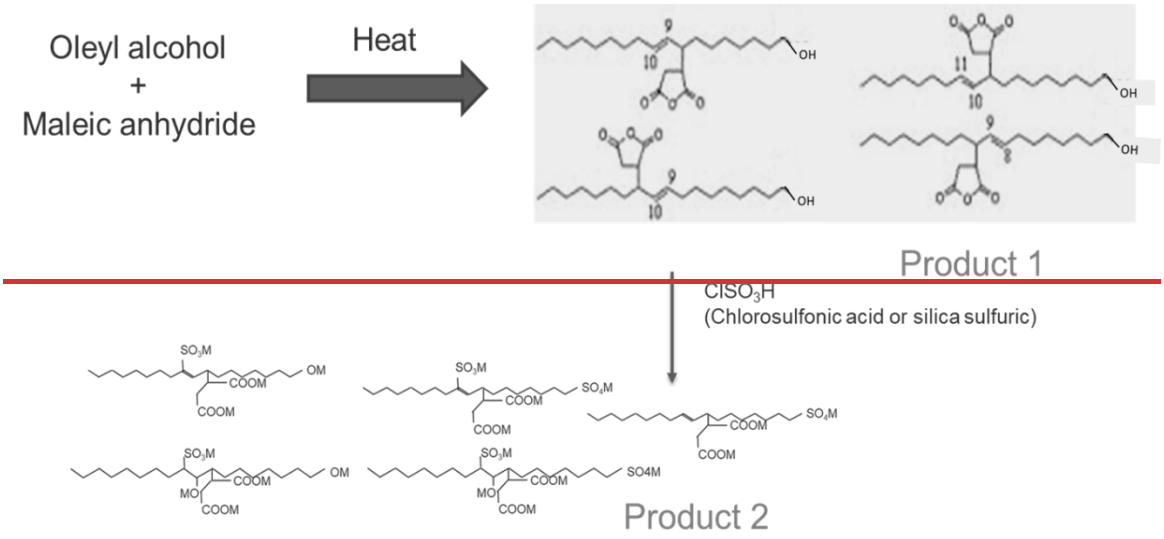


FIGURE 1

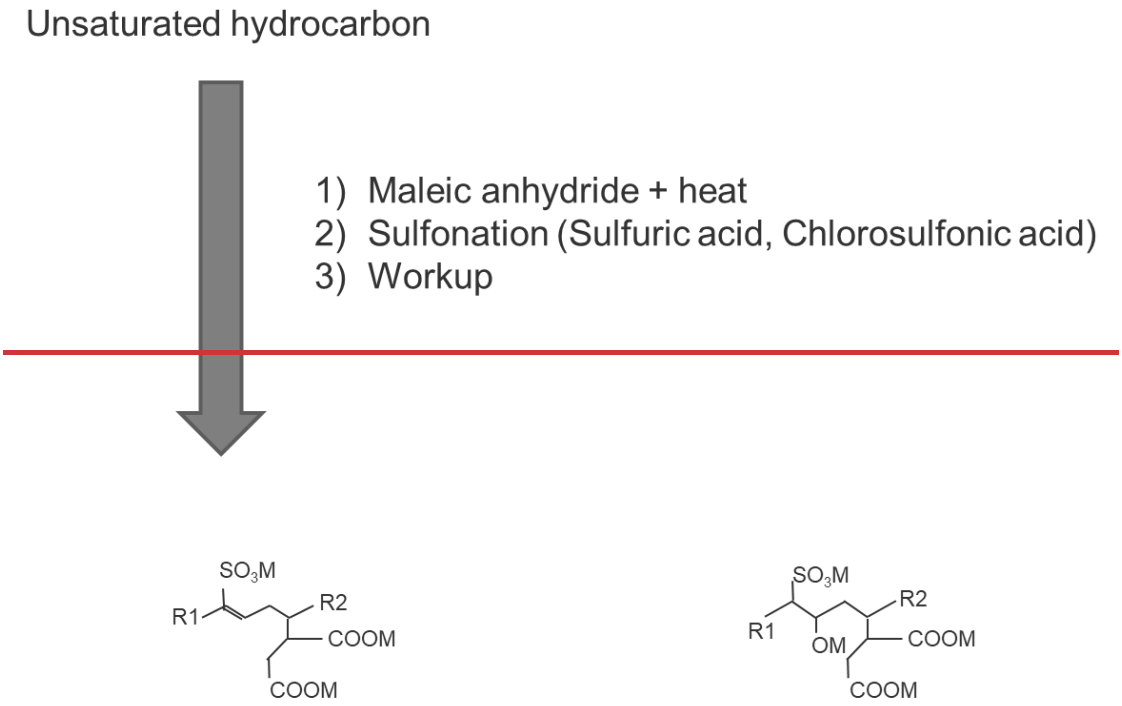


FIGURE 2

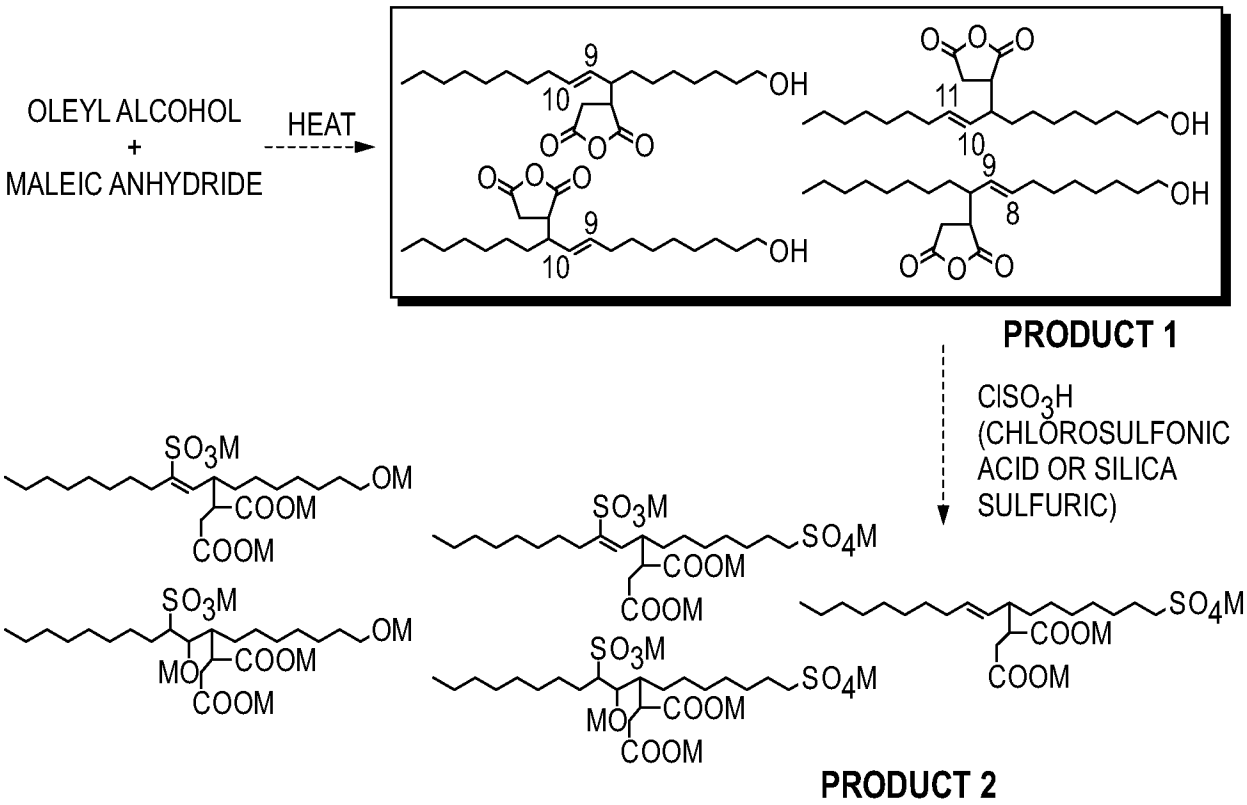

OLEYL ALCOHOL
+
MALEIC ANHYDRIDE
HEAT
PRODUCT 1
ClSO3H
(CHLOROSULFONIC
ACID OR SILICA
SULFURIC)
PRODUCT 2

FIG. 1

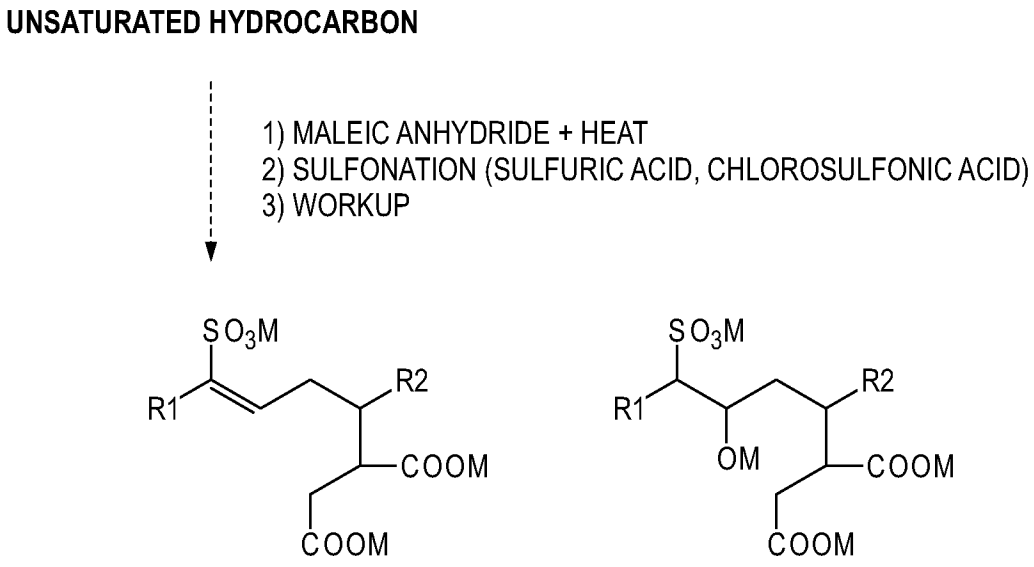

UNSATURATED HYDROCARBON
