APPENDIX

APPENDIX A ^{1}H and ^{13}C NMR Spectra, FT-IR spectra, and HPLC

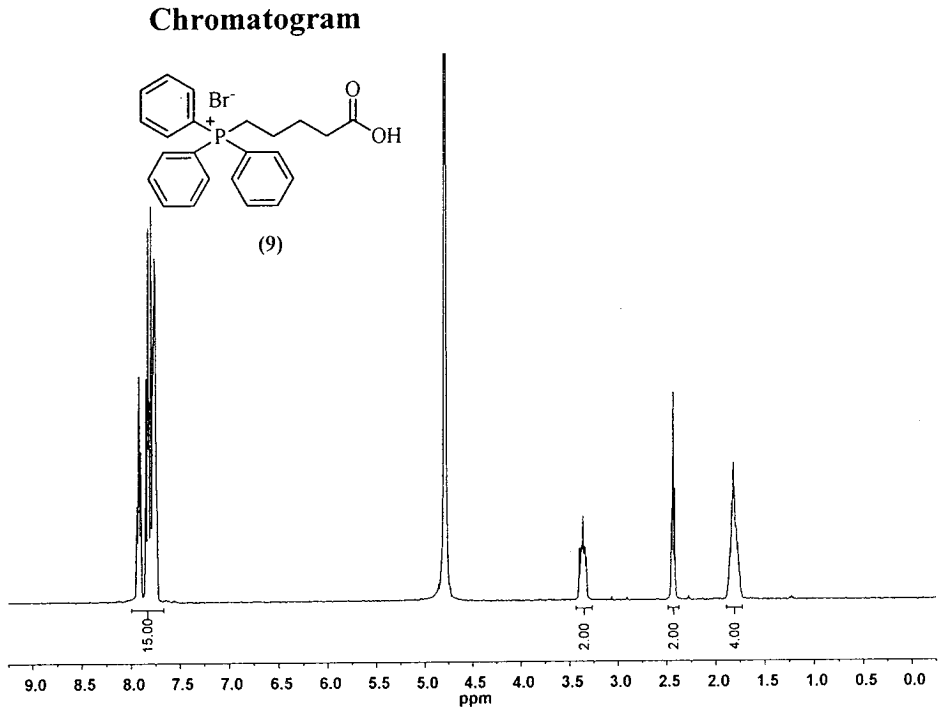


Figure 37 ^{1}H NMR Spectrum of (4-carboxybutyl)triphenylphosphonium bromide (9) (D_2O)

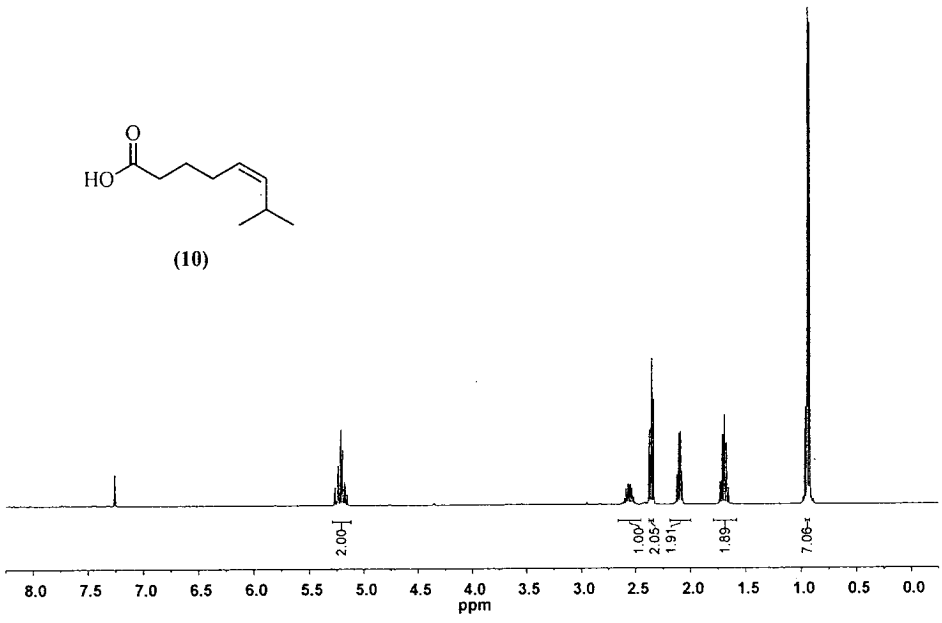


Figure 38 ^{1}H NMR Spectrum of *(Z)*-7-methyl-5-octenoic acid (10) ($CDCl_3$)

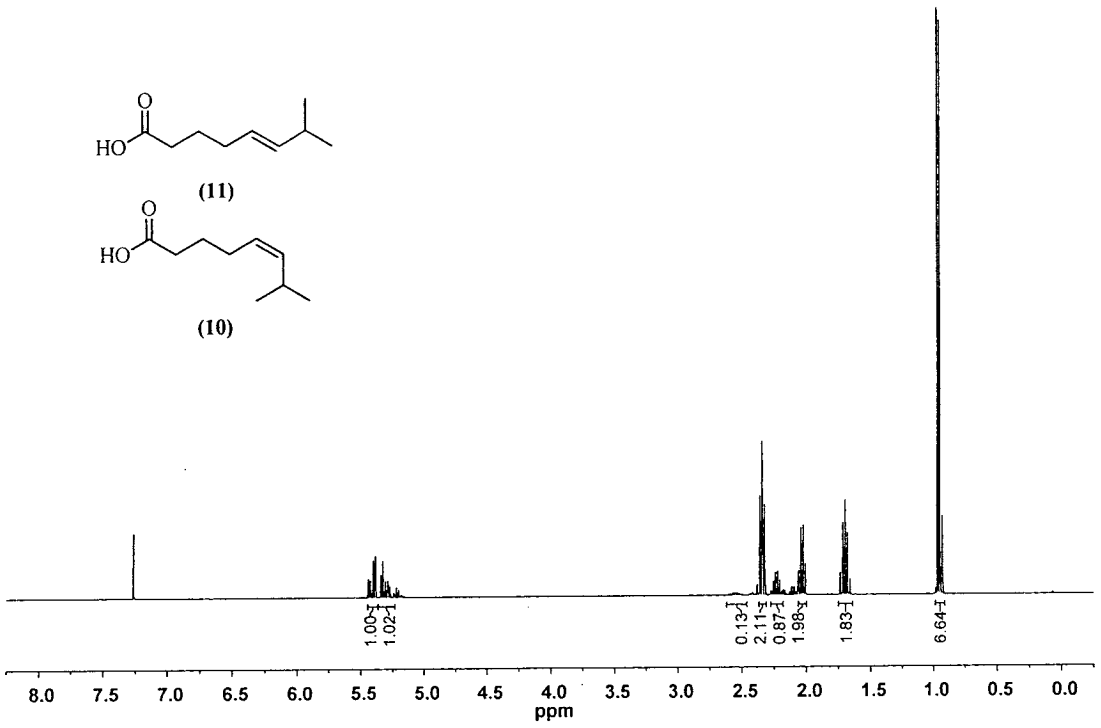


Figure 39 ^{1}H NMR Spectrum of *(E/Z)*-7-methyl-5-octenoic acid (11, 10) ($CDCl_3$)

