Supplementary Material

Methodologies used for Synthesis/Chemical Characterization

Materials and Methods

Chemical reagents used were commercially available. All reactions were conducted with magnetic stirring under the atmosphere of argon in oven dried flasks. Reactions were monitored by TLC until deemed complete using silica-gel-coated glass plates (Merck Kiselgel 60 F254). Plates were visualized under UV light (254 nm). Plates were dyed with 10% phosphomolybdic acid (PMA) in ethanol.

HPLC analysis

Agilent 1100 HPLC system equipped with a quaternary pump, an Agilent diode array detector 1200 Series and normal phase silica gel column (Phenomenex® Sphereclone, 250 × 10 mm, 5 µm) with gradient system *n*-hexane to ethyl acetate in 20 min at 2 mL/min.

Characterization

^{1}H, ^{13}C NMR spectra were recorded at 500 (^{1}H), 125 MHz (^{13}C) on Agilent Inova 500, and Jeol Eclipse 400 MHz 400 (^{1}H), 100 MHz (^{13}C) spectrometers. Chemical shifts (δ) are reported in parts per million (ppm) from the residual solvent peak and coupling constant (*J*) in Hz. Proton multiplicity is reported in: singlet (s), doublet (d), triplet (t), quartet (quart.), quintet (quint.), septet (sept), multiplet (m), broad (br). Infrared measurements were carried out on a Brucker Platinum ATR Alpha instrument. The HRMS analyses were carried out on a Bruker Daltonics microTOF-QIII spectrometer.

General procedure 1 (GP1) for the synthesis of Alkyl succinate monoesters (S1-S3)

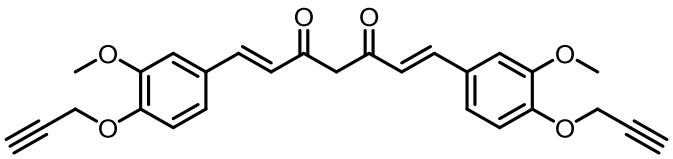
An oven dried round bottom flask was charged with alcohol (854 mg, 14.7 mmol), solvent (dichloromethane) (5 mL), and *N,N*-diisopropylethylamine (1.3 mL, 7.35 mmol, 0.5 equiv.) at room temperature (RT). After 2 h, succinic anhydride (735 mg, 7.35 mmol, 0.5 equiv.), and 4-dimethylaminopyridine (448 mg, 3.67 mmol, 0.25 equiv.) were added, and the reaction stirred at RT. After 48 h, the reaction mixture was diluted with brine/1M HCl (3:1, 10 mL). The aqueous layer was extracted with dichloromethane (3 × 10 mL), and the combined organic phases dried over anhydrous sodium sulfate (Na_2SO_4) and concentrated under reduced pressure. The crude product was washed with *n*-hexanes (3 × 20 mL) to give the desired product.

General procedure 2 (GP2) for the synthesis of dialkylcurcumin and monoalkylcurcumin derivatives (5-10)

An oven dried round bottom flask, equipped with magnetic stirrer and 3 Å molecular sieves, was flushed with argon and charged with succinate (207 mg, 1.3 mmol, 10 equiv.), pyridine (3 mL), 4-dimethylaminopyridine (366 mg, 0.39 mmol, 3 equiv.), and 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide hydrochloride (75 mg, 0.39 mmol, 3 equiv.). The reaction was stirred for 4 h at RT. Concurrently a solution of curcumin (**1**) (50 mg, 0.13 mmol) in pyridine (3 mL) was stirred for 4 h at RT. Then the curcumin solution was added to 4-oxobutanoic acid reaction, and allowed to stir for 48 h at RT. The reaction mixture was then diluted with a 0.5 M aqueous solution of Na_2CO_3/brine (1:1, 10 mL), and the aqueous layer was extracted with ethyl acetate (EtOAc) (3 × 10 mL). The combined organic phases were dried over Na_2SO_4, concentrated under reduced pressure, and purified by HPLC using normal

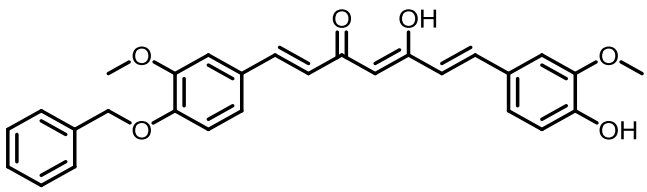
phase silica gel column (Phenomenex® Sphereclone, 250 × 10 mm, 5 µm) with the gradient system of *n*-hexane to ethyl acetate in 20 min at 2 mL/min to give the desired product.

(1*E*,6*E*)-1,7-Bis(3-methoxy-4-(prop-2-yn-1-yloxy)phenyl)hepta-1,6-diene-3,5-dione[i] (2)



Curcumin (200 mg, 0.54 mmol), *N,N*-dimethylformamide (6 mL), K_2CO_3 (150 mg, 1.08 mmol, 2 equiv.), and propargyl bromide (300 µL, 2.7 mmol, 5 equiv.) were stirred for 48 h at RT. The reaction mixture was diluted with water (10 mL), and extracted with EtOAc (3 × 10 mL). The combined organic phases were dried over Na_2SO_4, and concentrated under reduced pressure. The crude product was washed with hexane (3 × 20 mL) to yield diether **2** (168 mg, 70 %). – ^{1}H NMR (400 MHz): 3.17 (2 H, d, *J* = 2 Hz), 3.94 (6 H, s), 4.79–4.81 (6 H, m), 6.67 (2 H, d, *J* = 16 Hz), 6.99–7.03 (4 H, m), 7.15 (2 H, dd, *J* = 2, 8 Hz), 7.73 (2 H, d, *J* = 16 Hz) ppm. – ^{13}C NMR (100 MHz): 56.0, 56.1, 56.6, 72.1, 76.3, 110.9, 113.7, 118.6, 123.5, 128.1, 145.6, 149.5, 149.8, 193.5 ppm. – HRMS (m/z) calcd for $C_{27}H_{24}NaO_6$: 467.1465; found: 467.1474 [M+Na^+].

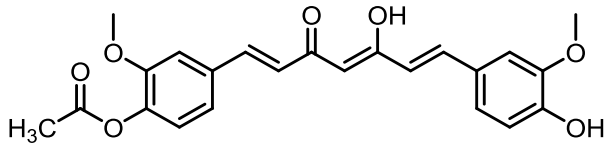
(1*E*, 4*Z*, 6*E*)-1-(4-(Benzyloxy)-3-methoxyphenyl)-5-hydroxy-7-(4-hydroxy-3-methoxyphenyl)hepta-1,4,6-trien-3-one (3)



Curcumin (]]00 mg, 0.27 mmol), acetone (5 mL), Cs_2CO_3 (88 mg, 0.27 mmol, 1 equiv.), and benzyl bromide (1 mL, 8.1 mmol, 30 equiv.) were 56 °C for 24 h. The reaction mixture was diluted with water (20 mL), and extracted with EtOAc (3 × 10 mL). The combined organic phases were dried over Na_2SO_4, and concentrated under reduced pressure. The

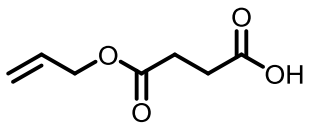
crude product was purified by column chromatography [hexane/EtOAc, silica gel] to give curcumin ether **3** (98 mg, 80 %). – ^{1}H NMR (400 MHz): 3.94 (6 H, s), 5.20 (2 H, s), 5.81 (1 H, s), 6.48 (2 H, d, *J* = 16 Hz), 6.87-6.94 (2 H, m), 7.05–7.09 (4 H, m), 7.31–7.44 (5 H, m), 7.58 (2 H, d, *J* = 16 Hz) ppm. – ^{13}C NMR (100 MHz): 55.9, 56.0, 70.9, 101.2, 109.7, 110.4, 113.5, 114.8, 115.9, 121.8, 122.1, 122.3, 122.9, 127.2, 127.7, 128.0, 128.6, 130.0, 136.6, 140.3, 140.6, 146.8, 147.9, 149.8, 150.2, 183.0, 183.4 ppm. – IR: 1136, 1270, 1430, 1464, 1512, 1585, 1625, 2850, 2917, 2955, 3370 cm^{-1}. – HRMS (m/z) calcd for $C_{28}H_{26}NaO_6$: 481.1622; found: 481.1619 [M+Na^{+}].

