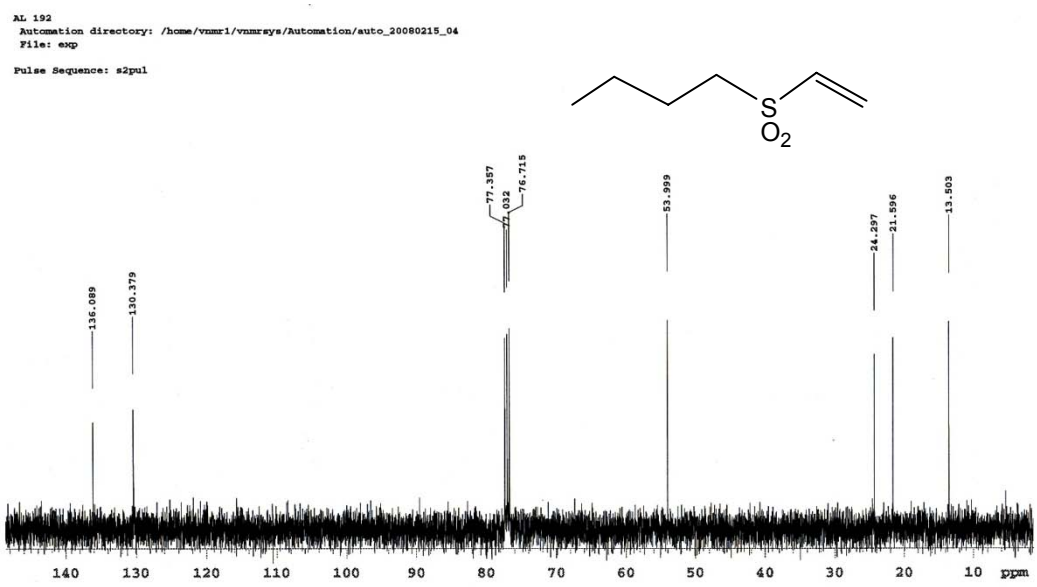

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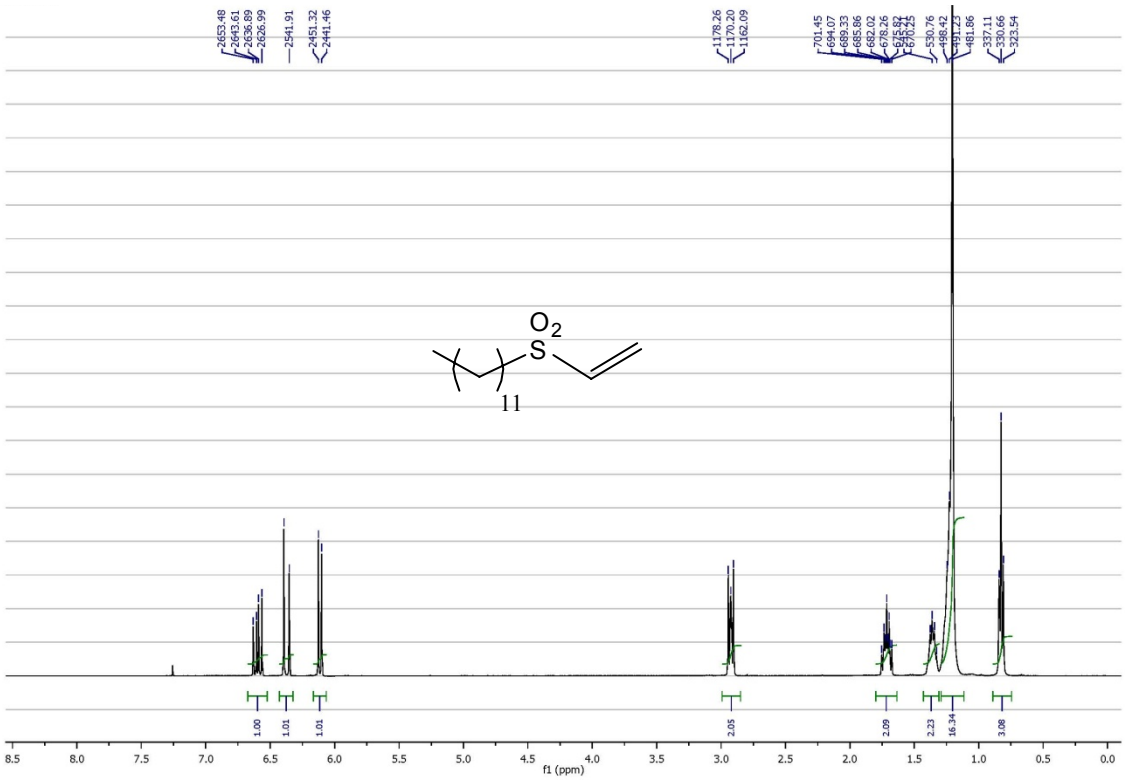

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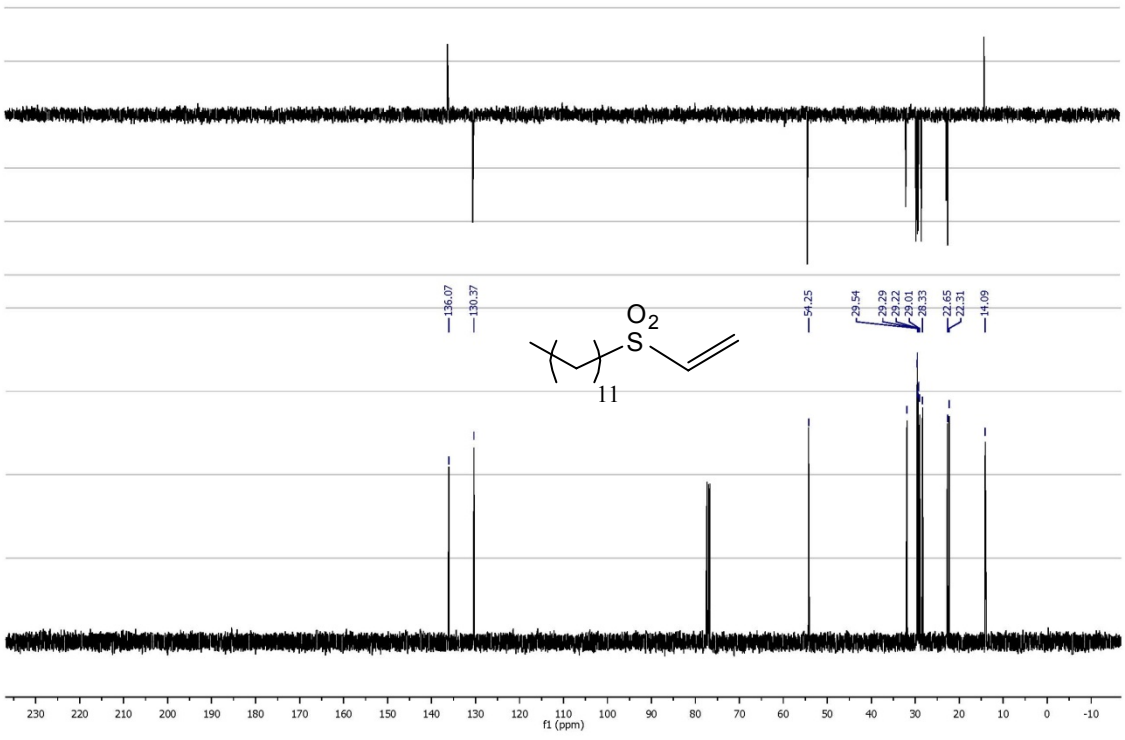

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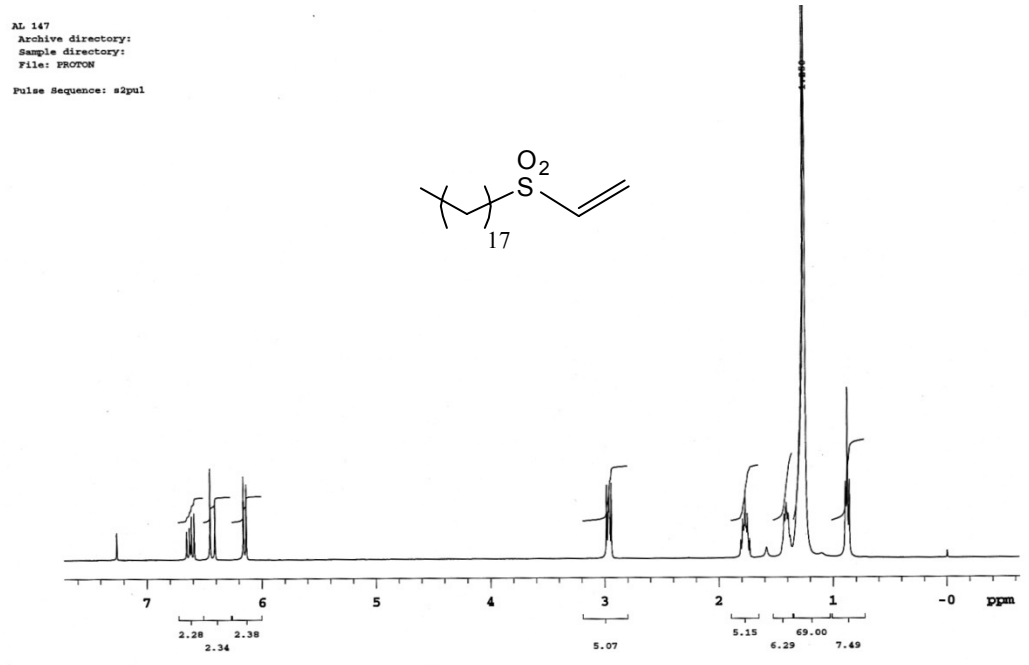

