Synthesis and identification of some new thiazin and oxazin compounds and new derived from chalcones

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Abstract

This research deals with preparing a new hetero cyclic compounds through two parts: The first part of this study includes preparation of new (Chalcone) Compounds through condensation reaction of aryl ketones with aromatic aldehyde .The second part includes synthesis of new hetero cyclic compounds(Oxazin and Thiazin) through cyclization of the prepared compounds in the first part with Urea and Thiourea .

Thin Layer Chromatography was used to follow the chemical reaction and to Characterize the new derivatives by using FT- IR ,C.H. N and H- NMR techniques , the Results proved correctiness of the chemical structures of the prepard derivatives .

الخلاصة

تضمن البحث تحضير مركبات حلقية غير متجانسة جديدة من خلال مرحلتين :

المرحلة الأولى تضمنت تحضير مركبات الجالكون الجديدة عن طريق تكثيف الكيتونات الأريلية مع الألديهايدات الأروماتية أما المرحلة الثانية فقد تضمنت تخليق مركبات حلقية غير متجانسة جديدة من الأوكسازين والثايازين عن طريق الغلق الحلقي لمركبات المرحلة الأولى مع اليوريا والثايوريا .

وقد تم متابعة سير التفاعلات الكيميائية بوساطة تقنية كروماتوغرافيا الطبقة الرقيقة (TLC) أما تشخيص المركبات المحضرة فقد تم بعدة تقنيات منها الأشعة تحت الحمراء FT- IR والرنين النووي المغناطيسي H^1- NMR والتحليل الدقيق للعناصر C . H . N لبعض منها وقد أثبتت هذه النتائج صحة التراكيب الكيميائية المقترحة للمشتقات المحضرة .

Introduction

Chalcones are α,β- unsaturated ketones contain functional group (-CO-CH=CH-) group [1],

obtain There on a cording to condensation aryl ketone with aromatic aldehyde are called Aldol – condensation [2] and Claisen – Schimdt Condensation [3], chalcones(flavonids) are principal unit in most biological active compounds [4], chalcones are highly biological active which have medicinal and pharmaceutical applications[5], Chalcones have been used as intermediate for the preparations of compounds having therapeutic value. Literature review reveals that chalcone derivatives exhibit diverse pharmacological activities[6] such as potential cytotoxic agents[7] ,antimicrobial agents[8],antiviral, antiinflammatory, anesthetics, mydriatics etc. Based on the above observation it is worthwhile to prepare newer compounds for their antimicrobial[9] and anti-inflammatory [10].

Materials

The necessary chemical materials were purchased from Merck and Fluka :ethanol Absolute, methanol, hydrochloric acid,2,4- di chloro benzaldehyde,4- hydroxy aceto phenone,urea ,thiourea,4_ (N,N-di methyl amino benzaldehyde , sodium hydroxide , benzene and iodine

Measurements

Melting points of the synthesized compounds were determined in open capillary tube Electro Thermal melting point,9300- U.K and are uncorrected, IR spectra (υ- cm^{-1}) were recorded by Testseon Shimadzu (FT- IR 8000 Series Japan) using the KBr disc method .

The elemental analysis (C . H . N) were measured by Eurovectro , E A 3000 A ,Italy. Thin Layer Chromatography (T L C) was preformed on silica gel G for TLC and spots Were visualized by iodine vapors. The H^1- NMR spectra were obtained with Bruker , Ultra Shield 300 MHZ , Switzer Land using MeOD as solvent and TMS as an interanal standard.

Synthesis of chalcone compounds

Synthesis of: 3-(2,4-dichloro phenyl)-1-(4-hydroxylphenyl)prop-2-en-1-one

2,4-di chloro benzaldehyde (1.6gm ,0.01M) in 30 ml of ethanol absolute is placed in a round bottom flask, after that 4-hydroxy acetophenone (1.36 gm, 0.01M) was added with 5ml ofsodium hydroxid %10, the mixture was Stirred at room temperature for 5hs. the precipitate obtained was filtered, washed and recrystallized The completion of the reaction was monitored by TLC. to produce compound (A).

