SUPPLIMENTARY INFORMATION

UNUSUAL TITANIUM INDUCED McMURRY COUPLING OF 4-OXO-4H-CHROMENE-2- CARBALDEHYDES ENROUTE TO BIS-CHROMONES

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Experimental section

General Information

Electrospray ionization and tandem mass spectrometry experiments were performed using a triple quadrupole mass spectrometer (PE Sciex model API 3000). The positive and negative electrospray data were obtained by switching the capillary voltage between +5000 and −4500 V, respectively. For HRMS, UPLC-TOF-MS system consisted of an ACQUITY™ Ultra Performance Liquid Chromatography system and Micromass LCT Premier XE Mass Spectrometer (High sensitivity orthogonal time-of-flight instrument; Waters, Milford, USA) equipped with an ESI lock spray source for accurate mass values. Leucine-enkephalin was used as reference compound and introduced via the lock spray channel.

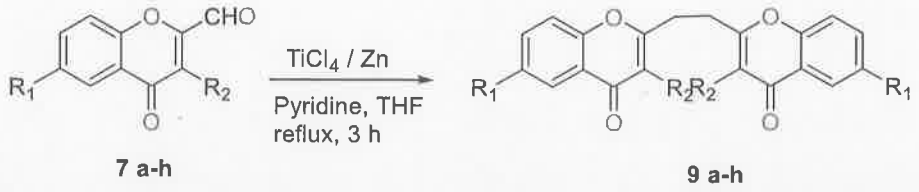
The NMR experiments were performed on Varian spectrometers operating at 400 and 500 MHz in DMSO (D_6) and $CDCl_3$ at 30 °C. The ^1H chemical shift values were reported on the δ scale in ppm, relative to TMS (δ = 0.00) and the ^{13}C chemical shift values were reported relative to DMSO (δ = 40 ppm), $CDCl_3$ (δ = 77 ppm) as internal standards.

- For the compounds **9b, 9f** and **9g** ^{13}C NMR could not be recorded due to low solubility in selective NMR solvents.

X-ray reflections for compound 9h were collected at 290 K on an Oxford Xcalibur Mova E diffractometer equipped with an EOS CCD detector and a microfocus sealed tube using Mo Kα radiation (λ= 0.7107 A). Data collection and reduction was performed using CrysAlisPro (version 1.171.36.32) and OLEX2 (version 1.2) was used to solve and refine the crystal structures. All non-hydrogen atoms were refined anisotropically. All C–H atoms were fixed geometrically. The final CIF files were validated in PLATON and doesn't resulted in any missed symmetry. General procedure for McMurry coupling of 4-oxo-4*H*-chromen-2-carbaldehydes 7a-i

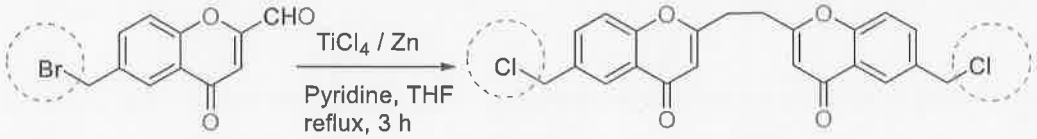
Zn powder (4 mmol) was added to 15 volumes of dry THF under stirring at 0-5°C followed by $TiCl_4$ (2 mmol). Reaction temperature was raised 60-65°C, maintained for about 3 h and then cooled to 0-5°C. Pyridine (2.5 mmol) and corresponding chromone-2-carbaldehyde **(7a-i)** (1.0 mmol) in 15 volumes of dry THF were then added to the mixture. Reaction temperature was raised to 60-65°C and maintained for 3-4 h. Reaction mass was cooled to 10-15°C and quenched with 10% K_2CO_3 solution. After filtering the inorganic salts product was extracted into

dichloromethane, which was concentrated under reduced pressure to get the product in crude form. Pure products **(9a-h, 9j)** were obtained by passing the crude products through silica column (ethylacetate : petether, 40 : 60).



7 a-h **9 a-h**

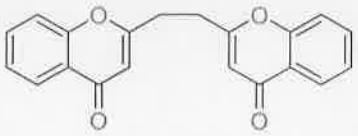
a: R_1 = H R_2 = H **b: R_1 = H R_2 = Br** **c: R_1 = H R_2 = Cl**
d: R_1 = CH_3 R_2 = Br **e: R_1 = Br R_2 = H** **f: R_1 = Cl R_2 = H**
g: R_1 = NO_2 R_2 = H **h: R_1 = CH_3 R_2 = H** **i: R_1 = CH_2Br R_2 = H**



7 i **9 j**

Characterization data for products 9 a-i, 11-12

2,2'-(Ethane-1,2-diyl)bis(4*H*-chromen-4-one) (9a)

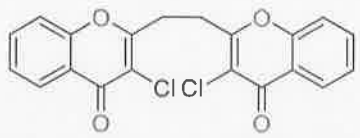


Pale yellow crystalin solid (165 mg, 52%), mp: 190-193 °C: ^{1}H NMR (400 MHz, DMSO-d_6, ppm): δ = 8.01 (dd, 1H, *J* = 8.4, 2.0 Hz, H-5), 7.79 (dt, 1H, *J* = 8.8, 2.0 Hz, H-7), 7.56 (d, 1H, *J* = 8.4 Hz, H-8), 7.48 (t, 1H, *J* = 7.6 Hz, H-6), 6.35 (s, 1H, H-3) and 3.15 (s, 2H, H-2a). ^{13}C NMR (100 MHz, DMSO-d_6, ppm): δ = 30.3 (CH_3), 109.8 (C-3), 118.0 (C-Ar), 123.0 (C-Ar), 124.8 (C-Ar), 125.3 (C-Ar), 134.1 (C-Ar), 155.8 (C-8a), 167.6 (C-2), 176.7 (C-4, CO). IR (KBr): v = 1650, 1380 cm^{-1}. HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{20}H_{15}O_4$ $[M+H]^+$: 319.0970; found: 319.0956.

2,2'-(Ethane-1,2-diyl)bis(3-bromo-4*H*-chromen-4-one) (9b)

Pale yellow crystalline powder (240 mg, 51%), mp: 266-288 °C. ^{1}H NMR (400 MHz, DMSO-d_6, ppm): δ = 8.00 (dd, 1H, *J* = 7.6, 1.2 Hz, H-5), 7.79-7.83 (m, 1H, H-7), 7.56 (d, 1H, *J* = 8.0 Hz, H-8), 7.52 (t, 1H, *J* = 6.8 Hz, H-6) and 3.50 (s, 2H, H-2a). FT-IR (KBr): v = 1646 cm^{-1} (C=O), HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{20}H_{13}O_4Br_2$ $[M+H]^+$: 474.9181; found: 474.9202.

2,2'-(Ethane-1,2-diyl)bis(3-chloro-4*H*-chromen-4-one) (9c)

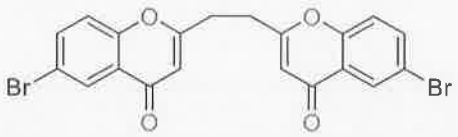


Off white crystalline powder (232 mg, 60%). mp: 254-256 °C: ^{1}H NMR (400MHz, DMSO-d_6, ppm): δ = 8.07 (d, 1H, *J* = 8.0 Hz, H-5), 7.84 (t, 1H, *J* = 7.6 Hz, H-7), 7.58 (d, 1H, *J* = 8.8 Hz, H-8), 7.54 (t, 1H, *J* = 7.6 Hz, H-6) and 3.47 (s, 2H, H-2a). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 29.1 (C-2a), 117.6 (C-3), 118.8 (C-Ar), 122.3 (C-Ar), 125.7 (C-Ar), 126.3 (C-Ar), 134.1 (C-Ar), 155.2 (C-8a), 162.6 (C-2), 172.0 (C-4, CO). FT-IR (KBr): v = 1648 cm^{-1} (C=O). HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{20}H_{13}O_4Cl_2$ $[M+H]^+$: 387.0191; found: 387.0178.

2,2'-(Ethane-1,2-diyl)bis(3-bromo-6-methyl-4*H*-chromen-4-one) (9d)

Off white crystalline powder (300 mg, 60%), mp: 250-253 °C: ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.99 (s, 1H, H-5), 7.47 (dd, 1H, *J* = 8.8, 2.0 Hz, H-7), 7.25 (d, 1H, *J* = 8.8 Hz, H-8), 3.49 (s, 2H, H-2a) and 2.45 (s, 3H, 6-CH3). ^{13}C NMR (100 MHz , $CDCl_3$, ppm): δ = 20.8 (6-CH_3), 31.5 (C-2a), 110.0 (C-3), 117.2 (C-Ar), 121.4 (C-Ar), 125.6 (C-Ar), 135.3 (C-Ar), 135.8 (C-Ar), 153.5 (C-8a), 163.5 (C-2), 172.2 (C-4, CO). FT-IR (KBr): v = 1643 cm^{-1} (C=O). HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{22}H_{17}O_4Br_2$ $[M+H]^+$: 502.9494, found: 502.9487.

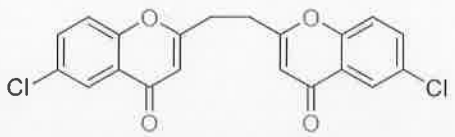
2,2'-(Ethane-1,2-diyl)bis(6-bromo-4*H*-chromen-4-one) (9e)



Yellow crystalline powder (240 mg, 50%), mp: 245-247 °C; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 8.30 (d, 1H, *J* = 2.4 Hz, H-5), 7.75 (dd, 1H, *J* = 2.4 Hz, 8.8 Hz, H-7), 7.28 (d, 1H, *J* = 10.4 Hz, H-8), 6.23 (s, 1H, H-3) and 3.09 (s, 2H, H-2a). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 31.5 (C-2a), 110.5 (C-3), 118.8 (C-Ar), 119.6 (C-Ar), 124.9 (C-Ar), 128.4 (C-Ar), 136.8 (C-Ar), 155.0 (C-

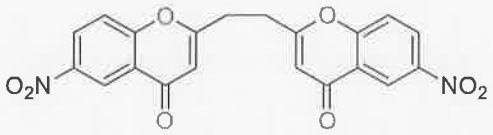
8a), 166.5 (C-2), 176.5 (C-4, CO). FT-IR (KBr): v = 1649 cm^{-1}(C=O). HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{20}H_{13}O_4Br_2$ $[M+H]^+$: 474.9181; found: 474.9182.

