Supporting Information

Synthesis and self-assemblies of amphiphilic polymers based on polyoxazoline and vegetable oil derivatives

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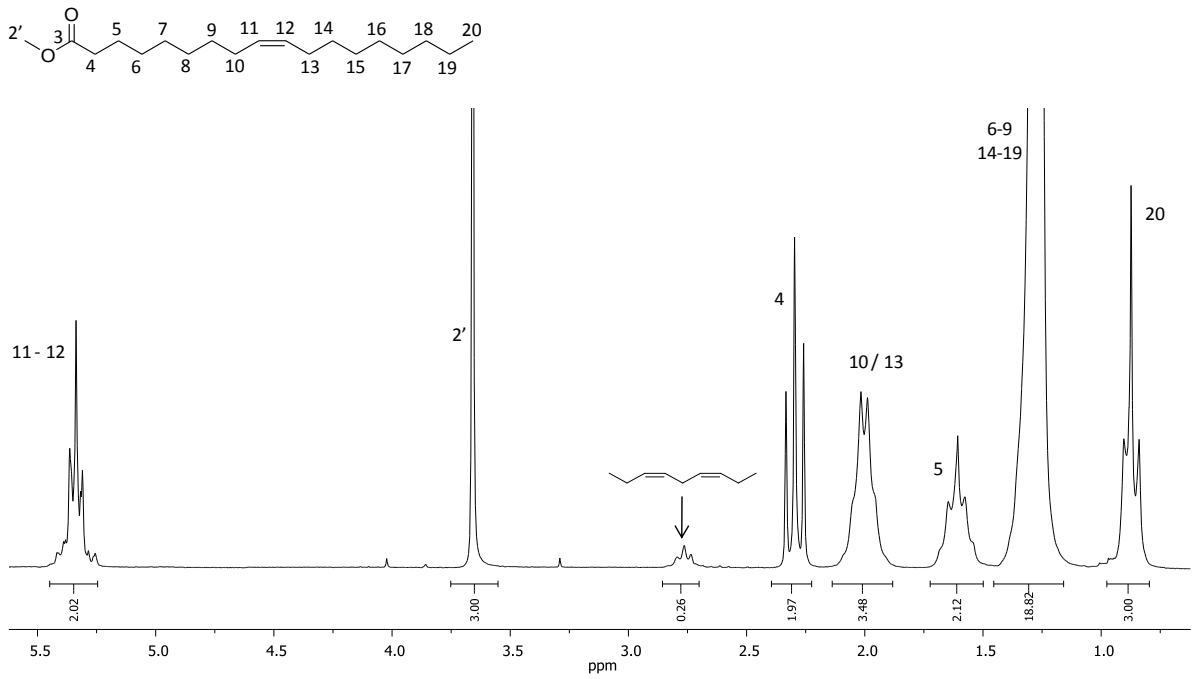
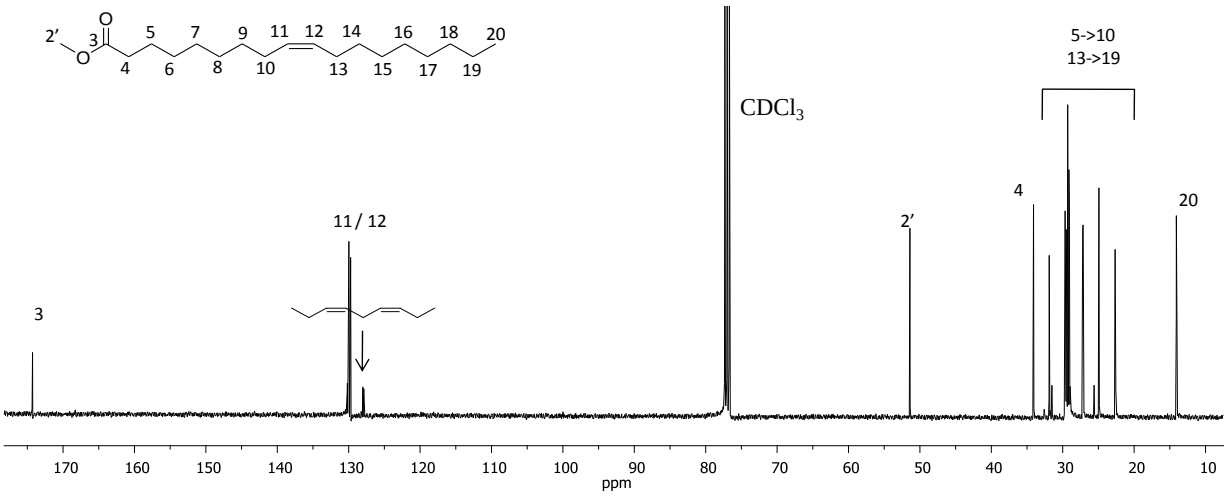
A- Characterization of MO and GSO

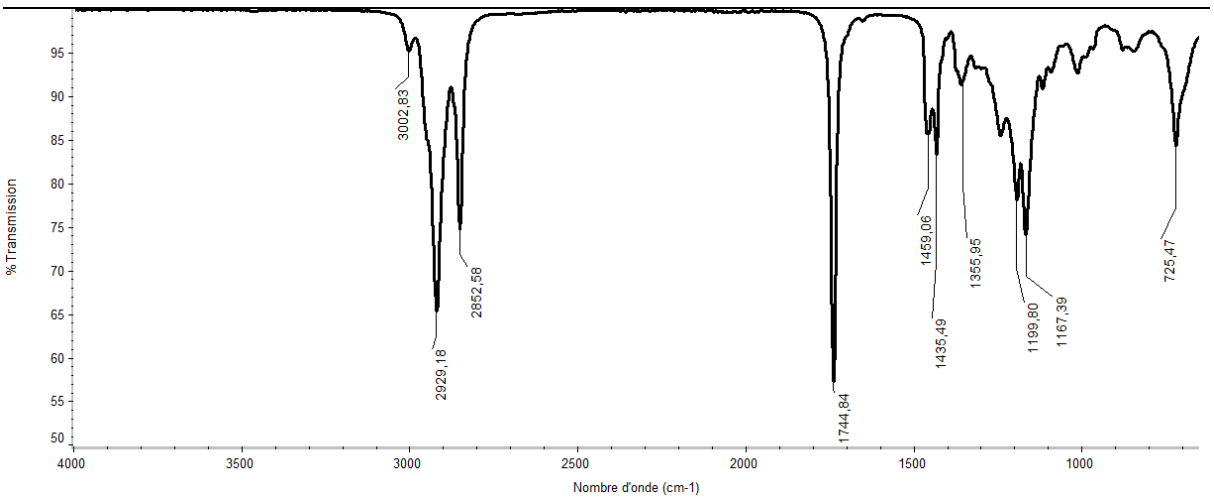
Methyl oleate: MO



^{1}H NMR (300 MHz, $CDCl_3$), δ = 0.79-0.88 (t, J = 7.0 Hz, 3H, CH_2-C**H**$_3$, H-20), 1.16-1.30 (m, 19H, C**H**$_2$, H-6 to H-9 and H-14 to H-19), 1.6 (t, J = 7.0 Hz, 2H, C**H**$_2$-CH_2-C=O, H-5), 1.92-2.07(m, 3,5H, -C**H**$_2$-CH=CH-, H-10 and H-13), 2.24-2.37 (t, J = 7.5 Hz, 2 H, CH_2-C**H**$_2$-C=O, H-4), 2.74-2.78 (t, 0.26H, negligible), 3.66 (s, 3H, C**H**$_3$-O-(C=O)-, H-2'), 5.21-5.42 (m, 2H, C**H**=C**H**, H-11 and H-12).

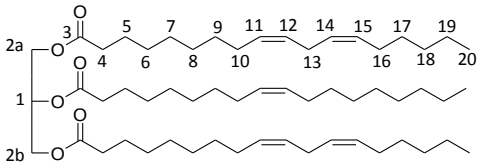


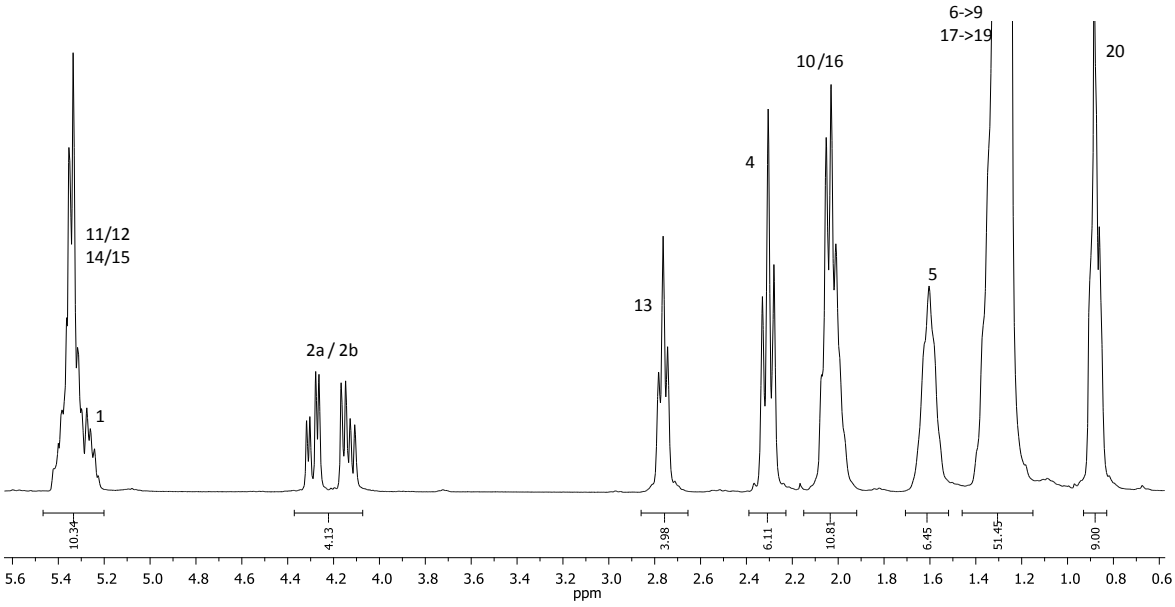
^{13}C NMR (75.47 MHz, $CDCl_3$), δ = 13.04 (CH_2-**C**H_3, C-20), 22.66-31.8 (**C**H_2, C-5 to C-10 and C-13 to C-19), 34.9 (**C**H_2-(C=O)-, C-4), 51.4 (**C**H_3-O-(C=O)-, C-2'), 127.9 (negligible), 129.7 (**C**H=**C**H, C-11, C12), 174.3 (**C**=O,C-3).