4-((1*E*,4Z,6*E*)-5-Hydroxy-7-(4-hydroxy-3-methoxyphenyl)-3-oxohepta-1,4,6-trien-1-yl)-2-methoxyphenyl acetate[ii] **(4)**



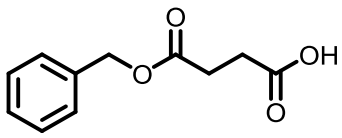
Curcumin (100 mg, 0.27 mmol) and K_2CO_3 (38 mg, 0.27 mmol, 1 equiv.) in CH_2Cl_2 (10 mL) were stirred at RT. After 8 h, a solution of acetyl chloride (96 µL, 1.35 mmol, 5 equiv.) in CH_2Cl_2 (5 mL) was sonicated for 5 min and added to the curcumin solution. The reaction was stirred for 24 h at RT. Column chromatography [hexane/EtOAc, silica gel] afforded acetate **4** (79 mg) in 71 % yield. – ^{1}H NMR (400 MHz): 2.32 (3 H, s), 3.88 (3 H, s), 3.94 (3 H, s), 5.81–5.85 (2 H, m), 6.52–6.58 (2 H, m), 7.05–7.17 (6 H, m), 7.58–7.63 (2 H, m), 15.8 (1 H, br s) ppm. – ^{13}C NMR (100 MHz): 20.6, 55.9, 56.0, 101.5, 109.7, 111.5, 114.8, 121.0, 121.8, 123.0, 123.3, 124.3, 127.6, 134.1, 139.4, 141.1, 146.8, 148.0, 151.4, 168.8, 181.8, 184.4 ppm. – HRMS (m/z) calcd for $C_{23}H_{22}NaO_7$: 433.1258; found: 433.1263 [M+Na^{+}].

4-(Allyloxy)-4-oxobutanoic acid[iii] **(S1)**



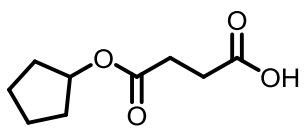
According to GP1, allyl alcohol (854 mg, 14.7 mmol), and *N,N*-diisopropylethylamine (640 µL, 3.67 mmol, 0.25 equiv.) were stirred in CH_2Cl_2 (5 mL) at RT. After 2 h, succinic anhydride (735 mg, 7.35 mmol, 0.5 equiv.) and 4-dimethylaminopyridine (448 mg, 3.67 mmol, 0.25 equiv.) were added, and the reaction mixture stirred for 48 h at RT to yield monoester **S1** (790 mg) in 40% yield. – ^{1}H NMR (500 MHz): 2.56 (2 H, m), 2.65 (2 H, m), 4.61 (2 H, d, *J* = 6 Hz), 5.29 (1 H, dd, *J* = 1, 10 Hz), 5.35 (1 H, dd, *J* = 2, 17 Hz) 5.86 (1 H, m), 9.70 (1 H, br s) ppm. – ^{13}C NMR (125 MHz): 28.9, 29.1, 65.5, 118.4, 134.1, 171.6, 178.2 ppm.

4-(Benzyloxy)-4-oxobutanoic acid[iv] **(S2)**



According to GP1, benzyl alcohol (3 g, 27.7 mmol, 2.88 mL), pyridine (20 mL), 4-dimethylaminopyridine (508mg, 4.15 mmol, 0.15 equiv.), and succinic anhydride (1.3 g, 13.8 mmol, 0.5 equiv.) were combined and the reaction stirred for 6 h at 100 °C to yield monoester **S2** (3.74 g) in 65% yiled. – ^{1}H NMR (500 MHz): 2.70 (4 H, m), 5.15 (2 H, s), 7.36 (5 H, br s), 9.42 (1 H, br s) ppm. – ^{13}C NMR (125 MHz): 28.9, 29.1, 66.7, 128.2, 128.3, 128.6, 135.7, 172.0, 178.3 ppm.

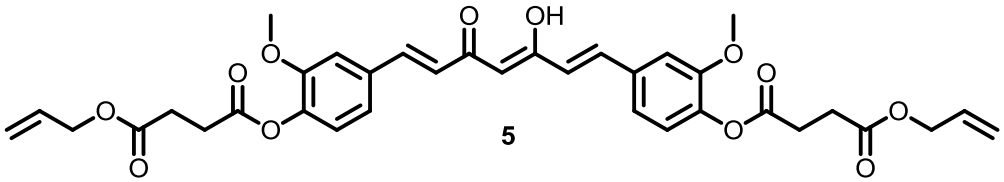
4-(Cyclopentyloxy)-4-oxobutanoic acid[v] **(S3)**



According to GP1, cyclopentanol (949 mg, 11 mmol, 1 mL) and *N,N*-diisopropylethylamine (958 µL, 5.5 mmol, 0.5 equiv.) were stirred in CH_2Cl_2 (5 mL) at RT. After 2 h, succinic anhydride (550 mg, 5.5 mmol, 0.5 equiv.) and 4-dimethylaminopyridine (672 mg, 5.5 mmol, 0.5 equiv.) were added and the reaction mixture was stirred for 48 h at RT to yield monoester **S3** (1 g) in 50% yield. – ^{1}H NMR (500 MHz): 1.54–1.71 (8 H, m),

2.55 (2 H, m), 2.63 (2 H, m), 5.12 (1 H, s), 9.70 (1 H, br s) ppm. – ^{13}C NMR (125 MHz): 23.5, 28.9, 29.1, 32.4, 77.5, 171.9, 177.8 ppm.

Diallyl *O,O'*-(((1*E*,3*Z*,6*E*)-3-hydroxy-5-oxohepta-1,3,6-triene-1,7-diyl)bis(2-methoxy-4,1-phenylene)) disuccinate (5), and allyl (4-((1*E*,4*Z*,6*E*)-5-hydroxy-7-(4-hydroxy-3-methoxyphenyl)-3-oxohepta-1,4,6-trien-1-yl)-2-methoxyphenyl) succinate (6)



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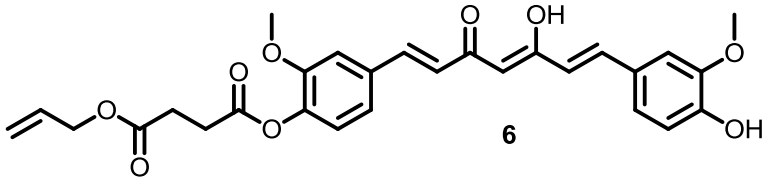
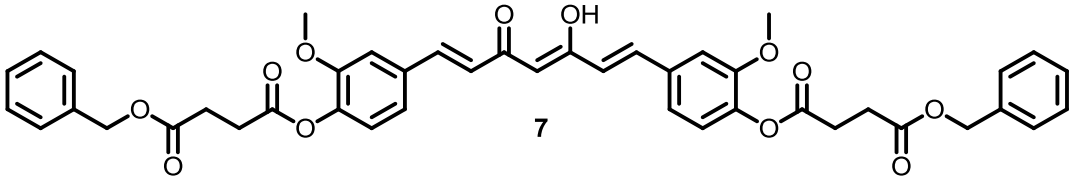


6

According to GP2, monosuccinate **S1** (207 mg, 0.67 mmol, 10 equiv), pyridine (3 mL), 4-dimethylaminopyridine (366 mg, 0.39 mmol, 3 equiv.), and 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride (75 mg, 0.39 mmol, 3 equiv.) were combined and stirred at RT. Concurrently, a solution of curcumin (50 mg, 0.13 mmol) in pyridine (3 mL) was prepared at RT. After 4 h, the reactions were combined and allowed to stir for 48 h at RT. The crude product was purified by HPLC to obtain diester **5** (19 mg, 22%) and monoester **6** (27 mg, 39%). **Compound 5:** ^{1}H NMR (400 MHz): 2.80 (4 H, t, *J* = 14 Hz), 2.95 (4 H, t, *J* = 13 Hz), 3.87 (6 H, s), 4.63 (4 H, d, *J* = 5 Hz), 5.25 (2H, dd, *J* = 1, 10 Hz), 5.34 (2 H, dd, *J* = 2, 17 Hz), 5.85 (1 H, s), 5.87-5.97 (2 H, m), 6.56 (2 H, d, *J* = 16 Hz), 7.06-7.17 (6 H, m), 7.61 (2 H, d, *J* = 16 Hz), 15.8 (1 H, br s) ppm. – ^{13}C NMR (100 MHz): 28.9, 29.1, 55.9, 65.5, 101.8, 111.5, 118.4, 121.0, 123.3, 124.3, 132.0, 134.0, 140.0, 141.2, 151.4, 170.2, 171.6, 183.1 ppm. – IR: 1031, 1132, 1202, 1259, 1509, 1599, 1736, 1762, 2851, 2922 cm^{-1}. HRMS (m/z) calcd for $C_{35}H_{36}NaO_{12}$:

671.2099; found: 671.2068 [M+Na$^+$]. **Compound 6:** ^{1}H NMR (400 MHz): 2.79 (2 H, t, *J* = 14 Hz), 2.95 (2 H, t, *J* = 14 Hz), 3.86 (3 H, s), 3.94 (3 H, s), 4.63 (2 H, d, *J* = 6 Hz), 5.24 (1 H, dd, *J* = 1, 10 Hz), 5.33 (1 H, dd, *J* = 2, 17 Hz), 5.83 (1 H, s), 5.87-5.97 (2 H, m), 6.51 (2 H, dd, *J* = 16, 22 Hz), 6.93 (1 H, d, *J* = 8 Hz), 7.05-7.16 (5 H, m), 7.60 (2 H, dd, *J* = 5, 16 Hz), 15.9 (1 H, br s) ppm. – ^{13}C NMR (100 MHz): 28.9, 29.1, 55.9, 56.0, 65.5, 101.5, 109.7, 111.5, 114.9, 118.4, 120.9, 121.8, 123.0, 123.2, 124.3, 127.6, 131.9, 134.1, 139.4, 141.1, 146.8, 148.0, 151.3, 170.3, 171.7, 181.8, 184.6 ppm. – IR: 1131, 1203, 1269, 1510, 1588, 1627, 1736, 2850, 2918, 2956, 3401 cm^{-1}. HRMS (m/z) calcd for $C_{28}H_{28}NaO_9$: 531.1626; found: 531.1606 [M+Na$^+$].