2,2'-(Ethane-1,2-diyl)bis(6-chloro-4*H*-chromen-4-one) (9f)



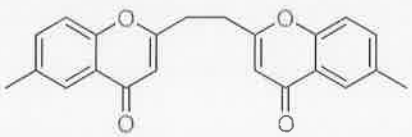
Brown crystalline powder (235 mg, 60%), mp: 233-236 °C; ^{1}H NMR (400 MHz, $CDCl_3$+DMSO-d_6, ppm): δ = 7.93 (d, 1H, *J* = 3.2 Hz, H-5), 7.82 (dd, 1H, *J* = 8.8, 2.8 Hz, H-7), 7.60 (d, 1H, *J* = 8.8 Hz, H-8), 6.40 (s, 1H, H-3) and 3.15 (s, 1H, H-2a). FT-IR (KBr): v = 1651 cm^{-1}(C=O). HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{20}H_{13}O_4Cl_2$ $[M+H]^+$: 387.0191; found: 387.0198.

2,2'-(Ethane-1,2-diyl)bis(6-nitro-4*H*-chromen-4-one) (9g)



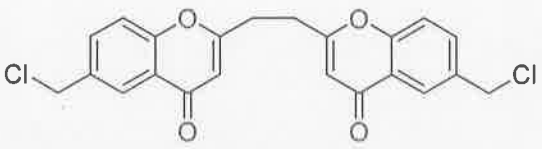
Yellow crystalline powder (210 mg, 50%), mp: 199-201 °C; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 9.06 (dd, 1H, *J* = 6.8, 2.4 Hz, Ar-H), 8.45-8.52 (m, 2H, Ar-H), 8.33 (t, 1H, *J* = 6.4 Hz, Ar-H), 7.51-7.58 (m, 2H, Ar-H), 6.32 (dd, 1H, *J* = 6.4, 1.6 Hz, H-3) and 3.25 (d, 2H, *J* = 15.4 Hz, H-2a). FT-IR (KBr): v = 1656 cm^{-1} (C=O). HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{20}H_{13}N_2O_8$ $[M+H]^+$: 409.0672; found: 409.0661.

2,2'-(Ethane-1,2-diyl)bis(6-methyl-4*H*-chromen-4-one) (9h).



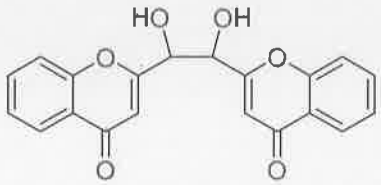
Off white crystalline powder (210 mg, 60%). mp: 195-197 °C: ^{1}H NMR (400 MHz, DMSO-d_6, ppm): δ = 7.78 (d, 1H, *J* = 1.2 Hz, H-5), 7.59 (dd, 1H, *J* = 8.0, 1.6 Hz, H-7), 7.43 (d, 1H, *J* = 8.4 Hz, H-8), 6.30 (s, 1H, H-3), 3.12 (s, 2H, H-2a) and 2.40 (s, 3H, 6-CH_3). ^{13}C NMR (100 MHz, $CDCl_3$ + DMSO-d_6, ppm): δ = 20.4 (6-CH_3), 30.4 (C-2a), 109.6 (C-3), 117.8 (C-Ar), 122.7 (C-Ar), 124.1 (C-Ar), 134.8 (C-Ar), 135.1(C-Ar), 154.1 (C-8a), 167.4 (C-2), 176.7 (C-4, CO). FT-IR (KBr): v = 1643 cm^{-1} (C=O). HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{22}H_{19}O_4$ $[M+H]^+$: 347.1283; found: 347.1278.

2,2'-(Ethane-1,2-diyl)bis(6-(chloromethyl)-4*H*-chromen-4-one) (9i)



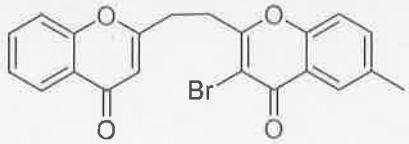
Pale yellow crystalline solid (215 mg, 52%). mp: 119-122 °C: ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 8.16 (s, 1H, H-5), 7.70 (d, 1H, *J* =8.8 Hz, H-7), 7.40 (d, 1H, *J* = 8.8 Hz, H-8), 6.23 (s, 1H, H-3), 4.66 (s, 2H, 6-$\underline{CH_2}$Cl) and 3.10 (s, 2H, H-2a).^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 31.4 (C-2a), 45.0 (C-6a), 110.6 (C-3), 118.5 (C-Ar), 123.5 (C-Ar), 125.6 (C-Ar), 134.1 (C-Ar), 134.9 (C-Ar), 155.1 (C-2), 166.4 (C-8a), 177.8 (C-4, CO). FT-IR (KBr): v = 1644 cm^{-1} (C=O). HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{22}H_{17}Cl_2O_4$ $[M+H]^+$: 415.0504; found: 415.0512.

2,2'-(1,2-Dihydroxyethane-1,2-diyl)bis(4*H*-chromen-4-one) (11).



White crystalline solid (217 mg, 62%). mp: 219-221 °C. ^{1}H NMR (400 MHz, DMSO-d_6, ppm): δ = 8.04 (dd, 1H, *J* = 8.4, 1.2 Hz, H-5), 7.80 (dt, 1H, *J* = 8.8, 1.6 Hz, H-7), 7.57 (d, 1H, *J* = 8.4 Hz, H-8), 7.50 (t, 1H, *J* = 8.0 Hz, H-6), 6.46 (s, 1H, H-3), 6.22 (d, 1H, *J* = 6.0 Hz, 2a-OH) and 4.97 (d, 1H, *J* = 6.4 Hz, H-2a).^{13}C NMR (100 MHz, DMSO-d_6, ppm): δ = 71.2 (C-2a), 109.0 (C-3), 118.2 (C-8), 123.9 (C-6), 124.8 (C-4a), 125.3 (C-5), 134.1 (C-7), 155.6 (C-8a), 168.6 (C-2a), 176.7 (C-4, CO). FT-IR (KBR): v = 3345 cm^{-1} (OH), 1650 cm^{-1} (C=O). ESI-MS: m/z 351.2 $[M+H]^+$.

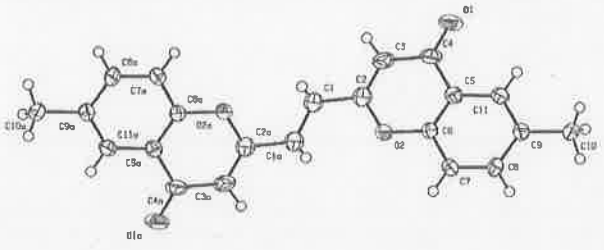
3-Bromo-6-methyl-2-(2-(4-oxo-4*H*-chromen-2-yl)ethyl)-4*H*-chromen-4-one (12).



Pale yellow crystalline solid (290 mg, 70%). mp: 141-143 °C.^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 8.18 (dd, 1H, *J* = 7.6, 1.6 Hz, H-5), 8.01 (s, 1H, H-7), 7.66 (dt, 1H, *J* = 8.0, 1.2 Hz, Ar-H), 7.46 (dd, 1H, *J* =8.0, 1.2 Hz, Ar-H), 7.35-7.40 (m, 3H, Ar-H), 7.23 (s, 1H, Ar-H), 6.24 (s, 1H, H-3), 3.44 (t, 2H, *J* = 7.6 Hz, H-2a), 3.16 (t, 2H, *J* = 8.0 Hz, H-2a') and 2.46 (s, 3H, 6-CH_3). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 20.9 (6'-CH_3), 32.1- 32.0 (C-2a, C-2'a), 110.0 (C-3'), 110.5 (C-3), 117.2 (C-Ar), 117.7 (C-Ar), 121.5 (C-Ar), 123.6 (C-Ar), 125.2 (C-Ar), 125.7 (C-Ar), 133.7 (C-Ar), 135.4 (C-Ar), 135.9 (C-Ar), 153.5 (C-Ar), 156.3 (C-Ar), 163.6 (C-8a), 166.3 (C-2a), 178.0 (C-4, CO), 172.2 (C-4', CO). FT-IR (KBr): v =1644 cm^{-1} (C=O). HRMS (ESI-TOF/MS): *m/z* calcd. for $C_{21}H_{16}O_4Br$ $[M+H]^+$: 411.0232; found: 411.0238.

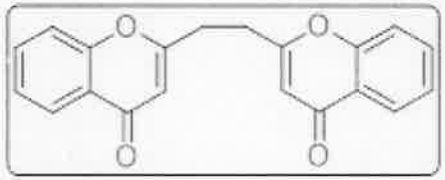
Single Crystal Data (Crystallographic parameters of compound **9h**).

Temperature / K	290K
Compound	9h
Formula weight	346.36
Crystal system	Orthorhombic
Space group	*C2cb*
a / Å	7.4743(5)
b / Å	15.2098(8)
c / Å	14.2562(8)
α / °	90
β / °	90
γ / °	90
Volume / Å^3	1620.68(2)
Z	4
Density / (g cm^{-3})	1.42
μ / mm^{-1}	0.097
F_{000}	728
h_{min}, h_{max}	-8, 8
k_{min}, k_{max}	-18, 18
l_{min}, l_{max}	-16, 16
No. of measured reflections	11806
No. of unique reflections	1427
No. of reflections used	1133
R_{all}, R_{obs}	0.095, 0.075
$wR_{2,all}$, $wR_{2,obs}$	0.202, 0.186
$\Delta\rho_{min,max}$ / (e Å^{-3})	-0.518, 0.408
GooF	1.082
CCDC No.	1818348

