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Synthesis and Characterization of Some Novel Oxazine, Thiazine and Pyrazol Derivatives

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Abstract:

In this paper, some chalcone derivatives (C1, C2) were synthesized based on the reaction of equal amount of substituted acetophenone and substituted banzaldehyde in basic medium. Oxazine and thiazine derivatives were prepared from the reaction of chalcones (C1-C2) with urea and thiourea respectively in a basic medium. Pyrazole derivatives were prepared based on the reaction of chalcones with hydrazine mono hydrate or phenyl hydrazine in the presence of glacial acetic acid as a catalyst. The new synthesized compounds were identified using various physical techniques like ^{1}H-NMR and FT-IR spectra.

Key words: Chalcone , oxazine , thiazine ,pyrazol.

Introduction:

Chalcone or 1,3-diphenyl-2-propene-1-one is a two aromatic ring which are linked by a three carbon α,β-unsaturated carbonyl group system as [1] (E)-chalcone They are well known intermediates in the synthesis of heterocyclic compounds exhibiting various biological activities as well as natural biocides [2] Chalcone derivatives possess some important biological properties such as antibacterial, antiflammatory, antifungal, insecticidal, and analgesic [3] .Chalcones exist as either E or Z isomers, E isomer is the more stable from Z .Chalcone compounds can be isolated from different natural, source such as fruits, vegetables , spices , tea and soya [4] , it can be synthesis by Claisen Schimidt Condensation Reaction from various aromatic ketones and aldehydes [5] .

Oxazine compounds are important kind of heterocyclic because they have attracted much interest synthetic due to their extensive biological activities like sedative, antipyretic, anticonvulsant, antitumor, antimicrobial, and antimalarial. They have aromatic heterocyclic compounds include one oxygen and one nitrogen atom, depending on the relative position of hetero atom and double bond, oxazine have three isomers [6] .

Thiazine is a heterocyclic compound which has four carbon atoms and one nitrogen and sulfur atom at different position, so thiazine has three isomers 1,2; 1,3;1,4-thiazine [7].

Thiazine derivatives with (N-C-S) linkage have been used as antitubercular ,antibacterial ,antitumor, antimicrobial fungicidal , herbicidal agents , tranquilizers and different dyes [8].

Pyrazol is a heterocyclic compound with five membered ring , two adjacent atoms of nitrogen and three carbon atoms [9] . pyrazol can be prepared by the reaction of hydrazine with α, β-unsaturated aldehydes and subsequent dehydrogenation [10] .

Materials and Methods:

Melting points were determined on Stuart Scientific melting point SMPLU-K and were uncorrected, infrared spectra (FT-IR)were recorded using KBr disk on shimadzuFT-IR-8300 spectrophotometer in Ibn Sina State Company (ISSC) .

^{1}H –NMR spectra were carried out in Al –al Bayt University (Jordan) operation at 300 MHz in (DMSO-d_6)[which has chemical shift at δ=(2.5)ppm] on Fourier transform Varian spectrometer.

Synthesis of chalcones [C1-C2]by Claisen Schimidt Condensation Reaction [11]:

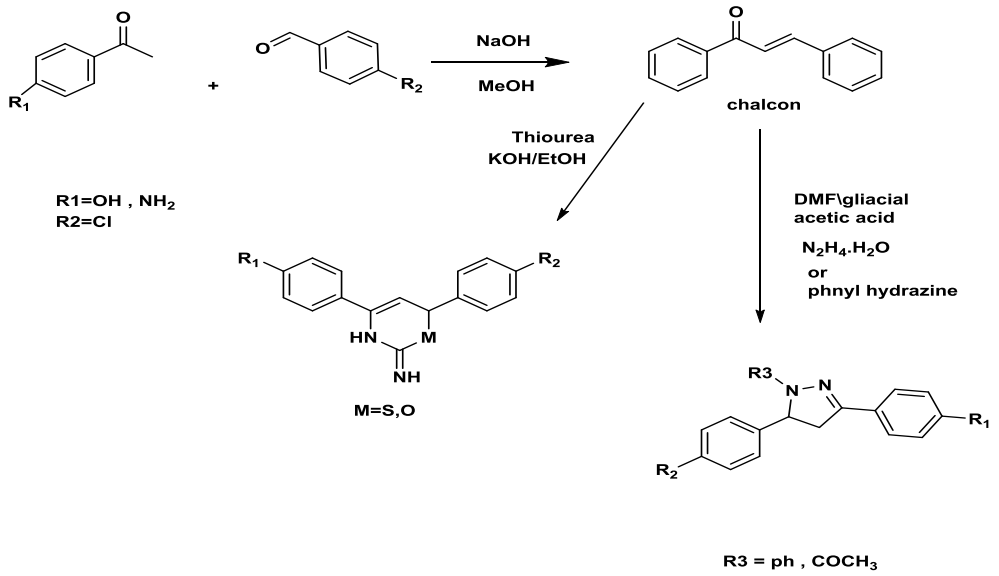
A (200) ml of methanol addition of solution (22) gm. of sodium hydroxide in (250) ml of distal water, the mixture was placed in flask (500 ml) and stirred for 15 minutes in ice path ,(0.01) mole of Para substituted acetophenone and (0.01) mole of Para substituted benzaldehyde were added in room temperature and stirred until the solution was thick . Then the mixture of reaction was kept overnight in an ice chest refrigerator. The solid obtained was filtered and washed with water until PH become **7** , dried and recrystallized from ethanol to get final product. The physical properties of compounds were shown in Table (1).

Synthesis of Thiazine and Oxazine Derivatives [12]:

A mixture of(0.01) mole of chalcones derivatives (C1-C2) and (0.01) mole of urea or thioure respectively in ethanol as a solvent in presence of KOH was taken in round bottom flask. The mixture of reaction was heated under refluxed for 3hrs. cooled and acidified with HCl 1:1 then poured on crushed ice. The solid formed was filtered, dried , and recrystallized from ethanol to get final compounds. The physical properties of compounds was shown in Table (1).

Synthesis of Pyrazole Derivatives [13]:

Equal moles of chalcones (C1-C2) and hydrazine monohydrate or phenyl hydrazine was treated with DMF as a solvent in presence 4dropes of glacial acetic acid as a catalyst .The mixture of reaction was heated under refluxed for (10) hrs. After cooled the solution poured in ice water, filtered , and dried in air then recrystallized from dilute DMF to get final compounds in good yield. The physical properties of compounds are shown in Table (1).

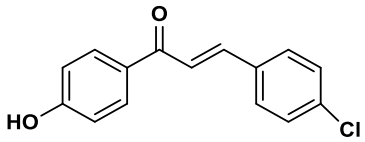
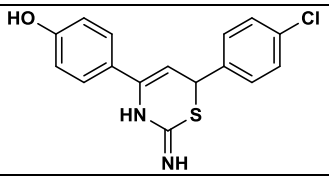
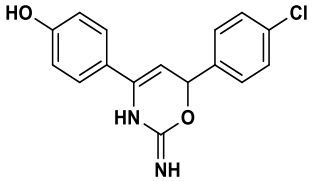
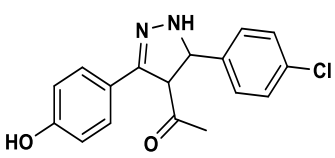


Scheme [1] : Show Syntheis of Chalcones derivatives.

Results and Discussion:

Novel thiazine and oxazine derivatives were prepared using cyclization of chalcone derivatives in the presence of thiourea and urea respectively in basic medium to give product in good yield (scheme 1). Novel pyrazole derivatives were synthesized successively from the cyclization reaction of chalcones derivatives with hydrazine mono hydrate(80%) or phenyl hydrazine in presence glacial acetic acid as a catalyst to get product with good yield.

Table (1) physical properties of synthesized compounds.