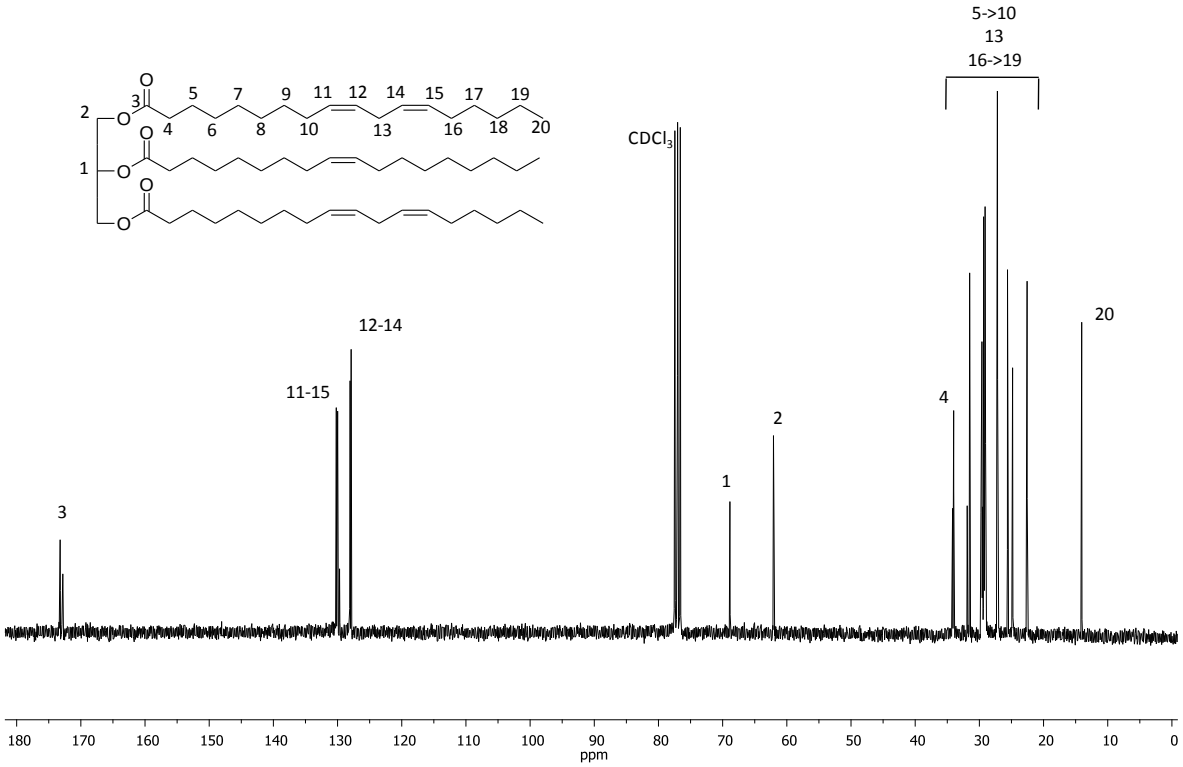
FTIR (cm^{-1}): 3003 (C=C-H (cis), asymmetrical elongation), 2929 (C-H, asymmetrical elongation), 2853 (C-H, symmetrical elongation), 1745 ($C=O_{ester}$, elongation), 1459-1436 (CH_2 scissoring), 1355 (CH_3 symmetrical deformation), 1167 ($C-O_{ester}$ elongation), 725 (CH_2 rocking).

Grape seed oil: GSO

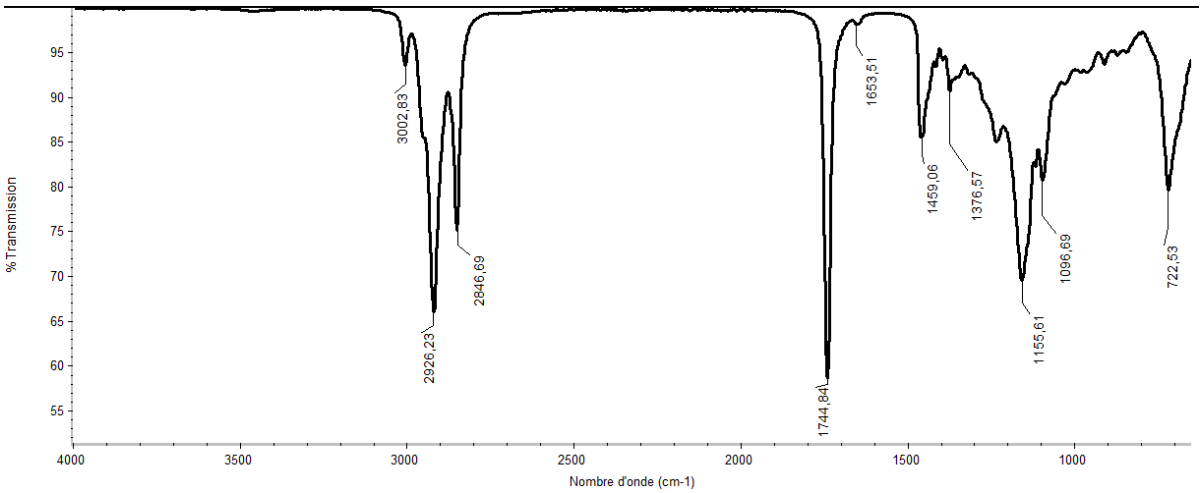




^{1}H NMR (300 MHz, $CDCl_3$), δ = 0.79-0.88 (m, 9 H, CH_2-C**H**$_3$, H-20), 1.16-1.43 (m, 51.5 H, C**H**$_2$, H-6 to H-9, H-17 to H-19), 1.6 (m, 6.5 H, C**H**$_2$-CH_2-(C=O)-, H-5), 1.92-2.07 (m, 10.8 H, -C**H**$_2$-CH=CH-, H-10 and H-16), 2.24-2.37 (t, J = 7.5 Hz, 6.1H, C**H**$_2$-(C=O)-, H-4), 2.74-2.78 (t, J = 5.9 Hz, 4 H, CH=CH-C**H**$_2$-CH=CH, H-13), 4.11-4.17 (dd, 2 H, ^{2}J = 11.7 Hz, ^{3}J = 5.7 Hz, ^{3}J = 6 Hz, C**H**$_2$-O, H-2a), 4.26-4.32 (dd, 2 H, ^{2}J = 12 Hz, ^{3}J = 4.2 Hz, C**H**$_2$-O, H-2b), 5.21-5.42 (m, 10.49 H, C**H**-O and C**H**=C**H**, H-1, H-11, H-12, H-14 and H-15).



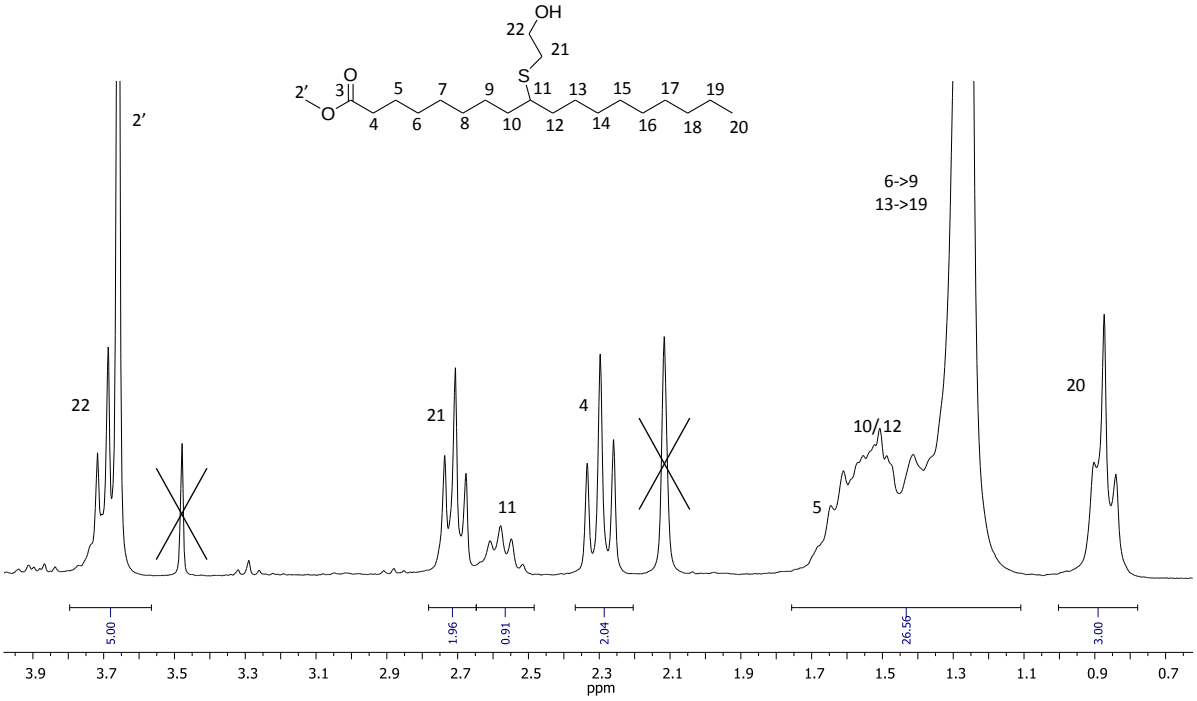
^{13}C NMR (75.47 MHz, $CDCl_3$), δ = 13.98 (**C**H_3-CH_2, C-20), 22.49-31.8 (**C**H_2, C-5 to C-10, C-13 and C-16 to C-19), 33.9-34.07 (**C**H_2-C=O, C-4), 61.9 (**C**H_2-O, C-2), 68.8 (CH_2-**C**H-O, C-1), 127.8 (CH_2-CH=**C**H-CH_2-**C**H=CH, C-12 and C-14), 130.05 (CH_2-**C**H=CH-CH_2-**C**H=**C**H, C-11, C15), 172.64-173.04 (**C**=O,C-3).