1) MALEIC ANHYDRIDE + HEAT
2) SULFONATION (SULFURIC ACID, CHLOROSULFONIC ACID)
3) WORKUP

FIG. 2

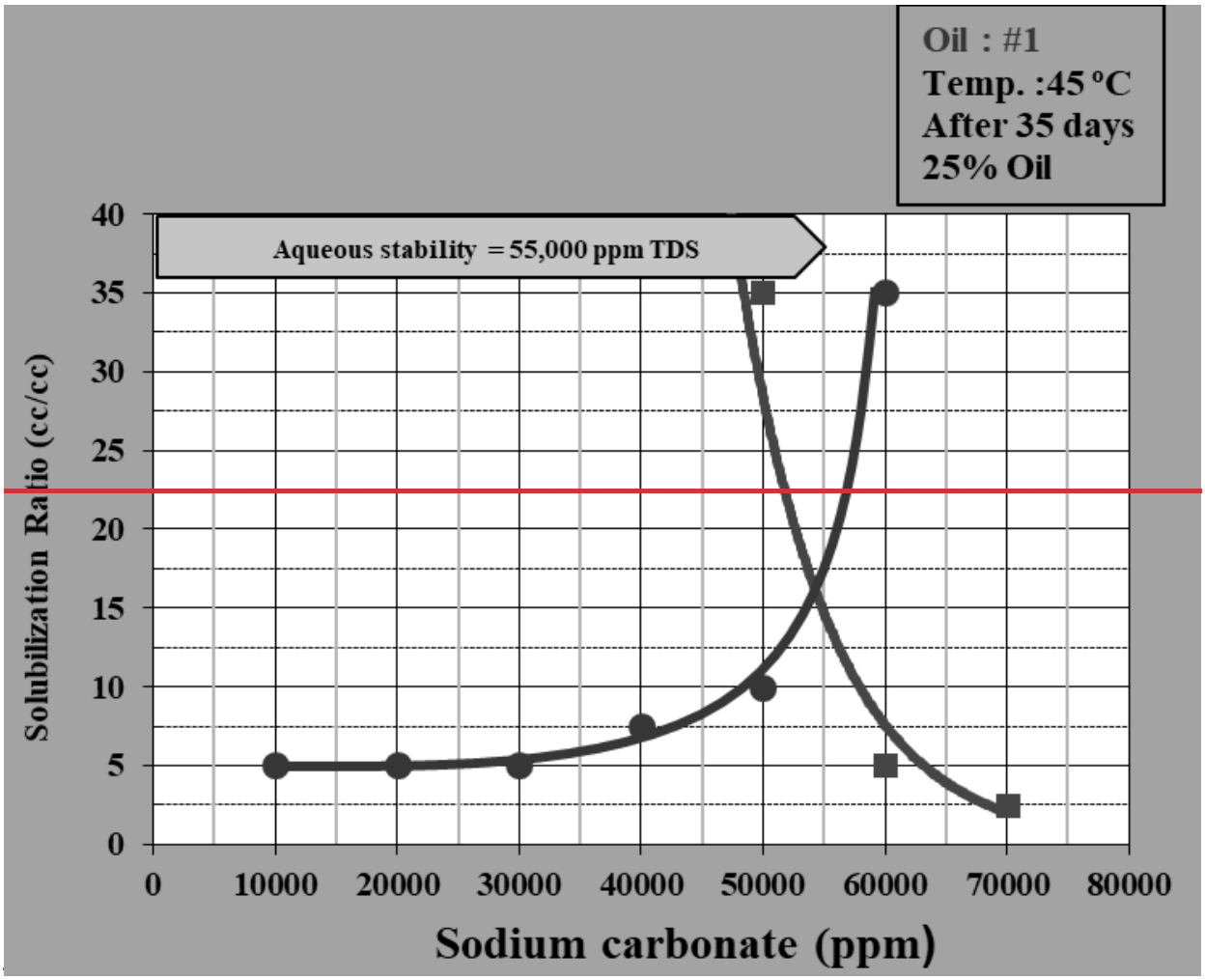

Oil : #1
Temp. :45 °C
After 35 days
25% Oil
Aqueous stability = 55,000 ppm TDS
Solubilization Ratio (cc/cc)
0
5
10
15
20
25
30
35
40
0
10000
20000
30000
40000
50000
60000
70000
80000
Sodium carbonate (ppm)