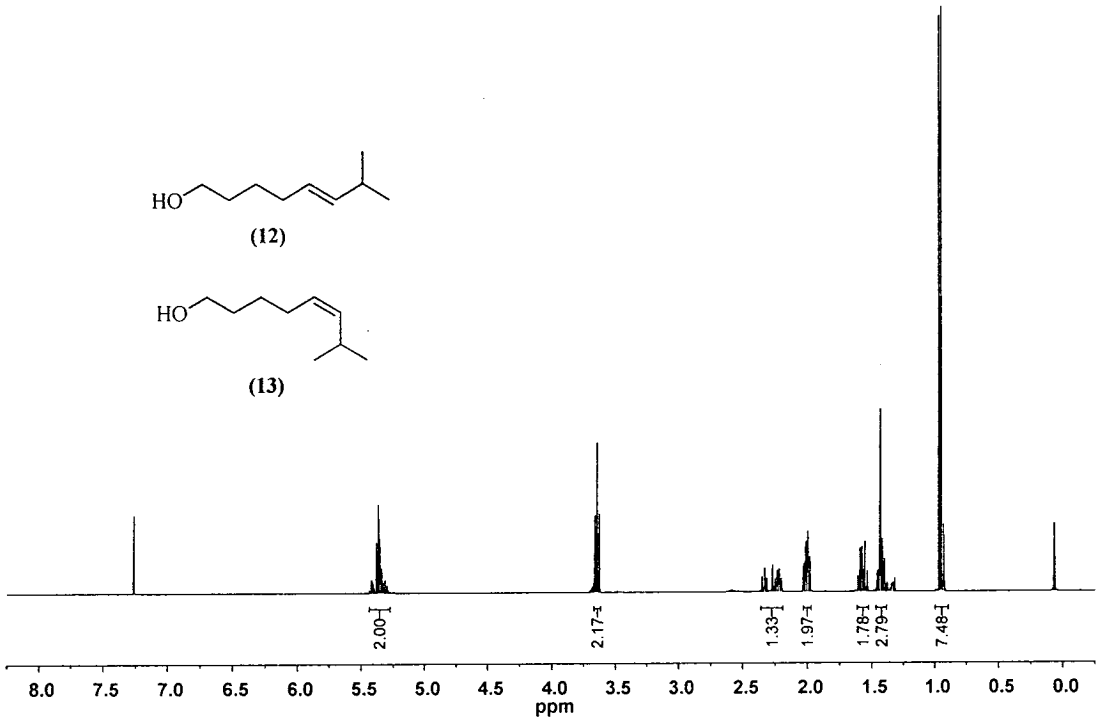


Figure 40 ^{1}H NMR Spectrum of *(E/Z)*-7-methyl-5-octenol (12, 13) ($CDCl_3$)

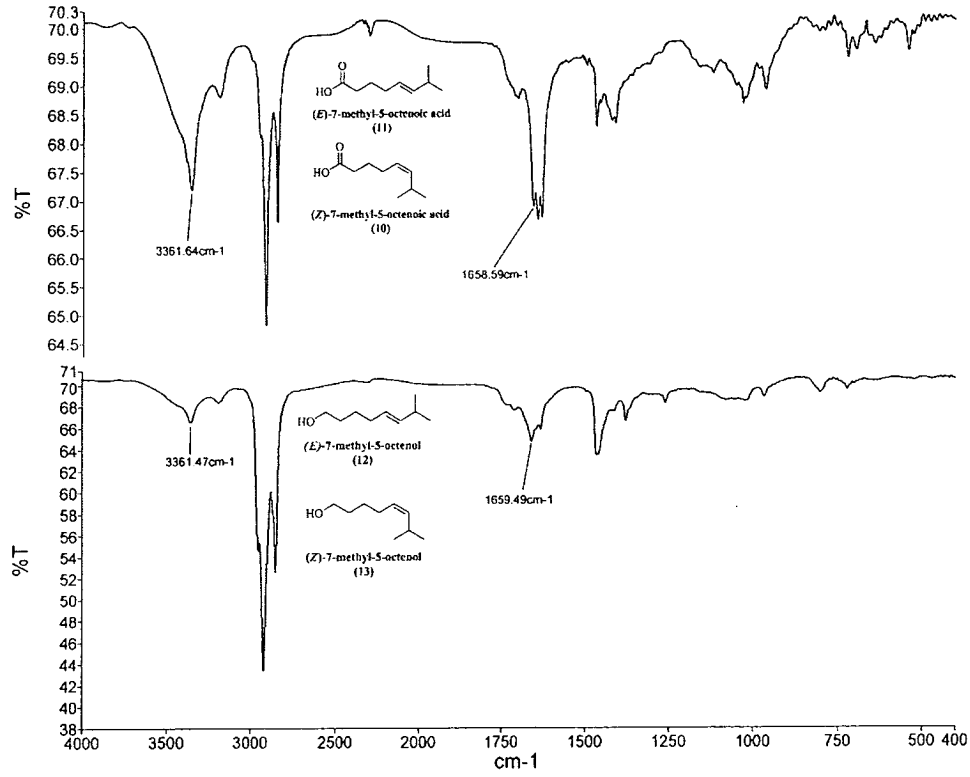


Figure 41 Overlay FT-IR spectrum of mixture *(E/Z)*-7-methyl-5-octenoic acid (11 and 10) and (*E/Z*)-7-Methyl-5-octenol (12 and 13)

