Supporting Information

An efficient one-pot approach for the regio and diastereoselective synthesis of *trans*-dihydrofuran derivatives: Cytotoxicity and DNA-binding studies

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X-ray Crystallography:

X-ray data for the compound were collected at room temperature using a Bruker Smart Apex CCD diffractometer with graphite monochromated MoKα radiation (λ=0.71073Å) with ω-scan method.[1] Preliminary lattice parameters and orientation matrices were obtained from four sets of frames.

Integration and scaling of intensity data were accomplished using SAINT program.[1] The structure was solved by direct methods using SHELXS-2014/7 [2] and refinement was carried out by full-matrix least-squares technique using SHELXS-2014/7.[2] Anisotropic displacement parameters were included for all non-hydrogen atoms. H atoms were positioned geometrically and treated as riding on their parent C atoms [C-H = 0.93-0.97 Å and $U_{iso}(H) = 1.5U_{eq}(C)$ for methyl H or $1.2U_{eq}(c)$ for other H atoms]. The methyl groups were allowed to rotate but not to tip.

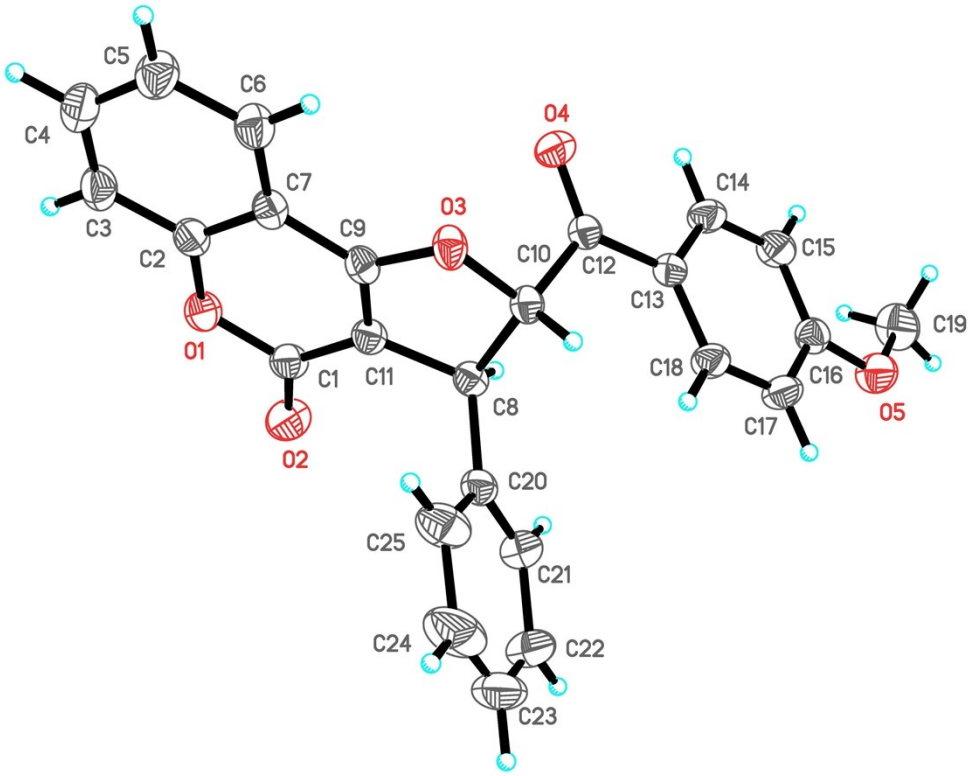


Fig. 1 A view of compound **1b**, showing the atom-labelling scheme. Displacement ellipsoids are drawn at the 30% probability level and H atoms are represented by circles of arbitrary radii.

Crystal Data for Compound 1b: $C_{25}H_{18}O_5$ (M =398.42 g/mol): monoclinic, space group $P2_1/c$ (no. 14), a = 7.5463(10) Å, b = 21.489(3) Å, c = 12.4234(17) Å, β = 105.179(2)°, V = 1944.3(5) Å^3, Z = 4, T = 294.15 K, μ(Mo Kα) = 0.095 mm^{-1}, *Dcalc* = 1.3610 g/cm^3, 22589 reflections measured (3.88° ≤ 2Θ ≤ 56.52°), 4691 unique (R_{int} = 0.0189, R_{sigma} = 0.0156) which were used in all calculations. The final R_1 was 0.0493 (I>2σ(I)) and wR_2 was 0.1546 (all data). CCDC 1524575 contains supplementary Crystallographic data for the structure. CCDC contains supplementary Crystallographic data for the structure. These data can be obtained free of charge at www.ccdc.cam.ac.uk/conts/retrieving.html [or from the Cambridge Crystallographic Data Centre (CCDC), 12 Union Road, Cambridge CB2 1EZ, UK; fax: +44(0) 1223 336 033; email: deposit@ccdc.cam.ac.uk].

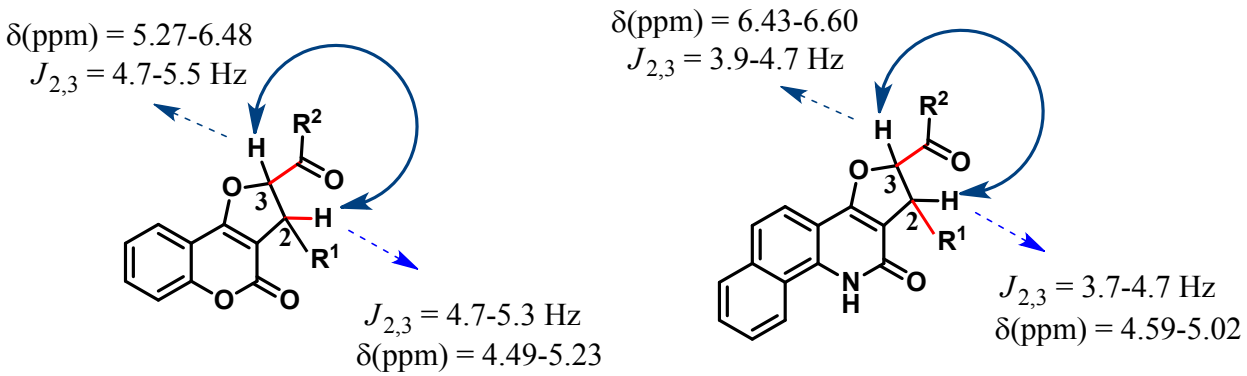


Fig. 1 Establishment of the *trans*- orientation of the structures **1** and **2** from their ^{1}H NMR coupling constants.

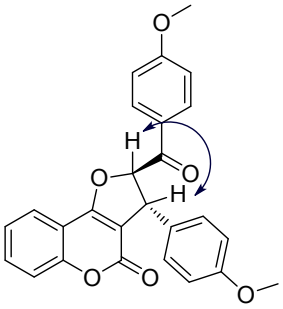
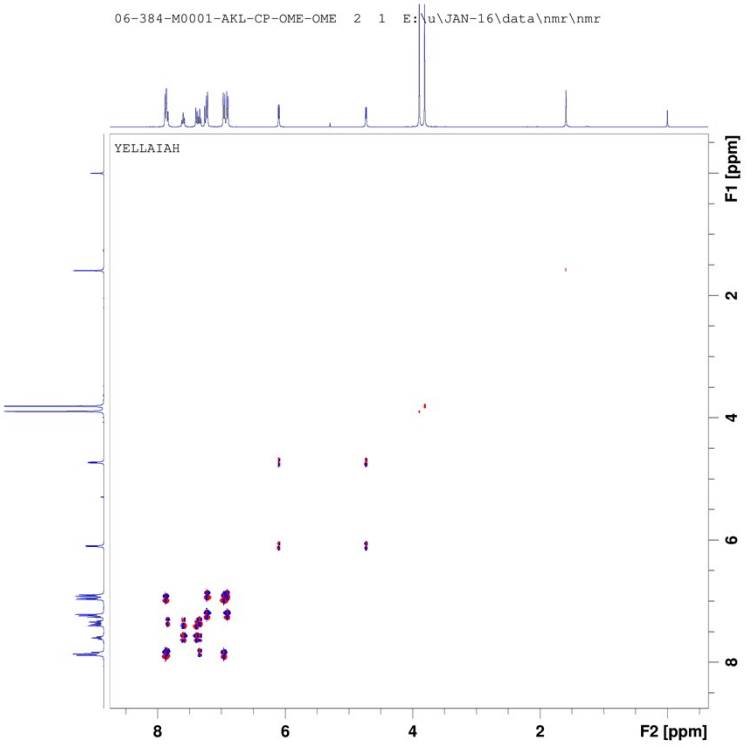
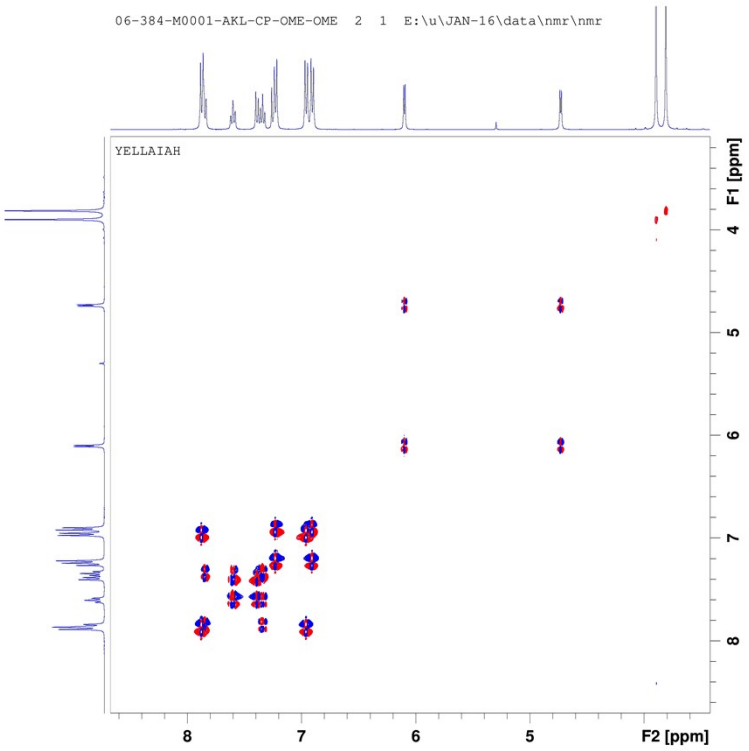


Fig. 1 Key COSY correlations of compound **1e**.

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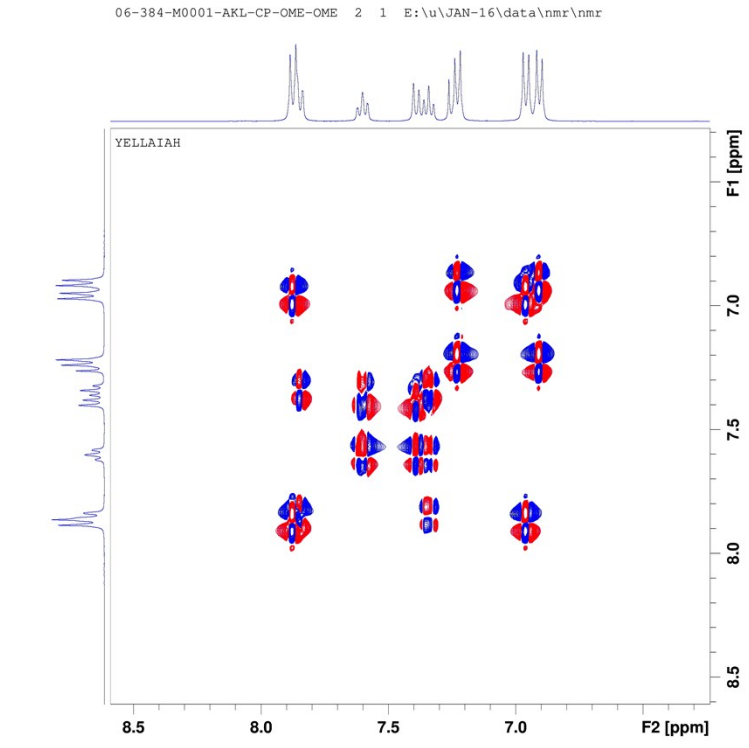
5
6
7
8
F2 [ppm]
8
7
6
5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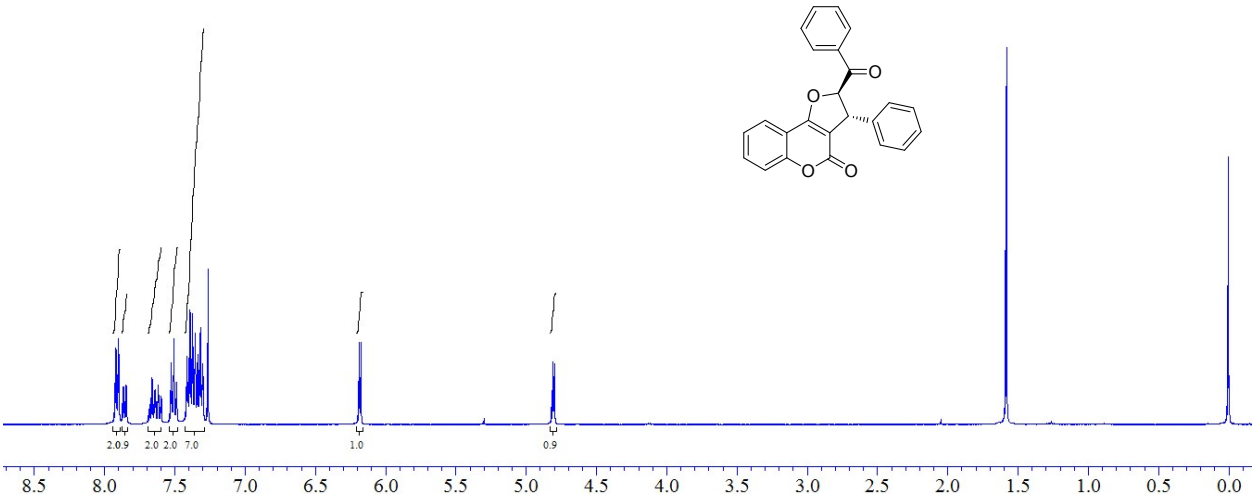
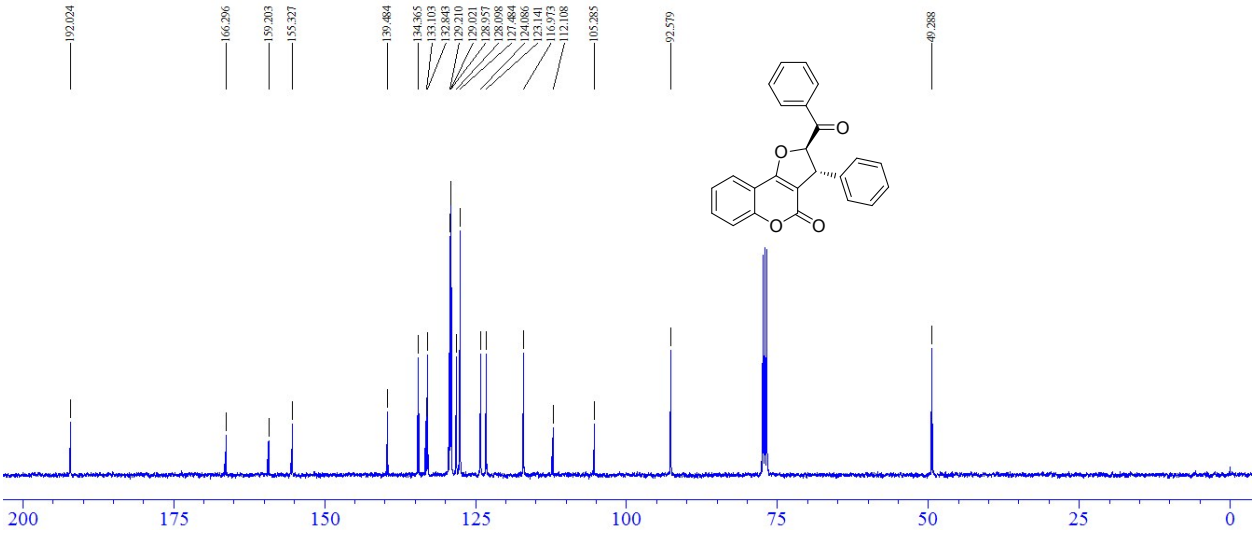
7.5
8.0
8.5
F2 [ppm]
8.5
8.0
7.5
7.0

***trans*-2-Benzoyl-3-phenyl-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1a).**

^{1}H NMR (400 MHz, $CDCl_3$)

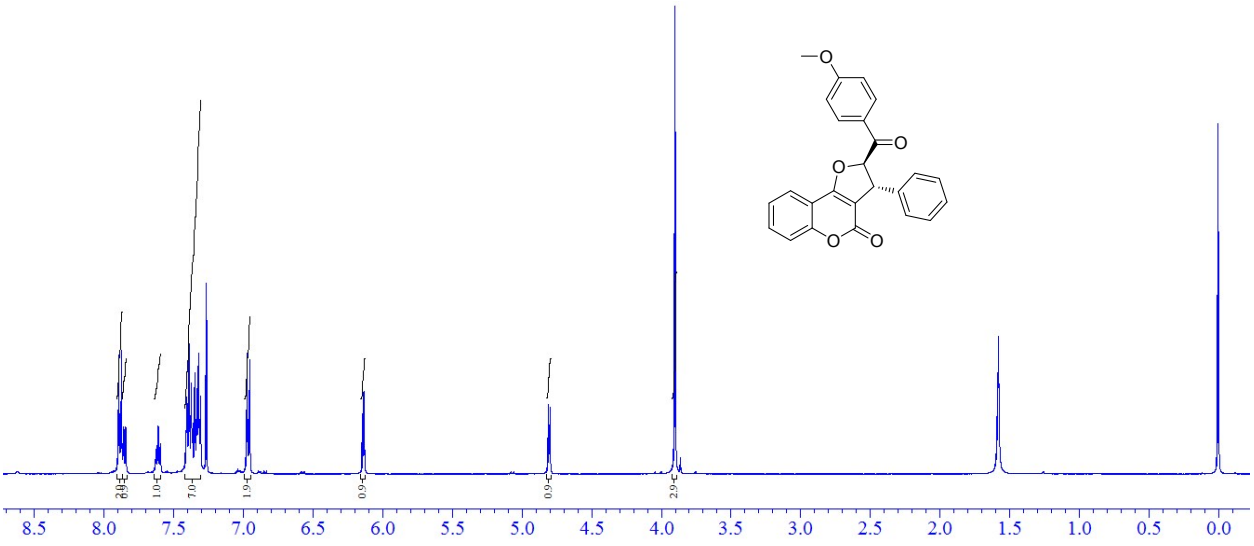


^{13}C NMR (100 MHz, $CDCl_3$)

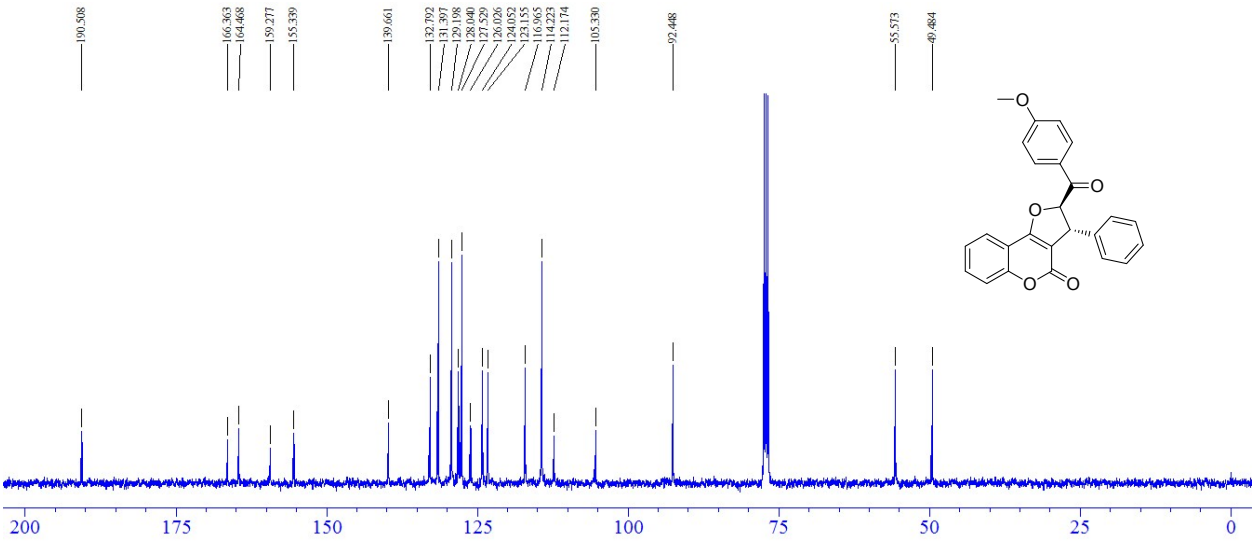


***trans*-2-(4-Methoxybenzoyl)-3-phenyl-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1b).**

^{1}H NMR (500 MHz, $CDCl_3$)

