Synthesis and Study of Many New Chalcone Derivatives

Natiq G. Ahmad Murtatha H. Ali
Chemistry Department, College of Education, University of Mosul
Mosul – Iraq

Received **Accepted**
09/09/2013 **06/11/2013**

تحضير ودراسة عدد من مشتقات الجالكون الجديدة

الخلاصة

تضمنت الدراسة تحضير المركب ١-(H١-بينزو[d]ايميدازول-٢-يل) ايثانول [1] من مفاعلة اورثو فنيلين ثنائي أمين مع حامض اللاكتيك[١] ومن ثم أكسدته بواسطة ثنائي كرومات البوتاسيوم إلى ١-(H١-بينزو[d]ايميدازول-٢-يل) ايثانون [٢]، وعند مفاعلة مع مختلف البنزاليهيدات المعوضة أو ١-(H١-بينزو[d]ايميدازول-٢-يل) ايثانون نحصل على مركبات الكاربونيل الفا،بيتا-غير المشبعة (الجالكونات) [3-11].

واستعملت هذه الجالكونات في تحضير عدد من المركبات الحلقيه غير المتجانسه وذلك بتفاعلها مع بيروكسيد الهيدروجين لتحضير مركبات الأوكسيران(ثلاثية الحلقه) [١٢-٢٠]، الهيدروكسيل أمين لتحضير مركبات الأيزوأوكسازولين (خماسية الحلقة) [21-29] ، ٣-نيتروبنزوهيدرازيد لتحضير مركبات البايرازولين (خماسية الحلقة) [30-38]،الثايوسميكاربازيد لتحضير مركبات البايرازولين(خماسية الحلقة) [39-47]، السميكاربازيد لتحضير مركبات البايرازولين (خماسية الحلقة) [48-56]، نترات الكواندين لتحضير مركبات البريميدينات (سداسية الحلقة).[57-65] اورثوفنيلين ثنائي الأمين لتحضير مركبات البنزودايازبين(سباعية الحلقة) [66-74]، اورثو أمينو فينول لتحضير مركبات البنزواوكسازبين(سباعية الحلقة)[75-83].

شخصت المركبات المحضرة بالطرائق الفيزيائية، الكيميائية المختبرية والطيفية المتوفرة (درجة الانصهار، التغيرات اللونية، طيف الاشعة تحت الحمراء، طيف الاشعة فوق البنفسجية، طيف الرنين النووي المغناطيسي وعدد من الحسابات النظرية).

ABSTRACT

This study include the synthesis of the compound 1-(1H-benzo[d]imidazol-2-yl)ethanol [1], from the reaction of ortho pheneylene diamine with lactic acid and then oxidized using potassium dichromate to give1-(1H-benzo[d]imidazol-2-yl) ethanone [2]. Reaction of this compound with different substituted benzaldehydes or 1-(1H-benzo[d]imidazol-2-yl)ethanone, to obtain α, β-unsaturated carbonyl compounds (chalcones) [3-11]. These chalcones have been used in preparing number of heterocyclic compounds through reaction with the hydrogen peroxide to get the oxiran compounds (three membered rings) [12-20], hydroxyl amine hydrochloride to prepare the isooxazoline compounds(five membered rings) [21-29], 3-nitrobenzohydrazide to prepare the pyrazoline compounds(five membered rings)[30-38], thiosemicarbazide hydrochloride to prepare the pyrazoline compounds(five membered rings) [39-47], semicarbazide to prepare the pyrazoline compounds(five membered rings) [48-56], guanidine nitrate to prepare the pyrimidine compounds(six membered rings) [57-65], ortho pheneylenediamine to prepare the benzodiazepine compounds (seven membered rings) [66-74], ortho aminophenol to prepare the benzoxazepine compounds(seven membered rings) [75-83].
The synthesized compounds were identified, using chemical, physical and spectral methods (melting points, color change, infrared spectra, ultraviolet spectra, nuclear magnetic resonance spectra and many theoretical studies).

INTRODUCTION

Chalcones constitute an important group of natural products and serve as precursors for the synthesis of different classes of flavonoids, which are common substances in plants. Chalcones are open-chain flavonoids in which two aromatic rings are joined by a three carbon α, β, - ansaturated carbonyl system (1, 3-diphenyl-2-propen-1-one)[1]. Chalcone derivatives have received a great attention due to their relatively simple structure, and wide variety of pharmacological activities reported for these compounds include anti-inflammatory[2], anti-ulcerative[3], analgesic[4], anti-viral[5],anti-malarial[6],anti-fungal[7] and anti-cancer activities[8]. Recently 1-(4- Floro phenyl)-3-(4-Methyl phenyl)-2-propen-1-one have been prepared at (2010)[9] from the reaction between (p-fluroacetophenone) and (p- methylbenzaldehyde)in basic medium . The reaction of acetyl furan with 3,4,5-triethoxybenzaldehyde give the (chalcone)[10] 1-(furan-2-yl)-3-(3,4,5-trimethoxyphenyl)-2-propen-1-one. Also the chalcones was synthesized by using (Grinding Technique)[11]

EXPERIMENTAL

The melting points were measured on an electro thermal 9300 engineering LTD and are uncorrected, IR spectrum were recorded on infrared spectrophotometer model tensor 27, Bruker Co., Germany, using KBr discs. The U.V spectrum were recorded on UV-Visible Shimadzu 1601 spectrophotometer using DMSO as a solvent. The ^{1}HNMR [400MHz, δ, ppm, DMSO-d_6] were recorded on Bruker : AvanceIII 400 MHz : Tocat / Gazi Osman pasa University(Turkey). All chemicals were purchased from Fluka and BDH chemical Ltd.

Synthesis of 1-(1H-benzo[d]imidazol-2-yl) ethanol [1] [12]

A mixture of (0.05mol, 5.4g) ortho phenylene diamine and (0. 05 mol, 4.5g) of lactic acid and 25 mL of 4N HCl, was refluxed for 14 hours, then cooled to room temperature then the mixture was neutralize by adding 10% NaOH solution. The precipitate was filtered, washed with cold water, dried and recrystallized from hot water. The yield of the reaction was (93%).

Synthesis of 1-(1H-benzo[d]imidazol-2-yl) ethanone [2][13,14]

To a solution of 1-(1H-benzo[d]imidazol-2-yl) ethanol (0.01mol, 1.62g) in queous acetic acid (25mL) was added at room temperature a solution of $K_2Cr_2O_7$ (0.01mol, 2.94g) in water (20mL) and the mixture reflux for 3 hours. The reaction mixture was cooled and neutralized very carefully with aq. NH_4OH. The separated solid was filtered and washed with cold water, dried and purified by recrystallization from ethanol.

Synthesis of the chalcones[15] (E)-1-(1H- benzo[d]imidazol-2-yl) -3-(substituted phenyl)prop-2-en-1-one [3-9], (E)-1-(1H-benzo [d] imidazol-2-yl)-3-(pyridine-3-yl)prop-2-en-1- one [3-10]

A mixture of 1-(1H-benzo[d]imidazol-2-yl) ethanon (0.001 mol, 0.16gm) dissolved in ethanol (25mL), 10 mL of 10 % KOH and substituted aromatic aldehyde (0.001 mol) The reaction mixture was stirred at room temperature for 6 hrs. The reaction mixture was cooled and poured into ice water, neutralized with 30% acetic acid, the solid product was filtered then dried and recrystallized from ethanol.

Synthesis of the chalcone 1, 3-di (1H-benzo[d]imidazol-2-yl) prop-2-en-1-one [11][16]

A mixture of 1-(1H-benzo[d]imidazol-2-yl) ethanone (0.005 mol, 0.8g) dissolved in ethanol (20mL),10 mL of 10 % KOH The reaction mixture was reflux for 6 hrs. The reaction mixture was cooled and poured into ice water, neutralized using 30% acetic acid the solid products was filtered off then dried and recrystallized from ethanol.

Synthesis of [3-(1H-benzo[d]imidazol-2-yl) (3-(substituted phenyl) oxiran-2-yl) methanone [12-18], [1H-benzo[d]imidazol-2-yl) (3-(pyridine-3-yl) oxiran-2-yl) methanone [19] and (3- (1H-benzo [d]

imidazol-2-yl) -3- methyloxiran -2- yl) (1H -benzo [d] imidazol -2-yl) methanone [20][17].

To a mixture of (0.001mol) of one of the chalcones [3-11] dissolved in (10 mL) of ethanol, (1 mL) of 10% sodium hydroxide in (10 mL) of 30% hydrogen peroxide were added drop wise. The reaction mixture was stirred at room temperature for 2 hrs. with constant stirring, the resultant solution was cooled to obtain the crude product. The product was recrystallized from (ethanol/ water) to give the titled compounds.

Synthesis of 3-(1H-benzo[d]imidazol-2-yl)-5-(substituted phenyl) -4,5-dihydro isoxazole [21-27], (1H-benzo[d]imidazol-2-yl)-5-(pyridine-3-yl) -4,5- dihydroisoxazole [28] and (3,5-di (1H-benzo [d] imidazol-2-yl) -5-methyl-4,5- dihydroisoxazole [29][18].

To a mixture of (0.0005mol) of one of the chalcones [3-11] dissolved in (10 mL) of dry ethanol, and (0.0005mol, 0.034g) hydroxylamine hydrochloride dissolved in ethanol (10 mL), 10mL of 10 % NaOH were added drop wise. The contents were refluxed for 5 hrs. The reaction mixture was then poured into ice cold water, The product was recrystallized from (ethanol) to give the titled compounds.

Synthesis of (3-(1H-benzo[d]imidazol-2-yl)-5-(substitutedphenyl) 4,5 - dihydro-1H-pyrazol-1-yl)(3-nitrophenyl) methanone [30-36], (3-(1H-benzo [d]imidazol-2-yl) -5-(pyridine-3-yl) -4,5-dihydro-1H- pyrazol-1-yl) (3- nitrophenyl) methanone [37] and (3,5-di(1H-benzo[d]imidazol-2-yl) -5-methyl-4,5-dihydro-1H- pyrazol-1-yl)(3- nitrophenyl) methanone [38][19].