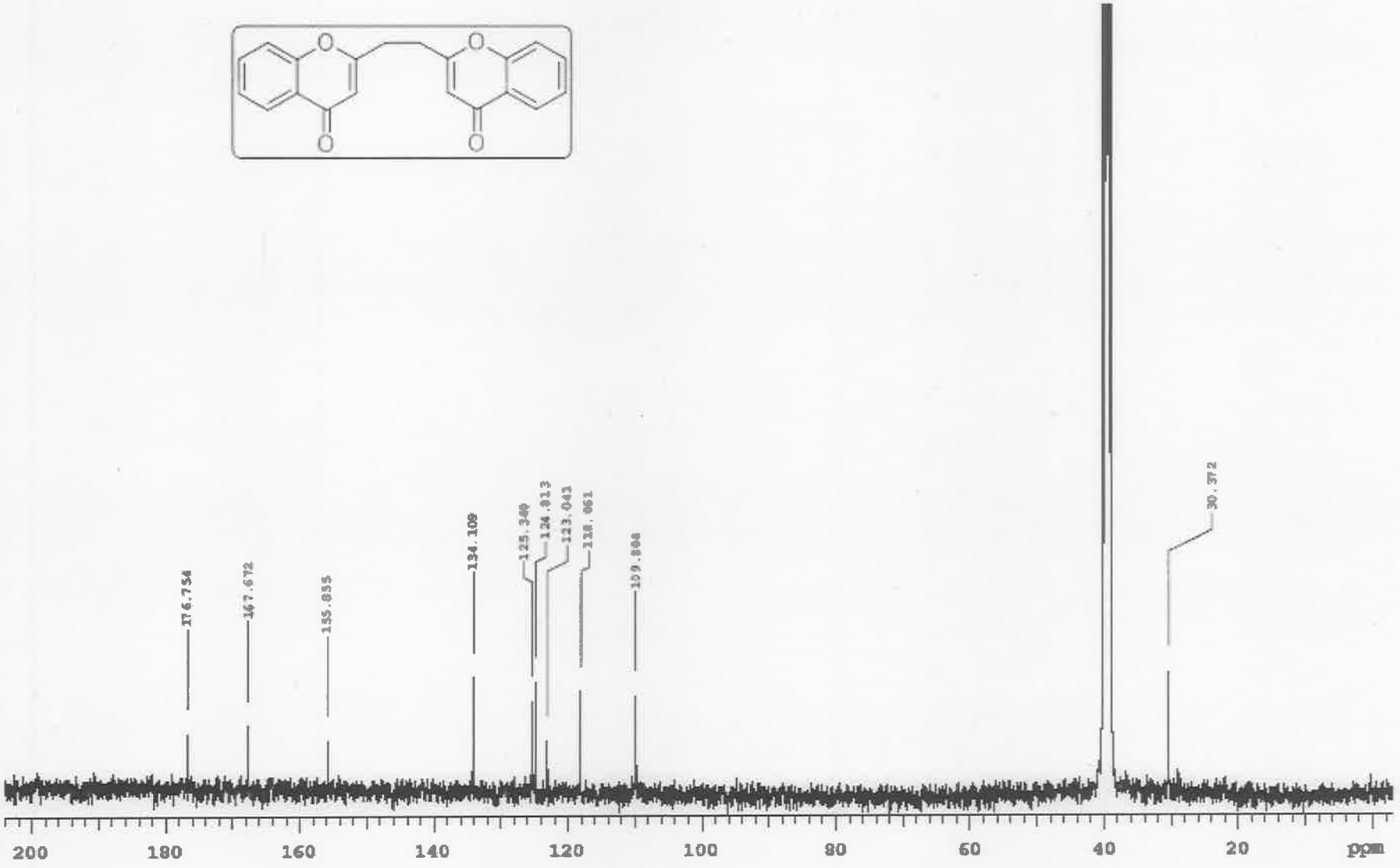


Ortep diagram of 2,2'-(ethane-1,2-diyl)bis(6-methyl-4*H*-chromen-4-one) **(9h)**

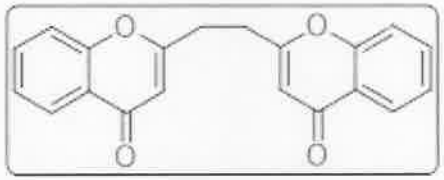
^{1}H NMR (DMSO-d6) of 2,2'-(Ethane-1,2-diyl)bis(4H-chromen-4-one) **(9a)**

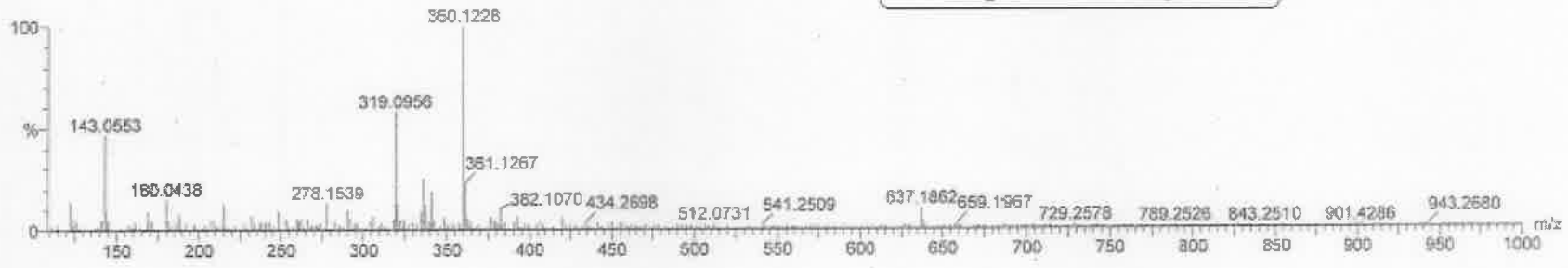


^{13}C NMR (DMSO-d_6) of 2,2'-(Ethane-1,2-diyl)bis(4H-chromen-4-one) **(9a)**



HRMS of 2,2'-(Ethane-1,2-diyl)bis(4H-chromen-4-one) **(9a)**

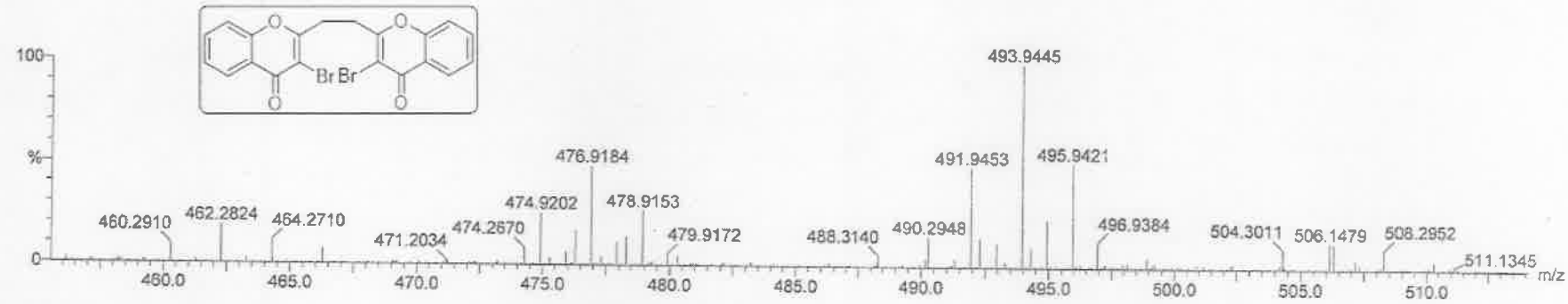




Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
319.0956	319.0970	-1.4	-4.4	13.5	7.4	C20 H15 O4

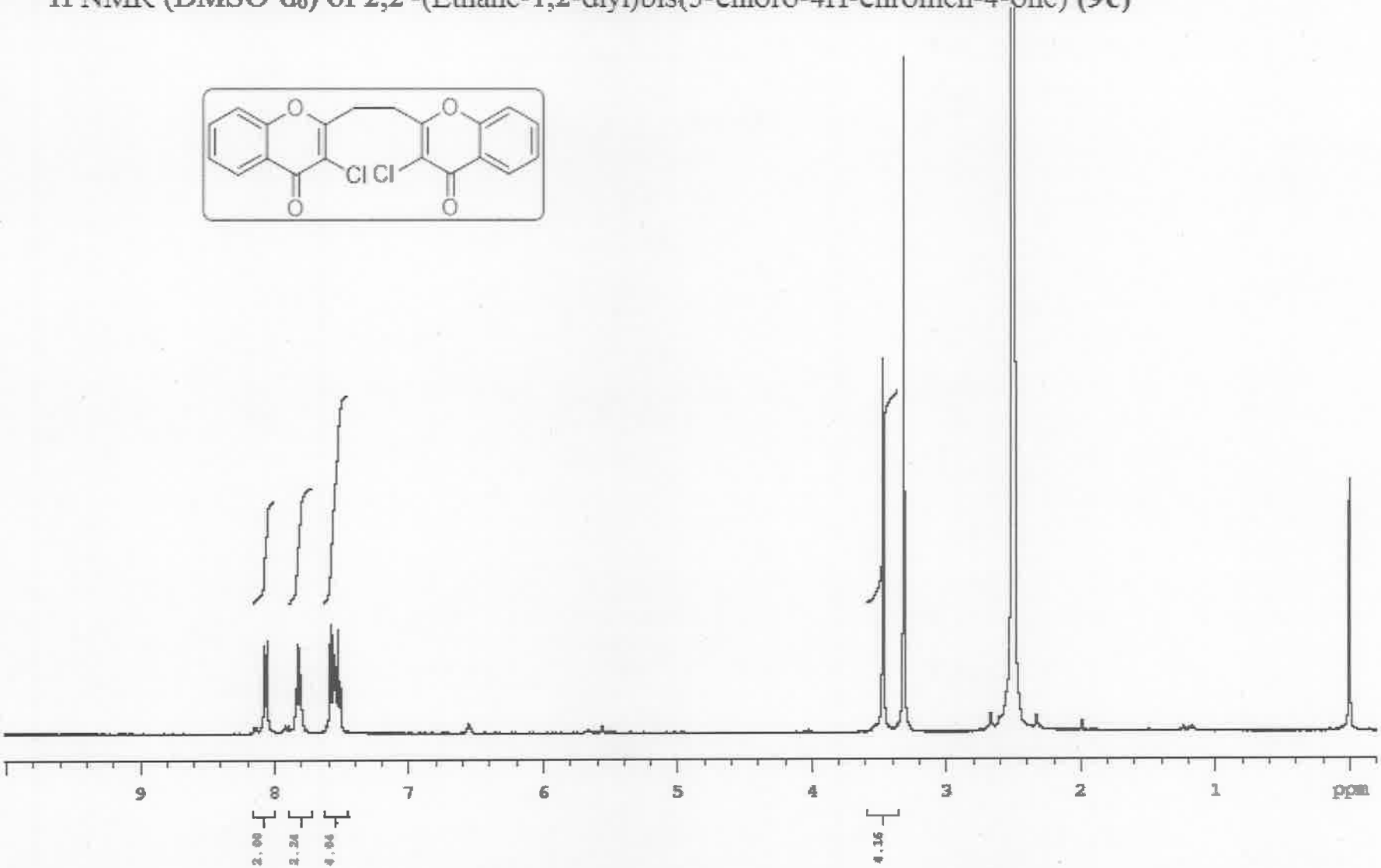
^{1}H NMR (DMSO-d_6) of 2,2'-(Ethane-1,2-diyl)bis(3-bromo-4H-chromen-4-one) **(9b)**