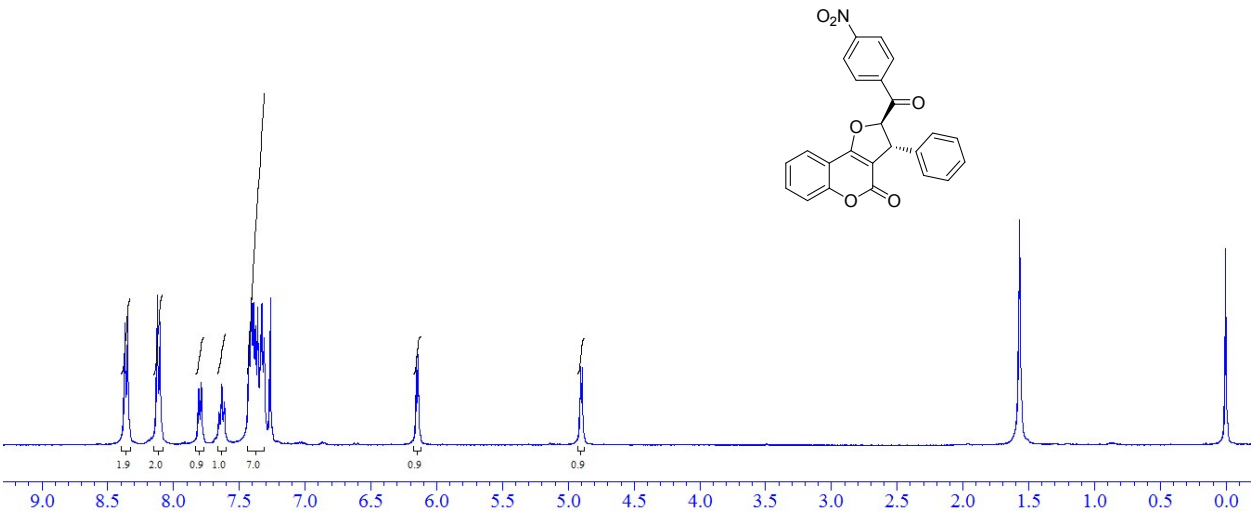


^{13}C NMR (100 MHz, $CDCl_3$)

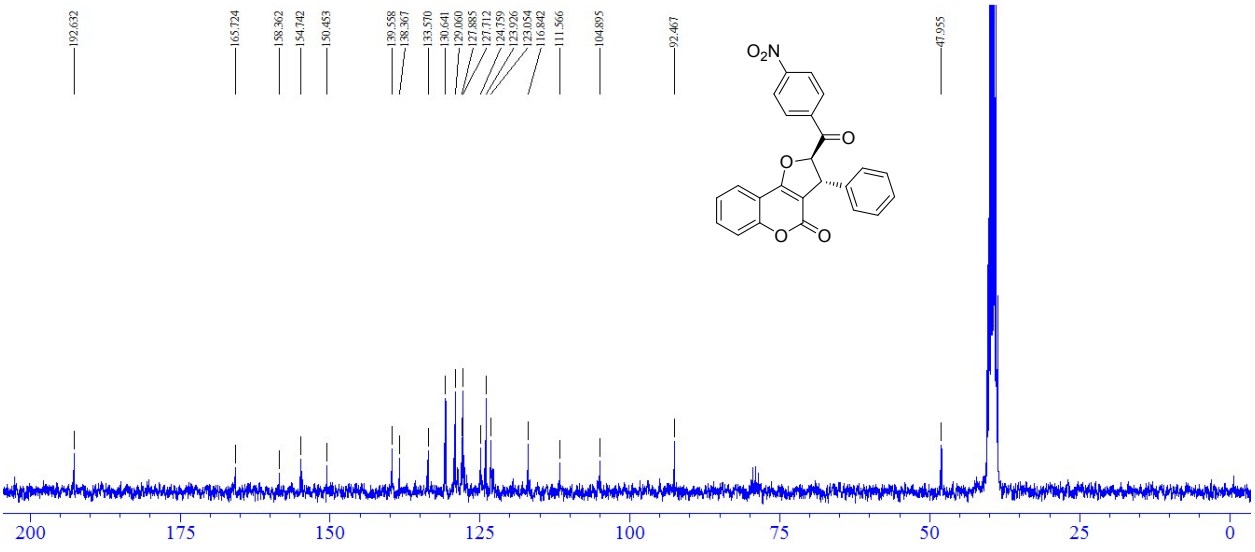


***trans*-2-(4-Nitrobenzoyl)-3-phenyl-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1c).**

^{1}H NMR (500 MHz, $CDCl_3$)

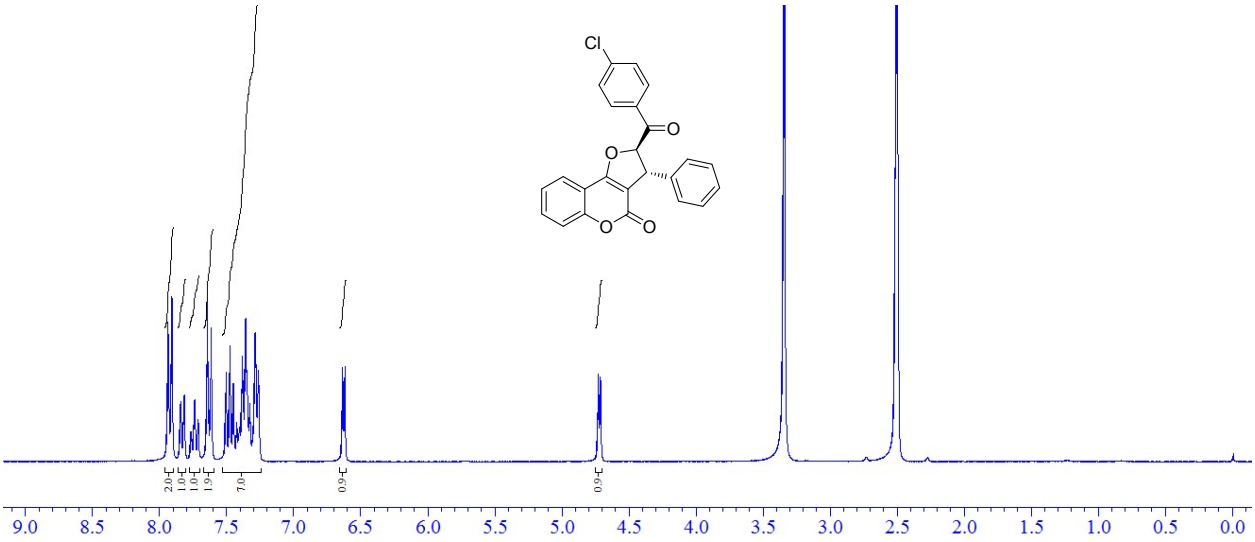


^{13}C NMR (75 MHz, $CDCl_3$ + DMSO-d_6)

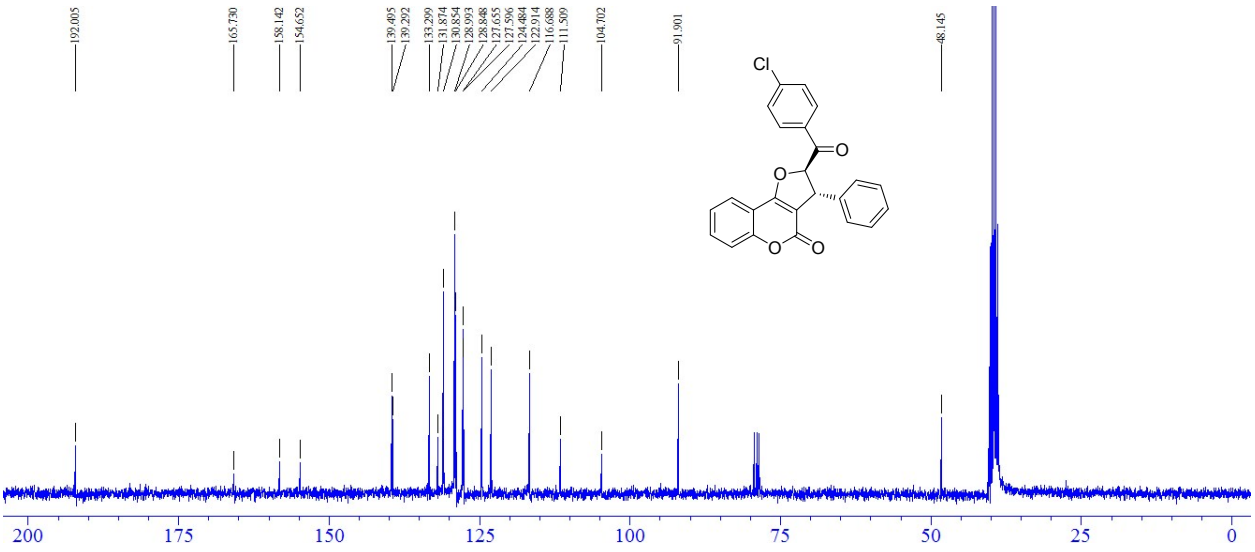


***trans* -2-(4-Chlorobenzoyl)-3-phenyl-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1d).**

^{1}H NMR (300 MHz, DMSO-d_6)

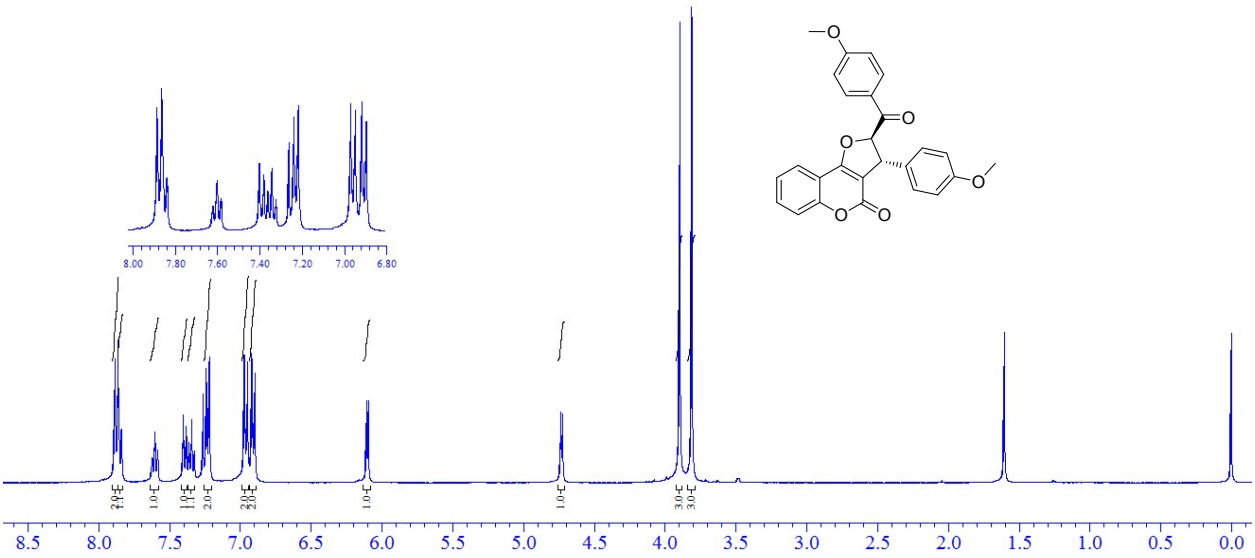


^{13}C NMR (75 MHz, $CDCl_3$ + DMSO-d_6)

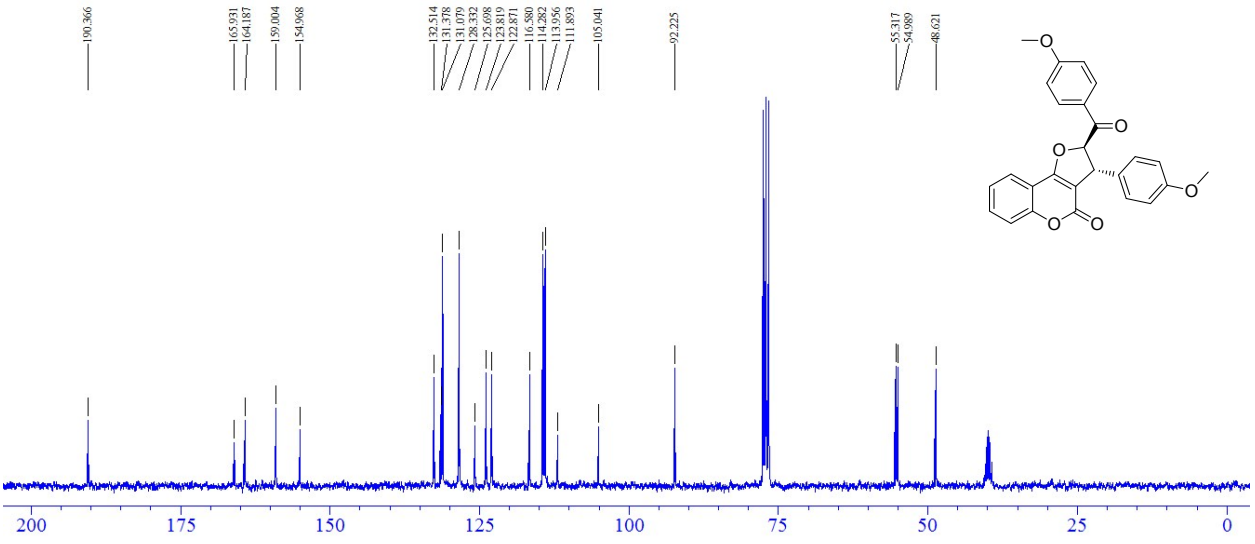


***trans*-2-(4-Methoxybenzoyl)-3-(4-methoxyphenyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1e).**

^{1}H NMR (400 MHz, $CDCl_3$)

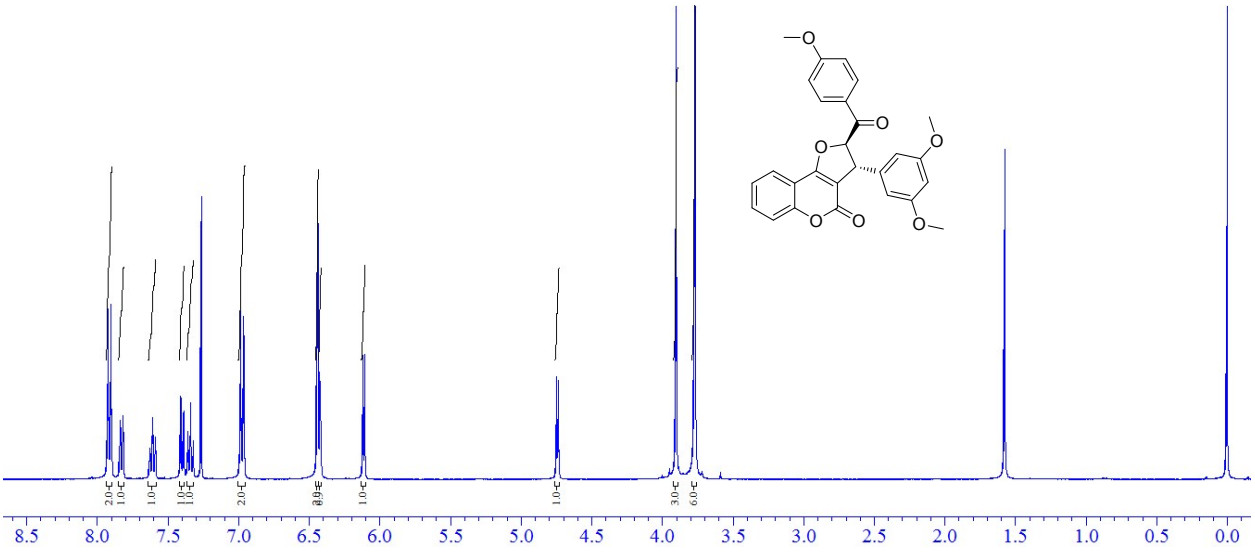


^{13}C NMR (75 MHz, $CDCl_3$ + DMSO-d_6)

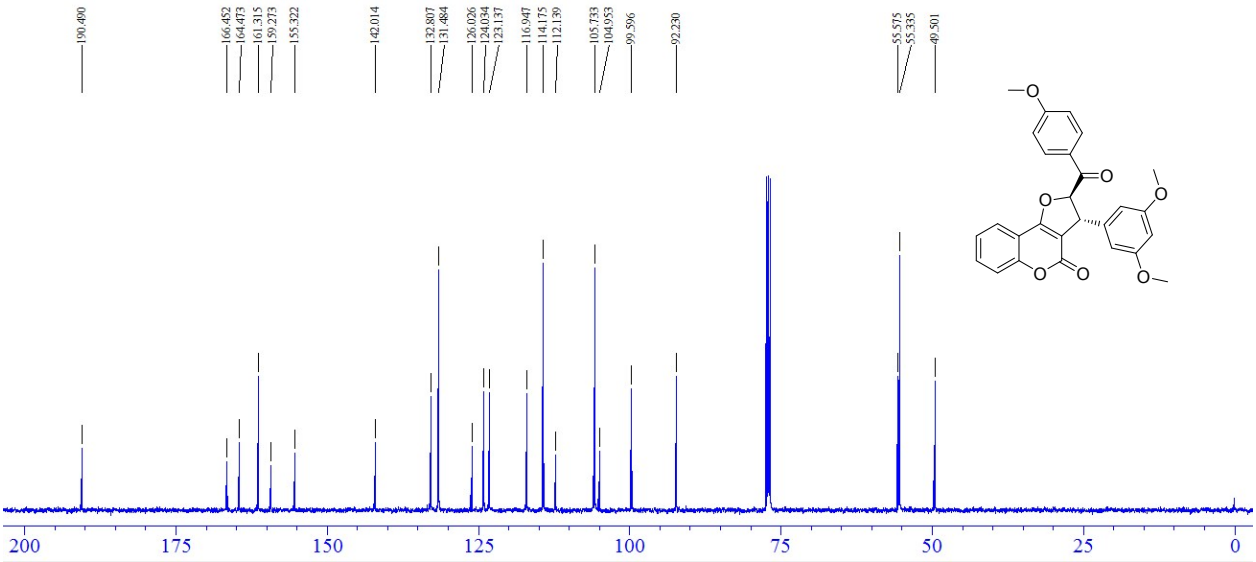


***trans*-3-(3,5-Dimethoxyphenyl)-2-(4-methoxybenzoyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1f).**

^{1}H NMR (400 MHz, $CDCl_3$)

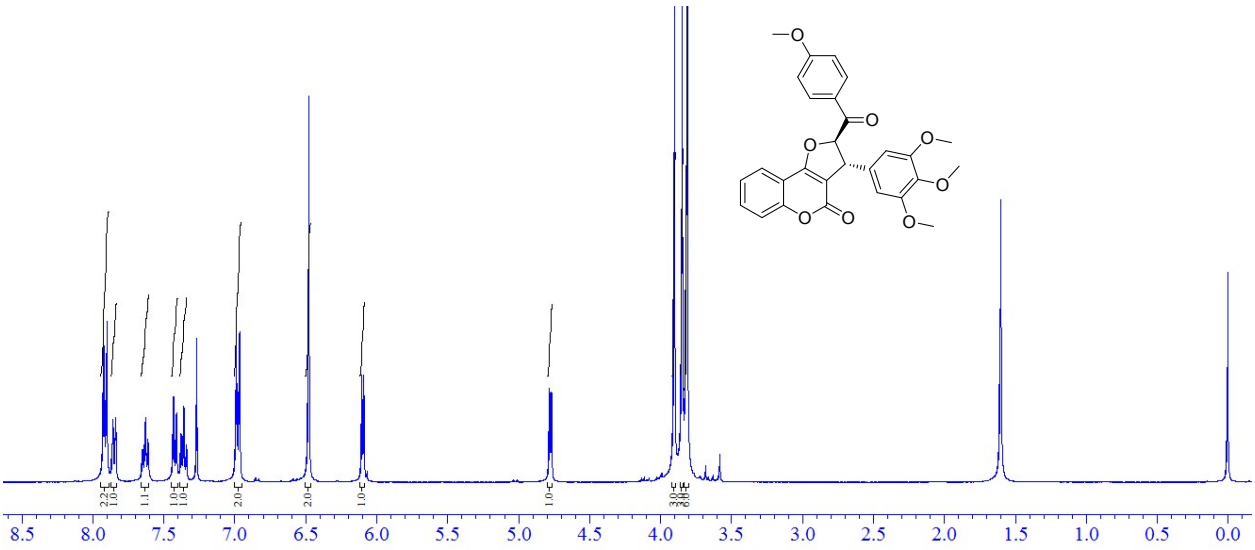


^{13}C NMR (125 MHz, $CDCl_3$)