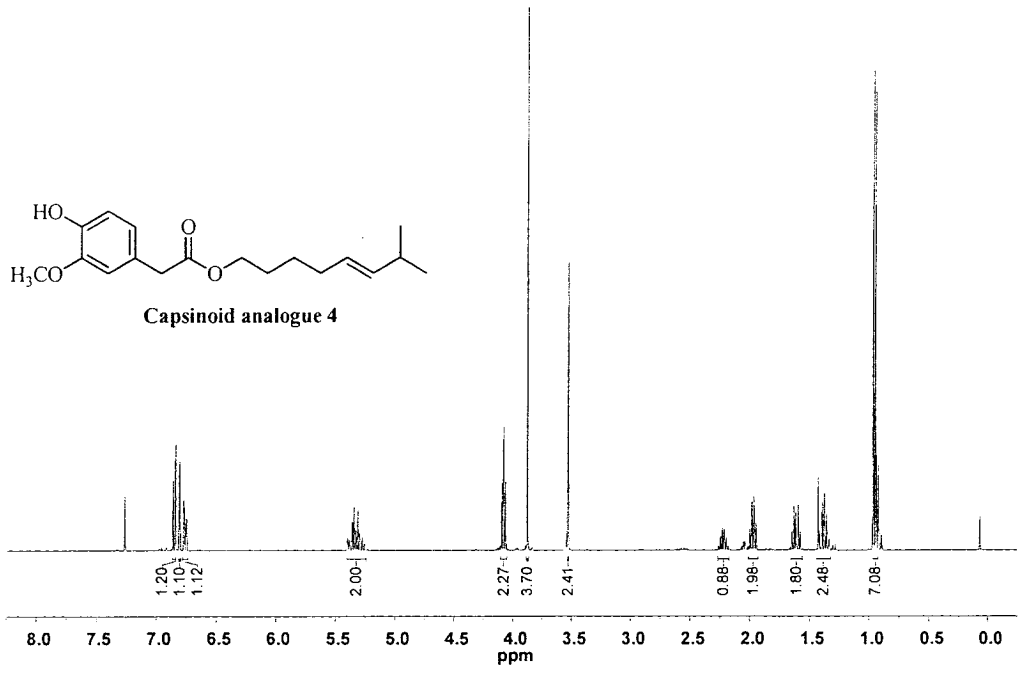


Figure 42 ^{1}H NMR Spectrum of capsinoid analogue 4, ($CDCl_3$)

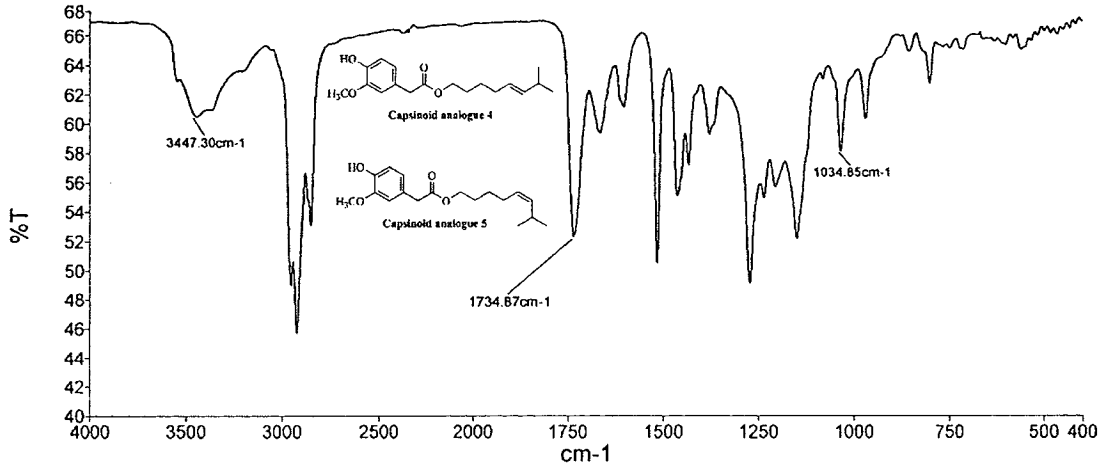


Figure 43 FT-IR spectrum of mixture capsinoid analogue 4 and 5

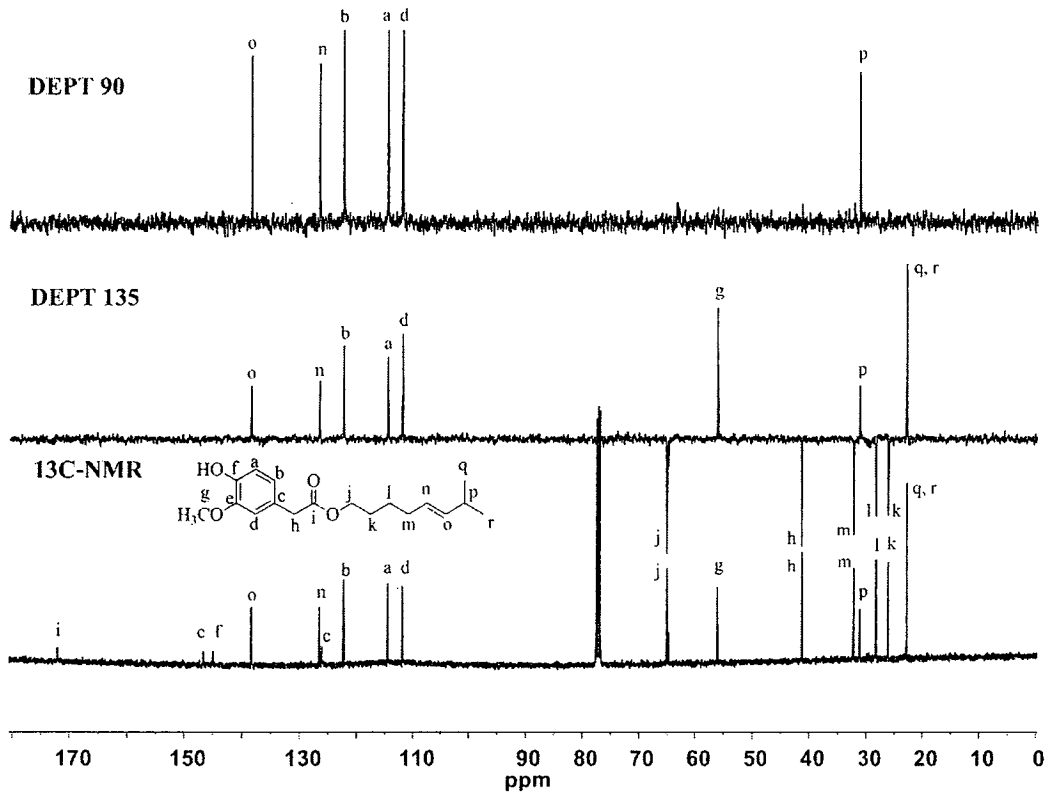


Figure 44 ^{13}C NMR Spectrum of capsinoid analogue 4, ($CDCl_3$)

