Synthesis and Characterization of some bis 1,3-Oxazepine and 2,3-Dihydroquinozoline derivatives

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Abstract

In this study some new compounds have been synthesized including preparation of some different Schiff bases[1-6] from the reaction benzdine with substituted of benzal-dehyde in absolute ethanol and converted into derivatives of 1,3-oxazpines(by ring clo- sure reaction (2+5) of Schiff bases with maleic anhydride in dry benzene[7-12],also the 2,3 –dihyroquinozoline-4(1H) one[13-17] were prepared. The prepared compounds were characterized by color and melting point determination, FT-IR and UV-Vis spectral analysis . Some of the prepared compounds were identified by ^{1}H- NMR and C.H.N spectra analysis .

Key words: Schiff bases, 1,3-Oaxzepine ,2,3-dihydroquinozoline

Introduction:

Schiff bases are one of the most prevalent and important mixed donor systems in the field of coordination chemistry. The first preparation of imines was reported in the 19th century by Schiff (1864), which are prepared by condensing primary amines with an aldehyde or ketone under specific conditions [(1)]. Because of the relative easiness of preparation, flexibility and special properties of C=N group ,Schiff bases are considered as an excellent chelating agents. Schiff bases and its metal complexes have found to exhibit biological activities [(2-7)] ,and one of them is Oxazepine – dione ,which is seven membered ring containing nitrogen ,oxygen and two carbonyl group [(8)]. Oxazepine and their derivatives have some important biological ,pharmacological activities [(9)], Psychoactive drugs [(10)], enzyme inhibitors[(11)], analgesic [(12)] and antidepressant. Quinazolinones are among the most important classes of heterocyclic compounds, which possess versatile types of biological activities such as; anticancer [(13,14)], anti- tubercular [(15)], antibacterial[(16)], antifungal [(17)], anti-HIV activities.

Experimental :

- - Melting point were recorded with Stuart melting point apparatus and were uncorrected .
- -Ultra violet –visible (UV-Vis) spectra were recorded on shimadzu (UV-1800) PC spectrophotometer in chemistry department ,College of Education for Women University of Tikrit / Iraq .
- -Infar red spectra(FT-IR) were recorded on shimadzu (FT-IR-3800 spectropho- tometer in chemistry department ,College of Education for Women University of Tikrit / Iraq .
- -^{1} H-NMR spectra were recorded on a Bruker Ultra Shield -400MHz with tetra methyl silane as internal standard in $CDCI_3$ and DMSO $–d_6$ as a solvent .Jordin University of Science and Technology .
- -C.H.N. analysis were recorded on a Evrov victoria – 3000. Jordan
- University of Science and Technology .

Synthesis Methods :

1- Synthesis of Schiff bases[1-6][(18)]

A solution of (0.01mol,1.831g) of benzidine in (40ml) absolute ethanol was added to (0.02mol) substituted benzaldehyde in (20ml) absolute ethanol and tow drop of glacial acetic acid then the mixture was refluxed for (3hr.). The mixture was cooled to room temperature, filtered, dry and re-crystallized in absolute ethanol, physical properties are given in table(1) .

2- Synthesis of N,N$^/$ -(1,1- biphenyl]-4,4-diyl) bis-(2-(4-substituted-phenyl-2,3dihydro-1,3-Oxazepine - 4,7- dione [7-12] [(19)]

A mixture(0.01mol) of Schiff bases[1-6] with (0.02 mol, 1.9g)of maleic anhydride in (20ml) of dry benzene was refluxed for (7hr.) then the solvent evaporated and then

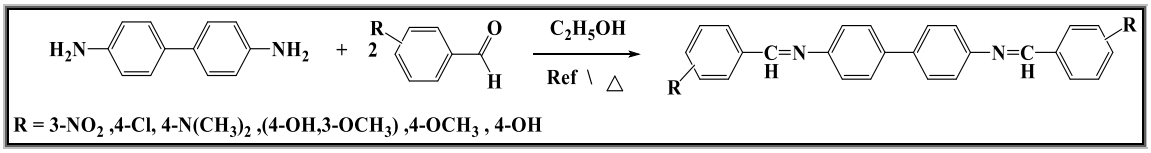
formed precipitate was re-crystallized from absolute ethanol, physical properties are given in table (2) .

3- Synthesis of 3,3$^{'}$-([1,1'-biphenyl]-4,4-diyl) bis-(2-(4- substituted-phenyl)-2,3 dihydroquinazoline -4(1H)-one [13-17][(20)]

A mixture (0.01mol) of Schiff bases [1-5]with (0.02mol,2.74g) of anthranilic acid in(30ml) ethanol the mixture was refluxed for (5hr.) then the solvent evaporated and then with 10% sodium bicarbonate, formed precipitate and re-crystallized from mixture (benzene – petroleum ether), physical properties are given in table (3) .

Results and Discussion:

The Schiff bases were prepare by the reaction of benzidine with substituted benza-aldyde in absolute ethanol.

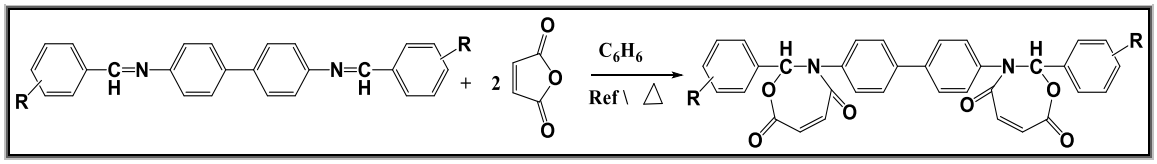


The prepared compound were characterized by FT-IR spectra, ^{1}H-NMR,UV-Vis. spectra, C.H.N analysis , and melting point [21] .