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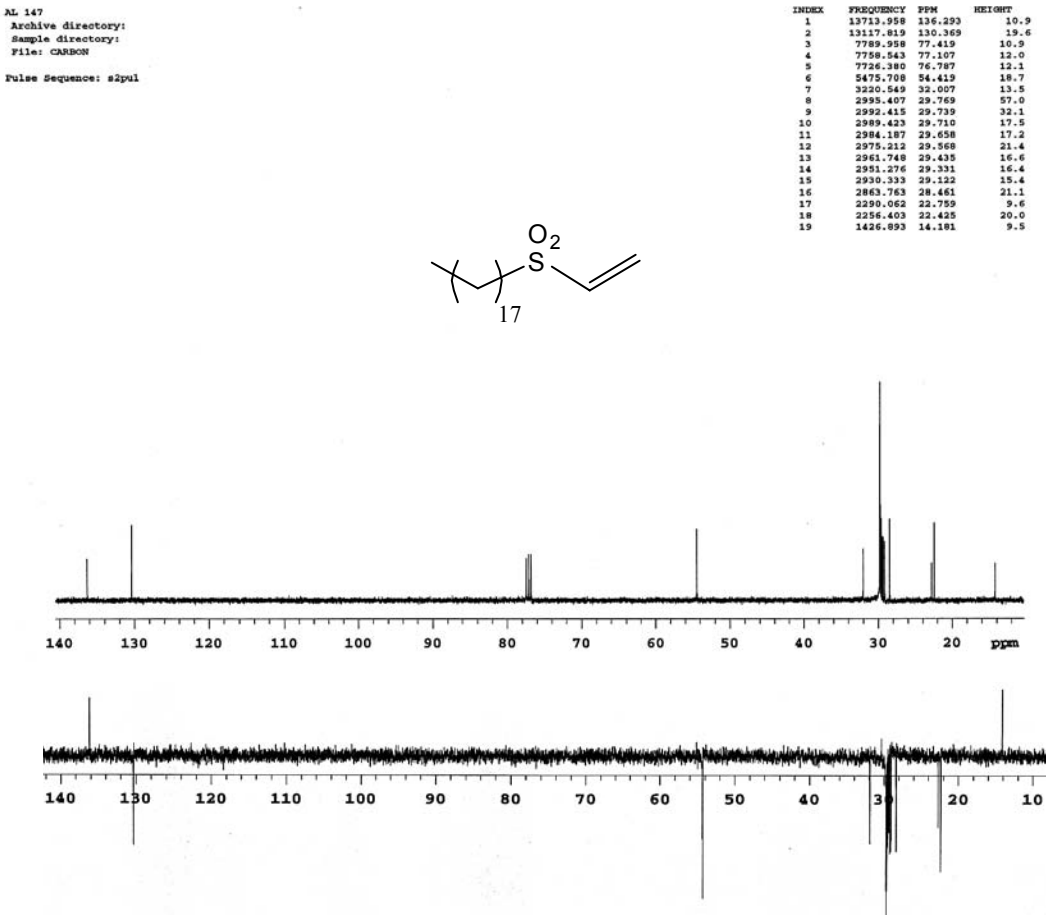

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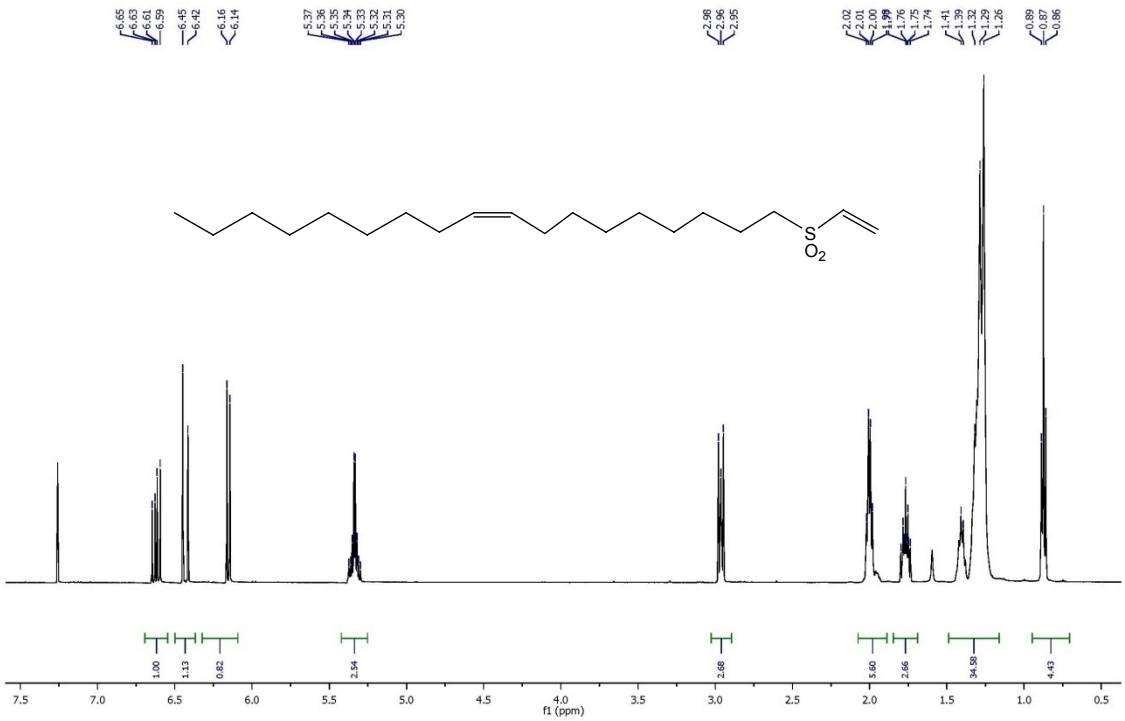

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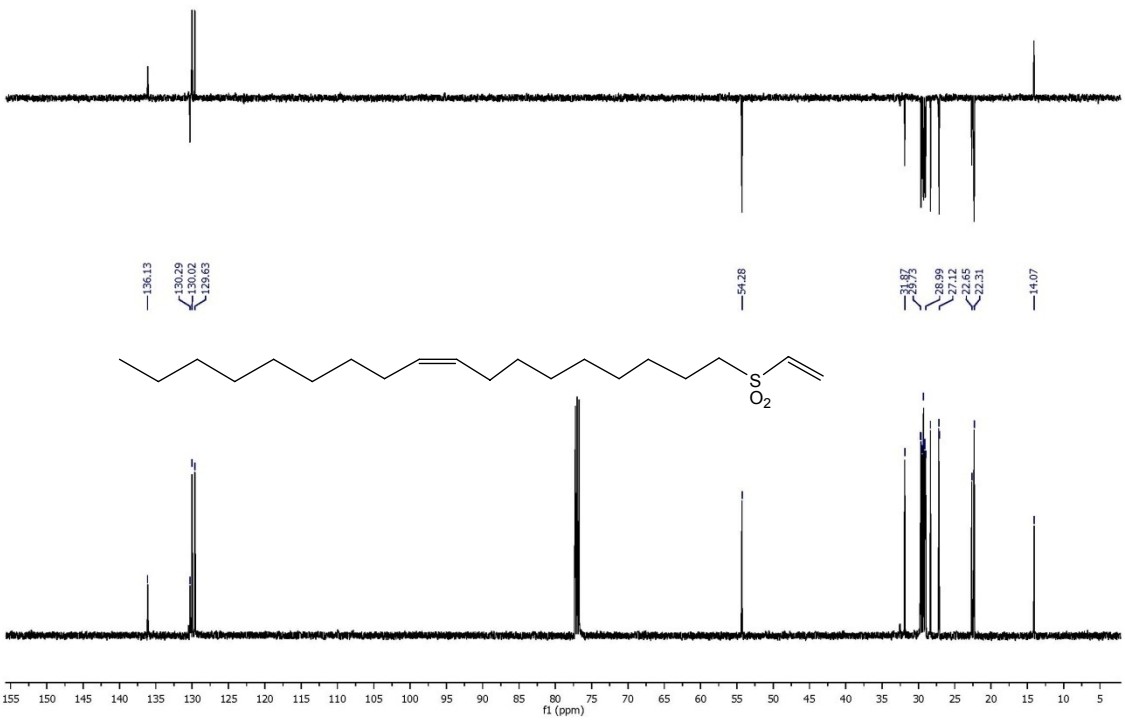

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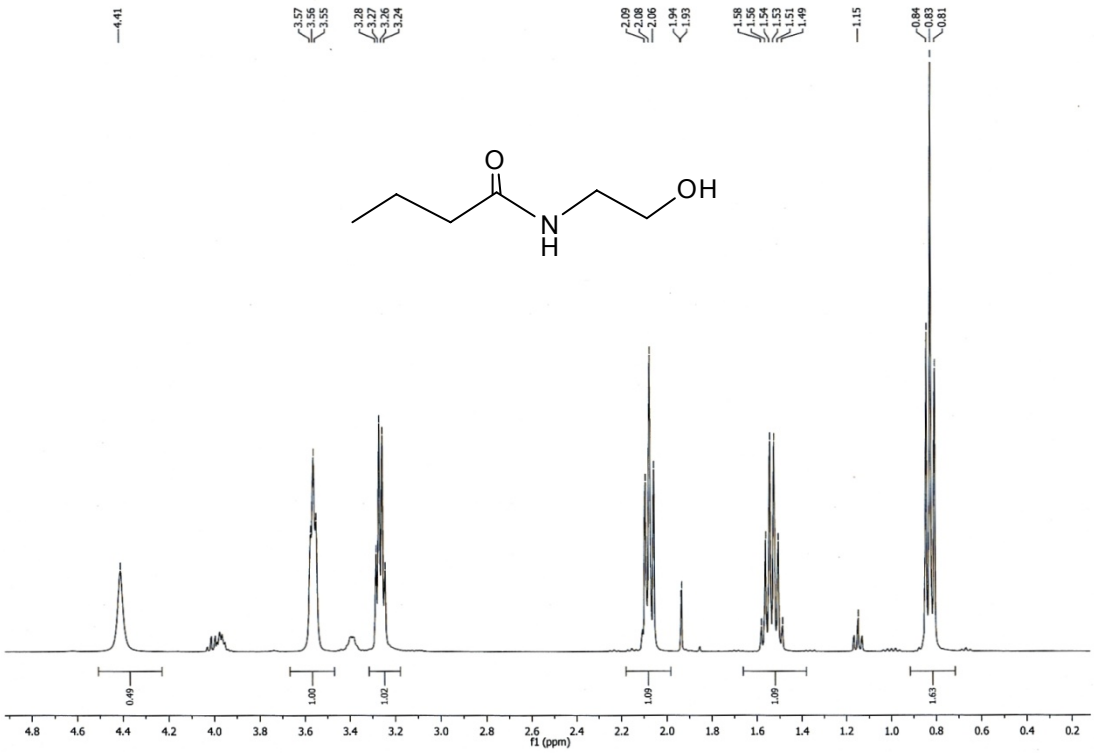

