



Supplementary Materials

# Anti Gram-Positive Bacteria Activity of Synthetic Quaternary Lipid and its Precursor Phosphonium Salt

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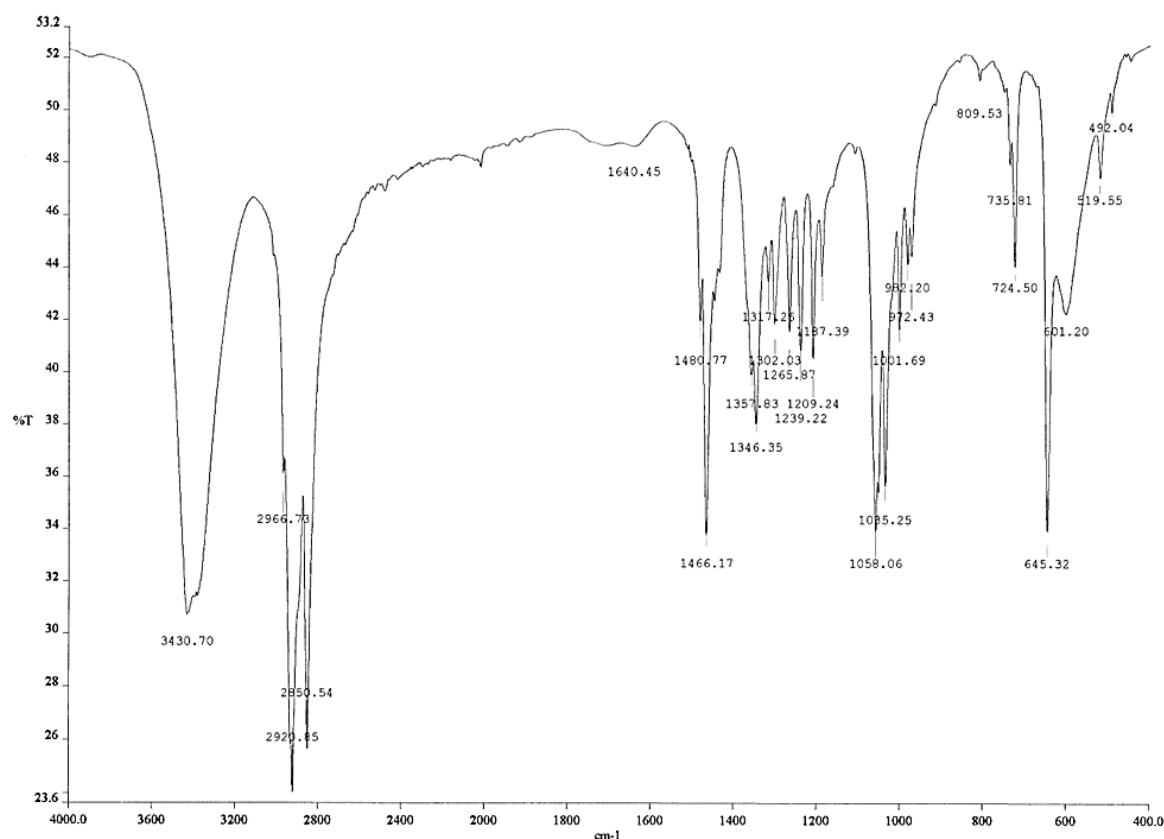
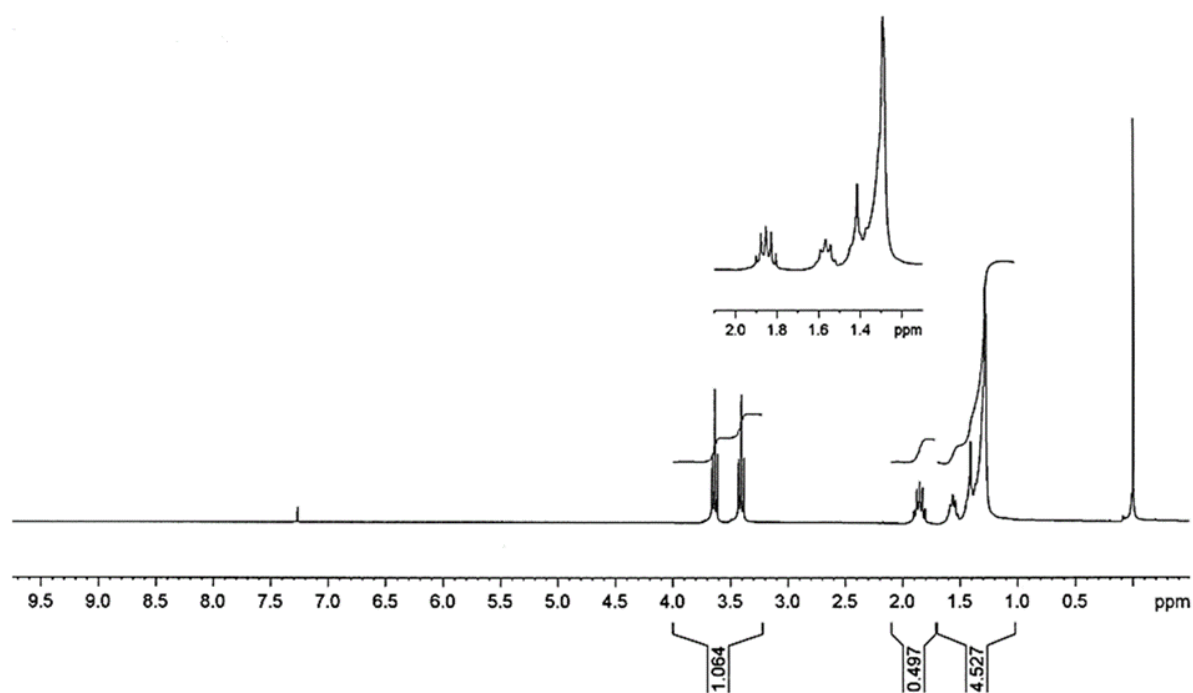
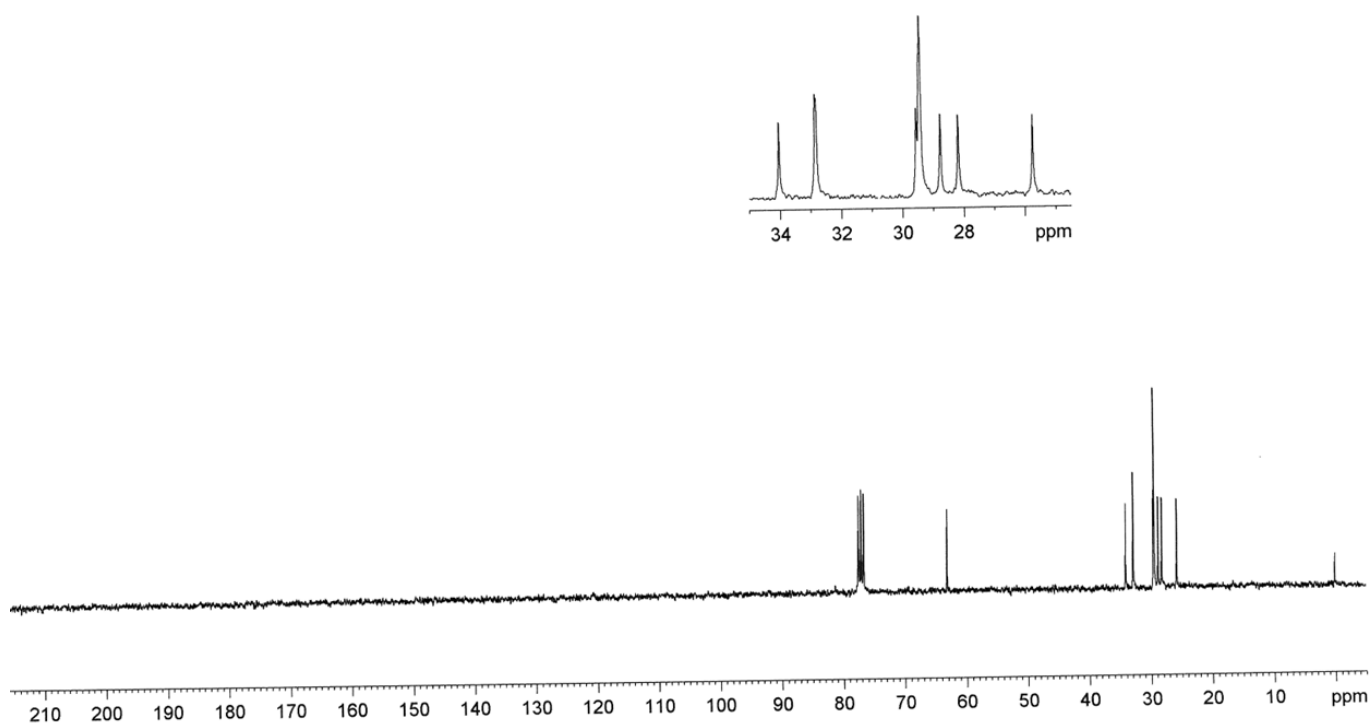


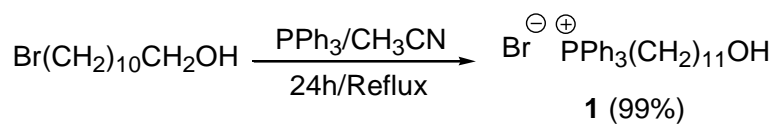
Figure S1. FTIR spectrum of 11-bromo-undecan-1-ol (oil on KBr disc).