Dibenzyl *O,O'*-(((1*E*,3*Z*,6*E*)-3-hydroxy-5-oxohepta-1,3,6-triene-1,7-diyl)bis(2-methoxy-4,1-phenylene)) disuccinate (7), and benzyl (4-((1*E*,4*Z*,6*E*)-5-hydroxy-7-(4-hydroxy-3-methoxyphenyl)-3-oxohepta-1,4,6-trien-1-yl)-2-methoxyphenyl) succinate (8)



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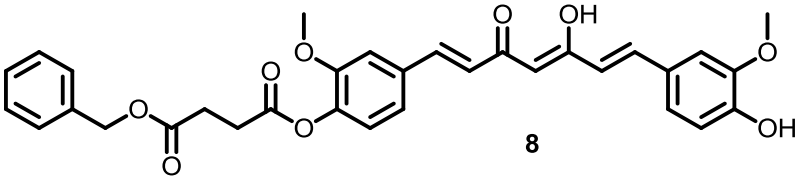


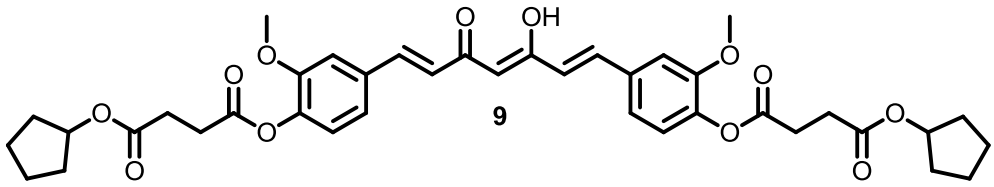
8

According to GP2, monosuccinate **S2** (64 mg, 1.3 mmol, 10 equiv.), pyridine (3 mL), 4-dimethylaminopyridine (366 mg, 0.39 mmol, 3 equiv.), and 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride (75 mg, 0.39 mmol, 3 equiv.) were stirred at RT. Concurrently, a solution of curcumin (50 mg, 0.13 mmol) in pyridine (3 mL) was stirred at RT. After 4 h, were combined, and allowed to stir for 48 h at RT. The crude product was purified by HPLC-DAD to obtain diester **7** (21 mg, 21%) and monoester **8** (28 mg, 37%). **Compound 7:** ^{1}H NMR (400 MHz): 2.81 (4

H, t, *J* = 13 Hz), 2.96 (4 H, t, *J* = 14 Hz), 3.85 (6 H, s), 5.17 (4 H, s), 5.86 (1 H, s), 6.56 (2 H, d, *J* = 16 Hz), 7.02 (2 H, d, *J* = 8 Hz), 7.14 (4 H, m), 7.36 (10 H, s), 7.62 (2 H, d, *J* = 16 Hz), 15.8 (1 H, br s) ppm. – ^{13}C NMR (100 MHz): 29.0, 29.2, 55.9, 66.7, 101.8, 111.5, 121.0, 123.3, 124.3, 128.2, 128.3, 128.6, 134.0, 135.7, 140.0, 141.2, 151.4, 170.2, 171.8, 183.1 ppm. – IR: 1131, 1203, 1260, 1465, 1509, 1599, 1736, 1764, 2850, 2910, 2955 cm^{-1}. – HRMS (m/z) calcd for $C_{43}H_{40}NaO_{12}$: 771.2412; found: 771.2391 [M+Na^{+}].

Compound 8: ^{1}H NMR (400 MHz): 2.82 (2 H, t, *J* = 14 Hz), 2.94 (2 H, t, *J* = 14 Hz), 3.84 (3 H, s), 3.94 (3 H, s), 5.20 (2 H, s), 5.83 (1 H, s), 5.93 (1 H, br s), 6.52 (2H, dd, *J* = 16, 21 Hz), 6.93 (1H, d, *J* = 8 Hz), 7.00-7.14 (5 H, m), 7.61 (2 H, dd, *J* = 6, 16 Hz), 15.9 (1H, br s) ppm. – ^{13}C NMR (100 MHz): 29.0, 29.2, 55.9, 56.0, 66.7, 101.5, 109.7, 111.5, 114.9, 120.9, 121.8, 123.0, 123.2, 124.3, 127.6, 128.2, 128.3, 128.6, 134.1, 135.7, 139.4, 141.1, 141.2, 146.8, 148.0, 151.4, 170.2, 171.8, 181.8, 184.5 ppm. – IR: 1031, 1101, 1268, 1510, 1588, 1627, 1736, 2851, 2920, 2955, 3360 cm^{-1}. – HRMS (m/z) calcd for $C_{32}H_{30}NaO_{9}$: 581.1782; found: 581.1776 [M+Na^{+}].

Dicyclopentyl *O,O'*-(((1*E*,3*Z*,6*E*)-3-hydroxy-5-oxohepta-1,3,6-triene-1,7-diyl)bis(2-methoxy-4,1-phenylene)) disuccinate (9), and cyclopentyl (4-((1*E*,4*Z*,6*E*)-5-hydroxy-7-(4-hydroxy-3-methoxyphenyl)-3-oxohepta-1,4,6-trien-1-yl)-2-methoxyphenyl) succinate (10).



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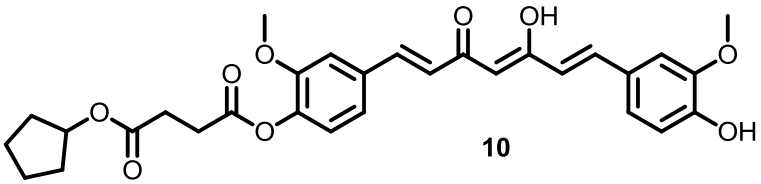
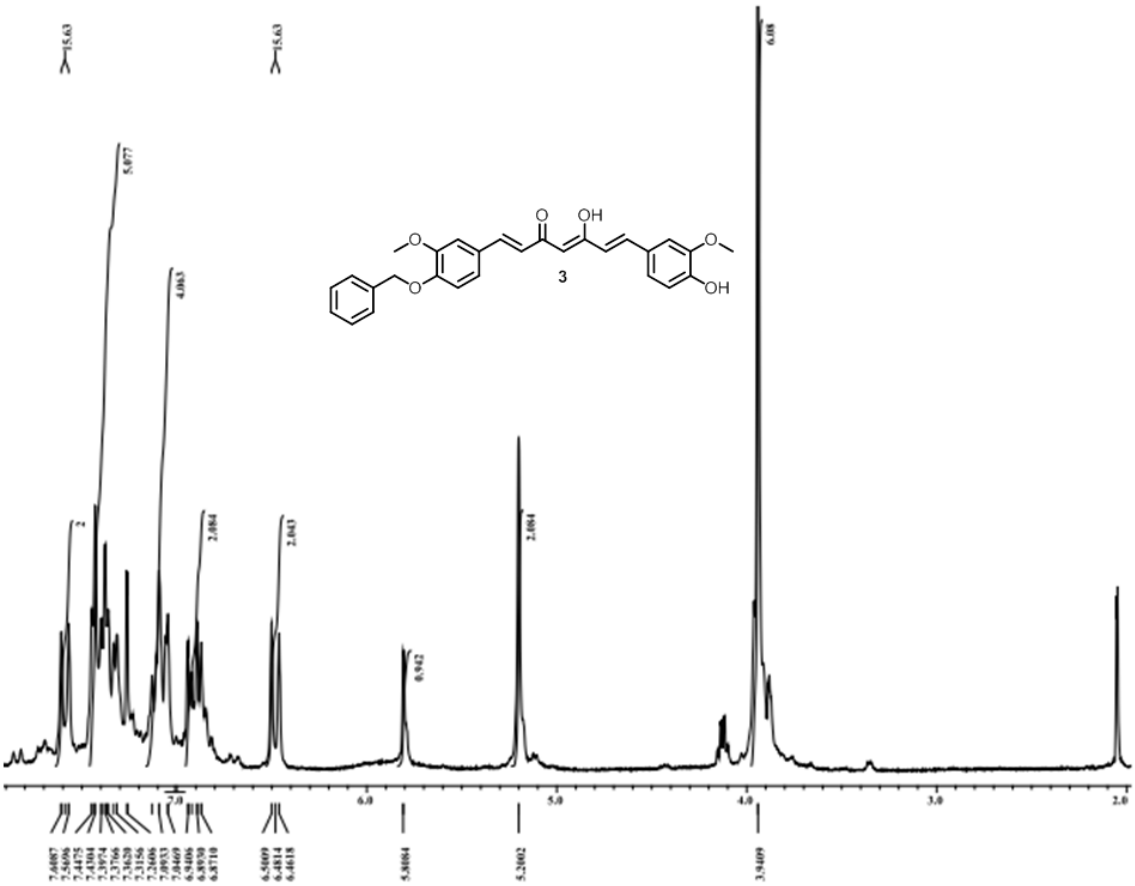


