

## Supporting Information

### The deep eutectic melt of sorbitol and metformin hydrochloride: Synthesis of 3-substituted 2-aminonaphtho[2,3-*b*]furan-4,9-diones and their photophysical properties

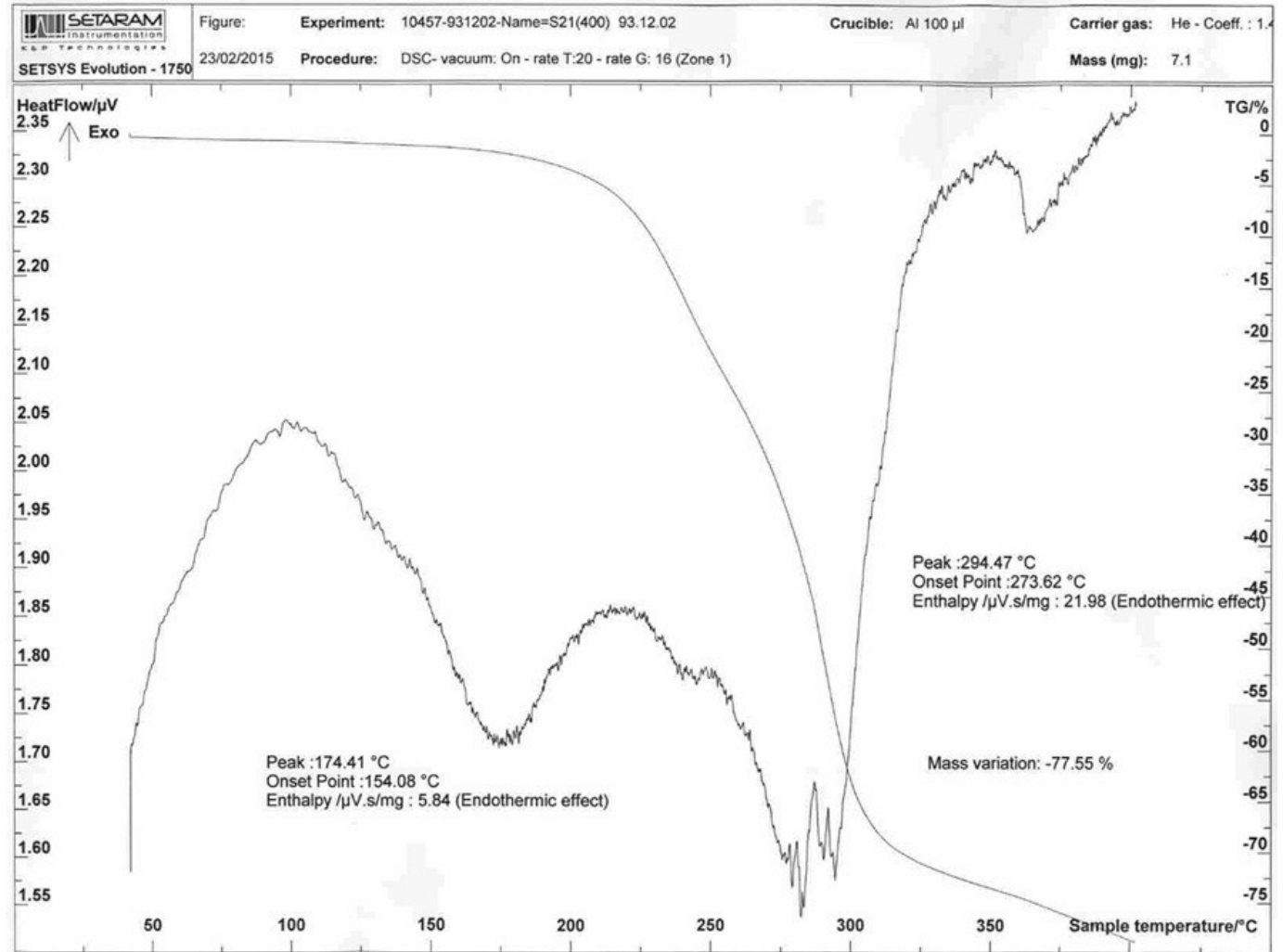
Kurosh Rad-Moghadam\*, Seyyed Ali Reza Mousazadeh Hassani and Saeedeh Toorchi Roudsari  
*Chemistry department, Univrsity of Guilan, Rasht 41335-1914; radmm@guilan.ac.ir*

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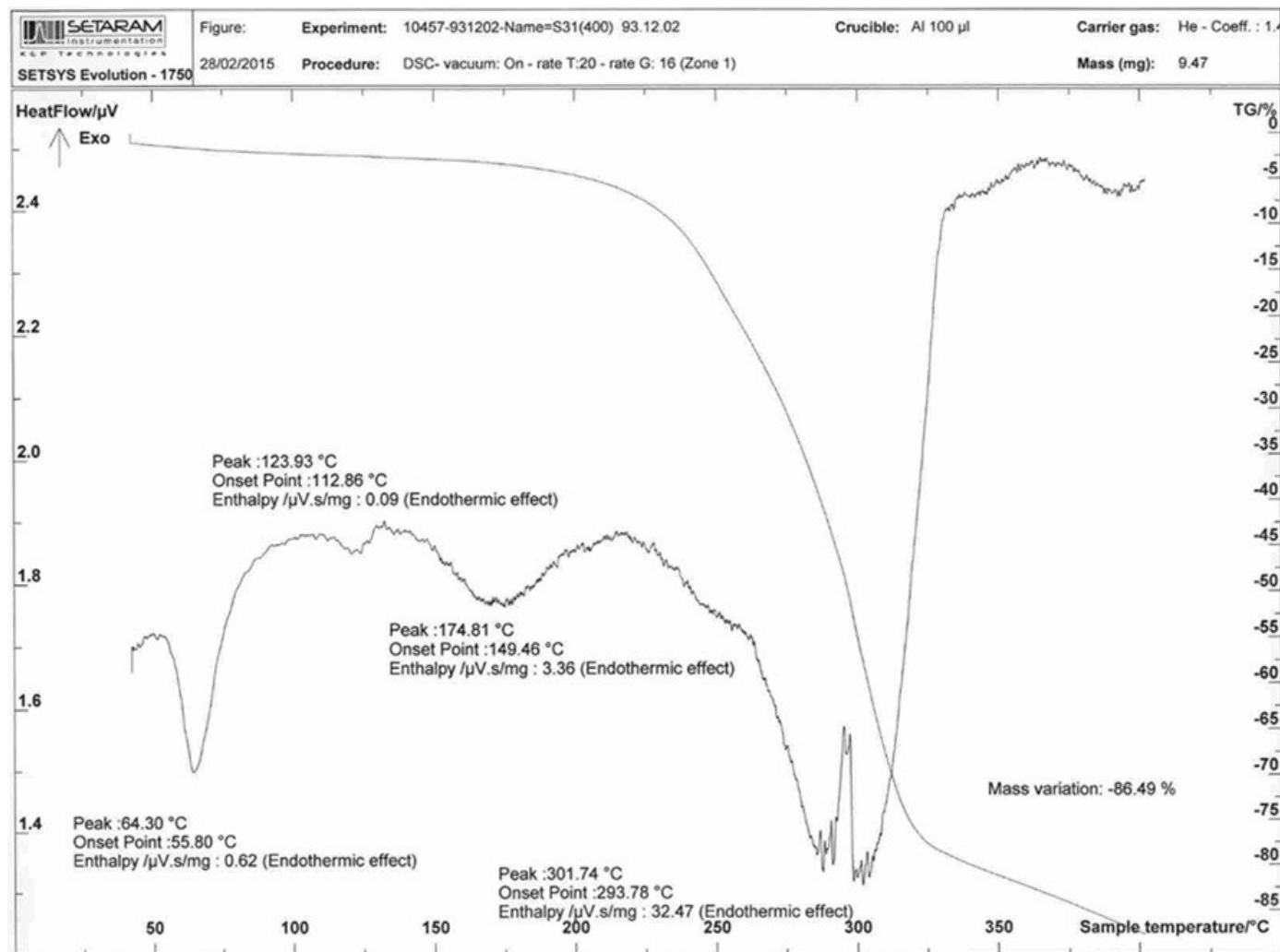
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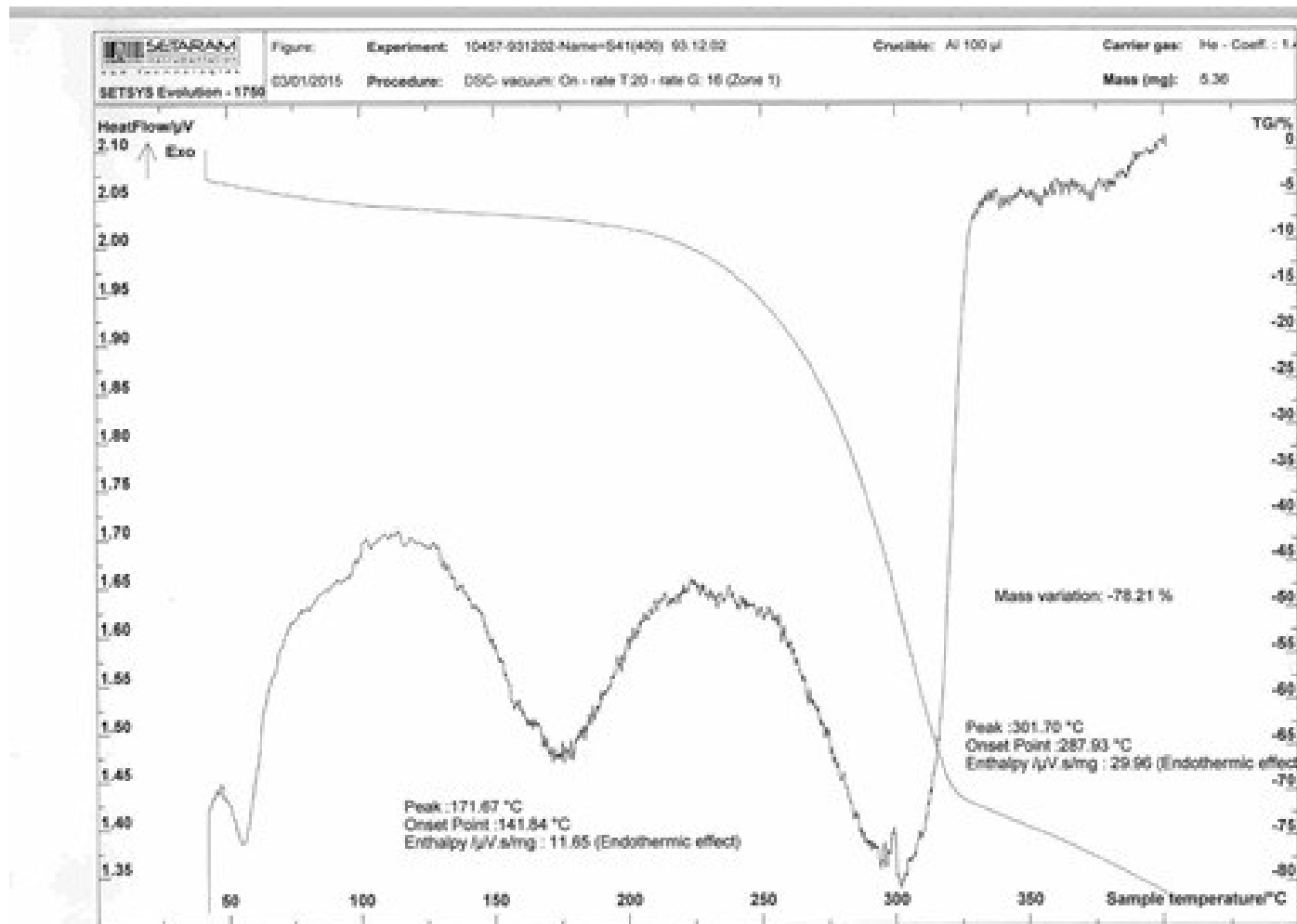
**S<sub>1</sub>** Differential scanning calorimetry (DSC) and thermal gravimetric analysis (TGA) of Sorbitol:MetHCl (2:1)