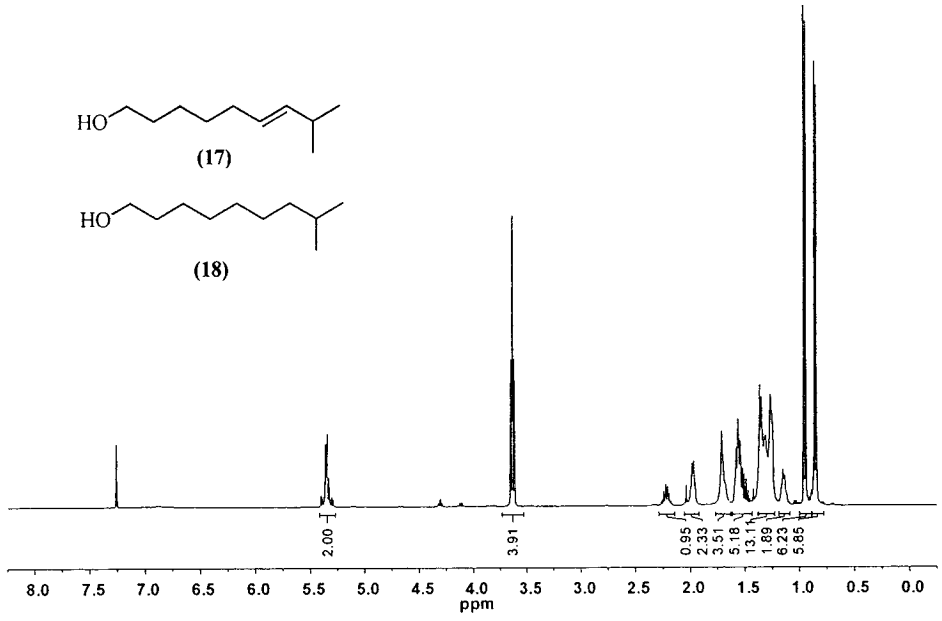


Figure 45 ^{1}H NMR Spectrum the mixture of *(E)*-8-methyl-6-nonenol (17) and 8-methylnonanol (18) ($CDCl_3$)

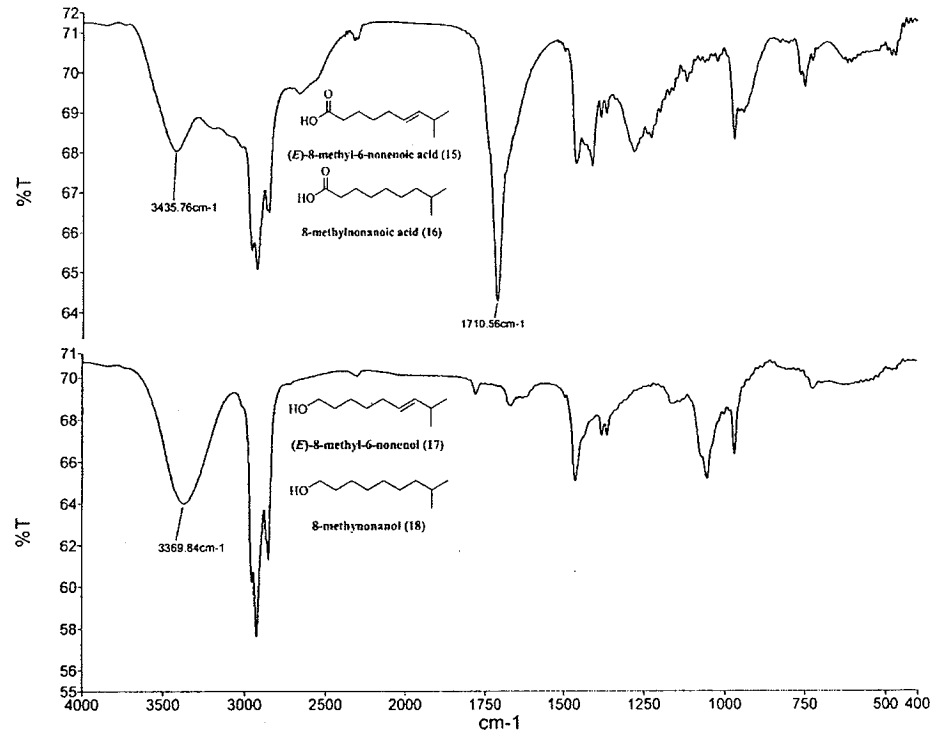


Figure 46 Overlay FT-IR spectrum of mixture (E)-8-methyl-6-nonenol (17) and 8-methylnonanol (18)

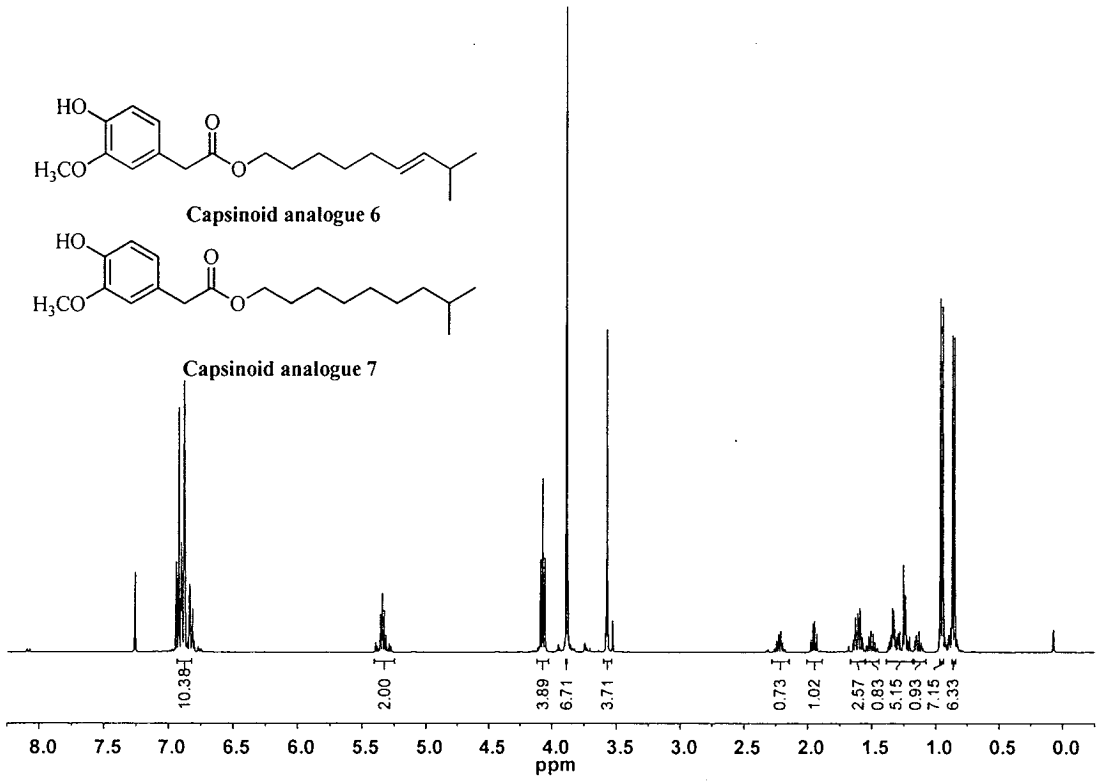


Figure 47 ^{1}H NMR Spectrum the mixture of capsinoid analogue 6 and 7 ($CDCl_3$)