FIGURE 3

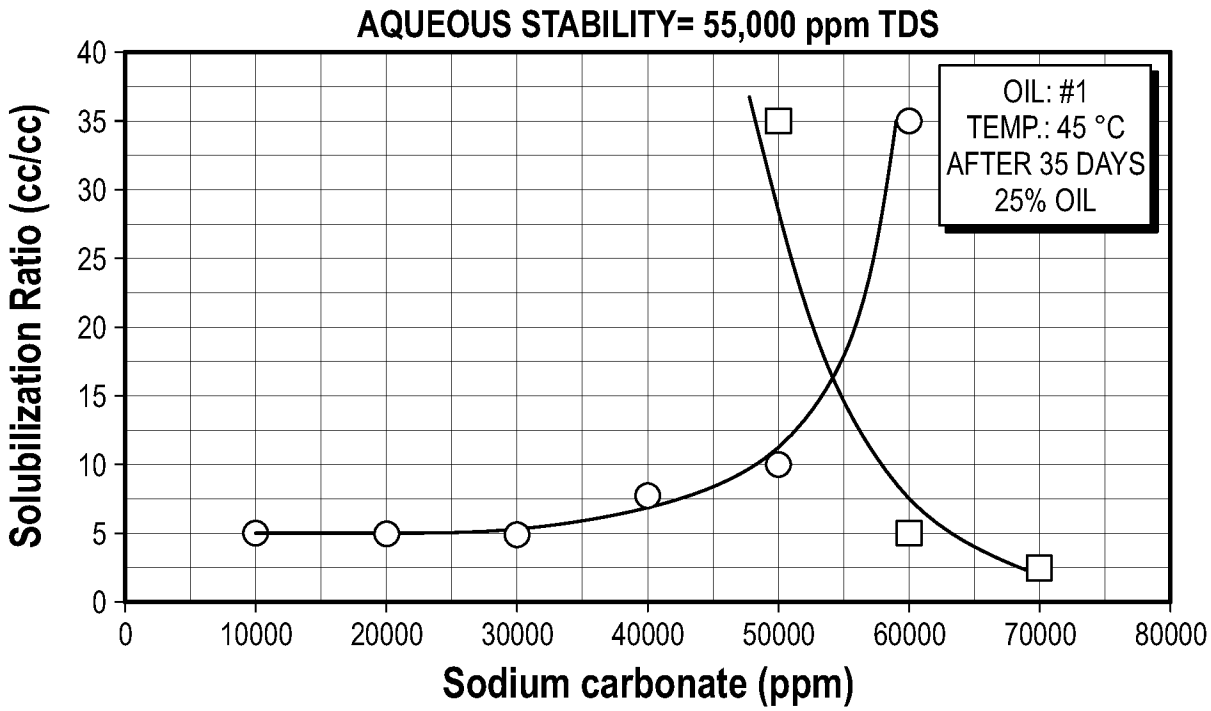

AQUEOUS STABILITY= 55,000 ppm TDS
Solubilization Ratio (cc/cc)
Sodium carbonate (ppm)
OIL: #1
TEMP.: 45 °C
AFTER 35 DAYS
25% OIL
0
5
10
15
20
25
30
35
40
0
10000
20000
30000
40000
50000
60000
70000
80000