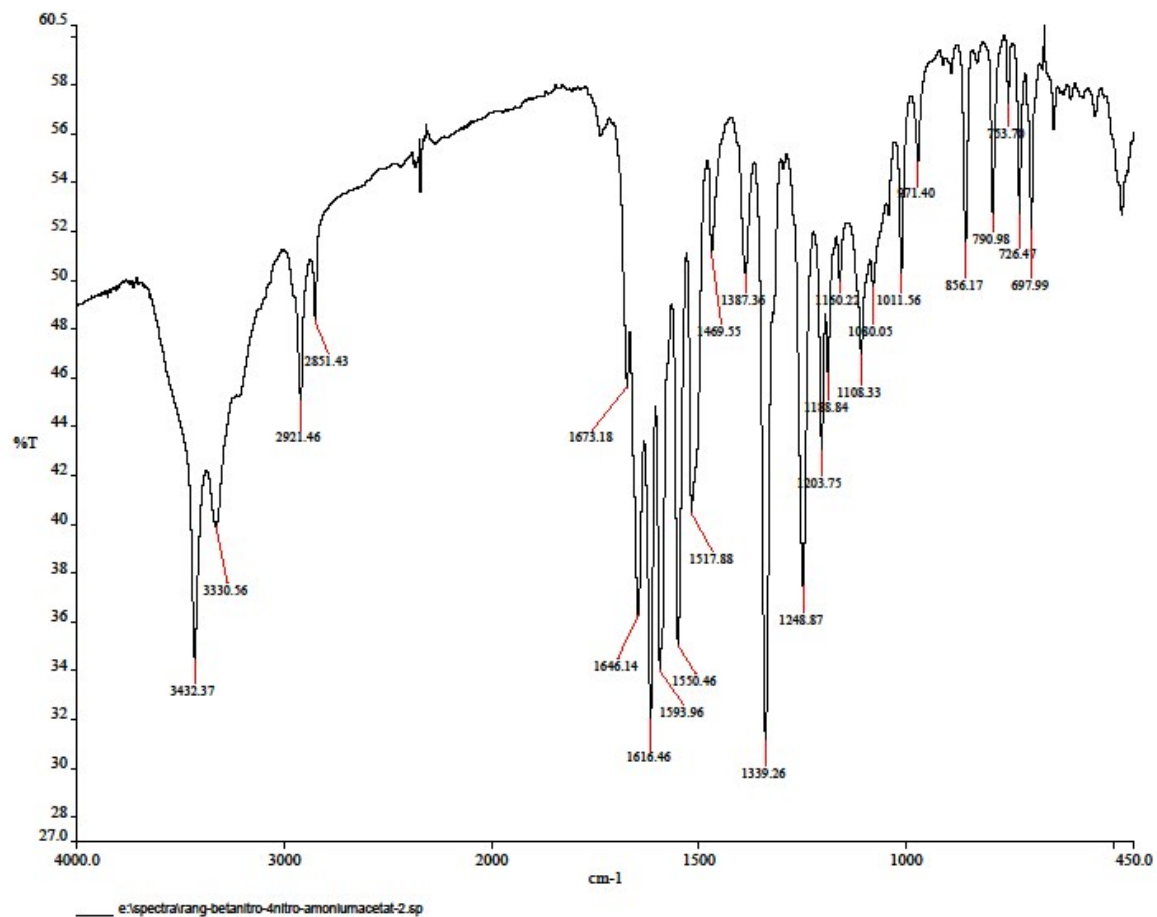
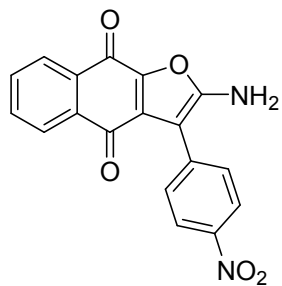
S<sub>2</sub> Differential scanning calorimetry (DSC) and thermal gravimetric analysis (TGA) of Sorbitol:MetHCl (3:1)



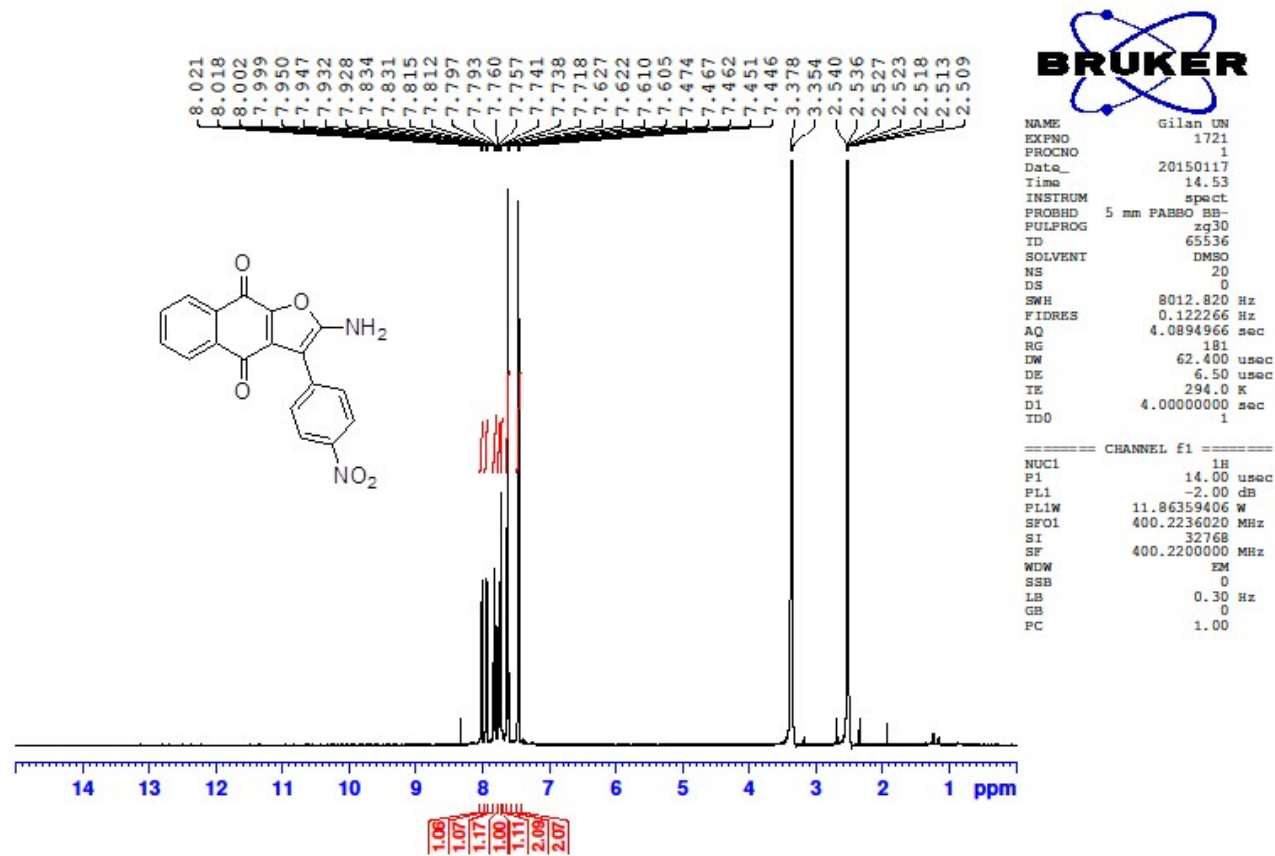
S<sub>3</sub> Differential scanning calorimetry (DSC) and thermal gravimetric analysis (TGA) of Sorbitol:MetHCl (4:1)



S<sub>4</sub> The IR spectrum of 2-amino-3-(4-nitrophenyl)naphtho[2,3-*b*]furan-4,9-dione (**4d**)

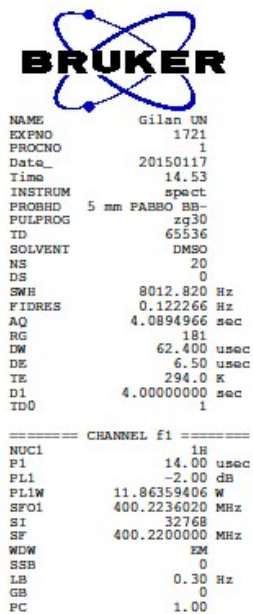
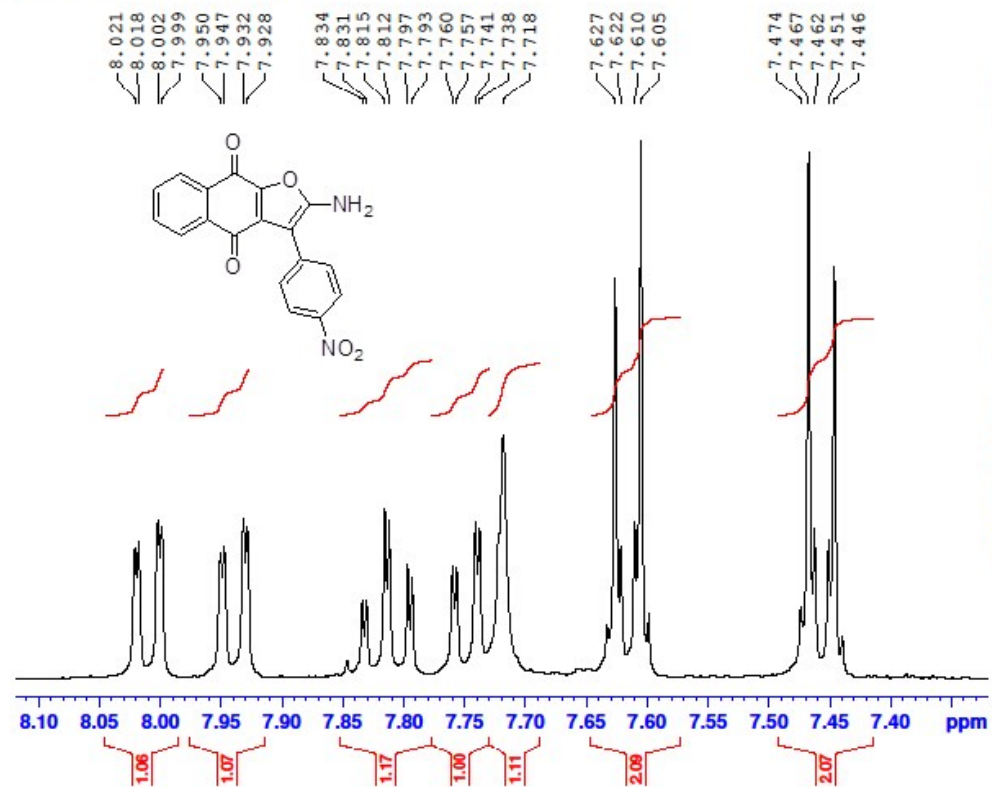


S<sub>5</sub> The <sup>1</sup>H NMR spectrum of 2-amino-3-(4-nitrophenyl)naphtho[2,3-*b*]furan-4,9-dione in DMSO-*d*<sub>6</sub> (**4d**)