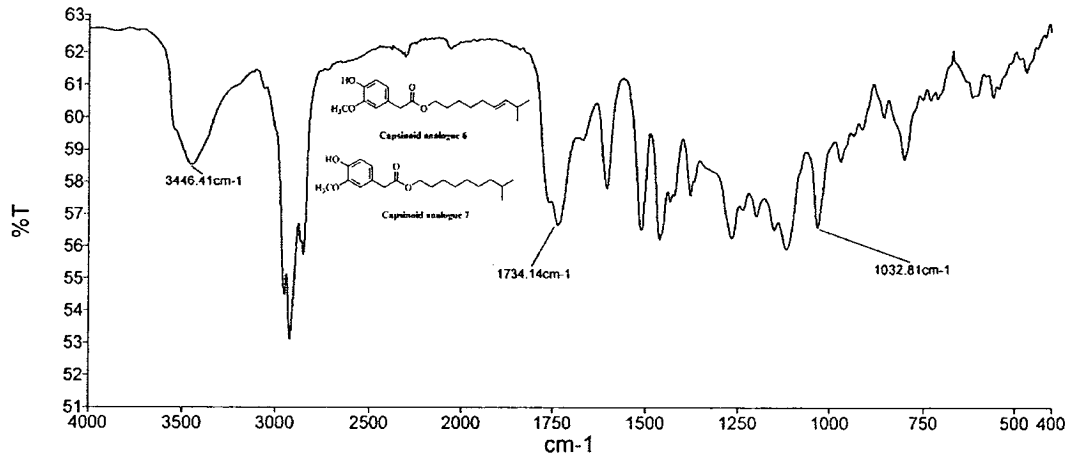


Figure 48 FT-IR spectrum of mixture capsinoid analogue 6 and 7

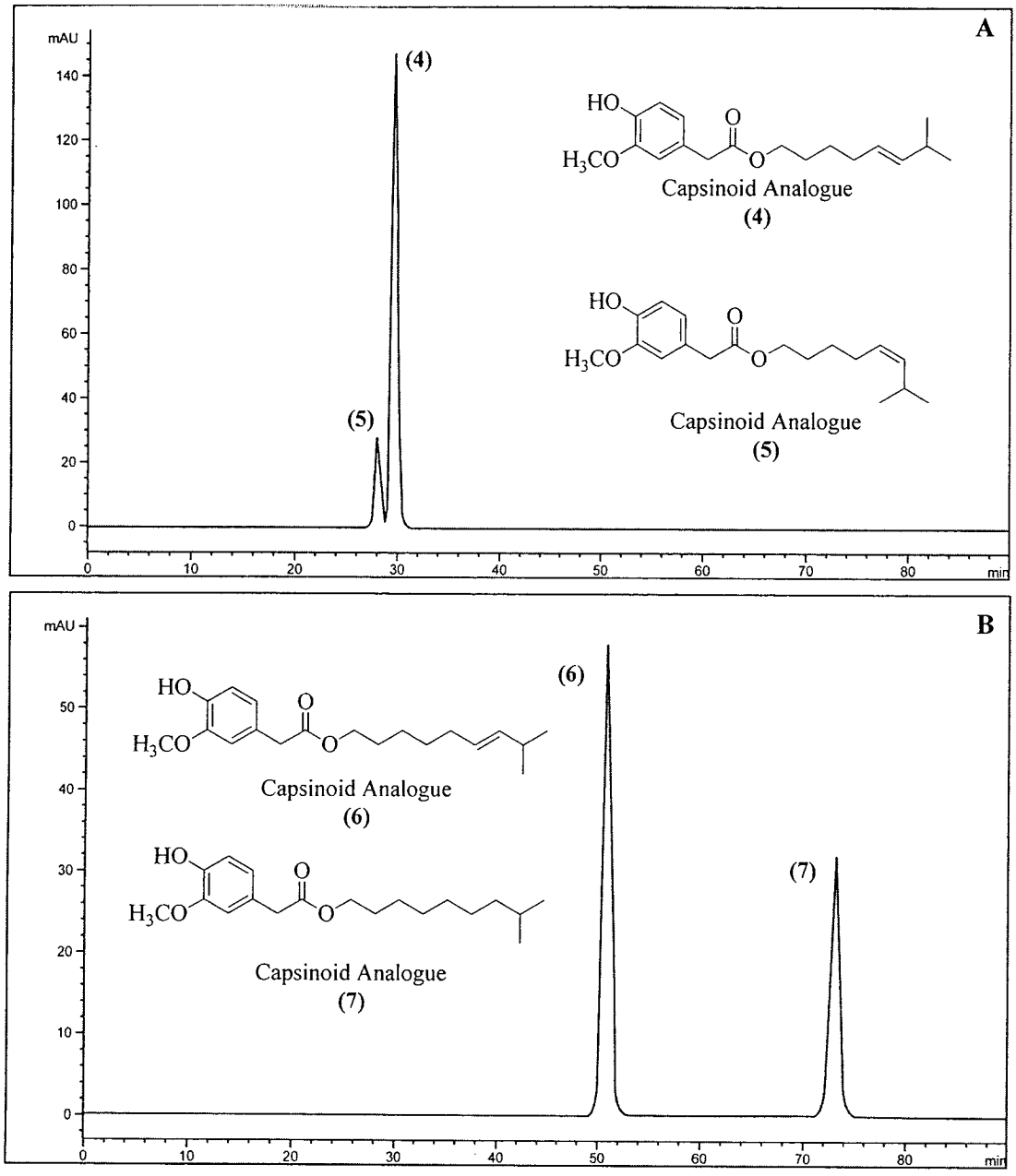
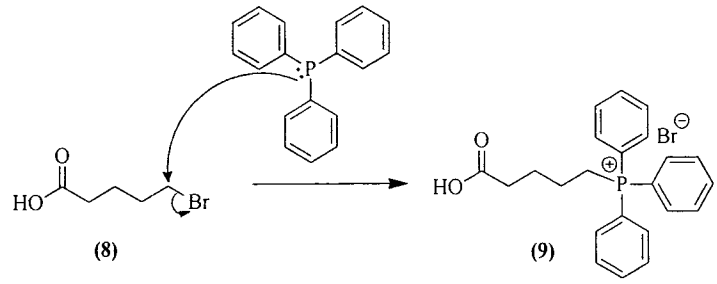
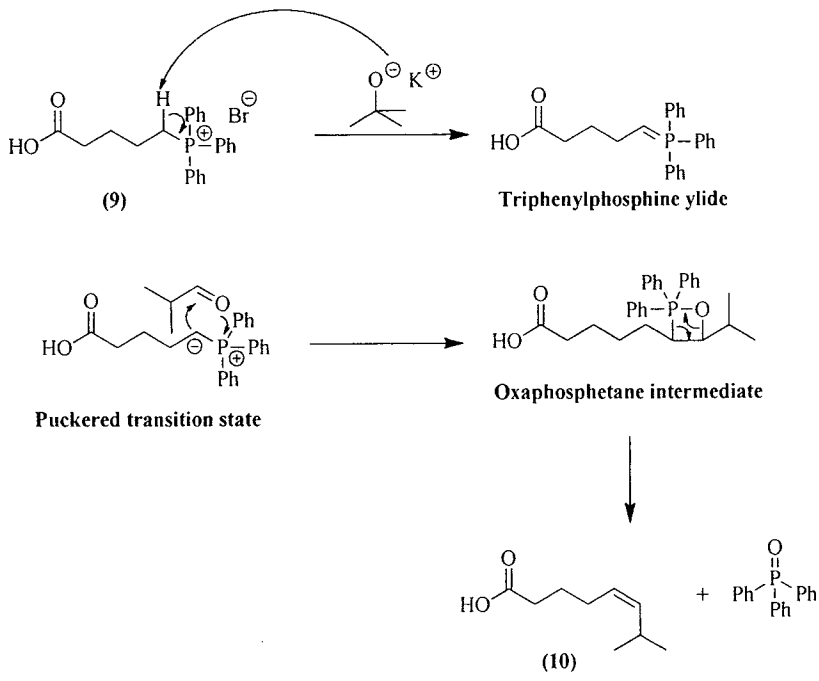