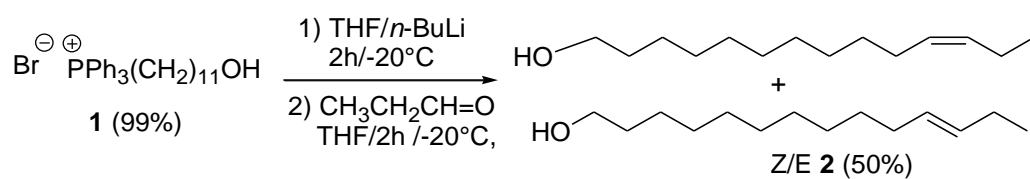
**Figure S2.**  $^1\text{H}$  NMR spectrum ( $\text{CDCl}_3$ , 300 MHz) spectrum of 11-bromo-undecan-1-ol.



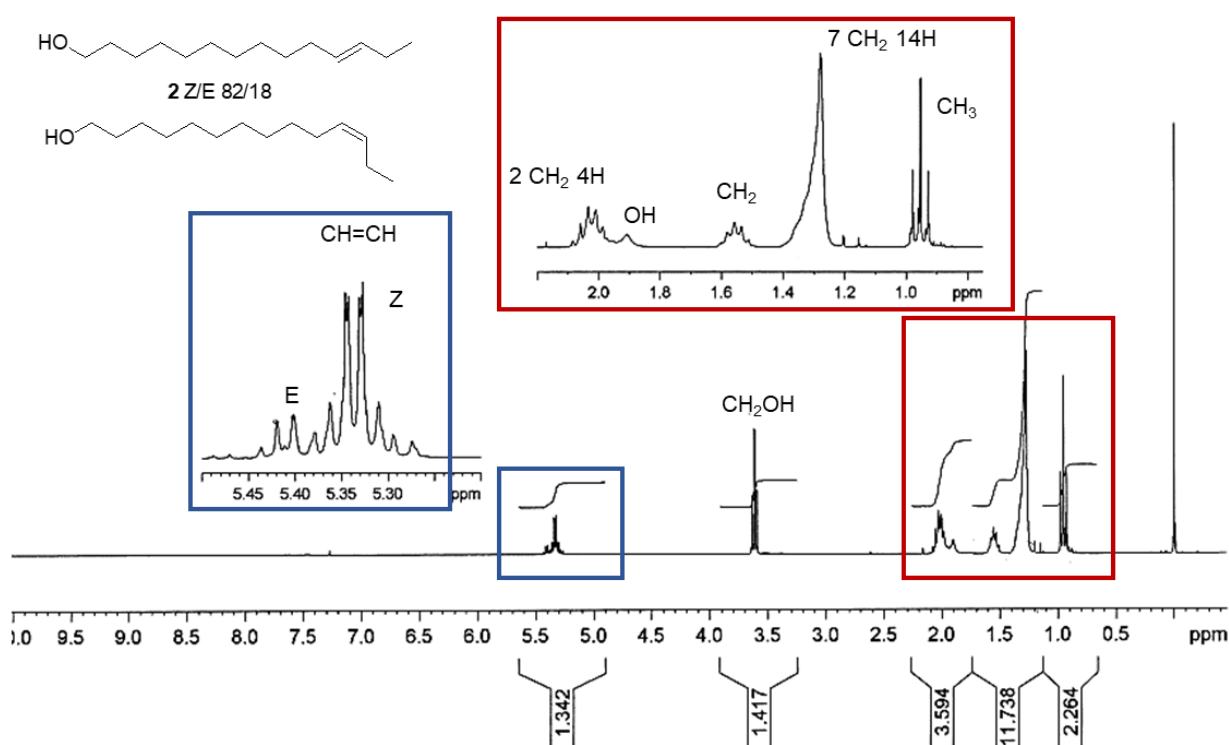
**Figure S3.**  $^{13}\text{C}$  NMR spectrum ( $\text{CDCl}_3$ , 75.5 MHz) spectrum of 11-bromo-undecan-1-ol.



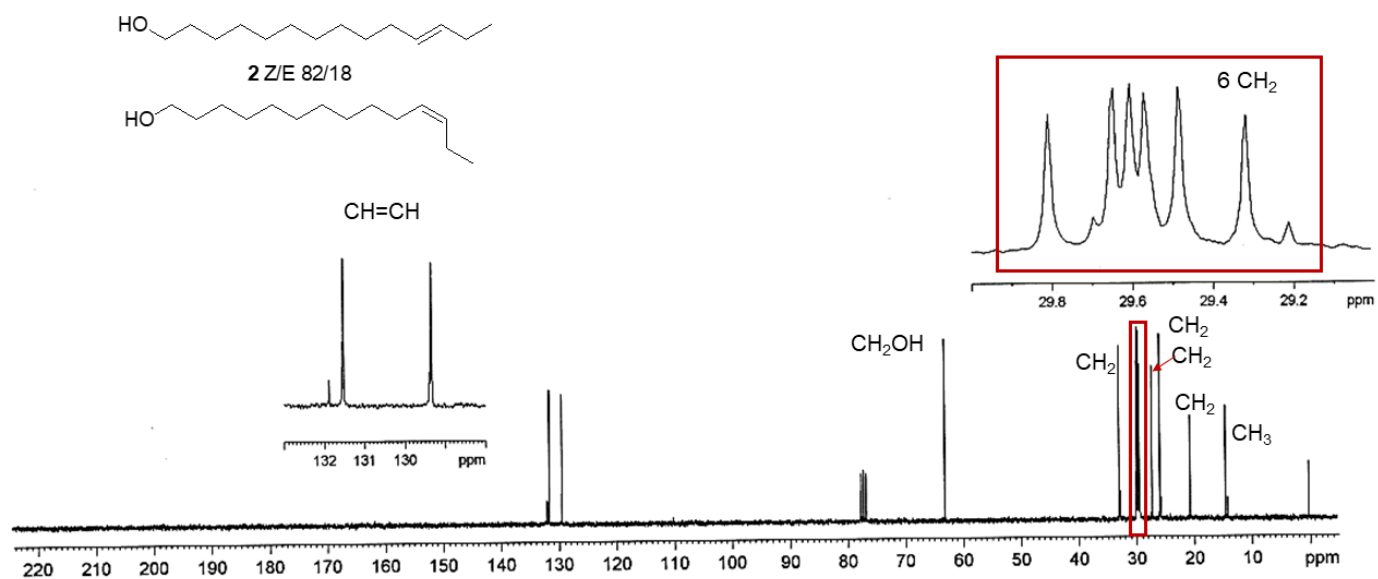
**Scheme S1.** Synthesis of (11-hydroxyundecyl) triphenyl phosphonium bromide (**1**).



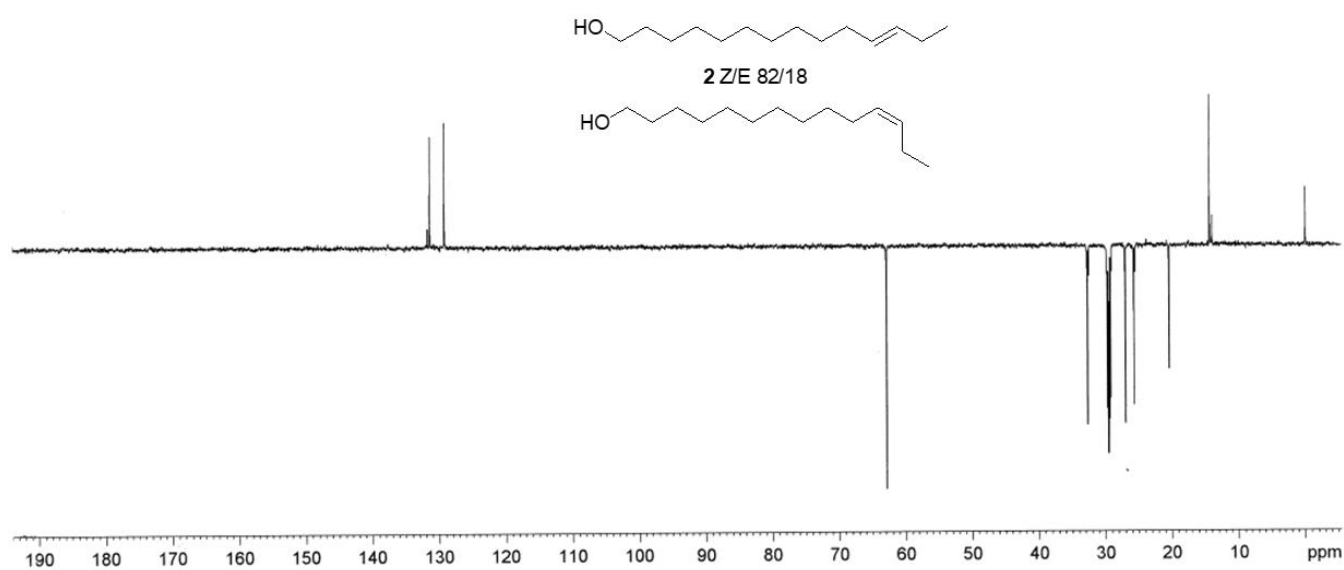
**Scheme S2.** Synthesis of the (Z/E)-11-tetradecen-1-ol (**2**).