FIG. 3

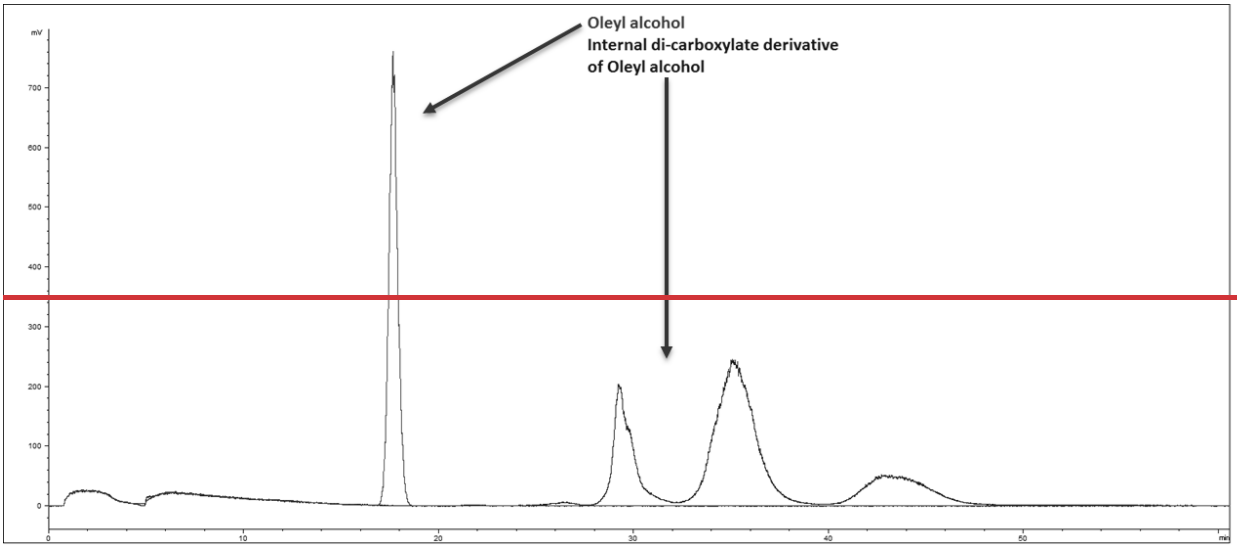


FIGURE 4

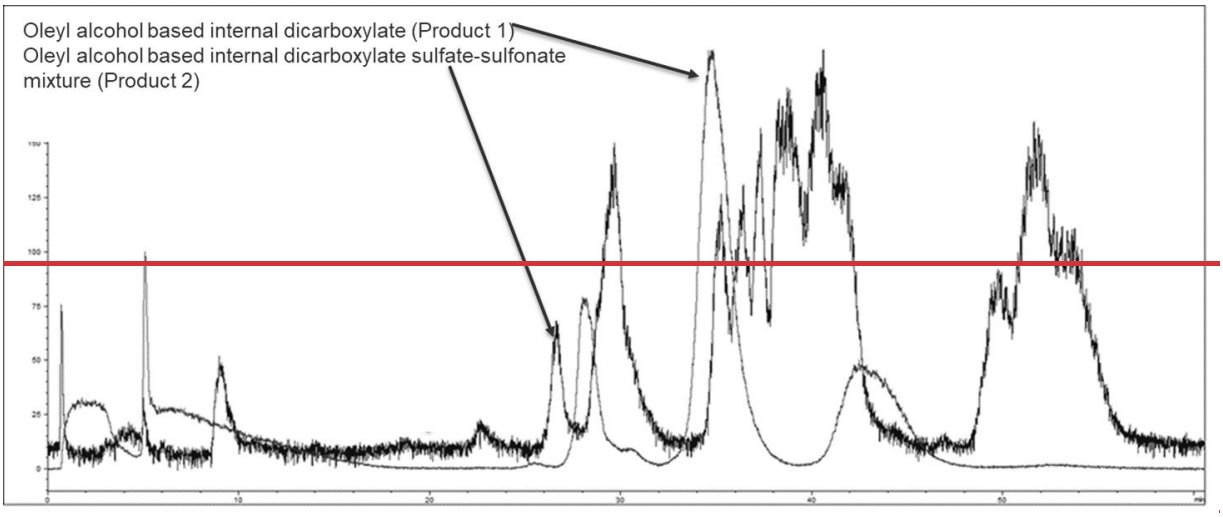


FIGURE 5

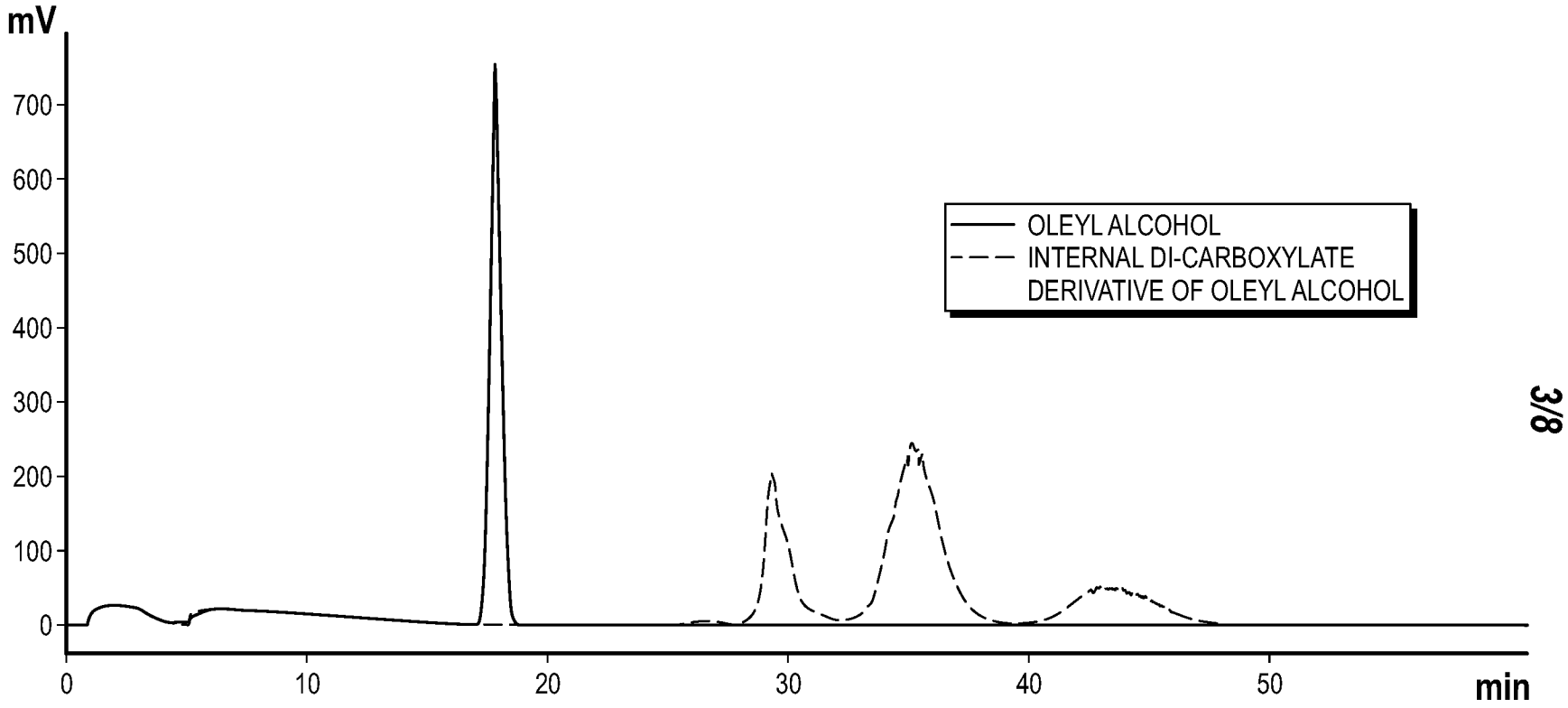

mV
700
600
500
400
300
200
100
0
0
10
20
30
40
50
min
OLEYL ALCOHOL
INTERNAL DI-CARBOXYLATE
DERIVATIVE OF OLEYL ALCOHOL

FIG. 4

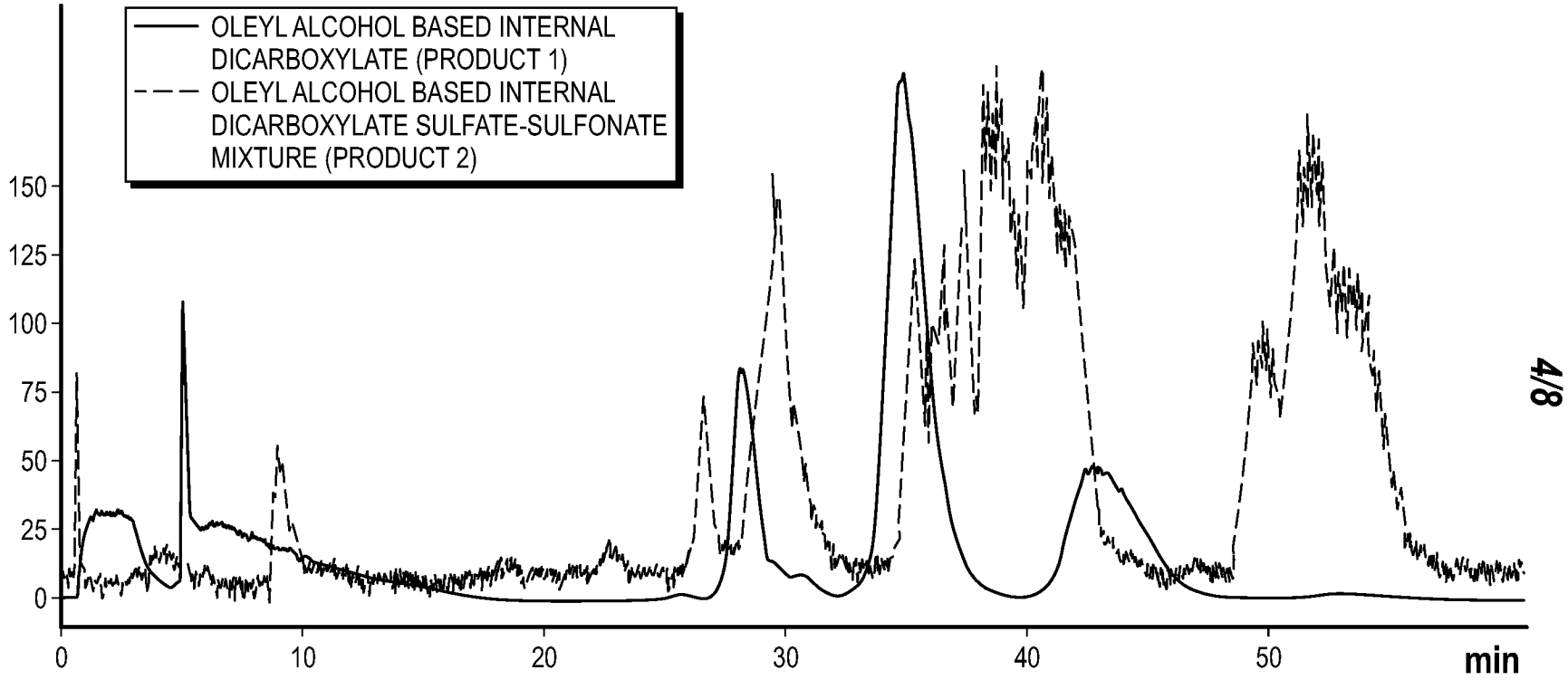

OLEYL ALCOHOL BASED INTERNAL DICARBOXYLATE (PRODUCT 1)
OLEYL ALCOHOL BASED INTERNAL DICARBOXYLATE SULFATE-SULFONATE MIXTURE (PRODUCT 2)
150
125
100
75
50
25
0
0
10
20
30
40
50
min