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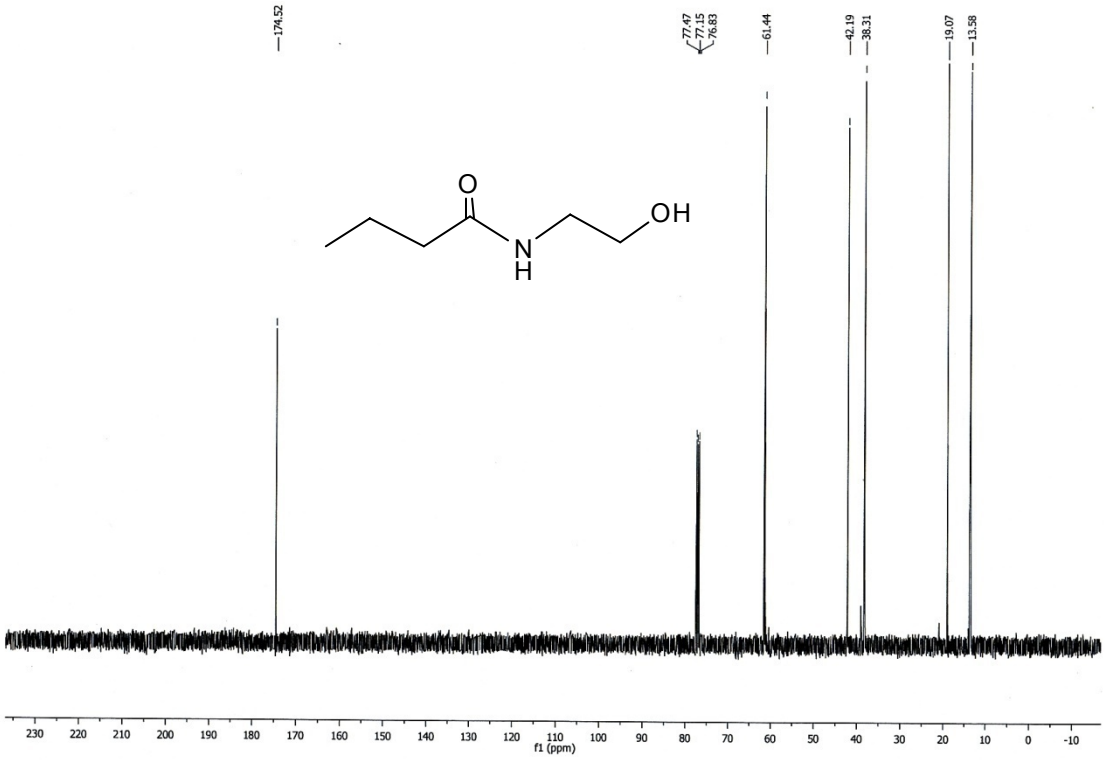

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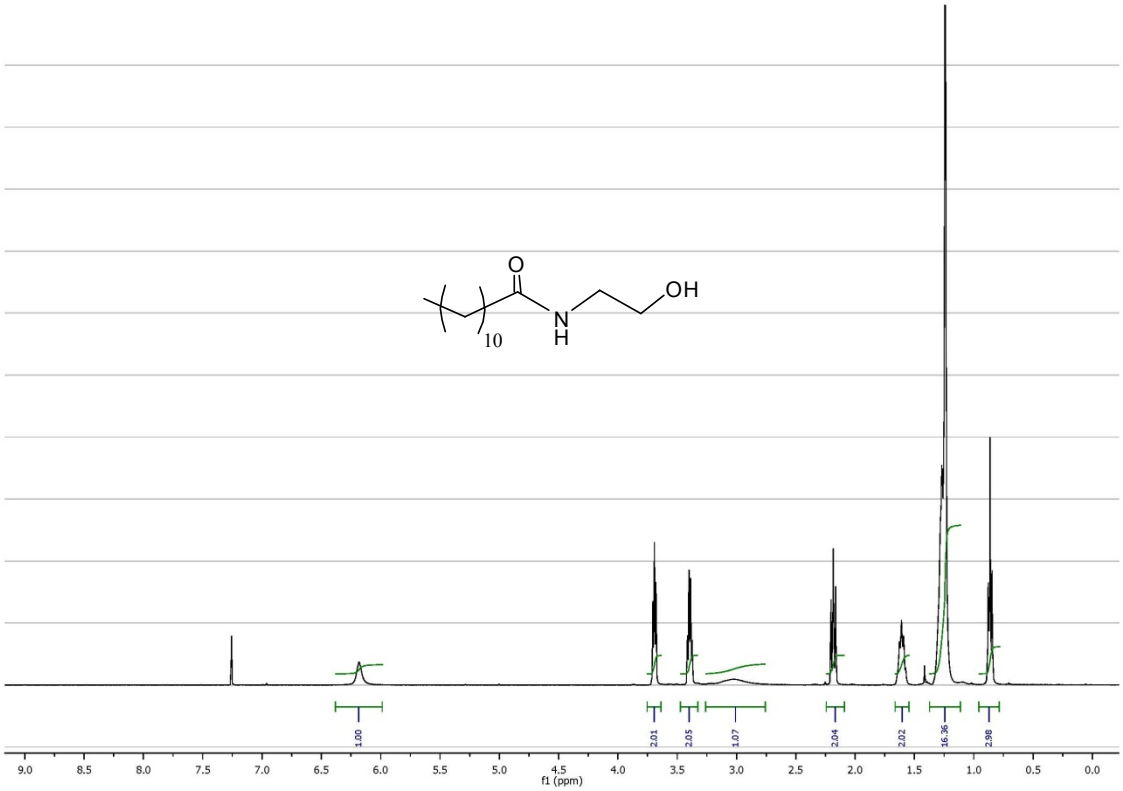

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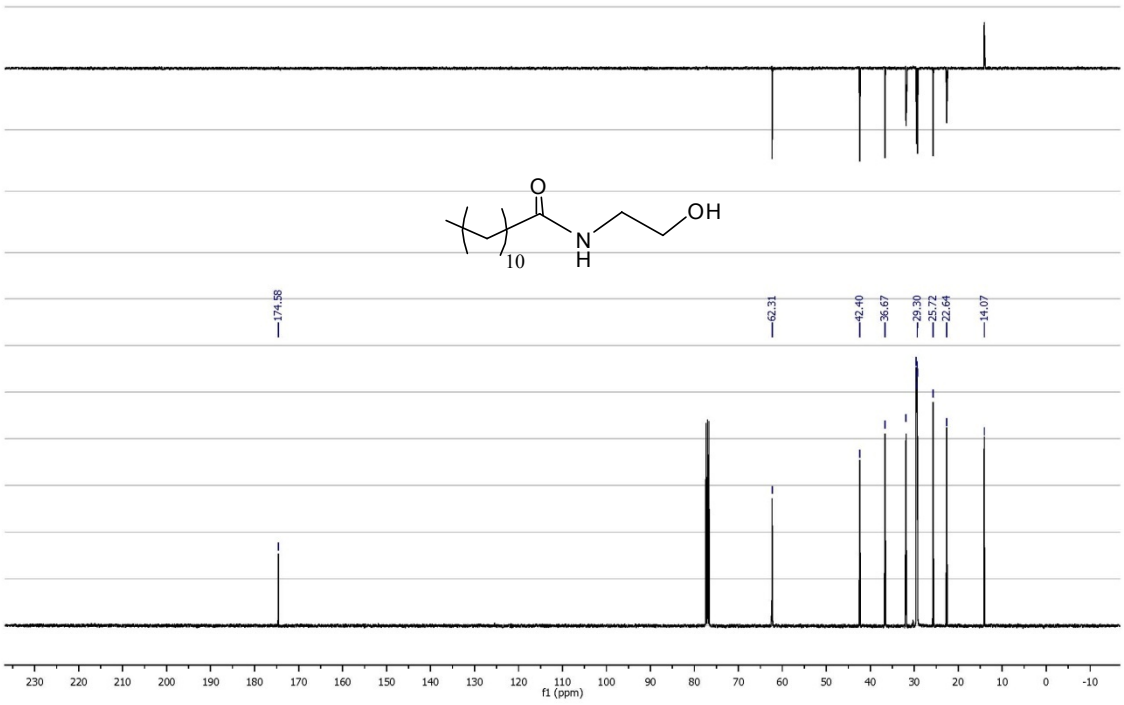

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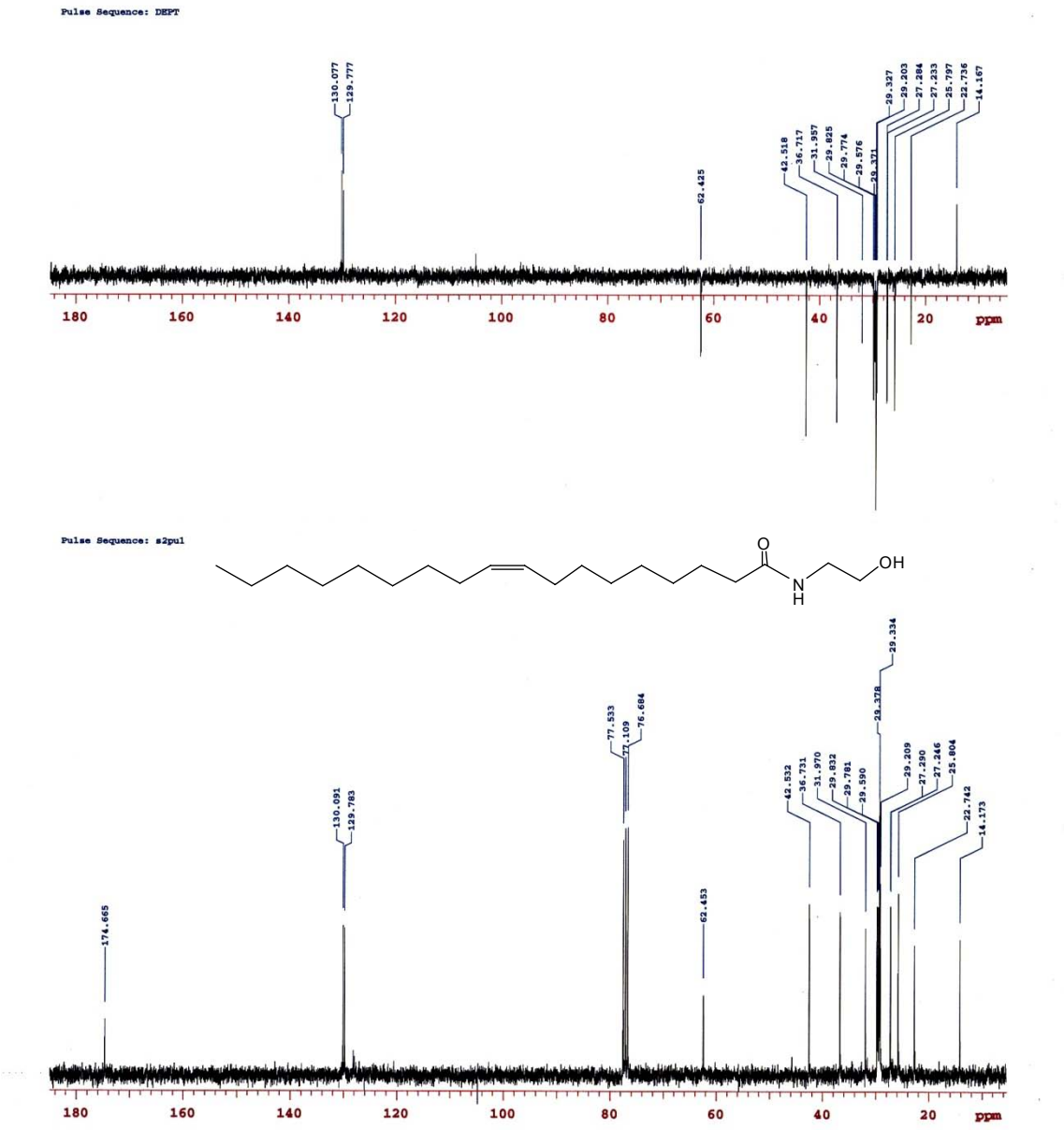