HRMS of 2,2'-(Ethane-1,2-diyl)bis(3-bromo-4H-chromen-4-one) **(9b)**

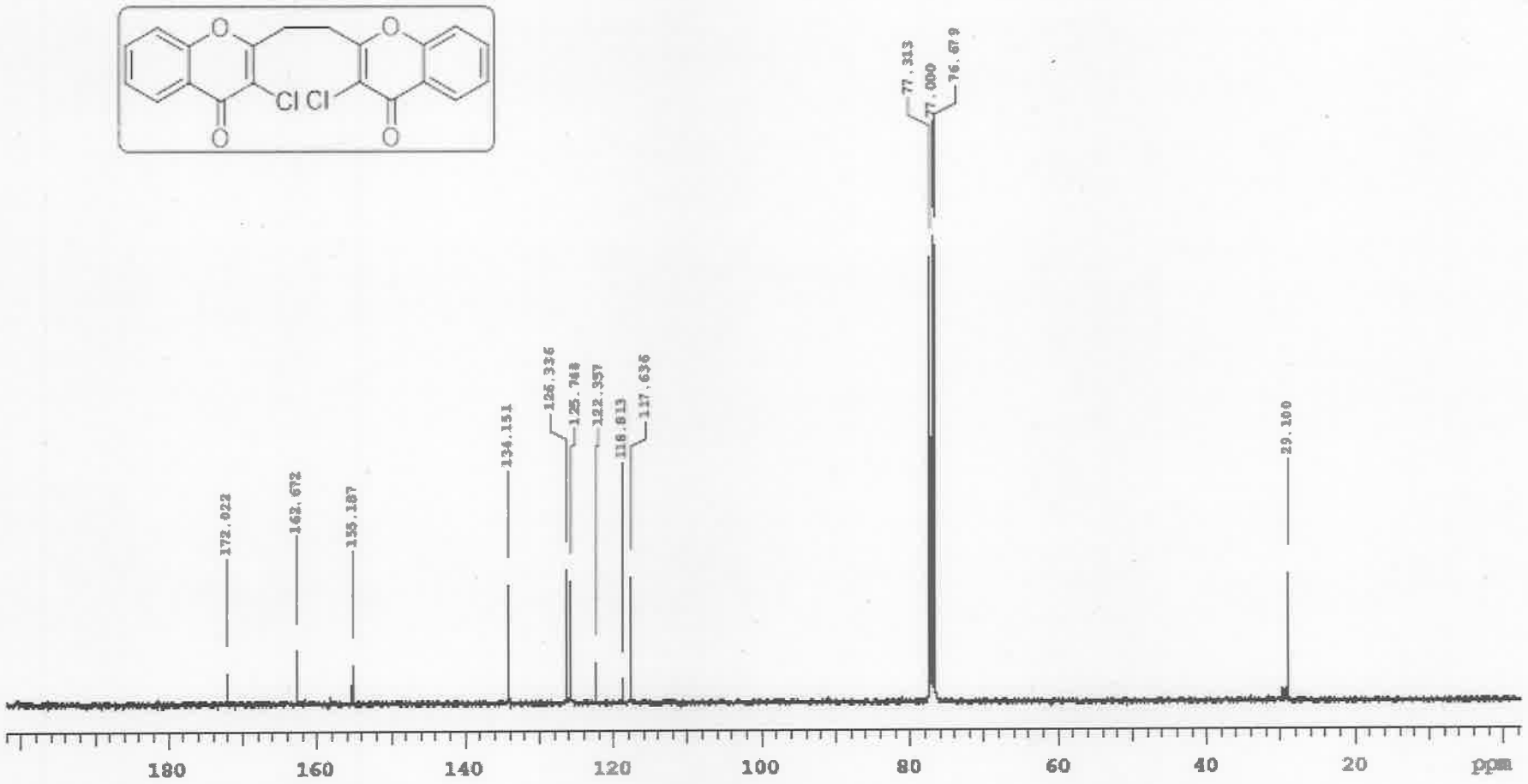


Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
474.9202	474.9181	2.1	4.4	13.5	1.1	C20 H13 O4 Br2

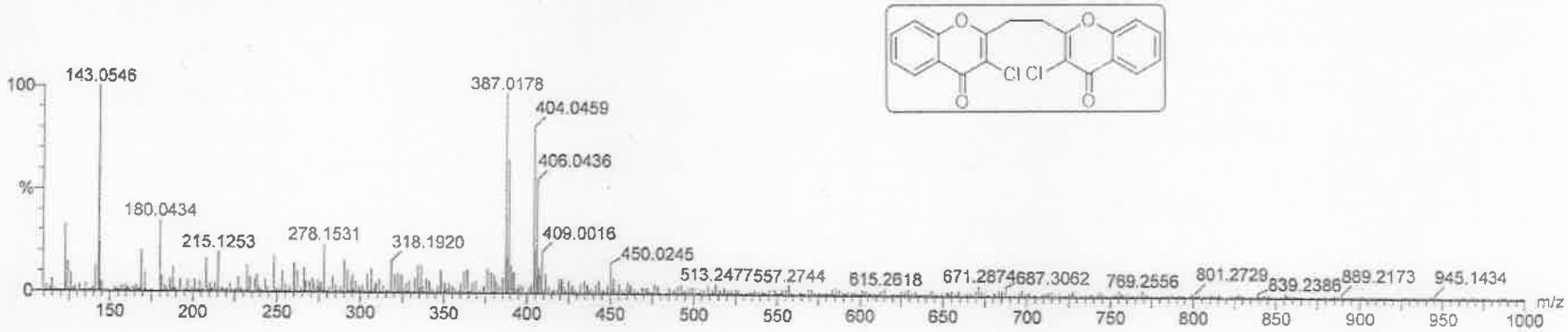
^{1}H NMR (DMSO-d_6) of 2,2'-(Ethane-1,2-diyl)bis(3-chloro-4H-chromen-4-one) (**9c**)



^{13}C NMR ($CDCl_3$) of 2,2'-(Ethane-1,2-diyl)bis(3-chloro-4H-chromen-4-one) (**9c**)

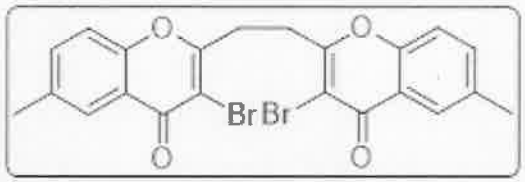


HRMS of 2,2'-(ethane-1,2-diyl)bis(3-chloro-4H-chromen-4-one) **(9c)**

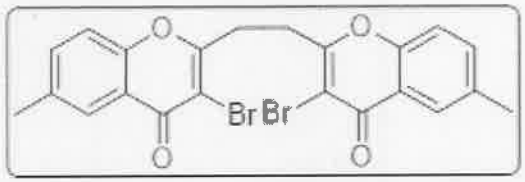


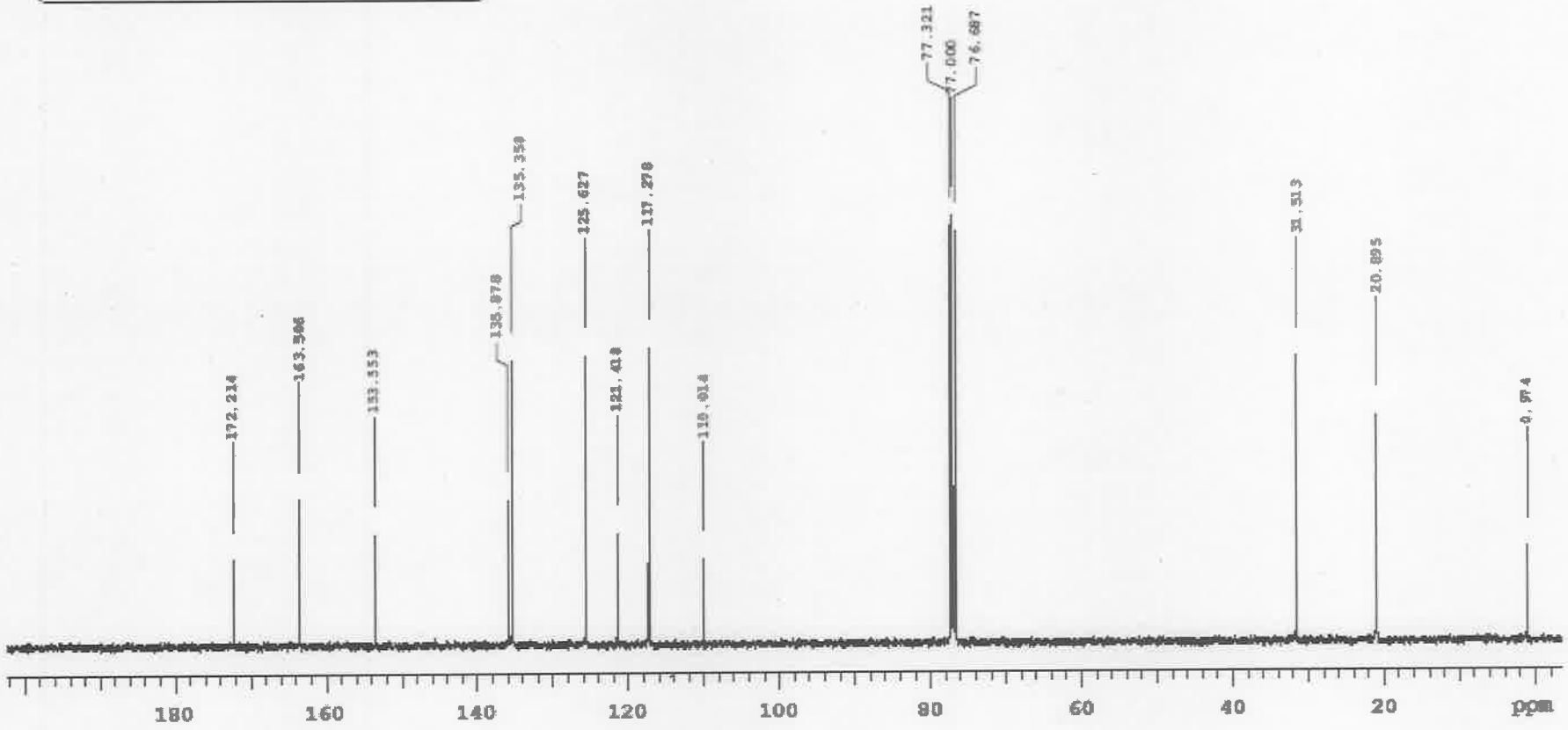
Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
387.0178	387.0191	-1.3	-3.4	13.5	6.6	C20 H13 O4 Cl2

^{1}H NMR ($CDCl_3$) of 2,2'-(Ethane-1,2-diyl)bis(3-bromo-6-methyl-4H-chromen-4-one) **(9d)**