No. of comp.	Nomenclature and Chemical formula	Structure formula	Yield %	color	M.P℃
1[C1]	(E)-3-(4-chlorophenyl)-1-(4-hydroxyphenyl)prop-2-en-1-one. ***$C_{15}H_{11}ClO_2$***		**30**	yellow	156-158
2	4-(6-(4-chlorophenyl)-2-imino-3,6-dihydro-2H-1,3thiazin-4-yl)phenol ***$C_{16}H_{17}ClN_2OS$***		**40**	Light yellow	220-222
3	4-(6-(4-chlorophenyl)-2-imino-3,6-dihydro-2H-1,3-oxazin-4-yl)phenol ***$C_{16}H_{13}ClN_2O_2$***		**94.7**	orang	228-230
4	1-(5-(4-chlorophenyl)-3-(4-hydroxyphenyl)-4,5-dihydro-1H-pyrazol-1-yl)ethan-1-one ***$C_{17}H_{15}ClN_2O_2$***		**70**	Light yellow	196-198

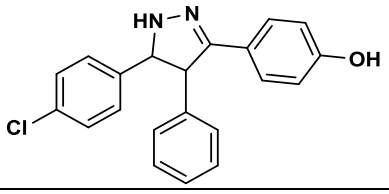
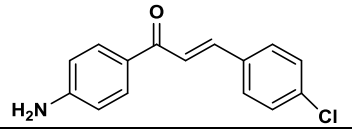
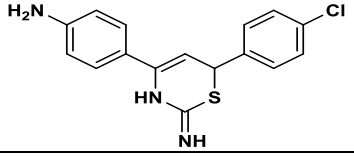
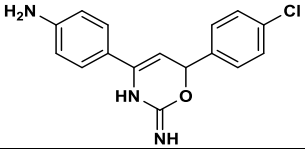
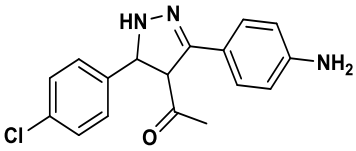
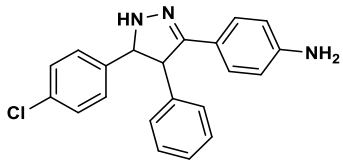
5	4-(5-(4-chlorophenyl)-1-phenyl-4,5-dihydro-1H-pyrazol-3-yl)phenol ***$C_{21}H_{17}ClN_2O$***		**73.81**	yellow	207-209
6 [C2]	(E)-1-(4-aminophenyl)-3-(4-chlorophenyl)prop-2-en-1-one. ***$C_{15}H_{12}ClNO$***		**67.50**	orang	164-166
7	4-(6-(4-chlorophenyl)-2-imino-3,6-dihydro-2H-1,3-thiazin-4-yl)aniline ***$C_{16}H_{14}ClN_3S$***		**81.14**	orang	225-227
8	4-(6-(4-chlorophenyl)-2-imino-3,6-dihydro-2H-1,3-oxazin-4-yl)aniline ***$C_{16}H_{14}ClN_3O$***		**91.17**	orang	220-222
9	1-(3-(4-aminophenyl)-5-(4-chlorophenyl)-4,5-dihydro-1H-pyrazol-1-yl)ethan-1-one ***$C_{17}H_{16}ClN_3O$***		**89.22**	orang	188-190
10	4-(5-(4-chlorophenyl)-1-phenyl-4,5-dihydro-1H-pyrazol-3-yl)aniline ***$C_{21}H_{18}ClN_3$***		**30**	yellow	200-201

Table (1) : FT-IR Spectra data of synthesized compounds.

No. of compounds	IR data(cm^{-1})
1 [C1]	3429(O-H) , 1651(C=O) ,1589,1489(C=C arm.) , 1091(C-Cl).
2	3417(O-H),1681(C=N), 1593,1489 1408(C=C arm.), 1091(C-N), 825(C-Cl).
3	3650(O-H) , 3417(N-H) , 3271(N-H) , 1678(C=N) , 1597 , 1489 (C=C arm.) , 825 (C-Cl).
4	3433(O-H) , 1666(C=N) , 1647(C=O) , 1589 , 1489 (C=C arm.), 1087(C-N) , 821(C-Cl).
5	3433(O-H),1651(C=N)1597,1492,1438(C=C arm.),1091(C-N),829(C-Cl).
6 [C2]	3460,3340(NH_2), 1674 (C=O) , 1600,1573 1489(C=C arm.) , 1087(C-Cl).
7	3340 ,3205(NH_2) , 3059(NH) , 1620(C=N), 1597,1489,1442 (C=C arm) , 817(C-Cl).
8	3460,3340(NH_2),3217 (N-H),1647(C=N)1604,1570,1489(C=C arm.),813(C-Cl).
9	3460, 3340 (NH_2) , 1647(C=N) , 1627(C=O) , 1573 , 1489(C=C arm.), 1087(C-N) , 813(C-Cl).
10	3460 3340(NH_2),3217(NH),1627(C=N),1573,1546,1489(C=C arm.),813(C-Cl).