Figure 49 Chromatogram of Capsinoid analogues (4-7) at 0 hour, C18, 4.6 x 250 mm, 5 μm, mobile phase, CH_3OH:H_2O 80:20 v/v with 0.025 AcOH, flow rate 0.5 mL/min, detection UV 280 nm

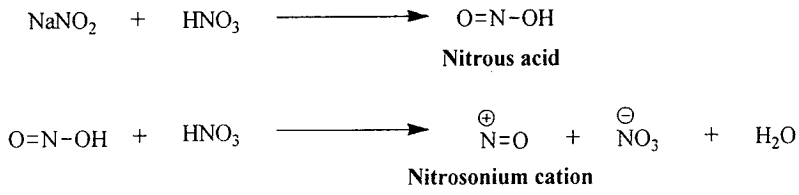
APPENDIX B Mechanism



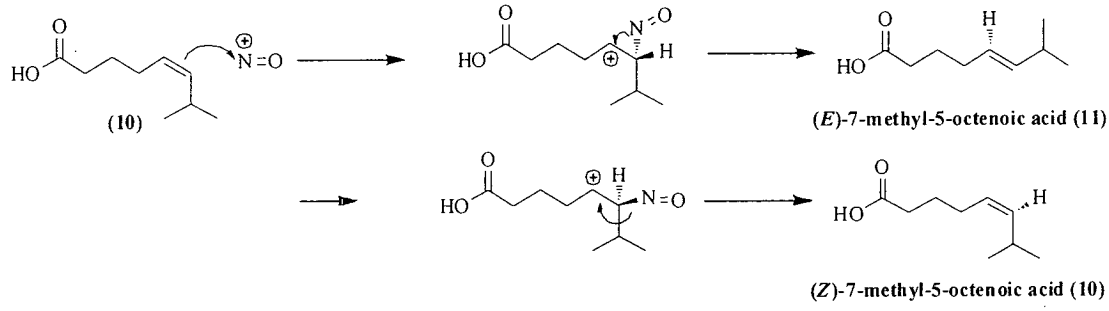
Scheme 21 S_N2 mechanism of 5-bromovaleric acid (8) *via* triphenylphosphine



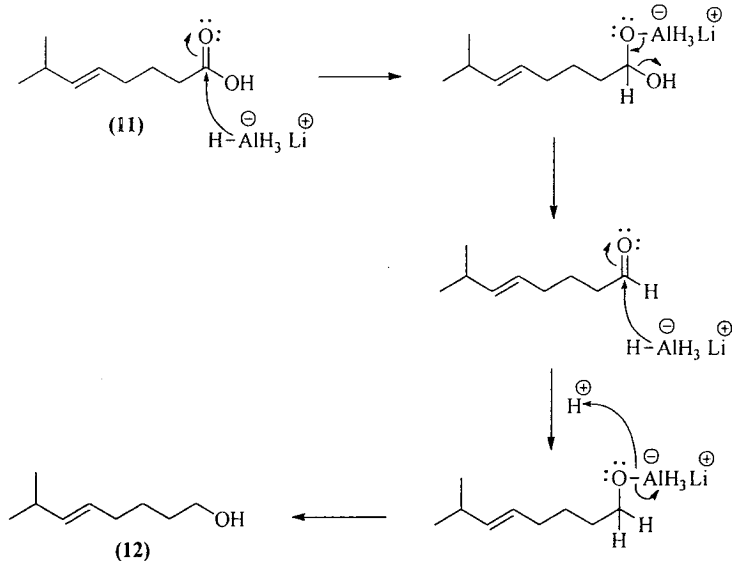
Scheme 22 Wittig reaction mechanism of phosphine ylide with isobutyraldehyde producing (*Z*)-7-methyl-5-octenoic acid (10)



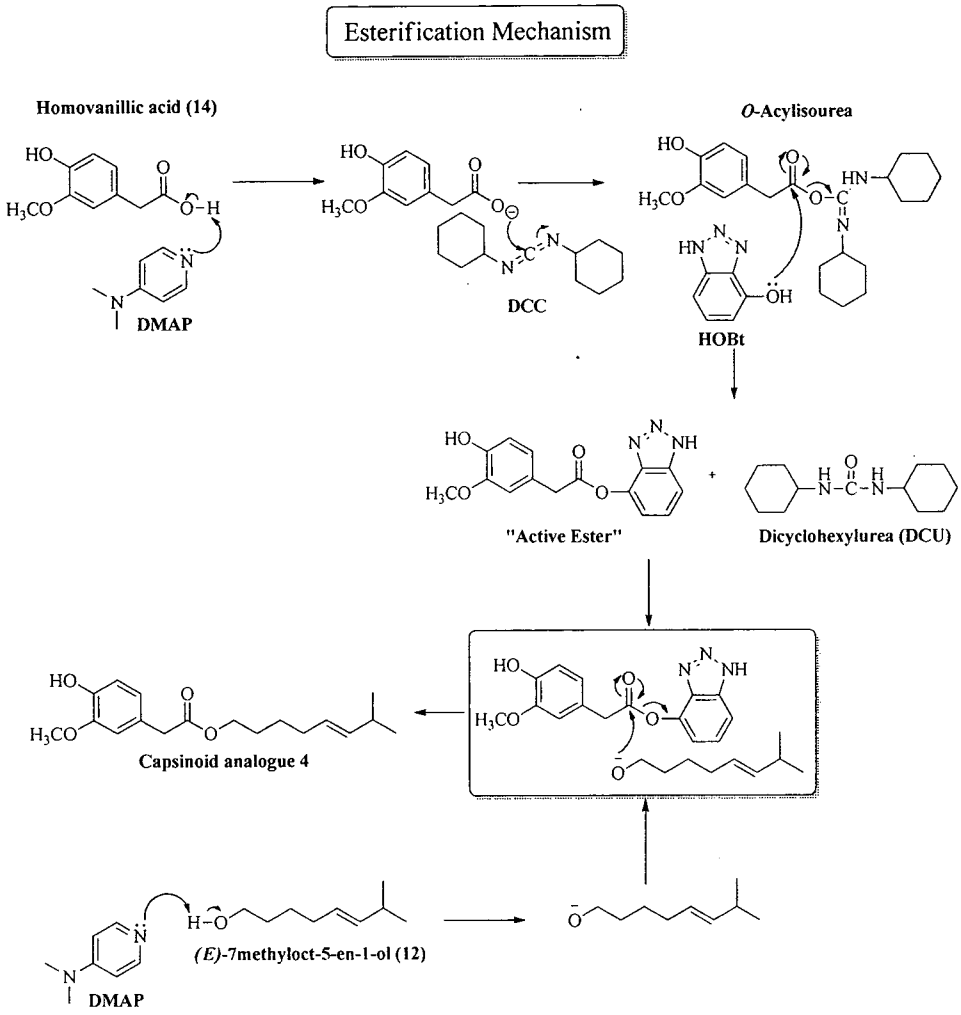
Scheme 23 Generation of nitrosonium cation from sodium nitrite and nitric acid