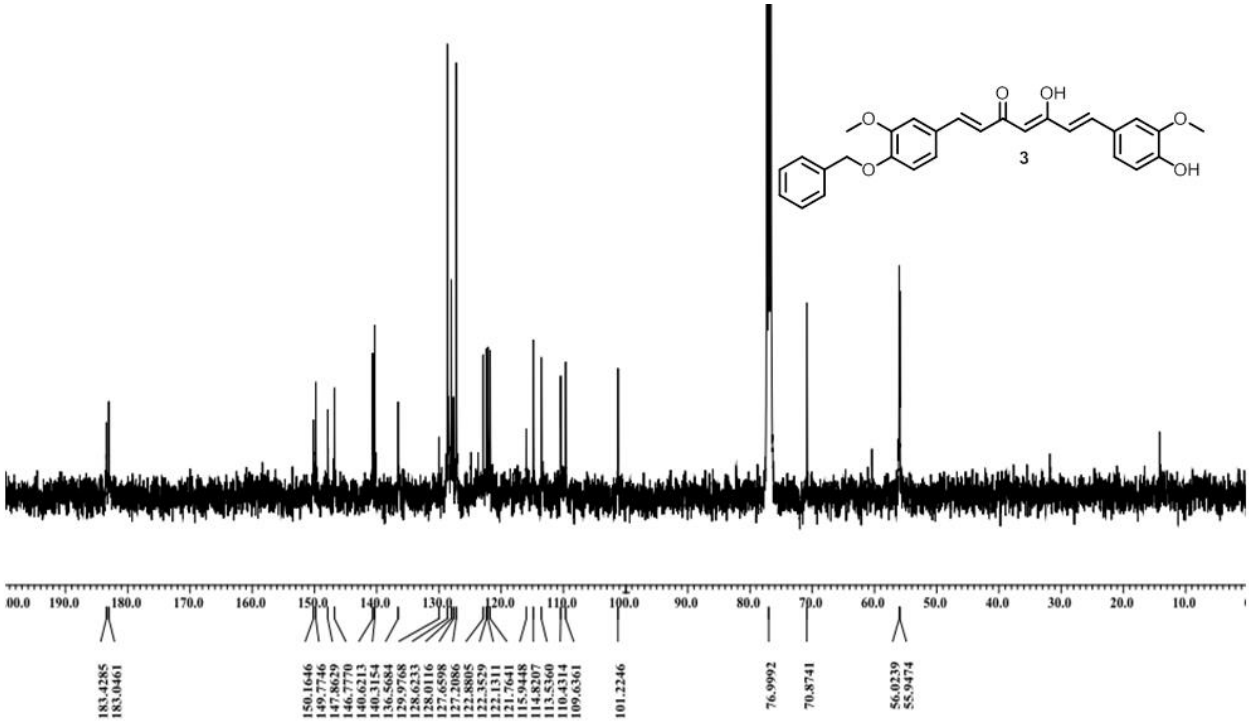
10

According to GP2, monoester **S3** (245 mg, 1.3 mmol, 10 equiv.), pyridine (3 mL), 4-dimethylaminopyridine (366 mg, 0.39 mmol, 3 equiv.), and 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride (75 mg, 0.39 mmol, 3 equiv.) was stirred at RT. Concurrently, a solution of curcumin (50 mg, 0.13 mmol) in pyridine (3 mL) was stirred at RT. After 4 h, the reaction mixtures were combined and allowed to stir for 48 h at RT. The crude product was purified by HPLC to obtain diester **9** (17 mg, 18%) and monoester **10** (25 mg, 34%). **Compound 9:** ^{1}H NMR (400 MHz): 1.57-1.61 (4 H, m), 1.70-1.71 (8 H, m), 1.84-1.87 (4 H, m), 2.70 (4 H, t, *J* = 14 Hz), 2.92 (4 H, t, *J* = 14 Hz), 3.87 (6 H, s), 5.17-5.22 (2 H, m), 5.85 (1 H, s), 6.56 (2 H, d, *J* = 16 Hz), 7.06-7.17 (6 H, m), 7.60 (2 H, d, *J* = 16 Hz), 15.8 (1 H, br s) ppm. – ^{13}C NMR (100 MHz): 23.7, 29.0, 29.5, 32.6, 55.9, 77.6, 101.8, 111.5, 121.0, 122.1, 123.3, 124.3, 129.2, 134.0, 140.0, 141.3, 151.4, 170.3, 171.7, 183.1 ppm. – IR: 1132, 1157, 1417, 1465, 1509, 1600, 1731, 1765, 2852, 2923, 2956 cm^{-1}. – HRMS (m/z) calcd for $C_{39}H_{44}NaO_{12}$: 727.2725; found: 727.2709 [M+Na^{+}]. **Compound 10:** ^{1}H NMR (400 MHz): 1.57-1.59 (2 H, m), 1.70-1.72 (4 H, m), 1.84-1.87 (2 H, m), 2.71 (2 H, t, *J* = 14 Hz), 2.92 (2 H, t, *J* = 14 Hz), 3.87 (3 H, s), 3.95 (3 H, s), 5.20 (1 H, m), 5.83 (1 H, s), 6.52 (2 H, dd, *J* = 16, 22 Hz), 6.94 (1 H, d, *J* = 8 Hz), 7.06-7.16 (5 H, m), 7.60 (2 H, dd, *J*

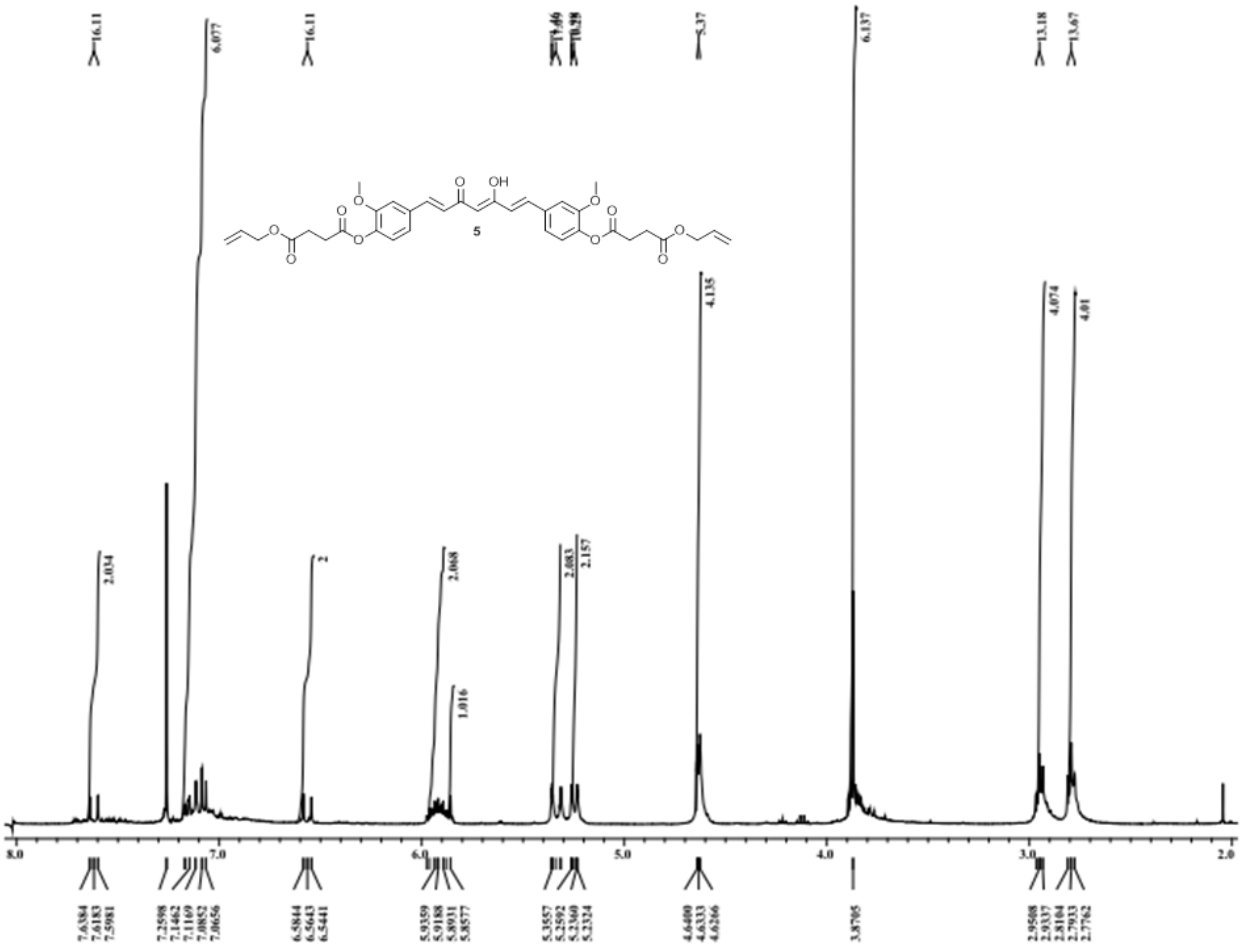
= 4, 16 Hz) ppm.– ^{13}C NMR (100 MHz): 23.7, 29.0, 29.4, 32.6, 55.9, 56.0, 77.6, 101.5, 109.7, 111.5, 114.9, 120.9, 121.8, 123.0, 123.3, 124.3, 127.6, 130.1, 134.1, 139.4, 141.1, 146.8, 148.0, 151.3, 170.4, 171.8, 172.1, 181.8, 184.5 ppm. – IR: 1159, 1269, 1511, 1588, 1627, 1729, 2851, 2872, 2924, 2958, 3315 cm^{-1}. – HRMS (m/z) calcd for $C_{30}H_{32}NaO_9$: 559.1939; found: 559.1912 [$M+Na^+$].