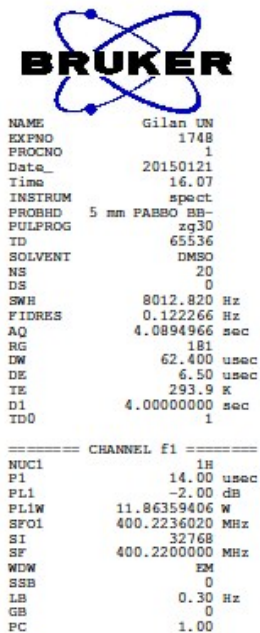
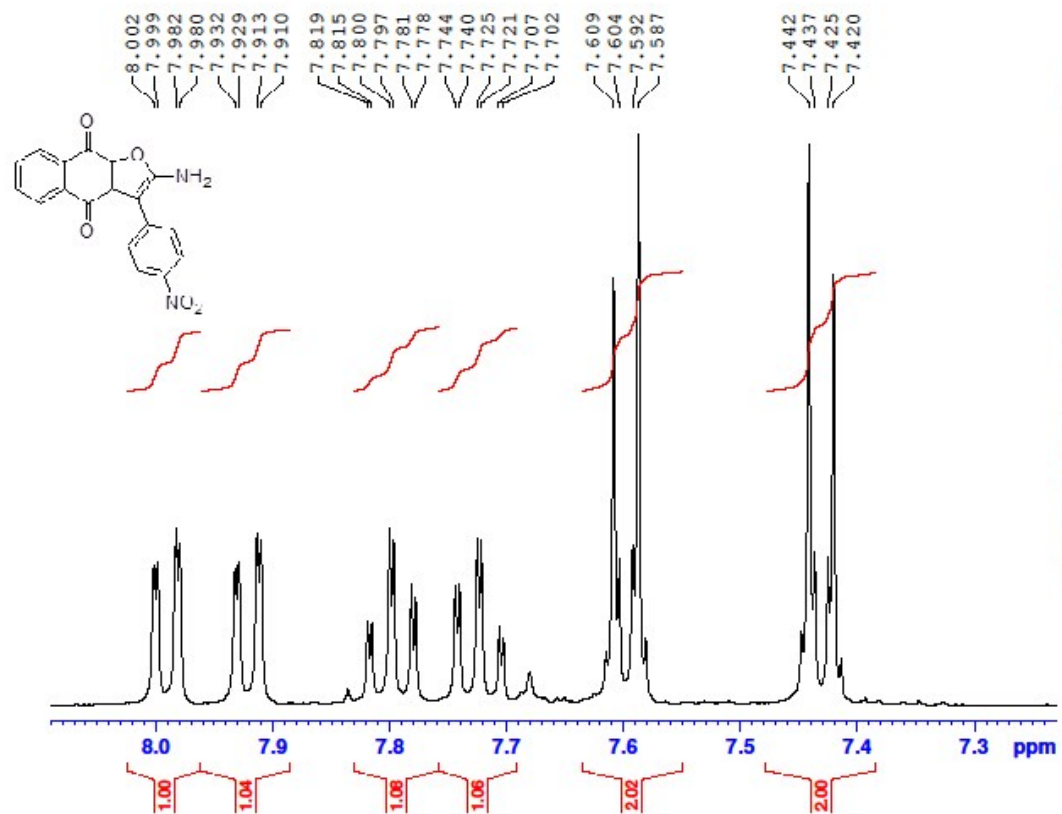
S<sub>5</sub> The <sup>1</sup>H NMR spectrum of 2-amino-3-(4-nitrophenyl)naphtho[2,3-*b*]furan-4,9-dione in DMSO-*d*<sub>6</sub> (**4d**)

Sample code: V2 (mousa zadeh)

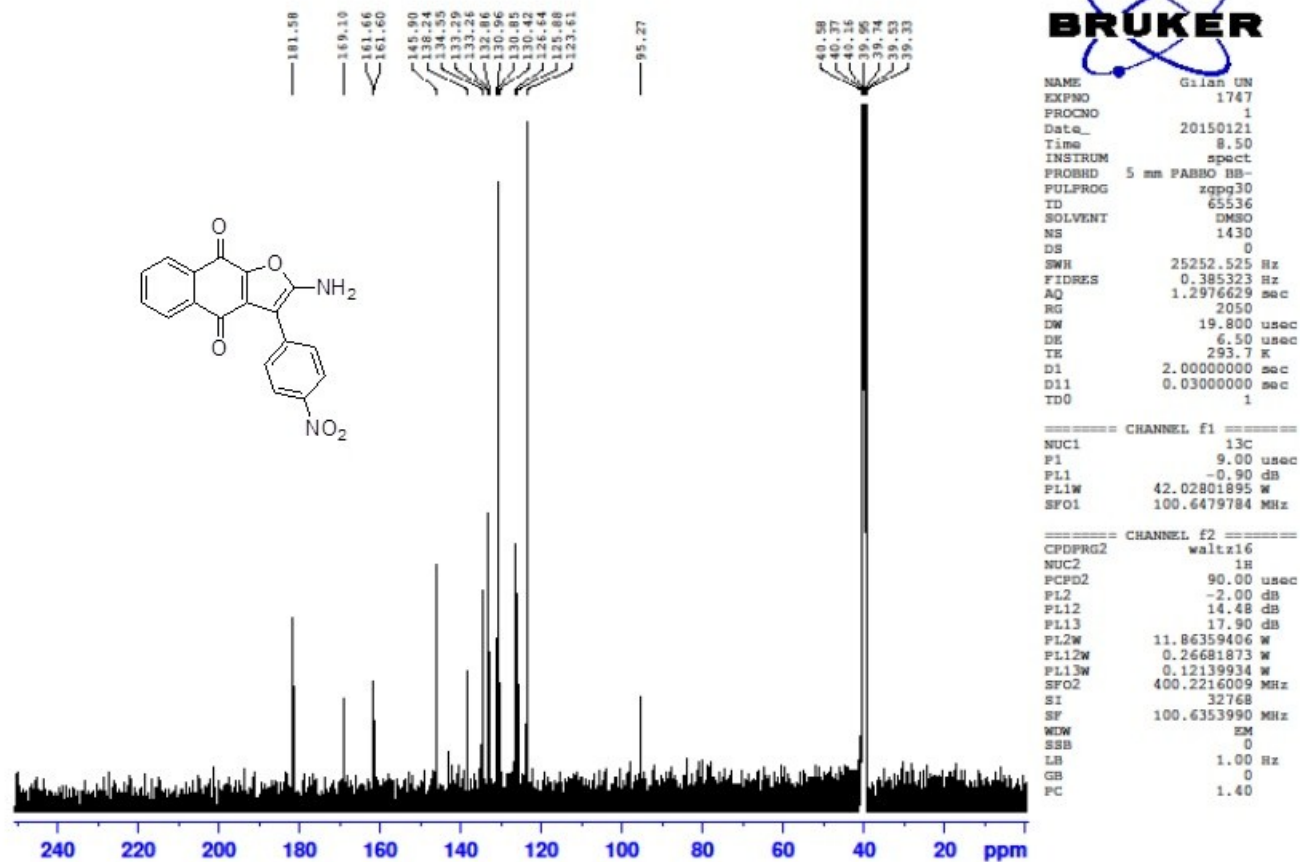




S<sub>6</sub> The <sup>1</sup>H NMR spectrum of 2-amino-3-(4-nitrophenyl)naphtho[2,3-*b*]furan-4,9-dione in DMSO-*d*<sub>6</sub> + D<sub>2</sub>O (4d)

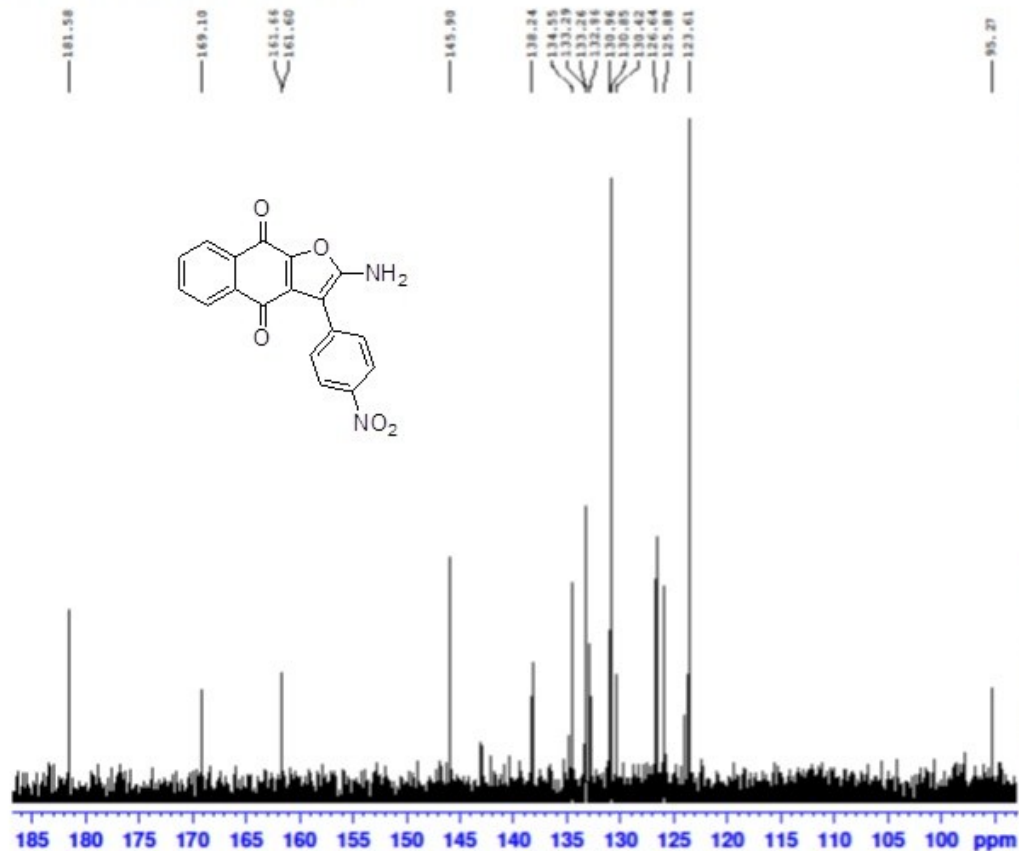


S<sub>7</sub> The <sup>13</sup>C NMR spectrum of  
 2-amino-3-(4-nitrophenyl)  
 naphtho[2,3-*b*]furan-4,9-  
 dione (**4d**)



S<sub>7</sub> The <sup>13</sup>C NMR spectrum of  
 2-amino-3-(4-nitrophenyl)  
 naphtho[2,3-*b*]furan-4,9-  
 dione (**4d**)

Sample code: V3 (mousa zadeh)



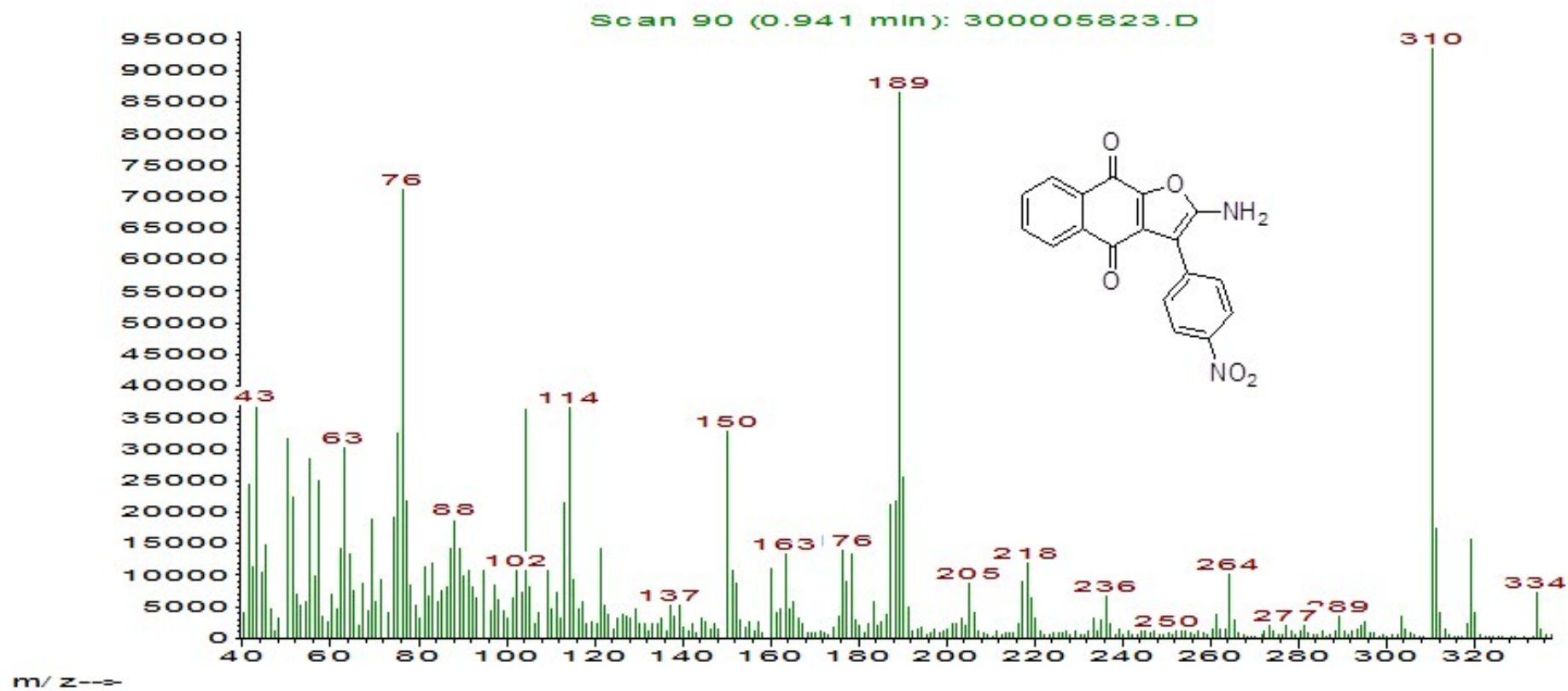
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 TD 65536  
 SOLVENT DMSO  
 NS 1430  
 DS 0  
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 FIDRES 0.385323 Hz  
 AQ 1.2976629 sec  
 RG 2050  
 DW 19.800 usec  
 DE 6.50 usec  
 TE 293.7 K  
 D1 2.0000000 sec  
 D11 0.0300000 sec  
 TDO 1