A mixture of (0.0005mol) of one of the chalcones [3-11] and (0.09g, 0.0005mol) 3-nitrobenzhydrazid dissolved in glacial acetic acid (20 mL). The contents were refluxed for 10 hrs. The reaction mixture was then poured into ice cold water, The product was recrystallized from (ethanol/water) to give the titled compounds.

Synthesis of 3-(1H-benzo[d]imidazol-2-yl)-5-(substitutedphenyl) -4,5 - dihydro -1 H-pyrazol -1- carbothioamide [39-45], (3-(1H-benzo [d] imidazol-2-yl)-5-(pyridine-3-yl) -4,5-dihydro-1H- pyrazol-1- carbothioamide [46] and (3,5-di(1H-benzo[d]imidazol-2-yl) -5-methyl-4,5-dihydro -1H- pyrazol-1- carbothioamide) [47][20].

To a mixture of (0.001mol) of one of the chalcones [3-11] in (10 mL) of dry ethanol, and (0.0005mol, 0.0455g) thiosemicarbazide dissolved in ethanol (10 mL), 10 mL of 10 % KOH were added drop wise. The contents were reflux temperature for 8 hrs. The reaction mixture was then poured into ice cold- water, The product was recrystallized from (ethanol/water) to give the titled compounds.

Synthesis of 3-(1H-benzo[d]imidazol-2-yl)-5-(substituted phenyl) -4,5 – dihydro -1 H-pyrazol -1- carboxamide [48-54], (3-(1H-benzo [d] imidazol-2-yl)-5-(pyridine-3-yl)-4,5-dihydro-1H- pyrazol-1- carboxamide

[55] and (3,5-di(1H-benzo[d]imidazol-2-yl) -5-methyl-4,5-dihydro-1H-pyrazol-1- carboxamide) [56][20].

To a mixture of (0.0005mol) of one of the chalcones [3-11] in (10 mL)of dry ethanol, (0.0005mol, 0.0375g) semicarbazide dissolved in ethanol (10 mL),10 mL of 10 % KOH were added drop wise. The contents were refluxed for 8 hrs. The reaction mixture was then poured into ice cold- water, The product was recrystallized from (ethanol/water) to give the titled compounds.

Synthesis of ٦-(1H-benzo[d]imidazol-2-yl)-٤-(substituted phenyl) -4,5 -dihydropyrimidin-2-amine [57-63], ٦-(1H-benzo[d]imidazol-2-yl) -٤-(pyridine-3-yl)-4,5- dihydropyrimidin-2-amine [64] and 4,6-di(1H-benzo[d]imidazol-2-yl)-5-methyl-4,5-dihydropyrimidin-2-amine) [65][21].

A mixture of (0.0005mol) of one of the chalcones [3-11] in (10 mL) of dry ethanol, guanidine nitrate (0.061g, 0.0005 mol) in (10 mL) sodium ethoxide were added. The contents were refluxed for 6 hrs. The reaction mixture was then cooled, poured into crushed ice and the separated product was filtered, washed with water, dried and recrystallized from ethanol.

Synthesis of 4-(1H-benzo[d]imidazol-2-yl)-2-(substitutedphenyl)-2,3- dihydro-1H-benzo[b][1,4] diazepine [66-72], 4-(1H-benzo[d] imidazole -2-yl) -2-(pyridine-3-yl)-2,3- dihydro-1H-benzo [b][1,4] diazepine [73] and 2,4-(1H-benzo[d]imidazol-2-yl) -2-methyl-2,3-dihydro-1H-benzo [b] [1,4] diazepine [74][22].

To a mixture of (0.0005mol) of one of the chalcones [3-11] and (0.054g, 0.0005mol) ortho phenylenediamine dissolved in dry ethanol (25 mL) a few drops of glacial acetic acid were added. The contents were refluxed for 10 hrs. The reaction mixture was then poured into ice cold water, The product was recrystallized from (ethanol/water) to give the titled compounds.

Synthesis of 4-(1H-benzo[d]imidazol-2-yl)-2-(substituted phenyl) -2,3-dihydrobenzo [b] [1,4] oxazepine [75-81],4-(1H-benzo [d] imidazole -2-yl) -2-(pyridine-3-yl)-2,3- dihydrobenzo [b][1,4] oxazepine [82] and 2,4-(1H-benzo[d]imidazol-2-yl)-2-methyl-2,3- dihydrobenzo [b][1,4] oxazepine [83][23].

A mixture of (0.0005mol) of one of the chalcones [3-11] and (0.054g, 0.0005mol) 2-aminophenol dissolved in dry ethanol (25 mL) and few drops of glacial acetic acid . were refluxed for 10 hrs. The reaction mixture was then poured into ice cold water, The product was recrystallized from (ethanol/water) to give the titled compounds.

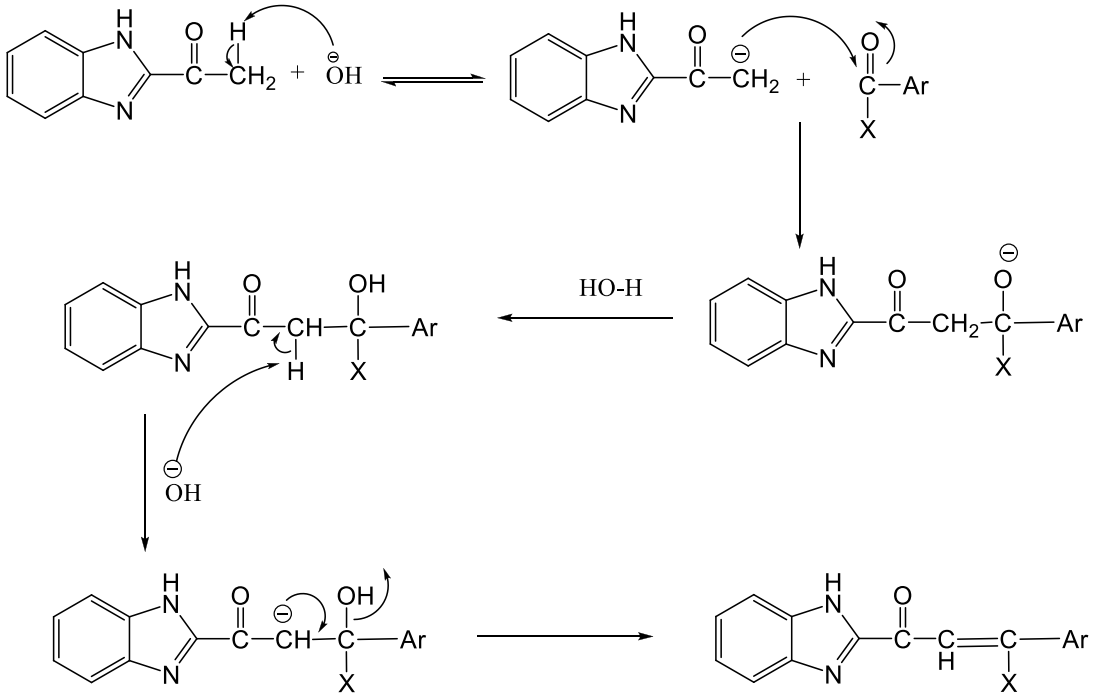
RESULTS AND DISCUSSION

In this paper we investigate the synthesis of heterocyclic compounds [12-83]

From their starting materials, thus ortho phenylen diamine was treated with lactic acid to give 1-(1H-benzo[d]imidazol-2-yl) ethanol [1] in 93% yield. The IR spectra[24] show absorption at υ_{cm}^{-1} (3423) (O-H), υ_{cm}^{-1} (3171) (N-H) and υ_{cm}^{-1} (1621) (C=N), U.V λ max (287) in DMF, ^{1}H NMR [400MHz, δ, ppm, DMSO-d6] 1.503-1.552 δ (3H,d,CH3), 4.909 -4.970 δ(1H,m,CH), 5.764 -5.776 δ (1H,d,OH), 7.096 -7.158 δ (2H,m,Ar-H), 7.425-7.553 δ (2H,m,Ar-H), 12.242 δ (1H,S,N-H), the product is white in colour and has m.p (177-179 °C).

1-(1H-benzo[d]imidazol-2-yl) ethanol was oxidized by Potassium dichromate to give 1-(1H-benzo[d]imidazol-2-yl) ethanone [2] in 70% yield. The IR spectra[25] show absorption at υ_{cm}^{-1} (3290) (N-H), υ_{cm}^{-1} (1617) (C=N), υ_{cm}^{-1} (1675) (C=O), The disappearance of O-H band indicate the oxidation of the secondary alcohol to ketone, ^{1}H NMR [400MHz, δ, ppm, DMSO-d6] 2.655-2.755δ (3H,S,CH3), 7.327-7.368δ (2H,m,Ar-H), 7.693 δ(2H,s,Ar-H), 13.247 δ(1H,S,N-H) it has Yellow colour of m.p(185-187°C).

1-(1H-benzo[d]imidazol-2-yl) ethanone was condensed with substituted benzaldehyde through Claisen – Schimidite reaction to give chalcones [3-11]. The IR spectra[26] show absorption bands at υ_{cm}^{-1} (1654-1674) (C=O) and υ_{cm}^{-1} (1587-1508) (C=C), λ_{max} (281-333)nm, (Table 1) ^{1}H NMR [400MHz, δ, ppm, DMSO-d_6] of Compound[7] give the following signals bands 7.384 -7.397 δ (2H,m,Ar-H), 7.462 -7.503 δ (1H,t,di chloroAr-H), 7.635-7.655δ (2H,d,dichloroAr-H), 7.746 δ (2H,s,Ar-H), 7.979-8.021δ (α1H,d,CH), 8.203-8.244δ(β1H,d,CH), 13.627 δ(1H,S,N-H), and compound [9] 7.381-7.403δ (3H,m,m-nitroAr-H), 7.767-7.807 δ (α1H,d,CH), 8.077-8.117δ(β1H,d,CH), 8.260-8.386δ (4H, m, Ar-H, benzimidazole), the physical properties and spectral data are listed in Table(1).