FIG. 5

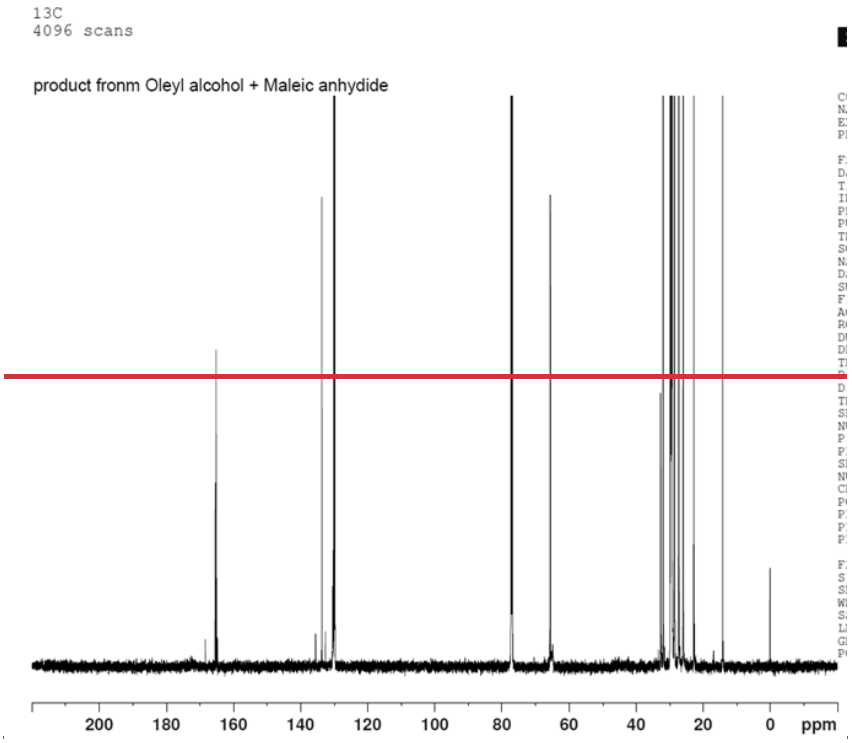


FIGURE 6A

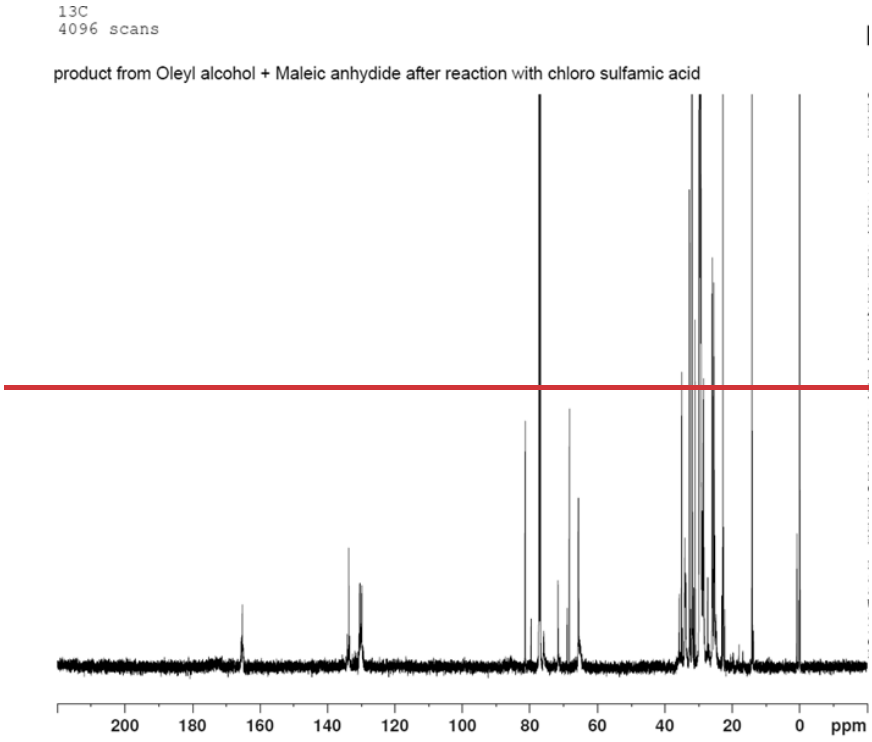


FIGURE 6B

PRODUCT FROM OLEYL ALCOHOL + MALEIC ANHYDIDE

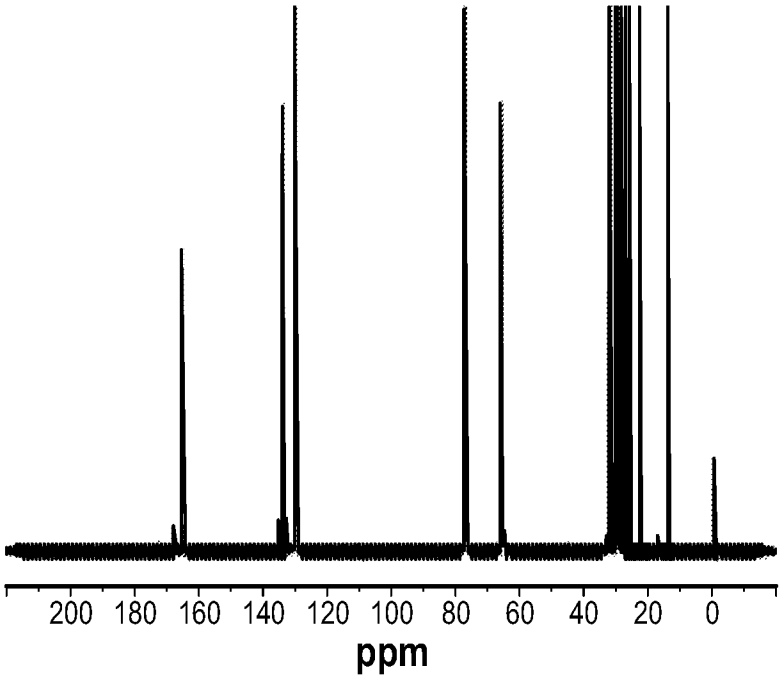


FIG. 6A

PRODUCT FROM OLEYL ALCOHOL + MALEIC ANHYDIDE AFTER REACTION WITH CHLORO SULFAMIC ACID

