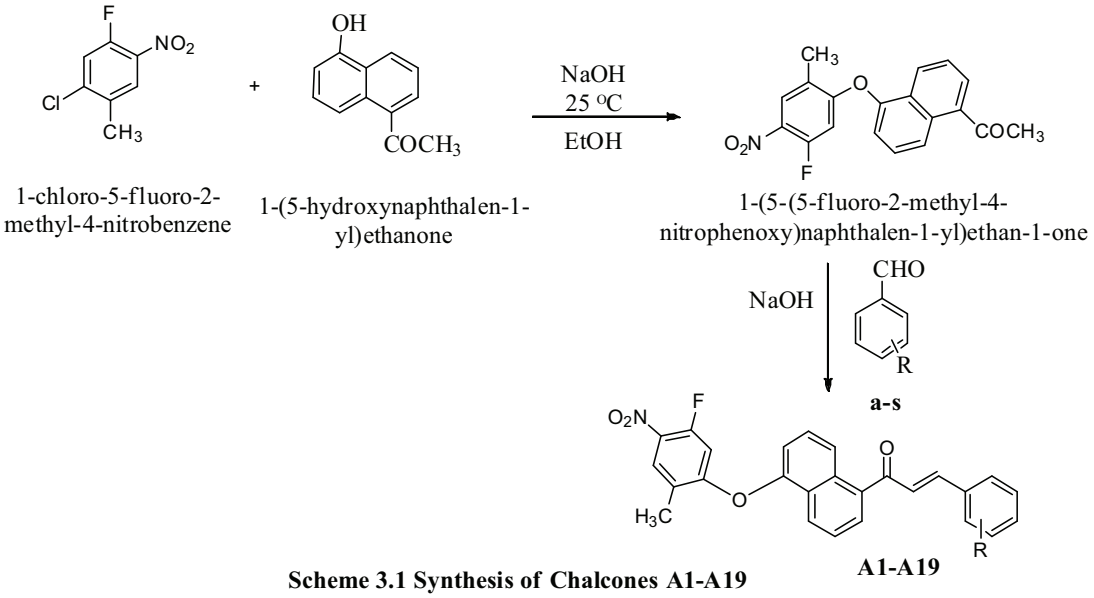
CHAPTER – III

SYNTHESIS AND CHARACTERIZATION OF CHALCONES

CONTENTS

3.1 REACTION SCHEME

Some chalcones [**A1-A19]** were prepared by reaction between 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in the presence of NaOH under ethanol as solvent followed by reaction with aromatic aldehyde (**Scheme 3.1**).



1-chloro-5-fluoro-2-methyl-4-nitrobenzene

1-(5-hydroxynaphthalen-1-yl)ethanone

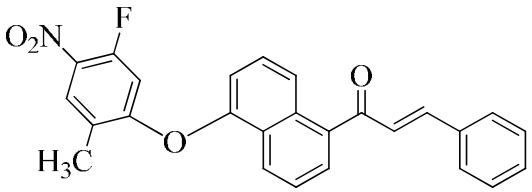
1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)ethan-1-one

A1-A19

Scheme 3.1 Synthesis of Chalcones A1-A19

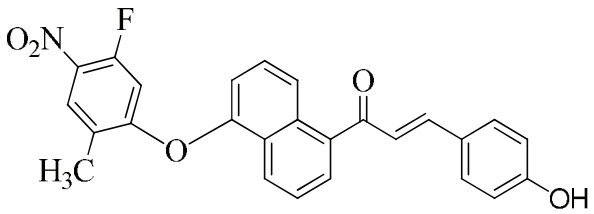
3.2 STRUCTURE OF COMPOUNDS A1 TO A19

Compound A1:



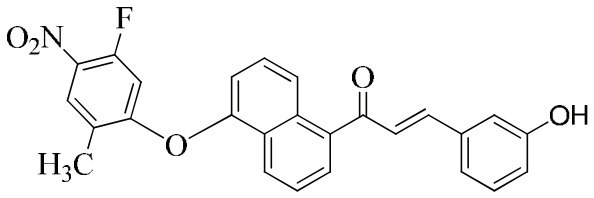
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-phenylprop-2-en-1-one

Compound A2:



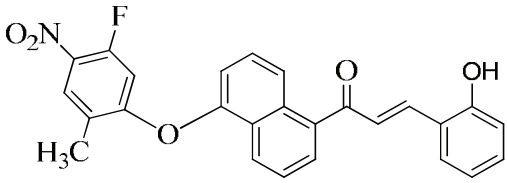
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(4-hydroxyphenyl)prop-2-en-1-one

Compound A3:



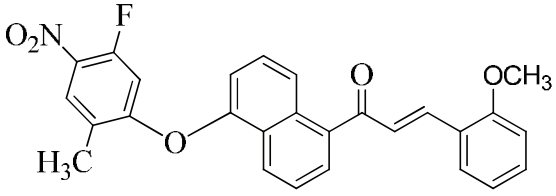
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(3-hydroxyphenyl)prop-2-en-1-one

Compound A4:



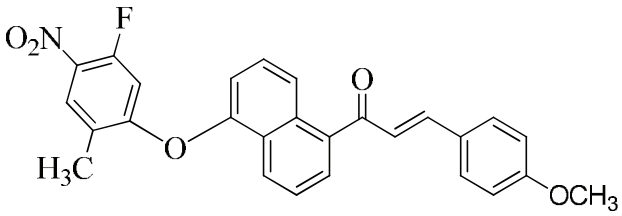
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(3-hydroxyphenyl)prop-2-en-1-one

Compound A5:



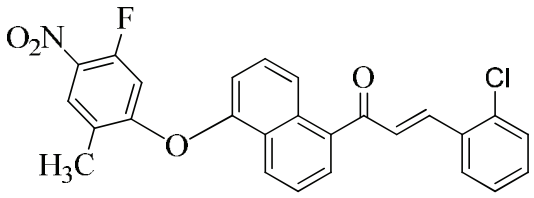
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(2-methoxyphenyl)prop-2-en-1-one

Compound A6:



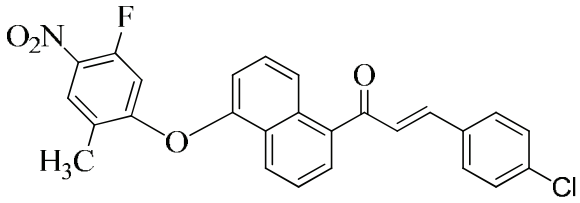
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(4-methoxyphenyl)prop-2-en-1-one

Compound A7:



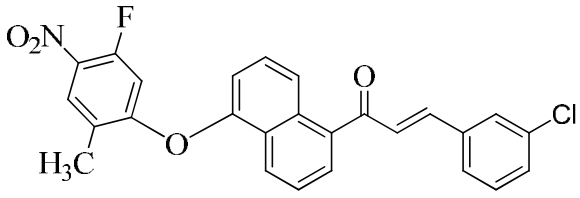
(*E*)-3-(2-chlorophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

Compound A8:



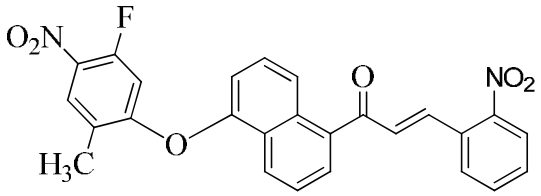
(*E*)-3-(4-chlorophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

Compound A9:



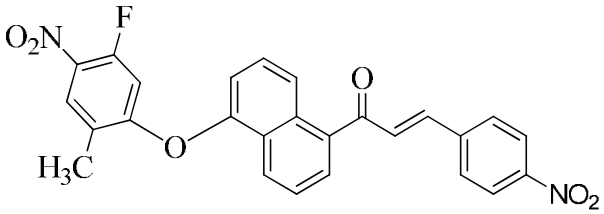
(*E*)-3-(3-chlorophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

Compound A10:



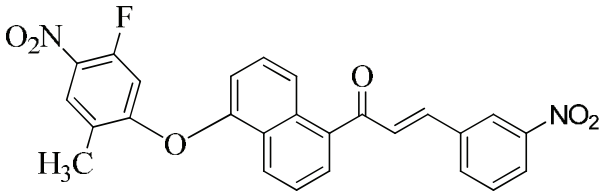
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(2-nitrophenyl)prop-2-en-1-one