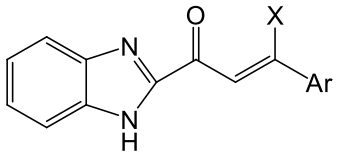
[3-10]

Ar = Ph , 4 -(N,N(CH_3)$_2$)Ph , 4-OCH_3Ph , 3,4 - (OCH_3)$_2$Ph , 2,6 - $(Cl)_2$Ph , 4-Cl Ph , 3-NO_2Ph , 3-pyridyl , benzimidazol-2-yl

X = H , CH_3 (in compound [11])

Scheme (1)
The suggested mechanism for the Synthesis of chalcones

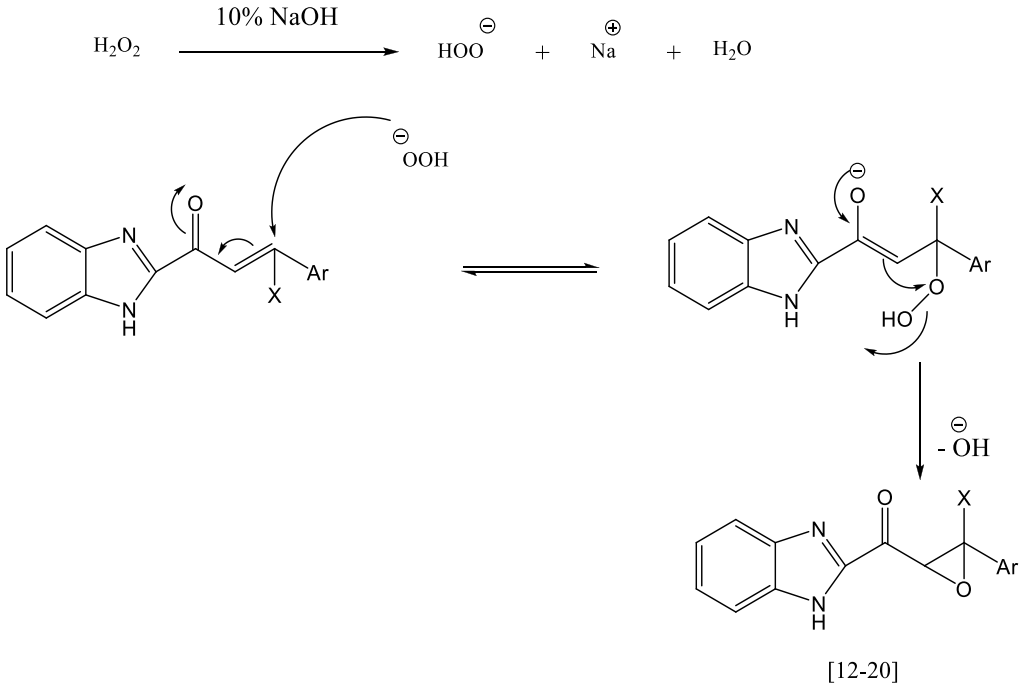
Table(1): Physical properties and spectral data[IR (KBr) υ cm^{-1} and U.Vnm]of compounds [3-11]



Com.. No	Ar	X	M.p. (ºC)	Yield (%)	IR υ cm^{-1} (KBr)				U.V inDMF λ_{max}, (nm)
					C=O	N-H	C-H Ar	C=C	
3	Ph	H	199-203	88	1662	3251	3063	1573	325
4	4-N,N$(CH_3)_2$Ph	H	240-242	60	1660	3282	3066	1561	211
5	4-OCH_3Ph	H	180-182	89	1654	3260	3064	1576	326
6	3,4$(OCH_3)_2$Ph	H	204-206	77	1654	3247	3015	1587	251
7	2,6$(Cl)_2$Ph	H	197-198	81	1659	3279	3069	1553	266
8	4-Cl Ph	H	208-210	92	1665	3559	3967	1566	372
9	3-NO_2 Ph	H	218-220	93	1666	3417	3031	1569	287
10	3-pyridyl	H	209-211	90	1668	3422	3158	1585	326
11	Benzimidazol -2-yl	CH_3	169-171	75	1674	3289	3059	1508	310

The chalcones were treated with hydrogen peroxide in ethanol in the presence of sodium hydroxide to give the oxiran compound[12-20]. The IR spectra[27] of compounds [12-20] show absorption bands at υ $_{cm}^{-1}$ (1675-1734) (C=O) and υ $_{cm}^{-1}$ (1581-1662) (C=N), λ¬max (347-275 nm)and (269-236 nm), (Table2). ^{1}H NMR [400MHz, δ, ppm, DMSO-d_6] of compound[14], 3.390δ (1H,S,COCH -epoxy), 3.825 δ(3H,S,-OCH3), 7.010 -7.031 δ 2H,d, Ar-H), 7.181 -7.203 δ(2H,m,Ar-H), 7.584 -7.606 δ (2H,m,Ar-H), 7.892-7.914δ(2H,d, Ar-H), 8.223δ(1H,S, CH -epoxy),

12.609 δ (1H,S,N-H), the physical properties and spectral data are listed in Table (2).



[12-20]

Ar = Ph , 4 -(N,N(CH$_3$)$_2$)Ph , 4-OCH$_3$Ph , 3,4 - (OCH$_3$)$_2$Ph ,

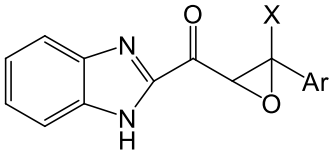
2,6 - (Cl)$_2$Ph , 4-Cl Ph , 3-NO$_3$Ph , 3-pyridyl , benzimidazol-2-yl

X = H , CH$_3$ (in compound [20])

Scheme (2)

The suggested mechanism for the reaction of chalcones with hydrogen peroxide

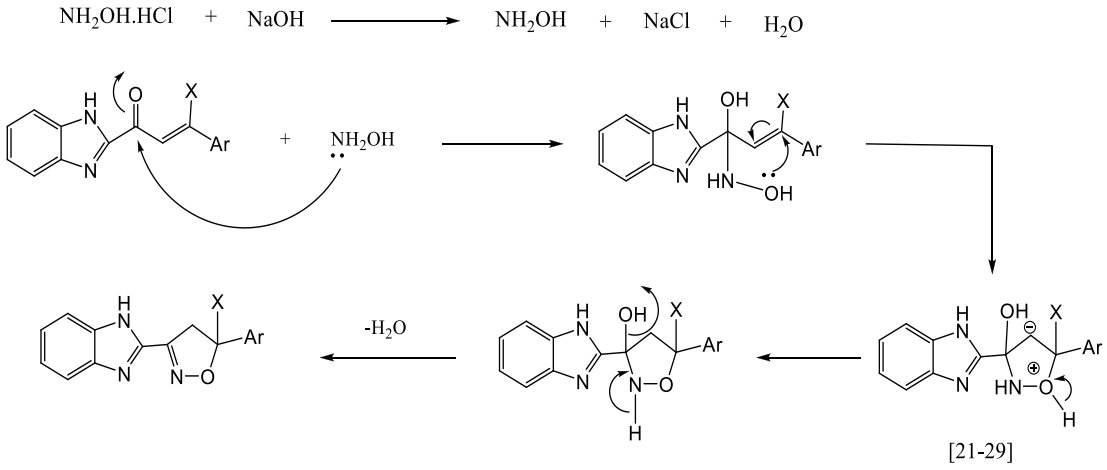
Table(2): Physical properties and spectral data [IR (KBr) υ cm^{-1} and U.Vnm] of compounds [12-20]



Comp. No	Ar	X	M.p. (ºC)	Yield(%)	IR υ cm^{-1} (KBr)					U.V In DMF λ_{max}, (nm)
					C=O	N-H	C=N	C—O—C	C-N	
١٢	Ph	H	280 dec.	62	16٨٢	٣٤٤٣	1646	as 1106 sy ١٠٢٢	1253	٢٩٢ ٢٦٧
١٣	٤-N,N$(CH_3)_2$Ph	H	168 dec.	73	1٧٠٥	٣٣٢٣	1662	as 1190 sy ١٠٦٦	1230	٣٠٩ ٢٥٢
١٤	4-OCH_3Ph	H	155-156	63	16٨٥	٣٤٣١	1655	as 1180 sy ١٠٢٦	1228	٢٧٨ ٢٣٨
١٥	3,4-$(OCH_3)_2$Ph	H	210 dec.	68	1٧٣٤	٣٤٠٤	1647	as 1107 sy١٠٢٢	13٣٣	٢٧٥ ٢٤٢
١٦	2,6-$(Cl)_2$Ph	H	178 dec.	63	16٧٥	٣٢٩١	1581	as 1140 sy ١٠٨٧	1217	٣٤٧ ٢٦٩
١٧	4-Cl Ph	H	162-163	75	16٩٣	٣٤٩٥	1620	as 1176 sy ١٠89	1228	٣٣٥ ٢٦٧
١٨	3-NO_2 Ph	H	174-177	82	16٨٩	٣٤٠٨	1620	as 1141 sy 10٩٩	1312	٣٢٣ ٢٦٨
١٩	3-pyridyl	H	270 dec.	70	16٨٤	٣٤٢١	1661	as 1093 sy ٩٥٨	1317	٣٠٥ ٢٤٣
٢٠	Benzimidazol-2-yl	CH_3	178-180	75	16٨٧	32٧٩	1611	as 1147 sy 1007	1241	٣١١ ٢٣٦

The chalcones was treated with hydroxylamine hydrochloride in the presence of sodium hydroxide to give the isoxazoline compounds[21-29] The IR spectra of compounds [21-29] show absorption at (930-995) υ cm^{-1} (N-O) and (1609-1664) υ cm-^{1} (C=N)[28], λ¬max(298-262 nm)

and (352-301 nm), (Table3). ^{1}HNMR [400MHz,δ,ppm, DMSO-d^{6}]. compounds[23] give the following signals 3.704 δ (3H,S,-OCH3), 3.748-3.806δ (1H,t,-CH), 3.850-3.859δ (2H,d,-CH_2), 7.135 -7.203δ (2H,t,Ar-H) δ, 7.419 -7.439 δ(2H,d,Ar-H), 7.518-7.538δ (2H,d,Ar-H), 7.935 -7.975δ(2H,t,Ar-H), 11.696 δ (1H,S,N-H), the physical properties and spectral data are listed in Table (3).