Synthesis of : 3-[4-(N,N-di methyl amino)phenyl]-1-(4-hydroxy phenyl)prop-2- en-1-one

4-(N,N-di methyl amino) benzaldehyde (1.4 gm ,0.01M) in 30 ml of ethanol absolute is placed in a round bottom flask, after that 4-hydroxy acetophenone (1.31 gm, 0.01M) was added with 5ml of %10 sodium hydroxide, the mixture was stirred at room temperature for 4hs. the precipitate obtained was filtered, washed and recrystallized The completion of the reaction was monitored by TLC to produce compound(B).

Synthesis of Oxazin derivatives

Synthesis of : 4-[2-amino-6-(2,4-di chloro phenyl)-6H-1,3-Oxazin-4-yl]phenol

compound A (0.3gm,o.oo1M) in 30ml of ethanol absolute is placed in a round

bottom flask ,after that (0.06gm,0.001M) of urea was added with 5ml from %10 sodium hydroxide, the mixture was stirred at room temperature for 3hs , then 20ml of cold water was added , the mixture was stirred for one hour and cooled in an ice- bath for two days . the precipitate obtained was filtered, washed and recrystallized The completion of the reaction was monitored by TLC . to produce compound(A1)

Synthesis of : 4-(2-amino-6-[4-(N,N-di methyl amino)phenyl]-6H-1,3-Oxazin-4- Yl)phenol

compound B(0.5gm,o.oo1M) in 30ml of ethanol absolute is placed in a round bottom flask,after that (0.06gm,0.001M) of urea was added with 5ml of %10 sodium hydroxide, the mixture was stirred at room temperature for 3hs , then 20ml of cold water was added , the mixture was stirred for one hour and cooled in an ice- bath for two days . the precipitate obtained was filtered, washed and recrystallized The completion of the reaction was monitored by TLC. to produce compound.(B_1)