Compound A11:



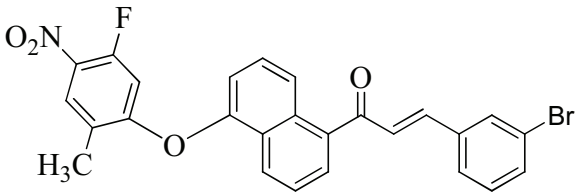
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(4-nitrophenyl)prop-2-en-1-one

Compound A12:



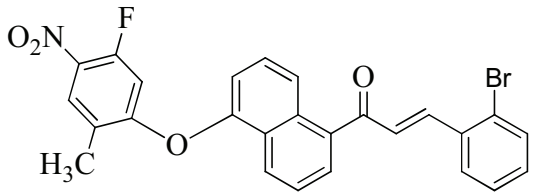
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(3-nitrophenyl)prop-2-en-1-one

Compound A13:



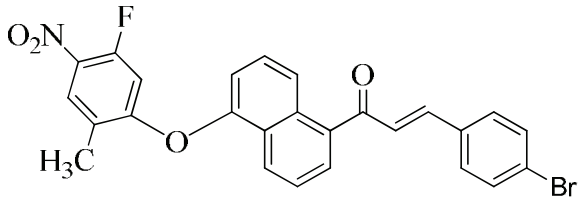
(*E*)-3-(3-bromophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

Compound A14:



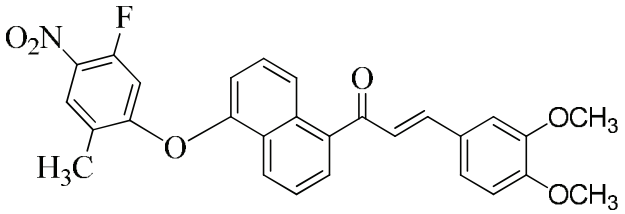
(*E*)-3-(2-bromophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

Compound A15:



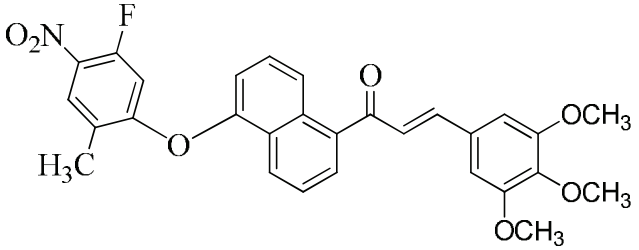
(*E*)-3-(4-bromophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

Compound A16:



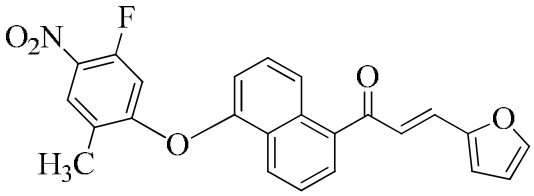
(*E*)-3-(3,4-dimethoxyphenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

Compound A17:



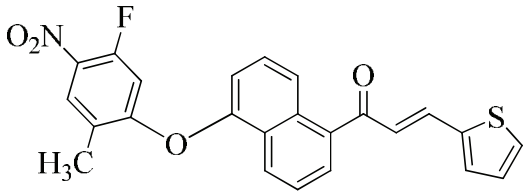
(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(3,4,5-trimethoxyphenyl)prop-2-en-1-one

Compound A18:



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(furan-2-yl)prop-2-en-1-one

Compound A19:



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(thiophen-2-yl)prop-2-en-1-one

3.3 EXPERIMENTAL

3.3.1 Chemicals and Reagents

All chemicals used were of laboratory reagent grade and used without further purification**.** Various aldehydes, 1-(5-hydroxynaphthalen-1-yl)ethan-1-one, 1-chloro-5-fluoro-2-methyl-4-nitrobenzene, NaOH and ethanol were used as received from Merck, Mumbai, India.

3.3.2 Analytical Methods

Bruker Avance-400 MHz instrument was used for Proton NMR study and 100 MHz frequency instrument was used for ^{13}C NMR. Parts per million unit was used to expressed chemical shift value. ABB Bomem Inc. FT-IR 3000 Spectrophotometer was used for Infrared Spectral study. Data obtained was expressed in cm^{-1} unit. Shimadzu LCMS-2010 was used for MASS spectral analysis. Perkin Elmer-2400 Series II CHNS/O Elemental Analyzer was used for Composition measurement.

3.3.3 General Experimental Procedure

3.3.3.1 Synthesis of chalcone A1

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl)ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF

under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and benzaldehyde(0.01 mol) was added drop wise at 0°C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A1.

3.3.3.2 Synthesis of chalcone A2

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl)ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 4-hydroxybenzaldehyde (0.01 mol) was added drop wise at 0°C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A2.

3.3.3.3 Synthesis of chalcone A3

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl)ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 3-hydroxybenzaldehyde (0.01 mol) was added drop wise at 0°C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A3.

3.3.3.4 Synthesis of chalcone A4

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl)ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 2-hydroxybenzaldehyde (0.01 mol) was added drop wise at 0°C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A4.

3.3.3.5 Synthesis of chalcone A5

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 2-methoxybenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A5.

3.3.3.6 Synthesis of chalcone A6

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl)ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol)in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 4-methoxybenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A6.

2.3.3.7 Synthesis of chalcone A7

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl)ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol)in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 2-chlorobenzaldehyde(0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A7.

3.3.3.8 Synthesis of chalcone A8

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl)ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol)in 250 mL RBF under ethanol (40 mL) as the solvent, add 40% sodium hydroxide (40 mL) and 4-chlorobenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents

were poured into ice water and crystallized from ethanol. The chalcone obtained is called A8.

3.3.3.9 Synthesis of chalcone A9

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl)ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 3-chlorobenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A9.

3.3.3.10 Synthesis of chalcone A10

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 2-nitrobenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A10.

3.3.3.11 Synthesis of Chalcone A11

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 4-nitrobenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A11.

3.3.3.12 Synthesis of Chalcone A12

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol)in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 3-nitrobenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of

addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A12.

3.3.3.13 Synthesis of chalcone A13

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl)ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol)in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 3-bromobenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A13.

3.3.3.14 Synthesis of chalcone A14

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol)in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 2-bromobenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A14.

3.3.3.15 Synthesis of chalcone A15

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 4-bromobenzaldehyde (0.01 mol) was added drop wise at 0^{o}C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A15.

3.3.3.16 Synthesis of chalcone A16

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol)in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 3,4-

dimethoxybenzaldehyde (0.01 mol) was added drop wise at 0°C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A16.

3.3.3.17 Synthesis of chalcone A17

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol)in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 3,4,6-trimethoxybenzaldehyde (0.01 mol) was added drop wise at 0°C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A17.

3.3.3.18 Synthesis of chalcone A18

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 2-Furaldehyde (0.01 mol) was added drop wise at 0°C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A18.

3.3.3.19 Synthesis of chalcone A19

To a well stirred solution of 1-(5-hydroxynaphthalen-1-yl) ethan-1-one (0.01 mol) and 1-chloro-5-fluoro-2-methyl-4-nitrobenzene (0.01 mol) in 250 mL RBF under ethanol (40 mL) as the solvent, 40% sodium hydroxide (40 mL) and 2-thienaldehyde (0.01 mol) was added drop wise at 0°C. After the completion of addition, the mixture was stirred for further 1-2 hours and left overnight. The contents were poured into ice water and crystallized from ethanol. The chalcone obtained is called A19.