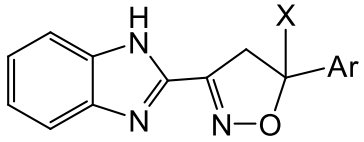
Ar = Ph , 4 -(N,N(CH$_3$)$_2$)Ph , 4-OCH$_3$Ph , 3,4 - (OCH$_3$)$_2$Ph ,

2,6 - (Cl)$_2$Ph , 4-Cl Ph , 3-NO$_3$Ph , 3-pyridyl , benzimidazol-2-yl

X = H , CH$_3$ (in compound [29])

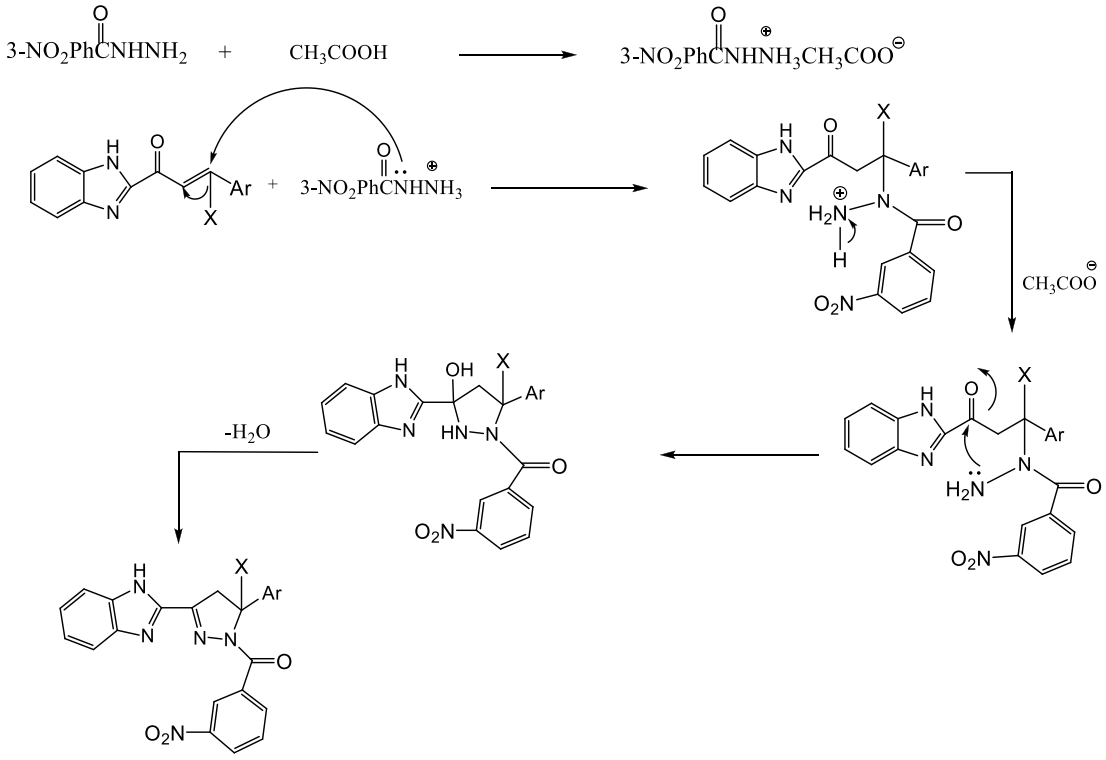
Scheme (3)
The suggested mechanism for the reaction of chalcones with hydroxylamine hydrochloride

Table(3): Physical properties and spectral data [IR (KBr) υ cm^{-1} and U.Vnm] of compounds [21-29]



Comp. No	Ar	X	M.p. (ºC)	Yield(%)	IR υ cm^{-1} (KBr)				U.V inDMF λ_{max}, (nm)
					C=N	C=C	N-H	N-O	
21	Ph	H	95-97	80	1619	1596	3396	968	329 284
22	ε-N,N$(CH_3)_2$Ph	H	130-133	71	1610	1521	3216	943	338 292
23	4-OCH_3Ph	H	104-106	69	1609	1542	3221	965	317 298
24	3,4-$(OCH_3)_2$Ph	H	153-156	75	1611	1557	3419	971	339 285
25	2,6-$(Cl)_2$Ph	H	250 dec.	66	1664	1562	3242	980	304 262
26	4-Cl Ph	H	205-207	78	1614	1594	3178	968	352 299
27	3-NO_2 Ph	H	203 dec.	84	1628	1558	3363	930	311 266
28	3-pyridyl	H	265 dec.	79	1655	1610	3240	984	325 294
29	Benzimidazol-2-yl	CH_3	234-237	65	1662	1652	3375	995	301 270

The chalcones were treated with 3-nitrobenzohydrazide in the presence of glacial acetic acid to give the pyrazoline compounds [30-38]. The IR spectra of compounds [30-38] show absorption at(1638-1697) υ cm^{-1} (C=O)[29] amide and(1593-1664) υ cm^{-1} (C=N), λ¬max (362-268nm) and (267-204nm), (Table4). ^{1}HNMR [400MHz, δ, ppm, DMSO-d^6] of compound [32], 3.350 δ(3H,S,-OCH3), 3.848δ(2H,d,-CH_2), 3.887-3. 918**δ**(1H,t,-CH), 7.052 -7.074 δ (2H,d,Ar-H), 7.578 -7.598 δ (2H,d,Ar-H), 7.316 -7.427**δ** (3H,m, m-nitro Ar-H), 7.987 δ (1H,S, m-nitro Ar-H) 7.849 -7.863δ (2H,d,Ar-H),7.871-7.882δ (2H,d,Ar-H), 13.456 δ (1H,S,N-H), the physical properties and spectral data are listed in Table (4).



[30-38]

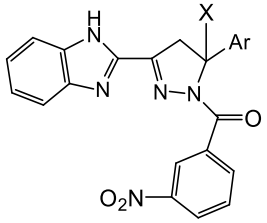
Ar = Ph , 4 -(N,N(CH$_3$)$_2$)Ph , 4-OCH$_3$Ph , 3,4 - (OCH$_3$)$_2$Ph ,

2,6 - (Cl)$_2$Ph , 4-Cl Ph , 3-NO$_3$Ph , 3-pyridyl , benzimidazol-2-yl

X = H , CH$_3$ (in compound [47])

Scheme (4)
The suggested mechanism for the reaction of chalcones with 3-nitrobenzohydrazide

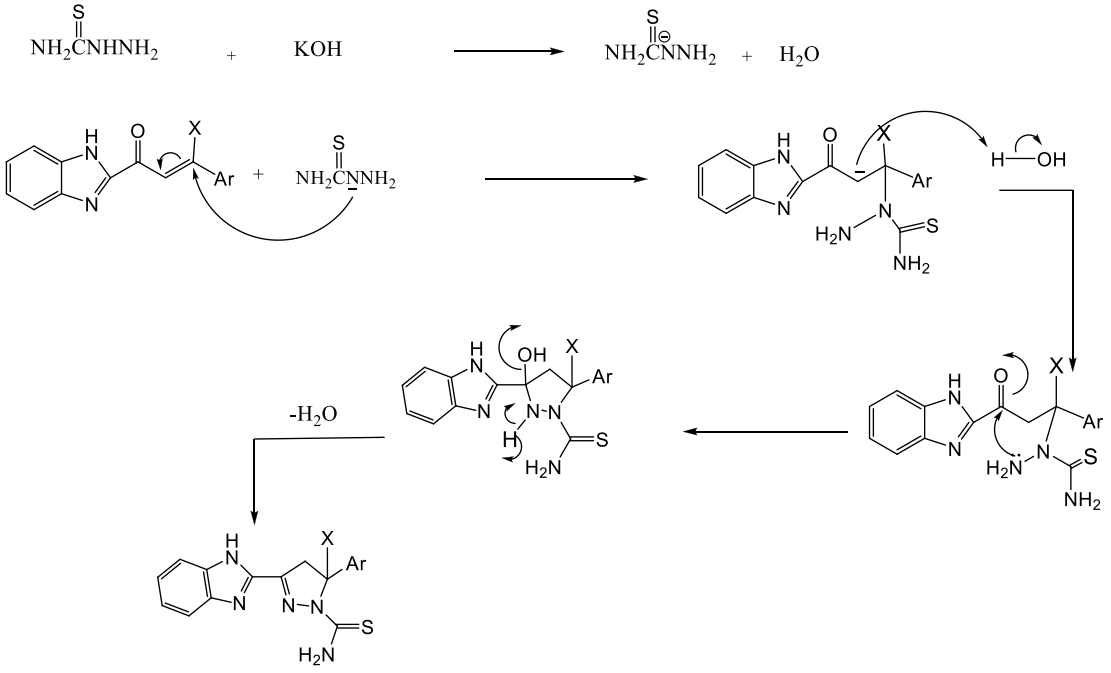
Table(4): Physical properties and spectral data [IR (KBr) υ cm^{-1} and U.Vnm] of compounds [30-38]