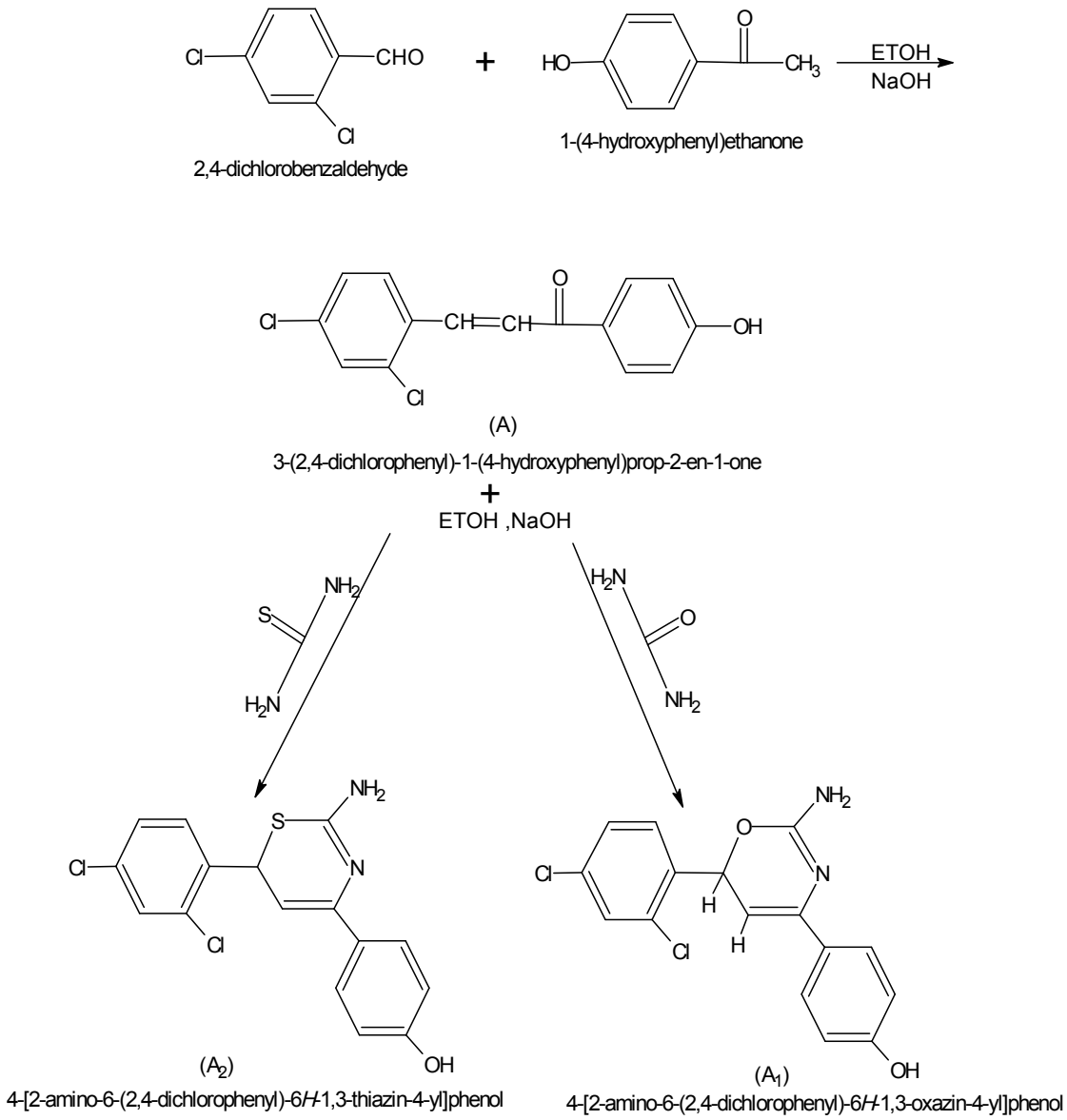
Synthesis of Thiazin derivatives

Synthesis of : 4-[2-amino-6-(2,4-di chloro phenyl)-6H-1,3-Thiazin-4-yl]phenol

compound A (0.2gm,o.oo6M) in 30ml of ethanol absolute is placed in a round bottom flask,after that (0.04gm,0.006M) of thiourea was added with 5ml of %10 sodium hydroxide, the mixture was stirred at room temperature for 3hs , then 20 ml of cold water was added, the mixture was stirred for one hour and cooled in an ice- bath for two days. the precipitate obtained was filtered, washed and recrystallized The completion of the reaction was monitored by TLC . to produce compound (A2)

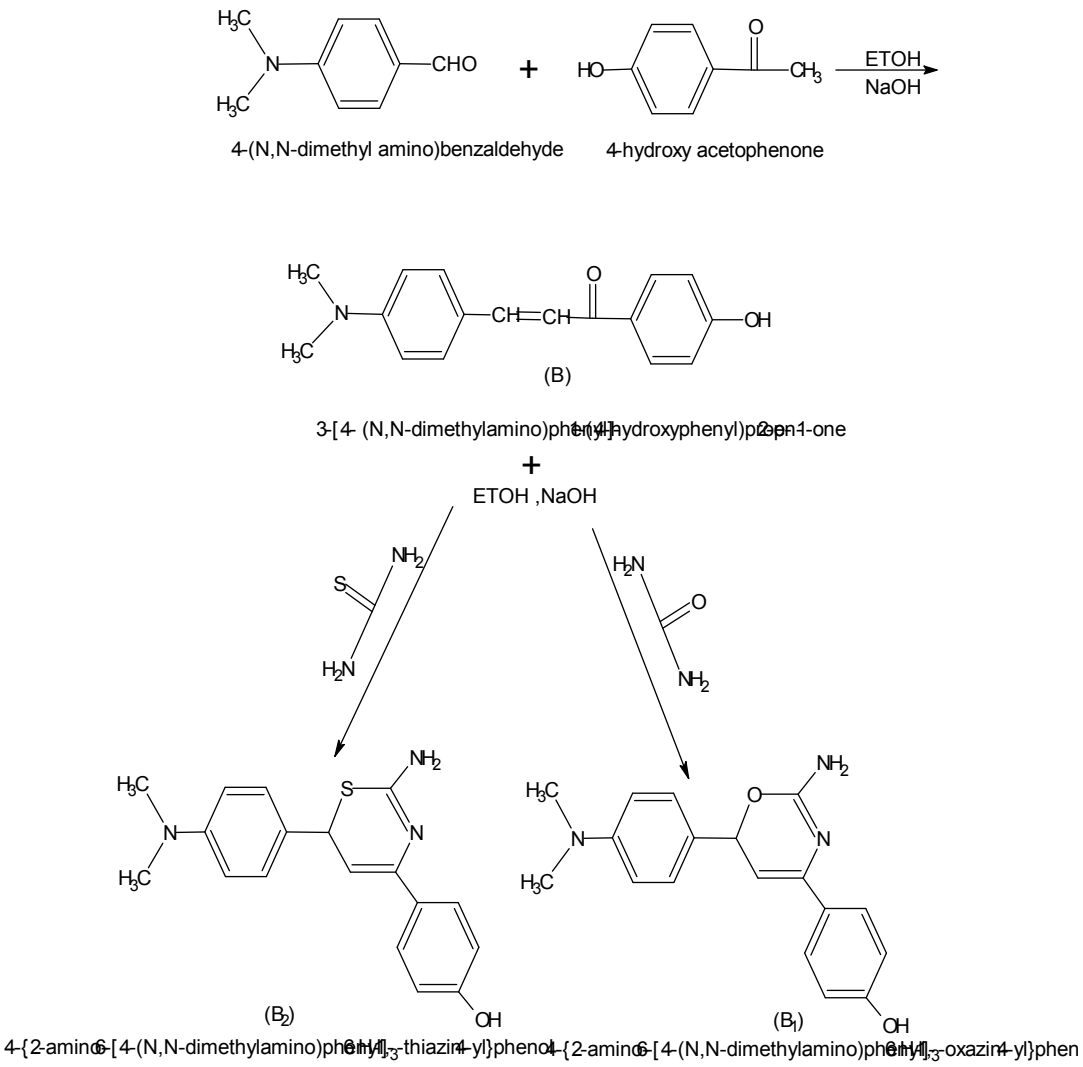
Synthesis of : 4-(2-amino-6-[4-(N,N-di methyl amino)phenyl]-6H-1,3-Thiazin-4-Yl)phenol