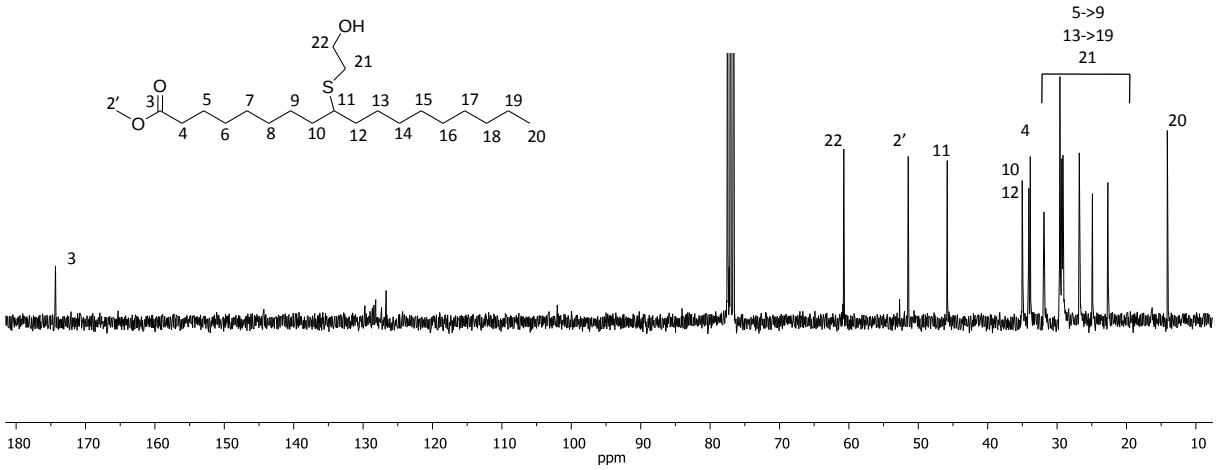
FTIR (cm^{-1}): 3003 (C=C-H (cis), asymmetrical elongation), 2920 (C-H, asymmetrical elongation), 2850 (C-H, symmetrical elongation), 1742 ($C=O_{ester}$, elongation), 1459 (CH_2 scissoring), 1377 (CH_3 symmetrical deformation), 1157 ($C-O_{ester}$ elongation), 725 (CH_2 rocking).

B- Characterization of HMO and HGSO

Hydroxylated methyloleate: HMO

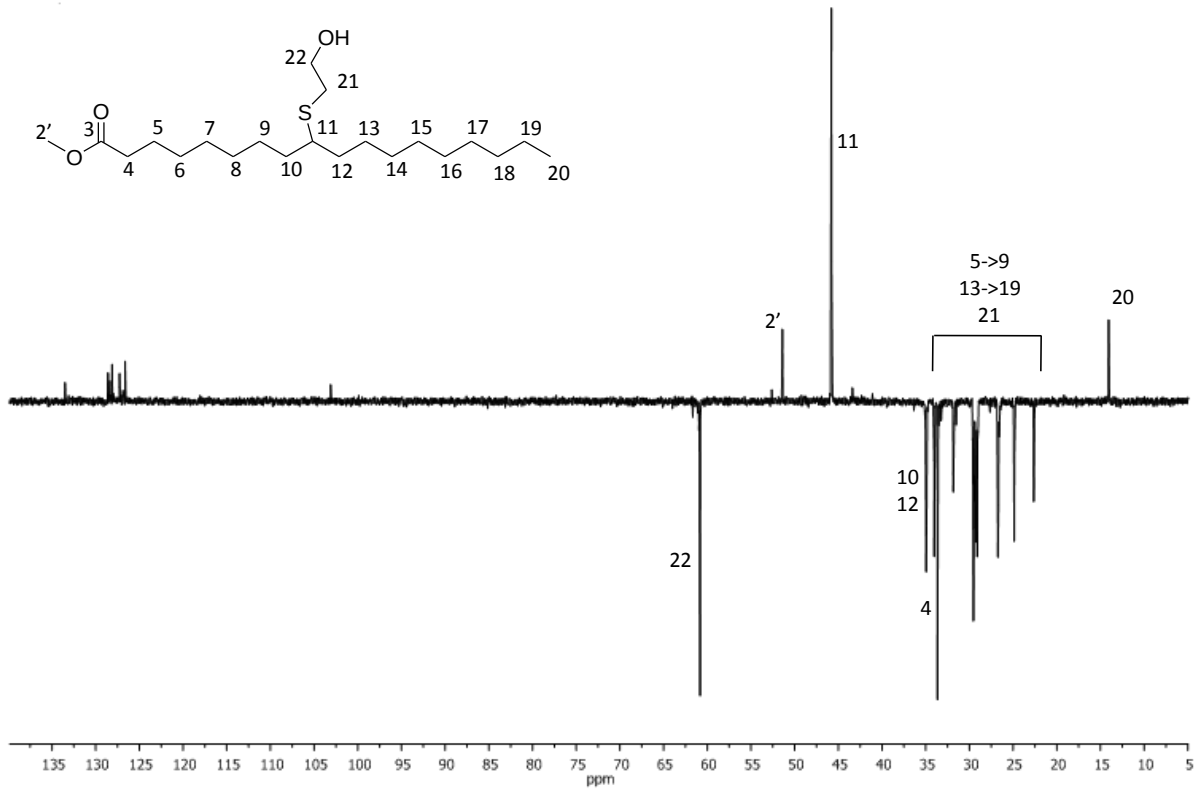


^{1}H NMR (300 MHz, $CDCl_3$), δ = 0.79-0.88 (t, J = 7.0 Hz, 3H, CH_2-C**H**$_3$, H-20), 1.16-1.7 (m, 27H, C**H**$_2$, H-5 to H-10 and H-12 to H-19), 2.24-2.37 (t, J = 7.5 Hz, 2 H, C**H**$_2$-(C=O)-, H-4), 2.56 (q, 1H, J = 12.4, 6.3 Hz, C**H**-S, H-11), 2.71 (t, 2H, J = 6.0 Hz, S-C**H**$_2$, H-21), 3.66 (s, 3H C**H**$_3$-O-(C=O)-, H-2'), 3.66-3.76 (t, 2H, C**H**$_2$-OH, H-22).

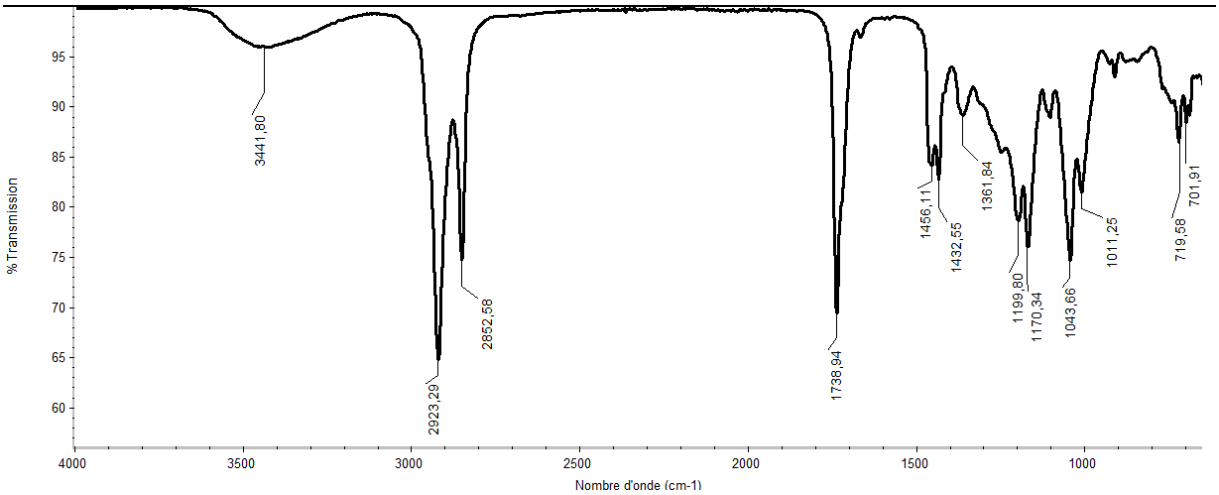


^{13}C NMR (75.47 MHz, $CDCl_3$), δ = 14.2 (CH_2-**C**H_3, C-20), 22.7-31.9 (**C**H_2, C5 to C-9, C-13 to C-19 and C-21), 34.1 (**C**H_2-(C=O)-, C-4), 35.0 (**C**H_2-CH-S, C-10 and C-12), 45.1 (**C**H-S-CH_2, C-11), 51.6 (**C**H_3-O-(C=O)-, C-2'), 60.9 (**C**H_2-OH), 127.9- 129.7 (negligible, residual double bonds), 174.4 (**C**=O,C-3).