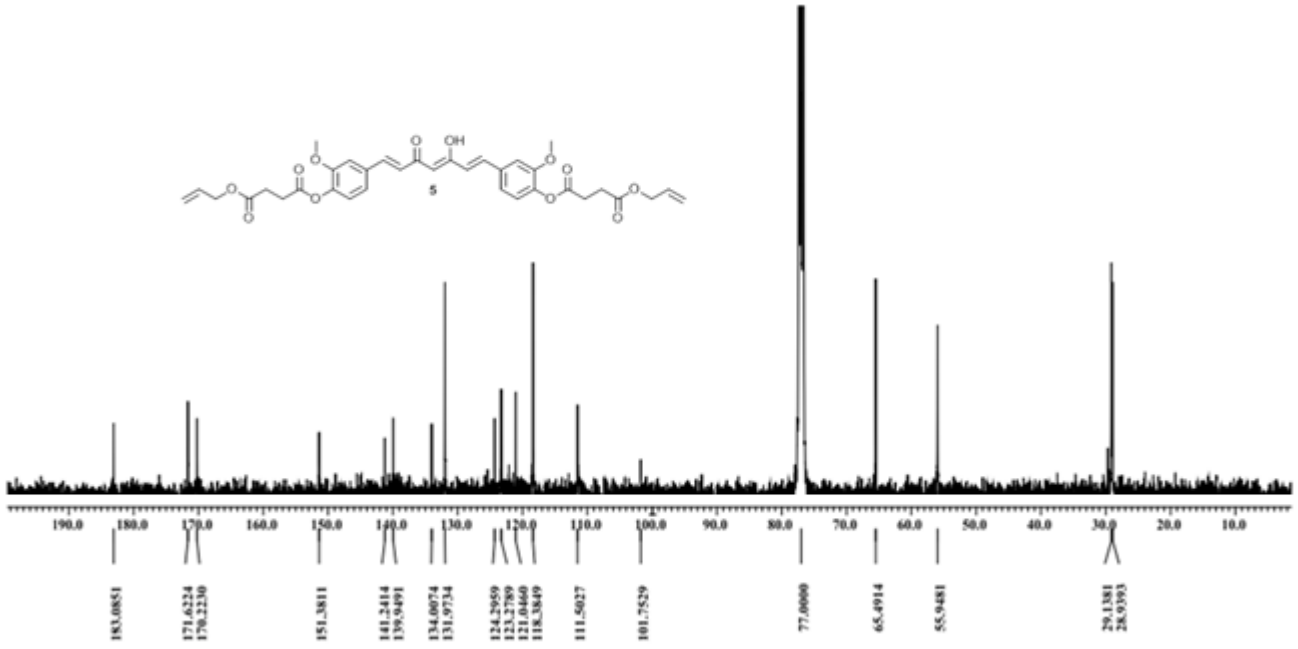
H and ^{13} C NMR Spectral Data of (1E, 4Z,6E)-1-(4-(benzyloxy)-3-methoxyphenyl)-5-hydroxy-7-(4-hydroxy-3-methoxyphenyl)hepta-1,4,6-trien-3-one (3)




O
OH
O
O
O
OH
3
00.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0
183.4285
183.0461
150.1646
149.7746
147.8629
146.7770
140.6213
140.3154
136.5684
129.9768
128.6233
128.0116
127.6598
127.2086
122.8805
122.3529
122.1311
121.7641
115.9448
114.8207
113.5360
110.4314
109.6361
101.2246
76.9992
70.8741
56.0239
55.9474

^{1}H and ^{13} C NMR Spectral Data of diallyl O,O'-(((1E,3Z,6E)-3-hydroxy-5-oxohepta-1,3,6-triene-1,7-diyl)bis(2-methoxy-4,1-phenylene)) disuccinate (5)




OH
5
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
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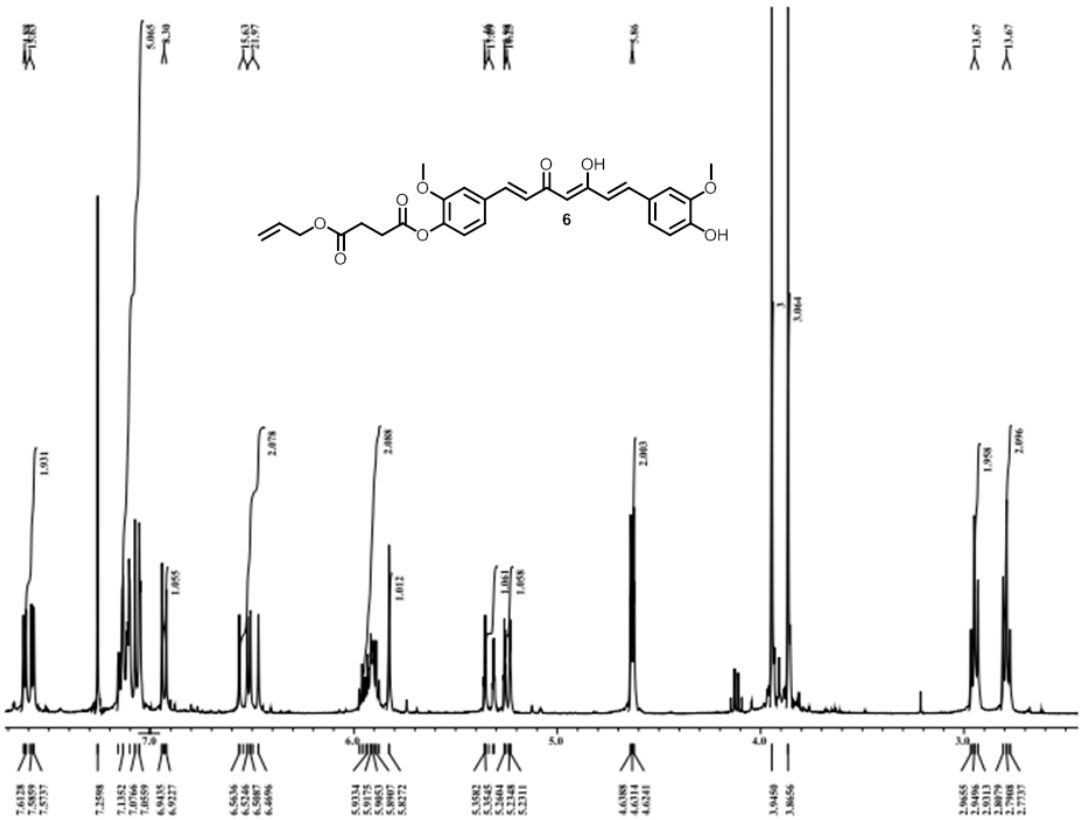
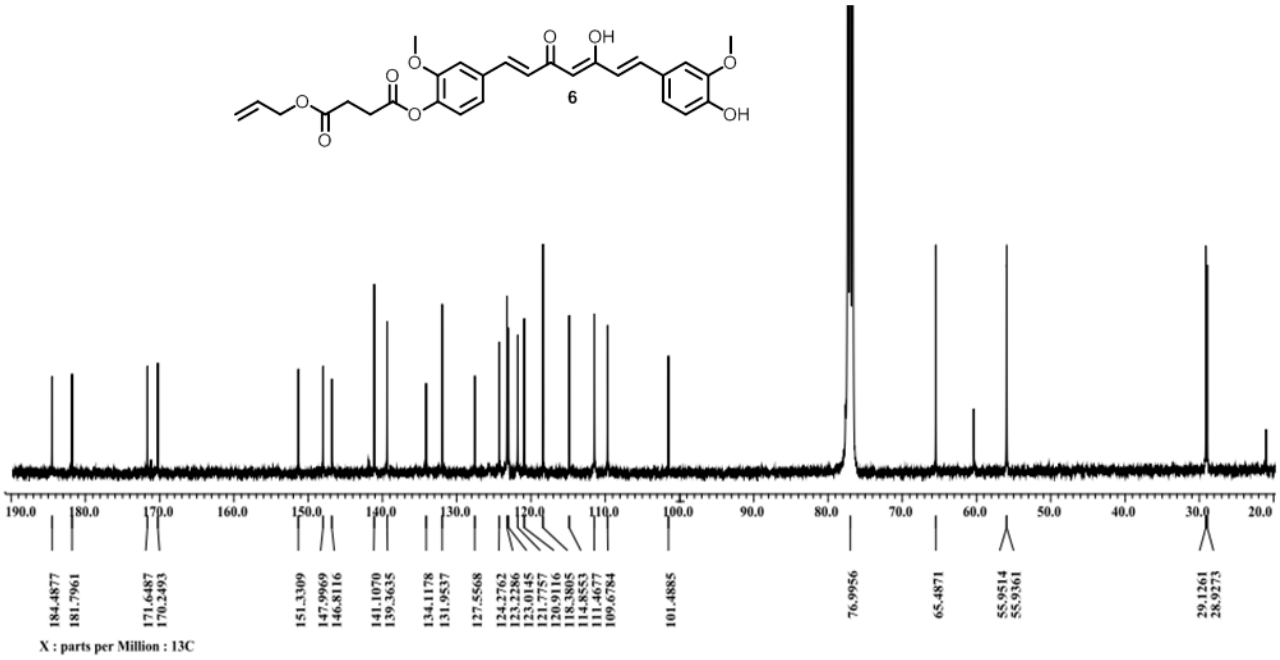
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
183.0851
171.6224
170.2230
151.3811
141.2414
139.9491
134.0074
131.9734
124.2959
123.2789
121.0460
118.3849
111.5027
101.7529
77.0000
65.4914
55.9481
29.1381
28.9393