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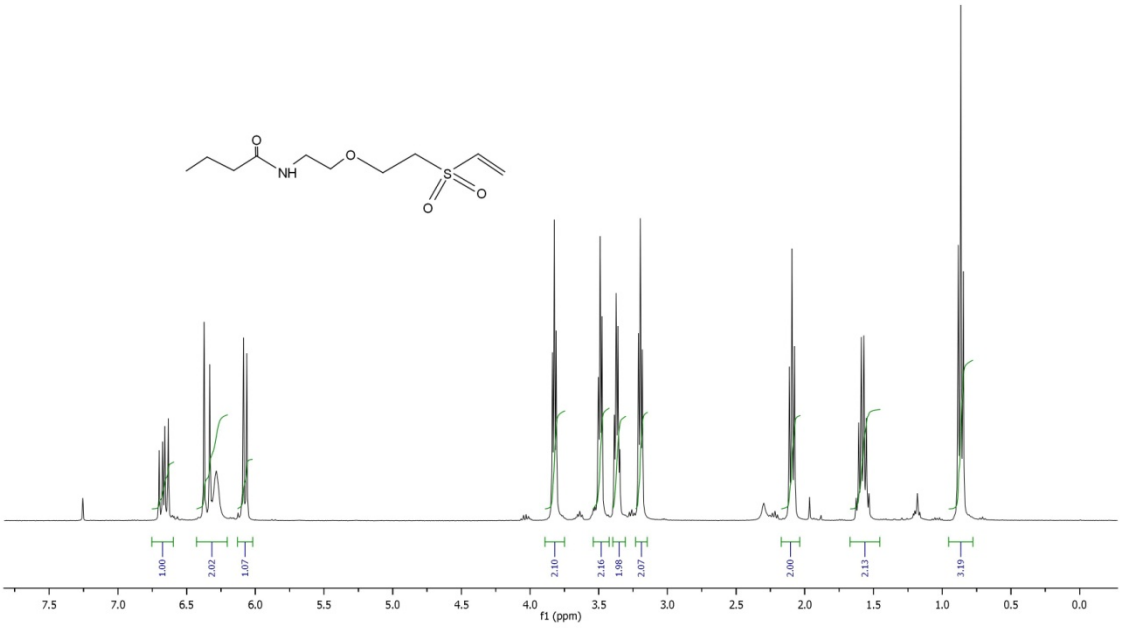

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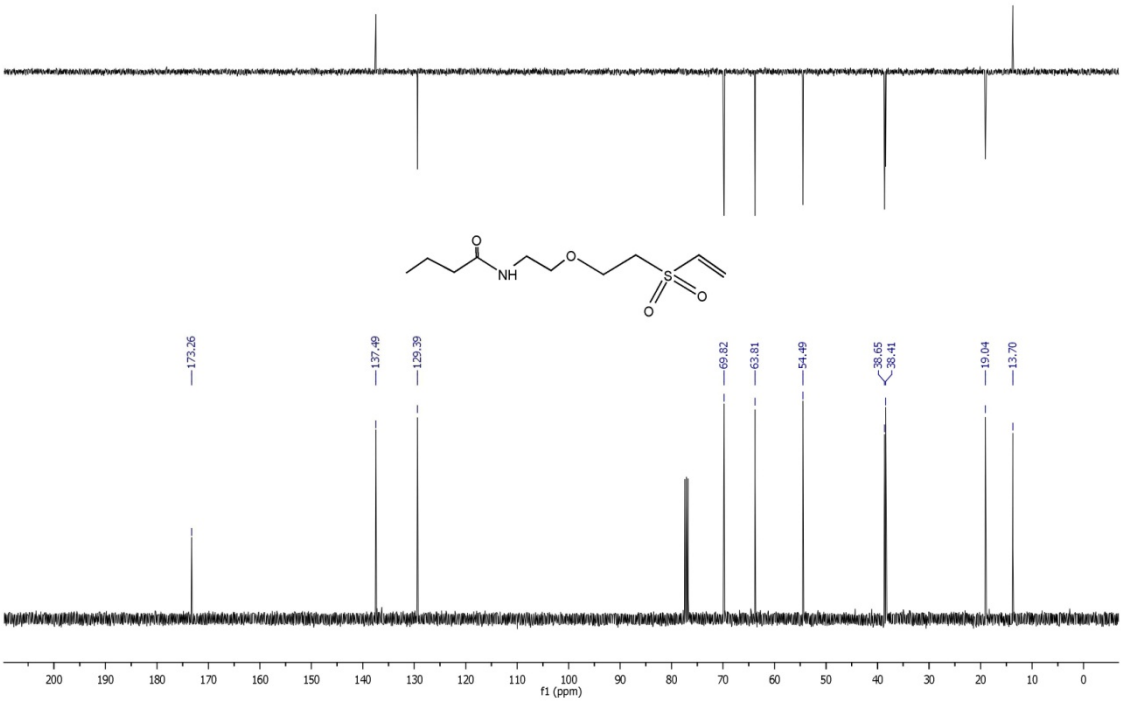

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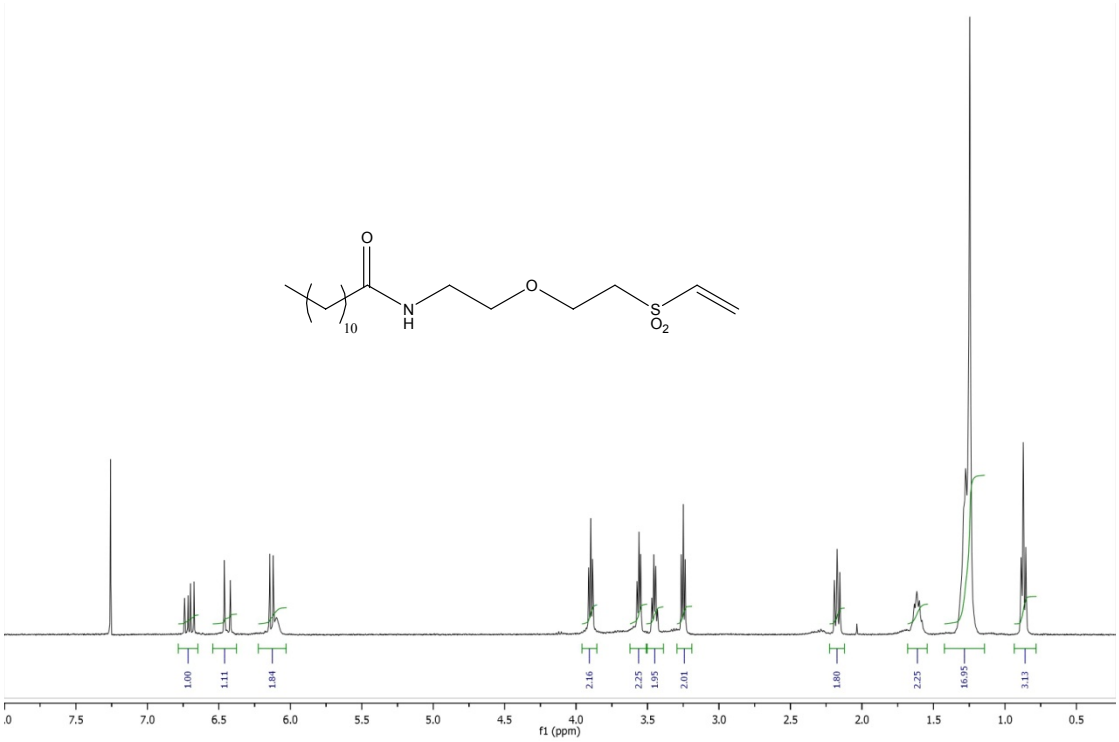

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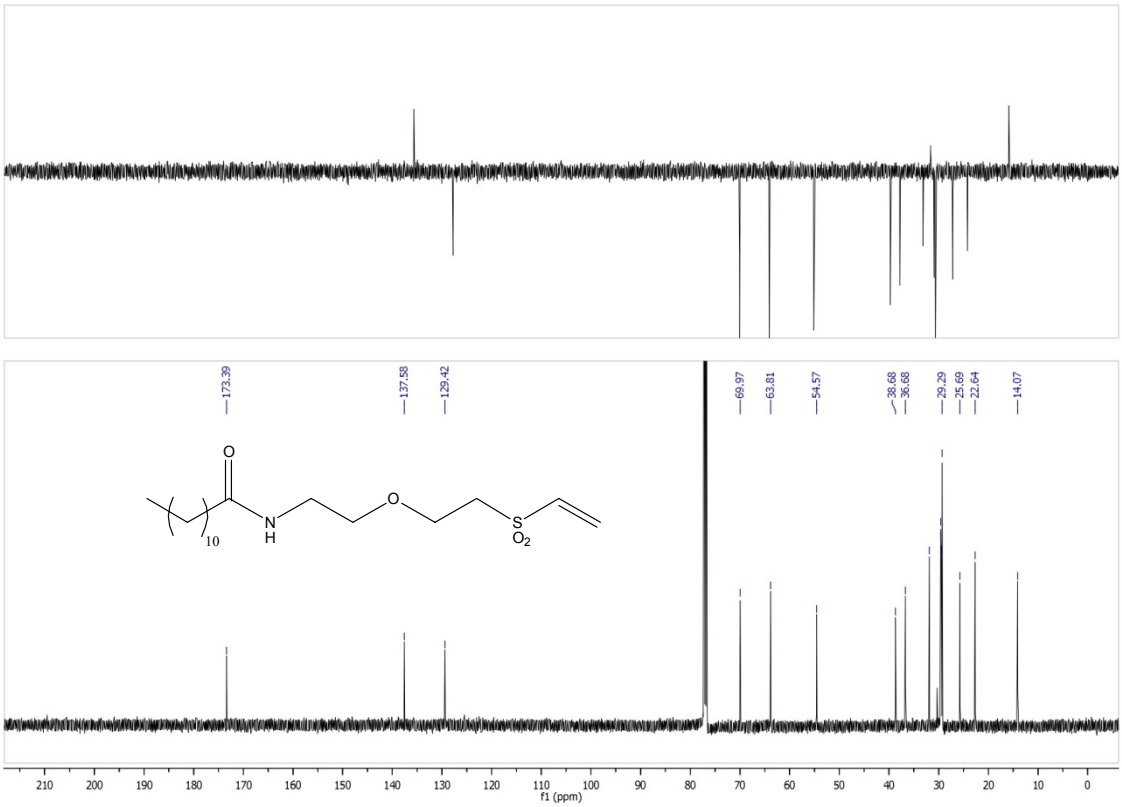