3.4 SYNTHESIS OF CHALCONES A1-A19.

Table 3.1 Synthesis of ChalconesA1-A19

S. No.	Compounds	R	Reaction Time (h)	% Yield[b]
1	**A1**	-H	1.5	73
2	**A2**	4-OH	2	73
3	**A3**	3-OH	2	69
4	**A4**	2-OH	2	76
5	**A5**	2- OCH_3	2.5	69
6	**A6**	4-OCH_3	2.5	68
7	**A7**	2-Cl	1.5	81
8	**A8**	4-Cl	1.5	81
9	**A9**	3-Cl	1.5	76
10	**A10**	2-NO_2	1.5	84
11	**A11**	4-NO_2	1.5	84
12	**A12**	3-NO_2	1.5	83
13	**A13**	3-Br	1.5	79
14	**A14**	2- Br	1.5	76
15	**A15**	4- Br	1.5	79
16	**A16**	3, 4-$(OCH_3)_2$	2.5	73
17	**A17**	3,4,5-$(OCH_3)_3$	2.5	73
18	**A18**	2-furfuryl[c]	1.5	83
19	**A19**	2-Thineyl[c]	1.5	81

[a]Reaction is monitored by TLC, [b]Isolated yield and [c]Names of aldehyde groups

3.5 RESULTS AND DISCUSSION

Various condensation products of reaction between various aromatic aldehyde and 1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)ethan-1-one are given in Table 3.1. It clearly indicates that the compounds bearing electron withdrawing group are synthesized in shorter reaction time as compared to compounds bearing electron donating group. Compounds A7-A15 bearing electron withdrawing were synthesized in 1.5 h as compared to compounds bearing electron donating group compounds A16 and A17having electron donating group were synthesized in 2.5 h.

3.6 PHYSICAL DATA OF SYTHESIZED DERIVATIVES

Table 3.2 Physical data of compounds A1 to A19

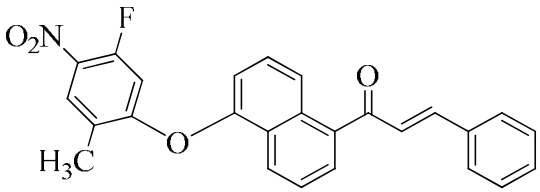
Comp.	R	Molecular Formula	Mol. Wt. (g/m)	% Yield	M.P. °C	% Carbon		% Hydrogen		% Nitrogen	
						Found	Calcd.	Found	Calcd.	Found	Calcd.
A1	-H	$C_{26}H_{18}FNO_4$	427.4	73	237	73.26	73.06	4.20	4.24	3.23	3.28
A2	4-OH	$C_{26}H_{18}FNO_5$	443.4	73	251	70.40	70.42	4.15	4.09	3.10	3.16
A3	3-OH	$C_{26}H_{18}FNO_5$	443.4	69	244	70.38	70.42	4.12	4.09	3.12	3.16
A4	2-OH	$C_{26}H_{18}FNO_5$	443.4	76	255	70.41	70.42	4.10	4.09	3.17	3.16
A5	2- OCH_3	$C_{27}H_{20}FNO_5$	457.4	69	242	70.85	70.89	4.45	4.41	3.10	3.06
A6	4-OCH_3	$C_{27}H_{20}FNO_5$	457.4	68	252	70.83	70.89	4.42	4.41	3.02	3.06
A7	2-Cl	$C_{26}H_{17}FClNO_4$	461.8	81	231	67.65	67.61	3.80	3.71	3.10	3.03
A8	4-Cl	$C_{26}H_{17}FClNO_4$	461.8	81	241	67.68	67.61	3.75	3.71	3.06	3.03
A9	3-Cl	$C_{26}H_{17}FClNO_4$	461.8	76	254	67.66	67.61	3.78	3.71	3.12	3.03
A10	2-NO_2	$C_{26}H_{17}FN_2O_6$	472.4	84	241	66.05	66.10	3.60	3.63	5.85	5.93

A11	4-NO_2	$C_{26}H_{17}FN_2O_6$	472.4	84	255	66.01	66.10	3.66	3.63	5.80	5.93
A12	3-NO_2	$C_{26}H_{17}FN_2O_6$	472.4	83	245	66.15	66.10	3.68	3.63	5.91	5.93
A13	3-Br	$C_{26}H_{17}FBrNO_4$	506.3	79	251	61.60	61.68	3.35	3.38	2.70	2.77
A14	2- Br	$C_{26}H_{17}FBrNO_4$	506.3	76	257	61.61	61.68	3.32	3.38	2.65	2.77
A15	4- Br	$C_{26}H_{17}FBrNO_4$	506.3	79	258	61.62	61.68	3.30	3.38	2.72	2.77
A16	3,4-$(OCH_3)_2$	$C_{28}H_{22}FNO_6$	487.4	73	241	68.90	68.99	4.45	4.55	2.80	2.87
A17	3,4,5-$(OCH_3)_3$	$C_{29}H_{24}FNO_7$	517.5	73	257	67.28	67.31	4.60	4.67	2.65	2.71
A18	2-furfuryl	$C_{24}H_{16}FNO_5$	417.3	83	248	69.10	69.06	3.80	3.86	3.30	3.36
A19	2-Thineyl	$C_{24}H_{16}FSNO_4$	433.4	81	261	66.40	66.50	3.65	3.72	3.20	3.23

3.7 SPECTROSCOPIC CHARACTERIZATION OF COMPOUNDS A1-A19

For characterization, Compound A1 was taken as the model compound from the series and it was characterized by various spectroscopic methods such as ^{1}H NMR, ^{13}C NMR, MASS and IR spectroscopy. Its structure was decided on the basis of ^{1}H NMR, ^{13}C NMR, IR and MASS spectra given in Fig.-3.1 to Fig. 3.4 respectively.

Compound A1



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-phenylprop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.5 ppm in downfield region. Twoα and β CH proton of the vinylic group give doublet at δ 4.5 and 5.5 ppm respectively. All the 13 aromatic protons appeared in aromatic region between δ 6.8 to 8.3 ppm.

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group is at 32.0. Signals due to carbon of methine groupsare found at 60.2 and 62.4 δ ppm. All aromatic carbons give signals at 127.9, 129.4, 130.3, 131.6, 140.2, 143.6, 151.8, 154.6, 155.1 and 160.8 δ ppm. Carbonyl carbon more down field region at 190.1 δ ppm.

IR Spectroscopy (KBr)

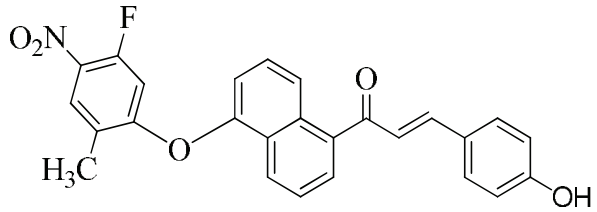
Infrared spectra was recorded in KBr reveals that band at 3120 cm^{-1} indicates the aromatic C-H stretching. Band 2950 cm^{-1} shows aliphatic C-H stretching of the methyl group while band at 1710, 1592 and 1569 cm^{-1} indicate the C=C stretching.

The band at 1480 cm^{-1} indicates the N=O stretching and band at 744 cm^{-1} is for mono- and disubstituted benzene ring C-H bending frequency,.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak was at M+ 427.4 indicating the molecular weight of the compound.

Compound A2



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(4-hydroxyphenyl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Signal due to -OH proton comes in the more downfield region at 9.2 ppm. Three protons of the CH_3 gives singlet at δ 2.5 ppm in downfield region. Two α and β CH proton of the vinylic group give doublet at δ 4.5 and 5.5 ppm, respectively. All 12 aromatic protons appeared in aromatic region between δ 6.8 to 8.3 ppm.

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group comes at 31.2. Signals due to carbon of methine groups are found at 60.2 and 63.4 δ ppm. All aromatic carbons give signal at 128.9, 129.4, 130.3, 132.6, 140.2, 143.6, 151.8, 154.6, 154.1 and 160.8 δ ppm. Carbonyl carbon comes in more down field region at 190.3 δ ppm.

IR Spectroscopy (KBr)

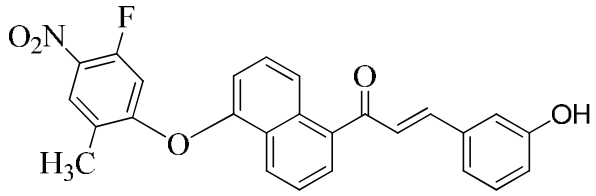
Infrared spectra was recorded using reveals that band at 3356cm^{-1} is due to O-H stretching frequency. A band at 3121 cm^{-1} indicates the aromatic C-H stretching while band at 2952 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at

1710, 1592 and 1569 cm^{-1} indicate the C=C stretching and band at 1480 cm^{-1} indicates the N=O stretching. The band at 744 cm^{-1} is for mono and disubstituted benzene ring C-H bending frequency,.