^{1}H and ^{13} C NMR Spectral Data of allyl (4-((1E,4Z,6E)-5-hydroxy-7-(4-hydroxy-3-methoxyphenyl)-3-oxohepta-1,4,6-trien-1-yl)-2-methoxyphenyl) succinate (6)




O
OH
O
O
O
O
O
O
OH
6
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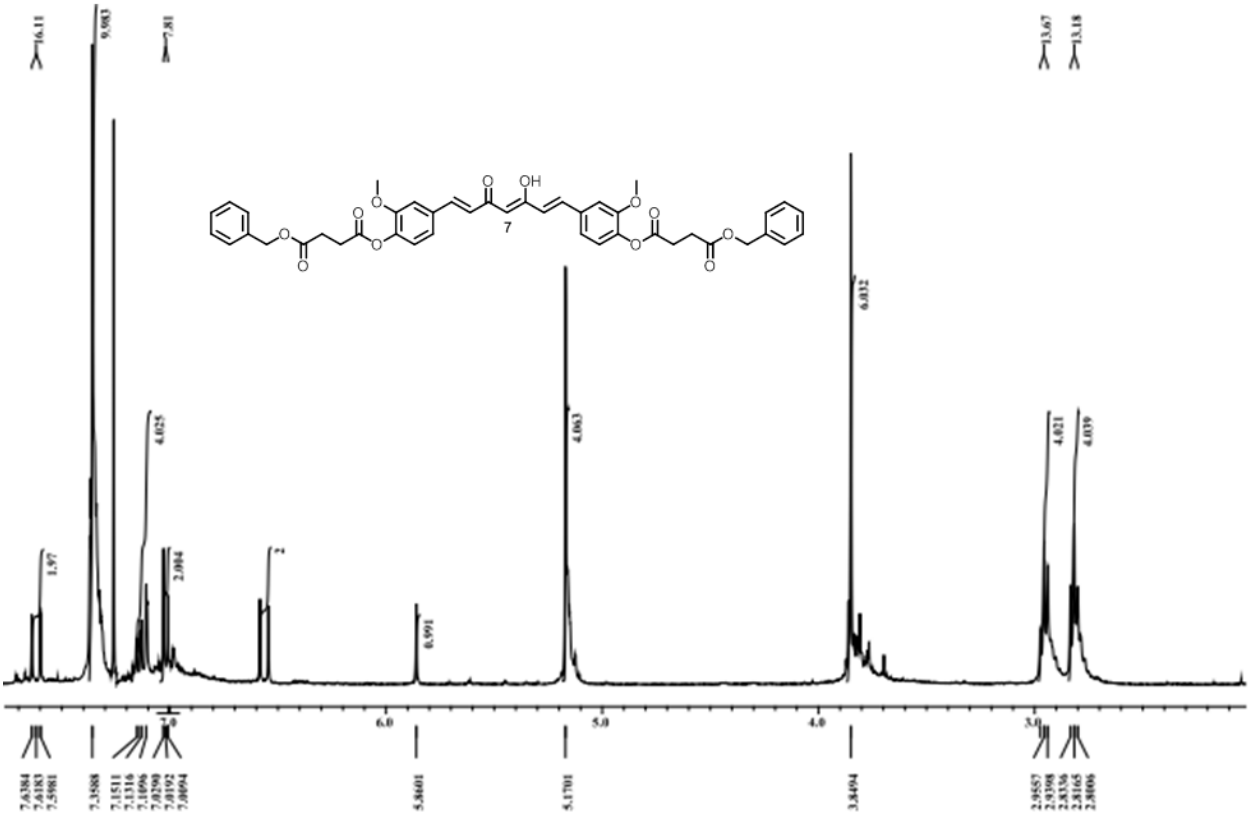
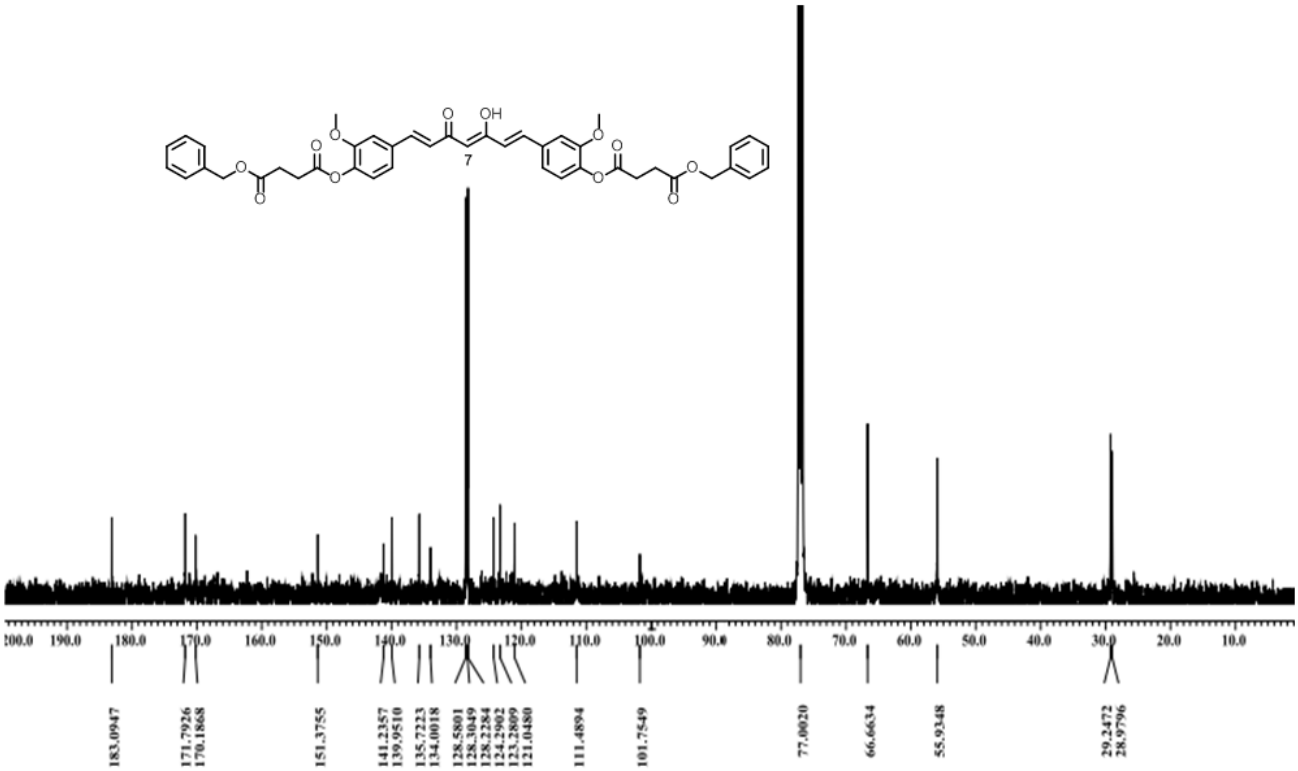
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
184.4877
181.7961
171.6487
170.2493
151.3309
147.9969
146.8116
141.1070
139.3635
134.1178
131.9537
127.5568
124.2762
123.2286
123.0145
121.7757
120.9116
118.3805
114.8553
111.4677
109.6784
101.4885
76.9956
65.4871
55.9514
55.9361
29.1261
28.9273
X : parts per Million : 13C

^{1}H and ^{13} C NMR Spectral Data of dibenzyl O,O'-(((1E,3Z,6E)-3-hydroxy-5-oxohepta-1,3,6-

triene-1,7-diyl)bis(2-methoxy-4,1-phenylene)) disuccinate (7)