DEPT 135

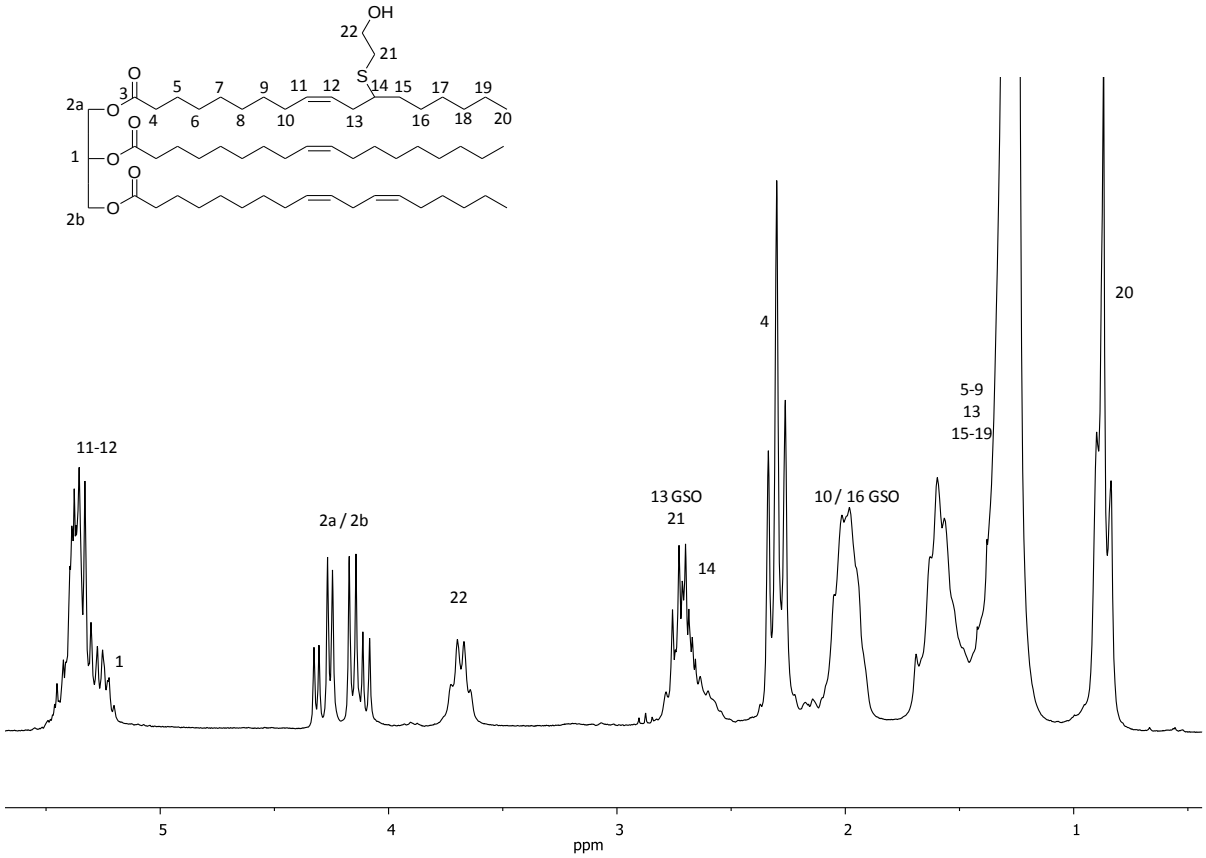


^{13}C NMR (75.47 MHz, $CDCl_3$), δ = 14.2 (CH_2-**C**H_3, C-20), 22.7-31.9 (**C**H_2, C5 to C-9, C-13 to C-19 and C-21), 34.1 (**C**H_2-(C=O)-, C-4), 35 (**C**H_2-CH-S, C-10 and C-12), 45.1 (**C**H-S-CH_2, C-11), 51.6 (**C**H_3-O-(C=O)-, C-2'), 60.9 (**C**H_2-OH), 127.9- 129.7 (negligible, residual double bonds).

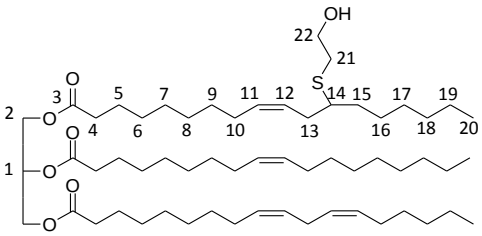


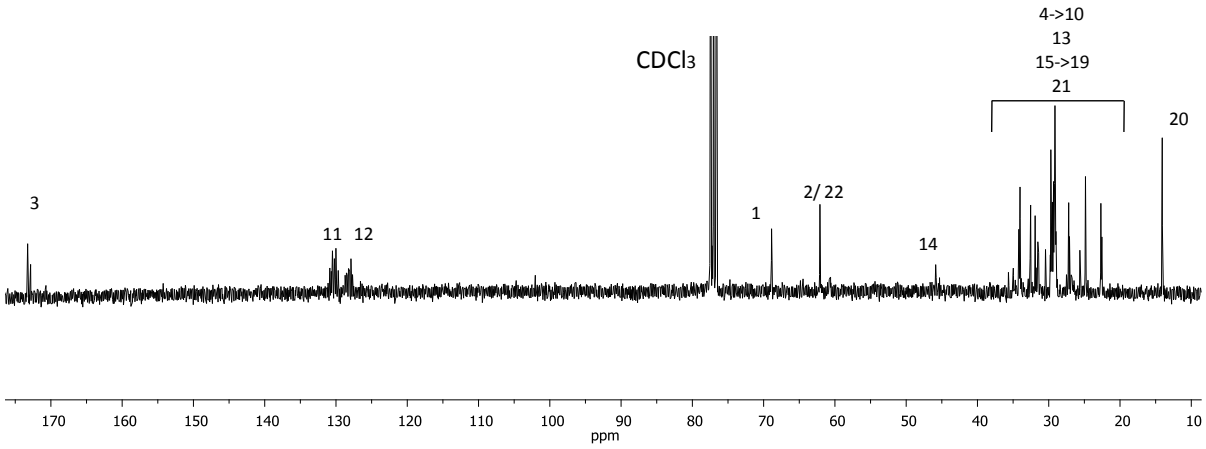
FTIR (cm^{-1}): 3440 (OH, stretching), 2923 (C-H, asymmetrical elongation), 2854 (C-H, symmetrical elongation), 1739 (C=O_{ester}, elongation), 1456-1433 (CH_2 scissoring), 1362 (CH3 symmetrical deformation), 1170 (C-O_{ester} elongation), 1043-1012 (C-C-OH $_{mercaptoethanol}$), 725 (CH_2 rocking).

Hydroxylated grapeseed oil: HGSO

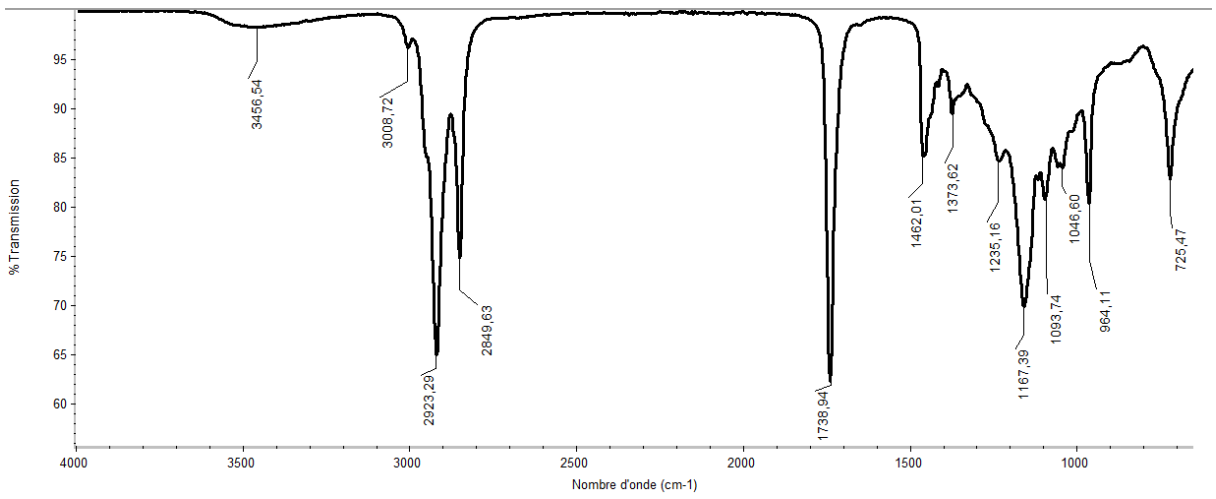


^{1}H NMR (300 MHz, $CDCl_3$), δ = 0.79-0.88 (9 H, CH_2-C**H**$_3$, H-20), 1.16-1.50 (49H, C**H**$_2$, H-6 to H-9 and H-16 to H-19), 1.5-1,7 (9.5H, C**H**$_2$-CH-S and C**H**$_2$-CH_2-C=O, H-13, H-15 and H5), 1.92-2.07 (8.35H, C**H**$_2$-CH=CH-, H-10 and H-16 GSO), 2.24-2.37 (t, 7H, ^{3}J = 7.5 Hz, C**H**$_2$-(C=O)-, H-4), 2.5-2.8 (m, 5.1H, CH=CH-C**H**$_2$-CH=CH, C**H**-S and S-C**H**$_2$, H-13 GSO, H-14 and H-21), 3.6-3.8 (dd, C**H**$_2$-OH, H-22) , 4.11-4.17 (dd, 2H, ^{2}J = 11.7 Hz, ^{3}J = 5.7 Hz, ^{3}J = 6 Hz, C**H**$_2$-O, H-2a), 4.26-4.32 (dd, 2 H, ^{2}J = 12 Hz, ^{3}J = 4.2 Hz , C**H**$_2$-O ,H-2b), 5.21-5.42 (m, 7.56H, C**H**-O and C**H**=C**H**, H-1 and H11, H-12).