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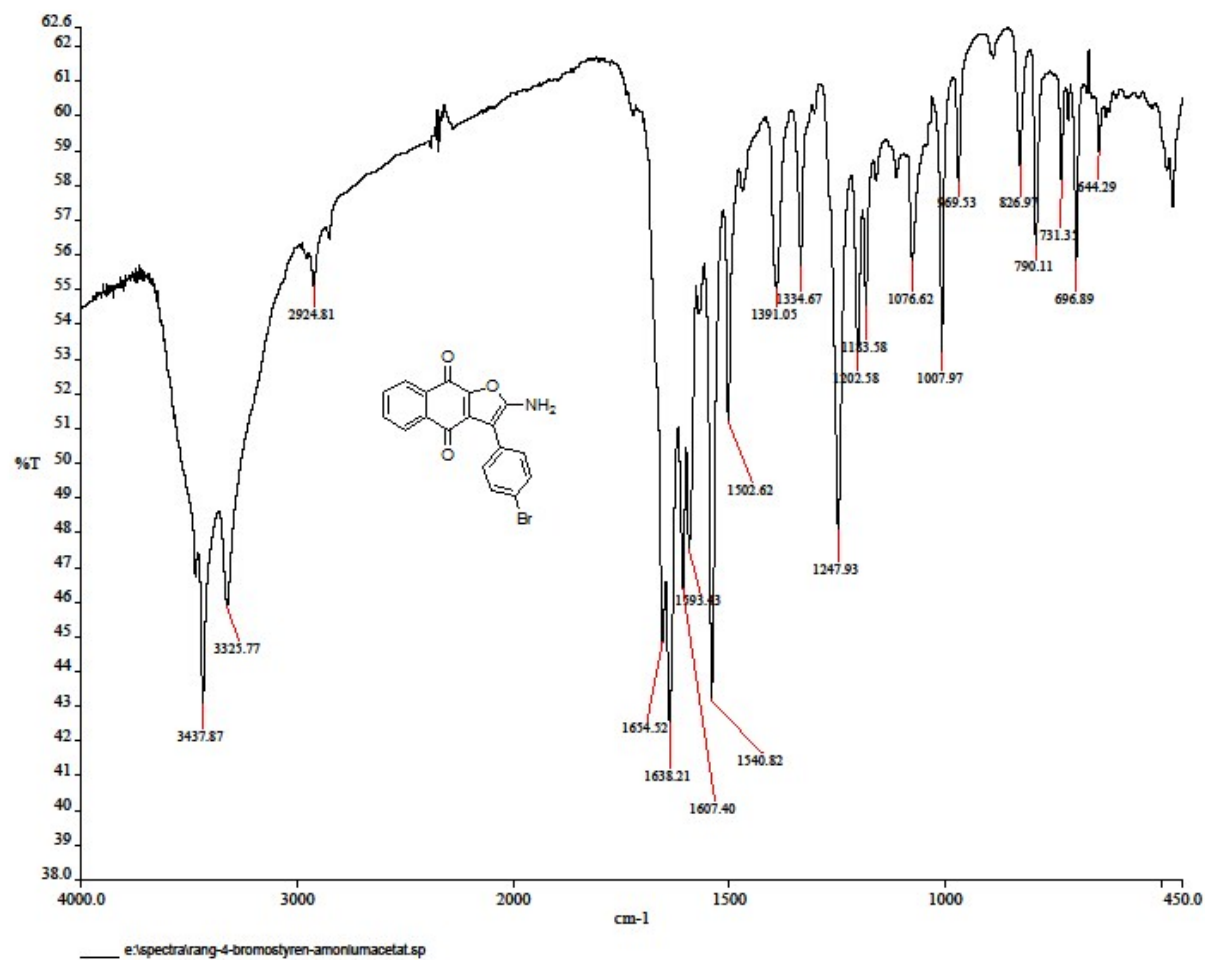
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 PL2 -2.00 dB  
 PL12 14.48 dB  
 PL13 17.90 dB  
 PL2W 11.86359406 W  
 PL12W 0.26681873 W  
 PL13W 0.12139934 W  
 SFO2 400.2216009 MHz  
 SI 32768  
 SF 100.6353990 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40

S<sub>8</sub> The Mass spectrum of 2-amino-3-(4-nitrophenyl)naphtho[2,3-*b*]furan-4,9-dione (**4d**)

Abundance

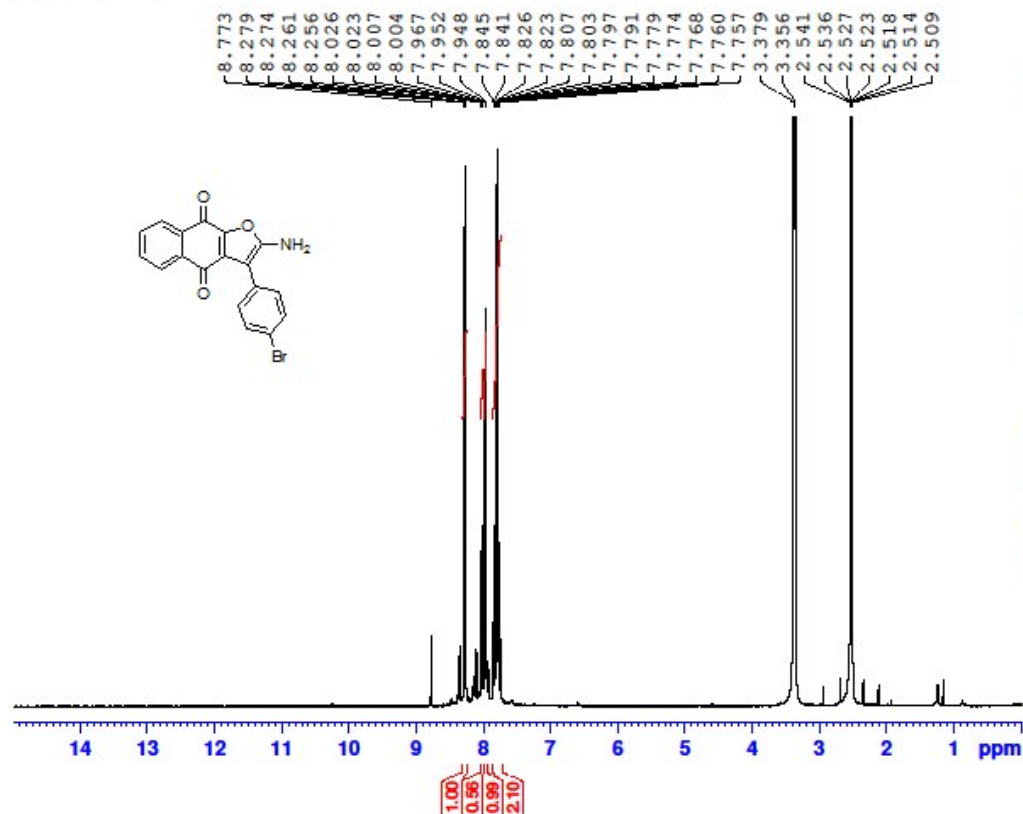
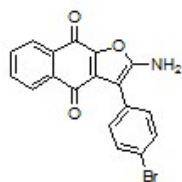


S<sub>9</sub> The IR spectrum of 2-amino-3-(4-bromophenyl)naphtho[2,3-*b*]furan-4,9-dione (**4g**)



S<sub>10</sub> The <sup>1</sup>H NMR spectrum of 2-amino-3-(4-bromophenyl)naphtho[2,3-*b*]furan-4,9-dione (4g)

Sample code: V3 (mousa zadeh)



**BRUKER**

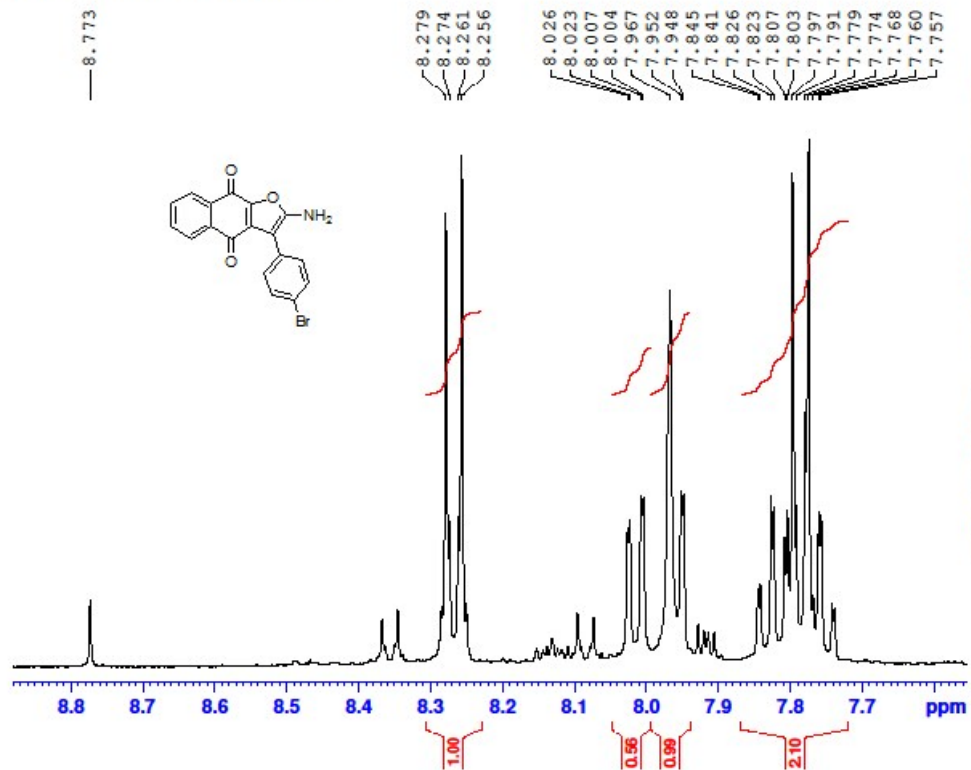
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FIDRES        0.122266 Hz
AQ            4.0894966 sec
RG            181
DW            62.400 usec
DE            6.50 usec
TE            294.0 K
TK            4.0000000 sec
TD            1

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SI            32768
SF            400.2200000 MHz
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LB            0.30 Hz
GB            0
PC            1.00
  
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S<sub>10</sub> The <sup>1</sup>H NMR spectrum of 2-amino-3-(4-bromophenyl)naphtho[2,3-*b*]furan-4,9-dione (4g)

Sample code: V3 (mousa zadeh)



**BRUKER**

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NAME      Gilan UN
EXPNO     1720
PROCNO    1
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PULPROG   zg30
ID        65536
SOLVENT   DMSO
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FIDRES    0.122266 Hz
AQ        4.0894966 sec
RG        181
LW        62.400 usec
DE        6.50 usec
TE        294.0 K
D1        4.00000000 sec
TD0       1

===== CHANNEL f1 =====
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P1        14.00 usec
PL1       -2.00 dB
PL1W      11.86359406 W
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PC        1.00