compound B (0.2gm,o.oo7M) in 30 ml of ethanol absolute is placed in a round bottom flask ,after that (0.05gm,0.007M) of thiourea was added with 5ml of %10 sodium hydroxide, the mixture was stirred at room temperature for 3hs , then 20 ml of cold water was added , the mixture was stirred for one hour and cooled in an ice- bath for two days. the precipitate obtained was filtered, washed and recrystallized The completion of the reaction was monitored by TLC . to produce compound (B2).



Scheme (1)

Synthetic path way for preparation of A,A_1, A_2 compounds



Scheme (2)

Synthetic path way for preparation of B,B1,B2 compounds

Results and Discussion

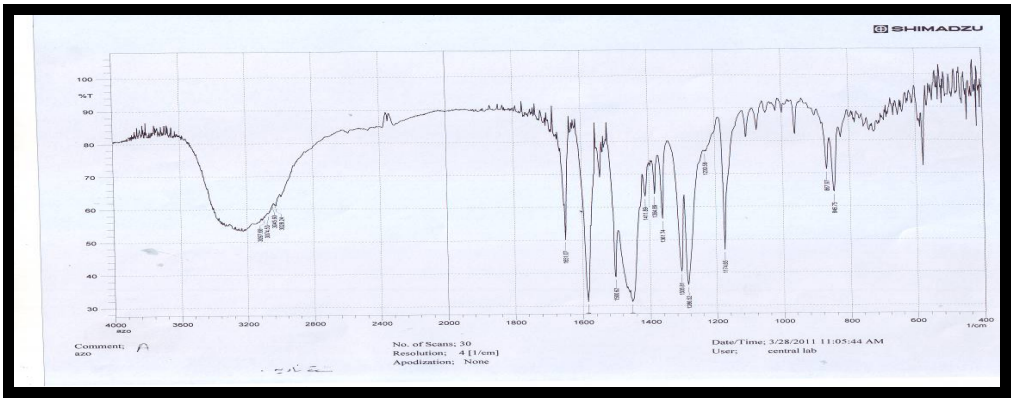
The synthesized compound A: % 58 yield ; m.p: 120 - 122 ˚υ; the FT-IR spectrum (KBr) 0f compound A υ(cm^{-1}) showed bands at : 1651 (C = O, ketone), 1595 (C=C, alkene) , 1500 (C= C, aromatic), 3028 , (C - H,alkene) , 3320 (O- H, phenol) , 846 (C- Cl) ; the elemental analysis calculated (%) for C_{15} $H_{10}O_2Cl_2$: (293) ; C,61.43 ;H,3.41 ; found: C ,61.22 ;H, 3.34.