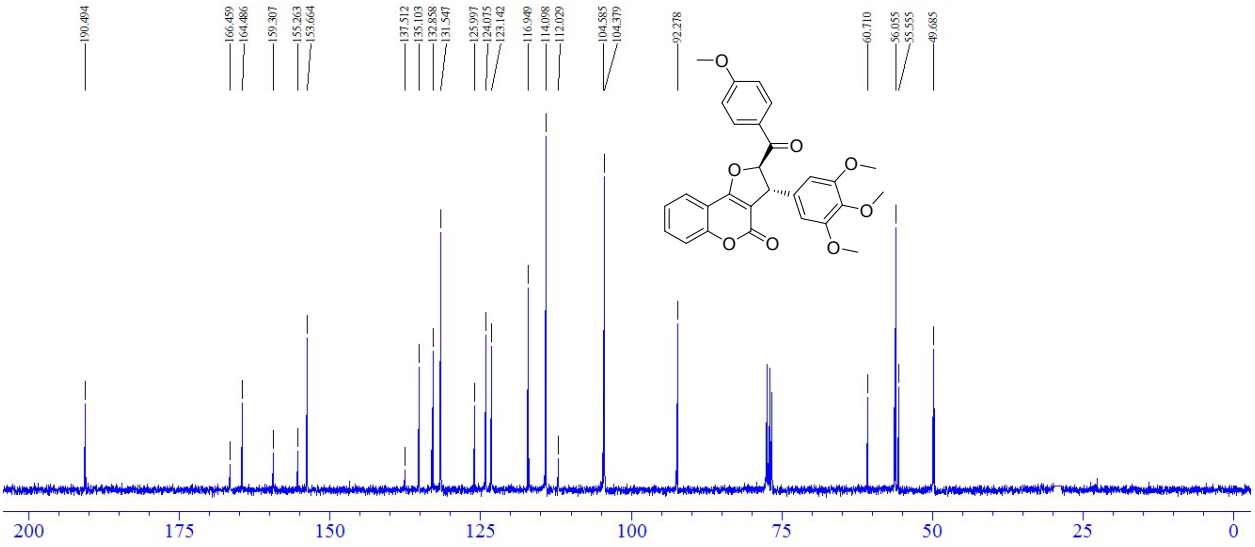


***trans*-2-(4-Methoxybenzoyl)-3-(3,4,5-trimethoxyphenyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1g).**

^{1}H NMR (400 MHz, $CDCl_3$)

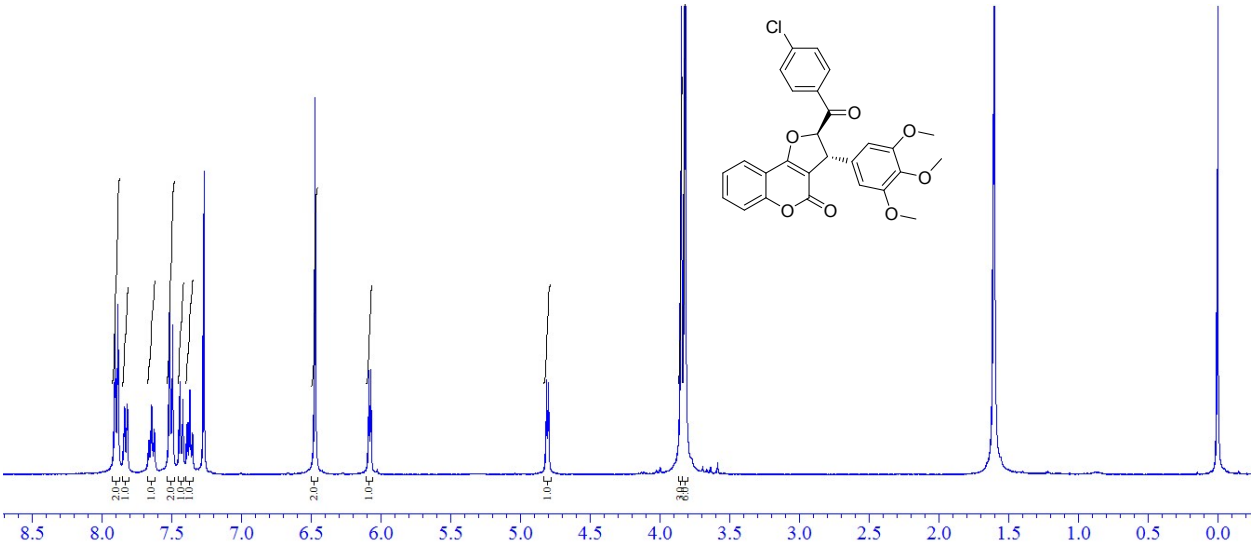


^{13}C NMR (75 MHz, $CDCl_3$)

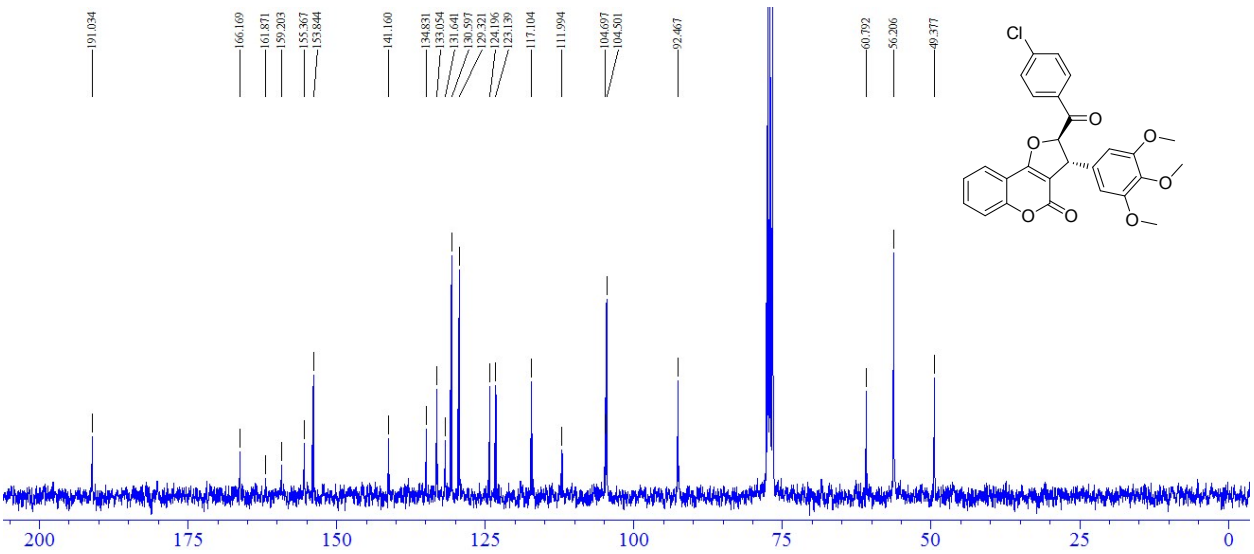


t*rans*-2-(4-Chlorobenzoyl)-3-(3,4,5-trimethoxyphenyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1h).

^{1}H NMR (400 MHz, $CDCl_3$)

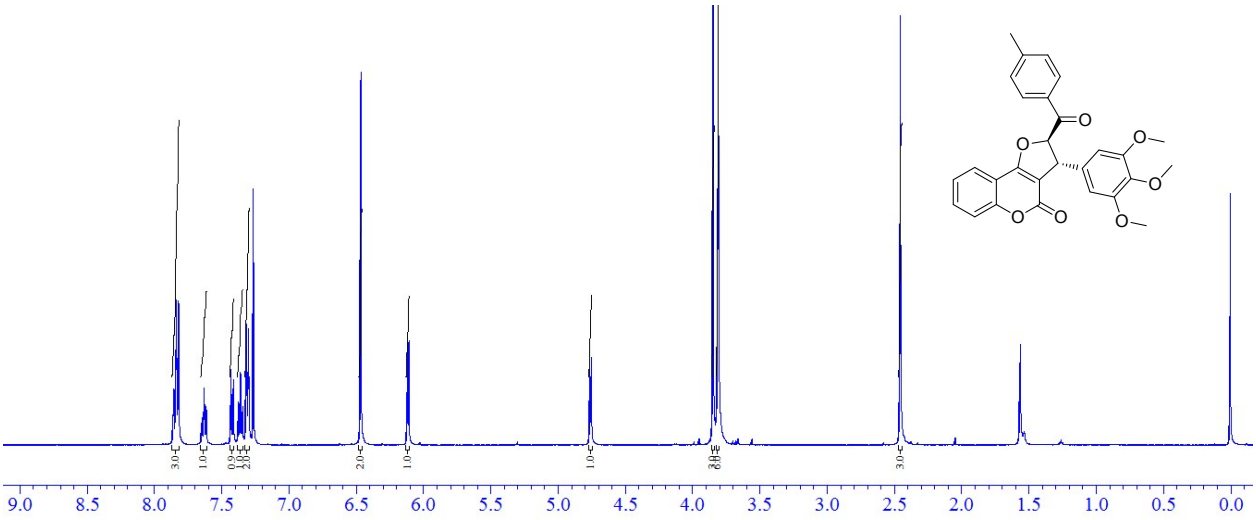


^{13}C NMR (75 MHz, $CDCl_3$)

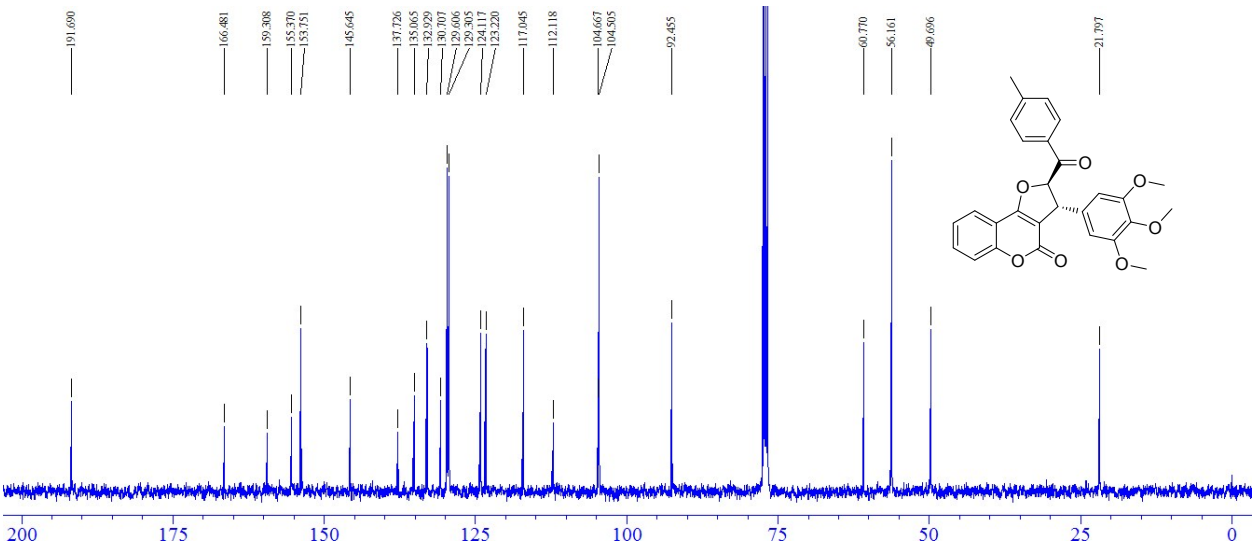


***trans*-2-(4-Methylbenzoyl)-3-(3,4,5-trimethoxyphenyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1i).**

^{1}H NMR (500 MHz, $CDCl_3$)

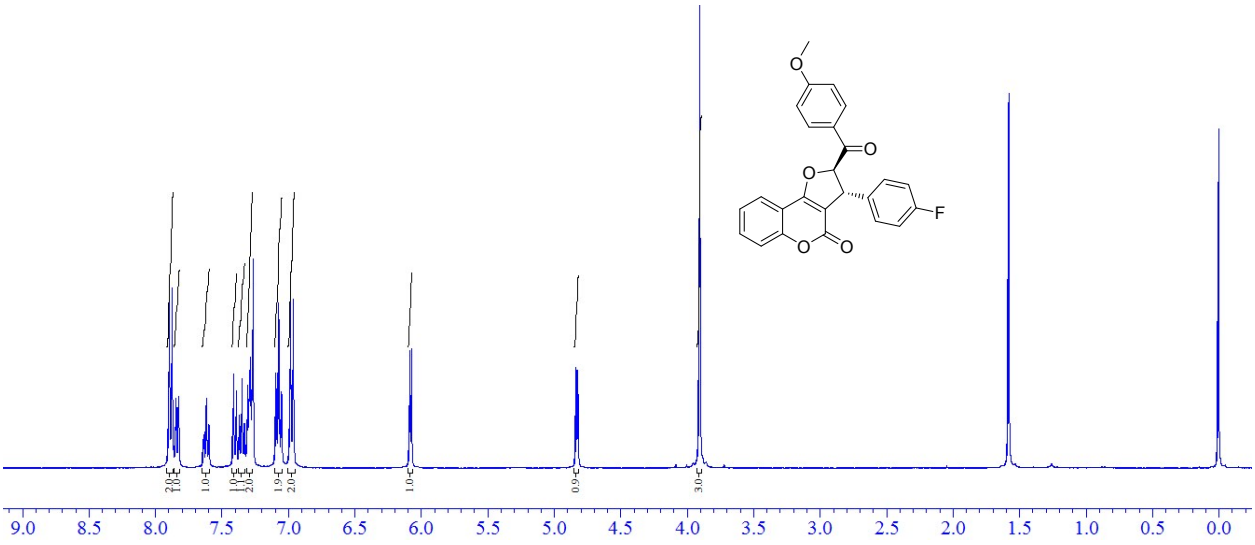


^{13}C NMR (100 MHz, $CDCl_3$)

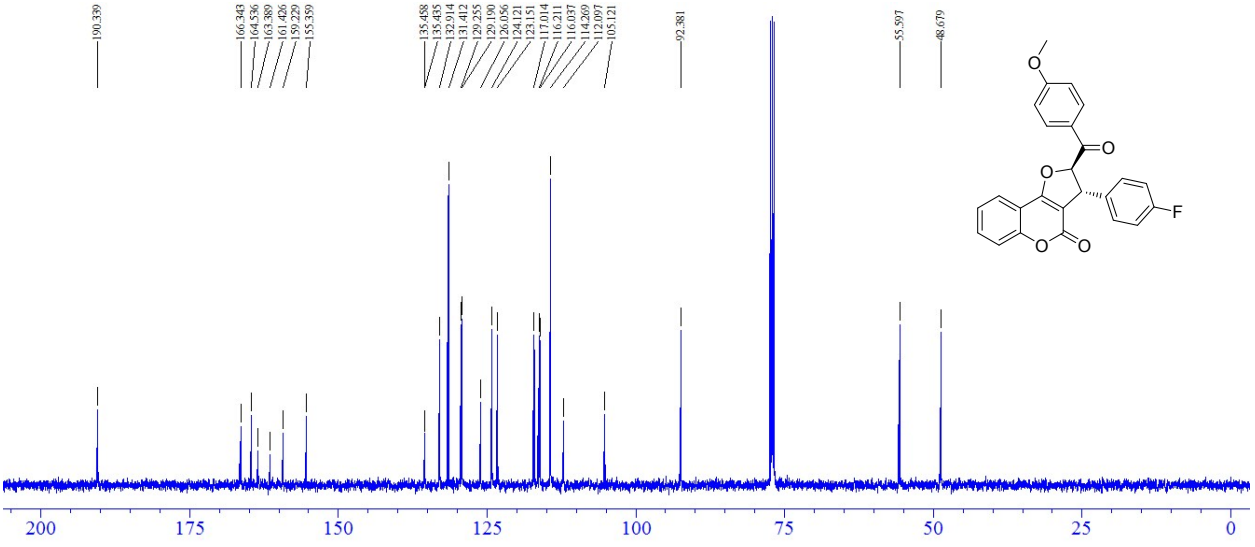


***trans*-3-(4-Fluorophenyl)-2-(4-methoxybenzoyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1j).**

^{1}H NMR (400 MHz, $CDCl_3$)

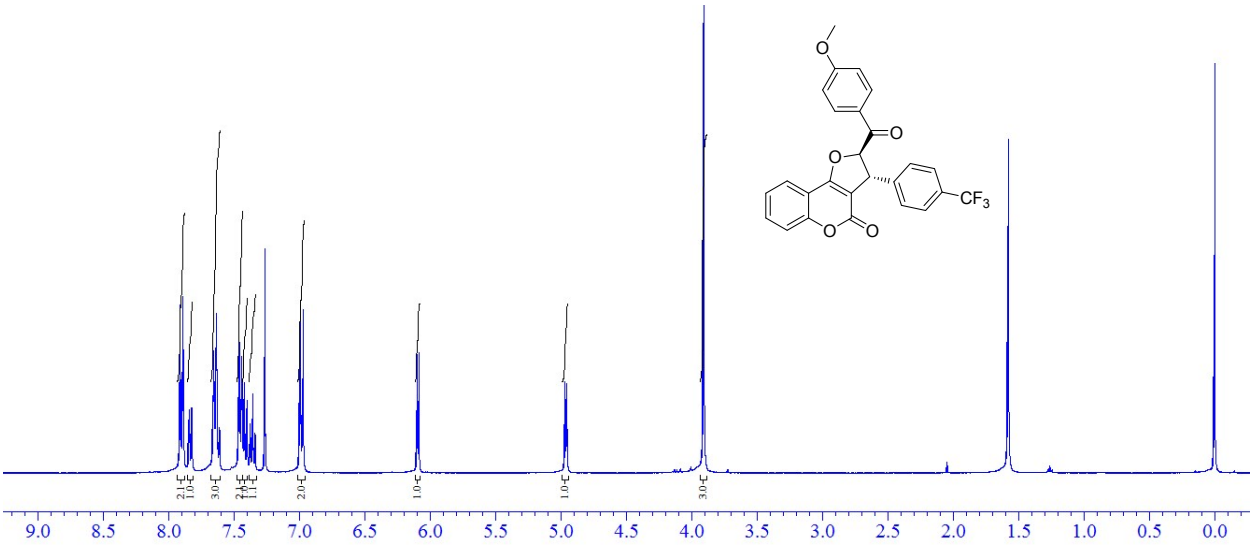


^{13}C NMR (125 MHz, $CDCl_3$)

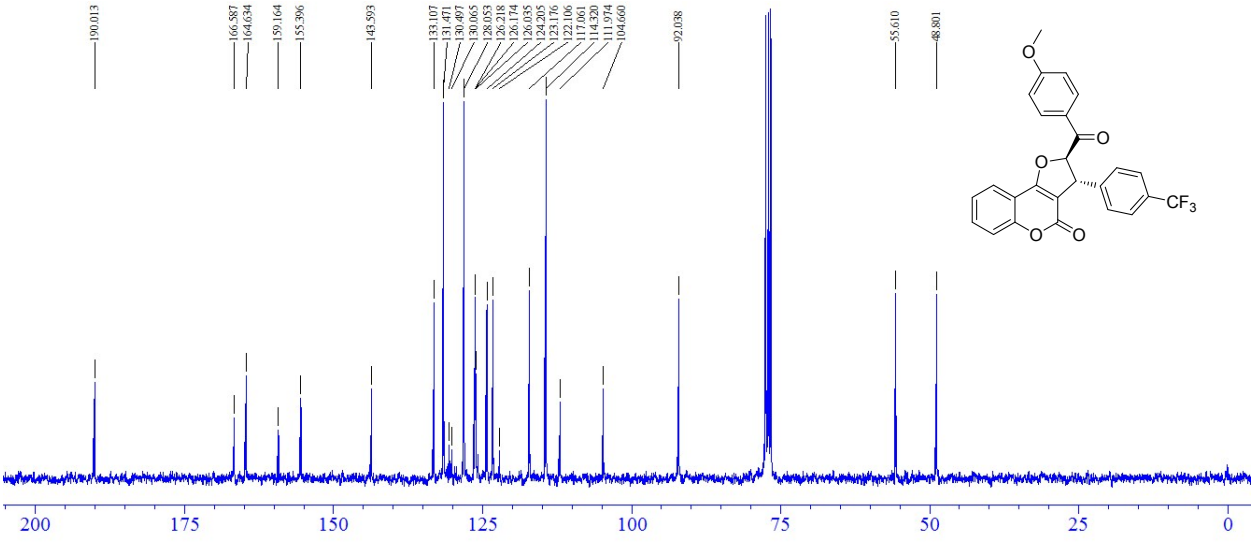


***trans*-2-(4-Methoxybenzoyl)-3-(4-(trifluoromethyl)phenyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*) one (1k).**

^{1}H NMR (400 MHz, $CDCl_3$)

