

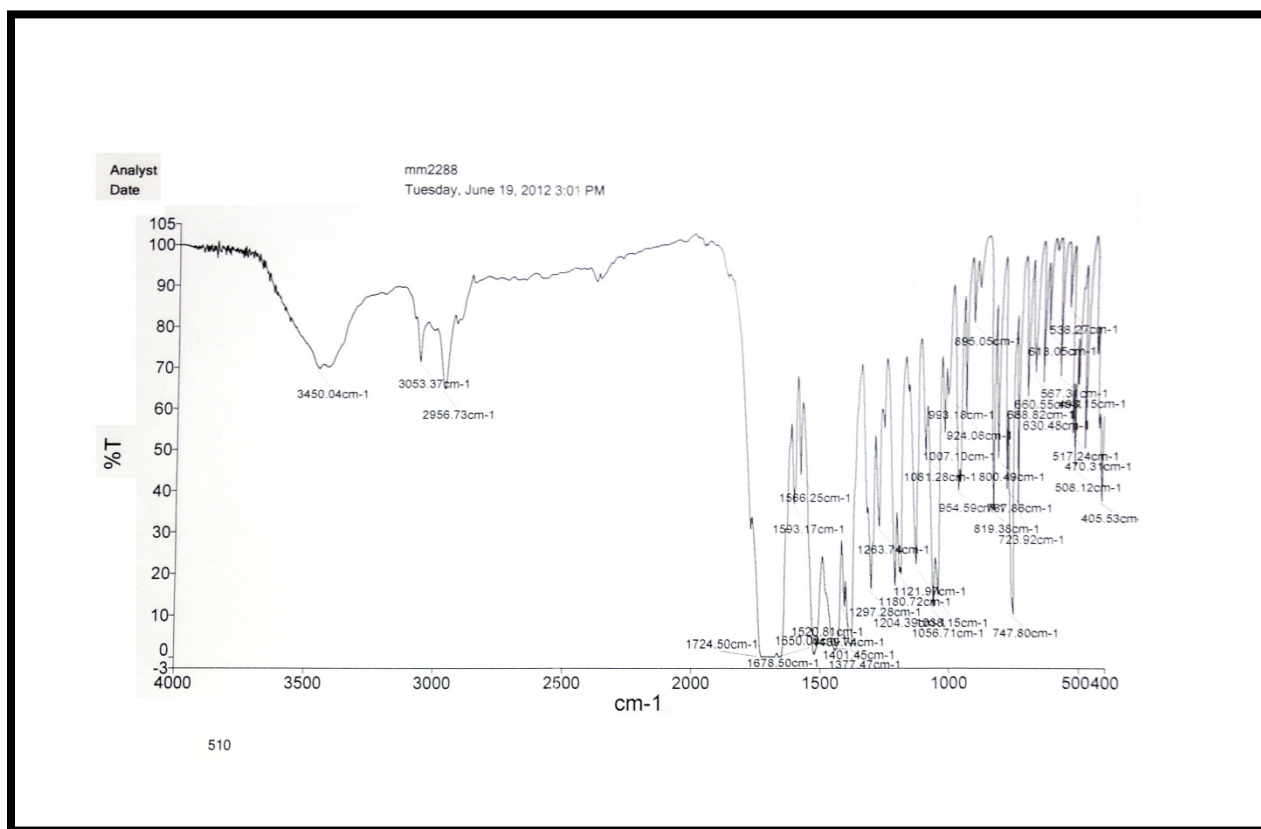
## One-pot synthesis of new derivatives of pyran using *N*-halosulfonamides

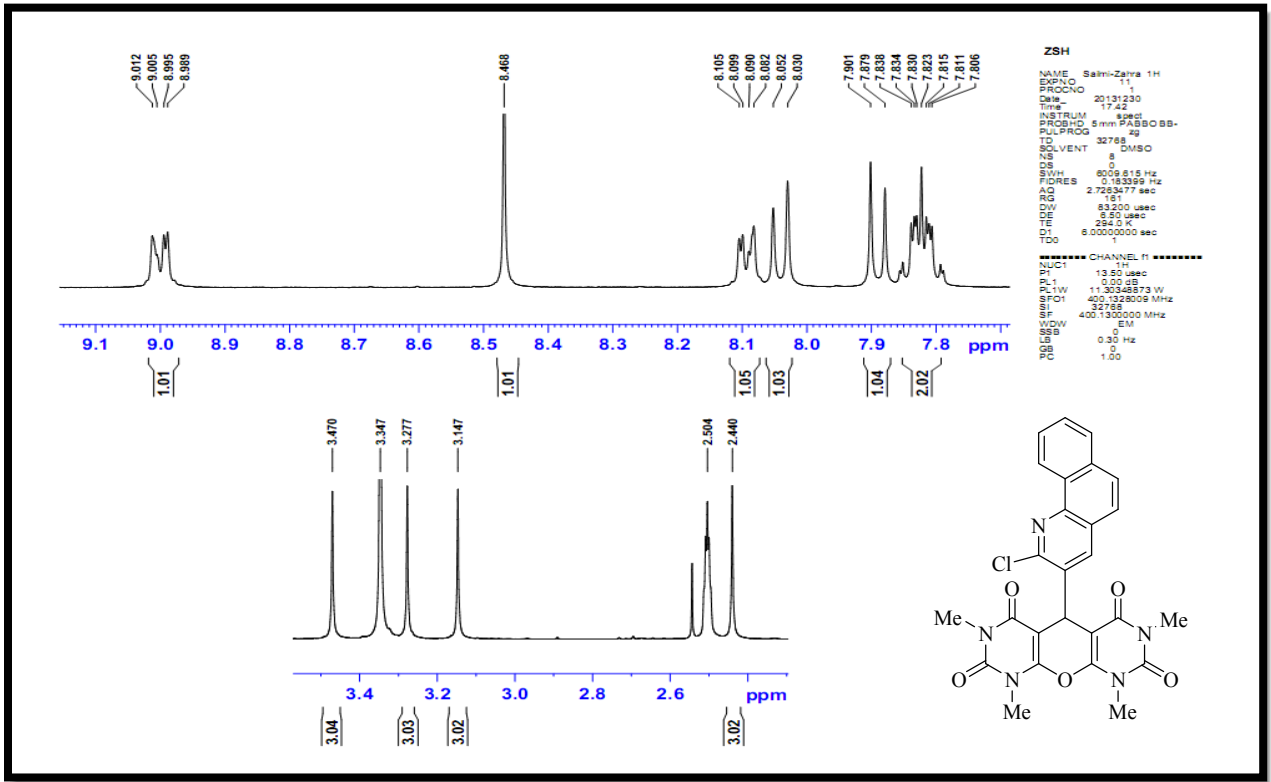
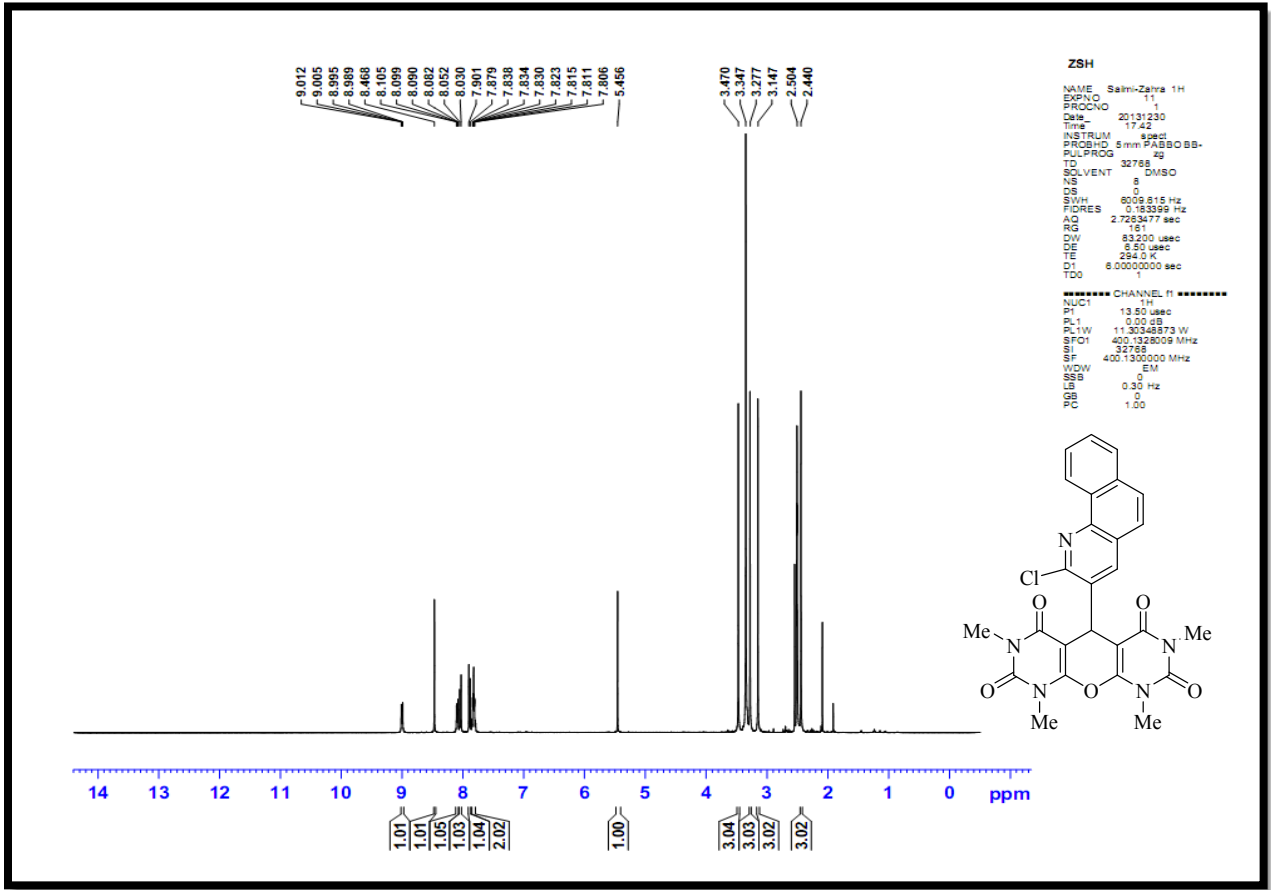
RaminGhorbani-Vaghei \*, Zahra Salimi, SeyedehMina Malaekhepoor, Samira Noori andFatemehEslami  
Department of Organic Chemistry, Faculty of Chemistry, Bu-Ali Sina University, 65174, Hamedan, Iran

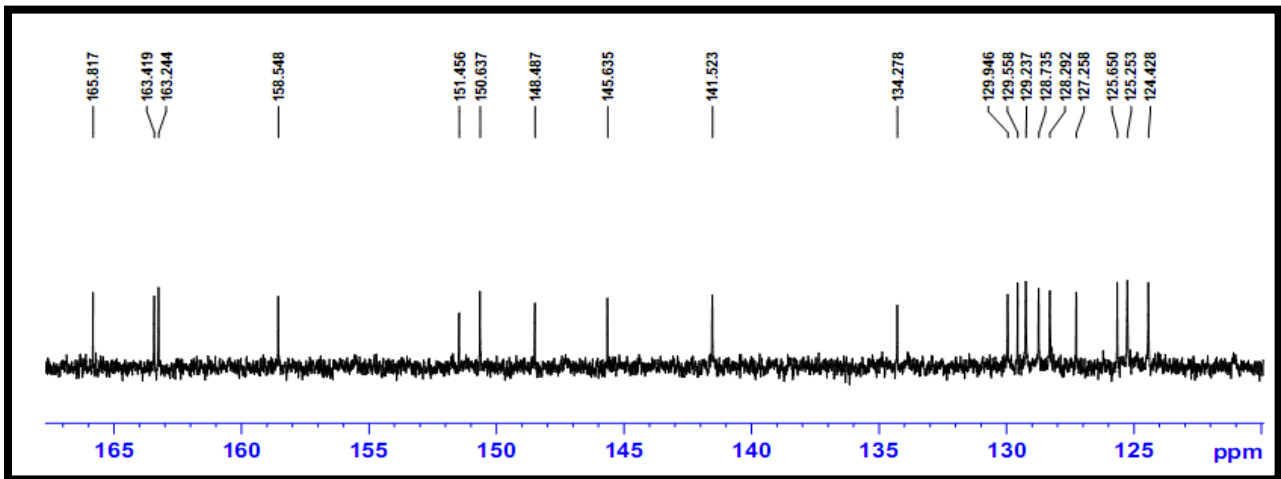
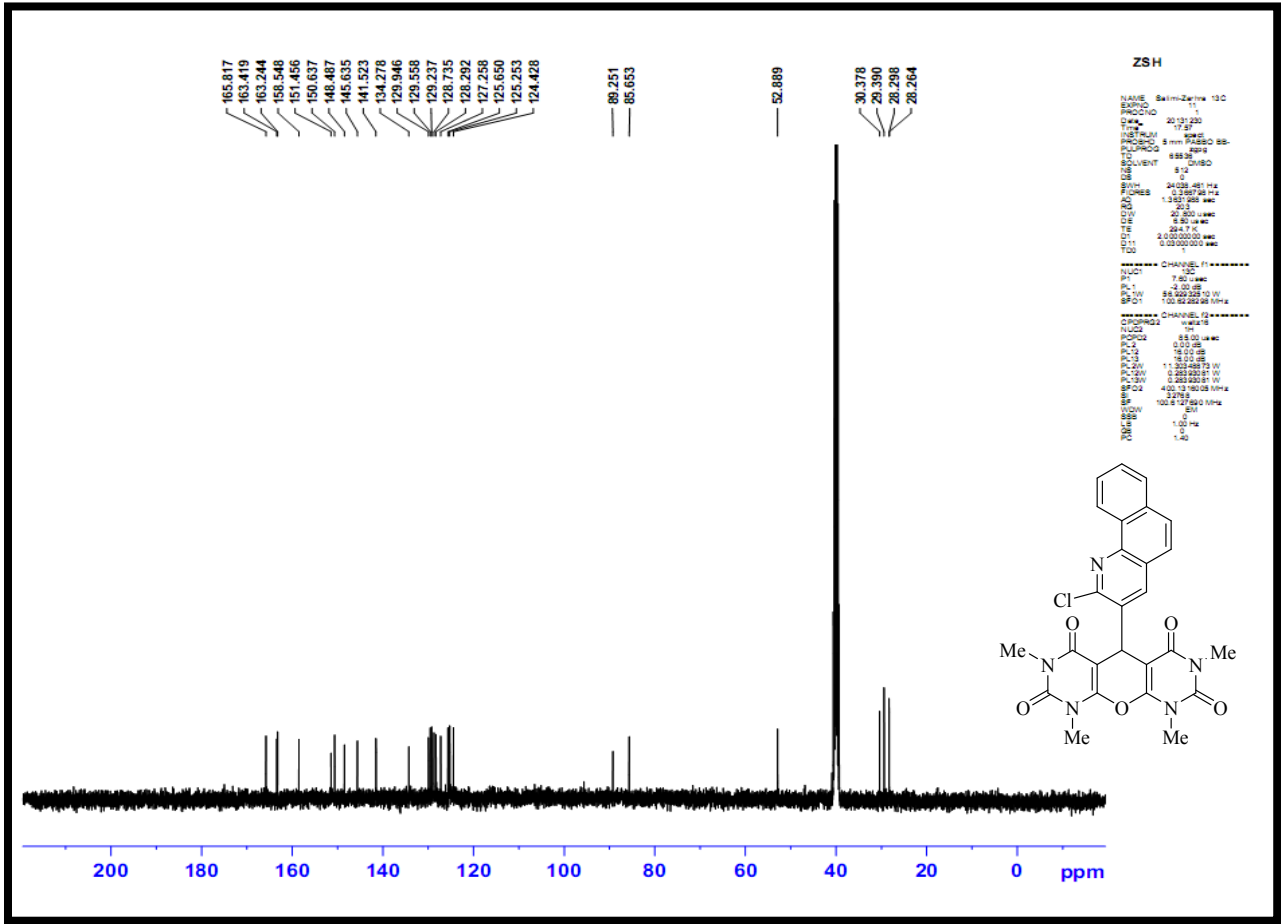
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### 9-(2-Chlorobenzo[h]quinoline)-9H-2,4,5,7-tetramethyl-diurasilopyran(Table 2, entry 1)ZSH

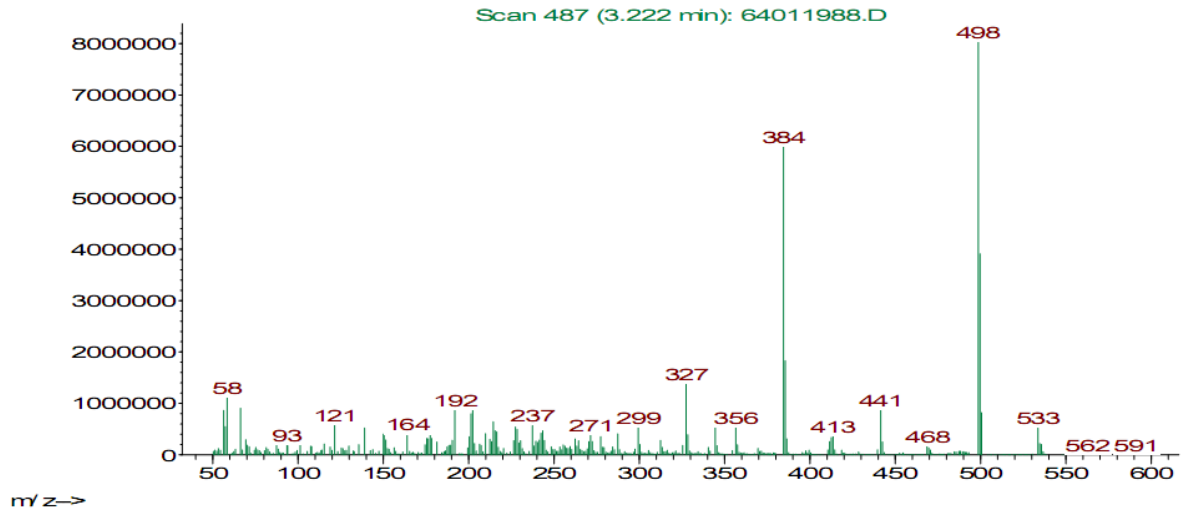
White powder 88 %; mp 273-275°C; IR (KBr) ( $\nu_{\max}$ ,  $\text{cm}^{-1}$ ): 3450, 3053, 2956, 1724, 1650;  $^1\text{H-NMR}$  [400 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{H}}$  (ppm) 2.44 (3H, s, OMe), 3.14 (3H, s, OMe), 3.27 (3H, s, OMe), 3.47 (3H, s, OMe), 5.45 (1H, s, CH), 7.80-7.90 (5H, m, ArH), 8.46 (1H, s, ArH), 8.99-9.01 (1H, q, ArH);  $^{13}\text{C-NMR}$  [100 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{C}}$  (ppm) 28.2, 28.2, 29.3, 30.3, 52.8, 85.6, 89.2, 124.4, 125.2, 125.6, 127.2, 128.2, 128.7, 129.2, 129.5, 129.9, 134.2, 141.5, 145.6, 148.4, 150.6, 151.4, 158.5, 163.2, 163.4, 165.8; MS ( $m/z$ ): 517 ( $\text{M}^+$ ); found for  $\text{C}_{26}\text{H}_{20}\text{ClN}_5\text{O}_5$ : C, 59.94; H, 3.35; N, 13.08requires C, 60.29; H, 3.89; N, 13.52%.



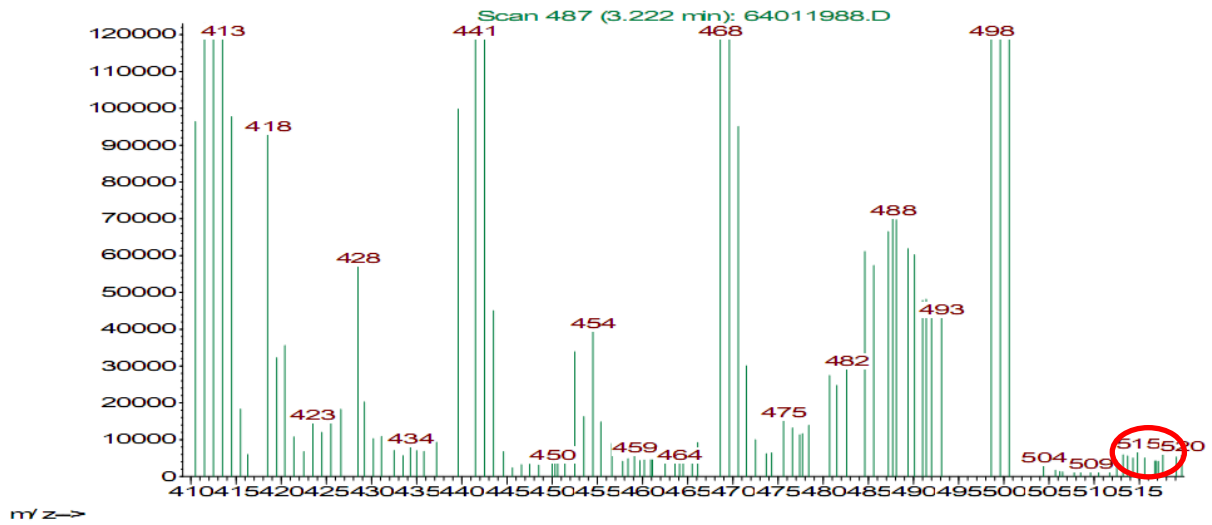




Abundance



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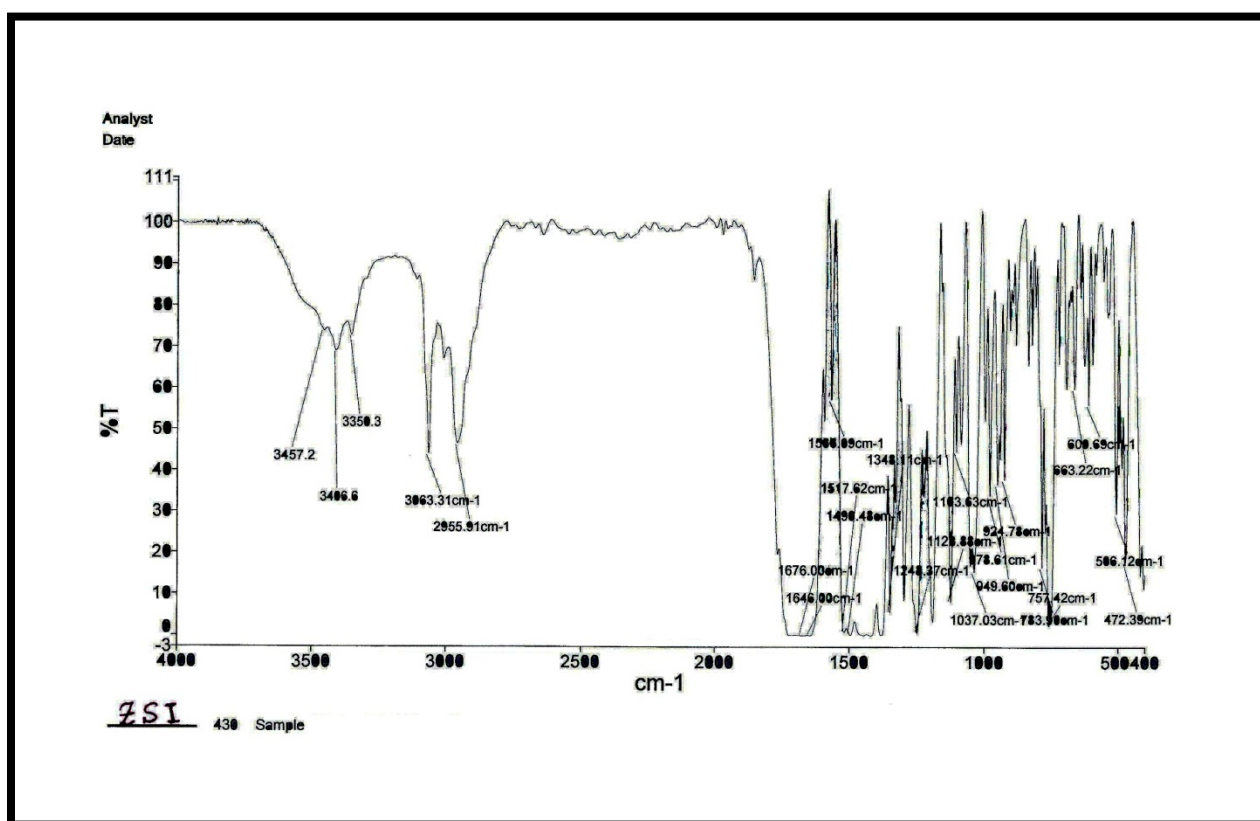
ZSH