Mass Spectroscopy

In the mass spectrum of the given compound molecular ion peak was at M+ 443.4 indicating the molecular weight of the compound.

Compound A3



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(3-hydroxyphenyl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Signal due to -OH proton appeared in the more downfield region at 9.1 ppm. Three protons of the CH_3 of the compound gives singlet at δ 2.5 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.5 and 5.5 ppm respectively. All 12aromatic protons appeared in aromatic region between δ 6.8 to 8.3 ppm.

^{13}C NMR Spectroscopy:

100 MHz Apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) wastaken as the solvent. Signal due to carbon of methyl group comes at 31.2. Signal due to carbon of methine groups are found at δ 61.2 and 63.4ppm. All aromatic carbons give signal at δ 124.9, 129.5, 130.3, 132.6, 142.2, 143.6, 151.8, 154.6, 154.2 and 160.4 ppm. Carbonyl carbon comes in more down field region at δ 190.2 ppm.

IR Spectroscopy (KBr)

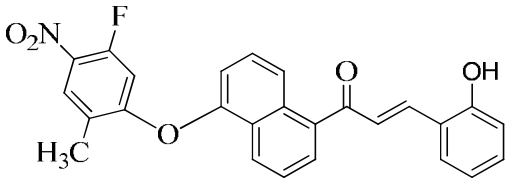
Infrared spectra was recorded in KBr reveals that absorption band at 3356 cm^{-1} is due to O-H stretching frequency. Band at 3122 cm^{-1} indicates the aromatic C-H stretching. Absorption at 2954 cm^{-1} showed aliphatic C-H stretching of the methyl group. Bands at 1710, 1592 and 1568 cm^{-1} are due to the C=C stretching The

absorption at 1480 cm^{-1} indicates the N=O stretching. The band at 744 cm^{-1} may be due to mono and disubstituted benzene ring C-H bending vibrations,.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak was at M+ 443.4 which indicates the molecular weight of the compound.

Compound A4



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(3-hydroxyphenyl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Signal due to -OH proton appear in the more downfield region at 9.0 ppm. Three protons of the CH_3 gives singlet at δ 2.5 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.5 ppm, respectively. All 12aromatic protons appeared in aromatic region between δ 6.8 to 8.3 ppm.

^{13}C NMR Spectroscopy:

100MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group appeared at δ 31.2. Signal due to carbon of methine groups, were found at 60.2 and 62.4 δ ppm. All aromatic carbons give signal at 125.9, 129.4, 130.3, 131.6, 142.3, 143.6, 151.8, 154.6, 158.2 and 160.4 δ ppm. Carbonyl carbon is more down field at δ 191.0 δ ppm.

IR Spectroscopy (KBr)

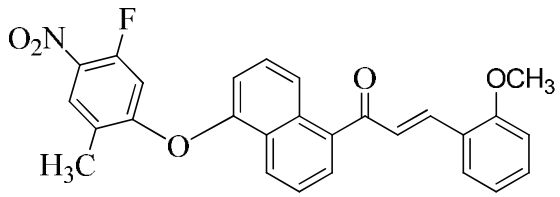
Infrared spectra recorded in KBr reveals that absorption band at 3344cm^{-1} is due to O-H stretching frequency. The band at 3120 cm^{-1} indicates aromatic C-H stretching. Absorption at 2958 cm^{-1} indicates aliphatic C-H stretching of the methyl group. The bands at 1710, 1592 and 1567cm^{-1} indicate the C=C stretching while band at 1480cm^{-1}

indicates the N=O stretching. The band at 745 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the Mass spectrum of the given compound molecular ion peak at M+ 443.4 indicates the molecular weight of the compound.

Compound A5



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(2-methoxyphenyl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.5 ppm in the downfield region. Signal due to -OCH_3 proton appeared in the more downfield region at 3.5 ppm. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.5 ppm, respectively. All 12 aromatic protons appeared in aromatic region between δ 6.8 to 8.3 ppm.

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at 33.2. Signal due to -OCH_3 group was found at 39.8 δ ppm. Signal due to carbon of methine groups were found at 61.2 and 62.4 δ ppm. All aromatic carbons gave signals at 126.9, 128.4, 130.3, 131.6, 142.3, 143.6, 152.7, 154.4, 155.1 and 160.4 δppm. Carbonyl carbon signals was found in more down field region at 191.1 δ ppm.

IR Spectroscopy (KBr)

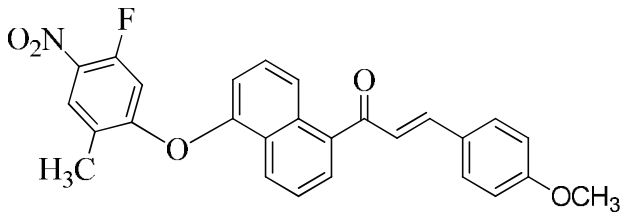
Infrared spectra recorded in KBr reveals that the absorption band at 3122 cm^{-1} indicates the aromatic C-H stretching. The band at 2958 cm^{-1} is due to aliphatic C-H stretching of the methyl group. Absorption at 1708, 1593 and 1568 cm^{-1} indicates the

C=C stretching, while band at 1480cm^{-1} indicates the N=O stretching. The band at 745 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak at M+ 457.4 indicates the molecular weight of the compound.

Compound A6



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(4-methoxyphenyl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.4 ppm in downfield region. Signal due to -OCH_3 proton comes in the more downfield region at 3.5 ppm. Two α and β CH protons of the vinylic group give doublets at δ 4.3 and 5.5 ppm respectively. All 12aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm.

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appearing at δ 33.2 ppm. Signal due to -OCH_3 group was found at δ 38.7 ppm. Signal due to carbon of methine groups were found at δ 61.3 and 62.4 ppm. All aromatic carbons give signals at 126.9, 128.4, 130.3, 131.6, 142.3, 143.6, 152.7, 154.4, 155.1and 161.4 δ ppm. Carbonyl carbon showed signal in more down field region at 191.2 δ ppm.

IR Spectroscopy (KBr)

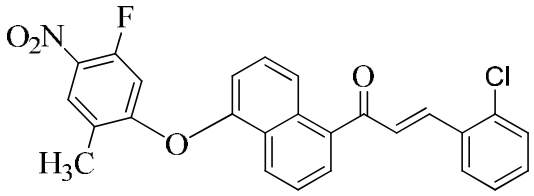
Infrared spectr recorded in KBr reveals that absorption band at 3122 cm^{-1} is due to the aromatic C-H stretching. The band at 2958 cm^{-1}shows aliphatic C-H stretching of the

methyl group. Absorption at 1708, 1593 and 1568 cm^{-1} indicate the C=C stretching and band at 1480 cm^{-1} indicates the N=O stretching. The band at 745 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak at M+ 457.4 indicates the molecular weight of the compound.

Compound A7



(*E*)-3-(2-chlorophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound appear as singlet at δ 2.4 ppm in downfield region. Two α and β CH protons of the vinylic group gave doublets at 4.4 and 5.5 δ ppm respectively. All 12 aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm.

^{13}C NMR Spectroscopy:

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appered at δ 33.2 ppm. Signal due to carbon of methine groups were found at 61.2 and 62.3 δ ppm. All aromatic carbons gave signals at 124.9, 128.4, 131.3, 132.6, 142.3, 143.6, 152.7, 154.4, 156.1and 161.3 δ ppm. Carbonyl carbon was found in more down field region at 191.1 δ ppm.

IR Spectroscopy (KBr)

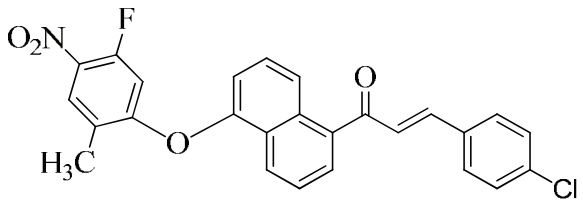
Infrared spectra recorded in KBr reveals that the absorption at 3124 cm^{-1} indicates the aromatic C-H stretching. The band at 2958 cm^{-1}shows aliphatic C-H stretching of the methyl group. The band at 1708, 1594 and 1530 cm^{-1} indicate the C=C stretching and

band at 1480 cm^{-1} indicates the N=O stretching. Absorption at 746 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak at M+ 461.8 indicates the molecular weight of the compound.