The FT-IR spectrum of Schiff bases showed the disappearance of band at(3317-3392) cm^{-1}due to amino group ,beside new bands which appear at(1603-1628)cm^{-1} due attributed to the azomethine (C=N) more than the appearance of band at(1429-1523) $cm^{-1}$and (1502-1581) cm^{-1} due to(C=C) aromatic and at (3400) cm^{-1} attributed to (OH) in addition (3000-3010) cm^{-1} attributed to(C-H)aromatic , UV-Vis. Spectrum are given in table (4) fig. (1)(2).

^{1}H-NMR spectrum for compound [5] showed single signal at(3.05) ppm due to methyl beside (8.49)ppm due to (N=C-H) proton of imine group besides the signal at (2.7) ppm due to proton of DMSO and signal at(6.83-7.8) ppm attributed to proton of aromatic fig. (7) .

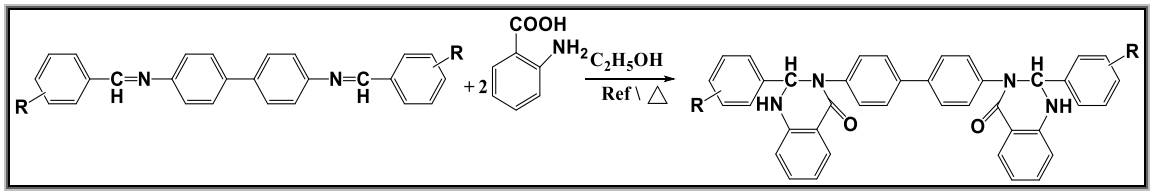
Oxazepine compounds [7-12] were prepared from the reaction of maleic anhydride with schiff bases [1-6] [22] .



The FT-IR spectrum of showed the bands at (1711-1724) cm^{-1} (1601-1655) cm^{-1} due to(C=O)for lactone and lactam compounds respectively besides other two bonds at(1496-1535)$cm^{-1}$and (1526-1587) cm^{-1}due to (C=C)ring aromatic and (1215-1288) cm^{-1} due to C-O-C and. UV-Vis. spectra are given in the table (5) fig. (3)(4) .

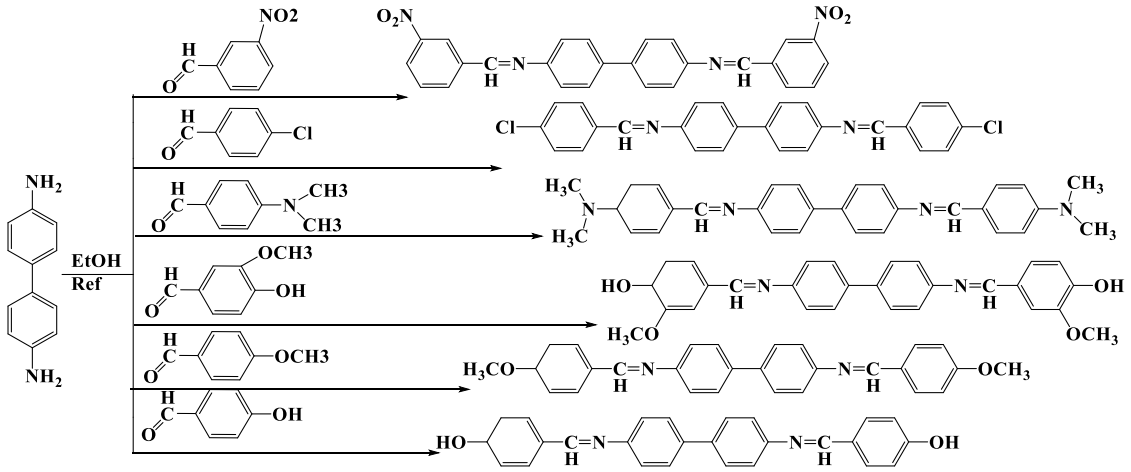
^{1}H-NMR spectrum for compound [10] showed signal at (6.3-6.6) ppm due to olivinc protons besides the signal at (2.7) ppm due to protons of DMSO and the multiple signal at (6.36-7.68) ppm due to aromatic protons more than the signal at(7.72) due to (HC-N) . Addition the signal at (3.39) ppm due to protons (OCH_3), it showed single signal at(10.73) ppm due of (OH) fig (8).