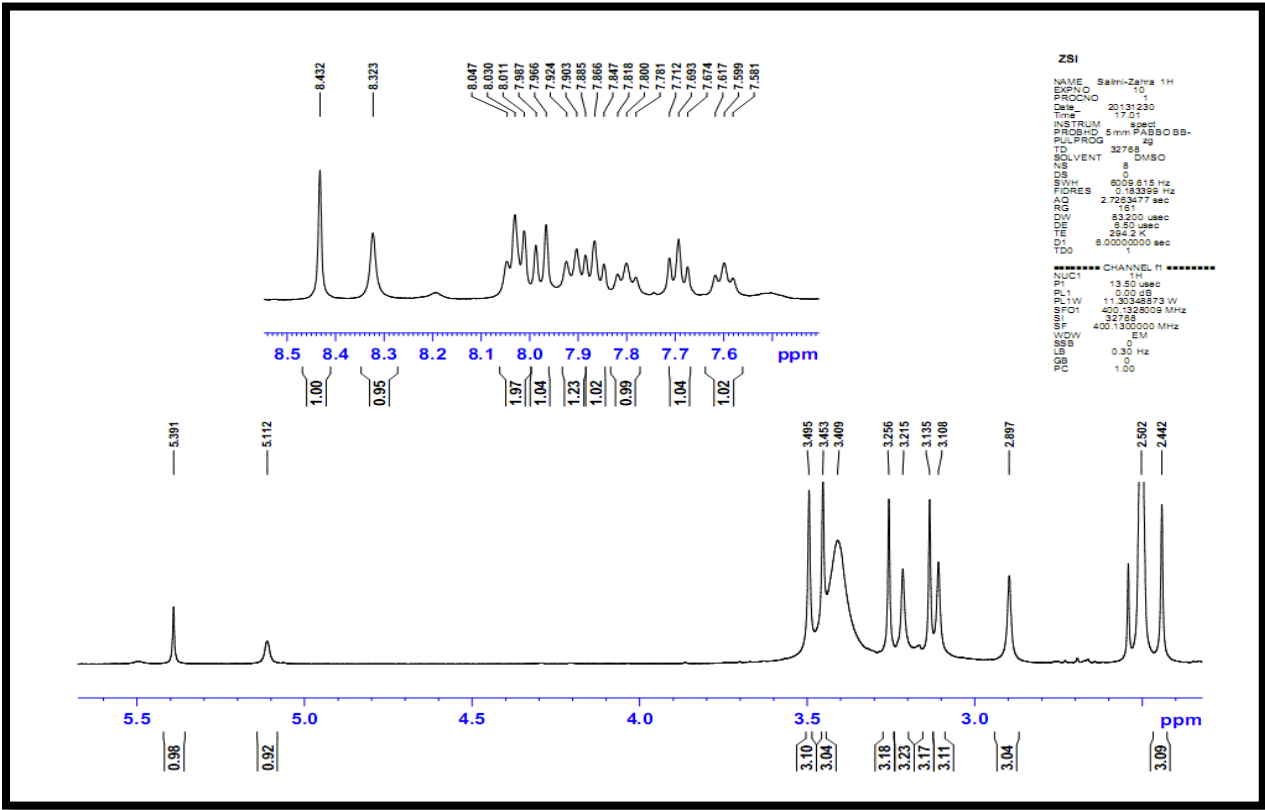
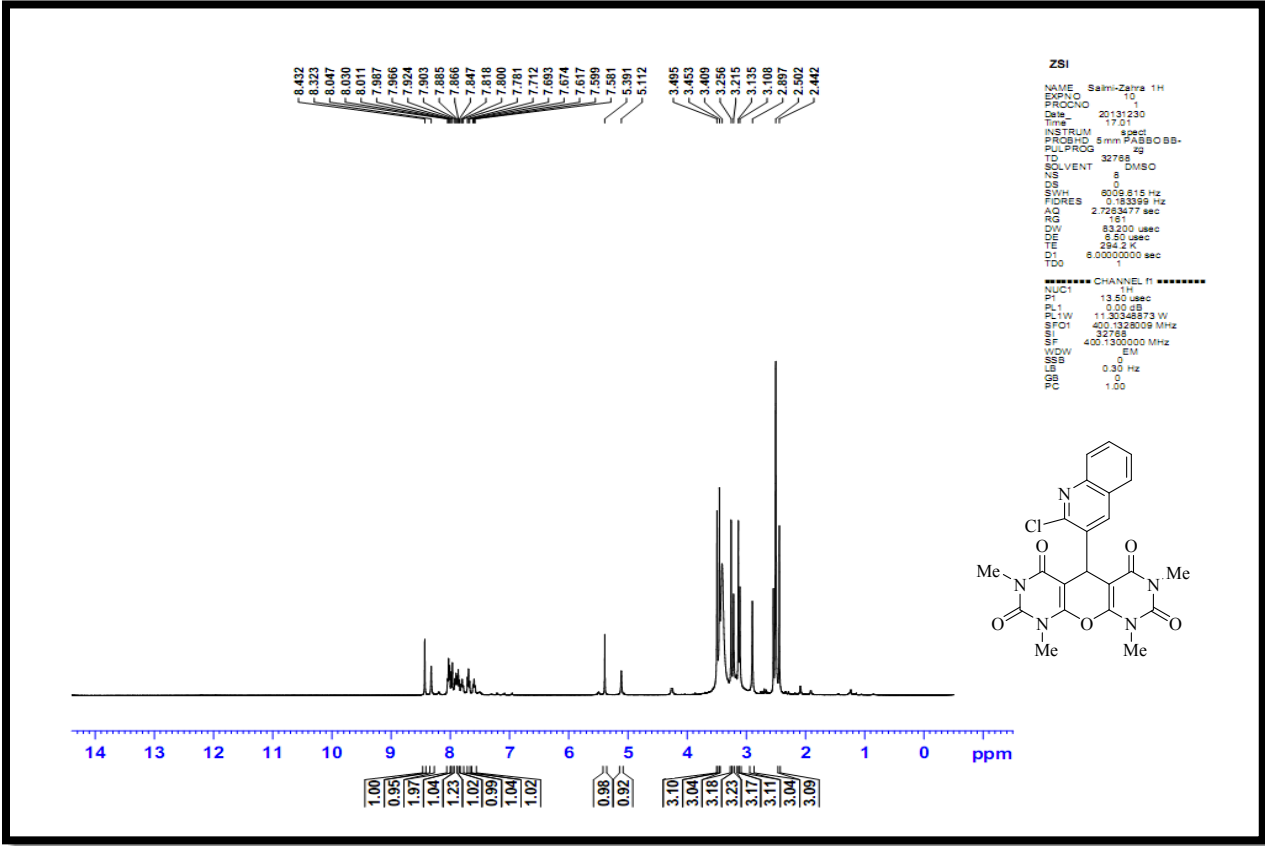
Result Table (ESTD - ZSH 15\_10\_2013\_10\_15\_2013 9\_41\_56 PM\_064 - INT7 - 1)

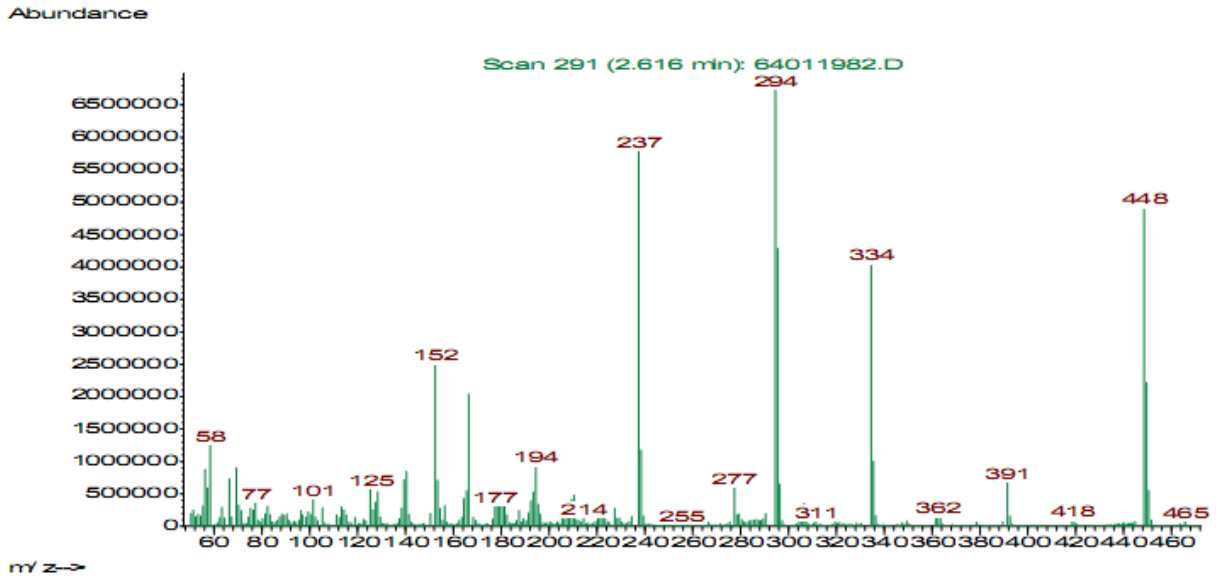
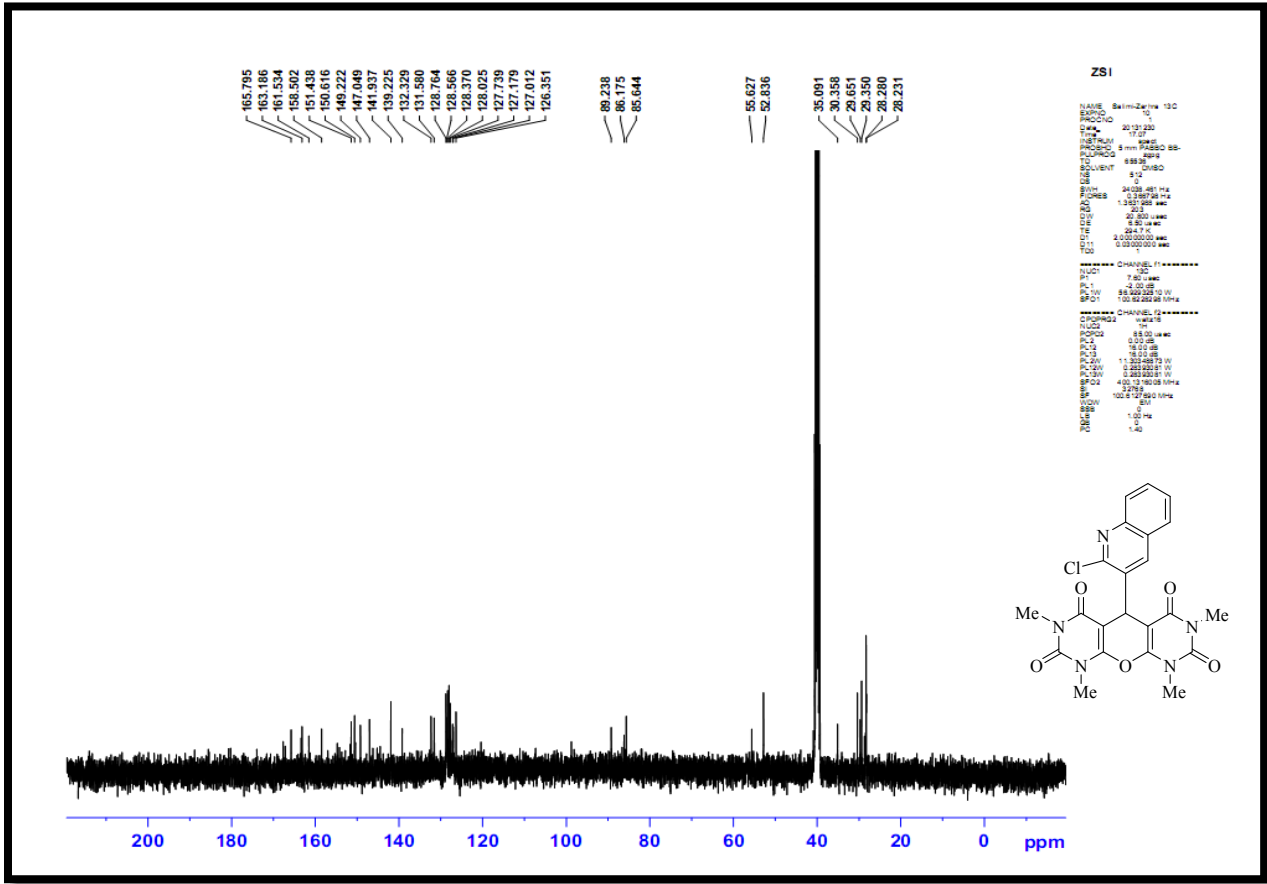
	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
2	0.960	994.775	0.330	13.08	Refer	Nitrogen	0.115
	1.537	8636.120	1.513	59.94	Refer	Carbon	1.000
4	4.767	1916.468	0.085	3.35	Refer	Hydrogen	0.222
	Total		2.525	76.37			

## 9-(2-Chloroquinolin-3-yl)-9H-2,4,5,7-tetramethyl-diurasilopyran (Table 2, entry 2) ZSI

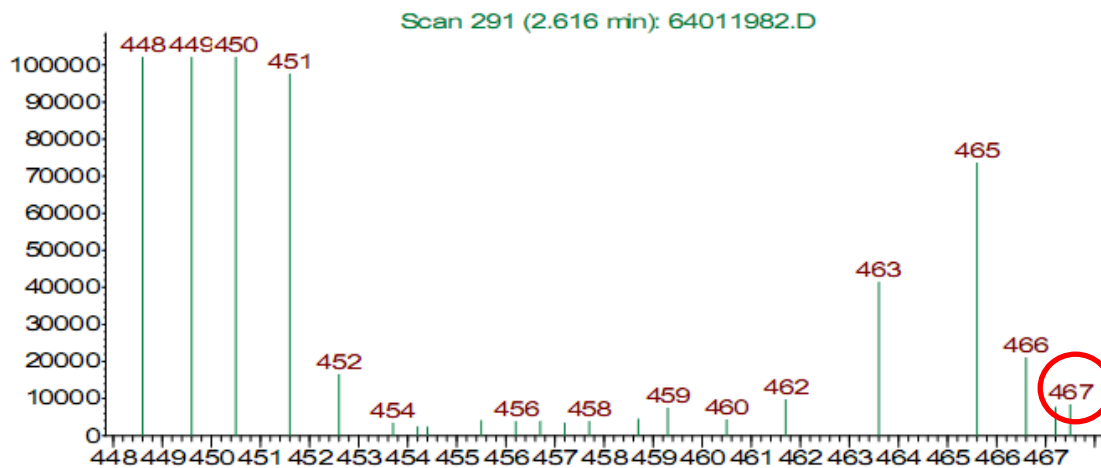
Opalescent powder 85 %; mp 265-267 °C; IR (KBr) ( $\nu_{\max}$ ,  $\text{cm}^{-1}$ ): 3406, 3063, 2955, 1676, 1646;  $^1\text{H-NMR}$  [400 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{H}}$  (ppm) 2.44 (3H, s, OMe), 2.89 (3H, s, OMe), 3.11 (3H, s, OMe), 3.13 (3H, s, OMe), 3.21 (3H, s, OMe), 3.25 (3H, s, OMe), 3.45 (3H, s, OMe), 3.49 (3H, s, OMe), 5.11 (1H, s, CH), 5.39 (1H, s, CH), 7.58- 7.61 (1H, t,  $J=7.2$ , ArH), 7.67- 7.71 (1H, t,  $J=7.6$ , ArH), 7.78- 7.81 (1H, t,  $J=7.6$ , ArH), 7.84-7.86 (1H, d,  $J=7.6$ , ArH), 7.88-7.92 (1H, t,  $J=7.2$ , ArH), 7.96- 7.98 (1H, d,  $J=8.4$ , ArH), 8.01- 8.04 (2H, t,  $J=7.6$ , ArH), 8.32 (1H, s, ArH), 8.43 (1H, s, ArH);  $^{13}\text{C-NMR}$  [100 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{C}}$  (ppm) 28.2, 28.2, 29.3, 29.6, 30.3, 35.1, 52.8, 55.6, 85.6, 86.1, 89.2, 126.3, 127.0, 127.1, 127.7, 128.0, 128.3, 128.5, 128.7, 131.5, 132.3, 139.2, 141.9, 147.0, 149.2, 150.6, 151.4, 158.5, 161.5, 163.1, 165.7; MS ( $m/z$ ): 467 ( $\text{M}^+$ ); found for  $\text{C}_{22}\text{H}_{18}\text{ClN}_5\text{O}_5$ : C, 56.43; H, 3.59; N, 14.78 requires C, 56.48; H, 3.88; N, 14.97 %.







Abundance



ZSI

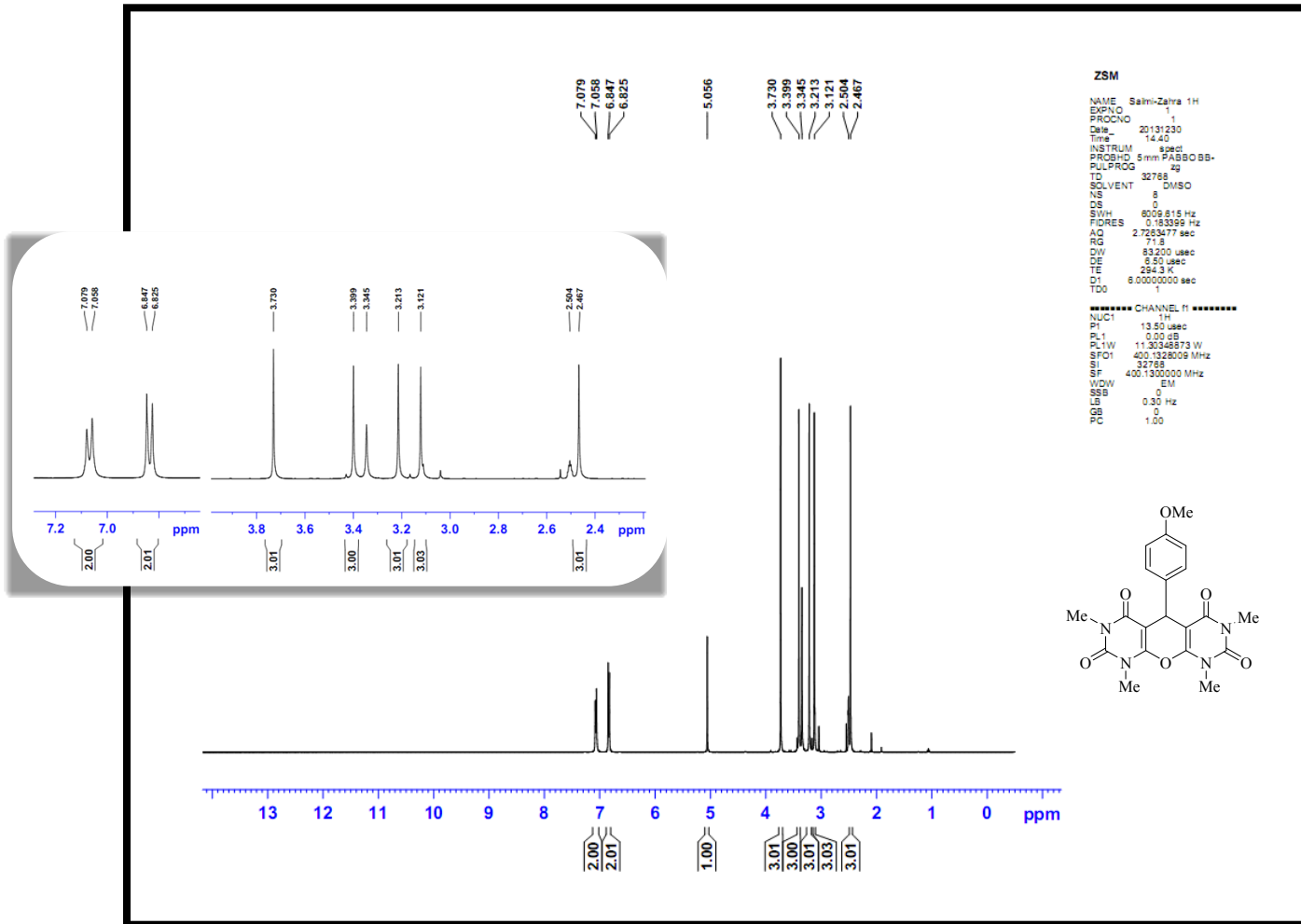
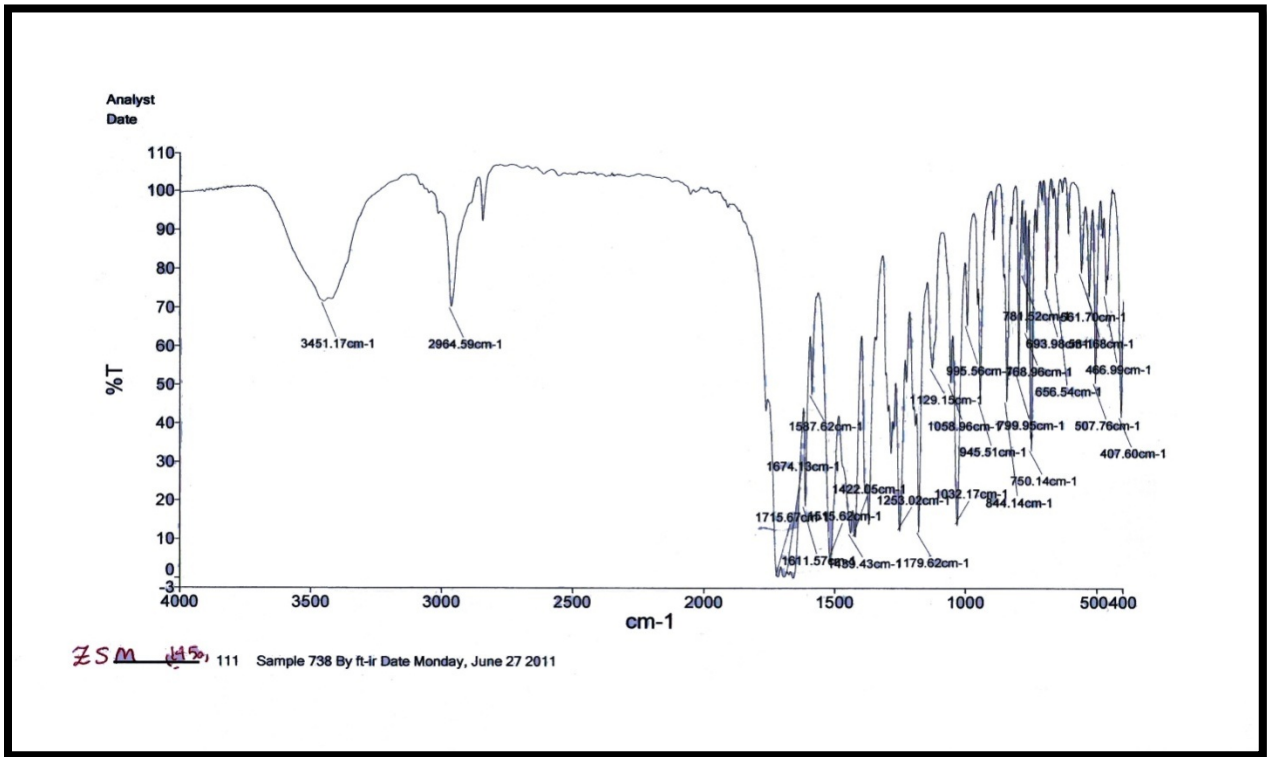
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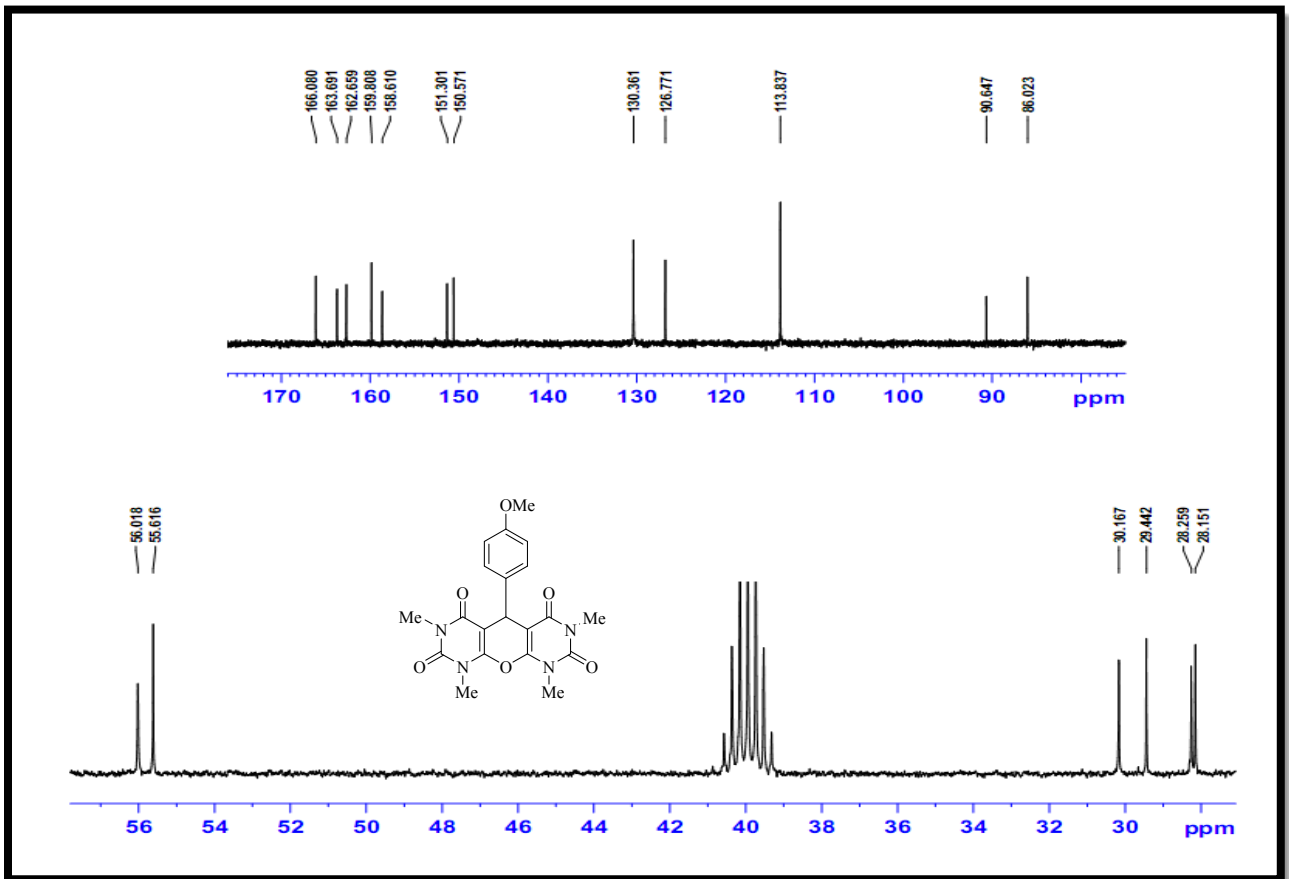
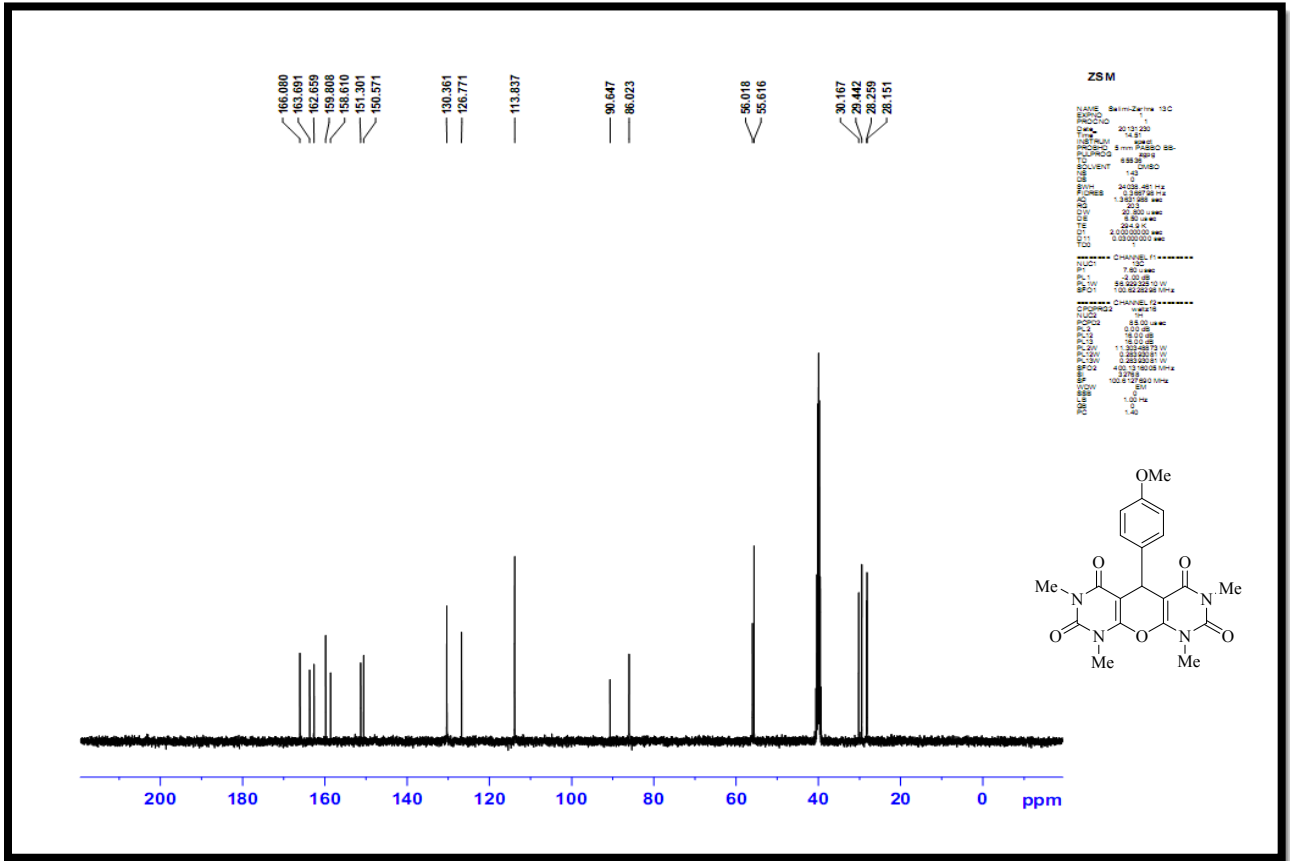
	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
1	0.973	1977.622	0.742	14.78	Refer	Nitrogen	0.127
2	1.463	15544.561	2.831	56.43	Refer	Carbon	1.000
3	5.280	4457.552	0.180	3.59	Refer	Hydrogen	0.287
4	12.180	74.727	0.040	0.79	Refer	Sulphur	0.005
	Total		5.017	75.59			