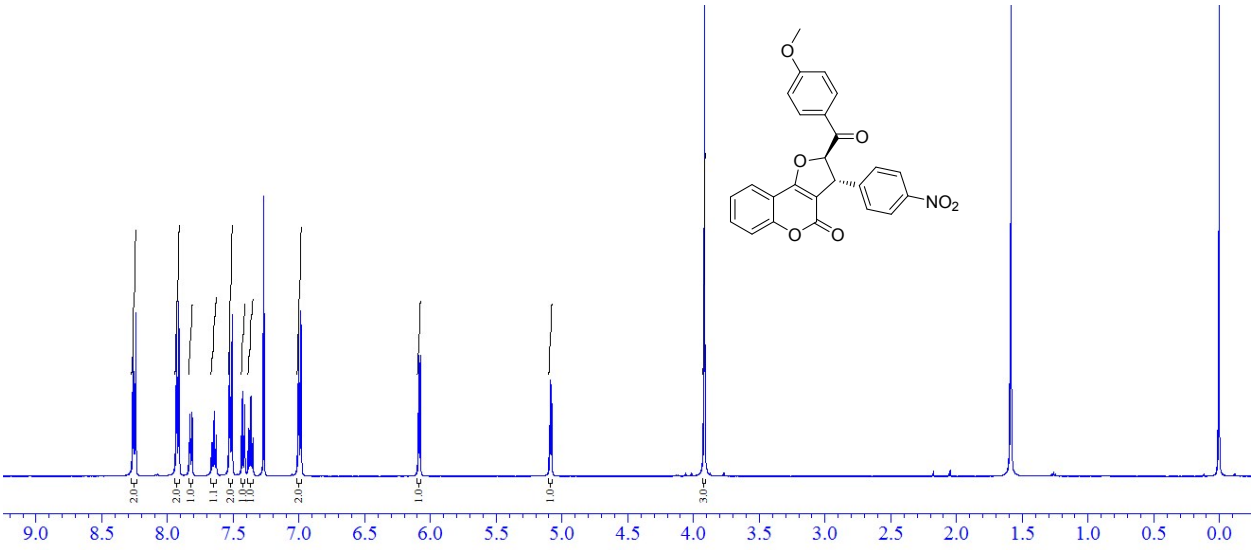


^{13}C NMR (75 MHz, $CDCl_3$)

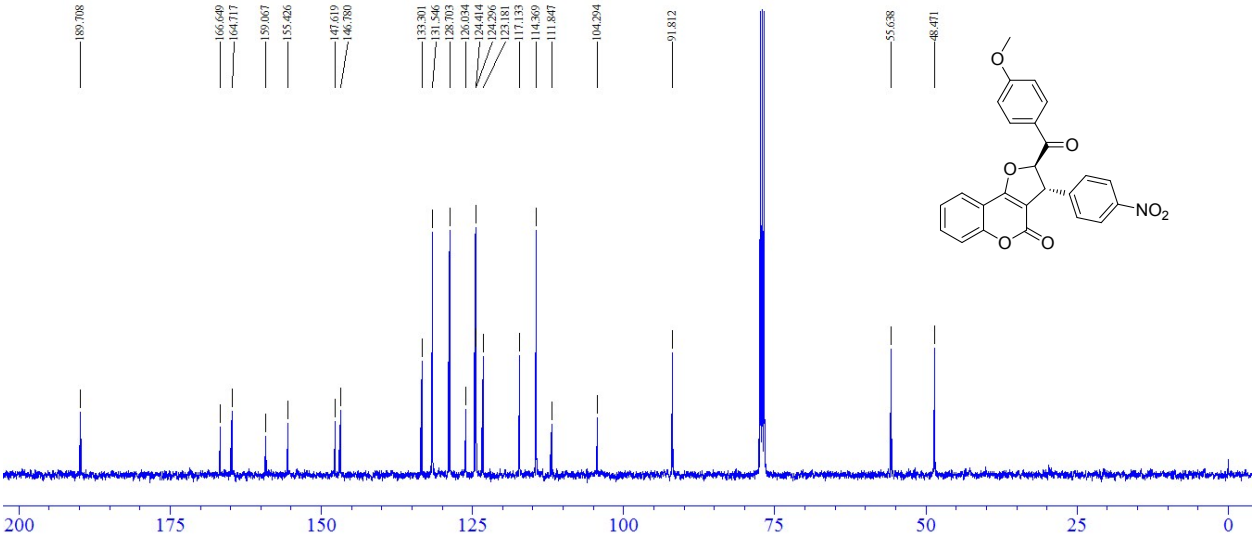


***trans*-2-(4-Methoxybenzoyl)-3-(4-nitrophenyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1l).**

^{1}H NMR (500 MHz, $CDCl_3$)

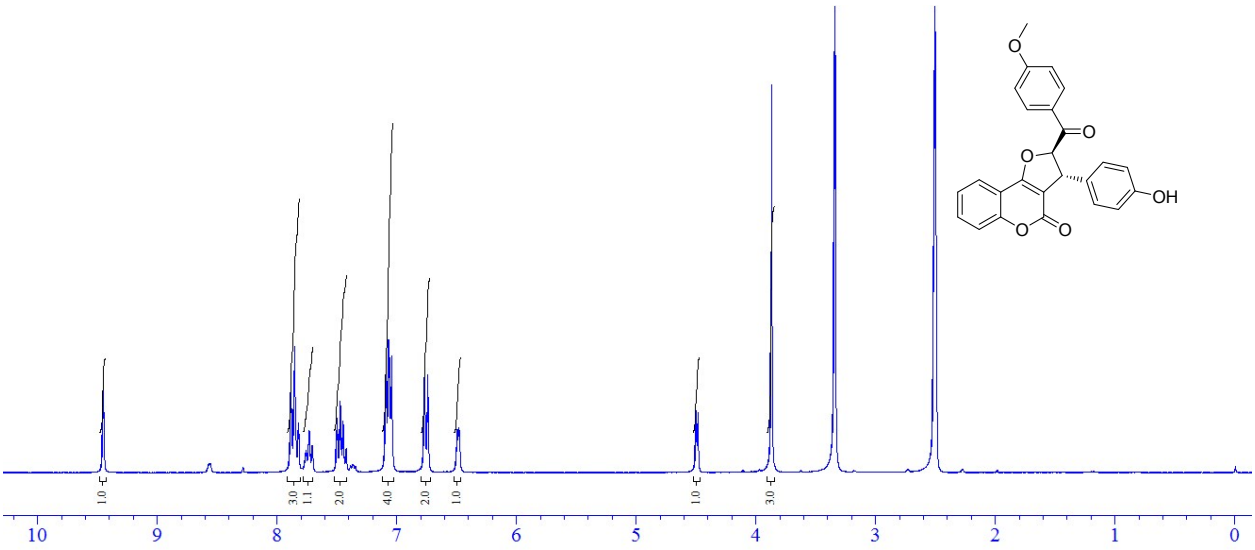


^{13}C NMR (100 MHz, $CDCl_3$)

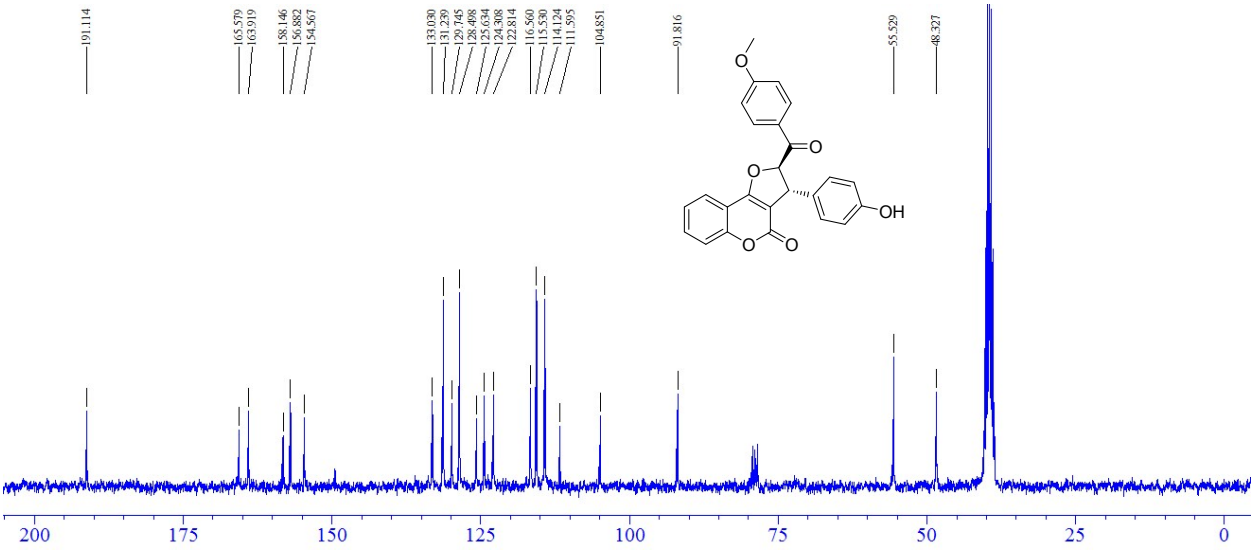


***trans*-3-(4-Hydroxyphenyl)-2-(4-methoxybenzoyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1m).**

^{1}H NMR (300 MHz, DMSO–d_6)

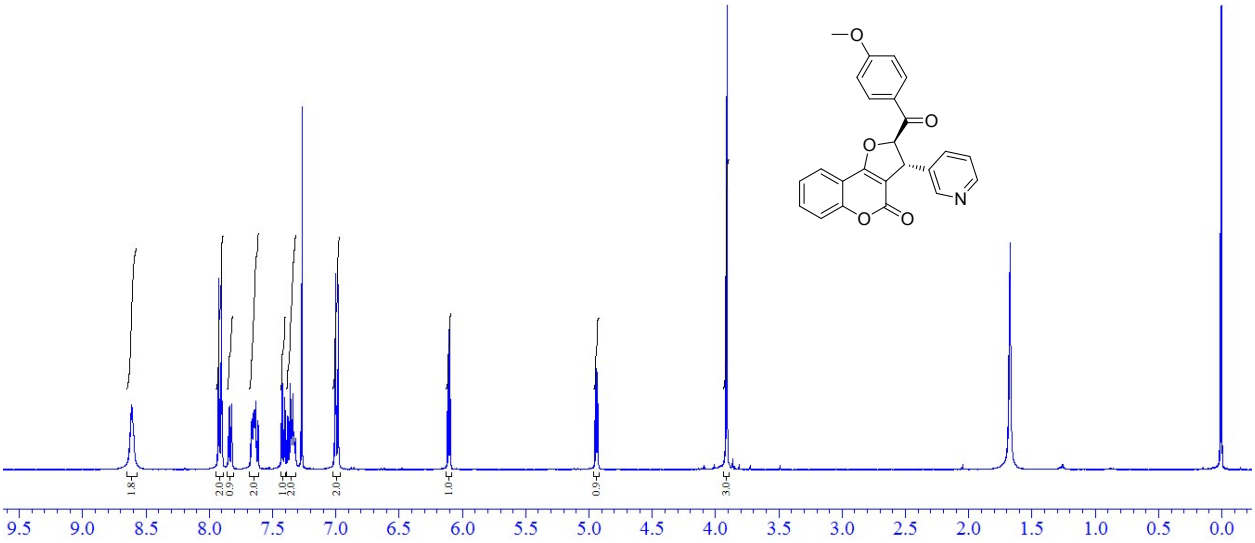


^{13}C NMR (75MHz, $CDCl_3$ + DMSO-d_6)

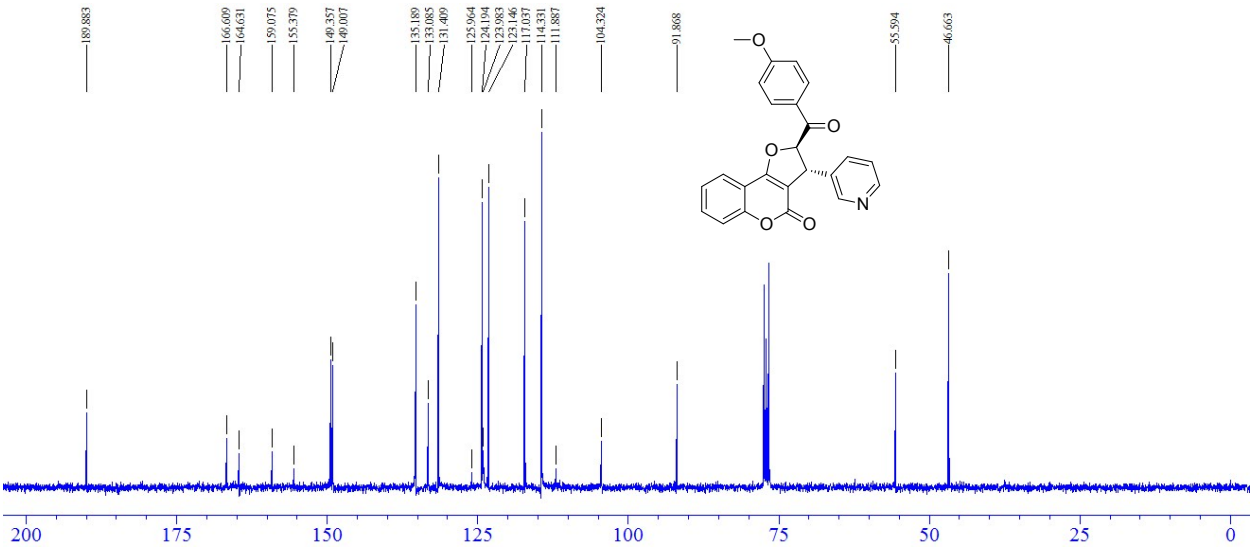


***trans*-2-(4-Methoxybenzoyl)-3-(pyridin-4-yl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1n).**

^{1}H NMR (400 MHz, $CDCl_3$)

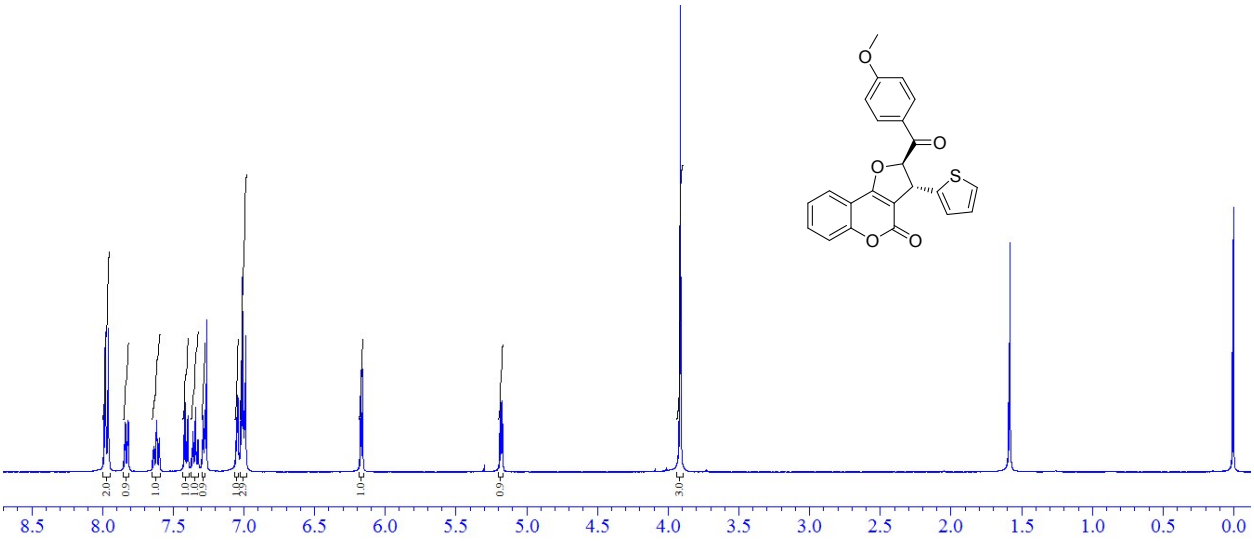


^{13}C NMR (75MHz, $CDCl_3$)

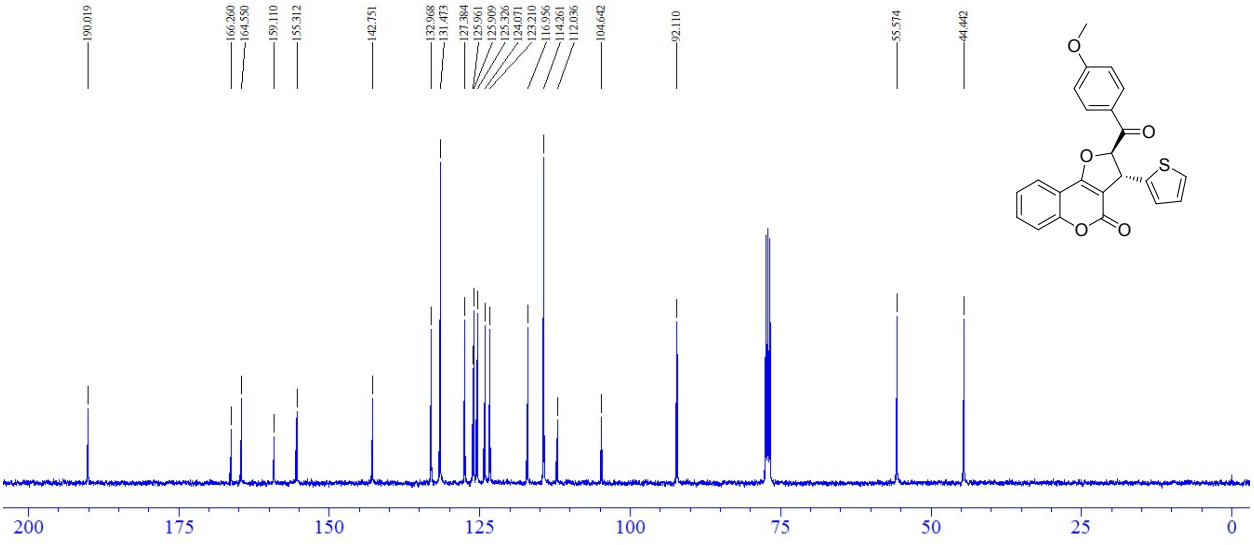


***trans*-2-(4-Methoxybenzoyl)-3-(thiophen-2-yl)-2*H*-furo[3,2-*c*]chromen-4(3H)-one (1o).**

^{1}H NMR (400 MHz, $CDCl_3$)

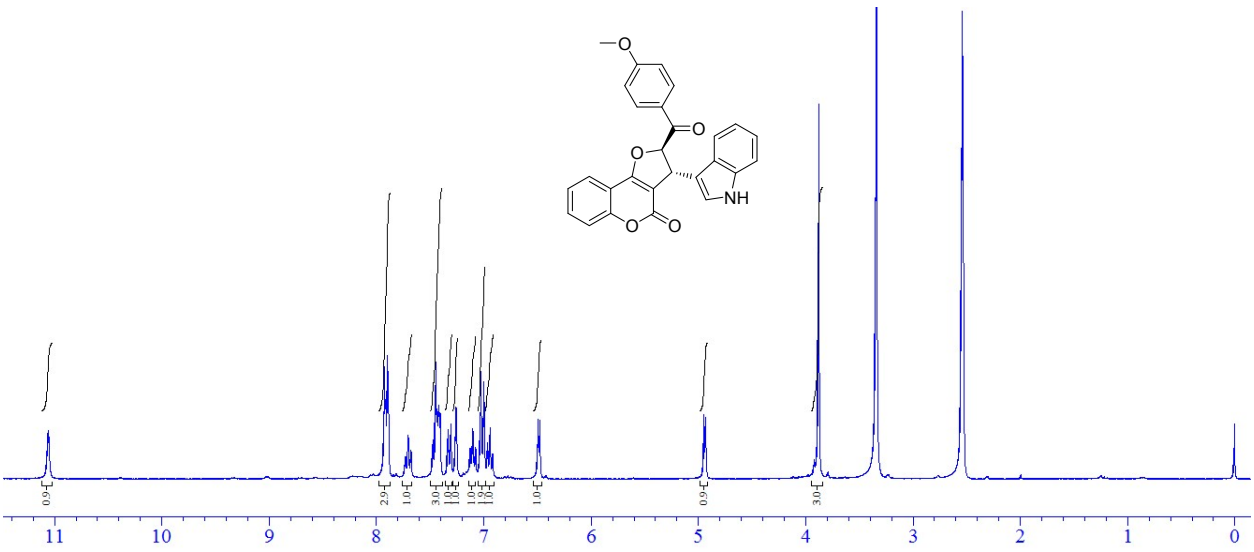


^{13}C NMR (100 MHz, $CDCl_3$)