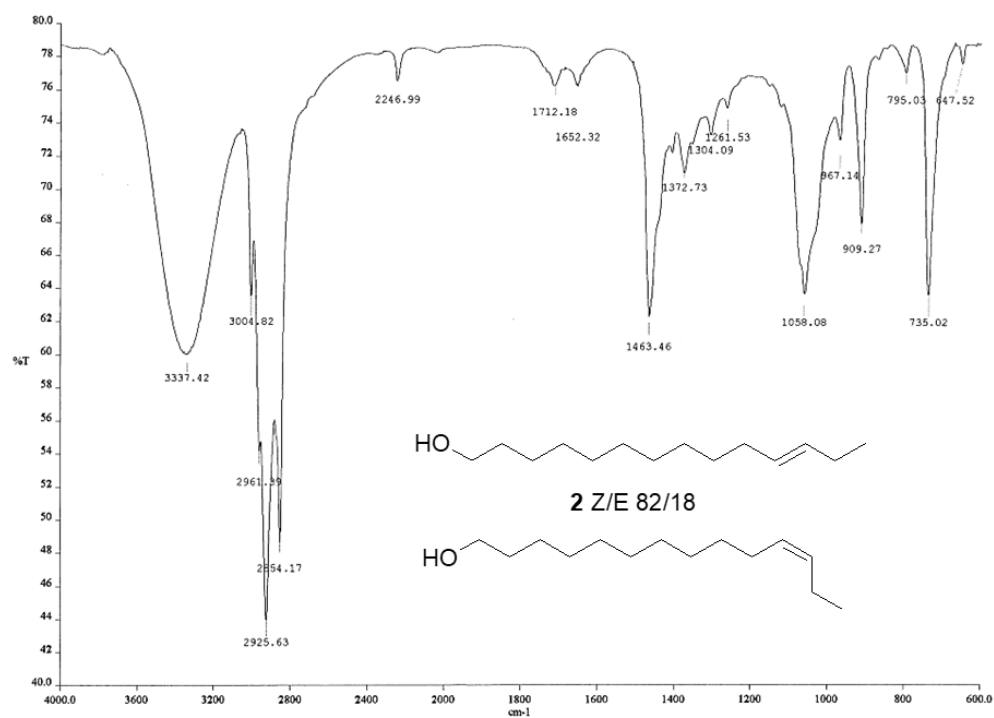
**Figure S4.** <sup>1</sup>H NMR spectrum (CDCl<sub>3</sub>, 300 MHz) spectrum of Z/E-11-tetradecen-1-ol (**2**). In the squares of the same color are evidenced significant selected regions of the spectrum and the related magnification.



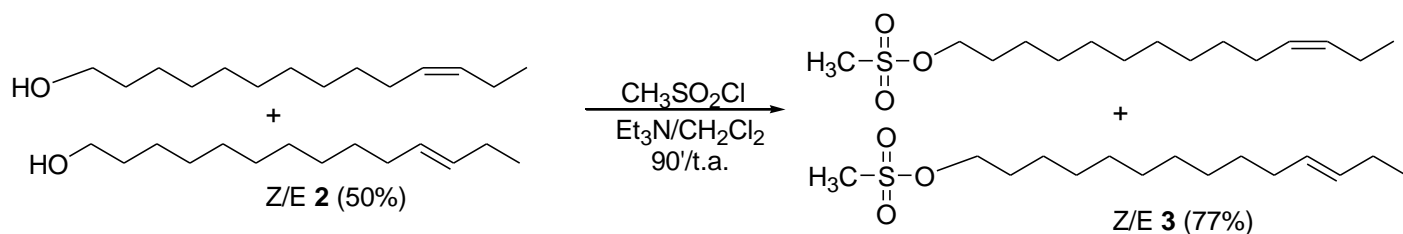
**Figure S5.** <sup>13</sup>C NMR spectrum (CDCl<sub>3</sub>, 75.5 MHz) spectrum of Z/E-11-tetradecen-1-ol (**2**). In the squares of the same color are evidenced significant selected regions of the spectrum and the related magnification.



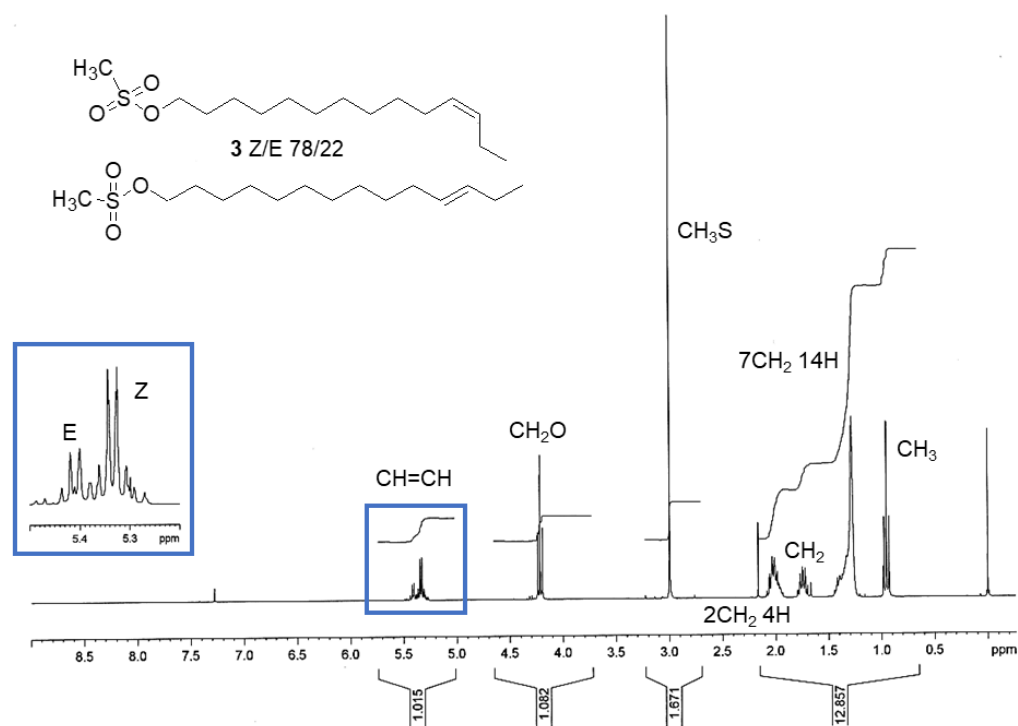
**Figure S6.** <sup>13</sup>C NMR spectrum (CDCl<sub>3</sub>, 75.5 MHz) spectrum of Z/E-11-tetradecen-1-ol (**2**), 135 DEPT experiment.



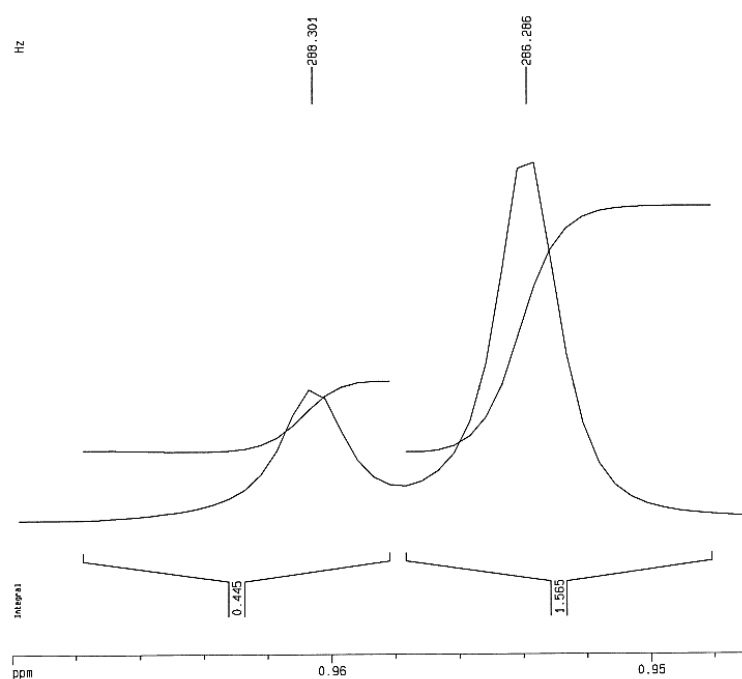
**Figure S7.** FTIR spectrum (oil on KBr disc) of **2**.



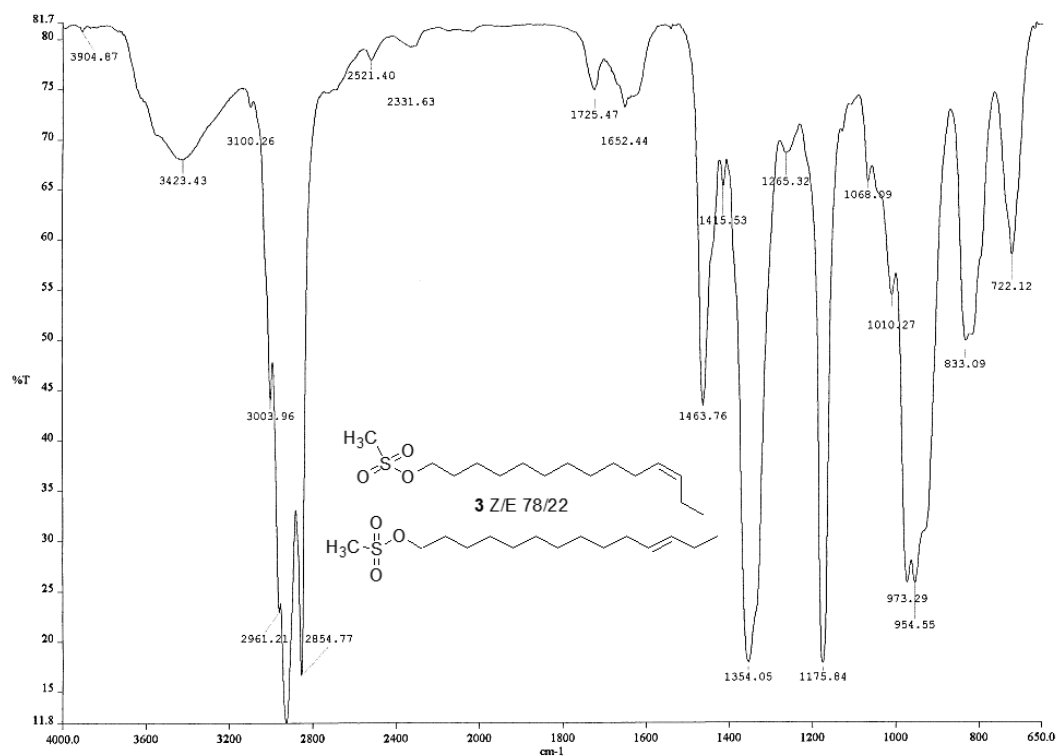
**Scheme S3.** Synthesis of the (Z/E)-11-tetradecenyl-1-mesylate (**3**).