### 9-(4-Methoxyphenyl)-9H-2,4,5,7-tetramethyl-diurasilopyran (Table 2, entry 3) ZSM

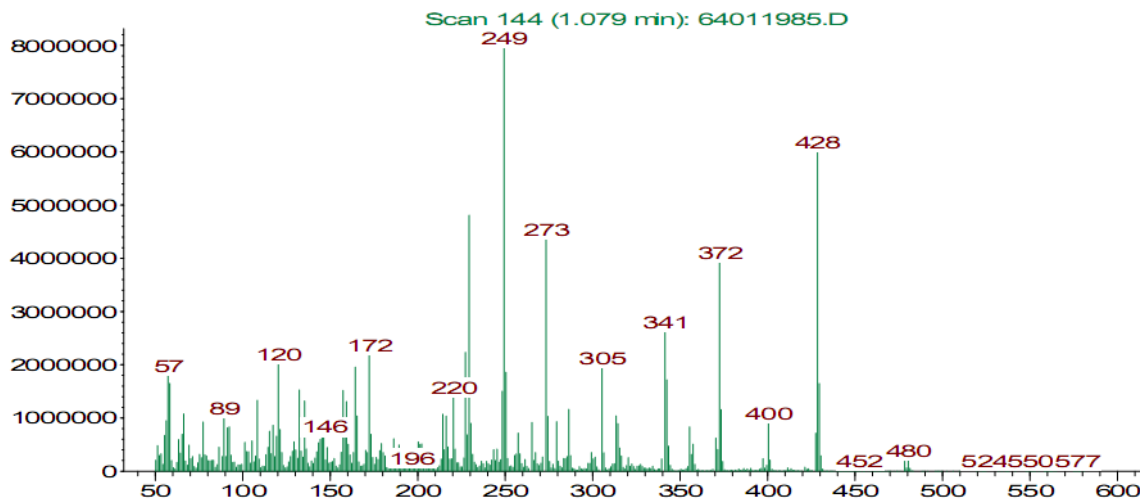
Whitepowder 85%; mp 246-248 °C; IR (KBr) ( $\nu_{\max}$ ,  $\text{cm}^{-1}$ ) 3451, 2964, 1715, 1674;  $^1\text{H-NMR}$  [400 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{H}}$  (ppm) 2.46 (3H, s, OMe), 3.11 (3H, s, OMe), 3.21 (3H, s, OMe), 3.39 (3H, s, OMe), 3.73 (3H, s, OMe), 5.05 (1H, s, CH), 6.82-7.07 (4H, s, ArH);  $^{13}\text{C-NMR}$  [100 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{C}}$  (ppm) 28.1, 28.2, 29.4, 30.1, 55.6, 56.0, 86.0, 90.6, 113.8, 126.7, 130.3, 150.571, 151.3, 158.6, 159.8, 162.6, 163.6, 166.0; MS (m/z): 412 ( $\text{M}^+$ ); found for  $\text{C}_{20}\text{H}_{20}\text{N}_4\text{O}_6$ : C, 51.91; H, 4.09; N, 12.44 requires C, 53.25; H, 4.89; N, 13.59%



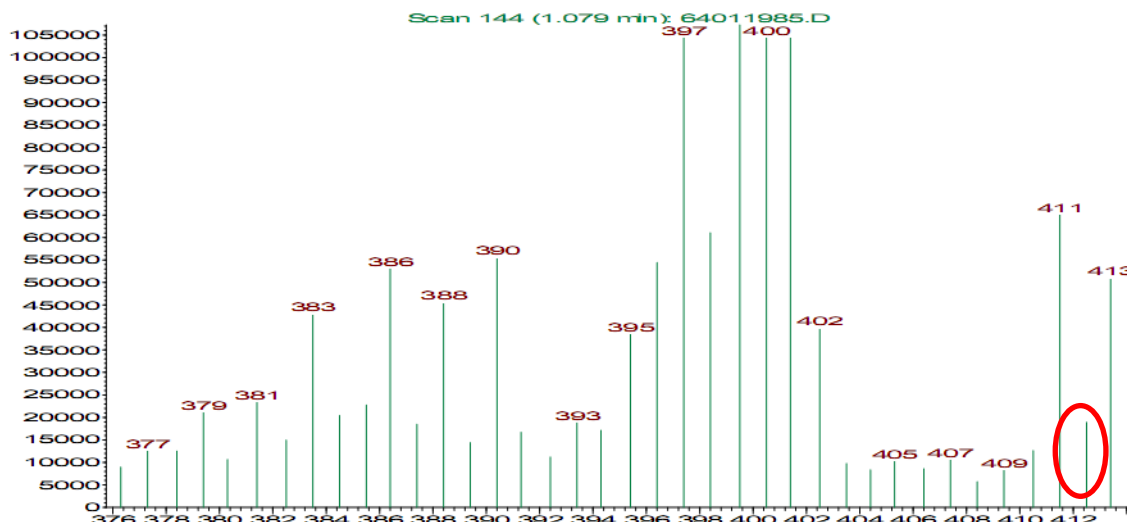




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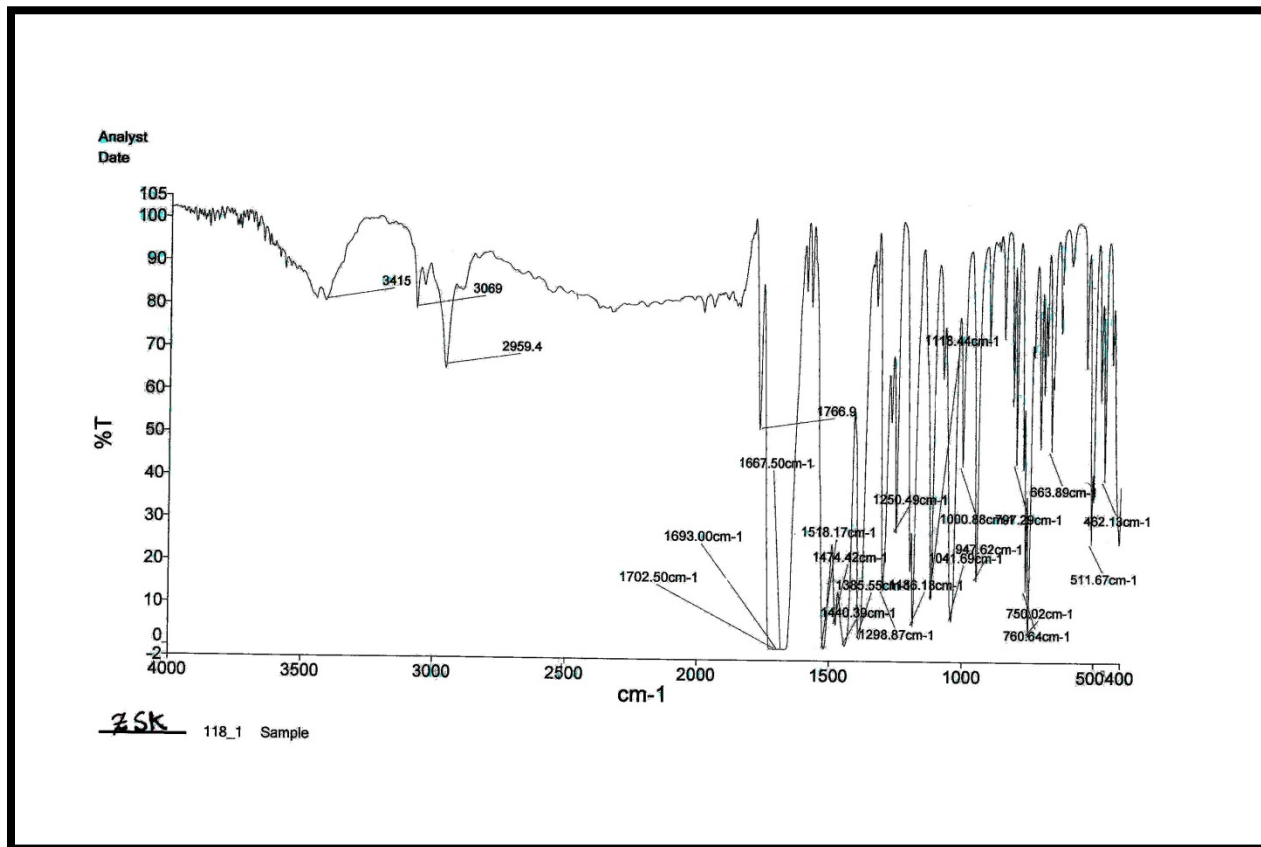
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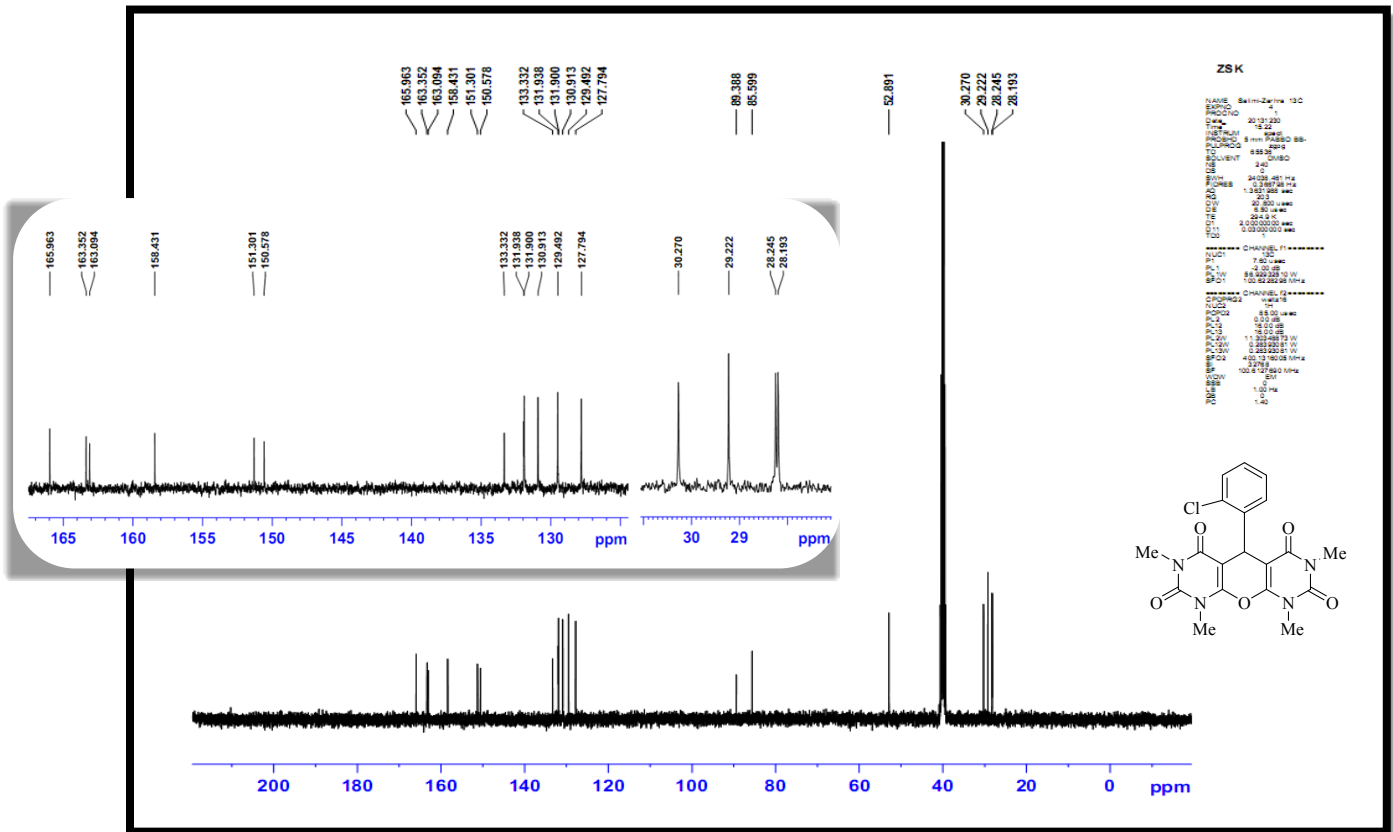
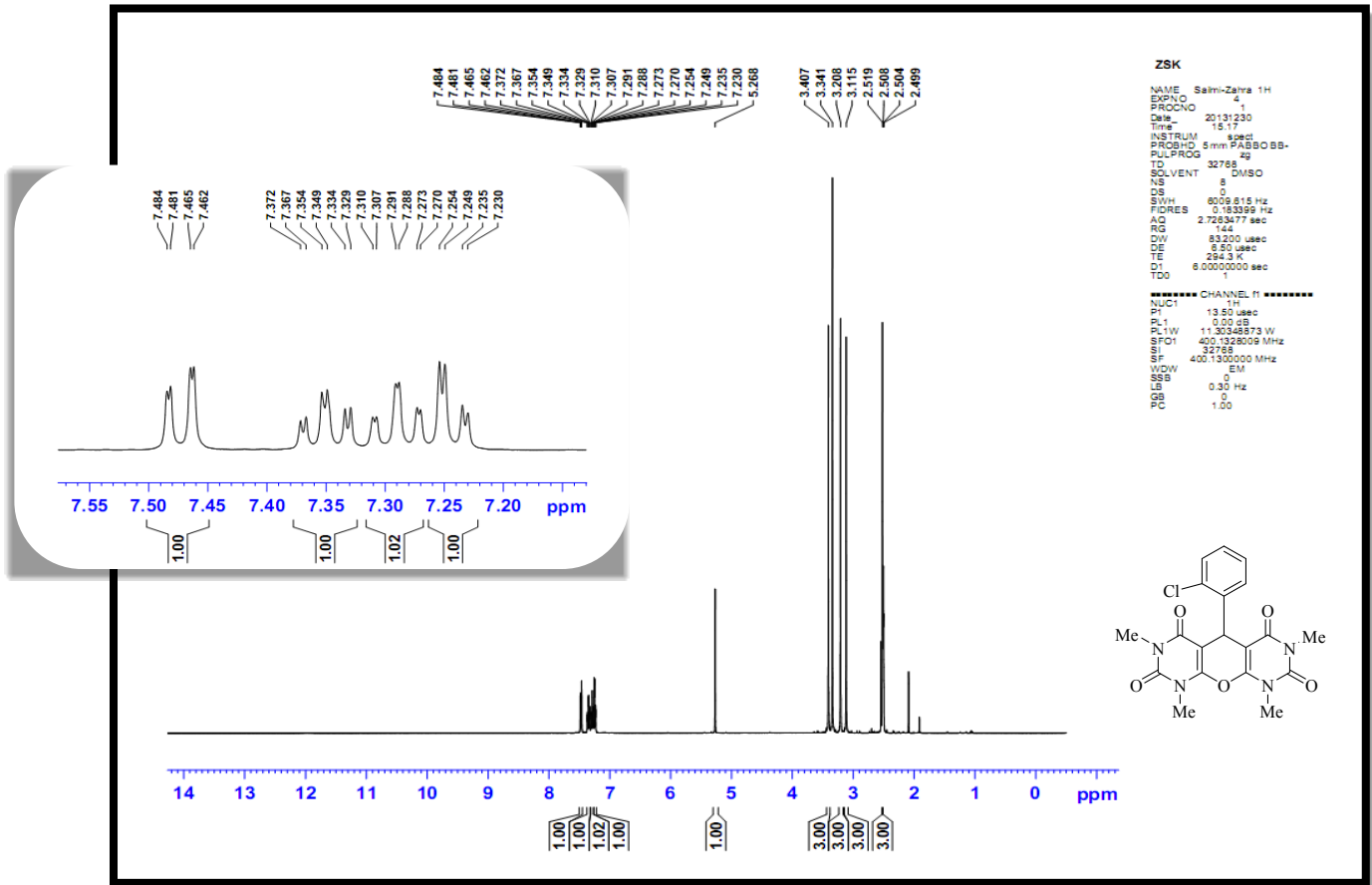
Result Table (ESTD - ZSM09\_10\_2013\_10\_9\_2013 8\_00\_46 PM\_049 - INT7 - 1)

	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
1	0.963	1955.349	0.747	12.44	Refer	Nitrogen	0.115
	1.420	16958.957	3.116	51.91	Refer	Carbon	1.000
3	5.460	5685.897	0.246	4.09	Refer	Hydrogen	0.335
	Total		6.002	68.44			

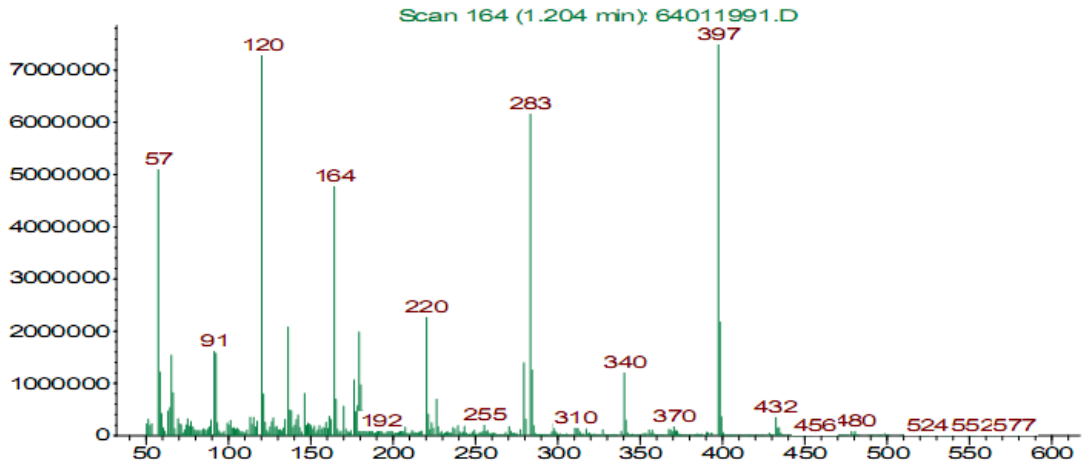
**9-(2-Chlorophenyl)-9H-2,4,5,7-tetramethyl-diurasilopyran (Table 2, entry 4) ZSK**

Whitepowder 91 %; mp 199-201 °C; IR (KBr) ( $\nu_{\max}, \text{cm}^{-1}$ ) 3415, 3069, 2959, 1766, 1702, 1693, 1667;  $^1\text{H-NMR}$  [400 MHz, DMSO- $d_6$ ]:  $\delta_{\text{H}}$  (ppm) 2.51 (3H, s, OMe), 3.11 (3H, s, OMe), 3.20 (3H, s, OMe), 3.40 (3H, s, OMe), 5.26 (1H, s, CH), 7.23-7.37 (3H, m, ArH), 7.46-7.48 (1H, d,  $J=8$ , ArH);  $^{13}\text{C-NMR}$  [100 MHz, DMSO- $d_6$ ]:  $\delta_{\text{C}}$  (ppm) 28.1, 28.2, 29.2, 30.2, 52.8, 85.5, 89.3, 127.7, 129.4, 130.9, 131.9, 131.9, 133.3, 150.5, 151.3, 158.4, 163.0, 163.3, 165.9; MS ( $m/z$ ): 415 ( $M^+-1$ ); found for  $\text{C}_{19}\text{H}_{17}\text{ClN}_4\text{O}_5$ : C, 52.97; H, 3.54; N, 12.70 requires C, 53.75; H, 4.11; N, 13.44%.