Comp. No	Ar	X	M.P (ºC)	Yield (%)	IR υ cm^{-1} (KBr)					U.V In DMF λ_{max}, (nm)
					C=N	N-H	C=O	ArC-H	C-N	
30	Ph	H	135-167	70	1593	٣249	1660	٣٠٦٠	1275	341 266
31	٤-N,N$(CH_3)_2$Ph	H	140-142	74	1615	٣٢٢٣	1638	٣٠87	1290	330 267
32	4-OCH_3Ph	H	132-135	69	1654	٣٢٥٦	1697	٣٠٦8	1258	362 267
33	3,4-$(OCH_3)_2$Ph	H	190-192	60	1654	3256	1694	٣٠65	1٢94	331 266
34	2,6-$(Cl)_2$Ph	H	198-200	68	1658	٣٢83	1٦88	٣٠81	1292	337 258
35	4-Cl Ph	H	150-152	81	1664	٣170	1696	٣٠٦6	1297	345 266
36	3-NO_2 Ph	H	170-172	62	1606	٣402	1664	٣٠86	1٢71	306 263
37	3-pyridyl	H	142-1464	59	1636	٣٤24	1669	٣087	1268	319 204
38	Benzimidazol-2-yl	CH_3	122-124	57	١٦٤٦	3٢٧٦	16٨٥	٣٠٩٠	12٨٩	268 257

The chalcones was treated with thiosemicarbazide in the presence of potassium hydroxide to give the pyrazoline compound[39-47]. The IR spectra of compounds [39-47] show absorption at (1105-1227) υ cm^{-1} (C=S)[30] and (1594-1625)υ cm^{-1} (C=N), λ¬max (369-310nm)and(327-265nm).(Table5). ^{1}HNMR [400MHz, δ, ppm, DMSO-d^6] of

compound[٤0], 3.361 δ (3H,S,-N(CH3)$_2$), 6.687-6.709 δ(1H,d,-CH$_2$), 7.191-7.291δ(2H,t,-CH), 7.488 -7.508 **δ**(2H,d,Ar-H),7.667-7.687 δ (2H,t,Ar-H), 7.571 -7.593 δ (2H,d,Ar-H), 7.776 δ(2H,s,Ar-H), 7.932 δ (2H,s,Ar-H), 8.016 δ (2H,s,Ar-H), 8.559- 8.606 δ(1H,d,NH2), 13.766 δ (1H,S,N-H), the physical properties and spectral data are listed in Table (5).



[39-47]

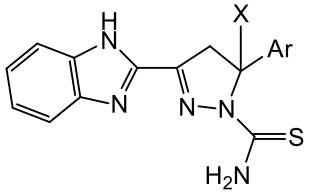
Ar = Ph , 4 -(N,N(CH$_3$)$_2$)Ph, 4-OCH$_3$Ph , 3,4 - (OCH$_3$)$_2$Ph ,

2,6 - (Cl)$_2$Ph , 4-Cl Ph , 3-NO$_3$Ph , 3-pyridyl , benzimidazol-2-yl

X = H , CH$_3$ (in compound [56])

Scheme (5)
The suggested mechanism for the reaction of chalcones with Thiosemicarbazide

Table(5): Physical properties and spectral data [IR (KBr) υ cm^{-1} and U.Vnm] of compounds [39-47]

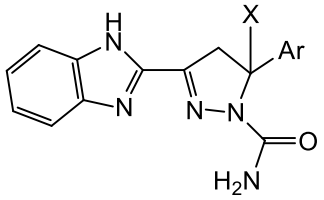


Comp. No	Ar	X	M.P (ºC)	Yield (%)	IR υ cm^{-1} (KBr)					U.V In DMF λ_{max}, (nm)
					C=S	C-N	C=N	N-N	NH_2	
39	Ph	H	197-199	52	1227	1276	1598	1093	3420 3260	362 276
40	٤-N,N$(CH_3)_2$Ph	H	165-167	79	1183	1280	1606	1058	3416 3257	327 276
41	4-OCH_3Ph	H	108-110	71	1169	1249	1604	1026	3454 3330	310 278
42	3,4-$(OCH_3)_2$Ph	H	138-140	57	1163	1265	1601	1032	3423 3281	369 327
43	2,6-$(Cl)_2$Ph	H	208-210	76	1192	1275	1594	1071	3415 3251	358 304
44	4-Cl Ph	H	177-179	75	1176	1283	1601	1091	3438 3280	357 279
45	3-NO_2 Ph	H	145-148	77	1144	1277	1618	1097	3417	317 278
46	3-pyridyl	H	187-190	75	1113	1278	1625	1047	3440 ٣٢٥٠	282 265
47	Benzimidazol-2-yl	CH_3	215-217	52	1105	1276	1609	1040	3415 3272	358 266

The chalcones was treated with semicarbazide in the presence of potassium hydroxide to give the pyrazoline compound[48-56]. The IR spectra of compounds [48-56] show absorption at (1661-1713) υ cm^{-1} (C=O)[31] amide and(1575-1669)υ cm^{-1}(C=N),λ¬max (211-326)nm. (Table 6). ^{1}HNMR [400MHz, δ, ppm, DMSO-d^6]of compounds[52] 3.346δ (2H,d,-CH2), 7.468 -7.527 δ (2H,d,di chloroAr-H), 8.202 -8.322 δ (1H,t,di chloroAr-H), 7.640 -7.660 δ(2H,d,Ar-H), δ 7.875 -7.895 (2H,d,Ar-H), 8.202-8.322δ(1H,t,-CH), 11.774 δ (1H,S,NH_2), 13.626 δ

(1H,S,N-H), the physical properties and spectral data are listed in Table (6).

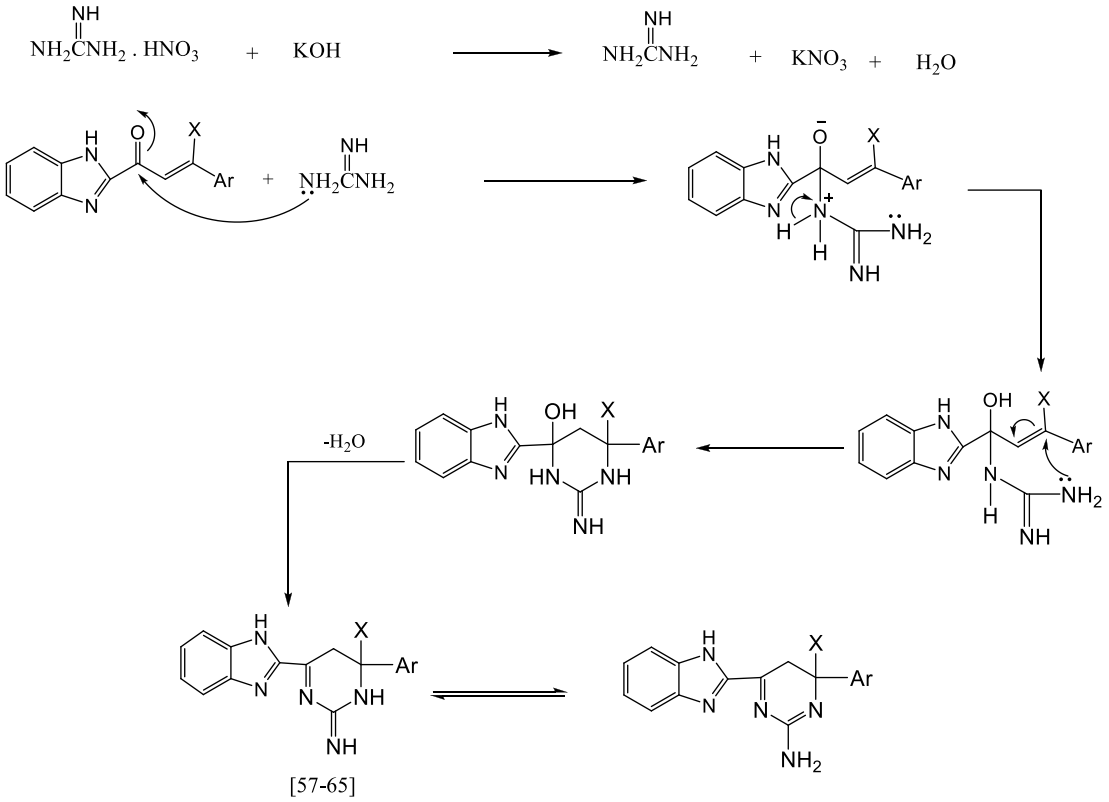
Table(6): Physical properties and spectral data [IR (KBr) υ cm^{-1} and U.Vnm] of compounds [48-56]



Comp. No	Ar	X	M.P (°C)	Yield (%)	IR υ cm^{-1} (KBr)					U.V In DMF λ_{max}, (nm)
					C=O	C-N	C=N	N-N	NH_2	
48	Ph	H	189-200	80	1684	1288	1647	1092	3462 3290	330 289
49	٤-N,N$(CH_3)_2$Ph	H	230 dec.	72	1684	1229	1609	1013	3460	317 262
50	4-OCH_3Ph	H	270 dec.	67	16٨٩	1252	1646	1088	3454 ٣٢82	314 298
51	3,4-$(OCH_3)_2$Ph	H	189-191	78	1664	1238	1624	1081	3433	336 263
52	2,6-$(Cl)_2$Ph	H	200-202	57	1661	1213	1594	1072	3415 3281	321 264
53	4-Cl Ph	H	290 dec.	64	1713	1224	1669	1092	3464 3280	312 288
54	3-NO_2 Ph	H	240 dec.	56	1685	1271	1647	1020	3475	303 286
55	3-pyridyl	H	165-167	72	1681	1278	1575	1085	3422	312 261
56	Benzimidazol-2-yl	CH_3	190 dec.	52	1703	1282	1620	1012	3417	336 262

The chalcones was treated with guanidine nitrate in the presence of sodium ethoxide to give the compounds[57-65]. The IR spectra of compounds [57-65] show absorption at (1172-1295)υ cm^{-1} (C-N) and (1590-1655) υ cm^{-1} (C=N)[32], λ¬max (371-304nm) and (311-214nm)

(Table7). ^{1}HNMR [400MHz, δ, ppm, DMSO-d^{6}] of compounds[64] 3.391 δ (2H,S,-CH2), 6. 946δ(1H,b,-CH), 7.245 -7.330 δ(2H,m,Ar-H),7.567 -7.630δ(2H,m,Ar-H), 7.753 -7.772 δ(1H,t, pyridine) 8.016 δ(1H,s, pyridine), 8.521 -8.540 δ(1H,d, pyridine), 8.733 -8.744 δ(1H,d, pyridine), 9.349 δ(1H,S,NH2), 13.072 δ(1H,S,N-H), the physical properties and spectral data are listed in Table (7).