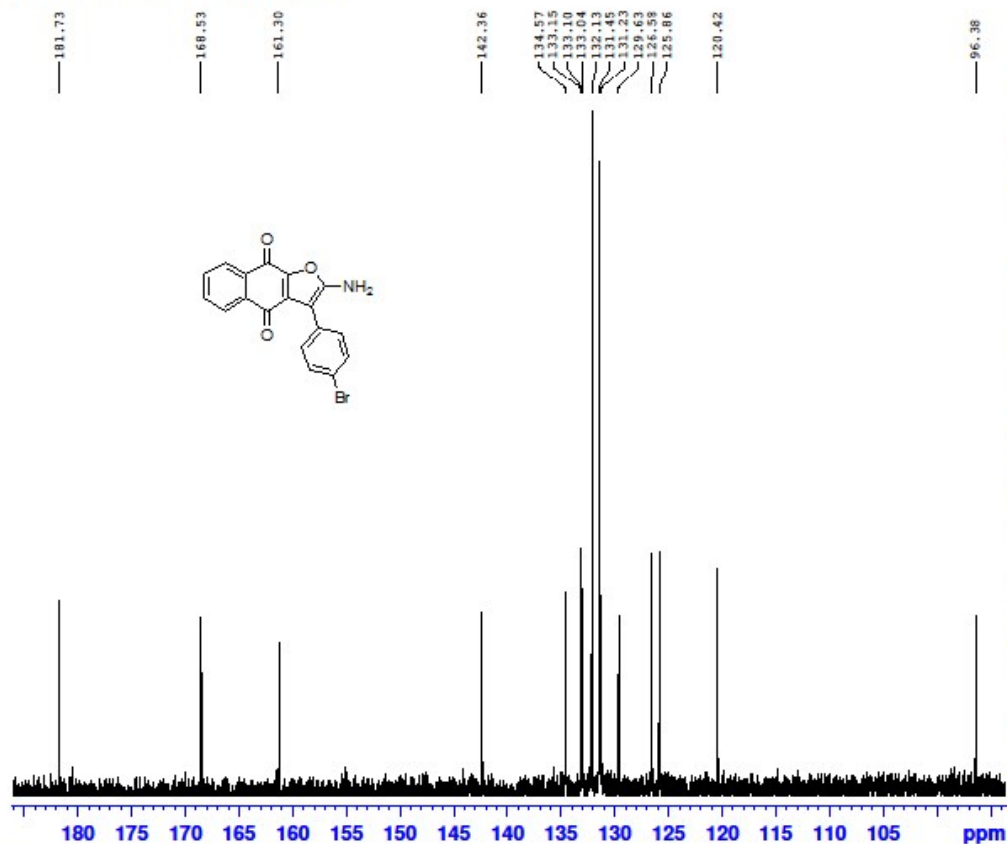
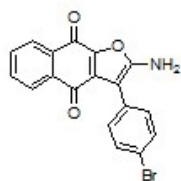
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S<sub>11</sub> The <sup>13</sup>C NMR spectrum of  
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 naphtha[2,3-*b*]furan-4,9-dione  
 (4g)

Sample code: V2 (mousa zadeh)



**BRUKER**

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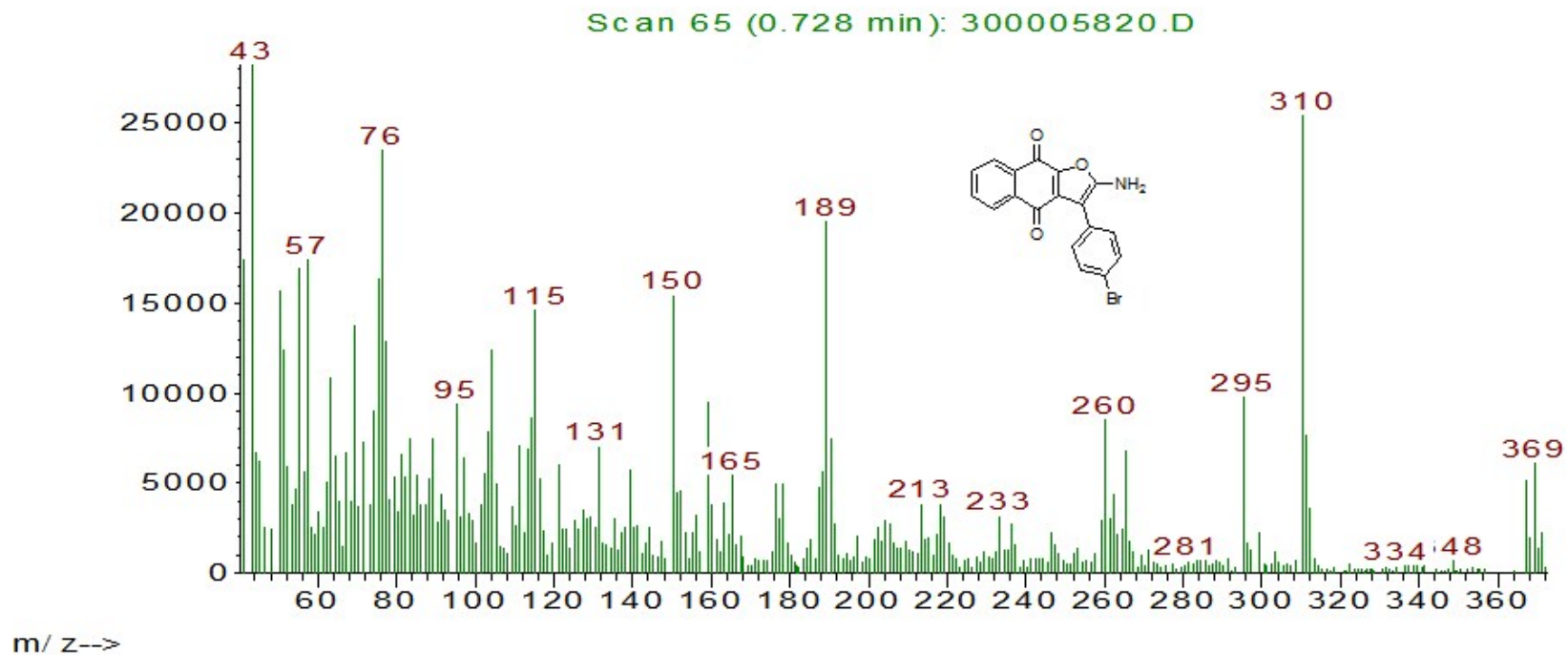
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TD         65536
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FIDRES     0.385323 Hz
AQ         1.2976629 sec
RG         2050
DW         19.800 usec
DE         6.50 usec
TE         294.3 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
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P1         9.00 usec
PL1        -0.90 dB
PL1W       42.02801895 W
SFO1       100.6479784 MHz

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NUC2       1H
PCPD2      90.00 usec
PL2        -2.00 dB
PL12       14.48 dB
PL13       17.90 dB
PL12W      11.86359406 W
PL12W      0.26681873 W
PL13W      0.12139934 W
SFO2       400.2216009 MHz
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SF         100.6353990 MHz
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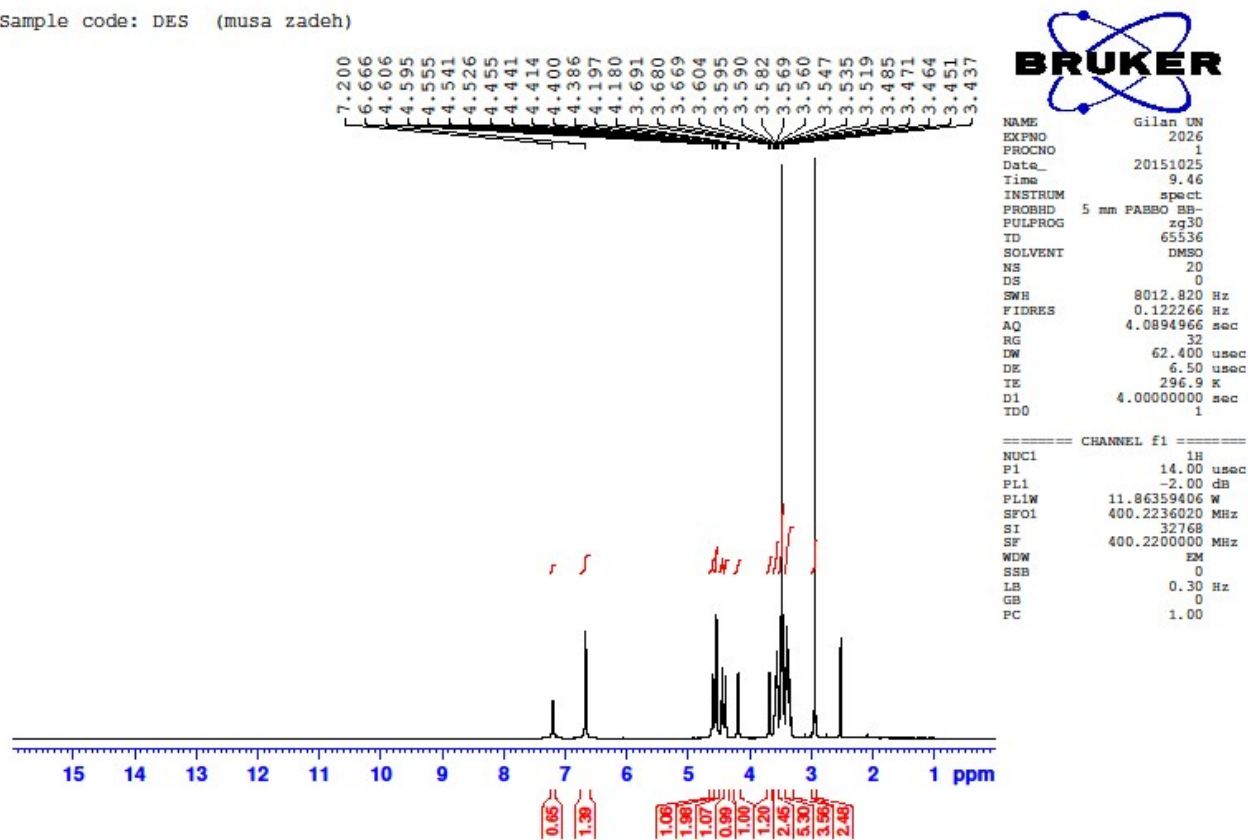
S<sub>12</sub> The Mass spectrum of 2-amino-3-(4-bromophenyl) naphtha [2,3-*b*]furan-4,9-dione (**4g**)

Abundance



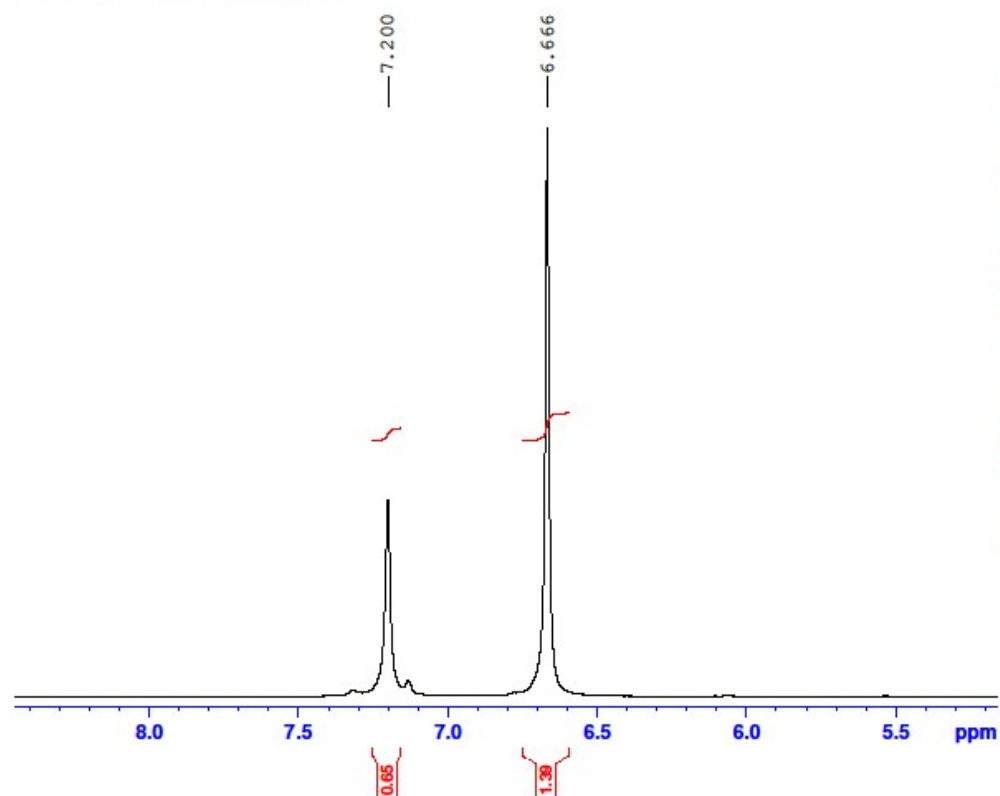
S<sub>13</sub> The <sup>1</sup>H NMR spectrum of 3:1 S:MetHCl