Table(2): Chemical Shifts ^{1}H.NMR Spectra

No.of comp.	^{1}H-NMR (DMSO-d6) δppm
1	7.84(m,8H,aromatic ring),7.3-7.5(d×d,2H,CH=CH)
6	6.2(s,2H,NH_2) , 6.6-7.5 (d×d,2H,CH=CH) , 7.89(m,8H ,aromatic ring)

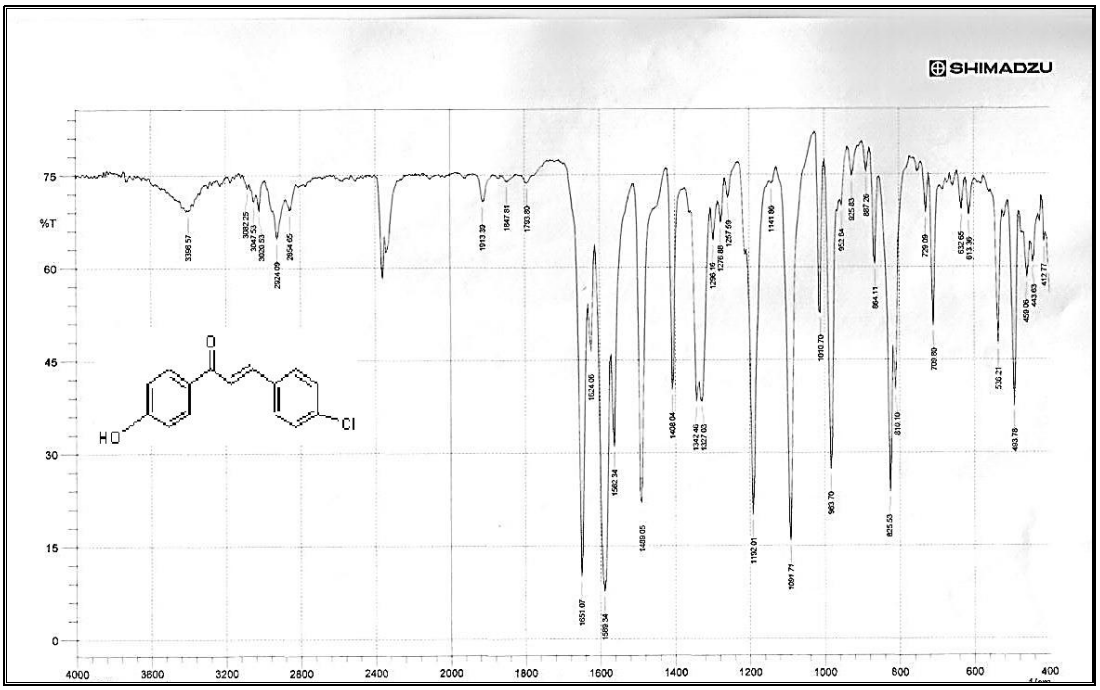


Fig. (1): FT-IR spectrum of compound (1)