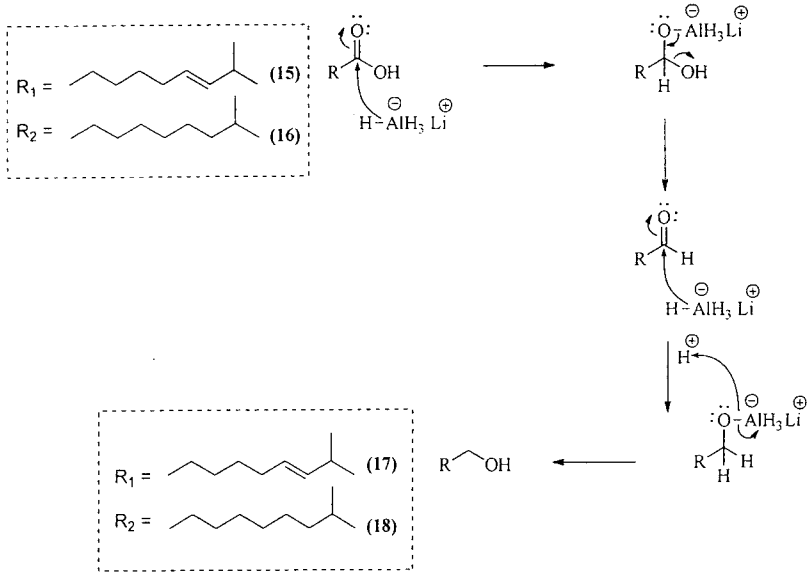
Scheme 24 Isomerization of *(Z)*-7-methyl-5-octenoic acid (10) to *(E)*-7-methyl-5-octenoic acid (11) *via* nitrosonium cation



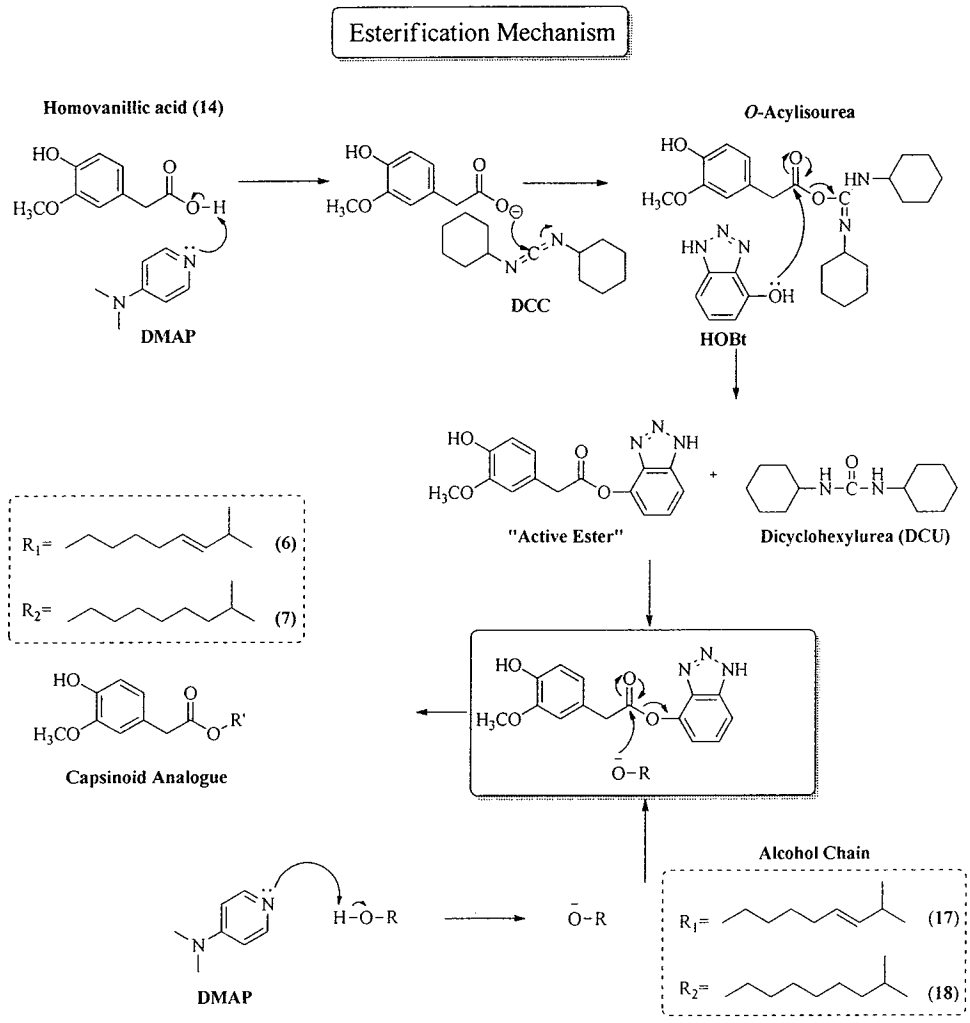
Scheme 25 Reduction mechanism of *(E)*-7-methyl-5-octenoic acid (11) to *(E)*-7-Methyl-5-octenol (12) *via* $LiAlH_4$ as a reducing agent



Scheme 26 Esterification reaction mechanism *via* DCC, DMAP and HOBt as a coupling agent