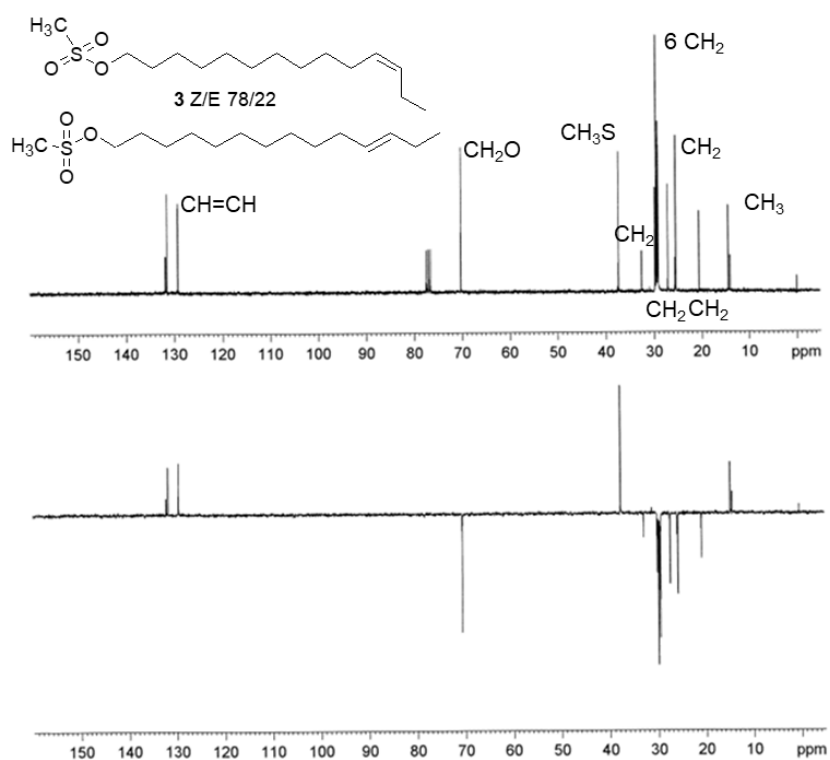
**Figure S8.**  $^1\text{H}$  NMR spectrum (CDCl<sub>3</sub>, 300 MHz) of **3**. In the squares are evidenced significant selected regions of the spectrum and the related magnification.

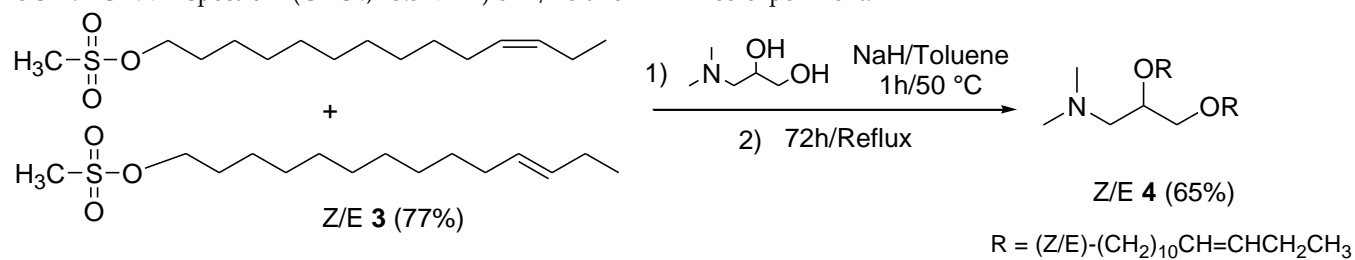
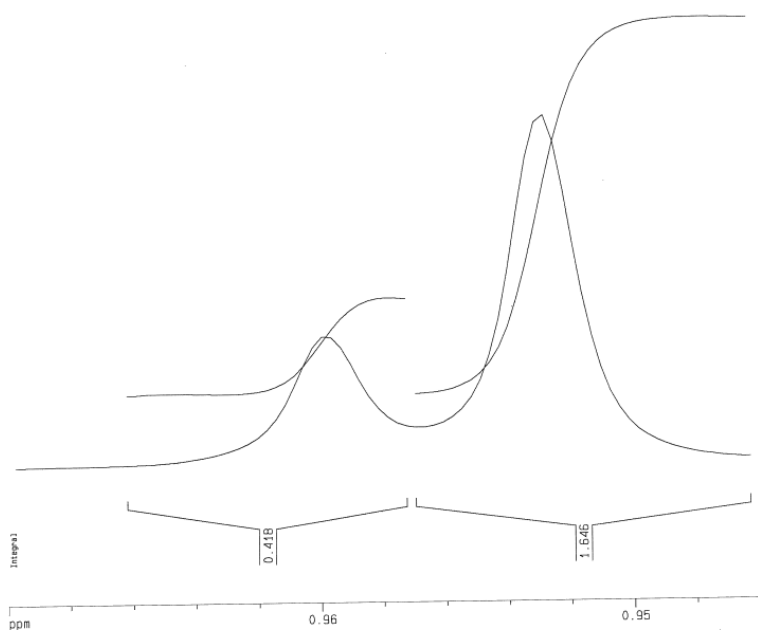


**Figure S9.**  $^1\text{H}$  NMR spectrum ( $\text{CDCl}_3$ , 300 MHz) of **3**: magnification of the signal used to calculate the Z (higher peak)/E (lower peak) ratio.