Ar = Ph , 4 -(N,N(CH$_3$)$_2$)Ph, 4-OCH$_3$Ph , 3,4 - (OCH$_3$)$_2$Ph ,

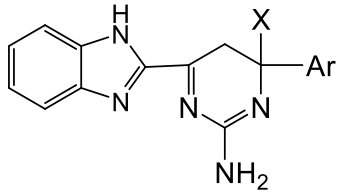
2,6 - (Cl)$_2$Ph , 4-Cl Ph , 3-NO$_3$Ph , 3-pyridyl , benzimidazol-2-yl

X = H , CH$_3$ (in compound [74])

Scheme (6)

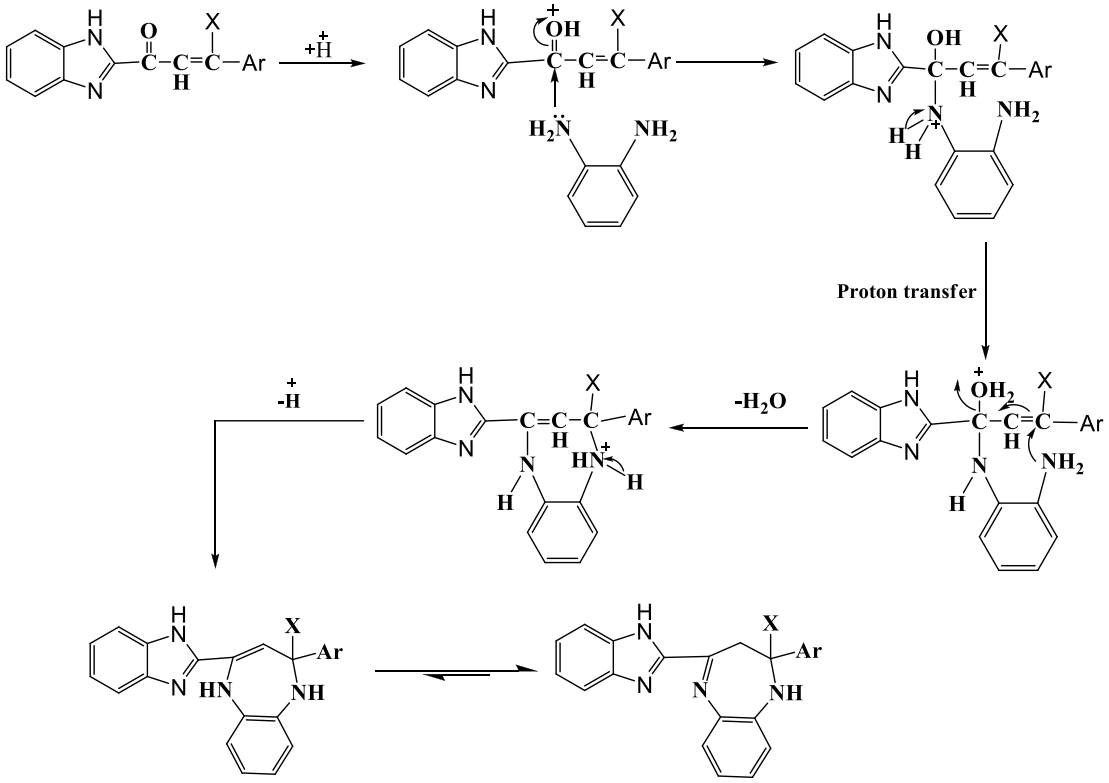
The suggested mechanism for the reaction of chalcones with guanidine nitrate

Table(7): Physical properties and spectral data [IR (KBr) υ cm^{-1} and U.Vnm] of compounds [57-65]



Comp. No	Ar	X	M.P (°C)	Yield (%)	IR υ cm^{-1} (KBr)				U.V inDMF λ_{max}, (nm)
					C=N	C=C	C-N	NH_2	
57	Ph	H	257 dec.	73	1655	1591	1172	3448	٣٤٧ ٣١١
58	٤-N,N$(CH_3)_2$Ph	H	145-148	69	1580	1540	1277	3394 3180	٣١٤ ٢٣٦
59	4-OCH_3Ph	H	110-112	54	1591	1548	1295	3471 3392	٣٧١ ٢٣٢
60	3,4-$(OCH_3)_2$Ph	H	130-133	70	1616	1580	1275	3464 3375	٣٥٩ ٢٤٨
61	2,6-$(Cl)_2$Ph	H	161-163	57	1618	1589	1277	3475 3381	٣٠٤ ٢١٤
62	4-Cl Ph	H	154-157	67	1635	1595	1261	3437	٣٦١ ٢٧١
63	3-NO_2 Ph	H	294 dec.	61	1590	1552	1237	3385	٣٥٧ ٢٧٢
64	3-pyridyl	H	141-143	58	1626	1590	1278	3346 3211	٣٦٨ ٣٠٤
65	Benzimidazol-2-yl	CH_3	167-170	66	1676	1581	1281	3410 3292	٣٠٧ ٢٥٦

The chalcones was treated with ortho phenylenediamine in the presence of glacial acetic acid to give the benzdiazepines compound[66-74]. The IR spectra[23] of compounds [30-38] show absorption at(1620-1686 υ m^{-1} (C=N)and(1253-1290 υ cm^{-1} (C-N), λ¬max (372-311nm) and(296-57nm) The physical properties and spectral data are listed in Table (8).



[66-74]

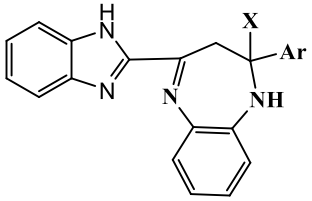
Ar = Ph , 4 -(N,N(CH_3)$_2$)Ph, 4-OCH_3Ph , 3,4 - (OCH_3)$_2$Ph ,

2,6 - $(Cl)_2$Ph , 4-Cl Ph , 3-NO_3Ph , 3-pyridyl , benzimidazol-2-yl

X = H , CH_3 (in compound [83])

Scheme (7)
The suggested mechanism for the reaction of chalcones with ortho phenylenediamine

Table(8):Physical properties and spectral data [IR (KBr) υ cm^{-1} and U.Vnm] of compounds [66-74]

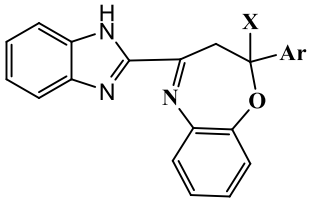


Comp. No	Ar	X	M.P (ºC)	Yield (%)	IR υ cm^{-1} (KBr)				U.V inDMF λ_{max}, (nm)
					C=N	C=C	N-H	C-N	
66	Ph	H	116-119	68	1686	1654	3358	1280	372 ٢٨٢
67	٤-N,N$(CH_3)_2$Ph	H	150 dec.	80	1638	1593	3427	1275	٣٥٦ ٢٩١
68	4-OCH_3Ph	H	135-137	76	1682	1650	3380	1253	٣٢٦ ٢٧٢
69	3,4-$(OCH_3)_2$Ph	H	196-198	68	1664	1579	3255	1267	٣٦٦ ٢٩٦
70	2,6-$(Cl)_2$Ph	H	136-138	60	1661	1607	٣٢85	1290	٣٣٢ ٢٥٧
71	4-Cl Ph	H	180-182	65	1647	1616	3242	1279	٣٥٦ ٢٨٦
72	3-NO_2 Ph	H	134-136	63	1664	1613	3384	1275	٣١١ ٢٦٥
73	3-pyridyl	H	240 dec.	59	1624	1560	3215	١٢٧٧	٣٥٧ ٢٩٦
74	Benzimidazol-2-yl	CH_3	153-155	51	1620	1587	3113	1273	٣٢٤ ٢٨١

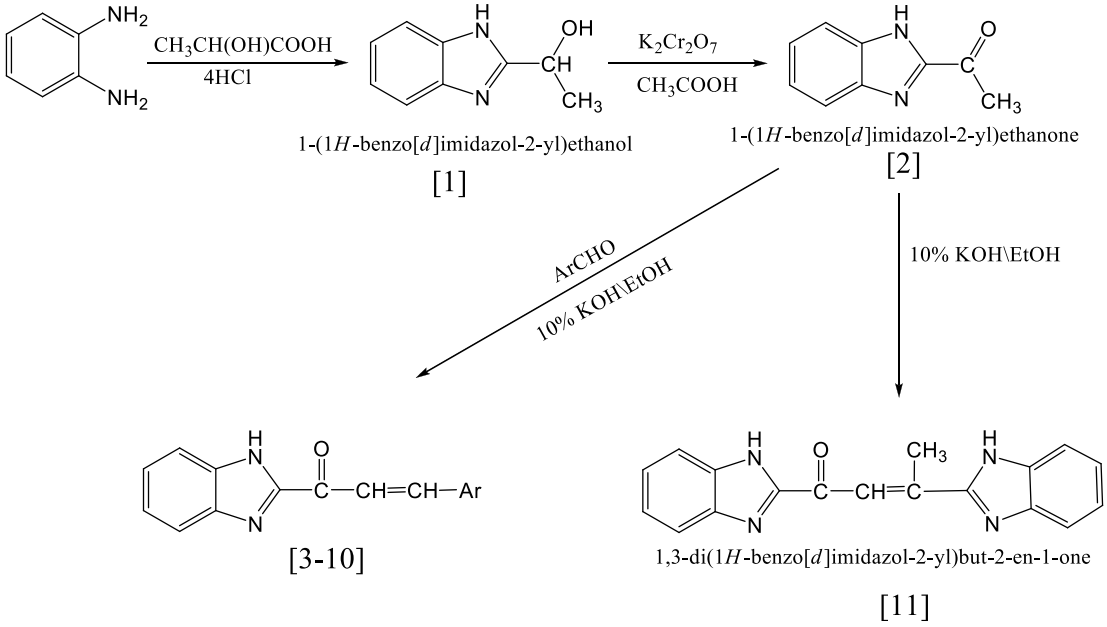
The chalcones was treated with 2-aminophenol in the presence of glacial acetic acid to give the benzoxazepines compound[75-83]. The IR spectra[23] of compounds [30-38] show absorption at(1086-7911) υ cm-1 symmetrical and (1147-1255) υ cm^{-1} asymmetrical (C-O-C)[27], (1620-

1686) υ cm^{-1} (C=N), λ¬max(368-268nm) and (301-222nm), the physical properties and spectral data are listed in Table (9).