Dihydroquinozoline compound [13-17] were prepared from the reaction of anthra-nilic acid with Schiff bases [1-5] in ethanol [23]

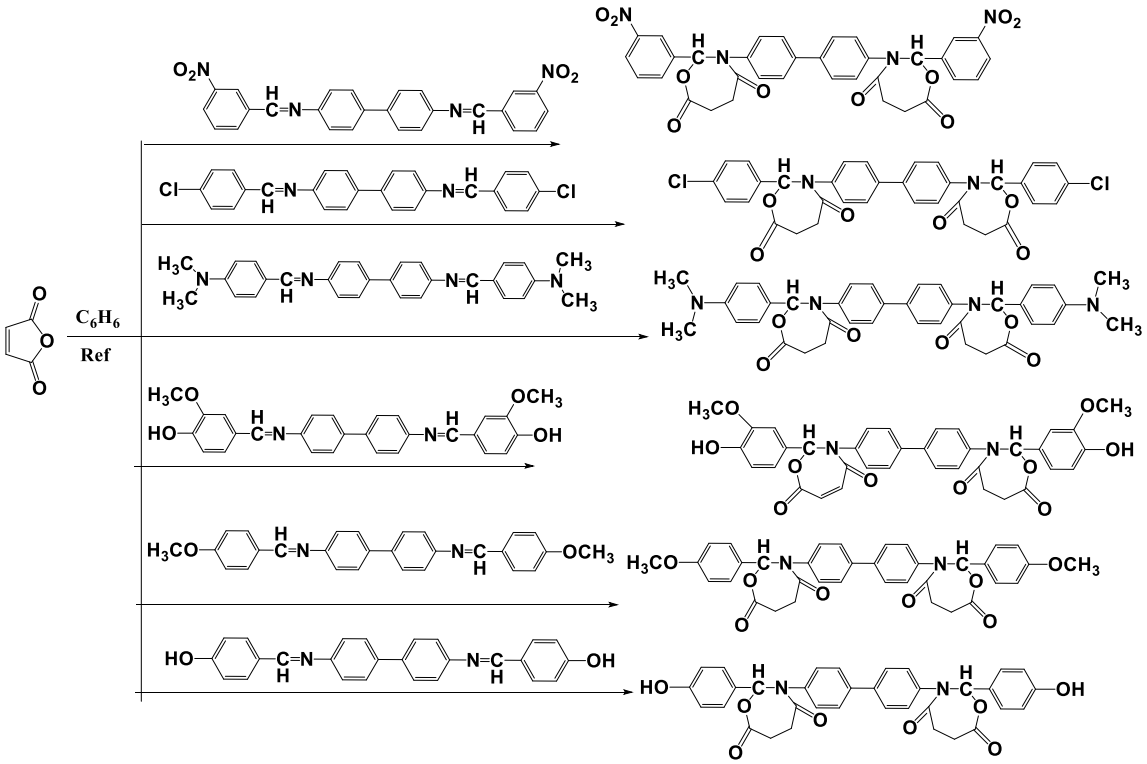


The FT-IR spectrum showed the bands at (1112-1190) cm^{-1} due to (C-N) and at (3308 -3379) cm^{-1}due to N-H and at (1658-1606) cm^{-1} due to (N-C=O) for imide com- pounds respectively besides other bands at (1496-1583) cm^{-1} and at (1440-1484) cm^{-1} due to (C=C) aromatic ring and (3001-3118)cm^{-1} for aromatic (C-H), UV-Vis. and FT-IR spectra are given in table (6) fig. (5)(6).

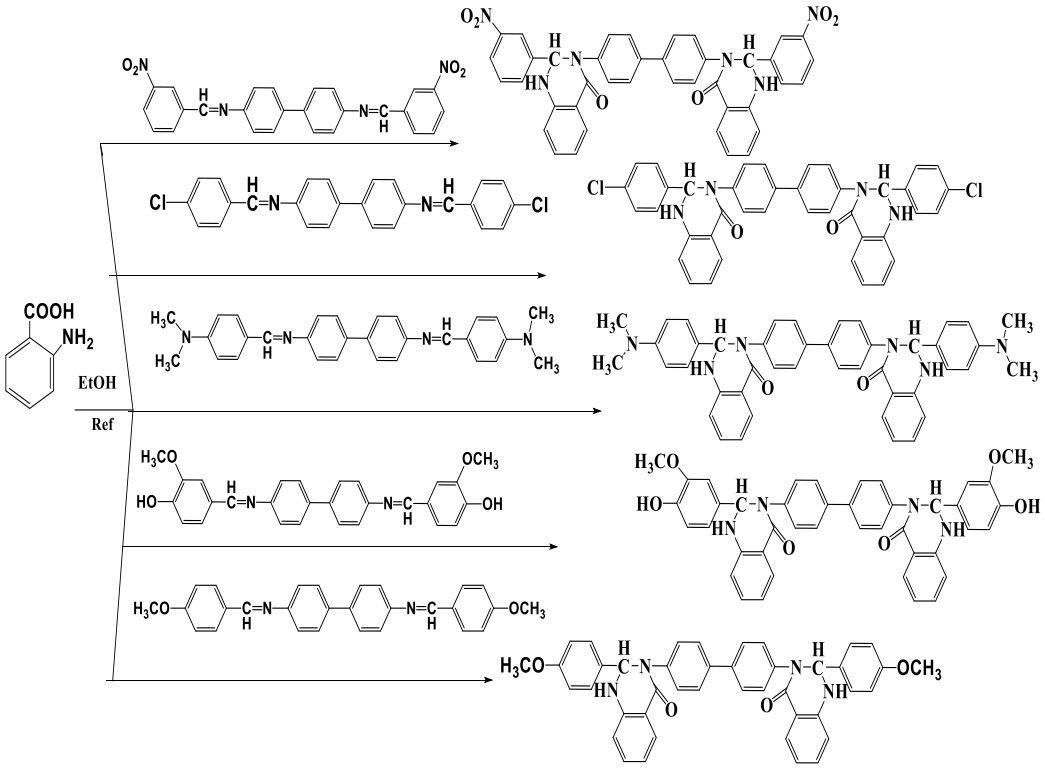
^{1}H-NMRspectrum for compound [17] showed single signal at(2.4)ppm due to proton of DMSO and signal at (5.32) ppm due to proton of(N-CH) and signal at (6.64) due to (N-H) secondary amine more than signal at (6.43-7.67) ppm to aromatic protons addition signal at(3.34)ppm due to protons(OCH_3), and showed single signal at(6.31) ppm due of(N-H) fig. (9).