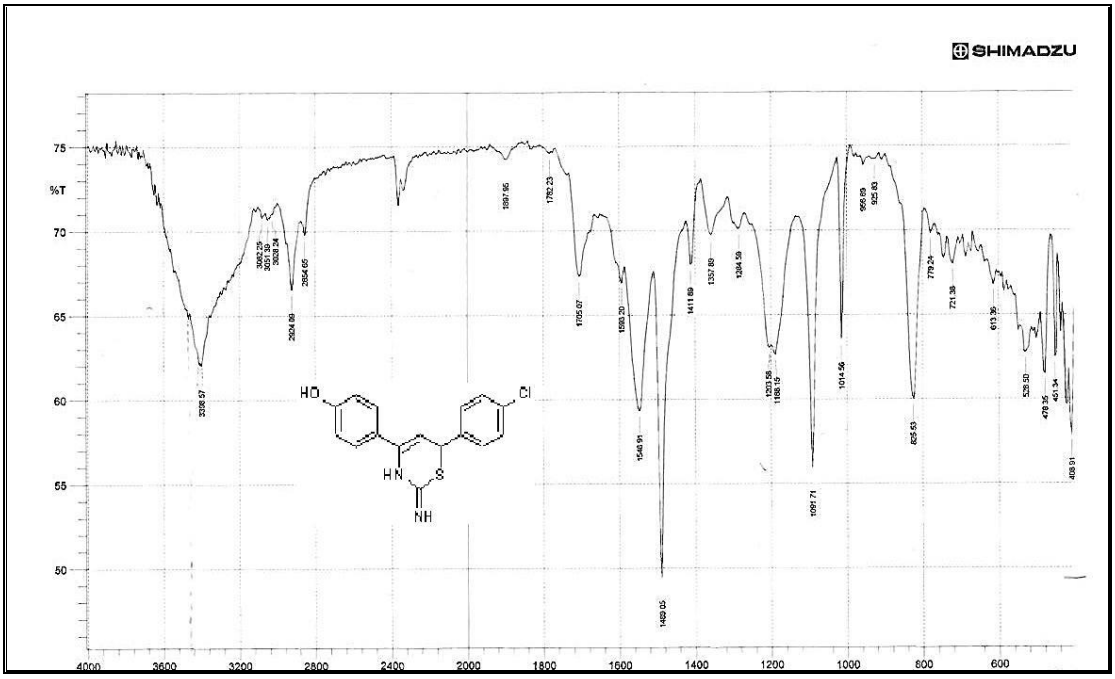


Fig. (2) : FT-IR spectrum of compound (2)

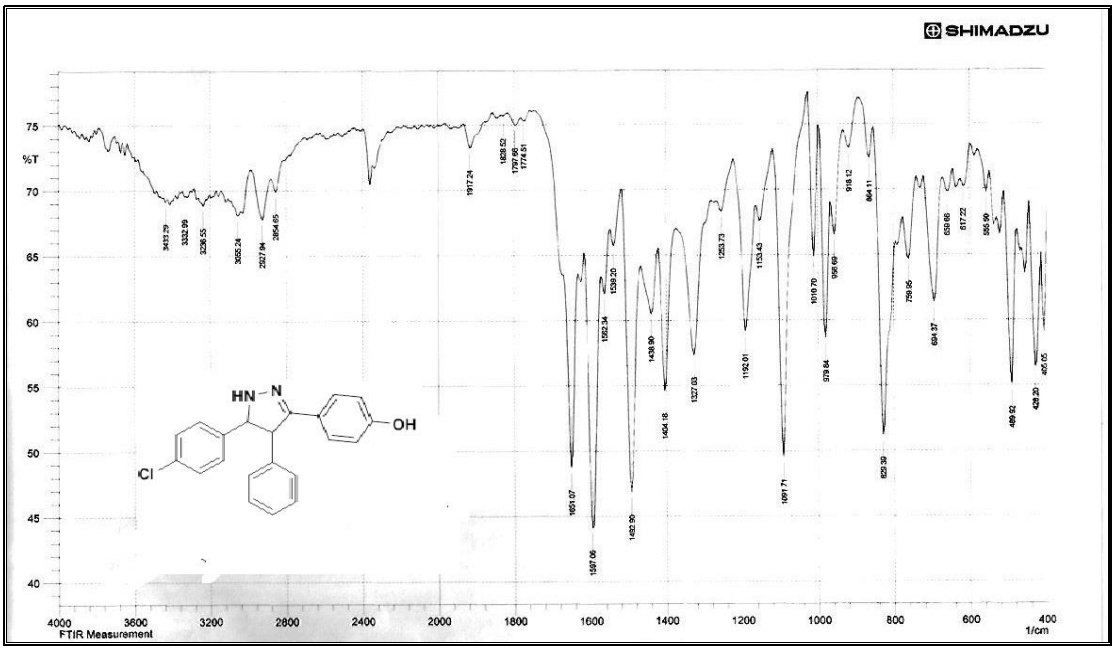


Fig. (3) : FT-IR spectrum of compound (5).