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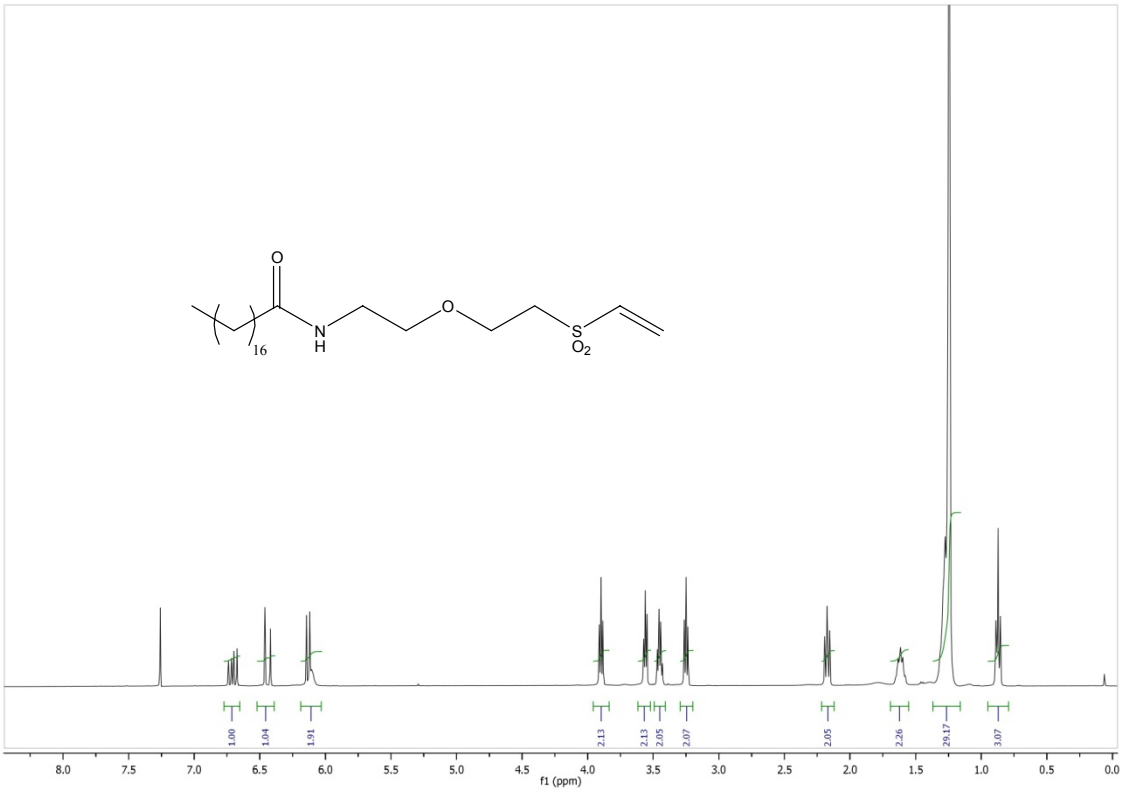

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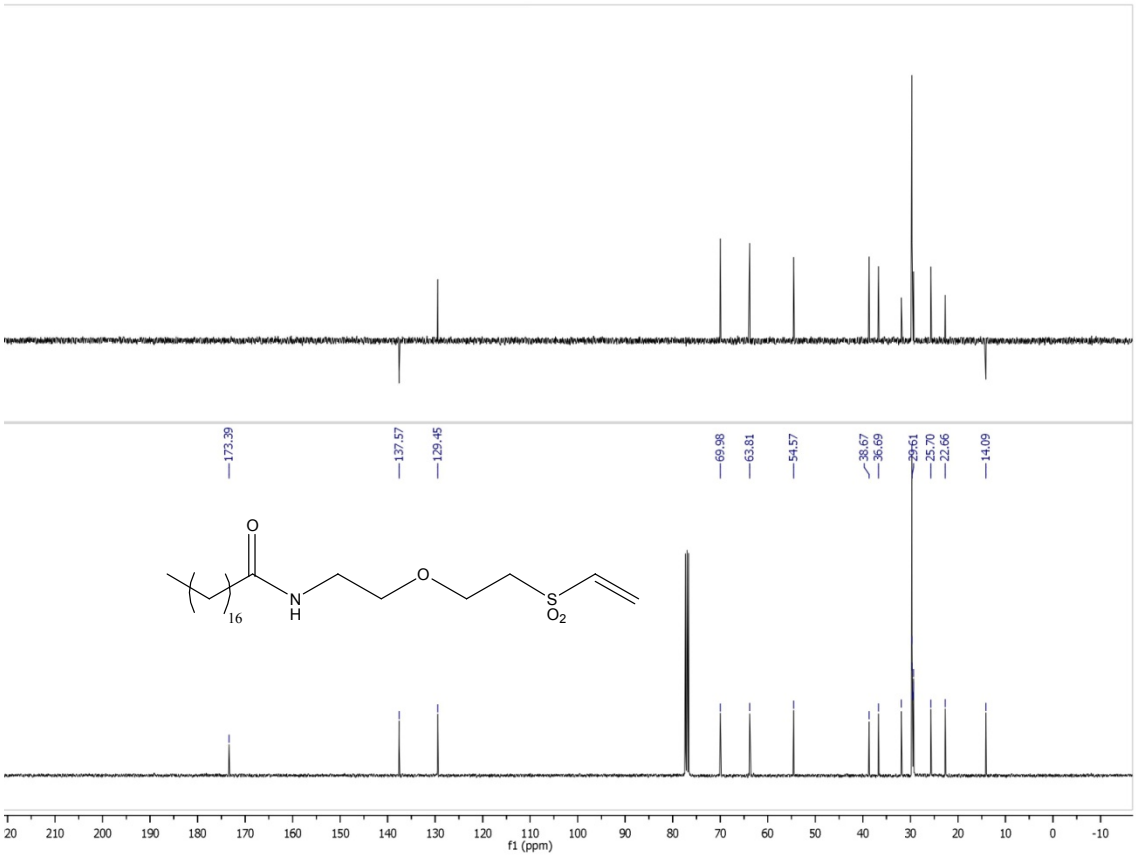

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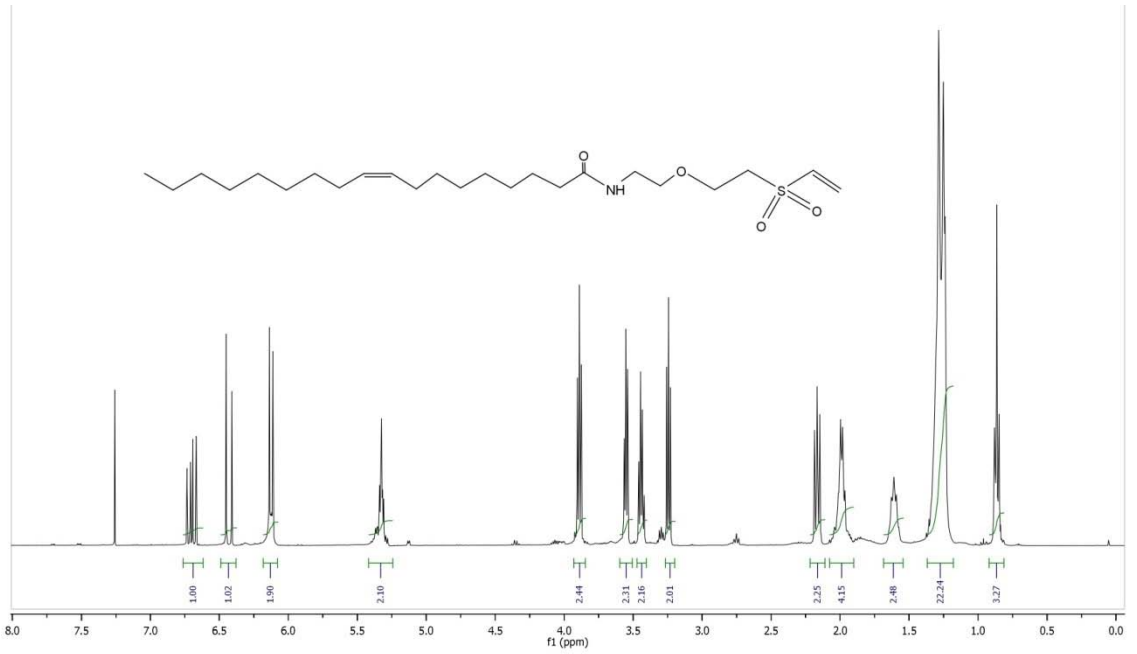

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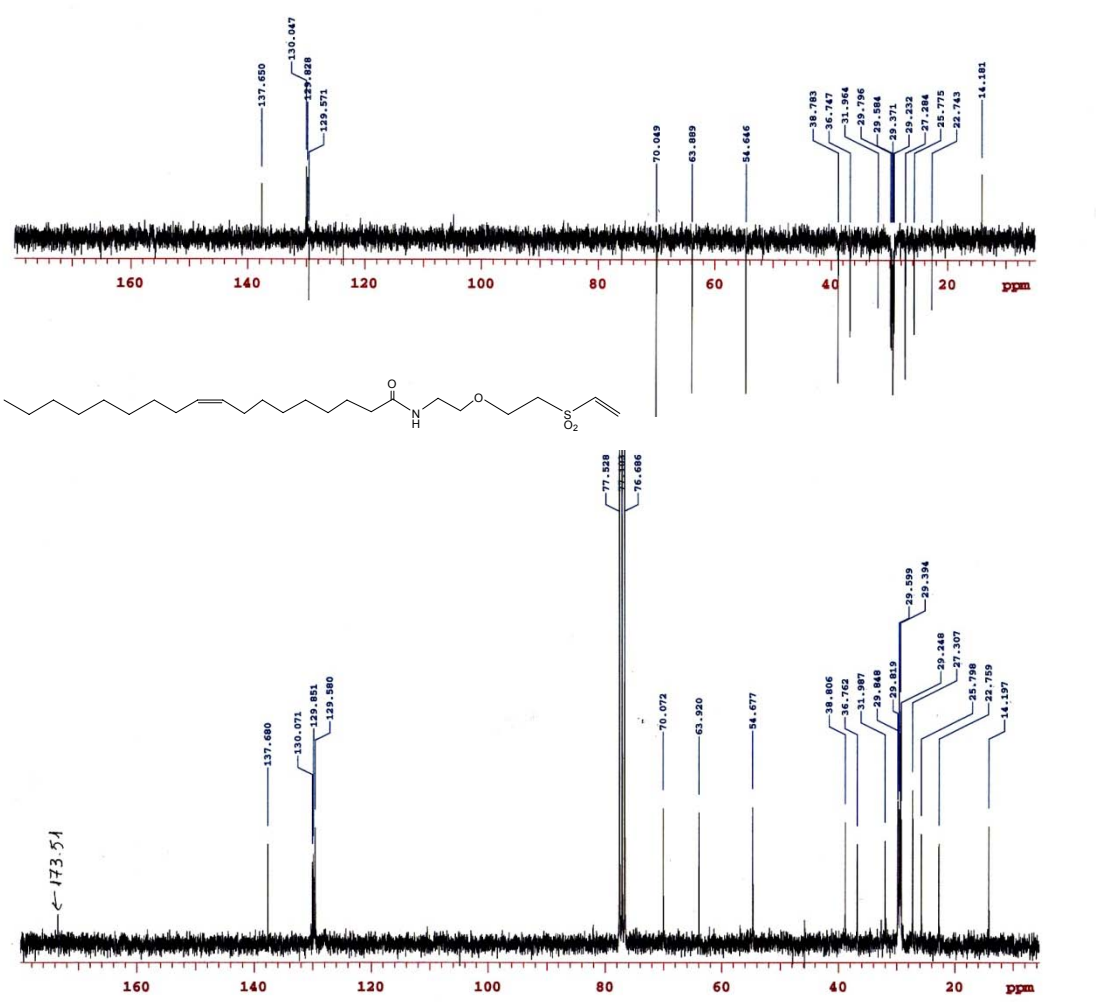