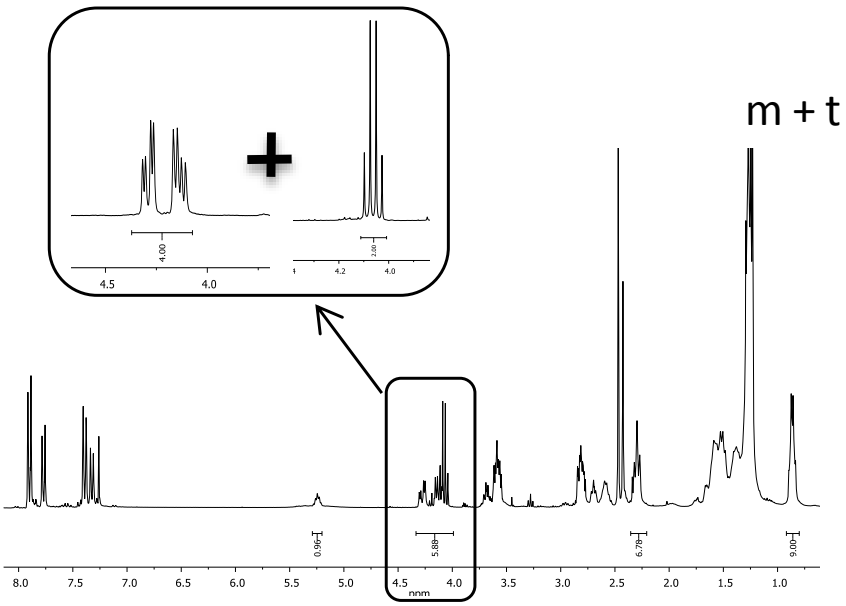
^{13}C NMR (75.47 MHz, $CDCl_3$), δ = 14.1 (CH_2-**C**H_3, C-20), 22.49-35 (**C**H_2, C-4 to C-10, C-13, C-15 to C-19 and C-21), 45.1 (**C**H-S-CH_2, C-14), 61.9 (**C**H_2-O and C**H**$_2$-OH, C-2 and C-22), 68.8 (**C**H-O, C-1), 127.8-130.05 (CH_2-CH=**C**H-CH_2-**C**H=CH, C-11 and C-12), 172.9-173.3 (**C**=O,C-3).



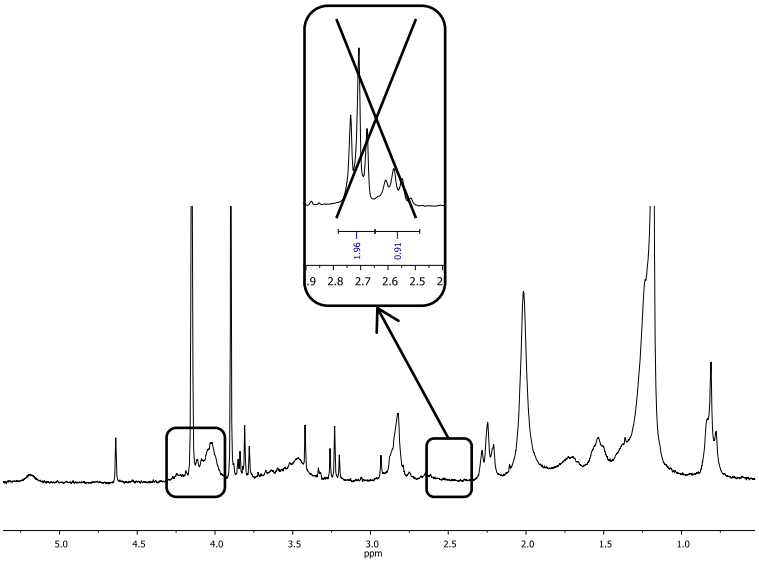
FTIR (cm^{-1}): 3457 (OH, stretching), 3009 (C=C-H (cis), asymmetrical elongation), 2923 (C-H, asymmetrical elongation), 2850 (C-H, symmetrical elongation), 1739 ($C=O_{ester}$, elongation), 1462 (CH_2 scissoring), 1374 (CH3 symmetrical deformation), 1167 ($C-O_{ester}$ elongation), 1043-964 (C-C-OH $_{mercaptoethanol}$), 725 (CH_2 rocking).

C- Characterization of macroinitiators

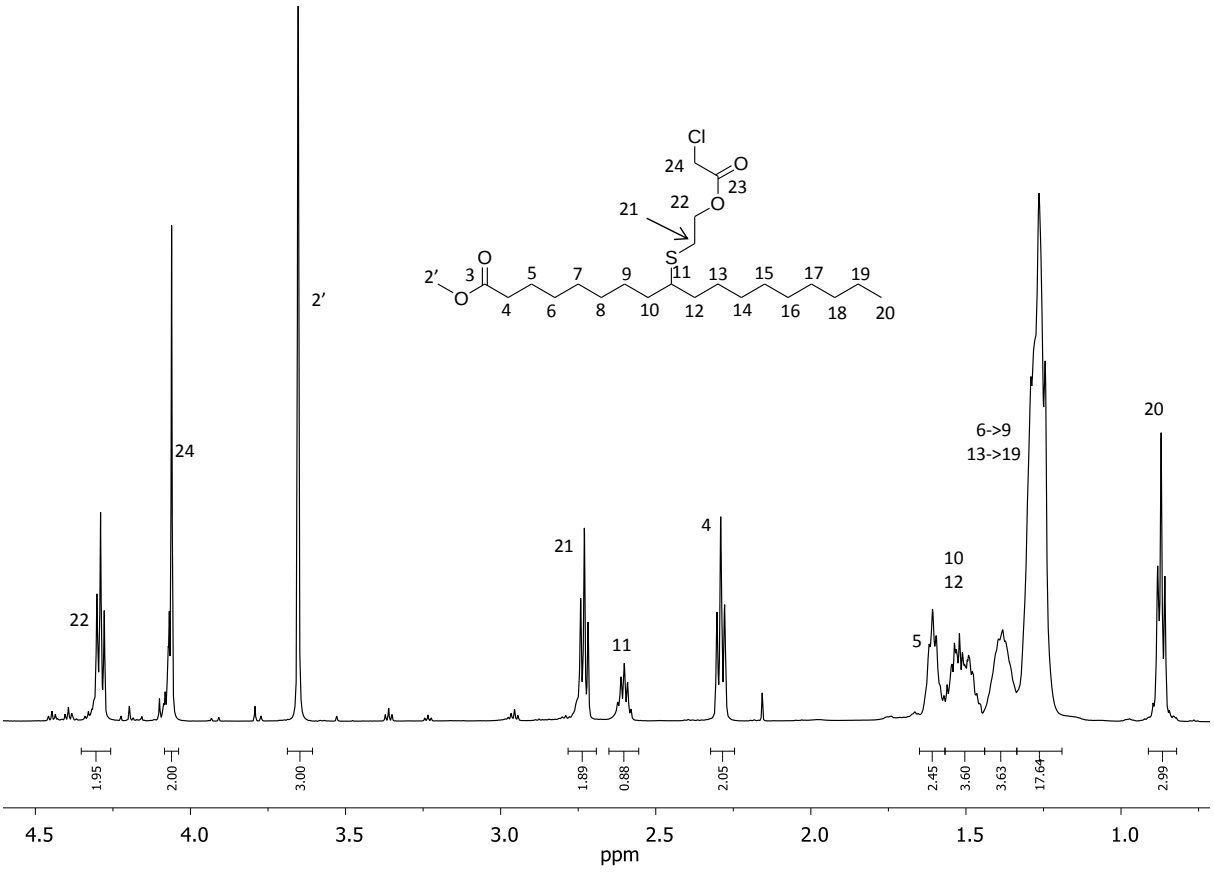
^{1}H NMR of reaction product of HGSO and *p*-toluenesulfonyl chloride



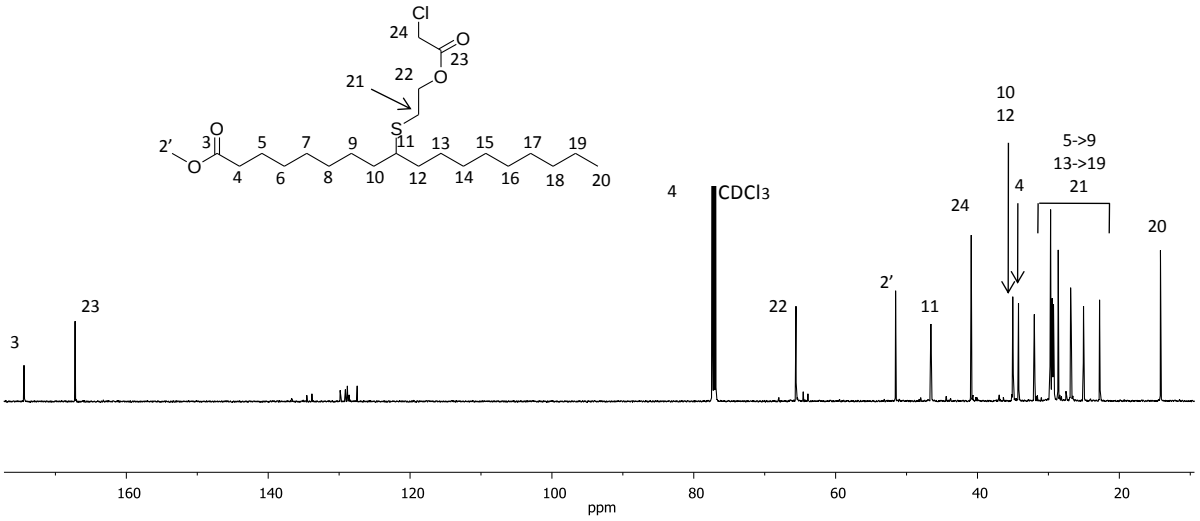
^{1}H NMR of reaction product of HGSO and trifluoromethanesulfonic anhydride