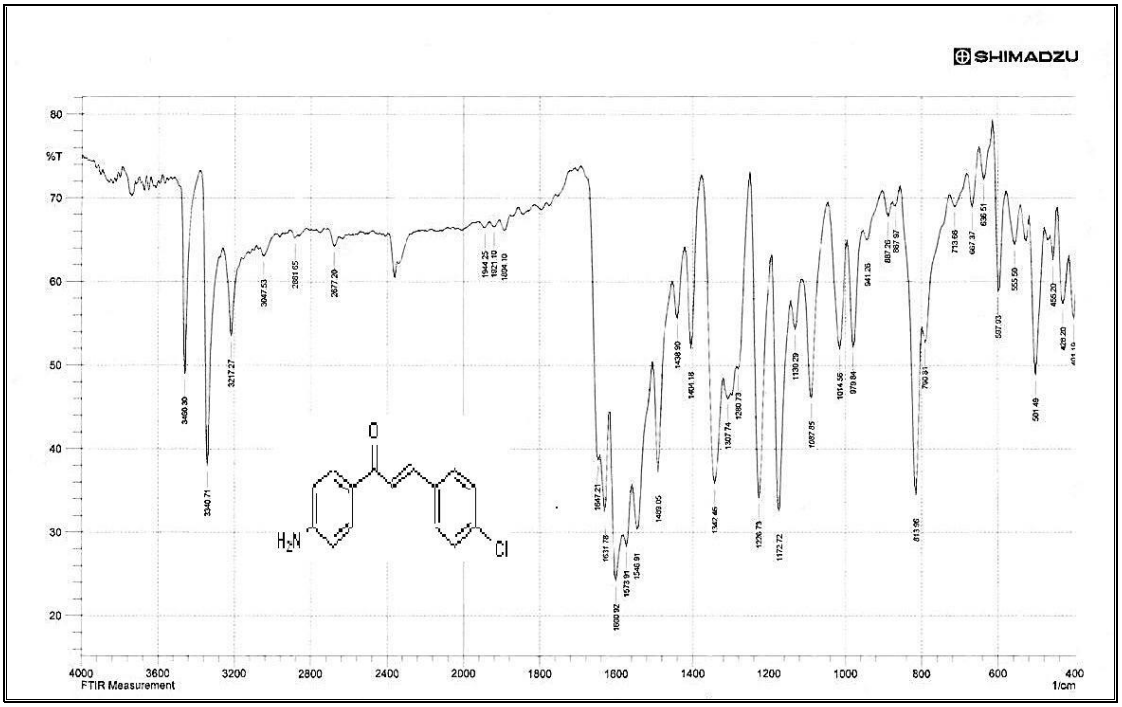


Fig. (4): FT-IR spectrum of compound (6)