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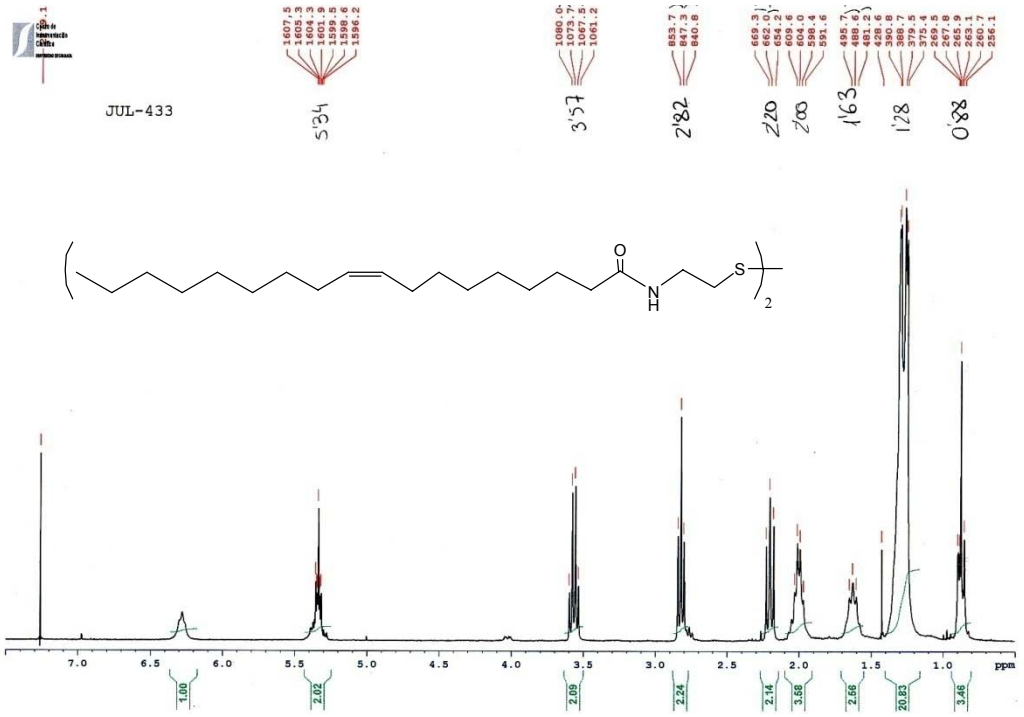

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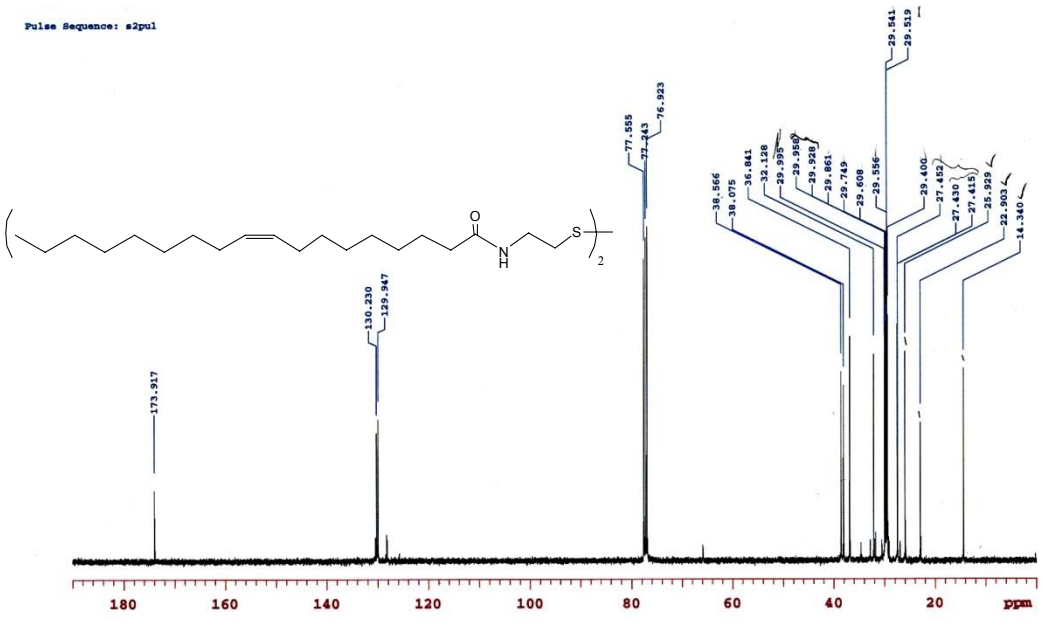

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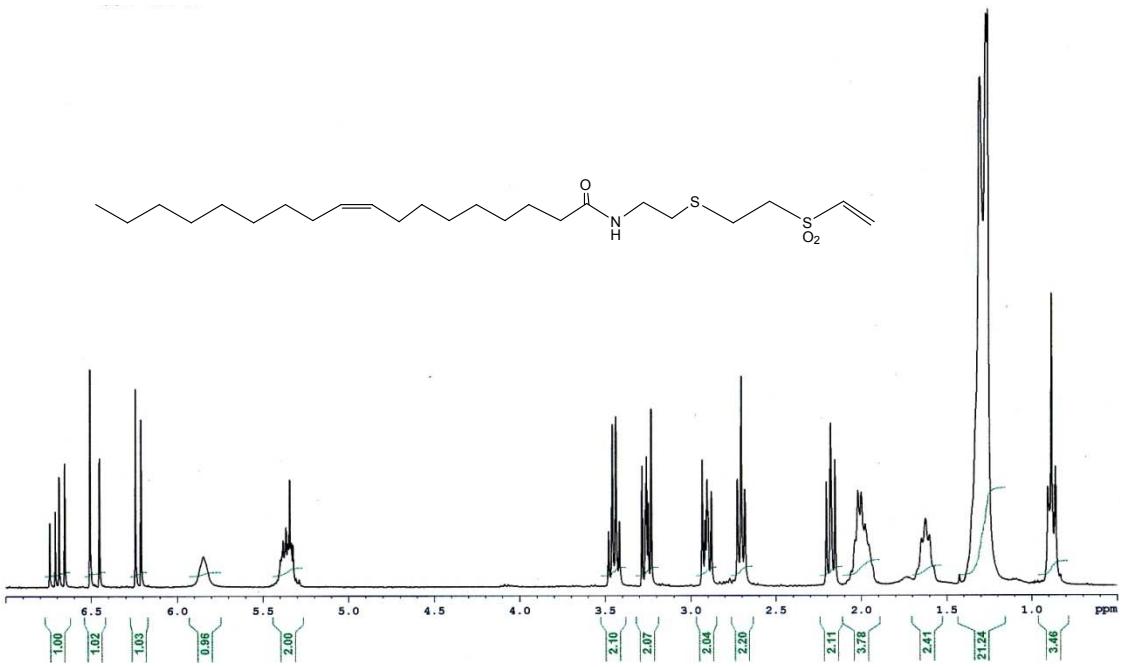

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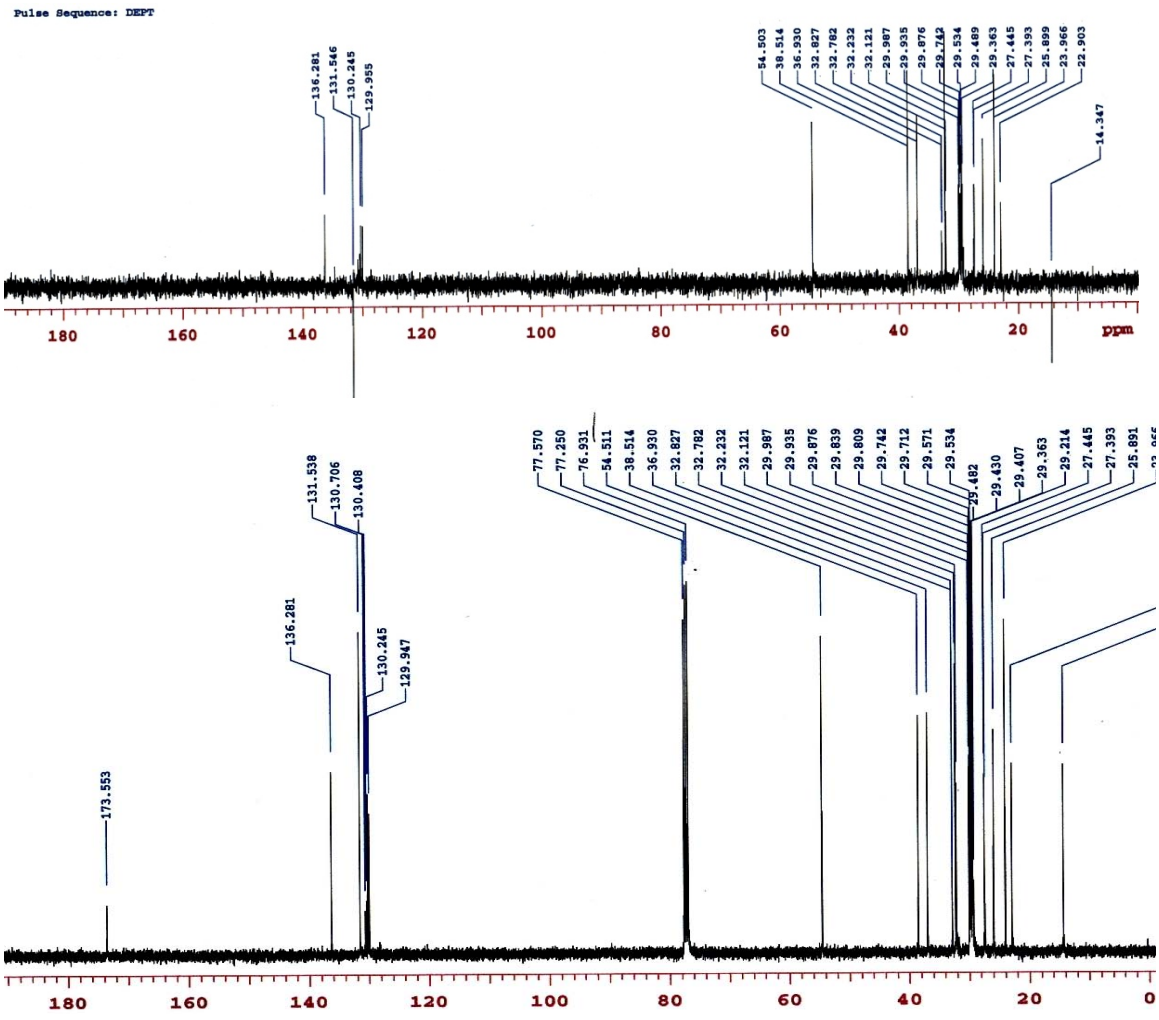