Scheme(1): Represents Schiff bases compound [1-6]

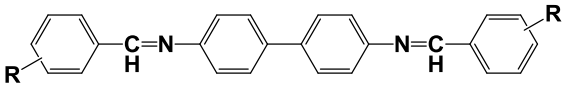


Scheme (2) Represents oxazepine compounds [7-12]



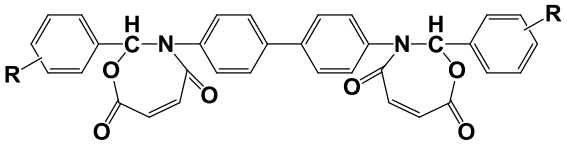
Scheme (3) Represents dihydroquinozoline compounds [13-17]

Table (1) Physical properties of Schiff bases [1-6]



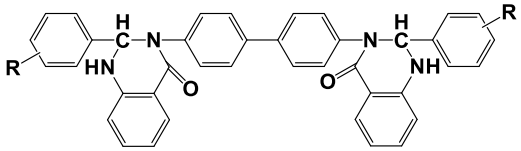
Comp. No.	R	Molecular Formula M.Wt	Colour	Yelid %	M.P ^{0}C
1	3-NO_2	$C_{28}H_{17}N_4O_4$ 450	Orange	64	239-241
2	4-Cl	$C_{28}H_{17}N_2Cl_2$ 457	Yellow	63	261-263
3	4-$N(CH_3)_2$	$C_{30}H_{30}N_4$ 446	Yellow	70	280-282
4	4- OH , 3-OCH_3	$C_{28}H_{24}N_2O_4$ 450	Orange	71	253-255
5	4-OCH_3	$C_{26}H_{25}N_2O_2$ 392	Yellow	83	264-266
6	4-OH	$C_{28}H_{20}N_2O_2$ 453	Yellow	82	266,dce

Table (2) Physical properties oxazepines compounds [7-12]



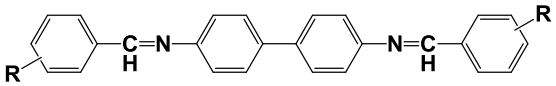
Comp. No.	R	Molecular Formula M.Wt	Colour	Yelid %	M.P ^{0}C
7	3-NO_2	$C_{34}H_{18}N_4O_{10}$ 594	Yellow	64	223-225
8	4-Cl	$C_{34}H_{29}N_2O_6Cl_2$ 649	Yellow	64	225-227
9	4-$N(CH_3)_2$	$C_{38}H_{30}N_4O_6$ 638	Dark Yellow	56	170-172
10	4- OH 3-OCH_3	$C_{36}H_{23}N_2O_{10}$ 634	Dark Orange	71	210 dce
11	4-OCH_3	$C_{36}H_{26}N_2O_8$ 642	Orange	54	210-212
12	4-OH	$C_{34}H_{20}N_2O_8$ 584	Red	58	198-200

Table (3) Physical properties dihydroquinozoline compounds[13 – 17]



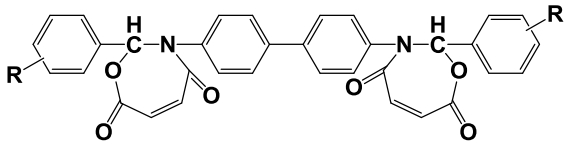
Comp. No.	R	Molecular Formula M.Wt	Colour	Yelid %	M.P ^{0}C
13	3-NO_2	$C_{40}H_{28}N_6O_6$ 688	Dark Orange	65	235-237
14	4-Cl	$C_{40}H_{28}N_6Cl_2$ 608	Brown	70	279-281
15	4-$N(CH_3)_2$	$C_{43}H_{37}N_6O_2$ 669	Brown	85	234-236
16	4- OH3-OCH_3	$C_{42}H_{32}N_4O_6$ 688	Yellow	68	253-255
17	4-OCH_3	$C_{42}H_{31}N_4O_4$ 655	Yellow	68	255-257

Table (4) FT-IR & UV-Vis spectrum data of Schiff bases[1-6]



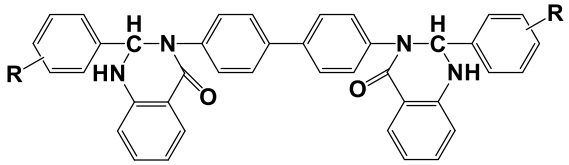
Comp. No.	R	max$_1$λ Max$_2$λ THF	IR (KBr) cm^{-1}				
			=CHν Ar.	C=Nν	C=Cν Ar.	1,4-di Sub.	Others
1	3-NO_2	359.5 261	3101	1628	1520 1423	816	**NO_2asy.syν 1520,1355**
2	4-Cl	352 279	3000	1618	1579 1484	833	**Cl, asy.syν 1088**
3	4-$N(CH_3)_2$	378 237	3008	1610	1581 1523	839	**CH_3,asy.syν 2910,2850 δCH_3 asy.sy 1433,1361**
4	4-OH 3-OCH_3	355 268	3099	1605	1510 1449	829	**OH,3400ν CH_3asy.sy.ν 2910,2856 δCH_3asy.sy 1429,1383**
5	4-OCH_3	394 220	3050	1603	1570 1506	839	**CH_3 asy.syν 2912,2838 CH_3 asy.sy δ 1410,1304**
6	4-OH	347 289	3109	1603	1502 1429	823	**OH,3352ν**