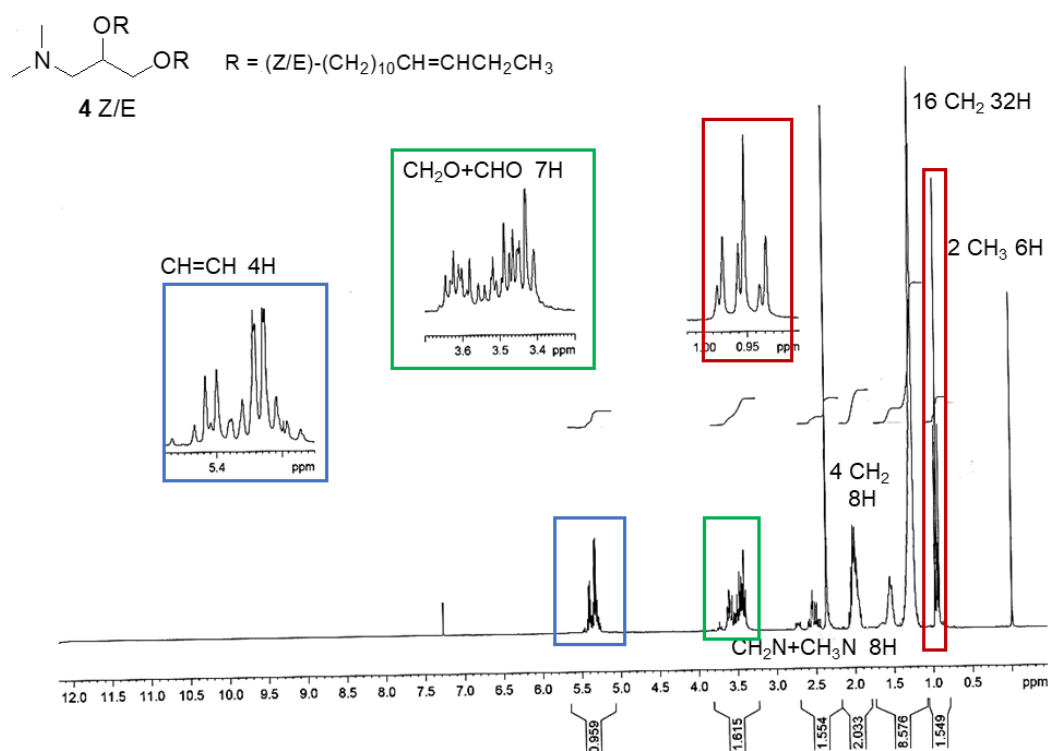


**Figure S10.** FTIR spectrum (oil on KBr disc) of **3**.

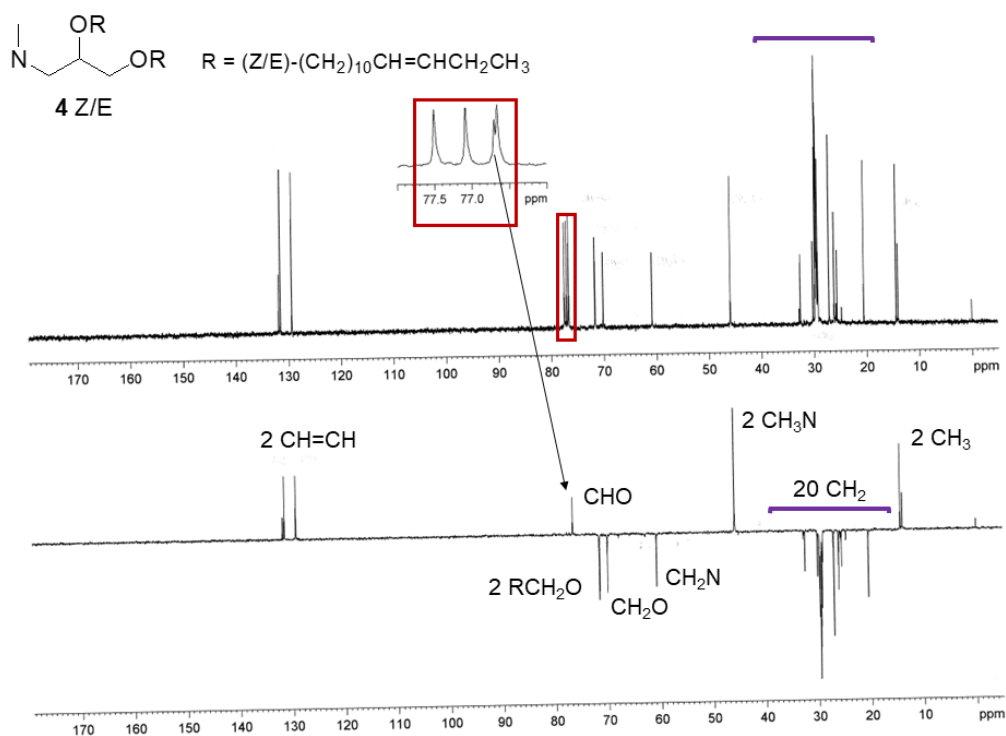


**Figure S11.**  $^{13}\text{C}$  NMR spectrum ( $\text{CDCl}_3$ , 75.5 MHz) of Z/E **3** and DEPT-135 experiment.**Scheme S4.** Synthesis of the *N,N*-dimethyl-2,3-bis(tetradec-11-enyloxy)propylamine (**4**).**Figure S12.**  $^1\text{H}$  NMR spectrum ( $\text{CDCl}_3$ , 300 MHz) of **4**: magnification of the signal used to calculate the Z (higher peak)/E (lower peak) ratio.

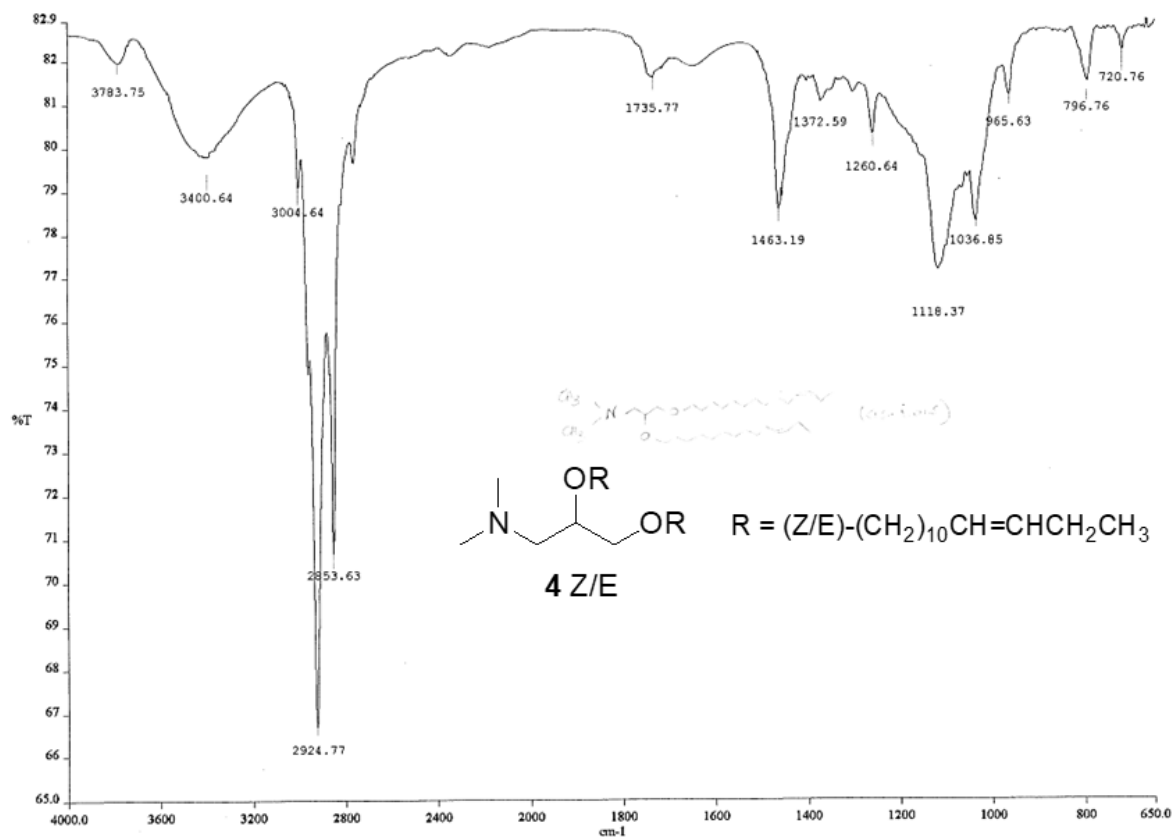




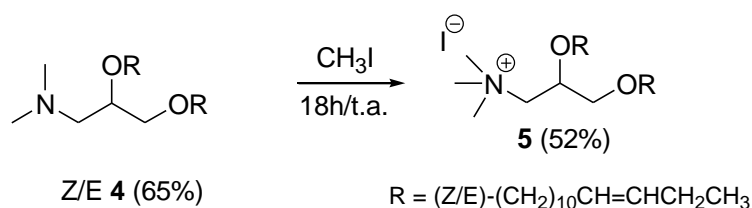
**Figure S13.**  $^1\text{H}$  NMR spectrum ( $\text{CDCl}_3$ , 300 MHz) of **4**. In the squares of the same color are evidenced significant selected regions of the spectrum and the related magnification.



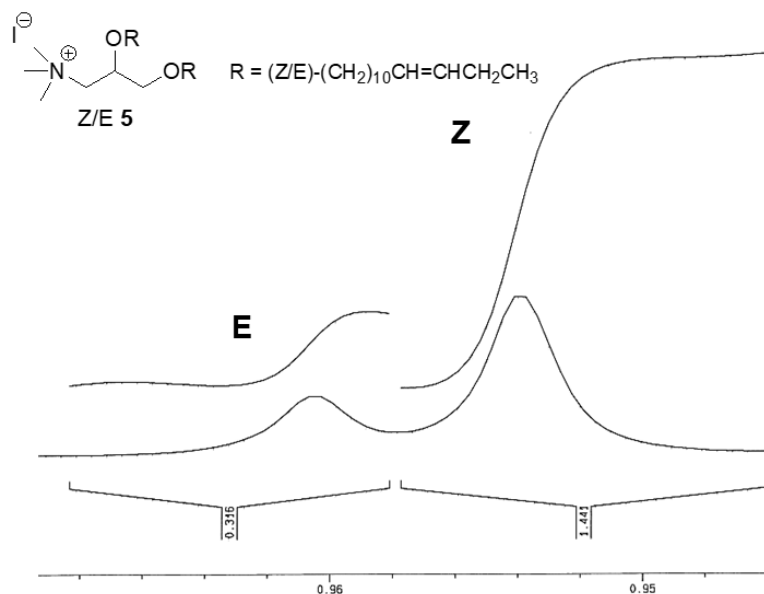
**Figure S14.**  $^{13}\text{C}$  NMR spectrum ( $\text{CDCl}_3$ , 75.5 MHz) of Z/E **4** and DEPT-135 analysis. In the squares are evidenced significant selected regions of the spectrum and the related magnification. The black arrow evidences the CHO peak well visible in the DEPT-135 analysis where chloroform peaks disappeared, while visible only in the magnification in the  $^{13}\text{C}$  NMR spectrum. Purple bar groups the signals of the 20 methylene groups.



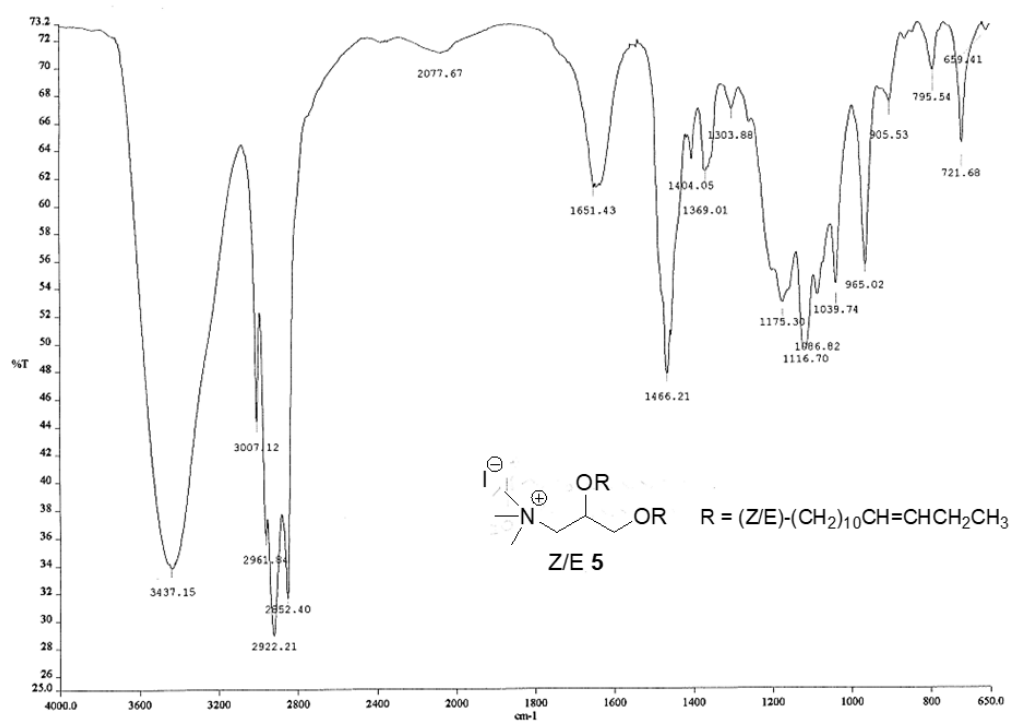
**Figure S15.** FTIR spectrum (oil on KBr disc) of **4**.