Sample code: DES (musa zadeh)



S<sub>13</sub> The <sup>1</sup>H NMR spectrum of 3:1 S:MetHCl

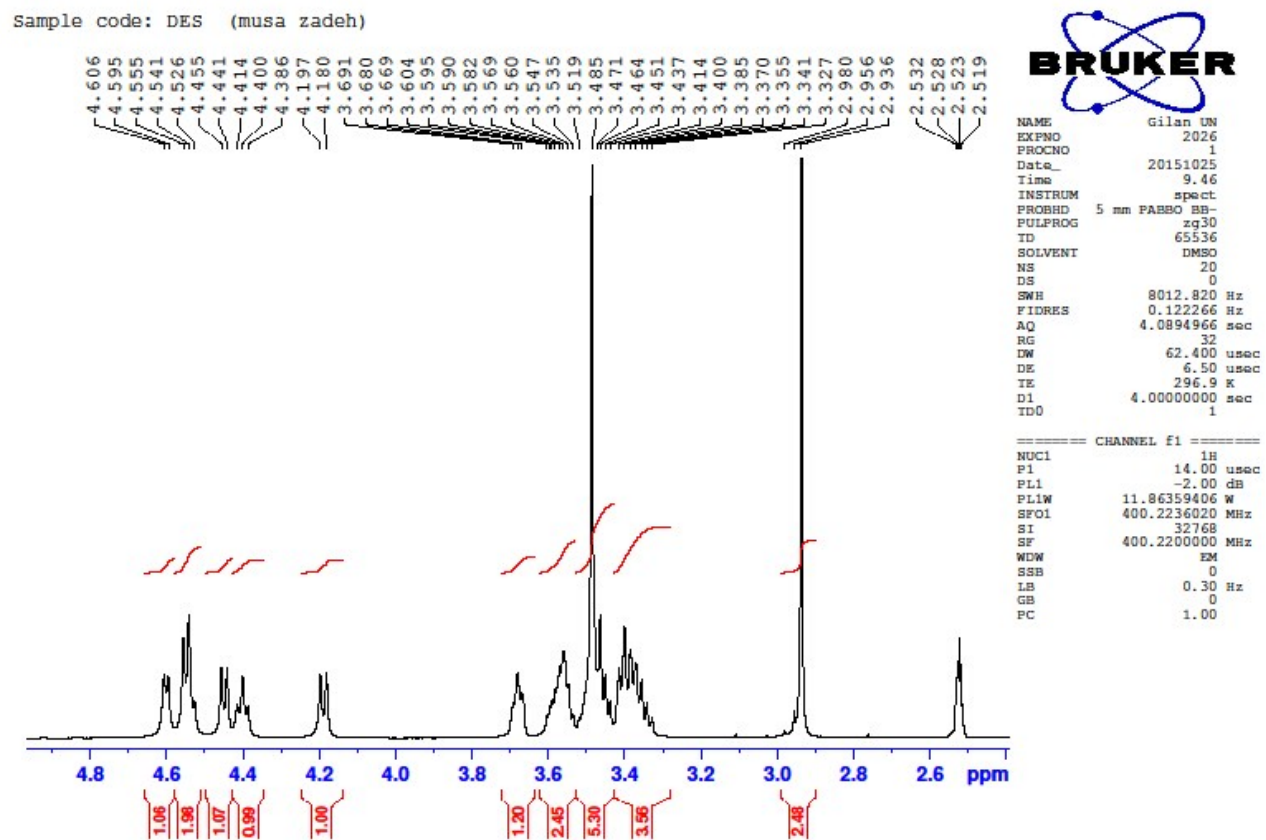
Sample code: DES (musa zadeh)



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PROCNO 1  
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PULPROG zg30  
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SOLVENT DMSO  
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DS 0  
SWH 8012.820 Hz  
FIDRES 0.122266 Hz  
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RG 32  
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DE 6.50 usec  
TE 296.9 K  
D1 4.0000000 sec  
TD0 1

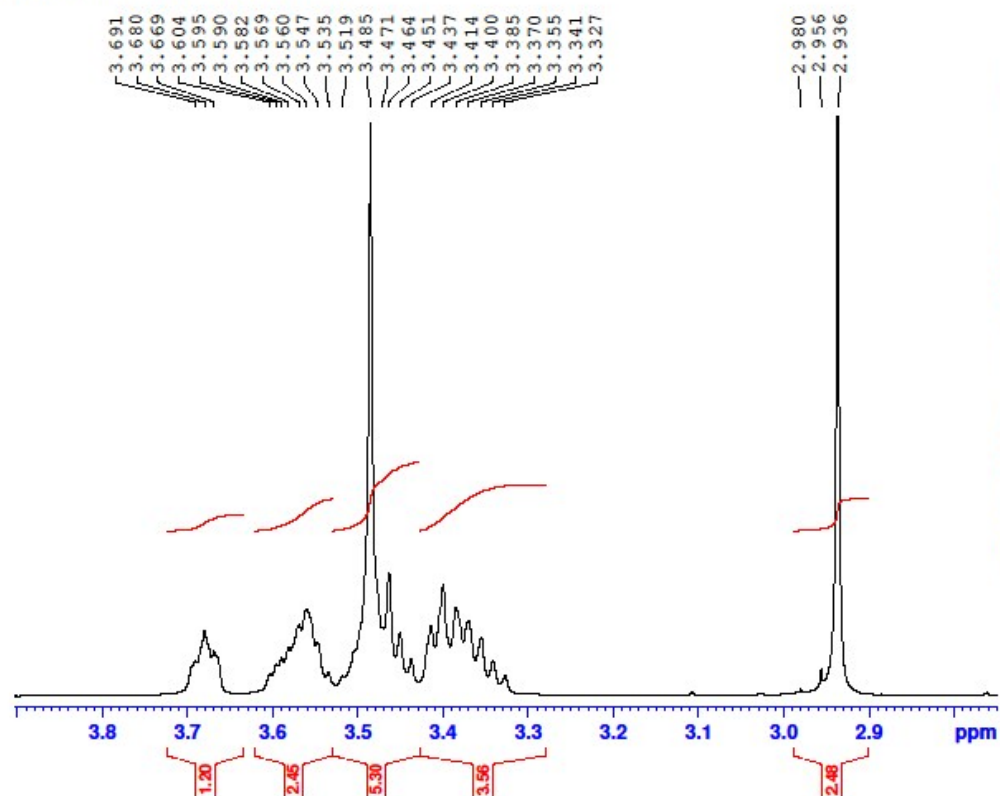
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SF 400.2200000 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

S<sub>13</sub> The <sup>1</sup>H NMR spectrum of 3:1 S:MetHCl



S<sub>13</sub> The <sup>1</sup>H NMR spectrum of 3:1 S:MetHCl

Sample code: DES (musa zadeh)



**BRUKER**

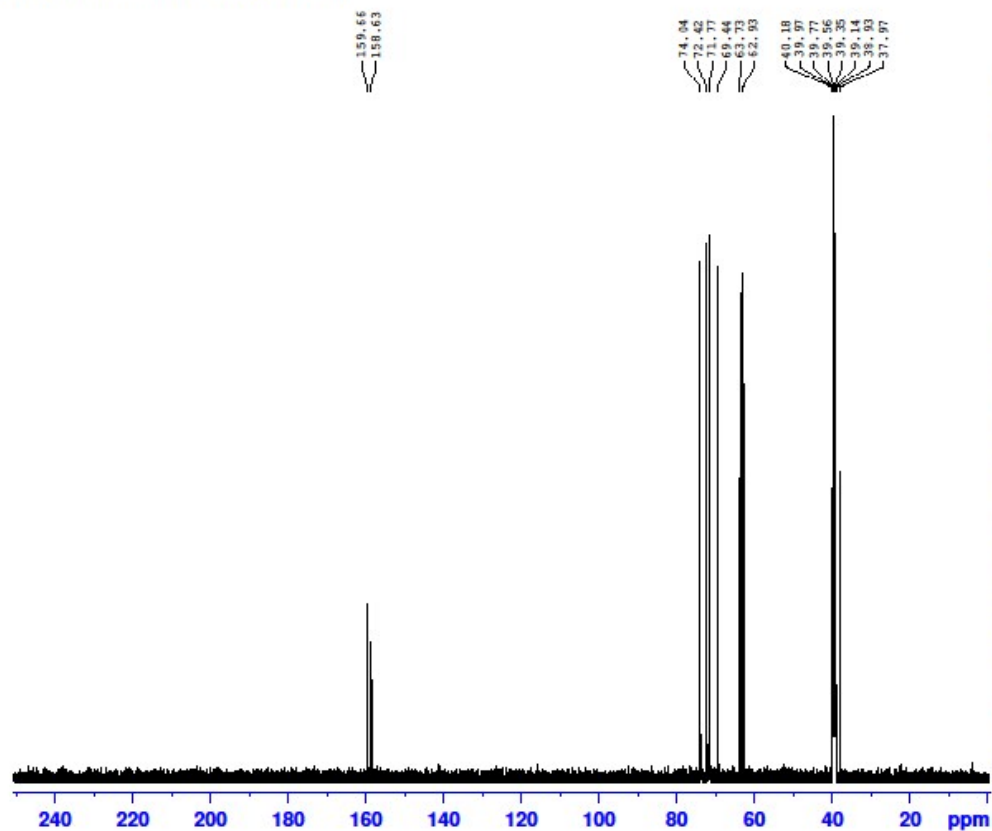
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PROCNO        1
Date_         20151025
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PULPROG       zg30
ID            65536
SOLVENT       DMSO
NS            20
DS            0
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FIDRES        0.122266 Hz
AQ            4.0894966 sec
RG            32
DW            62.400 usec
DE            6.50 usec
TE            296.9 K
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ID0           1

===== CHANNEL f1 =====
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S<sub>14</sub> The <sup>13</sup>C NMR spectrum of 3:1 S:MetHCl

Sample code: DES (musa zadeh)