The synthesized compound B: % 72 yield ; m.p: 77- 79 υ ˚ ; the FT- IR Spectrum of compound B υ (cm^{-1}) : showed bands at :1653 (C=O, ketone) , 1590 (C=C, alkene), 1548 (C=C , aromatic) , 2918 (C- H, alkene) , 3330(O_ H, phenol) ; the elemental analysis calculated (%) for $C_{17}H_{17}O_2N$: (267) ; C, 76.40 ; H, 6. 36 ; N, 5.24 ; found: C, 76. 29 ;H, 6. 14 ; N , 5. 10 ; the H^1- NMR spectrum of compound B : 3.41δ (s,6H,$(CH_3)_2$ 11.57 δ (s,1H,OH) ; 6.5 δ (S,2H,CH=CH) .

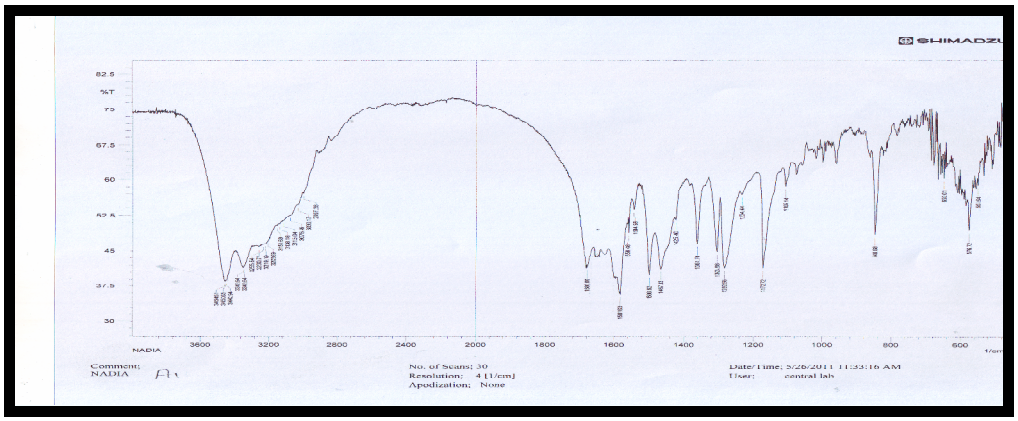
The synthesized compound A_1 : % 68 yield ; m.p : 102- 104 υ ˚ ; the FT- IR Spectrum of compound B υ (cm^{-1}) showed bands at : 1581(C=C, aromatic), 3342 (O- H, phenol),1680 (C=N , endo cyclic), 3450 (- NH_2 group) , 1172 (C – O – C, cyclic), 848 (C- Cl) and disappearance the band of (C=O, ketone) which appeared in 1651cm^{-1} and the band of (C=C, alkene) , which appeared in 1595 cm^{-1} in compound A ; the elemental analysis calculated (%) for C_{16} $H_{11}O_2N_2Cl_2$: (334) ; C, 57.48 ; H, 3.29 ; N, 8.38; found: C, 57.31 ; H, 3. 18 ; N, 8. 21 ; the H^1- NMR spectrum of compound A1: 11.6 δ (S,1H,OH) ; 2.85 δ (S,2H,NH_2) ; 7. 2- 7.8 δ (S,3H,Ar-H); 6.34- 6.37 δ(S,2H, oxazin ring).

The synthesized compound B_1 : % 54 yield ; m.p: 139- 141 υ ˚ ; the FT- IR Spectrum of compound B_1 υ (cm^{-1}) : showed bands at :1600 (C=C , aromatic), 3338(O- H, phenol) , 1660 (C=N, endo cyclic) , 3442 (-NH_2 group) ,1166 (C – O – C , cyclic) and disappearance the band of (C=O, ketone) which appeared in 1653 cm^{-1} and the band of (C=C, alkene) , which appeared in 1590 cm^{-1} in compound B; the elemental analysis calculated (%) for $C_{18}H_{18}O_2N_2$: (294) ; C, 73.46 ; H, 6.12 ; N, 9.52 ; found: C, 73.25 ; H, 6.01; N, 9.41. The synthesized compound A_2 : % 65 yield ; m.p: 125-127 υ ˚ ; the FT- IR Spectrum of compound A_2 υ (cm^{-1}) showed bands at : 1460 (C=C, aromatic), 3278 (O- H, phenol),1610(C=N, endo cyclic), 3383 (_ NH_2 group) , 1168 (C – O – C , cyclic) , 866 (C_ Cl) and disappearance of band of (C=O, ketone) which appeared in 1651 cm^{-1} and the band of (C=C, alkene) , which appeared in 1595 cm^{-1} in compound A spectrum ; the elemental analysis calculated (%) for $C_{16}H_{11}ON_2SCl_2$: (350) ; C,54.85; H, 3.14; N, 7.99 ; S, 9.14 found : C, 54.62 ; H, 3.08 ; N, 7.67 ; S, 9.03.