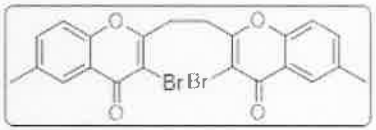


^{13}C NMR ($CDCl_3$) of 2,2'-(Ethane-1,2-diyl)bis(3-bromo-6-methyl-4H-chromen-4-one) **(9d)**



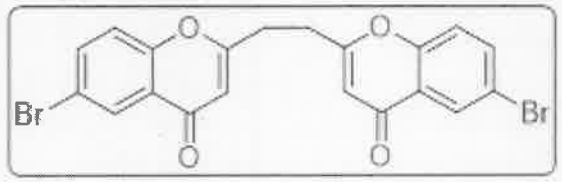


HRMS of 2,2'-(Ethane-1,2-diyl)bis(3-bromo-6-methyl-4H-chromen-4-one) **(9d)**

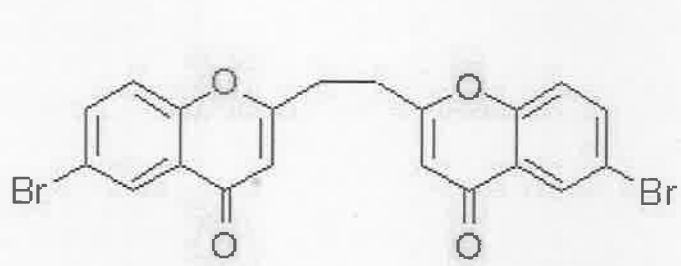


Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
502.9487	502.9494	-0.7	-1.4	13.5	7.1	C22 H17 O4 Br2

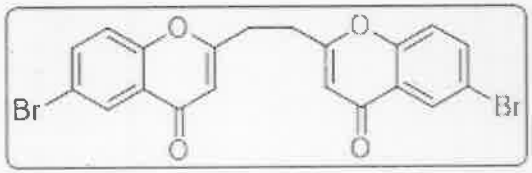
^{1}H NMR ($CDCl_3$) of 2,2'-(Ethane-1,2-diyl)bis(6-bromo-4H-chromen-4-one) **(9e)**

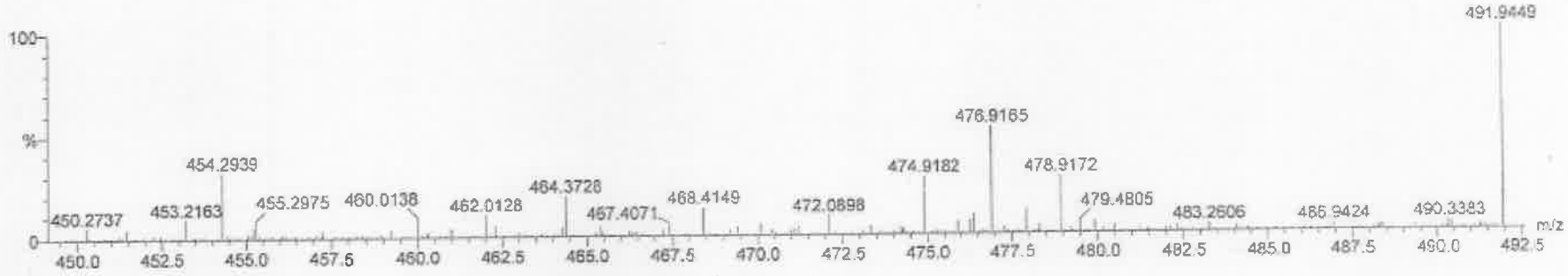


^{13}C NMR ($CDCl_3$) of 2,2'-(Ethane-1,2-diyl)bis(6-bromo-4H-chromen-4-one) **(9e)**



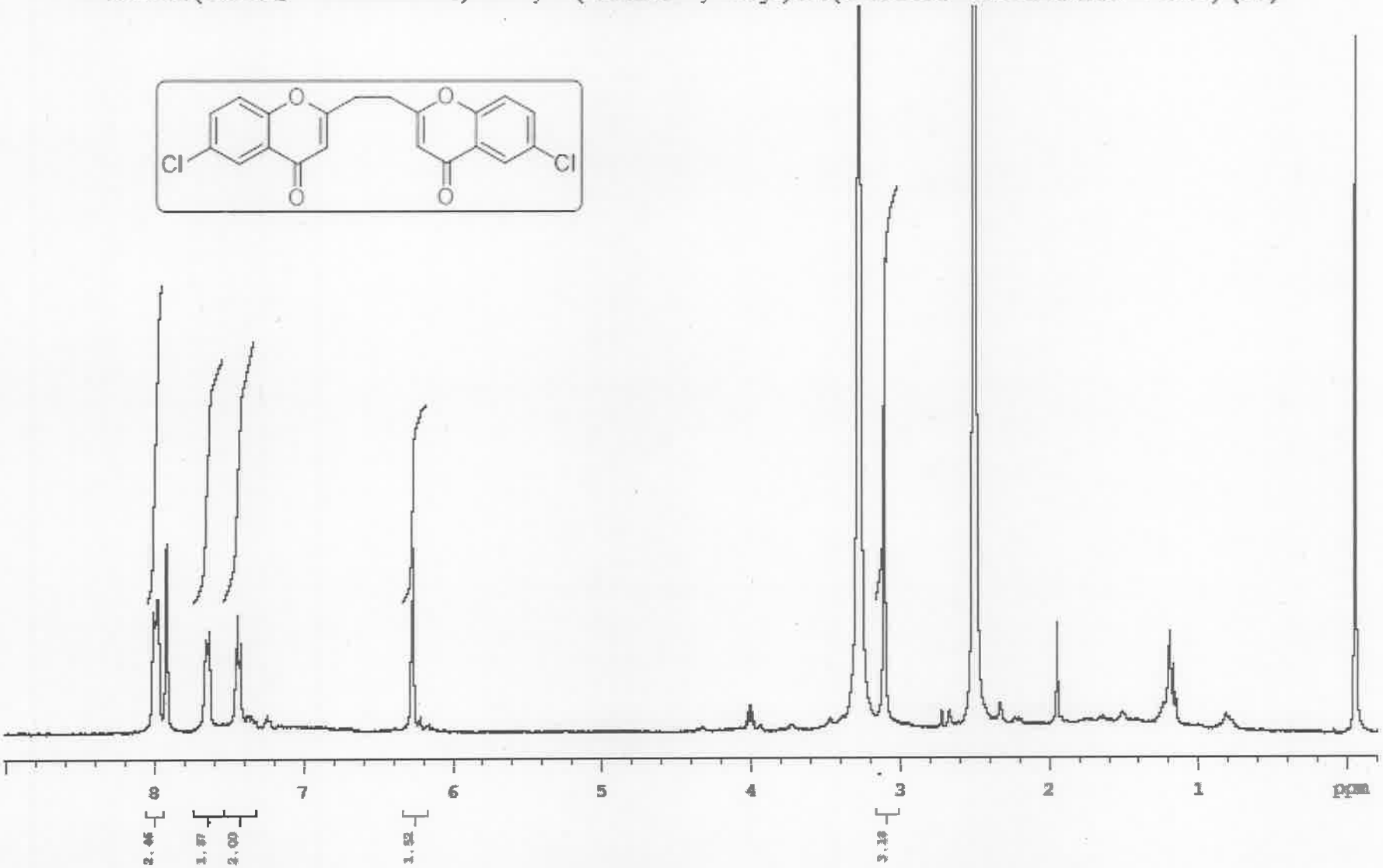
HRMS of 2,2'-(Ethane-1,2-diyl)bis(6-bromo-4H-chromen-4-one) **(9e)**



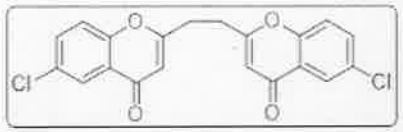


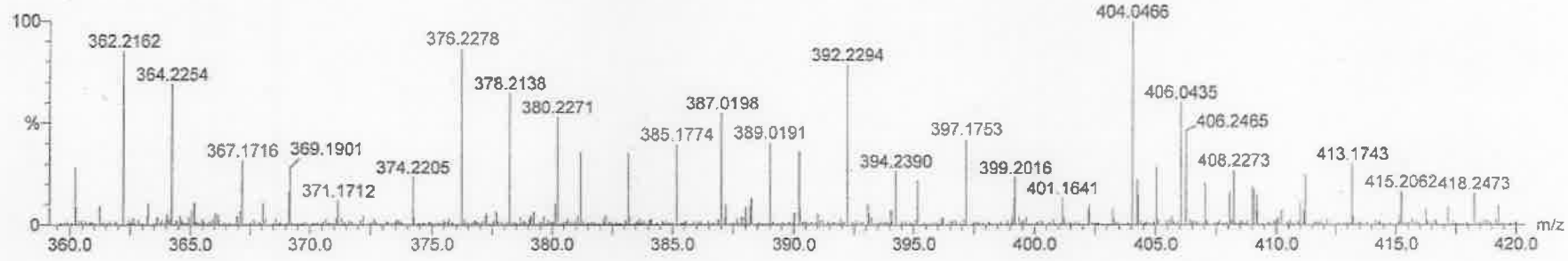
Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
474.9182	474.9181	0.1	0.2	13.5	0.8	C20 H13 O4 Br2

^{1}H NMR ($CDCl_3$ + DMSO-d_6) of 2,2'-(Ethane-1,2-diyl)bis(6-chloro-4H-chromen-4-one) **(9f)**



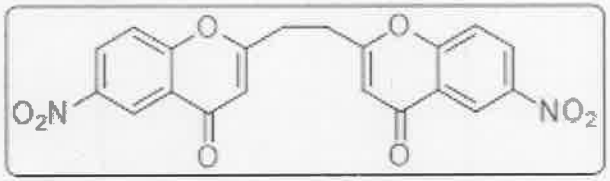
HRMS of 2,2'-(Ethane-1,2-diyl)bis(6-chloro-4H-chromen-4-one) **(9f)**