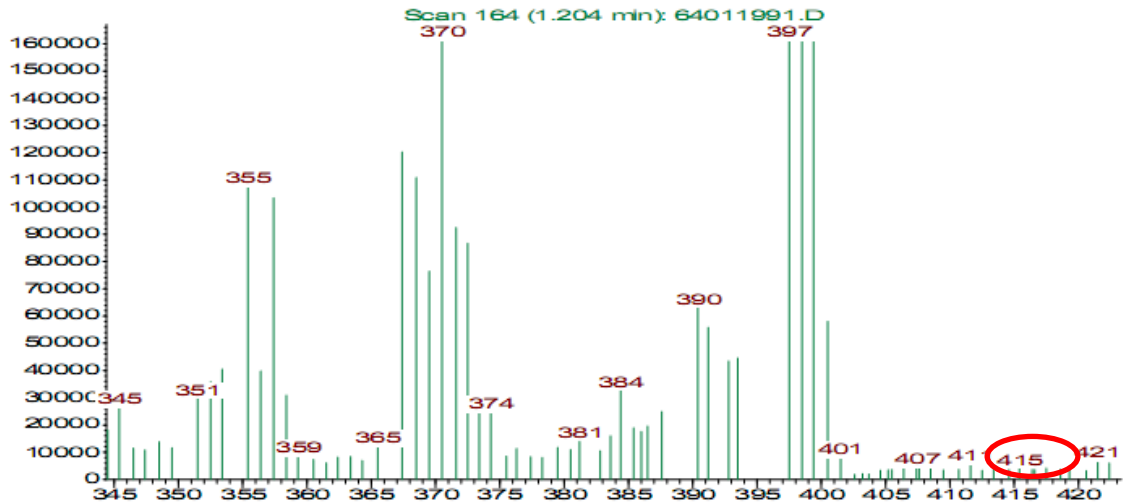




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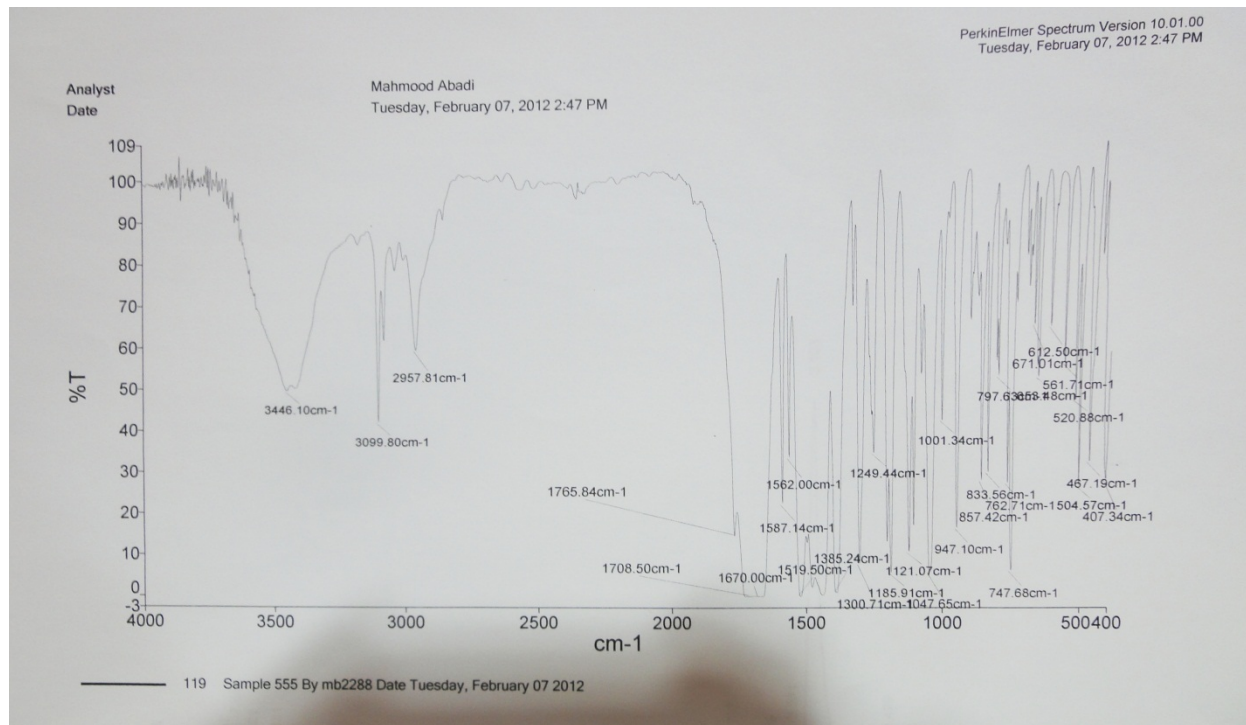
m/z ->

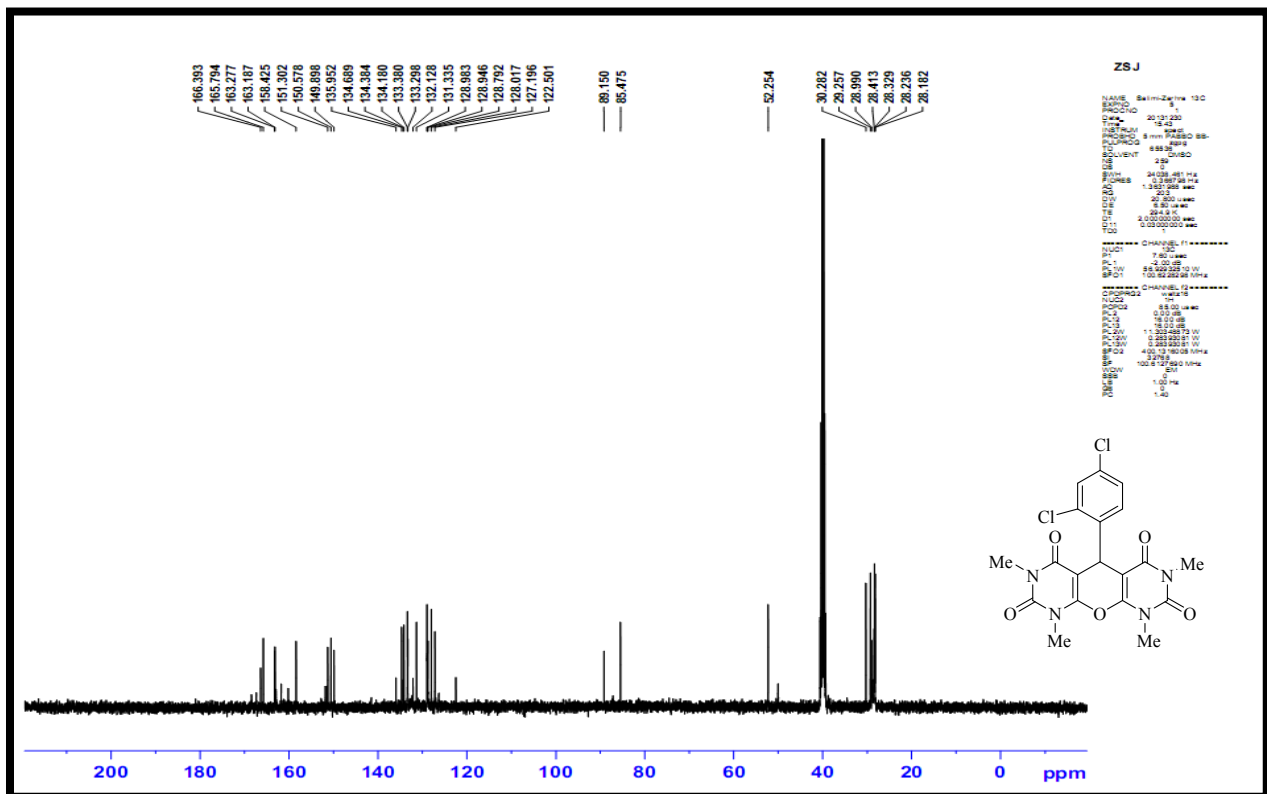
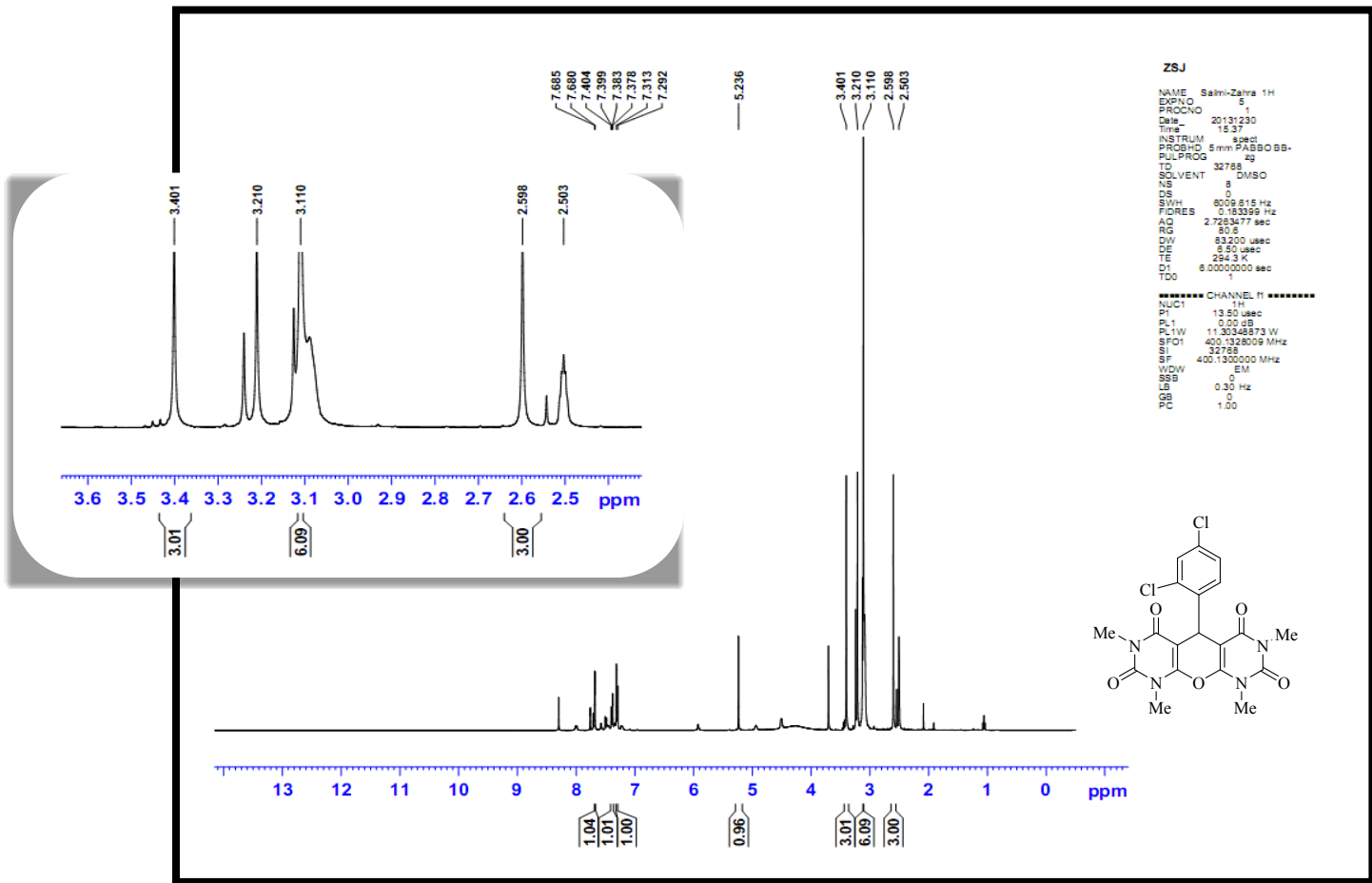
Result Table (ESTD - ZSK 15\_10\_2013\_10\_15\_2013 10\_01\_57 PM\_065 - INT7 - 1)

	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
2	0.967	1913.097	0.714	12.70	Refer	Nitrogen	0.119
	1.437	16117.545	2.976	52.97	Refer	Carbon	1.000
4	5.387	4811.606	0.199	3.54	Refer	Hydrogen	0.299
	Total		5.619	69.21			

**9-(2,4-Dichlorophenyl)-9H-2,4,5,7-tetramethyl-diurasilopyran (Table 2, entry 5) ZSJ**

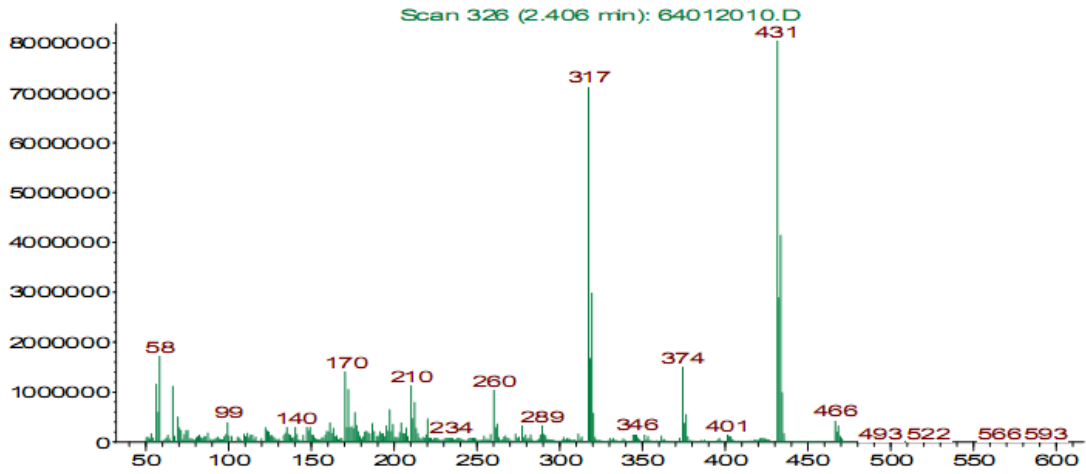
Whitepowder 82 %; mp 258-259 °C; IR (KBr) ( $\nu_{\max}$ ,  $\text{cm}^{-1}$ ) 3446, 3099, 2957, 1765, 1708, 1670;  $^1\text{H-NMR}$  [400 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{H}}$  (ppm) 2.59 (3H, s, OMe), 3.11 (6H, s, 2 OMe), 3.40 (3H, s, OMe), 5.23 (1H, s, CH), 7.29-7.40 (2H, m, ArH), 7.68-7.68 (1H, d,  $J=2$ , ArH);  $^{13}\text{C-NMR}$  [100 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{C}}$  (ppm) 28.1, 28.2, 28.3, 28.4, 28.9, 29.2, 30.2, 52.2, 85.4, 89.1, 122.5, 127.1, 128.0, 128.7, 128.9, 128.9, 131.3, 132.1, 133.2, 133.3, 134.1, 134.3, 134.6, 135.9, 149.8, 150.5, 151.3, 158.4, 163.1, 163.2, 165.7, 166.3; MS ( $m/z$ ): 449 ( $\text{M}^+-1$ ); found for  $\text{C}_{19}\text{H}_{16}\text{Cl}_2\text{N}_4\text{O}_5$ : C, 48.82; H, 2.93; N, 12.22 requires C, 50.57; H, 3.57; N, 12.42 %.



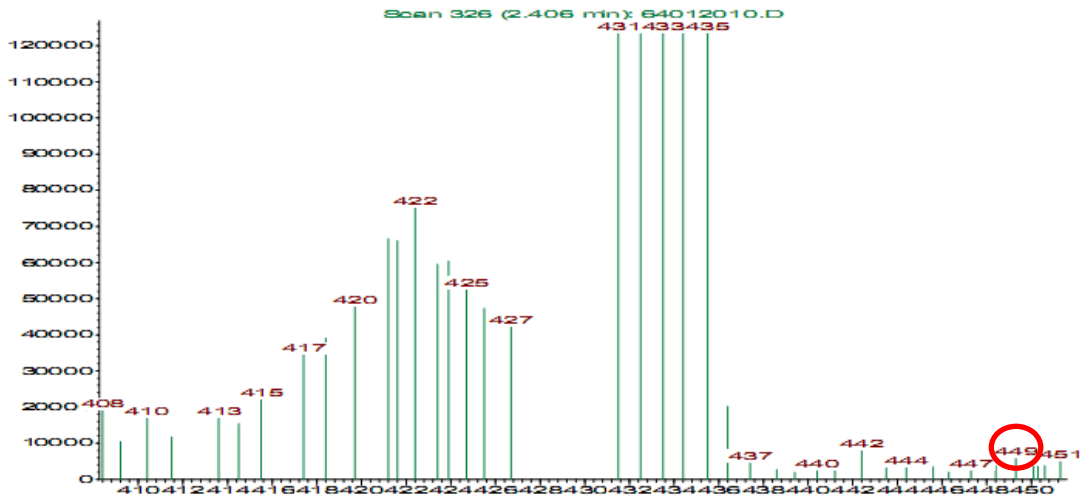




Abundance



m/z ->  
Abundance



ZSJ

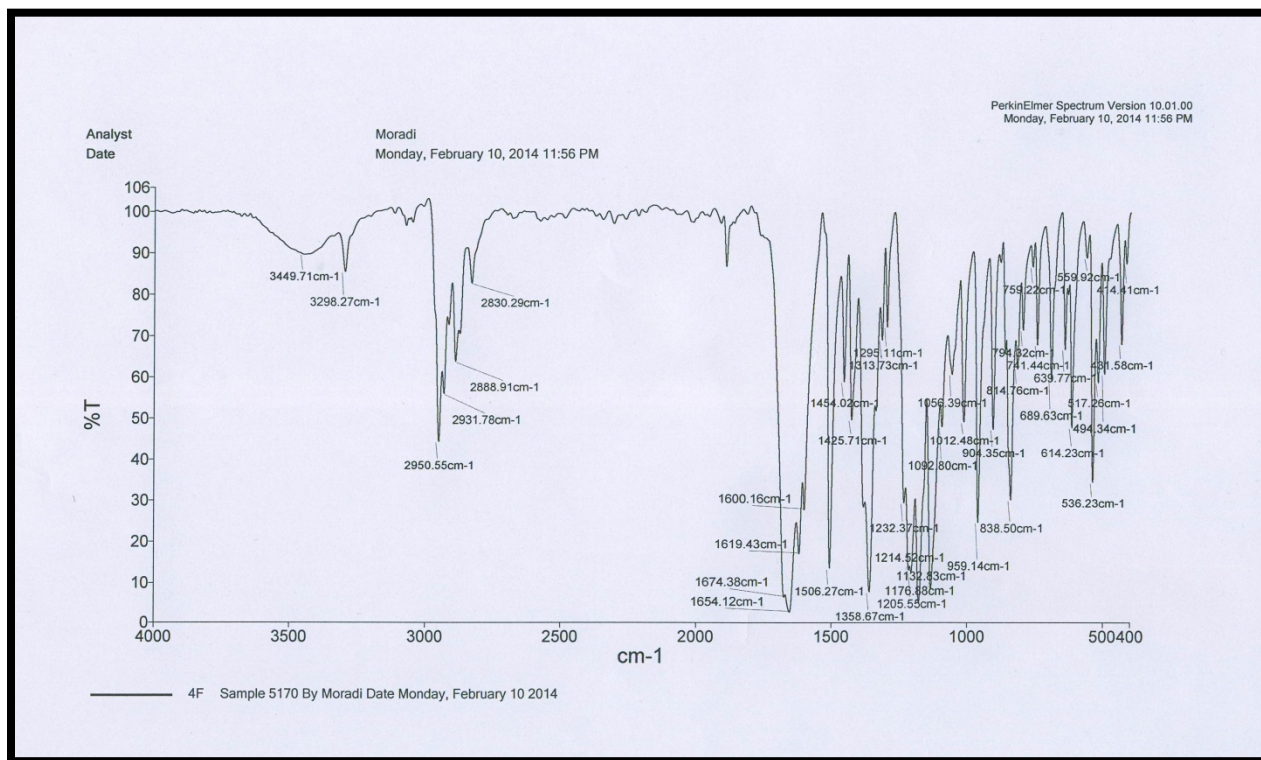
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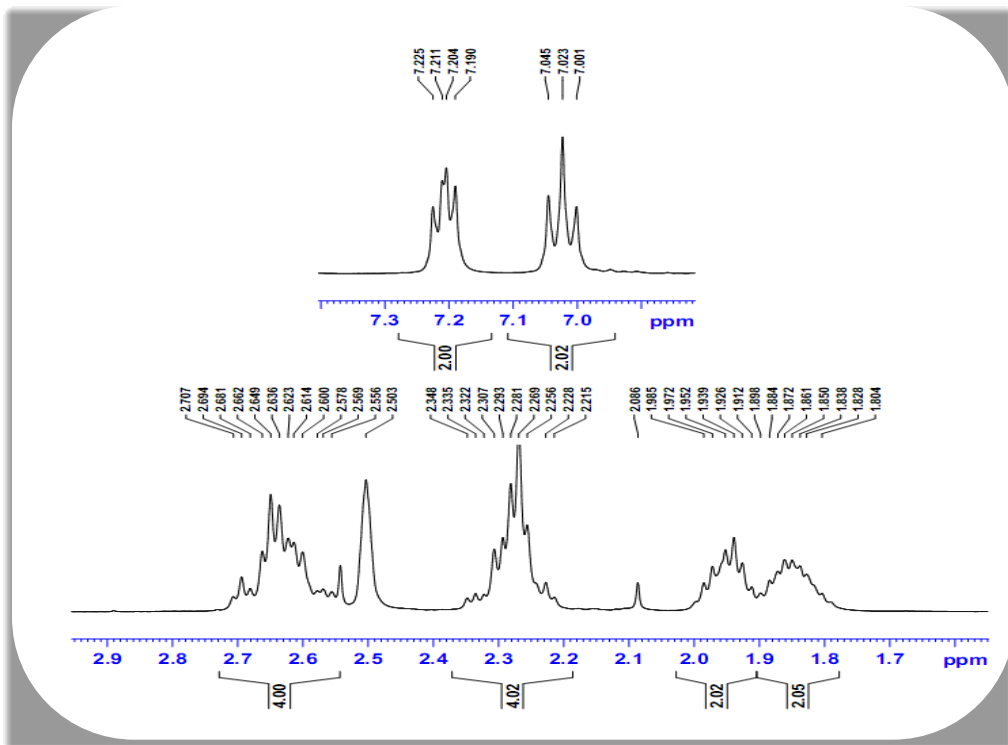
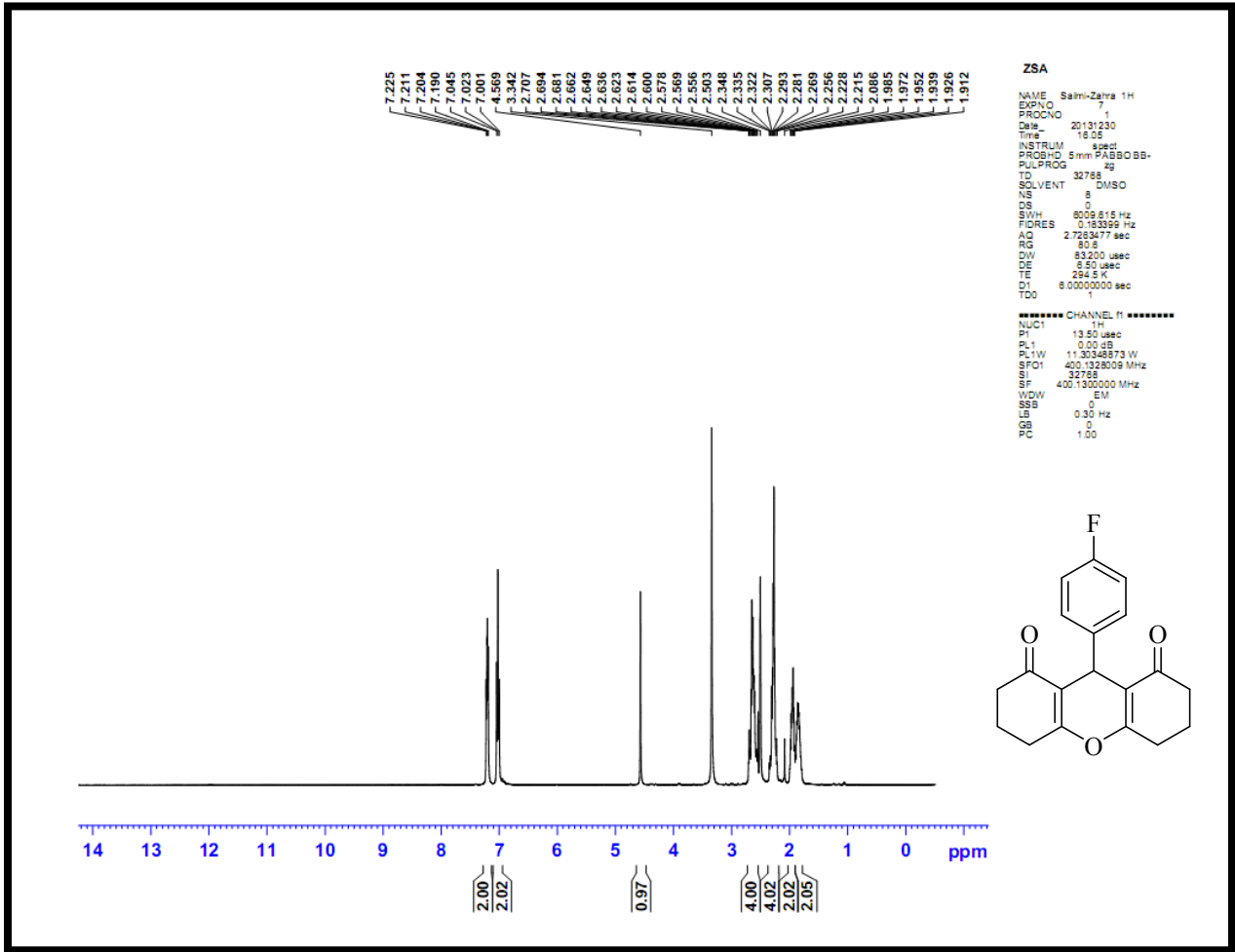
	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
1	0.973	1652.174	0.625	12.22	Refer	Nitrogen	0.120
	1.477	13807.165	2.494	48.82	Refer	Carbon	1.000
3	5.183	3892.476	0.150	2.93	Refer	Hydrogen	0.282
	Total		5.109	63.98			