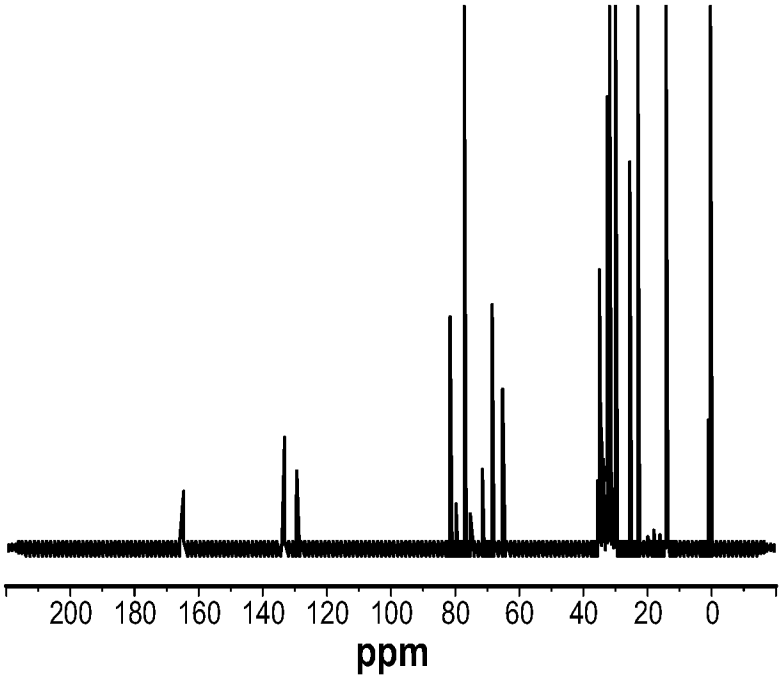


FIG. 6B

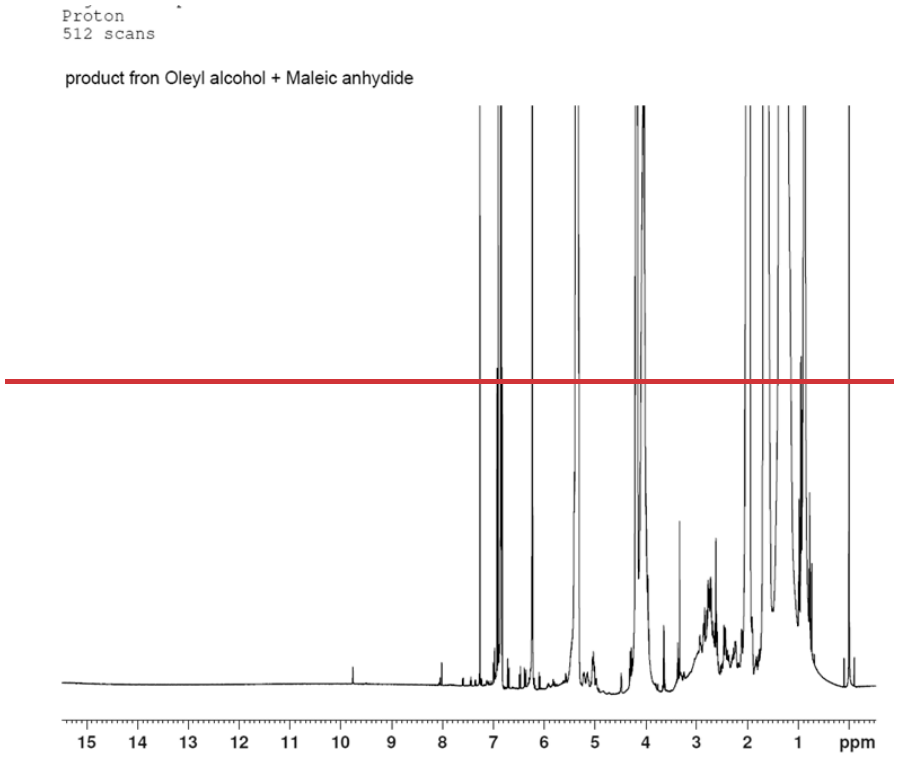


FIGURE 7A

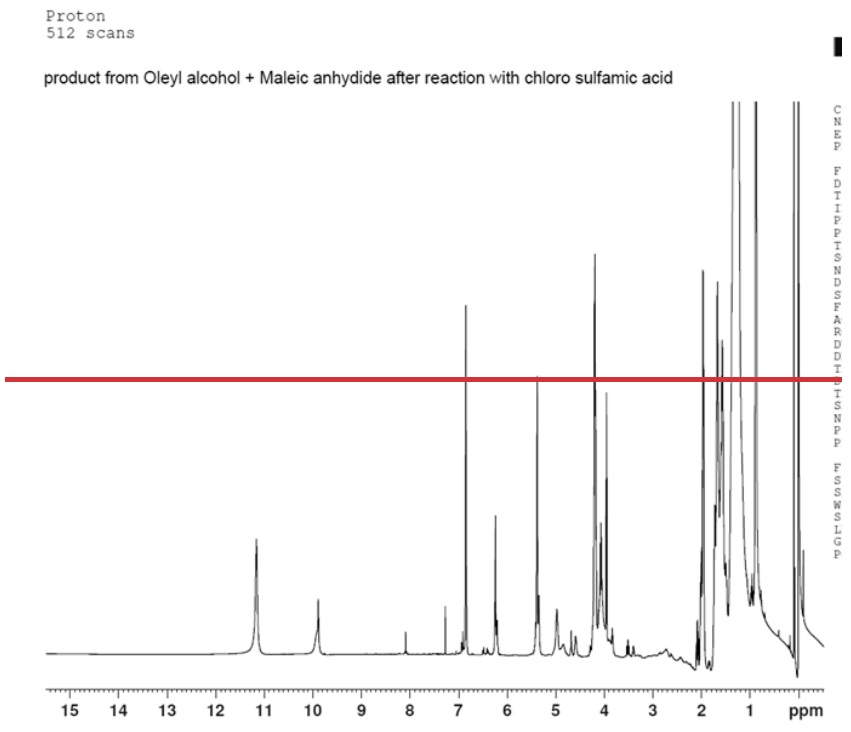


FIGURE 7B

PRODUCT FROM OLEYL ALCOHOL + MALEIC ANHYDIDE

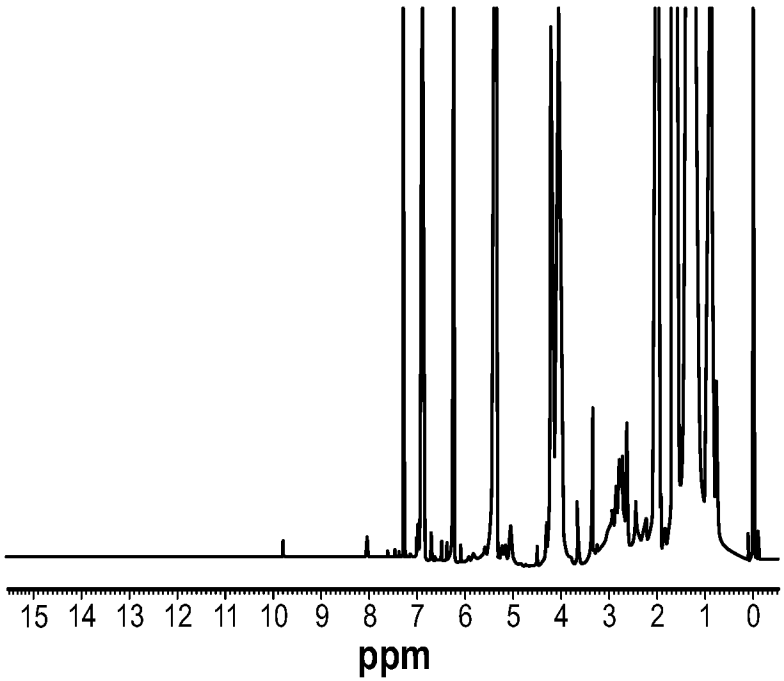


FIG. 7A