Compound A8



(*E*)-3-(4-chlorophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

^{1}H NMR Spectroscopy:

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.5 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.5 ppm respectively. All 12 aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm.

^{13}C NMR Spectroscopy:

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring comes at δ 33.2 ppm. Signals due to carbon of methine groups were found at 61.2 and 62.3 δ ppm. All aromatic carbons give signals at δ 124.9, 128.4, 131.3, 132.6, 142.3, 143.6, 152.7, 154.4, 156.1 and 161.2 ppm. Carbonyl carbon gives signal in more down field region at 191.1 δ ppm.

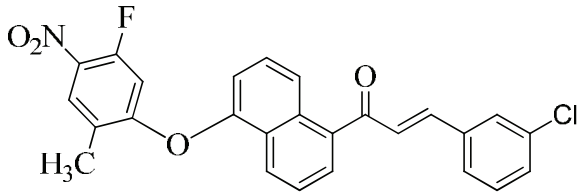
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that absorption at 3124 cm^{-1} can be ascribed to the aromatic C-H stretching. The band at 2958 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1708, 1594 and 1531 cm^{-1} indicates the C=C stretching and band at 1480 cm^{-1} indicates the N=O stretching. Absorption at 740 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations,.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak at M+ 461.8 indicates the molecular weight of the compound.

Compound A9



(*E*)-3-(3-chlorophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

^{1}H NMR Spectroscopy:

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.3 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.4 ppm respectively. All 12 aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm.

^{13}C NMR Spectroscopy:

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at δ 32.2 ppm. Signals due to carbon of methine groups were found at 61.2 and 62.3 δ ppm. All aromatic carbons give signals at 125.9, 128.4, 130.3, 131.6, 142.3, 143.6, 152.7, 154.4, 156.1 and 161.3 δ ppm. Carbonyl carbon shows signal in more down field region at 191.1 δ ppm.

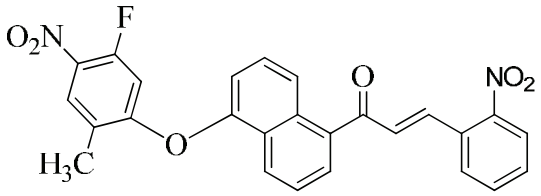
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that absorption band at 3123 cm^{-1} may be due to the aromatic C-H stretching. The band at 2958 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1710, 1594 and 1530 cm^{-1} indicate the C=C stretching and band at 1480 cm^{-1} indicates the N=O stretching. Absorption at 746 cm^{-1} is due to mono and disubstituted benzene ring C-H bending frequency.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak at M+ 461.8 indicates the molecular weight of the compound.

Compound A10



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(2-nitrophenyl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.4 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.4 ppm respectively. All 12 aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm.

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at 32.2 ppm. Signal due to carbon of methine groups were found at δ 61.2 and 62.3 ppm. All aromatic carbons give signals at 125.9, 128.4, 130.3, 131.6, 142.3, 143.6, 152.7, 154.4, 157.1 and 161.3 δ ppm. Carbonyl carbon produced signal in more down field region atδ 191.1 δ ppm.

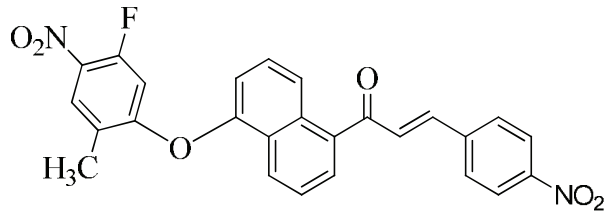
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that absorption at 3123 cm^{-1} indicates the aromatic C-H stretching. The band at 2958 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1711, 1594 and 1530 cm^{-1} indicates the C=C stretching and 1480cm^{-1} indicates the N=O stretching. Absorption at 746 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the mass spectrum of the given compound molecular ion peak appeared at M+ 472.4 indicating the molecular weight of the compound.

Compound A11



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(4-nitrophenyl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.5 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.5 ppm respectively. All 12 aromatic protons appeared in aromatic region between δ 6.6 to 8.4 ppm.

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at 32.2 δ ppm. Signal due to carbon of methine groups were found at δ 61.2 and 63.3 ppm. All aromatic carbons give signals at 126.8, 128.4, 131.3, 131.6, 142.3, 143.6, 152.7, 154.4, 157.1 and 161.3 δ ppm. Carbonyl carbon gives signal in more down field region atδ 191.2 δ ppm.

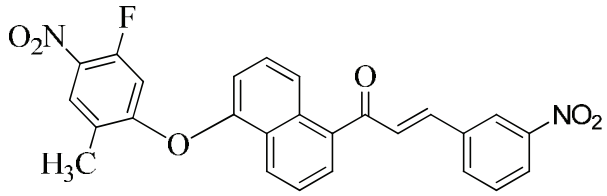
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that absorption at 3123 cm^{-1} indicates aromatic C-H stretching. The band at 2958 cm^{-1}shows aliphatic C-H stretching of the methyl group. Bands at 1711, 1594 and 1530 cm^{-1} indicates the C=C stretching and band at 1480 cm^{-1} indicates the N=O stretching. Absorption at 746cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations,.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak was found at M+ 472.4, which indicates the molecular weight of the compound.

Compound A12



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(3-nitrophenyl)prop-2-en-1-one

^{1}H NMR Spectroscopy:

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.5 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.5 ppm respectively. All 12 aromatic protons appeared in aromatic region between δ 6.6 to 8.4 ppm.

^{13}C NMR Spectroscopy:

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at δ 32.2 ppm. Signals due to carbon of methine groups were found at δ 60.2 and 62.3 ppm. All aromatic carbons give signals at 125.8, 128.4, 131.3, 132.6, 142.3, 143.6, 152.7, 154.4, 157.1 and 162.3 δ ppm. Carbonyl carbon gave signal in more down field region at 192.1 δ ppm.

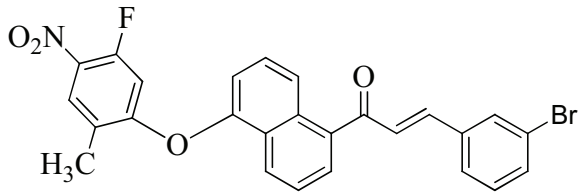
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that absorption at 3123 cm^{-1} indicates the aromatic C-H stretching. The band at 2958 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1711, 1596 and 1530 cm^{-1}indicate the C=C stretching and 1480 cm^{-1} indicates the N=O stretching. Absorption at 740 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the mass spectrum of the given compound molecular ion peak appeared at M+ 472.4 indicating the molecular weight of the compound.

Compound A13



(*E*)-3-(3-bromophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

^{1}H NMR Spectroscopy:

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.4 ppm in downfield region. Two α and β CH proton of the vinylic group give doublets at δ 4.4 and 5.4 ppm respectively. All 12 aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm.

^{13}C NMR Spectroscopy:

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at 32.2 δ ppm . Signals due to carbon of methine groups were found at δ 62.2 and 62.8 ppm. All aromatic carbons give signals at δ 125.9, 128.4, 130.3, 131.6, 142.3, 143.6, 152.7, 154.4, 156.1and 161.3 ppm. Carbonyl carbon gave signal in more down field region at δ 191.1 ppm.

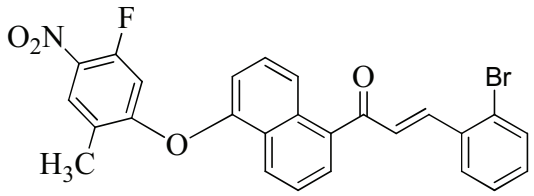
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that absorption band at 3123 cm^{-1} indicates the aromatic C-H stretching. The band at 2958 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1710, 1594 and 1530 cm^{-1} indicate the C=C stretching and 1480 cm^{-1} indicates the N=O stretching. Adsorption at 745 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the Mass spectrum of the given compound, molecular ion peak appeared at M+ 506.3 indicating the molecular weight of the compound.