**BRUKER**

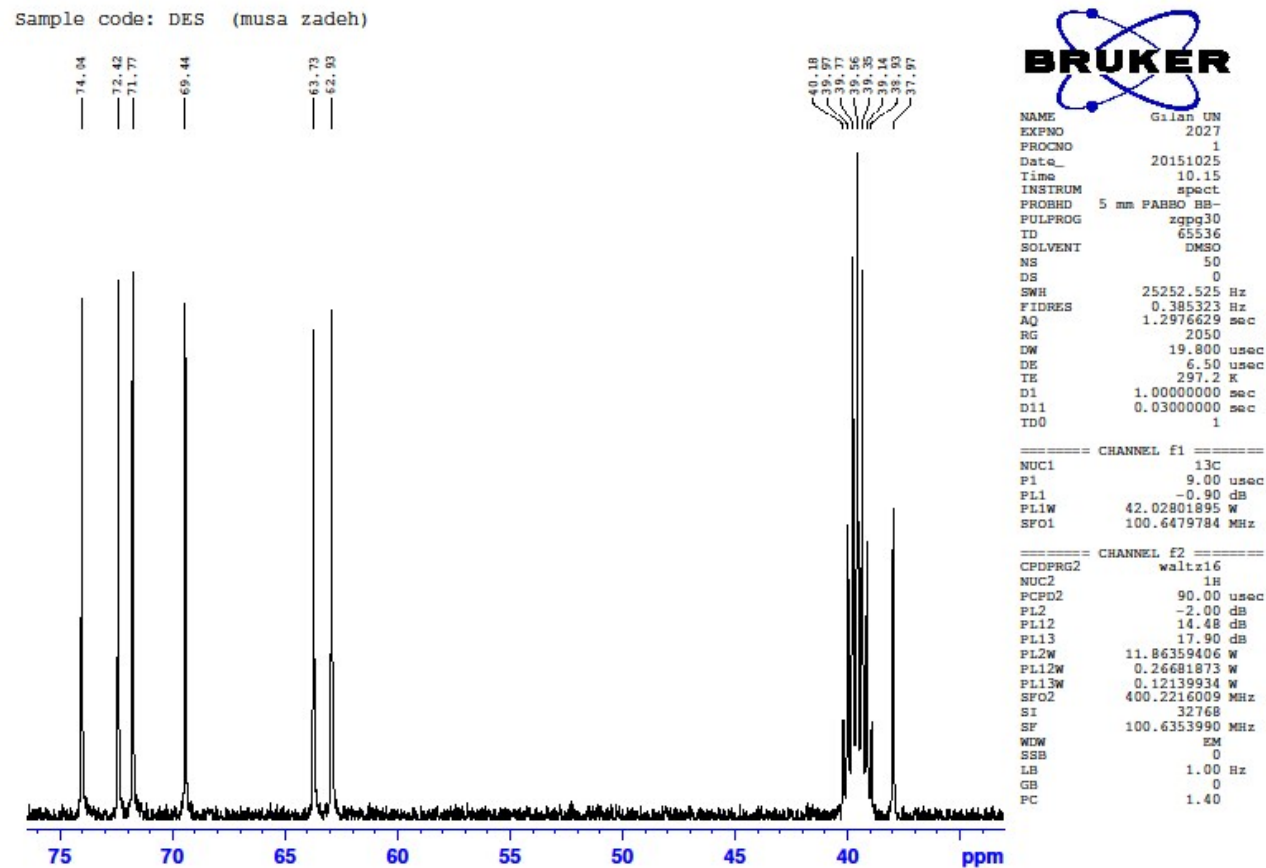
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ID        65536
SOLVENT   DMSO
NS        50
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FIDRES    0.385323 Hz
AQ        1.2976629 sec
RG        2050
DW        19.800 usec
DE        6.50 usec
TE        297.2 K
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D11       0.03000000 sec
TD0       1

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SFO1     100.6479784 MHz

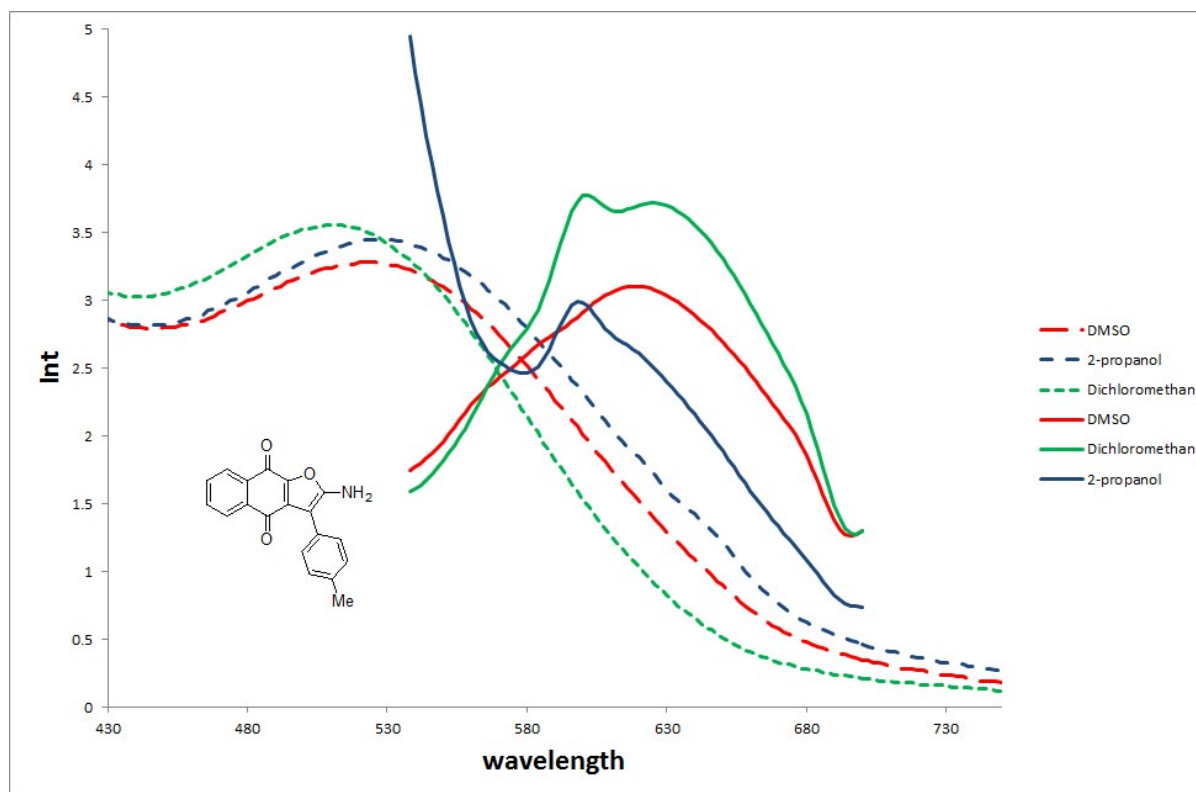
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PL12     14.48 dB
PL13     17.90 dB
PL2W     11.86359406 W
PL12W    0.26681873 W
PL13W    0.12139934 W
SFO2     400.2216009 MHz
SI        32768
SF        100.6353990 MHz
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LB        1.00 Hz
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PC        1.40
    
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S14 The  $^{13}\text{C}$  NMR spectrum of 3:1 S:MetHCl

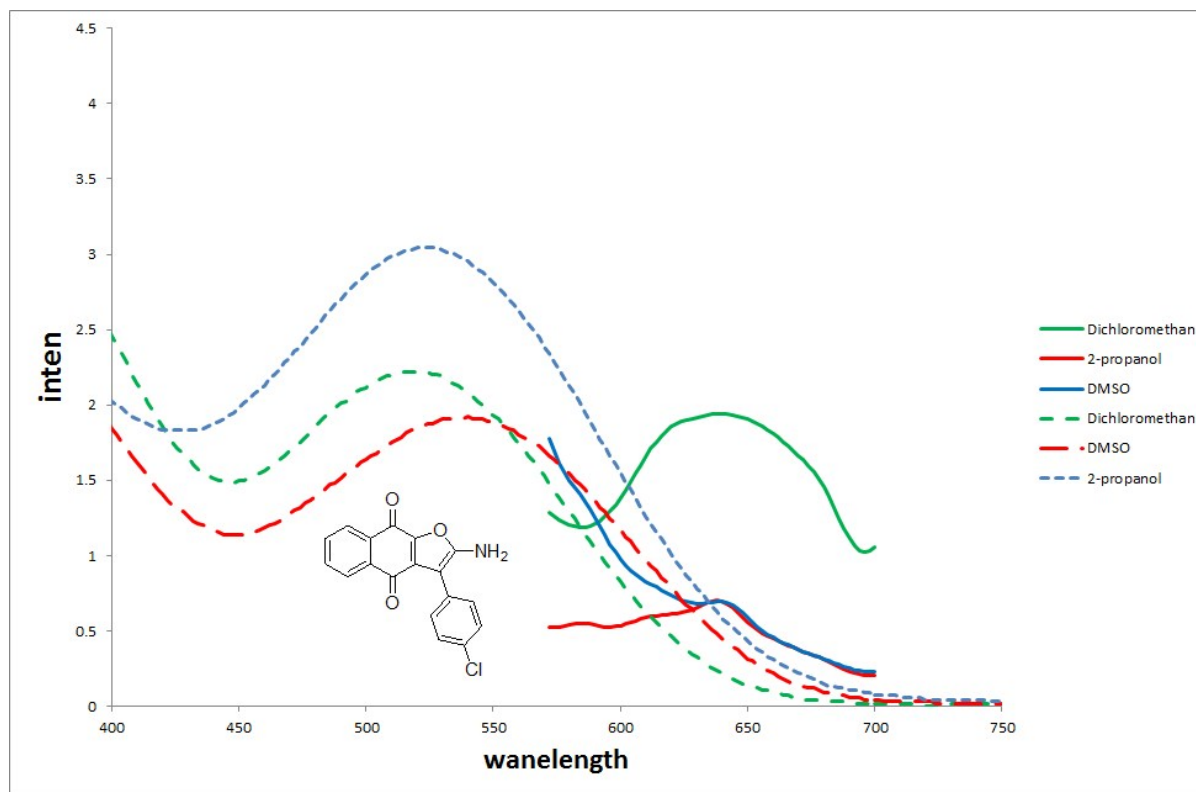




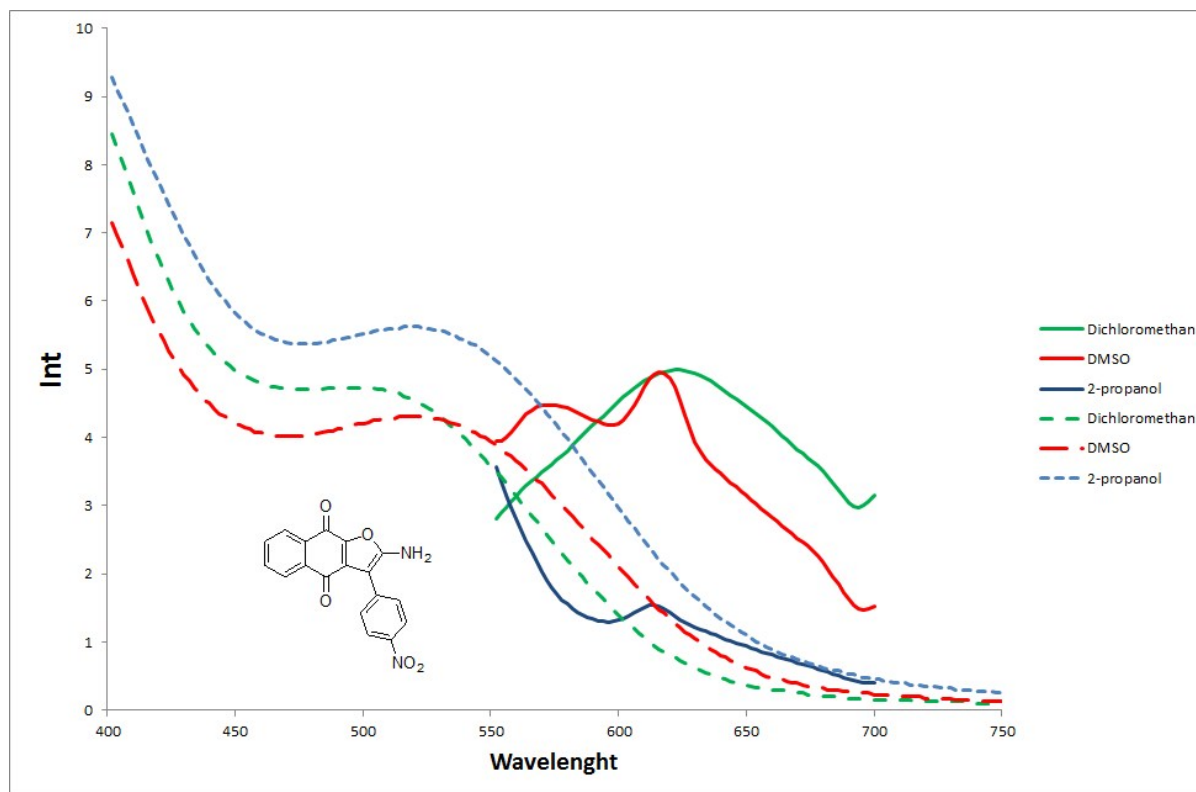
S<sub>15</sub> The absorption (dashed) and emission (solid) spectra for compound **4b**



