

Electronic supplementary information

PRODUCTION OF NEW SILOXANE RUBBERS WITH PERFLUOROALKYL SUBSTITUENTS BASED ON HEXAFLUOROPROPYLENE DIMER

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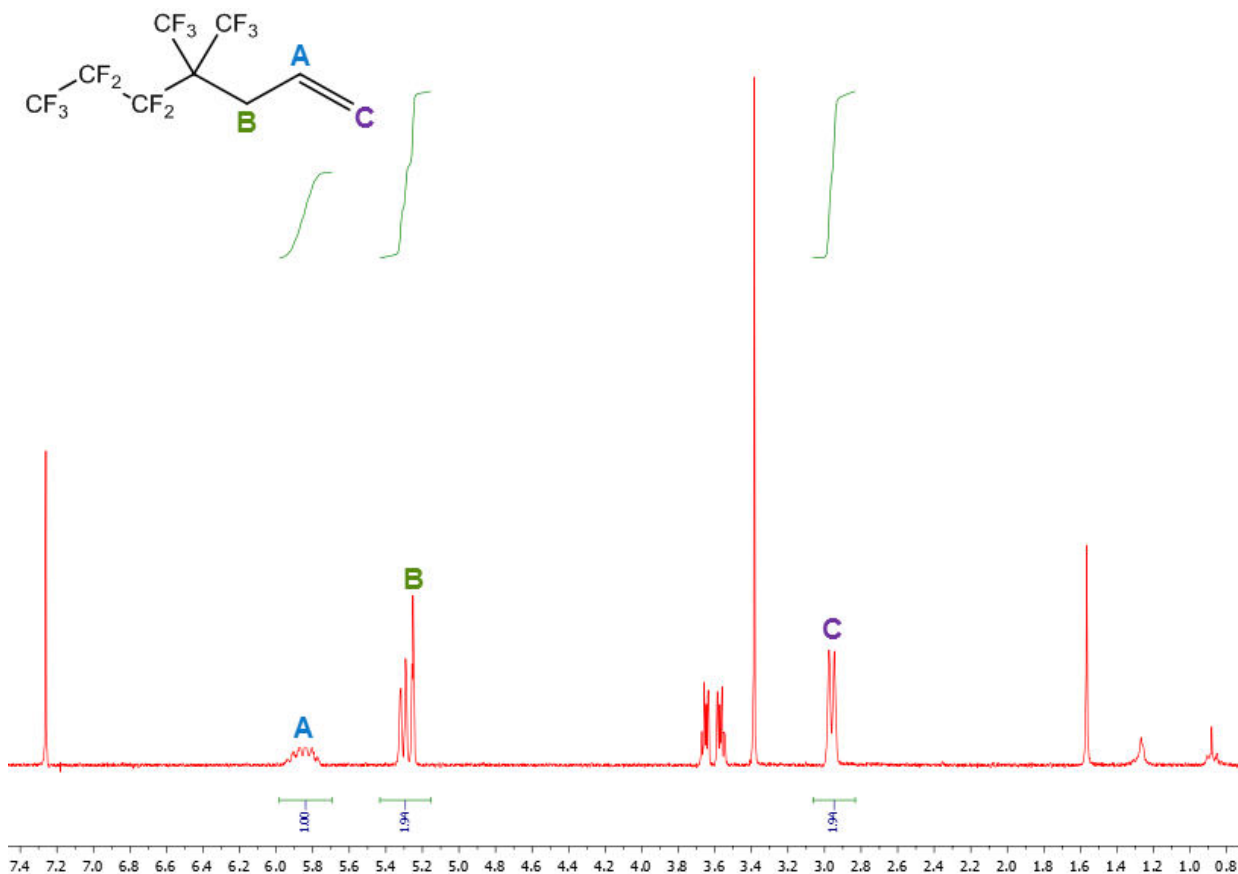
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Experimental section

Synthesis of allyl-substituted hexafluoropropylene dimer (1)