Table (5) FT-IR & UV-Vis spectra data for oxazepines [7-12]



Comp. No.	R	max$_1$λ Max$_2$λ THF	IR (KBr) cm^{-1}				
			V=CH Ar.	VC=O Lacton lactam	VC=C Ar.	1,4-di sub	others
7	3-NO_2	300 252	3049	1712 1628	1575 1525	827	**NO_2asy.syv 1394,VC-O-C 1257**
8	4-Cl	319 228	3047	1722 1628	1533 1496	823	**VC-O-C, 1247 VC-Cl,1005**
9	4-N(CH_3)$_2$	350 229	3105	1711 1655	1568 1506	820	**CH_3asy.sy.v 2929,2880 δCH_3 asy.sy. 1535,1398 C-O-C,1228δ**
10	3-OCH_3 4-OH	286 247	3118	1718 1608	1581 1520	844	**OH,3296v vCH_3asy.sy. 2998,2850 C-O-C,1215v**
11	4-OCH_3	287 222	3118	1718 1608	1568 1506	847	**CH_3asy.sy.v 2920,2884 δCH_3asy.sy. 1505,1398 C-O-C,1250v**
12	4-OH	285 220	3109	1724 1601	1576 1504	845	**OH,3306v C-O-C,1245v**

Table (6) FT-IR and UV-Vis spectra data for Dihydroquinozoline[13-17]



Comp. No.	R	max$_1$λ Max$_2$λ THF	IR (KBr) cm^{-1}					
			=CHv Ar.	NC=Ov imide	C=Cv Ar.	N-Hv	1,4-di Sub.	Others
13	3-NO_2	295 261	3097	1628	1520 1483	3408	868	**NO_2asy.sy.v 1520,1345**
14	4-Cl	352 279	3087	1658	1520 1484	3335	819	**C-Cl,1090v**
15	4-**N(CH_3)$_2$**	373 237	3186	1610	1551 1496	3379	818	**CH_3asy.syv 2922,2856 CH_3asy.sy.δ 1467,1367**
16	4-OCH_3	355 268	3033	1606	1506 1404	3303	837	**CH_3asy.sy.v 2954,2820 δCH_3asy.sy. 1404,1304**
17	4-OH	349 220	3001	1618	1469 1440	3217	821	**OH,3352v CH_3asy.syv 2969,2850 δ CH_3asy.sy. 1441,1330**

Results of a careful analysis of the elements [5,7,13] Table (7) C.H.N.

Comp. No.	Molecular Formula	Found			Calculated		
		C%	H%	N%	C%	H%	N%
5	$C_{28}H_{24}N_2O_2$	78.93	7.7	6.71	79.98	7.75	6.66
7	$C_{34}H_{26}N_4O_{10}$	62.72	4.08	8.66	62.77	4.03	8.61
13	$C_{40}H_{28}N_6O_6$	69.74	4.05	12.23	69.76	4.10	12.20

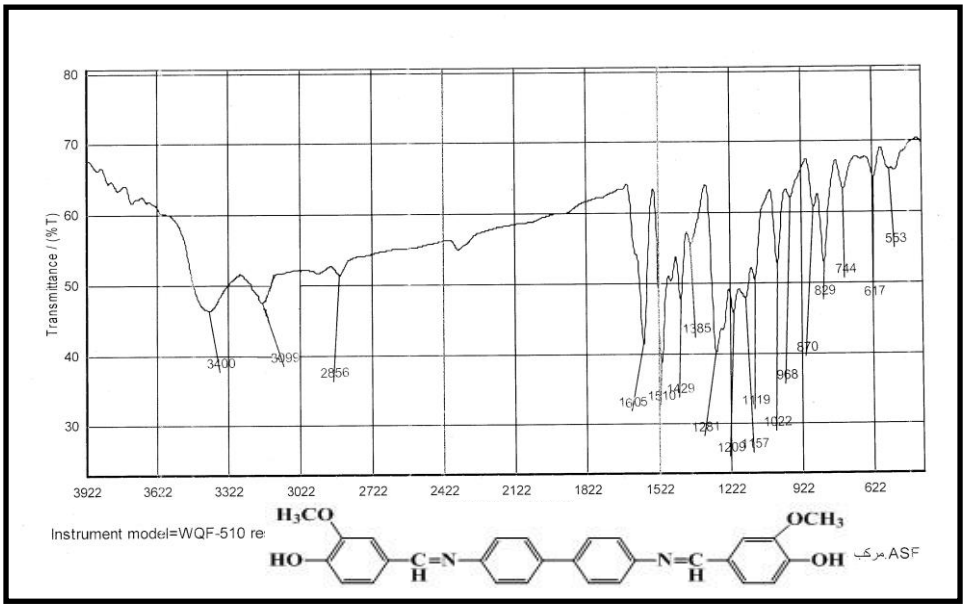


Fig (1) FT-IR: spectrum of compound[4]