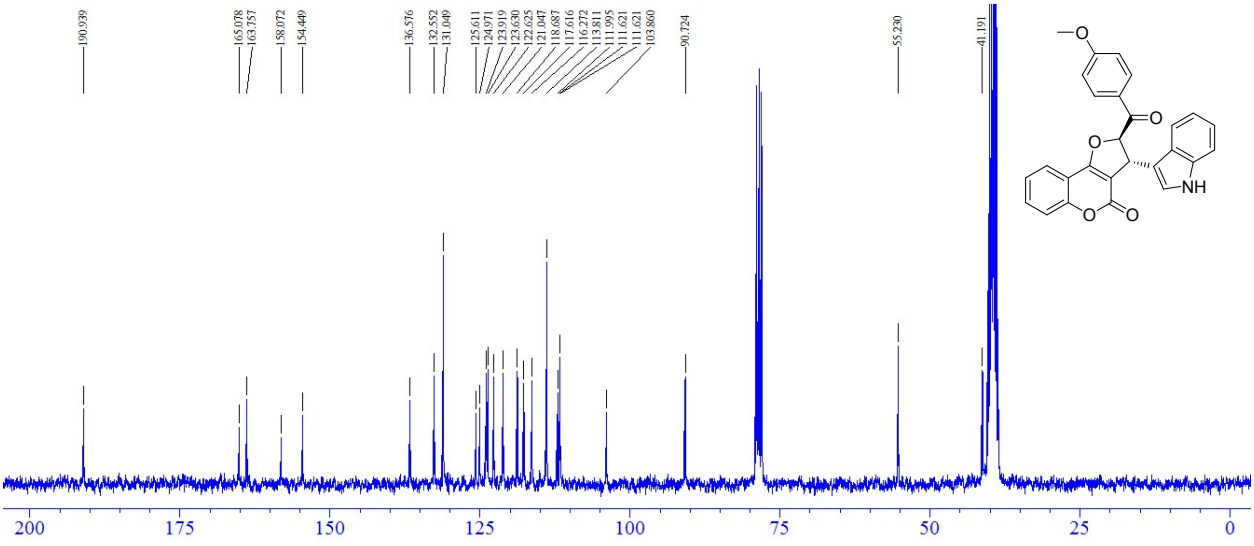


***trans*-3-(1*H*-Indol-3-yl)-2-(4-methoxybenzoyl)-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1p).**

^{1}H NMR (400 MHz, $CDCl_3$ + DMSO-d_6)

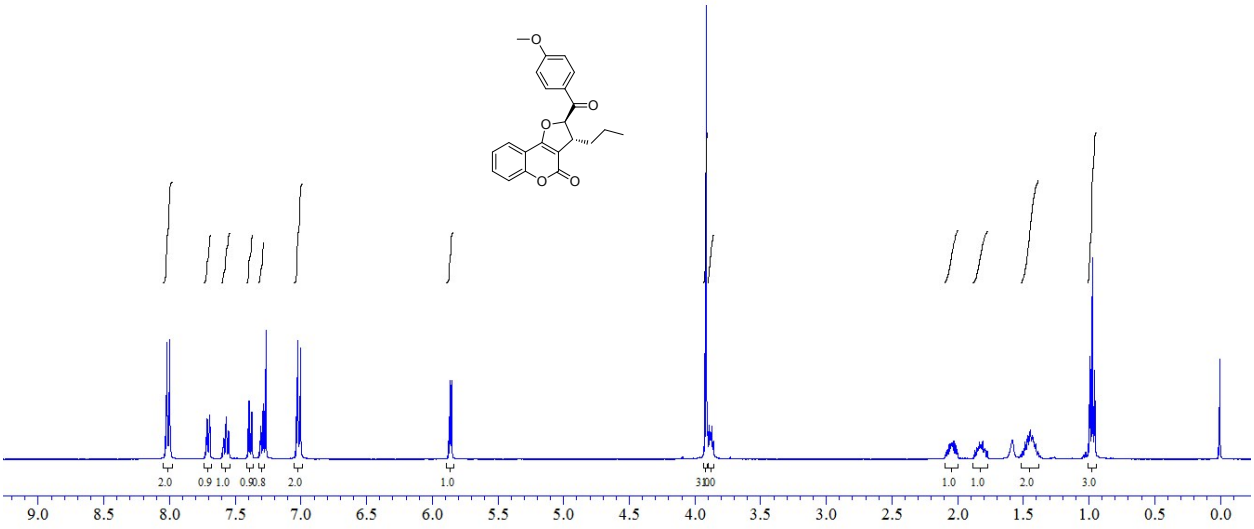


^{13}C NMR (75MHz, $CDCl_3$+ DMSO-d_6)

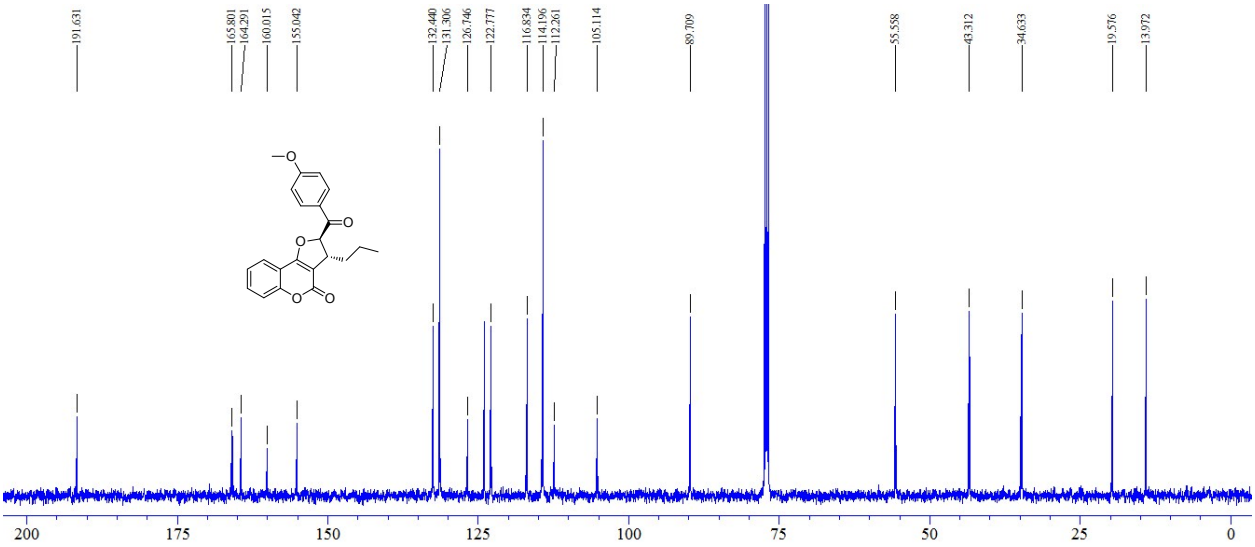


***trans*-2-(4-Methoxybenzoyl)-3-propyl-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1q).**

^{1}H NMR (300 MHz, $CDCl_3$)

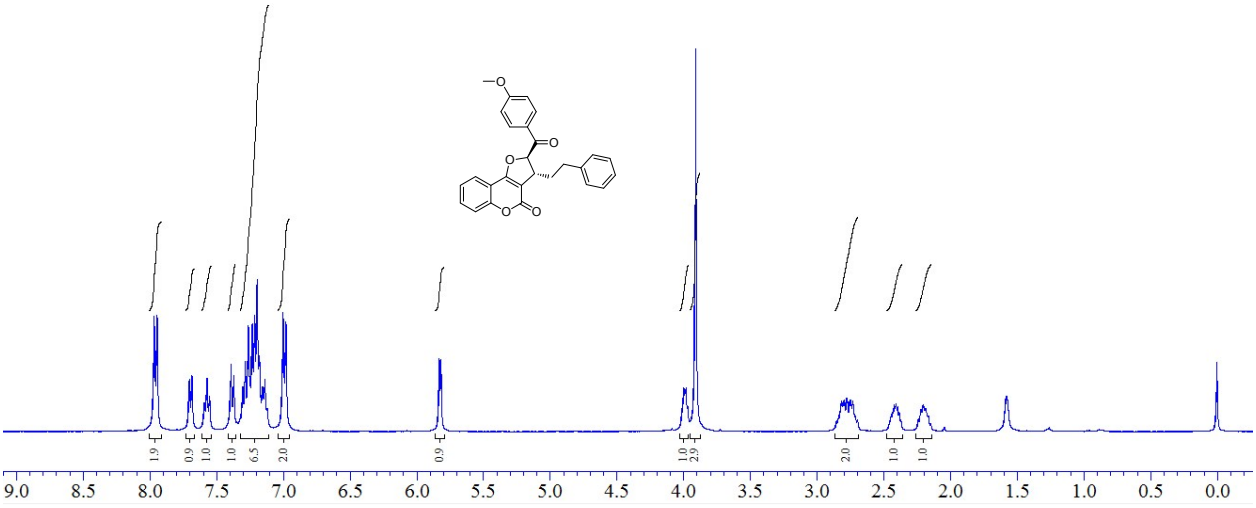


^{13}C NMR (125 MHz, $CDCl_3$)

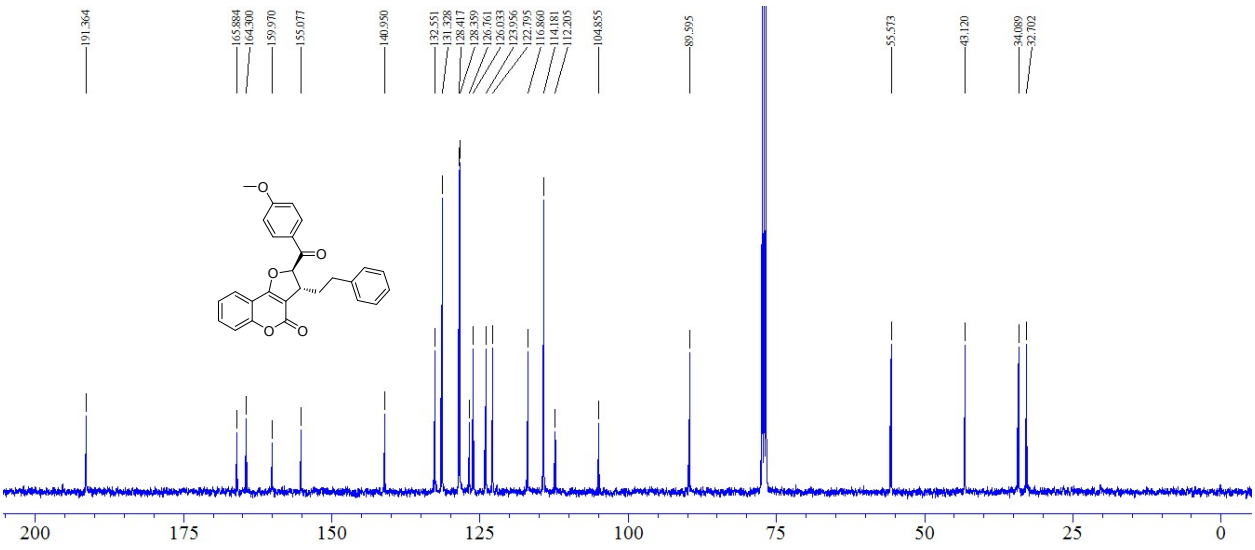


***trans*-2-(4-Methoxybenzoyl)-3-phenethyl-2*H*-furo[3,2-*c*]chromen-4(3*H*)-one (1r).**

^{1}H NMR (300 MHz, $CDCl_3$)

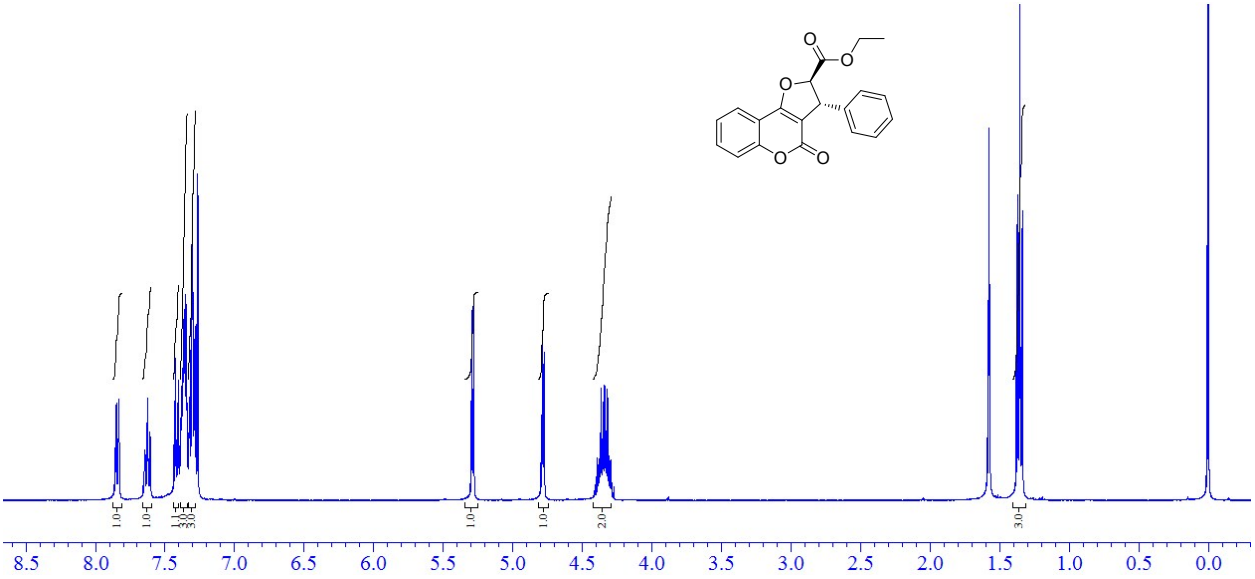


^{13}C NMR (100 MHz, $CDCl_3$)

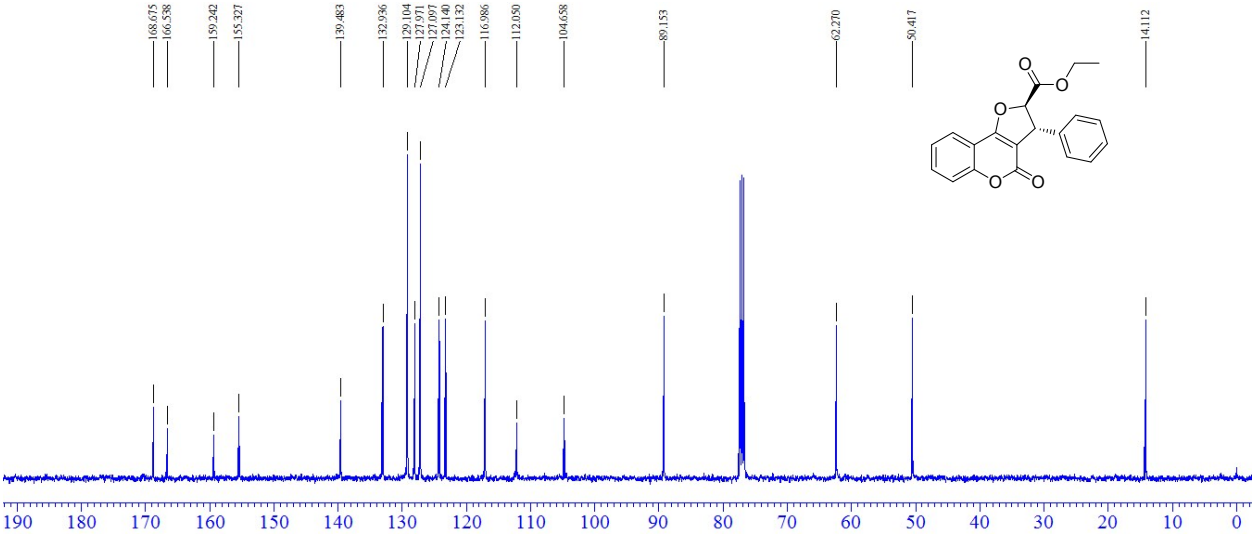


***trans*-Ethyl 4-oxo-3-phenyl-3,4-dihydro-2*H*-furo[3,2-*c*]chromene-2-carboxylate (1s).**

^{1}H NMR (400 MHz, $CDCl_3$)

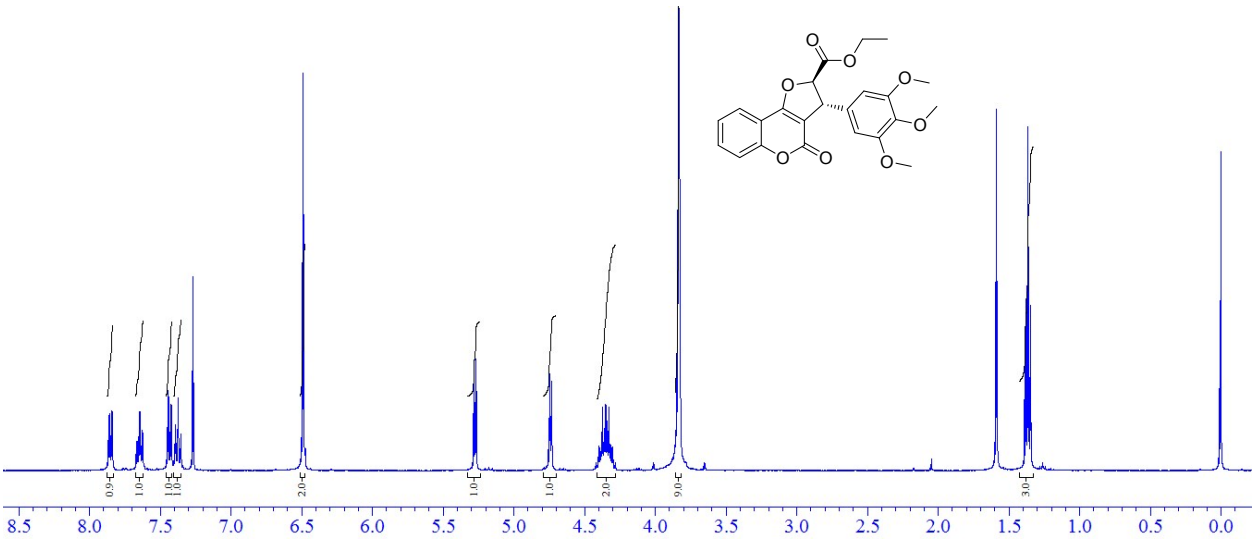


^{13}C NMR (100 MHz, $CDCl_3$)

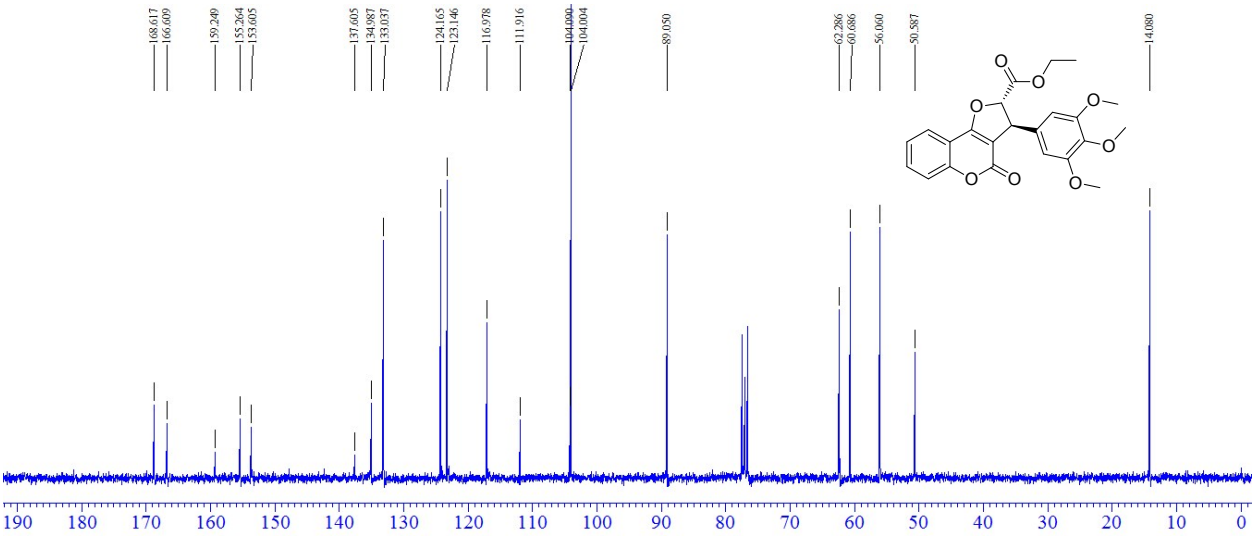


***trans*-Ethyl4-oxo-3-(3,4,5-trimethoxyphenyl)-3,4-dihydro-2*H*-furo[3,2-*c*]chromene-2-carboxylate (1t).**

^{1}H NMR (400 MHz, $CDCl_3$)

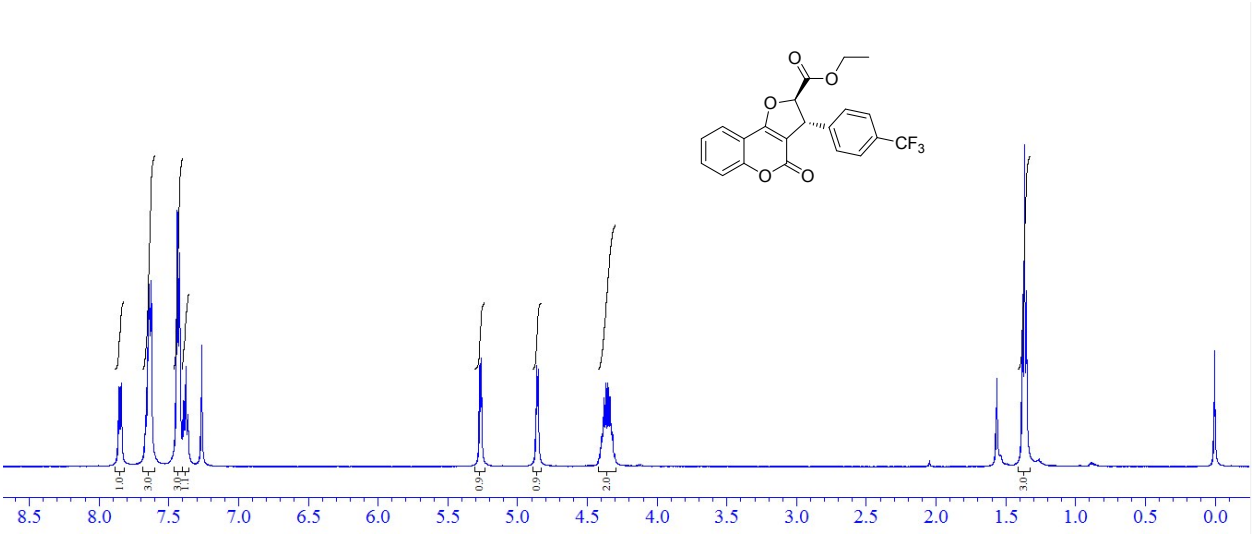


^{13}C NMR (75 MHz, $CDCl_3$)