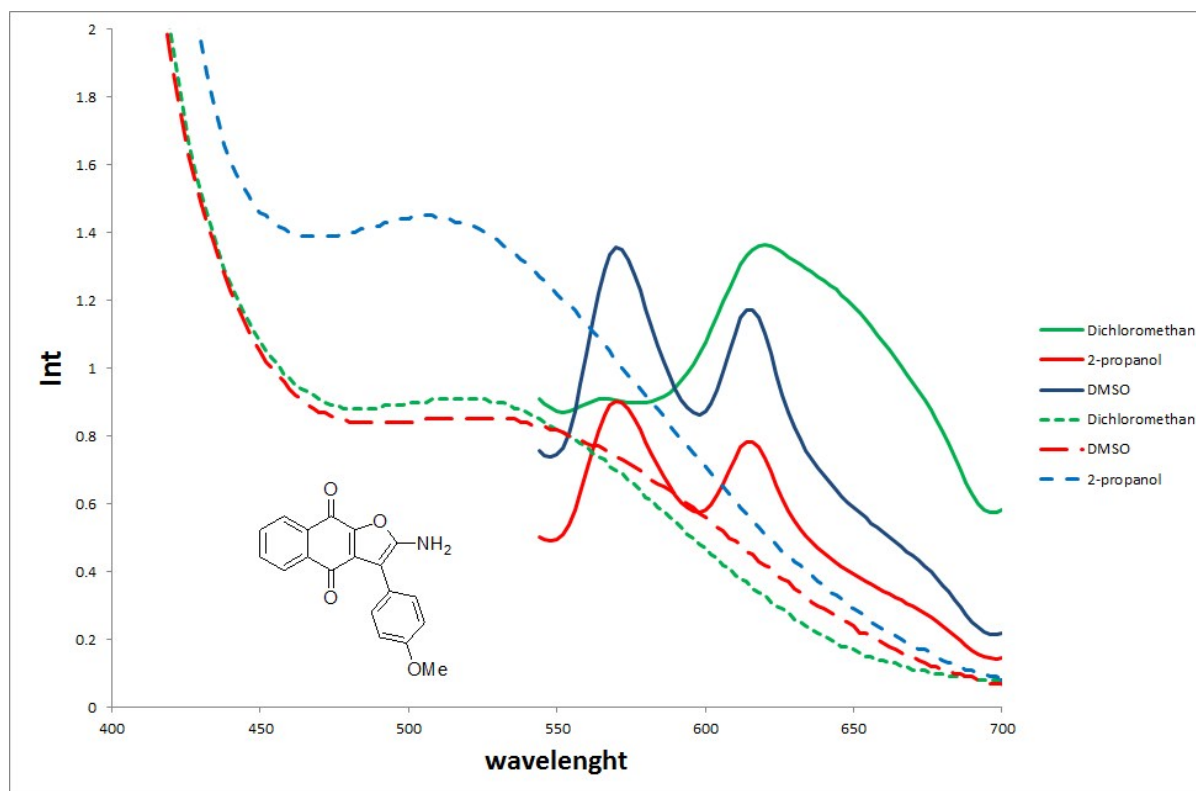
S<sub>16</sub> The absorption (dashed) and emission (solid) spectra for compound **4c**



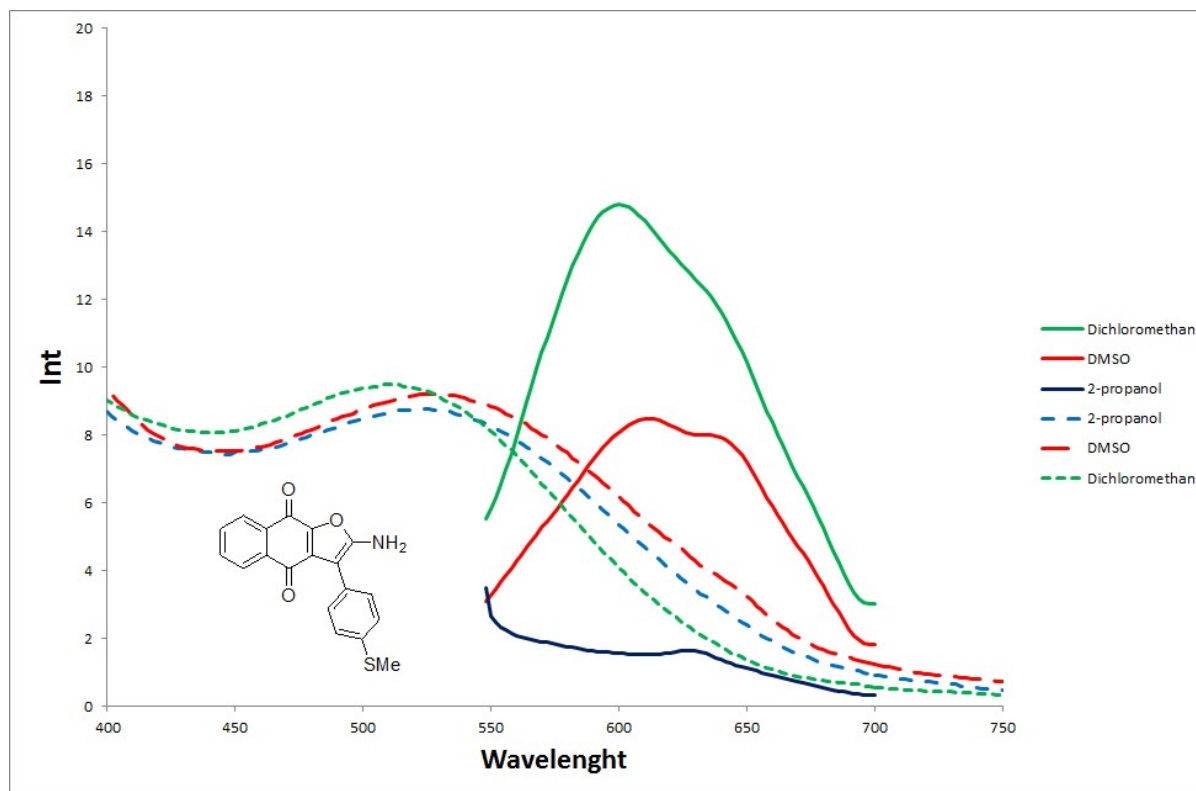
S<sub>17</sub> The absorption (dashed) and emission (solid) spectra for compound **4d**



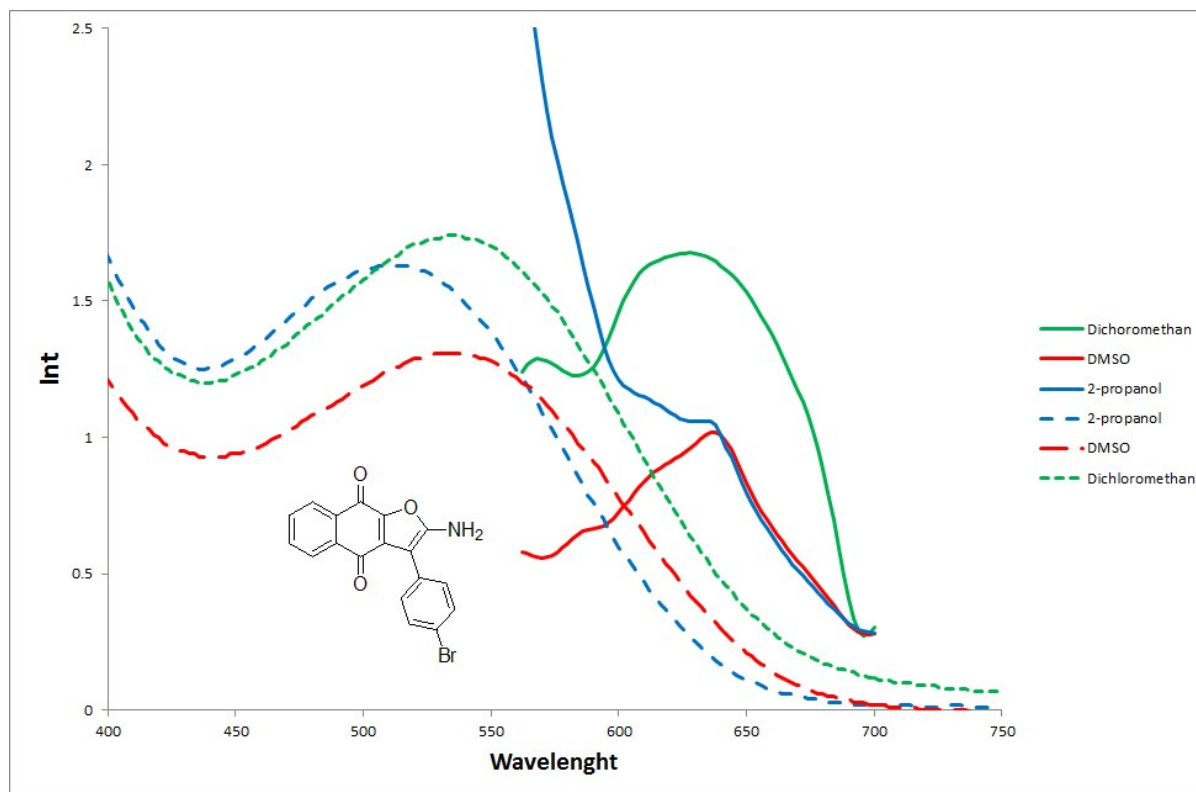
S<sub>18</sub> The absorption (dashed) and emission (solid) spectra for compound **4e**



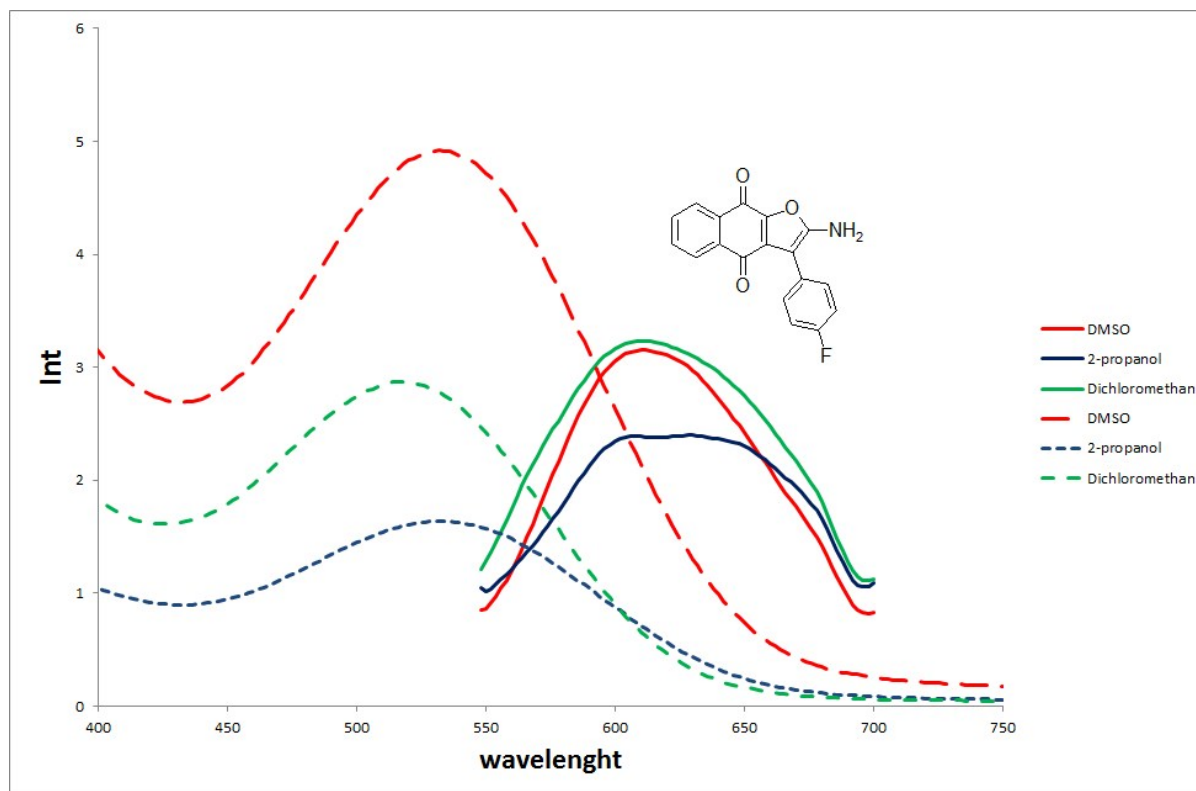
S<sub>19</sub> The absorption (dashed) and emission (solid) spectra for compound **4f**



S<sub>20</sub> The absorption (dashed) and emission (solid) spectra for compound **4g**



S<sub>21</sub> The absorption (dashed) and emission (solid) spectra for compound **4h**



S<sub>22</sub> The absorption (dashed) and emission (solid) spectra for compound **4i**