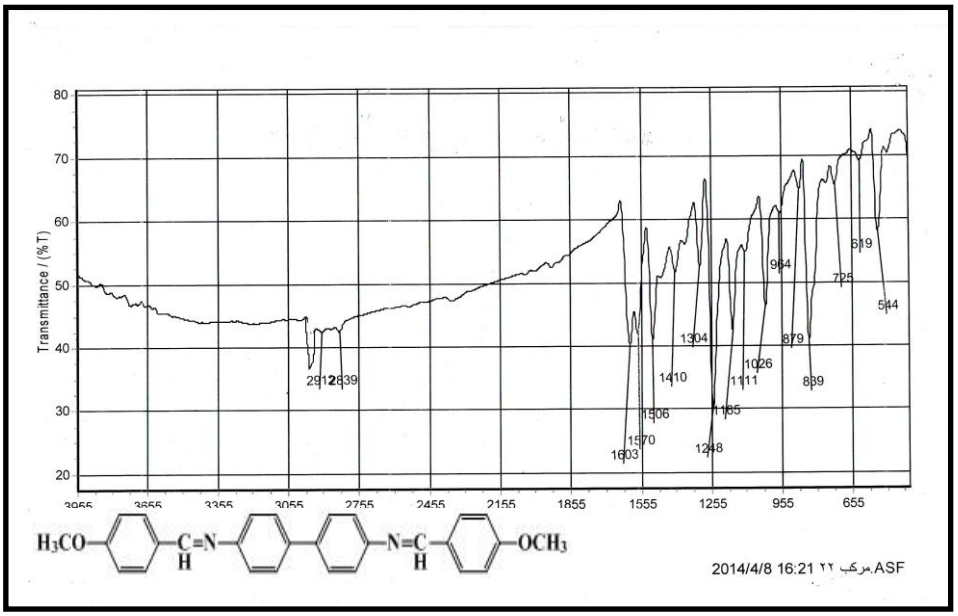


Fig (2) FT-IR: spectrum of compound[5]

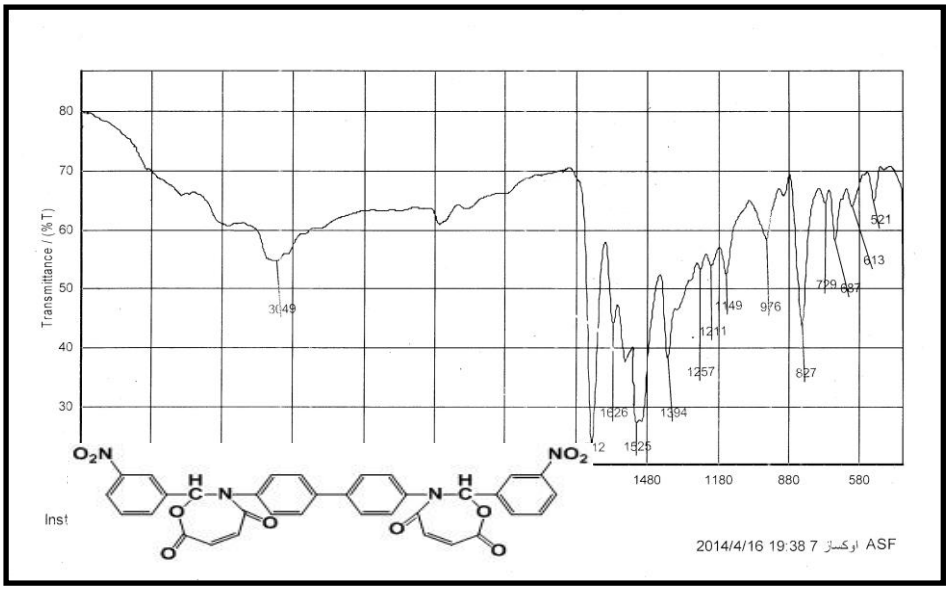


Fig (3) FT-IR: spectrum of compound[7]

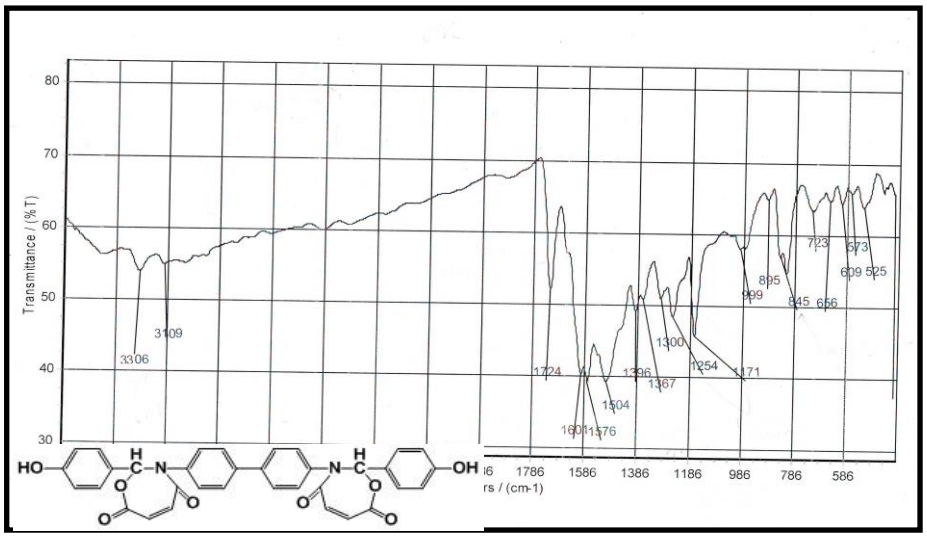


Fig (4) FT-IR spectrum of compounds [12]