Scheme 27 Reduction mechanism of the mixture compounds (15, 16) to (*E*)-8 Methyl-6-nonenol (17) and 8-methylnonanol (18) *via* $LiAlH_4$ as a reducing agent



Scheme 28 Esterification reaction mechanism of 6, 7 *via* DCC, DMAP and HOBt as a coupling agent

APPENDIX C Calculation for percent remaining of *E/Z*-capsiate, capsinoid analogue 4, capsinoid analogue 5, capsinoid analogue 6 and capsinoid analogue 7

Table 6 Calculated percent remaining of capsinoid analogue 4

Sample	Percent remaining of capsinoid analogue 4 under period of time (%)				
	0 hour	**6 hour**	**12 hour**	**18 hour**	**24 hour**
n = 1	100.000	100.043	99.980	100.017	100.293
n = 2	100.000	99.999	100.046	100.255	100.169
n = 3	100.000	100.018	99.983	99.991	100.169
n = 4	100.000	100.032	100.020	100.040	100.345
average	100.000	100.023	100.007	100.076	100.211
SD	0.000	0.019	0.032	0.121	0.072

Table 7 Calculated percent remaining capsinoid analogue 5

Sample	Percent remaining of capsinoid analogue 5 under period of time (%)				
	0 hour	**6 hour**	**12 hour**	**18 hour**	**24 hour**
n = 1	100.000	99.939	99.943	99.951	100.090
n = 2	100.000	99.830	99.998	101.176	100.139
n = 3	100.000	99.934	100.053	100.040	100.247
n = 4	100.000	100.055	100.020	99.997	100.233
average	100.000	99.939	100.004	100.291	100.159
SD	0.000	0.092	0.046	0.591	0.081

Table 8 Calculated percent remaining capsinoid analogue 6

Sample	Percent remaining of capsinoid analogue 6 under period of time (%)				
	0 hour	**6 hour**	**12 hour**	**18 hour**	**24 hour**
n = 1	100.000	99.946	100.043	101.395	100.051
n = 2	100.000	100.122	100.159	101.016	100.082
n = 3	100.000	100.119	100.054	100.938	100.027
n = 4	100.000	99.876	100.047	100.884	100.025
average	100.000	100.016	100.076	101.116	100.046
SD	0.000	0.125	0.056	0.245	0.027

Table 9 Calculated percent remaining capsinoid analogue 7

Sample	Percent remaining of capsinoid analogue 7 under period of time (%)				
	0 hour	**6 hour**	**12 hour**	**18 hour**	**24 hour**
n = 1	100.000	99.941	100.009	100.064	99.996
n = 2	100.000	99.549	99.913	100.035	100.004
n = 3	100.000	99.019	99.937	100.040	99.982
n = 4	100.000	98.929	99.970	99.981	100.026
average	100.000	99.360	99.957	100.030	100.002
SD	0.000	0.474	0.042	0.035	0.018

Table 10 Calculated percent remaining *E*-capsiate

Sample	Percent remaining of *E*-capsiate under period of time (%)				
	0 hour	**6 hour**	**12 hour**	**18 hour**	**24 hour**
n = 1	100.000	94.707	91.632	88.230	86.513
n = 2	100.000	94.957	92.445	85.817	85.340
n = 3	100.000	90.453	89.481	88.149	85.665
n = 4	100.000	93.843	93.591	83.513	85.298
average	100.000	93.490	91.839	86.427	85.704
SD	0.000	2.080	2.121	2.242	0.563

Table 11 Calculated percent remaining *Z*-capsiate

Sample	Percent remaining of *Z*-capsiate under period of time (%)				
	0 hour	**6 hour**	**12 hour**	**18 hour**	**24 hour**
n = 1	100.000	77.063	69.598	66.231	59.969
n = 2	100.000	77.122	69.869	71.275	59.669
n = 3	100.000	72.749	69.061	65.815	59.669
n = 4	100.000	74.142	71.512	65.961	59.945
average	100.000	75.269	70.010	67.320	59.813
SD	0.000	2.181	1.056	2.642	0.167

APPENDIX D %Cell viability of Caco-2 cell *via* cytotoxicity MTT assay

Table 12 %Cell viability of Caco-2 cell *via* cytotoxicity MTT assay at 18 hours

Treatment Dose (μM)	%Cell viability of Caco-2 cell *via* cytotoxicity MTT assay					
	Capsaicin	Capsiate	Capsinoid analogue (4)	Capsinoid analogue (5)	Capsinoid analogue (6)	Capsinoid analogue (7)
0.10	83.77 ± 0.00	98.65 ± 0.01	99.74 ± 0.01	90.88 ± 0.01	99.53 ± 0.01	98.03 ± 0.02
1.00	82.90 ± 0.00	98.17 ± 0.04	93.37 ± 0.02	94.07 ± 0.08	99.41 ± 0.00	92.68 ± 0.01
10.00	71.57 ± 0.02	88.24 ± 0.03	95.36 ± 0.02	91.80 ± 0.01	94.07 ± 0.01	95.04 ± 0.00
100.00	54.96 ± 0.01	84.25 ± 0.00	93.04 ± 0.02	91.37 ± 0.03	94.82 ± 0.01	100.22 ± 0.02
200.00	49.68 ± 0.00	76.43 ± 0.02	82.74 ± 0.03	83.71 ± 0.03	90.51 ± 0.04	96.76 ± 0.01

n = 3, 1%PEG+DMEM us as control, capsaicin negative control, capsiate positive control

Table 13 %Cell viability of Caco-2 cell *via* cytotoxicity MTT assay at 24 hours

Treatment Dose (μM)	%Cell viability of Caco-2 cell *via* cytotoxicity MTT assay					
	Capsaicin	Capsiate	Capsinoid analogue (4)	Capsinoid analogue (5)	Capsinoid analogue (6)	Capsinoid analogue (7)
0.10	88.95 ± 0.00	91.01 ± 0.00	97.76 ± 0.01	90.09 ± 0.01	98.37 ± 0.01	96.09 ± 0.02
1.00	72.97 ± 0.01	89.36 ± 0.00	88.87 ± 0.00	85.07 ± 0.01	83.94 ± 0.02	81.13 ± 0.02
10.00	69.37 ± 0.00	85.06 ± 0.02	85.66 ± 0.00	84.13 ± 0.00	77.01 ± 0.00	80.01 ± 0.01
100.00	51.12 ± 0.00	79.78 ± 0.00	82.57 ± 0.03	80.13 ± 0.00	74.54 ± 0.01	78.20 ± 0.01
200.00	46.85 ± 0.01	76.37 ± 0.00	80.89 ± 0.02	73.32 ± 0.01	71.37 ± 0.00	75.13 ± 0.00

n = 3, 1%PEG+DMEM us as control, capsaicin negative control, capsiate positive control