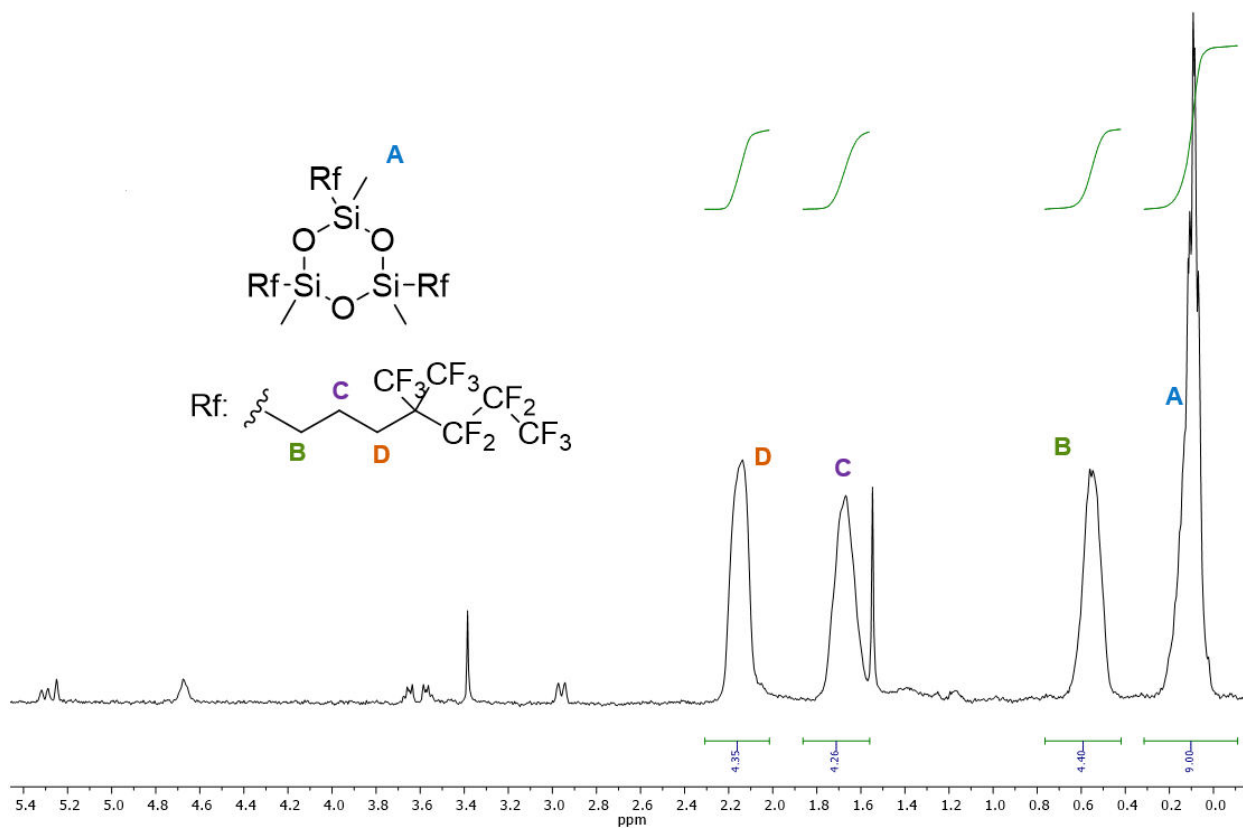
A freshly oven dried flask was cooled in an argon stream, charged with cesium fluoride (80 g, 0.53 mol), diglyme (150 mL), and hexafluoropropylene dimer (174 g, 0.58 mol). Then allyl bromide (52.5 mL, 0.61 mol) was added dropwise. The reaction mixture was stirred at 25 °C for 40 h. The mixture obtained was diluted with hexane and filtered to separate cesium bromide. The filtrate obtained was evaporated on a rotary evaporator to remove hexane, and the resulting residue was distilled. The target product was collected at 110 °C. Yield: 55%.



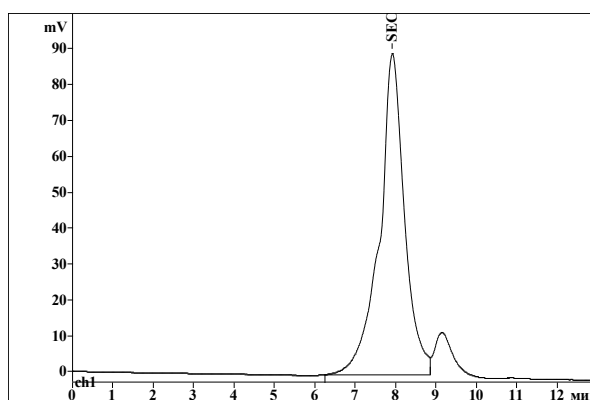
Scheme 1. ¹H NMR spectrum of the allyl-substituted hexafluoropropylene dimer.

Addition of the allyl-substituted hexafluoropropylene dimer to the siloxane cycle D3^H

Allyl-substituted hexafluoropropylene dimer (30.4 g, 0.08 mol) was placed into a test tube flushed with argon. Then D3^H (4.9 g, 0.03 mol) and Speier's catalyst were added under an argon atmosphere. The stirred reaction mixture was heated at 120 °C for 120 h. The platinum precipitate was filtered off. The target product was isolated in 99%.