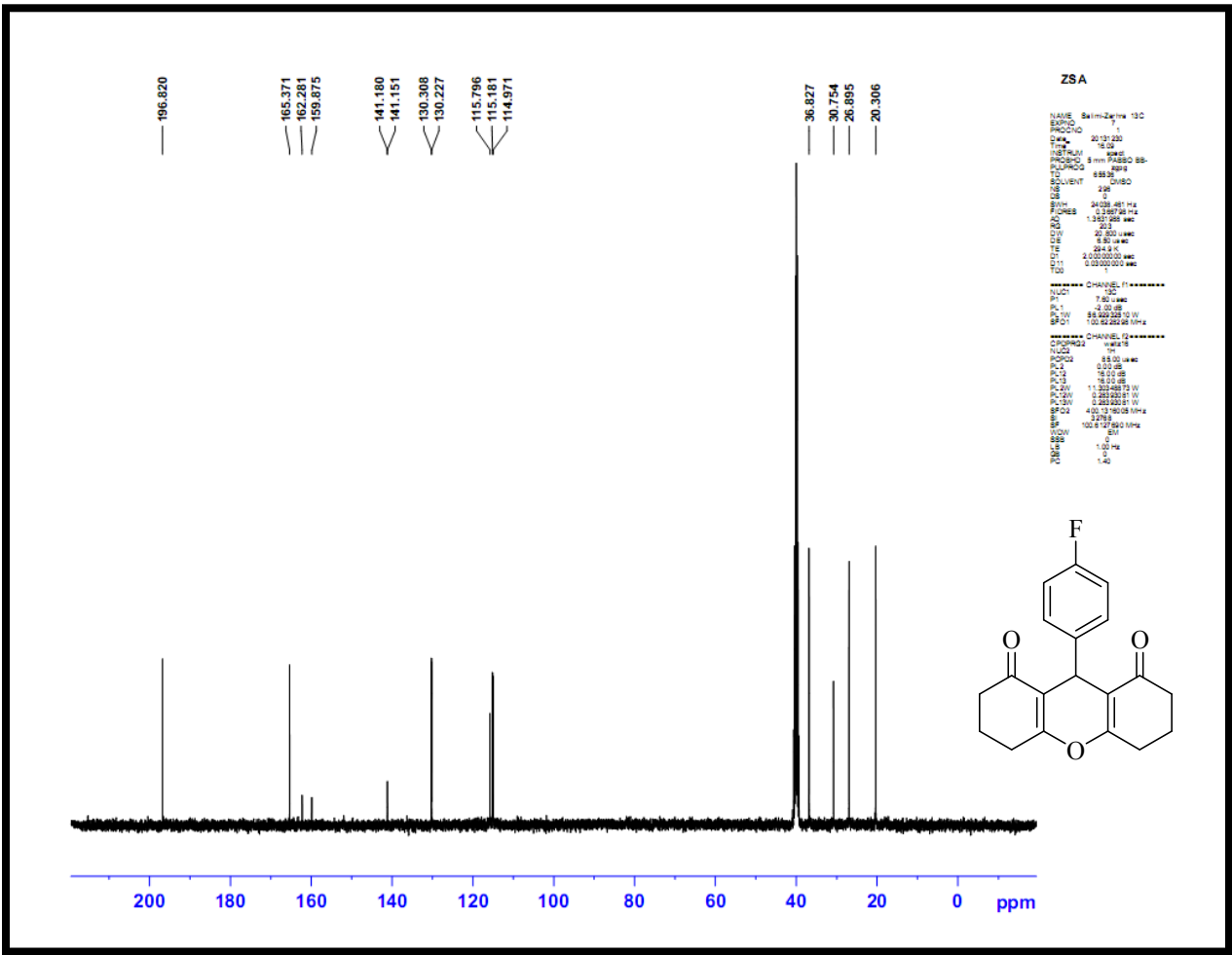
**9-(4-Fluorophenyl)-3,4,6,7-tetrahydro-2H-xanthene-1,8(5H,9H)-dione (Table 2, entry 6)**

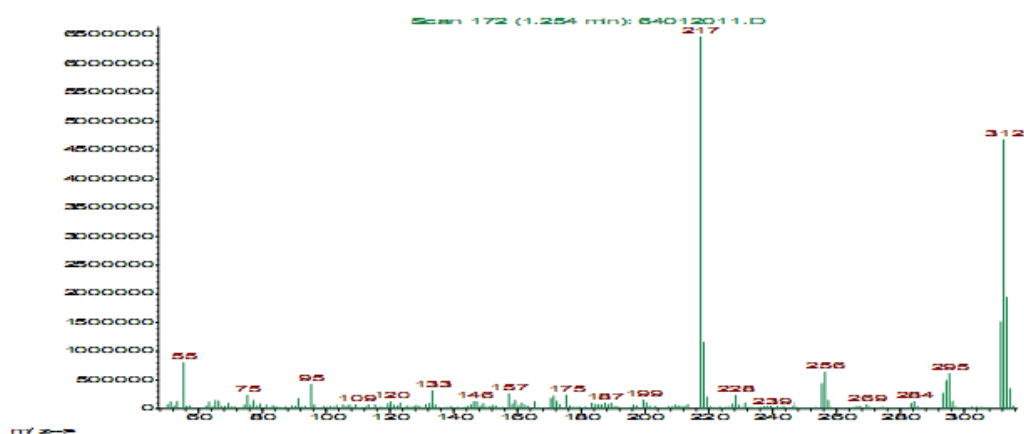
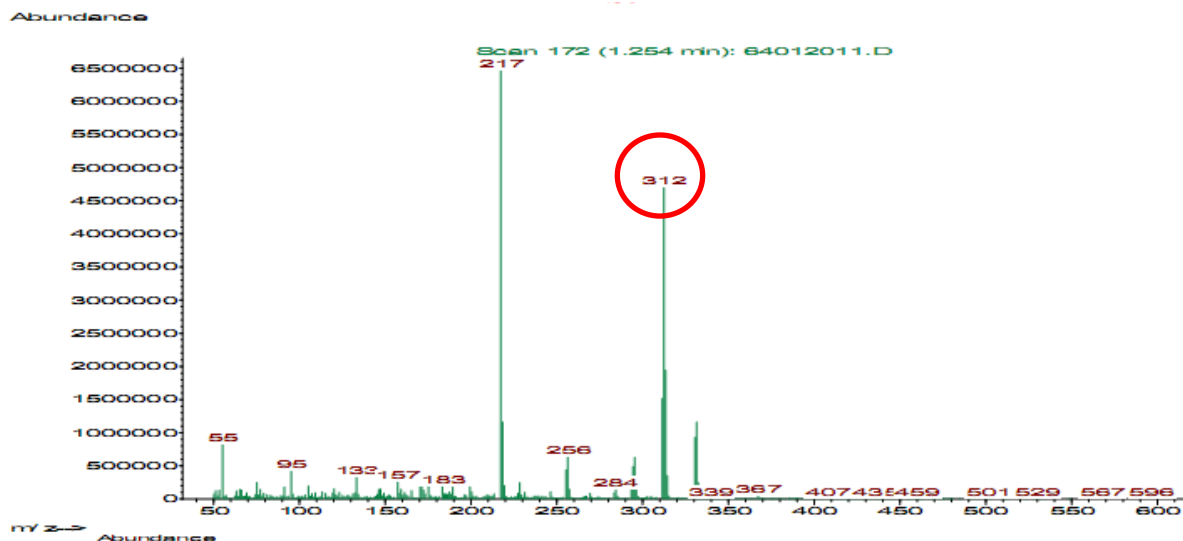
**ZSA**

Whitepowder 61 %; mp266-268 °C; IR (KBr) ( $\nu_{\max}$ , cm<sup>-1</sup>)2955, 1721, 1655; <sup>1</sup>H-NMR [400 MHz, DMSO-d<sub>6</sub>]:  $\delta_{\text{H}}$  (ppm) 1.80-1.89 (2H, m, CH<sub>2</sub>), 1.91-1.98 (2H, m, CH<sub>2</sub>), 2.21-2.34 (4H, m, 2CH<sub>2</sub>), 2.55-2.70 (4H, m, 2CH<sub>2</sub>), 4.56 (1H, s, CH), 7.00-7.04 (2H, t,  $J= 8.8$ , ArH), 7.19- 7.22 (2H, q, ArH); <sup>13</sup>C-NMR [100 MHz, DMSO-d<sub>6</sub>]:  $\delta_{\text{C}}$ (ppm) 20.3, 26.8, 30.7, 36.8, 114.9, 115.1, 115.7, 130.2, 130.3, 141.1, 141.1, 159.8, 162.2, 165.3, 196.8; MS (m/z): 312 (M<sup>+</sup>); found for C<sub>19</sub>H<sub>17</sub>FO<sub>3</sub>: C, 72.75; H, 5.30; requires C, 73.06; H, 5.49%.









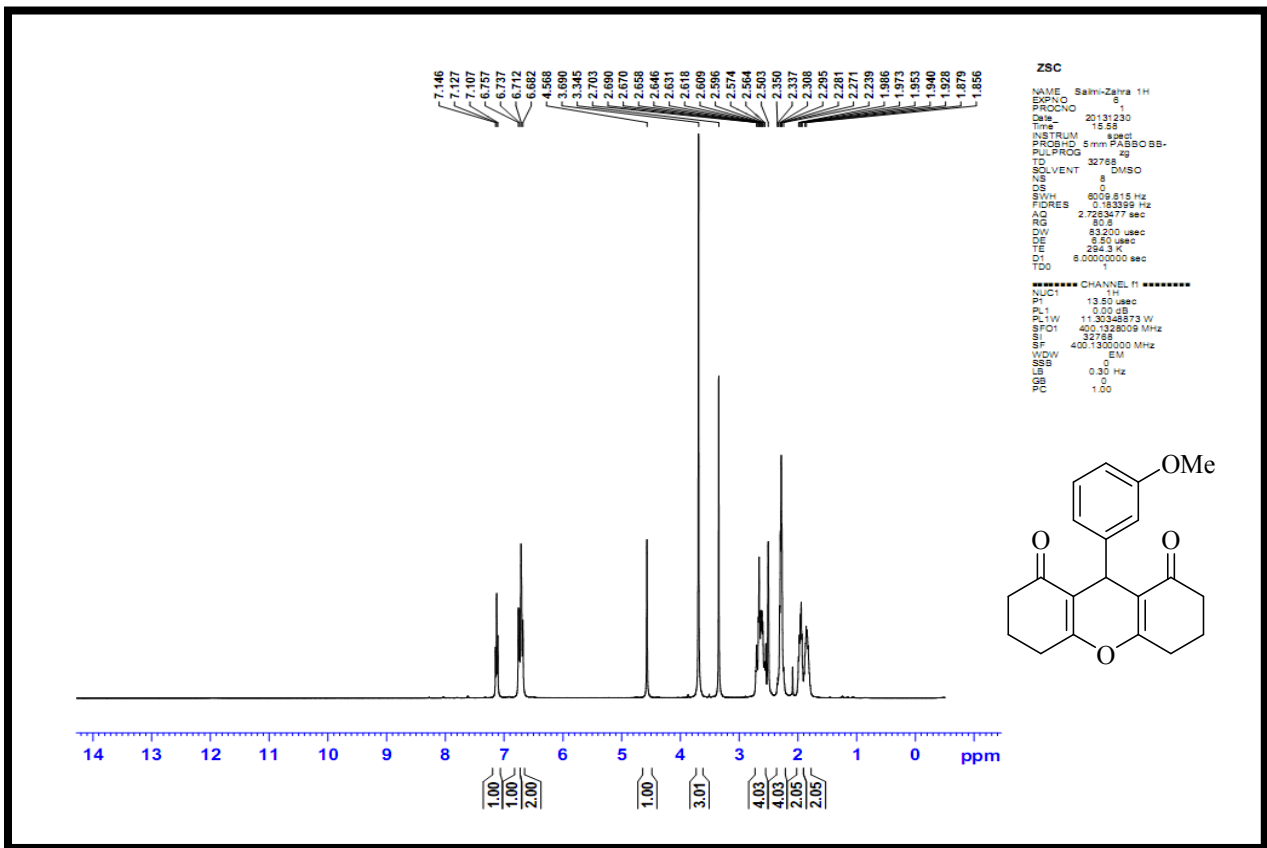
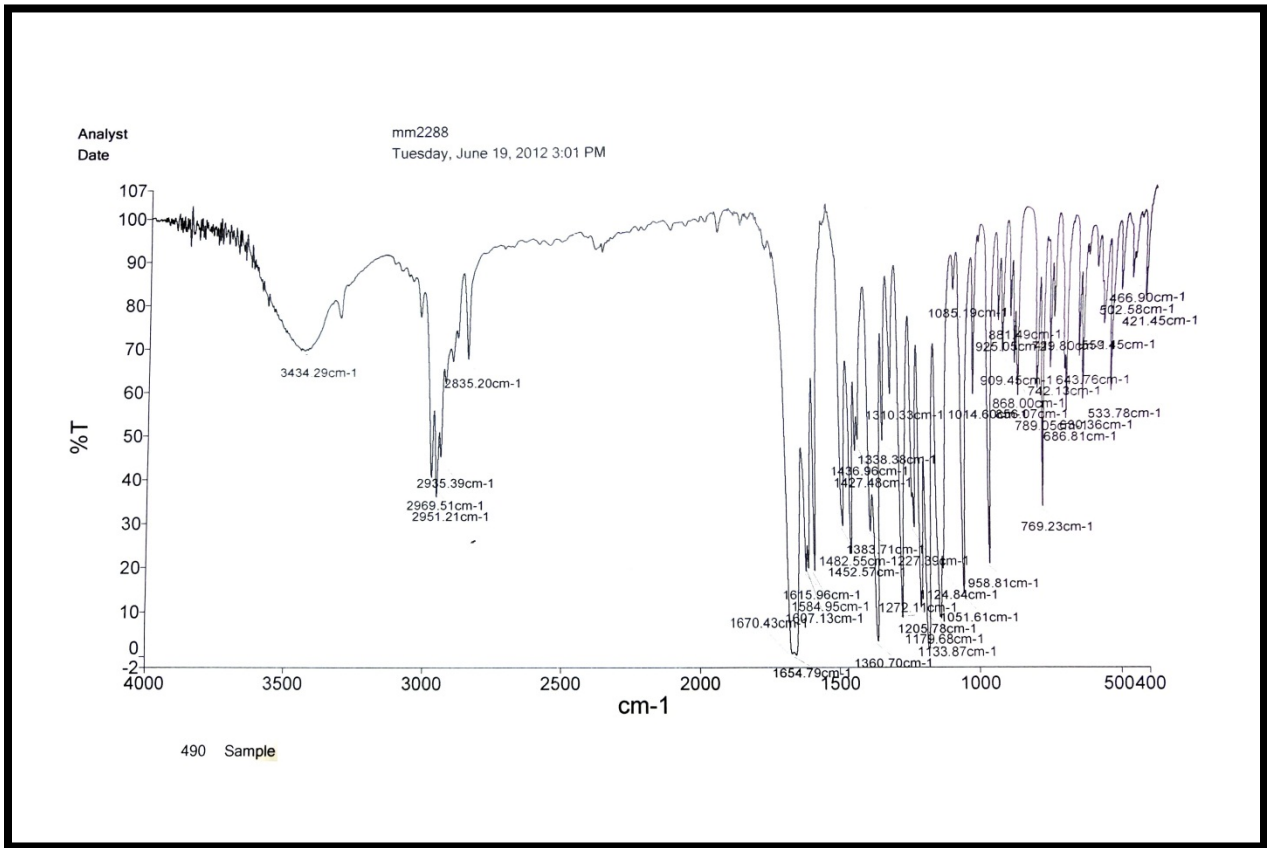
ZSA

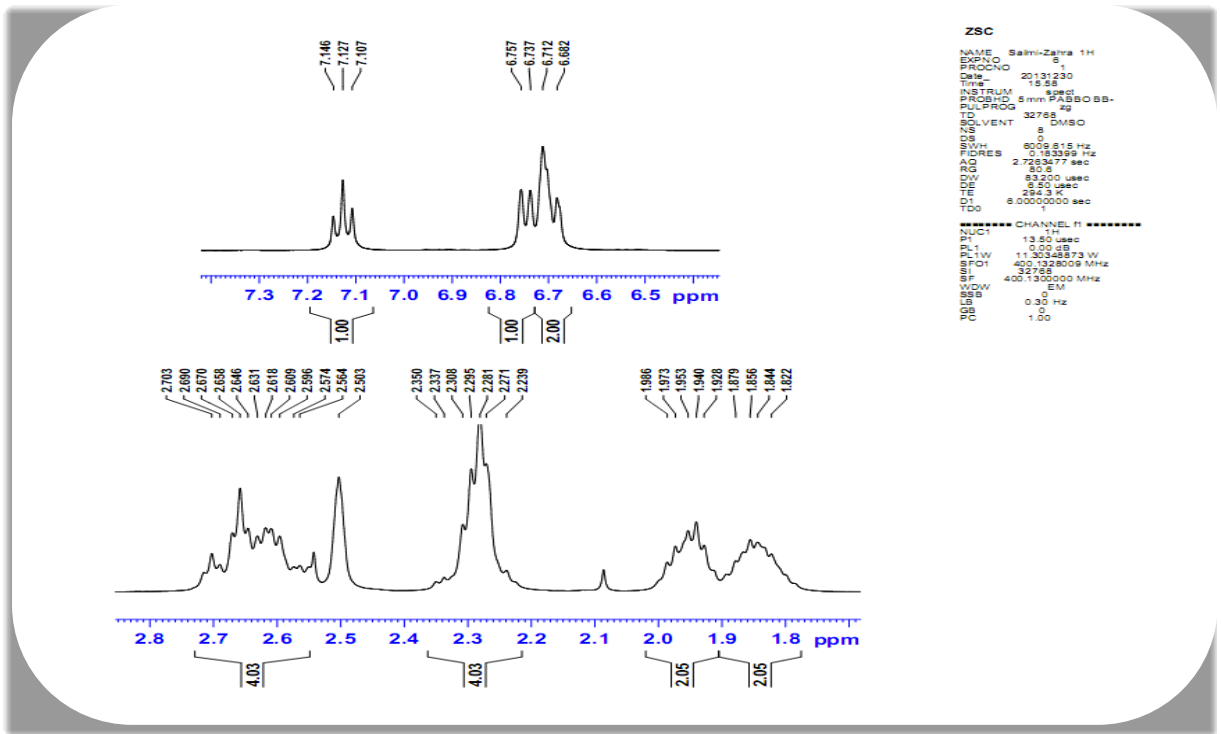
Result Table (ESTD - ZSA 15\_10\_2013\_10\_15\_2013 8\_21\_55 PM\_060 - INT7 - 1)

	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
	1.383	20805.393	3.923	72.75	Refer	Carbon	1.000
4	5.727	6438.046	0.286	5.30	Refer	Hydrogen	0.309
	Total		5.392	78.06			

### 9-(3-Methoxyphenyl)-3,4,6,7-tetrahydro-2H-pyran-1,8(5H,9H)-dione (Table 2, entry 7) ZSC

White powder 66 %; mp 199-201 °C; IR (KBr) ( $\nu_{\max}$ ,  $\text{cm}^{-1}$ ) 3434, 2969, 2935, 2835, 1670, 1654;  $^1\text{H-NMR}$  [400 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{H}}$  (ppm) 1.82-1.87 (2H, m,  $\text{CH}_2$ ), 1.92-1.98 (2H, m,  $\text{CH}_2$ ), 1.98-2.35 (4H, m, 2 $\text{CH}_2$ ), 2.56-2.70 (4H, m, 2 $\text{CH}_2$ ), 3.69 (3H, s,  $\text{OCH}_3$ ), 4.56 (1H, s, CH), 6.68-6.71 (2H, q, ArH), 6.73-6.75 (1H, d,  $J=8$ , ArH), 7.10-7.14 (1H, t,  $J=10$ , ArH);  $^{13}\text{C-NMR}$  [100 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{C}}$  (ppm) 20.3, 26.8, 31.1, 36.8, 55.2, 111.3, 114.8, 115.8, 120.5, 129.4, 146.4, 159.3, 165.3, 196.7; MS ( $m/z$ ): 324 ( $\text{M}^+$ ); found for  $\text{C}_{20}\text{H}_{20}\text{O}_4$ : C, 74.01; H, 6.07; requires C, 74.06; H, 6.21%.

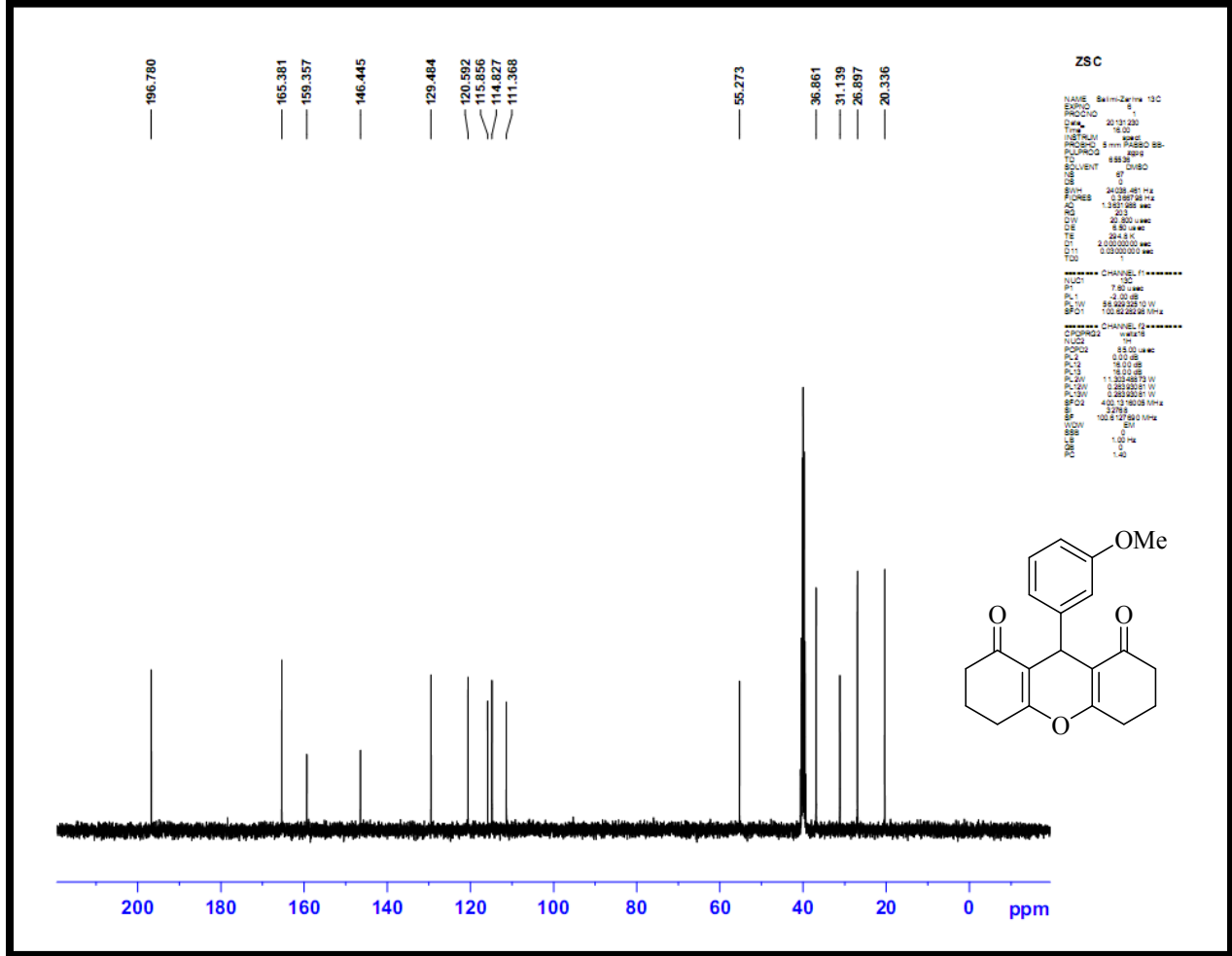
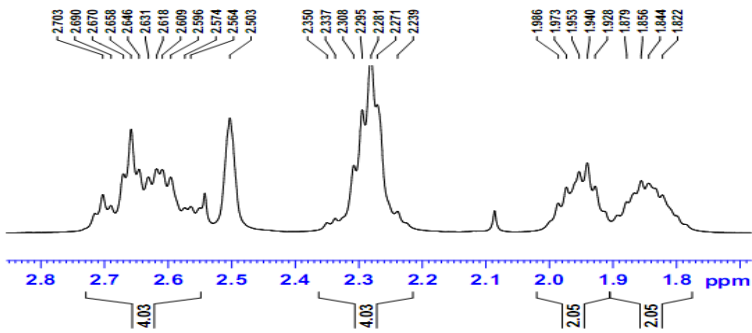