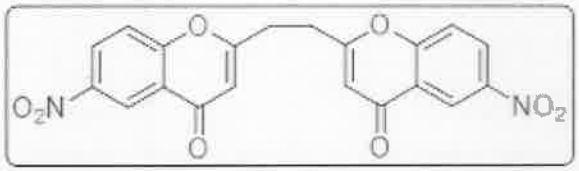


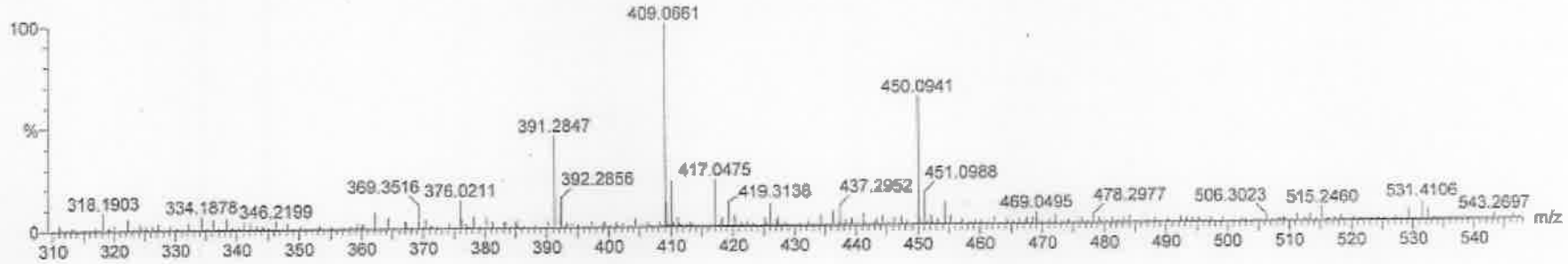
Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
387.0198	387.0191	0.7	1.8	13.5	6.3	C20 H13 O4 Cl2

^{1}H NMR (DMSO-d_6) of 2,2'-(Ethane-1,2-diyl)bis(6-nitro-4H-chromen-4-one) **(9g)**



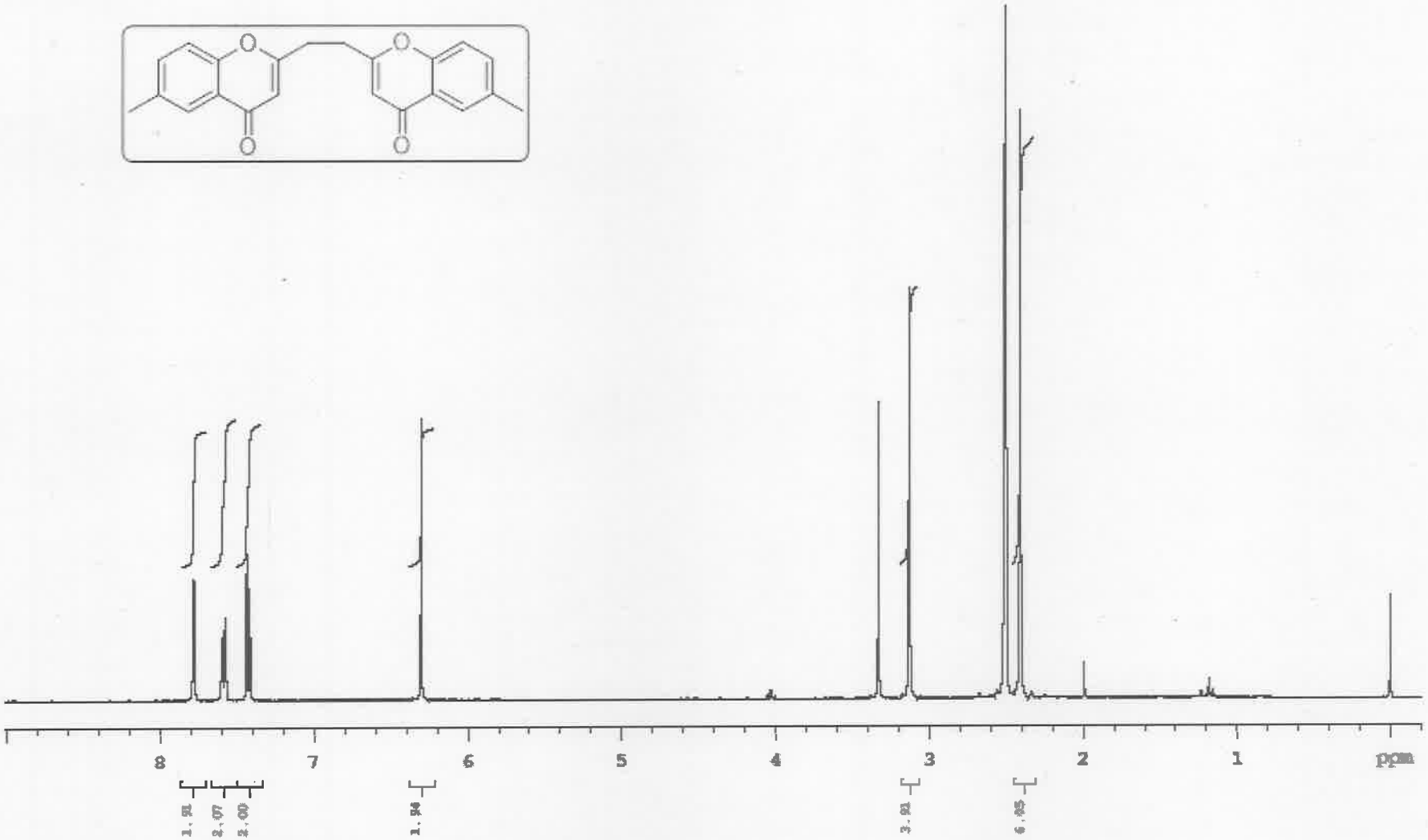
HRMS of 2,2'-(Ethane-1,2-diyl)bis(6-nitro-4H-chromen-4-one) (**9g**)



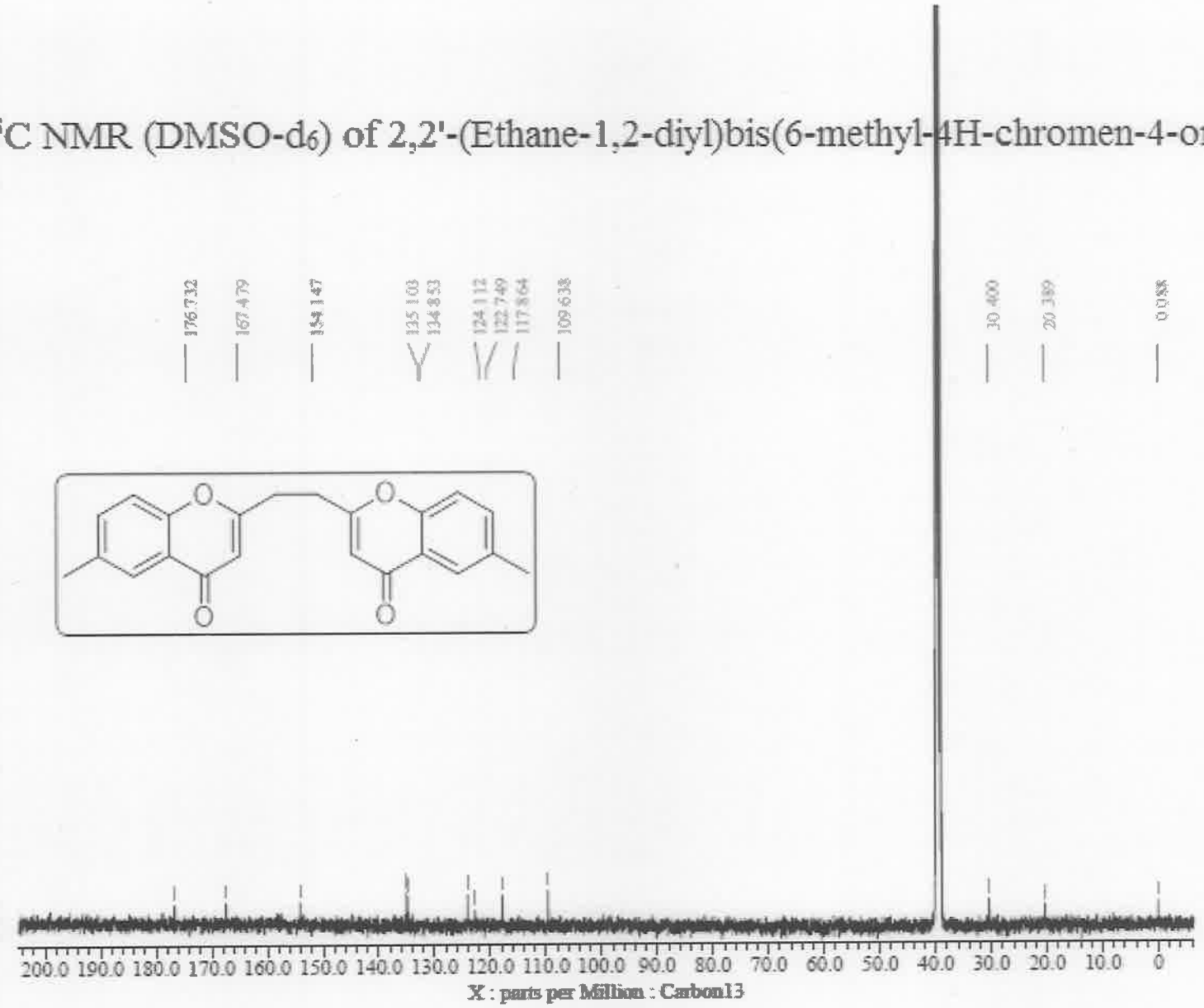


Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
409.0661	409.0672	-1.1	-2.7	15.5	13.3	C20 H13 N2 O8

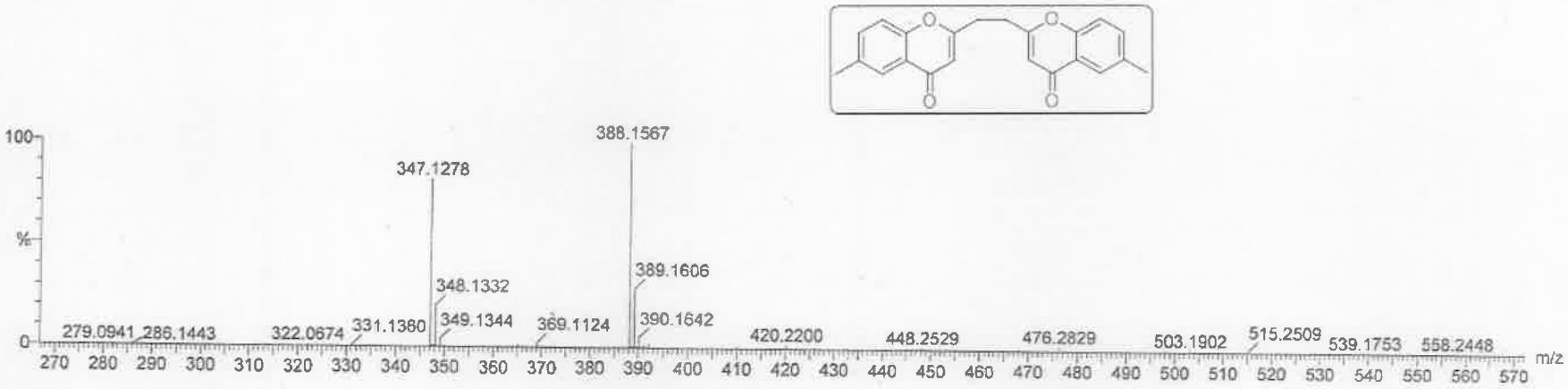
^{1}H NMR (DMSO-d6) of 2,2'-(Ethane-1,2-diyl)bis(6-methyl-4H-chromen-4-one) (**9h**)