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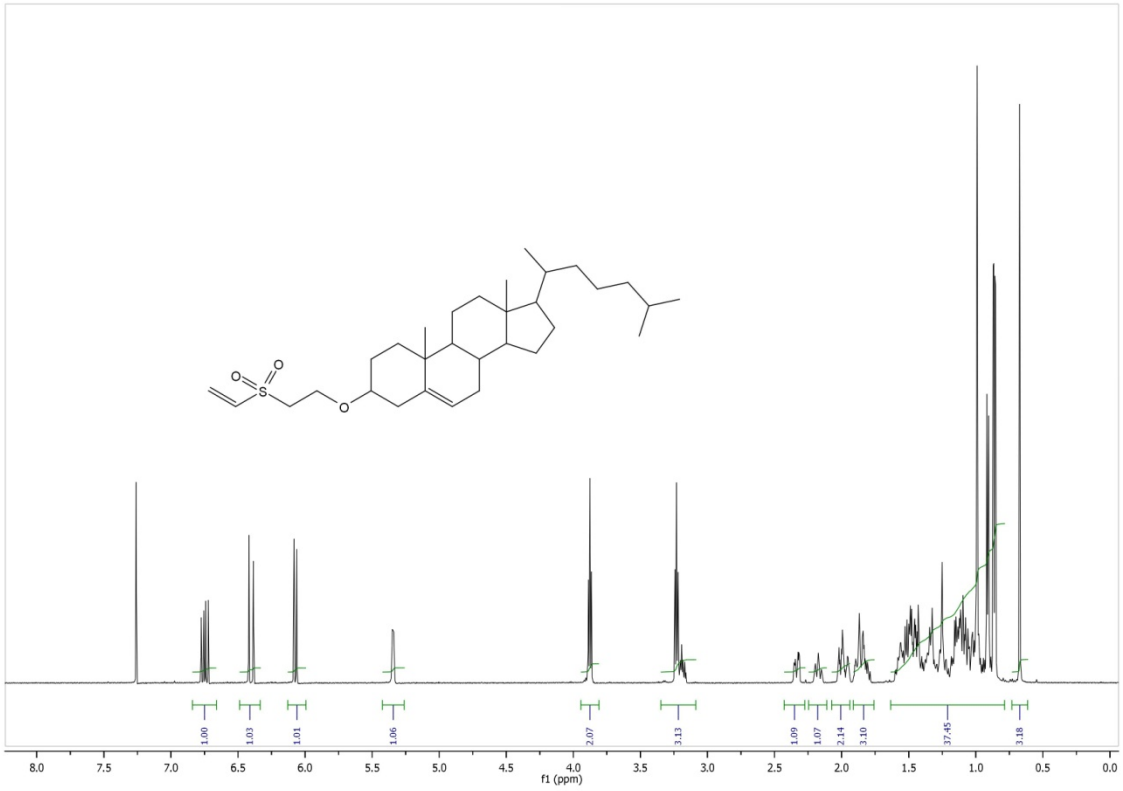

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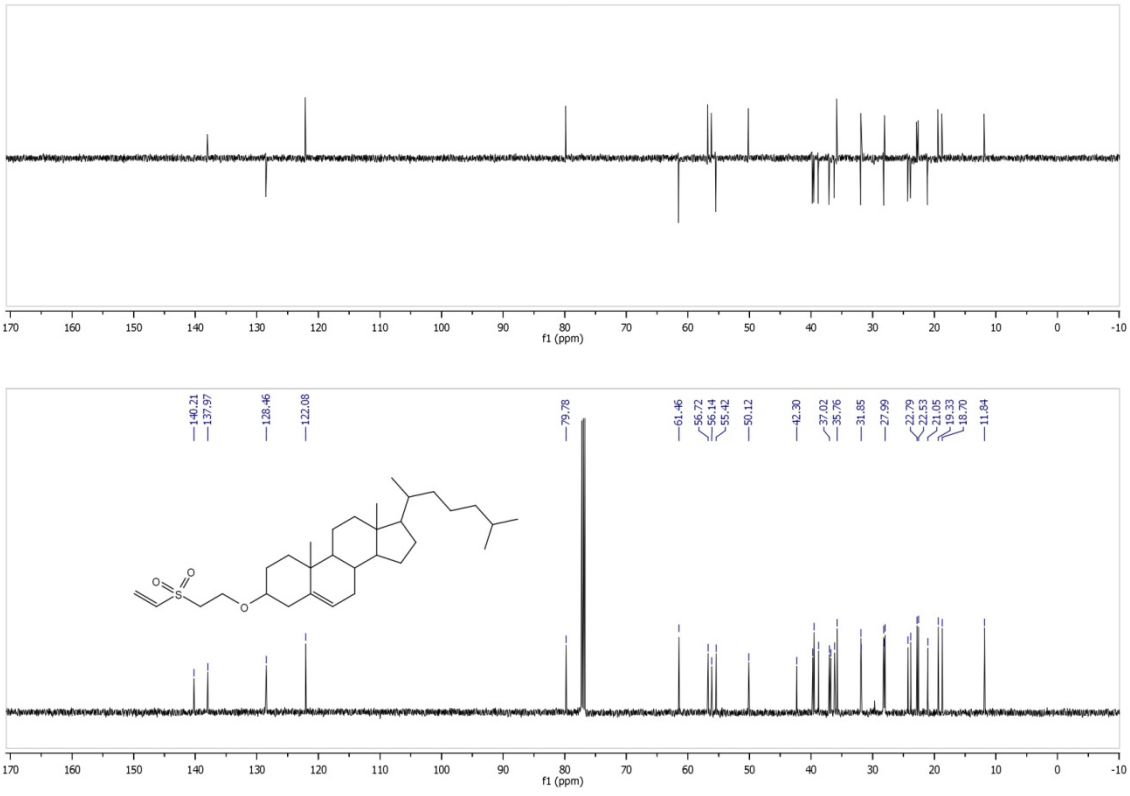