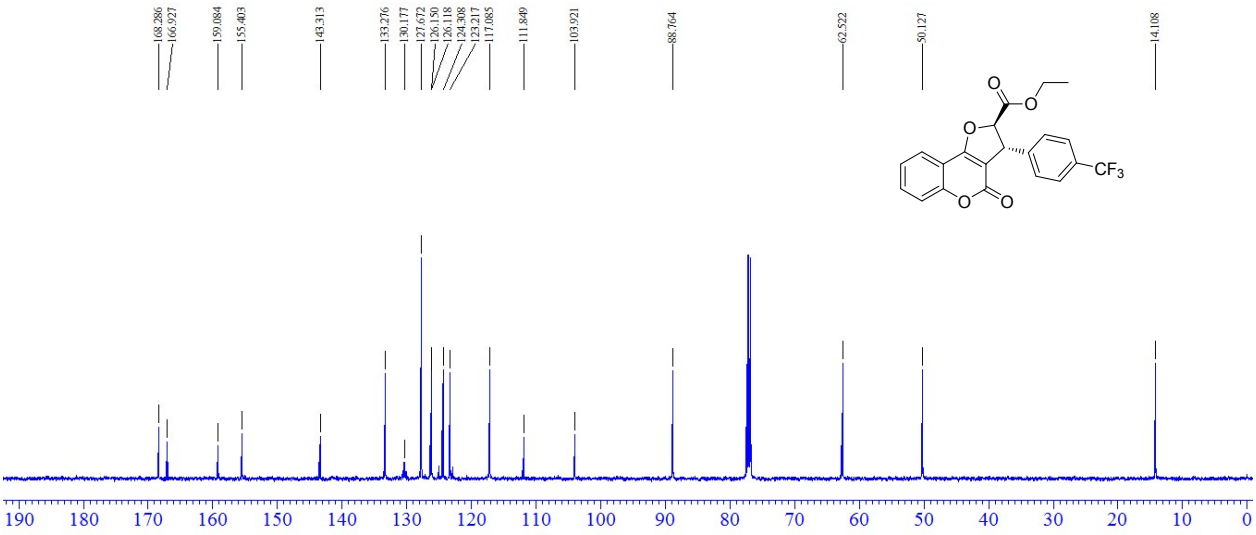


***trans*-Ethyl4-oxo-3-(4-(trifluoromethyl)phenyl)-3,4-dihydro-2*H*-furo[3,2-*c*]chromene-2-carboxylate (1u).**

^{1}H NMR (500 MHz, $CDCl_3$)

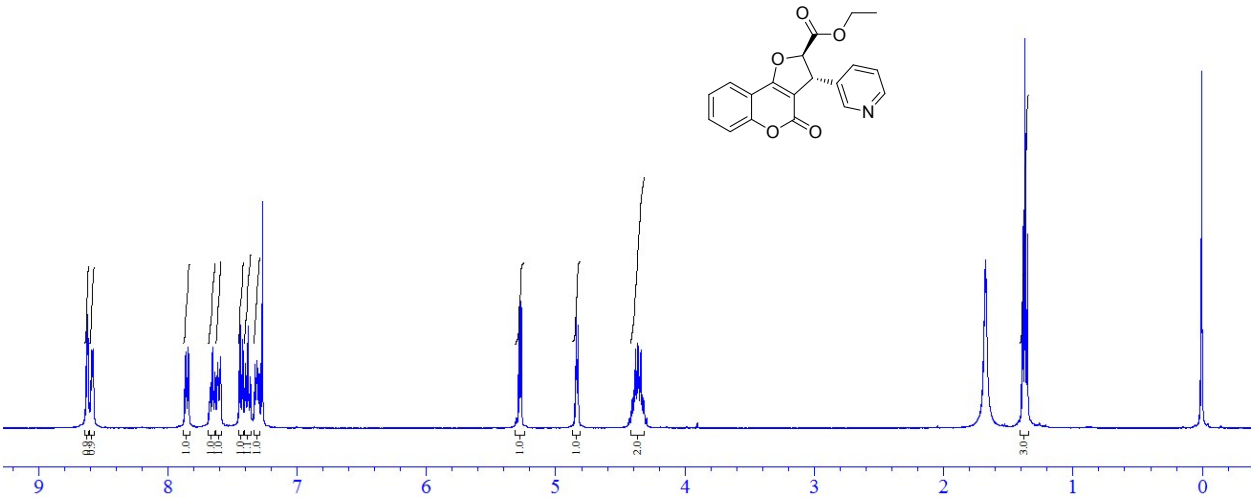


^{13}C NMR (75 MHz, $CDCl_3$)

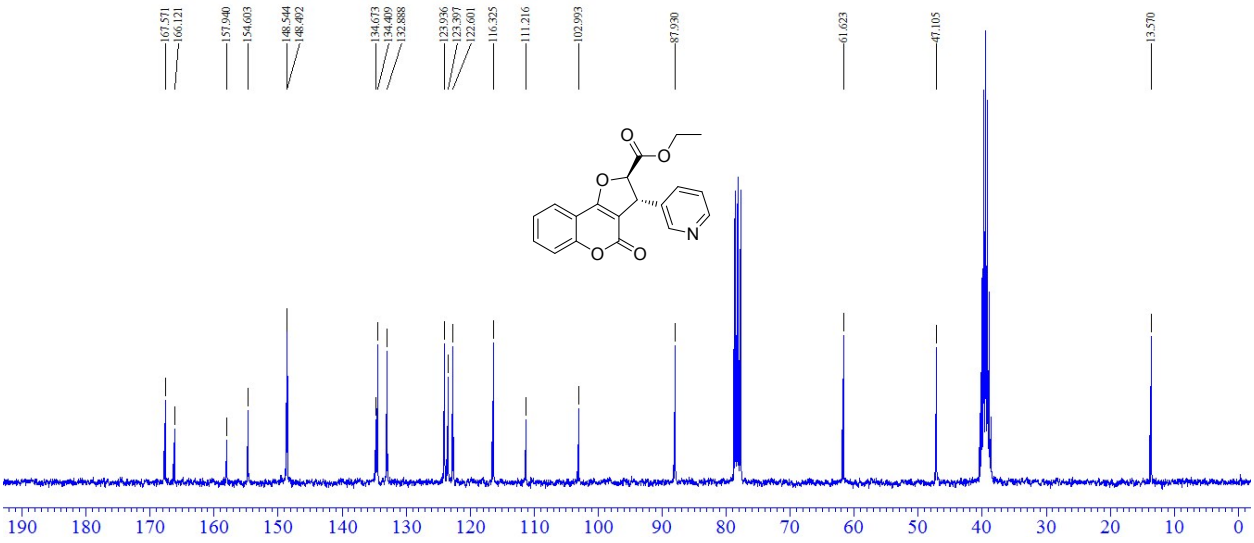


***trans*-Ethyl 4-oxo-3-(pyridin-3-yl)-3,4-dihydro-2*H*-furo[3,2-*c*]chromene-2-carboxylate (1v).**

^{1}H NMR (400 MHz, $CDCl_3$)

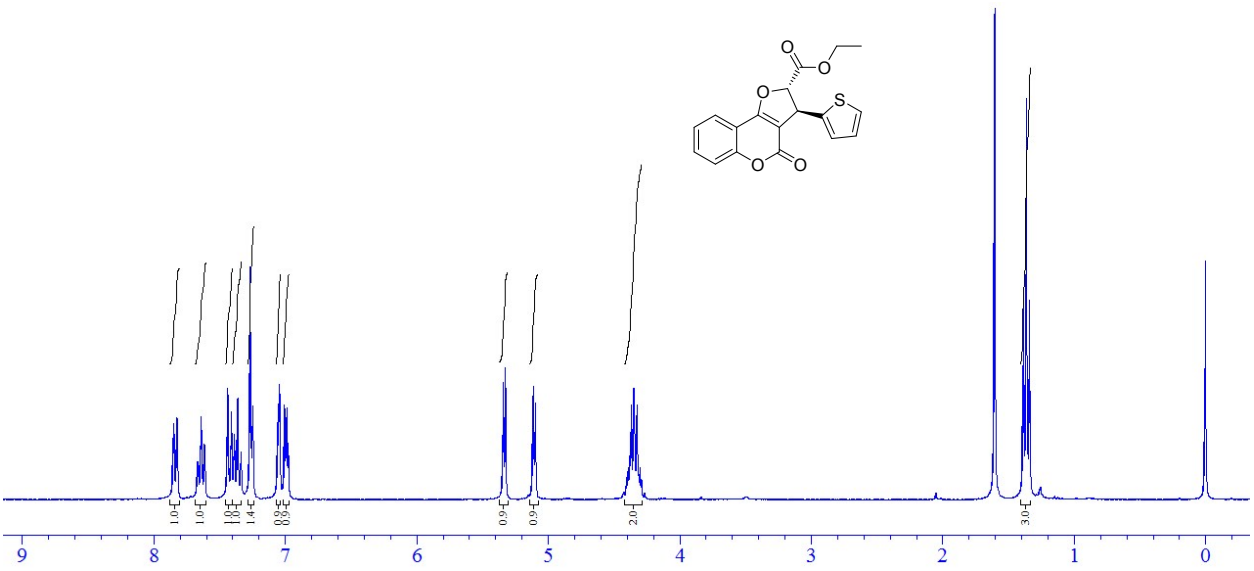


^{13}C NMR (75 MHz, $CDCl_3$ + DMSO-d_6)

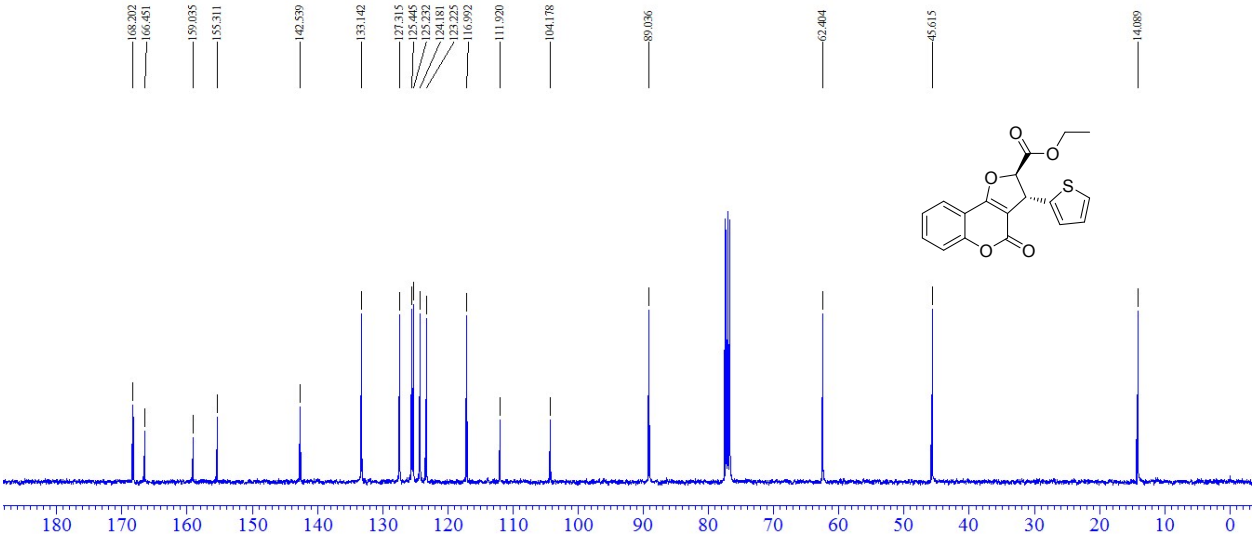


***trans*-Ethyl 4-oxo-3-(thiophen-2-yl)-3,4-dihydro-2*H*-furo[3,2-*c*]chromene-2-carboxylate (1w).**

^{1}H NMR (300 MHz, $CDCl_3$)

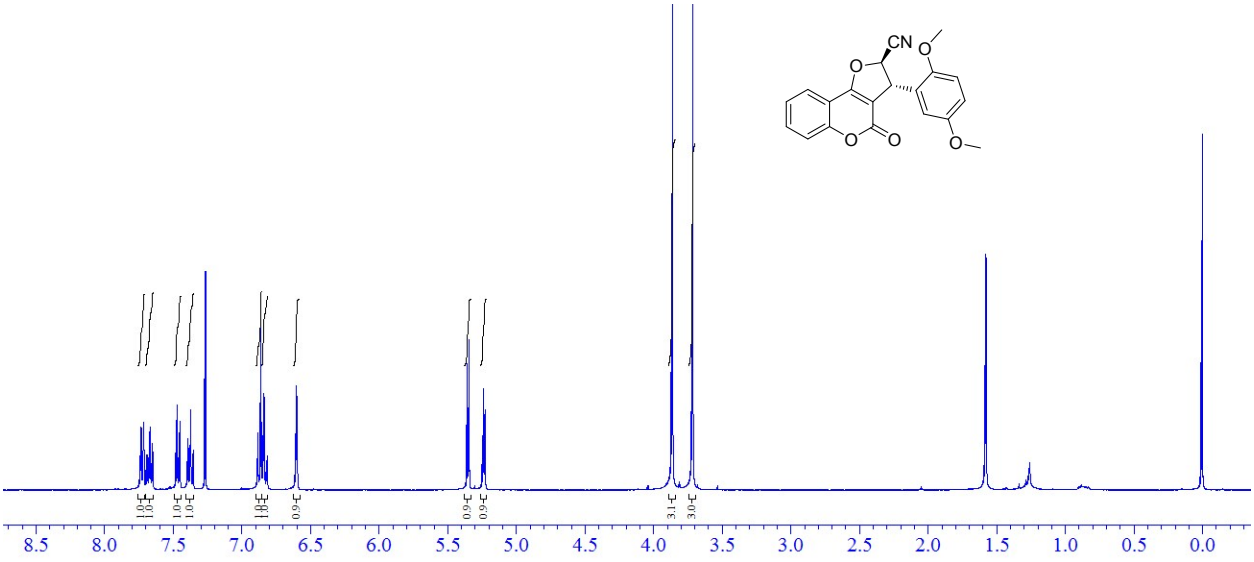


^{13}C NMR (100 MHz, $CDCl_3$)

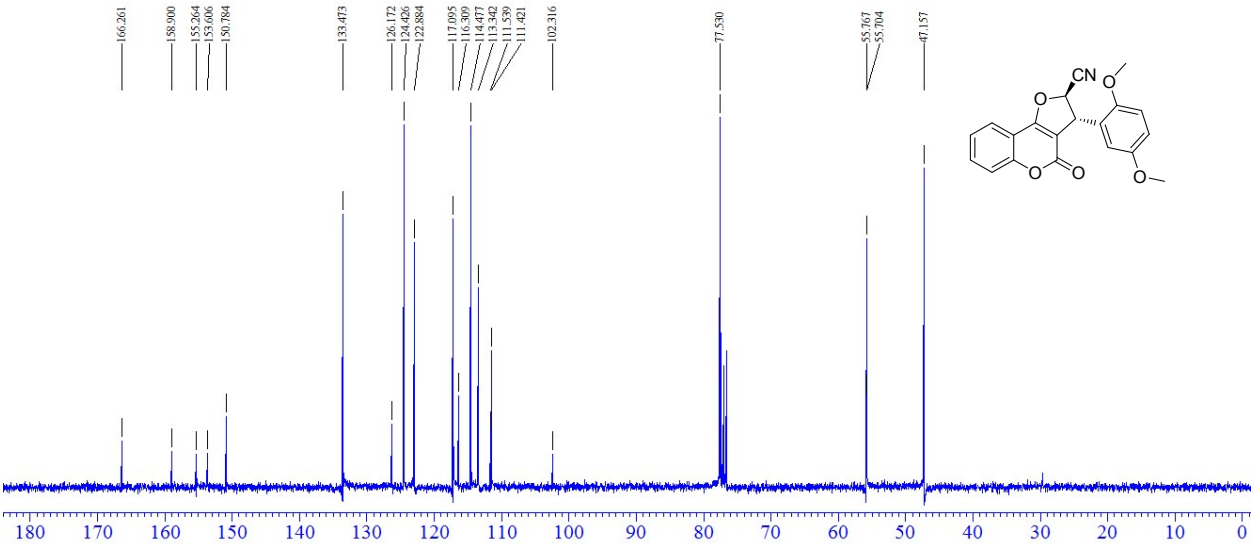


***trans*-3-(2,5-Dimethoxyphenyl)-4-oxo-3,4-dihydro-2*H*-furo[3,2-*c*]chromene-2-carbonitrile (1x).**

^{1}H NMR (400 MHz, $CDCl_3$)

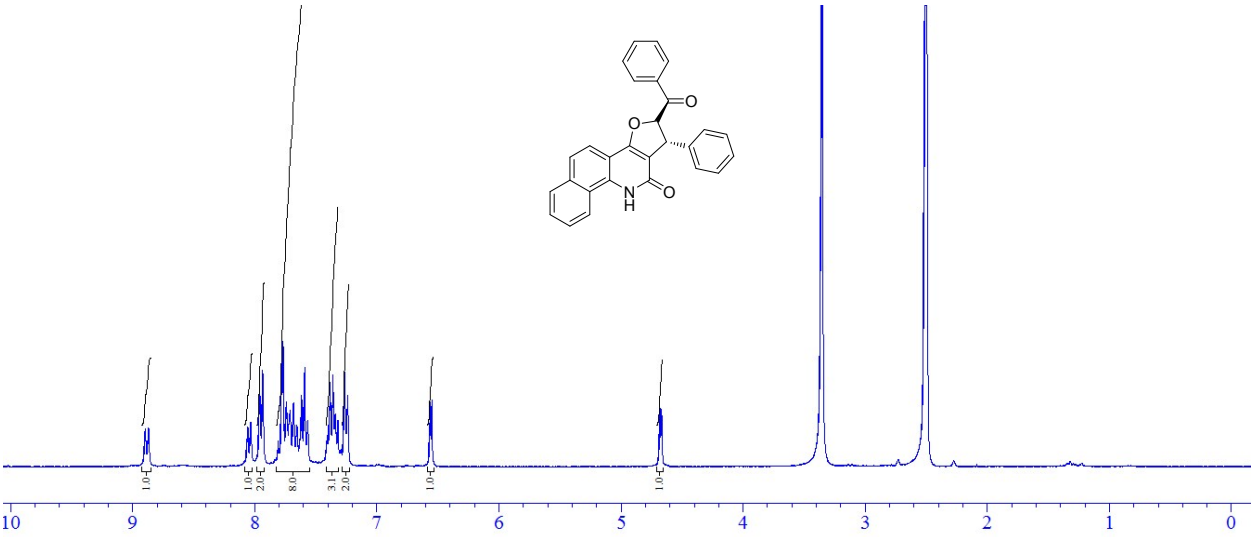


^{13}C NMR (75MHz, $CDCl_3$)

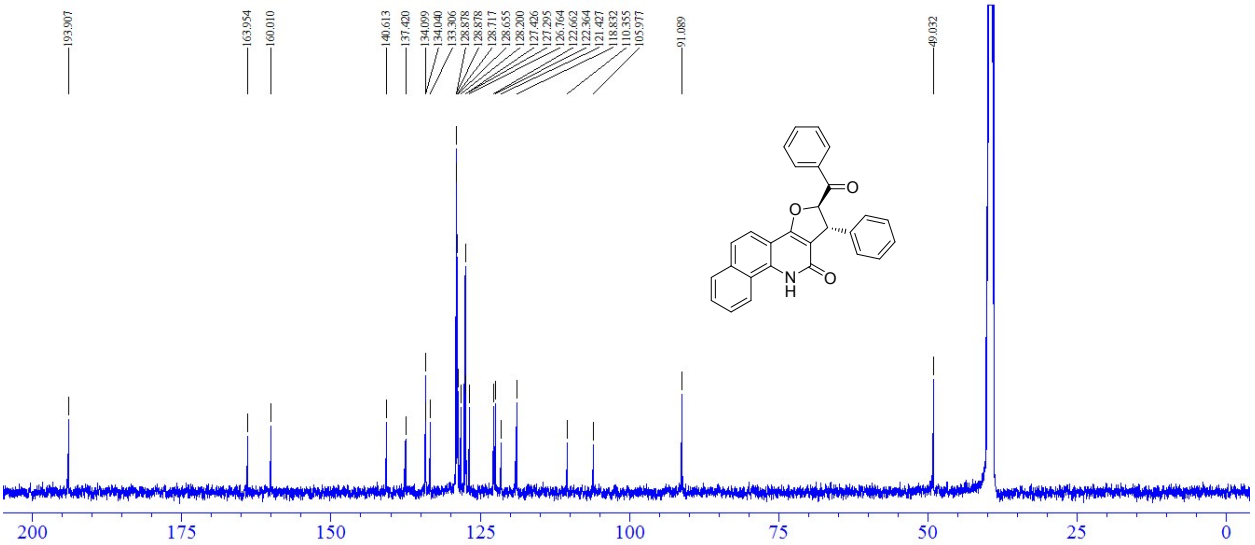


***trans*-2-Benzoyl-1-phenyl-1,2-dihydrobenzo[*h*]furo[3,2-*c*]quinolin-11(10*H*)-one (2a).**

^{1}H NMR (300 MHz, DMSO-d_6)