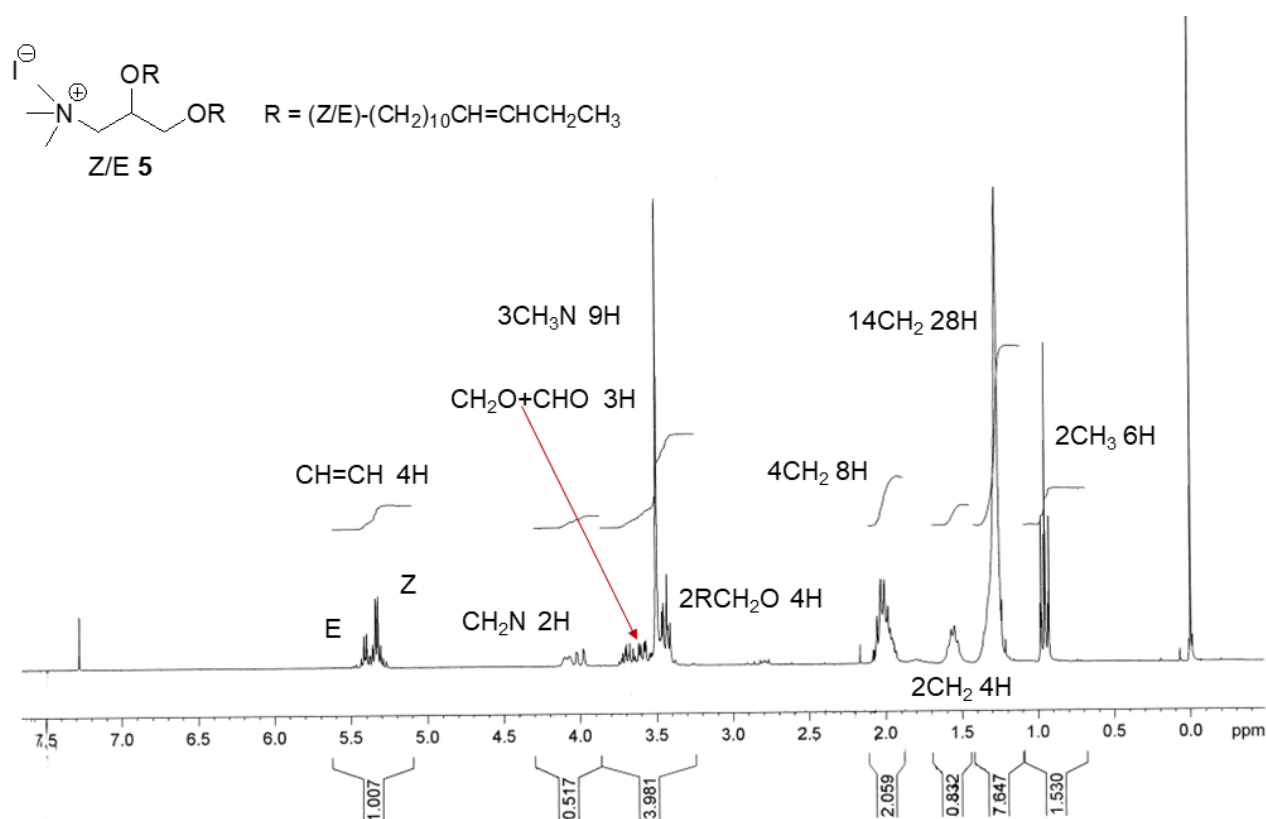
**Scheme S5.** *N,N,N*-trimethyl-2,3-bis(tetradec-11-enyloxy)propylammonium iodide (**5**).



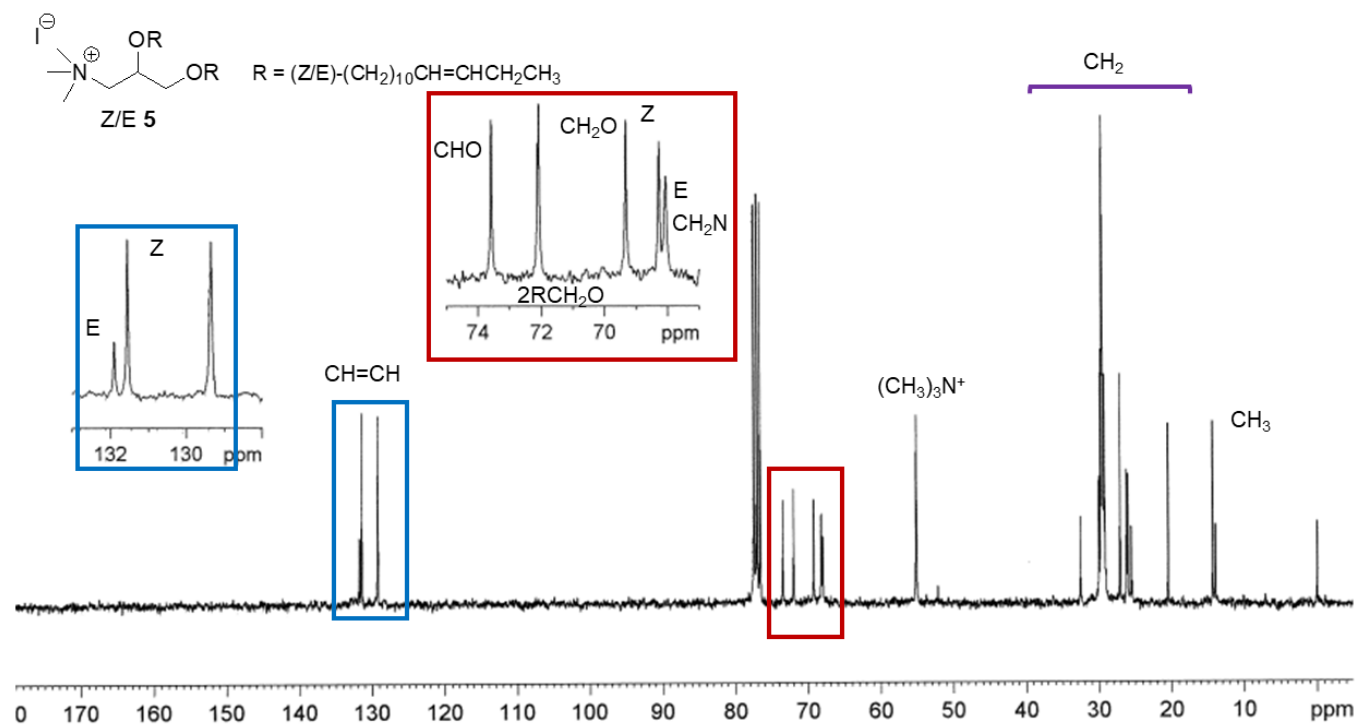
**Figure S16.**  $^1\text{H}$  NMR spectrum (CDCl<sub>3</sub>, 300 MHz) of **4**: magnification of the signal used to calculate the *Z*/*E* ratio.



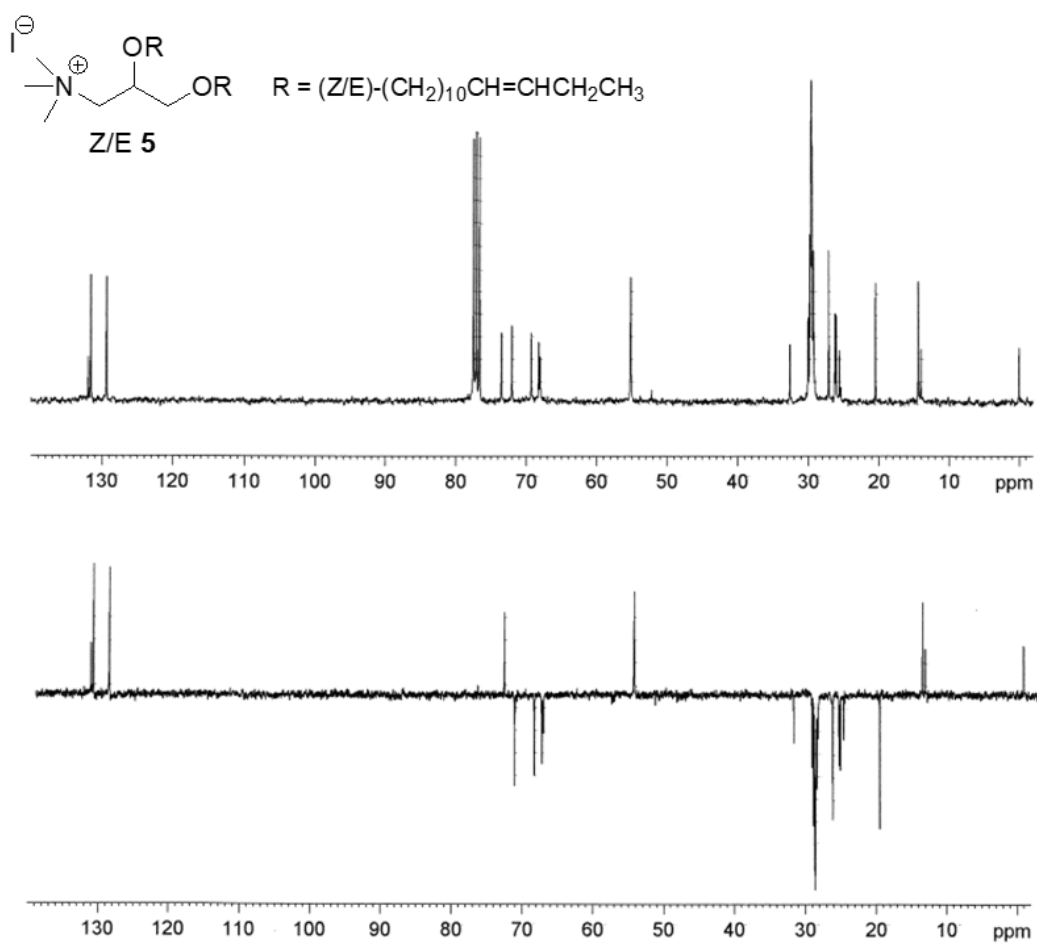
**Figure S17.** FTIR spectrum (oil on KBr disc) of **5**.