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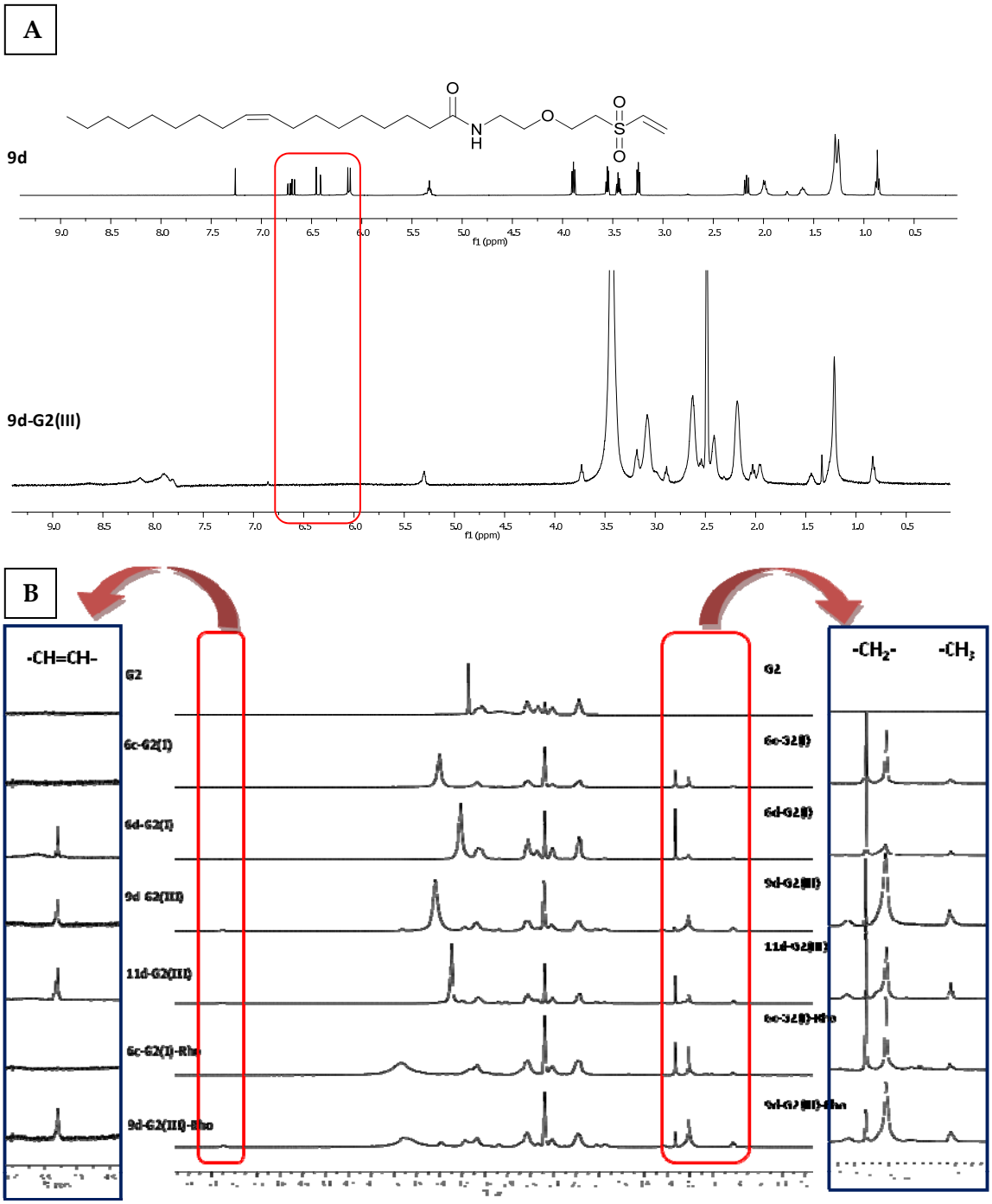
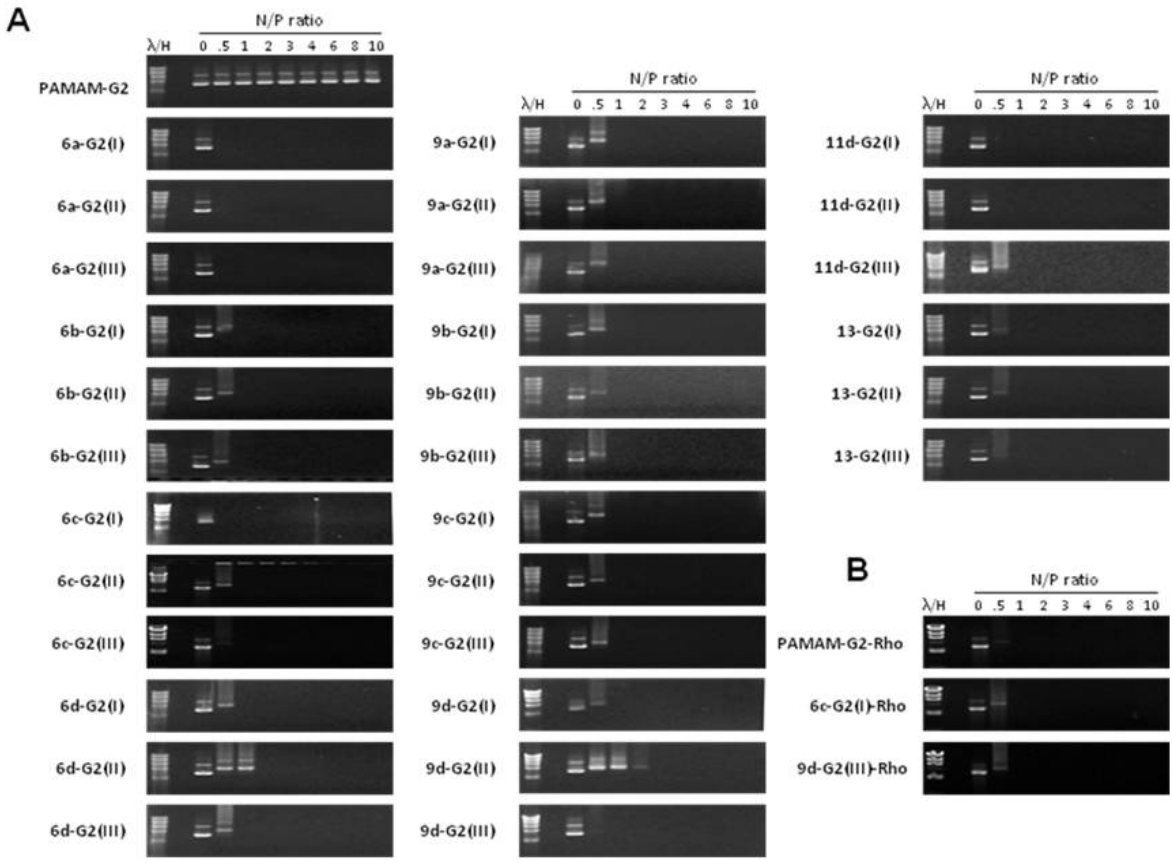
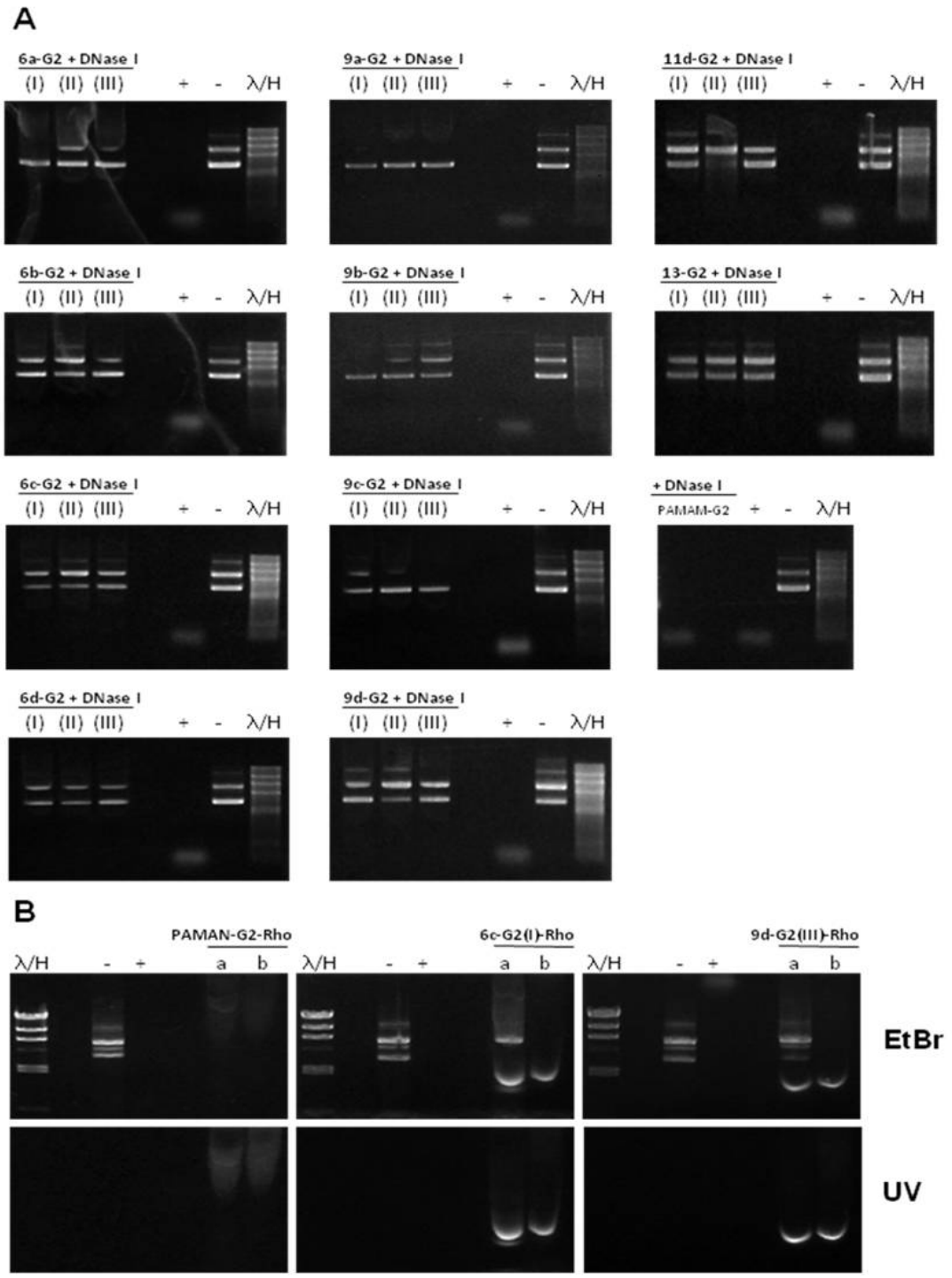


2. Figure S1 ^{1}H NMR spectra (400 MHz) proving functionalization of PAMAM-G2 on the reaction with vinyl sulfone derivatives in selected cases: A, Disappearance of the vinyl sulfone proton signals of compound **9d** in the reaction with PAMAM-G2 for the preparation of **9d-G2(III)** dendrimer; B, Appearance of signals corresponding to the alkyl chains and the vinyl residue in the preparation of **6c-G2(I)**, **6d-G2(I)**, **9d-G2(III)**, **11d-G2(III)**, **6cd-G2(I)-Rho** and **9d-G2(III)-Rho**.



3. Figure S2. *Gel Electrophoresis Shift Assays.* **A**.- Gel shift assays showing PAMAM-G2 or PAMAM-G2 derivatives-pEGFP-N3 binding at *N*/*P* ratios between 0 (pEGFP-N3 alone) and 10. The absence of plasmid band in the wells correlates with the inhibition of the plasmid DNA electrophoretic mobility. **B.-** Rhodamine labeled PAMAM or PAMAM-G2 derivatives gel shift assays.



4. Figure S3. DNase I protection experiments. Representative agarose electrophoresis of samples corresponding to pEGFP-N3 incubated in the absence (-) or presence (+) of DNase I as controls. pEGFP-N samples that have been complexed with the PAMAM-G2 derivatives before the DNase I treatment have been run in parallel. B.- Samples of PAMAM-G2 derivatives labeled with Rhodamine has been processed as above and the DNase I protection has been assayed by gel electrophoresis. (a) Dendrimer-pDNA complexes, (b) labeled dendrimer alone. Since the dendrimers are labeled with fluorescence, the gels have been photographed before (UV) and after ethidium bromide staining (EtBr). Notice that due to the interaction of the free labeled dendrimer with the SDS used in the sample preparation, the free labeled dendrimers have a net negative charge in the electrophoresis.

5. Table S1. Hydrodynamic Diameter and ζ Potential for PAMAM-G2 derivatives and their complexes with DNA.

Compound	Z Potential (mV)		Hydrodynamic Diameter (nm)		N/P
	Without DNA	With DNA	Without DNA	With DNA	
6b-G2(I)	+ 25.8 ± 0.9	+ 14.4 ± 0.3	367 ± 20	734 ± 33	2.5
6c-G2(I)	+ 29.6 ± 0.7	+ 14.8 ± 0.2	536 ± 84	524 ± 19	2.5
6d-G2-(I)	+ 29.9 ± 0.2	+ 12.2 ± 0.2	394 ± 41	736 ± 68	2.5
9b-G2-(I)	+ 29.5 ± 0.5	+ 21.8 ± 0.8	709 ± 95	515 ± 10	10
9c-G2(I)	+ 32.1 ± 0.6	+ 13.2 ± 1.6		627 ± 27	2.5
9d-G2-(III)	+ 38.1 ± 0.6	+ 28.2 ± 0.6	131 ± 26	226 ± 3	10
11d-G2-(III)	+ 27.3 ± 0.5	+ 17.8 ± 0.7	272 ± 24	288 ± 5	10
13-G2(III)	+ 23.5 ± 0.4	+ 21.3 ± 0.6	528 ± 92	329 ± 15	10
G2-Rho	+ 27.3 ± 3.2	+ 15.2 ± 0.7	267 ± 66	326 ± 19	2.5
6c-G2(I)-Rho	+ 33.1 ± 1.2	+ 24.3 ± 1.6	393 ± 18	207 ± 10	2.5
9d-G2-(III)-Rho	+ 44.9 ± 7.6	+ 28.2 ± 2.4	282 ± 22	273 ± 9	10