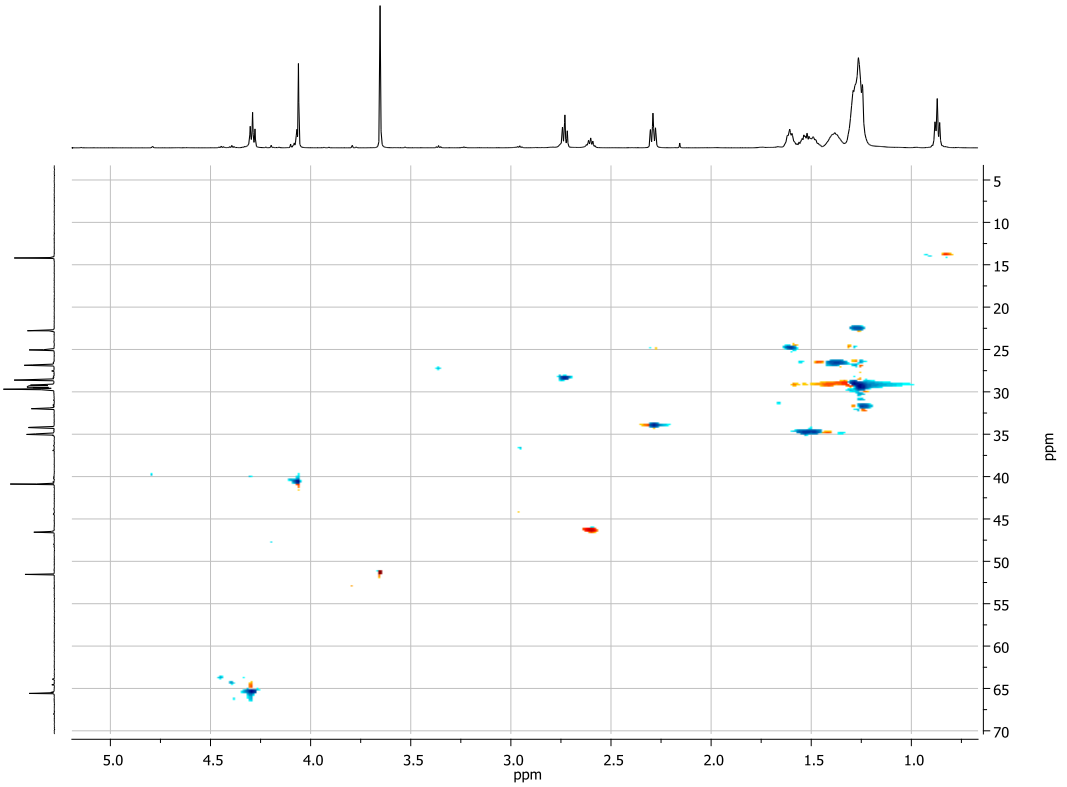
Chloro-methyloleate: Cl-MO

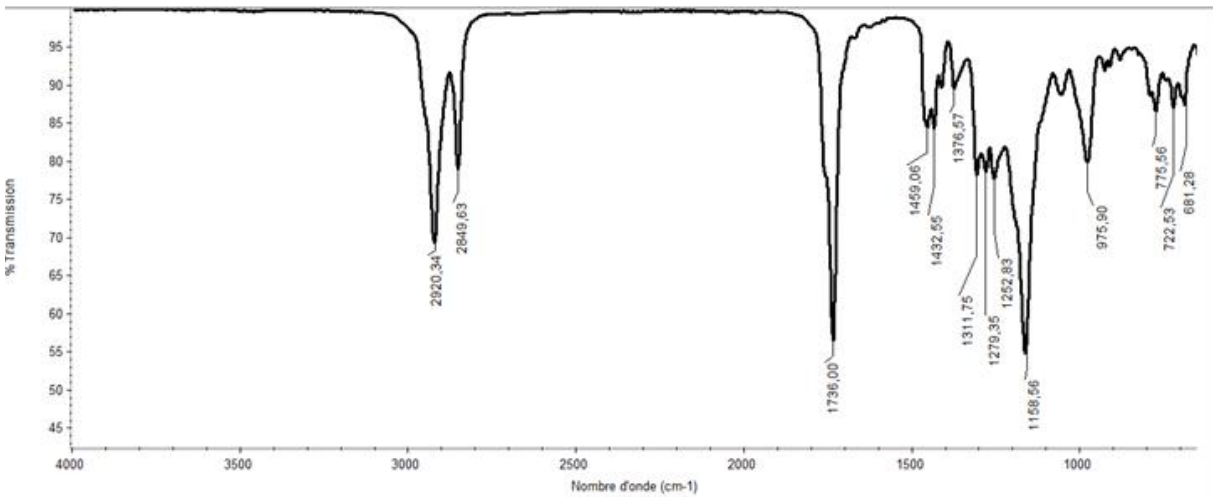


^{1}H NMR (300 MHz, $CDCl_3$), δ = 0.79-0.88 (t, J = 7.0 Hz, 3H, CH_2-C**H**$_3$, H-20), 1.16-1.7 (m, 27H, C**H**$_2$, H-5 to H-10 and H-12 to H-19), 2.24-2.33 (t, J = 7.5 Hz, 2 H, C**H**$_2$-C=O, H-4), 2.6 (q, 1H, J = 12.4, 6.3 Hz, C**H**-S, H-11), 2.73 (t, J = 7.2 Hz, 2H, S-C**H**$_2$, H-21), 3.65 (s, 3H, C**H**$_3$-O-C=O, H-2'), 4.06 (s, 2H, C**H**$_2$-Cl, H-24), 4.27-4.34 (t, J = 7.1 Hz, 2H, C**H**$_2$-O-(C=O)-CH_2-Cl, H-22).



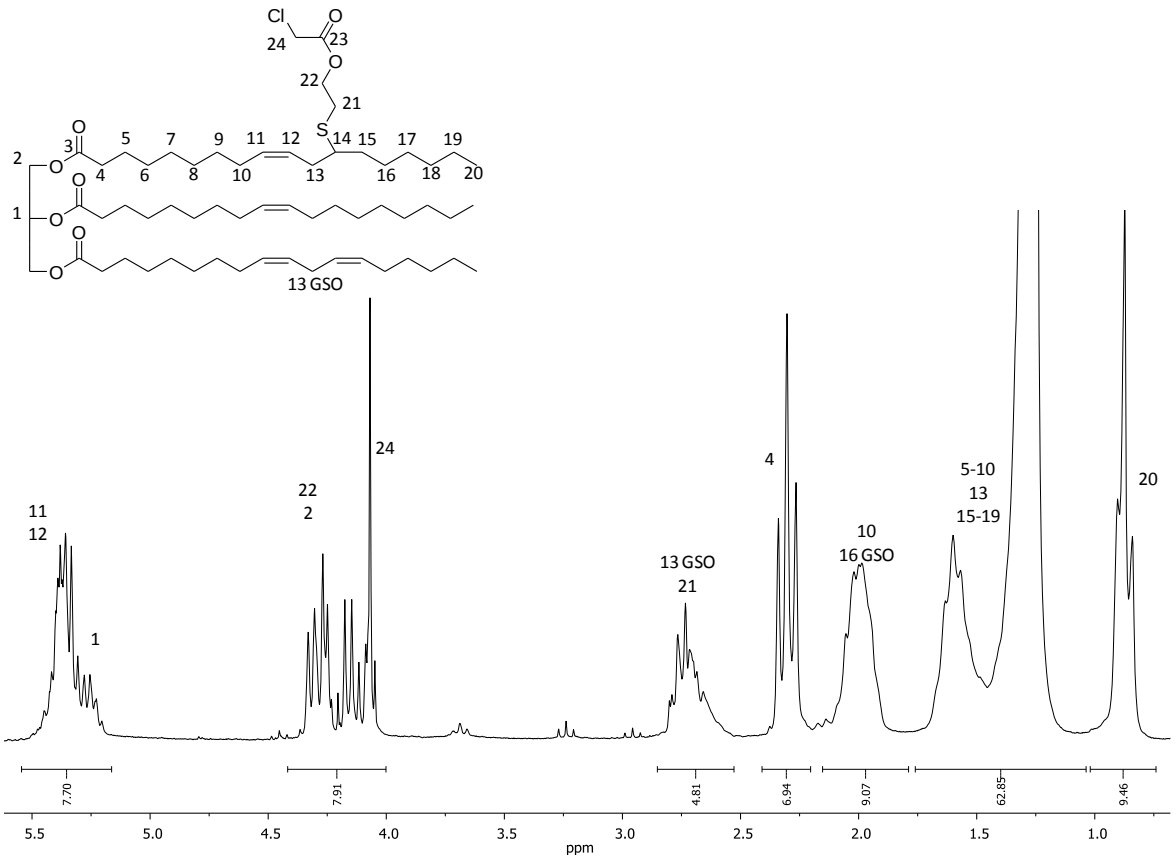
^{13}C NMR (75.47 MHz, $CDCl_3$), δ = 14.2 (CH_2-**C**H_3, C-20), 22.7-31.9 (**C**H_2, C5 to C-9, C-13 to C-19 and C-21), 34.2 (**C**H_2-(C=O)-, C-4), 35 (**C**H_2-CH-S, C-10 and C12), 40.9 (**C**H_2-Cl, C-24), 46,6 (**C**H-S-CH_2, C-11), 51.5 (**C**H_3-O-(C=O)-, C-2'), 65,6 (**C**H_2-O-(C=O)-CH_2-Cl, C-22), 127.9- 129,7 (negligible, residual double bonds), 167,2 (O-**C**=O-CH_2-Cl, C-23), 174.4 (**C**=O).