OH
7
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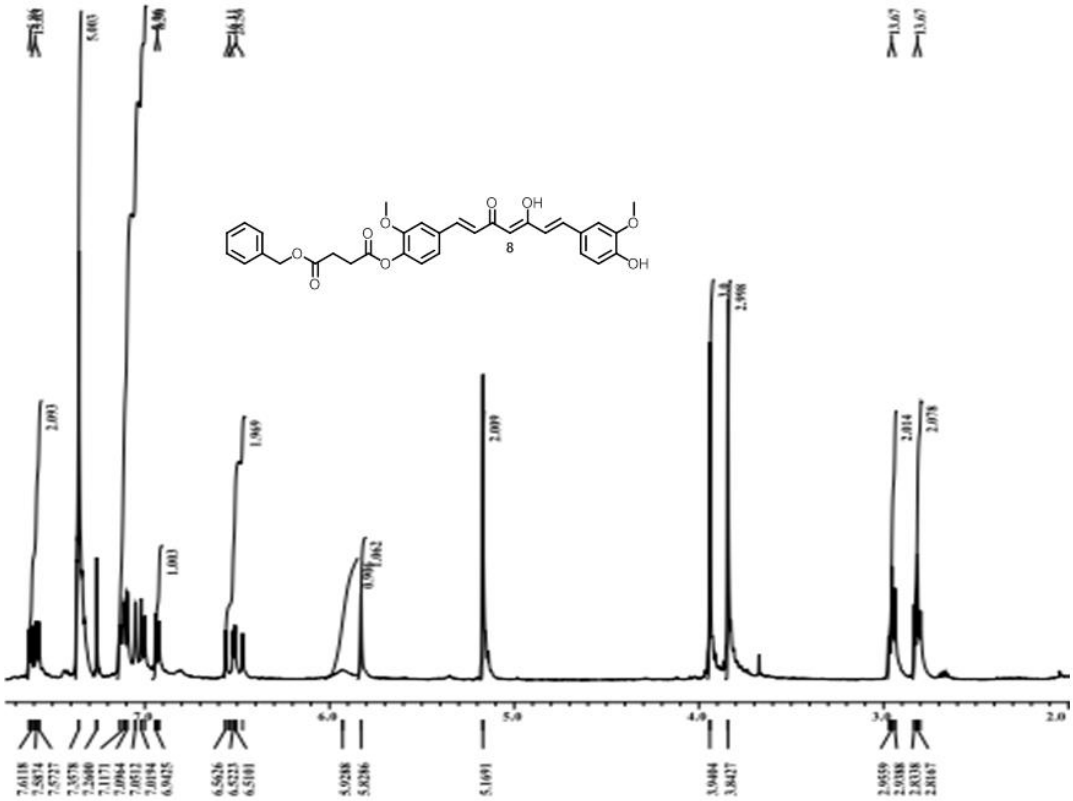
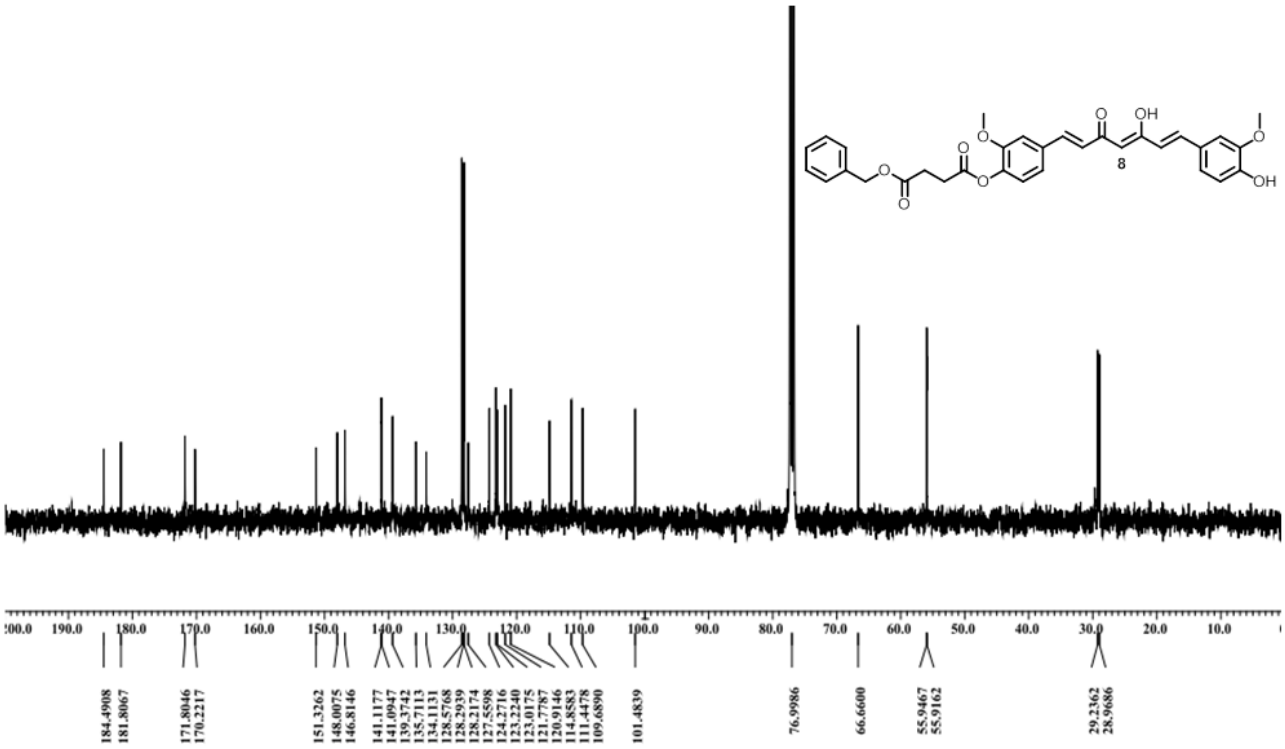
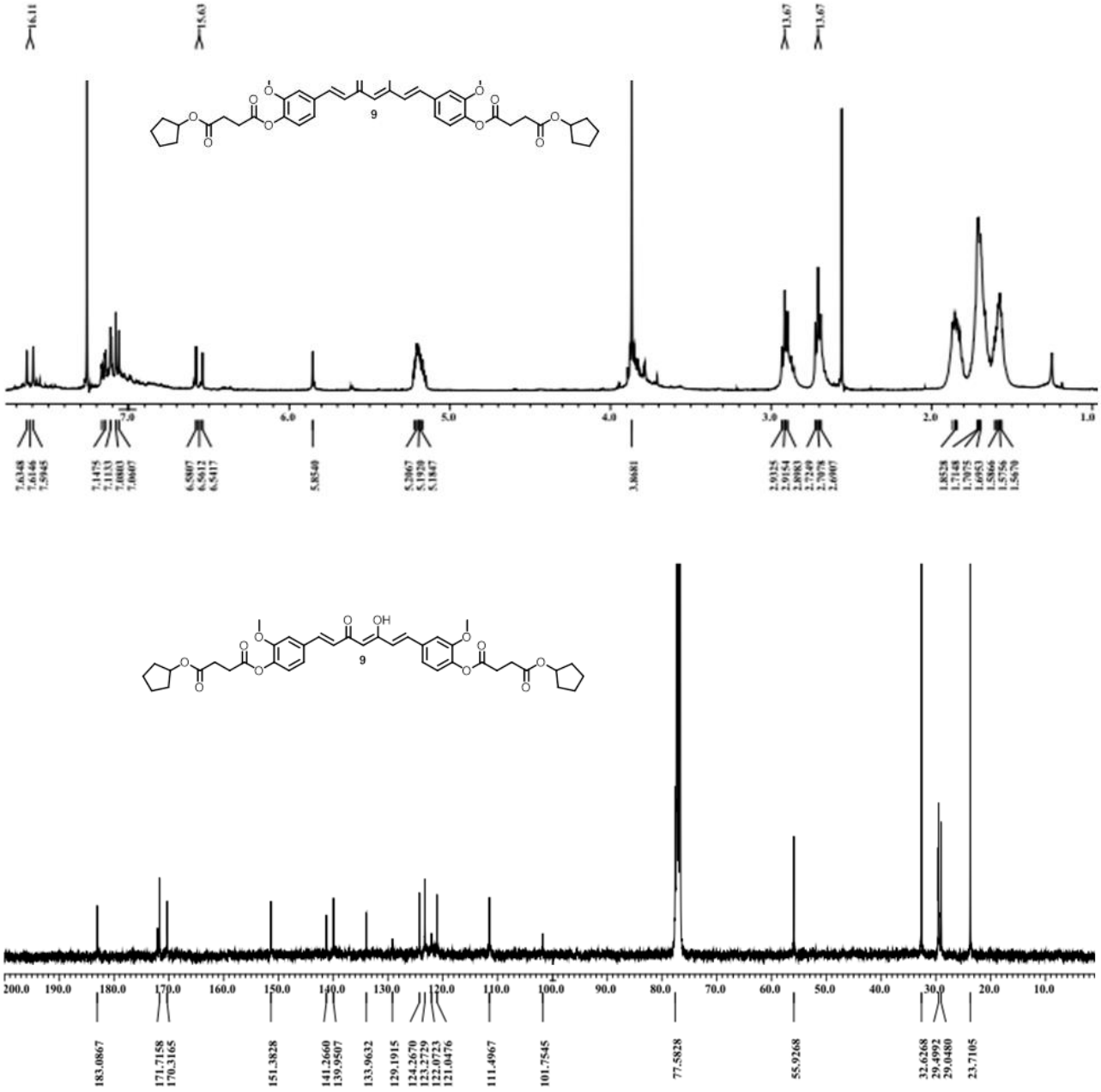
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
183.0947
171.7926
170.1868
151.3755
141.2357
139.9510
135.7223
134.0018
128.5801
128.3049
128.2284
124.2902
123.2809
121.0480
111.4894
101.7549
77.0020
66.6634
55.9348
29.2472
28.9796