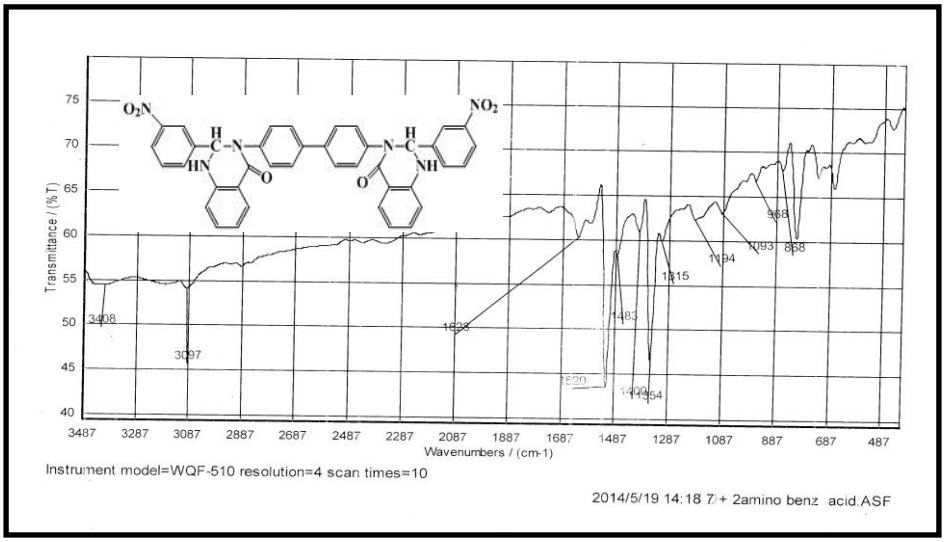


Fig (5) FT-IR spectrum of compounds [13]

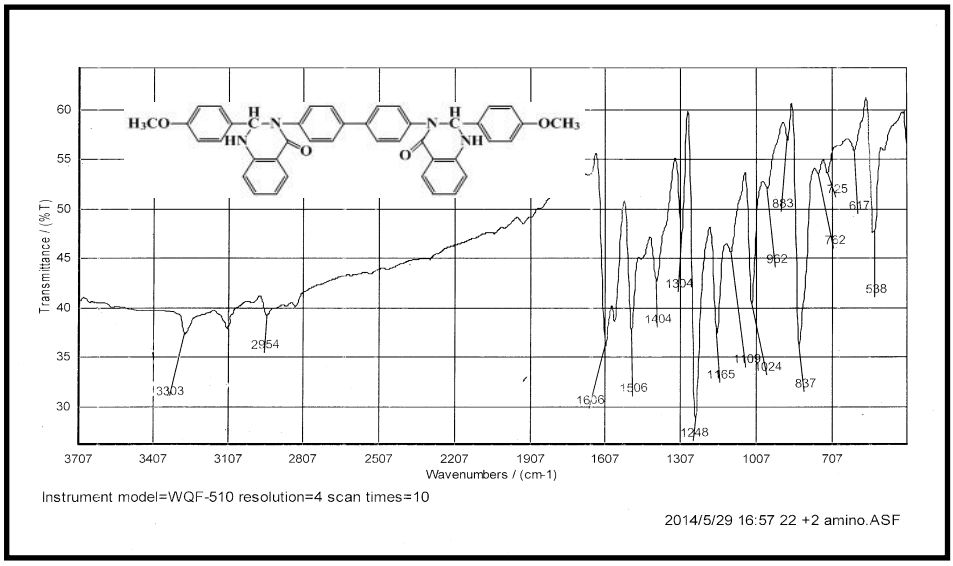


Fig (6) FT-IR spectrum of compounds [16]

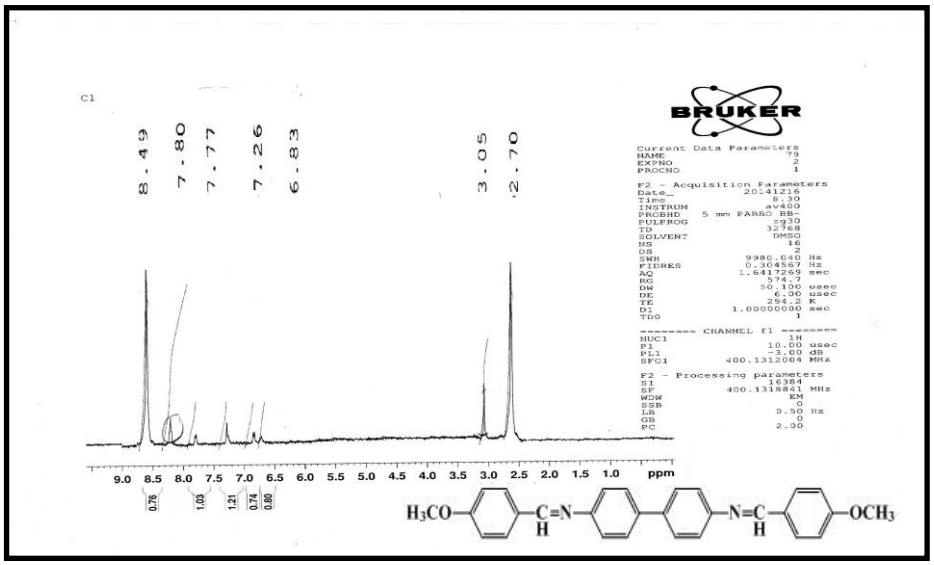


Fig (7) ^{1}H-NMR spectrum of compounds [5]