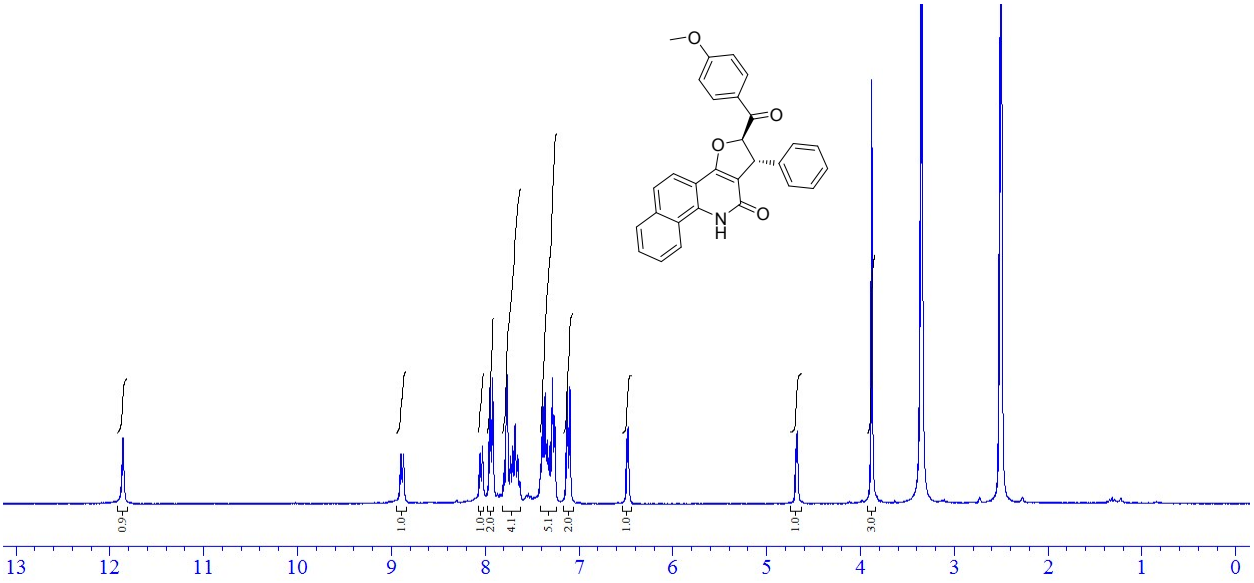


^{13}C NMR (125 MHz, DMSO–d_6)

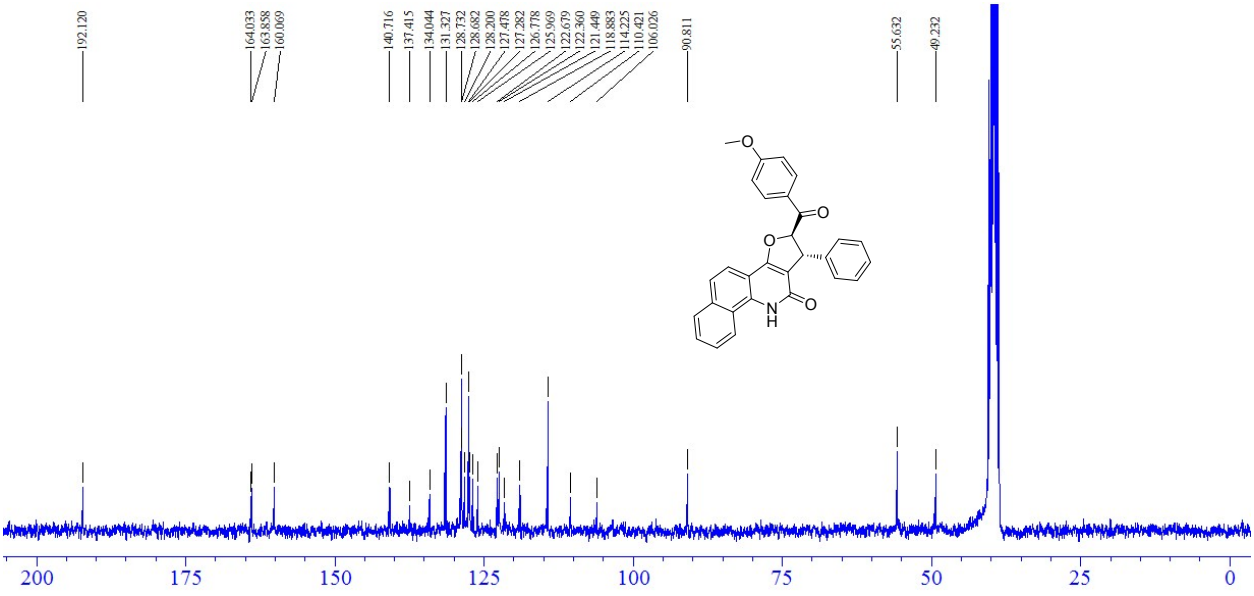


***trans*-2-(4-Methoxybenzoyl)-1-phenyl-1,2-dihydrobenzo[*h*]furo[3,2-*c*]quinolin-11(10*H*)-one (2b).**

^{1}H NMR (300 MHz, DMSO-d_6)

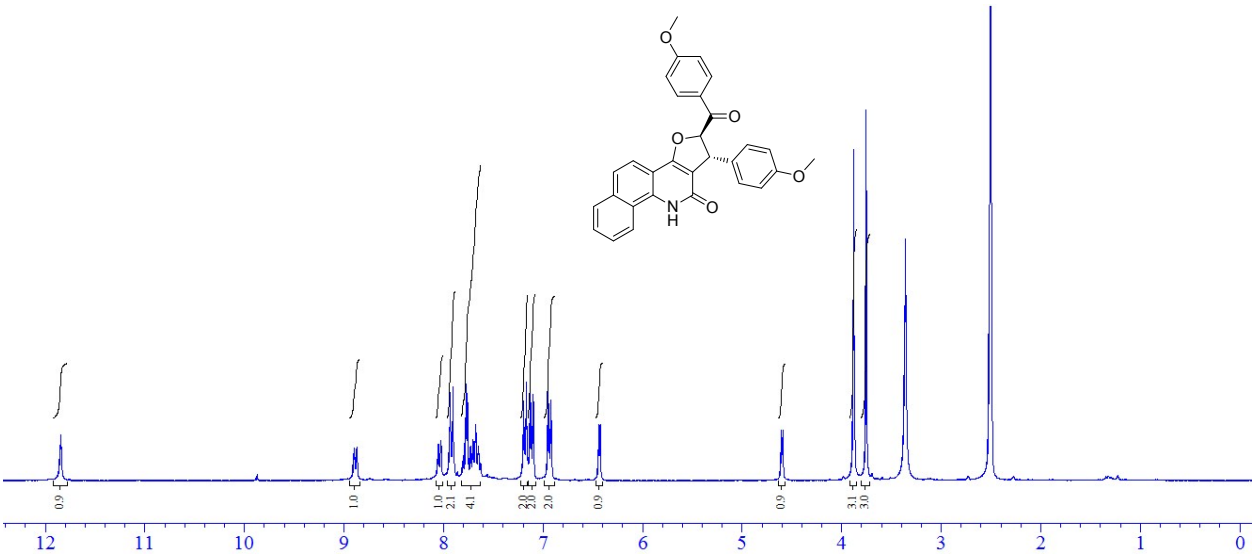


^{13}C NMR (75 MHz, DMSO-d_6)

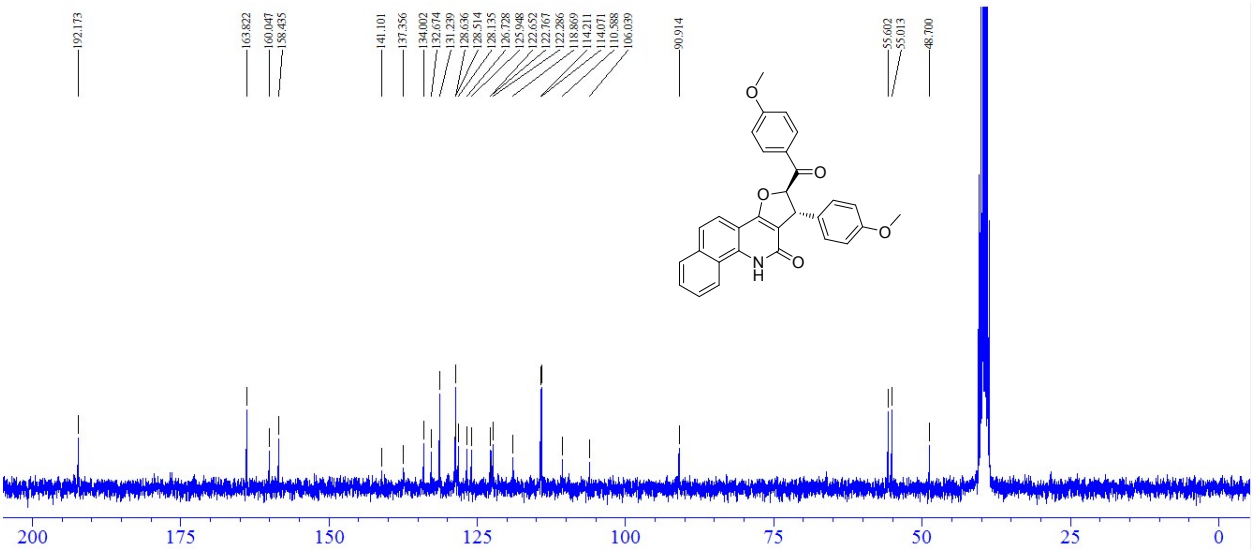


***trans*-4-Methoxybenzoyl)-1-(4-methoxyphenyl)-1,2-dihydrobenzo[*h*]furo[3,2-*c*]quinolin-11(10*H*)-one (2c).**

^{1}H NMR (300 MHz, DMSO-d_6)

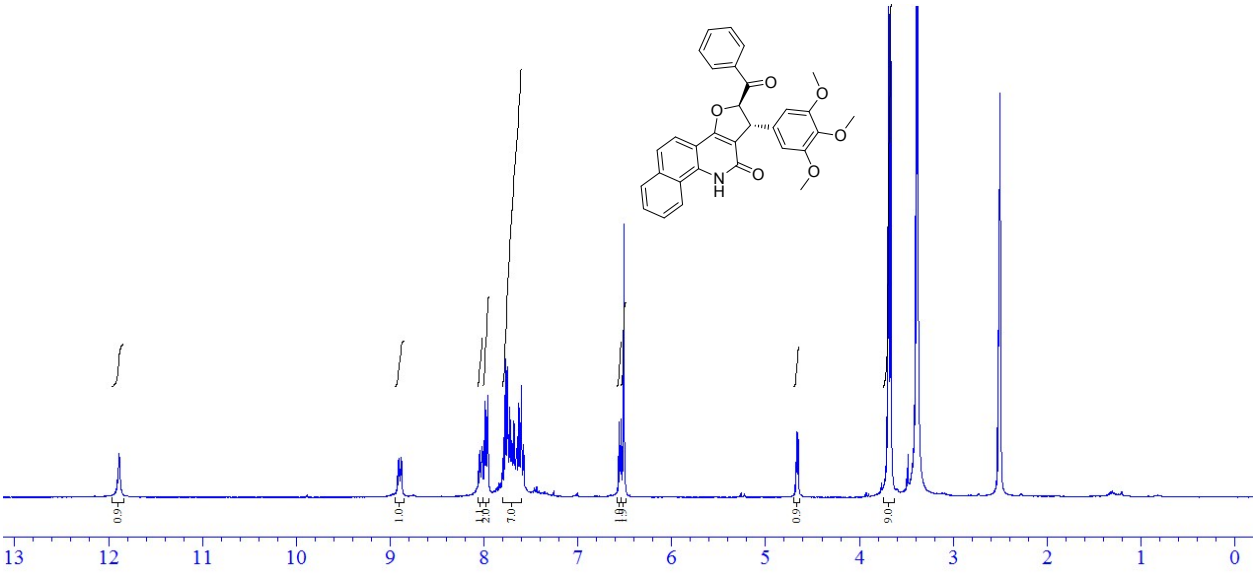


^{13}C NMR (75 MHz, DMSO-d_6)

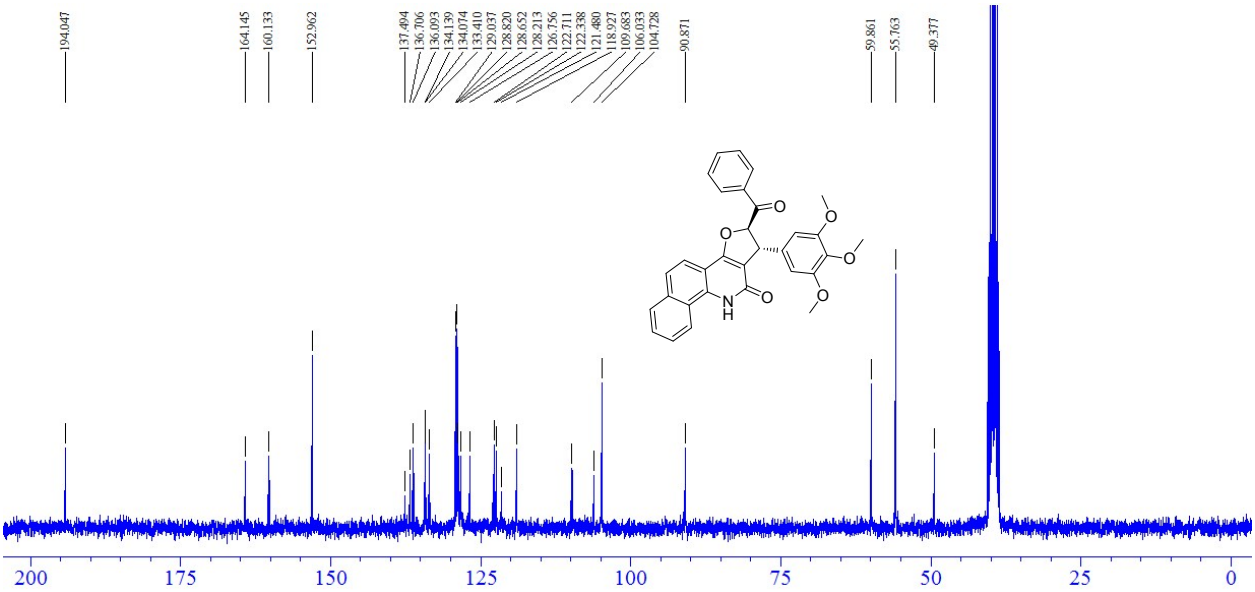


***trans*-2-Benzoyl-1-(3,4,5-trimethoxyphenyl)-1,2-dihydrobenzo[*h*]furo[3,2-*c*]quinolin-11(10*H*)-one (2d).**

^{1}H NMR (300 MHz, DMSO-d_6)

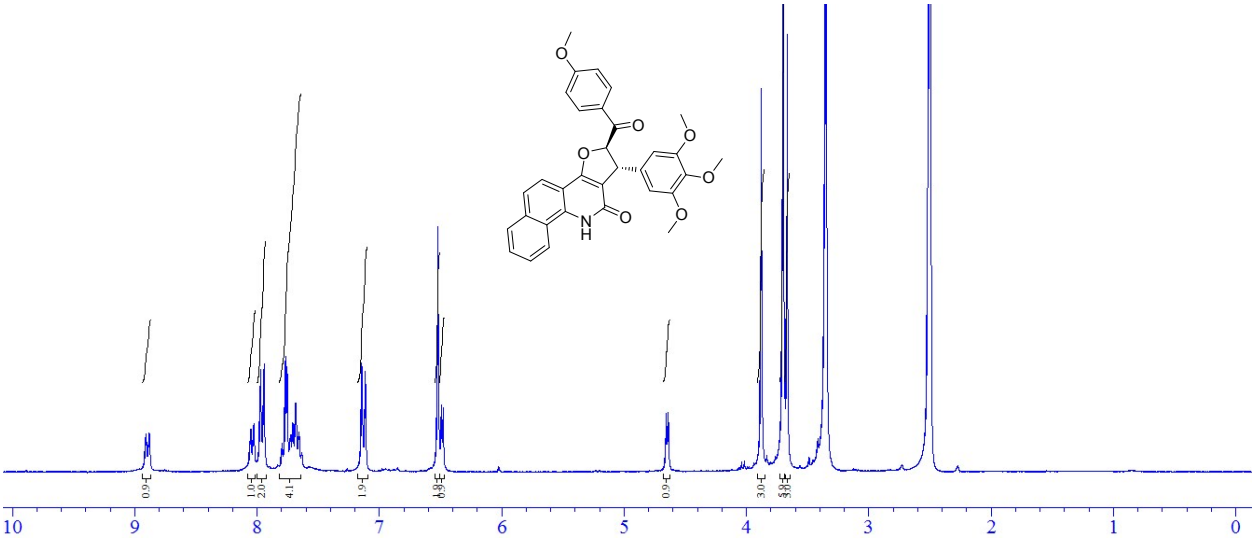


^{13}C NMR (125 MHz, DMSO-d_6)

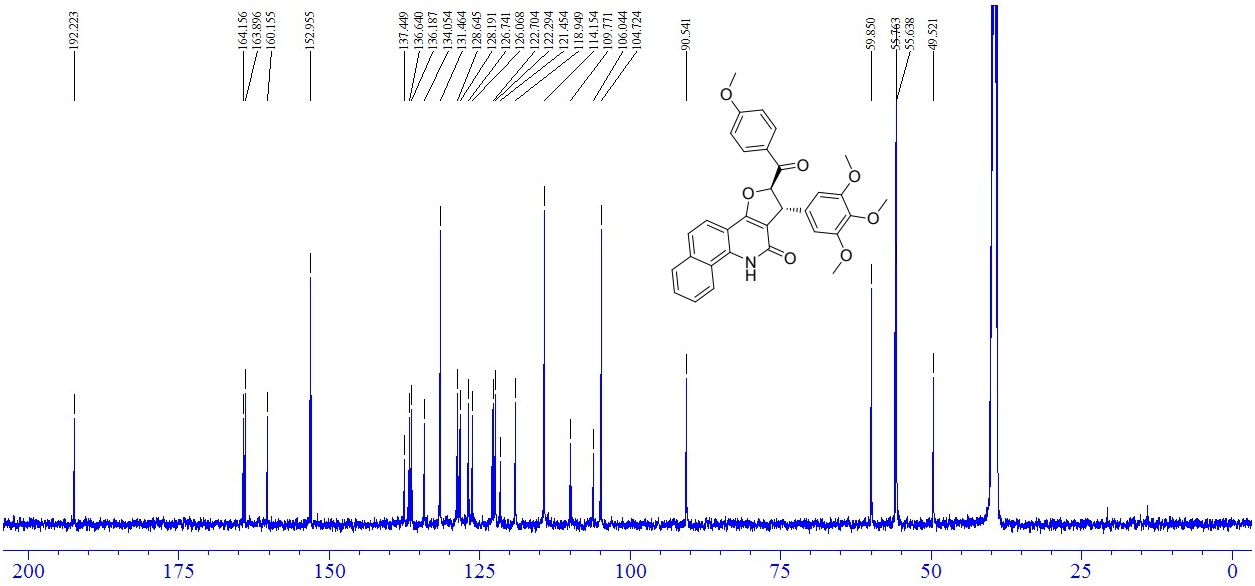


***trans*-2-(4-Methoxybenzoyl)-1-(3,4,5-trimethoxyphenyl)-1,2-dihydrobenzo[*h*]furo[3,2-*c*]quinolin-11(10*H*)-one (2e).**

^{1}H NMR (300 MHz, DMSO-d_6)