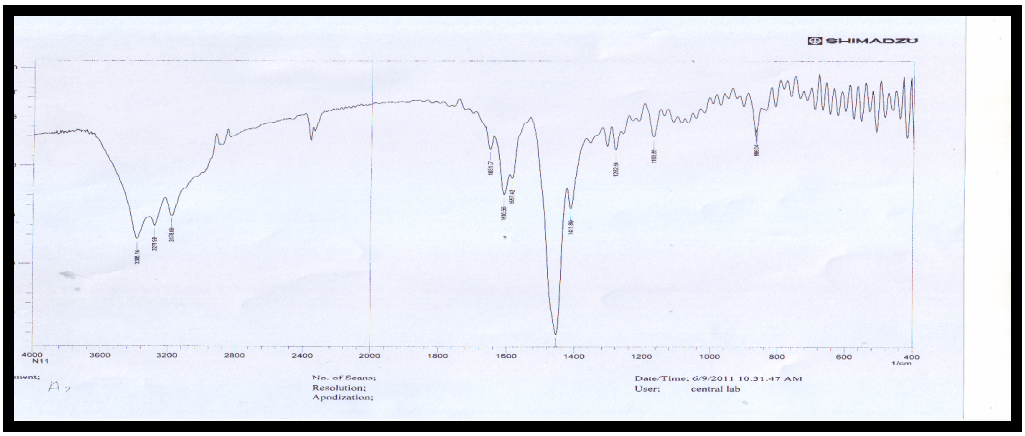
The synthesized compound B_2 : % 80 yield ; m.p: 176- 178 υ ˚ ; the FT- IR Spectrum of compound B_2 υ (cm^{-1}) showed bands at : 1469 (C=C, aromatic), 3276 (O- H, phenol),1604 (C=N, endo cyclic), 3420 (_ NH_2 group), 1165 (C – O – C , cyclic) , and disappearance of the band of (C=O, ketone) which appeared in 1653 cm-1. the band of (C=C, alkene) , which appeared in 1590 cm^{-1} in B compound; the elemental analysis calculated (%) for $C_{18}H_{18}ON_2S$: (310) ; C , 69.67 ; H , 5.80 ; N , 9.03 ; S , 10.32 found : C , 69.51 ; H , 5.55 ; N , 8.89 ; S , 10.14



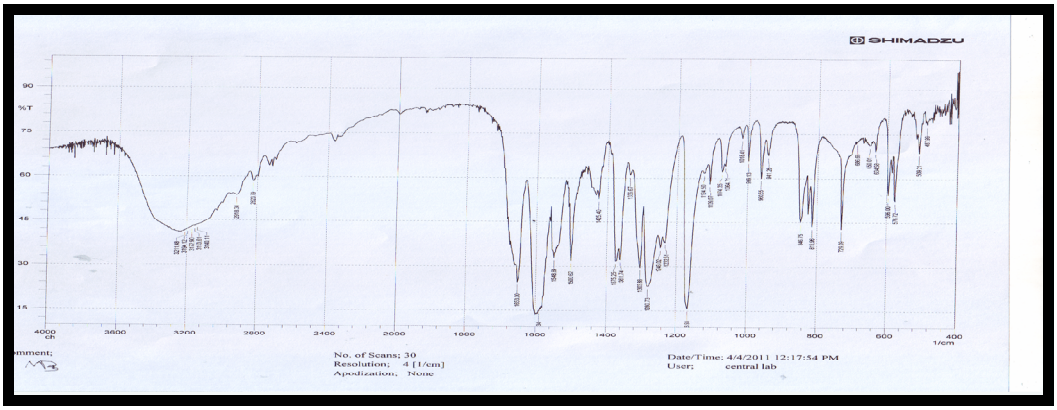
Fig(1): FT-IR Spectra for the compound A