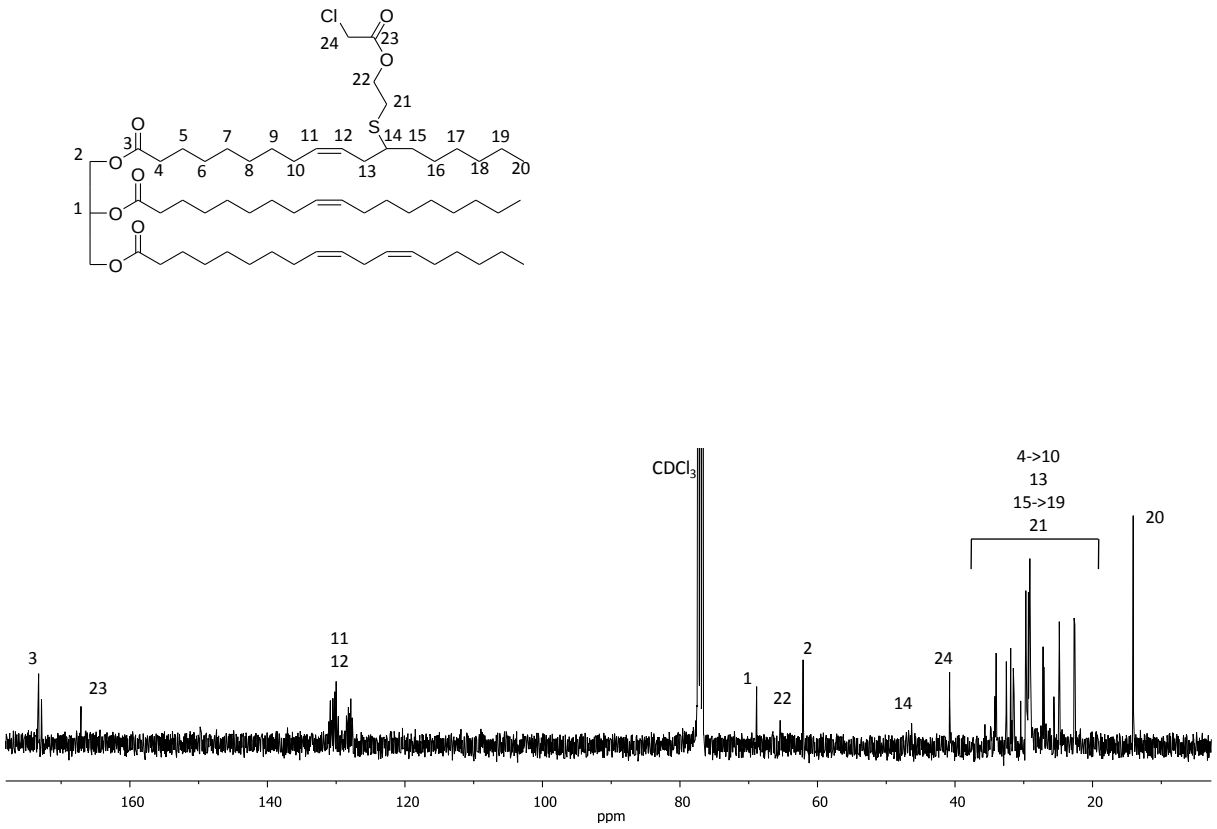


FTIR (cm^{-1}): 2920 (C-H, asymmetrical elongation), 2850 (C-H, symmetrical elongation), 1736 ($C=O_{ester}$, elongation), 1459-1432 (CH_2 scissoring), 1377 (CH3 symmetrical deformation), 1159 ($C-O_{ester}$ elongation), 776 (C-Cl stretching), 725 (CH_2 rocking).

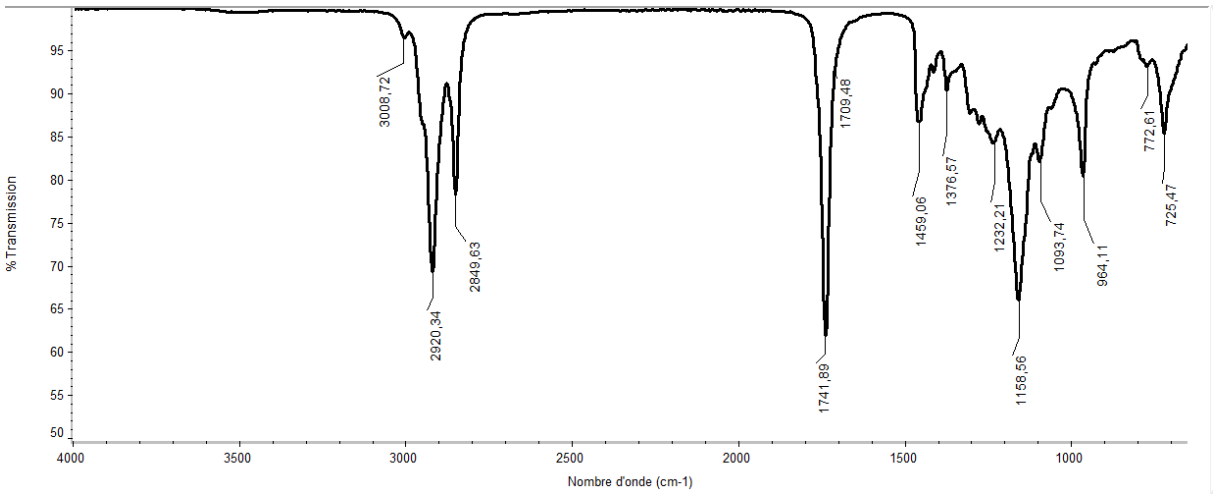
Chloro-grapeseed oil: Cl-GSO



^{1}H NMR (300 MHz, $CDCl_3$), δ = 0.79-0.88 (9 H, CH_2-C**H**$_3$, H-20), 1.16-1.70 (63H, C**H**$_2$, C**H**$_2$-CH-S and C**H**$_2$-CH_2-(C=O)-, H-6 to H-9, H-16 to H-19, H-13, H-15 and H-5), 1.92-2.07 (9H, -C**H**$_2$-CH=CH-, H-10 and H-16 GSO), 2.24-2.37 (t, 7H, ^{3}J = 7.5 Hz ,C**H**$_2$-(C=O)-, H-4), 2.5-2.8 (m, 5H, CH=CH-C**H**$_2$-CH=CH, C**H**-S and S-C**H**$_2$, H-13 GSO, H-14 and H-21), 4.11-4.32 (m, 8H, C**H**$_2$-O, C**H**$_2$-O-(C=O)-CH_2-Cl, C**H**$_2$-Cl, H-2, H-22 and H-24), 5.21-5.42 (m, 7.7H, C**H**-O and C**H**=C**H**, H-1 and H-11, H-12).



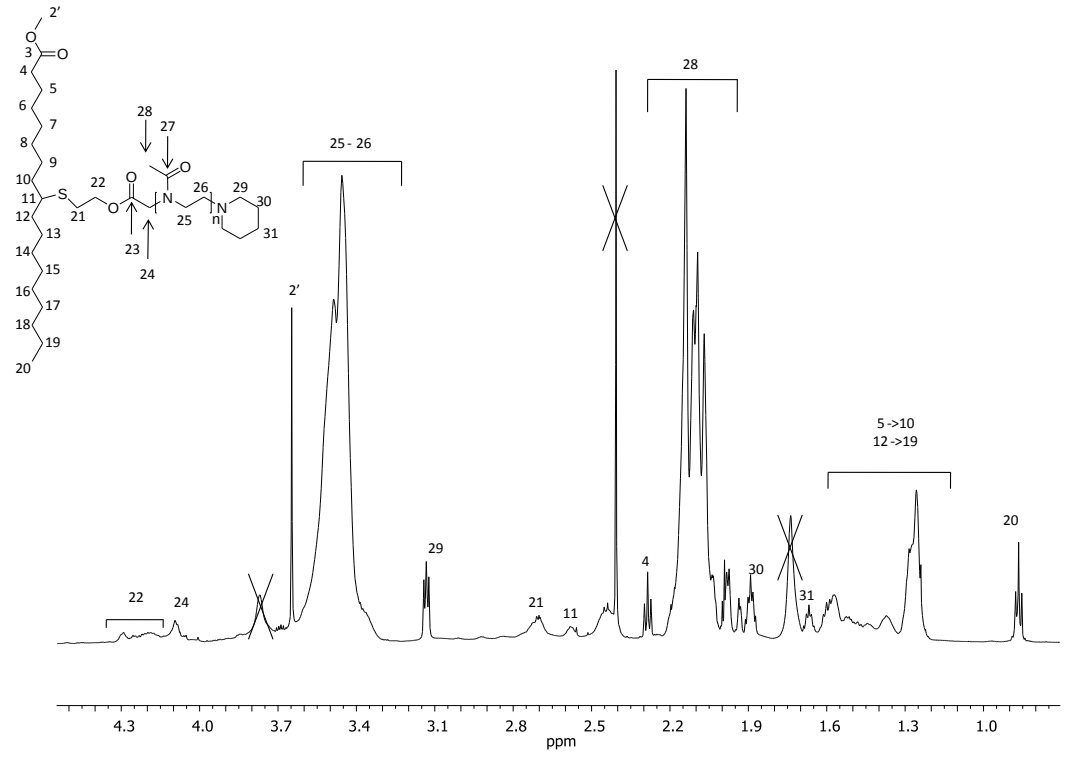
^{13}C NMR (75.47 MHz, $CDCl_3$), δ = 14.1 (CH_2-**C**H_3, C-20), 22.49-35.7 (**C**H_2 and S-**C**H_2, C-4 to C-10, C-13, C-15 to C-19 and C-21), 40.8 (**C**H_2-Cl, C-24), 46.3 (**C**H-S, C-14), 62.1 (**C**H_2-O, C-2), 65.3 (**C**H_2-O-(C=O)-CH_2-Cl, C-22), 69.1 (**C**H-O, C-1), 127.8-130.05 (CH_2-CH=**C**H-CH_2-**C**H=CH, C-11 and C-12), 167.2 (-(**C**=O)-CH_2-Cl, C-23), 172.9-173.3 (**C**=O,C-3).