Table(9):Physical properties and spectral data [IR (KBr) υ cm^{-1} and U.Vnm] of compouns [75-83]



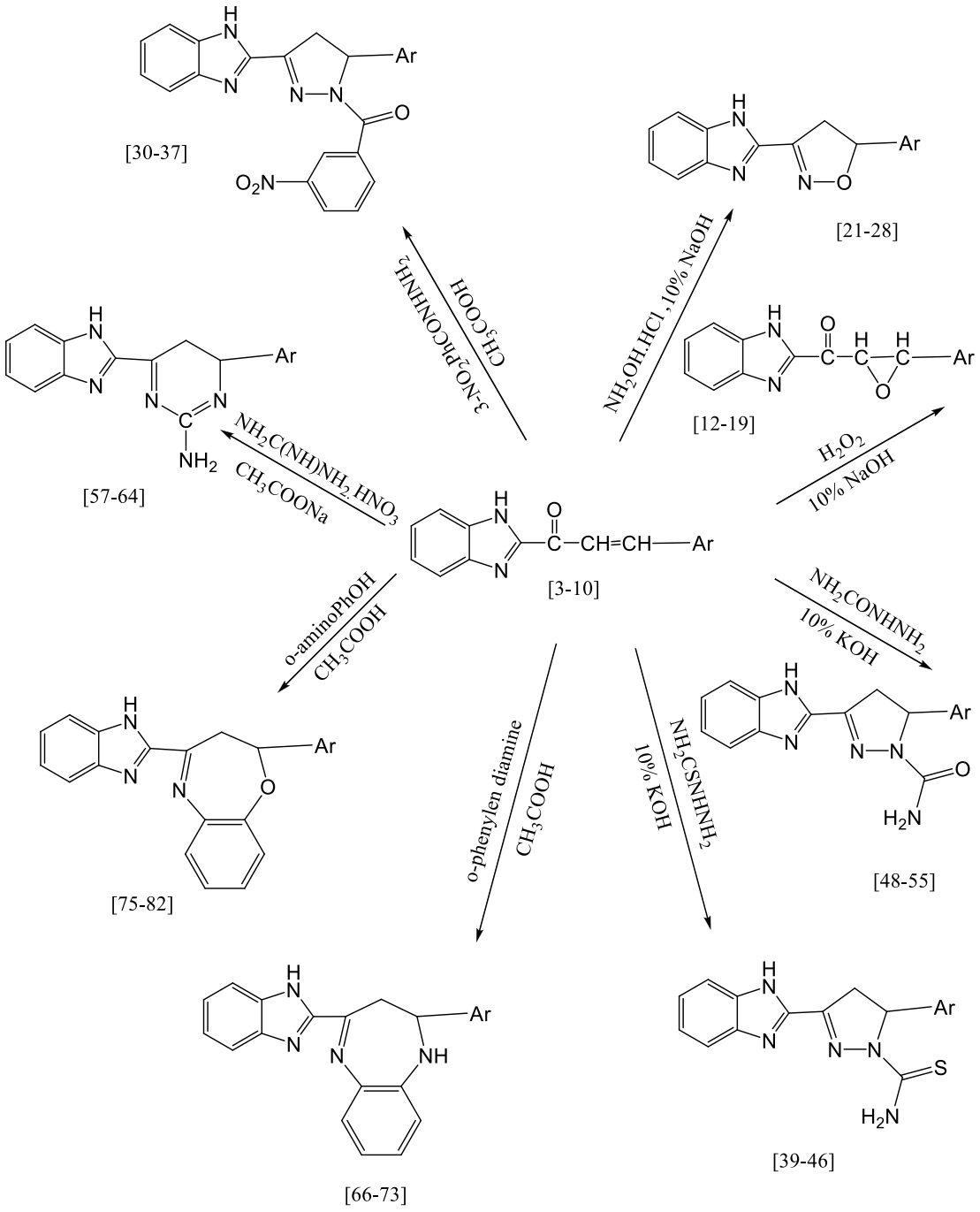
Comp. No	Ar	X	M.P (ºC)	Yield (%)	IR υ cm^{-1} (KBr)				U.V inDMF λ_{max}, (nm)
					C=N	C-O-C	N-H	C-N	
75	Ph	H	145-147	74	1599	as1194 sy1086	3284	1254	344 260
76	٤-N,N$(CH_3)_2$Ph	H	283-285	86	1634	as1231 sy1179	3445	1281	322 278
77	4-OCH_3Ph	H	196-198	69	1685	as1255 sy1092	3255	1285	362 301
78	3,4-$(OCH_3)_2$Ph	H	198-199	62	1655	as1215 sy1101	3255	1273	268 222
79	2,6-$(Cl)_2$Ph	H	218-220	65	1662	as1213 sy1140	٣٢85	1327	309 240
80	4-Cl Ph	H	241-243	58	1657	as1215 sy1138	3261	1290	346 269
81	3-NO_2 Ph	H	216-218	71	1662	as1213 sy1149	3290	1213	359 294
82	3-pyridyl	H	169-171	55	1678	as1228 sy1120	3180	١٢٧٧	317 240
83	Benzimidazol-2-yl	CH_3	190 dec.	61	1676	as1147 sy1086	3290	1236	308 248



Ar = Ph , 4 - (N,N$(CH_3)_2$)Ph , 4-OCH_3Ph , 3,4 - $(OCH_3)_2$Ph ,

2,6 - $(Cl)_2$Ph , 4-Cl Ph , 3-NO_3Ph , 3-pyridyl

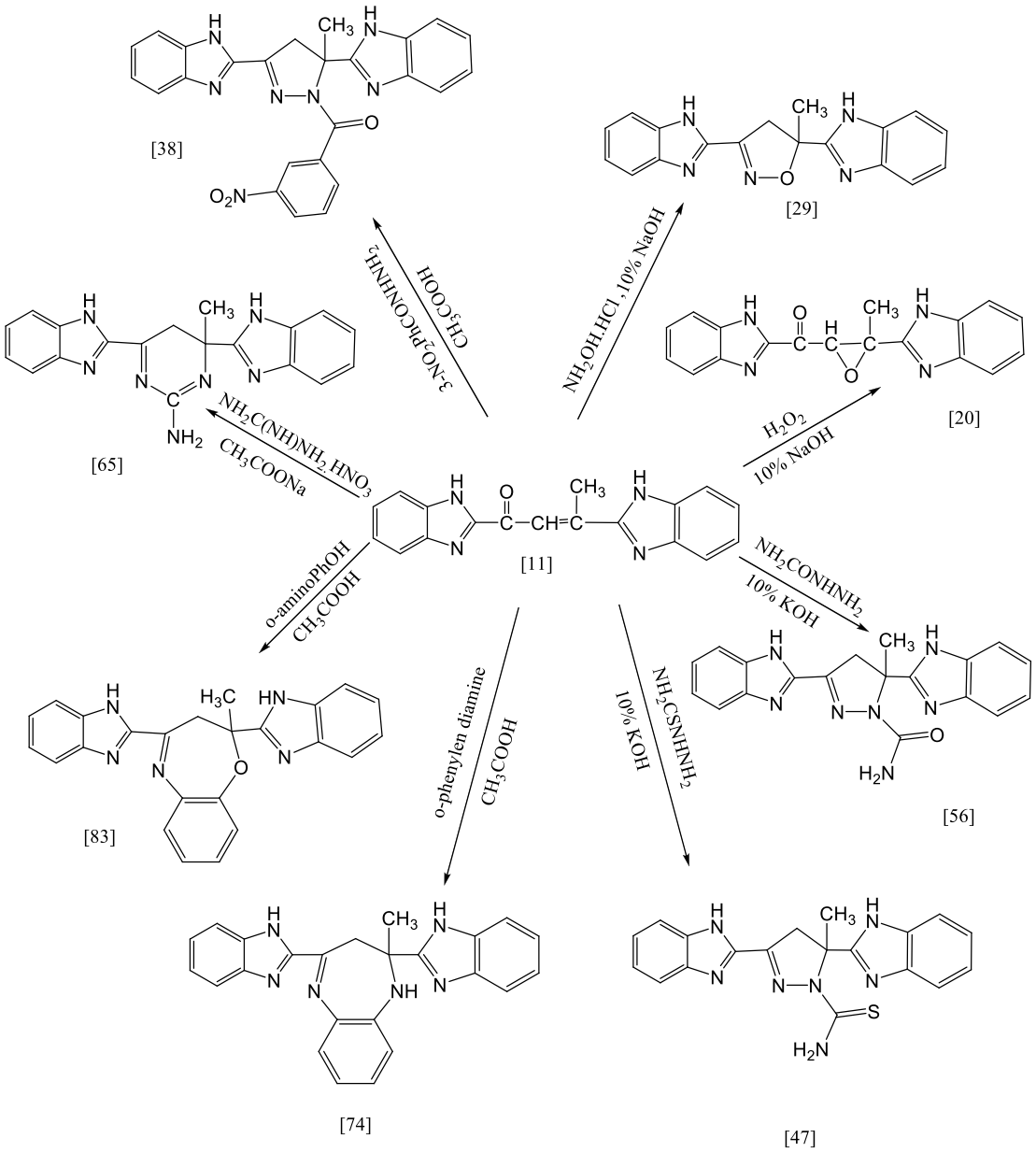
Scheme(8): The synthetic route of compound[1-11]