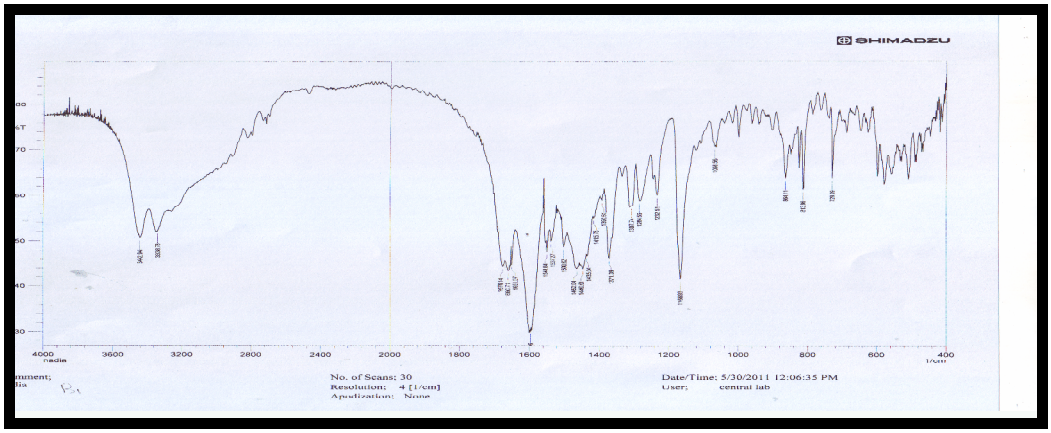
Fig(2): FT-IR Spectra for the compound A_1



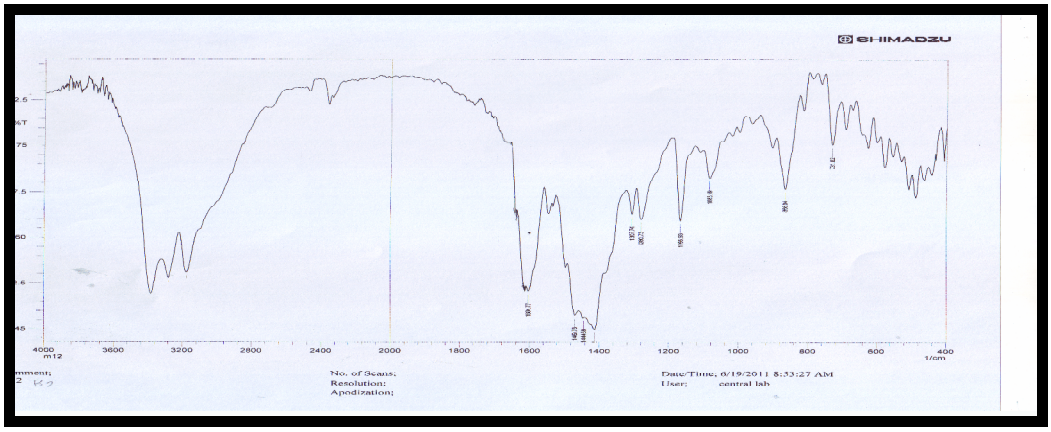
Fig(3): FT-IR Spectra for the compound A2



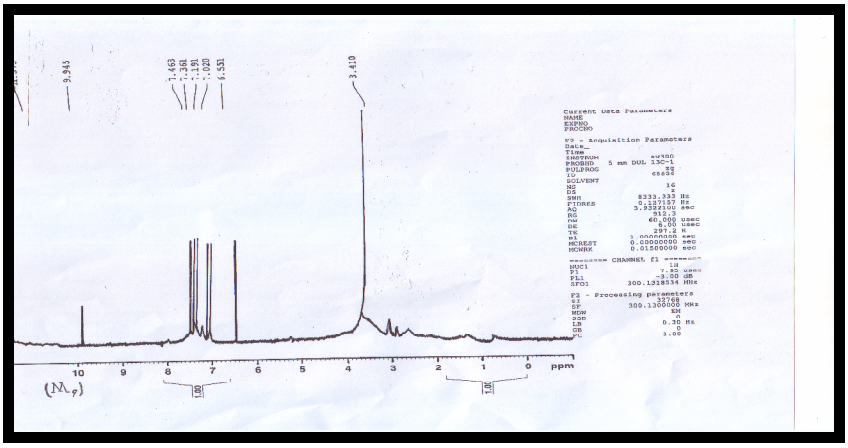
Fig(4): FT-IR Spectra for the compound B