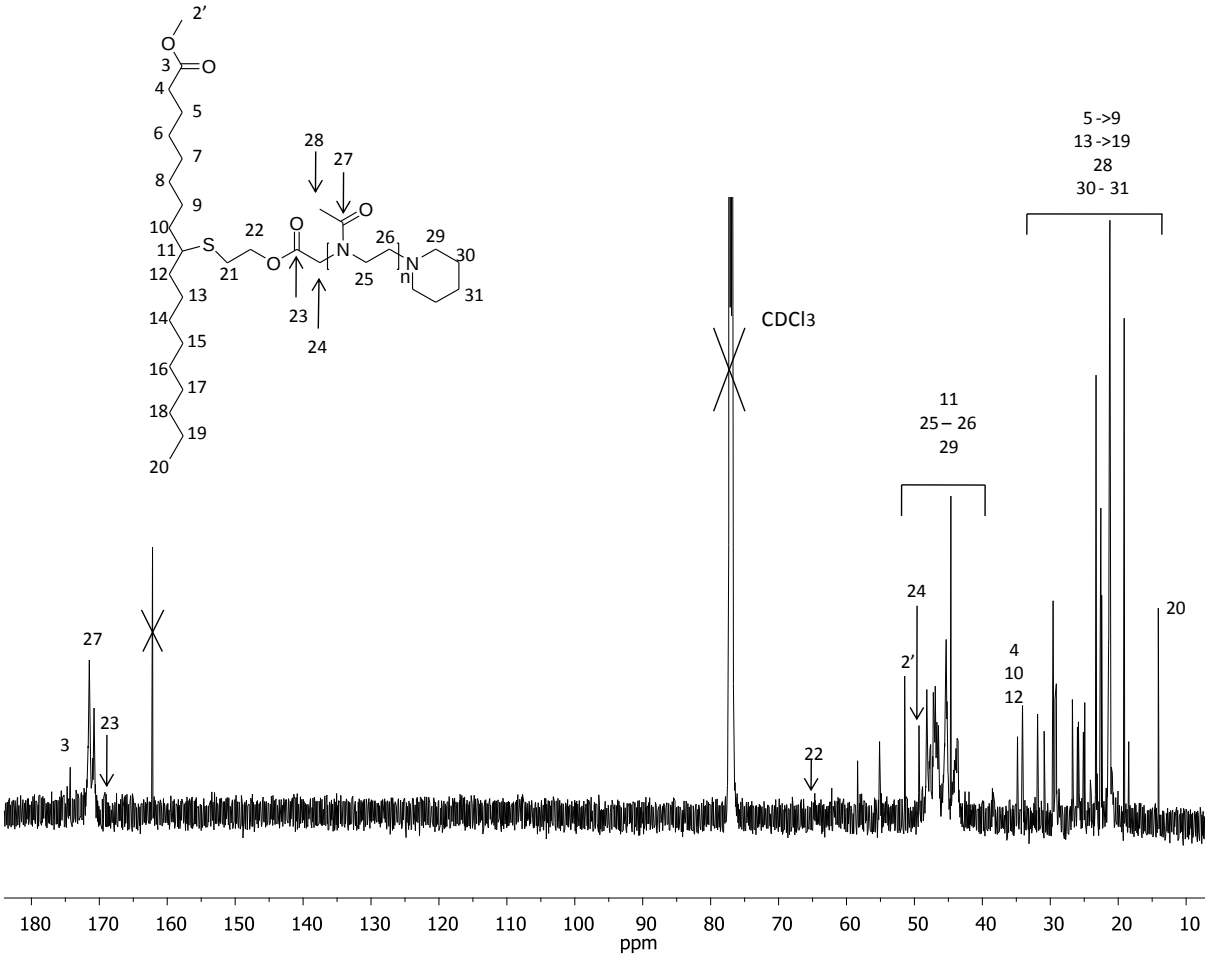
FTIR (cm^{-1}): 3009 (C=C-H (cis), asymmetrical elongation), 2920 (C-H, asymmetrical elongation), 2850 (C-H, symmetrical elongation), 1742 ($C=O_{ester}$, elongation), 1459 (CH_2 scissoring), 1377 (CH3 symmetrical deformation), 1159 ($C-O_{ester}$ elongation), 772 (C-Cl stretching), 725 (CH_2 rocking).

D- Characterization of LipoPOx

Copolymer based on MO

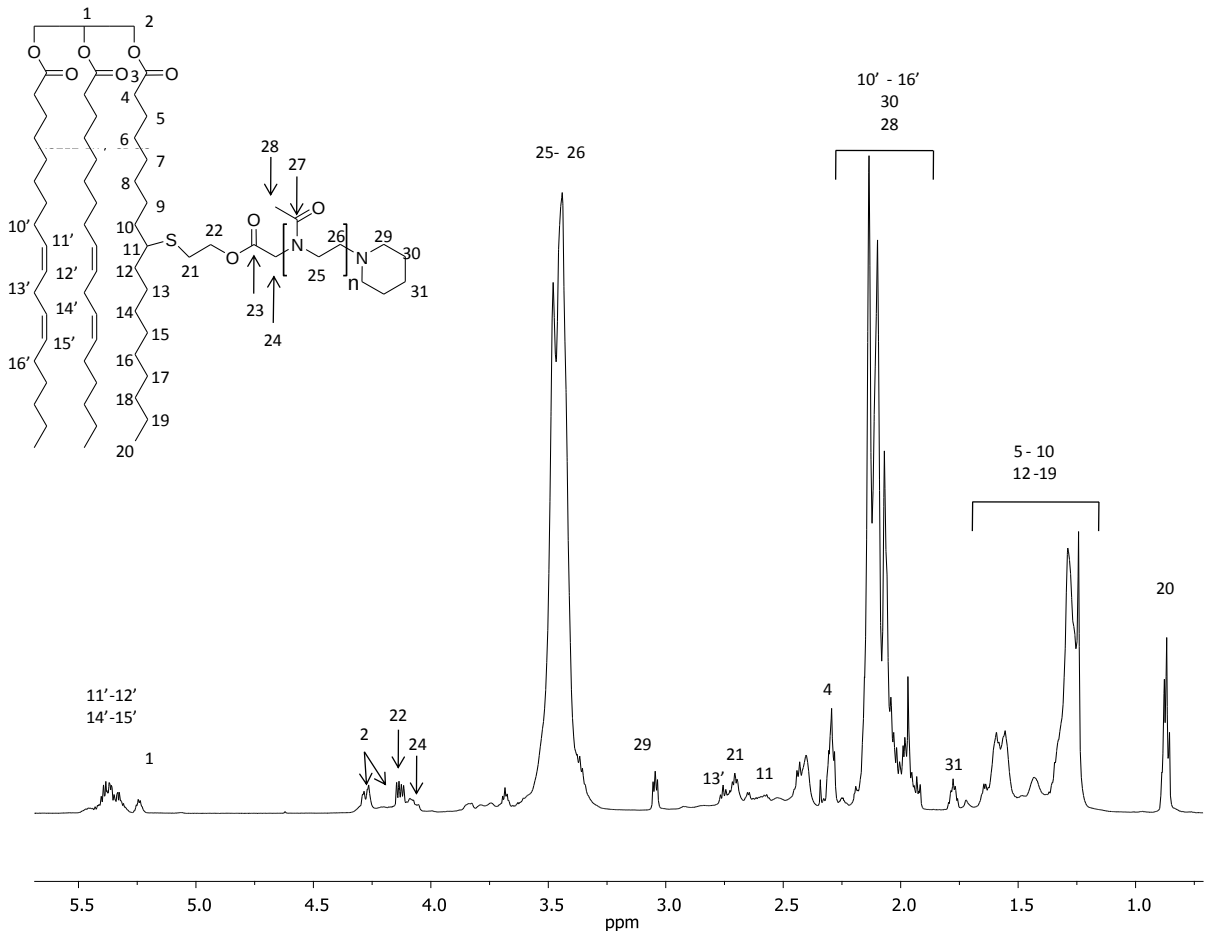


^{1}H NMR (300 MHz, $CDCl_3$), δ = 0.79-0.88 (t, CH_2-C**H**$_3$, H-20), 1.16-1.65 (m, C**H**$_2$, H-5 to H-10 and H-12 to H-19),1.67 (C**H**$_2$-CH_2-CH_2-N, H-31), 1.88 (C**H**$_2$-CH_2-N, H-30), 1.9-2.2 (C**H**$_3$-(C=O)-N, H-28), 2.27-2.31 (t, 2 H, C**H**$_2$-(C=O)-, H-4), 2.6 (m, C**H**-S, H-11), 2.73 (m, S-C**H**$_2$, H-21), 3.1-3.15 (t, C**H**$_2$-N, H-29), 3.3-3.6 (m, C**H**$_2$-C**H**$_2$-N-(C=O)-, H-25, H-26), 3.65 (s, C**H**$_3$-O-(C=O)-, H-2'), 4.1 (m, -(C=O)-C**H**$_2$-N-(C=O)-, H-24), 4.1-4.3 (m,S-CH_2-C**H**$_2$, H-22).



^{13}C NMR (75.47 MHz, $CDCl_3$), δ = 14.2 (CH_2-**C**H_3, C-20), 22.7-31.9 (**C**H_2, C5 to C-9, C-13 to C-19, C-28, C-30 and C-31), 34.1 (**C**H_2-(C=O)-, C-4), 34.9 (**C**H_2-CH-S, C-10 and C12), 43- 50 (**C**H-S-CH_2, **C**H_2-**C**H_2-N-(C=O)-, **C**H_2-N, C-11, C-25, C-26 and C-29), 49.6 (-(C=O)-**C**H_2-N-(C=O)-, C-24) 51.5 (**C**H_3-O-(C=O)-, C-2'), 64 (S-CH_2-**C**H_2, C-22), 169.2 (-(**C**=O)-CH_2-N, C-23), 170.9-171.6 (N-(**C**=O)-CH_3,C-27), 174.4 (CH_3-(**C**=O)-,C-3).

Copolymer based on GSO



^{1}H NMR (300 MHz, $CDCl_3$), δ = 0.79-0.88 (t, CH_2-C**H**$_3$, H-20), 1.16-1.65 (m, C**H**$_2$, H-5 to H-10 and H-12 to H-19), 1.67 (C**H**$_2$-CH_2-CH_2-N, H-31), 1.88-2.2 (C**H**$_2$-CH=CH, C**H**$_3$-(C=O)-N, C**H**$_2$-CH_2-N, H-10', H16', H-28 and H-30), 2.27-2.31 (t, 2 H, C**H**$_2$-(C=O)-, H-4), 2.6 (m, C**H**-S, H-11), 2.73 (m, S-C**H**$_2$, H-21), 2.77 (CH=CH-C**H**$_2$-CH=CH, H-13'), 3.1-3.15 (t, C**H**$_2$-N, H-29), 3.3-3.6 (m, C**H**$_2$-C**H**$_2$-N-(C=O)-, H-25, H-26), 4.1 (m, -(C=O)-C**H**$_2$-N-(C=O)-, H-24), 4.1-4.3 (C**H**$_2$-CH_2-S, H-22), 4.11-4.32 (dd, C**H**$_2$-O, H-2), 5.25 (C**H**-O, H-1), 5.3-5.42 (m, C**H**=C**H**, H-11', H-12', H-14' and H-15').