PRODUCT FROM OLEYL ALCOHOL + MALEIC ANHYDIDE AFTER REACTION WITH CHLORO SULFAMIC ACID

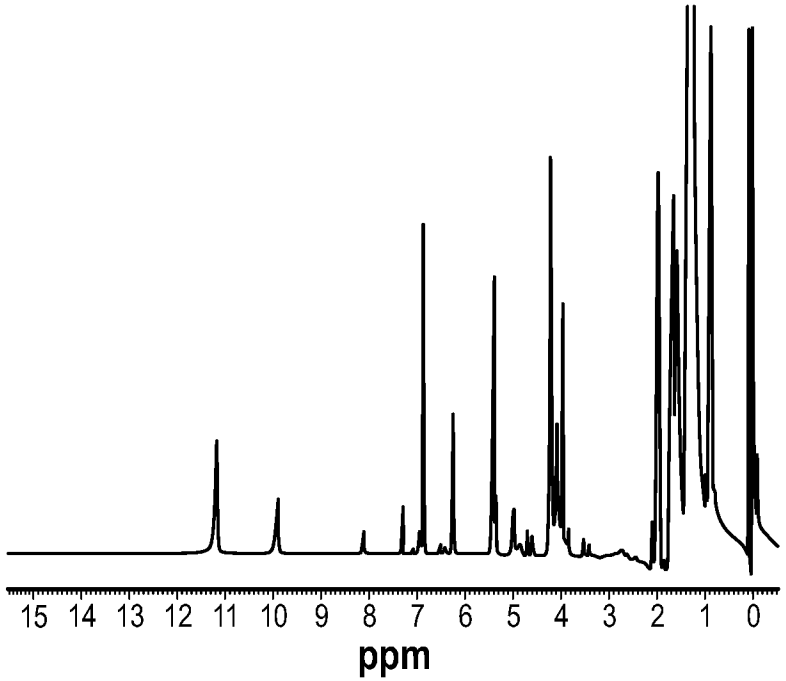


FIG. 7B

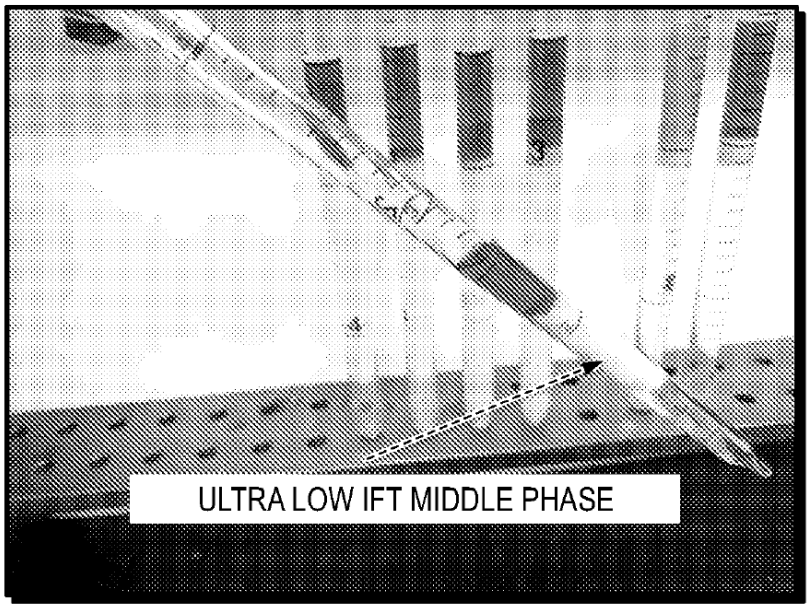


FIG. 8

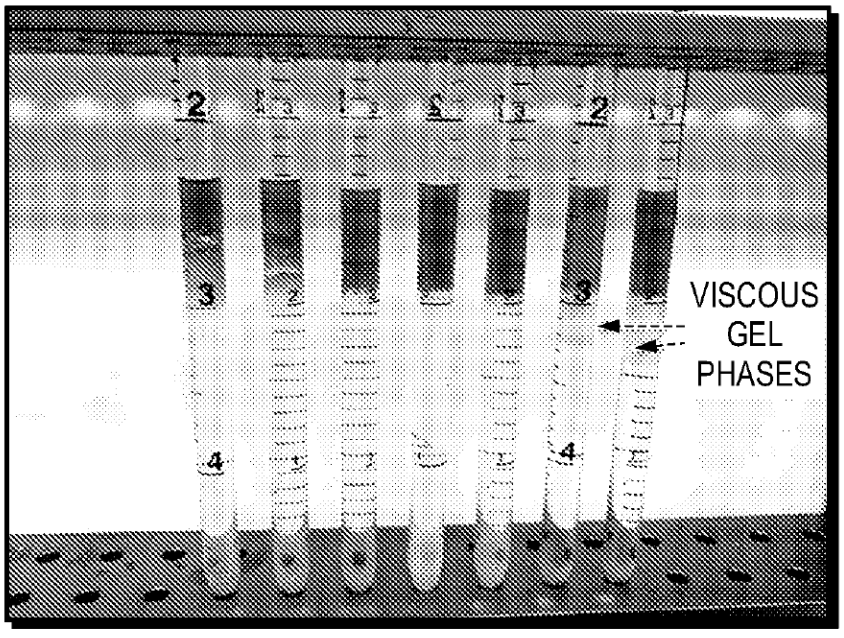
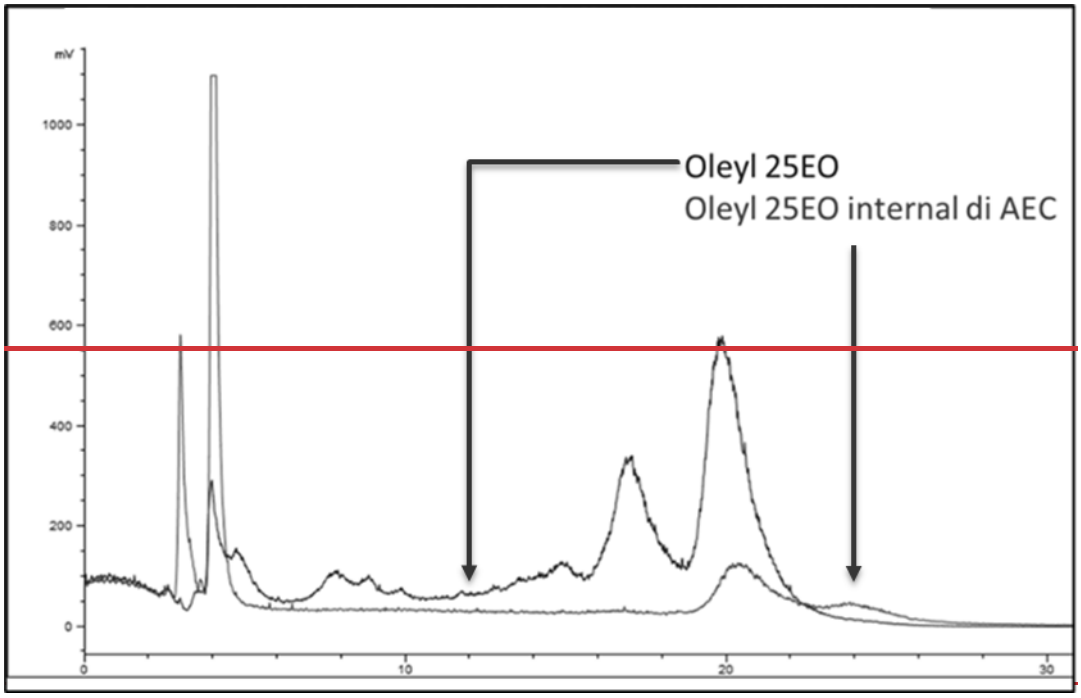