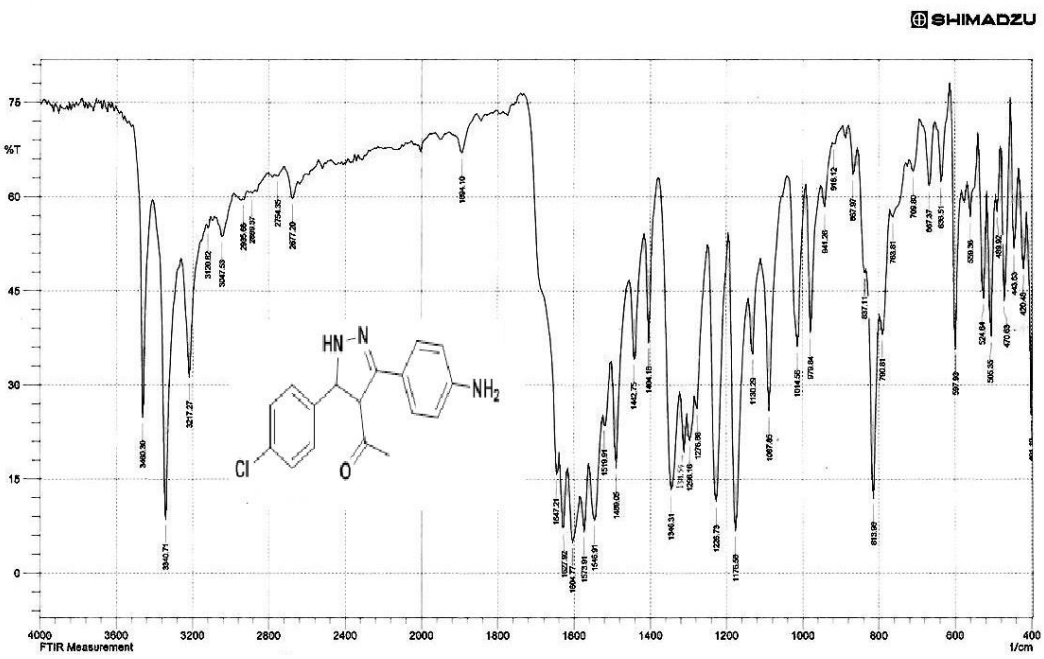


Fig. (5): FT-IR spectrum of compound (9)

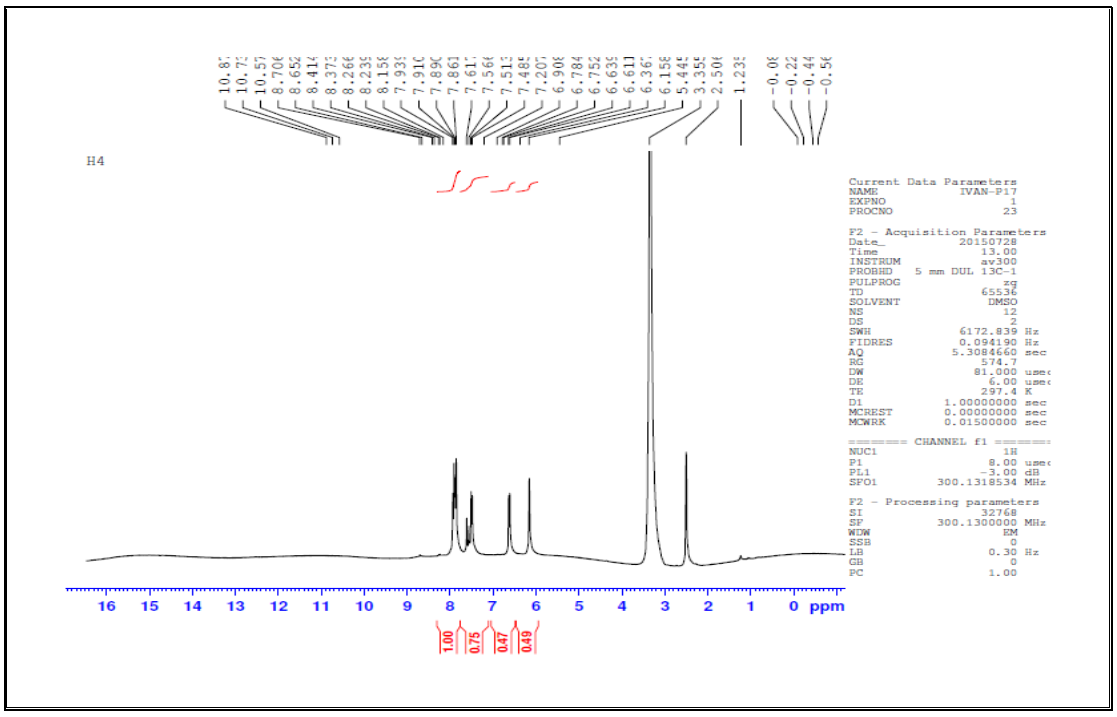


Fig.(6): ^{1}H-NMR spectrum of compound (6)