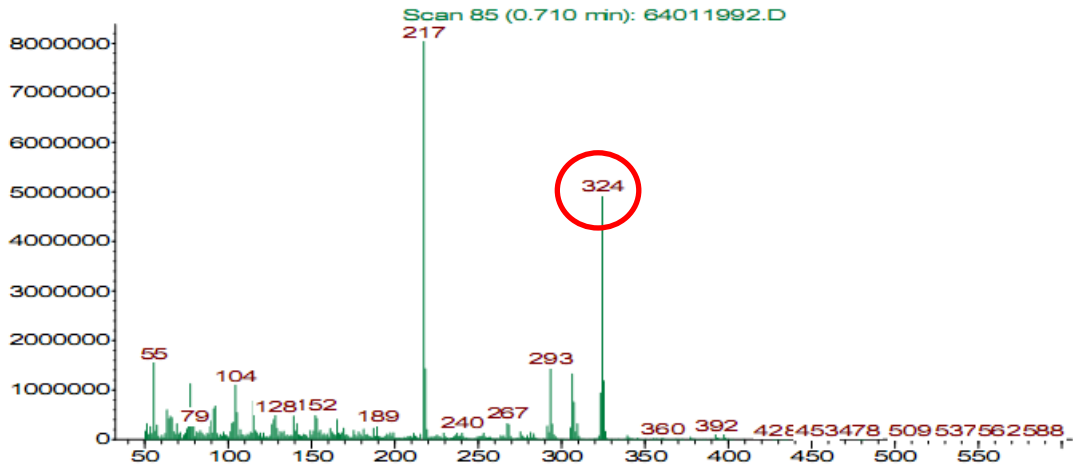
**ZSC**

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 PROCNO 1  
 Date\_ 20131230  
 Time 18.28  
 INSTRUM spect  
 PROBHD 5mm PABBO BB-  
 PULPROG zgpg30  
 SOLVENT DMSO  
 NS 640  
 DS 4  
 SWH 6009.815 Hz  
 FIDRES 0.182399 Hz  
 AQ 2.728377 sec  
 RG 320  
 DQ 32.00 usec  
 DE 4.00 usec  
 TE 299.3 K  
 D1 6.0000000 sec  
 TSD 1

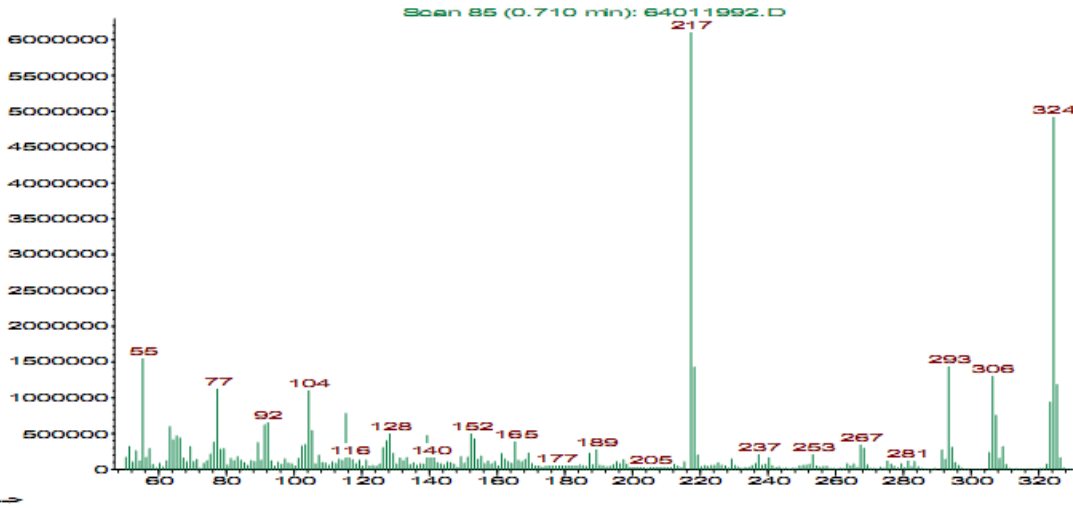
----- CHANNEL f1 -----  
 NUC1 1H  
 P1 13.00 usec  
 PL1 0.00 dB  
 PL1W 11.30348873 W  
 SF01 400.1426009 MHz  
 SFO1 327.68  
 F2 400.1330000 MHz  
 WDW EM  
 SS 0  
 LB 0.30 Hz  
 GB 0  
 RB 1.00



Abundance



m/z →  
Abundance



ZSC

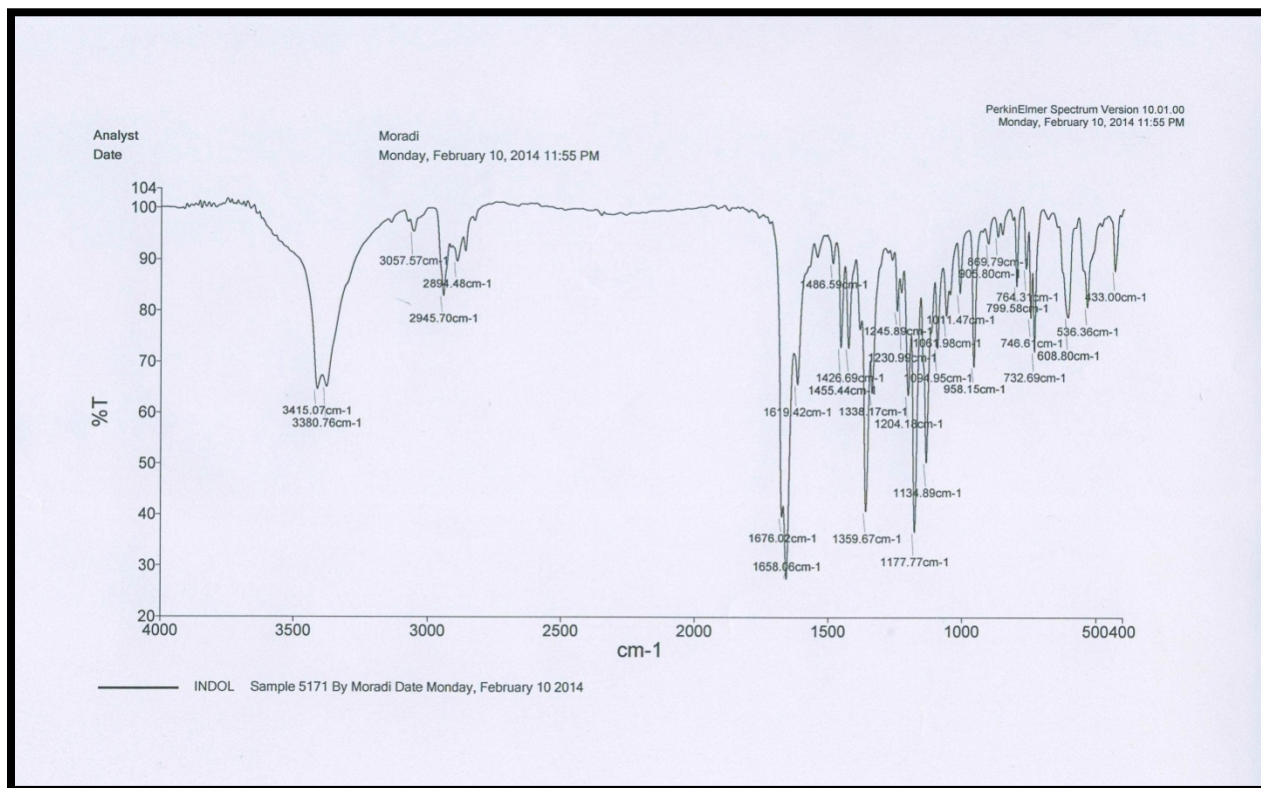
Result Table (ESTD - ZSC 15\_10\_2013\_10\_15\_2013 9\_01\_56 PM\_062 - INT7 - 1)

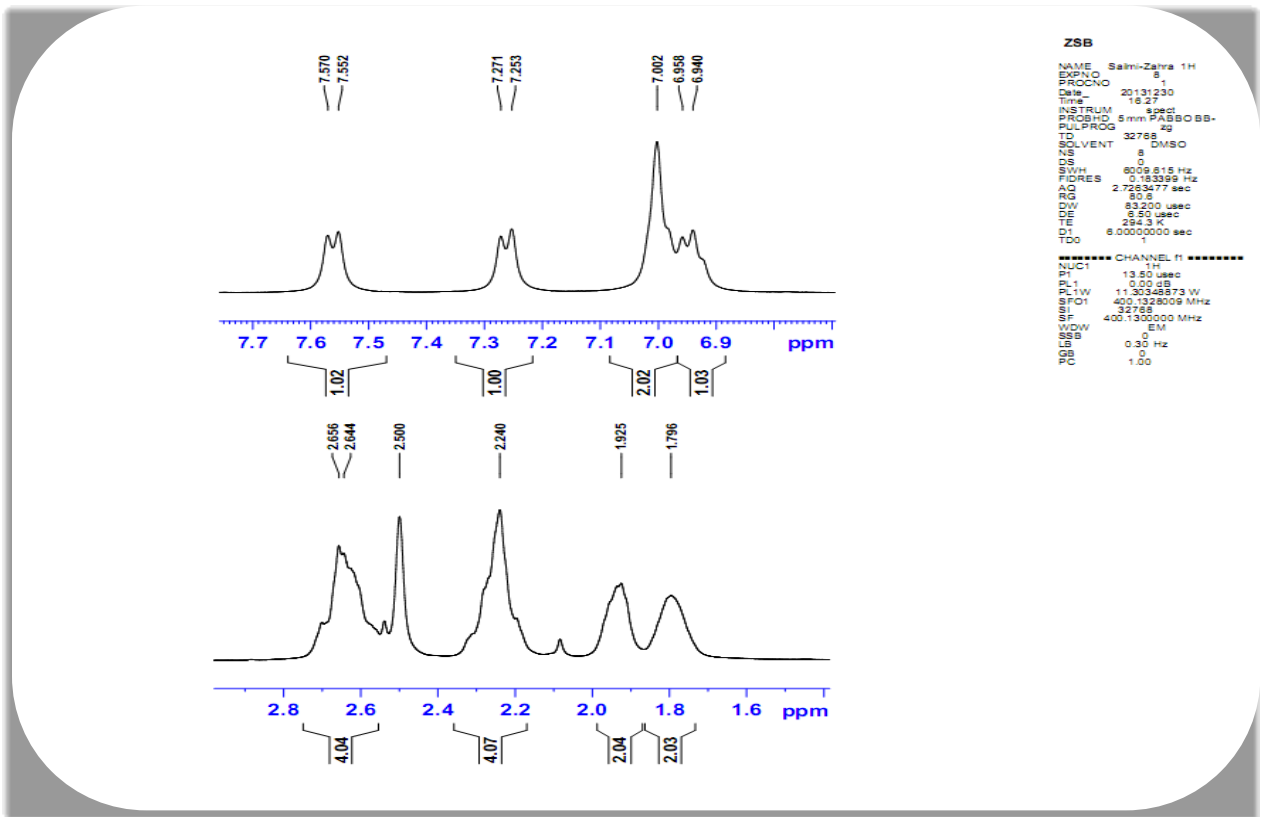
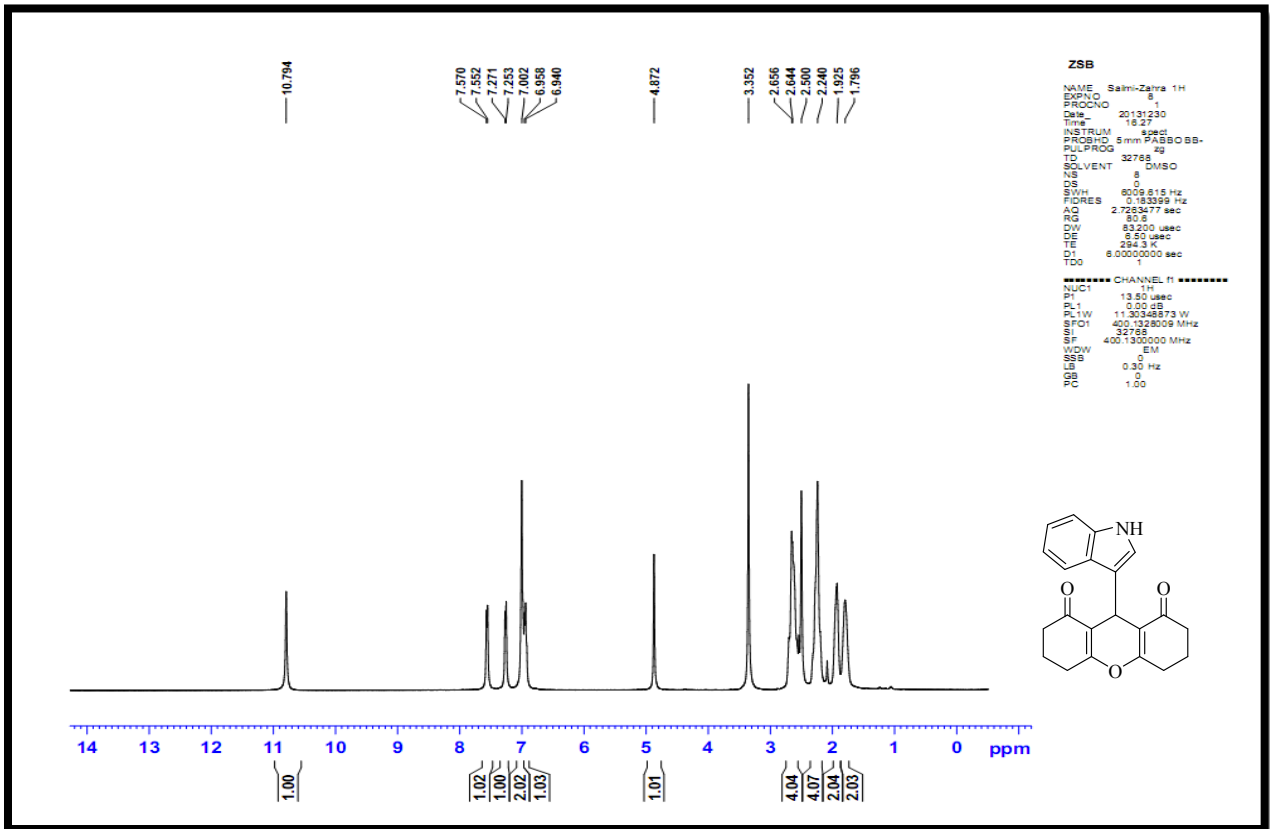
	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
	1.380	22783.507	4.492	74.01	Refer	Carbon	1.000
3	6.167	7983.604	0.369	6.07	Refer	Hydrogen	0.350
	Total		6.070	80.08			

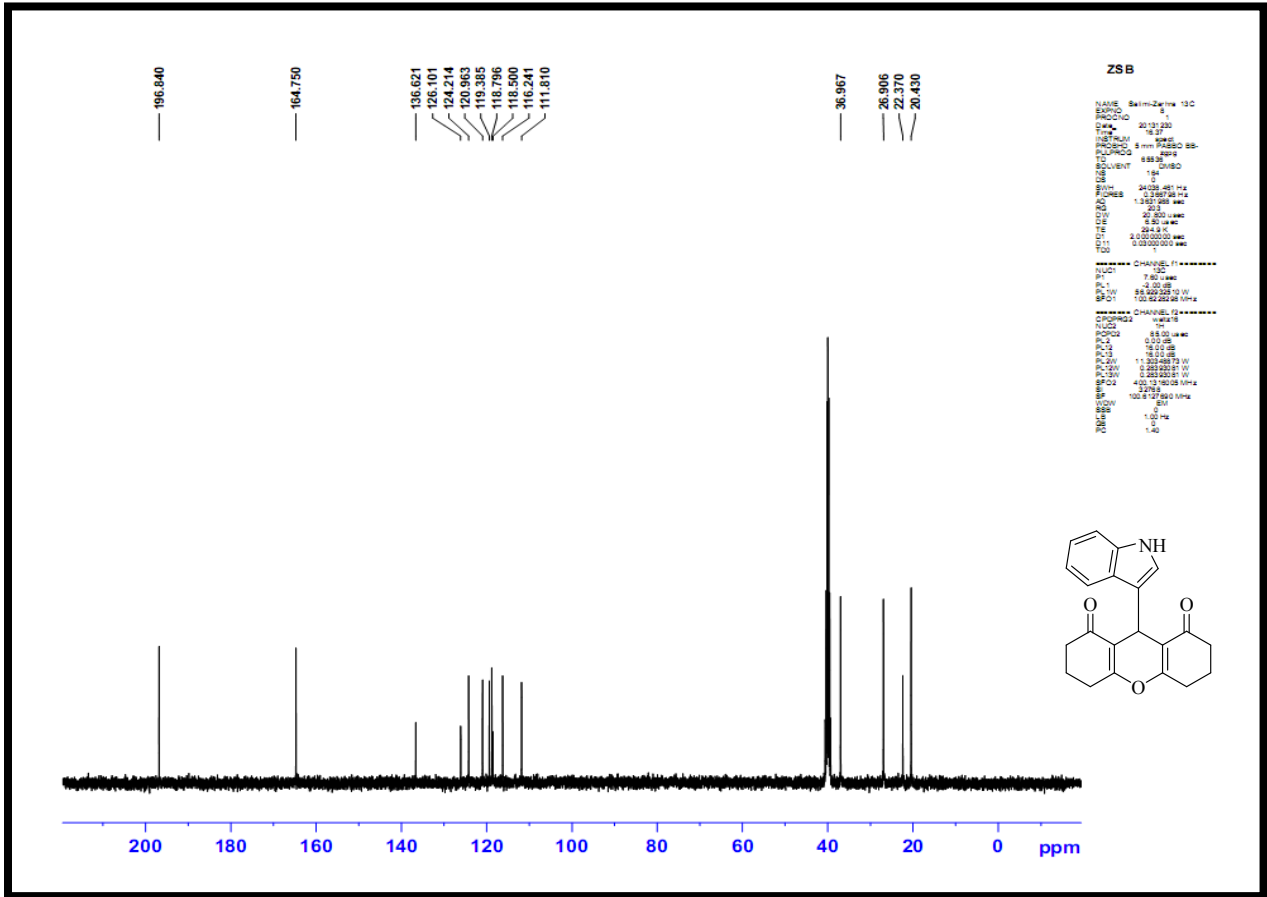


**9-(1H-Indol-3-yl)-3,4,6,7-tetrahydro-2H-pyran-1,8(5H,9H)-dione(Table 2, entry 8)ZSB**

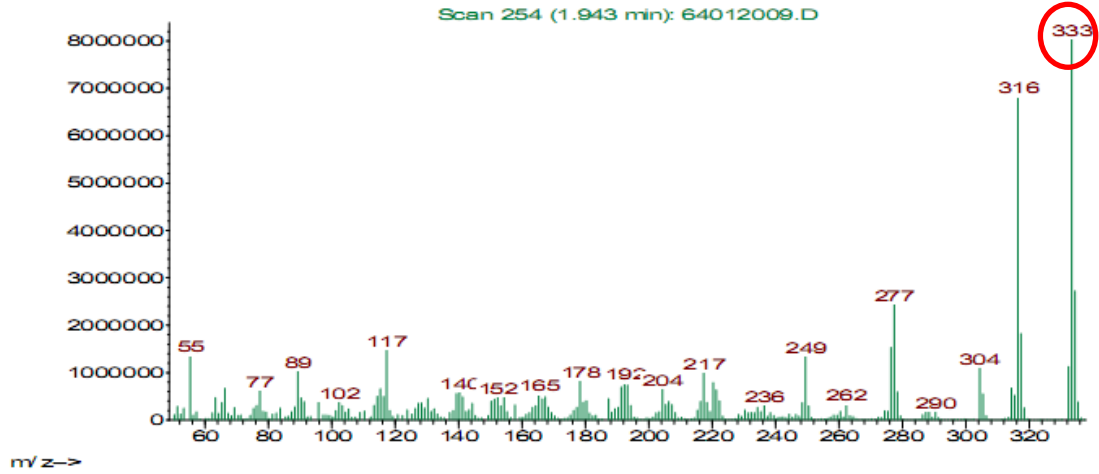
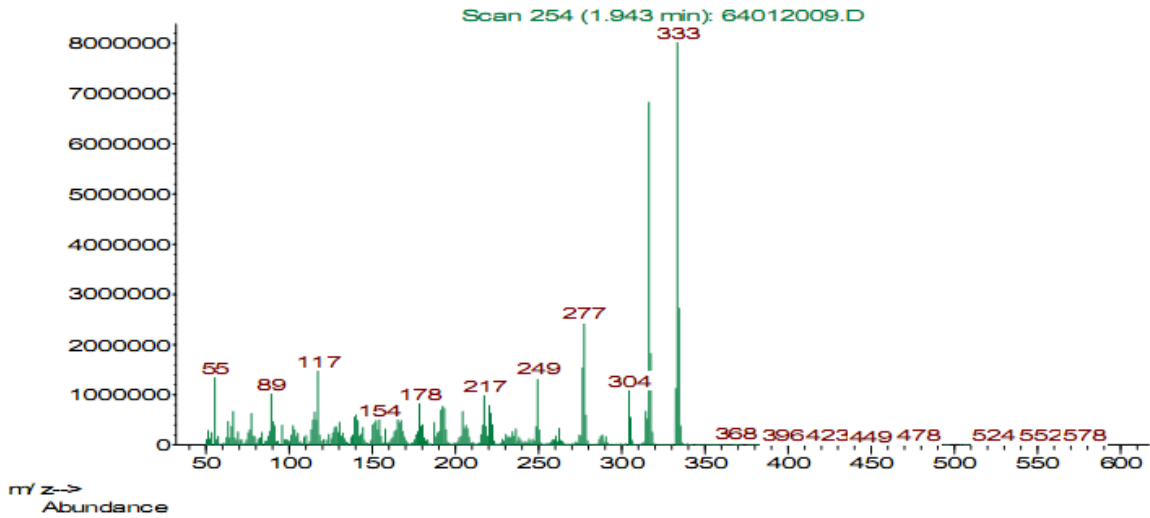
Opalescent powder 63 %; mp 268-269°C; IR (KBr) ( $\nu_{\max}$ ,  $\text{cm}^{-1}$ ) 3415, 3058, 2946, 2895, 1676, 1656;  $^1\text{H-NMR}$  [400 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{H}}$  (ppm) 1.79 (2H, broad,  $\text{CH}_2$ ), 1.92 (2H, broad,  $\text{CH}_2$ ), 2.24 (4H, m,  $2\text{CH}_2$ ), 2.64-2.65 (4H, m,  $2\text{CH}_2$ ), 4.87 (1H, s, CH), 6.94-6.95 (1H, t,  $J=7.2$ , ArH), 7.00 (2H, m, ArH), 7.25-7.27 (1H, d,  $J=8$ , ArH), 7.55-7.57 (1H, d,  $J=8$ , ArH), 10.79 (1H, s, NH);  $^{13}\text{C-NMR}$  [100 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{C}}$  (ppm) 20.4, 22.3, 26.9, 36.9, 111.8, 116.2, 118.5, 118.7, 119.3, 120.9, 124.2, 126.1, 136.6, 164.7, 196.8; MS ( $m/z$ ): 333 ( $\text{M}^+$ ); found for  $\text{C}_{21}\text{H}_{19}\text{NO}_3$ : C, 74.94; H, 5.49; N, 3.83 requires C, 75.66; H, 5.74; N, 4.20 %.