Compound A14



(*E*)-3-(2-bromophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

^{1}H NMR Spectroscopy:

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.5 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.4 ppm respectively. All 12 aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm

^{13}C NMR Spectroscopy:

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring was found at 32.2 δ ppm . Signals due to carbon of methine groups were found at δ 62.2 and 62.8 ppm. All aromatic carbons give signals at δ 124.9, 128.4, 130.3, 131.6, 142.3, 143.6, 152.7, 154.4, 156.1 and 161.3 ppm. Carbonyl carbon gave signal in more down field region at δ 191.0 ppm.

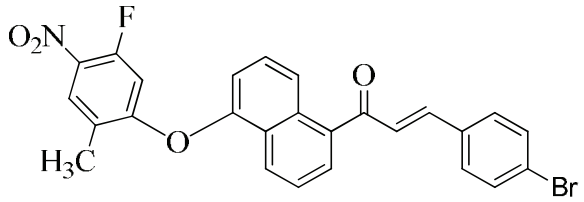
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that absorption band at 3134 cm^{-1} indicates the aromatic C-H stretching. The band at 2958 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1707, 1594 and 1530 cm^{-1} indicate the C=C stretching and 1480 cm^{-1} indicates the N=O stretching. The band at 746 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations,.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak appeared at M+ 506.3 indicating the molecular weight of the compound.

Compound A15



(*E*)-3-(4-bromophenyl)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)prop-2-en-1-one

^{1}H NMR Spectroscopy:

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.5 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.5 ppm respectively. All 12 aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at 32.2 δ ppm . Signals due to carbon of methine groups were found at 62.2 and 62.8 δ ppm. All aromatic carbons give signals at δ 125.9, 128.4, 131.3, 131.6, 142.3, 143.6, 152.7, 154.4, 157.1 and 161.2 ppm. Carbonyl carbon gave signal in more down field region at δ 191.1 ppm.

IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that absorption band at 3124 cm^{-1} indicates the aromatic C-H stretching. The band at 2957 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1704, 1594 and 1531 cm^{-1} indicate the C=C stretching and the band at 1480 cm^{-1} indicates the N=O stretching. The absorption at 740 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations,.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak appeared at M+ 506.3 indicates the molecular weight of the compound.

Compound A16

^{1}H NMR Spectroscopy:

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.4 ppm in downfield region. Signal due to six $–OCH_3$ protons appeared in the more downfield region at δ 3.5 ppm. Two α and β CH protons of the vinylic group give doublets at δ 4.3 and 5.5 ppm, respectively. All 12 aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at δ 33.2 ppm . Signals due to two $–OCH_3$ group was found at 38.7 and 39.2 δ ppm.Signal due to carbon of methine groups were found at 61.1 and 62.3 δ ppm. All aromatic carbons give signals at 126.9, 128.4, 130.3, 131.6, 142.3, 143.6, 152.7, 154.4, 155.2 and 161.3 δ ppm. Carbonyl carbon appeared in more down field region at δ 191.1 ppm.

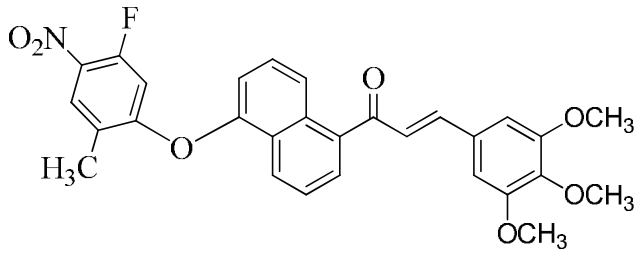
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that the band at 3120 cm^{-1} indicates the aromatic C-H stretching. The band at 2950 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1704, 1594 and 1560 cm^{-1} indicate the C=C stretching and the band at 1480 cm^{-1} indicates the N=O stretching. The absorption at 748 cm^{-1} is indicates C-H bending frequency mono and disubstituted benzene ring,.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak appeared at M+ 506.3 which indicates the molecular weight of the compound.

Compound A17



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(3,4,5-trimethoxyphenyl)prop-2-en-1-one

^{1}H NMR Spectroscopy:

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.4 ppm in downfield region. Signal due to six $–OCH_3$ protons appeared in the more downfield region at δ 3.4 ppm. Two α and β CH protons of the vinylic group give doublets at δ 4.3 and 5.5 ppm, respectively. All 10 aromatic protons appeared in aromatic region between δ 6.7 to 8.4 ppm

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at δ 33.2 ppm . Signals due to three $–OCH_3$ groups was found at 38.7, 39.2 and 40.2 δ ppm. Signal due to carbon of methine groups were found at 61.1 and 62.3 δ ppm. All aromatic carbons give signals at 126.9, 128.4, 130.3, 131.6, 142.3, 143.6, 152.7, 154.4, 155.2 and 161.3 δ ppm. Carbonyl carbon appeared in more down field region at 191.2 δ ppm.

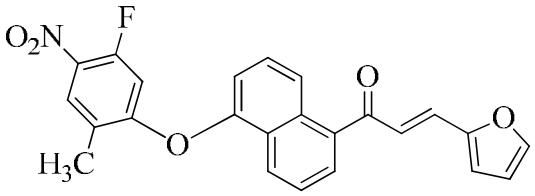
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that the band at 3123 cm^{-1} indicates the aromatic C-H stretching. Absorption at 2950 cm^{-1} shows aliphatic C-H stretching of the methyl group. The bands at 1708, 1595 and 1560 cm^{-1} indicates the C=C stretching and the band at 1480 cm^{-1} indicates the N=O stretching. The absorption at 748 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak appeared at M+ 487.4, which indicates the molecular weight of the compound.

Compound A18



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(furan-2-yl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.5 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.3 and 5.5 ppm, respectively. All 11 aromatic protons appeared in aromatic region between δ 6.5 to 8.4 ppm

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at δ 33.1 ppm . Signal due to carbon of methine groups were found at 60.1 and 62.3 δ ppm. All aromatic carbons give signals at 125.8, 128.4, 130.3, 131.6, 142.3, 143.6, 152.7, 154.4, 155.2 and 160.3 δ ppm. Carbonyl carbon produced signal in more down field region at 191.2 δ ppm.

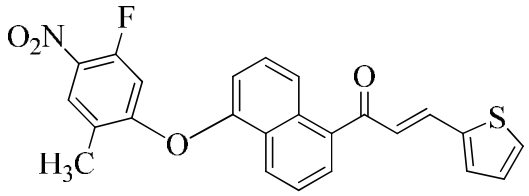
IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that the band at 3124 cm^{-1} indicates the aromatic C-H stretching. Absorption at 2952 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1708, 1595 and 1562 cm^{-1} indicates the C=C stretching and the band at 1480 cm^{-1} indicates the N=O stretching. The absorption at 748 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak appeared at M+ 517.5, which indicates the molecular weight of the compound.

Compound A19



(*E*)-1-(5-(5-fluoro-2-methyl-4-nitrophenoxy)naphthalen-1-yl)-3-(thiophen-2-yl)prop-2-en-1-one

^{1}H NMR Spectroscopy

400 MHz apparatus was used to record ^{1}H NMR spectra. Deuterated chloroform was used as the solvent. Three protons of the CH_3 of the compound gives singlet at δ 2.4 ppm in downfield region. Two α and β CH protons of the vinylic group give doublets at δ 4.4 and 5.5 ppm, respectively. All 11 aromatic protons appeared in aromatic region between δ 6.5 to 8.4 ppm

^{13}C NMR Spectroscopy

100 MHz apparatus was used to record ^{13}C NMR spectra. Deuterated chloroform ($CDCl_3$) was used as the solvent. Signal due to carbon of methyl group attached to aryl ring appeared at δ 33.1 ppm . Signal due to carbon of methine groups were found at 61.1 and 62.3 δ ppm. All aromatic carbons give signals at 125.8, 128.4, 129.3, 131.6, 142.3, 143.6, 152.7, 154.4, 155.2 and 160.3 δ ppm. Carbonyl carbon was found in more down field region at 191.1 δ ppm.