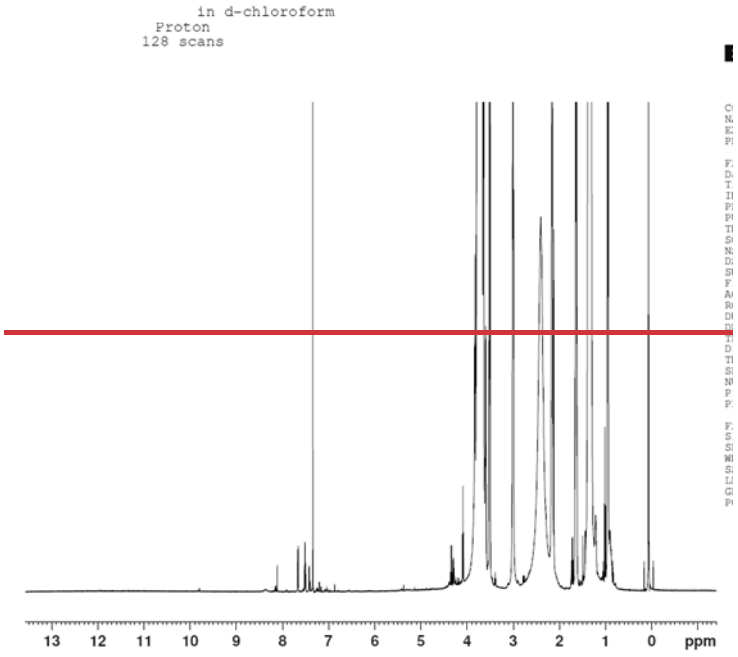


FIG. 9



~~FIGURE 10~~



~~FIGURE 11~~

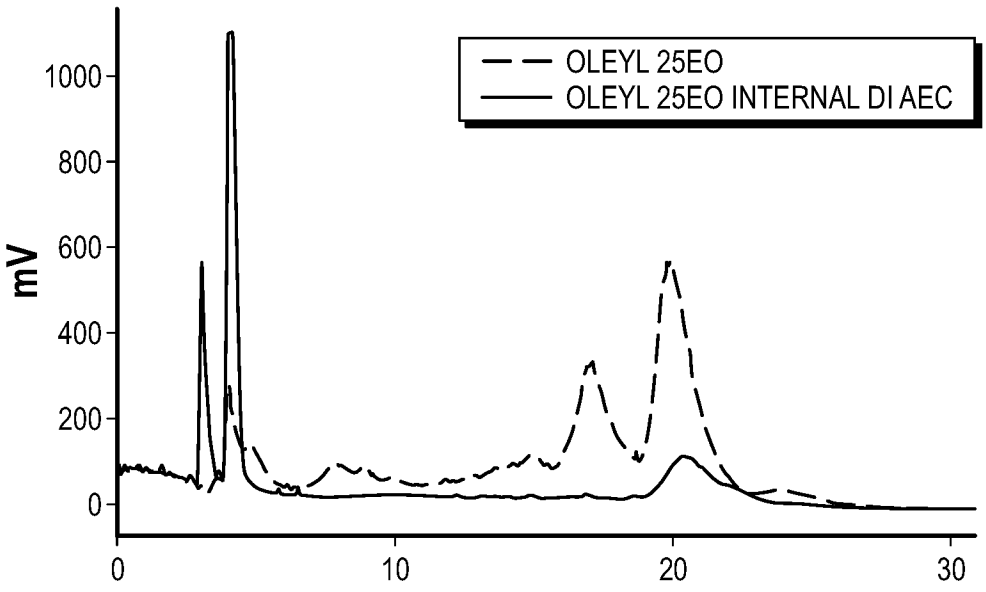

OLEYL 25EO
OLEYL 25EO INTERNAL DI AEC
mV
1000
800
600
400
200
0
0
10
20
30

FIG. 10

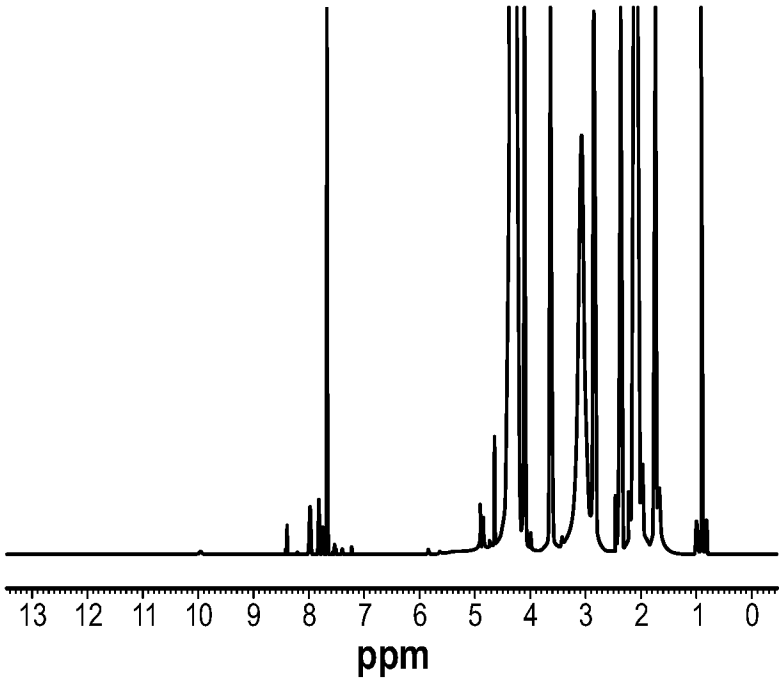

13 12 11 10 9 8 7 6 5 4 3 2 1 0
ppm

FIG. 11