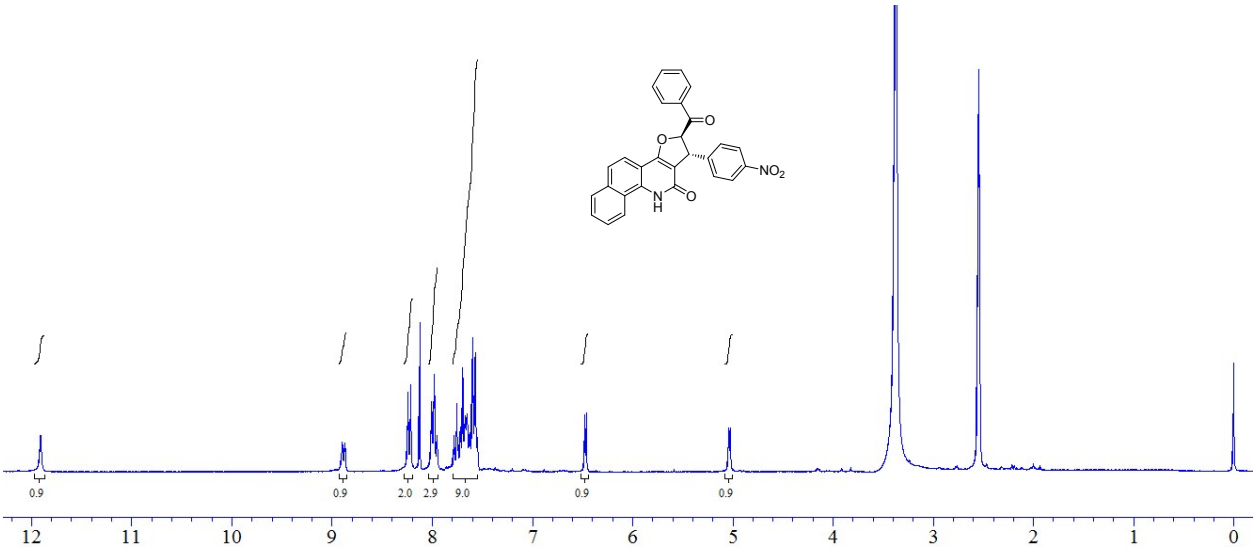


^{13}C NMR (125 MHz, DMSO-d_6)

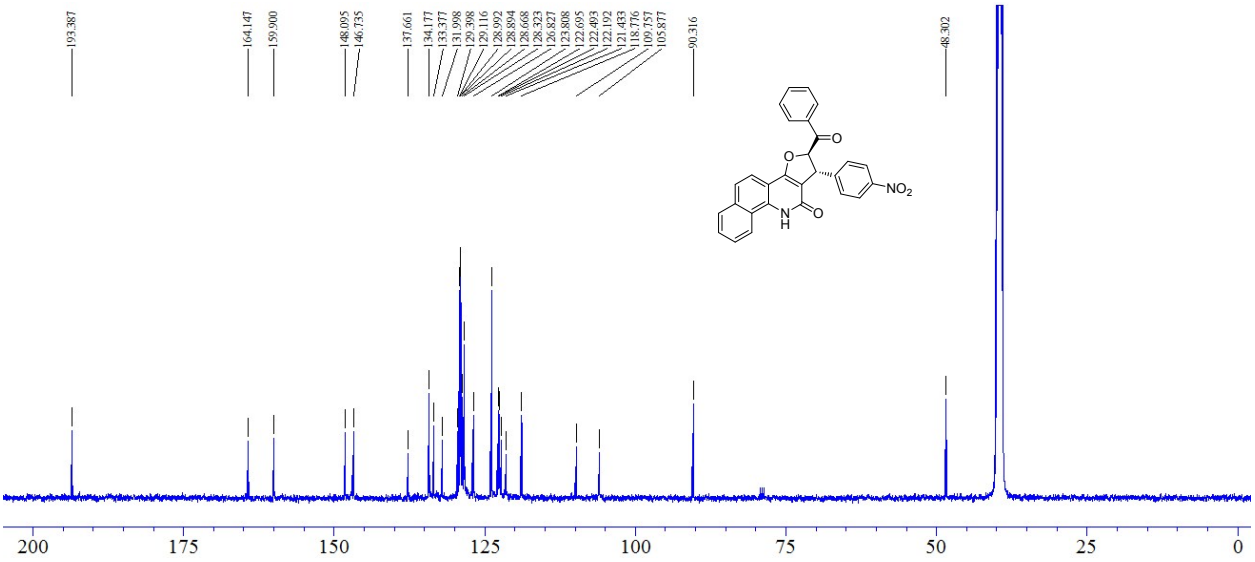


***trans*-2-Benzoyl-1-(4-nitrophenyl)-1,2-dihydrobenzo[*h*]furo[3,2-c]quinolin-11(10*H*)-one (2f).**

^{1}H NMR (300 MHz, $CDCl_3$ + DMSO-d_6)

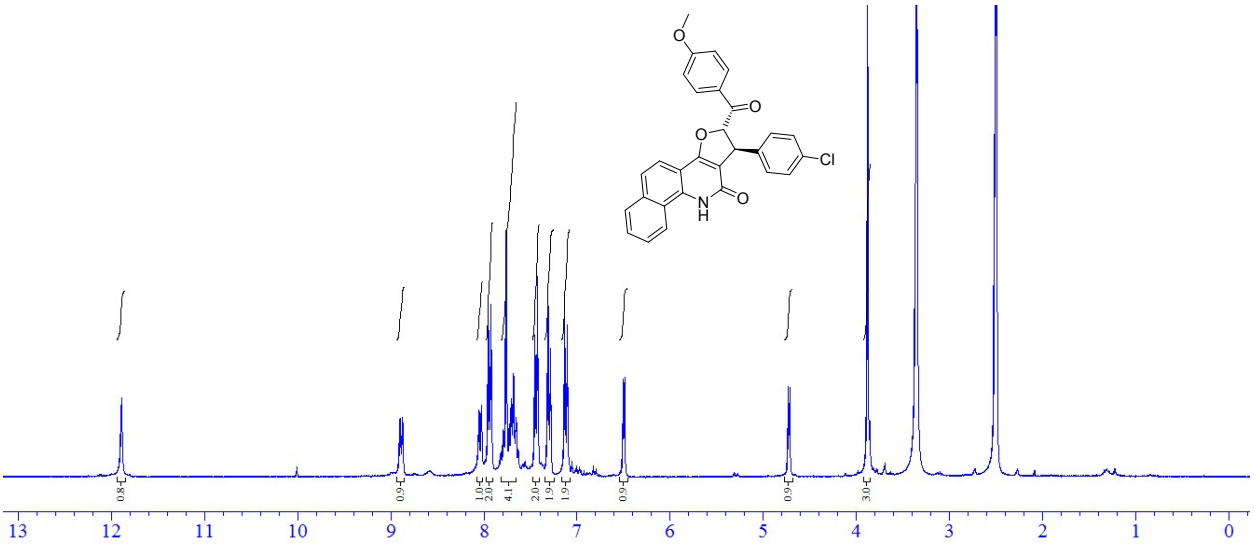


^{1}C NMR (300 MHz, $CDCl_3$ + DMSO-d_6)

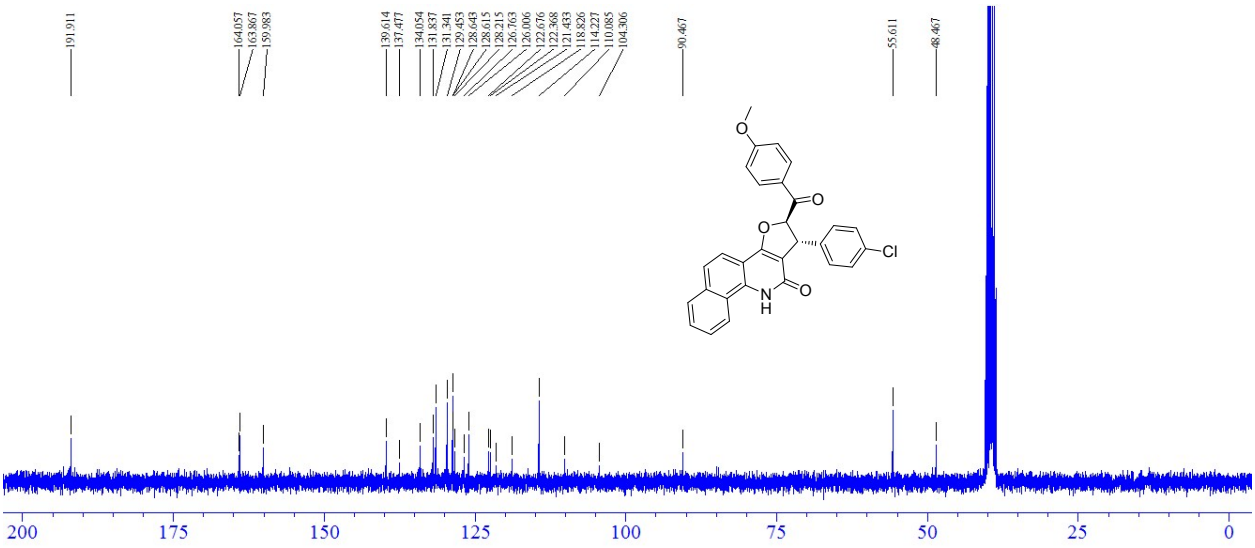


***trans*-1-(4-Chlorophenyl)-2-(4-methoxybenzoyl)-1,2-dihydrobenzo[*h*]furo[3,2-*c*]quinolin-11(10*H*)-one (2g).**

^{1}H NMR (300 MHz, DMSO-d_6)

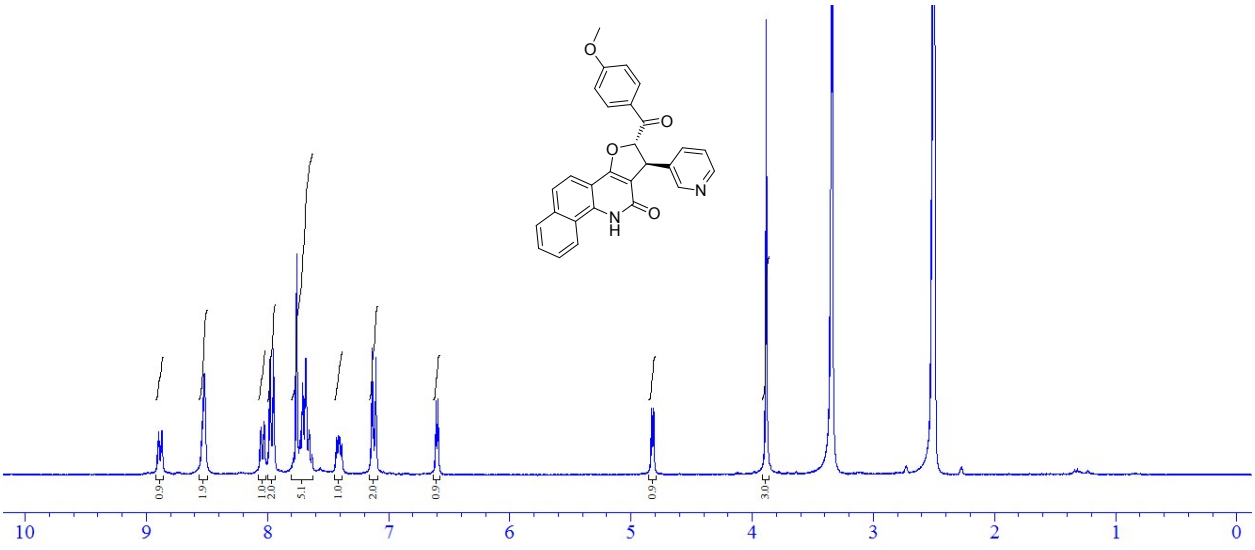


^{13}C NMR (75 MHz, DMSO-d_6)

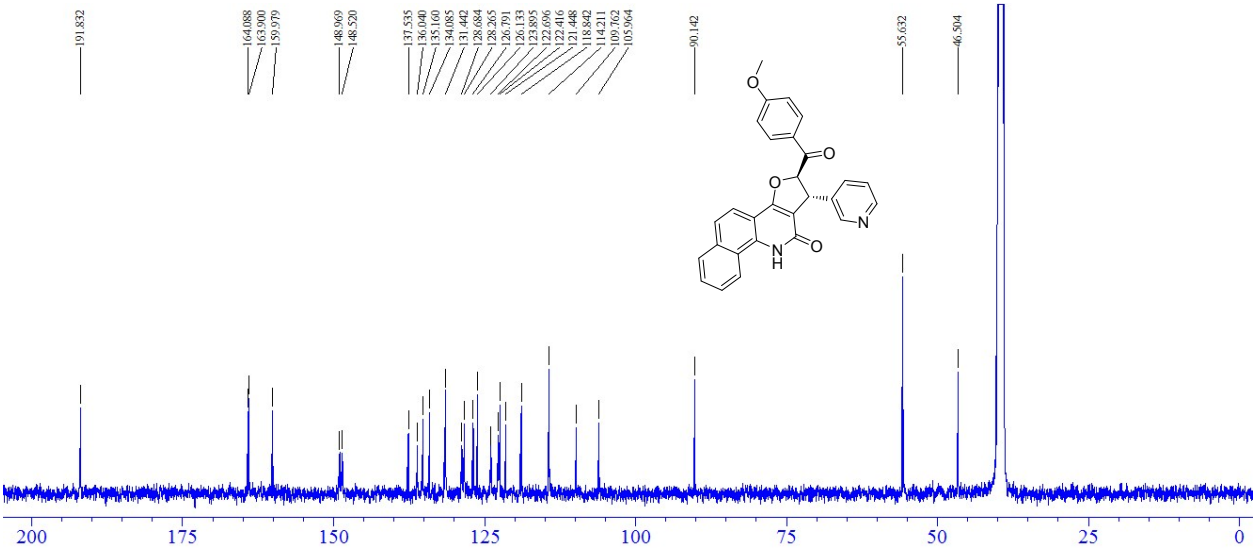


***trans*-2-(4-Methoxybenzoyl)-1-(pyridin-3-yl)-1,2-dihydrobenzo[*h*]furo[3,2-*c*]quinolin-11(10*H*)-one (2h).**

^{1}H NMR (300 MHz, DMSO-d_6)

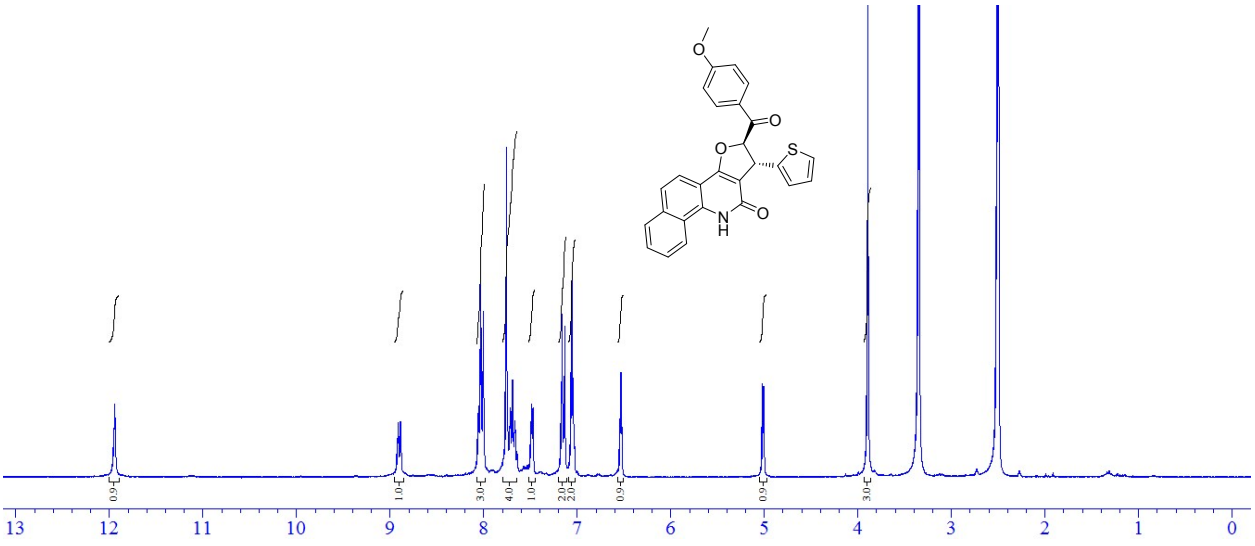


^{13}C NMR (125 MHz, DMSO-d_6)

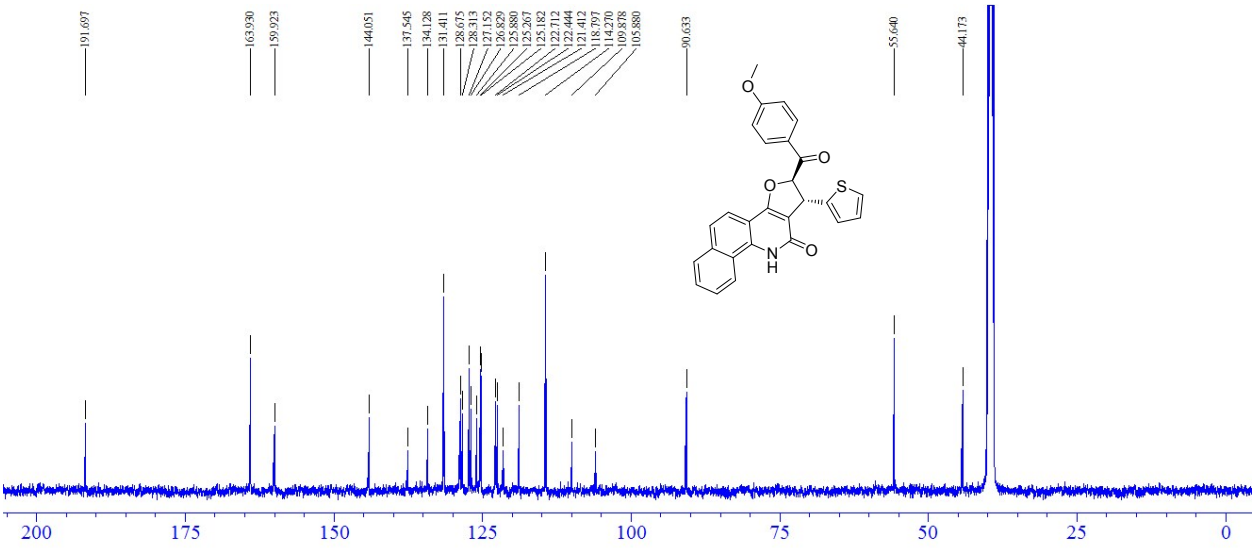


***trans*-2-(4-Methoxybenzoyl)-1-(thiophen-2-yl)-1,2-dihydrobenzo[*h*]furo[3,2-*c*]quinolin-11(10*H*)-one (2i).**

^{1}H NMR (300 MHz, DMSO-d_6)

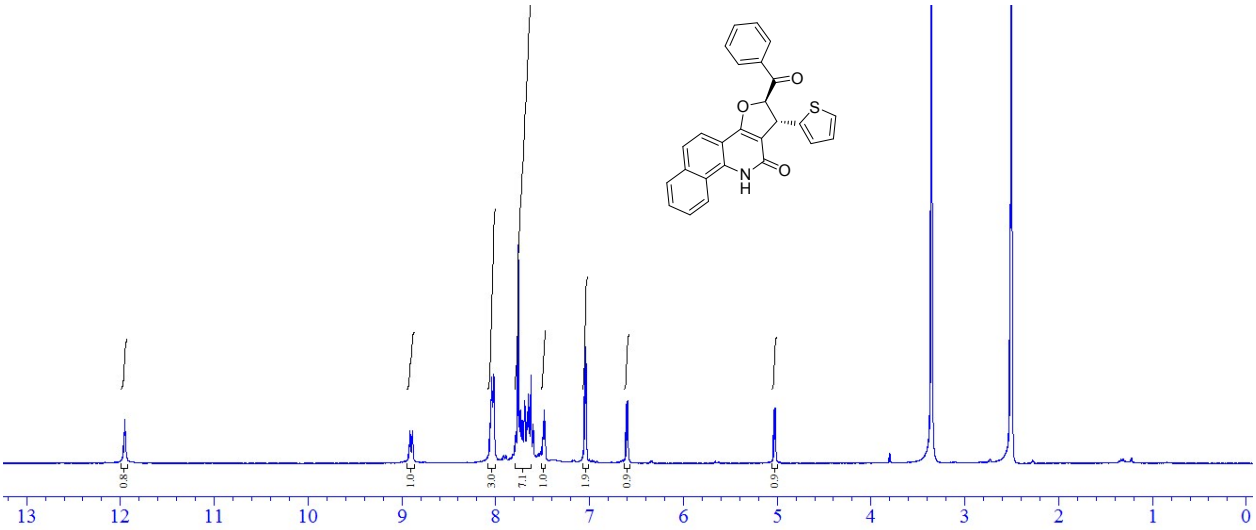


^{13}C NMR (125 MHz, DMSO-d_6)



***trans*-2-Benzoyl-1-(thiophen-2-yl)-1,2-dihydrobenzo[*h*]furo[3,2-*c*]quinolin-11(10*H*)-one (2j).**

^{1}H NMR (300 MHz, DMSO-d_6)



^{13}C NMR (125 MHz, DMSO-d_6)