IR Spectroscopy (KBr)

Infrared spectra recorded in KBr reveals that absorption at 3122 cm^{-1} indicates the aromatic C-H stretching. The band at 2952 cm^{-1} shows aliphatic C-H stretching of the methyl group. Bands at 1710, 1595 and 1562 cm^{-1} indicates the C=C stretching and the band at 1480 cm^{-1} indicates the N=O stretching. The band at 750 cm^{-1} is due to mono and disubstituted benzene ring C-H bending vibrations.

Mass Spectroscopy

In the mass spectrum of the given compound, molecular ion peak appeared at M+ 417.3, which indicates the molecular weight of the compound.

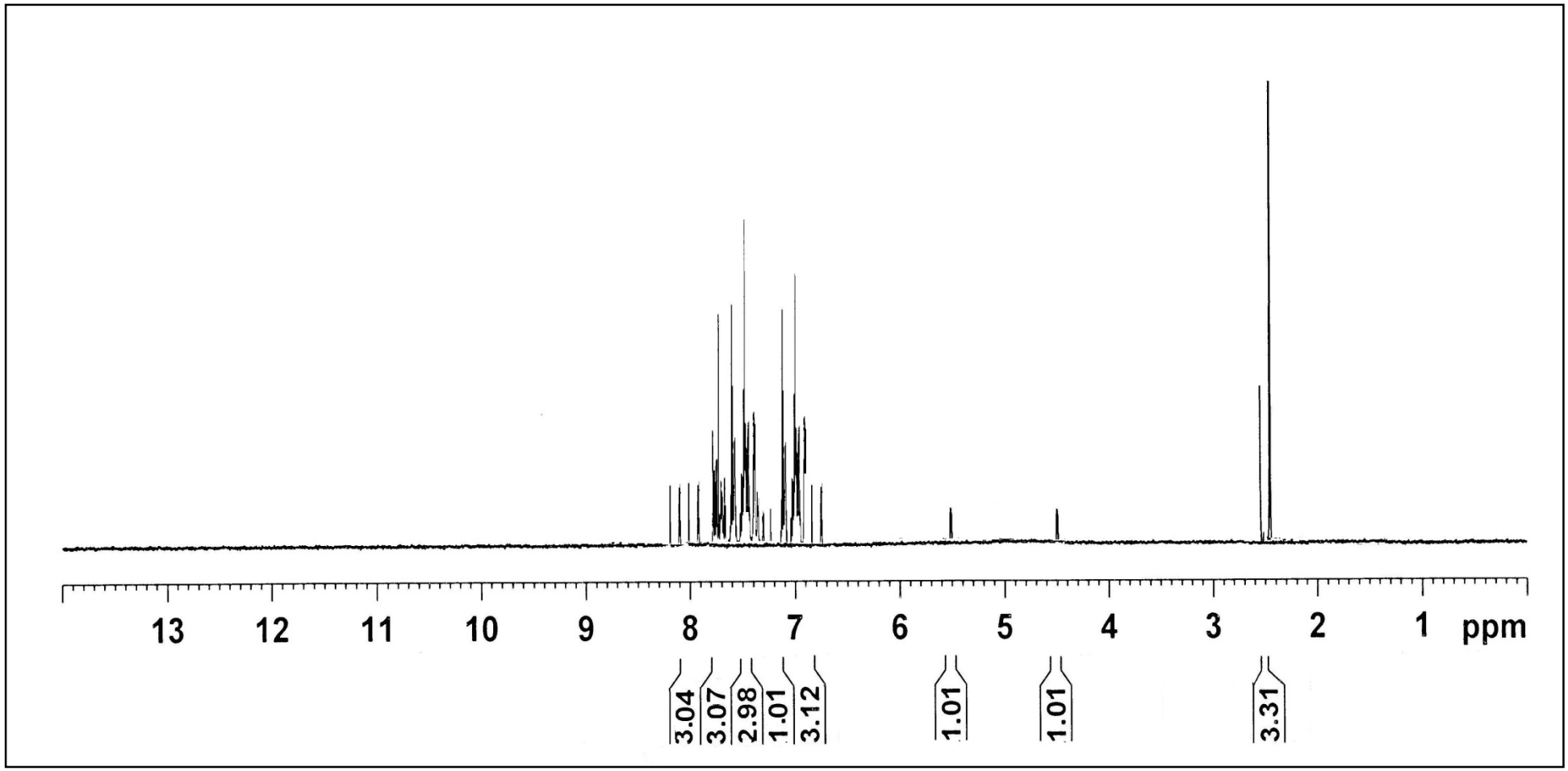


Fig. 3.1: ^{1}H NMR Spectra of Compound A1

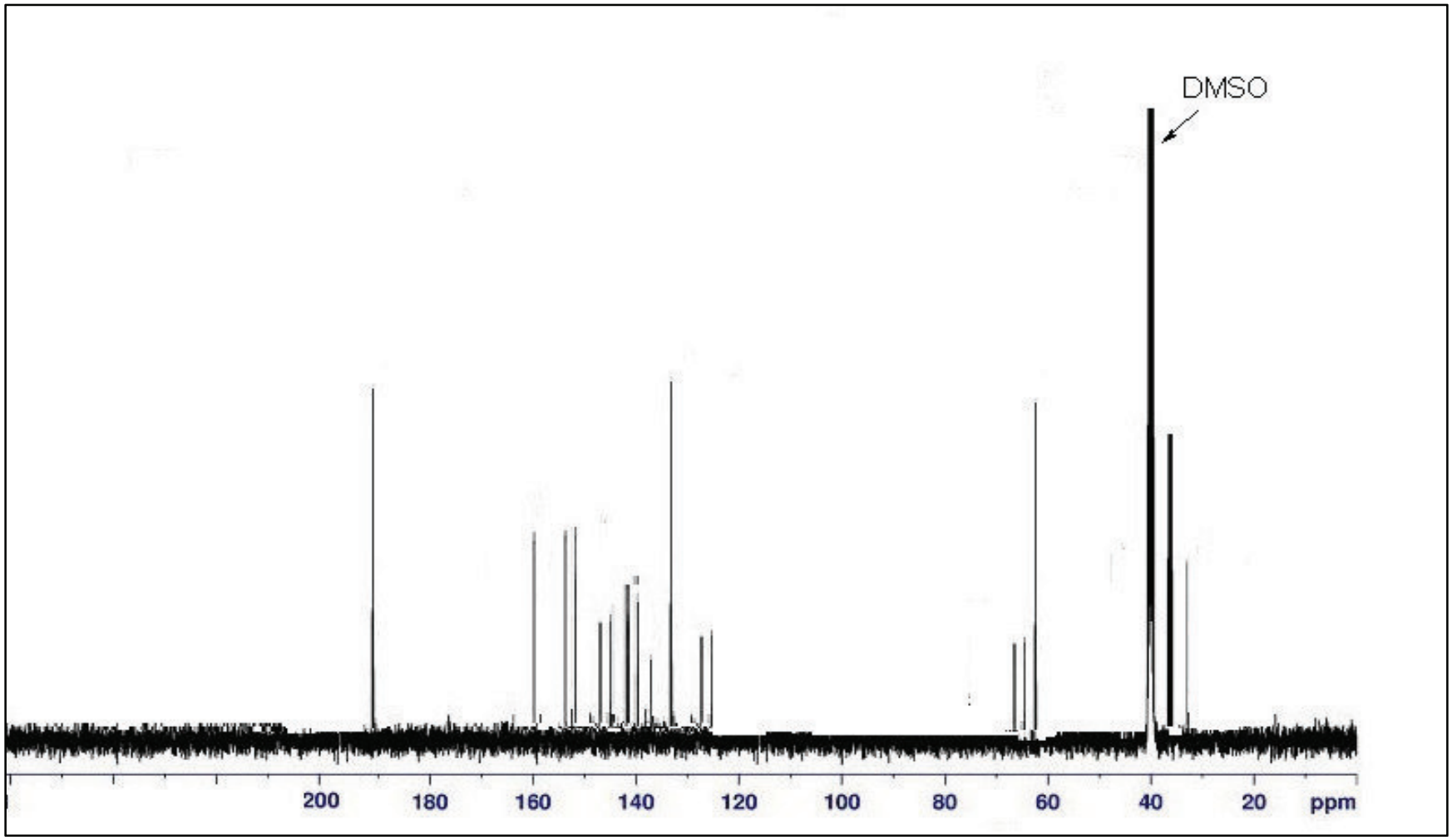


Fig. 3.2: ^{13}C NMR Spectra of Compound A1

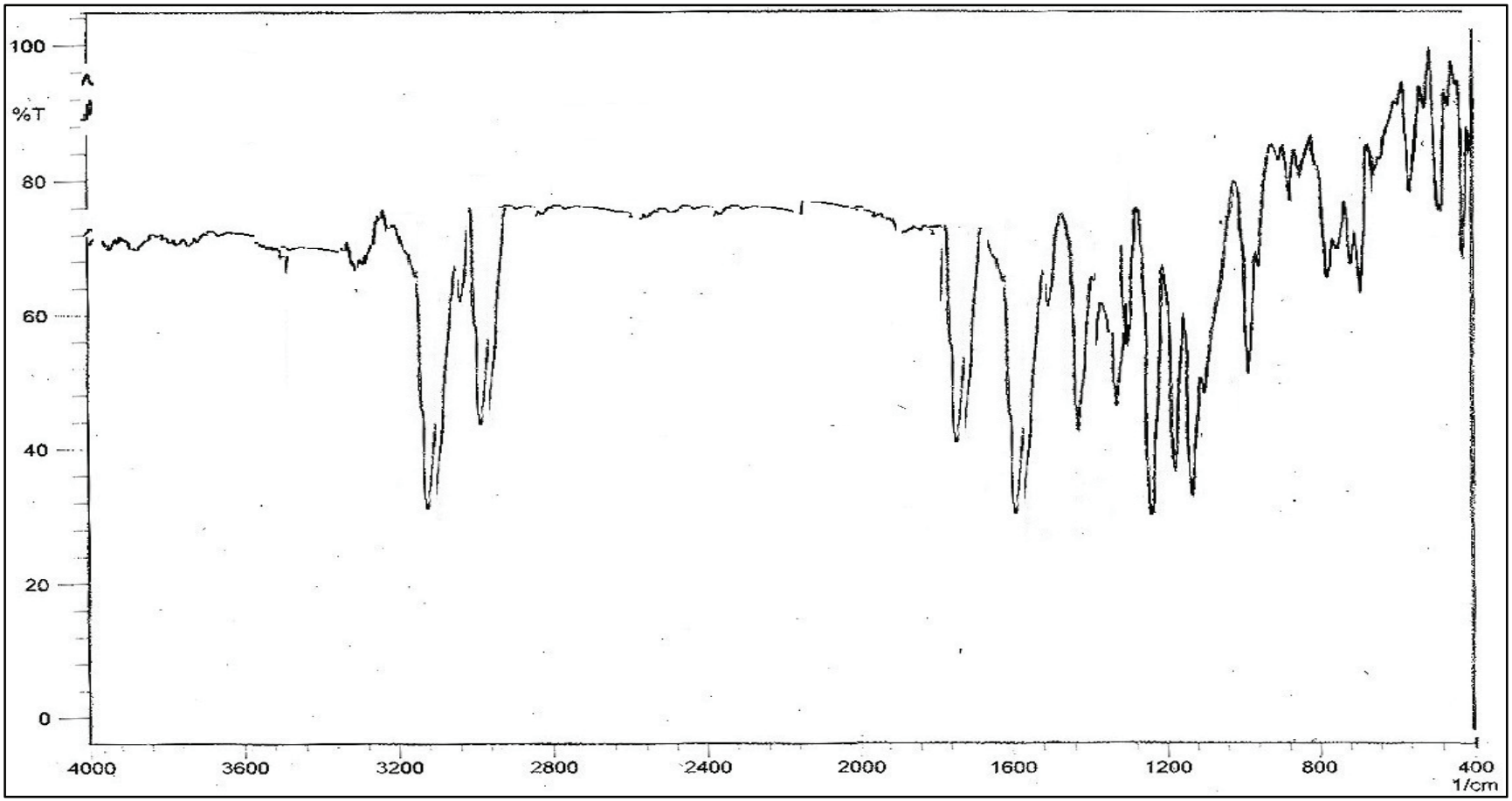


Fig. 3.3: IR Spectra of Compound A1

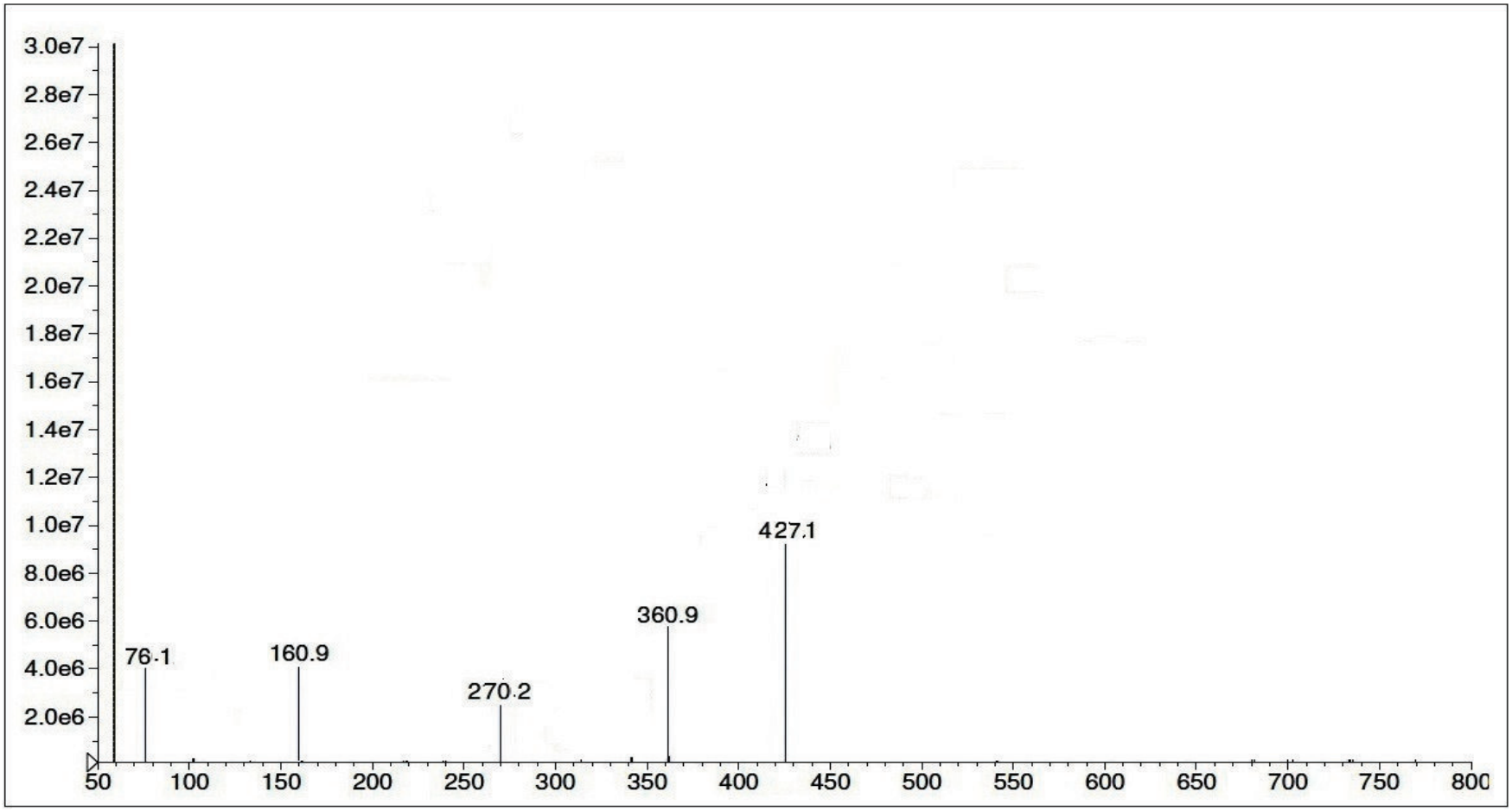


Fig. 3.4: MASS Spectra of Compound A1

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