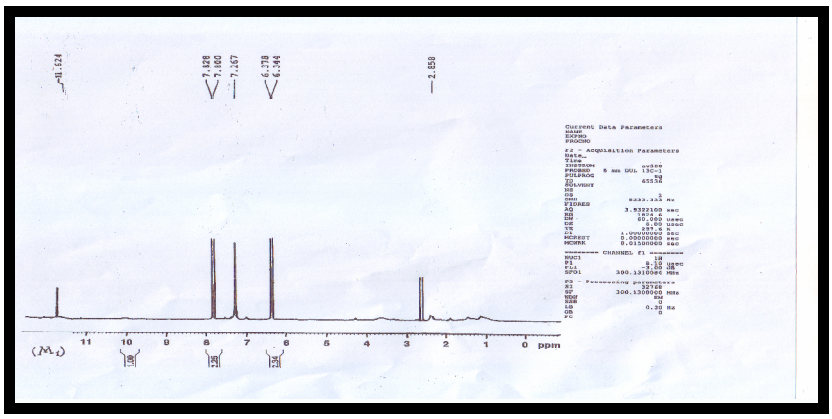
Fig(5): FT-IR Spectra for the compound B1



Fig(6): FT-IR Spectra for the compound B2



Fig(7): H-NMR Spectra for the compound B



Fig(8): H-NMR Spectra for the compound A1

Table (1) : physical and analytical data of compounds

N0.	M.F	M.W gm/ M	Yield %	m.p: υ °	Rf (4:1) Ben : meth	Colour
A	$C_{15}H_{10}O_2Cl_2$	293	58	120- 122	0.81	Yellow
A1	$C_{16}H_{11}O_2N_2Cl_2$	334	68	102- 104	0.63	Orange
A2	$C_{16}H_{11}ON_2SCl_2$	350	65	125- 127	0.56	Brown
B	$C_{17}H_{17}O_2N$	267	72	77- 79	0.67	Brown
B1	$C_{18}H_{18}O_2N_2$	294	54	139- 141	0.84	Brown
B2	$C_{18}H_{18}ON_2S$	310	80	176- 178	0.75	Yellow

Table (2) : the FT- IR spectral data of the prepared compounds (υ cm^{-1})

N0.	Ketone υ C=O	Alkene υ C=C	Aromatic υ C=C	Alkene υ C- H	Phenol O – H	Cyclic υ C=N	Amine - NH_2	υ C-C	Cyclic c-o-c
A	1651	1595	1500	3028	3328	____	___	846	____
A1	___	___	1581	___	3342	1680	3450	848	1172
A2	___	___	1460	___	3278	1610	3383	866	1168
B	1653	1590	1548	2918	3330	____	___	___	___
B1	___	___	1600	___	3338	1660	3442	___	1166
B2	___	___	1469	___	3276	1604	3420	___	1165

Table (3) : Elemental analysis of compounds(A,A1,A2,B,B1,B2)

N_0.	M.F		% C	% H	% N	% S
A	$C_{15}H_{10}O_2Cl_2$	Calcu.	61.43	3.41	____	___
		Found	61.22	3.34	____	____
A_1	$C_{16}H_{11}O_2N_2Cl_2$		57.48	3.29	8.38	___
			57.31	3.18	8.21	___
A_2	$C_{16}H_{11}ON_2SCl_2$		54.85	3.14	7.99	9.14
			54.62	3.08	7.67	9.03
B	$C_{17}H_{17}O_2N$		76.40	6.36	5.24	___
			76.29	6.14	5.10	____
B_1	$C_{18}H_{18}O_2N_2$		73.46	6.12	9.52	____
			73.25	6.01	9.41	____
B_2	$C_{18}H_{18}ON_2S$		69.67	5.80	9.03	10.32
			69.51	5.55	8.89	10.14

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