Abundance



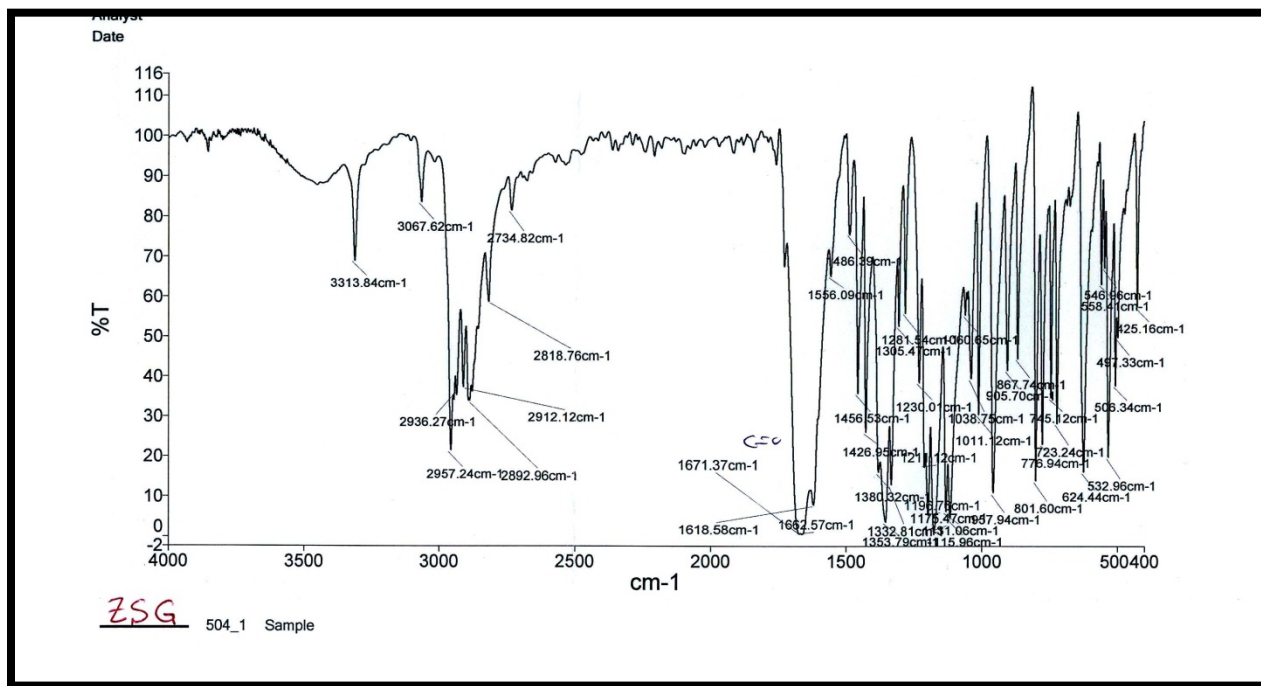
ZSB

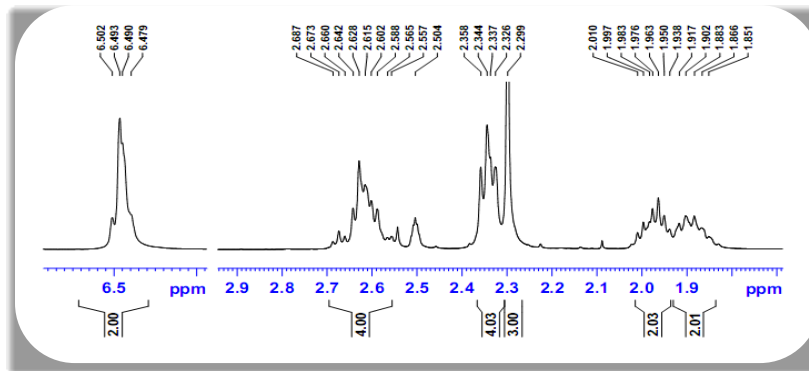
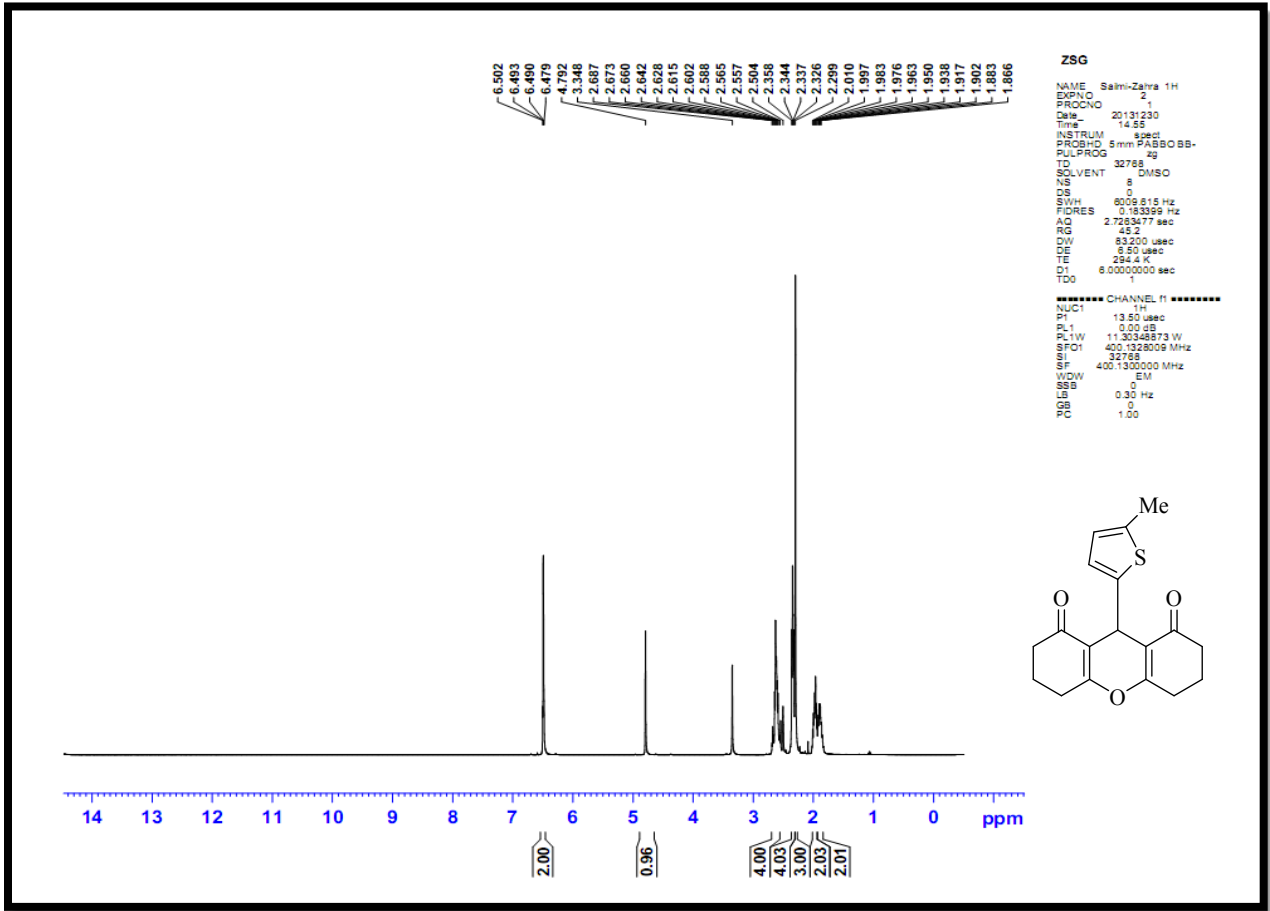
Result Table (ESTD - ZSB 15\_10\_2013\_10\_15\_2013 8\_41\_56 PM\_061 - INT7 - 1)

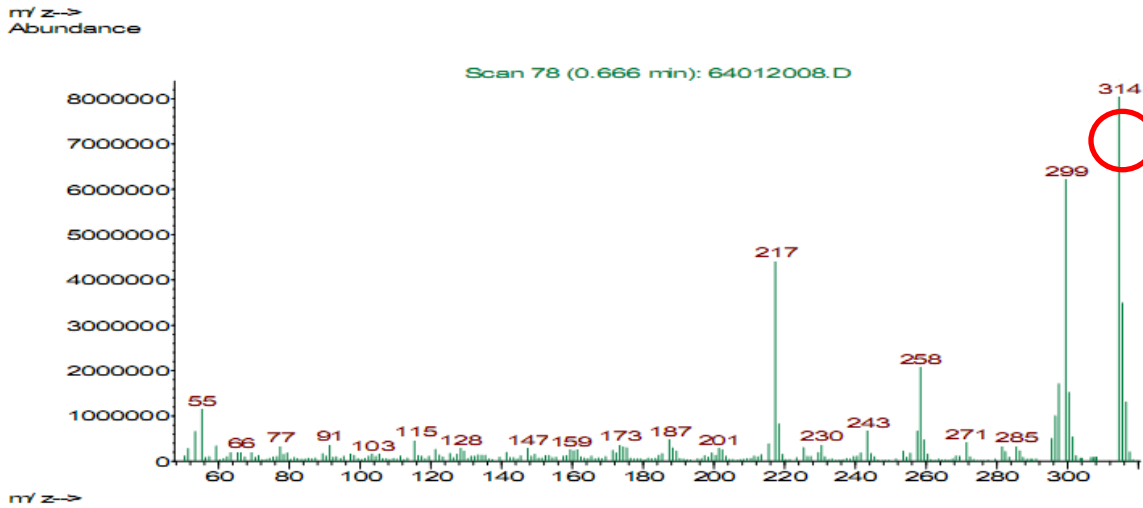
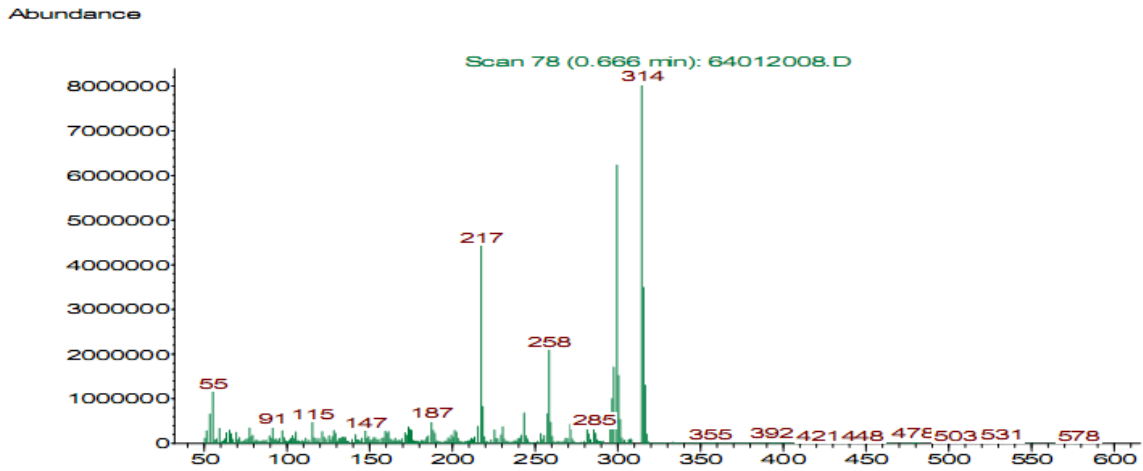
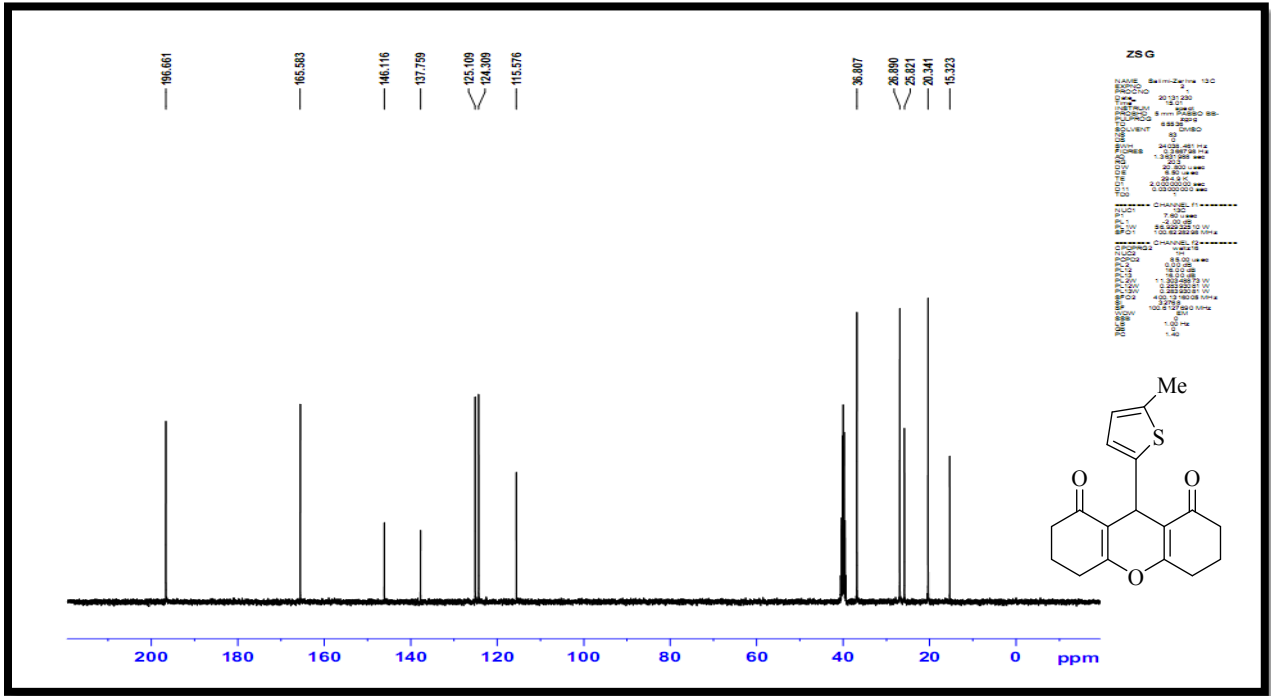
	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
1	0.983	715.351	0.193	3.83	Refer	Nitrogen	0.036
	1.407	19990.708	3.766	74.94	Refer	Carbon	1.000
3	5.703	6251.560	0.276	5.49	Refer	Hydrogen	0.313
	Total		5.025	84.26			

**9-(5-Methylthiophen-2-yl)-3,4,6,7-tetrahydro-2H-pyran-1,8(5H,9H)-dione**(Table 2, entry 9)**ZSG**

Pale Yellow powder 73 %; mp 232-233 °C; IR (KBr) ( $\nu_{\max}$ ,  $\text{cm}^{-1}$ ) 3313, 2957, 2936, 2892, 2818, 1671, 1618;  $^1\text{H-NMR}$  [400 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{H}}$  (ppm) 1.85-1.93 (2H, m,  $\text{CH}_2$ ), 1.95-2.01 (2H, m,  $\text{CH}_2$ ), 2.29 (3H, s,  $\text{CH}_3$ ), 2.32-2.35 (4H, m,  $2\text{CH}_2$ ), 2.55-2.68 (4H, m,  $2\text{CH}_2$ ), 4.79 (1H, s, CH), 6.47-6.50 (2H, q, ArH);  $^{13}\text{C-NMR}$  [100 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{C}}$  (ppm) 15.3, 20.3, 25.8, 26.8, 36.8, 115.5, 124.3, 125.1, 137.7, 146.1, 165.5, 196.6; MS ( $m/z$ ): 314 ( $\text{M}^+$ ); found for  $\text{C}_{18}\text{H}_{18}\text{O}_3\text{S}$ : C, 68.44; H, 5.73; S, 9.11; requires C, 68.76; H, 5.77; O, 15.27; S, 10.20%.







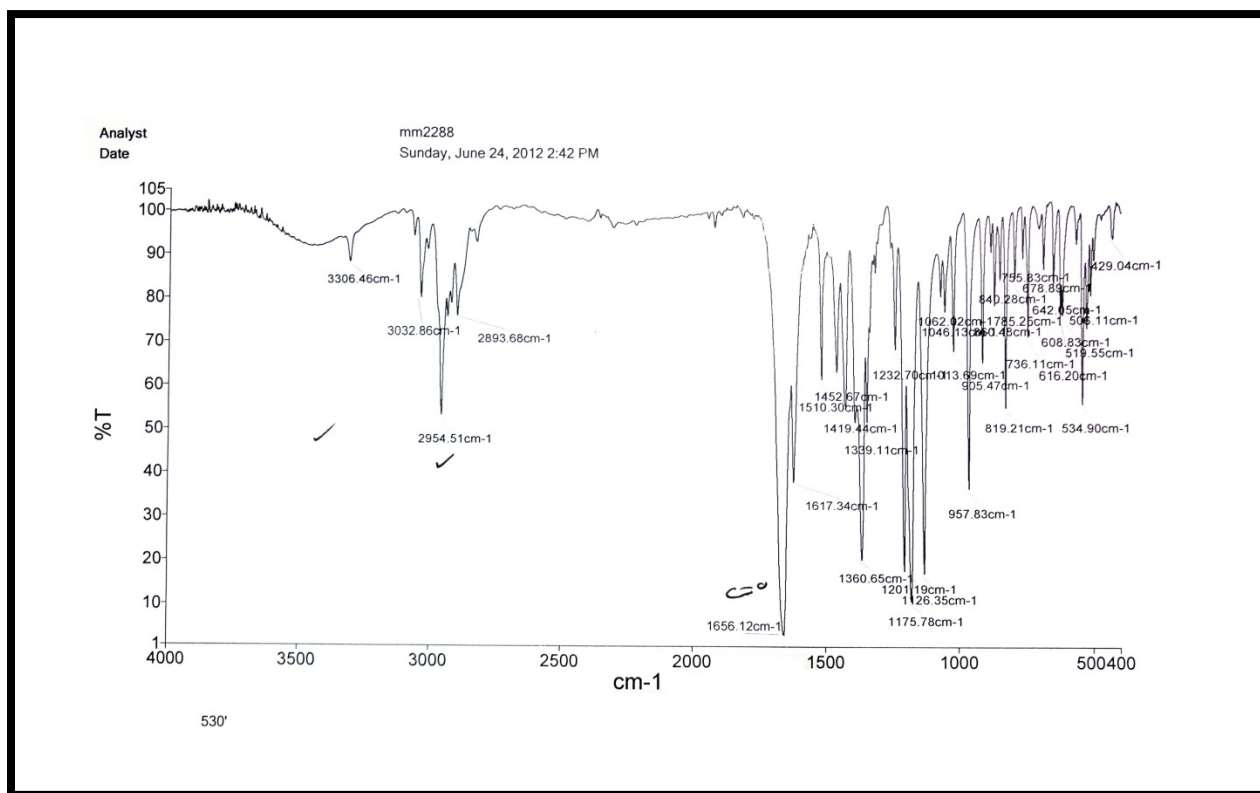
ZSG

Result Table (ESTD - ZSG 15\_10\_2013\_10\_15\_2013 7\_41\_55 PM\_058 - INT7 - 1)

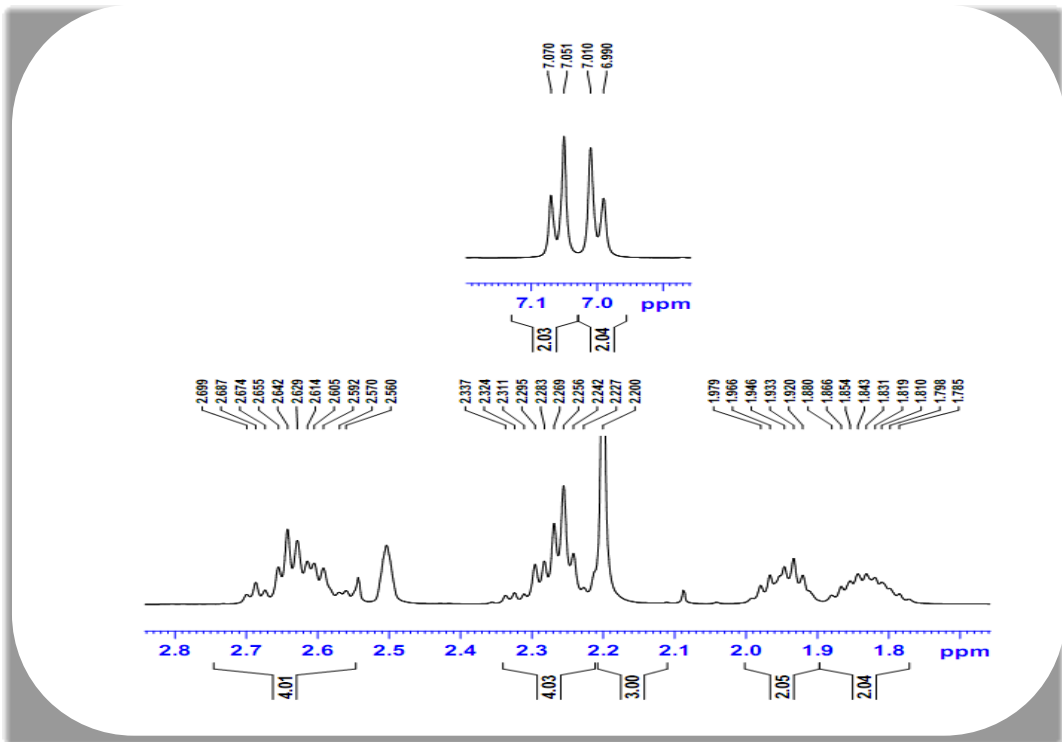
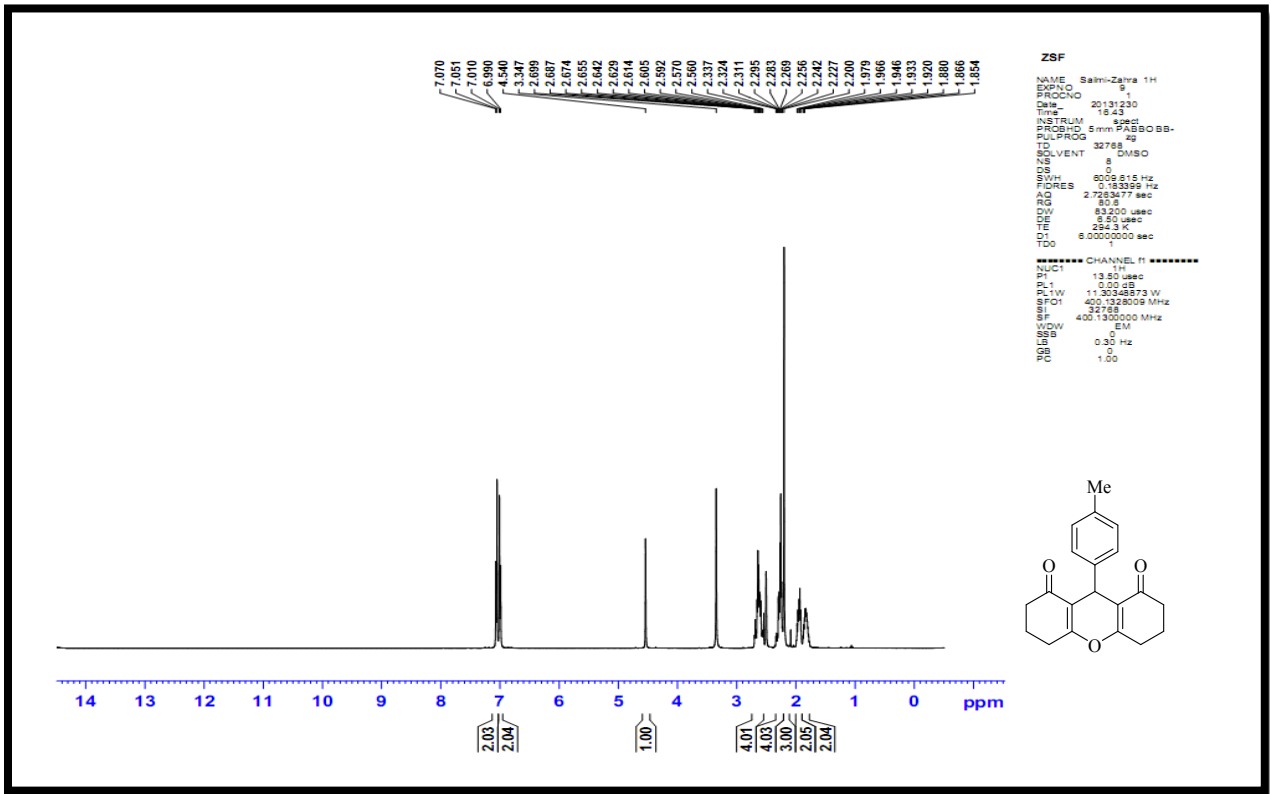
	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
	1.407	19517.931	3.678	68.44	Refer	Carbon	1.000
3	5.783	6848.211	0.308	5.73	Refer	Hydrogen	0.351
4	12.010	1211.316	0.490	9.11	Refer	Sulphur	0.062
	Total		5.375	83.28			

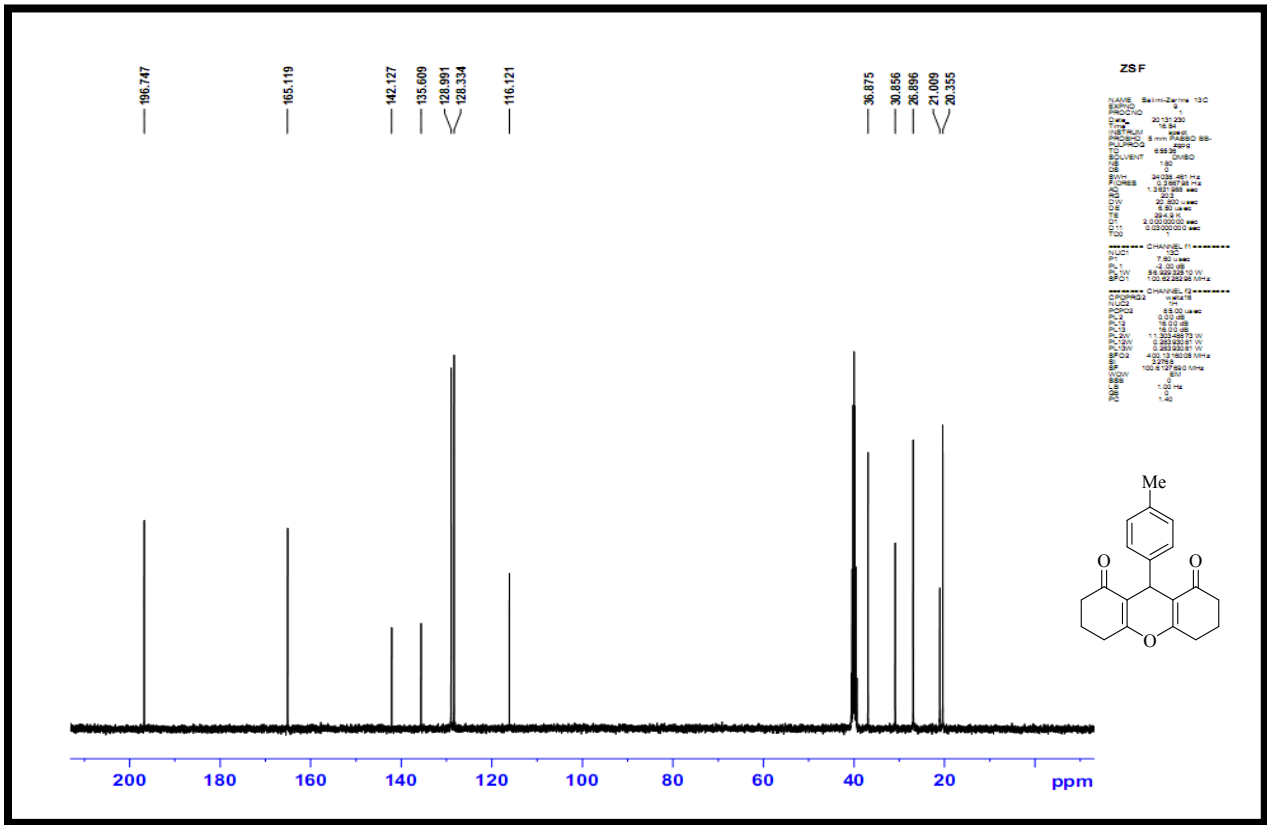
### 9-*p*-Tolyl-3,4,6,7-tetrahydro-2H-pyran-1,8(5H,9H)-dione (Table 2, entry 10) ZSF