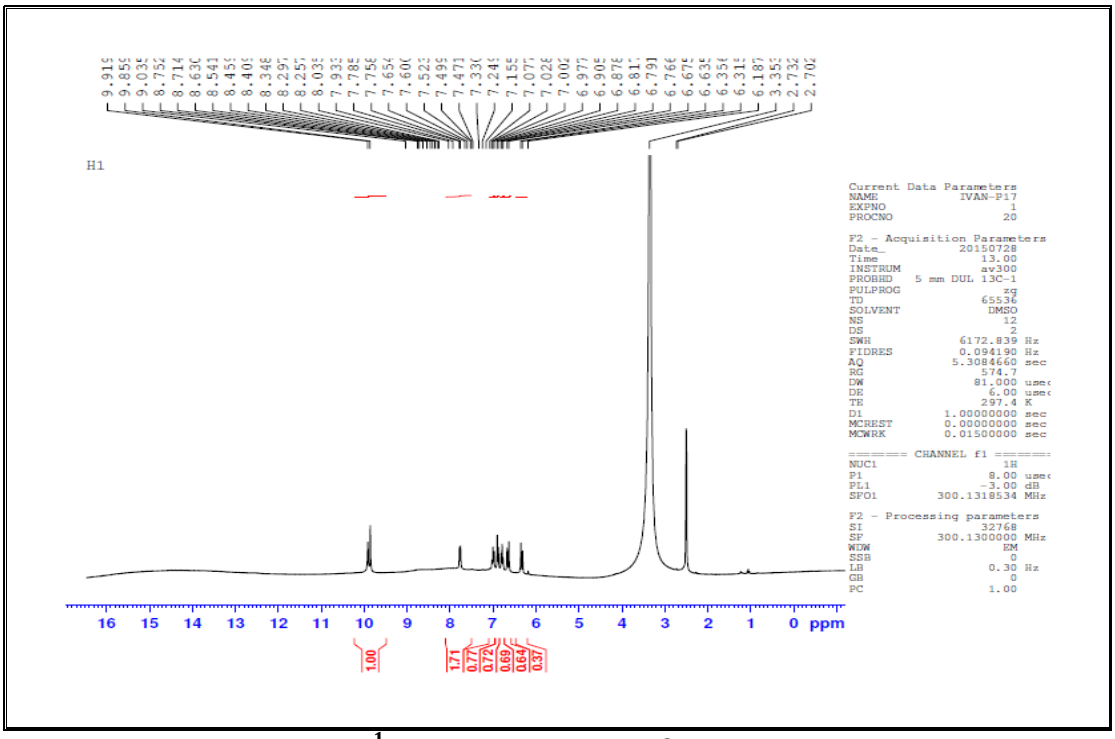


Fig. (7) : ^{1}H-NMR-spectrum of compound(1)

Conclusion:

Novel Oxazine and Thiazine derivatives were preparation by cyclization of substituted chalcones derivatives in the presence of urea or thiourea using potassium hydroxide as a catalyst well synthesized pyrazols were successively prepared by the cyclization of substituted chalcone using phenyl hydrazine or hydrazine monohydrate in presence of glacial acetic acid as a catalyst, Scheme (1) .

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تحضير وتشخيص بعض مشتقات الثايازين، الاوكسازين و البايرازول الجديدة

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الخلاصة:

تم في هذا البحث تحضير نوعان من الكالكونات باعتماد تكاثف(كلايسن شمددت) و ذالك بمفاعلة مولات متساوية من الالديهايدات والكيتونات المعوضة في الموقع بارا في وسط قاعدي حيث تعتبر الكالكونات مركبات وسطية تدخل في تفاعلات الغلق الحلقي لتحضير العديد من المركبات العضوية غير متجانسة الحلقات والتي تمتلك فعالية بايولوجية التي تستخدم في الصناعات الدوائية، مثل مشتقات الاوكسازين و الثايازين التي تم تحضيرها من خلال مفاعلة الكالكونات مع اليوريا او الثايويوريا في وسط قاعدي وكذلك مشتقات البايرازول التي تم تحضيرها من مفاعلة الهيدرازين او الفنيل هيدرازين باستخدام حامض الخليك الثلجي كعامل مساعد.

الكلمات المفتاحية:الجالكونات ،الثايازين ،الاوكسازين ، البايرازول.