Scheme 2. ¹H NMR spectrum of the product of addition of the allyl-substituted hexafluoropropylene dimer to the siloxane cycle D3^H.

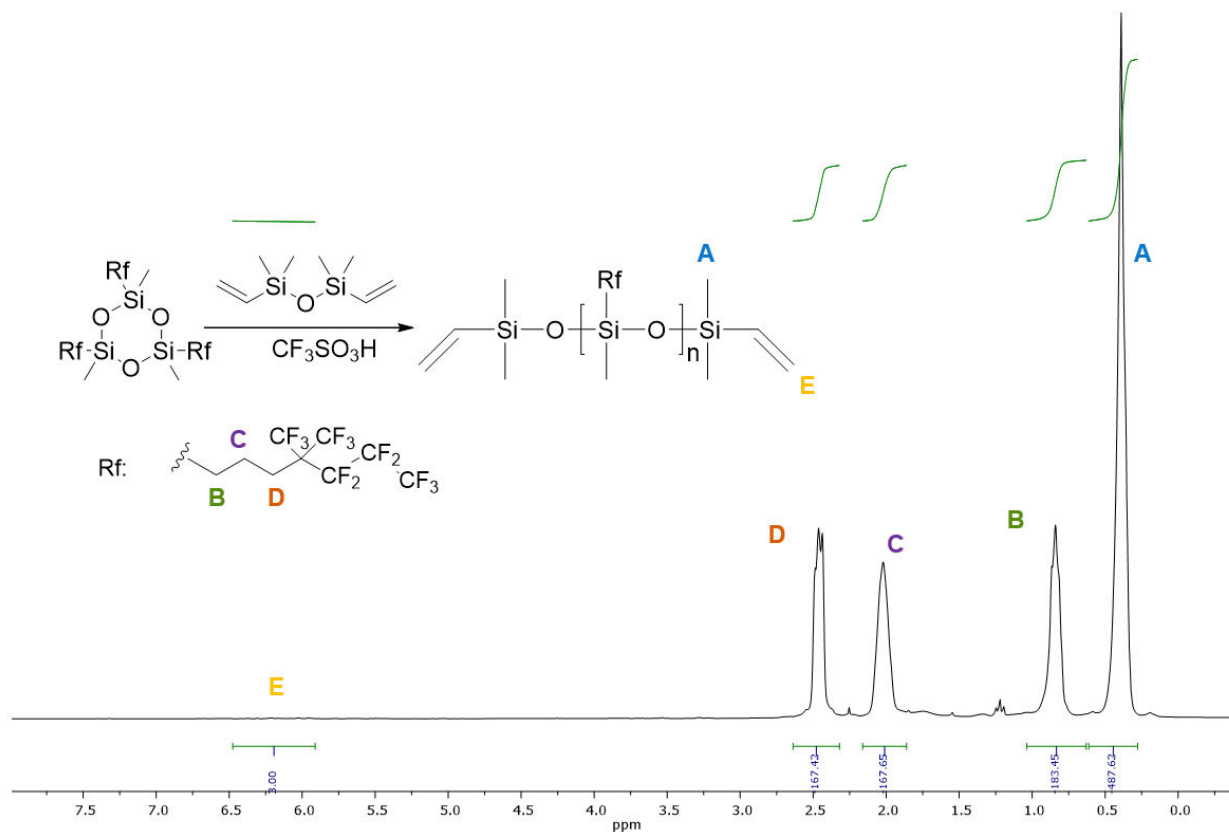


Scheme 3. GPC curve of the product of addition of the allyl-substituted hexafluoropropylene dimer to the siloxane cycle D3^H.

Opening of the D3^H siloxane ring of compound 2 in the presence of trifluoromethanesulfonic acid (3)

Compound 2 (0.5 g, 0.4 mmol) was placed in an argon-flushed flask. Then

tetramethyldivinylsiloxane (8 mg, 0.04 mmol) and trifluoromethanesulfonic acid (0.2 mg, 0.001 mmol) were added. The stirred reaction mixture was heated at 100 °C for 20 h. The residue obtained was dissolved in trichlorotrifluoroethane. The resulting solution was washed with water, dried over anhydrous sodium sulfate, and evaporated to dryness. The target product was isolated in 98% yield.



Scheme 4. ^1H NMR spectrum of the polymer obtained by the ring-opening polymerization.