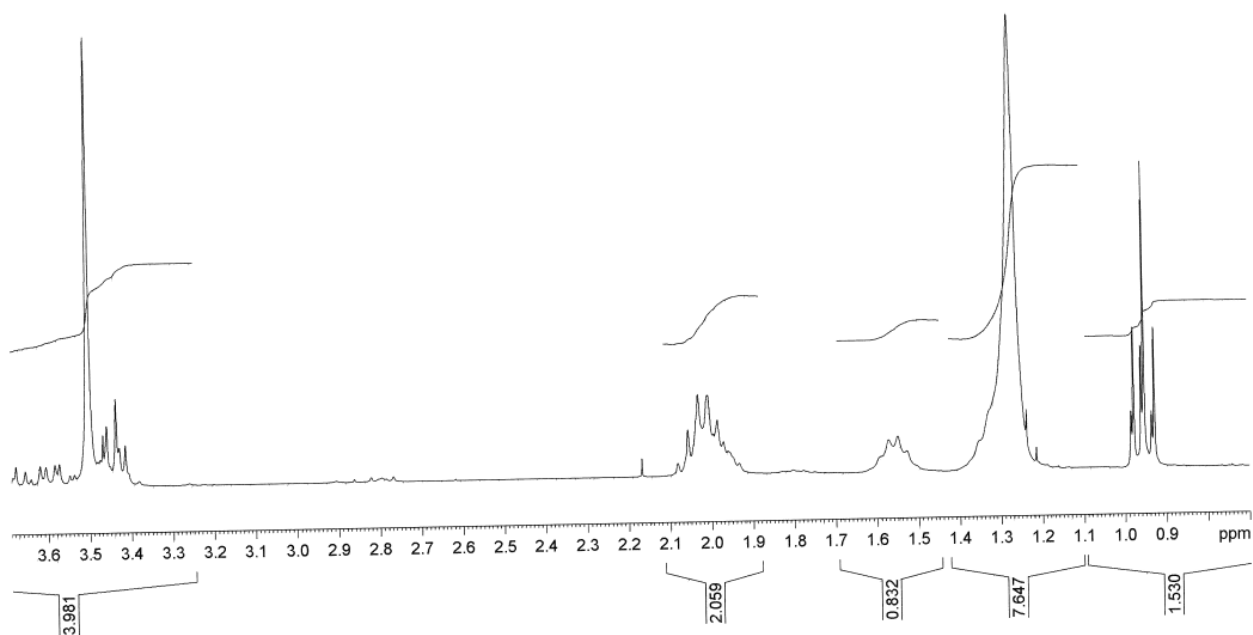
**Figure S18.**  $^1\text{H}$  NMR spectrum ( $\text{CDCl}_3$ , 300 MHz) of **4**. The red arrow indicates the signals of CHO and  $\text{CH}_2\text{O}$  proton atoms.



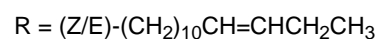
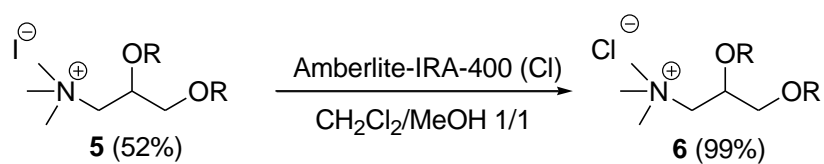
**Figure S19.**  $^{13}\text{C}$  NMR spectrum ( $\text{CDCl}_3$ , 75.5 MHz) of Z/E **5**. In the squares of same color are evidenced significant selected regions of the spectrum and the related magnification. Purple bar groups the signals of the 20 methylene groups.



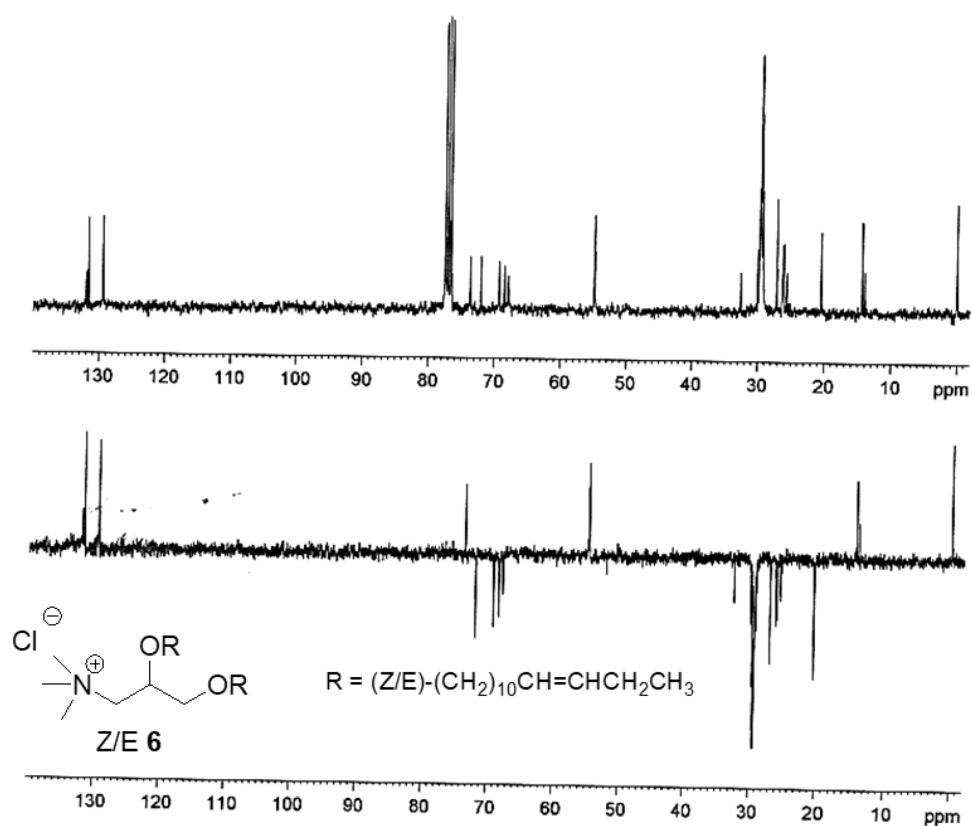
**Figure S20.** <sup>13</sup>C NMR spectrum (CDCl<sub>3</sub>, 75.5 MHz) of Z/E 5 and its DEPT-135 analysis.