^{1}H and ^{13} C NMR Spectral Data of benzyl (4-((1E,4Z,6E)-5-hydroxy-7-(4-hydroxy-3-methoxyphenyl)-3-oxohepta-1,4,6-trien-1-yl)-2-methoxyphenyl) succinate (8)

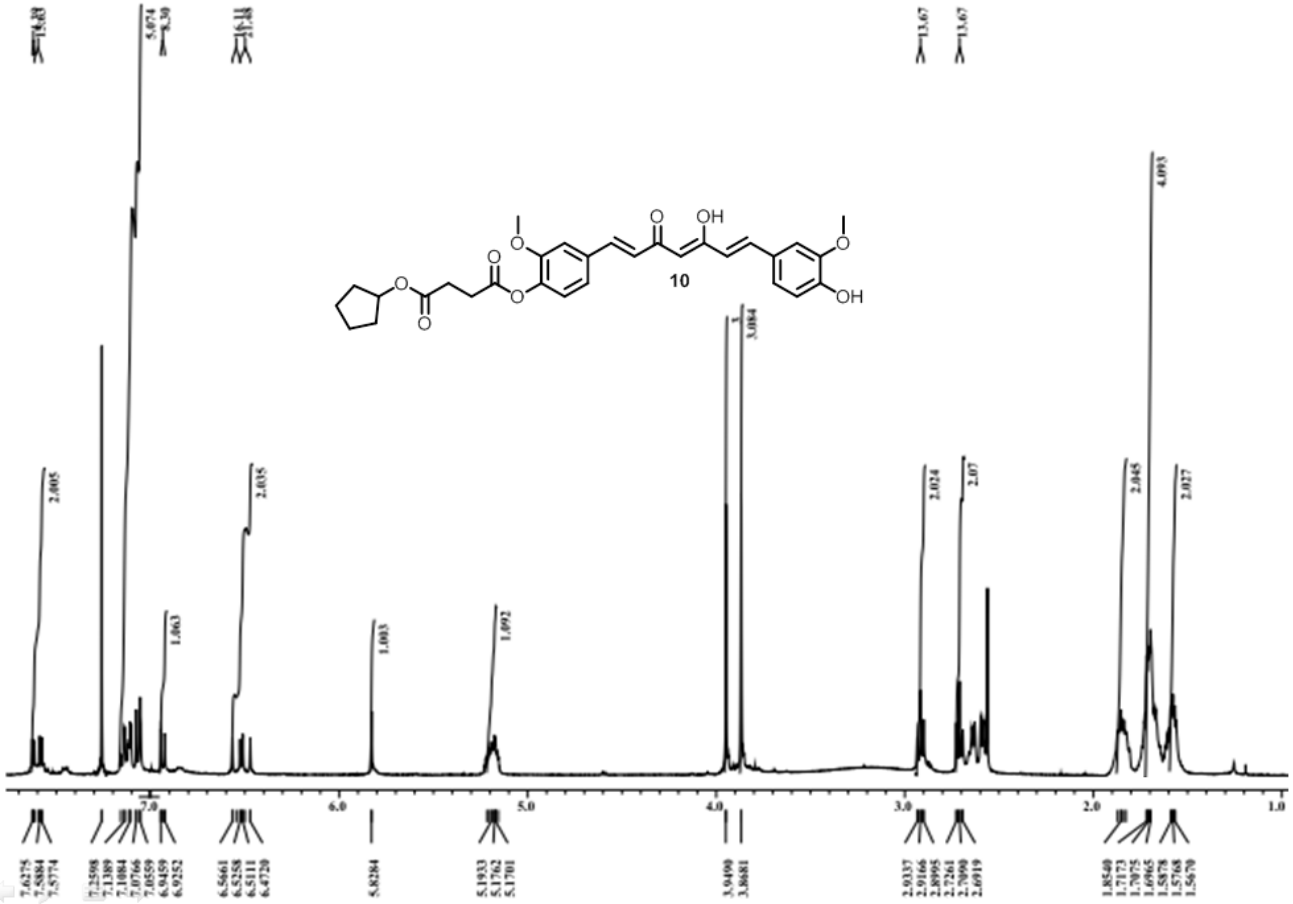


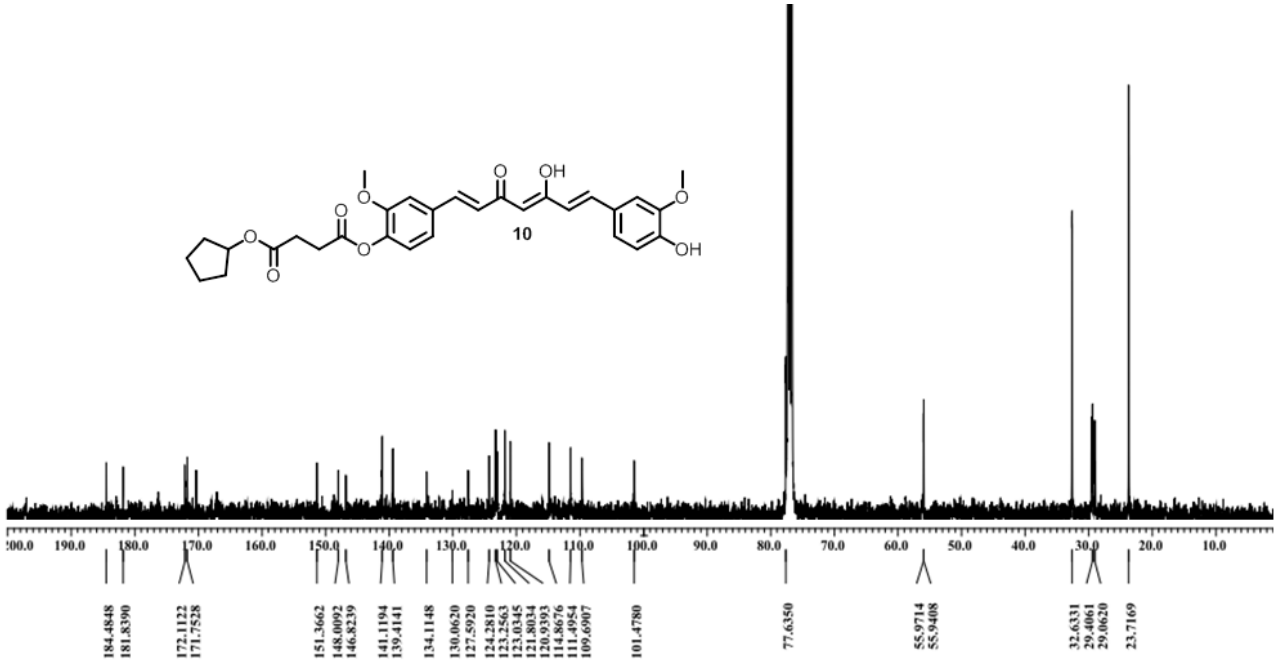

O
O
O
O
O
O
OH
O
OH
8
200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
184.4908
181.8067
171.8046
170.2217
151.3262
148.0075
146.8146
141.1177
141.0947
139.3742
135.7113
134.1131
128.5768
128.2939
128.2174
127.5598
124.2716
123.2240
123.0175
121.7787
120.9146
114.8583
111.4478
109.6890
101.4839
76.9986
66.6600
55.9467
55.9162
29.2362
28.9686

^{1}H and ^{13} C NMR Spectral Data of dicyclopentyl O,O'-(((1E,3Z,6E)-3-hydroxy-5-oxohepta-1,3,6-triene-1,7-diyl)bis(2-methoxy-4,1-phenylene)) disuccinate (9)



^{1}H and ^{13} C NMR Spectral Data of cyclopentyl (4-((1E,4Z,6E)-5-hydroxy-7-(4-hydroxy-3-methoxyphenyl)-3-oxohepta-1,4,6-trien-1-yl)-2-methoxyphenyl) succinate (10).




10
200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
184.4848
181.8390
172.1122
171.7528
151.3662
148.0092
146.8239
141.1194
139.4141
134.1148
130.0620
127.5920
124.2810
123.2563
123.0345
121.8934
120.8593
114.8676
111.4954
109.6907
101.4780
77.6350
55.9714
55.9408
32.6331
29.4061
29.0620
23.7169

Supplementary References

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