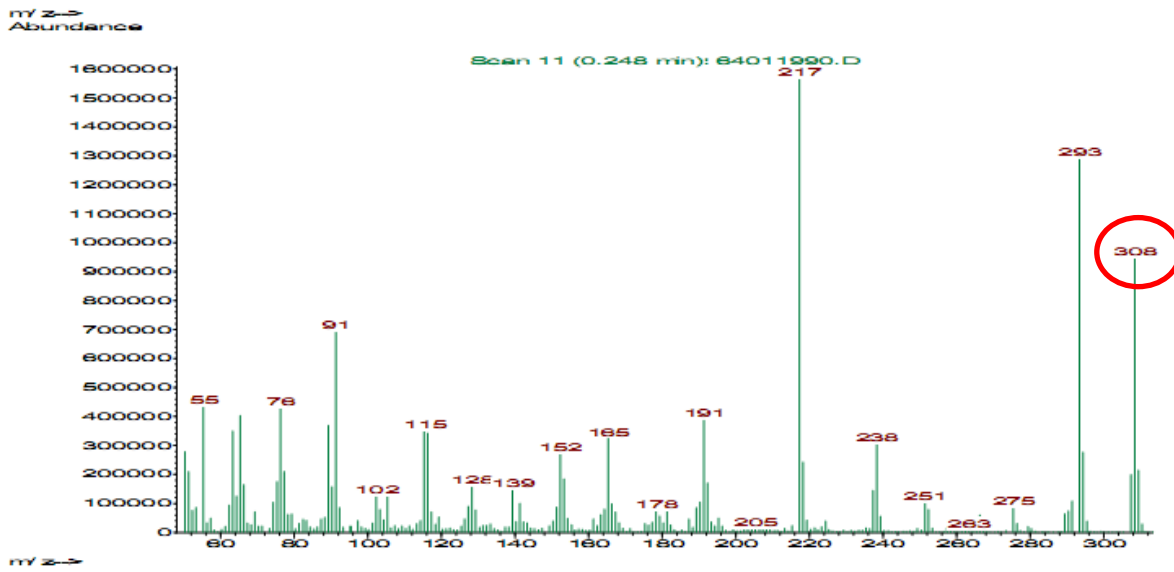
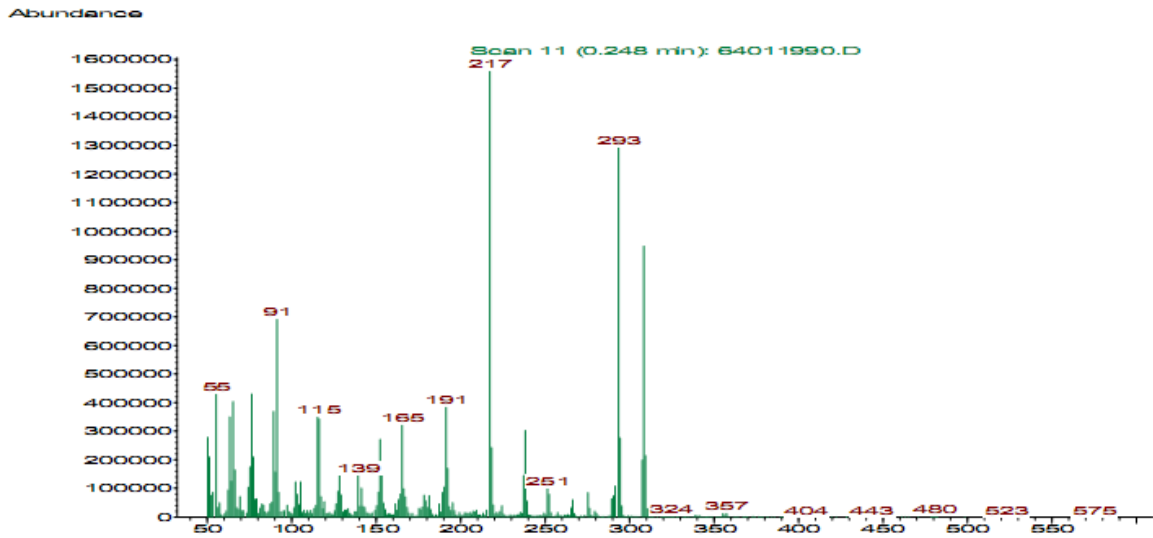
White powder 79 %; mp 259-261 °C; IR (KBr) ( $\nu_{\max}$ ,  $\text{cm}^{-1}$ ) 3032, 2954, 2893, 1656, 1617;  $^1\text{H-NMR}$  [400 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{H}}$  (ppm) 1.78-1.88 (2H, m,  $\text{CH}_2$ ), 1.92-1.97 (2H, m,  $\text{CH}_2$ ), 2.20 (3H, s,  $\text{CH}_3$ ), 2.22-2.33 (4H, m,  $2\text{CH}_2$ ), 2.56-2.69 (4H, m,  $2\text{CH}_2$ ), 4.54 (1H, s, CH), 6.99-7.01 (2H, d,  $J = 8$ , Ph), 7.05-7.07 (2H, d,  $J = 8$ , ArH);  $^{13}\text{C-NMR}$  [100 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{C}}$  (ppm) 20.3, 21.0, 26.8, 30.8, 36.8, 116.1, 128.3, 128.9, 135.6, 142.1, 165.1, 196.7; MS ( $m/z$ ): 308 ( $\text{M}^+$ ); found for  $\text{C}_{20}\text{H}_{20}\text{O}_3$ : C, 77.99; H, 6.63 requires C, 77.90; H, 6.54%.











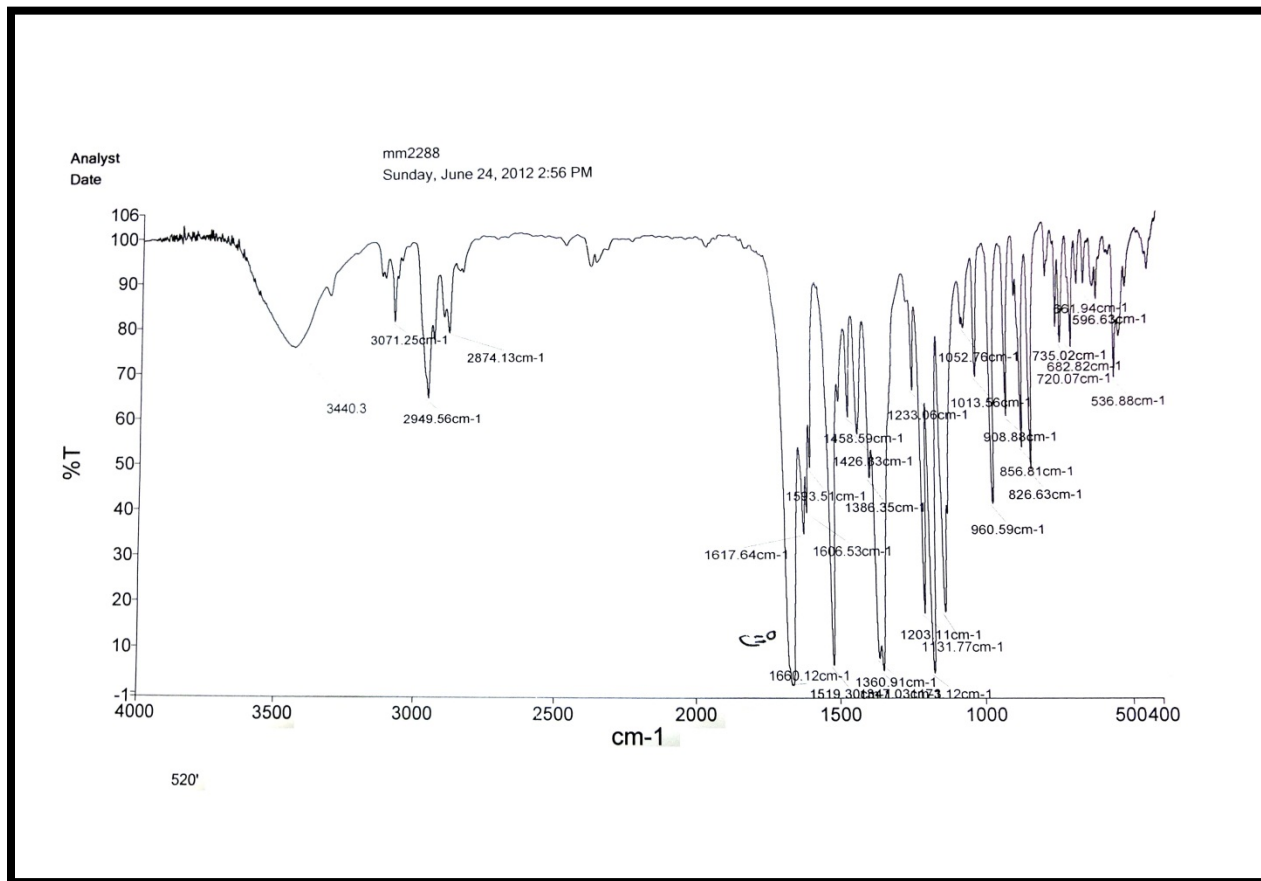
ZSF

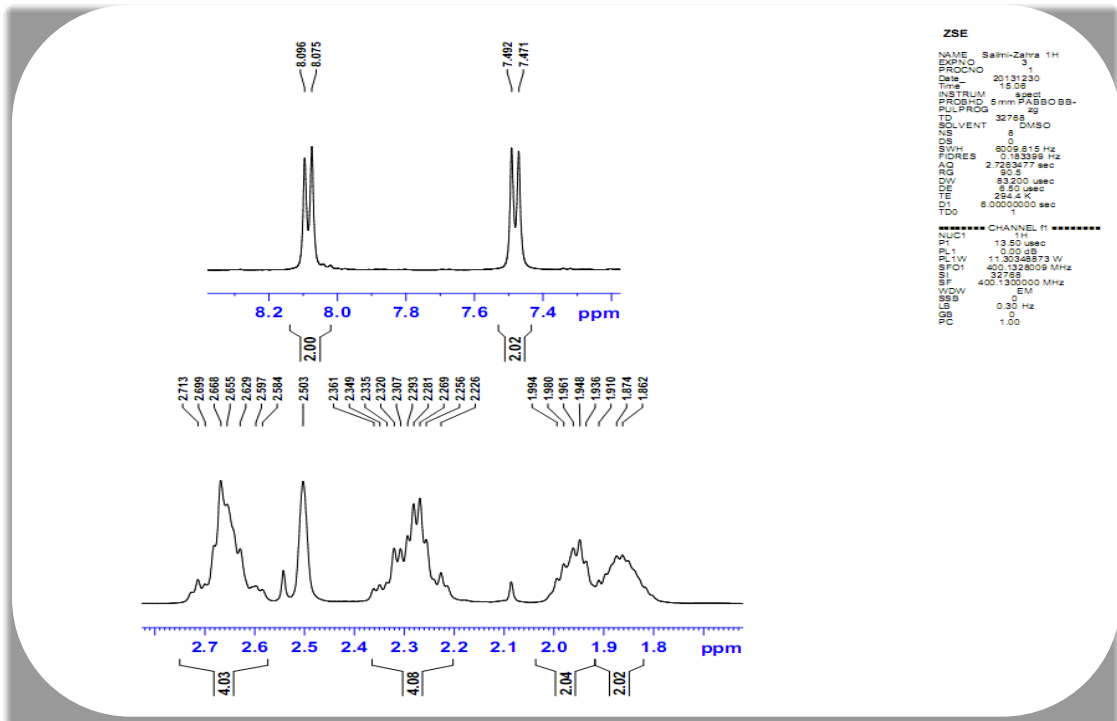
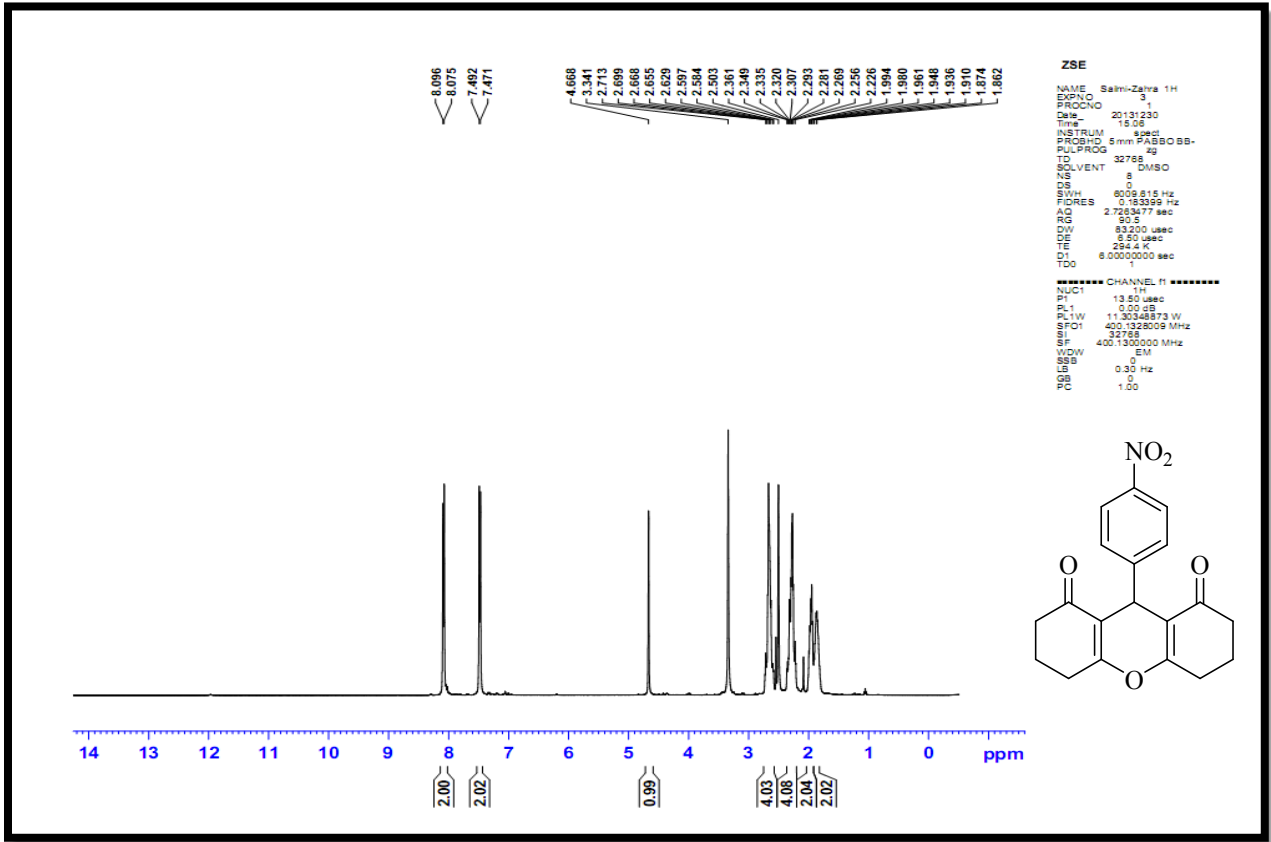
Result Table (ESTD - ZSF 15\_10\_2013\_10\_15\_2013 9\_21\_56 PM\_063 - INT7 - 1)

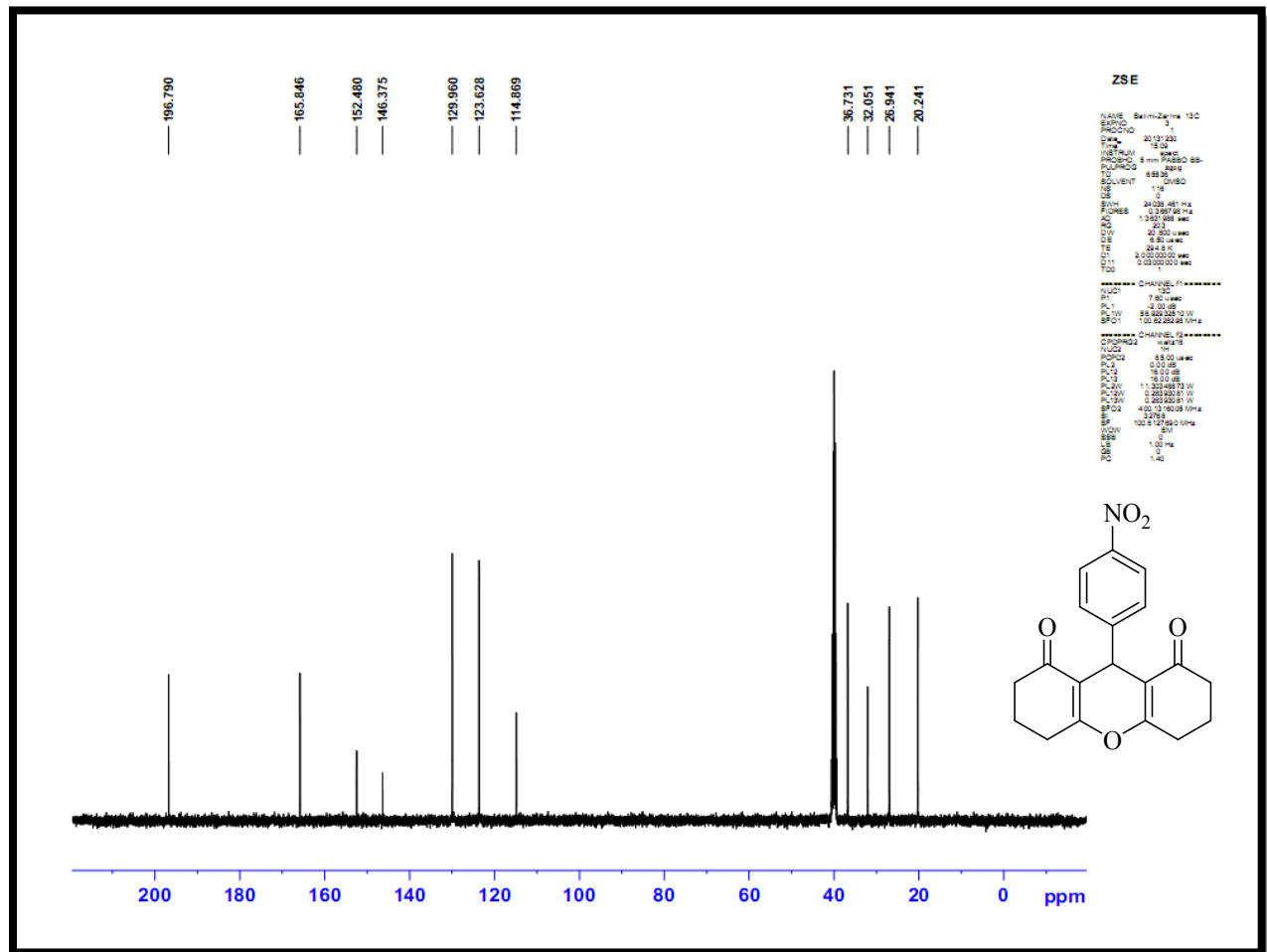
	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
	1.373	24501.405	4.785	77.99	Refer	Carbon	1.000
3	6.310	8698.792	0.407	6.63	Refer	Hydrogen	0.355
	Total		6.135	84.62			

**9-(4-Nitrophenyl)-3,4,6,7-tetrahydro-2H-pyran-1,8(5H,9H)-dione (Table 2, entry 11)ZSE**

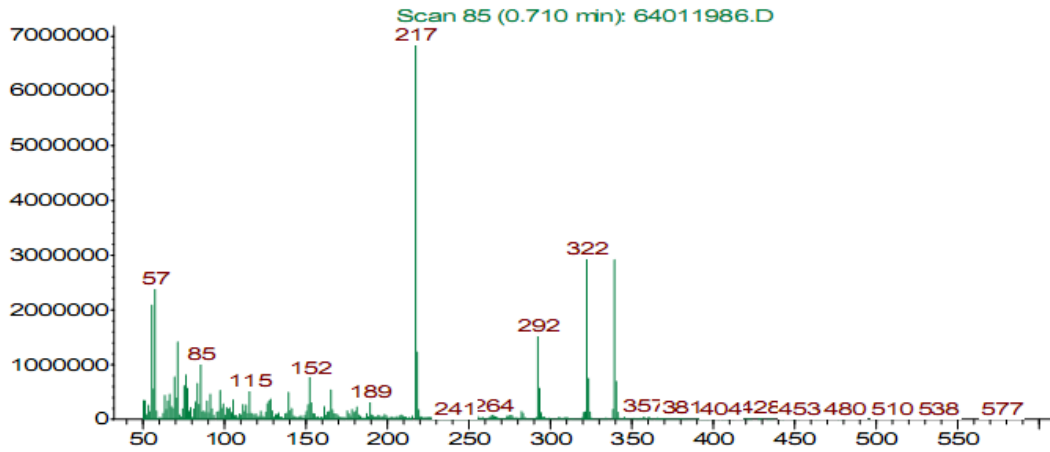
White powder 75 %; mp252-254 °C; IR (KBr) ( $\nu_{\max}$ ,  $\text{cm}^{-1}$ ) 3071, 2949, 2874, 1660, 1617;  $^1\text{H-NMR}$  [400 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{H}}$  (ppm) 1.86-1.91 (2H, m,  $\text{CH}_2$ ), 1.93-1.99 (2H, m,  $\text{CH}_2$ ), 2.22-2.36 (4H, m, 2 $\text{CH}_2$ ), 2.58-2.71 (4H, m, 2 $\text{CH}_2$ ), 4.66 (1H, s, CH), 7.47-7.49 (2H, d,  $J=8.4$ , ArH), 8.07-8.09 (2H, d,  $J=8.4$ , ArH);  $^{13}\text{C-NMR}$  [100 MHz,  $\text{DMSO-d}_6$ ]:  $\delta_{\text{C}}$  (ppm) 20.2, 26.9, 32.0, 36.7, 114.8, 123.6, 129.9, 146.3, 152.4, 165.8; MS (m/z): 339 ( $\text{M}^+$ ); found for  $\text{C}_{19}\text{H}_{17}\text{NO}_5$ : C, 67.18; H, 4.91; N, 3.85; requires C, 67.25; H, 5.05; N, 4.13%.



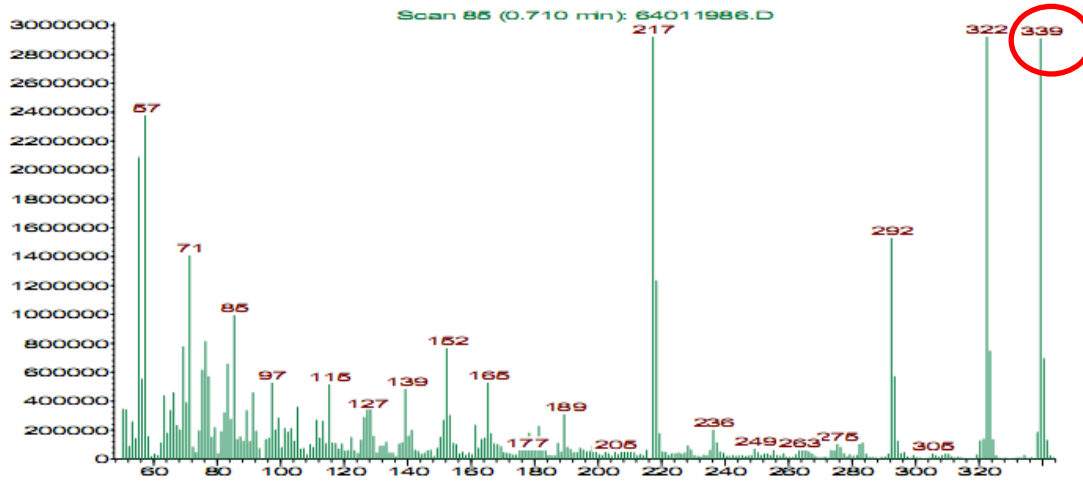




Abundance



m/z ->  
Abundance



ZSE

Result Table (ESTD - ZSE 15\_10\_2013\_10\_15\_2013 7\_21\_54 PM\_057 - INT7 - 1)

	Reten. Time [min]	Response	Weight [mg]	Weight [%]	Peak Type	Element Name	Carbon Response Ratio
1	0.980	788.368	0.224	3.85	Refer	Nitrogen	0.038
	1.430	20550.279	3.917	67.18	Refer	Carbon	1.000
4	5.723	6442.217	0.286	4.91	Refer	Hydrogen	0.313
	Total		5.831	75.93			

# IR spectra of recycle sulfonamide