^{13}C NMR (DMSO-d_6) of 2,2'-(Ethane-1,2-diyl)bis(6-methyl-4H-chromen-4-one) **(9h)**

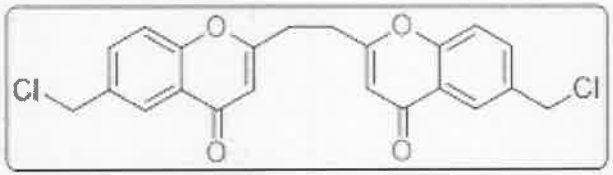


HRMS of 2,2'-(Ethane-1,2-diyl)bis(6-methyl-4H-chromen-4-one) **(9h)**

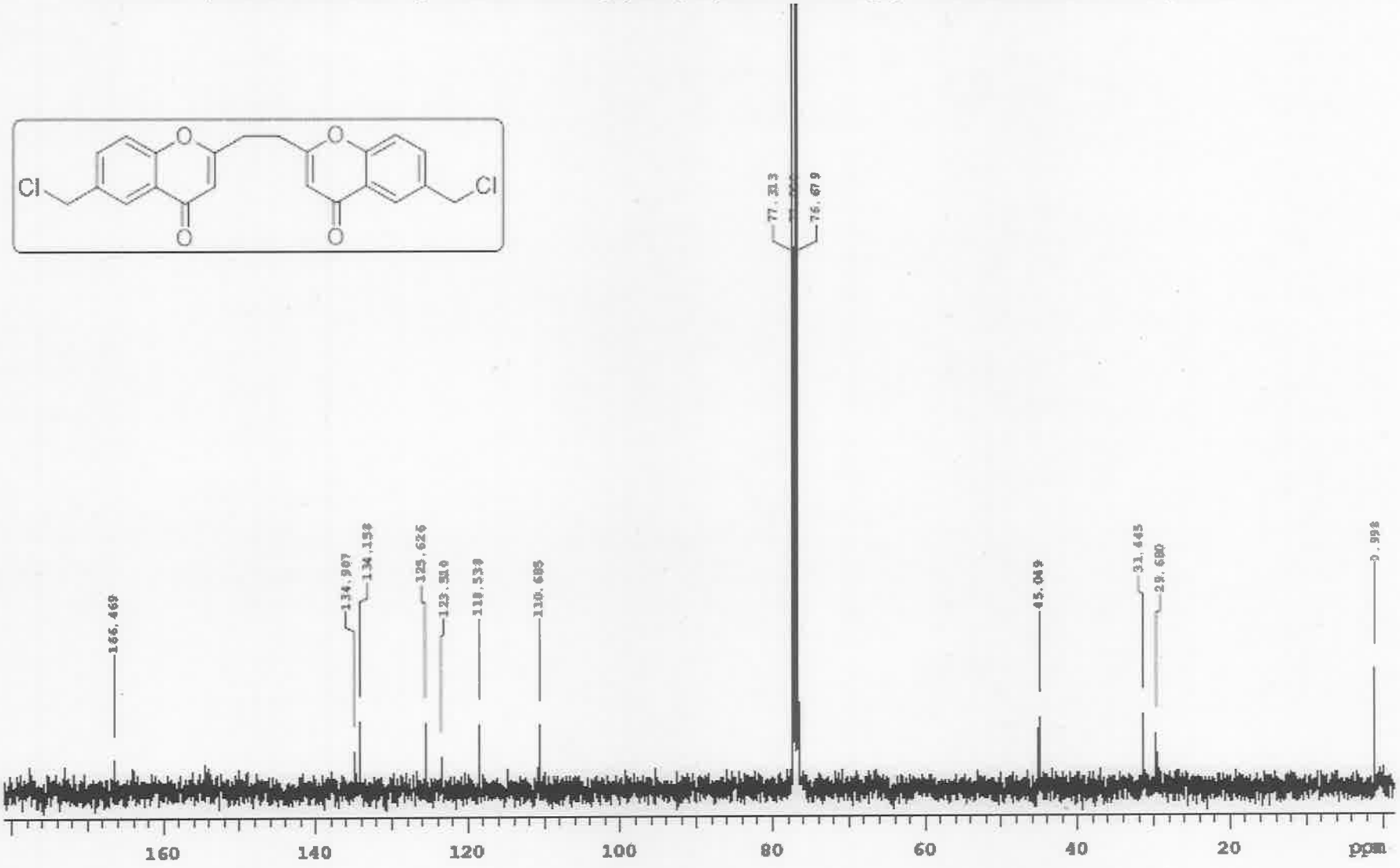


Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
347.1278	347.1283	-0.5	-1.4	13.5	114.3	C22 H19 O4

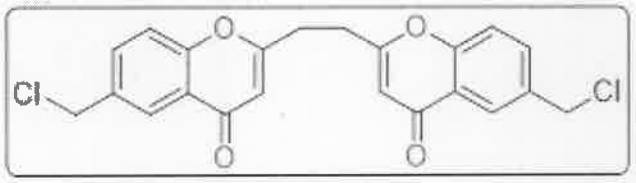
^{1}H NMR ($CDCl_3$) of 2,2'-(Ethane-1,2-diyl)bis(6-(chloromethyl)-4H-chromen-4-one) **(9i)**

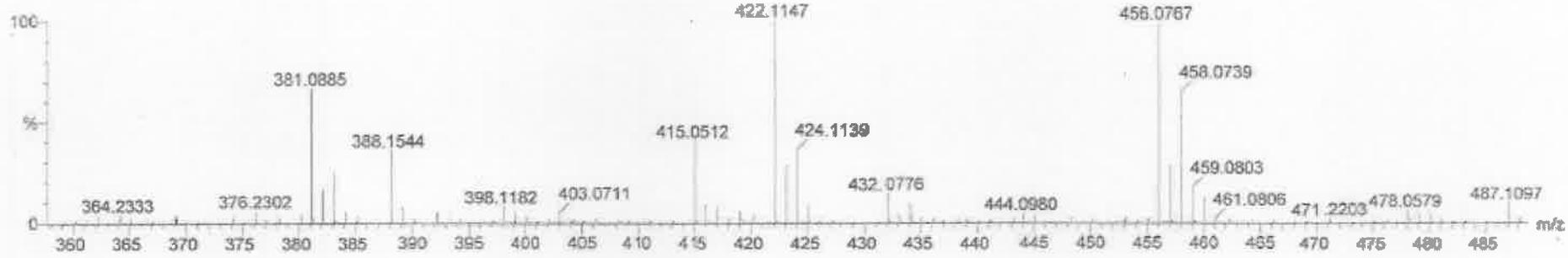


^{13}C NMR ($CDCl_3$) of 2,2'-(Ethane-1,2-diyl)bis(6-(chloromethyl)-4H-chromen-4-one) **(9i)**



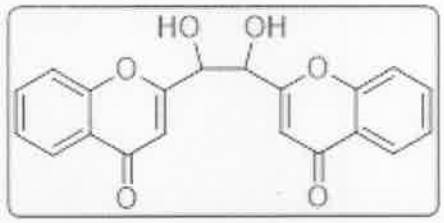
HRMS of 2,2'-(Ethane-1,2-diyl)bis(6-(chloromethyl)-4H-chromen-4-one) (**9i**)



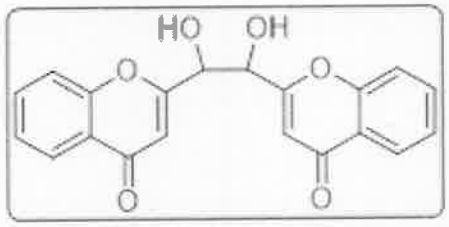


Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
415.0512	415.0504	0.8	1.9	13.5	242.7	C22 H17 O4 Cl2

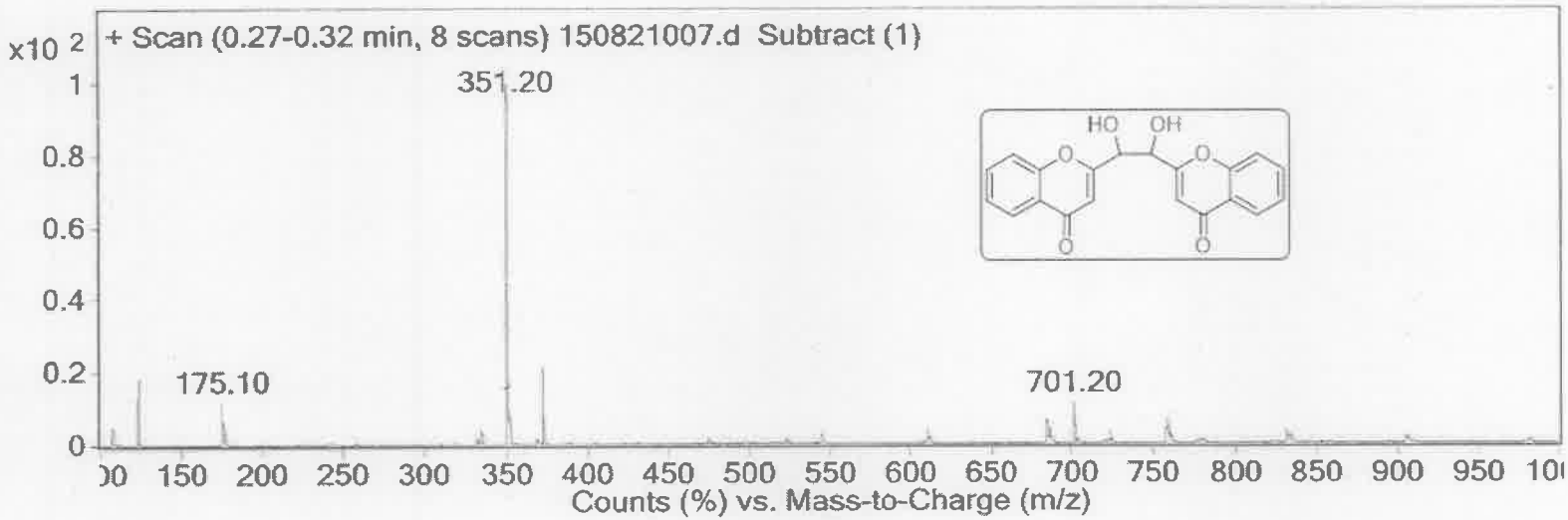
^{1}H NMR ($CDCl_3$) of 2,2'-(1,2-dihydroxyethane-1,2-diyl)bis(4H-chromen-4-one) **(11)**