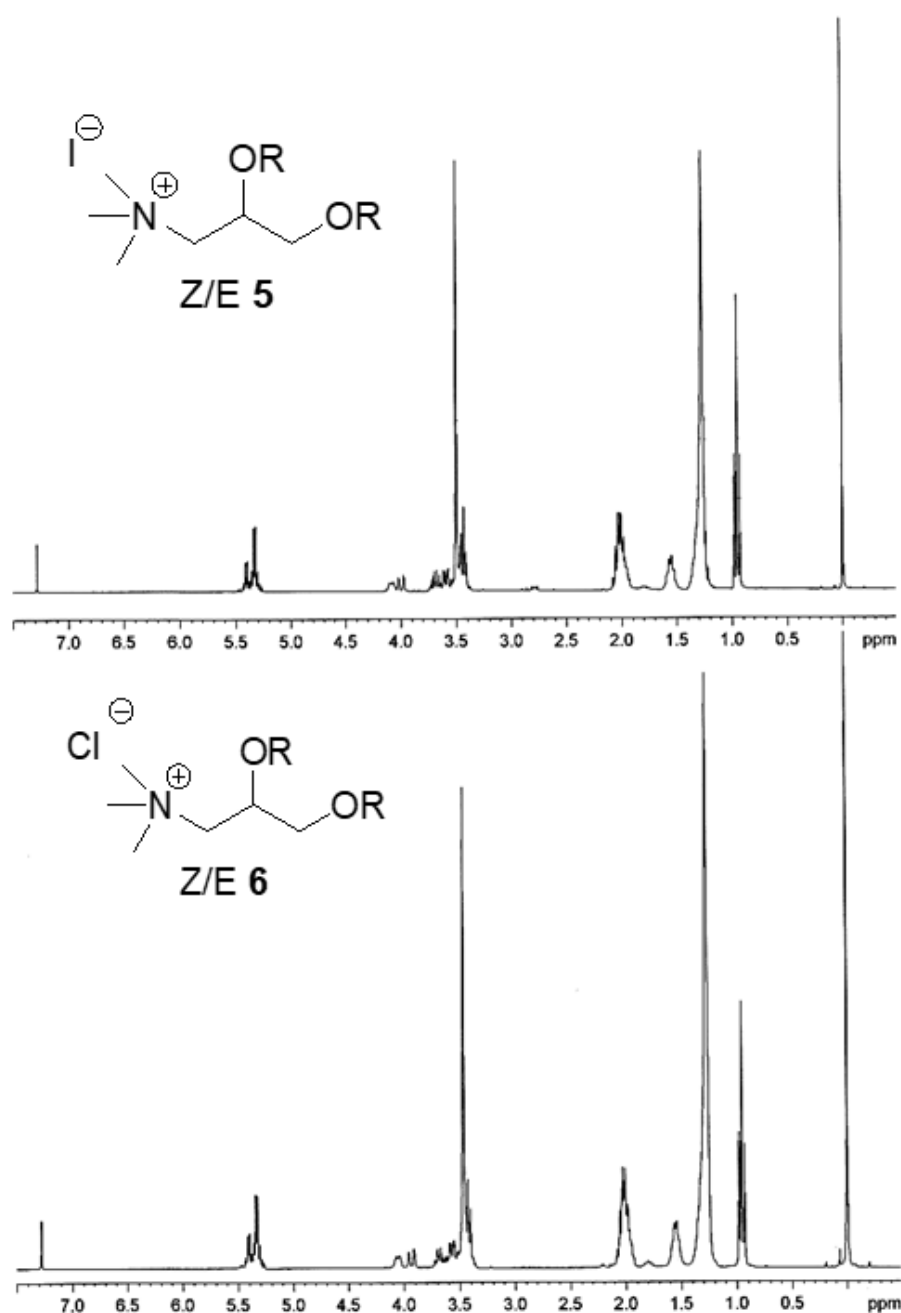
**Figure S21.** Magnification of the <sup>1</sup>H NMR spectrum (CDCl<sub>3</sub>, 300 MHz) of Z/E 5 in the region 0.8-3.65 ppm.



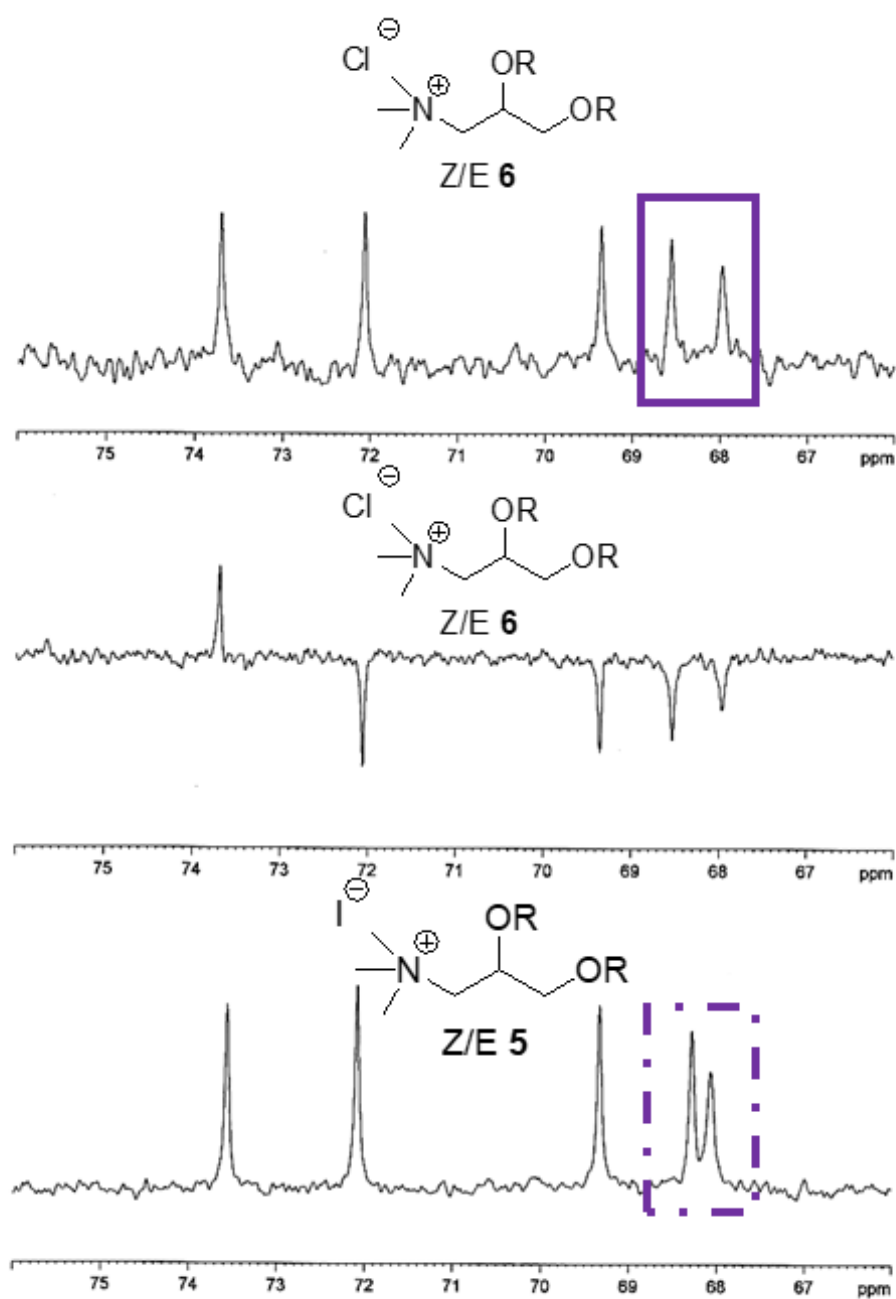
**Scheme S6.** *N,N,N*-trimethyl-2,3-bis(tetradec-11-enyloxy)propylammonium chloride (5).



**Figure S22.**  $^{13}\text{C}$  NMR spectrum (CDCl<sub>3</sub>, 75.5 MHz) of **Z/E 6** and its DEPT-135 analysis.

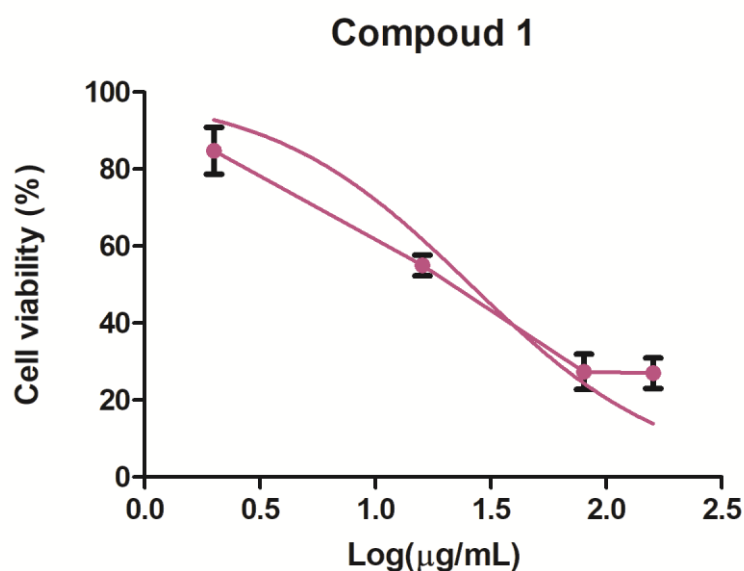


**Figure S23.** Comparison between the <sup>1</sup>H NMR spectra (CDCl<sub>3</sub>, 300 MHz) of Z/E 5 and Z/E 6.

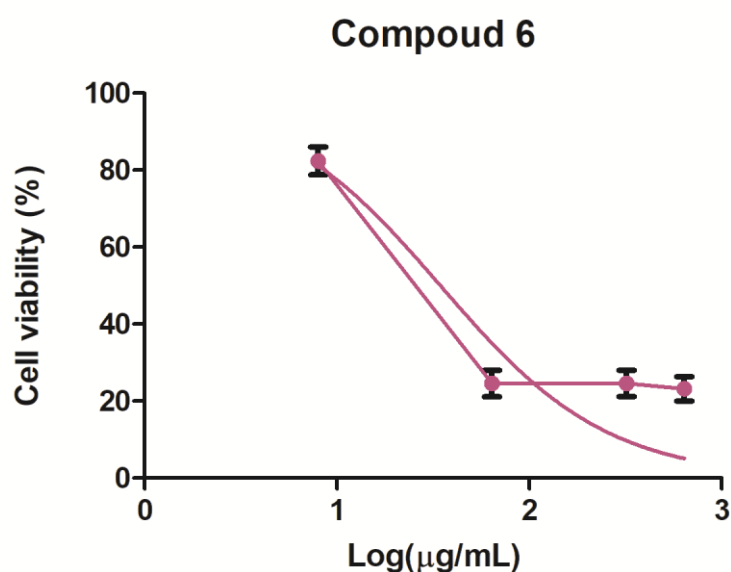


**Figure S24.** Comparison between the  $^{13}\text{C}$  NMR spectra and DEPT-135 analysis ( $\text{CDCl}_3$ , 75.5 MHz) of Z/E 5 and Z/E 6.





**Figure S25.** Plot of Log concentration of **1** vs. cell viability (%) (line with indicators and error bars) and plot of Log concentrations of **1** vs. normalized cell viability (%) (line without indicators).



**Figure S26.** Plot of Log concentration of **6** vs. cell viability (%) (line with indicators and error bars) and plot of Log concentrations of **6** vs. normalized cell viability (%) (line without indicators).

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