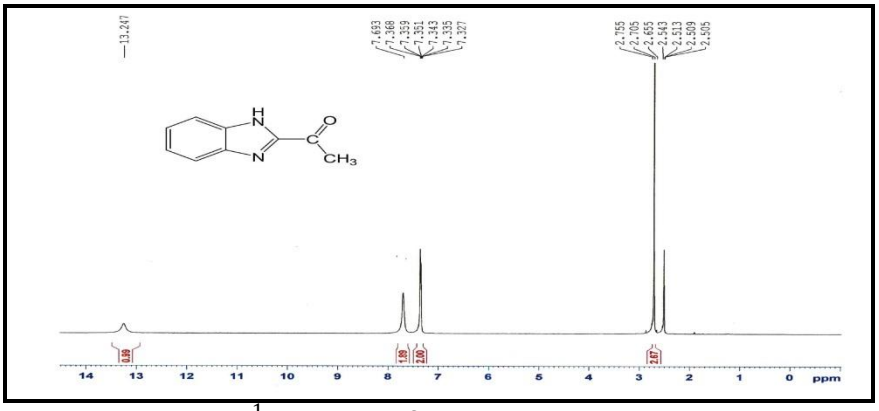
Ar = Ph , 4-(N,N(CH_3)$_2$) Ph , 4- OCH_3 , 3,4-(OCH_3) Ph

2,6- $(Cl)_2$ Ph , 4- Cl Ph , 3- NO_2 Ph , 3- Pyridyl

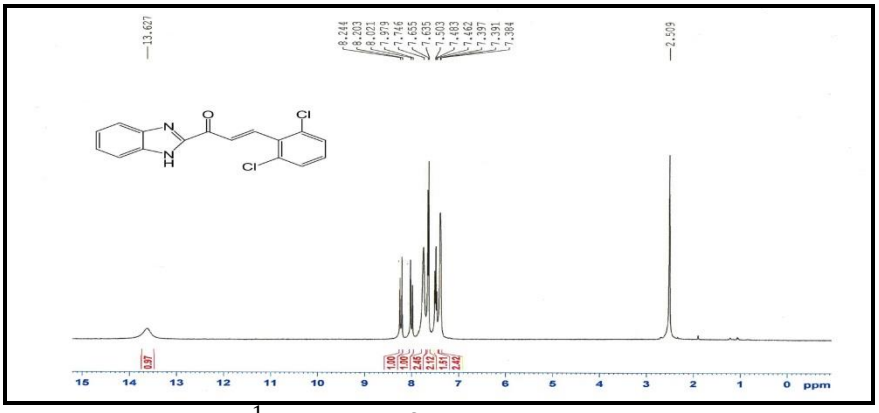
Scheme(9): The reaction route of chalcones [1-8]



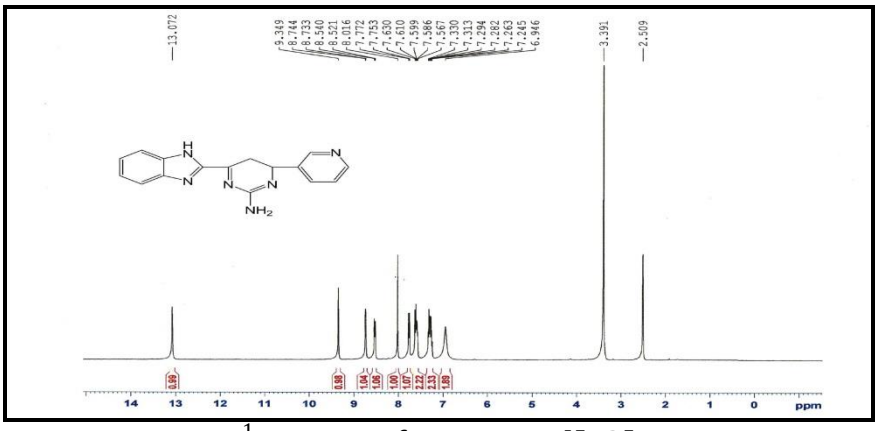
Scheme(10): The reaction route of chalcone [9]



^{1}HNMR of compound[2]



^{1}HNMR of compound[7]



^{1}HNMR of compound[73]

REFERNCES

1. HP Avila; EF Smania; FD Monache; AJr Smania., Bioorg. Med. Chem16, 9790. (2008).
2. J H Cheng; C F Hung; S C Yang; J P Wang; S J Won; C N Lin., Bioorg. Med.Chem., 16,7270,(2008).
3. S Murakami; M Muramatsu; H Aihara; S Otomo. Biochem. Pharmacol, 42, 1447-1451. (1991).

4. GS Viana; MA Bandeira; FJ Matos. Phytomedicine., 10, 189-195, (2003).
5. JH Wu; XH Wang; YH Yi; K H Lee. Bioorg. Med. Chem. Lett., 13,1813-1815,(2003).
6. M Liu; P Go; MLWilairat. J. Med. Chem, 44, 4443-4452.(2001).
7. Lopez, S. N.; Castelli, M. V.; Zacchino, S. A.; Dominguez, J. N. Lobo, G.; Jaime, C. C, Cortes, J. C. G.; Ribas, J. C.; Devia, C. Ana, M. R.; Ricardo, D. E. Bioorg. Med. Chem. 2001, 9, (1999).
8. HJ Zhang; Y Qian; DD Zhu; X G Yang; HL Zhu. European Journal of Medicinal Chemistry, 46 4702-4708, (2011).
9. Balkrishna Tiwari, A S Pratapwar, A R Tapas, S R Butle, and BS Vatkar, Int.J. ChemTech Res.2010, 2(1).
10. Thanh-Dao Tran, Th Nhu Nguyen, Tuong-Ha Do, Khac-Minh Thai, and Cat-Dong Tran, International Electronic Conference on Synthetic Organic Chemistry,1-30, (2011).
11. S Zangade, S Mokle, A Vibhute, Y Vibhute, Chemical Sciences Journal, Volume, CSJ-13, (٢٠١١).
12. Gayathri.B, S.M.Hipparagi, Ramjith.U.S, Cyril Mathews Jacob, Ramjith U.S. et al. IJRPS, 2(3), 146-158, (2012).
13. P.Kishore Kumar & P. K. Dubey, Der Pharma Chemica, 4 (3):1292-1295, (2012).
14. I. Sudeer Babu and S. Selvakumar, International Journal of Biological & Pharmaceutical Research, 3(2): 275-284,(2012).
15. Anjani. S, Kishor. K, Ana. C, Marina.S, Irini.D and Athina Geronikaki, European Journal of Medicinal Chemistry, 45, 510–518, (2010)
16. Seema I. Habib and Praffullkumar A. Kulkarni, Der Pharmacia Lettre, 5 (2):101-104,(2013).
17. Cromwell N. H., Bamlurg R. E. and Bakly R. P., J. Am. Chem. Soc., 81, 4294,(1959).
18. Vijay kumar Tirlapur, Narasimha Gandhi, Raga Basawaraj and Rajendra Prasad Y. International Journal of ChemTech Research, Vol.2, No.3, pp 1434-1440,(2010).
19. Ch.Sridevi, K.Balaji, A.Naidu, S.Kavimani, D.Venkappayya, R.Suthakaran and Sudha parimala, International journal of pharm Tech Research,Vol.1,No.3,pp816-821,(2009).
20. Singh Vinayaditya, Argal Ameeta, Mishra Vikash, Raghuvanshi Ramsneh, Agnihotri Savita, Singh Vinayaditya et al. IJRPS,1(3), 125-146,(٢٠١١) .
21. J Venkatesan, Pandeya, D Selvakumar, Indian J Pharm Sci, 69: p586-589. (2007).

22. Janardan Singh Yadav and Y.K. Srivastava, Rasayan J. Chem. Vol. 3,No.4,p 726-730 (2010).
23. N. Garg, T. Chandra, Archana, A. Jain, A. Kumar, European Journal of Medicinal Chemistry, 45, 1529–1535, (2010).
24. Ashish Kumar Tewari and Anil Mishra,Indian Journal of chemistry,Vol, 45B, pp.489-493, (2006).
25. Adel Kamal Khider, British Journal of Pharmacology and Toxicology 2(2): 92-96, (2011).
26. Farouq E. Hawaiz, Lana H. Chawishli, Diler D. Ghafur, MSc. Thesis Chemistry Department, College of Science Education, University of Salahaddin, (2009).
27. Parikh.V.M, ″Absorption Spectroscopy of Organic Molecules″, P: 535-540,(1985).
28. Rajeev Bhimwal, Anil K Sharma, Ankit Jain, Journal of Advanced Pharmacy Education & Research1(5) 251-258, (2011).
29. Ameen Ali Abu-Hashem and Ahmed S. Aly, Arch Pharm Res Vol 35, No 3, 437-445, (2012).
30. Ameen Ali Abu-Hashem and Ahmed S. Aly, Arch Pharm Res Vol 35, No 3, 437-445, (2012).
31. Anees A Siddiqui, Md. Azizur Rahman, Md. Shaharyar, Ravinesh Mishra. Chemical Sciences Journal, Volume: CSJ-8, (2010).
32. V. M. Barot & B.G. Rathod, Asian Journal of Biochemical and Pharmaceutical Research Issue: 4, Vol. 2, (2012).