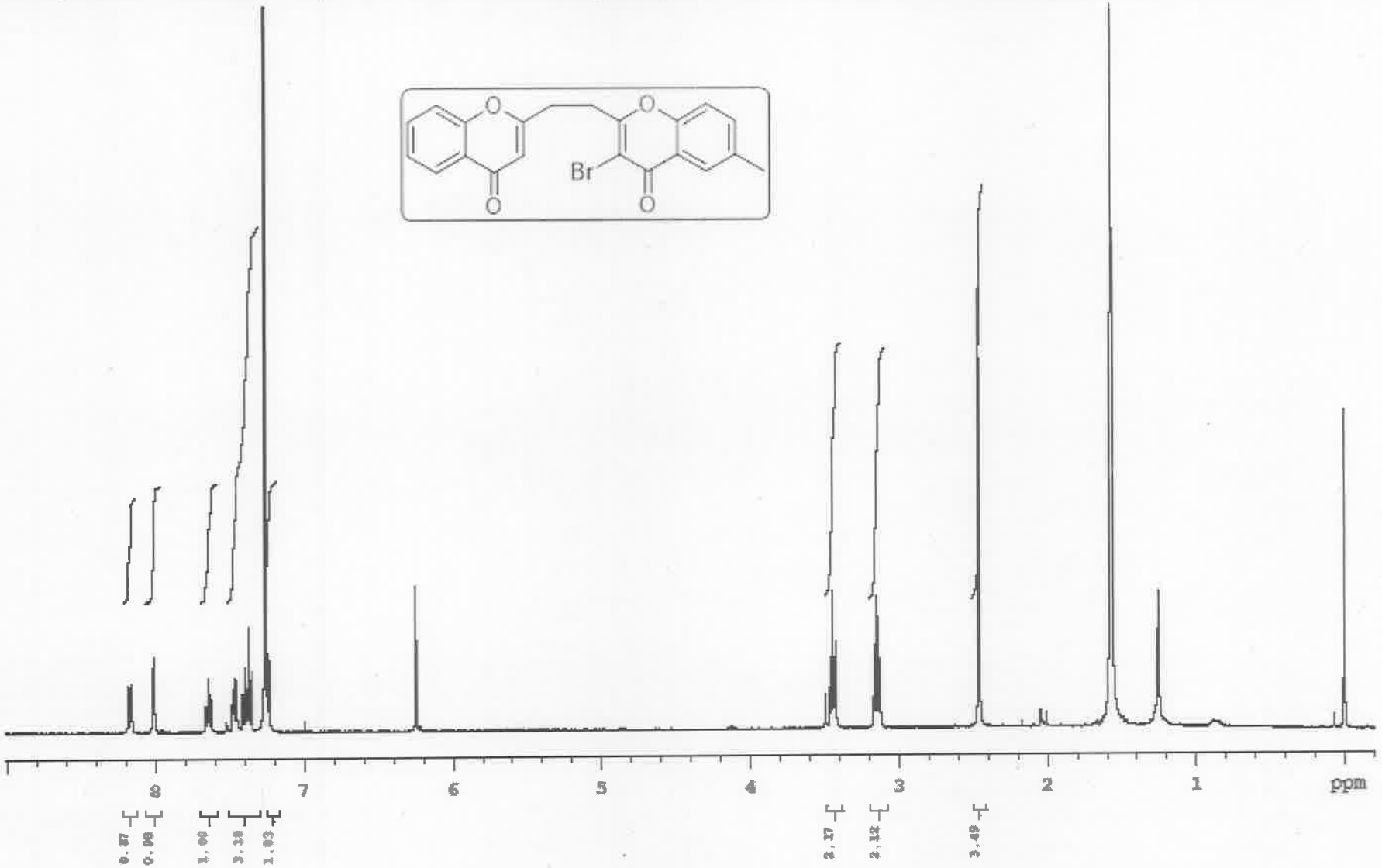
^{13}C NMR (DMSO-d_6) of 2,2'-(1,2-dihydroxyethane-1,2-diyl)bis(4H-chromen-4-one) **(11)**



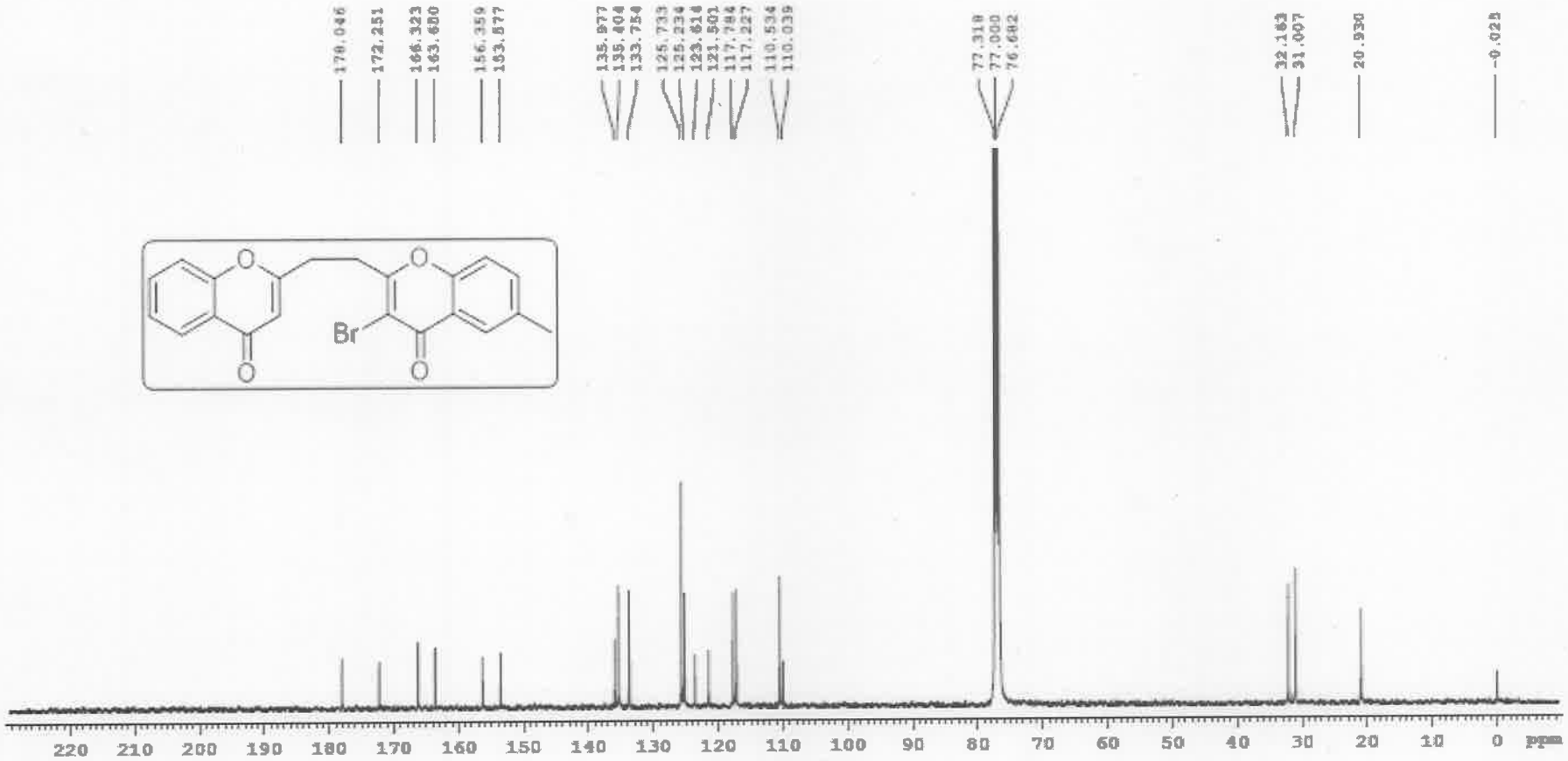
MASS of 2,2'-(1,2-dihydroxyethane-1,2-diyl)bis(4H-chromen-4-one) **(11)**



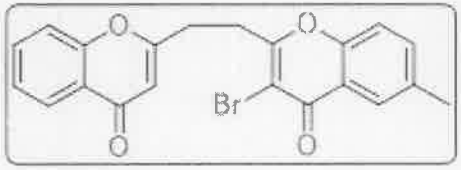
^{1}H NMR ($CDCl_3$ + DMSO-d_6) of 3-Bromo-6-methyl-2-(2-(4-oxo-4H-chromen-2-yl)ethyl)-4H-chromen-4-one **(12)**

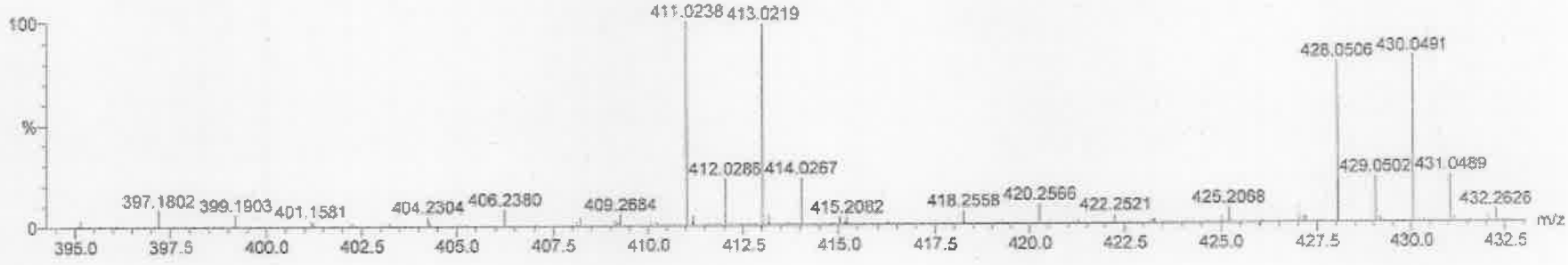


^{13}C NMR ($CDCl_3$) of 3-Bromo-6-methyl-2-(2-(4-oxo-4H-chromen-2-yl)ethyl)-4H-chromen-4-one **(12)**



HRMS of 3-Bromo-6-methyl-2-(2-(4-oxo-4H-chromen-2-yl)ethyl)-4H-chromen-4-one **(12)**





Minimum:				-5.0		
Maximum:		5.0	5.0	80.0		
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
411.0238	411.0232	0.6	1.5	13.5	1.4	C21 H16 O4 Br