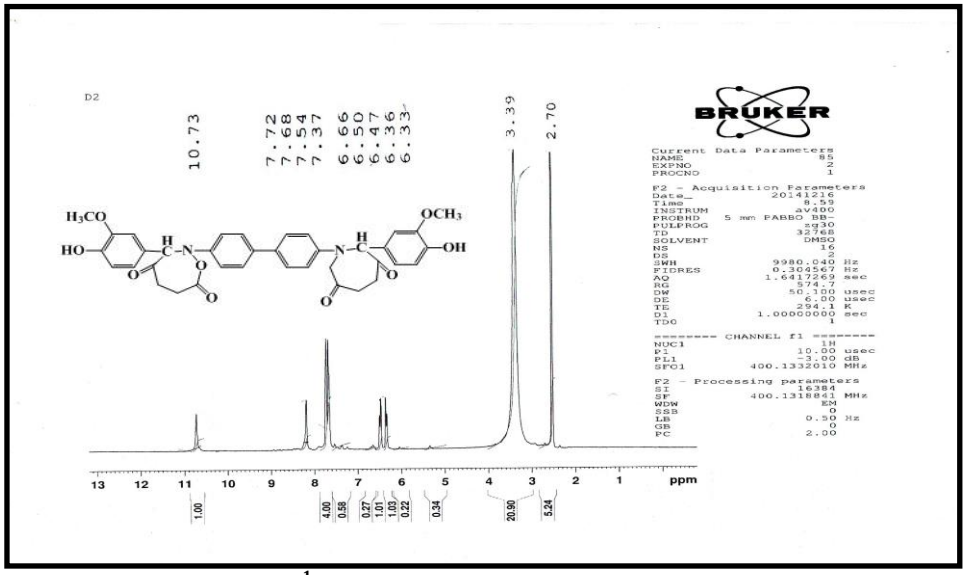


Fig (8) ^{1}H-NMIR spectrum of compounds [10]

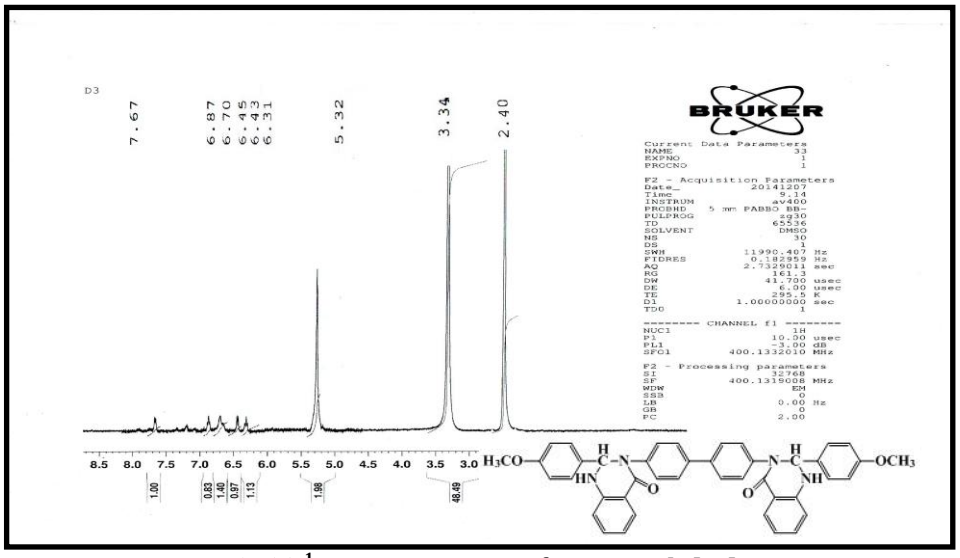


Fig (9) ^{1}H-NMR spectrum of compounds [17]

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تحضير وتشخيص بعض مشتقات بس 3,1- اوكسازبين و3,2- ثنائي هايدروكوينازولين

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الملخص :

تم في هذا البحث تحضير بعض المركبات والمتضمنة قواعد شيف [1-6] من تفاعل البنزدين مع معوضات مختلفة للبنزالديهايد بالايثانول المطلق ثم تحويلها الى مشتقات 3,1- اوكسازبين (من تفاعلات غلق الحلقة 2+5) لقواعد شيف مع انهدريد الماليك بالبنزين الجاف[7-12] ، بجانب 3,2- ثنائي هايدروكوينازولين [13-17]. وشخصت المركبات المحضرة من خلال الطرق الفيزيائية مثل اللون ودرجات الانصهار، وكذلك اطياف الاشعة فوق البنفسجية والاشعة تحت الحمراء. وشخصت بعض المركبات المحضرة من خلال اطياف الرنين النووي المغناطيسي للبروتون و التحليل الدقيق للعناصر.

مفتاح الكلمات : قواعد شيف و 3,1- اوكسازبين و 2,3- ثنائي هايدروكوينازولين